GENERAL INFORMATION SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.

This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.

Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

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SPECIFICATIONS	SPC
PRECAUTION	PC
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IDENTIFICATION	ID
RECOMMENDED MATERIALS	RM
PRE-DELIVERY INSPECTION	PI
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All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD.

G8050BE

ENGINE SECTION

FUEL INJECTION (FUEL SYSTEMS)	FU
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SUSPENSION SECTION

FRONT SUSPENSION FS
REAR SUSPENSION RS
WHEEL AND TIRE SYSTEMS WT

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DRIVELINE/AXLE SECTION

DIFFERENTIALS	DI
TRANSFER CASE	TC
DRIVE SHAFT SYSTEM	DS

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BRAKE SECTION

ABS	ABS
BRAKE	BR
PARKING BRAKE	PB
ABS (DIAGNOSTICS)	ABS

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TRANSMISSION/TRANSAXLE SECTION

CONTROL SYSTEMS	CS
AUTOMATIC TRANSMISSION	AT
MANUAL TRANSMISSION AND DIFFERENTIAL	MT
CLUTCH SYSTEM	CL
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	AT

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G8050BE

STEERING SECTION

POWER ASSISTED SYSTEM (POWER STEERING) PS

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HVAC SECTION

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HVAC SYSTEM
(HEATER, VENTILATOR AND A/C) AC

RESTRAINTS SECTION

AIRBAG SYSTEM	AB
SEAT BELT SYSTEM	SB
AIRBAG SYSTEM (DIAGNOSTICS)	AB

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G8050BE

BODY, CAB AND ACCESSORIES SECTION

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LIGHTING SYSTEM	LI
WIPER AND WASHER SYSTEMS	WW
ENTERTAINMENT	ET
COMMUNICATION SYSTEM	COM
GLASS/WINDOWS/MIRRORS	GW
BODY STRUCTURE	BS
INSTRUMENTATION/DRIVER INFO	IDI
SEATS	SE
SECURITY AND LOCKS	SL
SUNROOF/T-TOP/ COVERTIBLE TOP (SUNROOF)	SR
EXTERIOR/INTERIOR TRIM	EI
EXTERIOR BODY PANELS	EB
CRUISE CONTROL SYSTEM	CC
CRUISE CONTROL SYSTEM (DIAGNOSTICS)	CC

FUJI HEAVY INDUSTRIES LTD.

G8050BE

WIRING SYSTEM SECTION

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Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

WIRING SYSTEM WI

FUJI HEAVY INDUSTRIES LTD.

FOREWORD

FW

Page

1. Foreword 2

1. Foreword *SA01674*

A: FOREWORD *SA01674G21*

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

Applied model: SF***** from 2002MY.

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.

HOW TO USE THIS MANUALS

HU

Page

1. How to Use This Manuals 2

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. WARNING, CAUTION, NOTE SA02675F6910

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

SPECIFICATIONS

SPC

Page

1. Forester 2

1. Forester SA08758

A: DIMENSIONS SA08758G28

Model				2.5 L	
				AWD	
				5MT	4AT
Overall length			mm (in)	4,460 (175.6)	
Overall width			mm (in)	1,735 (68.3)	
Overall height			mm (in)	1,595 (62.8)	
Compart-ment	Leg room	Front Max.	mm (in)	1,092 (43.0)	
		Rear Min.	mm (in)	848 (33.4)	
	Head room	Front	mm (in)	1,013 (39.9), 1,005 (39.6)*	
		Rear	mm (in)	991(39.0), 945 (37.2)*	
	Shoulder room	Front	mm (in)	1,360 (53.5)	
		Rear	mm (in)	1,362 (53.6)	
Wheelbase			mm (in)	2,525 (99.4)	
Tread		Front	mm (in)	1,475 (58.1)	
		Rear	mm (in)	1,465 (57.7)	
Minimum road clearance		M.L.V.W.	mm (in)	150 (5.91)	
		C.W.	mm (in)	190 (7.5)	

*: With sunroof

B: ENGINE SA08758G29

Model		2.5 L
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 (150)
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)/4,000

C: ELECTRICAL SA08758G30

Model			2.5 L
Ignition timing at idling speed		BTDC/rpm	10°±8°/650 (MT), 15°±8°/700 (AT)
Spark plug	Type and manufacturer		CHAMPION: RC10YC4 (Standard) NGK: BKR6E-11, BKR5E-11
Generator			12 V — 75 A
Battery	Reserve capacity	min	99 (MT), 118 (AT)
	Cold cranking amperes	amp.	356 (MT), 520 (AT)

D: TRANSMISSION *SA08758G31*

Model			2.5 L	
			AWD	
Transmission type			5MT	4AT
Clutch type			DSPD	TCC
Gear ratio		1st	3.454	3.027
		2nd	2.062	1.619
		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	4.111	4.444
Reduction gear (Rear drive)	Transfer reduction	Type of gear	Helical	—
		Gear ratio	1.000	—
	Final reduction	Type of gear	Hypoid	Hypoid
		Gear ratio	4.111	4.444

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

E: STEERING *SA08758G32*

Type	Rack and Pinion
Turns, lock to lock	3.4
Minimum turning circle m (ft)	Curb to curb: 10.8 (35.4), Wall to wall: 11.6 (38.1)

F: SUSPENSION *SA08758G33*

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

G: BRAKE *SA08758G34*

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

H: TIRE *SA08758G35*

Model	15 inch wheel	16 inch wheel
Size	P205/70R15 95S	P215/60R16 94H
Type	Steel belted radial, Tubeless	

I: CAPACITY SA08758G36

Model			2.5 L	
			AWD	
			5MT	4AT
Fuel tank		ℓ (US gal, Imp gal)	60 (15.9, 13.2)	
Engine oil	Upper level	ℓ (US qt, Imp qt)	4.0 (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, 0.6)	
Power steering fluid		ℓ (US qt, Imp qt)	0.7 (0.7, 0.6)	
Engine coolant		ℓ (US qt, Imp qt)	6.0 (6.3, 5.3)	

J: WEIGHT SA08758G37

1. U.S. SPEC. VEHICLE SA08758G3701

Model			2.5 L			
			AWD			
			L		S	
			MT	AT	MT	AT
Curb weight (CW)	Front	kg (lb)	773 (1,705)	798 (1,760)	776 (1,710)	800 (1,765)
	Rear	kg (lb)	651 (1,435)	649 (1,430)	649 (1,430)	649 (1,430)
	Total	kg (lb)	1,424 (3,140)	1,447 (3,190)	1,424 (3,140)	1,449 (3,195)
Gross vehicle weight (G.V.W.)	Front	kg (lb)	907 (2,000)		914 (2,015)	
	Rear	kg (lb)	971 (2,140)		989 (2,180)	
	Total	kg (lb)	1,868 (4,120)		1,893 (4,175)	

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

Weight of optional parts		Cruise control	Side airbag	Sunroof
Font	kg (lb)	1.6 (3.5)	2.0 (4.4)	7.0 (15.4)
Rear	kg (lb)	0.0 (0)	2.0 (4.4)	16.0 (35.3)
Total	kg (lb)	1.6 (3.5)	4.0 (8.8)	23.0 (50.7)

2. CANADA SPEC. VEHICLE *SA08758G3702*

Model			2.5 L			
			AWD			
			L		S	
			MT	AT	MT	AT
Curb weight (C.W.)	Front	kg (lb)	760 (1,676)	785 (1,731)	775 (1,709)	800 (1,764)
	Rear	kg (lb)	650 (1,433)	650 (1,433)	650 (1,433)	650 (1,433)
	Total	kg (lb)	1,410 (3,109)	1,435 (3,164)	1,425 (3,142)	1,450 (3,197)
Gross vehicle weight (G.V.W.)	Front	kg (lb)	905 (1,996)		915 (2,018)	
	Rear	kg (lb)	975 (2,150)		990 (2,183)	
	Total	kg (lb)	1,870 (4,123)		1,895 (4,178)	

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

Weight of optional parts		Side airbag	Air conditioner	Sunroof
Font	kg (lb)	2.0 (4.4)	17.0 (37.5)	7.0 (15.4)
Rear	kg (lb)	2.0 (4.4)	−3.0 (−6.6)	16.0 (35.3)
Total	kg (lb)	4.0 (8.8)	14.0 (30.9)	23.0 (50.7)

MEMO:

PRECAUTION

PC

Page

1. Precaution 2

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 Subaru of America, INC. or your importer instructions for airbag module disposal. Follow all government regulations concerning disposal of refuse.

7. AIRBAG MODULE SA04677F5907

Adhere to the following when handing 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.

NOTE

NT

Page

1. Note 2

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

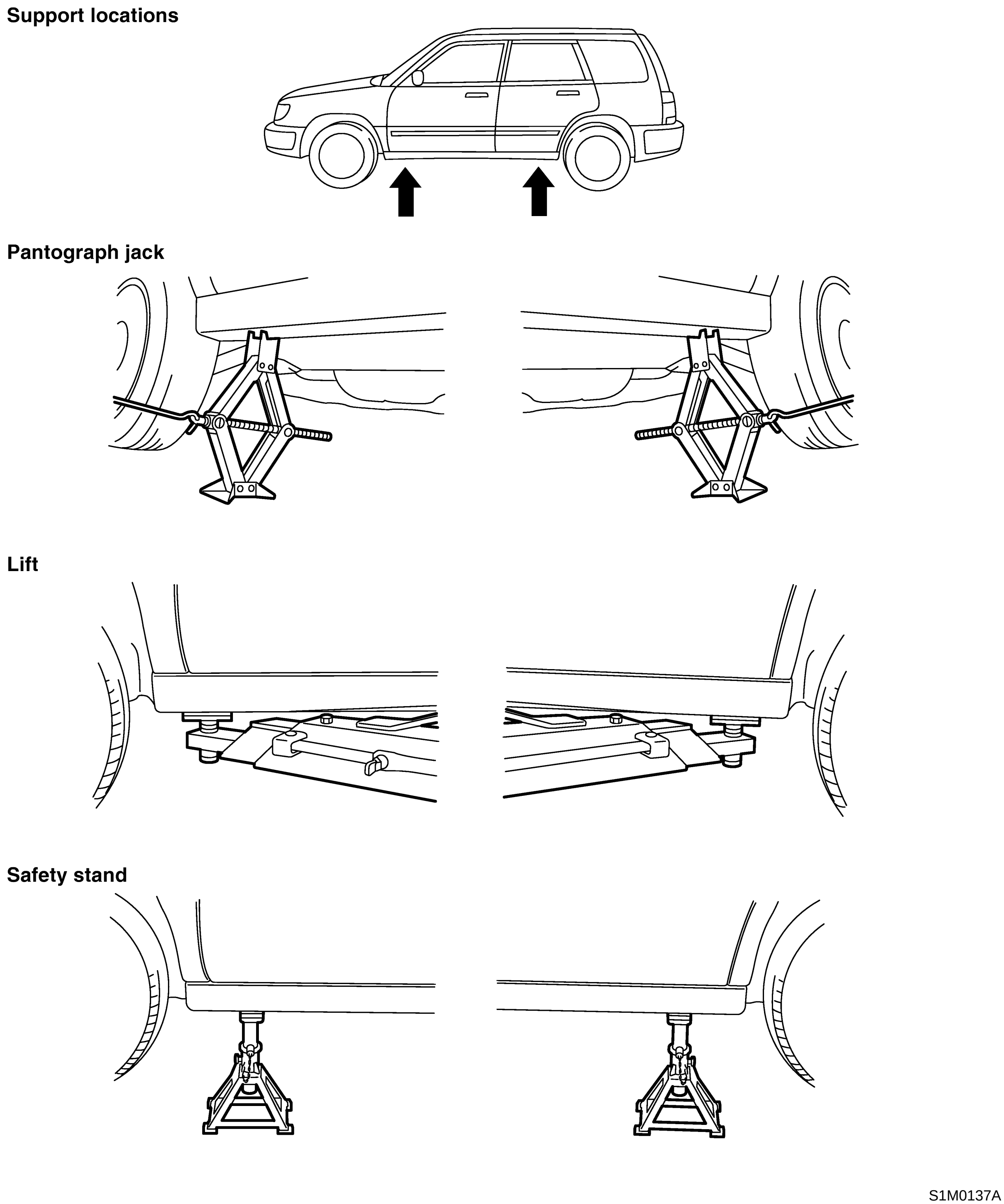
When removing the battery cables, always be sure to turn the ignition off to prevent electrical damage to the ECM from rush current.

4. SERVICE PARTS SA03676A1504

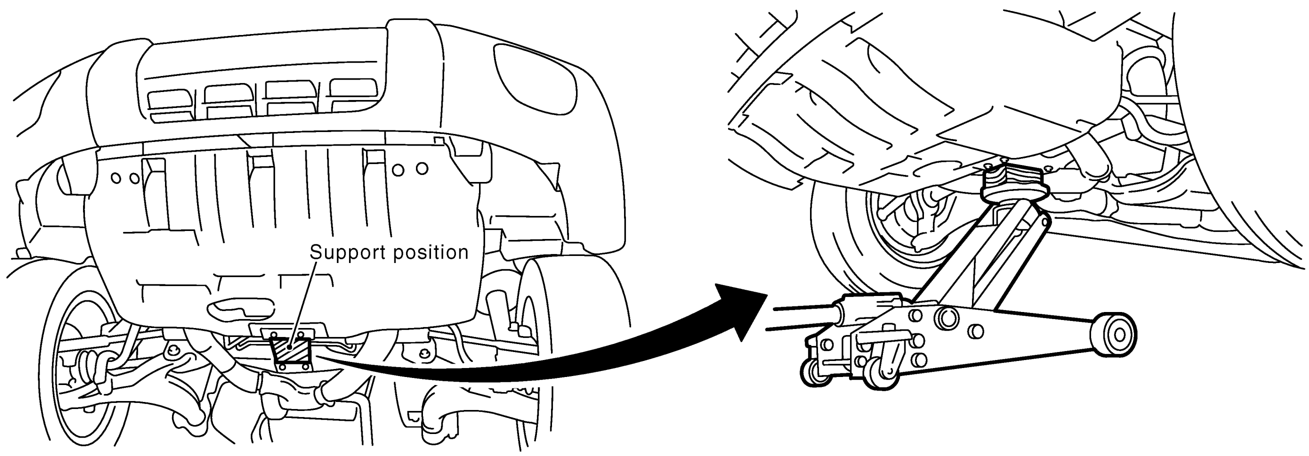
Use authentic service parts for maximum performance and maintenance, when conducting repairs. Subaru/FHI will not be responsible for poor performance resulting from the use of parts not specified by a genuine dealer.

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.



Front



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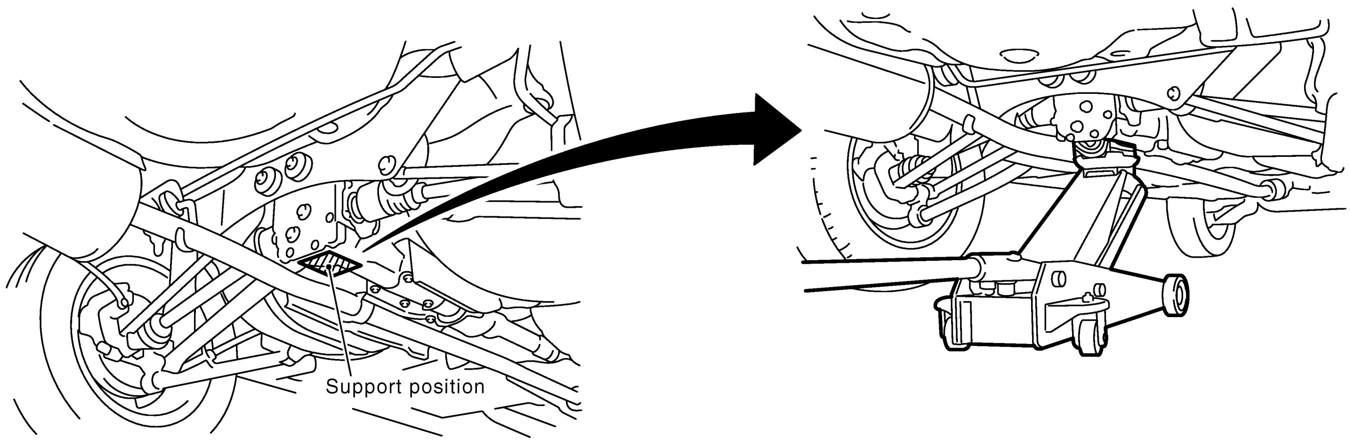
Rear



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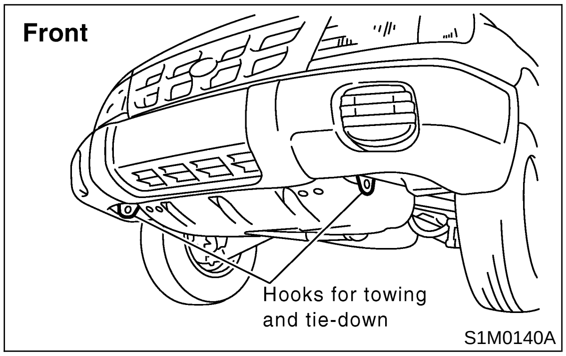
6. TIE DOWNS *SA03676A1506*

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



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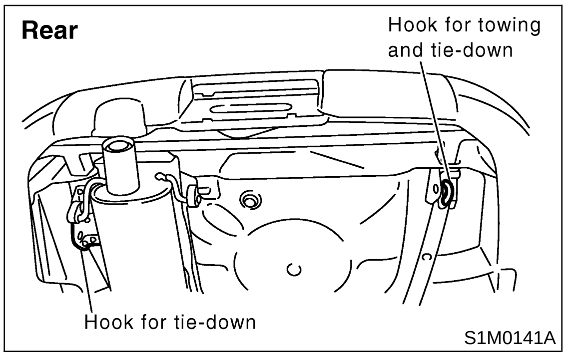

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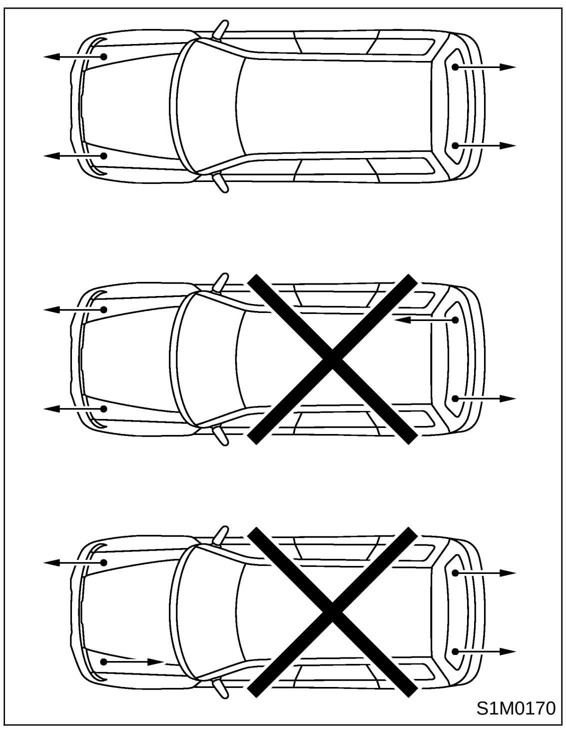
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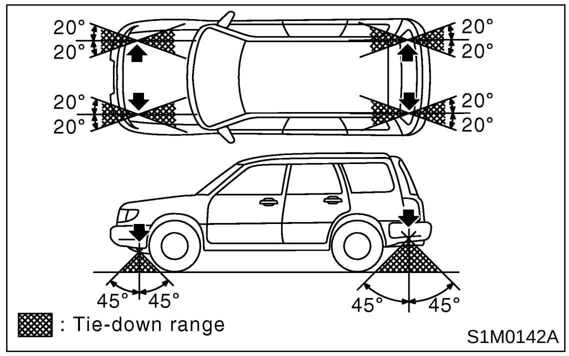


S1M0142A

7. TOWING *SA03676A1507*

Avoid towing vehicles except when the vehicle cannot be driven. For vehicles with AWD or AT, 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 that 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, and other parts.

MEMO:

IDENTIFICATION

ID

Page

1. Identification 2

1. Identification SA06679

A: IDENTIFICATION SA06679F70

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.

SF9EY3J

Digits	Code	Meaning	Details
1	S	Series	S: Forester
2	F	Body style	F: Wagon
3	9	Engine displacement Drive system Suspension system	9: 2.5 L AWD
4	E	Minor change	E: Current model
5	Y	Destination	Y: For United States, Canada
6	3	Grade	3: L 7: S
7	J	Transmission, fuel feed system	J: SOHC MPI 5-speed MT R: SOHC MPI 4-speed AT

The engine and transmission type are as follows:

- **Engine**

EJ251AXVAA

Digits	Code	Meaning	Details
1 and 2	EJ	Engine type	EJ: 4 cylinders
3 and 4	25	Displacement	25: 2.5 L
5	1	Fuel feed system	1: D-MPI SOHC-A phase-3
6	A	Exhaust regulations	A: US Federal & California
7	X	Transmission	W: AWD MT X: AWD AT
8	V	Minor change	V: Current model
9 and 10	AA	Detailed specifications	Used when ordering parts. See the parts catalog for details.

- **Transmission**

TZ1A3ZC3AA

Digits	Code	Meaning	Details
1	T	Transmission	T: Transmission
2	Z	Transmission type	Y: Full-time AWD MT center differential Z: Full-time AWD AT MPT
3 and 4	1A	Classification	75: MT 1A: New AT
5	3	Series	3: AT 5: MT
6	Z	Transmission specifica-tions	V: Full-time AWD 5-speed MT with viscous coupling center differential single range Z: Full-time AWD 4-speed AT with MPT
7	C	Mounted body	C: US 2.5 L SOHC
8	3	Minor change	3: Initial
9 and 10	AA	Detailed specifications	Used when ordering parts. See the parts catalog for details.

● Rear differential

T2

Code	Reduction gear ratio	LSD
T2	4.111	No
TP	4.444	No
JP	4.111	Viscous
CF	4.444	Viscous

MEMO:

RECOMMENDED MATERIALS

RM

Page

1. Recommended Materials 2

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.

- **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**

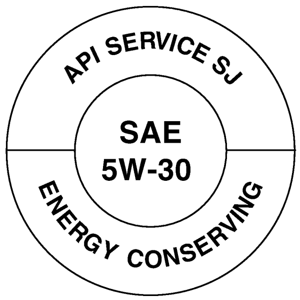
All Subaru vehicles are LEV, and thus can use California specification gasoline.

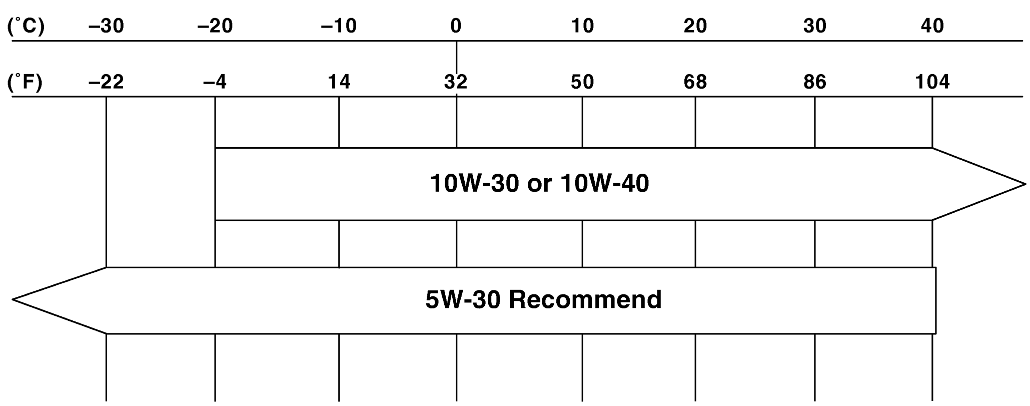
- **Reformulated gasoline**

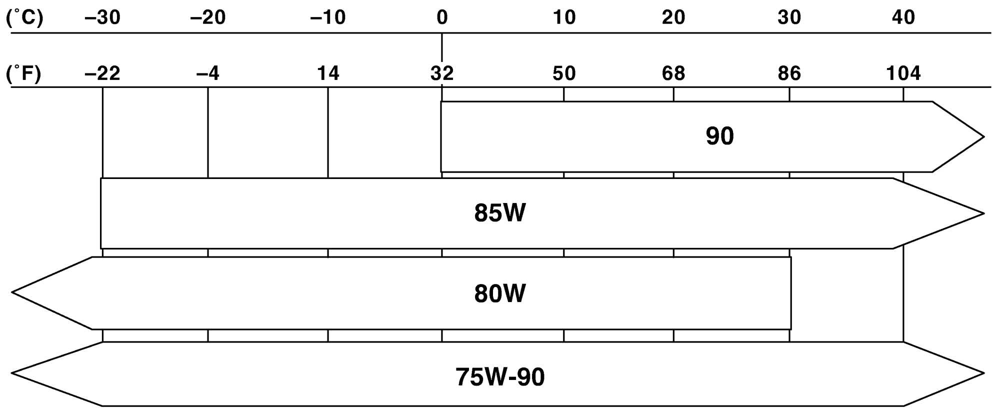
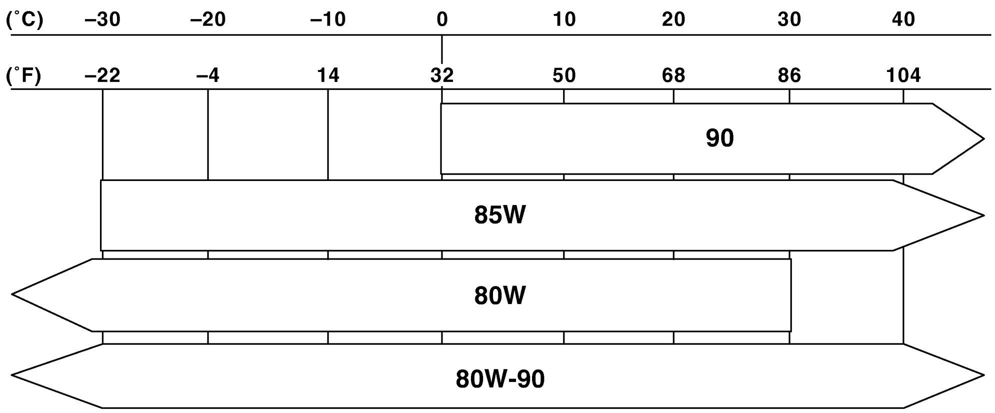
Reformulated gasoline may be used.

3. LUBRICANTS *SA05678G2203*

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	 GI0003A

SAE viscosity	SAE viscosity No. and applicable temperature SAE J300
Manual transmission oil Rear differential	 GI0004A
Front differential	 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

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 bear-ing ● 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 BJ	NTG2218	28093AA000	—
	Front axle SFJ	SSG-6003	28093TA000	—
	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 Ure-thane 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
	Automatic transmission oil pan	Three Bond 1217B	K0877YA020	—
	Torque converter clutch case	Three Bond 1215B	0029431040	—
	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	—

MEMO:

PRE-DELIVERY INSPECTION

PI

Page

1. Pre-delivery Inspection 2

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. 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.
5. Check the rear gate for lock/unlock and open/close operations.	(1) Using the key, check if the rear gate can be locked and unlocked normally. (2) Open and close the rear gate to see that there are no abnormal conditions. (3) Operate the power door locking switch to check that the rear gate is locked and unlocked normally.
6. Check fuel lid for open and close.	(1) Check fuel lid for smooth open and close.
7. Operation check of child lock system.	(1) Check that the child lock operates normally.
8. Accessory check	Check the following accessories are provided: ● Owner’s manual ● Warranty and maintenance booklet ● Spare key ● Jack ● Tool set ● Spare tire
9. Operation check of hood lock release system	(1) Operate the hood lock release lever to check that the hood opens normally.
10. Connection of air conditioner harness	(1) If the vehicle is about to be delivered to the customer, connect the air conditioner harness.
11. Battery	(1) Check the battery for any abnormal conditions such as rust and trace of battery fluid leaks.
12. Brake fluid	(1) Check the fluid amount.
13. Engine oil	(1) Check the oil amount.
14. Transmission fluid	(1) Check the fluid amount.
15. AT front differential oil	(1) Check the AT front differential oil amount.
16. Coolant	(1) Check the coolant amount.
17. Clutch fluid	(1) Check the clutch fluid amount.
18. Window washer fluid	(1) Check the window washer fluid amount.
19. Hood latch check	(1) Check that the hood is closed and latched securely.
20. Keyless entry system	(1) Check that the keyless entry system operates normally.
21. Security system	(1) Check that the security system operates normally.
22. Seat	(1) Check the seat surfaces for smears or dirt. (2) Check the seat installation conditions and functionality.
23. Seat belt	(1) Check the seat belt installation conditions and functionality.
24. Wheel alignment	(1) Check that the wheel alignments are properly adjusted.

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. Key warning system	(1) Check key warning system for normal operation.
4. Starting condition	(1) Start the engine and check that the engine starts smoothly.
5. Exhaust system	(1) Check that the exhaust noise is normal and no leaks are found.
6. Indicator light	(1) Check that all the indicator lights operate normally.
7. Clock	(1) Check that the clock operates normally.
8. Radio	(1) Check that the radio system operates normally.
9. Cigarette lighter	(1) Check that the cigarette lighter operates normally.
10. Lighting system	(1) Check that the lighting systems operate normally.
11. Window washer	(1) Check that the window washer system operates normally.
12. Wiper	(1) Check that the wiper system operates normally.
13. Power window operation check	(1) Check that the power window 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.

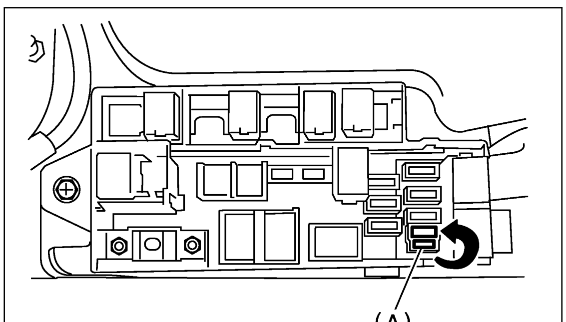
2. TIRE CHECK SA09719G5002

- 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
P205/70R15 95S P215/60R16 94H	Light load	200 (2.0, 29)	190 (1.9, 28)
	Full load	200 (2.0, 29)	250 (2.5, 36)

3. FUSE INSTALLATION SA09719G5010

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



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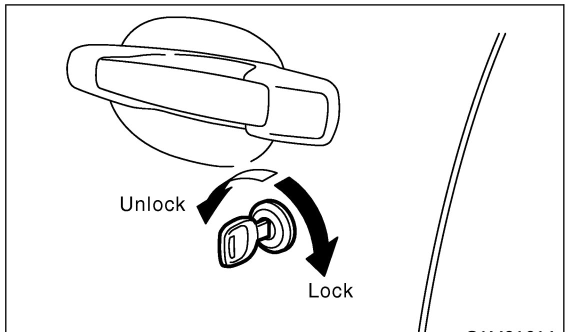
4. CHECK THE DOOR OPERATIONS, LOCK/UNLOCK AND OPEN/CLOSE, AS FOLLOWS. SA09719G5003

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.



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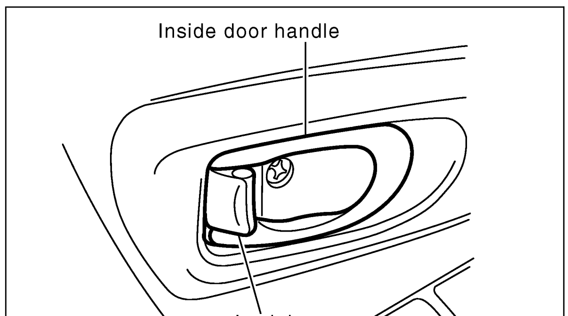
- **Vehicles with manual door locks:**

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.



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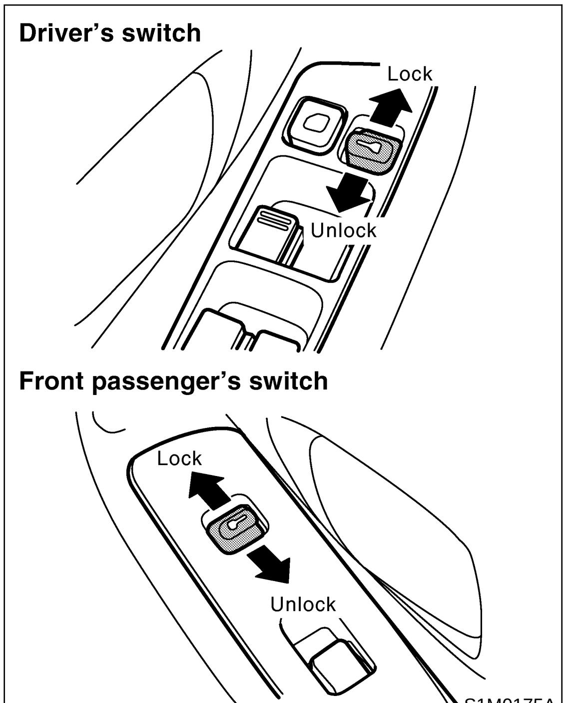
● **Vehicles with power door locks:**

Close the door completely, and operate the power lock switches on both front doors. Pull all the inside door handles to ensure that the all doors will not open.



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5. CHECK THE REAR GATE OPERATIONS, LOCK/UNLOCK AND OPEN/CLOSE, AS FOLLOWS. *SA09719G5053*

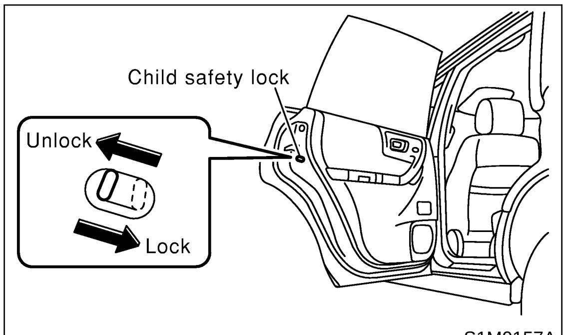
● Using the key, lock and unlock the rear gate several times to check for normal operation.
● Open and close the rear gate several times for smooth movement.
● Operate the power door locking switch to check that the rear gate is locked and unlocked normally.

6. CHECK FUEL LID FOR OPEN AND CLOSE. *SA09719G5054*

● Check fuel lid for smooth open and close.

7. CHECK THE OPERATION OF CHILD SAFETY LOCKS. *SA09719G5052*

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



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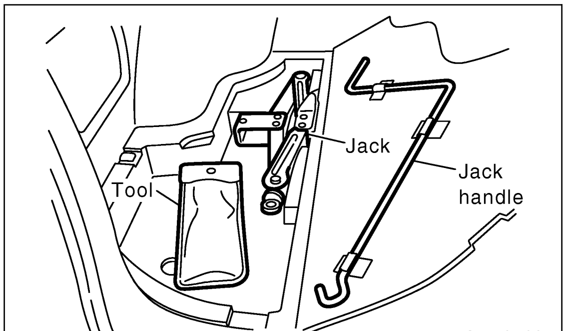
8. ACCESSORY CHECK *SA09719G5008*

Check that the following accessories are provided in the luggage compartment or cargo area.
● Owner's manual
● Warranty and maintenance booklet
● Spare key
● Jack
● Tool set
● Spare tire



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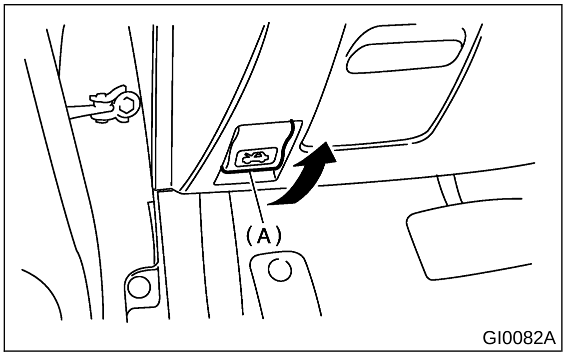
9. OPERATION CHECK OF HOOD LOCK RELEASE SYSTEM *SA09719G5009*

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



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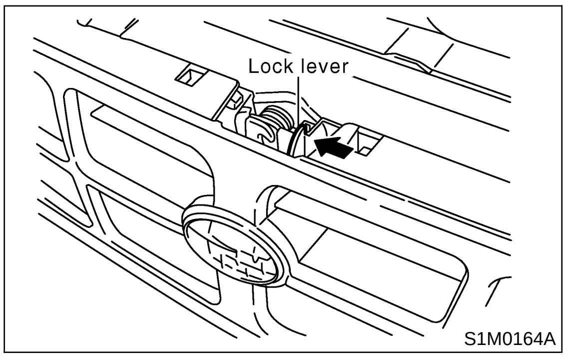

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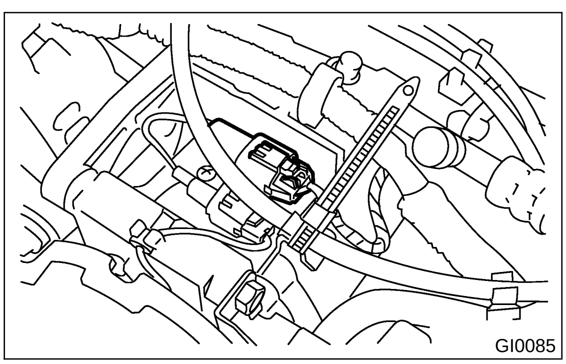
10. CONNECTION OF AIR CONDITIONER HARNESS *SA09719G5011*

A vehicle just delivered has its air conditioner harness disconnected to protect the air conditioner compressor. Connect the harness as shown in the figure.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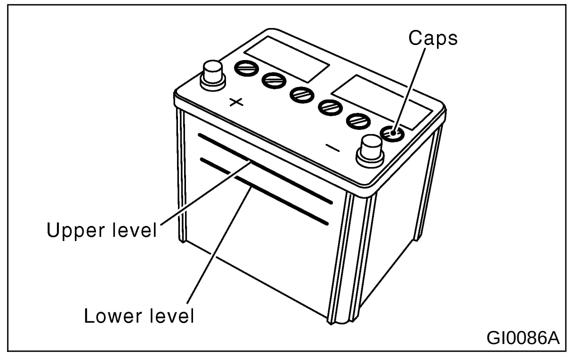
11. BATTERY *SA09719G5012*

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



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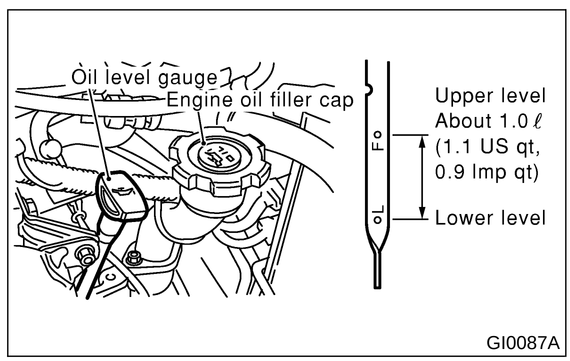
12. BRAKE FLUID *SA09719G5013*

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.

13. 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.



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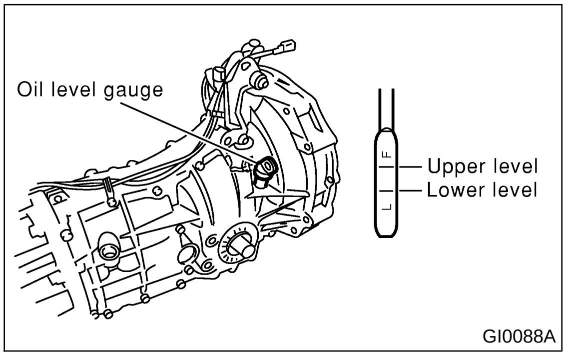
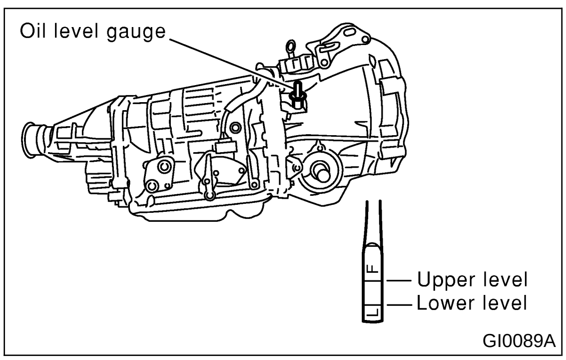
14. TRANSMISSION FLUID *SA09719G5015*

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.



15. 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.

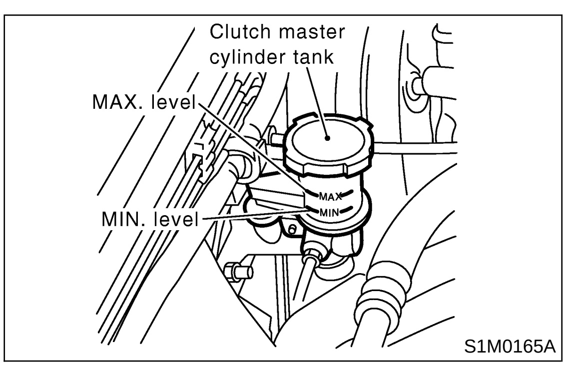


16. COOLANT *SA09719G5017*

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.

17. 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.



18. 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.

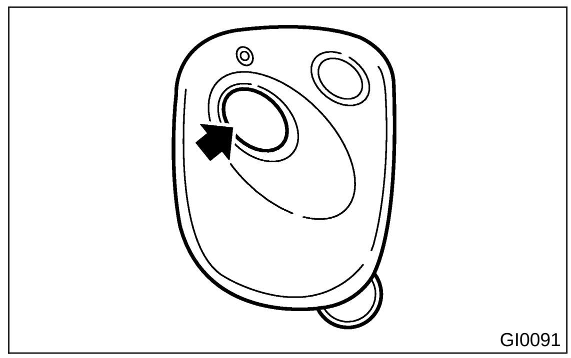
19. HOOD LATCH CHECK *SA09719G5020*

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

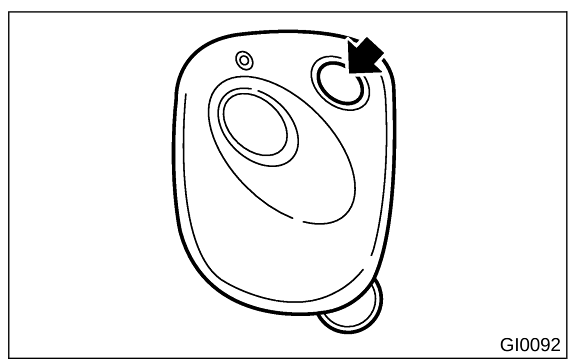
20. KEYLESS ENTRY SYSTEM *SA09719G5021*

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.
- Press the “LOCK/ARM” button on the transmitter momentarily once and check if all the doors are locked and the horn chirps once.

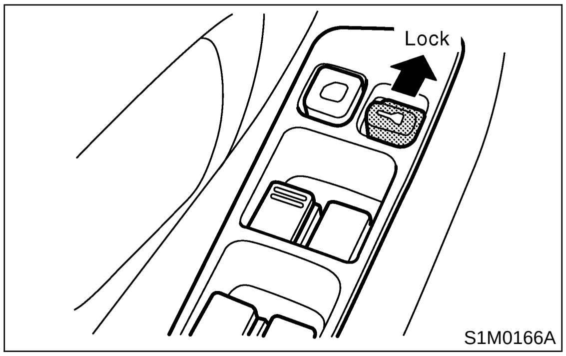


- Press the “UNLOCK/DISARM” button on the transmitter momentarily once and check if the driver’s door is unlocked, the horn chirps twice and the dome light illuminates.



- Press the “UNLOCK/DISARM” button on the transmitter momentarily once again and check if all the doors including the rear gate 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 open and check if the horn chirps three times to warn of a door ajar. Then, bring all doors including the rear gate 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 open. Then, bring all the doors including the rear gate in the closed condition and check if all the doors are locked and the horn chirps once.



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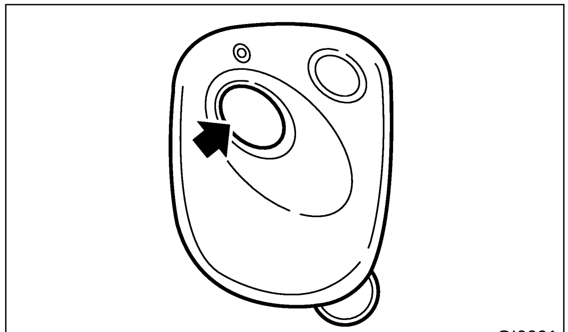
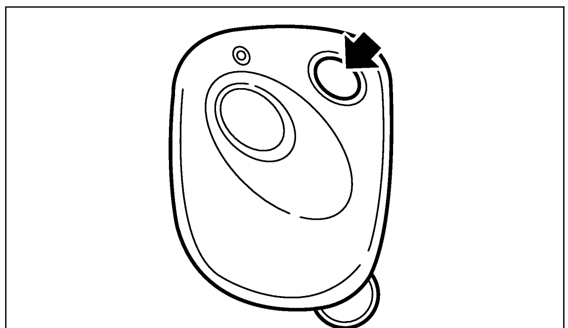
Check selecting audible signal operation.
● Using the horn, the system will give you an audible signal when the doors lock and unlock.
If desired, you may turn the audible signal off.
To turn the audible signal off, carry out the unlocking procedure of keyless entry system, then simultaneously depress LOCK/ARM and UNLOCK/ DISARM buttons for more than two seconds.
The horn will sound two times to inform you that the audible signal has been turned off.
To turn the audible signal on, carry out the unlocking procedure of keyless entry system, then simultaneously depress LOCK/ARM and UNLOCK/ DISARM buttons for more than two seconds.
The horn will sound one time to inform you that the audible signal has been turned on.

21. 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.
● 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.


GI0091

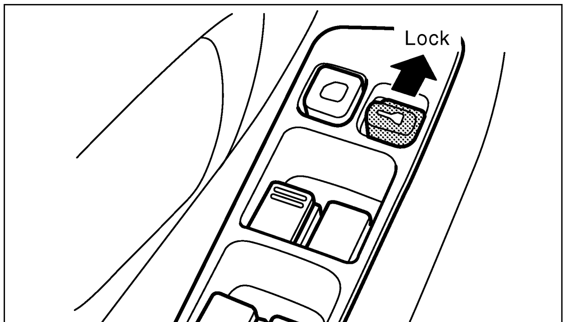
● Press the “UNLOCK/DISARM” button on the transmitter momentarily once and check if the driver’s door is unlocked, the horn chirps twice, the parking lights flash twice, the dome light illuminates and the security indicator light goes off to ensure that the system has been brought into the disarming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


GI0092

● Press the “UNLOCK/DISARM” button on the transmitter momentarily once again and check if all the doors including the rear gate 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 open and check if the horn chirps three times to warn of a door ajar. Then, bring all doors including the rear gate 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 open. Then, bring all the doors including the rear gate 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.



S1M0166A

● 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.

22. SEAT *SA09719G5023*

Check that each seat provides full functionality in sliding and reclining.

23. SEAT BELT *SA09719G5024*

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

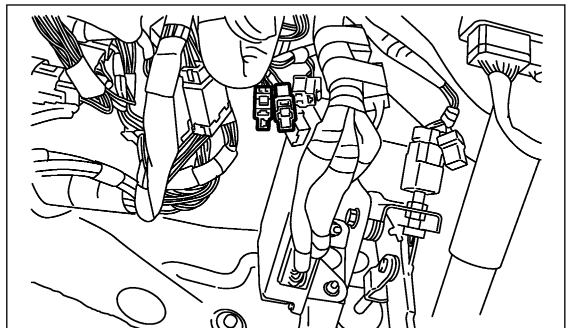
● Check the seat belt warning light and chime operations.

24. WHEEL ALIGNMENT *SA09719G5026*

Check the wheel alignments. <Ref. to FS-6, Wheel Alignment.> and <Ref. to RS-7, Wheel Alignment.>

25. 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.


S1M0167

26. 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.

27. KEY WARNING SYSTEM *SA09719G5055*

Check that the chime sounds when the driver's door opens and the key is in the "LOCK" or "ACC" position.

28. 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.

29. EXHAUST SYSTEM *SA09719G5030*

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

30. INDICATOR LIGHT *SA09719G5031*

Check that all the indicator lights are off.

31. CLOCK *SA09719G5032*

Check the clock for normal operations and enough accuracy.

32. RADIO *SA09719G5033*

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

33. CIGARETTE LIGHTER *SA09719G5034*

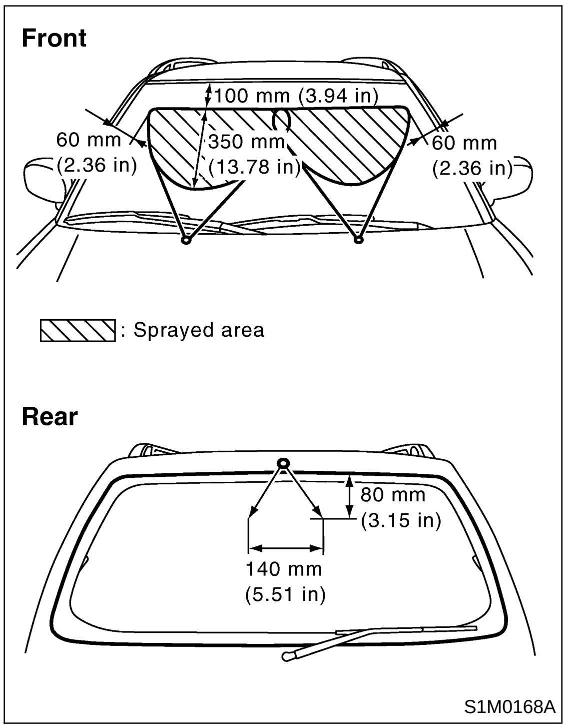
Check the cigarette lighter operations.

34. LIGHTING SYSTEM *SA09719G5035*

- Check the headlight operations.
- Check the brake light operations.
- Check the other lights for normal operations.
- Check the day time running light system operations.
- Check the illumination brightness control system operations.

35. WINDOW WASHER *SA09719G5036*

Check that the window washer system sprays washer fluid on the specified area of the windshield and rear window shown in the figure.



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36. WIPER *SA09719G5037*

Check the front and rear wipers for normal operations.

37. 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.

38. BRAKE TEST *SA09719G5038*

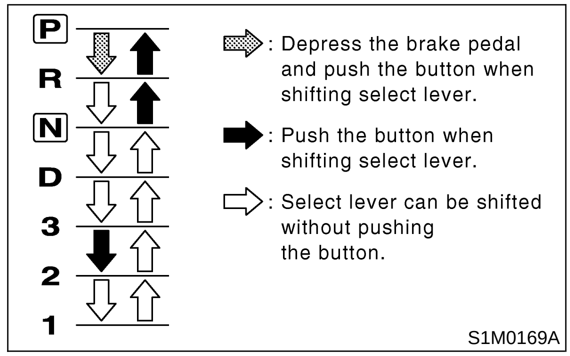
Check the foot brake for normal operations.

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.



S1M0169A

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*

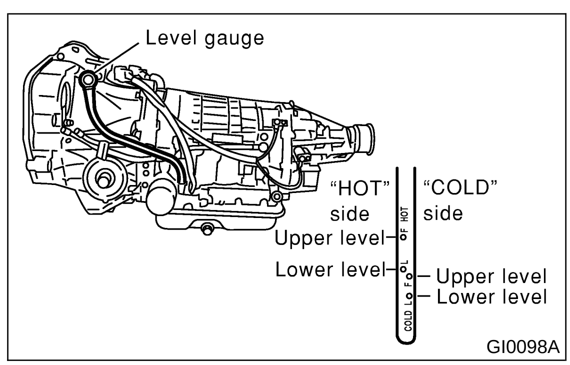
Operate the air conditioner. Check that the A/C compressor operates normally and enough cooling is provided.

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.

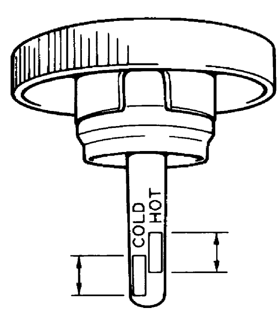


GI0098A

45. POWER STEERING FLUID LEVEL

SA09719G5046

1) Check power steering fluid for deterioration or contamination. If the fluid is highly deteriorated or contaminated, drain it and refill with new fluid.
2) Check joints and units for oil leakage. If any oil leaks are found, repair or replace the applicable part.
3) Inspect fluid level on flat and level surface with engine “OFF” by indicator of reservoir tank.
If the level is at lower point or below, add fluid to keep the level in the specified range of the indicator. If at upper point or above, drain fluid by using a syringe or the like.
   (1) Check at temperature 20°C (68°F) on reservoir surface of oil pump; read the fluid level on the “COLD” side.
   (2) Check at temperature 80°C (176°F) on reservoir surface of oil pump; read the fluid level on the “HOT” side.



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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 100 mm (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.

PERIODIC MAINTENANCE SERVICES

PM

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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.

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**	
4	Drive belt(s)					**I**				**I**				**I**		**R**			
5	Camshaft Drive belt					**I**				**I**				**I**		**R**			
6	Fuel line					**(I)**				**(I)**				**(I)**				**I**	Note (1)
7	Fuel filter					**(R)**				**(R)**				**(R)**				**R**	Note (1)
8	Air cleaner element					**R**				**R**				**R**				**R**	Note (2)
9	Cooling system					**I**				**I**				**I**				**I**	
10	Coolant					**R**				**R**				**R**				**R**	
11	Clutch system			I		**I**		I		**I**		I		**I**		I		**I**	
12	Transmission oil					**I**				**I**				**I**				**I**	
13	ATF					**I**				**I**				**I**				**I**	Note (3)
14	Front & rear differential oil					**I**				**I**				**I**				**I**	
15	Brake line			I		**I**		I		**I**		I		**I**		I		**I**	
16	Brake fluid					**R**				**R**				**R**				**R**	
17	Disc brake pads & discs					**I**				**I**				**I**				**I**	
18	Brake linings and drums					**I**				**I**				**I**				**I**	
19	Parking brake			I		**I**		I		**I**		I		**I**		I		**I**	
20	Suspension			I		**I**		I		**I**		I		**I**		I		**I**	
21	Wheel bearing			I		**I**		I		**I**		I		**I**		I		**I**	
22	Axle boots & joints			I		**I**		I		**I**		I		**I**		I		**I**	
23	Tire rotation		I	I	I	**I**	I	I	I	**I**	I	I	I	**I**	I	I	I	**I**	Note (4)
24	Steering system (Power steering)			I		**I**		I		**I**		I		**I**		I		**I**	
25	Supplement restraint system	Inspect every 10 years																	

Symbols used:
R: Replace
I: Inspection
(R) or (I): Recommended service for safe vehicle operation.
NOTE:
(1) 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.
(2) When the vehicle is used in extremely dusty conditions, the air cleaner element should be replaced more often.
(3) ATF filter is maintenance free part. ATF filter needs replacement, when it has physically damaged or ATF leaked.
(4) 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.

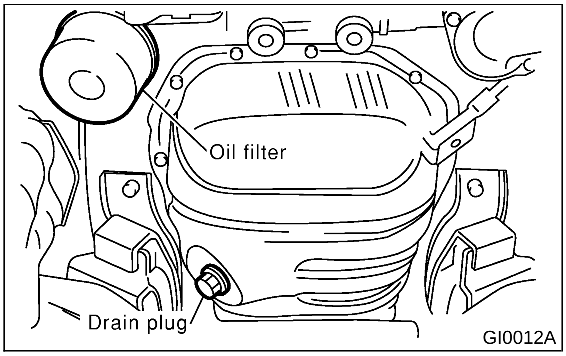
B: MAINTENANCE SCHEDULE 2 *SA07682G25*

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 tow-ing trailer
Engine oil	3.75 months 6,000 km 3,750 miles	R		R			R
Engine oil filter	3.75 months 6,000 km 3,750 miles	R		R			R
Fuel filter	15 months 24,000 km 15,000 miles				I		
Fuel line	15 months 24,000 km 15,000 miles				I		
Transmission oil	15 months 24,000 km 15,000 miles						R
ATF	15 months 24,000 km 15,000 miles						R
Front & rear differ-ential oil	15 months 24,000 km 15,000 miles						R
Brake line	15 months 24,000 km 15,000 miles	I	I		I		I
Brake fluid	15 months 24,000 km 15,000 miles					R	
Disc brake pads & discs	15 months 24,000 km 15,000 miles	I	I		I		I
Brake linings and drums	15 months 24,000 km 15,000 miles	I	I		I		I
Parking brake	15 months 24,000 km 15,000 miles	I	I		I		I
Suspension	7.5 months 12,000 km 7,500 miles		I	I	I		I
Axle boots & joints	7.5 months 12,000 km 7,500 miles	I	I	I	I		I
Steering system (Power steering)	7.5 months 12,000 km 7,500 miles	I	I	I	I		I

3. Engine Oil *SA07077*

A: REPLACEMENT *SA07077A20*

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

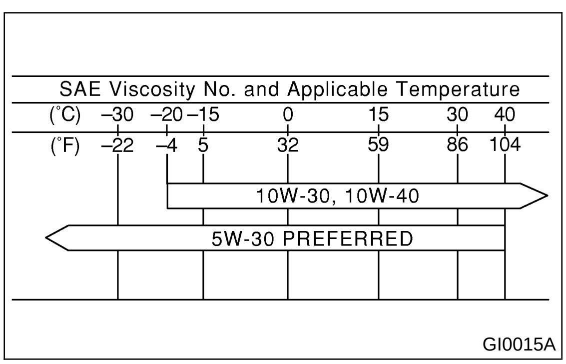


2) Open engine oil filler cap for quick draining of the engine oil.
3) Replace drain plug gasket.
4) Tighten engine oil drain plug after draining engine oil.

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.

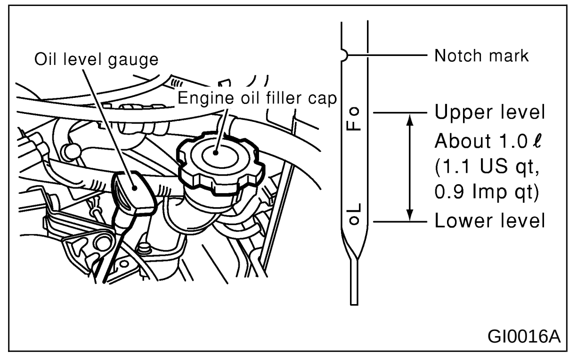
Engine oil capacity:
Upper level
4.0 ℓ (4.2 US qt, 3.5 Imp qt)
Lower level
3.0 ℓ (3.2 US qt, 2.6 Imp qt)



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

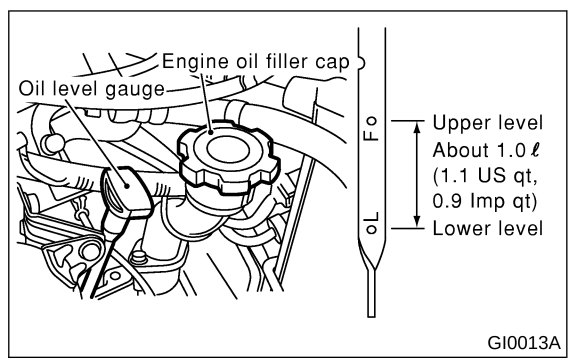
NOTE:
- When replenishing oil, it does not matter if the oil to be added is a different brand from that in the engine; however, use oil having the API classification and SAE viscosity No. designated by SUBARU.
- If vehicle is used in desert areas with very high temperatures or for other heavy duty applications, 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.



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.

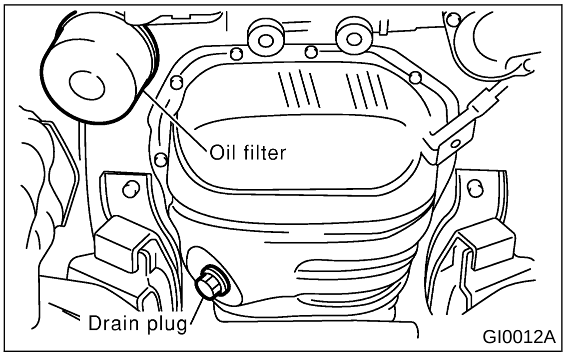


5) After turning off the engine, wait a few minutes for the oil to drain back into the oil pan before checking the level.
6) Just after driving or while the engine is warm, engine oil level may show in the range between the “F” line and the notch mark. This is caused by thermal expansion of the engine 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) 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.

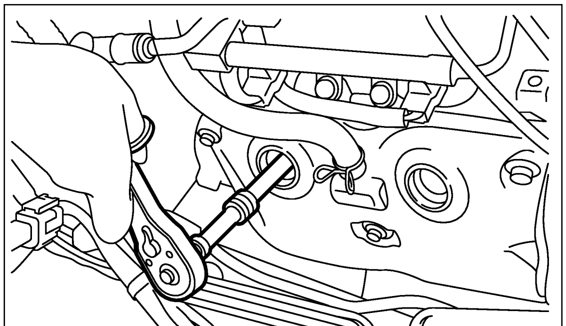
6) Check the engine oil level. <Ref. to PI-7, ENGINE OIL, PDI PROCEDURE, Pre-delivery Inspection.>

5. Spark Plugs *SA07683*

A: REPLACEMENT *SA07683A20*

NOTE:
For spark plug replacement procedure details, refer to IG section. <Ref. to IG-4, Spark Plug.>

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


GI0018

7) Set new spark plug.

Recommended spark plug:
CHAMPION RC10YC4
NGK BKR6E-11, BKR5E-11
Spark plug gap
1.0 — 1.1 mm (0.039 — 0.043 in)

8) 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.

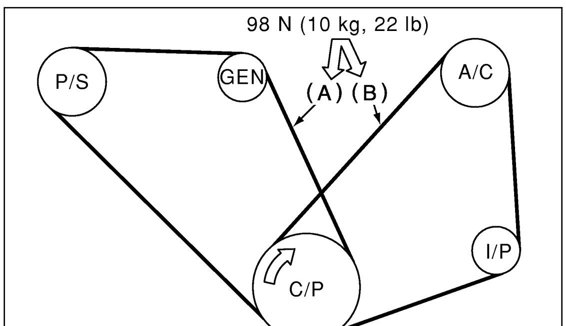
6. Drive Belt(s) *SA07684*

A: INSPECTION *SA07684A10*

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.



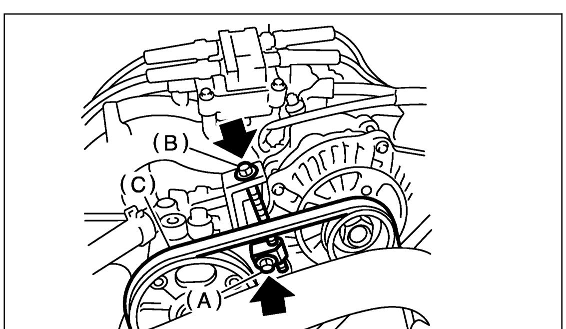
GI0019A

C/P Crankshaft pulley
GEN Generator
P/S Power steering oil pump pulley
A/C Air conditioning compressor pulley
I/P Idler pulley

B: REPLACEMENT *SA07684A20*

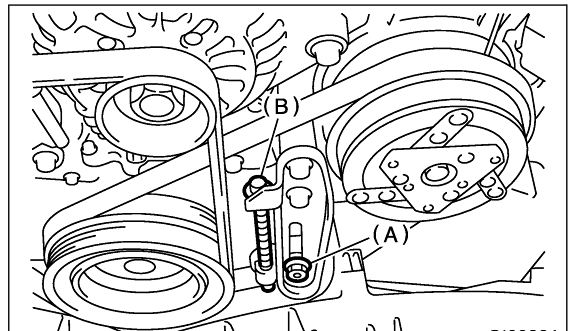
NOTE:
Wipe off any oil or water on the belt and pulley.

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



GI0021A

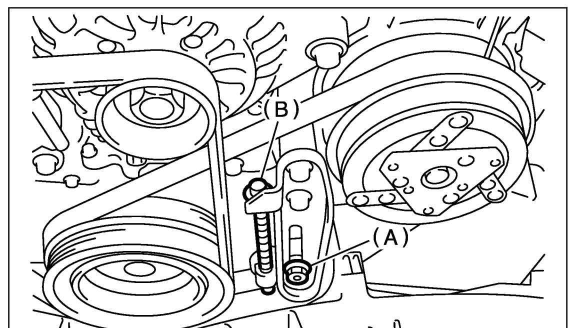
4) Loosen the lock nut (A).
5) Loosen the slider bolt (B).
6) Remove the rear side belt.



GI0022A

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

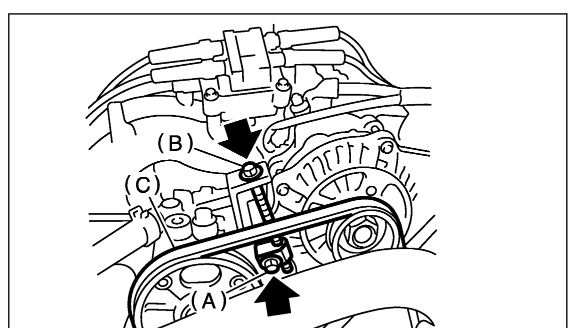
Tightening torque:
22.6 N·m (2.3 kgf-m, 16.6 ft-lb)



GI0022A

10) Install a new belt, and tighten the slider bolt so as to obtain the specified belt tension.
11) Tighten the slider bolt (B).
12) 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)



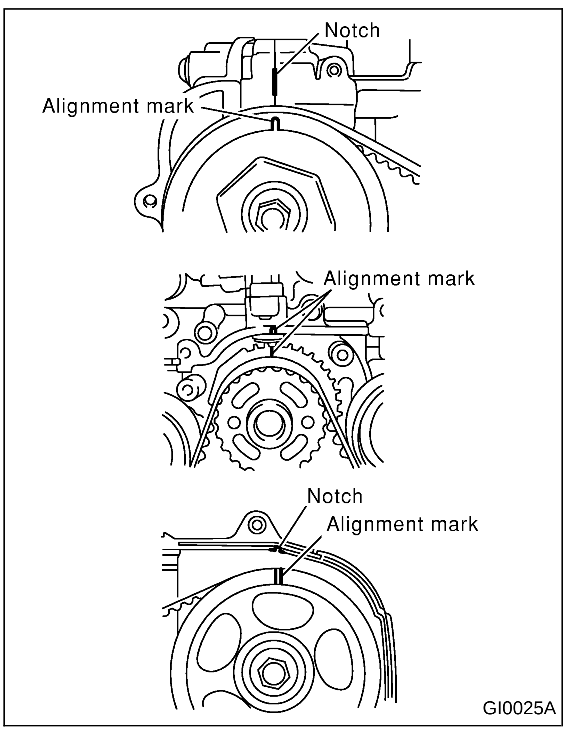
GI0021A

7. Camshaft Drive Belt SA07685

A: REPLACEMENT SA07685A20

NOTE:
For camshaft drive belt replacement procedure details, refer to ME section. <Ref. to ME-46, Timing Belt Assembly.>

1) Remove radiator fan <Ref. to CO-26, Radiator Main Fan and Fan Motor.> and air conditioner fan <Ref. to CO-28, Radiator Sub Fan and Fan Motor.>.
2) Remove V-belt cover.
3) Remove V-belts. <Ref. to ME-42, V-belt.>
4) Remove air conditioning compressor drive belt tensioner.
5) Remove pulley bolt.
ST 499977100 CRANKSHAFT PULLEY WRENCH
6) Remove crankshaft pulley.
7) Remove left side belt cover.
8) Remove front belt cover.
9) Remove timing belt guide. (MT vehicle only)
10) 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



11) Remove belt idler.
12) Remove belt idler (No. 2).
13) Remove timing belt.
14) Remove automatic belt tension adjuster assembly.

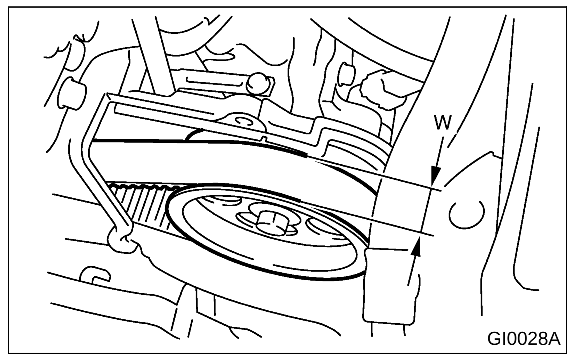
B: INSTALLATION SA07685A11

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. 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-70, Fuel Delivery, Return and Evaporation Lines.>

9. Fuel Filter *SA07027*

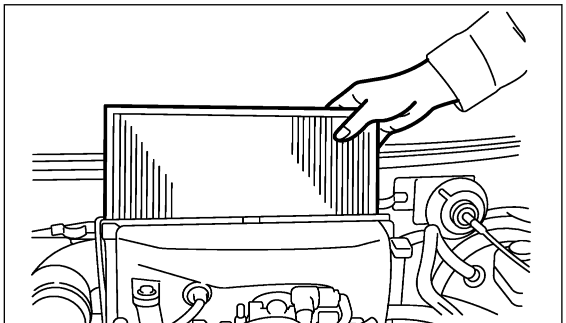
A: REPLACEMENT *SA07027A20*

For fuel filter replacement procedures, refer to “FU” section. <Ref. to FU-67, Fuel Filter.>

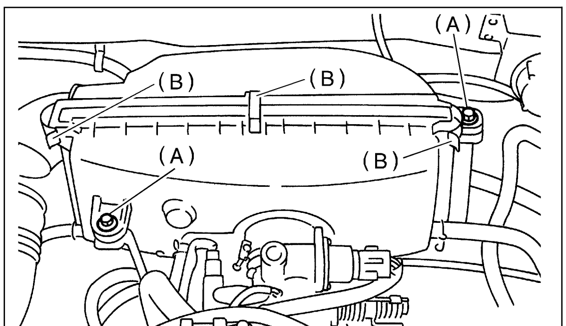
10. Air Cleaner Element SA07687

A: REPLACEMENT SA07687A20

NOTE:
Do not attempt to clean the air cleaner element. The filter paper of the element is wetted with a special 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.


GI0032

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



H2M2947A

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.

11. Cooling System *SA07688*

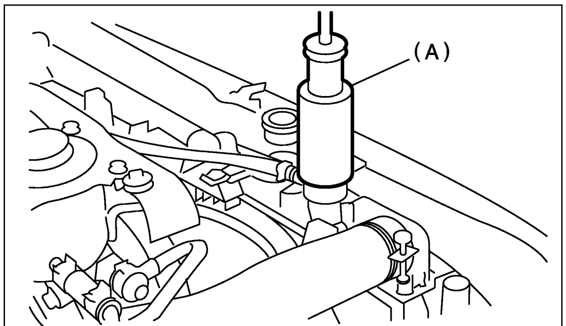
A: INSPECTION *SA07688A10*

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/cm^2, 23 psi) and check the following points:

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

CAUTION:

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



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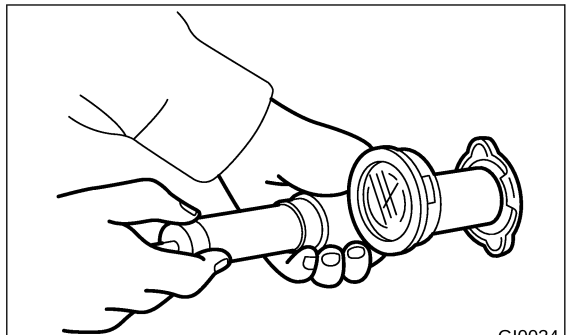
- **When performing this check, be sure to keep the engine stationary and fill radiator with coolant.**
- **Wipe off check points before applying pressure.**
- **Use care not to spill coolant when detaching tester from radiator.**

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

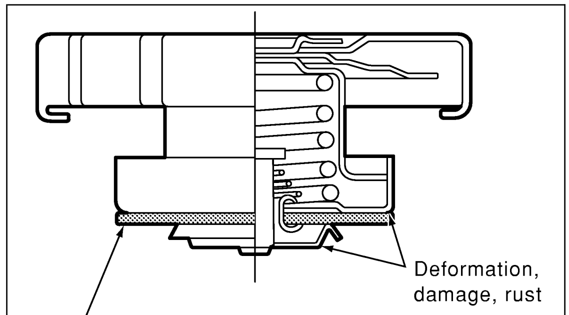
NOTE:
Rust or dirt on cap may prevent valve from functioning normally: be sure to clean cap before testing.

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/cm^2, 14 — 18 psi)
Service limit:
83 kPa (0.85 kg/cm^2 , 12 psi)



GI0034



GI0035A

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.

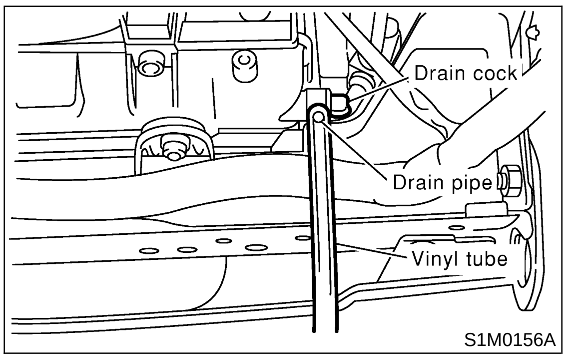
12. Coolant SA07689

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) Fit vinyl tube to drain pipe.
4) Place a container under drain tube.
5) Loosen drain cock to drain engine coolant into container.



6) For quick draining, open radiator cap.

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

7) Drain coolant from reservoir tank.
8) Tighten radiator drain screw securely after draining coolant.
9) Install reservoir tank to original position.
10) Slowly pour prepared coolant from radiator filler port to neck of filler, then pour into reservoir tank up to "FULL" level.

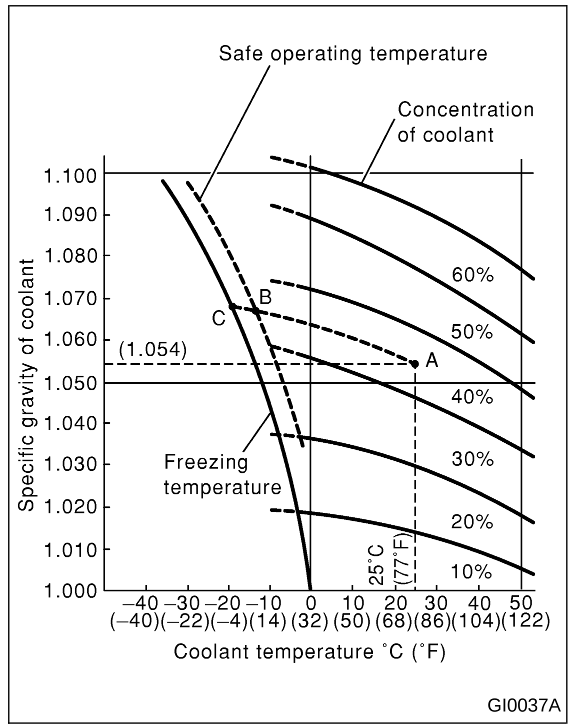
Coolant capacity (fill up to "FULL" level)
Approx. 6.0 ℓ (6.3 US qt, 5.3 Imp qt)

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.

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

2. RELATIONSHIP OF SUBARU COOLANT CONCENTRATION AND FREEZING TEMPERATURE SA07689A2002

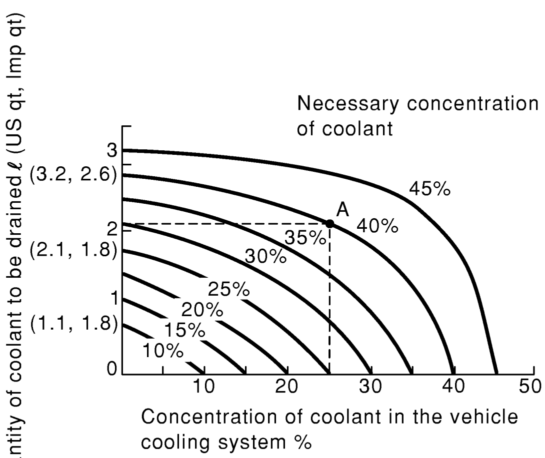
The concentration and safe operating temperature of the SUBARU coolant is shown in the diagram. Measuring the temperature and specific gravity of the coolant will provide this information.
[Example]
If the coolant temperature is 25°C (77°F) and its specific gravity is 1.054, the concentration is 35% (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.



Concentration of coolant in vehicle and quantity to be drained

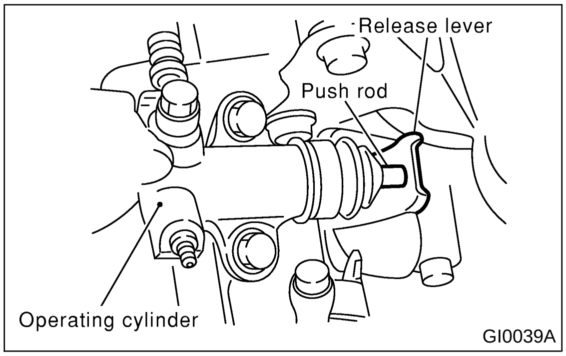
GI0038A

13. 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.

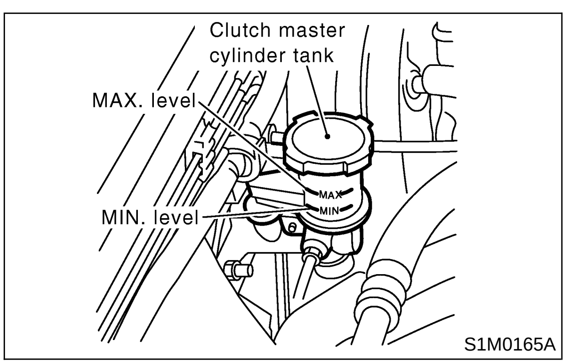


GI0039A

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. If the level is below “MIN”, add clutch fluid to bring it up to “MAX”.

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

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



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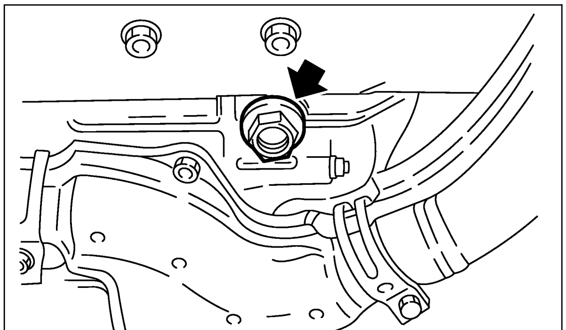
14. Transmission Oil *SA07691*

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.



GI0041

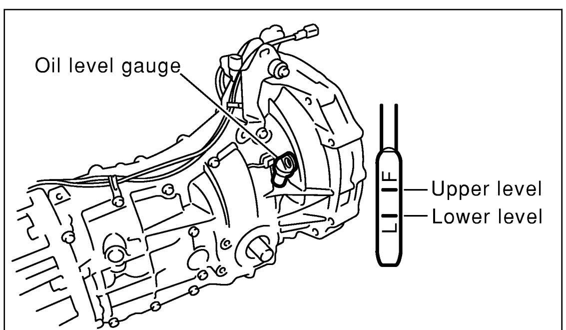
2) Reinstall drain plug after draining gear oil and tighten it to the specified torque.

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:
3.5 ℓ (3.7 US qt, 3.1 Imp qt)



GI0042A

15. ATF SA07692

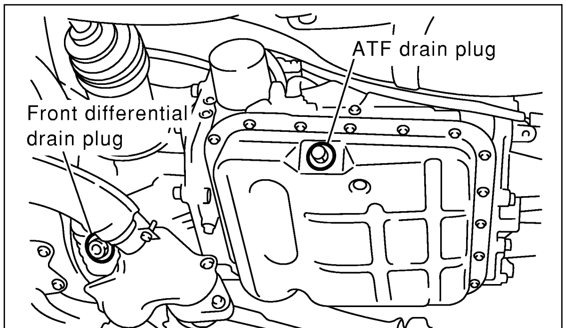
A: REPLACEMENT SA07692A20

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.



GI0043A

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

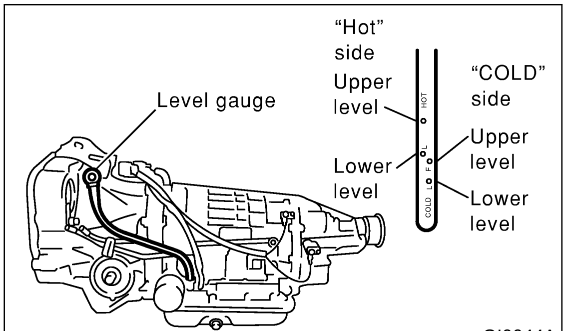
Tightening torque:
25.0 N·m (2.55 kgf-m, 18.4 ft-lb)

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

Recommended fluid:
Dexron III type automatic transmission fluid

Fluid capacity:
Fill the same amount drained from ATF drain plug hole.

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



GI0044A

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-44, ATF Filter.>

16. Front & Rear Differential Oil

SA07693

A: REPLACEMENT SA07693A20

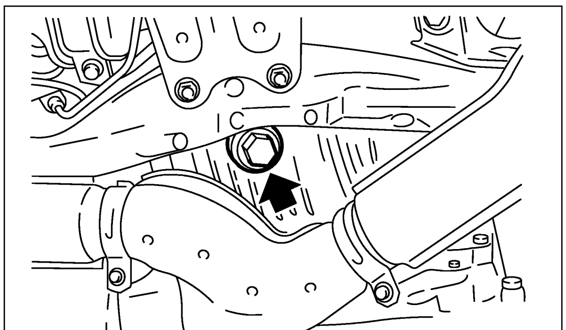
1. FRONT DIFFERENTIAL (MANUAL TRANSMISSION) SA07693A2001

For M/T vehicle, manual transmission oil works as differential oil to lubricate differential. Refer to “Transmission Oil”. <Ref. to PM-17, 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.



GI0045

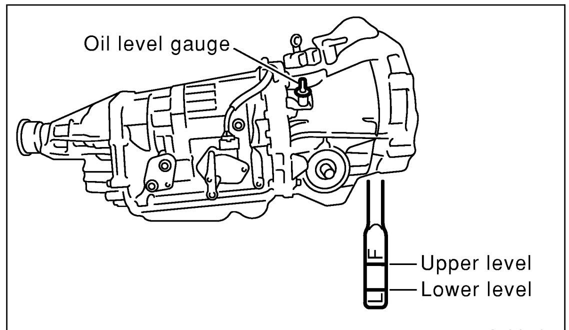
2) Reinstall drain plug after draining differential gear oil and tighten it to the specified torque.

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)



GI0046A

3. REAR DIFFERENTIAL SA07693A2003

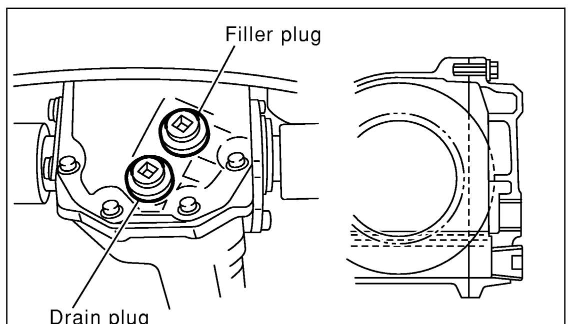
1) Drain oil by removing drain plug.
2) Remove filler plug for quick draining oil.
3) Reinstall drain plug after draining oil.

NOTE:
Apply fluid packing to drain plug threads before installation.

Fluid packing:
Three Bond 1105

Tightening torque:
49.0 N·m (5.0 kgf-m, 36.2 ft-lb)

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



GI0047A

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.

Fluid packing:
Three Bond 1105

Tightening torque:
49.0 N·m (5.0 kgf-m, 36.2 ft-lb)

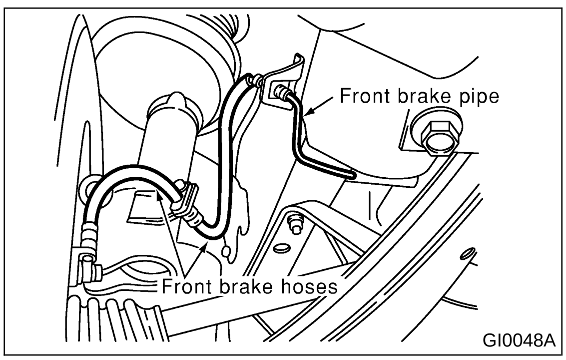
17. Brake Line SA07694

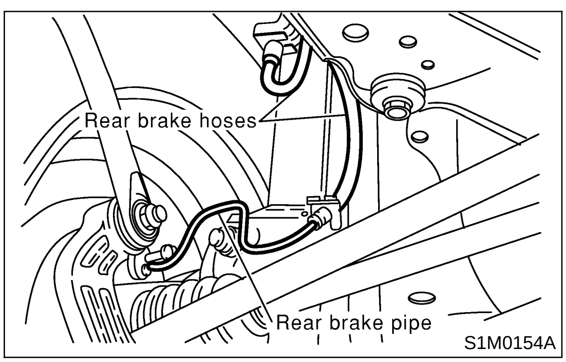
A: INSPECTION SA07694A10

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.



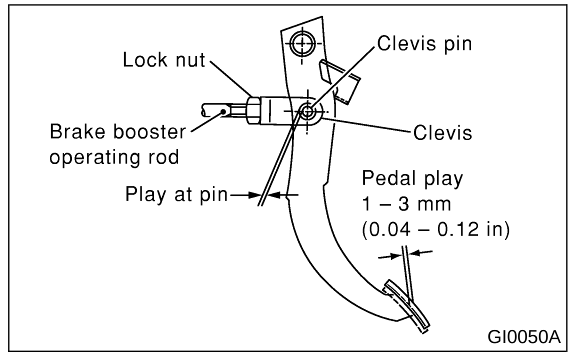


B: CHECKING SA07694G27

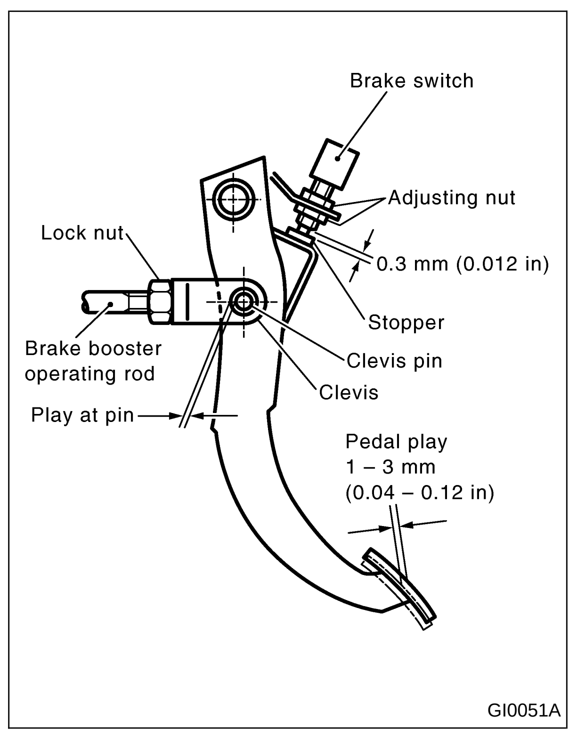
1. SERVICE BRAKE SA07694G2701

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)

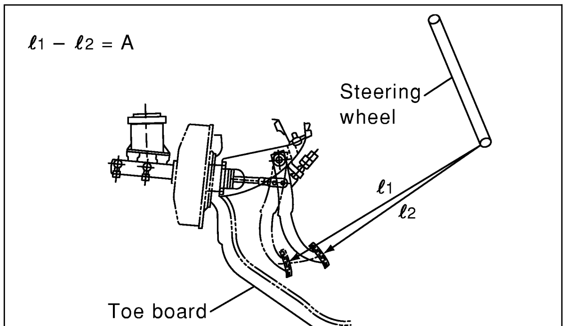


2) If the free play is out of specifications above, adjust the brake pedal as follows:
(1) Be sure engine is off. (No vacuum is applied to brake booster.)
(2) There should be play between brake booster clevis and pin at brake pedal installing portion.
[Depress brake pedal pad with a force of less than 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).



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)

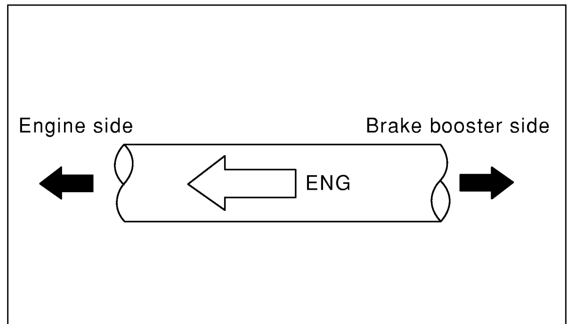


GI0052A

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.



GI0053A

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.

18. Brake Fluid SA07162

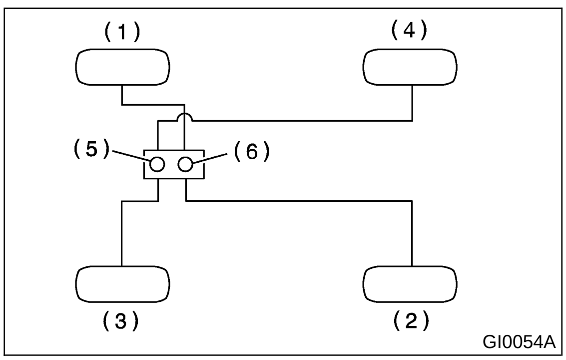
A: REPLACEMENT SA07162A20

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

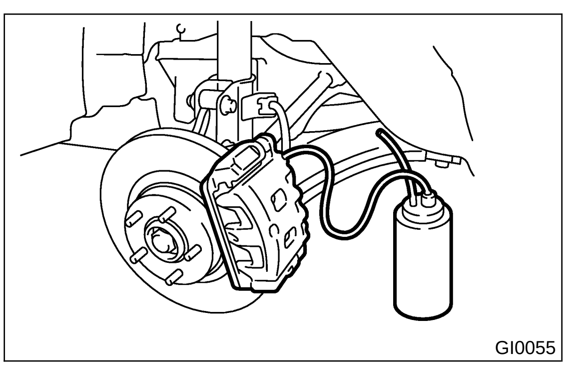
NOTE:
- Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
- Be careful not to allow dirt or dust to get into the reservoir tank.

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.

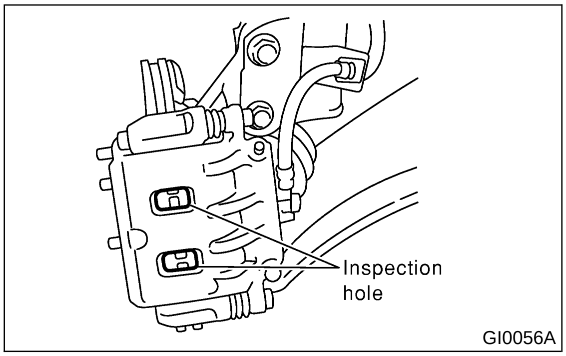
19. Disc Brake Pads and Discs

SA07695

A: INSPECTION SA07695A10

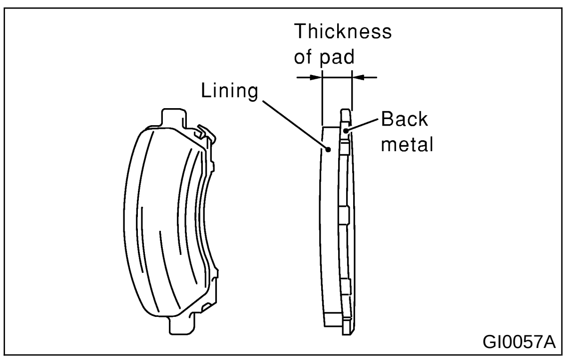
1. DISC BRAKE PAD AND DISC SA07695A1001

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.



GI0056A

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)



GI0057A

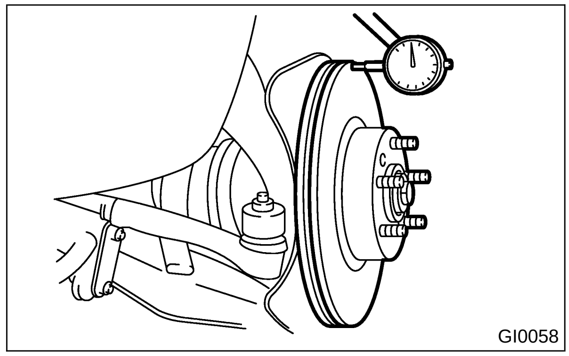
3) Check the disc rotor, and correct or replace if it is damaged or worn.

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: 0.070 mm (0.0028 in)

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.


GI0058

20. Brake Linings and Drums

SA07696

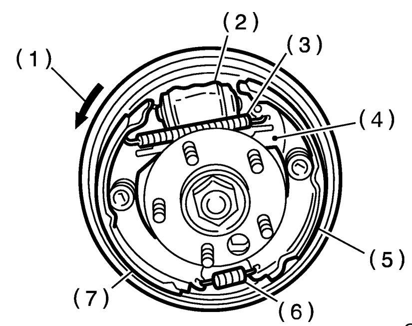
A: INSPECTION SA07696A10

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-29, 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)



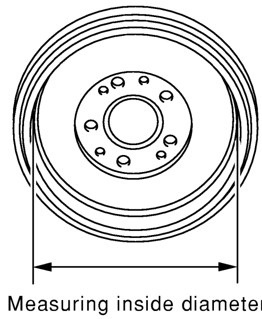
GI0059A

(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.



GI0060A

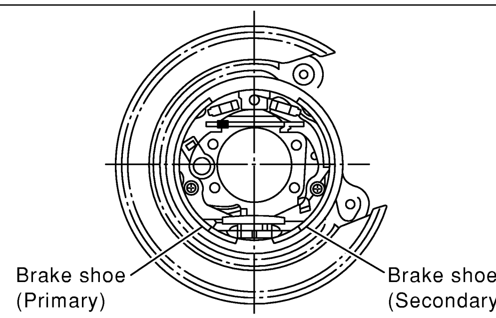
2. PARKING BRAKE (REAR DISC BRAKE)

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.

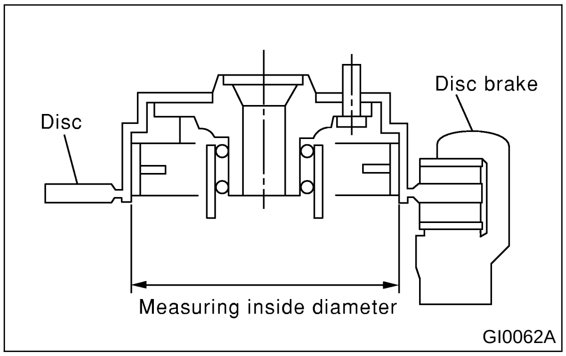
Brake lining thickness excluding back metal
Standard value: 3.2 mm (0.126 in)
Wear limit: 1.5 mm (0.059 in)



S1M0158A

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.

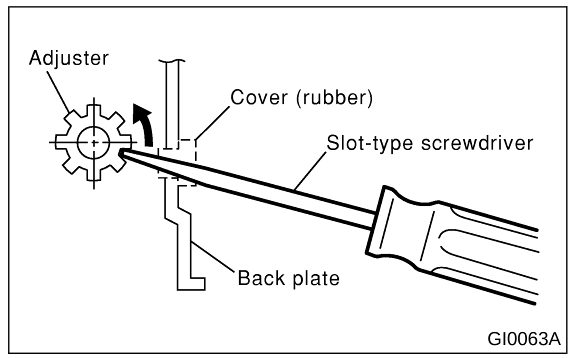
B: ADJUSTMENT SA07696A01

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.



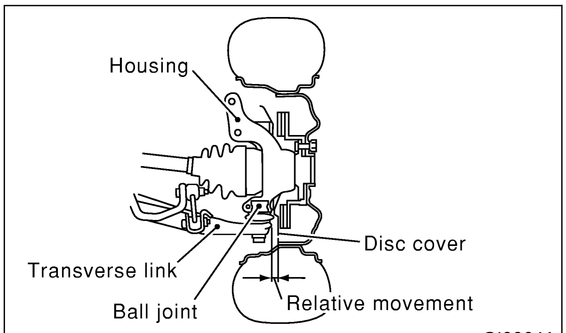
3) Turn back (downward) adjuster 3 to 4 notches.
4) Install cover (rubber) at original position correctly.

21. 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-16, Front Ball Joint.>



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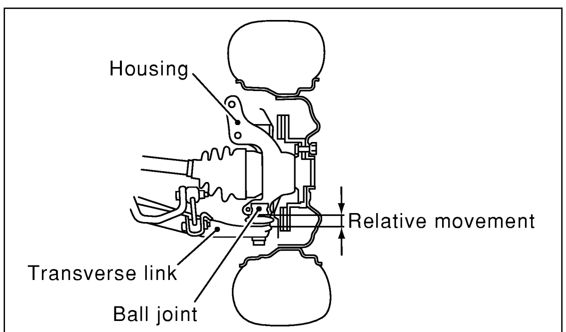
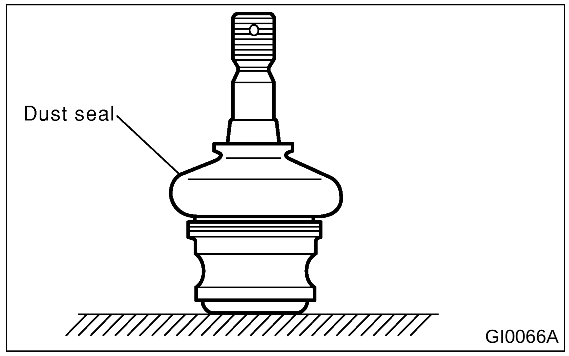


GI0065A

5) Damage of dust seal
Visually inspect ball joint dust seal. If it is damaged, remove transverse link. <Ref. to FS-14, Front Transverse Link.> And measure free play of ball joint. <Ref. to FS-16, 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.

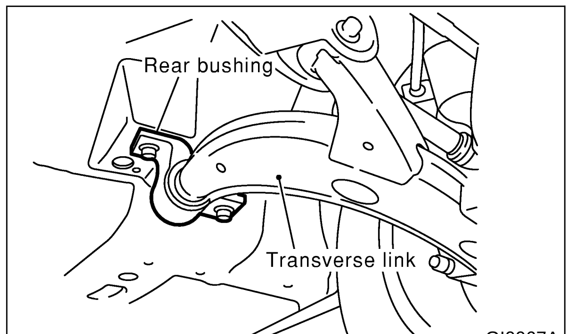
NOTE:
When transverse link ball joint has been removed or replaced, check toe-in of front wheel. If front wheel toe-in is not at specified value, adjust toe-in. <Ref. to FS-6, Wheel Alignment.>



GI0066A

2. TRANSVERSE LINK'S REAR BUSHING SA07697A1002

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



GI0067A

3. WHEEL ARCH HEIGHT SA07697A1003

1) Unload cargoes and set vehicle in curb weight 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 strut 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.> and <Ref. to RS-7, 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-7, 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 [Strut assembly, crossmember, lateral link, 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 SA07697A1009

Visually inspect front strut and rear strut for oil leakage as instructed. Replace front strut and rear strut 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
  - Lateral link
  - Trailing link
  - Crossmember
  - Strut
- 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.

22. Wheel Bearing SA07698

A: INSPECTION SA07698A10

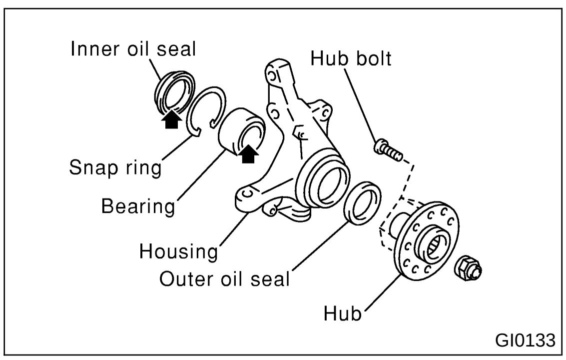
1. FRONT WHEEL BEARING SA07698A1001

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 S.F.J. to transmission spindle, remove it.
7) Extract S.F.J. from transmission spindle. <Ref. to DS-17, 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.



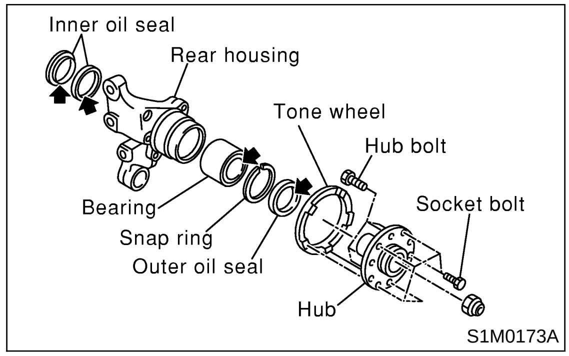
2. REAR WHEEL BEARING SA07698A1002

NOTE:
Inspect the condition of rear wheel bearing grease.

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 COMPL 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 remove front lateral link from crossmember.
6) Remove the DOJ of rear drive shaft from rear differential. <Ref. to DS-38, Rear Drive Shaft.>
7) While supporting rear drive shaft horizontally with one hand, turn hub COMPL with the other to check for noise or binding.
If hub COMPL is noisy or binds, disassemble rear axle and check condition of oil seals, bearings, etc.

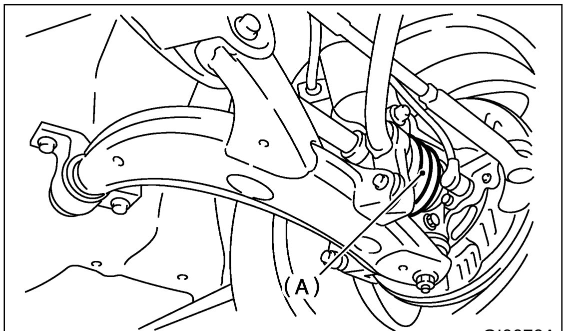


23. Axle Boots & Joints SA07699

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-32, Front Drive Shaft.> <Ref. to DS-38, Rear Drive Shaft.>



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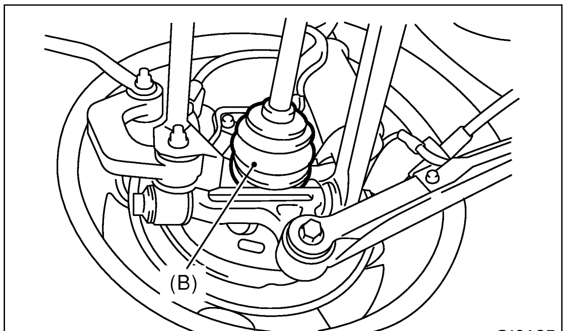


GI0135

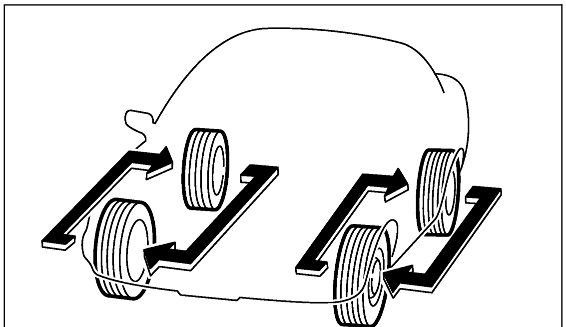
2. PROPELLER SHAFT SA07699A1002

Inspect propeller shaft for damage or failure. If faulty, replace it with a new one. <Ref. to DS-14, Propeller Shaft.>

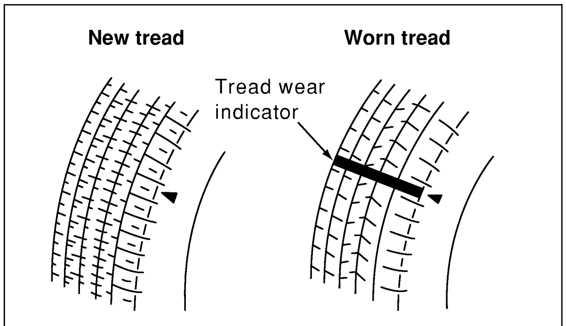
24. Tire Rotation *SA07700*

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.



GI0072



GI0073A

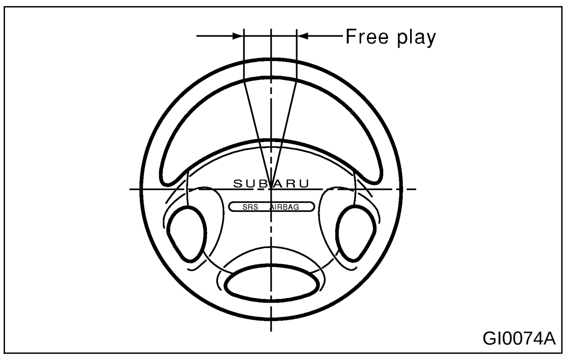
25. Steering System (Power Steering) SA07701

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)



GI0074A

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

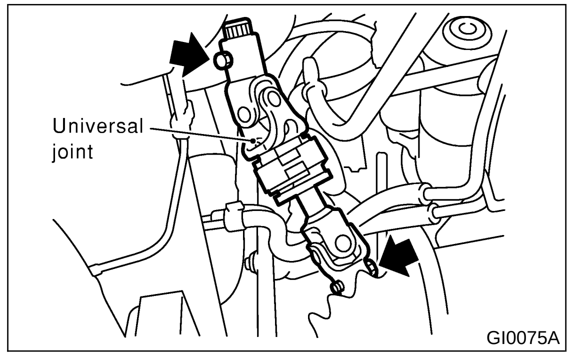
Maximum permissible play:
0.5 mm (0.020 in)

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.

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)

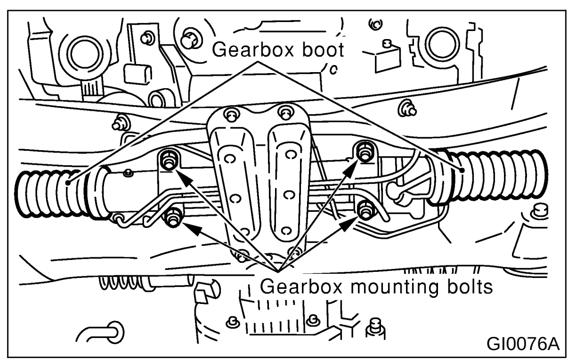


GI0075A

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)

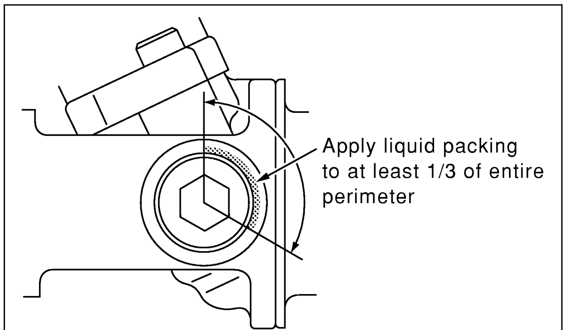


GI0076A

2) Check boot for damage, cracks or deterioration.

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) Loosen the adjusting screw three to four rotations.
(2) Apply liquid packing to at least 1/3 of entire perimeter of adjusting screw thread.
(3) Tighten adjusting screw to 7.4 N·m (0.75 kgf-m, 5.4 ft-lb) and then loosen. Repeat this operation twice.
(4) Retighten adjusting screw to 7.4 N·m (0.75 kgf-m, 5.4 ft-lb) and back off 25°.



GI0077A

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

ST 926230000 SPANNER

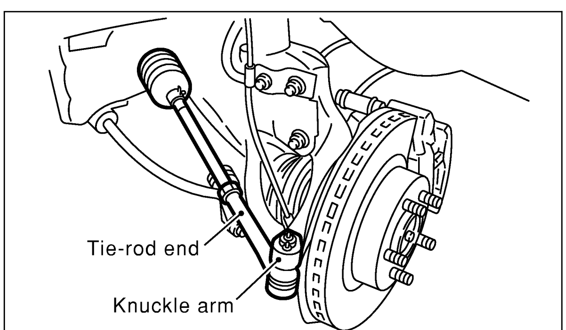
Tightening torque (Lock nut):
39 N·m (4.0 kgf-m, 29 ft-lb)

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.



GI0105A

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.

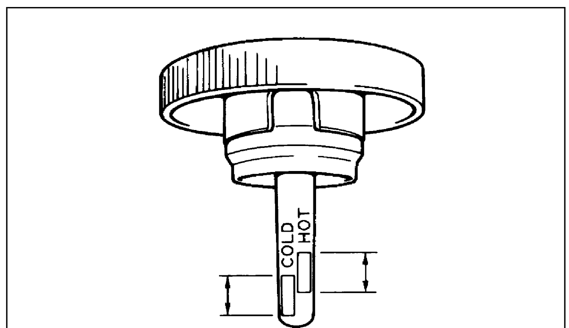
Tightening torque:
83 N·m (8.5 kgf-m, 61.5 ft-lb)

5. POWER STEERING FLUID LEVEL

SA07701A1005

1) Check power steering fluid for deterioration or contamination. If the fluid is highly deteriorated or contaminated, drain it and refill with new fluid.
2) Check joints and units for oil leakage. If any oil leaks are found, repair or replace the applicable part.
3) Inspect fluid level on flat and level surface with engine “OFF” by indicator of reservoir tank.
If the level is at lower point or below, add fluid to keep the level in the specified range of the indicator. If at upper point or above, drain fluid by using a syringe or the like.

(1) Check at temperature 20°C (68°F) on reservoir surface of oil pump; read the fluid level on the “COLD” side.
(2) Check at temperature 80°C (176°F) on reservoir surface of oil pump; read the fluid level on the “HOT” side.



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NOTE:
When fluid level exceeds specified level, drain fluid to keep the level in the specified range of indicator by using a syringe or the like.

Recommended fluid:
Dexron IIE or 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.

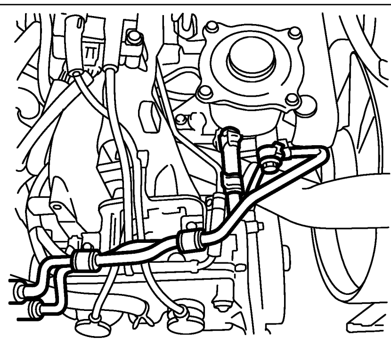
NOTE:
- Wipe the leakage fluid off after correcting fluid leaks, or a wrong diagnosis is taken later.
- Also pay attention to clearances between hoses (or pipings) and other parts when inspecting fluid leaks.

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 a new one if necessary.

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



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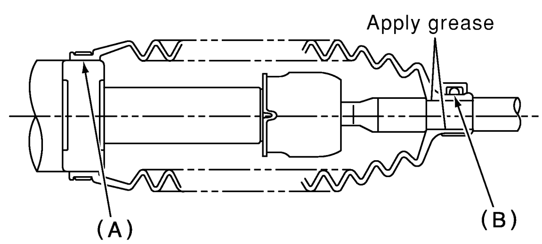
8. POWER STEERING PIPES FOR DAMAGE SA07701A1008

Check power steering pipes for corrosion and damage.
Replace pipes with a 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.



GI0023A

10. FITTING BOLTS AND NUTS SA07701A1010

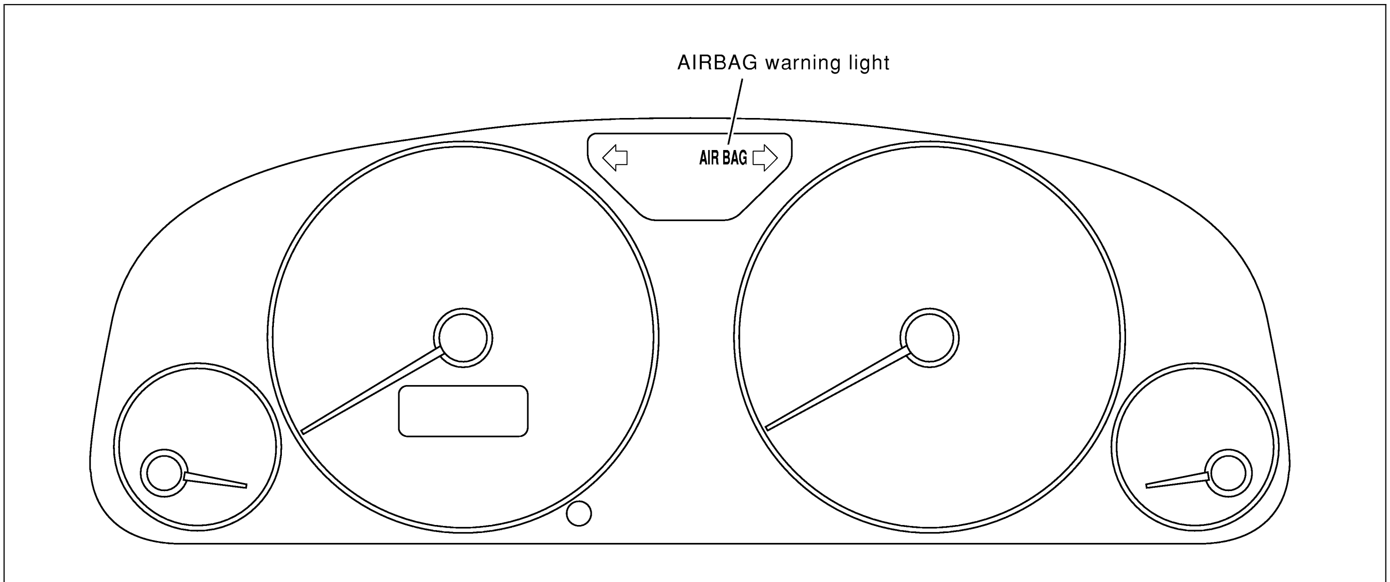
Inspect fitting bolts and nuts of oil pump and bracket for looseness, and retighten them if necessary.
Inspect and/or retighten them when engine is cold.

26. 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 turns on to identify the fault.



S1M0160A

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.>

FUEL INJECTION (FUEL SYSTEMS)

FU

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1. General Description S175001

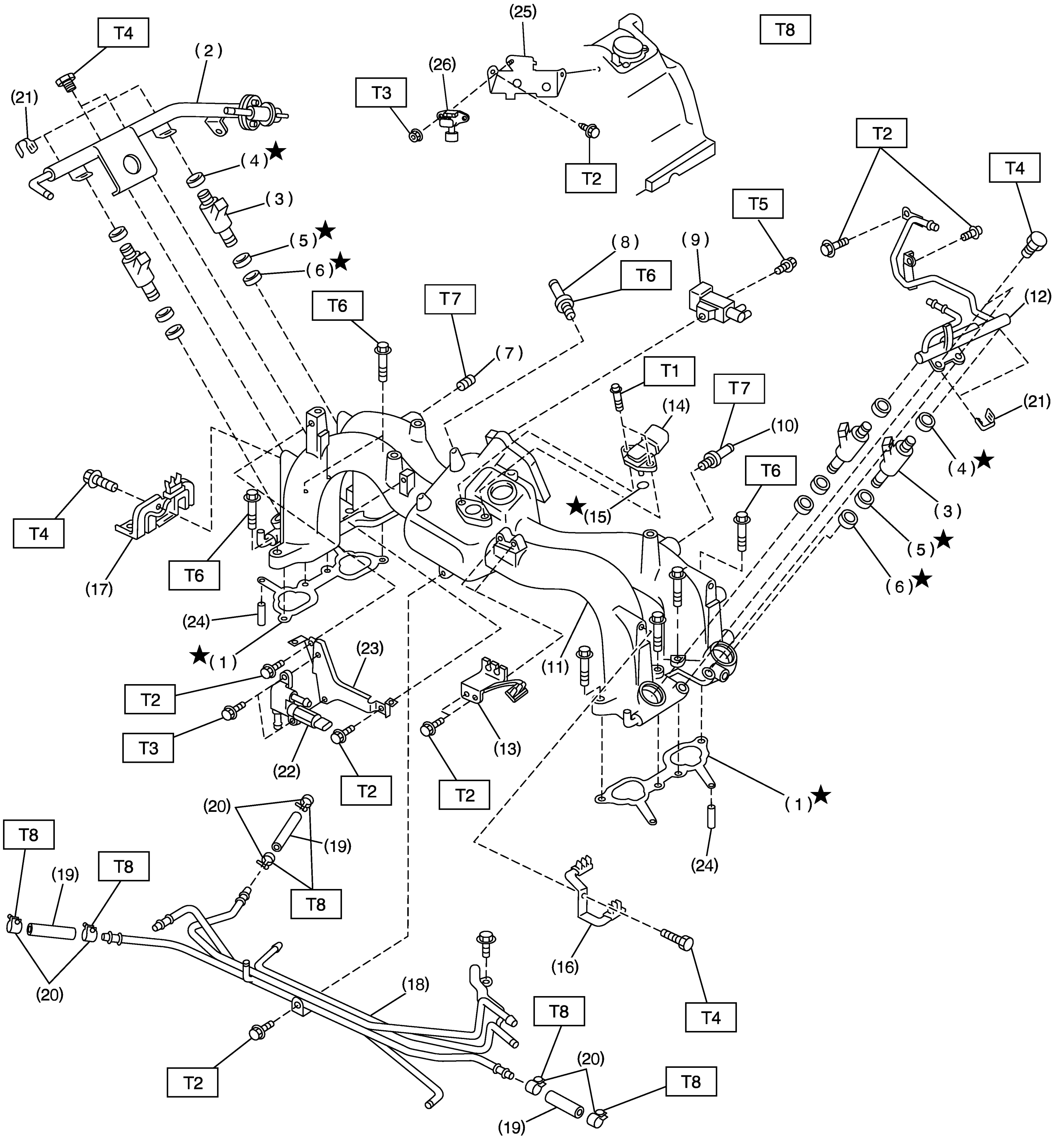
A: SPECIFICATIONS S175001E49

Model		
Fuel tank	Capacity	60 ℓ (15.9 US gal, 13.2 Imp gal)
	Location	Under rear seat
Fuel pump	Type	Impeller
	Shutoff discharge pressure	373 — 677 kPa (3.8 — 6.9 kg/cm^2, 54 — 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

MEMO:

B: COMPONENT S175001A05

1. INTAKE MANIFOLD S175001A0501

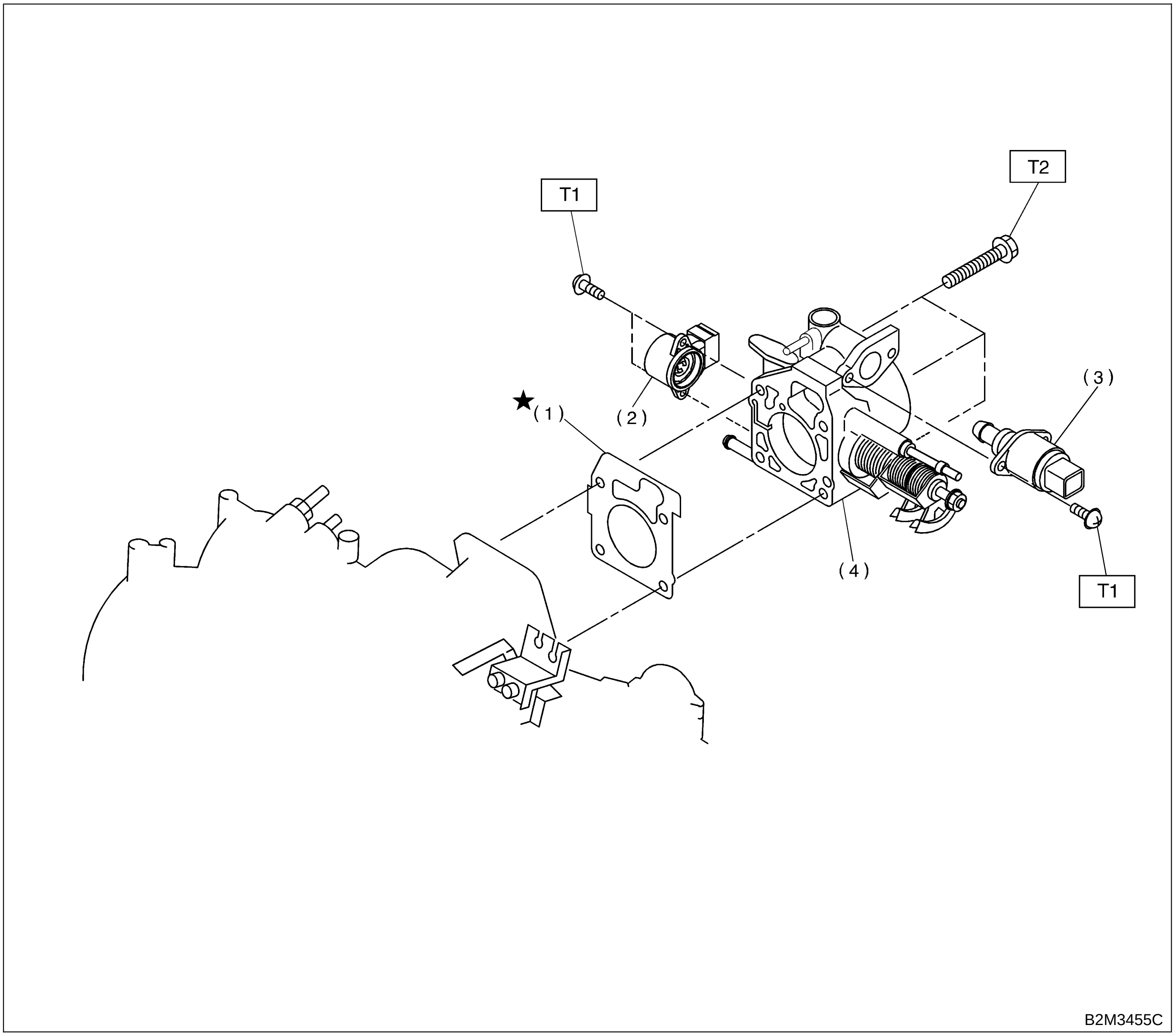


S2M2270A

(1) Intake manifold gasket
(2) Fuel injector pipe RH
(3) Fuel injector
(4) O-ring
(5) O-ring
(6) O-ring
(7) Plug
(8) PCV valve
(9) Purge control solenoid valve
(10) Nipple
(11) Intake manifold
(12) Fuel injector pipe LH
(13) Accelerator cable bracket
(14) Intake air temperature and pressure sensor
(15) O-ring
(16) Plug cord holder LH
(17) Plug cord holder RH
(18) Fuel pipe ASSY
(19) Fuel hose
(20) Clip
(21) Clip
(22) Air assist injector solenoid valve
(23) Air assist injector solenoid valve bracket
(24) Guide pin
(25) Atmospheric pressure sensor bracket
(26) Atmospheric pressure sensor

Tightening torque: N·m (kgf-m, ft-lb)
T1: 3.4 (0.35, 2.5)
T2: 5.0 (0.51, 3.7)
T3: 6.4 (0.65, 4.7)
T4: 19 (1.9, 13.7)
T5: 16 (1.6, 12)
T6: 25 (2.6, 18.8)
T7: 17 (1.7, 12)
T8: 1.5 (0.15, 1.1)

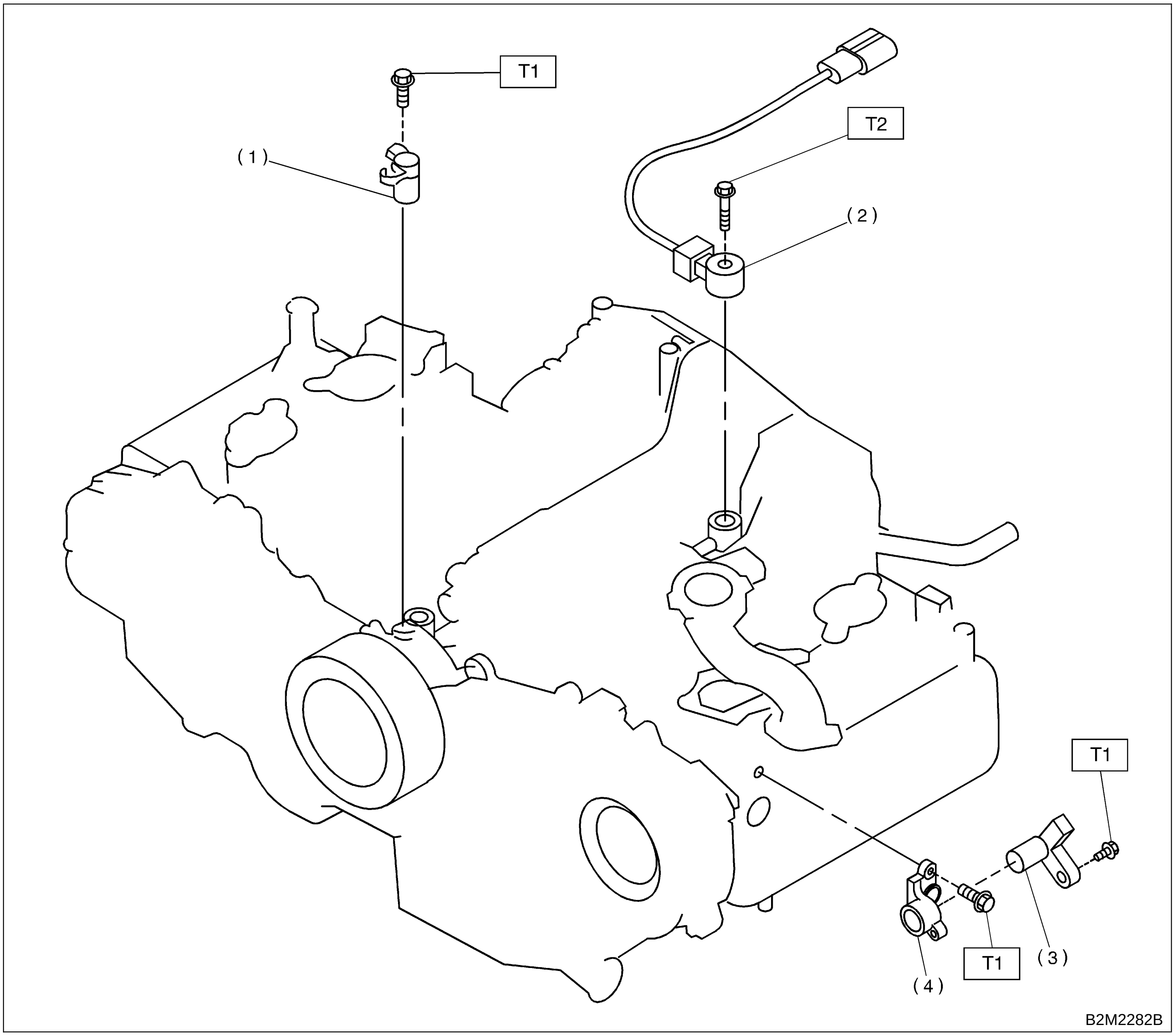
2. AIR INTAKE SYSTEM *S175001A0502*



(1) Gasket
(2) Throttle position sensor
(3) Idle air control solenoid valve
(4) Throttle body

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.6 (0.16, 1.2)
T2: 22 (2.2, 16)

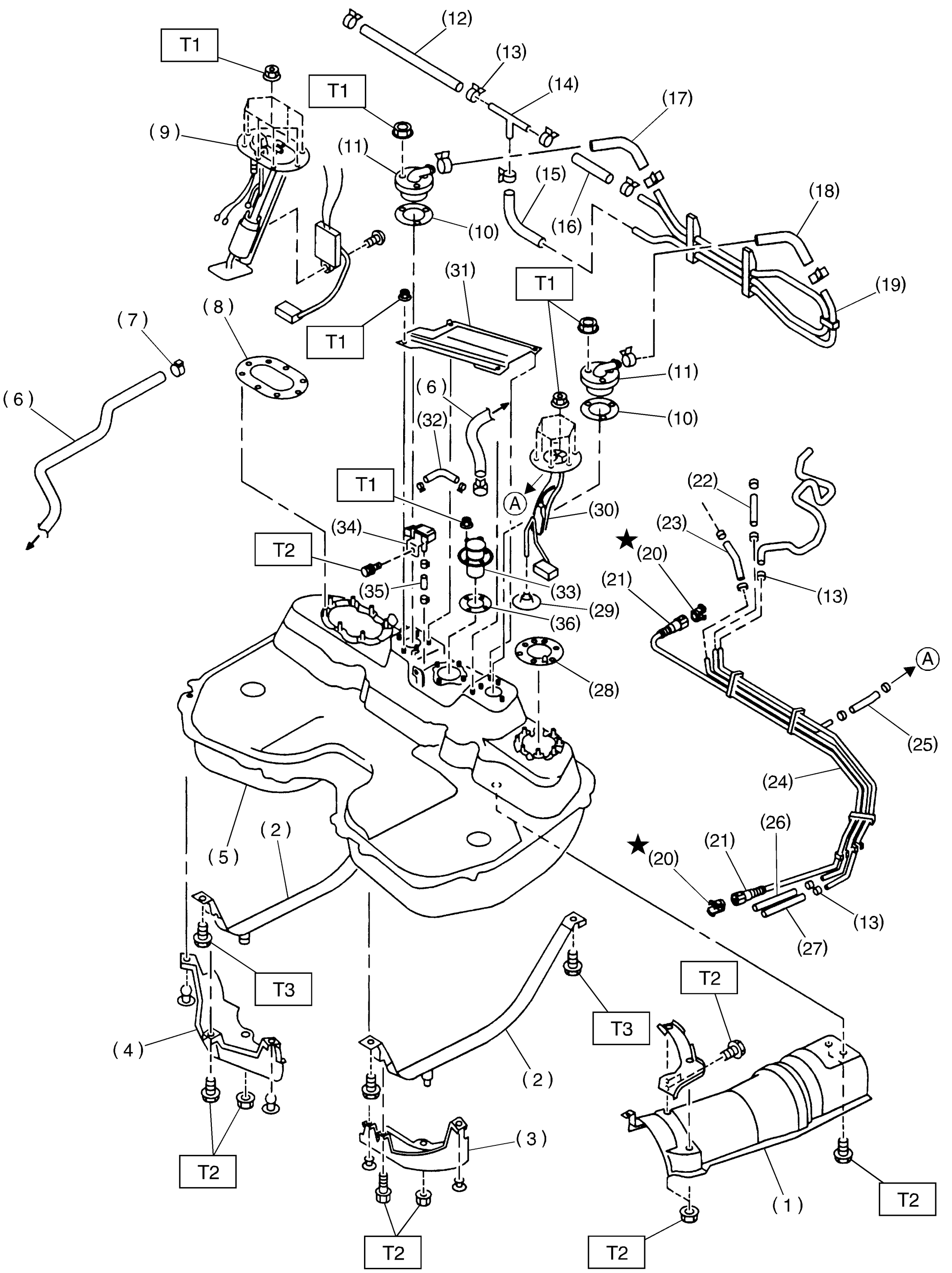
3. CRANKSHAFT POSITION, CAMSHAFT POSITION AND KNOCK SENSORS *S175001A0503*



(1) Crankshaft position sensor
(2) Knock sensor
(3) Camshaft position sensor
(4) Camshaft position sensor support

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 24 (2.4, 17.4)

4. FUEL TANK *S175001A0504*

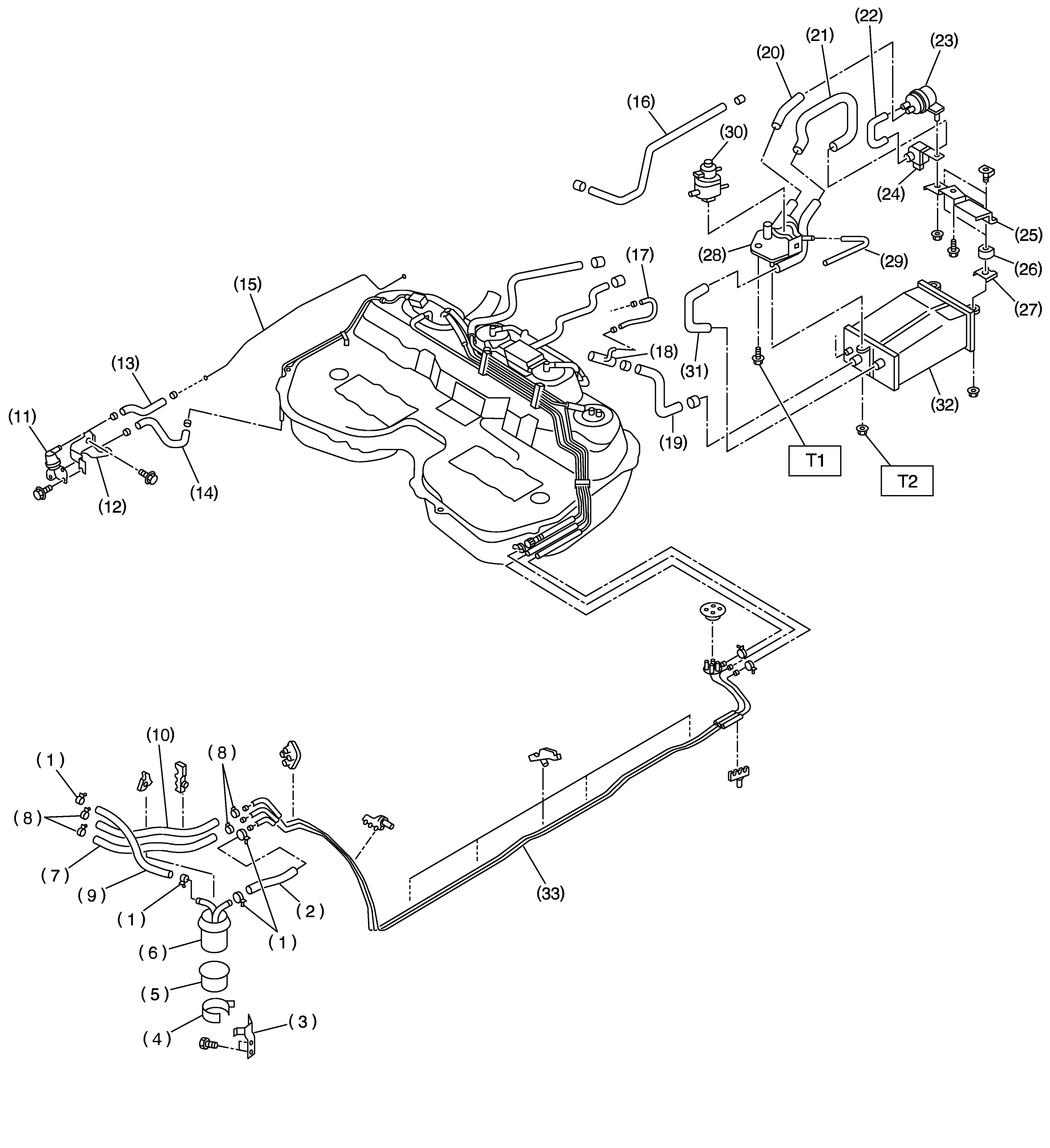


S2M2001A

(1) Heat sealed cover
(2) Fuel tank band
(3) Protector LH
(4) Protector RH
(5) Fuel tank
(6) Canister hose A
(7) Clamp
(8) Fuel pump gasket
(9) Fuel pump ASSY
(10) Fuel cut valve gasket
(11) Fuel cut valve
(12) Evaporation hose A
(13) Clip
(14) Joint pipe
(15) Evaporation hose C
(16) Evaporation hose B
(17) Evaporation hose D
(18) Evaporation hose E
(19) Evaporation pipe ASSY
(20) Retainer
(21) Quick connector
(22) Jet pump hose A
(23) Fuel return hose A
(24) Fuel pipe ASSY
(25) Jet pump hose B
(26) Fuel return hose B
(27) Evaporation hose F
(28) Fuel sub level sensor gasket
(29) Jet pump filter
(30) Fuel sub level sensor
(31) Protector cover
(32) Vent valve hose
(33) Vent valve
(34) Fuel tank pressure sensor
(35) Fuel tank pressure sensor hose
(36) Vent valve gasket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.3)
T2: 7.4 (0.75, 5.4)
T3: 33 (3.4, 25)

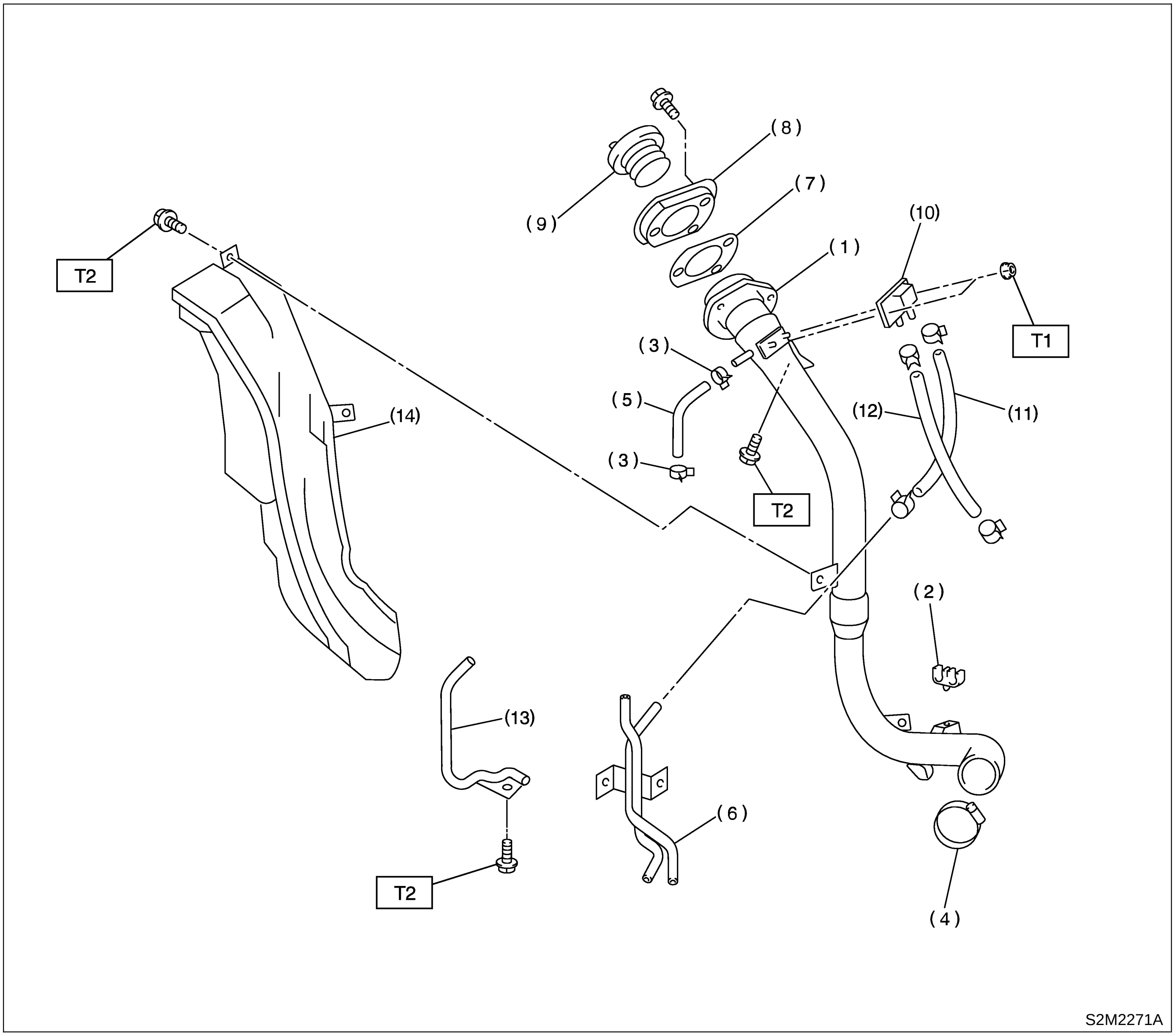
5. FUEL LINE *S175001A0505*



(1) Clamp
(2) Fuel delivery hose A
(3) Fuel filter bracket
(4) Fuel filter holder
(5) Fuel filter cup
(6) Fuel filter
(7) Evaporation hose
(8) Clip
(9) Fuel delivery hose B
(10) Fuel return hose
(11) Roll over valve
(12) Roll over valve bracket
(13) Evaporation hose A
(14) Evaporation hose B
(15) Evaporation pipe
(16) Evaporation hose C
(17) Evaporation hose D
(18) Joint pipe
(19) Canister hose A
(20) Drain filter hose A
(21) Drain valve hose
(22) Drain filter hose B
(23) Drain filter
(24) Drain valve
(25) Canister upper bracket
(26) Cushion rubber
(27) Canister lower bracket
(28) Canister holder
(29) Evaporation hose E
(30) Pressure control solenoid valve
(31) Canister hose B
(32) Canister
(33) Fuel pipe ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18)
T2: 23 (2.3, 16.6)

6. FUEL FILLER PIPE *S175001A0506*



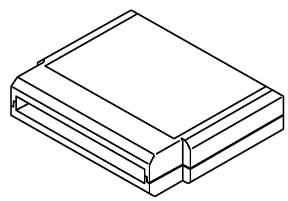
(1) Fuel filler pipe ASSY
(2) Evaporation hose holder
(3) Clamp
(4) Clamp
(5) Evaporation hose A
(6) Evaporation pipe
(7) Filler pipe packing
(8) Filler ring
(9) Filler cap
(10) Shut valve
(11) Evaporation hose B
(12) Evaporation hose C
(13) Joint pipe
(14) Fuel filler pipe protector

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.3)
T2: 7.5 (0.76, 5.53)

C: CAUTION S175001A03

- 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.

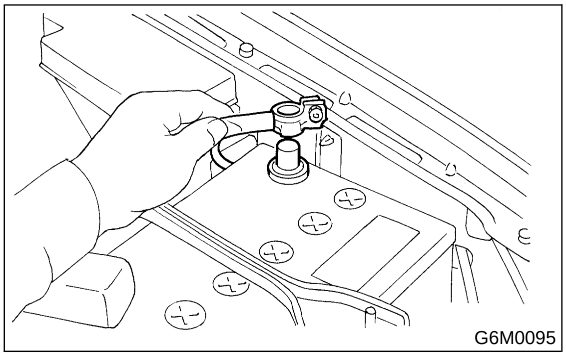
D: PREPARATION TOOL S175001A17

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3876	24082AA150 (Newly adopted tool)	CARTRIDGE	Troubleshooting for electrical system.
 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)

2. Throttle Body *S175010*

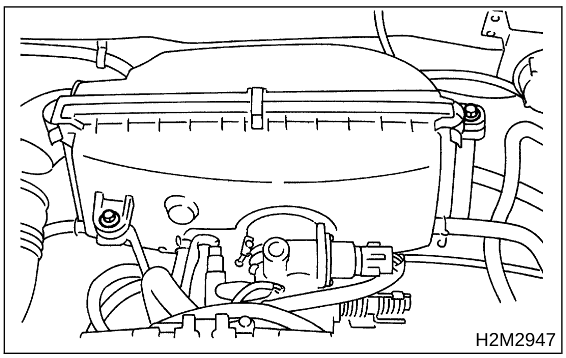
A: REMOVAL *S175010A18*

1) Disconnect battery ground cable.



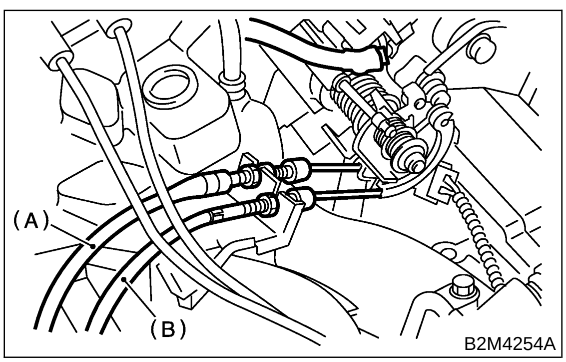
G6M0095

2) Remove air cleaner case.



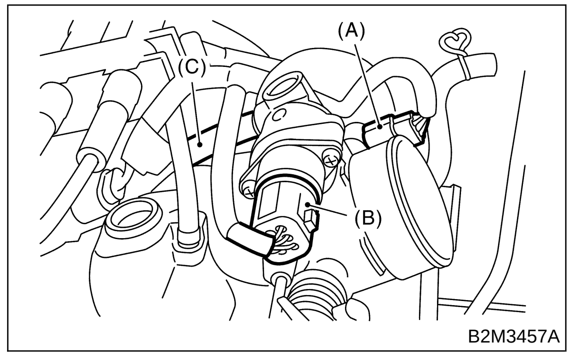
H2M2947

3) Disconnect accelerator cable (A).
4) Disconnect cruise control cable (B). (With cruise control model)



B2M4254A

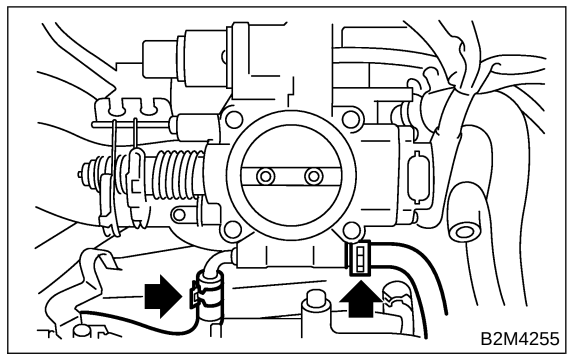
5) Disconnect connectors from idle air control solenoid valve, throttle position sensor.
6) Disconnect air by-pass hose from throttle body.



B2M3457A

(A) Throttle position sensor
(B) Idle air control solenoid valve
(C) Air by-pass hose

7) Disconnect engine coolant hoses from throttle body.



B2M4255

8) Remove bolts which install throttle body to intake manifold.

B: INSTALLATION *S175010A11*

Install in the reverse order of removal.

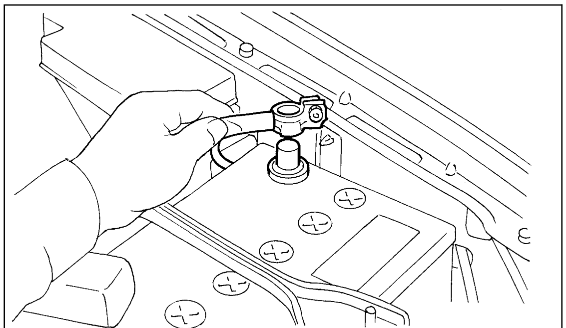
NOTE:
Always use a new gasket.

Tightening torque:
Throttle body;
22 N·m (2.2 kgf-m, 15.9 ft-lb)
Air cleaner case;
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

3. Intake Manifold *S175034*

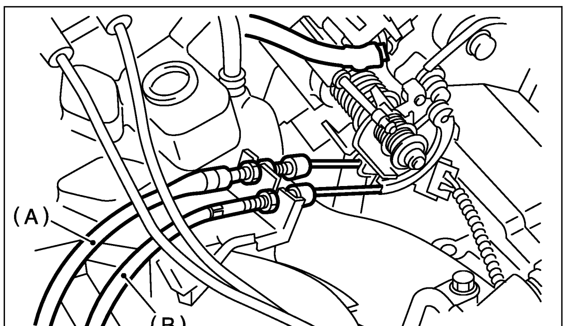
A: REMOVAL *S175034A18*

1) Release fuel pressure. <Ref. to FU-52, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open fuel flap lid, and remove fuel filler cap.
3) Disconnect battery ground cable.



G6M0095

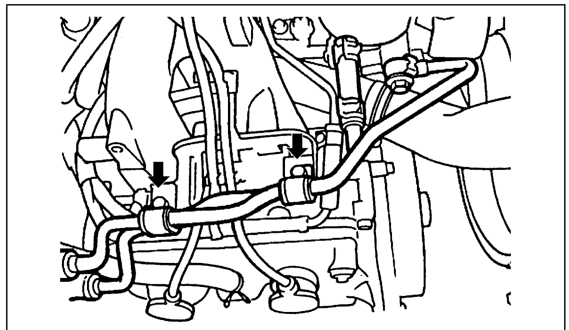
4) Remove air intake duct and air cleaner assembly. <Ref. to IN-7, REMOVAL, Air Intake Duct.> and <Ref. to IN-6, REMOVAL , Air Cleaner Case.>
5) Disconnect accelerator cable (A).
6) Disconnect cruise control cable (B). (With cruise control model)



B2M4254A

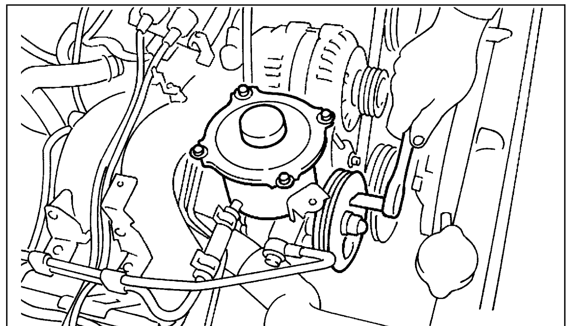
7) Remove power steering pump and tank from brackets.
   (1) Remove resonator chamber. <Ref. to IN-8, REMOVAL, Resonator Chamber.>
   (2) Remove front side V-belt. <Ref. to ME-42, REMOVAL, V-belt.>
   (3) Remove bolts which hold power steering pipes brackets onto intake manifold.

NOTE:
Do not disconnect power steering hose.



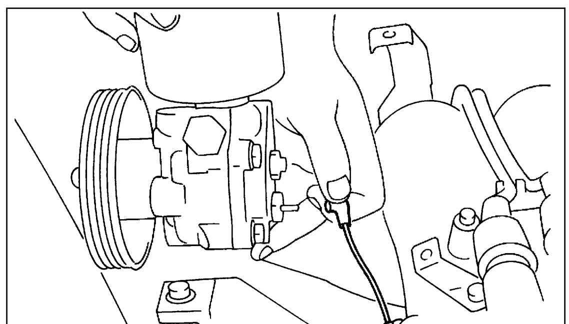
S2M1013

   (4) Remove bolts which install power steering pump bracket.



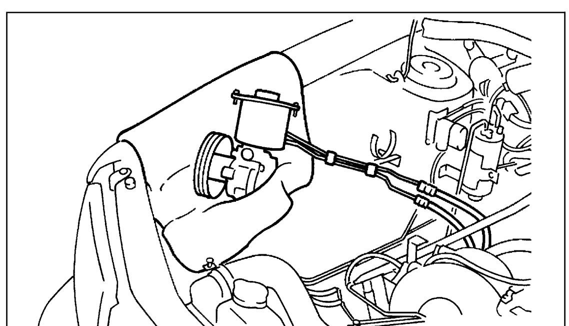
S2M0488

   (5) Disconnect connector from power steering pump switch.



S2M0490

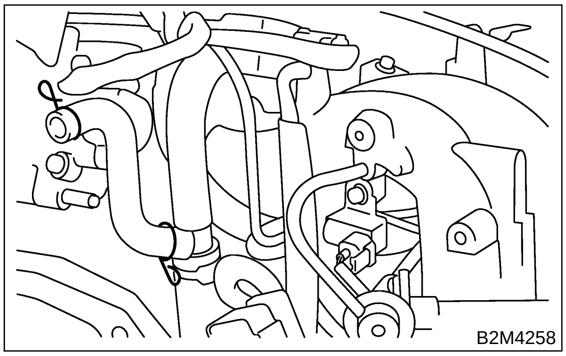
   (6) Place power steering pump and tank on the right side wheel apron.



S2M0491

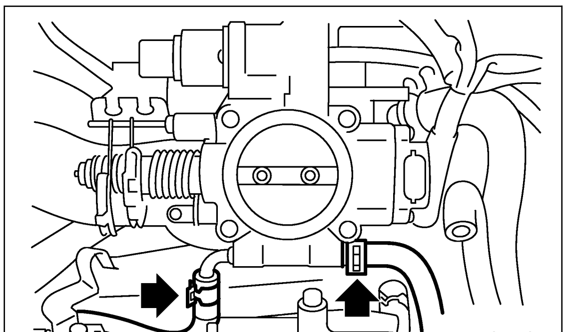
8) Disconnect spark plug cords from spark plugs.

9) Disconnect PCV hose from intake manifold.



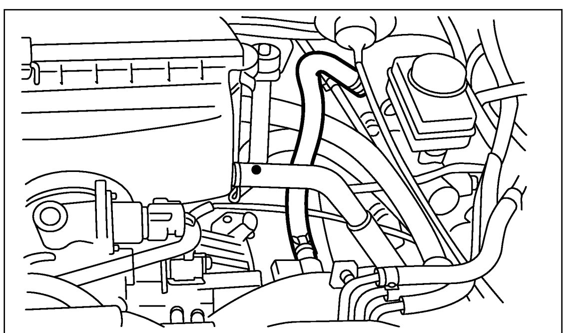
B2M4258

10) Disconnect engine coolant hose from throttle body.



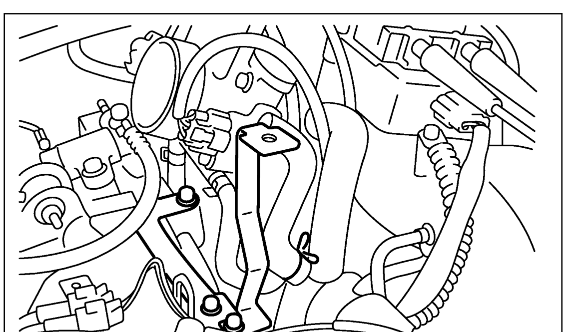
B2M4255

11) Disconnect brake booster hose.



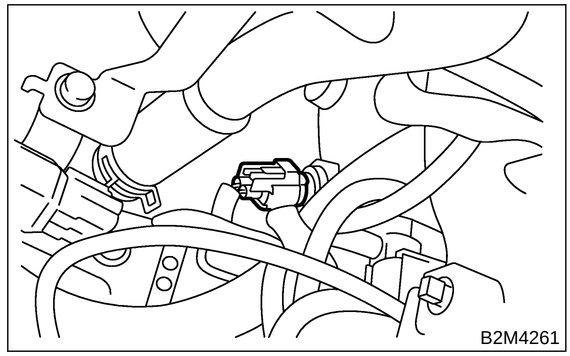
B2M4259

12) Remove air cleaner case stay RH and engine harness bracket, and disconnect engine harness connectors from bulkhead harness connectors.



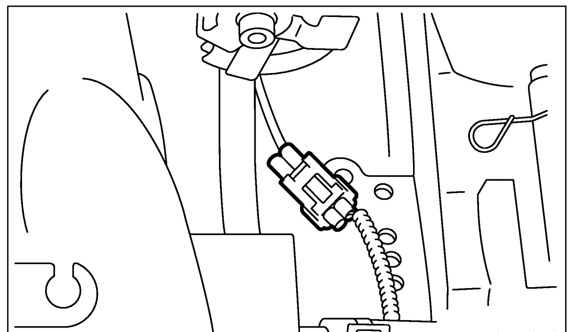
B2M4260

13) Disconnect connectors from engine coolant temperature sensor.



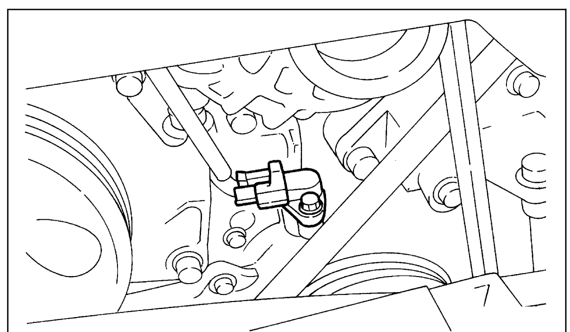
B2M4261

14) Disconnect knock sensor connector.



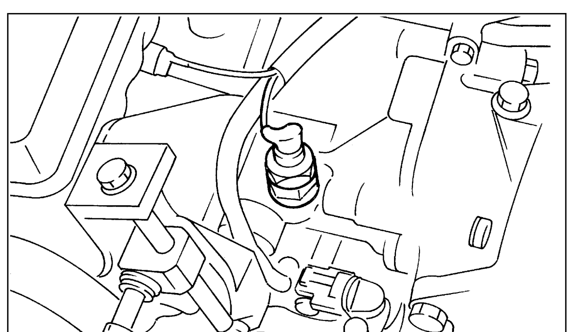
B2M4262

15) Disconnect connector from crankshaft position sensor.



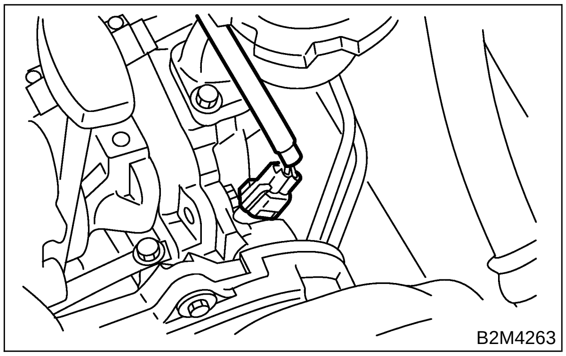
B2M1252

16) Disconnect connector from oil pressure switch.



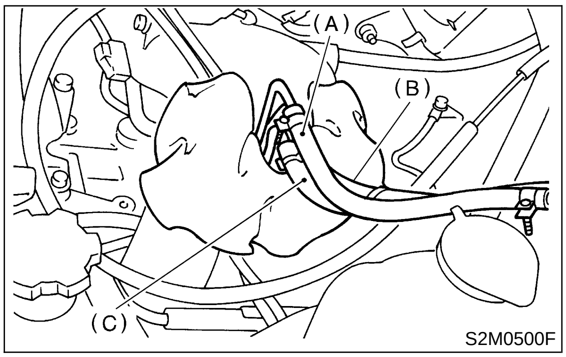
B2M1253

17) Disconnect connector from camshaft position sensor.


B2M4263

18) Disconnect fuel hoses from fuel pipes.

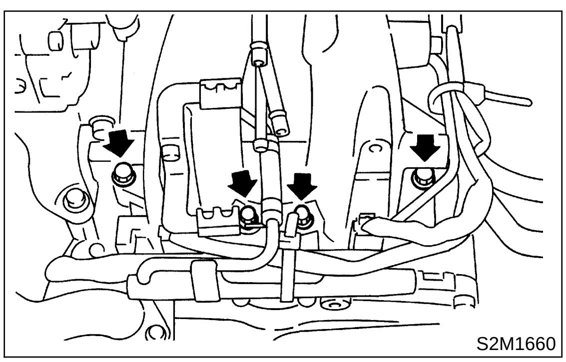
WARNING:
- **Do not spill fuel.**
- **Catch fuel from hoses in a container or cloth.**



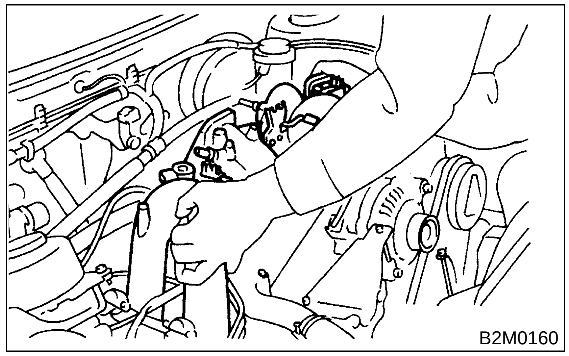
S2M0500F

(A) Fuel delivery hose
(B) Return hose
(C) Evaporation hose

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


S2M1660

20) Remove intake manifold.

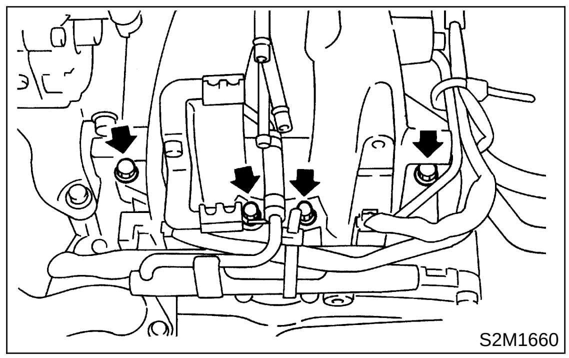

B2M0160

B: INSTALLATION *S175034A11*

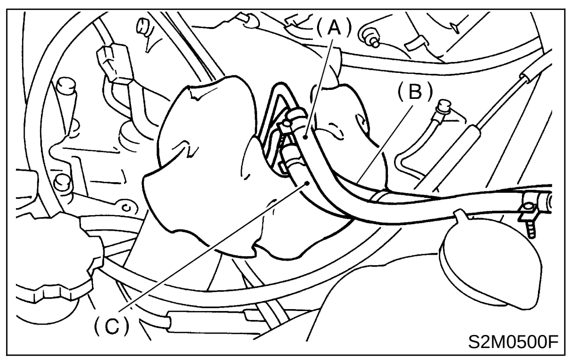
1) Install intake manifold onto cylinder heads.

NOTE:
Always use new gaskets.

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


S2M1660

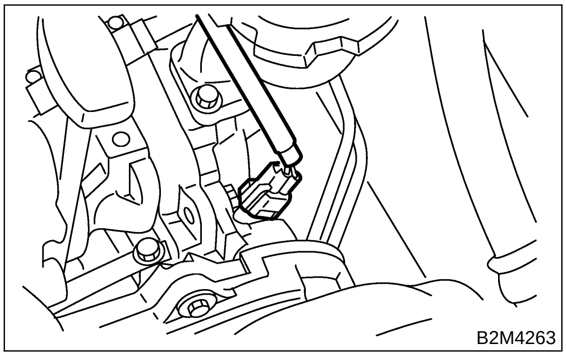
2) Connect fuel hoses.



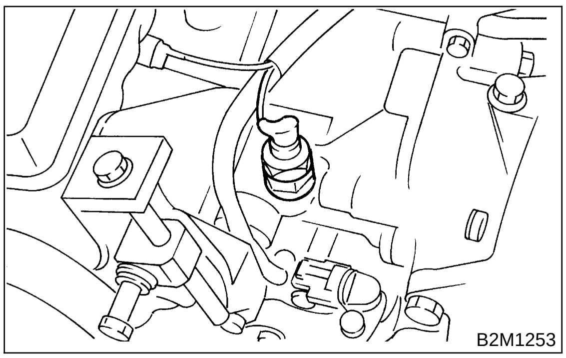
S2M0500F

(A) Fuel delivery hose
(B) Return hose
(C) Evaporation hose

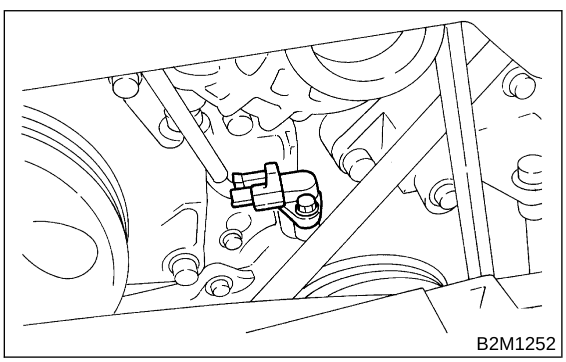
3) Connect connector to camshaft position sensor.



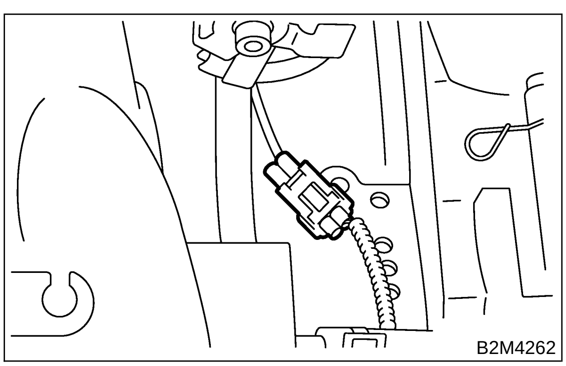
4) Connect connector to oil pressure switch.



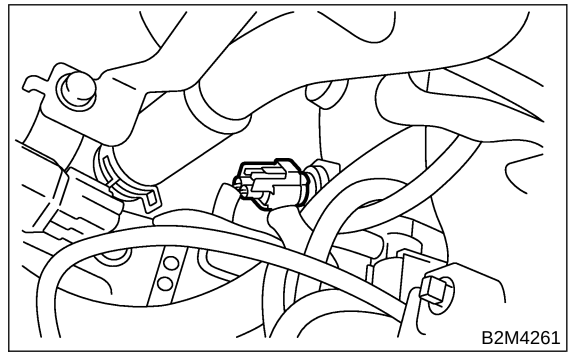
5) Connect connector to crankshaft position sensor.



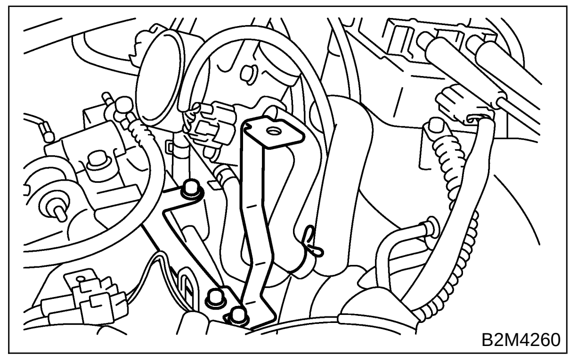
6) Connect knock sensor connector.



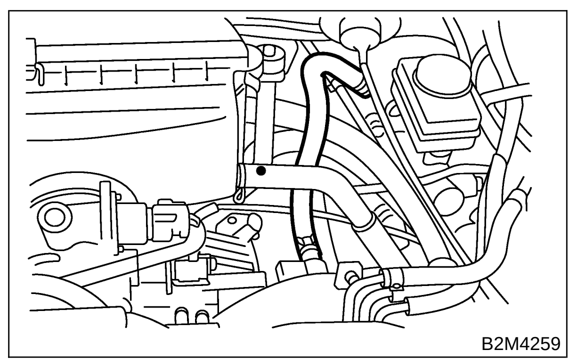
7) Connect connectors to engine coolant temperature sensor.



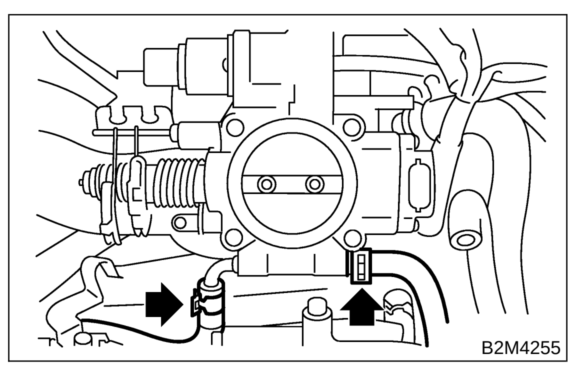
8) Install air cleaner case stay RH and engine harness bracket, and connect engine harness connectors to bulkhead connectors.



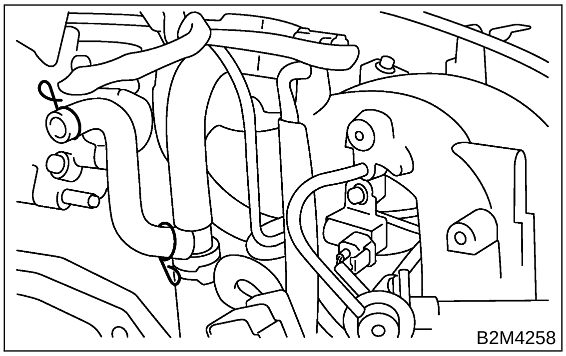
9) Connect brake booster hose.



10) Connect engine coolant hose to throttle body.

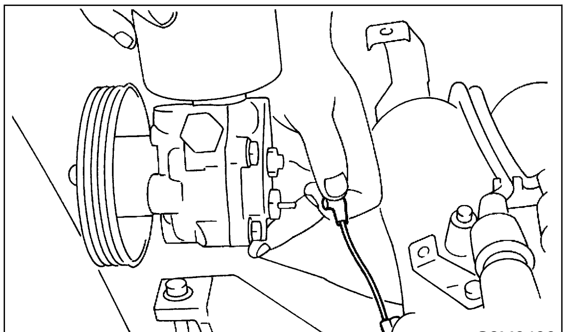


11) Connect PCV hose to intake manifold.



B2M4258

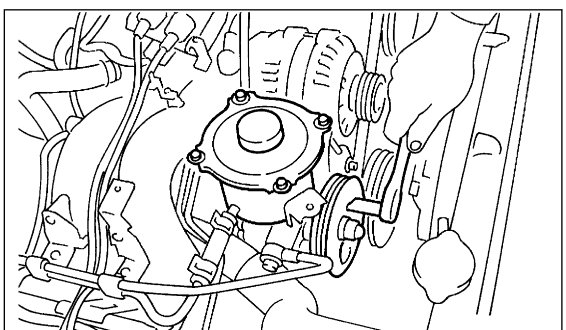
12) Connect spark plug cords to spark plugs.
13) Install power steering pump on brackets.
(1) Connect terminal to power steering pump switch.



S2M0490

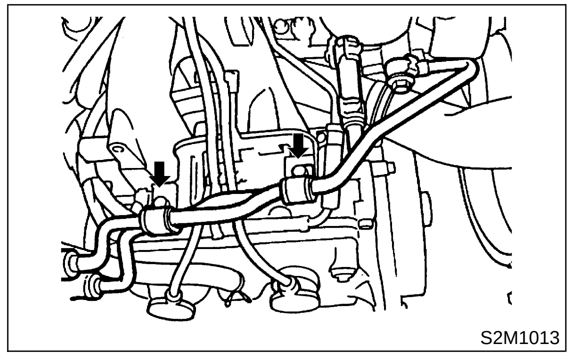
(2) Tighten bolts which install power steering pump on bracket.

Tightening torque:
20.1 N·m (2.05 kgf-m, 14.8 ft-lb)



S2M0488

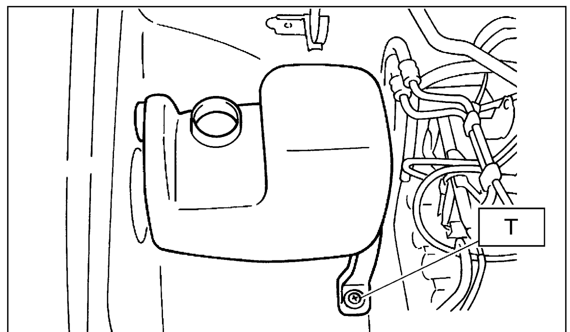
(3) Install power steering pipe brackets onto right side intake manifold.



S2M1013

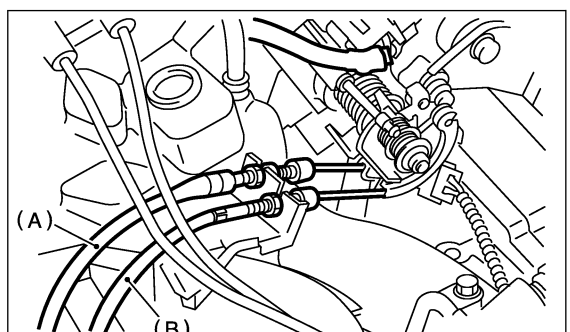
(4) Install front side V-belt. <Ref. to ME-42, INSTALLATION, V-belt.>
(5) Install resonator chamber.

Tightening torque:
33 N·m (3.4 kgf-m, 24.6 ft-lb)



S2M0481A

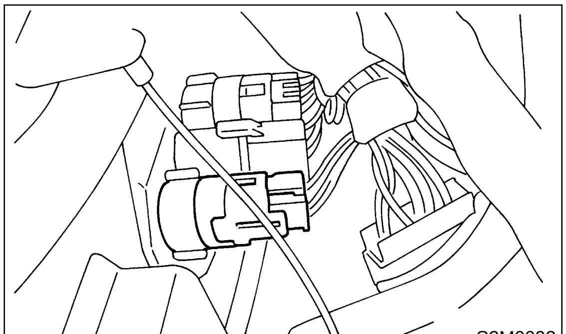
14) Connect accelerator cable (A).
15) Connect cruise control cable (B). (With cruise control models)



B2M4254A

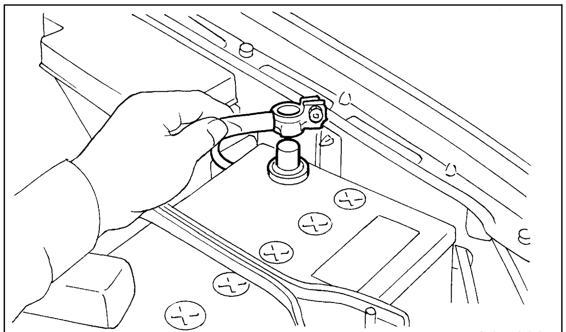
16) Install air intake duct and air cleaner assembly. <Ref. to IN-7, REMOVAL, Air Intake Duct.> and <Ref. to IN-6, INSTALLATION, Air Cleaner Case.>

17) Connect connector to fuel pump relay.



S2M0093

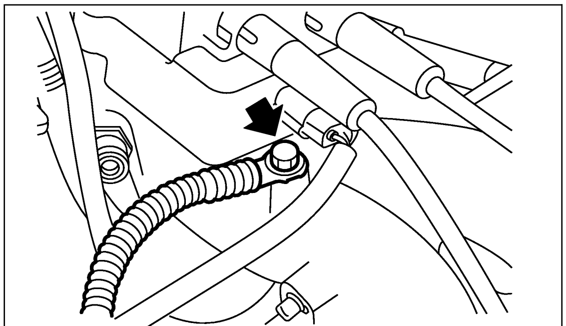
18) Connect battery ground cable.



G6M0095

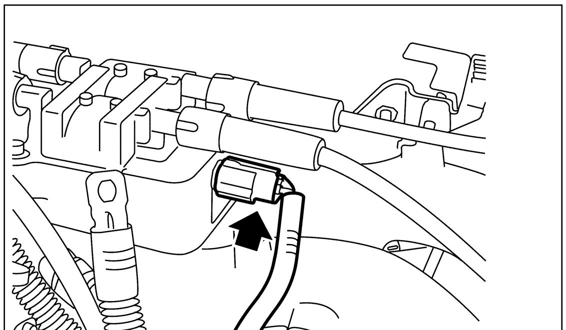
C: DISASSEMBLY S175034A06

1) Disconnect engine ground terminal from intake manifold.



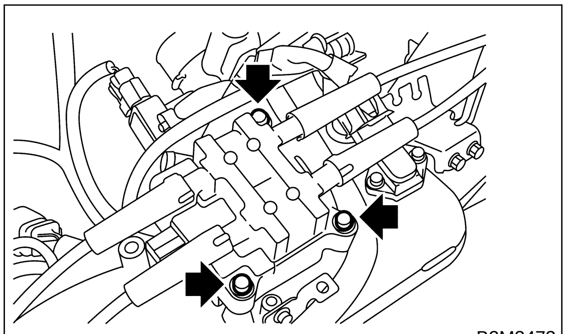
B2M4265

2) Disconnect connector from ignition coil and ignitor assembly.



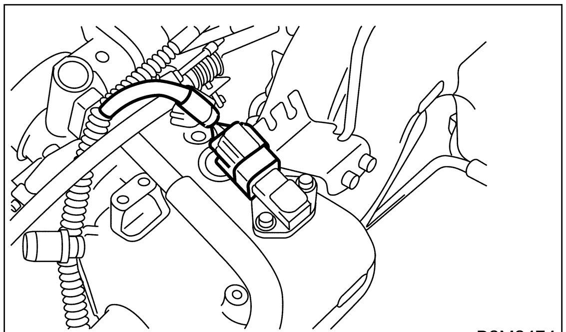
B2M3472

3) Remove ignition coil and ignitor assembly.



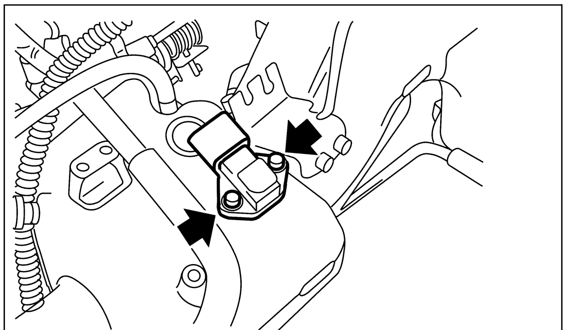
B2M3473

4) Disconnect connector from intake air temperature and pressure sensor.



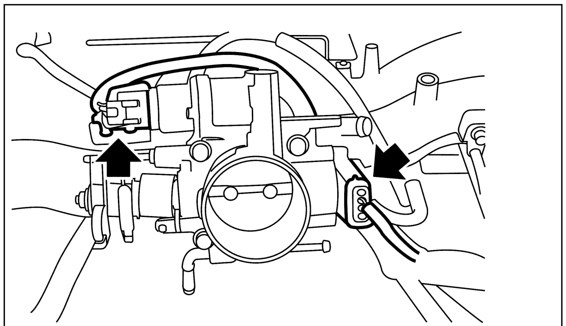
B2M3474

5) Remove intake air temperature and pressure sensor from intake manifold.



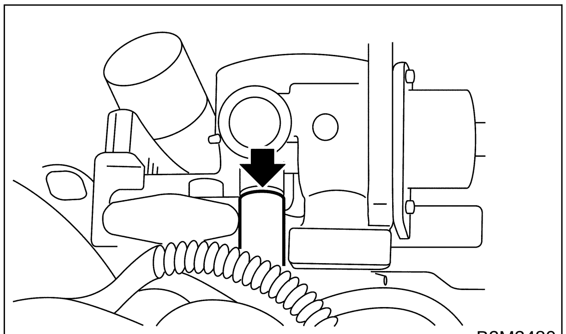
B2M3475

6) Disconnect connectors from throttle position sensor and idle air control solenoid valve.



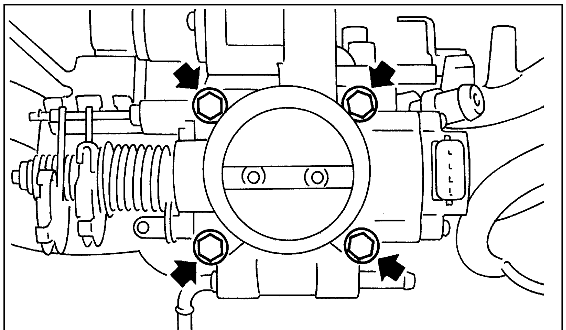
B2M3479

7) Disconnect air by-pass hose from throttle body.



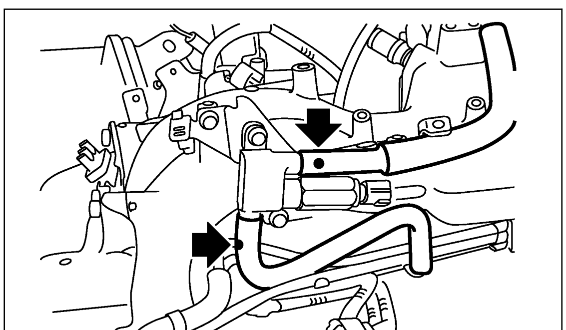
B2M3480

8) Remove throttle body.



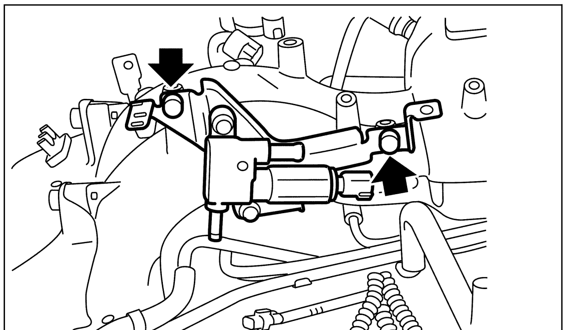
H2M2951

9) Disconnect connector from air assist injector solenoid valve.
10) Disconnect air by-pass hoses from air assist solenoid valve.



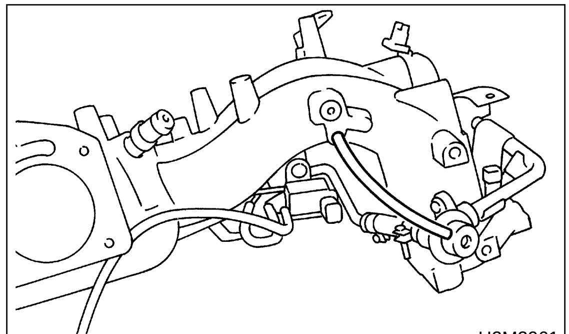
B2M4266

11) Remove air assist injector solenoid valve from intake manifold.



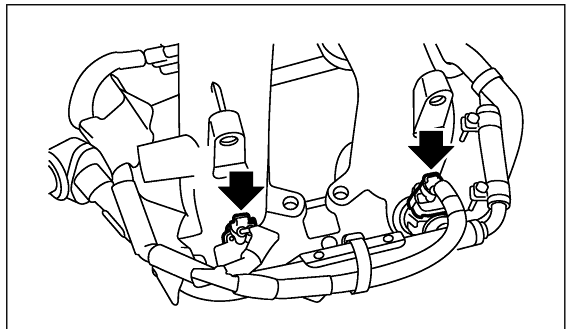
B2M3478

12) Disconnect pressure regulator vacuum hose from intake manifold.



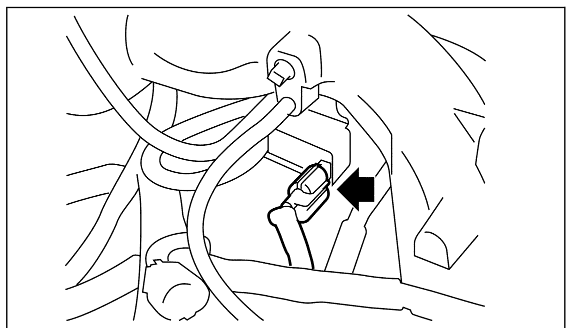
H2M2961

13) Disconnect connectors from fuel injectors.



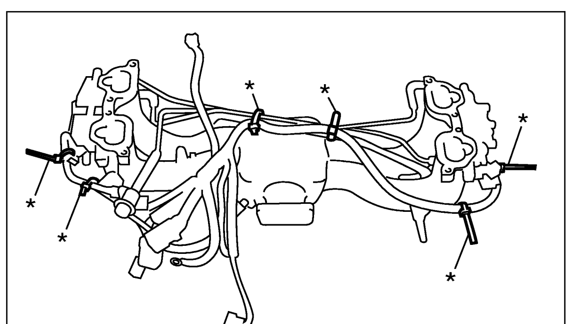
B2M4270

14) Disconnect connector from purge control solenoid valve.



B2M3485

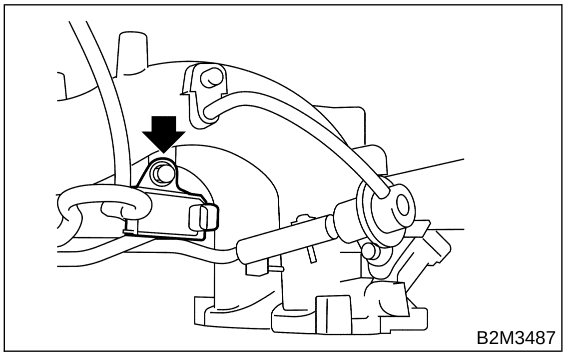
15) Disconnect air by-pass hose from purge control solenoid valve.
16) Remove harness bands (*) which hold engine harness onto intake manifold.



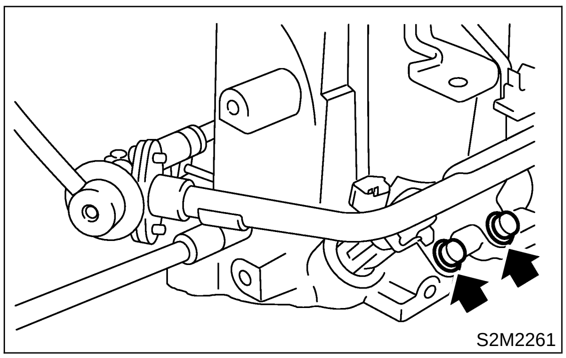
B2M3486A

17) Remove engine harness from intake manifold.

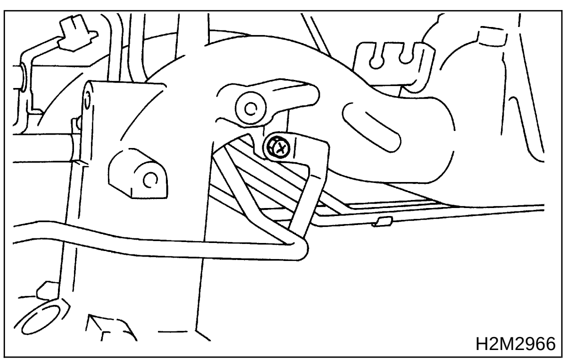
18) Remove purge control solenoid valve.



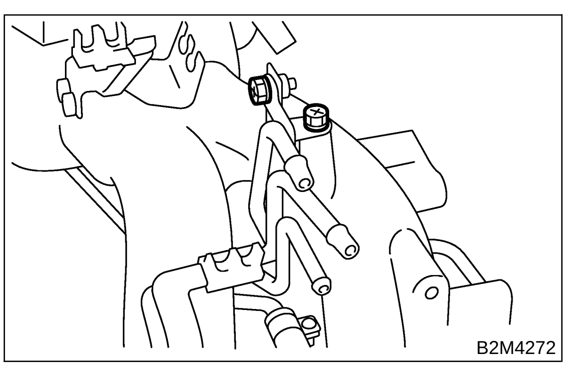
19) Remove bolt which installs injector pipe on intake manifold as shown in figure.



20) Remove bolt which installs injector pipe on intake manifold.

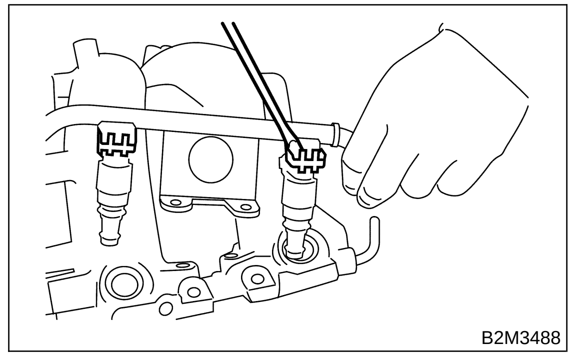


21) Remove two bolts which hold fuel pipes on the left side of intake manifold.

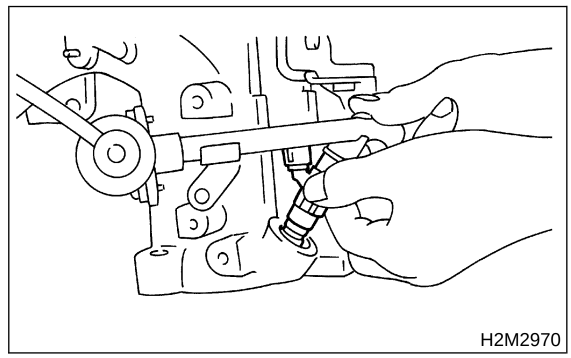


22) Remove fuel injectors.

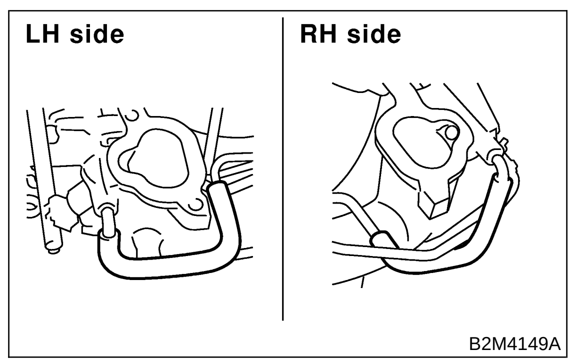
(1) Remove fuel injector securing clip.



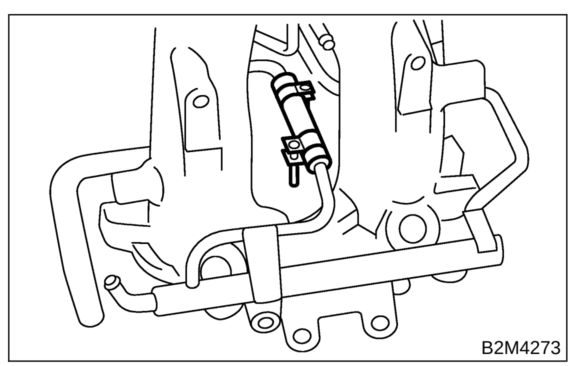
(2) Remove fuel injector while lifting up fuel injector pipe.



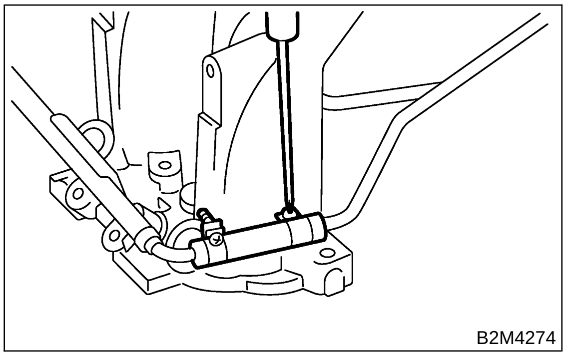
23) Disconnect air by-pass hoses from intake manifold.



24) Loosen clamp which holds front left side fuel hose to injector pipe and remove the pipe from fuel hose.

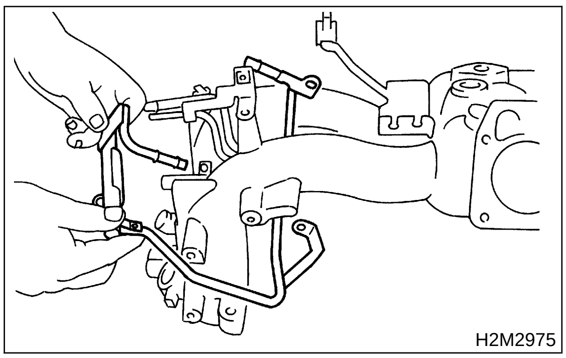


25) Loosen clamp which holds front right side fuel hose to injector pipe and remove the pipe from fuel hose.



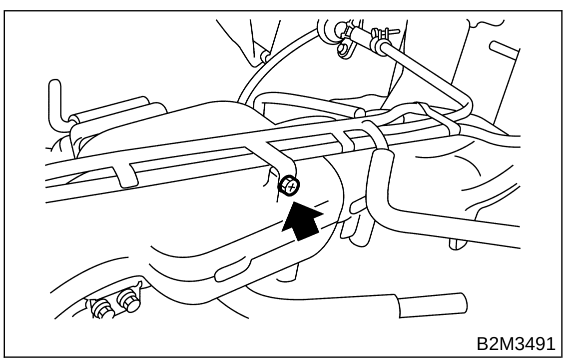
B2M4274

26) Remove fuel injector pipe.



H2M2975

27) Remove bolt which installs fuel pipes on intake manifold.



B2M3491

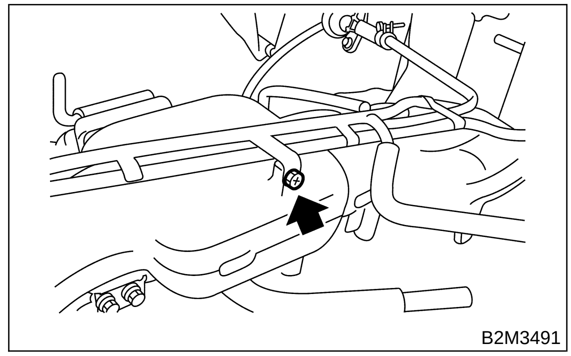
28) Remove fuel pipe assembly and pressure regulator, from intake manifold.

D: ASSEMBLY *S175034A02*

1) Install fuel pipe assembly and pressure regulator, etc. to intake manifold.

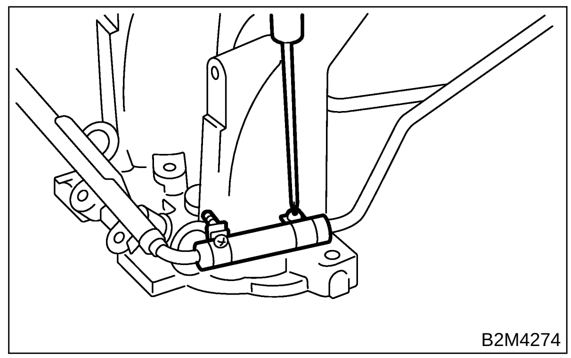
2) Tighten bolt which installs fuel pipes on intake manifold.

Tightening torque:
5.0 N·m (0.51 kgf-m, 3.7 ft-lb)



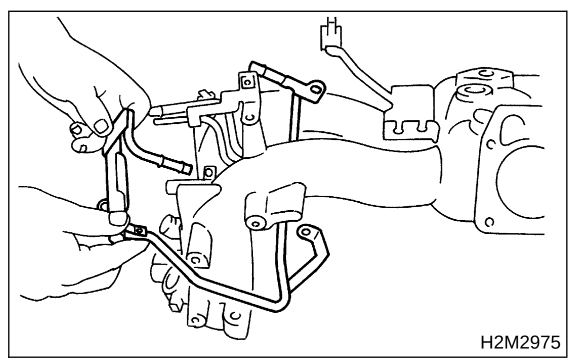
B2M3491

3) Connect right side fuel hose to injector pipe, and tighten clamp screw.



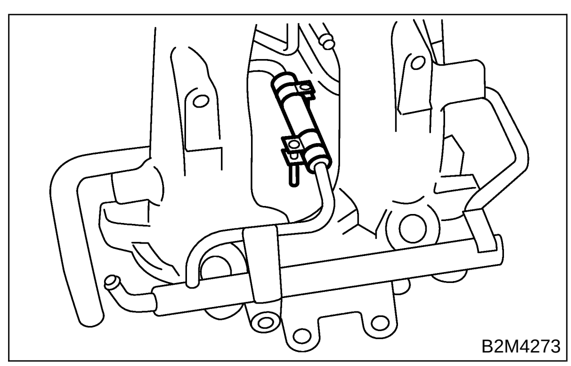
B2M4274

4) Install fuel injector pipe.



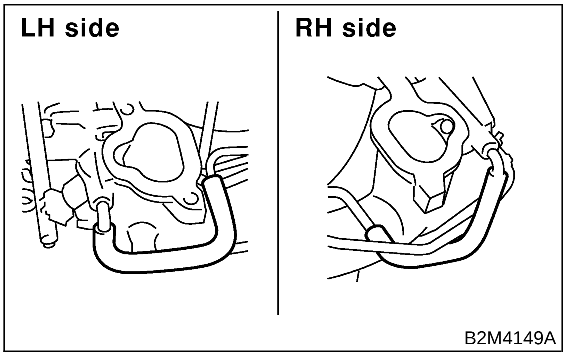
H2M2975

5) Connect left side fuel hose to injector pipe, and tighten clamp screw.



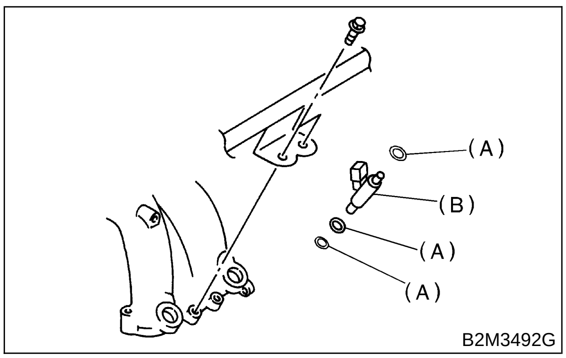
B2M4273

6) Connect air assist hoses.



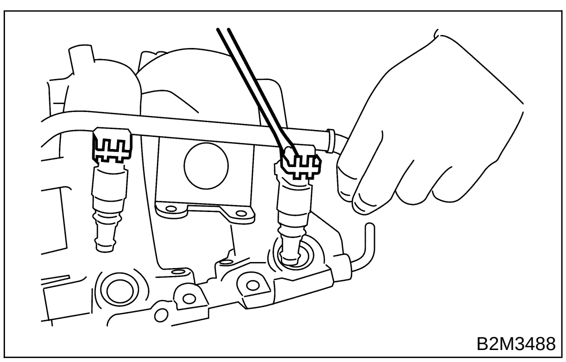
7) Install fuel injectors.

NOTE:
Always use new O-rings.



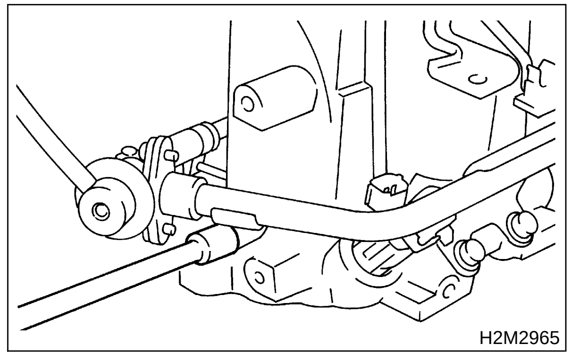
(A) O-ring
(B) Fuel injector

NOTE:
Do not forget to install the fuel injector securing clip.



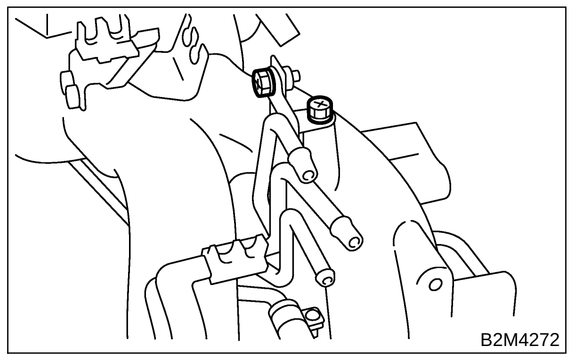
8) Tighten bolt which installs injector pipe on intake manifold.

Tightening torque:
5.0 N·m (0.51 kgf-m, 3.7 ft-lb)



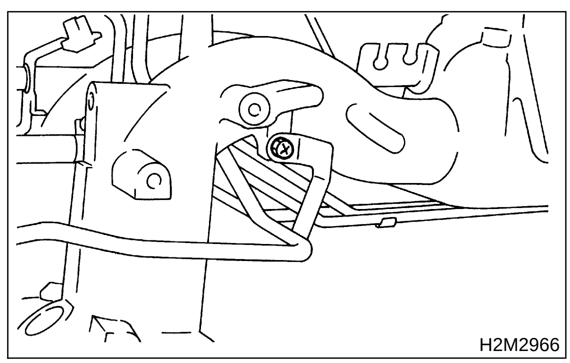
9) Tighten two bolts which install fuel pipes on the left side of intake manifold.

Tightening torque:
5.0 N·m (0.51 kgf-m, 3.7 ft-lb)



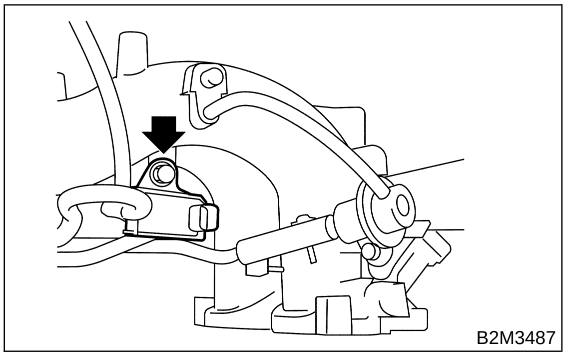
10) Tighten bolt which installs injector pipe on intake manifold.

Tightening torque:
5.0 N·m (0.51 kgf-m, 3.7 ft-lb)



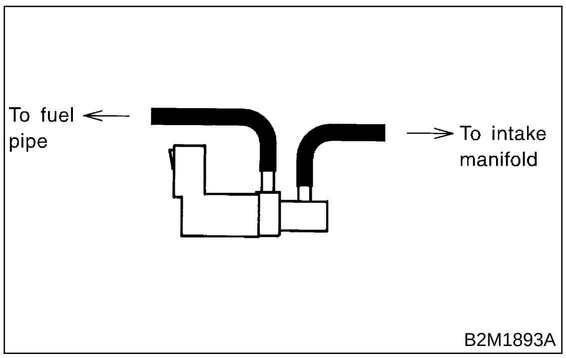
11) Install purge control solenoid valve.

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

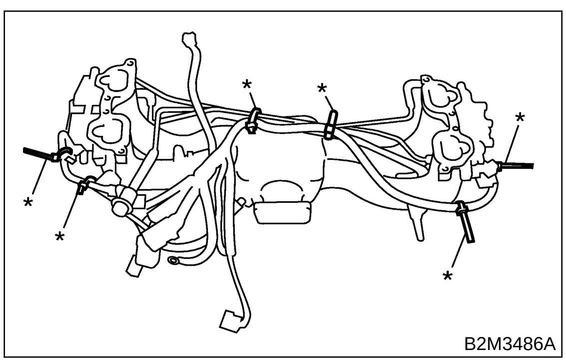


12) Connect hoses to purge control solenoid valve.

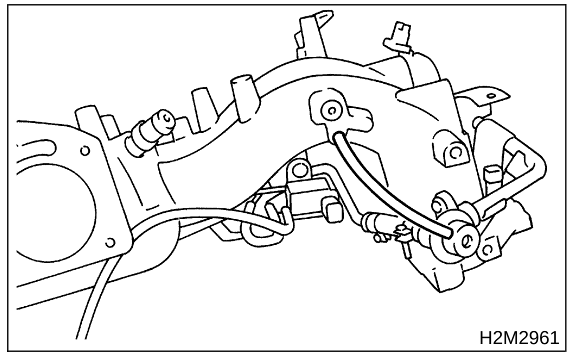
CAUTION:
Carefully connect the evaporation hoses.



13) Install engine harness onto intake manifold.
14) Connect connectors to fuel injectors and purge control solenoid valve.
15) Hold engine harness by harness band (*).

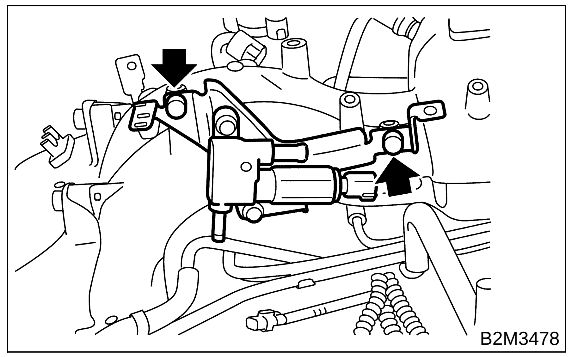


16) Connect pressure regulator vacuum hose to intake manifold.

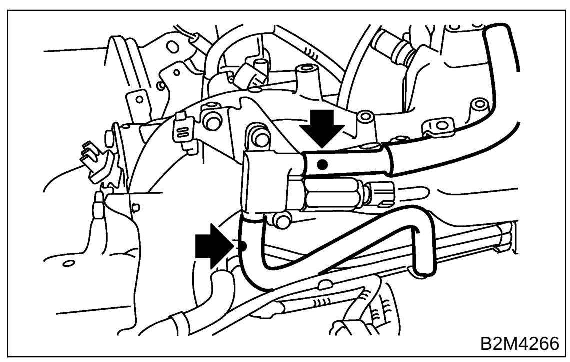


17) Install air assist injector solenoid valve to bracket.

Tightening torque:
5.0 N·m (0.51 kgf-m, 3.7 ft-lb)



18) Connect air by-pass hoses to air assist solenoid valve.

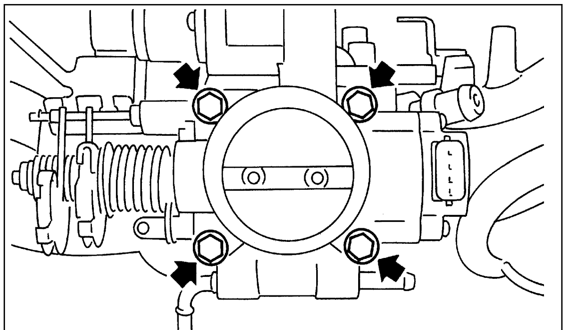


19) Connect connector to air assist solenoid valve.

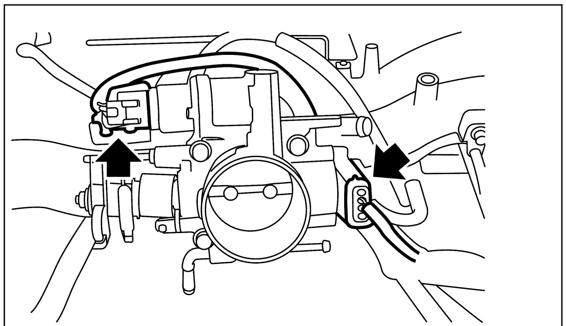
20) Install throttle body to intake manifold.

NOTE:
Replace gasket with a new one.

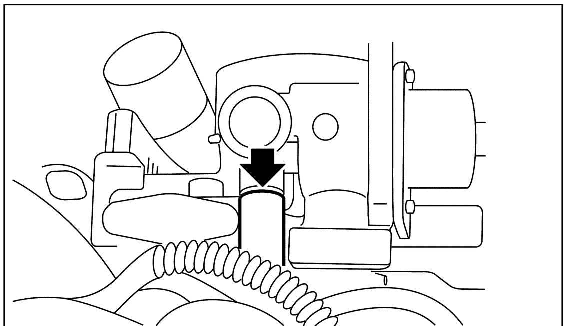
Tightening torque:
22 N·m (2.2 kgf-m, 15.9 ft-lb)


H2M2951

21) Connect connector to throttle position sensor and idle air control solenoid valve.

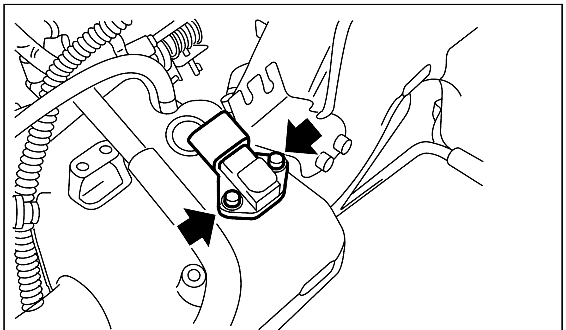

B2M3479

22) Connect air by-pass hose to throttle body.

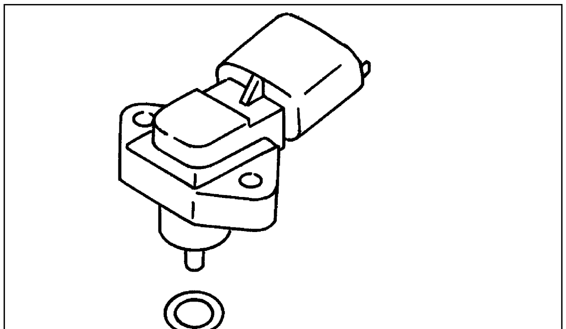

B2M3480

23) Install intake air temperature and pressure sensor.

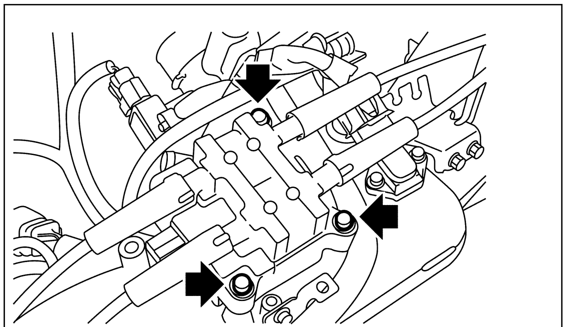
Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)


B2M3475

NOTE:
Replace O-ring with a new one.

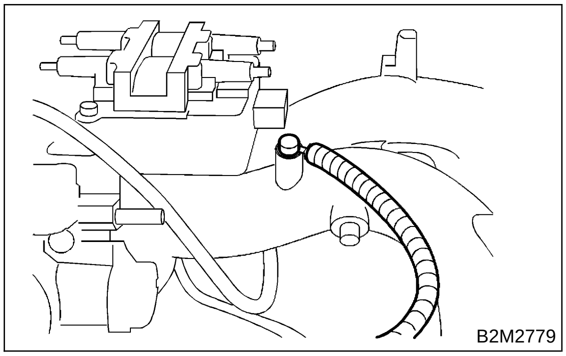

H2M2999

24) Connect connector to intake air temperature and pressure sensor.
25) Install ignition coil and ignitor assembly.


B2M3473

26) Connect connector to ignition coil and ignitor assembly.
27) Install engine ground terminal to intake manifold.

Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)



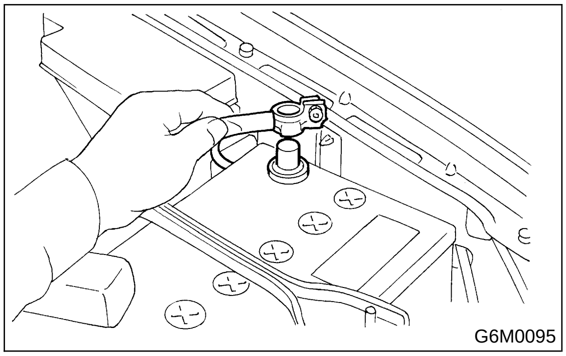
E: INSPECTION *S175034A10*

Make sure the fuel pipe and fuel hoses are not cracked and that connections are tight.

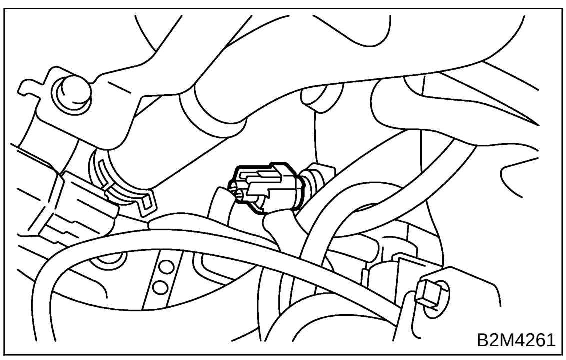
4. Engine Coolant Temperature Sensor S175047

A: REMOVAL S175047A18

1) Disconnect battery ground cable.



2) Remove air intake duct and air cleaner assembly. <Ref. to IN-7, REMOVAL, Air Intake Duct.> and <Ref. to IN-6, REMOVAL , Air Cleaner Case.>
3) Disconnect connector from engine coolant temperature sensor.

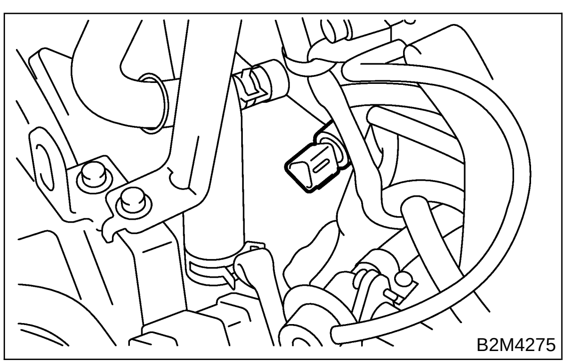


4) Remove engine coolant temperature sensor.

B: INSTALLATION S175047A11

Install in the reverse order of removal.

Tightening torque:
18 N·m (1.8 kgf-m, 13 ft-lb)

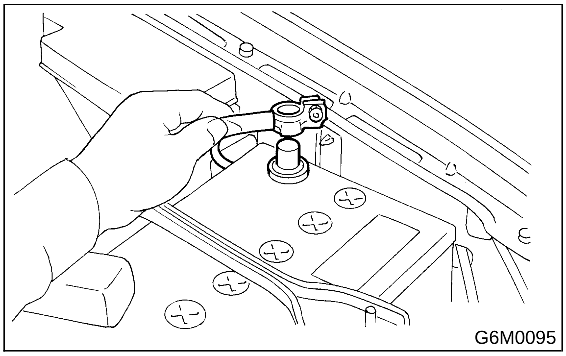


5. Crankshaft Position Sensor

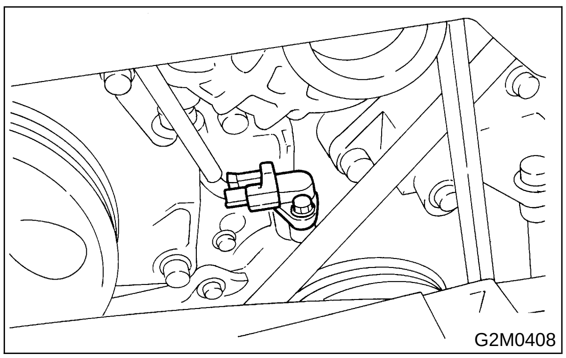
S175043

A: REMOVAL S175043A18

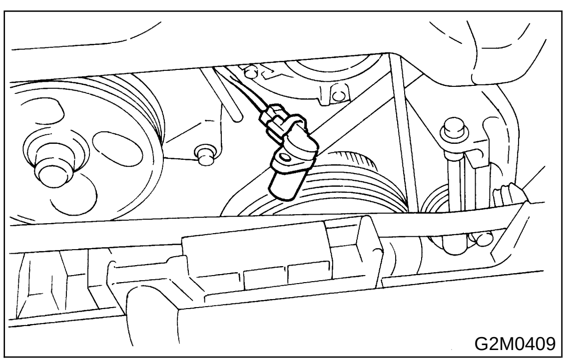
1) Disconnect battery ground cable.



2) Remove bolt which installs crankshaft position sensor to cylinder block.



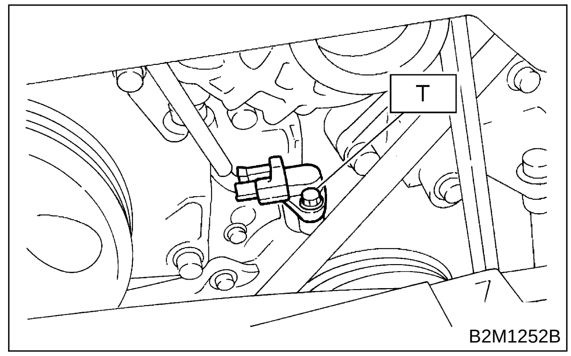
3) Remove crankshaft position sensor, and disconnect connector from it.



B: INSTALLATION S175043A11

Install in the reverse order of removal.

Tightening torque:
T: 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

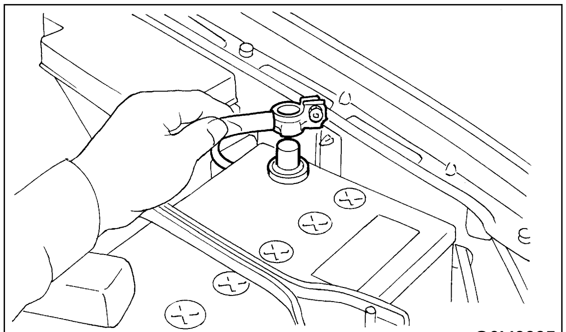


6. Camshaft Position Sensor

S175041

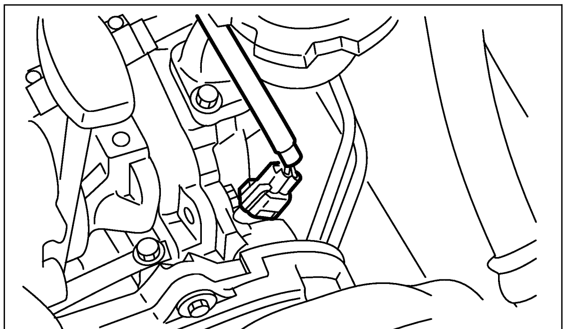
A: REMOVAL S175041A18

1) Disconnect battery ground cable.



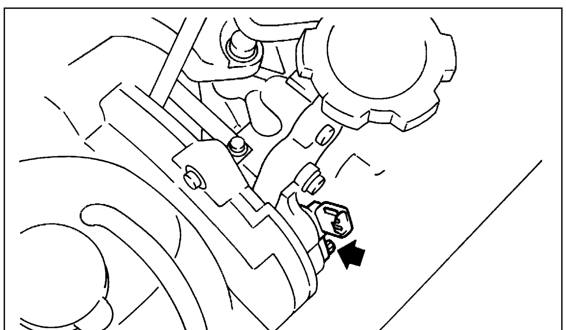
G6M0095

2) Disconnect connector from camshaft position sensor.



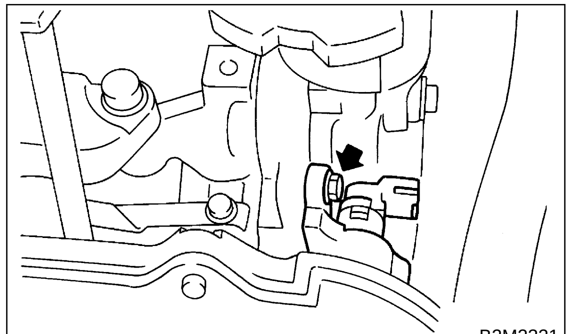
B2M4263

3) Remove bolt which installs camshaft position sensor to camshaft position sensor support.



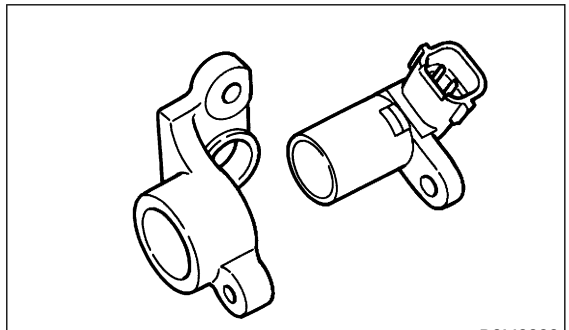
B2M2375

4) Remove bolt which installs camshaft position sensor support to camshaft cap LH.



B2M2321

5) Remove camshaft position sensor and camshaft position sensor support as a unit.
6) Remove camshaft position sensor itself.



B2M2322

B: INSTALLATION S175041A11

Install in the reverse order of removal.

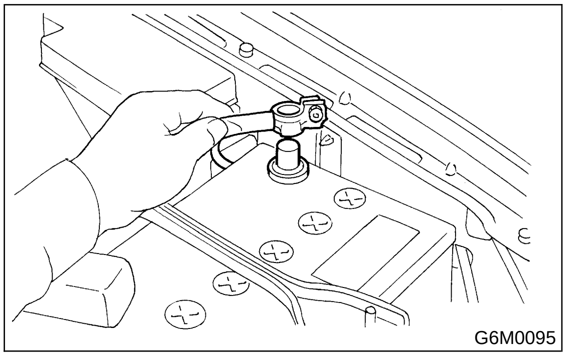
Tightening torque:

- ***Camshaft position sensor support;***
  6.4 N·m (0.65 kgf-m, 4.7 ft-lb)
- ***Camshaft position sensor;***
  6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

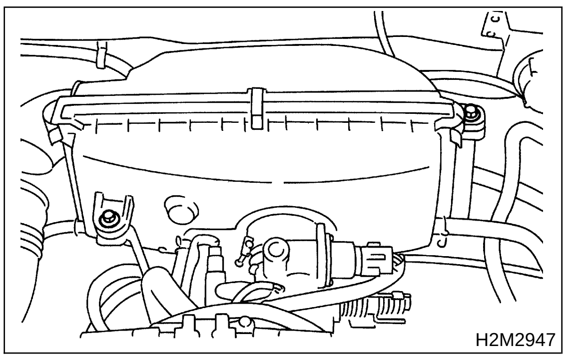
7. Knock Sensor S175042

A: REMOVAL S175042A18

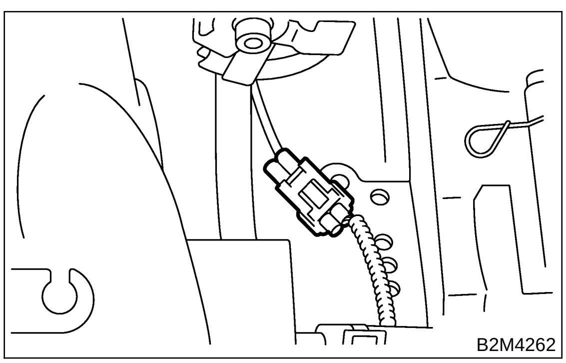
1) Disconnect battery ground cable from battery ground terminal.



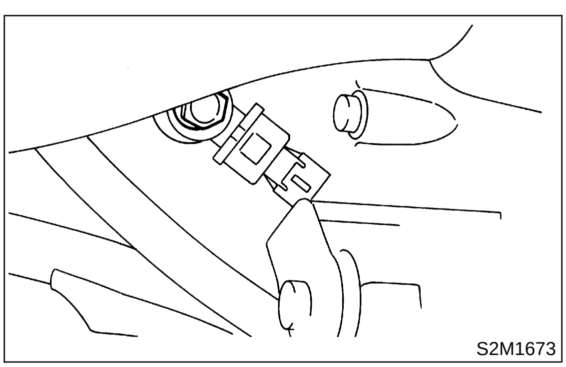
2) Remove air cleaner case.



3) Disconnect knock sensor connector.



4) Remove knock sensor from cylinder block.

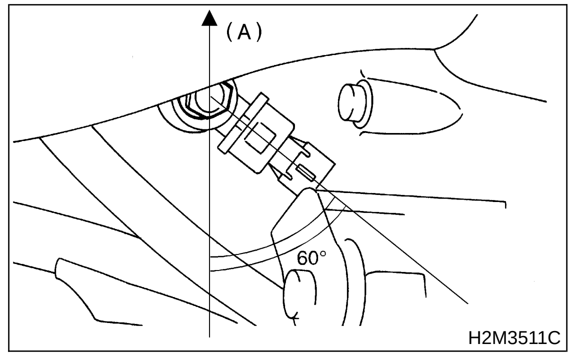


B: INSTALLATION S175042A11

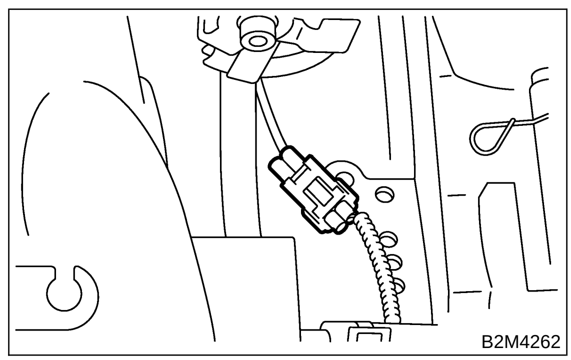
1) Install knock sensor to cylinder block.

Tightening torque:
24 N·m (2.4 kgf-m, 17.4 ft-lb)

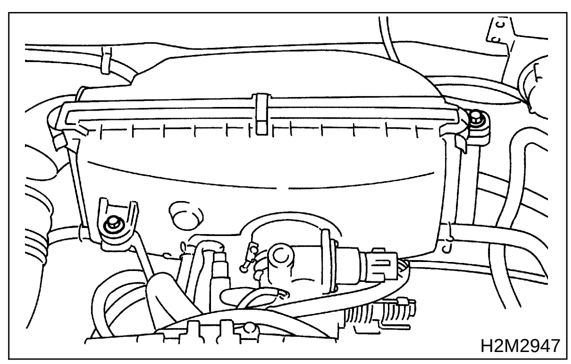
NOTE:
The extraction area of the knock sensor cord must be positioned at a 60° angle relative to the engine rear.



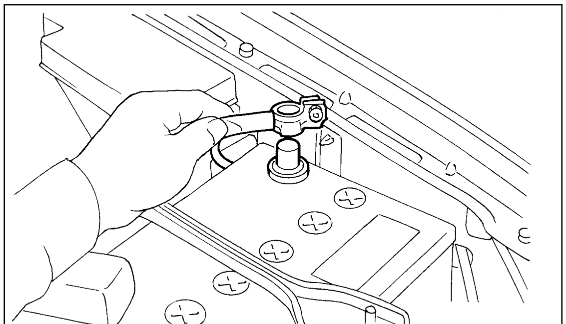
2) Connect knock sensor connector.



3) Install air cleaner case.



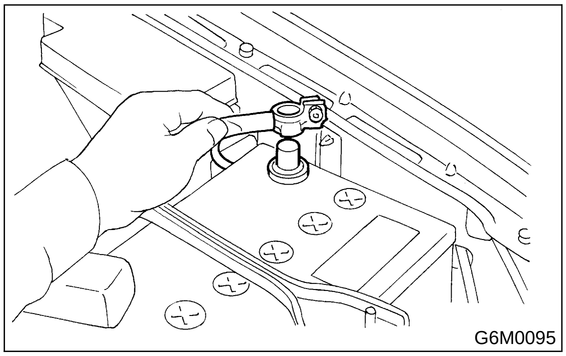
4) Connect battery ground cable.


G6M0095

8. Throttle Position Sensor S175039

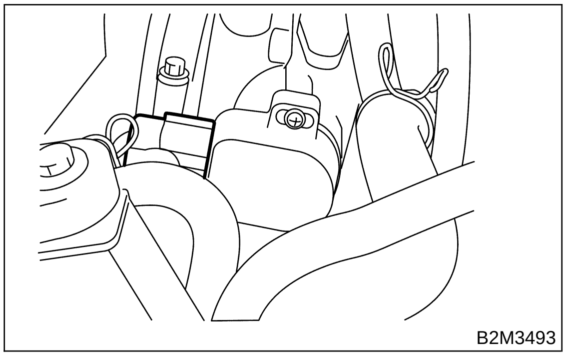
A: REMOVAL S175039A18

1) Disconnect battery ground cable.



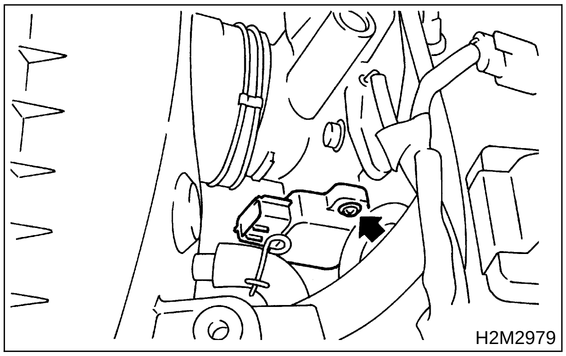
G6M0095

2) Disconnect connector from throttle position sensor.



B2M3493

3) Remove throttle position sensor holding screws, and remove it.



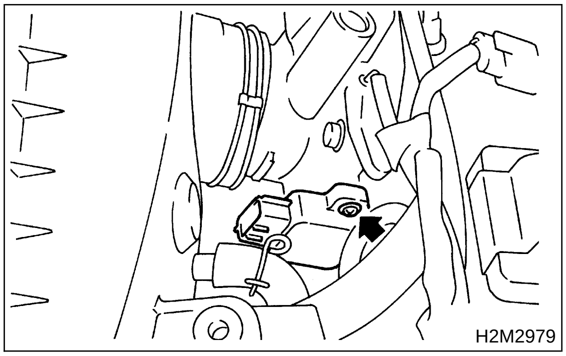
H2M2979

B: INSTALLATION S175039A11

Install in the reverse order of removal.

Tightening torque:
1.6 N·m (0.16 kgf-m, 1.2 ft-lb)

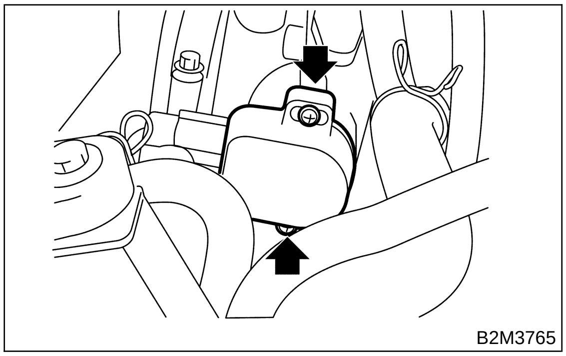
CAUTION:
When installing throttle position sensor, adjust to the specified data.



H2M2979

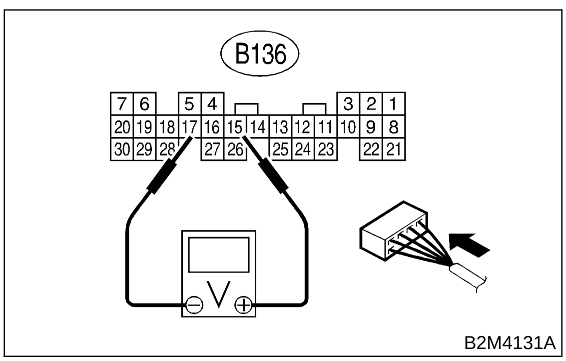
C: ADJUSTMENT S175039A01

1) Turn ignition switch to OFF.
2) Loosen throttle position sensor holding screws.


B2M3765

3) When using voltage meter;
(1) Take out ECM.
(2) Turn ignition switch to ON.
(3) Adjust throttle position sensor to the proper position to allow the voltage signal to ECM to be in specification.

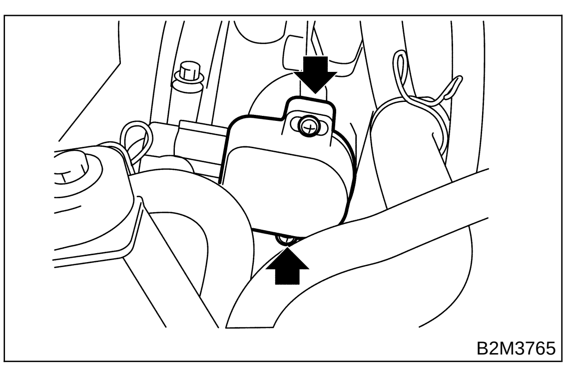
Connector & terminal / Specified voltage
(B136) No. 15 — (B136) No. 17 / 0.45 — 0.55 V
[Fully closed.]



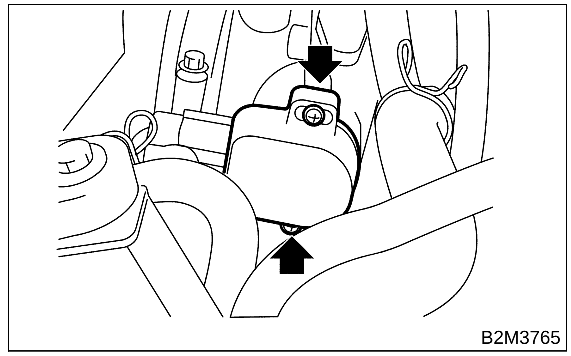
B2M4131A

(4) Tighten throttle position sensor holding screws.

Tightening torque:
1.6 N·m (0.16 kgf-m, 1.2 ft-lb)

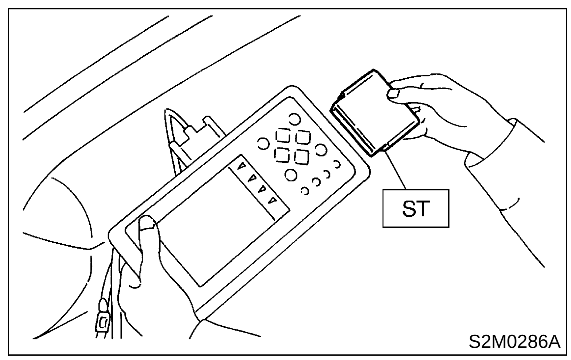

B2M3765

4) When using Subaru Select Monitor;
(1) Turn ignition switch to OFF.
(2) Loosen throttle position sensor holding screws.


B2M3765

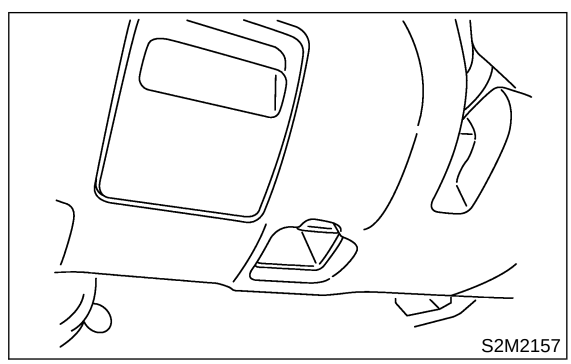
NOTE:
For detailed operation procedures, refer to the Subaru Select Monitor Operation Manual.

(3) Insert the cartridge to Subaru Select Monitor.



S2M0286A

(4) Connect Subaru Select Monitor to the data link connector.

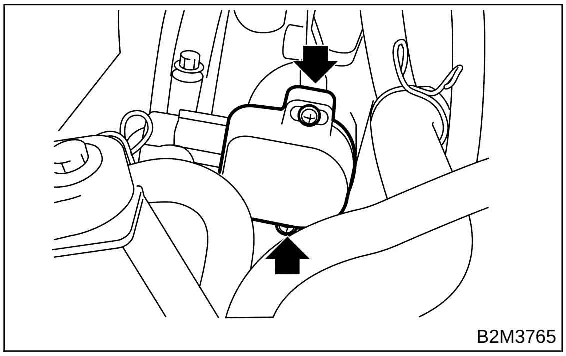

S2M2157

5) Turn ignition switch to ON, and Subaru Select Monitor switch to ON.
6) Select {2. Each System Check} in Main Menu.
7) Select {Engine Control System} in Selection Menu.
8) Select {1. Current Data Display & Save} in Engine Control System Diagnosis.
9) Select {1.12 Data Display} in Data Display Menu.
10) Adjust throttle position sensor to the proper position to match with the following specifications.

Condition: Throttle fully closed
Throttle opening angle 0.00%
Throttle sensor voltage 0.50 V

11) Tighten throttle position sensor holding screws.

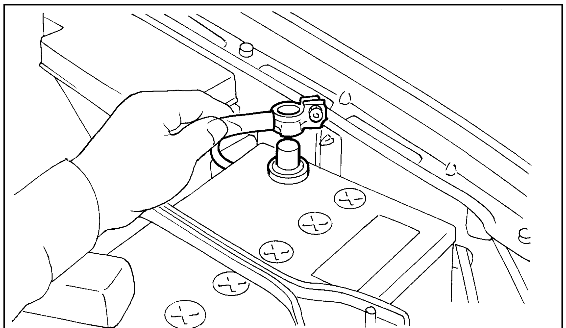
Tightening torque:
1.6 N·m (0.16 kgf-m, 1.2 ft-lb)



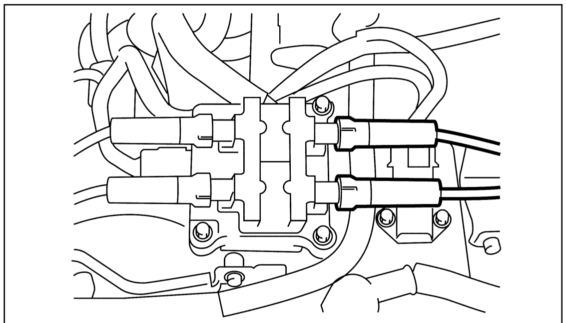
9. Intake Air Temperature and Pressure Sensor S175044

A: REMOVAL S175044A18

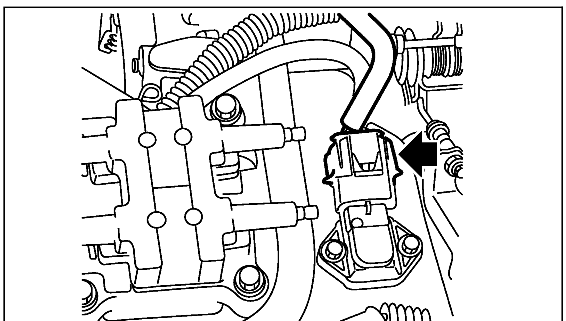
1) Disconnect battery ground cable.


G6M0095

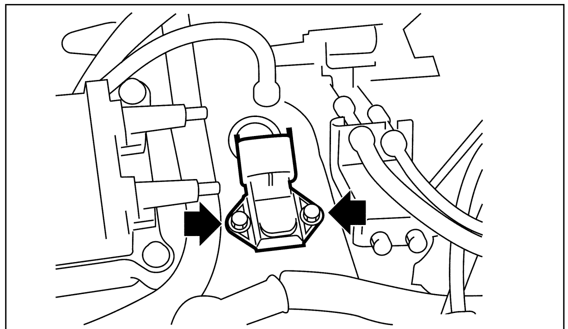
2) Disconnect spark plug cord from ignition coil and ignitor assembly.


B2M3495

3) Disconnect connector from intake air temperature and pressure sensor.


B2M4276

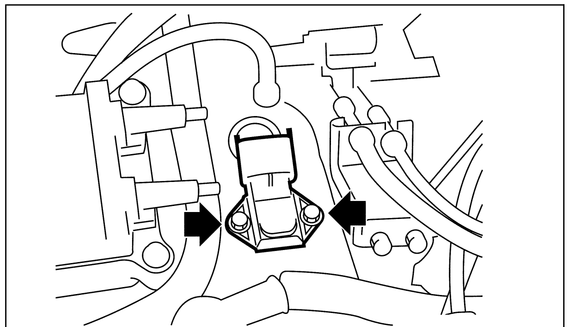
4) Remove intake air temperature and pressure sensor.


B2M3497

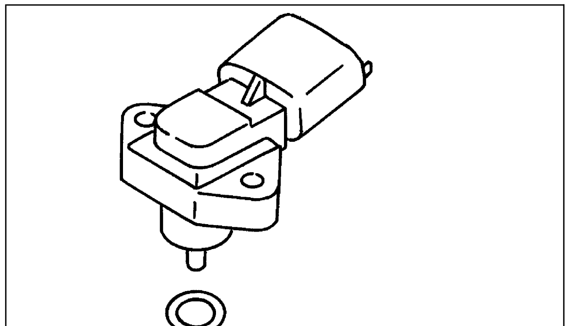
B: INSTALLATION S175044A11

Install in the reverse order of removal.

Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)


B2M3497

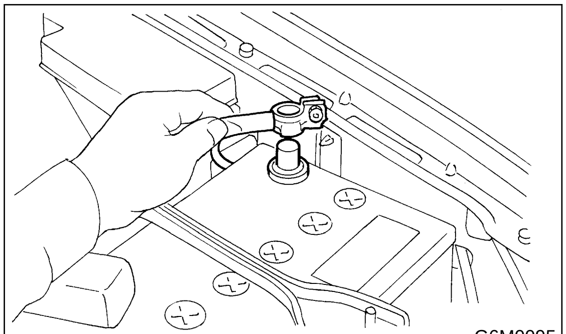
NOTE:
Replace O-ring with a new one.


H2M2999

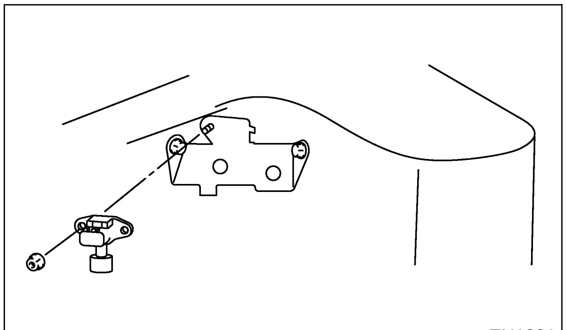
10. Atmospheric Pressure Sensor S175045

A: REMOVAL S175045A18

1) Disconnect battery ground cable.


G6M0095

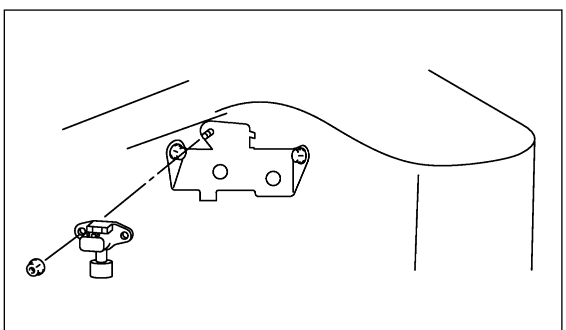
2) Disconnect connector from atmospheric pressure sensor.
3) Remove atmospheric pressure sensor from bracket.


EN1001

B: INSTALLATION S175045A11

Install in the reverse order of removal.

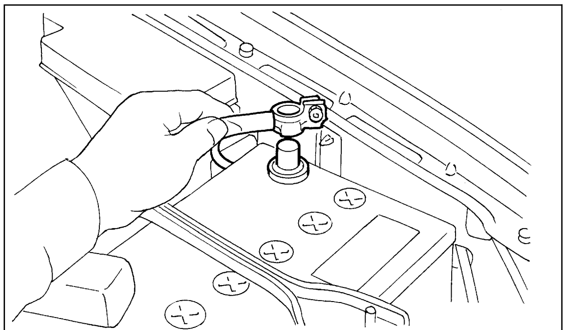
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)


EN1001

11. Idle Air Control Solenoid Valve S175056

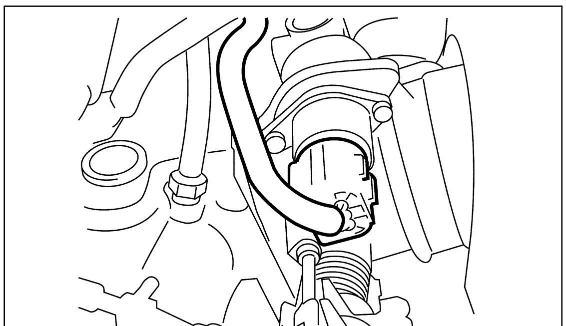
A: REMOVAL S175056A18

1) Disconnect battery ground cable.



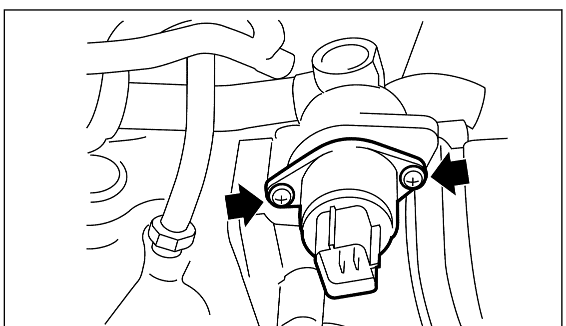
G6M0095

2) Disconnect connector from idle air control solenoid valve.



B2M3500

3) Remove idle air control solenoid valve from throttle body.

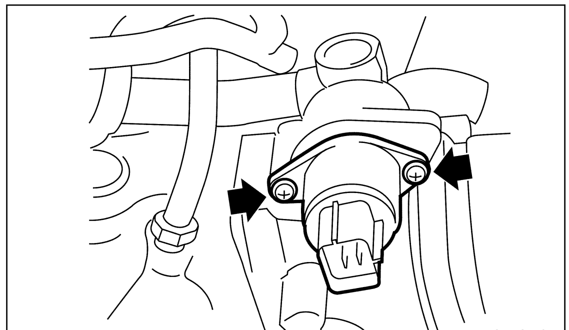


B2M3501

B: INSTALLATION S175056A11

Install in the reverse order of removal.

Tightening torque:
1.6 N·m (0.16 kgf-m, 1.2 ft-lb)

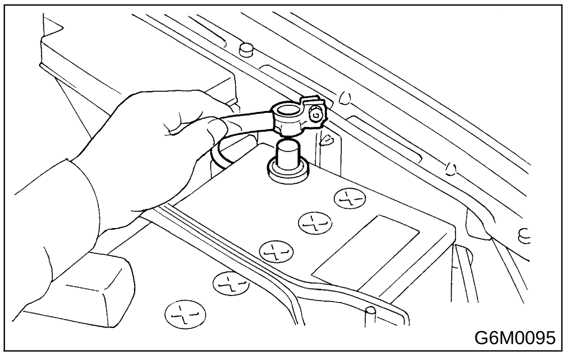


B2M3501

12. Air Assist Injector Solenoid Valve S175570

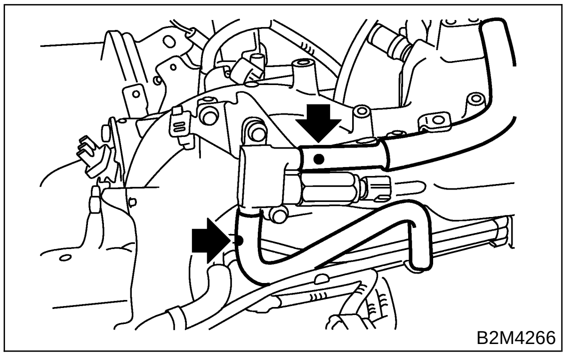
A: REMOVAL S175570A18

1) Disconnect battery ground cable.



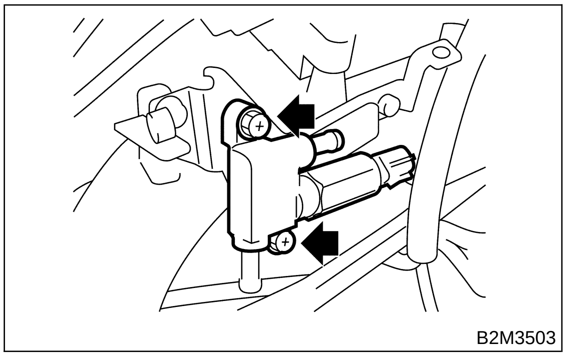
G6M0095

2) Disconnect connector from air assist injector solenoid valve and disconnect air by-pass hoses.



B2M4266

3) Remove air assist injector solenoid valve from intake manifold.

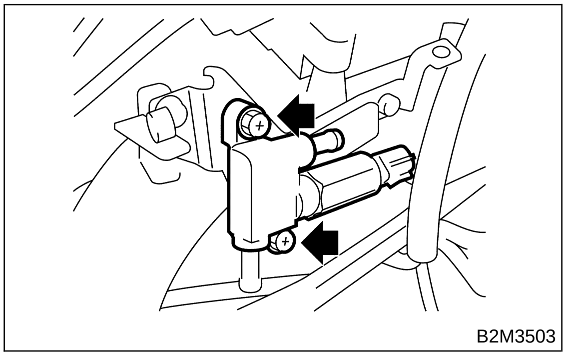


B2M3503

B: INSTALLATION S175570A11

Install in the reverse order of removal.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



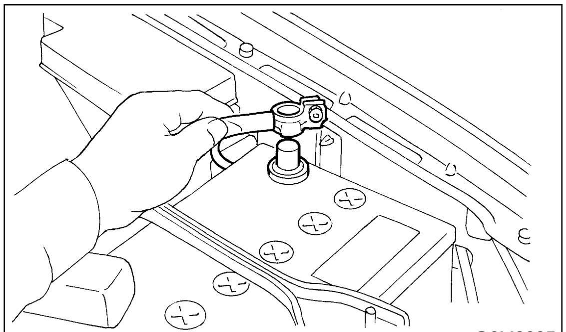
B2M3503

13. Fuel Injector S175051

A: REMOVAL S175051A18

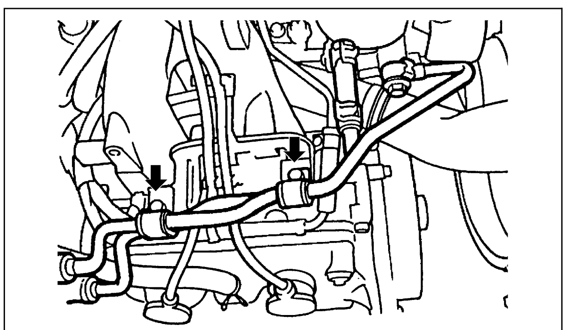
1. RH SIDE S175051A1801

1) Release fuel pressure.
<Ref. to FU-52, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open fuel flap lid, and remove fuel filler cap.
3) Disconnect battery ground cable.



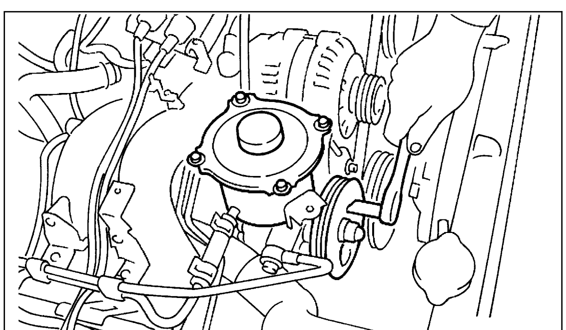
G6M0095

4) Remove resonator chamber. <Ref. to IN-8, REMOVAL, Resonator Chamber.>
5) Remove power steering pump and tank from brackets.
(1) Remove front side V-belt. <Ref. to ME-42, REMOVAL, V-belt.>
(2) Remove bolts which hold power steering pipe bracket onto intake manifold.



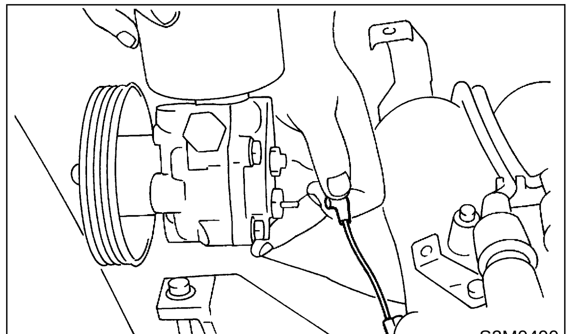
S2M1013

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



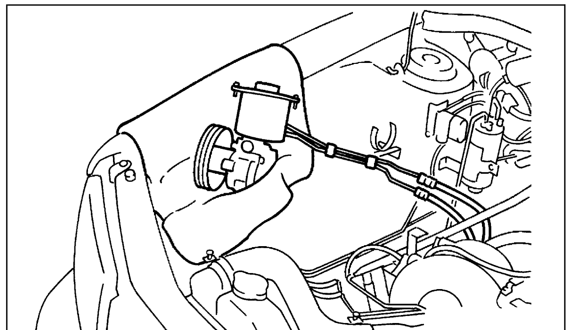
S2M0488

(4) Disconnect connector from power steering pump switch.



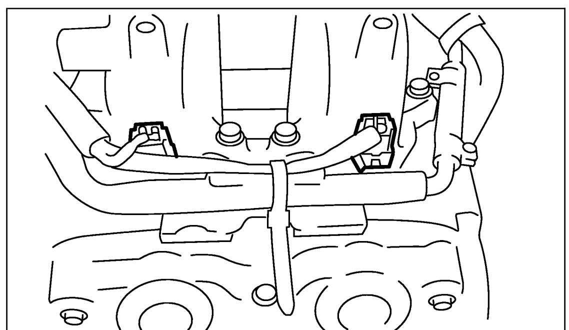
S2M0490

(5) Place power steering pump and tank on the right side wheel apron.



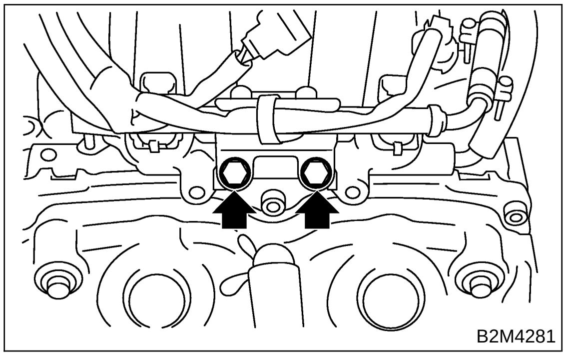
S2M0491

6) Remove spark plug cords from spark plugs (#1 and #3 cylinders).
7) Disconnect connector from fuel injector.

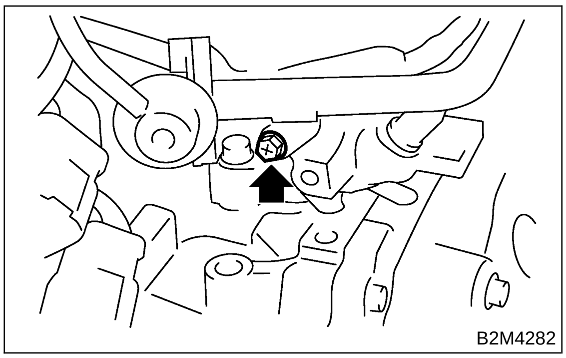


B2M4280

8) Remove bolt which holds injector pipe to intake manifold.



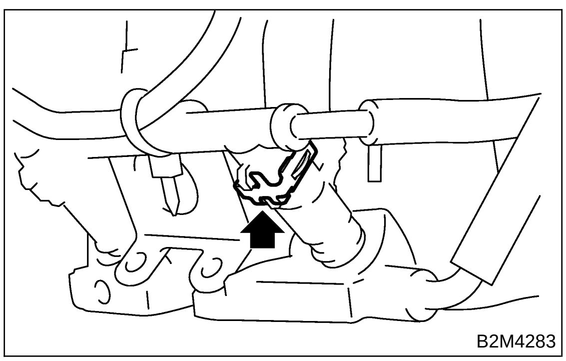
B2M4281



B2M4282

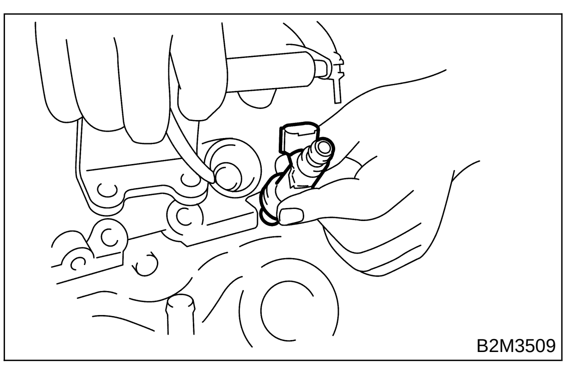
9) Remove fuel injector from intake manifold.

(1) Remove fuel injector securing clip.



B2M4283

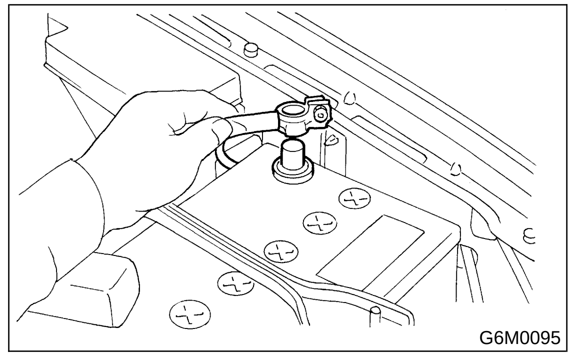
(2) Remove fuel injector while lifting up fuel injector pipe.



B2M3509

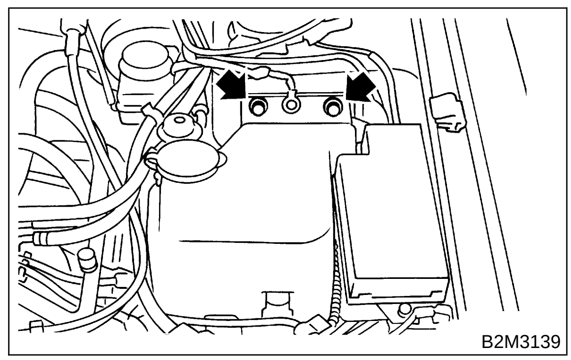
2. LH SIDE *S175051A1802*

1) Release fuel pressure. <Ref. to FU-52, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open fuel flap lid, and remove fuel filler cap.
3) Disconnect battery ground cable.



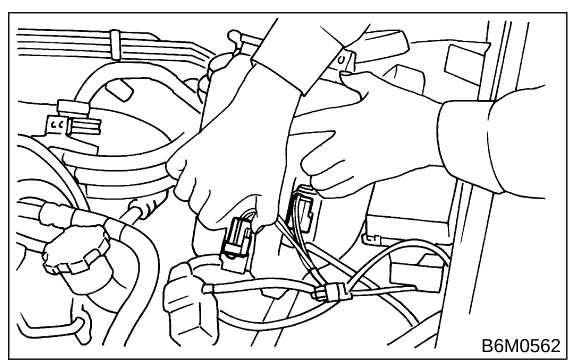
G6M0095

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



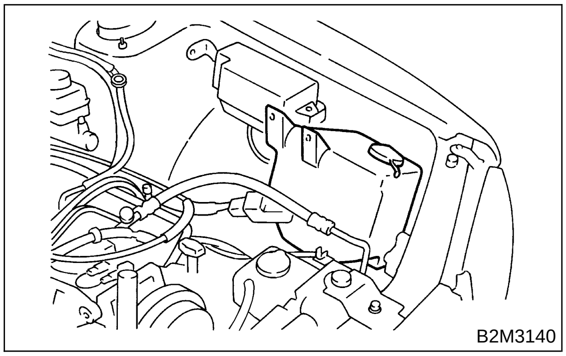
B2M3139

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

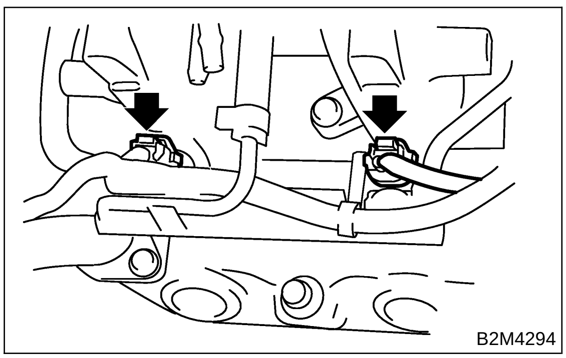


B6M0562

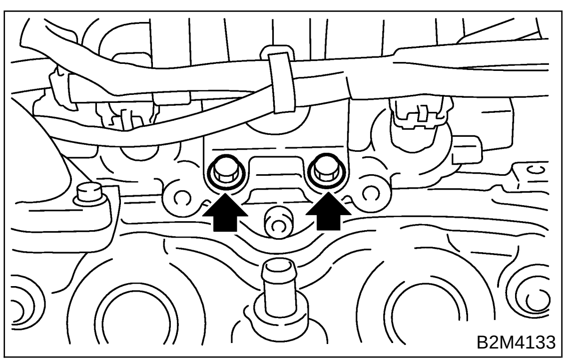
7) Disconnect rear window glass washer hose from washer motor, then plug connection with a suitable cap.
8) Move washer tank, and secure it away from working area.

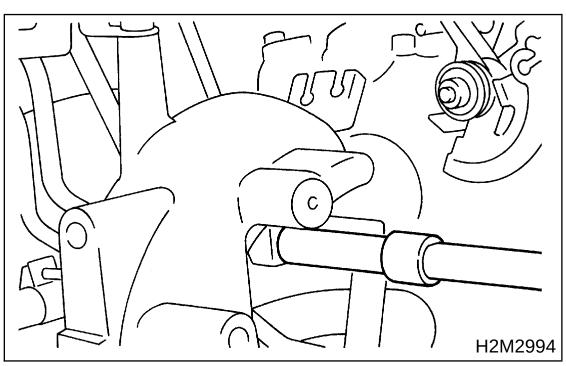


9) Remove spark plug cords from spark plugs (#2 and #4 cylinders).
10) Disconnect connector from fuel injector.

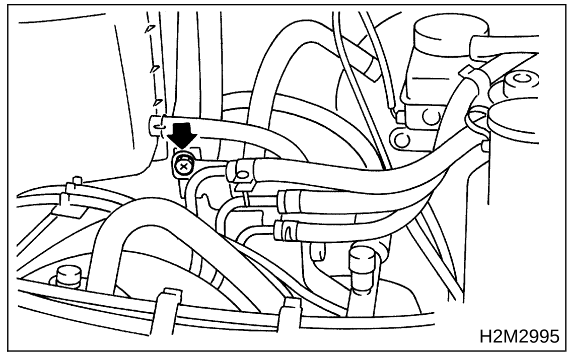


11) Remove bolt which holds injector pipe to intake manifold.

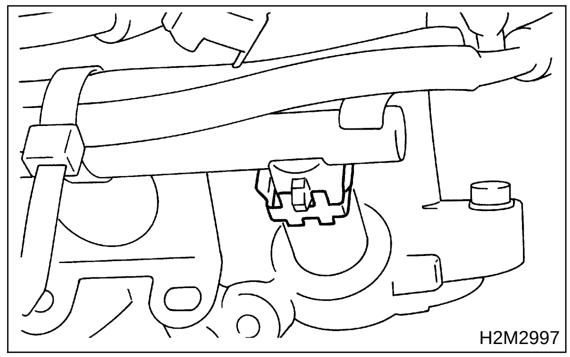




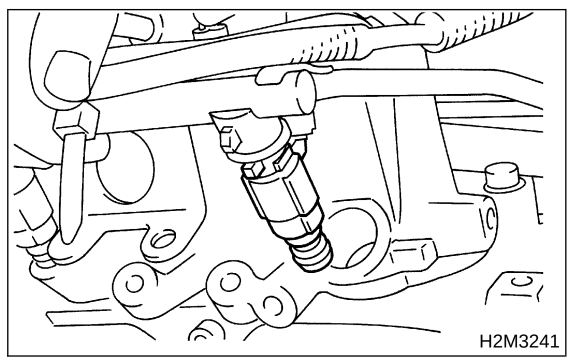
12) Remove bolt which holds fuel pipe on the left side intake manifold.



13) Remove fuel injector from intake manifold.
(1) Remove fuel injector securing clip.



(2) Remove fuel injector while lifting up fuel injector pipe.

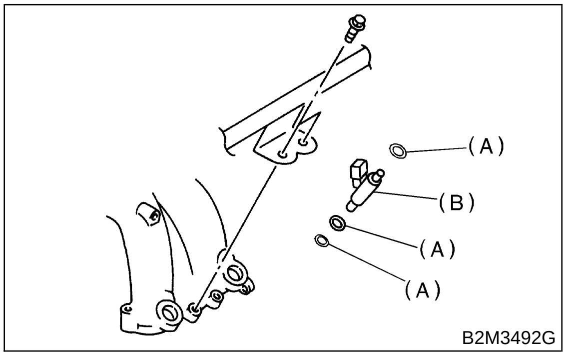


B: INSTALLATION S175051A11

1. RH SIDE S175051A1101

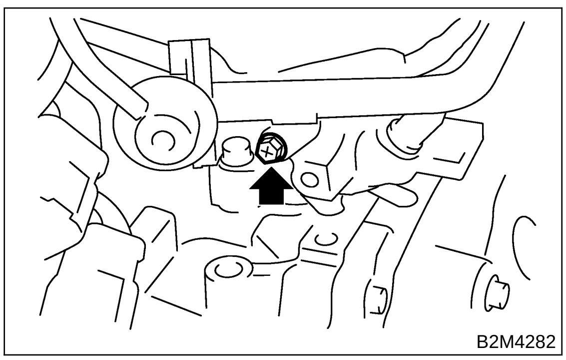
Install in the reverse order of removal.

NOTE:
Replace O-rings with new ones.

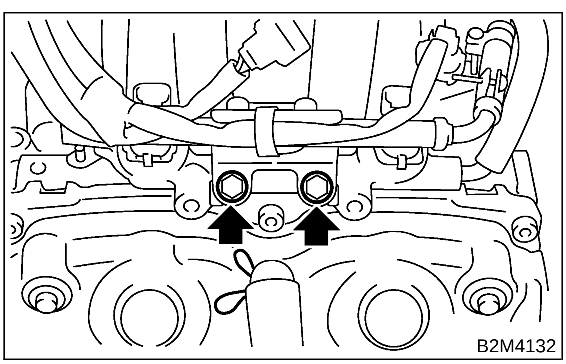


(A) O-ring
(B) Fuel injector

Tightening torque:
5.0 N·m (0.51 kgf-m, 3.7 ft-lb)



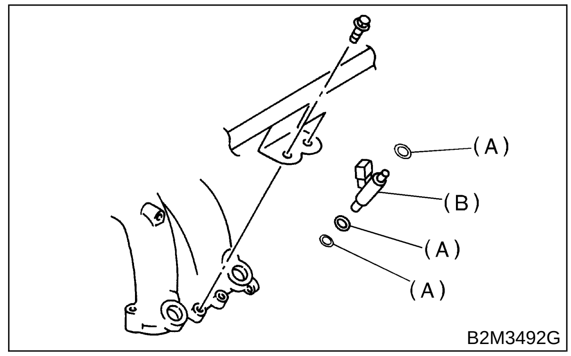
Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)



2. LH SIDE S175051A1102

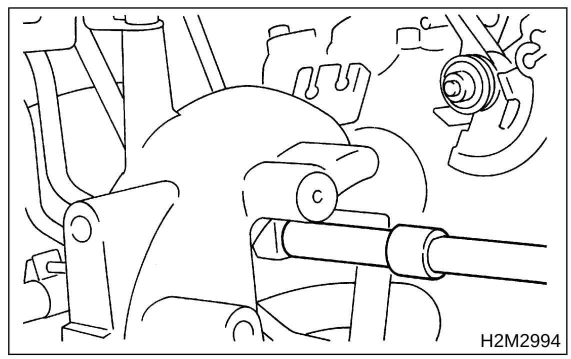
Install in the reverse order of removal.

NOTE:
Replace O-rings with new ones.

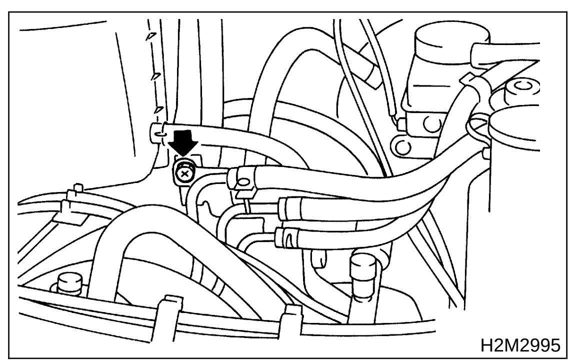


(A) O-ring
(B) Fuel injector

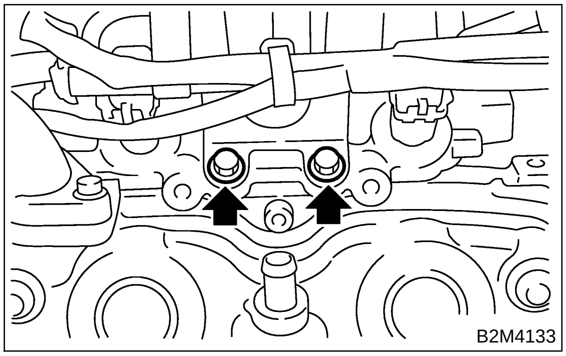
Tightening torque:
5.0 N·m (0.51 kgf-m, 3.7 ft-lb)



Tightening torque:
5.0 N·m (0.51 kgf-m, 3.7 ft-lb)



Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)

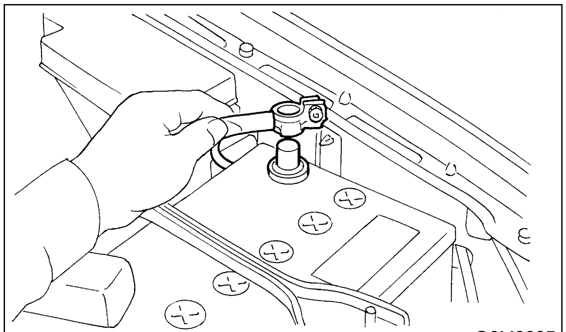


14. Front Oxygen (A/F) Sensor

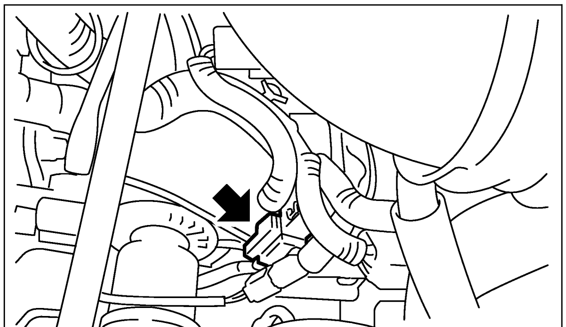
S175642

A: REMOVAL S175642A18

1) Disconnect battery ground cable.


G6M0095

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

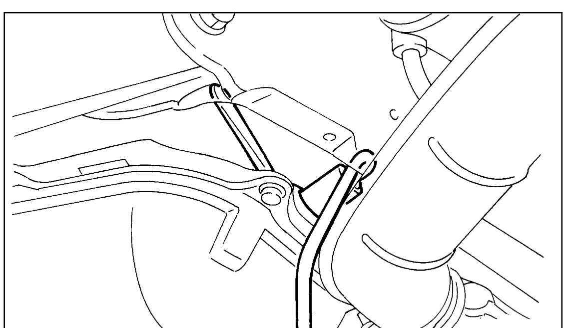

B2M4243

3) Lift-up the vehicle.
4) 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)

5) Remove front oxygen (A/F) sensor.

CAUTION:
When removing the oxygen (A/F) sensor, wait until exhaust pipe cools, otherwise it will damage exhaust pipe.

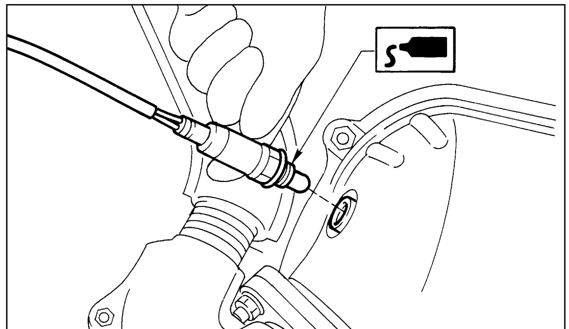

G2M0411

B: INSTALLATION S175642A11

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

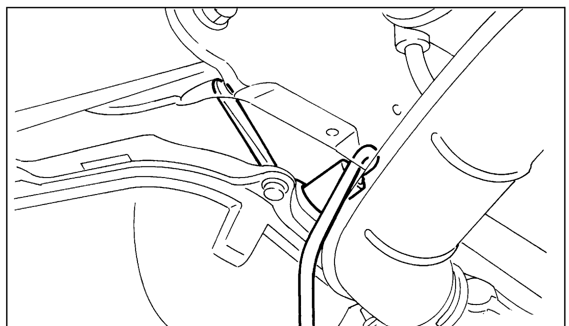
CAUTION:
Never apply anti-seize compound to protector of front oxygen (A/F) sensor.



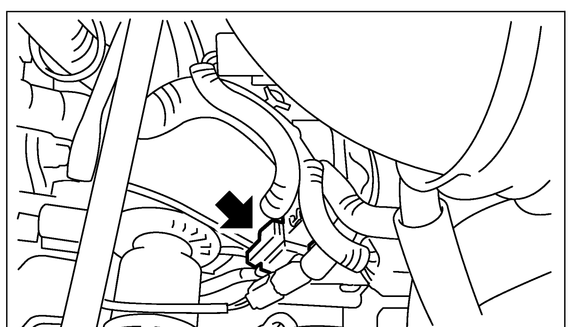
G2M0412

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

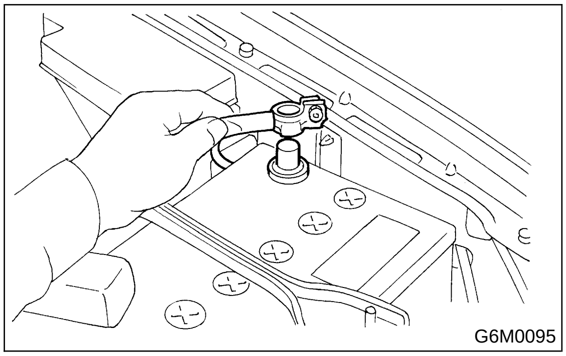
Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)


G2M0411

3) Lower the vehicle.
4) Connect connector of front oxygen (A/F) sensor.


B2M4243

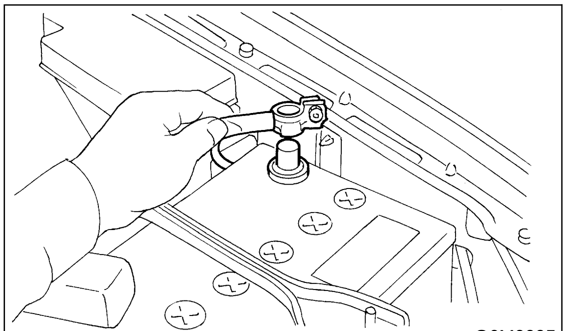
5) Connect battery ground cable.



15. Rear Oxygen Sensor S175657

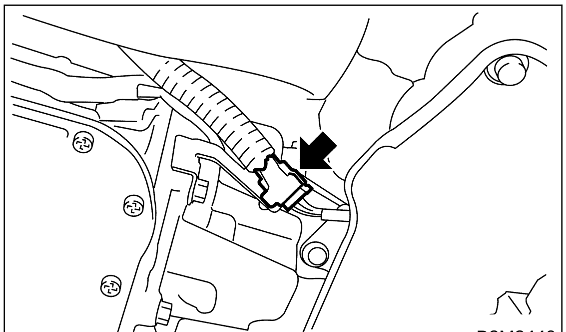
A: REMOVAL S175657A18

1) Disconnect battery ground cable.



G6M0095

2) Lift-up the vehicle.
3) Disconnect connector from rear oxygen sensor.



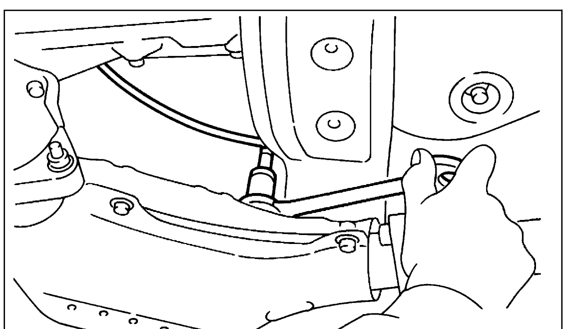
B2M3440

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 the oxygen sensor, wait until exhaust pipe cools, otherwise it will damage exhaust pipe.



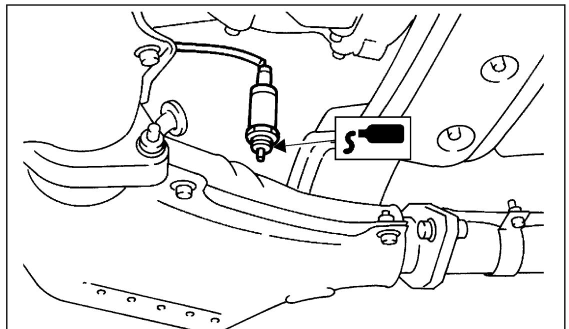
B2M0741

B: INSTALLATION S175657A11

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.

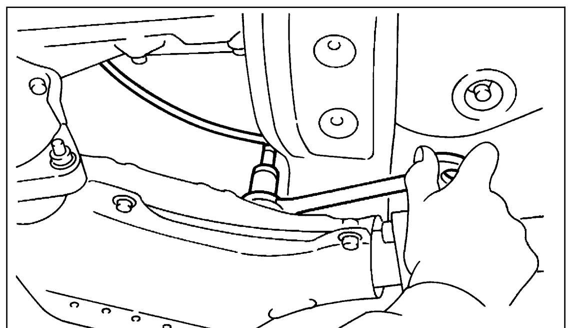
Anti-seize compound:
SS-30 by JET LUBE



B2M0742A

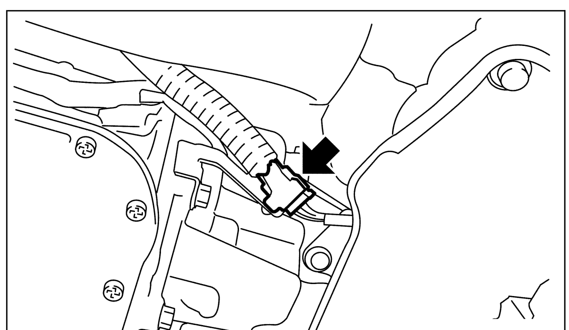
2) Install rear oxygen sensor.

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



B2M0741

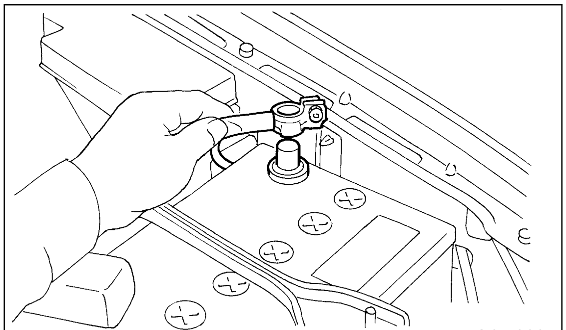
3) Connect connector to rear oxygen sensor.



B2M3440

4) Lower the vehicle.

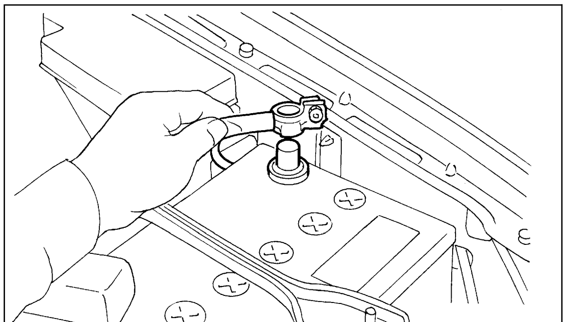
5) Connect battery ground cable.


G6M0095

16. Engine Control Module *S175049*

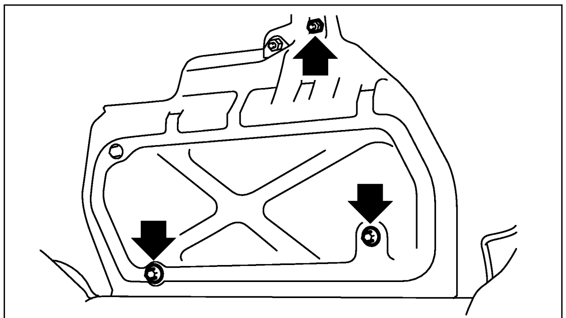
A: REMOVAL *S175049A18*

1) Disconnect battery ground cable.



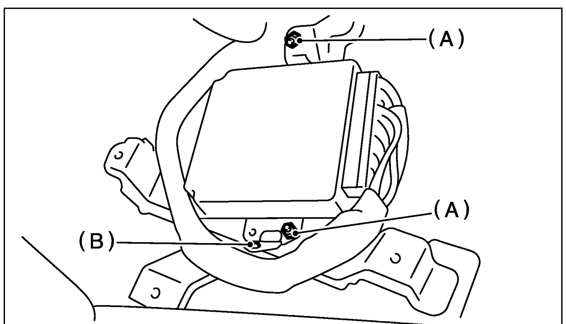
G6M0095

2) Remove lower inner trim of passenger side. <Ref. to EI-40, REMOVAL, Lower Inner Trim.>
3) Detach floor mat of front passenger seat.
4) Remove protect cover.



S2M2272

5) Remove nuts (A) which hold ECM to bracket.
6) Remove clip (B) from bracket.



S2M2273A

7) Disconnect ECM connectors and take out ECM.

B: INSTALLATION *S175049A11*

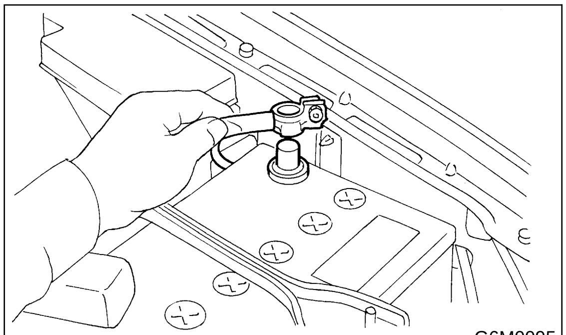
Install in the reverse order of removal.

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

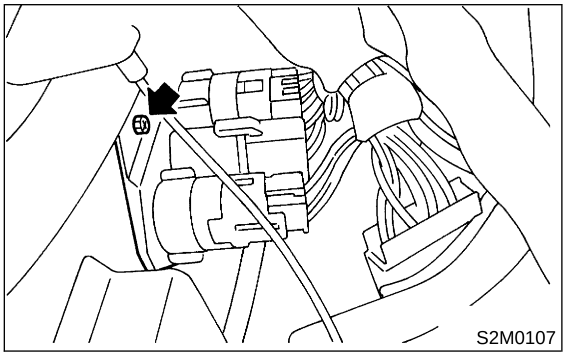
17. Main Relay *S175050*

A: REMOVAL *S175050A18*

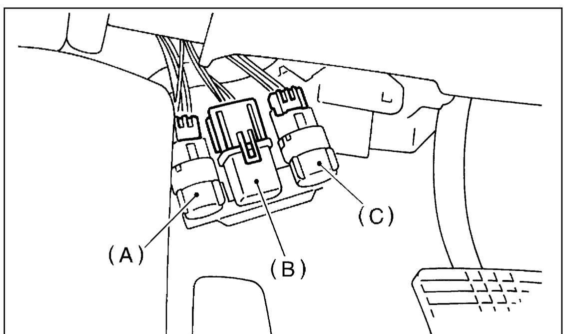
1) Disconnect battery ground cable.


G6M0095

2) Remove bolt which holds bracket of main relay and fuel pump relay.


S2M0107

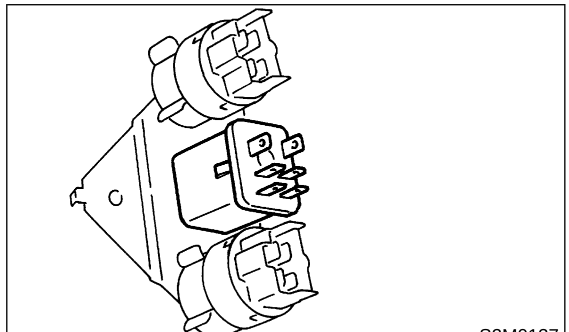
3) Disconnect connectors from relays.



S2M0108A

(A) Blower fan motor relay
(B) Main relay
(C) Fuel pump relay

4) Remove main relay from mounting bracket.


S2M0137

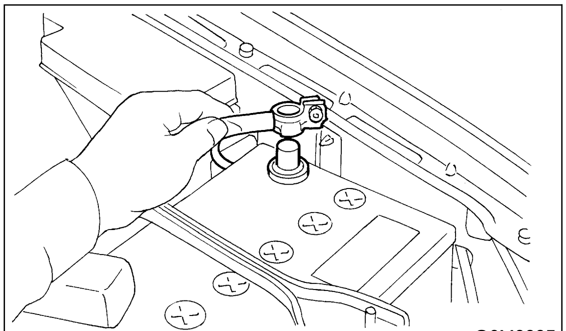
B: INSTALLATION *S175050A11*

Install in the reverse order of removal.

18. Fuel Pump Relay *S175048*

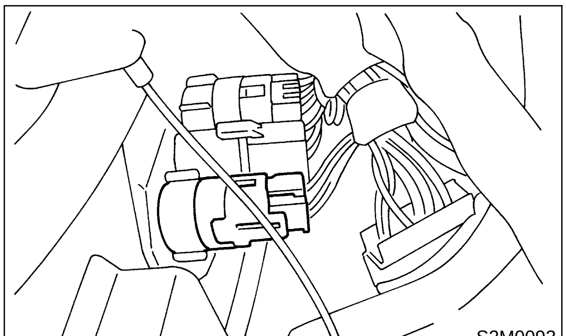
A: REMOVAL *S175048A18*

1) Disconnect battery ground cable.



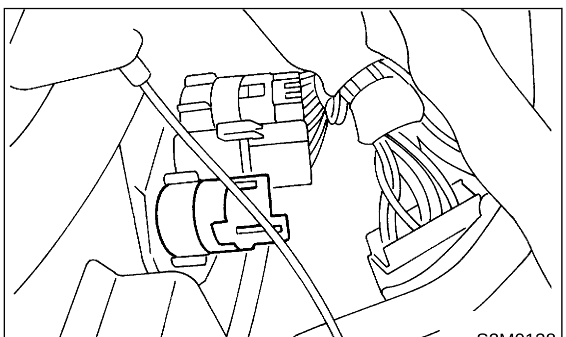
G6M0095

2) Disconnect connector from fuel pump relay.



S2M0093

3) Remove fuel pump relay from mounting bracket.



S2M0138

B: INSTALLATION *S175048A11*

Install in the reverse order of removal.

19. Fuel *S175052*

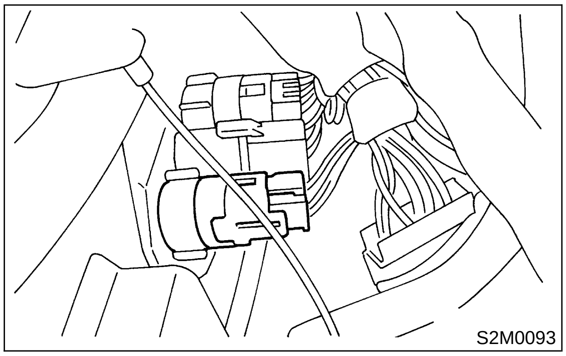
A: OPERATION *S175052A16*

1. RELEASING OF FUEL PRESSURE

S175052A1601

WARNING:
- **Place “No fire” signs near the working area.**
- **Disconnect ground terminal from battery.**

1) Disconnect connector from fuel pump relay.



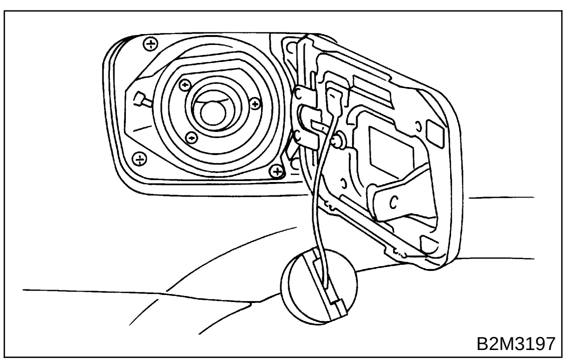
S2M0093

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 OFF.

2. DRAINING OF FUEL *S175052A1603*

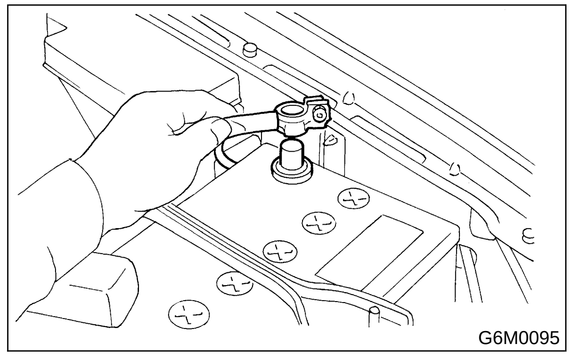
WARNING:
- **Place “No fire” signs near the working area.**
- **Be careful not to spill fuel on the floor.**

1) Release fuel pressure. <Ref. to FU-52, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open fuel flap lid, and remove fuel filler cap.



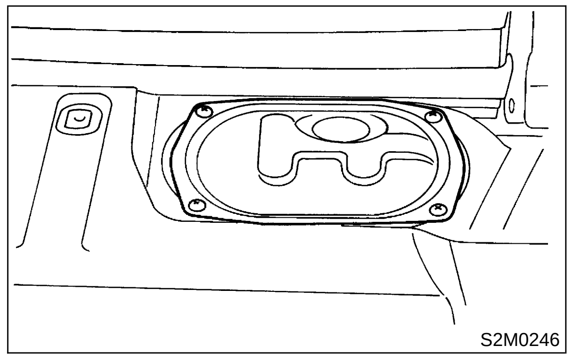
B2M3197

3) Disconnect battery ground cable.



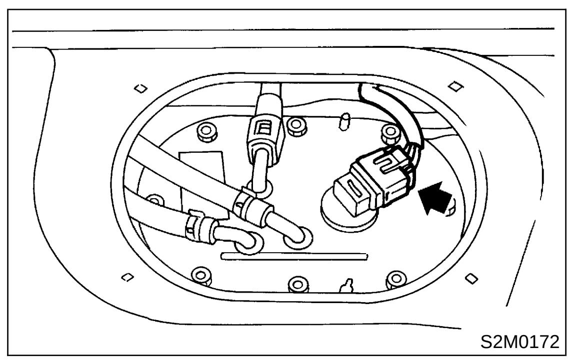
G6M0095

4) Remove the floor box located just behind the rear seats.
5) Remove access hole lid.



S2M0246

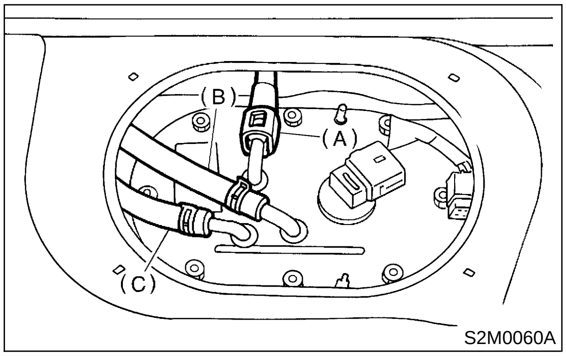
6) Disconnect connector from fuel pump.



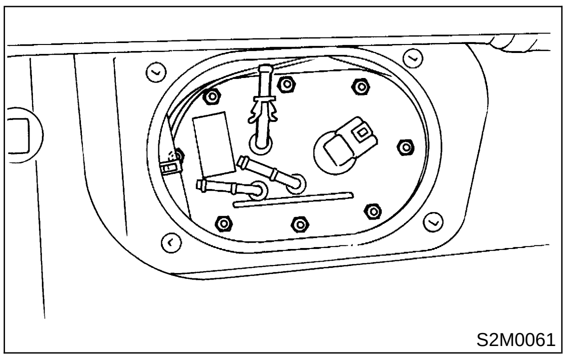
S2M0172

7) Disconnect quick connector, and then disconnect fuel delivery hose (A). <Ref. to FU-70, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>

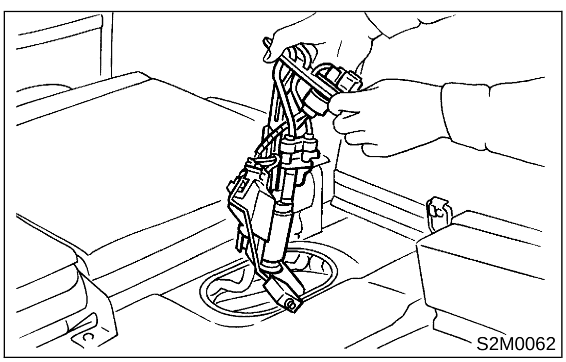
8) Move clips, and then disconnect fuel return hose (B) and jet pump hose (C).



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

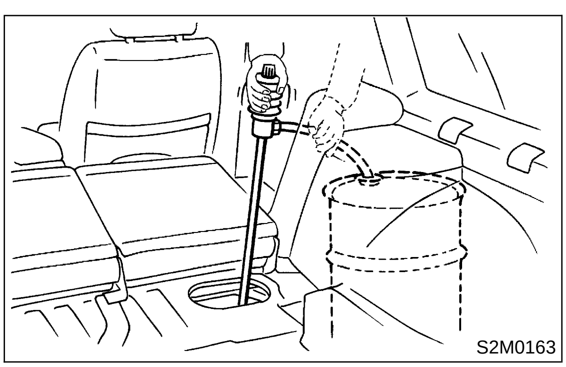


10) Take off fuel pump from fuel tank.

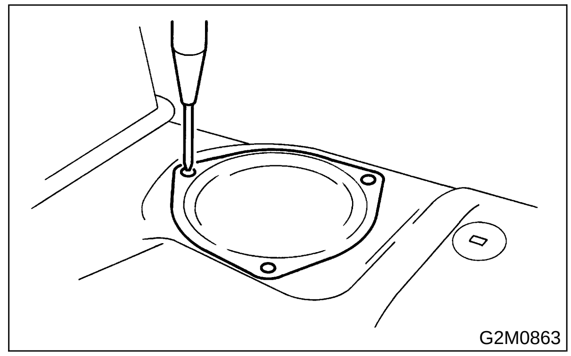


11) Drain fuel from fuel tank by using a hand pump.

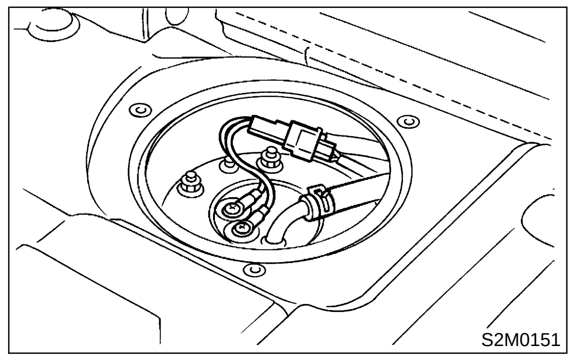
WARNING:
Do not use a motor pump when draining fuel.



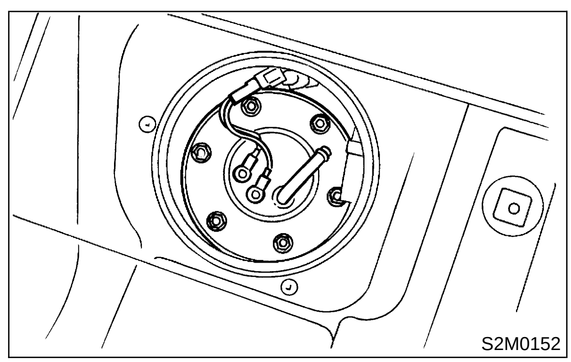
12) Remove service hole cover.



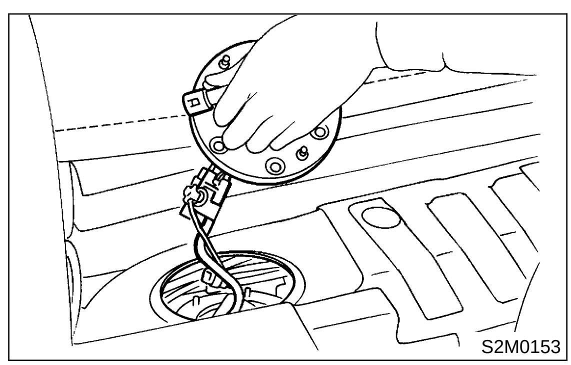
13) Disconnect connector from fuel sub meter.
14) Disconnect fuel jet pump hose.



15) Remove bolts which install fuel sub meter unit on fuel tank.

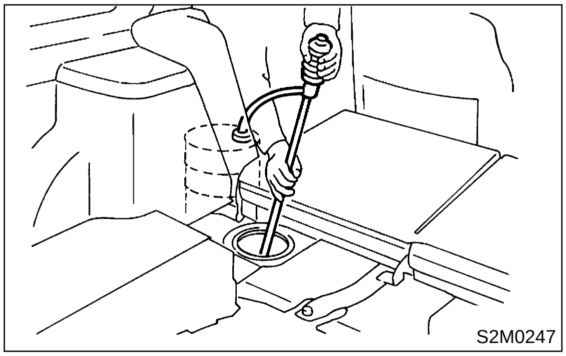


16) Remove fuel sub meter unit.



17) Drain fuel from there.

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



S2M0247

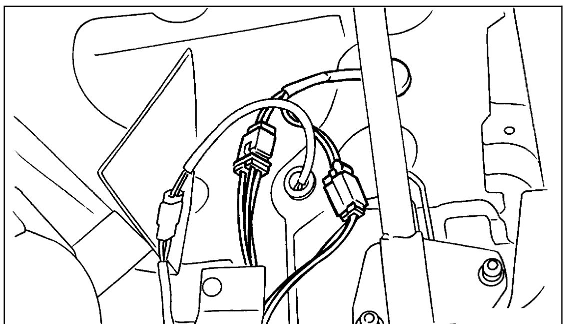
20. Fuel Tank S175053

A: REMOVAL S175053A18

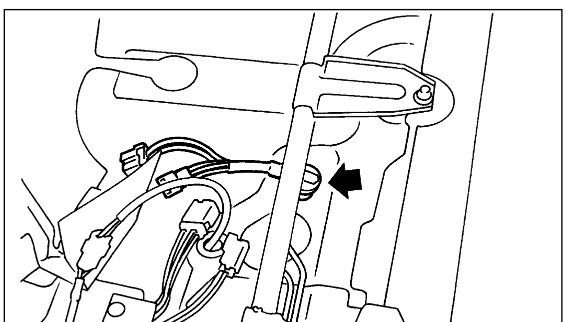
WARNING:

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

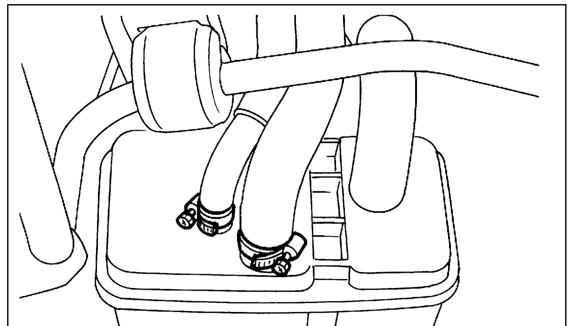
1) Set vehicle on the lift.
2) Release fuel pressure. <Ref. to FU-52, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
3) Drain fuel from fuel tank. <Ref. to FU-52, DRAINING OF FUEL, OPERATION, Fuel.>
4) Remove rear seat.
5) Disconnect connector of fuel tank cord to rear harness.


S2M0164

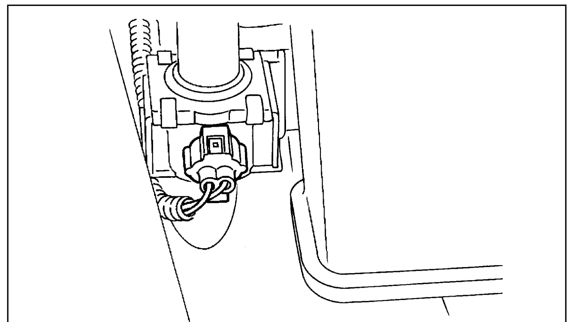
6) Push grommet which holds fuel tank cord on floor panel into under the body.


S2M0165

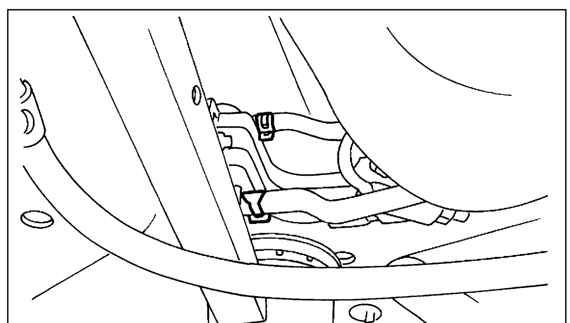
7) Remove rear crossmember. <Ref. to RS-19, REMOVAL, Rear Crossmember.>
8) Move clamp, and disconnect evaporation hose from canister.


S2M0949

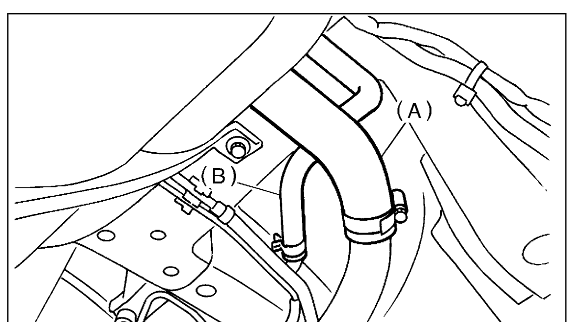
9) Disconnect connector from pressure control solenoid valve.
10) Disconnect connector from drain valve.


B2M1743

11) Disconnect hoses from roll over valve.

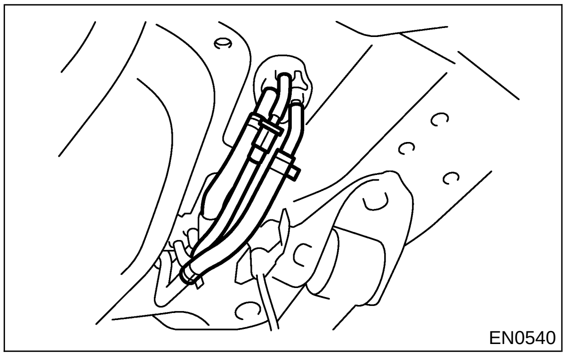

H2M2538

12) Loosen clamp and disconnect fuel filler hose and air vent hose from fuel filler pipe and air vent pipe.



S2M0193A

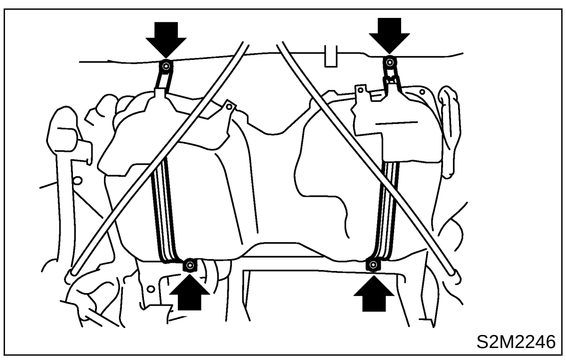
13) Move clips, and disconnect quick connector. <Ref. to FU-70, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>
14) Disconnect fuel hoses.



EN0540

15) 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.

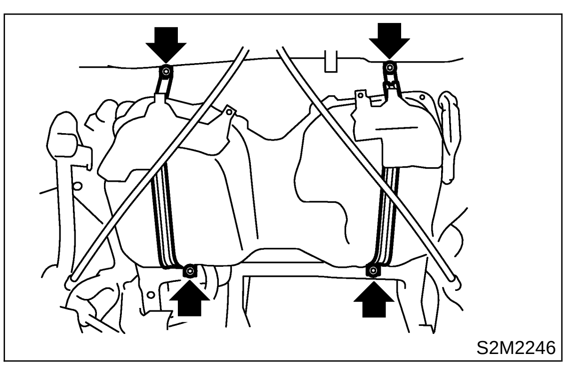


S2M2246

B: INSTALLATION *S175053A11*

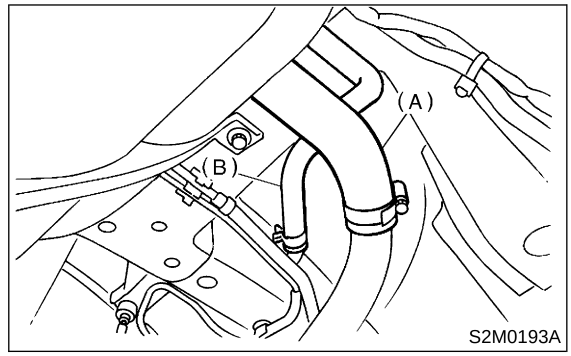
1) Support fuel tank with transmission jack and push fuel tank harness into access hole with grommet.
2) Set fuel tank and temporarily tighten bolts of fuel tank bands.

WARNING:
A helper is required to perform this work.



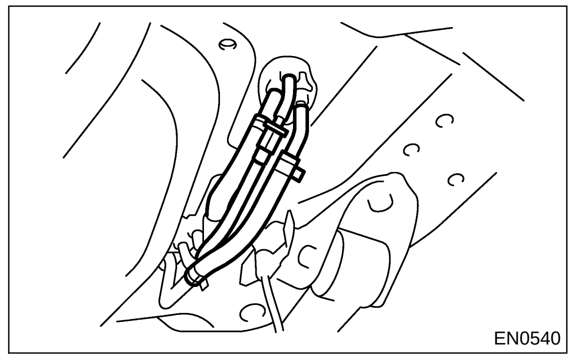
S2M2246

3) Connect fuel filler hose (A) and air vent hose (B).



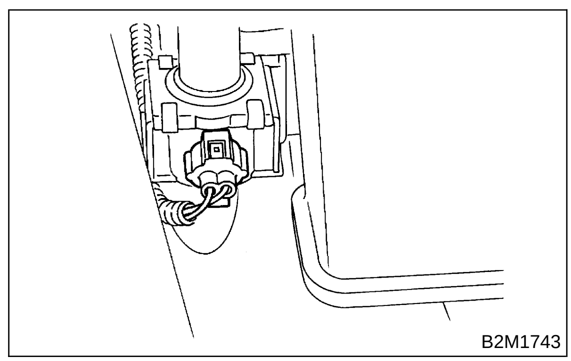
S2M0193A

4) Connect fuel hoses, and hold then with clips and quick connector. <Ref. to FU-70, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>



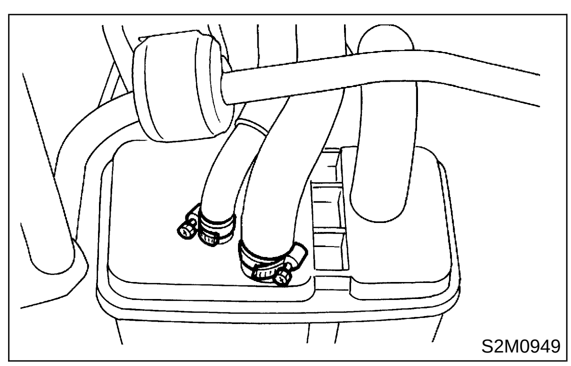
EN0540

5) Connect connector to drain valve.



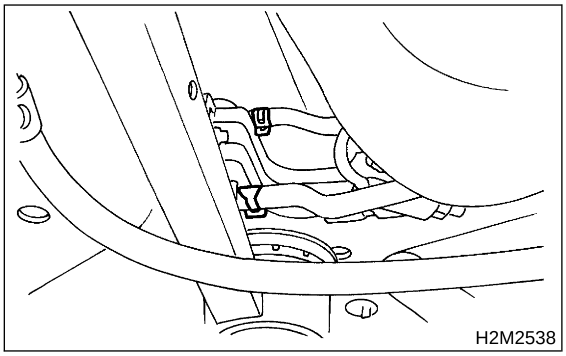
B2M1743

6) Connect connector to pressure control solenoid valve.
7) Connect evaporation hose to canister, and hold them with clamp.



S2M0949

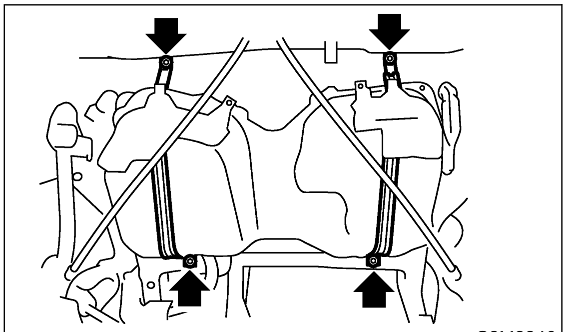
8) Connect hoses to roll over valve.



H2M2538

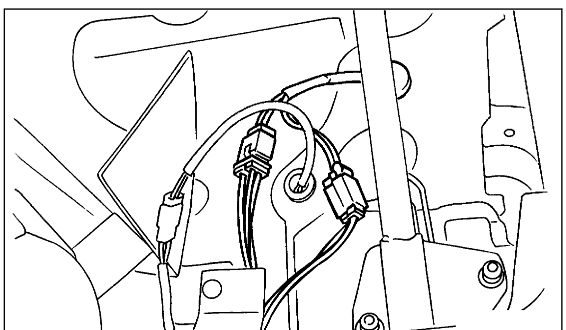
9) Tighten band mounting bolts.

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



S2M2246

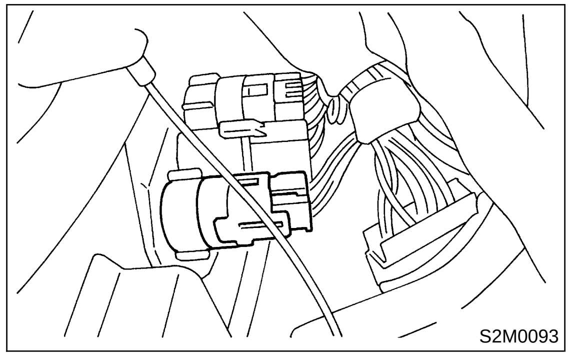
10) Install rear crossmember. <Ref. to RS-19, INSTALLATION, Rear Crossmember.>
11) Connect connectors to fuel tank cord and plug service hole with grommet.



S2M0164

12) Set rear seat and floor mat.

13) Connect connector to fuel pump relay.



S2M0093

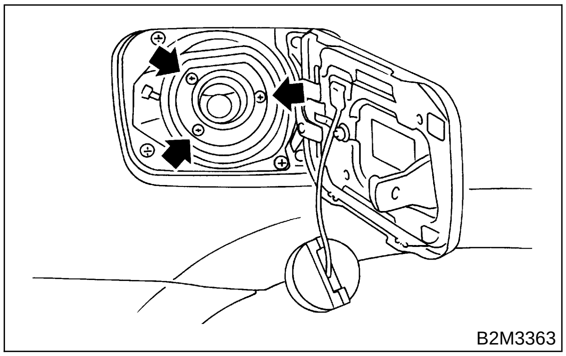
C: INSPECTION S175053A10

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.

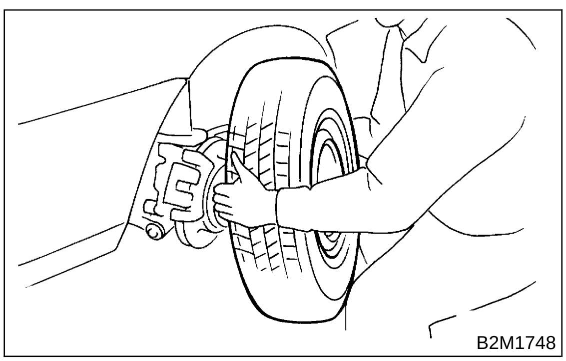
21. Fuel Filler Pipe S175022

A: REMOVAL S175022A18

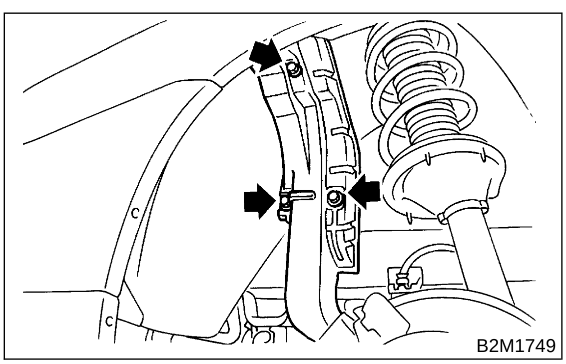
1) Set the vehicle on the lift.
2) Drain fuel from fuel tank. <Ref. to FU-52, DRAINING OF FUEL, OPERATION, Fuel.>
3) Remove screws which install fuel filler pipe on filler lid open.


B2M3363

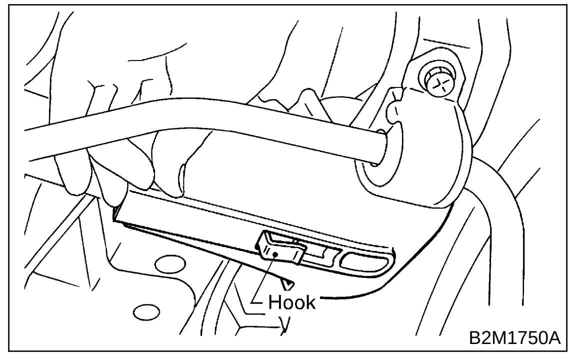
4) Remove wheel nuts of rear right side.
5) Lift-up the vehicle.
6) Remove rear right side wheel.


B2M1748

7) Remove bolts which install protector cover on body.

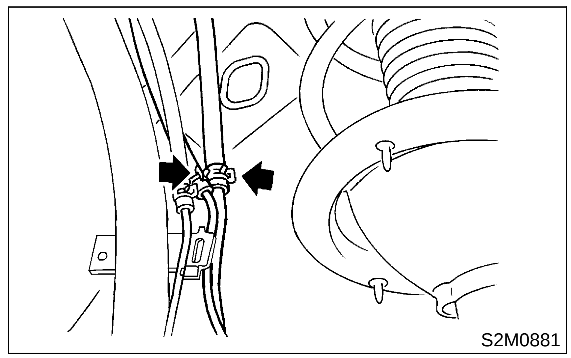

B2M1749

8) While releasing the under side of protector cover from hook, remove it.

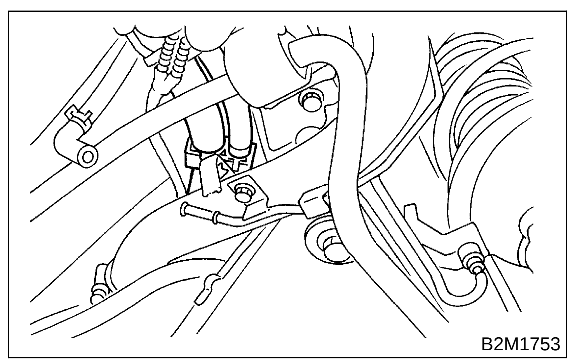


B2M1750A

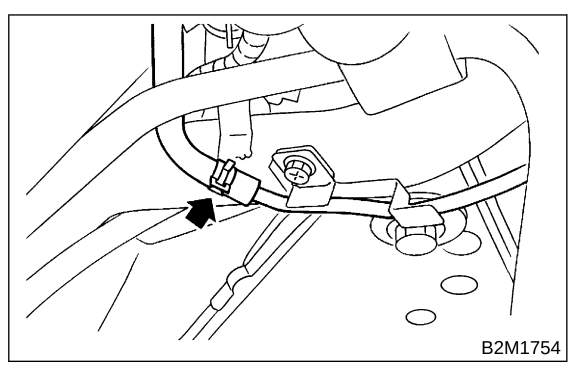
9) Disconnect evaporation hoses from pipes.


S2M0881

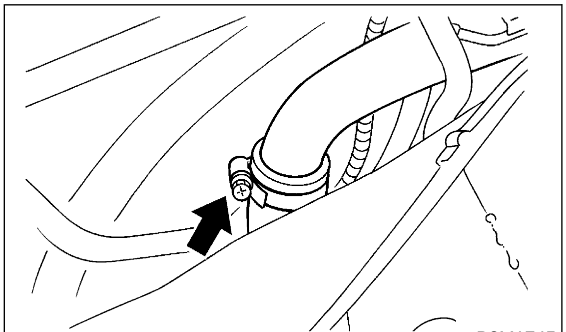
10) Lift-up the vehicle more.
11) Remove two evaporation hoses from clip.


B2M1753

12) Disconnect evaporation hose from joint pipe.

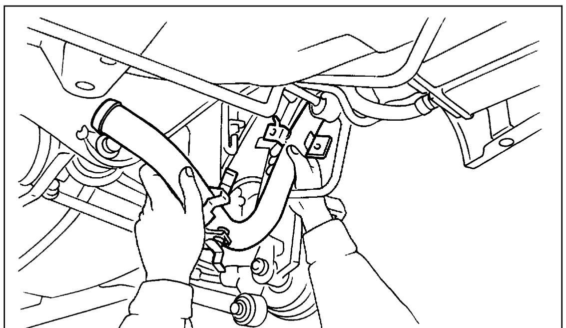

B2M1754

13) Loosen clamp, and disconnect fuel filler hose from fuel filler pipe.



B2M1745

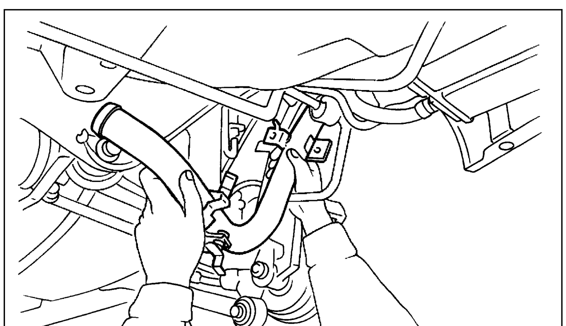
14) Remove fuel filler pipe to under side of vehicle.



B2M1756

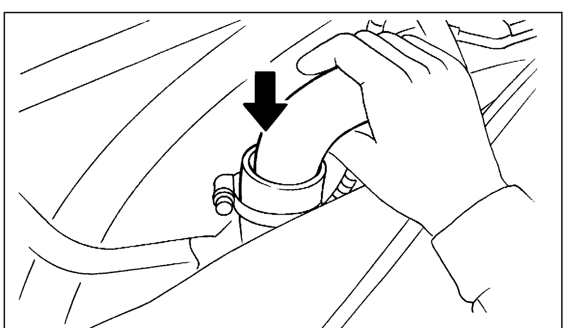
B: INSTALLATION *S175022A11*

1) Set fuel filler pipe from under side of vehicle, and hold it on fuel filler flap open.



B2M1756

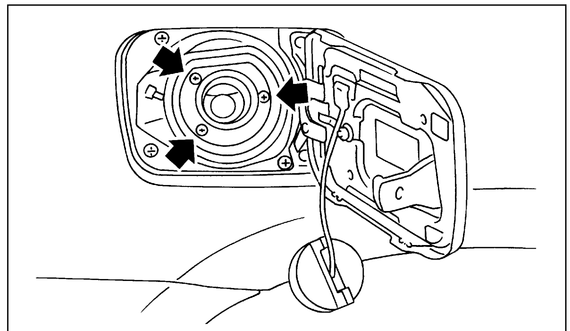
2) Connect fuel filler pipe into fuel filler hose.



B2M1757

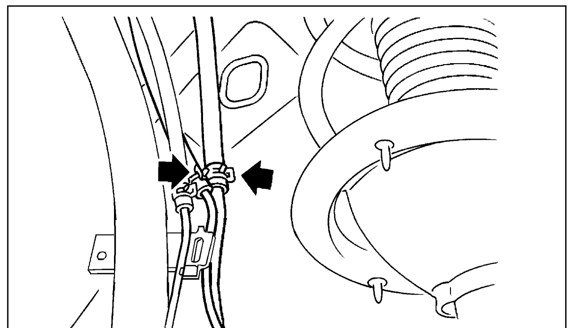
3) Lower the vehicle.

4) Temporarily tighten screws which install fuel filler pipe on filler lid open.



B2M3363

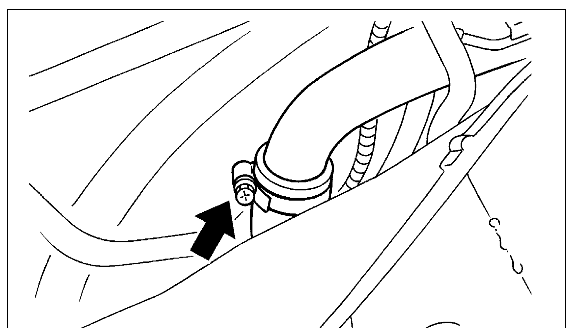
5) Connect evaporation hoses to pipes.



S2M0881

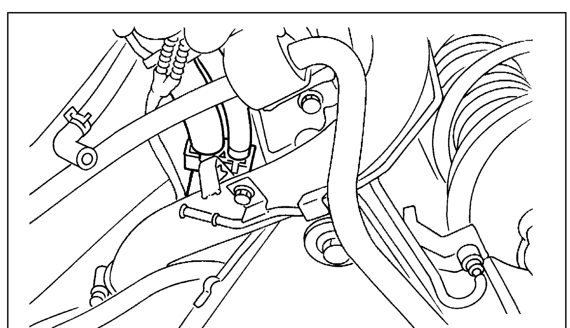
6) Lift-up the vehicle.

7) Tighten clamp bolt which holds fuel filler hose.



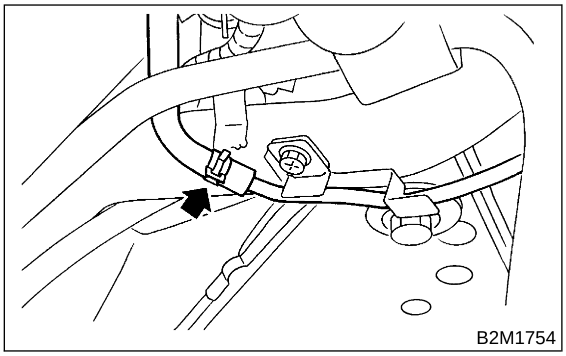
B2M1745

8) Install two evaporation hoses to clip.

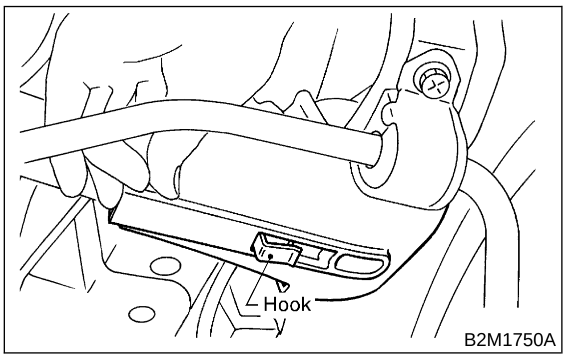


B2M1753

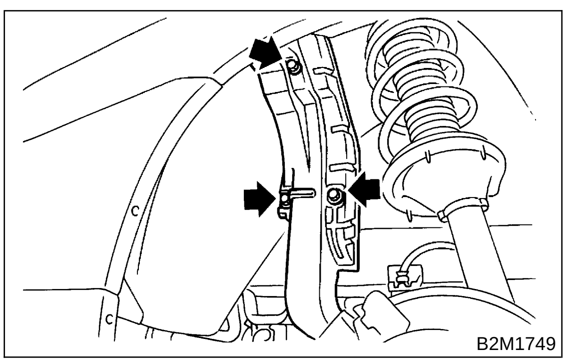
9) Connect evaporation hose to joint pipe.



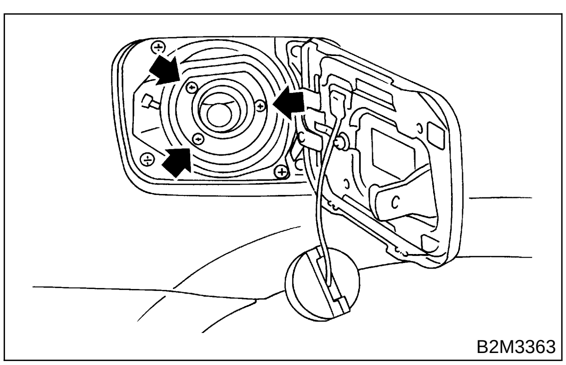
10) Lower the vehicle.
11) While holding the under side of protector cover on bracket, install it.



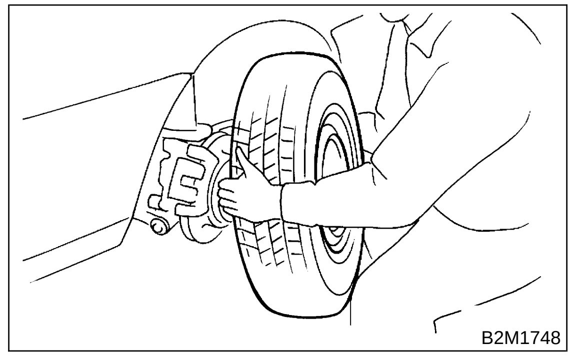
12) Tighten bolts which install protector cover on body.



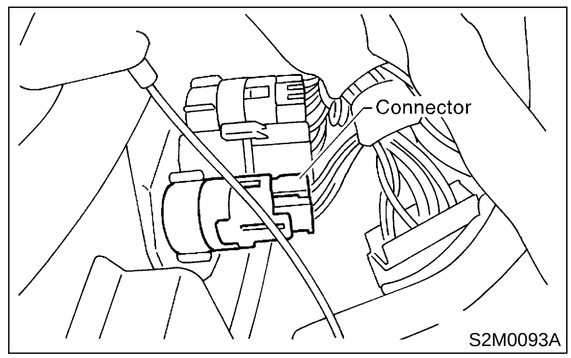
13) Tighten screws which install fuel filler pipe on filler lid open.



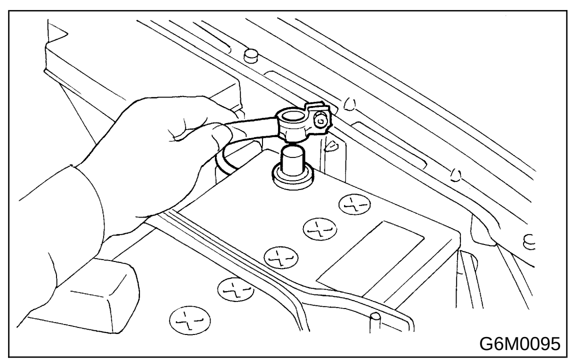
14) Install rear right wheel.



15) Install fuel filler cap.
16) Connect connector to fuel pump relay.

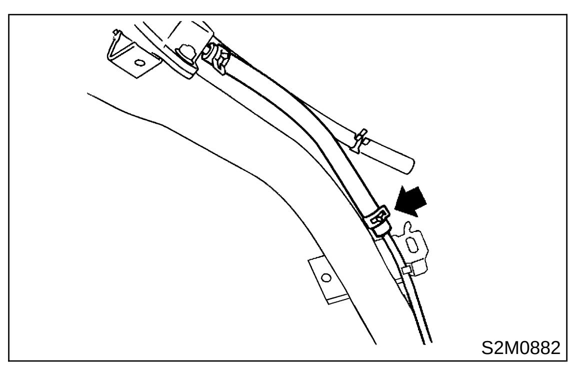


17) Connect battery ground terminal.

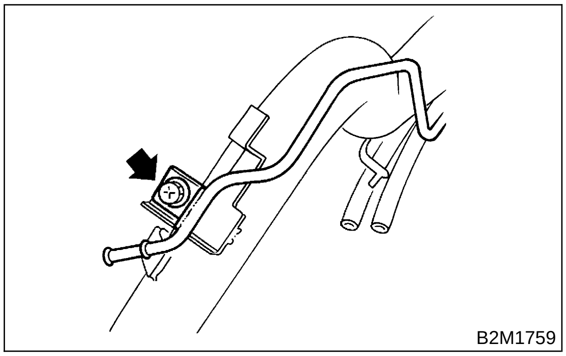


C: DISASSEMBLY *S175022A06*

1) Move clip, and disconnect evaporation hose from joint pipe.

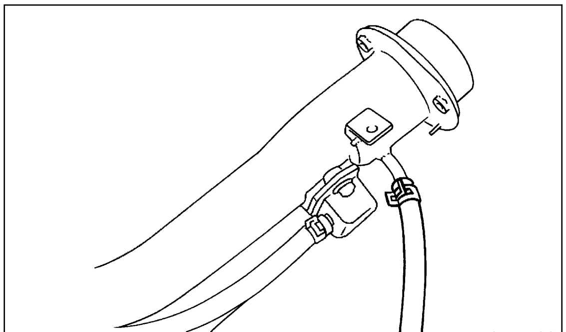


2) Remove bolt which installs joint pipe on fuel filler pipe.



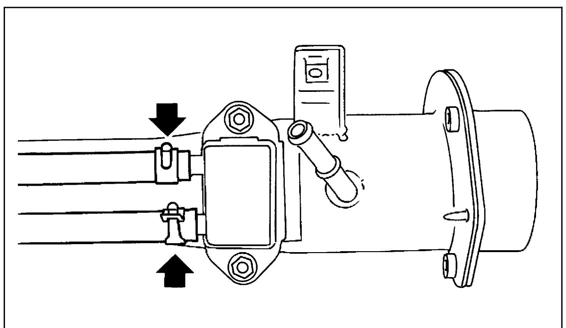
B2M1759

3) Disconnect evaporation hose from fuel filler pipe.



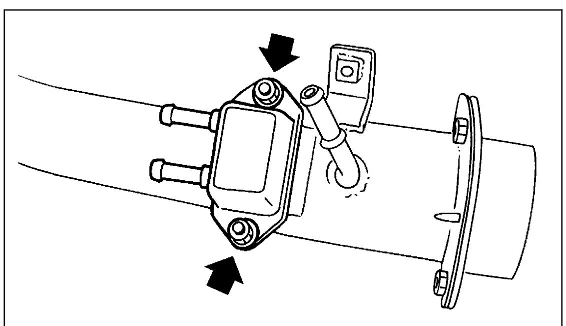
B2M1760

4) Disconnect evaporation hoses from shut valve.



B2M1761

5) Remove shut valve from fuel filler pipe.

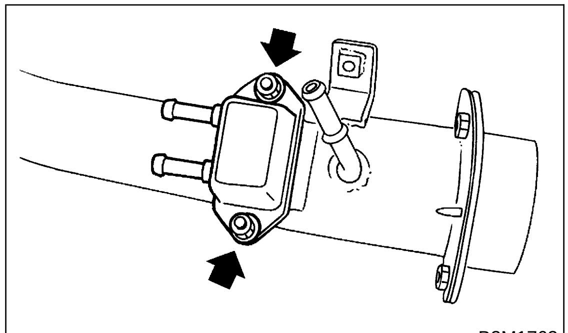


B2M1762

D: ASSEMBLY S175022A02

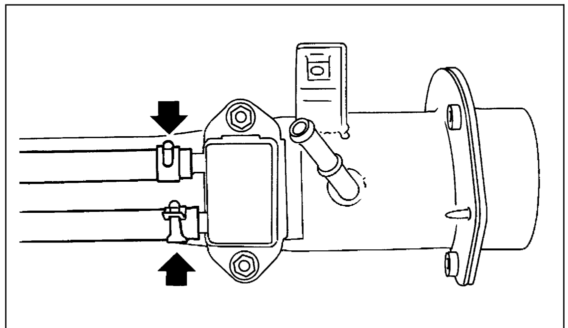
1) Install shut valve on fuel filler pipe.

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



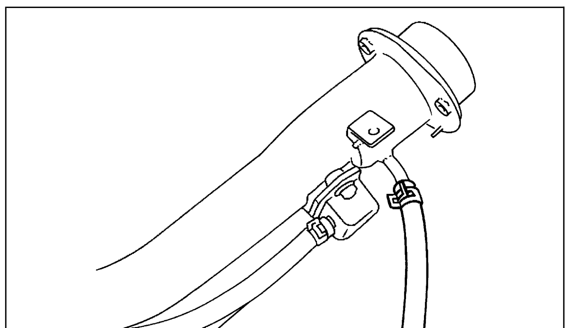
B2M1762

2) Connect evaporation hoses to shut valve.



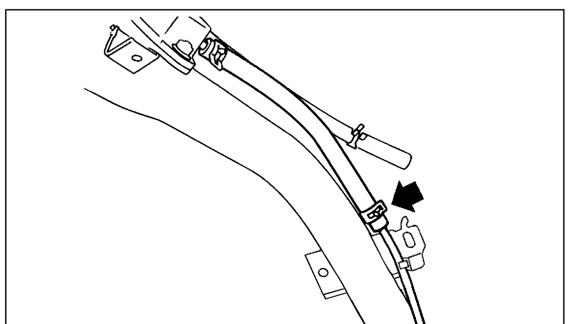
B2M1761

3) Connect evaporation hose to fuel filler pipe.



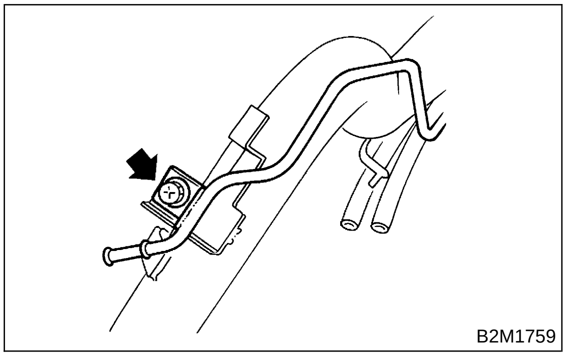
B2M1760

4) Connect evaporation hose to evaporation pipe.



S2M0882

5) Install evaporation pipe to fuel filler pipe.



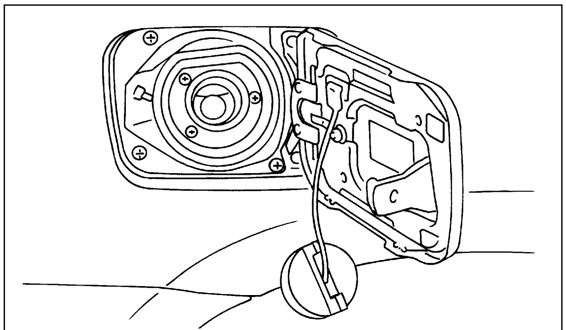
22. Fuel Pump S175025

A: REMOVAL S175025A18

WARNING:

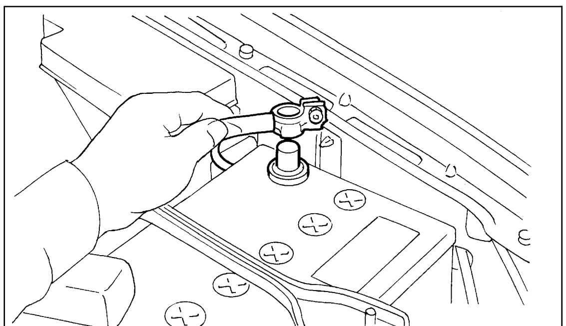
- **Place “No fire” signs near the working area.**
- **Be careful not to spill fuel on the floor.**

1) Release fuel pressure. <Ref. to FU-52, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open fuel filler flap lid, and remove fuel filler cap.



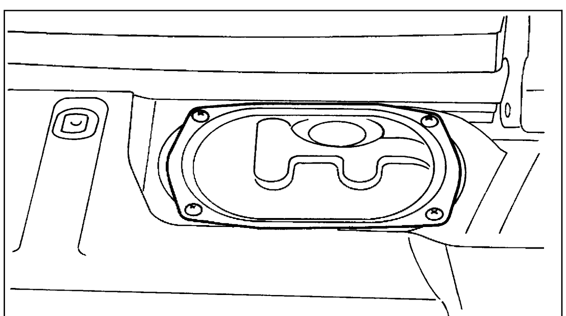
B2M3197

3) Disconnect battery ground cable.



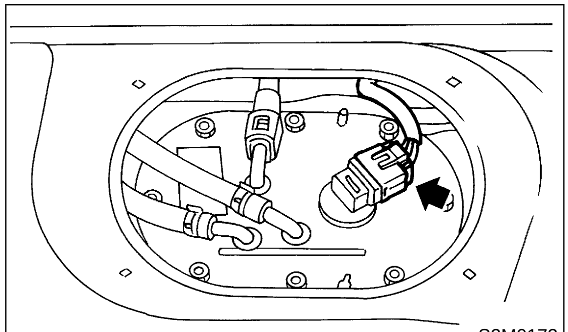
G6M0095

4) Remove the floor box located just behind the rear seats.
5) Remove access hole lid.



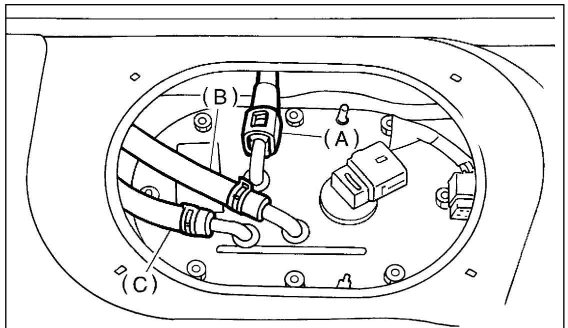
S2M0246

6) Disconnect connector from fuel pump.



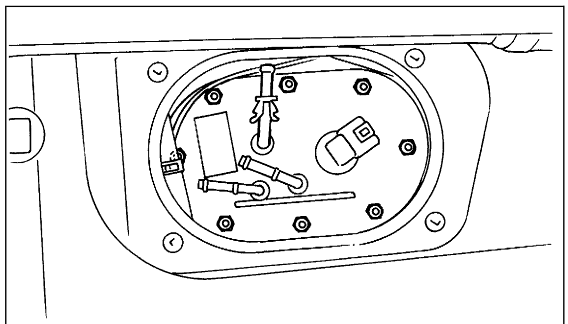
S2M0172

7) Move clips, and then disconnect fuel delivery hose (A), return hose (B) and jet pump hose (C).
8) Disconnect quick connector, and then disconnect fuel delivery hose (A). <Ref. to FU-70, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>



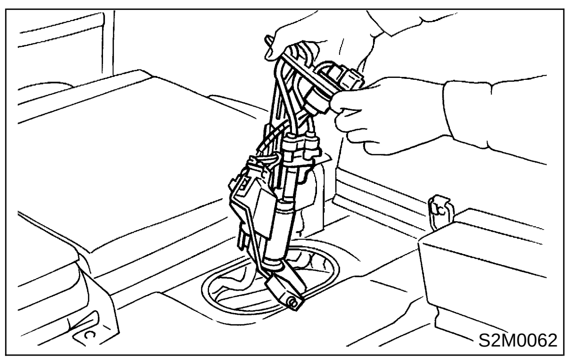
S2M0060A

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



S2M0061

10) Take off fuel pump from fuel tank.

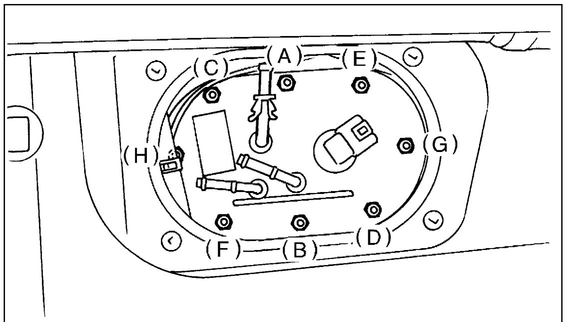


S2M0062

B: INSTALLATION *S175025A11*

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 the figure to specified torque.

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

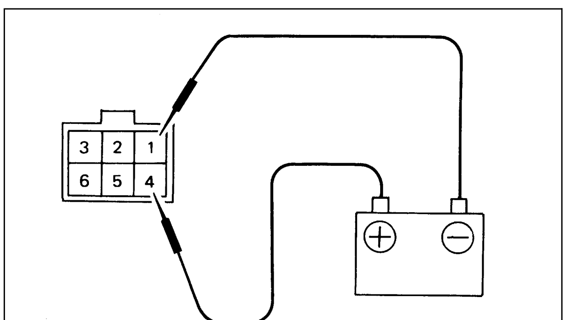


S2M0063A

C: INSPECTION *S175025A10*

Connect lead harness to connector terminal of fuel pump, and apply battery power supply to check whether the pump operate.

WARNING:
- **Wipe off the fuel completely.**
- **Keep battery as far apart from fuel pump as possible.**
- **Be sure to turn the battery supply ON and OFF on the battery side.**
- **Do not run fuel pump for a long time under non-load condition.**



G2M0366

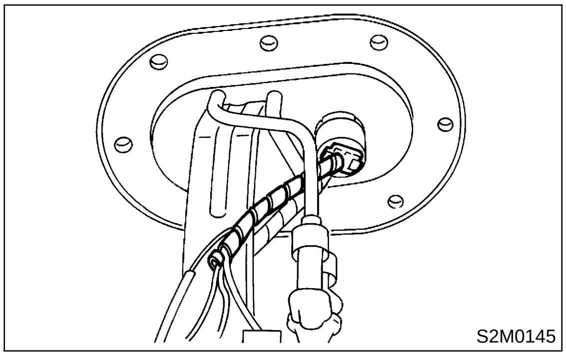
23. Fuel Level Sensor *S175026*

A: REMOVAL *S175026A18*

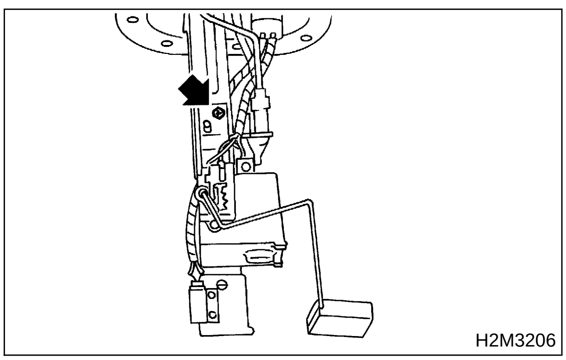
WARNING:
- **Place “NO FIRE” signs near the working area.**
- **Be careful not to spill fuel on the floor.**

NOTE:
Fuel level sensor is built in fuel pump assembly.

1) Remove fuel pump assembly. <Ref. to FU-63, REMOVAL, Fuel Pump.>
2) Disconnect connector from fuel pump bracket.



3) Remove bolt which installs fuel level sensor on mounting bracket.



B: INSTALLATION *S175026A11*

Install in the reverse order of removal.

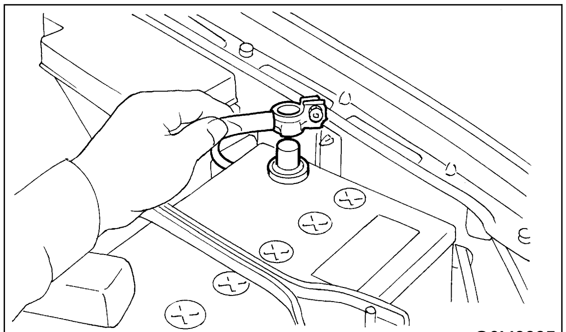
24. Fuel Sub Level Sensor S175023

A: REMOVAL S175023A18

WARNING:

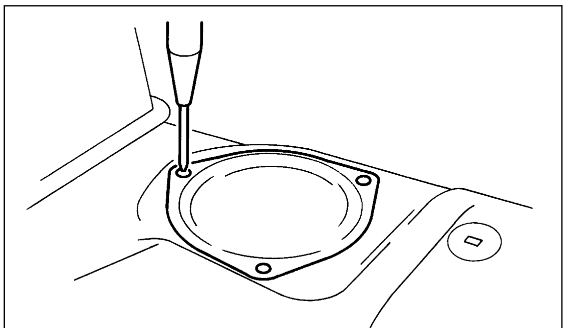
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

1) Disconnect battery ground cable.



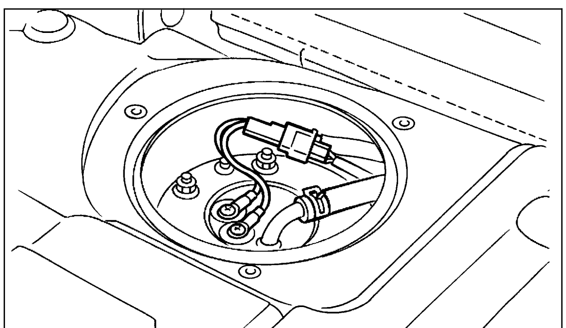
G6M0095

2) Remove the floor box located just behind the rear seats.
3) Remove service hole cover.



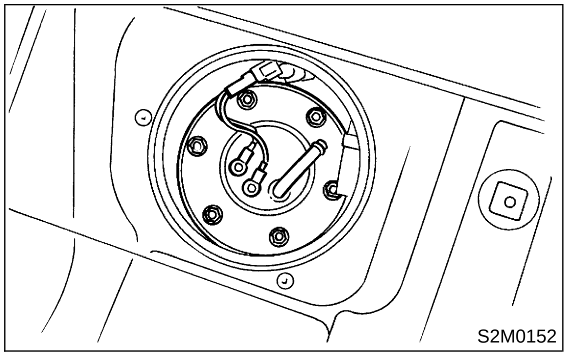
G2M0863

4) Disconnect connector from fuel sub meter.
5) Disconnect fuel jet pump hose.



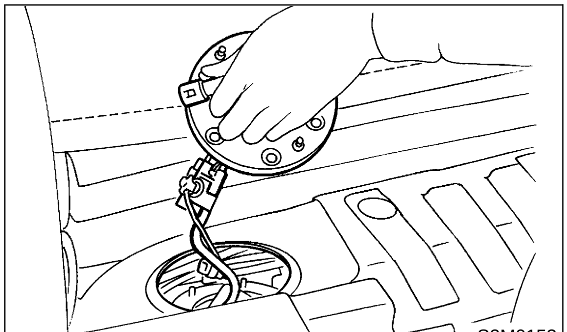
S2M0151

6) Remove bolts which install fuel sub meter unit on fuel tank.



S2M0152

7) Remove fuel sub meter unit.

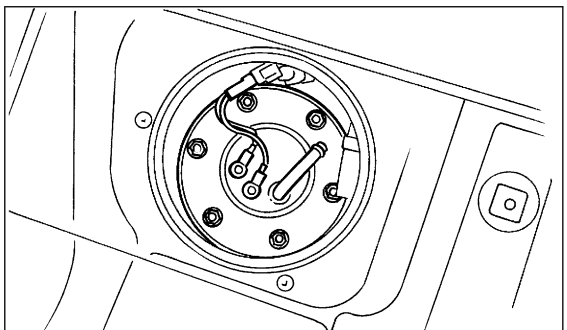


S2M0153

B: INSTALLATION S175023A11

Install in the reverse order of removal.

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



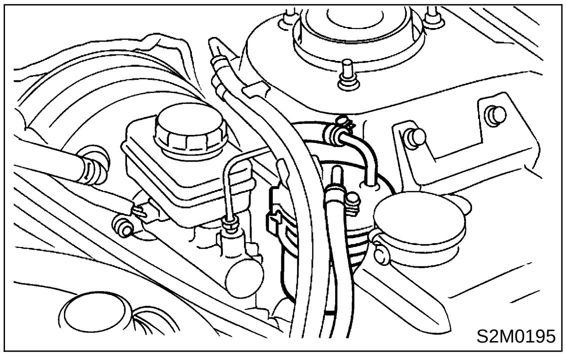
S2M0152

25. Fuel Filter *S175027*

A: REMOVAL *S175027A18*

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-52, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Disconnect fuel delivery hoses from fuel filter.

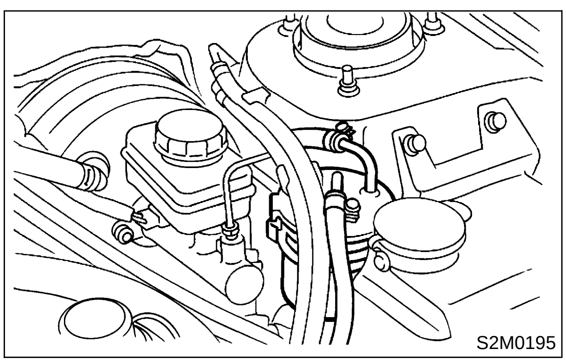


3) Remove filter from holder.

B: INSTALLATION *S175027A11*

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

Tightening torque:
1.25 N·m (0.13 kgf-m, 0.9 ft-lb)



C: INSPECTION *S175027A10*

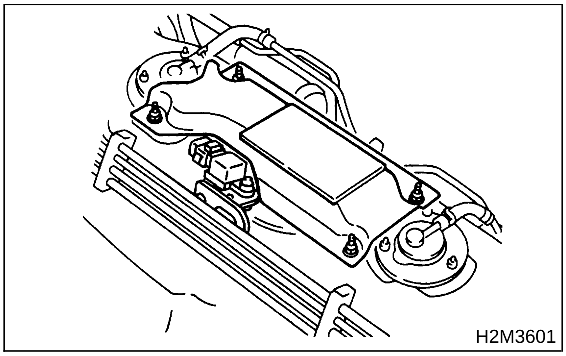
1) Check the inside of fuel filter for dirt and water sediment.
2) If it is clogged, or if replacement interval has been reached, replace it.
3) If water is found in it, shake and expel the water from inlet port.
4) If fuel hoses are damaged at the connecting portion, replace it with a new one.
5) If clamps are badly damaged, replace with new ones.

26. Fuel Cut Valve *S175021*

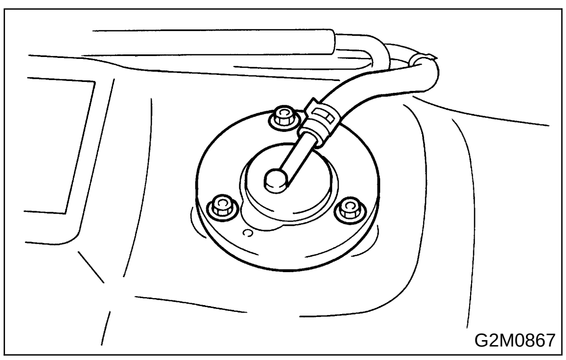
A: REMOVAL *S175021A18*

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

1) Remove fuel tank. <Ref. to FU-55, REMOVAL, Fuel Tank.>
2) Remove protective cover.



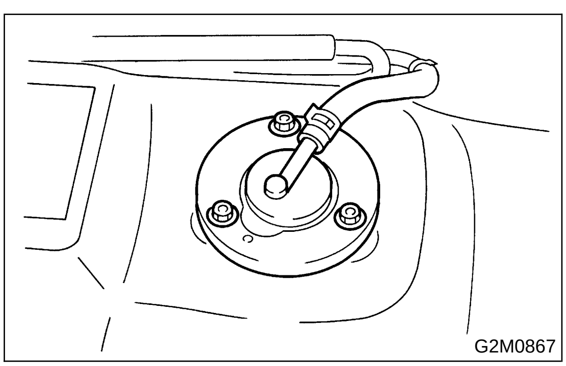
3) Move clip and disconnect evaporation hose from fuel cut valve.
4) Remove bolts which install fuel cut valve.



B: INSTALLATION *S175021A11*

Install in the reverse order of removal.

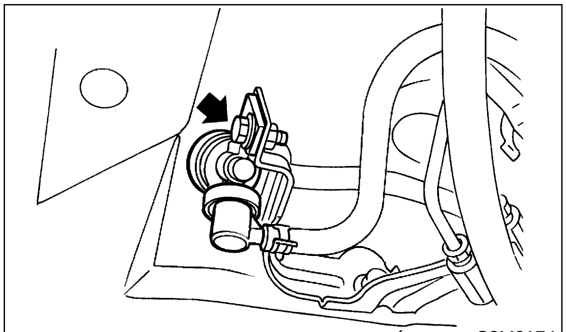
Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



27. Roll Over Valve S175018

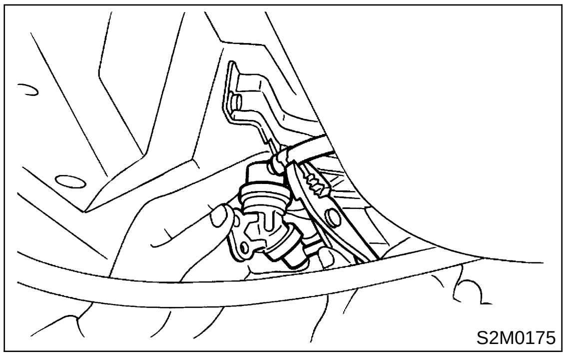
A: REMOVAL S175018A18

1) Lift-up the vehicle.
2) Remove roll over valve from bracket.



S2M0174

3) Disconnect hoses from roll over valve, and remove it from bracket.

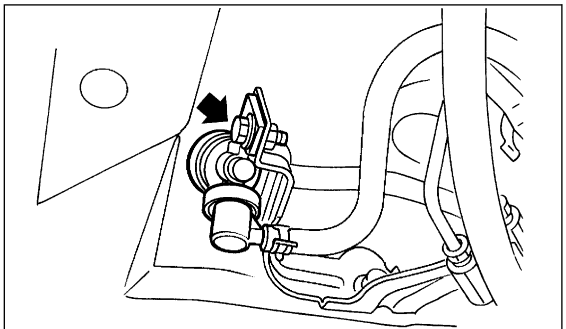


S2M0175

B: INSTALLATION S175018A11

Install in the reverse order of removal.

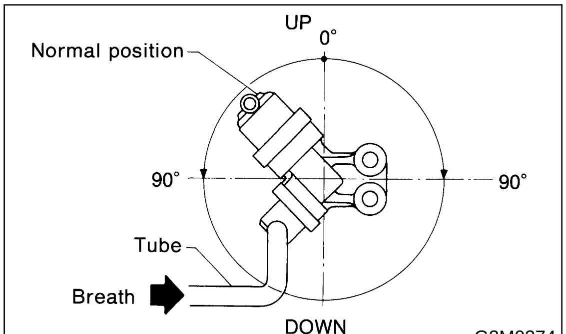
CAUTION:
- **Do not install top side of valve down.**
- **Before installing bracket on body, securely fit concave part of bracket to hole in body.**



S2M0174

C: INSTALLATION S175018A10

1) Connect hoses to roll over valve as shown in Figure.



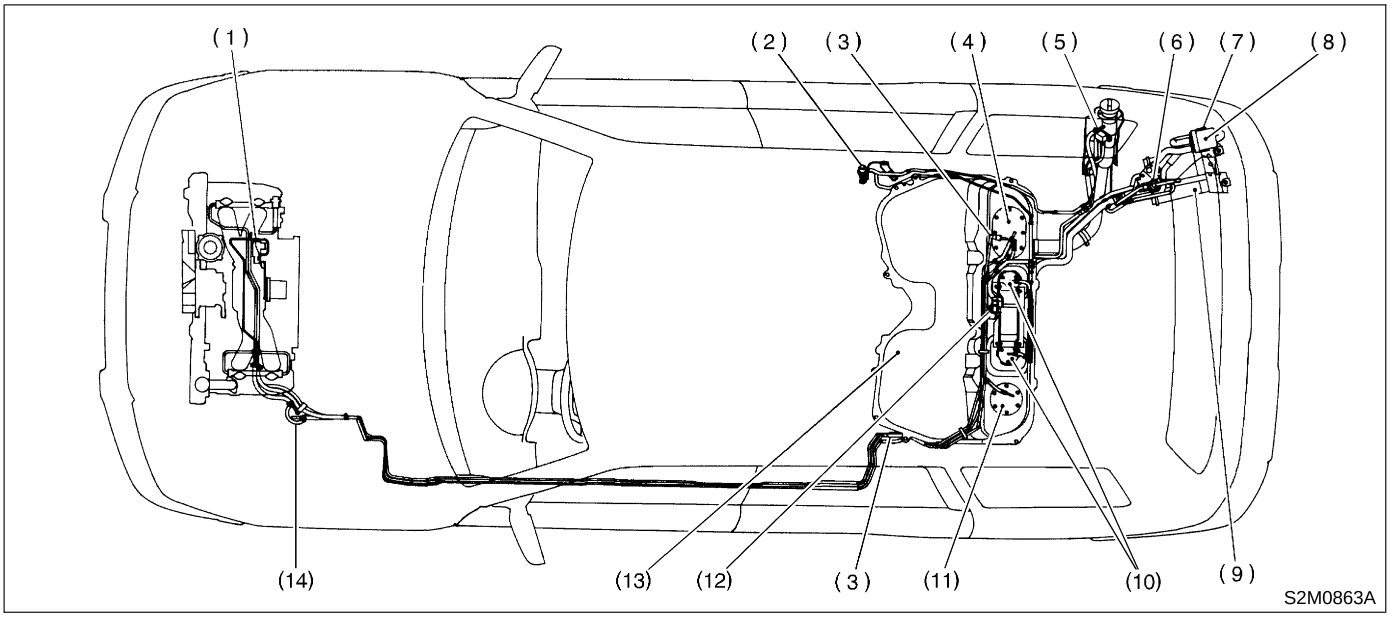
G2M0374

2) While blowing through open end of hose, tilt valve at least 90° left and right from normal position.
3) Ensure that there is no air flow when hose is tilted greater than 90°.

28. Fuel Delivery, Return and Evaporation Lines S175019

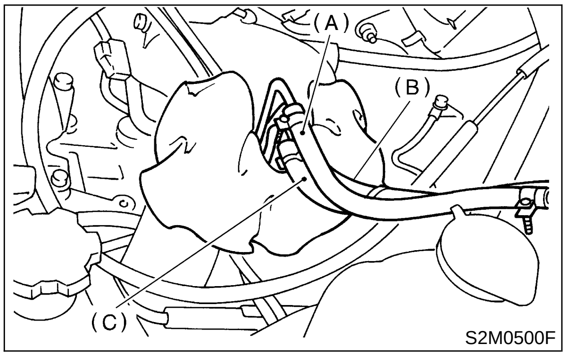
A: REMOVAL S175019A18

1) Set vehicle on the lift.
2) Release fuel pressure. <Ref. to FU-52, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
3) Open fuel filler flap lid and remove fuel filler cap.
4) Remove floor mat. <Ref. to EI-45, REMOVAL, Floor Mat.>
5) Remove fuel delivery pipes and hoses, fuel return pipes and hoses, evaporation pipes and hoses.



(1) Purge control solenoid valve
(2) Roll over valve
(3) Quick connector
(4) Fuel pump
(5) Shut valve
(6) Pressure control solenoid valve
(7) Drain valve
(8) Drain filter
(9) Canister
(10) Fuel cut valve
(11) Fuel sub level sensor
(12) Fuel tank pressure sensor
(13) Fuel tank
(14) Fuel filter

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

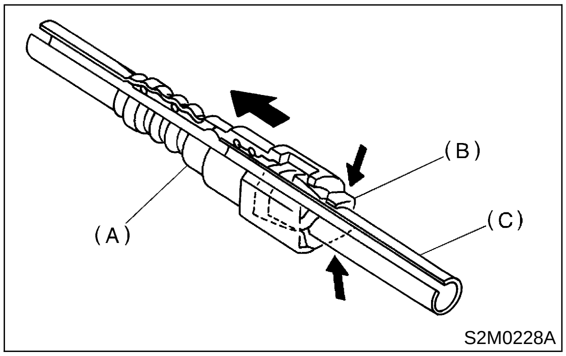


(A) Fuel delivery hose
(B) Return hose
(C) Evaporation hose

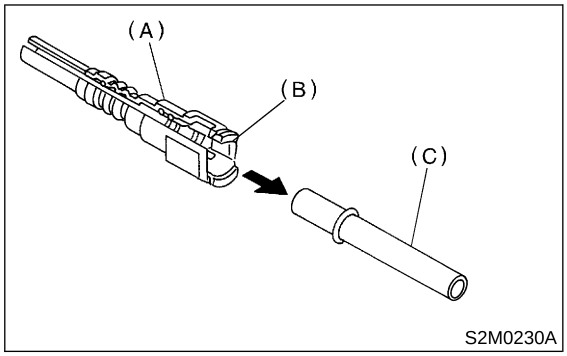
7) Lift-up the vehicle.

8) Separate quick connector on fuel delivery and return 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 retainers with new ones.

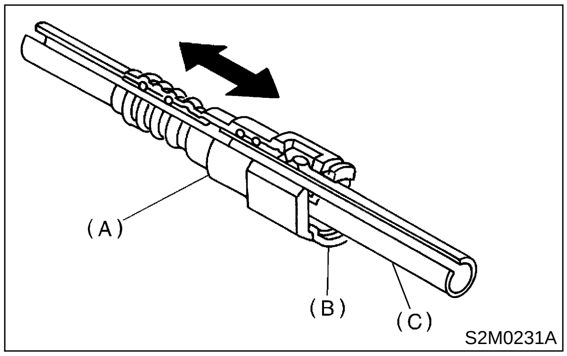


(A) Connector
(B) Retainer
(C) Pipe



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

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.**

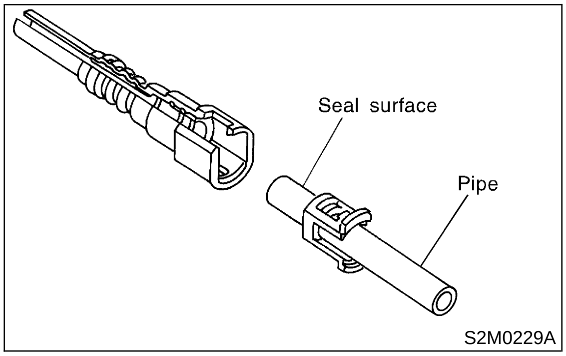


(A) Connector
(B) Retainer
(C) Pipe

B: INSTALLATION *S175019A11*

1) Connect quick connector on fuel delivery 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.**



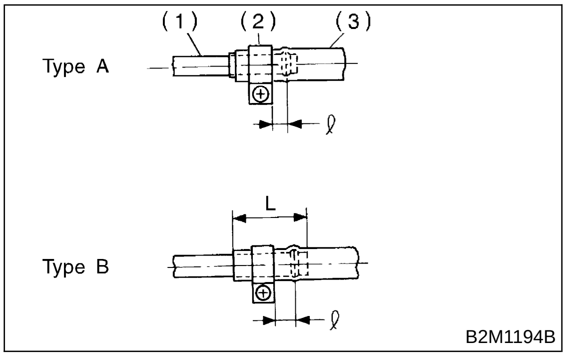
(1) Set new retainer (B) to connector (A).
(2) Push pipe into connector completely.

NOTE:
At this time, two clicking sounds are heard.

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.

***ℓ*: 2.5±1.5 mm (0.098±0.059 in)**

L: 22.5±2.5 mm (0.886±0.098 in)

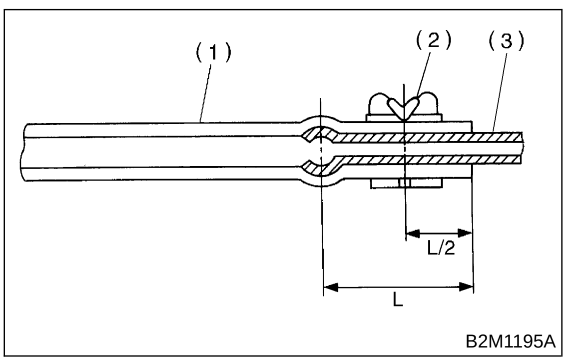


(1) Fitting
(2) Clamp
(3) Hose

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

L = 17.5±2.5 mm (0.689±0.098 in)

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



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

C: INSPECTION *S175019A10*

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.

29. Fuel System Trouble in General S175571

A: INSPECTION S175571A10

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 level sensor.	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 cooling system. Refueling will also complement the effect of anti-freeze solution each time the fuel level drops to about one-half. After the winter season, drain water which may have accumulated in the fuel filter and fuel tank in the manner same as that described under Affected areas 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 antifreeze 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.

MEMO:

EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)

EC

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3.	Rear Catalytic Converter	4
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5.	Purge Control Solenoid Valve	6
6.	Main Fuel Level Sensor	7
7.	Fuel Temperature Sensor	8
8.	Sub Fuel Level Sensor	9
9.	Fuel Tank Pressure Sensor	10
10.	Pressure Control Solenoid Valve	11
11.	Drain Filter	13
12.	Vent Valve	14
13.	Shut Valve	15
14.	Drain Valve	16

1. General Description S170001

A: CAUTION S170001A03

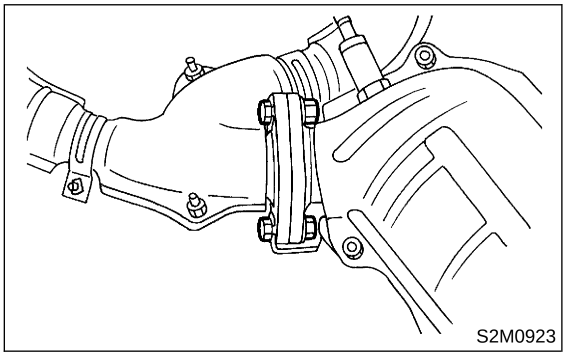
- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation 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 ground cable from battery.

2. Front Catalytic Converter S170017

A: REMOVAL S170017A18

1) Remove the front exhaust pipe and center exhaust pipe. <Ref. to EX-5, REMOVAL, Front Exhaust Pipe.>
2) Separate front catalytic converter from front exhaust pipe.

NOTE:
The front catalytic converter is integrated with rear catalytic converter.

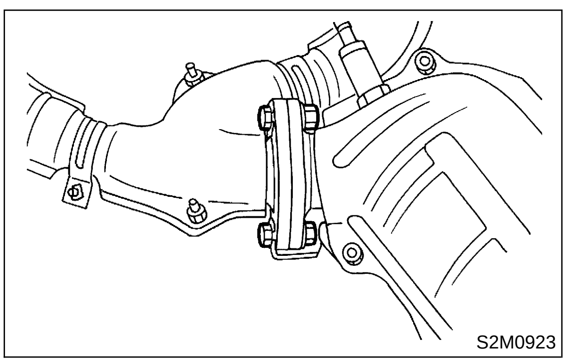

S2M0923

B: INSTALLATION S170017A11

NOTE:
Replace gaskets with new ones.

1) Install front catalytic converter to front exhaust pipe.

Tightening torque:
30 N·m (3.1 kgf-m, 22.4 ft-lb)


S2M0923

2) Install the front exhaust pipe and center exhaust pipe. <Ref. to EX-6, INSTALLATION, Front Exhaust Pipe.>

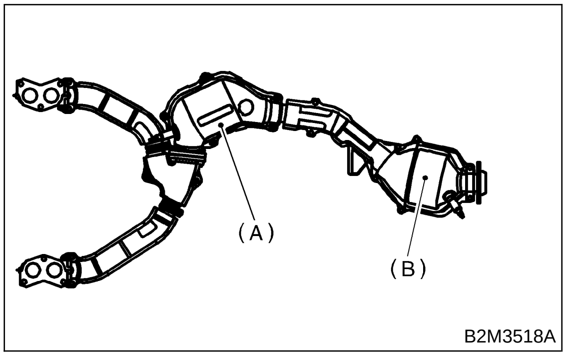
C: INSPECTION S170017A10

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

3. Rear Catalytic Converter *S170036*

A: REMOVAL *S170036A18*

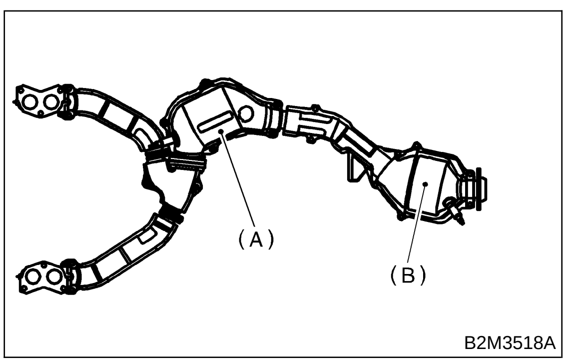
The front and rear catalytic converter and center exhaust pipe are integrated into one unit. Therefore, the removal and installation procedures are the same as the those for the front catalytic converter. <Ref. to EC-3 REMOVAL, Front Catalytic Converter.>



(A) Front catalytic converter
(B) Rear catalytic converter

B: INSTALLATION *S170036A11*

The front and rear catalytic converter and center exhaust pipe 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-3 INSTALLATION, Front Catalytic Converter.>



(A) Front catalytic converter
(B) Rear catalytic converter

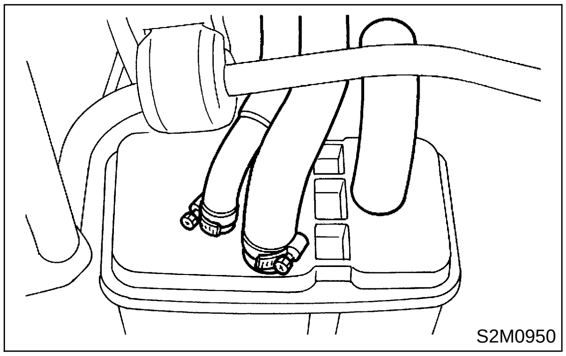
C: INSPECTION *S170036A10*

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

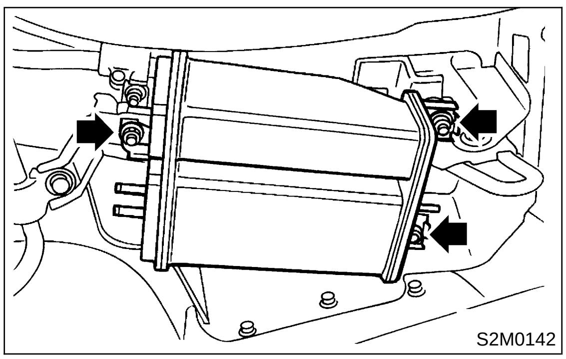
4. Canister *S170037*

A: REMOVAL *S170037A18*

1) Lift-up the vehicle.
2) Loosen two clamps which hold two canister hoses, and disconnect evaporation three hoses from canister.



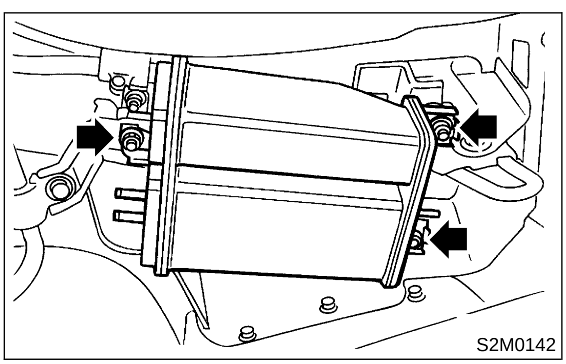
3) Remove canister from body.



B: INSTALLATION *S170037A11*

Install in the reverse order of removal.

Tightening torque:
23 N·m (2.3 kgf-m, 17 ft-lb)



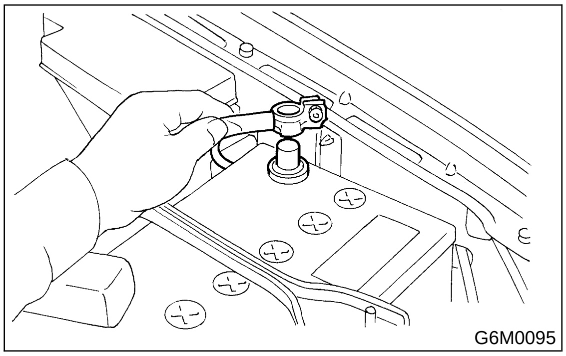
C: INSPECTION *S170037A10*

Make sure the canister and canister hoses are not cracked or loose.

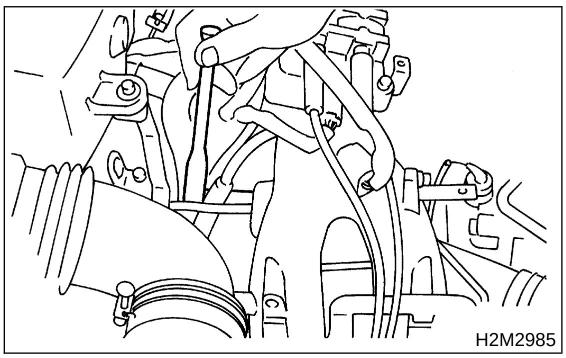
5. Purge Control Solenoid Valve S170035

A: REMOVAL S170035A18

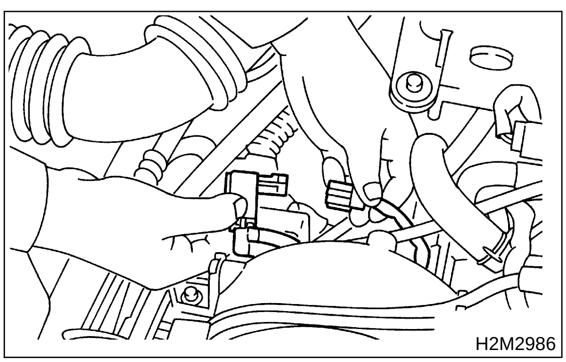
1) Disconnect battery ground cable.



2) Remove bolt which installs purge control solenoid valve onto intake manifold.



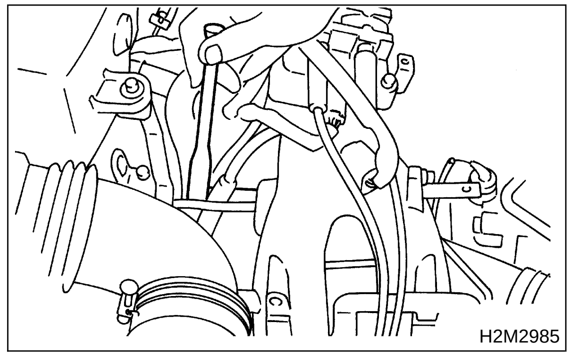
3) Take out purge control solenoid valve through the bottom of the intake manifold.
4) Disconnect connector and hoses from purge control solenoid valve.



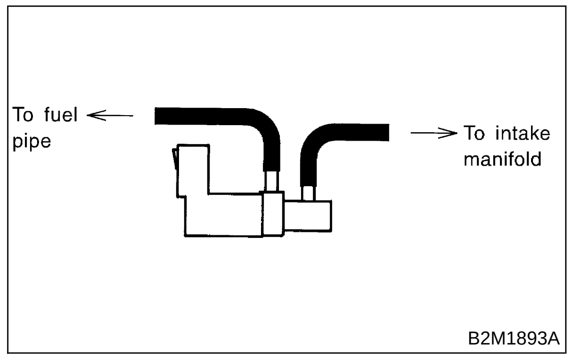
B: INSTALLATION S170035A11

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 S170035A10

Make sure hoses are not cracked or loose.

6. Main Fuel Level Sensor *S170038*

A: REMOVAL *S170038A18*

For work procedures, refer to “FU” section. <Ref. to FU-65, REMOVAL, Fuel Level Sensor.>

B: INSTALLATION *S170038A11*

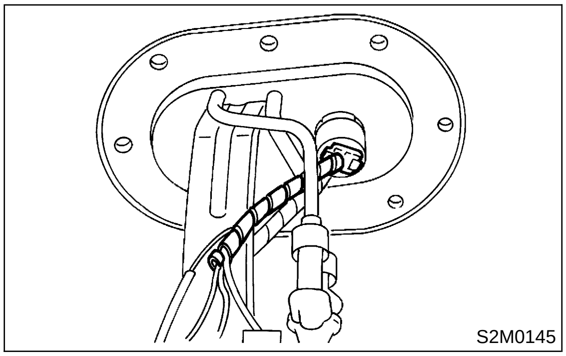
For work procedures, refer to “FU” section. <Ref. to FU-65, INSTALLATION, Fuel Level Sensor.>

7. Fuel Temperature Sensor S170032

A: REMOVAL S170032A18

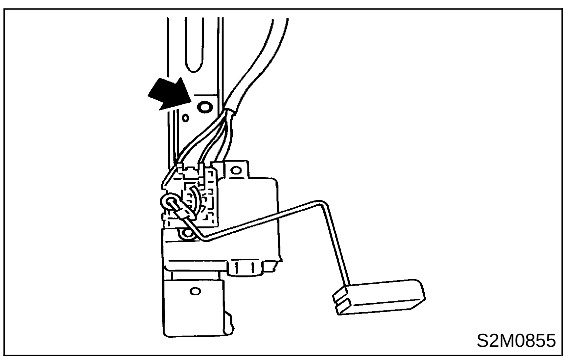
NOTE:
Fuel temperature sensor is built in fuel pump assembly.

1) Remove fuel pump assembly. <Ref. to FU-63, 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-65, REMOVAL, Fuel Level Sensor.>



B: INSTALLATION S170032A11

Install in the reverse order of removal.

WARNING:
Spark may occur and ignite if fuel is nearby.

8. Sub Fuel Level Sensor *S170029*

A: REMOVAL *S170029A18*

For work procedures, refer to “FU” section. <Ref. to FU-66, REMOVAL, Fuel Sub Level Sensor.>

B: INSTALLATION *S170029A11*

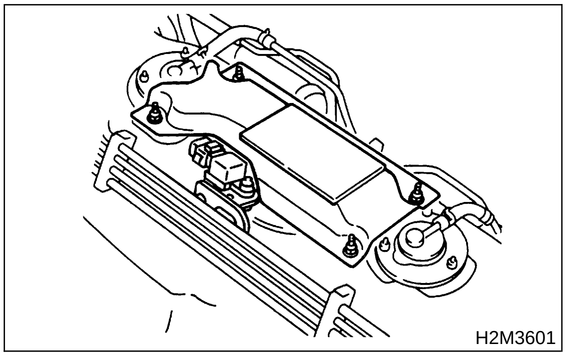
For work procedures, refer to “FU” section. <Ref. to FU-66, INSTALLATION, Fuel Sub Level Sensor.>

9. Fuel Tank Pressure Sensor

S170030

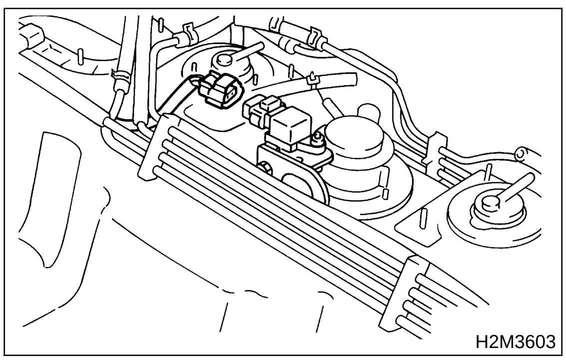
A: REMOVAL *S170030A18*

1) Remove fuel tank. <Ref. to FU-55, REMOVAL, Fuel Tank.>
2) Remove fuel pipe protector.



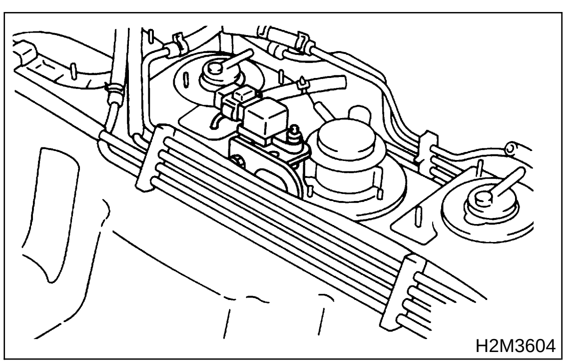
H2M3601

3) Disconnect the connector from fuel tank pressure sensor.



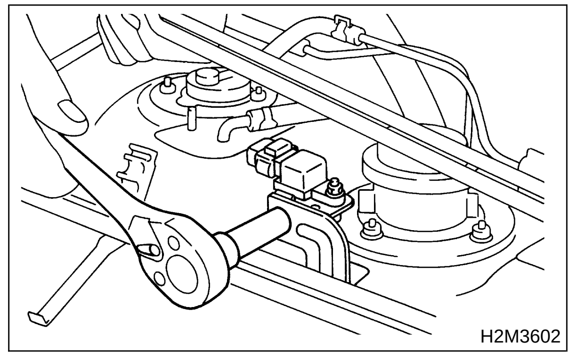
H2M3603

4) Release the clips which hold fuel pipes onto fuel tank.



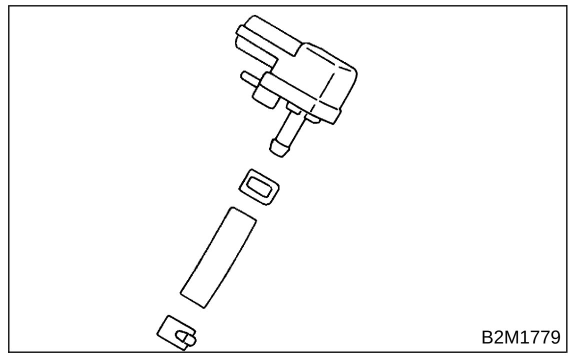
H2M3604

5) Move the two fuel pipes to upper side, and remove bolt which secures fuel tank pressure sensor to bracket.



H2M3602

6) Disconnect pressure hose from fuel tank pressure sensor.

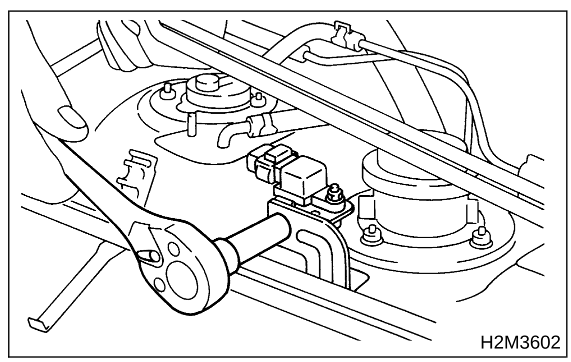


B2M1779

B: INSTALLATION *S170030A11*

Install in the reverse order of removal.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)



H2M3602

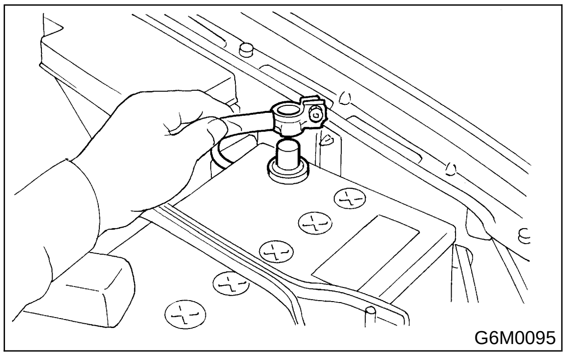
C: INSPECTION *S170030A10*

Make sure that hoses are not cracked or loose.

10. Pressure Control Solenoid Valve *S170031*

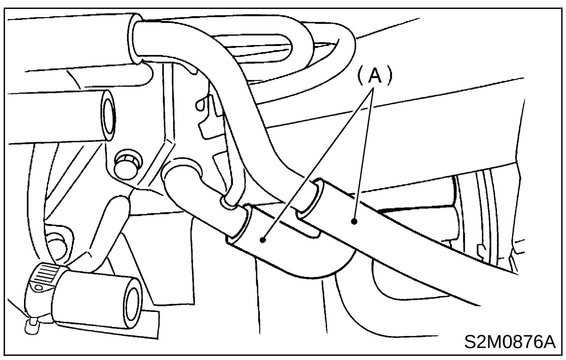
A: REMOVAL *S170031A18*

1) Disconnect battery ground cable.


G6M0095

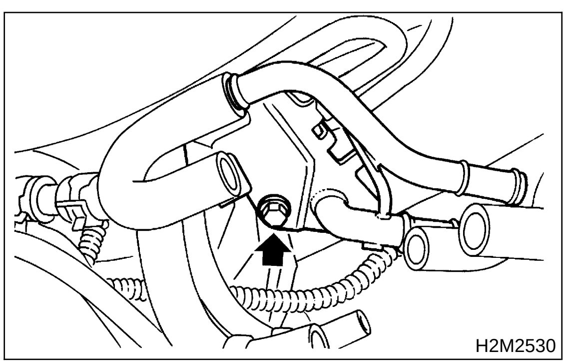
2) Remove the canister. <Ref. to EC-5, REMOVAL, Canister.>

3) Disconnect the evaporation hoses (A) from joint pipes.

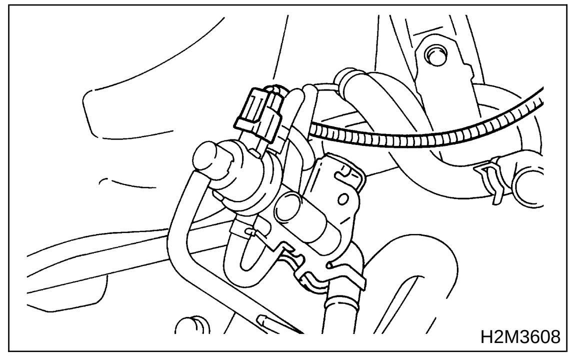


S2M0876A

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

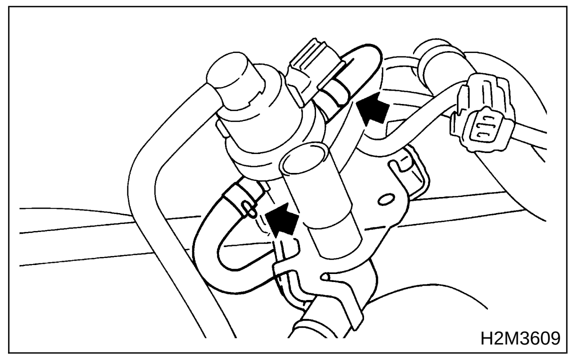

H2M2530

5) Disconnect the connector from pressure control solenoid valve.

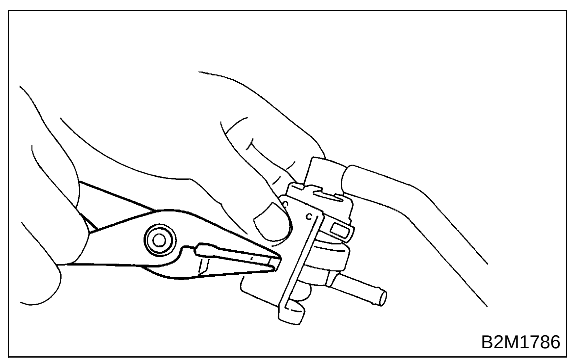

H2M3608

6) Disconnect the two evaporation hoses from pressure control solenoid valve.

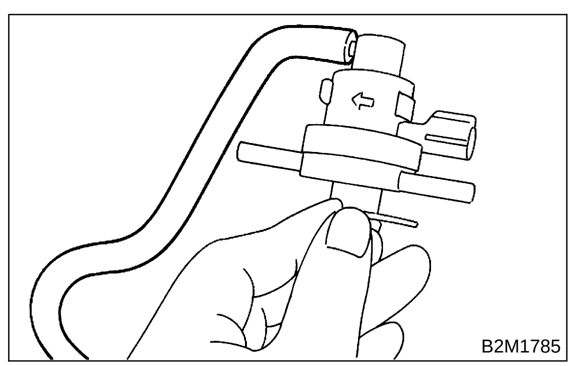
7) Remove the pressure control solenoid valve with bracket.


H2M3609

8) Remove the pressure control solenoid valve from bracket.


B2M1786

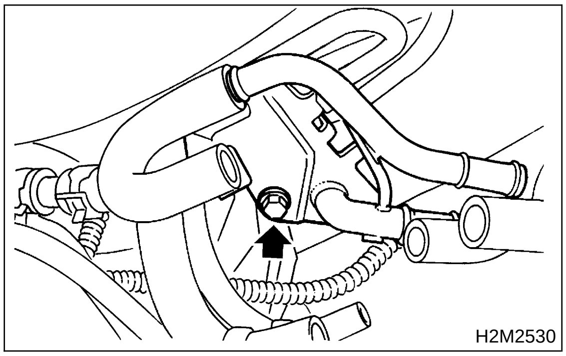
9) Disconnect the vacuum hose from pressure control solenoid valve.


B2M1785

B: INSTALLATION S170031A11

Install in the reverse order of removal.

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



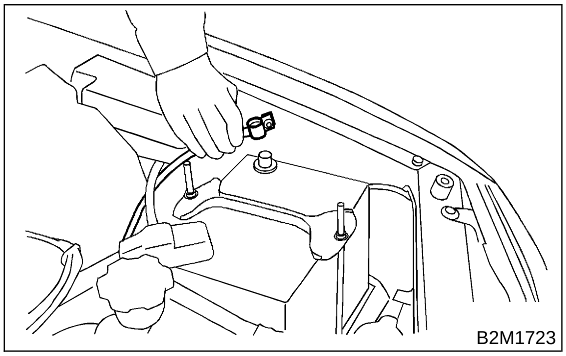
C: INSPECTION S170031A10

Make sure the hoses are not cracked or loose.

11. Drain Filter *S170567*

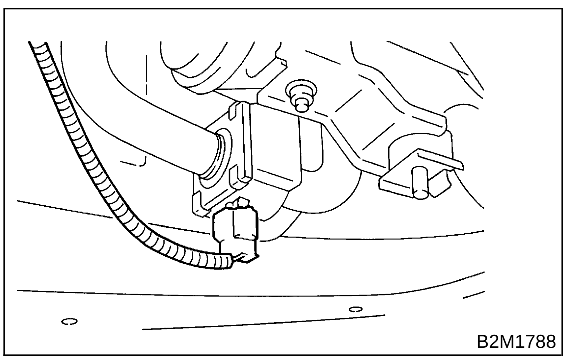
A: REMOVAL *S170567A18*

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



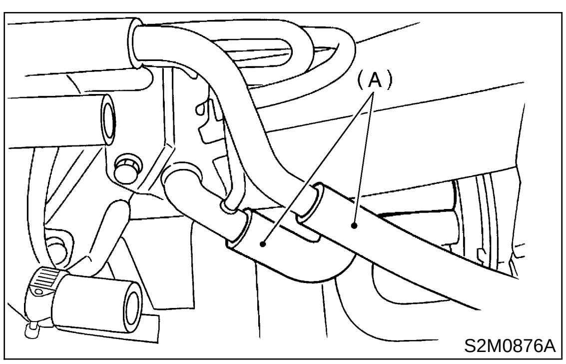
B2M1723

3) Lift-up the vehicle.
4) Remove canister. <Ref. to EC-5 REMOVAL, Canister.>
5) Disconnect connector from drain valve.



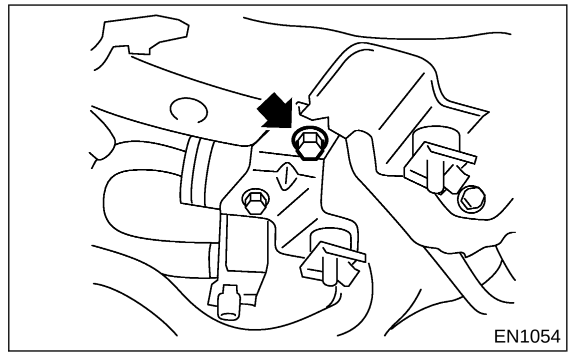
B2M1788

6) Disconnect evaporation hoses, (a) and remove drain filter (b).



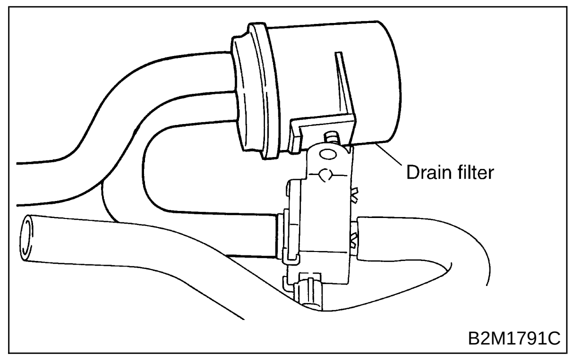
S2M0876A

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



EN1054

8) Disconnect the evaporation hoses, and remove the drain filter.

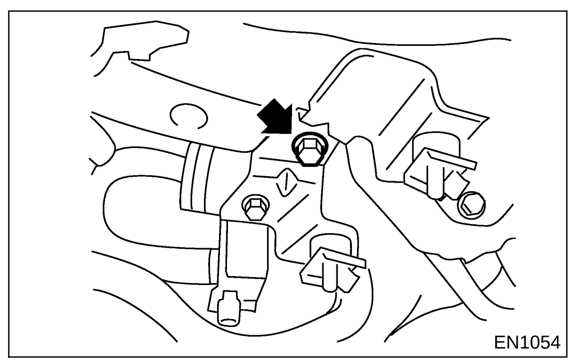


B2M1791C

B: INSTALLATION *S170567A11*

Install in the reverse order of removal.

Tightening torque:
23 N·m (2.3 kgf-m, 17 ft-lb)



EN1054

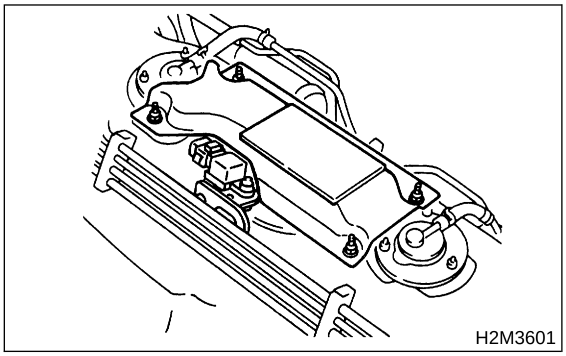
C: INSPECTION *S170567A10*

1) Make sure that all hoses are installed correctly.
2) Make sure that hoses are not cracked or loose.

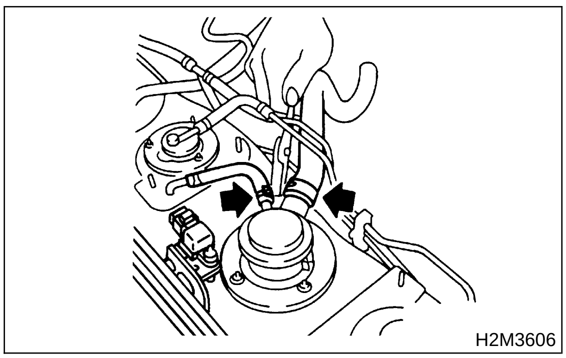
12. Vent Valve S170033

A: REMOVAL S170033A18

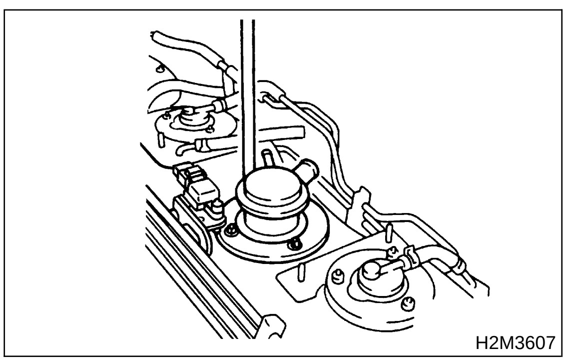
1) Remove fuel tank. <Ref. to FU-55, REMOVAL, Fuel Tank.>
2) Remove the protector cover.



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



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

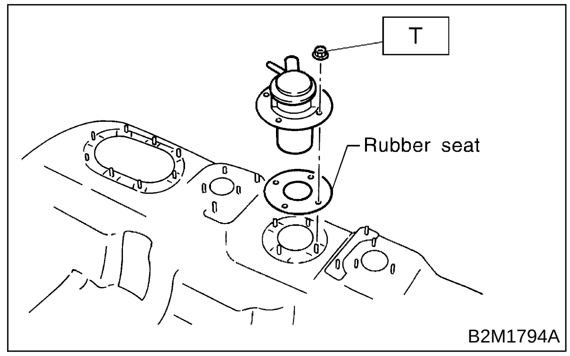


B: INSTALLATION S170033A11

Install in the reverse order of removal.

NOTE:
Replace rubber seat with a new one.

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



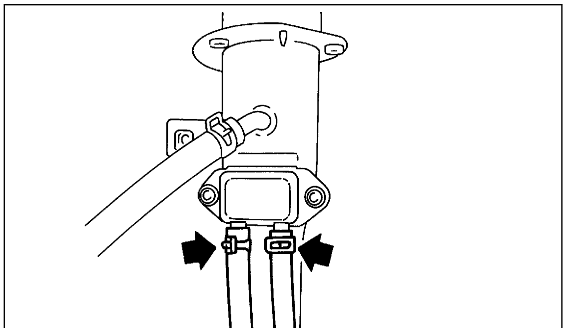
C: INSPECTION S170033A10

Make sure that hoses are not cracked or loose.

13. Shut Valve *S170024*

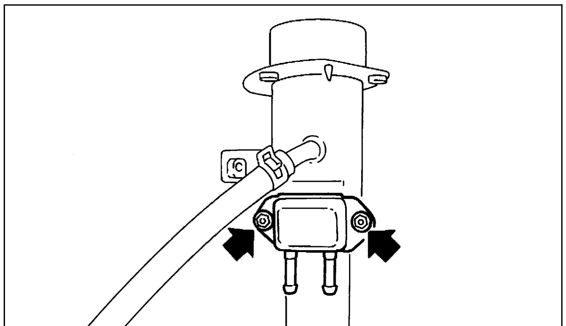
A: REMOVAL *S170024A18*

1) Drain fuel from fuel tank. <Ref. to FU-55, REMOVAL, Fuel Tank.>
2) Remove fuel filler pipe. <Ref. to FU-58, REMOVAL, Fuel Filler Pipe.>
3) Disconnect evaporation hoses from shut valve.



B2M1796

4) Remove shut valve from fuel filler pipe.

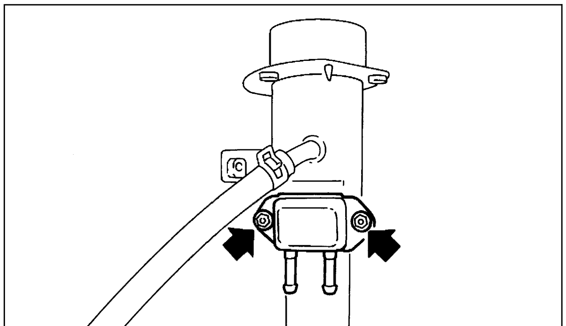


B2M1797

B: INSTALLATION *S170024A11*

Install in the reverse order of removal.

Tightening torque:
4.5 N·m (0.46 kgf-m, 3.3 ft-lb)



B2M1797

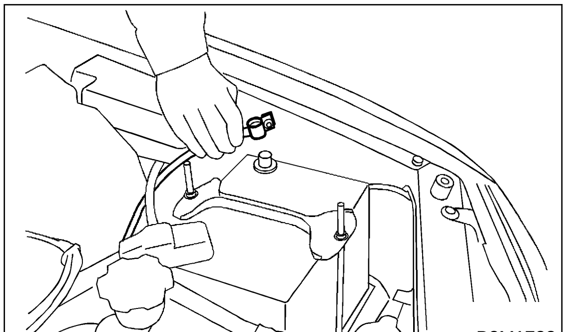
C: INSPECTION *S170024A10*

Make sure that hoses are not cracked or loose.

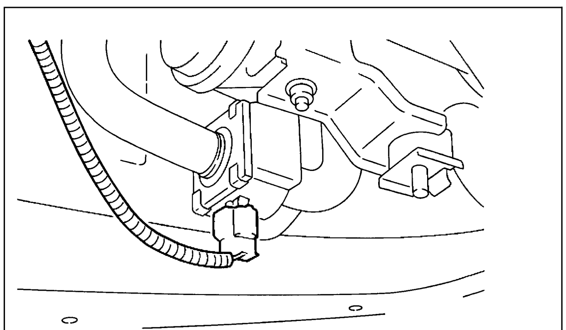
14. Drain Valve S170088

A: REMOVAL S170088A18

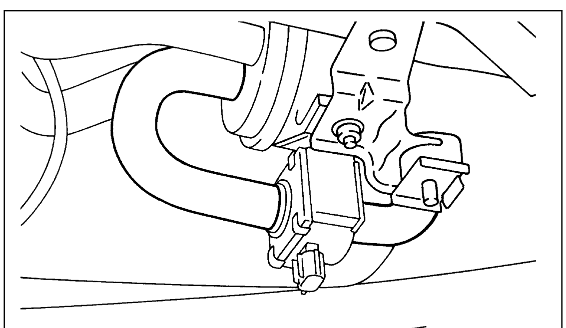
1) Set the vehicle on the lift.
2) Disconnect battery ground cable.


B2M1723

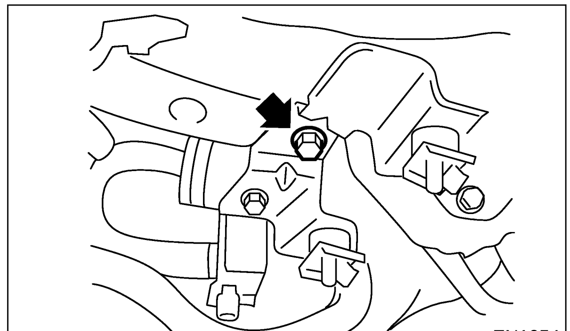
3) Lift-up the vehicle.
4) Remove canister. <Ref. to EC-5 REMOVAL, Canister.>
5) Disconnect connector from drain valve.


B2M1788

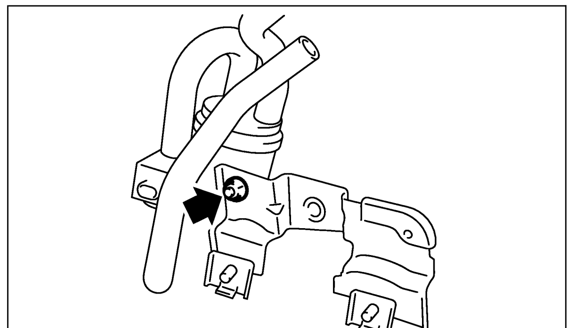
6) Disconnect evaporation hose and remove drain valve.


H2M3612

7) Remove the bolt which installs the drain filter and drain valve brackets on body, and remove them as a unit.


EN1054

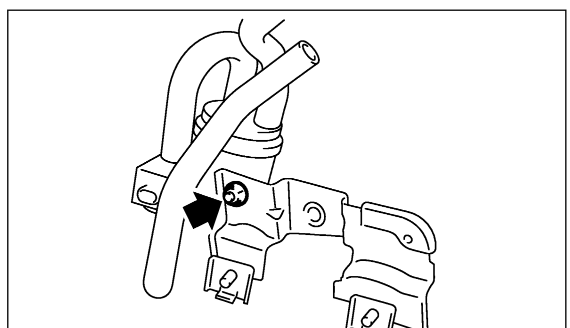
8) Remove the drain valve from bracket.


EN1059

B: INSTALLATION S170088A11

Install in the reverse order of removal.

Tightening torque:
23 N·m (2.3 kgf-m, 17 ft-lb)


EN1059

C: INSPECTION S170088A10

1) Make sure that all hoses are installed correctly.
2) Make sure that hoses are not cracked or loose.

INTAKE (INDUCTION)

IN

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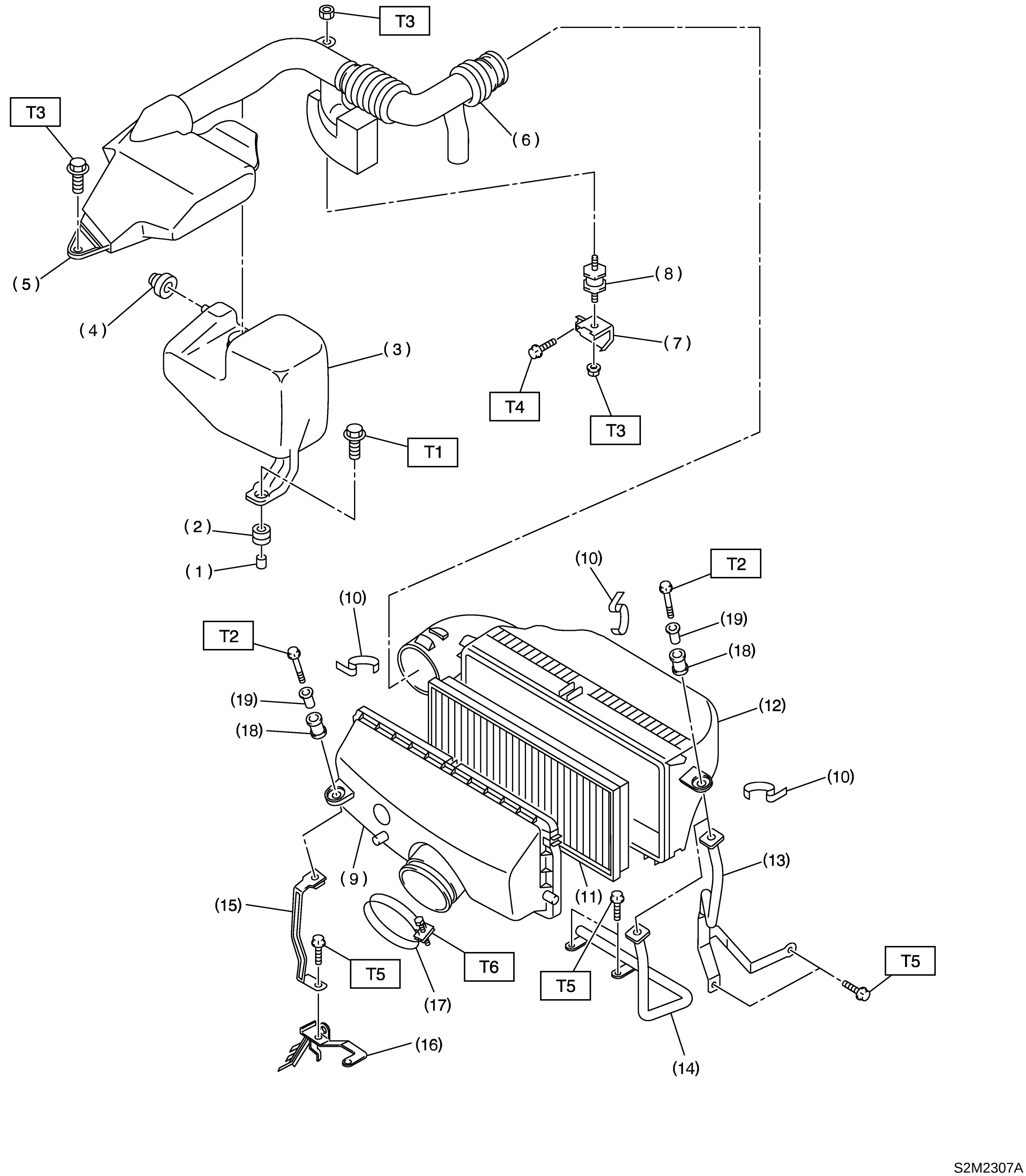
3. Air Cleaner Case...6
4. Air Intake Duct...7
5. Resonator Chamber 8

1. General Description *S174001*

A: COMPONENT *S174001A05*



(1) Spacer
(2) Bushing
(3) Resonator chamber
(4) Cushion rubber
(5) Air intake duct A
(6) Air intake duct B
(7) Bracket
(8) Cushion
(9) Air cleaner case A
(10) Clip
(11) Air cleaner element
(12) Air cleaner case B
(13) Air cleaner case stay LH (MT vehicles)
(14) Air cleaner case stay LH (AT vehicles)
(15) Air cleaner case stay RH
(16) Engine harness bracket
(17) Clamp
(18) Bushing
(19) Spacer

Tightening torque: N·m (kgf-m, ft-lb)
T1: 33 (3.4, 24.4)
T2: 6.4 (0.65, 4.7)
T3: 7.5 (0.76, 5.5)
T4: 14 (1.4, 10)
T5: 16 (1.6, 11.6)
T6: 3 (0.3, 2.2)

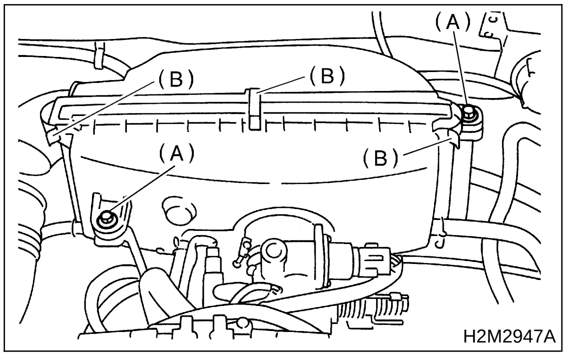
B: CAUTION *S174001A03*

- 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 ground cable from battery.

2. Air Cleaner S174087

A: REMOVAL S174087A18

1) Remove bolts (A) which secure air cleaner case to stays.
2) Remove the clips (B) above the air cleaner case.



3) Remove air cleaner element.

B: INSTALLATION S174087A11

Install in the reverse order of removal.

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

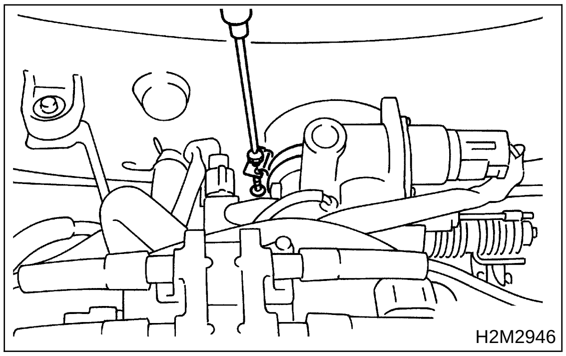
C: INSPECTION S174087A10

Replace if excessively damaged or dirty.

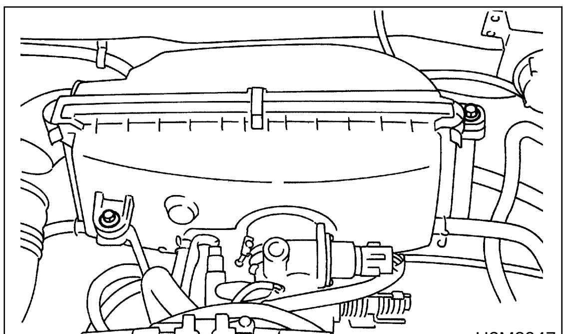
3. Air Cleaner Case S174089

A: REMOVAL S174089A18

1) Loosen clamp which connects air cleaner case to throttle body.


H2M2946

2) Disconnect hoses and intake duct from air cleaner case.
3) Remove bolts which secure air cleaner case to stays.


H2M2947

4) Remove air cleaner case.

B: INSTALLATION S174089A11

Install in the reverse order of removal.

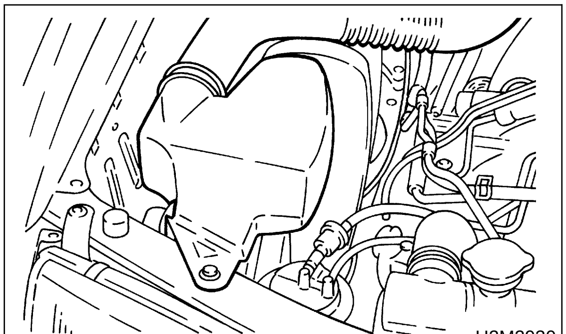
C: INSPECTION S174089A10

Inspect for cracks and loose connections.

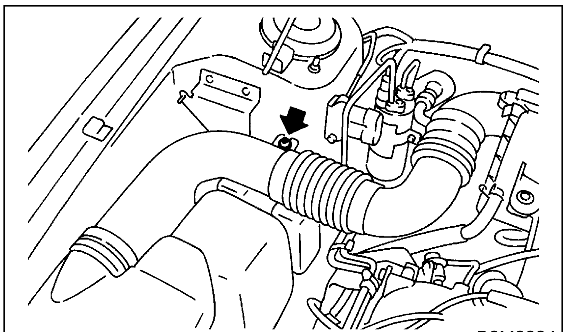
4. Air Intake Duct *S174566*

A: REMOVAL *S174566A18*

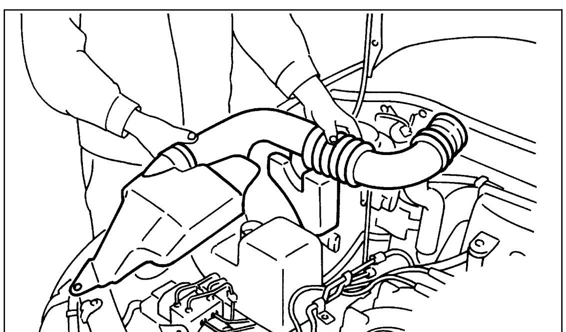
1) Remove bolts which secure air intake duct on the front side of body.


H2M2930

2) Remove bolt which secures air intake duct on body.


B2M2284

3) Remove air intake ducts as a unit.


S6M0353

B: INSTALLATION *S174566A11*

Install in the reverse order of removal.

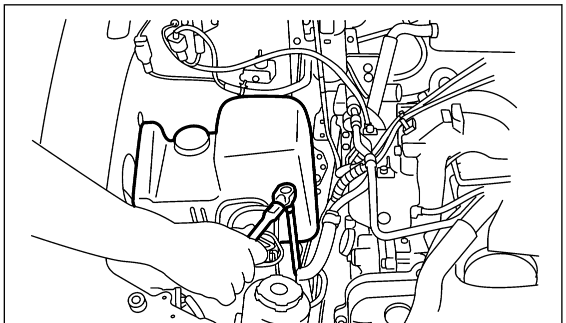
C: INSPECTION *S174566A10*

1) Inspect for cracks and loose connections.
2) Inspect that no foreign objects are mixed in the air intake duct.

5. Resonator Chamber S174639

A: REMOVAL S174639A18

1) Remove air intake duct. <Ref. to IN-7, REMOVAL, Air Intake Duct.>
2) Remove resonator chamber.

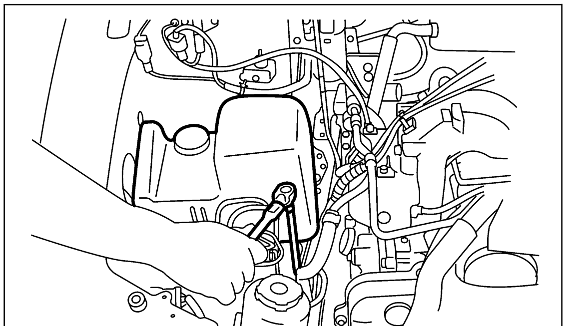


B6M1237

B: INSTALLATION S174639A11

Install in the reverse order of removal.

Tightening torque:
33 N·m (3.4 kgf-m, 24.6 ft-lb)



B6M1237

C: INSPECTION S174639A10

Inspect for cracks and loose connections.

MECHANICAL

ME

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1. General Description S173001

A: SPECIFICATIONS S173001E49

Engine	Type		Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine
	Valve arrangement		Belt driven, single over-head camshaft, 4-valve/cylinder
	Bore x Stroke mm (in)		99.5 x 79.0 (3.917 x 3.110)
	Displacement cm^3 (cu in)		2,457 (150)
	Compression ratio		10.0
	Compression pressure (at 200 — 300 rpm) kPa (kg/cm^2, psi)		1,079 — 1,275 (11.0 — 13.0, 156 — 185)
	Number of piston rings		Pressure ring: 2, Oil ring: 1
	Intake valve timing	Opening	1° BTDC
		Closing	51° ABDC
	Exhaust valve timing	Opening	50° BBDC
		Closing	6° ATDC
	Valve clearance	Intake mm (in)	0.20±0.02 (0.0079±0.0008)
		Exhaust mm (in)	0.25±0.02 (0.0098±0.0008)
	Idling speed [At neutral position on MT, or “P” or “N” position on AT] rpm		MT: 650±100 (No load) AT: 700±100 (No load) 850±100 (A/C switch ON)
	Firing order		1 → 3 → 2 → 4
	Ignition timing BTDC/rpm		MT: 10°±8°/650 AT: 15°±8°/700

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

Belt tensioner adjuster	Protrusion of adjuster rod			5.2 — 6.2 mm (0.205 — 0.244 in)
Belt tensioner	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)
Valve rocker arm	Clearance between shaft and arm		STD	0.020 — 0.054 mm (0.0008 — 0.0021 in)
			Limit	0.10 mm (0.0039 in)
Camshaft	Bend limit			0.025 mm (0.0010 in)
	Thrust clearance		STD	0.030 — 0.090 mm (0.0012 — 0.0035 in)
			Limit	0.10 mm (0.0039 in)
	Cam lobe height	Intake	STD	39.485 — 39.585 mm (1.5545 — 1.5585 in)
			Limit	39.385 mm (1.5506 in)
		Exhaust	STD	39.257 — 39.357 mm (1.5455 — 1.5495 in)
			Limit	39.157 mm (1.5416 in)
	Camshaft journal O.D.			31.928 — 31.945 mm (1.2570 — 1.2577 in)
	Camshaft journal hole I.D.			32.000 — 32.018 mm (1.2598 — 1.2605 in)
	Oil clearance		STD	0.055 — 0.090 mm (0.0022 — 0.0035 in)
			Limit	0.10 mm (0.0039 in)

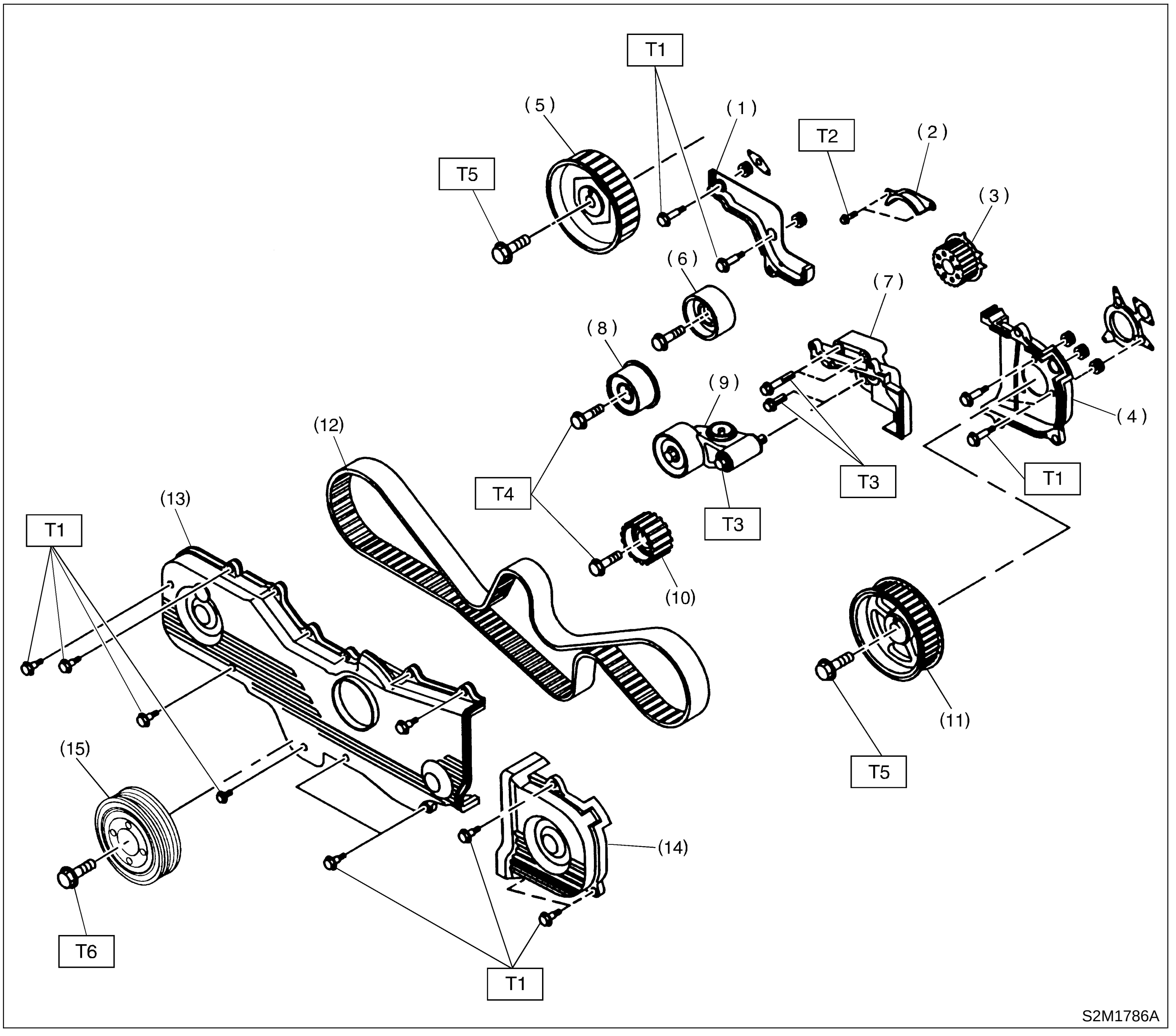
Cylinder head	Surface warpage limit			0.05 mm (0.0020 in)
	Surface grinding limit			0.1 mm (0.004 in)
	Standard height			97.5 mm (3.839 in)
Valve set	Refacing angle			90°
	Contacting width	Intake	STD	1.0 mm (0.039 in)
			Limit	1.7 mm (0.067 in)
		Exhaust	STD	1.4 mm (0.055 in)
			Limit	2.1 mm (0.083 in)
Valve guide	Inner diameter			6.000 — 6.012 mm (0.2362 — 0.2367 in)
	Protrusion above head		Intake	20.0 — 20.5 mm (0.787 — 0.807 in)
			Exhaust	16.5 — 17.0 mm (0.650 — 0.669 in)
Valve	Head edge thickness	Intake	STD	1.0 mm (0.039 in)
			Limit	0.6 mm (0.024 in)
		Exhaust	STD	1.2 mm (0.047 in)
			Limit	0.6 mm (0.024 in)
	Stem diameter		Intake	5.950 — 5.965 mm (0.2343 — 0.2348 in)
			Exhaust	5.945 — 5.960 mm (0.2341 — 0.2346 in)
	Stem oil clearance	STD	Intake	0.035 — 0.062 mm (0.0014 — 0.0024 in)
			Exhaust	0.040 — 0.067 mm (0.0016 — 0.0026 in)
		Limit	—	0.15 mm (0.0059 in)
	Overall length		Intake	120.6 mm (4.75 in)
			Exhaust	121.7 mm (4.79 in)
Valve spring	Free length			54.30 mm (2.1378 in)
	Squareness			2.5°, 2.4 mm (0.094 in)
	Tension/spring height			214.8 — 246.2 N (21.9 — 25.1 kgf, 48.3 — 55.3 lb)/ 45.0 mm (1.772 in) 526.6 — 581.6 N (53.7 — 59.3 kgf, 118.4 — 130.8 lb)/34.7 mm (1.366 in)
Cylinder block	Surface warpage limit (mating with cylinder head)			0.05 mm (0.0020 in)
	Surface grinding limit			0.1 mm (0.004 in)
	Cylinder bore	STD	A	99.505 — 99.515 mm (3.9175 — 3.9179 in)
			B	99.495 — 99.505 mm (3.9171 — 3.9175 in)
	Taper		STD	0.015 mm (0.0006 in)
			Limit	0.050 mm (0.0020 in)
	Out-of-roundness		STD	0.010 mm (0.0004 in)
			Limit	0.050 mm (0.0020 in)
	Piston clearance		STD	0.010 — 0.030 mm (0.0004 — 0.0012 in)
			Limit	0.050 mm (0.0020 in)
	Enlarging (boring) limit			0.5 mm (0.020 in)
Piston	Outer diameter	STD	A	99.485 — 99.495 mm (3.9167 — 3.9171 in)
			B	99.475 — 99.485 mm (3.9163 — 3.9167 in)
		0.25 mm (0.0098 in) OS		99.725 — 99.735 mm (3.9262 — 3.9266 in)
		0.50 mm (0.0197 in) OS		99.975 — 99.985 mm (3.9360 — 3.9364 in)
	Standard inner diameter of piston pin hole			23.000 — 23.006 mm (0.9055 — 0.9057 in)
Piston pin	Outer diameter			22.994 — 23.000 mm (0.9053 — 0.9055 in)
	Standard clearance between piston pin and hole in piston			0.004 — 0.008 mm (0.0002 — 0.0003 in)
	Degree of fit			Piston pin must be fitted into position with thumb at 20°C (68°F).

Piston ring	Piston ring gap	Top ring	STD	0.20 — 0.35 mm (0.0079 — 0.0138 in)
			Limit	1.0 mm (0.039 in)
		Second ring	STD	0.35 — 0.50 mm (0.0138 — 0.0197 in)
			Limit	1.0 mm (0.039 in)
		Oil ring	STD	0.20 — 0.70 mm (0.0079 — 0.0276 in)
			Limit	1.5 mm (0.059 in)
	Clearance between piston ring and piston ring groove	Top ring	STD	0.040 — 0.080 mm (0.0016 — 0.0031 in)
			Limit	0.15 mm (0.0059 in)
		Second ring	STD	0.030 — 0.070 mm (0.0012 — 0.0028 in)
			Limit	0.15 mm (0.0059 in)
Connecting rod	Bend twist per 100 mm (3.94 in) in length		Limit	0.10 mm (0.0039 in)
	Side clearance		STD	0.070 — 0.330 mm (0.0028 — 0.0130 in)
			Limit	0.4 mm (0.016 in)
Connecting rod bearing	Oil clearance		STD	0.020 — 0.046 mm (0.0008 — 0.0018 in)
			Limit	0.05 mm (0.0020 in)
	Thickness at center portion		STD	1.486 — 1.498 mm (0.0585 — 0.0590 in)
			0.03 mm (0.0012 in) US	1.504 — 1.512 mm (0.0592 — 0.0595 in)
			0.05 mm (0.0020 in) US	1.514 — 1.522 mm (0.0596 — 0.0599 in)
			0.25 mm (0.0098 in) US	1.614 — 1.622 mm (0.0635 — 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, #5, #3	STD	59.992 — 60.008 mm (2.3619 — 2.3625 in)
			0.03 mm (0.0012 in) US	59.962 — 59.978 mm (2.3607 — 2.3613 in)
			0.05 mm (0.0020 in) US	59.942 — 59.958 mm (2.3599 — 2.3605 in)
			0.25 mm (0.0098 in) US	59.742 — 59.758 mm (2.3520 — 2.3527 in)
		#2, #4	STD	59.992 — 60.008 mm (2.3619 — 2.3625 in)
			0.03 mm (0.0012 in) US	59.962 — 59.978 mm (2.3607 — 2.3613 in)
			0.05 mm (0.0020 in) US	59.942 — 59.958 mm (2.3599 — 2.3605 in)
			0.25 mm (0.0098 in) US	59.742 — 59.758 mm (2.3520 — 2.3527 in)
	Thrust clearance		STD	0.030 — 0.115 mm (0.0012 — 0.0045 in)
			Limit	0.25 mm (0.0098 in)
	Oil clearance		STD	0.010 — 0.030 mm (0.0004 — 0.0012 in)
			Limit	0.040 mm (0.0016 in)

Crankshaft bearing	Crankshaft bearing thickness	#1, #3	STD	1.998 — 2.011 mm (0.0787 — 0.0792 in)
			0.03 mm (0.0012 in) US	2.017 — 2.020 mm (0.0794 — 0.0795 in)
			0.05 mm (0.0020 in) US	2.027 — 2.030 mm (0.0798 — 0.0799 in)
			0.25 mm (0.0098 in) US	2.127 — 2.130 mm (0.0837 — 0.0839 in)
		#2, #4, #5	STD	2.000 — 2.013 mm (0.0787 — 0.0793 in)
			0.03 mm (0.0012 in) US	2.019 — 2.022 mm (0.0795 — 0.0796 in)
			0.05 mm (0.0020 in) US	2.029 — 2.032 mm (0.0799 — 0.0800 in)
			0.25 mm (0.0098 in) US	2.129 — 2.132 mm (0.0838 — 0.0839 in)

B: COMPONENT *S173001A05*

1. TIMING BELT *S173001A0501*

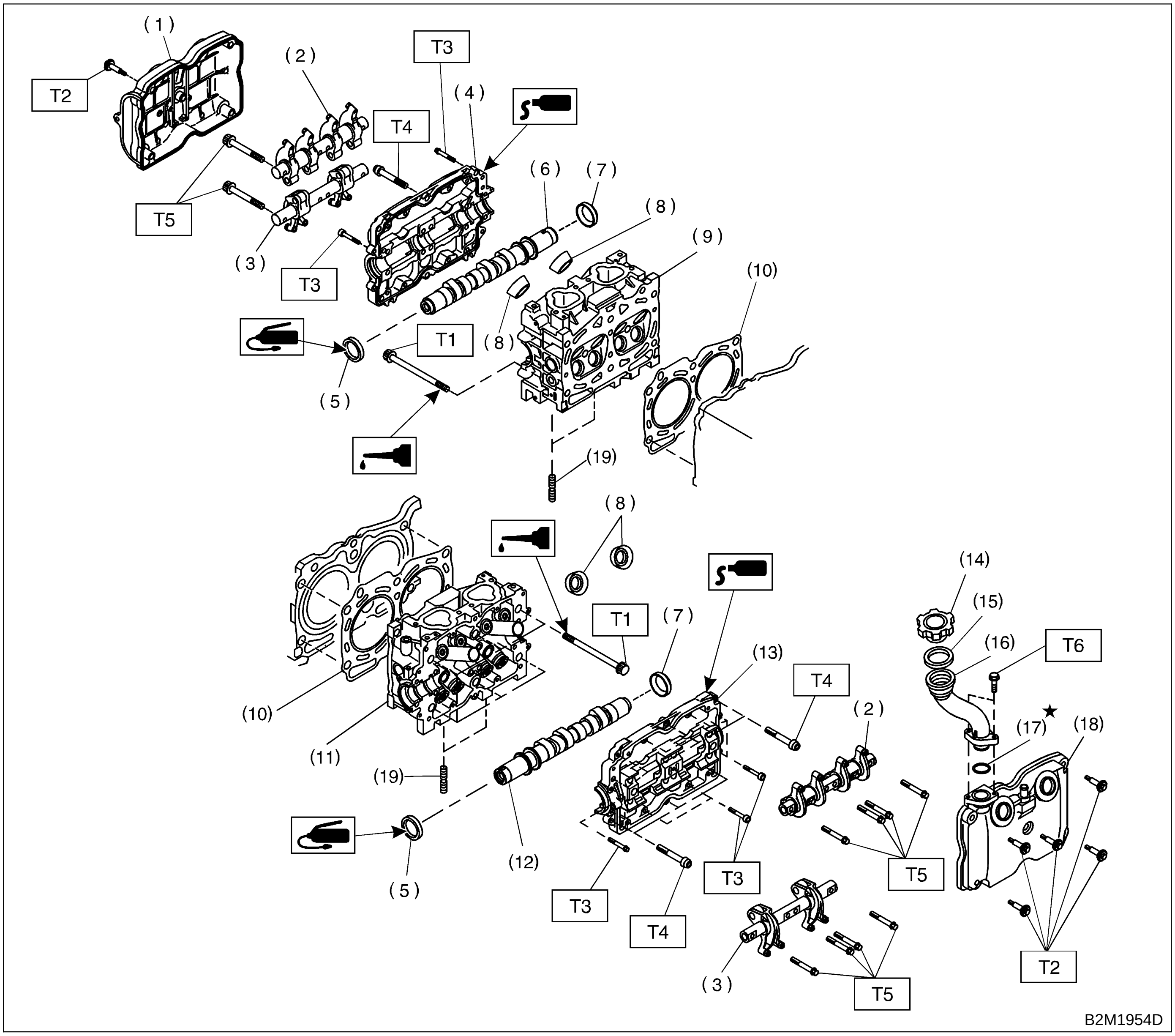


(1) Belt cover No. 2 (RH)
(2) Timing belt guide (MT vehicles only)
(3) Crankshaft sprocket
(4) Belt cover No. 2 (LH)
(5) Camshaft sprocket No. 1
(6) Belt idler (No. 1)
(7) Tensioner bracket
(8) Belt idler (No. 2)
(9) Automatic belt tension adjuster ASSY
(10) Belt idler No. 2
(11) Camshaft sprocket No.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

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: 9.8 (1.0, 7.2)
T3: 25 (2.5, 18.1)
T4: 39 (4.0, 28.9)
T5: 78 (8.0, 57.9)
T6: <Ref. to ME-44, INSTALLATION, Crankshaft pulley.>

2. CYLINDER HEAD AND CAMSHAFT

S173001A0502



(1) Rocker cover (RH)
(2) Intake valve rocker ASSY
(3) Exhaust valve rocker ASSY
(4) Camshaft cap (RH)
(5) Oil seal
(6) Camshaft (RH)
(7) Plug
(8) Spark plug pipe gasket
(9) Cylinder head (RH)
(10) Cylinder head gasket
(11) Cylinder head (LH)
(12) Camshaft (LH)
(13) Camshaft cap (LH)
(14) Oil filler cap
(15) Gasket
(16) Oil filler pipe
(17) O-ring
(18) Rocker cover (LH)
(19) Stud bolt

Tightening torque: N·m (kgf-m, ft-lb)

T1: <Ref. to ME-60, INSTALLATION, Cylinder Head Assembly.>

T2: 5 (0.5, 3.6)

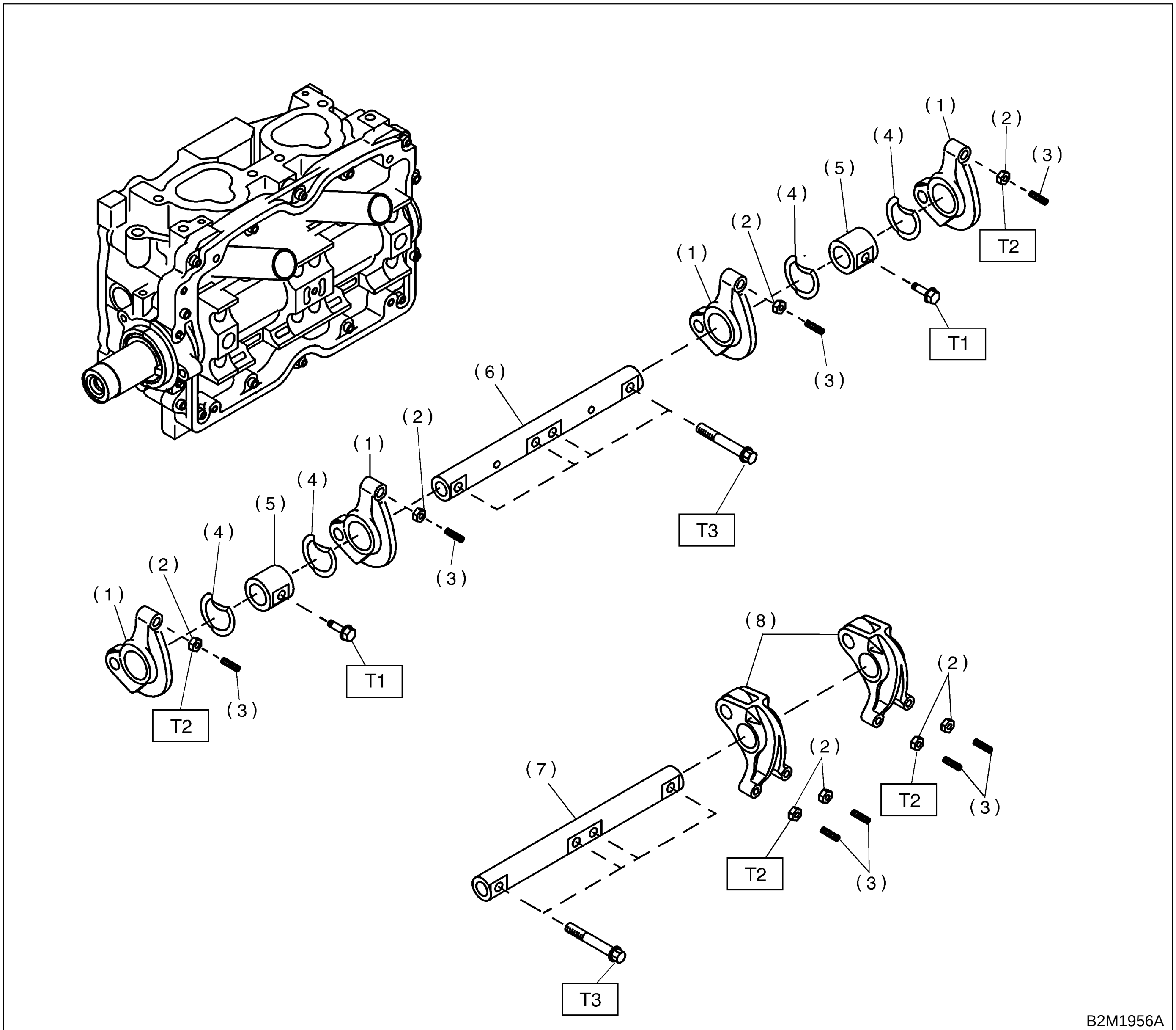
T3: 10 (1.0, 7.2)

T4: 18 (1.8, 13.0)

T5: 25 (2.5, 18.1)

T6: 6.4 (0.65, 4.7)

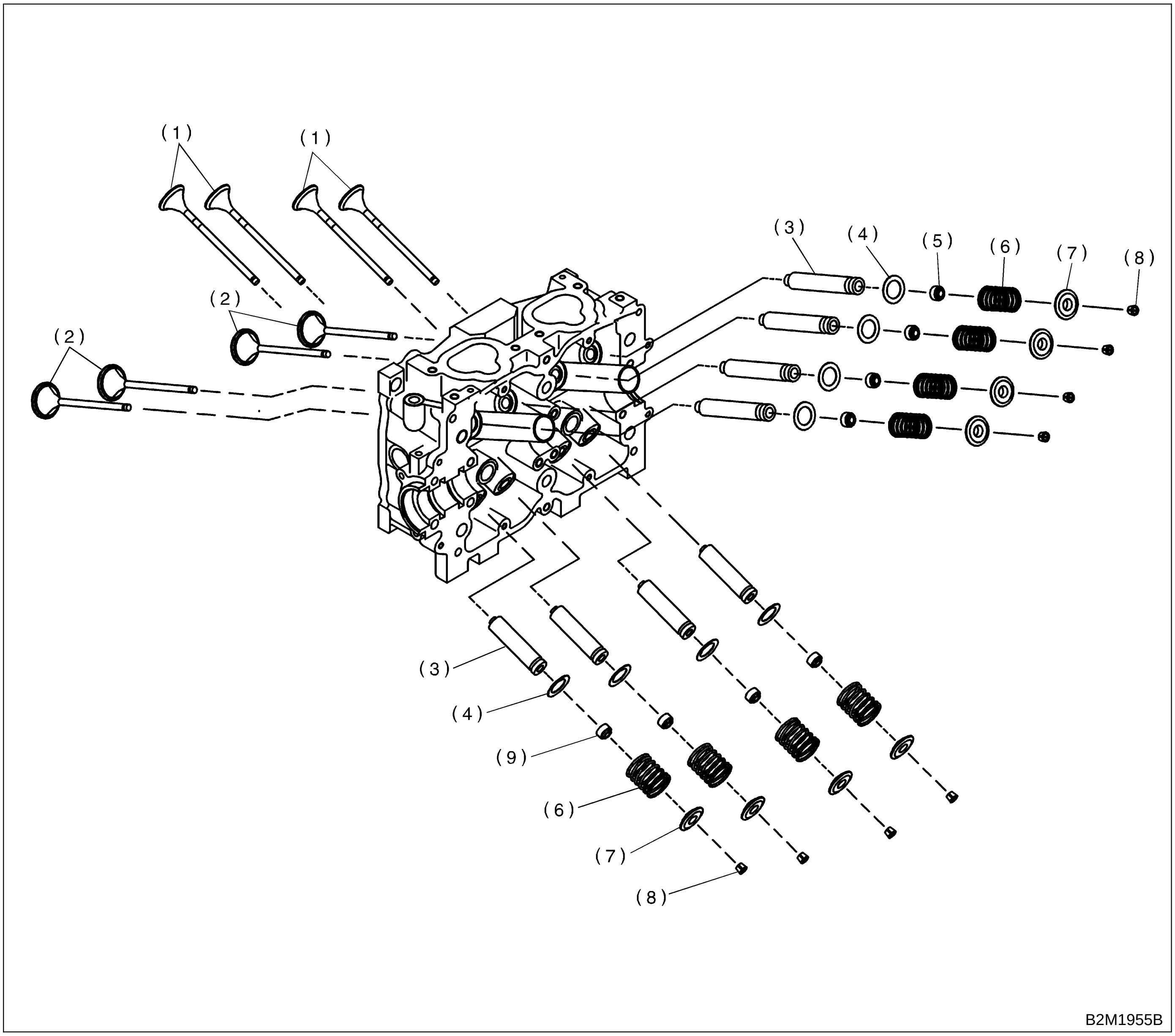
3. VALVE ROCKER ASSEMBLY *S173001A0503*



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

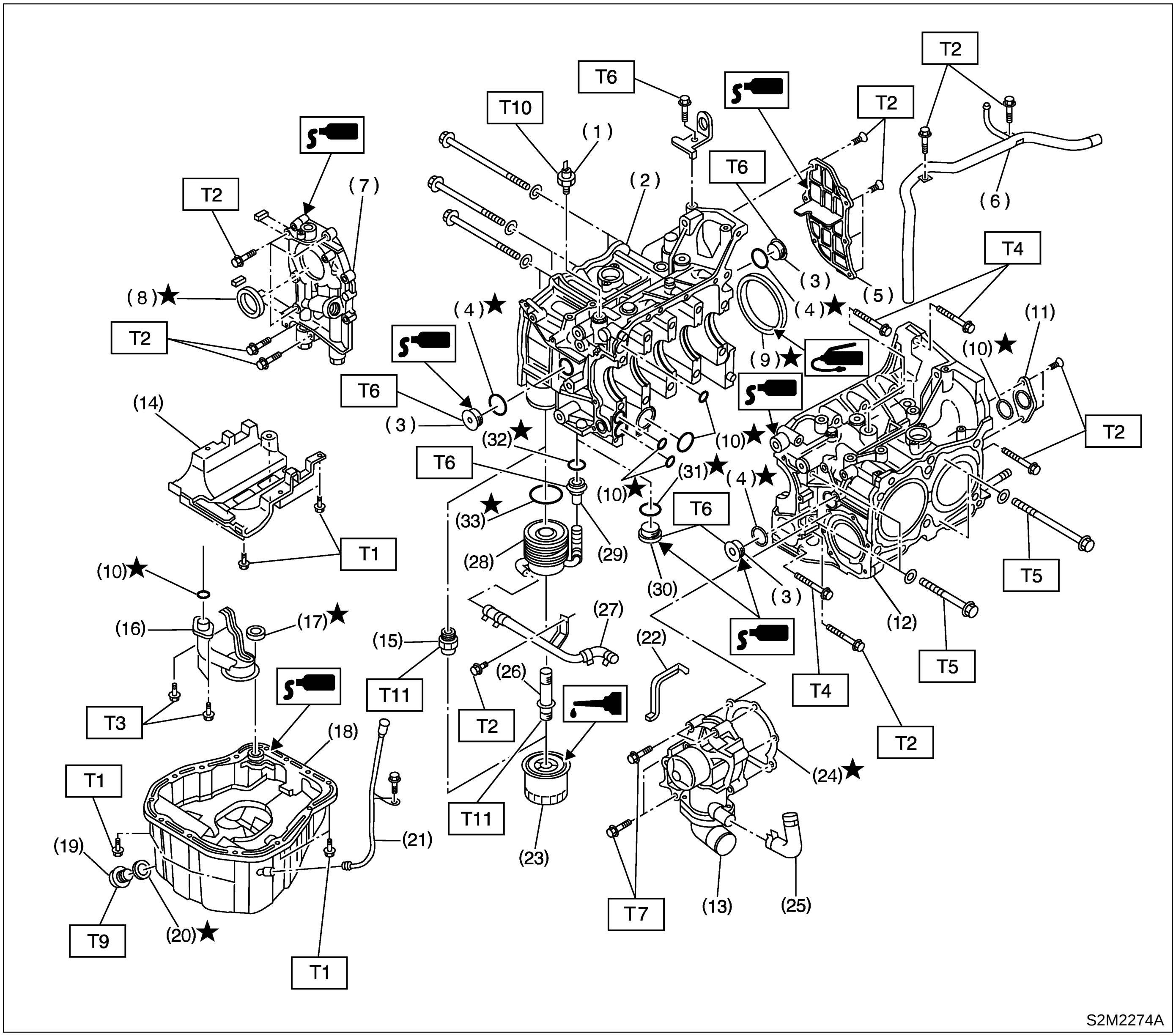
Tightening torque: N·m (kgf-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: 10 (1.0, 7.2)
T3: 25 (2.5, 18.1)

4. CYLINDER HEAD AND VALVE ASSEMBLY *S173001A0504*



(1) Exhaust valve	(4) Valve spring seat	(7) Retainer
(2) Intake valve	(5) Intake valve oil seal	(8) Retainer key
(3) Valve guide	(6) Valve spring	(9) Exhaust valve oil seal

5. CYLINDER BLOCK *S173001A0505*

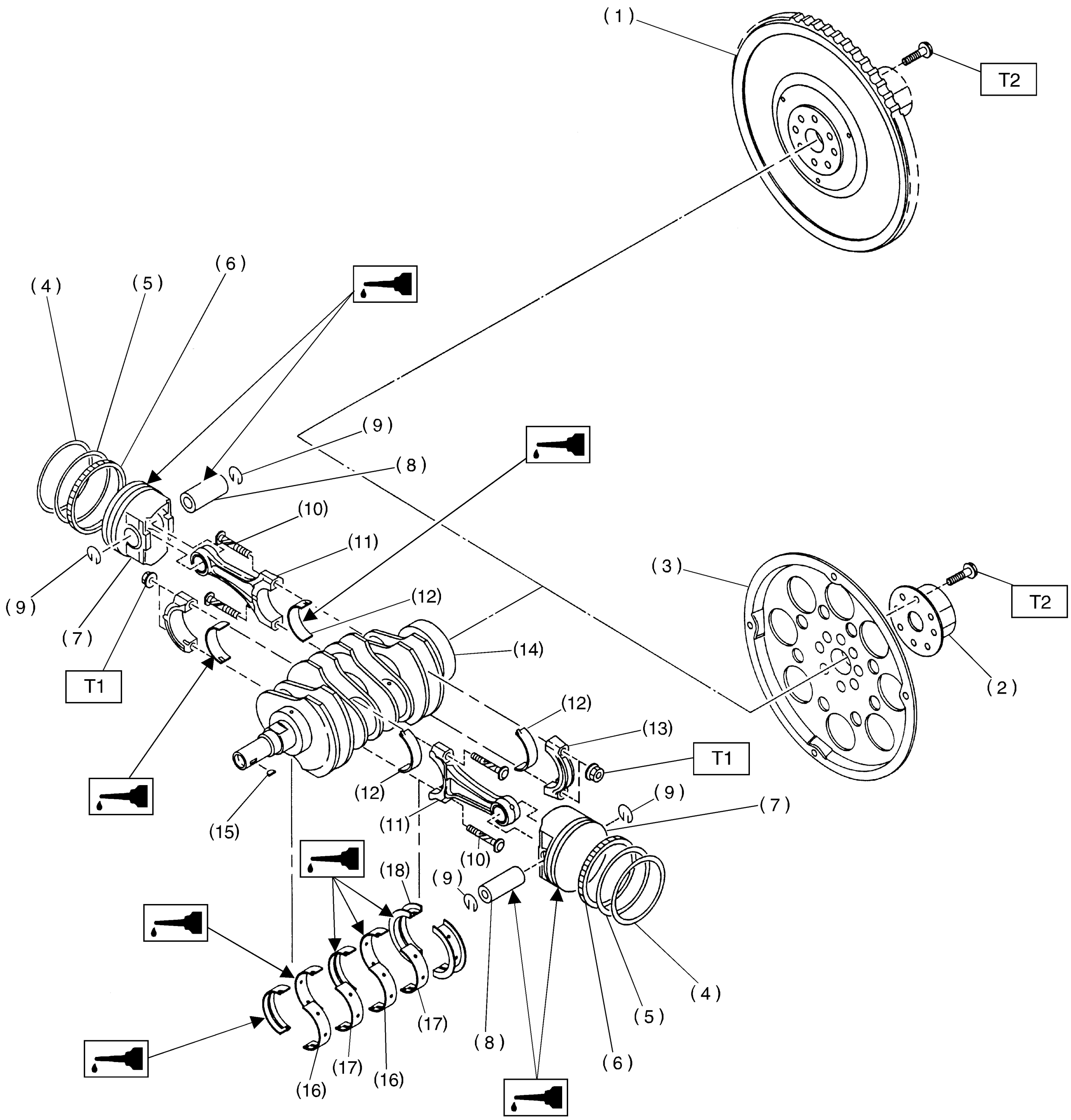


(1) Oil pressure switch
(2) Cylinder block (RH)
(3) Service hole plug
(4) Gasket
(5) Oil separator cover
(6) Water by-pass pipe
(7) Oil pump
(8) Front oil seal
(9) Rear oil seal
(10) O-ring
(11) Service hole cover
(12) Cylinder block (LH)
(13) Water pump
(14) Baffle plate
(15) Oil filter connector (MT vehicles)
(16) Oil strainer
(17) Gasket
(18) Oil pan
(19) Drain plug
(20) Metal gasket
(21) Oil level gauge guide
(22) Water pump sealing
(23) Oil filter
(24) Gasket
(25) Water pump hose
(26) Connector (AT vehicles)
(27) Water by-pass pipe (AT vehicles)
(28) Oil cooler (AT vehicles)
(29) Nipple (AT vehicles)
(30) Plug (MT vehicles)
(31) Gasket (MT vehicles)
(32) Gasket (AT vehicles)
(33) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: 6.4 (0.65, 4.7)
T3: 10 (1.0, 7)
T4: 25 (2.5, 18.1)
T5: 47 (4.8, 34.7)
T6: 69 (7.0, 50.6)
T7: First 12 (1.2, 8.7)
Second 12 (1.2, 8.7)
T8: 16 (1.6, 11.6)
T9: 44 (4.5, 33)
T10: 25 (2.5, 18.1)
T11: 55 (5.6, 41)

MEMO:

6. CRANKSHAFT AND PISTON *S173001A0506*

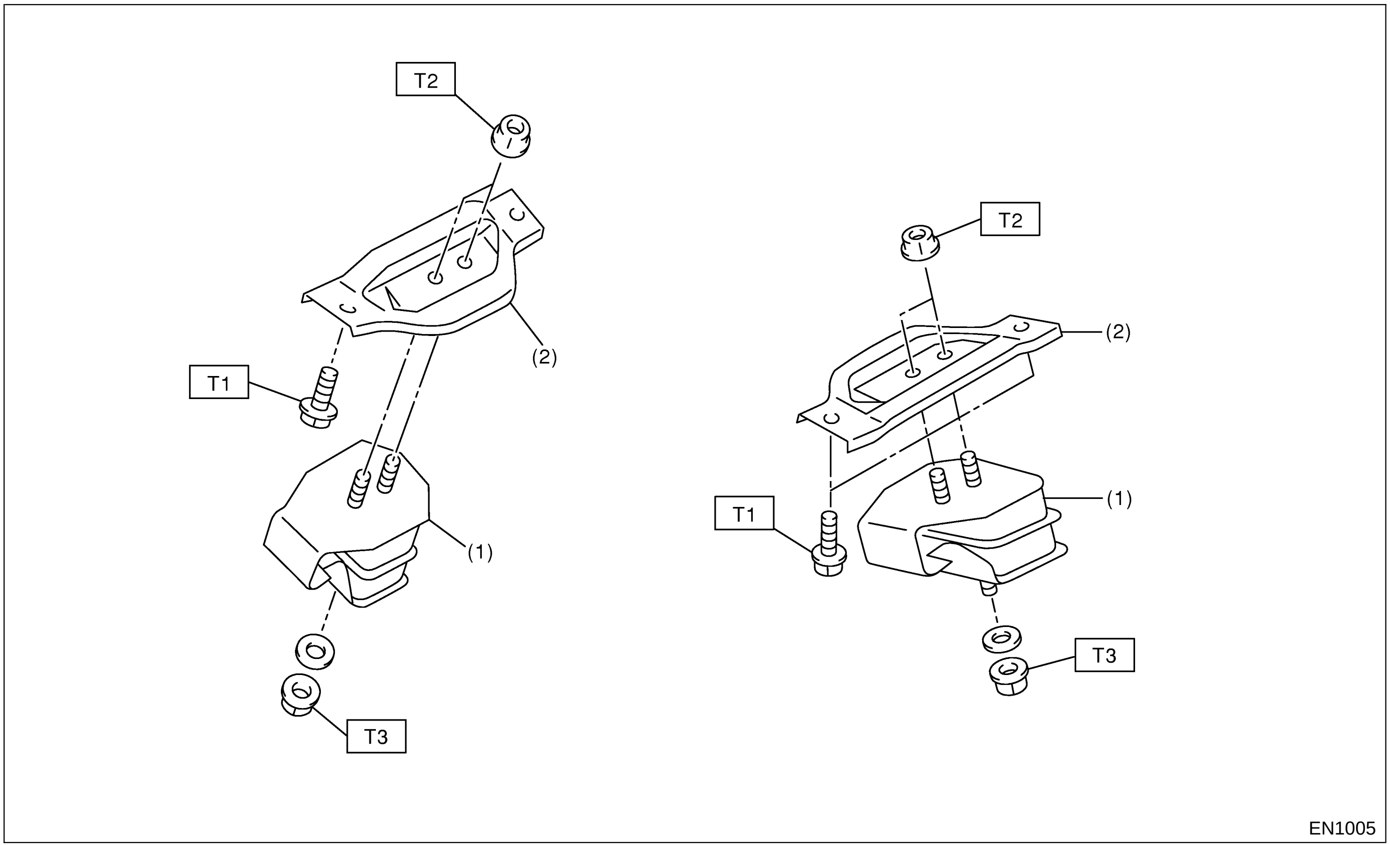


B2M3429A

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

Tightening torque: N·m (kgf-m, ft-lb)
T1: 44.6 (4.55, 32.9)
T2: 72 (7.3, 52.8)

7. ENGINE MOUNTING *S173001A0507*



(1) Front cushion rubber
(2) Front engine mounting bracket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 35 (3.6, 25.8)
T2: 41 (4.2, 30)
T3: 85 (8.7, 63)

C: CAUTION *S173001A03*

- 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 timing belt, 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:

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 S173001A17

1. SPECIAL TOOLS S173001A1701

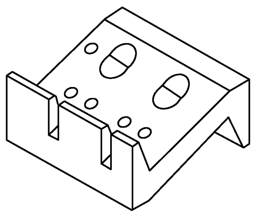
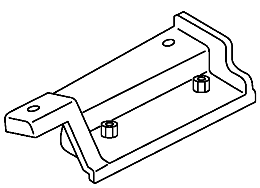
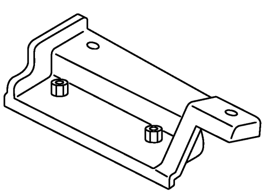
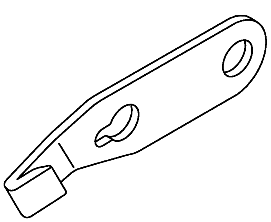
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3850	498267800	CYLINDER HEAD TABLE	● Used for replacing valve guides. ● Used for removing and installing valve springs.
 B2M3851	498457000	ENGINE STAND ADAPTER RH	Used with ENGINE STAND (499817000).
 B2M3852	498457100	ENGINE STAND ADAPTER LH	Used with ENGINE STAND (499817000).
 B2M3853	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel when loosening and tightening crankshaft pulley bolt, etc.

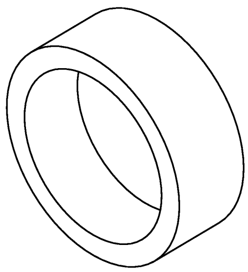
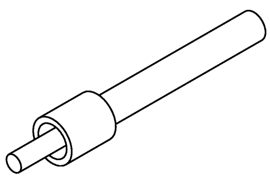
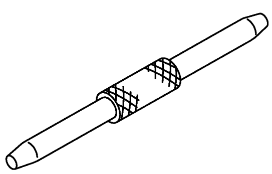
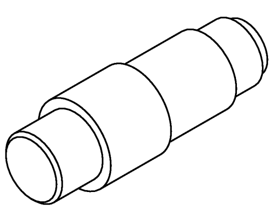
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3854	498747100	PISTON GUIDE	Used for installing piston in cylinder for 2,500 cc engine.
 B2M3855	498857100	VALVE OIL SEAL GUIDE	Used for press-fitting of intake and exhaust valve guide oil seals.
 B2M3856	499017100	PISTON PIN GUIDE	Used for installing piston pin, piston and connecting rod.
 B2M3857	499037100	CONNECTING ROD BUSHING REMOVER & INSTALLER	Used for removing and installing connecting rod bushing.

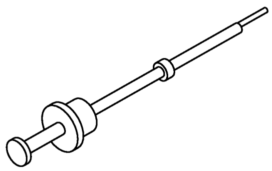
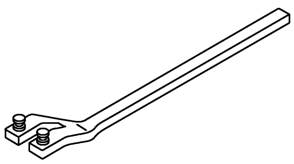
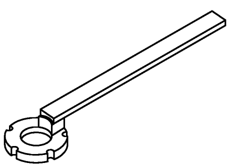
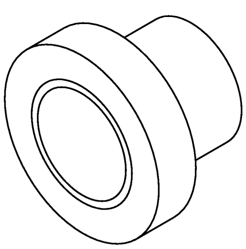
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3858	499097700	PISTON PIN REMOVER ASSY	Used for removing piston pin.
 B2M3859	499207100	CAMSHAFT SPROCKET WRENCH	Used for removing and installing camshaft sprocket. (LH side)
 B2M4158	499207400	CAMSHAFT SPROCKET WRENCH	Used for removing and installing camshaft sprocket. (RH side)
 B2M3860	499587700	CAMSHAFT OIL SEAL INSTALLER	Used for installing cylinder head plug.

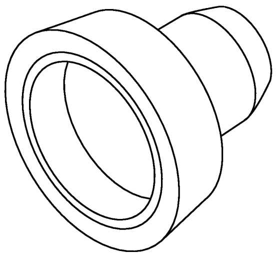
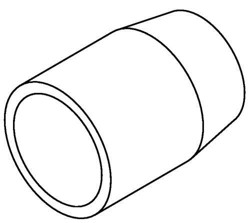
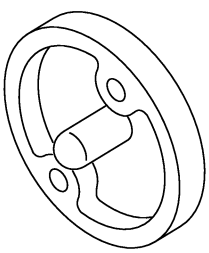
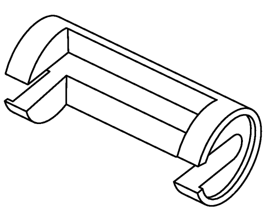
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3861	499587200	CRANKSHAFT OIL SEAL INSTALLER	● Used for installing crankshaft oil seal. ● Used with CRANKSHAFT OIL SEAL GUIDE (499597100).
 B2M3862	499597000	OIL SEAL GUIDE	● Used for installing camshaft oil seal. ● Used with CAMSHAFT OIL SEAL INSTALLER (499587100).
 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.

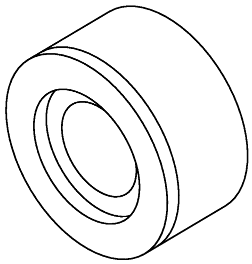
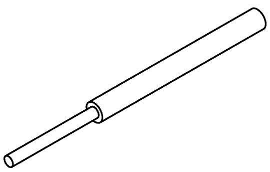
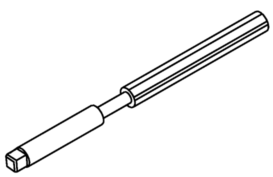
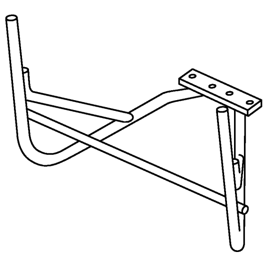
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3865	499767700 (Intake side) 499767800 (Exhaust side)	VALVE GUIDE ADJUSTER	Used for installing valve guides.
 B2M3867	499767200	VALVE GUIDE REMOVER	Used for removing valve guides.
 B2M3868	499767400	VALVE GUIDE REAMER	Used for reaming valve guides.
 B2M3869	499817100	ENGINE STAND	● Stand used for engine disassembly and assembly. ● Used with ENGINE STAND ADAPTER RH (498457000) & LH (498457100).

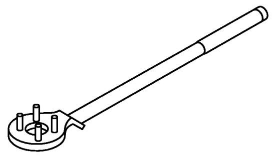
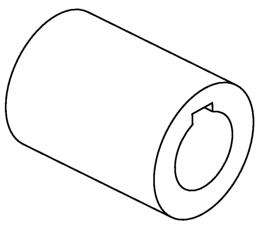
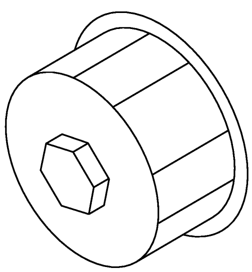
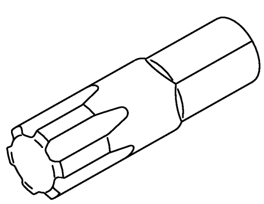
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3870	499977100	CRANK PULLEY WRENCH	Used for stopping rotation of crankshaft pulley when loosening and tightening crankshaft pulley bolts.
 B2M3871	499987500	CRANKSHAFT SOCKET	Used for rotating crankshaft.
 B2M3872	498547000	OIL FILTER WRENCH	Used for removing and installing oil filter.
 B2M3873	499497000	TORX PLUS	Used for removing and installing camshaft cap.

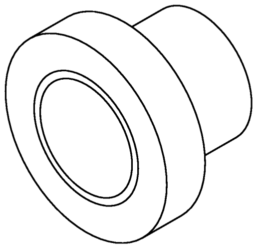
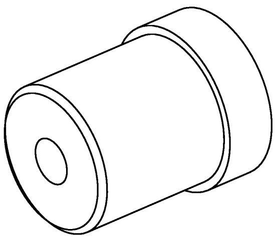
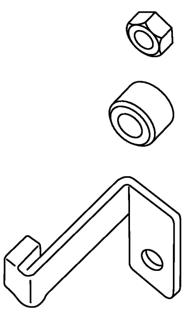
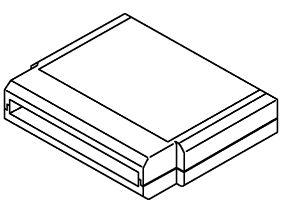
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3874	499587500	OIL SEAL INSTALLER	Used for installing front camshaft oil seal.
 B2M3875	499587100	OIL SEAL INSTALLER	Used for installing oil pump oil seal.
 B3M2043	498277200	STOPPER SET	Used for installing automatic transmission assembly to engine.
 B2M3876	24082AA150 (Newly adopted tool)	CARTRIDGE	Troubleshooting for electrical systems.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 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)

2. GENERAL PURPOSE TOOLS S173001A1702

TOOL NAME	REMARKS
Compression Gauge	Used for measuring compression.
Tachometer (Secondary pick-up type)	Used for measuring idle speed.
Timing Light	Used for measuring ignition timing.

E: PROCEDURE S173001E45

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.

- V-belt
- Timing Belt
- Valve Rocker Assembly
- Camshaft
- Cylinder Head

2. Compression S173081

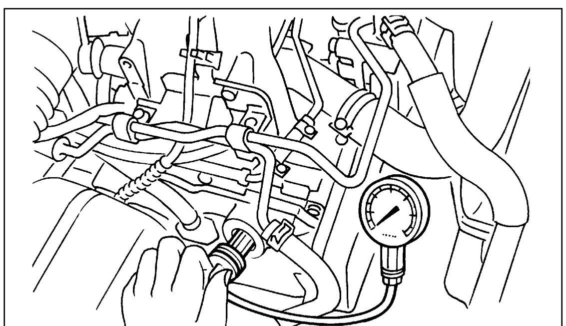
A: INSPECTION S173081A10

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-52, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
4) Remove all the spark plugs. <Ref. to IG-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.



B2M3133

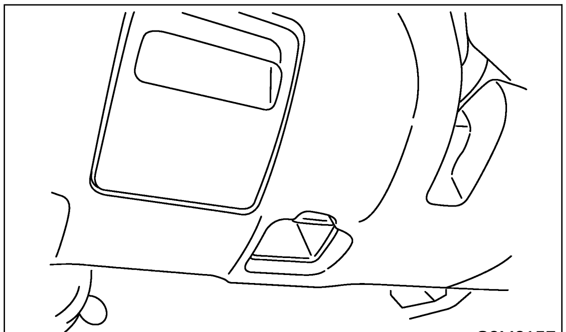
9) Perform at least two measurements per cylinder, and make sure that the values are correct.

Compression (350 rpm and fully open throttle):
  Standard;
    1,275 kPa (13.0 kg/cm^2, 185 psi)
  Limit;
    1,020 kPa (10.4 kg/cm^2, 148 psi)
  Difference between cylinders;
    49 kPa (0.5 kg/cm^2, 7 psi), or less

3. Idle Speed *S173082*

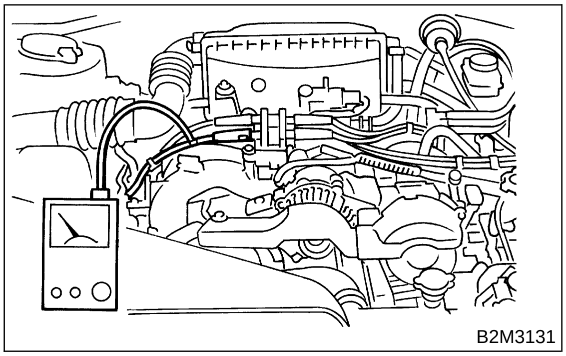
A: INSPECTION *S173082A10*

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-15, SPECIAL TOOLS, PREPARATION TOOL, General Description.>
   (1) Insert the cartridge to SUBARU SELECT MONITOR.
   (2) Connect SUBARU SELECT MONITOR to the data link connector.



S2M2157

   (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.
5) When using tachometer (Secondary pick-up type).
   (1) Attach the pick-up clip to No. 1 cylinder spark plug cord.
   (2) Start the engine, and read engine idle speed.



B2M3131

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

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

Idle speed (No load and gears in neutral (MT), or N or P (AT) position):
   MT: 650±100 rpm
   AT: 700±100 rpm

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

Idle speed [A/C “ON”, no load and gears in neutral (MT) or N or P (AT) position]:
   850±100 rpm

CAUTION:
Never rotate idle adjusting screw. If idle speed is out of specifications, refer to General Onboard Diagnosis Table under “Engine Control System”. <Ref. to EN-2, Basic Diagnostic Procedure.> or <Ref. to EN-2, Basic Diagnostic Procedure.>

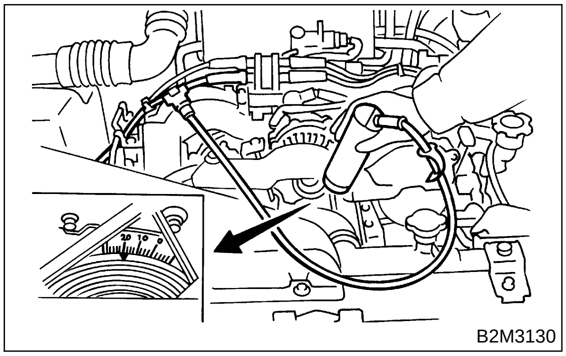
4. Ignition Timing S173086

A: INSPECTION S173086A10

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

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

Ignition timing [BTDC/rpm]:
MT: 10°±8°/650 rpm
AT: 15°±8°/700 rpm



B2M3130

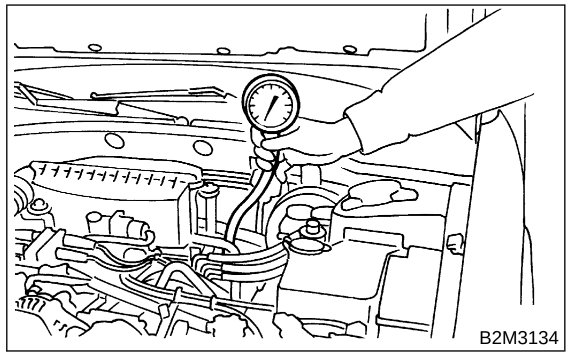
If the timing is not correct, check the ignition control system.
Refer to Engine Control System. <Ref. to EN-2, Basic Diagnostic Procedure.>

5. Intake Manifold Vacuum S173654

A: INSPECTION S173654A10

1) Warm-up the engine.
2) Disconnect the brake vacuum hose and install the vacuum gauge to the hose fitting on the manifold.
3) Keep the engine at the idle speed and read the vacuum gauge indication.

By observing the gauge needle movement, the internal condition of the engine can be diagnosed as described below.


B2M3134

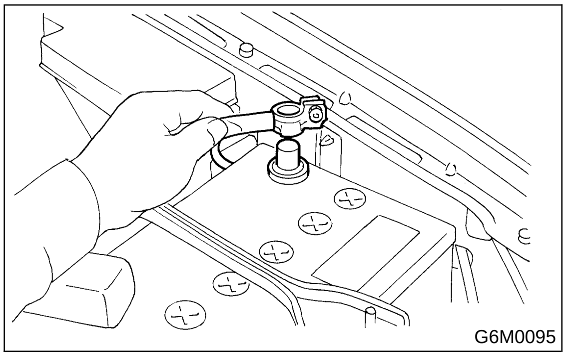
Vacuum pressure (at idling, A/C "OFF"):
Less than −60.0 kPa (−450 mmHg, −17.72 inHg)

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

6. Engine Oil Pressure *S173655*

A: INSPECTION *S173655A10*

1) Disconnect battery ground cable.



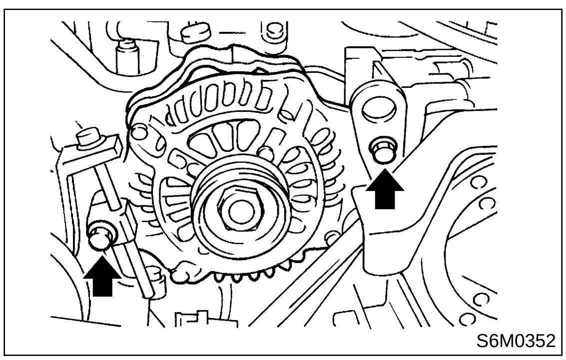
G6M0095

2) Remove generator from bracket.

(1) Loosen lock bolt and slider bolt, and remove front side V-belt. <Ref. to ME-42, REMOVAL, V-belt.>

(2) Remove generator lock bolt.

(3) Remove bolt which install generator on bracket.



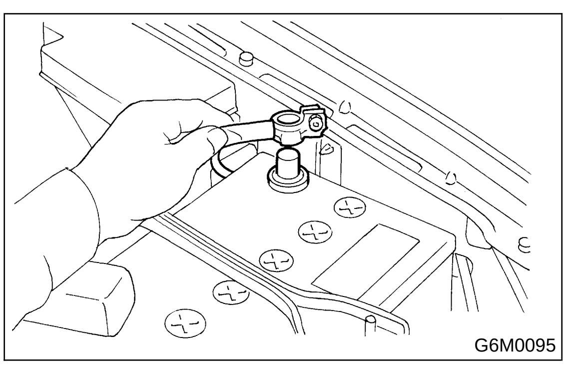
S6M0352

3) Disconnect connector from oil pressure switch.

4) Remove oil pressure switch from engine cylinder block. <Ref. to LU-18, REMOVAL, Oil Pressure Switch.>

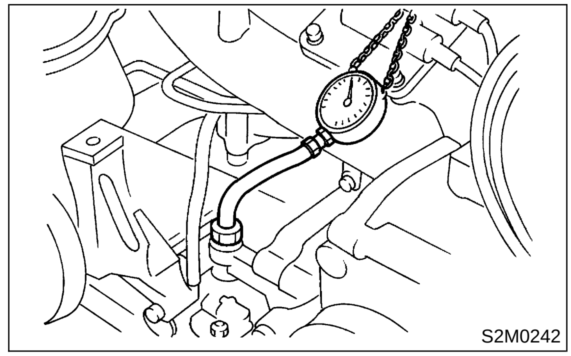
5) Connect oil pressure gauge hose to cylinder block.

6) Connect battery ground cable.



G6M0095

7) Start the engine, and measure oil pressure.



S2M0242

Oil pressure:

98 kPa (1.0 kg/cm^2, 14 psi) or more at 800 rpm

294 kPa (3.0 kg/cm^2, 43 psi) or more at 5,000 rpm

CAUTION:

- **If oil pressure is out of specification, check oil pump, oil filter and lubrication line. <Ref. to LU-22, INSPECTION, Engine Lubrication System Trouble in General.>**
- **If oil pressure warning light is turned ON and oil pressure is in specification, replace oil pressure switch. <Ref. to LU-22, INSPECTION, Engine Lubrication System Trouble in General.>**

NOTE:

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

8) After measuring oil pressure, install oil pressure switch. <Ref. to LU-18, INSTALLATION, Oil Pressure Switch.>

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)

9) Install generator and V-belt in the reverse order of removal, and adjust the V-belt deflection. <Ref. to ME-42, INSTALLATION, V-belt.>

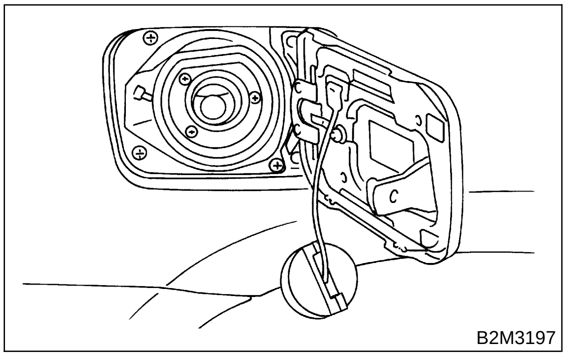
7. Fuel Pressure *S173656*

A: INSPECTION *S173656A10*

WARNING:
Before removing fuel pressure gauge, release fuel pressure.

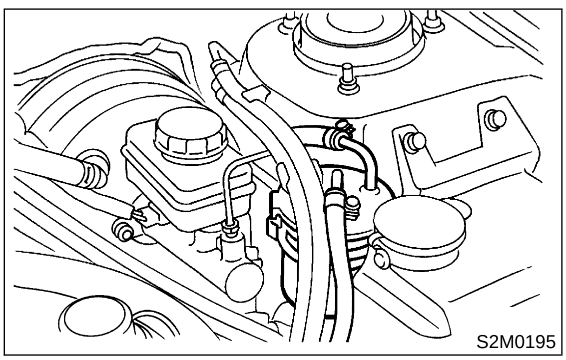
NOTE:
If out of specification, check or replace pressure regulator and pressure regulator vacuum hose.

1) Release fuel pressure. <Ref. to FU-52, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open fuel flap lid, and remove fuel filler cap.



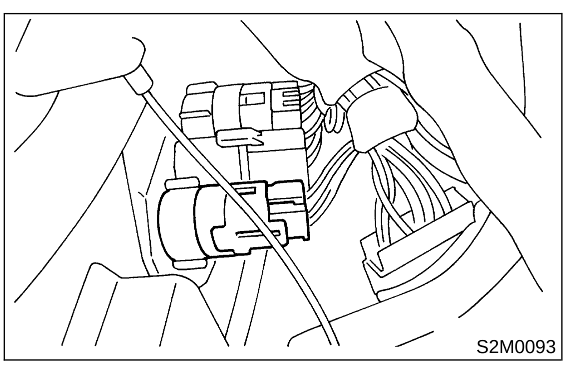
B2M3197

3) Disconnect fuel delivery hoses from fuel filter, and connect fuel pressure gauge.



S2M0195

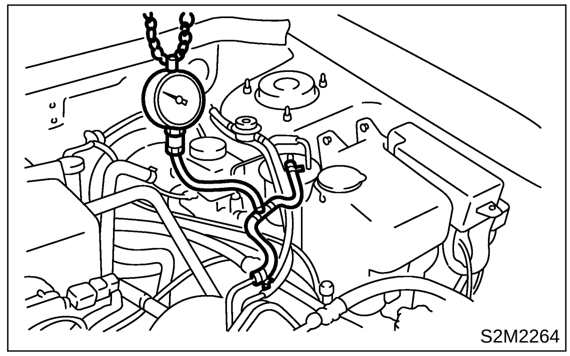
4) Connect fuel pump relay connector.



S2M0093

5) Start the engine.
6) Measure fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold.

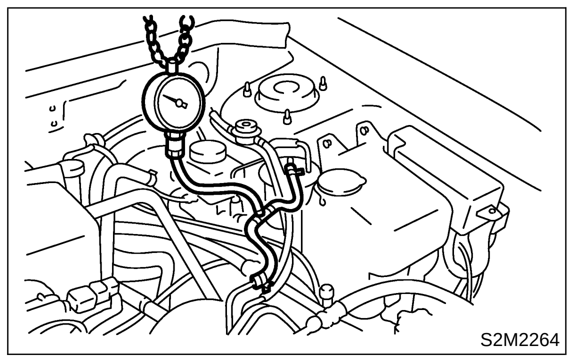
Fuel pressure:
Standard; 284 — 314 kPa (2.9 — 3.2 kg/cm^2, 41 — 46 psi)



S2M2264

7) After connecting pressure regulator vacuum hose, measure fuel pressure.

Fuel pressure:
Standard; 206 — 235 kPa (2.1 — 2.4 kg/cm^2, 30 — 34 psi)



S2M2264

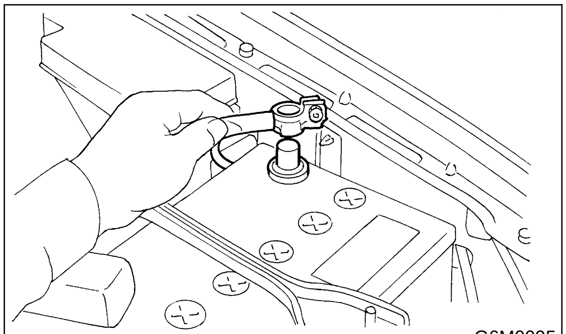
NOTE:
The fuel pressure gauge registers 10 to 20 kPa (0.1 to 0.2 kg/cm^2, 1 to 3 psi) higher than standard values during high-altitude operations.

8. Valve Clearance S173083

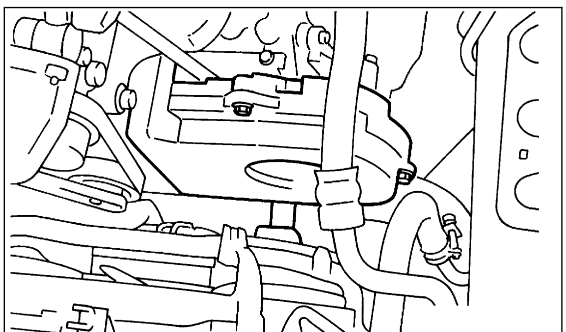
A: INSPECTION S173083A10

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

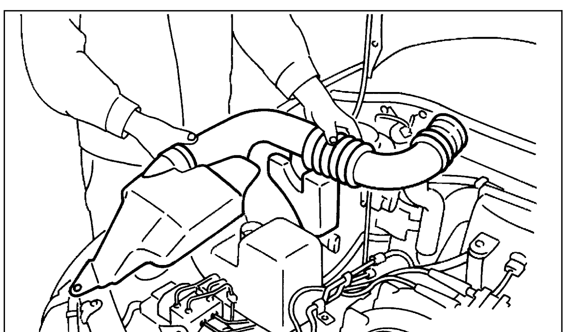
1) Set the vehicle onto the lift.
2) Lift-up the vehicle.
3) Remove under cover.
4) Disconnect battery ground cable.


G6M0095

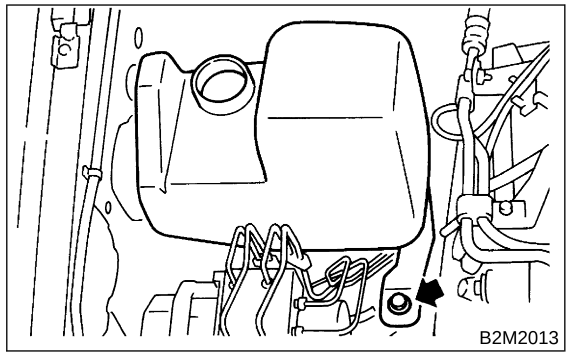
5) Lower the vehicle.
6) Remove timing belt cover (LH).


B2M2031

7) When inspecting #1 and #3 cylinders;
(1) Remove air intake duct as a unit.

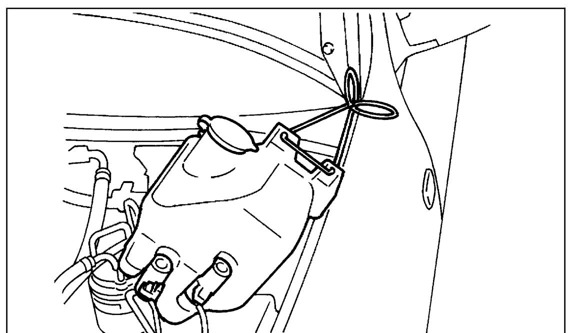

B2M2012

(2) Remove resonator chamber.


B2M2013

(3) Disconnect spark plug cords from spark plugs RH side. <Ref. to IG-4, RH SIDE, REMOVAL, Spark Plug.>
(4) Disconnect PCV hose from rocker cover (RH).
(5) Remove bolts, then remove rocker cover (RH).

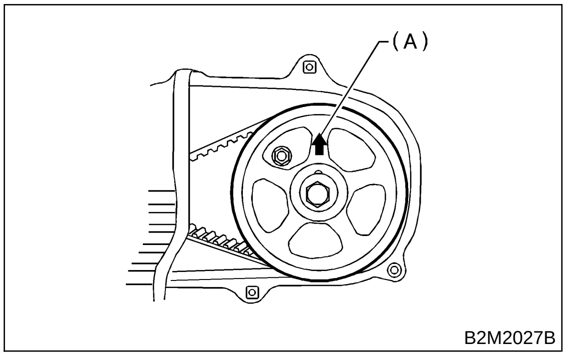
8) When inspecting #2 and #4 cylinders;
(1) Remove battery and battery carrier.
(2) Disconnect window washer motor connectors.
(3) Remove the two bolts which hold washer tank, then secure the tank away from working area.


H6M0431

(4) Disconnect spark plug cords from spark plugs (LH Side) <Ref. to IG-4, LH SIDE, REMOVAL, Spark Plug.>
(5) Disconnect PCV hose from rocker cover (LH).
(6) Remove bolts, then remove rocker cover (LH).

9) Set #1 cylinder piston to top dead center of compression stroke by rotating crankshaft pulley clockwise using ST.
ST 499977100 CRANKSHAFT PULLEY WRENCH

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

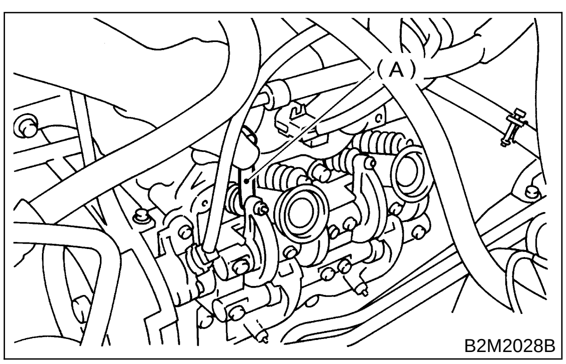


(A) Arrow mark

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

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

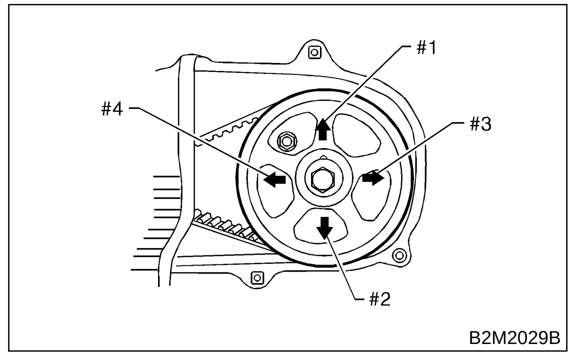
Valve clearance:
Intake;
0.20±0.02 mm (0.0079±0.0008 in)
Exhaust;
0.25±0.02 mm (0.0098±0.0008 in)



(A) Thickness gauge

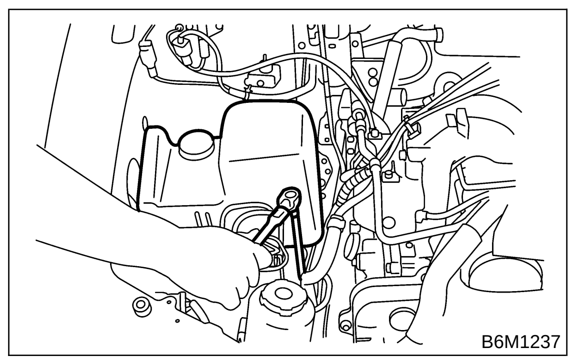
11) If necessary, adjust the valve clearance. <Ref. to ME-30, ADJUSTMENT, Valve Clearance.>
12) Similar to measurement procedures used for #1 cylinder, measure #2, #3 and #4 cylinder valve clearances.

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



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

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

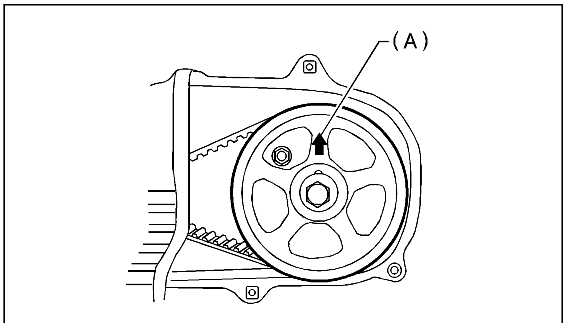


B: ADJUSTMENT *S173083A01*

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

1) Set #1 cylinder piston to top dead center of compression stroke by rotating crankshaft pulley clockwise using ST.
ST 499977100 CRANKSHAFT PULLEY WRENCH

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



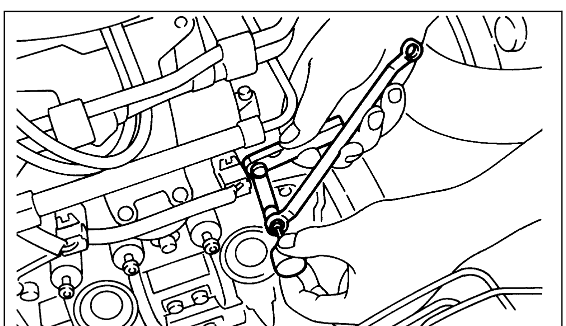
B2M2027B

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

Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)

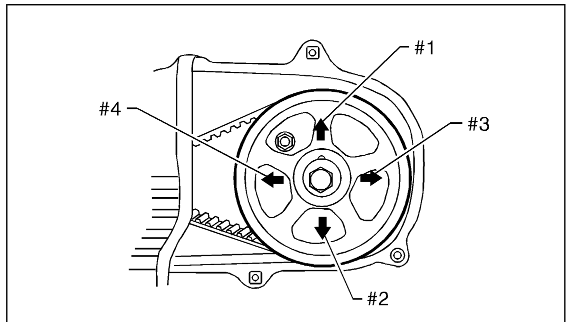
CAUTION:
- **Insert the thickness gauge in as horizontal a direction as possible with respect to the valve stem end face.**
- **Adjust exhaust valve clearances while lifting-up the vehicle.**

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


B2M2030

3) Ensure that valve clearances are within specifications.
4) Turn crankshaft two complete rotations until #1 cylinder piston is again set to top dead center on compression stroke.
5) Ensure that valve clearances are within specifications. If necessary, readjust valve clearances.
6) Similar to adjustment procedures used for #1 cylinder, adjust #2, #3 and #4 cylinder valve clearances.

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

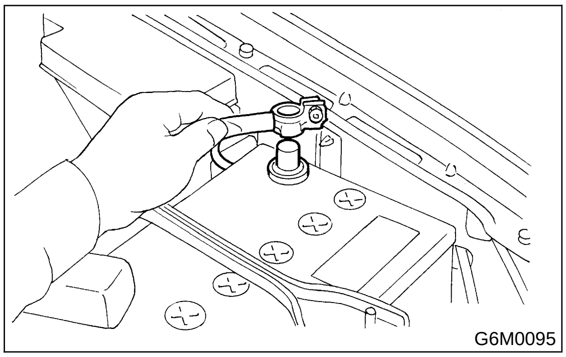


B2M2029B

9. Engine Assembly *S173079*

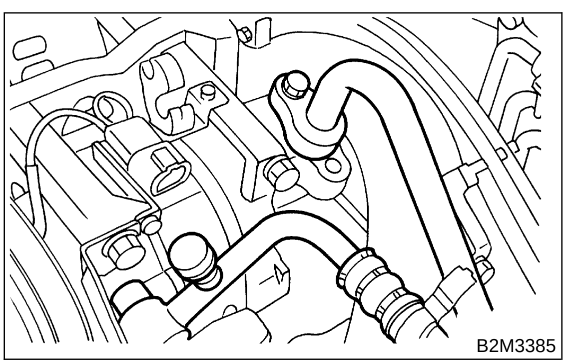
A: REMOVAL *S173079A18*

1) Set the vehicle on lift arms.
2) Open front hood fully and support with stay.
3) Release fuel pressure. <Ref. to FU-52, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
4) Remove filler cap.
5) Disconnect battery ground cable.



G6M0095

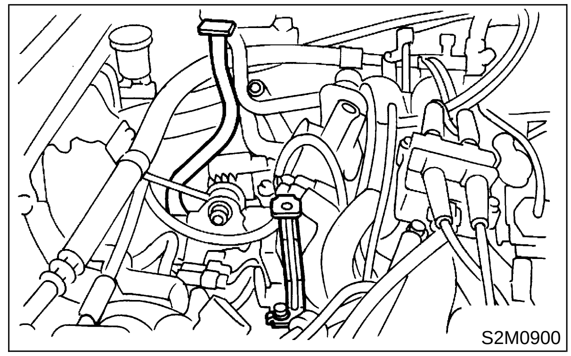
6) Remove air intake duct and air cleaner case. <Ref. to IN-7, REMOVAL, Air Intake Duct.> and <Ref. to IN-6, REMOVAL , Air Cleaner Case.>
7) Remove under cover.
8) Remove radiator from vehicle. <Ref. to CO-21, REMOVAL, Radiator.>
9) Remove ATF cooler pipe from cylinder head. <Ref. to AT-48, REMOVAL, ATF Cooler Pipe and Hose.>
10) Collect refrigerant, and remove pressure hoses.
   (1) Place and connect the attachment hose to the refrigerant recycle system.
   (2) Collect refrigerant from A/C system.
   (3) Disconnect A/C pressure hoses from A/C compressor.



B2M3385

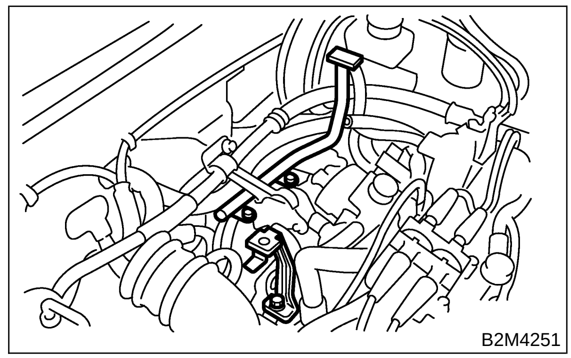
11) Remove air cleaner case stay.

● **MT model**



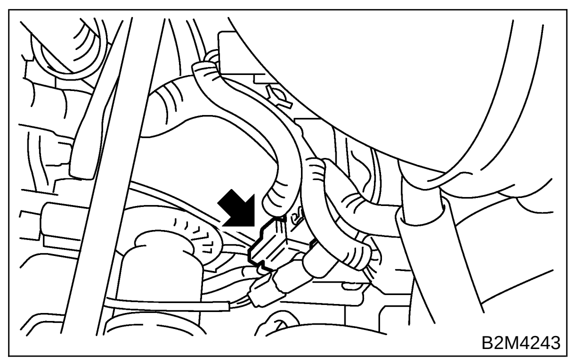
S2M0900

● **AT model**



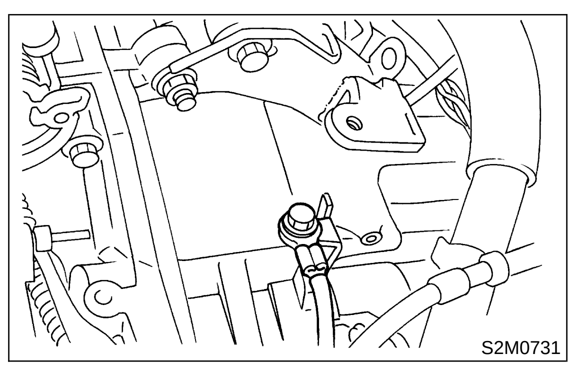
B2M4251

12) Disconnect the following connectors and cables.
   (1) Front oxygen (A/F) sensor connector



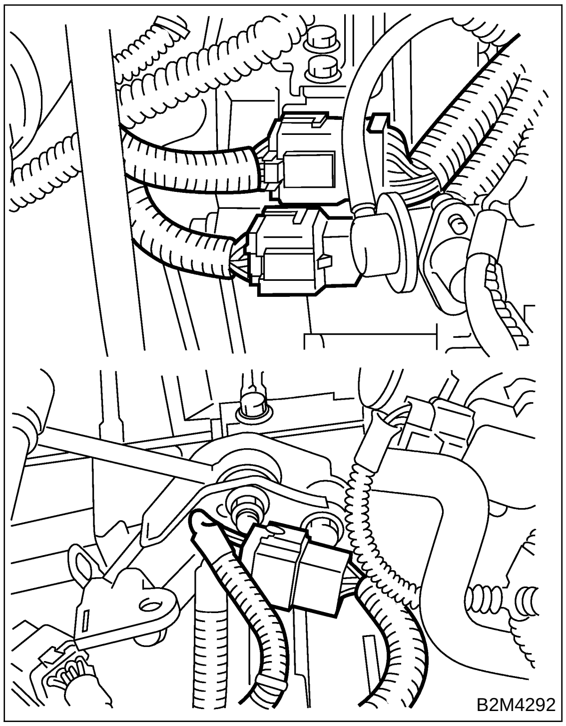
B2M4243

   (2) Engine ground cable

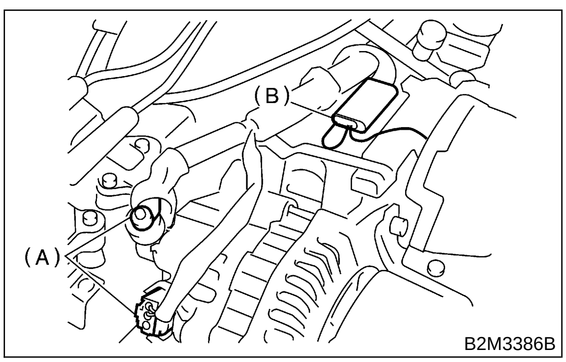


S2M0731

(3) Engine harness connectors

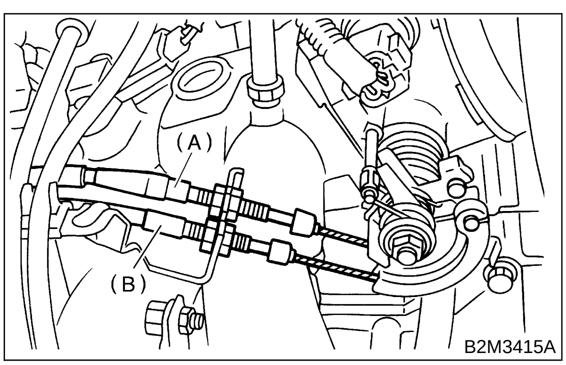


(4) Generator connector, terminal and A/C compressor connector



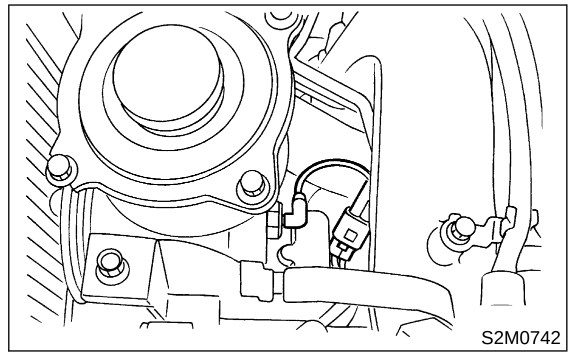
(A) Generator connector and terminal
(B) A/C compressor connector

(5) Accelerator cable and cruise control cable

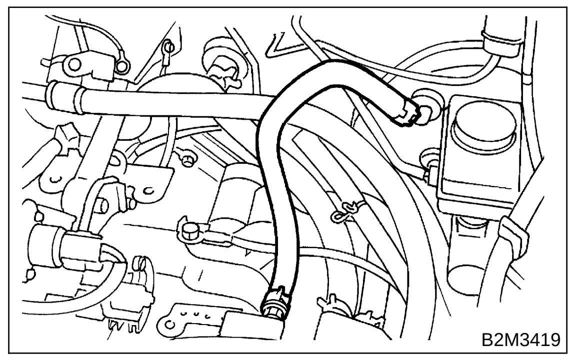


(A) Accelerator cable
(B) Cruise control cable

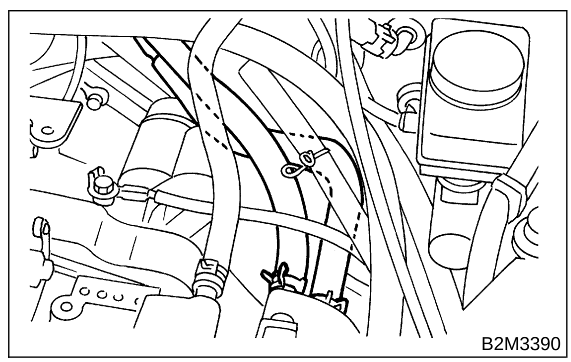
(6) Pressure switch



13) Disconnect the following hoses.
(1) Brake booster vacuum hose

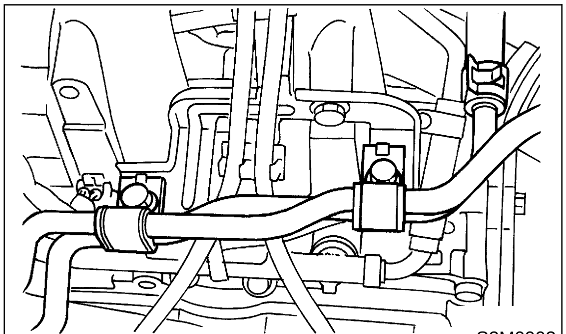


(2) Heater inlet outlet hose

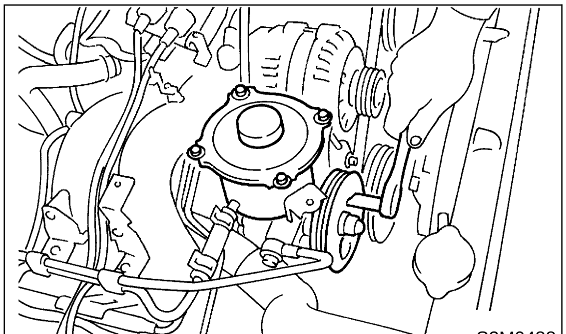


14) Remove power steering pump from bracket.
(1) Remove resonator chamber.
(2) Loosen lock bolt and slider bolt, and remove front side V-belt.<Ref. to ME-42, FRONT SIDE BELT, REMOVAL, V-belt.>

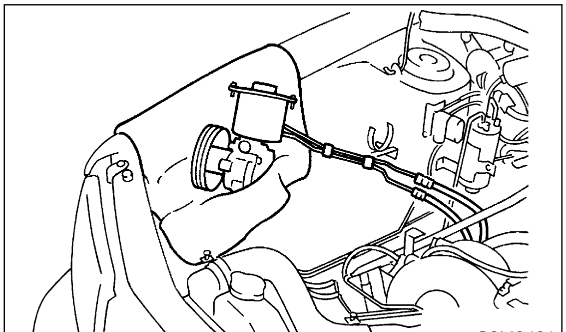
(3) Remove pipe with bracket from intake manifold.


S2M0903

(4) Remove bolts which install power steering pump from bracket.

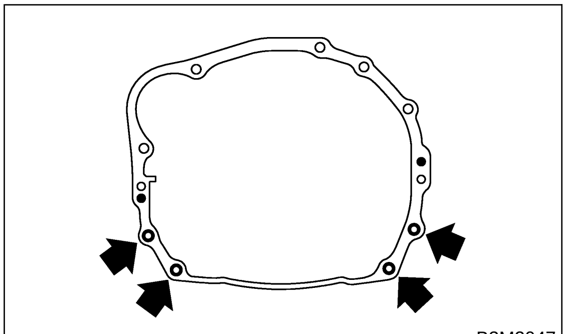

S2M0488

(5) Remove bolt which installs power steering pump bracket on cylinder head.
(6) Place power steering pump on the right side wheel apron.

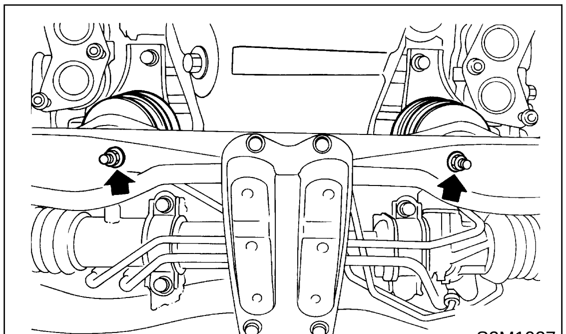

S2M0491

15) Remove front and center exhaust pipe.
<Ref. to EX-5, REMOVAL, Front Exhaust Pipe.>

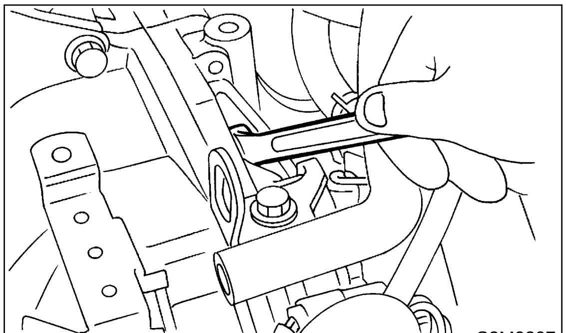
16) Remove nuts which hold lower side of transmission to engine.


B3M2047

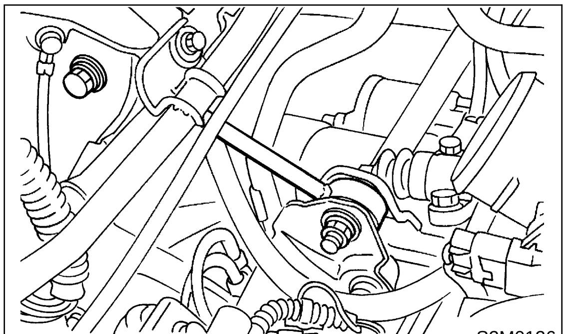
17) Remove nuts which install front cushion rubber onto front crossmember.


S2M1927

18) Separate torque converter clutch from drive plate. (AT model)
(1) Lower the vehicle.
(2) Remove service hole plug.
(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


S2M0207

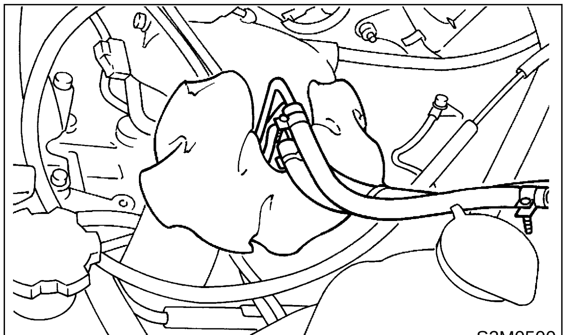
19) Remove pitching stopper.



S2M0126

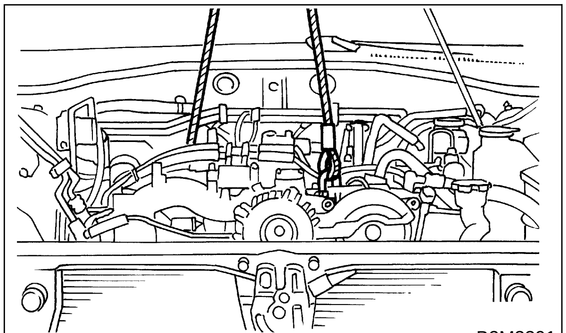
20) Disconnect fuel delivery hose, return hose and evaporation hose.

CAUTION:
- **Disconnect hose with its end wrapped with cloth to prevent fuel from splashing.**
- **Catch fuel from hose into container.**



S2M0500

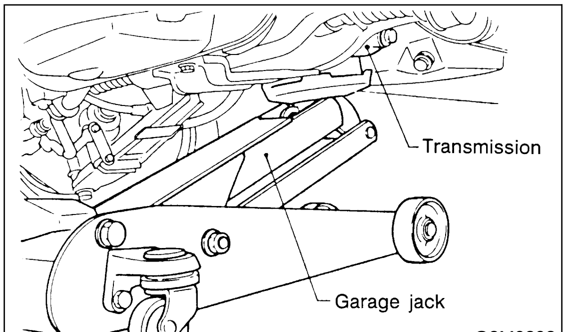
21) Support engine with a lifting device and wire ropes.



B2M3391

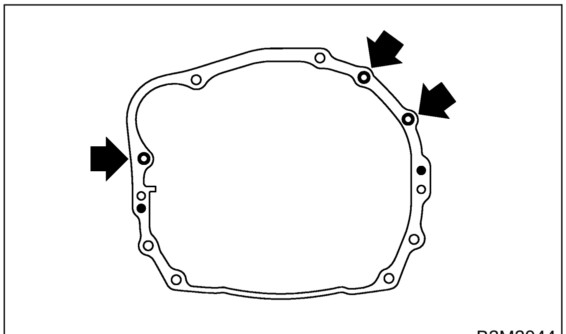
22) Support transmission with a garage jack.

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.



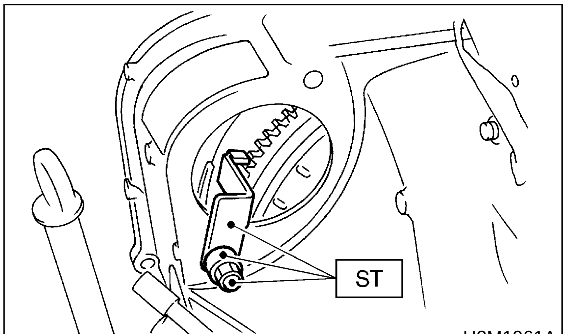
G2M0298

23) Separation of engine and transmission.
(1) Remove starter. <Ref. to SC-5, REMOVAL, Starter.>
(2) Remove bolts which hold upper side of transmission to engine.



B3M2044

24) Install ST to torque converter clutch case. (AT model)
ST 498277200 STOPPER SET

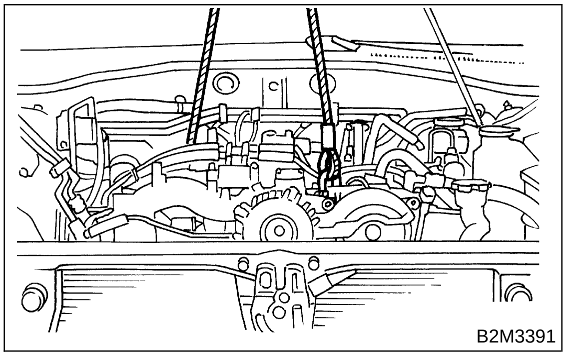


H2M1961A

25) 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.


B2M3391

26) Remove front cushion rubbers.

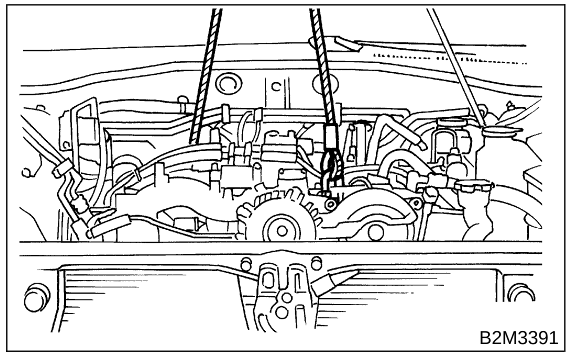
B: INSTALLATION S173079A11

1) Install front cushion rubbers.

Tightening torque:
34 N·m (3.5 kgf-m, 25.3 ft-lb)

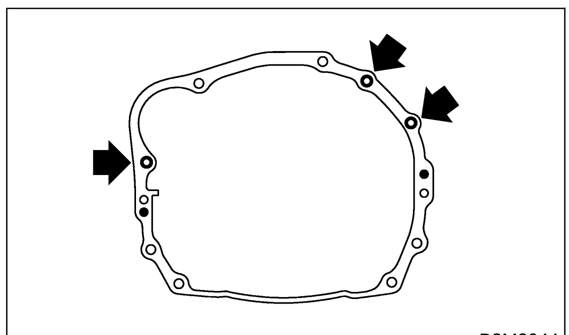
2) Install engine onto transmission.
(1) Position engine in engine compartment and align it with transmission.

CAUTION:
Be careful not to damage adjacent parts or body panels with crank pulley, oil level gauge, etc.

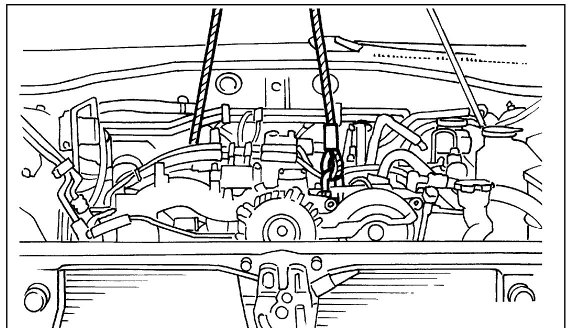

B2M3391

(2) Apply a small amount of grease to spline of main shaft. (MT model)
3) Tighten bolts which hold upper side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)


B3M2044

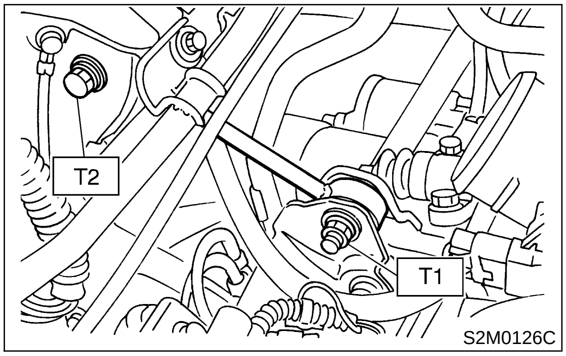
4) Remove lifting device and wire ropes.


B2M3391

5) Remove garage jack.

6) Install pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



7) Remove ST from torque converter clutch case. (AT model)

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-6, INSTALLATION, Starter.>

9) Install torque converter clutch onto drive plate. (AT model)

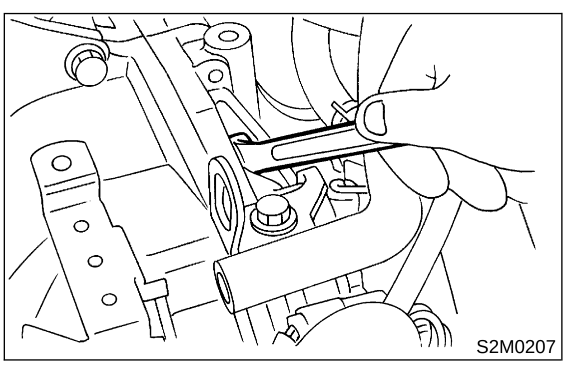
(1) Tighten bolts which hold torque converter clutch to drive plate.

(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)

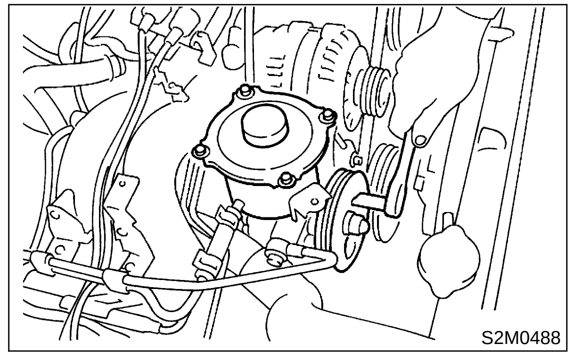


(3) Clog plug onto service hole.

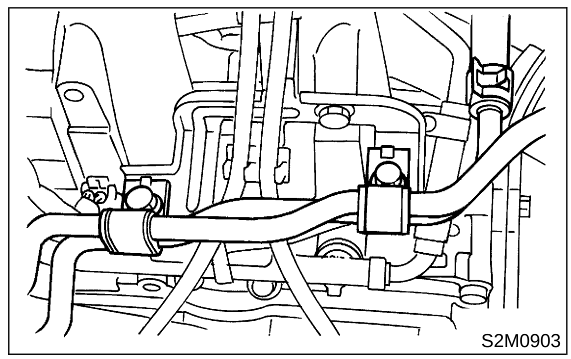
10) Install power steering pump on bracket.

(1) Install power steering pump on bracket, and tighten bolts.

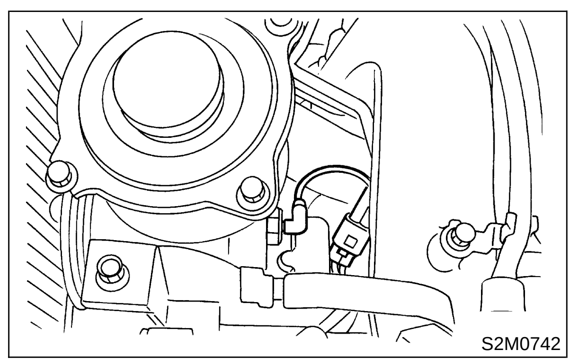
Tightening torque:
20.1 N·m (2.05 kgf-m, 14.8 ft-lb)



(2) Tighten bolt which installs power steering pump bracket, and install spark plug codes.



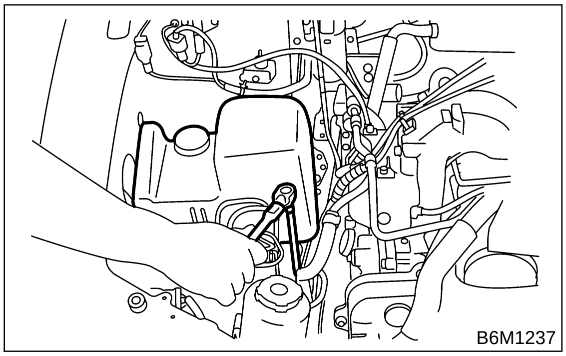
(3) Connect power steering switch connector.



(4) Install front side V-belt, and adjust it. <Ref. to ME-42, FRONT SIDE BELT, INSTALLATION, V-belt.>

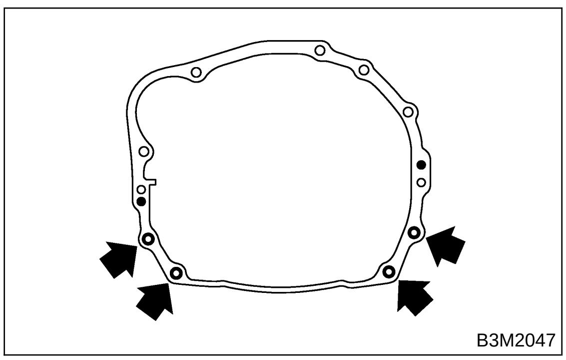
(5) Install resonator chamber.

Tightening torque:
33 N·m (3.4 kgf-m, 24.6 ft-lb)


B6M1237

11) Tighten nuts which hold lower side of transmission to engine.

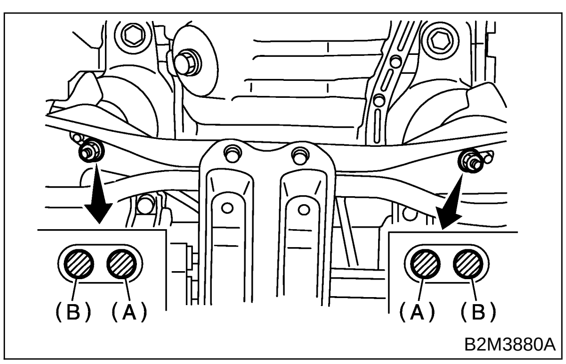
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)


B3M2047

12) Tighten nuts which install front cushion rubber onto crossmember.

Tightening torque:
85 N·m (8.7 kgf-m, 63 ft-lb)

CAUTION:
Make sure the front cushion rubber mounting bolts (A) and locator (B) are securely installed.



B2M3880A

13) Install front and center exhaust pipe.
<Ref. to EX-6, INSTALLATION, Front Exhaust Pipe.>
14) Connect the following hoses.
(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) Generator connector and terminal
(4) A/C compressor connectors
16) Connect the following cables.
(1) Accelerator cable
(2) Cruise control cables (With cruise control)

CAUTION:
After connecting each cable, adjust them.

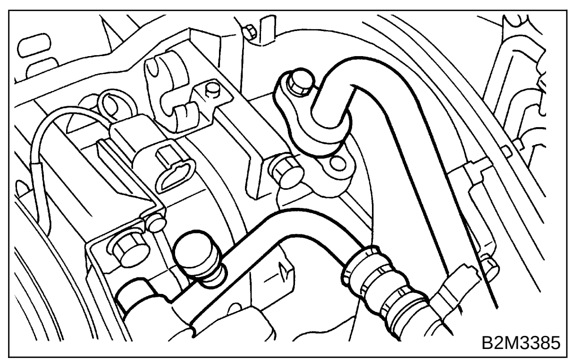
17) Install air cleaner case stay.

Tightening torque:
16 N·m (1.6 kgf-m, 11.6 ft-lb)

18) Install A/C pressure hoses.
<Ref. to AC-33, INSTALLATION, Flexible Hose.>

CAUTION:
Use new O-rings.

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


B2M3385

19) Install radiator to vehicle. <Ref. to CO-22, INSTALLATION, Radiator.>
20) Install ATF cooler pipe to cylinder head. <Ref. to AT-48, INSTALLATION, ATF Cooler Pipe and Hose.>
21) Install under cover.
22) Install battery in the vehicle, and connect cables.
23) Fill coolant.
<Ref. to CO-12, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
24) Check ATF level and correct if necessary. (AT model)
<Ref. to AT-9, INSPECTION, Automatic Transmission Fluid.>
25) Charge A/C system with refrigerant.
<Ref. to AC-16, OPERATION, Refrigerant Charging Procedure.>
26) Install air intake duct and air cleaner case.

<Ref. to IN-7, INSTALLATION, Air Intake Duct.> and <Ref. to IN-6, INSTALLATION, Air Cleaner Case.>

27) Remove front hood stay, and close front hood.

28) Take off the vehicle from lift arms.

C: INSPECTION *S173079A10*

1) Make sure pipes and hoses are installed correctly.

2) Make sure the engine coolant and ATF are at specified levels.

10. Engine Mounting S173085

A: REMOVAL S173085A18

1) Remove engine assembly. <Ref. to ME-32, REMOVAL, Engine Assembly.>
2) Remove engine mounting from engine assembly.

B: INSTALLATION S173085A11

Install in the reverse order of removal.

Tightening torque:
Engine mounting;
35 N·m (3.6 kgf-m, 26.0 ft-lb)

C: INSPECTION S173085A10

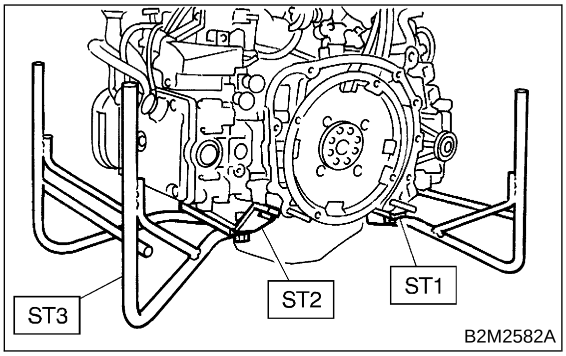
Make sure there are no cracks or other damage.

11. Preparation for Overhaul *S173091*

A: PROCEDURE *S173091E45*

1) After removing the engine from the body, secure it in the ST shown below.

ST1	498457000	ENGINE STAND ADAPTER RH
ST2	498457100	ENGINE STAND ADAPTER LH
ST3	499817100	ENGINE STAND



2) In this section the procedures described under each index are all connected and stated in order. It will be the complete procedure for overhauling of the engine itself when you go through all steps in the process.
Therefore, in this section, to conduct the particular procedure within the flow of a section, you need to go back and conduct the procedure described previously in order to do that particular procedure.

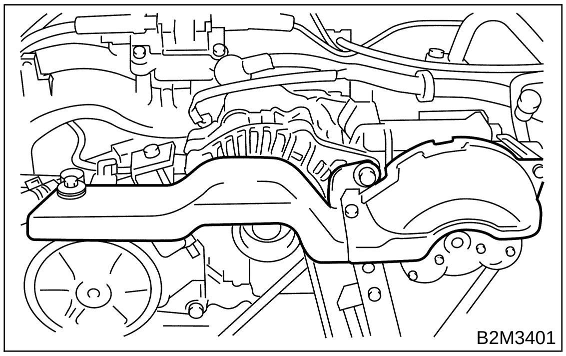
12. V-belt *S173080*

A: REMOVAL *S173080A18*

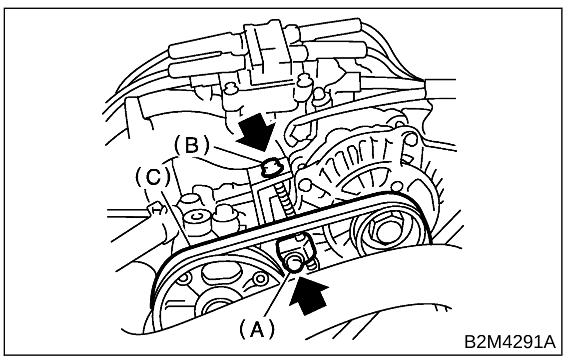
1. FRONT SIDE BELT *S173080A1801*

NOTE:
Perform the following procedures 1) to 4) with the engine installed to the body.

1) Remove V-belt cover.


B2M3401

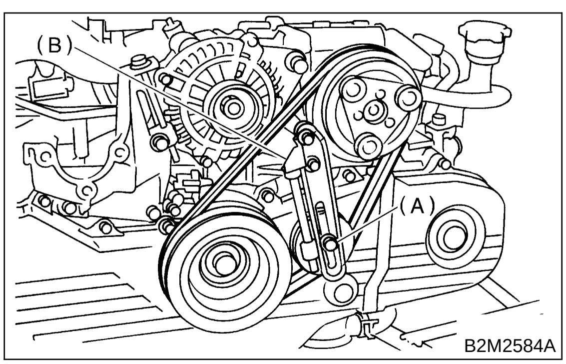
2) Loosen the lock bolt (A).
3) Loosen the slider bolt (B).
4) Remove the front side belt (C).



B2M4291A

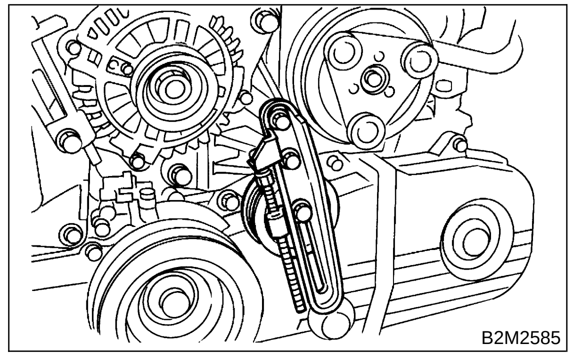
2. REAR SIDE BELT *S173080A1802*

1) Loosen the lock nut (A).
2) Loosen the slider bolt (B).



B2M2584A

3) Remove the A/C belt.
4) Remove the A/C belt tensioner.


B2M2585

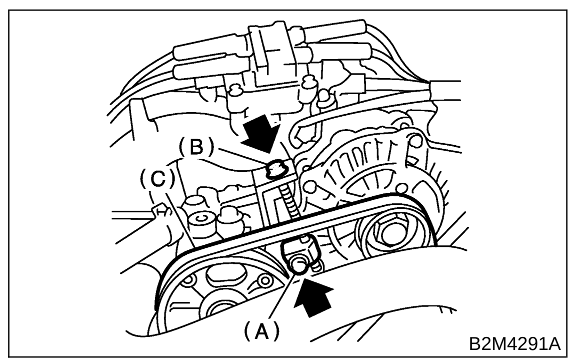
B: INSTALLATION *S173080A11*

1. FRONT SIDE BELT *S173080A1101*

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

1) Install a belt, and tighten the slider bolt so as to obtain the specified belt tension <Ref. to ME-43, INSPECTION, V-belt.>
2) Tighten the lock bolt (A)
3) Tighten slider bolt (B).

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)



B2M4291A

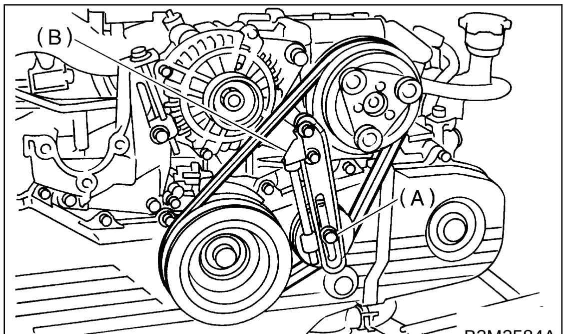
4) Install V-belt cover.

2. REAR SIDE BELT *S173080A1102*

1) Install a belt, and tighten the slider bolt (B) so as to obtain the specified belt tension. <Ref. to ME-43, INSPECTION, V-belt.>

2) Tighten the lock nut (A).

Tightening torque:
Lock nut (A);
22.6 N·m (2.3 kgf-m, 16.6 ft-lb)

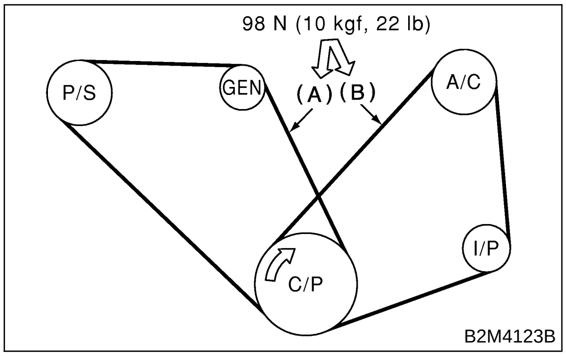


B2M2584A

C: INSPECTION *S173080A10*

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 — 11 mm (0.354 — 0.433 in)
(B)*
Replaced: 7.5 — 8.5 mm (0.295 — 0.335 in)
Reused: 9.0 — 10.0 mm (0.354 — 0.394 in)



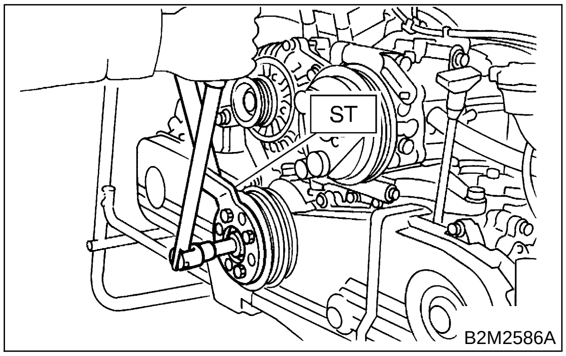
B2M4123B

C/P Crankshaft pulley
GEN Generator
P/S Power steering oil pump pulley
A/C Air conditioning compressor pulley
I/P Idler pulley

13. Crankshaft Pulley S173098

A: REMOVAL S173098A18

1) Remove V-belt. <Ref. to ME-42, REMOVAL, V-belt.>
2) Remove crankshaft pulley bolt. To lock crankshaft, use ST.
ST 499977100 CRANKSHAFT PULLEY WRENCH



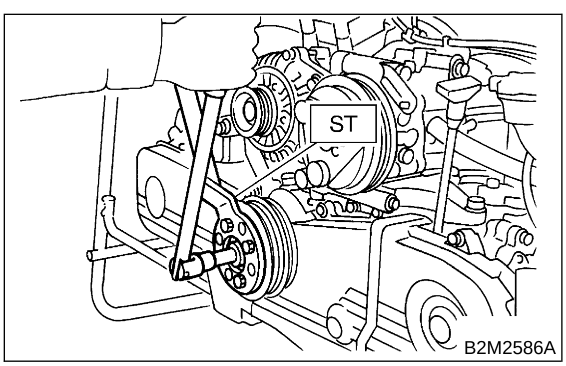
B2M2586A

3) Remove crankshaft pulley.

B: INSTALLATION S173098A11

1) Install crankshaft pulley.
2) Install pulley bolt.
To lock crankshaft, use ST.
ST 499977100 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 bolts temporarily with tightening torque of 44 N·m (4.5 kgf-m, 33 ft-lb).
(4) Tighten the crankshaft pulley bolts.

Tightening torque:
177 N·m (18.0 kgf-m, 130.2 ft-lb)



B2M2586A

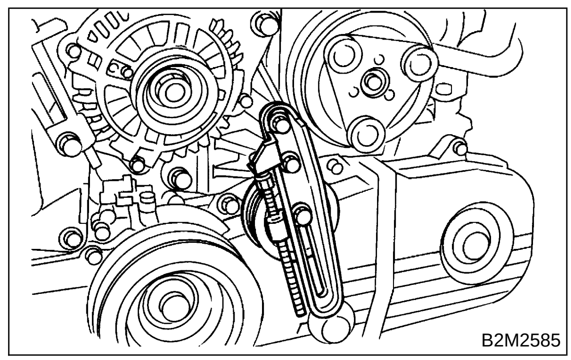
3) Confirm that the tightening angle of the crankshaft pulley bolt is 65 degrees or more. If not, conduct the following procedures (1) through (5).
(1) Replace the crankshaft pulley bolts and clean them.

Crankshaft pulley bolt:
12369AA011

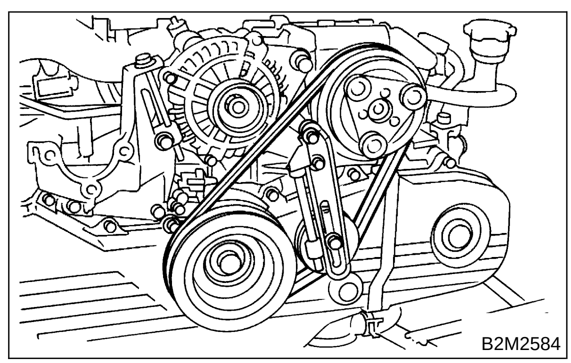
(2) Clean the crankshaft thread using an air gun.
(3) Apply engine oil to the crankshaft pulley bolt seat and thread.
(4) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kgf-m, 33 ft-lb).
(5) Tighten the crankshaft pulley bolts keeping them in an angle between 65 degrees and 75 degrees.

CAUTION:
Conduct the tightening procedures by confirming the turning angle of the crankshaft pulley bolt referring to the gauge indicated on the belt cover.

4) Install A/C belt tensioner.


B2M2585

5) Install A/C belt.


B2M2584

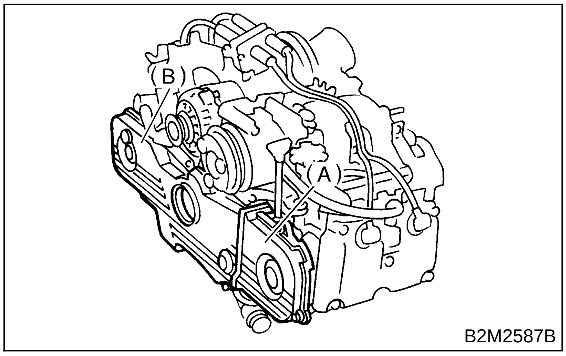
C: INSPECTION S173098A10

1) Make sure the V-belt is not worn or otherwise damaged.
2) Check the tension of the belt. <Ref. to ME-43, INSPECTION, V-belt.>

14. Belt Cover S173582

A: REMOVAL S173582A18

1) Remove V-belt. <Ref. to ME-42, REMOVAL, V-belt.>
2) Remove crankshaft pulley. <Ref. to ME-44, REMOVAL, Crankshaft Pulley.>
3) Remove belt cover (LH).
4) Remove front belt cover.



(A) Belt cover (LH)
(B) Front belt cover

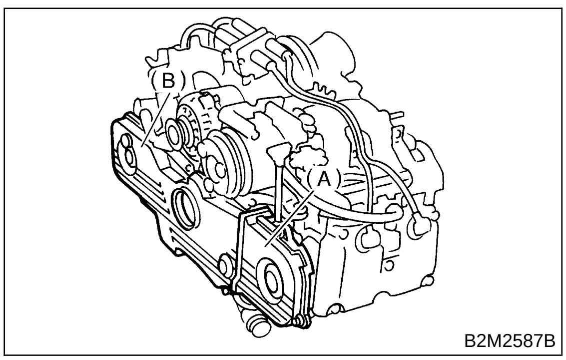
B: INSTALLATION S173582A11

1) Install front belt cover.

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

2) Install belt cover (LH).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



(A) Belt cover (LH)
(B) Front belt cover

3) Install crankshaft pulley. <Ref. to ME-44, INSTALLATION, Crankshaft Pulley.>
4) Install V-belt. <Ref. to ME-42, INSTALLATION, V-belt.>

C: INSPECTION S173582A10

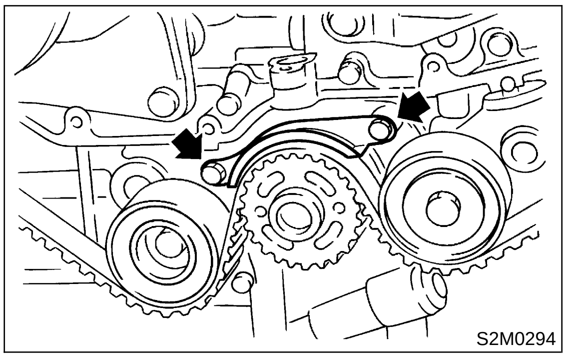
Make sure the cover is not damaged.

15. Timing Belt Assembly S173099

A: REMOVAL S173099A18

1. TIMING BELT S173099A1801

1) Remove V-belt. <Ref. to ME-42, REMOVAL, V-belt.>
2) Remove crankshaft pulley. <Ref. to ME-44, REMOVAL, Crankshaft Pulley.>
3) Remove belt cover. <Ref. to ME-45, REMOVAL, Belt Cover.>
4) Remove timing belt guide. (MT vehicle only)

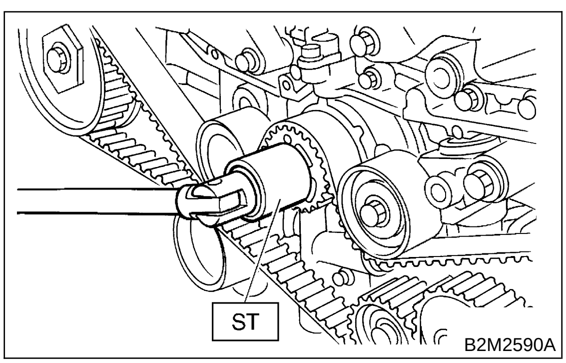


S2M0294

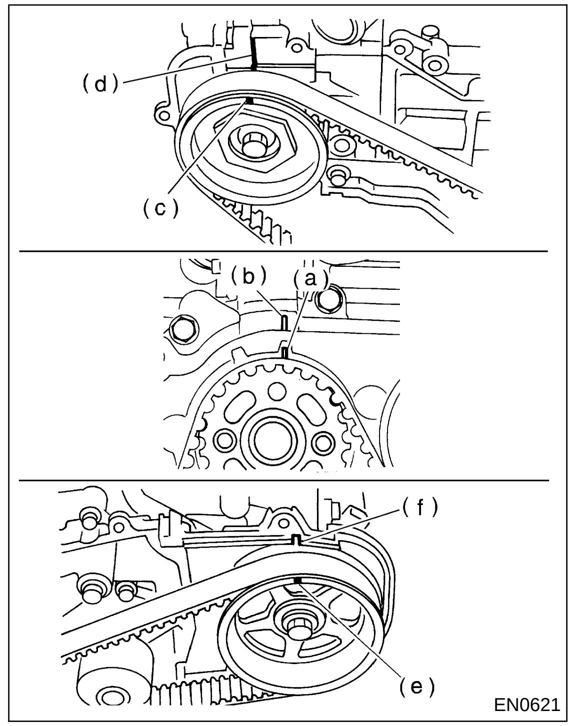
5) If alignment mark (a) and/or arrow mark (which indicates rotation direction) on timing belt fade away, put new marks before removing timing belt as shown in procedures below.

(1) Turn crankshaft using ST. Align mark (a) of sprocket to cylinder block notch (b) and ensure that right side cam sprocket mark (c), cam cap and cylinder head matching surface (d) and/or left side cam sprocket mark (e) and belt cover notch (f) are properly adjusted.

ST 499987500 CRANKSHAFT SOCKET

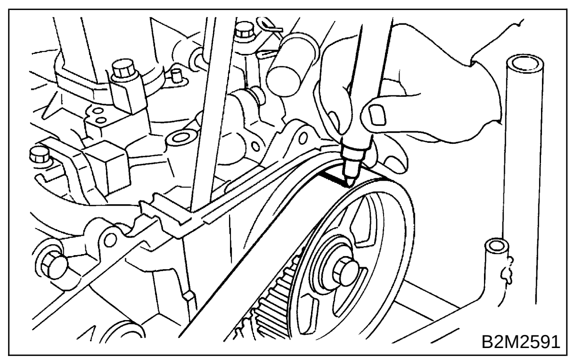


B2M2590A



EN0621

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

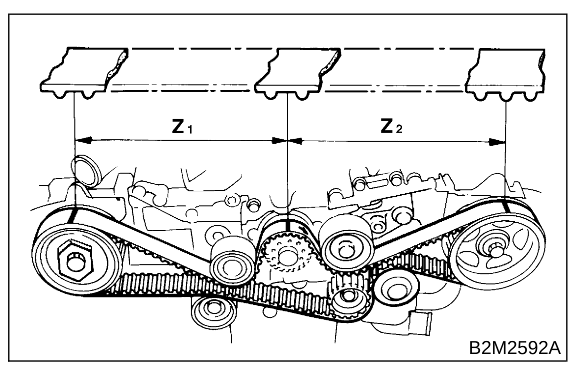


B2M2591

Specified data:

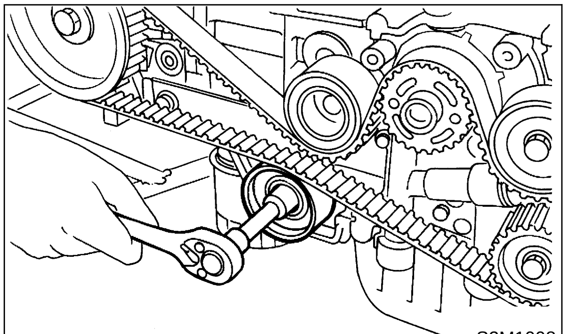
Z_1: 46.8 tooth length

Z_2: 43.7 tooth length

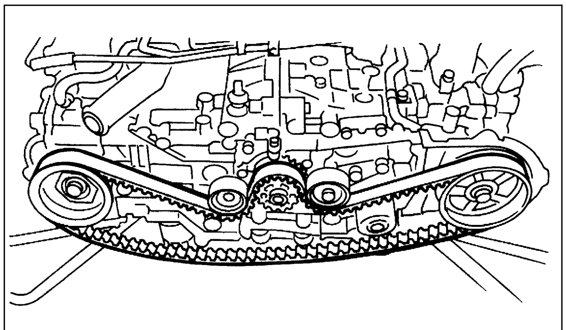


B2M2592A

6) Remove belt idler (No. 2).
7) Remove belt idler No. 2.

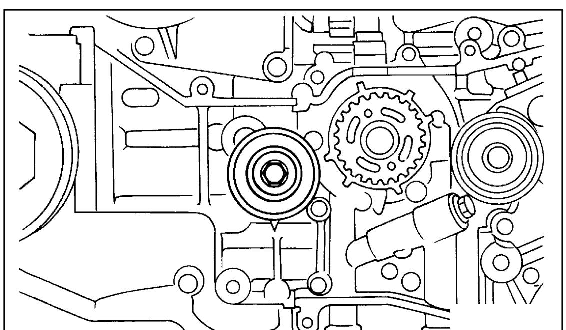

S2M1008

8) Remove timing belt.

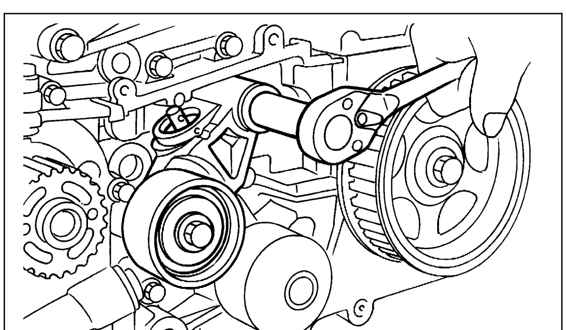

B2M2594

2. BELT IDLER AND AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY S173099A1802

1) Remove belt idler (No. 1).


B2M2596

2) Remove automatic belt tension adjuster assembly.


H2M2375

B: INSTALLATION S173099A11

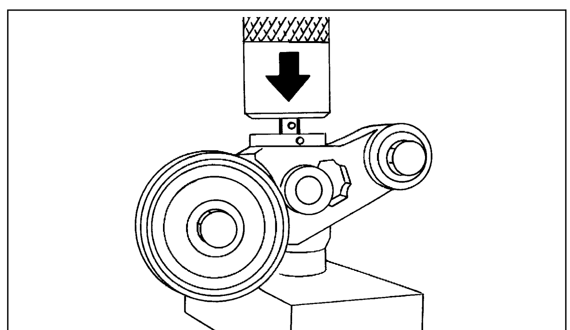
1. AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER

S173099A1101

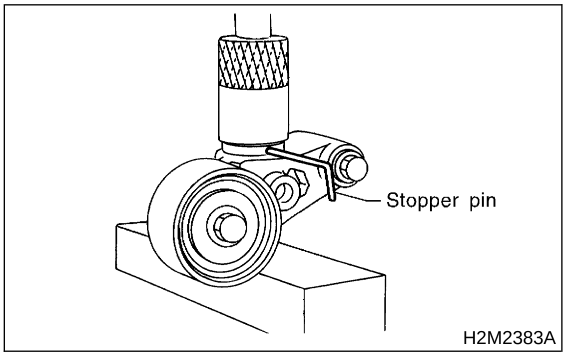
1) Preparation for installation of automatic belt tension adjuster assembly;

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

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

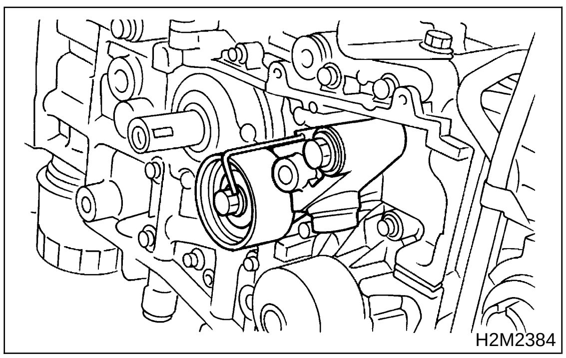

H2M2382

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



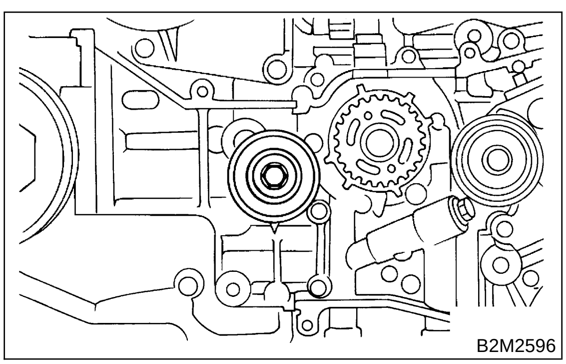
2) Install automatic belt tension adjuster assembly.

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



3) Install belt idler (No. 1).

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

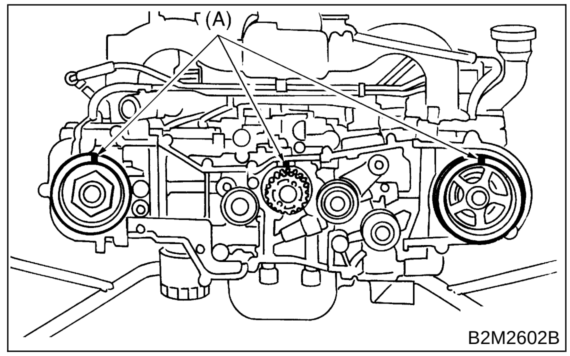


2. TIMING BELT *S173099A1102*

1) Preparation for installation of automatic belt tension adjuster assembly. <Ref. to ME-47, AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER, INSTALLATION, Timing Belt Assembly.>
2) Installation of timing belt

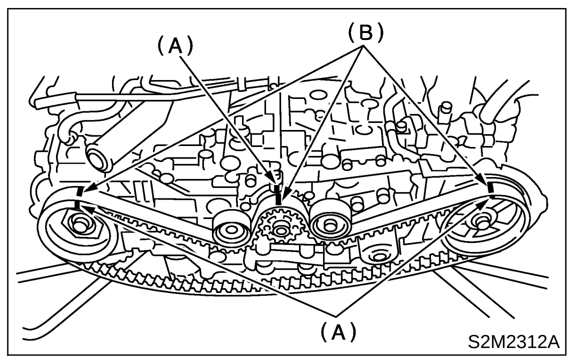
(1) Turn camshaft sprocket No. 2 using ST1, and turn camshaft sprocket No. 1 using ST2 so that their alignment marks (A) come to top positions.

ST1	499207100	CAMSHAFT SPROCKET WRENCH
ST2	499207400	CAMSHAFT SPROCKET WRENCH



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

CAUTION:
Ensure belt's rotating direction is correct.

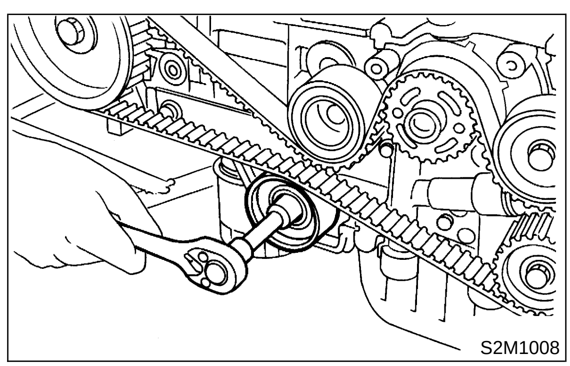


3) Install belt idler No. 2.

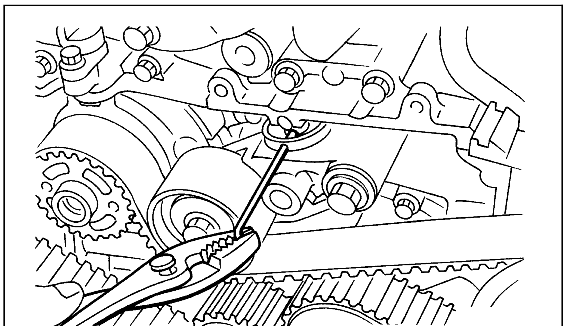
Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

4) Install belt idler (No. 2).

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

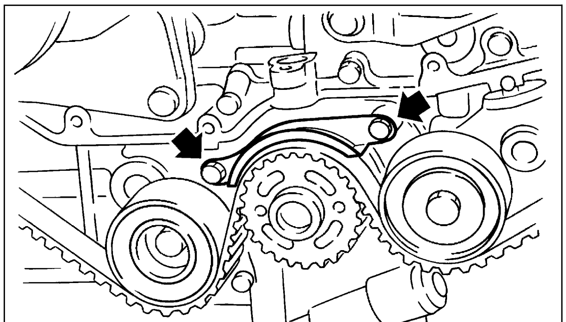


5) After ensuring that the marks on timing belt and camshaft sprockets are aligned, remove stopper pin from belt tensioner adjuster.



H2M2387

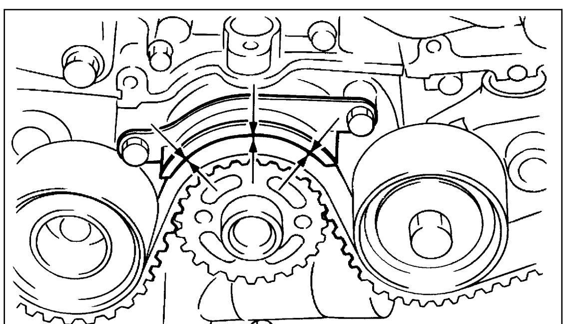
6) Install timing belt guide. (MT vehicles only)
(1) Temporarily tighten remaining bolts.



S2M0294

(2) Check and adjust clearance between timing belt and timing belt guide by using thickness gauge.

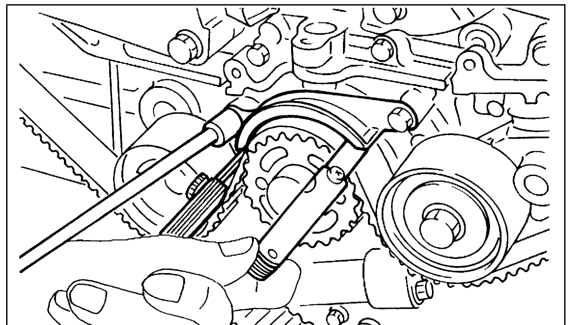
Clearance:
1.0±0.5 mm (0.039±0.020 in)



S2M0297

(3) Tighten remaining bolts.

Tightening torque:
9.8 N·m (1.0 kgf-m, 7.2 ft-lb)



H2M2415

7) Install belt cover. <Ref. to ME-45, INSTALLATION, Belt Cover.>
8) Install crankshaft pulley. <Ref. to ME-44, INSTALLATION, Crankshaft Pulley.>
9) Install V-belt. <Ref. to ME-42, INSTALLATION, V-belt.>

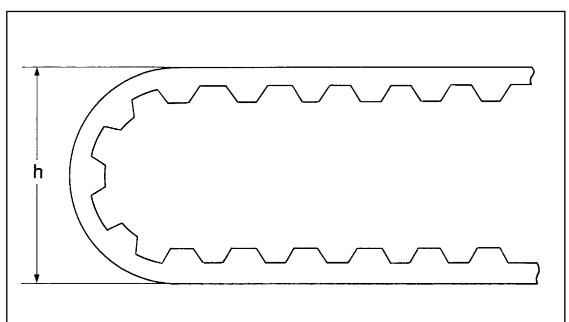
C: INSPECTION *S173099A10*

1. TIMING BELT *S173099A1001*

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

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

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



G2M0115

2. AUTOMATIC BELT TENSION ADJUSTER *S173099A1002*

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

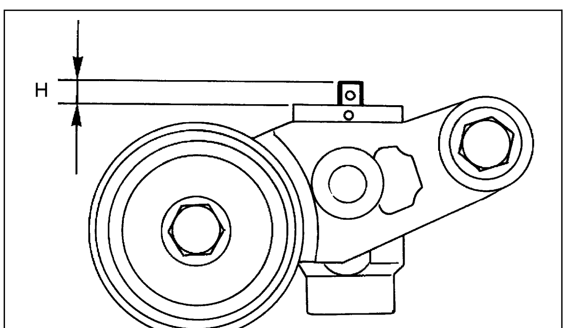
CAUTION:
Slight traces of oil at rod's oil seal does not indicate a problem.

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

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

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

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



H2M2381A

3. BELT TENSION PULLEY S173099A1003

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

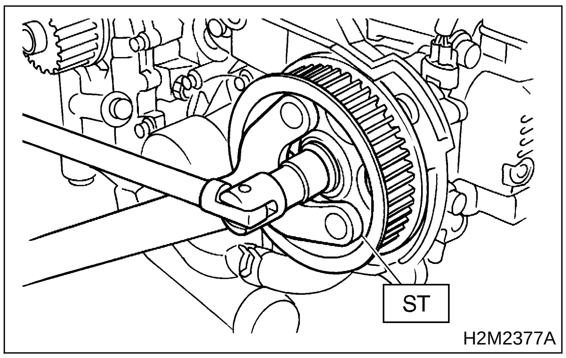
4. BELT IDLER S173099A1004

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

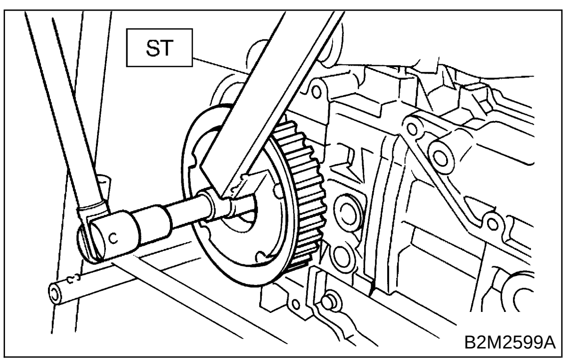
16. Camshaft Sprocket S173097

A: REMOVAL S173097A18

1) Remove V-belt. <Ref. to ME-42, REMOVAL, V-belt.>
2) Remove crankshaft pulley. <Ref. to ME-44, REMOVAL, Crankshaft Pulley.>
3) Remove belt cover. <Ref. to ME-45, REMOVAL, Belt Cover.>
4) Remove timing belt assembly. <Ref. to ME-46, REMOVAL, Timing Belt Assembly.>
5) Remove camshaft position sensor. <Ref. to FU-30, REMOVAL, Camshaft Position Sensor.>
6) Remove camshaft sprocket No. 2. To lock camshaft, use ST.
ST 499207100 CAMSHAFT SPROCKET WRENCH



7) Remove camshaft sprocket No. 1. To lock camshaft, use ST.
ST 499207400 CAMSHAFT SPROCKET WRENCH

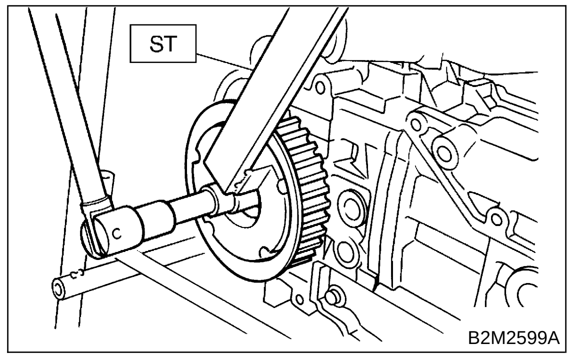


B: INSTALLATION S173097A11

1) Install camshaft sprocket No. 1. To lock camshaft, use ST.
ST 499207400 CAMSHAFT SPROCKET WRENCH

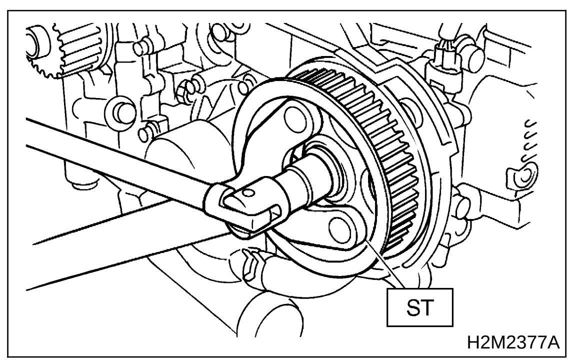
Tightening torque:
78 N·m (8.0 kgf-m, 57.9 ft-lb)

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



2) Install camshaft sprocket No. 2. To lock camshaft, use ST.
ST 499207100 CAMSHAFT SPROCKET WRENCH

Tightening torque:
78 N·m (8.0 kgf-m, 57.9 ft-lb)



3) Install camshaft position sensor. <Ref. to FU-30, INSTALLATION, Camshaft Position Sensor.>
4) Install timing belt assembly. <Ref. to ME-47, INSTALLATION, Timing Belt Assembly.>
5) Install belt cover. <Ref. to ME-45, INSTALLATION, Belt Cover.>
6) Install crankshaft pulley. <Ref. to ME-44, INSTALLATION, Crankshaft Pulley.>
7) Install V-belt. <Ref. to ME-42, INSTALLATION, V-belt.>

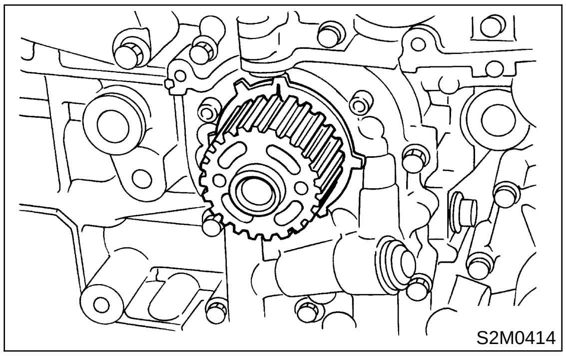
C: INSPECTION S173097A10

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

17. Crankshaft Sprocket S173101

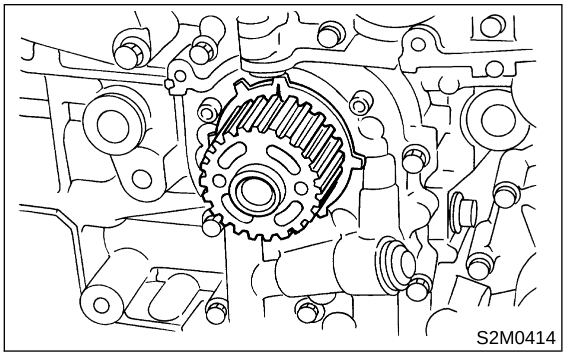
A: REMOVAL S173101A18

1) Remove V-belt. <Ref. to ME-42, REMOVAL, V-belt.>
2) Remove crankshaft pulley. <Ref. to ME-44, REMOVAL, Crankshaft Pulley.>
3) Remove belt cover. <Ref. to ME-45, REMOVAL, Belt Cover.>
4) Remove timing belt assembly. <Ref. to ME-46, REMOVAL, Timing Belt Assembly.>
5) Remove camshaft sprocket. <Ref. to ME-51, REMOVAL, Camshaft Sprocket.>
6) Remove crankshaft sprocket.



B: INSTALLATION S173101A11

1) Install crankshaft sprocket.



2) Install camshaft sprocket. <Ref. to ME-53, INSTALLATION, Camshaft Sprocket.>
3) Install timing belt assembly. <Ref. to ME-47, INSTALLATION, Timing Belt Assembly.>
4) Install belt cover. <Ref. to ME-45, INSTALLATION, Belt Cover.>
5) Install crankshaft pulley. <Ref. to ME-44, INSTALLATION, Crankshaft Pulley.>
6) Install V-belt. <Ref. to ME-42, INSTALLATION, V-belt.>

C: INSPECTION S173101A10

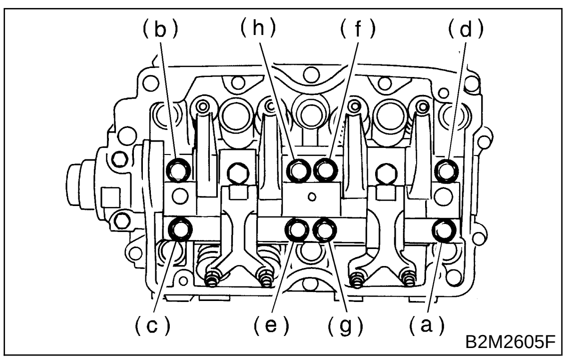
1) Check sprocket teeth for abnormal wear and scratches.
2) Make sure there is no free play between sprocket and key.
3) Check crankshaft sprocket notch for sensor for damage and contamination of foreign matter.

18. Valve Rocker Assembly S173094

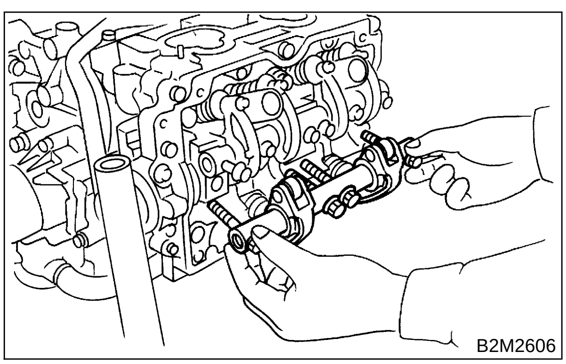
A: REMOVAL S173094A18

1) Remove V-belt. <Ref. to ME-42, REMOVAL, V-belt.>
2) Remove crankshaft pulley. <Ref. to ME-44, REMOVAL, Crankshaft Pulley.>
3) Remove belt cover. <Ref. to ME-45, REMOVAL, Belt Cover.>
4) Remove timing belt assembly. <Ref. to ME-46, REMOVAL, Timing Belt Assembly.>
5) Remove camshaft sprocket. <Ref. to ME-51, REMOVAL, Camshaft Sprocket.>
6) Disconnect PCV hose and remove rocker cover.
7) Removal of valve rocker assembly
(1) Remove bolts (a) through (h) in alphabetical sequence.

CAUTION:
Leave two or three threads of bolts (g and h) engaged to retain valve rocker assembly.



(2) Remove valve rocker assembly.



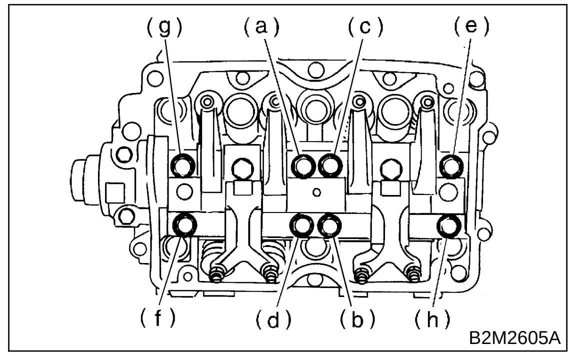
B: INSTALLATION S173094A11

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

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

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

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



2) Adjust the valve clearances. <Ref. to ME-30, ADJUSTMENT, Valve Clearance.>
3) Install rocker cover and connect PCV hose.
4) Install camshaft sprocket. <Ref. to ME-51, INSTALLATION, Camshaft Sprocket.>
5) Install timing belt assembly. <Ref. to ME-47, INSTALLATION, Timing Belt Assembly.>
6) Install belt cover. <Ref. to ME-45, INSTALLATION, Belt Cover.>
7) Install crankshaft pulley. <Ref. to ME-44, INSTALLATION, Crankshaft Pulley.>
8) Install V-belt. <Ref. to ME-42, INSTALLATION, V-belt.>

C: DISASSEMBLY S173094A06

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

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

3) Remove nut and adjuster screw from valve rocker.

D: ASSEMBLY S173094A02

1) Install adjuster screw and nut to valve rocker.
2) Arrange valve rocker arms, springs and shaft supports in assembly order and insert valve rocker shaft.

Tightening torque (Shaft supports installing bolts):
5 N·m (0.5 kgf-m, 3.6 ft-lb)

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

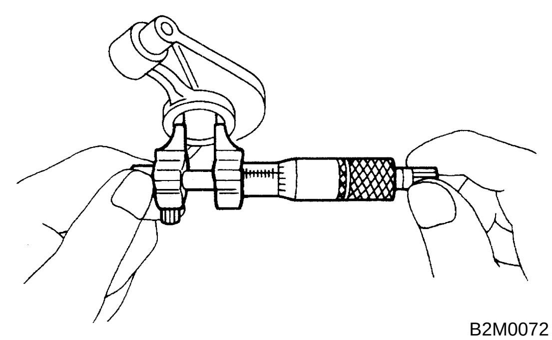
3) Install valve rocker shaft securing bolts.

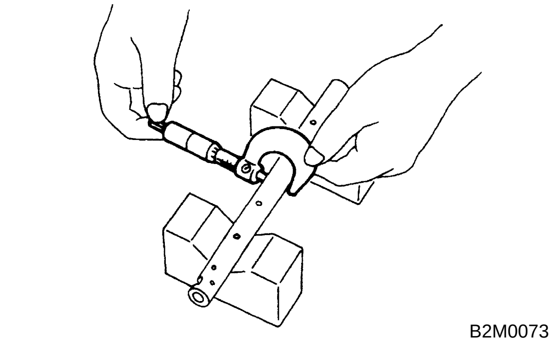
E: INSPECTION *S173094A10*

1. VALVE ROCKER ARM *S173094A1001*

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

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


B2M0072


B2M0073

2) If oil clearance exceeds the limit, replace valve rocker arm or shaft, whichever shows greater amount of wear.

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

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

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

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

4) If oil clearance exceeds the limit, replace rocker shaft support or shaft, whichever shows greater amount of wear.

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

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

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

2. INTAKE AND EXHAUST VALVE ROCKER SHAFT *S173094A1002*

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

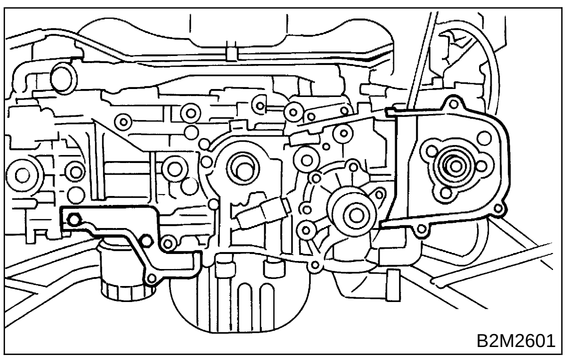
CAUTION:
Repair or replace valve rocker shaft as necessary.

19. Camshaft *S173092*

A: REMOVAL *S173092A18*

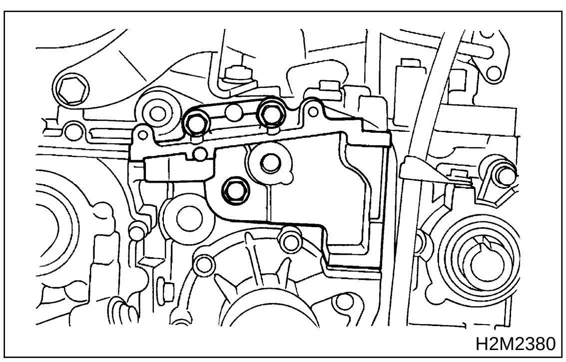
1) Remove V-belt. <Ref. to ME-42, REMOVAL, V-belt.>
2) Remove crankshaft pulley. <Ref. to ME-44, REMOVAL, Crankshaft Pulley.>
3) Remove belt cover. <Ref. to ME-45, REMOVAL, Belt Cover.>
4) Remove timing belt assembly. <Ref. to ME-46, REMOVAL, Timing Belt Assembly.>
5) Remove camshaft sprocket. <Ref. to ME-51, REMOVAL, Camshaft Sprocket.>
6) Remove crankshaft sprocket. <Ref. to ME-53, REMOVAL, Crankshaft Sprocket.>
7) Remove belt cover No. 2 (LH).
8) Remove belt cover No. 2 (RH).

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



B2M2601

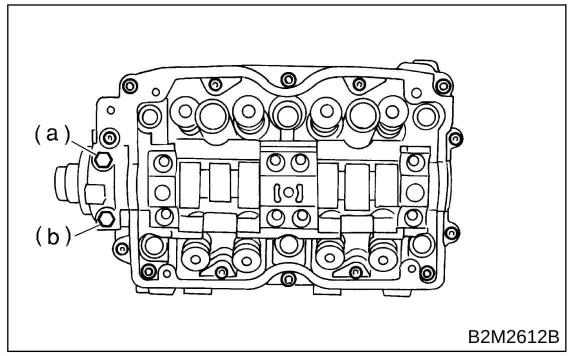
9) Remove tensioner bracket.



H2M2380

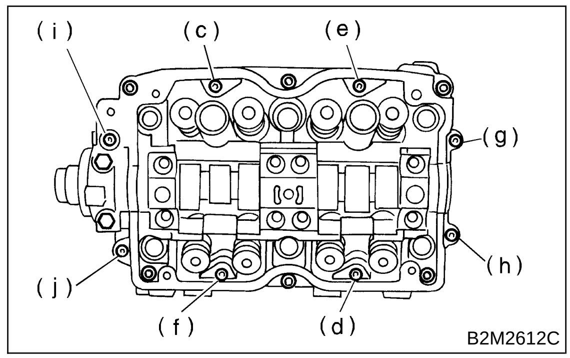
10) Remove camshaft position sensor support. (LH side only)
11) Remove oil level gauge guide. (LH side only)
12) Remove valve rocker assembly. <Ref. to ME-54, REMOVAL, Valve Rocker Assembly.>
13) Remove camshaft cap.

(1) Remove bolts (a) through (b) in alphabetical sequence.



B2M2612B

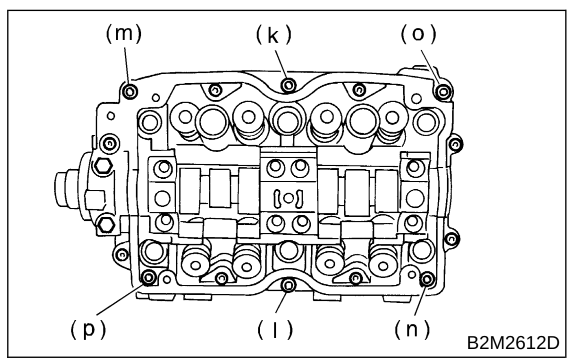
(2) Equally loosen bolts (c) through (j) all the way in alphabetical sequence.



B2M2612C

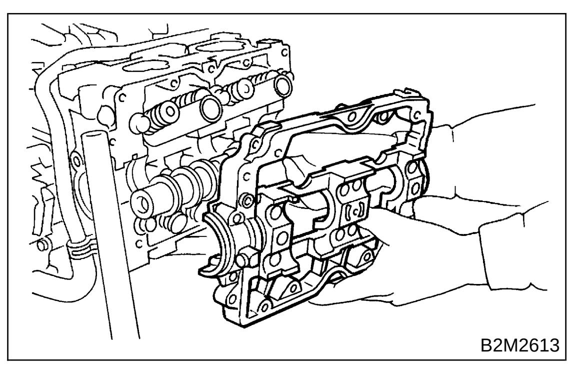
(3) Remove bolts (k) through (p) in alphabetical sequence using ST.

ST 499497000 TORX PLUS



B2M2612D

(4) Remove camshaft cap.



B2M2613

14) Remove camshaft.
15) Remove oil seal.

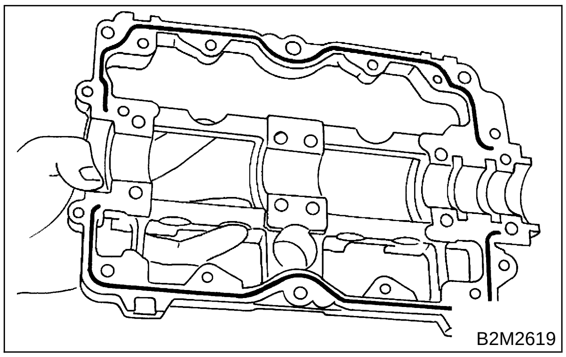
16) Remove plug from rear side of camshaft.

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

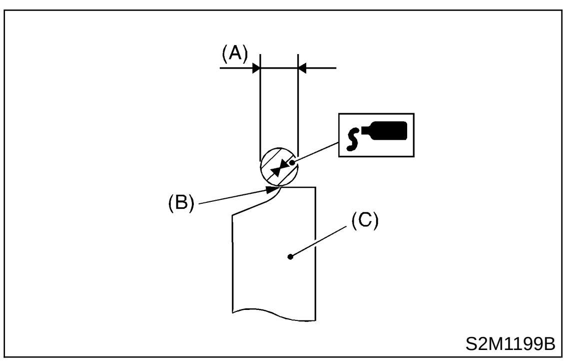
B: INSTALLATION S173092A11

1) Apply a coat of engine oil to camshaft journals and install camshaft.
2) Install camshaft cap.
   (1) Apply liquid gasket on the around of camshaft cap.

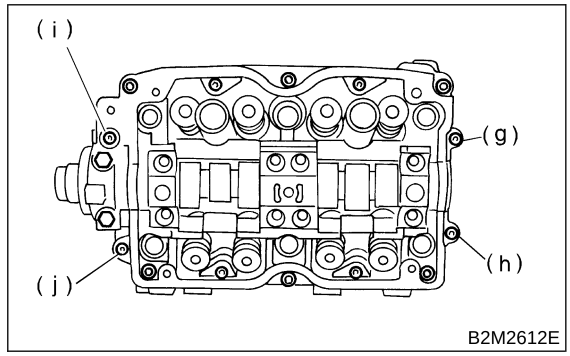
Liquid gasket:
THREE BOND 1280B
P/N K0877YA018



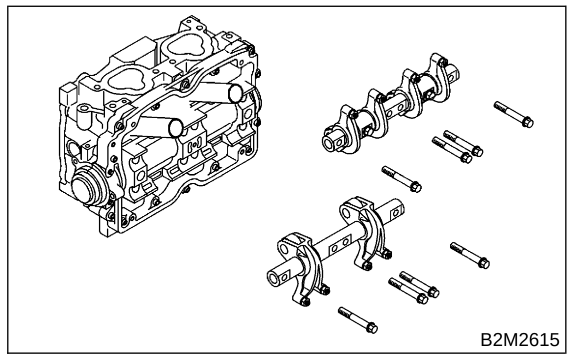
NOTE:
Apply a coat of 3 mm (0.12 in) dia. (A) liquid gasket along edge (B) of camshaft cap (C) mating surface.



(2) Temporarily tighten bolts (g) through (j) in alphabetical sequence.

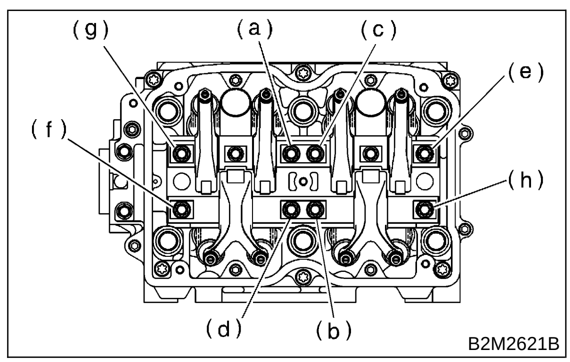


(3) Install valve rocker assembly.



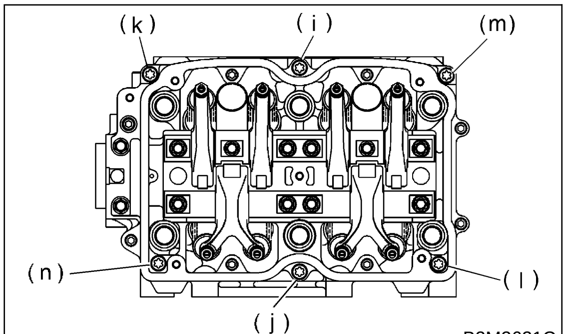
(4) Tighten bolts (a) through (h) in alphabetical sequence.

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



(5) Tighten TORX bolts (i) through (n) in alphabetical sequence using ST.
ST 499427000 TORX PLUS

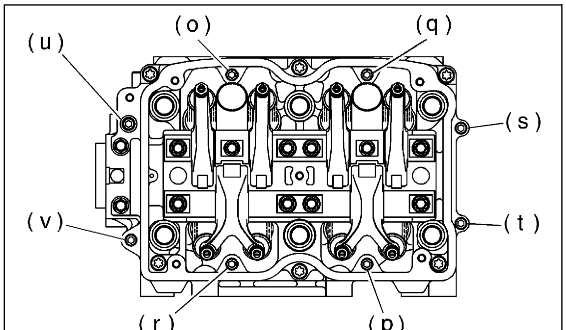
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



B2M2621C

(6) Tighten bolts (o) through (v) in alphabetical sequence.

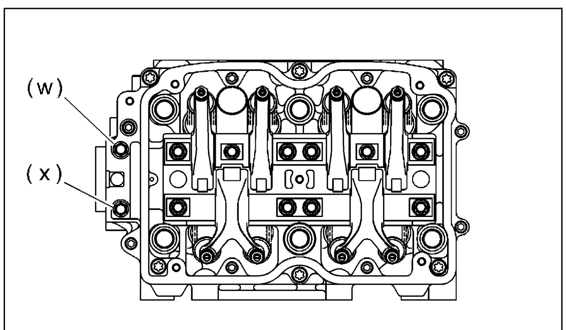
Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)



B2M2621D

(7) Tighten bolts (w) through (x) in alphabetical sequence.

Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)

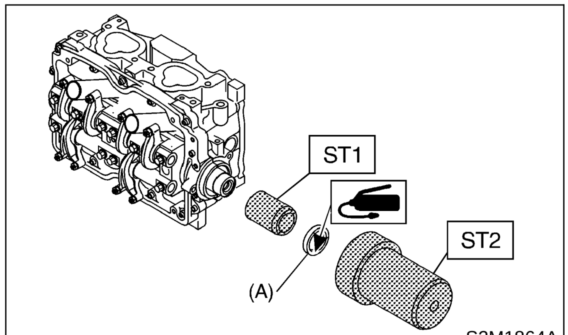


B2M2621E

3) Apply a coat of grease to oil seal lips and install oil seal (A) on camshaft using ST1 and ST2.

CAUTION:
Use a new oil seal.

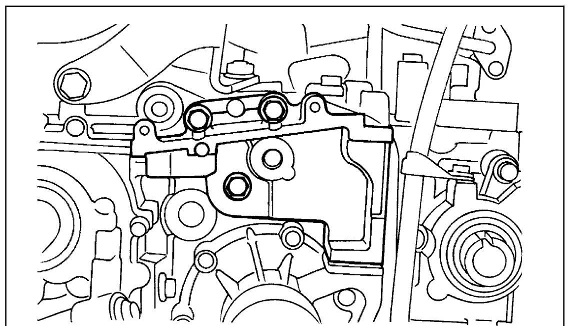
ST1 499597000 OIL SEAL GUIDE
ST2 499587500 OIL SEAL INSTALLER



S2M1864A

4) Install plug using ST.
ST 499587700 OIL SEAL INSTALLER
5) Adjust the valve clearance. <Ref. to ME-30, ADJUSTMENT, Valve Clearance.>
6) Install rocker cover and connect PCV hose.
7) Install oil level gauge guide. (LH side only)
8) Install camshaft position sensor support. (LH side only)
9) Install tensioner bracket.

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

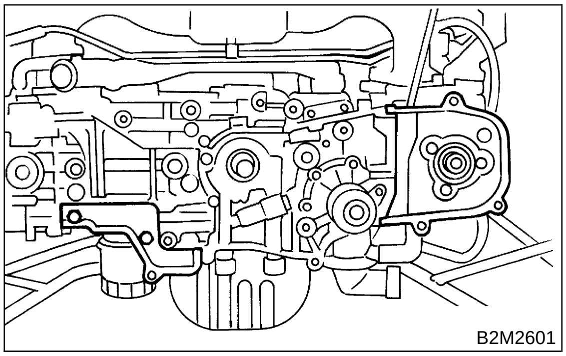

H2M2380

10) Install belt cover No. 2 (RH).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

11) Install belt cover No. 2 (LH).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)


B2M2601

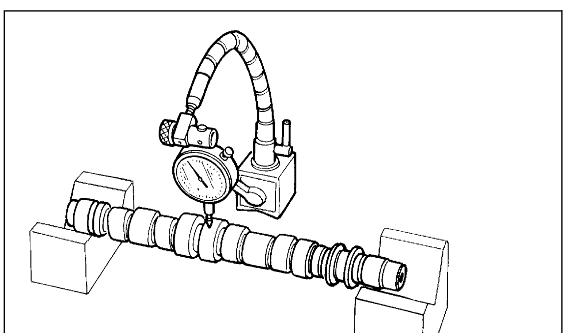
12) Install crankshaft sprocket. <Ref. to ME-53, INSTALLATION, Crankshaft Sprocket.>
13) Install camshaft sprocket. <Ref. to ME-51, INSTALLATION, Camshaft Sprocket.>
14) Install timing belt assembly. <Ref. to ME-47, INSTALLATION, Timing Belt Assembly.>
15) Install belt cover. <Ref. to ME-45, INSTALLATION, Belt Cover.>
16) Install crankshaft pulley. <Ref. to ME-44, INSTALLATION, Crankshaft Pulley.>
17) Install V-belt. <Ref. to ME-42, INSTALLATION, V-belt.>

C: INSPECTION S173092A10

1. CAMSHAFT S173092A1001

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

Limit:
0.025 mm (0.0010 in)


B2M2617

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

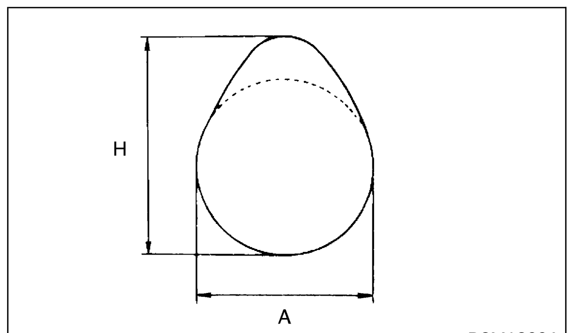
		Unit: mm (in)
Clearance at journal	Standard	0.055 — 0.090 (0.0022 — 0.0035)
	Limit	0.10 (0.0039)
Camshaft journal O.D.		31.928 — 31.945 (1.2570 — 1.2577)
Journal hole I.D.		32.000 — 32.018 (1.2598 — 1.2605)

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

Cam height: H

Item		Unit: mm (in)
Intake	STD	39.485 — 39.585 (1.5545 — 1.5585)
	Limit	39.385 (1.5506)
Exhaust	STD	39.257 — 39.357 (1.5455 — 1.5495)
	Limit	39.157 (1.5416)

Cam base circle diameter A:
IN: 34.00 mm (1.3386 in)
EX: 34.00 mm (1.3386 in)



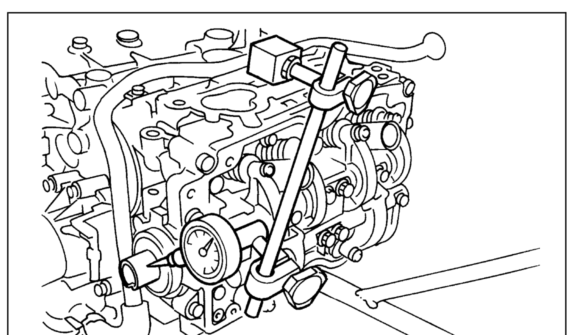
B2M1209A

2. CAMSHAFT SUPPORT S173092A1002

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

Standard:
0.030 — 0.090 mm (0.0012 — 0.0035 in)

Limit:
0.10 mm (0.0039 in)

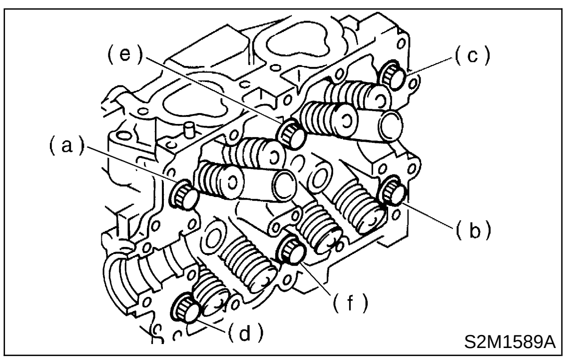

B2M2618

20. Cylinder Head Assembly S173093

A: REMOVAL S173093A18

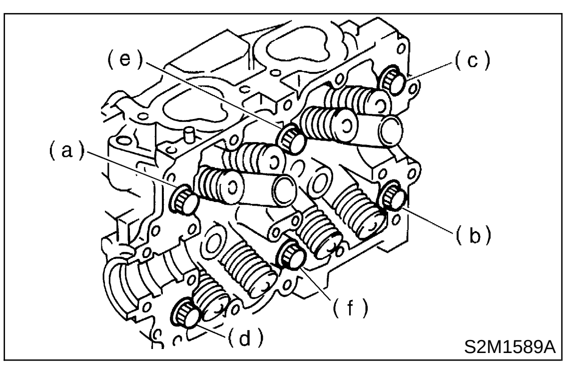
1) Remove V-belt. <Ref. to ME-42, REMOVAL, V-belt.>
2) Remove crankshaft pulley. <Ref. to ME-44, REMOVAL, Crankshaft Pulley.>
3) Remove belt cover. <Ref. to ME-45, REMOVAL, Belt Cover.>
4) Remove timing belt assembly. <Ref. to ME-46, REMOVAL, Timing Belt Assembly.>
5) Remove camshaft sprocket. <Ref. to ME-51, REMOVAL, Camshaft Sprocket.>
6) Remove intake manifold. <Ref. to FU-15, REMOVAL, Intake Manifold.>
7) Remove bolt which installs A/C compressor bracket on cylinder head.
8) Remove valve rocker assembly. <Ref. to ME-54, REMOVAL, Valve Rocker Assembly.>
9) Remove camshaft. <Ref. to ME-56, REMOVAL, Camshaft.>
10) Remove cylinder head bolts in alphabetical sequence shown in figure.

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



S2M1589A

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



S2M1589A

13) Remove cylinder head gasket.

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

14) Similarly, remove right side cylinder head.

B: INSTALLATION S173093A11

1) Install cylinder head and gaskets on cylinder block.

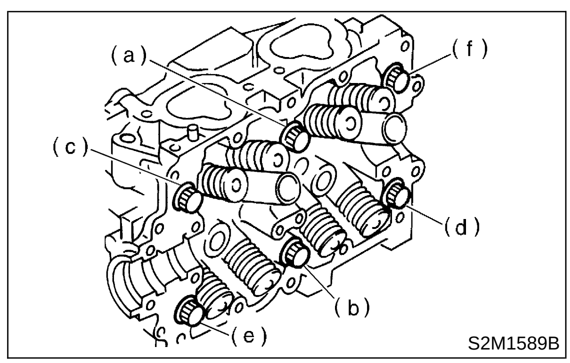
CAUTION:
- **Use new cylinder head gaskets.**
- **Be careful not to scratch the mating surface of cylinder block and cylinder head.**

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

CAUTION:
Do not tighten bolts more than 90°.

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

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



S2M1589B

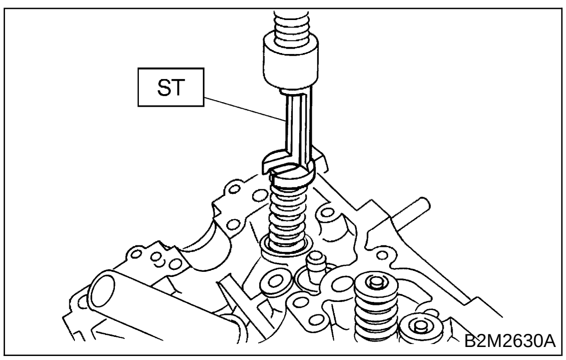
3) Install camshaft. <Ref. to ME-57, INSTALLATION, Camshaft.>
4) Install valve rocker assembly. <Ref. to ME-54, INSTALLATION, Valve Rocker Assembly.>
5) Install A/C compressor bracket on cylinder head.
6) Install intake manifold. <Ref. to FU-17, INSTALLATION, Intake Manifold.>

7) Install camshaft sprocket. <Ref. to ME-51, INSTALLATION, Camshaft Sprocket.>
8) Install timing belt assembly. <Ref. to ME-47, INSTALLATION, Timing Belt Assembly.>
9) Install belt cover. <Ref. to ME-45, INSTALLATION, Belt Cover.>
10) Install crankshaft pulley. <Ref. to ME-44, INSTALLATION, Crankshaft Pulley.>
11) Install V-belt. <Ref. to ME-42, INSTALLATION, V-belt.>

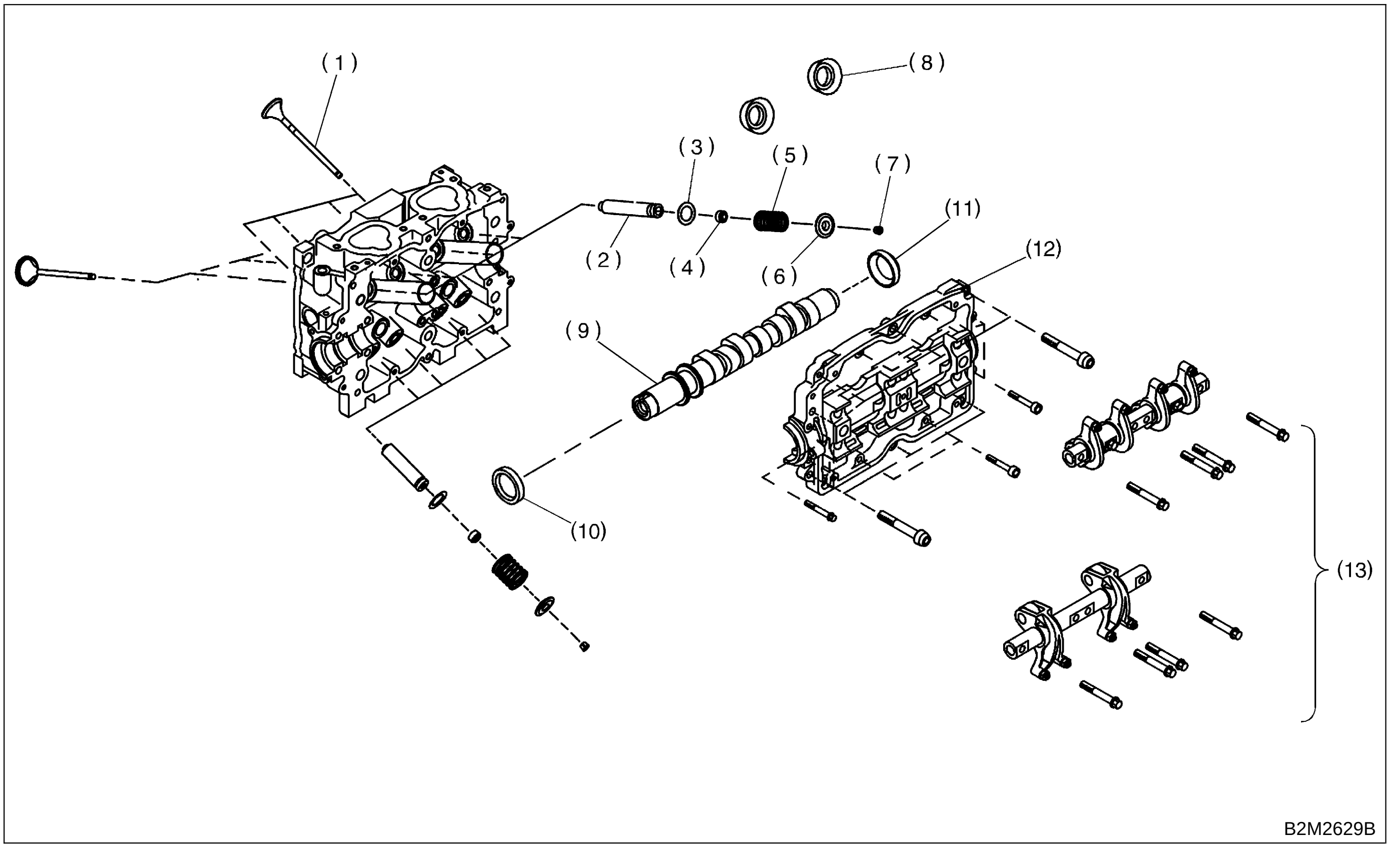
C: DISASSEMBLY *S173093A06*

1) Place cylinder head on ST.
ST 498267800 CYLINDER HEAD TABLE
2) Set ST on valve spring. Compress valve spring and remove the valve spring retainer key. Remove each valve and valve spring.
ST 499718000 VALVE SPRING REMOVER

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



D: ASSEMBLY *S173093A02*



(1) Valve
(2) Valve guide
(3) Valve spring seat
(4) Oil seal
(5) Valve spring
(6) Retainer
(7) Retainer key
(8) Spark plug gasket
(9) Camshaft
(10) Oil seal
(11) Plug
(12) Camshaft cap
(13) Valve rocker ASSY

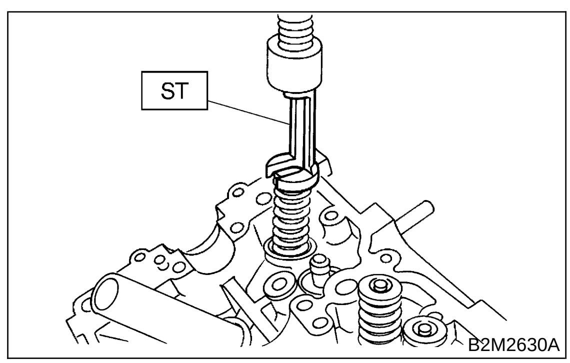
1) Installation of valve spring and valve
(1) Place cylinder head on ST.
ST 498267800 CYLINDER HEAD TABLE
(2) Coat stem of each valve with engine oil and insert valve into valve guide.

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

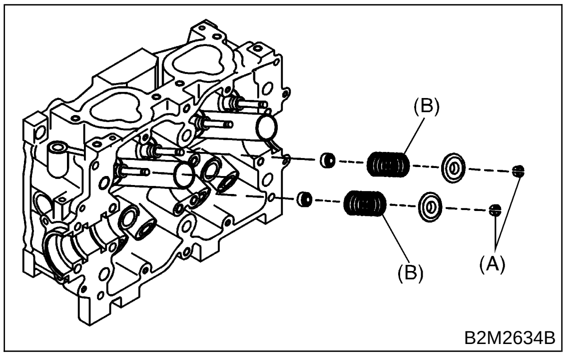
(3) Install valve spring and retainer.

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

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



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



(A) Retainer key
(B) Painted face

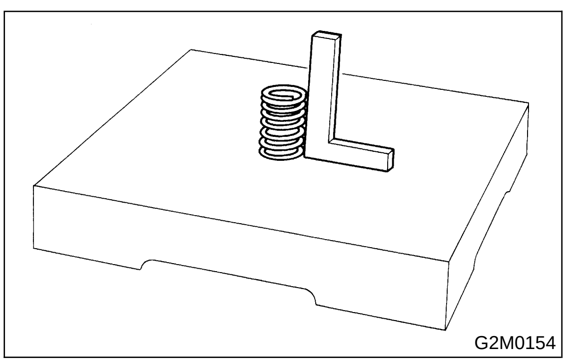
(6) After installing, tap valve spring retainers lightly with wooden hammer for better seating.

E: INSPECTION S173093A10

1. VALVE SPRING S173093A1001

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	54.30 mm (2.1378 in)
Squareness	2.5°, 2.4 mm (0.094 in)
Tension/spring height	214.8 — 246.2 N (21.9 — 25.1 kgf, 48.3 — 55.3 lb)/ 45.0 mm (1.772 in)
	526.6 — 581.6 N (53.7 — 59.3 kgf, 118.4 — 130.8 lb)/34.7 mm (1.366 in)



2. INTAKE AND EXHAUST VALVE OIL SEAL S173093A1002

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.

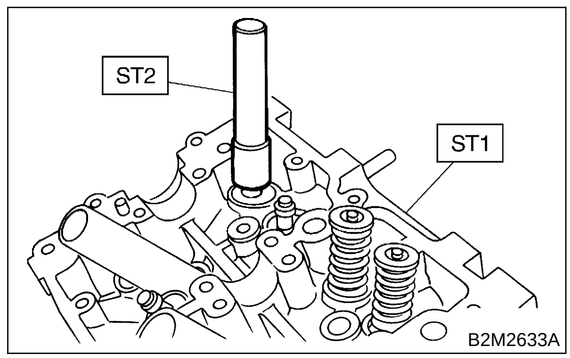
1) Place cylinder head on ST1.
2) Press-fit oil seal to the specified dimension indicated in the figure using ST2.

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 498267800 CYLINDER HEAD TABLE
ST2 498857100 VALVE OIL SEAL GUIDE

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

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



F: ADJUSTMENT S173093A01

1. CYLINDER HEAD S173093A0101

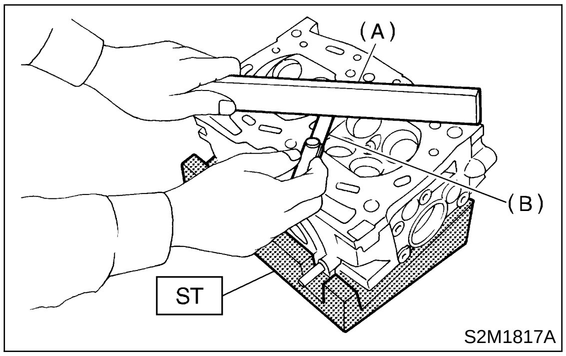
1) Make sure that no crack or other damage exists. In addition to visual inspection, inspect important areas by means of red lead check.
Also make sure that gasket installing surface shows no trace of gas and water leaks.
2) Place cylinder head on ST.
ST 498267800 CYLINDER HEAD TABLE
3) Measure the warping 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:
97.5 mm (3.839 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.

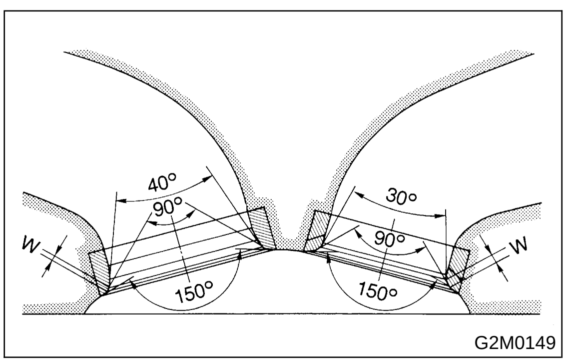


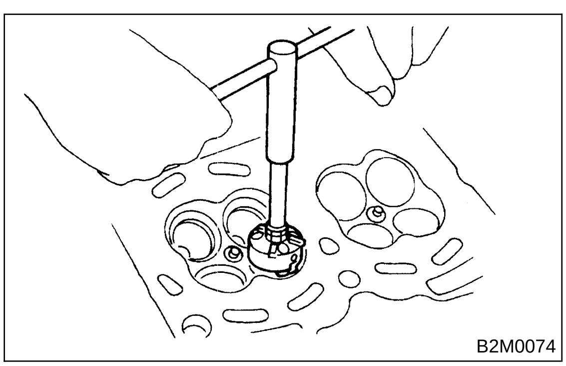
(A) Straight edge
(B) Thickness gauge

2. VALVE SEAT S173093A0102

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 1.4 mm (0.055 in)
Limit 2.1 mm (0.083 in)



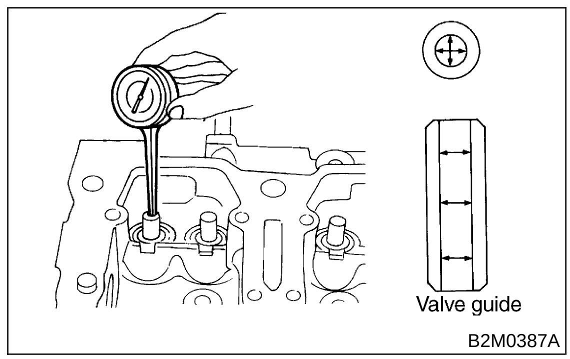


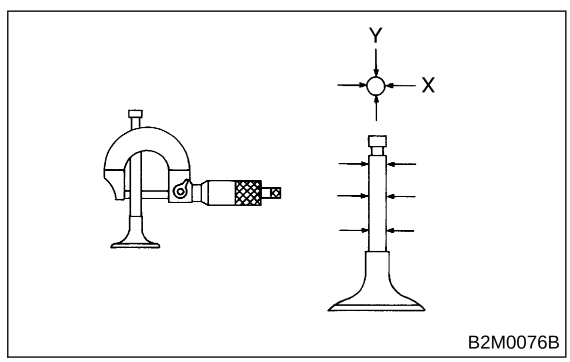
3. VALVE GUIDE S173093A0103

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

Clearance between the valve guide and valve stem:
Standard
Intake 0.035 — 0.062 mm (0.0014 — 0.0024 in)
Exhaust 0.040 — 0.067 mm (0.0016 — 0.0026 in)
Limit
0.15 mm (0.0059 in)

NOTE:
Measure the top, center, and bottom diameters of valve and valve guide respectively to check each clearance.





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.

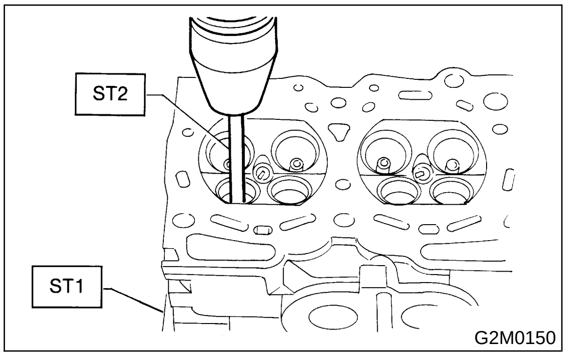
Valve guide inner diameter:
6.000 — 6.012 mm (0.2362 — 0.2367 in)

Valve stem outer diameters:
Intake
5.950 — 5.965 mm (0.2343 — 0.2348 in)
Exhaust
5.945 — 5.960 mm (0.2341 — 0.2346 in)

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

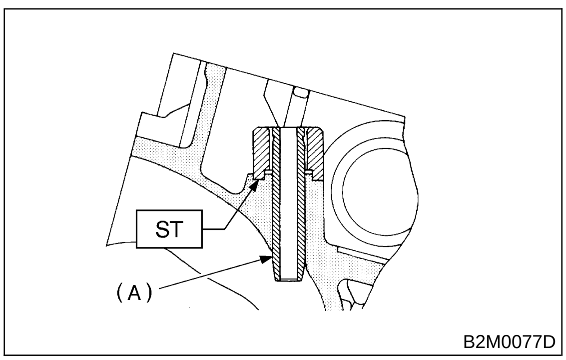
(2) Insert ST2 into valve guide and press it down to remove valve guide.

ST1 498267800 CYLINDER HEAD TABLE
ST2 499767200 VALVE GUIDE REMOVER



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

Intake side:
ST 499767700 VALVE GUIDE ADJUSTER
Exhaust side:
ST 499767800 VALVE GUIDE ADJUSTER

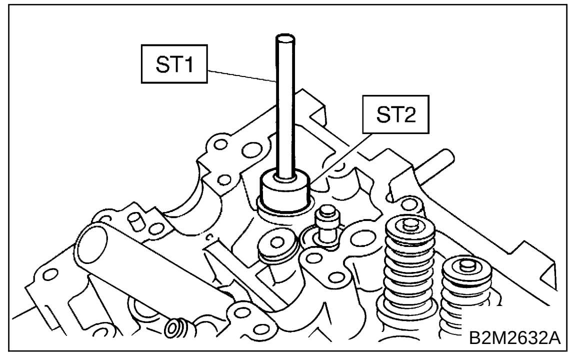


(A) Valve guide

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

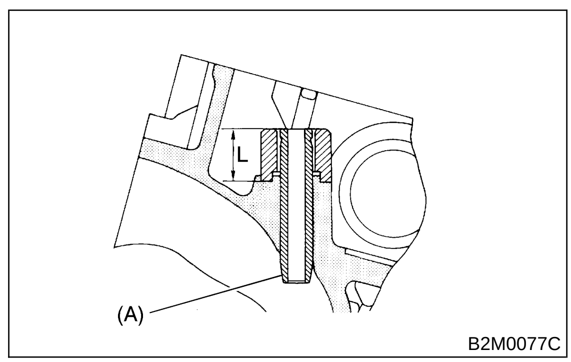
(5) Put new valve guide, coated with sufficient oil, in cylinder, and insert ST1 into valve guide. Press in until the valve guide upper end is flush with the upper surface of ST2.

ST1 499767200 VALVE GUIDE REMOVER
Intake side:
ST2 499767700 VALVE GUIDE ADJUSTER
Exhaust side:
ST2 499767800 VALVE GUIDE ADJUSTER



(6) Check the valve guide protrusion.

Valve guide protrusion: L
Intake
20.0 — 20.5 mm (0.787 — 0.807 in)
Exhaust
16.5 — 17.0 mm (0.650 — 0.669 in)

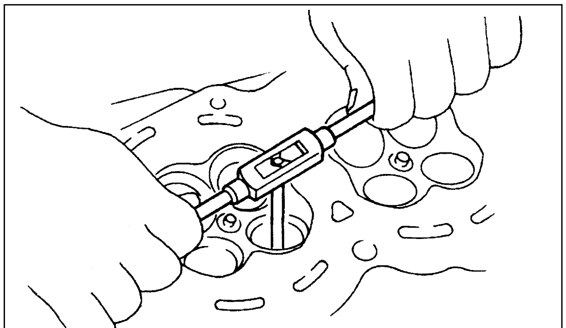


(A) Valve guide

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

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

ST 499767400 VALVE GUIDE REAMER



B2M0078

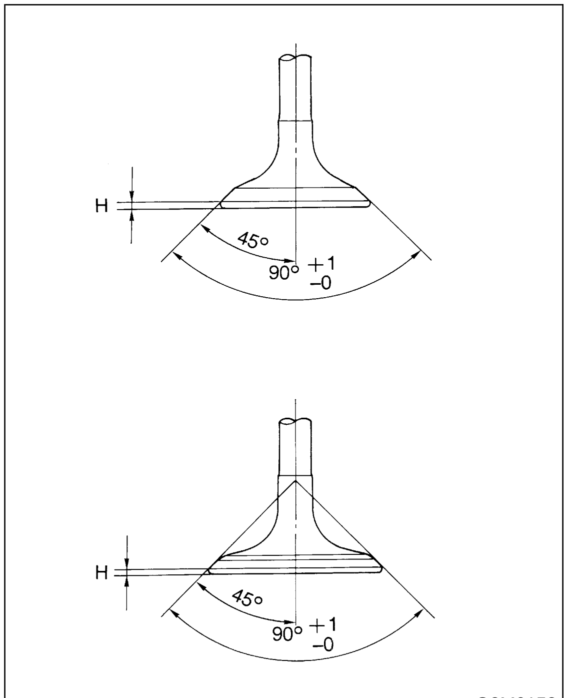
(8) Recheck the contact condition between valve and valve seat after replacing valve guide.

4. INTAKE AND EXHAUST VALVE S173093A0104

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

H:
Intake
Standard 1.0 mm (0.039 in)
Limit 0.6 mm (0.024 in)
Exhaust
Standard 1.2 mm (0.047 in)
Limit 0.6 mm (0.024 in)

Valve overall length:
Intake
120.6 mm (4.75 in)
Exhaust
121.7 mm (4.79 in)



G2M0153

2) Put a small amount of grinding compound on the seat surface and lap the valve and seat surface. <Ref. to ME-64, Valve Seat, ADJUSTMENT, Cylinder Head Assembly.> Install a new intake valve oil seal after lapping.

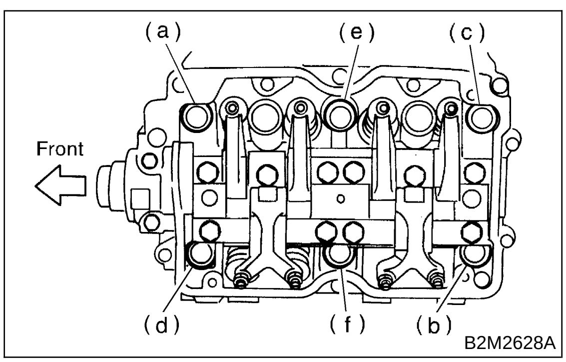
21. Cylinder Block S173090

A: REMOVAL S173090A18

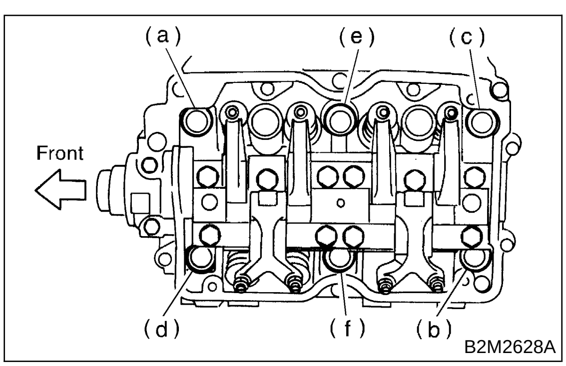
NOTE:
Before conducting this procedure, drain engine oil completely if applicable.

1) Remove intake manifold. <Ref. to FU-15, REMOVAL, Intake Manifold.>
2) Remove V-belt. <Ref. to ME-42, REMOVAL, V-belt.>
3) Remove crankshaft pulley. <Ref. to ME-44, REMOVAL, Crankshaft Pulley.>
4) Remove belt cover. <Ref. to ME-45, REMOVAL, Belt Cover.>
5) Remove timing belt assembly. <Ref. to ME-46, REMOVAL, Timing Belt Assembly.>
6) Remove camshaft sprocket. <Ref. to ME-51, REMOVAL, Camshaft Sprocket.>
7) Remove crankshaft sprocket. <Ref. to ME-44, REMOVAL, Crankshaft Pulley.>
8) Remove generator and A/C compressor with their brackets.
9) Remove rocker cover.
10) Remove cylinder head bolts in alphabetical sequence shown in figure.

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



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

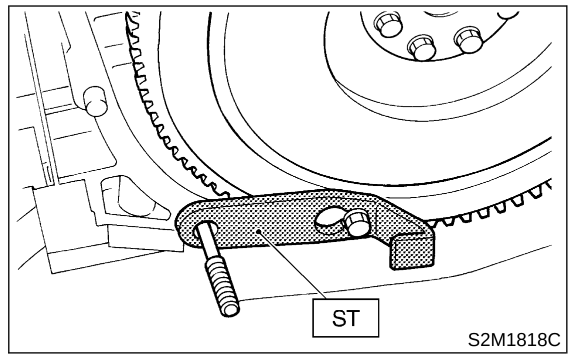


13) Remove cylinder head gasket.

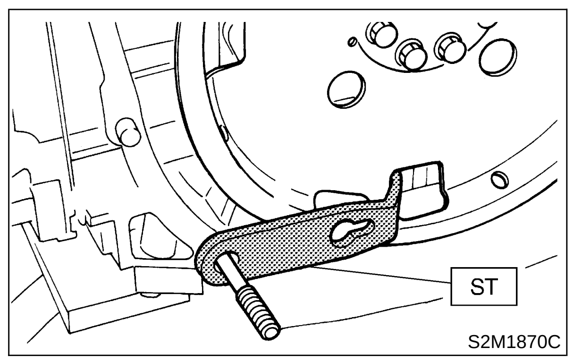
CAUTION:
Do not scratch the mating surface of cylinder head and cylinder block.

14) Similarly, remove right side cylinder head.
15) Remove clutch housing cover (MT vehicles only).
16) Remove flywheel (MT vehicles only) or drive plate (AT vehicles only).
Using ST, lock crankshaft.
ST 498497100 CRANKSHAFT STOPPER

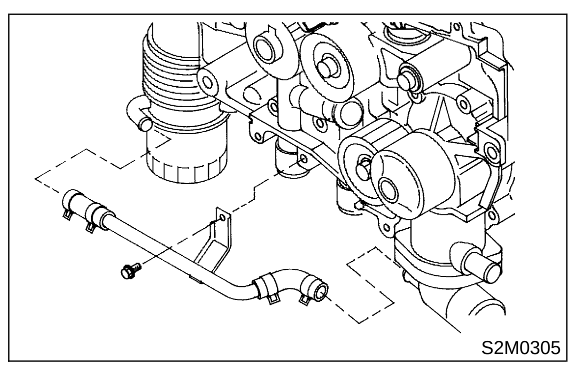
- MT MODEL



- AT MODEL

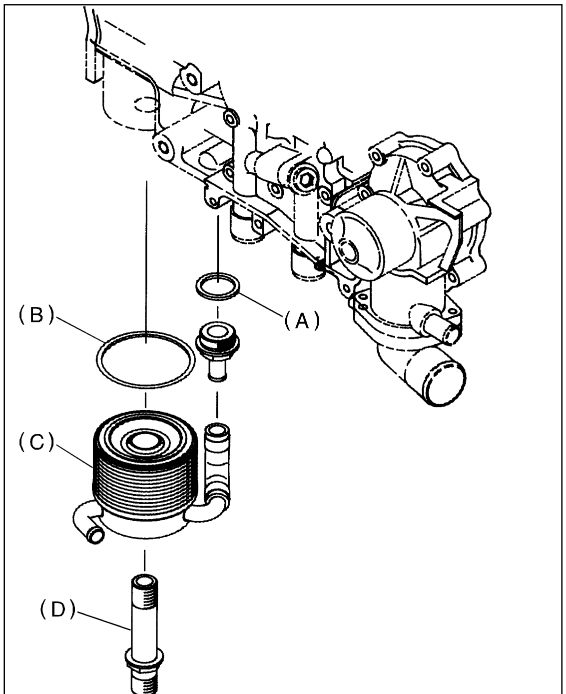


17) Remove oil separator cover.
18) Remove water by-pass pipe for heater.
19) Remove water by-pass pipe between oil cooler and water pump (AT vehicles only).



20) Remove oil filter using ST.
ST 498187300 OIL FILTER WRENCH

21) Remove oil cooler. (AT vehicles only)

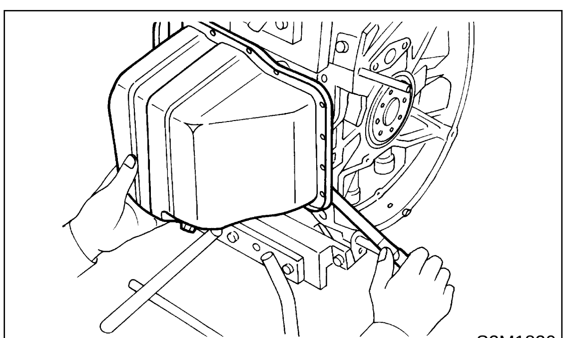


S2M0123D

(A) Gasket
(B) O-ring
(C) Oil cooler
(D) Connector

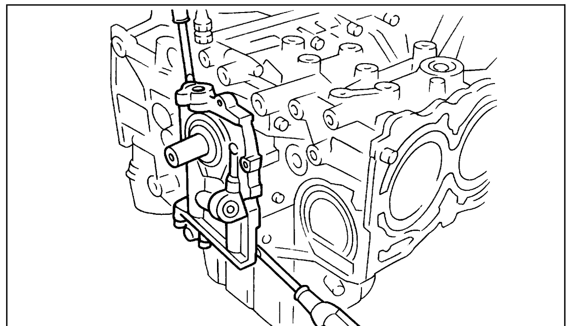
22) Removal of oil pan
(1) Turn cylinder block with #2 and #4 piston sides facing upward.
(2) Remove bolts which secure oil pan to cylinder block.
(3) Insert a oil pan cutter blade between cylinder block-to-oil pan clearance and remove oil pan.

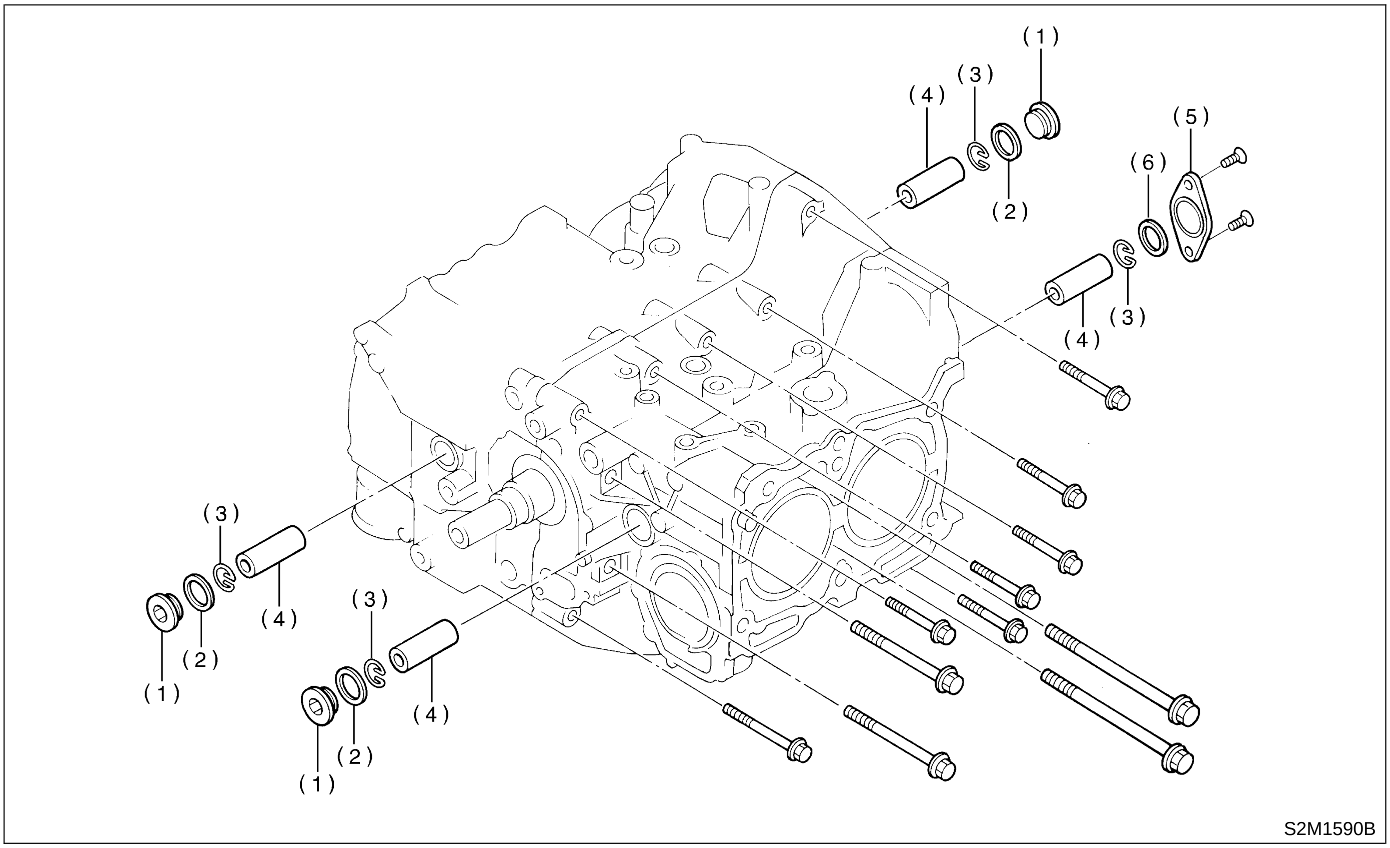
CAUTION:
Do not use a screwdriver or similar tool in place of oil pan cutter.


S2M1820

23) Remove oil strainer stay.
24) Remove oil strainer.
25) Remove baffle plate.
26) Remove water pips.
27) Remove water pump.
28) Remove oil pump from cylinder block.
Use a flat-bladed screwdriver as shown in figure when removing oil pump.

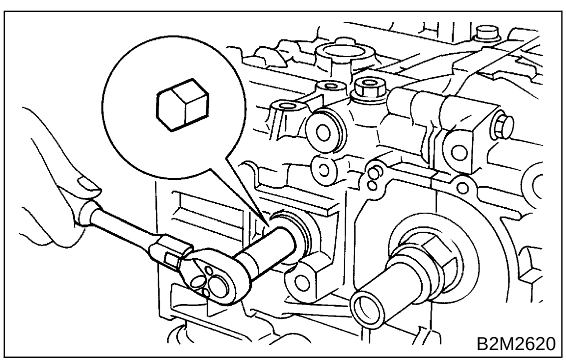
CAUTION:
Be careful not to scratch the mating surface of cylinder block and oil pump.


S2M1819

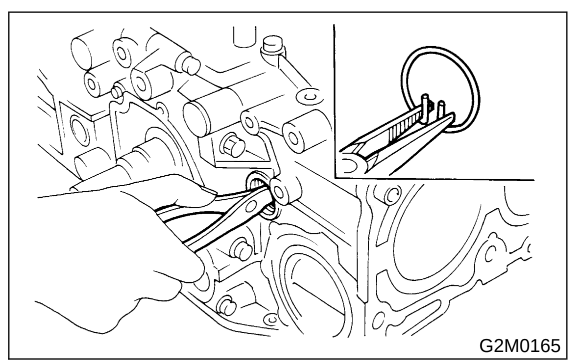


(1) Service hole plug
(2) Gasket
(3) Circlip
(4) Piston pin
(5) Service hole cover
(6) O-ring

29) Remove service hole cover and service hole plugs using hexagon wrench [14 mm (0.55 in)].

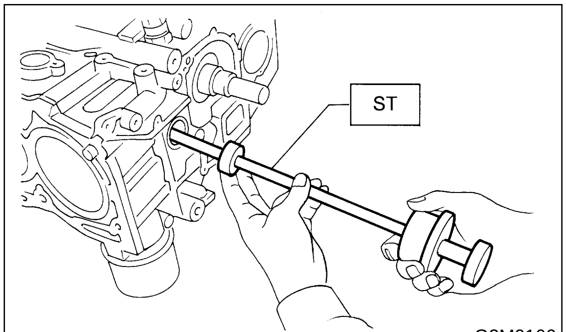


30) Rotate crankshaft to bring #1 and #2 pistons to bottom dead center position, then remove piston circlip through service hole of #1 and #2 cylinders.



31) Draw out piston pin from #1 and #2 pistons using ST.
ST 499097700 PISTON PIN REMOVER

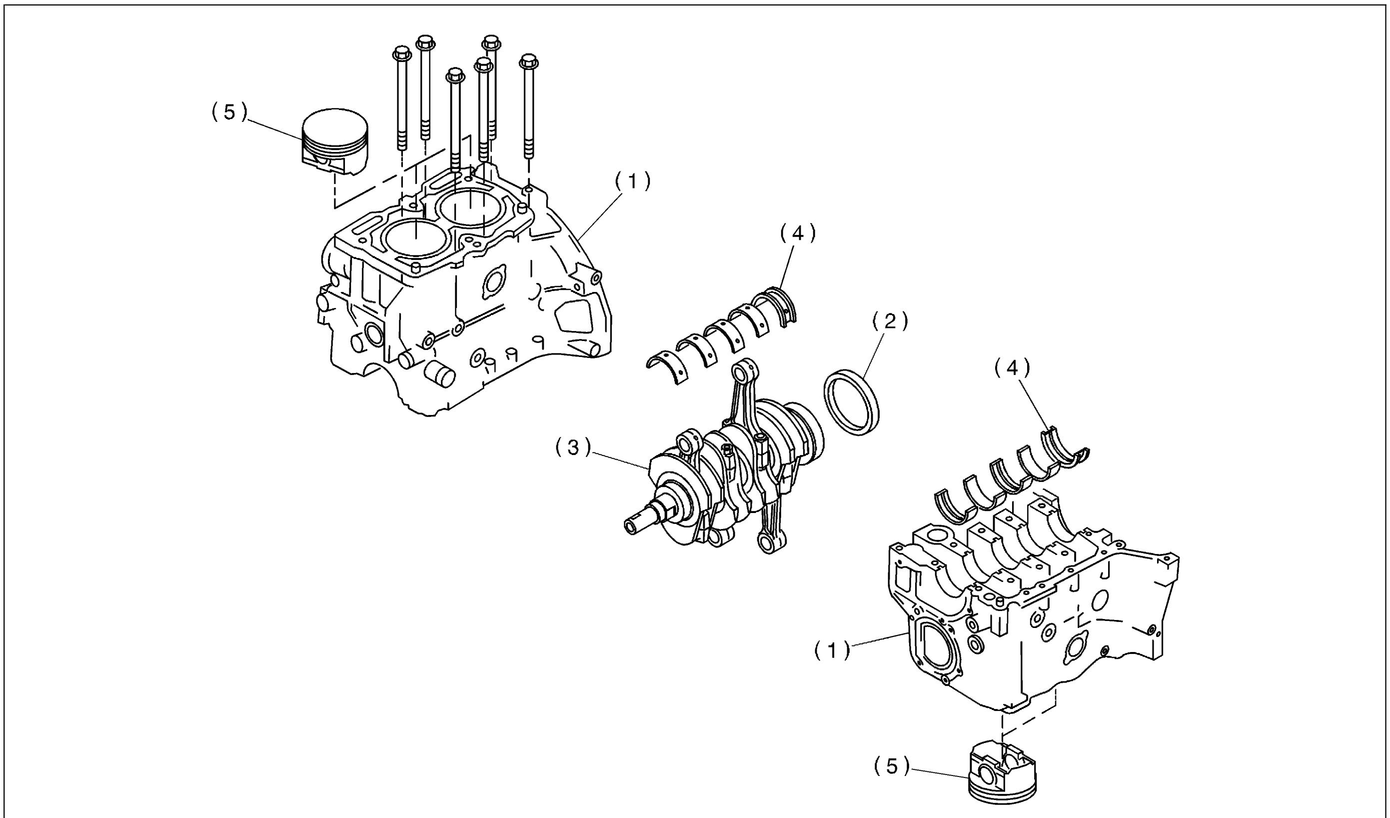
CAUTION:
Be careful not to confuse original combination of piston, piston pin and cylinder.



G2M0166

32) Similarly remove piston pins from #3 and #4 pistons.
33) Remove bolts which connect cylinder block on the side of #2 and #4 cylinders.
34) Back off bolts which connect cylinder block on the side of #1 and #3 cylinders two or three turns.
35) Set up cylinder block so that #1 and #3 cylinders are on the upper side, then remove cylinder block connecting bolts.
36) 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.



B2M2408A

(1) Cylinder block
(2) Rear oil seal
(3) Crankshaft
(4) Crankshaft bearing
(5) Piston

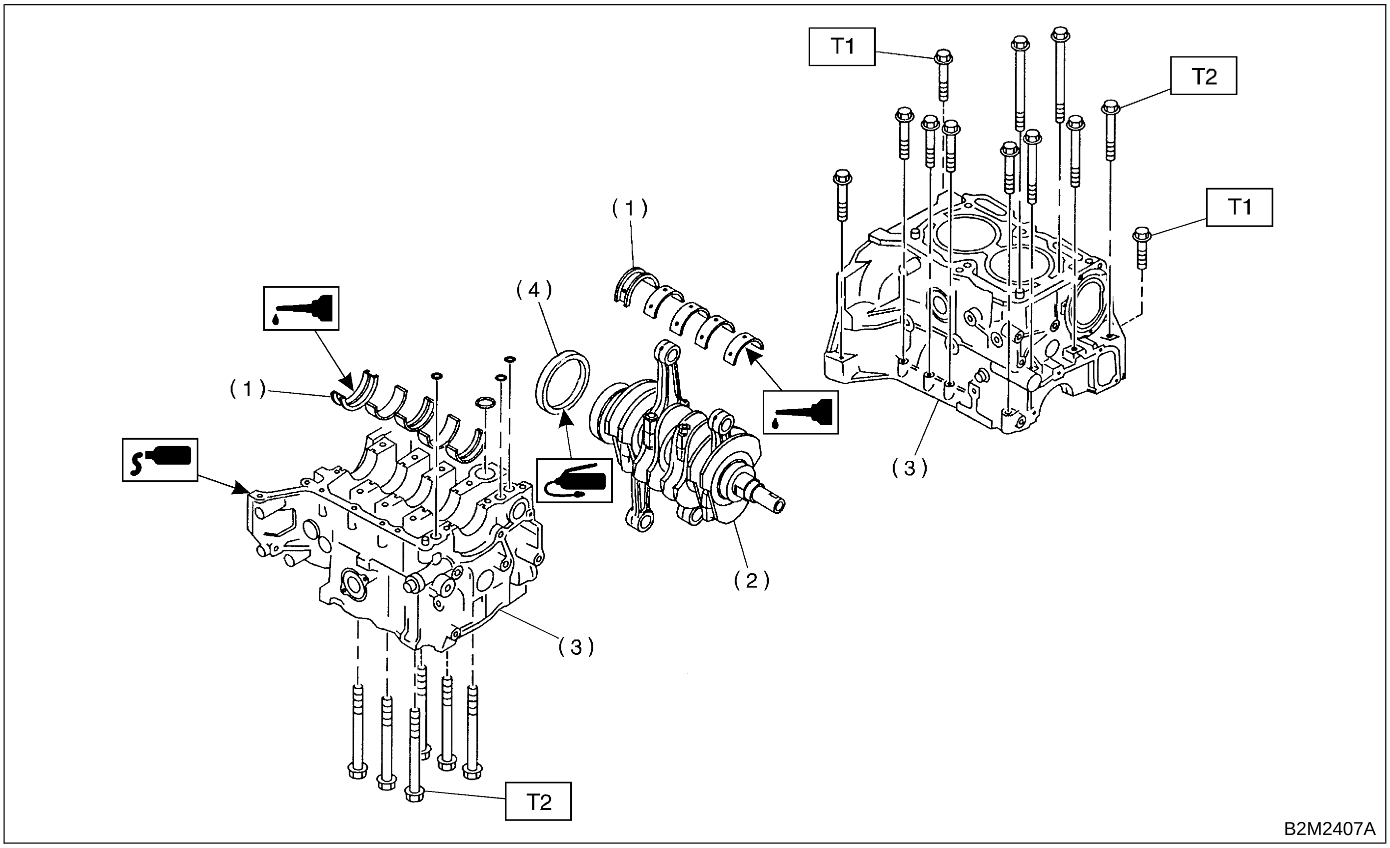
37) Remove rear oil seal.
38) Remove crankshaft together with connecting rod.
39) Remove crankshaft bearings from cylinder block using hammer handle.

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

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

CAUTION:
Do not confuse combination of piston and cylinder.

B: INSTALLATION S173090A11



(1) Crankshaft bearing
(2) Crankshaft
(3) Cylinder block
(4) Rear oil seal

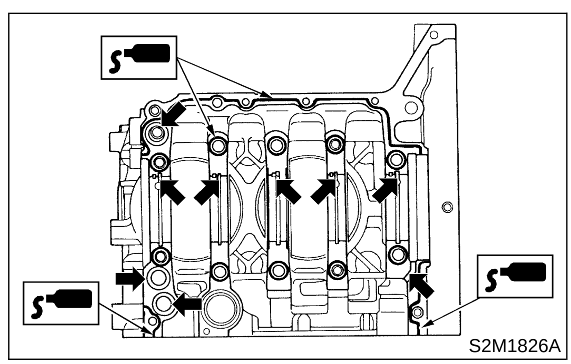
Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.1)
T2: 47 (4.8, 34.7)

CAUTION:
Remove oil in the mating surface of bearing and cylinder block before installation. Also apply a coat of engine oil to crankshaft pins.

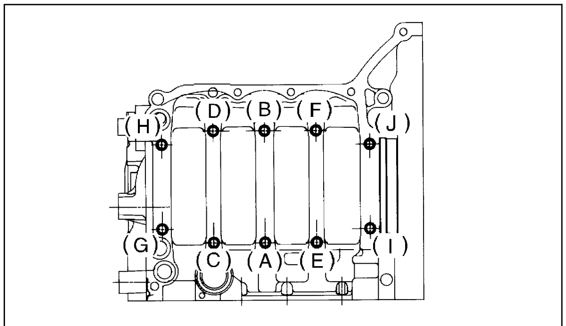
1) Position crankshaft on the #2 and #4 cylinder block.
2) Apply fluid packing to the mating surface of #1 and #3 cylinder block, and position it on #2 and #4 cylinder block.

Fluid packing:
THREE BOND 1215 or equivalent

CAUTION:
Do not allow fluid packing to jut into O-ring grooves, oil passages, bearing grooves, etc.



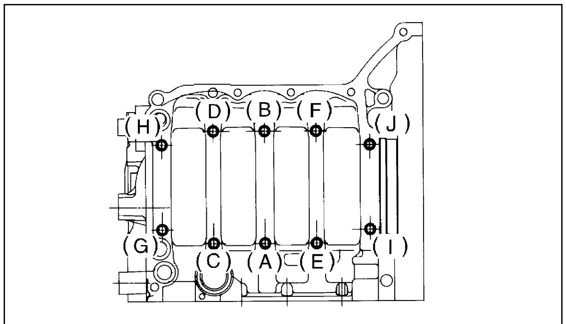
3) Temporarily tighten 10 mm cylinder block connecting bolts in alphabetical sequence shown in figure.



B2M0088D

4) Tighten 10 mm cylinder block connecting bolts in alphabetical sequence.

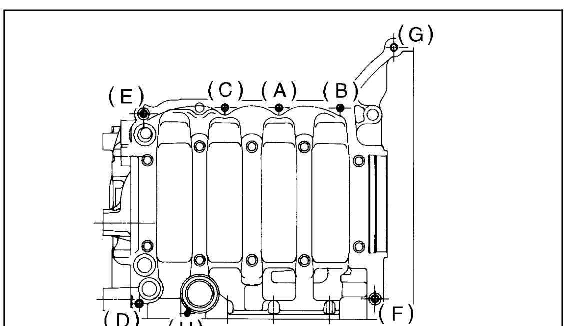
Tightening torque:
47 N·m (4.8 kgf-m, 34.7 ft-lb)



B2M0088D

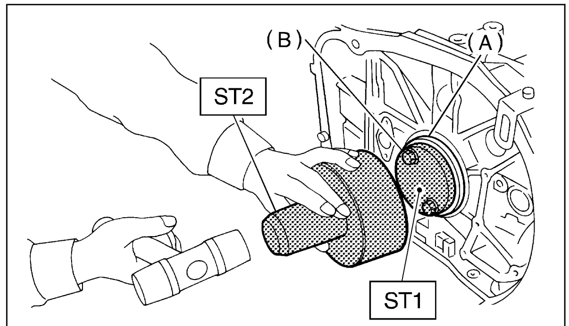
5) Tighten 8 mm and 6 mm cylinder block connecting bolts in alphabetical sequence shown in figure.

Tightening torque:
(A) — (G): 25 N·m (2.5 kgf-m, 18.1 ft-lb)
(H): 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



B2M0089F

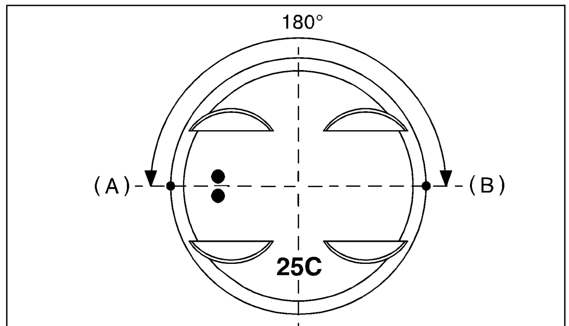
6) Install rear oil seal using ST1 and ST2.
ST1 499597100 OIL SEAL GUIDE
ST2 499587200 OIL SEAL INSTALLER



S2M1827A

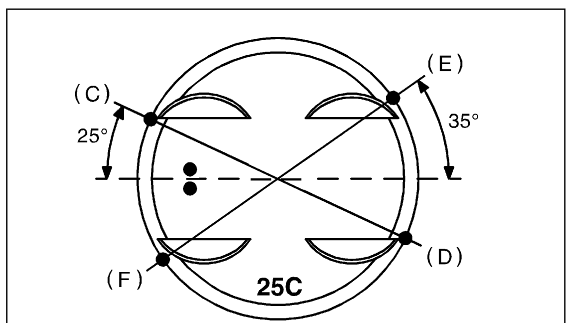
(A) Rear oil seal
(B) Flywheel attaching bolt

7) Position the top ring gap at (A) or (B) in the figure.



B2M3722D

8) Position the second ring gap at 180° on the reverse side for the top ring gap.
9) Position the upper rail gap at (C) or (D) in the figure.

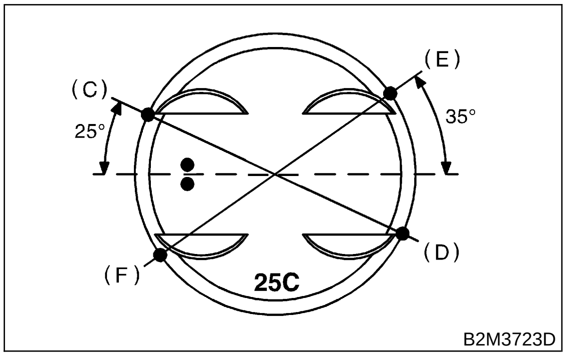


B2M3723D

10) Position the expander gap at 180° of the reverse side for the upper rail gap.

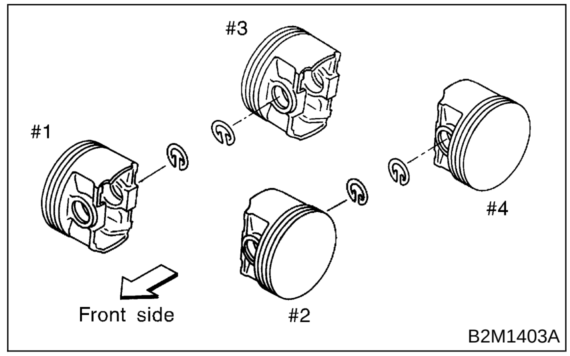
11) Position the lower rail gap at (E) or (F) in the figure.

CAUTION:
- **Ensure ring gaps do not face the same direction.**
- **Ensure ring gaps are not within the piston skirt area.**

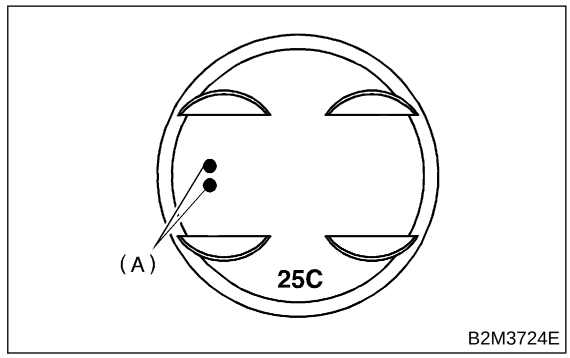


12) Install circlip.
Install circlips in piston holes located opposite service holes in cylinder block, when positioning all pistons in the corresponding cylinders.

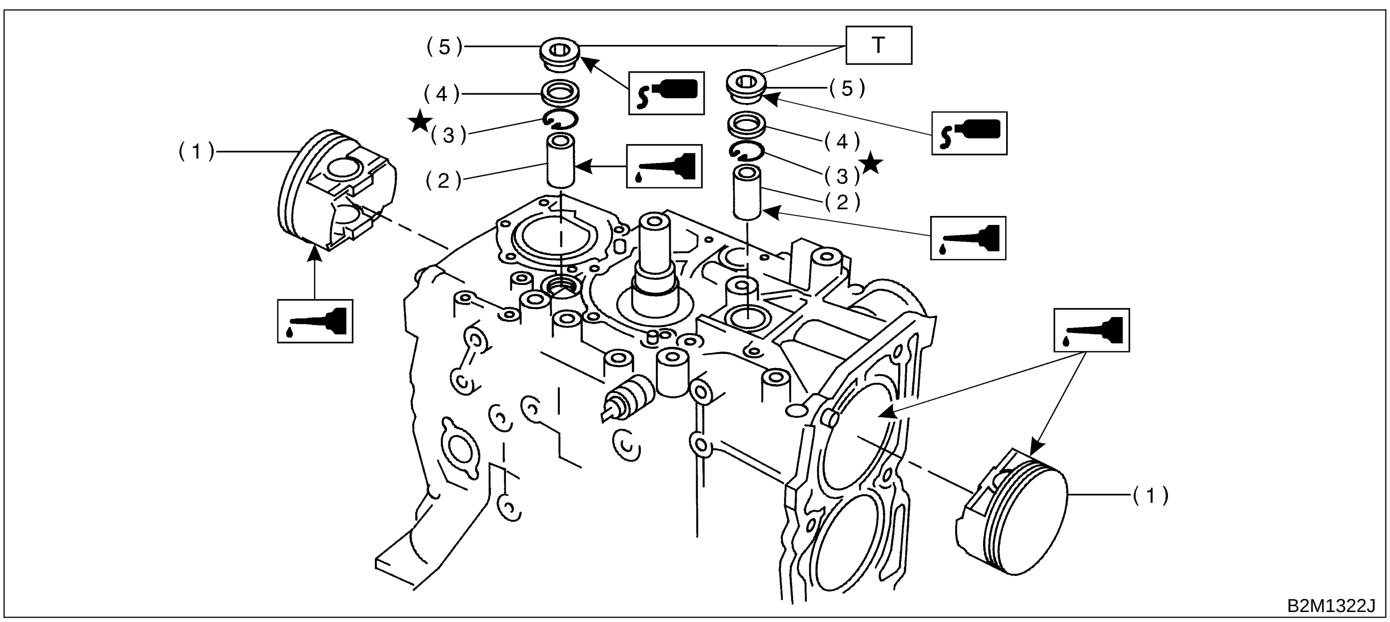
CAUTION:
Use new circlips.



CAUTION:
Piston front mark faces towards the front of the engine.



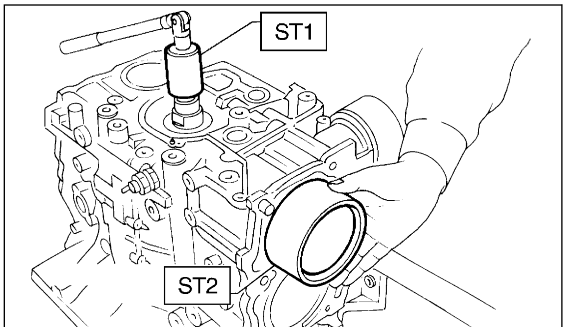
(A) Front mark



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

Tightening torque: N·m (kgf-m, ft-lb)
T: 69 (7.0, 50.6)

13) Installing piston
(1) Turn cylinder block so that #1 and #2 cylinders face upward.
(2) Using ST1, turn crankshaft so that #1 and #2 connecting rods are set at bottom dead center.
ST1 499987500 CRANKSHAFT SOCKET
(3) Apply a coat of engine oil to pistons and cylinders and insert pistons in their cylinders using ST2.
ST2 498747100 PISTON GUIDE

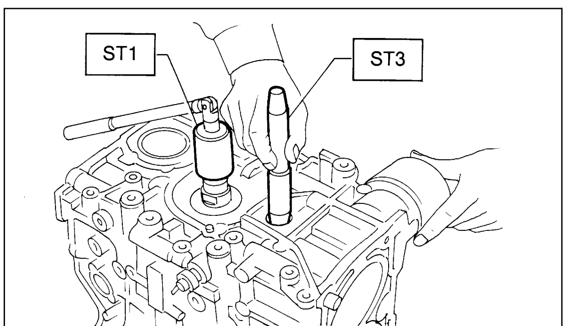


S2M0306A

14) Installing piston pin
(1) Insert ST3 into service hole to align piston pin hole with connecting rod small end.

CAUTION:
Apply a coat of engine oil to ST3 before insertion.

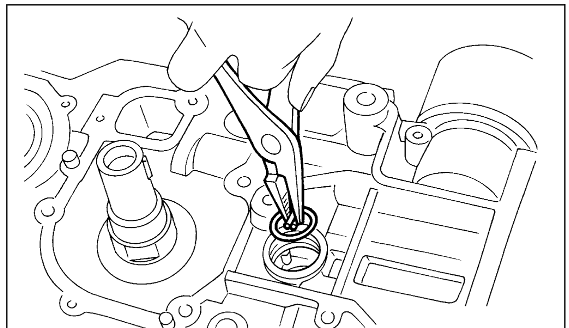
ST3 499017100 PISTON PIN GUIDE



G2M0189

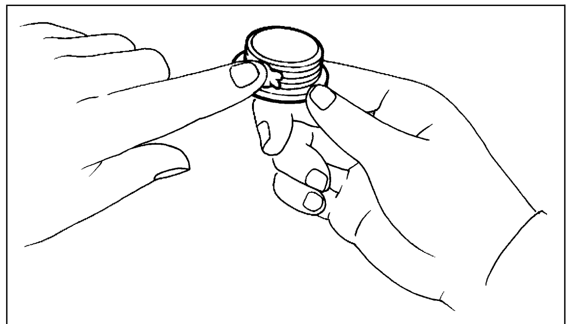
(2) Apply a coat of engine oil to piston pin and insert piston pin into piston and connecting rod through service hole.
(3) Install circlip.

CAUTION:
Use new circlips.


S2M1828

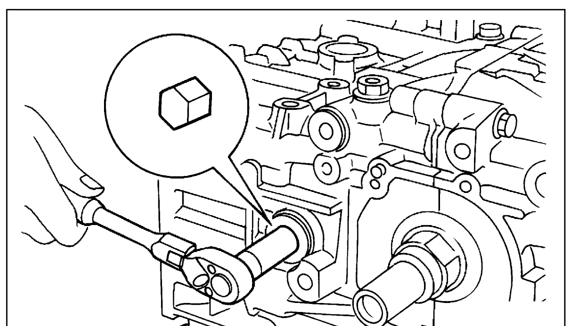
(4) Apply fluid packing around the service hole plug.

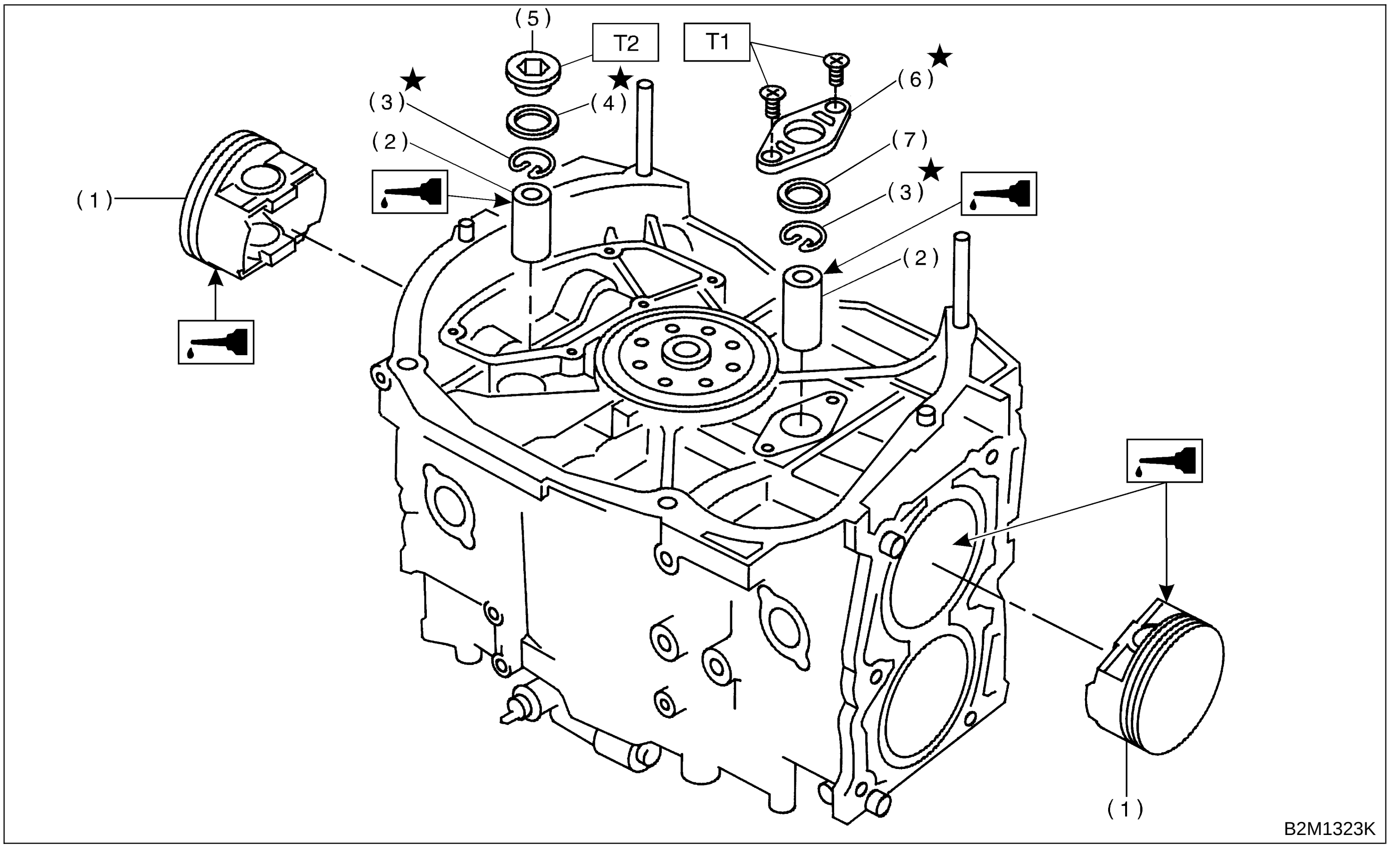
Fluid packing:
THREE BOND 1215 or equivalent


B2M2625

(5) Install service hole plug and gasket.

CAUTION:
Use a new gasket.


B2M2620

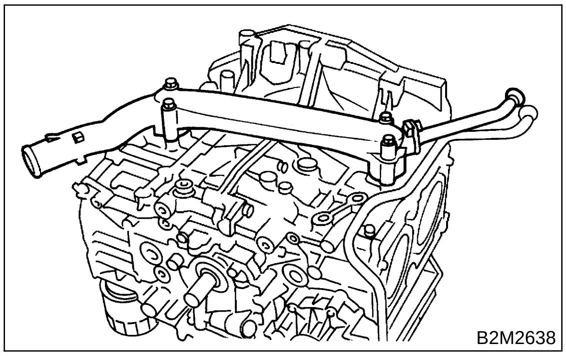


(1) Piston
(2) Piston pin
(3) Circlip
(4) Gasket
(5) Service hole plug
(6) Service hole cover
(7) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 69 (7.0, 50.6)

(6) Turn cylinder block so that #3 and #4 cylinders face upward. Using the same procedures as used for #1 and #2 cylinders, install pistons and piston pins.

15) Install water pipe.


B2M2638

16) Install baffle plate.

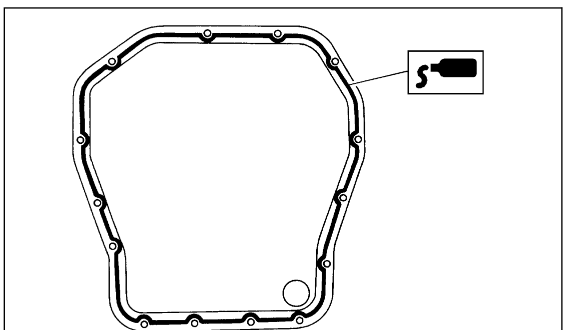
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

17) Install oil strainer and O-ring

Tightening torque:
10 N·m (1.0 kgf-m, 7 ft-lb)

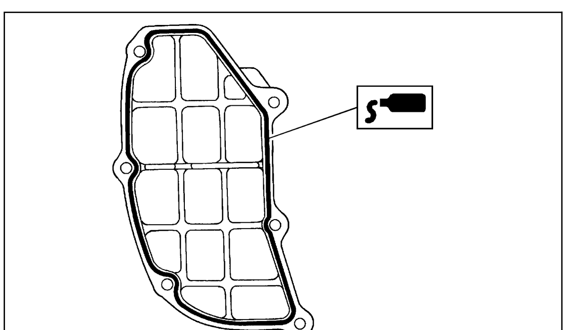
18) Install oil strainer stay.
19) Apply fluid packing to matching surfaces and install oil pan.

Fluid packing:
THREE BOND 1215 or equivalent


S2M1833A

20) Apply fluid packing to matching surfaces and install oil separator cover.

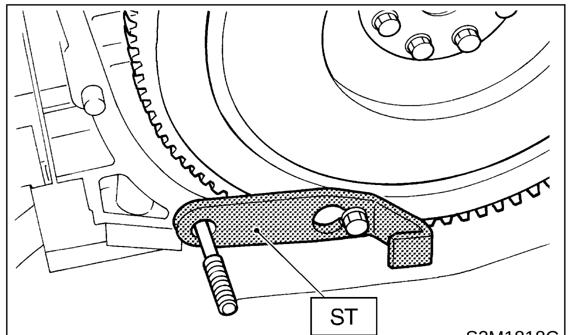
Fluid packing:
THREE BOND 1215 or equivalent


S2M1834A

21) Install flywheel or drive plate.
To lock crankshaft, use ST.
ST 498497100 CRANKSHAFT STOPPER

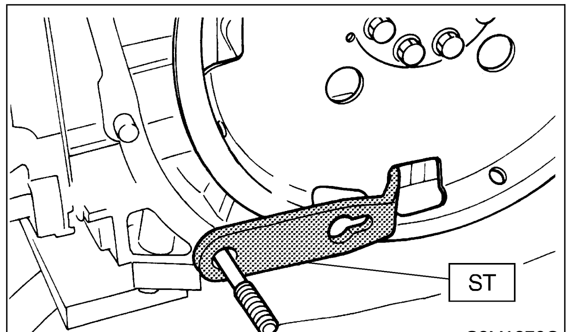
Tightening torque:
72 N·m (7.3 kgf-m, 52.8 ft-lb)

- MT MODEL



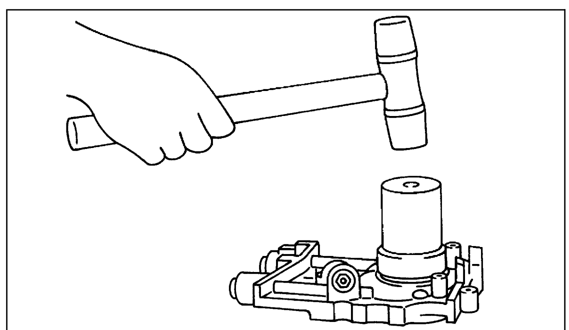
S2M1818C

- AT MODEL



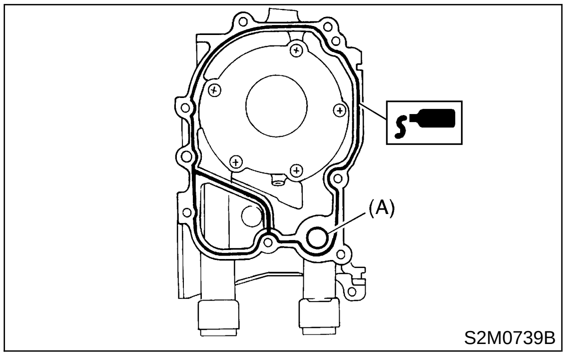
S2M1870C

22) Install housing cover.
23) Installation of oil pump.
(1) Discard front oil seal after removal. Replace with a new one using ST.
ST 499587100 OIL SEAL INSTALLER


S2M0235

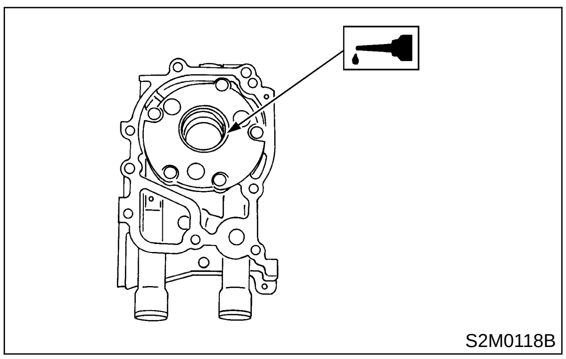
(2) Apply fluid packing to matching surface of oil pump.

Fluid packing:
THREE BOND 1215 or equivalent



(A) O-ring

(3) Apply a coat of engine oil to the inside of the oil seal.



(4) Install oil pump on cylinder block. Be careful not to damage oil seal during installation.

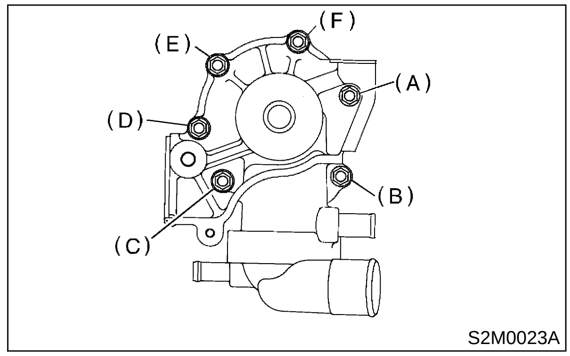
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

CAUTION:
- **Do not forget to install O-ring and seal when installing oil pump.**
- **Align flat surface of oil pump's inner rotor with crankshaft before installation.**

24) Install water pump and gasket.

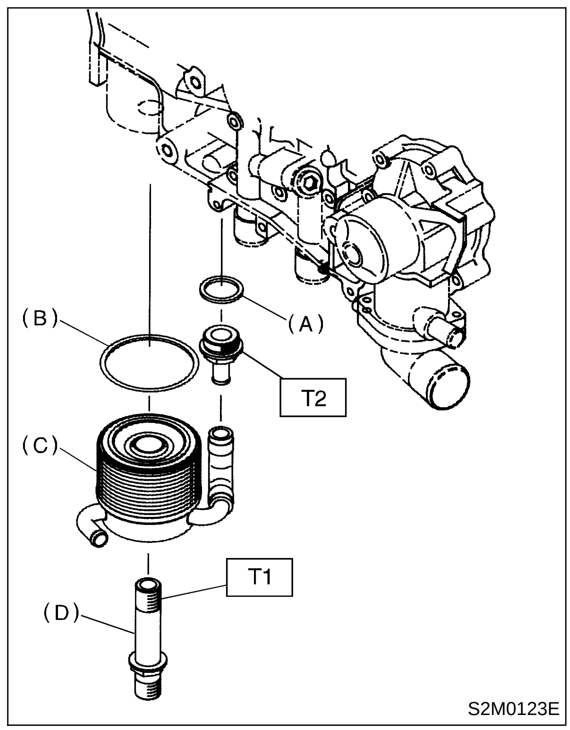
Tightening torque:
First; 12 N·m (1.2 kgf-m, 8.7 ft-lb)
Second; 12 N·m (1.2 kgf-m, 8.7 ft-lb)

CAUTION:
- **Be sure to use a new gasket.**
- **When installing water pump, tighten bolts in two stages in alphabetical sequence as shown in figure.**



25) Install water by-pass pipe for heater.
26) Install oil cooler. (AT vehicles only)

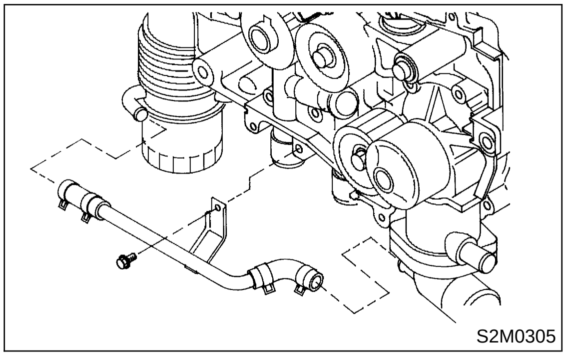
Tightening torque:
T1: 55 N·m (5.6 kgf-m, 41 ft-lb)
T2: 69 N·m (7.0 kgf-m, 50.6 ft-lb)



(A) O-ring
(B) Gasket
(C) Oil cooler
(D) Connector

27) Install oil filter using ST.
ST 498547000 OIL FILTER WRENCH

28) Install water by-pass pipe between oil cooler and water pump. (AT vehicles only)



S2M0305

29) Tighten cylinder head bolts.

(1) Apply a coat of engine oil to washers and bolt threads.

(2) Tighten all bolts to 29 N·m (3.0 kgf-m, 22 ft-lb) in alphabetical sequence.
Then tighten all bolts to 69 N·m (7.0 kgf-m, 51 ft-lb) in alphabetical sequence.

(3) Back off all bolts by 180° first; back them off by 180° again.

(4) Tighten bolts (a) and (b) to 34 N·m (3.5 kgf-m, 25 ft-lb).

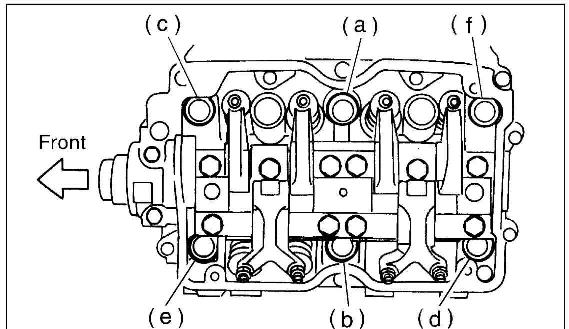
(5) Tighten bolts (c), (d), (e) and (f) to 15 N·m (1.5 kgf-m, 11 ft-lb).

(6) Tighten all bolts by 80 to 90° in alphabetical sequence.

CAUTION:
Do not tighten bolts more than 90°.

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

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



B2M2628B

30) Install oil level gauge guide and tighten attaching bolt (left side only).

31) Install rocker cover.

32) Install crankshaft sprocket. <Ref. to ME-53, INSTALLATION, Crankshaft Sprocket.>

33) Install camshaft sprocket. <Ref. to ME-51, INSTALLATION, Camshaft Sprocket.>

34) Install timing belt assembly. <Ref. to ME-47, INSTALLATION, Timing Belt Assembly.>

35) Install belt cover. <Ref. to ME-45, INSTALLATION, Belt Cover.>

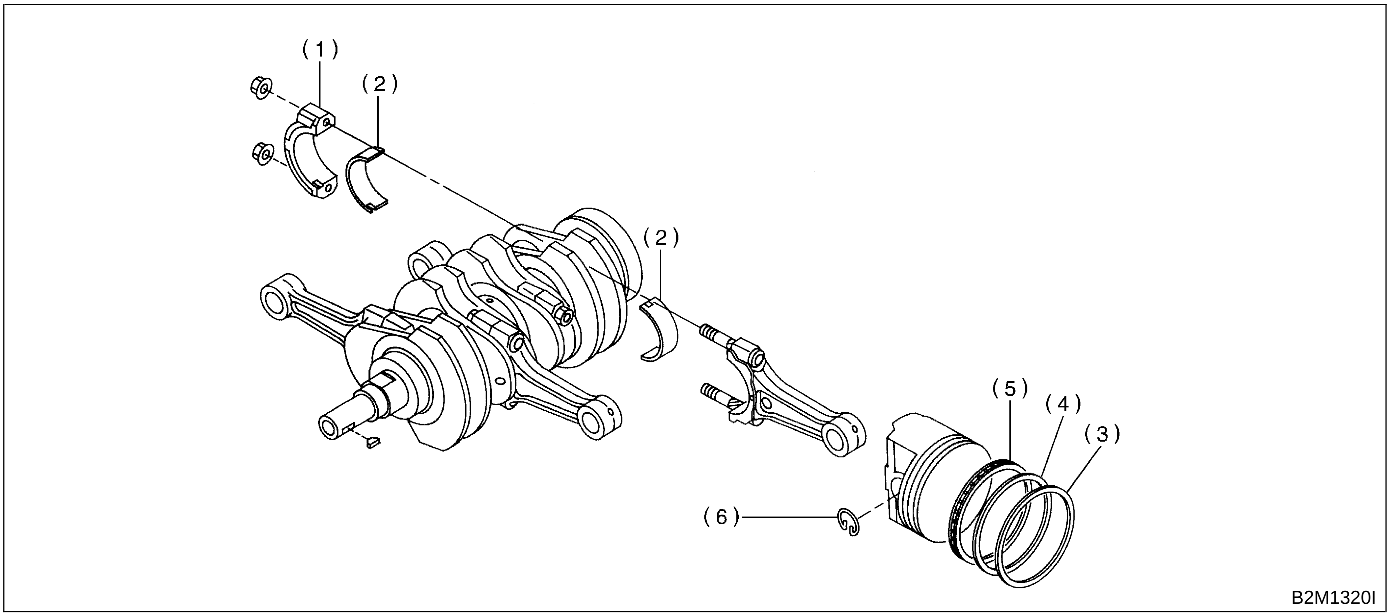
36) Install crankshaft pulley. <Ref. to ME-44, INSTALLATION, Crankshaft Pulley.>

37) Install generator and A/C compressor brackets on cylinder head.

38) Install V-belt. <Ref. to FU-17, INSTALLATION, Intake Manifold.> <Ref. to ME-42, INSTALLATION, V-belt.>

39) Install intake manifold. <Ref. to FU-17, INSTALLATION, Intake Manifold.>

C: DISASSEMBLY *S173090A06*



(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.

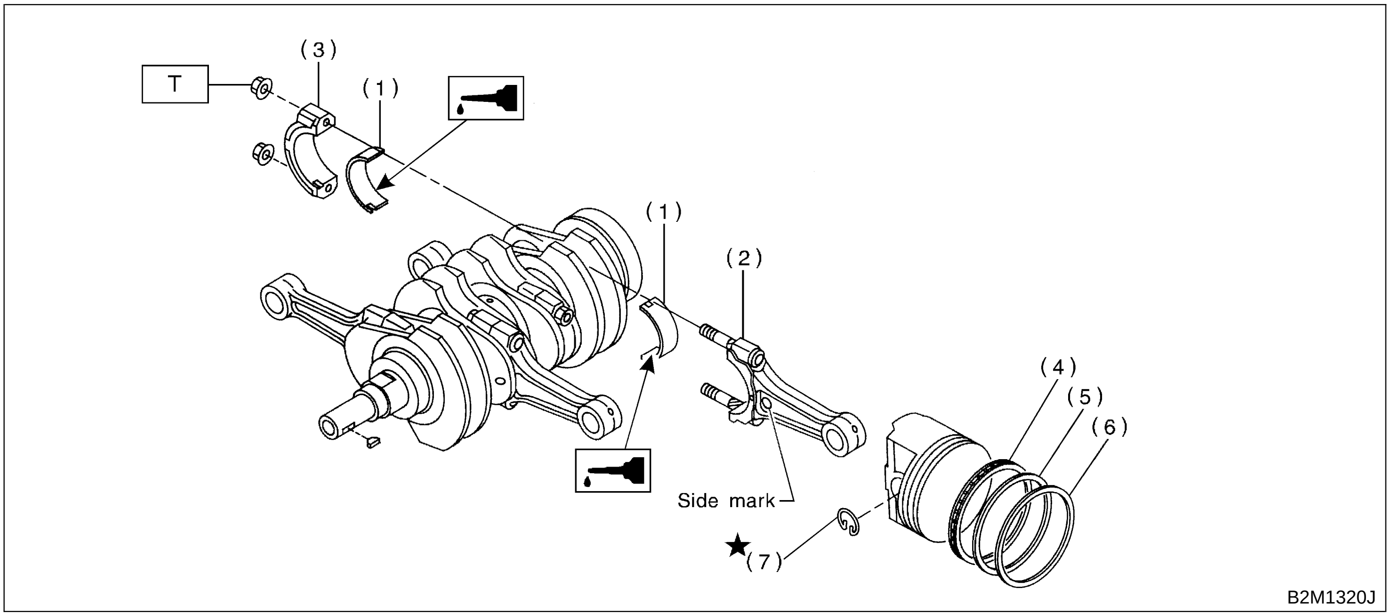
CAUTION:
Arrange removed connecting rod, connecting rod cap and bearing in order to prevent confusion.

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 S173090A02



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

Tightening torque: N·m (kgf-m, ft-lb)
T: 44.6 (4.55, 32.9)

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) 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.

E: INSPECTION S173090A10

1. CYLINDER BLOCK S173090A1001

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:
201.0 mm (7.91 in)

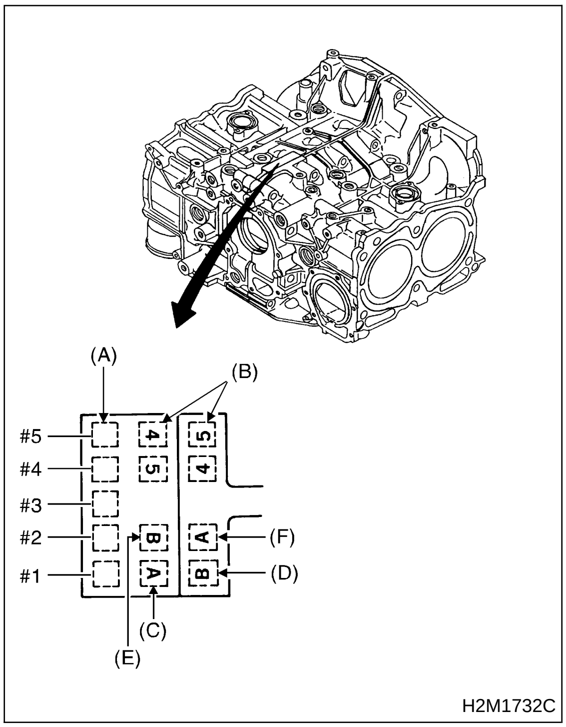
2. CYLINDER AND PISTON *S173090A1002*

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

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

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

Standard diameter:
A: 99.505 — 99.515 mm (3.9175 — 3.9179 in)
B: 99.495 — 99.515 mm (3.9171 — 3.9179 in)



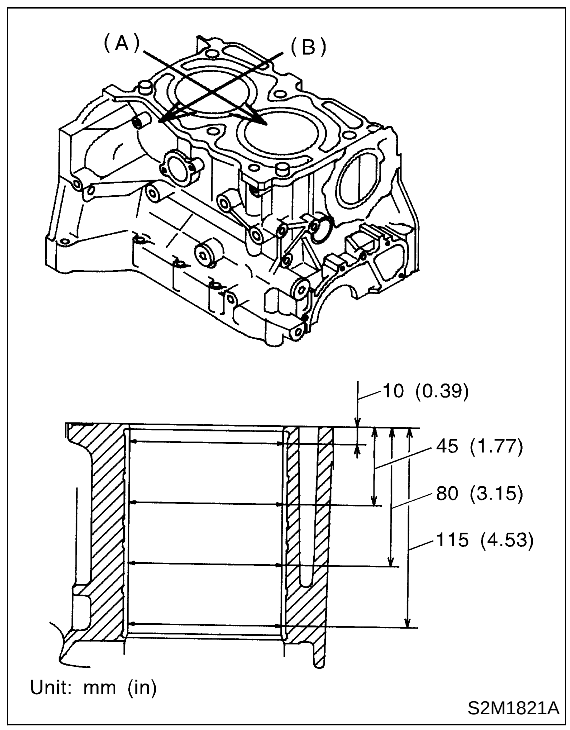
(A) Main jourual size mark
(B) Cylinder block RH-LH combination mark
(C) #1 cylinder bore size mark
(D) #2 cylinder bore size mark
(E) #3 cylinder bore size mark
(F) #4 cylinder bore size mark

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

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

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

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



(A) Piston pin direction
(B) Thrust direction

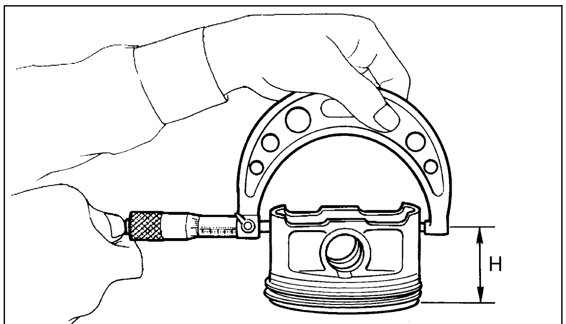
3) When piston is to be replaced due to general or cylinder wear, determine a suitable sized piston by measuring the piston clearance.

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:
37.0 mm (1.457 in)

Piston outer diameter:
Standard
A: 99.485 — 99.495 mm
(3.9167 — 3.9171 in)
B: 99.475 — 99.485 mm
(3.9163 — 3.9167 in)
0.25 mm (0.0098 in) oversize
99.725 — 99.735 mm
(3.9262 — 3.9266 in)
0.50 mm (0.0197 in) oversize
99.975 — 99.985 mm
(3.9360 — 3.9364 in)



B2M1305A

5) Calculate the clearance between cylinder and piston.

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

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

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

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

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

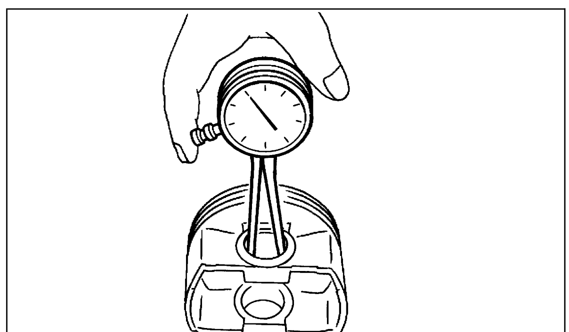
CAUTION:
Immediately after reboring, the cylinder diameter may differ from its real diameter due to temperature rise. Thus, pay attention to this when measuring the cylinder diameter.

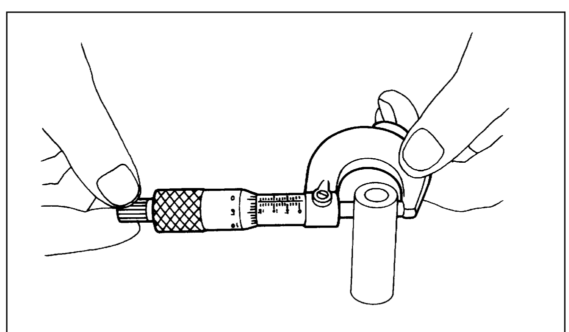
Limit of cylinder enlarging (boring):
0.5 mm (0.020 in)

3. PISTON AND PISTON PIN *S173090A1003*

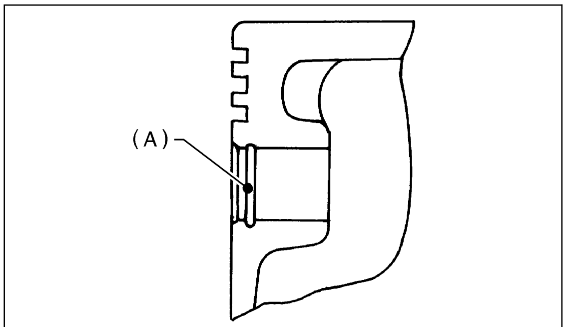
1) Check pistons and piston pins for damage, cracks, and wear and the piston ring grooves for wear and damage. Replace if defective.
2) Measure the piston-to-cylinder clearance at each cylinder. <Ref. to ME-81, CYLINDER AND PISTON, INSPECTION, Cylinder Block.> If any of the clearances is not to specification, 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)


B2M1401


B2M0084

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



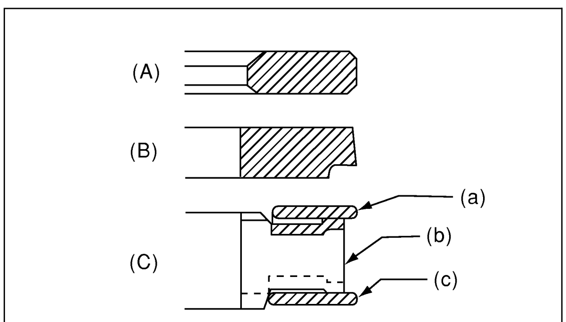
B2M0420C

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

4. PISTON RING *S173090A1004*

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:
● Marks are shown on the end of the top and second rings. When installing the rings to the piston, face these marks upward.
● The oil ring is a combined ring consisting of two rails and a spacer in between. When installing, be careful to assemble correctly.

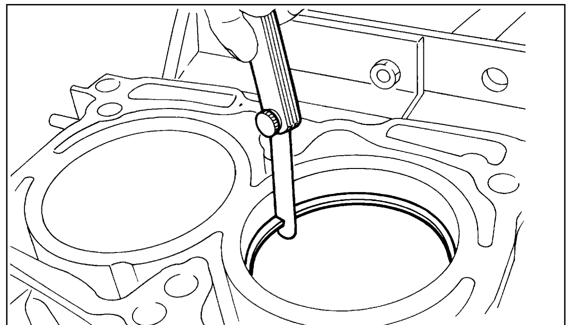


EN1006

(A) Top ring
(B) Second ring
(C) Oil ring
(a) Upper rail
(b) Spacer
(c) Lower rail

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 — 0.70 (0.0079 — 0.0276)	1.5 (0.059)

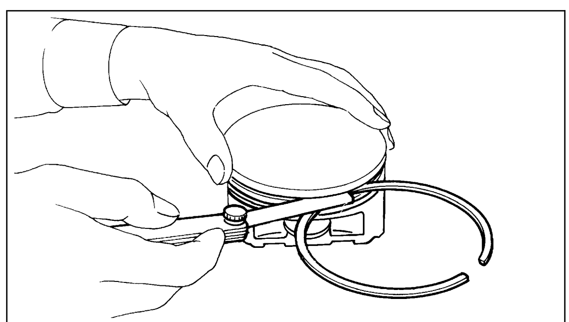


S2M1823

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)

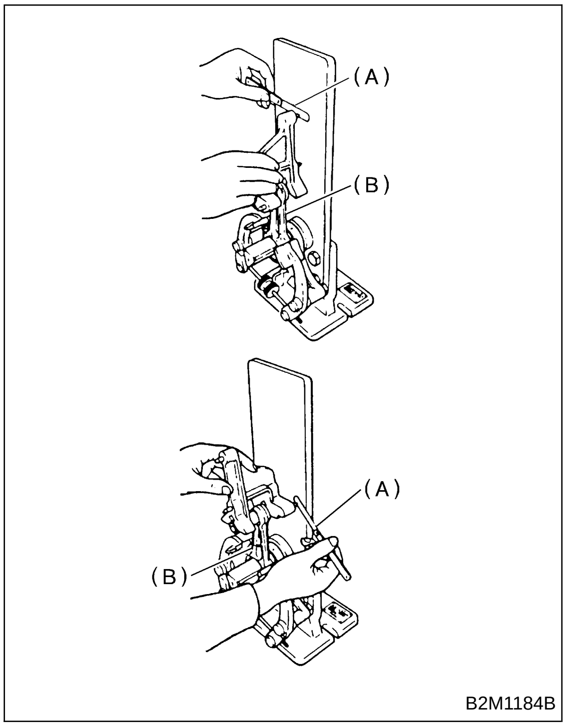


B2M1402

5. CONNECTING ROD *S173090A1005*

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.

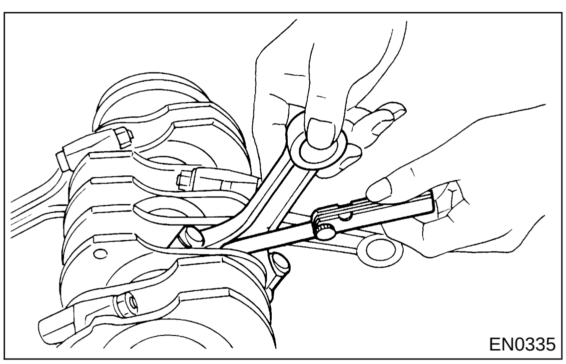
Limit of bend or twist per 100 mm (3.94 in) in length:
0.10 mm (0.0039 in)



(A) Thickness gauge
(B) Connecting rod

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.)

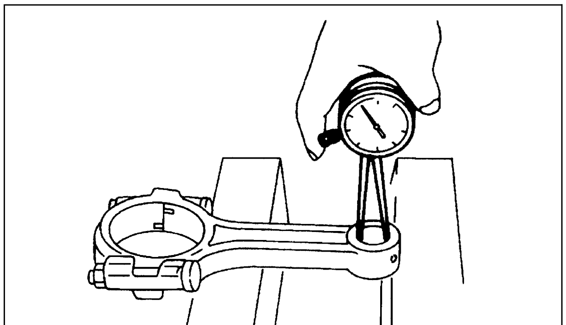
Connecting rod oil clearance:
Standard
0.020 — 0.046 mm (0.0008 — 0.0018 in)
Limit
0.05 mm (0.0020 in)

Unit: mm (in)

Bearing	Bearing size (Thickness at center)	Outer diameter of crank pin
Standard	1.486 — 1.498 (0.0585 — 0.0590)	51.984 — 52.000 (2.0466 — 2.0472)
0.03 (0.0012) undersize	1.504 — 1.512 (0.0592 — 0.0595)	51.954 — 51.970 (2.0454 — 2.0461)
0.05 (0.0020) undersize	1.514 — 1.522 (0.0596 — 0.0599)	51.934 — 51.950 (2.0446 — 2.0453)
0.25 (0.0098) undersize	1.614 — 1.622 (0.0635 — 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)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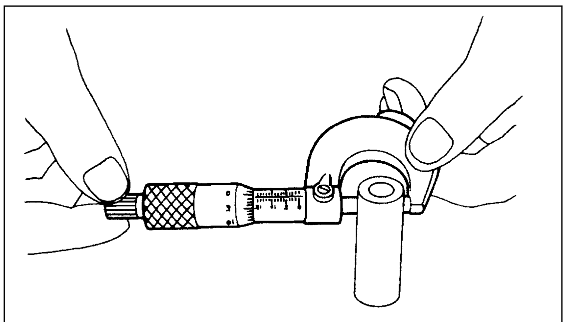
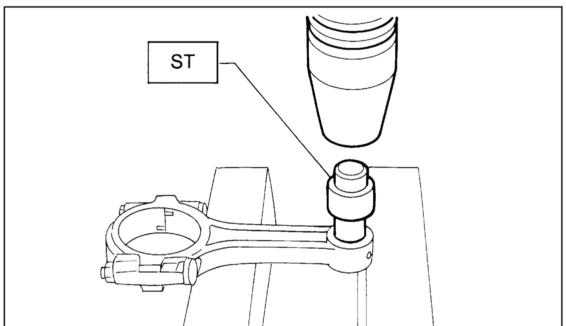

EN0337

7) Replacement procedure is as follows.
(1) Remove bushing from connecting rod with ST and press.
(2) Press bushing with ST after applying oil on the periphery of bushing.
ST 499037100 CONNECTING ROD BUSHING REMOVER AND INSTALLER



G2M0177

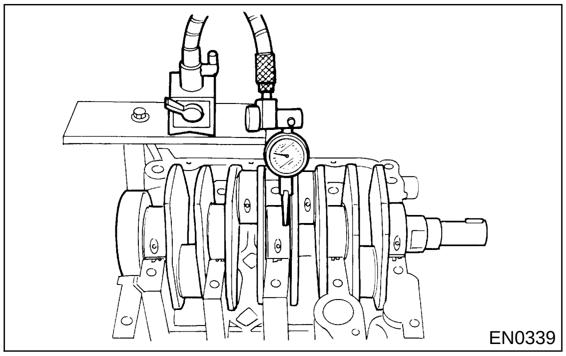
(3) Make two 3 mm (0.12 in) holes in bushing. Ream the inside of bushing.
(4) After completion of reaming, clean bushing to remove chips.

6. CRANKSHAFT AND CRANKSHAFT BEARING S173090A1006

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.

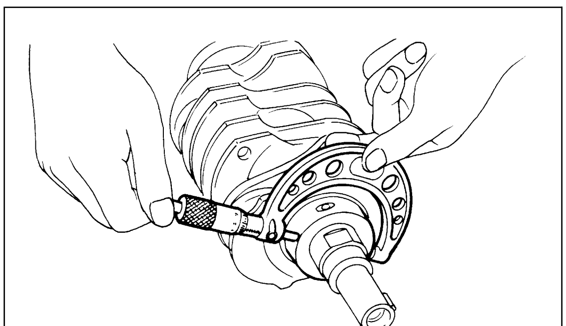
CAUTION:
If a suitable V-block is not available, install #1 and #5 crankshaft bearing on cylinder block, position crankshaft on these bearings and measure crankshaft bend using a dial gauge.

Crankshaft bend limit:
0.035 mm (0.0014 in)


EN0339

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)

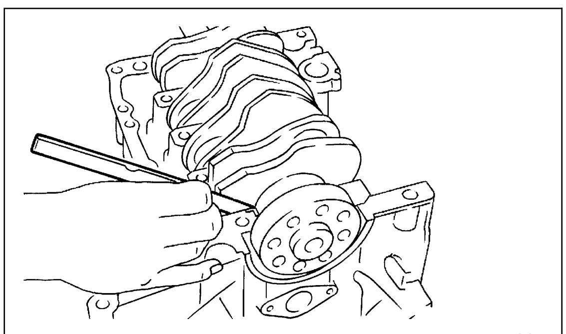

G2M0179

Unit: mm (in)				
		Crank journal diameter		Crank pin diameter
		#1, #3	#2, #4, #5	
Standard	Journal O.D.	59.992 — 60.008 (2.3619 — 2.3625)	59.992 — 60.008 (2.3619 — 2.3625)	51.984 — 52.000 (2.0466 — 2.0472)
	Bearing size (Thickness at center)	1.998 — 2.011 (0.0787 — 0.0792)	2.000 — 2.013 (0.0787 — 0.0793)	1.492 — 1.501 (0.0587 — 0.0591)
0.03 (0.0012) undersize	Journal O.D.	59.962 — 59.978 (2.3607 — 2.3613)	59.962 — 59.978 (2.3607 — 2.3613)	51.954 — 51.970 (2.0454 — 2.0461)
	Bearing size (Thickness at center)	2.017 — 2.020 (0.0794 — 0.0795)	2.019 — 2.022 (0.0795 — 0.0796)	1.510 — 1.513 (0.0594 — 0.0596)
0.05 (0.0020) undersize	Journal O.D.	59.942 — 59.958 (2.3599 — 2.3605)	59.942 — 59.958 (2.3599 — 2.3605)	51.934 — 51.950 (2.0446 — 2.0453)
	Bearing size (Thickness at center)	2.027 — 2.030 (0.0798 — 0.0799)	2.029 — 2.032 (0.0799 — 0.0800)	1.520 — 1.523 (0.0598 — 0.0600)
0.25 (0.0098) undersize	Journal O.D.	59.742 — 59.758 (2.3520 — 2.3527)	59.742 — 59.758 (2.3520 — 2.3527)	51.734 — 51.750 (2.0368 — 2.0374)
	Bearing size (Thickness at center)	2.127 — 2.130 (0.0837 — 0.0839)	2.129 — 2.132 (0.0838 — 0.0839)	1.620 — 1.623 (0.0638 — 0.0639)

O.D. ... Outer Diameter

4) Measure the thrust clearance of crankshaft at center bearing. If the clearance exceeds the limit, replace bearing.

Crankshaft thrust clearance:
Standard
0.030 — 0.115 mm (0.0012 — 0.0045 in)
Limit
0.25 mm (0.0098 in)


EN0341

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)

22. Engine Trouble in General

S173095

A: INSPECTION S173095A10

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-2, Basic Diagnostic Procedure.>		A
	● Fuel line	● Defective fuel pump and relay	A
		● Lack of or insufficient fuel	B
	● Belt	● Defective	B
		● Defective timing	B
	● Compression	● Incorrect valve clearance	C
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	C
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	B
		● Improper engine oil (low viscosity)	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
3) Initial combustion occur.	● Engine control system <Ref. to EN-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
	● Belt	● Defective	B
		● Defective timing	B
	● Compression	● Incorrect valve clearance	C
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	C
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	B
		● Improper engine oil (low viscosity)	B
4) Engine stalls after initial combustion.	● Engine control system <Ref. to EN-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
	● Belt	● Defective	B
		● Defective timing	B
	● Compression	● Incorrect valve clearance	C
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	C
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	B
		● Improper engine oil (low viscosity)	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
2. Rough idle and engine stall	● Engine control system <Ref. to EN-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 filler cap	B
		● Dirty air cleaner element	C
	● Fuel line	● Defective fuel pump and relay	C
		● Clogged fuel line	C
		● Lack of or insufficient fuel	B
	● Belt	● Defective timing	C
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	B
		● Loosened cylinder head bolts or defective gasket	B
		● Improper valve seating	B
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	B
		● Incorrect valve timing	A
		● Improper engine oil (low viscosity)	B
	● Lubrication system	● Incorrect oil pressure	B
		● Defective rocker cover gasket	C
	● Cooling system	● Overheating	C
	● Others	● Malfunction of evaporative emission control system	A
		● Stuck or damaged throttle valve	B
		● Accelerator cable out of adjustment	C

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
3. Low output, hesitation and poor acceleration	● Engine control system <Ref. to EN-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 filler cap	B
		● Dirty air cleaner element	A
	● Fuel line	● Defective fuel pump and relay	B
		● Clogged fuel line	B
		● Lack of or insufficient fuel	C
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	B
		● Loosened cylinder head bolts or defective gasket	B
		● Improper valve seating	B
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	A
		● Improper engine oil (low viscosity)	B
	● Lubrication system	● Incorrect oil pressure	B
	● Cooling system	● Overheating	C
		● Over cooling	C
	● Others	● Malfunction of evaporative emission control system	A
4. Surging	● Engine control system <Ref. to EN-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 filler cap	B
		● Dirty air cleaner element	B
	● Fuel line	● Defective fuel pump and relay	B
		● Clogged fuel line	B
		● Lack of or insufficient fuel	C
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	C
		● Defective valve stem	C
		● Worn or broken valve spring	C
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	A
		● Improper engine oil (low viscosity)	B
	● Cooling system	● Overheating	B
	● Others	● Malfunction of evaporative emission control system	C

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
5. Engine does not return to idle.	● Engine control system <Ref. to EN-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-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-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
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	B
		● Defective valve stem	C
		● Worn or broken valve spring	C
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	A
	● Lubrication system	● Incorrect oil pressure	C
	● Cooling system	● Over cooling	C
	● Others	● Malfunction of evaporative emission control system	C
8. Knocking	● Engine control system <Ref. to EN-2, Basic Diagnostic Procedure.>		A
	● Intake system	● Loosened oil filler cap	B
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	C
		● Incorrect valve timing	B
	● Cooling system	● Overheating	A
9. Excessive engine oil consumption	● Intake system	● Loosened or cracked PCV hose	A
		● Defective PCV valve	B
		● Loosened oil filler cap	C
	● Compression	● Defective valve stem	A
		● Worn or stuck piston rings, cylinder and piston	A
	● Lubrication system	● Loosened oil pump attaching bolts and defective gasket	B
		● Defective oil filler seal	B
		● Defective crankshaft oil seal	B
		● Defective rocker cover gasket	B
		● Loosened oil drain plug or defective gasket	B
		● Loosened oil pan fitting bolts or defective oil pan	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
10. Excessive fuel consumption	● Engine control system <Ref. to EN-2, Basic Diagnostic Procedure.>		A
	● Intake system	● Dirty air cleaner element	A
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	B
		● Defective valve stem	C
		● Worn or broken valve spring	C
		● Worn or stuck piston rings, cylinder and piston	B
		● Incorrect valve timing	B
	● Lubrication system	● Incorrect oil pressure	C
	● Cooling system	● Over cooling	C
	● Others	● Accelerator cable out of adjustment	B

23. Engine Noise S173096

A: INSPECTION S173096A10

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-43, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN-40, OPERATION, Inspection Mode.> after connecting fuel injector connector.

MEMO:

EXHAUST

EX

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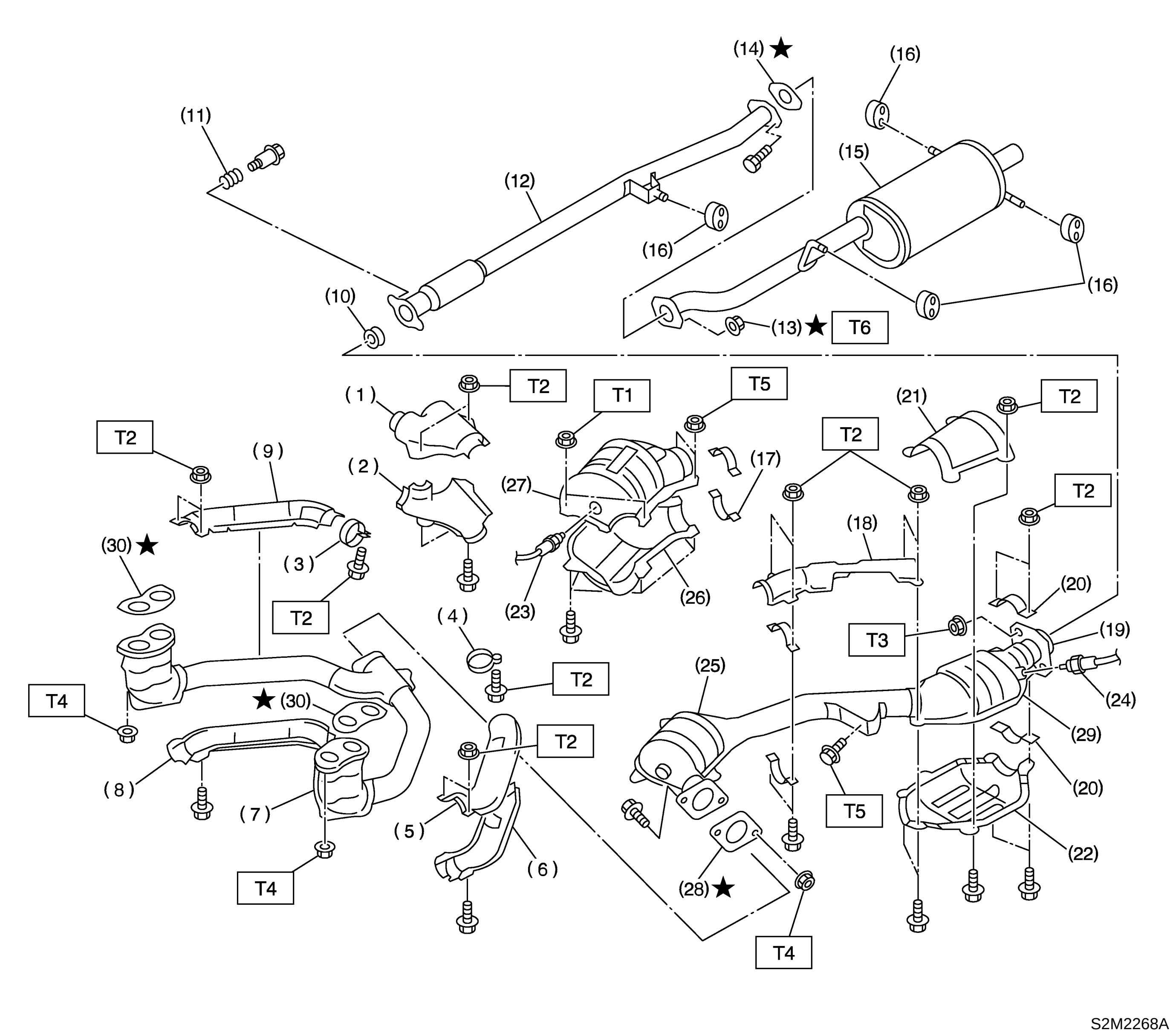
4. Rear Exhaust Pipe 9
5. Muffler...11

1. General Description *S172001*

A: COMPONENT *S172001A05*



(1) Upper front exhaust pipe cover CTR
(2) Lower front exhaust pipe cover CTR
(3) Band RH
(4) Band LH
(5) Upper front exhaust pipe cover LH
(6) Lower front exhaust pipe cover LH
(7) Front exhaust pipe
(8) Lower front exhaust pipe cover RH
(9) Upper front exhaust pipe cover RH
(10) Gasket
(11) Spring
(12) Rear exhaust pipe
(13) Self-locking nut
(14) Gasket
(15) Muffler
(16) Cushion rubber
(17) Clamp
(18) Upper center exhaust pipe cover
(19) Center exhaust pipe
(20) Clamp B
(21) Upper rear catalytic converter cover
(22) Lower rear catalytic converter cover
(23) Front oxygen (A/F) sensor
(24) Rear oxygen sensor
(25) Front catalytic converter
(26) Lower front catalytic converter cover
(27) Upper front catalytic converter cover
(28) Gasket
(29) Rear catalytic converter
(30) Gasket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 13 (1.3, 9.4)
T3: 18 (1.8, 13.0)
T4: 30 (3.1, 22.4)
T5: 35 (3.6, 26.0)
T6: 48 (4.9, 35.4)

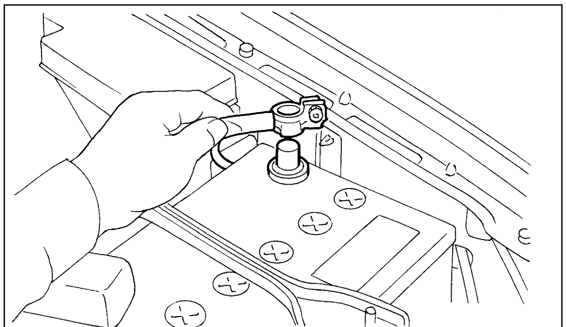
B: CAUTION *S172001A03*

- 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 ground cable from battery.

2. Front Exhaust Pipe *S172065*

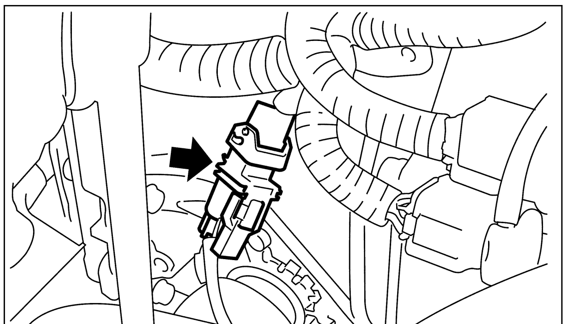
A: REMOVAL *S172065A18*

1) Disconnect battery ground cable.



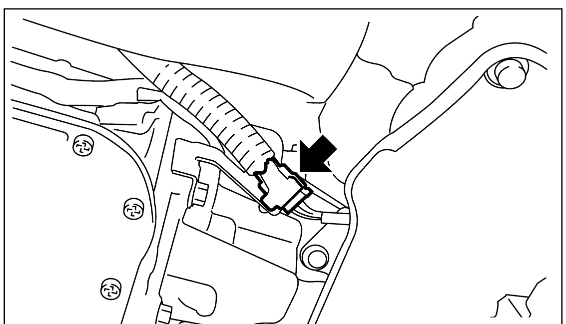
G6M0095

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



B2M3439

3) Lift-up the vehicle.
4) Disconnect rear oxygen sensor connector.

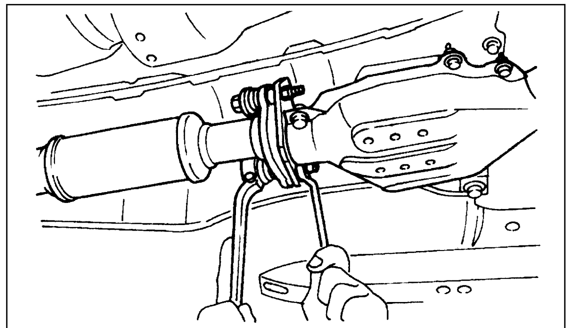


B2M3440

5) Remove under cover. <Ref. EI-12, REMOVAL, Front Under Cover.>

6) Separate front and center exhaust pipe assembly from rear exhaust pipe.

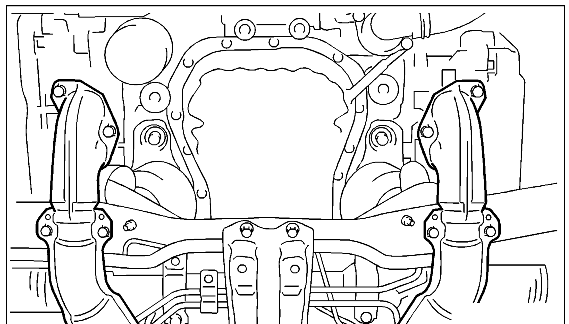
WARNING:
Be careful, exhaust pipe is hot.



B2M0055

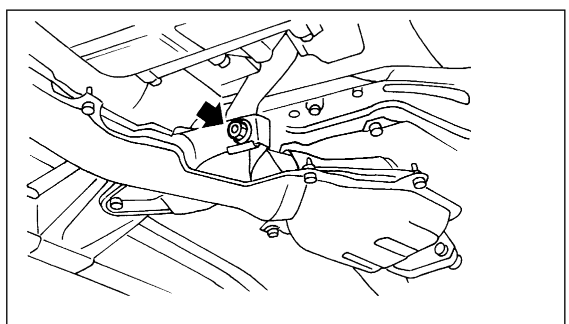
7) Remove bolts which hold front exhaust pipe onto cylinder heads.

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



B2M3200

8) Remove bolt which installs front and center exhaust pipe assembly to hanger bracket.

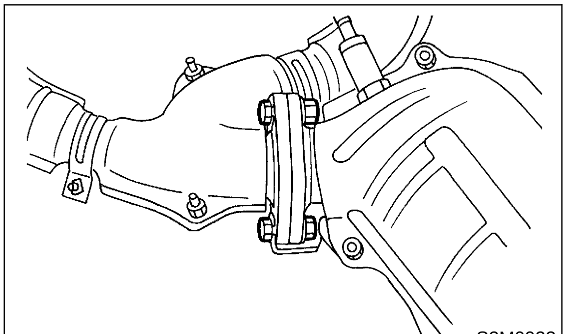


B2M3111

9) Remove front and center exhaust pipe assembly from the vehicle.

CAUTION:
- **Be careful not to let front and center exhaust pipe assembly fall off when removing as it is quite heavy.**
- **After removing front and center exhaust assembly, do not apply excessive pulling force on rear exhaust pipe.**

10) Separate front exhaust pipe from center exhaust pipe.

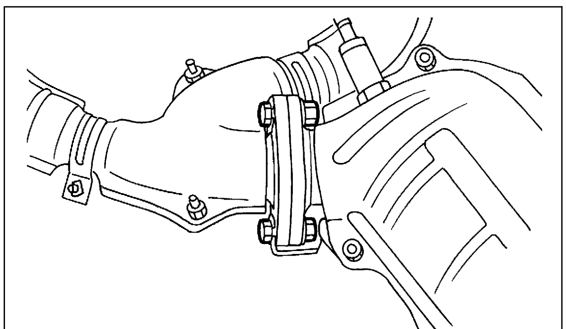

S2M0923

B: INSTALLATION S172065A11

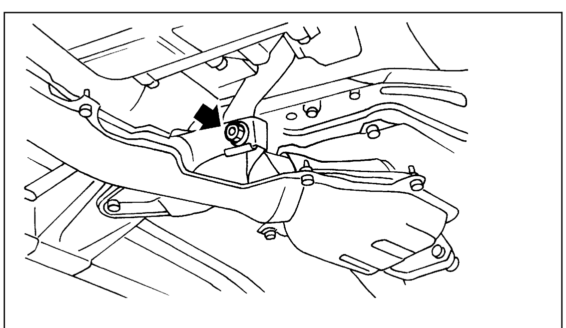
1) Install front exhaust pipe to center exhaust pipe.

NOTE:
Replace gaskets with new ones.

Tightening torque:
30 N·m (3.1 kgf-m, 22.4 ft-lb)

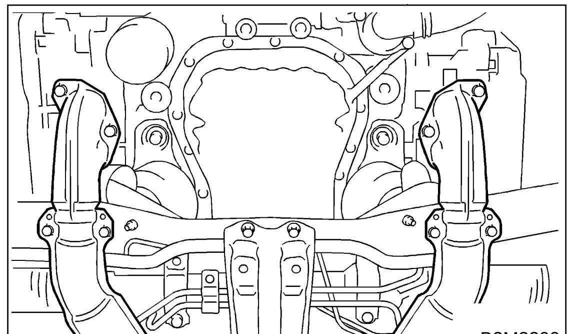

S2M0923

2) Install front and center exhaust pipe assembly to the vehicle.
3) Temporarily tighten bolt which installs front and center exhaust pipe assembly to hanger bracket.


B2M3111

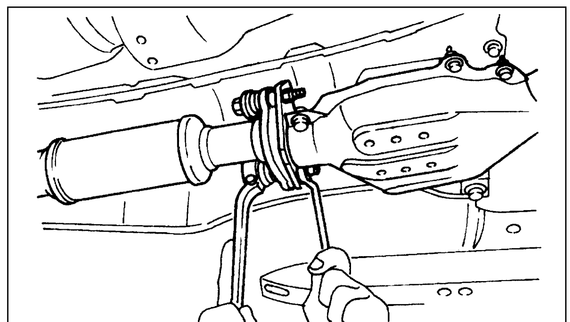
4) Tighten bolts which hold front exhaust pipe onto cylinder heads.

Tightening torque:
30 N·m (3.1 kgf-m, 22.4 ft-lb)


B2M3200

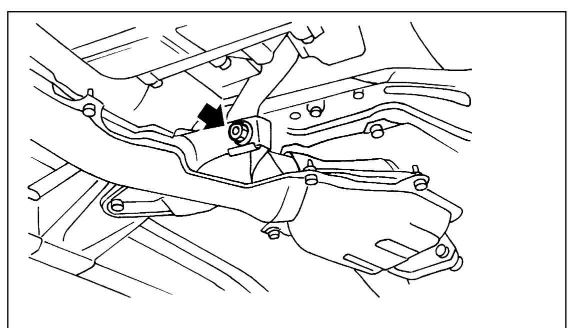
5) Tighten bolts which install front and center exhaust pipe assembly to rear exhaust pipe.

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


B2M0055

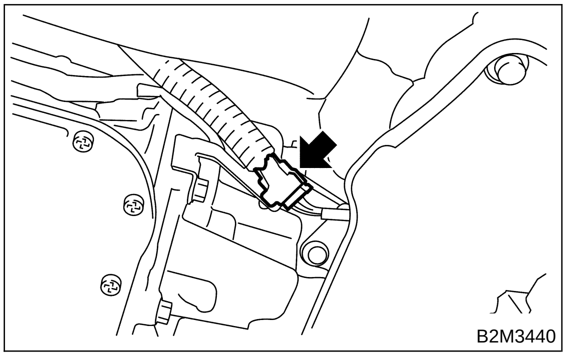
6) Tighten bolt which holds front and center exhaust pipe assembly to hanger bracket.

Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)

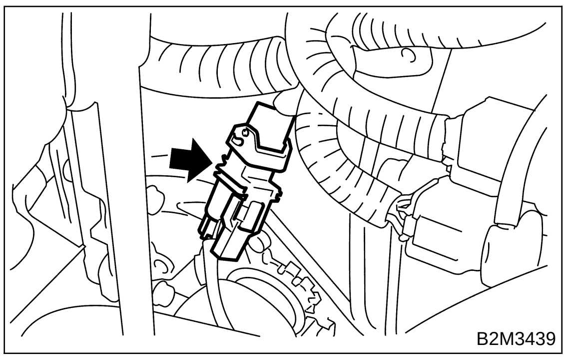

B2M3111

7) Install under cover. <Ref. EI-12, INSTALLATION, Front Under Cover.>

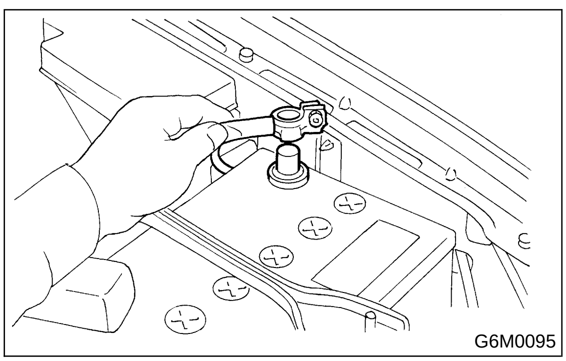
8) Connect rear oxygen sensor connector.



9) Lower the vehicle.
10) Connect front oxygen (A/F) sensor connector.



11) Connect battery ground cable.



C: INSPECTION *S172065A10*

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

3. Center Exhaust Pipe S172067

A: REMOVAL S172067A18

After removing the center and front exhaust pipes as one unit, separate them. Refer to the procedure for removing the front exhaust pipe. <Ref. to EX-5, REMOVAL, Front Exhaust Pipe.>

B: INSTALLATION S172067A11

Install the center exhaust pipe and front exhaust pipe as one unit. Refer to the procedure for installing the front exhaust pipe. <Ref. to EX-6, INSTALLATION, Front Exhaust Pipe.>

C: INSPECTION S172067A10

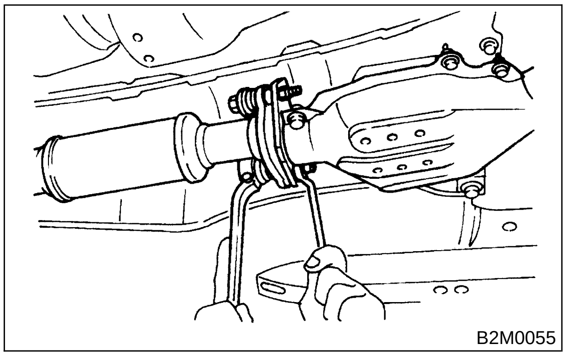
1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

4. Rear Exhaust Pipe S172068

A: REMOVAL S172068A18

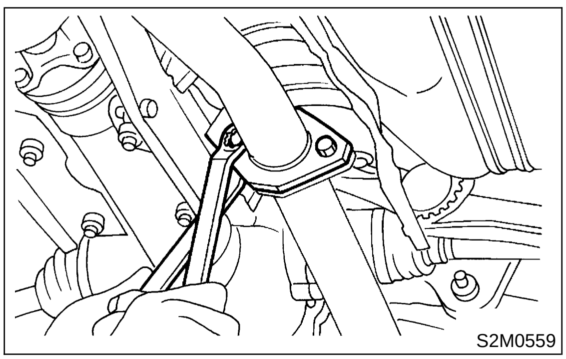
1) Separate rear exhaust pipe from center exhaust pipe.

CAUTION:
Be careful, exhaust pipe is hot.



2) Separate rear exhaust pipe from muffler.

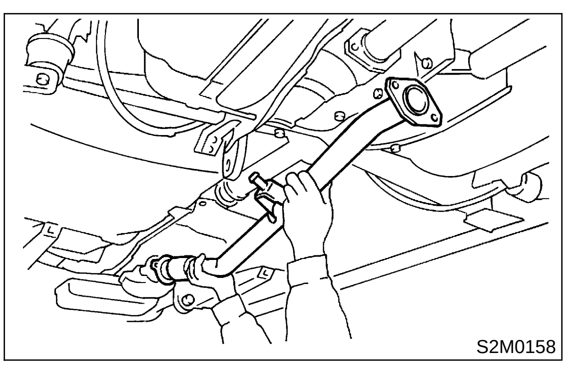
CAUTION:
Be careful not to pull down rear exhaust pipe.



3) Remove rear exhaust pipe bracket from rubber cushion.

NOTE:
To facilitate removal, apply a coat of SUBARU CRC to pipe bracket in advance.

SUBARU CRC (Part No. 004301003)



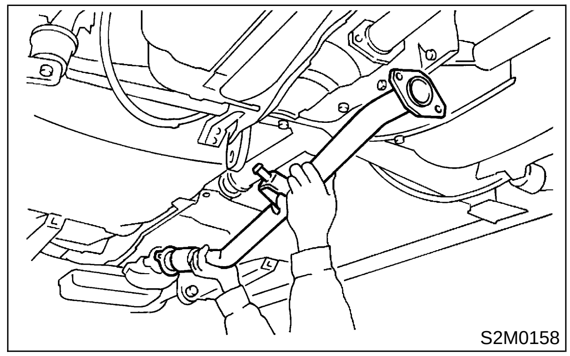
B: INSTALLATION S172068A11

NOTE:
Replace gaskets with new ones.

1) Install rear exhaust pipe bracket to rubber cushion.

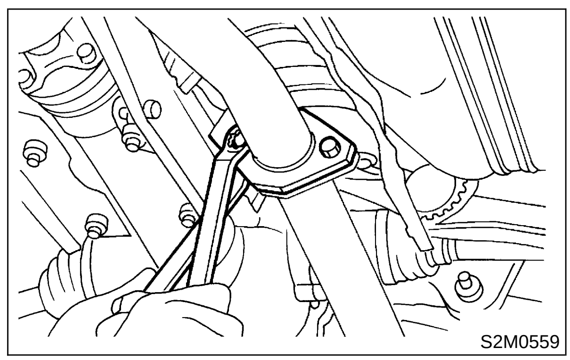
NOTE:
To facilitate removal, apply a coat of SUBARU CRC to mating area of rubber cushion in advance.

SUBARU CRC (Part No. 004301003)



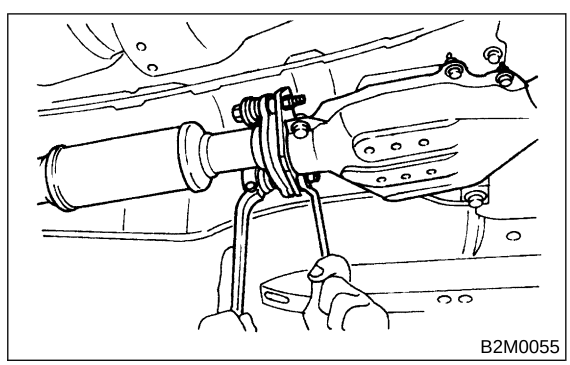
2) Install rear exhaust pipe to muffler.

Tightening torque:
48 N·m (4.9 kgf-m, 35.4 ft-lb)



3) Install rear exhaust pipe to center exhaust pipe.

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



C: INSPECTION *S172068A10*

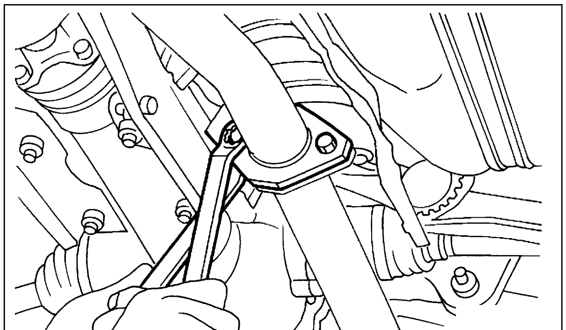
1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.
3) Make sure the cushion rubber is not worn or cracked.

5. Muffler S172066

A: REMOVAL S172066A18

1) Separate muffler from rear exhaust pipe.

CAUTION:
Be careful, exhaust pipe is hot.

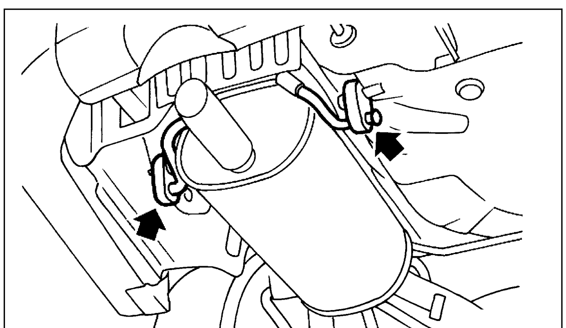

S2M0559

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.

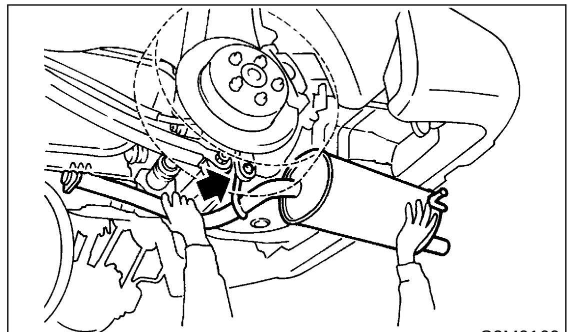
SUBARU CRC (Part No. 004301003)


S2M0608

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)

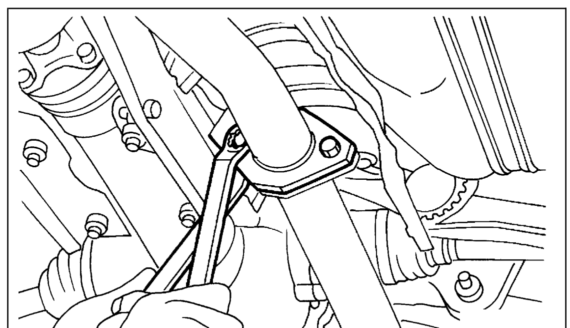

S2M0160

B: INSTALLATION S172066A11

Install in the reverse order of removal.

NOTE:
Replace gasket with a new one.

Tightening torque:
48 N·m (4.9 kgf-m, 35.4 ft-lb)


S2M0559

C: INSPECTION S172066A10

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.

MEMO:

COOLING

CO

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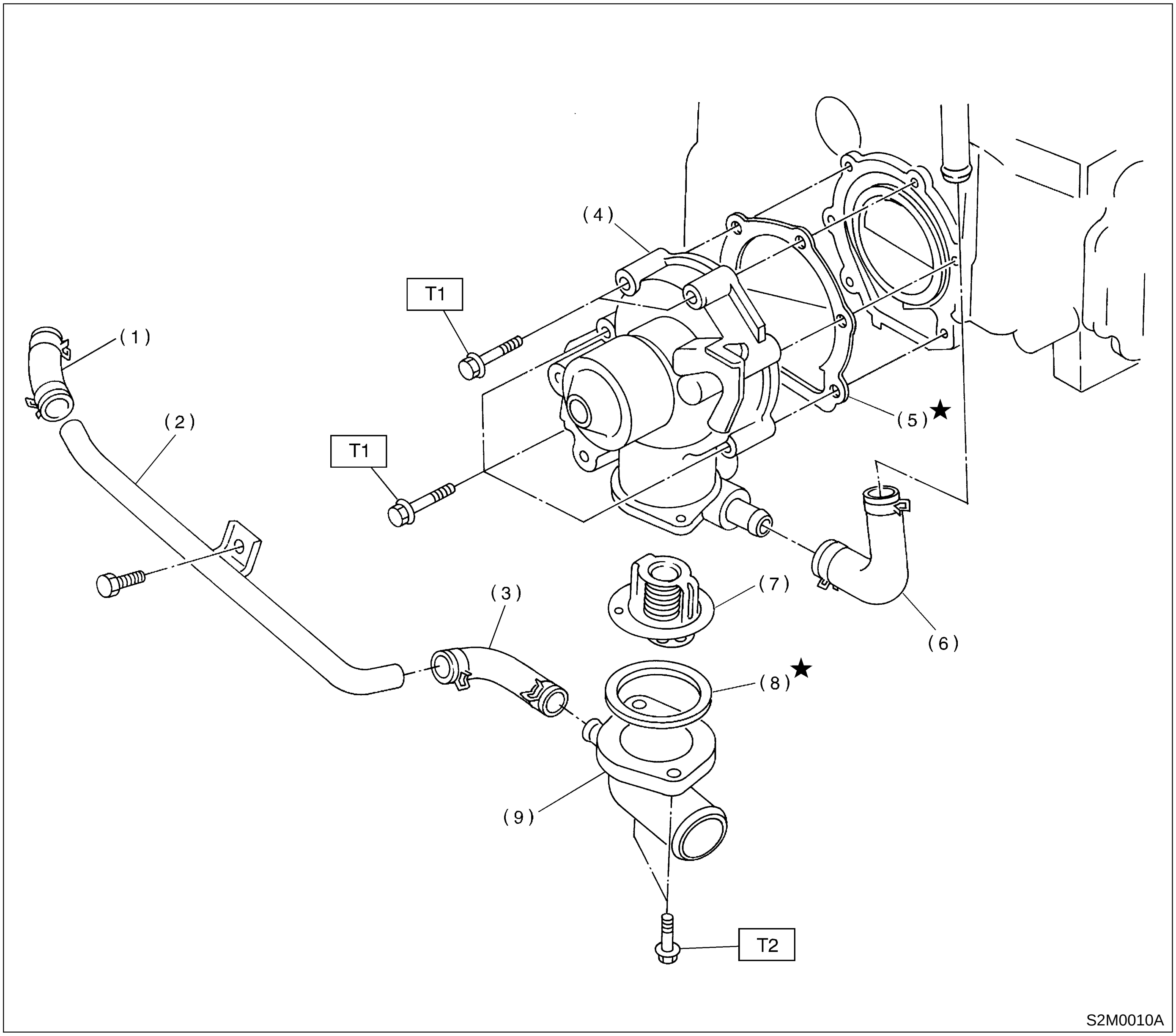
1. General Description S176001

A: SPECIFICATIONS S176001E49

Cooling system			Electric fan + Forced engine coolant circulation system
Total engine coolant capacity ℓ (US qt, Imp qt)			AT: Approx. 6.3 (6.7, 5.5) MT: Approx. 6.4 (6.8, 5.6)
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	700 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)
	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)
Thermostat	Type		Wax pellet type
	Starts to open		76 — 80°C (169 — 176°F)
	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	Main fan	70 W
		Sub fan	70 W
	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		691.5 × 340 × 16 mm (27.22 × 13.39 × 0.63 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 *S176001A05*

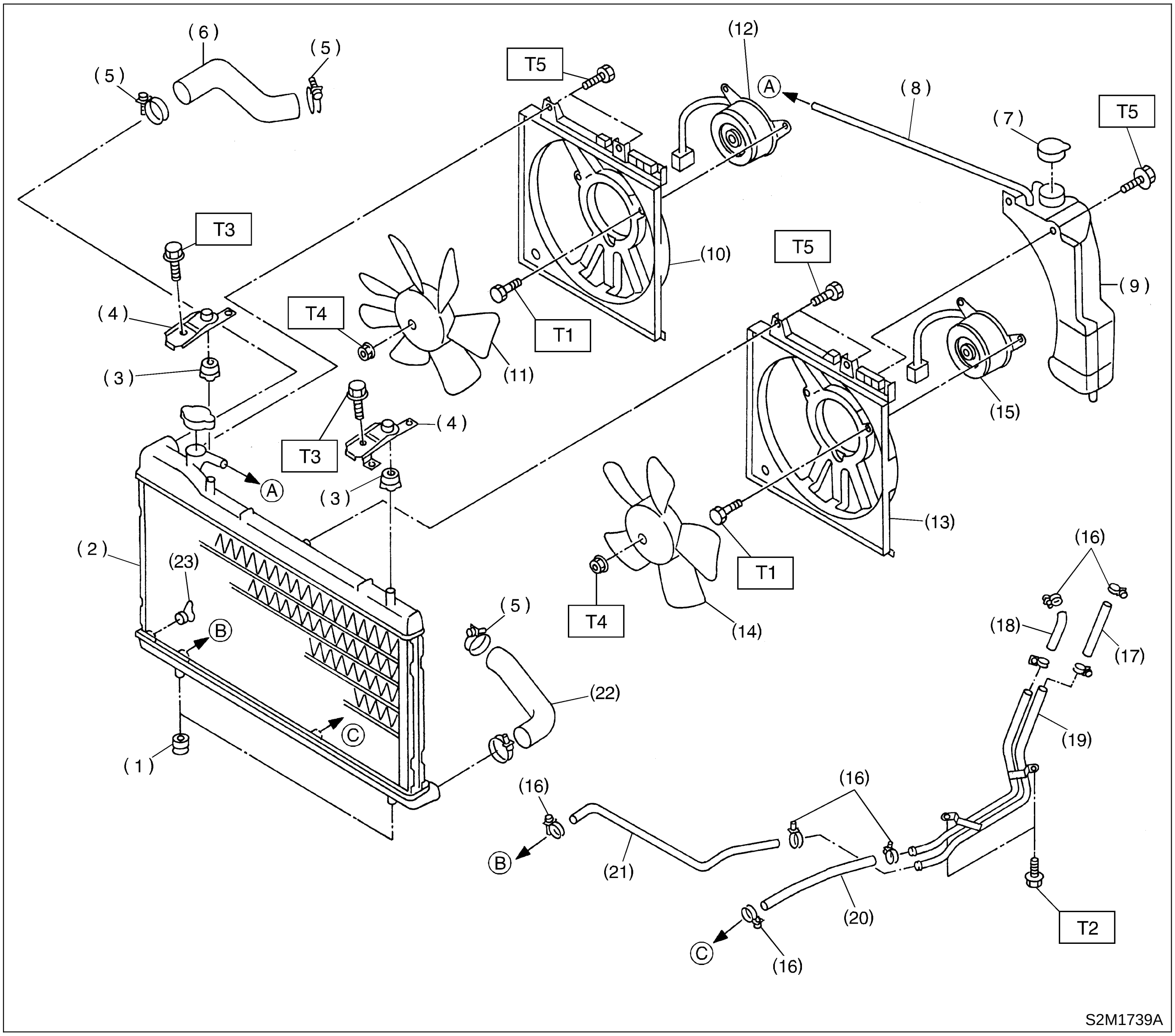
1. WATER PUMP *S176001A0501*



(1) Water by-pass hose A (AT models)
(2) Water by-pass pipe (AT models)
(3) Water by-pass hose B (AT models)
(4) Water pump ASSY
(5) Gasket
(6) Heater by-pass hose
(7) Thermostat
(8) Gasket
(9) Thermostat cover

Tightening torque: N·m (kgf-m, ft-lb)
T1: First 12 (1.2, 8.7)
Second 12 (1.2, 8.7)
T2: 6.4 (0.65, 4.7)

2. RADIATOR AND RADIATOR FAN S176001A0502



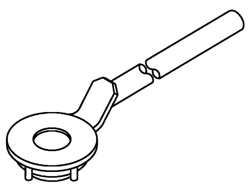
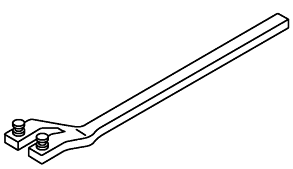
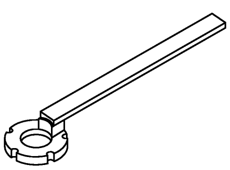
(1) Radiator lower cushion
(2) Radiator
(3) Radiator upper cushion
(4) Radiator upper bracket
(5) Clamp
(6) Radiator inlet hose
(7) Engine coolant reservoir tank cap
(8) Over flow hose
(9) Engine coolant reservoir tank
(10) Sub fan shroud
(11) Radiator sub fan
(12) Radiator sub fan motor
(13) Main fan shroud
(14) Radiator main fan
(15) Radiator main fan motor
(16) ATF hose clamp (AT vehicles only)
(17) ATF inlet hose A (AT vehicles only)
(18) ATF outlet hose A (AT vehicles only)
(19) ATF pipe (AT vehicles only)
(20) ATF outlet hose B (AT vehicles only)
(21) ATF inlet hose B (AT vehicles only)
(22) Radiator outlet hose
(23) Radiator drain plug

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.3)
T2: 12 (1.2, 8.7)
T3: 18 (1.8, 13.0)
T4: 3.4 (0.35, 2.5)
T5: 4.9 (0.50, 3.6)

C: CAUTION S176001A03

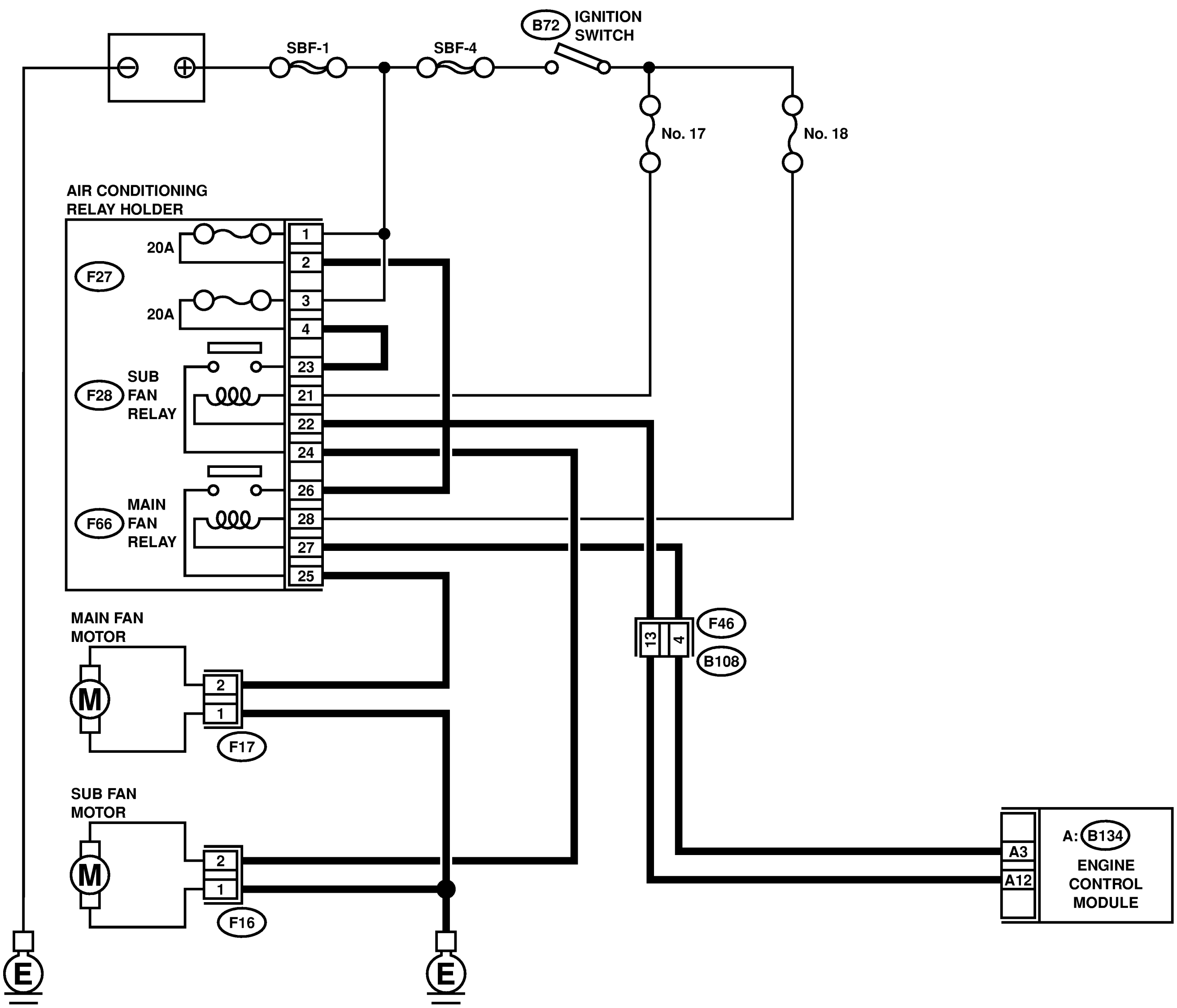
- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation 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 ground cable from battery.

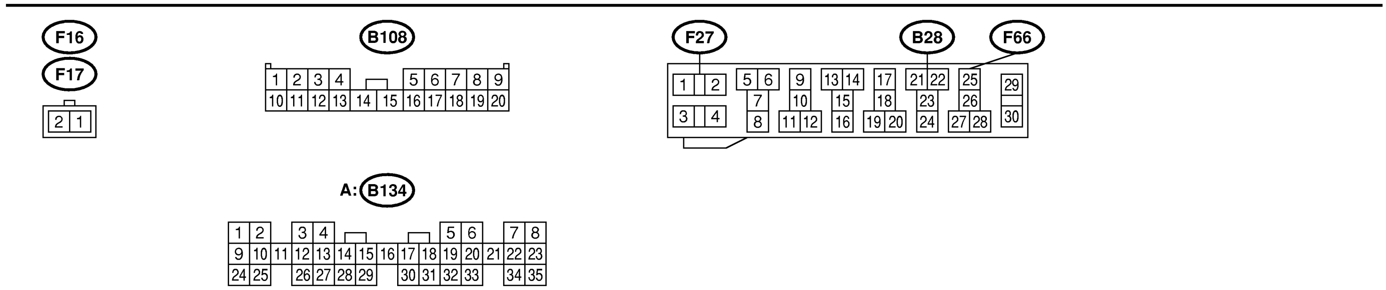
D: PREPARATION TOOL S176001A17

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M4157	499977300	CRANK PULLEY WRENCH	Used for stopping crankshaft pulley when loosening and tightening crankshaft pulley bolts.
 B2M3859	499207100	CAMSHAFT SPROCKET WRENCH	Used for removing and installing camshaft sprocket. (LH side only)
 B2M4158	499207400	CAMSHAFT SPROCKET WRENCH	Used for removing and installing camshaft sprocket.

2. Radiator Main Fan System *S176732*

A: SCHEMATIC *S176732A21*





S2M2269

B: INSPECTION S176732A10

DETECTING CONDITION:

Condition:

- Engine coolant temperature is above 95°C (203°F).
- Vehicle speed is below 19 km/h (12 MPH).

TROUBLE SYMPTOM:

- Radiator main fan does not rotate under the above conditions.

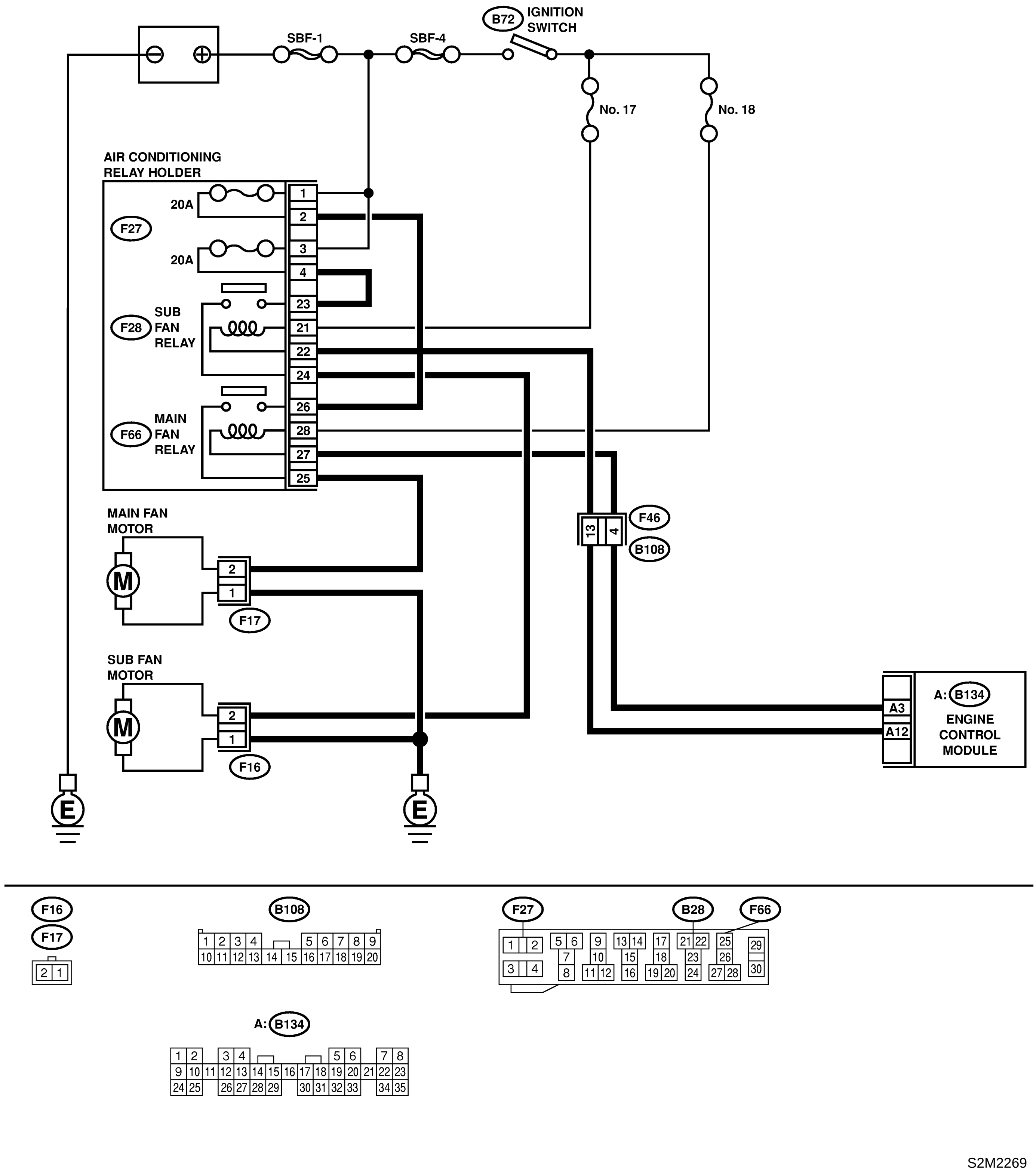
No.	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO MAIN FAN MOTOR.** **CAUTION:** **Be careful not to overheat engine during repair.** 1) Turn ignition switch to OFF. 2) Disconnect connector from main fan motor. 3) Start the engine, and warm it up until engine coolant temperature increases over 95°C (203°F). 4) Stop the engine and turn ignition switch to ON. 5) Measure voltage between main fan motor connector and chassis ground. ***Connector & terminal*** ***(F17) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2**.	Go to step **5**.
2	**CHECK GROUND CIRCUIT OF MAIN FAN MOTOR.** 1) Turn ignition switch to OFF. 2) Measure resistance between main fan motor connector and chassis ground. ***Connector & terminal*** ***(F17) No. 1 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3**.	Repair open circuit in harness between main fan motor connector and chassis ground.
3	**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 **4**.
4	**CHECK MAIN FAN MOTOR.** Connect battery positive (+) terminal to terminal No. 2, and negative (−) terminal to terminal No. 1 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.
5	**CHECK POWER SUPPLY TO MAIN FAN RELAY.** 1) Turn ignition switch to OFF. 2) Remove main fan relay from A/C relay holder. 3) Measure voltage between main fan relay terminal and chassis ground. ***Connector & terminal*** ***(F66) No. 26 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **6**.	Go to step **7**.
6	**CHECK POWER SUPPLY TO MAIN FAN RELAY.** 1) Turn ignition switch to ON. 2) Measure voltage between main fan relay terminal and chassis ground. ***Connector & terminal*** ***(F66) No. 28 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **10**.	Go to step **9**.
7	**CHECK 20 A FUSE.** 1) Remove 20 A fuse from A/C relay holder. 2) Check condition of fuse.	Is the fuse blown-out?	Replace fuse.	Go to step **8**.

No.	Step	Check	Yes	No
8	**CHECK POWER SUPPLY TO A/C RELAY HOLDER 20 A FUSE TERMINAL.** Measure voltage of harness between A/C relay holder 20 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 20 A fuse and main fan relay terminal.	Repair open circuit in harness between main fuse box connector and 20 A fuse terminal.
9	**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.
10	**CHECK MAIN FAN RELAY.** 1) Turn ignition switch to OFF. 2) Remove main fan relay. 3) Measure resistance of main fan relay. ***Terminal*** ***No. 26 — No. 25:***	Is the resistance more than 1 MΩ?	Go to step **11**.	Replace main fan relay.
11	**CHECK MAIN FAN RELAY.** 1) Connect battery to terminals No. 27 and No. 28 of main fan relay. 2) Measure resistance of main fan relay. ***Terminal*** ***No. 26 — No. 25:***	Is the resistance less than 1 Ω?	Go to step **12**.	Replace main fan relay.
12	**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 terminal. ***Connector & terminal*** ***(F17) No. 2 — (F66) No. 25:***	Is the resistance less than 1 Ω?	Go to step **13**.	Repair open circuit in harness between main fan motor connector and main fan relay terminal.
13	**CHECK HARNESS BETWEEN MAIN FAN RELAY AND ECM.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between main fan relay connector and ECM connector. ***Connector & terminal*** ***(F66) No. 27 — (B134) No. 3:***	Is the resistance less than 1 Ω?	Go to step **14**.	Repair open circuit in harness between main fan relay and ECM.
14	**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 SOA (distributor) service.

NOTE:
Inspection by SOA (distributor) service is required, because probable cause is deterioration of multiple parts.

3. Radiator Sub Fan System *S176733*

A: SCHEMATIC *S176733A21*



B: INSPECTION S176733A10

NOTE:
System for A/C equipped vehicles only.

DETECTING CONDITION:

Condition (1):
- Engine coolant temperature is below 95°C (203°F).
- A/C switch is turned ON.
- Vehicle speed is below 19 km/h (12 MPH).

Condition (2):
- Engine coolant temperature is above 100°C (212°F).
- A/C switch is turned OFF.
- Vehicle speed is below 19 km/h (12 MPH).

TROUBLE SYMPTOM:
- Radiator sub fan does not rotate under conditions (1) and (2) above.

No.	Step	Check	Yes	No
1	**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 and main fan motor. 3) Start the engine, and warm it up until engine coolant temperature increases over 100°C (212°F). 4) Stop the engine and turn ignition switch to ON. 5) Measure voltage between sub fan motor connector and chassis ground. ***Connector & terminal*** ***(F16) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2**.	Go to step **5**.
2	**CHECK GROUND CIRCUIT OF SUB FAN MOTOR.** 1) Turn ignition switch to OFF. 2) Measure resistance between sub fan motor connector and chassis ground. ***Connector & terminal*** ***(F16) No. 1 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3**.	Repair open circuit in harness between sub fan motor connector and chassis ground.
3	**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 **4**.
4	**CHECK SUB FAN MOTOR.** Connect battery positive (+) terminal to terminal No. 2, and negative (−) terminal to terminal No. 1 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.
5	**CHECK POWER SUPPLY TO SUB FAN RELAY.** 1) Turn ignition switch to OFF. 2) Remove sub fan relay from A/C relay holder. 3) Measure voltage between sub fan relay terminal and chassis ground. ***Connector & terminal*** ***(F28) No. 23 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **6**.	Go to step **7**.
6	**CHECK POWER SUPPLY TO SUB FAN RELAY.** 1) Turn ignition switch to ON. 2) Measure voltage between sub fan relay terminal and chassis ground. ***Connector & terminal*** ***(F28) No. 21 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **10**.	Go to step **9**.

No.	Step	Check	Yes	No
7	**CHECK 20 A FUSE.** 1) Remove 20 A fuse from A/C relay holder. 2) Check condition of fuse.	Is the fuse blown-out?	Replace fuse.	Go to step **8**.
8	**CHECK POWER SUPPLY TO A/C RELAY HOLDER 20 A FUSE TERMINAL.** Measure voltage of harness between A/C relay holder 20 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 20 A fuse and sub fan relay terminal.	Repair open circuit in harness between main fuse box connector and 20 A fuse terminal.
9	**CHECK FUSE.** 1) Turn ignition switch to OFF. 2) Remove fuse No. 17 from joint box. 3) Check condition of fuse.	Is the fuse blown-out?	Replace fuse.	Repair open circuit in harness between sub fan relay and ignition switch.
10	**CHECK SUB FAN RELAY.** 1) Turn ignition switch to OFF. 2) Measure resistance of sub fan relay. ***Terminal*** ***No. 23 — No. 24:***	Is the resistance more than 1 MΩ?	Go to step **11**.	Replace sub fan relay.
11	**CHECK SUB FAN RELAY.** 1) Connect battery to terminals No. 21 and No. 22 of sub fan relay. 2) Measure resistance of sub fan relay. ***Terminal*** ***No. 23 — No. 24:***	Is the resistance less than 1 Ω?	Go to step **12**.	Replace sub fan relay.
12	**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 terminal. ***Connector & terminal*** ***(F16) No. 2 — (F28) No. 24:***	Is the resistance less than 1 Ω?	Go to step **13**.	Repair open circuit in harness between sub fan motor and sub fan relay connector.
13	**CHECK HARNESS BETWEEN SUB FAN RELAY AND ECM.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between sub fan relay connector and ECM connector. ***Connector & terminal*** ***(F28) No. 22 — (B134) No. 12:***	Is the resistance less than 1 Ω?	Go to step **14**.	Repair open circuit in harness between sub fan relay and ECM.
14	**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 SOA (distributor) service.

NOTE:
Inspection by SOA (distributor) service is required, because probable cause is deterioration of multiple parts.

4. Engine Coolant S176060

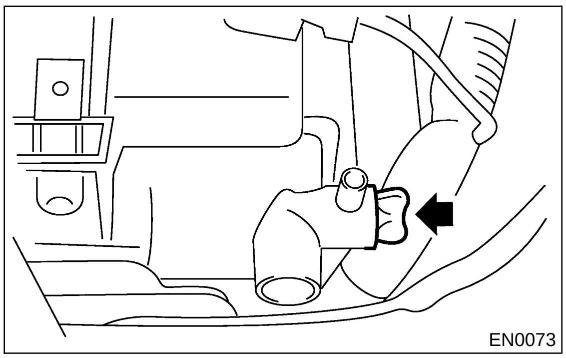
A: REPLACEMENT S176060A20

1. DRAINING OF ENGINE COOLANT

S176060A2001

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.


EN0073

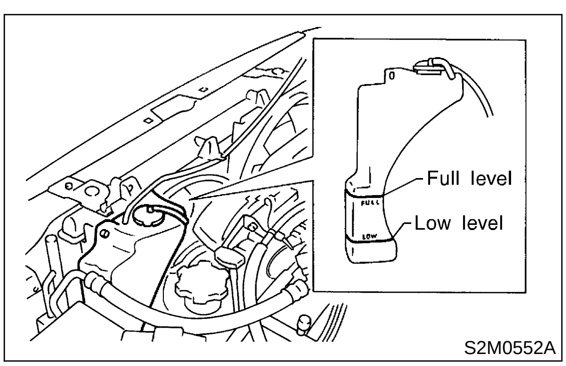
2. FILLING OF ENGINE COOLANT S176060A2002

1) Fill engine coolant into radiator up to filler neck position.

Coolant capacity (fill up to "FULL" level):
AT model
Approx. 6.4 ℓ (6.8 US qt, 5.6 Imp qt)
MT model
Approx. 6.3 ℓ (6.7 US qt, 5.5 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.



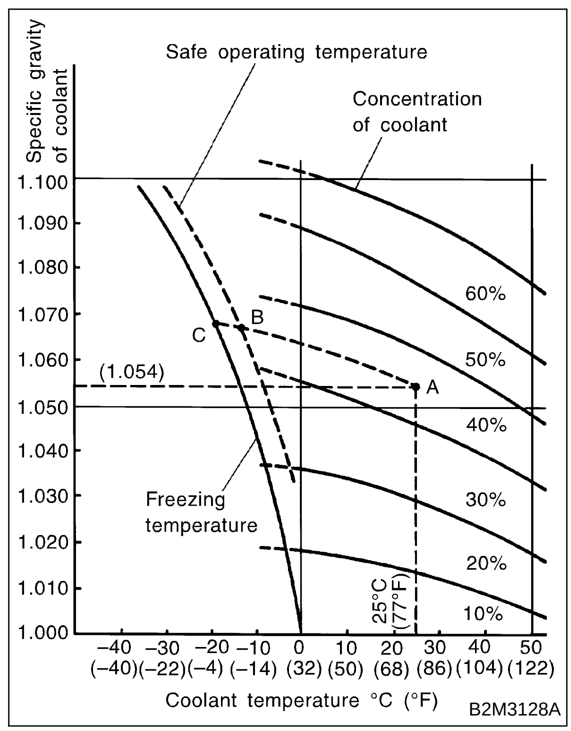
S2M0552A

3) Warm-up engine completely for more than five minutes at 2,000 to 3,000 rpm.
4) If engine coolant level drops in radiator, add engine coolant to filler neck position.
5) If engine coolant level drops from upper level of reservoir tank, add engine coolant to upper level.
6) Attach radiator cap and reservoir tank cap properly.

B: INSPECTION S176060A10

1. RELATIONSHIP OF SUBARU COOLANT CONCENTRATION AND FREEZING TEMPERATURE S176060A1001

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).



B2M3128A

2. PROCEDURE TO ADJUST THE CONCENTRATION OF THE COOLANT

S176060A1002

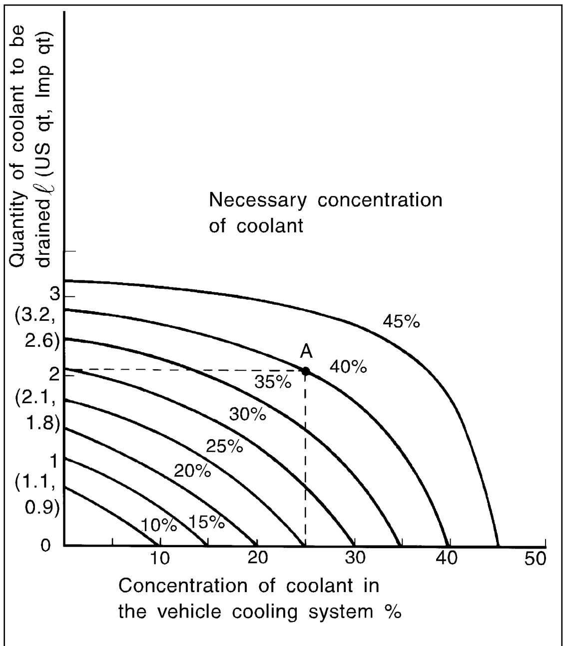
To adjust the concentration of the coolant according to temperature, find the proper fluid concentration in the above diagram and replace the necessary amount of coolant with an undiluted solution of SUBARU genuine coolant (concentration 50%).

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.



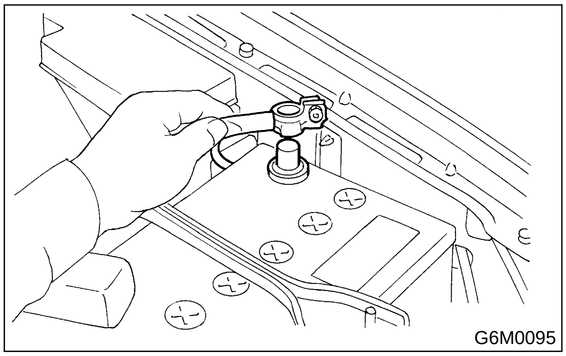
Concentration of coolant in vehicle and quantity to be drained

B2M3129A

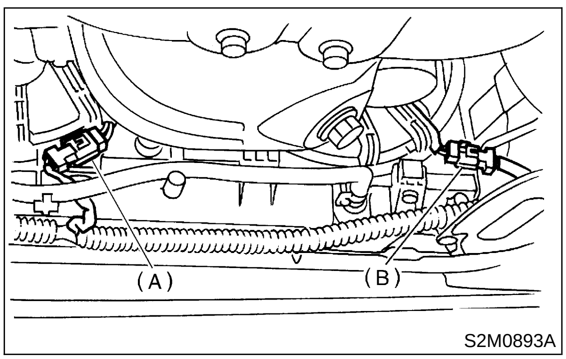
5. Water Pump *S176061*

A: REMOVAL *S176061A18*

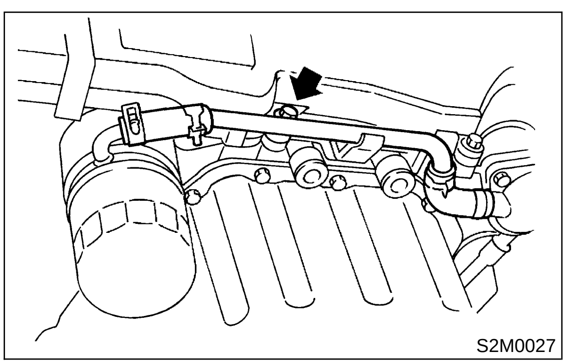
1) Disconnect battery ground cable.



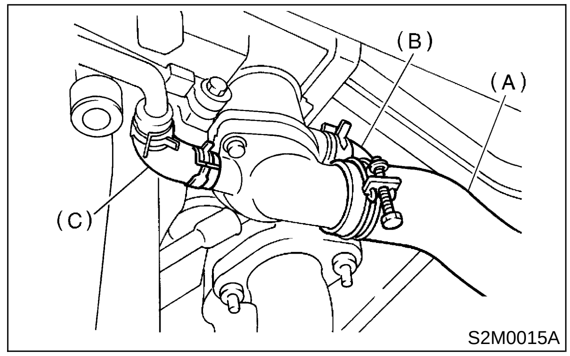
2) Lift-up the vehicle.
3) Remove under cover.
4) Drain engine coolant completely.
<Ref. to CO-12, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
5) Disconnect connectors from radiator main fan (A) and sub fan (B) motors.



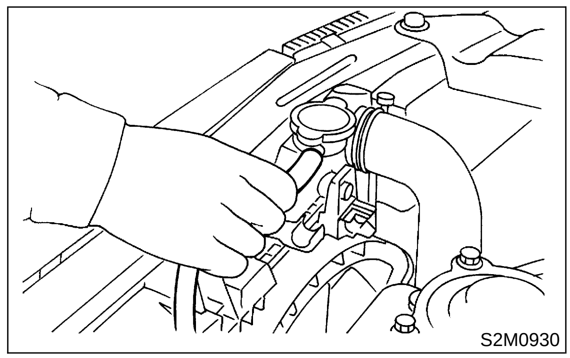
6) Remove bolt which installs water by-pass pipe of oil cooler onto oil pump. (AT vehicles only)



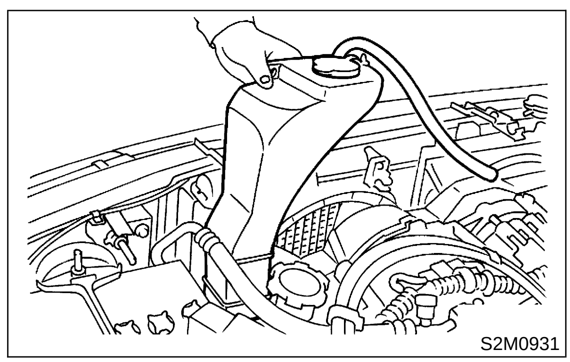
7) Disconnect radiator outlet hose (A) and heater hose (B) from water pump.
8) Disconnect water by-pass hose (C). (AT vehicles only)



9) Lower the vehicle.
10) Disconnect over flow hose.

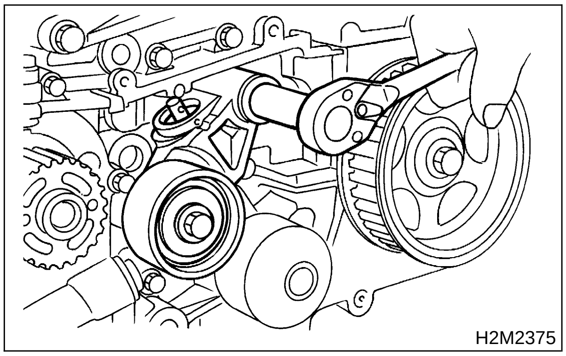


11) Remove reservoir tank.

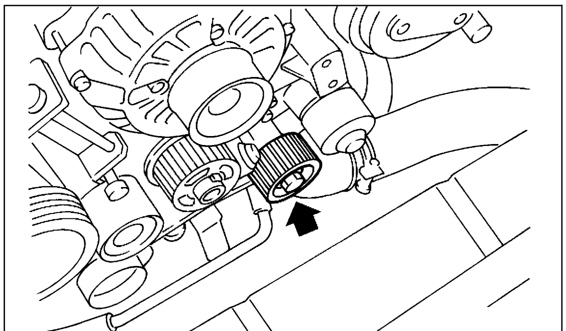


12) Remove radiator main fan and sub fan assemblies. <Ref. to CO-26, REMOVAL, Radiator Main Fan and Fan Motor.> and <Ref. to CO-28, REMOVAL, Radiator Sub Fan and Fan Motor.>
13) Remove V-belts.
<Ref. to ME-42, REMOVAL, V-belt.>
14) Remove timing belt.
<Ref. to ME-46, TIMING BELT, REMOVAL, Timing Belt Assembly.>

15) Remove automatic belt tension adjuster.


H2M2375

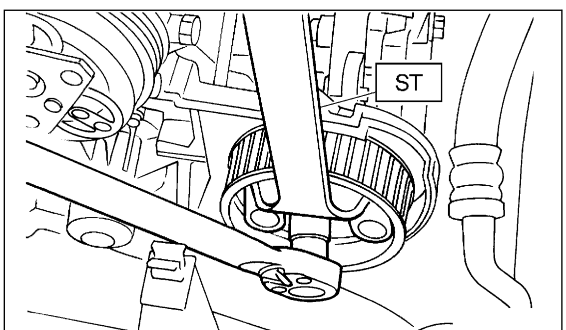
16) Remove belt idler No. 2.


S2M0024

17) Remove camshaft position sensor <Ref. to FU-29, REMOVAL, Camshaft Position Sensor.>

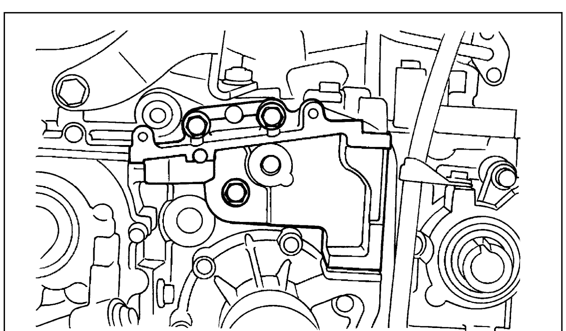
18) Remove left-hand camshaft sprocket by using ST.

ST 499207100 CAMSHAFT SPROCKET WRENCH

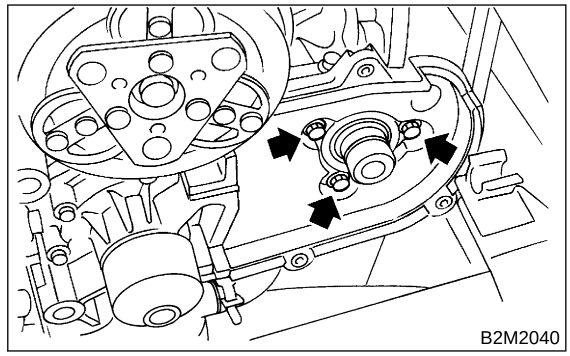


B2M2039A

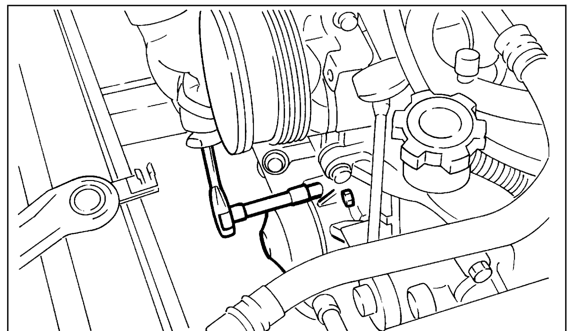
19) Remove tensioner bracket.


H2M2380

20) Remove left-hand belt cover No. 2.


B2M2040

21) Remove water pump.


B2M3894

B: INSTALLATION S176061A11

1) Install water pump onto left-hand cylinder head.

CAUTION:

- **Replace gasket with a new one.**
- **When installing water pump, tighten bolts in two stages in alphabetical sequence as shown in figure.**

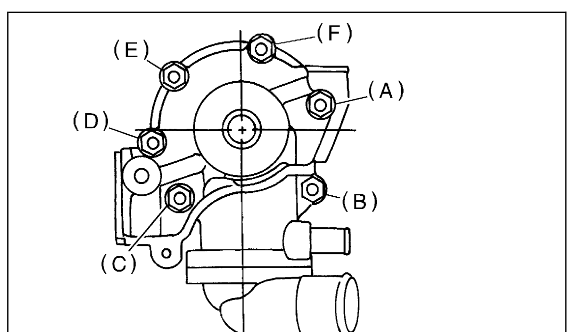
Tightening torque:

First:

12 N·m (1.2 kgf-m, 8.7 ft-lb)

Second:

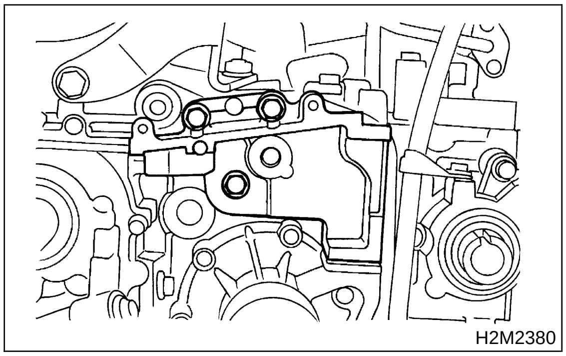
12 N·m (1.2 kgf-m, 8.7 ft-lb)



S2M0760A

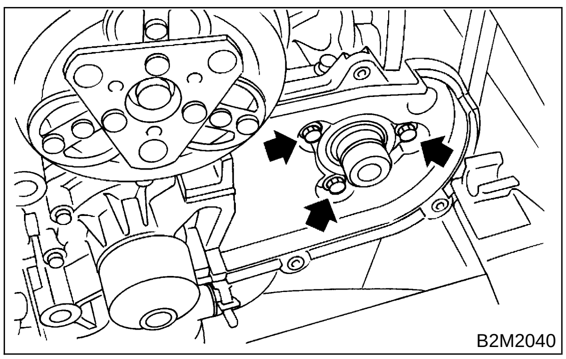
2) Install tensioner bracket.

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



3) Install left-hand belt cover No. 2.

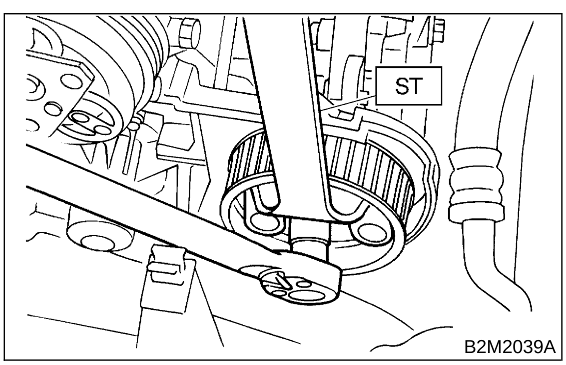
Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



4) Install left-hand camshaft sprockets by using ST.

ST 4992707100 CAMSHAFT SPROCKET WRENCH

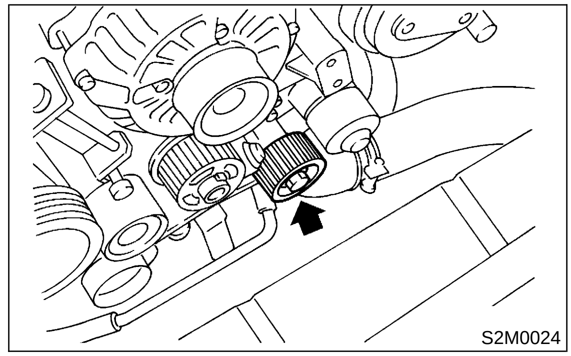
Tightening torque:
78 N·m (8.0 kgf-m, 57.9 ft-lb)



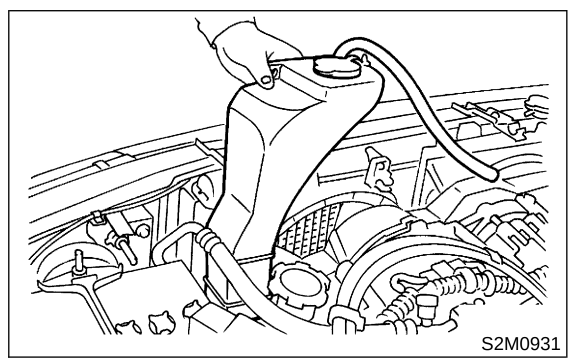
5) Install camshaft position sensor <Ref. to FU-29, INSTALLATION, Camshaft Position Sensor.>

6) Install belt idler No. 2.

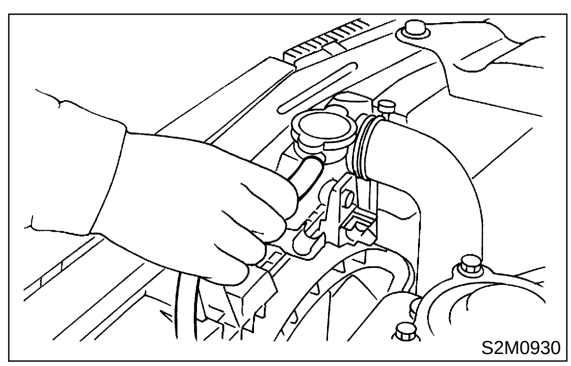
Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)



7) Install automatic belt tension adjuster. <Ref. to ME-47, AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER, INSTALLATION, Timing Belt Assembly.>
8) Install timing belt. <Ref. to ME-48, TIMING BELT, INSTALLATION, Timing Belt Assembly.>
9) Install V-belts. <Ref. to ME-42, INSTALLATION, V-belt.>
10) Install radiator main fan and sub fan motor assemblies. <Ref. to CO-26, INSTALLATION, Radiator Main Fan and Fan Motor.> and <Ref. to CO-28, INSTALLATION, Radiator Sub Fan and Fan Motor.>
11) Install reservoir tank.

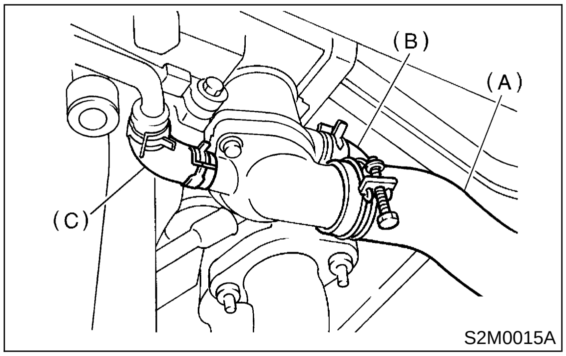


12) Connect over flow hose.



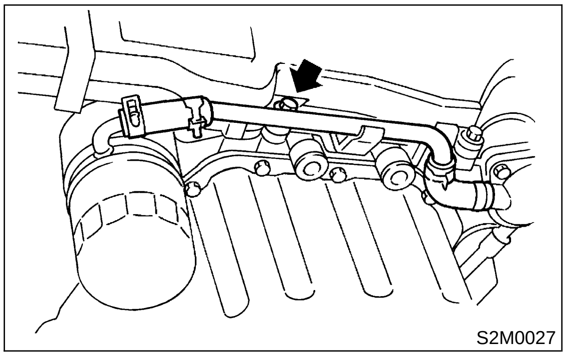
13) Lift-up the vehicle.

14) Connect radiator outlet hose (A) and heater hose (B) to water pump.
15) Connect water by-pass hose (C). (AT vehicles only)

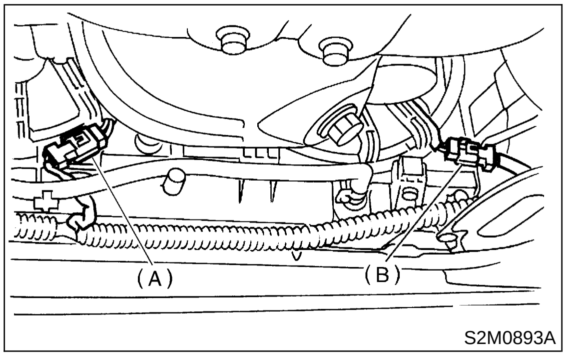


S2M0015A

16) Install bolt which installs water by-pass pipe onto oil pump. (AT vehicles only)

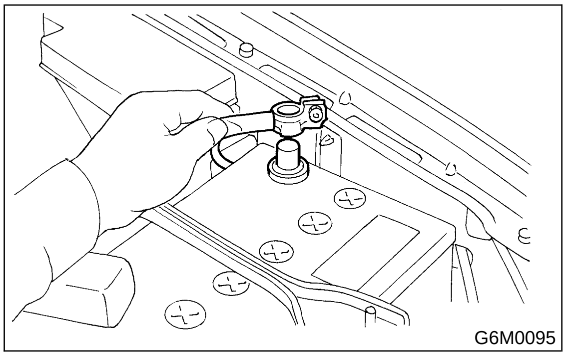

S2M0027

17) Connect connectors to radiator main fan (A) and sub fan (B) motors.



S2M0893A

18) Install under cover.
19) Lower the vehicle.
20) Connect battery ground cable.

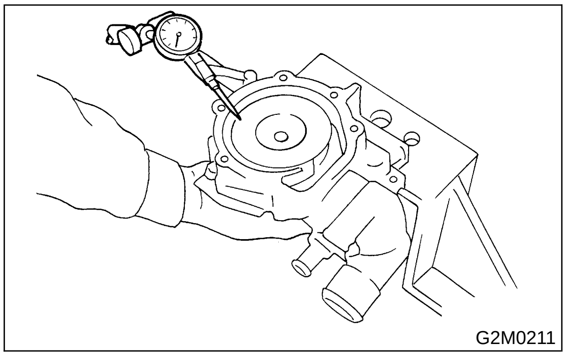

G6M0095

21) Fill coolant. <Ref. to CO-12, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

C: INSPECTION *S176061A10*

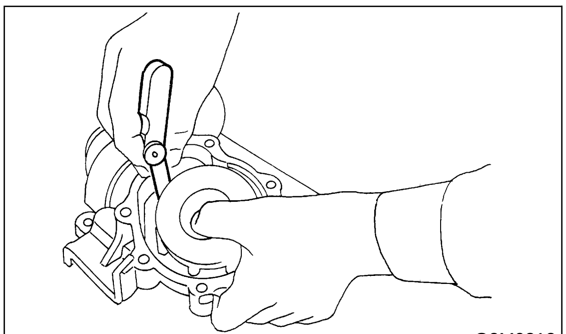
1) Check water pump bearing for smooth rotation.
2) Check water pump pulley for abnormalities.
3) Using a dial gauge, measure impeller runout in thrust direction while rotating the pulley.

"Thrust" runout limit:
0.5 mm (0.020 in)


G2M0211

4) Check clearance between impeller and pump case.

Clearance between impeller and pump case:
Standard
0.5 — 0.7 mm (0.020 — 0.028 in)
Limit
1.0 mm (0.039 in)

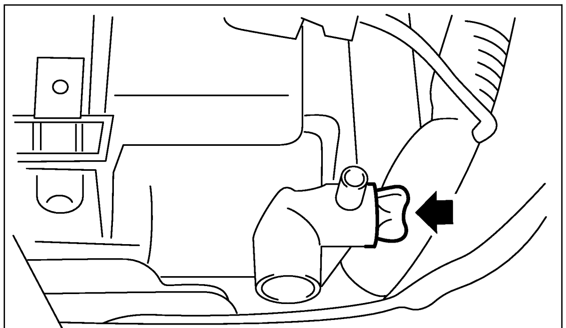

G2M0212

5) After water pump installation, check pulley shaft for engine coolant leaks. If leaks are noted, replace water pump assembly.

6. Thermostat *S176062*

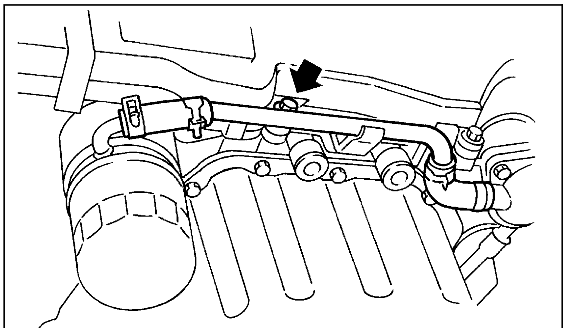
A: REMOVAL *S176062A18*

1) Lift-up the vehicle.
2) Remove under cover.
3) Drain engine coolant completely. <Ref. to CO-12, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>



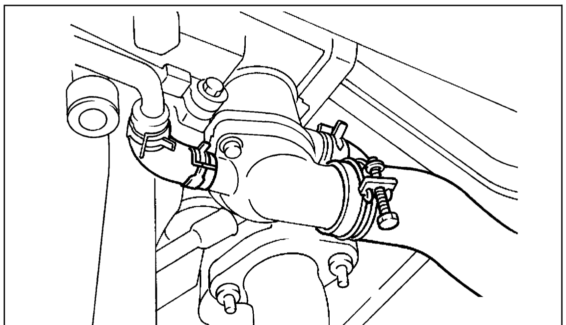
EN0073

4) Remove bolt which installs water by-pass pipe of oil cooler onto oil pump. (AT vehicles only)



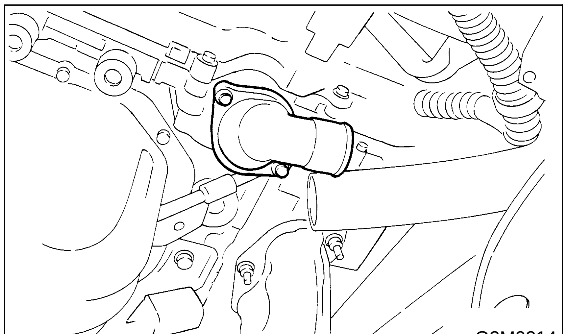
S2M0027

5) Disconnect radiator outlet hose and water by-pass hose B (AT vehicles) from thermostat cover.



S2M0015

6) Remove thermostat cover and gasket, and pull out the thermostat.



G2M0214

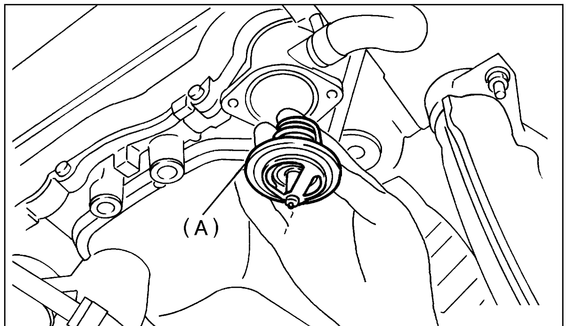
B: INSTALLATION *S176062A11*

1) Install the thermostat in the water pump, 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)



EN0100

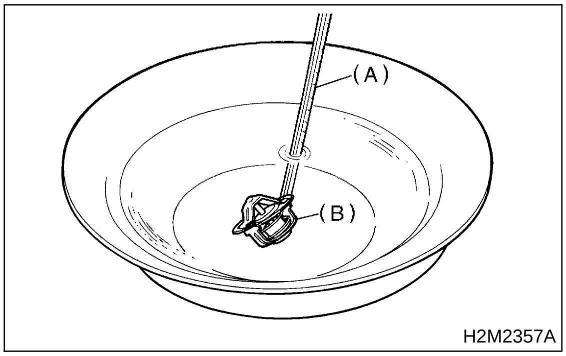
2) Fill coolant. <Ref. to CO-12, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

C: INSPECTION *S176062A10*

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 open. During the test, agitate the water for even temperature distribution. The measurement should be to the specification.

Starts to open:
76 — 80°C (169 — 176°F)

Fully opens:
91°C (196°F)

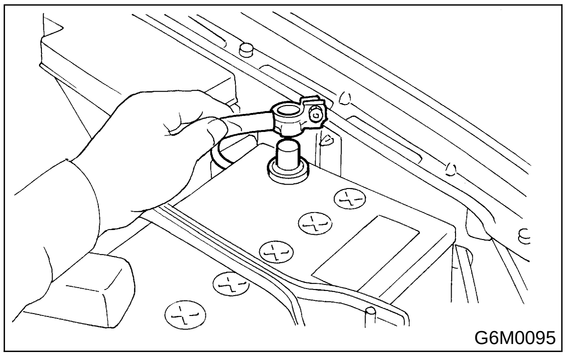


(A) Thermometer
(B) Thermostat

7. Radiator *S176058*

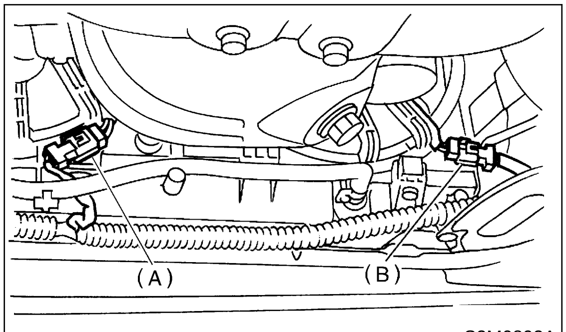
A: REMOVAL *S176058A18*

1) Disconnect battery ground cable.



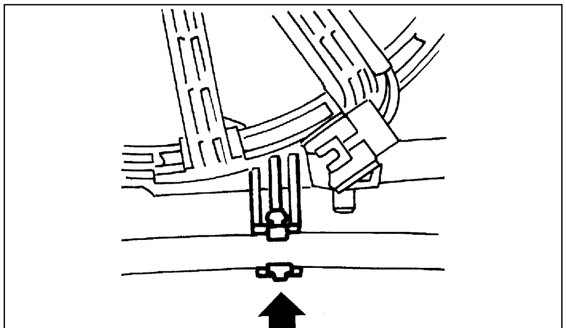
G6M0095

2) Lift-up the vehicle.
3) Drain engine coolant completely. <Ref. to CO-12, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
4) Disconnect connectors of radiator main fan (A) and sub fan (B) motor.



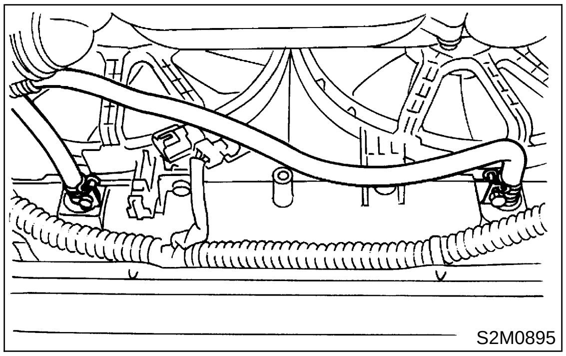
S2M0893A

5) Detach ATF cooler hose attached to a clip under the radiator main fan shroud. (AT vehicles only)



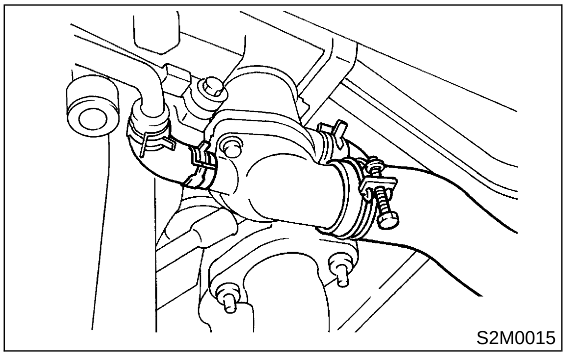
H2M3592

6) Disconnect ATF cooler hoses from radiator. (AT vehicles only)



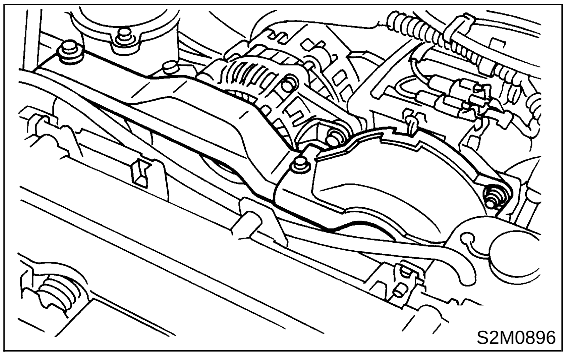
S2M0895

7) Disconnect radiator outlet hose from thermostat cover.



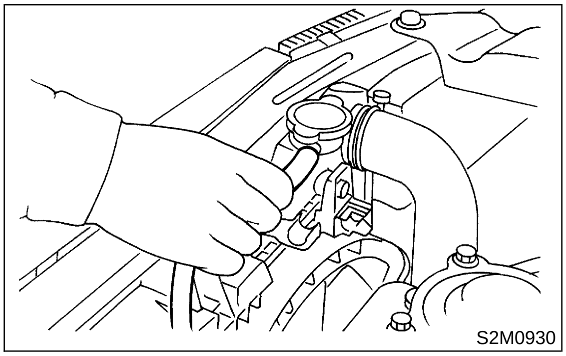
S2M0015

8) Lower the vehicle.
9) Remove V-belt covers.



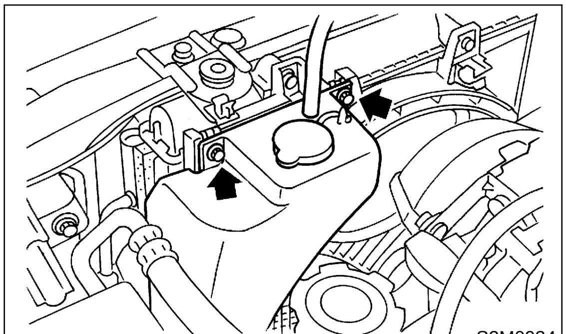
S2M0896

10) Disconnect over flow hose.

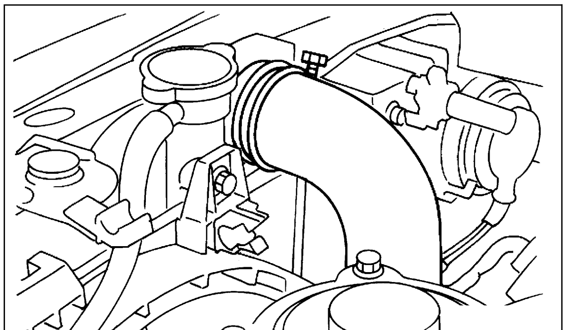


S2M0930

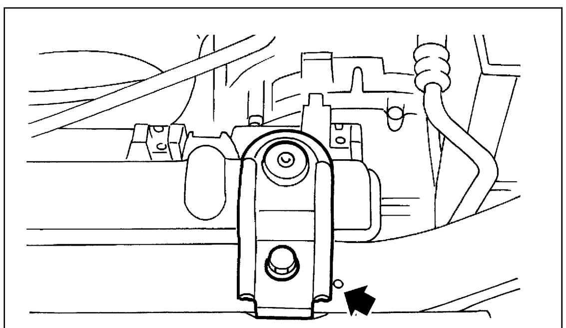
11) Remove reservoir tank.


S2M0934

12) Disconnect radiator inlet hose from radiator.


S2M0897

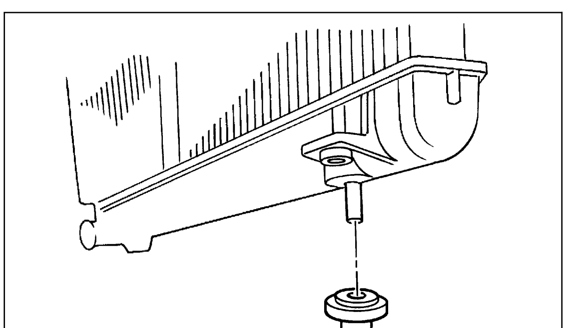
13) Remove radiator upper brackets.


S2M1167

14) While slightly lifting radiator, slide it to left.
15) Lift radiator up and away from vehicle.

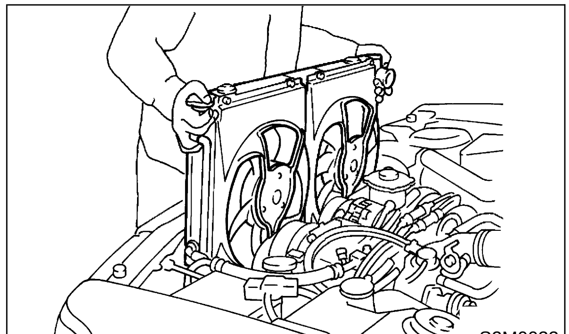
B: INSTALLATION S176058A11

1) Attach radiator mounting cushions to pins on the lower side of radiator.


S2M0944

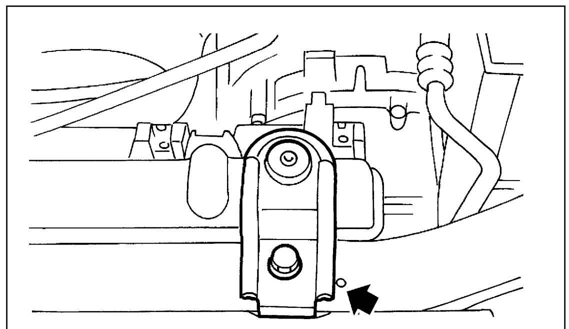
2) Install radiator while fitting radiator pins to cushions.

NOTE:
Fit pins on lower side of radiator into cushions on body side.

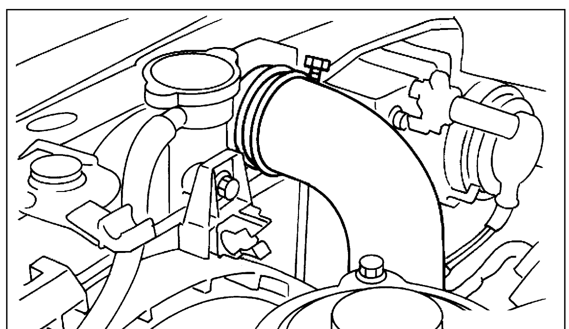

S2M0033

3) Install radiator brackets and tighten bolts.

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

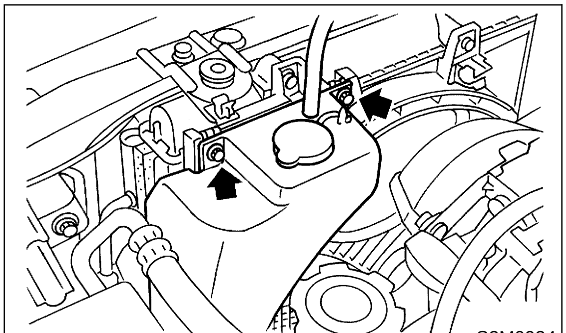

S2M1167

4) Connect radiator inlet hose.

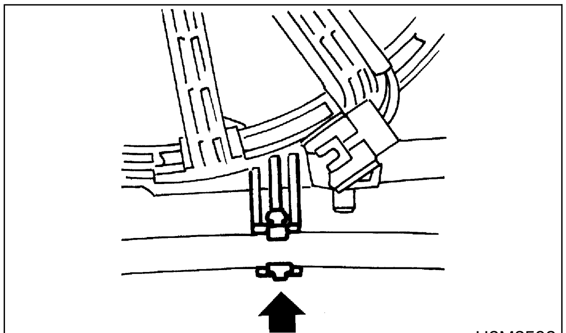

S2M0897

5) Install reservoir tank.

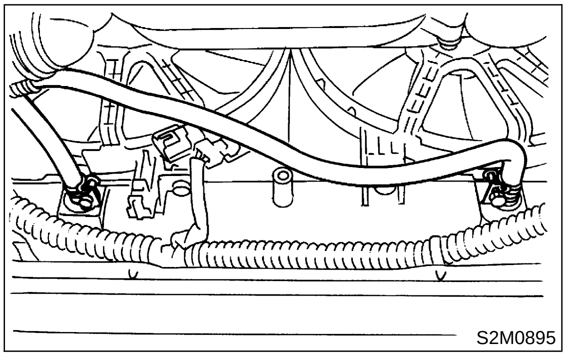
Tightening torque:
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)


S2M0934

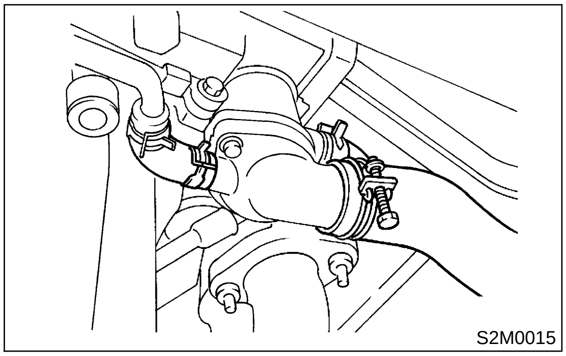
6) Lift-up the vehicle.
7) Attach ATF cooler hose to a clip under the radiator main fan shroud. (AT vehicles only)


H2M3592

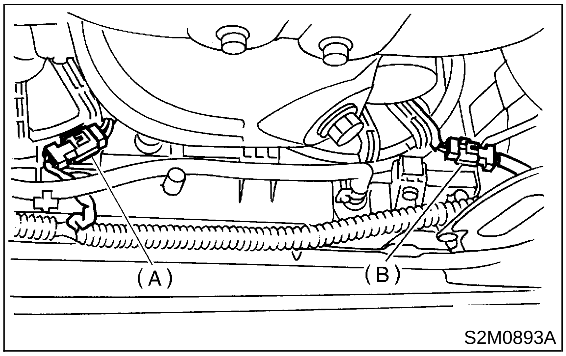
8) Connect ATF cooler hoses. (AT vehicles only)


S2M0895

9) Connect radiator outlet hose.

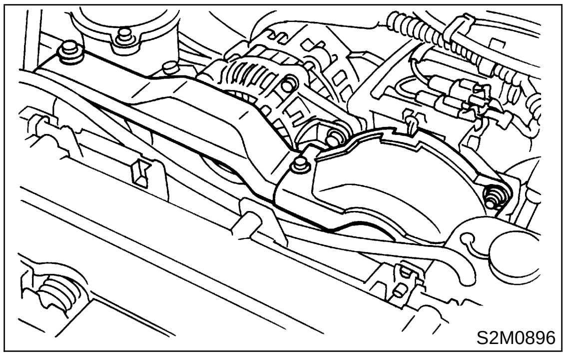

S2M0015

10) Connect connectors to radiator main fan motor (A) and sub fan motor (B).

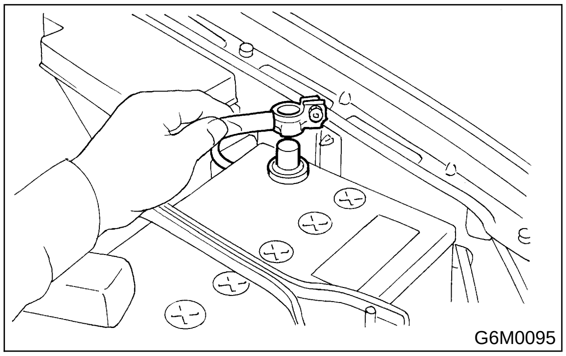


S2M0893A

11) Install under cover.
12) Lower the vehicle.
13) Install V-belt covers.


S2M0896

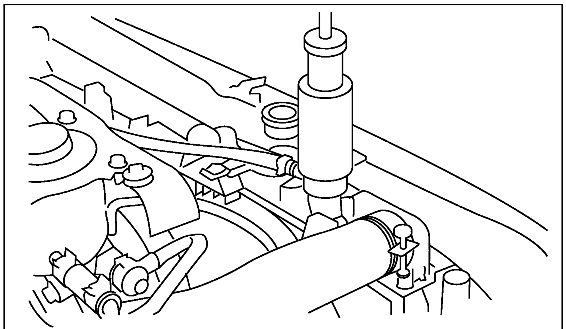
14) Connect battery ground cable.


G6M0095

15) Fill coolant. <Ref. to CO-12, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
16) Check ATF level. <Ref. to AT-9, INSPECTION, Automatic Transmission Fluid.>

C: INSPECTION *S176058A10*

1) Remove radiator cap, top off radiator, and attach tester to radiator in place of cap.



S2M2149

2) Apply a pressure of 157 kPa (1.6 kg/cm^2, 23 psi) to radiator to check if:

(1) Engine coolant leaks at/around radiator.

(2) Engine coolant leaks at/around hoses or connections.

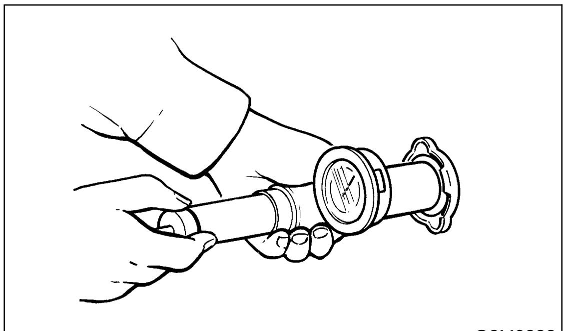
CAUTION:

- **Engine should be off.**
- **Wipe engine coolant from check points in advance.**
- **Be careful to prevent engine coolant from spurting out when removing tester.**
- **Be careful also not to deform filler neck of radiator when installing or removing tester.**

8. Radiator Cap *S176064*

A: INSPECTION *S176064A10*

1) Attach radiator cap to tester.


G2M0223

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/cm^2, 14 — 18 psi)

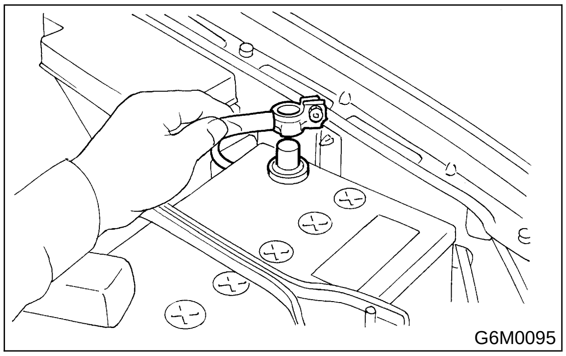
Service limit pressure:
83 kPa (0.85 kg/cm^2, 12 psi)

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 S176059

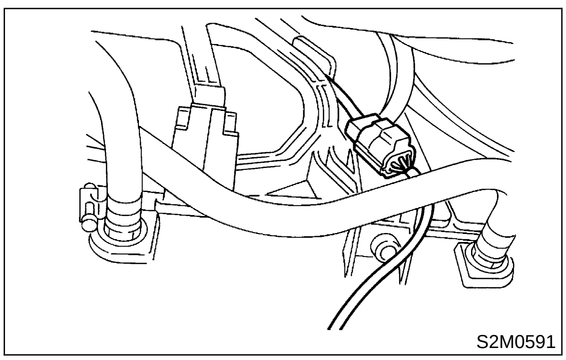
A: REMOVAL S176059A18

1) Disconnect battery ground cable.



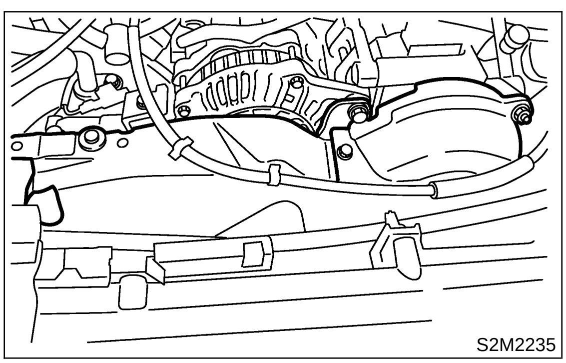
G6M0095

2) Lift-up the vehicle.
3) Remove under cover.
4) Disconnect connector of main fan motor.



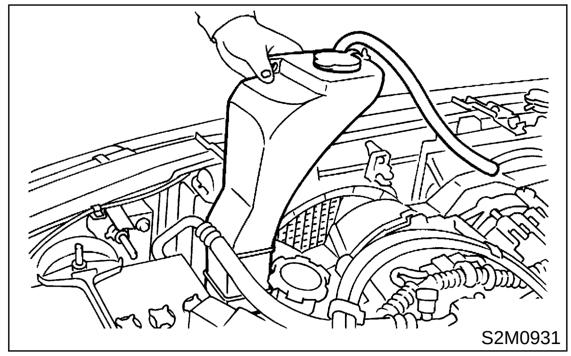
S2M0591

5) Lower the vehicle.
6) Remove V-belt cover.



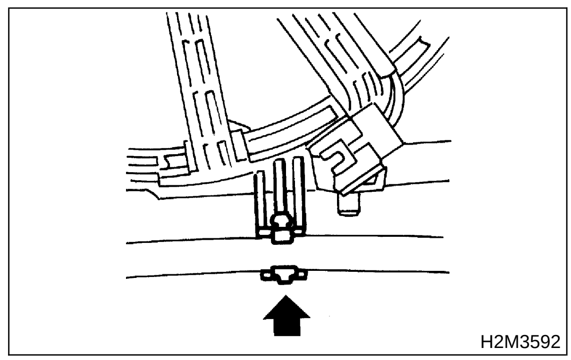
S2M2235

7) Disconnect over flow hose.
8) Remove reservoir tank.



S2M0931

9) Lift-up radiator main fan motor assembly.
10) While lifting up radiator main fan motor assembly, detach oil cooler hose attached to a clip under the radiator main fan shroud. (AT vehicles only)



H2M3592

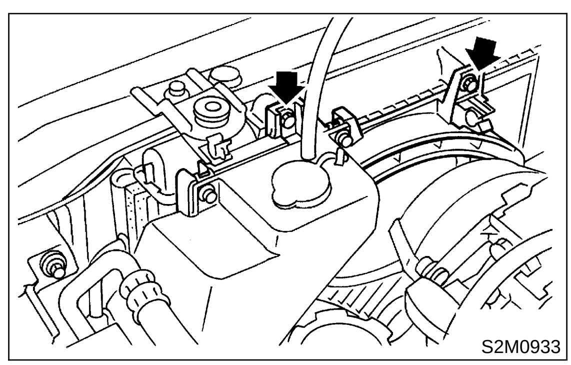
11) Remove radiator main fan motor assembly.

B: INSTALLATION S176059A11

Install in the reverse order of removal.

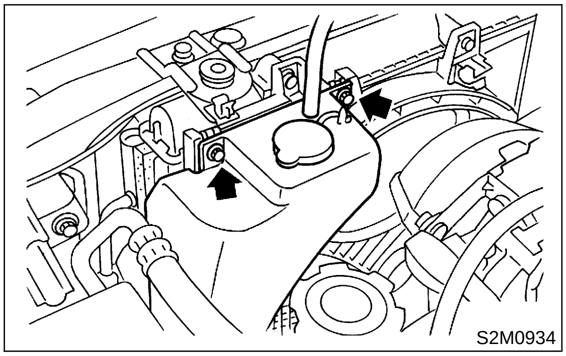
NOTE:
When the main fan motor assembly cannot be installed as is, loosen the sub fan motor assembly securing bolts to install it.

Tightening torque:
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)



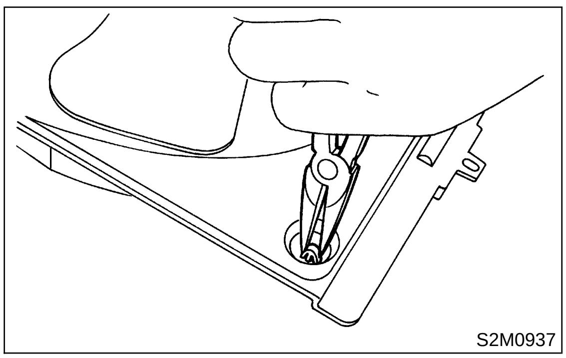
S2M0933

Tightening torque:
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)

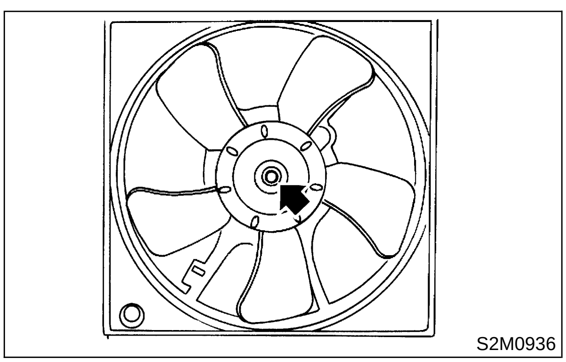

S2M0934

C: DISASSEMBLY *S176059A06*

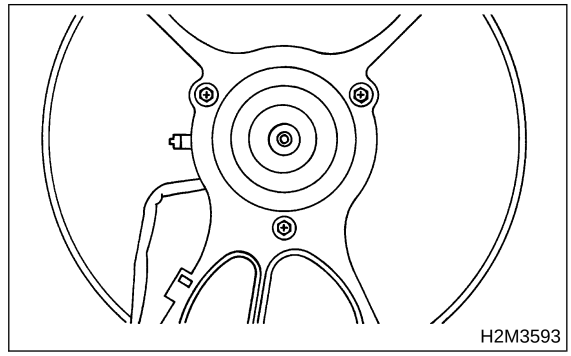
1) Remove clip which holds motor connector onto shroud.


S2M0937

2) Remove nut which holds fan itself onto fan motor and shroud assembly.


S2M0936

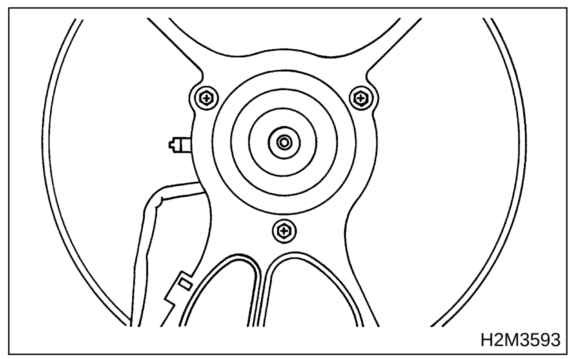
3) Remove bolts which install fan motor onto shroud.


H2M3593

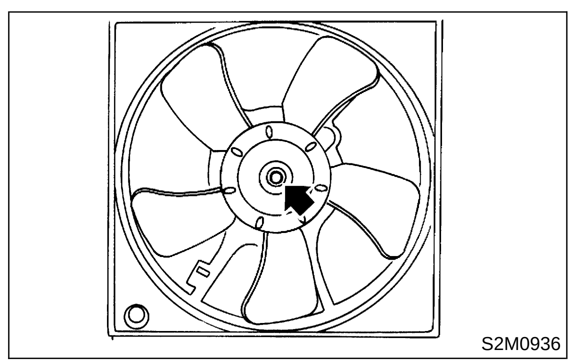
D: ASSEMBLY *S176059A02*

Assemble in the reverse order of disassembly.

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


H2M3593

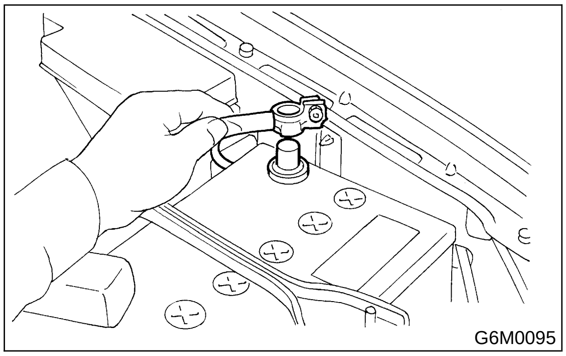
Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)


S2M0936

10. Radiator Sub Fan and Fan Motor S176074

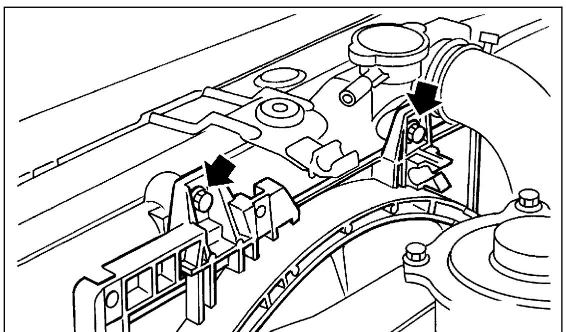
A: REMOVAL S176074A18

1) Disconnect battery ground cable.



G6M0095

2) Lift-up the vehicle.
3) Remove under cover.
4) Disconnect connector of sub fan motor.
5) Lower the vehicle.
6) Remove bolts which hold sub fan shroud to radiator.
7) Remove radiator sub fan shroud through the under side of vehicle.

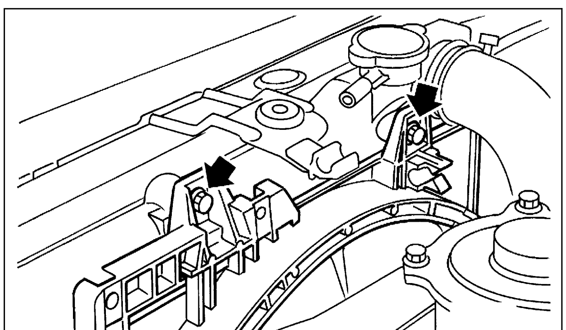


S2M0935

B: INSTALLATION S176074A11

Install in the reverse order of removal.

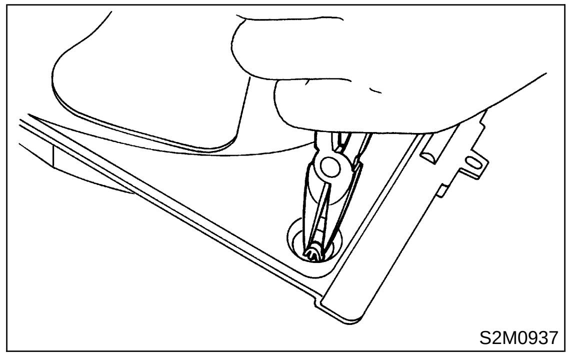
Tightening torque:
 4.9 N·m (0.50 kgf-m, 3.6 ft-lb)



S2M0935

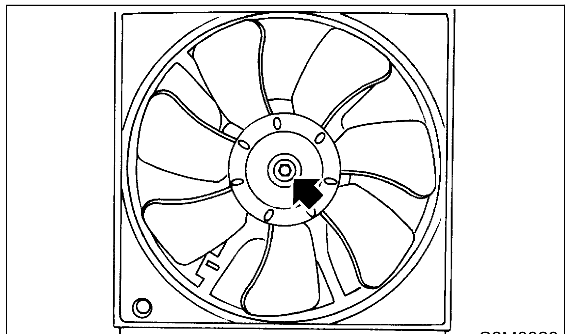
C: DISASSEMBLY S176074A06

1) Remove clip which holds motor harness onto shroud.



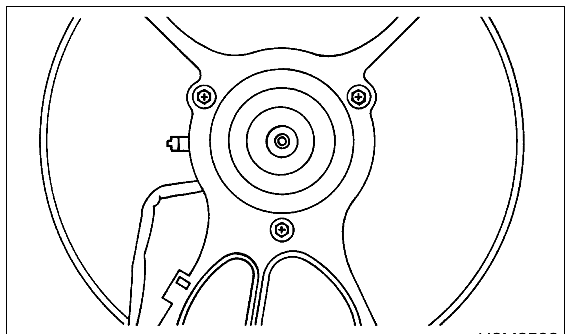
S2M0937

2) Remove nut which holds fan itself onto fan motor and shroud assembly.



S2M0939

3) Remove bolts which install fan motor onto shroud.

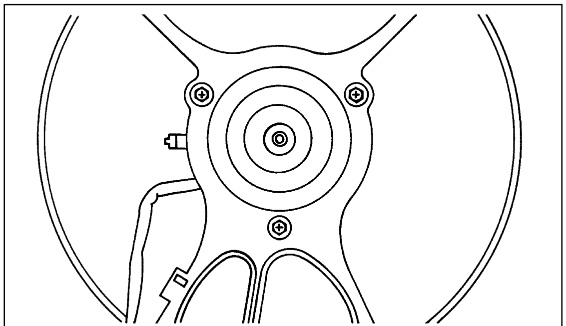


H2M3593

D: ASSEMBLY *S176074A02*

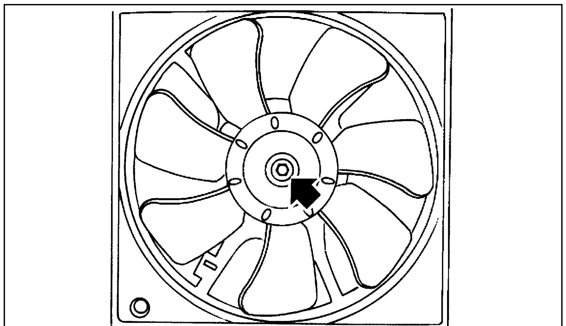
Assemble in the reverse order of disassembly.

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



H2M3593

Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)

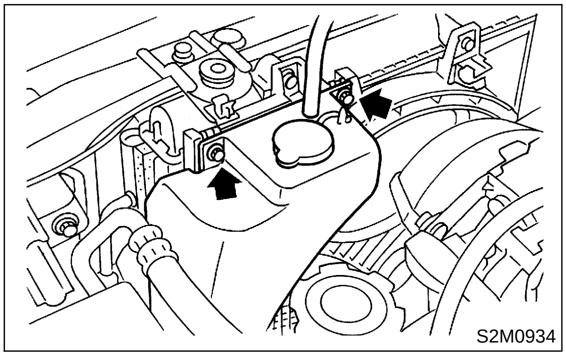


S2M0939

11. Reservoir Tank *S176075*

A: REMOVAL *S176075A18*

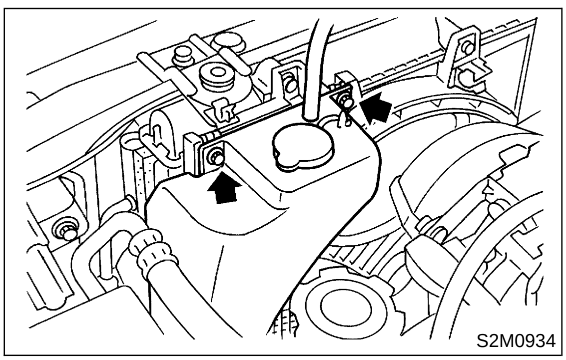
1) Disconnect over flow hose from radiator filler neck position.
2) Remove bolts which install reservoir tank onto radiator main fan shroud.
3) Remove reservoir tank.



B: INSTALLATION *S176075A11*

Install in the reverse order of removal.

Tightening torque:
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)



C: INSPECTION *S176075A10*

Make sure the engine coolant level is between full and low.

12. Engine Cooling System Trouble in General S176078

A: INSPECTION S176078A10

Trouble	Possible cause	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-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-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.

MEMO:

LUBRICATION

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1.	General Description	2
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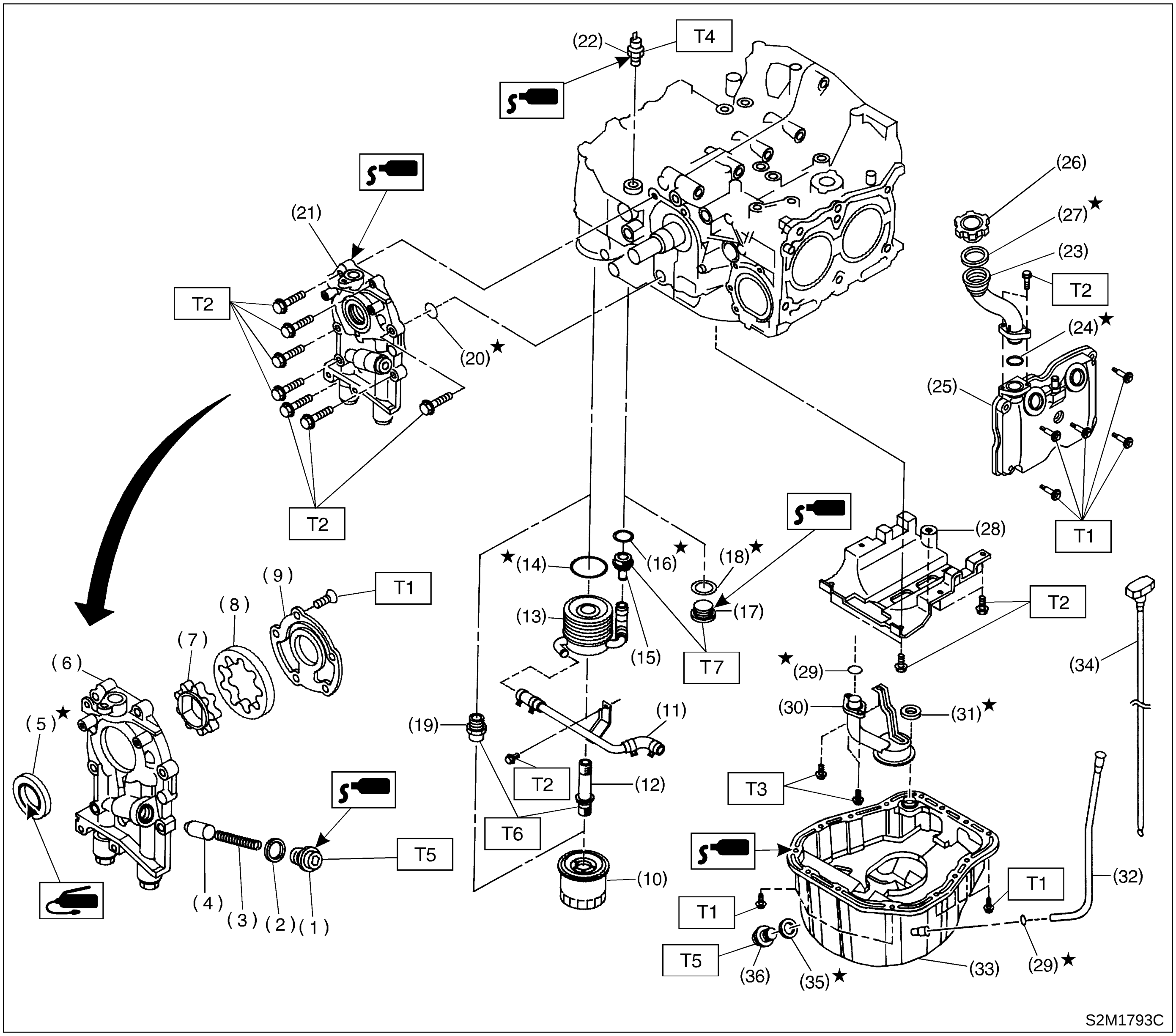
4.	Oil Pump	11
5.	Oil Pan and Strainer	15
6.	Oil Pressure Switch	18
7.	Engine Oil Cooler	19
8.	Engine Oil Filter	21
9.	Engine Lubrication System Trouble in General	22

1. General Description S178001

A: SPECIFICATIONS S178001E49

Lubrication method					Forced lubrication
Oil pump	Pump type				Trochoid type
	Number of teeth		Inner rotor		9
			Outer rotor		10
	Outer rotor diameter × thickness				78 × 9 mm (3.07 × 0.35 in)
	Tip clearance between inner and outer rotor			STANDARD	0.04 — 0.14 mm (0.0016 — 0.0055 in)
				LIMIT	0.18 mm (0.0071 in)
	Side clearance between inner rotor and pump case			STANDARD	0.02 — 0.07 mm (0.0008 — 0.0028 in)
				LIMIT	0.12 mm (0.0047 in)
	Case clearance between outer rotor and pump case			STANDARD	0.10 — 0.175 mm (0.0039 — 0.0069 in)
				LIMIT	0.20 mm (0.0079 in)
	Capacity at 80°C (176°F)	600 rpm	Discharge	- pressure	98 kPa (1.0 kg/cm^2, 14 psi)
				- quantity	4.6 ℓ (4.9 US qt, 4.0 Imp qt)/min.
		5,000 rpm	Discharge	- pressure	294 kPa (3.0 kg/cm^2, 43 psi)
				- quantity	47.0 ℓ (12.4 US gal, 10.3 Imp gal)/min.
	Relief valve operation pressure				588 kPa (6.0 kg/cm^2, 85 psi)
Oil filter	Type				Full-flow filter type
	Filtration area				1,000 cm^2 (155 sq in)
	By-pass valve opening pressure				157 kPa (1.6 kg/cm^2, 23 psi)
	Outer diameter × width				80 × 70 mm (3.15 × 2.76 in)
	Oil filter to engine thread size				M 20 × 1.5
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 (at replacement)					4.0 ℓ (4.2 US qt, 3.5 Imp qt)

B: COMPONENT *S178001A05*



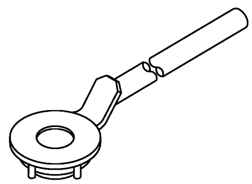
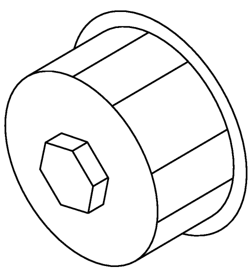
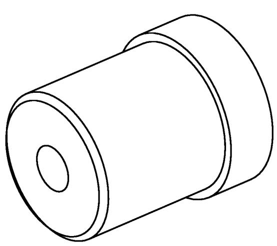
(1) Plug
(2) Washer
(3) Relief valve spring
(4) Relief valve
(5) Oil seal
(6) Oil pump case
(7) Inner rotor
(8) Outer rotor
(9) Oil pump cover
(10) Oil filter
(11) Oil cooler pipe and hose ASSY (AT vehicles)
(12) Connector (AT vehicles)
(13) Oil cooler (AT vehicles)
(14) O-ring (AT vehicles)
(15) Nipple (AT vehicles)
(16) Gasket (AT vehicles)
(17) Oil cooler connector (MT vehicles)
(18) Gasket (MT vehicles)
(19) Oil filter connector (MT vehicles)
(20) O-ring
(21) Oil pump ASSY
(22) Oil pressure switch
(23) Oil filler duct
(24) O-ring
(25) Cylinder head cover
(26) Oil filler cap
(27) O-ring
(28) Baffle plate
(29) O-ring
(30) Oil strainer
(31) Gasket
(32) Oil level gauge guide
(33) Oil pan
(34) Oil level gauge
(35) Metal gasket
(36) Drain plug

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: 6.4 (0.65, 4.7)
T3: 10 (1.0, 7.2)
T4: 25 (2.5, 18.1)
T5: 44 (4.5, 33)
T6: 55 (5.6, 40.5)
T7: 69 (7.0, 50.6)

C: CAUTION *S178001A03*

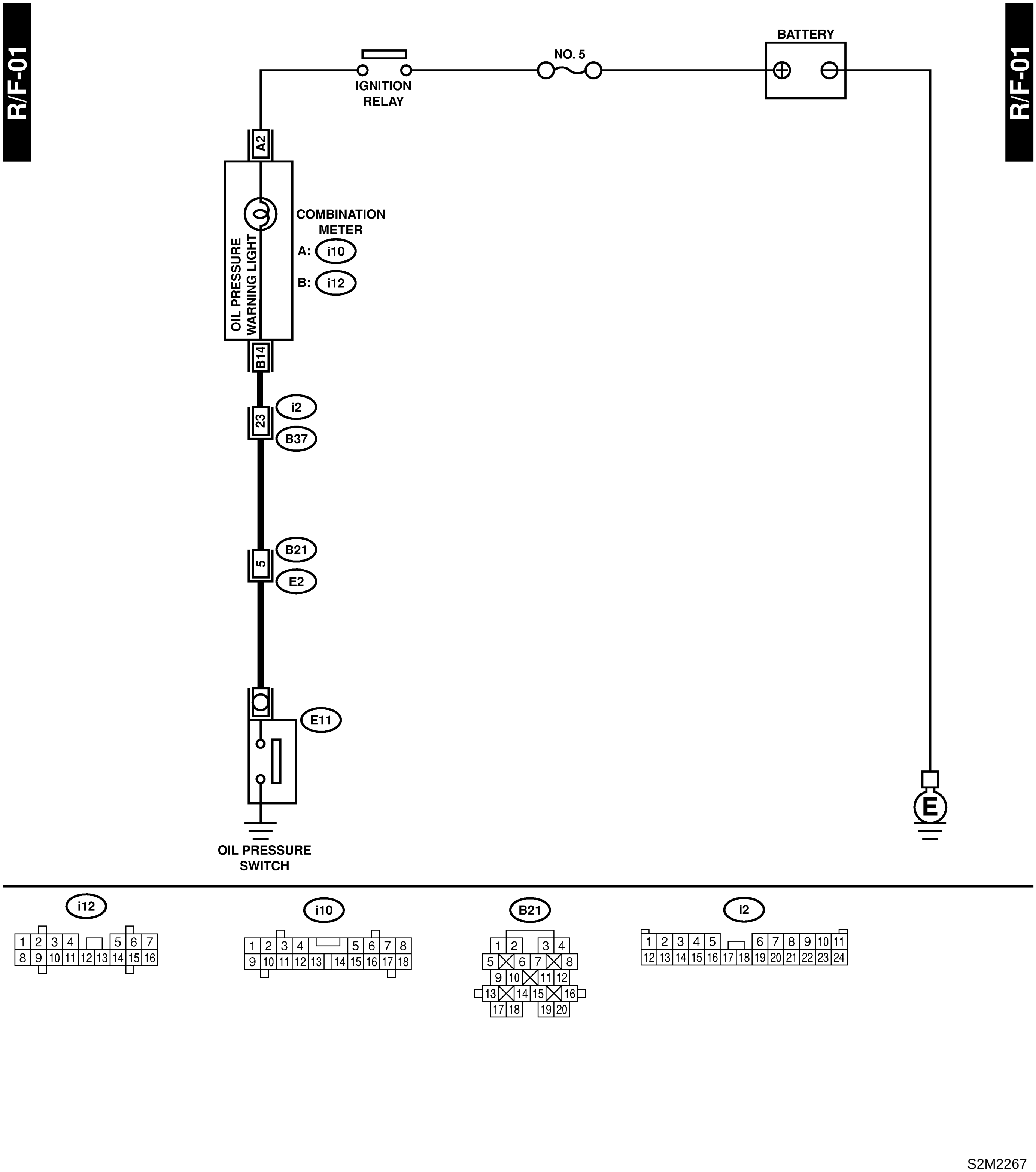
- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation 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 ground cable from battery.

D: PREPARATION TOOL *S178001A17*

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M4157	499977300	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.
 B2M3875	499587100	OIL SEAL INSTALLER	Used for installing oil pump oil seal.

2. Oil Pressure System S178076

A: SCHEMATIC S178076A21



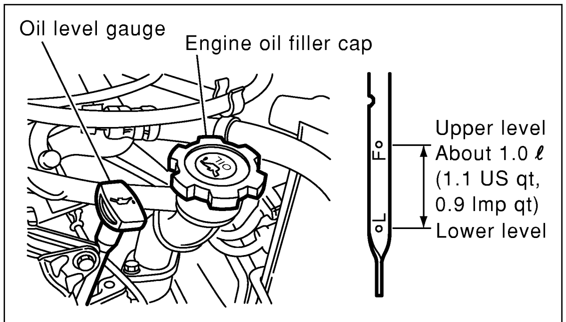
B: INSPECTION S178076A10

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-4, 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 to 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. A2 — No. B14:***	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 S178077

A: INSPECTION S178077A10

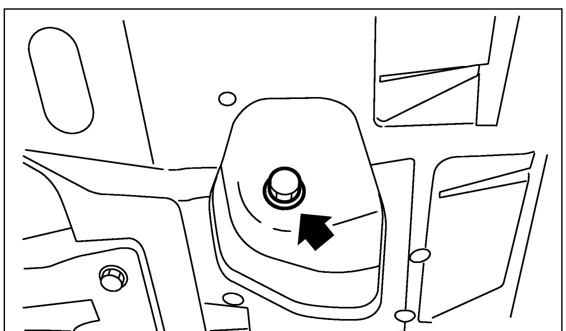
1) Park vehicle on a level surface.
2) Remove oil level gauge and wipe it clean.
3) Reinsert the level gauge all the way. Be sure that the level gauge is correctly inserted and in the proper orientation.
4) Remove it again and note the reading. If the engine oil level is below the “L” line, add oil to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



B2M3883A

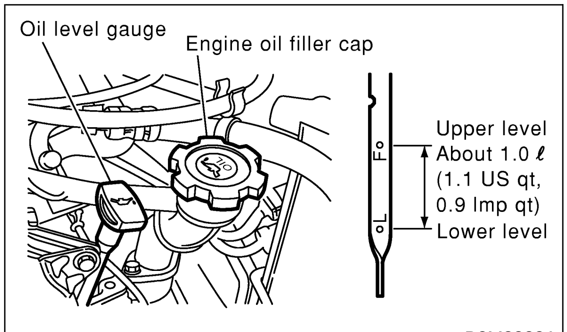
B: REPLACEMENT S178077A20

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



S2M2143

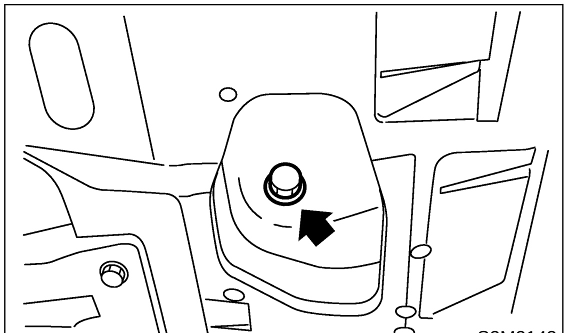
2) Open engine oil filler cap for quick draining of the engine oil.



B2M3883A

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)

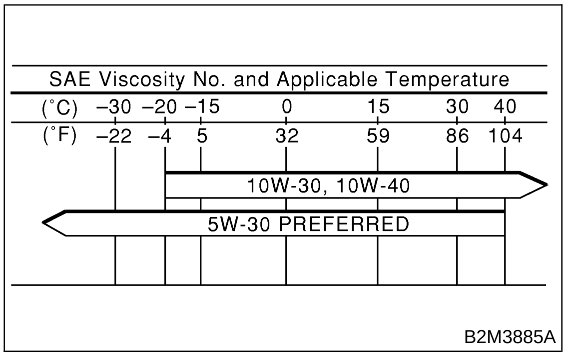


S2M2143

5) Fill engine oil through filler pipe up to upper point on level gauge. Make sure that vehicle is placed on level surface 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:
Upper level
4.0 ℓ (4.2 US qt, 3.5 Imp qt)
Lower level
3.0 ℓ (3.2 US qt, 2.6 Imp qt)

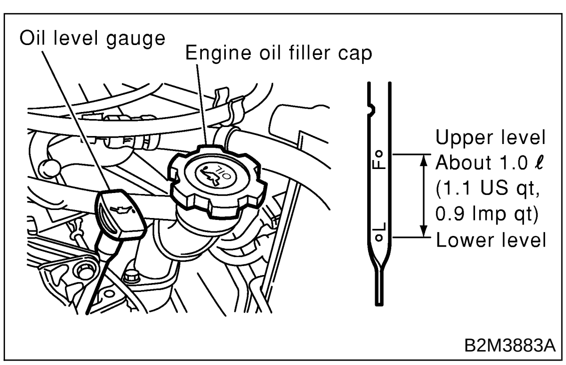


The proper viscosity helps vehicle get good cold and hot starting by reducing viscous friction and thus increasing cranking speed.

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.

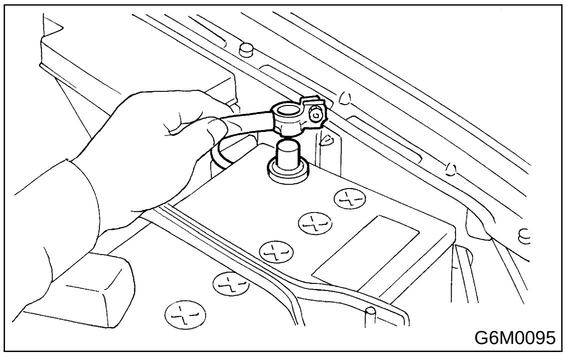
6) Close engine oil filler cap.
7) Start engine and warm it up for a time.
8) After engine stops, recheck the oil level. If necessary, add engine oil up to upper level on level gauge.



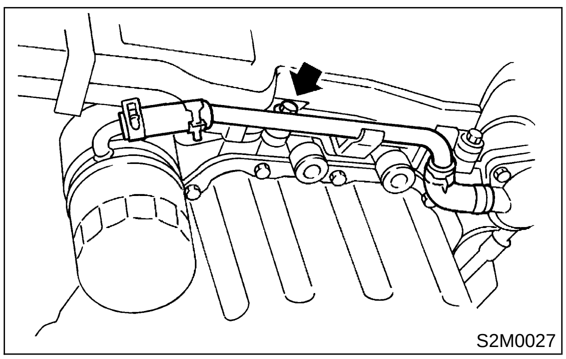
4. Oil Pump *S178070*

A: REMOVAL *S178070A18*

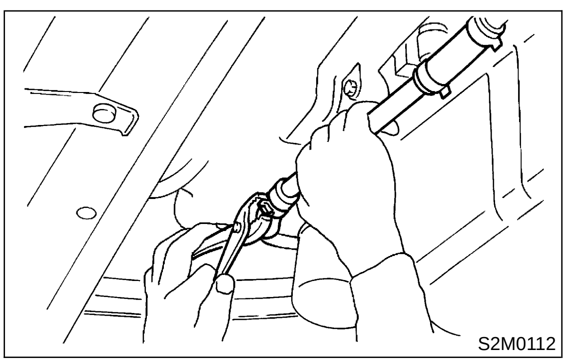
1) Disconnect battery ground cable.


G6M0095

2) Lift-up the vehicle.
3) Remove under cover.
4) Remove bolts which install water pipe of oil cooler to oil pump. (AT model)

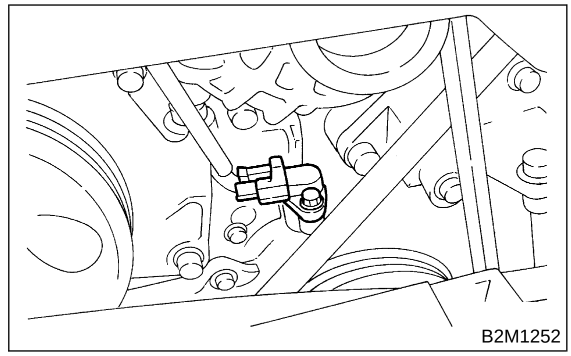

S2M0027

5) Remove water pipe and hoses between oil cooler and water pump. (AT model)

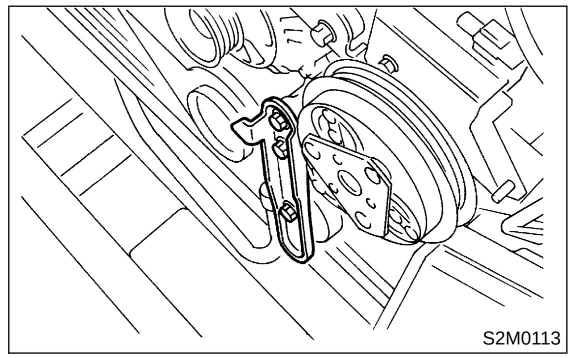

S2M0112

6) Remove radiator. <Ref. to CO-21, REMOVAL, Radiator.>

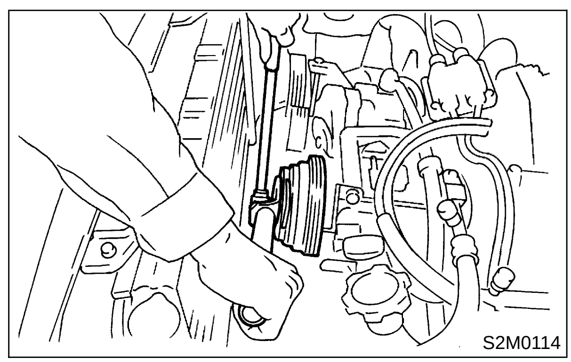
7) Remove crankshaft position sensor.


B2M1252

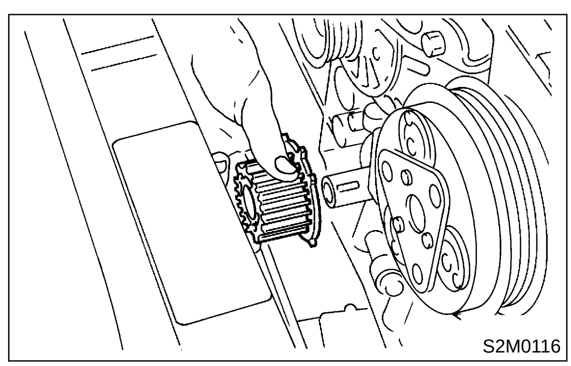
8) Remove V-belts. <Ref. to ME-42, REMOVAL, V-belt.>
9) Remove rear side V-belt tensioner.


S2M0113

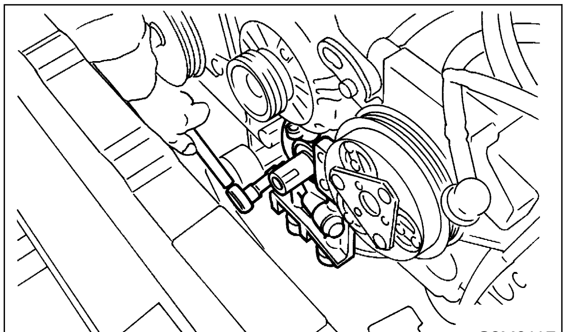
10) Remove crankshaft pulley by using ST.
ST 499977300 CRANKSHAFT PULLEY WRENCH


S2M0114

11) Remove water pump. <Ref. to CO-14, REMOVAL, Water Pump.>
12) Remove crankshaft sprocket.


S2M0116

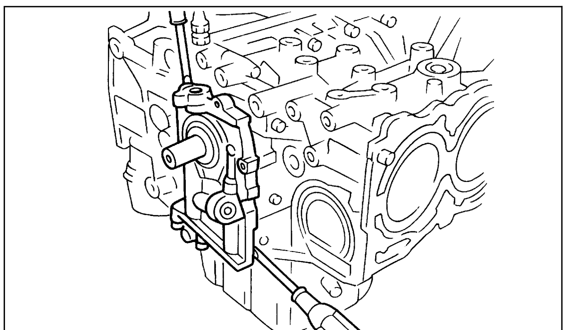
13) Remove bolts which install oil pump onto cylinder block.



S2M0117

14) Remove oil pump by using flat bladed screwdriver.

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



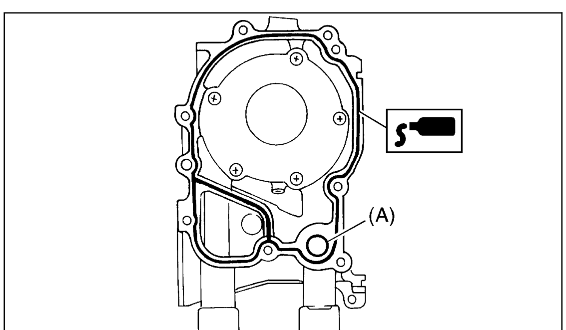
S2M1819

B: INSTALLATION *S178070A11*

Install in the reverse order of removal.
Do the following:
1) Apply fluid packing to matching surfaces of oil pump.

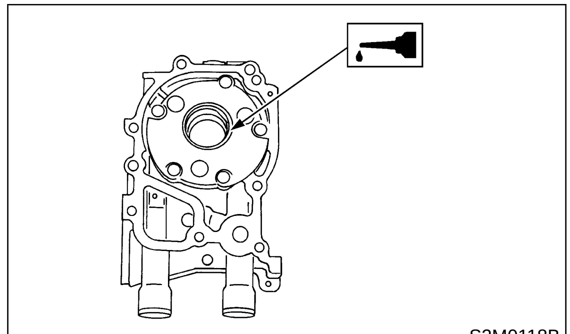
Fluid packing:
THREE BOND 1215 or equivalent

2) Replace O-ring (A) with a new one.



S2M0739B

3) Apply a coat of engine oil to the inside of the oil seal.



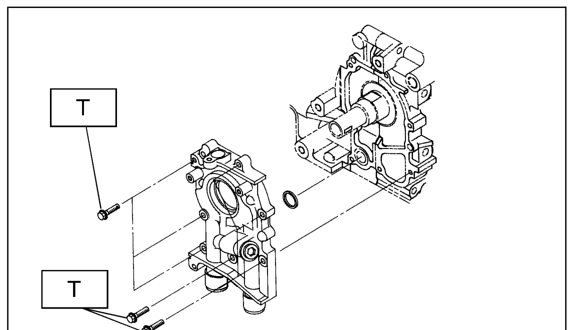
S2M0118B

4) Be careful not to scratch oil seal when installing oil pump on cylinder block.
5) Position the oil pump, aligning the notched area with the crankshaft, and push the oil pump straight.

CAUTION:
Make sure the oil seal lip is not folded.

6) Install oil pump.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

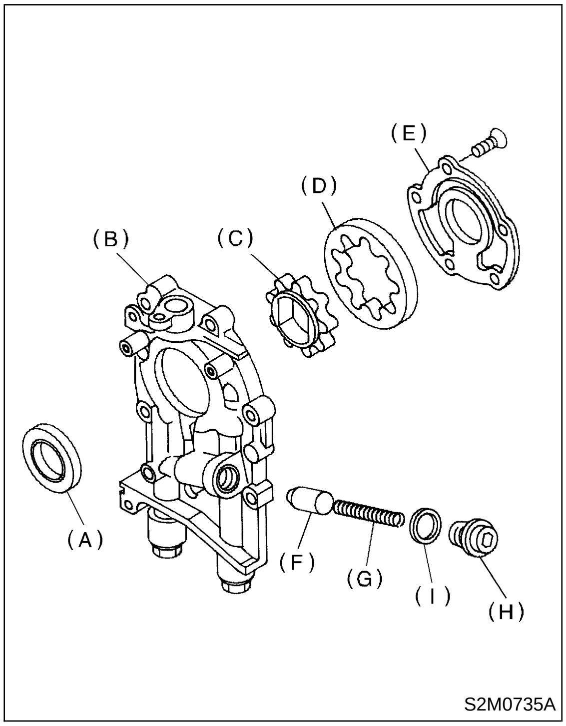


S2M0740B

C: DISASSEMBLY *S178070A06*

Remove screws which secure oil pump cover and disassemble oil pump. Inscribe alignment marks on inner and outer rotors so that they can be replaced in their original positions during reassembly.

CAUTION:
Before removing relief valve, loosen plug when removing oil pump from cylinder block.

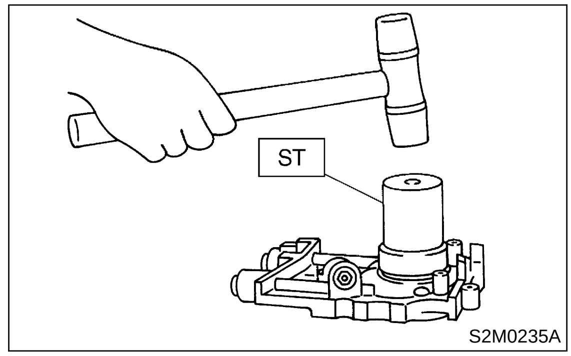


(A) Oil seal
(B) Pump case
(C) Inner rotor
(D) Outer rotor
(E) Pump cover
(F) Relief valve
(G) Relief valve spring
(H) Plug
(I) Washer

D: ASSEMBLY *S178070A02*

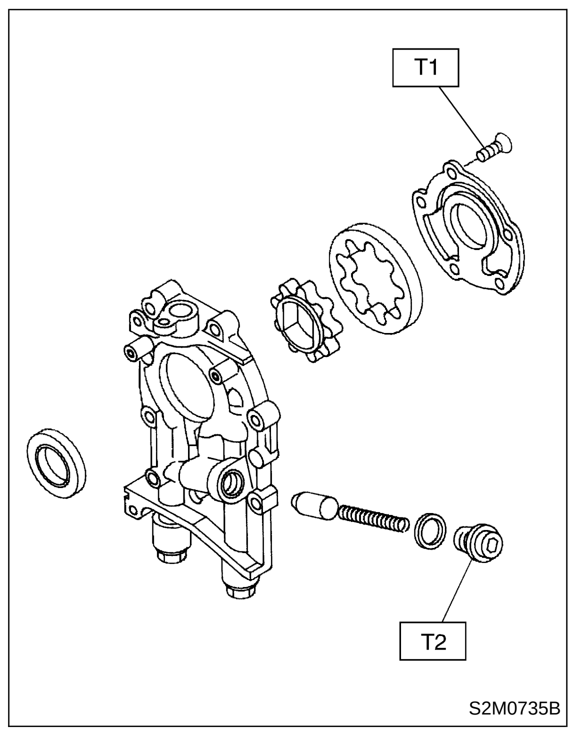
1) Install front oil seal by using ST.
ST 499587100 OIL SEAL INSTALLER

NOTE:
Use a new oil seal.



2) Apply a coat of engine oil to inner and outer rotors.
3) Install inner and outer rotors in their original positions.
4) Install oil relief valve and relief valve spring.
5) Install oil pump cover.

Tightening torque:
T1: 5 N·m (0.5 kgf-m, 3.6 ft-lb)
T2: 44 N·m (4.5 kgf-m, 33 ft-lb)

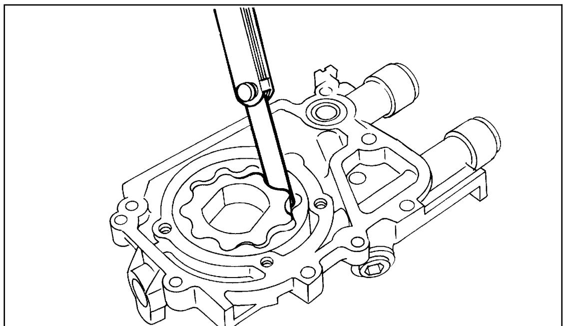


E: INSPECTION S178070A10

1. TIP CLEARANCE S178070A1001

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)

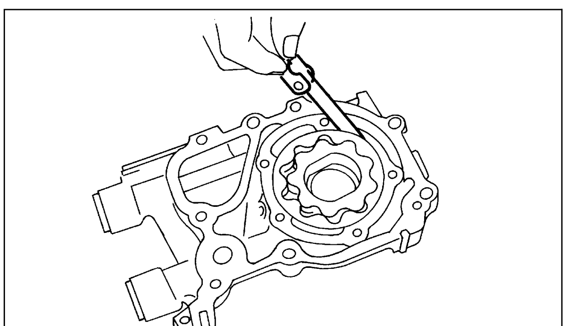


S2M0736

2. CASE CLEARANCE S178070A1002

Measure the clearance between the outer rotor and the cylinder block rotor housing. If the clearance exceeds the limit, replace the rotor.

Case clearance:
Standard
0.10 — 0.175 mm (0.0039 — 0.0069 in)
Limit
0.20 mm (0.0079 in)

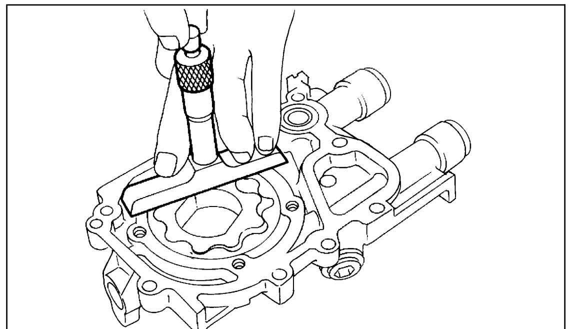


S2M0737

3. SIDE CLEARANCE S178070A1003

Measure clearance between oil pump inner rotor and pump cover. If the clearance exceeds the limit, replace rotor or pump body.

Side clearance:
Standard
0.02 — 0.07 mm (0.0008 — 0.0028 in)
Limit
0.12 mm (0.0047 in)



S2M0738

4. OIL RELIEF VALVE S178070A1004

Check the valve for fitting condition and damage, and the relief valve spring for damage and deterioration. Replace the parts if defective.

Relief valve spring:
Free length
71.8 mm (2.827 in)
Installed length
54.7 mm (2.154 in)
Load when installed
77.08 N (7.86 kgf, 17.33 lb)

5. OIL PUMP CASE S178070A1005

Check the oil pump case for worn shaft hole, clogged oil passage, worn rotor chamber, cracks, and other faults.

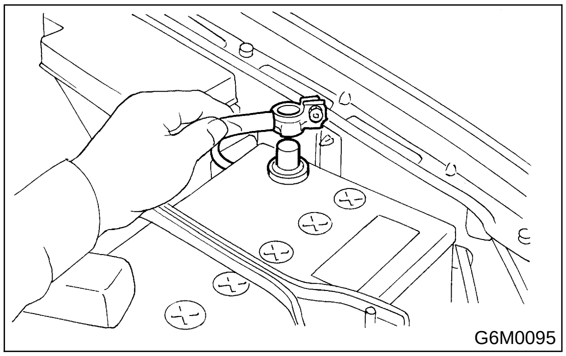
6. OIL SEAL S178070A1006

Check the oil seal lips for deformation, hardening, wear, etc. and replace if defective.

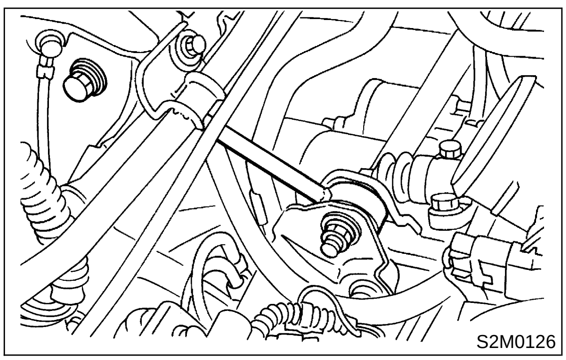
5. Oil Pan and Strainer S178071

A: REMOVAL S178071A18

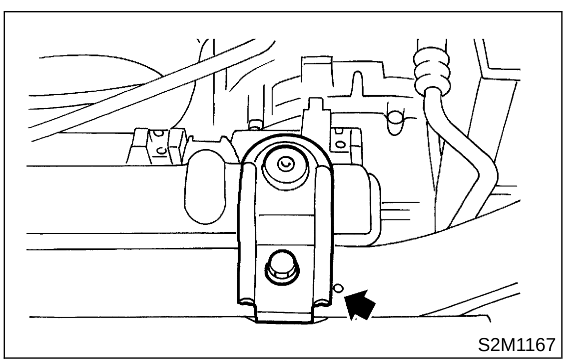
1) Set the vehicle on lift arms.
2) Remove front wheels.
3) Disconnect battery ground cable.


G6M0095

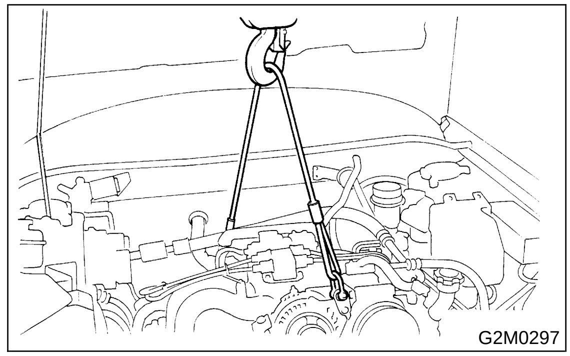
4) Remove air intake duct and air cleaner case. <Ref. to IN-7, REMOVAL, Air Intake Duct.> and <Ref. to IN-6, REMOVAL, Air Cleaner Case.>
5) Remove pitching stopper.


S2M0126

6) Remove radiator upper brackets.


S2M1167

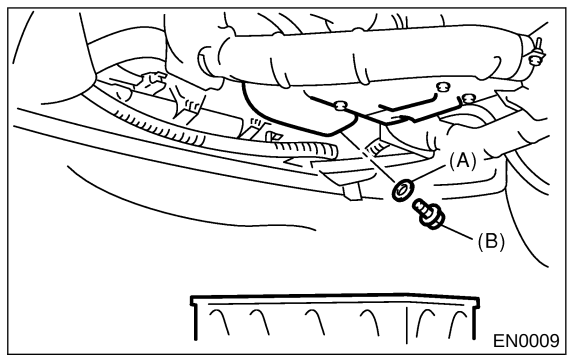
7) Support engine with a lifting device and wire ropes.


G2M0297

8) Lift-up the vehicle.

CAUTION:
At this time, raise up wire ropes.

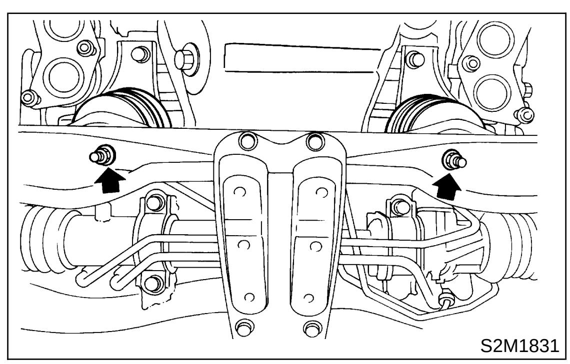
9) Remove under cover.
10) Drain engine oil.
Set container under the vehicle, and remove drain plug from oil pan.



EN0009

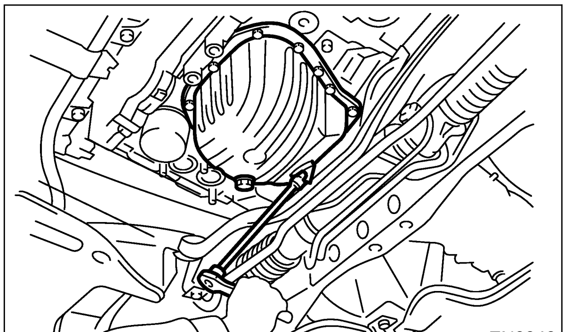
(A) Gasket
(B) Drain plug

11) Remove front and center exhaust pipes. <Ref. to EX-5, REMOVAL, Front Exhaust Pipe.>
12) Remove nuts which install front cushion rubber onto front crossmember.

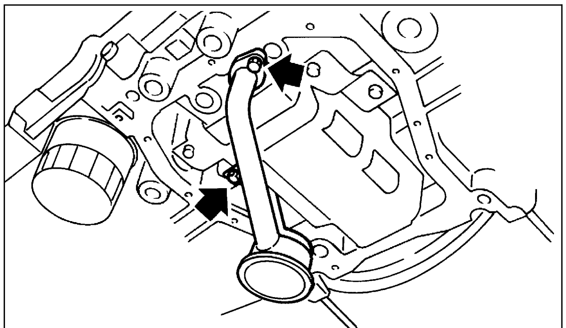

S2M1831

13) Remove bolts which install oil pan on cylinder block while raising up engine.
14) Insert oil pan cutter blade between cylinder block-to-oil pan clearance.

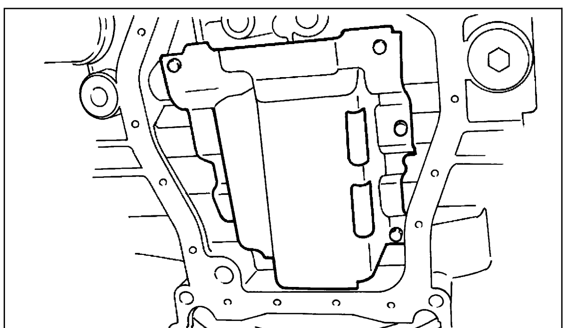
CAUTION:
Do not use a screwdriver or similar tool in place of oil pan cutter.


EN0040

15) Remove oil strainer.


S2M0238

16) Remove baffle plate.

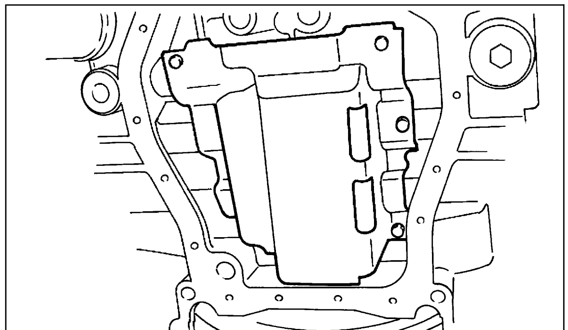

S2M0309

B: INSTALLATION S178071A11

CAUTION:
Before installing oil pan, clean sealant from oil pan and engine block.

1) Install baffle plate.

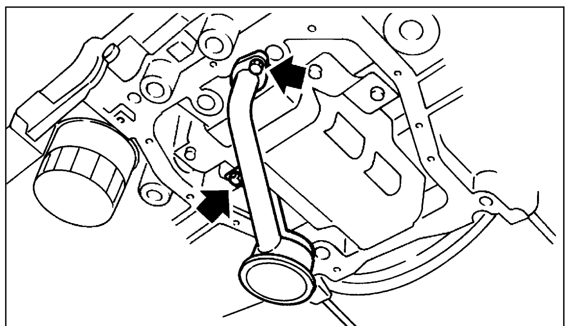
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)


S2M0309

2) Install oil strainer onto baffle plate.

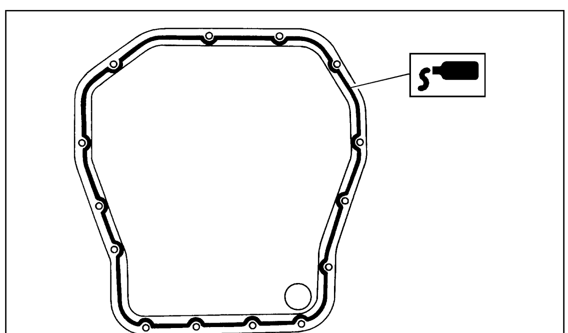
NOTE:
Replace O-ring with a new one.

Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)


S2M0238

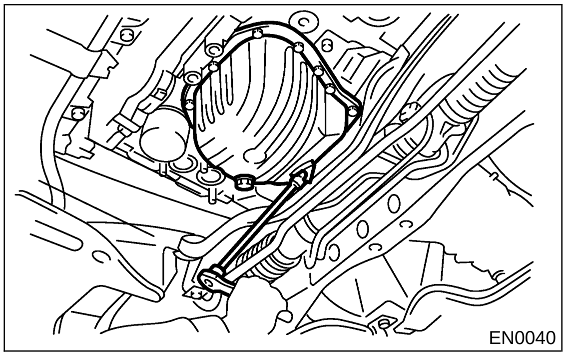
3) Apply fluid packing to mating surfaces and install oil pan.

Fluid packing:
THREE BOND 1215 or equivalent


S2M1833A

4) Tighten bolts which install oil pan onto engine block.

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

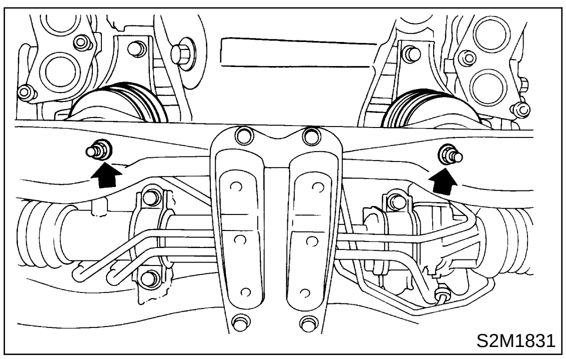


EN0040

5) Lower engine onto front crossmember.

6) Tighten nuts which install front cushion rubber onto front crossmember.

Tightening torque:
69 N·m (7.0 kgf-m, 51 ft-lb)



S2M1831

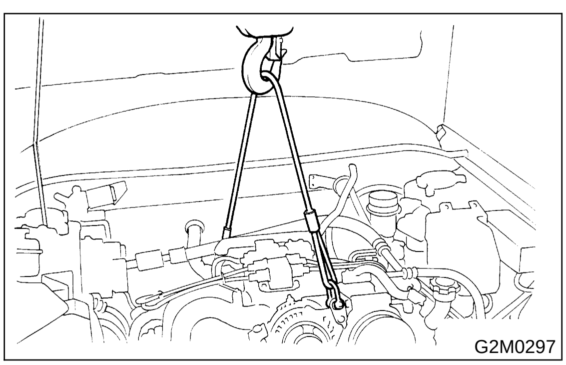
7) Install front and center exhaust pipes. <Ref. to EX-6, INSTALLATION, Front Exhaust Pipe.>

8) Install under cover.

9) Lower the vehicle.

CAUTION:
At this time, lower lifting device and release steel cables.

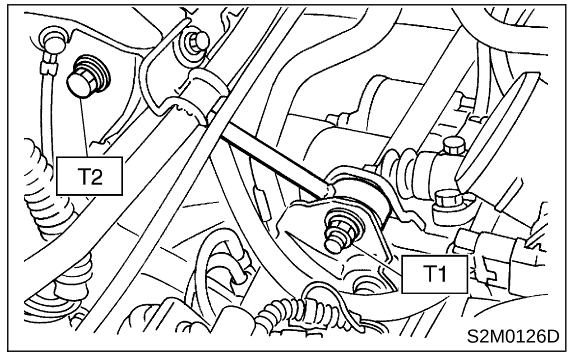
10) Remove lifting device and steel cables.



G2M0297

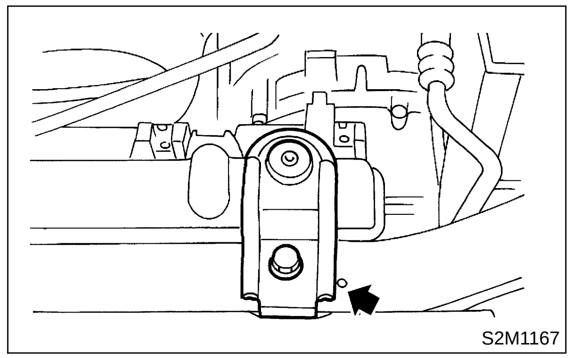
11) Install pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 37 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



S2M0126D

12) Install radiator upper brackets.

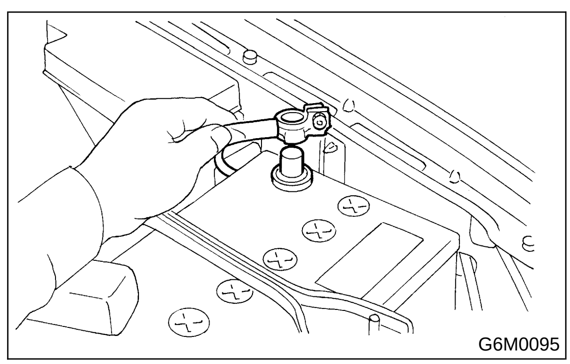


S2M1167

13) Install air intake duct and air cleaner case. <Ref. to IN-6, INSTALLATION, Air Cleaner Case.> and <Ref. to IN-7, INSTALLATION, Air Intake Duct.>

14) Install front wheels.

15) Connect battery ground cable.



G6M0095

16) Fill engine oil. <Ref. to LU-9, INSPECTION, Engine Oil.>

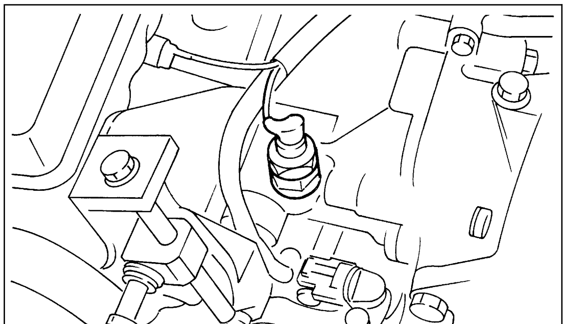
C: INSPECTION *S178071A10*

By visual check make sure oil pan, oil strainer, oil strainer stay and baffle plate are not damaged.

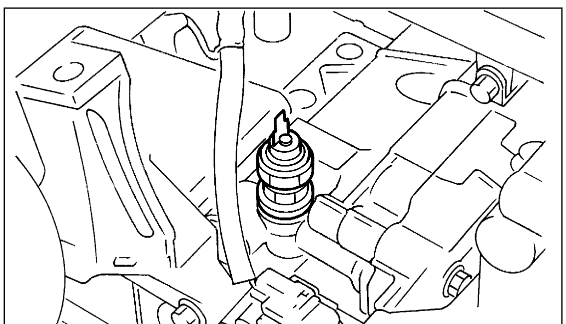
6. Oil Pressure Switch S178069

A: REMOVAL S178069A18

1) Remove generator from bracket. <Ref. to SC-12, REMOVAL, Generator.>
2) Disconnect terminal from oil pressure switch.


G2M0091

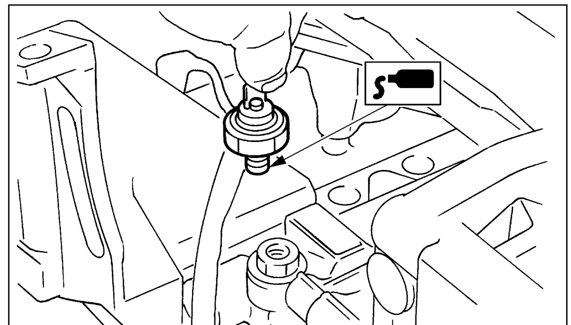
3) Remove oil pressure switch.


S2M0119

B: INSTALLATION S178069A11

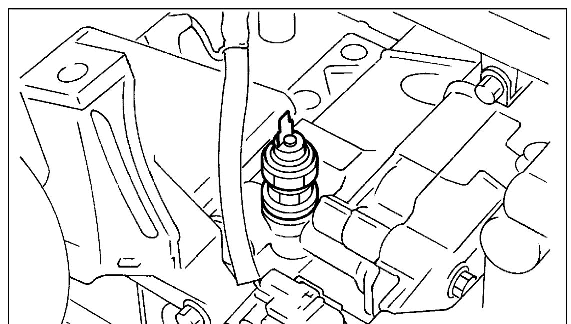
1) Apply fluid packing to oil pressure switch threads.

Fluid packing:
THREE BOND 1215 or equivalent

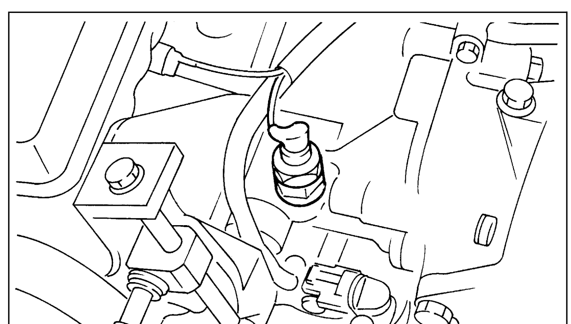

S2M0124B

2) Install oil pressure switch onto engine block.

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


S2M0119

3) Connect terminal of oil pressure switch.


G2M0091

4) Install generator on bracket. <Ref. to SC-12, INSTALLATION, Generator.>

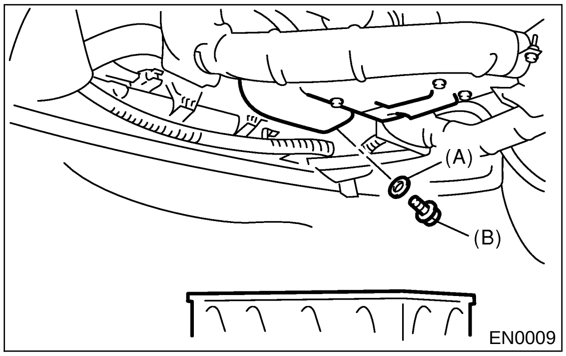
C: INSPECTION S178069A10

Make sure oil does not leak or seep from where the oil pressure switch is installed.

7. Engine Oil Cooler *S178768*

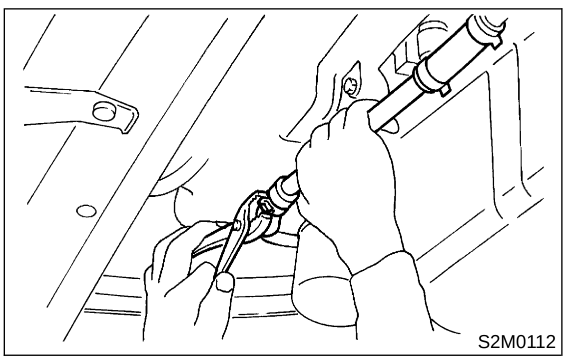
A: REMOVAL *S178768A18*

1) Lift-up the vehicle.
2) Remove under cover.
3) Drain engine oil. Set container under the vehicle, and remove drain plug from oil pan.



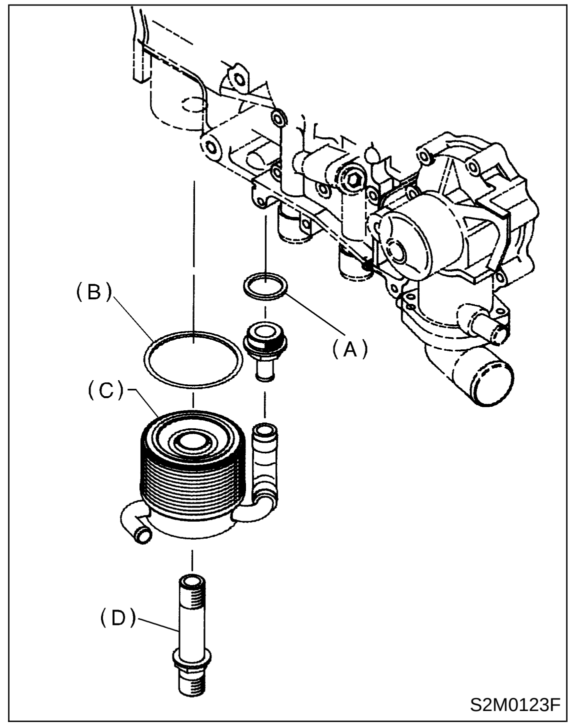
(A) Metal gasket
(B) Drain plug

4) Drain coolant.
5) Remove water by-pass pipe between oil cooler and water pump.



6) Remove engine oil filter. <Ref. to LU-21, REMOVAL, Engine Oil Filter.>

7) Remove connector and remove oil cooler.



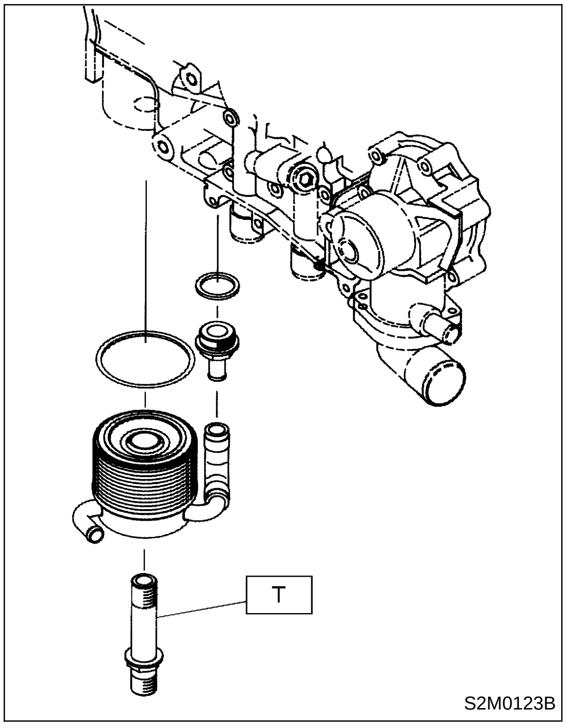
(A) Gasket
(B) O-ring
(C) Oil cooler
(D) Connector

B: INSTALLATION S178768A11

Install in the reverse order of removal.

Tightening torque:
T: 55 N·m (5.6 kgf-m, 40.5 ft-lb)

NOTE:
Always use a new O-ring.



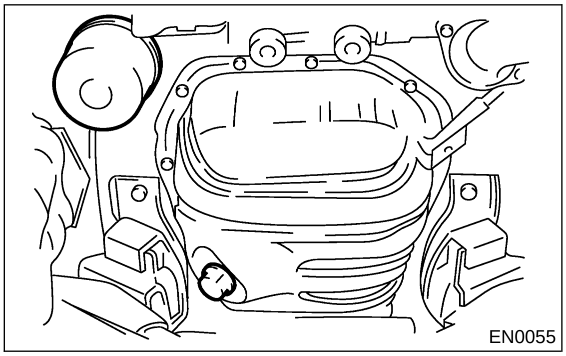
C: INSPECTION S178768A10

1) Check that coolant passages are not clogged using air blow method.
2) Check mating surfaces of cylinder block, O-ring groove and oil filter for damage.

8. Engine Oil Filter *S178585*

A: REMOVAL *S178585A18*

1) Remove under cover.
2) Remove oil filter with ST.
ST 498547000 OIL FILTER WRENCH


EN0055

B: INSTALLATION *S178585A11*

1) Get a new oil filter and apply a thin coat of engine oil to the seal rubber.
2) Install oil filter by turning it by hand, being careful not to damage seal rubber.
3) 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.

C: INSPECTION *S178585A10*

1) 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 jointed; therefore, interior cleaning is not necessary.

2) Check the engine oil level. <Ref. to LU-9, INSPECTION, Engine Oil.>

9. Engine Lubrication System Trouble in General S178100

A: INSPECTION S178100A10

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).

SPEED CONTROL SYSTEMS

SP

Page

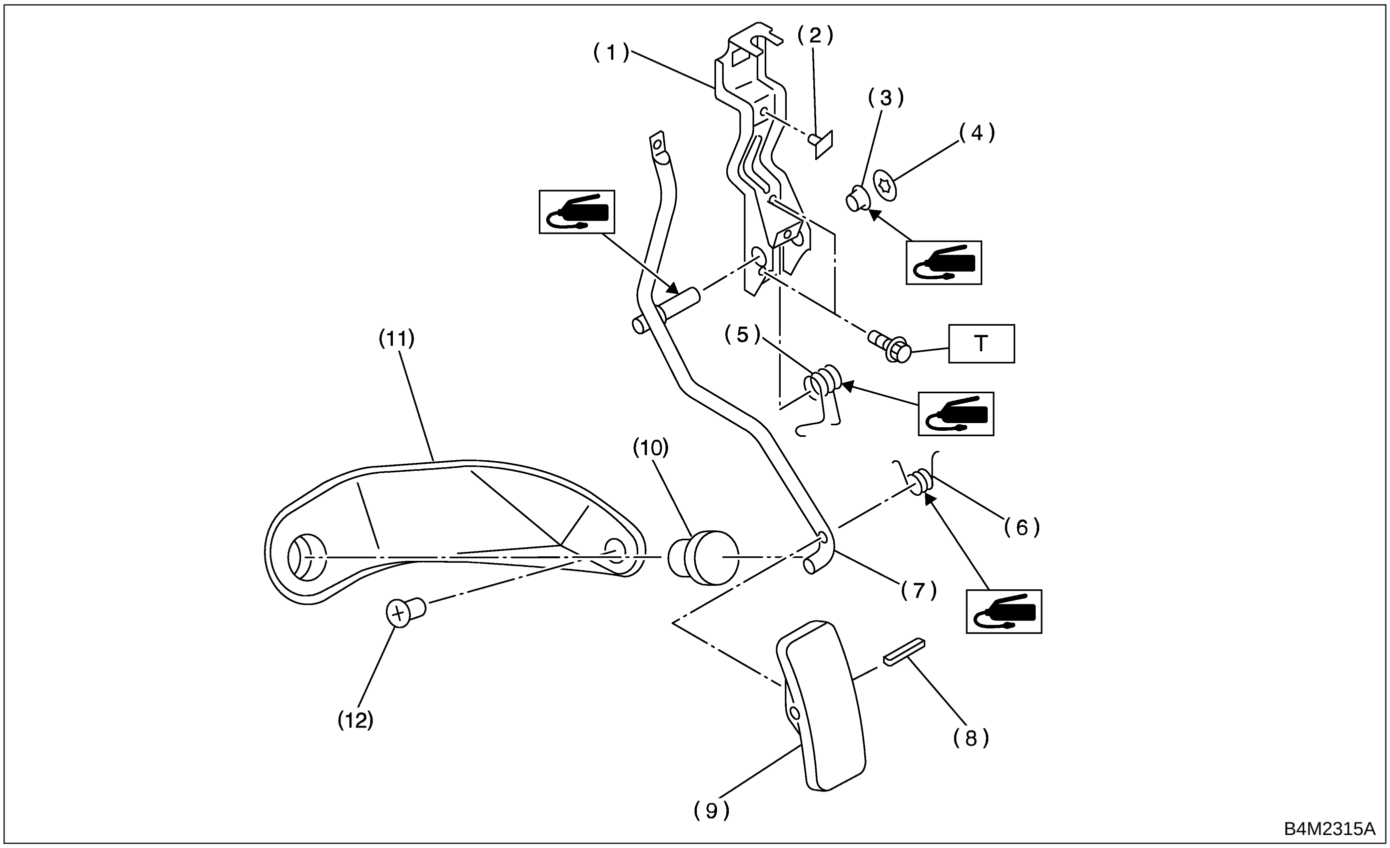
1. General Description..2
2. Accelerator Pedal..4
3. Accelerator Control Cable..7

1. General Description S177001

A: SPECIFICATION S177001A22

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 S177001A05



(1) Accelerator bracket
(2) Stopper
(3) Bushing
(4) Clip
(5) Accelerator spring
(6) Accelerator pedal spring
(7) Accelerator pedal lever
(8) Spring pin
(9) Accelerator pedal
(10) Accelerator stopper
(11) Accelerator plate
(12) Clip

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

C: CAUTION *S177001A03*

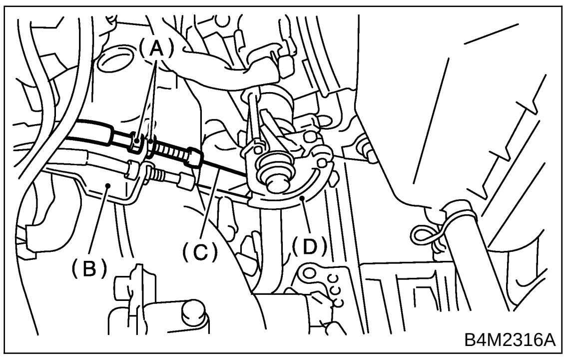
- Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination, including dirt and corrosion, before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- Before removal, installation 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 ground cable from battery.

2. Accelerator Pedal S177005

A: REMOVAL S177005A18

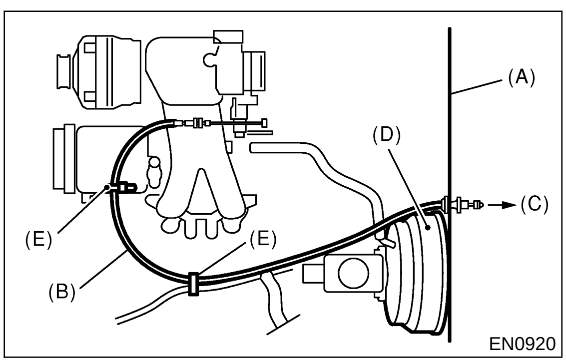
1) Disconnect ground cable from battery.
2) Remove lock nut from accelerator cable bracket.
3) Separate accelerator cable from bracket.
4) Remove accelerator cable end from throttle cam.
5) Disconnect accelerator cable from throttle body.

CAUTION:
Be careful not to kink accelerator cable.



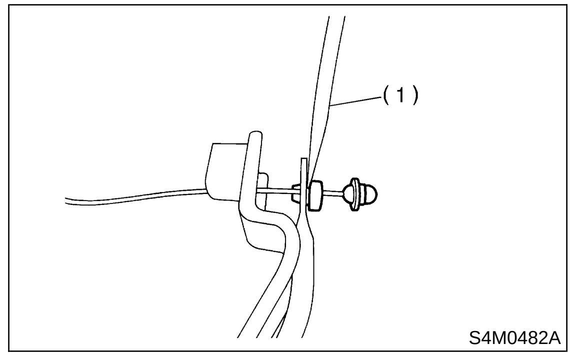
(A) Lock nut
(B) Accelerator cable bracket
(C) Accelerator cable
(D) Throttle cam

6) Remove clip inside engine compartment.



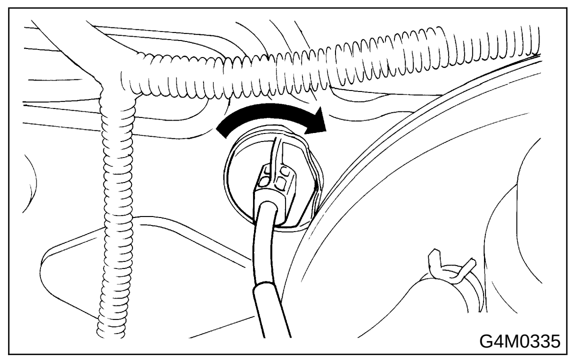
(A) Toe board
(B) Accelerator cable
(C) To accelerator pedal
(D) Brake booster
(E) Clip

7) Remove instrument panel lower cover from instrument panel, and connector.
8) Remove brake and clutch pedal bracket. <Ref. to BR-46, REMOVAL, Brake Pedal.>
9) Disconnect accelerator cable from accelerator pedal lever.

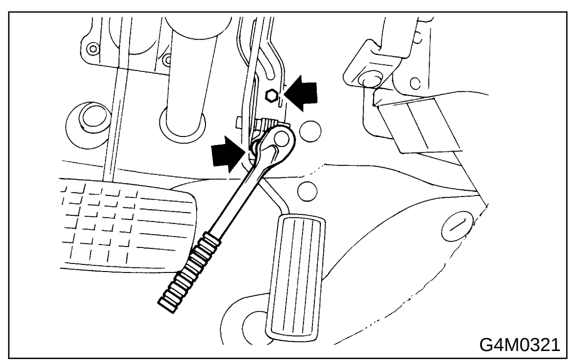


(1) Slot type screwdriver

10) Working inside engine compartment, remove casing cap out of the toe board by turning it clockwise.



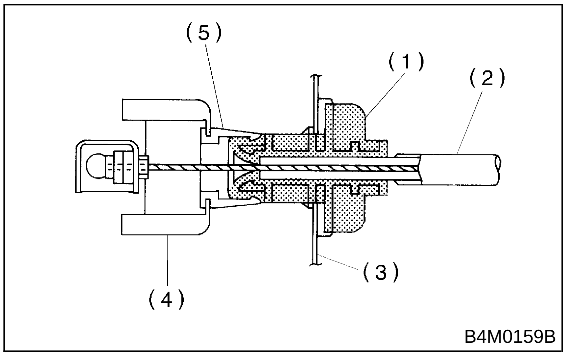
11) Pull out the cable from the toe board hole.
12) Remove accelerator pedal connecting bolt from accelerator pedal bracket.



B: INSTALLATION S177005A11

Install in the reverse order of removal.

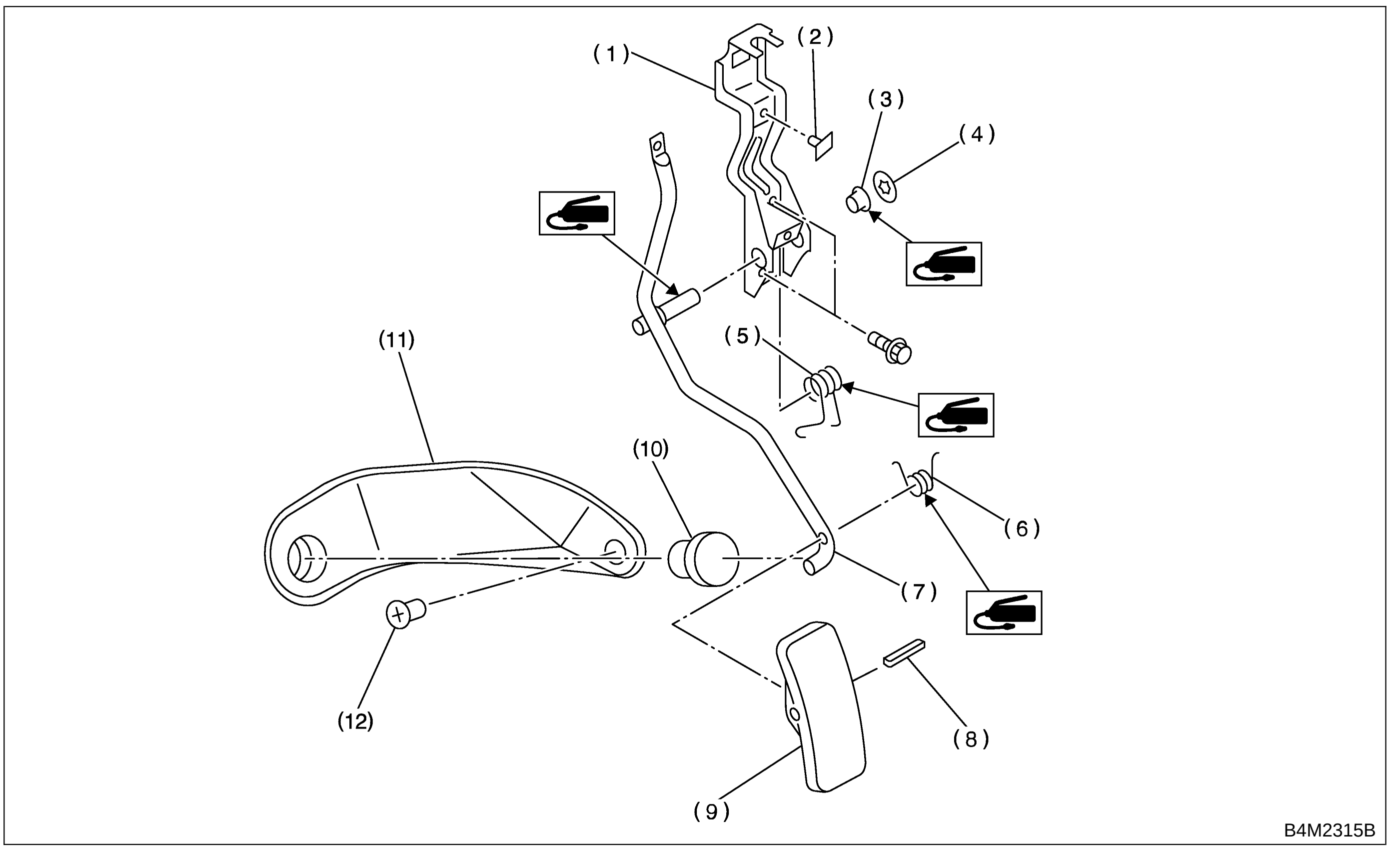
CAUTION:
- **If cable clamp is damaged, replace it with a new one.**
- **Never fail to cover outer cable end with boot.**
- **Be careful not to kink accelerator cable.**
- **Make sure that holder and casing cap are securely connected.**



(1) Casing cap
(2) Accelerator cable
(3) Toe board
(4) Accelerator pedal bracket
(5) Holder

C: DISASSEMBLY S177005A06

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.



(1) Accelerator bracket
(2) Stopper
(3) Bushing
(4) Clip
(5) Accelerator spring
(6) Accelerator pedal spring
(7) Accelerator pedal lever
(8) Spring pin
(9) Accelerator pedal
(10) Accelerator stopper
(11) Accelerator plate
(12) Clip

D: ASSEMBLY S177005A02

Assemble in the reverse order of disassembly.

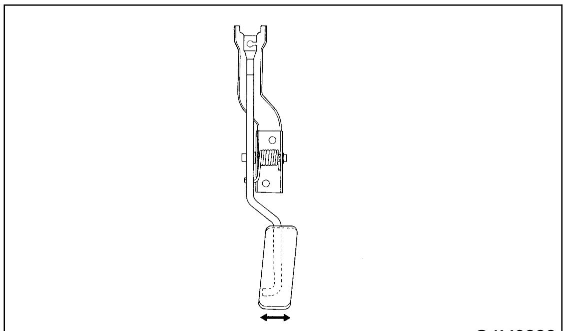
CAUTION:
Clean and apply grease to spacer and inside bore of accelerator pedal.

E: INSPECTION S177005A10

Lightly move pedal pad in the lateral 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



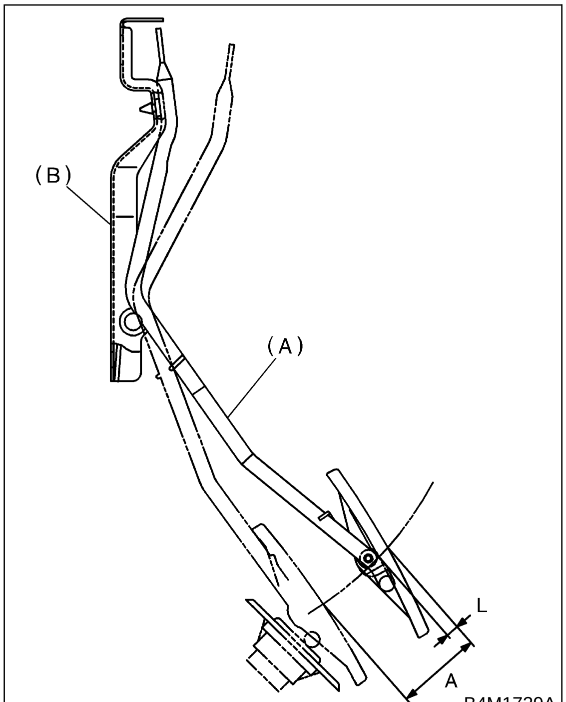
G4M0333

F: ADJUSTMENT S177005A01

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)



B4M1739A

(A) Accelerator pedal
(B) Accelerator pedal bracket

Accelerator cable lock nut tightening torque:
14 N·m (1.4 kgf-m, 10.1 ft-lb)

3. Accelerator Control Cable S177759

A: REMOVAL S177759A18

1) Remove accelerator pedal. <Ref. to SP-4, REMOVAL, Accelerator Pedal.>
2) Separate accelerator cable and accelerator pedal.

B: INSTALLATION S177759A11

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-4, INSTALLATION, Accelerator Pedal.>

C: INSPECTION S177759A10

1) Make sure the inner cable is not twisted or frayed.
2) Make sure the outer cable is not cracked.

MEMO:

IGNITION

IG

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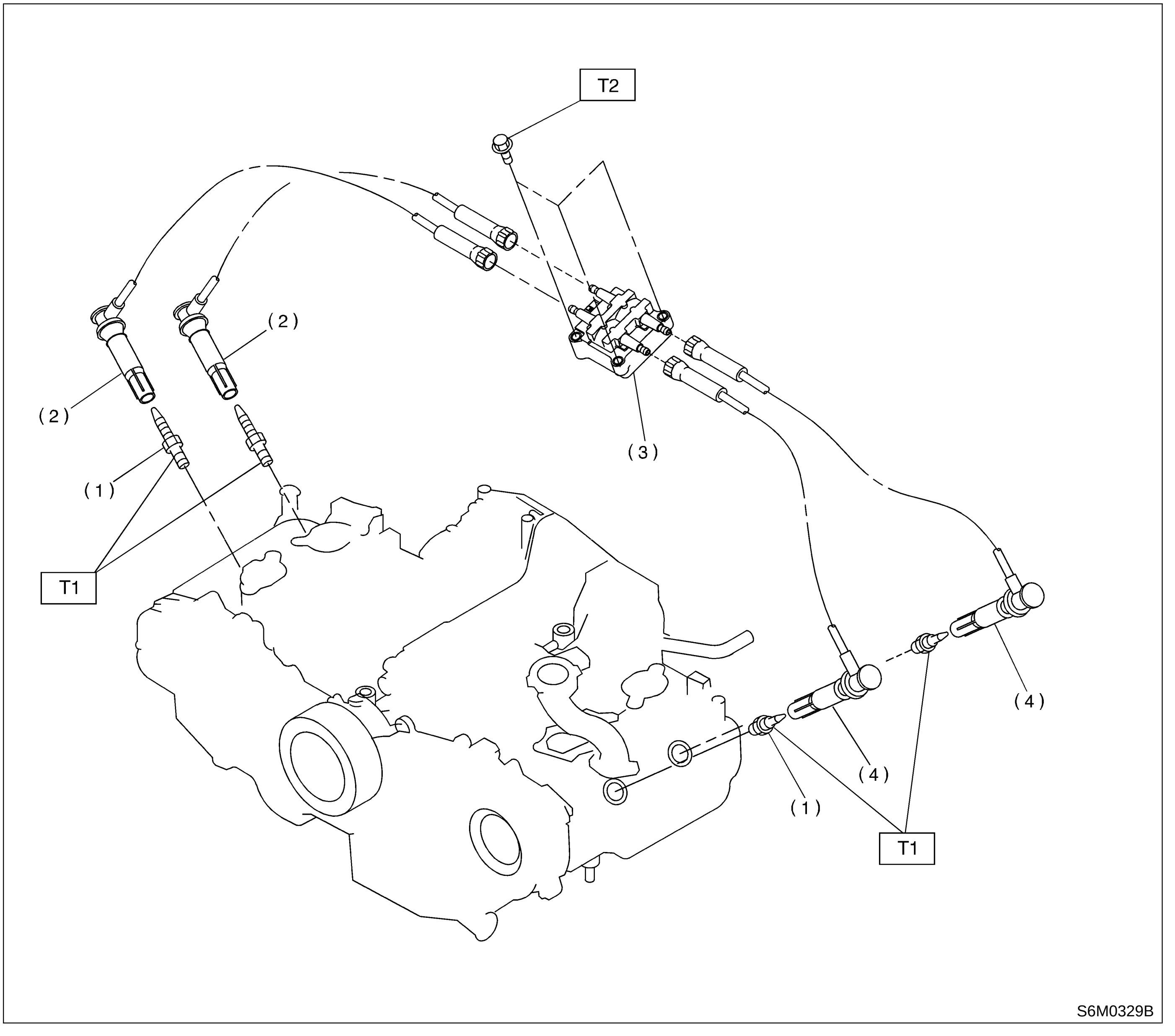
1. General Description..2
2. Spark Plug...4
3. Ignition Coil and Ignitor Assembly..7
4. Spark Plug Cord..9

1. General Description S171001

A: SPECIFICATIONS S171001E49

<table>
<tr><th colspan="2">Item</th><th colspan="2">Designation</th></tr>
<tr><td rowspan="5">Ignition coil and ignitor assembly</td><td>Model</td><td colspan="2">FH0137</td></tr>
<tr><td>Manufacturer</td><td colspan="2">DIAMOND</td></tr>
<tr><td>Primary coil resistance</td><td colspan="2">0.73 Ω±10%</td></tr>
<tr><td>Secondary coil resistance</td><td colspan="2">12.8 kΩ±15%</td></tr>
<tr><td>Insulation resistance between primary terminal and case</td><td colspan="2">More than 10 MΩ</td></tr>
<tr><td rowspan="4">Spark plug</td><td rowspan="2">Type and manufacturer</td><td colspan="2">RC10YC4 .... CHAMPION</td></tr>
<tr><td>Alternate</td><td>BKR5E-11 .... NGK
BKR6E-11 .... NGK</td></tr>
<tr><td>Thread size mm</td><td colspan="2">14, P = 1.25</td></tr>
<tr><td>Spark gap mm (in)</td><td colspan="2">1.0 — 1.1 (0.039 — 0.043)</td></tr>
</table>

B: COMPONENT *S171001A05*



(1) Spark plug
(2) Spark plug cord (#1, #3)
(3) Ignition coil and ignitor ASSY
(4) Spark plug cord (#2, #4)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 21 (2.1, 15)
T2: 6.4 (0.65, 4.7)

C: CAUTION *S171001A03*

- 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 ground cable from battery.

2. Spark Plug S171003

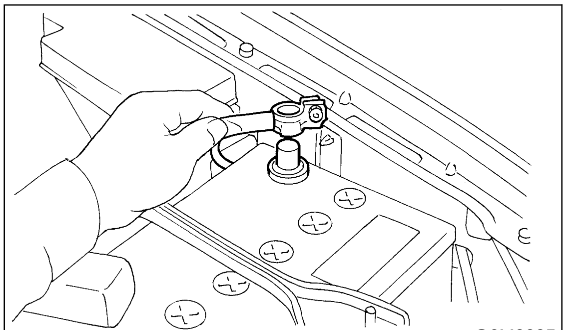
A: REMOVAL S171003A18

CAUTION:
All spark plugs installed on an engine, must be of the same heat range.

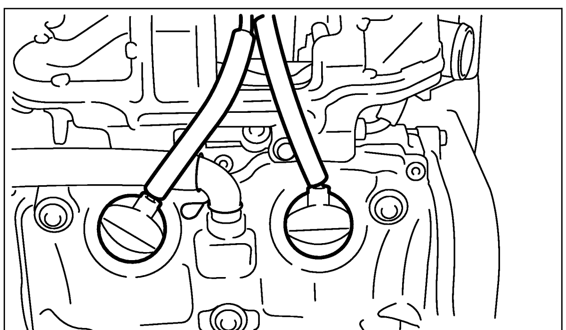
Spark plug:
CHAMPION: RC10YC4
(Alternate)
NGK: BKR5E-11, BKR6E-11

1. RH SIDE S171003A1805

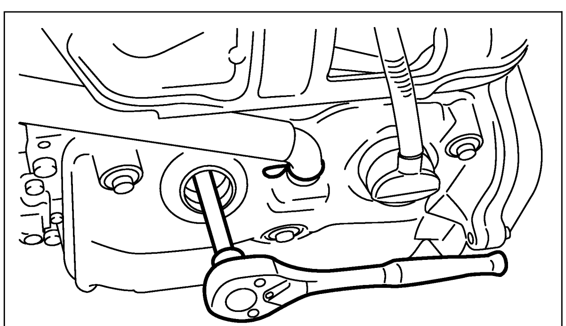
1) Disconnect battery ground cable.


G6M0095

2) Remove resonator chamber.
<Ref. to IN-8, REMOVAL, Resonator Chamber.>
3) Remove spark plug cords by pulling boot, not cord itself.

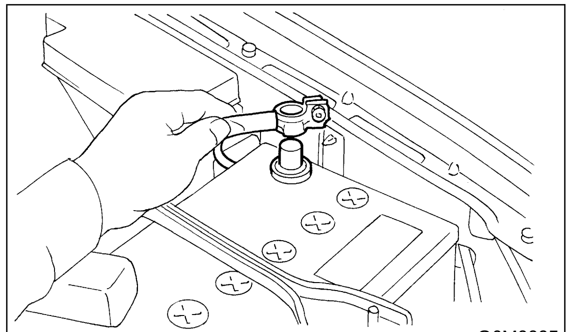

B2M4127

4) Remove spark plugs with the spark plug socket.

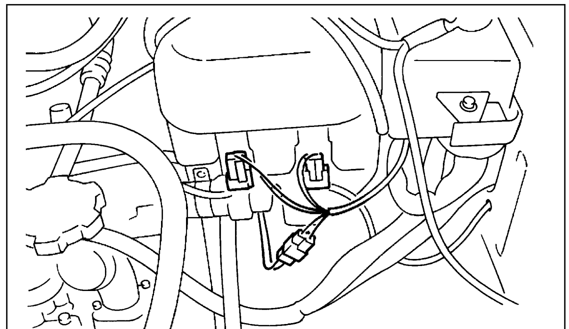

B2M4286

2. LH SIDE S171003A1806

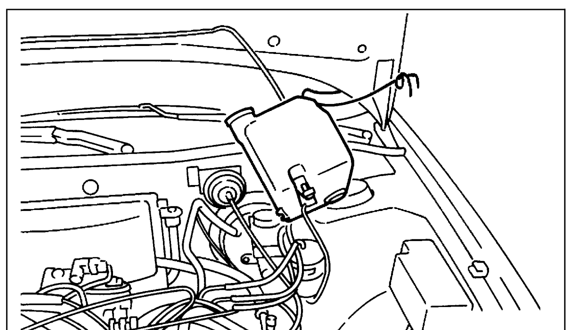
1) Disconnect battery ground cable.


G6M0095

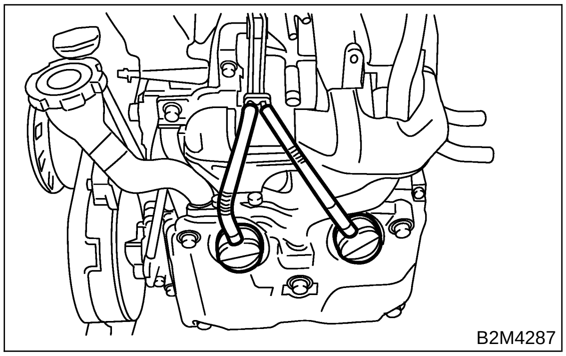
2) Disconnect washer motor connector.


S2M0546

3) Disconnect rear window glass washer hose from washer motor, then plug connection with a suitable cap.
4) Remove the two bolts which hold the washer tank, then take the tank away from the working area.

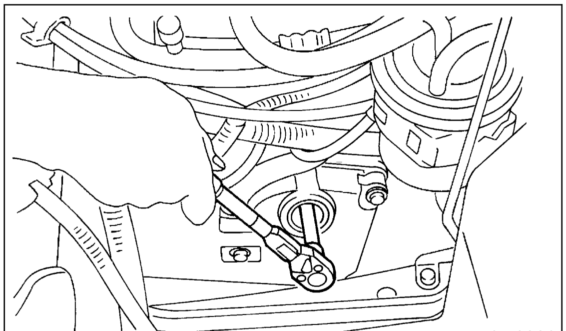

B2M2023

5) Remove spark plugs cord by pulling boot, not cord itself.



B2M4287

6) Remove spark plug with the spark plugs socket.



B6M0926

B: INSTALLATION S171003A11

1. RH SIDE S171003A1105

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 (Resonator chamber):
33 N·m (3.4 kgf-m, 24.6 ft-lb)

2. LH SIDE S171003A1106

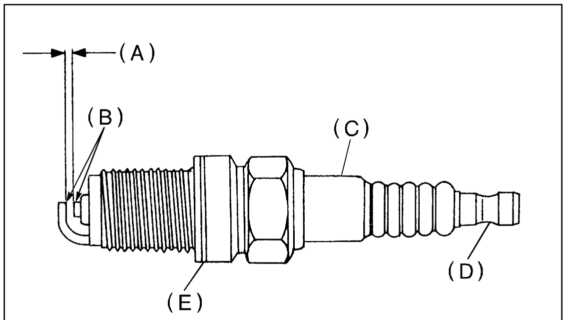
Install in the reverse order of removal.

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.

C: INSPECTION S171003A10

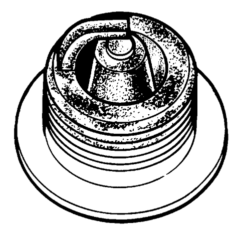
Check electrodes and inner and outer porcelain of plugs, noting the type of deposits and the degree of electrode erosion.



S6M0420A

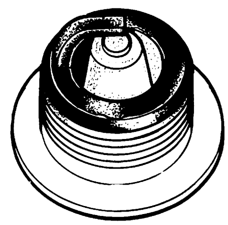
(A) Electrode gap
(B) Carbon accumulation or wear
(C) Cracks
(D) Damage
(E) Damaged gasket

1) Normal
Brown to grayish-tan deposits and slight electrode wear indicate correct spark plug heat range.



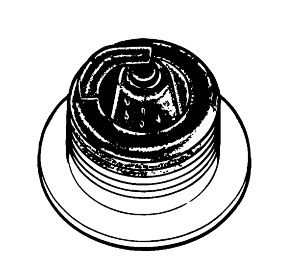
G6M0087

2) Carbon fouled
Dry fluffy carbon deposits on insulator and electrode are mostly caused by slow speed driving in city, weak ignition, too rich fuel mixture, dirty air cleaner, etc.
It is advisable to replace with plugs having hotter heat range.

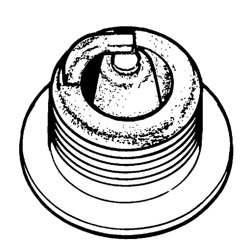


G6M0088

3) Oil fouled
Wet black deposits show excessive oil entrance into combustion chamber through worn rings and pistons or excessive clearance between valve guides and stems. If same condition remains after repair, use a hotter plug.


G6M0089

4) Overheating
White or light gray insulator with black or gray brown spots and bluish burnt electrodes indicate engine overheating. Moreover, the appearance results from incorrect ignition timing, loose spark plugs, wrong selection of fuel, hotter range plug, etc. It is advisable to replace with plugs having colder heat range.


G6M0090

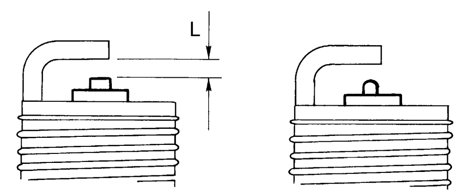
D: CLEANING S171003E56

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.

E: ADJUSTMENT S171003A01

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)



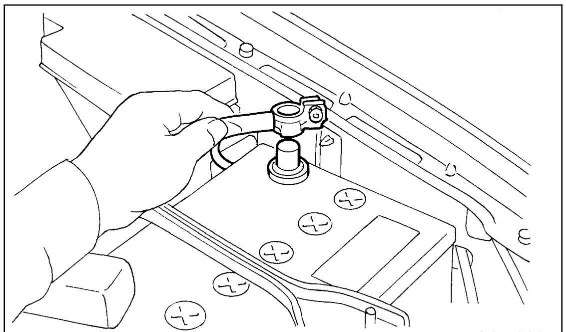
S6M0412A

NOTE:
Replace with new spark plug if this area is worn to “ball” shape.

3. Ignition Coil and Ignitor Assembly S171015

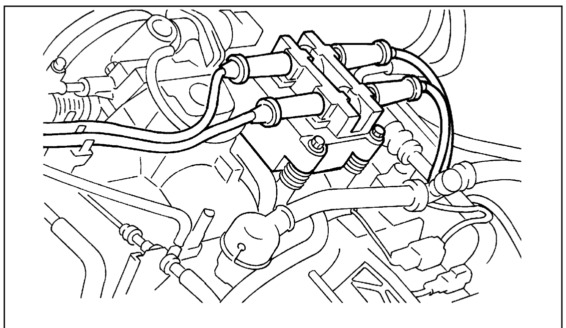
A: REMOVAL S171015A18

1) Disconnect battery ground cable.



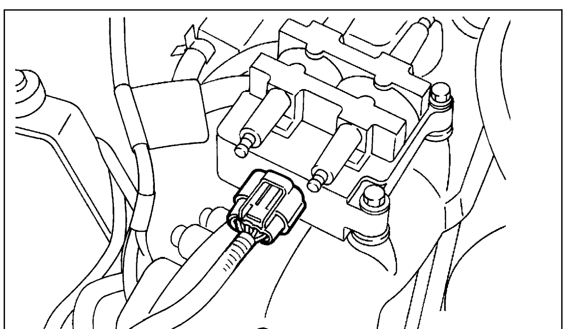
G6M0095

2) Disconnect spark plug cords from ignition coil and ignitor assembly.



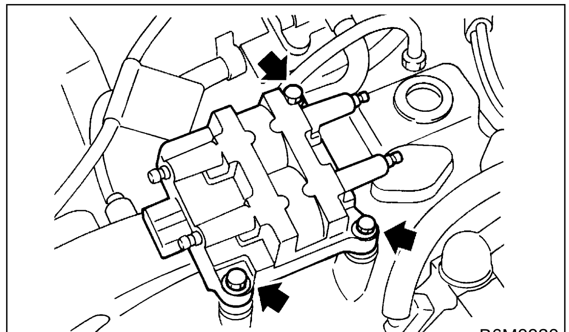
S6M0373

3) Disconnect connector from ignition coil and ignitor assembly.



B6M0932

4) Remove ignition coil and ignitor assembly.



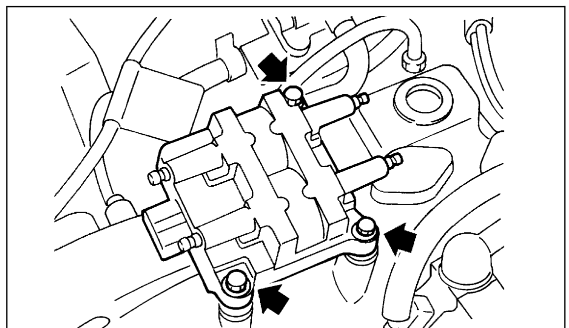
B6M0930

B: INSTALLATION S171015A11

Install in the reverse order of removal.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

CAUTION:
Be sure to connect wires to their proper positions. Failure to do so will damage unit.



B6M0930

C: INSPECTION S171015A10

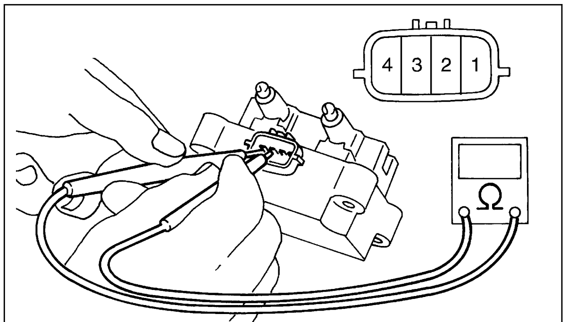
Using accurate tester, inspect the following items, and replace if defective.
1) Primary resistance
2) Secondary coil resistance

CAUTION:
If the resistance is extremely low, this indicates the presence of a short-circuit.

Specified resistance:

[Primary side]
Between terminal No. 1 and No. 2
0.73 Ω±10%
Between terminal No. 2 and No. 4
0.73 Ω±10%

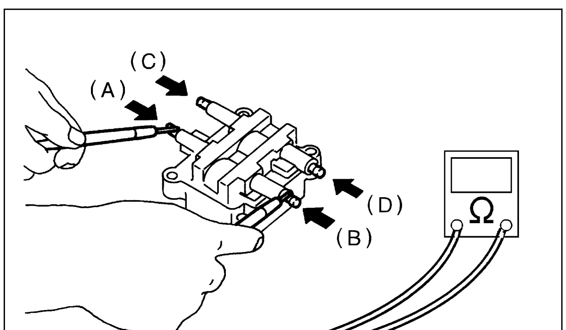
- Primary side



B6M0931

[Secondary side]
Between (A) and (B)
12.8 kΩ±15%
Between (C) and (D)
12.8 kΩ±15%

- Secondary side



B6M0773J

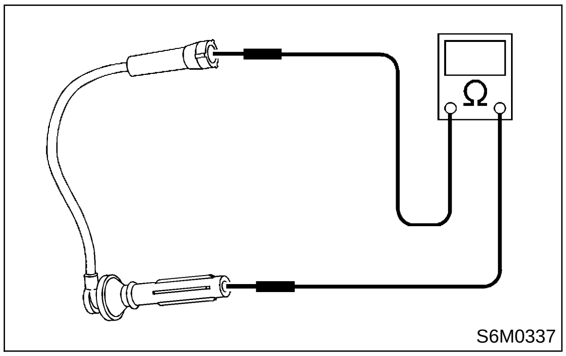
3) Insulation between primary terminal and case: 10 MΩ or more.

4. Spark Plug Cord *S171014*

A: INSPECTION *S171014A10*

Check for:
1) Damage to cords, deformation, burning or rust formation of terminals
2) Resistance values of cords

Resistance value:
> ***#1 cord: 5.6 — 10.6***
> ***#2 cord: 7.3 — 13.7***
> ***#3 cord: 5.9 — 11.1***
> ***#4 cord: 7.3 — 13.7***



MEMO:

STARTING/CHARGING SYSTEMS

SC

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1. General Description....................2
2. Starter....................5
3. Generator....................12
4. Battery....................17

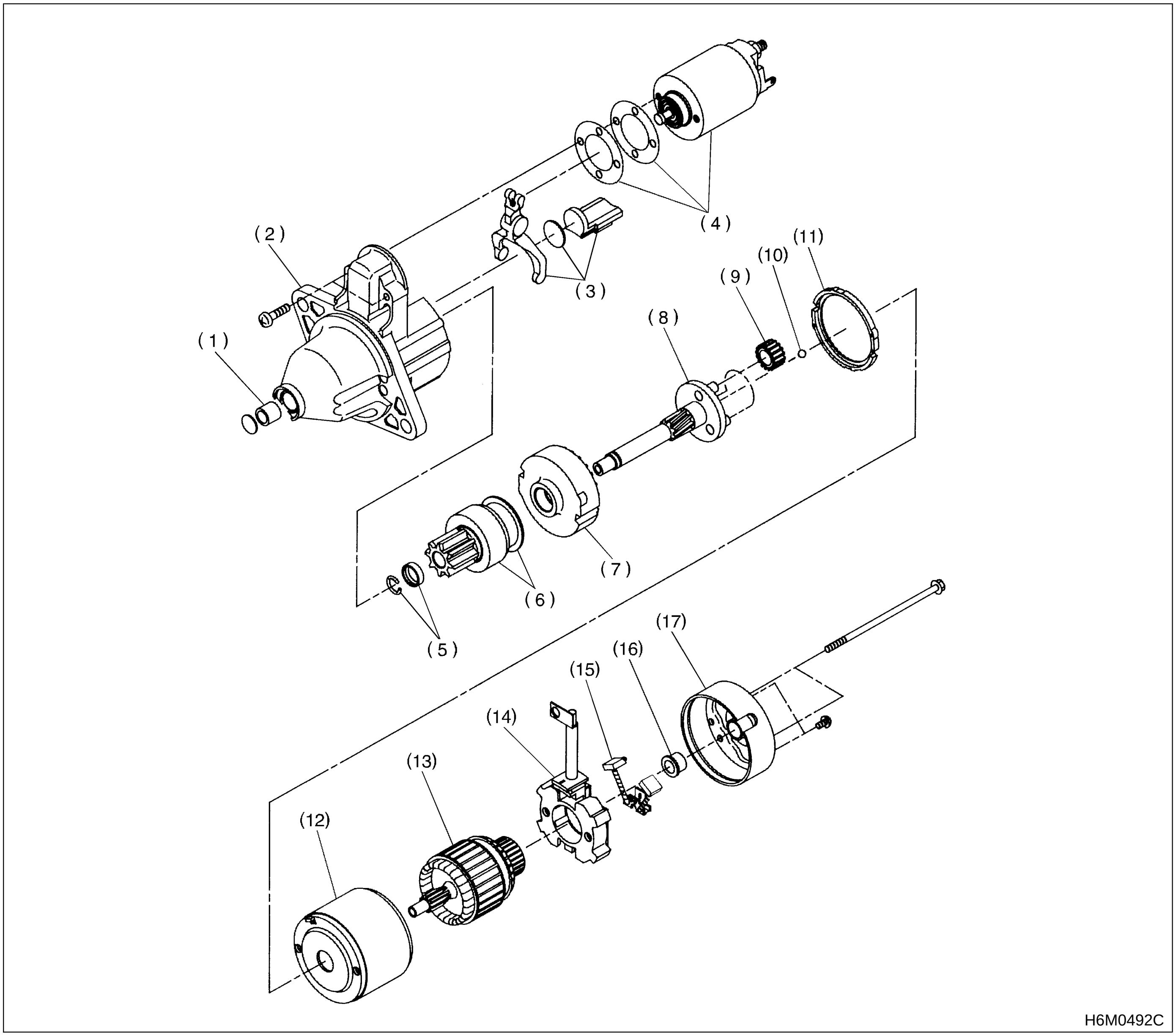
1. General Description S179001

A: SPECIFICATIONS S179001E49

Item			Designation	
Starter	Type		Reduction type	
	Vehicle type		MT vehicles	AT vehicles
	Model		M000T83981	M001T86481
	Manufacturer		Mitsubishi Electric	
	Voltage and output		12 V — 1.0 kW	12 V — 1.4 kW
	Direction of rotation		Counterclockwise (when observed from pinion)	
	Number of pinion teeth		8	9
	No-load characteristics	Voltage	11 V	
		Current	90 A or less	
		Rotating speed	2,800 rpm or more	2,400 rpm or more
	Load characteristics	Voltage	7.5 V	7.7 V
		Current	300 A	400 A
		Torque	8.6 N·m (0.88 kgf-m, 6.4 ft-lb) or more	16.0 N·m (1.63 kgf-m, 11.8 ft-lb) or more
		Rotating speed	920 rpm or more	740 rpm or more
	Lock characteristics	Voltage	4 V	3.5 V
		Current	650 A or less	940 A or less
		Torque	14.7 N·m (1.50 kgf-m, 10.8 ft-lb) or more	28.9 N·m (2.95 kgf-m, 21.3 ft-lb) or more
Generator	Type		Rotating-field three-phase type, Voltage regulator built-in type, with load response control system	
	Model		A2TB2991	
	Manufacturer		Mitsubishi Electric	
	Voltage and output		12 V — 75 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 — 30 A or more 2,500 rpm — 64 A or more 5,000 rpm — 76 A or more	
	Regulated voltage		14.1 — 14.8 V [20°C (68°F)]	
Battery	Reservoir capacity	min	90	110
	Cold cranking amperes	amp.	430	490

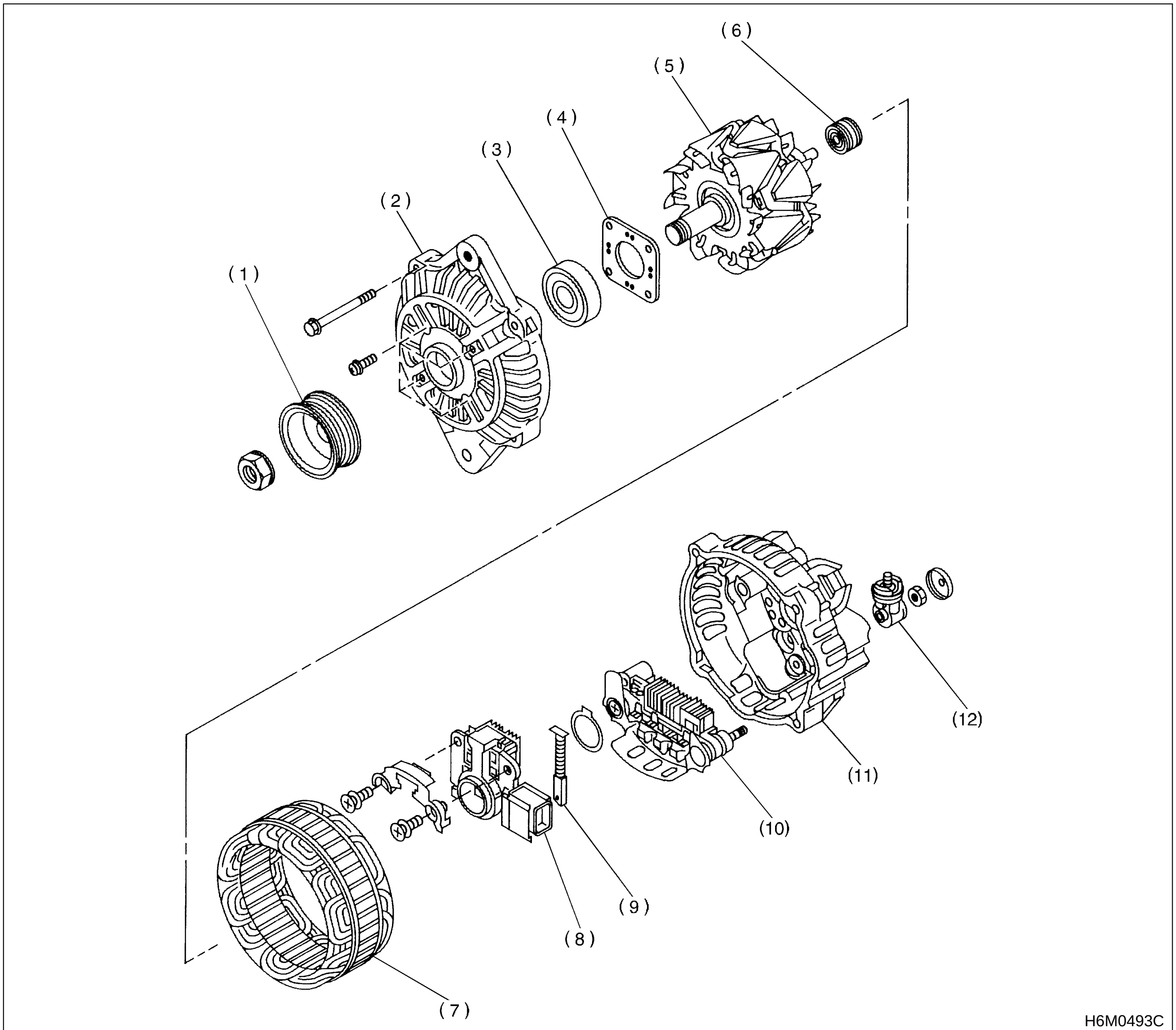
B: COMPONENT *S179001A05*

1. STARTER *S179001A0501*



(1) Sleeve bearing
(2) Front bracket
(3) Lever set
(4) Magnet switch ASSY
(5) Stopper set
(6) Over running clutch
(7) Internal gear ASSY
(8) Shaft ASSY
(9) Gear ASSY
(10) Ball
(11) Packing
(12) Yoke
(13) Armature
(14) Brush holder
(15) Brush
(16) Sleeve bearing
(17) Rear bracket

2. GENERATOR *S179001A0502*



(1) Pulley	(5) Rotor	(9) Brush
(2) Front cover	(6) Bearing	(10) Rectifier
(3) Ball bearing	(7) Stator coil	(11) Rear cover
(4) Bearing retainer	(8) IC regulator with brush	(12) Terminal

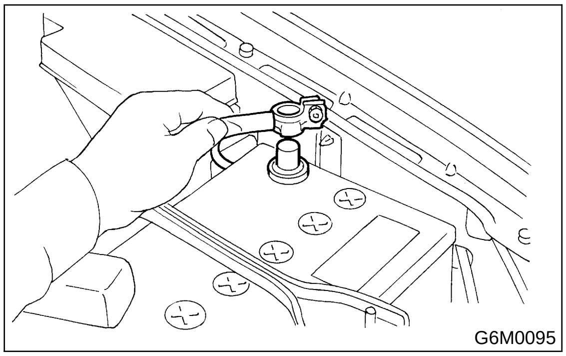
C: CAUTION *S179001A03*

- 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 ground cable from battery.

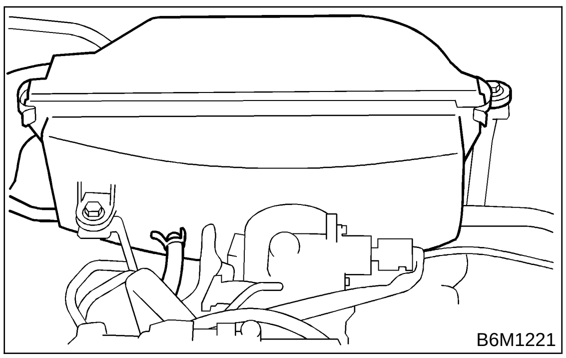
2. Starter *S179012*

A: REMOVAL *S179012A18*

1) Disconnect battery ground cable.

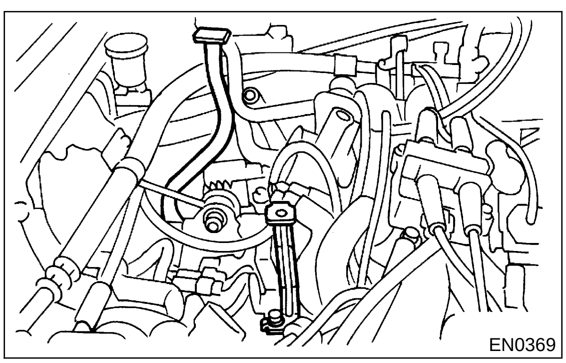


2) Remove air cleaner case.

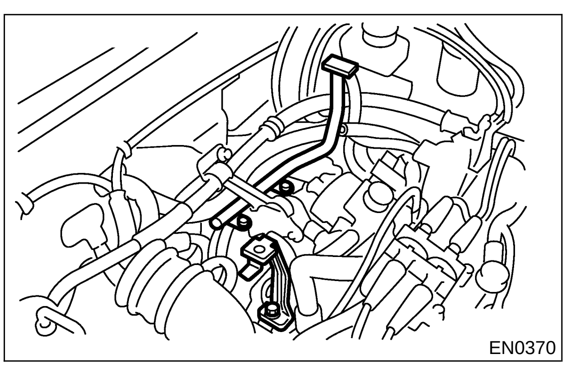


3) Remove air cleaner case stay.

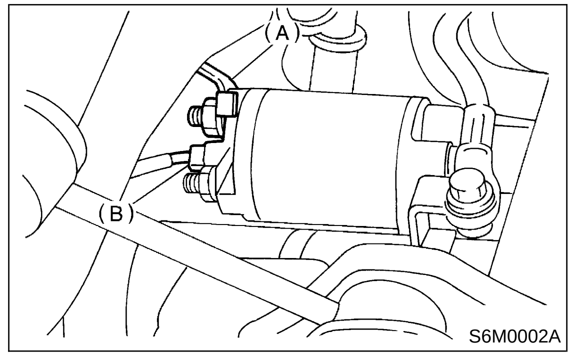
- MT vehicles



- AT vehicles

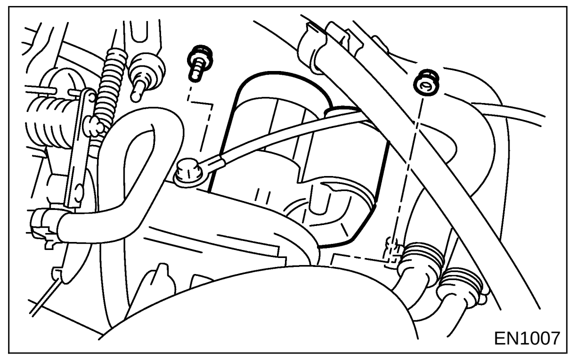


4) Disconnect connector and terminal from starter.



(A) Terminal
(B) Connector

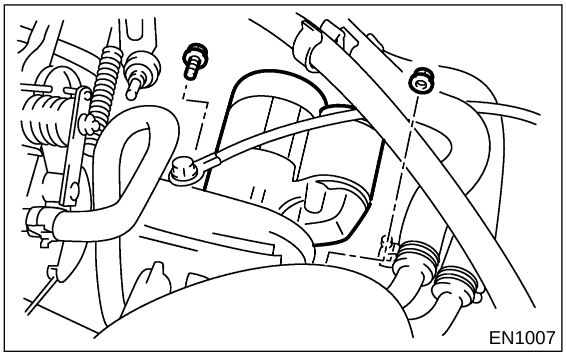
5) Remove starter from transmission.



B: INSTALLATION *S179012A11*

Install in the reverse order of removal.

Tightening torque:
50 N·m (5.1 kgf-m, 37 ft-lb)

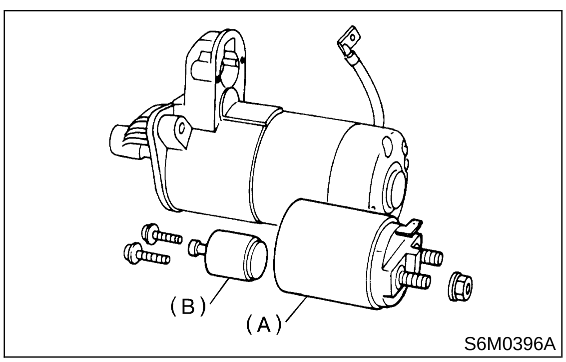


C: DISASSEMBLY *S179012A06*

1. STARTER ASSEMBLY *S179012A0601*

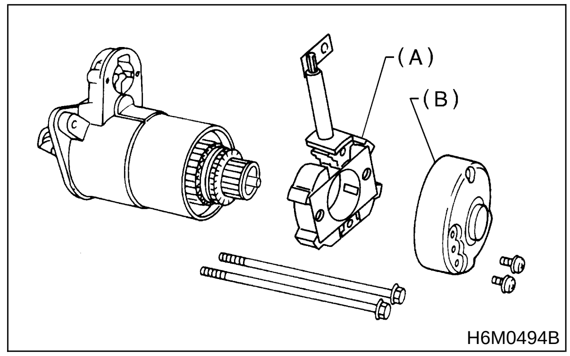
1) Loosen nut which holds terminal M of switch assembly, and disconnect connector.
2) Remove bolts which hold switch assembly, and remove switch assembly, plunger and plunger spring from starter as a unit.

CAUTION:
Be careful because pinion gap adjustment washer may sometimes be used on the mounting surface of switch assembly.



(A) Switch ASSY
(B) Plunger

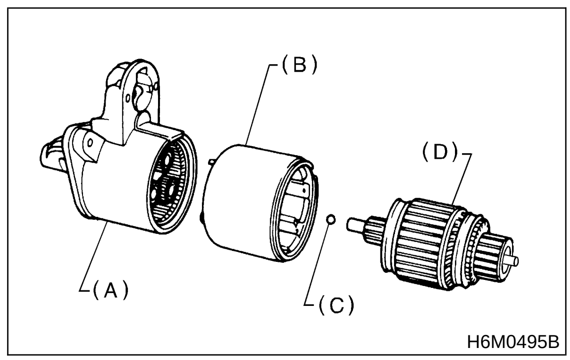
3) Remove both through-bolts and brush holder screws, and detach rear bracket and brush holder.



(A) Brush holder
(B) Rear bracket

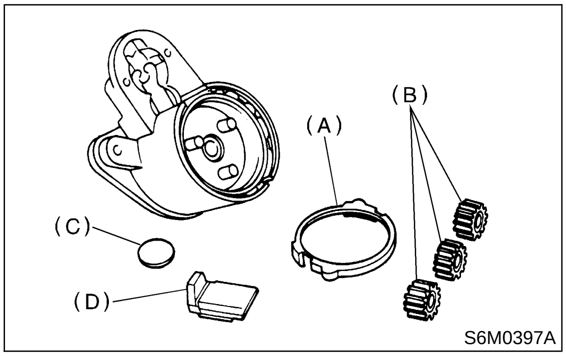
4) Remove armature and yoke. Ball used as a bearing will then be removed from the end of armature.

CAUTION:
Be sure to mark an alignment mark on yoke and front bracket before removing yoke.



(A) Front bracket
(B) Yoke
(C) Ball
(D) Armature

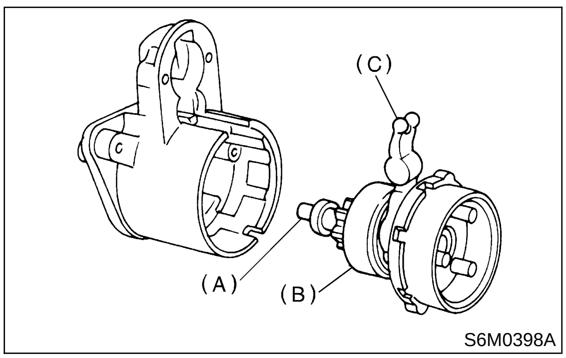
5) Remove packing A, three planetary gears, packing B and plate.



(A) Packing A
(B) Planetary gear
(C) Plate
(D) Packing B

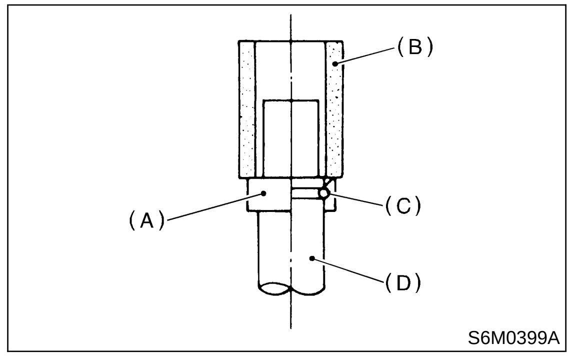
6) Remove shaft assembly and overrunning clutch as a unit.

CAUTION:
Record the direction of lever before removing.



(A) Shaft ASSY
(B) Overrunning clutch
(C) Lever

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.

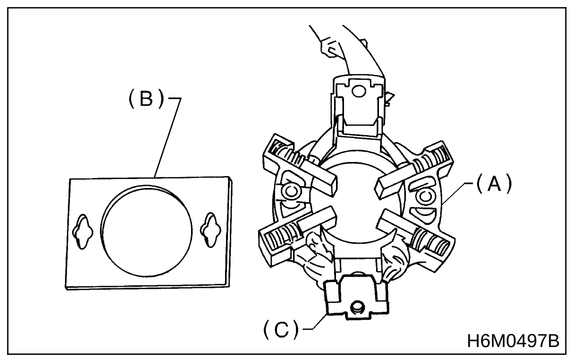


(A) Stopper
(B) Tool
(C) Ring
(D) Shaft

2. BRUSH HOLDER *S179012A0602*

Slightly open the metal fitting holding the insulating plate to the brush holder. Remove the insulating plate.

NOTE:
The brush and spring can be easily removed from the brush holder at this time.



(A) Brush holder
(B) Insulating plate
(C) Metal fitting

D: ASSEMBLY *S179012A02*

Assembly is in the reverse order of disassembly procedures. 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.

- 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

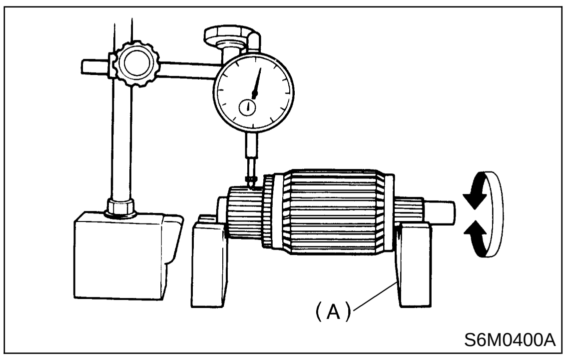
3) After assembling parts correctly, make sure starter operates properly.

E: INSPECTION S179012A10

1. ARMATURE S179012A1001

1) Check commutator for any sign of burns of rough surfaces or stepped wear. If wear is of a minor nature, correct it by using sand paper.
2) Run-out test
Check the commutator run-out and replace if it exceeds the limit.

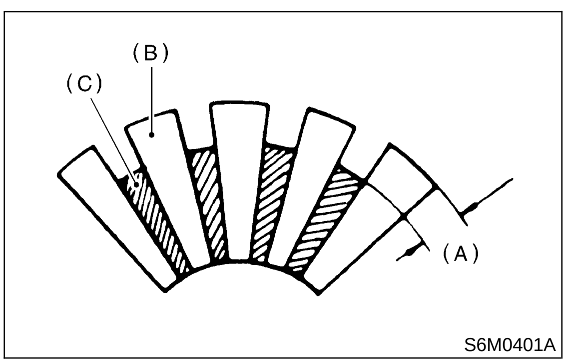
Commutator run-out:
Standard
0.05 mm (0.0020 in)
Service limit
Less than 0.10 mm (0.0039 in)



(A) V-block

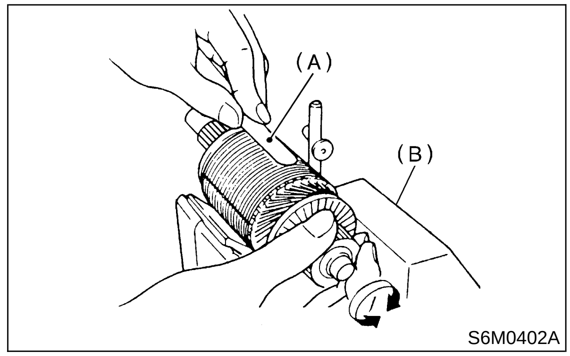
3) Depth of segment mold
Check the depth of segment mold.

Depth of segment mold:
0.5 mm (0.020 in)



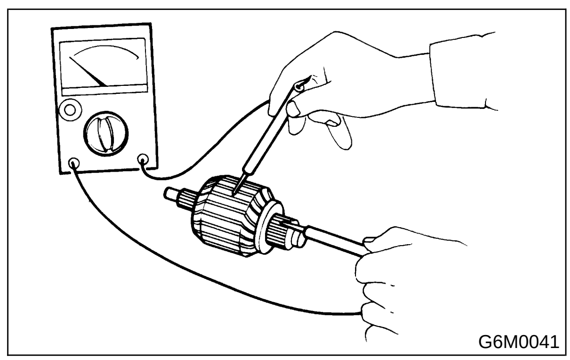
(A) Depth of mold
(B) Segment
(C) Mold

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) Grower

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 S179012A1002

Make sure pole is set in position.

3. OVERRUNNING CLUTCH S179012A1003

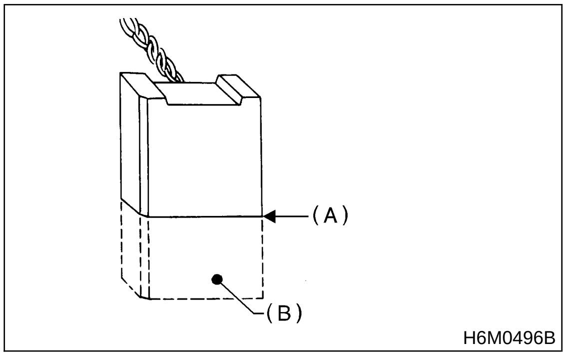
Inspect teeth of pinion for wear and damage. Replace if it is damaged. Rotate pinion in direction of rotation (counterclockwise). It should rotate smoothly. But in opposite direction, it should be locked.

CAUTION:
Do not clean overrunning clutch with oil to prevent grease from flowing out.

4. BRUSH AND BRUSH HOLDER S179012A1004

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
12.3 mm (0.484 in)
Service limit
7.0 mm (0.276 in)



(A) Service limit line
(B) Brush

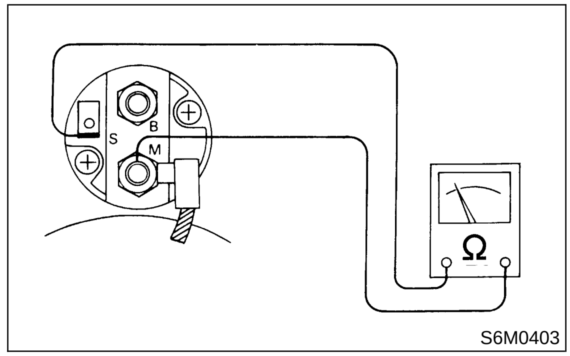
2) Brush movement
Be sure brush moves smoothly inside brush holder.
3) Brush spring force
Measure brush spring force with a spring scale. If it is less than the service limit, replace brush holder.

Brush spring force:
Standard
21.6 N (2.2 kgf, 4.9 lb) (when new)
Service limit
5.9 N (0.6 kgf, 1.3 lb)

5. SWITCH ASSEMBLY S179012A1005

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 terminals M and B.

Terminal / Specified resistance:
S — M / Less than 1 Ω
S — Ground / Less than 1 Ω
M — B / More than 1 MΩ



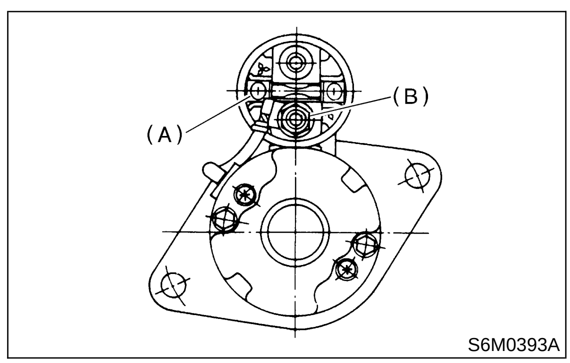
6. SWITCH ASSEMBLY OPERATION

S179012A1006

1) Connect terminal S of switch assembly to positive terminal of battery with a lead wire, and starter body to ground terminal of battery. Pinion should be forced endwise on shaft.

CAUTION:
With pinion forced endwise on shaft, starter motor can sometimes rotate because current flows, through pull-in coil, to motor. This is not a problem.

2) Disconnect connector from terminal M, and connect positive terminal of battery and terminal M using a lead wire and ground terminal to starter body.
In this test set up, pinion should return to its original position even when it is pulled out with a screwdriver.

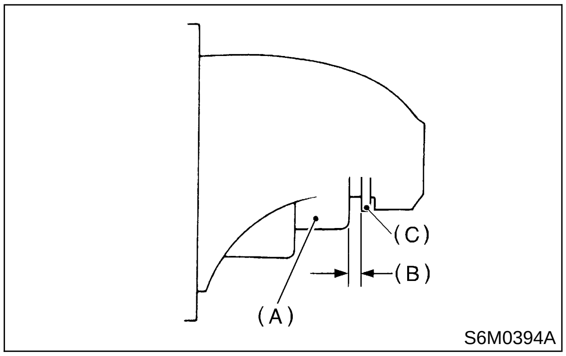


(A) Terminal S
(B) Terminal M

7. PINION GAP S179012A1007

1) Measure pinion gap while the pinion is pulled out as shown in the figure.

Pinion gap:
0.5 — 2.0 mm (0.020 — 0.079 in)

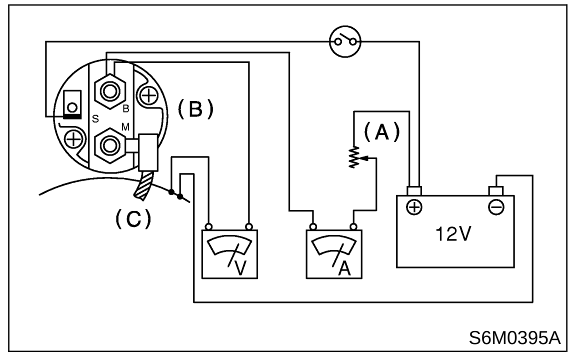


(A) Pinion
(B) Gap
(C) Stopper

If motor is running with the pinion forced endwise on the shaft, disconnect connector from terminal M of switch assembly and connect terminal M to ground terminal (−) of battery with a lead wire. Next, gently push pinion back with your fingertips and measure pinion gap.
2) If pinion gap is outside specified range, remove or add number of adjustment washers used on the mounting surface of switch assembly until correct pinion gap is obtained.

8. PERFORMANCE TEST S179012A1008

The starter should be submitted to performance tests whenever it has been overhauled, to assure its satisfactory performance when installed on the engine.
Three performance tests, no-load test, load test, and lock test, are presented here; however, if the load test and lock test cannot be performed, carry out at least the no-load test.
For these performance tests, use the circuit shown in figure.



(A) Variable resistance
(B) Magnetic switch
(C) Starter body

1) No-load test
With switch on, adjust the variable resistance to obtain 11 V, take the ammeter reading and measure the starter speed. Compare these values with the specifications.

No-load test (Standard):

Voltage / Current
11 V / 90 A max.

Rotating speed
MT vehicles
2,800 rpm or more
AT vehicles
2,400 rpm or more

2) Load test
Apply the specified braking torque to starter. The condition is satisfactory if the current draw and starter speed are within specifications.

Load test (Standard):

Voltage / Load
MT vehicles
7.5 V/8.6 N·m (0.88 kgf-m, 6.4 ft-lb)
AT vehicles
7.7 V/16.0 N·m (1.63 kgf-m, 11.8 ft-lb)

Current / Speed
MT vehicles
300 A/920 rpm or more
AT vehicles
400 A/740 rpm or more

3) Lock test
With starter stalled, or not rotating, measure the torque developed and current draw when the voltage is adjusted to the specified voltage.

Lock test (Standard):

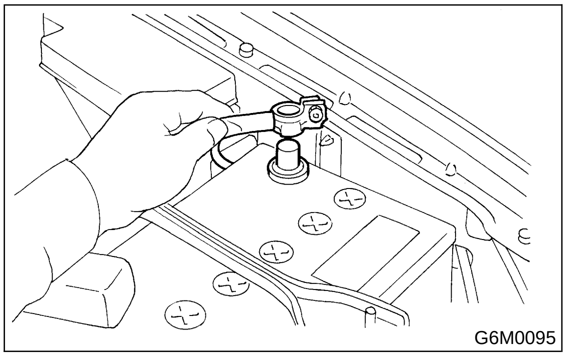
Voltage / Current
MT vehicles
4 V/650 A or less
AT vehicles
3.5 V/940 A or less

Torque
MT vehicles
14.7 N·m (1.50 kgf-m, 10.8 ft-lb) or more
AT vehicles
28.9 N·m (2.95 kgf-m, 21.3 ft-lb) or more

3. Generator *S179008*

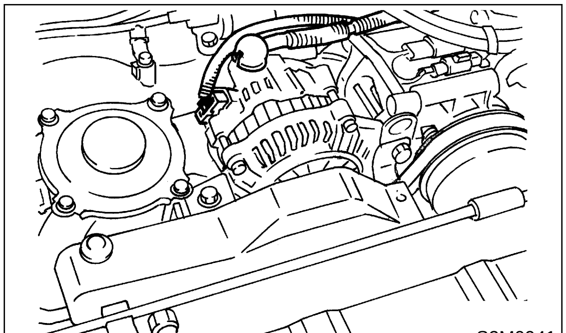
A: REMOVAL *S179008A18*

1) Disconnect battery ground cable.



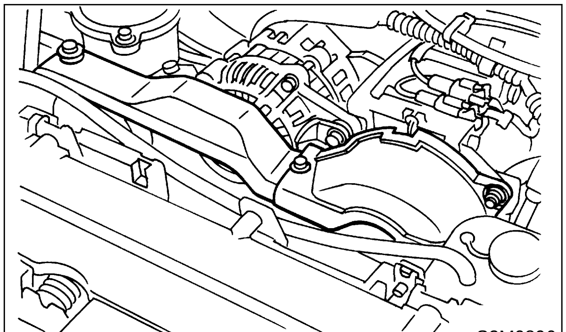
G6M0095

2) Disconnect connector and terminal from generator.



S2M0941

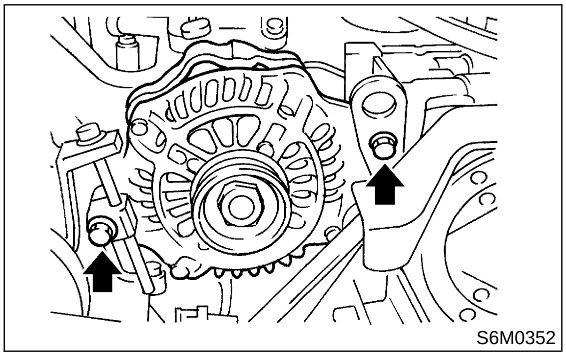
3) Remove V-belt cover.



S2M0896

4) Remove front side V-belt.
<Ref. to ME-42, FRONT SIDE BELT, REMOVAL, V-belt.>

5) Remove bolts which install generator onto bracket.

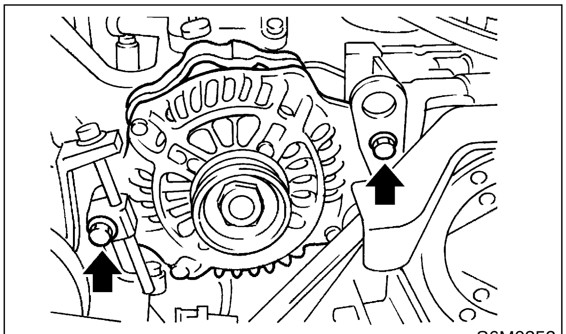


S6M0352

B: INSTALLATION *S179008A11*

Install in the reverse order of removal.

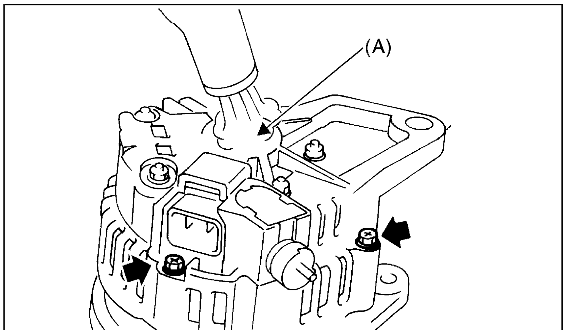
CAUTION:
Check and adjust V-belt tension. <Ref. to ME-43, INSPECTION, V-belt.>



S6M0352

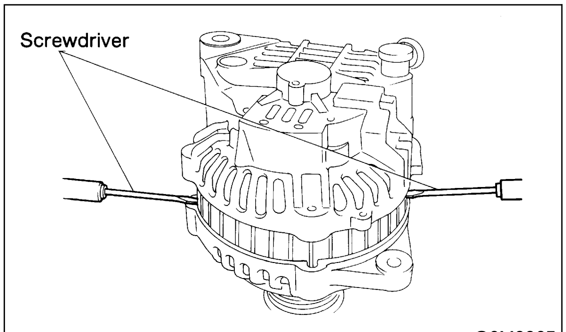
C: DISASSEMBLY *S179008A06*

1) Heat the portion (A) of rear cover to 50°C (122°F) with heater drier.



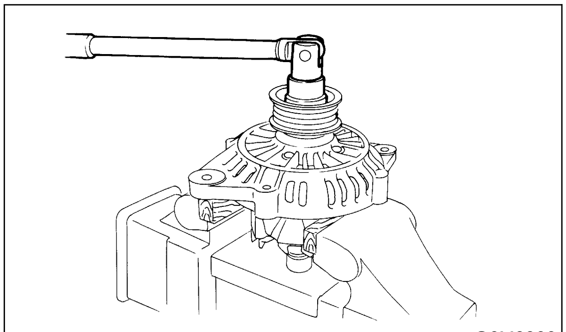
B6M0476B

2) Remove the four through bolts. Then insert the tip of a flat-head screwdriver into the gap between the stator core and front bracket. Pry then apart to disassemble.



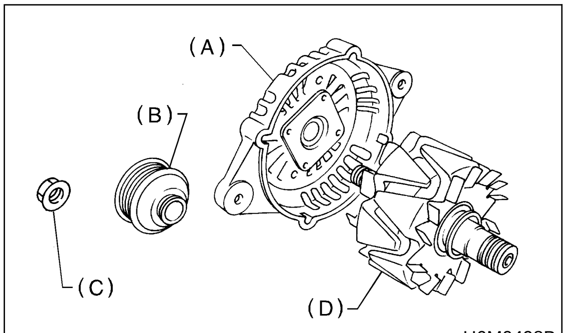
G6M0065

3) Hold rotor with a vise and remove pulley nut.



G6M0066

CAUTION:
When holding rotor with vise, insert aluminum plates or wood pieces on the contact surfaces of the vise to prevent rotor from damage.

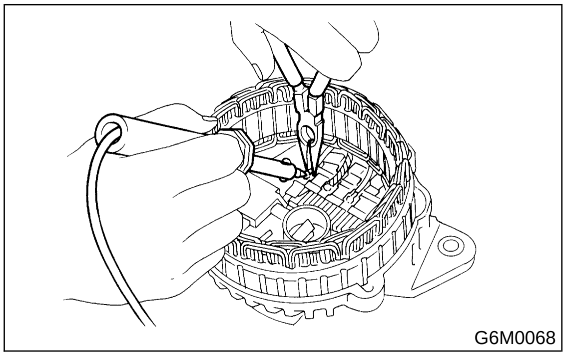


H6M0498B

(A) Front cover
(B) Pulley
(C) Nut
(D) Rotor

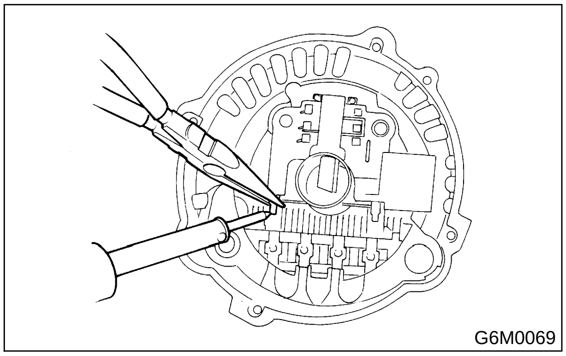
4) Unsolder connection between rectifier and stator coil to remove stator coil.

CAUTION:
Finish the work rapidly (less than three seconds) because the rectifier cannot withstand heat very well.



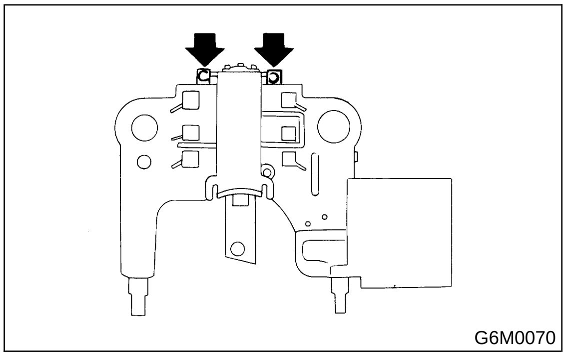
G6M0068

5) Remove screws which secure IC regulator to rear cover, and unsolder connection between IC regulator and rectifier to remove IC regulator.



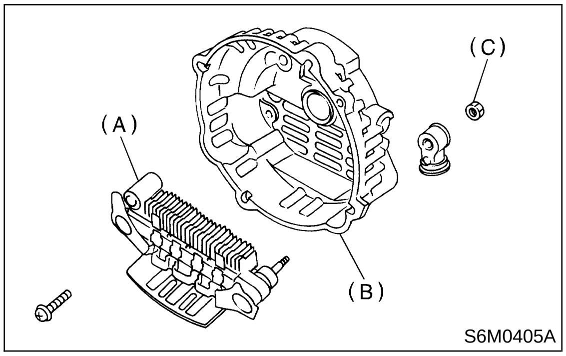
G6M0069

6) Remove the brushes by unsoldering at the pigtails.



G6M0070

7) Remove the nut and insulating bushing at terminal B, and remove rectifier.

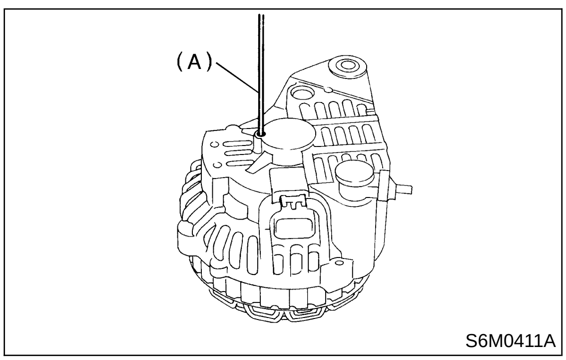


(A) Rectifier
(B) Rear cover
(C) Nut

D: ASSEMBLY S179008A02

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.



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.

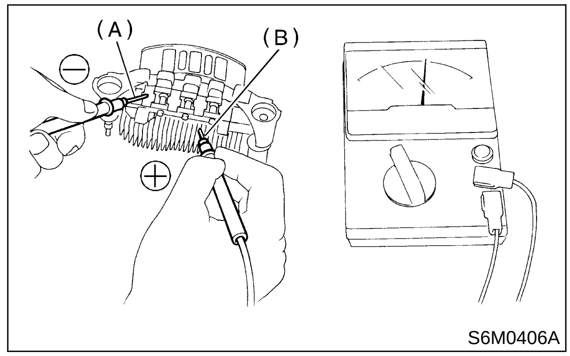
3) After reassembly, turn the pulley by hand to check that the rotor turns smoothly.

E: INSPECTION S179008A10

1. DIODE S179008A1001

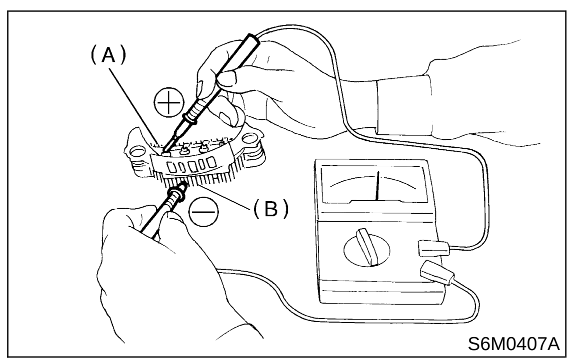
CAUTION:
Never use a high capacity tester (measuring use for high voltage) or any other similar measure for this test; otherwise, the diodes may be damaged.

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 (1 Ω or less) 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 (1 Ω or less) exists only in the direction from the heat sink to the diode lead.



(A) Diode lead
(B) Heat sink (Negative side)

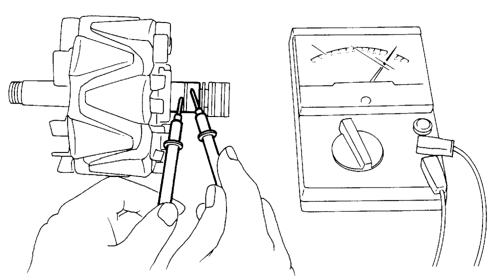
2. ROTOR S179008A1002

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)

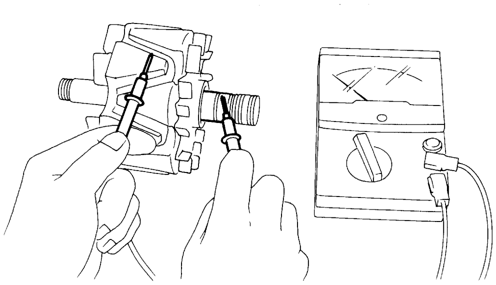
3) Continuity test
Check resistance between slip rings using circuit tester.
If the resistance is not within specification, replace rotor assembly.

Specified resistance:
Approx. 2.7 — 3.2 Ω



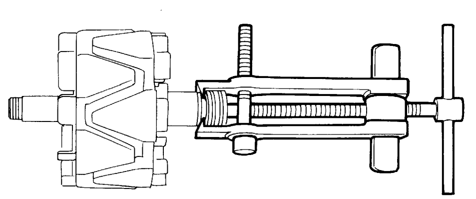
G6M0075

4) Insulation test
Check continuity between slip ring and rotor core or shaft. If continuity (1 Ω or less) exists, the rotor coil is grounded, and so replace rotor assembly.



G6M0076

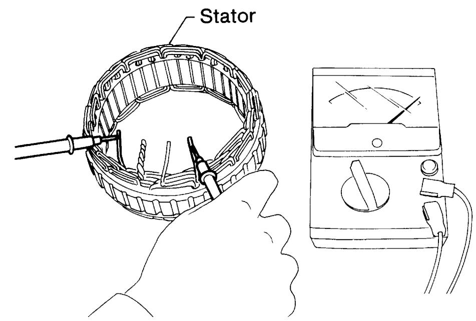
5) Ball bearing (rear side)
(1) Check rear ball bearing. Replace if it is noisy or if rotor does not turn smoothly.
(2) The rear bearing can be removed by using common bearing puller.



G6M0077

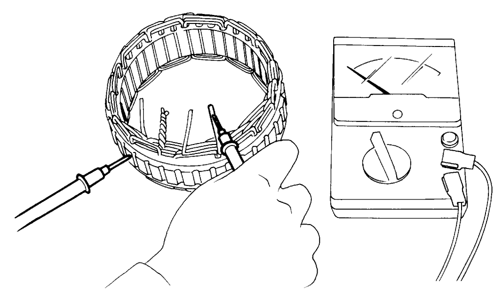
3. STATOR S179008A1003

1) Continuity test
Inspect stator coil for continuity between each end of the lead wires. If there is no continuity (1 MΩ or more) between individual lead wires, the lead wire is broken, and so replace stator assembly.



G6M0078

2) Insulation test
Inspect stator coil for continuity (1 Ω or less) between stator core and each end of the lead wire. If there is continuity, the stator coil is grounded, and so replace stator assembly.

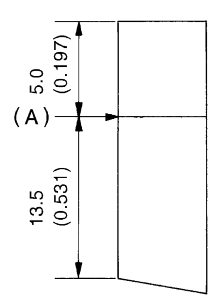


G6M0079

4. BRUSH S179008A1004

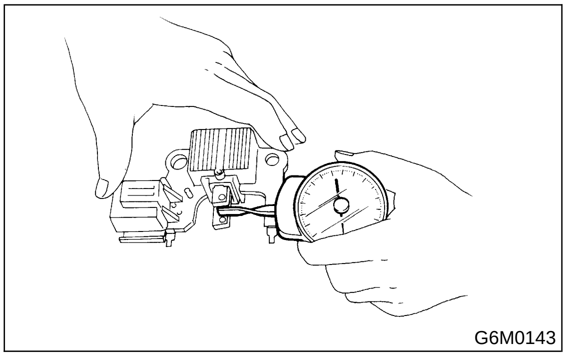
1) Measure the length of each brush. If wear exceeds the service limit, replace the brush. Each brush has the service limit mark (A) on it.

Brush length:
Standard
18.5 mm (0.728 in)
Service limit
5.0 mm (0.197 in)



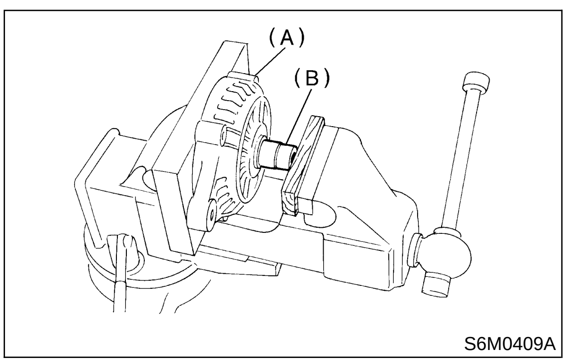
H6M0499B

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).



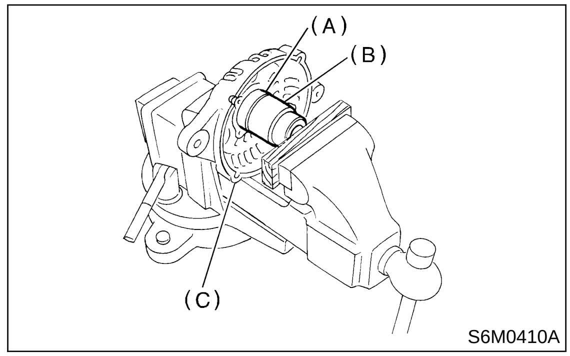
5. BEARING (FRONT SIDE) *S179008A1005*

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

(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.

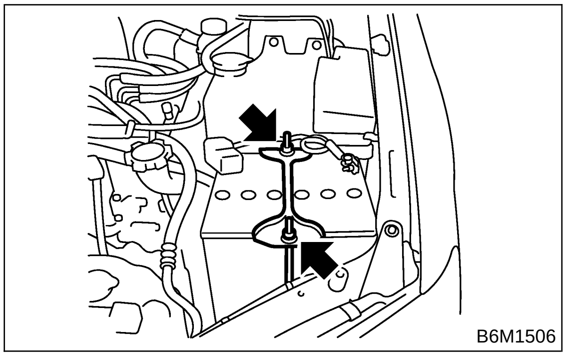


(A) Bearing
(B) Socket wrench
(C) Front cover

4. Battery *S179011*

A: REMOVAL *S179011A18*

1) Disconnect the positive (+) cable after disconnecting the negative (−) cable of battery.
2) Remove flange nuts from battery rods and take off battery holder.



3) Remove battery.

B: INSTALLATION *S179011A11*

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 *S179011A10*

WARNING:
- **Electrolyte has toxicity; be careful handling the fluid.**
- **Avoid contact with skin, eyes or clothing. Especially at contact with eyes, blush with water for 15 minutes and get prompt medical attention.**
- **Batteries produce explosive gasses. Keep sparks, flame, cigarettes away.**
- **Ventilate when charging or using in enclosed space.**
- **For safety, in case an explosion does occur, wear eye protection or shield your eyes when working near any battery. Never lean over a battery.**
- **Do not let battery fluid contact eyes, skin, fabrics, or paint-work because battery fluid is corrosive acid.**
- **To lessen the risk of sparks, remove rings, metal watch-bands, and other metal jewelry. Never allow metal tools to contact the positive battery terminal and anything connected to it while you are at the same time in contact with any other metallic portion of the vehicle because a short circuit will be caused.**

1. EXTERNAL PARTS: *S179011A1001*

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: *S179011A1002*

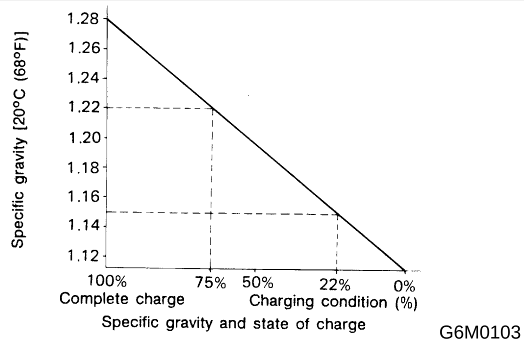
Check the electrolyte level in each cell. If the level is below MIN LEVEL, bring the level to MAX LEVEL by pouring distilled water into the battery cell. Do not fill beyond MAX LEVEL.

3. SPECIFIC GRAVITY OF ELECTROLYTE: *S179011A1003*

1) Measure specific gravity of electrolyte using a hydrometer and a thermometer.
Specific gravity varies with temperature of electrolyte so that it must be corrected at 20°C (68°F) using the following equation:

S_{20} = St + 0.0007 × (t − 20)

S_{20}: Specific gravity corrected at electrolyte temperature of 20°C
St : Measured specific gravity
t : Measured temperature (°C)
Determine whether or not battery must be charged, according to corrected specific gravity.
Standard specific gravity: 1.220 — 1.290 [at 20°C (68°F)]



G6M0103

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 S179011A14

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 S179011A1401

1) Specific gravity of electrolyte is held at a specific value in a range from 1.250 to 1.290 for more than one hour.
2) Voltage per battery cell is held at a specific value in a range from 2.5 to 2.8 volts for more than one hour.

2. CHECK HYDROMETER FOR STATE OF CHARGE S179011A1402

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 S179011A1403

Charge the battery at current value specified by manufacturer or at approximately 1/10 of battery's ampere-hour rating.

4. QUICK CHARGING S179011A1404

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.**

ENGINE (DIAGNOSTICS)

EN

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1. Basic Diagnostic Procedure

S078501

A: PROCEDURE S078501E45

1. ENGINE S078501E4501

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-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-65, 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-336, 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?	Record diagnostic trouble code. Repair the trouble cause. <Ref. to EN-84, LIST, List of Diagnostic Trouble Code (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-54, Engine Malfunction Indicator Lamp (MIL).>
4	**PERFORM THE DIAGNOSIS.** 1) Perform the clear memory mode. <Ref. to EN-50, Clear Memory Mode.> 2) Perform the inspection mode. <Ref. to EN-43, Inspection Mode.>	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC?	Inspect using “Diagnostics Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to EN-90, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Complete the diagnosis.

2. AUTOMATIC TRANSMISSION *S078501E4502*

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-11, Differential Gear Oil.>
3) ATF leak check <Ref. to AT-9, Automatic Transmission Fluid.>
4) Differential gear oil leak check <Ref. to AT-11, Differential Gear Oil.>
5) Stall test <Ref. to AT-13, Stall Test.>
6) Line pressure test <Ref. to AT-16, Line Pressure Test.>
7) Transfer clutch pressure test <Ref. to AT-18, Transfer Clutch Pressure Test.>
8) Time lag test <Ref. to AT-15, Time Lag Test.>
9) Road test <Ref. to AT-12, Road Test.>
10) Shift characteristics <Ref. to AT-18, Transfer Clutch Pressure Test.>

2. Check List for Interview S078502

A: CHECK S078502A04

1. CHECK LIST NO. 1 S078502A0401

Check the following items when problem has occurred.

NOTE:
Use copies of this page for interviewing customers.

Customer's name		Engine no.	
Date of sale		Fuel brand	
Date of repair		Odometer reading	km
Vin no.			miles
Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others:		
Outdoor temperature	°C (°F)		
	☐ Hot ☐ Warm ☐ Cool ☐ Cold		
Place	☐ Highway ☐ Suburbs ☐ Inner city ☐ Uphill ☐ Downhill ☐ Rough road ☐ Others:		
Engine temperature	☐ Cold ☐ Warming-up ☐ After warming-up ☐ Any temperature ☐ Others:		
Engine speed	rpm		
Vehicle speed	MPH		
Driving conditions	☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH)		
Headlight	☐ ON/☐ OFF	Rear defogger	☐ ON/☐ OFF
Blower	☐ ON/☐ OFF	Radio	☐ ON/☐ OFF
A/C compressor	☐ ON/☐ OFF	CD/Cassette	☐ ON/☐ OFF
Cooling fan	☐ ON/☐ OFF	Car phone	☐ ON/☐ OFF
Front wiper	☐ ON/☐ OFF	CB	☐ ON/☐ OFF
Rear wiper	☐ ON/☐ OFF		

2. CHECK LIST NO. 2 S078502A0402

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 S078001

A: CAUTION S078001A03

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.**

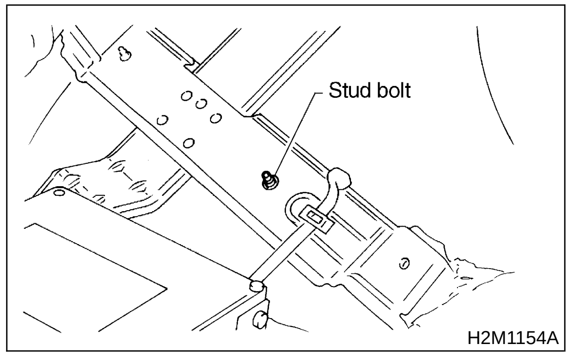
2) Never connect the battery in reverse polarity.
- The ECM will be destroyed instantly.
- The fuel injector and other part will be damaged in just a few minutes more.

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.

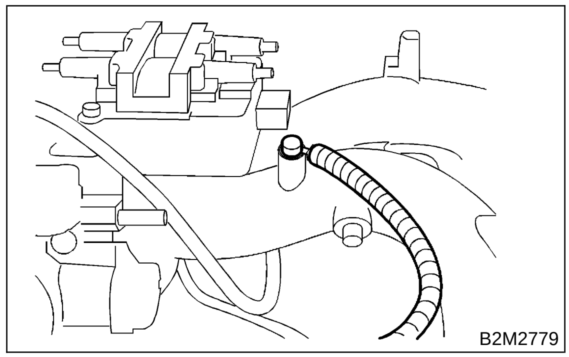
4) Before disconnecting the connectors of each sensor and the ECM, be sure to turn OFF the ignition switch.
5) Poor contact has been identified as a primary cause of this problem. To measure the voltage and/or resistance of individual sensors or all electrical control modules at the harness side connector, 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.

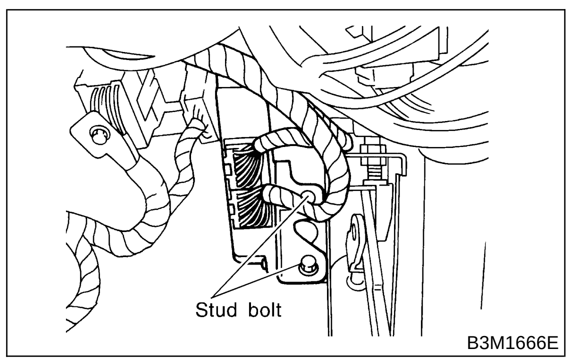
7) The connectors to each sensor in the engine compartment and the harness connectors on the engine side and body side are all designed to be waterproof. However, it is still necessary to take care not to allow water to get into the connectors when washing the vehicle, or when servicing the vehicle on 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 S078001A10

Before performing diagnostics, check the following items which might affect engine problems:

1. BATTERY S078001A1001

1) Measure battery voltage and specific gravity of electrolyte.

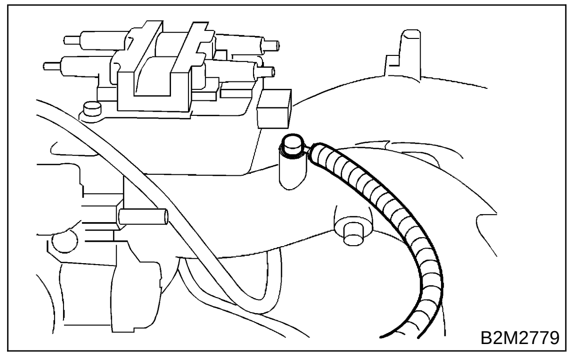
Standard voltage: 12 V

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 S078001A1002

Make sure the engine grounding terminal is properly connected to the engine.



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C: NOTE S078001A15

1. DESCRIPTION S078001A1501

- The on-board diagnostics (OBD) system detects and indicates a fault in various inputs and outputs of the complex electronic control. CHECK ENGINE malfunction indicator lamp (MIL) in the combination meter indicates occurrence of a fault or trouble.
- Further, against such a failure or sensors as may disable the drive, the fail-safe function is provided to ensure the minimal driveability.
- The OBD system incorporated with the vehicles within this engine family complies with Section 1968.1, California Code of Regulations (OBD-II regulation). The OBD system monitors the components and the system malfunction listed in Engine Section which affects on emissions.
- When the system decides that a malfunction occurs, MIL illuminates. At the same time of the MIL illumination or blinking, a diagnostic trouble code (DTC) and a freeze frame engine conditions are stored into on-board computer.
- The OBD system stores freeze frame engine condition data (engine load, engine coolant temperature, fuel trim, engine speed and vehicle speed, etc.) into on-board computer when it detects a malfunction first.
- If the OBD system detects the various malfunctions including the fault of fuel trim or misfire, the OBD system first stores freeze frame engine conditions about the fuel trim or misfire.
- When the malfunction does not occur again for three consecutive driving cycles, MIL is turned off, but DTC remains at on-board computer.
- The OBD-II system is capable of communication with a general scan tool (OBD-II general scan tool) formed by ISO 9141 CARB.
- The OBD-II diagnostics procedure is different from the usual diagnostics procedure. When troubleshooting OBD-II vehicles, connect Subaru

Select Monitor or the OBD-II general scan tool to the vehicle.

2. ENGINE AND EMISSION CONTROL SYSTEM *S078001A1502*

- 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.

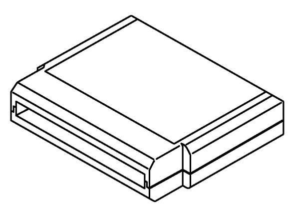
The MFI system also has the following features:

- 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 *S078001A1503*

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 *S078001A17*

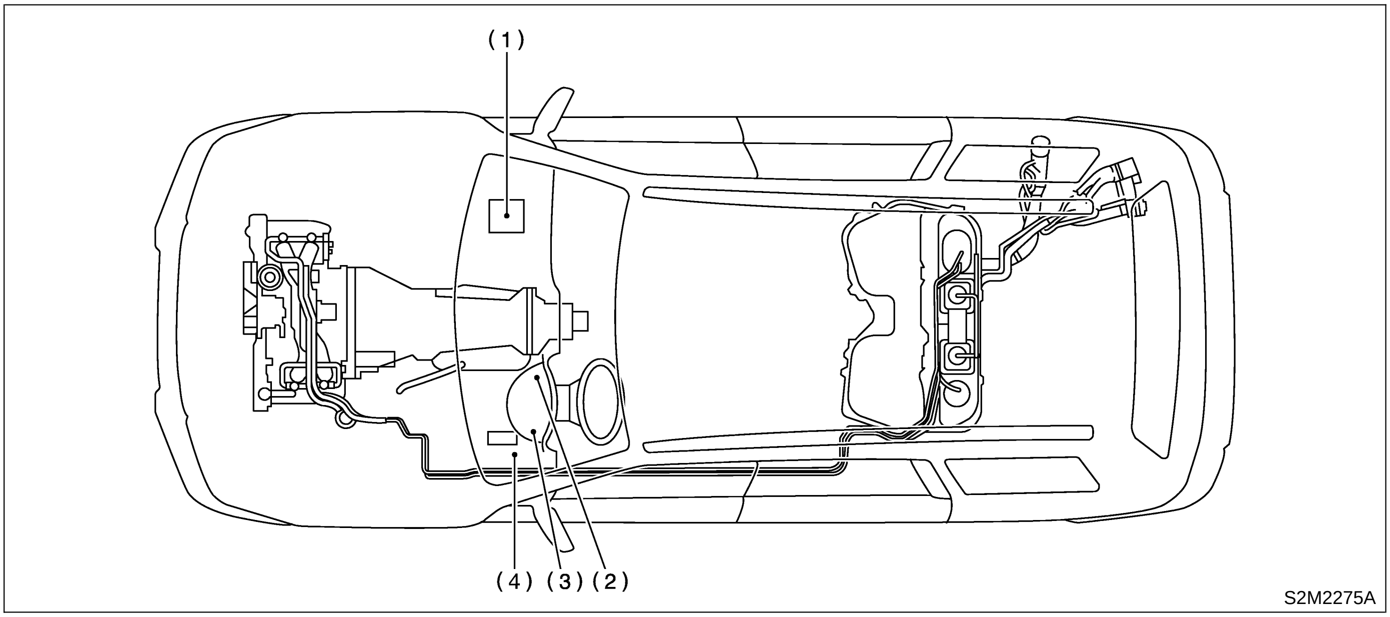
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3876	24082AA190 (Newly adopted tool)	CARTRIDGE	Troubleshooting for electrical systems.
 B2M3877	22771AA030	SELECT MONITOR KIT	Troubleshooting for electrical systems. ● English: 22771AA030 (Without printer) ● German: 22771AA070 (Without printer) ● French: 22771AA080 (Without printer) ● Spanish: 22771AA090 (Without printer)

4. Electrical Components Location S078507

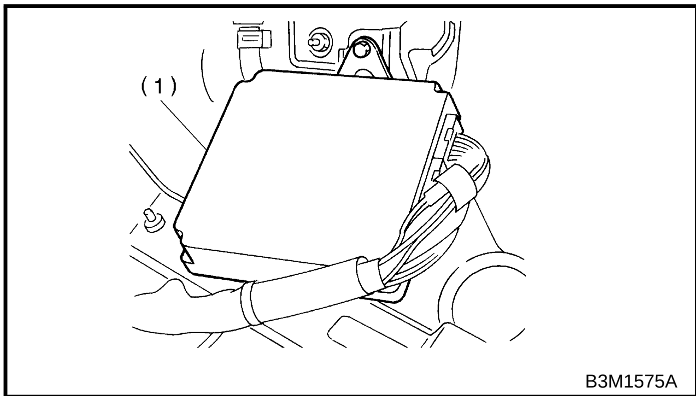
A: LOCATION S078507A13

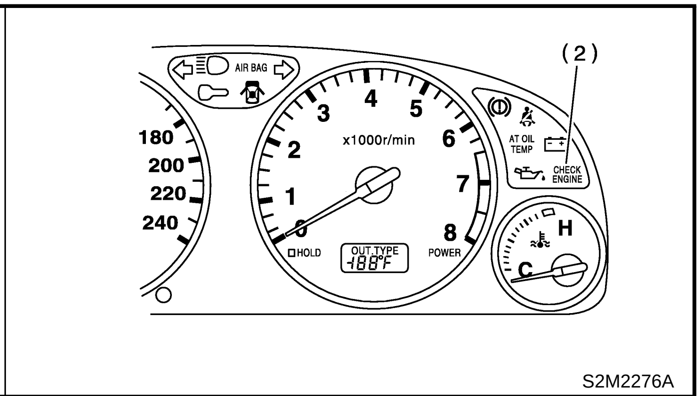
1. ENGINE S078507A1301

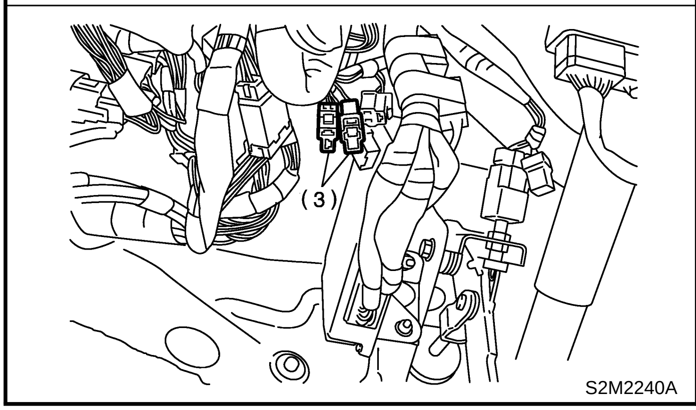
- **MODULE**

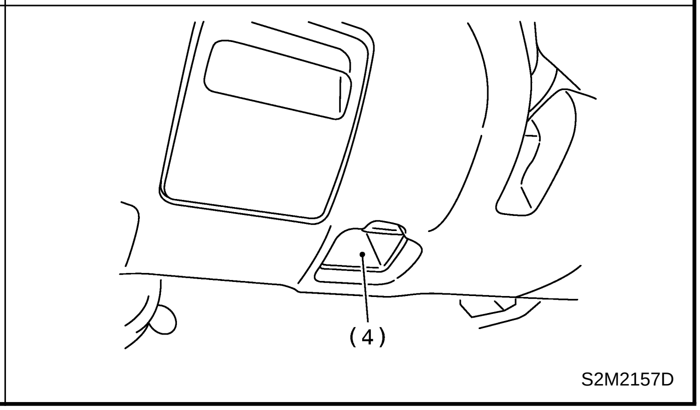


(1) Engine control module (ECM)
(2) CHECK ENGINE malfunction indicator lamp (MIL)
(3) Test mode connector
(4) Data link connector (for Subaru Select Monitor and OBD-II general scan tool)

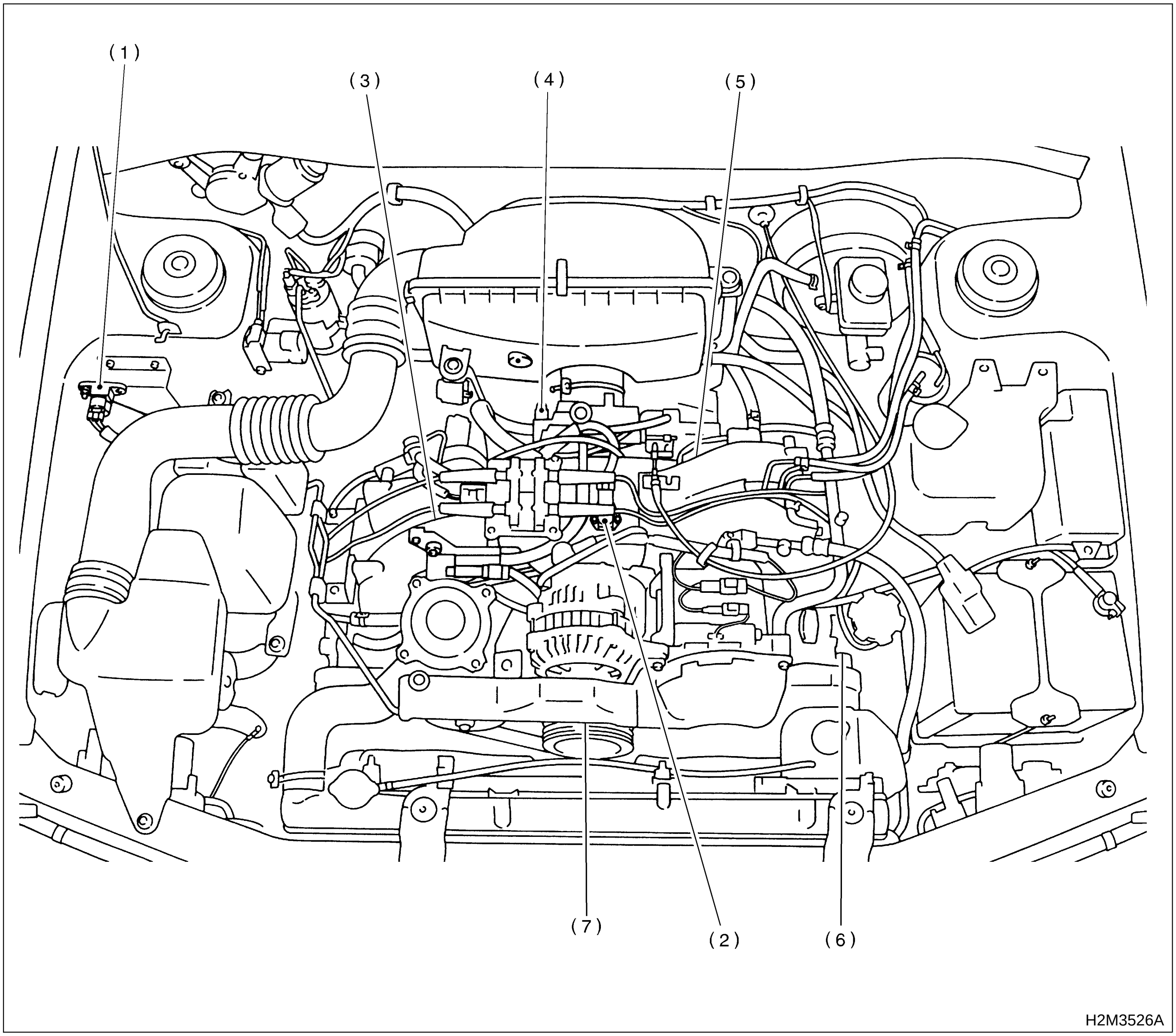




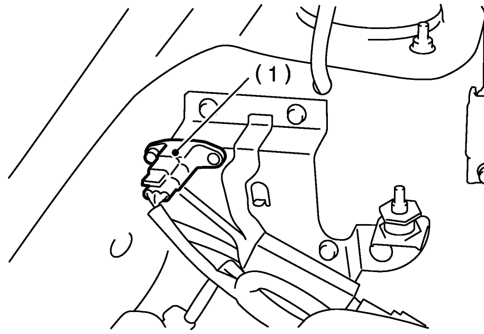




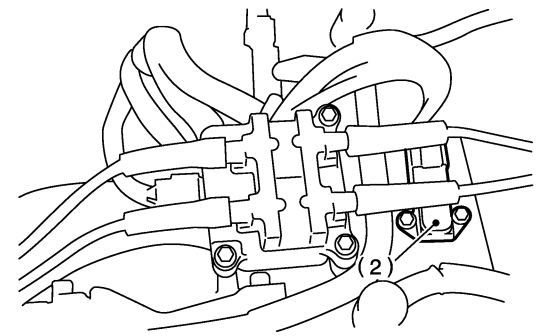
● SENSOR



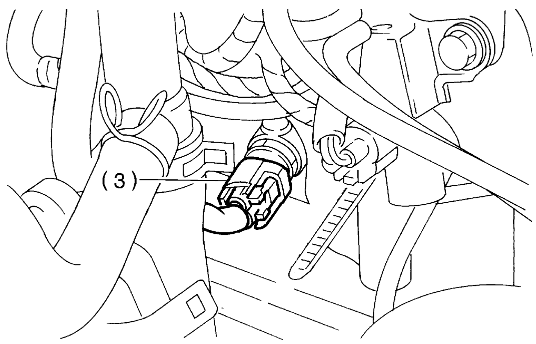
(1) Atmospheric pressure sensor
(2) Intake air temperature and pressure sensor
(3) Engine coolant temperature sensor
(4) Throttle position sensor
(5) Knock sensor
(6) Camshaft position sensor
(7) Crankshaft position sensor



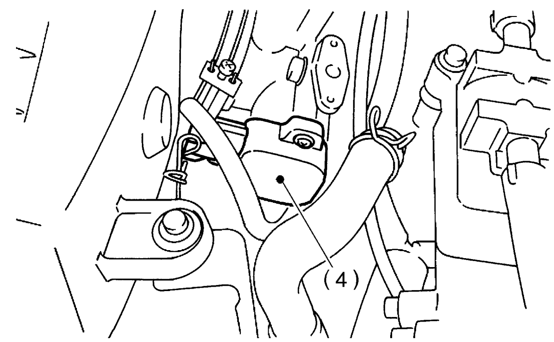
B2M3713A



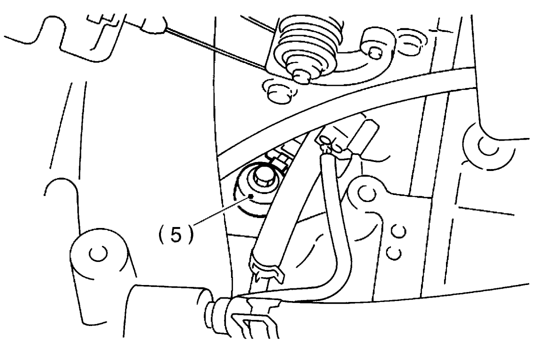
B2M3714A



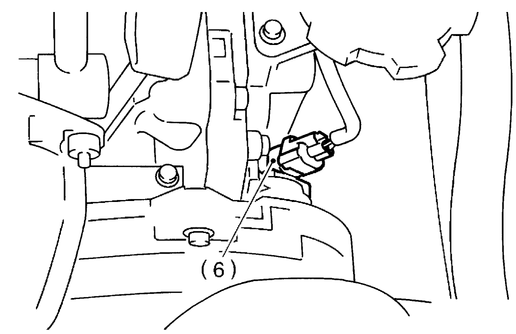
S2M1248B



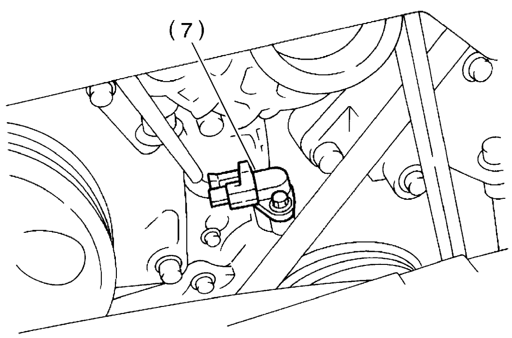
B2M2240A



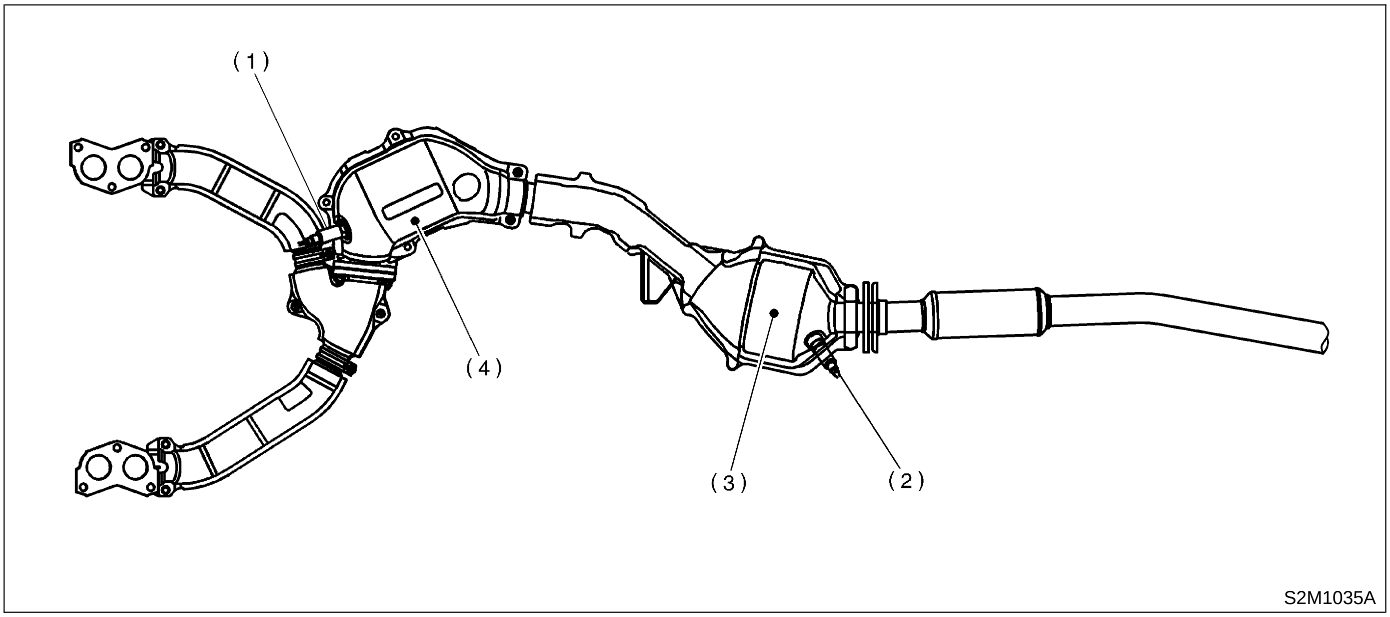
B2M2241A



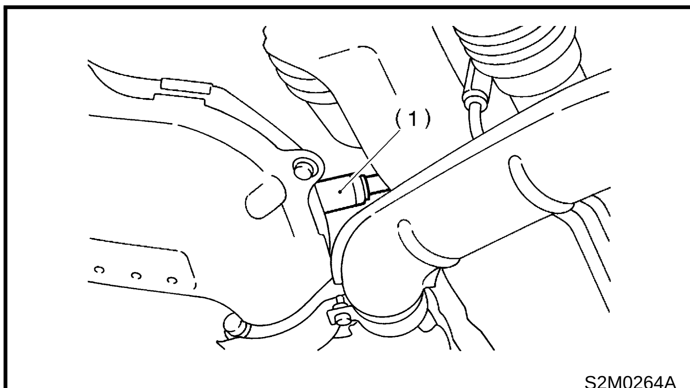
B2M2242A

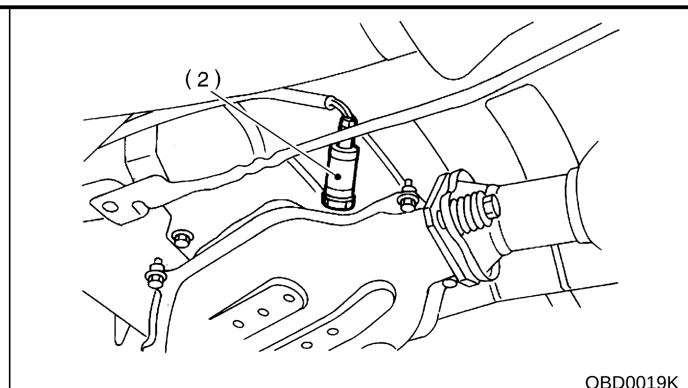


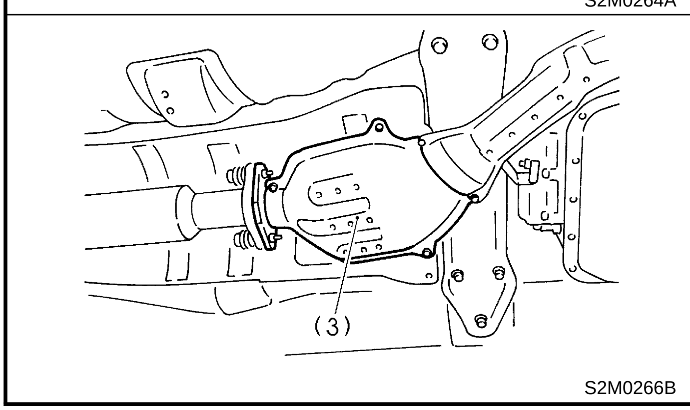
B2M0213J

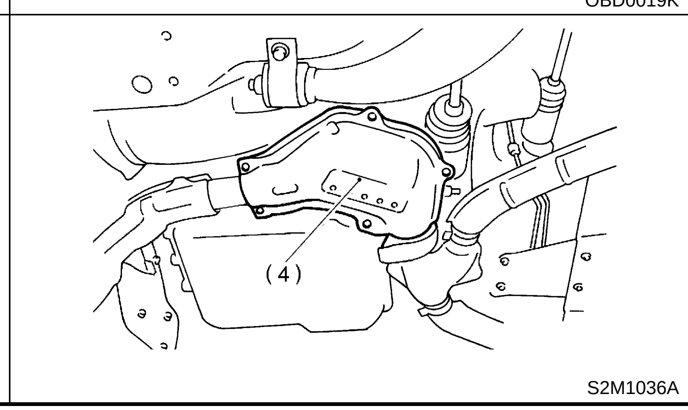


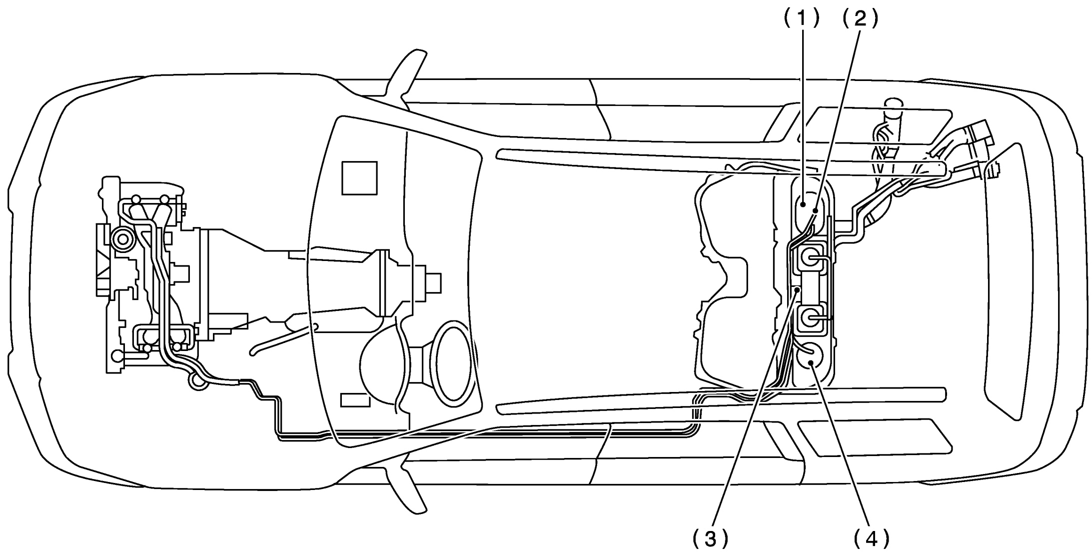
(1) Front oxygen (A/F) sensor
(2) Rear oxygen sensor
(3) Front catalytic converter
(4) Rear catalytic converter





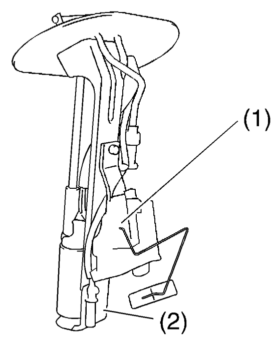




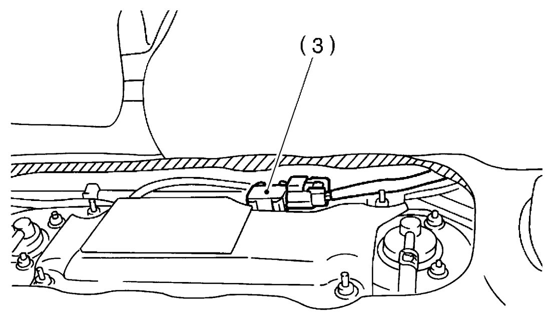


S2M2275B

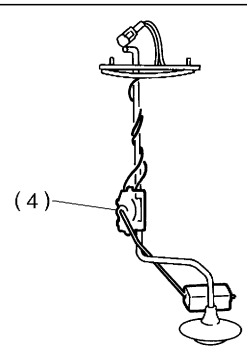
(1) Fuel level sensor
(2) Fuel temperature sensor
(3) Fuel tank pressure sensor
(4) Fuel sub level sensor



H2M3207A



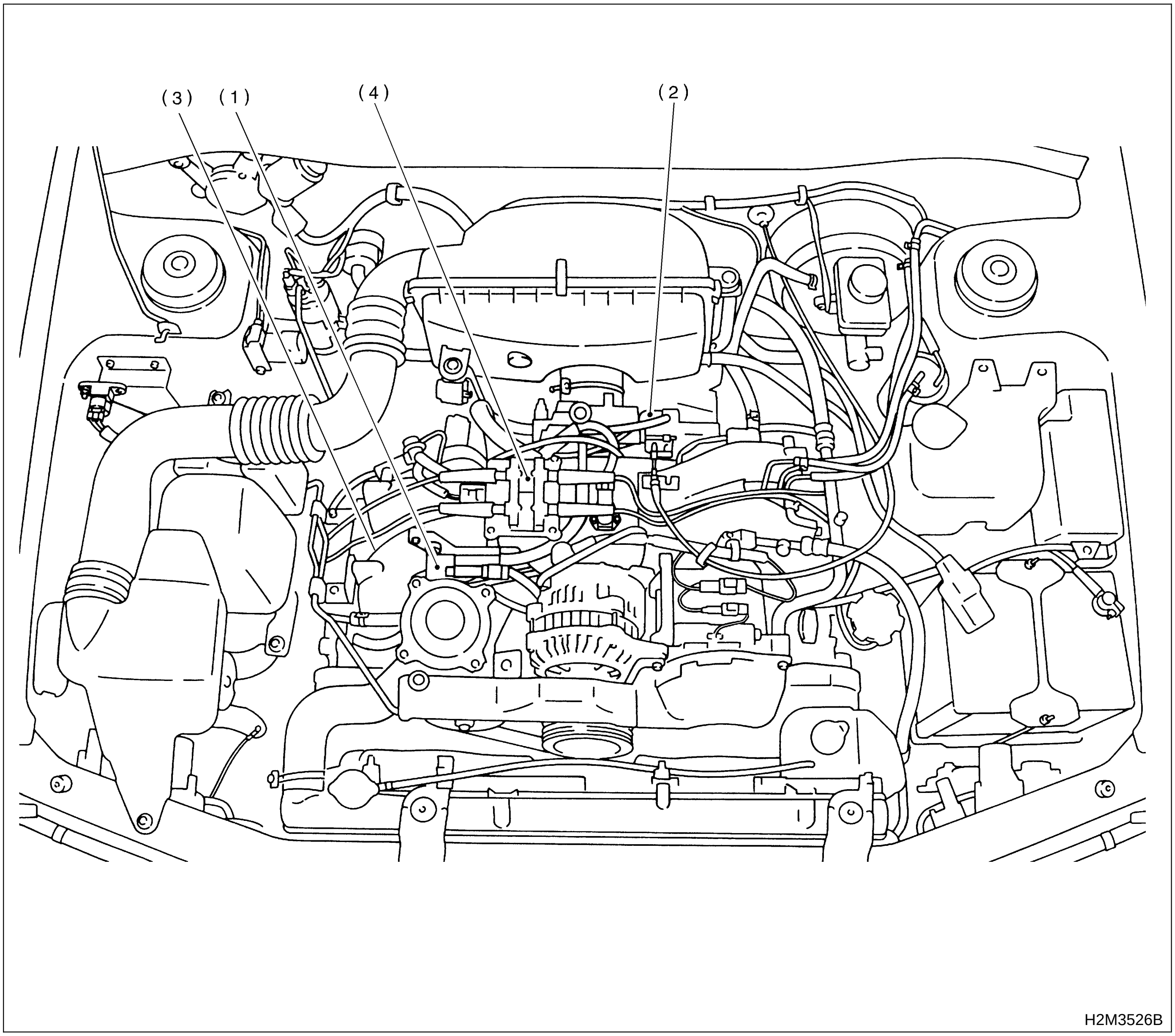
B2M1807A



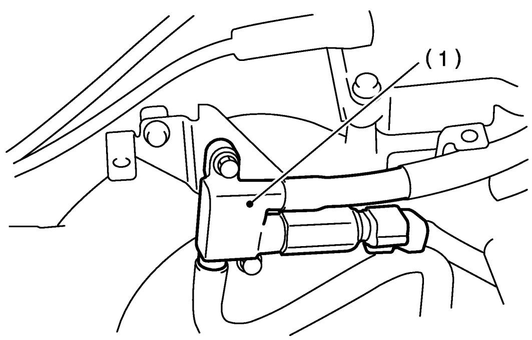
S2M0270A

SUBARU

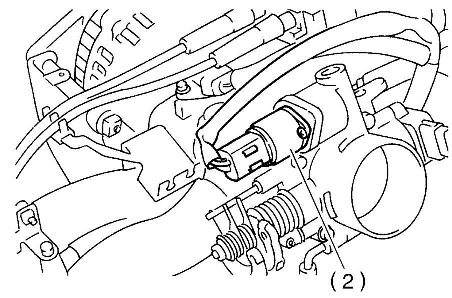
● SOLENOID VALVE, EMISSION CONTROL SYSTEM PARTS AND IGNITION SYSTEM PARTS



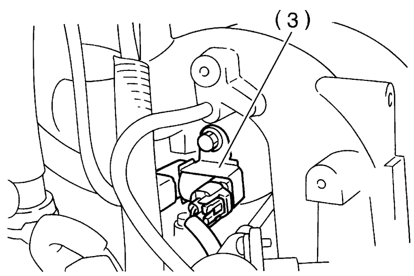
(1) Air assist injector solenoid valve
(2) Idle air control solenoid valve
(3) Purge control solenoid valve
(4) Ignition coil & ignitor ASSY



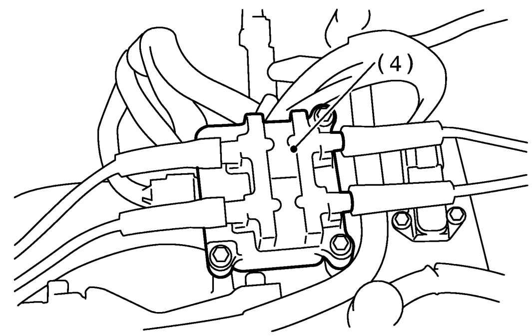
B2M3715A



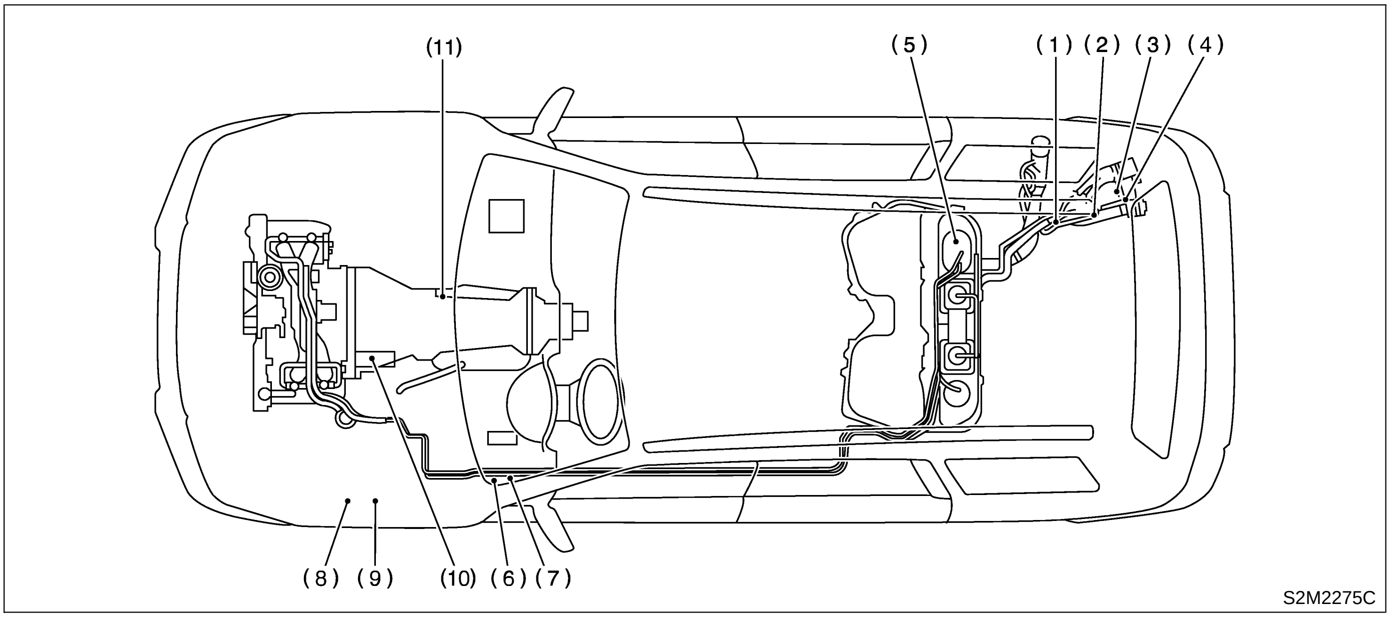
H2M3259A



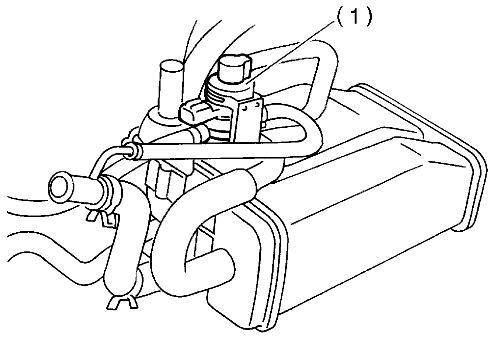
H2M3258B



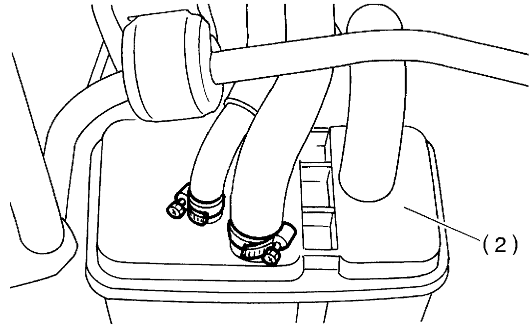
B2M3720A



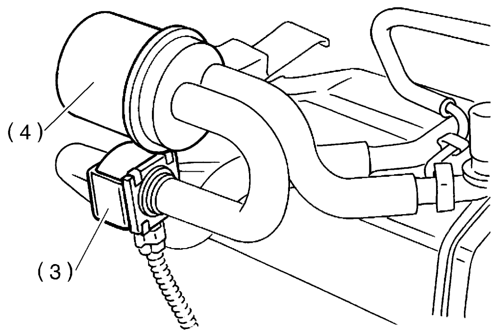
(1) Pressure control solenoid valve
(2) Canister
(3) Drain valve
(4) Air filter
(5) Fuel pump
(6) Main relay
(7) Fuel pump relay
(8) Cooling main fan relay
(9) Cooling sub fan relay
(10) Starter
(11) Inhibitor switch



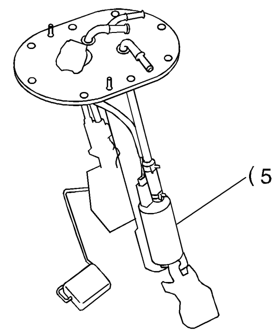
H2M2443A



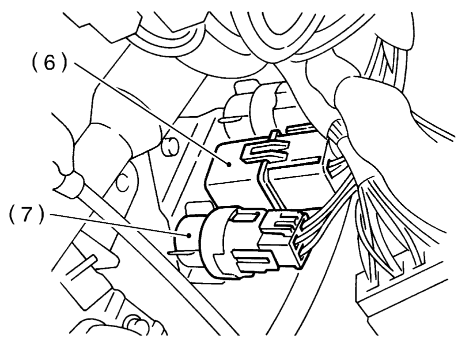
S2M0949B



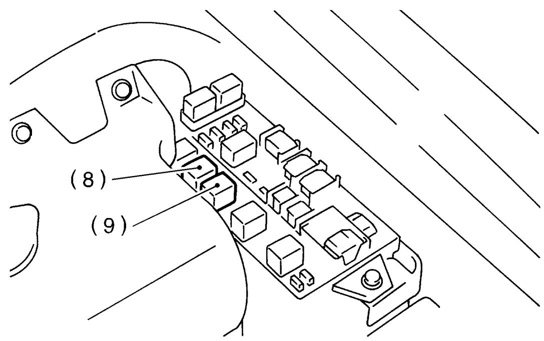
H2M2444A



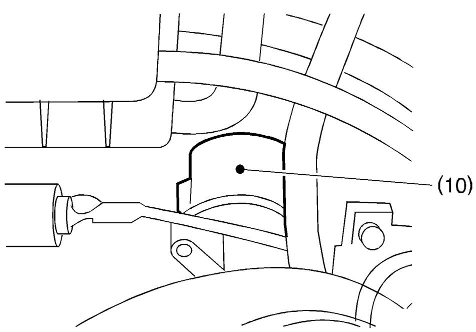
S2M1184B



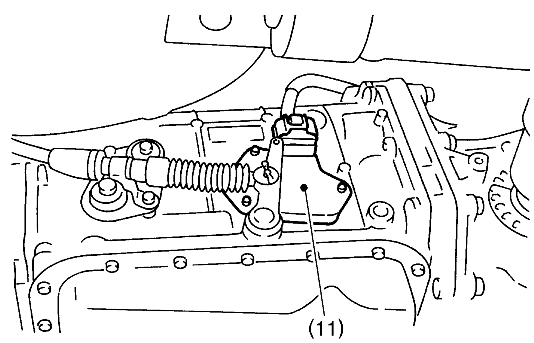
S2M0278D



S2M0279B



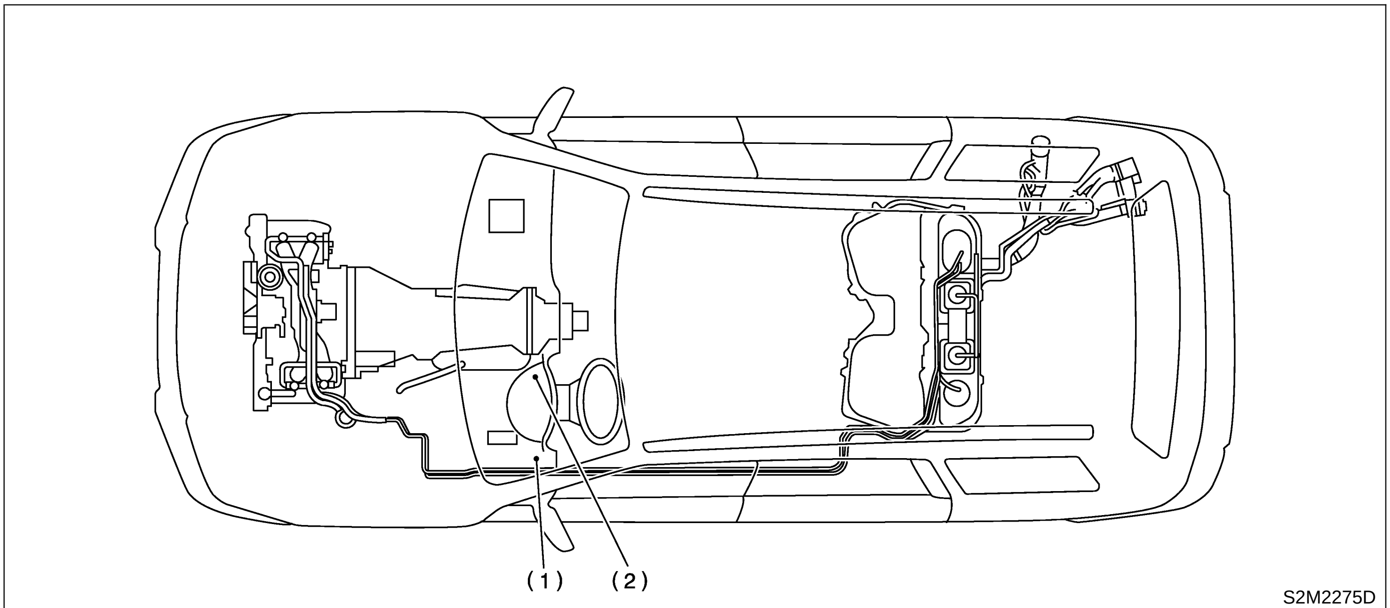
B2M2247G



B2M2246H

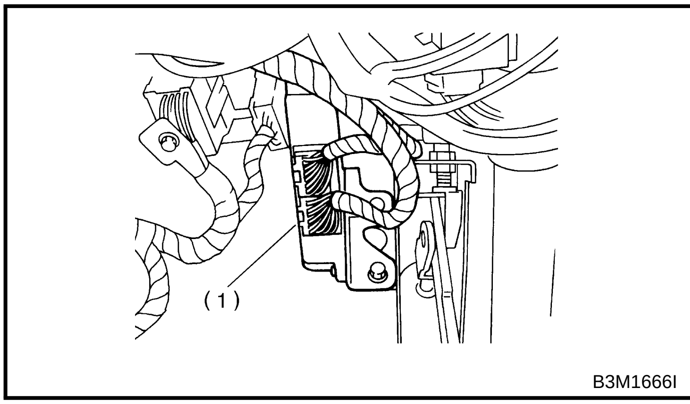
2. TRANSMISSION *S078507A1302*

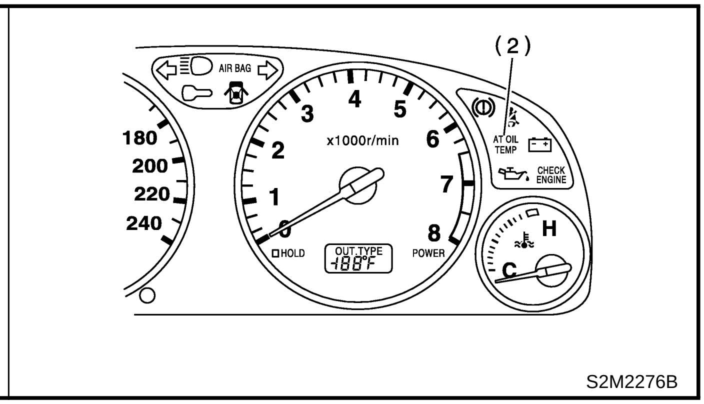
● MODULE



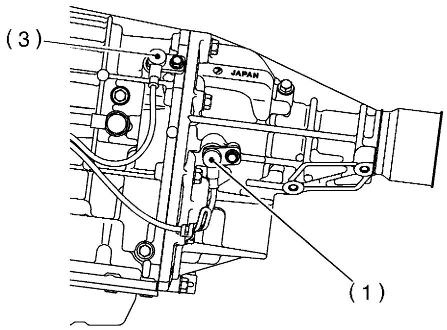
(1) Transmission Control Module (TCM) (for AT vehicles)

(2) AT diagnostic indicator light (for AT vehicles)

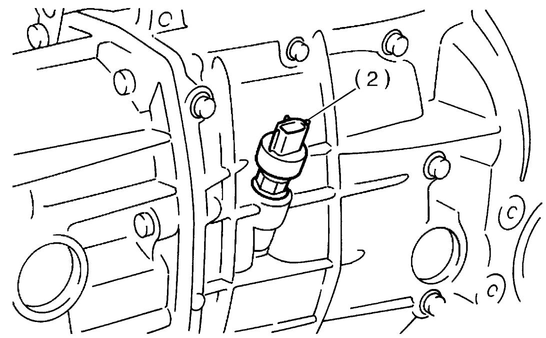




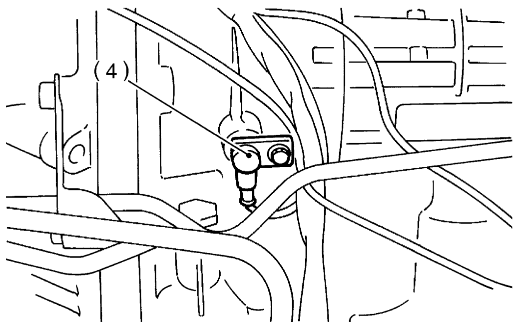
● SENSOR



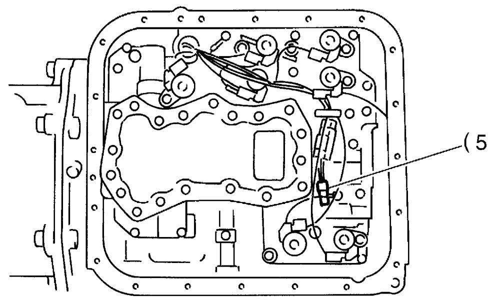
B2M2258A



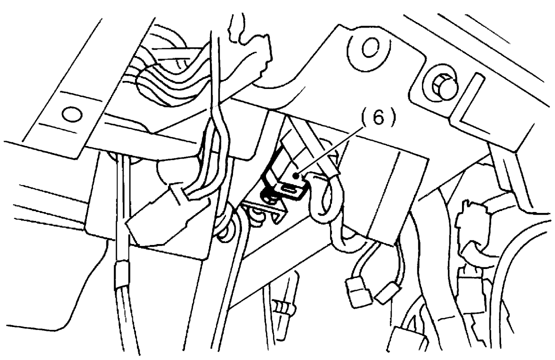
B2M2259A



B2M2260A



B2M2261A

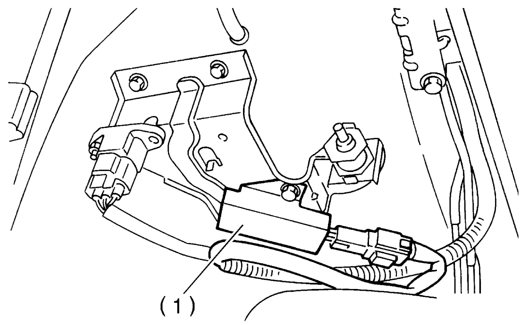


OBD0653B

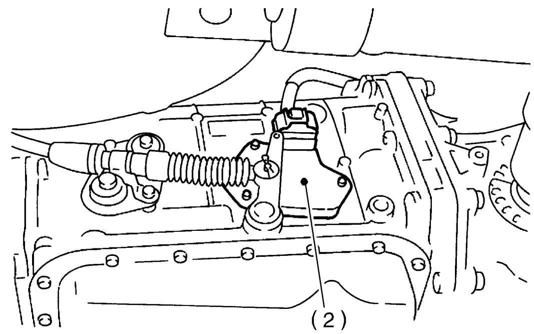
SUBARU.

(1) Rear vehicle speed sensor (for AT vehicles)
(2) Front vehicle speed sensor (for MT vehicles)
(3) Front vehicle speed sensor (for AT vehicles)
(4) Torque converter turbine speed sensor
(5) ATF temperature sensor (for AT vehicles)
(6) Brake light switch

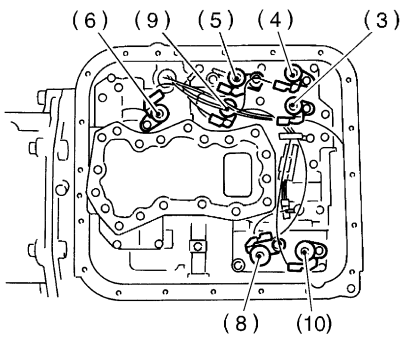
● SOLENOID VALVE AND SWITCH (AT VEHICLES)



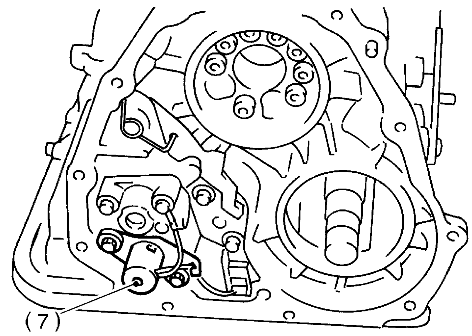
B3M1670C



B2M2246B



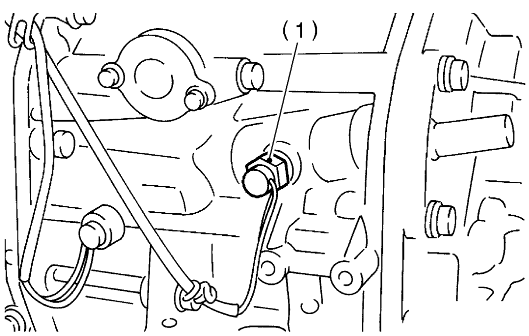
B2M2263A



B2M2264A

(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

● SOLENOID VALVE AND SWITCH (MT VEHICLES)



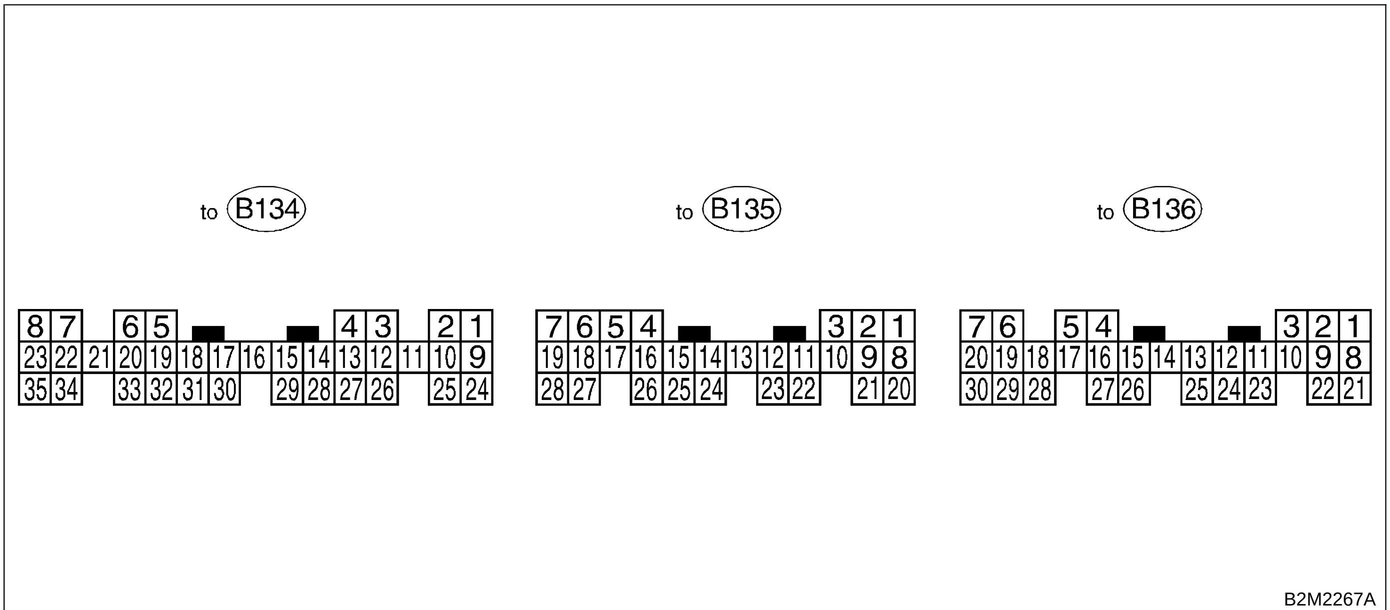
B2M2265A

(1) Neutral position switch

MEMO:

5. Engine Control Module (ECM) I/O Signal S078526

A: ELECTRICAL SPECIFICATION S078526A08



Content		Connector No.	Terminal No.	Signal (V) Ignition SW ON (Engine OFF)	Signal (V) Engine ON (Idling)	Note
Crankshaft position sensor	Signal (+)	B135	1	0	−7 — +7	Sensor output waveform
	Signal (−)	B135	8	0	0	—
	Shield	B135	10	0	0	—
Camshaft position sensor	Signal (+)	B135	2	0	−7 — +7	Sensor output waveform
	Signal (−)	B135	9	0	0	—
	Shield	B135	10	0	0	—
Throttle position sensor	Signal	B136	17	Fully closed: 0.2 — 1.0 Fully open: 4.2 — 4.7		—
	Power supply	B136	15	5	5	—
	GND (sensor)	B136	16	0	0	—
Rear oxygen sensor	Signal	B136	18	0	0 — 0.9	—
	Shield	B136	24	0	0	—
	GND (sensor)	B136	16	0	0	—
Front oxygen (A/F) sensor heater	Signal 1	B134	22	0 — 1.0	0 — 1.0	—
	Signal 2	B134	23	0 — 1.0	0 — 1.0	—
Rear oxygen sensor heater signal		B134	21	0 — 1.0	0 — 1.0	—
Engine coolant temperature sensor	Signal	B136	14	1.0 — 1.4	1.0 — 1.4	After warm-up the engine.
	GND (sensor)	B136	16	0	0	After warm-up the engine.
Vehicle speed signal		B135	24	0 or 5	0 or 5	“5” and “0” are repeatedly displayed when vehicle is driven.
Starter switch		B135	28	0	0	Cranking: 8 — 14

Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
A/C switch		B135	27	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
Ignition switch		B135	7	10 — 13	13 — 14	—
Neutral position switch	MT	B135	26	ON: 12±0.5 OFF: 0		On MT vehicle; Switch is ON when gear is in neutral position.
	AT	B135	26	ON: 0 OFF: 12±0.5		ON AT vehicle; Switch is ON when shift is in “N” or “P” position.
Test mode connector		B135	20	5	5	When connected: 0
Knock sensor	Signal	B136	4	2.8	2.8	—
	Shield	B136	25	0	0	—
Back-up power supply		B136	9	10 — 13	13 — 14	Ignition switch “OFF”: 10 — 13
Control unit power supply		B136	1	10 — 13	13 — 14	—
		B136	2	10 — 13	13 — 14	—
Sensor power supply		B136	15	5	5	—
Line end check 1		B135	14	0	0	—
Ignition control	#1, #2	B134	25	0	1 — 3.4	Waveform
	#3, #4	B134	26	0	1 — 3.4	Waveform
Fuel injector	#1	B134	4	10 — 13	1 — 14	Waveform
	#2	B134	13	10 — 13	1 — 14	Waveform
	#3	B134	14	10 — 13	1 — 14	Waveform
	#4	B134	15	10 — 13	1 — 14	Waveform
Idle air control solenoid valve	Signal 1	B134	5	—	1 — 13	Waveform
	Signal 2	B134	6	—	1 — 13	Waveform
	Signal 3	B134	19	—	1 — 13	Waveform
	Signal 4	B134	20	—	1 — 13	Waveform
	Power supply	B136	2	10 — 13	13 — 14	—
Fuel pump relay control		B134	16	ON: 0.5, or less OFF: 10 — 13	0.5, or less	—
A/C relay control		B134	17	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	—
Radiator fan relay 1 control		B134	3	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	—
Radiator fan relay 2 control		B134	12	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	With A/C vehicles only
Malfunction indicator lamp		B134	11	—	—	Light “ON”: 1, or less Light “OFF”: 10 — 14
Engine speed output		B134	30	—	0 — 13, or more	Waveform
Torque control 1 signal		B135	16	5	5	—
Torque control 2 signal		B135	17	5	5	—
Torque control cut signal		B134	31	8	8	—
Purge control solenoid valve		B134	2	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	—
Atmospheric pressure sensor	Signal	B136	29	3.9 — 4.1	2.0 — 2.3	—
	Power supply	B136	15	5	5	
	GND (sensor)	B136	16	0	0	

Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Fuel temperature sensor		B136	26	2.5 — 3.8	2.5 — 3.8	Ambient temperature: 25°C (75°F)
Fuel level sensor		B136	27	0.12 — 4.75	0.12 — 4.75	—
Fuel tank pressure sensor	Signal	B136	12	2.3 — 2.7	2.3 — 2.7	The value obtained after the fuel filler cap was removed once and recapped.
	Power supply	B136	15	5	5	—
	GND (sensor)	B136	16	0	0	—
Fuel tank pressure control solenoid valve		B134	1	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	—
Drain valve		B134	10	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	—
AT diagnosis input signal		B135	4	Less than 1 ←→ More than 4	Less than 1 ←→ More than 4	Waveform
Small light switch		B136	3	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Blower fan switch		B136	30	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Rear defogger switch		B135	21	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Front oxygen (A/F) sensor signal 1		B136	19	2.8 — 3.2	2.8 — 3.2	—
Front oxygen (A/F) sensor signal 2		B136	6	2.4 — 2.7	2.4 — 2.7	—
Front oxygen (A/F) sensor signal 3		B136	7	0.2 — 4.9	0.2 — 4.9	—
Front oxygen (A/F) sensor signal 4		B136	20	0.2 — 4.9	0.2 — 4.9	—
Pressure sensor		B136	5	2.4 — 4.8	0.4 — 1.8	—
Intake air temperature sensor		B136	13	2.3 — 2.5	1.4 — 1.6	—
SSM/GST communication line		B135	3	Less than 1 ←→ More than 4	Less than 1 ←→ More than 4	—
GND (sensors)		B136	16	0	0	—
GND (injectors)		B134	7	0	0	—
GND (ignition system)		B134	27	0	0	—
GND (power supply)		B134	8	0	0	—
GND (control systems)		B136	21	0	0	—
		B136	22	0	0	—
GND (oxygen sensor heater 1)		B134	35	0	0	—
GND (oxygen sensor heater 2)		B134	34	0	0	—

6. Engine Condition Data S078530

A: ELECTRICAL SPECIFICATION

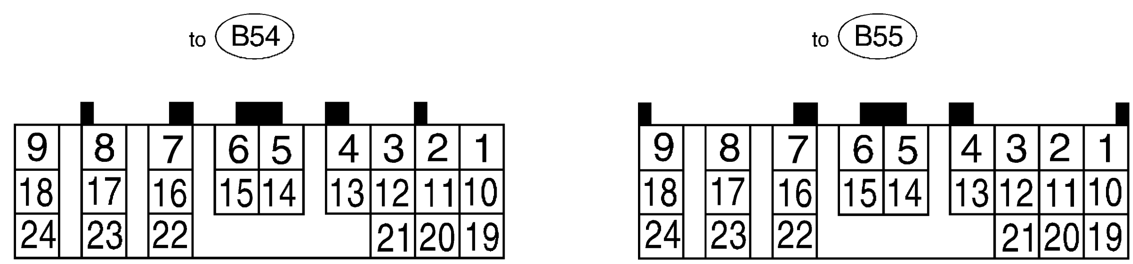
S078530A08

Content	Specified data
Engine load	1.6 — 2.9 (%): 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 S078506

A: ELECTRICAL SPECIFICATION S078506A08



NOTE:
Check with ignition switch ON.

Content		Connector No.	Terminal No.	Measuring conditions	Voltage (V)
Back-up power supply		B55	6	Ignition switch OFF	10 — 13
Ignition power supply		B54	23	Ignition switch ON (with engine OFF)	10 — 13
		B54	24		
Inhibitor switch	“P” range switch	B55	23	Selector lever in “P” range	Less than 1
				Selector lever in any other than “P” range	More than 8
	“N” range switch	B55	22	Selector lever in “N” range	Less than 1
				Selector lever in any other than “N” range	More than 8
	“R” range switch	B55	17	Selector lever in “R” range	Less than 1
				Selector lever in any other than “R” range	More than 8
	“D” range switch	B55	8	Selector lever in “D” range	Less than 1
				Selector lever in any other than “D” range	More than 8
	“3” range switch	B55	18	Selector lever in “3” range	Less than 1
				Selector lever in any other than “3” range	More than 8
	“2” range switch	B54	10	Selector lever in “2” range	Less than 1
				Selector lever in any other than “2” range	More than 8
	“1” range switch	B54	1	Selector lever in “1” range	Less than 1
				Selector lever in any other than “1” range	More than 8
Brake switch		B55	24	Brake pedal depressed	More than 10.5
				Brake pedal released	Less than 1
ABS signal		B54	19	ABS switch ON	Less than 1
				ABS switch OFF	More than 6.5

Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Throttle position sensor	B55	2	Throttle fully closed.	Approx 0.5	—
			Throttle fully open.	Approx 4.3	
Throttle position sensor power supply	B55	1	Ignition switch ON (with engine OFF)	Approx 5	—
AT OIL TEMP warning light	B54	3	Light ON	Less than 1	—
			Light OFF	More than 9	
ATF temperature sensor	B55	11	ATF temperature 20°C (68°F)	1.6 — 2.0	2.1 k — 2.9 k
			ATF temperature 80°C (176°F)	0.4 — 0.9	275 — 375
Rear vehicle speed sensor	B55	3	Vehicle stopped.	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Front vehicle speed sensor	B55	5	Vehicle stopped.	0	—
			Vehicle speed at most 10 km/h (6 MPH)	More than 1 (AC range)	—
Torque converter turbine speed sensor	B55	12	Vehicle stopped.	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Vehicle speed output signal	B55	13	Vehicle speed at most 10 km/h (6 MPH)	Less than 1←→More than 5	—
Engine speed signal	B55	4	Ignition switch ON (with engine OFF).	0	—
			Ignition switch ON (with engine ON).	8 — 11	
Cruise set signal	B54	11	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 1 signal	B54	13	Ignition switch ON (with engine ON)	More than 4	—
Torque control 2 signal	B54	21	Ignition switch ON (with engine ON)	More than 4	—
Torque control cut signal	B54	2	Ignition switch ON	8	—
Intake manifold pressure signal	B55	20	Engine idling after warm-up	1.2 — 1.8	—
AT load signal	B55	20	Engine idling after warm-up	1.2 — 1.8	—
Shift solenoid 1	B54	7	1st gear	More than 9	10 — 16
			3rd gear	Less than 1	
Shift solenoid 2	B54	6	2nd gear	More than 9	10 — 16
			4th gear	Less than 1	
Line pressure duty solenoid	B54	9	Ignition switch to ON (with engine OFF) Throttle fully closed after warm-up.	1.5 — 5.0	2.0 — 4.5
			Ignition switch to ON (with engine OFF) Throttle fully open after warm-up.	Less than 1	
Dropping resistor	B54	18	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	

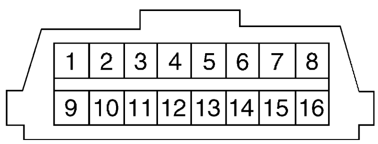
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Lock-up duty solenoid	B54	16	When lock up occurs.	More than 8.5	10 — 17
			When lock up is released.	Less than 0.5	
Transfer duty solenoid	B54	15	Fuse on FWD switch	More than 8.5	10 — 17
			Fuse removed from FWD switch (with throttle fully open and with select lever in 1st gear).	Less than 0.5	
2-4 brake duty solenoid	B54	8	Ignition switch to ON (with engine OFF) Throttle fully closed after warm-up.	1.5 — 5.0	2.0 — 4.5
			Ignition switch to ON (with engine OFF) Throttle fully open after warm-up.	Less than 1	
2-4 brake duty 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	5	3rd gear	More than 9	10 — 16
			1st gear	Less than 1	
Low clutch timing solenoid	B54	14	2nd gear	Less than 1	10 — 16
			4th gear	More than 9	
Sensor ground line	B55	21	—	0	Less than 1
System ground line	B55	9	—	0	Less than 1
		19			
FWD switch	B55	14	Fuse removed.	More than 9	—
			Fuse installed.	Less than 1	
FWD indicator lamp	B54	12	Fuse on FWD switch	Less than 1	—
			Fuse removed from FWD switch.	More than 9	
Data link signal (Subaru Select Monitor)	B55	7	—	—	—
		16	—	—	
AT diagnosis signal (Waveform)	B54	4	Ignition switch ON	Less than 1 ←→ More than 4	—

8. Data Link Connector S078505

A: NOTE S078505A15

1) This connector is used both for OBD-II general scan tools and the Subaru Select Monitor.
2) Terminal 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.



H2M1280

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	Subaru Select Monitor signal (Subaru Select Monitor to ECM)*	13	Ground
6	Line end check signal 1	14	Blank
7	Blank	15	Blank
8	Blank	16	Blank

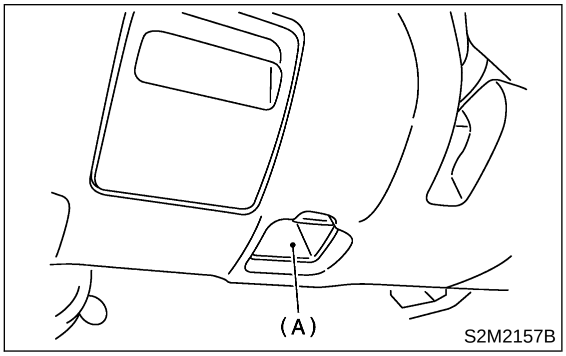
*: Circuit only for Subaru Select Monitor

9. OBD-II General Scan Tool S078527

A: OPERATION S078527A16

1. HOW TO USE OBD-II GENERAL SCAN TOOL S078527A1601

1) Prepare a general scan tool (OBD-II general scan tool) required by SAE J1978.
2) Connect the OBD-II general scan tool to the data link connector (A) 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-84, List of Diagnostic Trouble Code (DTC).>

2. MODE $01 (CURRENT POWERTRAIN DIAGNOSTIC DATA) S078527A1602

Refers to data denoting the current operating condition of analog input/output, digital input/output and/or the powertrain system.
A list of the support data and PID (Parameter Identification) codes are shown in the following table.

PID	Data	Unit of measure
01	Number of emission-related powertrain trouble codes and MIL status	ON/OFF
03	Fuel system control status	—
04	Calculated engine load value	%
05	Engine coolant temperature	°C
06	Short term fuel trim	%
07	Long term fuel trim	%
0B	Intake manifold absolute pressure	kPa
0C	Engine revolution	rpm
0D	Vehicle speed	km/h
0E	Ignition timing advance	°
0F	Intake air temperature	°C
10	Air flow rate from pressure sensor	g/sec
11	Throttle valve opening angle	%
13	Check whether oxygen sensor is installed.	—
15	Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor—bank 2	V and %
24	A/F sensor 1 output voltage and short term fuel trim associated with A/F sensor 1	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).

3. MODE $02 (POWERTRAIN FREEZE FRAME DATA) *S078527A1603*

Refers to data denoting the operating condition when trouble is sensed by the on-board diagnosis system. A list of the support data and PID (Parameter Identification) codes are shown in the following table.

PID	Data	Unit of measure
02	Trouble code that caused CARB required freeze frame data storage	—
03	Fuel system control status	—
04	Calculated engine load value	%
05	Engine coolant temperature	°C
06	Short term fuel trim	%
07	Long term fuel trim	%
0B	Intake manifold absolute pressure	kPa
0C	Engine revolution	rpm
0D	Vehicle speed	km/h

NOTE:
Refer to OBD-II general scan tool manufacturer's instruction manual to access freeze frame data (MODE $02).

4. MODE $03 (EMISSION-RELATED POWERTRAIN DIAGNOSTIC TROUBLE CODE) *S078527A1604*

Refer to Read Diagnostic Trouble Code for information about data denoting emission-related powertrain diagnostic trouble codes. <Ref. to EN-42, Read Diagnostic Trouble Code.>

5. MODE $04 (CLEAR/RESET EMISSION-RELATED DIAGNOSTIC INFORMATION) *S078527A1605*

Refers to the mode used to clear or reset emission-related diagnostic information (OBD-II trouble diagnostic information).

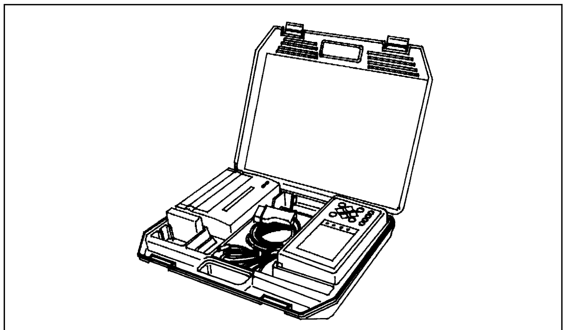
NOTE:
Refer to OBD-II general scan tool manufacturer's instruction manual to clear or reset emission-related diagnostic information (MODE $04).

10. Subaru Select Monitor S078503

A: OPERATION S078503A16

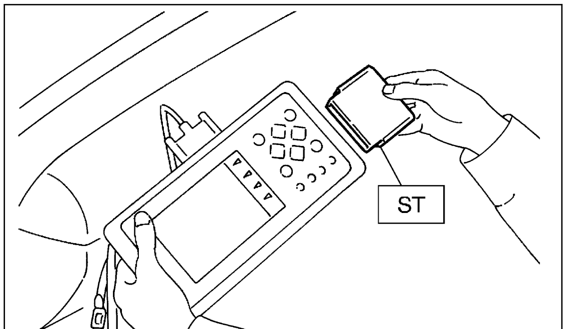
1. HOW TO USE SUBARU SELECT MONITOR S078503A1601

1) Prepare Subaru Select Monitor kit. <Ref. to EN-8, PREPARATION TOOL, General Description.>



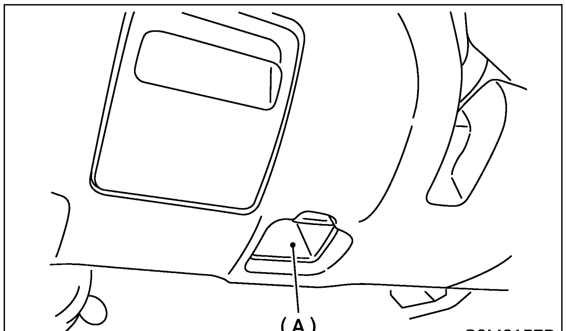
S2M0285

2) Connect diagnosis cable to Subaru Select Monitor.
3) Insert cartridge into Subaru Select Monitor. <Ref. to EN-8, PREPARATION TOOL, General Description.>



S2M0286A

4) Connect Subaru Select Monitor to data link connector.
(1) Data link connector (A) located in the lower portion of the instrument panel (on the driver's side).

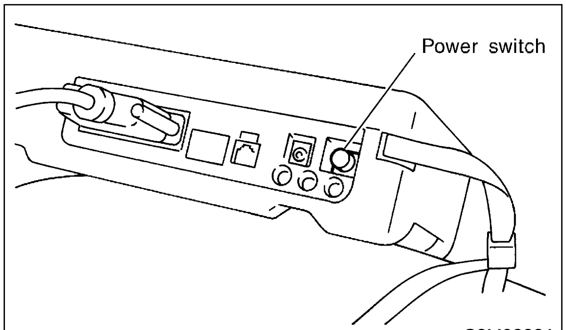


S2M2157B

(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.



S2M0288A

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)

S078503A1602

Refer to Read Diagnostic Trouble Code for information about how to indicate DTC. <Ref. to EN-42, Read Diagnostic Trouble Code.>

3. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE. (OBD MODE) S078503A1603

Refer to Read Diagnostic Trouble Code for information about how to indicate DTC. <Ref. to EN-42, Read Diagnostic Trouble Code.>

4. READ CURRENT DATA FOR ENGINE. (NORMAL MODE) S078503A1604

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	Fuel Injection #1 Pulse	ms
Idle air control signal	ISC Valve Step	STEP
Engine load data	Engine Load	%
Front oxygen (A/F) sensor output signal	A/F Sensor #1	—
Rear oxygen sensor output signal	Rear O2 Sensor	V
Short term fuel trim	A/F Correction #1	%
Knock sensor signal	Knocking Correction	deg
Atmospheric absolute pressure signal	Atmosphere Pressure	mmHg or kPa or inHg or psig
Intake manifold relative pressure signal	Mani. Relative Pressure	mmHg or kPa or inHg or psig
Intake manifold absolute pressure signal	Mani. Absolute Pressure	mmHg or kPa or inHg or psig
A/F correction (short term fuel trim) by rear oxygen sensor	A/F Correction #3	%
Long term whole fuel trim	A/F Learning #1	%
Front oxygen (A/F) sensor heater current	Front O2 Heater #1	A
Rear oxygen sensor heater current	Rear O2 Heater Current	A
Canister purge control solenoid valve duty ratio	CPC Valve Duty Ratio	%
Fuel level signal	Fuel Level	V
Fuel tank pressure signal	Fuel Tank Pressure	mmHg or kPa or inHg or psig
Fuel temperature signal	Fuel Temp.	°C or °F
Intake air temperature signal	Intake Air Temp.	°C or °F
Learned ignition timing	Learned Ignition Timing	deg
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 conditioning switch signal	A/C Switch	ON or OFF
Air conditioning compressor signal	A/C Compressor Signal	ON or OFF
Radiator main fan relay signal	Radiator Fan Relay #1	ON or OFF
Fuel pump relay signal	Fuel Pump Relay	ON or OFF
Knocking signal	Knocking Signal	ON or OFF
Radiator sub fan relay signal	Radiator Fan Relay #2	ON or OFF
Power steering switch signal	P/S Switch	ON or OFF
Engine torque control signal #1	Torque Control Signal #1	ON or OFF

Contents	Display	Unit of measure
Engine torque control signal #2	Torque Control Signal #2	ON or OFF
Engine torque control permission signal	Torque Permission Signal	ON or OFF
Rear oxygen sensor rich signal	Rear O2 Rich Signal	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	Light Switch	ON or OFF
Air assist injector solenoid valve signal	Assist Air Sol. Valve	ON or OFF
AT vehicle ID signal	AT Vehicle ID Signal	ON or OFF

NOTE:
- For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
- For select monitor display details, refer to the following.

Engine Load
Display: 0 — 100 %

The engine load is displayed. The ECM calculates the engine load via the engine speed and signals from the pressure sensor. The engine load increases when the engine speed and absolute pressure of the intake manifold increase.

Coolant Temp.
Display: −40 to 215°C (−40 to 419°F)

The coolant temperature transmitted from the engine coolant temperature sensor is displayed.

A/F Correction #1
Display: −100 to 99 %

Using the signal from the front oxygen (A/F) sensor, the correction value of the fuel supply amount regulated by the ECM is indicated. When the A/F is lean and when displayed value becomes 0 % or more, ECM increases the fuel. When the A/F is rich and when displayed value becomes 0 % or less, ECM decreases the fuel.

A/F Learning #1
Display: −100 to 99.2 %

The ECM calculates the long-term fuel trim value from the short-term fuel trim value. The long-term fuel trim value means the correction value of long-term fuel supply amount. If the displayed value is less than 0 %, the fuel system is in rich status and the ECM restricts the fuel supply (by shortening the injector pulse). If the displayed value is more than 0 %, the fuel system is in lean status and the ECM increases the fuel supply (by extending the injector pulse).

Mani Absolute Pressure
Display: 0 — 254.9 kPa (0 — 1,912.5 mmHg, 0 — 75.3 inHg)

The pressure in the intake manifold is displayed. The ECM detects the pressure in the intake tube via the signal from the pressure sensor. The ECM calculates the air mass required for the engine.

Engine Speed
Display: 0 — 16,383 rpm

The engine speed transmitted from the crankshaft position sensor is detected.

Vehicle Speed
Display: 0 — 255 km/h (0 — 158 MPH)

The vehicle speed transmitted from the vehicle speed sensor is displayed.

Ignition Timing
Display: −64 to 63.5 deg.

The advanced ignition timing value is displayed. The ECM calculates the advanced ignition timing value using engine coolant temperature, engine speed, and engine load.

Intake Air Temp.
Display: 40 — 215°C (104 — 419°F)

The intake air temperature is displayed. The ECM detects the intake air temperature via the signal from the intake air temperature sensor, and corrects the ignition timing and fuel supply amount.

Rear O2 sensor
Display: 0 — 327.7 Volt

The ECM correct air-fuel ratio by the signal sent from O2 sensor. Also, the signal is used for catalyst degradation diagnosis.

Battery Voltage
Display: 0 — 20.4 V

The battery voltage is displayed.

Throttle Sensor Voltage
Display: 0 — 5 V

The throttle angle is displayed in voltage. When the throttle is fully-closed, the displayed voltage value is approx. 0.5 V. When it is fully-open, the voltage is approx. 4 V or more.

Fuel injection #1 Pulse
Display: 0 — 65.3 m/sec (0 — 214.2 ft/sec)

The injector valve opening time is displayed. The longer the injector valve opening time, the more the fuel is supplied. The higher the engine load, the longer the injector valve opening time becomes.

Knocking Correction
Display: −64 to 63.5 deg.

The ECM controls the ignition timing via the signal from the knock sensor.

Atmosphere Pressure
Display: 0 — 254.9 kPa (0 — 1,912.5 mmHg, 0 — 75.3 inHg)

The atmospheric pressure is displayed. The ECM detects the atmospheric pressure via the signal from the atmosphere sensor.

Mani. Relative Pressure
Display: 0 — 126.9 kPa (0 — 952 mmHg, 0 — 37.5 inHg)

A value calculated by subtracting the absolute pressure in the intake tube from the atmospheric pressure is displayed. A larger load leads to a larger value.

Fuel tank pressure
Display: 0 — 3.2 kPa (0 — 24 mmHg, 0 — 0.94 inHg)

The pressure in the fuel tank is displayed.

Learned Ignition Timing
Display: −64 to 63.5 deg.

The advanced ignition timing value is displayed. The ECM calculates the learned ignition timing in each driving range via the signal from the knock sensor. A positive value indicates advanced timing, and a negative value indicates retarded timing.

Fuel Temp.
Display: −40 to 215°C (−40 to 419°F)

The fuel temperature is displayed. The ECM detects the fuel temperature via the signal from the fuel temperature sensor. This signal is used for the evaporation diagnosis.

Front O2 Heater #1
Display: 0 — 10A

The heater current of the front oxygen (A/F) sensor is displayed. A larger current value leads to increased heat generation.

Rear O2 Heater Current
Display: 0 — 10 A

The heater current of the rear O2 sensor is displayed. A larger current value leads to increased heat generation.

Fuel Level
Display: 0 — 5 V

The float inside the fuel tank is a variable resistor which varies the resistance based on fuel level. The ECM then averages this voltage and the signal voltage from the fuel tank in order to determine fuel level. The scan tool displays close to 0.7 volts for an empty tank, and close to 5 volts for a full tank.

CPC Valve Duty Ratio
Display: 0 — 100 %

The purge control solenoid valve is regulated by the ECM. The displayed value of 0 % indicates that the purge amount is 0, and 100 % indicates that the purge amount becomes the maximum.

ISC Valve Step
Display: 0 — 255 step

The idle air control solenoid valve is driven by the stepping motor. The number of steps is regulated by the ECM. A value of 0 step indicates that the air bypass circuit is closed, and the value of 255 steps indicates that it is fully open.

A/F Sensor #1
Display: 0 — 2

The air surplus ratio output from the front oxygen (A/F) sensor is displayed. Air overflow ratio = 1.0 is regarded as a stoichiometric A/F ratio. A value above 1.0 indicates A/F lean range, and below 1.0 indicates A/F rich range.

A/F Correction #3
Display:

The correction value of fuel supply amount regulated by the ECM via the signal from the rear oxygen sensor is displayed.

AT Vehicle ID Signal
Display: ON or OFF

AT and MT vehicles are identified. For AT vehicles, ON is displayed, and for MT ones, OFF is displayed.

Neutral Position Switch
Display: ON or OFF

When the shift lever stays in the neutral position, ON is displayed. When in other positions, OFF is displayed.

Idle Switch Signal
Display: ON or OFF

When the accelerator pedal is released fully, ON is displayed. When depressed fully, OFF is displayed.

P/S Switch
Display: ON or OFF

When the steering wheel is turned fully, ON is displayed. When returned, OFF is displayed. This signal is used for idle control or other controls.

A/C Switch
Display: ON or OFF

When the A/C switch is turned ON, ON is displayed. When turned OFF, OFF is displayed. This signal is used for idle control or other controls.

Starter Switch
Display: ON or OFF

When the vehicle is cranking, ON is displayed. When not cranking, OFF is displayed.

Rear O2 Rich Signal
Display: ON or OFF

When the A/F ratio is rich, ON is displayed. When lean, OFF is displayed.

Knocking Signal
Display: ON or OFF

When knocking occurs and the ignition timing is retarded, ON is displayed. At any other time, OFF is displayed.

Crankshaft Position Sig.
Display: ON or OFF

When a crankshaft signal exists, ON is displayed. At any other time (at engine stall), OFF is displayed.

Camshaft Position Sig.
Display: ON or OFF

When a camshaft signal exists, ON is displayed. At any other time (at engine stall), OFF is displayed.

Rear Defogger SW
Display: ON or OFF

When the rear defogger switch is turned ON, ON is displayed. When turned OFF, OFF is displayed. This signal is used for idle control or other controls.

Blower Fan SW
Display: ON or OFF

When the blower fan switch is turned ON, ON is displayed. When turned OFF, OFF is displayed. This signal is used for idle control or other controls.

Light Switch
Display: ON or OFF

When the light switch is turned ON, ON is displayed. When turned OFF, OFF is displayed. This signal is used for idle control or other controls.

A/C Compressor Signal
Display: ON or OFF

When the A/C clutch is engaged, ON is displayed. When disengaged, OFF is displayed.

Radiator Fan Relay #1, #2
Display: ON or OFF

When the radiator fan relay is ON (radiator operates), ON is displayed. When OFF (radiator stops), OFF is displayed.

Fuel Pump Relay
Display: ON or OFF

When the radiator fan relay is ON (fuel pump operates), ON is displayed. When OFF (fuel pump stops), OFF is displayed.

PCV Solenoid Valve
Display: ON or OFF

The status of the pressure control solenoid valve is displayed. When the pressure control solenoid valve is closed, OFF is displayed. When open, ON is displayed. During an evaporation leak diagnosis, the pressure control solenoid valve is only open when vacuum in the intake tube is taken into the fuel tank.

Vent Solenoid Valve
Display: ON or OFF

The status of the drain valve is displayed. When the drain valve is closed, ON is displayed. When open, OFF is displayed. Except during an evaporation leak diagnosis, the drain valve is always open.

Assist Air Sol. Valve
Display: ON or OFF

When the air assist injector solenoid valve is open, ON is displayed. When closed, OFF is displayed. The air assist injector solenoid valve opens to increase mass air flow at cold start, improving the mixture formation.

Tank Sensor Cont. Valve
Display: ON or OFF

When the atmospheric pressure solenoid valve is open, ON is displayed. When closed, OFF is displayed. The valve is only activated during a 0.02-inch evaporation leak diagnosis.

Torque Control Signal #1, #2
Display: ON or OFF

When a torque down signal exists, ON is displayed. When it doesn't, OFF is displayed.

Torque Permission Signal
Display: ON or OFF

The signal which notifies whether or not torque down is possible is displayed. This signal is transmitted from the ECU in response to a torque down signal from the TCU. When torque down is prohibited, ON is displayed. When permitted, OFF is displayed.

5. READ CURRENT DATA FOR ENGINE. (OBD MODE) S078503A1605

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	MI (MIL)	ON or OFF
Monitoring test of misfire	Misfire monitoring	Complete or incomplete
Monitoring test of fuel system	Fuel system monitoring	Complete or incomplete
Monitoring test of comprehensive component	Component monitoring	Complete or incomplete
Test of catalyst	Catalyst Diagnosis	Complete or incomplete
Test of heated catalyst	Heated catalyst	No support
Test of evaporative emission purge control system	Evaporative purge system	Complete or incomplete
Test of secondary air system	Secondary air system	No support
Test of air conditioning system refrigerant	A/C system refrigerant	No support
Test of oxygen sensor	Oxygen sensor	Complete or incomplete
Test of oxygen sensor heater	O2 Heater Diagnosis	Complete or incomplete
Test of EGR system	EGR system	No support
Air fuel ratio control system for bank 1	Fuel System for Bank 1	—
Engine load data	Calculated load value	%
Engine coolant temperature signal	Coolant Temp.	°C or °F
Short term fuel trim by front oxygen (A/F) sensor	Short term fuel trim B1	%
Long term fuel trim by front oxygen (A/F) sensor	Long term fuel trim B1	%
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
Intake air amount	Mass Air Flow	g/s
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) S078503A1606

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
Engine load data	Engine Load	%
Engine coolant temperature signal	Coolant Temp.	°C or °F
Short term fuel trim by front oxygen (A/F) sensor	Short term fuel trim B1	%
Long term fuel trim by front oxygen (A/F) sensor	Long term fuel trim B1	%
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.

7. READ OXYGEN SENSOR MONITORING TEST RESULTS DATA FOR ENGINE. (OBD MODE) S078503A1607

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 {O2 Sensor Monitor} and press the [YES] key.
6) On the ≪O2 Sensor Select≫ display screen, select the {Bank 1-Sensor1} or {Bank 1-Sensor2} and press the [YES] key.
- Bank 1-Sensor1 indicates the front oxygen or A/F sensor, and Bank 1-Sensor2 indicates the rear oxygen sensor.
- A list of the support data is shown in the following table.

Contents	Display	Unit of measure
Oxygen sensor for monitoring test	<O2 Sensor Monitor (-------)>	—
Rich to lean oxygen sensor threshold voltage	Rich to lean sensor volt	V
Lean to rich oxygen sensor threshold voltage	Lean to rich sensor volt	V
Low oxygen sensor voltage for switch time calculation	Low sensor voltage	V
High oxygen sensor voltage for switch time calculation	High sensor voltage	V
Rich to lean oxygen sensor switch time	Rich to lean switch time	sec
Lean to rich oxygen sensor switch time	Lean to rich switch time	sec
Maximum oxygen sensor voltage for test cycle	Maximum sensor Voltage	V
Minimum oxygen sensor voltage for test cycle	Minimum sensor Voltage	V

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

8. LED OPERATION MODE FOR ENGINE S078503A1608

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 in function.
Radiator main fan relay signal	Radiator Fan Relay #1	ON or OFF	When radiator main fan relay is in function.
Fuel pump relay signal	Fuel Pump Relay	ON or OFF	When fuel pump relay is in function.
Knocking signal	Knocking Signal	ON or OFF	When knocking signal is entered.
Radiator sub fan relay signal	Radiator Fan Relay #2	ON or OFF	When radiator sub fan relay is in function.
Engine torque control signal #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.
Front oxygen (A/F) sensor rich signal	Front O2 Rich Signal #1	ON or OFF	When front oxygen (A/F) sensor mixture ratio is rich.
Rear oxygen sensor rich signal	Rear O2 Rich Signal	ON or OFF	When rear oxygen sensor mixture ratio is rich.
Drain valve	Vent. Solenoid Valve	ON or OFF	When drain valve is in function.
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.

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

9. READ CURRENT DATA FOR AT. *S078503A1609*

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 *S078508*

A: OPERATION *S078508A16*

1. SUBARU SELECT MONITOR (NORMAL MODE) *S078508A1601*

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-84, List of Diagnostic Trouble Code (DTC).>

2. SUBARU SELECT MONITOR (OBD MODE) *S078508A1602*

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-84, List of Diagnostic Trouble Code (DTC).>

3. OBD-II GENERAL SCAN TOOL *S078508A1603*

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-84, 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 S078510

A: OPERATION S078510A16

Carry out trouble diagnosis shown in the following DTC table.

When performing trouble diagnosis which is not shown in the DTC table, refer to the next item Drive cycle. <Ref. to EN-48, Drive Cycle.>

DTC No.	Item
P0031	Front oxygen (A/F) sensor heater circuit low input
P0032	Front oxygen (A/F) sensor heater circuit high input
P0037	Rear oxygen sensor heater circuit low input
P0038	Rear oxygen sensor heater circuit high input
P0066	Air assist injector solenoid valve circuit low input
P0067	Air assist injector solenoid valve circuit high input
P0106	Pressure sensor circuit range/performance problem (low input)
P0107	Pressure sensor circuit low input
P0108	Pressure sensor circuit high input
P0112	Intake air temperature sensor circuit low input
P0113	Intake air temperature sensor circuit high input
P0117	Engine coolant temperature sensor circuit low input
P0118	Engine coolant temperature sensor circuit high input
P0122	Throttle position sensor circuit low input
P0123	Throttle position sensor circuit high input
P0131	Front oxygen (A/F) sensor circuit malfunction (open circuit)
P0132	Front oxygen (A/F) sensor circuit malfunction (short circuit)
P0136	Rear oxygen sensor circuit malfunction
P0182	Fuel temperature sensor A circuit low input
P0183	Fuel temperature sensor A circuit high input
P0327	Knock sensor circuit low input
P0328	Knock sensor circuit high input
P0335	Crankshaft position sensor circuit malfunction
P0336	Crankshaft position sensor circuit range/performance problem
P0340	Camshaft position sensor circuit malfunction
P0341	Camshaft position sensor circuit range/performance problem
P0444	Evaporative emission control system purge control valve circuit low input
P0447	Evaporative emission control system vent control low input
P0448	Evaporative emission control system vent control high input
P0452	Evaporative emission control system pressure sensor low input
P0462	Fuel level sensor circuit low input
P0463	Fuel level sensor circuit high input
P0480	Cooling fan relay 1 circuit low input
P0500	Vehicle speed sensor malfunction
P0512	Starter switch circuit high input
P0604	Internal control module memory check sum error
P0703	Brake switch input malfunction
P0705	Transmission range sensor circuit malfunction
P0710	Transmission fluid temperature sensor circuit malfunction
P0715	Torque converter turbine speed sensor circuit malfunction
P0720	Output speed sensor (vehicle speed sensor 2) circuit malfunction
P0725	Engine speed input circuit malfunction
P0731	Gear 1 incorrect ratio
P0732	Gear 2 incorrect ratio
P0733	Gear 3 incorrect ratio

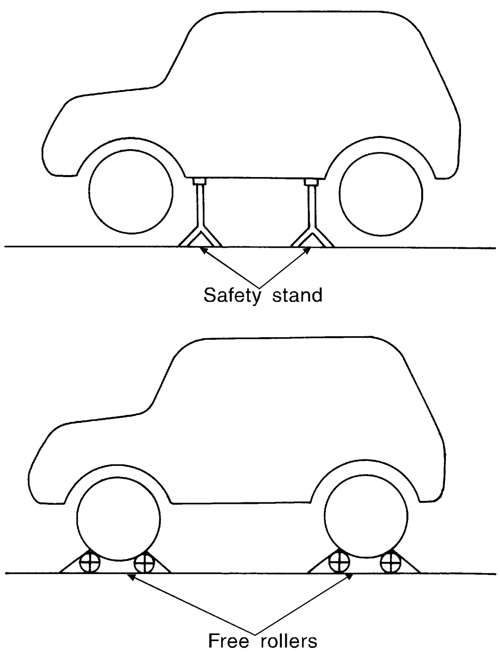
DTC No.	Item
P0734	Gear 4 incorrect ratio
P0741	Torque converter clutch system malfunction
P0743	Torque converter clutch system (Lock-up duty solenoid) electrical
P0748	Pressure control solenoid (Line pressure duty solenoid) electrical
P0753	Shift solenoid A (Shift solenoid 1) electrical
P0758	Shift solenoid B (Shift solenoid 2) electrical
P0778	2-4 brake pressure control solenoid valve circuit malfunction
P0785	2-4 brake timing control solenoid valve circuit malfunction
P1110	Atmospheric pressure sensor low input
P1111	Atmospheric pressure sensor high input
P1112	Atmospheric pressure sensor range/performance problem
P1146	Pressure sensor circuit range/performance problem (high input)
P1400	Fuel tank pressure control solenoid valve circuit low input
P1420	Fuel tank pressure control solenoid valve circuit high input
P1480	Cooling fan relay 1 circuit high input
P1507	Idle control system malfunction (fail-safe)
P1510	Idle air control solenoid valve signal 1 circuit low input
P1511	Idle air control solenoid valve signal 1 circuit high input
P1512	Idle air control solenoid valve signal 2 circuit low input
P1513	Idle air control solenoid valve signal 2 circuit high input
P1514	Idle air control solenoid valve signal 3 circuit low input
P1515	Idle air control solenoid valve signal 3 circuit high input
P1516	Idle air control solenoid valve signal 4 circuit low input
P1517	Idle air control solenoid valve signal 4 circuit high input
P1518	Starter switch circuit low input
P1540	Vehicle speed sensor malfunction 2
P1560	Back-up voltage circuit malfunction
P1590	Neutral position switch circuit high input (AT model)
P1591	Neutral position switch circuit low input (AT model)
P1592	Neutral position switch circuit malfunction (MT model)
P1594	Automatic transmission diagnosis input signal circuit malfunction
P1595	Automatic transmission diagnosis input signal circuit low input
P1596	Automatic transmission diagnosis input signal circuit high input
P1698	Engine torque control cut signal circuit low input
P1699	Engine torque control cut signal circuit high input
P1700	Throttle position sensor circuit malfunction for automatic transmission
P1701	Cruise control set signal circuit malfunction for automatic transmission
P1703	Low clutch timing control solenoid valve circuit malfunction
P1711	Engine torque control signal 1 circuit malfunction
P1712	Engine torque control signal 2 circuit malfunction

1. PREPARATION FOR THE INSPECTION MODE *S078510A1601*

1) Make sure that fuel remains approx. half amount [20 to 40 ℓ (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)], and battery voltage is 12V or more.
2) 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.**



B2M2969A

2. SUBARU SELECT MONITOR *S078510A1602*

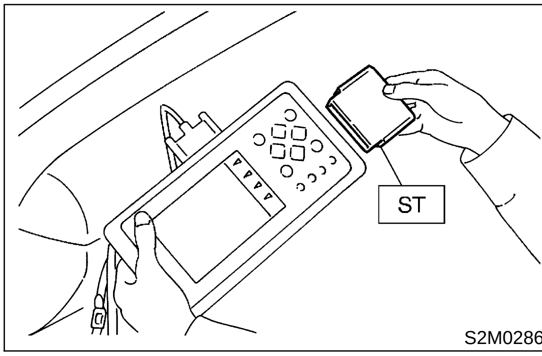
After performing diagnostics and clearing the memory, check for any remaining unresolved trouble data.

1) Prepare Subaru Select Monitor kit. <Ref. to EN-8, PREPARATION TOOL, General Description.>


S2M0285

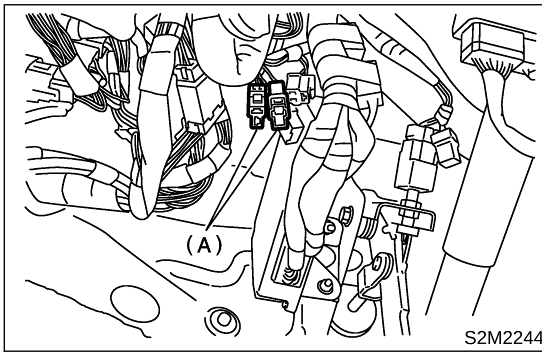
2) Connect diagnosis cable to Subaru Select Monitor.

3) Insert cartridge into Subaru Select Monitor. <Ref. to EN-8, PREPARATION TOOL, General Description.>



S2M0286A

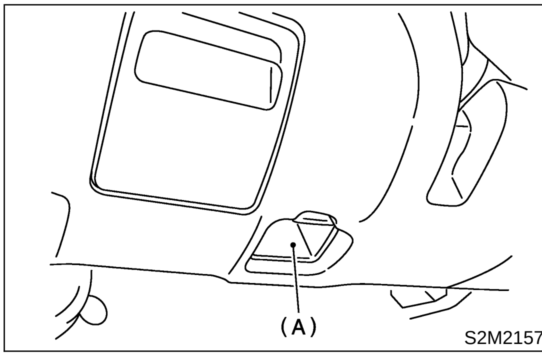
4) Connect test mode connector (A) at the lower portion of instrument panel (on the driver’s side).



S2M2244A

5) Connect Subaru Select Monitor to data link connector.

(1) Connect Subaru Select Monitor to data link connector located (A) in the lower portion of the instrument panel (on the driver’s side).

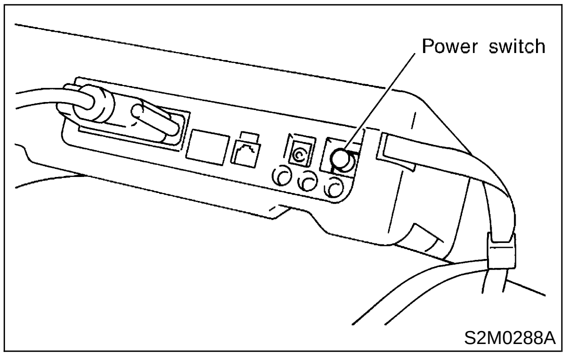


S2M2157B

(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.



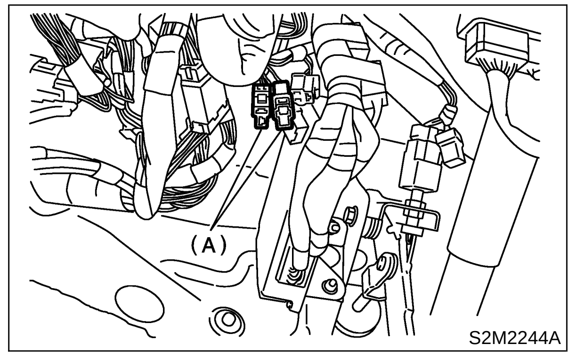
7) On the ≪Main Menu≫ display screen, select the {2. Each System Check} and press the [YES] key.
8) On the ≪System Selection Menu≫ display screen, select the {Engine Control System} and press the [YES] key.
9) Press the [YES] key after displayed the information of engine type.
10) On the ≪Engine Diagnosis≫ 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-84, 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 *S078510A1603*

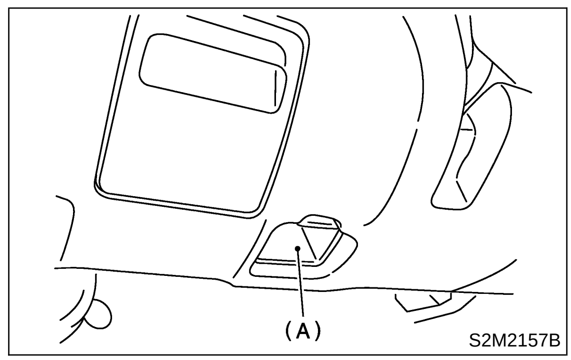
After performing diagnostics and clearing the memory, check for any remaining unresolved trouble data:

1) Connect test mode connector (A) 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 (A) 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. (AT vehicles)
- Depress clutch pedal when starting the engine. (MT vehicles)

4) Using the selector lever or shift lever, turn the "P" position switch and the "N" position switch to ON.
5) Depress the brake pedal to turn the brake switch ON. (AT vehicles)
6) Keep engine speed in the 2,500 — 3,000 rpm range for 40 seconds.
7) Place the selector lever or shift lever in the "D" position (AT vehicles) or "1st" gear (MT vehicles) and drive the vehicle at 5 to 10 km/h (3 to 6 MPH).

NOTE:
- On AWD vehicles, release the parking brake.
- The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunctions. When engine control diagnosis is finished, perform the ABS memory

clearance procedure of self-diagnosis system.

8) Using the OBD-II general scan tool, check for diagnostic trouble code(s) and record the result(s).

NOTE:

- For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.
- For detailed concerning diagnostic trouble codes, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).>

13. Drive Cycle S078812

A: OPERATION S078812A16

There are 3 drive patterns for trouble diagnosis. Driving in the specified pattern allows to diagnose the malfunctioning items listed below. After the malfunctioning items listed below are repaired, always check whether they correctly resume their functions by driving in the required drive pattern.

1. PREPARATION FOR THE DRIVE CYCLE S078812A1601

1) Make sure that fuel remains approx. half amount [20 to 40 ℓ (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)], and battery voltage is 12V or more.
2) After performing diagnostics and clearing the memory, check for any remaining unresolved trouble data. <Ref. to EN-50, Clear Memory Mode.>
3) Separate test mode connector.

NOTE:
- Except for water temperature specified items at starting, diagnosis is carried out after engine warm up.
- Carry out diagnosis which is marked * on DTC twice, Then, after finishing 1st diagnosis, stop engine and do the second time at the same condition.

2. AFTER RUNNING 20 MINUTES AT 80 KM/H (50 MPH), IDLE ENGINE FOR 1 MINUTE.

S078812A1602

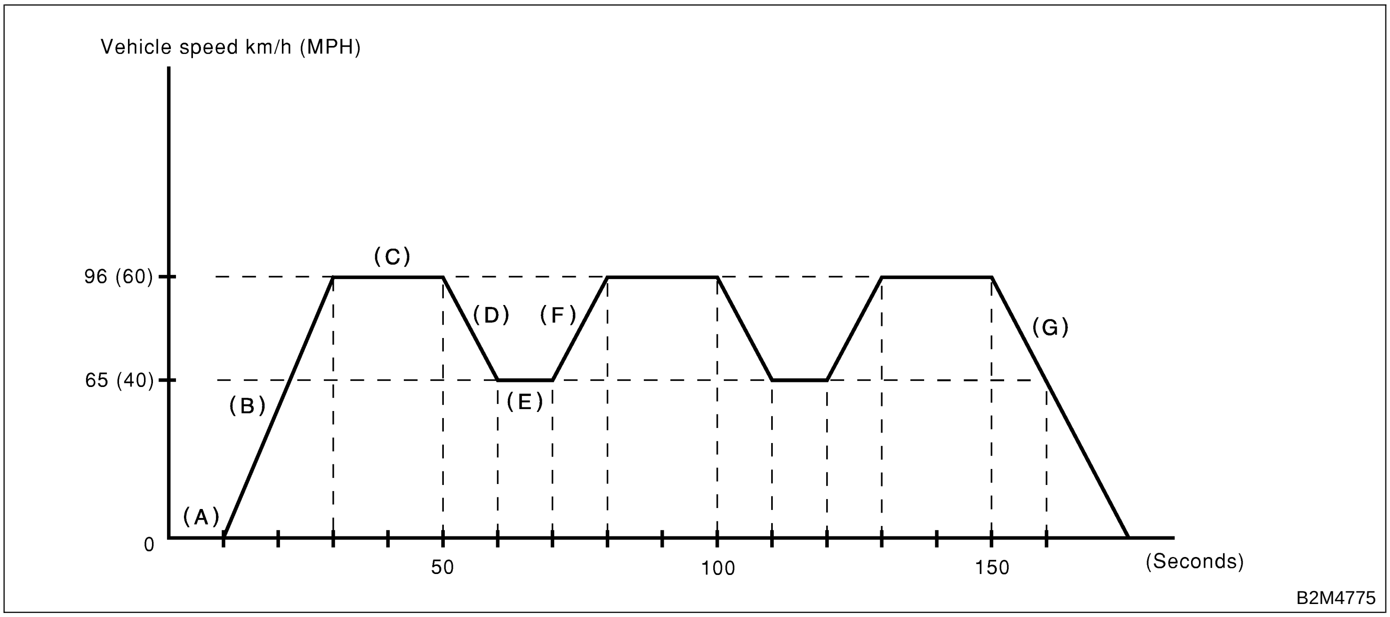
DTC No.	Item	Condition
*P0111	Intake air temperature sensor circuit range/ performance problem	Coolant temperature at start is less than 30°C (86°F).
*P0125	Insufficient coolant temperature for closed loop fuel control	Coolant temperature at start is less than 20°C (68°F).
*P0128	Thermostat malfunction	Coolant temperature at start is less than 55°C (131°F).
*P0130	Front oxygen (A/F) sensor circuit range/ performance problem (Lean)	—
*P0133	Front oxygen (A/F) sensor circuit slow response	—
*P0181	Fuel temperature sensor A circuit range/ performance problem	—
*P0420	Catalyst system efficiency below threshold	—
*P0442	Evaporative emission control system malfunction	—
P0445	Evaporative emission control system purge control valve circuit high input	—
*P0451	Evaporative emission control system pressure sensor range/performance problem	—
P0453	Evaporative emission control system pressure sensor high input	—
*P0456	Evaporative emission control system malfunction	—
*P0461	Fuel level sensor circuit range/performance problem	—
*P0464	Fuel level sensor intermittent input	—
*P1137	Front oxygen (A/F) sensor circuit range/ performance problem	—
*P1442	Fuel level sensor circuit range/performance problem 2	—
P1443	Evaporative emission control system vent control function problem	—

3. IDLE FOR 10 MINUTES *S078812A1603*

NOTE:
Before diagnosis, drive vehicle at 4 km/h (6 MPH) or more.

DTC No.	Item	Condition
*P0483	Cooling fan function problem	—
*P0506	Idle control system RPM lower than expected	—
*P0507	Idle control system RPM higher than expected	—

4. DRIVE ACCORDING TO THE FOLLOWING DRIVE PATTERN *S078812A1604*



(A) Idle engine for 1 minute.
(B) Accelerate to 97 km/h (60 MPH) within 20 seconds.
(C) Drive vehicle at 97 km/h (60 MPH) for 20 seconds.
(D) Decelerate with fully closed throttle to 64 km/h (40 MPH).
(E) Drive vehicle at 64 km/h (40 MPH) for 10 seconds.
(F) Accelerate to 97 km/h (60 MPH) within 10 seconds.
(G) Stop vehicle with throttle fully closed.

DTC No.	Item	Condition
*P0065	Air assist injector solenoid valve malfunction	—
*P0121	Throttle position sensor circuit range/performance problem (high input)	—
*P0139	Rear oxygen sensor circuit slow response	—
*P0171	Fuel trim malfunction (Lean)	—
*P0172	Fuel trim malfunction (Rich)	—
*P0301	Cylinder 1 misfire detected	—
*P0302	Cylinder 2 misfire detected	—
*P0303	Cylinder 3 misfire detected	—
*P0304	Cylinder 4 misfire detected	—
*P1142	Throttle position sensor circuit range/performance problem (low input)	—

14. Clear Memory Mode S078513

A: OPERATION S078513A16

1. SUBARU SELECT MONITOR (NORMAL MODE) S078513A1601

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:
- After the memory has been cleared, the idle air control solenoid valve must be initialized. To do this, turn the ignition switch to the ON position. Wait 3 seconds before starting the engine.
- For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

2. SUBARU SELECT MONITOR (OBD MODE) S078513A1602

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:
- After the memory has been cleared, the idle air control solenoid valve must be initialized. To do this, turn the ignition switch to the ON position. Wait 3 seconds before starting the engine.
- For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

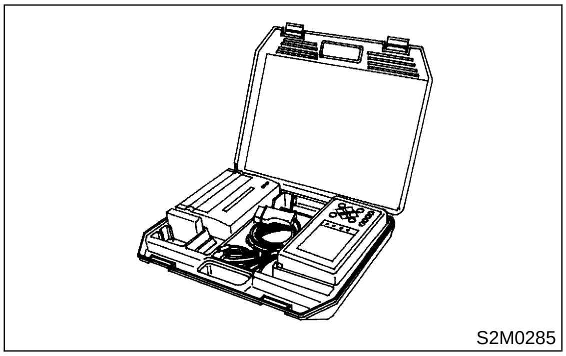
3. OBD-II GENERAL SCAN TOOL S078513A1603

For clear memory procedures using the OBD-II general scan tool, refer to the OBD-II General Scan Tool Instruction Manual.
After the memory has been cleared, the idle air control solenoid valve must be initialized. To do this, turn the ignition switch to the ON position. Wait 3 seconds before starting the engine.

15. Compulsory Valve Operation Check Mode S078528

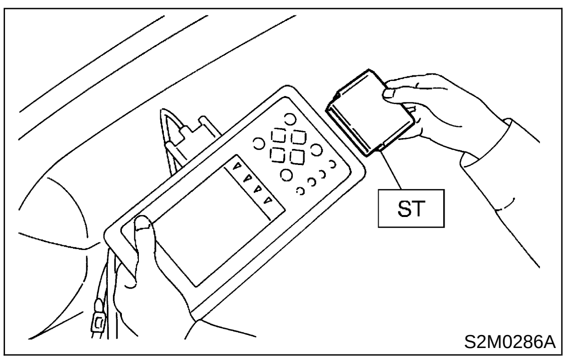
A: OPERATION S078528A16

1) Prepare Subaru Select Monitor kit. <Ref. to EN-8, PREPARATION TOOL, General Description.>



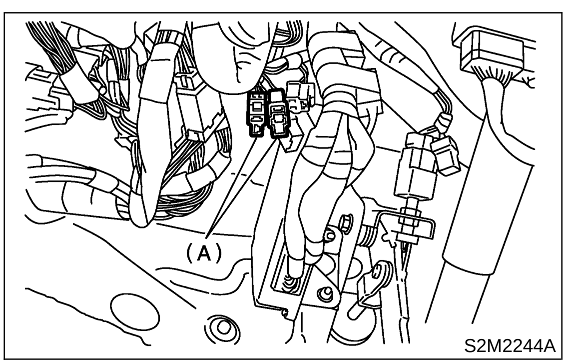
S2M0285

2) Connect diagnosis cable to Subaru Select Monitor.
3) Insert cartridge into Subaru Select Monitor. <Ref. to EN-8, PREPARATION TOOL, General Description.>



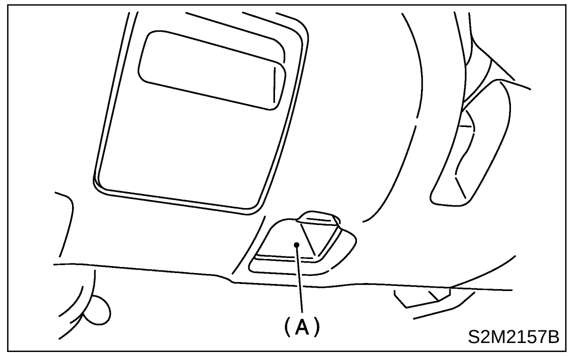
S2M0286A

4) Connect test mode connector (A) at the lower portion of instrument panel (on the driver's side).



S2M2244A

5) Connect Subaru Select Monitor to data link connector.
(1) Connect Subaru Select Monitor to data link connector (A) located in the lower portion of the instrument panel (on the driver's side).

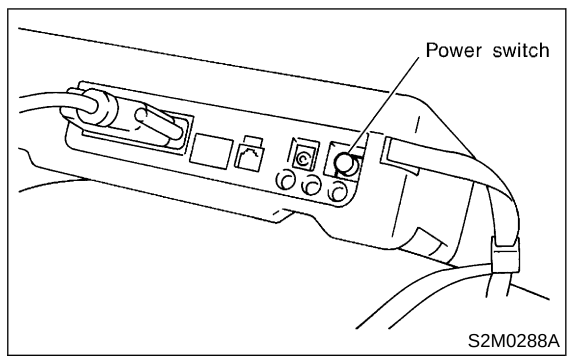


S2M2157B

(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.

- 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 air assist injector solenoid valve operation check	AAI Solenoid Valve
Compulsory fuel tank pressure control solenoid valve operation check	PCV Solenoid Valve
Compulsory drain valve operation check	Vent Control Solenoid Valve
Fuel tank pressure sensor operation check	Fuel Tank Sensor Control Valve

NOTE:
- The following parts will be displayed but not functional because they are not installed on the vehicle.

Display
EGR 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.

MEMO:

16. Engine Malfunction Indicator Lamp (MIL) S078653

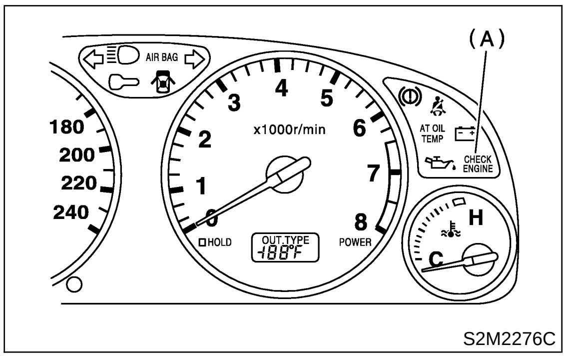
A: PROCEDURE S078653E45

1. Activation of check engine malfunction indicator lamp (MIL). <Ref. to EN-55, 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-56, 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-59, 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-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-62, CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) REMAINS BLINKING AT A CYCLE OF 3 HZ., Engine Malfunction Indicator Lamp (MIL).>

B: ACTIVATION OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) S078653E89

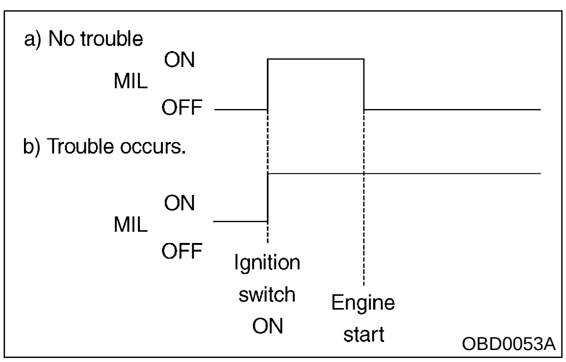
1) When ignition switch is turned to ON (engine off), the CHECK ENGINE malfunction indicator lamp (MIL) in the combination meter illuminates.

NOTE:
If the MIL does not illuminate, perform diagnostics of the CHECK ENGINE light circuit or the combination meter circuit. <Ref. to EN-56, CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT COME ON., Engine Malfunction Indicator Lamp (MIL).>

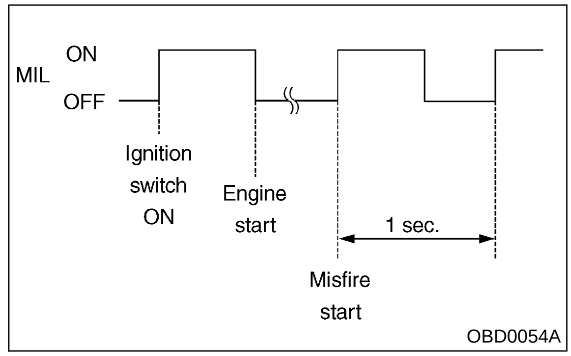


(A) Malfunction indicator lamp (MIL)

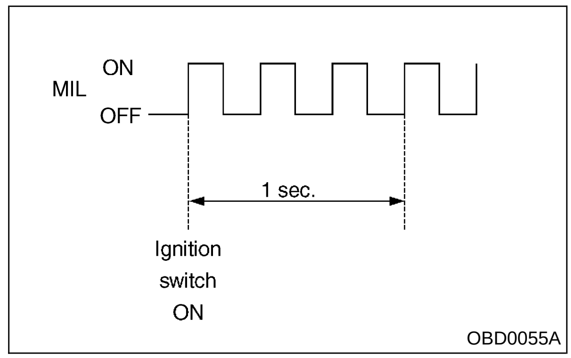
2) After starting the engine, the MIL goes out. If it does not, either the engine or the emission control system is malfunctioning.



3) If the diagnosis system senses a misfire which could damage the catalyzer, the MIL will blink at a cycle of 1 Hz.

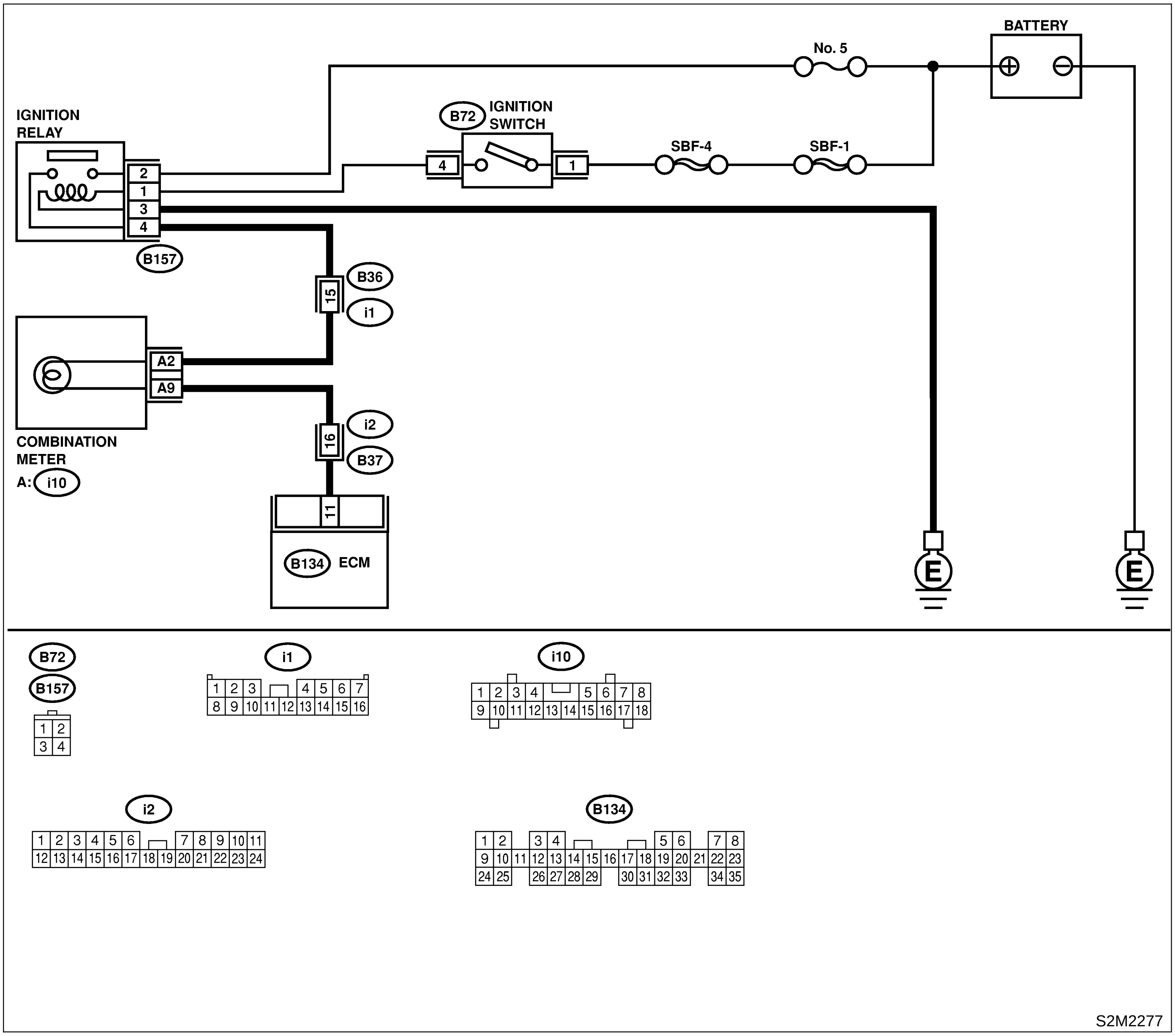


4) When ignition switch is turned to ON (engine off) or to “START” with the test mode connector connected, the MIL blinks at a cycle of 3 Hz.



C: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT COME ON. *S078653E90*

- **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:**



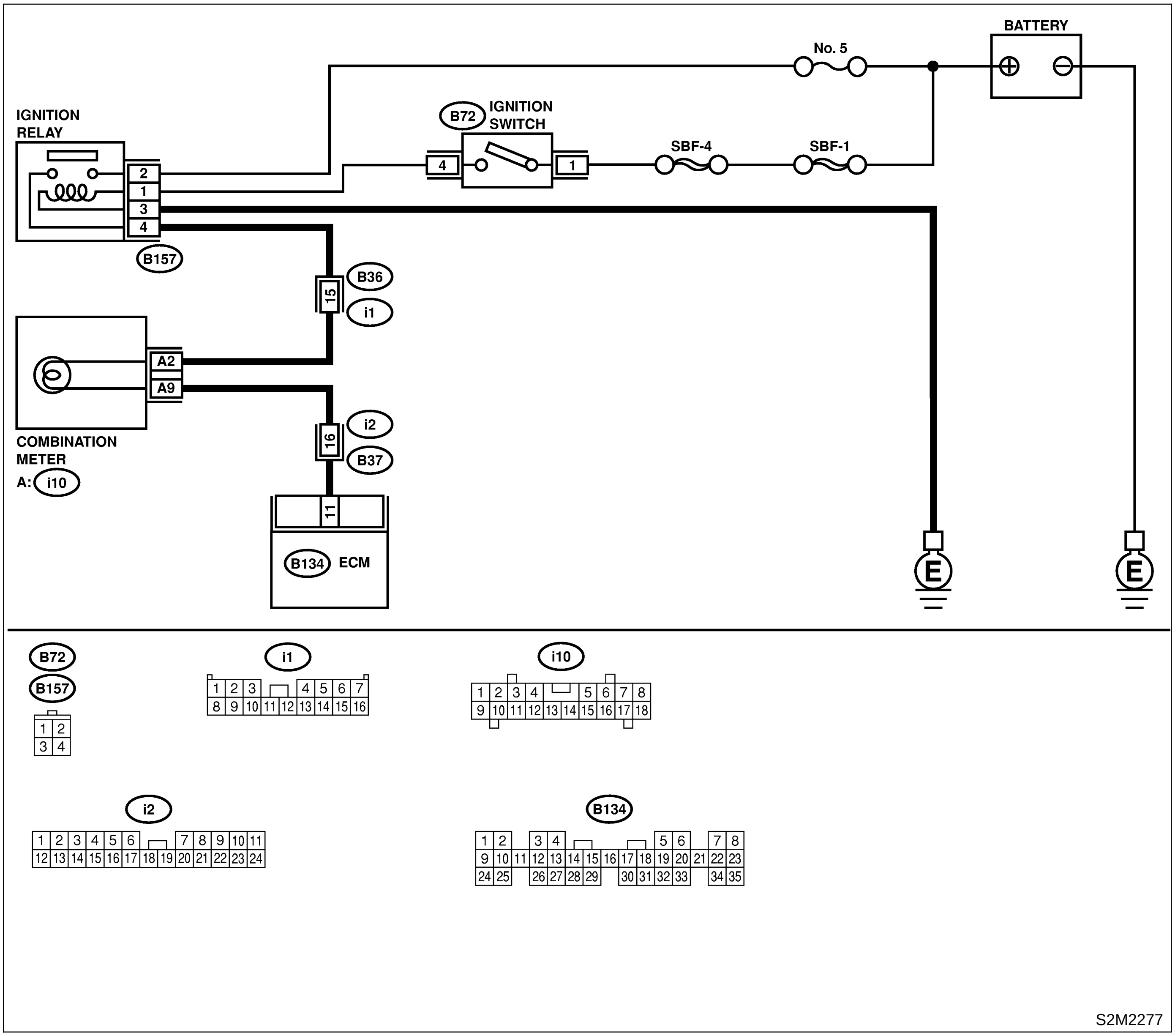
No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 11 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **4**.	Go to step **2**.

No.	Step	Check	Yes	No
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-49, 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-12, REMOVAL, Combination Meter Assembly.> 3) Disconnect connector from ECM and combination meter. 4) Measure resistance of harness between ECM and combination meter connector. ***Connector & terminal*** ***(B134) No. 11 — (i10) No. 9:***	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**.
6	**CHECK HARNESS BETWEEN COMBINATION METER AND IGNITION SWITCH CONNECTOR.** 1) Turn ignition switch to ON. 2) Measure voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 2 (+) — 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

No.	Step	Check	Yes	No
7	**CHECK LAMP BULB.** Remove engine malfunction indicator lamp bulb.	Is lamp bulb condition OK?	Repair combination meter connector.	Replace lamp bulb.

D: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT GO OFF. S078653E91

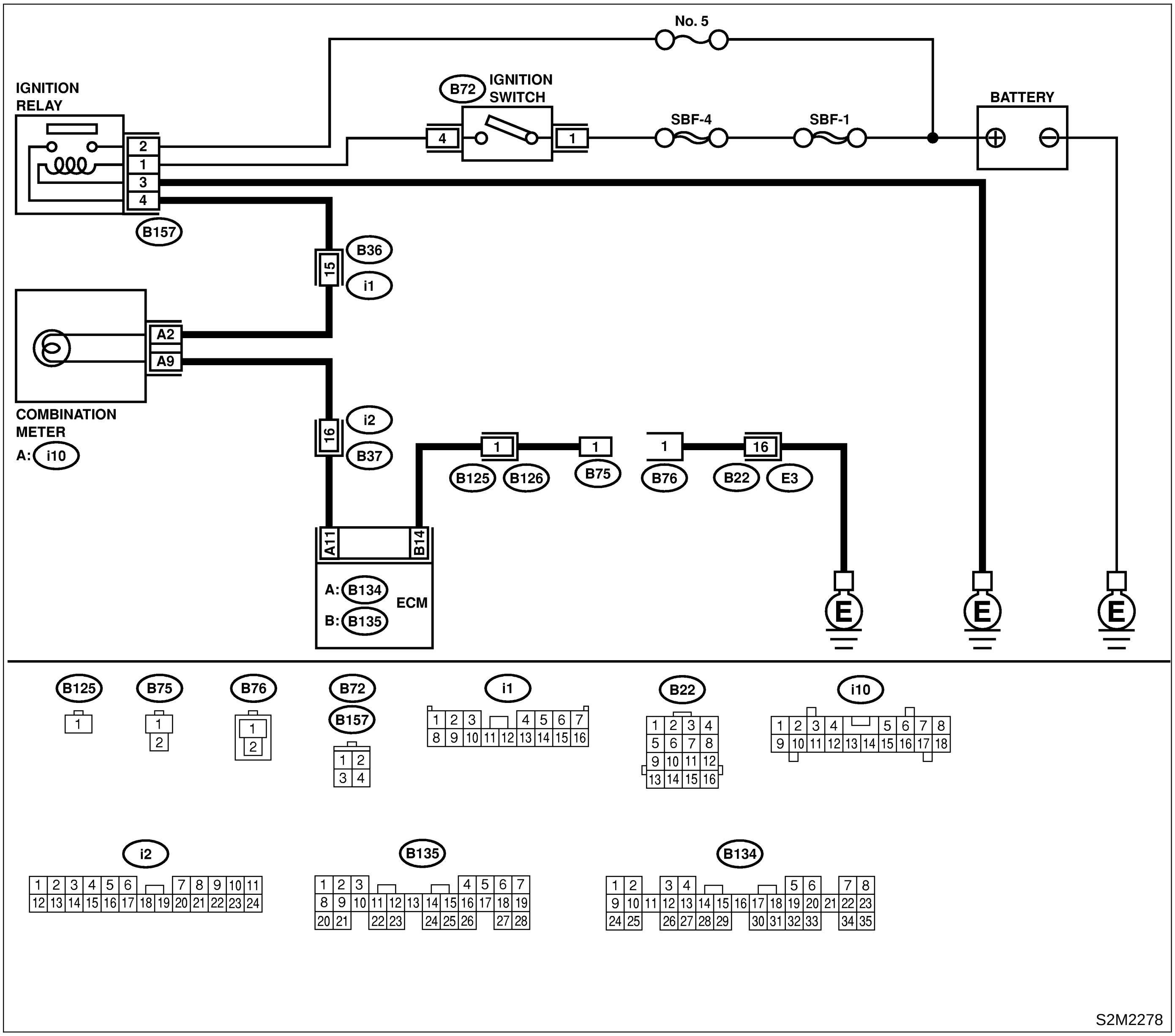
- **DIAGNOSIS:**
  - The CHECK ENGINE malfunction indicator lamp (MIL) circuit is shorted.
- **TROUBLE SYMPTOM:**
  - Although MIL comes on when engine runs, trouble code is not shown on Subaru select monitor or OBD-II general scan tool display.
- **WIRING DIAGRAM:**



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-49, Engine Control Module.>

E: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT BLINK AT A CYCLE OF 3 Hz. S078653E92

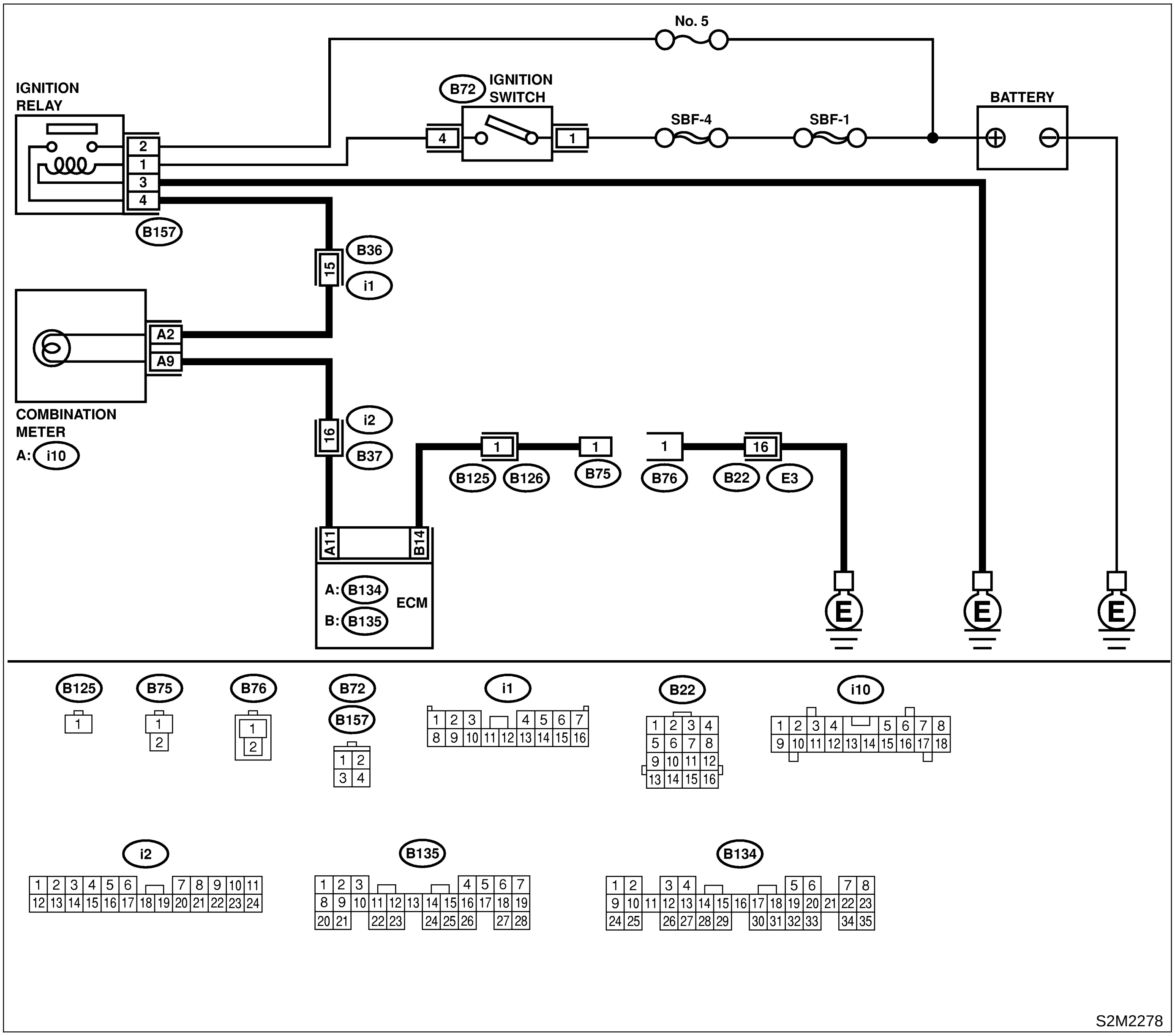
- **DIAGNOSIS:**
  - The CHECK ENGINE malfunction indicator lamp (MIL) circuit is open or shorted.
  - Test mode connector circuit is in open.
- **TROUBLE SYMPTOM:**
  - When inspection mode, MIL does not blink at a cycle of 3 Hz.
- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK STATUS OF CHECK ENGINE MAL-FUNCTION 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-56, CHECK ENGINE MAL-FUNCTION INDI-CATOR LAMP (MIL) DOES NOT COME ON., Engine Malfunc-tion Indicator Lamp (MIL).>
2	**CHECK HARNESS BETWEEN COMBINA-TION 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 connec-tor.	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 follow-ing: ● Open circuit in harness between test mode con-nector and chas-sis ground
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor con-tact in ECM con-nector.	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*** ***(B135) No. 14 — Chassis ground:***	Is resistance less than 1 Ω?	Go to step **6**.	Repair open cir-cuit 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 con-tact in ECM con-nector.	Replace ECM. <Ref. to FU-49, Engine Control Module.>

F: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) REMAINS BLINKING AT A CYCLE OF 3 Hz. S078653E93

- **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:**



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.

No.	Step	Check	Yes	No
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*** ***(B135) 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-49, Engine Control Module.>

MEMO:

17. Diagnostics for Engine Starting Failure S078533

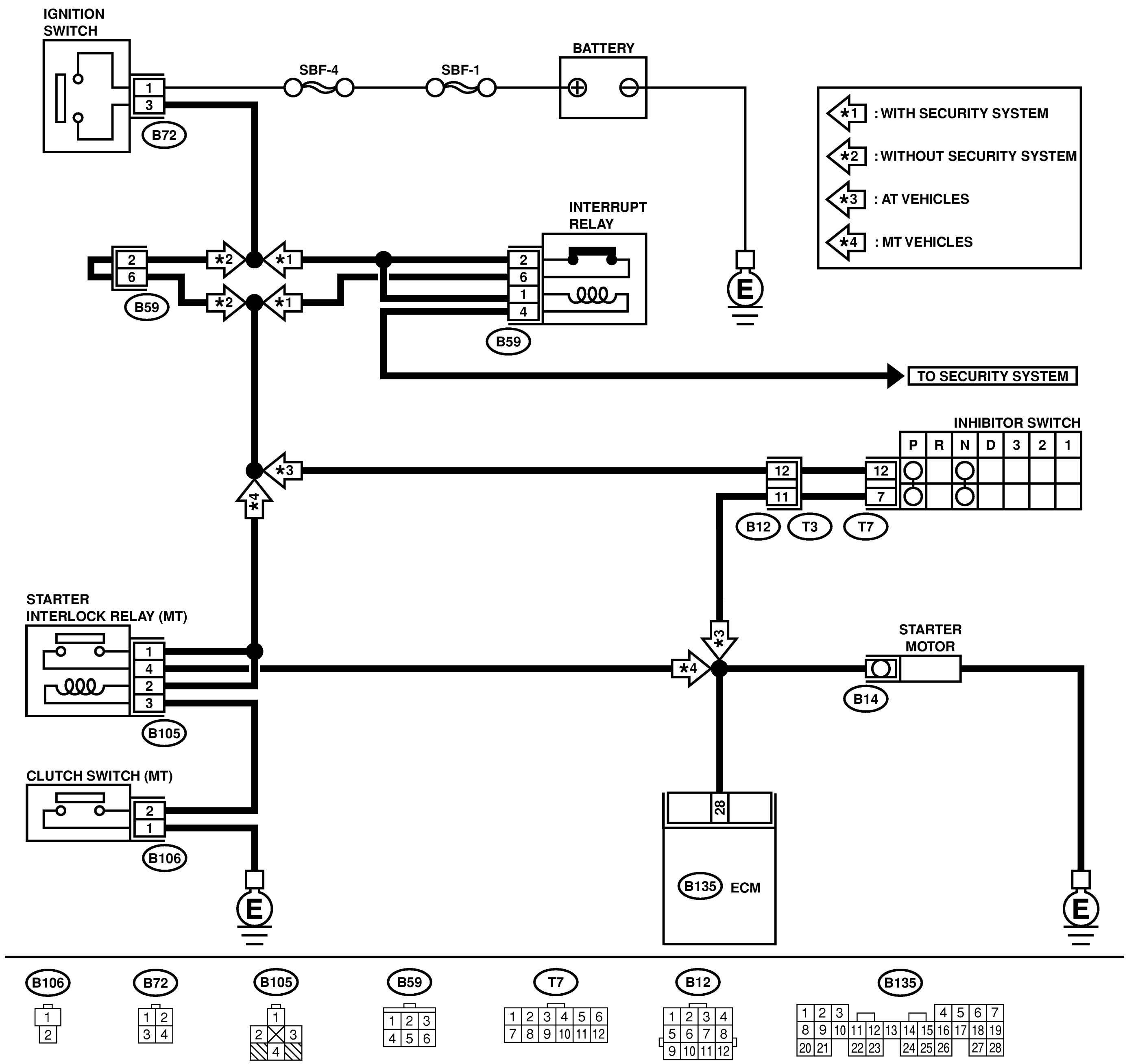
A: PROCEDURE S078533E45

1. Inspection of starter motor circuit. <Ref. to EN-66, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
2. Inspection of ECM power supply and ground line. <Ref. to EN-70, CONTROL MODULE POWER SUPPLY AND GROUND LINE, Diagnostics for Engine Starting Failure.>
↓
3. Inspection of ignition control system. <Ref. to EN-74, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>
↓
4. Inspection of fuel pump circuit. <Ref. to EN-78, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
5. Inspection of fuel injector circuit. <Ref. to EN-82, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

B: STARTER MOTOR CIRCUIT *S078533E94*

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN-50, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN-43, Inspection Mode.>.

- **WIRING DIAGRAM:**



S2M2279

No.	Step	Check	Yes	No
1	**CHECK OPERATION OF STARTER MOTOR.**	Does starter motor operate when the switch starts?	Go to step **2**.	Go to step **3**.
2	**CHECK DTC.** <Ref. to EN-42, OPERATION, Read Diagnostic Trouble Code.>	Is the trouble code stored in memory? <Ref. to EN-84, LIST, List of Diagnostic Trouble Code (DTC).>	Record DTC. Repair the trouble case. <Ref. to EN-22, Engine Control Module (ECM) I/O Signal.>	Go to step **3**.
3	**CHECK INPUT SIGNAL FOR STARTER MOTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from starter motor. 3) Turn ignition switch to ST. 4) Measure power supply voltage between starter motor connector terminal and engine ground. ***Connector & terminal*** ***(B14) No. 1 (+) — Engine ground (−):*** NOTE: On AT vehicles, place the selector lever in the “P” or “N” position.	Is the voltage more than 10 V?	Go to step **4**.	Go to step **5**.
4	**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-8, INSPECTION, Starter.>	Repair open circuit of ground cable.
5	**CHECK HARNESS BETWEEN ECM AND STARTER MOTOR CIRCUIT.** 1) Turn ignition switch to OFF. 2) Measure resistance between starter motor and ECM. ***Connector & terminal*** ***(B14) No. 1 — Engine ground:***	Is resistance less than 1 Ω?	Repair ground short circuit.	Go to step **6**.
6	**CHECK HARNESS BETWEEN ECM AND STARTER MOTOR CIRCUIT.** 1) Turn ignition switch to START. 2) Measure resistance of fuse. ***Connector & terminal*** ***(B14) No. 1 — Engine ground:***	Is resistance less than 1 Ω?	Go to step **7**.	Repair ground short circuit.
7	**CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.** 1) Ignition switch to OFF. 2) Disconnect connector from ignition switch. 3) 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 **8**.	Repair open circuit in harness between ignition switch and battery.
8	**CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.** 1) Connect connector to ignition switch. 2) Turn ignition switch to START. 3) Measure voltage between ignition switch and chassis ground. ***Connector & terminal*** ***(B72) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **9**.	Replace ignition switch.

No.	Step	Check	Yes	No
9	**CHECK TRANSMISSION TYPE.**	Is the vehicle AT?	Go to step **10**.	Repair open circuit between ignition switch and starter motor circuit.
10	**CHECK INHIBITOR SWITCH CIRCUIT.** 1) Turn ignition switch to OFF. 2) Place the selector lever in the “P” or “N” position. 3) Separate transmission harness connector. 4) Measure resistance between transmission harness connector receptacle’s terminals. ***Connector & terminal*** ***(T3) No. 11 — No. 12:***	Is the resistance less than 1 Ω?	Repair open circuit in harness between starter motor and ignition switch connector.	Go to step **11**.
11	**CHECK TRANSMISSION HARNESS.** 1) Disconnect connector from inhibitor switch. 2) Measure resistance of harness between transmission harness and inhibitor switch connector. ***Connector & terminal*** ***(T3) No. 11 — (T7) No. 7:***	Is the resistance less than 1 Ω?	Go to step **12**.	Repair open circuit in harness between transmission harness and inhibitor switch connector.
12	**CHECK POOR CONTACT.** Check poor contact in inhibitor switch connector.	Is there poor contact in inhibitor switch connector?	Repair poor contact in inhibitor switch connector.	Replace inhibitor switch.

MEMO:

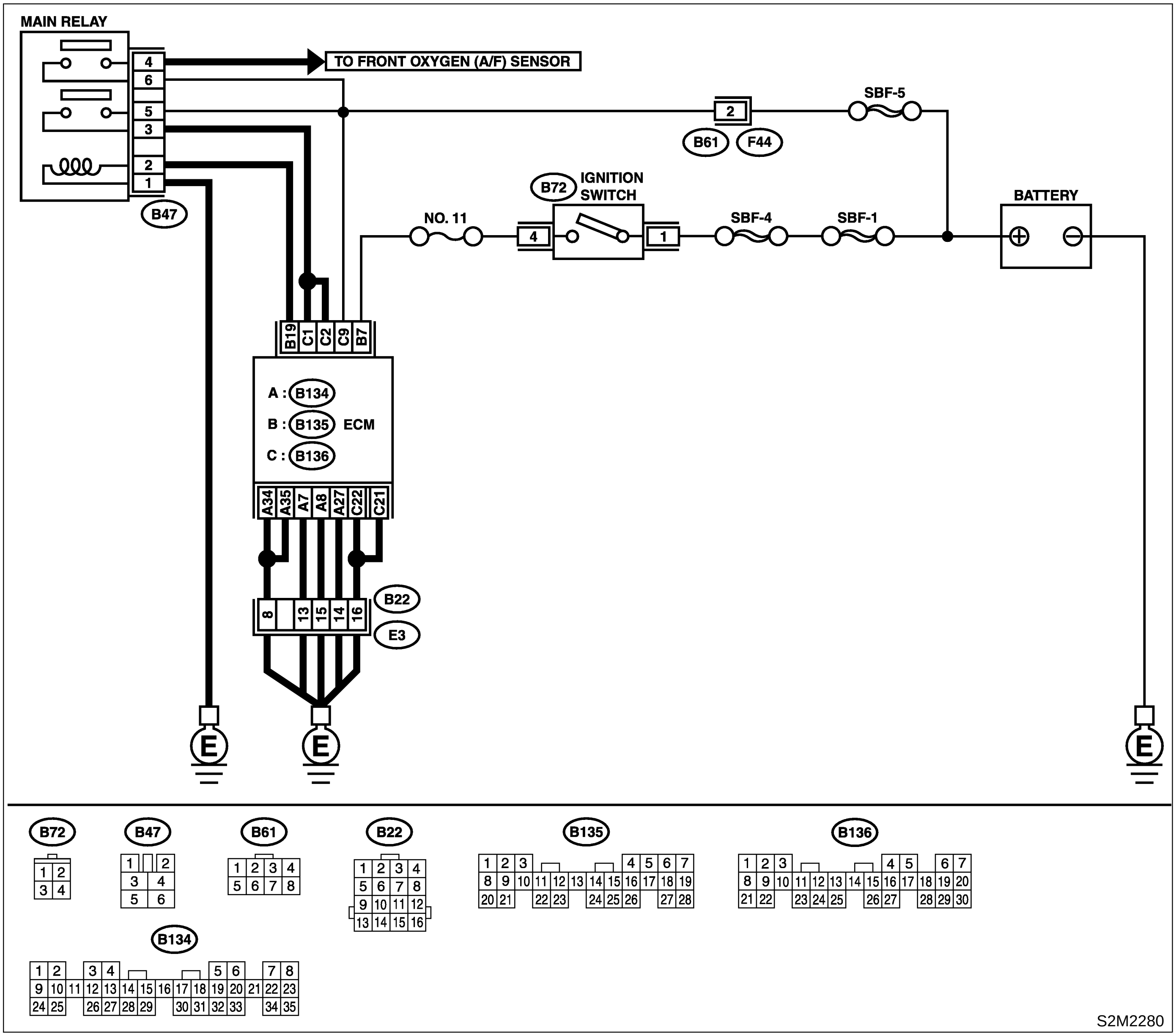
C: CONTROL MODULE POWER SUPPLY AND GROUND LINE

S078533E37

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN-50, Clear Memory Mode.> and INSPECTION MODE. <Ref. to EN-43, 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:*** ***No. 4 — No. 6:***	Is the resistance less than 10 Ω?	Go to step **2**.	Replace main relay.

No.	Step	Check	Yes	No
2	**CHECK GROUND CIRCUIT OF ECM.** 1) Disconnect connector from ECM. 2) Measure resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 21 — Chassis ground:*** ***(B136) No. 22 — Chassis ground:*** ***(B134) No. 27 — Chassis ground:*** ***(B134) No. 8 — Chassis ground:*** ***(B134) No. 7 — Chassis ground:*** ***(B134) No. 34 — Chassis ground:*** ***(B134) No. 35 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3**.	Repair open circuit in harness between ECM connector and engine grounding terminal.
3	**CHECK INPUT VOLTAGE OF ECM.** Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 9 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4**.	Repair open or ground short circuit of power supply circuit.
4	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 7 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **5**.	Repair open or ground short circuit of power supply circuit.
5	**CHECK HARNESS BETWEEN ECM AND MAIN RELAY CONNECTOR.** 1) Turn ignition switch to OFF. 2) Measure resistance between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 19 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Repair ground short circuit in harness between ECM connector and main relay connector, then replace ECM.
6	**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. ***Connector & terminal*** ***(B135) No. 19 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **7**.	Replace ECM.
7	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Check voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **8**.	Repair open circuit in harness between ECM connector and main relay connector.
8	**CHECK GROUND CIRCUIT OF MAIN RELAY.** 1) Turn ignition switch to OFF. 2) Measure resistance between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 1 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **9**.	Repair open circuit between main relay and chassis ground.
9	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Measure voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 5 (+) — Chassis ground (–):*** ***(B47) No. 6 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **10**.	Repair open or ground short circuit in harness of power supply circuit.

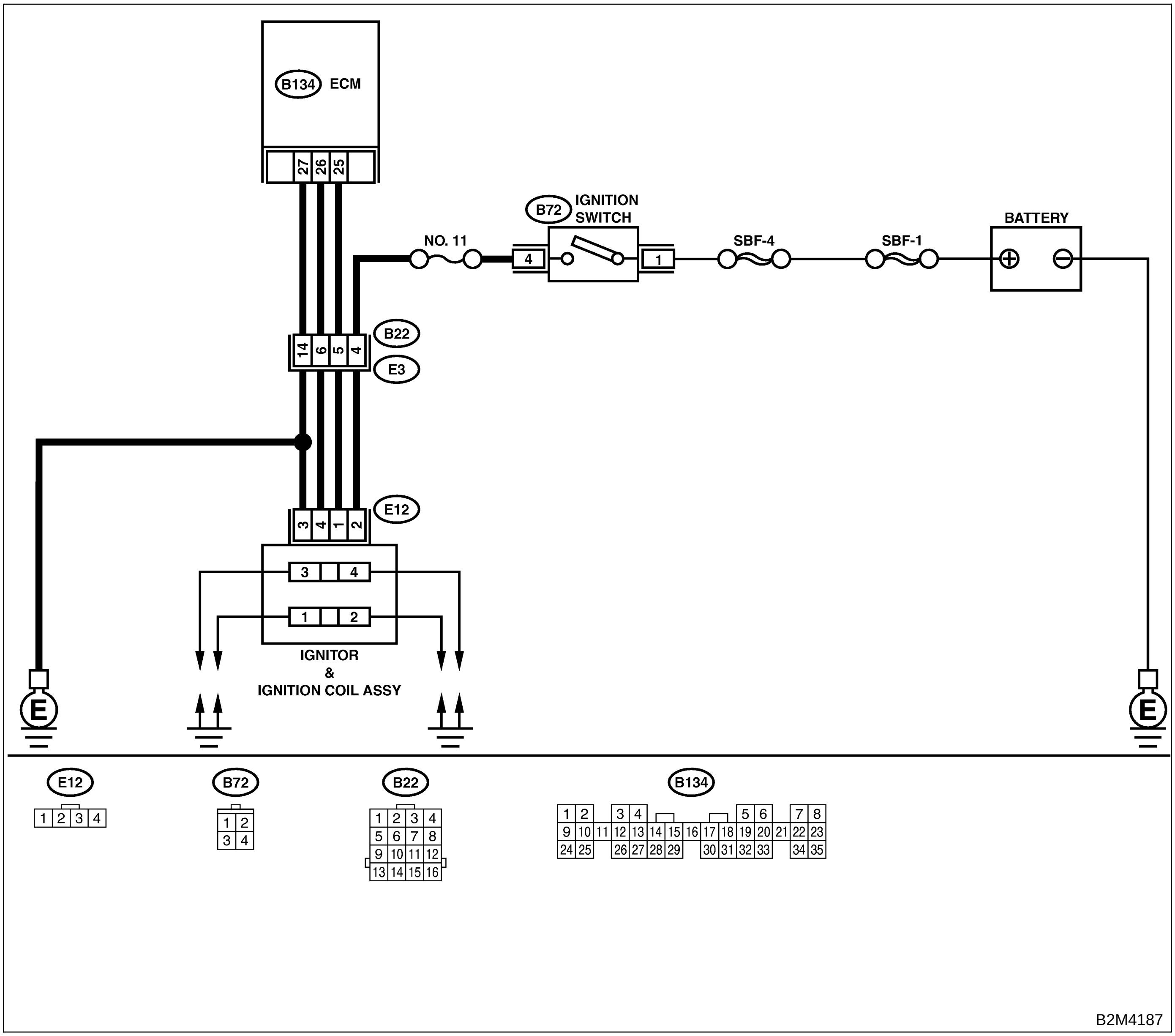
No.	Step	Check	Yes	No
10	**CHECK INPUT VOLTAGE OF ECM.** 1) Connect main relay connector. 2) Turn ignition switch to ON. 3) Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 1 (+) — Chassis ground (–):*** ***(B136) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Check ignition control system. <Ref. to EN-74, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Repair open or ground short circuit in harness between ECM connector and main relay connector.

MEMO:

D: IGNITION CONTROL SYSTEM *S078533E95*

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN-50, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN-43, Inspection Mode.>.

- **WIRING DIAGRAM:**



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-78, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **2**.
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*** ***(E12) 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 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*** ***(E12) No. 3 — 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 IGNITION COIL & IGNITOR ASSEMBLY.** 1) Remove spark plug cords. 2) Measure resistance between spark plug cord contact portions to check secondary coil. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 10 and 15 kΩ?	Go to step **5**.	Replace ignition coil & ignitor assembly. <Ref. to IG-7, Ignition Coil and Ignitor Assembly.>
5	**CHECK IGNITION COIL & IGNITOR ASSEMBLY.** Measure resistance between spark plug cord contact portions to check secondary coil. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance between 10 and 15 kΩ?	Go to step **6**.	Replace ignition coil & ignitor assembly. <Ref. to IG-7, Ignition Coil and Ignitor Assembly.>

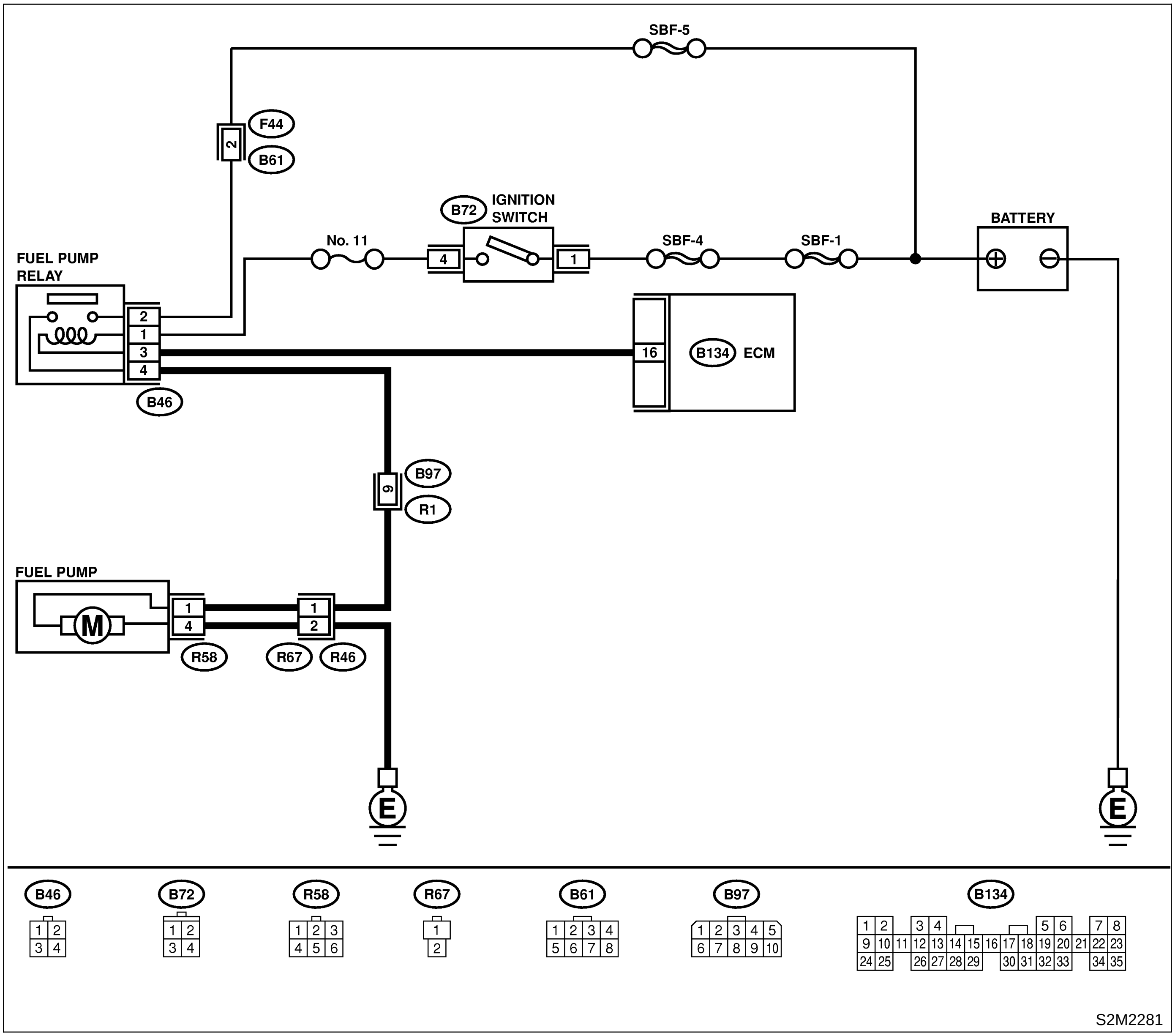
No.	Step	Check	Yes	No
6	**CHECK INPUT SIGNAL FOR IGNITION COIL & IGNITOR ASSEMBLY.** 1) Connect connector to ignition coil & ignitor assembly. 2) Check if voltage varies synchronously with engine speed when cranking, while monitoring voltage between ignition coil & ignitor assembly connector and engine ground. ***Connector & terminal*** ***(E12) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **7**.	Replace ignition coil & ignitor assembly. <Ref. to IG-7, Ignition Coil and Ignitor Assembly.>
7	**CHECK INPUT SIGNAL FOR IGNITION COIL & IGNITOR ASSEMBLY.** Check if voltage varies synchronously with engine speed when cranking, while monitoring voltage between ignition coil & ignitor assembly connector and engine ground. ***Connector & terminal*** ***(E12) No. 4 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **8**.	Replace ignition coil & ignitor assembly. <Ref. to IG-7, Ignition Coil and Ignitor Assembly.>
8	**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*** ***(B134) No. 25 — (E12) No. 1:***	Is the resistance less than 1 Ω?	Go to step **9**.	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
9	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSEMBLY CONNECTOR.** Measure resistance of harness between ECM and ignition coil & ignitor assembly connector. ***Connector & terminal*** ***(B134) No. 26 — (E12) No. 4:***	Is the resistance less than 1 Ω?	Go to step **10**.	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
10	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSEMBLY CONNECTOR.** Measure resistance of harness between ECM and engine ground. ***Connector & terminal:*** ***(B134) No. 25 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **11**.	Repair ground short circuit in harness between ECM and ignition coil & ignitor assembly connector.

No.	Step	Check	Yes	No
11	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSEMBLY CONNECTOR.** Measure resistance of harness between ECM and engine ground. ***Connector & terminal*** ***(B134) No. 26 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **12**.	Repair ground short circuit in harness between ECM and ignition coil & ignitor assembly connector.
12	**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-78, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>

E: FUEL PUMP CIRCUIT S078533E96

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN-50, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN-43, Inspection Mode.>.

- **WIRING DIAGRAM:**



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-51, Compulsory Valve Operation Check Mode.>	Does fuel pump produce operating sound?	Check fuel injector circuit. <Ref. to EN-82, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **2**.

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 trunk compartment floor (Sedan) or luggage compartment floor (Wagon). 3) Disconnect connector from fuel pump. 4) Measure resistance of harness connector between fuel pump and chassis ground. ***Connector & terminal*** ***(R58) No. 4 — Chassis ground:***	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. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace fuel pump. <Ref. to FU-63, 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. 1 — (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. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	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-51, Fuel Pump Relay.>

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*** ***(B134) No. 16 — (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-82, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

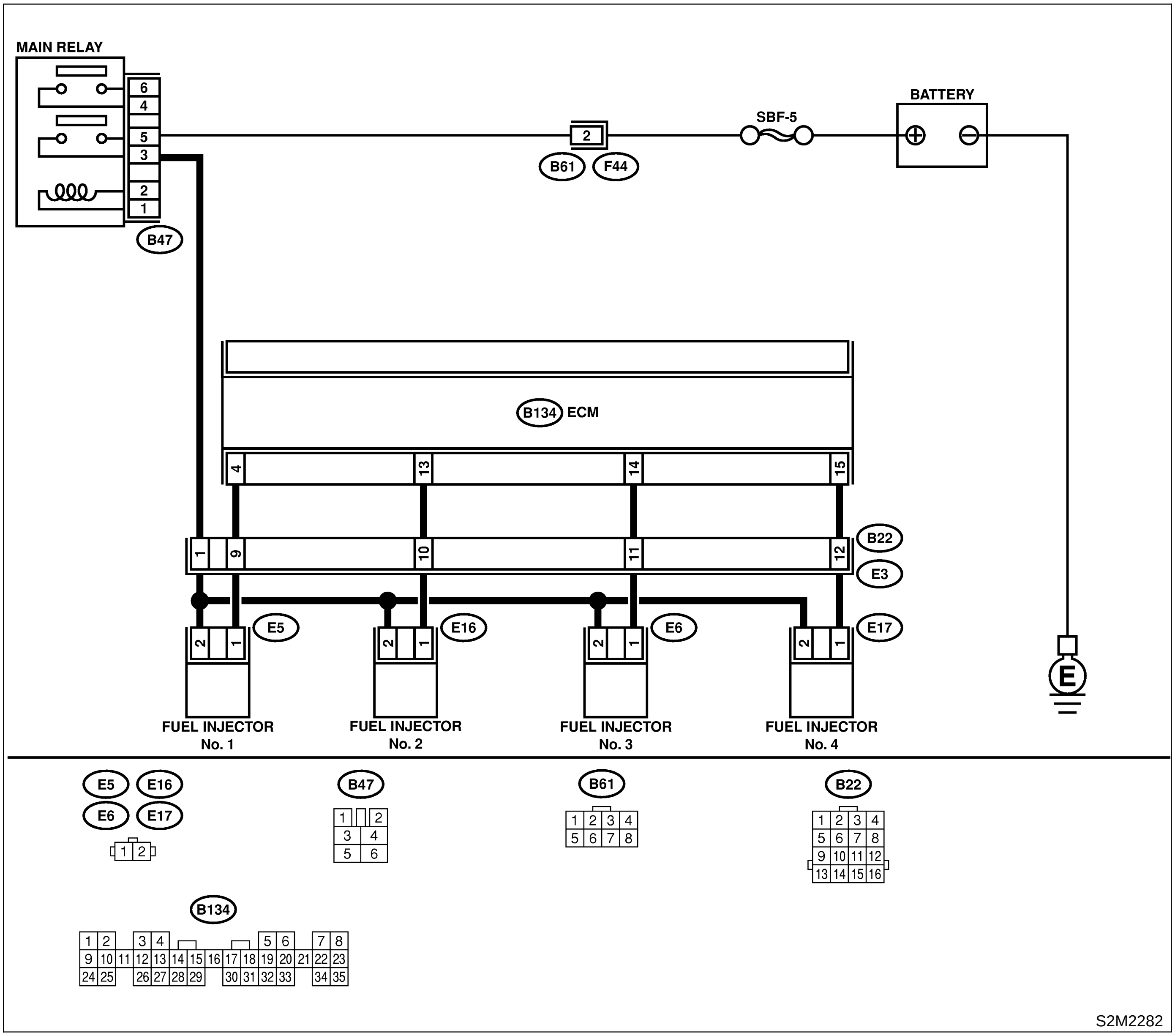
MEMO:

F: FUEL INJECTOR CIRCUIT *S078533E97*

CAUTION:

- **Check or repair only faulty parts.**
- **After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN-50, Clear Memory Mode.> and INSPECTION MODE. <Ref. to EN-43, 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.	Is the fuel injector emits “operating” sound?	Check fuel pressure. <Ref. to ME-28, INSPECTION, Fuel Pressure.>	Go to step **2**.

No.	Step	Check	Yes	No
2	**CHECK POWER SUPPLY TO EACH FUEL INJECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from 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 (–):***	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 and fuel injector. 2) Measure resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(B134) No. 4 — (E5) No. 1:*** ***(B134) No. 13 — (E16) No. 1:*** ***(B134) No. 14 — (E6) No. 1:*** ***(B134) No. 15 — (E17) 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 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*** ***(B134) No. 4 — Chassis ground:*** ***(B134) No. 13 — Chassis ground:*** ***(B134) No. 14 — Chassis ground:*** ***(B134) No. 15 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Repair ground short circuit in harness between ECM and fuel injector connector.
5	**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 **6**.	Replace faulty fuel injector.
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Inspection using “General Diagnostic Table”. <Ref. to EN-336, INSPECTION, General Diagnostic Table.>

18. List of Diagnostic Trouble Code (DTC) S078525

A: LIST S078525A12

DTC No.	Item	Index
P0031	Front oxygen (A/F) sensor heater circuit low input	<Ref. to EN-90, DTC P0031 - FRONT OXYGEN (A/F) SENSOR HEATER CIRCUIT LOW INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0032	Front oxygen (A/F) sensor heater circuit high input	<Ref. to EN-94, DTC P0032 - FRONT OXYGEN (A/F) SENSOR HEATER CIRCUIT HIGH INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0037	Rear oxygen sensor heater circuit malfunction	<Ref. to EN-96, DTC P0037 - REAR OXYGEN SENSOR HEATER CIRCUIT MALFUNCTION -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0038	Rear oxygen sensor heater circuit high input	<Ref. to EN-100, DTC P0038 - REAR OXYGEN SENSOR HEATER CIRCUIT HIGH INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0065	Air assist injector solenoid valve malfunction	<Ref. to EN-102, DTC P0065 - AIR ASSIST INJECTOR SOLENOID VALVE MALFUNCTION -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0066	Air assist injector solenoid valve circuit low input	<Ref. to EN-104, DTC P0066 - AIR ASSIST INJECTOR SOLENOID VALVE CIRCUIT LOW INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0067	Air assist injector solenoid valve circuit high input	<Ref. to EN-106, DTC P0067 - AIR ASSIST INJECTOR SOLENOID VALVE CIRCUIT HIGH INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0106	Pressure sensor circuit range/ performance problem (low input)	<Ref. to EN-108, DTC P0106 - PRESSURE SENSOR CIRCUIT RANGE/ PERFORMANCE PROBLEM (LOW INPUT) -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0107	Pressure sensor circuit low input	<Ref. to EN-110, DTC P0107 - PRESSURE SENSOR CIRCUIT LOW INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0108	Pressure sensor circuit high input	<Ref. to EN-114, 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-118, 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-120, 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-122, 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-126, 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-128, DTC P0118 - ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT HIGH INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0121	Throttle position sensor circuit range/performance problem (high input)	<Ref. to EN-132, 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-134, DTC P0122 - THROTTLE POSITION SENSOR CIRCUIT LOW INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC No.	Item	Index
P0123	Throttle position sensor circuit high input	<Ref. to EN-138, 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-140, DTC P0125 - INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0128	Thermostat malfunction	<Ref. to EN-142, DTC P0128 - THERMOSTAT MALFUNCTION -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0130	Front oxygen (A/F) sensor circuit range/performance problem (Lean)	<Ref. to EN-144, DTC P0130 - FRONT OXYGEN (A/F) SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LEAN) -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0131	Front oxygen (A/F) sensor circuit malfunction (open circuit)	<Ref. to EN-148, DTC P0131 - FRONT OXYGEN (A/F) SENSOR CIRCUIT MALFUNCTION (OPEN CIRCUIT) -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0132	Front oxygen (A/F) sensor circuit malfunction (short circuit)	<Ref. to EN-150, DTC P0132 - FRONT OXYGEN (A/F) SENSOR CIRCUIT MALFUNCTION (SHORT CIRCUIT) -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0133	Front oxygen (A/F) sensor circuit slow response	<Ref. to EN-152, DTC P0133 - FRONT OXYGEN (A/F) SENSOR CIRCUIT SLOW RESPONSE -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0136	Rear oxygen sensor circuit malfunction	<Ref. to EN-154, DTC P0136 - REAR OXYGEN SENSOR CIRCUIT MALFUNCTION -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0139	Rear oxygen sensor circuit slow response	<Ref. to EN-158, DTC P0139 - REAR OXYGEN SENSOR CIRCUIT SLOW RESPONSE -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0171	Fuel trim malfunction (A/F too Lean)	<Ref. to EN-160, DTC P0171 - FUEL TRIM MALFUNCTION (A/F TOO LEAN) -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0172	Fuel trim malfunction (A/F too Rich)	<Ref. to EN-160, DTC P0172 - FUEL TRIM #1 (RH) MALFUNCTION (A/F TOO RICH) -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0181	Fuel temperature sensor A circuit range/performance problem	<Ref. to EN-162, 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-164, 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-166, DTC P0183 - FUEL TEMPERATURE SENSOR A CIRCUIT HIGH INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0301	Cylinder 1 misfire detected	<Ref. to EN-169, DTC P0301 - CYLINDER 1 MISFIRE DETECTED -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0302	Cylinder 2 misfire detected	<Ref. to EN-169, DTC P0302 - CYLINDER 2 MISFIRE DETECTED -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0303	Cylinder 3 misfire detected	<Ref. to EN-169, DTC P0303 - CYLINDER 3 MISFIRE DETECTED -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0304	Cylinder 4 misfire detected	<Ref. to EN-170, DTC P0304 - CYLINDER 4 MISFIRE DETECTED -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0327	Knock sensor circuit low input	<Ref. to EN-176, DTC P0327 - KNOCK SENSOR CIRCUIT LOW INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0328	Knock sensor circuit high input	<Ref. to EN-178, DTC P0328 - KNOCK SENSOR CIRCUIT HIGH INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0335	Crankshaft position sensor circuit malfunction	<Ref. to EN-180, 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-182, DTC P0336 - CRANKSHAFT POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC No.	Item	Index
P0340	Camshaft position sensor circuit malfunction	<Ref. to EN-184, 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-186, DTC P0341 - CAMSHAFT POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0420	Catalyst system efficiency below threshold	<Ref. to EN-190, DTC P0420 - CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0442	Evaporative emission control system malfunction	<Ref. to EN-194, DTC P0442 - EVAPORATIVE EMISSION CONTROL SYSTEM MALFUNCTION -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0444	Evaporative emission control system purge control valve circuit low input	<Ref. to EN-198, DTC P0444 - EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT LOW INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0445	Evaporative emission control system purge control valve circuit high input	<Ref. to EN-202, DTC P0445 - EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0447	Evaporative emission control system vent control low input	<Ref. to EN-204, DTC P0447 - EVAPORATIVE EMISSION 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-208, DTC P0448 - EVAPORATIVE EMISSION 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-210, DTC P0451 - EVAPORATIVE EMISSION 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-212, DTC P0452 - EVAPORATIVE EMISSION 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-216, DTC P0453 - EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR HIGH INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0456	Evaporative emission control system malfunction	<Ref. to EN-220, DTC P0456 - EVAPORATIVE EMISSION CONTROL SYSTEM MALFUNCTION -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0461	Fuel level sensor circuit range/ performance problem	<Ref. to EN-224, 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-226, DTC P0462 - FUEL LEVEL SENSOR CIRCUIT LOW INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0463	Fuel level sensor circuit high input	<Ref. to EN-230, DTC P0463 - FUEL LEVEL SENSOR CIRCUIT HIGH INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0464	Fuel level sensor intermittent input	<Ref. to EN-234, DTC P0464 - FUEL LEVEL SENSOR INTERMITTENT INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0480	Cooling fan relay 1 circuit low input	<Ref. to EN-236, DTC P0480 - COOLING FAN RELAY 1 CIRCUIT LOW INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0483	Cooling fan function problem	<Ref. to EN-240, DTC P0483 - COOLING FAN FUNCTION PROBLEM -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0500	Vehicle speed sensor malfunction	<Ref. to EN-244, DTC P0500 - VEHICLE SPEED SENSOR MALFUNCTION -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0506	Idle control system RPM lower than expected	<Ref. to EN-246, DTC P0506 - IDLE CONTROL SYSTEM RPM LOWER THAN EXPECTED -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC No.	Item	Index
P0507	Idle control system RPM higher than expected	<Ref. to EN-248, DTC P0507 - IDLE CONTROL SYSTEM RPM HIGHER THAN EXPECTED -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0512	Starter switch circuit high input	<Ref. to EN-250, 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-254, DTC P0604 - INTERNAL CONTROL MODULE MEMORY CHECK SUM ERROR -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0703	Brake switch input malfunction	<Ref. to EN-255, DTC P0703 - BRAKE SWITCH INPUT MALFUNCTION -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0705	Transmission range sensor circuit malfunction	<Ref. to AT-102, CHECK INHIBITOR SWITCH., Diagnostic Procedure for No-diagnostic Trouble Code (DTC).>
P0710	Transmission fluid temperature sensor circuit malfunction	<Ref. to AT-38, DTC 27 ATF TEMPERATURE SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0715	Torque converter turbine speed sensor circuit malfunction	<Ref. to AT-52, DTC 36 TORQUE CONVERTER TURBINE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0720	Output speed sensor (Front vehicle speed sensor) circuit malfunction	<Ref. to AT-46, DTC 33 FRONT VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0725	Engine speed input circuit malfunction	<Ref. to AT-36, DTC 11 ENGINE SPEED SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0731	Gear 1 incorrect ratio	<Ref. to EN-257, DTC P0731 - GEAR 1 INCORRECT RATIO -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0732	Gear 2 incorrect ratio	<Ref. to EN-257, DTC P0732 - GEAR 2 INCORRECT RATIO -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0733	Gear 3 incorrect ratio	<Ref. to EN-257, DTC P0733 - GEAR 3 INCORRECT RATIO -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0734	Gear 4 incorrect ratio	<Ref. to EN-257, DTC P0734 - GEAR 4 INCORRECT RATIO -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0741	Torque converter clutch system malfunction	<Ref. to EN-259, 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 AT-84, DTC 77 LOCK-UP DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0748	Pressure control solenoid (Line pressure duty solenoid) electrical	<Ref. to AT-76, DTC 75 LINE PRESSURE DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0753	Shift solenoid A (Shift solenoid 1) electrical	<Ref. to AT-60, DTC 71 SHIFT SOLENOID 1, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0758	Shift solenoid B (Shift solenoid 2) electrical	<Ref. to AT-64, DTC 72 SHIFT SOLENOID 2, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0778	2-4 brake pressure control solenoid valve circuit malfunction	<Ref. to AT-80, DTC 76 2-4 BRAKE DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0785	2-4 brake timing control solenoid valve circuit malfunction	<Ref. to AT-72, DTC 74 2-4 BRAKE TIMING SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1110	Atmospheric pressure sensor low input	<Ref. to EN-262, DTC P1110 - ATMOSPHERIC PRESSURE SENSOR CIRCUIT LOW INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1111	Atmospheric pressure sensor high input	<Ref. to EN-266, 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-270, DTC P1112 - ATMOSPHERIC PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1137	Front oxygen (A/F) sensor circuit range/perfomance problem	<Ref. to EN-272, DTC P1137 - FRONT OXYGEN (A/F) SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC No.	Item	Index
P1142	Throttle position sensor circuit range/performance problem (low input)	<Ref. to EN-276, 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-278, 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-280, 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-284, DTC P1420 - FUEL TANK PRESSURE CONTROL SOLENOID VALVE CIRCUIT HIGH INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1442	Fuel level sensor circuit range/ performance problem 2	<Ref. to EN-286, DTC P1442 - FUEL LEVEL SENSOR CIRCUIT RANGE/ PERFORMANCE PROBLEM 2 -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1443	Evaporative emission control system vent control function problem	<Ref. to EN-288, 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-290, 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-294, DTC P1507 - IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE) -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1510	Idle air control solenoid valve signal 1 circuit low input	<Ref. to EN-296, DTC P1510 - IDLE AIR CONTROL SOLENOID VALVE SIGNAL 1 CIRCUIT LOW INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1511	Idle air control solenoid valve signal 1 circuit high input	<Ref. to EN-296, DTC P1511 - IDLE AIR CONTROL SOLENOID VALVE SIGNAL 1 CIRCUIT HIGH INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1512	Idle air control solenoid valve signal 2 circuit low input	<Ref. to EN-296, DTC P1512 - IDLE AIR CONTROL SOLENOID VALVE SIGNAL 2 CIRCUIT LOW INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1513	Idle air control solenoid valve signal 2 circuit high input	<Ref. to EN-296, DTC P1513 - IDLE AIR CONTROL SOLENOID VALVE SIGNAL 2 CIRCUIT HIGH INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1514	Idle air control solenoid valve signal 3 circuit low input	<Ref. to EN-296, DTC P1514 - IDLE AIR CONTROL SOLENOID VALVE SIGNAL 3 CIRCUIT LOW INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1515	Idle air control solenoid valve signal 3 circuit high input	<Ref. to EN-296, DTC P1515 - IDLE AIR CONTROL SOLENOID VALVE SIGNAL 3 CIRCUIT HIGH INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1516	Idle air control solenoid valve signal 4 circuit low input	<Ref. to EN-298, DTC P1516 - IDLE AIR CONTROL SOLENOID VALVE SIGNAL 4 CIRCUIT LOW INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1517	Idle air control solenoid valve signal 4 circuit high input	<Ref. to EN-302, DTC P1517 - IDLE AIR CONTROL SOLENOID VALVE SIGNAL 4 CIRCUIT HIGH INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1518	Starter switch circuit low input	<Ref. to EN-304, DTC P1518 - STARTER SWITCH CIRCUIT LOW INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1540	Vehicle speed sensor malfunction 2	<Ref. to EN-308, DTC P1540 - VEHICLE SPEED SENSOR MALFUNCTION 2 -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1560	Back-up voltage circuit malfunction	<Ref. to EN-310, DTC P1560 - BACK-UP VOLTAGE CIRCUIT MALFUNCTION -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1590	Neutral position switch circuit high input (AT model)	<Ref. to EN-312, DTC P1590 - NEUTRAL POSITION SWITCH CIRCUIT HIGH INPUT (AT MODEL) -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC No.	Item	Index
P1591	Neutral position switch circuit low input (AT model)	<Ref. to EN-316, DTC P1591 - NEUTRAL POSITION SWITCH CIRCUIT LOW INPUT (AT MODEL) -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1592	Neutral position switch circuit malfunction (MT model)	<Ref. to EN-318, DTC P1592 - NEUTRAL POSITION SWITCH CIRCUIT MALFUNCTION (MT MODEL) -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1594	Automatic transmission diagnosis input signal circuit malfunction	<Ref. to EN-320, 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-322, 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-324, 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-326, 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-328, DTC P1699 - ENGINE TORQUE CONTROL CUT SIGNAL CIRCUIT HIGH INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1700	Throttle position sensor circuit malfunction for automatic transmission	<Ref. to AT-42, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1701	Cruise control set signal circuit malfunction for automatic transmission	<Ref. to EN-330, 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 AT-68, DTC 73 LOW CLUTCH TIMING SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1711	Engine torque control signal 1 circuit malfunction	<Ref. to EN-332, 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-334, DTC P1712 - ENGINE TORQUE CONTROL SIGNAL 2 CIRCUIT MALFUNCTION -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

19. Diagnostic Procedure with Diagnostic Trouble Code (DTC)

S078521

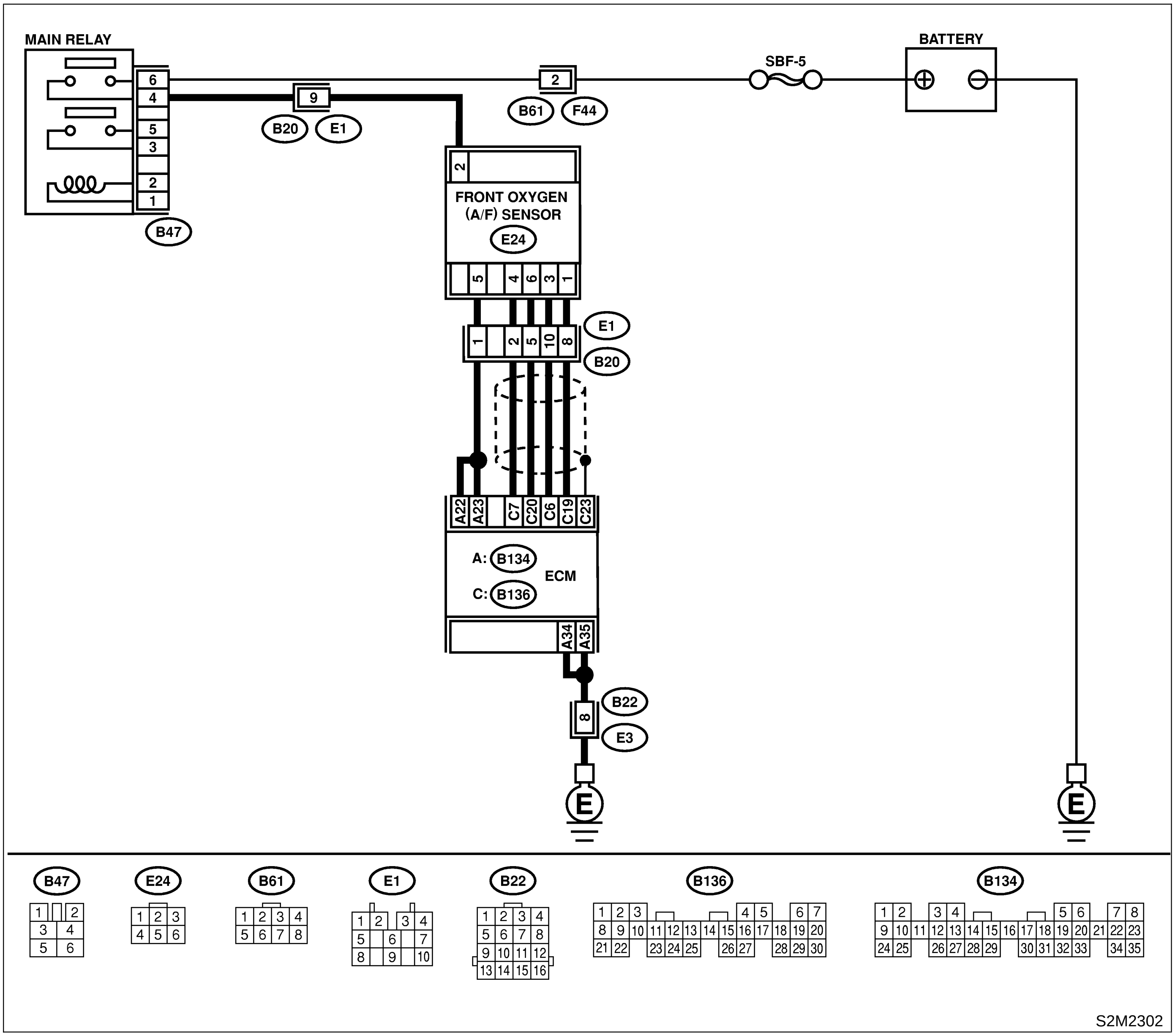
A: DTC P0031 — FRONT OXYGEN (A/F) SENSOR HEATER CIRCUIT LOW INPUT —

S078521F83

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



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 and P0037 at the same time?	Go to step **2**.	Go to step **5**.
2	**CHECK POWER SUPPLY TO FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from front oxygen (A/F) sensor. 3) Turn the ignition switch to ON. 4) Measure the 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 **3**.	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
3	**CHECK GROUND CIRCUIT OF ECM.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 35 — Chassis ground:*** ***(B134) No. 34 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **4**.	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
4	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the 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-32, 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 **5**.
5	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Start and idle the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 22 (+) — Chassis ground (−):***	Is the voltage less than 1.0 V?	Go to step **7**.	Go to step **6**.

No.	Step	Check	Yes	No
6	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 22 (+) — 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**.
7	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 23 (+) — Chassis ground (−):***	Is the voltage less than 1.0 V?	Go to step **9**.	Go to step **8**.
8	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 23 (+) — 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 **9**.
9	**CHECK FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between front oxygen (A/F) sensor connector terminals. ***Terminals*** ***No. 2 — No. 5:***	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 the front oxygen (A/F) sensor. <Ref. to FU-52, Fuel.>

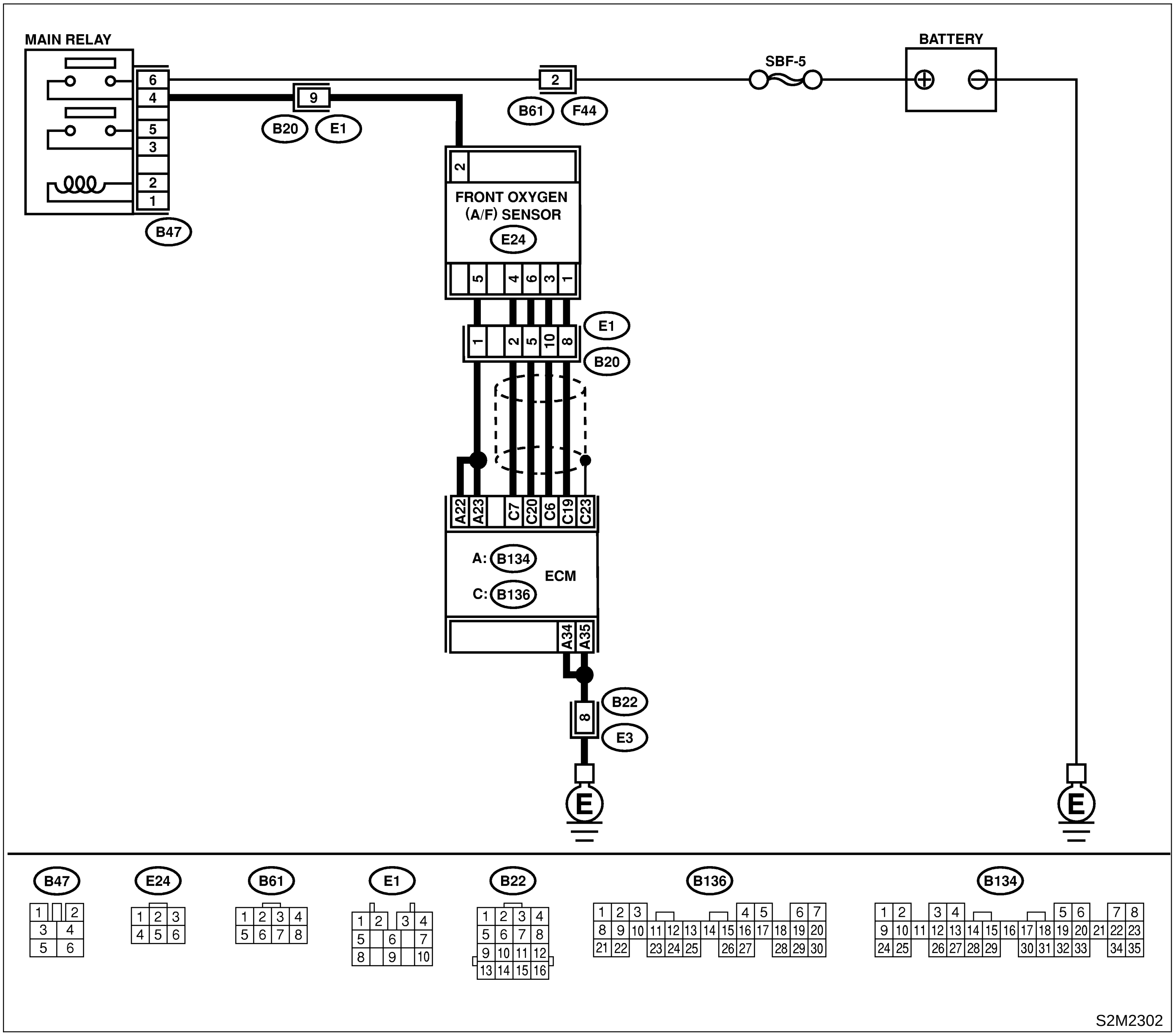
MEMO:

B: DTC P0032 — FRONT OXYGEN (A/F) SENSOR HEATER CIRCUIT HIGH INPUT — S078521F84

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 23 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **3**.	Go to step **2**.

No.	Step	Check	Yes	No
2	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 22 (+) — 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 the ignition switch to OFF. 2) Repair the battery short circuit in harness between ECM and front oxygen (A/F) sensor connector. 3) Turn the ignition switch to ON. 4) Read the 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-32, 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 the ECM. <Ref. to FU-49, Engine Control Module.>	END
4	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 23 (+) — 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 the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 22 (+) — 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

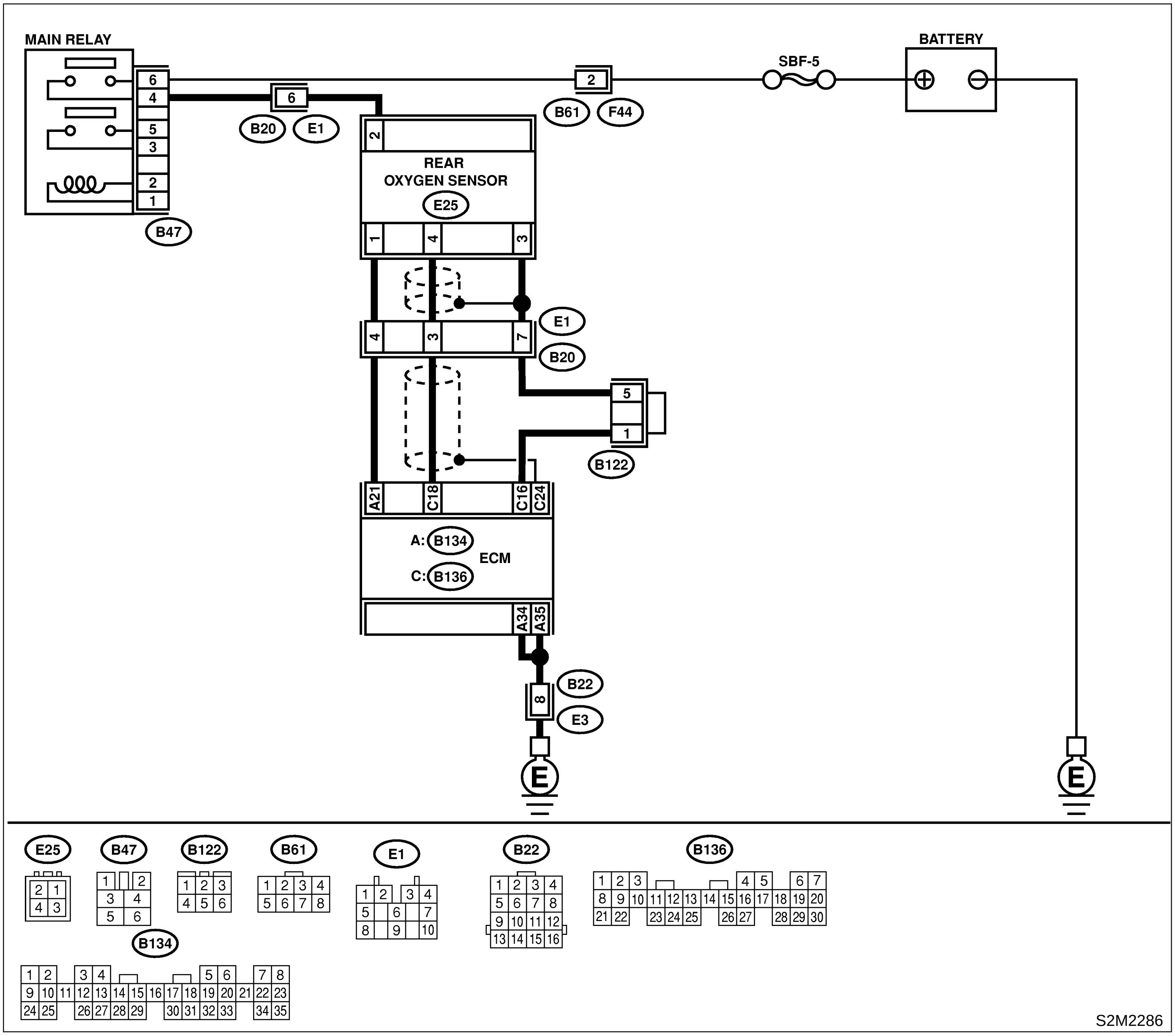
C: DTC P0037 — REAR OXYGEN SENSOR HEATER CIRCUIT MALFUNCTION —

S078521F85

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK GROUND CIRCUIT OF ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 35 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3**.	Go to step **2**.

No.	Step	Check	Yes	No
2	**CHECK GROUND CIRCUIT OF ECM.** 1) Repair the 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*** ***(B134) No. 34 — 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 the engine. 2) Read the 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-32, 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 the 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 **4**.
4	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Start and idle the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 21 (+) — Chassis ground (−):***	Is the voltage less than 1.0 V?	Go to step **7**.	Go to step **5**.
5	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 21 (+) — 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.** 1) Disconnect the connector from rear oxygen sensor. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 21 (+) — Chassis ground (−):***	Is the voltage less than 1.0 V?	Replace the ECM. <Ref. to FU-49, Engine Control Module.>	Repair battery short circuit in harness between ECM and rear oxygen sensor connector. After repair, replace the ECM. <Ref. to FU-49, Engine Control Module.>

No.	Step	Check	Yes	No
7	**CHECK POWER SUPPLY TO REAR OXYGEN SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor connector and engine ground or chassis ground. ***Connector & terminal*** ***(E25) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **8**.	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
8	**CHECK REAR OXYGEN SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the 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 the rear oxygen sensor. <Ref. to FU-47, Rear Oxygen Sensor.>

MEMO:

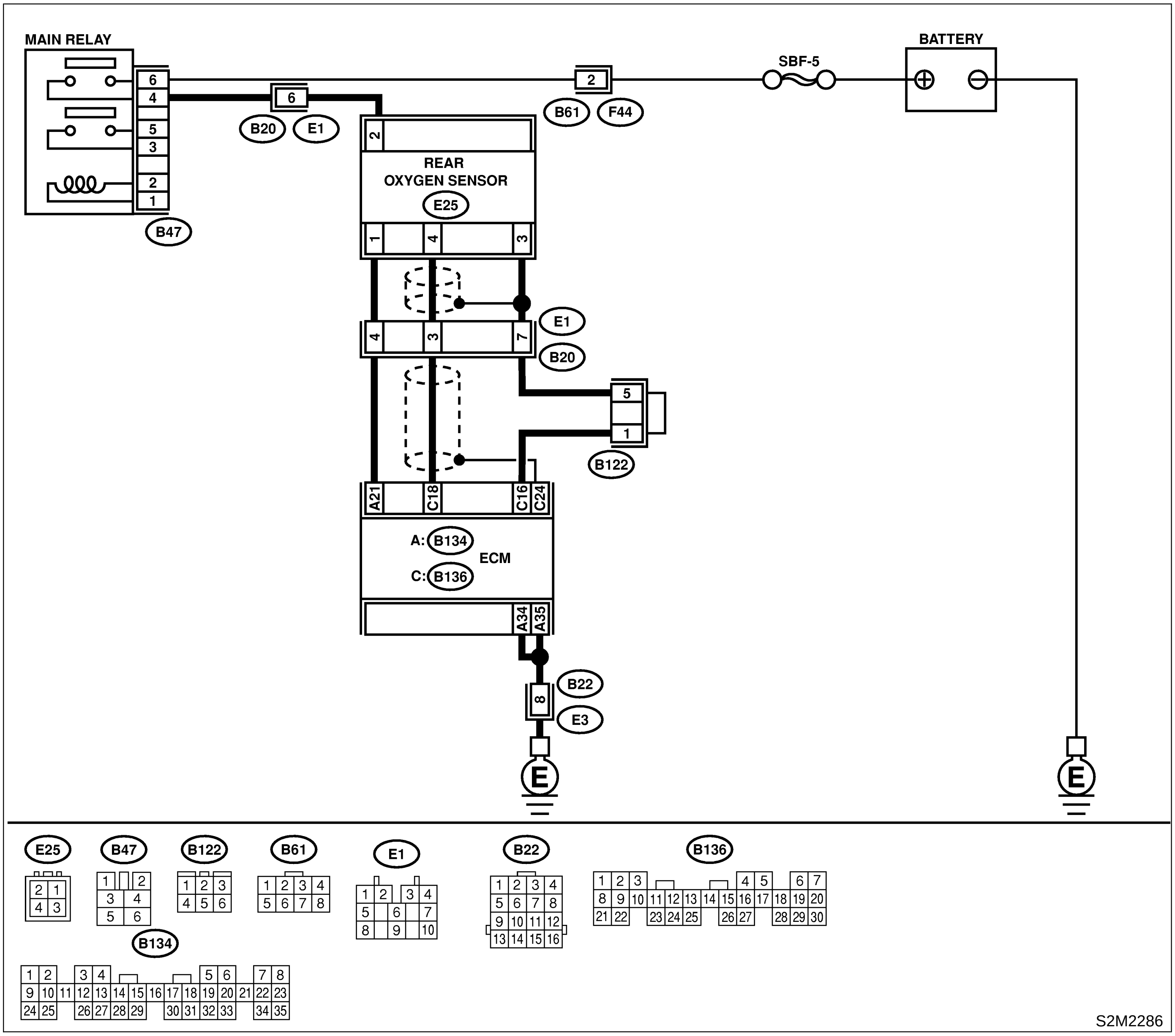
D: DTC P0038 — REAR OXYGEN SENSOR HEATER CIRCUIT HIGH INPUT —

S078521F86

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 21 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **2**.	Go to step **3**.

No.	Step	Check	Yes	No
2	**CHECK CURRENT DATA.** 1) Turn the ignition switch to OFF. 2) Repair the battery short circuit in harness between ECM and rear oxygen sensor connector. 3) Turn the ignition switch to ON. 4) Read the 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-32, 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 the ECM. <Ref. to FU-49, 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

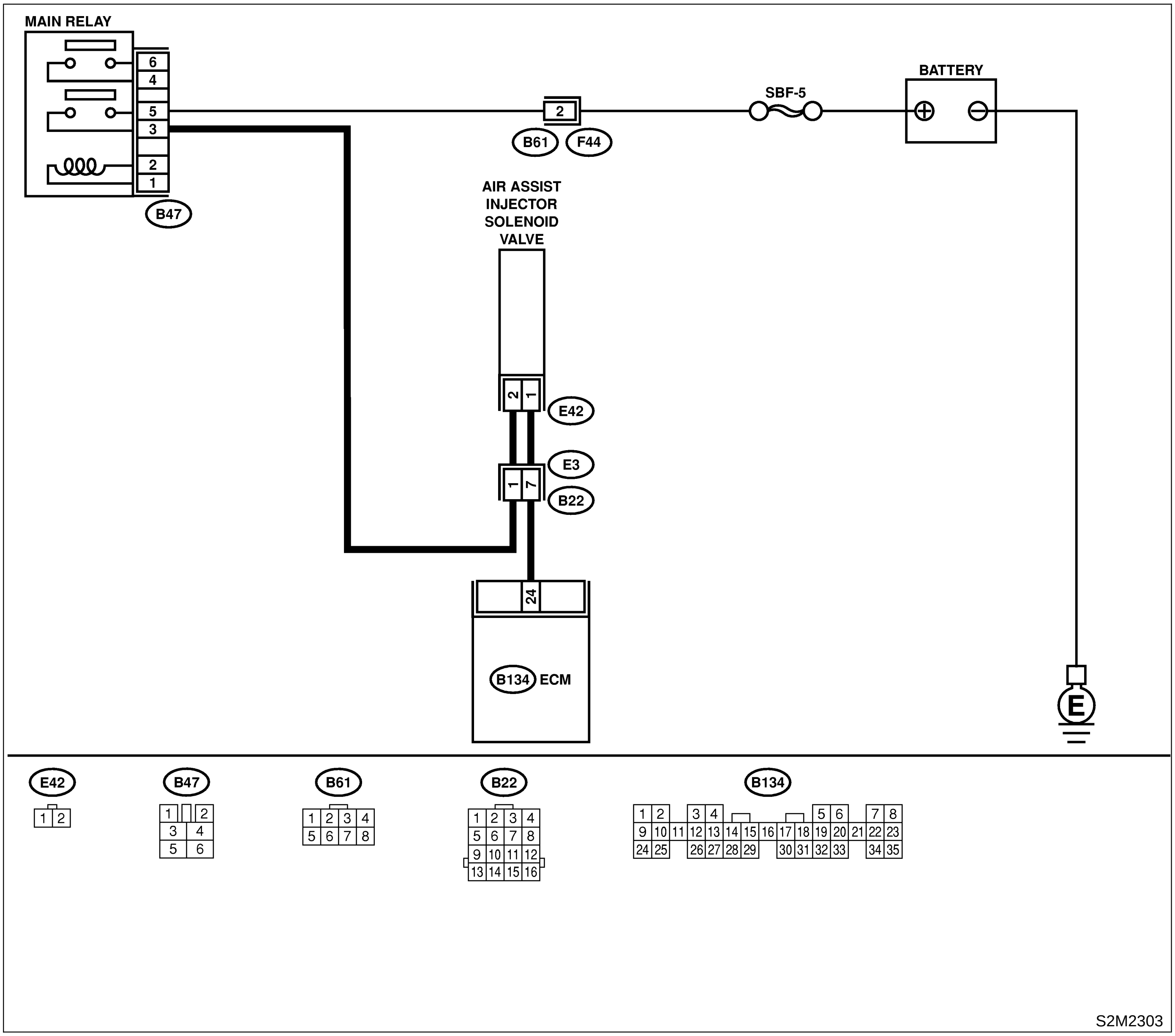
E: DTC P0065 — AIR ASSIST INJECTOR SOLENOID VALVE MALFUNCTION —

S078521F87

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



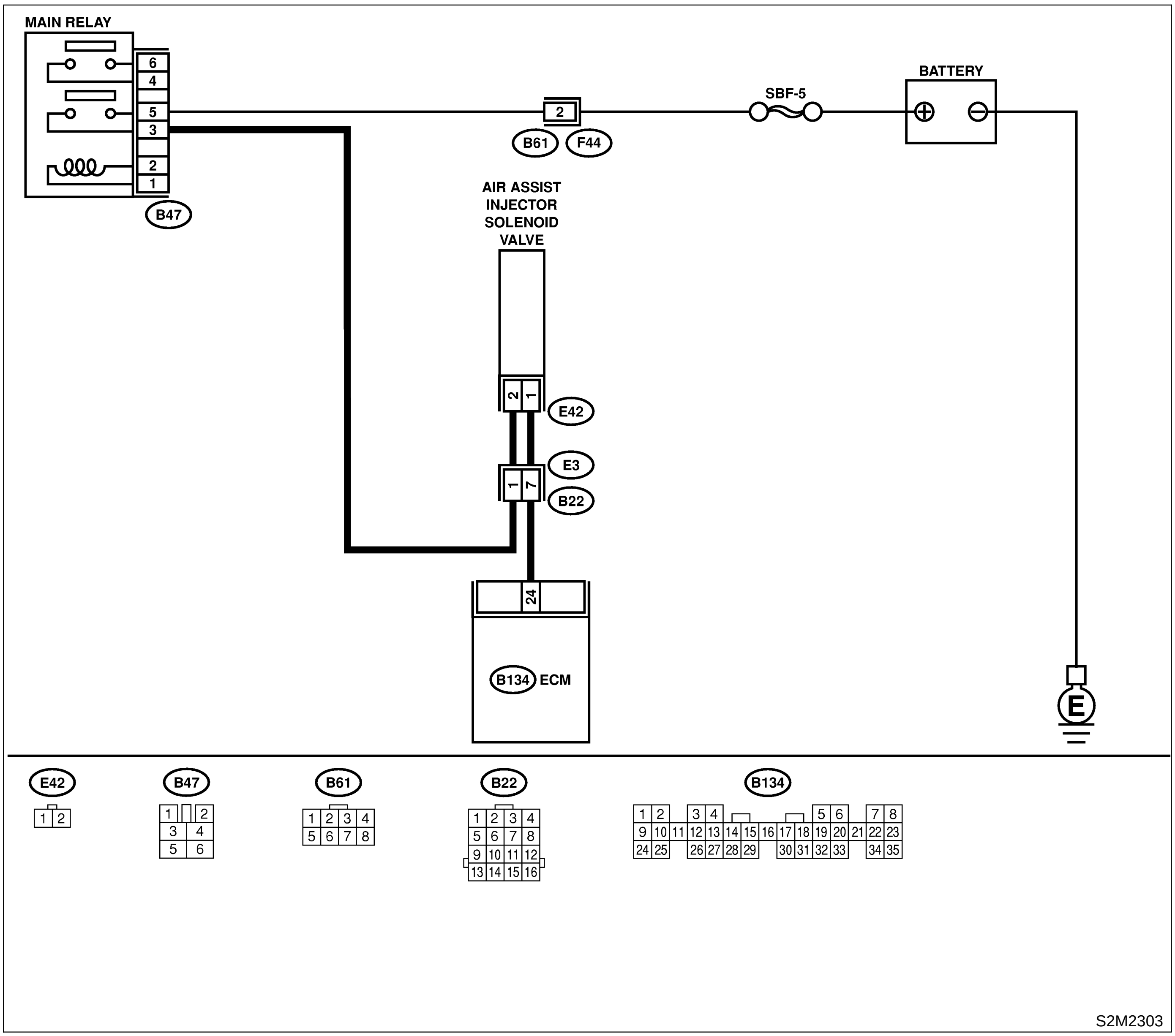
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is there any other DTC on display?	Inspect the relevant DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK AIR ASSIST INJECTOR SOLENOID VALVE OPERATION.** 1) Turn the ignition switch to OFF. 2) Connect the test mode connector at the lower portion of instrument panel (on the driver’s side). 3) Turn the ignition switch to ON. 4) Operate the air assist injector solenoid valve. NOTE: Air assist injector solenoid valve operation can also be executed using Subaru Select Monitor. For the procedure, refer to the “Compulsory Valve Operation Check Mode”. <Ref. to EN-51, Compulsory Valve Operation Check Mode.>	Does the air assist injector solenoid valve operating sound?	Go to step **3**.	Replace the air assist injector solenoid valve. <Ref. to FU-39, Air Assist Injector Solenoid Valve.>
3	**CHECK AIR BY-PASS HOSES.** Use your mouth to blow through the air by-pass hose to make sure that there is a smooth air flow (no clogging).	Is the air by-pass hose damaged?	Repair or replace the air by-pass hoses.	Go to step **4**.
4	**CHECK FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Remove the fuel injector. <Ref. to FU-40, REMOVAL, Fuel Injector.> 3) Check for clogged fuel injectors.	Is the fuel injector clogged?	Replace the fuel injector. <Ref. to FU-40, Fuel Injector.>	Replace the air assist injector solenoid valve. <Ref. to FU-40, REMOVAL, Fuel Injector.>

F: DTC P0066 — AIR ASSIST INJECTOR SOLENOID VALVE CIRCUIT LOW INPUT — S078521F88

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



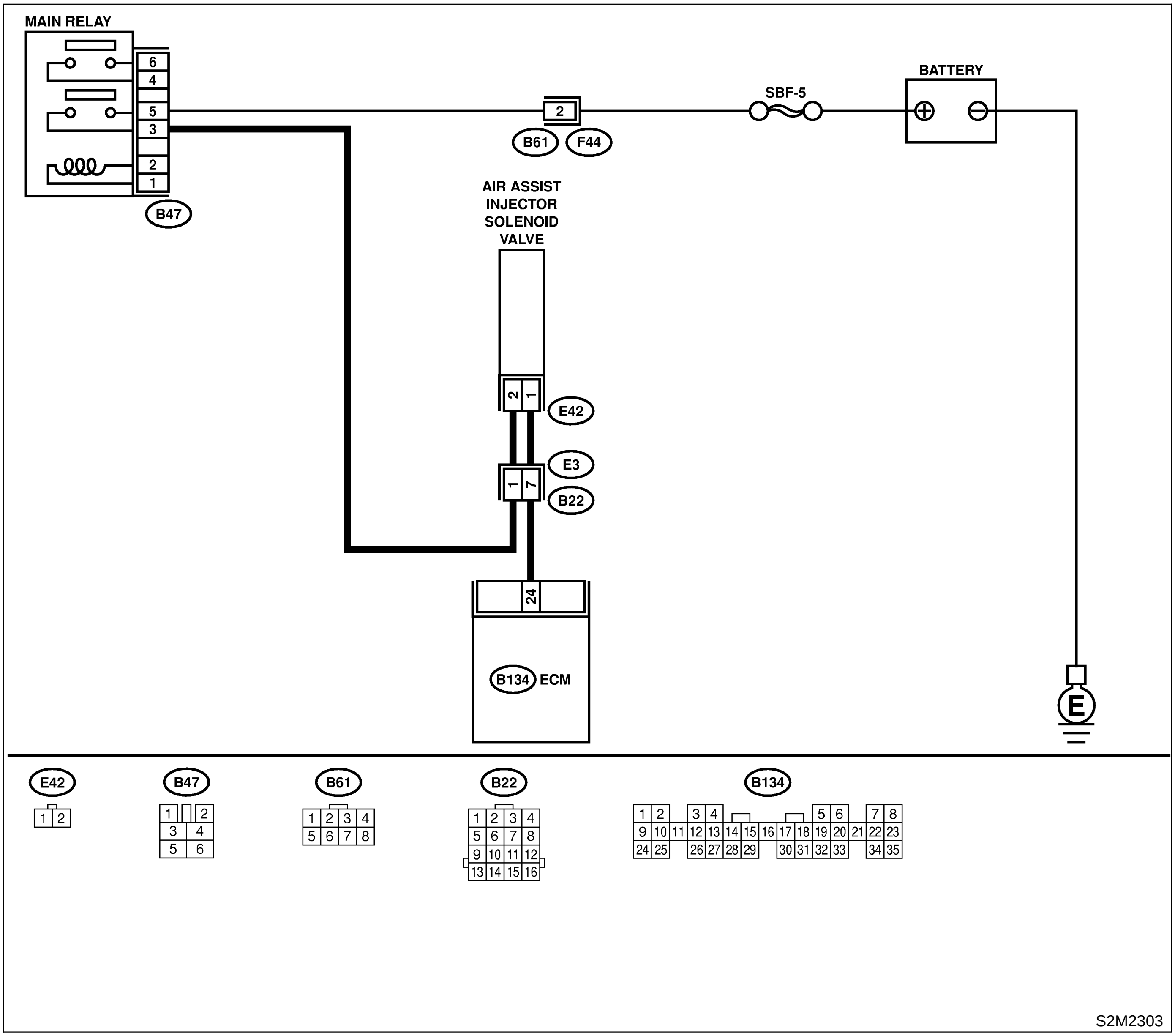
No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 24 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair poor contact in ECM connector.	Go to step **2**.
2	**CHECK POWER SUPPLY TO AIR ASSIST INJECTOR SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from air assist injector solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between air assist injector solenoid valve and engine ground. ***Connector & terminal*** ***(E42) 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 air assist injector solenoid valve and main relay connector ● Poor contact in coupling connector
3	**CHECK HARNESS BETWEEN ECM AND AIR ASSIST INJECTOR SOLENOID VALVE CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and air assist injector solenoid valve connector. ***Connector & terminal*** ***(B134) No. 24 — (E42) 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 air assist injector solenoid valve connector ● Poor contact in coupling connector
4	**CHECK HARNESS BETWEEN ECM AND AIR ASSIST INJECTOR SOLENOID VALVE CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 24 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between ECM and air assist injector solenoid valve connector.	Go to step **5**.
5	**CHECK POOR CONTACT.** Check poor contact in ECM and air assist injector solenoid valve connectors.	Is there poor contact in ECM and air assist injector solenoid valve connectors?	Repair poor contact in ECM and air assist injector solenoid valve connectors.	Replace the air assist injector solenoid valve. <Ref. to FU-39, Air Assist Injector Solenoid Valve.>

G: DTC P0067 — AIR ASSIST INJECTOR SOLENOID VALVE CIRCUIT HIGH INPUT — S078521G72

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



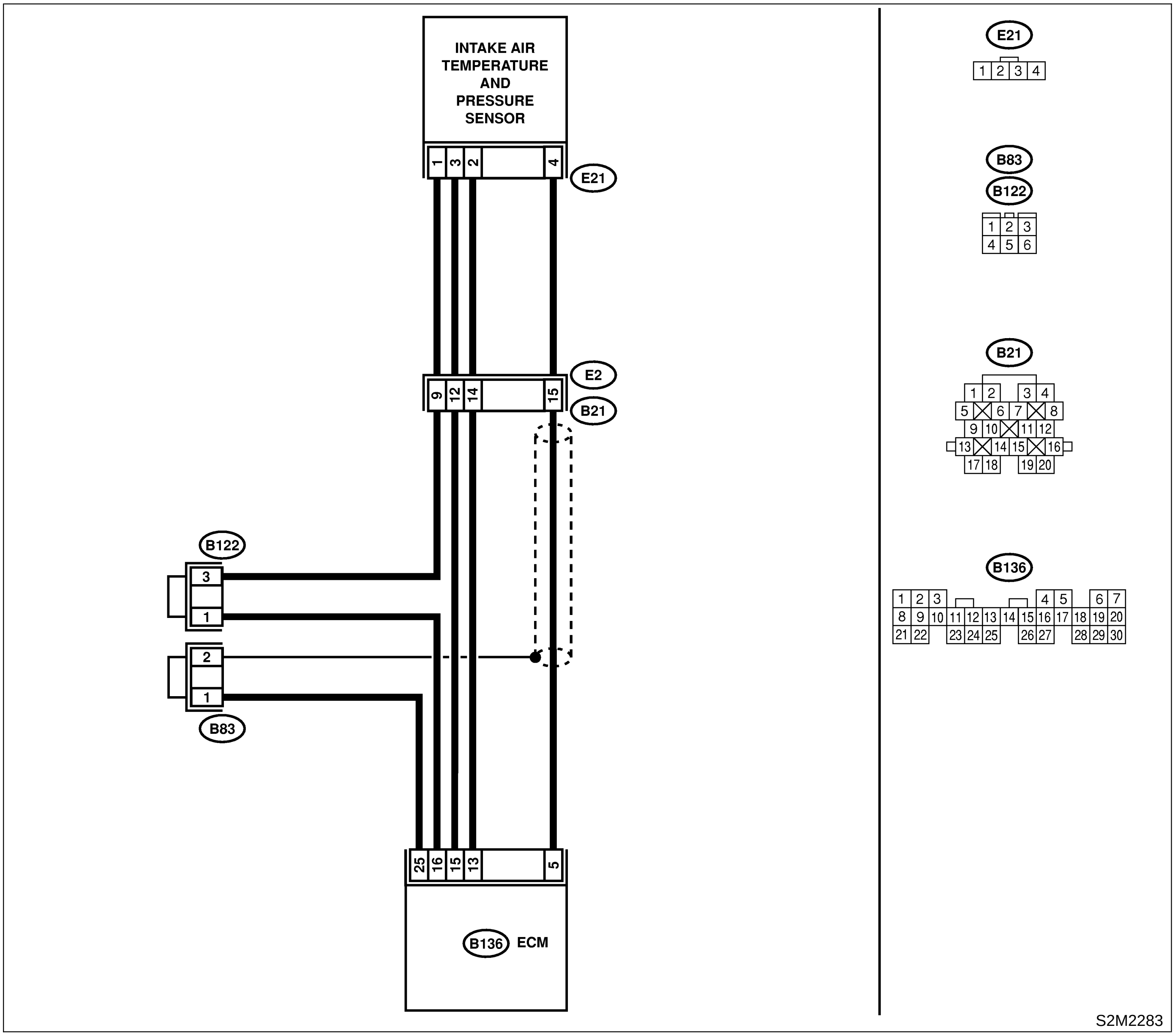
No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 24 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2**.	Go to step **3**.
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from air assist injector solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 24 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and air assist injector solenoid valve connector. After repair, replace the ECM. <Ref. to FU-49, Engine Control Module.>	Replace the air assist injector solenoid valve <Ref. to FU-39, Air Assist Injector Solenoid Valve.> and ECM <Ref. to FU-49, Engine Control Module.>
3	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 24 (+) — 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 air assist injector solenoid valve connector. After repair, replace the ECM. <Ref. to FU-49, Engine Control Module.>	Contact with SOA (distributor) service. NOTE: Insepction by DTM is required, because probable cause is deterioration of multiple parts.

H: DTC P0106 — PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LOW INPUT) — S078521F90

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



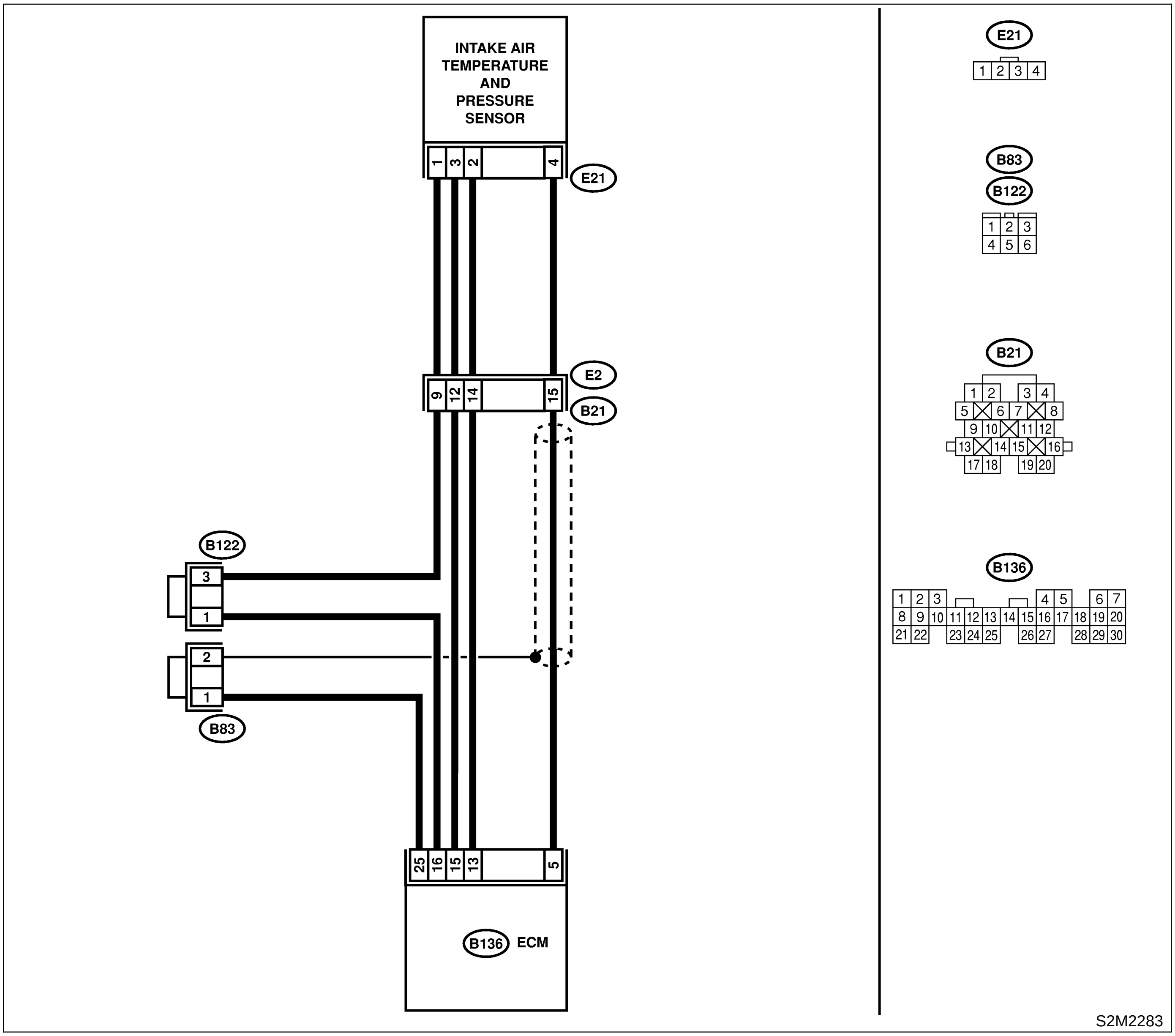
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.** NOTE: In this case, it is not necessary to inspect DTC P0106.	Is any other DTC displayed?	Inspect the relevant DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK 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 the A/C switch to OFF. 4) Turn all accessory switches to OFF. 5) Read the 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-32, 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 the intake air temperature sensor and pressure sensor. <Ref. to FU-36, Intake Air Temperature and Pressure Sensor.>
4	**CHECK THROTTLE POSITION.** Read the 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-32, Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.	Is the throttle positioning ratio equal to or less than 5% when throttle is fully closed?	Go to step **5**.	Adjust or replace the throttle position sensor. <Ref. to FU-33, Throttle Position Sensor.>
5	**CHECK THROTTLE POSITION.**	Is the throttle positioning ratio equal to or more than 85% when throttle is fully open?	Replace the intake air temperature and pressure sensor. <Ref. to FU-36, Intake Air Temperature and Pressure Sensor.>	Replace the throttle position sensor. <Ref. to FU-33, Throttle Position Sensor.>

I: DTC P0107 — PRESSURE SENSOR CIRCUIT LOW INPUT — S078521B12

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the 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-32, 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 13.3 kPa (100 mmHg, 3.94 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 the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 15 (+) — 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 the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 15 (+) — 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 (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
5	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 5 (+) — Chassis ground (−):***	Is the voltage less than 0.2 V?	Go to step **7**.	Go to step **6**.
6	**CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)** Read the 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-32, Subaru Select Monitor.>	Does the value change more than 13.3 kPa (100 mmHg, 3.94 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 AIR TEMPERATURE AND PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from intake air temperature and pressure sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between intake air temperature sensor and pressure sensor connector and engine ground. ***Connector & terminal*** ***(E20) 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 air temperature and pressure sensor connector.

No.	Step	Check	Yes	No
8	**CHECK HARNESS BETWEEN ECM AND INTAKE AIR TEMPERATURE AND PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and intake air temperature and pressure sensor connector. ***Connector & terminal*** ***(B136) No. 16 — (E20) No. 1:***	Is the resistance less than 1 Ω?	Go to step **9**.	Repair open circuit in harness between ECM and intake air temperature and pressure sensor connector.
9	**CHECK HARNESS BETWEEN ECM AND INTAKE AIR TEMPERATURE AND PRESSURE SENSOR CONNECTOR.** Measure the resistance of harness between intake air temperature and pressure sensor connector and engine ground. ***Connector & terminal*** ***(E20) No. 4 — Engine ground:***	Is the resistance more than 500 kΩ?	Go to step **10**.	Repair ground short circuit in harness between ECM and intake air temperature and 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 air temperature and pressure sensor connector.	Replace the intake air temperature and pressure sensor. <Ref. to FU-36, Intake Air Temperature and Pressure Sensor.>

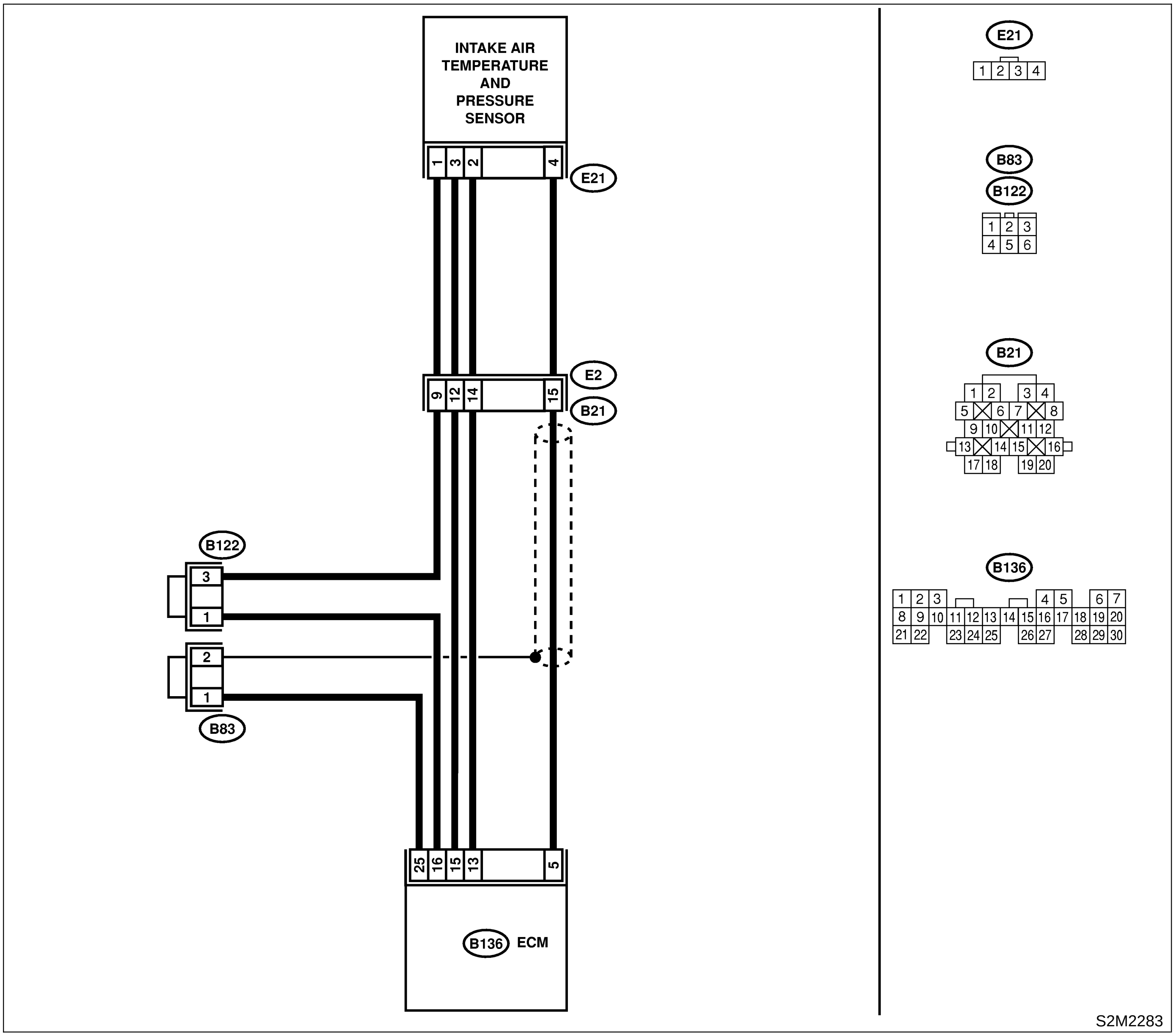
MEMO:

J: DTC P0108 — PRESSURE SENSOR CIRCUIT HIGH INPUT — S078521B13

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the 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-32, 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 119.5 kPa (896.5 mmHg, 35.29 inHg)?	Go to step **10**.	Go to step **2**.
2	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 15 (+) — 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 the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 15 (+) — 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 (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
4	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 5 (+) — 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 the 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-32, Subaru Select Monitor.>	Does the value change more than 13.3 kPa (100 mmHg, 3.94 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 AIR TEMPERATURE AND PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from intake air temperature and pressure sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between intake air temperature and pressure sensor connector and engine ground. ***Connector & terminal*** ***(E20) 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 air temperature and pressure sensor connector.

No.	Step	Check	Yes	No
7	**CHECK HARNESS BETWEEN ECM AND INTAKE AIR TEMPERATURE AND PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and intake air temperature and pressure sensor connector. ***Connector & terminal*** ***(B136) No. 5 — (E20) No. 4:***	Is the resistance less than 1 Ω?	Go to step **8**.	Repair open circuit in harness between ECM and intake air temperature and pressure sensor connector.
8	**CHECK HARNESS BETWEEN ECM AND INTAKE AIR TEMPERATURE AND PRESSURE SENSOR CONNECTOR.** Measure the resistance of harness between ECM and intake air temperature and pressure sensor connector. ***Connector & terminal*** ***(B136) No. 16 — (E20) No. 1:***	Is the resistance less than 1 Ω?	Go to step **9**.	Repair open circuit in harness between ECM and intake air temperature and pressure sensor connector.
9	**CHECK POOR CONTACT.** Check poor contact in intake air temperature and pressure sensor connector.	Is there poor contact in intake manifold pressure sensor connector?	Repair poor contact in intake air temperature and pressure sensor connector.	Replace the intake air temperature and pressure sensor. <Ref. to FU-36, Intake Air Temperature and Pressure Sensor.>
10	**CHECK HARNESS BETWEEN ECM AND INTAKE AIR TEMPERATURE AND PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF and Subaru Select Monitor or the OBD-II general scan tool switch to OFF. 2) Disconnect the connector from intake air temperature and pressure sensor. 3) Turn the ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON. 4) 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-32, 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 119.5 kPa (896.5 mmHg, 35.29 inHg)?	Repair battery short circuit in harness between ECM and intake air temperature and pressure sensor connector.	Replace the intake air temperature and pressure sensor. <Ref. to FU-36, Intake Air Temperature and Pressure Sensor.>

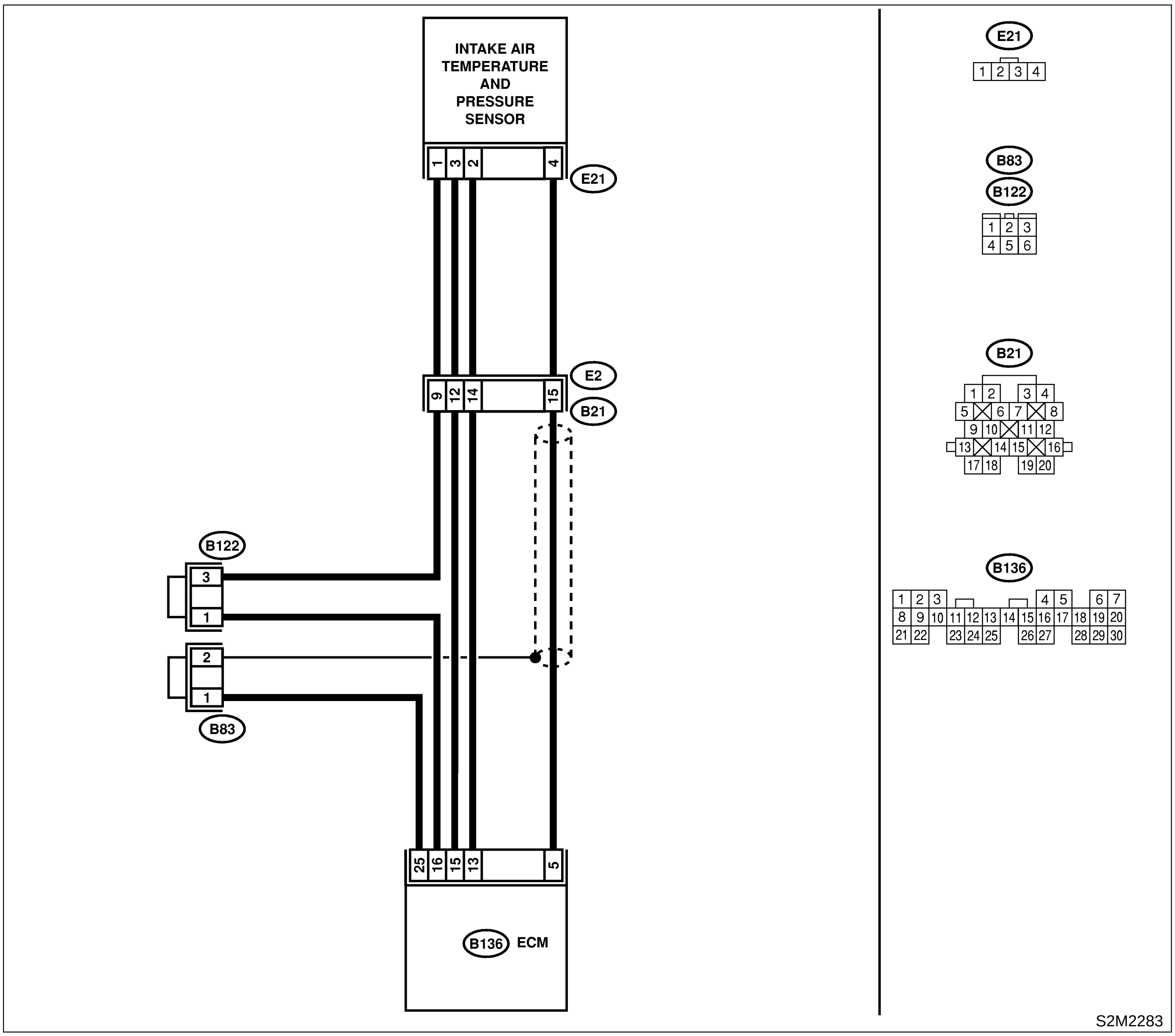
MEMO:

K: DTC P0111 — INTAKE AIR TEMPERATURE SENSOR CIRCUIT RANGE/ PERFORMANCE PROBLEM — S078521B14

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0111.	Go to step **2**.
2	**CHECK ENGINE COOLANT TEMPERATURE.** 1) Start the engine and warm it up completely. 2) Measure the engine coolant temperature 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-32, Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the engine coolant temperature between 75°C (167°F) and 95°C (203°F)?	Replace the intake air temperature and pressure sensor. <Ref. to FU-36, Intake Air Temperature and Pressure Sensor.>	Inspect DTC P0125 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).>

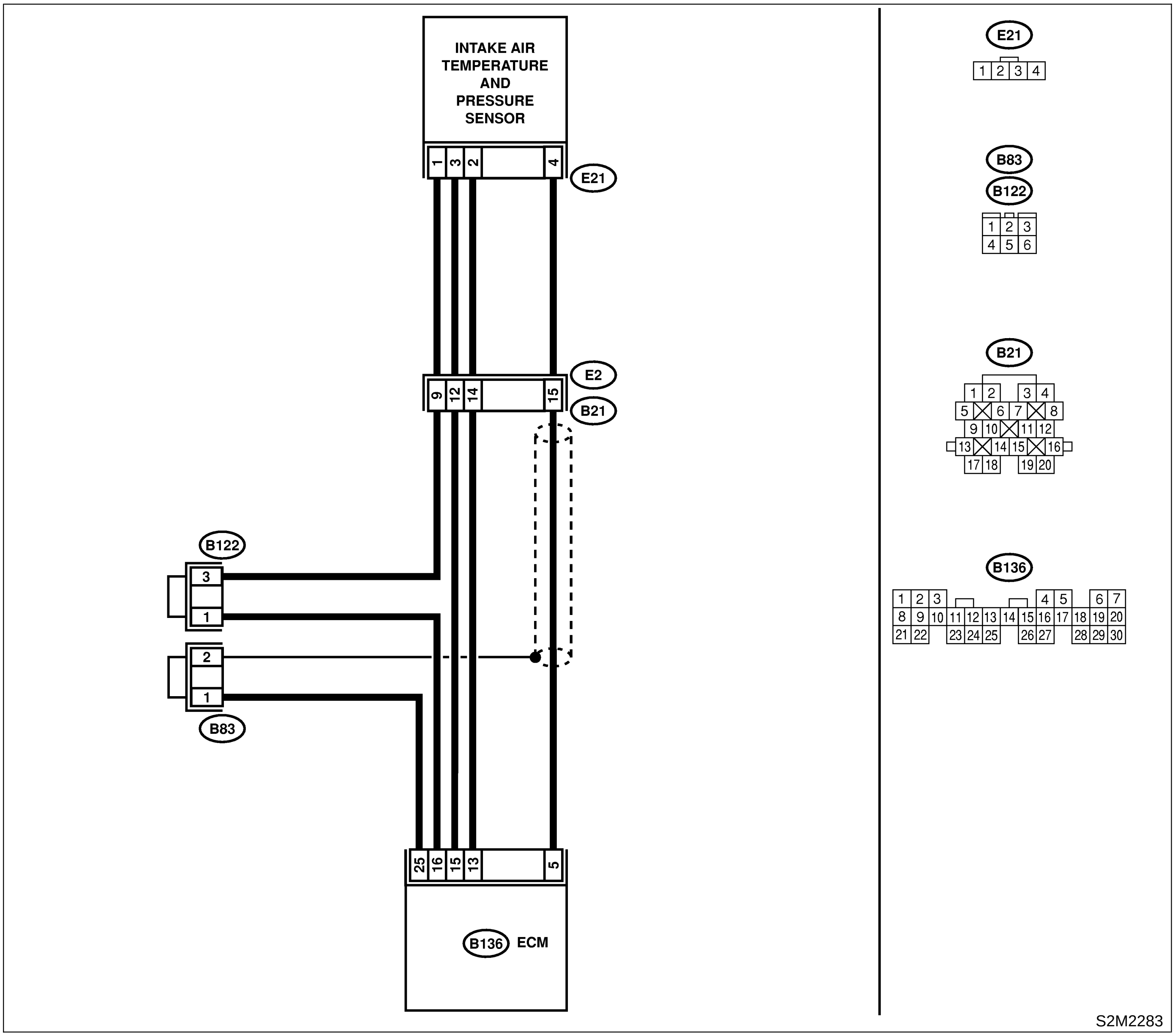
L: DTC P0112 — INTAKE AIR TEMPERATURE SENSOR CIRCUIT LOW INPUT —

S078521B15

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



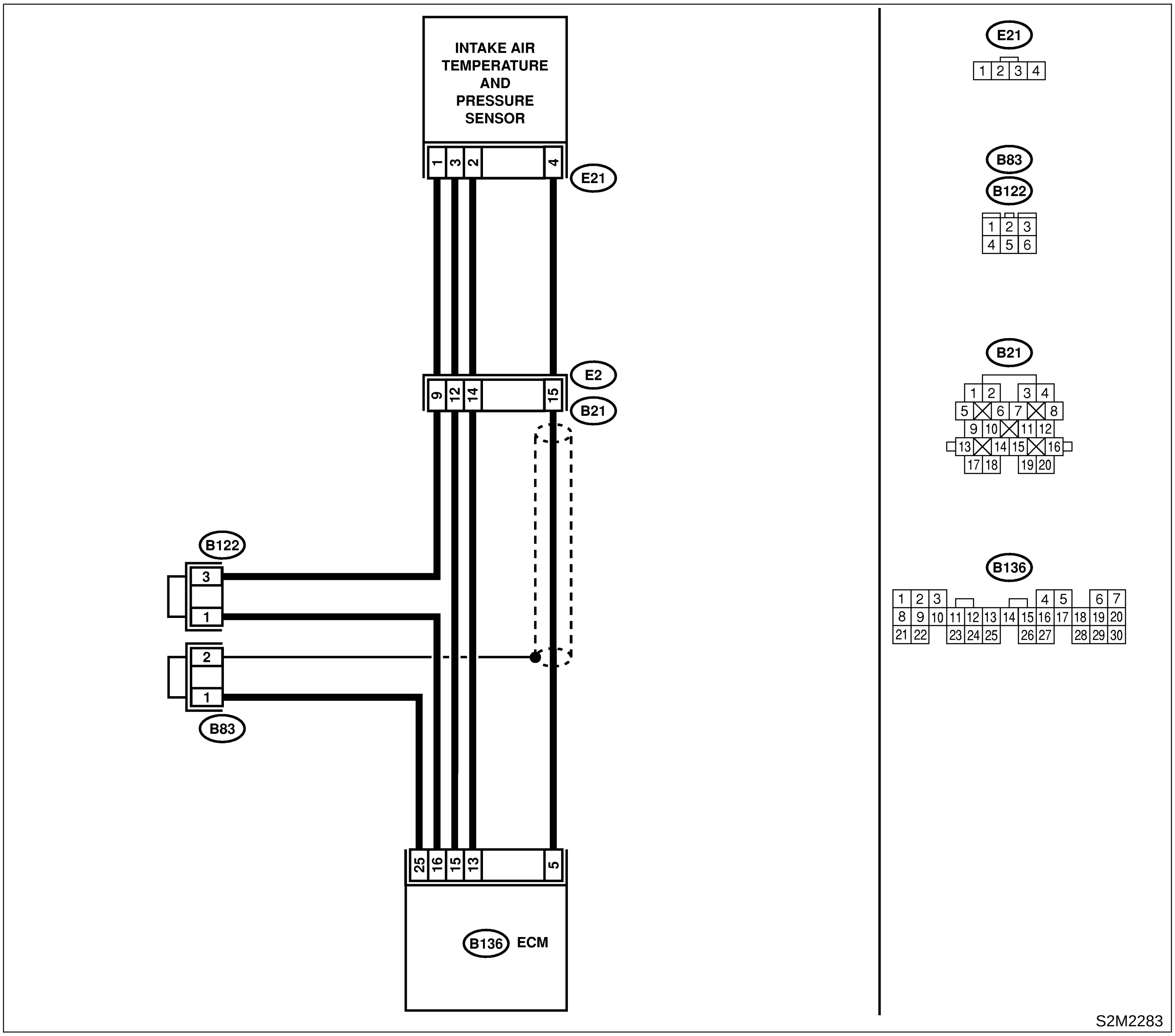
No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake air temperature sensor signal using Subaru Select Monitor or the OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the “READ CURRENT DATA FOR ENGINE”. <Ref. to EN-32, 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 and pressure sensor ● Poor contact in ECM ● Poor contact in coupling connector ● Poor contact in joint connector
2	**CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE AND PRESSURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from intake air temperature and pressure sensor. 3) Turn the ignition switch to ON. 4) Read the 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-32, 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 the intake air temperature and pressure sensor. <Ref. to FU-36, Intake Air Temperature and Pressure Sensor.>	Repair ground short circuit in harness between intake air temperature sensor and ECM connector.

M: DTC P0113 — INTAKE AIR TEMPERATURE SENSOR CIRCUIT HIGH INPUT — S078521B16

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the 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-32, 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 and pressure sensor ● Poor contact in ECM ● Poor contact in coupling connector ● Poor contact in joint connector
2	**CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE AND PRESSURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from intake air temperature and pressure sensor. 3) Measure the voltage between intake air temperature and pressure sensor connector and engine ground. ***Connector & terminal*** ***(E20) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between intake air temperature and pressure sensor and ECM connector.	Go to step **3**.
3	**CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE AND PRESSURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between intake air temperature and pressure sensor connector and engine ground. ***Connector & terminal*** ***(E20) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between intake air temperature and pressure sensor and ECM connector.	Go to step **4**.

No.	Step	Check	Yes	No
4	**CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE AND PRESSURE SENSOR AND ECM CONNECTOR.** Measure the voltage between intake air temperature and pressure sensor connector and engine ground. ***Connector & terminal*** ***(E20) No. 2 (+) — 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 and pressure sensor and ECM connector ● Poor contact in intake air temperature and pressure sensor ● Poor contact in ECM ● Poor contact in coupling connector ● Poor contact in joint connector
5	**CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE AND PRESSURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between intake air temperature and pressure sensor connector and engine ground. ***Connector & terminal*** ***(E20) No. 1 — Engine ground:***	Is the resistance less than 5 Ω?	Replace the intake air temperature and pressure sensor. <Ref. to FU-36, Intake Air Temperature and Pressure Sensor.>	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between intake air temperature and pressure sensor and ECM connector ● Poor contact in intake air temperature and pressure sensor ● Poor contact in ECM ● Poor contact in coupling connector ● Poor contact in joint connector

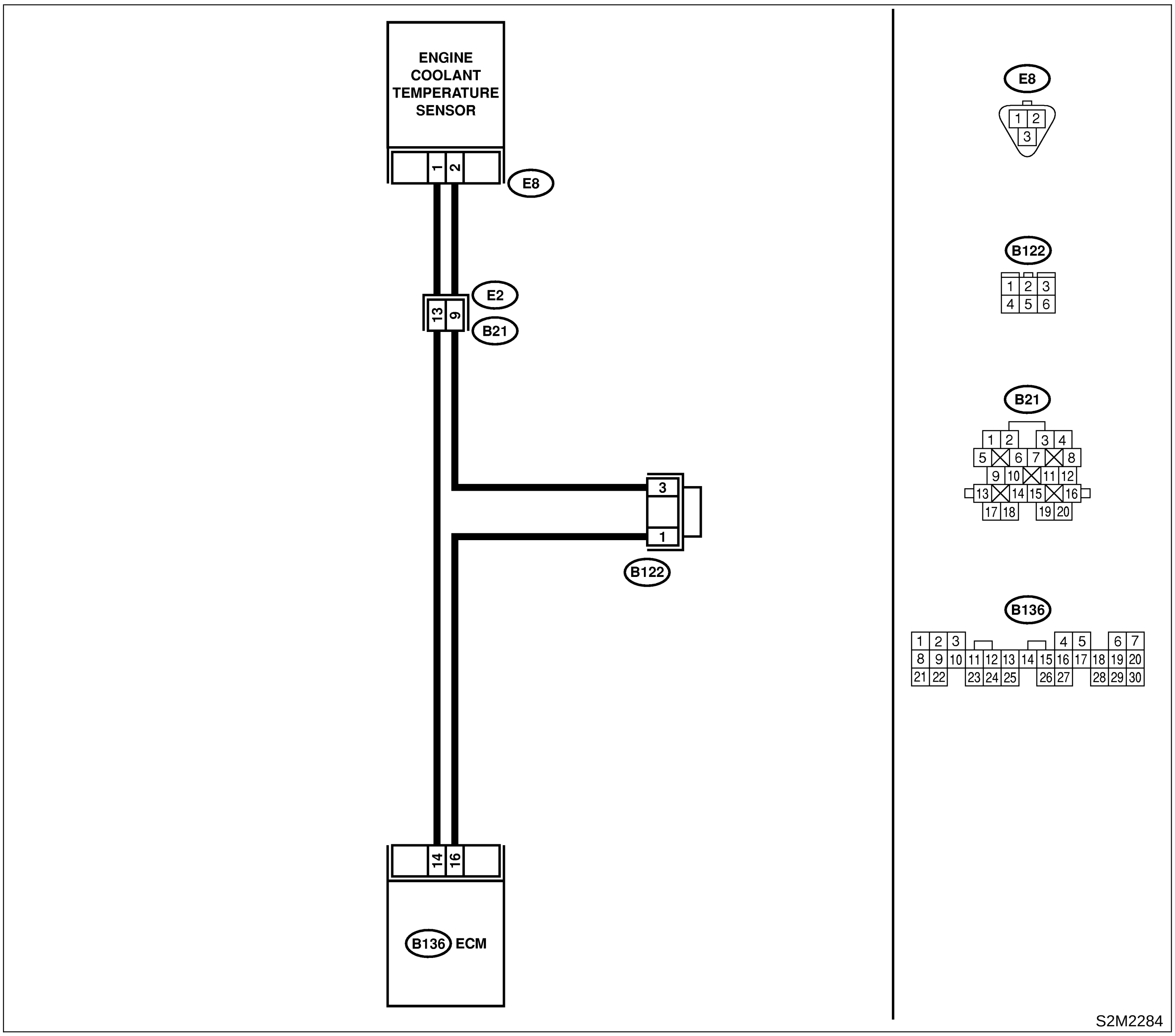
MEMO:

N: DTC P0117 — ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT LOW INPUT — S078521F91

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



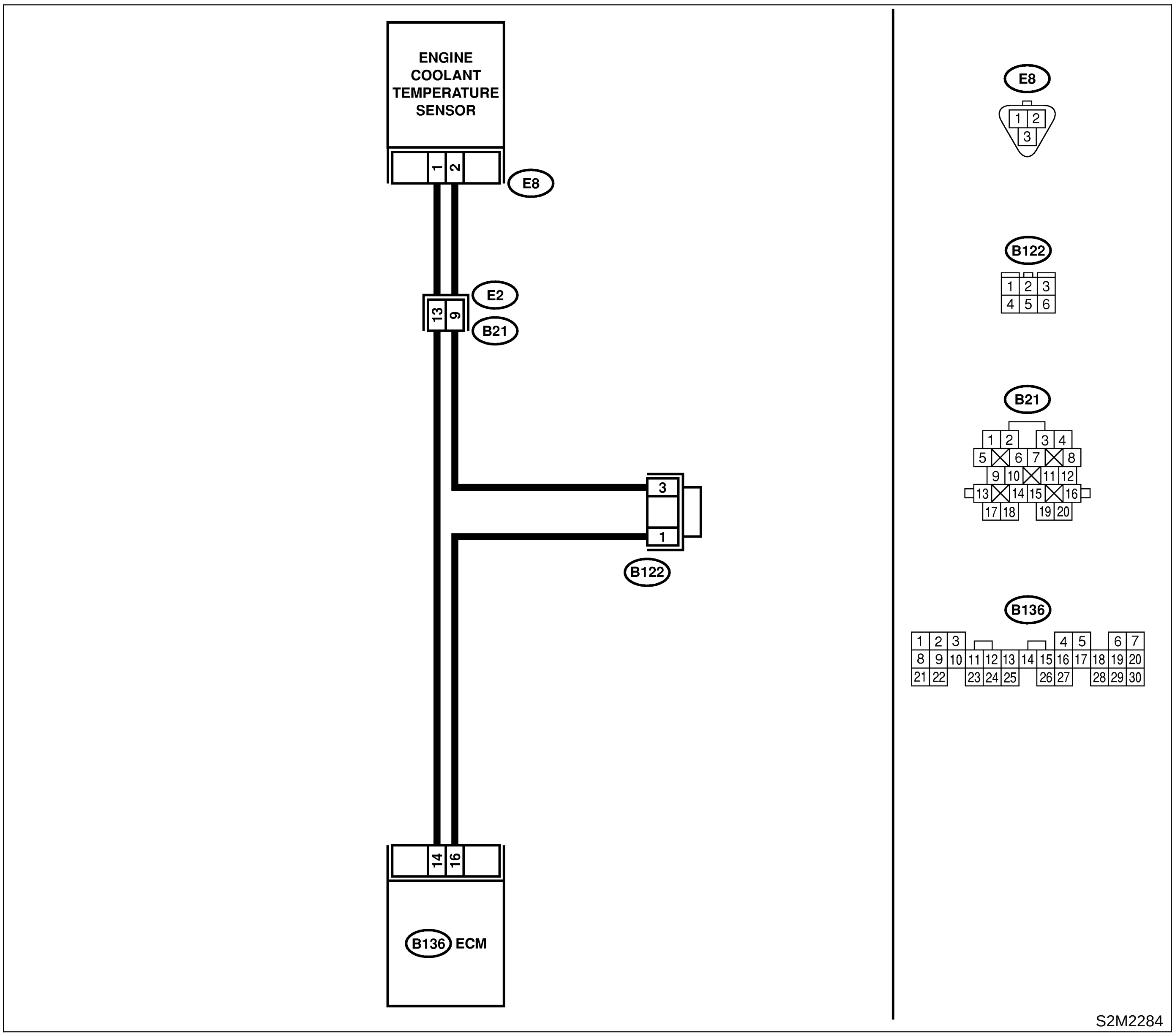
No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN-32, 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 the ignition switch to OFF. 2) Disconnect the connector from engine coolant temperature sensor. 3) Turn the ignition switch to ON. 4) Read the 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-32, 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 the engine coolant temperature sensor. <Ref. to FU-28, Engine Coolant Temperature Sensor.>	Repair ground short circuit in harness between engine coolant temperature sensor and ECM connector.

O: DTC P0118 — ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT HIGH INPUT — S078521F92

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the 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-32, 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 the ignition switch to OFF. 2) Disconnect the connector from engine coolant temperature sensor. 3) Measure the 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 the ignition switch to ON. 2) Measure the 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 the 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

No.	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the 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 the engine coolant temperature sensor. <Ref. to FU-28, 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

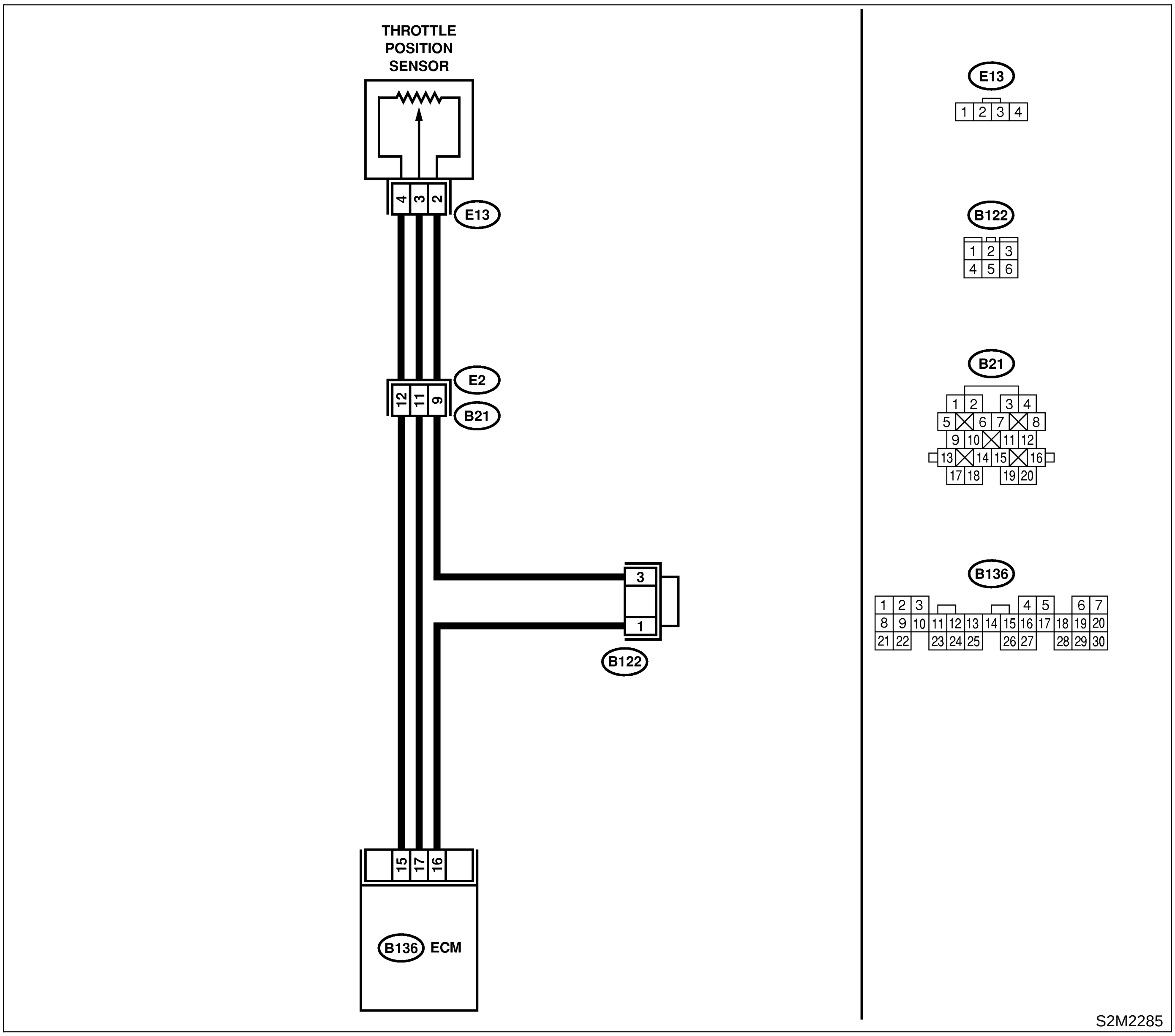
MEMO:

P: DTC P0121 — THROTTLE POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) — *S078521B19*

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



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 “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0121.	Replace the throttle position sensor. <Ref. to FU-33, Throttle Position Sensor.>

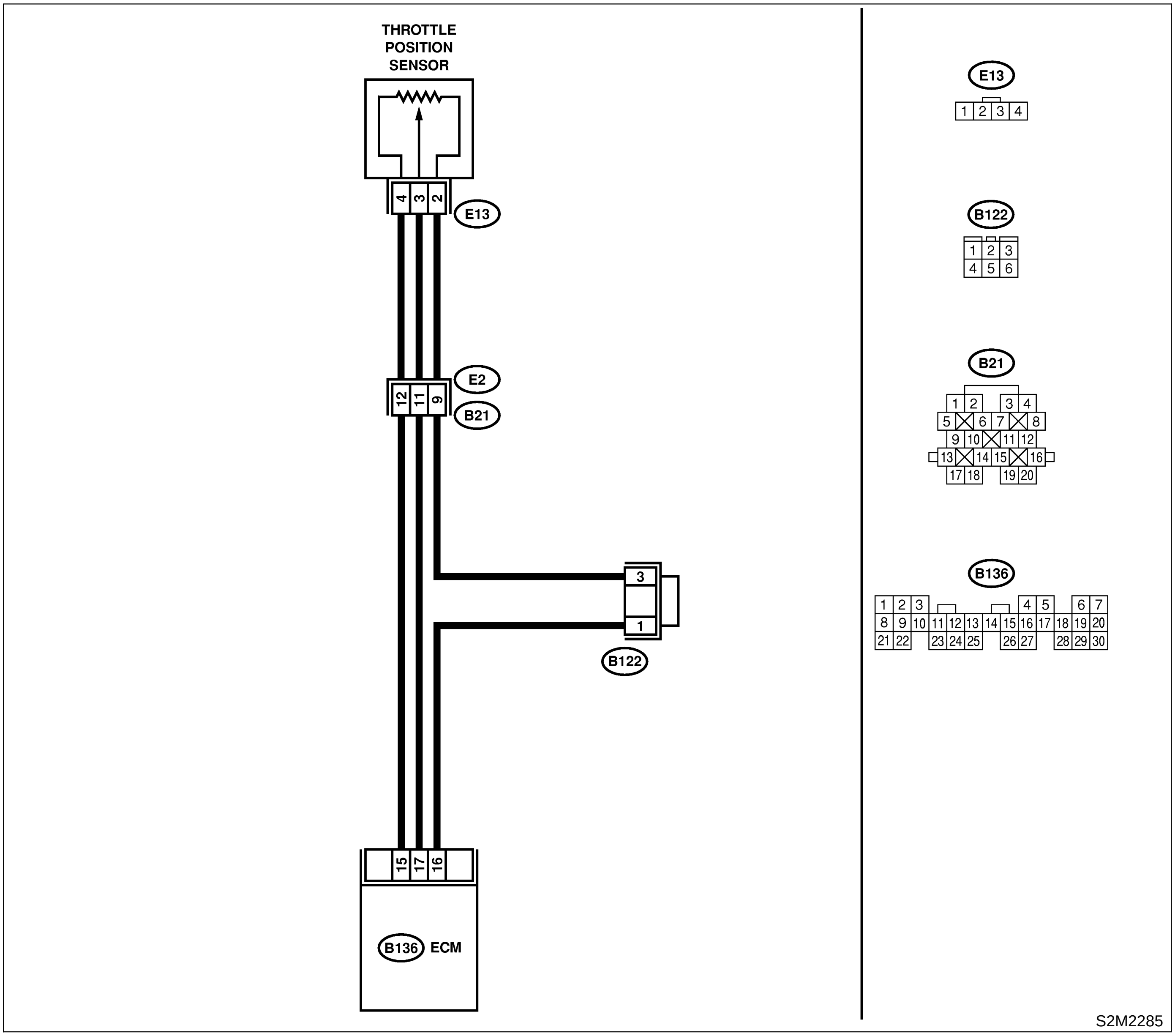
Q: DTC P0122 — THROTTLE POSITION SENSOR CIRCUIT LOW INPUT —

S078521B20

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the 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-32, 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 the voltage between ECM connector and chassis ground while throttle valve is fully closed. ***Connector & terminal*** ***(B136) No. 15 (+) — 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 the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 15 (+) — 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 (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
4	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 17 (+) — 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 the 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**.

No.	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from throttle position sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E13) No. 4 (+) — 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 the ignition switch to OFF. 2) Measure the resistance of harness between ECM connector and throttle position sensor connector. ***Connector & terminal*** ***(B136) No. 17 — (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 the 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 the throttle position sensor. <Ref. to FU-33, Throttle Position Sensor.>

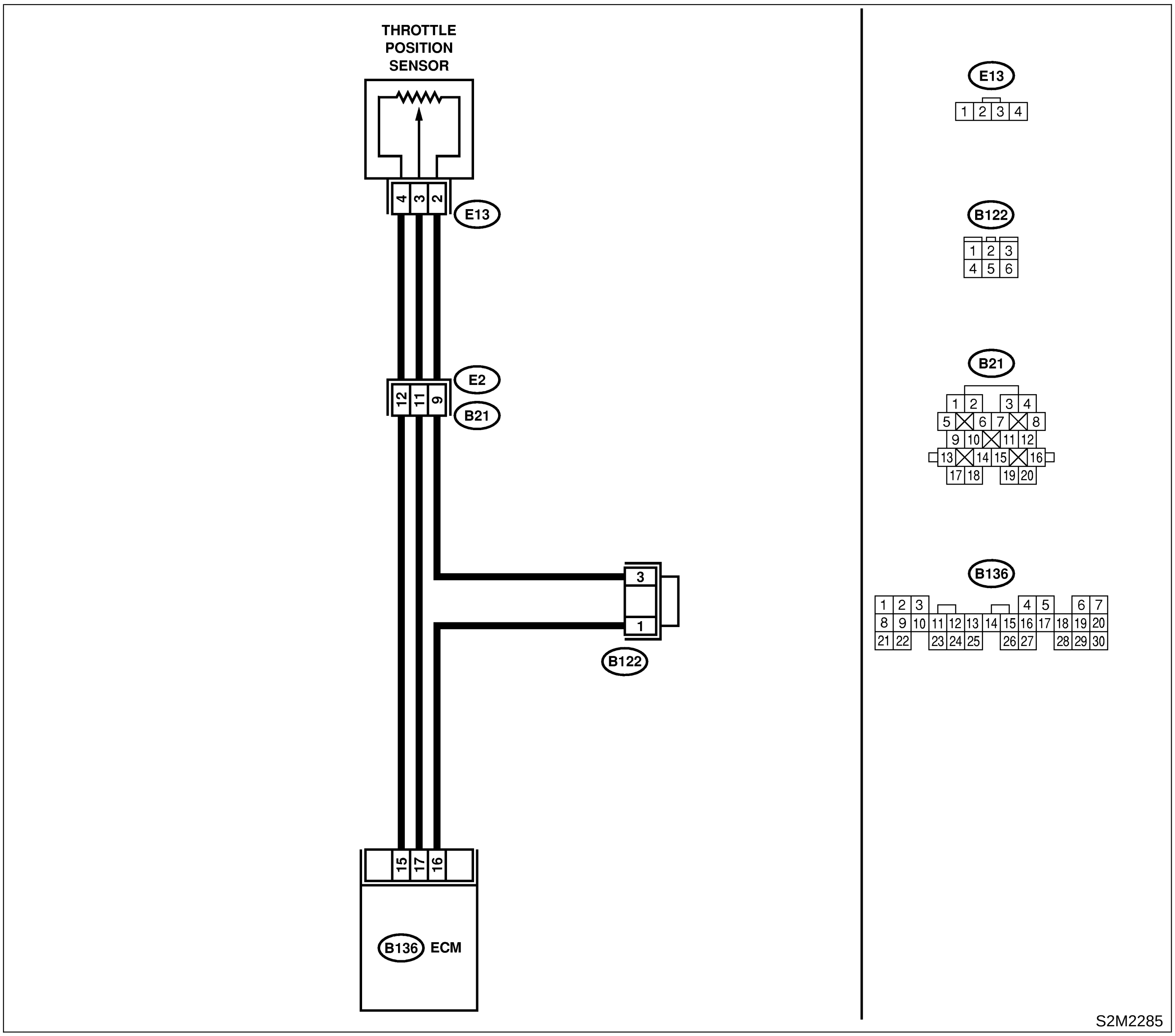
MEMO:

R: DTC P0123 — THROTTLE POSITION SENSOR CIRCUIT HIGH INPUT — S078521B21

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



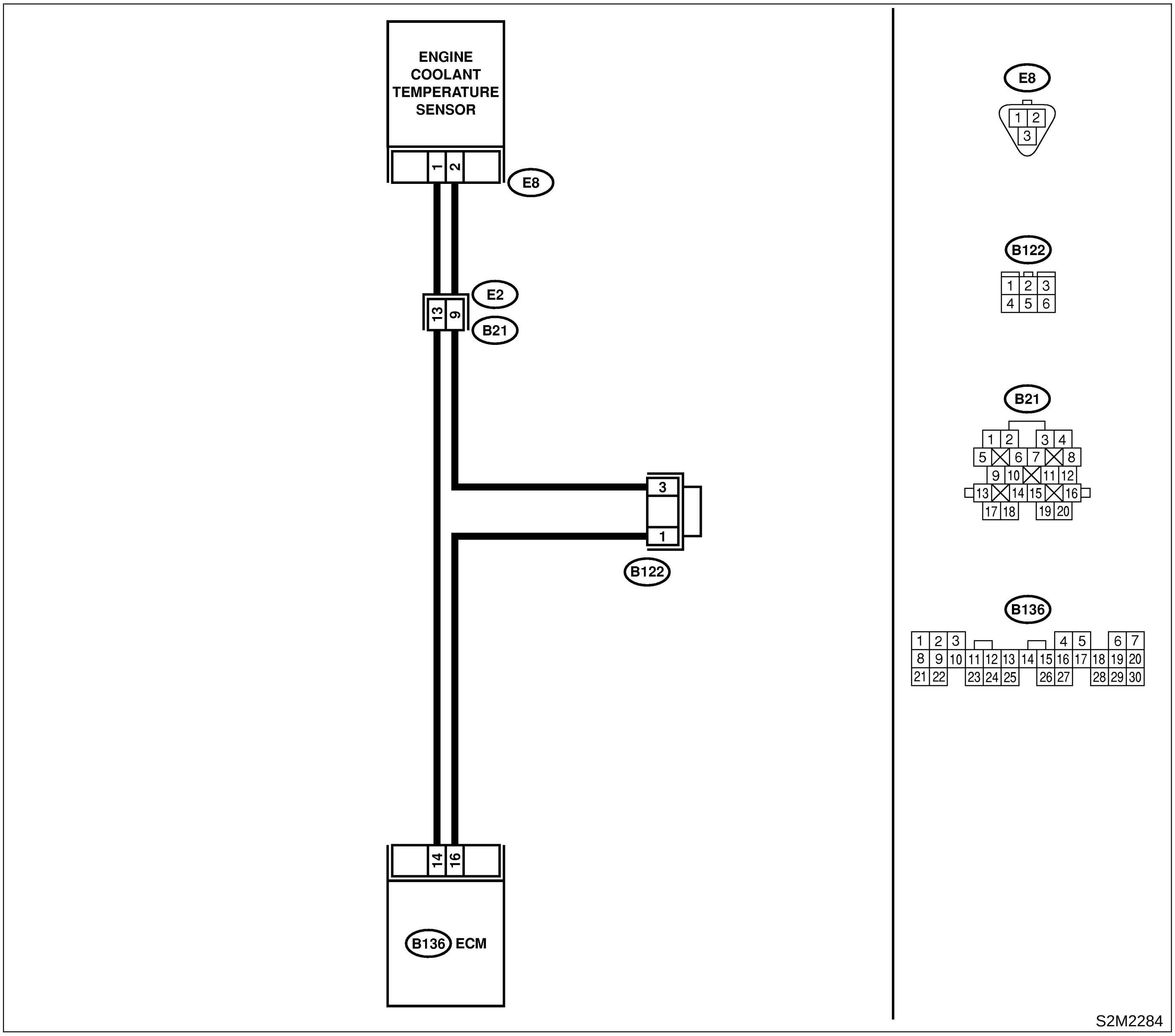
No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of throttle position sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the “READ CURRENT DATA FOR ENGINE”. <Ref. to EN-32, 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 4.9 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 the ignition switch to OFF. 2) Disconnect the connector from throttle position sensor. 3) Measure the 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 the ignition switch to ON. 2) Measure the 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 the ECM. <Ref. to FU-49, Engine Control Module.>	Replace the throttle position sensor. <Ref. to FU-33, Throttle Position Sensor.>

S: DTC P0125 — INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL — S078521B22

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Engine would not return to idling.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0125.	Go to step **2**.
2	**CHECK THERMOSTAT.**	Does the thermostat remain opened?	Replace the thermostat. <Ref. to CO-19, Thermostat.>	Replace the engine coolant temperature sensor. <Ref. to FU-28, Engine Coolant Temperature Sensor.>

T: DTC P0128 — THERMOSTAT MALFUNCTION — *S078521F93*

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, 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 and P0304 at same time?	Go to step **3**.	Inspect DTC P0125, P0301, P0302, P0303 and P0304 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN-84, 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 the engine coolant. <Ref. to CO-12, REPLACEMENT, Engine Coolant.>
4	**CHECK RADIATOR FAN.** 1) Start the engine. 2) Check radiator fan operation.	Does the radiator fan continuously rotate for more than 3 minutes during idling?	Repair radiator fan circuit. <Ref. to CO-26, Radiator Main Fan and Fan Motor.> and <Ref. to CO-28, Radiator Sub Fan and Fan Motor.>	Replace the thermostat. <Ref. to CO-19, Thermostat.>

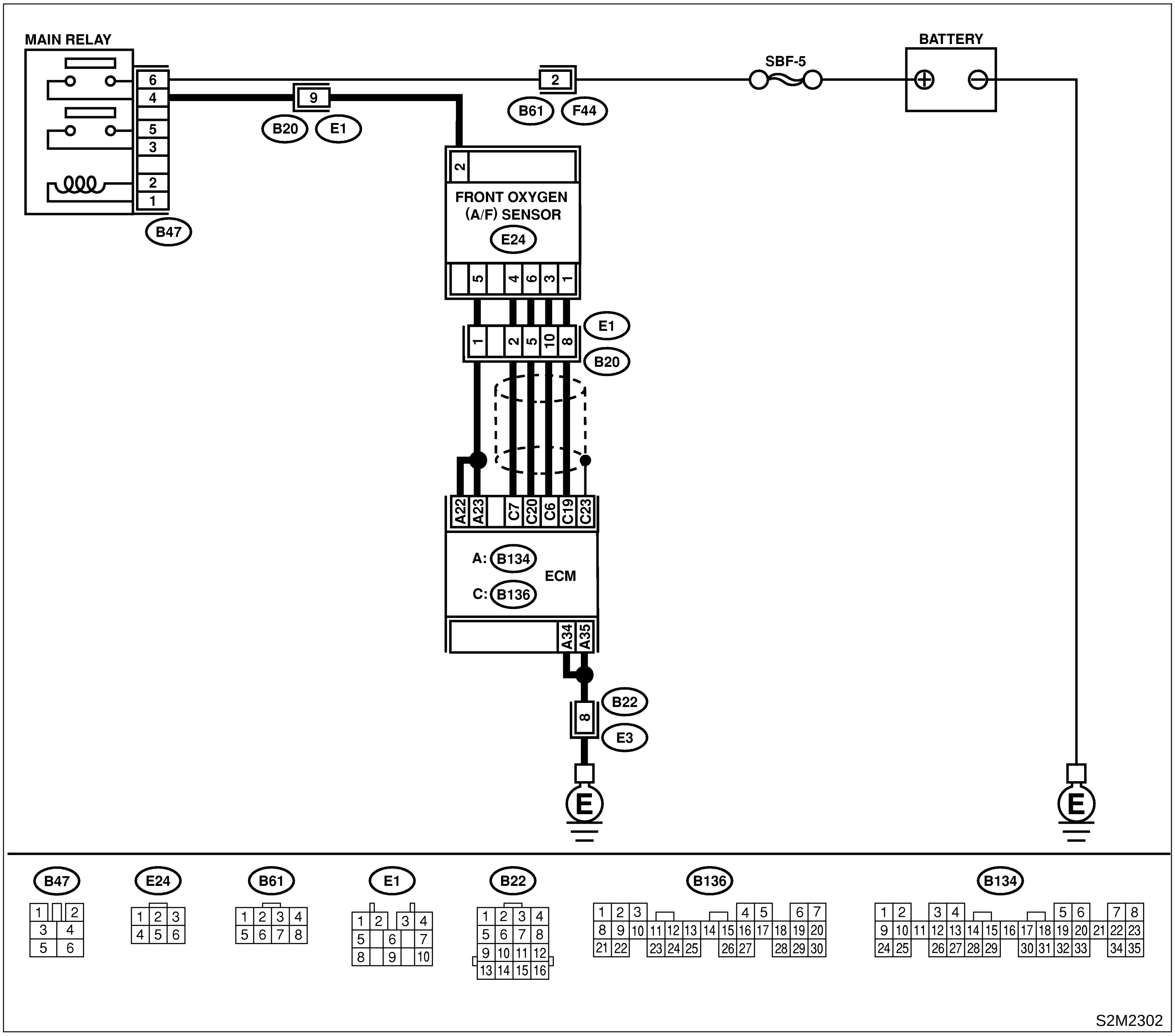
MEMO:

U: DTC P0130 — FRONT OXYGEN (A/F) SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LEAN) — S078521G44

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK FRONT OXYGEN (A/F) SENSOR DATA.** 1) Start the engine. 2) While observing the Subaru Select Monitor or OBD-II general scan tool screen, warm-up the engine until coolant temperature is above 70°C (160°F). If the engine is already warmed-up, operate at idle speed for at least 1 minute. 3) Read the 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-32, 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 FRONT OXYGEN (A/F) SENSOR DATA.** Race the 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.	Is the value more than 1.1 for a moment?	Go to step **6**.	Go to step **4**.
4	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance between ECM and front oxygen (A/F) sensor. ***Connector & terminals*** ***(B136) No. 6 — (E24) No. 3:*** ***(B136) No. 7 — (E24) No. 4:*** ***(B136) No. 19 — (E24) No. 1:*** ***(B136) No. 20 — (E24) No. 6:***	Is the resistance less than 5 Ω?	Go to step **5**.	Repair open circuit between ECM and front oxygen (A/F) sensor.
5	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR.** Measure the resistance between ECM and chassis ground. ***Connector & terminals*** ***(B136) No. 6 — Chassis ground:*** ***(B136) No. 7 — Chassis ground:*** ***(B136) No. 19 — Chassis ground:*** ***(B136) No. 20 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Repair ground short circuit between ECM and front oxygen (A/F) sensor.

No.	Step	Check	Yes	No
6	**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 the front oxygen (A/F) sensor. <Ref. to FU-45, Front Oxygen (A/F) Sensor.>

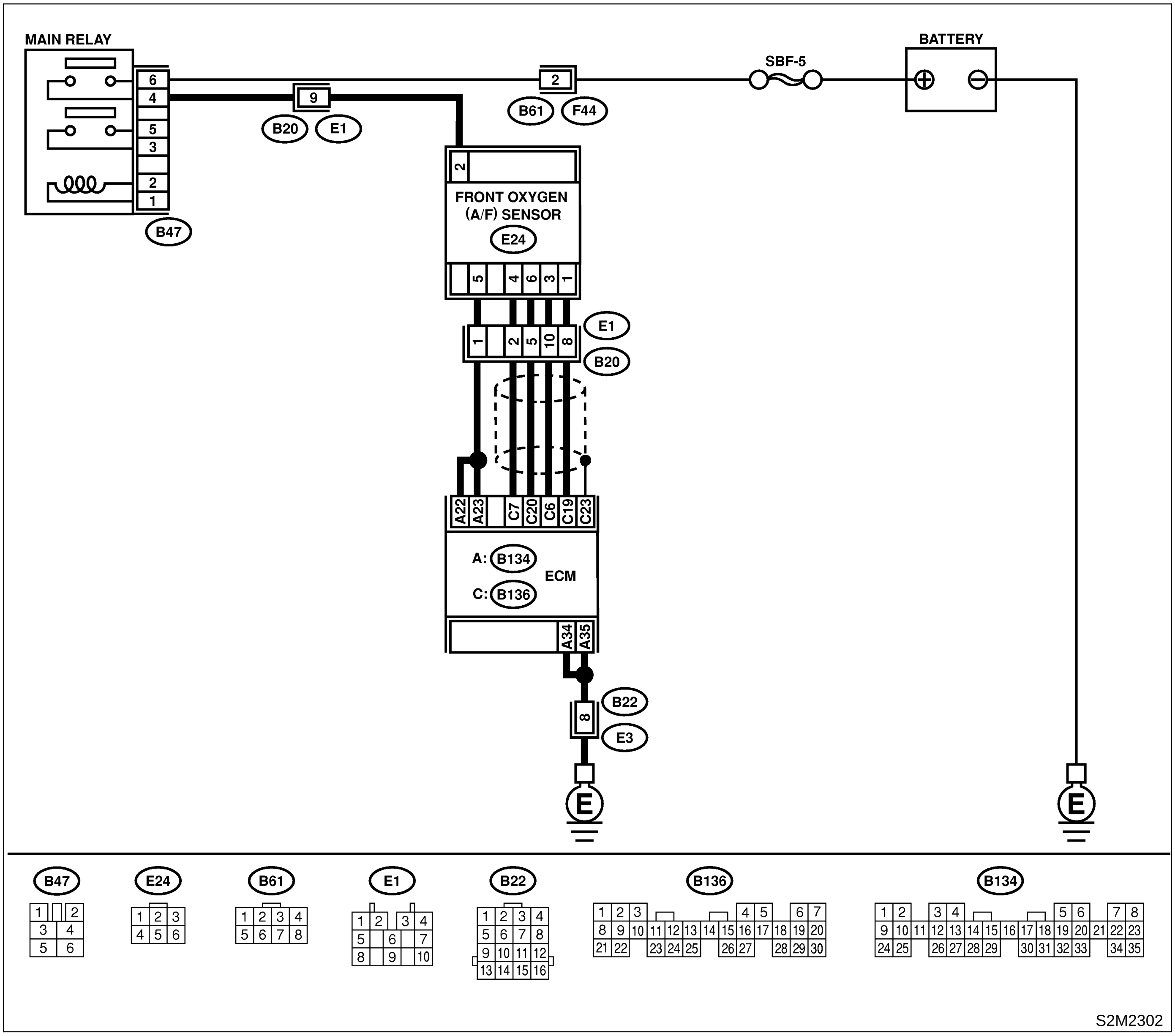
MEMO:

V: DTC P0131 — FRONT OXYGEN (A/F) SENSOR CIRCUIT MALFUNCTION (OPEN CIRCUIT) — *S078521G45*

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



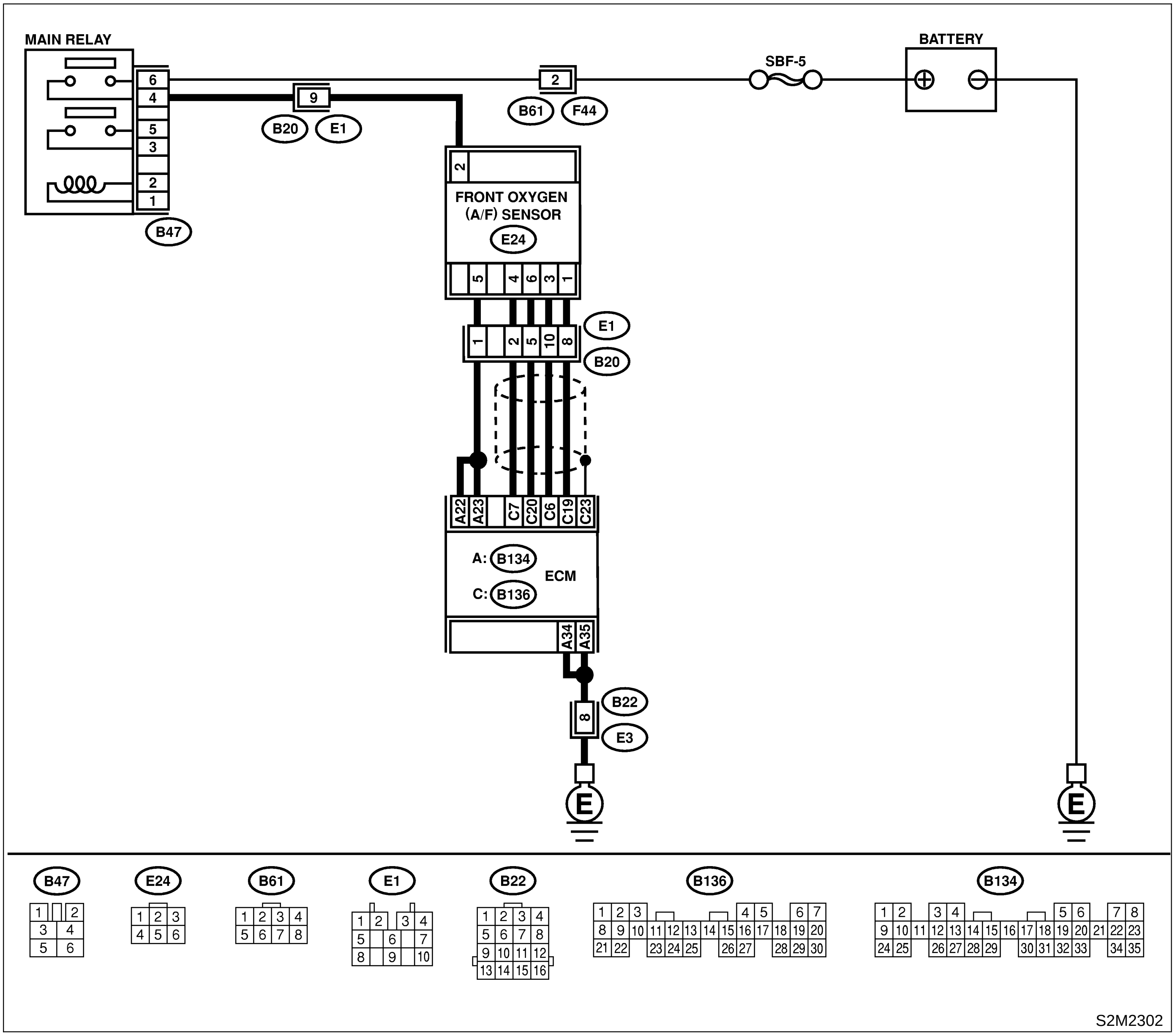
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B136) No. 6 — (E24) No. 3:*** ***(B136) No. 7 — (E24) No. 4:*** ***(B136) No. 19 — (E24) No. 1:*** ***(B136) No. 20 — (E24) No. 6:***	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 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 the front oxygen (A/F) sensor. <Ref. to FU-45, Front Oxygen (A/F) Sensor.>

W: DTC P0132 — FRONT OXYGEN (A/F) SENSOR CIRCUIT MALFUNCTION (SHORT CIRCUIT) — S078521G46

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



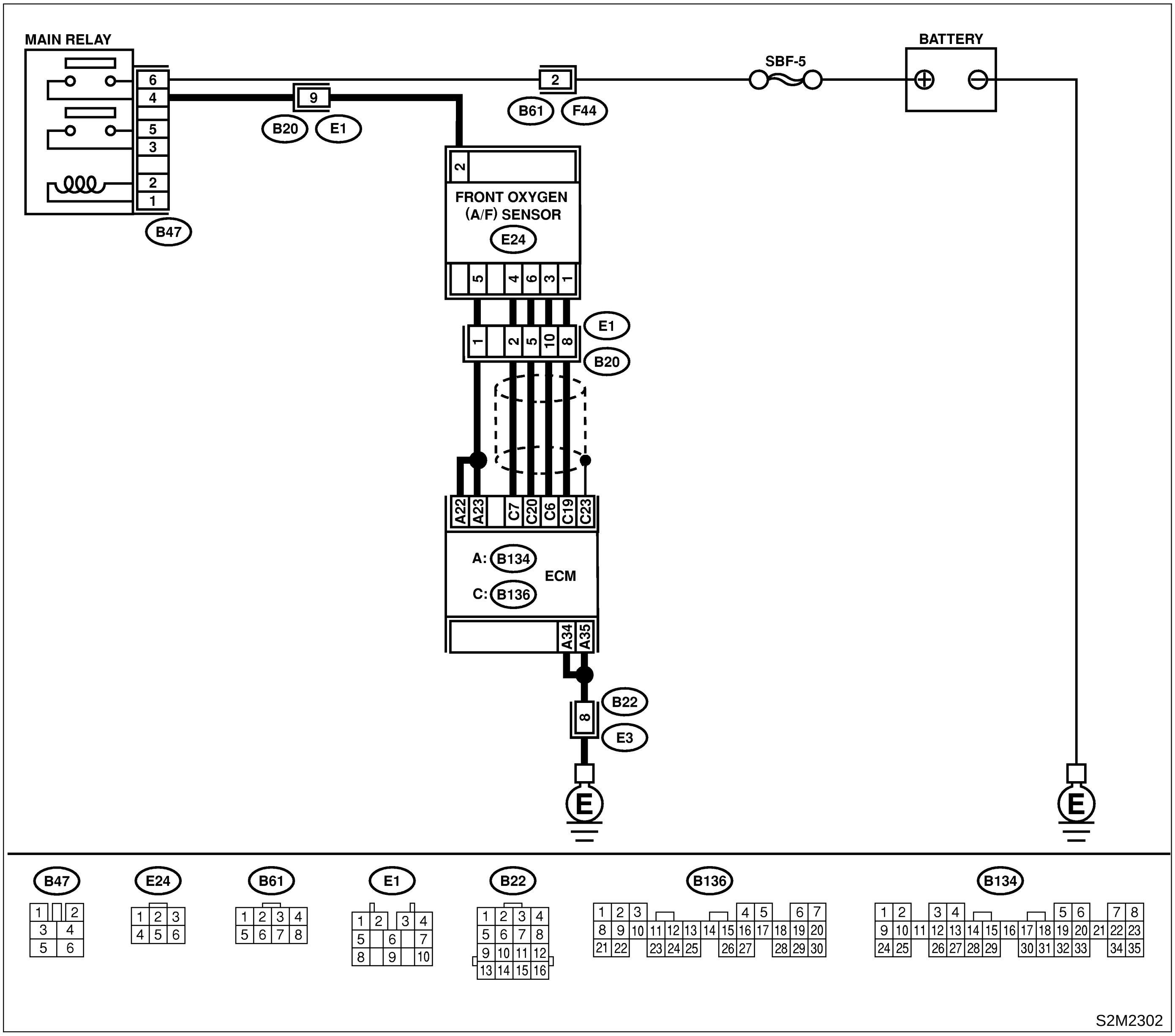
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 6 — Chassis ground:*** ***(B136) No. 7 — Chassis ground:*** ***(B136) No. 19 — Chassis ground:*** ***(B136) No. 20 — Chassis ground:***	Is the resistance more than 10 Ω?	Replace the front oxygen (A/F) sensor. <Ref. to FU-45, Front Oxygen (A/F) Sensor.>	Repair ground short circuit in harness between ECM and front oxygen (A/F) sensor connector.

X: DTC P0133 — FRONT OXYGEN (A/F) SENSOR CIRCUIT SLOW RESPONSE — *S078521B26*

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



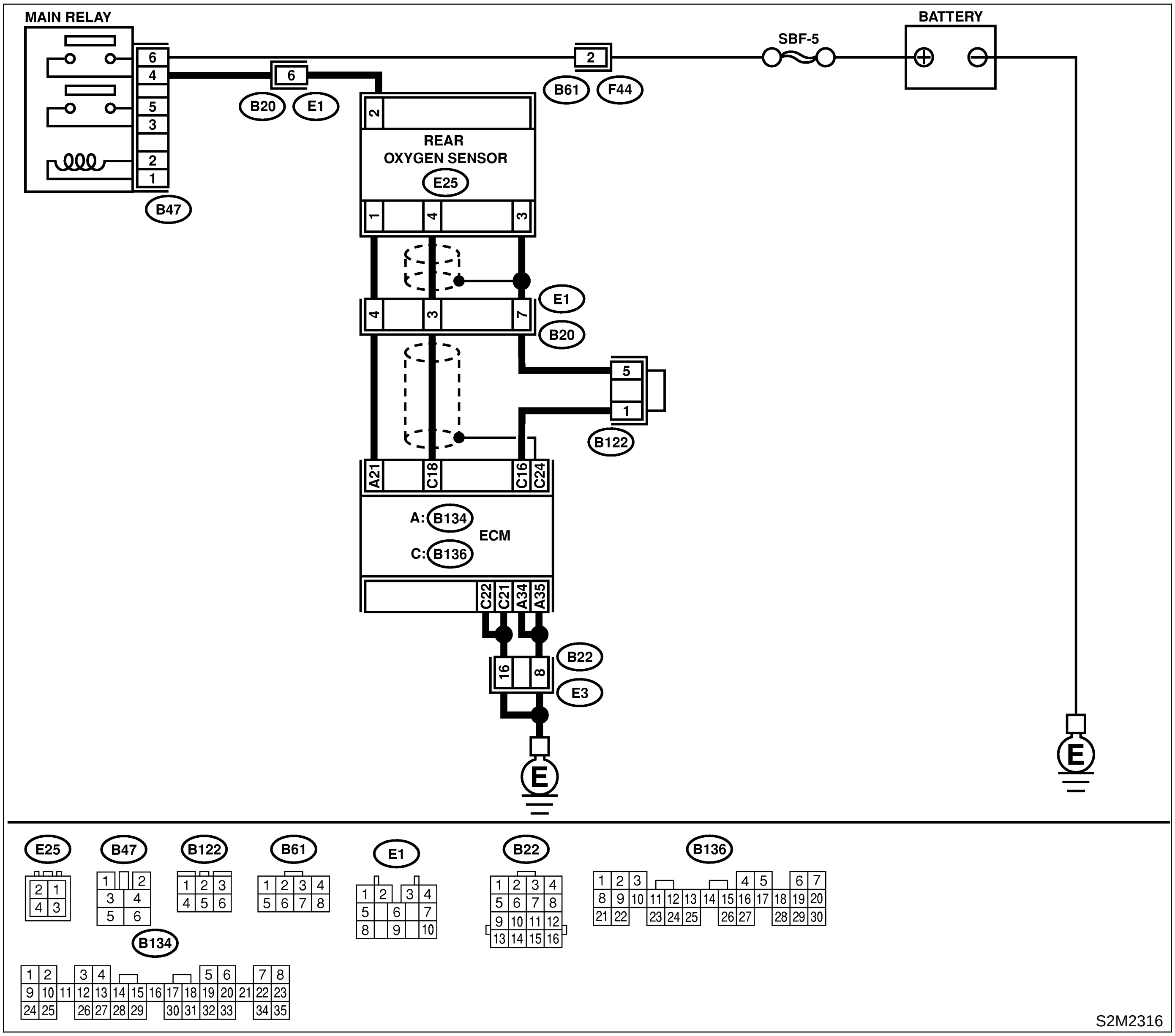
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0133.	Go to step **2**.
2	**CHECK 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 ● Damage of exhaust pipe resulting in a hole	Is there a fault in exhaust system?	Repair exhaust system.	Replace the front oxygen (A/F) sensor. <Ref. to FU-45, Front Oxygen (A/F) Sensor.>

Y: DTC P0136 — REAR OXYGEN SENSOR CIRCUIT MALFUNCTION — S078521B28

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



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 P0131 or P0132?	Go to step **2**.	Go to step **3**.

No.	Step	Check	Yes	No
2	**CHECK FAILURE CAUSE OF P0131 or P0132.** Inspect DTC P0131 or P0132 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).>	Is the failure cause of P0131 or P0132 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 the 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-32, 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 **8**.	Go to step **4**.
4	**CHECK REAR OXYGEN SENSOR DATA.** 1) After keeping engine speed at 4,500 rpm for 5 seconds, quickly depress the accelerator pedal fully. After that, keep the engine at idle speed for 10 seconds. 2) Repeat the operation of step 1) 3 times. 3) Read the data of rear oxygen sensor signal using Subaru Select Monitor or OBD-II General Scan Tool.	Is the value fixed between 0.2 and 0.4 V?	Go to step **5**.	Replace the rear oxygen sensor. <Ref. to FU-47, Rear Oxygen Sensor.>
5	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM and rear oxygen sensor connector. ***Connector & terminal*** ***(B136) No. 16 — (E25) No. 3:***	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 ECM AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 21 — Chassis ground:*** ***(B136) No. 22 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **7**.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between ECM and chassis ground ● Poor contact in coupling connector

No.	Step	Check	Yes	No
7	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and engine ground or chassis ground. ***Connector & terminal*** ***(E25) No. 4 (+) — Engine ground (−):***	Is the voltage more than 0.2 V?	Replace the rear oxygen sensor. <Ref. to FU-47, 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
8	**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 the rear oxygen sensor. <Ref. to FU-47, Rear Oxygen Sensor.>

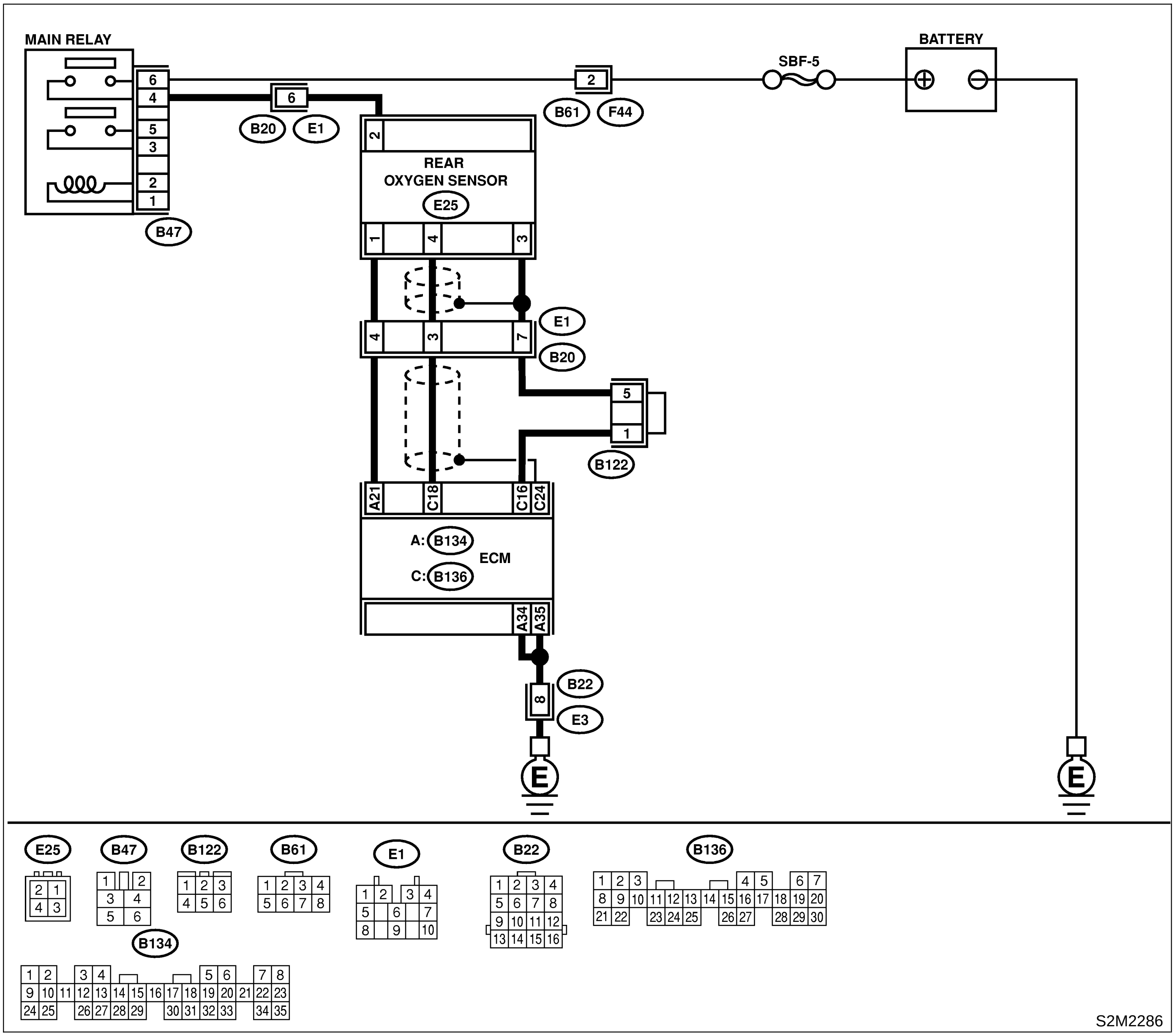
MEMO:

Z: DTC P0139 — REAR OXYGEN SENSOR CIRCUIT SLOW RESPONSE — S078521B29

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



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 “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0139.	Replace the rear oxygen sensor. <Ref. to FU-47, Rear Oxygen Sensor.>

AA: DTC P0171 — FUEL TRIM MALFUNCTION (A/F TOO LEAN) — S078521B33

Refer to DTC P0172 for diagnostic procedure. <Ref. to EN-160, DTC P0172 - FUEL TRIM #1 (RH) MALFUNCTION (A/F TOO RICH) -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AB: DTC P0172 — FUEL TRIM MALFUNCTION (A/F TOO RICH) — S078521H36

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, 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 the 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 the ignition switch to OFF. 2) Connect the connector to fuel pump relay. 3) Disconnect the fuel delivery hose from fuel filter, and connect fuel pressure gauge. 4) Install the fuel filler cap. 5) Start the engine and idle while gear position is neutral. 6) Measure the fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold. **WARNING:** **Before removing the 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

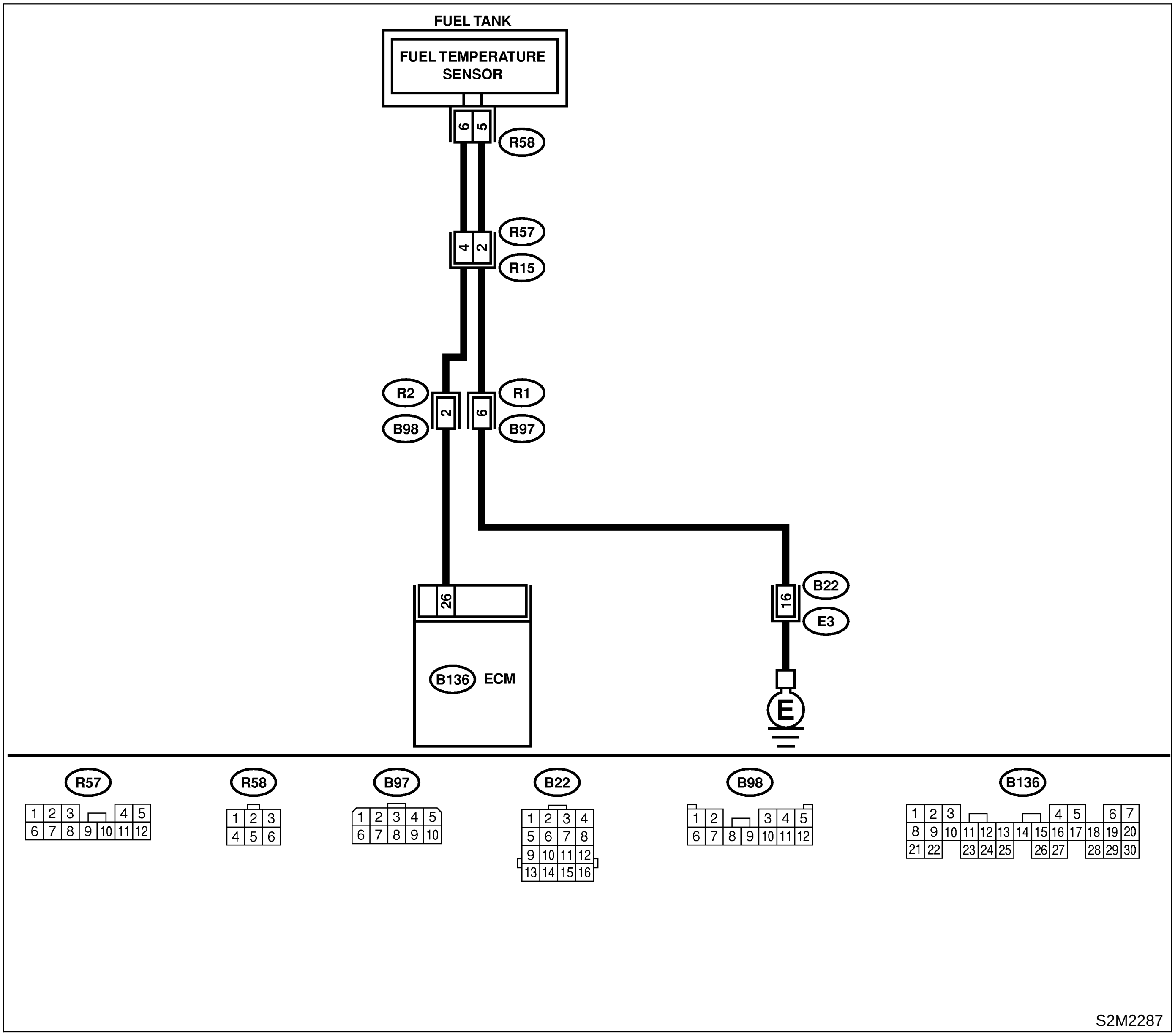
No.	Step	Check	Yes	No
4	**CHECK FUEL PRESSURE.** After connecting the pressure regulator vacuum hose, measure fuel pressure. **WARNING:** **Before removing the fuel pressure gauge, release fuel pressure.** NOTE: ● If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure 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 ENGINE COOLANT TEMPERATURE SENSOR.** 1) Start the engine and warm-up completely. 2) Read the 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-32, Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is temperature between 70°C (158°F) and 100°C (212°F)?	Go to step **6**.	Replace the engine coolant temperature sensor. <Ref. to FU-28, Engine Coolant Temperature Sensor.>
6	**CHECK INTAKE MANIFOLD PRESSURE SENSOR SIGNAL.** 1) Start the engine and warm-up engine until coolant temperature is greater than 60°C (140°F). 2) Place the selector lever in “N” or “P” position. 3) Turn the A/C switch to OFF. 4) Turn all accessory switches to OFF. 5) Read the 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-32, Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual. Specification: ***Idling*** ***24.0 — 41.3 kPa (180 — 310 mmHg, 7.09 — 12.20 inHg)*** ***Ignition ON*** ***73.3 — 106.6 kPa (550 — 800 mmHg, 21.65 — 31.50 inHg)***	Is the voltage within the specifications?	Contact with SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.	Replace the intake air temperature and pressure sensor. <Ref. to FU-36, Intake Air Temperature and Pressure Sensor.>

AC: DTC P0181 — FUEL TEMPERATURE SENSOR A CIRCUIT RANGE/PERFORMANCE PROBLEM — S078521B34

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



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 “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0181.	Replace the fuel temperature sensor. <Ref. to EC-8, Fuel Temperature Sensor.>

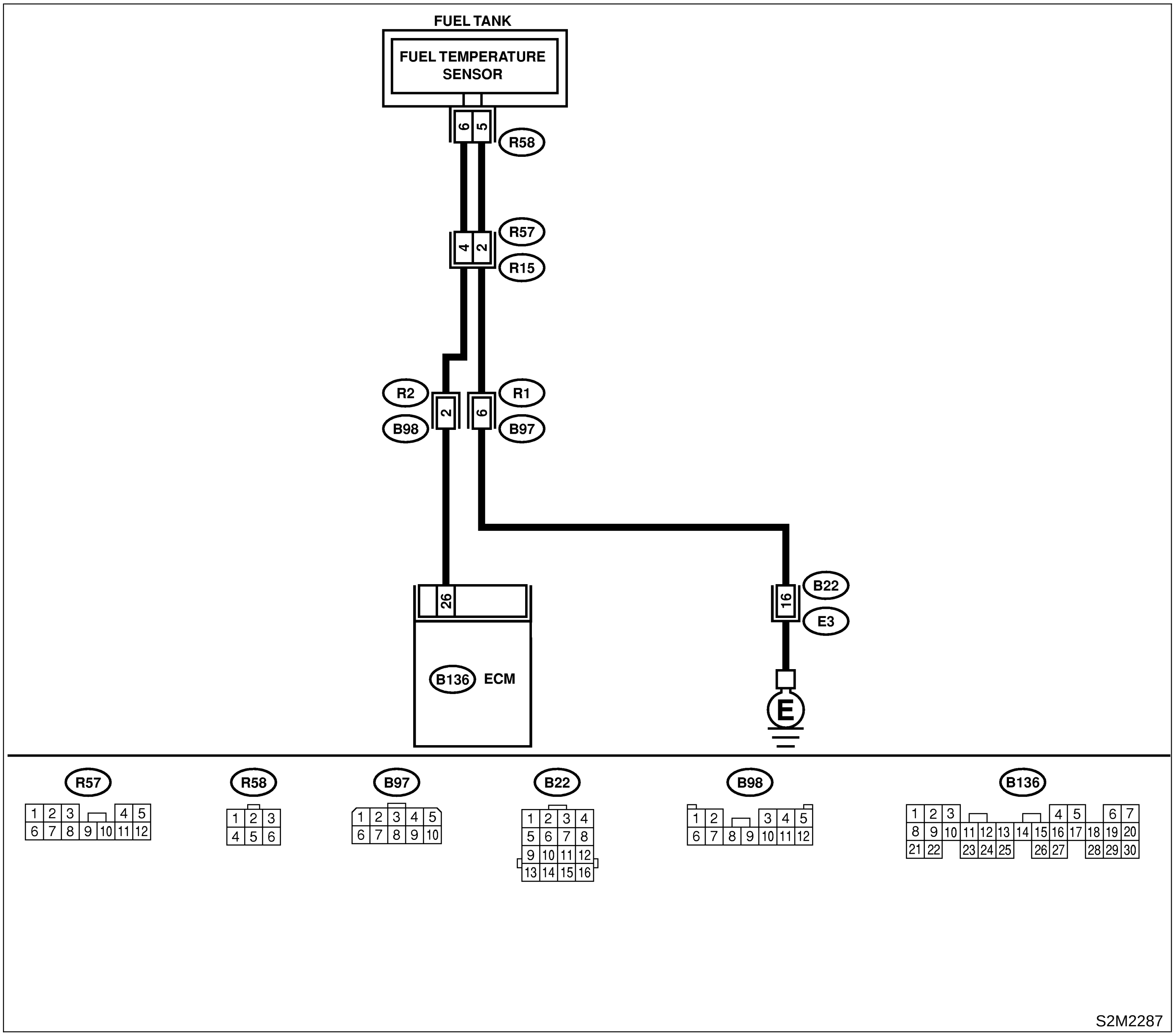
AD: DTC P0182 — FUEL TEMPERATURE SENSOR A CIRCUIT LOW INPUT —

S078521B35

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the 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-32, 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**.	Even if MIL lights up, the circuit has returned to a normal condition at this time.
2	**CHECK CURRENT DATA.** 1) Turn the ignition switch to OFF. 2) Remove the access hole lid. 3) Disconnect the connector from fuel pump. 4) Turn the ignition switch to ON. 5) Read the 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-32, 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 the fuel temperature sensor. <Ref. to EC-8, Fuel Temperature Sensor.>	Repair ground short circuit in harness between fuel pump and ECM connector.

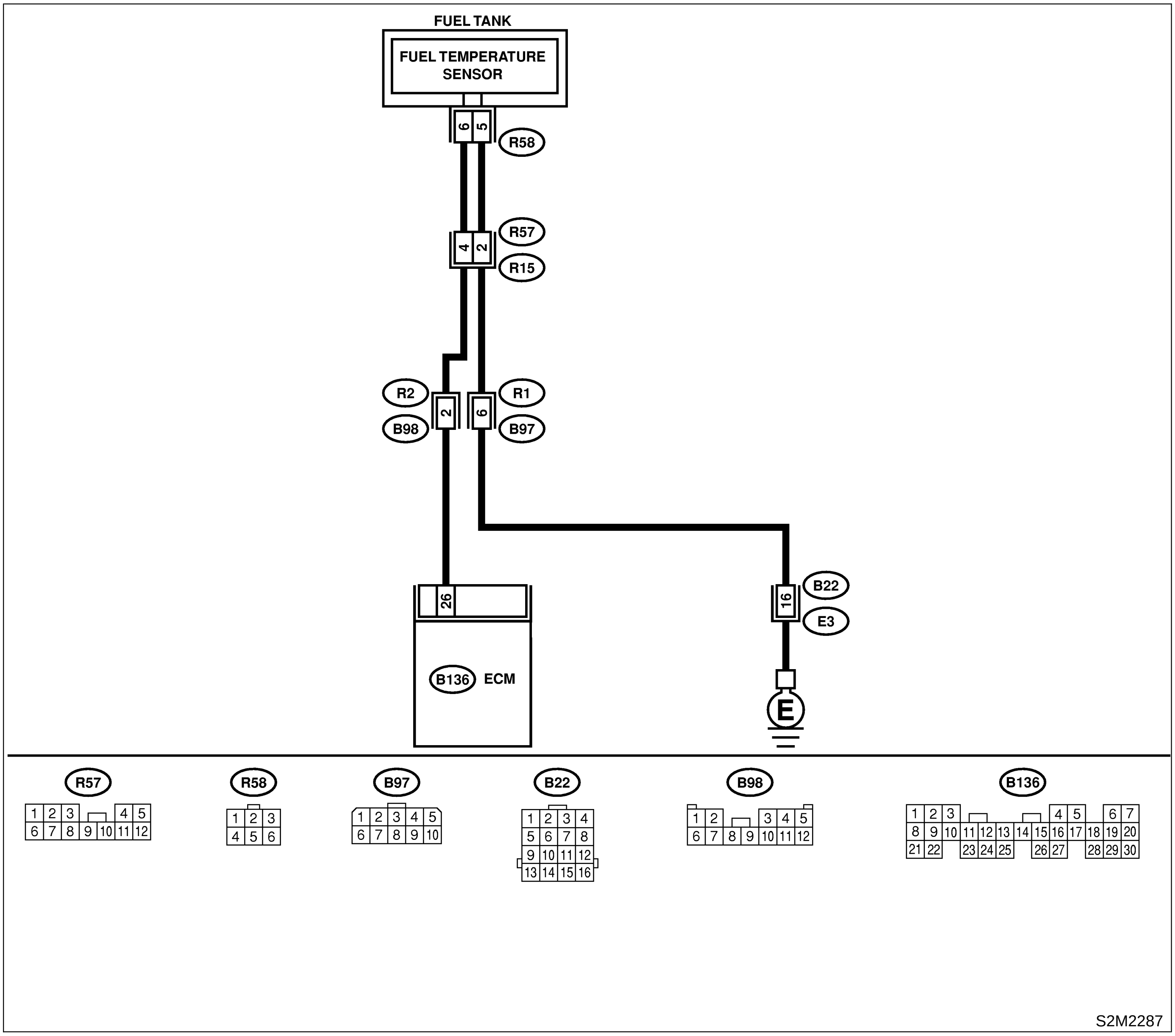
AE: DTC P0183 — FUEL TEMPERATURE SENSOR A CIRCUIT HIGH INPUT —

S078521B36

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the 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-32, 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 the ignition switch to OFF. 2) Remove the access hole lid. 3) Disconnect the connector from fuel pump. 4) Measure the voltage between fuel pump connector and chassis ground. ***Connector & terminal*** ***(R58) No. 6 (+) — 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 the ignition switch to ON. 2) Measure the voltage between fuel pump connector and chassis ground. ***Connector & terminal*** ***(R58) No. 6 (+) — 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 the voltage between fuel pump connector and chassis ground. ***Connector & terminal*** ***(R58) No. 6 (+) — 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

No.	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between fuel pump connector and chassis ground. ***Connector & terminal*** ***(R58) No. 5 — Chassis ground:***	Is the resistance less than 5 Ω?	Replace the fuel temperature sensor. <Ref. to EC-8, 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

AF: DTC P0301 — CYLINDER 1 MISFIRE DETECTED — S078521B37

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN-170, DTC P0304 - CYLINDER 4 MISFIRE DETECTED -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AG: DTC P0302 — CYLINDER 2 MISFIRE DETECTED — S078521B38

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN-170, DTC P0304 - CYLINDER 4 MISFIRE DETECTED -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AH: DTC P0303 — CYLINDER 3 MISFIRE DETECTED — S078521B39

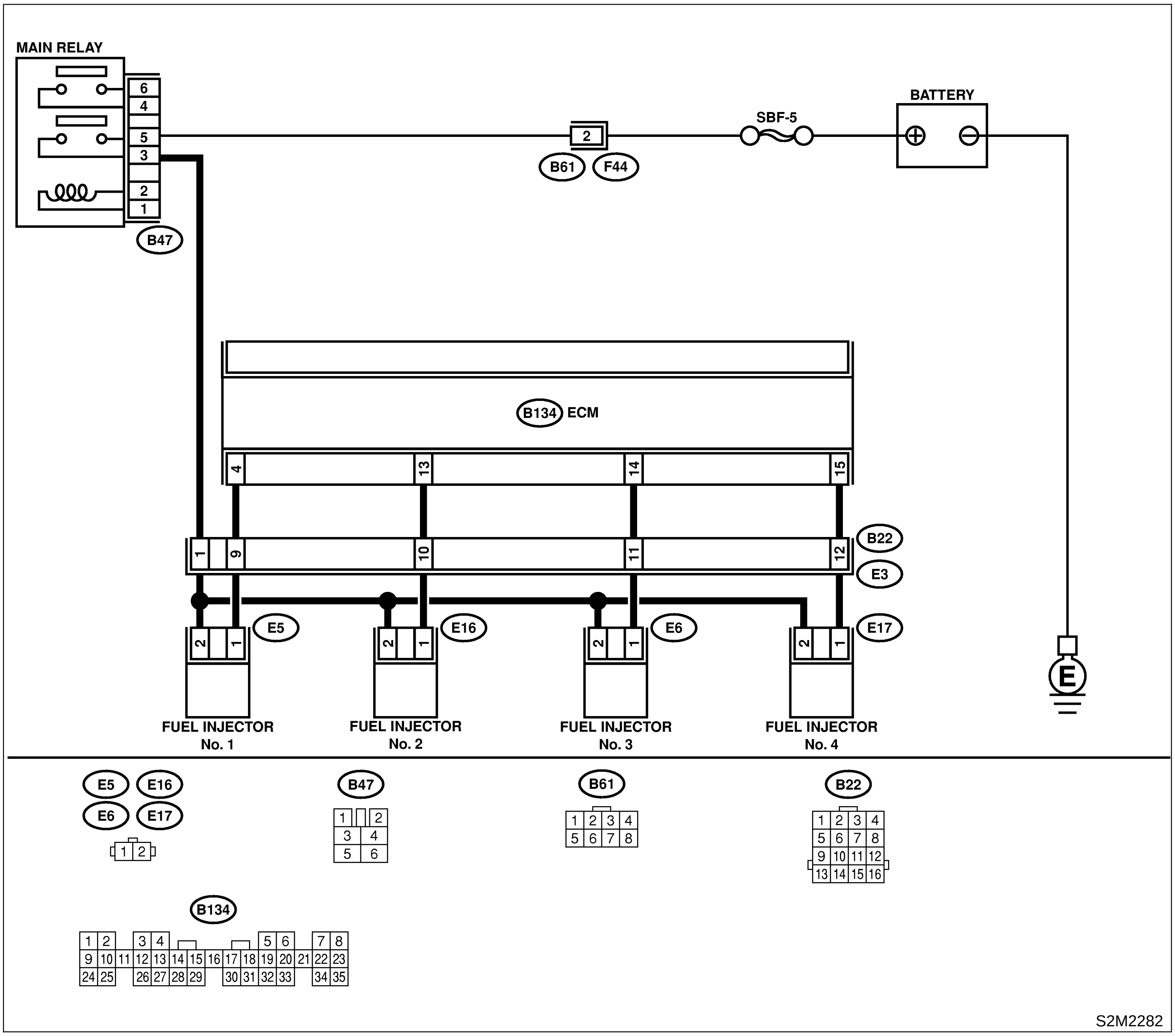
NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN-170, DTC P0304 - CYLINDER 4 MISFIRE DETECTED -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AI: DTC P0304 — CYLINDER 4 MISFIRE DETECTED — S078521B40

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0301, P0302, P0303 and P0304.	Go to step **2**.
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B134) No. 4 (+) — Chassis ground (−):*** ***#2 (B134) No. 13 (+) — Chassis ground (−):*** ***#3 (B134) No. 14 (+) — Chassis ground (−):*** ***#4 (B134) No. 15 (+) — 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 the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinders. 3) Measure the 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:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between fuel injector and ECM connector.	Go to step **4**.
4	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** Measure the resistance of harness connector between ECM connector and fuel injector on faulty cylinders. ***Connector & terminal*** ***#1 (B134) No. 4 — (E5) No. 1:*** ***#2 (B134) No. 13 — (E16) No. 1:*** ***#3 (B134) No. 14 — (E6) No. 1:*** ***#4 (B134) No. 15 — (E17) 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 the 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 the faulty fuel injector. <Ref. to FU-40, Fuel Injector.>

No.	Step	Check	Yes	No
6	**CHECK POWER SUPPLY LINE.** 1) Turn the ignition switch to ON. 2) Measure the 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 (−):***	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
7	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinder. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM connector and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B134) No. 4 (+) — Chassis ground (−):*** ***#2 (B134) No. 13 (+) — Chassis ground (−):*** ***#3 (B134) No. 14 (+) — Chassis ground (−):*** ***#4 (B134) No. 15 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and fuel injector. After repair, replace the ECM. <Ref. to FU-49, Engine Control Module.>	Go to step **8**.
8	**CHECK FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between fuel injector terminals on faulty cylinder. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Replace the faulty fuel injector <Ref. to FU-40, Fuel Injector.> and ECM <Ref. to FU-49, Engine Control Module.>	Go to step **9**.
9	**CHECK INSTALLATION OF CAMSHAFT POSITION SENSOR/CRANKSHAFT POSITION SENSOR.**	Is the camshaft position sensor or crankshaft position sensor loosely installed?	Tighten camshaft position sensor or crankshaft position sensor.	Go to step **10**.
10	**CHECK CRANKSHAFT SPROCKET.** Remove the timing belt cover.	Is the crankshaft sprocket rusted or does it have broken teeth?	Replace the crankshaft sprocket. <Ref. to ME-53, Crankshaft Sprocket.>	Go to step **11**.

No.	Step	Check	Yes	No
11	**CHECK INSTALLATION CONDITION OF TIMING BELT.** Turn the crankshaft using ST, and align alignment mark on crankshaft sprocket with alignment mark on cylinder block. ST 499987500 CRANKSHAFT SOCKET	Is the timing belt dislocated from its proper position?	Repair installation condition of timing belt. <Ref. to ME-46, Timing Belt 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 the memory using Subaru Select Monitor. <Ref. to EN-50, Clear Memory Mode.> 2) Start the engine, and drive the vehicle more than 10 minutes.	Is the MIL coming on or blinking?	Go to step **15**.	Go to step **14**.
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 the 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**.

No.	Step	Check	Yes	No
16	**CHECK MISFIRE SYMPTOM.** 1) Turn the ignition switch to ON. 2) Read the diagnostic trouble code (DTC). ● Subaru Select Monitor <Ref. to EN-32, 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 **21**.	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 **22**.	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 **23**.	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 P0301 and P0303?	Go to step **24**.	Go to step **20**.
20	**CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0302 and P0304?	Go to step **25**.	Go to step **26**.
21	**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	Go to DTC P0171. <Ref. to EN-160, DTC P0171 - FUEL TRIM MALFUNCTION (A/F TOO LEAN) -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
22	**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 abnormal is discovered, check for “IGNITION CONTROL SYSTEM” of #1 and #2 cylinders side. <Ref. to EN-74, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Go to DTC P0171. <Ref. to EN-160, DTC P0171 - FUEL TRIM MALFUNCTION (A/F TOO LEAN) -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

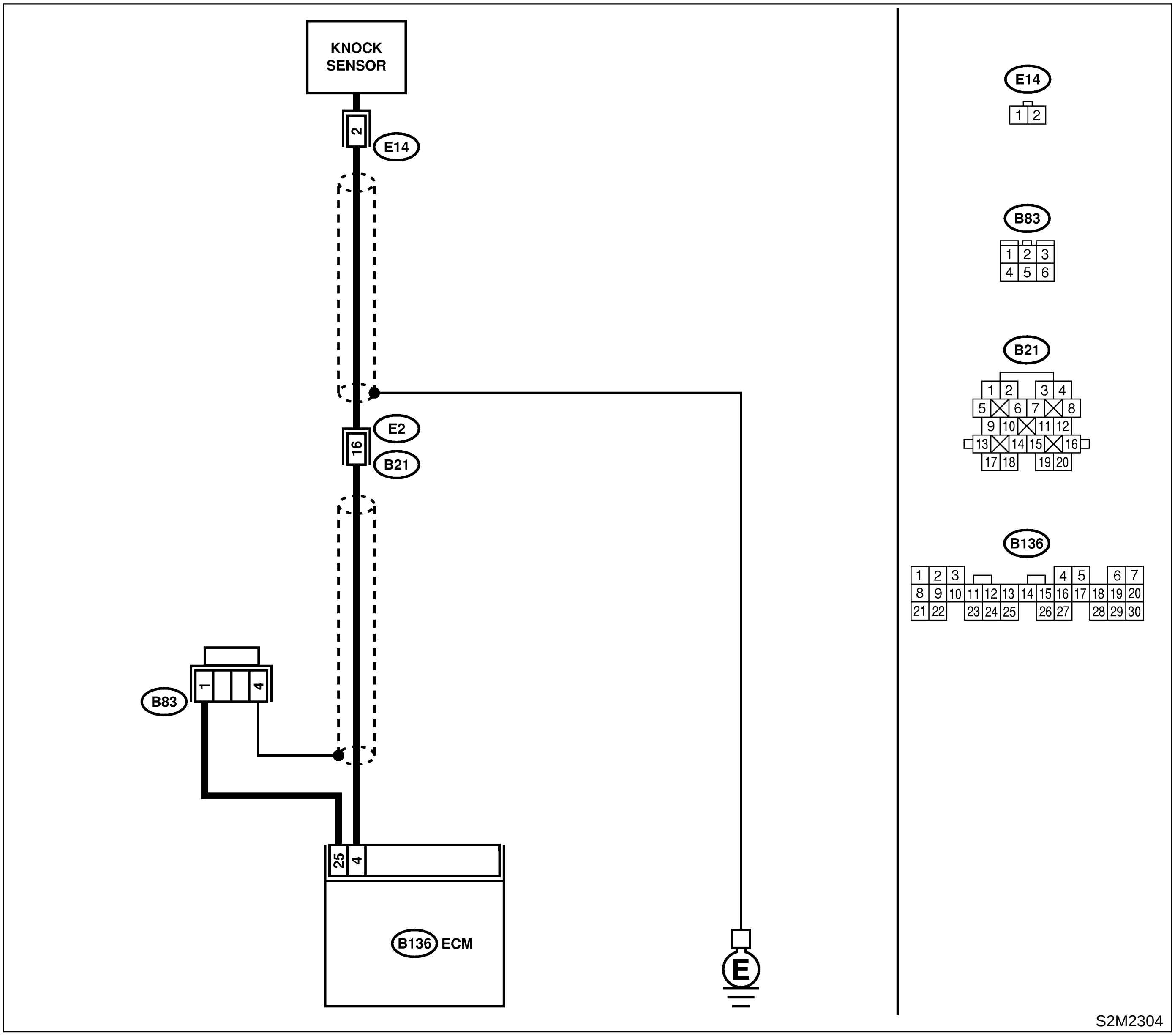
No.	Step	Check	Yes	No
23	**GROUP OF #3 AND #4 CYLINDERS**	Are there faults in #3 and #4 cylinders?	Repair or replace faulty parts. NOTE: ● Check the following items. Spark plugs Fuel injectors Ignition coil ● If no abnormal is discovered, check for “16. D: IGNITION CONTROL SYSTEM” of #3 and #4 cylinders side. <Ref. to EN-74, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Go to DTC P0171. <Ref. to EN-160, DTC P0171 - FUEL TRIM MALFUNCTION (A/F TOO LEAN) -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
24	**GROUP OF #1 AND #3 CYLINDERS**	Are there faults in #1 and #3 cylinders?	Repair or replace faulty parts. NOTE: Check the following items. ● Spark plugs ● Fuel injectors ● Skipping timing belt teeth	Go to DTC P0171. <Ref. to EN-160, DTC P0171 - FUEL TRIM MALFUNCTION (A/F TOO LEAN) -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
25	**GROUP OF #2 AND #4 CYLINDERS**	Are there faults in #2 and #4 cylinders?	Repair or replace faulty parts. NOTE: Check the following items. ● Spark plugs ● Fuel injectors ● Compression ratio ● Skipping timing belt teeth	Go to DTC P0171. <Ref. to EN-160, DTC P0171 - FUEL TRIM MALFUNCTION (A/F TOO LEAN) -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
26	**CYLINDER AT RANDOM**	Is the engine idle rough?	Go to DTC P0171. <Ref. to EN-160, DTC P0171 - FUEL TRIM 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

AJ: DTC P0327 — KNOCK SENSOR CIRCUIT LOW INPUT — S078521F94

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



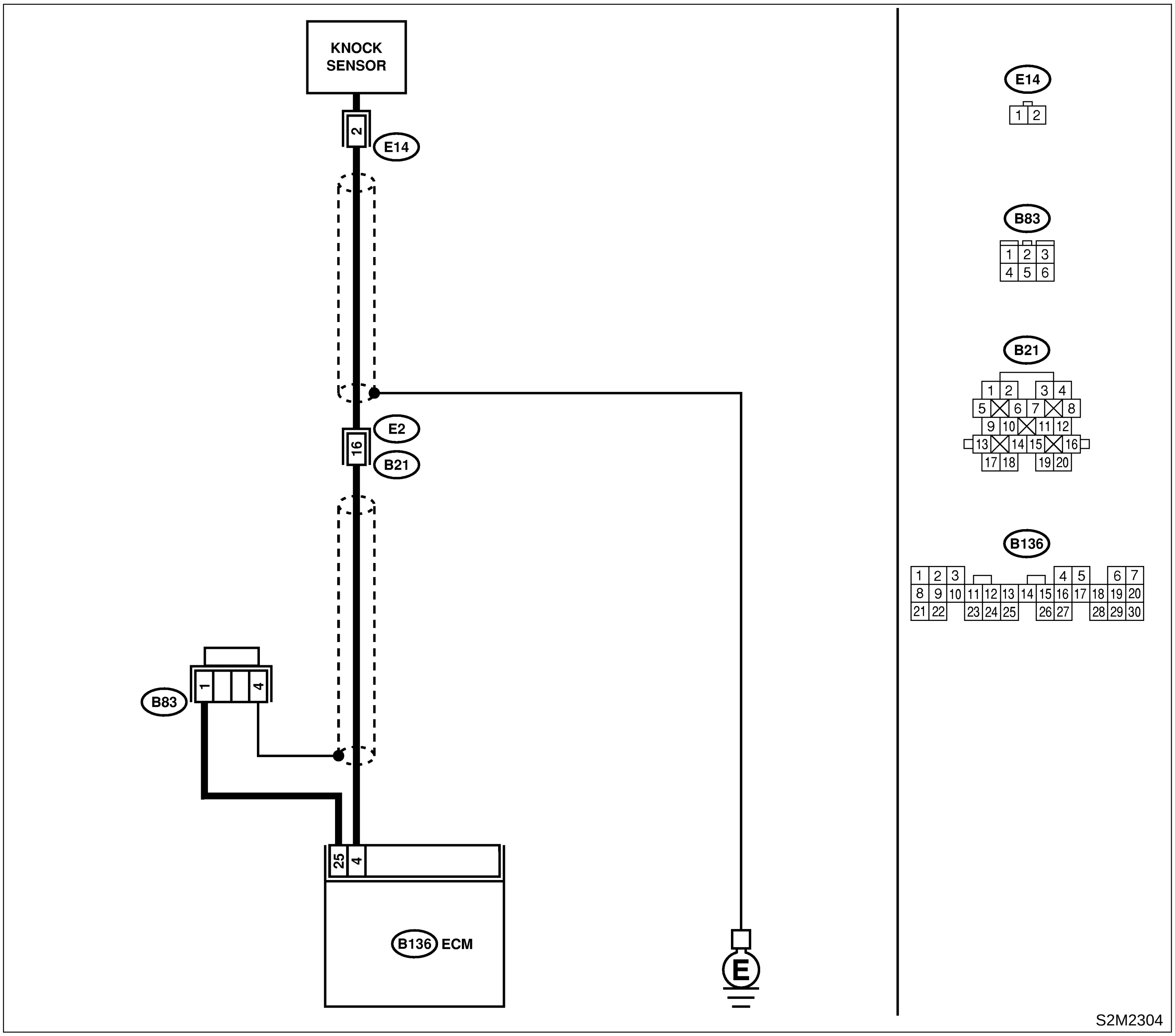
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM harness connector and chassis ground. ***Connector & terminal*** ***(B136) No. 4 — Chassis ground:***	Is the resistance more than 700 kΩ?	Go to step **2**.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between knock sensor and ECM connector ● Poor contact in knock sensor connector ● Poor contact in coupling connector
2	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connector terminal and engine ground. ***Terminal*** ***No. 2 — Engine ground:***	Is the resistance more than 700 kΩ?	Go to step **3**.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between knock sensor and ECM connector ● Poor contact in knock sensor connector ● Poor contact in coupling connector
3	**CHECK CONDITION OF KNOCK SENSOR INSTALLATION.**	Is the knock sensor installation bolt tightened securely?	Replace the knock sensor. <Ref. to FU-31, Knock Sensor.>	Tighten knock sensor installation bolt securely.

AK: DTC P0328 — KNOCK SENSOR CIRCUIT HIGH INPUT — S078521F95

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 4 — Chassis ground:***	Is the resistance less than 400 kΩ?	Go to step **2**.	Go to step **3**.

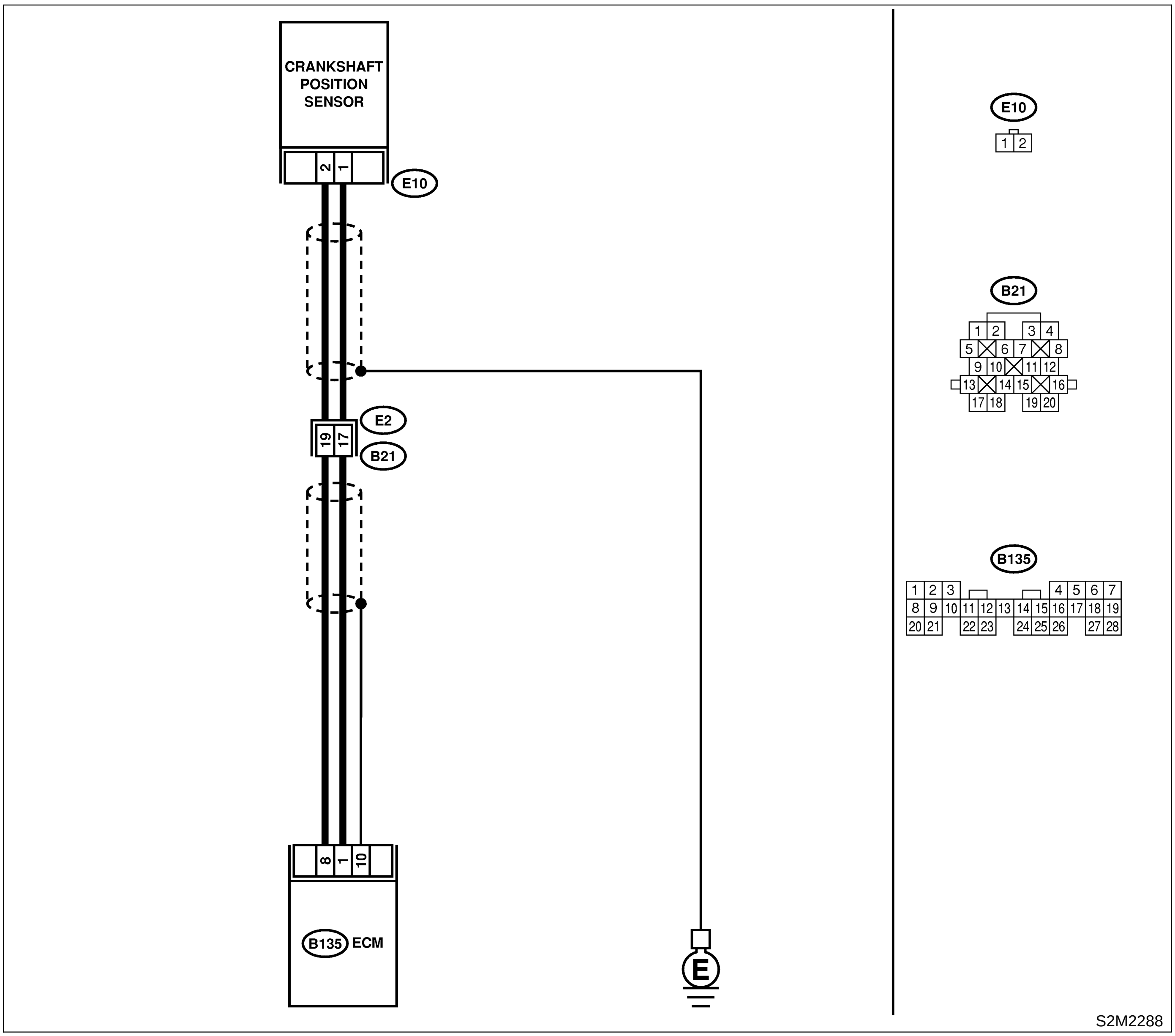
No.	Step	Check	Yes	No
2	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connector terminal and engine ground. ***Terminal*** ***No. 2 — Engine ground:***	Is the resistance less than 400 kΩ?	Replace the knock sensor. <Ref. to FU-31, Knock Sensor.>	Repair ground short circuit in harness between knock sensor connector and ECM connector. NOTE: The harness between both connectors is shielded. Repair short circuit of harness together with shield.
3	**CHECK INPUT SIGNAL FOR ECM.** 1) Connect the connectors to ECM and knock sensor. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) 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 connector ● Poor contact in ECM connector ● Poor contact in coupling connector	Repair poor contact in ECM connector.

AL: DTC P0335 — CRANKSHAFT POSITION SENSOR CIRCUIT MALFUNCTION — *S078521B42*

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



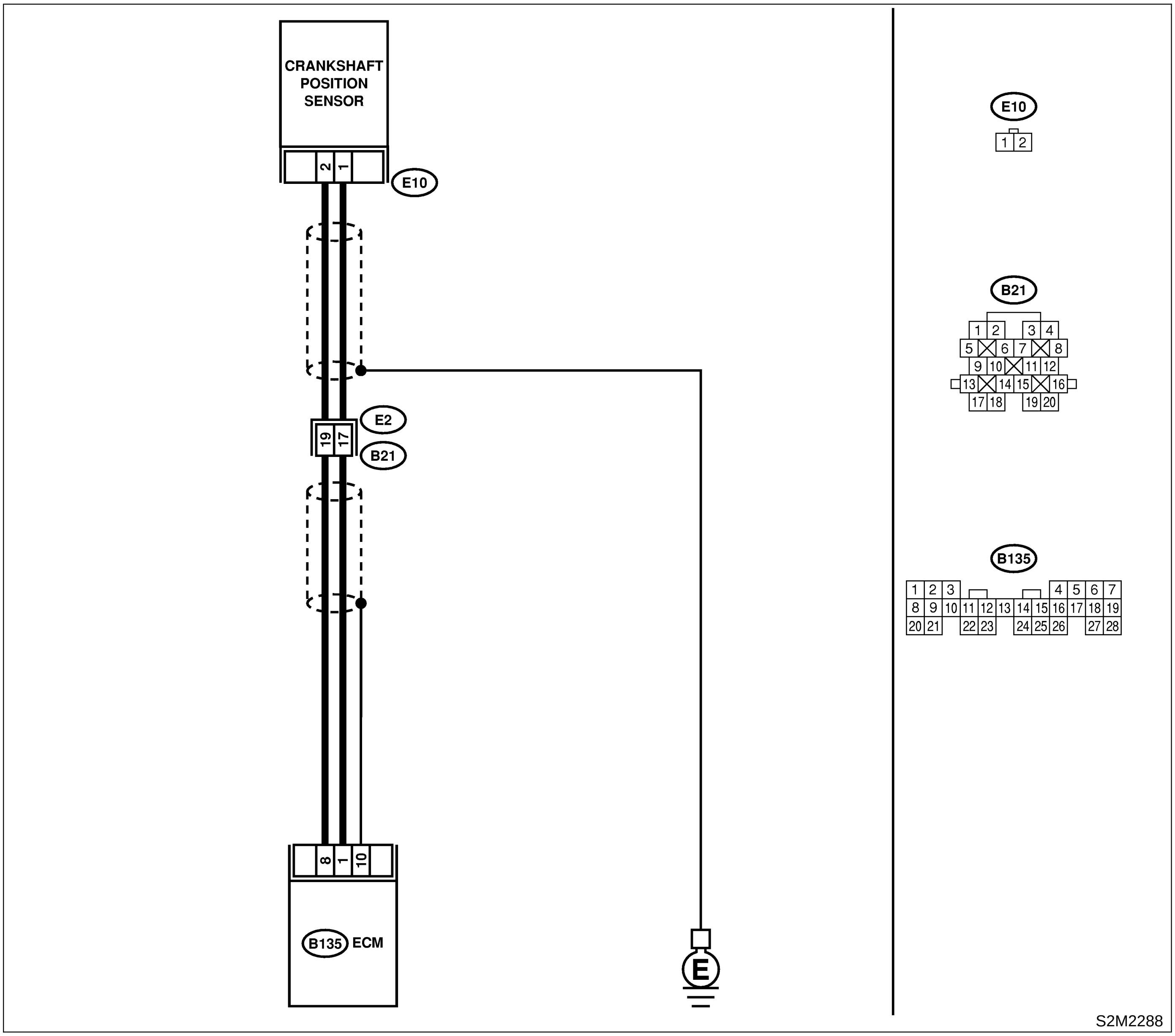
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN CRANK-SHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from crankshaft position sensor. 3) Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:***	Is the resistance more than 100 kΩ?	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between crankshaft position sensor and ECM connector ● Poor contact in ECM connector ● Poor contact in coupling connector	Go to step **2**.
2	**CHECK HARNESS BETWEEN CRANK-SHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between crankshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair ground short circuit in harness together with shield.	Go to step **3**.
3	**CHECK HARNESS BETWEEN CRANK-SHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **4**.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between crankshaft position sensor and ECM connector ● Poor contact in ECM connector ● Poor contact in coupling connector
4	**CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.**	Is the crankshaft position sensor installation bolt tightened securely?	Go to step **5**.	Tighten crankshaft position sensor installation bolt securely.
5	**CHECK CRANKSHAFT POSITION SENSOR.** 1) Remove the crankshaft position sensor. 2) Measure the resistance between connector terminals of crankshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 1 and 4 kΩ?	Repair poor contact in crankshaft position sensor connector.	Replace the crankshaft position sensor. <Ref. to FU-29, Crankshaft Position Sensor.>

AM: DTC P0336 — CRANKSHAFT POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM — *S078521B43*

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



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 “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.** Turn the 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 SPROCKET.** Remove the front belt cover.	Are crankshaft sprocket teeth cracked or damaged?	Replace the crankshaft sprocket. <Ref. to ME-53, Crankshaft Sprocket.>	Go to step **4**.
4	**CHECK INSTALLATION CONDITION OF TIMING BELT.** Turn the crankshaft using ST, and align alignment mark on crankshaft sprocket with alignment mark on cylinder block. ST 499987500 CRANKSHAFT SOCKET	Is the timing belt dislocated from its proper position?	Repair installation condition of timing belt. <Ref. to ME-46, Timing Belt Assembly.>	Replace the crankshaft position sensor. <Ref. to FU-29, Crankshaft Position Sensor.>

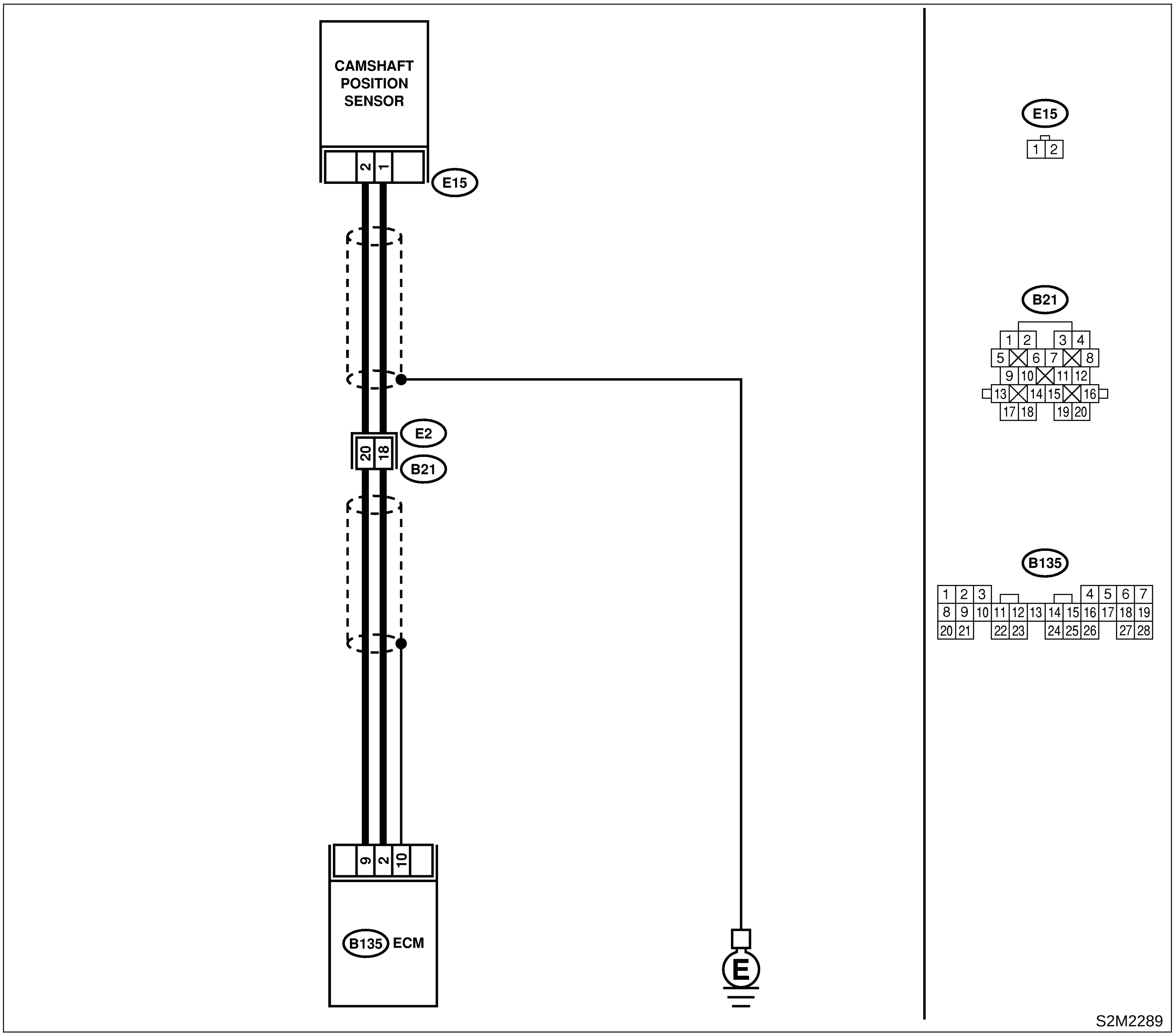
AN: DTC P0340 — CAMSHAFT POSITION SENSOR CIRCUIT MALFUNCTION —

S078521B44

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



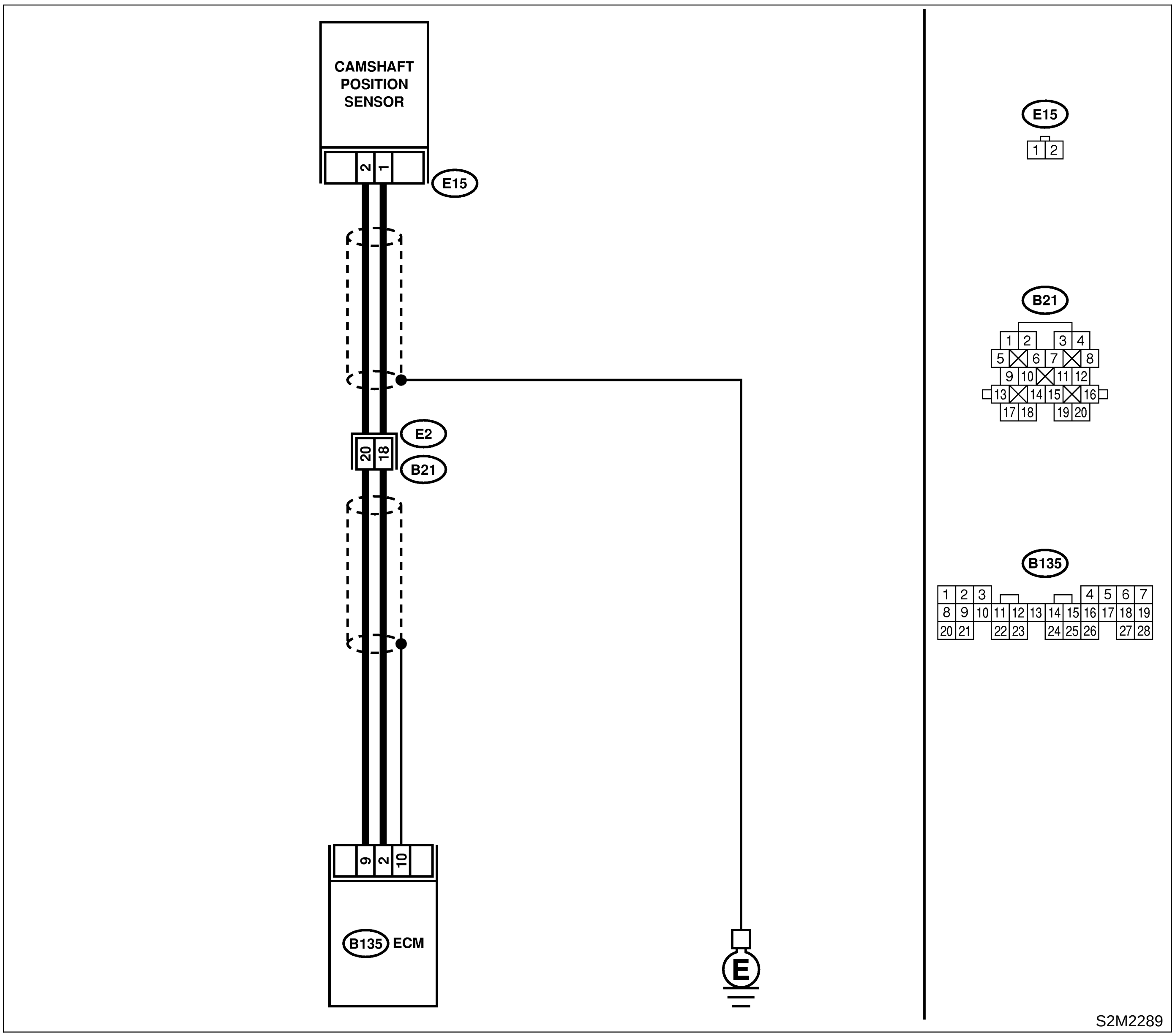
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from camshaft position sensor. 3) Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	Is the resistance more than 100 kΩ?	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between camshaft position sensor and ECM connector ● Poor contact in ECM connector ● Poor contact in coupling connector	Go to step **2**.
2	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between camshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair ground short circuit in harness together with shield.	Go to step **3**.
3	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **4**.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between camshaft position sensor and ECM connector ● Poor contact in ECM connector ● Poor contact in coupling connector
4	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.**	Is the camshaft position sensor installation bolt tightened securely?	Go to step **5**.	Tighten camshaft position sensor installation bolt securely.
5	**CHECK CAMSHAFT POSITION SENSOR.** 1) Remove the camshaft position sensor. 2) Measure the resistance between connector terminals of camshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 1 and 4 kΩ?	Repair poor contact in camshaft position sensor connector.	Replace the camshaft position sensor. <Ref. to FU-30, Camshaft Position Sensor.>

AO: DTC P0341 — CAMSHAFT POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM — S078521B45

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



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 “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from camshaft position sensor. 3) Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	Is the resistance more than 100 kΩ?	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between camshaft position sensor and ECM connector ● Poor contact in ECM connector ● Poor contact in coupling connector	Go to step **3**.
3	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between camshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair ground short circuit in harness together with shield.	Go to step **4**.
4	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5**.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between camshaft position sensor and ECM connector ● Poor contact in ECM connector ● Poor contact in coupling connector
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 securely.

No.	Step	Check	Yes	No
6	**CHECK CAMSHAFT POSITION SENSOR.** 1) Remove the camshaft position sensor. 2) Measure the resistance between connector terminals of camshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 1 and 4 kΩ?	Go to step **7**.	Replace the camshaft position sensor. <Ref. to FU-30, Camshaft Position Sensor.>
7	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.** Turn the ignition switch to OFF.	Is the camshaft position sensor installation bolt tightened securely?	Go to step **8**.	Tighten camshaft position sensor installation bolt securely.
8	**CHECK CAMSHAFT SPROCKET.** Remove the front belt cover. <Ref. to ME-45, Belt Cover.>	Are camshaft sprocket teeth cracked or damaged?	Replace the camshaft sprocket. <Ref. to ME-51, Camshaft Sprocket.>	Go to step **9**.
9	**CHECK INSTALLATION CONDITION OF TIMING BELT.** Turn the camshaft using ST, and align alignment mark on camshaft sprocket with alignment mark on timing belt cover LH. ST 499207100 CAMSHAFT SPROCKET WRENCH	Is the timing belt dislocated from its proper position?	Repair installation condition of timing belt. <Ref. to ME-46, Timing Belt Assembly.>	Replace the camshaft position sensor. <Ref. to FU-30, Camshaft Position Sensor.>

MEMO:

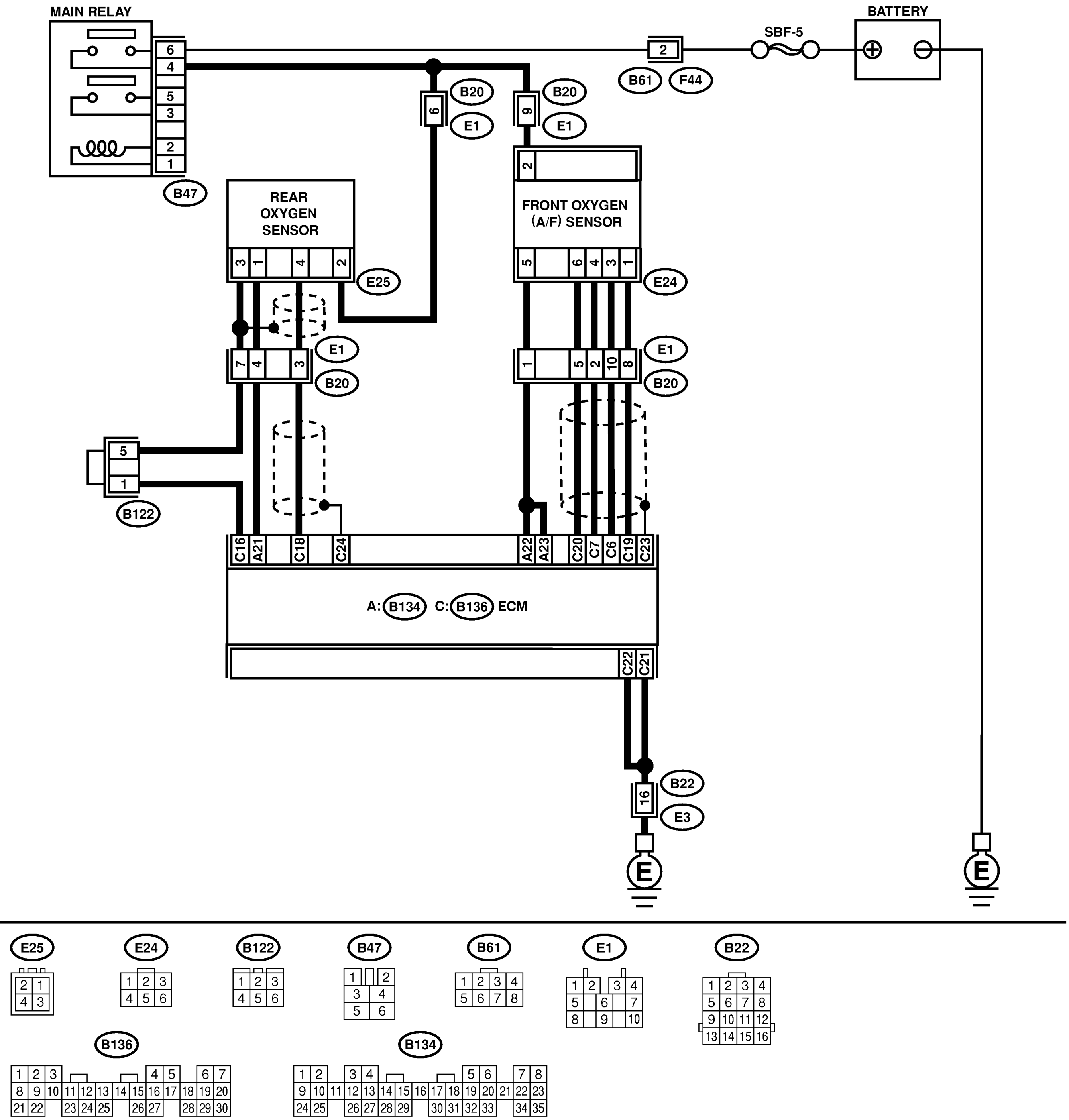
AP: DTC P0420 — CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD —

S078521B46

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



S2M2317

No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN-84, 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 the exhaust system. <Ref. to EX-2, General Description.>	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 the front catalytic converter <Ref. to EC-3, Front Catalytic Converter.> and rear catalytic converter <Ref. to EC-4, Rear Catalytic Converter.>.	Go to step **4**.
4	**CHECK FRONT CATALYTIC CONVERTER.** Remove the front catalytic converter.	Is there damage at rear face or front face of front catalyst?	Replace the front catalytic converter. <Ref. to EC-3, Front Catalytic Converter.>	Go to step **5**.
5	**CHECK REAR OXYGEN SENSOR HARNESS SHIELD WIRE.** NOTE: Visually check the above.	Is shield wire open?	Repair the rear oxygen sensor harness shield wire.	Go to step **6**.
6	**CHECK HARNESS BETWEEN ECM AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 21 — Chassis ground:*** ***(B136) No. 22 — Chassis ground:***	Is the resistance less than 5 Ω?	Contact with SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between ECM and chassis ground ● Poor contact in coupling connector

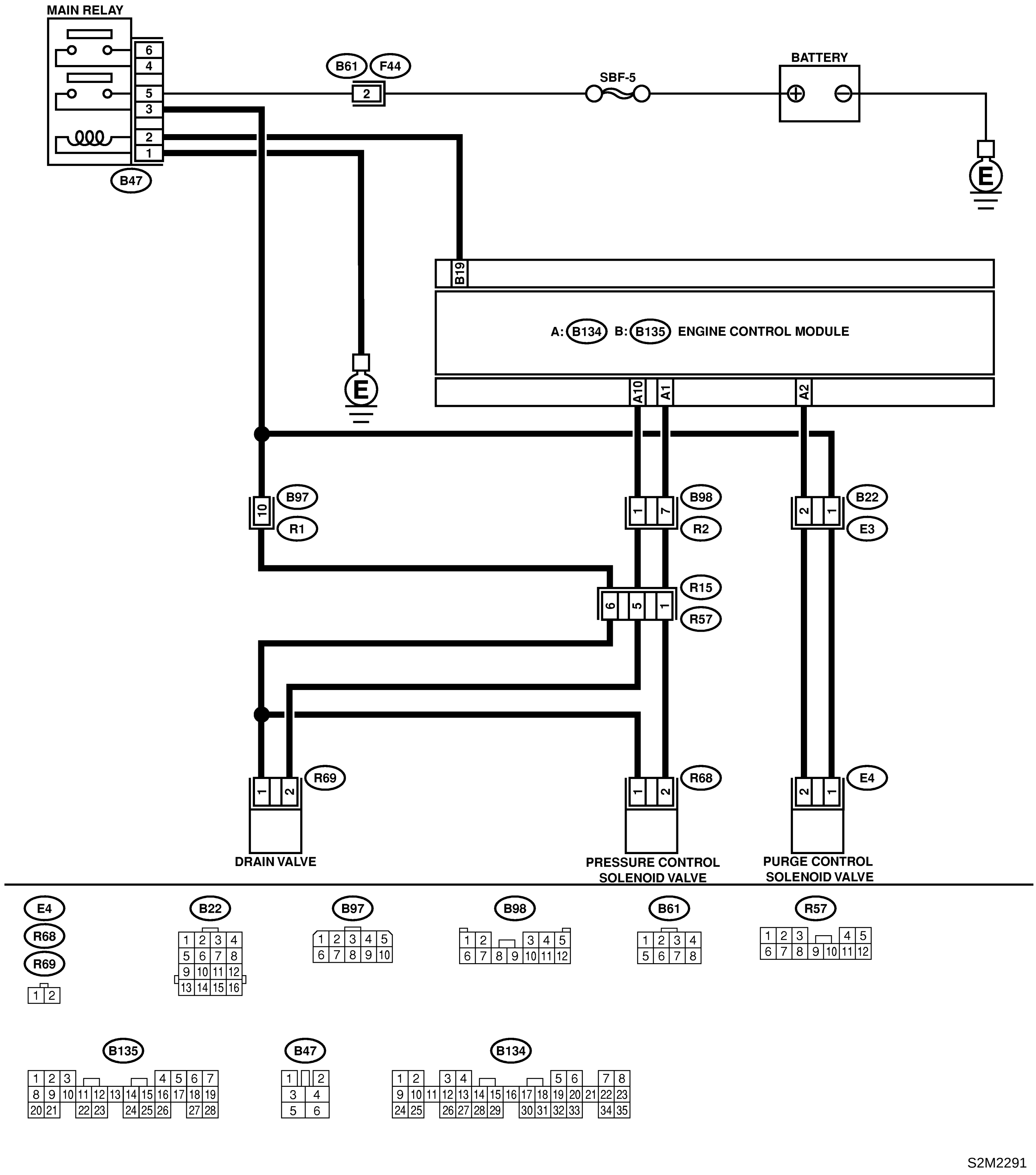
MEMO:

AQ: DTC P0442 — EVAPORATIVE EMISSION CONTROL SYSTEM MALFUNCTION — S078521B48

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, 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 the relevant DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK FUEL FILLER CAP.** 1) Turn the 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 the fuel filler cap and fuel filler pipe. <Ref. to FU-58, Fuel Filler Pipe.>	Go to step **4**.
4	**CHECK DRAIN VALVE.** 1) Connect the test mode connector. 2) Turn the ignition switch to ON. 3) Operate the 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-51, Compulsory Valve Operation Check Mode.>	Does the drain valve produce operating sound?	Go to step **5**.	Replace the drain valve. <Ref. to EC-11, Pressure Control Solenoid Valve.>
5	**CHECK PURGE CONTROL SOLENOID VALVE.** Operate the 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-51, Compulsory Valve Operation Check Mode.>	Does the purge control solenoid valve produce operating sound?	Go to step **6**.	Replace the purge control solenoid valve. <Ref. to EC-6, Purge Control Solenoid Valve.>
6	**CHECK PRESSURE CONTROL SOLENOID VALVE.** Operate the 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-51, Compulsory Valve Operation Check Mode.>	Does the pressure control solenoid valve produce operating sound?	Go to step **7**.	Replace the pressure control solenoid valve. <Ref. to EC-11, Pressure Control Solenoid Valve.>
7	**CHECK EVAPORATIVE EMISSION CONTROL SYSTEM LINE.** Turn the ignition switch to OFF.	Is there a hole of more than 1.0 mm (0.04 in) dia. on fuel line?	Repair or replace the fuel line. <Ref. to FU-70, Fuel Delivery, Return and Evaporation Lines.>	Go to step **8**.

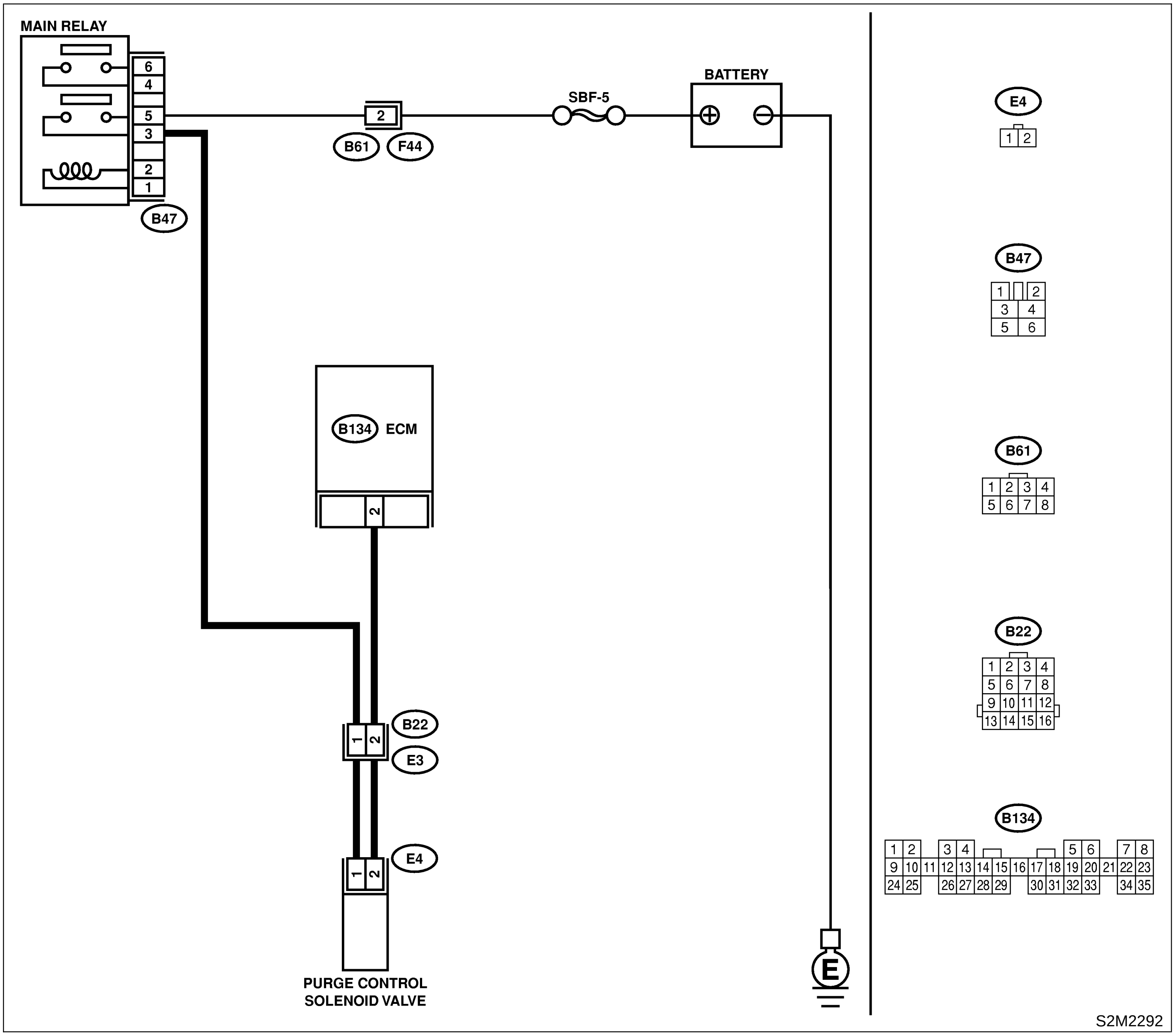
No.	Step	Check	Yes	No
8	**CHECK CANISTER.**	Is the canister damaged or is there a hole of more than 1.0 mm (0.04 in) dia. in it?	Repair or replace the canister. <Ref. to EC-5, Canister.>	Go to step **9**.
9	**CHECK FUEL TANK.** Remove the fuel tank. <Ref. to FU-55, Fuel Tank.>	Is the fuel tank damaged or is there a hole of more than 1.0 mm (0.04 in) dia. in it?	Repair or replace the fuel tank. <Ref. to FU-55, 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 the hoses or pipes.	Contact with SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

AR: DTC P0444 — EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT LOW INPUT — S078521G47

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 2 (+) — 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 with SOA (distributor) service. 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 the ignition switch to OFF. 2) Disconnect the connectors from purge control solenoid valve and ECM. 3) Measure the 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 the resistance of harness between ECM and purge control solenoid valve of harness connector. ***Connector & terminal*** ***(B134) No. 2 — (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 the purge control solenoid valve. 2) Measure the 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 the purge control solenoid valve. <Ref. to EC-6, Purge Control Solenoid Valve.>
5	**CHECK POWER SUPPLY TO PURGE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to ON. 2) Measure the 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.

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 with SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

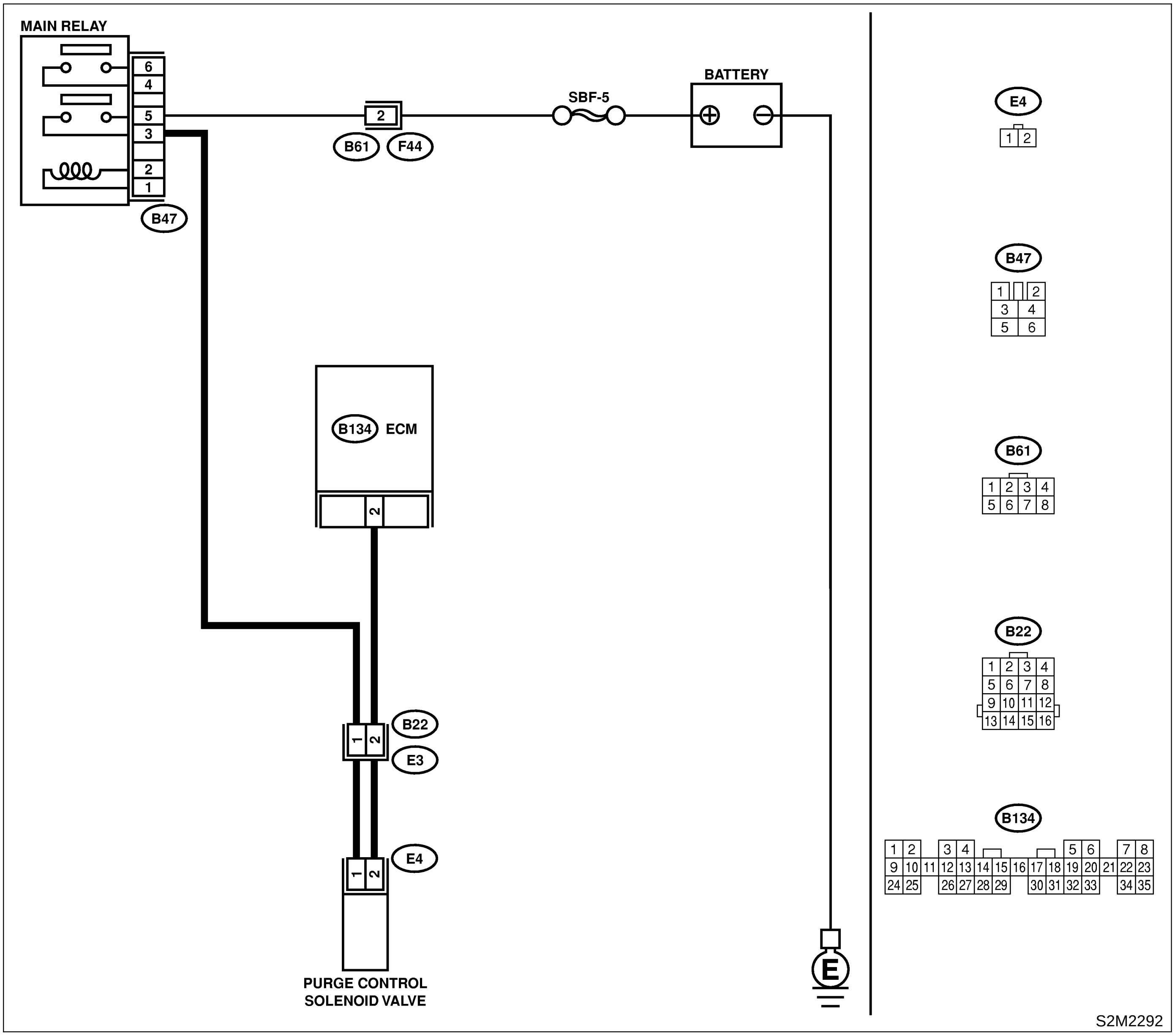
MEMO:

AS: DTC P0445 — EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH INPUT — S078521G48

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



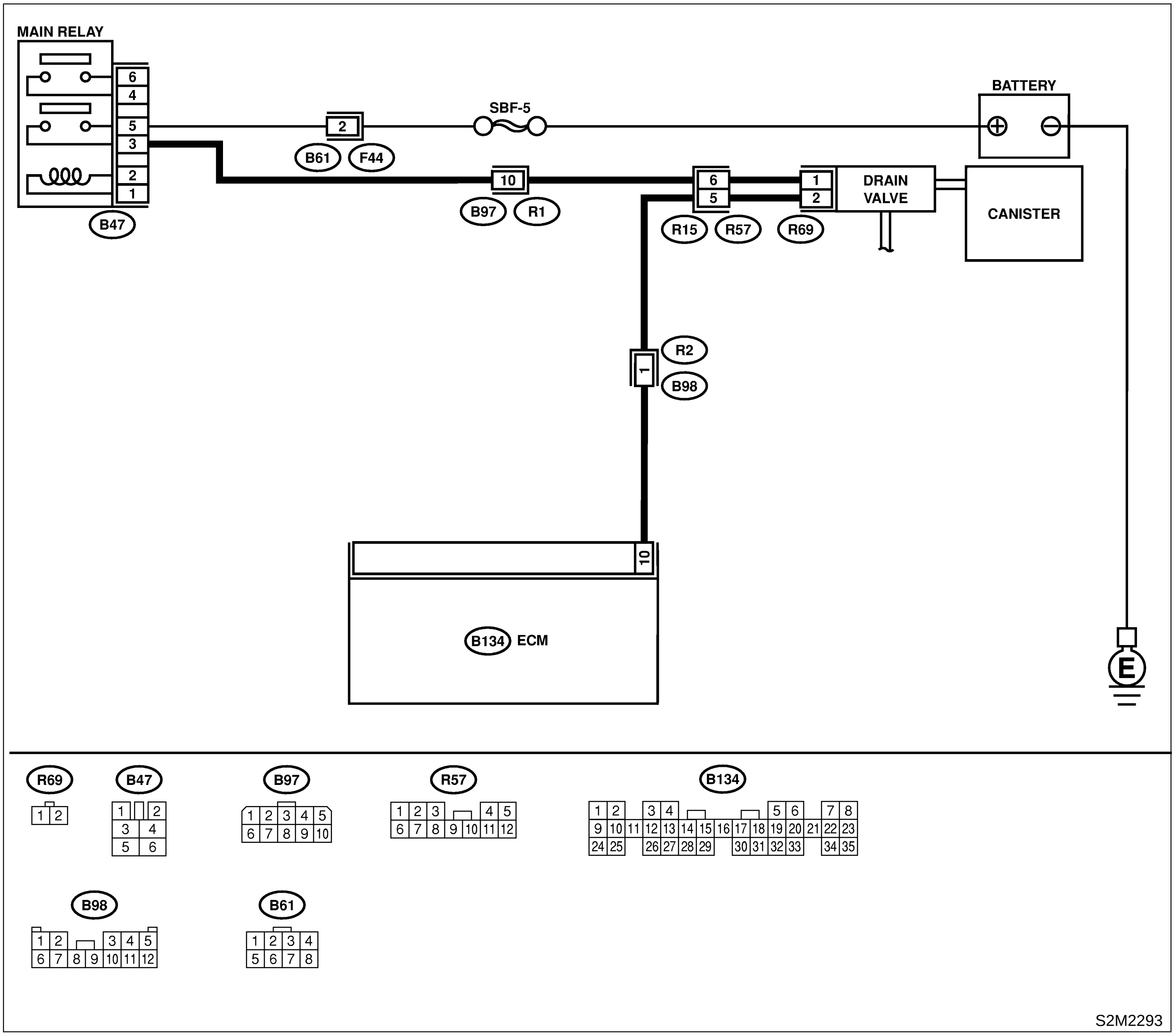
No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the test mode connector at the lower portion of instrument panel (on the driver's side). 3) Turn the ignition switch to ON. 4) While operating the purge control solenoid valve, measure voltage between 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-51, Compulsory Valve Operation Check Mode.> ***Connector & terminal*** ***(B134) No. 2 (+) — Chassis ground (−):***	Does the voltage change between 0 and 10 V?	Go to step **2**.	Even if MIL light 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 the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 2 (+) — 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 the ECM. <Ref. to FU-49, Engine Control Module.>
4	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from purge control solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the 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 purge control solenoid valve connector. After repair, replace the ECM. <Ref. to FU-49, Engine Control Module.>	Go to step **5**.
5	**CHECK PURGE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between purge control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Replace the purge control solenoid valve <Ref. to EC-6, Purge Control Solenoid Valve.> and ECM <Ref. to FU-49, 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 the ECM. <Ref. to FU-49, Engine Control Module.>

AT: DTC P0447 — EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL LOW INPUT — S078521F98

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 10 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2**.	Go to step **3**.

No.	Step	Check	Yes	No
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 the ignition switch to OFF. 2) Disconnect the connectors from drain valve and ECM. 3) Measure the 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 the resistance of harness between ECM and drain valve connector. ***Connector & terminal*** ***(B134) No. 10 — (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 the resistance between drain valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 10 and 100 Ω?	Go to step **6**.	Replace the drain valve. <Ref. to EC-16, Drain Valve.>

No.	Step	Check	Yes	No
6	**CHECK POWER SUPPLY TO DRAIN VALVE.** 1) Turn the ignition switch to ON. 2) Measure the 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 with SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

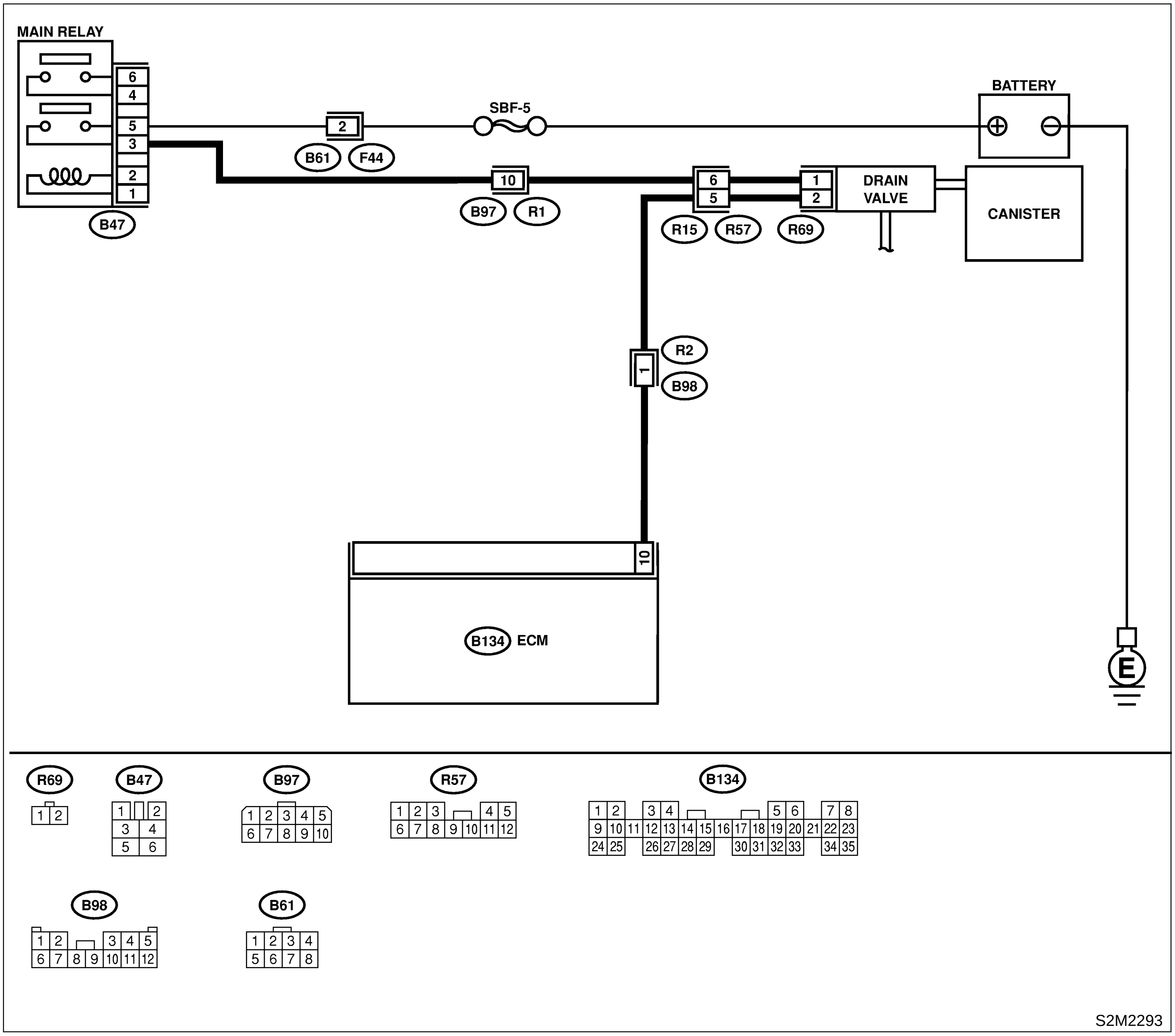
MEMO:

AU: DTC P0448 — EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL HIGH INPUT — S078521F99

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



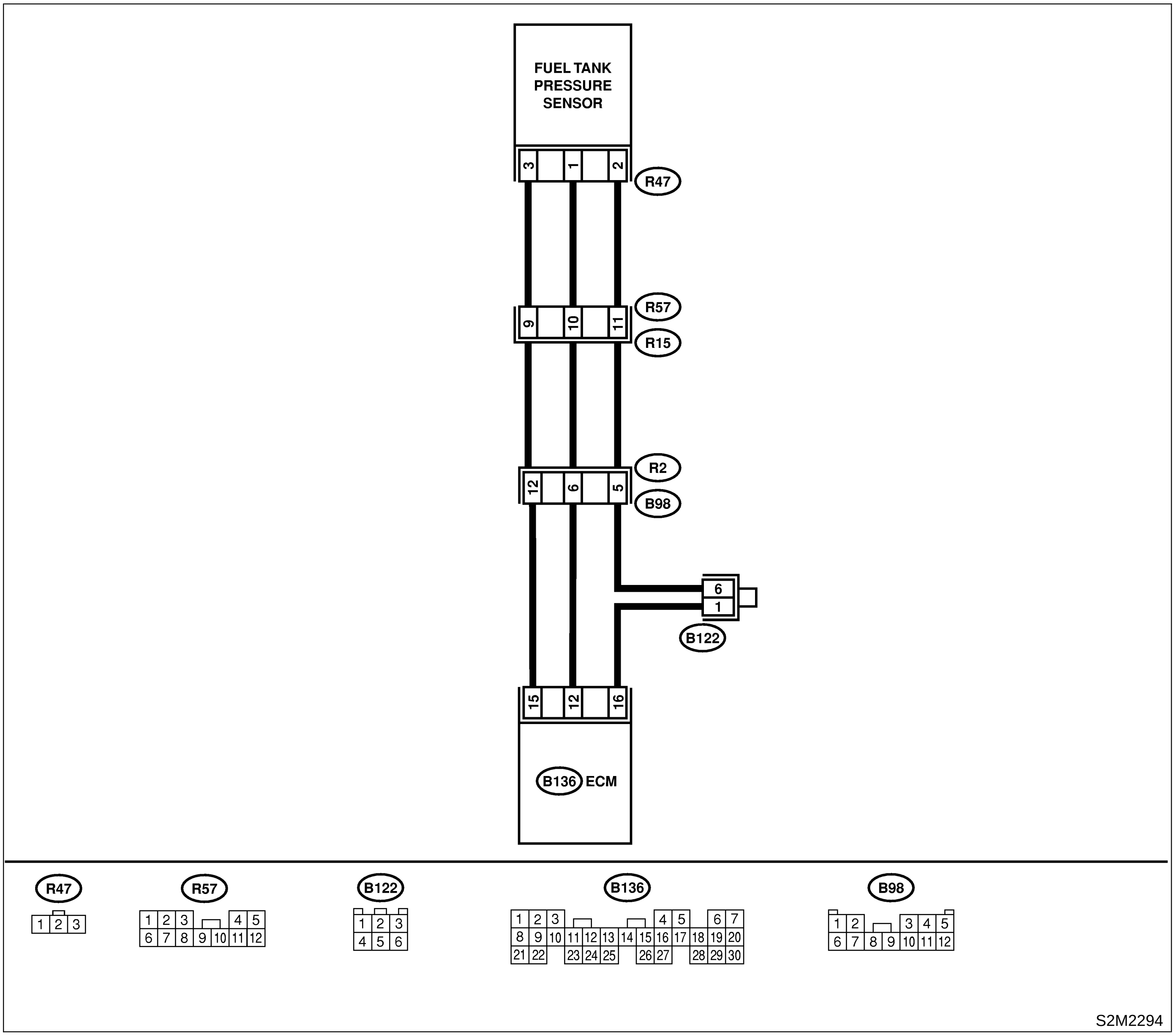
No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the test mode connector at the lower portion of instrument panel (on the driver's side). 3) Turn the ignition switch to ON. 4) While operating the drain valve, measure voltage between ECM and chassis ground. NOTE: Drain valve operation can be excecuted using Subaru Select Monitor. For procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN-51, Compulsory Valve Operation Check Mode.> ***Connector & terminal*** ***(B134) No. 10 (+) — Chassis ground (−):***	Does the voltage change between 0 and 10 V?	Go to step **2**.	Even if MIL light 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 the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 10 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **4**.	Go to step **5**.
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU-49, Engine Control Module.>
4	**CHECK HARNESS BETWEEN DRAIN VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from drain valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 10 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and drain valve connector. After repair, replace the ECM. <Ref. to FU-49, Engine Control Module.>	Go to step **5**.
5	**CHECK DRAIN VALVE.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between drain valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Replace the drain valve <Ref. to EC-16, Drain Valve.> and ECM <Ref. to FU-49, 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 the ECM. <Ref. to FU-49, Engine Control Module.>

AV: DTC P0451 — EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR RANGE/PERFORMANCE PROBLEM S078521B51

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



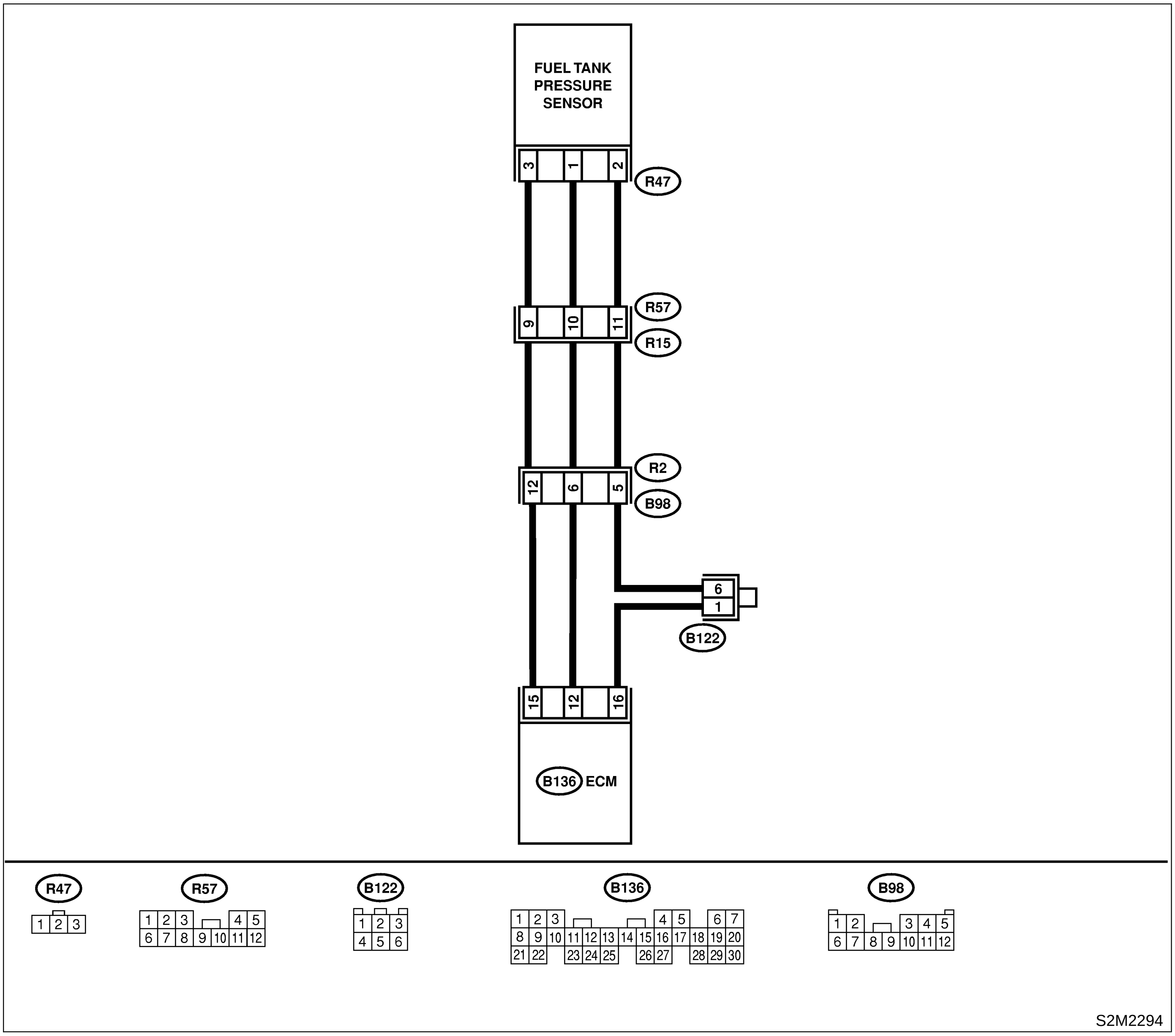
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is there any DTC on display?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK FUEL FILLER CAP.** 1) Turn the ignition switch to OFF. 2) 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 the hoses and pipes.	Replace the fuel tank pressure sensor. <Ref. to EC-10, Fuel Tank Pressure Sensor.>

AW: DTC P0452 — EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR LOW INPUT — S078521B52

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.> .

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Turn the ignition switch to OFF. 2) Remove the fuel filler cap. 3) Install the fuel filler cap. 4) Turn the 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-32, 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 the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 15 (+) — 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 the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 15 (+) — 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 (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
4	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 12 (+) — 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 the 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-32, 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**.

No.	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.** 1) Turn the ignition switch to OFF. 2) Remove the rear seat cushion (Sedan) or move rear seat cushion (Wagon). 3) Separate rear wiring harness and fuel tank cord. 4) Turn the ignition switch to ON. 5) Measure the voltage between rear wiring harness connector and chassis ground. ***Connector & terminal*** ***(R15) No. 9 (+) — 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
7	**CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and rear wiring harness connector. ***Connector & terminal*** ***(B136) No. 16 — (R15) No. 11:***	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 the resistance of harness between rear wiring harness connector and chassis ground. ***Connector & terminal*** ***(R15) No. 11 — Chassis ground:***	Is the resistance more than 500 kΩ?	Go to step **9**.	Repair ground short circuit in harness between ECM and rear wiring harness connector.
9	**CHECK FUEL TANK CORD.** 1) Disconnect the connector from fuel tank pressure sensor. 2) Measure the resistance of fuel tank cord. ***Connector & terminal*** ***(R57) No. 9 — (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 the resistance of fuel tank cord. ***Connector & terminal*** ***(R57) No. 11 — (R47) No. 2:***	Is the resistance less than 1 Ω?	Go to step **11**.	Repair open circuit in fuel tank cord.
11	**CHECK FUEL TANK CORD.** Measure the resistance of harness between fuel tank pressure sensor connector and chassis ground. ***Connector & terminal*** ***(R47) No. 1 — Chassis ground:***	Is the resistance more than 500 kΩ?	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 the fuel tank pressure sensor. <Ref. to EC-10, Fuel Tank Pressure Sensor.>

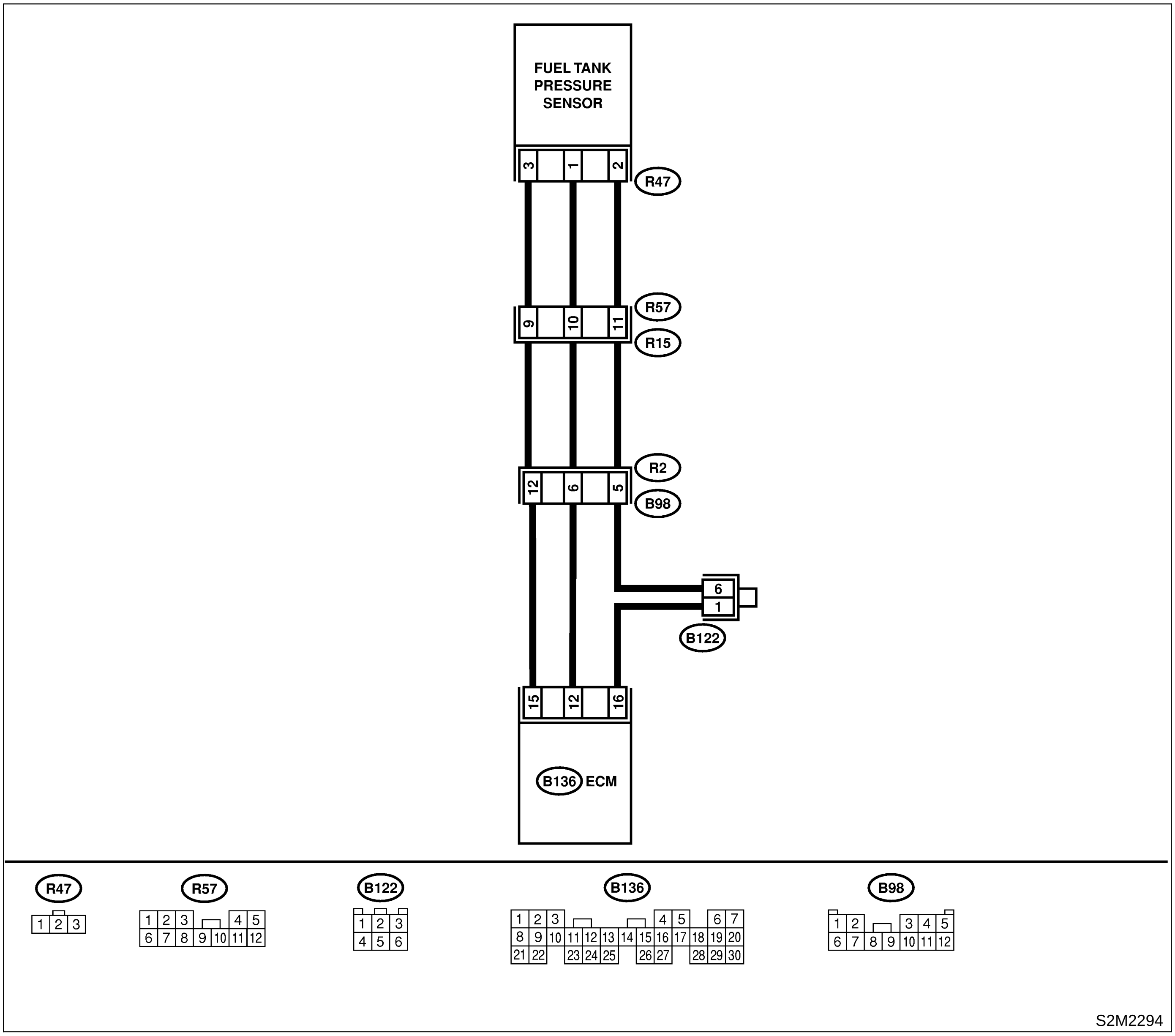
MEMO:

AX: DTC P0453 — EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR HIGH INPUT — S078521B53

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Turn the ignition switch to OFF. 2) Remove the fuel filler cap. 3) Install the fuel filler cap. 4) Turn the ignition switch to ON. 5) Read the 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-32, 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 the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 15 (+) — 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 the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 15 (+) — 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 the ECM. <Ref. to FU-49, Engine Control Module.>
4	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 12 (+) — 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 the 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-32, 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 the ignition switch to OFF. 2) Remove the rear seat cushion (Sedan) or move rear seat cushion (Wagon). 3) Separate rear wiring harness and fuel tank cord. 4) Turn the ignition switch to ON. 5) Measure the voltage between rear wiring harness connector and chassis ground. ***Connector & terminal*** ***(R15) No. 9 (+) — 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

No.	Step	Check	Yes	No
7	**CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and rear wiring harness connector. ***Connector & terminal*** ***(B136) No. 12 — (R15) No. 10:***	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 the resistance of harness between rear wiring harness connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 — (R15) No. 11:***	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 the connector from fuel tank pressure sensor. 2) Measure the resistance of fuel tank cord. ***Connector & terminal*** ***(R57) No. 10 — (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 the resistance of fuel tank cord. ***Connector & terminal*** ***(R57) No. 11 — (R47) No. 2:***	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 the fuel tank pressure sensor. <Ref. to EC-10, Fuel Tank Pressure Sensor.>
12	**CHECK HARNESS BETWEEN ECM AND FUEL TANK PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel tank pressure sensor. 3) Turn the ignition switch to ON. 4) 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-32, 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 the fuel tank pressure sensor. <Ref. to EC-10, Fuel Tank Pressure Sensor.>

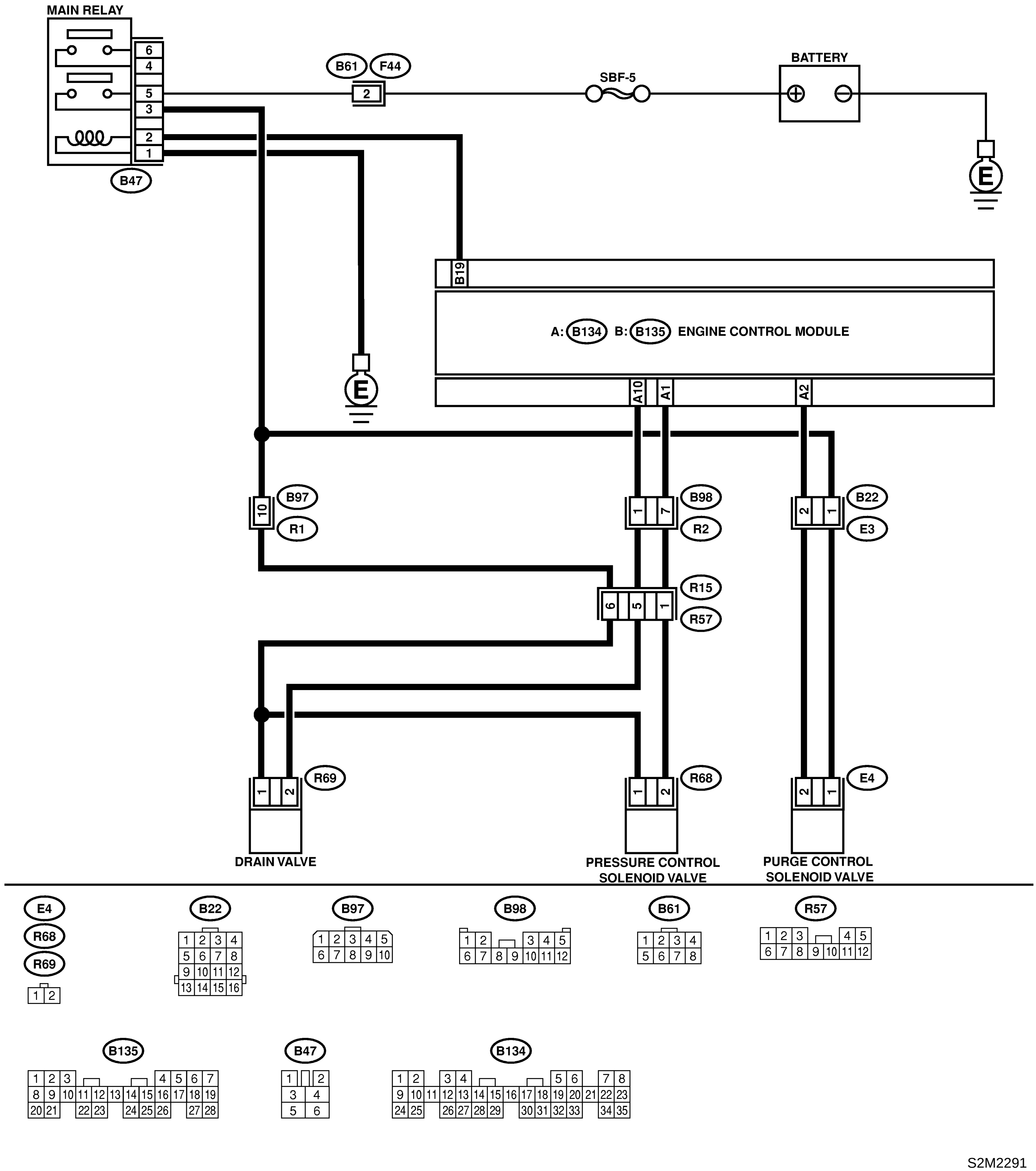
MEMO:

AY: DTC P0456 — EVAPORATIVE EMISSION CONTROL SYSTEM MALFUNCTION — S078521G00

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Gasoline smell
  - There is a hole of more than 0.5 mm (0.020 in) dia. in evaporation system or fuel tank.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, 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 the relevant DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK FUEL FILLER CAP.** 1) Turn the 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 the fuel filler cap and fuel filler pipe. <Ref. to FU-58, Fuel Filler Pipe.>	Go to step **4**.
4	**CHECK DRAIN VALVE.** 1) Connect the test mode connector. 2) Turn the ignition switch to ON. 3) Operate the 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-51, Compulsory Valve Operation Check Mode.>	Does the drain valve produce operating sound?	Go to step **5**.	Replace the drain valve. <Ref. to EC-16, Drain Valve.>
5	**CHECK PURGE CONTROL SOLENOID VALVE.** Operate the 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-51, Compulsory Valve Operation Check Mode.>	Does the purge control solenoid valve produce operating sound?	Go to step **6**.	Replace the purge control solenoid valve. <Ref. to EC-6, Purge Control Solenoid Valve.>
6	**CHECK PRESSURE CONTROL SOLENOID VALVE.** Operate the 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-51, Compulsory Valve Operation Check Mode.>	Does the pressure control solenoid valve produce operating sound?	Go to step **7**.	Replace the pressure control solenoid valve. <Ref. to EC-6, Purge Control Solenoid Valve.>
7	**CHECK EVAPORATIVE EMISSION CONTROL SYSTEM LINE.** Turn the ignition switch to OFF.	Is there a hole of more than 0.5 mm (0.020 in) dia. on fuel line?	Repair or replace the fuel line. <Ref. to FU-55, REMOVAL, Fuel Tank.>	Go to step **8**.
8	**CHECK CANISTER.**	Is the canister damaged or is there a hole of more than 0.5 mm (0.020 in) dia. in it?	Repair or replace the canister. <Ref. to EC-5, Canister.>	Go to step **9**.

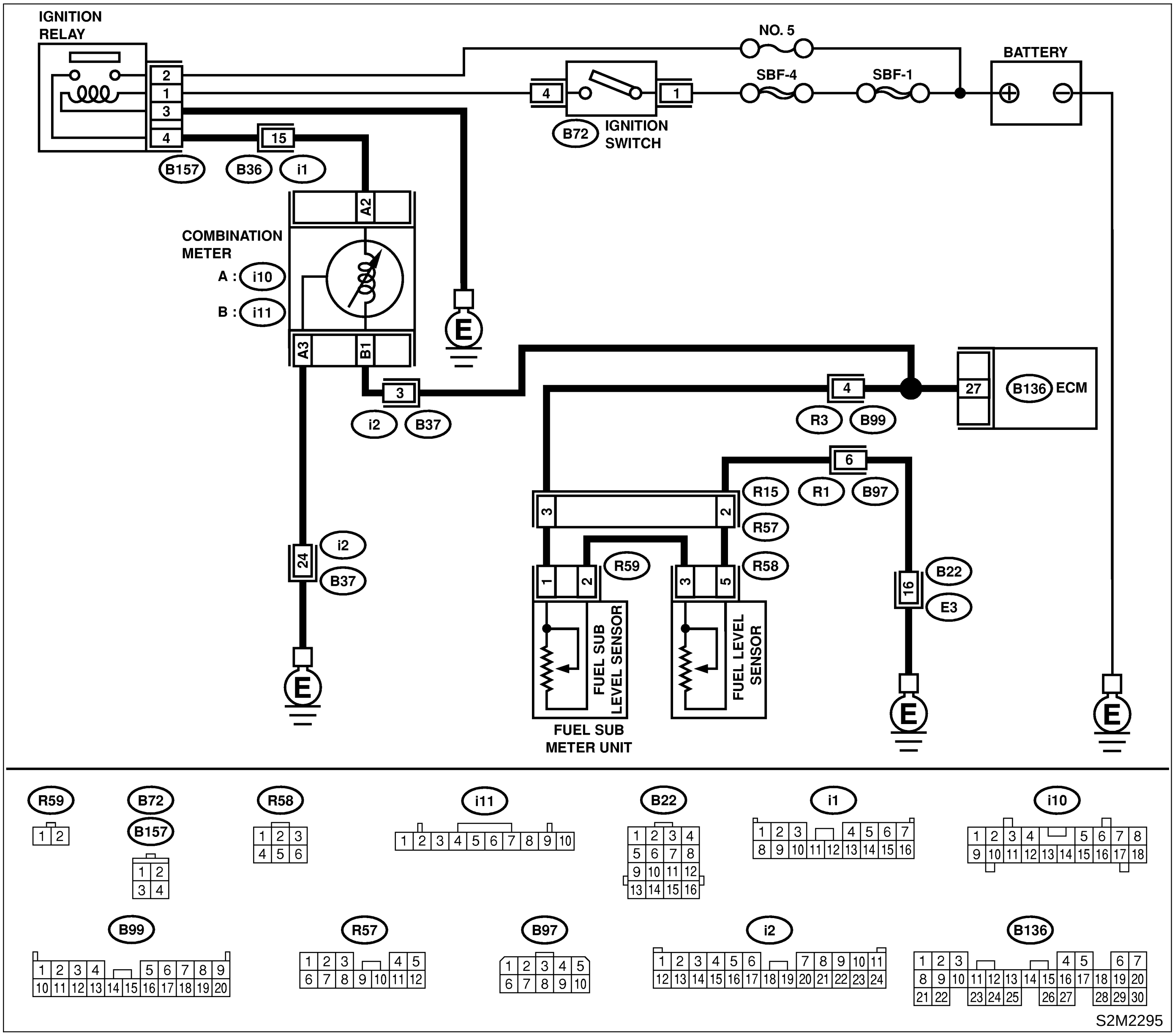
No.	Step	Check	Yes	No
9	**CHECK FUEL TANK.** Remove the fuel tank. <Ref. to FU-55, REMOVAL, Fuel Tank.>	Is the fuel tank damaged or is there a hole of more than 0.5 mm (0.020 in) dia. in it?	Repair or replace the fuel tank. <Ref. to FU-55, Fuel Tank.>	Go to step **10**.
10	**CHECK ANY OTHER MECHANICAL TROUBLE IN EVAPORATIVE EMISSION CONTROL SYSTEM.**	Are there holes of more than 0.5 mm (0.020 in) dia., cracks, clogging or disconnections of hoses or pipes in evaporative emission control system?	Repair or replace the hoses or pipes.	Contact with SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

AZ: DTC P0461 — FUEL LEVEL SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM — S078521B54

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.> .

- **WIRING DIAGRAM:**



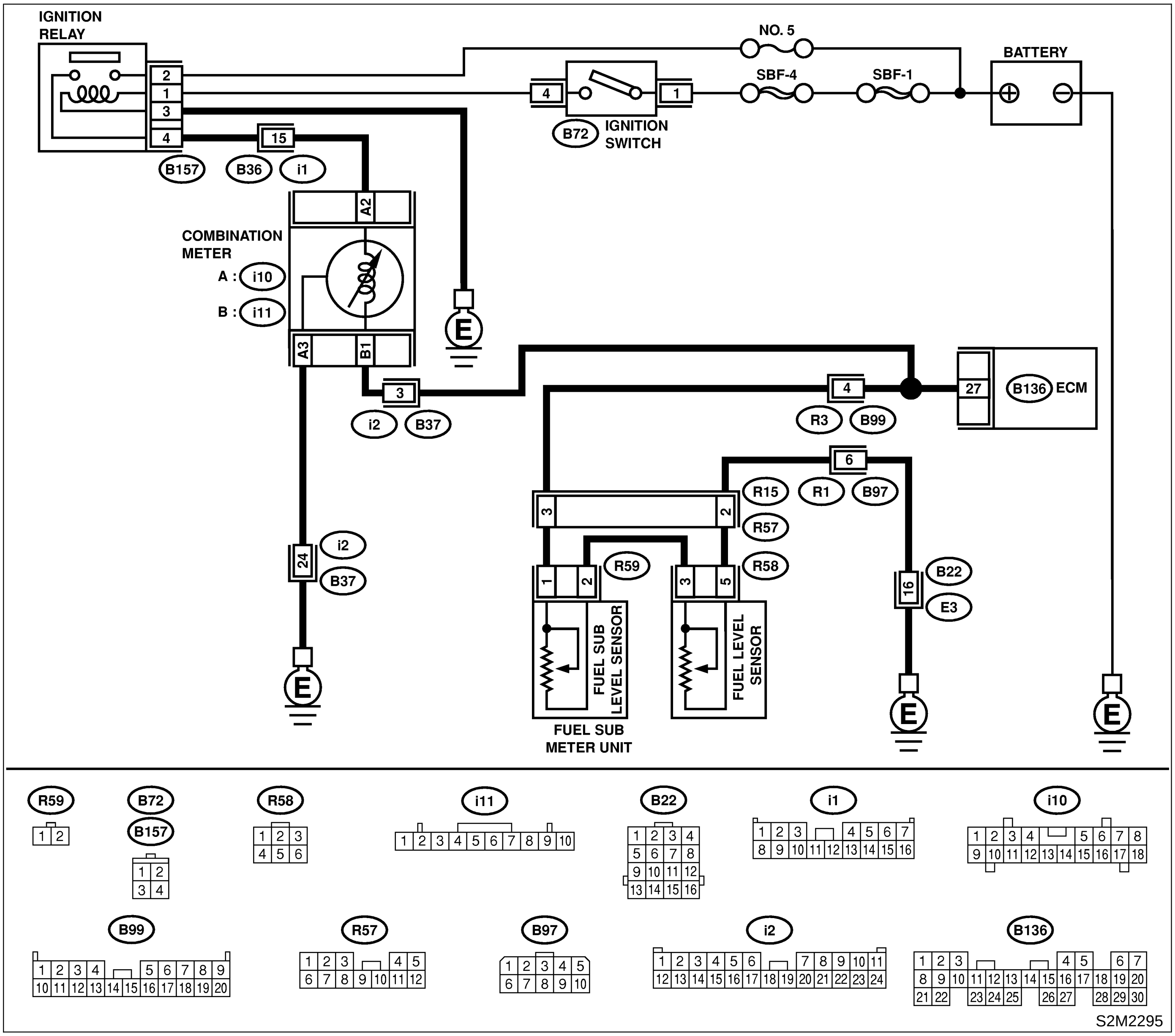
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0462 or P0463?	Inspect DTC P0462 or P0463 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect this trouble.	Replace the fuel level sensor <Ref. to FU-65, Fuel Level Sensor.> and fuel sub level sensor <Ref. to FU-66, Fuel Sub Level Sensor.>.

BA: DTC P0462 — FUEL LEVEL SENSOR CIRCUIT LOW INPUT — S078521B55

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK SPEEDOMETER AND TACHOMETER OPERATION IN COMBINATION METER.**	Does the speedometer and tachometer operate normally?	Go to step **2**.	Repair or replace the combination meter. <Ref. to IDI-4, Combination Meter System.>

No.	Step	Check	Yes	No
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. (Engine OFF) 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 27 (+) — 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 the 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-32, 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 the ignition switch to OFF. 2) Separate fuel tank cord connector (R57) and rear wiring harness connector (R15). 3) Turn the ignition switch to ON. 4) Measure the voltage of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 27 (+) — 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 the ignition switch to OFF. 2) Disconnect the connector from connector (i11) and ECM connector. 3) Measure the resistance between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 27 — 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 the resistance between ECM and combination meter connector. ***Connector & terminal*** ***(B136) No. 27 — (i11) No. 1:***	Is the resistance less than 10 Ω?	Repair or replace the 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

No.	Step	Check	Yes	No
7	**CHECK FUEL TANK CORD.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel sub level sensor. 3) Measure the 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 the connector from fuel pump assembly. 2) Measure the 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.** 1) Remove the fuel pump assembly. <Ref. to FU-66, Fuel Sub Level Sensor.> 2) Measure the resistance between fuel level sensor and terminals with its float set to the full position. ***Terminals*** ***No. 3 — No. 2:***	Is the resistance between 0.5 and 2.5 Ω?	Go to step **10**.	Replace the fuel level sensor.
10	**CHECK FUEL SUB LEVEL SENSOR.** 1) Remove the fuel sub level sensor. <Ref. to FU-63, REMOVAL, Fuel Pump.> 2) Measure the 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 the fuel sub level sensor.

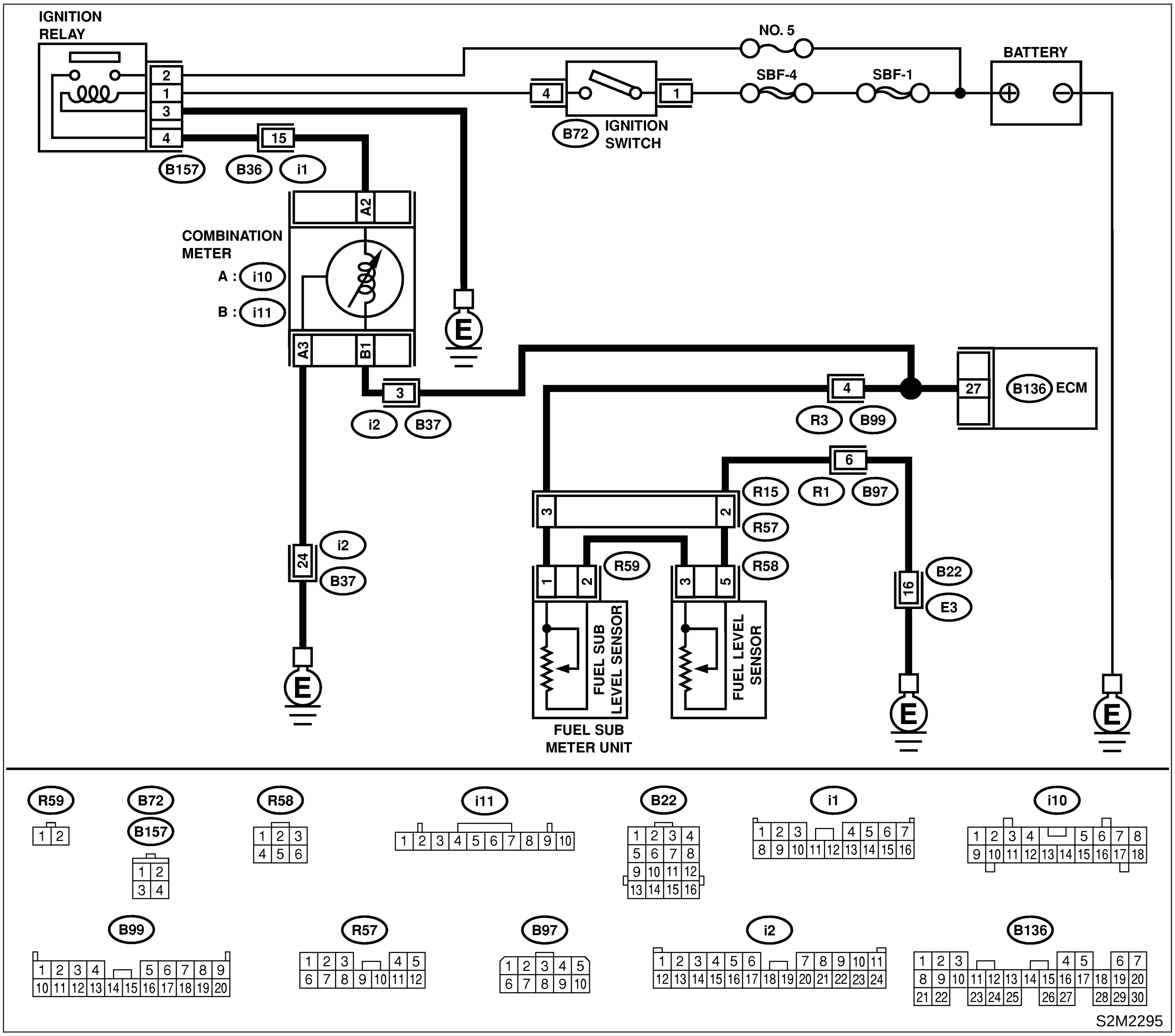
MEMO:

BB: DTC P0463 — FUEL LEVEL SENSOR CIRCUIT HIGH INPUT — S078521B56

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK SPEEDOMETER AND TACHOMETER OPERATION IN COMBINATION METER.**	Does the speedometer and tachometer operate normally?	Go to step **2**.	Repair or replace the combination meter. <Ref. to IDI-4, Combination Meter System.>

No.	Step	Check	Yes	No
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. (Engine OFF) 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 27 (+) — 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 the ignition switch to OFF. 2) Disconnect the combination meter connector (i10) and ECM connector. 3) Turn the ignition switch to ON. 4) Measure the voltage of harness between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 27 (+) — 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 the ignition switch to OFF. 2) Separate fuel tank cord connector (R57) and rear wiring harness connector (R15). 3) Measure the resistance between ECM and fuel tank cord. ***Connector & terminal*** ***(B136) No. 27 — (R15) No. 3:***	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 the resistance between fuel tank cord and chassis ground. ***Connector & terminal*** ***(R15) No. 2 — 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 the connector from fuel level sensor. 2) Measure the resistance between fuel level sensor and coupling connector. ***Connector & terminal*** ***(R57) No. 2 — (R58) No. 2:***	Is the resistance less than 10 Ω?	Go to step **7**.	Repair open circuit between coupling connector and fuel level sensor.

No.	Step	Check	Yes	No
7	**CHECK FUEL TANK CORD.** 1) Disconnect the connector from fuel sub level sensor. 2) Measure the resistance between fuel level sensor and fuel sub level sensor. ***Connector & terminal*** ***(R58) No. 3 — (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 the resistance between fuel sub level sensor and coupling connector. ***Connector & terminal*** ***(R57) No. 3 — (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.** 1) Remove the fuel pump assembly. <Ref. to FU-66, REMOVAL, Fuel Sub Level Sensor.> 2) While moving the fuel level sensor float up and down, measure resistance between fuel level sensor terminals. ***Terminals*** ***No. 3 — No. 2:***	Is the resistance more than 54.5 Ω?	Replace the fuel level sensor. <Ref. to FU-63, REMOVAL, Fuel Pump.>	Go to step **10**.
10	**CHECK FUEL SUB LEVEL SENSOR.** 1) Remove the fuel sub level sensor. <Ref. to FU-65, Fuel Level Sensor.> 2) While moving the 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 the fuel sub level sensor. <Ref. to FU-66, Fuel Sub Level Sensor.>	Replace the combination meter. <Ref. to IDI-12, Combination Meter Assembly.>

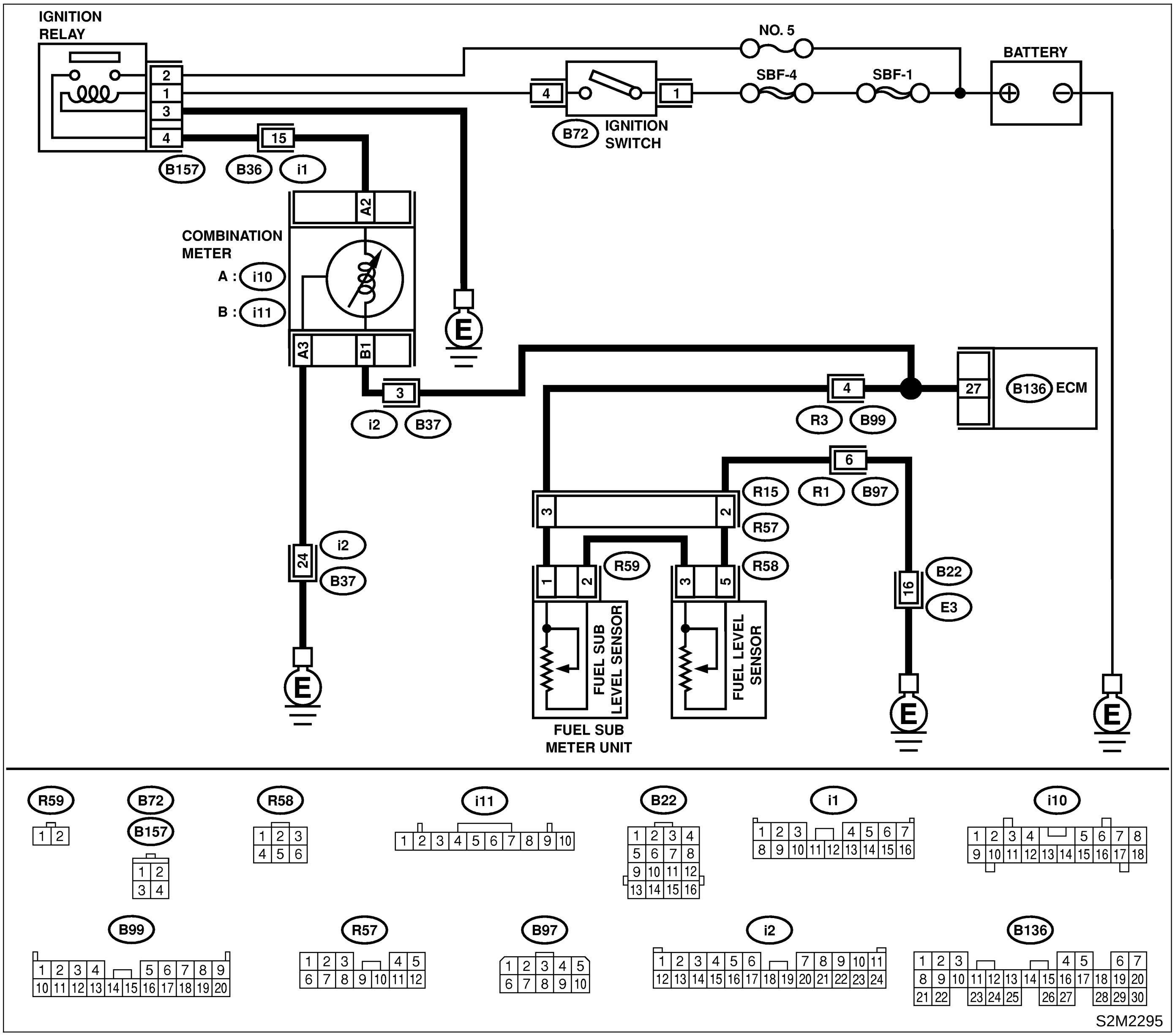
MEMO:

BC: DTC P0464 — FUEL LEVEL SENSOR INTERMITTENT INPUT— S078521G01

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.

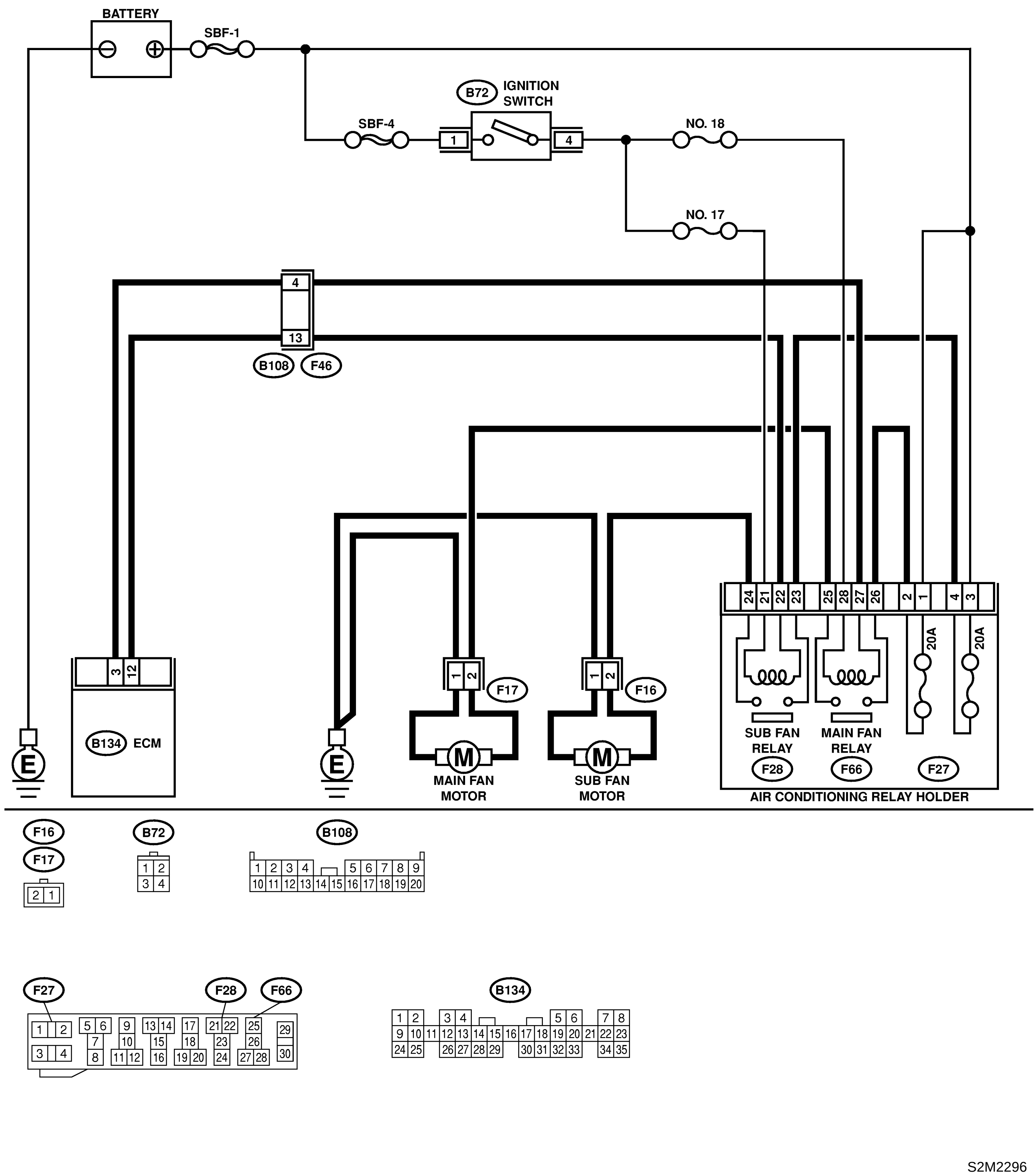
No.	Step	Check	Yes	No
2	**CHECK FUEL LEVEL SENSOR.** 1) Remove the fuel pump assembly. <Ref. to FU-63, REMOVAL, Fuel Pump.> 2) While moving the fuel level sensor float up and down, make sure that the resistance between fuel level sensor terminals changes smoothly. ***Terminals*** ***No. 3 — No. 2:***	Does the resistance change smoothly?	Go to step **3**.	Replace the fuel level sensor. <Ref. to FU-65, Fuel Level Sensor.>
3	**CHECK FUEL SUB LEVEL SENSOR.** 1) Remove the fuel sub level sensor. <Ref. to FU-66, REMOVAL, Fuel Sub Level Sensor.> 2) While moving the 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 the fuel sub level sensor. <Ref. to FU-66, Fuel Sub Level Sensor.>

BD: DTC P0480 — COOLING FAN RELAY 1 CIRCUIT LOW INPUT — S078521B57

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the test mode connector at the lower portion of instrument panel (on the driver's side). 3) Turn the ignition switch to ON. 4) While operating the 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-32, Subaru Select Monitor.> ***Connector & terminal*** ***(B134) No. 3 (+) — Chassis ground (−):***	Does the voltage change between 0 and 10 V?	Repair poor contact in ECM connector.	Go to step **2**.
2	**CHECK GROUND SHORT CIRCUIT IN RADIATOR MAIN FAN RELAY CONTROL CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 3 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in radiator main fan relay control circuit.	Go to step **3**.
3	**CHECK POWER SUPPLY FOR RELAY.** 1) Remove the main fan relay from A/C relay holder. 2) Turn the ignition switch to ON. 3) Measure the voltage between fuse and relay box (F/B) connector and chassis ground. ***Connector & terminal*** ***(F66) No. 28 (+) — 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 RELAY.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between main fan relay terminals. ***Terminal*** ***No. 28 — No. 27:***	Is the resistance between 87 and 107 Ω?	Go to step **5**.	Replace the main fan relay.
5	**CHECK OPEN CIRCUIT IN MAIN FAN RELAY CONTROL CIRCUIT.** Measure the resistance of harness between ECM and main fan relay connector. ***Connector & terminal*** ***(B134) No. 3 — (F66) No. 27:***	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
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 with SOA (distributor) service.

MEMO:

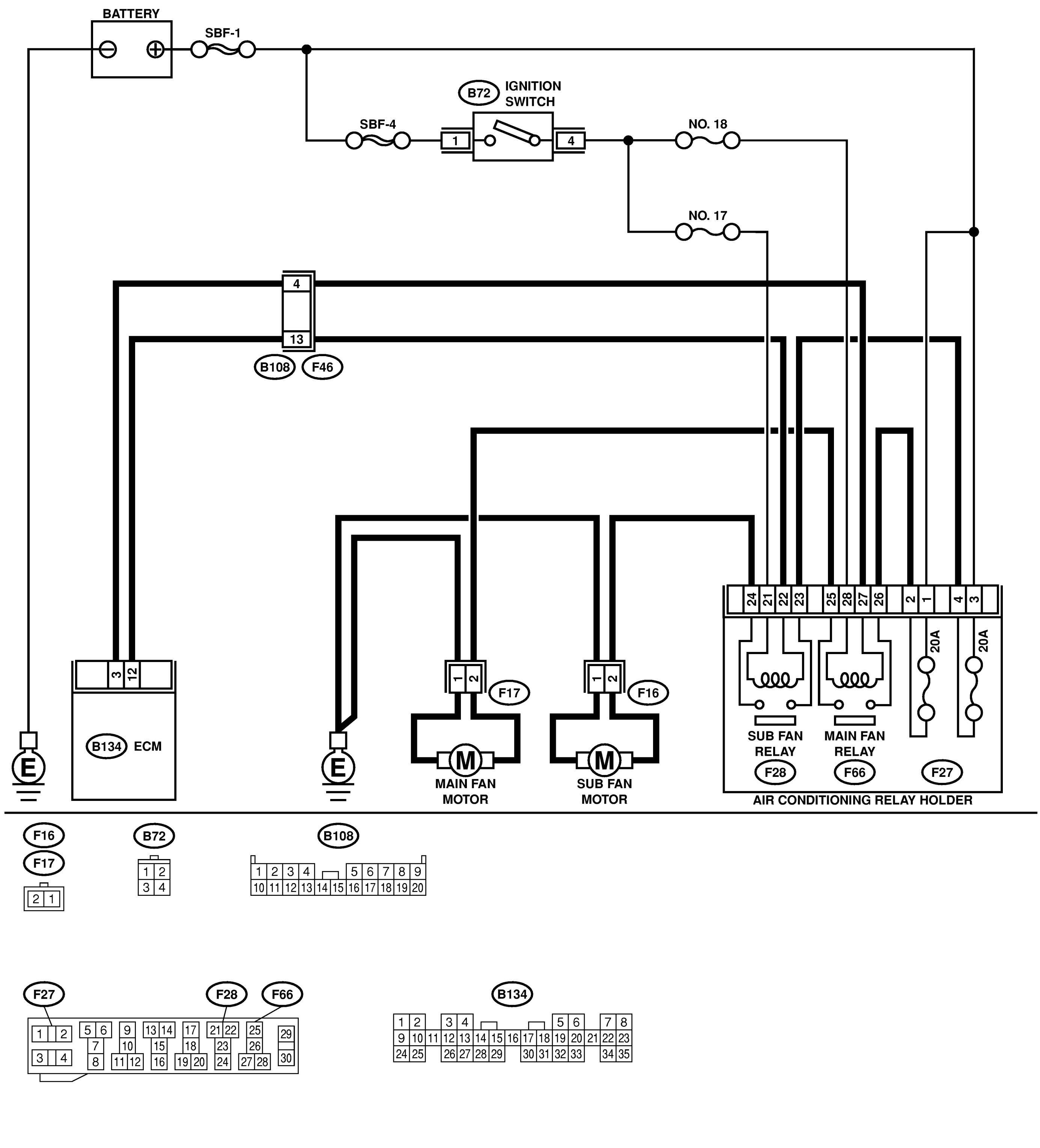
BE: DTC P0483 — COOLING FAN FUNCTION PROBLEM — S078521B58

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, 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.

- **WIRING DIAGRAM:**



S2M2296

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-84, List of Diagnostic Trouble Code (DTC).>	Check radiator fan, fan motor. <Ref. to CO-6, Radiator Main Fan System.>, <Ref. to CO-9, Radiator Sub Fan System.> and engine coolant. <Ref. to CO-12, Engine Coolant.>

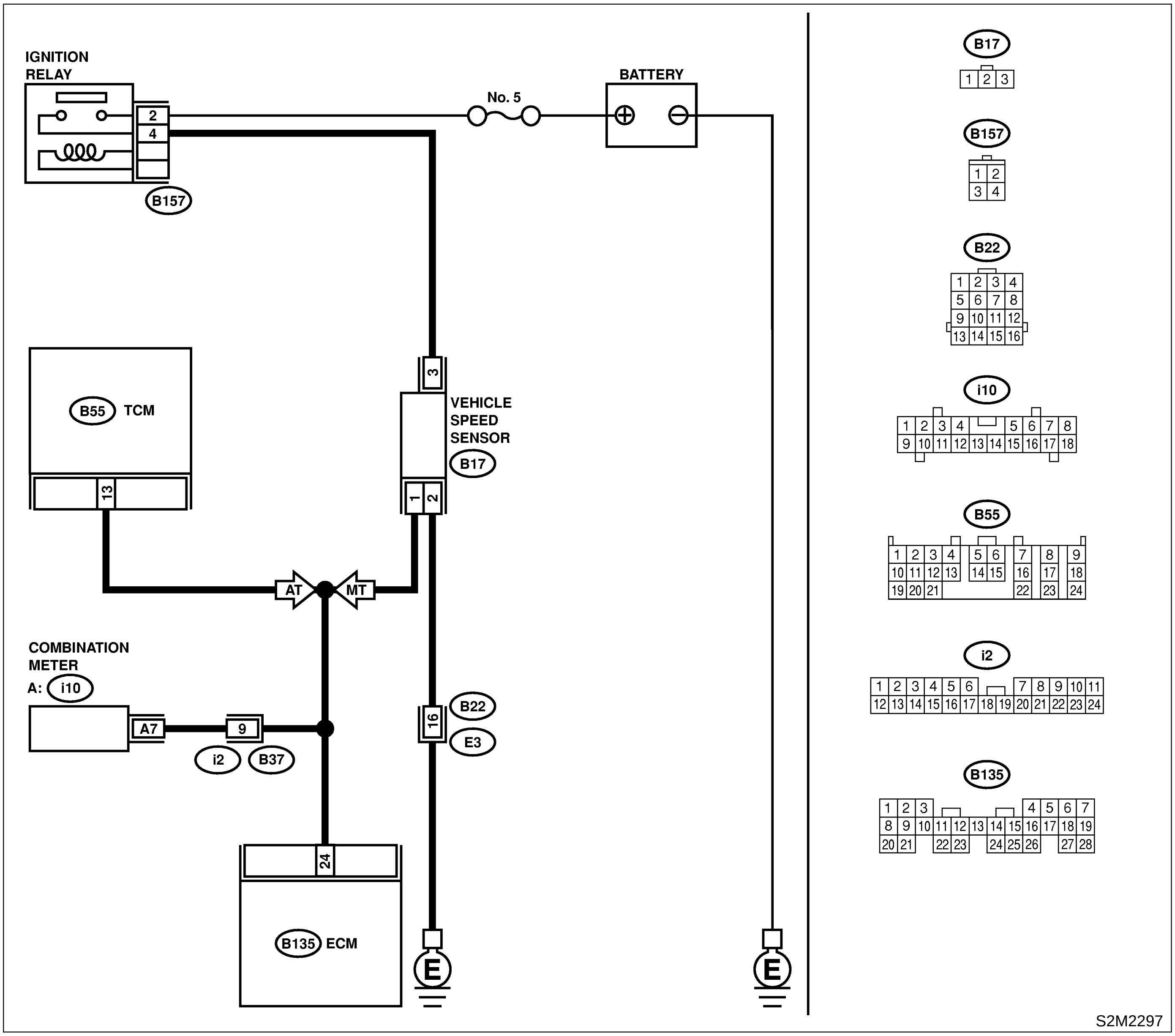
MEMO:

BF: DTC P0500 — VEHICLE SPEED SENSOR MALFUNCTION — S078521B59

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK TRANSMISSION TYPE.**	Is the transmission type AT?	Go to step **2**.	Go to step **3**.

No.	Step	Check	Yes	No
2	**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-46, DTC 33 FRONT VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Go to step **3**.
3	**CHECK SPEEDOMETER OPERATION IN COMBINATION METER.**	Does the speedometer operate normally?	Go to step **4**.	Check speedometer and vehicle speed sensor. <Ref. to IDI-14, Speedometer.> and <Ref. to AT-32, Front Vehicle Speed Sensor.> and <Ref. to AT-35, Rear Vehicle Speed Sensor.> and <Ref. to AT-36, Torque Converter Turbine Speed Sensor.>
4	**CHECK HARNESS BETWEEN ECM AND COMBINATION METER CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from combination meter. 3) Measure the resistance between ECM and combination meter. ***Connector & terminal*** ***(B135) No. 24 — (i10) No. 2:***	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

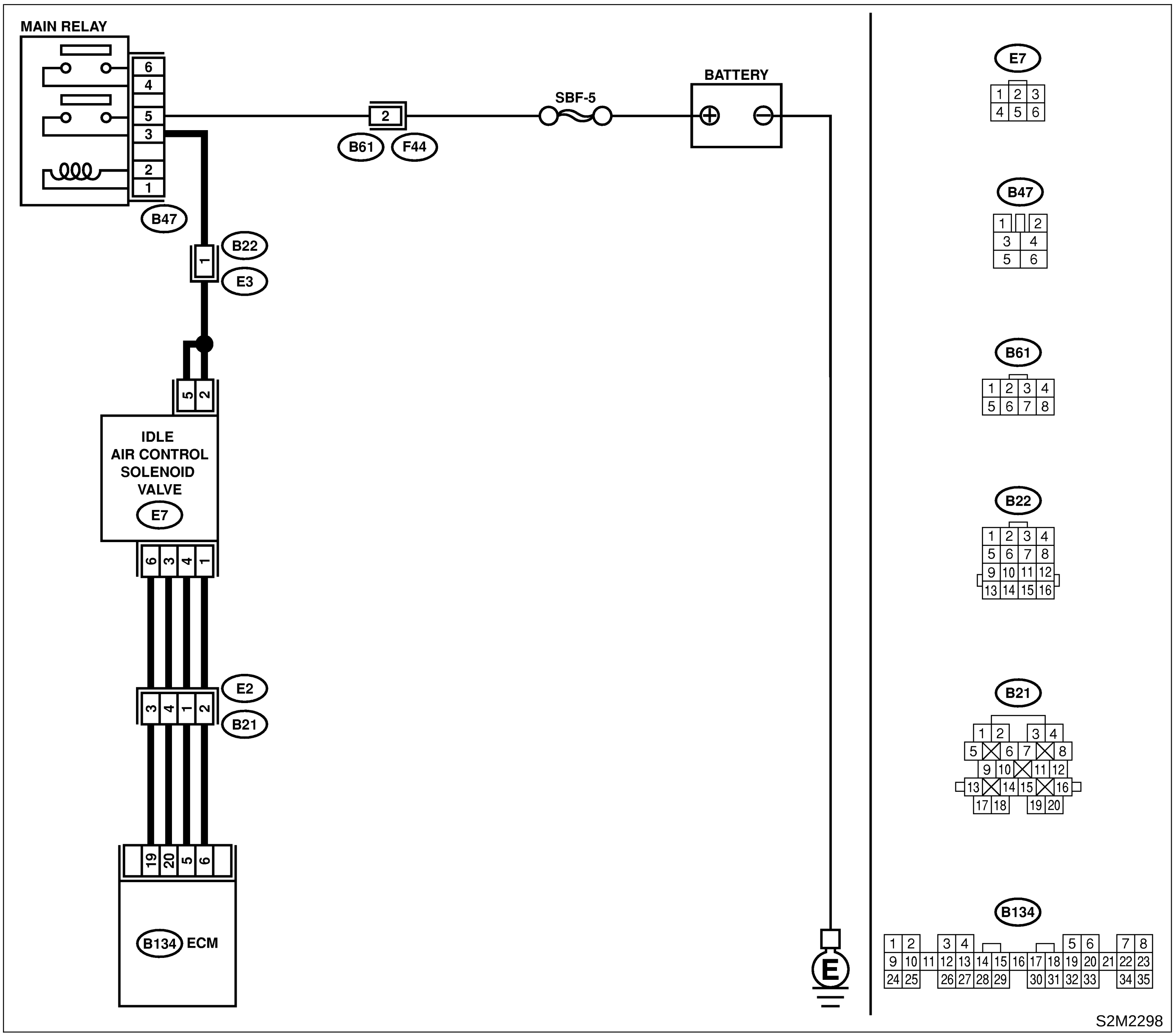
BG: DTC P0506 — IDLE CONTROL SYSTEM RPM LOWER THAN EXPECTED —

S078521B61

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.> .

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0506.	Go to step **2**.
2	**CHECK AIR BY-PASS LINE.** 1) Turn the ignition switch to OFF. 2) Remove the idle air control solenoid valve from throttle body. <Ref. to FU-38, REMOVAL, Idle Air Control Solenoid Valve.> 3) Remove the throttle body from intake manifold. <Ref. to FU-14, REMOVAL, Throttle Body.> 4) Using an air gun, force air into the idle air control solenoid valve installation area. Confirm that forced air subsequently escapes from throttle body interior.	Does air flow out?	Replace the idle air control solenoid valve. <Ref. to FU-38, Idle Air Control Solenoid Valve.>	Replace the throttle body. <Ref. to FU-14, Throttle Body.>

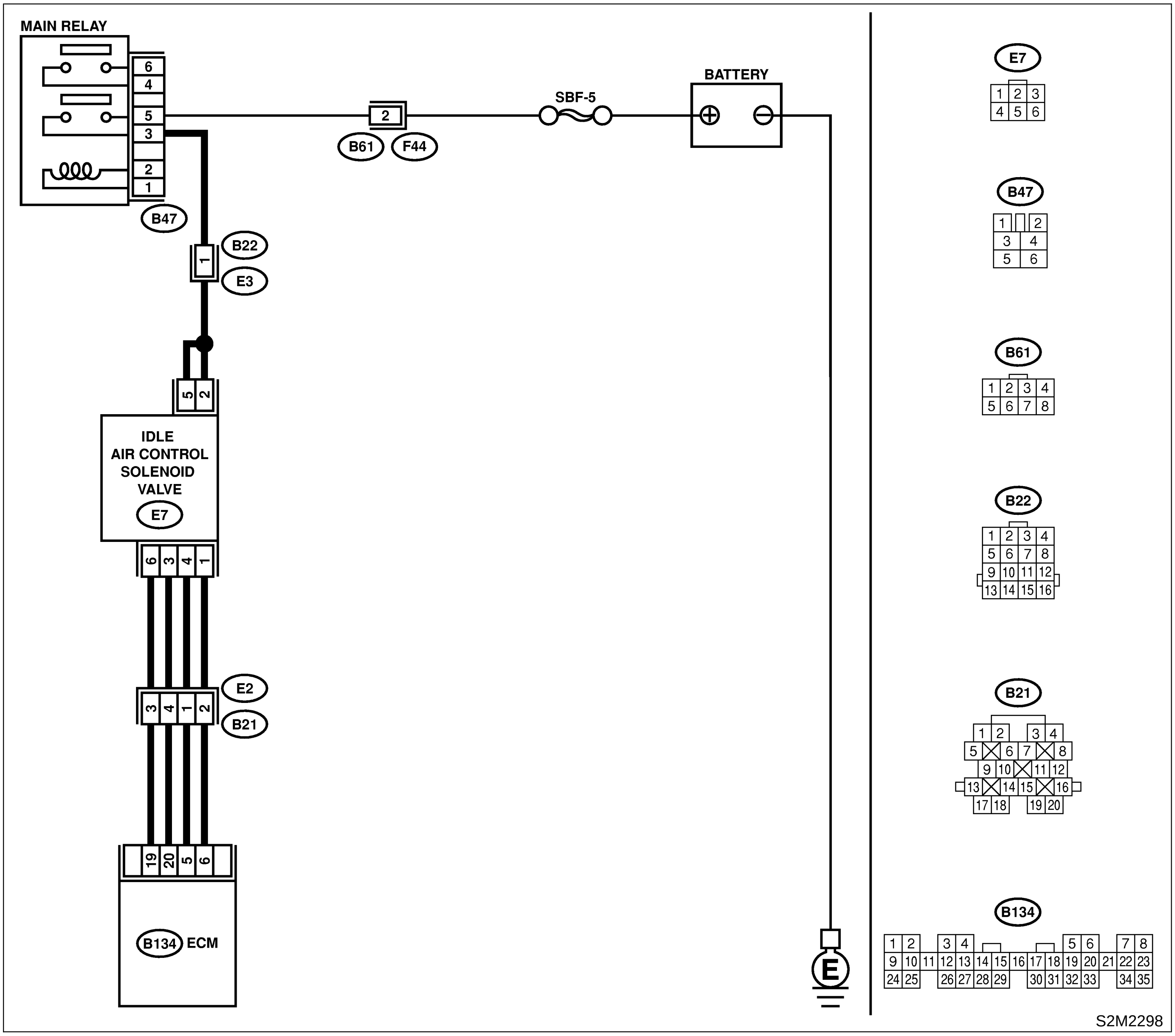
BH: DTC P0507 — IDLE CONTROL SYSTEM RPM HIGHER THAN EXPECTED —

S078521B62

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Engine keeps running at higher revolution than specified idling revolution.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



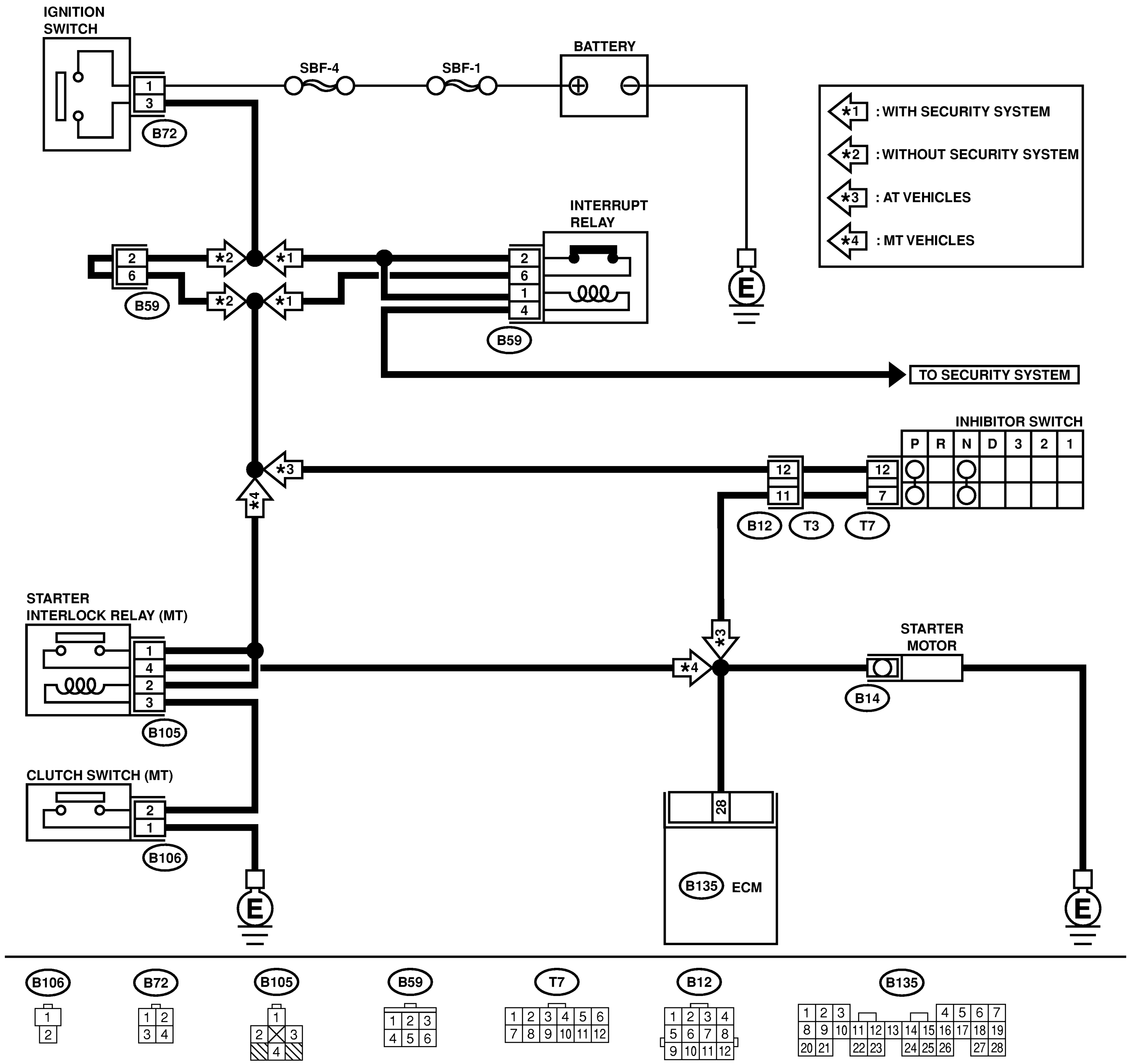
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0507.	Go to step **2**.
2	**CHECK AIR INTAKE SYSTEM.** 1) Turn the ignition switch to ON. 2) Start the 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.	Go to step **3**.
3	**CHECK THROTTLE CABLE.**	Does the throttle cable have play for adjustment?	Go to step **4**.	Adjust throttle cable. <Ref. to SP-7, Accelerator Control Cable.>
4	**CHECK AIR BY-PASS LINE.** 1) Turn the ignition switch to OFF. 2) Remove the idle air control solenoid valve from throttle body. <Ref. to FU-38, REMOVAL, Idle Air Control Solenoid Valve.> 3) Confirm that there are no foreign particles in by-pass air line.	Are foreign particles in by-pass air line?	Remove foreign particles from by-pass air line.	Replace the idle air control solenoid valve. <Ref. to FU-38, INSTALLATION, Idle Air Control Solenoid Valve.>

BI: DTC P0512 — STARTER SWITCH CIRCUIT HIGH INPUT — S078521G02

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK OPERATION OF STARTER MOTOR.** NOTE: Place the inhibitor switch in each position. (AT model) Depress or release the clutch pedal. (MT model)	Does the starter motor operate when ignition switch is turned to “ON”?	Repair battery short circuit in starter motor circuit. After repair, replace the ECM. <Ref. to FU-49, Engine Control Module.>	Check starter motor circuit. <Ref. to EN-66, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

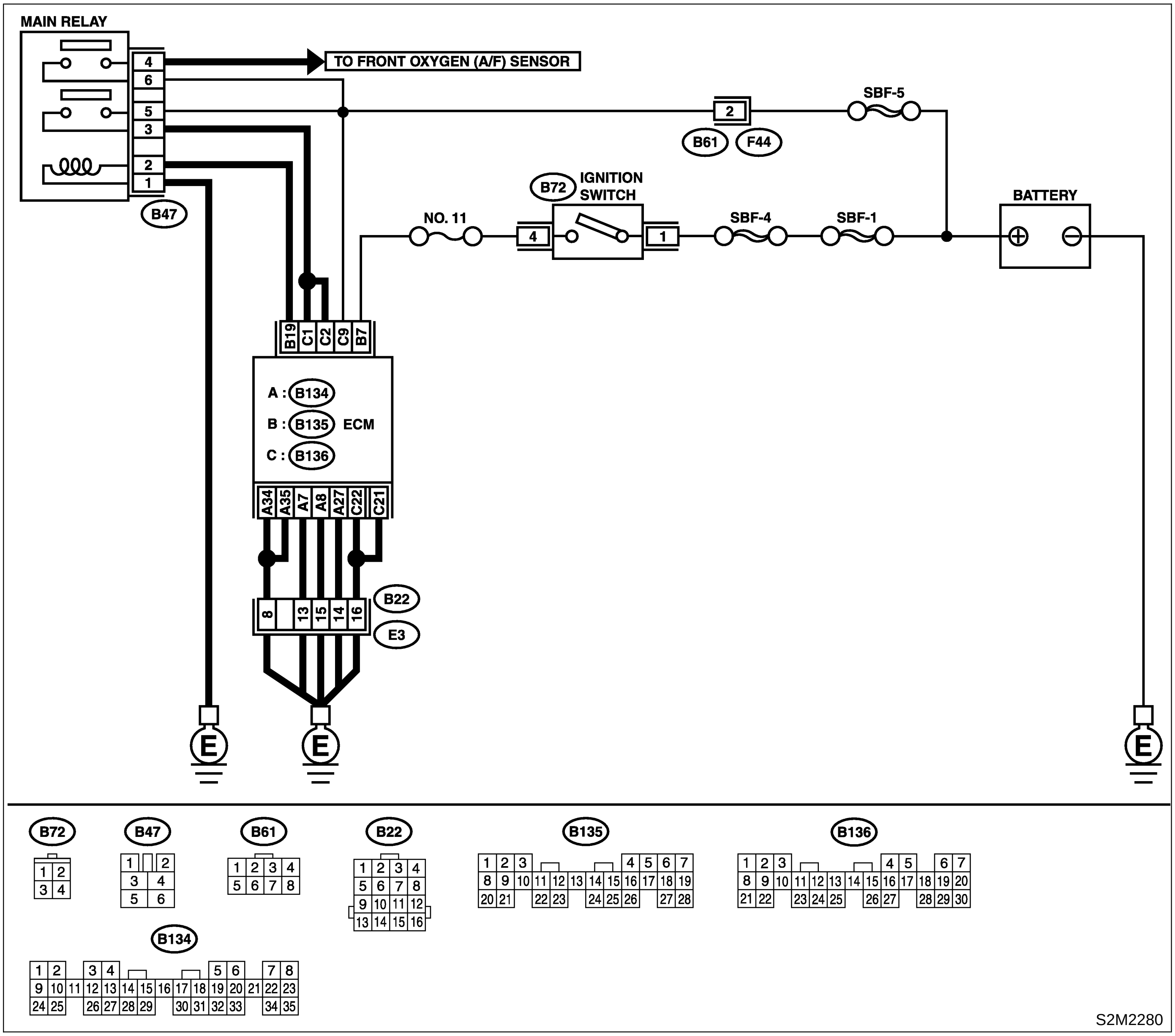
MEMO:

BJ: DTC P0604 — INTERNAL CONTROL MODULE MEMORY CHECK SUM ERROR — *S078521G03*

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



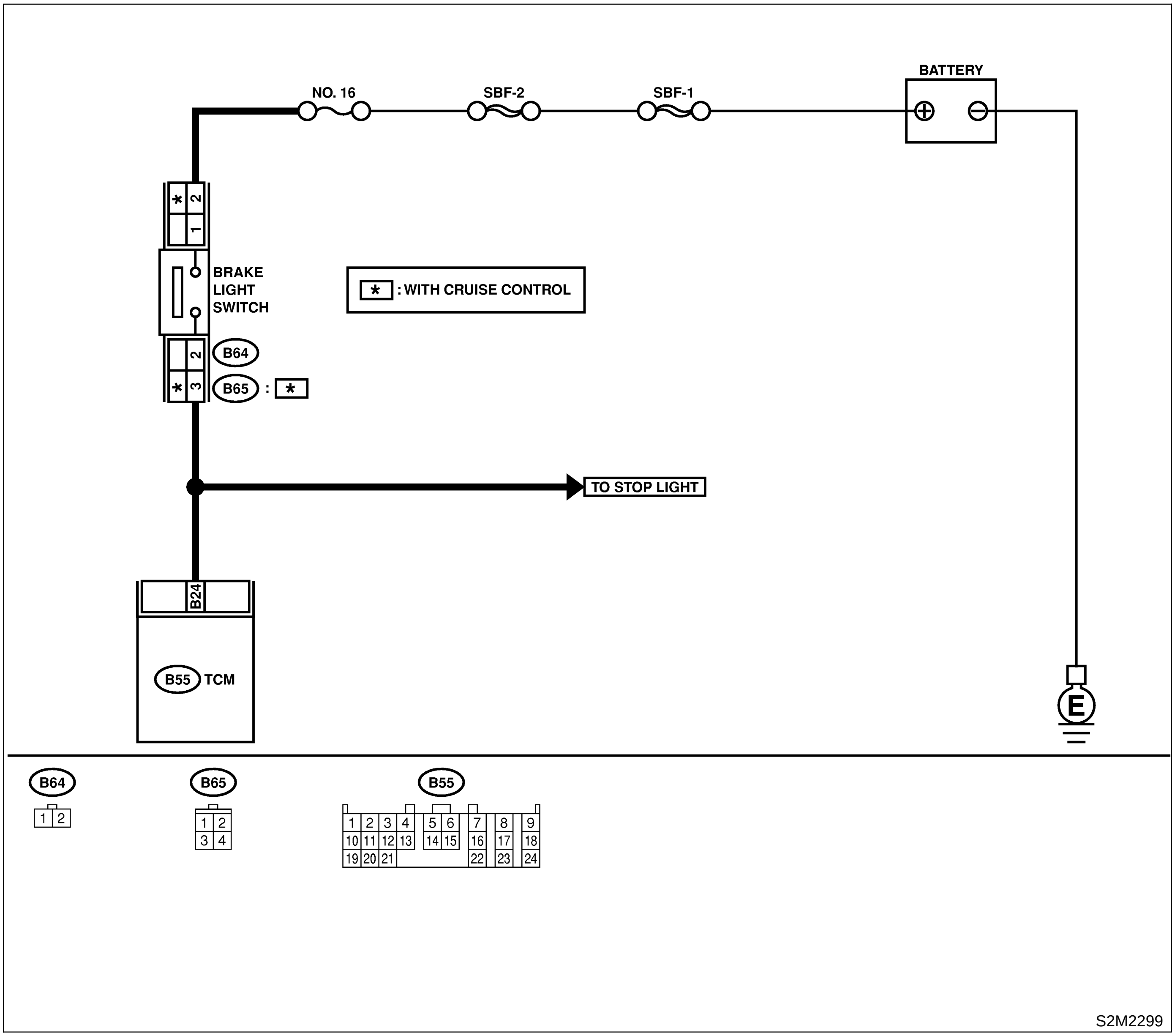
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0604?	Replace the ECM. <Ref. to FU-49, Engine Control Module.>	It is not necessary to inspect DTC P0604.

BK: DTC P0703 — BRAKE SWITCH INPUT MALFUNCTION — S078521B64

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK OPERATION OF BRAKE LIGHT.**	Does the brake light come on when depressing the brake pedal?	Go to step **2**.	Repair or replace the brake light circuit.

No.	Step	Check	Yes	No
2	**CHECK HARNESS BETWEEN TCM AND BRAKE LIGHT SWITCH CONNECTOR.** 1) Disconnect the connectors from TCM and brake light switch. 2) Measure the resistance of harness between TCM and brake light switch connector. ***Connector & terminal*** ***Without cruise control*** ***(B55) No. 24 — (B64) No.1:*** ***With cruise control*** ***(B55) No. 24 — (B65) No. 3***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair or replace the 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 the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 24 — Chassis ground:***	Is the resistance more than 1 MΩ?	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 the connectors to TCM and brake light switch. 2) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 24 (+) — Chassis ground (−):***	Is the voltage less than 1 V when releasing the brake pedal?	Go to step **5**.	Adjust or replace the brake light switch. <Ref. to LI-7, STOP LIGHT SWITCH, INSPECTION, Stop Light System.>
5	**CHECK INPUT SIGNAL FOR TCM.** Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 24 (+) — Chassis ground (−):***	Is the voltage more than 10 V when depressing the brake pedal?	Go to step **6**.	Adjust or replace the brake light switch. <Ref. to LI-7, 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 the TCM. <Ref. to AT-45, Transmission Control Module (TCM).>

BL: DTC P0731 — GEAR 1 INCORRECT RATIO — S078521B70

NOTE:
For the diagnostic procedure, refer to DTC P0734. <Ref. to EN-257, DTC P0734 - GEAR 4 INCORRECT RATIO -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BM: DTC P0732 — GEAR 2 INCORRECT RATIO — S078521B71

NOTE:
For the diagnostic procedure, refer to DTC P0734. <Ref. to EN-257, DTC P0734 - GEAR 4 INCORRECT RATIO -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BN: DTC P0733 — GEAR 3 INCORRECT RATIO — S078521B72

NOTE:
For the diagnostic procedure, refer to DTC P0734. <Ref. to EN-257, DTC P0734 - GEAR 4 INCORRECT RATIO -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BO: DTC P0734 — GEAR 4 INCORRECT RATIO — S078521B73

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Shift point too high or too low; engine brake not effected in “3” range; excessive shift shock; excessive tight corner “braking”

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, 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 “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK THROTTLE POSITION SENSOR CIRCUIT.** Check throttle position sensor circuit. <Ref. to AT-42, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble in throttle position sensor circuit?	Repair or replace the throttle position sensor circuit.	Go to step **3**.
3	**CHECK FRONT VEHICLE SPEED SENSOR CIRCUIT.** Check front vehicle speed sensor circuit. <Ref. to AT-46, DTC 33 FRONT VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble in front vehicle speed sensor circuit?	Repair or replace the front vehicle speed sensor circuit.	Go to step **4**.
4	**CHECK TORQUE CONVERTER TURBINE SPEED SENSOR CIRCUIT.** Check torque converter turbine speed sensor circuit. <Ref. to AT-52, DTC 36 TORQUE CONVERTER TURBINE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble in torque converter turbine speed sensor circuit?	Repair or replace the 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**.

No.	Step	Check	Yes	No
6	**CHECK MECHANICAL TROUBLE.** Check mechanical trouble in automatic transmission.	Is there any mechanical trouble in automatic transmission?	Repair or replace the automatic transmission. <Ref. to AT-12, INSPECTION, Road Test.>	Replace the TCM. <Ref. to AT-45, Transmission Control Module (TCM).>

BP: DTC P0741 — TORQUE CONVERTER CLUTCH SYSTEM MALFUNCTION —

S078521G04

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, 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-84, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK LOCK-UP DUTY SOLENOID CIRCUIT.** Check lock-up duty solenoid circuit. <Ref. to AT-84, DTC 77 LOCK-UP DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble in lock-up duty solenoid circuit?	Repair or replace the lock-up duty solenoid circuit.	Go to step **3**.
3	**CHECK THROTTLE POSITION SENSOR CIRCUIT.** Check throttle position sensor circuit. <Ref. to AT-42, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble in throttle position sensor circuit?	Repair or replace the 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-52, DTC 36 TORQUE CONVERTER TURBINE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble in torque converter turbine speed sensor circuit?	Repair or replace the torque converter turbine speed sensor circuit.	Go to step **5**.
5	**CHECK ENGINE SPEED INPUT CIRCUIT.** Check engine speed input circuit. <Ref. to AT-36, DTC 11 ENGINE SPEED SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble in engine speed input circuit?	Repair or replace the engine speed input circuit.	Go to step **6**.
6	**CHECK INHIBITOR SWITCH CIRCUIT.** Check inhibitor switch circuit. <Ref. to AT-102, CHECK INHIBITOR SWITCH., Diagnostic Procedure for No-diagnostic Trouble Code (DTC).>	Is there any trouble in inhibitor switch circuit?	Repair or replace the inhibitor switch circuit.	Go to step **7**.
7	**CHECK BRAKE LIGHT SWITCH CIRCUIT.** Check brake light switch circuit. <Ref. to AT-99, CHECK BRAKE SWITCH., Diagnostic Procedure for No-diagnostic Trouble Code (DTC).>	Is there any trouble in brake light switch circuit?	Repair or replace the brake light switch circuit.	Go to step **8**.

No.	Step	Check	Yes	No
8	**CHECK ATF TEMPERATURE SENSOR CIRCUIT.** Check ATF temperature sensor circuit. <Ref. to AT-38, DTC 27 ATF TEMPERATURE SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble in ATF temperature sensor circuit?	Repair or replace the 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 the automatic transmission. <Ref. to AT-12 INSPECTION, Road Test.>	Replace the TCM. <Ref. to AT-45, Transmission Control Module (TCM).>

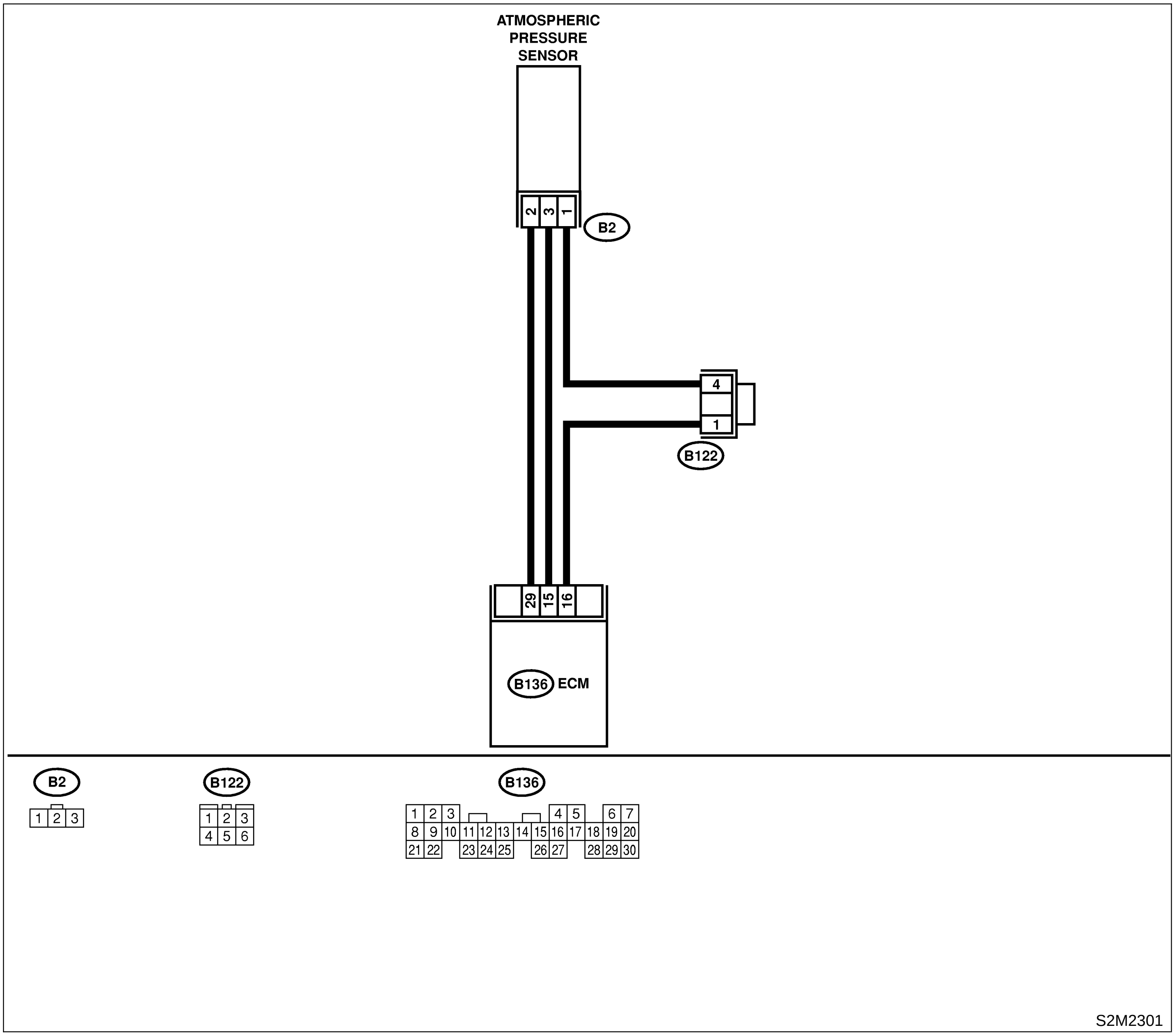
MEMO:

BQ: DTC P1110 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT LOW INPUT — S078521B84

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the 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-32, 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 kPa (0 mmHg, 0 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 atmospheric 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 the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 15 (+) — 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 the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 15 (+) — 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 (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
5	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 29 (+) — Chassis ground (−):***	Is the voltage less than 0.2 V?	Go to step **7**.	Go to step **6**.
6	**CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)** Read the 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-32, Subaru Select Monitor.>	Does the value change more than 0 kPa (0 mmHg, 0 inHg) by shaking harness and connector of ECM while monitoring the value with Subaru select monitor?	Repair poor contact in ECM connector.	Go to step **7**.

No.	Step	Check	Yes	No
7	**CHECK HARNESS BETWEEN ECM AND ATMOSPHERIC PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from atmospheric pressure sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between atmospheric pressure sensor connector and engine ground. ***Connector & terminal*** ***(B2) No. 3 (+) — Engine ground (−):***	Is the voltage more than 4.5 V?	Go to step **8**.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between ECM and atmospheric pressure sensor connector ● Poor contact in joint connector
8	**CHECK HARNESS BETWEEN ECM AND ATMOSPHERIC PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and pressure sensor connector. ***Connector & terminal*** ***(B136) No. 16 — (B2) No. 1:***	Is the resistance less than 1 Ω?	Go to step **9**.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between ECM and pressure sensor connector
9	**CHECK HARNESS BETWEEN ECM AND ATMOSPHERIC PRESSURE SENSOR CONNECTOR.** Measure the resistance of harness between pressure sensor connector and engine ground. ***Connector & terminal*** ***(B2) No. 2 — Engine ground:***	Is the resistance more than 500 kΩ?	Go to step **10**.	Repair ground short circuit in harness between ECM and pressure sensor connector.
10	**CHECK POOR CONTACT.** Check poor contact in pressure sensor connector.	Is there poor contact in pressure sensor connector?	Repair poor contact in atmospheric pressure sensor connector.	Replace the atmospheric pressure sensor. <Ref. to FU-37, Atmospheric Pressure Sensor.>

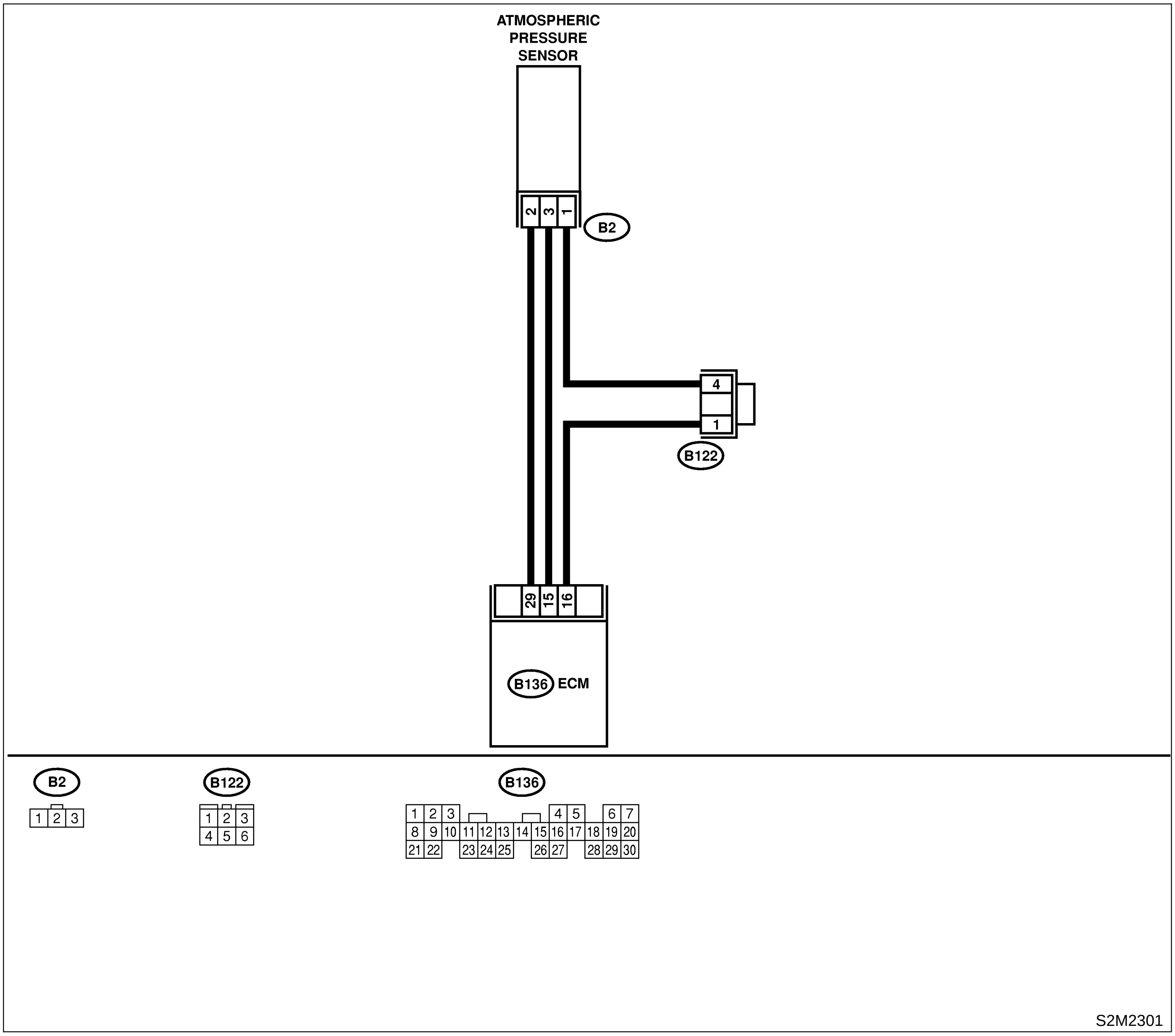
MEMO:

BR: DTC P1111 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT HIGH INPUT — *S078521B85*

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the 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-32, 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 140 kPa (1,050 mmHg, 41.34 inHg)?	Go to step **10**.	Go to step **2**.
2	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 15 (+) — 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 the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 15 (+) — 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 (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
4	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 29 (+) — 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 the 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-32, Subaru Select Monitor.>	Does the value change more than 0 kPa (0 mmHg, 0 inHg) by shaking harness and connector of ECM while monitoring the value with Subaru select monitor?	Repair poor contact in ECM connector.	Go to step **6**.
6	**CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from atmospheric pressure sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between atmospheric pressure sensor connector and engine ground. ***Connector & terminal*** ***(B2) No. 3 (+) — 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 ECM and pressure sensor connector ● Poor contact in joint connector

No.	Step	Check	Yes	No
7	**CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and pressure sensor connector. ***Connector & terminal*** ***(B136) No. 29 — (B2) No. 2:***	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 pressure sensor connector
8	**CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.** Measure the resistance of harness between ECM and pressure sensor connector. ***Connector & terminal*** ***(B136) No. 16 — (B2) No. 1:***	Is the resistance less than 1 Ω?	Go to step **9**.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between ECM and pressure sensor connector ● Poor contact in joint connector
9	**CHECK POOR CONTACT.** Check poor contact in pressure sensor connector.	Is there poor contact in pressure sensor connector?	Repair poor contact in atmospheric pressure sensor connector.	Replace the atmospheric pressure sensor. <Ref. to FU-37, Atmospheric Pressure Sensor.>
10	**CHECK CURRENT DATA.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from atmospheric pressure sensor. 3) Turn the ignition switch to ON. 4) 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-32, 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 140 kPa (1,050 mmHg, 41.34 inHg)?	Repair battery short circuit in harness between ECM and atmospheric pressure sensor connector.	Replace the atmospheric pressure sensor. <Ref. to FU-37, Atmospheric Pressure Sensor.>

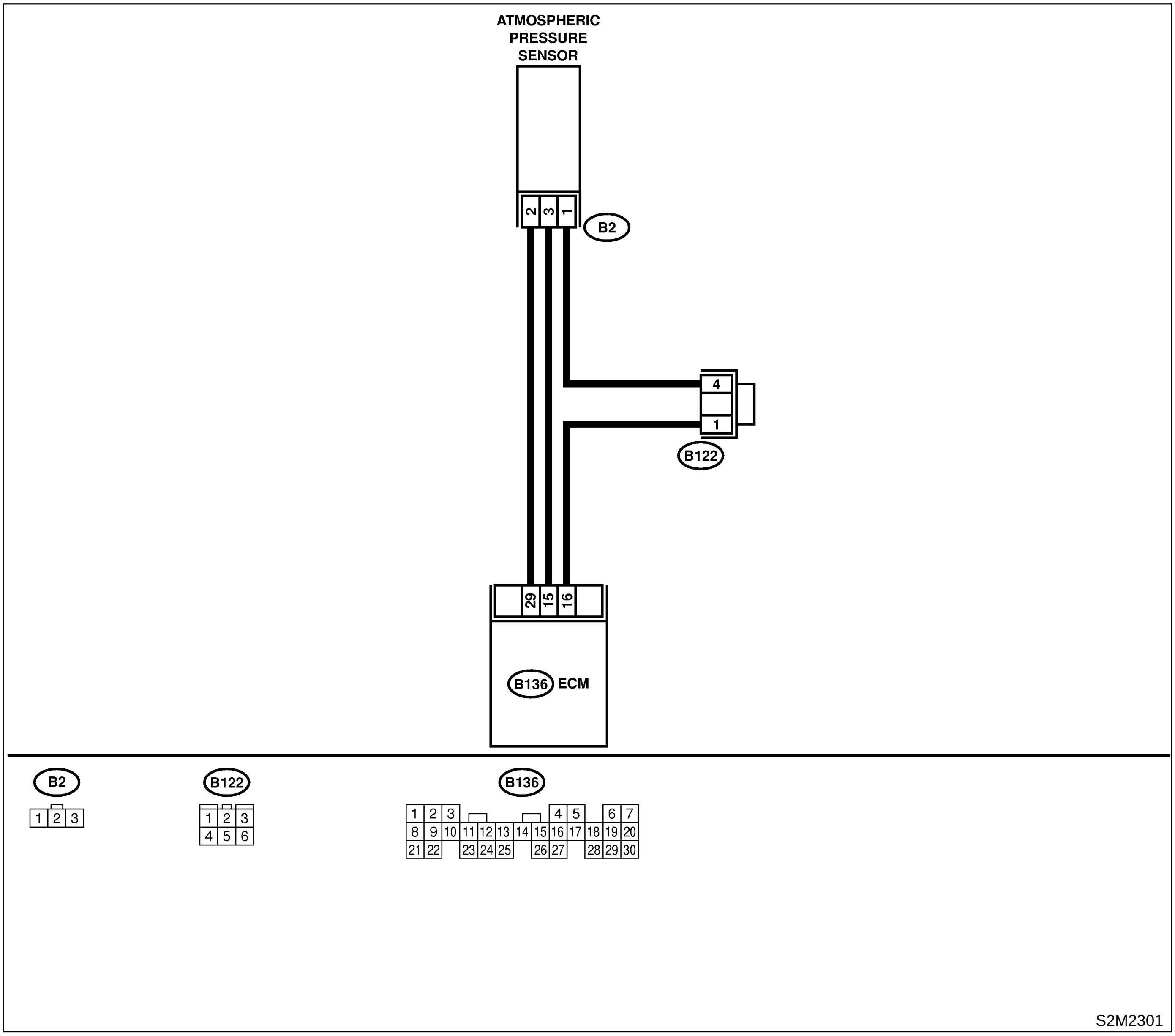
MEMO:

BS: DTC P1112 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT RANGE/ PERFORMANCE PROBLEM — S078521B86

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.** NOTE: In this case, it is not necessary to inspect DTC P1112.	Is any other DTC displayed?	Inspect the relevant DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK ATMOSPHERIC PRESSURE SENSOR FILTER.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from atmospheric pressure sensor. 3) Remove the atmospheric pressure sensor. 4) Check the atmospheric pressure sensor filter.	Is the atmospheric pressure sensor filter non-functional? (Check for contamination, damage, water leakage, etc.)	Replace the atmospheric pressure sensor filter.	Go to step **3**.
3	**CHECK CURRENT DATA.** 1) Turn the ignition switch to ON. 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-32, 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 between 73.3 kPa (550 mmHg, 21.65 inHg) and 106.6 kPa (800 mmHg, 31.50 inHg)?	Replace the atmospheric pressure sensor. <Ref. to FU-37, Atmospheric Pressure Sensor.>	Replace the intake air temperature and pressure sensor. <Ref. to FU-36, Intake Air Temperature and Pressure Sensor.>

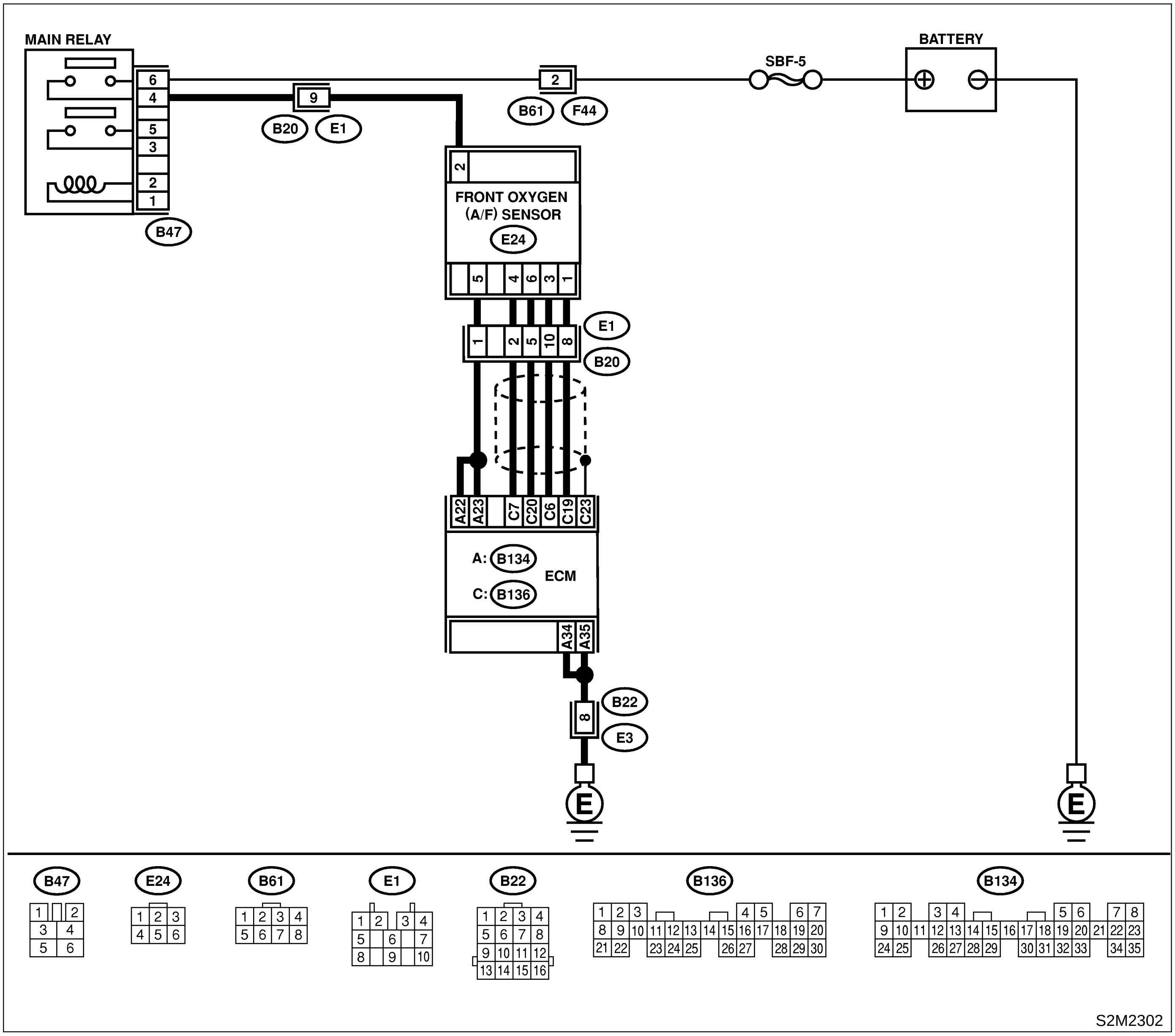
BT: DTC P1137 — FRONT OXYGEN (A/F) SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM — *S078521G49*

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK FRONT OXYGEN (A/F) SENSOR DATA.** 1) Start the engine. 2) While observing the Subaru Select Monitor or OBD-II general scan tool screen, warm-up the engine until coolant temperature is above 70°C (160°F). If the engine is already warmed-up, operate at idle speed for at least 1 minute. 3) Read the 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-32, 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 FRONT OXYGEN (A/F) SENSOR DATA.** Race the 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.	Is the value more than 1.1 for a moment?	Go to step **6**.	Go to step **4**.
4	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance between ECM and front oxygen (A/F) sensor. ***Connector & terminals*** ***(B136) No. 6 — (E24) No. 3:*** ***(B136) No. 7 — (E24) No. 4:*** ***(B136) No. 19 — (E24) No. 1:*** ***(B136) No. 20 — (E24) No. 6:***	Is the resistance less than 5 Ω?	Go to step **5**.	Repair open circuit between ECM and front oxygen (A/F) sensor.
5	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR.** Measure the resistance between ECM and chassis ground. ***Connector & terminals*** ***(B136) No. 6 — Chassis ground:*** ***(B136) No. 7 — Chassis ground:*** ***(B136) No. 19 — Chassis ground:*** ***(B136) No. 20 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Repair ground short circuit between ECM and front oxygen (A/F) sensor.

No.	Step	Check	Yes	No
6	**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 the front oxygen (A/F) sensor. <Ref. to FU-45, Front Oxygen (A/F) Sensor.>

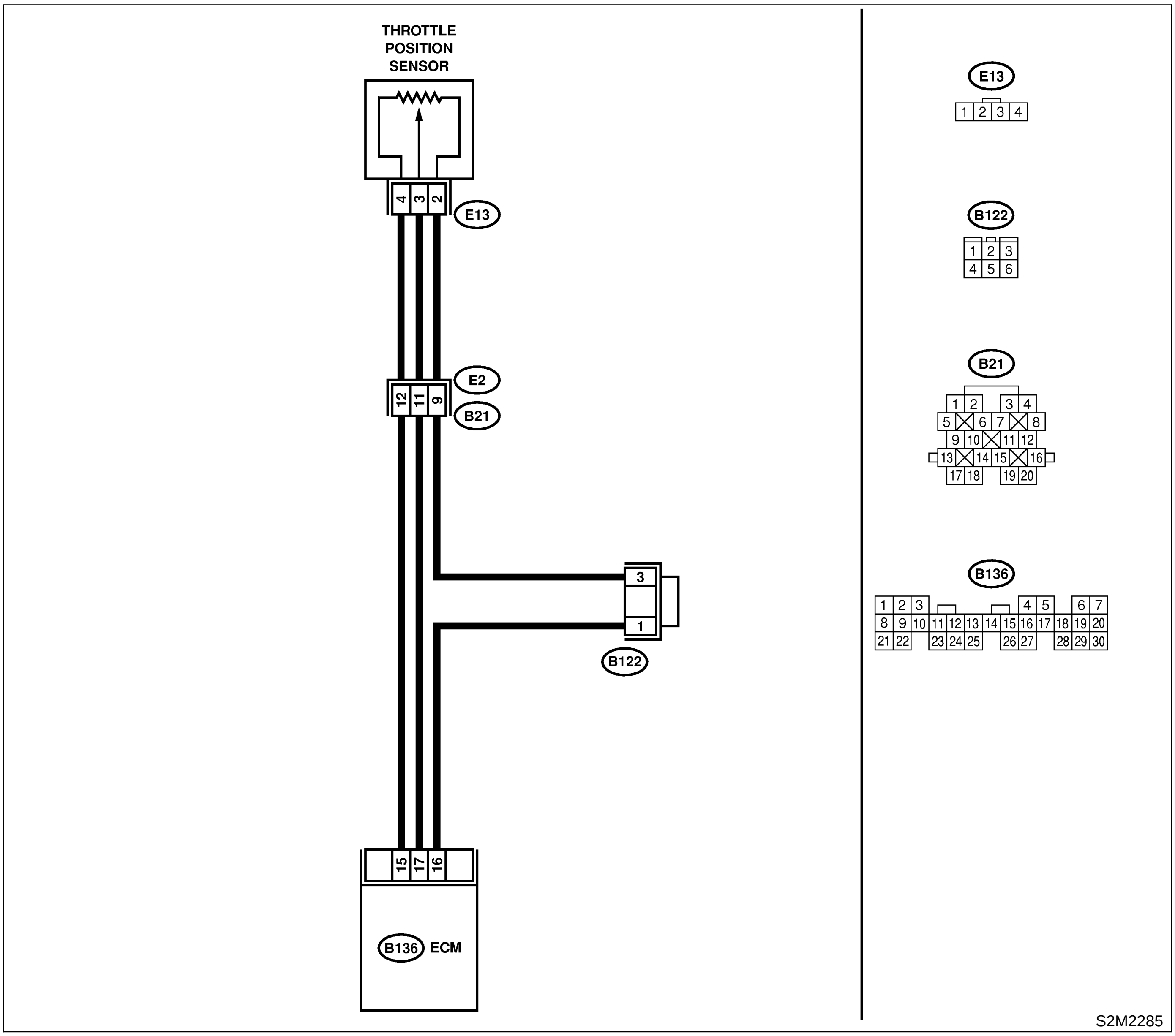
MEMO:

BU: DTC P1142 — THROTTLE POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LOW INPUT) — S078521B99

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



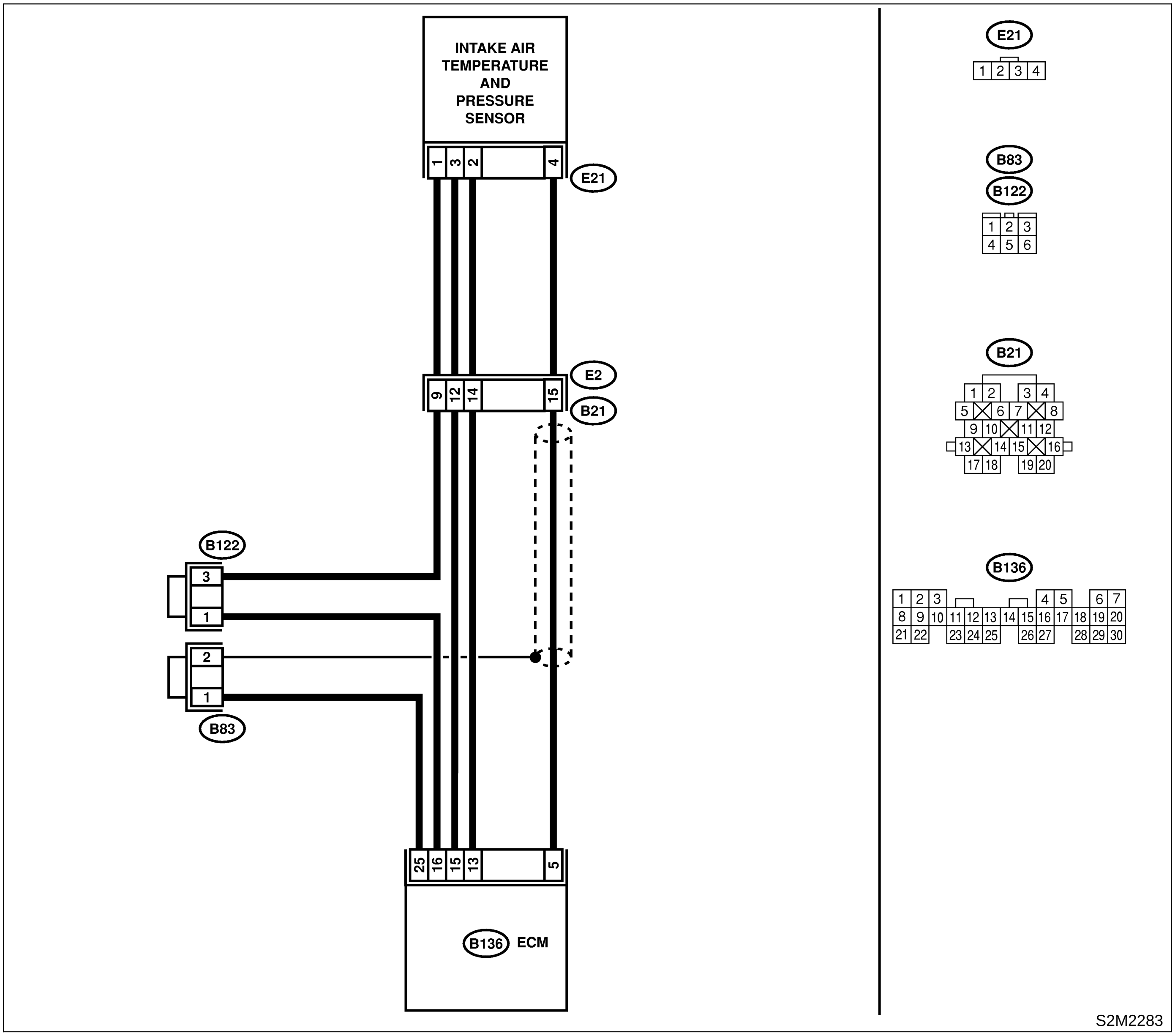
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P1142.	Replace the throttle position sensor. <Ref. to FU-33, Throttle Position Sensor.>

BV: DTC P1146 — PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) — S078521G07

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



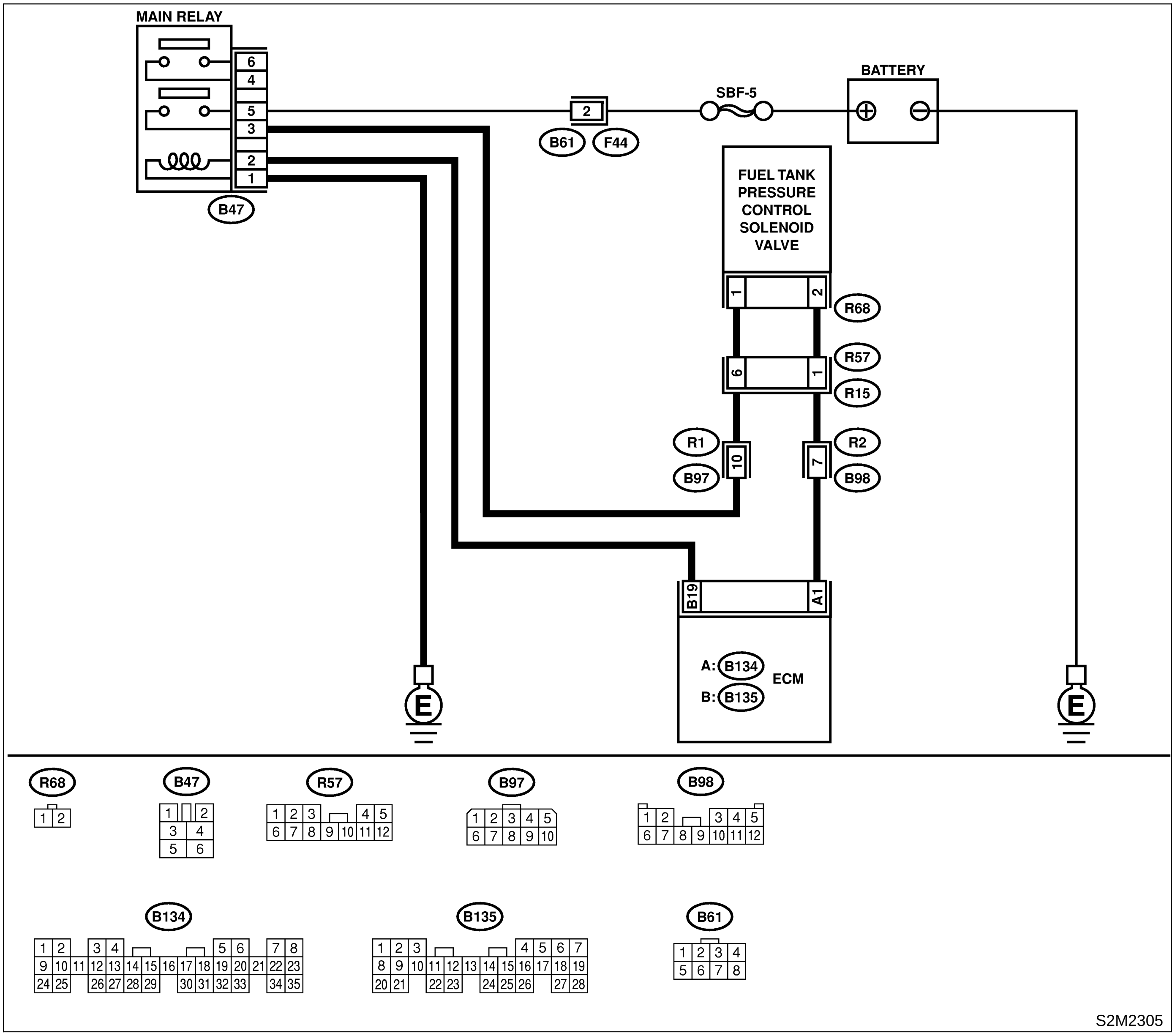
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.** NOTE: In this case, it is not necessary to inspect DTC P1146.	Is any other DTC displayed?	Inspect the relevant DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK 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 the A/C switch to OFF. 4) Turn all accessory switches to OFF. 5) Read the 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-32, 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 the intake air temperature sensor and pressure sensor. <Ref. to FU-36, Intake Air Temperature and Pressure Sensor.>
4	**CHECK THROTTLE POSITION.** Read the 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-32, Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.	Is the throttle positioning ratio equal to or less than 5% when throttle is fully closed?	Go to step **5**.	Adjust or replace the throttle position sensor. <Ref. to FU-33, Throttle Position Sensor.>
5	**CHECK THROTTLE POSITION.**	Is the throttle positioning ratio equal to or more than 85% when throttle is fully open?	Replace the intake air temperature and pressure sensor. <Ref. to FU-36 Intake Air Temperature and Pressure Sensor.>	Replace the throttle position sensor. <Ref. to FU-33, Throttle Position Sensor.>

BW: DTC P1400 — FUEL TANK PRESSURE CONTROL SOLENOID VALVE CIRCUIT LOW INPUT — S078521C07

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2**.	Go to step **3**.

No.	Step	Check	Yes	No
2	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Contact with SOA (distibutor) service. 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 the ignition switch to OFF. 2) Disconnect the connectors from fuel tank pressure control solenoid valve and ECM. 3) Measure the 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 the resistance of harness between ECM and fuel tank pressure control solenoid valve connector. ***Connector & terminal*** ***(B134) No. 1 — (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 the 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 the fuel tank pressure control solenoid valve. <Ref. to EC-11, Pressure Control Solenoid Valve.>

No.	Step	Check	Yes	No
6	**CHECK POWER SUPPLY TO FUEL TANK PRESSURE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to ON. 2) Measure the 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 with SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

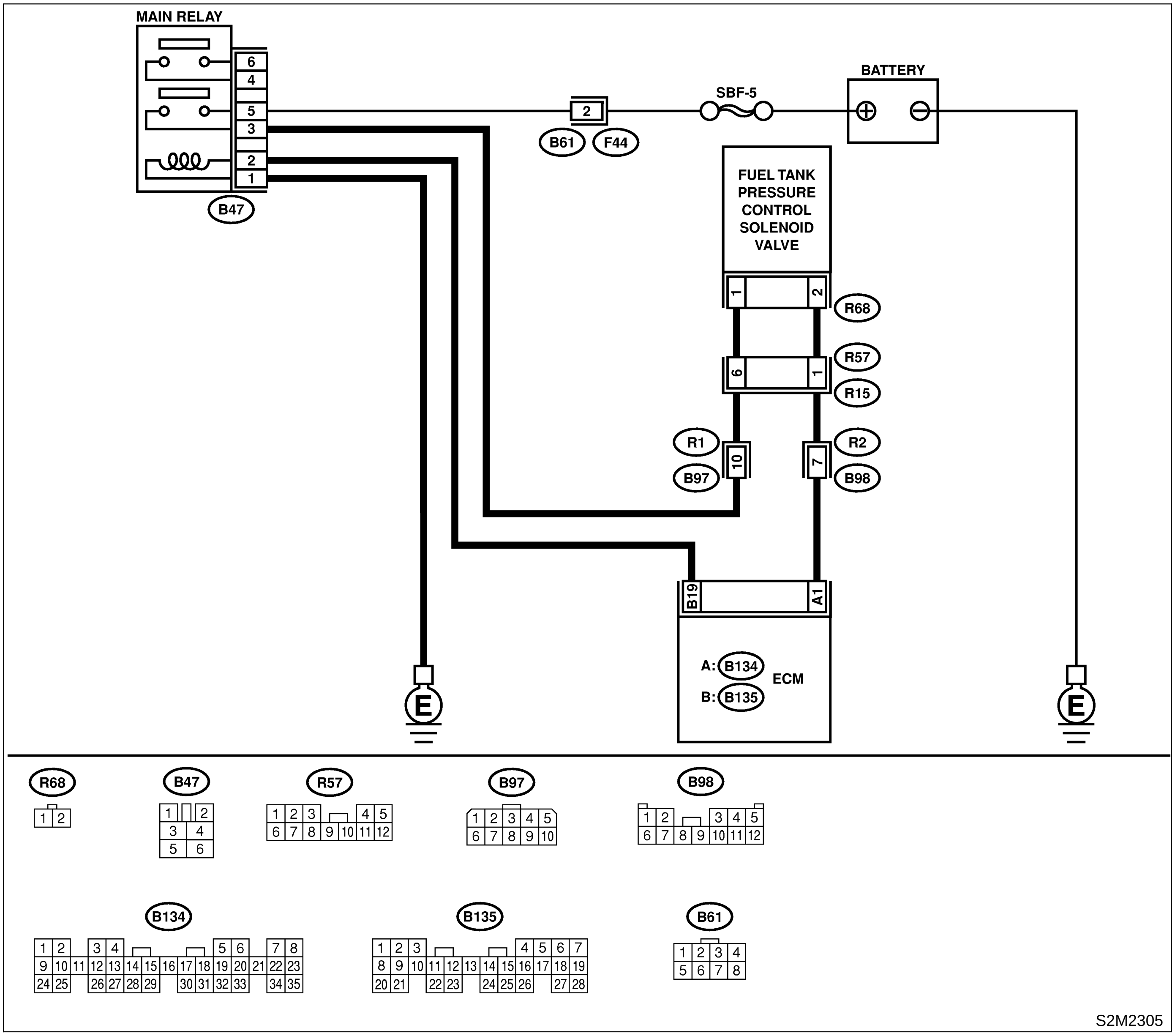
MEMO:

BX: P1420 — FUEL TANK PRESSURE CONTROL SOLENOID VALVE CIRCUIT HIGH INPUT — S078521C08

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



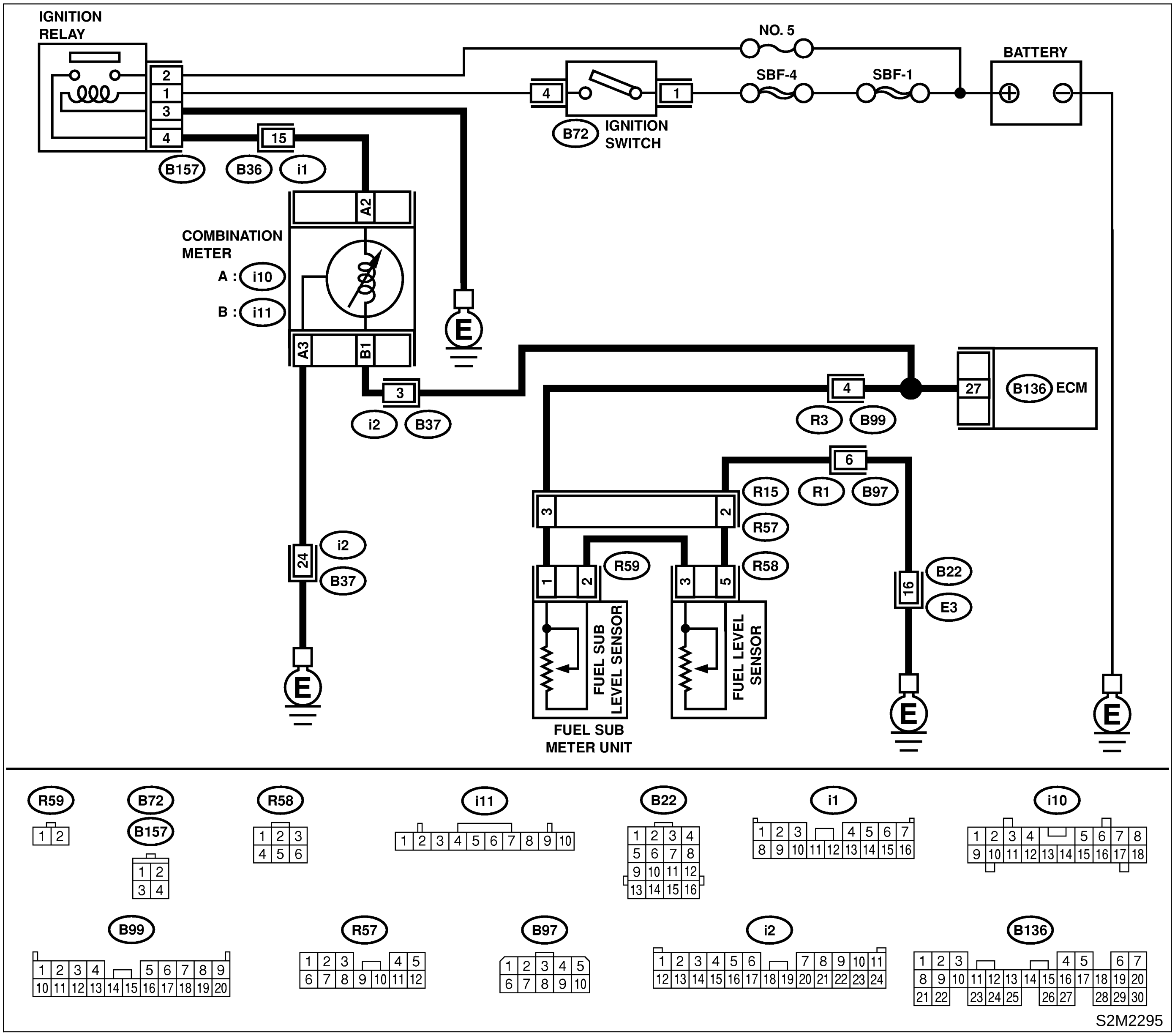
No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box. 3) Turn the ignition switch to ON. 4) While operating the fuel tank 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-51, Compulsory Valve Operation Check Mode.> ***Connector & terminal*** ***(B134) No. 1 (+) — Chassis ground (−):***	Does the voltage change between 0 and 10 V?	Go to step **2**.	Even if MIL light 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 the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 1 (+) — 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 the ECM. <Ref. to FU-49, Engine Control Module.>
4	**CHECK HARNESS BETWEEN FUEL TANK PRESSURE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel tank pressure control solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 1 (+) — 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 the ECM. <Ref. to FU-49, Engine Control Module.>	Go to step **5**.
5	**CHECK FUEL TANK PRESSURE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between fuel tank pressure control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Replace the fuel tank pressure control solenoid valve <Ref. to EC-11, Pressure Control Solenoid Valve.> and ECM <Ref. to FU-49, 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 the ECM. <Ref. to FU-49, Engine Control Module.>

BY: DTC P1442 — FUEL LEVEL SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM 2 — S078521C11

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



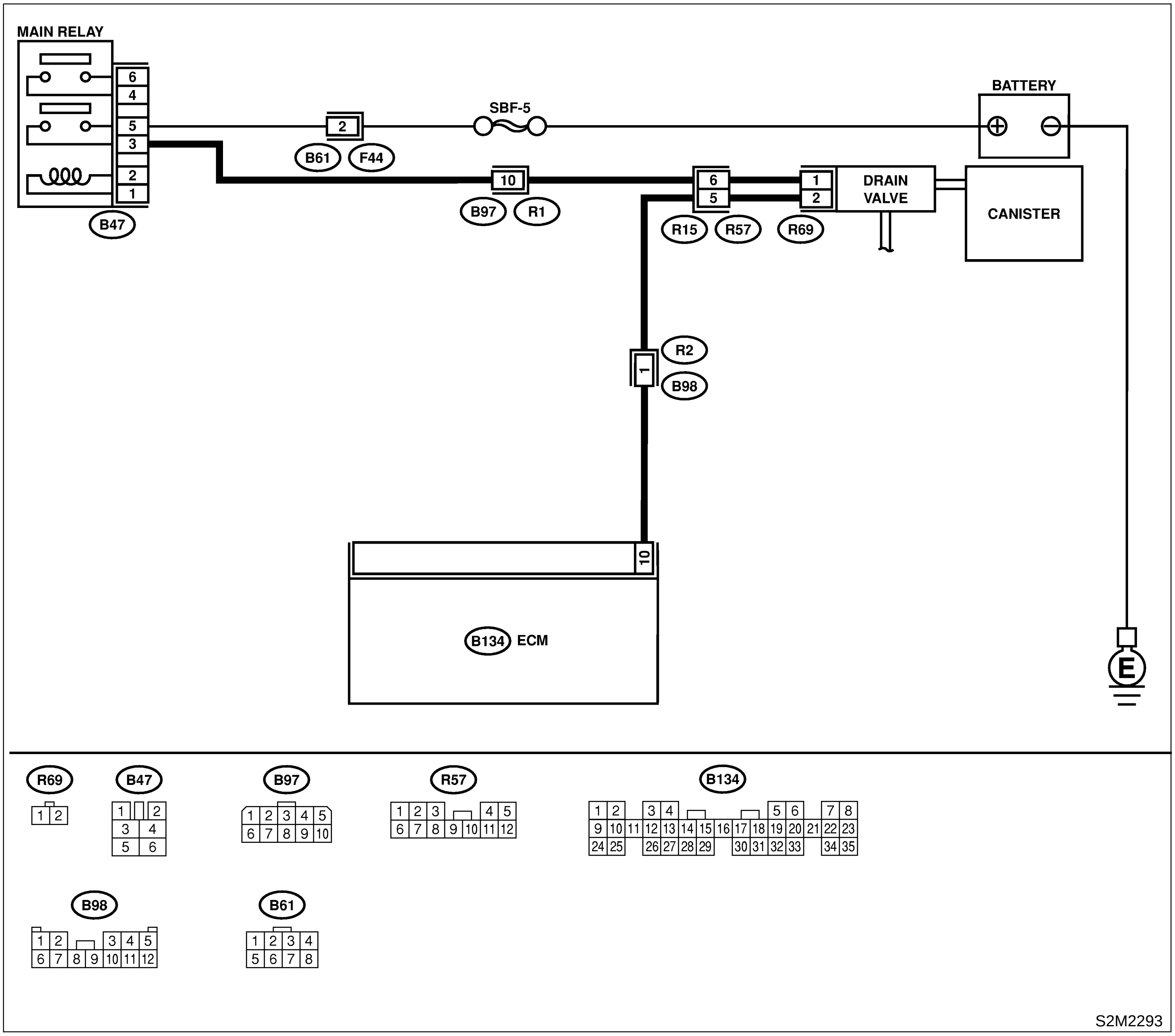
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect this trouble.	Replace the fuel level sensor <Ref. to FU-65, Fuel Level Sensor.> and fuel sub level sensor. <Ref. to FU-66, Fuel Sub Level Sensor.>

BZ: DTC P1443 — EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL FUNCTION PROBLEM — S078521C12

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



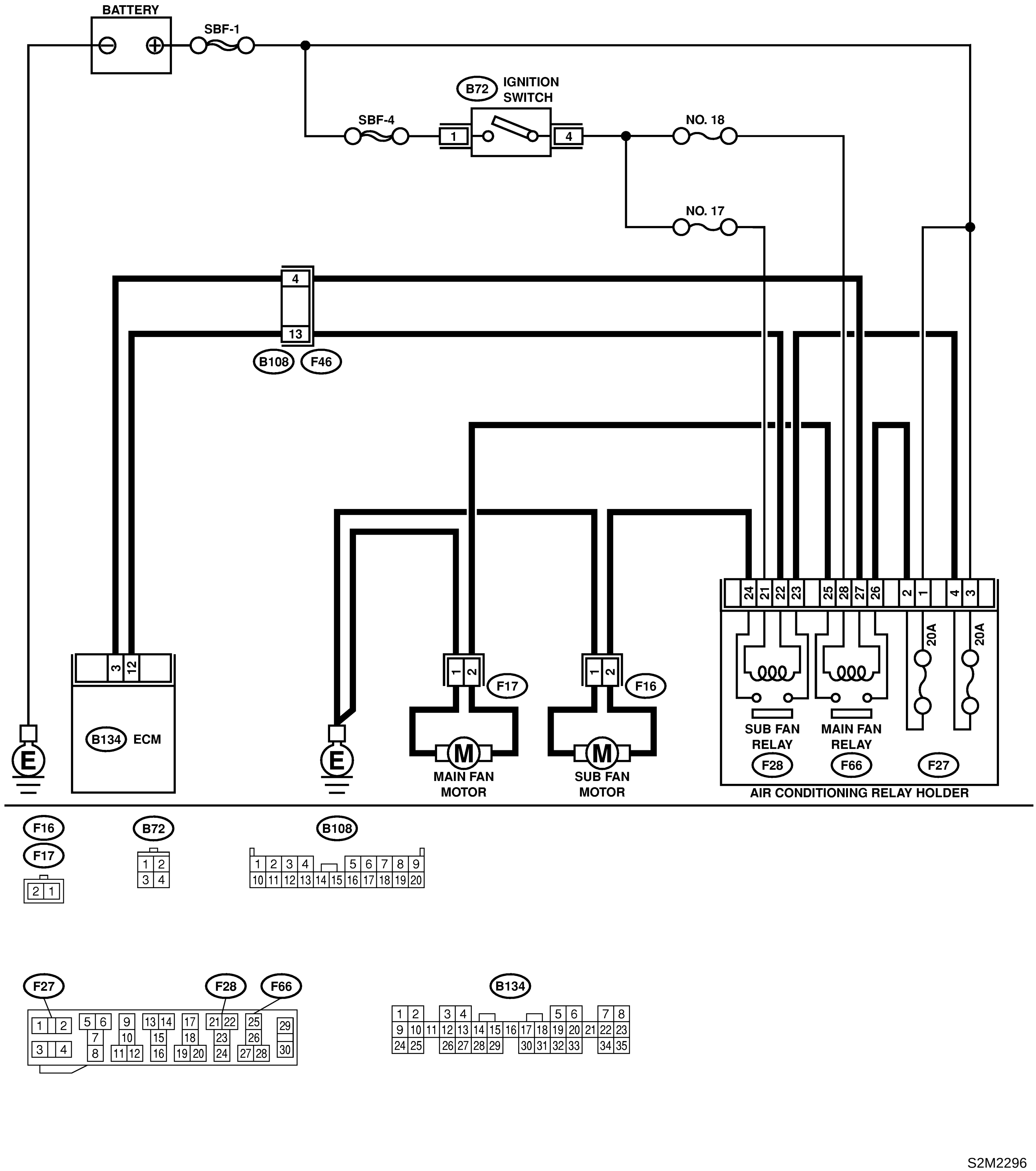
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is there any other DTC on display?	Inspect the relevant DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK VENT LINE HOSES.** Check the following items. ● Clogging 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 the ignition switch to OFF. 2) Connect the test mode connector at the lower portion of instrument panel (on the driver’s side). 3) Turn the ignition switch to ON. 4) Operate the 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-51, Compulsory Valve Operation Check Mode.>	Does the drain valve produce operating sound?	Contact with SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.	Replace the drain valve. <Ref. to EC-16, Drain Valve.>

CA: DTC P1480 — COOLING FAN RELAY 1 CIRCUIT HIGH INPUT — S078521G08

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the test mode connector at the lower portion of instrument panel (on the driver's side). 3) Turn the ignition switch to ON. 4) While operating the 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-51, Compulsory Valve Operation Check Mode.> ***Connector & terminal*** ***(B134) No. 3 (+) — Chassis ground (−):***	Does the 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 the ignition switch to OFF. 2) Remove the main fan relay and sub fan relay. (with A/C models) 3) Disconnect the test mode connector. 4) Turn the ignition switch to ON. 5) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair battery short circuit in radiator fan relay control circuit. After repair, replace the ECM. <Ref. to FU-49, Engine Control Module.>	Go to step **3**.
3	**CHECK MAIN FAN RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the main fan relay. 3) Measure the resistance between main fan relay terminals. ***Terminal*** ***No. 26 — No. 25:***	Is the resistance less than 1 Ω?	Replace the main fan relay and ECM. <Ref. to FU-49, Engine Control Module.>	Go to step **4**.
4	**CHECK SUB FAN RELAY.** 1) Remove the sub fan relay. 2) Measure the resistance between sub fan relay terminals. ***Terminal*** ***No. 23 — No. 24***	Is the resistance less than 1 Ω?	Replace the sub fan relay and ECM. <Ref. to FU-49, 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 the ECM. <Ref. to FU-49, Engine Control Module.>

MEMO:

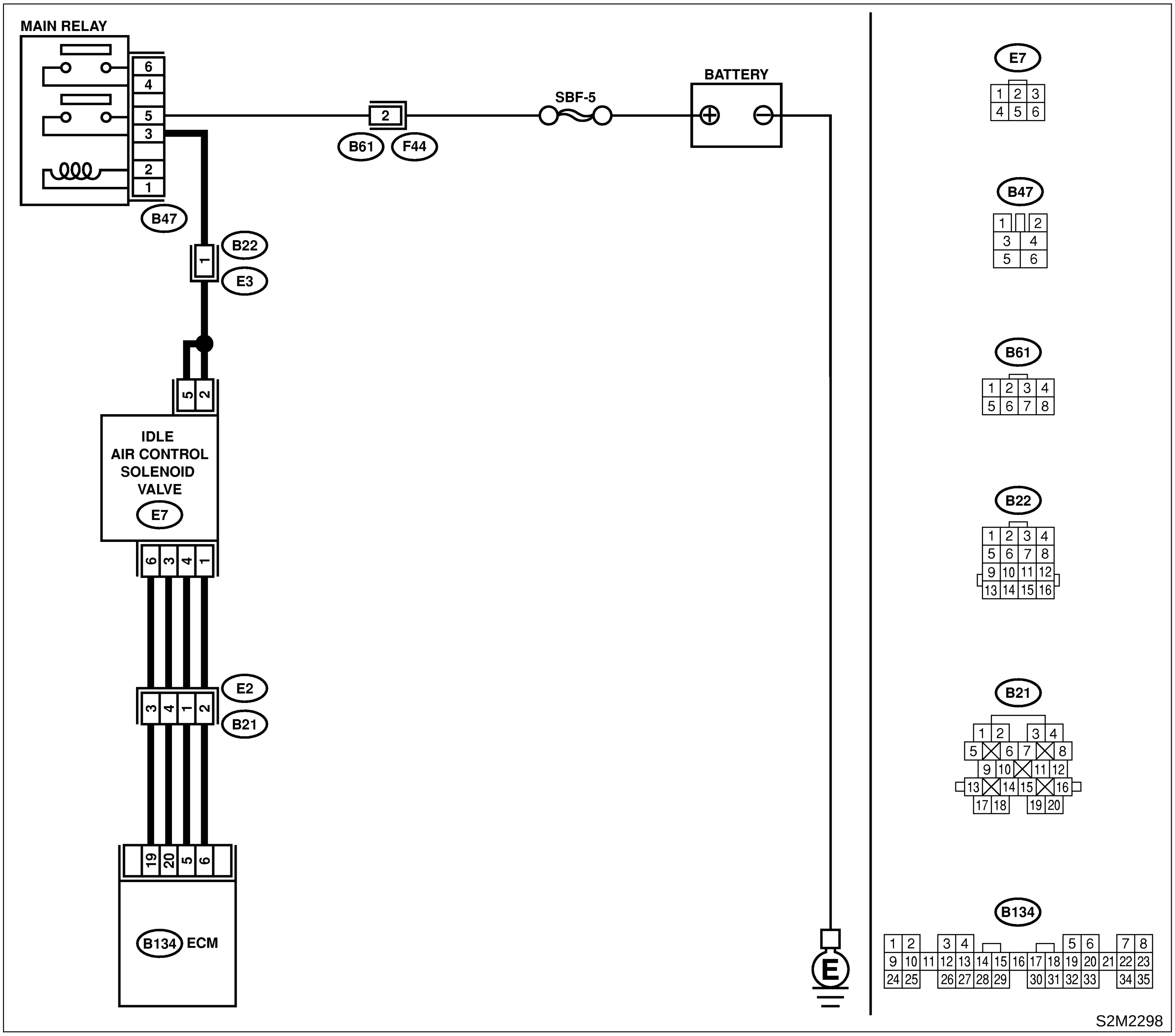
CB: DTC P1507 — IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE) —

S078521C16

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Engine keeps running at higher revolution than specified idling revolution.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0507.	Go to step **2**.
2	**CHECK AIR INTAKE SYSTEM.** 1) Turn the ignition switch to ON. 2) Start the 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.	Go to step **3**.
3	**CHECK THROTTLE CABLE.**	Does the throttle cable have play for adjustment?	Go to step **4**.	Adjust throttle cable. <Ref. to SP-7, INSTALLATION, Accelerator Control Cable.>
4	**CHECK AIR BY-PASS LINE.** 1) Turn the ignition switch to OFF. 2) Remove the idle air control solenoid valve from throttle body. <Ref. to FU-38, Idle Air Control Solenoid Valve.> 3) Confirm that there are no foreign particles in by-pass air line.	Are foreign particles in by-pass air line?	Remove foreign particles from by-pass air line.	Replace the idle air control solenoid valve. <Ref. to FU-38, Idle Air Control Solenoid Valve.>

CC: DTC P1510 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 1 CIRCUIT LOW INPUT — S078521C17

NOTE:
For the diagnostic procedure, refer to DTC P1516. <Ref. to EN-298, DTC P1516 - IDLE AIR CONTROL SOLENOID VALVE SIGNAL 4 CIRCUIT LOW INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CD: DTC P1511 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 1 CIRCUIT HIGH INPUT — S078521C18

NOTE:
For the diagnostic procedure, refer to DTC P1517. <Ref. to EN-302, DTC P1517 - IDLE AIR CONTROL SOLENOID VALVE SIGNAL 4 CIRCUIT HIGH INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CE: DTC P1512 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 2 CIRCUIT LOW INPUT — S078521C19

NOTE:
For the diagnostic procedure, refer to DTC P1516. <Ref. to EN-298, DTC P1516 - IDLE AIR CONTROL SOLENOID VALVE SIGNAL 4 CIRCUIT LOW INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CF: DTC P1513 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 2 CIRCUIT HIGH INPUT — S078521C20

NOTE:
For the diagnostic procedure, refer to DTC P1517. <Ref. to EN-302, DTC P1517 - IDLE AIR CONTROL SOLENOID VALVE SIGNAL 4 CIRCUIT HIGH INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CG: DTC P1514 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 3 CIRCUIT LOW INPUT — S078521C21

NOTE:
For the diagnostic procedure, refer to DTC P1516. <Ref. to EN-298, DTC P1516 - IDLE AIR CONTROL SOLENOID VALVE SIGNAL 4 CIRCUIT LOW INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CH: DTC P1515 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 3 CIRCUIT HIGH INPUT — S078521C22

NOTE:
For the diagnostic procedure, refer to DTC P1517. <Ref. to EN-302, DTC P1517 - IDLE AIR CONTROL SOLENOID VALVE SIGNAL 4 CIRCUIT HIGH INPUT -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

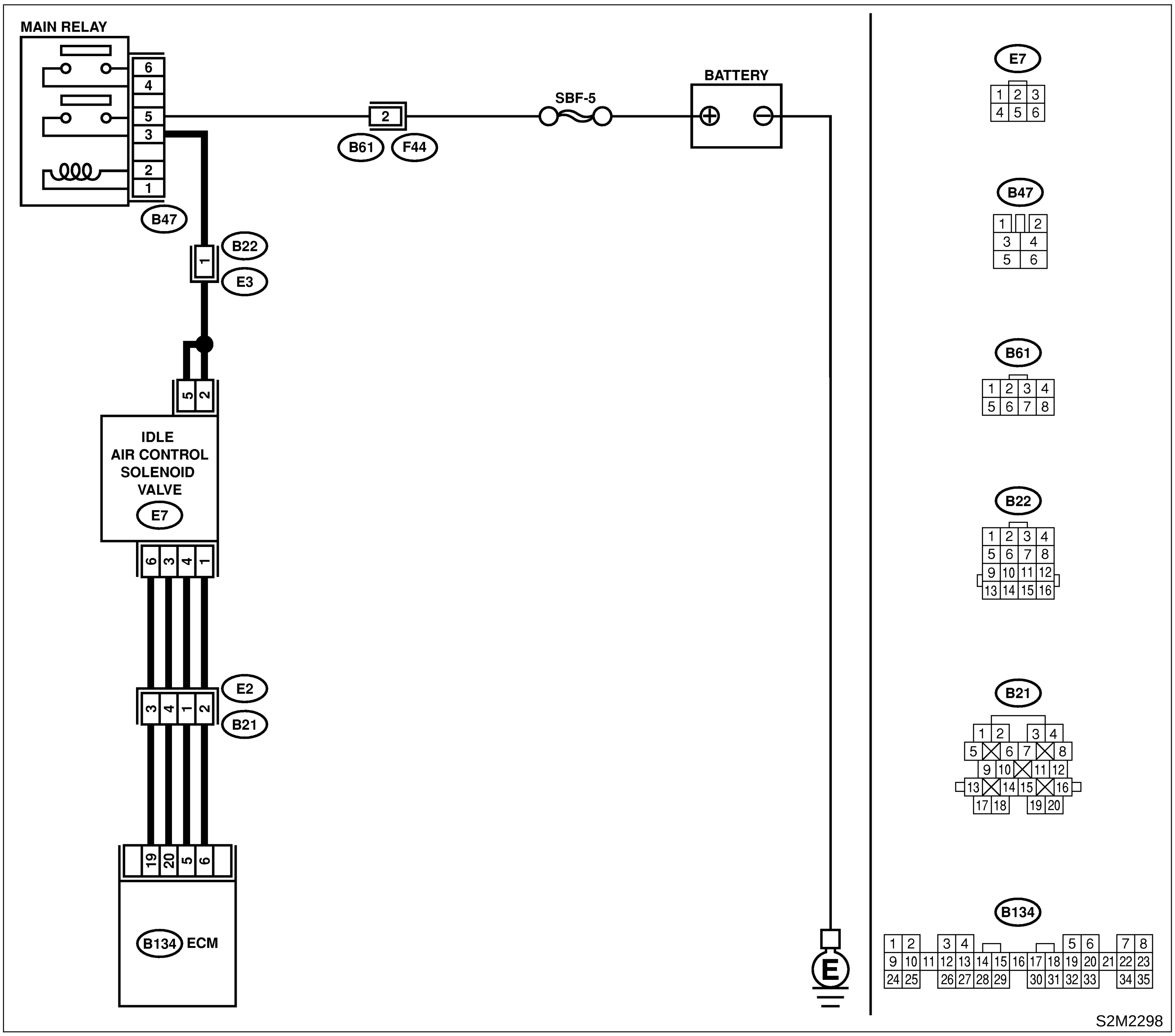
MEMO:

CI: DTC P1516 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 4 CIRCUIT LOW INPUT — S078521C23

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO IDLE AIR CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from idle air control solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between idle air control solenoid valve connector and engine ground. ***Connector & terminal*** ***(E7) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **2**.	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
2	**CHECK POWER SUPPLY TO IDLE AIR CONTROL SOLENOID VALVE.** Measure the voltage between idle air control solenoid valve connector and engine ground. ***Connector & terminal*** ***(E7) No. 5 (+) — 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 the ignition switch to OFF. 2) Measure the resistance between ECM and idle air control solenoid valve connector. ***Connector & terminal*** ***DTC P1510; (B134) No. 5 — (E7) No. 4:*** ***DTC P1512; (B134) No. 6 — (E7) No. 1:*** ***DTC P1514;*** ***(B134) No. 19 — (E7) No. 6:*** ***DTC P1516;*** ***(B134) No. 20 — (E7) No. 3:***	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.** 1) Disconnect the connector from ECM. 2) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***DTC P1510; (B134) No. 5 — Chassis ground:*** ***DTC P1512; (B134) No. 6 — Chassis ground:*** ***DTC P1514; (B134) No. 19 — Chassis ground:*** ***DTC P1516; (B134) No. 20 — 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**.

No.	Step	Check	Yes	No
5	**CHECK POOR CONTACT.** Check poor contact in ECM connector and idle air control solenoid valve connector.	Is there poor contact in ECM connector or idle air control solenoid valve connector?	Repair poor contact in ECM connector or idle air control solenoid valve connector.	Replace the idle air control solenoid valve. <Ref. to FU-38, Idle Air Control Solenoid Valve.>

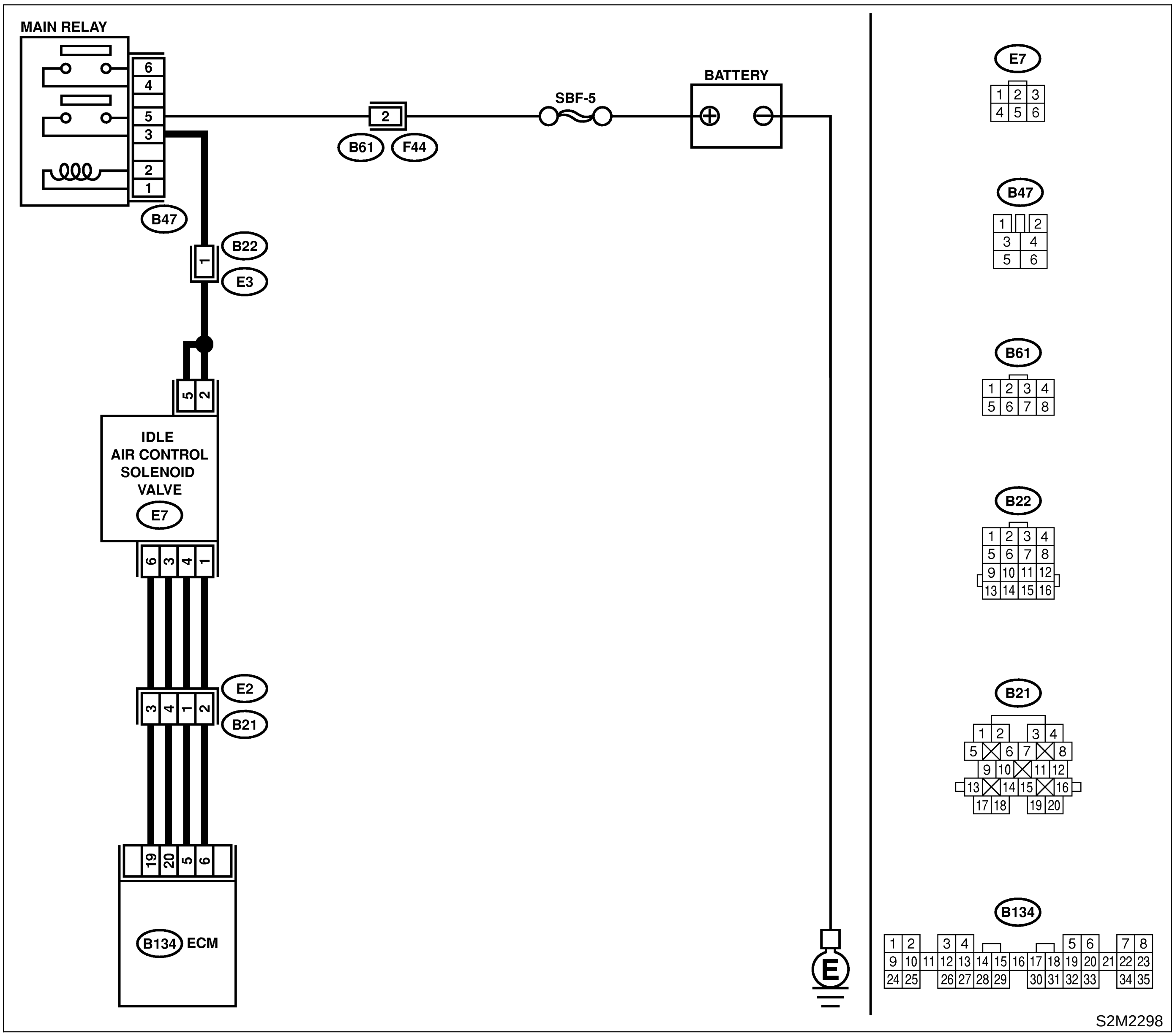
MEMO:

CJ: DTC P1517 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 4 CIRCUIT HIGH INPUT — S078521C24

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



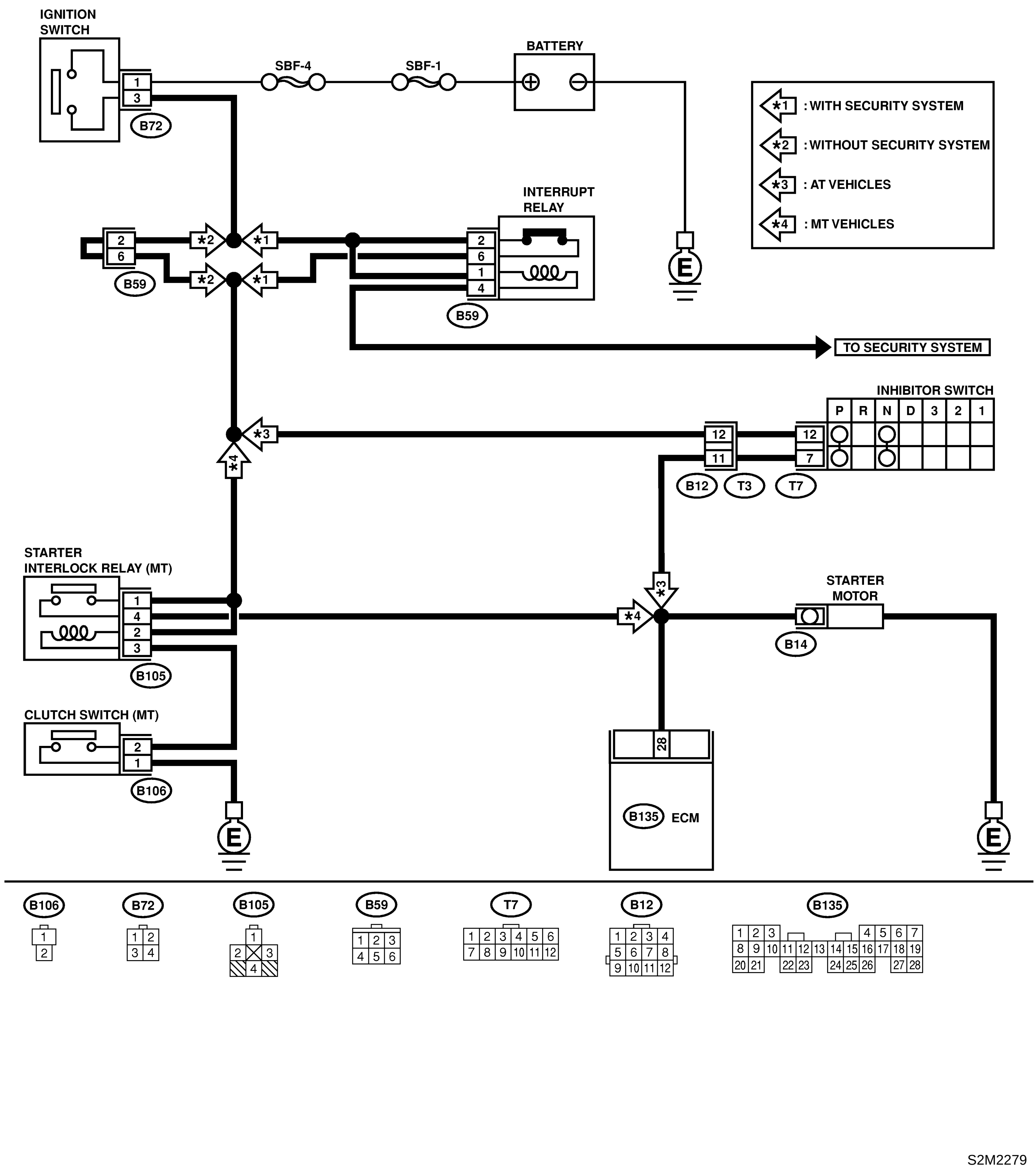
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1511, P1513, P1515 and P1517 at same time?	Go to step **2**.	Go to step **3**.
2	**CHECK GROUND CIRCUIT FOR ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 7 — 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 connector and engine ground terminal ● Poor contact in ECM connector ● Poor contact in coupling connector
3	**CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from idle air control solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***DTC P1511; (B134) No. 5 (+) — Chassis ground (–):*** ***DTC P1513; (B134) No. 6 (+) — Chassis ground (–):*** ***DTC P1515; (B134) No. 19 (+) — Chassis ground (–):*** ***DTC P1517; (B134) No. 20 (+) — 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 the ECM. <Ref. to FU-49, Engine Control Module.>	Replace the ECM. <Ref. to FU-49, Engine Control Module.>

CK: DTC P1518 — STARTER SWITCH CIRCUIT LOW INPUT — S078521G09

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK OPERATION OF STARTER MOTOR.** NOTE: Place the inhibitor switch in the “P” or “N” position. (AT model) Depress the clutch pedal. (MT model)	Does the starter motor operate when ignition switch is turned 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-66, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

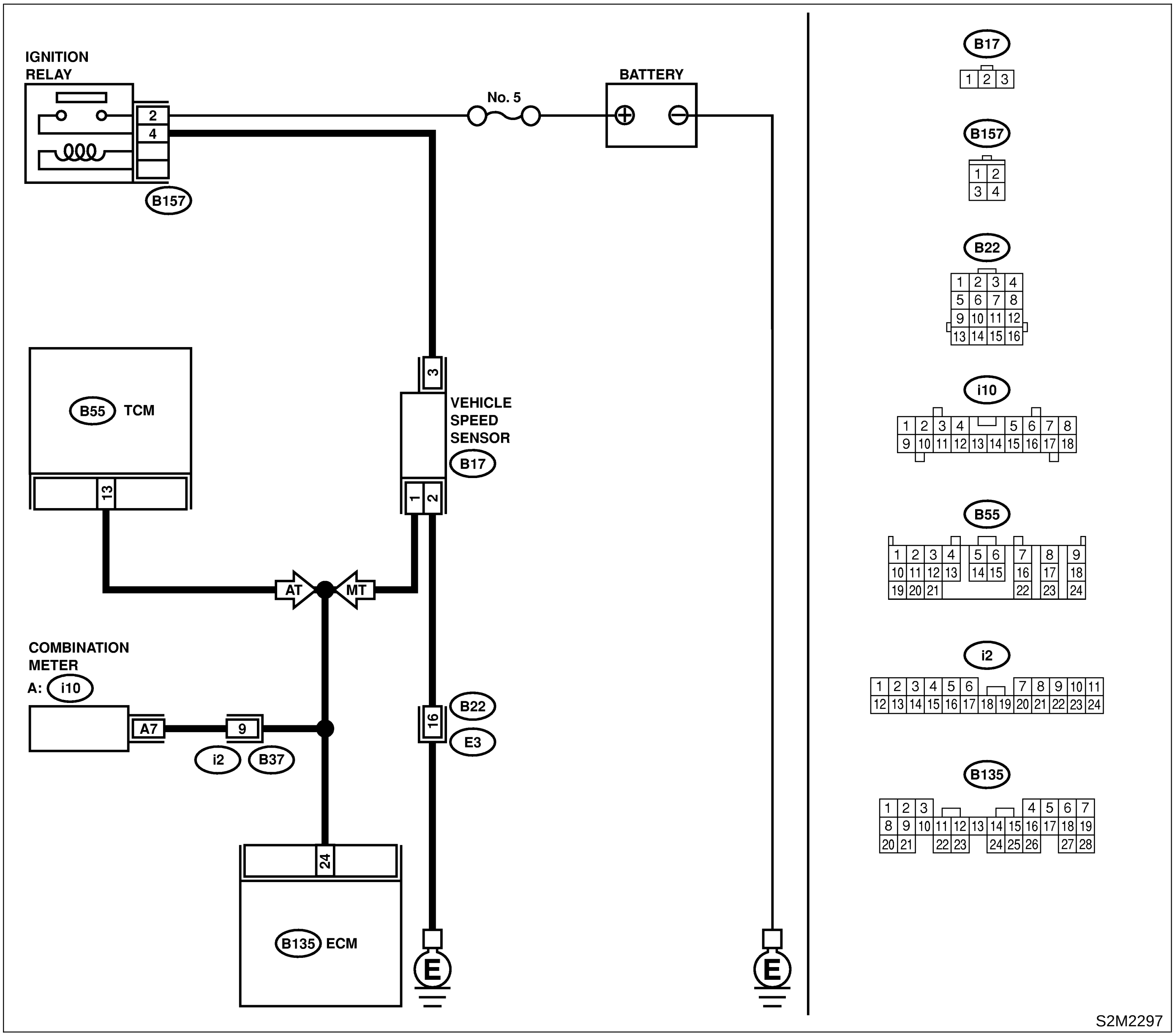
MEMO:

CL: DTC P1540 — VEHICLE SPEED SENSOR MALFUNCTION 2 — S078521C26

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



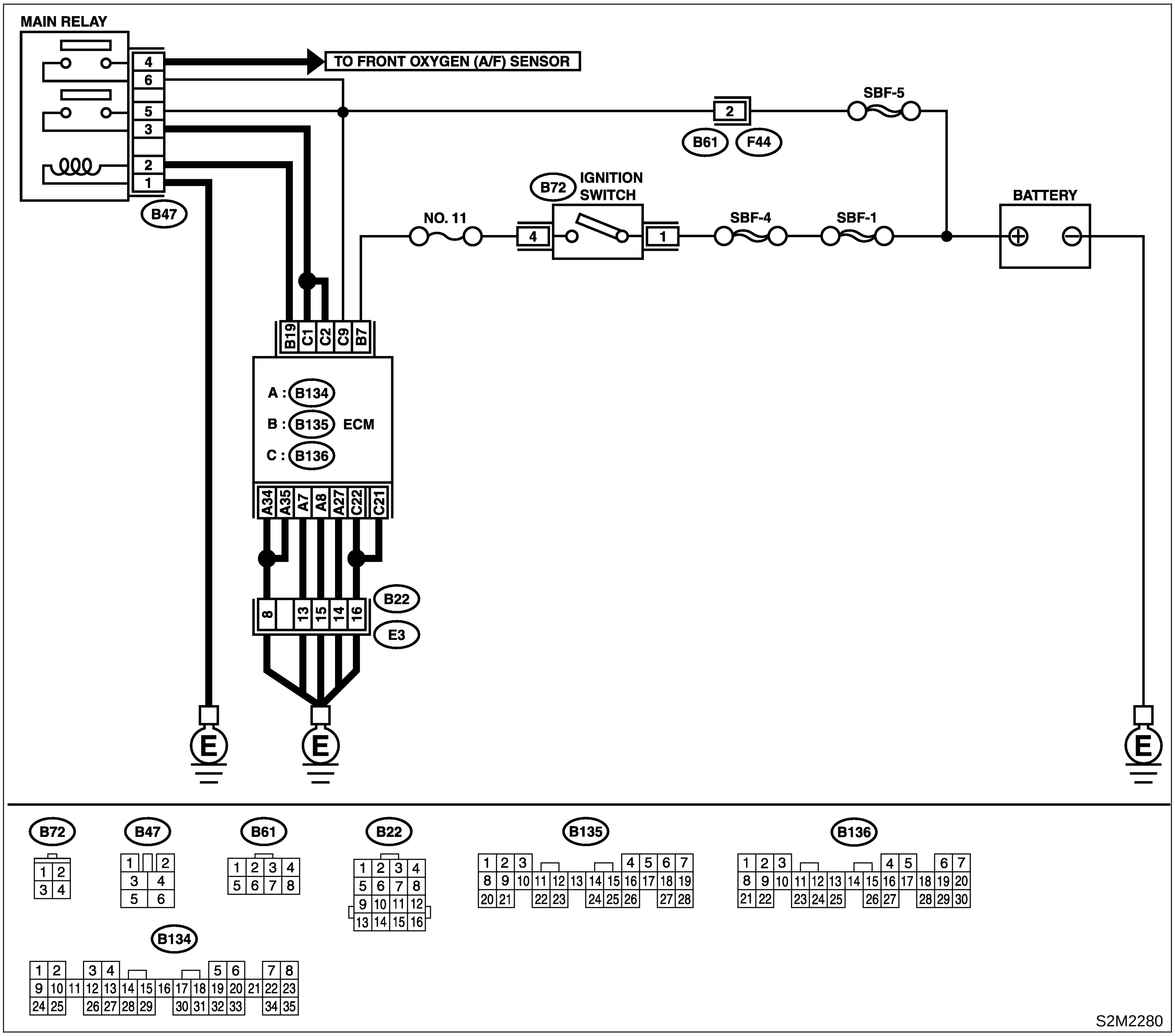
No.	Step	Check	Yes	No
1	**CHECK DTC P0720 ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0720?	Check front vehicle speed sensor signal circuit. <Ref. to AT-46, DTC 33 FRONT VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK SPEEDOMETER OPERATION IN COMBINATION METER.**	Does the speedometer operate normally?	Go to step **3**.	Check speedometer and vehicle speed sensor. <Ref. to IDI-14, INSPECTION, Speedometer.>
3	**CHECK HARNESS BETWEEN ECM AND COMBINATION METER CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from combination meter. 3) Measure the resistance between ECM and combination meter. ***Connector & terminal*** ***(B135) No. 24 — (i10) No. 2:***	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

CM: DTC P1560 — BACK-UP VOLTAGE CIRCUIT MALFUNCTION — S078521C27

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to OFF. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 9 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair poor contact in ECM connector.	Go to step **2**.

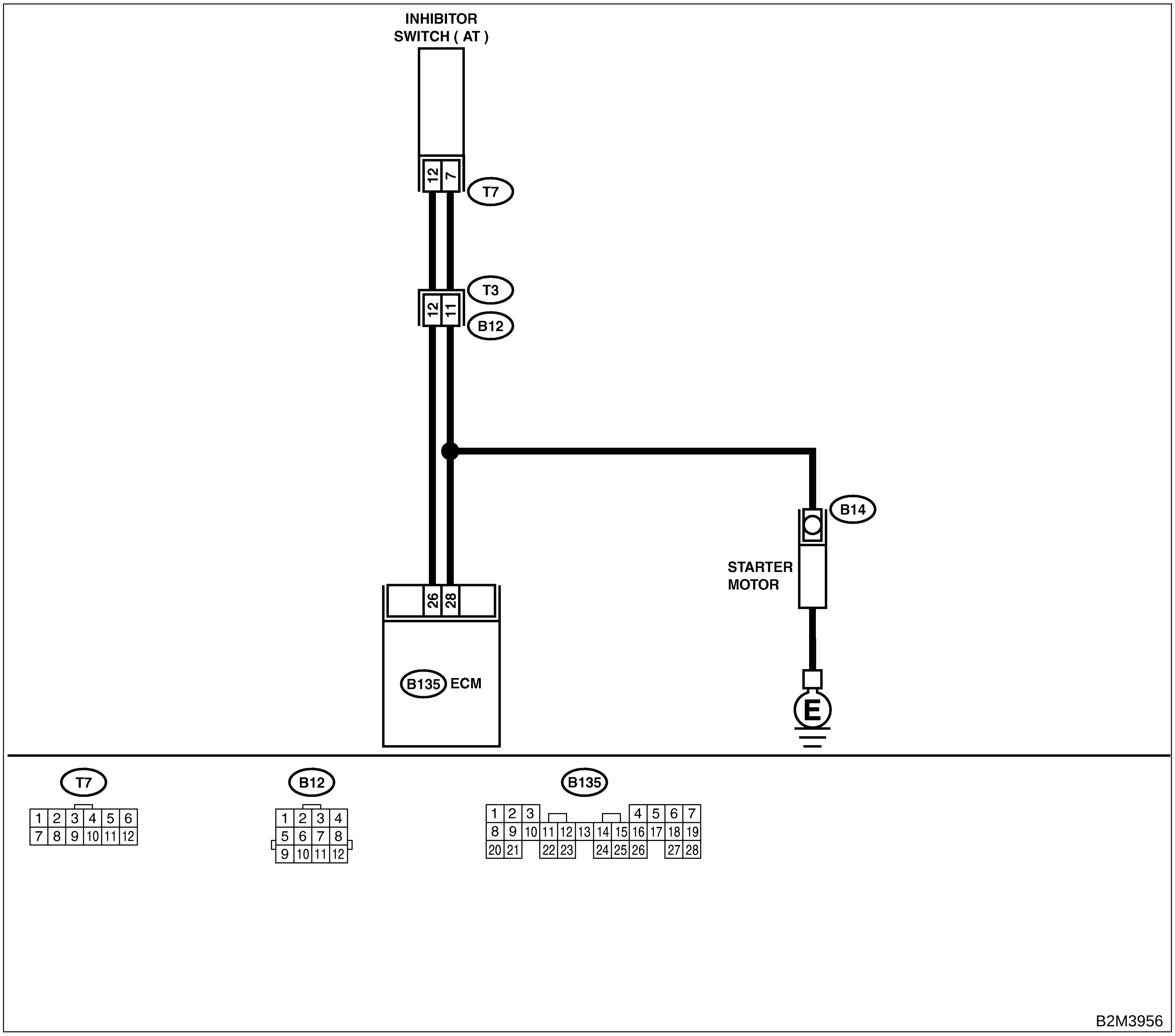
No.	Step	Check	Yes	No
2	**CHECK HARNESS BETWEEN ECM AND MAIN FUSE BOX CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 9 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between ECM connector and battery terminal.	Go to step **3**.
3	**CHECK FUSE SBF-5.**	Is fuse blown?	Replace the 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

CN: DTC P1590 — NEUTRAL POSITION SWITCH CIRCUIT HIGH INPUT (AT MODEL) — S078521G83

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



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 "List of Diagnostic Trouble Code (DTC)". <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground in selector lever "N" and "P" positions. ***Connector & terminal*** ***(B135) No. 26 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **3**.	Go to step **5**.
3	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground in selector lever except for "N" and "P" positions. ***Connector & terminal*** ***(B135) No. 26 (+) — 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 with SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
5	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 26 (+) — 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 the ignition switch to OFF. 2) Disconnect the connectors from ECM and inhibitor switch. 3) Measure the resistance of harness between ECM and inhibitor switch connector. ***Connector & terminal*** ***(B135) No. 26 — (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

No.	Step	Check	Yes	No
7	**CHECK INHIBITOR SWITCH GROUND LINE.** Measure the 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 the 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 the 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-27, INSPECTION, Select Cable.>	Contact with SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

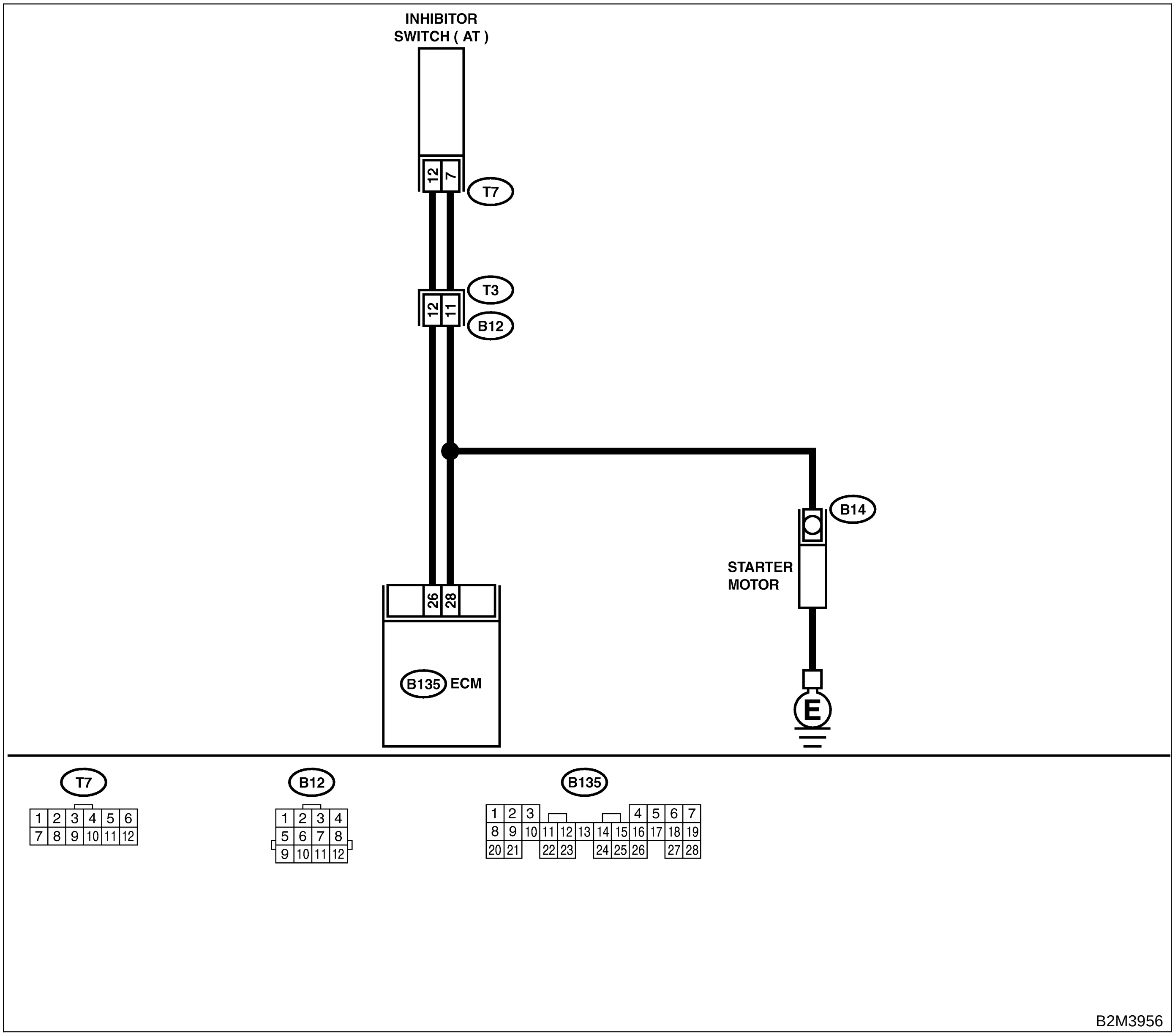
MEMO:

CO: DTC P1591 — NEUTRAL POSITION SWITCH CIRCUIT LOW INPUT (AT MODEL) — *S078521G84*

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



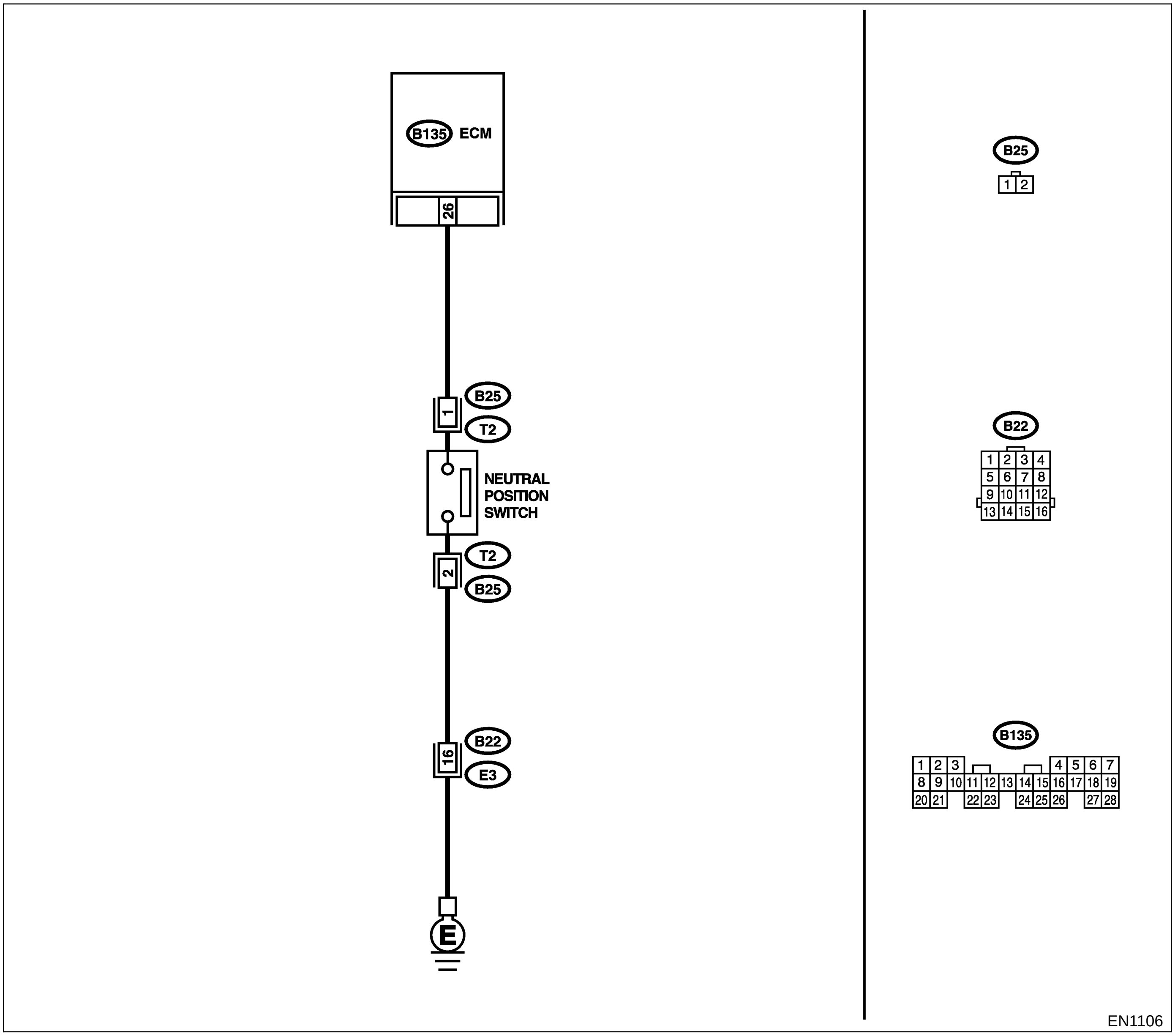
No.	Step	Check	Yes	No
1	**CHECK DTC P0705 ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0705?	Inspect DTC P0705 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN-84, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 26 (+) — 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 the ignition switch to OFF. 2) Disconnect the connectors from ECM and transmission harness connector (T3). 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 26 — 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 the connector from inhibitor switch. 2) Measure the 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 the resistance between inhibitor switch connector the receptacle’s terminals in selector lever except for “N” position. ***Terminals*** ***No. 7 — No. 12:***	Is the resistance more than 1 MΩ at except “N” and “P” positions?	Go to step **6**.	Replace the 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-27, INSPECTION, Select Cable.>	Contact with SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

CP: DTC P1592 — NEUTRAL POSITION SWITCH CIRCUIT MALFUNCTON (MT MODEL) — S078521K50

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



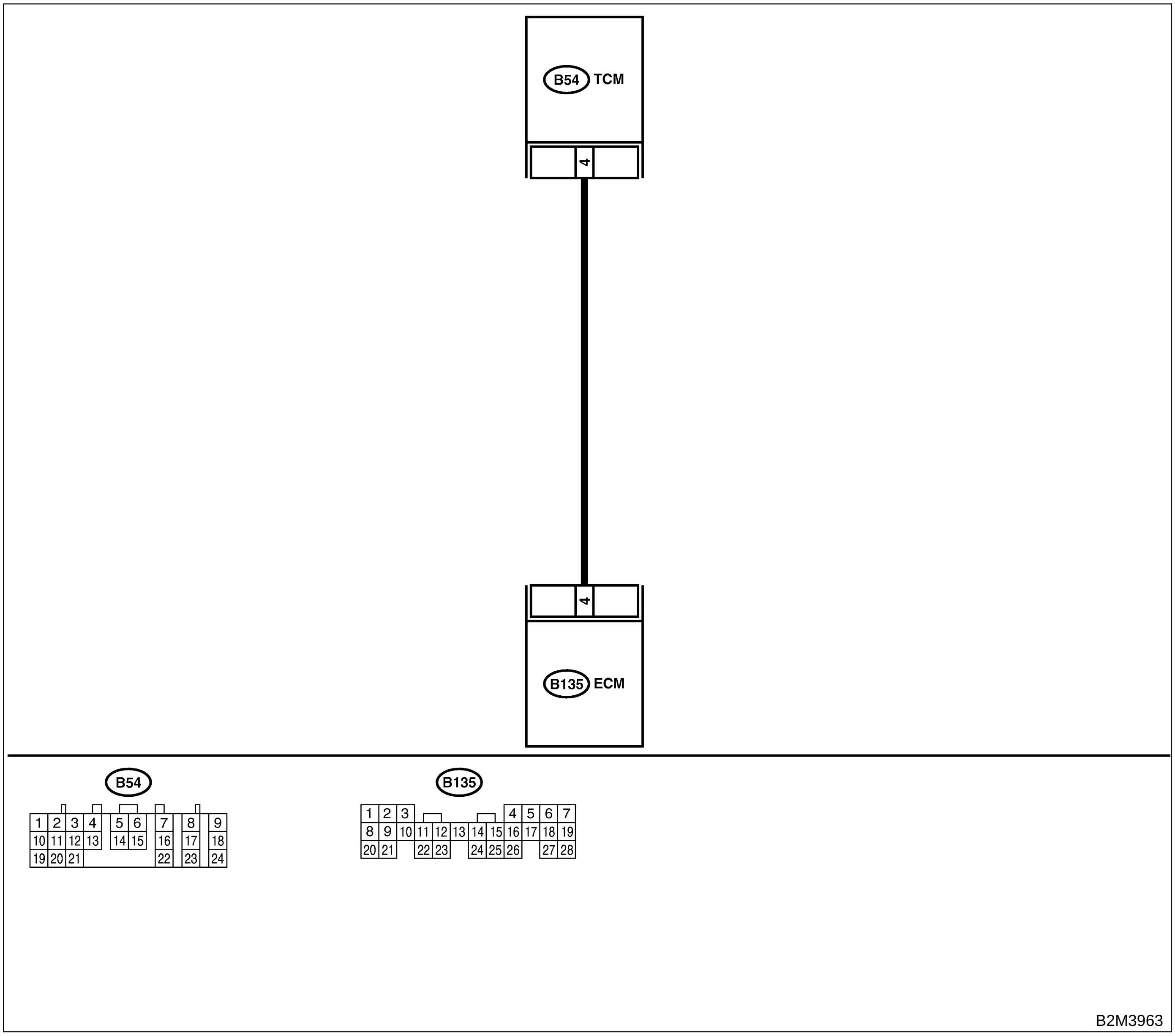
No.	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 26 (+) — Chassis ground (−):***	Is the voltage more than 10V in neutral position?	Go to step **2**.	Go to step **4**.
2	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 26 (+) — Chassis ground (−):***	Is the voltage less than 1V in other position?	Go to step **3**.	Go to step **4**.
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is the poor contact in ECM connector?	Repair poor contact in ECM connector.	Contact with SOA (distributor) service.
4	**CHECK NEUTRAL POSITION SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission harness. 3) Measure the resistance between transmission harness and connector termials. ***Connector & terminal*** ***(T2) No. 1 — No. 2:***	Is the resistance more than 1MΩ in neutral position?	Go to step **5**.	Repair short circuit in transmission harness or replace neutral position switch.
5	**CHECK NEUTRAL POSITION SWITCH.** Measure the resistance between transmission harness connector terminals.	Is the resistance less than 1Ω in other positions?	Go to step **6**.	Repair short circuit in transmissin harness or replace neutral position switch.
6	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** Measure the resistance between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 26 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between ECM and transmission harness connector.	Go to step **7**.
7	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and transmission harness connector. ***Connector & terminal*** ***(B135) No. 26 — (B25) No. 1:***	Is the resistance less than 1 Ω?	Go to step **8**.	Repair open circuit in harness between ECM and transmission harness connector.
8	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** Measure the resistance of harness between transmission harness connector and engine ground. ***Connector & terminal*** ***(B25) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **9**.	Repair open circuit between transmission harness connector and engine ground terminal.
9	**CHECK POOR CONTACT.** Check poor contact in transmission harness connector.	Is there poor contact in transmission harness connector?	Repair poor contact in transmission harness connector.	Contact with SOA (distributor) service.

CQ: DTC P1594 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT MALFUNCTION — S078521G12

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



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 the AT shift control functioning properly?	Go to step **2**.	Replace the TCM. <Ref. to AT-45, Transmission Control Module (TCM).>

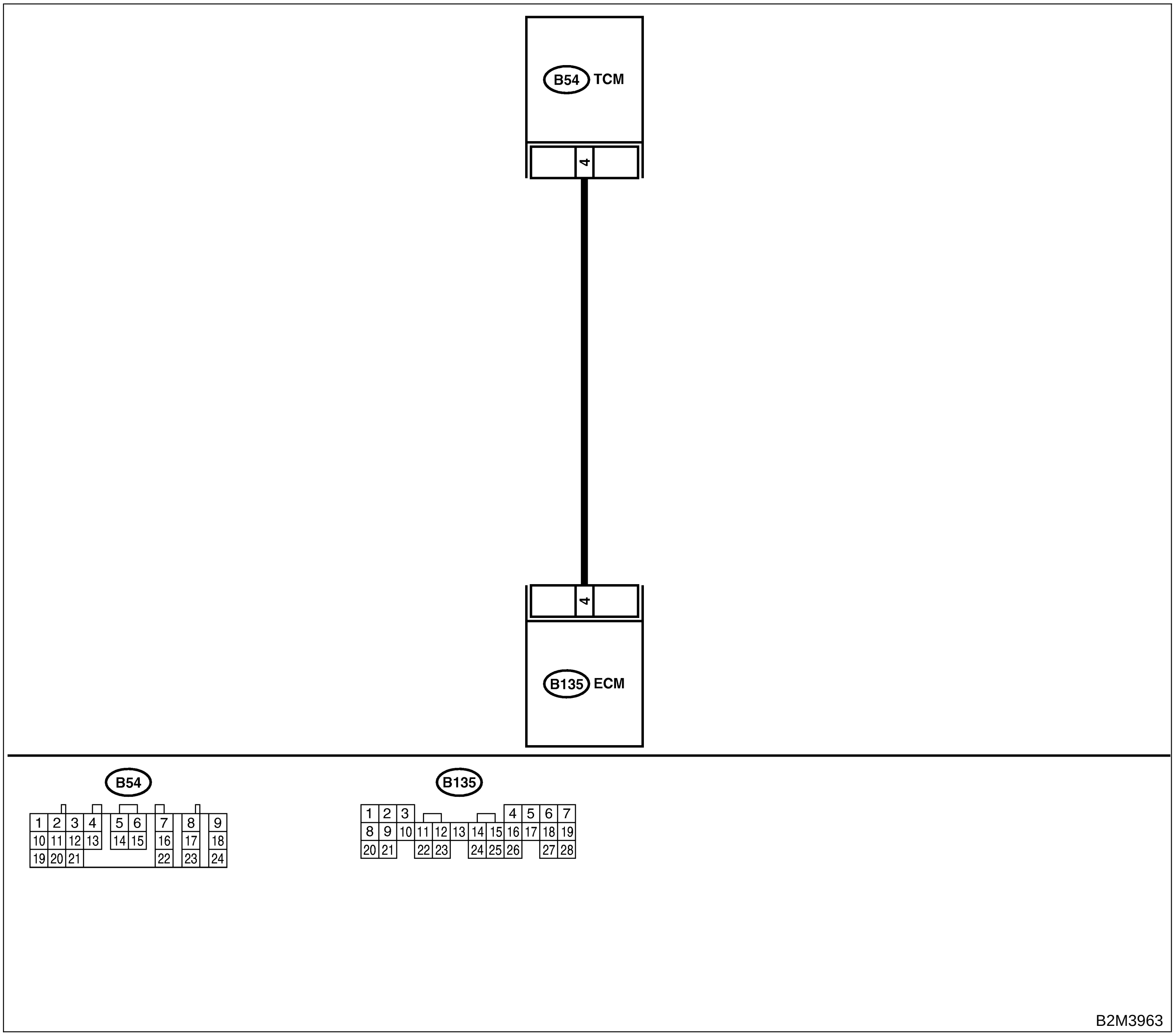
No.	Step	Check	Yes	No
2	**CHECK ACCESSORY.**	Are car phone and/or CB installed on vehicle?	Repair grounding line of car phone or CB system.	Replace the TCM. <Ref. to AT-45, Transmission Control Module (TCM).>

CR: DTC P1595 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT LOW INPUT — *S078521G13*

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



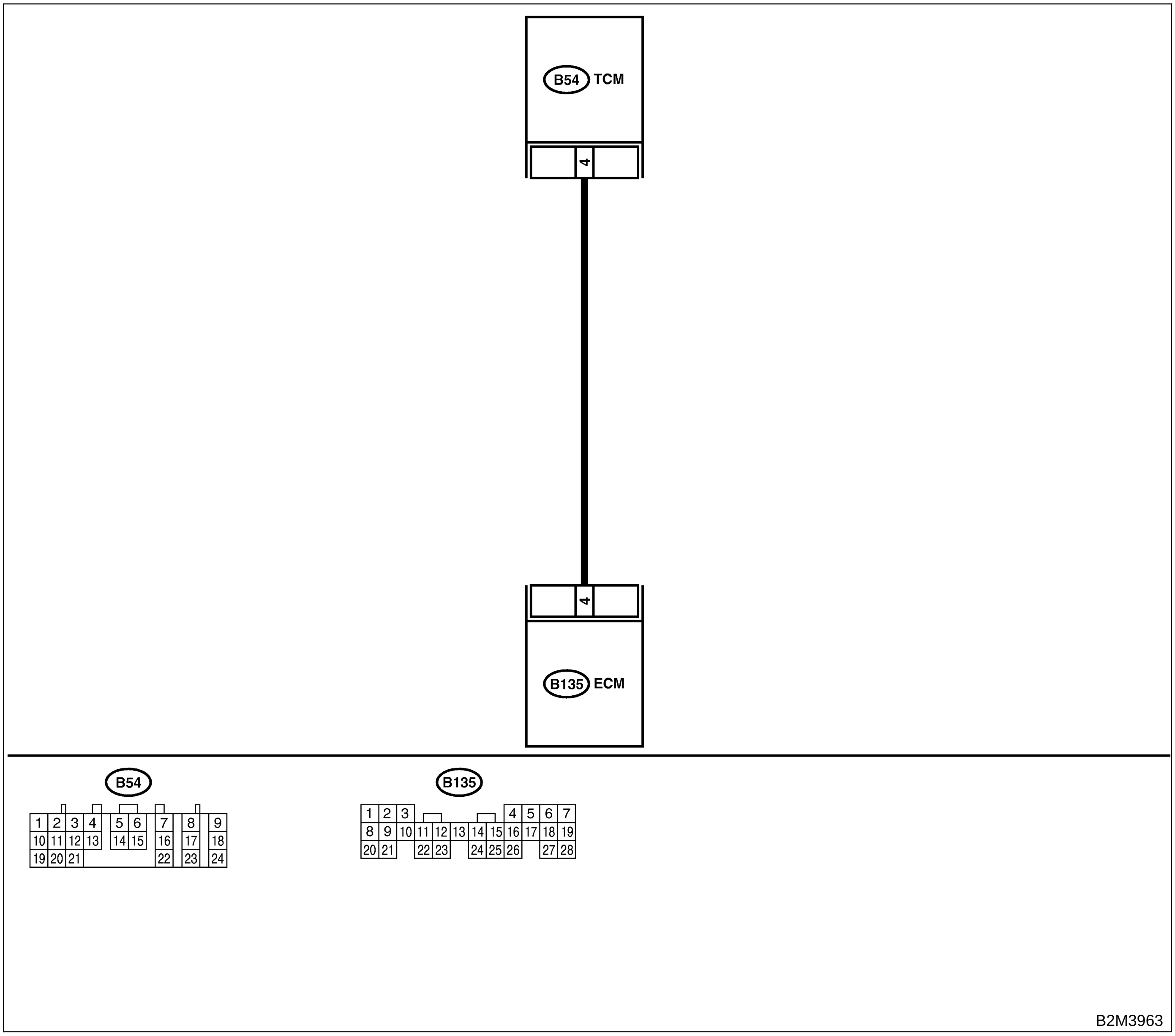
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 4 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **2**.	Even if MIL lights 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 the ignition switch to OFF. 2) Disconnect the connector from ECM and TCM. 3) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 4 — 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 the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 4 (+) — 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 the trouble code for automatic transmission. <Ref. to AT-18, Read Diagnostic Trouble Code (DTC).>	Does the trouble code appear for automatic transmission?	Inspect trouble code for automatic transmission. <Ref. to AT-36, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Replace the TCM. <Ref. to AT-45, Transmission Control Module (TCM).>

CS: DTC P1596 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT HIGH INPUT — S078521G14

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



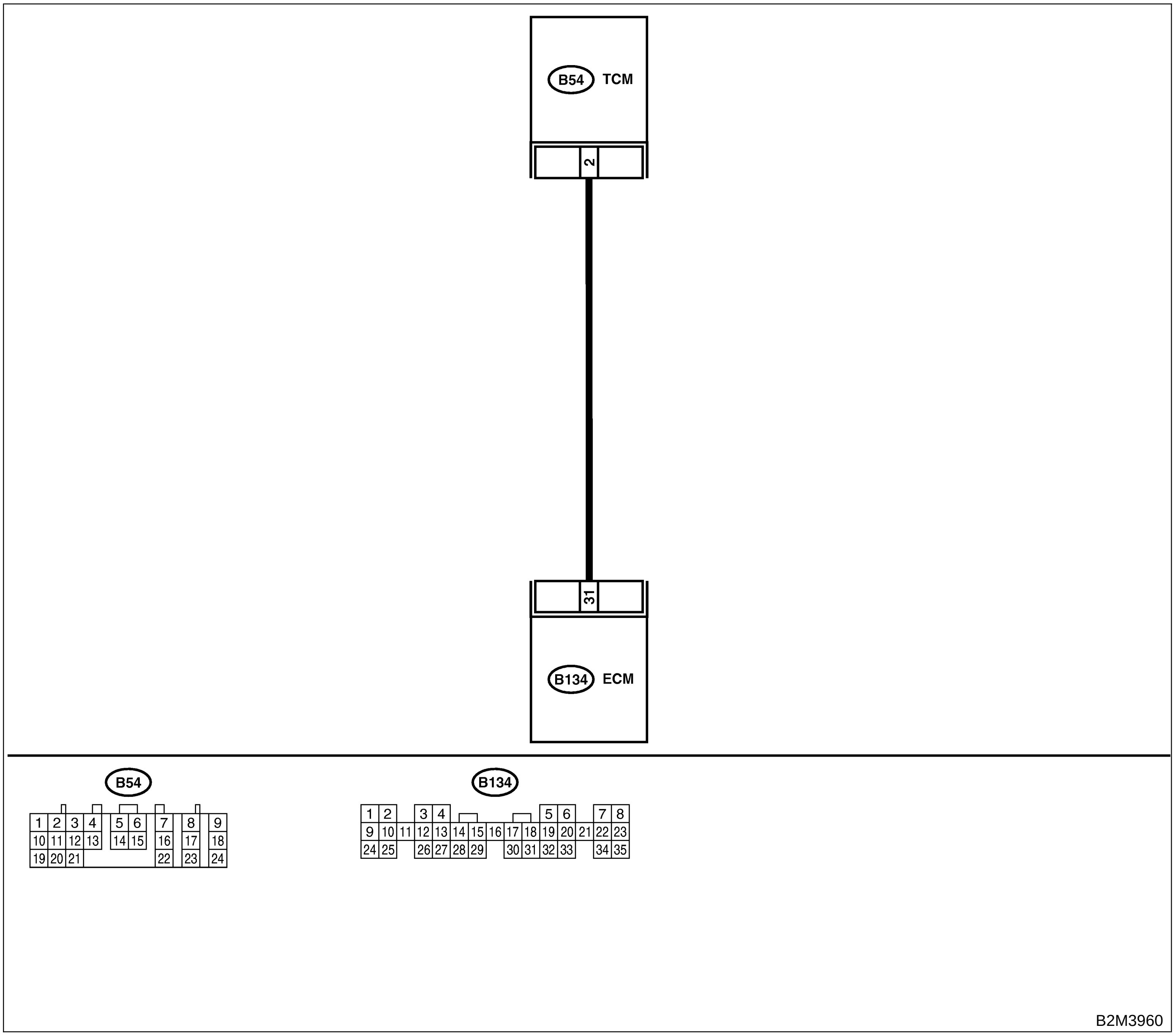
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and TCM connector. After repair, replace the ECM. <Ref. to FU-49, Engine Control Module.>	Go to step **2**.
2	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 4 (+) — 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 the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 4 (+) — 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 the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 4 (+) — 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 with SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
5	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 4 (+) — 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.

CT: DTC P1698 — ENGINE TORQUE CONTROL CUT SIGNAL CIRCUIT LOW INPUT — S078521G15

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



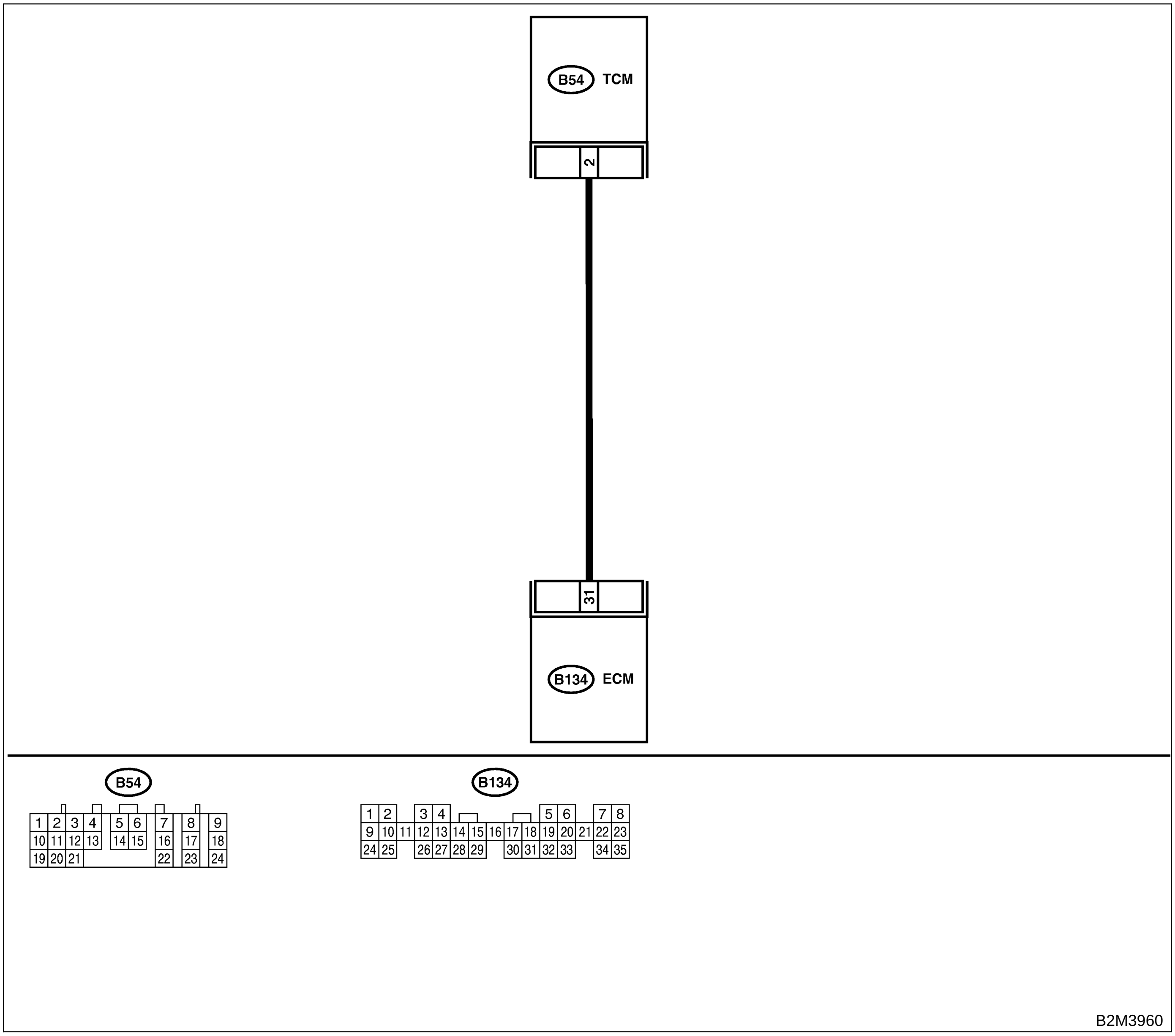
No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Start the engine, and warm-up the engine. 2) Turn the ignition switch to OFF. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 31 (+) — Chassis ground (−):***	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 the ignition switch to OFF. 2) Disconnect the connectors from ECM and TCM. 3) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 31 — 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 the resistance of harness betwee ECM and TCM connector. ***Connector & terminal*** ***(B134) No. 31 — (B54) No. 2:***	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.

CU: DTC P1699 — ENGINE TORQUE CONTROL CUT SIGNAL CIRCUIT HIGH INPUT — S078521G16

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



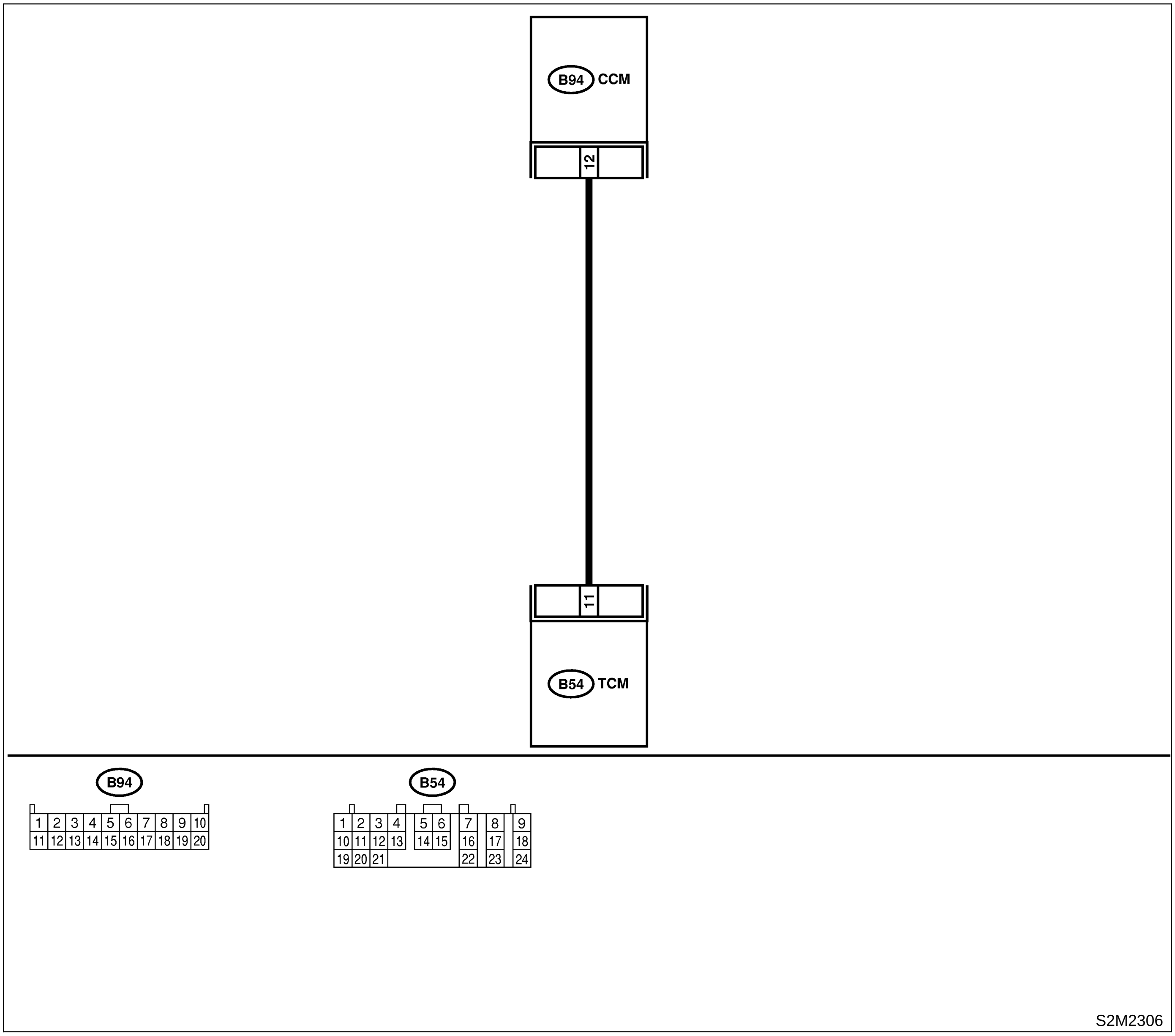
No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Start the engine, and warm-up the engine. 2) Turn the ignition swtich to OFF. 3) Disconnect the connector from TCM. 4) Turn the ignition switch to ON. 5) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 31 (+) — 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 the ECM. <Ref. to FU-49, Engine Control Module.>
2	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 31 (+) — 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 the ECM. <Ref. to FU-49, Engine Control Module.>	Contact with SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

CV: DTC P1701 — CRUISE CONTROL SET SIGNAL CIRCUIT MALFUNCTION FOR AUTOMATIC TRANSMISSION — S078521C29

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



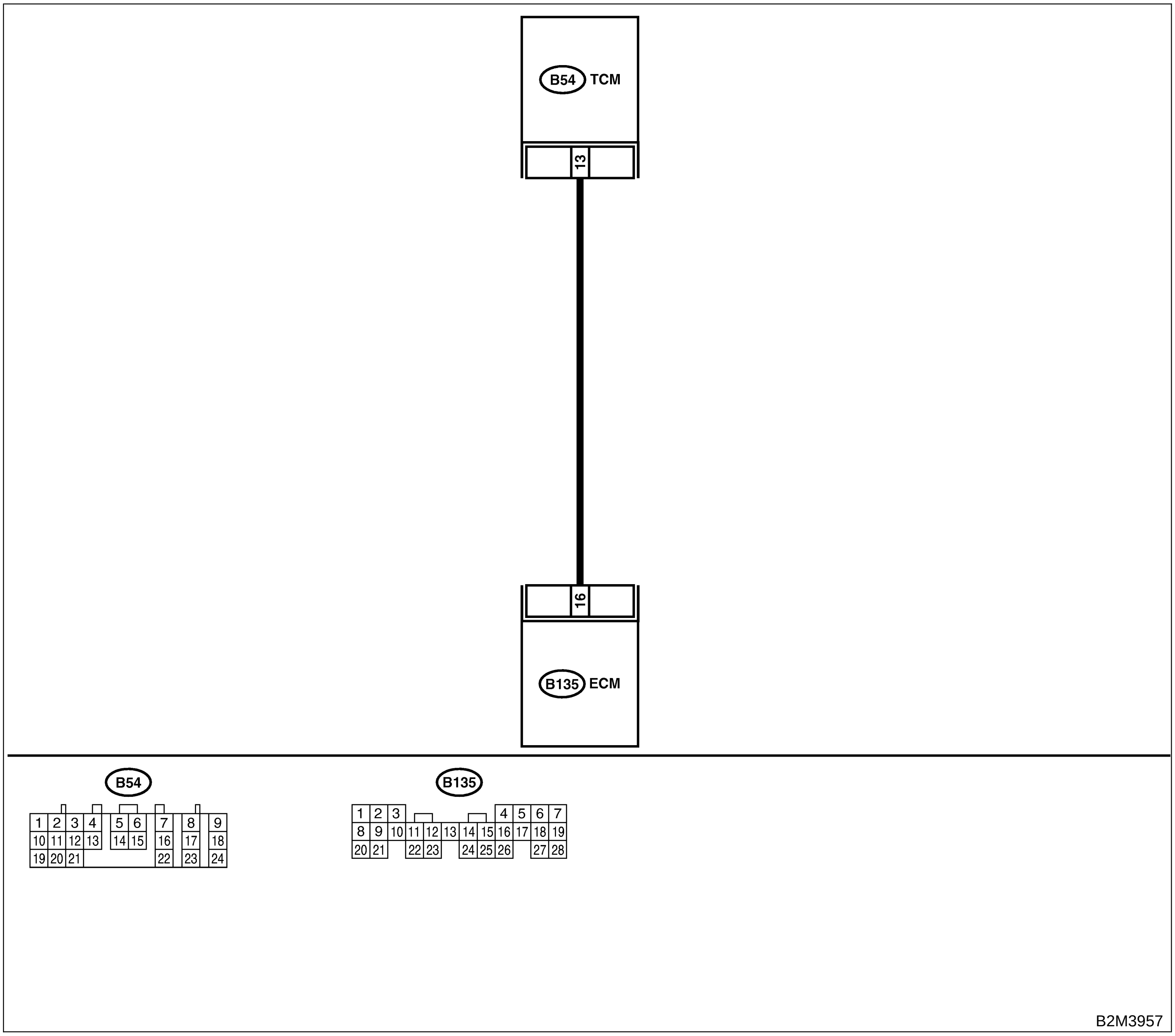
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN TCM AND CCM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and CCM. 3) Measure the resistance of harness between TCM and CCM connector. ***Connector & terminal*** ***(B54) No. 11— (B94) No. 12:***	Is the resistance 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 the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 11 — 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 the 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) Turn the cruise control main switch to ON. 5) Move selector lever to “D” and slowly increase vehicle speed to 50 km/h (31 MPH). 6) Turn the cruise control command switch to ON. 7) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 11 (+) — Chassis ground (−):***	Is the resistance less than 1 V?	Go to step **4**.	Check cruise control command switch circuit. <Ref. to CC-7, 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 the TCM. <Ref. to AT-45, Transmission Control Module (TCM).>

CW: DTC P1711 — ENGINE TORQUE CONTROL SIGNAL 1 CIRCUIT MALFUNCTION — S078521G17

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



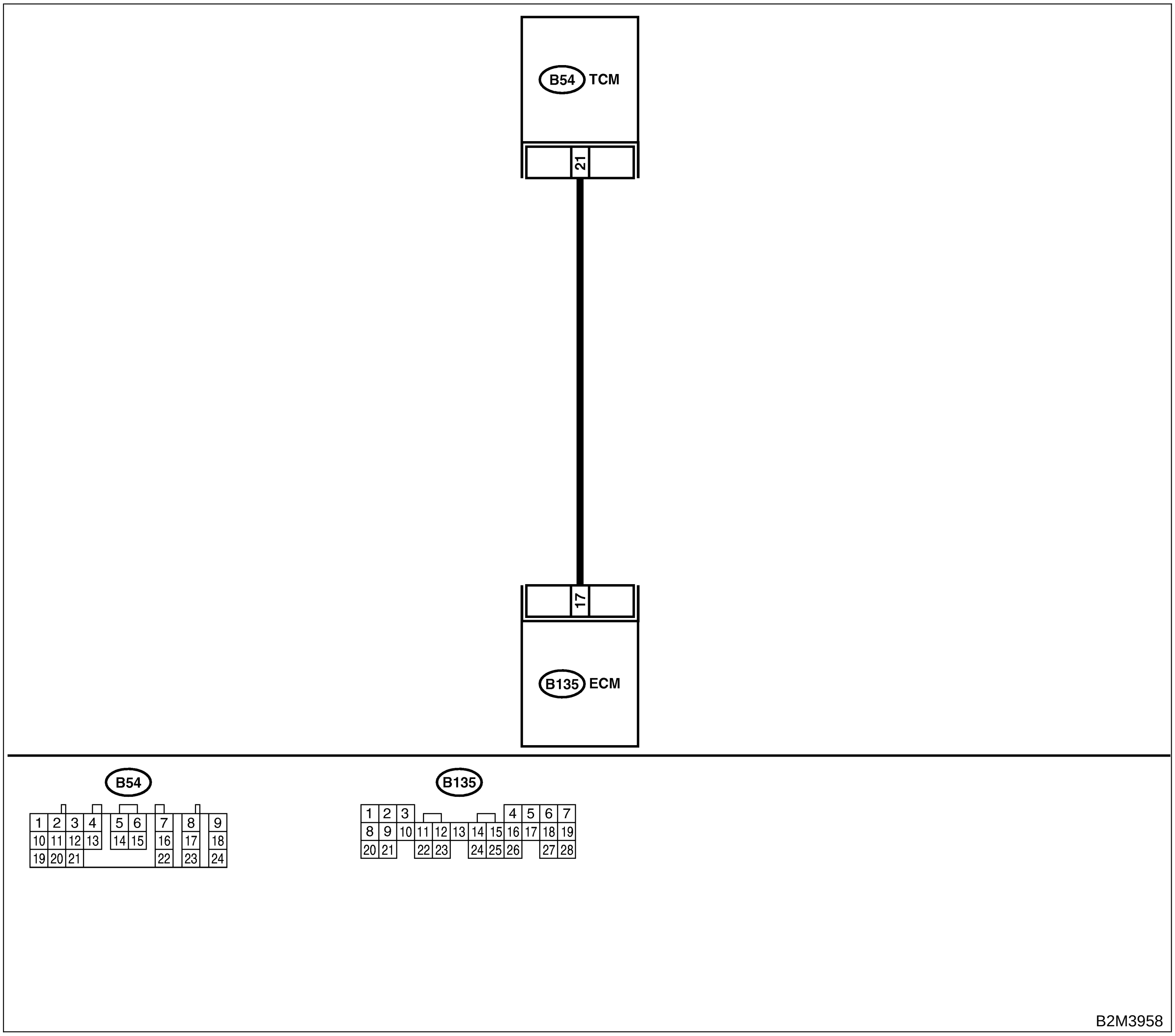
No.	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 16 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **2**.	Go to step **4**.
2	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 16 (+) — 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 the ECM. <Ref. to FU-49, Engine Control Module.>
4	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and TCM. 3) Measure the resistance of harness between ECM and TCM connector. ***Connector & terminal*** ***(B135) No. 16 — (B56) No. 5:***	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 the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 16 — 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 the TCM. <Ref. to AT-45, Transmission Control Module (TCM).>

CX: DTC P1712 — ENGINE TORQUE CONTROL SIGNAL 2 CIRCUIT MALFUNCTION — S078521G18

- **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-50, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-43, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 17 (+) — 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 the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 17 (+) — 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 the ECM. <Ref. to FU-49, Engine Control Module.>
4	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and TCM. 3) Measure the resistance of harness between ECM and TCM connector. ***Connector & terminal*** ***(B135) No. 17 — (B54) No. 21:***	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 the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 17 — 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 the TCM. <Ref. to AT-45, Transmission Control Module (TCM).>

20. General Diagnostic Table

S078257

A: INSPECTION S078257A10

1. ENGINE S078257A1001

NOTE:
Malfunction of parts other than those listed is also possible. <Ref. to ME-87, Engine Trouble in General.>

Symptom	Problem parts
1. Engine stalls during idling.	1) Idle air control solenoid valve 2) Intake air temperature and pressure sensor 3) Ignition parts (*1) 4) Engine coolant temperature sensor (*2) 5) Crankshaft position sensor (*3) 6) Camshaft position sensor (*3) 7) Fuel injection parts (*4)
2. Rough idling	1) Idle air control solenoid valve 2) Intake air temperature and pressure sensor 3) Engine coolant temperature sensor (*2) 4) Ignition parts (*1) 5) Air intake system (*5) 6) Fuel injection parts (*4) 7) Throttle position sensor 8) Crankshaft position sensor (*3) 9) Camshaft position sensor (*3) 10) Oxygen sensor 11) Fuel pump and fuel pump relay
3. Engine does not return to idle.	1) Idle air control solenoid valve 2) Engine coolant temperature sensor 3) Accelerator cable (*6) 4) Throttle position sensor 5) Intake air temperature and pressure sensor
4. Poor acceleration	1) Intake air temperature and pressure sensor 2) Throttle position sensor 3) Fuel injection parts (*4) 4) Fuel pump and fuel pump relay 5) Engine coolant temperature sensor (*2) 6) Crankshaft position sensor (*3) 7) Camshaft position sensor (*3) 8) A/C switch and A/C cut relay 9) Engine torque control signal circuit 10) Ignition parts (*1)
5. Engine stalls or engine sags or hesitates at acceleration.	1) Intake air temperature and pressure sensor 2) Engine coolant temperature sensor (*2) 3) Crankshaft position sensor (*3) 4) Camshaft position sensor (*3) 5) Purge control solenoid valve 6) Fuel injection parts (*4) 7) Throttle position sensor 8) Fuel pump and fuel pump relay
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

Symptom	Problem parts
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 *S078257A1002*

NOTE:
Check general diagnostics table with non-conformity symptom for automatic transmission. <Ref. to AT-2, Basic Diagnostic Procedure.>

MEMO:

FRONT SUSPENSION

FS

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1. General Description..........2
2. Wheel Alignment..........6
3. Front Transverse Link..........14
4. Front Ball Joint..........16
5. Front Strut..........17
6. Front Stabilizer..........21
7. Front Crossmember..........22
8. General Diagnostic Table..........23

1. General Description S202001

A: SPECIFICATIONS S202001E49

1. STABILIZER S202001E4901

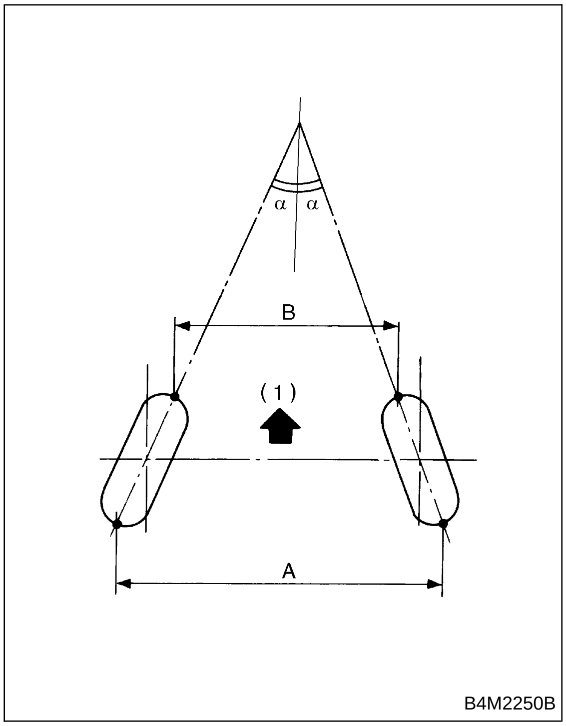
Bar dia.	
Front	Rear
19 mm (0.75 in)	13 mm (0.51 in)

2. WHEEL ALIGNMENT S202001E4902

Camber (tolerance: ±0°30′)	−0°15′
Caster (common difference: ±0°45′)	2°37′
Toe-in	0±3 mm (0±0.12 in)* Each toe angle: ±0°09′
Kingpin angle	13°25′
Wheel arch height [tolerance: $^{+12}/_{-24}$ mm ($^{+0.47}/_{-0.94}$ in)]	432 mm (17.01 in)

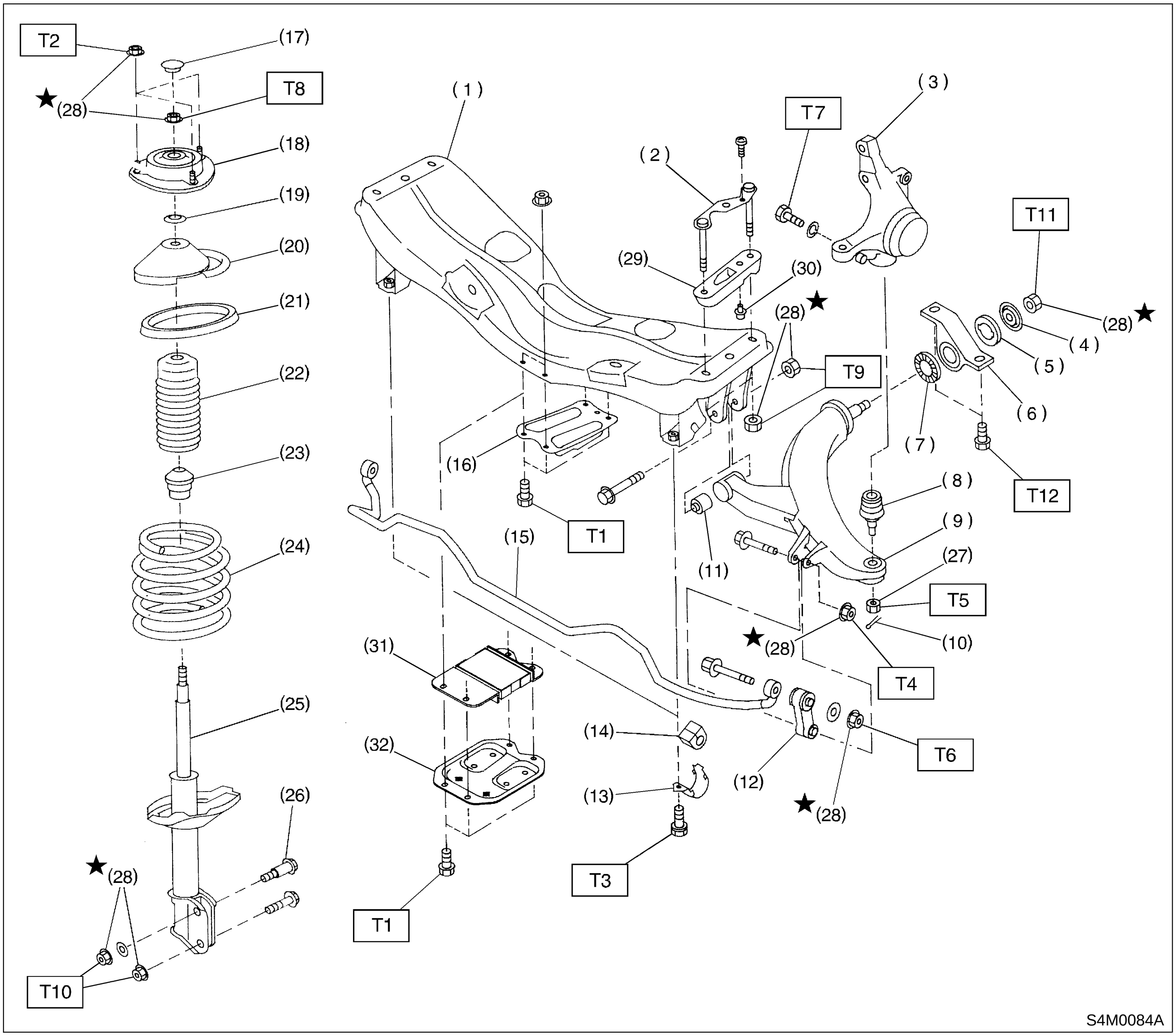
*: When performing toe-in adjustment, align as close to 0 mm (0 in) as possible.

NOTE:
- Front and rear toe-ins and front camber can be adjusted. If toe-in or camber tolerance exceeds specifications, adjust toe-in and camber to the middle value of specification.
- The other items indicated in the specification table cannot be adjusted. If the other items exceeds specifications, check suspension parts and connections for deformities; replace with new ones as required.



(1) Front
A − B = Positive: Toe-in, Negative: Toe-out
α = Each toe angle

B: COMPONENT *S202001A05*



(1) Front crossmember
(2) Bolt ASSY
(3) Housing
(4) Washer
(5) Stopper rubber (Rear)
(6) Rear bushing
(7) Stopper rubber (Front)
(8) Ball joint
(9) Transverse link
(10) Cotter pin
(11) Front bushing
(12) Stabilizer link
(13) Clamp
(14) Bushing
(15) Stabilizer
(16) Jack-up plate
(17) Dust seal
(18) Strut mount
(19) Spacer
(20) Upper spring seat
(21) Rubber seat
(22) Dust cover
(23) Helper
(24) Coil spring
(25) Damper strut
(26) Adjusting bolt
(27) Castle nut
(28) Self-locking nut
(29) Adapter front crossmember
(30) Clip
(31) Dynamic damper (MT model)
(32) Jack-up plate (MT model)

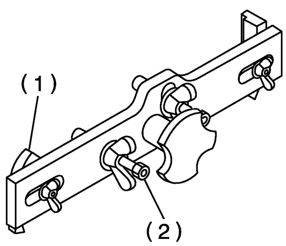
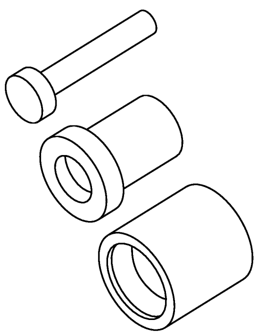
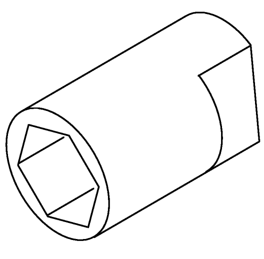
Tightening torque: N·m (kgf-m, ft-lb)
T1: 18 (1.8, 13.0)
T2: 20 (2.0, 14.5)
T3: 25 (2.5, 18.1)
T4: 30 (3.1, 22)
T5: 40 (4.1, 30)
T6: 45 (4.6, 33)
T7: 50 (5.1, 37)
T8: 55 (5.6, 41)
T9: 100 (10.2, 74)
T10: 175 (17.8, 129)
T11: 190 (19.4, 140)
T12: 250 (25.5, 184)

C: CAUTION S202001A03

- 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.
- Use SUBARU genuine grease etc. or the equivalent. Do not mix grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply grease onto sliding or revolution surfaces before installation.
- Before installing O-rings or snap rings, apply sufficient amount of grease to avoid damage and deformation.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.

D: PREPARATION TOOL S202001A17

1. SPECIAL TOOLS S202001A1701

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2378A	927380002	ADAPTER	Used as an adapter for camber & caster gauge when measuring camber and caster. (1) 28199AC000 PLATE (2) 28199AC010 BOLT
 B4M2385	927680000	INSTALLER & REMOVER SET	Used for replacing transverse link bushing.
 B4M2384	927760000	STRUT MOUNT SOCKET	Used for disassembling and assembling strut and shock mount.

2. GENERAL PURPOSE TOOLS S202001A1702

TOOL NAME	REMARKS
Alignment Gauge	Used for wheel alignment measurement.
Turning Radius Gauge	Used for wheel alignment measurement.
Toe-in Gauge	Used for toe-in measurement.
Dial Gauge	Used for damper strut measurement.

2. Wheel Alignment S202116

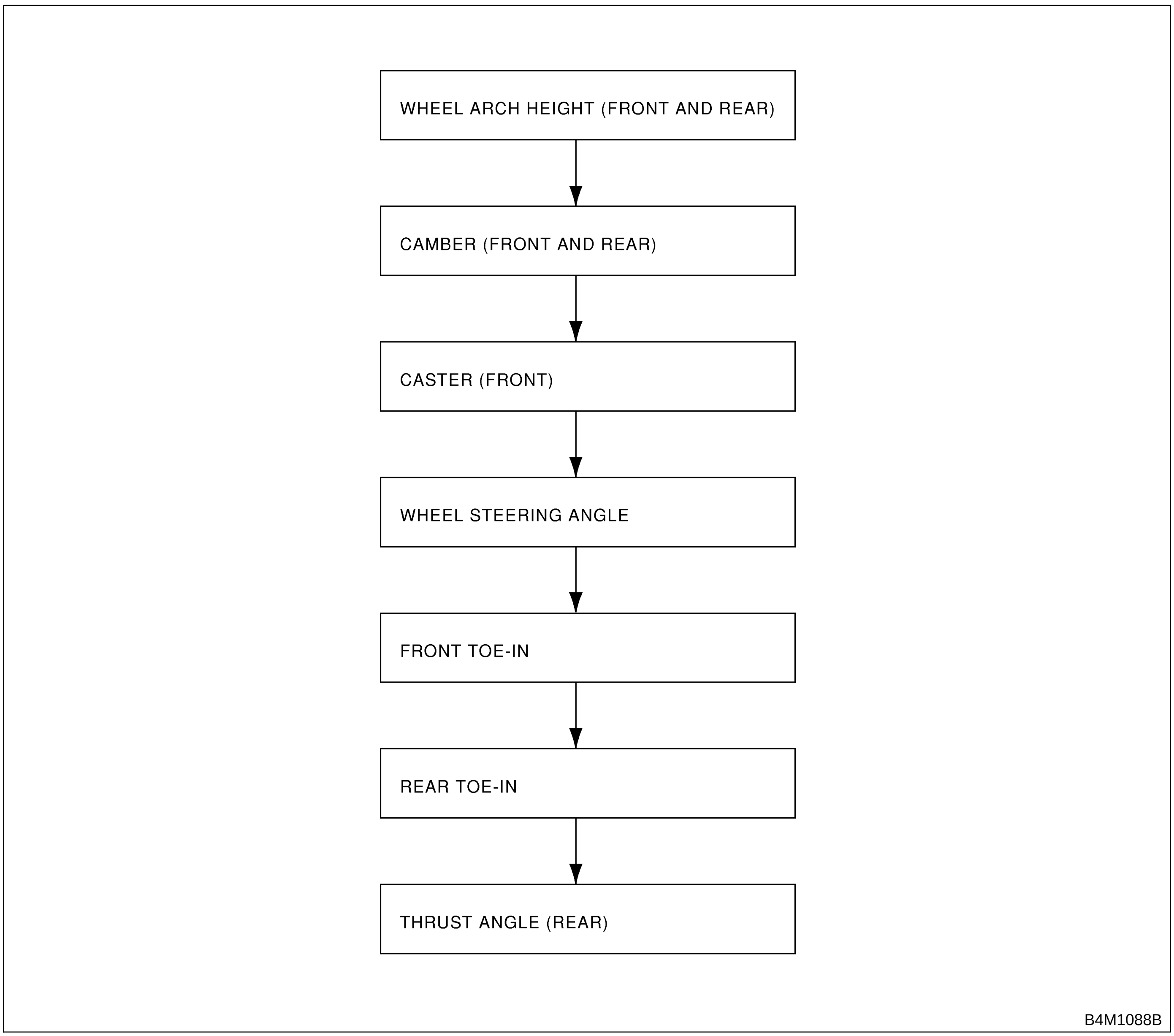
A: INSPECTION S202116A10

Check the following items before taking wheel alignment measurement.

Check items before taking wheel alignment measurement:

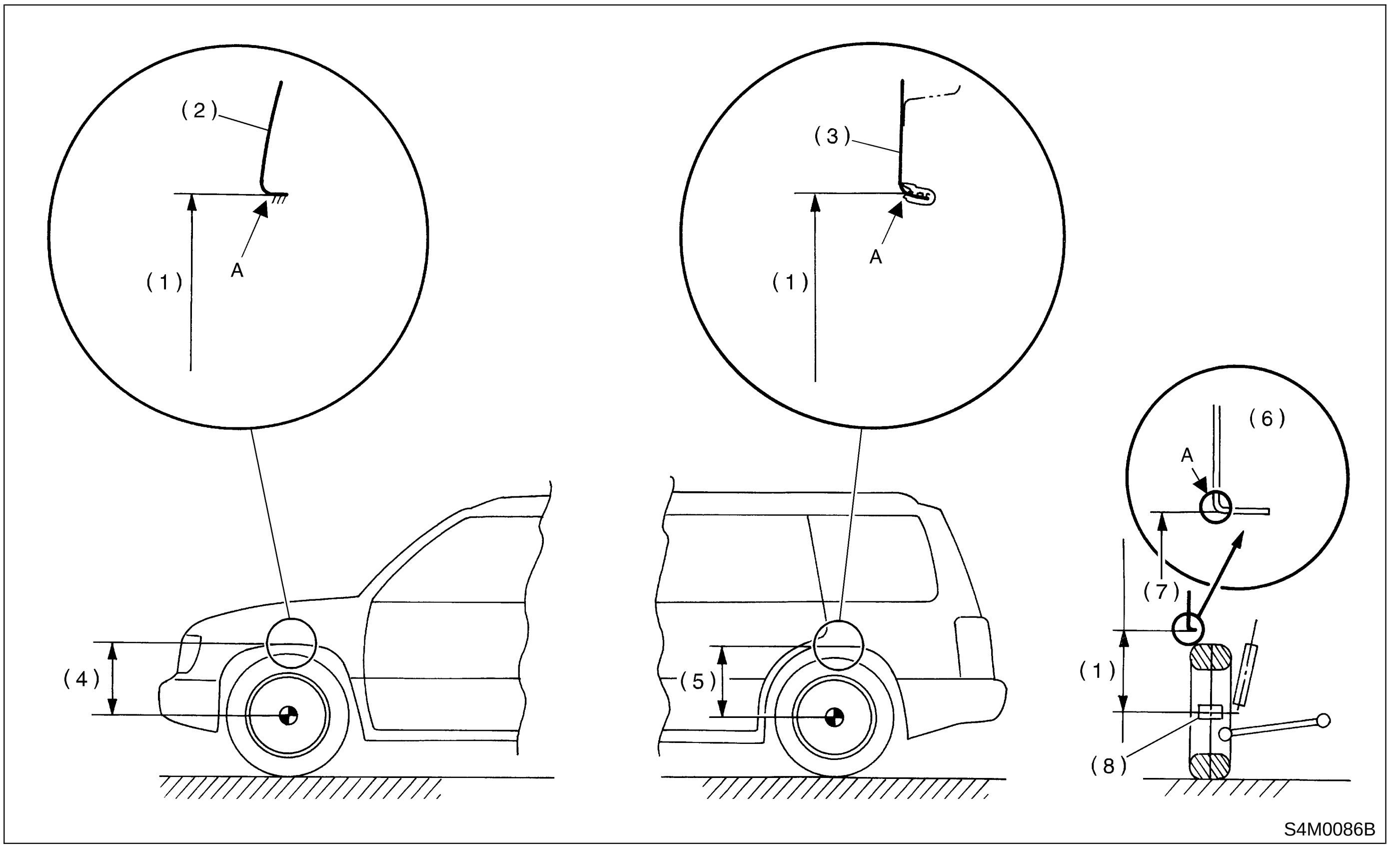
- tire air pressure
- unbalanced right and left tire wear, size difference
- tire run-out
- ball joint excessive play, wear
- tie rod end excessive play, wear
- wheel bearing excessive play
- right and left wheel base imbalance
- steering link part deformed, excessive play
- suspension part deformed, excessive play

Check, adjust and/or measure wheel alignment in accordance with procedures indicated in figure:



1. WHEEL ARCH HEIGHT *S202116A1006*

1) Set vehicle on a level surface.
2) Adjust tire pressure to specifications.
3) Set vehicle under “curb weight” conditions. (Empty luggage compartment, install spare tire, jack, service tools, and top up fuel tank.)
4) Set steering wheel in a straight line, then move the vehicle straight ahead more than 5 m (16 ft) to settle the suspension.
5) Suspend thread from wheel arch (point “A” in figure below) to determine a point directly above center of wheel.
6) Measure distance between measuring point “A” and center of wheel.



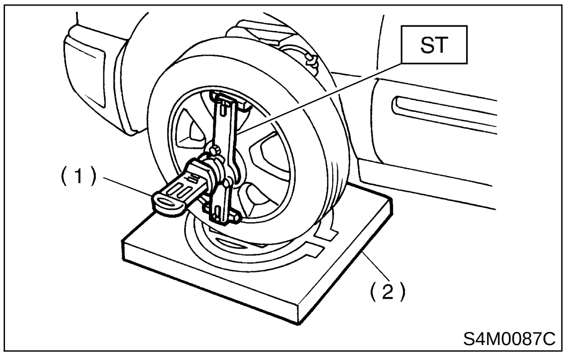
(1) Wheel arch height	(4) Front wheel arch height	(7) Measuring point
(2) Front fender	(5) Rear wheel arch height	(8) End of spindle
(3) Outer rear quarter	(6) Cross-section of arch	

Specified wheel arch height	
Front	Rear
$432^{+12}/_{-24}$ mm ($17.01^{+0.47}/_{-0.94}$ in)	$435^{+12}/_{-24}$ mm ($17.13^{+0.47}/_{-0.94}$ in)

2. CAMBER *S202116A1002*

● Inspection

1) Place front wheel on turning radius gauge. Make sure ground contacting surfaces of front and rear wheels are set at the same height.
2) Set ST into the center of the wheel, and then install the wheel alignment gauge.
ST 927380002 ADAPTER



(1) Alignment gauge
(2) Turning radius gauge

3) Follow the operation manual for wheel alignment gauge to measure the camber angle.

NOTE:
Refer to the “SPECIFICATIONS” for the camber values.
Front
<Ref. to FS-2, SPECIFICATIONS, General Description.>
Rear
<Ref. to RS-2, SPECIFICATIONS, General Description.>

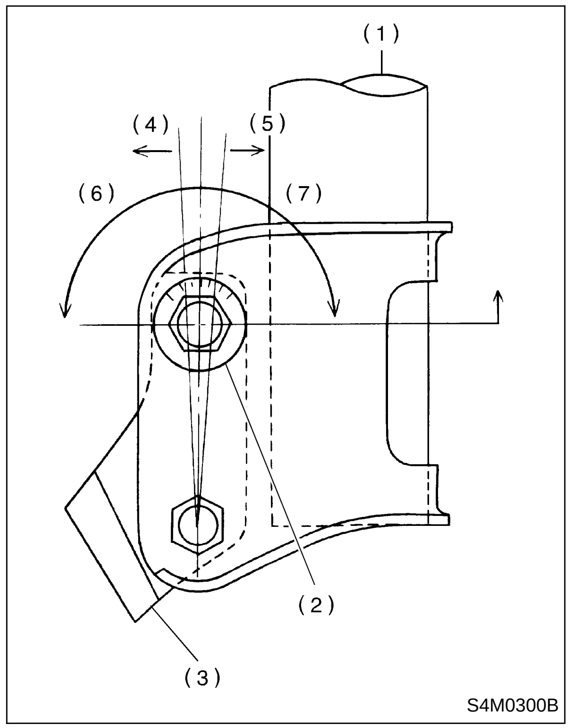
● Front Camber Adjustment

1) Loosen two self-locking nuts located at lower front portion of strut.

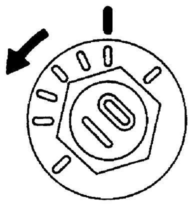
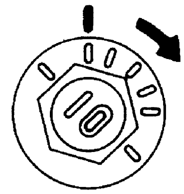
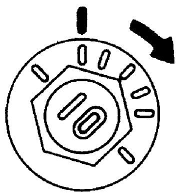
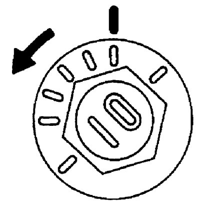
CAUTION:
● When adjusting bolt needs to be loosened or tightened, hold its head with a wrench and turn self-locking nut.
● Discard loosened self-locking nut and replace with a new one.
● When performing toe-in adjustment, align as close to 0 mm (0 in) as possible.

2) Turn camber adjusting bolt so that camber is set at the specification.

NOTE:
Moving the adjusting bolt by one scale graduation changes camber by approximately 0°10′.



(1) Strut
(2) Adjusting bolt
(3) Housing
(4) Outer
(5) Inner
(6) Camber is increased.
(7) Camber is decreased.

	Left side		Right side	
Camber is increased.	 B4M0190	Rotate counterclock-wise.	 B4M0350	Rotate clockwise.
Camber is decreased.	 B4M0350	Rotate clockwise.	 B4M0190	Rotate counterclock-wise.

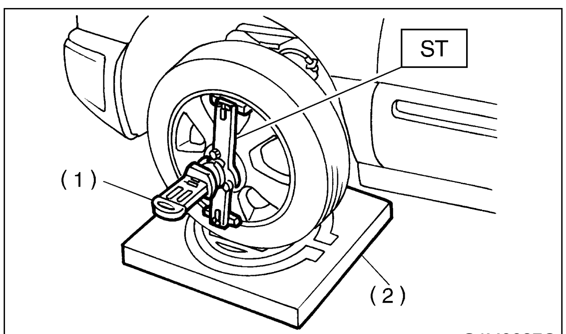
3) Tighten the two self-locking nuts.

Tightening torque:
175 N·m (17.8 kgf-m, 129 ft-lb)

3. CASTER *S202116A1003*

● Inspection

1) Place front wheel on turning radius gauge. Make sure ground contacting surfaces of front and rear wheels are set at the same height.
2) Set ST into the center of the wheel, and then install the wheel alignment gauge.
ST 927380002 ADAPTER



S4M0087C

(1) Alignment gauge
(2) Turning radius gauge

3) Follow the operation manual for wheel alignment gauge to measure the caster angle.

NOTE:
Refer to the “SPECIFICATIONS” for the caster values. <Ref. to FS-2, SPECIFICATIONS, General Description.>

4. STEERING ANGLE *S202116A1005*

● Inspection

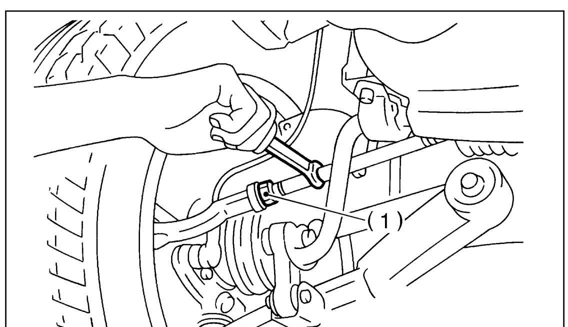
1) Place vehicle on a turning radius gauge.
2) While depressing brake pedal, turn steering wheel fully to the left and right. With steering wheel held at each fully turned position, measure both the inner and outer wheel steering angle.

Steering angle:
Inner wheel
34.4°±1.5°
Outer wheel
30.2°±1.5°

● Adjustment

Turn tie-rod to adjust steering angle of both inner and outer wheels.

CAUTION:
- **Because toe-in changes, adjustment values of right and left tie-rod should be the same.**
- **Check toe-in.**
- **Correct boot if it is twisted.**



S4M0348A

(1) Lock nut

5. FRONT WHEEL TOE-IN *S202116A1004*

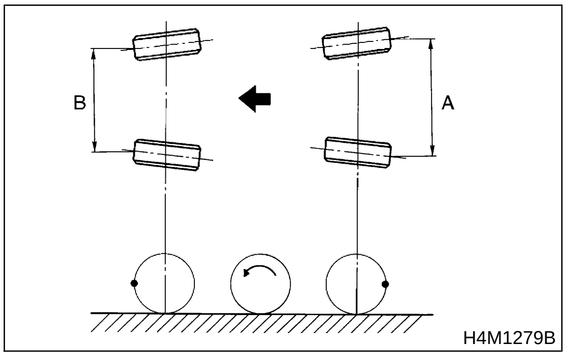
● Inspection

1) Using a toe gauge, measure front wheel toe-in.

Toe-in:
0±3 mm (0±0.12 in)

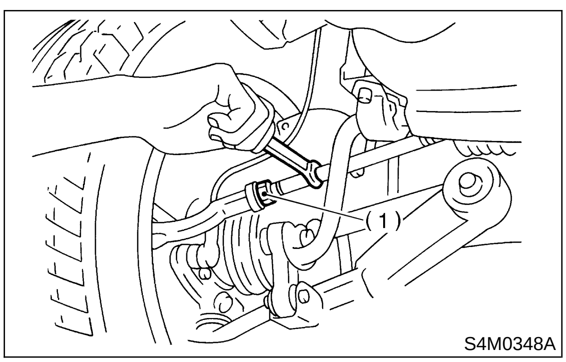
2) Mark rear sides of left and right tires at height corresponding to center of wheels and measure distance “A” between marks.
3) Move vehicle forward so that marks line up with front sides at height corresponding to center of wheels.
4) Measure distance “B” between left and right marks. Toe-in can then be obtained by the following equation:

A − B = Toe-in



● Adjustment

1) Loosen the left and right side steering tie-rods lock nuts.
2) Turn the left and right tie rods equal amounts until the toe-in is at the specification.
Both the left and right tie-rods are right-hand threaded. To increase toe-in, turn both tie-rods clockwise equal amounts (as viewed from the inside of the vehicle).



(1) Lock nut

3) Tighten tie-rod lock nut.

Tightening torque:
83 N·m (8.5 kgf-m, 61.5 ft-lb)

CAUTION:
Correct tie-rod boot, if it is twisted.

NOTE:
Check the left and right wheel steering angle is within specifications.

6. REAR WHEEL TOE-IN *S202116A1007*

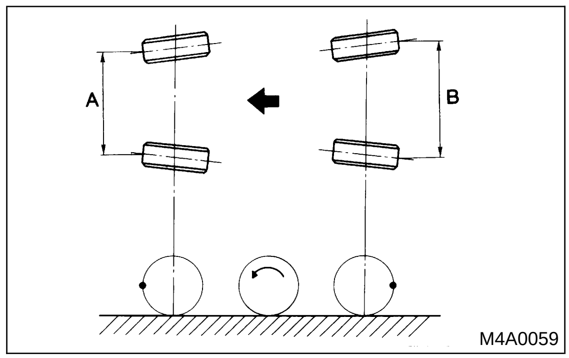
● Inspection

1) Using a toe-in gauge, measure rear wheel toe-in.

Toe-in: 2±3 mm (0.08±0.12 in)

2) Mark rear sides of left and right tires at height corresponding to center of wheels and measure distance “B” between marks.
3) Move vehicle forward so that marks line up with front sides at height corresponding to center of wheels.
4) Measure distance “A” between left and right marks. Toe-in can then be obtained by the following equation:

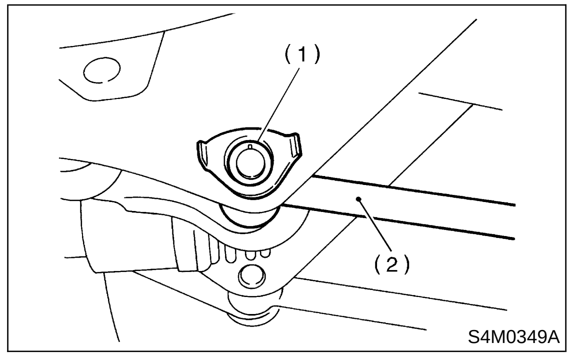
B − A = Toe-in



● Adjustment

1) Loosen self-locking nut on inner side of rear lateral link.

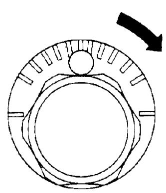
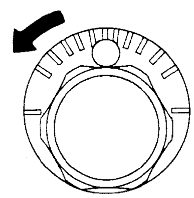
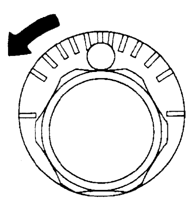
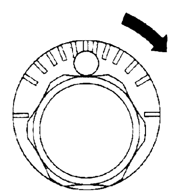
CAUTION:
● When loosening or tightening adjusting bolt, hold bolt head and turn self-locking nut.
● Discard loosened self-locking nut and replace with a new one.
● When performing toe-in adjustment, align as close to 0 mm (0 in) as possible.



(1) Adjusting scale
(2) Rear lateral link

2) Turn adjusting bolt head until toe-in is at the specification.

NOTE:
When left and right wheels are adjusted for toe-in at the same time, the movement of one scale graduation changes toe-in by approximately 3 mm (0.12 in).

	Left side		Right side	
Toe-in is increased.	 B4M0192	Rotate clockwise.	 B4M0352	Rotate counter-clockwise.
Toe-in is decreased.	 B4M0352	Rotate counter-clockwise.	 B4M0192	Rotate clockwise.

3) Tighten self-locking nut.

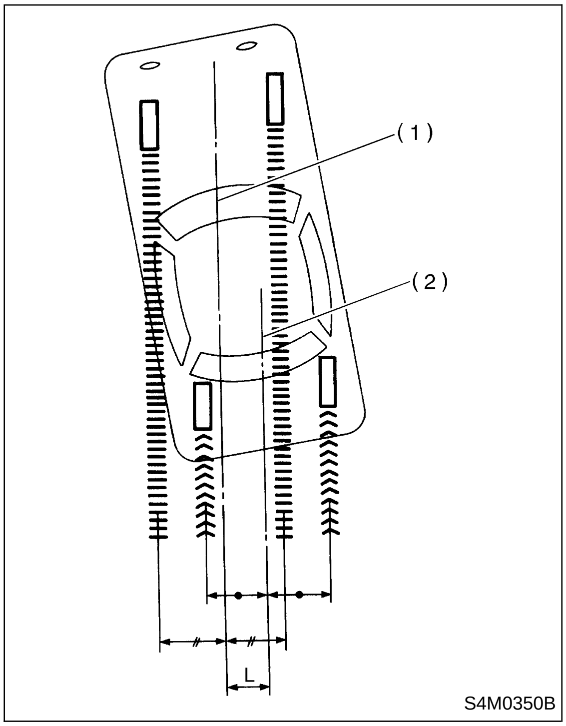
Tightening torque:
100 N·m (10.2 kgf-m, 74 ft-lb)

7. THRUST ANGLE *S202116A1008*

● Inspection

1) Position vehicle on a level surface.
2) Move vehicle 3 to 4 meters directly forward.
3) Determine locus of both front and rear axles.
4) Measure distance "L" between center line of loci of the axles.

Thrust angle:
Less than 20′ when "L" is equal to or less than 15 mm (0.59 in).

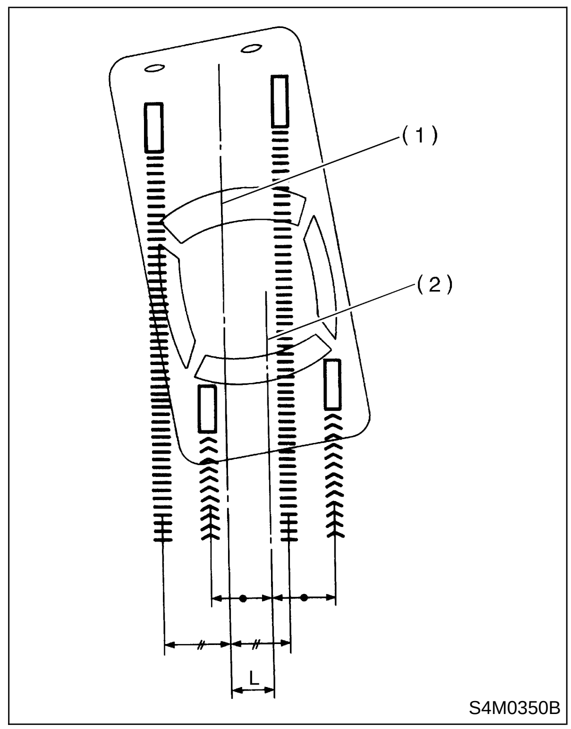


(1) Center line of loci (front axle)
(2) Center line of loci (rear axle)

● Adjustment

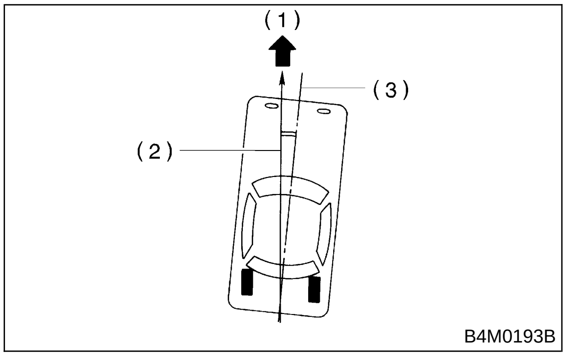
1) Make thrust angle adjustments by turning toe-in adjusting bolts of rear suspension equally in the same direction.
2) When one rear wheel is adjusted in a toe-in direction, adjust the other rear wheel equally in toe-out direction, in order to make thrust angle adjustment.
3) When left and right adjusting bolts are turned incrementally by one graduation in the same direction, the thrust angle will change approximately 10′ ["L" is almost equal to 7.5 mm (0.295 in)].

Thrust angle:
0°±20′



(1) Center line of loci (front axle)
(2) Center line of loci (rear axle)

NOTE:
Thrust angle refers to a mean value of left and right rear wheel toe angles in relation to vehicle body center line. Vehicle is driven straight in the thrust angle direction while swinging in the oblique direction depending on the degree of the mean thrust angle.

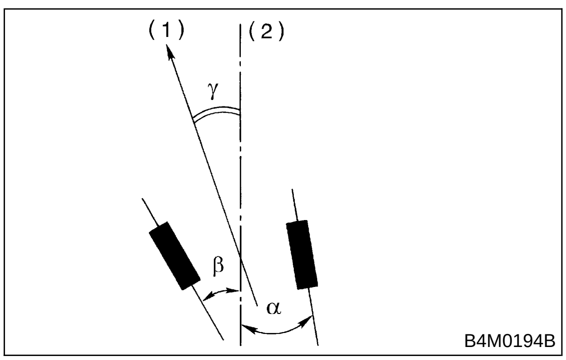


(1) Front
(2) Thrust angle
(3) Body center line

Thrust angle: r = ($\alpha - \beta$)/2

α: Right rear wheel toe-in angle
β: Left rear wheel toe-in angle

NOTE:
Here, use only positive toe-in values from each wheel to substitute for α and β in the equation.

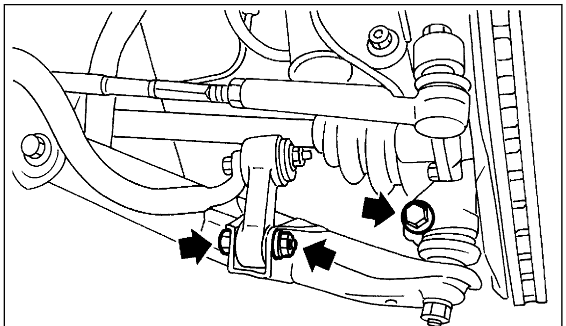


(1) Front
(2) Body center line

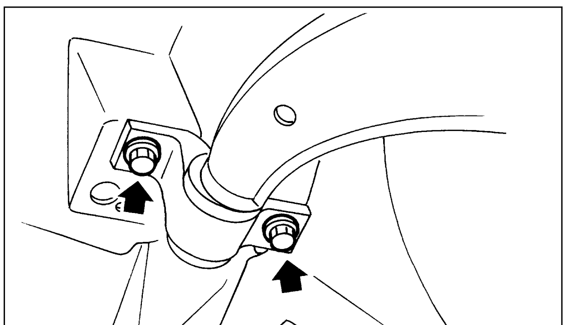
3. Front Transverse Link S202113

A: REMOVAL S202113A18

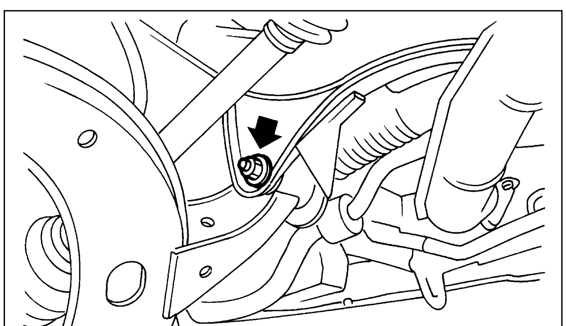
1) Set the vehicle on the lift.
2) Disconnect ground cable from battery.
3) Lift-up the vehicle and remove the wheel.
4) Disconnect stabilizer link from transverse link.
5) Remove bolt securing ball joint of transverse link to housing.


S4M0090

6) Remove nut (do not remove bolt.) securing transverse link to crossmember.
7) Remove two bolts securing bushing bracket of transverse link to vehicle body at rear bushing location.


S4M0091

8) Extract ball joint from housing.
9) Remove bolt securing transverse link to crossmember and extract transverse link from crossmember.


S4M0092

B: INSTALLATION S202113A11

1) Temporarily tighten the two bolts used to secure rear bushing of the transverse link to body.

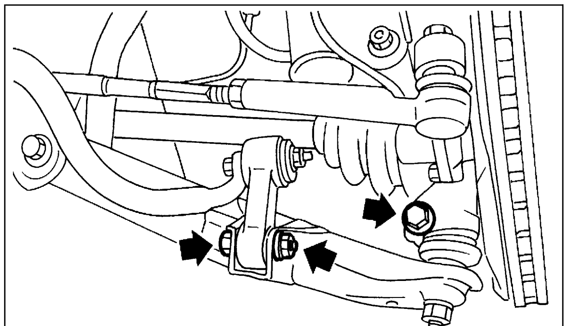
NOTE:
These bolts should be tightened to such an extent that they can still move back and forth in the oblong shaped hole in the bracket (which holds the bushing).

2) Install bolts used to connect transverse link to crossmember and temporarily tighten with nut.

CAUTION:
Discard loosened self-locking nut and replace with a new one.

3) Insert ball joint into housing.
4) Connect stabilizer link to transverse link, and temporarily tighten bolts.

CAUTION:
Discard loosened self-locking nut and replace with a new one.


S4M0090

5) Tighten the following points in the order shown below when wheels are in full contact with the ground and vehicle is curb weight.
(1) Transverse link and stabilizer

Tightening torque:
30 N·m (3.1 kgf-m, 22 ft-lb)

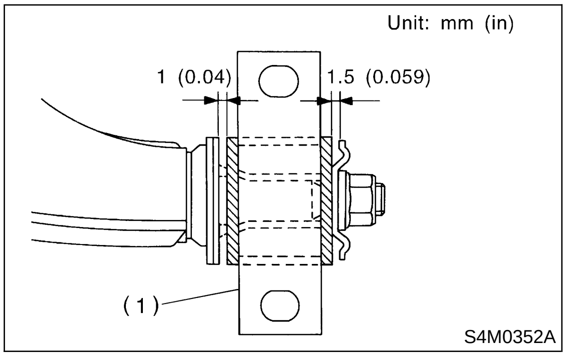
(2) Transverse link and crossmember

Tightening torque:
100 N·m (10.2 kgf-m, 74 ft-lb)

(3) Transverse link rear bushing and body

Tightening torque:
245 N·m (25 kgf-m, 181 ft-lb)

NOTE:
- Move rear bushing back and forth until transverse link-to-rear bushing clearance is established (as indicated in figure.) before tightening.
- Check wheel alignment and adjust if necessary.

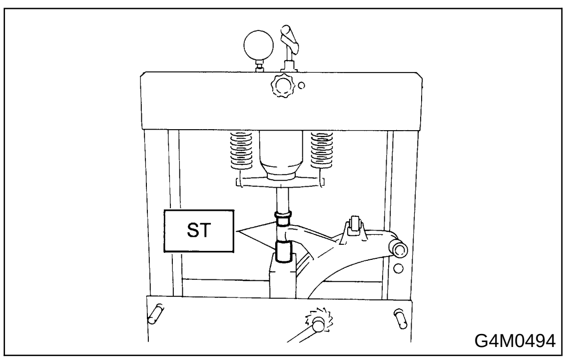


(1) Rear bushing

C: DISASSEMBLY S202113A06

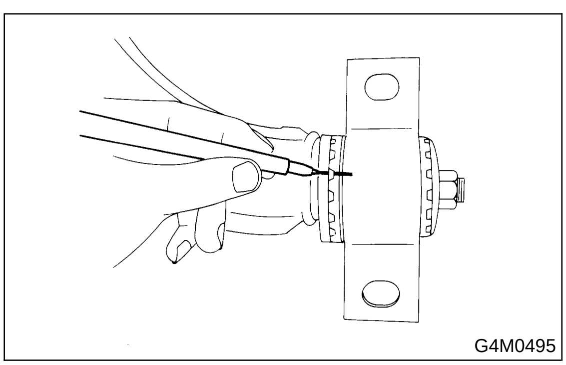
1. FRONT BUSHING S202113A0601

Using ST, press front bushing out of place.
ST 927680000 INSTALLER & REMOVER SET



2. REAR BUSHING S202113A0602

1) Scribe an aligning mark on transverse link and rear bushing.
2) Loosen nut and remove rear bushing.

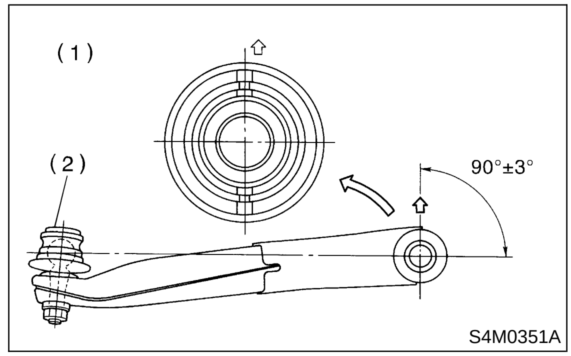


D: ASSEMBLY S202113A02

1. FRONT BUSHING S202113A0201

To reassemble, reverse disassembly procedures.

CAUTION:
Install front bushing in correct direction, as shown in figure.



(1) Face bushing toward center of ball joint
(2) Ball joint

2. REAR BUSHING S202113A0202

1) Install rear bushing to transverse link and align aligning marks scribed on the two.
2) Tighten self-locking nut.

CAUTION:
- **Discard loosened self-locking nut and replace with a new one.**
- **While holding rear bushing so as not to change position of aligning marks, tighten self-locking nut.**

Tightening torque:
190 N·m (19.4 kgf-m, 140 ft-lb)

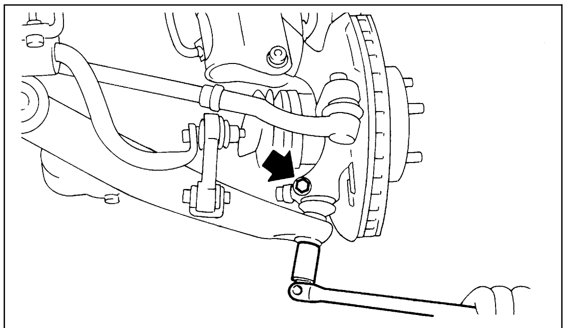
E: INSPECTION S202113A10

1) Check transverse link for wear, damage and cracks, and correct or replace if defective.
2) Check bushings for cracks, fatigue or damage.
3) Check rear bushing for oil leaks.

4. Front Ball Joint S202114

A: REMOVAL S202114A18

1) Set the vehicle on the lift.
2) Disconnect ground cable from battery.
3) Lift-up the vehicle and remove the wheel.
4) Pull out the cotter pin from the ball stud, remove the castle nut, and extract the ball stud from the transverse link.
5) Remove the bolt securing the ball joint to the housing.



G4M0499

6) Extract the ball joint from the housing.

B: INSTALLATION S202114A11

1) Install ball joint onto housing.

Torque (Bolt):
50 N·m (5.1 kgf-m, 37 ft-lb)

CAUTION:
Do not apply grease to tapered portion of ball stud.

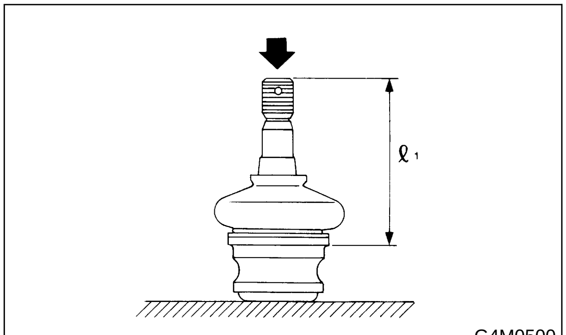
2) Connect ball joint to transverse link.

Torque (Castle nut):
40 N·m (4.1 kgf-m, 30 ft-lb)

3) Retighten castle nut further within 60° until a slot in castle nut is aligned with the hole in ball stud end, then insert new cotter pin and bend it around castle nut.
4) Install front wheel.

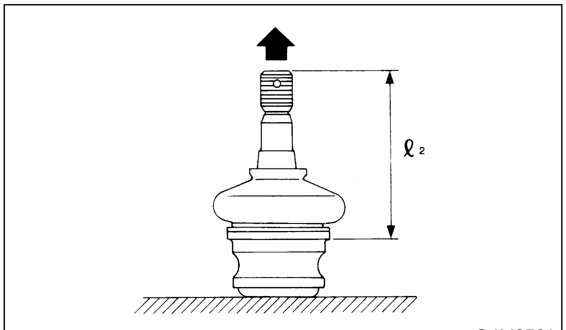
C: INSPECTION S202114A10

1) Measure play of ball joint by the following procedures. Replace with a new one when the play exceeds the specified value.
(1) With 690 N (70.4 kgf, 155 lb) loaded in the direction shown in the figure, measure dimension ℓ_1.



G4M0500

(2) With 690 N (70.4 kgf, 155 lb) loaded in the opposite direction shown in the figure, measure dimension ℓ_2.



G4M0501

(3) Calculate plays from the following formula.
$S = \ell_2 - \ell_1$
(4) When plays are larger than the following value, replace with a new one.

FRONT BALL JOINT
Specified play for replacement: S
Less than 0.3 mm (0.012 in)

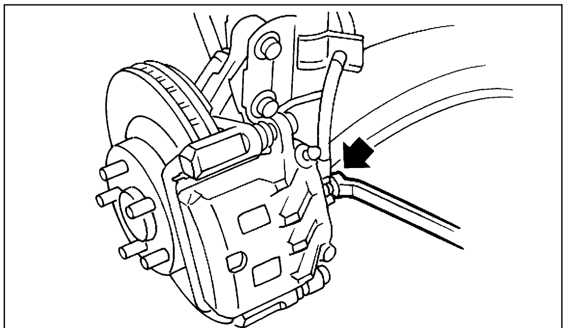
2) When play is smaller than the specified value, visually inspect the dust cover.
3) The ball joint and cover that have been removed must be checked for wear, damage or cracks, and any defective part must be replaced.
4) If the dust cover is damaged, replace with the new ball joint.

5. Front Strut S202115

A: REMOVAL S202115A18

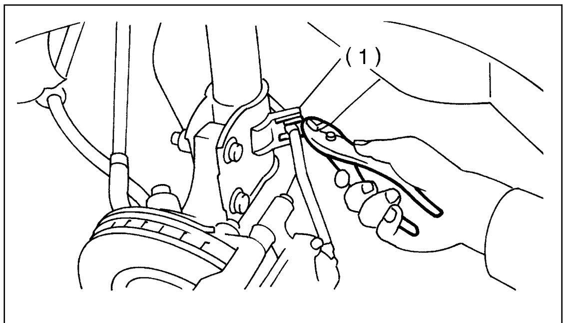
1) Set the vehicle on the lift.
2) Disconnect ground cable from battery.
3) Lift-up the vehicle and remove the wheel.
4) Depress brake pedal and hold it down using a wooden block etc.
5) Remove union bolts from caliper.

CAUTION:
Use brake hose cap to prevent brake fluid from escaping.



S4M0093

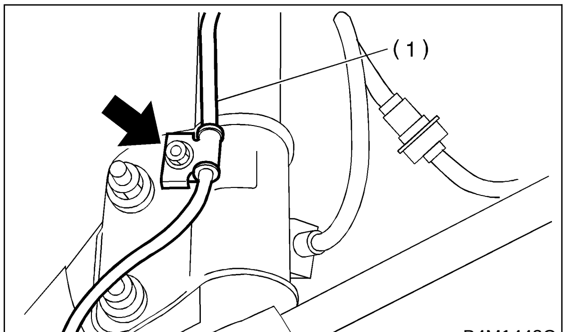
6) Remove brake hose clamp and disconnect brake hose from strut. Attach brake hose to body using gum tape.



S4M0094C

(1) Clamp

7) Scribe an alignment mark on the camber adjusting bolt which secures strut to housing.
8) Remove bolt securing the ABS sensor harness.



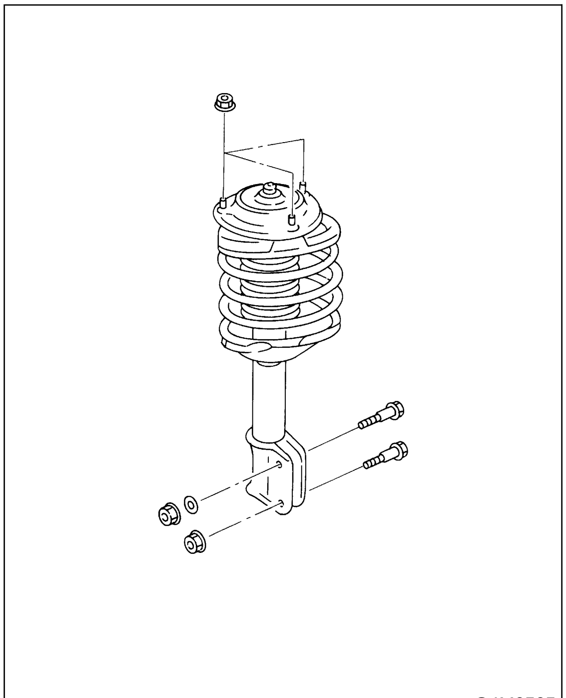
B4M1442C

(1) Sensor harness

9) Remove two bolts securing housing to strut.

CAUTION:
While holding head of adjusting bolt, loosen self-locking nut.

10) Remove the three nuts securing strut mount to body.



G4M0505

B: INSTALLATION S202115A11

1) Install strut mount at upper side of strut to body and tighten with nuts.

Tightening torque:
20 N·m (2.0 kgf-m, 14.5 ft-lb)

2) Install ABS sensor harness to strut.

Tightening torque:
32 N·m (3.3 kgf-m, 24 ft-lb)

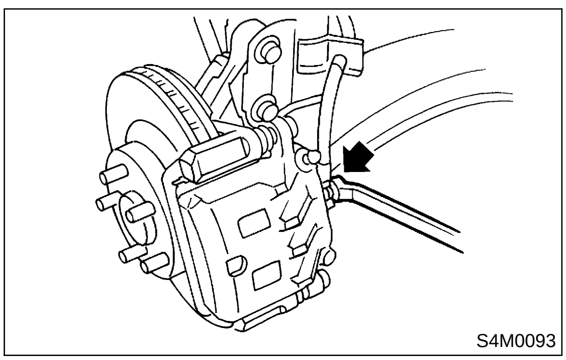
3) Position aligning mark on camber adjustment bolt with aligning mark on lower side of strut.

CAUTION:
- **While holding head of adjusting bolt, tighten self-locking nut.**
- **Be sure to use new self-locking nut.**

Tightening torque:
175 N·m (17.8 kgf-m, 129 ft-lb)

4) Install brake hose at lower side of strut with clamp.
5) Install union bolts which secure brake caliper to brake hose.

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

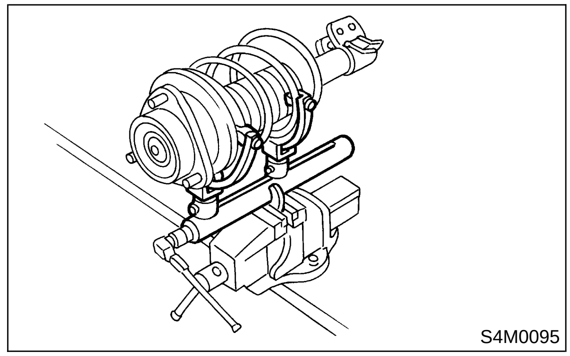


6) Be sure to bleed air from brake system. <Ref. to BR-42, Air Bleeding.>
7) Install wheels.

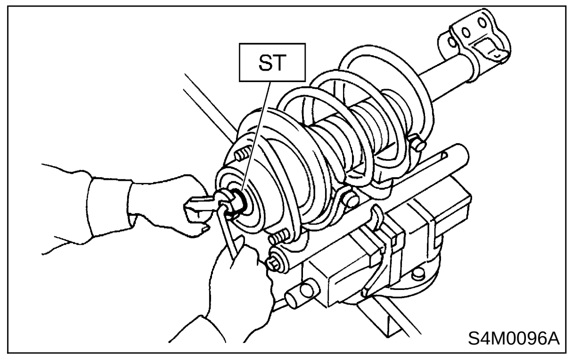
NOTE:
Check wheel alignment and adjust if necessary.

C: DISASSEMBLY S202115A06

1) Using a coil spring compressor, compress coil spring.



2) Using ST, remove self-locking nut.
ST 927760000 STRUT MOUNT SOCKET



3) Remove strut mount, upper spring seat and rubber seat from strut.
4) Gradually decreasing compression force, and remove coil spring.
5) Remove dust cover and helper spring.

D: ASSEMBLY
S202115A02

1) Before installing coil spring, strut mount, etc., on the strut, check for the presence of air in the dampening force generating mechanism of the strut since air prevents proper dampening force from being produced.

2) Checking for the presence of air

(1) Place the strut vertically with the piston rod facing up.

(2) Move the piston rod to the center of its entire stroke.

(3) While holding the piston rod end with fingertips, move the rod up and down.

(4) If the piston rod moves at least 10 mm (0.39 in) in the former step, purge air from the strut.

3) Air purging procedure

(1) Place the strut vertically with the piston rod facing up.

(2) Fully extend the piston rod.

(3) With the piston rod fully extended, place the piston rod side down. The strut must stand vertically.

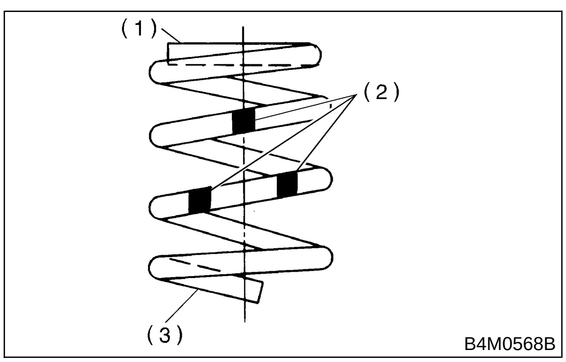
(4) Fully contract the piston rod.

(5) Repeat 3 or 4 times from the first step.

NOTE:
After completely purging air from the strut, be sure to place the strut with the piston rod facing up. If it is laid down, check for entry of air in the strut as outlined under “Checking for the presence of air”.

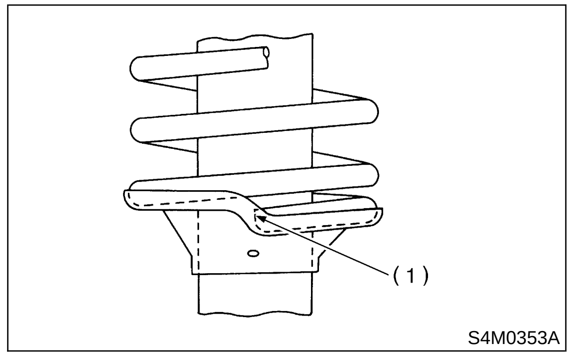
4) Using a coil spring compressor, compress the coil spring.

NOTE:
Make sure that the vertical installing direction of coil spring is as shown in figure.



(1) Flat (top side)
(2) Identification paint
(3) Inclined (bottom side)

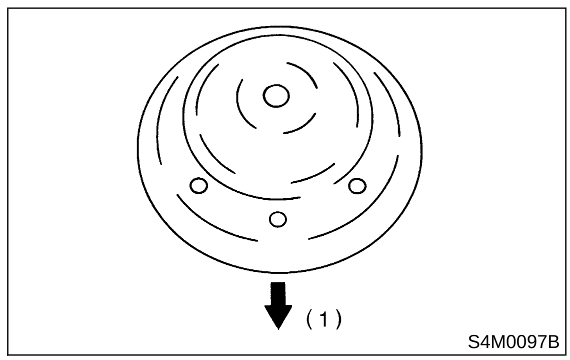
5) Set the coil spring correctly so that its end face (1) fits well into the spring seat as shown in the figure.



6) Install helper and dust cover to the piston rod.

7) Pull the piston rod fully upward, and install rubber seat and upper spring seat.

NOTE:
Ensure that upper spring seat is positioned as shown in figure.



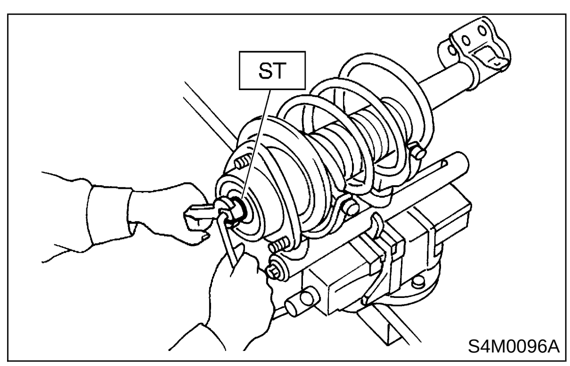
(1) Outside of body

8) Install strut mount to the piston rod, and tighten the self-locking nut temporarily.

CAUTION:
Be sure to use a new self-locking nut.

9) Using hexagon wrench to prevent strut rod from turning, tighten self-locking nut with ST.
ST 927760000 STRUT MOUNT SOCKET

Tightening torque:
55 N·m (5.6 kgf-m, 41 ft-lb)



10) Loosen the coil spring carefully.

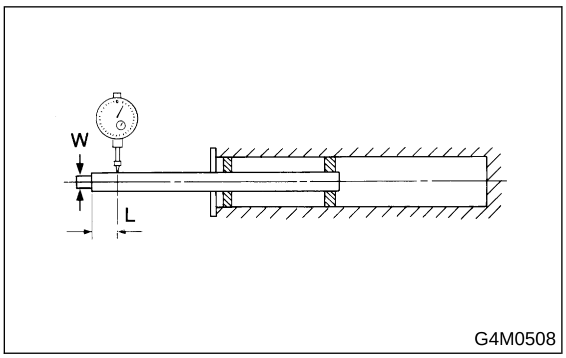
E: INSPECTION S202115A10

Check the disassembled parts for cracks, damage and wear, and replace with new parts if defective.

1. DAMPER STRUT S202115A1001

1) Check for oil leakage.
2) Move the piston rod up and down to check it operates smoothly without any binding.
3) Play of piston rod
- Measure the play as follows:

Fix outer shell and fully extend the rod. Set a dial gauge at the end of the rod: L [10 mm (0.39 in)], then apply a force of W [20 N (2 kgf, 4 lb)] to threaded portion. With the force of 20 N (2 kgf, 4 lb) applied, read dial gauge indication: P_1. Apply a force of 20 N (2 kgf, 4 lb) in the opposite direction of “W”, then read dial gauge indication: P_2.



G4M0508

The free play is determined by the following equation:

Play = P_1, P_2

Limit of play:
Less than 0.8 mm (0.031 in)

If the play is greater, replace the strut.

2. STRUT MOUNT S202115A1002

Check rubber part for creep, cracks and deterioration, and replace it with a new one if defective.

3. DUST COVER S202115A1003

If any cracks or damage are found, replace it with a new one.

4. COIL SPRING S202115A1004

One having permanent strain should be replaced with a new one. When vehicle posture is uneven, although there are no considerable reasons like tire puncture, uneven loading, etc., check coil spring for its free length referring to specifications, cracks, etc., and replace it with a new one if defective.

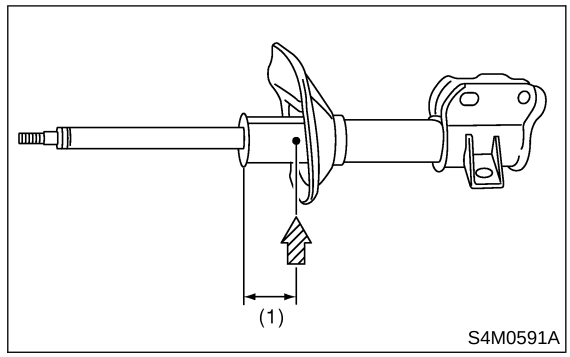
5. HELPER S202115A1005

Replace it with a new one if cracked or damaged.

F: DISPOSAL S202115A07

CAUTION:
- **Do not disassemble the strut damper or place it into a fire.**
- **Make a hole with drill before disposal of strut.**
- **Before handling gas filled struts, be sure to wear goggles to protect eyes from gas, oil and/or filings.**

1) Place the gas filled strut on a flat and level surface with piston rod fully extended.
2) Using a 2 to 3 mm (0.08 to 0.12 in) dia. drill, make a hole in position shown in the figure.



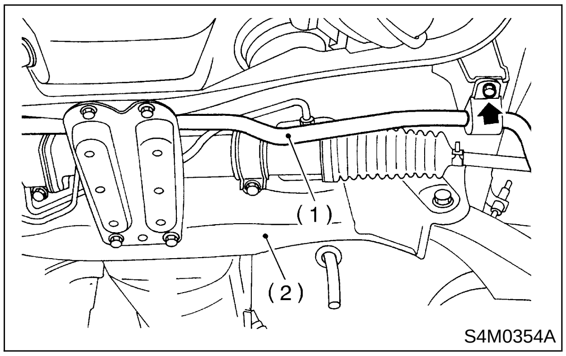
S4M0591A

(1) 40 mm (1.57 in)

6. Front Stabilizer S202119

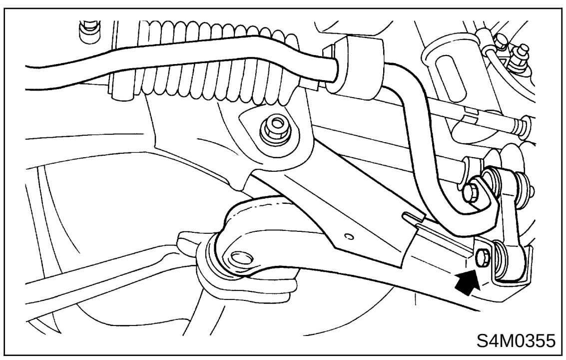
A: REMOVAL S202119A18

1) Disconnect ground cable from battery.
2) Jack-up the front part of the vehicle and support it with safety stand (rigid racks).
3) Remove jack-up plate from lower part of crossmember.
4) Remove bolts which secure stabilizer to crossmember.



(1) Front stabilizer
(2) Front crossmember

5) Remove bolts which secure stabilizer link to front transverse link.

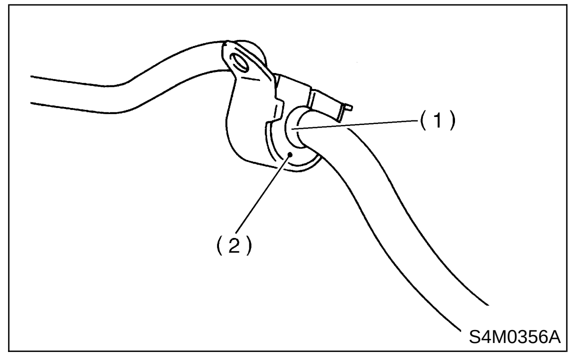


6) Remove front stabilizer.

B: INSTALLATION S202119A11

1) Install in the reverse order of removal.

NOTE:
- Install bushing (on front crossmember side) while aligning it with paint mark on stabilizer.
- Ensure that bushing and stabilizer have the same identification colors when installing.



(1) Mark stamped on stabilizer
(2) Bushing identification color

2) Always tighten rubber bushing location when wheels are in full contact with the ground and vehicle is curb weight.

Tightening torque:
Jack-up plate to crossmember:
20 N·m (2.0 kgf-m, 14 ft-lb)
Stabilizer link to front transverse link:
30 N·m (3.1 kgf-m, 22 ft-lb)
Stabilizer to crossmember:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

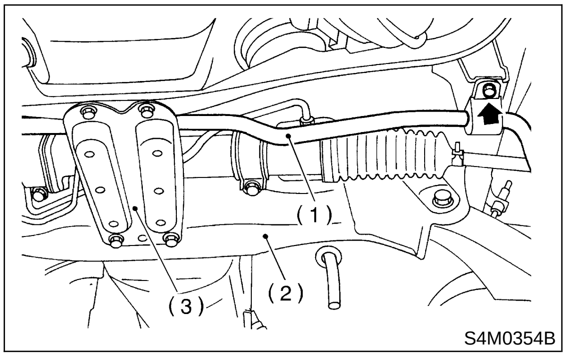
C: INSPECTION S202119A10

1) Check bushing for cracks, fatigue or damage.
2) Check stabilizer link for deformities, cracks, or damage, and bushing for protrusions from the hole of stabilizer link.

7. Front Crossmember S202108

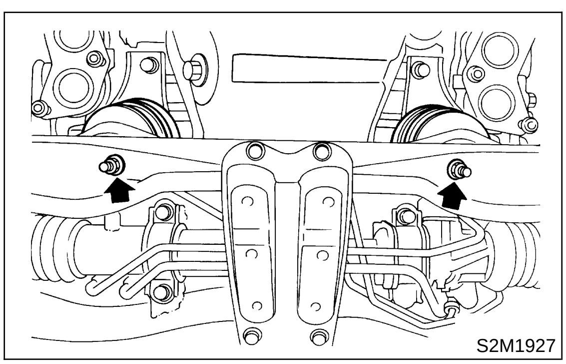
A: REMOVAL S202108A18

1) Set the vehicle on the lift.
2) Disconnect ground cable from battery.
3) Lift-up vehicle and remove front tires and wheels.
4) Remove both stabilizer and jack-up plate.



(1) Front stabilizer
(2) Front crossmember
(3) Jack-up plate

5) Disconnect tie-rod end from housing.
6) Remove front exhaust pipe. <Ref. to EX-5, REMOVAL, Front Exhaust Pipe.>
7) Remove front transverse link from front crossmember and body. <Ref. to FS-14, Front Transverse Link.>
8) Remove nuts attaching engine mount cushion rubber to crossmember.



9) Remove steering universal joint. <Ref. to PS-15, REMOVAL, Universal Joint.>
10) Disconnect power steering pipe from steering gear box.
11) Lift engine by approx. 10 mm (0.39 in) by using chain block.
12) Support crossmember with a jack, remove nuts securing crossmember to body and lower crossmember gradually along with steering gearbox.

CAUTION:
When removing crossmember downward, be careful that tie-rod end does not interfere with SFJ boot.

B: INSTALLATION S202108A11

1) Install in the reverse order of removal.

CAUTION:
Always tighten rubber bushing when wheels are in full contact with the ground and vehicle is curb weight.

Tightening torque:
Transverse link bushing to crossmember:
100 N·m (10.2 kgf-m, 74 ft-lb)
Stabilizer to bushing:
25 N·m (2.5 kgf-m, 18.1 ft-lb)
Tie-rod end to housing:
27.0 N·m (2.75 kgf-m, 19.9 ft-lb)
Front cushion rubber to crossmember:
85 N·m (8.7 kgf-m, 63 ft-lb)
Universal joint to pinion shaft:
24 N·m (2.4 kgf-m, 17.4 ft-lb)
Crossmember to body:
100 N·m (10.2 kgf-m, 74 ft-lb)

2) Purge air from power steering system. <Ref. to PS-54, INSTALLATION, Power Steering Fluid.>

NOTE:
Check wheel alignment and adjust if necessary.

C: INSPECTION S202108A10

Check crossmember for wear, damage and cracks, and correct or replace if defective.

8. General Diagnostic Table S202121

A: INSPECTION S202121A10

1. IMPROPER VEHICLE POSTURE OR IMPROPER WHEEL ARCH HEIGHT S202121A1001

Possible causes	Countermeasures
(1) Permanent distortion or breakage of coil spring	Replace.
(2) Unsmooth operation of damper strut and/or shock absorber	Replace.
(3) Installation of wrong strut and/or shock absorber	Replace with proper parts.
(4) Installation of wrong coil spring	Replace with proper parts.

2. POOR RIDE COMFORT S202121A1002

1) Large rebound shock
2) Rocking of vehicle continues too long after running over bump and/or hump.
3) Large shock in bumping

Possible causes	Countermeasures
(1) Breakage of coil spring	Replace.
(2) Overinflation pressure of tire	Adjust.
(3) Improper wheel arch height	Adjust or replace coil springs with new ones.
(4) Fault in operation of damper strut and/or shock absorber	Replace.
(5) Damage or deformation of strut mount and/or shock absorber mount	Replace.
(6) Unsuitability of maximum and/or minimum length of damper strut and/or shock absorber	Replace with proper parts.
(7) Deformation or loss of bushing	Replace.
(8) Deformation or damage of helper in strut assembly and/or shock absorber	Replace.
(9) Oil leakage of damper strut and/or shock absorber	Replace.

3. NOISE S202121A1003

Possible causes	Countermeasures
(1) Wear or damage of damper strut and/or shock absorber component parts	Replace.
(2) Loosening of suspension link installing bolt	Retighten to the specified torque.
(3) Deformation or loss of bushing	Replace.
(4) Unsuitability of maximum and/or minimum length of damper strut and/or shock absorber	Replace with proper parts.
(5) Breakage of coil spring	Replace.
(6) Wear or damage of ball joint	Replace.
(7) Deformation of stabilizer clamp	Replace.

MEMO:

REAR SUSPENSION

RS

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1. General Description 2
2. Wheel Alignment 7
3. Rear Stabilizer 8
4. Rear Trailing Link 9
5. Lateral link 12
6. Rear Strut 16
7. Rear Crossmember 19
8. General Diagnostic Table 20

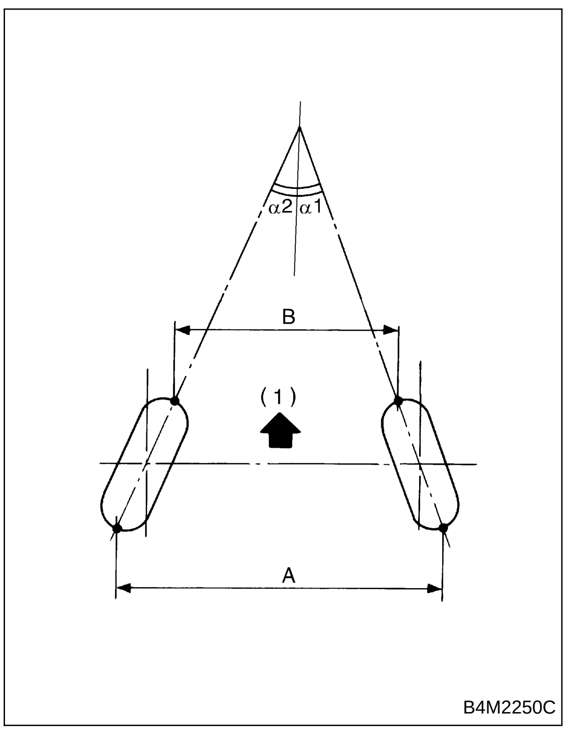
1. General Description S201001

A: SPECIFICATIONS S201001E49

Camber (tolerance: ±0°45′)	−0°35′
Toe-in	2±3 mm (0.08±0.12 in)* Each toe-in angle: 0°05′±0°08′
Wheel arch height [tolerance: $^{+12}/_{-24}$ mm ($^{+0.47}/_{-0.94}$ in)]	435 mm (17.13 in)
Thrust angle	0°±20′
Diameter of stabilizer	13 mm (0.51 in)

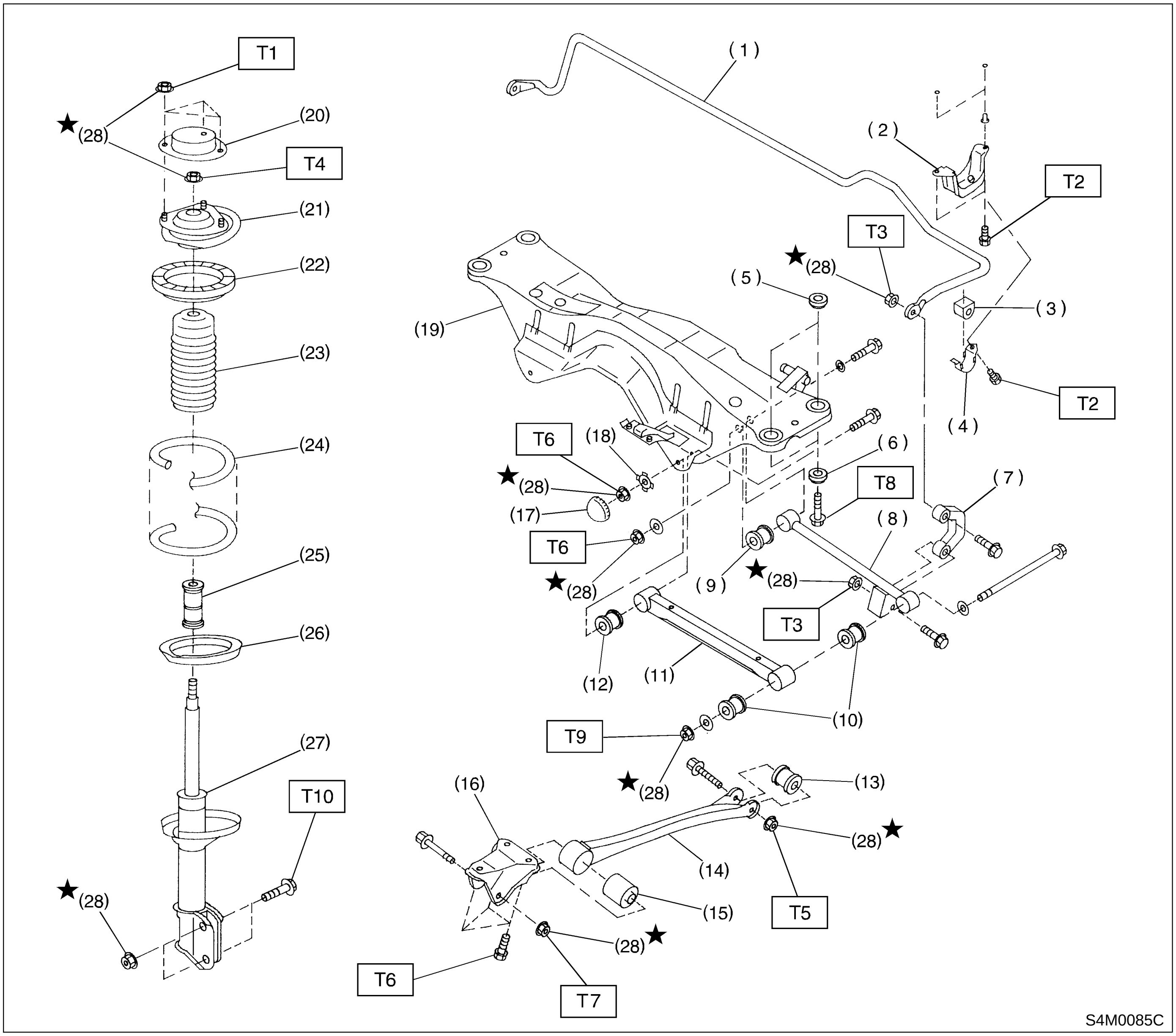
*: When performing toe-in adjustment, align as close to 2 mm (0.08 in) as possible.

NOTE:
- Front and rear toe-ins and front camber can be adjusted. If toe-in or camber tolerance exceeds specifications, adjust toe-in and camber to the middle value of specification.
- The other items indicated in the specification table cannot be adjusted. If the other items exceeds specifications, check suspension parts and connections for deformities; replace with new ones as required.



(1) Front
A − B = Positive: Toe-in, Negative: Toe-out
α1, α2: Each toe-in angle

B: COMPONENT S201001A05



(1) Stabilizer
(2) Stabilizer bracket
(3) Stabilizer bushing
(4) Clamp
(5) Floating bushing
(6) Stopper
(7) Stabilizer link
(8) Rear lateral link
(9) Bushing (C)
(10) Bushing (A)
(11) Front lateral link
(12) Bushing (B)
(13) Trailing link rear bushing
(14) Trailing link
(15) Trailing link front bushing
(16) Trailing link bracket
(17) Cap (Protection)
(18) Washer
(19) Rear crossmember
(20) Strut mount cap
(21) Strut mount
(22) Rubber seat upper
(23) Dust cover
(24) Coil spring
(25) Helper
(26) Rubber seat lower
(27) Damper strut
(28) Self-locking nut

Tightening torque: N·m (kgf-m, ft-lb)
T1: 20 (2.0, 14.5)
T2: 25 (2.5, 18.1)
T3: 45 (4.6, 33)
T4: 60 (6.1, 44)
T5: 90 (9.2, 67)
T6: 100 (10.2, 74)
T7: 115 (11.7, 85)
T8: 130 (13.3, 96)
T9: 140 (14.3, 103)
T10: 200 (20.4, 148)

C: CAUTION S201001A03

- 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.
- Use SUBARU genuine grease etc. or the equivalent. Do not mix grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply grease onto sliding or revolution surfaces before installation.
- Before installing O-rings or snap rings, apply sufficient amount of grease to avoid damage and deformation.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Before disposing shock absorbers, be sure to bleed gas completely. Also, do not throw away in fire.

D: PREPARATION TOOL *S201001A17*

1. SPECIAL TOOL *S201001A1701*

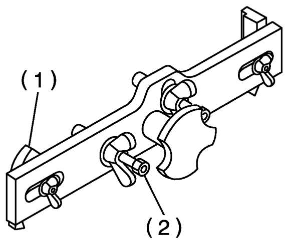
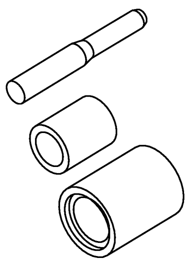
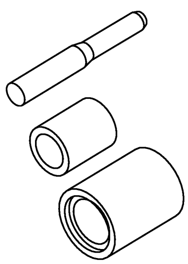
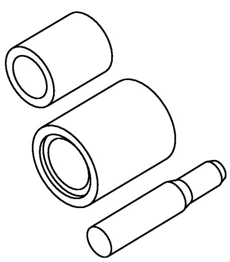
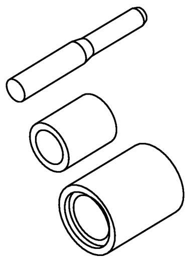
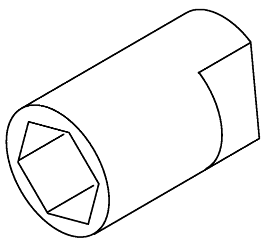
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2378A	927380002	ADAPTER	Used as an adapter for camber & caster gauge when measuring camber and caster. (1) 28199AC000 PLATE (2) 28199AC010 BOLT
 H5M0979	927690000	INSTALLER & REMOVER SET	Used for replacing lateral link bushing (12 dia.).
 H5M0979	927700000	INSTALLER & REMOVER SET	Used for replacing lateral link bushing (14 dia.).
 H5M0980	927720000	INSTALLER & REMOVER SET	Used for replacing trailing link bushing.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 H5M0979	927730000	INSTALLER & REMOVER SET	Used for replacing rear housing bushing.
 B4M2384	927760000	STRUT MOUNT SOCKET	Used for disassembling and assembling strut mount.

2. GENERAL TOOL *S201001A1704*

TOOL NAME	REMARKS
Alignment Gauge	Used for wheel alignment measurement.
Turning Radius Gauge	Used for wheel alignment measurement.
Toe-in Gauge	Used for toe-in measurement.
Transmission Jack	Used for suspension assembly/disassembly.
Bearing Puller	Used for removing bushings.

2. Wheel Alignment *S201116*

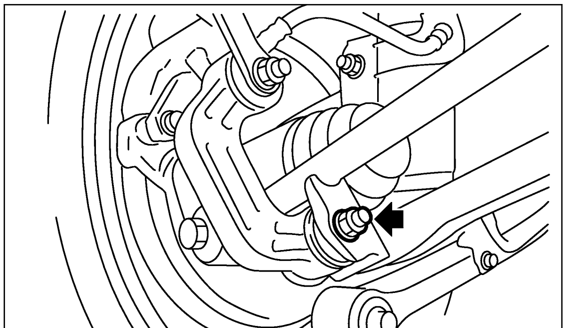
A: INSPECTION *S201116A10*

NOTE:
The front and rear wheel alignment must be measured and/or adjusted at once to obtain accuracy. Measure and/or adjust the rear wheel alignment together with the front. Follow the procedure in “FS” section “Wheel Alignment” for measurement and/or adjustment of wheel alignment. <Ref. FS-6, INSPECTION, Wheel Alignment.>

3. Rear Stabilizer S201118

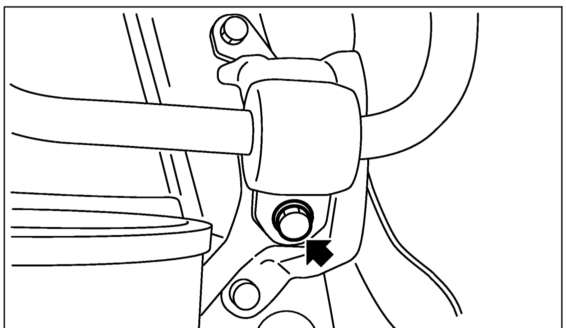
A: REMOVAL S201118A18

1) Disconnect ground cable from battery.
2) Jack-up the rear part of the vehicle, support it with safety stands (rigid racks).
3) Remove bolts which secure stabilizer link to rear lateral link.



S4M0525

4) Remove bolts which secure stabilizer to stabilizer bracket.



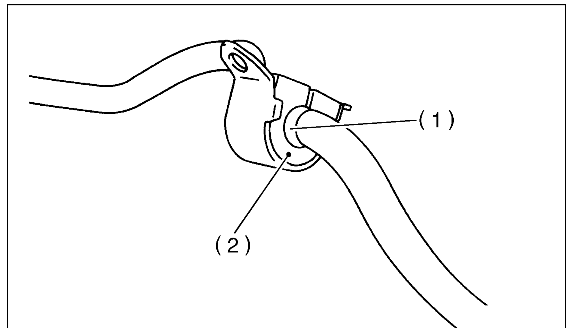
S4M0526

5) Separate rear stabilizer and stabilizer link.

B: INSTALLATION S201118A11

1) Install in the reverse order of removal.

NOTE:
- Install bushing while aligning it with paint mark on stabilizer.
- Ensure that bushing and stabilizer have the same identification colors when installing.



S4M0356A

(1) Mark stamped on stabilizer
(2) Bushing identification color

2) Always tighten rubber bushing location when wheels are in full contact with the ground and vehicle is curb weight.
3) Tightening torque:

Stabilizer to stabilizer link:
45 N·m (4.6 kgf-m, 33 ft-lb)

Stabilizer link to rear lateral link:
45 N·m (4.6 kgf-m, 33 ft-lb)

Stabilizer to stabilizer bracket:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

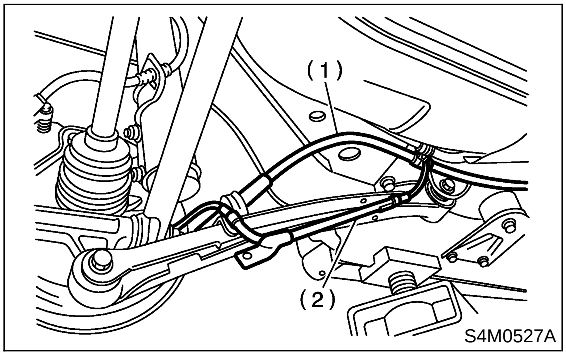
C: INSPECTION S201118A10

1) Check bushing for cracks, fatigue or damage.
2) Check stabilizer links for deformities, cracks, or damage, and bushing for protrusions from the hole of stabilizer link.

4. Rear Trailing Link S201107

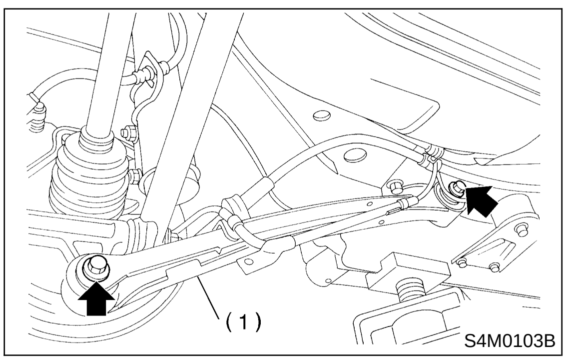
A: REMOVAL S201107A18

1) Set vehicle on a lift.
2) Disconnect ground cable from battery.
3) Loosen rear wheel nuts.
4) Lift-up vehicle, and remove rear wheels.
5) Remove both rear parking brake clamp and ABS sensor harness.



(1) Parking brake cable
(2) ABS sensor harness

6) Remove bolt securing trailing link to trailing link bracket.
7) Remove bolt securing trailing link to rear housing.



(1) Trailing link

B: INSTALLATION S201107A11

Install in the reverse order of removal.

CAUTION:
Always tighten rubber bushing location when wheels are in full contact with the ground and vehicle is at curb weight condition.

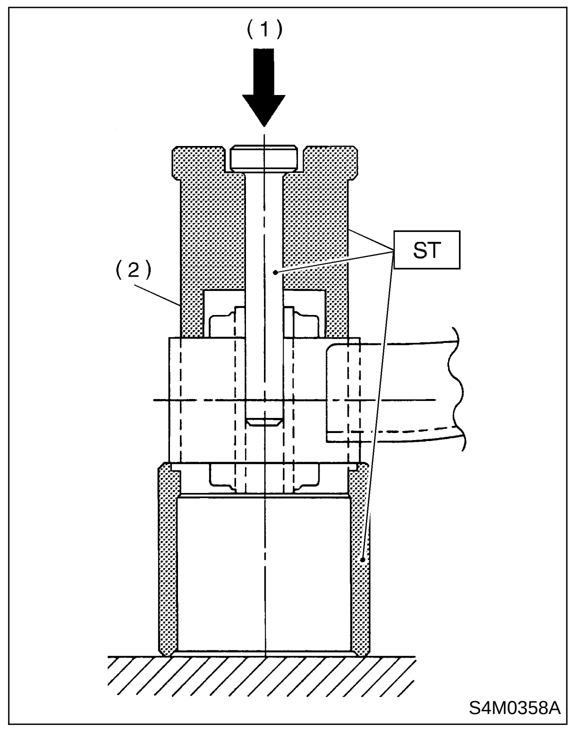
Tightening torque:
Trailing link to rear housing:
90 N·m (9.2 kgf-m, 67 ft-lb)
Trailing link to trailing link bracket:
115 N·m (11.7 kgf-m, 85 ft-lb)

NOTE:
Check wheel alignment and adjust if necessary.

C: DISASSEMBLY S201107A06

1. FRONT BUSHING S201107A0601

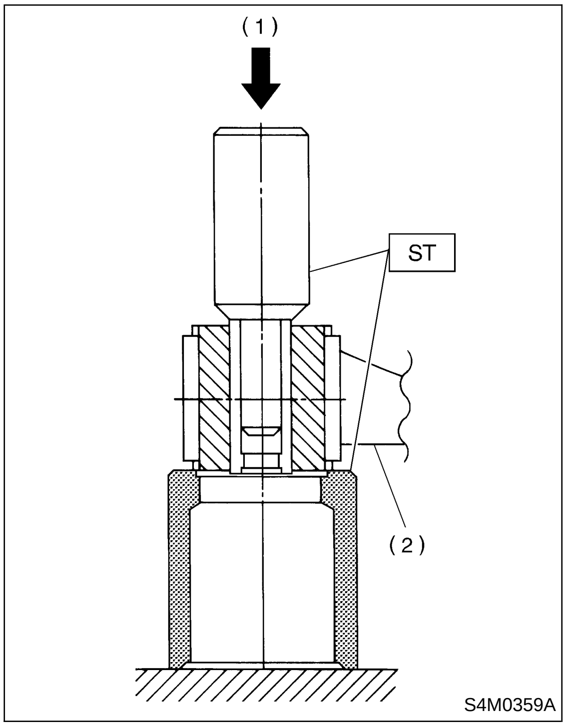
Using ST, press front bushing out of place.
ST 927720000 INSTALLER & REMOVER SET



(1) Press
(2) Trailing link

2. REAR BUSHING S201107A0602

1) Remove housing. <Ref. to DS-23, REMOVAL, Rear Axle.> for removal procedures.
2) Using ST, press rear bushing out of place.
ST 927730000 INSTALLER & REMOVER SET



(1) Press
(2) Housing

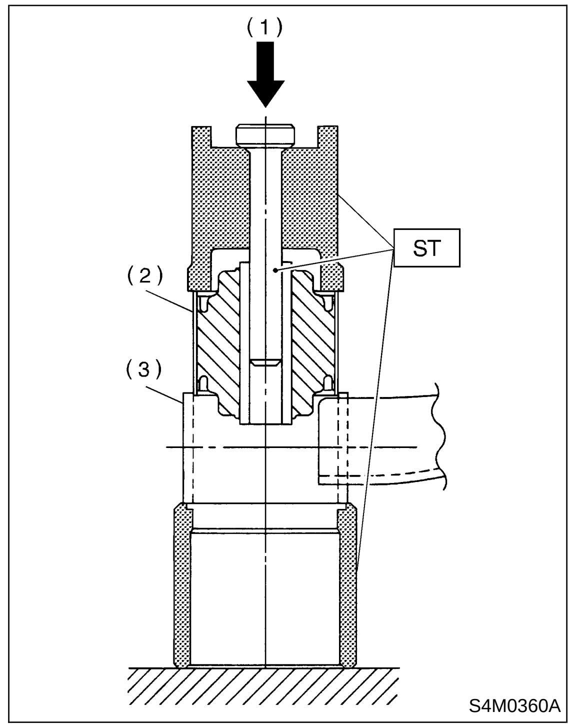
D: ASSEMBLY S201107A02

Assemble in the reverse order of disassembly.

1. FRONT BUSHING S201107A0201

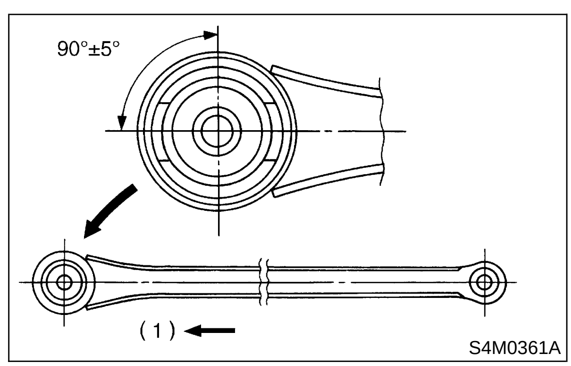
Using ST, press bushing into trailing link.
ST 927720000 INSTALLER & REMOVER SET

CAUTION:
When installing bushing, turn ST plunger upside down and press it until plunger end surface contacts trailing link end surface.



(1) Press
(2) Front bushing
(3) Trailing link

CAUTION:
Install front bushing in the proper direction, as shown in figure.



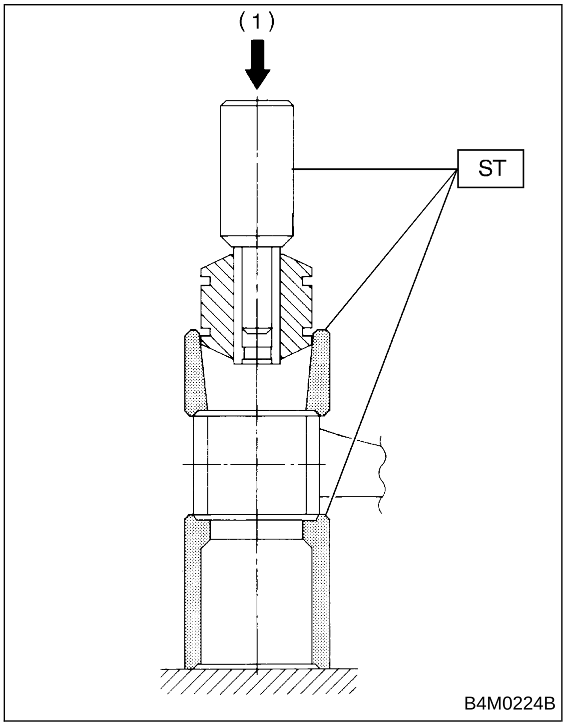
(1) Front

2. REAR BUSHING S201107A0202

1) Using ST, press bushing into trailing link.
ST 927730000 INSTALLER & REMOVER SET

NOTE:
If it is difficult to press bushing into trailing link, apply water-diluted TIRE LUBE to the inner surface of ST as a lubricant.

Specified lubricant:
TIRE LUBE : water = 1 : 3



(1) Press

2) Install housing. <Ref. to DS-26, INSTALLATION, Rear Axle.>

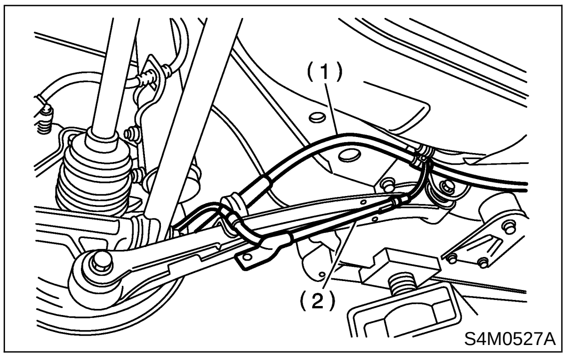
E: INSPECTION S201107A10

Check trailing links for bends, corrosion or damage.

5. Lateral link S201576

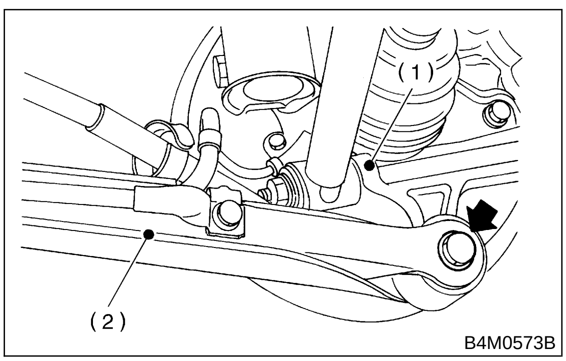
A: REMOVAL S201576A18

1) Set vehicle on a lift.
2) Disconnect ground cable from battery.
3) Loosen wheel nuts. Jack-up vehicle and remove wheel.
4) Remove stabilizers. <Ref. to RS-8, REMOVAL, Rear Stabilizer.>
5) Remove ABS sensor harness from trailing link.



(1) Parking brake cable
(2) ABS sensor harness

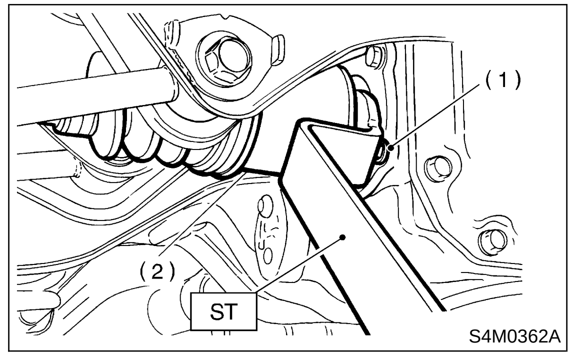
6) Remove bolt securing trailing link to housing.



(1) Rear housing
(2) Trailing link

7) Remove bolts which secure lateral link assembly to rear housing.

8) Remove DOJ from rear differential using ST.
ST 28099PA100 DRIVE SHAFT REMOVER



(1) Bolt
(2) DOJ

CAUTION:
Be careful not to damage side bearing retainer. Always use bolt as shown in figure, as supporting point for ST during removal.

9) Scribe an alignment mark on rear lateral link adjusting bolt and crossmember.
10) Remove bolts securing front and rear lateral links to crossmember, detach lateral links.

CAUTION:
To loosen adjusting bolt, always loosen nut while holding the head of adjusting bolt.

B: INSTALLATION S201576A11

Install in the reverse order of removal, observing the following instructions.

NOTE:
Installation of DOJ to differential; <Ref. to DS-39, INSTALLATION, Rear Drive Shaft.>

CAUTION:
- **Always tighten rubber bushing when wheels are in full contact with the ground and vehicle is curb weight.**
- **Tighten nut when installing adjusting bolt.**
- **Replace self-locking nut.**

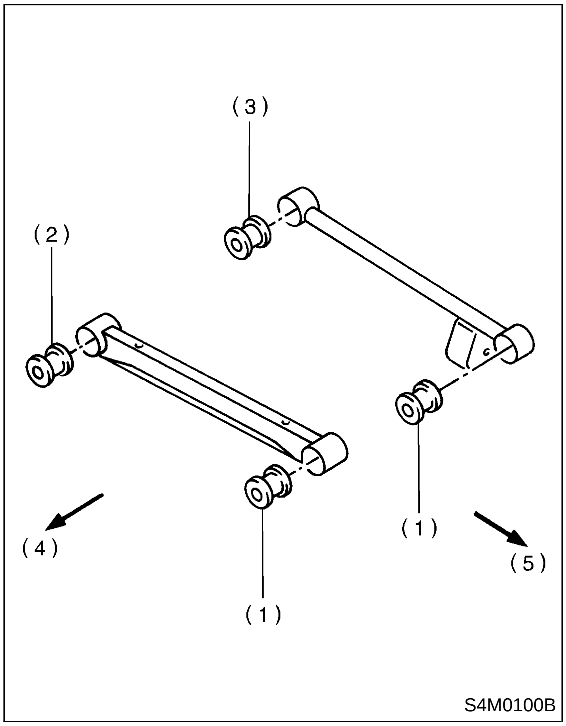
NOTE:
Check wheel alignment and adjust if necessary.

C: DISASSEMBLY *S201576A06*

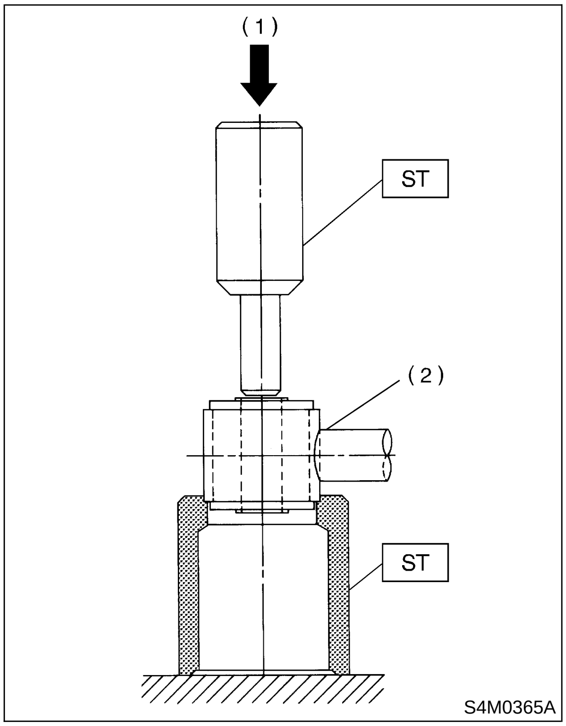
Using ST, press bushing out of place.

NOTE:
- Using the following table as a guide, verify the type of bushings.
- Select ST according to the type of bushings used.

Bushing	ST: INSTALLER & REMOVER SET
Bushing A	927700000
Bushing B	927690000
Bushing C	927700000



(1) Bushing A
(2) Bushing B
(3) Bushing C
(4) Front
(5) Outside of body



(1) Press
(2) Lateral link

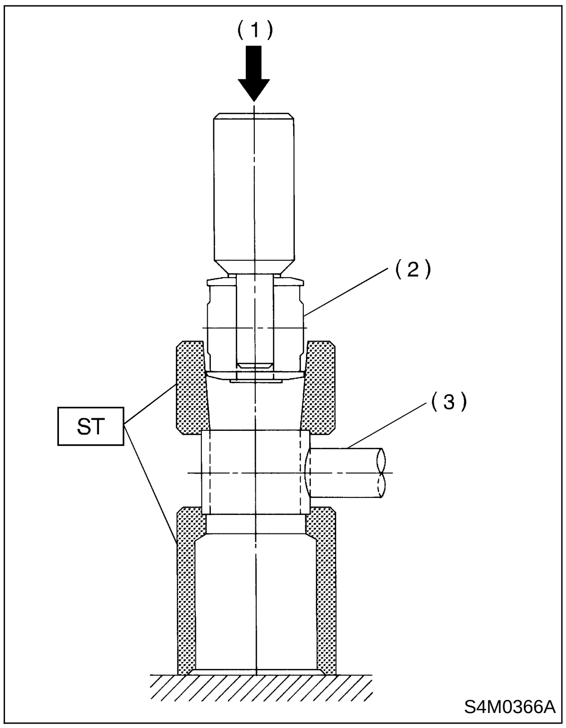
D: ASSEMBLY S201576A02

1) Using ST, press bushing into place.

CAUTION:
Select ST according to the type of bushings used.

NOTE:
- Use the same ST as that used during disassembly.
- If it is difficult to press bushing into trailing link, apply water-diluted TIRE LUBE to the inner surface of ST as a lubricant.

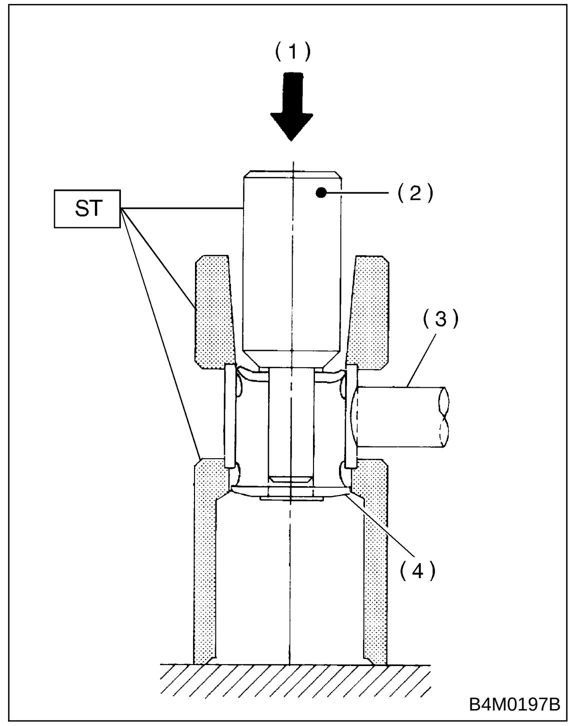
Specified lubricant:
TIRE LUBE : water = 1 : 3



(1) Press
(2) Bushing
(3) Lateral link

2) Press ST plunger until bushing flange protrudes beyond lateral link.

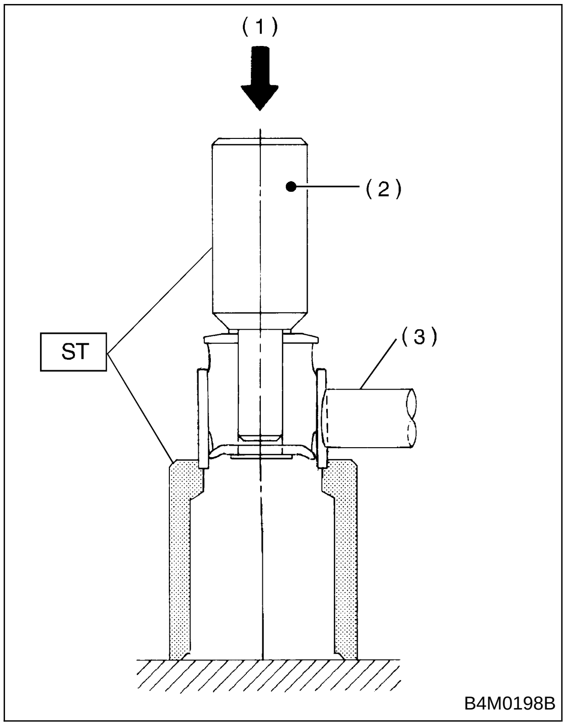
NOTE:
Use the same ST as that used during disassembly.



(1) Press
(2) Plunger
(3) Lateral link
(4) Flange

3) Turn lateral link upside down. Press ST plunger in the direction opposite that outlined in the former procedure until bushing is correctly positioned in trailing link.

NOTE:
Use the same ST as that used during disassembly.



(1) Press
(2) Plunger
(3) Lateral link

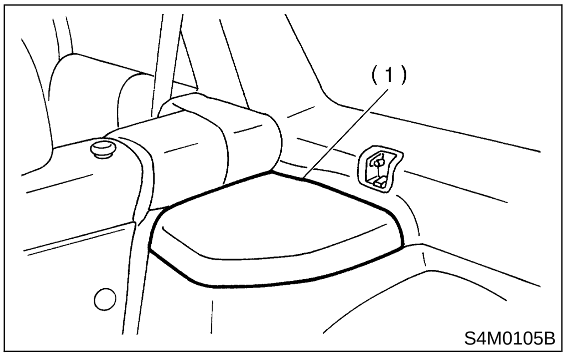
E: INSPECTION S201576A10

Visually check lateral links for damage or bends.

6. Rear Strut *S201132*

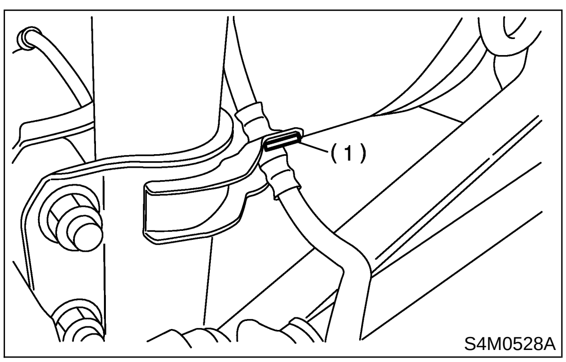
A: REMOVAL *S201132A18*

1) Set vehicle on a lift.
2) Disconnect ground cable from battery.
3) Depress brake pedal and secure it in that position using a wooden block, etc.
4) Remove strut cap of rear quarter trim.



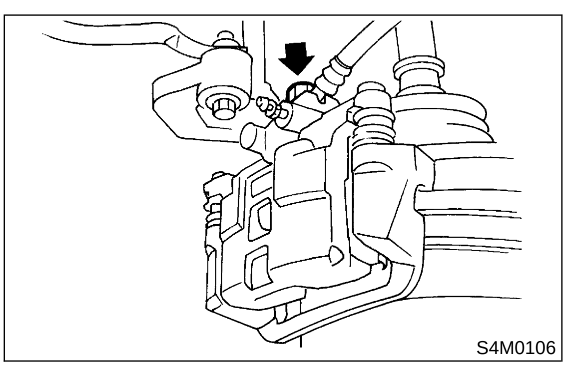
(1) Strut cap

5) Loosen rear wheel nuts.
6) Jack-up vehicle, and remove rear wheels.
7) Remove brake hose clip.



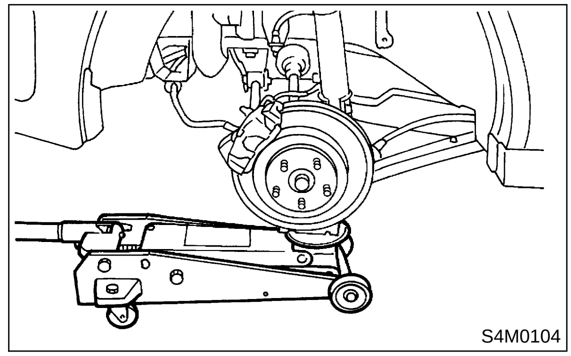
(1) Clip

8) Models equipped with rear disc brakes: Remove union bolt from brake caliper.

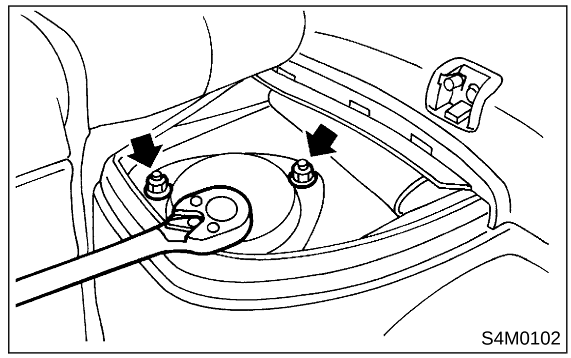


9) Models equipped with rear drum brakes: Disconnect brake hose and brake pipe from strut, and disconnect brake pipe from drum brake.

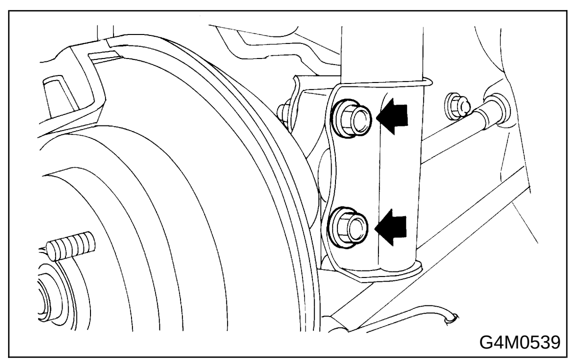
10) Use a garage jack to support the rear housing.



11) Remove nuts securing strut mount to body.



12) Remove bolts which secure rear strut to housing.



13) Remove strut mount.

B: INSTALLATION S201132A11

1) Install strut mount cap.
2) Tighten self-locking nut used to secure strut mount to vehicle body.

CAUTION:
Use a new self-locking nut.

NOTE:
Tighten strut mount and cap as a unit.

Tightening torque:
20 N·m (2.0 kgf-m, 14.5 ft-lb)

3) Tighten bolts securing rear strut to housing.

Tightening torque:
200 N·m (20.4 kgf-m, 148 ft-lb)

CAUTION:
Use a new self-locking nut.

4) Models with rear disc brakes:
Tighten brake hose union bolt on brake caliper.

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

Models with rear drum brakes:
Connect brake hose to brake pipe.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

5) Insert brake hose clip between brake hose and lower side of strut.

CAUTION:
- **Check that hose clip is positioned properly.**
- **Check brake hose for twisting, or excessive tension.**
- **Do not subject ABS sensor harness to excessive tension.**

6) Be sure to bleed air from brake system.
<Ref. to BR-42, Air Bleeding.>
7) Lower vehicle and tighten wheel nut.

Tightening torque:
88 N·m (9 kgf-m, 65 ft-lb)

8) Install strut cap of rear quarter trim.

NOTE:
Check wheel alignment and adjust if necessary.

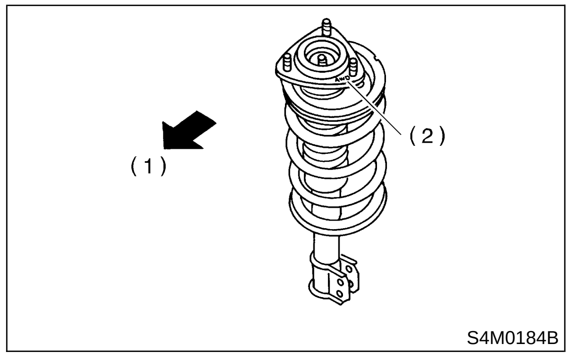
C: DISASSEMBLY S201132A06

For disassembly of rear strut, refer to procedures outlined under front strut as a guide. <Ref. to FS-18, DISASSEMBLY, Front Strut.>

D: ASSEMBLY S201132A02

Refer to Front Strut as a guide for assembly procedures. <Ref. to FS-19, ASSEMBLY, Front Strut.>

CAUTION:
- **Install rear strut with “4WD” mark on strut mount facing outside of vehicle body.**
- **Insert the protrusion of lower rubber seat into the strut spring seat hole.**



(1) Front of vehicle
(2) “4WD” mark

E: INSPECTION S201132A10

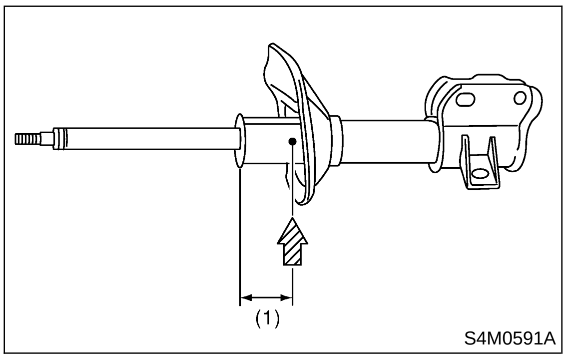
1) Refer to Front Strut as a guide for inspection procedures. <Ref. to FS-20, INSPECTION, Front Strut.>

F: DISPOSAL *S201132A07*

CAUTION:

- **Completely discharge the gas from struts, before disposal. Follow the disposal procedure outlined below.**
- **Do not disassemble strut damper or place into a fire.**
- **Make a hole with a drill before disposal of strut.**
- **Before handling gas filled struts, be sure to wear goggles to protect eyes from gas, oil and/or filings.**

1) Place the gas filled strut on a flat and level surface with piston rod fully extended.
2) Using a 2 to 3 mm (0.08 to 0.12 in) dia. drill, make a hole in position shown in the figure.



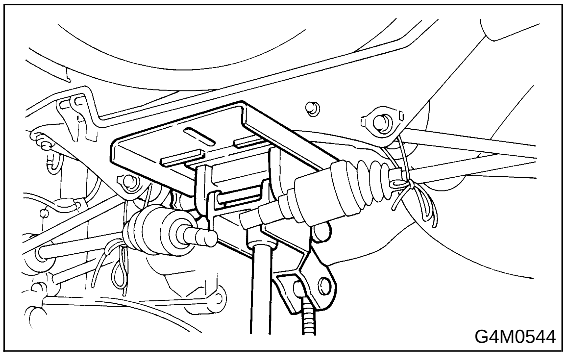
(1) 40 mm (1.57 in)

7. Rear Crossmember S201133

A: REMOVAL S201133A18

CAUTION:
Do not subject ABS sensor harness to excessive tension.

1) Set vehicle on a lift.
2) Disconnect ground cable from battery.
3) Loosen wheel nuts. Jack-up vehicle and remove wheels.
4) Separate front exhaust pipe and rear exhaust pipe.
5) Remove rear exhaust pipe and muffler.
6) Remove rear differential.
T-Type: <Ref. to DI-18, Rear Differential.>
7) Place transmission jack under rear crossmember.



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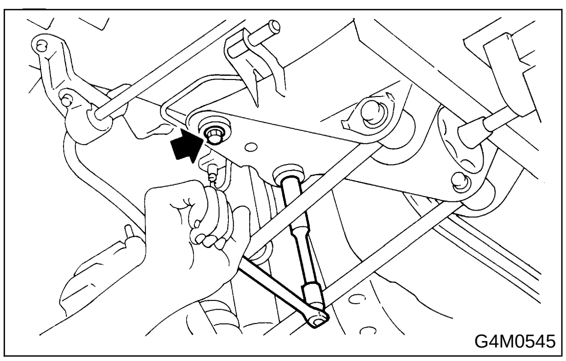
8) Remove bolts securing crossmember to vehicle body, and remove crossmember.



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9) Scribe an alignment mark on rear lateral link cam bolt and crossmember.
10) Remove front and rear lateral links by loosening nuts.

B: INSTALLATION S201133A11

1) Install in the reverse order of removal.
2) For installation and tightening torque of rear differential, always tighten rubber bushing when wheels are in full contact with the ground and vehicle is curb weight.

NOTE:
Check wheel alignment and adjust if necessary.

C: INSPECTION S201133A10

Check removed parts for wear, damage and cracks, and correct or replace if defective.

8. General Diagnostic Table S201257

A: INSPECTION S201257A10

1. IMPROPER VEHICLE POSTURE OR IMPROPER WHEEL ARCH HEIGHT S201257A1001

Possible causes	Countermeasures
(1) Permanent distortion or breakage of coil spring	Replace.
(2) Unsmooth operation of damper strut	Replace.
(3) Installation of wrong strut	Replace with proper parts.
(4) Installation of wrong coil spring	Replace with proper parts.

2. POOR RIDE COMFORT S201257A1002

1) Large rebound shock
2) Rocking of vehicle continues too long after running over bump and/or hump.
3) Large shock in bumping

Possible causes	Countermeasures
(1) Breakage of coil spring	Replace.
(2) Overinflation pressure of tire	Adjust.
(3) Improper wheel arch height	Adjust or replace coil springs with new ones.
(4) Fault in operation of damper strut	Replace.
(5) Damage or deformation of strut mount	Replace.
(6) Unsuitability of maximum and/or minimum length of damper strut	Replace with proper parts.
(7) Deformation or loss of bushing	Replace.
(8) Deformation or damage of helper in strut assembly	Replace.
(9) Oil leakage of damper strut	Replace.

3. NOISE S201257A1003

Possible causes	Countermeasures
(1) Wear or damage of damper strut component parts	Replace.
(2) Loosening of suspension link installing bolt	Retighten to the specified torque.
(3) Deformation or loss of bushing	Replace.
(4) Unsuitability of maximum and/or minimum length of damper strut	Replace with proper parts.
(5) Breakage of coil spring	Replace.
(6) Wear or damage of ball joint	Replace.
(7) Deformation of stabilizer clamp	Replace.

WHEEL AND TIRE SYSTEM

WT

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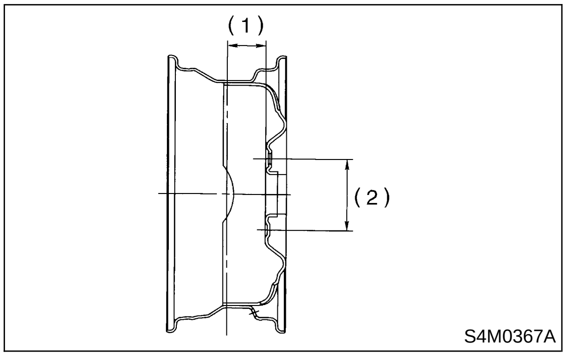
1. General Description 2
2. Tire 4
3. Steel Wheel 5
4. Aluminum Wheel 6
5. Wheel Balancing 7
6. General Diagnostics Table 8

1. General Description S204001

A: SPECIFICATIONS S204001E49



(1) Offset
(2) P.C.D.

	Model	Tire size	Rim size	Rim offset	P.C.D.
Front and Rear	L	P205/70R15 95S	15 × 6J	48 mm (1.89 in)	100 mm (3.94 in) dia.
	S	P215/60R16 94H	16 × 6 1/2JJ	48 mm (1.89 in)	

NOTE:
Spare tires are the same for both front and rear.

Model	Tire size	Tire inflation pressure	
		Light load	Full load
L	P205/70R15 95S	Ft: 200 kPa (2.0 kg/cm^2, 29 psi) Rr: 190 kPa (1.9 kg/cm^2, 27 psi)	Ft: 200 kPa (2.0 kg/cm^2, 29 psi) Rr: 250 kPa (2.5 kg/cm^2, 36 psi)
S	P215/60R16 94H		

NOTE:
At trailer towing, rear inflation pressure is 280 kPa (2.8 kg/cm^2, 41 psi).

1. SERVICE DATA S204001E4901

Item	Axial runout	Radial runout
Steel wheel	1.5 mm (0.059 in)	
Aluminum wheel	1.0 mm (0.039 in)	

2. ADJUSTING PARTS S204001E4902

Wheel balancing	Standard	Service limit
Dynamic unbalance	Less than 5 g (0.18 oz)	

Balance weight part number (For steel wheel)	Weight
28101FC000	5 g (0.18 oz)
28101FC010	10 g (0.35 oz)
28101FC020	15 g (0.53 oz)
723141320	20 g (0.71 oz)
723141330	25 g (0.88 oz)
723141340	30 g (1.06 oz)
723141350	35 g (1.23 oz)
723141360	40 g (1.41 oz)
723141370	45 g (1.59 oz)
723241380	50 g (1.76 oz)
723241580	55 g (1.94 oz)
723241590	60 g (2.12 oz)

Balance weight part number (For aluminum wheel)	Weight
23141GA462	5 g (0.18 oz)
23141GA472	10 g (0.35 oz)
23141GA482	15 g (0.53 oz)
23141GA492	20 g (0.71 oz)
23141GA502	25 g (0.88 oz)
23141GA512	30 g (1.06 oz)
23141GA522	35 g (1.23 oz)
23141GA532	40 g (1.41 oz)
23141GA542	45 g (1.59 oz)
23141GA552	50 g (1.76 oz)
—	55 g (1.94 oz)
23141GA572	60 g (2.12 oz)

B: PREPARATION TOOL S204001A17

1. GENERAL PURPOSE TOOLS S204001A1701

TOOL NAME	REMARKS
Air Pressure Gauge	Used for measuring tire air pressure.
Dial Gauge	Used for measuring wheel runout.

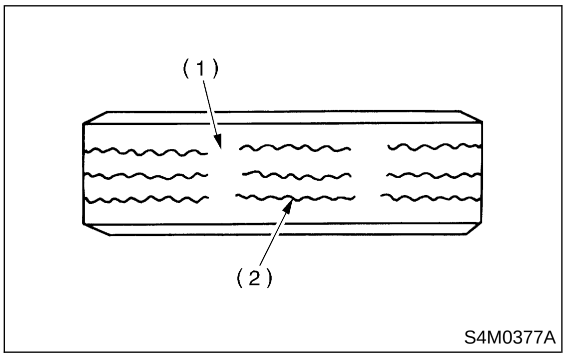
2. Tire S204125

A: INSPECTION S204125A10

1) Take stone, glass, nail etc. off the tread groove.
2) Replace tire:

CAUTION:
● When replacing a tire, make sure to use only the same size, construction and load range as originally installed.
● Avoid mixing radial, belted bias or bias tires on the vehicle.

(1) when large crack on side wall, damage or crack on tread is found.
(2) when the “tread wear indicator” appears as a solid band across the tread.



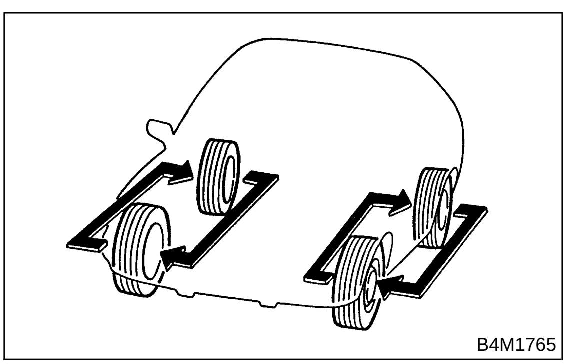
(1) Tread wear indicator
(2) Tire tread

3) When extremely biased wear on tire tread can been seen, after replacing the tire, measure wheel alignment. <Ref. to FS-6, Wheel Alignment.>

1. TIRE ROTATION S204125A1001

If tires are maintained at the same positions for a long period of time, uneven wear results. Therefore, they should be periodically rotated.
This lengthens service life of tires.

CAUTION:
When rotating tires, replace unevenly worn or damaged tires with new ones.



3. Steel Wheel S204131

A: REMOVAL S204131A18

1) Apply parking brake, and position select lever to “P” or “LOW”.
2) Set shop jacks or a lift to the specified point, and support the vehicle with its wheels slightly contacting the floor.
3) Loosen wheel nuts.
4) Raise the vehicle until its wheels take off the ground using a jack or a lift.
5) Remove wheel nuts and wheels.

NOTE:
- While removing wheels, prevent hub bolts from damage.
- Place wheels with their outer sides facing upward to prevent wheels from damage.

B: INSTALLATION S204131A11

1) Attach the wheel to the hub by aligning the wheel bolt hole with the hub bolt.
2) Temporarily attach the wheel nuts to the hub bolts. (In the case of aluminum wheel, use SUBARU genuine wheel nut for aluminum wheel.)
3) Manually tighten the nuts making sure the wheel hub hole is aligned correctly to the guide portion of hub.
4) Tighten the wheel nuts in a diagonal selection to the specified torque. Use a wheel nut wrench.

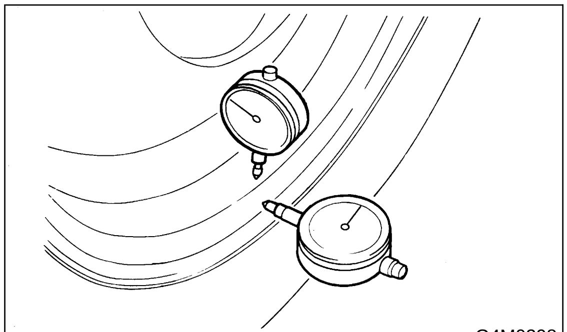
Wheel nut tightening torque:
88 N·m (9 kgf-m, 65 ft-lb)

CAUTION:
- **Tighten the wheel nuts in two or three steps by gradually increasing the torque and working diagonally, until the specified torque is reached. For drum brake models, excess tightening of wheel nuts may cause wheels to “judder”.**
- **Do not depress the wrench with a foot; Always use both hands when tightening.**
- **Make sure the bolt, nut and the nut seating surface of the wheel are free from oils.**

5) If a wheel is removed for replacement or for repair of a puncture, retighten the wheel nuts to the specified torque after running 1,000 km (600 miles).

C: INSPECTION S204131A10

1) Deformation or damage on the rim can cause air leakage. Check the rim flange for deformation, crack, or damage, and repair or replace as necessary.
2) Jack-up vehicle until wheels clear the floor.
3) Slowly rotate wheel to check rim “runout” using a dial gauge.



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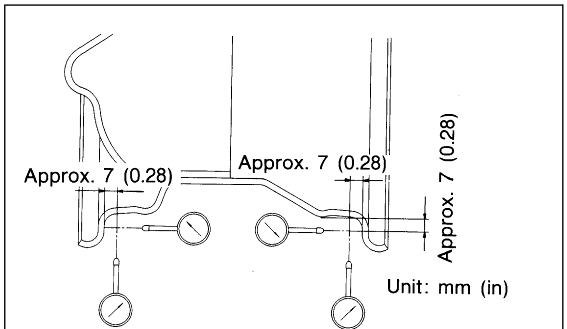
Axial runout limit	Radial runout limit
1.5 mm (0.059 in)	



G4M0299

4) If rim runout exceeds specifications, remove tire from rim and check runout while attaching dial gauge to positions shown in figure.
5) If measured runout still exceeds specifications, replace the wheel.

4. Aluminum Wheel S204130

A: REMOVAL S204130A18

Refer to Steel Wheel for removal procedure of aluminum wheels. <Ref. to WT-5, REMOVAL, Steel Wheel.>

B: INSTALLATION A204130A11

Refer to Steel Wheel for installation procedure of aluminum wheels. < Ref. to WT-5, INSTALLATION, Steel Wheel.>

C: INSPECTION S204130A10

Refer to Steel Wheel for inspection procedure of aluminum wheels. <Ref. to WT-5, INSPECTION, Steel Wheel.>

Rim runout:

<table>
<tr><td>Axial runout limit</td><td>Radial runout limit</td></tr>
<tr><td colspan="2">1.0 mm (0.039 in)</td></tr>
</table>

D: CAUTION S204130A03

Aluminum wheels are easily scratched. To maintain their appearance and safety, do the following:
1) Do not damage aluminum wheels during removal, disassembly, installation, wheel balancing, etc. After removing aluminum wheels, place them on a rubber mat, etc.
2) While vehicle is being driven, be careful not to ride over sharp obstacles or allow aluminum wheels to contact the shoulder of the road.
3) When installing tire chain, be sure to install it properly not to have a slack; otherwise it may hit wheel while driving.
4) When washing aluminum wheel, use neutral synthetic detergent and water. Avoid using the cleanser including abrasive, hard brushes or an automatic car washer.

5. Wheel Balancing S204127

A: REPLACEMENT S204127A20

1) Remove balance weights.
2) Using dynamic balancing, measure wheel balance.
3) Select a weight close to the value measured by dynamic balancing.

Balance weight part number (For steel wheel)	Weight
28101FC000	5 g (0.18 oz)
28101FC010	10 g (0.35 oz)
28101FC020	15 g (0.53 oz)
723141320	20 g (0.71 oz)
723141330	25 g (0.88 oz)
723141340	30 g (1.06 oz)
723141350	35 g (1.23 oz)
723141360	40 g (1.41 oz)
723141370	45 g (1.59 oz)
723241380	50 g (1.76 oz)
723241580	55 g (1.94 oz)
723241590	60 g (2.12 oz)

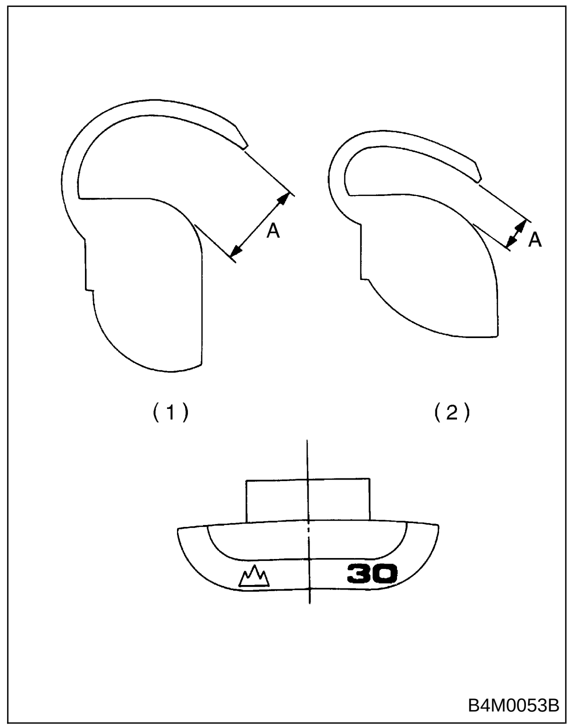
Balance weight part number (For aluminum wheel)	Weight
23141GA462	5 g (0.18 oz)
23141GA472	10 g (0.35 oz)
23141GA482	15 g (0.53 oz)
23141GA492	20 g (0.71 oz)
23141GA502	25 g (0.88 oz)
23141GA512	30 g (1.06 oz)
23141GA522	35 g (1.23 oz)
23141GA532	40 g (1.41 oz)
23141GA542	45 g (1.59 oz)
23141GA552	50 g (1.76 oz)
—	55 g (1.94 oz)
23141GA572	60 g (2.12 oz)

4) Install the selected weight to the point designated by dynamic balancing.
5) Using dynamic balancing, measure wheel balance again. Check that wheel balance is correctly adjusted.

B: INSPECTION S204127A10

1) Proper wheel balance may be lost if the tire is repaired or if it wears. Check the tire for dynamic balance, and repair as necessary.
2) To check for dynamic balance, use a dynamic balancer. Drive in the balance weight on both the top and rear sides of the rim.
3) Some types of balancer can cause damage to the wheel. Use an appropriate balancer when adjusting the wheel balance.
4) Use genuine balance weights.

CAUTION:
- **55 g (1.94 oz) weight used with aluminum wheel is not available.**
- **Balance weights are available for use with any of 14- to 16-inch wheels.**



(1) Weight for aluminum wheel
(2) Weight for steel wheel

Service limit: A
Weight for steel wheel;
1.8 — 2.0 mm (0.071 — 0.079 in)
Weight for aluminum wheel;
4.6 — 5.4 mm (0.181 — 0.213 in)

6. General Diagnostics Table S204121

A: INSPECTION S204121A10

Symptom	Possible cause	Remedy
Front wheel shimmy	• Worn or improperly inflated of tire.	Replace
	• Wheel is out of balance.	Adjustment
Abnormal tire wear	• Improperly inflated of tire.	Replace
Sways/pitches	• Worn or improperly inflated of tire.	Replace
Wander/pulls	• Worn or improperly inflated of tire.	Replace

DIFFERENTIALS

DI

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1. General Description S303001

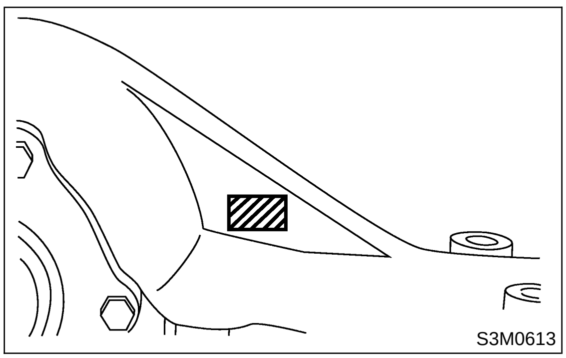
A: SPECIFICATIONS S303001E49

Model	Rear drum brake		Rear disc brake	
	MT	AT	MT	AT
	T type (without LSD)		T type (with LSD)	
Rear differential type	T2	TP	JP	CF
Gear	Hypoid gear			
Gear ratio	4.111 (37/9)	4.444 (40/9)	4.111 (37/9)	4.444 (40/9)
Oil capacity	0.8 L (0.8 US qt, 0.7 Imp qt)			
Rear differential gear oil	GL-5			

● **Identification**

When replacing a rear differential assembly, select the correct one according to the following table.

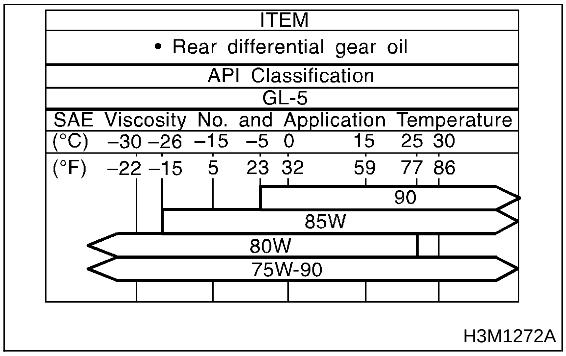
CAUTION:
Using the different rear differential assembly causes the drive line and tires to “drag” or emit abnormal noise when AWD is selected.



- **Rear differential gear oil**

Recommended oil

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



H3M1272A

1. SERVICE DATA *S303001E4901*

Front and rear bearing preload at companion flange bolt hole N (kgf, lb)	New bearing	19.6 — 28.4 (2.0 — 2.9, 4.4 — 6.4)
	Used bearing	8.34 — 16.67 (0.85 — 1.7, 1.87 — 3.75)
Side gear backlash mm (in)		0.10 — 0.20 (0.0039 — 0.0079)
Side bearing standard width mm (in)		20.00 (0.7874)
Crown gear to drive pinion backlash mm (in)		0.10 — 0.20 (0.0039 — 0.0079)
Crown gear runout on its back surface mm (in)		Less than 0.05 (0.0020)

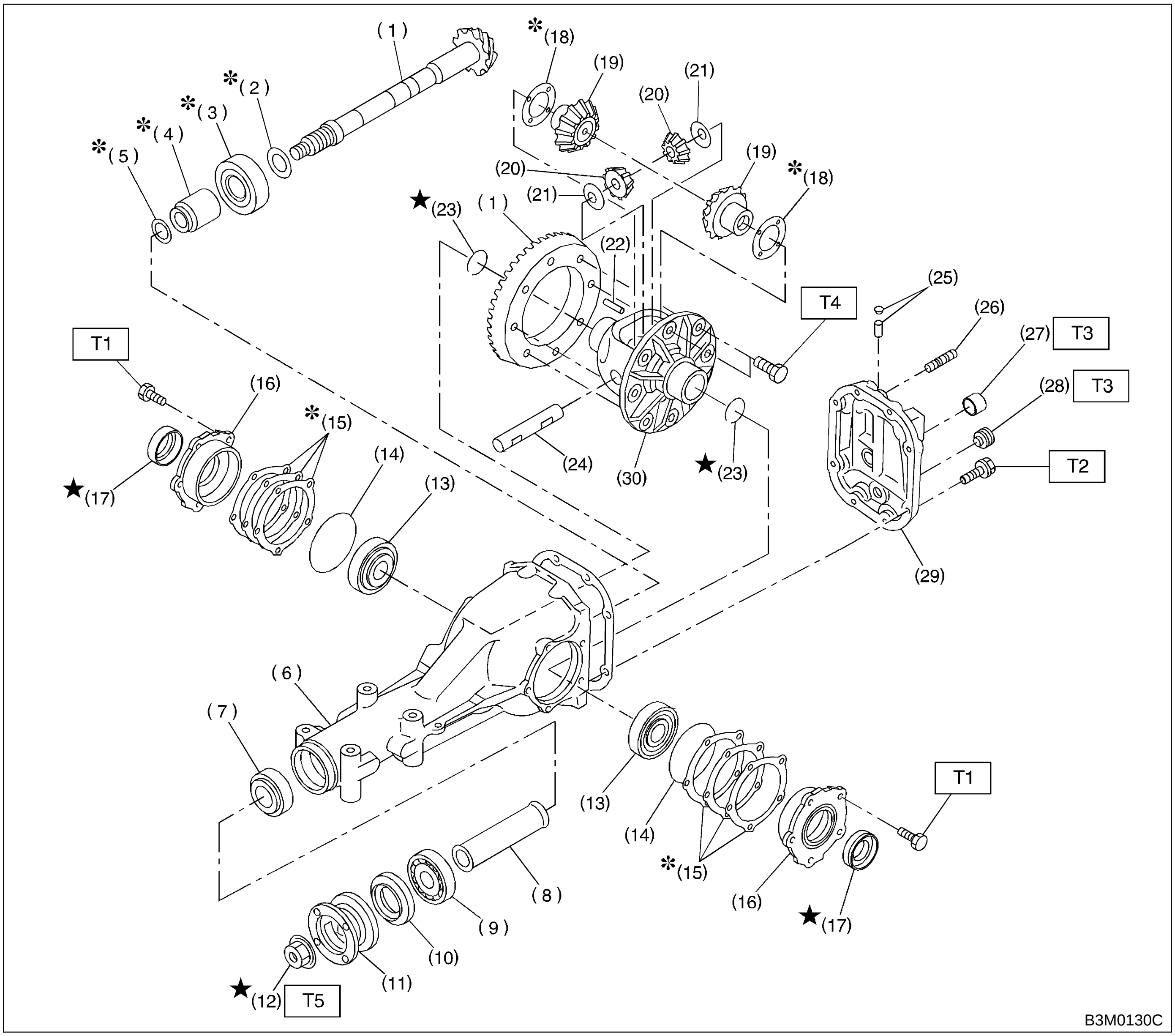
2. ADJUSTING PARTS *S303001E4902*

Item	Part No.	Length or thickness
Preload adjusting spacer	383695201	56.2 mm (2.213 in)
	383695202	56.4 mm (2.220 in)
	383695203	56.6 mm (2.228 in)
	383695204	56.8 mm (2.236 in)
	383695205	57.0 mm (2.244 in)
	383695206	57.2 mm (2.252 in)
Preload adjusting washer	383705200	2.59 mm (0.1020 in)
	383715200	2.57 mm (0.1012 in)
	383725200	2.55 mm (0.1004 in)
	383735200	2.53 mm (0.0996 in)
	383745200	2.51 mm (0.0988 in)
	383755200	2.49 mm (0.0980 in)
	383765200	2.47 mm (0.0972 in)
	383775200	2.45 mm (0.0965 in)
	383785200	2.43 mm (0.0957 in)
	383795200	2.41 mm (0.0949 in)
	383805200	2.39 mm (0.0941 in)
	383815200	2.37 mm (0.0933 in)
	383825200	2.35 mm (0.0925 in)
	383835200	2.33 mm (0.0917 in)
	383845200	2.31 mm (0.0909 in)
Pinion height adjusting shim	383495200	3.09 mm (0.1217 in)
	383505200	3.12 mm (0.1228 in)
	383515200	3.15 mm (0.1240 in)
	383525200	3.18 mm (0.1252 in)
	383535200	3.21 mm (0.1264 in)
	383545200	3.24 mm (0.1276 in)
	383555200	3.27 mm (0.1287 in)
	383565200	3.30 mm (0.1299 in)
	383575200	3.33 mm (0.1311 in)
	383585200	3.36 mm (0.1323 in)
	383595200	3.39 mm (0.1335 in)
	383605200	3.42 mm (0.1346 in)
	383615200	3.45 mm (0.1358 in)
	383625200	3.48 mm (0.1370 in)
	383635200	3.51 mm (0.1382 in)
	383645200	3.54 mm (0.1394 in)
	383655200	3.57 mm (0.1406 in)
	383665200	3.60 mm (0.1417 in)
	383675200	3.63 mm (0.1429 in)
	383685200	3.66 mm (0.1441 in)
Side gear thrust washer	383445201	0.75 — 0.80 mm (0.0295 — 0.0315 in)
	383445202	0.80 — 0.85 mm (0.0315 — 0.0335 in)
	383445203	0.85 — 0.90 mm (0.0335 — 0.0354 in)
	383445204	0.90 — 0.95 mm (0.0354 — 0.0374 in)
	383445205	0.95 — 1.0 mm (0.0374 — 0.0394 in)

Item	Part No.	Length or thickness
Side bearing retainer shim	383475201	0.20 mm (0.0079 in)
	383475202	0.25 mm (0.0098 in)
	383475203	0.30 mm (0.0118 in)
	383475204	0.40 mm (0.0157 in)
	383475205	0.50 mm (0.0197 in)

B: COMPONENT S303001A05

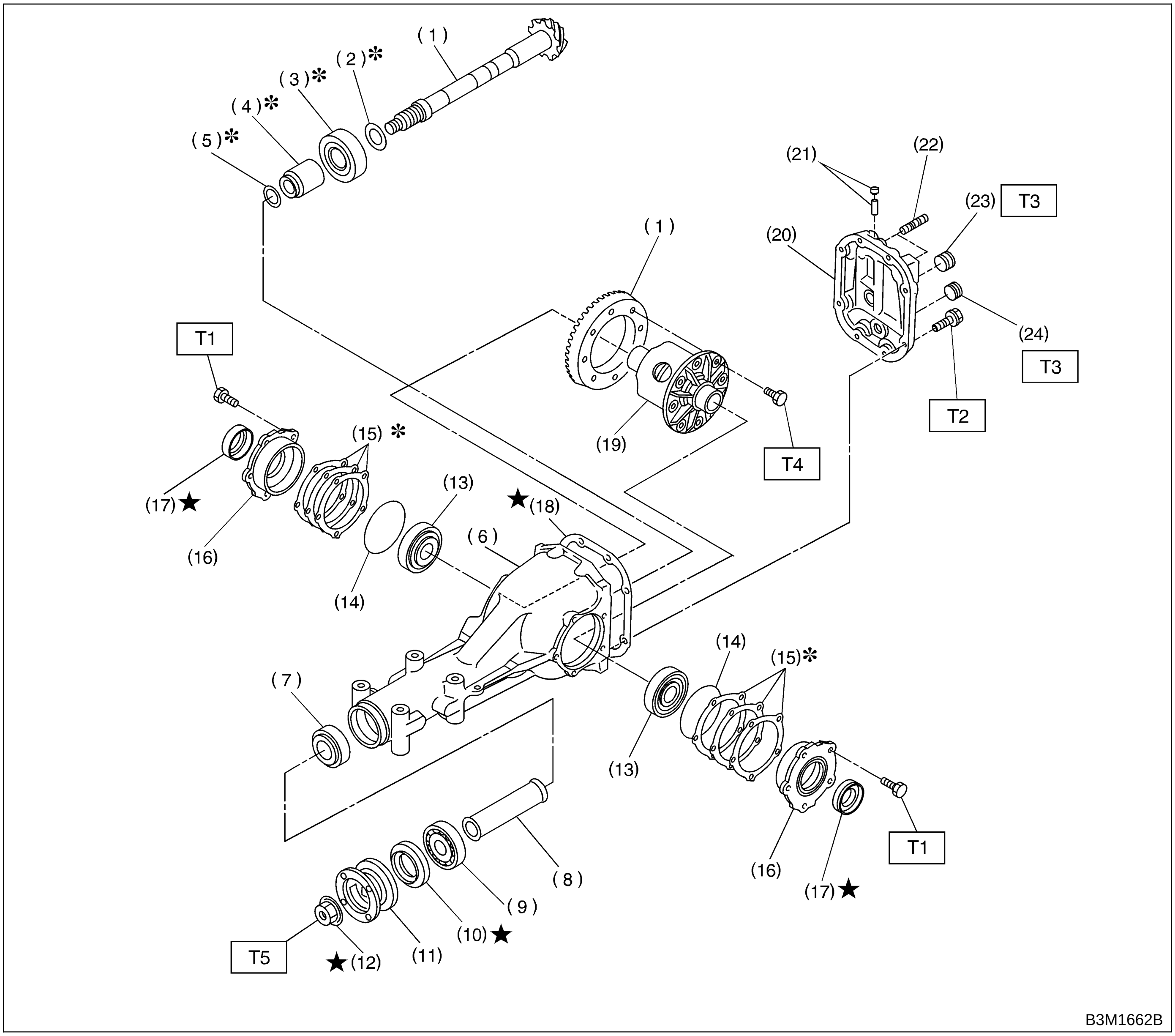
1. REAR DIFFERENTIAL WITHOUT LSD S303001A0507



(1) Pinion crown gear set
(2) Pinion height adjusting washer
(3) Rear bearing
(4) Bearing preload adjusting spacer
(5) Bearing preload adjusting washer
(6) Differential carrier
(7) Front bearing
(8) Spacer
(9) Pilot bearing
(10) Front oil seal
(11) Companion flange
(12) Self-locking nut
(13) Side bearing
(14) O-ring
(15) Side bearing retainer shim
(16) Side bearing retainer
(17) Side oil seal
(18) Side gear thrust washer
(19) Side gear
(20) Pinion mate gear
(21) Pinion mate gear washer
(22) Pinion shaft lock pin
(23) Circlip
(24) Pinion mate shaft
(25) Air breather cap
(26) Stud bolt
(27) Oil filler plug
(28) Oil drain plug
(29) Rear cover
(30) Differential case

Tightening torque: N·m (kgf-m, ft-lb)
T1: 10.3 (1.05, 7.6)
T2: 29.4 (3.00, 21.7)
T3: 49.0 (5.0, 36.2)
T4: 103.0 (10.50, 75.9)
T5: 181.4 (18.50, 133.8)

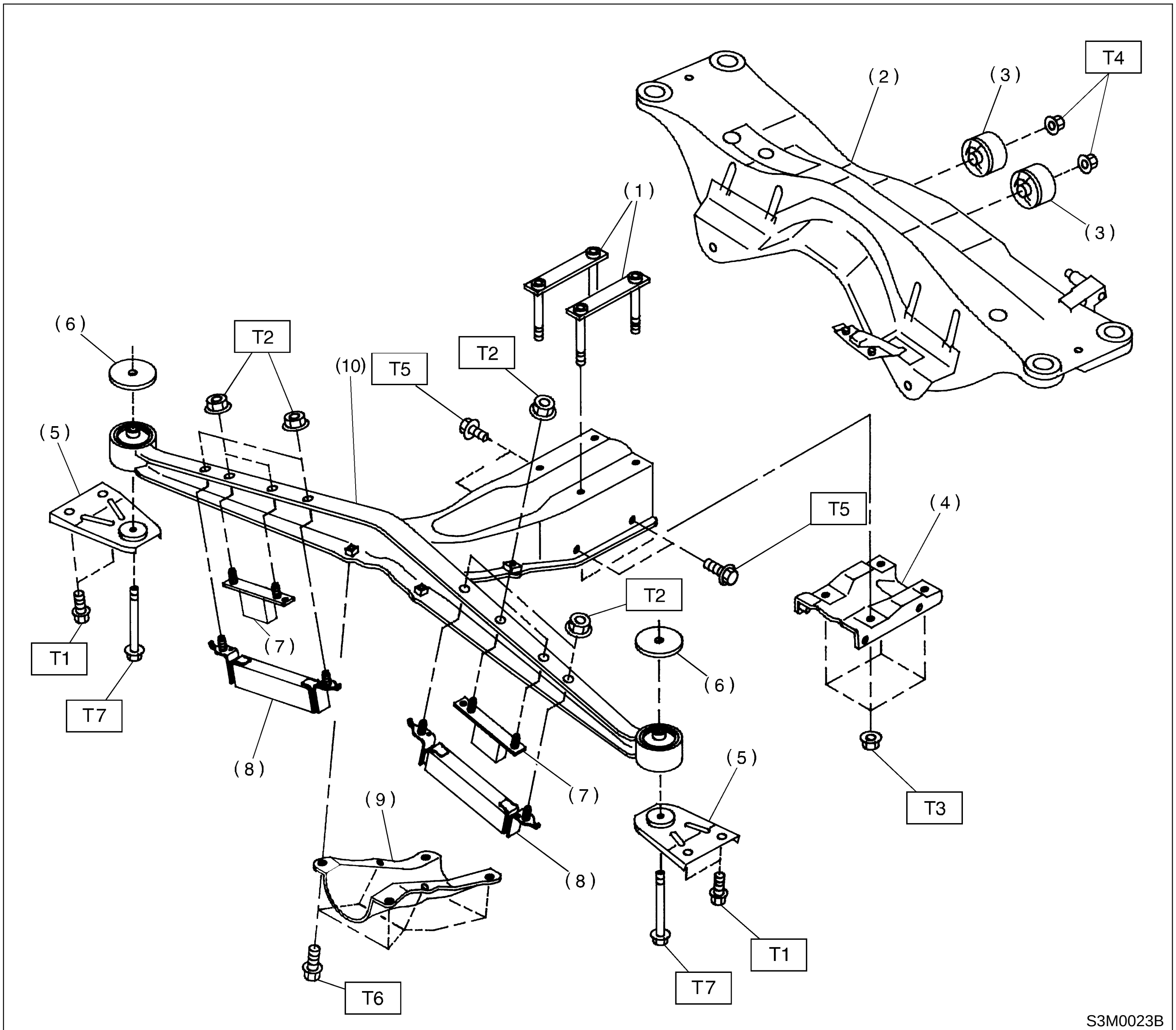
2. REAR DIFFERENTIAL WITH LSD
S303001A0508



(1) Pinion crown gear set
(2) Pinion height adjusting shim
(3) Rear bearing
(4) Bearing preload adjusting spacer
(5) Bearing preload adjusting washer
(6) Differential carrier
(7) Front bearing
(8) Collar
(9) Pilot bearing
(10) Front oil seal
(11) Companion flange
(12) Self-locking nut
(13) Side bearing
(14) O-ring
(15) Side bearing retainer shim
(16) Side bearing retainer
(17) Side oil seal
(18) Gasket
(19) Differential case
(20) Rear cover
(21) Air breather cap
(22) Stud bolt
(23) Oil filler plug
(24) Oil drain plug

Tightening torque: N·m (kgf-m, ft-lb)
T1: 10.3 (1.05, 7.6)
T2: 29 (3.0, 21.7)
T3: 49.0 (5.0, 36.2)
T4: 103 (10.5, 76)
T5: 181 (18.5, 134)

3. REAR DIFFERENTIAL MOUNTING SYSTEM *S303001A0504*



(1) Plate
(2) Crossmember
(3) Rear bushing
(4) Differential mount lower bracket
(5) Differential mount bracket
(6) Stopper
(7) Mass damper (AT vehicle)
(8) Dynamic damper (MT vehicle)
(9) Differential mount front cover
(10) Differential front member

Tightening torque: N·m (kgf-m, ft-lb)
T1: 32 (3.3, 23.9)
T2: 40 (4.1, 30)
T3: 64 (6.5, 47.0)
T4: 69 (7.0, 50.6)
T5: 69 (7.0, 50.6)
T6: 88 (9.0, 65)
T7: 98 (10.0, 72)

C: CAUTION *S303001A03*

- 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.
- Use SUBARU genuine gear oil, grease etc. or the equivalent. Do not mix gear oil, grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply gear oil onto sliding or revolution surfaces before installation.
- Before installing O-rings or snap rings, apply sufficient amount of gear oil to avoid damage and deformation.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Avoid damaging the mating face of the case.

D: PREPARATION TOOL S303001A17

1. SPECIAL TOOLS S303001A1701

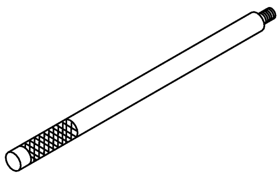
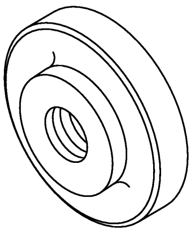
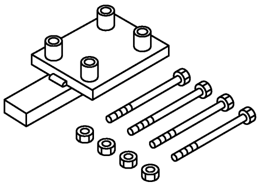
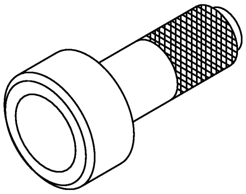
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1893	398477701	HANDLE	Used for installing front and rear bearing cone.
 B3M1894	398477702	DRIFT	Used for press-fitting the bearing cone of differential carrier (rear).
 B3M1895	398217700	ATTACHMENT SET	Stand for rear differential carrier disassembly and assembly.
 B3M1896	498447120	OIL SEAL INSTALLER	Used for installing front oil seal.

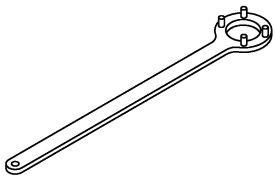
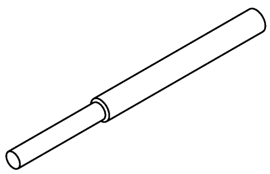
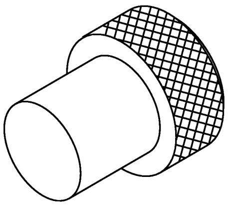
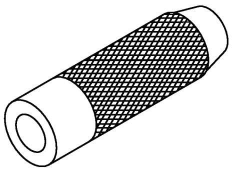
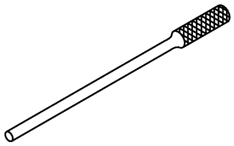
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1897	498427200	FLANGE WRENCH	Used for stopping rotation of companion flange when loosening and tightening self-lock nut.
 B3M1898	398467700	DRIFT	Used for removing pinion, pilot bearing and front bearing cone.
 B3M1899	399780104	WEIGHT	Used for installing front bearing cone, pilot bearing companion flange.
 B3M1900	899580100	INSTALLER	Used for press-fitting the front bearing cone, pilot bearing.
 B3M1901	899904100	STRAIGHT PIN REMOVER	Used for driving out differential pinion shaft lock pin.

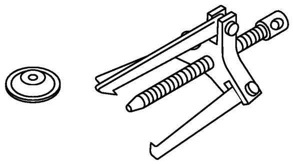
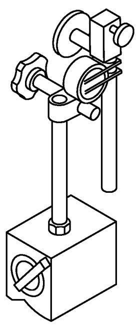
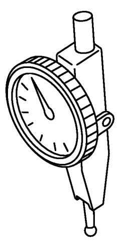
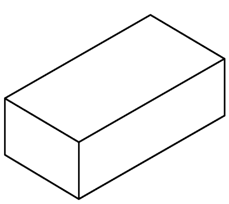
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1930	399703600	PULLEY ASSY	● Used for removing companion flange.
 B3M1902	498247001	MAGNET BASE	● Used for measuring backlash between side gear and pinion, and hypoid gear. ● Used with DIAL GAUGE (498247100).
 B3M1903	498247100	DIAL GAUGE	● Used for measuring backlash between side gear and pinion, and hypoid gear. ● Used with MAGNET BASE (498247001).
 B3M1904	398507704	BLOCK	Used for adjusting pinion height and preload.

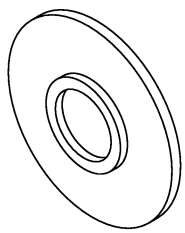
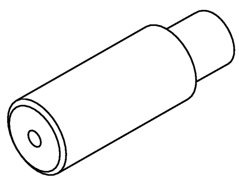
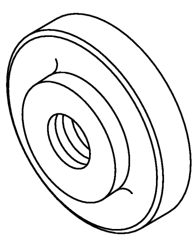
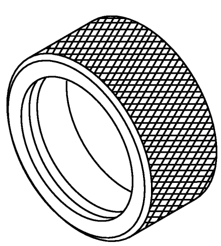
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1905	398177700	INSTALLER	Used for installing rear bearing cone.
 B3M1906	398457700	ATTACHMENT	Used for removing side bearing retainer.
 B3M1907	398477703	DRIFT2	Used for press-fitting the bearing race (rear) of differential carrier.
 B3M1908	398437700	DRIFT	Used for installing said oil seal.

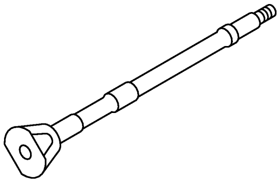
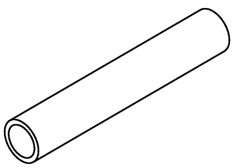
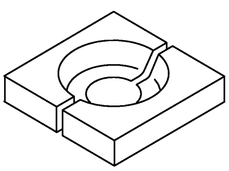
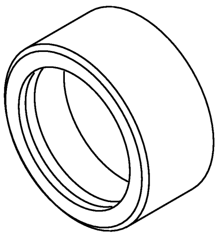
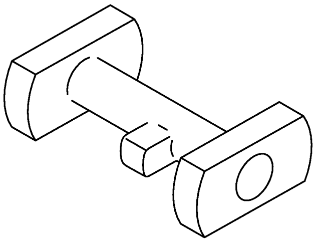
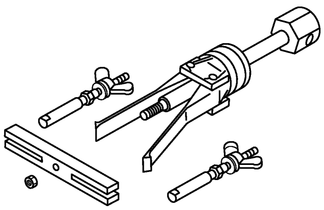
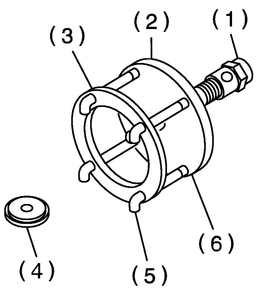
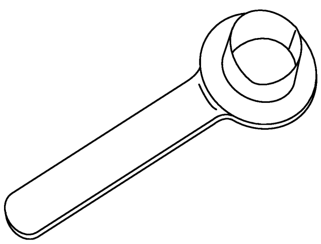
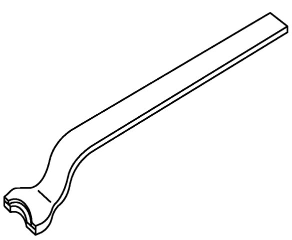
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1909	398507702	DUMMY SHAFT	Used for adjusting pinion height and preload.
 B3M1910	398507703	DUMMY COLLAR	Used for adjusting pinion height and preload.
 B3M1911	398517700	REPLACER	Used for removing rear bearing cone.
 B3M1912	398487700	DRIFT	Used for press-fitting the side bearing cone.
 B3M1913	398507701	GAUGE	Used for adjusting pinion height.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1914	398527700	PULLER ASSY	Used for removing oil seal and side bearing cup.
 B3M1915A	399527700	PULLER SET	Used for extracting side bearing cone. (1) BOLT (899521412) (2) PULLER (399527702) (3) HOLDER (399527703) (4) ADAPTER (398497701) (5) BOLT (899520107) (6) NUT (021008000)
 B3M1917	28099PA090	OIL SEAL PROTECTOR	• Used for installing rear drive shaft into rear differential. • For protecting oil seal.
 B3M1919	28099PA100	DRIVE SHAFT REMOVER	Used for removing rear drive shaft from rear differential.

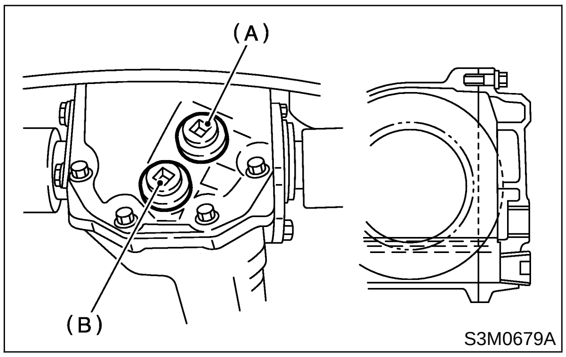
2. GENERAL PURPOSE TOOLS *S301001A1702*

TOOL NAME	REMARKS
Transmission Jack	Used for assembly/disassembly of rear differential.
Puller	Used for removal of side bearing retainer. (T-type)
Thickness Gauge	Used for measuring clearance.

2. Differential Gear Oil S303150

A: INSPECTION S303150A10

1) Lift vehicle.
2) Take out filler plug, and replace gear oil if it is contaminated or deteriorated. <Ref. to DI-16, REPLACEMENT, Differential Gear Oil.>
3) Check gear oil level is up to the bottom part of filler bolt. If the level is low, refill up to the bottom of filler bolt.

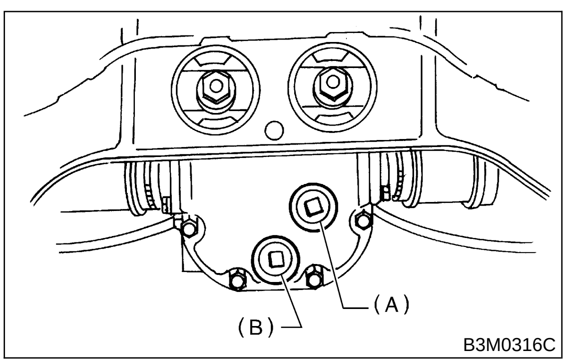


(A) Filler plug
(B) Drain plug

B: REPLACEMENT S303150A20

1) Jack-up vehicle and support it with sturdy racks.
2) Remove the oil drain plug and filler plug, and drain the gear oil.

CAUTION:
Be careful not to burn your hands, because gear oil becomes extremely hot after running.



(A) Filler plug
(B) Drain plug

3) Tighten oil drain plug.

NOTE:
- Apply fluid packing to drain plug.

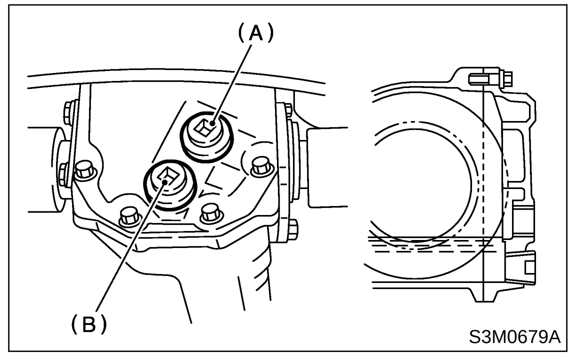
Fluid packing:
THREE BOND 1105 or equivalent

Tightening torque:
49.0 N·m (5.0 kgf-m, 36.2 ft-lb)

4) Fill differential carrier with gear oil to the upper plug level.

CAUTION:
Carefully refill oil while watching the level. Excess or insufficient oil must be avoided.

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



(A) Filler plug
(B) Drain plug

5) Install filler plug.

NOTE:
- Apply fluid packing to filler plug.

Fluid packing:
THREE BOND 1105 or equivalent

Tightening torque:
49.0 N·m (5.0 kgf-m, 36.2 ft-lb)

3. Front Differential S303152

A: NOTE S303152A15

1. AT MODEL S303152A1501

Refer to AUTOMATIC TRANSMISSION in separate publication “AUTOMATIC TRANSMISSION” for Front Differential. (Pub No. G0853ZE)

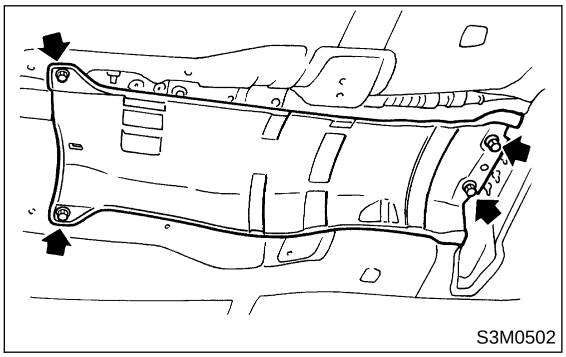
2. MT MODEL S303152A1502

For front differential of manual transmission, refer to “MT” section. <Ref. to MT-68, Front Differential Assembly.>

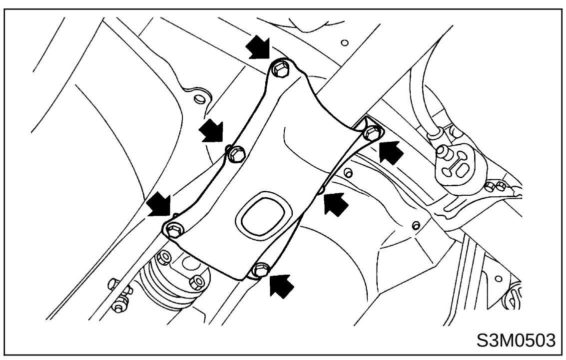
4. Rear Differential *S303787*

A: REMOVAL *S303787A18*

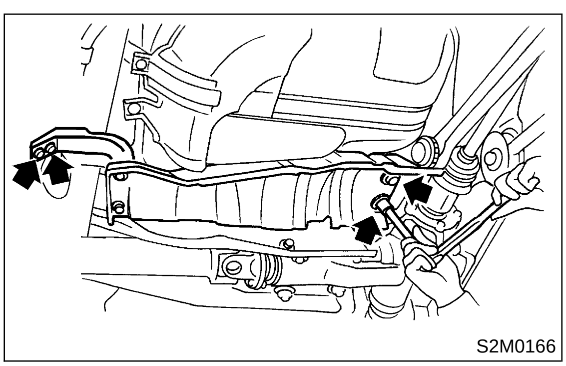
1) Set vehicle on a lift.
2) Disconnect battery ground cable.
3) Move select lever or gear shift lever to “N”.
4) Release the parking brake.
5) Loosen wheel nuts.
6) Jack-up vehicle and support it with sturdy racks.
7) Remove wheels.
8) Remove rear exhaust pipe and muffler.
<Ref. to EX-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX-11, REMOVAL, Muffler.>
9) Remove front exhaust cover.



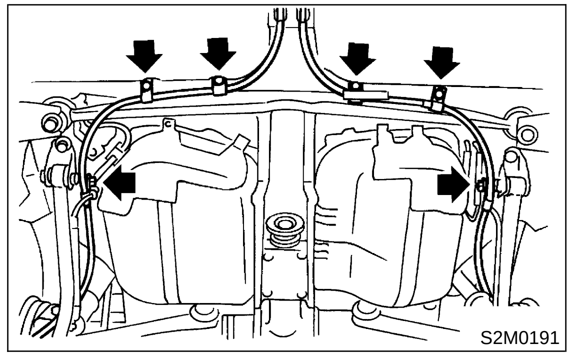
10) Remove front cover of rear differential mount.



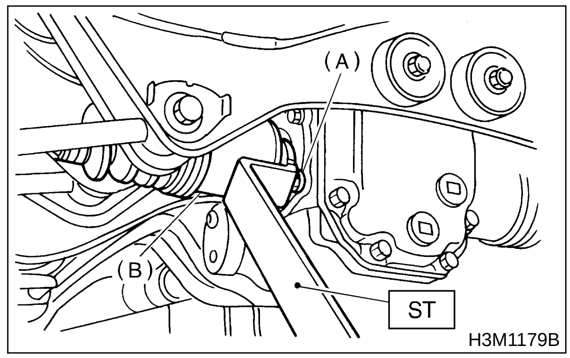
11) Remove rear differential protector. (If equipped)
12) Remove propeller shaft.
<Ref. to DS-14, REMOVAL, Propeller Shaft.>
13) Remove heat sealed cover.



14) Remove clamps and bracket of parking brake cable.

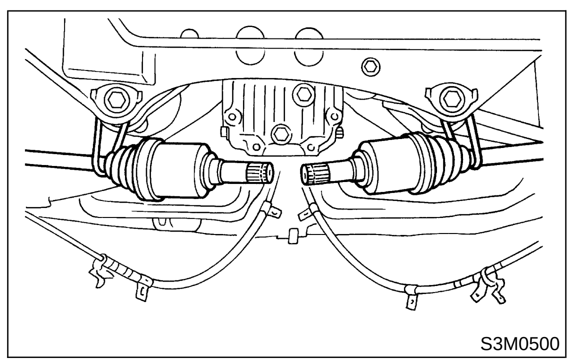


15) Remove DOJ of rear drive shaft from rear differential using ST. <Ref. to DI-36, REPLACEMENT, Rear Differential Side Oil Seal.>
ST 28099PA100 DRIVE SHAFT REMOVER

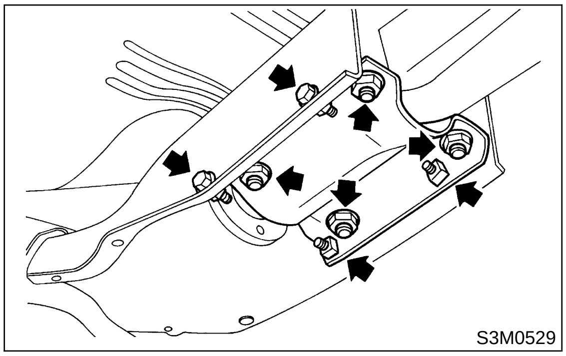


(A) Bolt
(B) DOJ

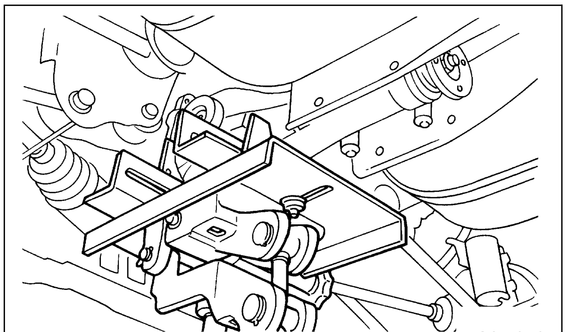
16) Secure rear drive shaft to rear crossmember using wire.



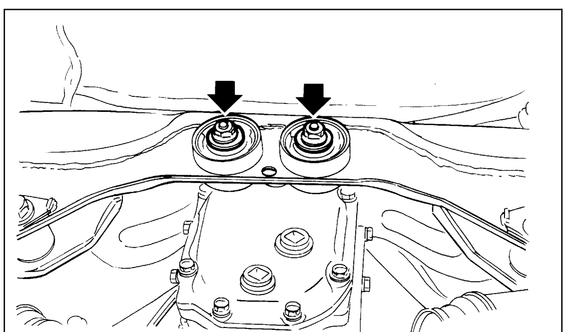
17) Remove lower differential bracket.


S3M0529

18) Support rear differential with transmission jack.


S3M0505

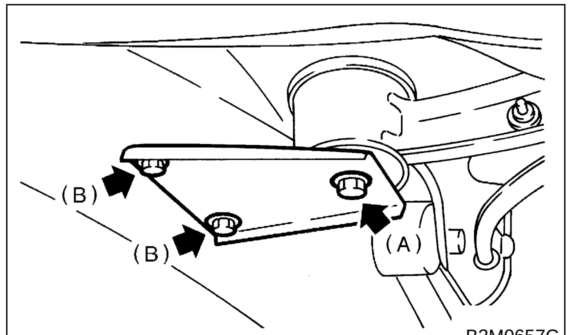
19) Remove self-locking nuts connecting rear differential to rear crossmember.


G3M1028

20) Remove bolts which secure rear differential front member to body.

(1) Loosen bolt A first, then remove bolts B.

NOTE:
Support front member with a help of an assistant to prevent it from dropping.



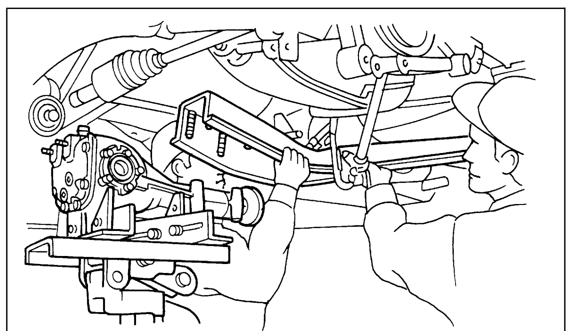
B3M0657C

(A) Bolt A
(B) Bolt B

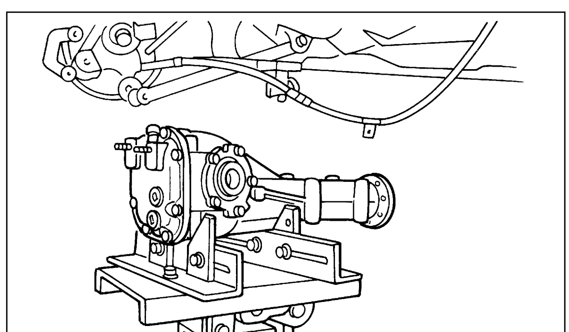
(2) Remove bolt A.

21) While slowly lowering transmission jack, move rear differential forward and remove bolts from rear crossmember.

22) Remove front member from body.


G3M1029

23) Remove rear differential from body.


G3M1030

B: INSTALLATION S303787A11

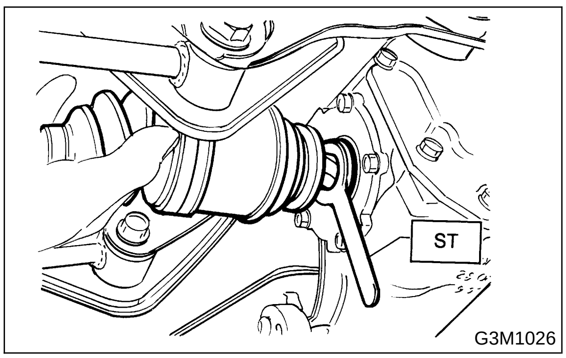
To install, reverse the removal sequence.
1) Install the air breather cap tapping with a plastic hammer.

CAUTION:
Be sure to install new air breather cap.

2) Position front member on body by passing it under parking brake cable and securing to rear differential.

NOTE:
When installing rear differential front member, do not confuse the installation sequence of the upper and lower stoppers.

3) Install DOJ of rear drive shaft into rear differential.
ST 28099PA090 SIDE OIL SEAL PROTECTOR

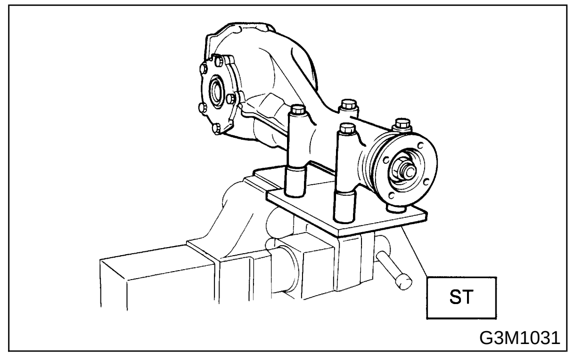


4) Install in the reverse order of removal.
5) After installing rear differential carrier on vehicle, remove filler plug and replenish gear oil up. <Ref. to DI-16, Differential Gear Oil.>

C: DISASSEMBLY S303787A06

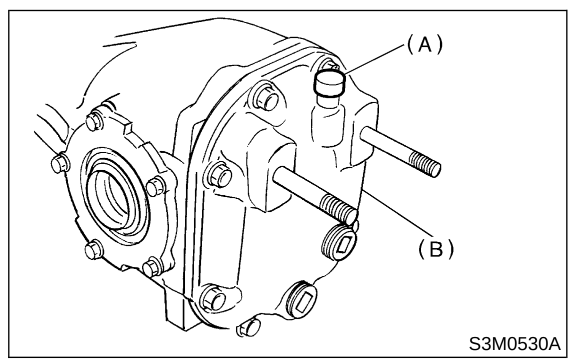
To detect real cause of trouble, inspect the following items before disassembling.
- Tooth contact of crown gear and pinion, and backlash
- Runout of crown gear at its back surface
- Turning resistance of drive pinion

1) Set ST on vise and install the differential assembly to ST.
ST 398217700 ATTACHMENT SET



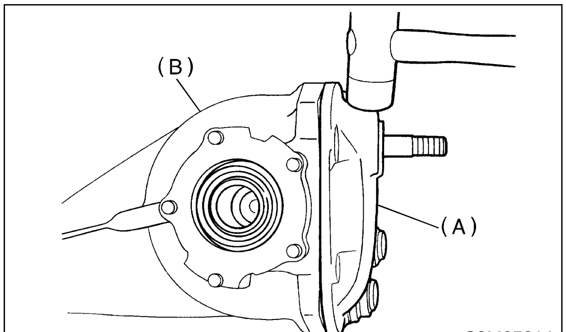
2) Drain gear oil by removing plug.
3) Remove the air breather cap.

NOTE:
Do not attempt to replace the air breather cap unless necessary.



(A) Air breather cap
(B) Rear cover

4) Remove rear cover by loosening retaining bolts.



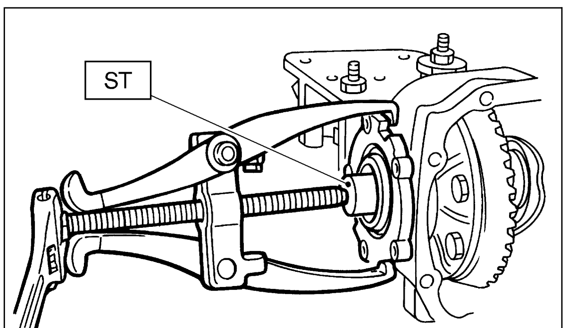
S3M0531A

(A) Rear cover
(B) Differential carrier

5) Make right and left side bearing retainers in order to identify them at reassembly. Remove side bearing retainer attaching bolts, set ST to differential case, and extract right and left side bearing retainers with a puller.

NOTE:
Each shim, which is installed to adjust the side bearing preload, should be kept together with its mating retainer.

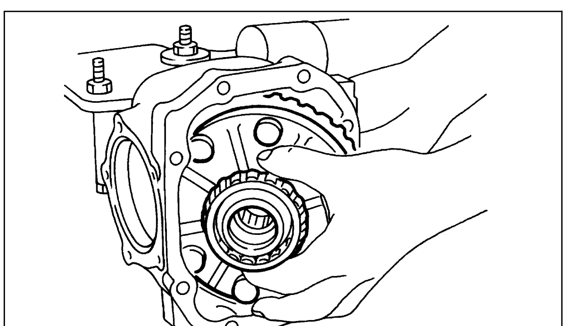
ST 398457700 ATTACHMENT



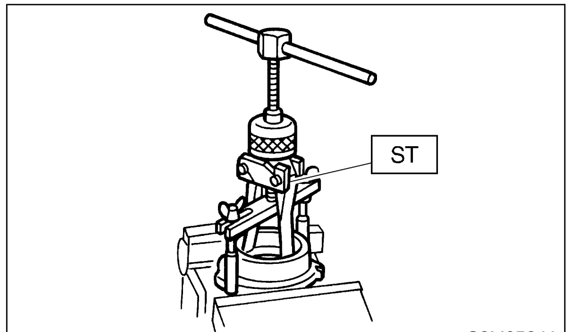
S3M0532A

6) Pull out differential case assembly from differential carrier.

NOTE:
Be careful not to hit the teeth against the case.


S3M0533

7) When replacing side bearing, pull bearing cup from side bearing retainer using ST.
ST 398527700 PULLER ASSY



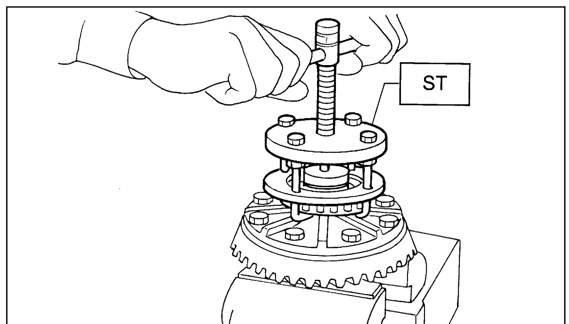
S3M0534A

8) Extract bearing cone with ST.

CAUTION:
Do not attempt to disassemble the parts unless necessary.

NOTE:
- Set puller so that its claws catch the edge of the bearing cone.
- Never mix up the right and left hand bearing races and cones.

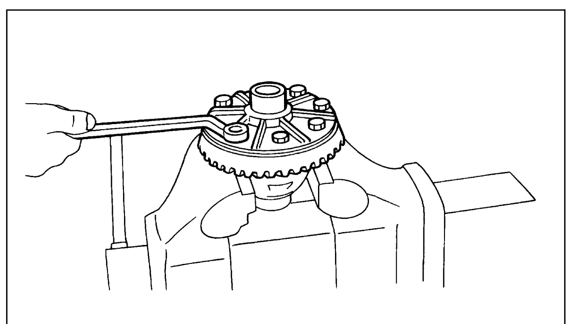
ST 399527700 PULLER SET



G3M0068

9) Remove crown gear by loosening crown gear bolts.

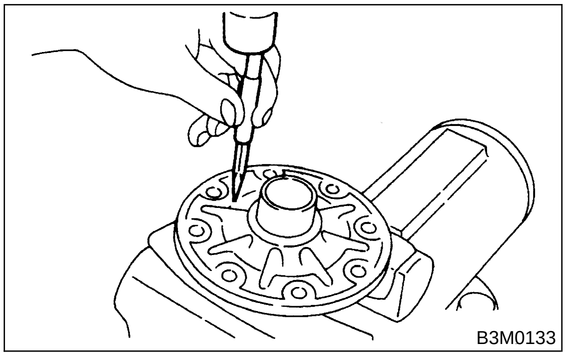
CAUTION:
Further disassembling is not allowed.


S3M0509

10) Drive out pinion shaft lock pin from crown gear side.

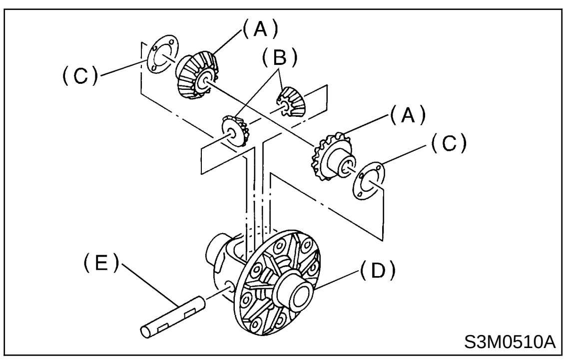
NOTE:
The lock pin is staked at the pin hole end on the differential carrier; do not drive it out forcibly before unstaking it.

ST 899904100 STRAIGHT PIN REMOVER



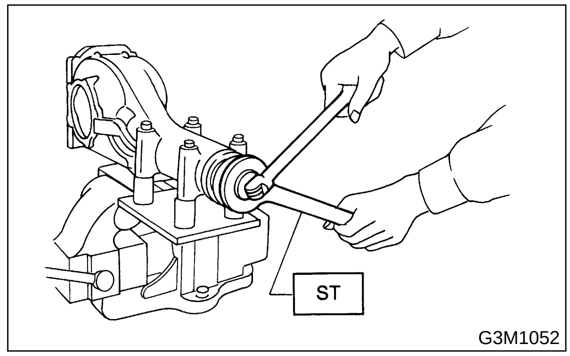
11) Draw out pinion mate shaft and remove pinion mate gears, side gears and thrust washers.

NOTE:
The gears as well as thrust washers should be marked or kept separated left and right, and front and rear.

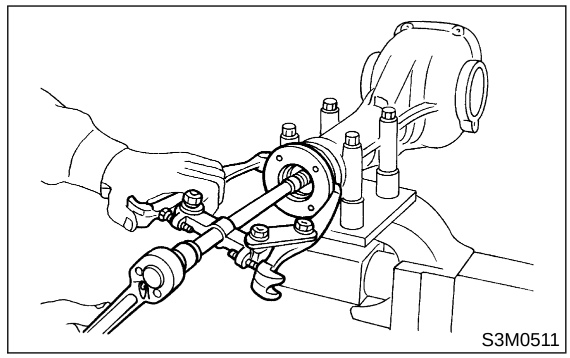


(A) Side gear
(B) Pinion mate gear
(C) Thrust washer
(D) Differential case
(E) Pinion mate shaft

12) Hold companion flange with ST and remove drive pinion nut.
ST 498427200 FLANGE WRENCH



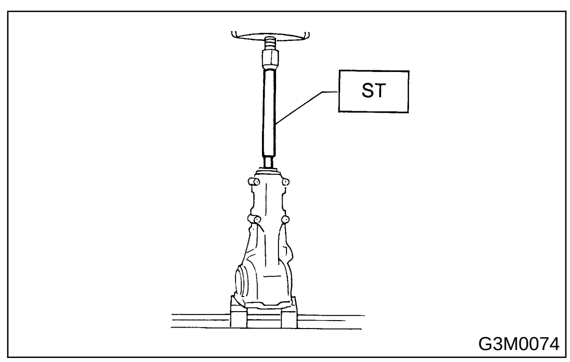
13) Extract the companion flange with a puller.



14) Press the end of drive pinion shaft and extract it together with rear bearing cone, preload adjusting spacer and washer.

NOTE:
Hold the drive pinion so as not to drop it.

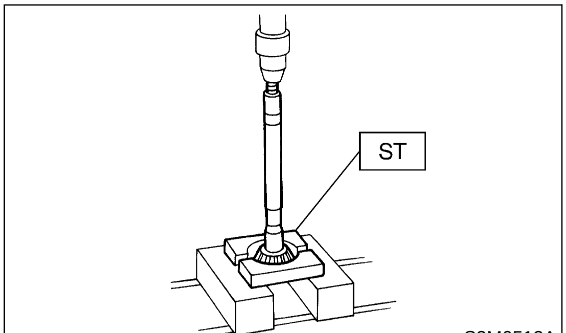
ST 398467700 DRIFT



15) Remove rear bearing cone from drive pinion by supporting cone with ST.

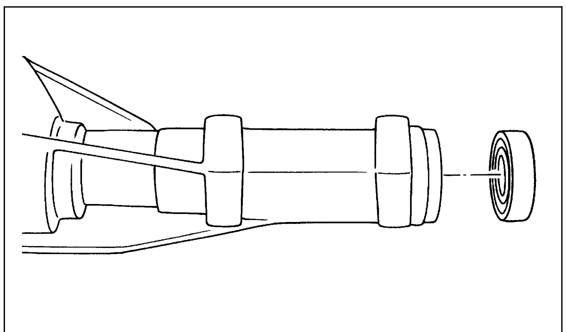
NOTE:
Place the replacer so that its center-recessed side faces the pinion gear.

ST 398517700 REPLACER

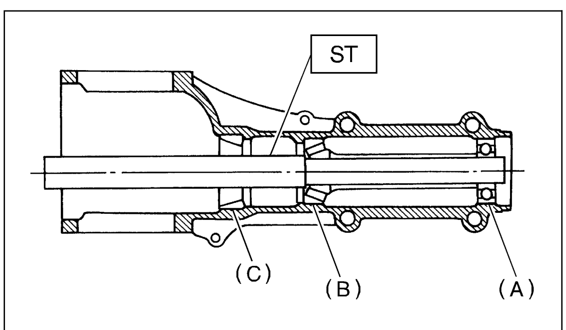


S3M0512A

16) Remove front oil seal from differential carrier using ST.
ST 398527700 PULLER ASSY


S3M0513

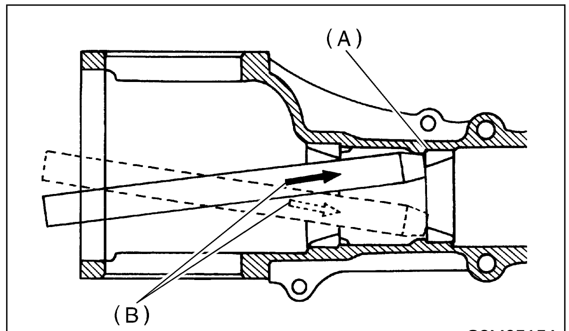
17) Remove pilot bearing together with front bearing cone using ST.
ST 398467700 DRIFT



S3M0514A

(A) Pinion bearing
(B) Front bearing
(C) Rear bearing cup

18) When replacing bearings, tap front bearing cup and rear bearing cup in this order out of case by using a brass bar.

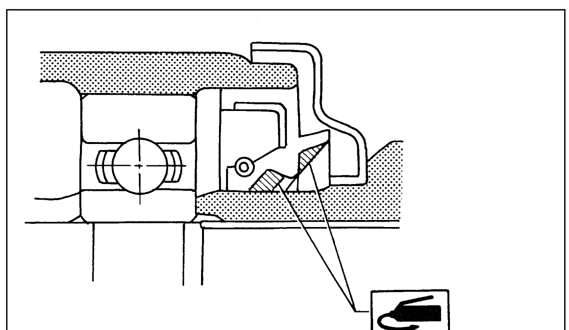


S3M0515A

(A) 2 cutouts along diagonal lines
(B) Tap alternately with brass bar.

D: ASSEMBLY S303787A02

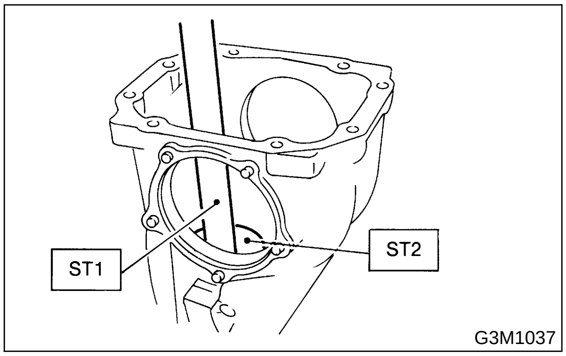
1) Precautions for assembling
- Assemble in the reverse order of disassembling.
- Check and adjust each part during assembly.
- For correct installation, keep the shims and washers in order.
- Thoroughly clean the surfaces on which the shims, washers and bearings are to be installed.
- Apply gear oil when installing the bearings and thrust washers.
- Be careful not to mix up the right and left hand races of the bearings.
- Replace the oil seal with new one at every disassembly. Apply chassis grease between the lips when installing the oil seal.


G3M0079

2) Adjusting preload for front and rear bearings
Adjust the bearing preload with spacer and washer between front and rear bearings. Pinion height adjusting washer are not affected by this adjustment. The adjustment must be carried out without oil seal inserted.

(1) Press rear bearing race into differential carrier with ST1 and ST2.

ST1 398477701 HANDLE
ST2 398477703 DRIFT 2

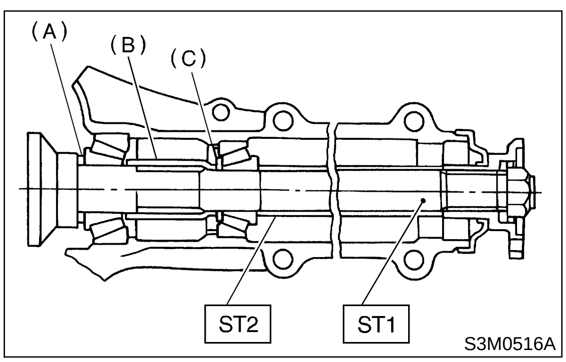


(2) Insert ST1 into carrier with pinion height adjusting washer and rear bearing cone fitted onto it.

CAUTION:
- **Re-use the used washer if not deformed.**
- **Use a new rear bearing cone.**

(3) Then install preload adjusting spacer and washer, front bearing cone, ST2, companion flange, and washer and drive pinion nut.

ST1 398507702 DUMMY SHAFT
ST2 398507703 DUMMY COLLAR



(A) Pinion height adjusting shim
(B) Preload adjusting spacer
(C) Preload adjusting washer

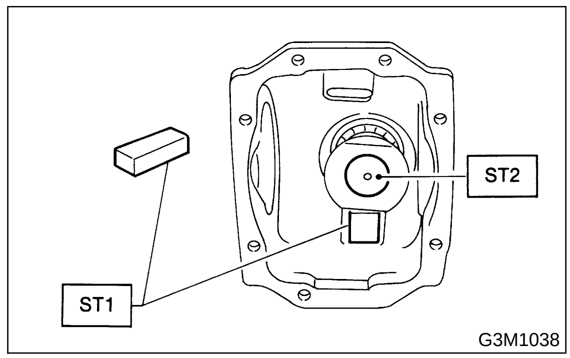
(4) Turn ST1 with hand to make it seated, and tighten drive pinion nut while measuring the preload with spring balance. Select preload adjusting washer and spacer so that the specified preload is obtained when nut is tightened to the specified torque.

CAUTION:
Use a new lock nut.

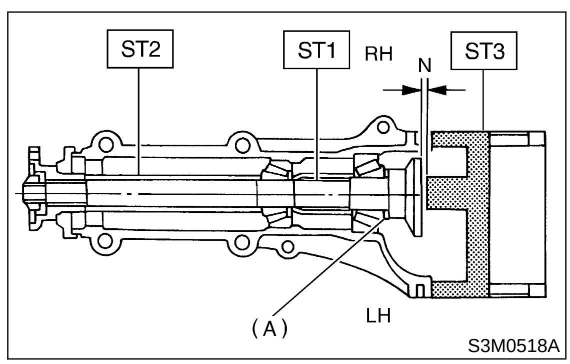
NOTE:
- Be careful not to give excessive preload.
- When tightening the drive pinion nut, lock ST1 with ST2 as shown in the figure.

ST1 398507704 BLOCK
ST2 398507702 DUMMY SHAFT

Tightening torque:
181 N·m (18.5 kgf-m, 134 ft-lb)



Front and rear bearing preload
For new bearing: 19.6 — 28.4 N (2.0 — 2.9 kgf, 4.4 — 6.4 lb) at companion flange bolt hole
For used bearing: 8.34 — 16.67 N (0.85 — 1.7 kgf, 1.87 — 3.75 lb) at companion flange bolt hole



	Part No.	Thickness mm (in)
Preload adjusting washer	383705200	2.59 (0.1020)
	383715200	2.57 (0.1012)
	383725200	2.55 (0.1004)
	383735200	2.53 (0.0996)
	383745200	2.51 (0.0988)
	383755200	2.49 (0.0980)
	383765200	2.47 (0.0972)
	383775200	2.45 (0.0965)
	383785200	2.43 (0.0957)
	383795200	2.41 (0.0949)
	383805200	2.39 (0.0941)
	383815200	2.37 (0.0933)
	383825200	2.35 (0.0925)
	383835200	2.33 (0.0917)
	383845200	2.31 (0.0909)
Preload adjusting spacer	Part No.	Length mm (in)
	383695201	56.2 (2.213)
	383695202	56.4 (2.220)
	383695203	56.6 (2.228)
	383695204	56.8 (2.236)
	383695205	57.0 (2.244)
	383695206	57.2 (2.252)

3) Adjusting drive pinion height

Adjust drive pinion height with shim installed between rear bearing cone and the back of pinion gear.

(1) Install ST1, ST2 and ST3, as shown in the figure, and apply the specified preload on the bearings.

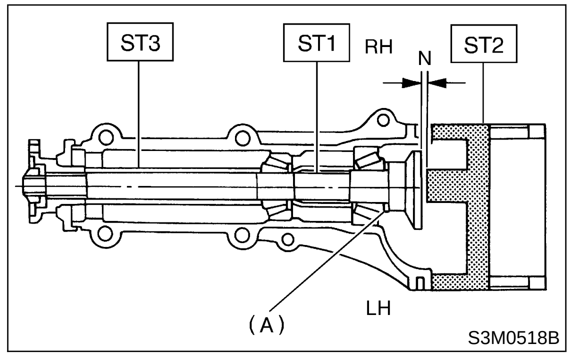
Front and rear bearing preload
For new bearing: 19.6 — 28.4 N (2.0 — 2.9 kgf, 4.4 — 6.4 lb) at companion flange bolt hole
For used bearing: 8.34 — 16.67 N (0.85 — 1.7 kgf, 1.87 — 3.75 lb) at companion flange bolt hole

Adjusting preload for front and rear bearings

NOTE:

At this time, install a pinion height adjusting shim which is temporarily selected or the same as that used before. Measure and record the thickness.

ST1 398507702 DUMMY SHAFT
ST2 398507701 GAUGE
ST3 398507703 DUMMY COLLAR



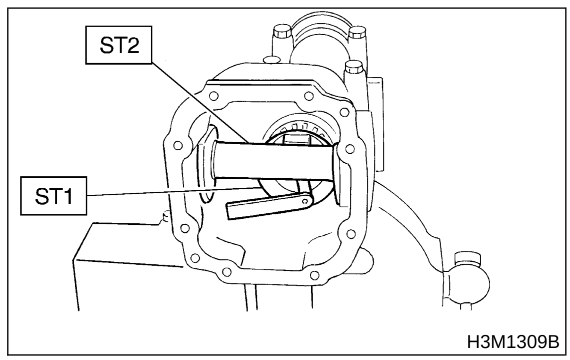
(A) Pinion height adjusting shim

(2) Measure the clearance N between the end of ST2 and the end surface of ST1 by using a thickness gauge.

NOTE:

Make sure there is no clearance between the case and ST2.

ST1 398507702 DUMMY SHAFT
ST2 398507701 GAUGE



(3) Obtain the thickness of pinion height adjusting shim to be inserted from the following formula, and replace the temporarily installed shim with this one.

T = To + N − (H x 0.01) − 0.20 mm (0.0079 in)

NOTE:

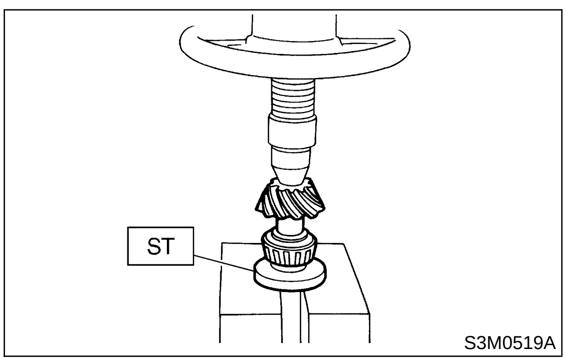
Use copies of this page.

T	Thickness of shim temporarily inserted mm (in)	
To	Thickness of pinion height adjusting shim mm (in)	
N	Reading of thickness gauge mm (in)	
H	Figure marked on drive pinion head	
Memo:		

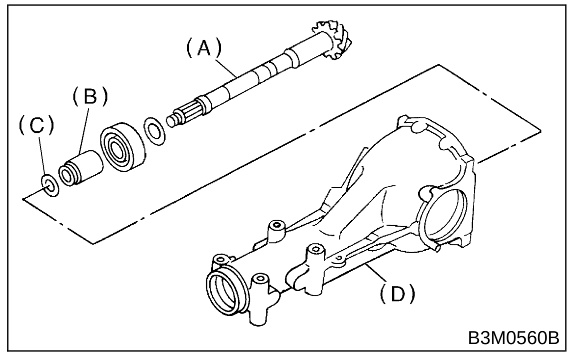
(Example of calculation)
To = 2.20 + 1.20 = 3.40 mm
N = 0.23 mm H = + 1,
T = 3.40 + 0.23 − 0.01 − 0.20 = 3.42
Result: Thickness = 3.42 mm
Therefore use the shim 383605200.

Pinion height adjusting shim	
Part No.	Thickness mm (in)
383495200	3.09 (0.1217)
383505200	3.12 (0.1228)
383515200	3.15 (0.1240)
383525200	3.18 (0.1252)
383535200	3.21 (0.1264)
383545200	3.24 (0.1276)
383555200	3.27 (0.1287)
383565200	3.30 (0.1299)
383575200	3.33 (0.1311)
383585200	3.36 (0.1323)
383595200	3.39 (0.1335)
383605200	3.42 (0.1346)
383615200	3.45 (0.1358)
383625200	3.48 (0.1370)
383635200	3.51 (0.1382)
383645200	3.54 (0.1394)
383655200	3.57 (0.1406)
383665200	3.60 (0.1417)
383675200	3.63 (0.1429)
383685200	3.66 (0.1441)

4) Install the selected pinion height adjusting shim on drive pinion, and press the rear bearing cone into position with ST.
ST 398177700 INSTALLER

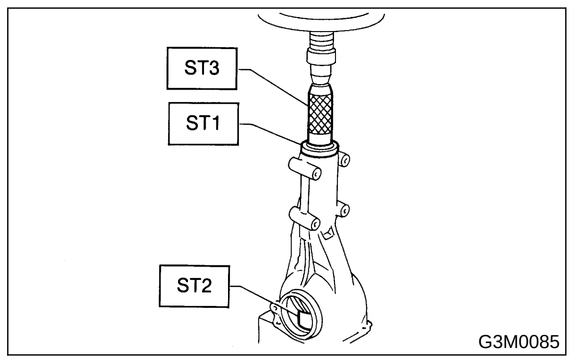


5) Insert drive pinion into differential carrier, install the previously selected bearing preload adjusting spacer and washer.

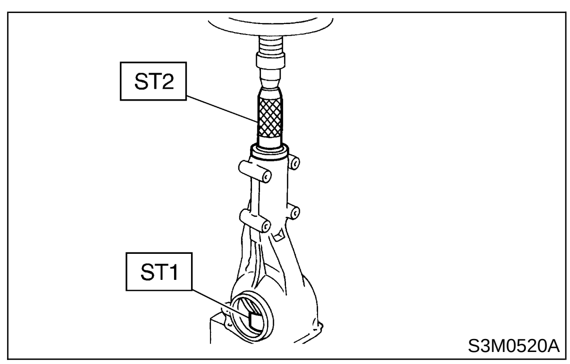


(A) Drive pinion
(B) Bearing adjusting spacer
(C) Washer
(D) Differential carrier

6) Press-fit front bearing cone into case with ST1, ST2 and ST3.
ST1 398507703 DUMMY COLLAR
ST2 399780104 WEIGHT
ST3 899580100 INSTALLER



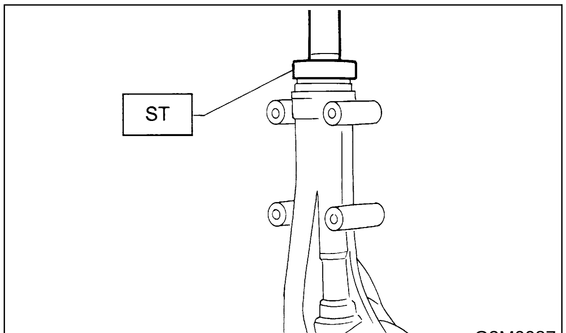
7) Insert spacer, then press-fit pilot bearing with ST1 and ST2.
ST1 399780104 WEIGHT
ST2 899580100 INSTALLER



8) Fit a new oil seal with ST.

NOTE:
- Press-fit until end of oil seal is 1 mm (0.04 in) inward from end of carrier.
- Apply grease between the oil seal lips.

ST 498447120 INSTALLER

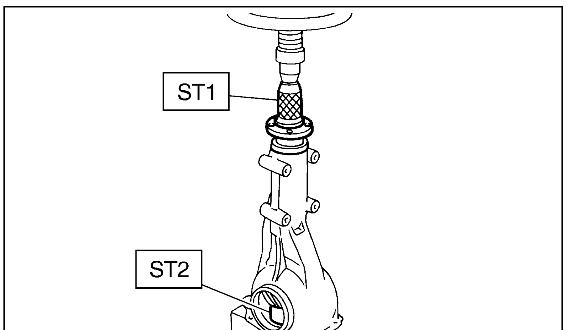


G3M0087

9) Press-fit companion flange with ST1 and ST2.

CAUTION:
Be careful not to damage bearing.

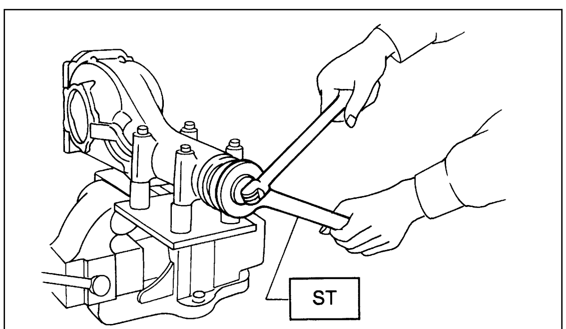
ST1 899874100 INSTALLER
ST2 399780104 WEIGHT



S3M0521A

10) Install self-locking nut. Then tighten it with ST.
ST 498427200 FLANGE WRENCH

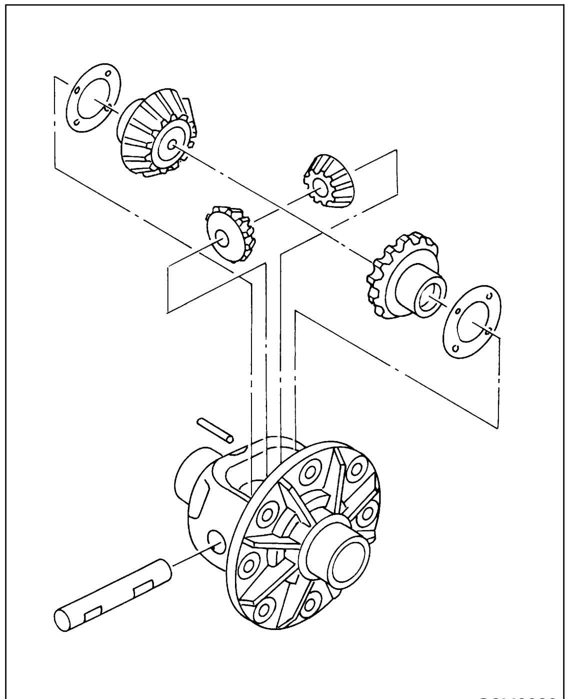
Tightening torque:
181 N·m (18.5 kgf-m, 134 ft-lb)



G3M1052

11) Assembling differential case
Install side gears and pinion mate gears, with their thrust washers and pinion mate shaft, into differential case.

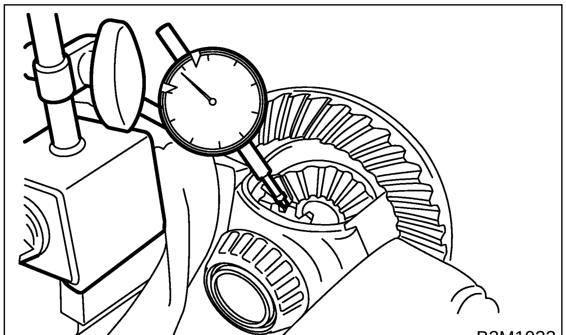
CAUTION:
- **Apply gear oil on both sides of the washer and on the side gear shaft before installing.**
- **Insert the pinion mate shaft into the differential case by aligning the lock pin holes.**



G3M0089

(1) Measure the side gear backlash.

Side gear back clearance:
0.10 — 0.20 mm (0.0039 — 0.0079 in)


B3M1933

(2) Adjust the backlash as specified by selecting side gear thrust washer.

Side gear thrust washer	
Part No.	Thickness mm (in)
383445201	0.75 — 0.80 (0.0295 — 0.0315)
383445202	0.80 — 0.85 (0.0315 — 0.0335)
383445203	0.85 — 0.90 (0.0335 — 0.0354)
383445204	0.90 — 0.95 (0.0354 — 0.0374)
383445205	0.95 — 1.00 (0.0374 — 0.0394)

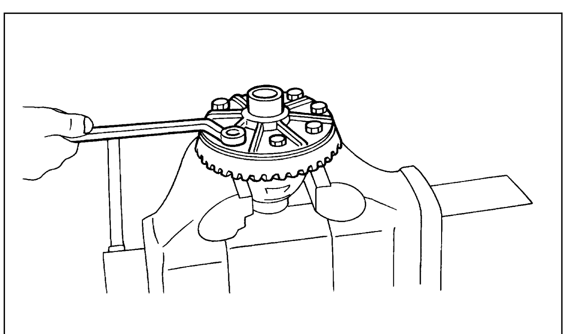
(3) Check the condition of rotation after applying oil to the gear tooth surfaces and thrust surfaces.
(4) After inserting pinion shaft lock pin into differential case, stake the both sides of the hole to prevent pin from falling off.
12) Install crown gear on differential case.

CAUTION:
Before installing bolts, apply Lock Tite to bolt threads.

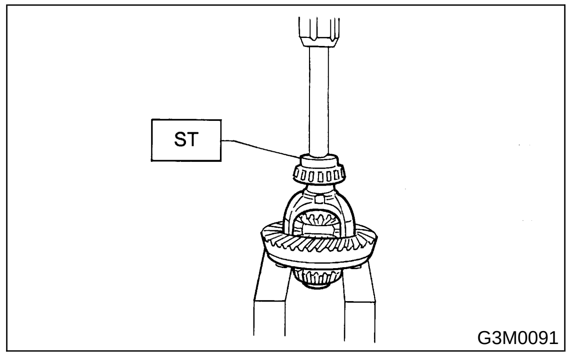
Lock Tite:
THREE BOND 1324 or equivalent

NOTE:
Tighten diagonally while tapping the bolt heads.

Tightening torque:
103 N·m (10.5 kgf-m, 76 ft-lb)

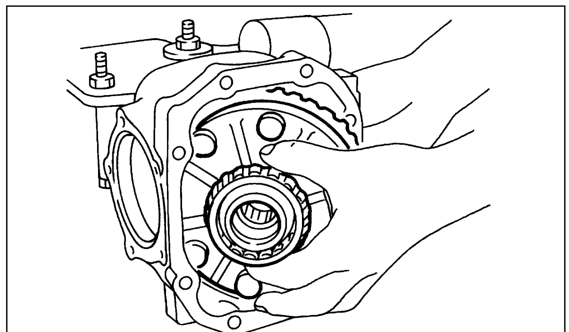

S3M0509

13) Press side bearing cone onto differential case with ST.
ST 398487700 DRIFT



G3M0091

14) Adjusting side bearing retainer shims
(1) The driven gear backlash and side bearing preload can be determined by the side bearing retainer shim thickness.
(2) Install the differential case assembly into differential carrier in the reverse order of disassembly.


S3M0533

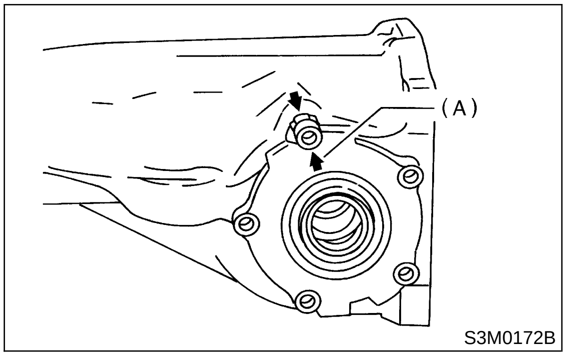
(3) Install side retainer shims and O-rings to the left and right retainers from which they were removed.

NOTE:
- Replace broken or cracked O-ring with new one.
- Replace broken or corroded side retainer shim with new one of same thickness.

Side bearing retainer shim	
Part No.	Thickness mm (in)
383475201	0.20 (0.0079)
383475202	0.25 (0.0098)
383475203	0.30 (0.0118)
383475204	0.40 (0.0157)
383475205	0.50 (0.0197)

(4) Align arrow marked on differential carrier with that marked on side retainer during installation.

CAUTION:
Be careful that side bearing outer race is not damaged by bearing roller.



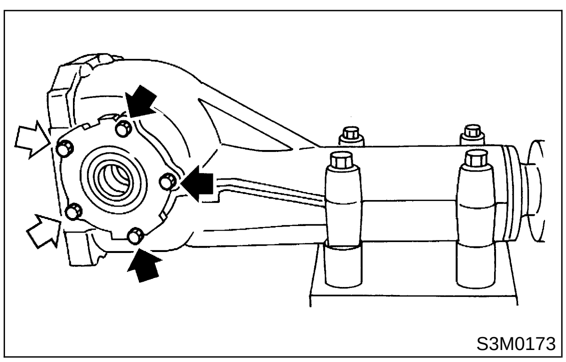
(A) Arrow mark

(5) Tighten side bearing retainer bolts.

CAUTION:
Before tightening the two side bearing retainer bolts, apply Lock Tite to bolt threads.

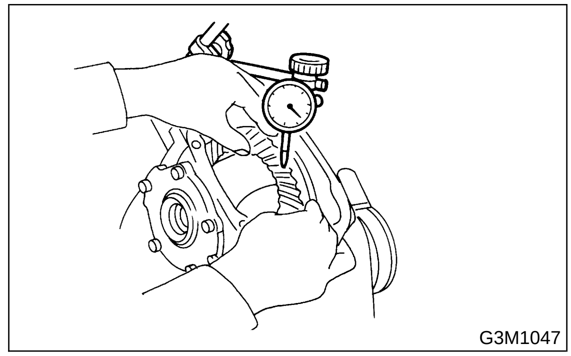
⇨ ***Lock Tite:***
THREE BOND 1105 or equivalent

Tightening torque:
10.3 N·m (1.05 kgf-m, 7.6 ft-lb)



(6) Measure the crown gear-to-drive pinion backlash. Set magnet base on differential carrier. Align contact point of dial gauge with tooth face of crown gear, and move crown gear while holding drive pinion still. Read value indicated on dial gauge.

Backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)

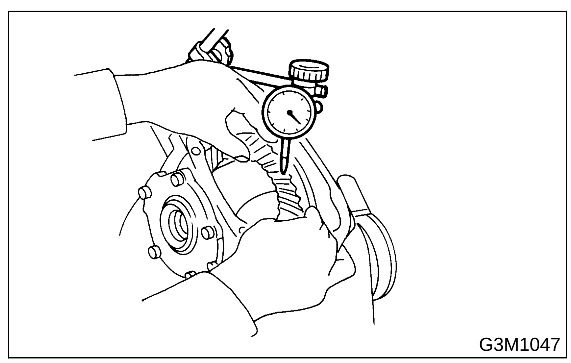


(7) At the same time, measure the turning resistance of drive pinion. Compared with the resistance when differential case is not installed, if the increase of the resistance is not within the specified range, readjust side bearing retainer shims.

Turning resistance increase:
2.9 — 10.8 N (0.3 — 1.1 kgf, 0.7 — 2.4 lb)

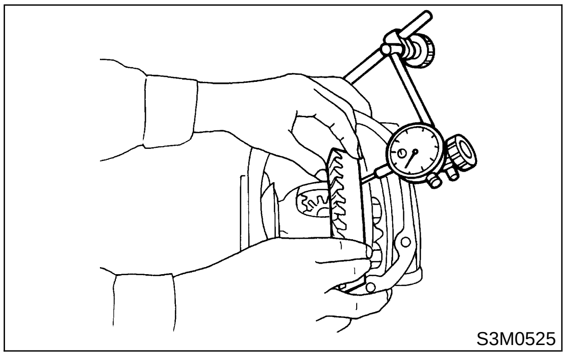
15) Re-check crown gear-to-pinion backlash.

Backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)



16) Check the crown gear runout on its back surface, and make sure pinion and crown gear rotate smoothly.

Limit of runout:
Less than 0.05 mm (0.0020 in)


S3M0525

17) Checking and adjusting tooth contact of crown gear

(1) Apply an even coat of red lead on both sides of three or four teeth on the crown gear. Check the contact pattern after rotating crown gear several revolutions back and forth until a definite contact pattern appears on the crown gear.

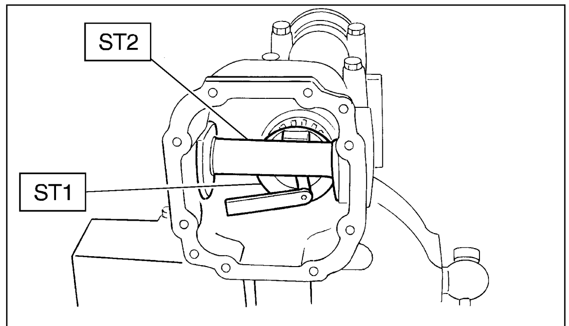
(2) When the contact pattern is incorrect, readjust according to the instructions given in "TOOTH CONTACT PATTERN".

NOTE:
Be sure to wipe off red lead completely after adjustment is completed.

18) If proper tooth contact is not obtained, once again adjust the drive pinion height changing RH and LH side bearing retainer shims and the hypoid gear backlash.

(1) Drive pinion height

ST1 398507702 DUMMY SHAFT
ST2 398507701 GAUGE



H3M1309B

T = To + N − (H x 0.01) − 0.20 (mm)

Where:

T = Thickness of pinion height adjusting shim (mm)

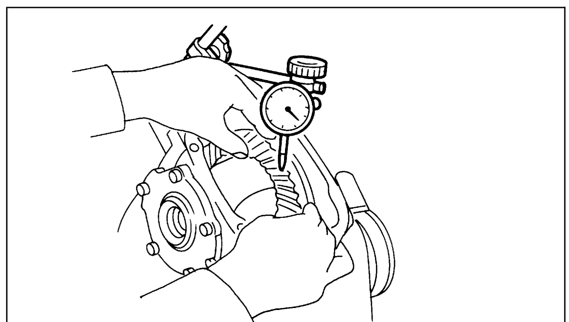
To = Thickness of shim temporarily inserted (mm)

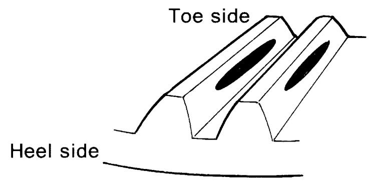
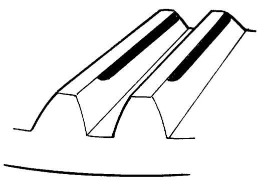
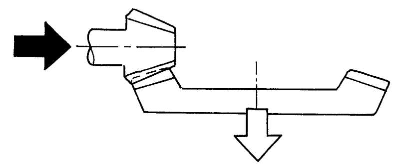
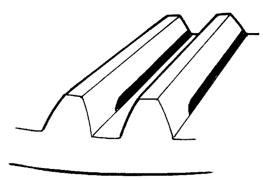
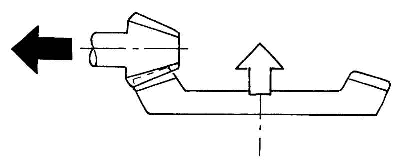
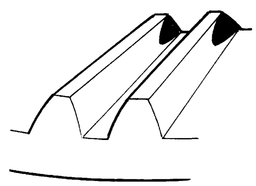
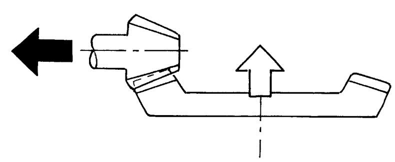
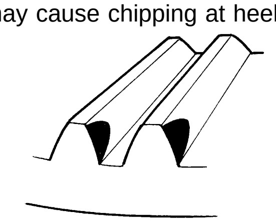
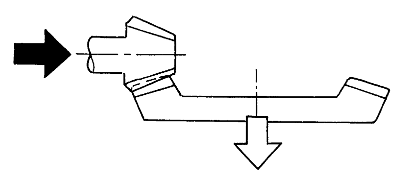
N = Reading of thickness gauge (mm)

H = Figure marked on drive pinion head

(2) Hypoid gear backlash

Backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)


G3M1047

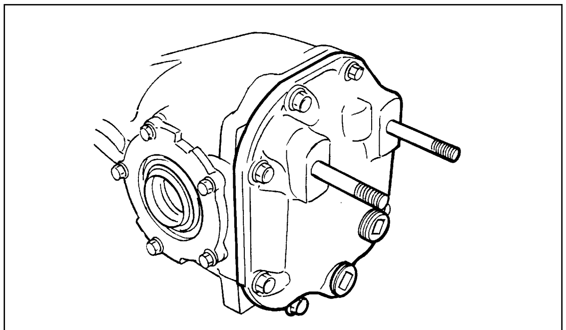
TOOTH CONTACT PATTERN		
Condition	Contact pattern	Adjustment
Correct tooth contact Tooth contact pattern slightly shifted towards toe under no load rotation. (When loaded, contact pattern moves toward heel.)	 G3M0098A	—
Face contact Backlash is too large.	This may cause noise and chipping at tooth ends.  G3M0098B	Increase thickness of drive pinion height adjusting shim in order to bring drive pinion closer to crown gear center.  G3M0098F
Flank contact Backlash is too small.	This may cause noise and stepped wear on surfaces.  G3M0098C	Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.  G3M0098G
Toe contact Contact area is small.	This may cause chipping at toe ends.  G3M0098D	Adjust as for flank contact.  G3M0098G
Heel contact Contact area is small.	This may cause chipping at heel ends.  G3M0098E	Adjust as for face contact.  G3M0098F

 : Adjusting direction of drive pinion
 : Adjusting direction of crown gear

19) Install rear cover and tighten bolts to specified torque.

CAUTION:
Securely connect ground terminal of rear differential temperature sensor.

Tightening torque:
29 N·m (3.0 kgf-m, 21.7 ft-lb)



G3M1050

E: INSPECTION S303787A10

Wash all the disassembled parts clean, and examine them for wear, damage, or other defects. Repair or replace defective parts as necessary.

1) Crown gear and drive pinion
- If abnormal tooth contact is evident, find out the cause and adjust to give correct tooth contact at assembly. Replace the gear if excessively worn or incapable of adjustment.
- If crack, score, or seizure is evident, replace as a set. Slight damage of tooth can be corrected by oil stone or the like.

2) Side gear and pinion mate gear
- Replace if crack, score, or other defects are evident on tooth surface.
- Replace if thrust washer contacting surface is worn or seized. Slight damage of the surface can be corrected by oil stone or the like.

3) Bearing
Replace if seizure, peeling, wear, rust, dragging during rotation, abnormal noise or other defect is evident.
4) Thrust washers of side gear and pinion mate gear
Replace if seizure, flaw, abnormal wear or other defect is evident.
5) Oil seal
Replace if deformed or damaged, and at every disassembling.
6) Differential carrier
Replace if the bearing bores are worn or damaged.
7) Differential case
Replace if its sliding surfaces are worn or cracked.
8) Companion flange
Replace if the oil seal lip contacting surfaces have flaws.
9) Rear differential oil temperature sensor (Turbo model for Europe)
If the results of the following inspections are not satisfactory, replace rear differential temperature sensor.
(1) At room temperature, check for continuity between the sensor terminal and body.
(2) Soak the sensor in oil, then raise the oil temperature. Check that the continuity is cut off when the oil temperature is between 144°C (291°F) and 156°C (313°F). Then, check that the continuity resumes by the time the oil temperature drops to 135°C (275°F).

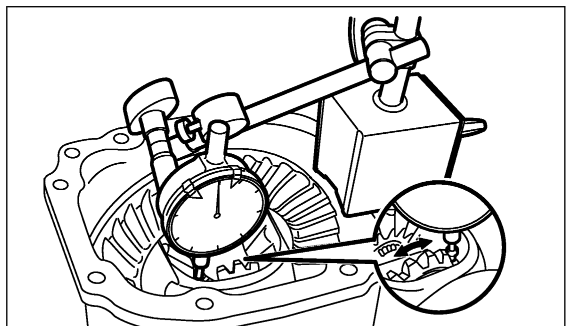
CAUTION:
The oil is hot, so be careful not to burn yourself when inspecting.

1. SIDE GEAR BACKLASH S303787A1001

Using a dial gauge, check the backlash of the side gear.

Side gear backlash:
0.1 — 0.2 mm (0.004 — 0.008 in)

If side gear backlash is not within the specification, adjust clearance as specified by selecting side gear thrust washer.



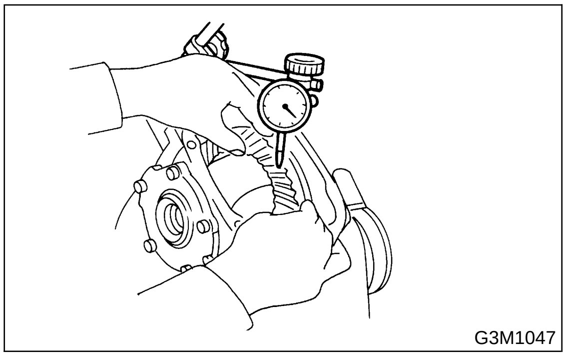
B3M1934

2. CROWN GEAR BACKLASH S303787A1002

Using a dial gauge, check the backlash of the crown gear.

Crown gear backlash:
0.1 — 0.2 mm (0.004 — 0.008 in)

If crown gear backlash is not within the specification, adjust the side bearing preload or repair if necessary.

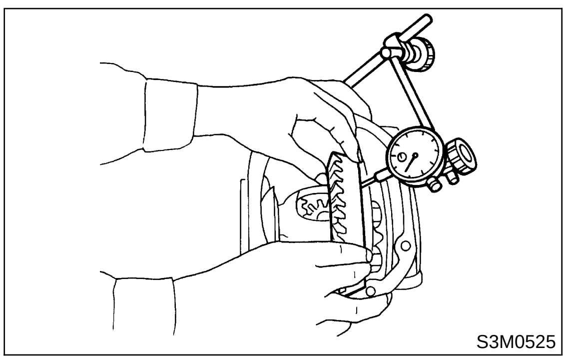


3. CROWN GEAR RUNOUT S303787A1003

Using a dial gauge, check the crown gear runout.

Crown gear runout:
Less than 0.05 mm (0.0020 in)

If the crown gear runout exceeds 0.05 mm (0.0020 in), replace the crown gear.



4. TOOTH CONTACT BETWEEN CROWN GEAR AND DRIVE PINION S303787A1004

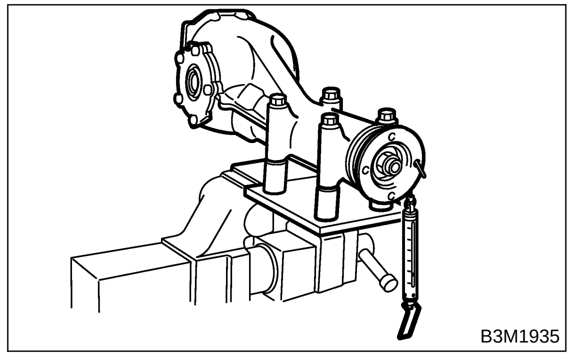
Inspect tooth contact between crown gear and driven pinion. <Ref. to DI-23, ASSEMBLY, Rear Differential.>

5. TOTAL PRELOAD S303787A1005

Using a gauge, check the turning resistance increase.

Total preload:
2.9 — 10.8 N (0.3 — 1.1 kgf, 0.7 — 2.4 lb)

If the increase of the resistance is not within the specification, adjust the side bearing retainer shims.



F: ADJUSTMENT S303787A01

1. SIDE GEAR BACKLASH A303145A0101

Adjust side gear backlash.
<Ref. to DI-23, ASSEMBLY, Rear Differential.>

2. CROWN GEAR BACKLASH A303145A0102

Adjust crown gear backlash.
<Ref. to DI-23, ASSEMBLY, Rear Differential.>

3. TOOTH CONTACT BETWEEN CROWN GEAR AND DRIVE PINION A303145A0103

Adjust the tooth contact between crown gear and drive pinion gear.
<Ref. to DI-23, ASSEMBLY, Rear Differential.>

4. TOTAL PRELOAD A303145A0104

Adjust side bearing shim.
<Ref. to DI-23, ASSEMBLY, Rear Differential.>

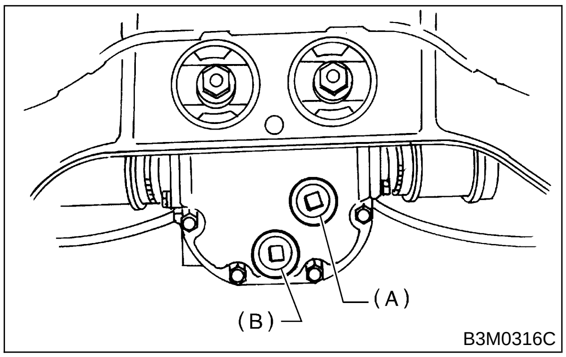
5. Rear Differential Front Oil Seal S303139

A: INSPECTION S303139A10

Check front oil seal portion for oil leakage, if any leak is found, replace the oil seal and inspect propeller shaft.

B: REPLACEMENT S303139A20

1) Set vehicle on a lift.
2) Disconnect battery ground cable.
3) Move select lever or gear shift lever to “N”.
4) Release the parking brake.
5) Lift the vehicle.
6) Remove oil drain plug, and drain gear oil.



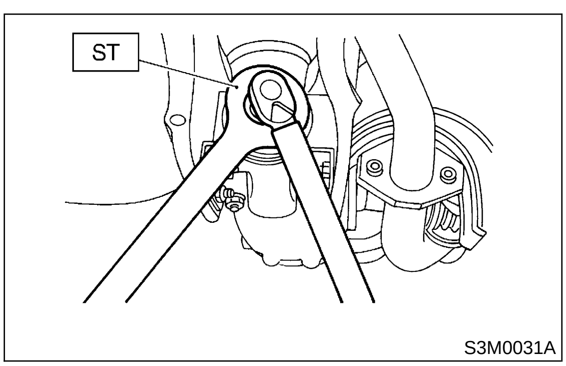
(A) Filler plug
(B) Drain plug

7) Install oil drain plug.

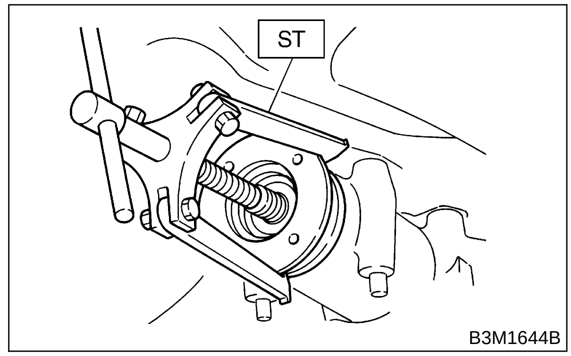
CAUTION:
- **Apply fluid packing to drain plug.**

Tightening torque:
49 N·m (5.0 kgf-m, 36.2 ft-lb)

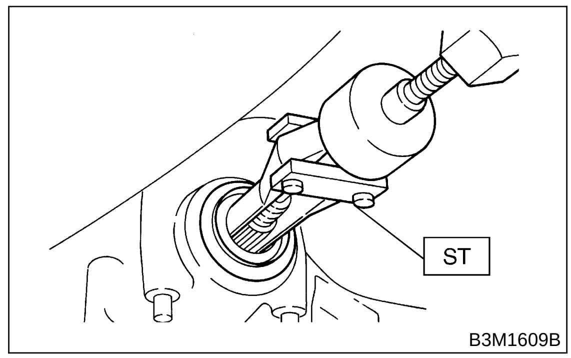
8) Remove rear exhaust pipe and muffler.
9) Remove rear differential protector. (If equipped)
10) Remove propeller shaft from body. <Ref. to DS-14, REMOVAL, Propeller Shaft.>
11) Remove self-locking nut while holding companion flange with ST.
ST 498427200 FLANGE WRENCH



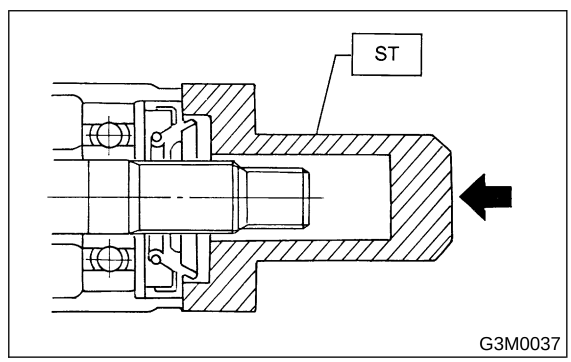
12) Extract companion flange using ST.
ST 399703600 PULLEY ASSY



13) Remove oil seal using ST.
ST 499705401 PULLER ASSY



14) Fit a new oil seal using ST.
ST 498447120 OIL SEAL INSTALLER



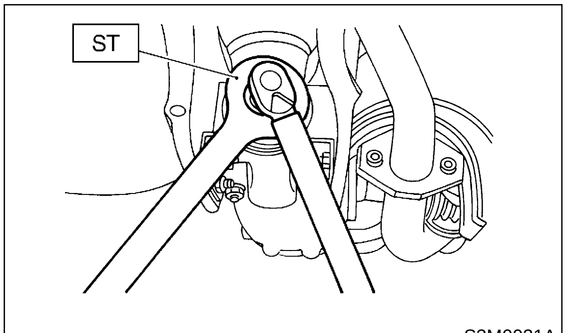
15) Install companion flange.

NOTE:
Use a plastic hammer to install companion flange.

16) Tighten self-locking nut within the specified torque range so that the turning resistance of companion flange becomes the same as that before replacing oil seal.
ST 498427200 FLANGE WRENCH

CAUTION:
Use a new self-locking nut.

Tightening torque:
181.4 N·m (18.50 kgf-m, 133.8 ft-lb)



S3M0031A

17) Install in the reverse order of removal.
18) Fill differential carrier with gear oil. <Ref. to DI-16, Differential Gear Oil.>

6. Rear Differential Side Oil Seal S303137

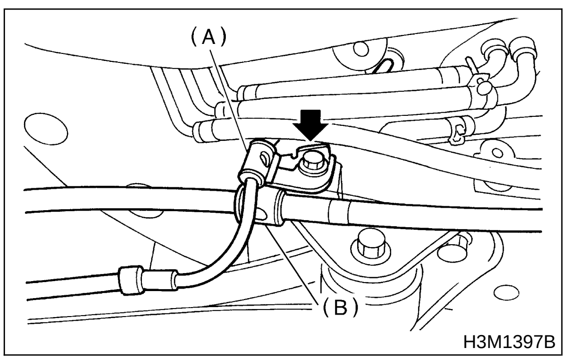
A: INSPECTION S303137A10

Check side oil seal portion for oil leakage, if any leak is found, replace the side oil seal and inspect propeller shaft.

B: REPLACEMENT S303137A20

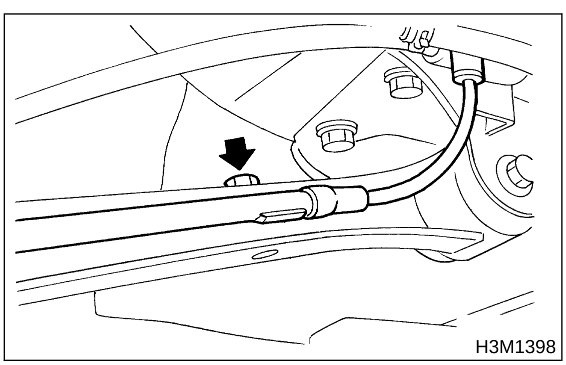
1) Set vehicle on a lift.
2) Disconnect battery ground cable.
3) Move select lever or gear shift lever to "N".
4) Release the parking brake.
5) Loosen both wheel nuts.
6) Jack-up the vehicle and support it with rigid racks.
7) Remove wheels.
8) Remove rear exhaust pipe and muffler.
<Ref. to EX-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX-11, REMOVAL, Muffler.>
9) Remove the DOJ of rear drive shaft from rear differential.

(1) Remove the ABS sensor cable clamp and parking brake cable guide from bracket.

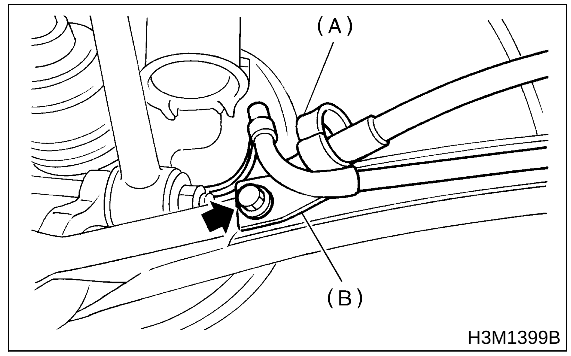


(A) ABS sensor cable clamp
(B) Parking brake cable guide

(2) Remove the ABS sensor cable clamp from the trailing link.

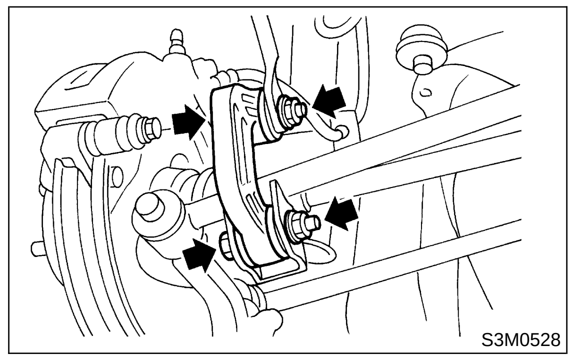


(3) Remove the ABS sensor cable clamp and parking brake cable guide from the trailing link.

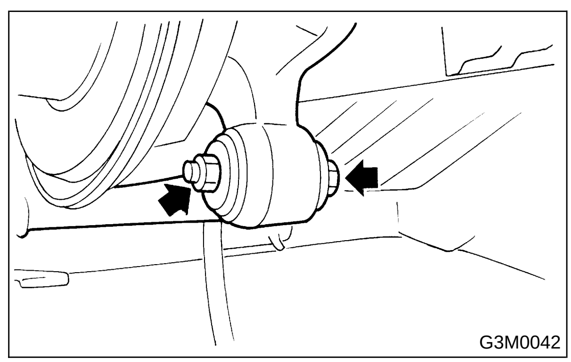


(A) ABS sensor cable clamp
(B) Parking brake cable guide

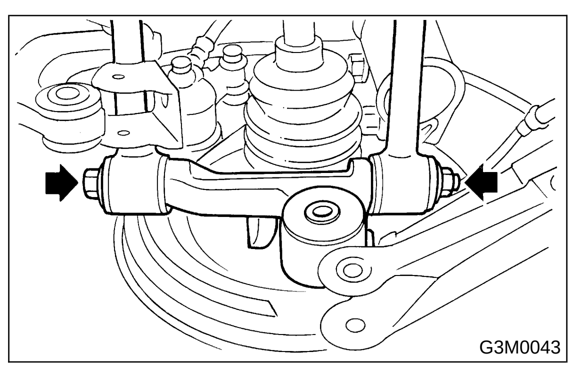
(4) Remove the rear stabilizer link.



(5) Remove the bolts which secure the trailing link to the rear housing.



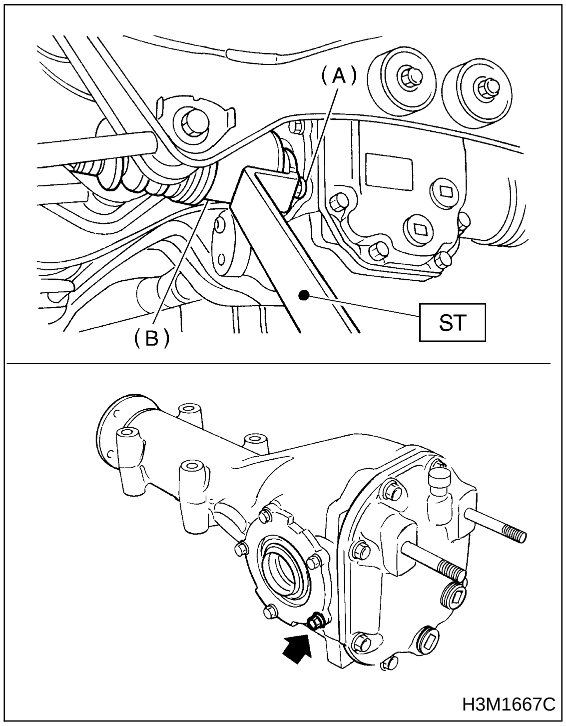
(6) Remove the bolts which secure the front and rear lateral link to the rear housing.



(7) Remove the DOJ from the rear differential by using ST.

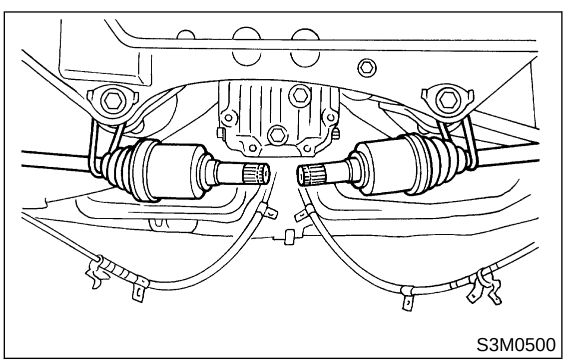
CAUTION:
When removing the DOJ from the rear differential, fit ST to the bolt as shown in figure so as not to damage the side bearing retainer.

ST 208099PA100 DRIVE SHAFT REMOVER

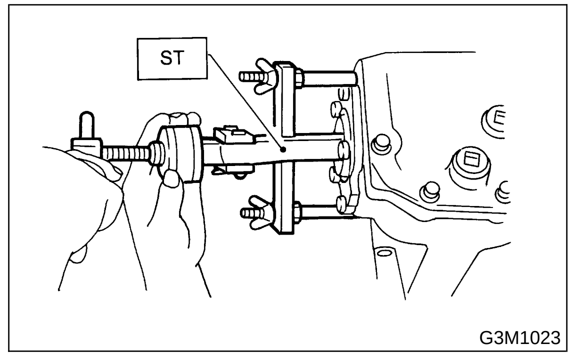


(A) Bolt
(B) DOJ

10) Secure rear drive shaft to rear crossmember using wire.

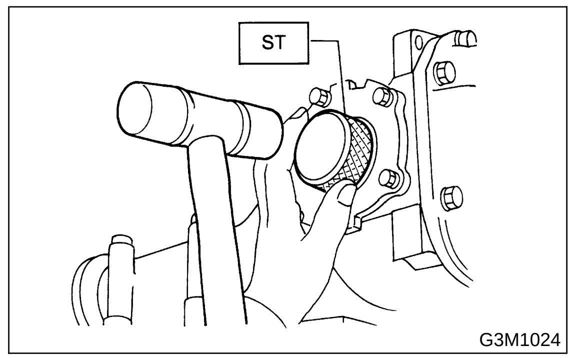


11) Remove side oil seal with ST.
ST 398527700 PULLER ASSY

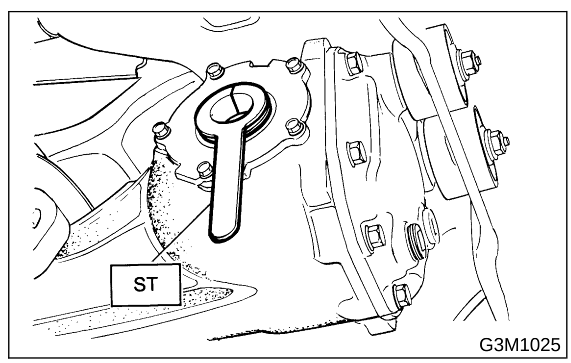


12) Drive in a new side oil seal with ST.

CAUTION:
Apply chassis grease between the oil seal lips.
ST 398437700 DRIFT

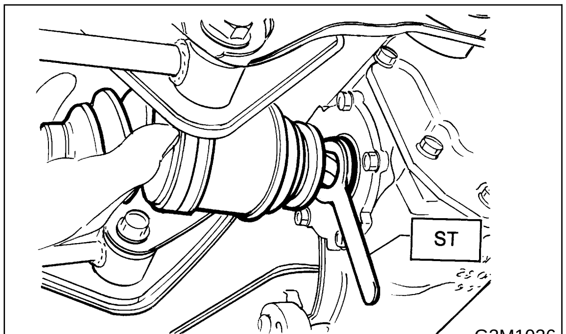


13) Insert the DOJ into rear differential.
(1) Install ST to rear differential.
ST 28099PA090 SIDE OIL SEAL PROTECTOR



(2) Insert the spline shaft until the spline portion is inside the side oil seal.
(3) Remove ST.

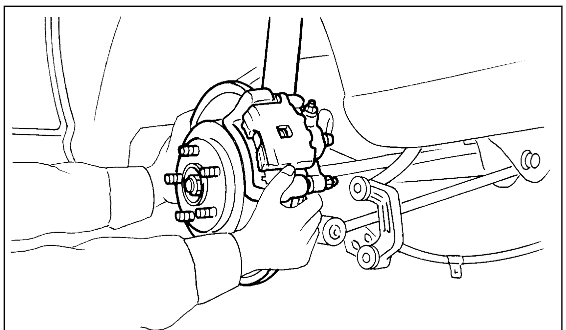
ST 28099PA090 SIDE OIL SEAL PROTECTOR



G3M1026

(4) Completely insert DOJ into rear differential by pressing rear housing.

NOTE:
Make sure that oil seal lip is not folded over inward.


G3M0050

14) Install in the reverse order of removal.

7. Rear Differential Member S303135

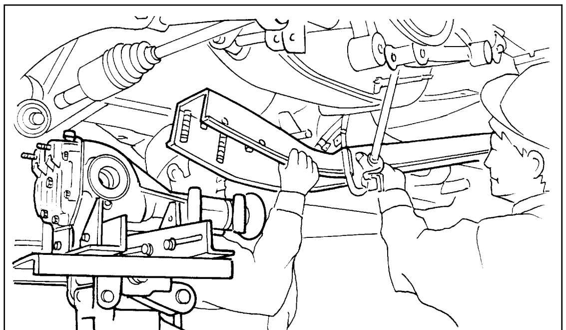
A: REMOVAL S303135A18

1) Set vehicle on a lift.
2) Disconnect battery ground cable.
3) Move select lever or gear shift lever to “N”.
4) Release the parking brake.
5) Loosen wheel nuts.
6) Jack-up vehicle and support it with sturdy racks.
7) Remove wheels.
8) Remove rear exhaust pipe and muffler.
<Ref. to EX-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX-11, REMOVAL, Muffler.>
9) Remove rear differential front member.
<Ref. to DI-18, REMOVAL, Rear Differential.>

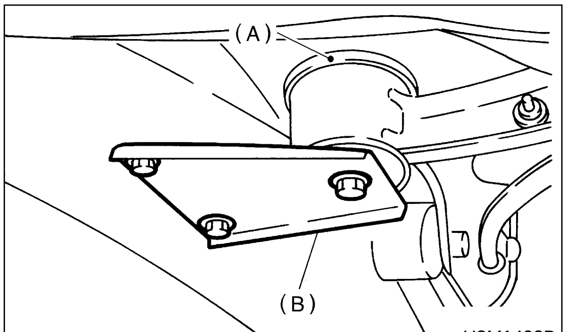
NOTE:
When removing rear differential front member, work the removal procedure as rear differential.

B: INSTALLATION S303135A11

To install, reverse the removal sequence.
1) Position front member on body by passing it under parking brake cable and securing to rear differential.


G3M0058

NOTE:
When installing rear differential front member, do not confuse the installation sequence of the stopper.



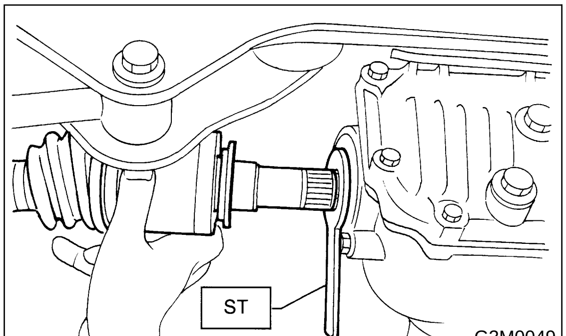
H3M1402B

(A) Stopper
(B) Differential mount bracket

2) Insert DOJ of rear drive shaft into rear differential.

ST	28099PA090	SIDE OIL SEAL PROTECTOR

CAUTION:
Before inserting, replace the differential side oil seal and the circlip at the end of the spline shaft with a new one.



G3M0049

3) Install in the reverse order of removal.

C: INSPECTION S303135A10

1) Check rear differential member for damage, bend, or corrosion.
If damage, bend, or corrosion is excessive, replace rear differential member.
2) Check bushings of rear differential member for cracking, hardening, or damage.
If cracking, hardening, or damage is excessive, replace rear differential member.

8. General Diagnostic Table S303257

A: INSPECTION S303257A10

Symptom or trouble	Possible cause	Remedy
1. Oil leakage	Worn, scratched, or incorrectly seated front or side oil seal. Scored, battered, or excessively worn sliding surface of companion flange.	Repair or replace.
	Clogged or damaged air breather.	Clean, repair or replace.
	Loose bolts on differential spindle or side retainer, or incorrectly fitted O-ring.	Tighten bolts to specified torque. Replace O-ring.
	Loose rear cover attaching bolts or damaged gasket.	Tighten bolts to specified torque. Replace gasket and apply liquid packing.
	Loose oil filler or drain plug.	Retighten and apply liquid packing.
	Wear, damage or incorrectly fitting for spindle, side retainer and oil seal.	Repair or replace.
2. Seizure NOTE: Seized or damaged parts should be replaced, and also other parts should be thoroughly checked for any defect and should be repaired or replaced as required.	Insufficient backlash for hypoid gear.	Readjust or replace.
	Excessive preload for side, rear, or front bearing.	Readjust or replace.
	Insufficient or improper oil used.	Replace seized part and fill with specified oil to specified level.
3. Damage NOTE: Damaged parts should be replaced, and also other parts should be thoroughly checked for any defect and should be repaired or replaced as required.	Improper backlash for hypoid gear.	Replace.
	Insufficient or excessive preload for side, rear, or front bearing.	Readjust or replace.
	Excessive backlash for differential gear.	Replace gear or thrust washer.
	Loose bolts and nuts such as crown gear bolt.	Retighten.
	Damage due to overloading.	Replace.
4. Noises when starting or shifting gears NOTE: Noises may be caused by differential assembly, universal joint, wheel bearing, etc. Find out what is actually making noise before disassembly.	Excessive backlash for hypoid gear.	Readjust.
	Excessive backlash for differential gear.	Replace gear or thrust washer.
	Insufficient preload for front or rear bearing.	Readjust.
	Loose drive pinion nut.	Tighten to specified torque.
	Loose bolts and nuts such as side bearing retainer attaching bolt.	Tighten to specified torque.
5. Noises when cornering	Damaged differential gear.	Replace.
	Excessive wear or damage of thrust washer.	Replace.
	Broken pinion mate shaft.	Replace.
	Seized or damaged side bearing.	Replace.
6. Gear noises NOTE: Since noises from engine, muffler, transmission, propeller shaft, wheel bearings, tires, and body are sometimes mistaken for noises from differential assembly, be careful in checking them. Inspection methods to locate noises include coasting, accelerating, cruising, and jacking-up all four wheels. Perform these inspections according to condition of trouble. When listening to noises, shift gears into four wheel drive and fourth speed position, trying to pick up only differential noise.	Improper tooth contact of hypoid gear.	Readjust or replace hypoid gear set.
	Improper backlash for hypoid gear.	Readjust.
	Scored or chipped teeth of hypoid gear.	Replace hypoid gear set.
	Seized hypoid gear.	Replace hypoid gear set.
	Improper preload for front or rear bearings.	Readjust.
	Seized, scored, or chipped front or rear bearing.	Replace.
	Seized, scored, or chipped side bearing.	Replace.
	Vibrating differential carrier.	Replace.

TRANSFER CASE

TC

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6. Transfer Driven Gear (MT)....................7
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10. Transfer Clutch Pressure Test....................11
11. Transfer Duty Solenoid and Valve Body....................12

1. General Description S302001

A: NOTE S302001A15

For removal, installation and inspection work, refer to “AT” section or “MT” section.
AT model:
<Ref. to AT-2, General Description.>
MT model:
<Ref. to MT-2, General Description.>

2. Transfer Case and Extension for MT *S302138*

A: NOTE *S302138A15*

For removal, installation and inspection work, refer to “MT” section. <Ref. to MT-38, Transfer Case and Extension Case Assembly.>

3. Transfer Clutch and Extension for AT S302142

A: NOTE S302142A15

For removal, installation and inspection work, refer to “AUTOMATIC TRANSMISSION” (a separate publication: Pub. No. G0853ZE).

4. Oil Seal *S302143*

A: NOTE *S302143A15*

For removal, installation and inspection work, refer to “AT” section or “MT” section.
AT model:
<Ref. to AT-27, Extension Case Oil Seal.>
MT model:
<Ref. to MT-33, Oil Seal.>

5. Transfer Drive Gear (MT) *S302146*

A: NOTE *S302146A15*

For removal, installation and inspection work, refer to “MT” section. <Ref. to MT-42, Transfer Drive Gear.>

6. Transfer Driven Gear (MT) *S302141*

A: NOTE *S302141A15*

For removal, installation and inspection work, refer to “MT” section. <Ref. to MT-44, Transfer Driven Gear.>

7. Reduction Drive Gear without VTD *S302144*

A: NOTE *S302144A15*

For removal, installation and inspection work, refer to “AUTOMATIC TRANSMISSION” (a separate publication: Pub. No. G0853ZE).

8. Reduction Driven Gear without VTD *S302147*

A: NOTE *S302147A15*

For removal, installation and inspection work, refer to “AUTOMATIC TRANSMISSION” (a separate publication: Pub. No. G0853ZE).

9. Center Differential *S302158*

A: NOTE *S302158A15*

For removal, installation and inspection work, refer to “AUTOMATIC TRANSMISSION” (a separate publication: Pub. No. G0853ZE) or “MT” section. <Ref. to MT-46, Center Differential.>

10. Transfer Clutch Pressure Test *S302159*

A: NOTE *S302159A15*

For removal, installation and inspection work, refer to “AT” section. <Ref. to AT-18, Transfer Clutch Pressure Test.>

11. Transfer Duty Solenoid and Valve Body *S302161*

A: NOTE *S302161A15*

For removal, installation and inspection work, refer to “AT” section. <Ref. to AT-39, TRANSFER DUTY SOLENOID AND TRANSFER VALVE BODY, REMOVAL, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>

MEMO:

DRIVE SHAFT SYSTEM

DS

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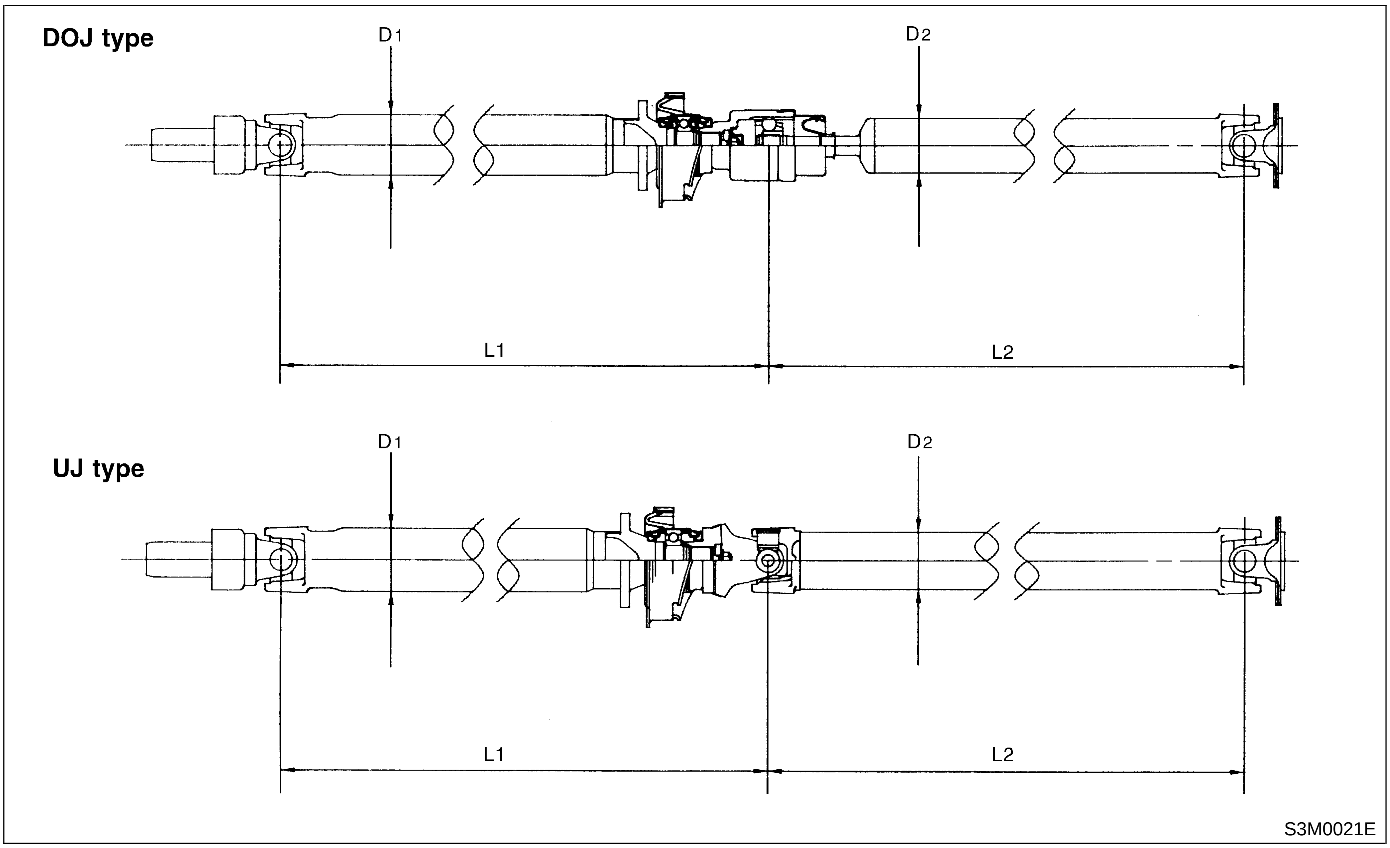
1. General Description S301001

A: SPECIFICATIONS S301001E49

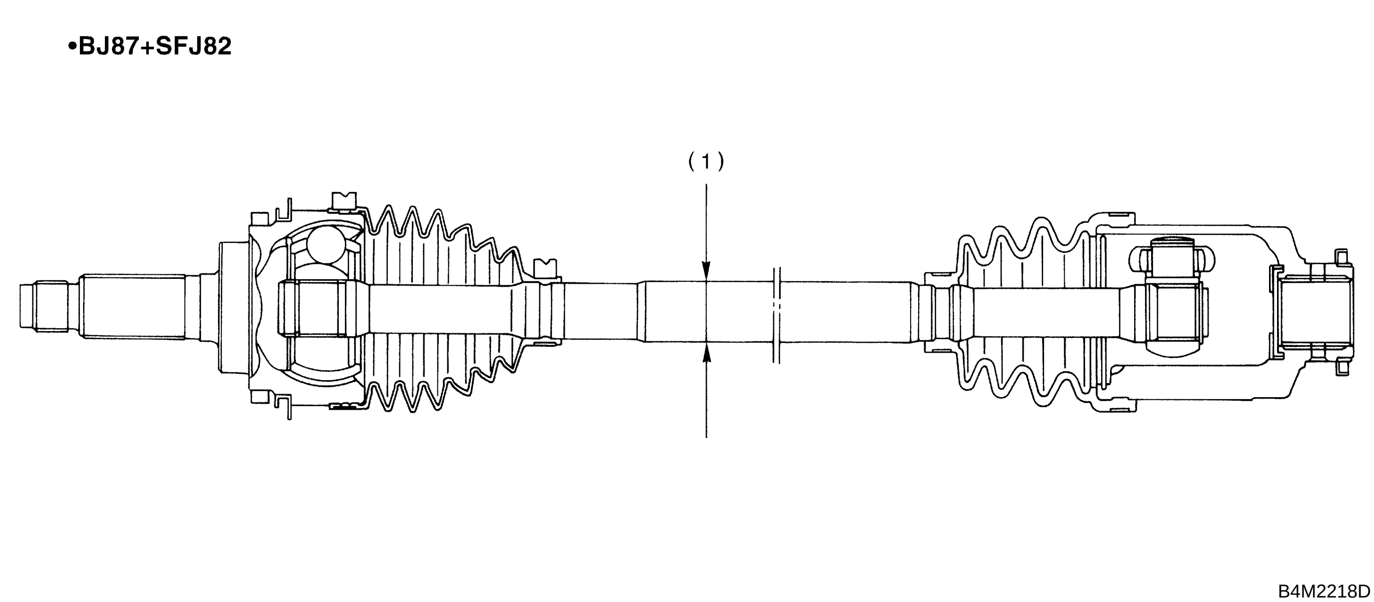
1. PROPELLER SHAFT S301001E4901

Propeller shaft type		UJ type
Front propeller shaft Joint-to-joint length: L_1 mm (in)	AT	585 (23.03)
	MT	644 (25.35)
Rear propeller shaft Joint-to-joint length: L_2 mm (in)		707 (27.83)
Outside dia. of tube mm (in)	D_1	63.5 (2.500)
	D_2	57.0 (2.244)



2. FRONT DRIVE SHAFT ASSEMBLY *S301001E4902*

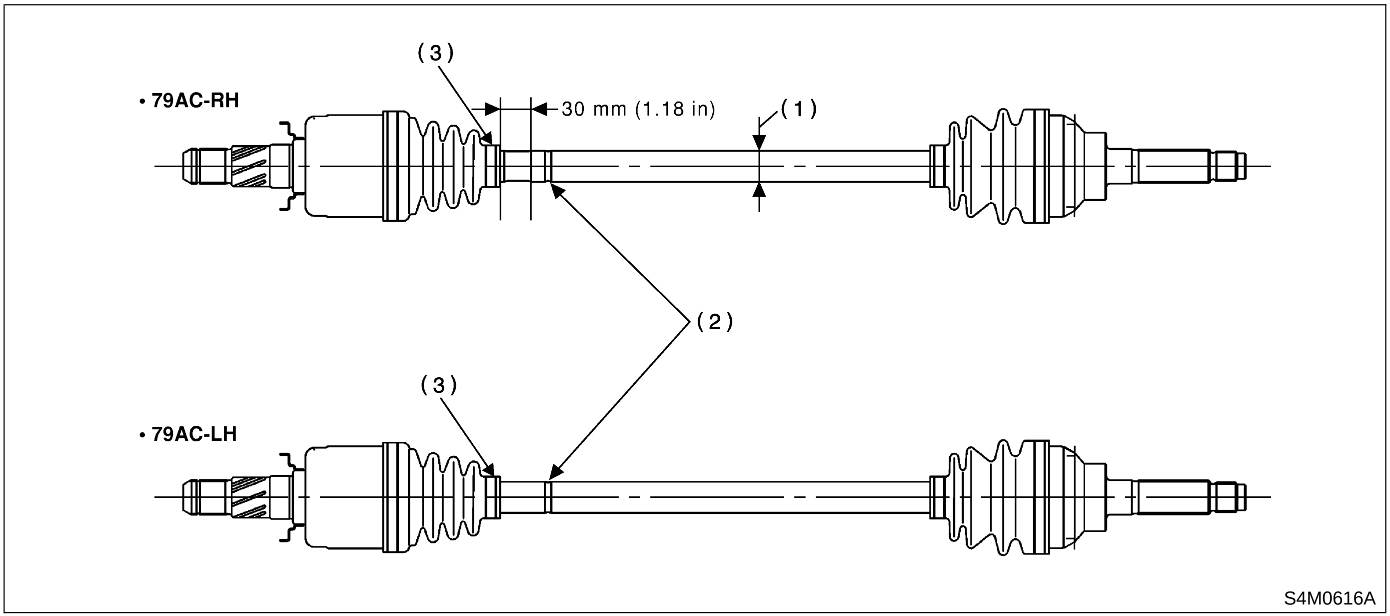
Type of drive shaft assembly	SHAFT
	Shaft diameter
BJ87L+SFJ82	26 mm (1.02 in)



(1) Measuring point

3. REAR DRIVE SHAFT ASSEMBLY *S301001E4903*

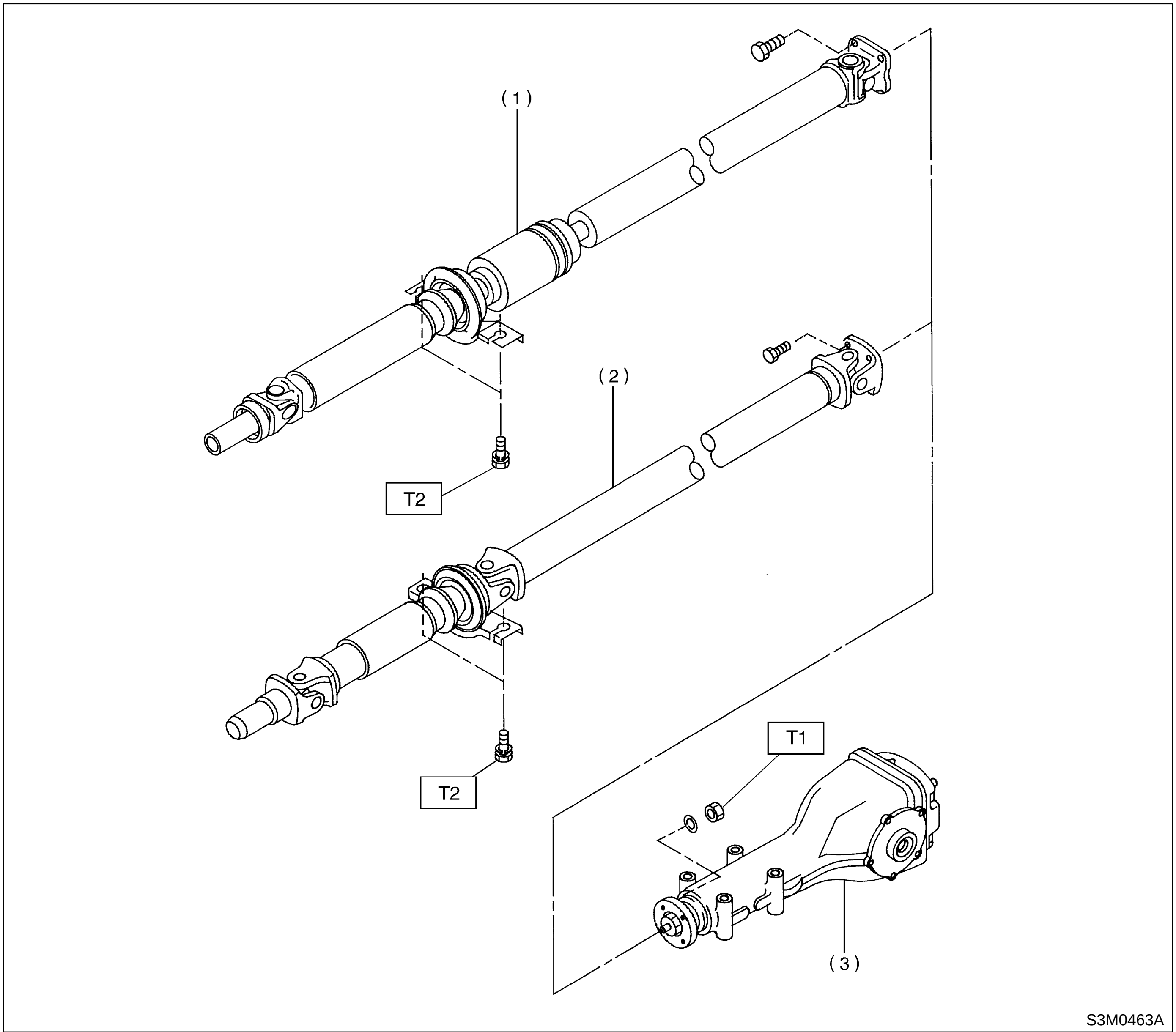
Type of drive shaft assembly	SHAFT		Boot band identification color
	No. of identification paddings on shaft	Shaft diameter	
79AC-RH	2 (Two)	23 mm (0.91 in)	White
79AC-LH	1 (One)	23 mm (0.91 in)	



(1) Measuring point
(2) Identification padding
(3) Boot band Identification

B: COMPONENT S301001A05

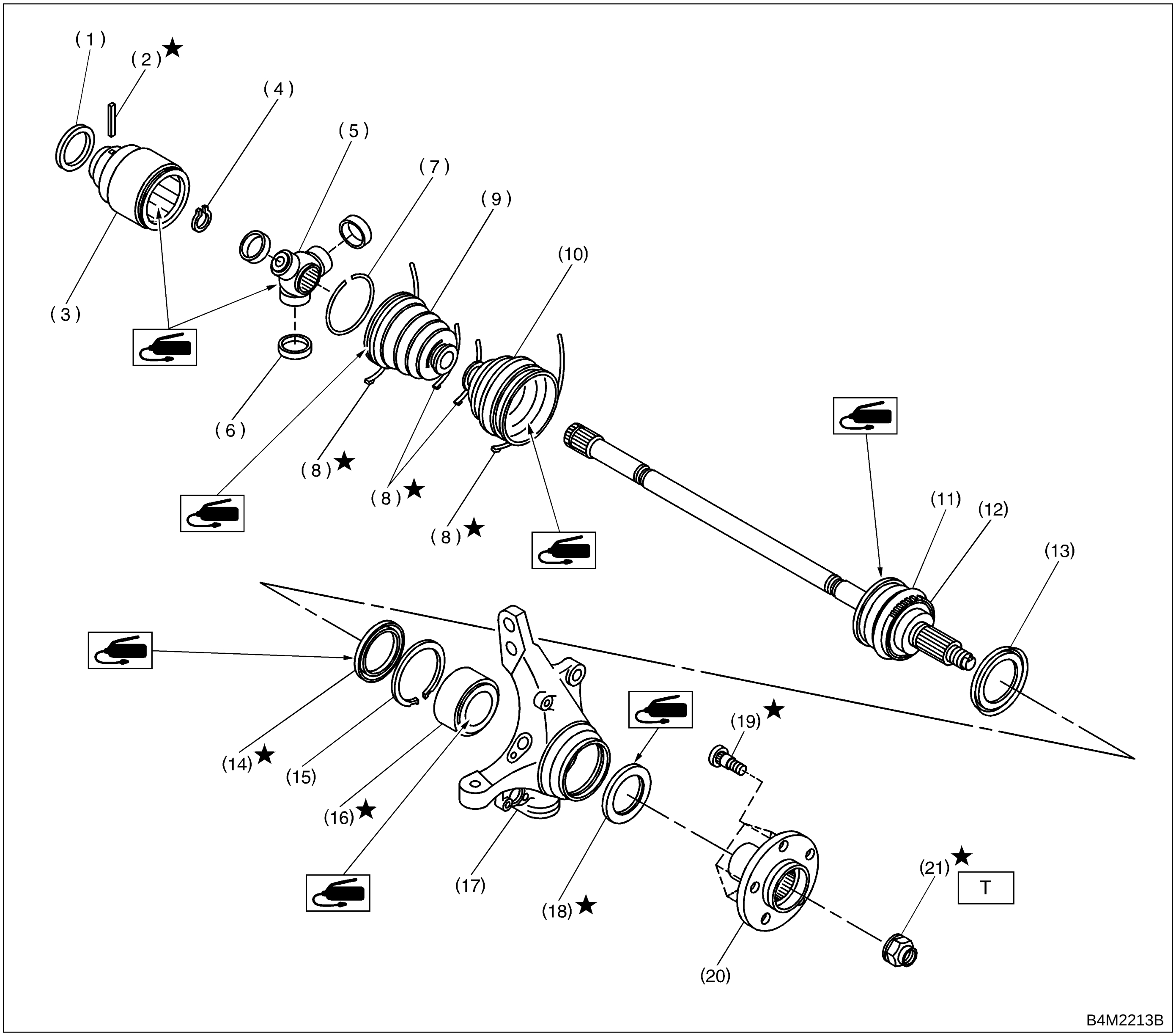
1. PROPELLER SHAFT S301001A0501



(1) Propeller shaft (DOJ type)
(2) Propeller shaft (UJ type)
(3) Rear differential

Tightening torque: N·m (kgf-m, ft-lb)
T1: 31 (3.2, 23.1)
T2: 52 (5.3, 38.3)

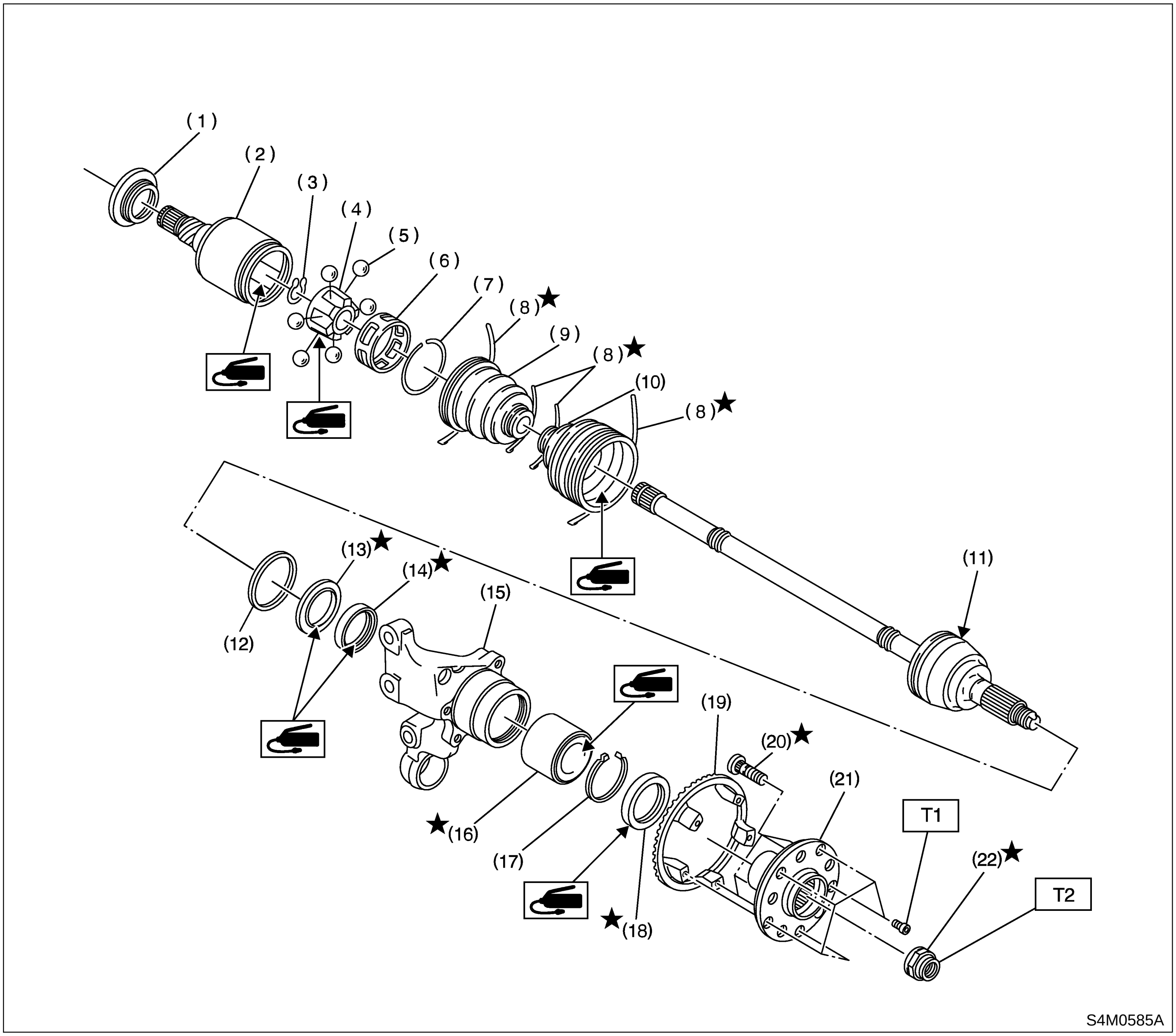
2. FRONT AXEL *S301001A0502*



(1) Baffle plate (SFJ)
(2) Spring pin
(3) Outer race (SFJ)
(4) Snap ring
(5) Trunnion
(6) Free ring
(7) Circlip
(8) Boot band
(9) Boot (SFJ)
(10) Boot (BJ)
(11) BJ ASSY
(12) Tone wheel
(13) Baffle plate
(14) Oil seal (IN)
(15) Snap ring
(16) Bearing
(17) Housing
(18) Oil seal (OUT)
(19) Hub bolt
(20) Hub
(21) Axle nut

Tightening torque: N·m (kgf-m, ft-lb)
T: 186 (19, 137)

3. REAR AXLE *S301001A0503*



(1) Baffle plate (DOJ)
(2) Outer race (DOJ)
(3) Snap ring
(4) Inner race
(5) Ball
(6) Cage
(7) Circlip
(8) Boot band
(9) Boot (DOJ)
(10) Boot (BJ)
(11) BJ ASSY
(12) Baffle plate
(13) Oil seal (IN. No. 2)
(14) Oil seal (IN)
(15) Housing
(16) Bearing
(17) Snap ring
(18) Oil seal (OUT)
(19) Tone wheel
(20) Hub bolt
(21) Hub
(22) Axle nut

Tightening torque: N·m (kgf-m, ft-lb)
T1: 13 (1.3, 9.4)
T2: 186 (19, 137)

C: CAUTION *S301001A03*

- 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.
- Use SUBARU genuine grease etc. or the equivalent. Do not mix grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply grease onto sliding or revolution surfaces before installation.
- Before installing O-rings or snap rings, apply sufficient amount of grease to avoid damage and deformation.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.

D: PREPARATION TOOL *S301001A17*

1. SPECIAL TOOLS *S301001A1701*

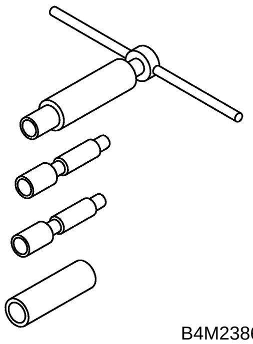
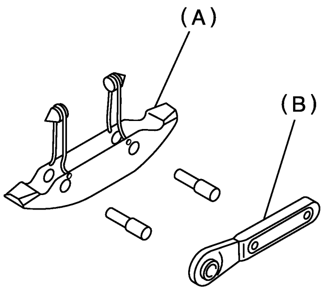
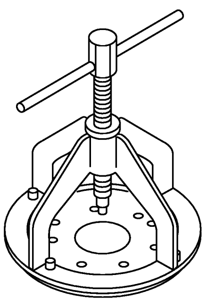
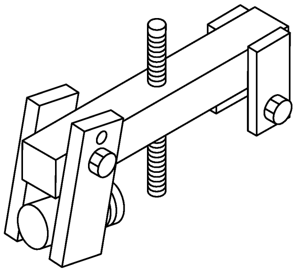
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2386	922431000	AXLE SHAFT INSTALLER	● Used for installing axle shaft into housing. ● Used with ADAPTER (927390000).
 B4M2387A	925091000	BAND TIGHTENING TOOL	● Used for tightening boot band. Except front axle housing side) (A) Jig for band (B) Ratchet wrench
 B4M2388	926470000	AXLE SHAFT PULLER	Used for removing axle shaft.
 B4M2389	927060000	HUB REMOVER	● Used for removing front hub. ● Used with HUB STAND (927080000).

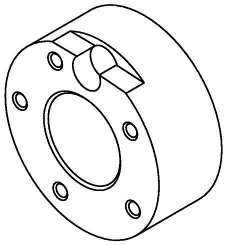
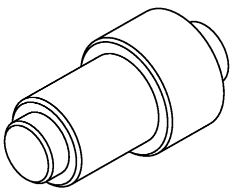
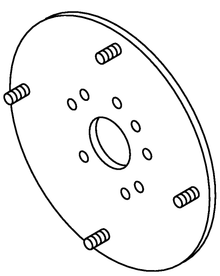
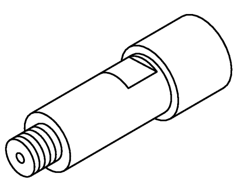
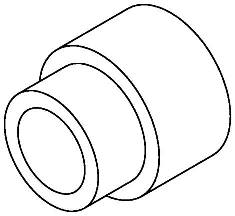
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2390	927080000	HUB STAND	Used for disassembling and assembling hub bolt in hub.
 B4M2391	927100000	BEARING REMOVER	● Used for disassembling and assembling front housing bearing. ● Used with HOUSING STAND (927400000).
 B4M2392	927140000	PLATE	Same as plate 2 included in AXLE SHAFT PULLER (926470000).
 B4M2393	927390000	ADAPTER	Used as an adapter for AXLE SHAFT INSTALLER (922431000).
 B4M2394	927400000	HOUSING STAND	● Used for disassembling and assembling front housing bearing. ● Used with BEARING PULLER (927100000).

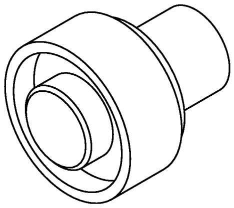
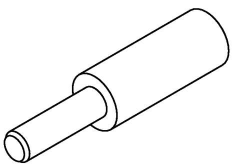
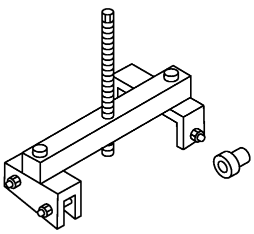
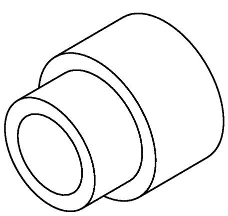
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2395	927410000	OIL SEAL INSTALLER	● Used for installing oil seal into front housing. ● Used with HOUSING STAND (927400000).
 B4M2399	927120000	HUB INSTALLER	● Used for installing hub. ● Used with HUB STAND (927080000)
 H5M0981	927420000	HUB REMOVER	● Used for removing rear hub. ● Used with HUB STAND (927080000).
 H5M0982	927430000	HOUSING STAND	● Used for disassembling and assembling rear housing bearing. ● Used with BEARING PULLER (927440000).

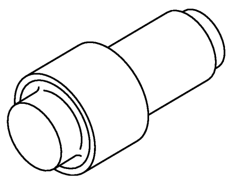
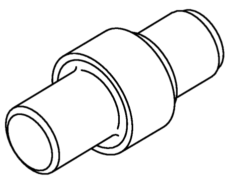
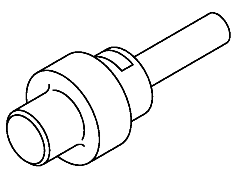
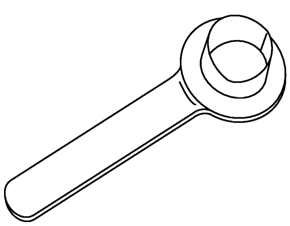
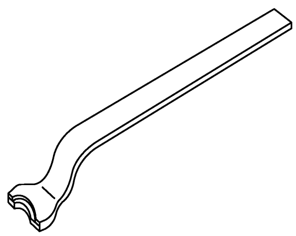
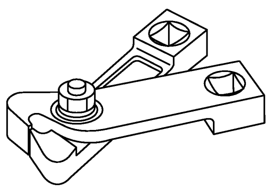
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 H5M0983	927440000	BEARING REMOVER	● Used for disassembling and assembling rear housing bearing. ● Used with HOUSING STAND (927430000).
 H5M0984	927460000	OIL SEAL INSTALLER	● Used for installing outer bearing and sub bearing into housing. ● Used with HOUSING STAND (927430000).
 B4M2400	927450000	HUB INSTALLER	● Used for installing rear hub into housing ASSY. ● Used with HUB STAND (927080000).
 B4M2401	28099PA090	OIL SEAL PROTEC-TOR	● Used for installing rear drive shaft into rear differential. ● For protecting oil seal.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2402	28099PA100	DRIVE SHAFT REMOVER	Used for removing rear drive shaft from rear differential.
 B4M2403	28099AC000	BOOT BAND PLIERS	Used for tightening front BJ boot band. (Front axle housing side)

2. GENERAL PURPOSE TOOLS *S301001A1702*

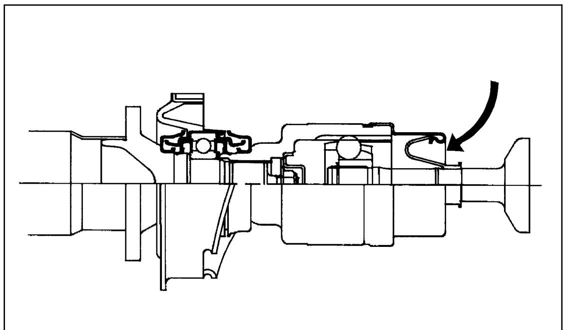
TOOL NAME	REMARKS
Puller	Used for removing ball joint from knuckle arm.
Dial Gauge	Used for inspecting propeller shaft run-out.
Snap Ring Pliers	Used for installing and removing snap ring.

2. Propeller Shaft *S301160*

A: REMOVAL *S301160A18*

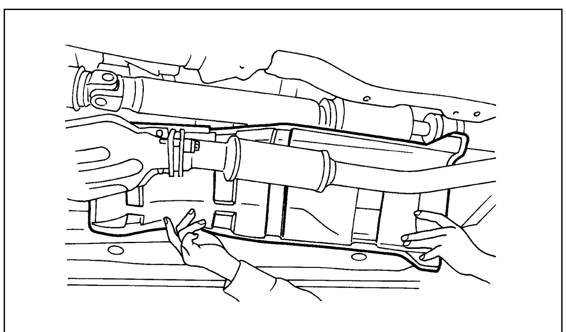
NOTE:

- Before removing propeller shaft, wrap metal parts with a cloth or rubber material.
- In case of DOJ type, before removing propeller shaft, wrap metal parts (installed at the rubber boot of center DOJ) with a cloth or rubber material, as shown in the figure. Rubber boot may be damaged due to interference with adjacent metal parts while bending the DOJ during removal.



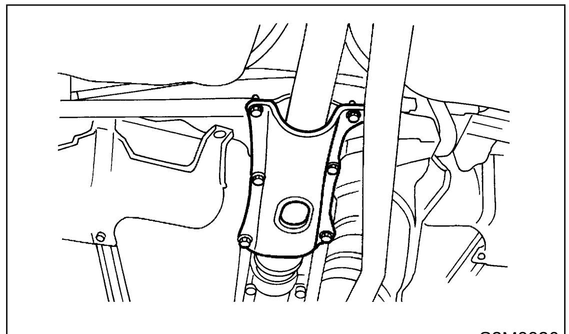
S3M0030

1) Set vehicle on a lift.
2) Disconnect battery ground cable.
3) Move select lever or gear shift lever to “N”.
4) Release the parking brake.
5) Jack-up vehicle and support it with sturdy racks.
6) Remove front exhaust cover.



S3M0025

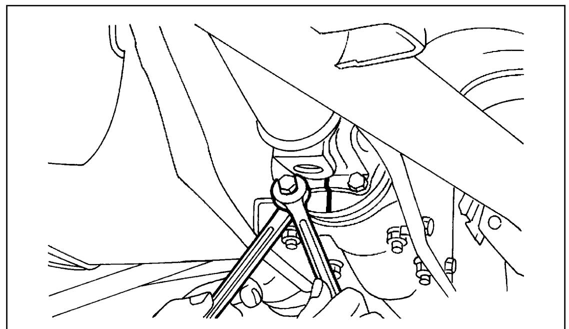
7) Remove differential mount front cover.



S3M0026

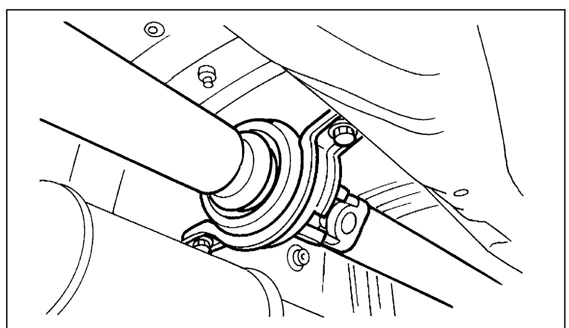
8) Put matching mark on the propeller shaft and rear differential
9) Remove the four bolts which hold propeller shaft to rear differential.

NOTE:
Remove all but one bolt.



S3M0027

10) Remove the two bolts which hold center bearing to vehicle body.



S3M0028

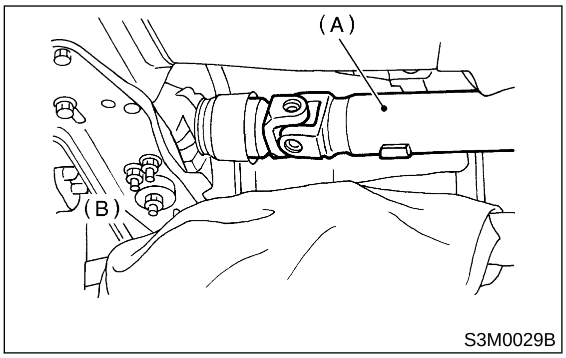
11) Remove propeller shaft from transmission.

CAUTION:

- **Be sure not to damage oil seals and the frictional surface of sleeve yoke.**
- **Cover the center exhaust pipe with a cloth to keep off any ATF or oil spilled from transmission when removing propeller shaft.**

NOTE:

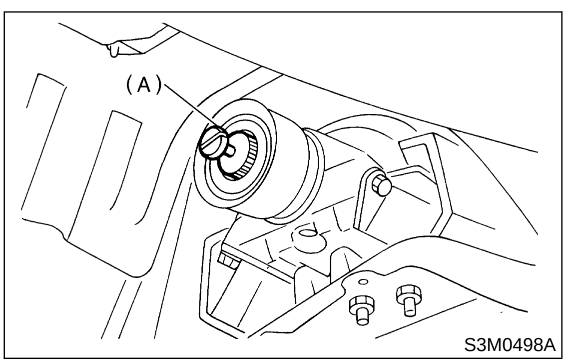
- Be sure to use an empty oil can to catch oil flowing out when removing propeller shaft.
- Be sure to plug the opening in transmission after removal of propeller shaft.



(A) Propeller shaft
(B) Cloth

12) Install the extension cap to transmission.

NOTE:
If extension cap is not available, cover the opening with a vinyl bag in order to prevent transmission gear oil or ATF from leaking.

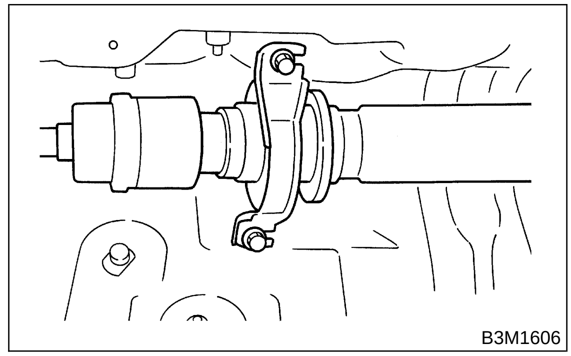


(A) Extension cap

B: INSTALLATION S301160A11

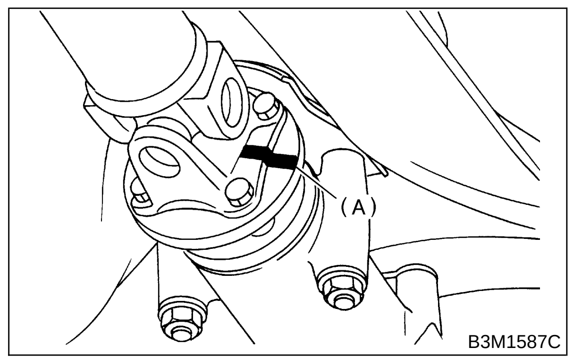
1) Insert sleeve yoke into transmission and attach center bearing to vehicle body.

Tightening torque:
52 N·m (5.3 kgf-m, 38.3 ft-lb)



2) Align matching marks and connect flange yoke and rear differential.

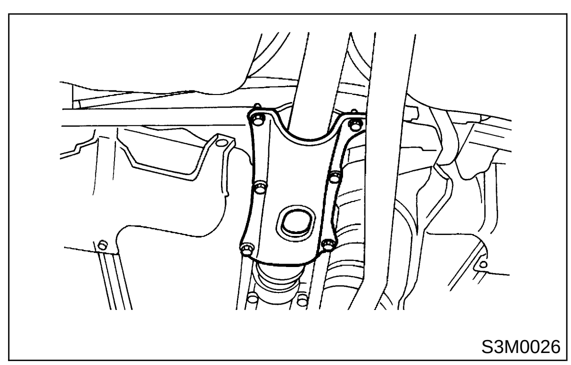
Tightening torque:
31 N·m (3.2 kgf-m, 23.1 ft-lb)



(A) Matching mark

3) Install front exhaust cover.
4) Install differential mount front cover.

Tightening torque:
88 N·m (9.0 kgf-m, 65 ft-lb)



C: INSPECTION S301160A10

NOTE:
Do not disassemble propeller shaft. Check the following and replace if necessary.

1) Tube surfaces for dents or cracks
2) Splines for deformation or abnormal wear
3) Joints for non-smooth operation or abnormal noise
4) Center bearing for free play, noise or non-smooth operation
5) Oil seals for abnormal wear or damage
6) Center bearing for breakage

Check the following points with propeller shaft installed in vehicle.

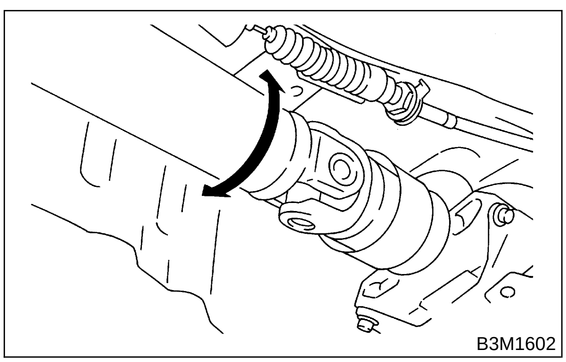
1. JOINTS AND CONNECTIONS S301160A1001

1) Remove center exhaust pipes.
2) Remove heat shield cover.
3) Check for any looseness of yoke flange connecting bolts and center bearing retaining bolts.

2. SPLINES AND BEARING LOCATIONS

S301160A1002

1) Remove front exhaust cover.
2) Turn propeller shaft by hand to check if abnormal free play exists at splines. Also move yokes to check if abnormal free play exists at spiders and bearings.



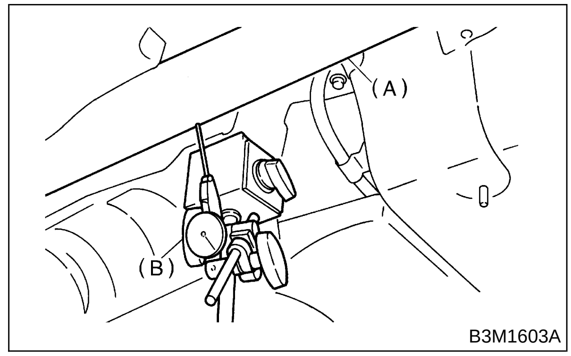
3. RUNOUT OF PROPELLER SHAFT

S301160A1003

1) Remove front exhaust cover.
2) Turn rear wheels by hand to check for “runout” of propeller shaft.

NOTE:
Measure runout with a dial gauge at the center of front and rear propeller shaft tubes.

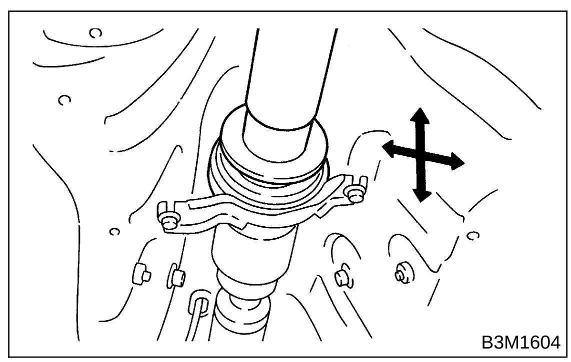
Runout:
Limit 0.6 mm (0.024 in)



(A) Propeller shaft
(B) Dial gauge

4. CENTER BEARING FREE PLAY S301160A1004

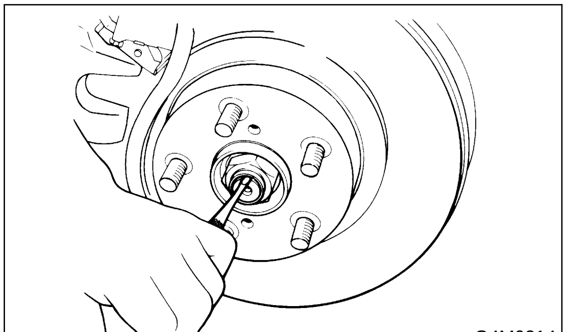
1) Remove front exhaust cover.
2) While holding propeller shaft near center bearing with your hand, move it up and down, and left and right to check for any abnormal bearing free play.



3. Front Axle S301148

A: REMOVAL S301148A18

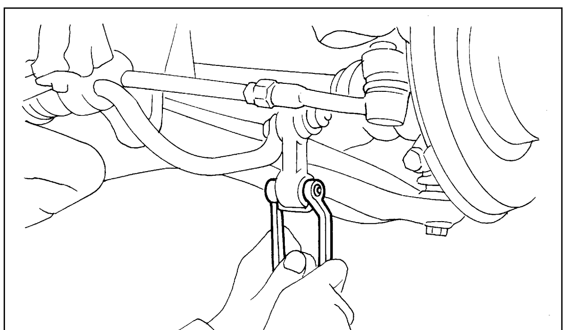
1) Disconnect battery ground cable.
2) Jack-up vehicle, support it with safety stands, and remove front wheels.
3) Unlock axle nut.


G4M0214

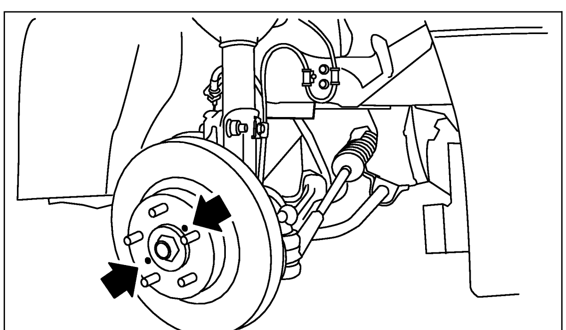
4) Remove axle nut using a socket wrench.

CAUTION:
Be sure to loose and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

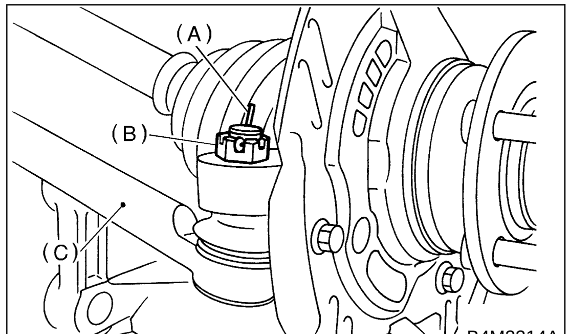
5) Remove stabilizer link.


G4M0215

6) Remove disc brake caliper from housing, and suspend it from strut using a wire.
7) Remove disc rotor from hub.
If disc rotor seizes up within hub, drive disc rotor out by installing an 8-mm bolt in screw hole on the rotor.


B4M1678

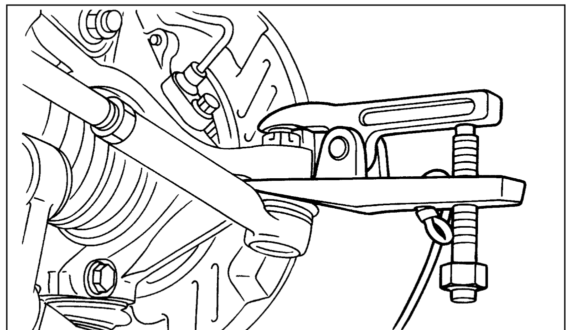
8) Remove cotter pin and castle nut which secure tie-rod end to housing knuckle arm.



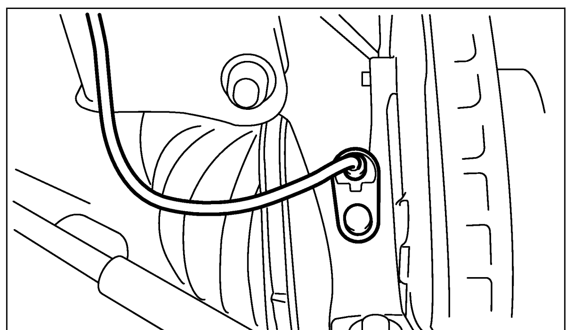
B4M2214A

(A) Cotter pin
(B) Castle nut
(C) Tie-rod end

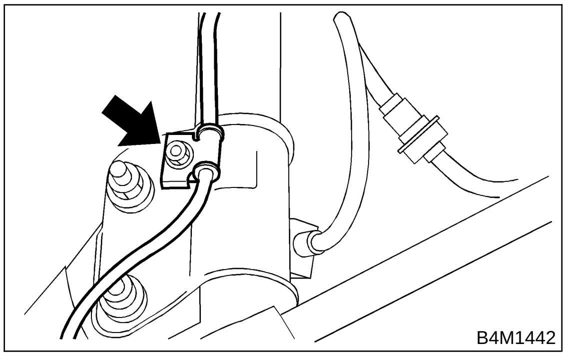
9) Using a puller, remove tie-rod ball joint from knuckle arm.


B4M2215

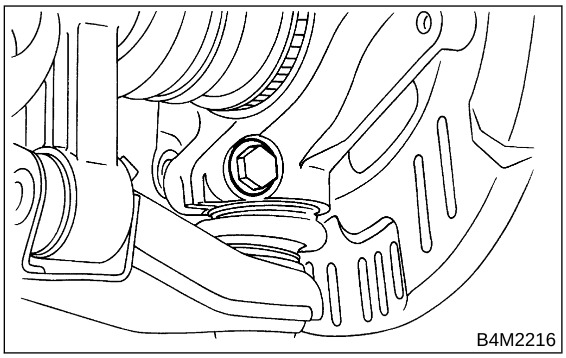
10) Remove ABS sensor assembly and harness in advance.


B4M2209

11) Remove bolt which secures sensor harness to strut.

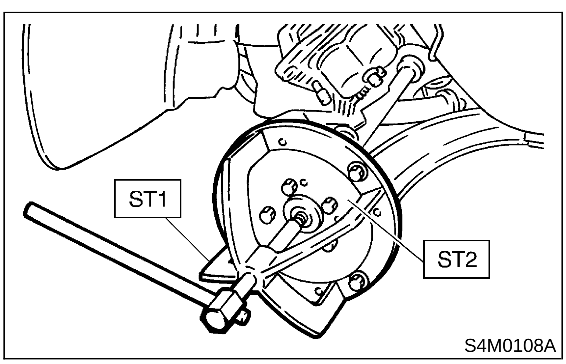


12) Remove transverse link ball joint from housing.

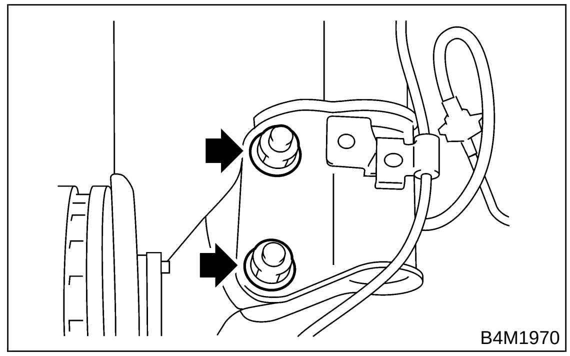


13) Remove SFJ from transmission spindle.
14) Remove front drive shaft assembly from hub. If it is hard to remove, use STs.
ST1 926470000 AXLE SHAFT PULLER
ST2 927140000 PLATE

CAUTION:
- **Be careful not to damage oil seal lip and tone wheel when removing front drive shaft.**
- **When replacing front drive shaft, also replace inner oil seal.**



15) After scribing an alignment mark on camber adjusting bolt head, remove bolts which connect housing and strut, and disconnect housing from strut.



B: INSTALLATION S301148A11

1) While aligning alignment mark on camber adjusting bolt head, connect housing and strut.

CAUTION:
Use a new self-locking nut.

Tightening torque:
155 N·m (15.8 kgf-m, 114 ft-lb)

2) Install front drive shaft. <Ref. to DS-32 INSTALLATION, Front Drive Shaft.>
3) Install transverse link ball joint to housing.

Tightening torque:
49 N·m (5.0 kgf-m, 36 ft-lb)

4) Install ABS sensor harness on strut.
5) Install ABS sensor on housing.

Tightening torque:
32 N·m (3.3 kgf-m, 23.9 ft-lb)

6) Install disc rotor on hub.
7) Install disc brake caliper on housing.

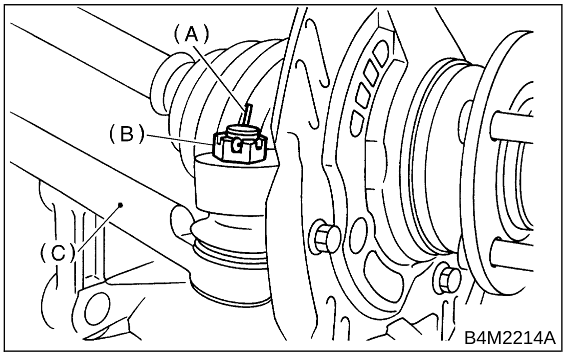
Tightening torque:
78 N·m (8 kgf-m, 57.9 ft-lb)

8) Connect stabilizer link.

9) Connect tie-rod end ball joint and knuckle arm with a castle nut, and insert cotter pin into tie-rod end.

Castle nut tightening torque:
Tighten to 27.0 N·m (2.75 kgf-m, 19.9 ft-lb), and tighten further within 60° until cotter pin hole is aligned with a slot in the nut.

CAUTION:
When connecting, do not hit cap at the bottom of tie-rod end with hammer.



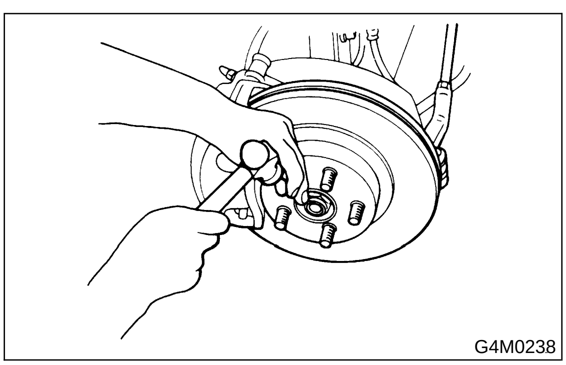
(A) Cotter pin
(B) Castle nut
(C) Tie-rod end

10) While depressing brake pedal, tighten axle nut and lock it securely.

Tightening torque:
186 N·m (19 kgf-m, 137 ft-lb)

CAUTION:
- **Use a new axle nut.**
- **Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.**
- **Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.**

11) After tightening axle nut, lock it securely.

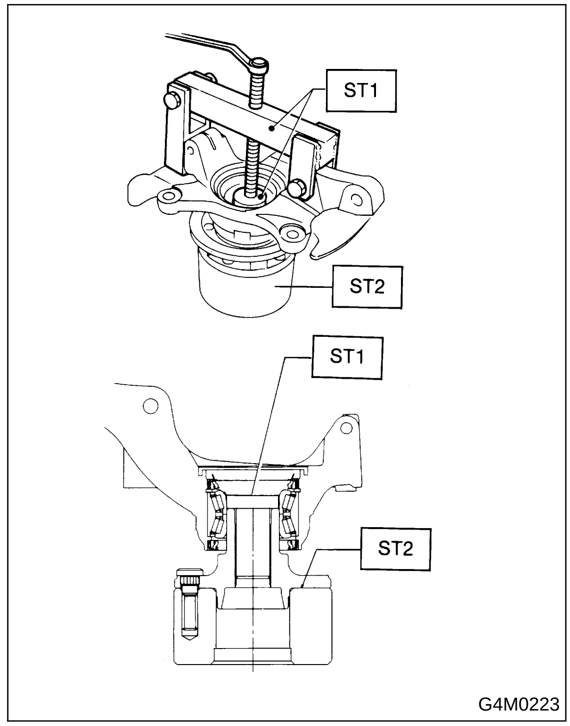


12) Install wheel and tighten wheel nuts to specified torque.

Tightening torque:
88 N·m (9 kgf-m, 65 ft-lb)

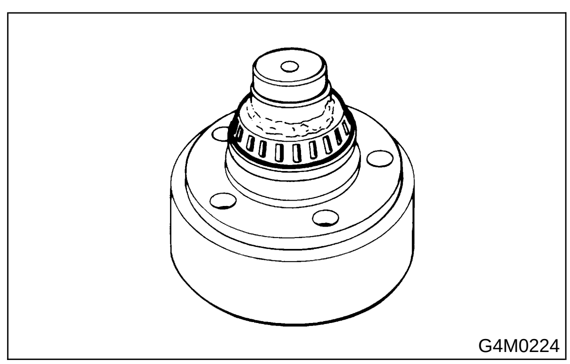
C: DISASSEMBLY S301148A06

1) Using ST1, support housing and hub securely.
2) Attach ST2 to housing and drive hub out.
ST1 927060000 HUB REMOVER
ST2 927080000 HUB STAND

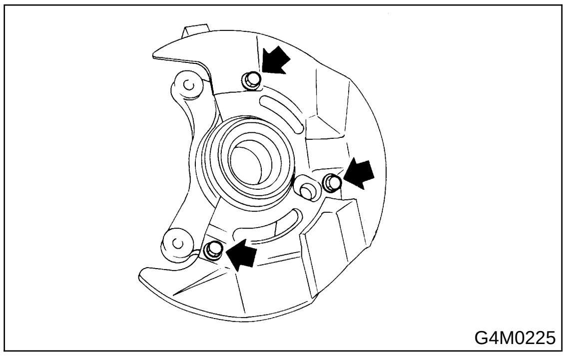


If inner bearing race remains in the hub, remove it with a suitable tool (commercially available).

CAUTION:
- **Be careful not to scratch polished area of hub.**
- **Be sure to install inner race on the side of outer race from which it was removed.**



3) Remove disc cover from housing.



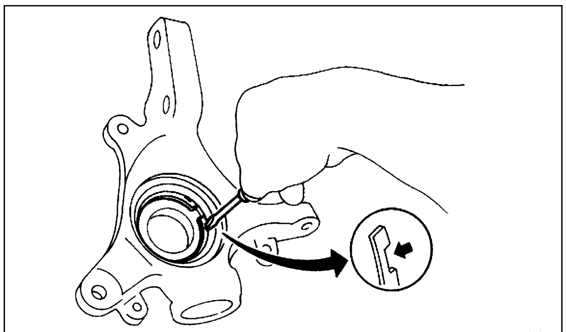
G4M0225

4) Using a standard screwdriver, remove outer and inner oil seals.

CAUTION:
Do not re-use oil seals.

5) Using flat bladed screwdriver, remove snap ring.

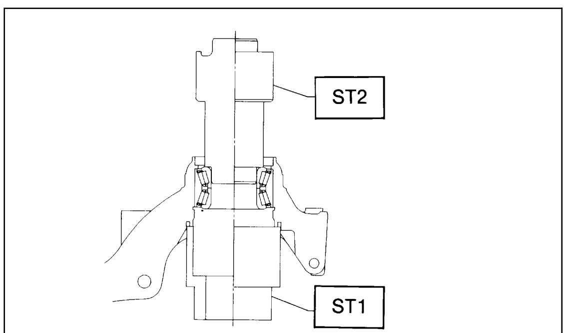
CAUTION:
Remove without scratching axle housing.



H4M1001

6) Using ST1, support housing securely.
7) Using ST2, press inner race to drive out outer bearing.
ST1 927400000 HOUSING STAND
ST2 927100000 BEARING REMOVER

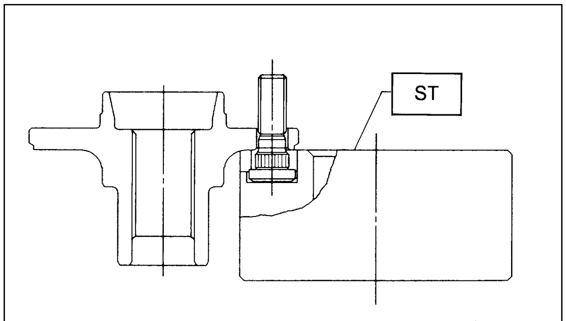
CAUTION:
- **Do not remove outer race unless it is faulty.**
- **Discard outer race after removal.**
- **Do not replace inner or outer race separately; always replace as a unit.**



G4M0227

8) Using ST and a hydraulic press, drive hub bolts out.
ST 927080000 HUB STAND

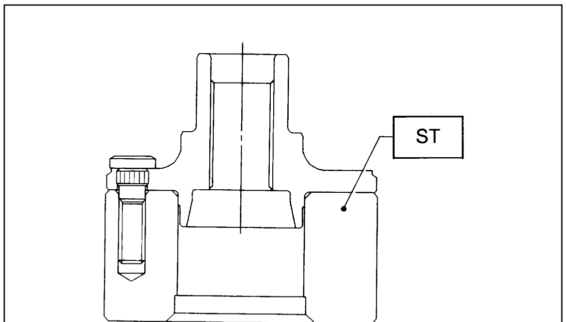
CAUTION:
Be careful not to hammer hub bolts. This may deform hub.



G4M0228

D: ASSEMBLY *S301148A02*

1) Attach hub to ST securely.
ST 927080000 HUB STAND



G4M0230

2) Using a hydraulic press, press new hub bolts into place.

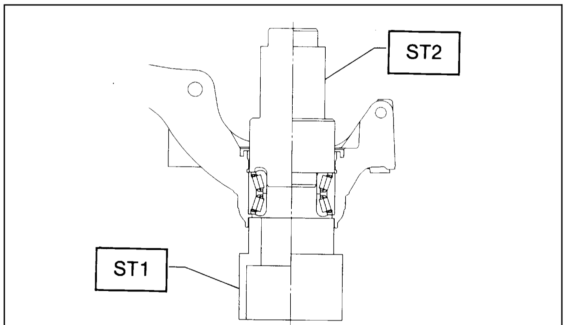
CAUTION:
Be sure to press hub bolts until their seating surfaces contact the hub.

NOTE:
Use 12 mm (0.47 in) dia. holes in HUB STAND to prevent bolts from tilting.

3) Clean dust or foreign particles from inside the housing.
4) Using ST1 and ST2, press a new bearing into place.
ST1 927400000 HOUSING STAND
ST2 927100000 BEARING REMOVER

CAUTION:
- **Always press outer race when installing bearing.**
- **Be careful not to remove plastic lock from inner race when installing bearing.**
- **Charge bearing with new grease when outer race is not removed.**

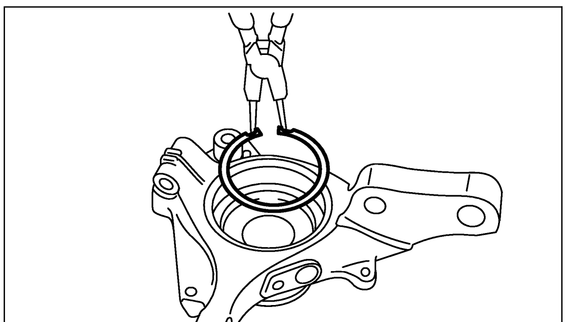
Specified grease:
SHELL 6459N



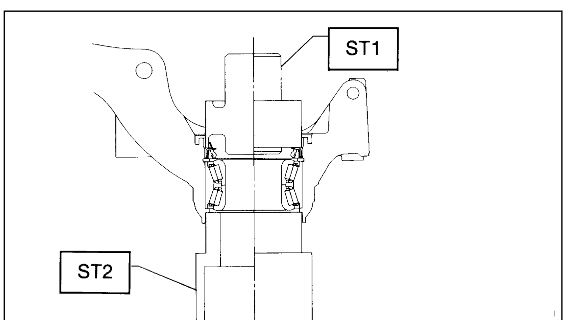
G4M0232

5) Using pliers, install snap ring in its groove.

CAUTION:
- **Make sure to install it firmly to groove.**
- **Install without scratching axle housing.**


B4M2253

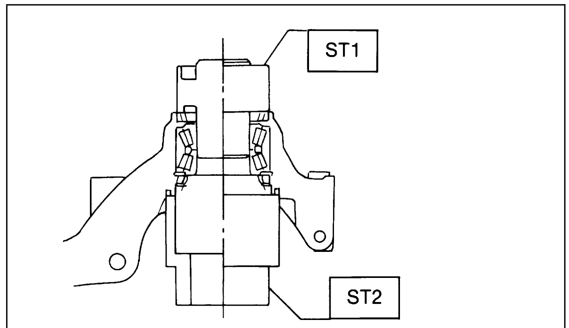
6) Using ST1 and ST2, press inner oil seal until it contacts circlip.
ST1 927410000 OIL SEAL INSTALLER
ST2 927400000 HOUSING STAND



G4M0234

7) Invert ST and housing.
ST 927400000 HOUSING STAND

8) Using ST1 and ST2, press outer oil seal until it contacts the bottom of housing.
ST1 927410000 OIL SEAL INSTALLER
ST2 927400000 HOUSING STAND



G4M0233

9) Apply sufficient grease to oil seal lip.

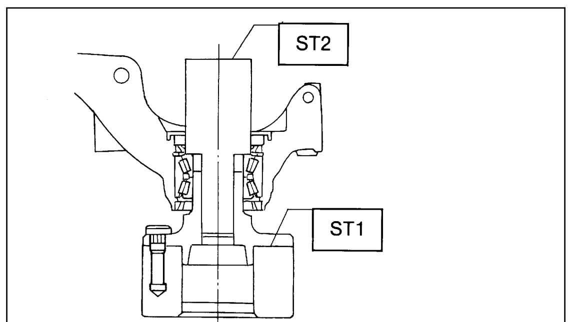
Specified grease
SHELL 6459N

CAUTION:
- **If specified grease is not available, remove bearing grease and apply Auto Rex A instead.**
- **Do not mix different types of grease.**

10) Install disc cover to housing the three bolts.

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

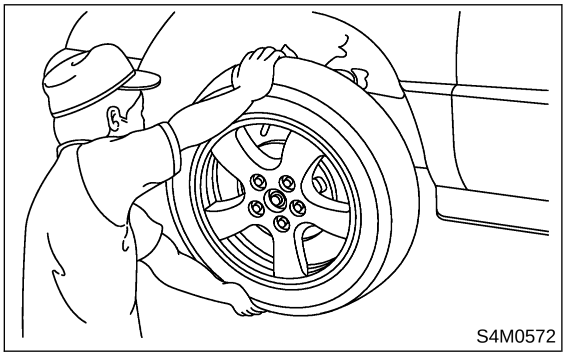
11) Attach hub to ST1 securely.
12) Clean dust or foreign particles from the polished surface of hub.
13) Using ST2, press bearing into hub by driving inner race.
ST1 927080000 HUB STAND
ST2 927120000 HUB INSTALLER



G4M0235

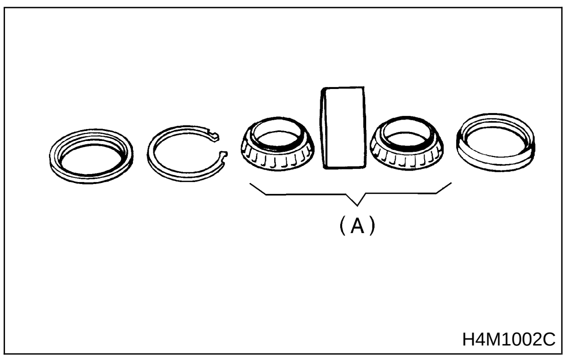
E: INSPECTION *S301148A10*

1) Moving front tire up and down by hand, check that there is no backlash in the bearing. And check that wheel rotates smoothly.



2) Inspect the removed parts for wear and damage. If defective, replace with new ones.

CAUTION:
- **If bearing is faulty, replace it as the bearing set.**
- **Be sure to replace oil seal at every overhaul.**



(A) Replace as a set.

4. Rear Axle *S301154*

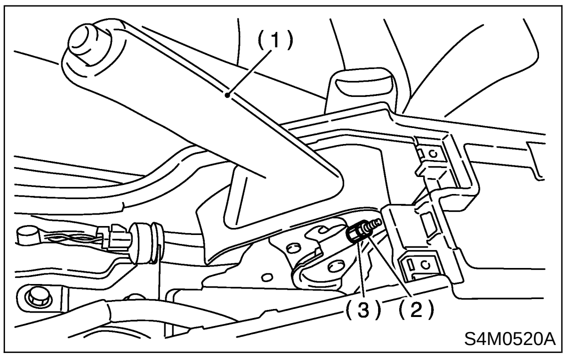
A: REMOVAL *S301154A18*

1. DISC BRAKE *S301154A1802*

1) Disconnect battery ground cable.
2) Jack-up vehicle, and remove rear wheel cap and wheels.

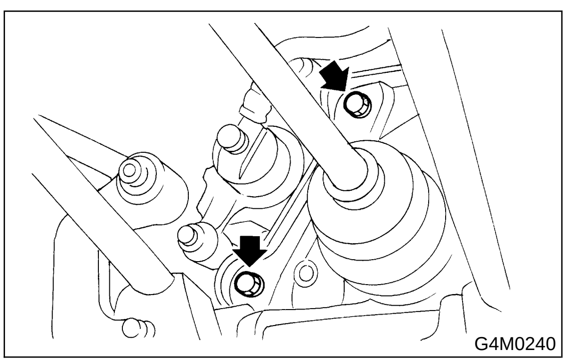
CAUTION:
Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

3) Unlock axle nut.
4) Remove axle nut using a socket wrench.
5) Return parking brake lever and loosen adjusting nut.



(1) Parking brake lever
(2) Lock nut
(3) Adjusting nut

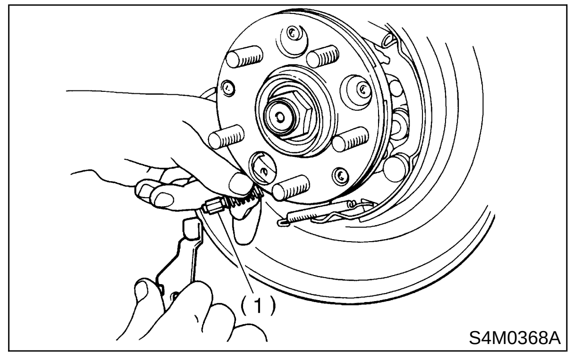
6) Remove disc brake caliper from back plate, and suspend it from strut using a piece of wire.



7) Remove disc rotor from hub.

NOTE:
If disc rotor seizes up within hub, drive it out by installing an 8-mm bolt into bolt hole in disc rotor.

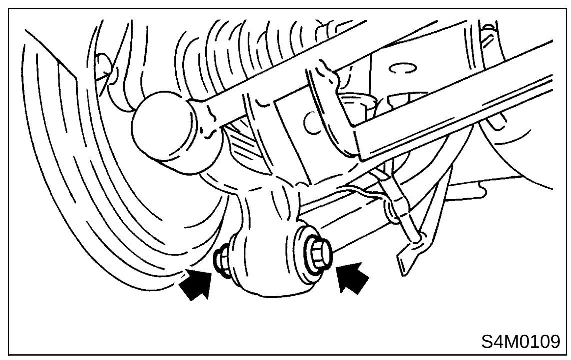
8) Disconnect parking brake cable end.



(1) Cable end

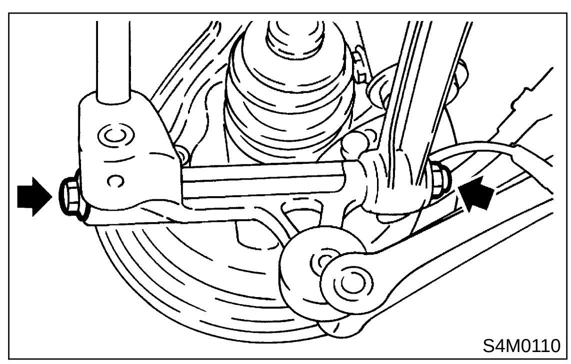
9) Disconnect rear stabilizer from rear lateral link.
10) Remove bolts which secure trailing link assembly to rear housing.

CAUTION:
Discard old self-locking nut. Replace with a new one.



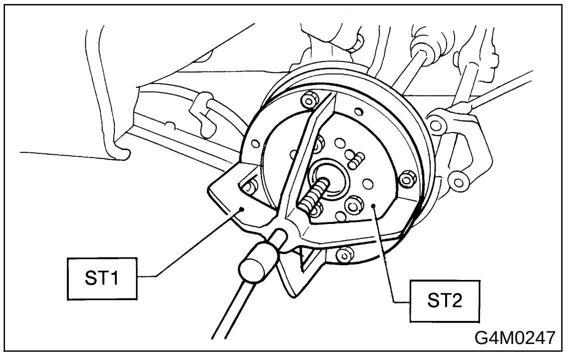
11) Remove bolts which secure lateral link assembly to rear housing.

CAUTION:
Discard old self-locking nut. Replace with a new one.

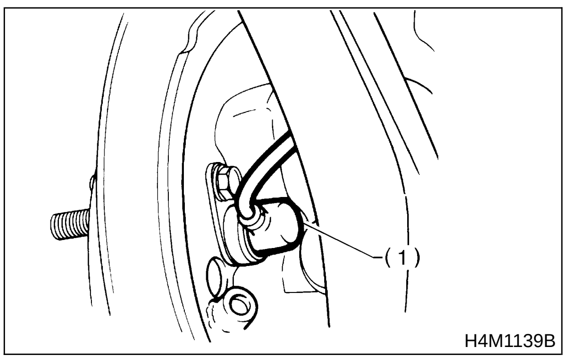


12) Disengage BJ from housing splines, and remove rear drive shaft assembly. If it is hard to remove, use STs.
ST1 926470000 AXLE SHAFT PULLER
ST2 927140000 PLATE

CAUTION:
• Be careful not to damage oil seal lip when removing rear drive shaft.
• When rear drive shaft is to be replaced, also replace inner oil seal with a new one.

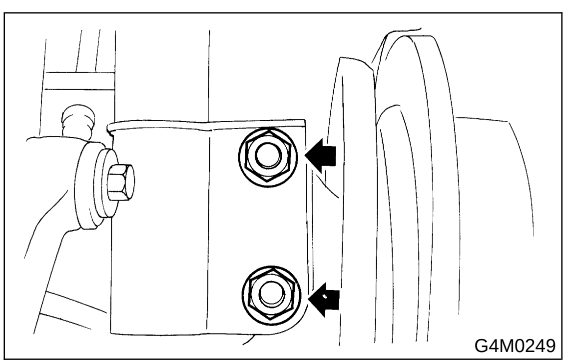


13) Remove rear ABS sensor from back plate (only vehicle equipped with ABS).



(1) ABS sensor

14) Remove bolts which secure rear housing to strut, and separate the two.

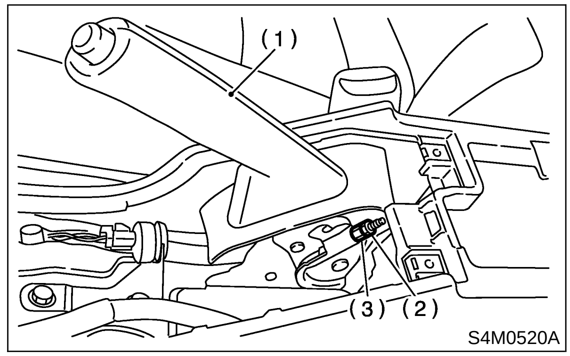


2. DRUM BRAKE *S301154A1803*

1) Disconnect battery ground cable.
2) Jack-up vehicle, and remove rear wheel cap and wheels.

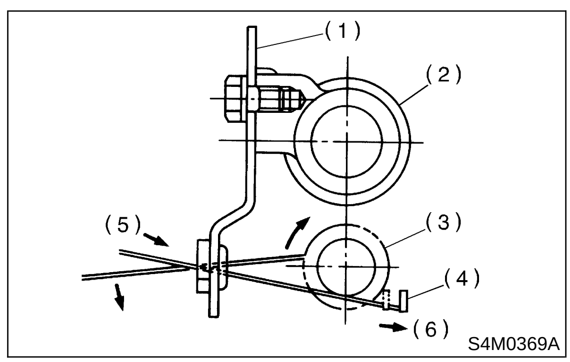
CAUTION:
Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

3) Unlock axle nut.
4) Remove axle nut using a socket wrench.
5) Return parking brake lever and loosen adjusting nut.



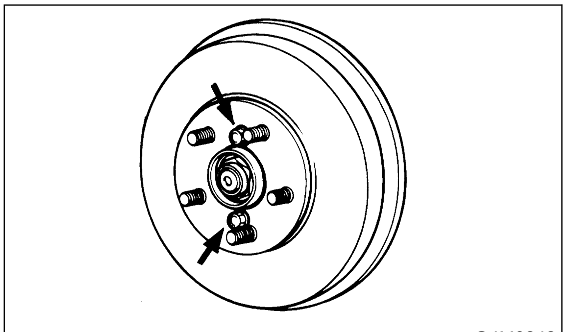
(1) Parking brake lever
(2) Lock nut
(3) Adjusting nut

6) Remove brake drum from hub.
7) If it is difficult to remove brake drum, remove adjusting hole cover from back plate, and then turn adjusting screw using a slot-type screwdriver until brake shoe separates from the drum.



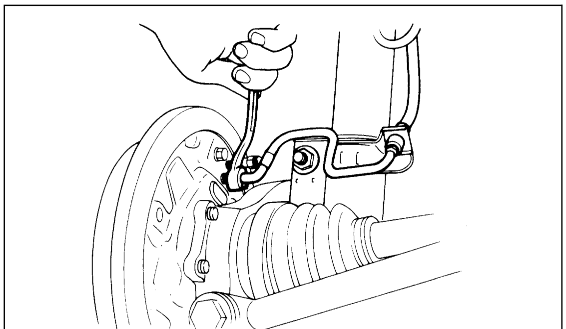
(1) Back plate
(2) Wheel cylinder
(3) Adjuster ASSY pawls
(4) Adjusting lever
(5) Tightening direction
(6) Push

NOTE:
If brake drum is difficult to remove, drive it out by installing an 8-mm bolt into bolt hole in brake drum.

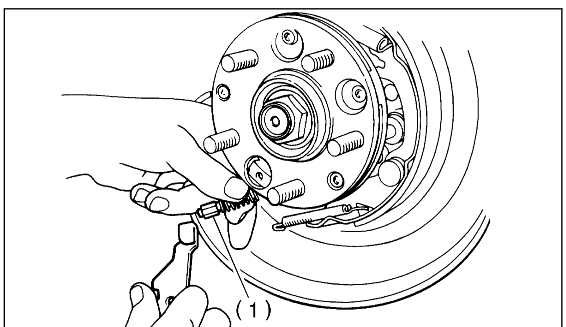

G4M0243

8) Using a flare-nut wrench, disconnect brake pipe from wheel cylinder.

CAUTION:
Cover open end of wheel cylinder to prevent entry of foreign particles.


G4M0244

9) Disconnect parking brake cable end.



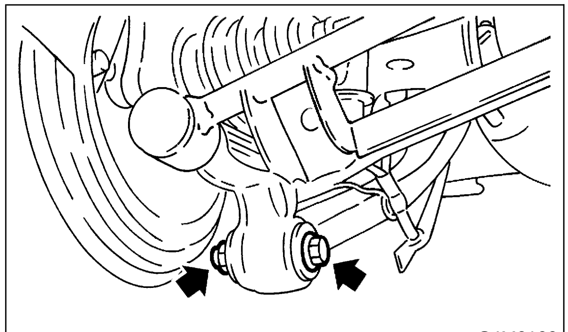
S4M0368A

(1) Cable end

10) Disconnect rear stabilizer from rear lateral link.

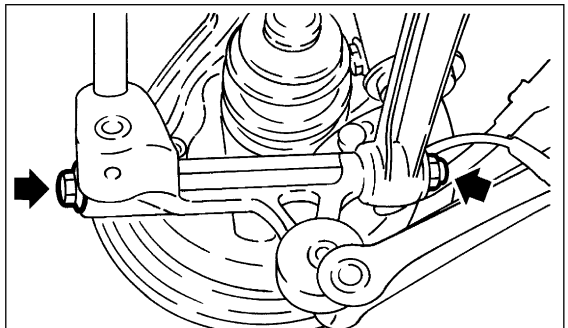
11) Remove bolts which secure trailing link assembly to rear housing.

CAUTION:
Discard old self-locking nut. Replace with a new one.


S4M0109

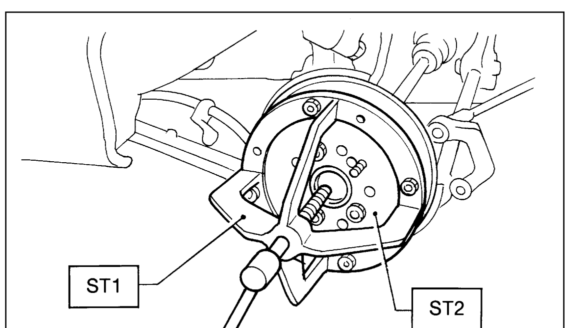
12) Remove bolts which secure lateral link assembly to rear housing.

CAUTION:
Discard old self-locking nut. Replace with a new one.


S4M0110

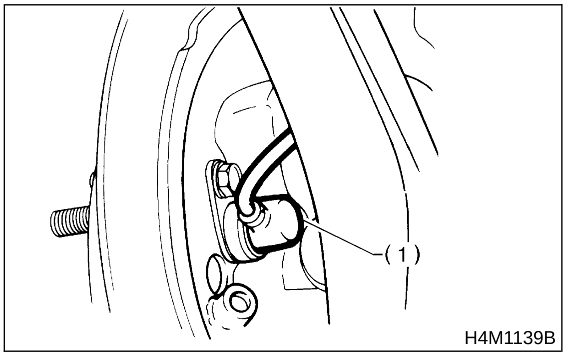
13) Disengage BJ from housing splines, and remove rear drive shaft assembly. If it is hard to remove, use STs.
ST1 926470000 AXLE SHAFT PULLER
ST2 927140000 PLATE

CAUTION:
- **Be careful not to damage oil seal lip when removing rear drive shaft.**
- **When rear drive shaft is to be replaced, also replace inner oil seal with a new one.**



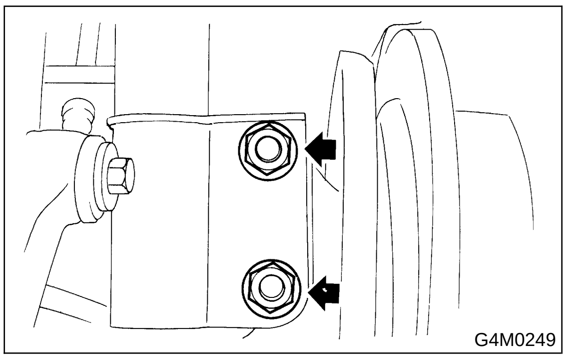
G4M0247

14) Remove rear ABS sensor from back plate (only vehicle equipped with ABS).



(1) ABS sensor

15) Remove bolts which secure rear housing to strut, and separate the two.



B: INSTALLATION *S301154A11*

1. DISC BRAKE *S301154A1102*

1) Connect rear housing assembly and strut assembly.

CAUTION:
Use a new self-locking nut.

Tightening torque:
196 N·m (20 kgf-m, 145 ft-lb)

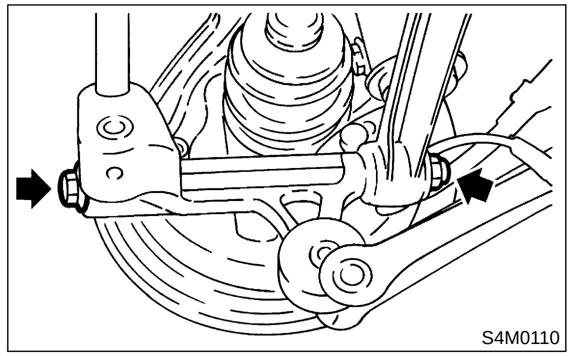
2) Fit BJ (bell joint) to rear housing splines.

CAUTION:
Be careful not to damage inner oil seal lip.

3) Connect rear housing assembly to lateral link assembly.

CAUTION:
Use a new self-locking nut.

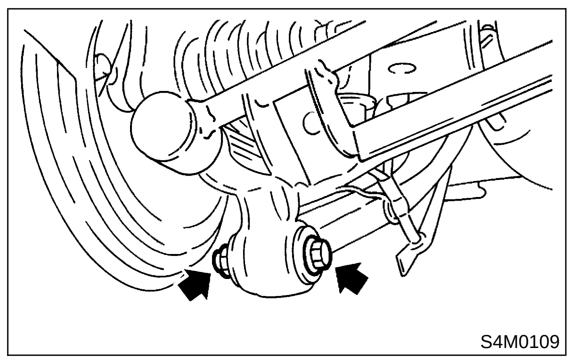
Tightening torque:
137 N·m (14 kgf-m, 101 ft-lb)



4) Connect rear housing assembly to trailing link assembly.

CAUTION:
Use a new self-locking nut.

Tightening torque:
113 N·m (11.5 kgf-m, 83 ft-lb)



5) Connect rear stabilizer to rear lateral link.

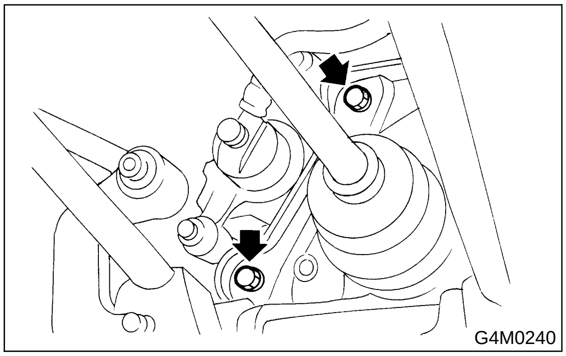
CAUTION:
Use a new self-locking nut.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)

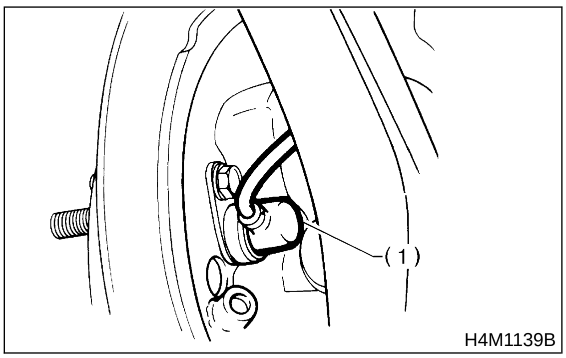
6) Connect parking brake cable to parking brake.
7) Install disc rotor on rear housing assembly.

8) Install disc brake caliper on back plate.

Tightening torque:
52 N·m (5.3 kgf-m, 38.3 ft-lb)


G4M0240

9) Install rear ABS sensor to back plate (only vehicle equipped with ABS).



H4M1139B

(1) ABS sensor

10) Bleed air from brake system. <Ref. to BR-42, Air Bleeding.>
11) Adjust parking brake lever stroke by turning adjuster.
12) Move brake lever back to apply brakes. While depressing brake pedal, tighten axle nut using a socket wrench. Lock axle nut after tightening.

Tightening torque:
186 N·m (19 kgf-m, 137 ft-lb)

CAUTION:
- **Use a new axle nut.**
- **Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.**
- **Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.**

13) Install wheel and tighten wheel nuts to specified torque.

Tightening torque:
88 N·m (9 kgf-m, 65 ft-lb)

2. DRUM BRAKE S301154A1103

1) Connect rear housing assembly and strut assembly.

CAUTION:
Use a new self-locking nut.

Tightening torque:
196 N·m (20 kgf-m, 145 ft-lb)

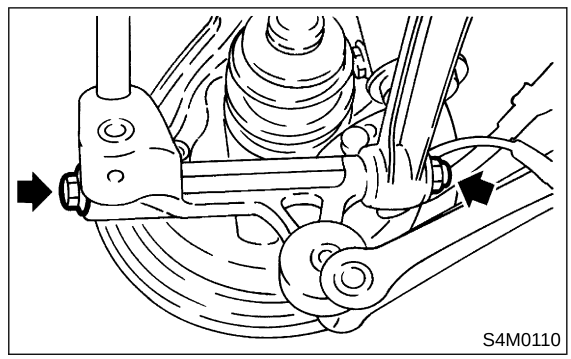
2) Fit BJ (bell joint) to rear housing splines.

CAUTION:
Be careful not to damage inner oil seal lip.

3) Connect rear housing assembly to lateral link assembly.

CAUTION:
Use a new self-locking nut.

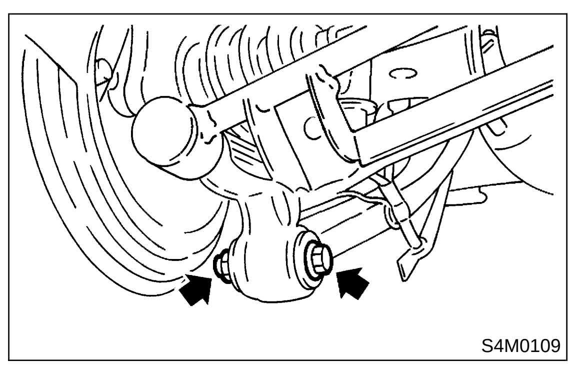
Tightening torque:
137 N·m (14 kgf-m, 101 ft-lb)


S4M0110

4) Connect rear housing assembly to trailing link assembly.

CAUTION:
Use a new self-locking nut.

Tightening torque:
113 N·m (11.5 kgf-m, 83 ft-lb)


S4M0109

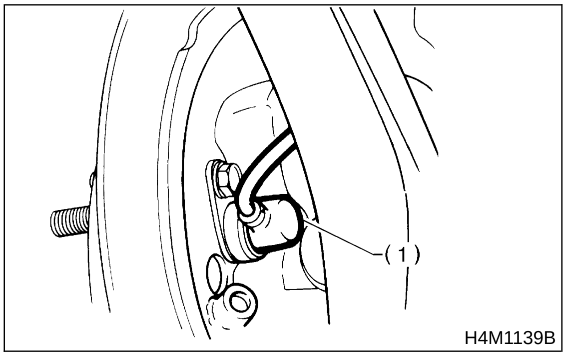
5) Connect rear stabilizer to rear lateral link.

CAUTION:
Use a new self-locking nut.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)

6) Connect parking brake cable to parking brake.

7) Clean brake pipe connection. Using a flare-nut wrench, connect brake pipe to wheel cylinder.
8) Connect rear ABS sensor to back plate (only vehicle equipped with ABS).



(1) ABS sensor

9) Connect parking brake cable to lever.
10) Install brake drum on rear housing assembly.
11) Bleed air from brake system. <Ref. to BR-42, Air Bleeding.>
12) Adjust parking brake lever stroke by turning adjuster.
13) Move brake lever back to apply brakes. While depressing brake pedal, tighten axle nut using a socket wrench. Lock axle nut after tightening.

Tightening torque:
186 N·m (19 kgf-m, 137 ft-lb)

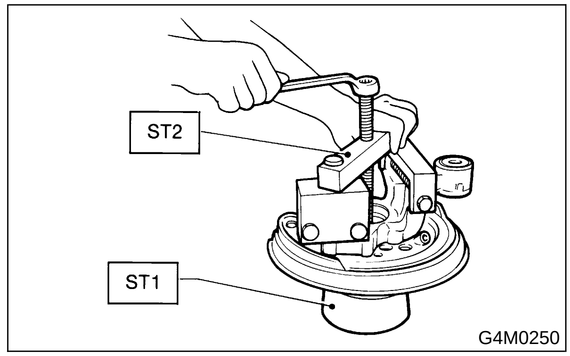
CAUTION:
- **Use a new axle nut.**
- **Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.**
- **Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.**

14) Install wheel and tighten wheel nuts to specified torque.

Tightening torque:
88 N·m (9 kgf-m, 65 ft-lb)

C: DISASSEMBLY *S301154A06*

1) Using ST1 and ST2, remove hub from rear housing.
ST1 927080000 HUB STAND
ST2 927420000 HUB REMOVER

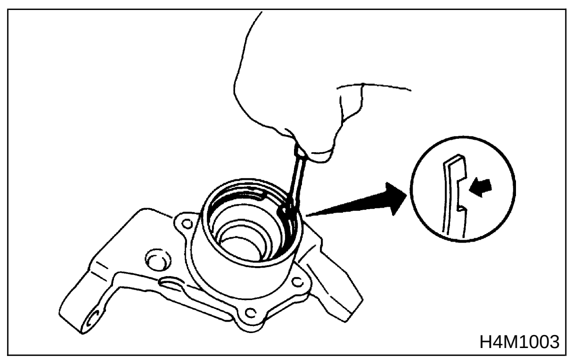


2) Remove back plate from rear housing.
3) Using a standard screwdriver, remove outer and inner oil seals.

CAUTION:
Use new oil seals.

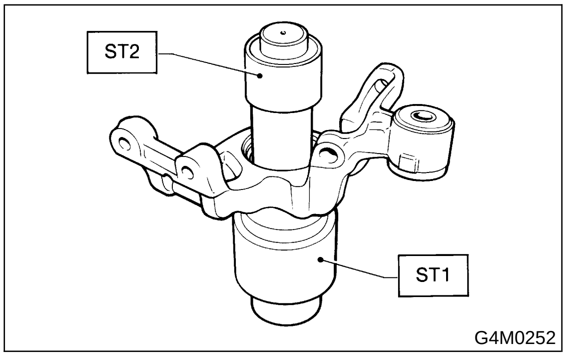
4) Using flat-bladed screwdriver, remove snap ring.

CAUTION:
Remove without scratching axle housing.



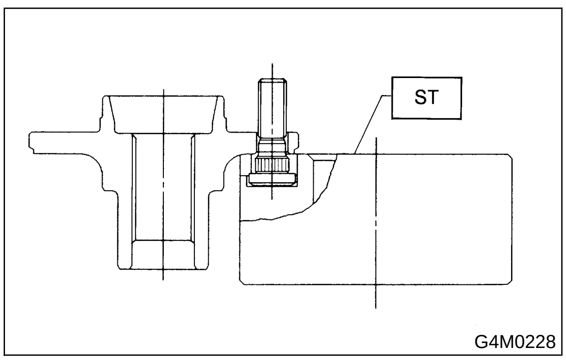
5) Using ST1 and ST2, remove bearing by pressing inner race.
ST1 927430000 HOUSING STAND
ST2 927440000 BEARING REMOVER

CAUTION:
- **Do not remove bearing unless damaged.**
- **Do not re-use bearing after removal.**



6) Remove tone wheel bolts and remove tone wheel from hub (only vehicle equipped with ABS).
7) Using ST, press hub bolt out.
ST 927080000 HUB STAND

CAUTION:
Be careful not to hammer hub bolts. This may deform hub.

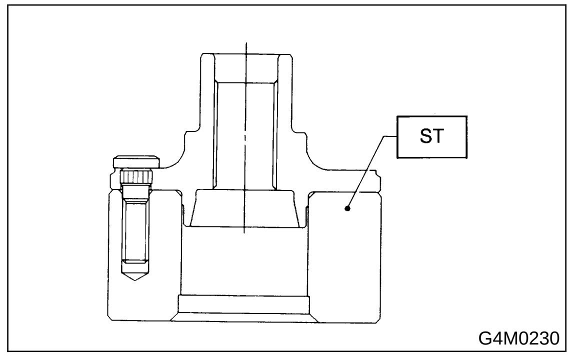


D: ASSEMBLY S301154A02

1) Using ST, press new hub bolt into place.

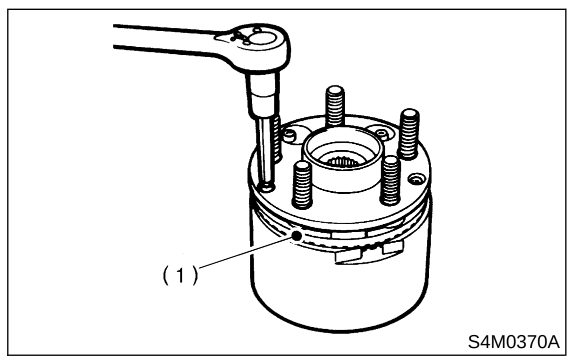
CAUTION:
- **Ensure hub bolt closely contacts hub.**
- **Use a 12 mm (0.47 in) hole in the ST to prevent hub bolt from tilting during installation.**

ST 927080000 HUB STAND



2) Remove foreign particles (dust, rust, etc.) from mating surfaces of hub and tone wheel, and install tone wheel to hub (only vehicle equipped with ABS).

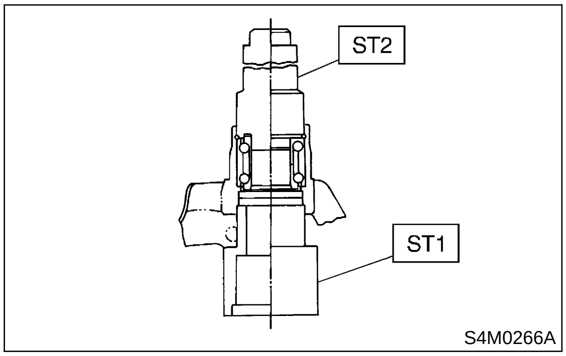
CAUTION:
- **Ensure tone wheel closely contacts hub.**
- **Be careful not to damage tone wheel teeth.**



(1) Tone wheel

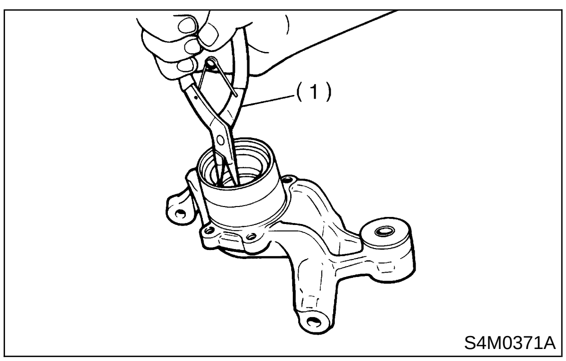
3) Clean housing interior completely. Using ST1 and ST2, press bearing into housing.
ST1 927430000 HOUSING STAND
ST2 927440000 BEARING REMOVER

CAUTION:
- **Always press outer race when installing bearing.**
- **Be careful not to remove plastic lock from inner race when installing bearing.**
- **Charge bearing with new grease when outer race is not removed.**



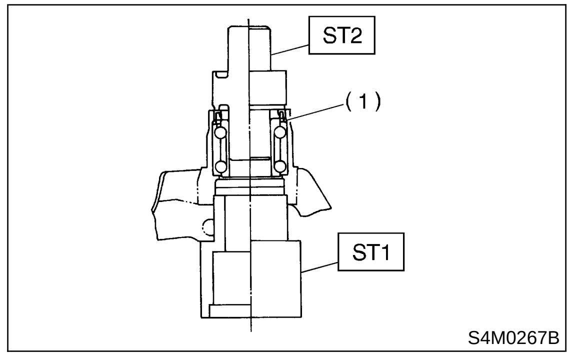
4) Using plier, install snap ring.

CAUTION:
- **Ensure snap ring fits in groove properly.**
- **Install without scratching axle housing.**



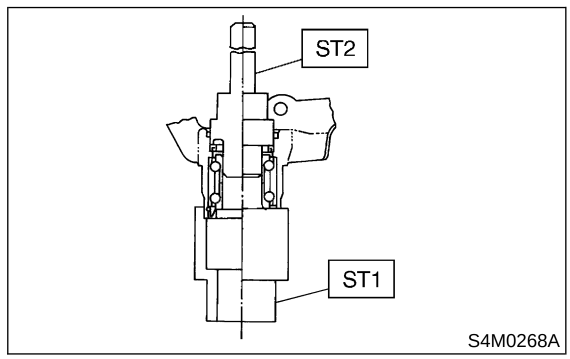
(1) Plier

5) Using ST1 and ST2, press outer oil seal until it comes in contact with snap ring.
ST1 927430000 HOUSING STAND
ST2 927460000 OIL SEAL INSTALLER

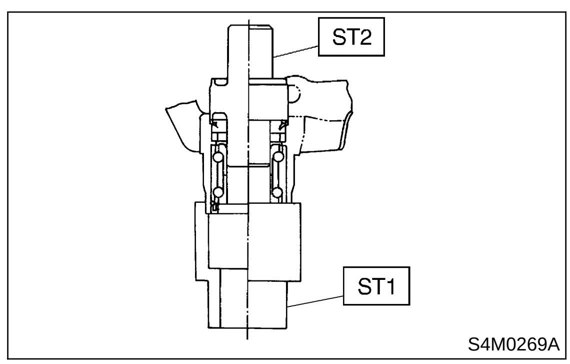


(1) Snap ring

6) Invert both ST1 and housing.
7) Using ST2, press inner oil seal into housing until it touches bottom.
ST1 927430000 HOUSING STAND
ST2 927460000 OIL SEAL INSTALLER



8) Using ST1 and ST2, press sub seal into place.
ST1 927430000 HOUSING STAND
ST2 927460000 OIL SEAL INSTALLER



9) Apply sufficient grease to oil seal lip.

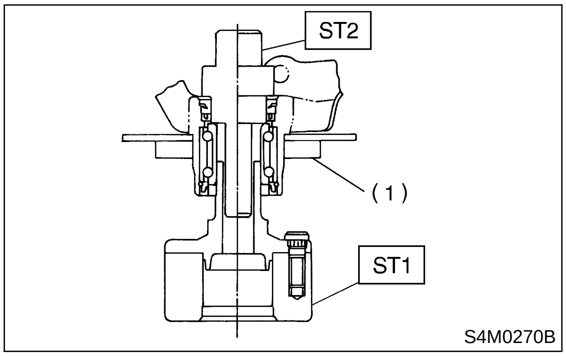
Specified grease:
SHELL 6459N

CAUTION:
- **If specified grease is not available, remove bearing grease and apply Auto Rex A instead.**
- **Do not mix different types of grease.**

10) Install back plate to rear housing.

Tightening torque:
52 N·m (5.3 kgf-m, 38 ft-lb)

11) Using ST1 and ST2, press bearing into hub.
ST1 927080000 HUB STAND
ST2 927450000 HUB INSTALLER



(1) Back plate

E: INSPECTION *S301154A10*

1) Check that there is no backlash in the rear bearing as well as front. And check that wheel rotates smoothly. <Ref. to DS-22, INSPECTION, Front Axle.>
2) Inspect the removed parts for wear and damage. If defective, replace with a new one.

CAUTION:
- **If a bearing is faulty, replace it as the bearing set.**
- **Be sure to replace oil seal at every overhaul.**

5. Front Drive Shaft S301153

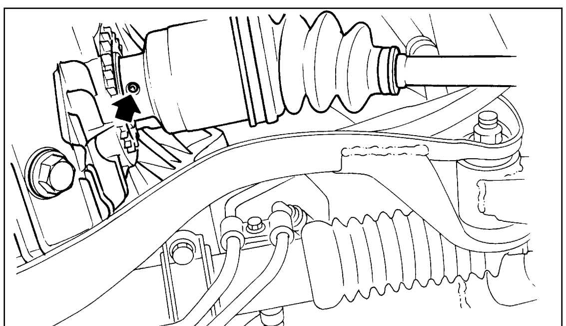
A: REMOVAL S301153A18

1) Disconnect battery ground cable.
2) Jack-up vehicle, support it with safety stands (rigid rocks), and remove front wheel cap and wheels.
3) Unlock axle nut.
4) Depress brake pedal and remove axle nut using a socket wrench.

CAUTION:
Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

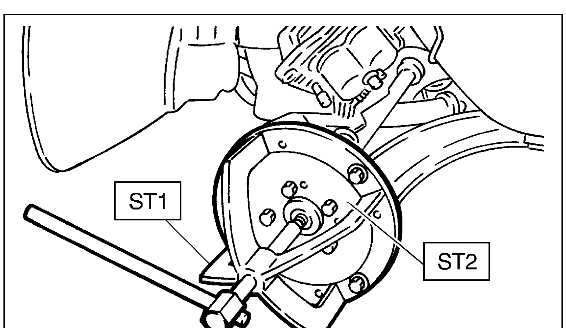
5) Remove stabilizer link from transverse link.
6) Disconnect transverse link from housing.
7) Remove spring pin which secures transmission spindle to SFJ.

CAUTION:
Use a new spring pin.


G4M0279

8) Remove front drive shaft assembly. If it is hard to remove, use ST1 and ST2.
ST1 926470000 AXLE SHAFT PULLER
ST2 927140000 PLATE

CAUTION:
- **Be careful not to damage oil seal lip and tone wheel when removing front drive shaft.**
- **When front drive shaft is to be replaced, also replace inner oil seal.**



S4M0108A

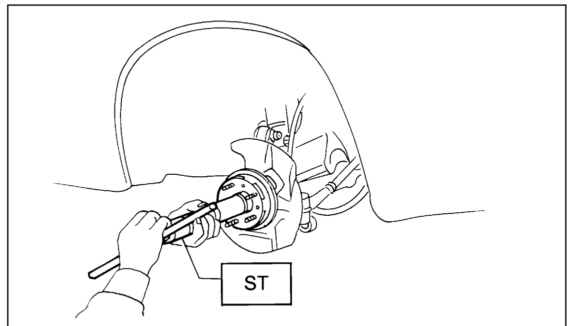
B: INSTALLATION S301153A11

1) Insert BJ into hub splines.

CAUTION:
Be careful not to damage inner oil seal lip and tone wheel.

2) Using ST1 and ST2, pull drive shaft into place.
ST1 922431000 AXLE SHAFT INSTALLER
ST2 927390000 ADAPTER

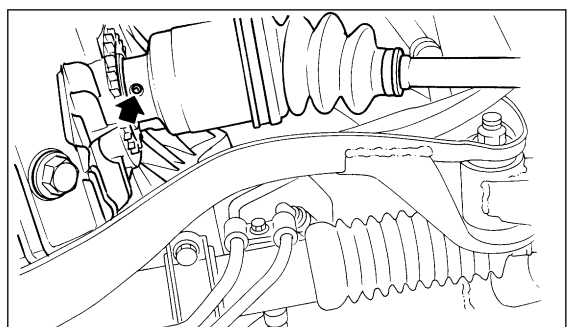
CAUTION:
Do not hammer drive shaft when installing it.



G4M0291

3) Tighten axle nut temporarily.
4) Install SFJ on transmission spindle and drive spring pin into place.

CAUTION:
Always use a new spring pin.


G4M0279

5) Connect transverse link to housing.

Tightening torque (self-locking nut):
49 N·m (5.0 kgf-m, 36 ft-lb)

CAUTION:
Use a new self-locking nut.

6) Install stabilizer bracket.
7) While depressing brake pedal, tighten axle nut to the specified torque.

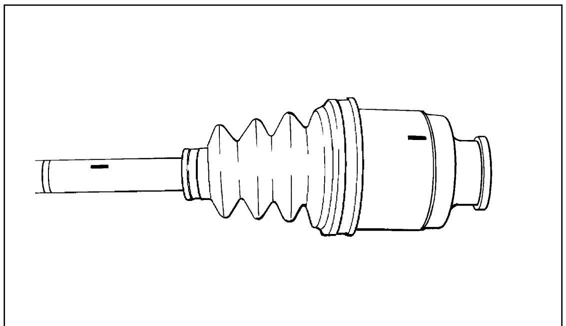
Tightening torque:
186 N·m (19 kgf-m, 137 ft-lb)

CAUTION:
- **Use a new axle nut.**
- **Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.**
- **Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.**

8) After tightening axle nut, lock it securely.

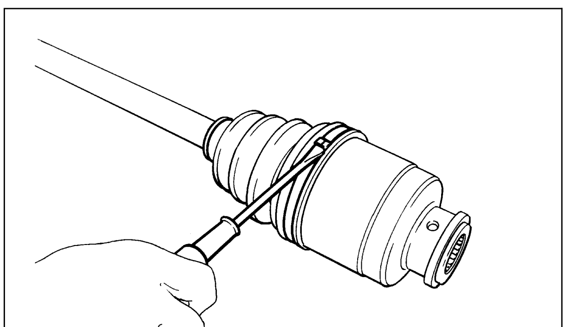
C: DISASSEMBLY *S301153A06*

1) Place alignment marks on shaft and outer race.

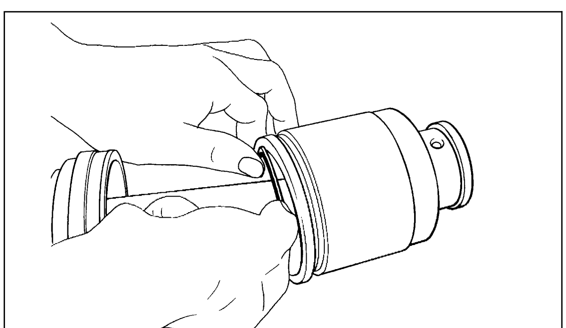

B4M0774

2) Remove SFJ boot band and boot.

CAUTION:
Be careful not to damage boot.


B4M0775

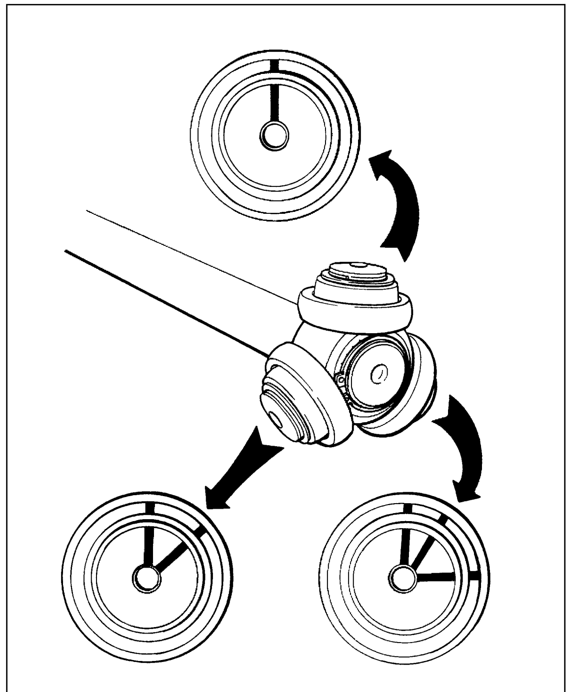
3) Remove circlip from SFJ outer race using screwdriver.


B4M0776

4) Remove SFJ outer race from shaft assembly.
5) Wipe off grease.

CAUTION:
The grease is a special grease. Do not confuse with other greases.

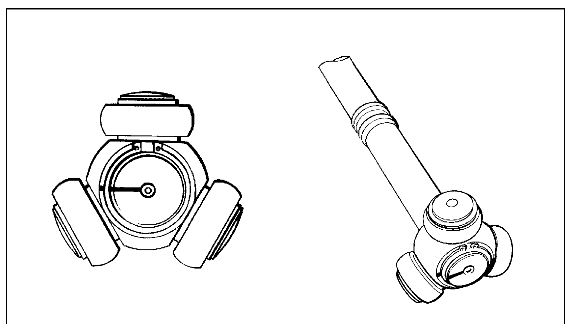
6) Place alignment mark on free ring and trunnion.


B4M0777

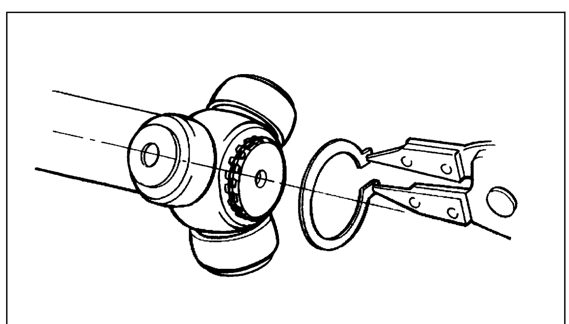
7) Remove free ring from trunnion.

CAUTION:
Be careful with the free ring position.

8) Place alignment mark on trunnion and shaft.


B4M0778

9) Remove snap ring and trunnion.

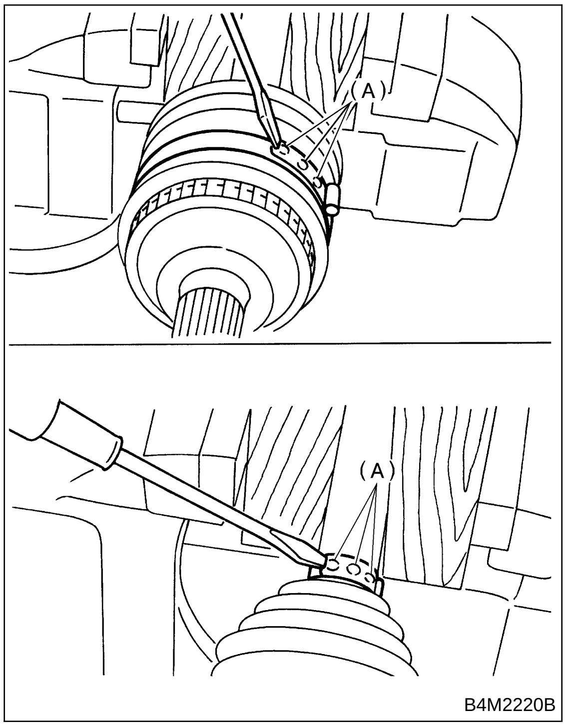

B4M0779

CAUTION:
Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

10) Remove SFJ boot.
11) Place drive shaft in a vise between wooden blocks.

CAUTION:
Do not place drive shaft directly in the vise; use wooden block.

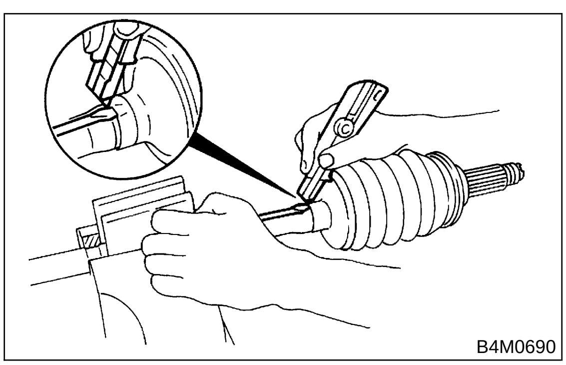
12) Raise boot band claws by means of screwdriver and hammer.



(A) Boot band claws

13) Cut and remove the boot.

CAUTION:
The boot must be replaced with a new one whenever it is removed.



14) Thus, disassembly of axle is completed, but BJ cannot be disassembled.

D: ASSEMBLY S301153A02

CAUTION:
Use specified grease.

BJ side:
NTG2218 (Part No. 28093AA000)

SFJ side:
SSG6003 (Part No. 28093TA000)

1) Place BJ boot and small boot band on BJ side of shaft.

CAUTION:
Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

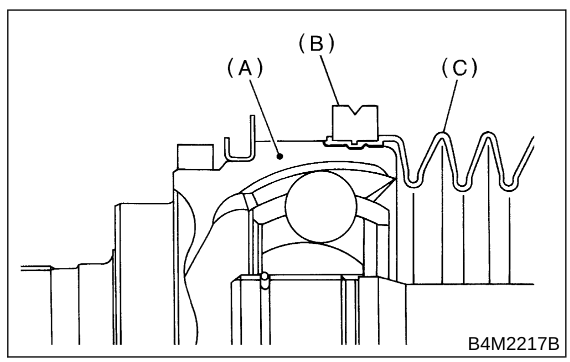
2) Place drive shaft in a vise.

CAUTION:
Do not place drive shaft directly in the vise; use wooden blocks.

3) Apply a coat of specified grease [60 to 70 g (2.12 to 2.47 oz)] to BJ.
4) Apply an even coat of specified grease [20 to 30 g (0.71 to 1.06 oz)] to the entire inner surface of boot. Also apply grease to shaft.

NOTE:
The inside of the larger end of BJ boot and the boot groove shall be cleaned so as to be free from grease and other substances.

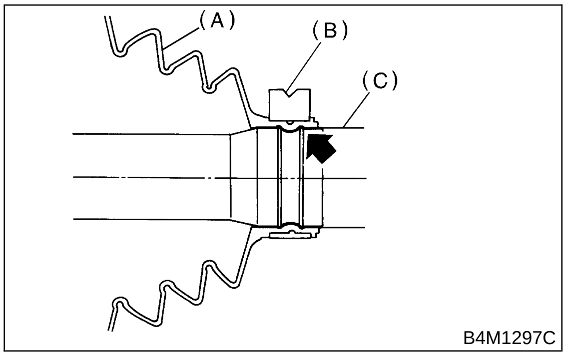
5) Install boot projecting portion to BJ groove.



(A) BJ
(B) Large boot band
(C) Boot

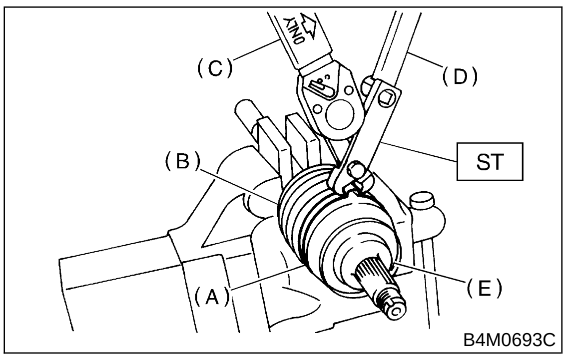
6) Set large boot band in place.

7) Install boot projecting portion to shaft groove.



(A) Boot
(B) Small boot band
(C) Shaft

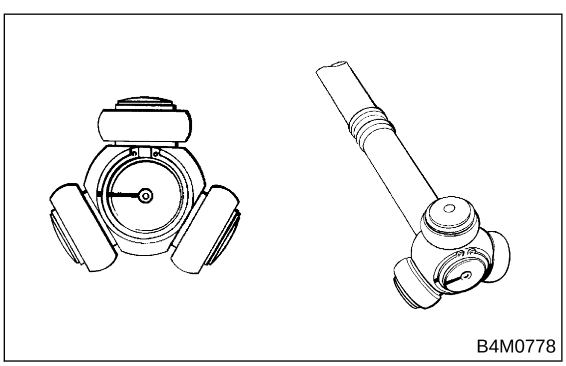
8) Tighten boot bands using ST, torque wrench and socket flex handle.
ST 28099AC000 BOOT BAND PLIER



(A) Large boot band
(B) Boot
(C) Torque wrench
(D) Socket flex handle
(E) BJ

Tightening torque:
Large boot band
157 N·m (16.0 kgf-m, 116 ft-lb) or more
Small boot band
133 N·m (13.6 kgf-m, 98 ft-lb) or more

9) Place SFJ boot at the center of shaft.
10) Align alignment marks and install trunnion on shaft.

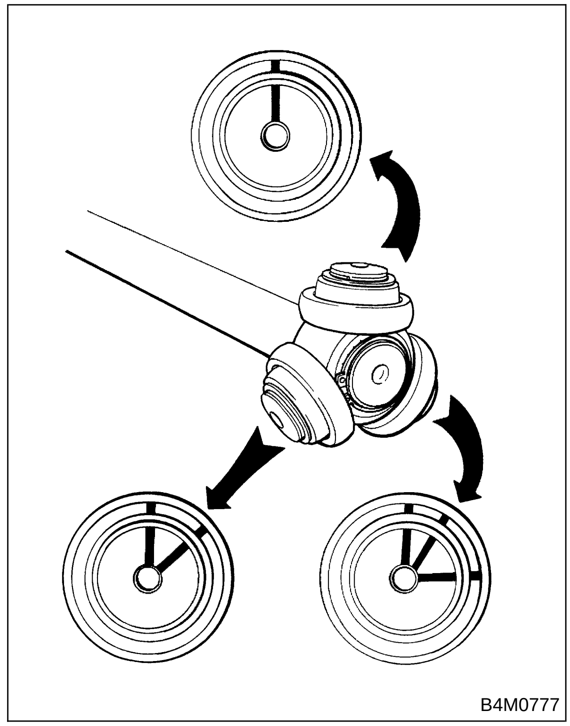


11) Install snap ring to shaft.

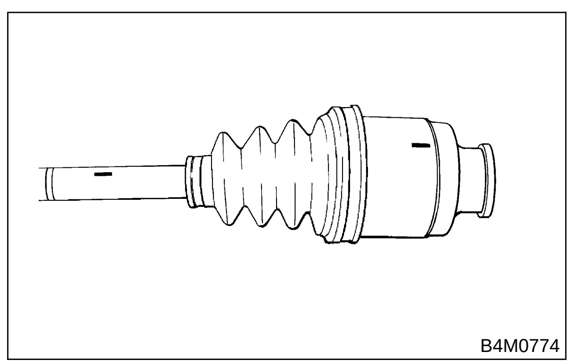
CAUTION:
Confirm that the snap ring is completely fitted in the shaft groove.

12) Fill 100 to 110 g (3.53 to 3.88 oz) of specified grease into the interior of SFJ outer race.
13) Apply a coat of specified grease to free ring and trunnion.
14) Align alignment marks on free ring and trunnion and install free ring.

CAUTION:
Be careful with the free ring position.



15) Align alignment marks on shaft and outer race, and install outer race.



16) Install circlip in the groove on SFJ outer race.

CAUTION:
Pull the shaft lightly and assure that the circlip is completely fitted in the groove.

17) Apply an even coat of the specified grease 30 to 40 g (1.06 to 1.41 oz) to the entire inner surface of boot.
18) Install SFJ boot taking care not to twist it.

CAUTION:
- **The inside of the larger end of SFJ boot and the boot groove shall be cleaned so as to be free from grease and other substances.**
- **When installing SFJ boot, position outer race of SFJ at center of its travel.**

19) Put a band through the clip and wind twice in alignment with band groove of boot.

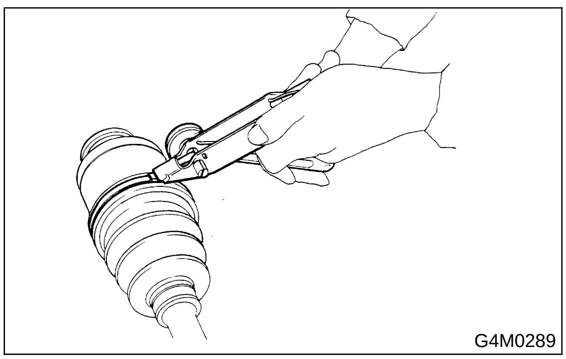
CAUTION:
Use a new band.

20) Pinch the end of band with pliers. Hold the clip and tighten securely.

NOTE:
When tightening boot, exercise care so that the air within the boot is appropriate.

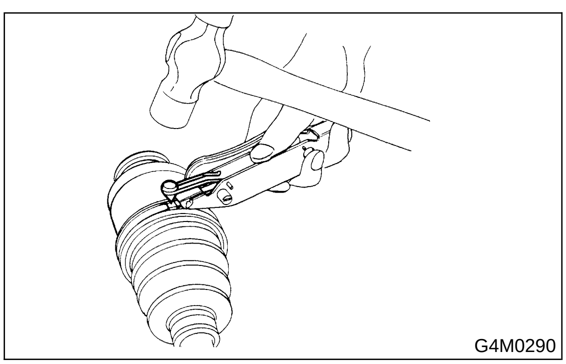
21) Tighten band by using ST.
ST 925091000 BAND TIGHTENING TOOL

NOTE:
Tighten band until it cannot be moved by hand.



22) Tap on the clip with the punch provided at the end of ST.
ST 925091000 BAND TIGHTENING TOOL

CAUTION:
Tap to an extent that the boot underneath is not damaged.



23) Cut off band with an allowance of about 10 mm (0.39 in) left from the clip and bend this allowance over the clip.

CAUTION:
Be careful so that the end of the band is in close contact with clip.

24) Fix up boot on BJ in the same manner.

NOTE:
Extend and retract SFJ to provide equal grease coating.

E: INSPECTION S301153A10

Check the removed parts for damage, wear, corrosion etc. If faulty, repair or replace.
1) DOJ (Double Offset Joint)
Check seizure, corrosion, damage, wear and excessive play.
2) SFJ (Shudder-less Freering tripod Joint)
Check seizure, corrosion, damage and excessive play.
3) Shaft
Check excessive bending, twisting, damage and wear.
4) BJ (Bell Joint)
Check seizure, corrosion, damage and excessive play.
5) Boot
Check for wear, warping, breakage or scratches.
6) Grease
Check for discoloration or fluidity.

6. Front Drive Shaft Boot S301755

A: INSPECTION S301755A10

Check boot for deterioration, deform and damage. If any fault is found, replace the boot.

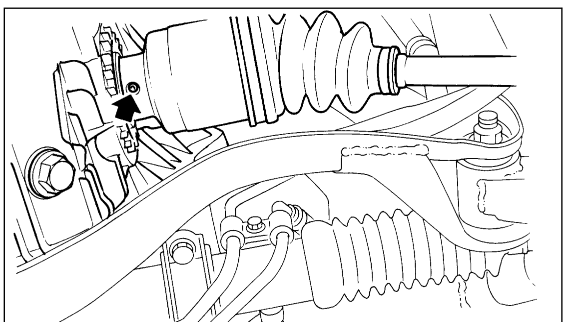
B: REPLACEMENT S301755A20

1) Set vehicle on a lift.
2) Disconnect battery ground cable.
3) Jack-up vehicle, support it with safety stands (rigid rocks), and remove front wheel cap and wheels.

NOTE:
Do not remove axle nut.

4) Remove stabilizer link.
5) Disconnect transverse link from housing.
6) Remove spring pin which secures transmission spindle to SFJ.

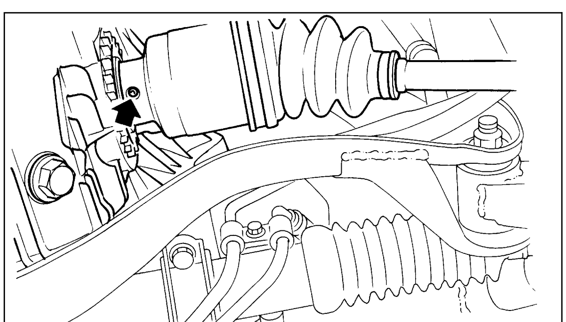
CAUTION:
Use a new spring pin.



G4M0279

7) Remove BJ and SFJ boots from drive shaft. <Ref. to DS-33, DISASSEMBLY, Front Drive Shaft.>
8) Install BJ and SFJ boots to drive shaft. <Ref. to DS-34, ASSEMBLY, Front Drive Shaft.>
9) Install SFJ on transmission spindle and drive spring pin into place.

CAUTION:
Always use a new spring pin.



G4M0279

10) Connect transverse link to housing.
11) Install stabilizer link.

7. Rear Drive Shaft S301156

A: REMOVAL S301156A18

1) Set vehicle on a lift.
2) Disconnect battery ground cable.
3) Lift vehicle. Remove rear wheel cap and wheels.

CAUTION:
Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

4) Unlock axle nut.
5) Loosen axle nut using a socket wrench.

CAUTION:
Do not remove axle nut.

6) Remove ABS sensor clamps and parking brake cable bracket.
7) Remove bolts which secure lateral link assembly to rear housing.

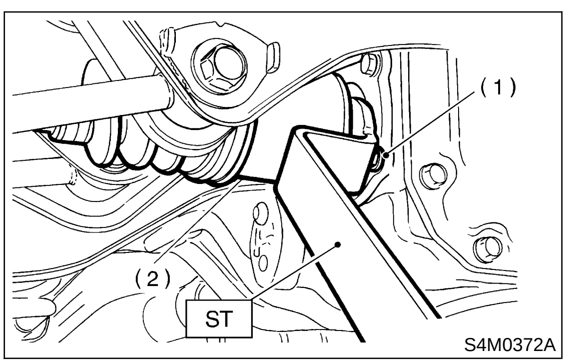
CAUTION:
Discard old self-locking nut. Replace with a new one.

8) Remove bolts which secure trailing link assembly to rear housing.

CAUTION:
Discard old self-locking nut. Replace with a new one.

9) Remove DOJ from rear differential using ST.
ST 28099PA100 DRIVE SHAFT REMOVER

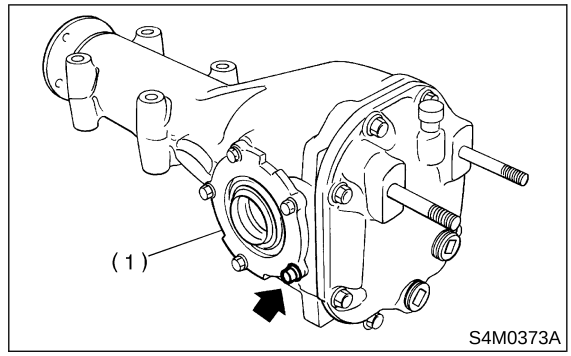
CAUTION:
Do not remove circlip attached to inside of differential.



(1) Bolt
(2) DOJ

CAUTION:
Be careful not to damage side bearing retainer. Always use bolt as shown in figure, as supporting point for ST during removal.

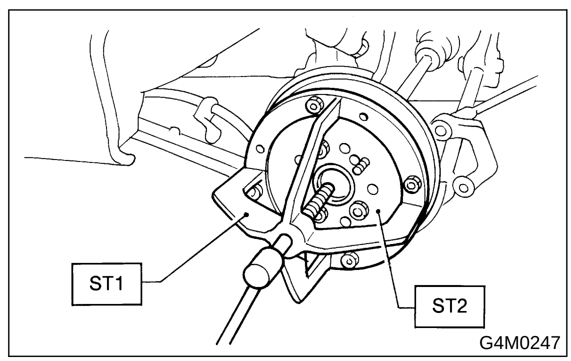
ST 28099PA100 DRIVE SHAFT REMOVER



(1) Side bearing retainer

10) Remove axle nut and drive shaft. If it is hard to remove, use ST1 and ST2.
ST1 926470000 AXLE SHAFT PULLER
ST2 927140000 PLATE

CAUTION:
- **Be careful not to damage oil seal lip when removing rear drive shaft.**
- **When rear drive shaft is to be replaced, also replace inner oil seal with a new one.**



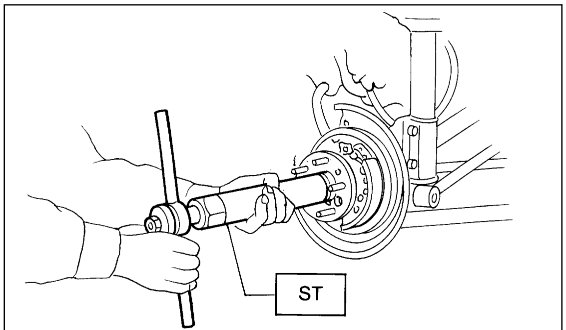
B: INSTALLATION S301156A11

1) Insert BJ into rear housing splines.

CAUTION:
Be careful not to damage inner oil seal lip.

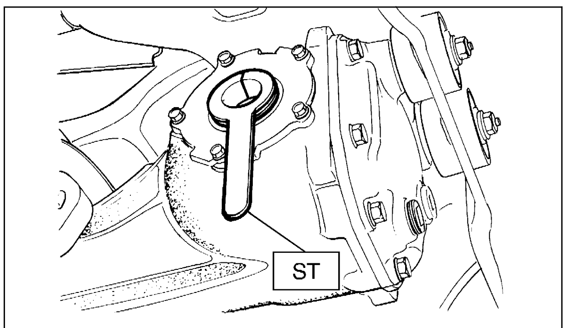
2) Using ST1 and ST2, pull drive shaft into place.
ST1 922431000 AXLE SHAFT INSTALLER
ST2 927390000 ADAPTER

CAUTION:
Do not hammer drive shaft when installing it.



G4M0293

3) Tighten axle nut temporarily.
4) Using ST, install DOJ into differential.
ST 28099PA090 SIDE OIL SEAL PROTECTOR

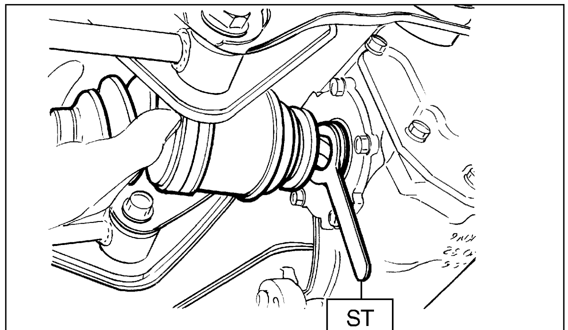


B4M0549A

5) Insert DOJ spline end into bore of side oil seal, and remove ST.

CAUTION:
Do not allow DOJ splines to damage side oil seal.

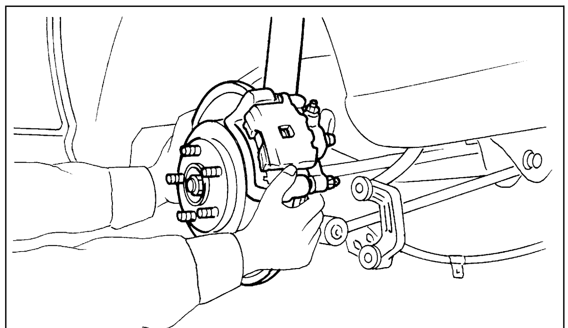
ST 28099PA090 SIDE OIL SEAL PROTECTOR



B4M0550A

6) Align DOJ and differential splines.
7) Push housing to insert DOJ into differential.

NOTE:
Make sure DOJ is inserted properly.


G3M0050

8) Connect rear housing assembly to trailing link assembly, and tighten self-locking nut.

Tightening torque:
113 N·m (11.5 kgf-m, 83 ft-lb)

9) Connect rear housing assembly to lateral link assembly, and tighten self-locking nut.

Tightening torque:
137 N·m (14 kgf-m, 101 ft-lb)

10) Install stabilizer bracket.

11) While depressing brake pedal, tighten axle nut using a socket wrench.

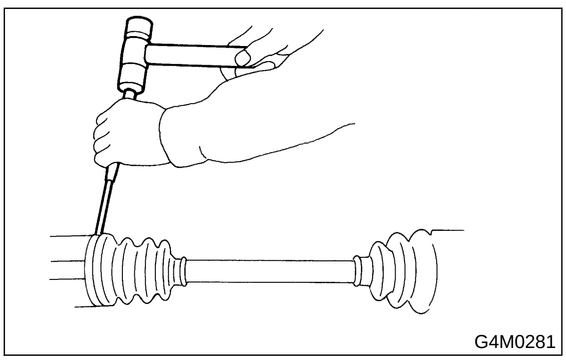
Tightening torque:
186 N·m (19 kgf-m, 137 ft-lb)

CAUTION:
- **Use a new axle nut.**
- **Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.**
- **Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.**

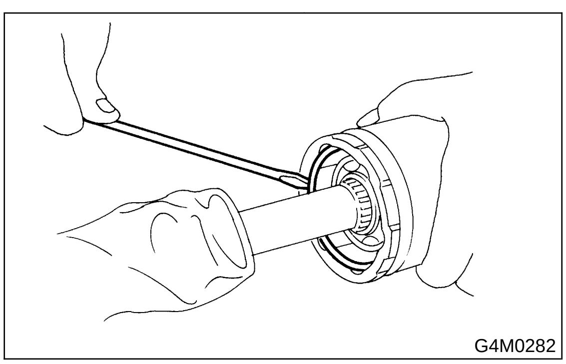
12) After tightening axle nut, lock it securely.

C: DISASSEMBLY *S301156A06*

1) Straighten bent claw of larger end of DOJ boot.
2) Loosen band by means of screwdriver or pliers with care of not damaging boot.



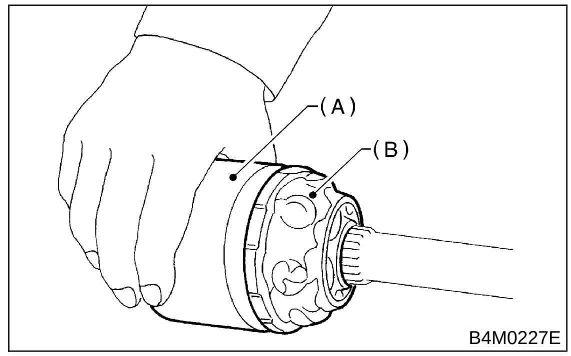
3) Remove boot band on the small end of DOJ boot in the same manner.
4) Remove the larger end of DOJ boot from DOJ outer race.
5) Pry and remove round circlip located at the neck of DOJ outer race with a screwdriver.



6) Take out DOJ outer race from shaft assembly.
7) Wipe off grease and take out balls.

CAUTION:
The grease is a special grease (grease for constant velocity joint). Do not confuse with other greases.

NOTE:
Disassemble exercising care not to lose balls (6 pcs).



(A) Outer race
(B) Grease

8) To remove the cage from the inner race, turn the cage by a half pitch to the track groove of the inner race and shift the cage.
9) Remove snap ring, which fixes inner race to shaft, by using pliers.
10) Take out DOJ inner race.
11) Take off DOJ cage from shaft and remove DOJ boot.

CAUTION:
Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

12) Remove BJ boot in the same procedure as DOJ boot.
13) Thus, disassembly of axle is completed, but BJ is unable to be disassembled.

D: ASSEMBLY *S301156A02*

CAUTION:
Use specified grease.

BJ side:
Molylex No. 2 (Part No. 723223010)

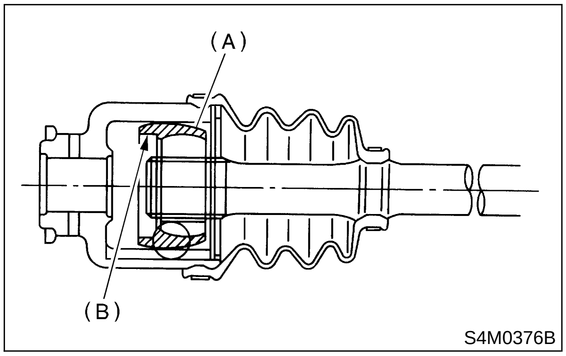
DOJ side:
VU-3A702 (Yellow) (Part No. 23223GA050)

1) Install BJ boot in specified position, and fill it with 60 to 70 g (2.12 to 2.47 oz) of specified grease.
2) Place DOJ boot at the center of shaft.

CAUTION:
Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

3) Insert DOJ cage onto shaft.

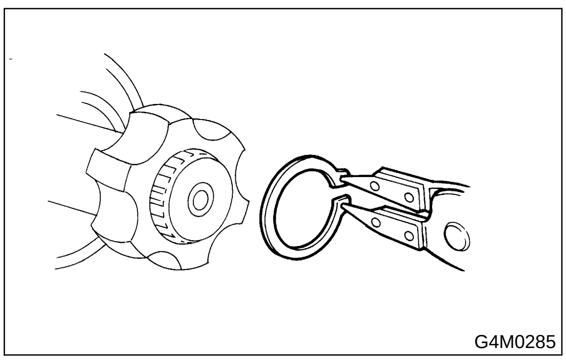
NOTE:
Insert the cage with the cut-out portion facing the shaft end, since the cage has an orientation.



(A) Cage
(B) Cut-out portion

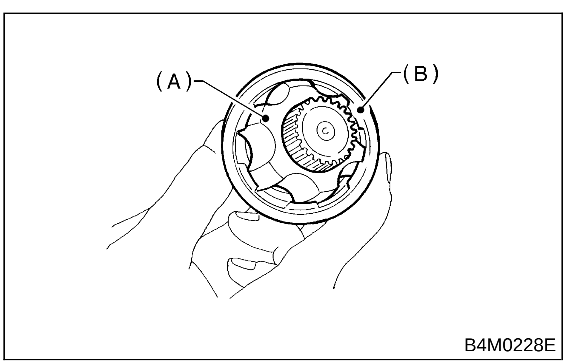
4) Install DOJ inner race on shaft and fit snap ring with pliers.

NOTE:
Confirm that the snap ring is completely fitted in the shaft groove.



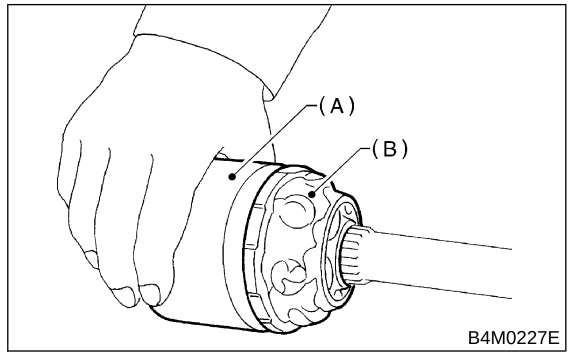
5) Install cage, which was previously fitted, to inner race fixed upon shaft.

NOTE:
Fit the cage with the protruded part aligned with the track on the inner race and then turn by a half pitch.



(A) Inner race
(B) Cage

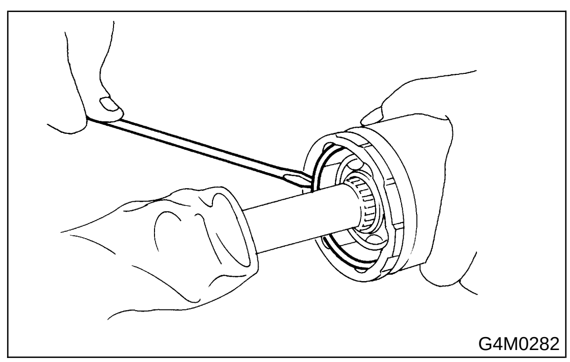
6) Fill 80 to 90 g (2.82 to 3.17 oz) of specified grease into the interior of DOJ outer race.
7) Apply a coat of specified grease to the cage pocket and six balls.
8) Insert six balls into the cage pocket.
9) Align the outer race track and ball positions and place in the part where shaft, inner race, cage and balls are previously installed, and then fit outer race.



(A) Outer race
(B) Grease

10) Install circlip in the groove on DOJ outer race.

NOTE:
- Assure that the balls, cage and inner race are completely fitted in the outer race of DOJ.
- Exercise care not to place the matched position of circlip in the ball groove of outer race.
- Pull the shaft lightly and assure that the circlip is completely fitted in the groove.



11) Apply an even coat of the specified grease [20 to 30 g (0.71 to 1.06 oz)] to the entire inner surface of boot. Also apply grease to shaft.
12) Install DOJ boot taking care not to twist it.

NOTE:
- The inside of the larger end of DOJ boot and the boot groove shall be cleaned so as to be free from grease and other substances.
- When installing DOJ boot, position outer race of DOJ at center of its travel.

13) Put a band through the clip and wind twice in alignment with band groove of boot.

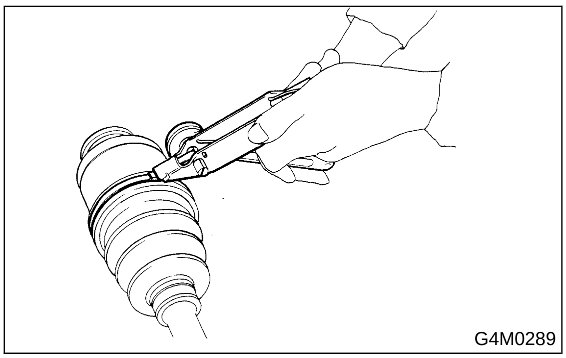
CAUTION:
Use a new band.

14) Pinch the end of band with pliers. Hold the clip and tighten securely.

NOTE:
When tightening boot, exercise care so that the air within the boot is appropriate.

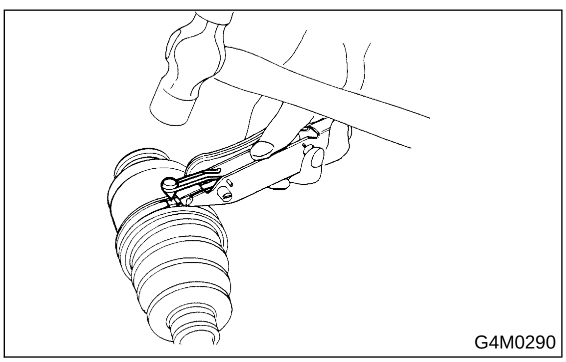
15) Tighten band by using ST.
ST 925091000 BAND TIGHTENING TOOL

NOTE:
Tighten band until it cannot be moved by hand.


G4M0289

16) Tap on the clip with the punch provided at the end of ST.
ST 925091000 BAND TIGHTENING TOOL

CAUTION:
Tap to an extent that the boot underneath is not damaged.


G4M0290

17) Cut off band with an allowance of about 10 mm (0.39 in) left from the clip and bend this allowance over the clip.

CAUTION:
Be careful so that the end of the band is in close contact with clip.

18) Fix up boot on BJ in the same manner.

NOTE:
Extend and retract DOJ to provide equal grease coating.

E: INSPECTION S301156A10

Check the removed parts for damage, wear, corrosion etc. If faulty, repair or replace.

1) DOJ (Double Offset Joint)
Check seizure, corrosion, damage, wear and excessive play.

2) SFJ (Shudder-less Freering tripod Joint)
Check seizure, corrosion, damage and excessive play.

3) Shaft
Check excessive bending, twisting, damage and wear.

4) BJ (Bell Joint)
Check seizure, corrosion, damage and excessive play.

5) Boot
Check for wear, warping, breakage or scratches.

6) Grease
Check for discoloration or fluidity.

8. Rear Drive Shaft Boot S301756

A: INSPECTION S301756A10

Check boot for deterioration, deform and damage. If any fault is found, replace the boot.

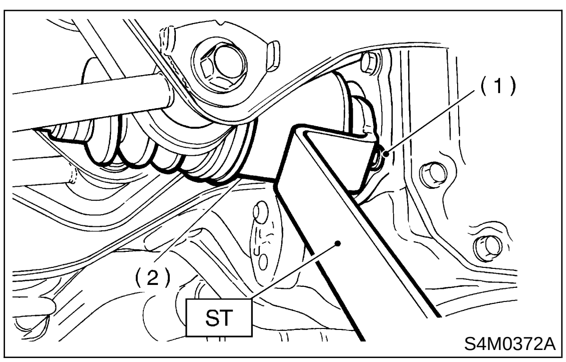
B: REPLACEMENT S301756A20

1) Set vehicle on a lift.
2) Disconnect battery ground cable.
3) Lift vehicle. Remove rear wheel cap and wheels.

NOTE:
Axle nut need not be removed.

4) Remove ABS sensor clamps and parking brake cable bracket.
5) Disconnect stabilizer link from lateral link.
6) Remove bolts which secure lateral link assembly to rear housing.
7) Remove bolts which secure trailing link assembly to rear housing.
8) Remove DOJ from rear differential using ST.
ST 28099PA100 DRIVE SHAFT REMOVER

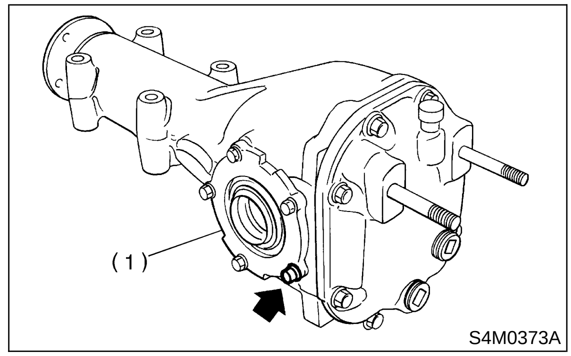
NOTE:
The side spline shaft circlip comes out together with the shaft.



(1) Bolt
(2) DOJ

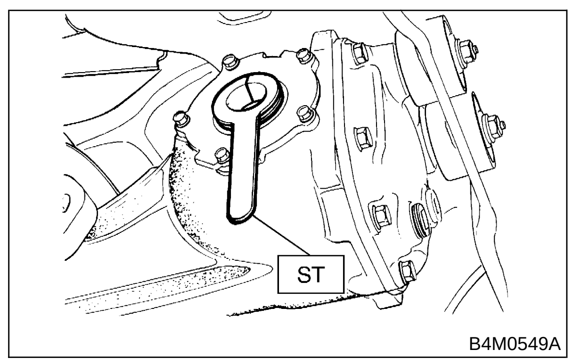
CAUTION:
Be careful not to damage side bearing retainer. Always use bolt as shown in figure, as supporting point for ST during removal.

ST 28099PA100 DRIVE SHAFT REMOVER



(1) Side bearing retainer

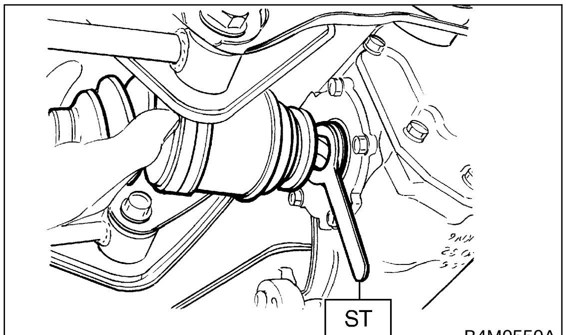
9) Remove DOJ and BJ boots from drive shaft. <Ref. to DS-33, DISASSEMBLY, Front Drive Shaft.>
10) Install DOJ and BJ boots to drive shaft. <Ref. to DS-40, ASSEMBLY, Rear Drive Shaft.>
11) Using ST, install DOJ into differential.
ST 28099PA090 SIDE OIL SEAL PROTECTOR



12) Insert DOJ spline end into bore of side oil seal, and remove ST.

CAUTION:
Do not allow DOJ splines to damage side oil seal.

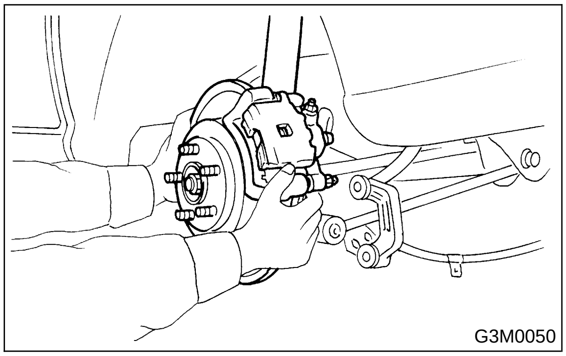
ST 28099PA090 SIDE OIL SEAL PROTECTOR



B4M0550A

13) Align DOJ and differential splines.
14) Push housing to insert DOJ into differential.

NOTE:
Make sure DOJ is inserted properly.


G3M0050

CAUTION:
Discard old self-locking nut. Replace with a new one.

15) Connect rear housing assembly to trailing link assembly, and tighten self-locking nut.
16) Connect rear housing assembly to lateral link assembly, and tighten self-locking nut.
17) Connect stabilizer link to lateral link.
18) Install ABS sensor clamps and parking brake cable bracket.

9. General Diagnostic Table S301257

A: INSPECTION S301257A10

NOTE:
Vibration while cruising may be caused by an unbalanced tire, improper tire inflation pressure, improper wheel alignment, etc.

Symptom	Possible cause	Remedy
1. Vibration of propeller shaft NOTE: Vibration is caused by propeller shaft during operation and is transferred to vehicle body. Generally vibration increase in proportion to vehicle speed.	(1) Worn or damaged universal joint.	Replace.
	(2) Unbalanced propeller shaft due to bend or dent.	Replace.
	(3) Loose installation of propeller shaft.	Retighten.
	(4) Worn or damaged center bearing and damaged center mounting rubber.	Replace.
2. Tapping when starting and noise while cruising, caused by propeller shaft.	(1) Worn or damaged universal joint.	Replace.
	(2) Worn spline of sleeve yoke.	Replace.
	(3) Loose installation of propeller shaft.	Retighten.
	(4) Loose installation of joint.	Replace.
	(5) Worn or damaged center bearing and damaged center mounting rubber.	Replace.
3. Front wheel shimmy	(1) Worn or damaged hub bearing	Repair or replace.
4. Wander or pulling	(1) Worn or damaged hub bearing	Repair or replace.

ABS

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2. ABS Control Module and Hydraulic Control Unit (ABSCM&H/U)...............7
3. ABS Sequence Control 11
4. Front ABS Sensor 14
5. Rear ABS Sensor..18
6. Front Tone Wheel..21
7. Rear Tone Wheel 22
8. G Sensor 23

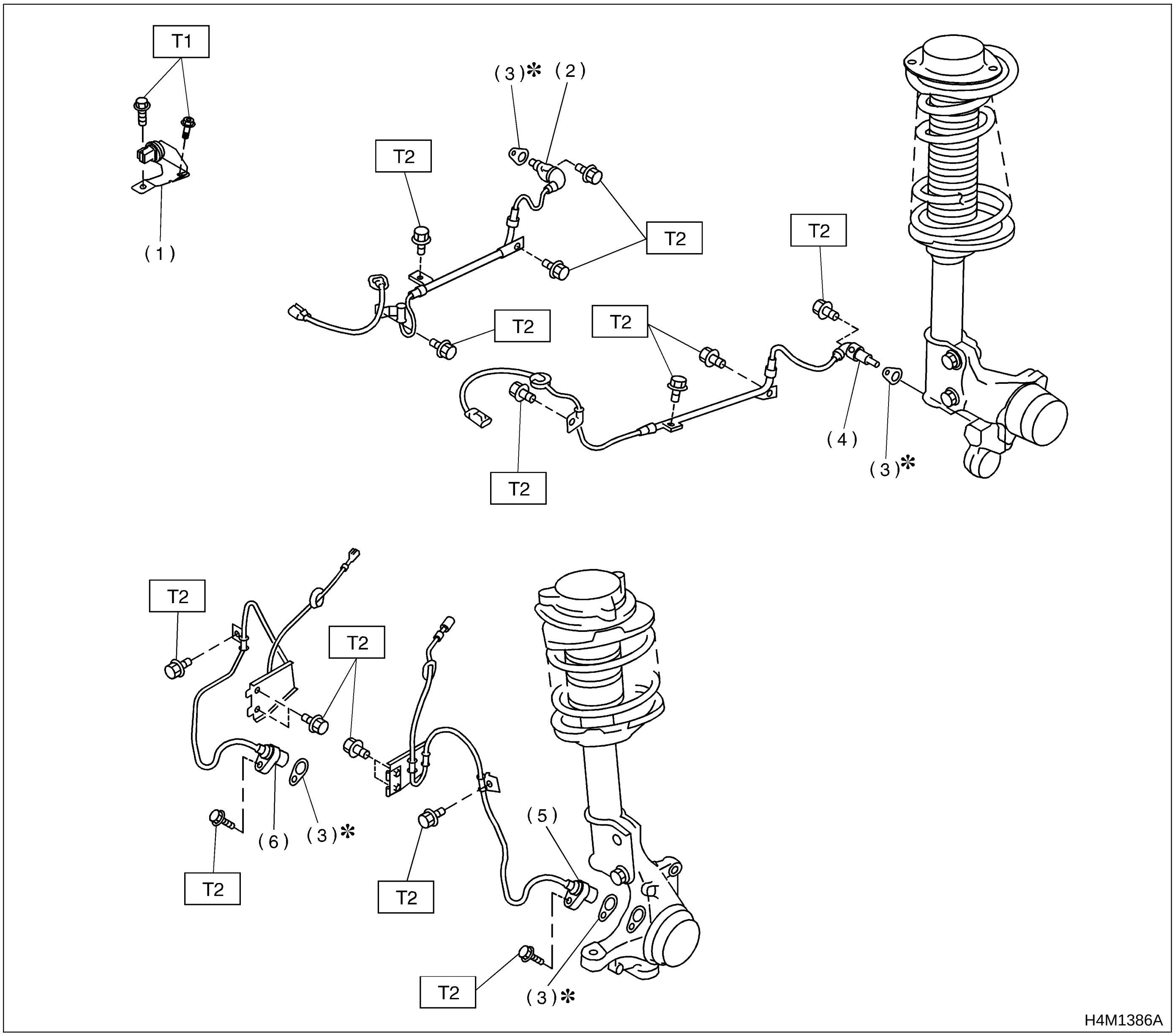
1. General Description S401001

A: SPECIFICATIONS S401001E49

Item			Standard or remarks
ABS sensor	ABS sensor gap	Front	0.3 — 0.8 mm (0.012 — 0.031 in)
		Rear	0.7 — 1.2 mm (0.028 — 0.047 in)
	ABS sensor resistance	Front	1.25±0.25 kΩ
		Rear	1.0±0.2 kΩ
	Marks of the harness	Front LH	Brown
		Front RH	Blue
		Rear LH	Yellow
		Rear RH	White
G sensor	G sensor voltage		2.3±0.2 V
ABS control module and hydraulic control unit (ABSCM&H/U) marks	AT		C7
	MT		C8

B: COMPONENT S401001A05

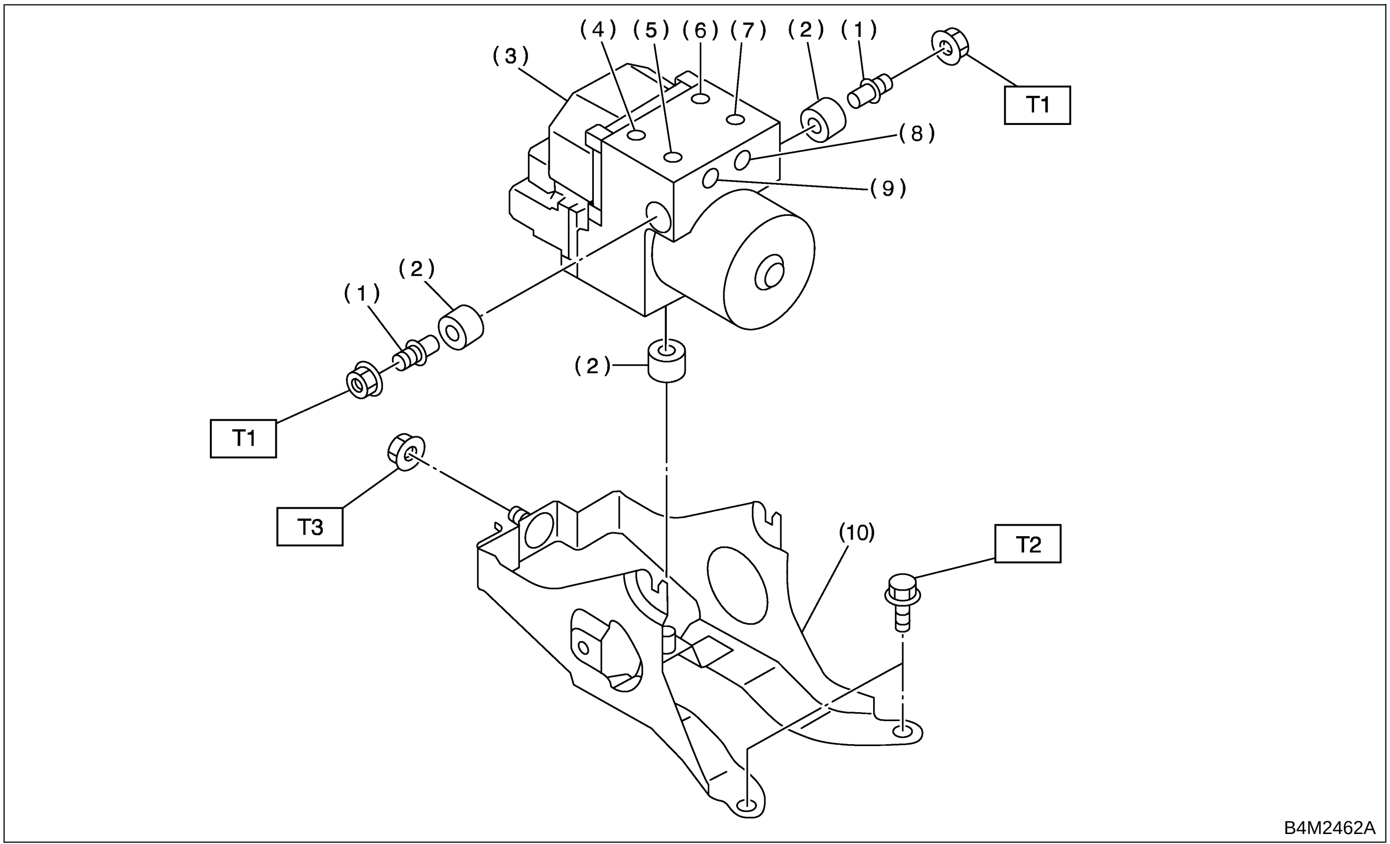
1. SENSOR S401001A0501



(1) G sensor
(2) Rear ABS sensor RH
(3) ABS spacer
(4) Rear ABS sensor LH
(5) Front ABS sensor LH
(6) Front ABS sensor RH

Tightening torque: N·m (kgf-m, ft-lb)
T1: 18 (1.8, 13.0)
T2: 32 (3.3, 24)

2. ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U) *S401001A0502*



(1) Stud bolt
(2) Damper
(3) ABS control module and hydraulic control unit
(4) Front-LH outlet
(5) Secondary inlet
(6) Front-RH outlet
(7) Primary inlet
(8) Rear-LH outlet
(9) Rear-RH outlet
(10) Bracket

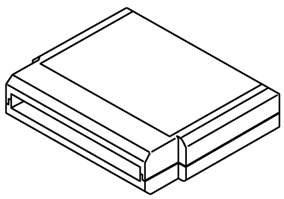
Tightening torque: N·m (kgf-m, ft-lb)
T1: 18 (1.8, 13.0)
T2: 32 (3.3, 24)
T3: 38 (3.8, 27)

C: CAUTION *S401001A03*

- 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 ground cable from battery.

D: PREPARATION TOOL *S401001A17*

1. SPECIAL TOOLS *S401001A1701*

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3876	24082AA150 (Newly adapted 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)

2. GENERAL PURPOSE TOOLS *S401001A1702*

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.
Pressure Gauge	Used for measuring oil pressure.
Oscilloscope	Used for measuring sensor.

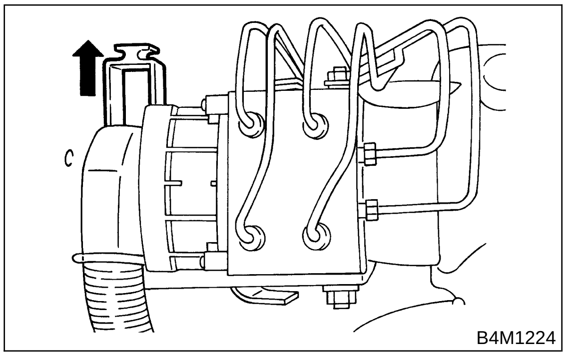
2. ABS Control Module and Hydraulic Control Unit (ABSCM&H/U) S401543

A: REMOVAL S401543A18

1) Disconnect battery ground cable.
2) Remove air intake duct from engine compartment to facilitate removal of ABSCM&H/U.
3) Use an air gun to get rid of water around the ABSCM&H/U.

CAUTION:
The contact will be insufficient if the terminal gets wet.

4) Pull off the lock of the ABSCM&H/U connector to remove it.


B4M1224

5) Disconnect connector from ABSCM&H/U.

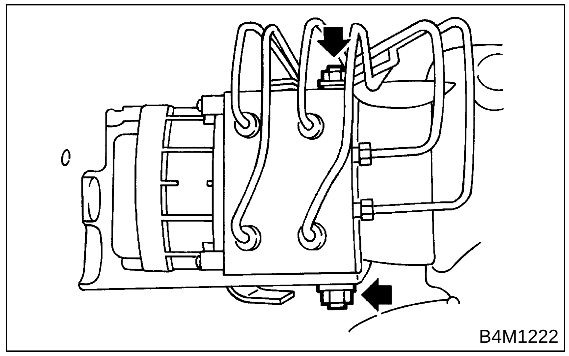
CAUTION:
Be careful not to let water or other foreign matter contact the ABSCM&H/U terminal.

6) Unlock cable clip.
7) Disconnect brake pipes from ABSCM&H/U.

CAUTION:
Wrap brake pipes with vinyl bag to avoid spilling brake fluid on vehicle body.

8) Remove ABSCM&H/U ground terminal from bracket.
9) Remove ABSCM&H/U from engine compartment.

CAUTION:
- **ABSCM&H/U cannot be disassembled. Do not attempt to loosen bolts and nuts.**
- **Do not drop or bump ABSCM&H/U.**
- **Do not turn the ABSCM&H/U upside down or place it on its side.**
- **Be careful to prevent foreign particles from getting into ABSCM&H/U.**
- **Apply a coat of rust-preventive wax (Nippeco LT or GB) to bracket attaching bolt after tightening.**
- **Do not pull harness when disconnecting connector.**


B4M1222

B: INSTALLATION S401543A11

1) Install ABSCM&H/U.

CAUTION:
Confirm that the specifications of the ABSCM&H/U conforms to the vehicle specifications.

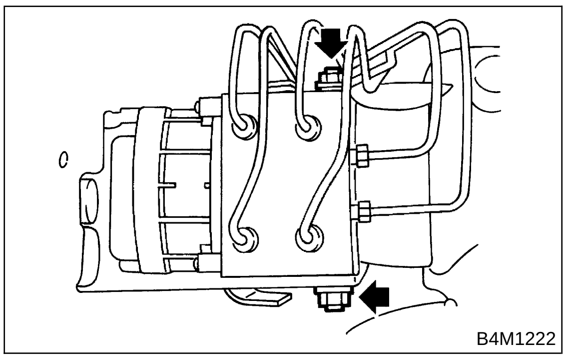
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

2) Install ABSCM&H/U ground terminal to bracket.

Tightening torque:
32 N·m (3.3 kgf-m, 24 ft-lb)

3) Connect brake pipes to their correct ABSCM&H/U connections.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)



4) Using cable clip, secure ABSCM&H/U harness to bracket.
5) Connect connector to ABSCM&H/U.

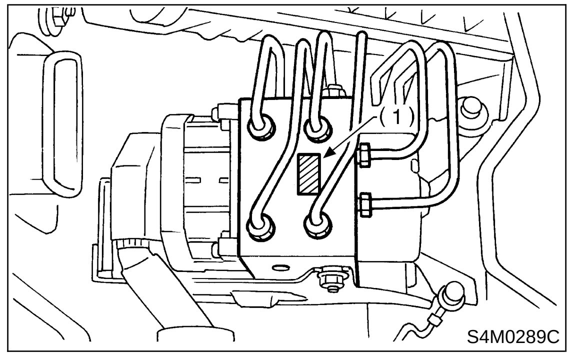
CAUTION:
● Be sure to remove all foreign matter from inside the connector before connecting.
● Ensure that the ABSCM&H/U connector is securely locked.

6) Install air intake duct.
7) Connect battery ground cable.
8) Bleed air from the brake system.

C: INSPECTION S401543A10

1) Check connected and fixed condition of connector.
2) Check specifications of the mark with ABSCM&H/U.

Mark	Model
C7	AT
C8	MT



(1) Mark

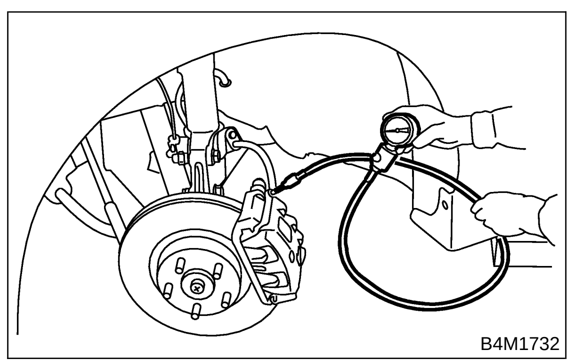
1. CHECKING THE HYDRAULIC UNIT ABS OPERATION BY PRESSURE GAUGE

S401543A1001

1) Lift-up vehicle and remove wheels.
2) Disconnect the air bleeder screws from the FL and FR caliper bodies.
3) Connect two pressure gauges to the FL and FR caliper bodies.

CAUTION:
● Pressure gauges used exclusively for brake fluid must be used.
● Do not employ pressure gauge previously used for transmission since the piston seal is expanded which may lead to malfunction of the brake.

NOTE:
Wrap sealing tape around the pressure gauge.



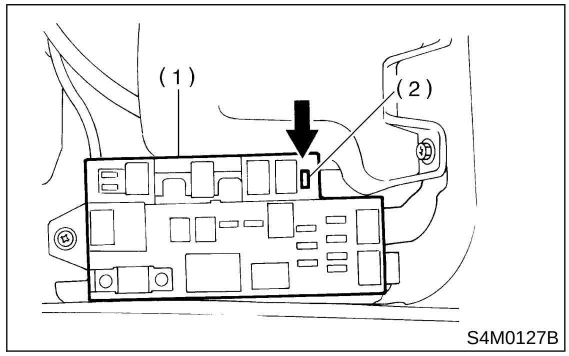
4) Bleed air from the pressure gauges.
5) Perform ABS sequence control.
<Ref. to ABS-11, ABS Sequence Control.>
6) When the hydraulic unit begins to work, and first the FL side performs decompression, holding, and compression, and then the FR side performs decompression, holding, and compression.
7) Read values indicated on the pressure gauge and check if the fluctuation of the values between decompression and compression meets the standard values. Also check if any irregular brake pedal tightness is felt.

	Front wheel	Rear wheel
Initial value	3,432 kPa (35 kg/cm^2, 498 psi)	3,432 kPa (35 kg/cm^2, 498 psi)
When decompressed	490 kPa (5 kg/cm^2, 71 psi) or less	490 kPa (5 kg/cm^2, 71 psi) or less
When compressed	3,432 kPa (35 kg/cm^2, 498 psi) or more	3,432 kPa (35 kg/cm^2, 498 psi) or more

8) Remove pressure gauges from FL and FR caliper bodies.
9) Remove air bleeder screws from the RL and RR caliper bodies.
10) Connect the air bleeder screws to the FL and FR caliper bodies.
11) Connect two pressure gauges to the RL and RR caliper bodies.
12) Bleed air from the pressure gauges and the FL and FR caliper bodies.
13) Perform ABS sequence control.
<Ref. to ABS-11, ABS Sequence Control.>
14) When the hydraulic unit begins to work, at first the RR side performs decompression, holding, and compression, and then the RL side performs decompression, holding, and compression.
15) Read values indicated on the pressure gauges and check if they meet the standard value.
16) After checking, remove the pressure gauges from caliper bodies.
17) Connect the air bleeder screws to RL and RR caliper bodies.
18) Bleed air from brake line.

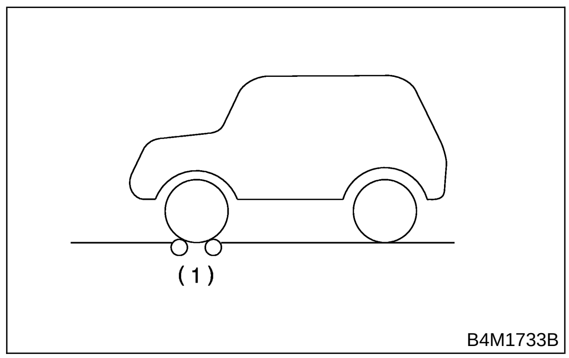
2. CHECKING THE HYDRAULIC UNIT ABS OPERATION WITH BRAKE TESTER S401543A1002

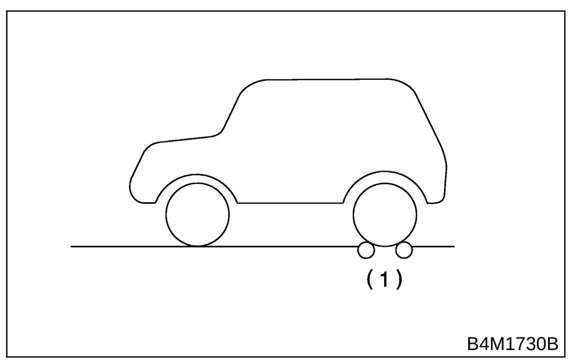
1) In the case of AWD AT vehicles, install a spare fuse with the FWD connector in the main fuse box to simulate FWD vehicles.



(1) Main fuse box
(2) FWD connector

2) Prepare for operating ABS sequence control.
<Ref. to ABS-11, ABS Sequence Control.>
3) Set the front wheels or rear wheels on the brake tester and set the select lever's position at "neutral".





(1) Brake tester

4) Operate the brake tester.
5) Perform ABS sequence control.
<Ref. to ABS-11, ABS Sequence Control.>

6) Hydraulic unit begins to work; and check the following working sequence.
(1) The FL wheel performs decompression, holding, and compression in sequence, and subsequently the FR wheel repeats the cycle.
(2) The RR wheel performs decompression, holding, and compression in sequence, and subsequently the RL wheel repeats the cycle.
7) Read values indicated on the brake tester and check if the fluctuation of values, when decompressed and compressed, meet the standard values.

	Front wheel	Rear wheel
Initial value	981 N (100 kgf, 221 lb)	981 N (100 kgf, 221 lb)
When decompressed	490 N (50 kgf, 110 lb) or less	490 N (50 kgf, 110 lb) or less
When compressed	981 N (100 kgf, 221 lb) or more	981 N (100 kgf, 221 lb) or more

8) After checking, also check if any irregular brake pedal tightness is felt.

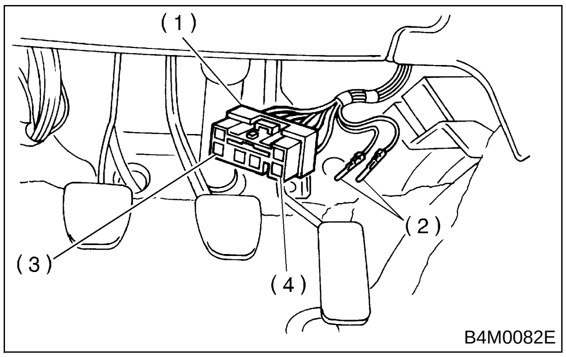
3. ABS Sequence Control S401187

A: OPERATION S401187A16

1) Under the ABS sequence control, after the hydraulic unit solenoid valve is driven, the operation of the hydraulic unit can be checked by means of the brake tester or pressure gauge.
2) ABS sequence control can be started by diagnosis connector or select monitor.

1. ABS SEQUENCE CONTROL WITH DIAGNOSIS CONNECTOR S401187A1601

1) Connect diagnosis terminals to terminals No. 3 and No. 6 of the diagnosis connector beside driver's seat heater unit.



(1) Diagnosis connector
(2) Diagnosis terminals
(3) No. 3 terminal
(4) No. 6 terminal

2) Set the speed of all wheels at 2.75 km/h (2 MPH) or less.
3) Turn ignition switch OFF.
4) Within 0.5 seconds after the ABS warning light goes out, depress the brake pedal and hold it immediately after ignition switch is turned to ON.

CAUTION:
Do not depress the clutch pedal.

NOTE:
- When the ignition switch is set to ON, the brake pedal must not be depressed.
- Engine must not operate.

5) After completion of ABS sequence control, turn ignition switch OFF.

2. ABS SEQUENCE CONTROL WITH SELECT MONITOR S401187A1602

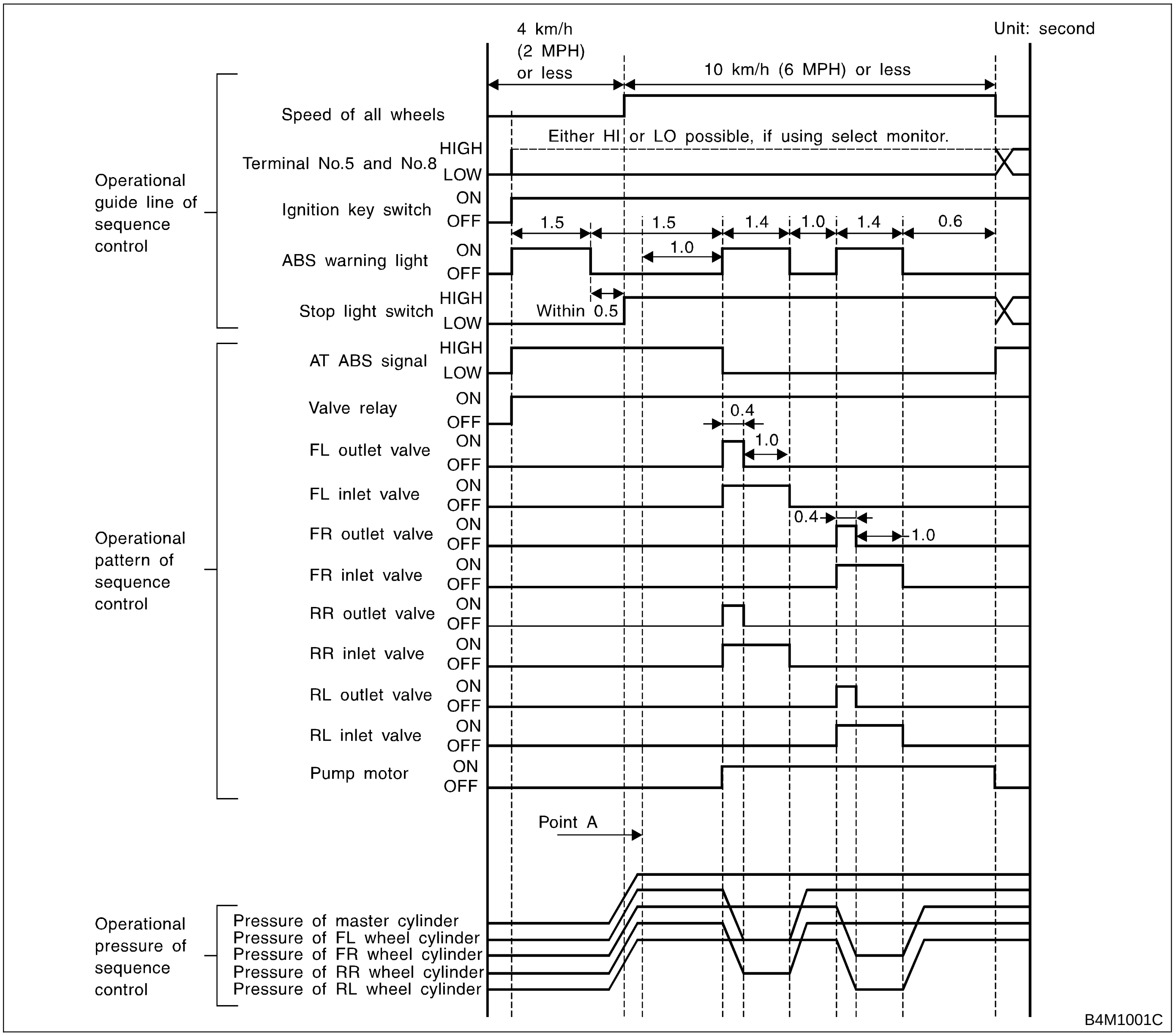
NOTE:
- In the event of any trouble, the sequence control may not be operative. In such a case, activate the sequence control, referring to "ABS SEQUENCE CONTROL WITH DIAGNOSIS CONNECTOR".
<Ref. to ABS-11, ABS SEQUENCE CONTROL WITH DIAGNOSIS CONNECTOR, OPERATION, ABS Sequence Control.>
- When the diagnosis terminal is connected to the diagnosis connector, the sequence control will not operate.

1) Connect select monitor to data link connector under driver's seat instrument panel lower cover.
2) Turn ignition switch ON.
3) Turn select monitor switch ON.
4) Put select monitor to "BRAKE CONTROL" mode.
5) When "Function check sequence" is selected, "ABS sequence control" will start.
6) The message 'Press Brake Pedal Firmly' is displayed as follows:
   (1) When using the brake tester, depress brake pedal with braking force of 981 N (100 kgf, 221 lb).
   (2) When using the pressure gauge, depress brake pedal so as to make the pressure gauge indicate 3,432 kPa (35 kg/cm^2, 498 psi).

CAUTION:
Do not depress the clutch pedal.

7) When the message "Press YES" is displayed, press ≪YES≫ key.
8) Operation points will be displayed on select monitor.

3. CONDITIONS FOR ABS SEQUENCE CONTROL *S401187A1603*



NOTE:
- When select monitor is used, control operation starts at point A. The patterns from IGN key ON to the point A show that operation is started by diagnosis connector.
- HIGH means high voltage.
- LOW means low voltage.

4. CONDITIONS FOR COMPLETION OF ABS SEQUENCE CONTROL *S401187A1604*

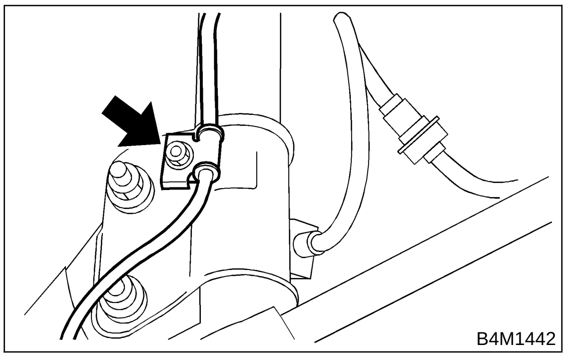
When the following conditions develop, the ABS sequence control stops and ABS operation is returned to the normal control mode.

1) When the speed of at least one wheel reaches 10 km/h (6 MPH).
2) When terminal No. 3 or No. 6 is separated from diagnosis terminals. (When select monitor is not used.)
3) When the brake pedal is released during sequence control and the braking lamp switch is set to off.
4) When brake pedal is depressed after ignition key is turned to ON, and before ABS warning light goes out. (When select monitor is not used.)
5) When brake pedal is not depressed after ignition key is turned to ON, and within 0.5 seconds after ABS warning light goes out. (When select monitor is not used.)
6) After completion of the sequence control.
7) When malfunction is detected. (When select monitor is used.)

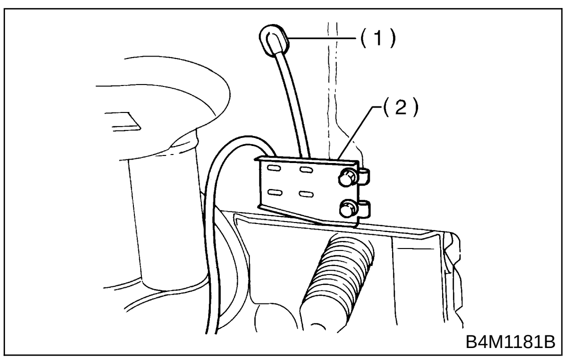
4. Front ABS Sensor *S401190*

A: REMOVAL *S401190A18*

1) Set vehicle on a lift.
2) Disconnect battery ground cable.
3) Loosen the wheel nuts.
4) Lift vehicle and remove wheels.
5) Disconnect front ABS sensor connector located next to front strut mounting house in engine compartment.
6) Remove bolts which secure sensor harness to strut.



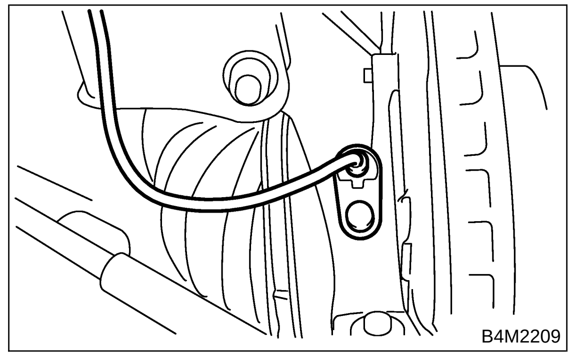
7) Remove bolts which secure sensor harness to body.



(1) To front ABS sensor connector
(2) Bracket

8) Remove bolts which secure front ABS sensor to housing, and remove front ABS sensor.

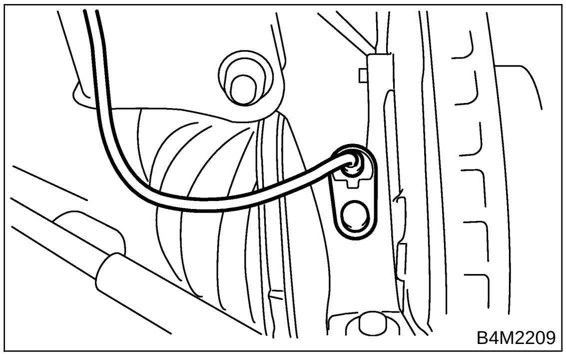
CAUTION:
- **During removal, be careful not to damage the pole piece and teeth face located at the tip of the sensor.**
- **Do not pull sensor harness during removal.**



B: INSTALLATION S401190A11

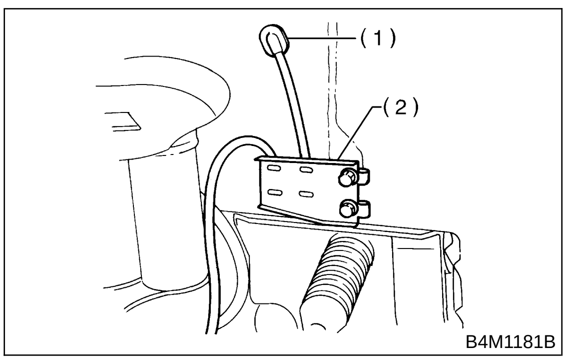
1) Temporarily install front ABS sensor on housing.

CAUTION:
Be careful not to strike ABS sensor's pole piece and tone wheel's teeth against adjacent metal parts during installation.



2) Install front ABS sensor on strut and wheel apron bracket.

Tightening torque:
32 N·m (3.3 kgf-m, 24 ft-lb)

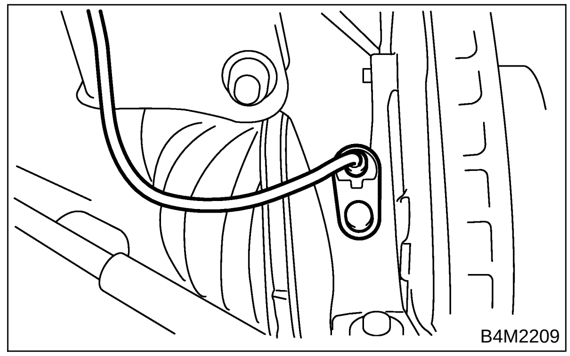


(1) To front ABS sensor connector
(2) Bracket

3) Place a thickness gauge between ABS sensor's pole piece and tone wheel's tooth face. After standard clearance is obtained over the entire perimeter, tighten ABS sensor on housing to specified torque.

ABS sensor standard clearance:
0.3 — 0.8 mm (0.012 — 0.031 in)

Tightening torque:
32 N·m (3.3 kgf-m, 24 ft-lb)



CAUTION:
Check the marks on the harness to make sure that no distortion exists.

	LH	RH
Mark	Brown	Light blue

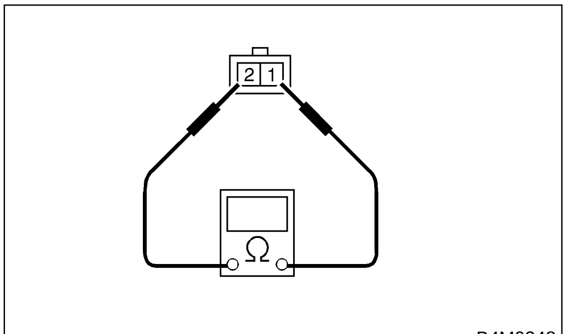
NOTE:
If the clearance is outside specifications, adjust the gap using spacer (Part No. 26755AA000).

4) After confirmation of the ABS sensor clearance, connect connector to ABS sensor.
5) Install the wheels.
6) Connect battery ground cable.

C: INSPECTION S401190A10

1. ABS SENSOR S401190A1001

1) Check pole piece of ABS sensor for foreign particles or damage. If necessary, clean pole piece or replace ABS sensor.
2) Measure ABS sensor resistance.



B4M0248

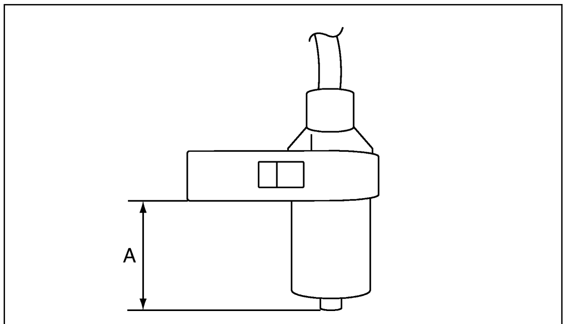
Terminal No.	Standard
1 and 2	1.25±0.25 kΩ

CAUTION:
If resistance is outside the standard value, replace ABS sensor with a new one.

NOTE:
Check ABS sensor cable for discontinuity. If necessary, replace with a new one.

2. SENSOR GAP S401190A1002

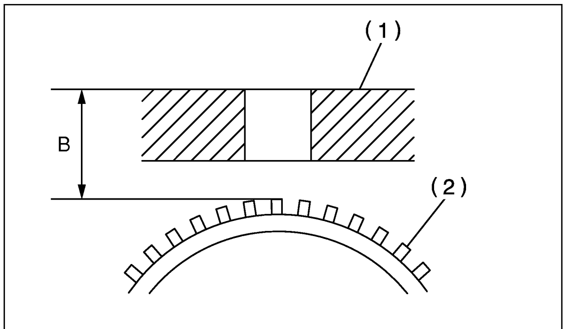
1) Measure the distance “A” between ABS sensor surface and sensor pole face.



B4M2482A

2) Measure the distance “B” between surface where the front axle housing meets the ABS sensor, and the tone wheel.

NOTE:
Measure so that the gauge touches the tone wheel teeth top.



S4M0510A

(1) Axle housing
(2) Tone wheel

3) Find the gap between the ABS sensor pole face and the surface of the tone wheel teeth by putting the measured values in the formula below and calculating.

ABS sensor clearance = B − A

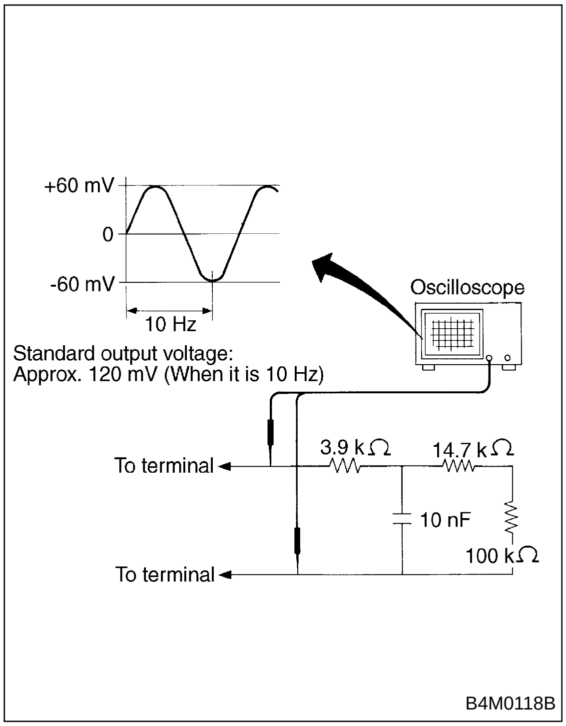
ABS sensor standard clearance:
0.3 — 0.8 mm (0.012 — 0.031 in)

NOTE:
If the clearance is outside specifications, adjust the gap using spacer (Part No. 26755AA000).

3. OUTPUT VOLTAGE *S401190A1003*

Output voltage can be checked by the following method. Install resistor and condenser, then rotate wheel about 2.75 km/h (2 MPH) or equivalent.

NOTE:
Regarding terminal No., please refer to item 1. ABS SENSOR.



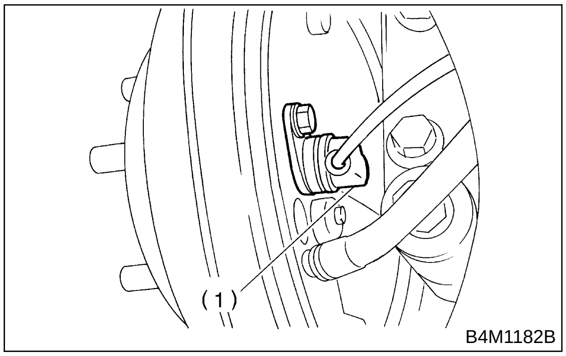
D: ADJUSTMENT *S401190A01*

Adjust the gap using spacer (Part No. 26755AA000).

5. Rear ABS Sensor *S401185*

A: REMOVAL *S401185A18*

1) Set vehicle on a lift.
2) Disconnect battery ground cable.
3) Loosen wheel nuts.
4) Lift vehicle, and remove wheels.
5) Remove rear seat and disconnect rear ABS sensor connector.
6) Remove rear sensor harness bracket from rear trailing link and bracket.
7) Remove rear ABS sensor from rear back plate.

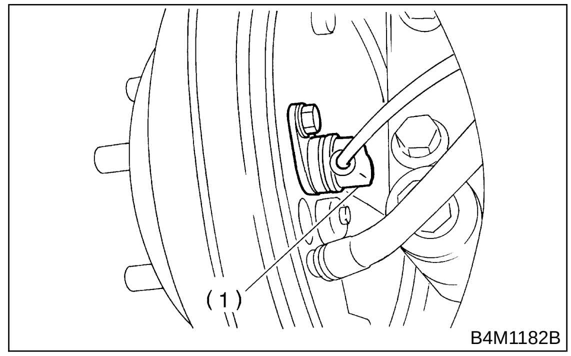


(1) Rear ABS sensor

B: INSTALLATION *S401185A11*

1) Temporarily install rear ABS sensor on back plate.

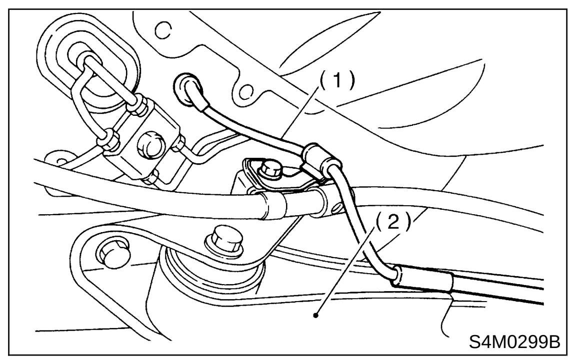
CAUTION:
Be careful not to strike ABS sensor's pole piece and tone wheel's teeth against adjacent metal parts during installation.



(1) Rear ABS sensor

2) Install rear sensor harness on rear trailing link.

Tightening torque:
32 N·m (3.3 kgf-m, 24 ft-lb)



(1) Rear sensor harness
(2) Trailing link

3) Place a thickness gauge between ABS sensor's pole piece and tone wheel's tooth face. After standard clearance is obtained over the entire perimeter, tighten ABS sensor on back plate to specified torque.

ABS sensor standard clearance:
0.7 — 1.2 mm (0.028 — 0.047 in)

Tightening torque:
32 N·m (3.3 kgf-m, 24 ft-lb)

CAUTION:
Check the marks on the harness to make sure that no distortion exists.

	LH	RH
Mark	Blue	Pink

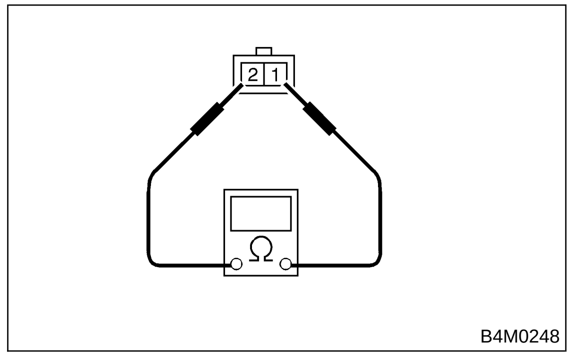
NOTE:
If the clearance is outside specifications, adjust the gap using spacer (Part No. 26755AA000).

4) Connect rear ABS sensor connector.
5) Install rear seat.
6) Install wheels.
7) Connect battery ground cable.

C: INSPECTION S401185A10

1. ABS SENSOR S401185A1001

1) Check pole piece of ABS sensor for foreign particles or damage. If necessary, clean pole piece or replace ABS sensor.
2) Measure ABS sensor resistance.



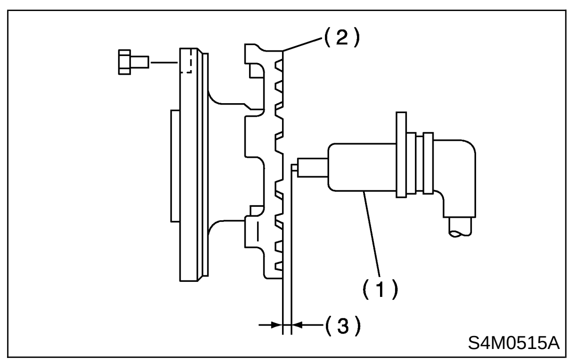
Terminal No.	Standard
1 and 2	1.0±0.2 kΩ

CAUTION:
If resistance is outside the standard value, replace ABS sensor with new one.

NOTE:
Check ABS sensor cable for discontinuity. If necessary, replace with a new one.

2. SENSOR GAP S401185A1002

Clearances (sensor gaps) should be measured one by one to ensure tone wheel and speed sensor are installed correctly.



(1) Rear ABS sensor
(2) Rear tone wheel
(3) Sensor gap

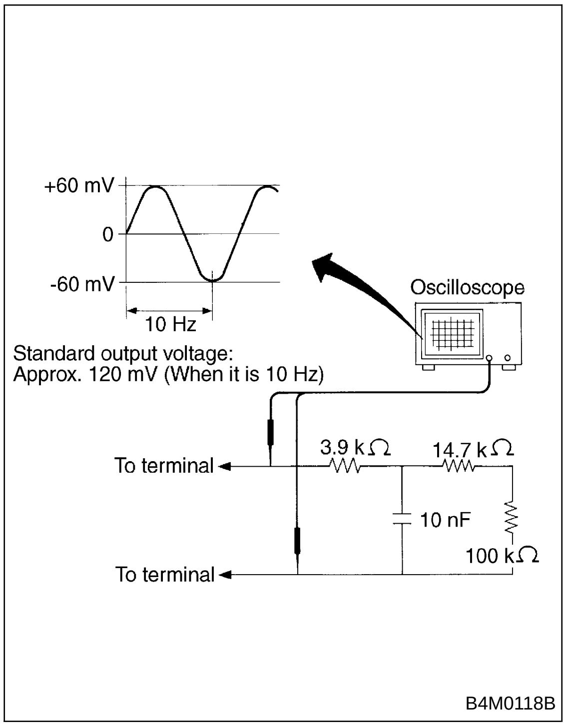
ABS sensor clearance:
0.7 — 1.2 mm (0.028 — 0.047 in)

NOTE:
- If clearance is narrow, adjust by using a spacer (Part No. 26755AA000).
- If clearance is wide, check the outputted voltage then replace ABS sensor or tone wheel if the outputted voltage is outside the specification.

3. OUTPUT VOLTAGE S401185A1003

Output voltage can be checked by the following method. Install resistor and condenser, then rotate wheel about 2.75 km/h (2 MPH) or equivalent.

NOTE:
Regarding terminal No., refer to item 1. ABS SENSOR.



D: ADJUSTMENT S401185A01

Adjust the gap using spacer (Part No. 26755AA000).

6. Front Tone Wheel *S401184*

A: REMOVAL *S401184A18*

Refer to Front Drive Shaft, because front tone wheel is integrated with front drive shaft.
<Ref. to DS-32, REMOVAL, Front Drive Shaft.>

B: INSTALLATION *S401184A11*

Refer to Front Drive Shaft, because front tone wheel is integrated with front drive shaft.
<Ref. to DS-32, INSTALLATION, Front Drive Shaft.>

C: INSPECTION *S401184A10*

Visually check tone wheels teeth (44 pieces) for cracks or dents. If necessary, replace tone wheel with a new one.

NOTE:
Tone wheel is built into BJ assembly, therefore, if any defects are found in the tone wheel, the entire BJ assembly must be replaced with a new one.

7. Rear Tone Wheel *S401182*

A: REMOVAL *S401182A18*

For removal procedures of rear tone wheel, refer to "Rear Axle". <Ref. to DS-23, Rear Axle.>

B: INSTALLATION *S401182A11*

For installation procedures of rear tone wheel, refer to "Rear Axle". <Ref. to DS-23, Rear Axle.>

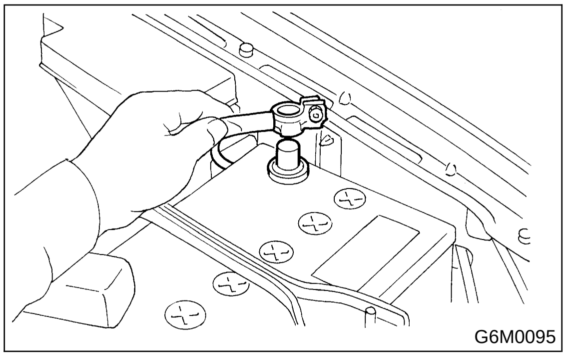
C: INSPECTION *S401182A10*

Visually check tone wheels teeth (44 pieces) for cracks or dents. If necessary, replace tone wheel with a new one.

8. G Sensor S401183

A: REMOVAL S401183A18

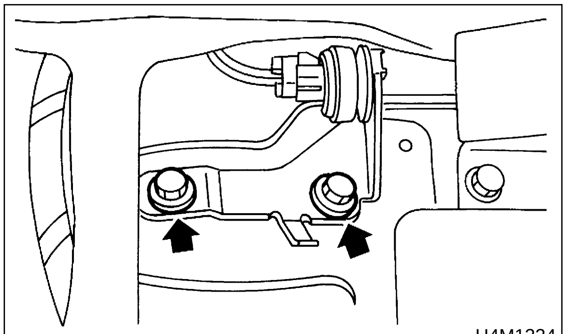
1) Disconnect battery ground cable.



G6M0095

2) Remove console cover.
<Ref. to EI-33, Console Box.>
3) Disconnect connector from G sensor.
4) Remove G sensor from body.

CAUTION:
Do not drop or bump G sensor.



H4M1324

B: INSTALLATION S401183A11

Install in the reverse order of removal.

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

C: INSPECTION S401183A10

No.	Step	Check	Yes	No
1	**CHECK SUBARU SELECT MONITOR.**	Do you have SUBARU SELECT MONITOR?	Go to step **5**.	Go to step **2**.
2	**CHECK G SENSOR.** 1) Turn ignition switch to OFF. 2) Remove G sensor from vehicle. 3) Connect connector to G sensor. 4) Turn ignition switch to ON. 5) Measure voltage between G sensor connector terminals. ***Connector & terminal:*** ***(R70) No. 2 (+) — No. 3 (−)***	Is the voltage 2.3±0.2 V when G sensor is horizontal?	Go to step **3**.	Replace G sensor.
3	**CHECK G SENSOR.** Measure voltage between G sensor connector terminals. ***Connector & terminal:*** ***(R70) No. 2 (+) — No. 3 (−)***	Is the voltage 3.9±0.2 V when G sensor is inclined forwards to 90°?	Go to step **4**.	Replace G sensor.
4	**CHECK G SENSOR.** Measure voltage between G sensor connector terminals. ***Connector & terminal:*** ***(R70) No. 2 (+) — No. 3 (−)***	Is the voltage 0.7±0.2 V when G sensor is inclined backwards to 90°?	G sensor is normal.	Replace G sensor.
5	**CHECK G SENSOR.** 1) Turn ignition switch to OFF. 2) Connect select monitor connector to data link connector. 3) Turn select monitor into {BRAKE CONTROL} mode. 4) Set the display in the {Current Data Display & Save} mode. 5) Read the G sensor output voltage.	Is the indicated reading 2.3±0.2 V when the vehicle is in horizontal position?	Go to step **6**.	Replace G sensor.
6	**CHECK G SENSOR.** 1) Remove console box. 2) Remove G sensor from vehicle. (Do not disconnect connector.) 3) Read the select monitor display.	Is the indicated reading 3.9±0.2 V when G sensor is inclined forwards to 90°?	Go to step **7**.	Replace G sensor.
7	**CHECK G SENSOR.** Read the select monitor display.	Is the indicated reading 0.7±0.2 V when G sensor is inclined backwards to 90°?	G sensor is normal.	Replace G sensor.

BRAKE

BR

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1. General Description S405001

A: SPECIFICATIONS S405001E49

Engine (cc)			2500	
Driving system			AWD	
			L	S
Front disc brake	Type		Disc (Floating type, ventilated)	
	Effective disc diameter	mm (in)	228 (8.98)	
	Disc thickness × Outer diameter	mm (in)	24 × 277 (0.94 × 10.91)	
	Effective cylinder diameter	mm (in)	42.8 (1.685) × 2	
	Pad dimensions (length × width × thickness*)	mm (in)	112.3 × 50.0 × 17.0 (4.42 × 1.969 × 0.669)	
	Clearance adjustment		Automatic adjustment	
Rear disc brake	Type		—	Disc (Floating type)
	Effective disc diameter	mm (in)	—	230 (9.06)
	Disc thickness × Outer diameter	mm (in)	—	10 × 266 (0.39 × 10.47)
	Effective cylinder diameter	mm (in)	—	38.1 (1.500)
	Pad dimensions (length × width × thickness*)	mm (in)	—	82.4 × 33.7 × 14.0 (3.244 × 1.327 × 0.551)
	Clearance adjustment		—	Automatic adjustment
Rear drum brake	Type		Drum (Leading-Trailing type)	—
	Effective drum diameter	mm (in)	228.6 (9)	—
	Effective cylinder diameter	mm (in)	19.0 (0.748)	—
	Lining dimensions (length × width × thickness)	mm (in)	219.4 × 35.0 × 4.1 (8.64 × 1.378 × 0.161)	—
	Clearance adjustment		Automatic adjustment	—
Master cylinder	Type		Tandem	
	Effective diameter	mm (in)	26.9 (1-1/16)	
	Reservoir type		Sealed type	
	Brake fluid reservoir capacity	cm^3 (cu in)	205 (12.51)	
Brake booster	Type		Vacuum suspended	
	Effective diameter	mm (in)	205 + 230 (8.07 + 9.06)	
Proportioning valve	Split point	kPa (kg/cm^2, psi)	3,678 (37.5, 533)	
	Reducing ratio		0.3	
Brake line			Dual circuit system	
ABS			STD	
Brake fluid			FMVSS No. 116, DOT3 or DOT4	

*: Including back metal

NOTE:
Refer to “PB section” for parking brake SPECIFICATIONS. <Ref. to PB-2, General Description.>

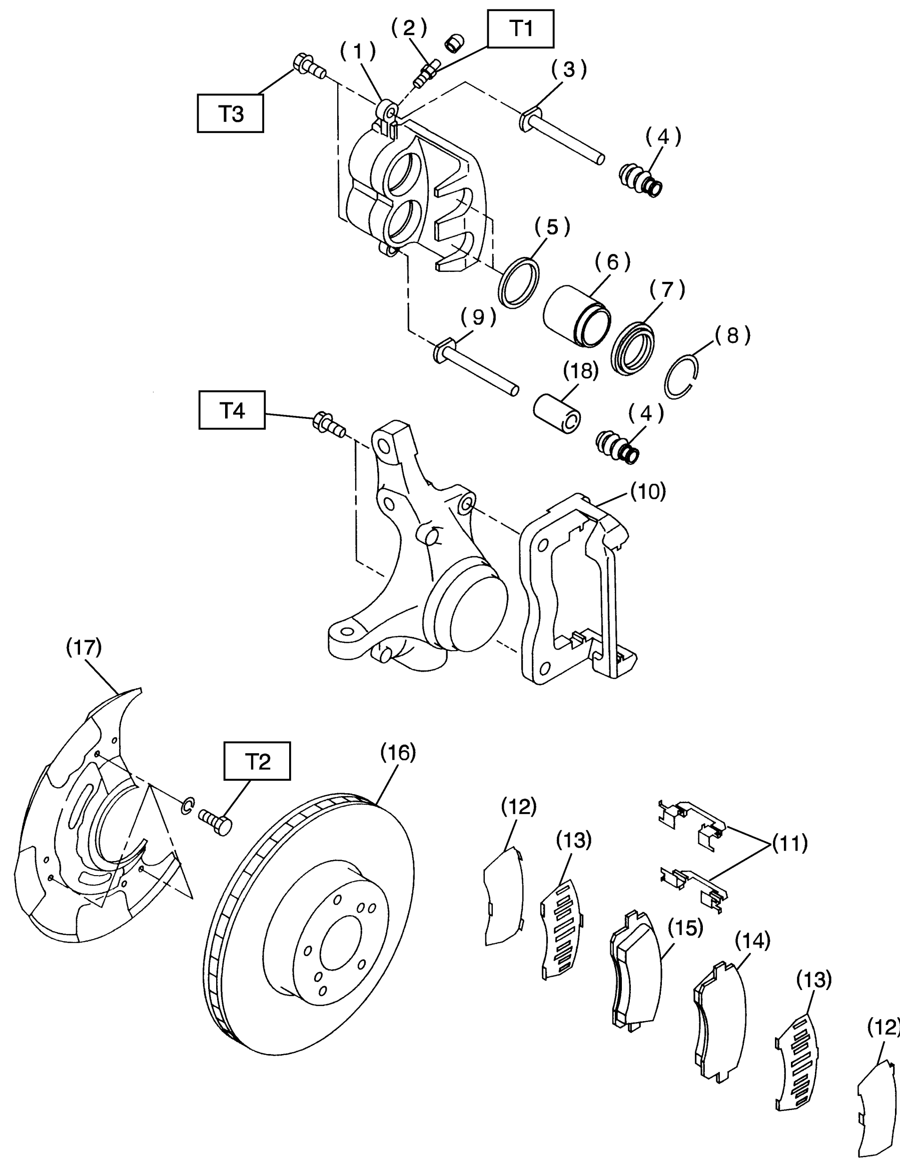
<table>
<tr><th colspan="2">ITEM</th><th>STANDARD</th><th>SERVICE LIMIT</th></tr>
<tr><td rowspan="3">Front brake</td><td>Pad thickness
(including back metal)</td><td>17 mm (0.67 in)</td><td>7.5 mm (0.295 in)</td></tr>
<tr><td>Disc thickness</td><td>24 mm (0.94 in)</td><td>22 mm (0.87 in)</td></tr>
<tr><td>Disc runout</td><td>—</td><td>0.075 mm (0.0030 in)</td></tr>
<tr><td rowspan="3">Rear brake (Disc type)</td><td>Pad thickness
(including back metal)</td><td>14 mm (0.55 in)</td><td>6.5 mm (0.256 in)</td></tr>
<tr><td>Disc thickness</td><td>10 mm (0.39 in)</td><td>8.5 mm (0.335 in)</td></tr>
<tr><td>Disc runout</td><td>—</td><td>0.070 mm (0.0028 in)</td></tr>
<tr><td rowspan="2">Rear brake (Drum type)</td><td>Inside diameter</td><td>228.6 mm (9 in)</td><td>230.6 mm (9.08 in)</td></tr>
<tr><td>Lining thickness</td><td>4.1 mm (0.161 in)</td><td>1.5 mm (0.059 in)</td></tr>
<tr><td rowspan="2">Rear brake (Disc type parking)</td><td>Inside diameter</td><td>170 mm (6.69 in)</td><td>171 mm (6.73 in)</td></tr>
<tr><td>Lining thickness</td><td>3.2 mm (0.126 in)</td><td>1.5 mm (0.059 in)</td></tr>
<tr><td>Parking brake</td><td>Lever stroke</td><td colspan="2">7 to 8 notches/196 N (20 kgf, 44 lb)</td></tr>
</table>

<table>
<tr><td rowspan="5">Brake booster</td><td></td><td>Brake pedal force</td><td>Fluid pressure</td></tr>
<tr><td rowspan="2">Brake fluid pressure without engine running</td><td>147 N (15 kgf, 33 lb)</td><td>588 kPa (6 kg/cm^2, 85 psi)</td></tr>
<tr><td>294 N (30 kgf, 66 lb)</td><td>1,667 kPa (17 kg/cm^2, 242 psi)</td></tr>
<tr><td rowspan="2">Brake fluid pressure with engine running and vacuum at 66.7 kPa (500 mmHg, 19.69 inHg)</td><td>147 N (15 kgf, 33 lb)</td><td>5,394 kPa (55 kg/cm^2, 782 psi)</td></tr>
<tr><td>294 N (30 kgf, 66 lb)</td><td>10,003 kPa (102 kg/cm^2, 1,450 psi)</td></tr>
</table>

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

B: COMPONENT *S405001A05*

1. FRONT DISC BRAKE *S405001A0511*

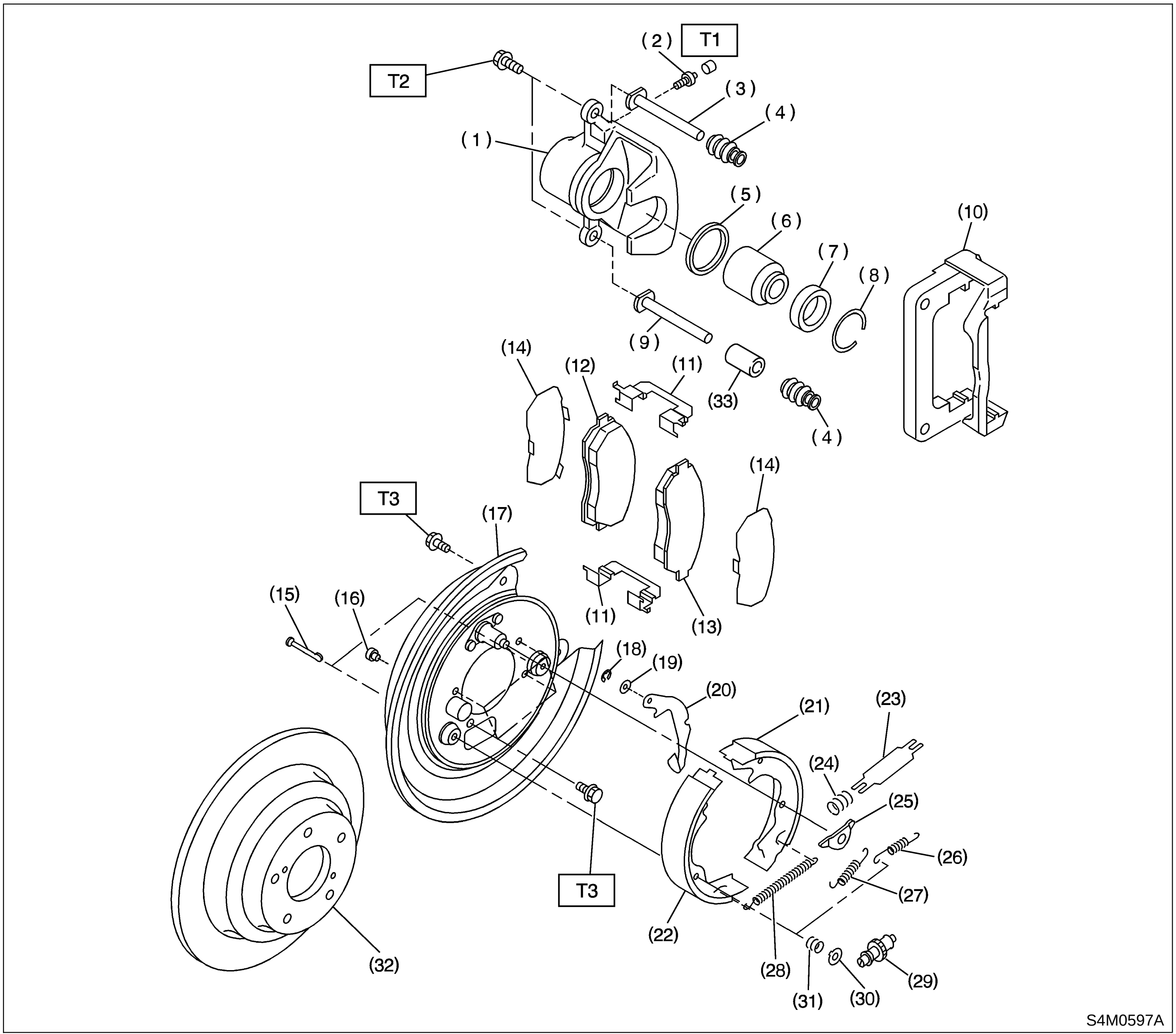


S4M0596A

(1) Caliper body
(2) Air bleeder screw
(3) Guide pin (Green)
(4) Pin boot
(5) Piston seal
(6) Piston
(7) Piston boot
(8) Boot ring
(9) Lock pin (Yellow)
(10) Support
(11) Pad clip
(12) Outer shim (For Australia)
(13) Inner shim (For Australia)
(14) Pad (Outside)
(15) Pad (Inside)
(16) Disc rotor
(17) Disc cover
(18) Bushing

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.0)
T3: 38 (3.9, 28)
T4: 80 (8.2, 59)

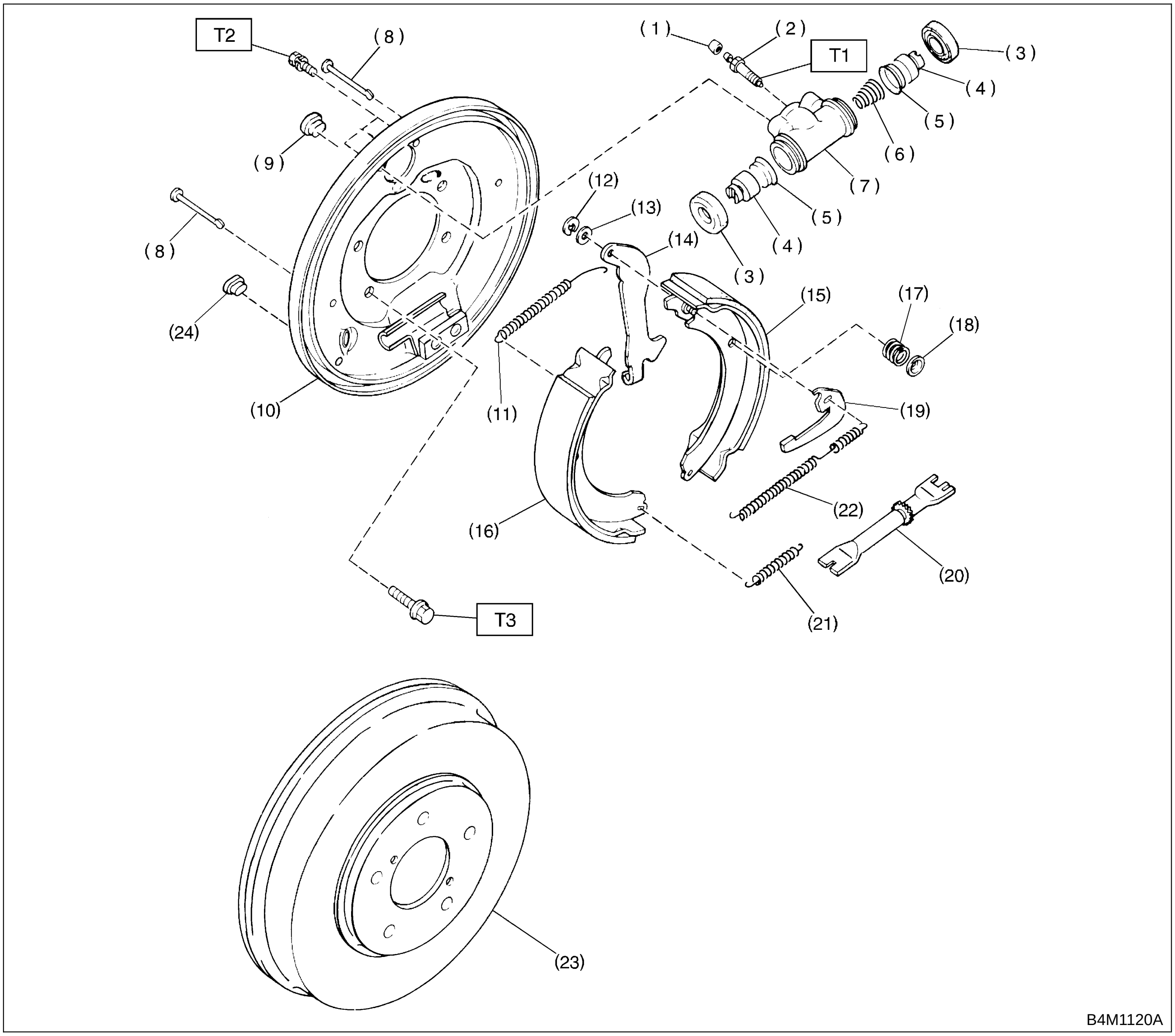
2. REAR DISC BRAKE *S405001A0503*



(1) Caliper body
(2) Air bleeder screw
(3) Guide pin (Green)
(4) Pin boot
(5) Piston seal
(6) Piston
(7) Piston boot
(8) Boot ring
(9) Lock pin (Yellow)
(10) Support
(11) Pad clip
(12) Inner pad
(13) Outer pad
(14) Shim
(15) Shoe hold-down pin
(16) Cover
(17) Back plate
(18) Retainer
(19) Spring washer
(20) Parking brake lever
(21) Parking brake shoe (Secondary)
(22) Parking brake shoe (Primary)
(23) Strut
(24) Strut shoe spring
(25) Shoe guide plate
(26) Secondary shoe return spring
(27) Primary shoe return spring
(28) Adjusting spring
(29) Adjuster
(30) Shoe hold-down cup
(31) Shoe hold-down spring
(32) Disc rotor
(33) Bushing

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 38 (3.9, 28)
T3: 53 (5.4, 39)

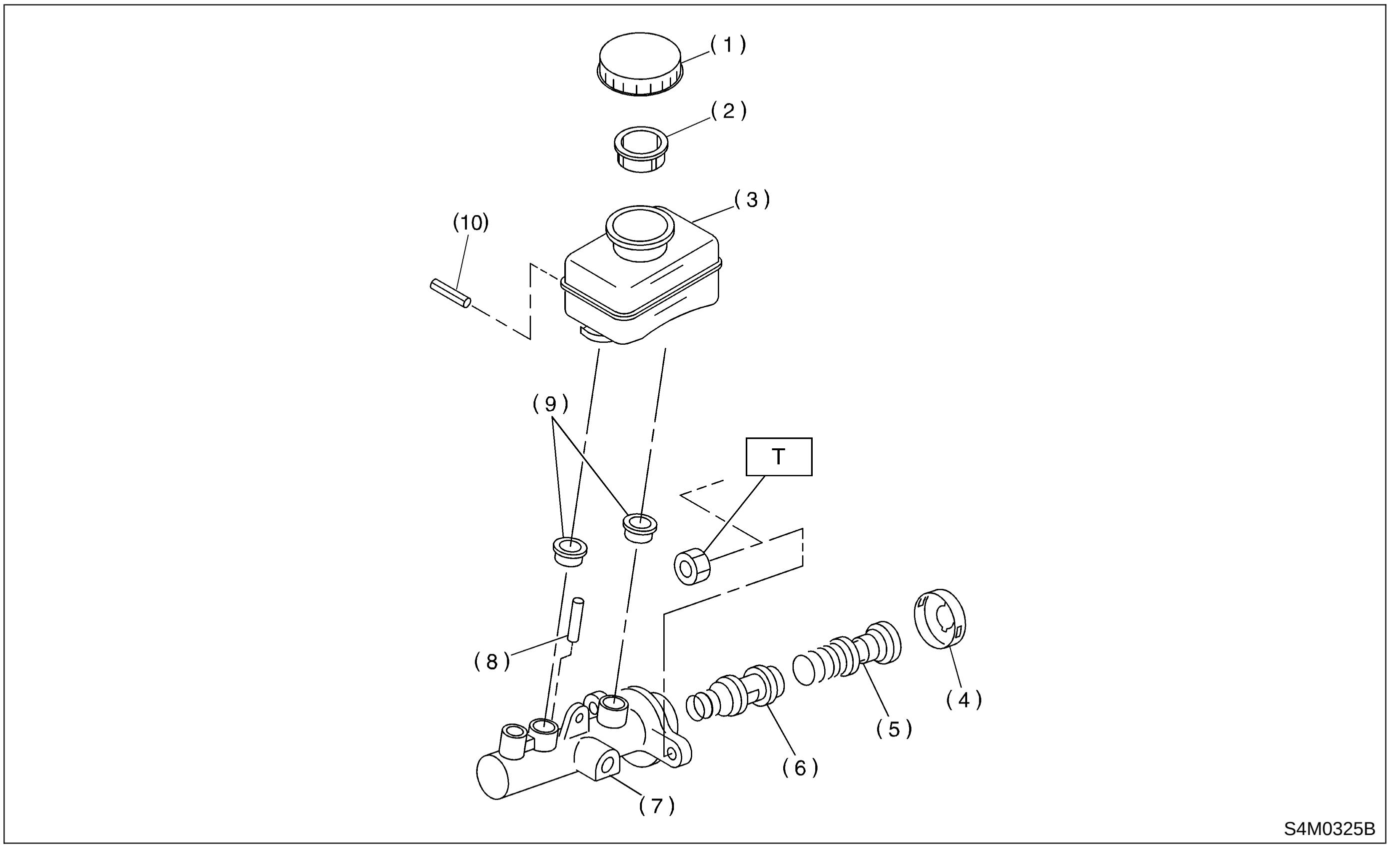
3. REAR DRUM BRAKE *S405001A0504*



(1) Air bleeder cap
(2) Air bleeder screw
(3) Boot
(4) Piston
(5) Cup
(6) Spring
(7) Wheel cylinder body
(8) Pin
(9) Plug
(10) Back plate
(11) Upper shoe return spring
(12) Retainer
(13) Washer
(14) Parking brake lever
(15) Brake shoe (Trailing)
(16) Brake shoe (Leading)
(17) Shoe hold-down spring
(18) Cup
(19) Adjusting lever
(20) Adjuster
(21) Lower shoe return spring
(22) Adjusting spring
(23) Drum
(24) Plug

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 10 (1.0, 7.2)
T3: 53 (5.4, 39)

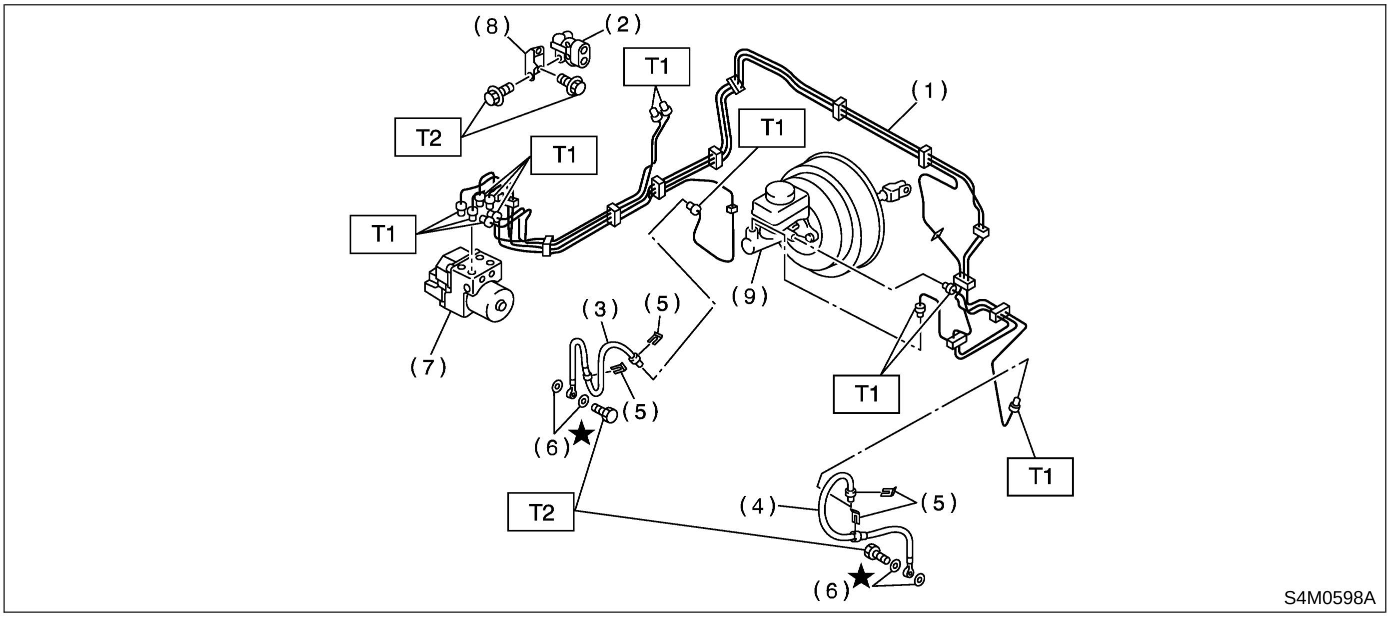
4. MASTER CYLINDER *S405001A0505*



(1) Cap
(2) Filter
(3) Reservoir tank
(4) Piston retainer
(5) Primary piston
(6) Secondary piston
(7) Cylinder body
(8) Cylinder pin (With ABS)
(9) Seal
(10) Pin

Tightening torque: N·m (kgf-m, ft-lb)
T: 14 (1.4, 10.1)

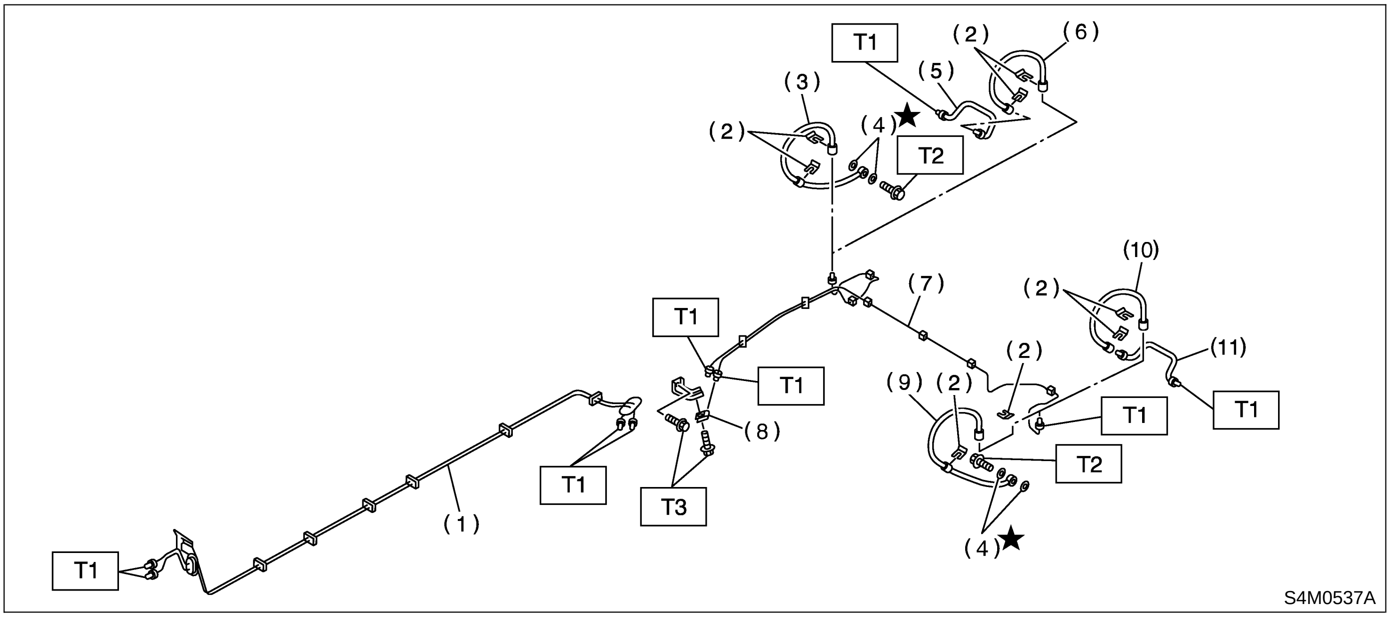
5. FRONT BRAKE PIPES AND HOSE *S405001A0517*



(1) Front brake pipe assembly
(2) Proportioning valve
(3) Front brake hose RH
(4) Front brake hose LH
(5) Clamp
(6) Gasket
(7) ABS control module and hydraulic control unit
(8) Bracket
(9) Master cylinder

Tightening torque: N·m (kgf-m, ft-lb)
T1: 15 (1.5, 10.8)
T2: 18 (1.8, 13.0)

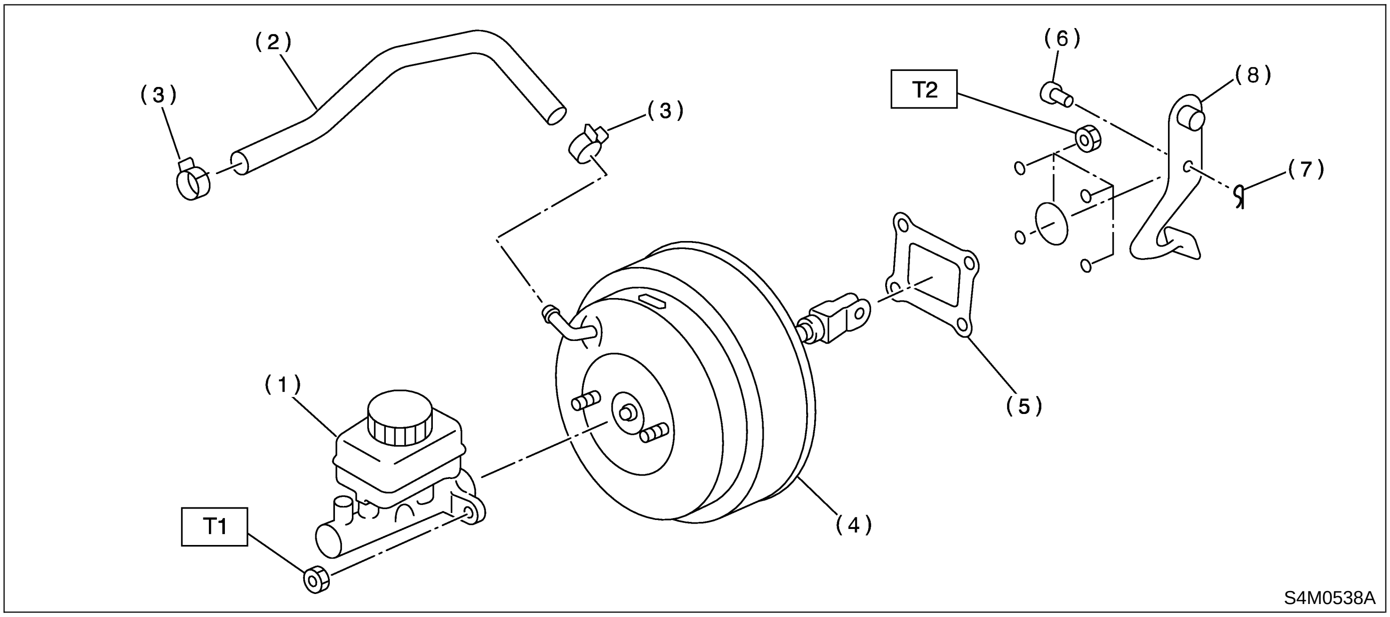
6. CENTER AND REAR BRAKE PIPES AND HOSE *S405001A0518*



(1) Center brake pipe assembly
(2) Clamp
(3) Rear brake hose RH (Disc brake)
(4) Gasket
(5) Rear brake pipe RH (Drum brake)
(6) Rear brake hose RH (Drum brake)
(7) Rear brake pipe assembly
(8) Two-way connector
(9) Rear brake hose LH (Disc brake)
(10) Rear brake hose LH (Drum brake)
(11) Rear brake pipe LH (Drum brake)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 15 (1.5, 10.8)
T2: 18 (1.8, 13.0)
T3: 32 (3.3, 23.6)

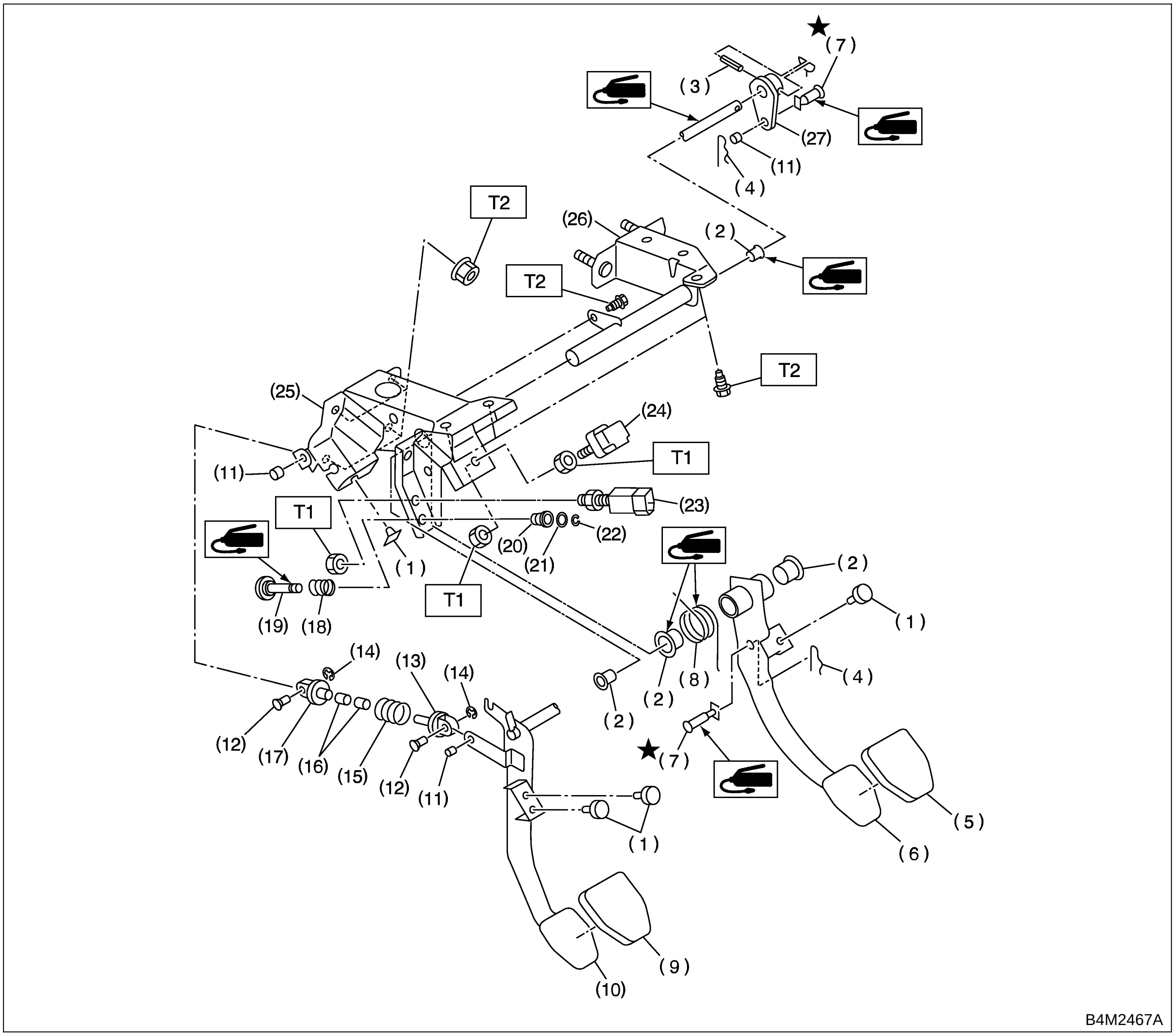
7. BRAKE BOOSTER *S405001A0507*



(1) Brake master cylinder
(2) Vacuum hose
(3) Clip
(4) Brake booster assembly
(5) Seal
(6) Clevis pin
(7) Snap pin
(8) Brake pedal

Tightening torque: N·m (kgf-m, ft-lb)
T1: 14 (1.4, 10.1)
T2: 18 (1.8, 13.0)

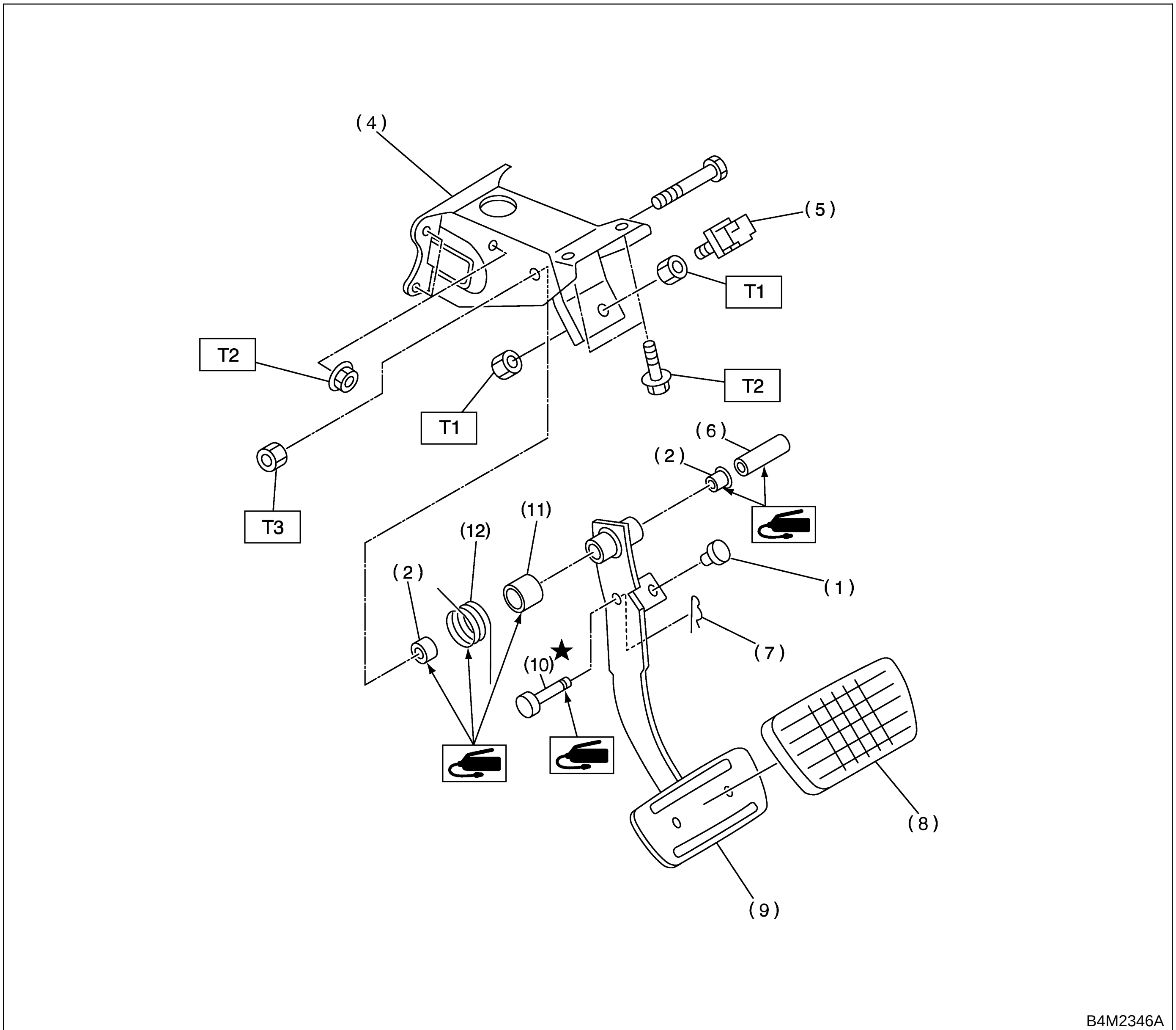
8. BRAKE PEDAL FOR MT MODEL *S405001A0508*



(1) Stopper
(2) Bushing
(3) Spring pin
(4) Snap pin
(5) Brake pedal pad
(6) Brake pedal
(7) Clevis pin
(8) Brake pedal spring
(9) Clutch pedal pad
(10) Clutch pedal
(11) Bushing C
(12) Clutch clevis pin
(13) Assist rod A
(14) Clip
(15) Assist spring
(16) Assist bushing
(17) Assist rod B
(18) Spring S
(19) Rod S
(20) Bushing S
(21) O-ring
(22) Clip
(23) Clutch switch (With cruise control)
(24) Stop light switch
(25) Pedal bracket
(26) Clutch master cylinder bracket
(27) Lever

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.0)

9. BRAKE PEDAL FOR AT MODEL S405001A0509



(1) Stopper
(2) Bushing
(3) Plug
(4) Pedal bracket
(5) Stop light switch
(6) Spacer
(7) Snap pin
(8) Brake pedal pad
(9) Brake pedal
(10) Clevis pin
(11) Brake spacer
(12) Brake pedal spring

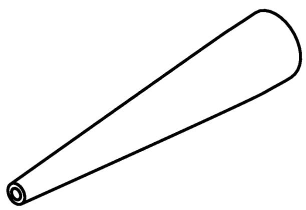
Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.0)
T3: 30 (3.1, 22.4)

C: CAUTION *S405001A03*

- 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.
- Use SUBARU genuine grease etc. or the equivalent. Do not mix grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply grease onto sliding or revolution surfaces before installation.
- Before installing O-rings or snap rings, apply sufficient amount of grease to avoid damage and deformation.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Do not put fluid on body. If the body is tainted, wash away with water.

D: PREPARATION TOOL S405001A17

1. SPECIAL TOOLS S405001A1701

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2406	926460000	WHEEL CYLINDER 3/4″ ADAPTER	Used for installing cup onto wheel cylinder piston (Size 3/4 in).

2. GENERAL PURPOSE TOOLS S405001A1702

TOOL NAME	REMARKS
Snap Ring Pliers	Used for removing and installing snap ring.

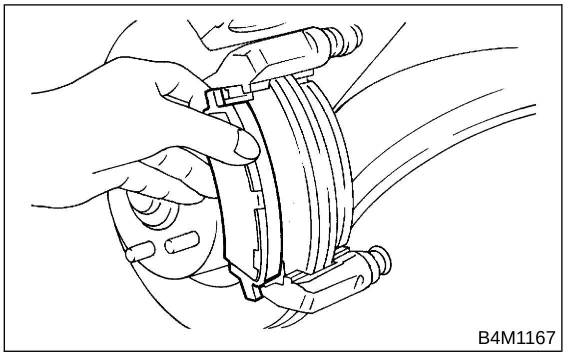
2. Front Brake Pad S405178

A: REMOVAL S405178A18

1) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
2) Remove the bolt on the bottom.
3) Raise the caliper body and suspend it securely.

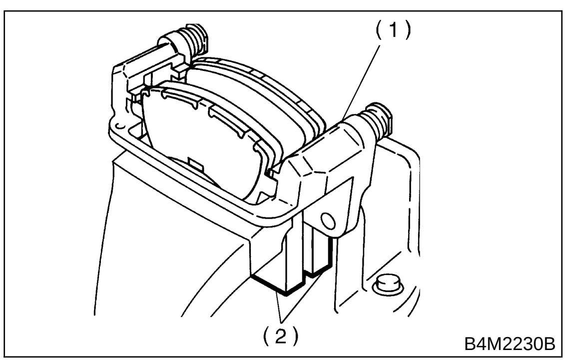
NOTE:
Do not disconnect the brake hose from the caliper body.

4) Remove pad.



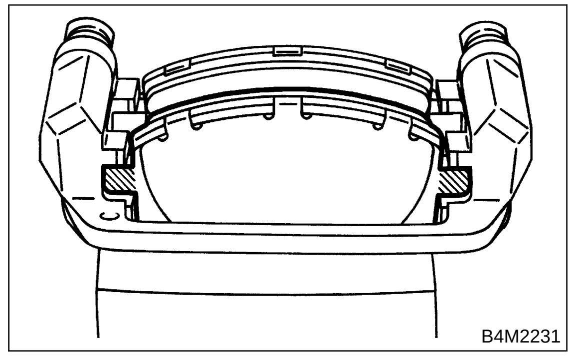
NOTE:
If brake pad is difficult to remove, proceed as follows:

(1) Remove caliper body from support.
(2) Remove support.
(3) Place a support in a vise between wooden blocks.



(1) Support
(2) Wooden blocks

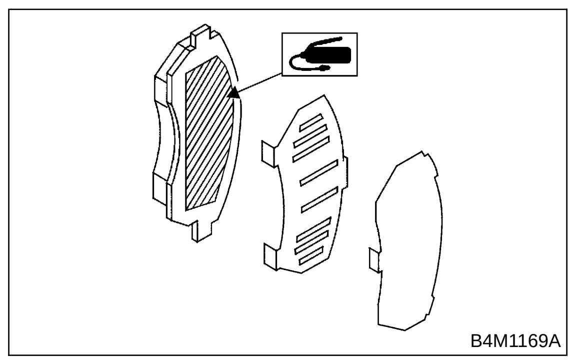
(4) Attach a rod of less than 12 mm (0.47 in) dia. to the shaded area of brake pad, and strike the rod with a hammer to drive brake pad out of place.



B: INSTALLATION S405178A11

1) Apply thin coat of Molykote AS880N (Part No. 26298AC000) to the frictional portion between pad and pad clip.
2) Apply thin coat of Molykote AS880N (Part No. 26298AC000) to the frictional portion between pad and pad inner shim.

CAUTION:
Do not allow oil or grease to adhere to the sliding surface of pad and disc rotor.



3) Check disc rotor thickness and runout. <Ref. to BR-17, INSPECTION, Front Disc Rotor.>
4) Install pads on support.
5) Install caliper body on support.

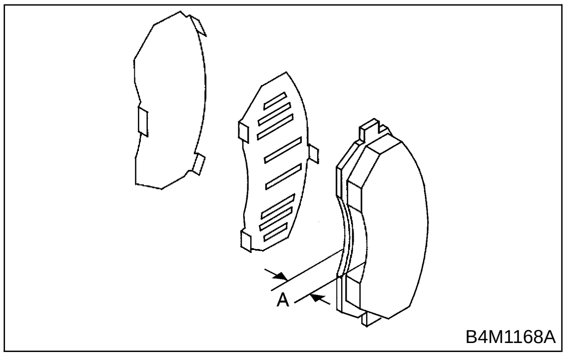
Tightening torque:
38 N·m (3.9 kgf-m, 28 ft-lb)

NOTE:
If it is difficult to push piston during pad replacement, loosen air bleeder to facilitate work.

6) Depress brake pedal several times.
7) Check that brake fluid level is at max line.

C: INSPECTION *S405178A10*

Check pad thickness A.



Pad thickness (including back metal)	Standard value	17 mm (0.67 in)
	Wear limit	7.5 mm (0.295 in)

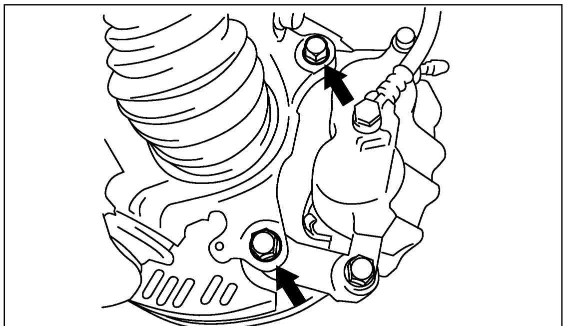
CAUTION:

- **Always replace the pads for both the left and right wheels at the same time. Also replace pad clips if they are twisted or worn.**
- **A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of the wear indicator contacts the disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.**
- **Replace pad if there is oil or grease on it.**

3. Front Disc Rotor *S405173*

A: REMOVAL *S405173A18*

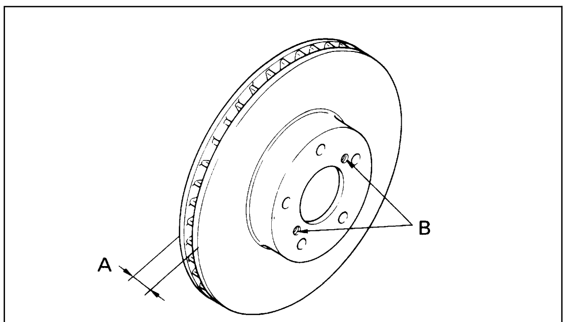
1) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
2) Remove caliper body from housing, and suspend it from strut using a wire.



BR0076

3) Remove the disc rotor.

NOTE:
If disc rotor seizes up within the hub, drive disc rotor out by installing an 8-mm bolt in holes B on the rotor.



G4M0365

4) Clean mud and foreign particles from caliper body assembly and support.

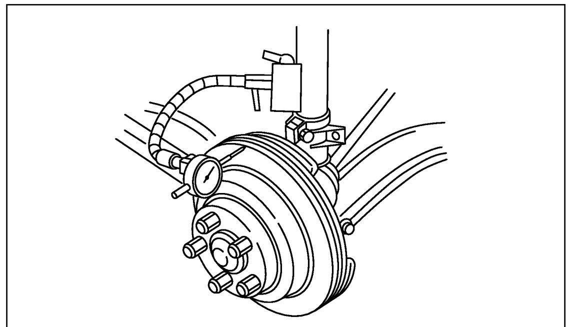
B: INSTALLATION *S405173A11*

1) Install the disc rotor.
2) Install the caliper body to housing.

Tightening torque:
80 N·m (8.2 kgf-m, 59 ft-lb)

C: INSPECTION *S405173A10*

1) Secure disc rotor by tightening the five wheel nuts.
2) Set a dial gauge on the disc rotor. Turn disc rotor to check runout.

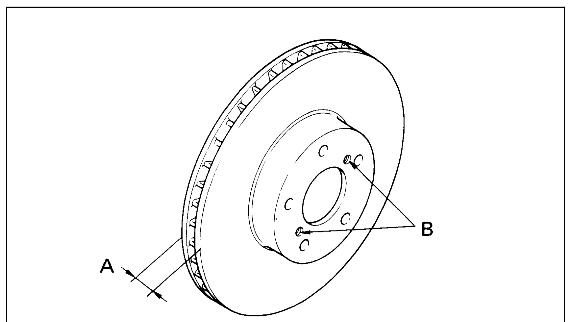


B4M2353

NOTE:
● Make sure that dial gauge is set 5 mm (0.20 in) inward of rotor outer perimeter.
● If disc rotor runout is above standard value, inspect play of hub bearing axial direction and runout of axle hub. <Ref. to DS-22, INSPECTION, Front Axle.>
If bearing and hub are normal, replace disc rotor.

Disc rotor runout limit:
0.075 mm (0.0030 in)

3) Measure disc rotor thickness.
If thickness of disc rotor is outside the standard value, replace disc rotor.



G4M0365

NOTE:
Make sure that micrometer is set 5 mm (0.20 in) inward of rotor outer perimeter.

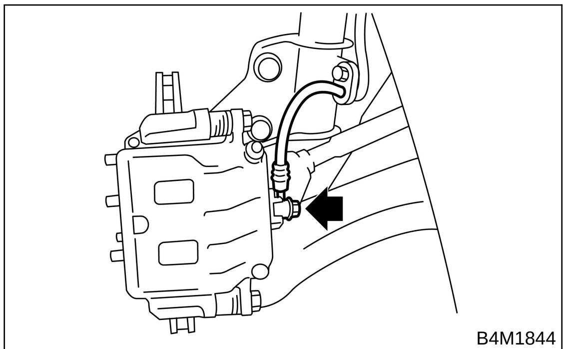
	Standard value	Service limit	Disc outer dia.
Disc rotor thickness A	24.0 mm (0.945 in)	22.0 mm (0.866 in)	277 mm (10.91 in)

4. Front Disc Brake Assembly

S405176

A: REMOVAL *S405176A18*

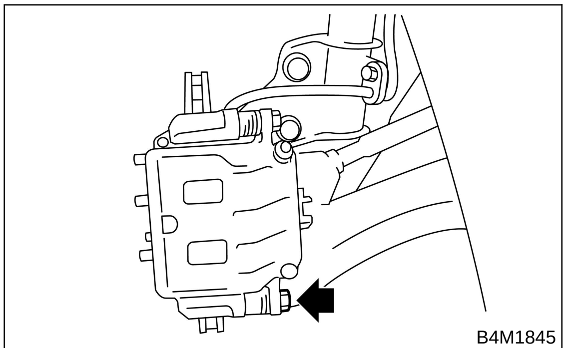
1) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
2) Remove union bolt and disconnect brake hose from caliper body assembly.



B4M1844

CAUTION:
Do not spill brake fluid on painted surface. Wash it off immediately.

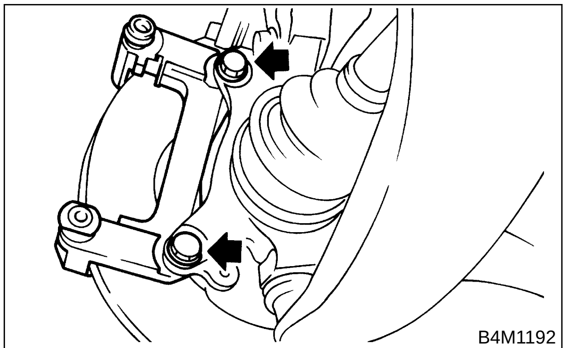
3) Remove bolt securing lock pin to caliper body.



B4M1845

4) Raise caliper body and move it toward vehicle center to separate it from support.
5) Remove support from housing.

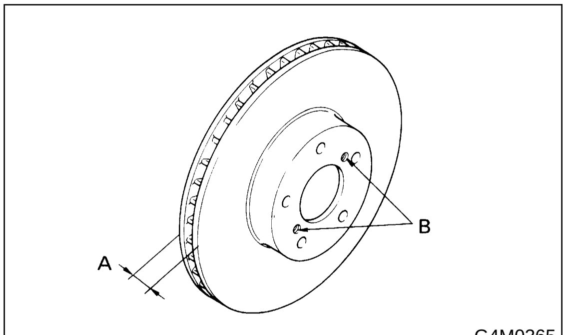
NOTE:
Remove support only when replacing it or the rotor. It need not be removed when servicing caliper body assembly.



B4M1192

6) Remove disc rotor from hub.

NOTE:
If disc rotor seizes up within hub, drive disc rotor out by installing an 8-mm bolt in holes B on the rotor.



G4M0365

7) Clean mud and foreign particles from caliper body assembly and support.

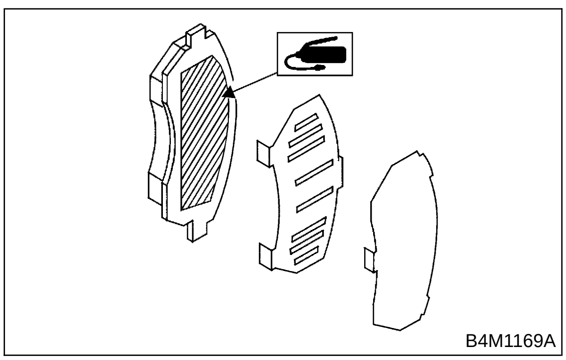
B: INSTALLATION S405176A11

1) Install disc rotor on hub.
2) Install support on housing.

Tightening torque:
80 N·m (8.2 kgf-m, 59 ft-lb)

CAUTION:
- **Always replace the pads for both the left and right wheels at the same time. Also replace pad clips if they are twisted or worn.**
- **A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of the wear indicator contacts the disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.**
- **When replacing the pads, replace pads of the right and left wheels at the same time.**

3) Apply thin coat of Molykote AS880N (Part No. 26298AC000) to the frictional portion between pad and pad clip.
4) Apply thin coat of Molykote AS880N (Part No. 26298AC000) to the frictional portion between pad and inner shim.



5) Install pads on support.
6) Install caliper body on support.

Tightening torque:
38 N·m (3.9 kgf-m, 28 ft-lb)

7) Connect brake hose.

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

CAUTION:
Replace brake hose gaskets with new ones.

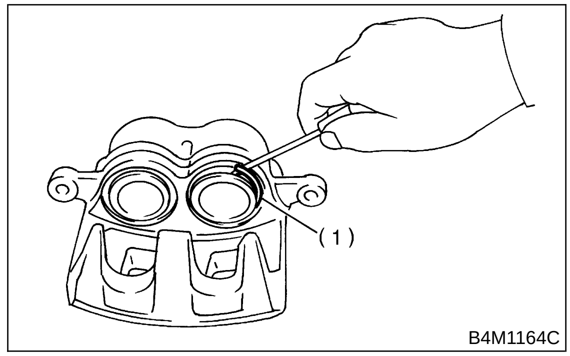
8) Bleed air from brake system.
<Ref. to BR-42, Air Bleeding.>

C: DISASSEMBLY S405176A06

1) Clean mud and foreign particles from caliper body assembly and support.

CAUTION:
Be careful not to allow foreign particles to enter inlet (at brake hose connector).

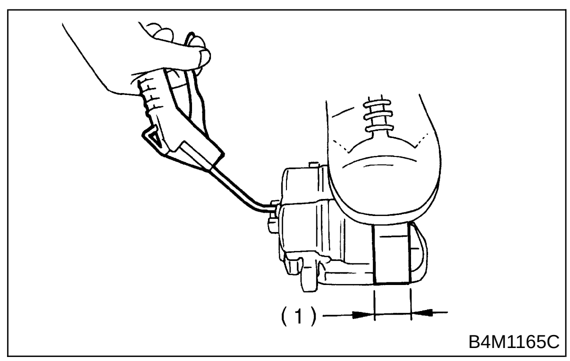
2) Using a standard screwdriver, remove boot ring from piston.



(1) Boot ring

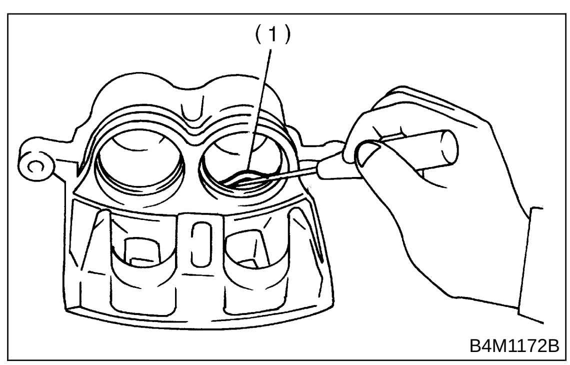
3) Remove boot from piston end.
4) Gradually supply compressed air via caliper body brake hose to force piston out.

CAUTION:
Place a wooden block as shown in Figure to prevent damage to piston.



(1) Place a 30 mm (1.18 in) wide wooden block here.

5) Remove piston seal from caliper body cylinder.



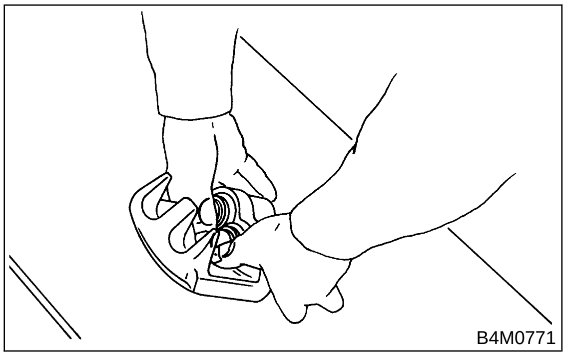
(1) Piston seal

6) Remove lock pin boot and guide pin boot.

D: ASSEMBLY S405176A02

1) Clean caliper body interior using brake fluid.
2) Apply a coat of brake fluid to piston seal and fit piston seal in groove on caliper body.
3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
4) Insert piston into cylinder.

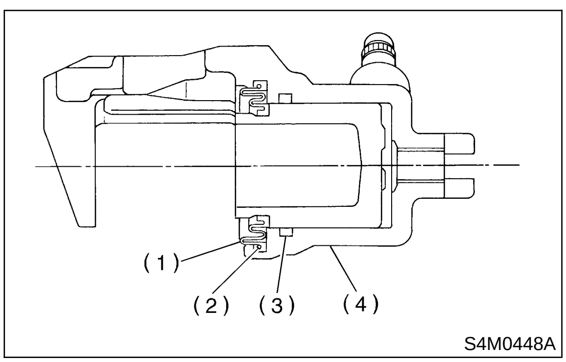
CAUTION:
Do not force piston into cylinder.



5) Apply a coat of specified grease to boot and fit in groove on ends of cylinder and piston.

Grease:
NIGLUBE RX-2 (Part No. 003606000)

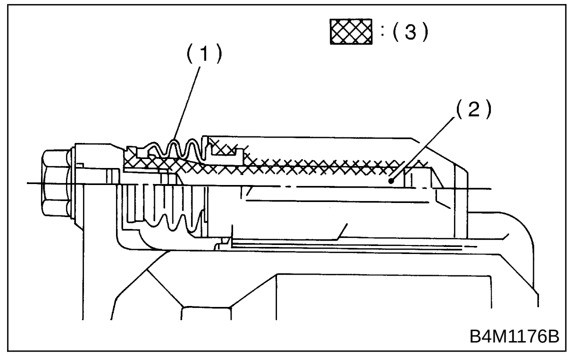
To facilitate installation, fit boot starting with piston end.



(1) Piston boot
(2) Boot ring
(3) Piston seal
(4) Caliper body

6) Position boot in grooves on cylinder and piston.
7) Install boot ring. Be careful not scratch boot.
8) Apply a coat of specified grease to lock pin and guide pin, outer surface, cylinder inner surface, and boot grooves.

Grease:
NIGLUBE RX-2 (Part No. 003606000)



(1) Pin boot
(2) Lock pin or guide pin
(3) Apply grease.

9) Install lock pin boot and guide pin boot on support.

E: INSPECTION S405176A10

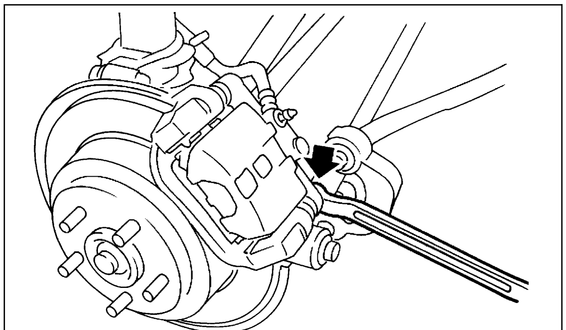
NOTE:
Repair or replace faulty parts.

1) Check caliper body and piston for uneven wear, damage or rust.
2) Check rubber parts for damage or deterioration.

5. Rear Brake Pad S405175

A: REMOVAL S405175A18

1) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
2) Remove the bolt on the bottom.



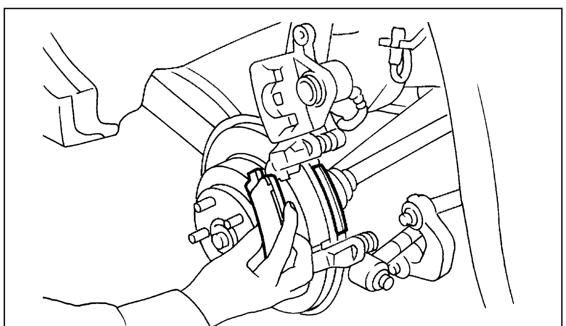
S4M0115

3) Raise caliper body and suspend it securely.

NOTE:
Do not disconnect the brake hose from the caliper body.

4) Remove pad from support.

NOTE:
If brake pad is difficult to remove, use the same procedure as for front disc brake pad.
<Ref. to BR-15, REMOVAL, Front Brake Pad.>



S4M0116

B: INSTALLATION S405175A11

1) Apply thin coat of Molykote AS880N (Part No. 26298AC000) to the frictional portion between pad and pad clip.

CAUTION:
Do not allow oil or grease to adhere to the sliding surface of pad and disc rotor.

2) Check disc rotor thickness and runout. <Ref. to BR-23, INSPECTION, Rear Disc Rotor.>
3) Install pad on support.
4) Install caliper body on support.

Tightening torque:
38 N·m (3.9 kgf-m, 28 ft-lb)

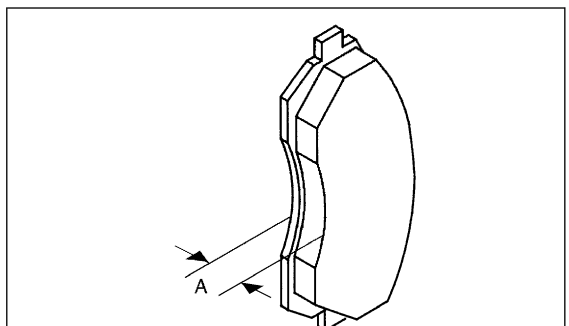
NOTE:
If it is difficult to push piston during pad replacement, loosen air bleeder to facilitate work.

5) Depress brake pedal several times.
6) Check that brake fluid level is at max line.

C: INSPECTION S405175A10

Check pad thickness (including back metal).

Pad thickness: A
Standard value
14.0 mm (0.551 in)
Wear limit
6.5 mm (0.256 in)



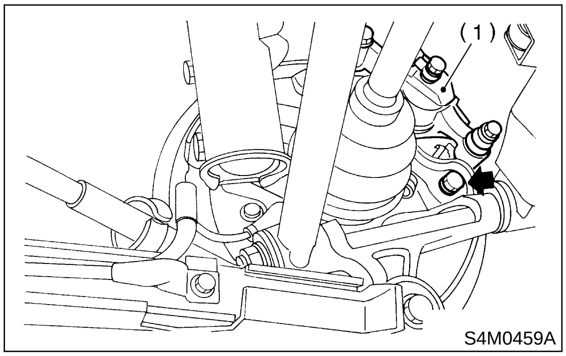
S4M0187A

CAUTION:
- **Always replace the pads for both the left and right wheels at the same time. Also replace pad clips if they are twisted or worn.**
- **A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of the wear indicator contacts the disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.**
- **Replace pad if there is oil or grease on it.**

6. Rear Disc Rotor S405177

A: REMOVAL S405177A18

1) Disconnect ground cable from battery.
2) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
3) Remove the two mounting bolts and remove the disc brake assembly.

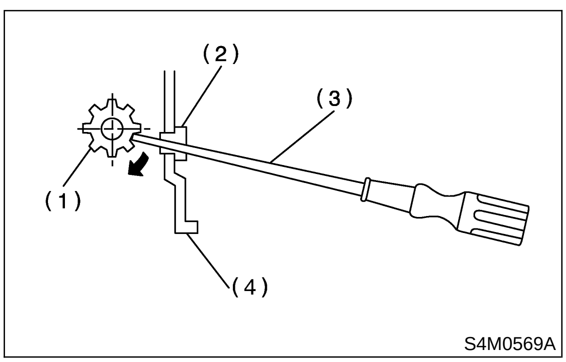


(1) Disc brake

4) Suspend the disc brake assembly so that the hose is not stretched.
5) Pull down and release parking brake.
6) Remove the disc rotor.

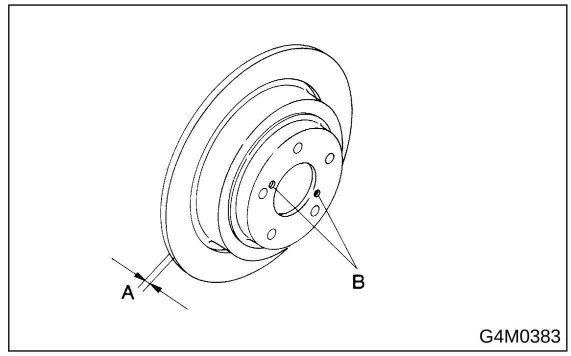
NOTE:
If the disc rotor is difficult to remove try the following two methods in order.

(1) Turn adjusting screw using a slot-type screwdriver until brake shoe gets away enough from the disc rotor.



(1) Adjusting screw
(2) Cover
(3) Slot-type screwdriver
(4) Back plate

(2) If disc rotor seizes up within hub, drive disc rotor out by installing an 8-mm bolt in holes B on the rotor.



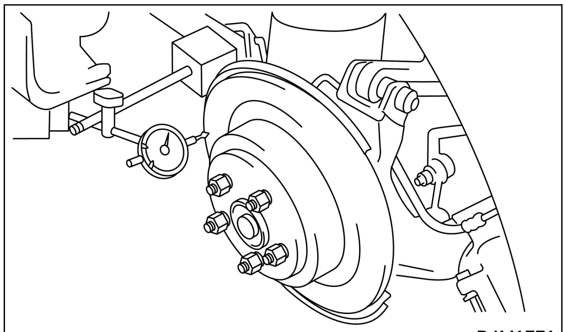
B: INSTALLATION S405177A11

1) Install in the reverse order of removal.
2) Adjust parking brake. <Ref. to PB-10, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

C: INSPECTION S405177A10

1) Secure disc rotor by tightening the five wheel nuts.
2) Set a dial gauge on the disc rotor. Turn disc rotor to check runout.

CAUTION:
Securely fix disc rotor to hub.

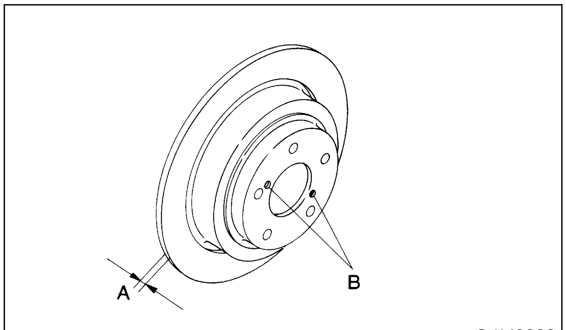


B4M1771

NOTE:
- Make sure that dial gauge is set 5 mm (0.20 in) inward of rotor outer perimeter.
- If disc rotor runout is above standard value, inspect play of hub bearing axial direction and runout of axle hub. <Ref. to DS-31, INSPECTION, Rear Axle.>

Disc rotor runout limit:
0.070 mm (0.0028 in)

3) Measure disc rotor thickness.
If thickness of disc rotor is outside the standard value, replace disc rotor.



G4M0383

NOTE:
Make sure that micrometer is set 5 mm (0.20 in) inward of rotor outer perimeter.

Disc rotor thickness: A
Standard value
10 mm (0.39 in)
Service limit
8.5 mm (0.335 in)

7. Rear Disc Brake Assembly

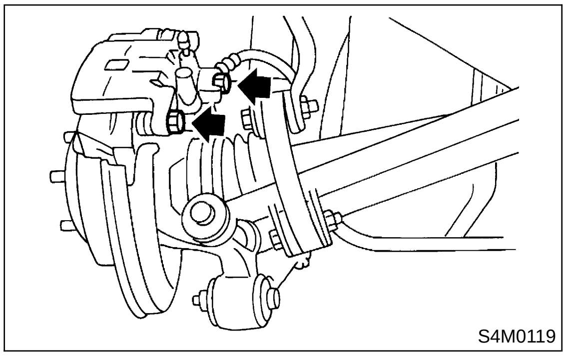
S405172

A: REMOVAL *S405172A18*

1) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
2) Disconnect brake hose from caliper body assembly.

CAUTION:
Do not spill brake fluid on painted surface. Wash it off immediately.

3) Remove bolt securing lock pin to caliper body.



4) Raise caliper body and move it toward vehicle center to separate it from support.
5) Remove support from back plate.

NOTE:
Remove support only when replacing it or the rotor. It need not be removed when servicing caliper body assembly.

6) Clean mud and foreign particles from caliper body assembly and support.

CAUTION:
Be careful not to allow foreign particles to enter inlet (at brake hose connector).

B: INSTALLATION *S405172A11*

1) Install disc rotor on hub.
2) Install support on back plate.

Tightening torque:
80 N·m (8.2 kgf-m, 59 ft-lb)

CAUTION:
- **Always replace the pads for both the left and right wheels at the same time. Also replace pad clips if they are twisted or worn.**
- **A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of the wear indicator contacts the disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.**
- **Replace pads if there is oil or grease on them.**

3) Apply thin coat of Molykote AS880N (Part No. 26298AC000) to the frictional portion between pad and pad clip.

CAUTION:
Do not allow oil or grease to adhere to the sliding surface of pad and disc rotor.

4) Install pads on support.
5) Install caliper body on support.

Tightening torque:
38 N·m (3.9 kgf-m, 28 ft-lb)

6) Connect brake hose.

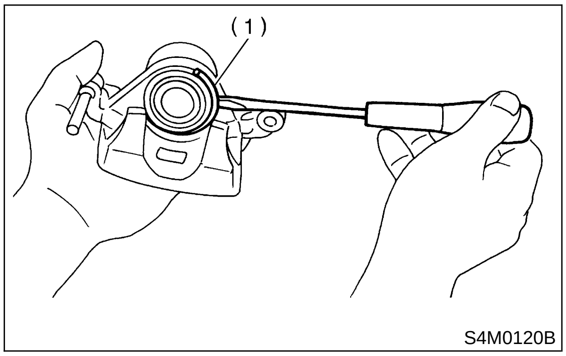
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

CAUTION:
- **The brake hose must be connected without any twist.**
- **Replace brake hose gaskets with new ones.**

7) Bleed air from brake system.
<Ref. to BR-42, Air Bleeding.>

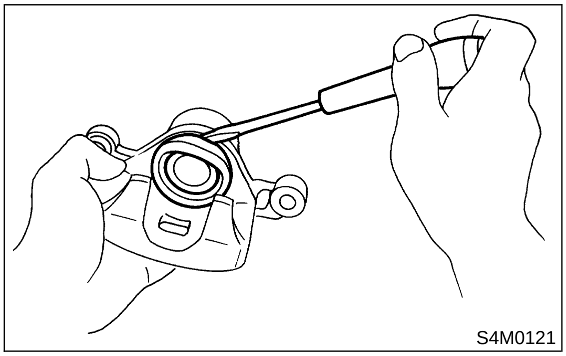
C: DISASSEMBLY *S405172A06*

1) Remove the boot ring.



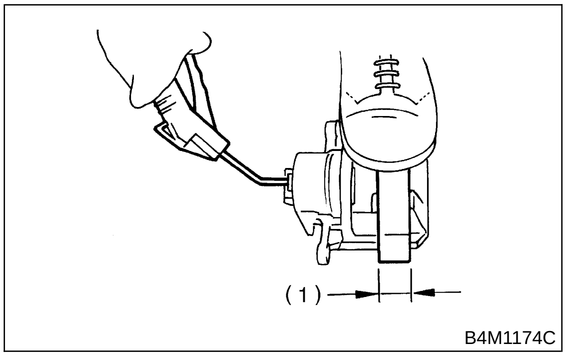
(1) Boot ring

2) Remove the piston boot.



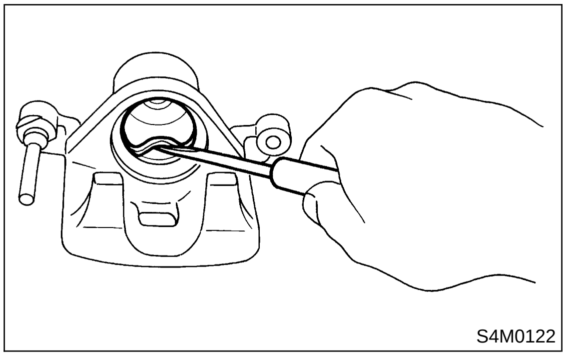
3) Gradually supply compressed air via inlet of caliper body to force piston out.

CAUTION:
- **Place a wooden block as shown in Figure to prevent damage to piston.**
- **Do not apply excessively high-pressure.**



(1) Place a 30 mm (1.18 in) wide wooden block here.

4) Remove piston seal from caliper body cylinder.



5) Remove lock pin sleeve and boot from caliper body.
6) Remove guide pin boot.

D: ASSEMBLY S405172A02

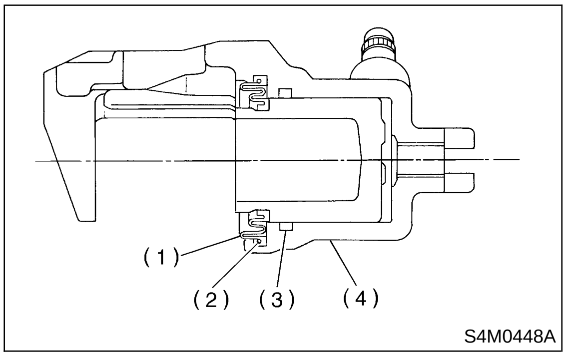
1) Clean caliper body interior using brake fluid.
2) Apply a coat of brake fluid to piston seal and fit piston seal in groove on caliper body.
3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
4) Insert piston into cylinder.

CAUTION:
Do not force piston into cylinder.

5) Apply a coat of specified grease to boot and fit in groove on ends of cylinder and piston.

Grease:
NIGLUBE RX-2 (Part No. 003606000)

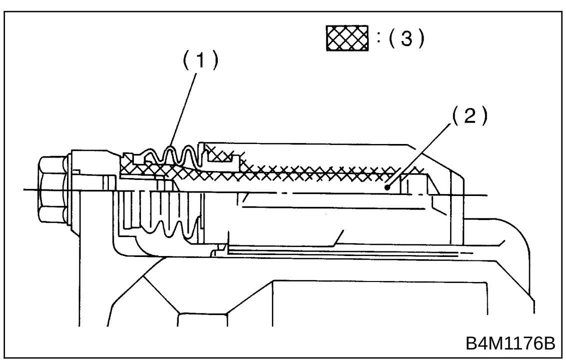
6) Install the piston boot to the caliper body, and attach boot ring.



(1) Piston boot
(2) Boot ring
(3) Piston seal
(4) Caliper body

7) Apply a coat of specified grease to guide pin, outer surface, sleeve outer surface, cylinder inner surface, and boot grooves.

Grease:
NIGLUBE RX-2 (Part No. 003606000)



(1) Pin boot
(2) Lock pin or guide pin
(3) Apply grease.

8) Install guide pin boot on caliper body.
9) Install lock pin boot on caliper body and insert lock pin sleeve into place.

E: INSPECTION S405172A10

NOTE:
Repair or replace faulty parts.

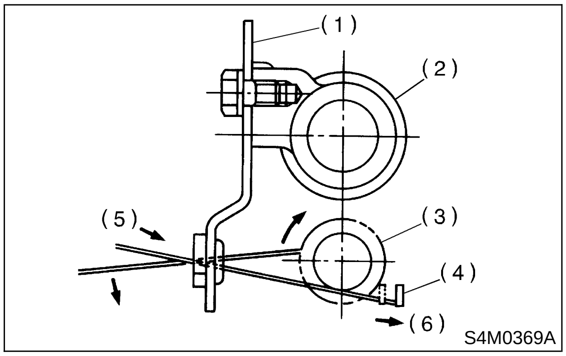
1) Check caliper body and piston for uneven wear, damage or rust.
2) Check rubber parts for damage or deterioration.

8. Rear Drum Brake Shoe S405174

A: REMOVAL S405174A18

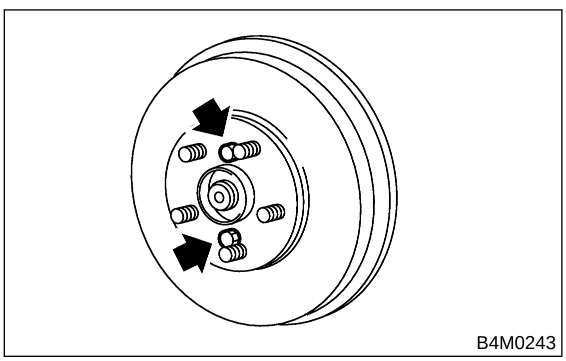
1) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
2) Release parking brake.
3) Remove brake drum from brake assembly.

NOTE:
- If it is difficult to remove brake drum, remove adjusting hole cover from drum, and then turn adjuster assembly pawls using a slot-type screwdriver until brake shoe separates from the drum.

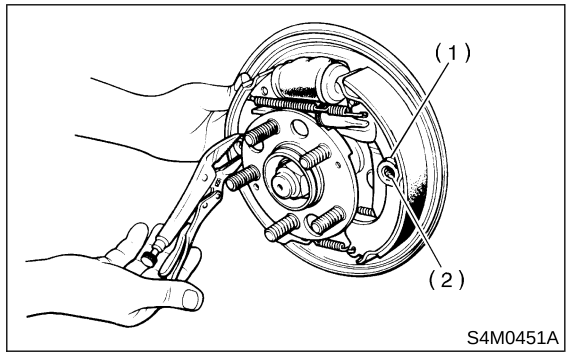


(1) Back plate
(2) Wheel cylinder
(3) Adjuster ASSY pawls
(4) Adjusting lever
(5) Tightening direction
(6) Push.

- If brake drum is difficult to remove, drive it out by installing an 8-mm bolt into bolt hole in brake drum.

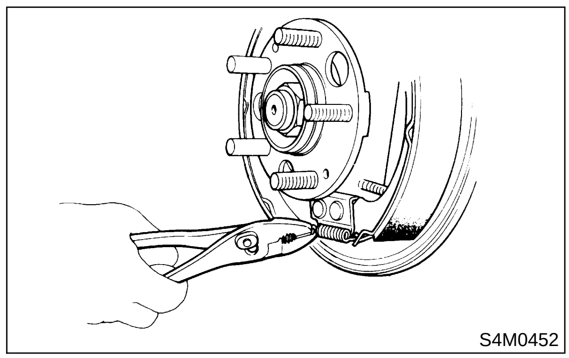


4) Hold hold-down pin by securing rear of back plate with your hand.



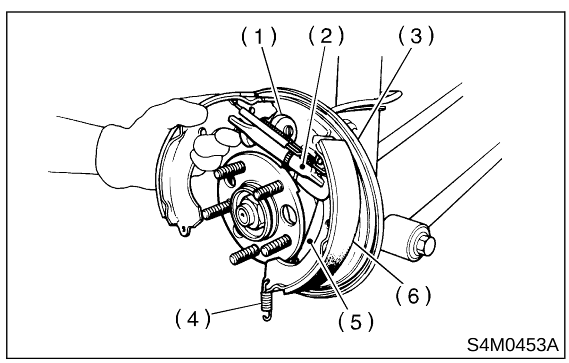
(1) Hold-down cup
(2) Hold-down pin

5) Disconnect hold-down cup from hold-down pin by rotating hold-down cup.
6) Disconnect lower shoe return spring from shoes.



7) Remove shoes one by one from back plate with adjuster.

CAUTION:
Be careful not to bend parking brake cable excessively when removing brake shoes.



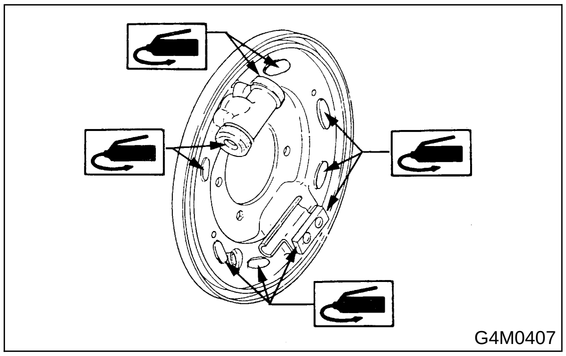
(1) Wheel cylinder
(2) Adjuster
(3) Back plate
(4) Lower shoe return spring
(5) Parking lever
(6) Trailing shoe

8) Disconnect parking brake cable from parking lever.

B: INSTALLATION S405174A11

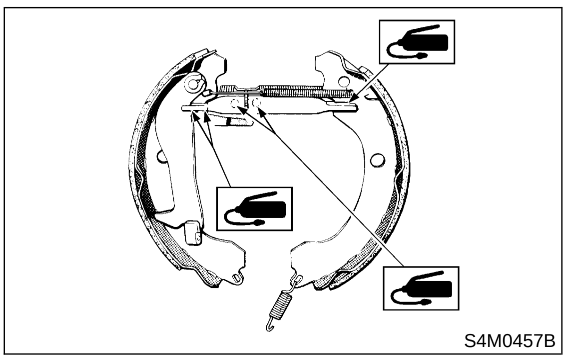
1) Clean back plate and wheel cylinder.
2) Apply grease to portions indicated by arrows in Figure.

Brake grease:
Dow Corning Molykote No. 7439 (Part No. 725191460)

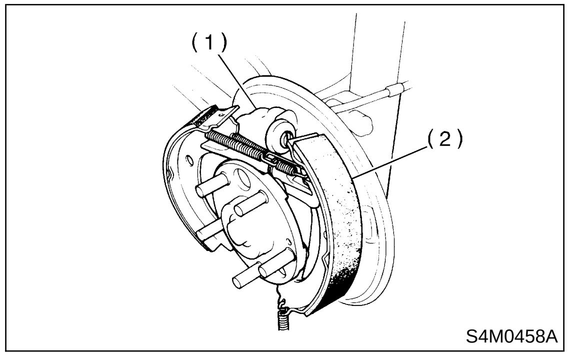


3) Apply grease to adjusting screw and both ends of adjuster.

Brake grease:
Dow Corning Molykote No. 7439 (Part No. 725191460)



4) Connect upper shoe return spring to shoes.
5) Connect parking brake cable to parking lever.
6) While positioning shoes (one at a time) in groove on wheel cylinder, secure shoes.



(1) Wheel cylinder
(2) Shoe (Trailing)

7) Fix shoes by connecting hold-down cup to hold-down pin.
8) Connect lower shoe return spring.
9) Set the outside diameter of brake shoes less than 0.5 to 0.8 mm (0.020 to 0.031 in) in comparison with the inside diameter of brake drum.
10) Install drum.

C: INSPECTION S405174A10

1) Measure the lining thickness.

Lining thickness:
Standard 4.1 mm (0.161 in)
Service limit 1.5 mm (0.059 in)

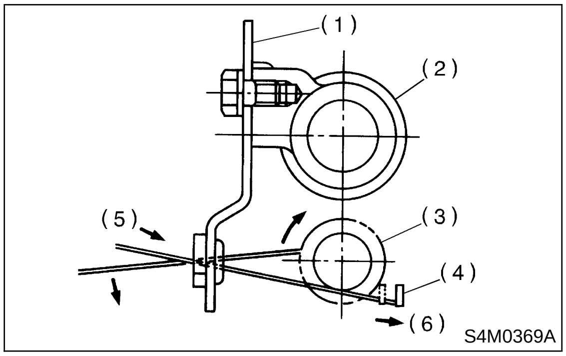
2) If the deformation or wear of back plate, shoe, etc. are notable, replace them.
3) When the shoe return spring tension is excessively weakened, replace it, taking care to identify upper and lower springs.

9. Rear Drum Brake Drum S405180

A: REMOVAL S405180A18

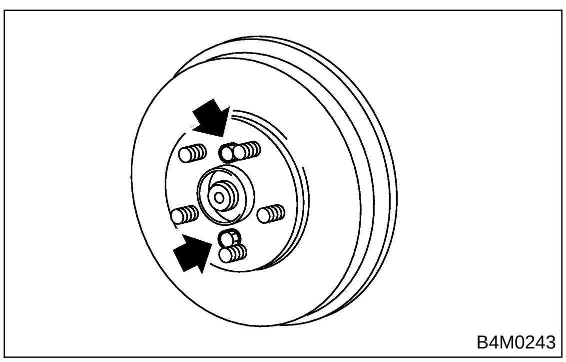
1) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
2) Release parking brake.
3) Remove brake drum from brake assembly.

NOTE:
- If it is difficult to remove brake drum, remove adjusting hole cover from drum, and then turn adjuster assembly pawls using a slot-type screwdriver until brake shoe separates from the drum.



(1) Back plate
(2) Wheel cylinder
(3) Adjuster ASSY pawls
(4) Adjusting lever
(5) Tightening direction
(6) Push.

- If brake drum is difficult to remove, drive it out by installing an 8-mm bolt into bolt hole in brake drum.



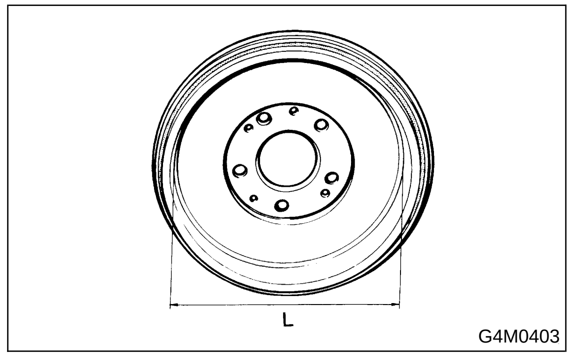
B: INSTALLATION S405180A11

1) Set the outside diameter of brake shoes less than 0.5 to 0.8 mm (0.020 to 0.031 in) in comparison with the inside diameter of brake drum.
2) Install drum.

C: INSPECTION S405180A10

1) If the inside surface of brake drum is streaked, correct the surface. And, if it is unevenly worn, tapered, streaked, or the outside surface of brake drum is damaged, correct or replace it.
2) Measure the drum inner diameter.

Drum inner diameter: "L"
Standard 228.6 mm (9 in)
Service limit 230.6 mm (9.08 in)

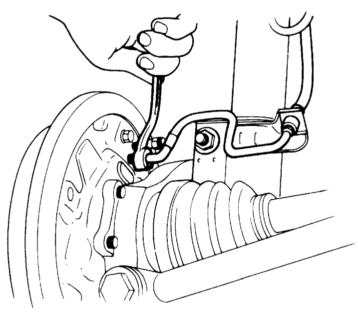


10. Rear Drum Brake Assembly

S405179

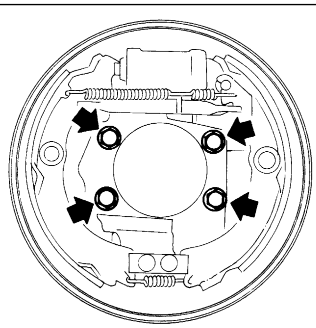
A: REMOVAL *S405179A18*

1) Disconnect ground cable from battery.
2) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
3) Release parking brake.
4) Remove brake drum from brake assembly. <Ref. to BR-29, REMOVAL, Rear Drum Brake Drum.>
5) Remove brake shoe. <Ref. to BR-27, REMOVAL, Rear Drum Brake Shoe.>
6) Unscrew the brake pipe flare nut and disconnect brake pipe.



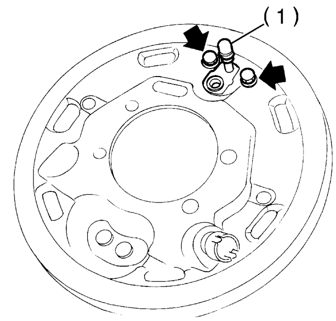
G4M0399

7) Disconnect ABS sensor from back plate.
8) Remove hub. <Ref. to DS-23, Rear Axle.>
9) Remove the bolts installing back plate, and then, remove brake assembly.



G4M0400

10) Remove the bolts installing wheel cylinder on back plate, and remove it.



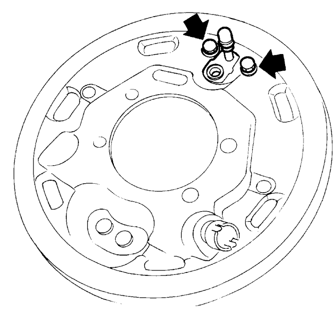
S4M0454A

(1) Air bleeder

B: INSTALLATION *S405179A11*

1) Clean back plate and wheel cylinder.
2) Install wheel cylinder on back plate, and tighten bolts.

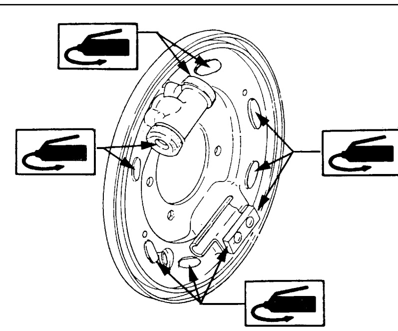
Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)



S4M0454

3) Apply grease to portions indicated by arrows in Figure.

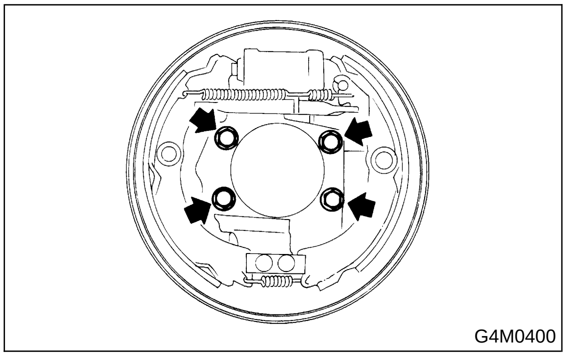
Brake grease:
Dow Corning Molykote No. 7439 (Part No. 725191460)



G4M0407

4) Install brake assembly on housing, and tighten bolts to install back plate.

Tightening torque:
53 N·m (5.4 kgf-m, 39 ft-lb)



5) Install hub. <Ref. to DS-23, Rear Axle.>
6) Connect brake pipe, and tighten brake pipe flange nut.

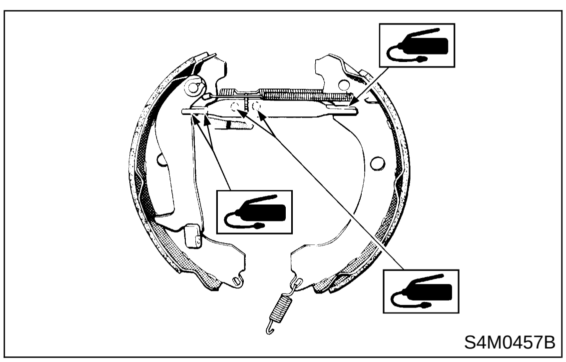
Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

7) Connect ABS sensor to back plate.

Tightening torque:
32 N·m (3.3 kgf-m, 24 ft-lb)

8) Apply grease to adjusting screw and both ends of adjuster.

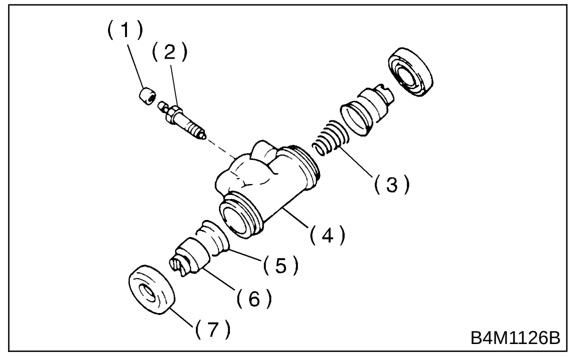
Brake grease:
Dow Corning Molykote No. 7439 (Part No. 725191460)



9) Install brake shoe. <Ref. to BR-28, INSTALLATION, Rear Drum Brake Shoe.>
10) Install drum. <Ref. to BR-29, INSTALLATION, Rear Drum Brake Drum.>
11) Bleed air from brake system. <Ref. to BR-42, Air Bleeding.>

C: DISASSEMBLY *S405179A06*

1) Remove right and left dust boots from wheel cylinder.



(1) Bleeder cap
(2) Bleeder screw
(3) Spring
(4) Cylinder
(5) Cup
(6) Piston
(7) Boot

2) Remove piston, cup, spring and air bleeder screw and cap.

D: ASSEMBLY *S405179A02*

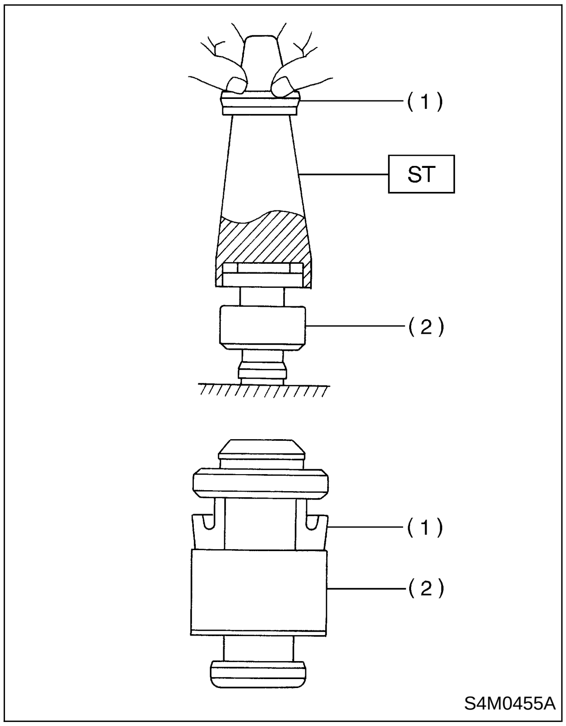
1) Clean all parts in brake fluid. Check and replace faulty parts.
- Cup and boot for damage or fatigue
- Cylinder, piston and spring or damage or rust formation

2) Assembly is the reverse order of disassembly.
(1) When installing the cup, use ST, apply brake fluid to the frictional surface for smooth installation and pay attention to cup direction.
(2) STs are available in different sizes.

CAUTION:
- **When replacing the repair kit, make sure that the sizes of cylinder and cup are the same as those which were replaced.**
- **Use only the tool of the correct size.**

ST: ADAPTER	
Applicable size	Part No.
19.0 mm (3/4 in)	926460000

CAUTION:
While assembling, be careful to prevent any metal chip, dust or dirt from entering the wheel cylinder.

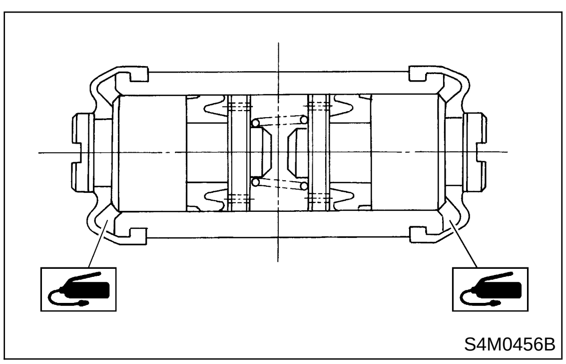


(1) Cup
(2) Piston

3) Apply rubber grease to the boot inside as shown in Figure.

CAUTION:
Never use brake grease.

Grease:
NIGLUBE RX-2 (Part No. 003606000)



E: INSPECTION S405179A10

1) Check wheel cylinder for leakage.
2) Inspect the disassembled parts for wear, rust or damage.
3) Inspect lining thickness. <Ref. to BR-28, INSPECTION, Rear Drum Brake Shoe.>
4) Inspect brake drum. <Ref. to BR-29, INSPECTION, Rear Drum Brake Drum.>

11. Master Cylinder S405168

A: REMOVAL S405168A18

1) Pull up parking brake lever, and block the tires.
2) Disconnect ground cable from battery.
3) Thoroughly drain brake fluid from reservoir tank.
4) Disconnect fluid level indicator harness connector.
5) Remove brake pipes from master cylinder.
6) Remove master cylinder mounting nuts, and take out master cylinder from brake booster.

CAUTION:
Be extremely careful not to spill brake fluid. Brake fluid spilt on the vehicle body will harm the painted surface; wash it off quickly if spilt.

B: INSTALLATION S405168A11

1) Install in the reverse order of removal.

Tightening torque:
Master cylinder mounting nut
14 N·m (1.4 kgf-m, 10.1 ft-lb)
Piping flare nut
15 N·m (1.5 kgf-m, 10.8 ft-lb)

CAUTION:
Be sure to use recommended brake fluid.

2) Bleed air from brake system. <Ref. to BR-42, Air Bleeding.>

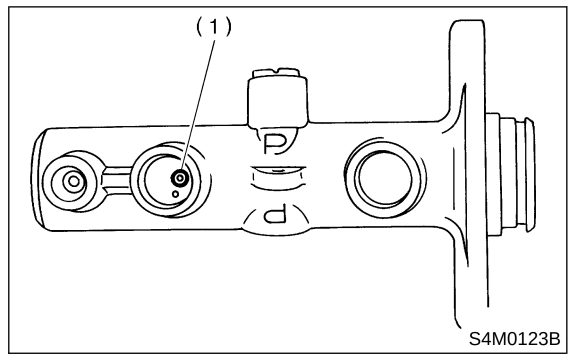
C: DISASSEMBLY S405168A06

1. PRECAUTIONS FOR DISASSEMBLING S405168A0602

1) Remove mud and dirt from the surface of brake master cylinder.
2) Prepare tools necessary for disassembly operation, and arrange them neatly on work bench.
3) Clean work bench.

2. DISASSEMBLING PROCEDURE S405168A0603

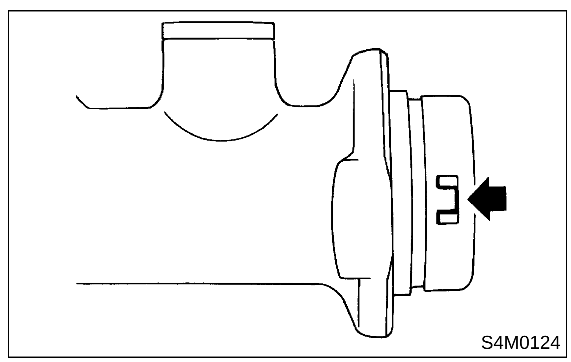
1) Remove pin with drift pin which secures reserve tank to master cylinder.
2) Remove cylinder pin with magnetic pick-up tool while pushing in primary piston.



(1) Cylinder pin

3) Pry up the pawl and remove the piston retainer.

NOTE:
Piston may jump out from master cylinder.



4) Extract primary piston assembly and secondary piston assembly.

CAUTION:
- **Do not disassemble the piston assembly; otherwise, the spring set value may be changed.**
- **Use brake fluid or methanol to wash inside wall of cylinder, pistons and piston cups. Be careful not to damage parts when washing. If methanol is used for washing, do not dip rubber parts, such as piston cups, in it for more than 30 seconds; otherwise, they may become swelled.**

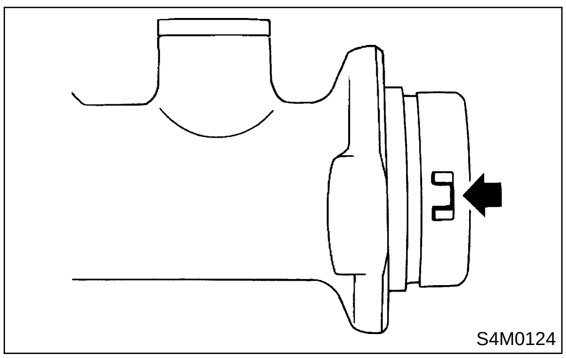
D: ASSEMBLY S405168A02

1. PRECAUTIONS FOR ASSEMBLING S405168A0201

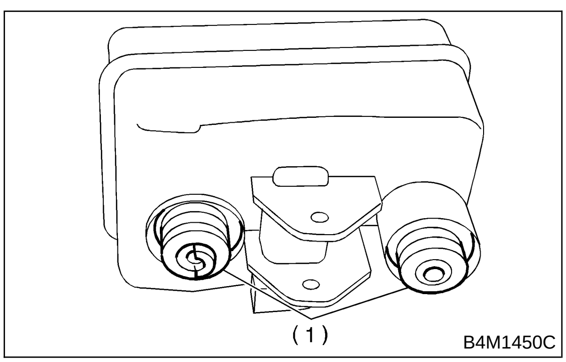
1) When assembling, be sure to use recommended brake fluid.
2) Ensure that the inside wall of cylinder, pistons, and piston cups are free from dirt when assembling.
3) Be extremely careful not to damage, scratch, or dent cylinder inside wall, pistons, and piston cups.
4) Do not drop parts. Never attempt to use any part that has been dropped accidentally.

2. ASSEMBLING PROCEDURE S405168A0202

1) Assembling piston assembly:
Apply recommended brake fluid to inside wall of cylinder, and to outer surface of piston assembly, and install piston assemblies carefully into cylinder.
2) Press the pawl and install the piston retainer into the master cylinder.



3) Install seal to reservoir tank.



(1) Seal

4) Install pin with drift pins which secures reservoir tank to master cylinder.

E: INSPECTION S405168A10

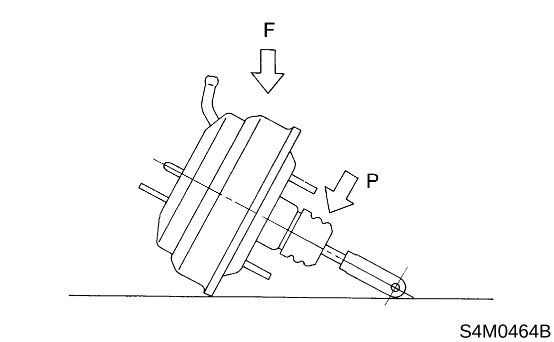
If any damage, deformation, wear, swelling, rust, and other faults are found on the primary piston assembly, secondary piston assembly, supply valve stopper, or gasket, replace the faulty part.

CAUTION:
- **The primary and secondary pistons must be replaced as complete assemblies.**
- **The service limit of the clearance between each piston and the master cylinder inner dia. is 0.11 mm (0.0043 in).**
- **When handling parts, be extremely careful not to damage or scratch the parts, or let any foreign matter get on them.**

12. Brake Booster S405166

A: REMOVAL S405166A18

CAUTION:
If external force "F" is applied from above when brake booster is placed in this position, the resin portion as indicated by "P", may be damaged.

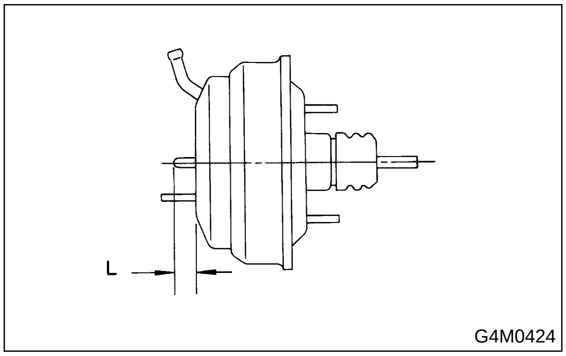


S4M0464B

1) Pull up parking brake lever, and block the tires.
2) Disconnect ground cable from battery.
3) Remove or disconnect the following parts at engine compartment.
   (1) Disconnect connector for brake fluid level indicator.
   (2) Remove brake pipes from master cylinder.
   (3) Remove master cylinder installing nuts.
   (4) Disconnect vacuum hose from brake booster.
4) Remove the following parts from the pedal bracket.
   (1) Snap pin and clevis pin
   (2) Four brake booster installing nuts
5) Remove brake booster while shunning brake pipes.

NOTE:
- Be careful not to drop brake booster. Brake booster should be discarded if it has been dropped.
- Use special care when handling operating rod. If excessive force is applied to operating rod, sufficient to cause a change in the angle in excess of ±3°, it may result in damage to the power piston cylinder.
- Use care when placing brake booster on the floor.
- Do not change the push rod length. If it has been changed, reset the projected length "L" to the standard length.

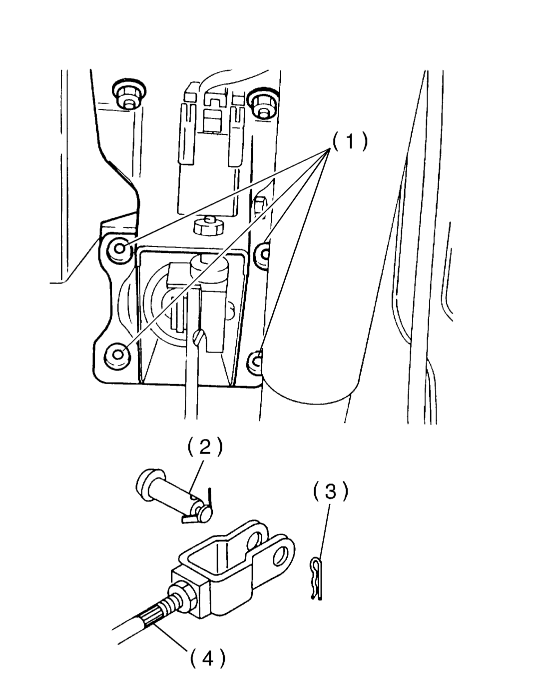
Standard:
L = 10 mm (0.39 in)



G4M0424

B: INSTALLATION S405166A11

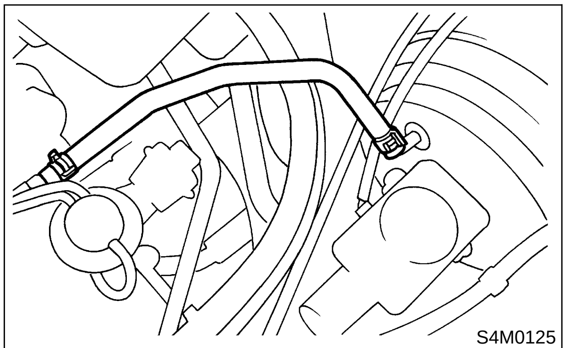
1) Mount brake booster in position.
2) Connect operating rod to brake pedal with clevis pin and snap pin.



B4M0117C

(1) Nuts
(2) Clevis pin
(3) Snap pin
(4) Operating rod

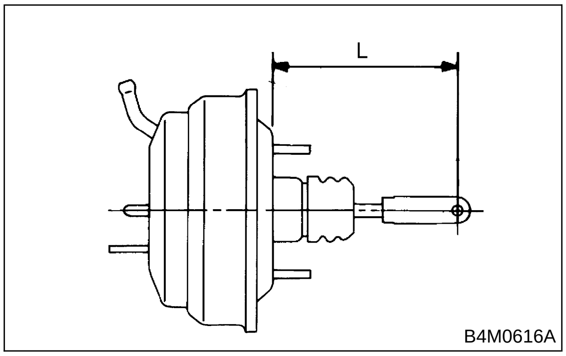
3) Connect vacuum hose to brake booster.


S4M0125

4) Mount master cylinder onto brake booster.
5) Connect brake pipes to master cylinder.
6) Connect electric connector for brake fluid level indicator.
7) Adjust operating rod of brake booster.

Standard: L
144.6 mm (5.69 in)

If it is not in specified value, adjust it by adjusting brake booster operating rod.

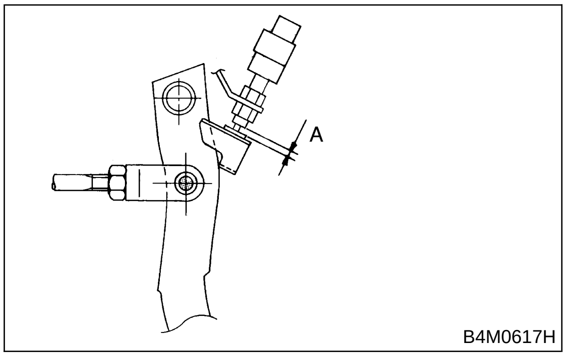


B4M0616A

8) Measure the clearance between threaded end of stop light switch and stopper.
If it is not in specified value, adjust it by adjusting position of stop light switch.

CAUTION:
Be careful not to rotate stop light switch.

Stop light switch clearance: A
0.3 mm (0.012 in)



B4M0617H

9) Apply grease to operating rod connecting pin to prevent it from wearing.
10) Bleed air from brake system.

Tightening torque (Air bleeder screw):
8 N·m (0.8 kgf-m, 5.8 ft-lb)

11) Conduct road tests to ensure brakes do not drag.

C: INSPECTION S405166A10

1. OPERATION CHECK (WITHOUT GAUGES) S405166A1001

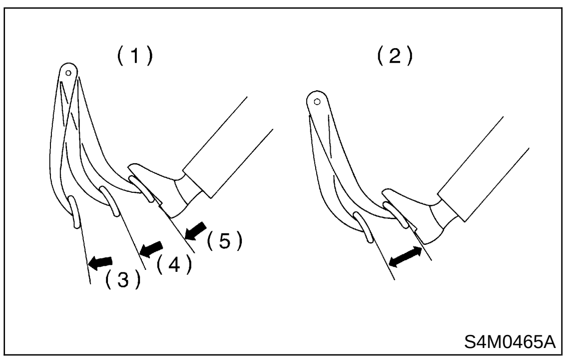
CAUTION:
When checking operation, be sure to securely apply the hand brake.

- **Checking without gauges**

This method cannot determine the exact portion which has failed, but it can provide a rough understanding of the nature of the failure if checking is conducted in accordance with the following procedures.

- **Air tightness check**

Start engine, and run it for 1 to 2 minutes, then turn it off. Depress brake pedal several times applying the same pedal force as that used in ordinary braking operations. The pedal stroke should be greatest on the 1st depression, and it should become smaller with each successive depression. If no change occurs in the pedal height while in a depressed state, brake booster is faulty.

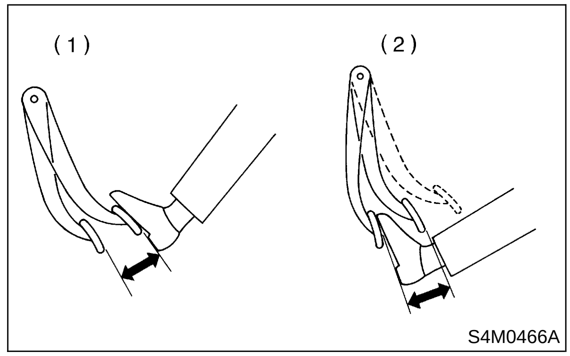


(1) OK
(2) NOT OK
(3) 1st
(4) 2nd
(5) 3rd

NOTE:
- In the event of defective operation, inspect the condition of the check valve and vacuum hose.
- Replace them if faulty and conduct the test again.
- If no improvement is observed, check precisely with gauges.

- **Operation check**

1) With engine off, depress brake pedal several times applying the same pedal force and make sure that the pedal height does not vary with each depression of the pedal.



(1) When engine is stopped
(2) When engine is started

2) With brake pedal depressed, start engine.
3) As engine starts, brake pedal should move slightly toward the floor. If no change occurs in the pedal height, brake booster is faulty.

NOTE:
If faulty, check precisely with gauges.

- **Loaded air tightness check**

Depress brake pedal while engine is running, and turn off engine while the pedal is still depressed. Keep the pedal depressed for 30 seconds; if no change occurs in the pedal height, brake booster is functioning normally; if the pedal height increases, it is faulty.

NOTE:
If faulty, check precisely with gauges.

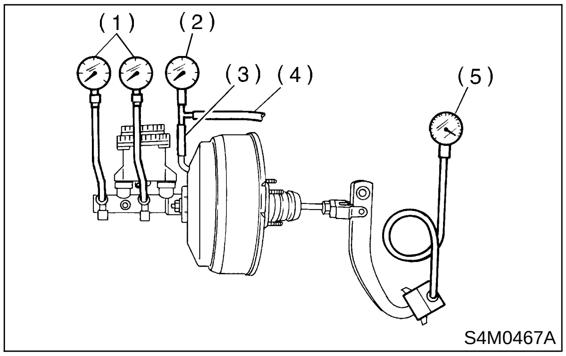
2. OPERATION CHECK (WITH GAUGES)

S405166A1002

CAUTION:
When checking operation, be sure to securely apply the hand brake.

- **Checking with gauges**

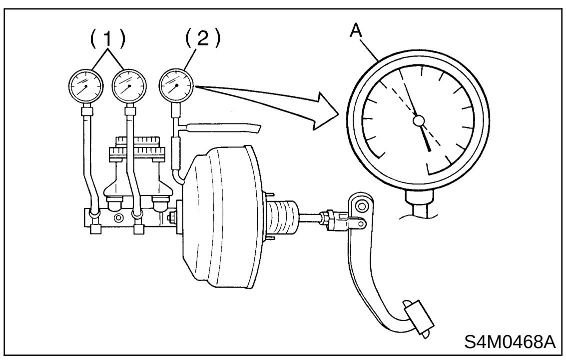
Connect gauges as shown in Figure. After bleeding air from pressure gauges, proceed to each check.



(1) Pressure gauge
(2) Vacuum gauge
(3) Adapter hose
(4) Vacuum hose
(5) Pedal force gauge

- **Air tightness check**

1) Start engine and keep it running until a vacuum of 66.7 kPa (500 mmHg, 19.69 inHg) = point A is indicated on vacuum gauge. Do not depress brake pedal.



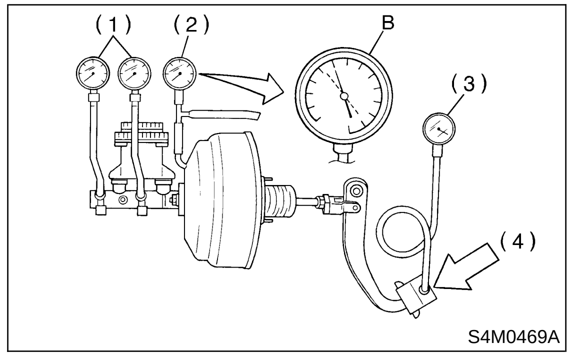
(1) Pressure gauge
(2) Vacuum gauge

2) Stop engine and watch the gauge. If the vacuum drop range is less than 3.3 kPa (25 mmHg, 0.98 inHg) within 15 seconds after stopping engine, brake booster is functioning properly. If defective, the cause may be one of those listed below.

- Check valve malfunction
- Leak from vacuum hose
- Leak from the shell jointed portion or stud bolt welded portion
- Damaged diaphragm
- Leak from valve body seal and bearing portion
- Leak from plate and seal assembly portion
- Leak from poppet valve assembly portion

- **Loaded air tightness check**

1) Start engine and depress brake pedal with pedal force of 196 N (20 kgf, 44 lb). Keep engine running until a vacuum of 66.7 kPa (500 mmHg, 19.69 inHg) = point B is indicated on vacuum gauge while the pedal is still depressed.



(1) Pressure gauge
(2) Vacuum gauge
(3) Pedal force gauge
(4) Depress

2) Stop engine and watch vacuum gauge.
If the vacuum drop range is less than 3.3 kPa (25 mmHg, 0.98 inHg) within 15 seconds after stopping engine, brake booster is functioning properly.
If defective, refer to “AIR TIGHTNESS CHECK”. <Ref. to BR-37, INSPECTION, Brake Booster.>

- **Lack of boosting action check**

Turn off engine, and set the vacuum gauge reading at “0”. Then, check the fluid pressure when brake pedal is depressed. The pressure must be greater than the standard value listed.

Brake pedal force	147 N (15 kgf, 33 lb)	294 N (30 kgf, 66 lb)
Fluid pressure	588 kPa (6 kg/cm^2, 85 psi)	1,667 kPa (17 kg/cm^2, 242 psi)

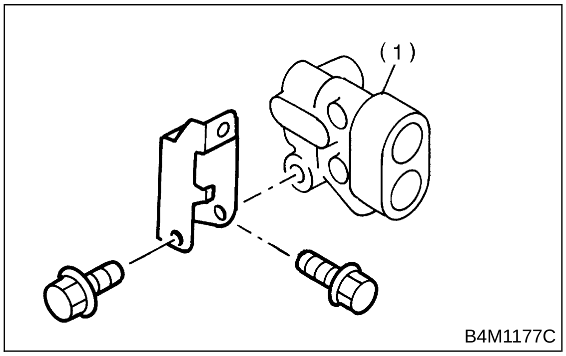
- **Boosting action check**

Set the vacuum gauge reading at 66.7 kPa (500 mmHg, 19.69 inHg) by running engine. Then, check the fluid pressure when brake pedal is depressed. The pressure must be greater than the standard value listed.

Brake pedal force	147 N (15 kgf, 33 lb)	294 N (30 kgf, 66 lb)
Fluid pressure	5,394 kPa (55 kg/cm^2, 782 psi)	10,003 kPa (102 kg/cm^2, 1,450 psi)

13. Proportioning Valve S405167

A: REMOVAL S405167A18



(1) Proportioning valve

1) Pull up parking brake lever, and block the tires.
2) Remove brake pipe from proportioning valve at four places.
3) Remove proportioning valve from its bracket.

CAUTION:
Do not disassemble or adjust the proportioning valve. (The proportioning valve must be replaced as an assembly.)

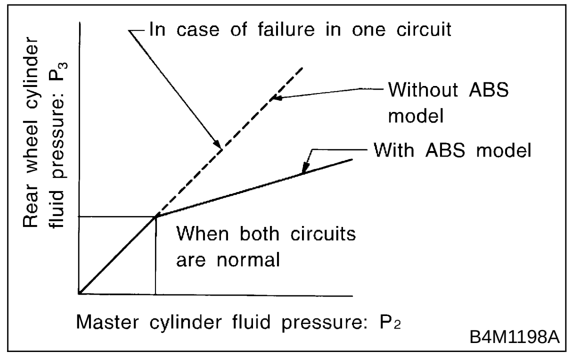
B: INSTALLATION S405167A11

1) Install proportioning valve to bracket.
2) Connect brake pipes correctly to proportioning valve.
3) Bleed air, then check each joint of brake pipe for oil leaks.

Tightening torque:
Proportioning valve to brake pipe flare nut:
15 N·m (1.5 kgf-m, 10.8 ft-lb)
Proportioning valve to bracket:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

C: INSPECTION S405167A10

1) Install the oil pressure gauges to measure the master cylinder fluid pressure (front wheel brake fluid pressure) and rear wheel cylinder fluid pressure.
2) Bleed air from the oil pressure gauges.
3) Check the master cylinder fluid pressure and rear wheel cylinder fluid pressure.
The standard values are shown in Figure.



4) For the oil pressure in case of split point, refer to “SPECIFICATIONS”.
<Ref. to BR-2, SPECIFICATIONS, General Description.>

14. Brake Fluid S405162

A: INSPECTION S405162A10

1) Check that brake fluid level remains between "MIN" and "MAX". If out of the specified range, refill or drain fluid. If fluid level becomes close to "MIN", refill fluid.
2) Check fluid for discoloration. If fluid color has excessively changed, drain the fluid and refill with new fluid.

B: REPLACEMENT S405162A20

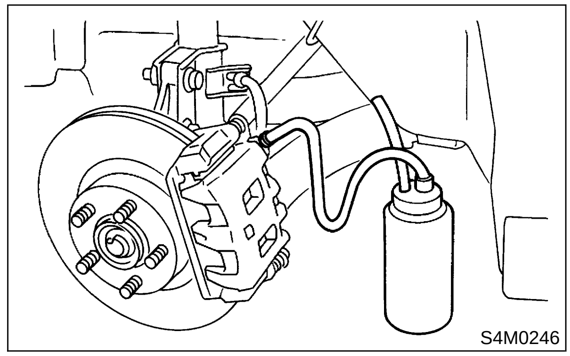
CAUTION:
- **To always maintain the brake fluid characteristics, replace the brake fluid according to maintenance schedule or earlier than that when used in severe condition.**
- **The FMVSS No. 116, fresh DOT3 or 4 brake fluid must be used.**
- **Cover bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.**
- **Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.**
- **Be careful not to allow dirt or dust to get into the reservoir tank.**
- **Be extremely careful not to spill brake fluid. Brake fluid spilt on the vehicle body will harm the painted surface; wash it off quickly if spilt.**

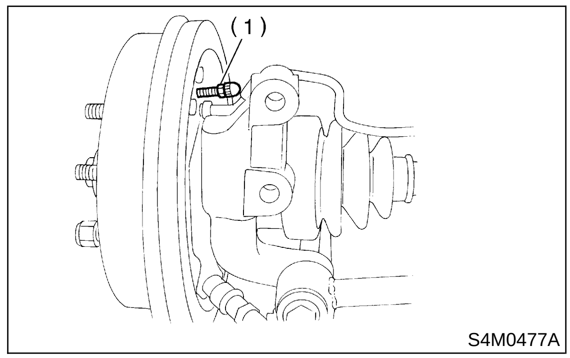
NOTE:
- During bleeding operation, keep the brake reservoir tank filled with brake fluid to eliminate entry of air.
- Brake pedal operating must be very slow.
- For convenience and safety, two people should do the work.
- The amount of brake fluid required is approximately 500 mℓ (16.9 US fl oz, 17.6 Imp fl oz) for total brake system.

1) Either jack-up vehicle and place a safety stand under it, or lift-up vehicle.
2) Remove both front and rear wheels.
3) Draw out the brake fluid from master cylinder with syringe.
4) Refill reservoir tank with recommended brake fluid.

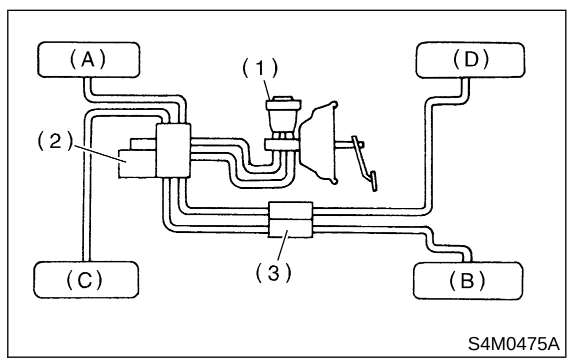
Recommended brake fluid:
FMVSS No. 116, fresh DOT3 or 4 brake fluid

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





CAUTION:
Brake fluid replacement sequence; (A) Front right → (B) Rear left → (C) Front left → (D) Rear right



(1) Master cylinder
(2) Hydraulic unit
(3) Proportioning valve

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 (Bleeder screw):
8 N·m (0.8 kgf-m, 5.8 ft-lb)

10) Bleed air from each wheel cylinder using the same procedures as described in steps 6) through 7) above.
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 shows any unusual movement.
Visually inspect bleeder screws and brake pipe joints to make sure that there is no fluid leakage.
12) Install wheels, and drive vehicle for a short distance between 2 to 3 km (1 to 2 miles) to make sure that brakes are operating properly.

15. Air Bleeding S405163

A: PROCEDURE S405163E45

CAUTION:

- **The FMVSS No. 116, fresh DOT3 or 4 brake fluid must be used.**
- **Cover bleeder with waste cloth when loosening it to prevent brake fluid from being splashed over surrounding parts.**
- **Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.**
- **Be careful not to allow dirt or dust to get into the reservoir tank.**
- **Be extremely careful not to spill brake fluid. Brake fluid spilt on the vehicle body will harm the painted surface; wash it off quickly if spilt.**

NOTE:

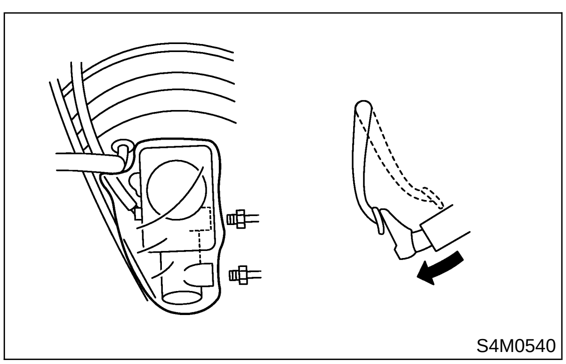
- Start with the brakes (wheels) connected to the secondary chamber of the master cylinder.
- The time interval between two brake pedal operations (from the time when the pedal is released to the time when it is depressed another time) shall be approximately 3 seconds.
- The air bleeder on each brake shall be released for 1 to 2 seconds.

1. MASTER CYLINDER S405163E4501

NOTE:

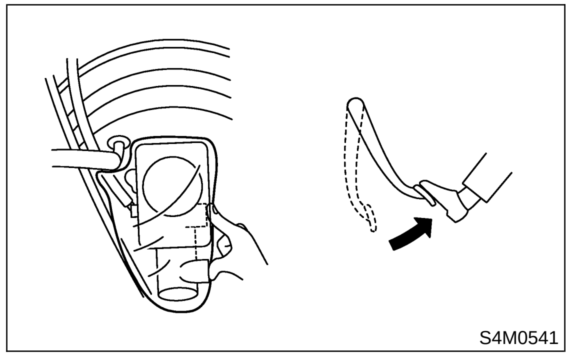
- If master cylinder is disassembled or reservoir tank is empty, bleed master cylinder.
- During bleeding operation, keep the brake reservoir tank filled with brake fluid to eliminate entry of air.
- Brake pedal operating must be very slow.
- For convenience and safety, two people should do the work.

1) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
2) Disconnect brake line at primary and secondary sides.
3) Put plastic bag cover on the master cylinder.
4) Carefully depress and hold brake pedal.



S4M0540

5) Close outlet plug with your finger, and release brake pedal.



S4M0541

6) Repeat items 4) and 5), until brake fluid come out of all outlet port.
7) Remove the plastic bag cover.
8) Install brake pipes to master cylinder.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

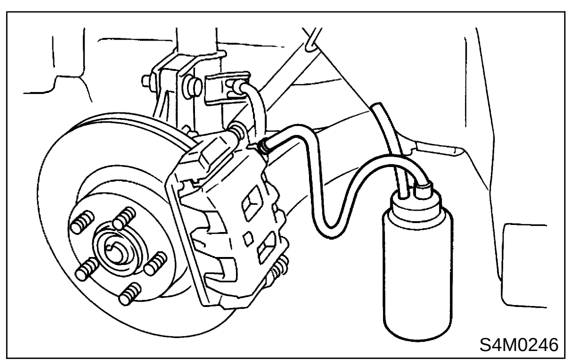
9) Cleanly wash away brake fluid spill on master cylinder etc.
10) Bleed air from brake system. <Ref. to BR-42, BRAKE LINE, PROCEDURE, Air Bleeding.>

2. BRAKE LINE S405163E4502

NOTE:

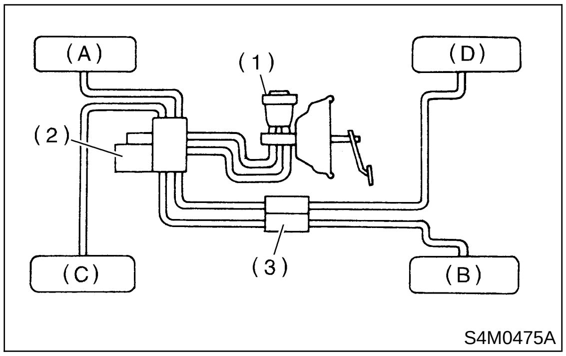
- During bleeding operation, keep the brake reservoir tank filled with brake fluid to eliminate entry of air.
- Brake pedal operating must be very slow.
- For convenience and safety, two people should do the work.

1) Make sure that there is no leak from joints and connections of the brake system.
2) Fit one end of vinyl tube into the air bleeder and put the other end into a brake fluid container.



S4M0246

CAUTION:
Brake fluid replacement sequence; (A) Front right → (B) Rear left → (C) Front left → (D) Rear right



(1) Master cylinder
(2) Hydraulic unit
(3) Proportioning valve

3) Slowly depress the brake pedal and keep it depressed. Then, open the air bleeder to discharge air together with the fluid.
Release air bleeder for 1 to 2 seconds.
Next, with the bleeder closed, slowly release the brake pedal.
Repeat these steps until there are no more air bubbles in the vinyl tube.
Allow 3 to 4 seconds between two brake pedal operations.

CAUTION:
Cover bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.

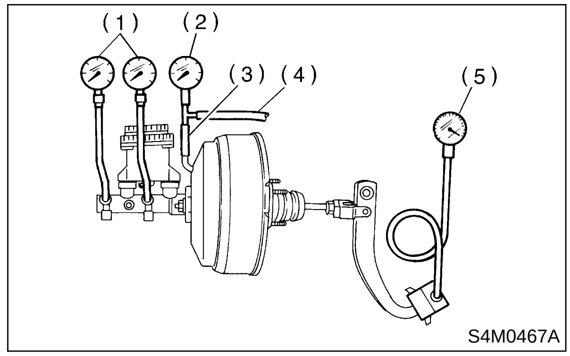
NOTE:
Brake pedal operating must be very slow.

4) Tighten air bleeder securely when no air bubbles are visible.

Air bleeder tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)

5) Perform these steps for the brakes connecting to the secondary chamber of master cylinder, first, and then for the ones connecting to primary chamber. With all procedures completed, fully depress the brake pedal and keep it in that position for approximately 20 seconds to make sure that there is no leak evident in the entire system.

6) 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 more than specified.



(1) Steering wheel
(2) Toe board

Specified pedal stroke:
Without ABS
90 mm (3.54 in)
With ABS
95 mm (3.74 in)
When depressing brake pedal with a 490 N (50 kgf, 110 lb) load.

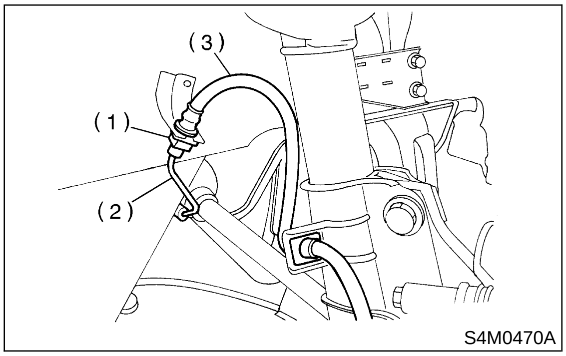
7) If the distance is more than specifications, there is a possibility that air is in the brake line. Bleed brake line until pedal stroke meets the specification.
8) Operate hydraulic control unit in the sequence control mode.
<Ref. to ABS-11, ABS Sequence Control.>
9) Recheck the brake stroke.
10) If the distance is more than specifications, there is a possibility air is in the inside of the hydraulic unit. Repeat above steps 2) to 9) above until pedal stroke meets the specification.
11) Add brake fluid to the required level (MAX. level) of reservoir tank.
12) As a final step, test run the vehicle at low speed and apply brakes relatively hard 2 to 3 times to ensure that brakes provide normal braking action on all four wheels without dragging and uneven braking.

16. Brake Hose S405164

A: REMOVAL S405164A18

1) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
2) Separate brake pipe from brake hose.

NOTE:
Always use flare nut wrench and be careful not to deform flare nut.



(1) Clamp
(2) Brake pipe
(3) Brake hose

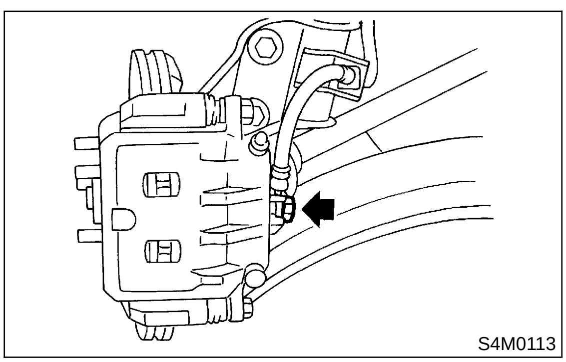
3) Pull out clamp to remove brake hose.
4) Remove clamp at strut and union bolt.

B: INSTALLATION S405164A11

1. FRONT BRAKE HOSE S405164A1101

1) Route end of brake hose (on caliper side) through hole in brake hose bracket at strut location.
2) Tighten end of brake hose at caliper using a union bolt.

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



3) Secure middle fitting of brake hose to bracket at strut location using a clamp.
4) Position disc in straight-forward direction and route brake hose through hole in bracket on wheel apron side.

CAUTION:
Be sure brake hose is not twisted.

5) Temporarily tighten flare nut to connect brake pipe and hose.
6) Fix brake hose with clamp at wheel apron bracket.
7) While holding hexagonal part of brake hose fitting with a wrench, tighten flare nut to the specified torque.

Tightening torque (Brake pipe flare nut):
15 N·m (1.5 kgf-m, 10.8 ft-lb)

8) Bleed air from the brake system. <Ref. to BR-42, Air Bleeding.>

2. REAR BRAKE HOSE S405164A1102

1) Pass brake hose through the hole of bracket, and lightly tighten flare nut to connect brake pipe.
2) Insert clamp upward to fix brake hose.
3) While holding hexagonal part of brake hose fitting with a wrench, tighten flare nut to the specified torque.

Tightening torque (Brake pipe flare nut):
15 N·m (1.5 kgf-m, 10.8 ft-lb)

4) Bleed air from the brake system. <Ref. to BR-42, Air Bleeding.>

C: INSPECTION S405164A10

Ensure there are no cracks, breakage, or damage on hoses. Check joints for fluid leakage. If any cracks, breakage, damage or leakage is found, repair or replace hose.

17. Brake Pipe S405165

A: REMOVAL S405165A18

NOTE:
Airbag system wiring harness is routed near the center brake pipe.

CAUTION:
- **All airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.**
- **Be careful not to damage airbag system wiring harness when servicing the center brake pipe.**
- **When removing the brake pipe, make sure that it is not bent.**

B: INSTALLATION S405165A11

NOTE:
Airbag system wiring harness is routed near the center brake pipe.

CAUTION:
- **All airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.**
- **Be careful not to damage airbag system wiring harness when servicing the center brake pipe.**
- **When installing the brake pipe, make sure that it is not bent.**
- **After installing the brake pipe and hose, bleed the air.**
- **After installing the brake hose, make sure that it does not touch the tire or suspension assembly, etc.**

Brake pipe tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

C: INSPECTION S405165A10

Ensure there are no cracks, breakage, or damage on pipes. Check joints for fluid leakage. If any cracks, breakage, damage or leakage is found, repair or replace pipe.

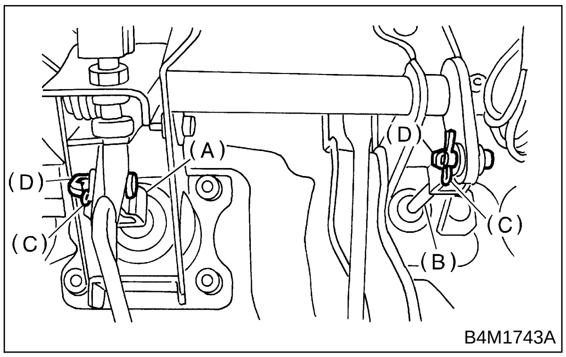
NOTE:
Use a mirror when inspecting low-visible part or back side.

18. Brake Pedal S405541

A: REMOVAL S405541A18

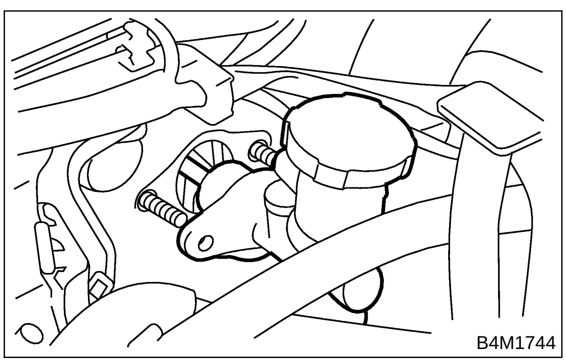
1. MT MODEL S405541A1801

1) Pull up parking brake lever and block tires.
2) Disconnect ground cable from battery.
3) Remove steering column.
<Ref. to PS-17, REMOVAL, Tilt Steering Column.>
4) Disconnect connectors from stop light and clutch switches.
5) Remove snap pins which secure lever to push rod and operating rod.
6) Remove clevis pins which secure lever to push rod and operating rod.



(A) Operating rod
(B) Push rod
(C) Snap pin
(D) Clevis pin

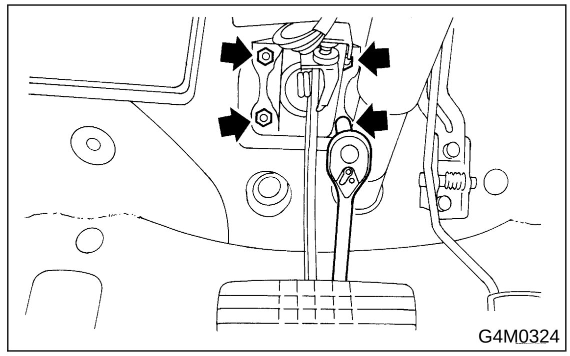
7) Remove nut which secures clutch master cylinder.



8) Remove bolts and nuts which secure brake and clutch pedals, and remove pedal assembly.

2. AT MODEL S405541A1802

1) Pull up parking brake lever.
2) Disconnect ground cable from battery.
3) Remove instrument panel lower cover from instrument panel.
4) Remove clevis pin which secures brake pedal to brake booster operating rod. Also disconnect stop light switch connector.
5) Remove two bolts and four nuts which secure brake pedal to pedal.

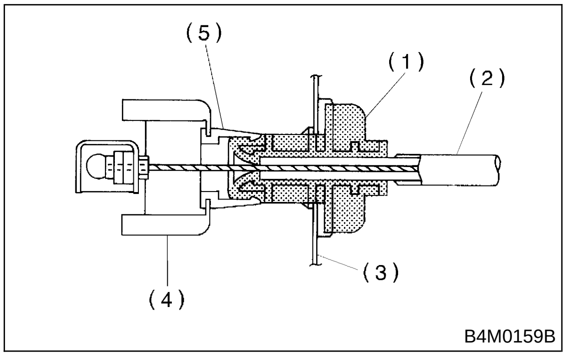


B: INSTALLATION S405541A11

1) Install in the reverse order of removal.

CAUTION:

- **Be careful not to bend clutch cable too much.**
- **Never fail to cover outer cable end with boot.**
- **Be careful not to kink accelerator cable.**
- **Make sure that holder and casing cap are securely connected.**



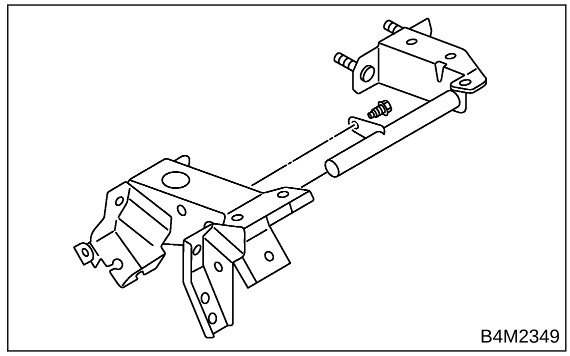
(1) Casing cap
(2) Accelerator cable
(3) Toe board
(4) Accelerator pedal bracket
(5) Holder

2) Adjustment of clutch pedal <Ref. to BR-48, ASSEMBLY, Brake Pedal.>
3) Inspect after pedal installation <Ref. to BR-49, INSPECTION, Brake Pedal.>

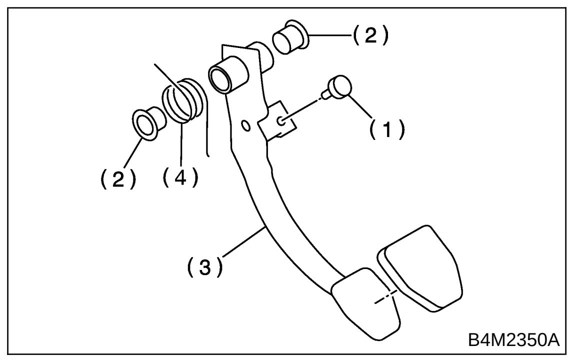
C: DISASSEMBLY S405541A06

1. MT MODEL S405541A0601

1) Remove the stop light switch.
<Ref. to BR-50, REMOVAL, Stop Light Switch.>
2) Remove the clutch pedal.
<Ref. to CL-21, DISASSEMBLY, Clutch Pedal.>
3) Remove the clutch master cylinder bracket.



4) Remove bushing, spring and stopper.

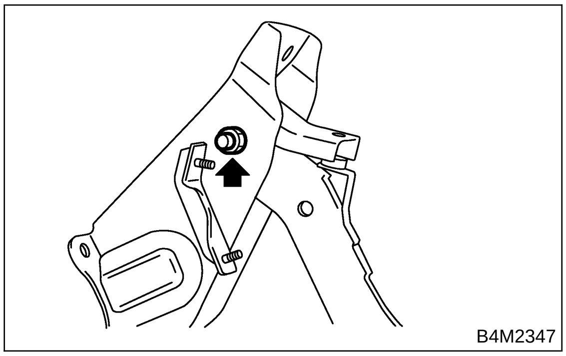


(1) Stopper
(2) Bushing
(3) Brake pedal
(4) Brake pedal spring

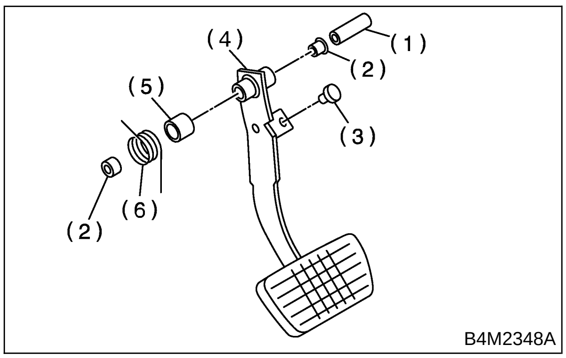
5) Remove the brake pedal pad.

2. AT MODEL S405541A0602

1) Remove the brake switch.
2) Unbolt, and then remove the brake pedal.



3) Remove bushing, spacer and spring.



(1) Spacer
(2) Bushing
(3) Stopper
(4) Brake pedal
(5) Brake spacer
(6) Brake pedal spring

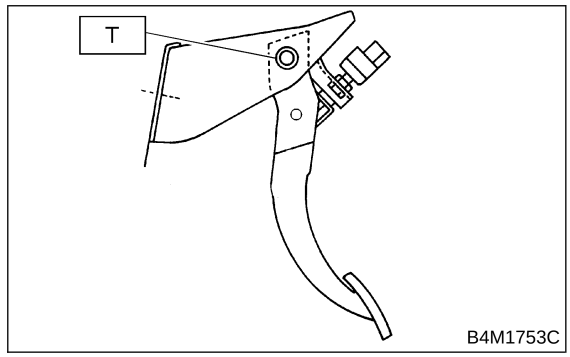
4) Remove the brake pedal pad.

D: ASSEMBLY S405541A02

1) Attach stop light switch, etc. to pedal bracket temporarily.
2) Clean inside of bores of clutch pedal and brake pedal, apply grease, and set bushings into bores.
3) Align bores of pedal bracket, clutch pedal and brake pedal, attach brake pedal return spring, and then install pedal bolt.

NOTE:
Clean up inside of bushings and apply grease before installing spacer.

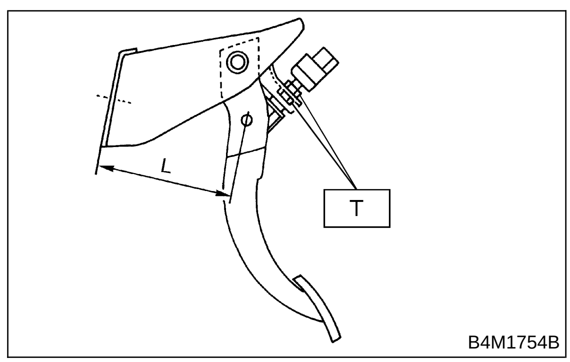
Tightening torque:
T: 29 N·m (3.0 kgf-m, 21.7 ft-lb)



4) Set brake pedal position by adjusting position of stop light switch.

Pedal position: L
125.9 mm (4.96 in)

Tightening torque:
T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)

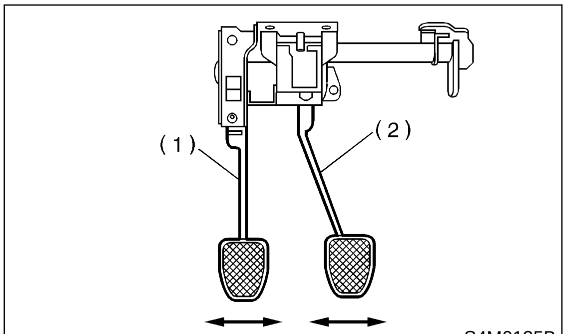


E: INSPECTION *S405541A10*

1) Move brake and clutch pedal pads in the lateral direction with a force of approximately 10 N (1 kgf, 2 lb) to ensure pedal deflection is in specified range.

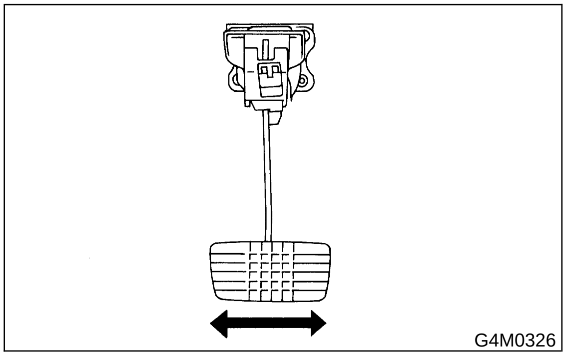
CAUTION:
If excessive deflection is noted, replace bushings with new ones.

Deflection of brake and clutch pedal:
Service limit
5.0 mm (0.197 in) or less



S4M0135B

(1) Clutch pedal
(2) Brake pedal

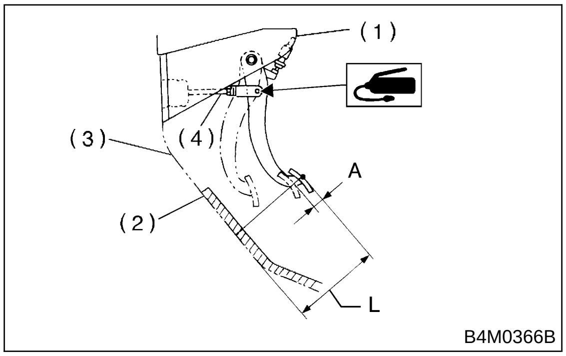


G4M0326

2) Check position of pedal pad.

Pedal height: L
148 mm (5.83 in)

Brake pedal free play: A
1 — 3 mm (0.04 — 0.12 in) [Depress brake pedal pad with a force of less than 10 N (1 kgf, 2 lb).]



B4M0366B

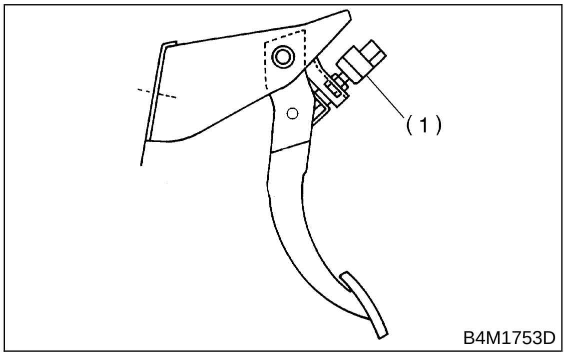
(1) Stop light switch
(2) Mat
(3) Toe board
(4) Brake booster operating rod

3) If it is not in specified value, adjust it by adjusting brake booster operating rod length.

19. Stop Light Switch S405542

A: REMOVAL S405542A18

1) Disconnect ground cable from battery.
2) Disconnect stop light switch connector.
3) Loosen nuts, and unscrew stop light switch to remove.

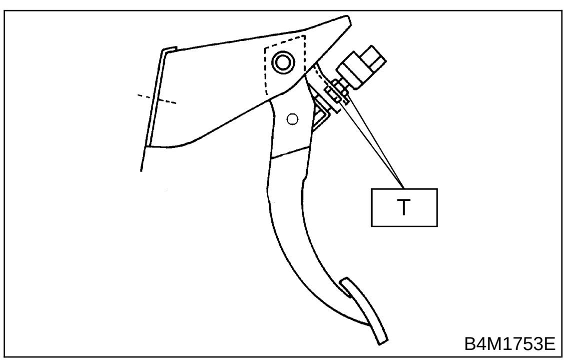


(1) Stop light switch

B: INSTALLATION S405542A11

1) Screw the stop light switch onto a bracket and secure it temporarily with a nut.
2) Adjust stop light switch position, and then tighten the nut.
<Ref. to BR-51, ADJUSTMENT, Stop Light Switch.>

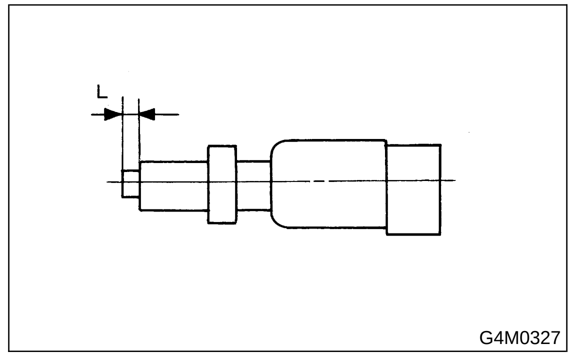
Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



C: INSPECTION S405542A10

1) If stop light switch does not operate properly (or if it does not stop at the specified position), replace with a new one.

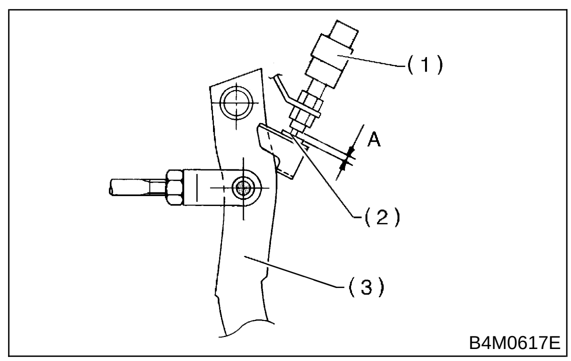
Specified position: L
$2^{+1.5}/_{0}$ mm ($0.079^{+0.059}/_{0}$ in)



2) Measure the clearance between threaded end of stop light switch and stopper.

CAUTION:
Be careful not to rotate stop light switch.

Stop light switch clearance: A
0.3 mm (0.012 in)



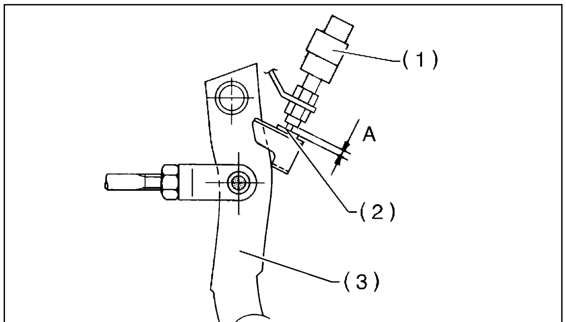
(1) Stop light switch
(2) Stopper
(3) Brake pedal

3) If it is not in specified value, adjust it by adjusting position of stop light switch.

CAUTION:
Be careful not to rotate stop light switch.

D: ADJUSTMENT *S405542A01*

Loosen the lock nut, and adjust stop light switch position until the clearance between threaded end of the stop light switch and the stopper becomes 0.3 mm (0.012 in). Then, tighten the lock nut.



B4M0617E

(1) Stop light switch
(2) Stopper
(3) Brake pedal

20. General Diagnostics S405278

A: INSPECTION S405278A10

1. BRAKE SYSTEM S405278A1001

	Trouble and possible cause	Corrective action
1. Insufficient braking	(1) Fluid leakage from the hydraulic mechanism	Repair or replace (cup, piston seal, piston boot, master cylinder piston kit, pipe or hose).
	(2) Entry of air into the hydraulic mechanism	Bleed the air.
	(3) Excessively wide shoe clearance	Adjust the clearance.
	(4) Wear, deteriorated surface material, adhering water or fluid on the lining	Replace, grind or clean.
	(5) Improper operation of master cylinder, disc caliper, brake booster or check valve	Correct or replace.
2. Unstable or uneven braking	(1) Fluid on the lining, drum or rotor	Eliminate cause of fluid leakage, clean, or replace.
	(2) Drum or rotor eccentricity	Correct or replace the drum or rotor.
	(3) Worn brake drum, or damage to the drum caused by sand	Correct by grinding, or replace.
	(4) Improper lining contact, deteriorated surface material, improper inferior material, or wear	Correct by grinding, or replace.
	(5) Deformed back plate	Correct or replace.
	(6) Improper tire inflation	Inflate to correct pressure.
	(7) Disordered wheel alignment	Adjust alignment.
	(8) Loosened back plate or the support installing bolts	Retighten.
	(9) Loosened wheel bearing	Retighten to normal tightening torque or replace.
	(10) Trouble in the hydraulic system	Replace the cylinder, brake pipe or hose.
	(11) Uneven effect of the parking brake	Check, adjust, or replace the rear brake and cable system.
3. Excessive pedal stroke	(1) Entry of air into the hydraulic mechanism	Bleed the air.
	(2) Excessive play in the master cylinder push rod	Adjust.
	(3) Fluid leakage from the hydraulic mechanism	Repair or replace (cup, piston seal, piston boot, master cylinder piston kit, pipe or hose).
	(4) Improperly adjusted shoe clearance	Adjust.
	(5) Improper lining contact or worn lining	Correct or replace.
4. Brake dragging or improper brake return	(1) Insufficient pedal play	Adjust play.
	(2) Improper master cylinder return	Clean or replace the cylinder.
	(3) Clogged hydraulic system	Replace.
	(4) Improper return or adjustment of parking brake	Correct or adjust.
	(5) Weakened spring tension or breakage of shoe return spring	Replace the spring.
	(6) Excessively narrow shoe clearance	Adjust the clearance.
	(7) Improper disc caliper operation	Correct or replace.
	(8) Improper adjusted wheel bearing	Adjust or replace.
5. Brake noise (1) (creak sound)	(1) Hardened or deteriorated lining	Replace the shoe assembly or pad.
	(2) Worn lining	Replace the shoe assembly or pad.
	(3) Loosened back plate or the support installing bolts	Retighten.
	(4) Loose wheel bearing	Retighten to normal tightening torque.
	(5) Dirty drum or rotor	Clean the drum or rotor, or clean and replace the brake assembly.

	Trouble and possible cause	Corrective action
6. Brake noise (2) (hissing sound)	(1) Worn lining	Replace the shoe assembly or pad.
	(2) Improper installed shoe or pad	Correct or replace the shoe assembly or pad.
	(3) Loose or bent drum or rotor	Retighten or replace.
7. Brake noise (3) (click sound)	In the case of the disc brake:	
	(1) Excessively worn pad or the support	Replace the pad or the support.
	In the case of the drum brake:	
	(1) Excessively worn shoe ridge	Replace the back plate.
	(2) Lack of oil on the shoe ridge surface and anchor	Add more grease.

MEMO:

PARKING BRAKE

PB

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2. Parking Brake Lever....6
3. Parking Brake Cable....7
4. Parking Brake Assembly (Rear Disc Brake)....8
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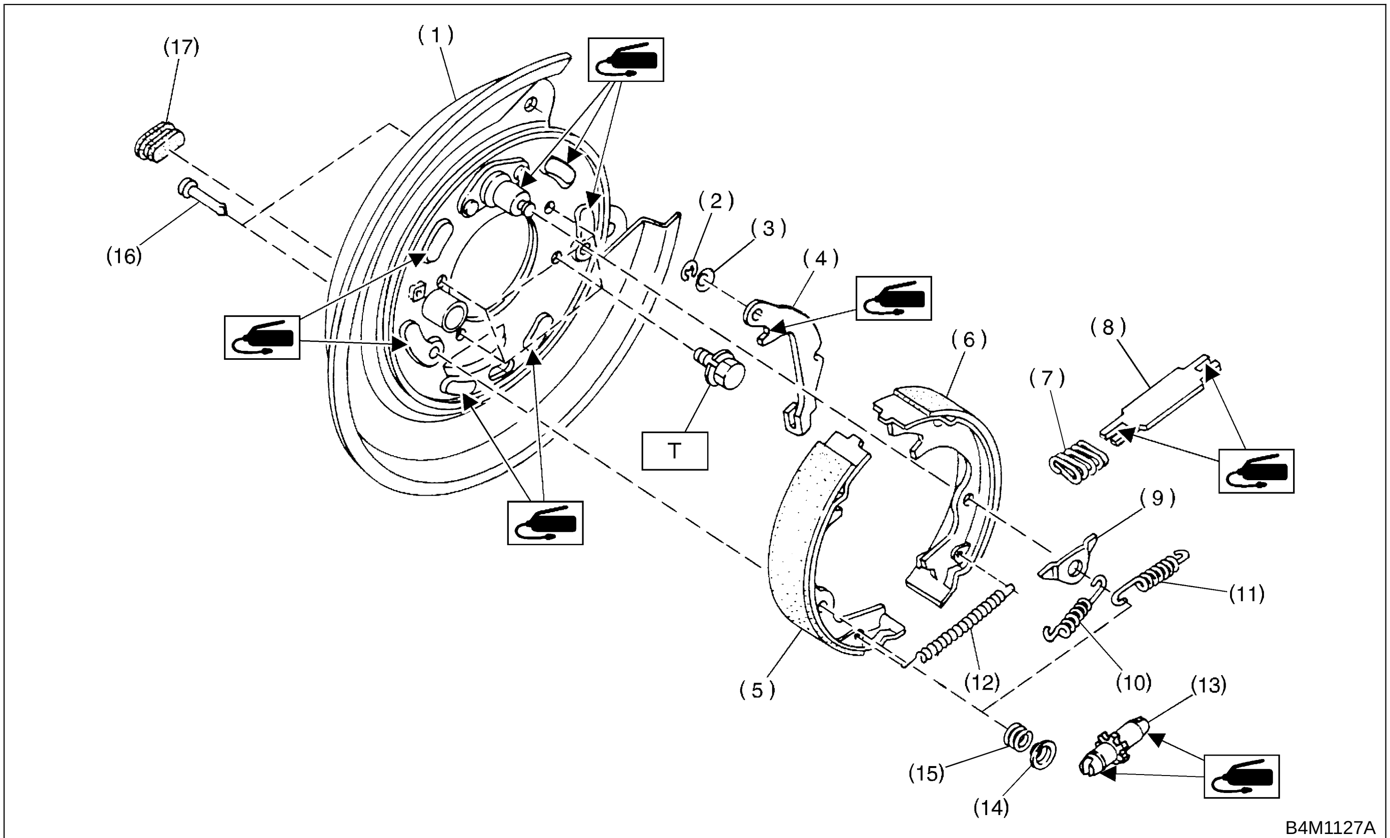
1. General Description S404001

A: SPECIFICATIONS S404001E49

Model		Rear drum brake	Rear disc brake
Type		Mechanical on rear brakes, drum in disc	
Effective drum diameter	mm (in)	228.6 (9)	170 (6.69)
Lining dimensions (length × width × thickness)	mm (in)	219.4 × 35.0 × 4.1 (8.64 × 1.378 × 0.161)	163.1 × 30.0 × 3.2 (6.42 × 1.181 × 0.126)
Clearance adjustment		Automatic adjustment	Manual adjustment
Lever stroke	noches/N (kgf, lb)	7 to 8/196 (20, 44)	

B: COMPONENT *S404001A05*

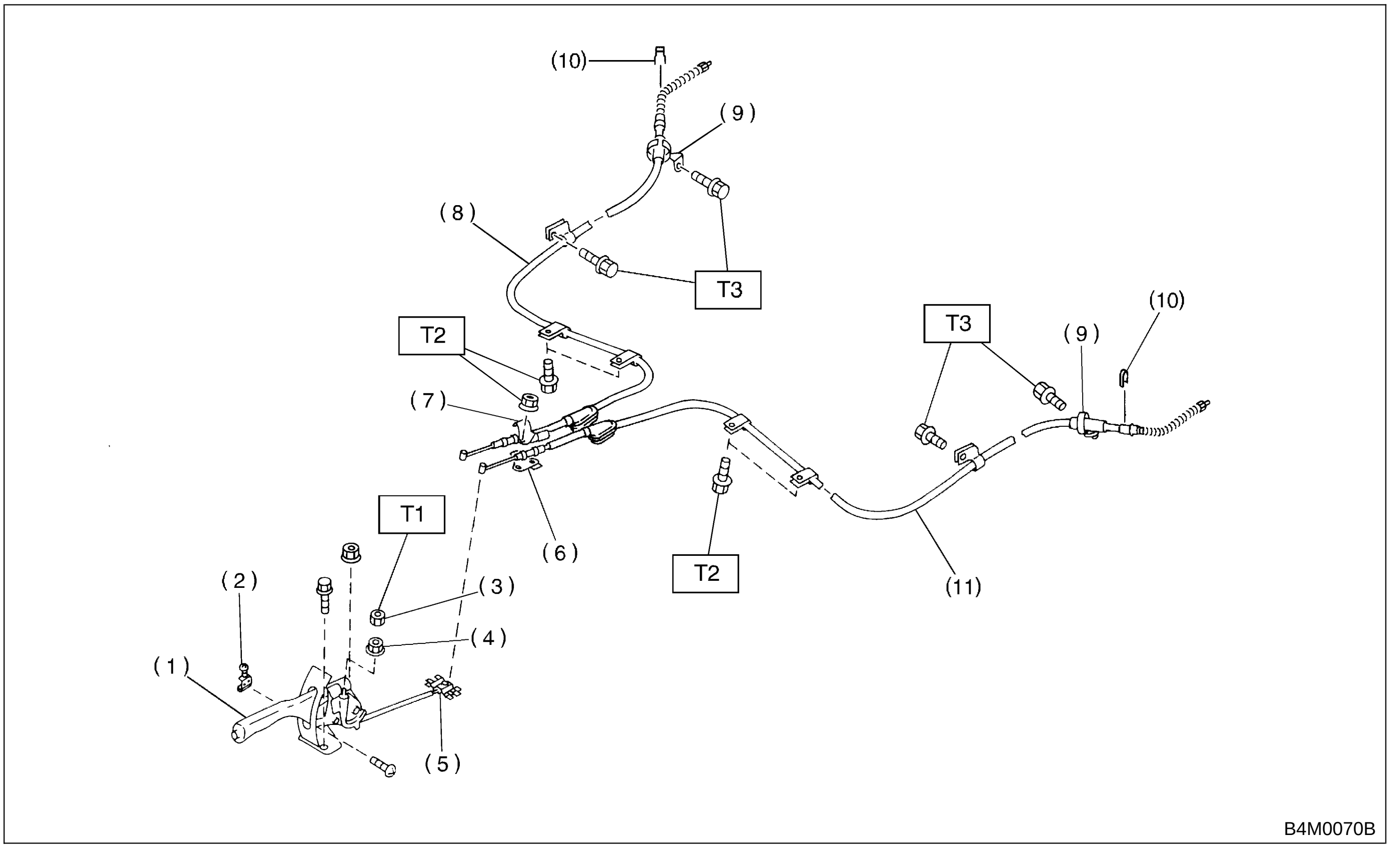
1. PARKING BRAKE (REAR DISC BRAKE) *S404001A0501*



(1) Back plate
(2) Retainer
(3) Spring washer
(4) Lever
(5) Parking brake shoe (Primary)
(6) Parking brake show (Secondary)
(7) Strut spring
(8) Strut
(9) Shoe guide plate
(10) Primary return spring
(11) Secondary return spring
(12) Adjusting spring
(13) Adjuster
(14) Shoe hold-down cup
(15) Shoe hold-down spring
(16) Shoe hold-down pin
(17) Adjusting hole cover

Tightening torque: N·m (kgf-m, ft-lb)
T: 53 (5.4, 39)

2. PARKING BRAKE CABLE *S404001A0502*



(1) Parking brake lever
(2) Parking brake switch
(3) Lock nut
(4) Adjusting nut
(5) Equalizer
(6) Bracket
(7) Clamp
(8) Parking brake cable RH
(9) Cable guide
(10) Clamp (Rear disc brake model only)
(11) Parking brake cable LH

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6 (0.6, 4.3)
T2: 18 (1.8, 13.0)
T3: 33 (3.4, 25)

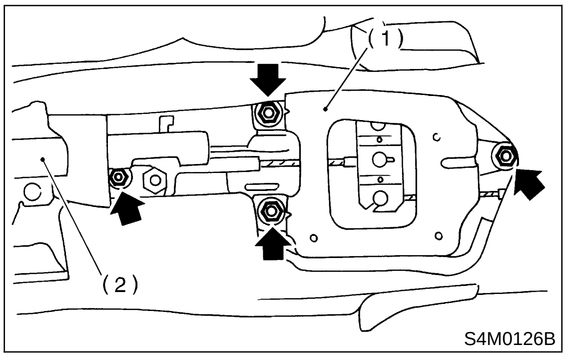
C: CAUTION *S404001A03*

- 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.
- Use SUBARU genuine grease etc. or the equivalent. Do not mix grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply grease onto sliding or revolution surfaces before installation.
- Before installing O-rings or snap rings, apply sufficient amount of grease to avoid damage and deformation.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Keep grease etc. away from parking brake shoes.

2. Parking Brake Lever S404171

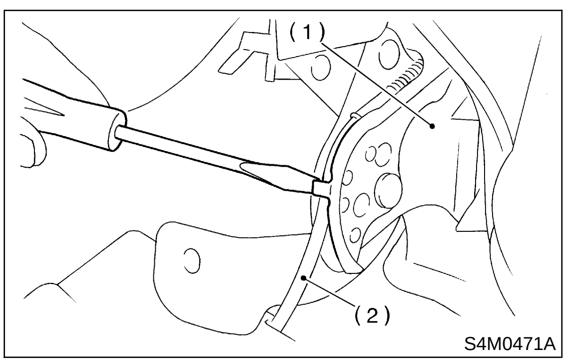
A: REMOVAL S404171A18

1) To immobilize vehicle, put the select lever in “1st ” or “P” position, and lock the tires.
2) Disconnect battery ground cable.
3) Remove console box. <Ref. to EI-33, REMOVAL, Console Box.>
4) Disconnect connector parking brake switch.
5) Loosen parking cable adjusting nut and remove inner cable end from equalizer.
6) Remove parking brake lever.



(1) Console bracket
(2) Parking brake lever

7) Unbend parking brake lever pawls and remove cable.



(1) Parking brake lever
(2) Cable

B: INSTALLATION S404171A11

Install in the reverse order of removal.

Tightening torque:
Parking brake lever;
18 N·m (1.8 kgf-m, 13.0 ft-lb)
Adjusting nut;
5.9 N·m (0.60 kgf-m, 4.3 ft-lb)

NOTE:
● Be sure to pass cable through guide inside the tunnel.
● Be sure to adjust the lever stroke. <Ref. to PB-6, ADJUSTMENT, Parking Brake Lever.>

C: INSPECTION S404171A10

While pulling parking brake lever upward, count the notches.

Lever stroke:
7 to 8 notches when pulled with a force of 196 N (20 kgf, 44 lb)

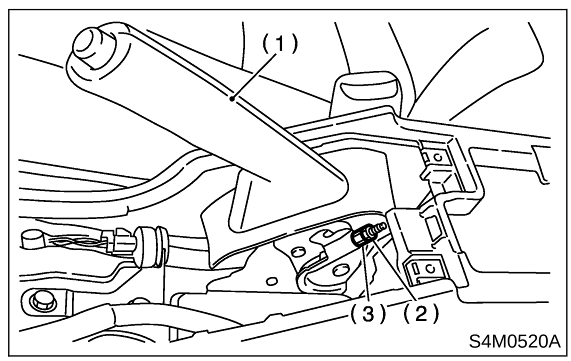
Incorrect, adjust the parking brake. <Ref. to PB-10, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

D: ADJUSTMENT S404171A01

1) Remove console box. <Ref. to EI-33, REMOVAL, Console Box.>
2) Forcibly pull parking brake lever 3 to 5 times.
3) Adjust parking brake lever by turning adjuster until parking brake lever stroke is set at 7 to 8 notches with operating force of 196 N (20 kgf, 44 lb).
4) Tighten lock nut.

Lever stroke:
7 to 8 notches when pulled with a force of 196 N (20 kgf, 44 lb)

Tightening torque (Lock nut):
6 N·m (0.6 kgf-m, 4.3 ft-lb)



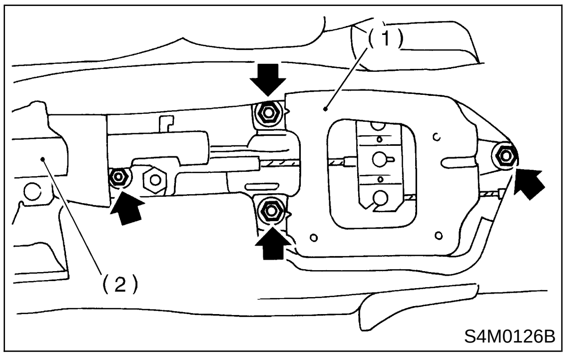
(1) Parking brake lever
(2) Lock nut
(3) Adjusting nut

5) Install console cover.

3. Parking Brake Cable S404170

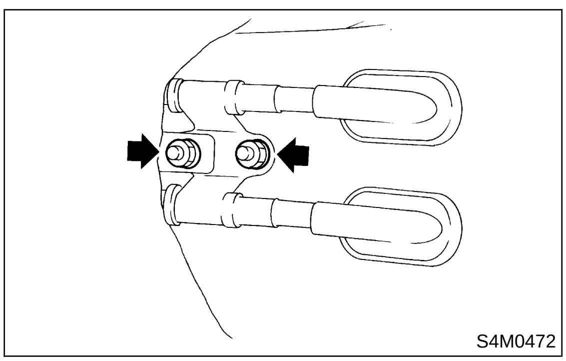
A: REMOVAL S404170A18

1) Set vehicle on a lift.
2) Disconnect battery ground cable.
3) Lift-up vehicle.
4) Remove rear tires and wheels.
5) Remove rear cushion.
6) Remove console box. <Ref. to EI-33, REMOVAL, Console Box.>
7) Loosen parking cable adjusting nut and console bracket.
8) Remove parking brake lever.

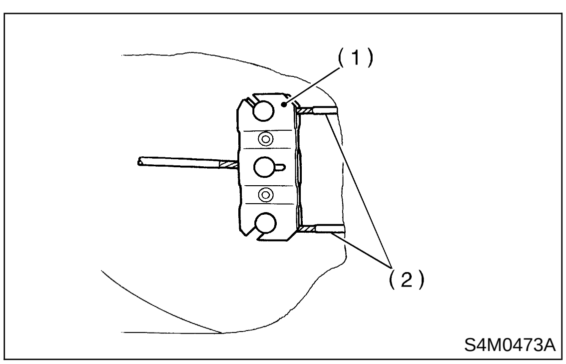


(1) Console bracket
(2) Parking brake lever

9) Roll up floor mat and remove clamps.

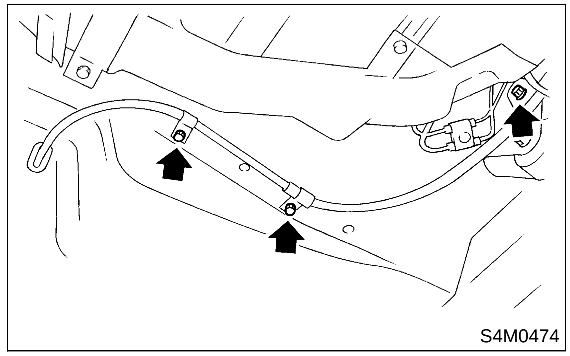


10) Remove equalizer cover.
11) Remove inner cable end from equalizer.



(1) Equalizer
(2) Inner cable end

12) Pull out parking brake cable from rear brake.
Disc brake: <Ref. to PB-8, REMOVAL, Parking Brake Assembly (Rear Disc Brake).>
Drum brake: <Ref. to BR-30, Rear Drum Brake Assembly.>
13) Pull out clamp from rear brake.
14) Remove bolt and bracket from trailing link bracket.
15) Remove bolt and clamp from rear floor.



16) Detach grommet from rear floor.
17) Remove cable assembly from cabin by forcibly pulling it backward.
18) Detach parking brake cable from cable guide at rear trailing link.

B: INSTALLATION S404170A11

Install (new) parking brake assembly in the reverse order of removal.

NOTE:
- Be sure to pass cable through cable guide inside the tunnel.
- Be sure to adjust the lever stroke. <Ref. to PB-6, ADJUSTMENT, Parking Brake Lever.>

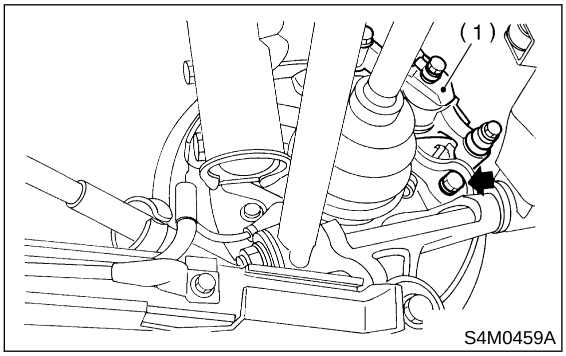
C: INSPECTION S404170A10

Check the removed cable and replace if damaged, rusty, or malfunctioning.
1) Check for smooth operation of the cable.
2) Check the inner cable for damage and rust.
3) Check the outer cable for damage, bends, and cracks.
4) Check the boot for damage, cracks, and deterioration.

4. Parking Brake Assembly (Rear Disc Brake) *S404552*

A: REMOVAL *S404552A18*

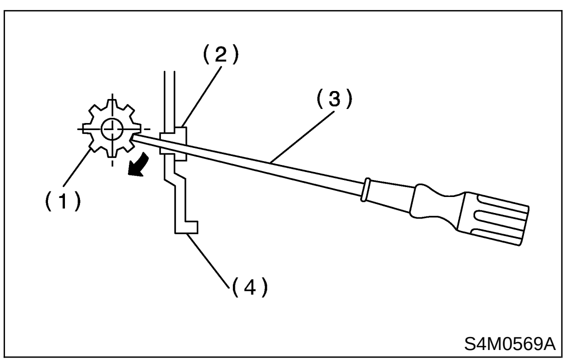
1) Set vehicle on a lift.
2) Disconnect battery ground cable.
3) Loosen wheel nuts.
4) Lift-up vehicle, and remove wheels.
5) Remove the two mounting bolts and remove the disc brake assembly.



6) Suspend the disc brake assembly so that the hose is not stretched.
7) Pull down and release parking brake.
8) Remove the disc rotor.

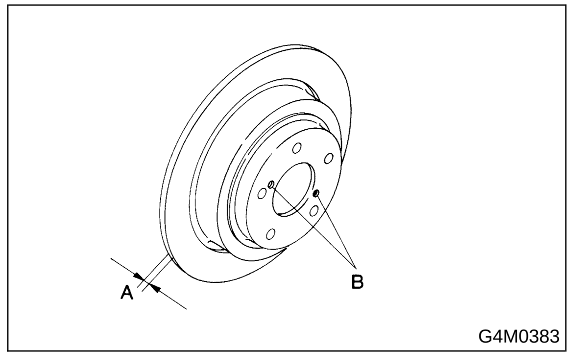
NOTE:
If the disc rotor is difficult to remove try the following two methods in order.

(1) Turn adjusting screw using a slot-type screwdriver until brake shoe gets away enough from the disc rotor.

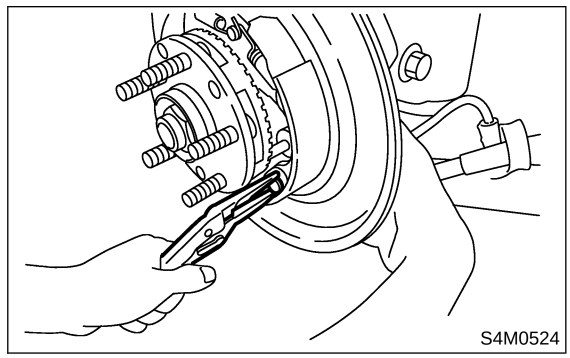


(1) Adjusting screw
(2) Adjusting hole cover (rubber)
(3) Slot-type screwdriver
(4) Back plate

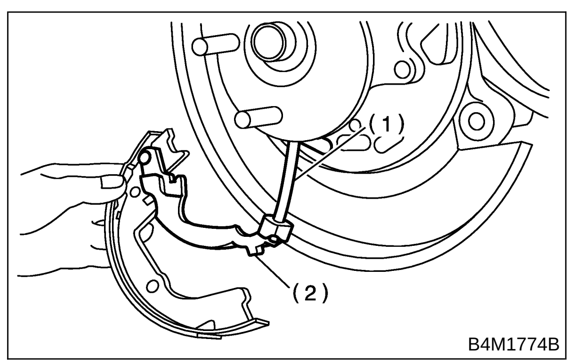
(2) If disc rotor seizes up within hub, drive disc rotor out by installing an 8-mm bolt in holes B on the rotor.



9) Remove shoe return spring from parking brake assembly.
10) Remove front shoe hold-down spring and pin with pliers.



11) Remove strut and strut spring.
12) Remove adjuster assembly from parking brake assembly.
13) Remove brake shoe.
14) Remove rear shoe hold-down spring and pin with pliers.
15) Remove parking cable from parking lever.



(1) Parking brake cable
(2) Parking brake lever

16) Using a standard screwdriver, raise retainer. Remove parking lever and washer from brake shoe.

B: INSTALLATION S404552A11

CAUTION:
Be sure lining surface is free from oil contamination.

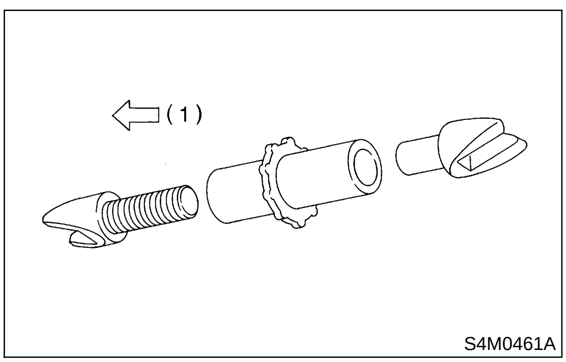
Brake grease:
Dow Corning Molykote No. 7439 (Part No. 725191460)

1) Apply brake grease to the following places.
- Six contact surfaces of shoe rim and back plate packing
- Contact surface of shoe wave and anchor pin
- Contact surface of lever and strut
- Contact surface of shoe wave and adjuster assembly
- Contact surface of shoe wave and strut
- Contact surface of lever and shoe wave

2) Install in reverse order of removal.

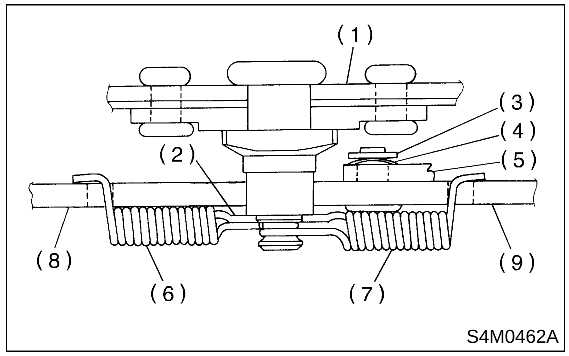
CAUTION:
- **Use new retainers and clinch them when installing brake shoes to levers.**
- **Ensure that parking lever moves smoothly.**
- **Do not confuse left parking lever with right one.**
- **Do not confuse left strut with right one.**

NOTE:
Ensure that adjuster assembly is securely installed with screw in the left side, facing vehicle front.



(1) LEFT

NOTE:
Ensure that shoe return spring is installed as shown in Figure.



(1) Back plate
(2) Shoe guide plate
(3) Retainer
(4) Spring washer
(5) Lever
(6) Primary shoe return spring (Blue)
(7) Secondary shoe return spring (Yellow)
(8) Parking brake shoe (Primary)
(9) Parking brake shoe (Secondary)

3) Adjust parking brakes. <Ref. to PB-10, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

CAUTION:
After replacing parking brake lining, be sure to drive vehicle for “break-in” purposes.
(1) Drive the vehicle about 35 km/h (22 MPH).
(2) With the parking brake release button pushed in, pull the parking brake lever gently.
(3) Drive the vehicle for about 200 meter (0.12 mile) in this condition.
(4) Wait 5 to 10 minutes for the parking brake to cool down. Repeat this procedure once more.
(5) After breaking-in, re-adjust parking brakes.

C: INSPECTION S404552A10

1) Measure brake disc inside diameter. If the disc is scored or worn, replace the brake disc.

Disc inside diameter:
Standard
170 mm (6.69 in)
Service limit
171 mm (6.73 in)

2) Measure the lining thickness. If it exceeds the limit, replace shoe assembly.

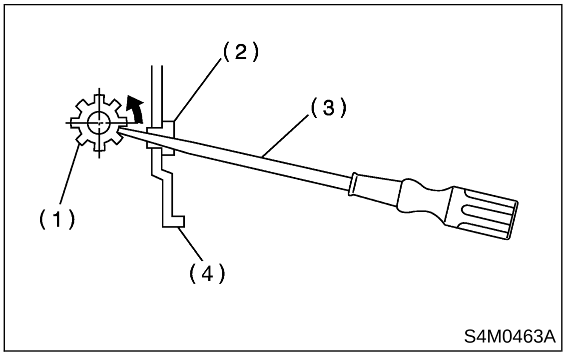
Lining thickness:
Standard
3.2 mm (0.126 in)
Service limit
1.5 mm (0.059 in)

CAUTION:
Replace the brake shoes on the right and left brake assembly at the same time.

D: ADJUSTMENT S404552A01

1. SHOE CLEARANCE S404552A0101

1) Remove adjusting hole cover from back plate.
2) Turn adjusting screw using a slot-type screwdriver until brake shoe is in close contact with disc rotor.

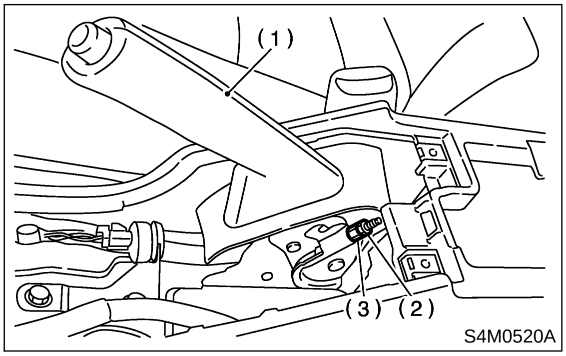


(1) Adjusting screw
(2) Adjusting hole cover (rubber)
(3) Slot-type screwdriver
(4) Back plate

3) Turn back (downward) adjusting screw 3 or 4 notches.
4) Install adjusting hole cover to back plate.

2. LEVER STROKE S404552A0102

1) Remove console cover.
2) Forcibly pull parking brake lever 3 to 5 times.
3) Adjust parking brake lever by turning adjuster until parking brake lever stroke is set at 6 notches with operating force of 196 N (20 kgf, 44 lb).



(1) Parking brake lever
(2) Lock nut
(3) Adjusting nut

4) Tighten lock nut.
5) Install console cover.

Lever stroke:
7 to 8 notches when pulled with a force of 196 N (20 kgf, 44 lb)

Tightening torque (Adjuster lock nut):
5.9 N·m (0.60 kgf-m, 4.3 ft-lb)

5. General Diagnostic Table S404257

A: INSPECTION S404257A10

Symptom	Possible cause	Remedy
Brake drag	● Parking brake lever is maladjusted.	● Adjustment.
	● Parking brake cable does not move.	● Repair or replace.
	● Parking brake shoe clearance is maladjusted.	● Adjustment.
	● Return spring is faulty.	● Replace.
Noise from brake	● Return spring is faulty.	● Replace.
	● Shoe hold-down spring is faulty.	● Replace.

MEMO:

ABS (DIAGNOSTICS)

ABS

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1. Basic Diagnostic Procedure S006501

A: PROCEDURE S006501E45

1. WITHOUT SUBARU SELECT MONITOR S006501E4501

CAUTION:
Remove foreign matter (dust, water, etc.) from the ABSCM&H/U connector during removal and installation.

NOTE:
- To check harness for broken wires or short circuits, shake it while holding it or the connector.
- When ABS warning light illuminates, read and record diagnostic trouble code (DTC) indicated by ABS warning light.

No.	Step	Check	Yes	No
1	**CHECK PRE-INSPECTION.** 1) Ask the customer when and how the trouble occurred using interview checklist. <Ref. to ABS-6, Check List for Interview.> 2) Before performing diagnosis, inspect unit which might influence the ABS problem. <Ref. to ABS-9, INSPECTION, General Description.>	Is unit that might influence the ABS problem normal?	Go to step **2**.	Repair or replace each unit.
2	**CHECK INDICATION OF DIAGNOSTIC TROUBLE CODE (DTC).** Calling up diagnostic trouble code (DTC). <Ref. to ABS-20, Read Diagnostic Trouble Code (DTC).>	Is diagnostic trouble code (DTC) readable?	Go to step **3**.	Inspect using diagnostic chart for ABS warning light failure.<Ref. to ABS-28, Diagnostics Procedure with Diagnosis Connector.> NOTE: Call up diagnostic trouble code (DTC) again after inspecting ABS warning light. <Ref. to ABS-20, Read Diagnostic Trouble Code (DTC).>
3	**CHECK DIAGNOSTIC TROUBLE CODE (DTC).** NOTE: Record all diagnostic trouble codes (DTC).	Is only the start code issued?	Go to step **4**.	Go to step **5**.
4	**PERFORM THE GENERAL DIAGNOSTICS.** 1) Inspect using “General Diagnostics Table”. <Ref. to ABS-159, General Diagnostics Table.> 2) Perform the clear memory mode. <Ref. to ABS-22, WITHOUT SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> 3) Perform the inspection mode. <Ref. to ABS-21, Inspection Mode.> Calling up diagnostic trouble code (DTC). <Ref. to ABS-20, Read Diagnostic Trouble Code (DTC).>	Is only the start code issued?	Complete the diagnosis.	Go to step **5**.

No.	Step	Check	Yes	No
5	**PERFORM THE DIAGNOSIS.** 1) Inspect using “Diagnostics Chart with Diagnostic Connector”.<Ref. to ABS-28, Diagnostics Procedure with Diagnosis Connector.> NOTE: For diagnostic trouble code (DTC) list, refer to “List of Diagnostic Trouble Code (DTC)”.<Ref. to ABS-24, WITHOUT SUBARU SELECT MONITOR, LIST, List of Diagnostic Trouble Code (DTC).> 2) Repair trouble cause. 3) Perform the clear memory mode. <Ref. to ABS-22, WITHOUT SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> 4) Perform the inspection mode. <Ref. to ABS-21, Inspection Mode.> 5) Calling up diagnostic trouble code (DTC). <Ref. to ABS-20, Read Diagnostic Trouble Code (DTC).>	Is only the start code issued?	Complete the diagnosis.	Inspect using “Diagnostics Chart with Diagnostic Connector”. <Ref. to ABS-28, Diagnostics Procedure with Diagnosis Connector.>

2. WITH SUBARU SELECT MONITOR *S006501E4502*

CAUTION:
Remove foreign matter (dust, water, etc.) from the ABSCM&H/U connector during removal and installation.

NOTE:
- To check harness for broken wires or short circuits, shake it while holding it or the connector.
- Check list for interview. <Ref. to ABS-6, Check List for Interview.>

No.	Step	Check	Yes	No
1	**CHECK PRE-INSPECTION.** 1) Ask the customer when and how the trouble occurred using interview checklist. <Ref. to ABS-6, Check List for Interview.> 2) Before performing diagnosis, inspect unit which might influence the ABS problem. <Ref. to ABS-9, INSPECTION, General Description.>	Is unit that might influence the ABS problem normal?	Go to step **2**.	Repair or replace each unit.
2	**CHECK INDICATION OF TROUBLE CODE DISPLAY.** 1) Turn ignition switch to OFF. 2) Connect the SUBARU SELECT MONITOR to data link connector. 3) Turn ignition switch to ON and SUBARU SELECT MONITOR to ON. NOTE: If the communication function of the select monitor cannot be executed normally, check the communication circuit. <Ref. to ABS-84, COMMUNICATION FOR INITIALIZING IMPOSSIBLE , Diagnostics Procedure with Subaru Select Monitor.> 4) Read diagnostic trouble code (DTC). <Ref. to ABS-18, OPERATION, Subaru Select Monitor.> 5) Record all diagnostic trouble codes (DTCs) and frame data.	Is the corresponding trouble encoding?	Go to step **3**.	Go to step **4**.
3	**PERFORM THE GENERAL DIAGNOSTICS.** 1) Inspect using “General Diagnostics Table”. <Ref. to ABS-159, General Diagnostics Table.> 2) Perform the clear memory mode. <Ref. to ABS-19, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.> 3) Perform the inspection mode. <Ref. to ABS-21, Inspection Mode.> 4) Calling up diagnostic trouble code (DTC). <Ref. to ABS-18, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Is no diagnostic trouble code (DTC) designated and ABS warning light goes out after turning on?	Complete the diagnosis.	Go to step **4**.

No.	Step	Check	Yes	No
4	**PERFORM THE DIAGNOSIS.** 1) Inspect using “Diagnostics Procedure with Subaru Select Monitor”.<Ref. to ABS-84, Diagnostics Procedure with Subaru Select Monitor.> NOTE: For diagnostic trouble code (DTC) list, refer to “List of Diagnostic Trouble Code (DTC)”.<Ref. to ABS-24, WITHOUT SUBARU SELECT MONITOR, LIST, List of Diagnostic Trouble Code (DTC).> 2) Repair trouble cause. 3) Perform the clear memory mode. <Ref. to ABS-19, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.> 4) Perform the inspection mode. <Ref. to ABS-21, Inspection Mode.> 5) Calling up diagnostic trouble code (DTC). <Ref. to ABS-18, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Is no diagnostic trouble code (DTC) designated and does ABS warning light go out after turning on?	Complete the diagnosis.	Inspect using “Diagnostics Procedure with Subaru Select Monitor”. <Ref. to ABS-84, Diagnostics Procedure with Subaru Select Monitor.>

2. Check List for Interview S006502

A: CHECK S006502A04

Check the following items about the vehicle’s state.

1. STATE OF ABS WARNING LIGHT S006502A0401

<table>
<tr><td>ABS warning light comes on.</td><td colspan="3">☐ Always
☐ Sometimes
☐ Only once
☐ Does not come on
● When / how long does it come on?:</td></tr>
<tr><td>Ignition key position</td><td colspan="3">☐ LOCK
☐ ACC
☐ ON (before starting engine)
☐ START
☐ On after starting (Engine is running)
☐ On after starting (Engine is stop)</td></tr>
<tr><td rowspan="12">Timing</td><td colspan="3">☐ Immediately after ignition is ON.
☐ Immediately after ignition starts.</td></tr>
<tr><td rowspan="2">☐ When advancing</td><td colspan="2">km/h to km/h</td></tr>
<tr><td colspan="2">MPH to MPH</td></tr>
<tr><td>☐ While traveling at a constant speed</td><td>km/h</td><td>MPH</td></tr>
<tr><td rowspan="2">☐ When decelerating</td><td colspan="2">km/h to km/h</td></tr>
<tr><td colspan="2">MPH to MPH</td></tr>
<tr><td rowspan="2">☐When turning to right</td><td>Steering angle :</td><td>deg</td></tr>
<tr><td>Steering time :</td><td>sec</td></tr>
<tr><td rowspan="2">☐ When turning to left</td><td>Steering angle :</td><td>deg</td></tr>
<tr><td>Steering time :</td><td>sec</td></tr>
<tr><td colspan="3">☐ When moving other electrical parts</td></tr>
<tr><td colspan="3">● Parts name :
● Operating condition :</td></tr>
</table>

2. SYMPTOMS *S006502A0402*

ABS operating condition	☐ Performs no work.		
	☐ Operates only when abruptly applying brakes.	Vehicle speed :	km/h
			MPH
	● How to step on brake pedal :		
	a) Operating time :	sec	
	b) Operating noise : ☐ Produce / ☐ Does not produce		
	● What kind of noise?	☐ Knock ☐ Gong gong ☐ Bong ☐ Buzz ☐ Gong gong buzz ☐ Others :	
	c) Reaction force of brake pedal		
		☐ Stick ☐ Press down once with a clunk ☐ Press and released ☐ Others :	
Behavior of vehicle	a) Directional stability cannot be obtained or steering arm refuses to work when applying brakes : ☐ Yes / ☐ No		
	● When :	☐ Vehicle turns to right ☐ Vehicle turns to left ☐ Spins ☐ Others :	
	b) Directional stability cannot be obtained or steering arm refuses to work when accelerating : ☐ Yes / ☐ No		
	● When :	☐ Vehicle turns to right ☐ Vehicle turns to left ☐ Spins ☐ Others :	
	c) Brakes are out of order : ☐ Yes / ☐ No		
	● What :	☐ Braking distance is long ☐ Brakes lock or drag ☐ Pedal stroke is long ☐ Pedal sticks ☐ Others :	
	d) Poor acceleration : ☐ Yes / ☐ No		
	● What :	☐ Fails to accelerate ☐ Engine stalls ☐ Others :	
	e) Occurrence of vibration : ☐ Yes / ☐ No		
	● Where ● What kind :		
	f) Occurrence of abnormal noise : ☐ Yes / ☐ No		
	● Where ● What kind :		
	g) Occurrence of other phenomena : ☐ Yes / ☐ No		
	● What kind :		

3. CONDITIONS UNDER WHICH TROUBLE OCCURS *S006502A0403*

Environment	a) Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others :	
	b) Ambient temperature	°F (°C)	
	c) Road	☐ Urban area ☐ Suburbs ☐ Highway ☐ General road ☐ Ascending slope ☐ Descending slope ☐ Paved road ☐ Gravel road ☐ Muddy road ☐ Sandy place ☐ Others :	
	d) Road surface	☐ Dry ☐ Wet ☐ New-fallen snow ☐ Compressed snow ☐ Frozen slope ☐ Others :	
Condition	a) Brakes	Deceleration : g	
		☐ Continuous / ☐ Intermittent	
	b) Accelerator	Acceleration : g	
		☐ Continuous / ☐ Intermittent	
	c) Vehicle speed	km/h	MPH
		☐ Advancing ☐ Accelerating ☐ Reducing speed ☐ Low speed ☐ Turning ☐ Others :	
	d) Tire inflation pressure	Front RH tire : kPa	
		Front LH tire : kPa	
		Rear RH tire : kPa	
		Rear LH tire : kPa	
	e) Degree of wear	Front RH tire :	
		Front LH tire :	
		Rear RH tire :	
		Rear LH tire :	
	f) Genuine parts are used. : ☐ Yes / ☐ No		
	g) Chain is passed around tires. : ☐ Yes / ☐ No		
	h) T tire is used. : ☐ Yes / ☐ No		
	i) Condition of suspension alignment :		
	j) Loading state :		
	k) Repair parts are used. : ☐ Yes / ☐ No		
	● What :		
	l) Others :		

3. General Description S006001

A: CAUTION S006001A03

1. SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG" S006001A0301

Airbag system wiring harness is routed near the ABS sensor, ABS control module and hydraulic control unit.

CAUTION:
- **All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.**
- **Be careful not to damage Airbag system wiring harness when servicing the ABS sensor, ABS control module and hydraulic control unit.**

B: INSPECTION S006001A10

Before performing diagnostics, check the following items which might affect ABS problems:

1. BATTERY S006001A1001

Measure battery voltage and specific gravity of electrolyte.

Standard voltage: 12 V, or more

Specific gravity: Above 1.260

2. BRAKE FLUID S006001A1002

1) Check brake fluid level.
2) Check brake fluid leakage.

3. HYDRAULIC UNIT S006001A1006

Check the hydraulic unit.
- With brake tester <Ref. to ABS-9, CHECKING THE HYDRAULIC UNIT ABS OPERATION WITH BRAKE TESTER, INSPECTION, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
- Without brake tester <Ref. to ABS-8, CHECKING THE HYDRAULIC UNIT ABS OPERATION BY PRESSURE GAUGE, INSPECTION, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

4. BRAKE DRAG S006001A1003

Check brake drag.

5. BRAKE PAD AND ROTOR S006001A1004

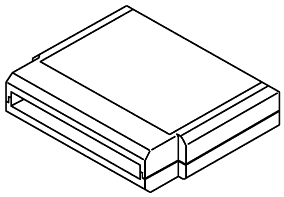
Check brake pad and rotor.
- Front <Ref. to BR-16, INSPECTION, Front Brake Pad.> and <Ref. to BR-17, INSPECTION, Front Disc Rotor.>
- Rear <Ref. to BR-21, INSPECTION, Rear Brake Pad.> and <Ref. to BR-23, INSPECTION, Rear Disc Rotor.> or <Ref. to BR-28, INSPECTION, Rear Drum Brake Shoe.> and <Ref. to BR-29, INSPECTION, Rear Drum Brake Drum.>

6. TIRE S006001A1005

Check tire specifications, tire wear and air pressure. <Ref. to WT-2, SPECIFICATIONS, General Description.>

C: PREPARATION TOOL S006001A17

1. SPECIAL TOOLS S006001A1701

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)

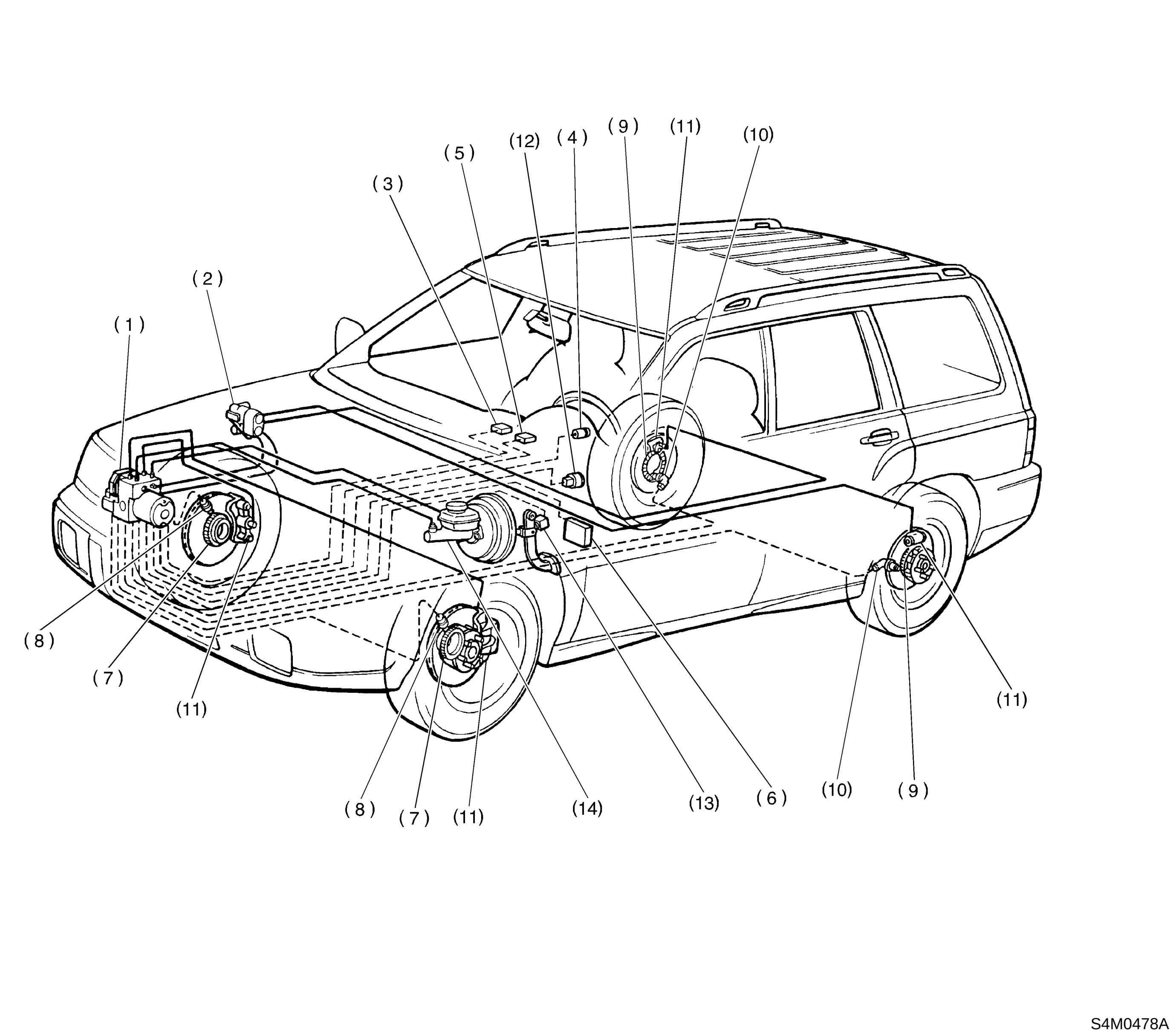
2. GENERAL PURPOSE TOOLS S006001A1702

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and ampere.
Oscilloscope	Used for measuring sensor.

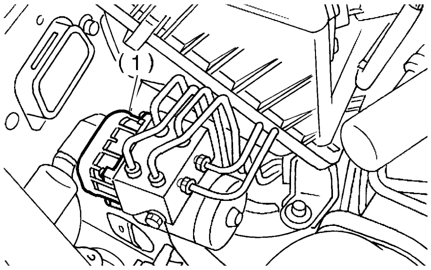
MEMO:

4. Electrical Components Location *S006507*

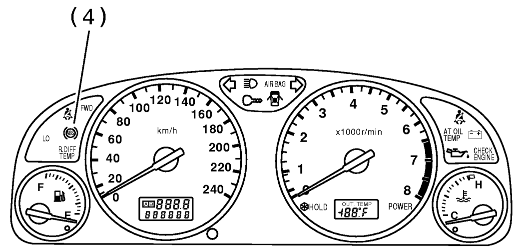
A: LOCATION *S006507A13*



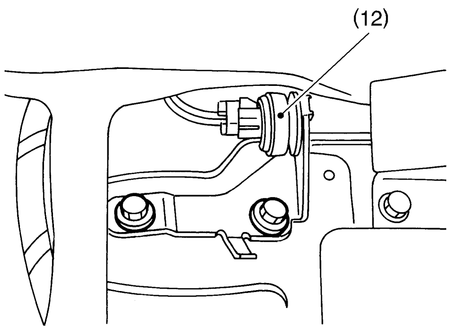
(1) ABS control module and hydraulic control unit (ABSCM&H/U)
(2) Proportioning valve
(3) Diagnosis connector
(4) ABS warning light
(5) Data link connector (for SUBARU select monitor)
(6) Automatic transmission control module
(7) Front tone wheel
(8) Front ABS sensor
(9) Rear tone wheel
(10) Rear ABS sensor
(11) Wheel cylinder
(12) G sensor
(13) Stop light switch
(14) Master cylinder



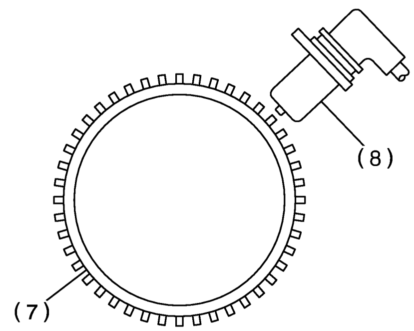
B4M1226B



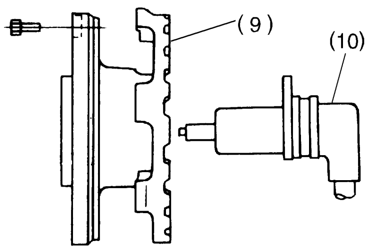
S2M2018B



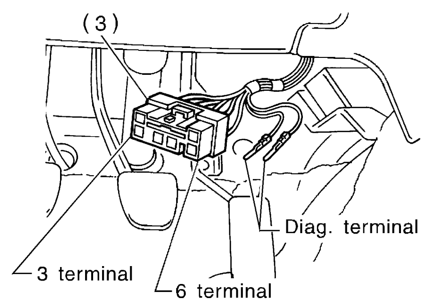
H4M1328B



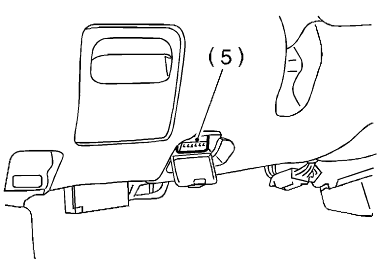
B4M2285A



B4M0646H



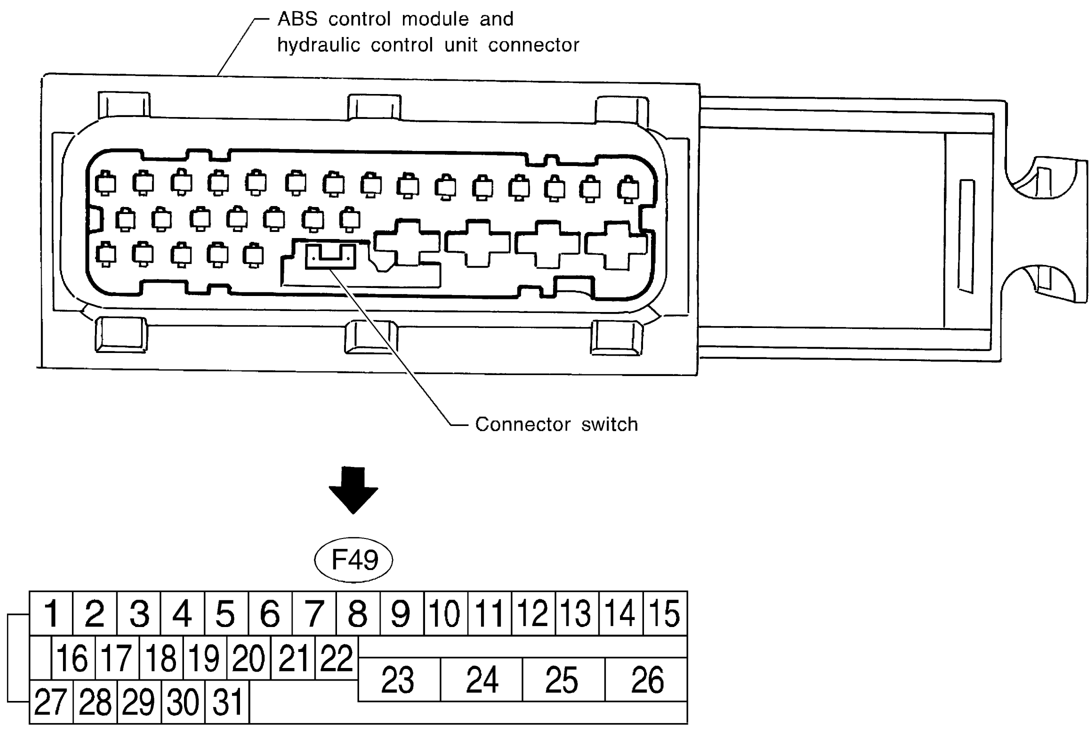
B4M0231E



S4M0056A

5. Control Module I/O Signal S006524

A: ELECTRICAL SPECIFICATION S006524A08



B4M1228A

NOTE:

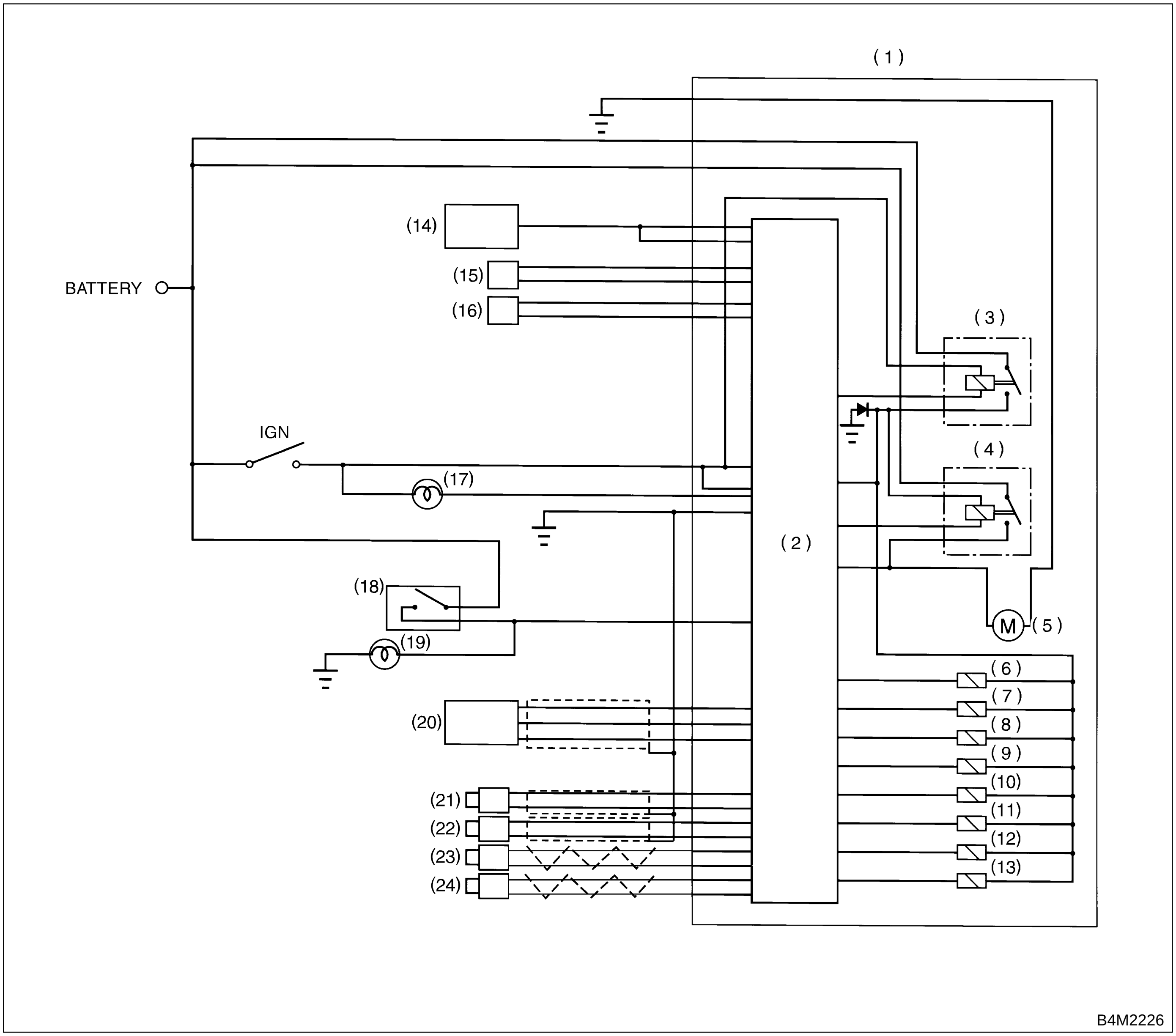
- The terminal numbers in the ABS control module and hydraulic control unit connector are as shown in the figure.
- When the connector is removed from the ABSCM&H/U, the connector switch closes the circuit between terminal No. 21 and No. 23. The ABS warning light illuminates.

CONTROL MODULE I/O SIGNAL

Contents		Terminal No. (+)—(−)	Input/Output signal: Measured value and measuring conditions
ABS sensor*2 (Wheel speed sensor)	Front left wheel	9—10	0.12 — 1 V (When it is 20 Hz.)
	Front right wheel	11—12	
	Rear left wheel	7—8	
	Rear right wheel	13—15	
Valve relay power supply		24—23	10 — 15 V
Motor relay power supply		25—23	10 — 15 V
G sensor*2	Power supply	30—28	4.75 — 5.25 V
	Ground	28	—
	Output	6—28	2.3±0.2 V when vehicle is in horizontal position.
Stop light switch*1		2—23	Less than 1.5 V when the stop light is OFF and, 10 — 15 V when the stop light is ON.
ABS warning light*2		21—23	Less than 1.5 V during 1.5 seconds when ignition switch is ON, and 10 — 15 V after 1.5 seconds.
AT ABS signal*2 (AT model only)		31—23	Less than 1.5 V when the ABS control still operates and more than 5.5 V when ABS does not operate.
ABS operation signal monitor*2		3—23	Less than 1.5 V when the ABS control still operates and more than 5.5 V when ABS does not operate.
Select monitor*2	Data is received.	20—23	Less than 1.5 V when no data is received.
	Data is sent.	5—23	4.75 — 5.25 V when no data is sent.
ABS diagnosis connector*2	Terminal No. 3	29—23	10 — 15 V when ignition switch is ON.
	Terminal No. 6	4—23	10 — 15 V when ignition switch is ON.
Power supply*1		1—23	10 — 15 V when ignition switch is ON.
Grounding line		23	—
Grounding line		26	—

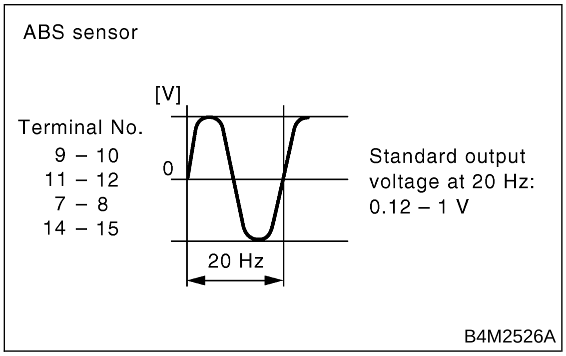
*1: Measure the I/O signal voltage after removing the connector from the ABSCM&H/U terminal.
*2: Measure the I/O signal voltage at connector (B62) and (R48).

B: SCHEMATIC *S006524A21*



(1) ABS control module and hydraulic control unit (ABSCM&H/U)
(2) ABS control module area
(3) Valve relay
(4) Motor relay
(5) Motor
(6) Front left inlet solenoid valve
(7) Front left outlet solenoid valve
(8) Front right inlet solenoid valve
(9) Front right outlet solenoid valve
(10) Rear left inlet solenoid valve
(11) Rear left outlet solenoid valve
(12) Rear right inlet solenoid valve
(13) Rear right outlet solenoid valve
(14) Transmission control module (only AT model)
(15) Diagnosis connector
(16) Data link connector
(17) ABS warning light
(18) Stop light switch
(19) Stop light
(20) G sensor
(21) Front left ABS sensor
(22) Front right ABS sensor
(23) Rear left ABS sensor
(24) Rear right ABS sensor

C: WAVEFORM *S006524G79*

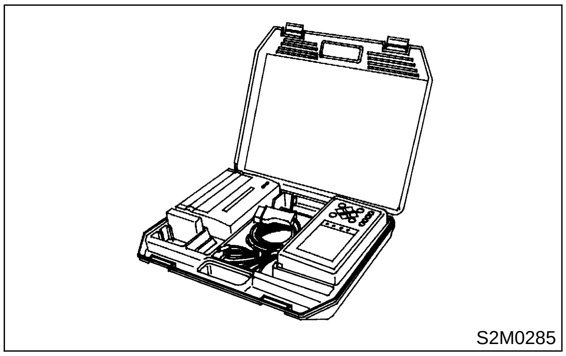


6. Subaru Select Monitor S006503

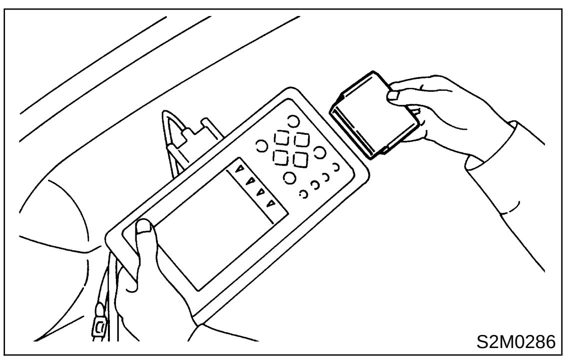
A: OPERATION S006503A16

1. READ DIAGNOSTIC TROUBLE CODE (DTC) S006503A1605

1) Prepare Subaru Select Monitor kit.

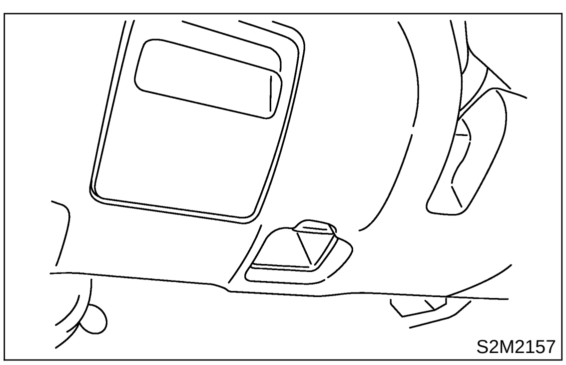


2) Connect diagnosis cable to Subaru Select Monitor.
3) Insert cartridge into Subaru Select Monitor. <Ref. to ABS-10, SPECIAL TOOLS, PREPARATION TOOL, General Description.>



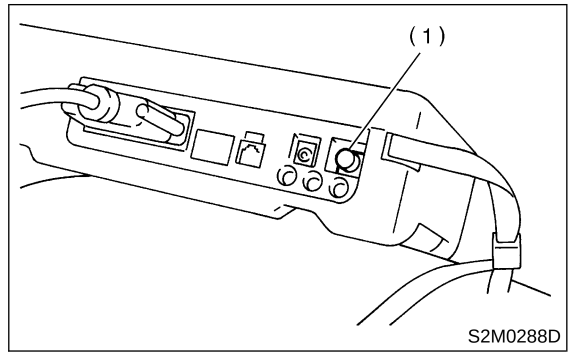
4) Connect Subaru Select Monitor to data link connector.

(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.

5) Turn ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.



(1) Power switch

6) On the ≪Main Menu≫ display screen, select the {Each System Check} and press the [YES] key.
7) On the ≪System Selection Menu≫ display screen, select the {Brake Control System} and press the [YES] key.
8) Press the [YES] key after displayed the information of engine type.
9) On the ≪ABS Diagnosis≫ display screen, select the {Diagnostic Code(s) Display} and press the [YES] key.
10) 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 (DTC), refer to the LIST OF DIAGNOSTIC TROUBLE CODE (DTC). <Ref. to ABS-24, List of Diagnostic Trouble Code (DTC).>

2. READ CURRENT DATA *S006503A1602*

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 {Brake Control System} and press the ≪YES≫ key.
3) Press the ≪YES≫ key after displayed the information of ABS type.
4) On the ≪Brake Control 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.

Display screen	Contents to be monitored	Unit of measure
FR Wheel Speed	Wheel speed detected by the Front Right ABS sensor is displayed	km/h or MPH
FL Wheel Speed	Wheel speed detected by the Front Left ABS sensor is displayed	km/h or MPH
RR Wheel Speed	Wheel speed detected by the Rear Right ABS sensor is displayed	km/h or MPH
RL Wheel Speed	Wheel speed detected by the Rear Left ABS sensor is displayed	km/h or MPH
Stop Light Switch	Stop light switch signal	ON or OFF
Stop Light Switch	Stop light switch monitor voltage is displayed.	V
G sensor output Signal	Refers to vehicle acceleration detecting by the analog G sensor. It appears on the select monitor display in volts.	V
Valve Relay Signal	Valve Relay Signal	ON or OFF
Motor Relay Signal	Motor Relay Signal	ON or OFF
ABS Signal to TCM	ABS operation signal from ABS control module to TCM	ON or OFF
ABS Warning Lamp	ON operation of the ABS warning light is displayed.	ON or OFF
Motor Relay Monitor	Operating condition of the motor relay is displayed.	High or Low
Valve Relay Monitor	Operating condition of the valve relay is displayed.	ON or OFF
CCM Signal	ABS operation signal from ABS control module to TCM	ON or OFF

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

3. CLEAR MEMORY MODE *S006503A1603*

1) On the ≪Main Menu≫ display screen, select the {2. Each System Check} and press the ≪YES≫ key.
2) On the ≪System Select Menu≫ display screen, select {Brake System} and press the ≪YES≫ key.
3) Press the ≪YES≫ key after displayed the information of engine type.
4) On the ≪Brake Control 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.

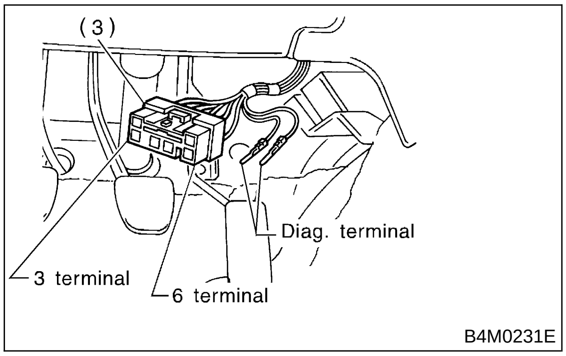
7. Read Diagnostic Trouble Code (DTC) S006792

A: OPERATION S006792A16

1. WITHOUT SUBARU SELECT MONITOR

S006792A1602

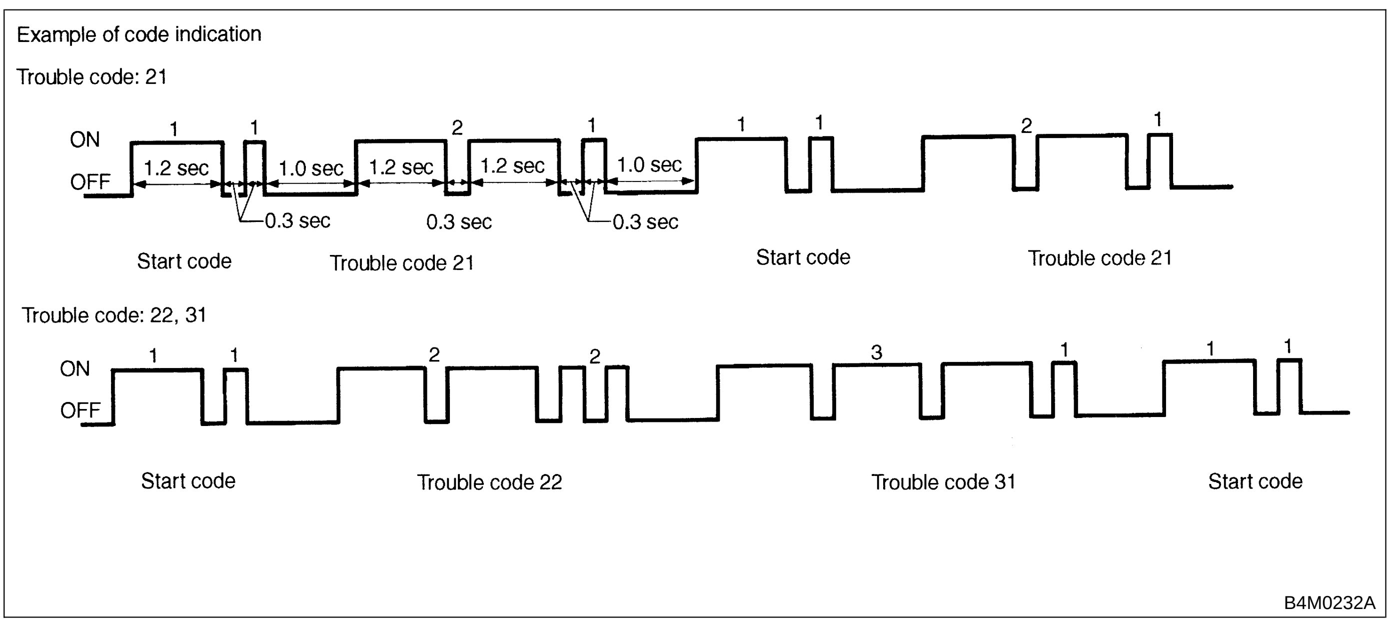
1) Take out diagnosis connector from side of driver's seat heater unit.



2) Turn ignition switch OFF.
3) Connect diagnosis connector terminal 6 to diagnosis terminal.
4) Turn ignition switch ON.
5) ABS warning light is set in the diagnostic mode and blinks to identify trouble code.

6) After the start code (11) is shown, the diagnostic trouble codes (DTC) will be shown in order of the last information first.
These repeat for a maximum of 3 minutes.

NOTE:
- When there are no diagnostic trouble codes (DTCs) in memory, only the start code (11) is shown.
- When on-board diagnosis of the ABS control module detects a problem, the information (up to a maximum of three) will be stored in the EEPROM as a diagnostic trouble code (DTC). When there are more than three, the most recent three will be stored. (Stored codes will stay in memory until they are cleared.)



2. WITH SUBARU SELECT MONITOR S006792A1601

Refer to SUBARU SELECT MONITOR for information about how to obtain and understand trouble codes. <Ref. to ABS-18, Subaru Select Monitor.>

8. Inspection Mode *S006510*

A: OPERATION *S006510A16*

Reproduce the condition under which the problem has occurred as much as possible.
Drive the vehicle at a speed more than 40 km/h (25 MPH) for at least one minute.

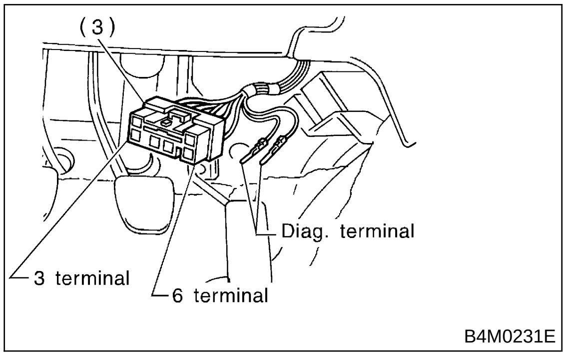
9. Clear Memory Mode S006513

A: OPERATION S006513A16

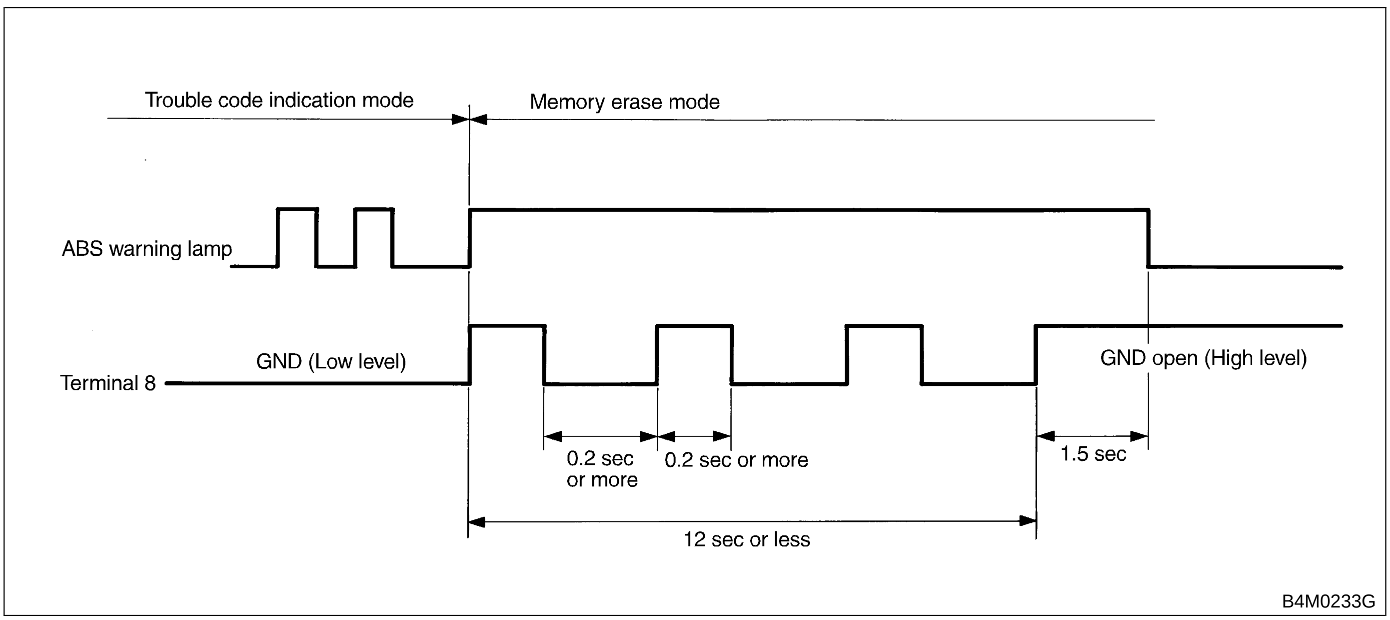
1. WITHOUT SUBARU SELECT MONITOR

S006513A1602

1) After calling up a diagnostic trouble code (DTC), disconnect diagnosis connector terminal 6 from diagnosis terminal.



2) Repeat 3 times within approx. 12 seconds; connecting and disconnecting terminal 6 and diagnosis terminal for at least 0.2 seconds each time.



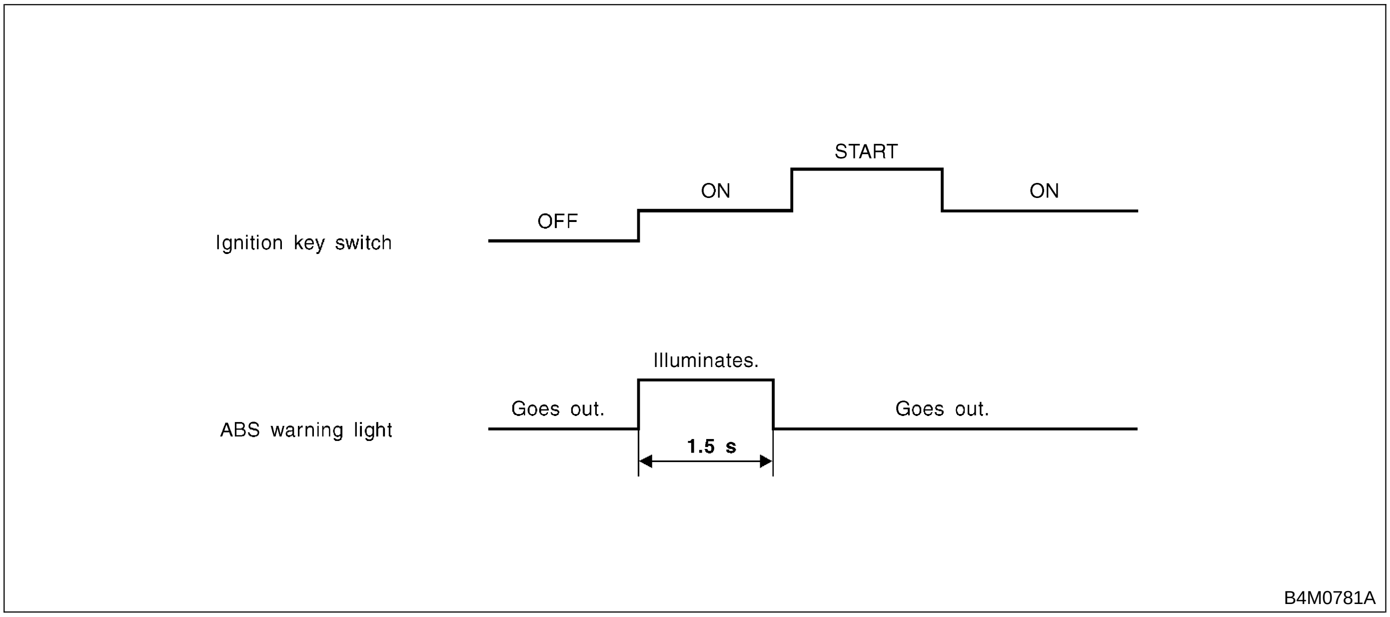
NOTE:
After diagnostics is completed, make sure to clear memory. Make sure only start code (11) is shown after memory is cleared.

2. WITH SUBARU SELECT MONITOR S006513A1601

Refer to SUBARU SELECT MONITOR for information about how to clear diagnostic trouble codes (DTCs). <Ref. to ABS-18, Subaru Select Monitor.>

10. ABS Warning Light Illumination Pattern S006581

A: INSPECTION S006581A10



1) When the ABS warning light does not illuminate in accordance with this illumination pattern, there must be an electrical malfunction.
2) When the ABS warning light remains constantly OFF, repair the ABS warning light circuit or diagnosis circuit. <Ref. to ABS-28, Diagnostics Procedure with Diagnosis Connector.>

NOTE:
Even though the ABS warning light does not go out 1.5 seconds after it illuminates, the ABS system operates normally when the warning light goes out while driving at approximately 12 km/h (7 MPH). However, the Anti-lock brakes do not work while the ABS warning light is illuminated.

11. List of Diagnostic Trouble Code (DTC) S006525

A: LIST S006525A12

1. WITHOUT SUBARU SELECT MONITOR S006525A1201

DTC No.	Item		Index
11	Start code ● Trouble code is shown after start code. ● Only start code is shown in normal condition.		—
21	Abnormal ABS sensor (Open circuit or input voltage too high)	Front right ABS sensor	<Ref. to ABS-40, DTC 21 ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (FRONT RH), Diagnostics Procedure with Diagnosis Connector.>
23		Front left ABS sensor	<Ref. to ABS-40, DTC 23 ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (FRONT LH), Diagnostics Procedure with Diagnosis Connector.>
25		Rear right ABS sensor	<Ref. to ABS-40, DTC 25 ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (REAR RH), Diagnostics Procedure with Diagnosis Connector.>
27		Rear left ABS sensor	<Ref. to ABS-40, DTC 27 ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (REAR LH), Diagnostics Procedure with Diagnosis Connector.>
22	Abnormal ABS sensor (Abnormal ABS sensor signal)	Front right ABS sensor	<Ref. to ABS-46, DTC 22 ABNORMAL ABS SENSOR (FRONT RH), Diagnostics Procedure with Diagnosis Connector.>
24		Front left ABS sensor	<Ref. to ABS-46, DTC 24 ABNORMAL ABS SENSOR (FRONT LH), Diagnostics Procedure with Diagnosis Connector.>
26		Rear right ABS sensor	<Ref. to ABS-46, DTC 26 ABNORMAL ABS SENSOR (REAR RH), Diagnostics Procedure with Diagnosis Connector.>
28		Rear left ABS sensor	<Ref. to ABS-46, DTC 28 ABNORMAL ABS SENSOR (REAR LH), Diagnostics Procedure with Diagnosis Connector.>
29		Any one of four	<Ref. to ABS-52, DTC 29 ABNORMAL ABS SENSOR SIGNAL (ANY ONE OF FOUR), Diagnostics Procedure with Diagnosis Connector.>
31	Abnormal solenoid valve circuit(s) in ABS control module and hydraulic unit	Front right inlet valve	<Ref. to ABS-56, DTC 31 ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT RH), Diagnostics Procedure with Diagnosis Connector.>
32		Front right outlet valve	<Ref. to ABS-60, DTC 32 ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT RH), Diagnostics Procedure with Diagnosis Connector.>
33		Front left inlet valve	<Ref. to ABS-56, DTC 33 ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT LH), Diagnostics Procedure with Diagnosis Connector.>
34		Front left outlet valve	<Ref. to ABS-60, DTC 34 ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT LH), Diagnostics Procedure with Diagnosis Connector.>
35		Rear right inlet valve	<Ref. to ABS-56, DTC 35 ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR RH), Diagnostics Procedure with Diagnosis Connector.>
36		Rear right outlet valve	<Ref. to ABS-60, DTC 36 ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR RH), Diagnostics Procedure with Diagnosis Connector.>
37		Rear left inlet valve	<Ref. to ABS-56, DTC 37 ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH), Diagnostics Procedure with Diagnosis Connector.>
38		Rear left outlet valve	<Ref. to ABS-60, DTC 38 ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH), Diagnostics Procedure with Diagnosis Connector.>

DTC No.	Item	Index
41	Abnormal ABS control module	<Ref. to ABS-64, DTC 41 ABNORMAL ABS CONTROL MODULE, Diagnostics Procedure with Diagnosis Connector.>
42	Source voltage is abnormal.	<Ref. to ABS-66, DTC 42 SOURCE VOLTAGE IS ABNORMAL, Diagnostics Procedure with Diagnosis Connector.>
44	A combination of AT control abnormal	<Ref. to ABS-68, DTC 44 A COMBINATION OF AT CONTROL ABNORMAL, Diagnostics Procedure with Diagnosis Connector.>
51	Abnormal valve relay	<Ref. to ABS-70, DTC 51 ABNORMAL VALVE RELAY, Diagnostics Procedure with Diagnosis Connector.>
52	Abnormal motor and/or motor relay	<Ref. to ABS-72, DTC 52 ABNORMAL MOTOR AND/OR MOTOR RELAY, Diagnostics Procedure with Diagnosis Connector.>
54	Abnormal stop light switch	<Ref. to ABS-76, DTC 54 ABNORMAL STOP LIGHT SWITCH, Diagnostics Procedure with Diagnosis Connector.>
56	Abnormal G sensor output voltage	<Ref. to ABS-78, DTC 56 ABNORMAL G SENSOR OUTPUT VOLTAGE, Diagnostics Procedure with Diagnosis Connector.>

2. WITH SUBARU SELECT MONITOR S006525A1202

DTC No.	Display screen	Item	Index
—	Communication for initializing impossible	Select monitor communication failure	<Ref. to ABS-84, COMMUNICATION FOR INITIALIZING IMPOSSIBLE , Diagnostics Procedure with Subaru Select Monitor.>
—	No trouble code	Although no trouble code appears on the select monitor display, the ABS warning light remains on.	<Ref. to ABS-88, NO TROUBLE CODE, Diagnostics Procedure with Subaru Select Monitor.>
21	Open or short circuit in front right ABS sensor circuit	Open or short circuit in front right ABS sensor circuit	<Ref. to ABS-92, DTC 21 OPEN OR SHORT CIRCUIT IN FRONT RIGHT ABS SENSOR CIRCUIT, Diagnostics Procedure with Subaru Select Monitor.>
22	Front right ABS sensor abnormal signal	Front right ABS sensor abnormal signal	<Ref. to ABS-98, DTC 22 FRONT RIGHT ABNORMAL ABS SENSOR SIGNAL, Diagnostics Procedure with Subaru Select Monitor.>
23	Open or short circuit in front left ABS sensor circuit	Open or short circuit in front left ABS sensor circuit	<Ref. to ABS-92, DTC 23 OPEN OR SHORT CIRCUIT IN FRONT LEFT ABS SENSOR CIRCUIT, Diagnostics Procedure with Subaru Select Monitor.>
24	Front left ABS sensor abnormal signal	Front left ABS sensor abnormal signal	<Ref. to ABS-98, DTC 24 FRONT LEFT ABNORMAL ABS SENSOR SIGNAL, Diagnostics Procedure with Subaru Select Monitor.>
25	Open or short circuit in rear right ABS sensor circuit	Open or short circuit in rear right ABS sensor circuit	<Ref. to ABS-92, DTC 25 OPEN OR SHORT CIRCUIT IN REAR RIGHT ABS SENSOR CIRCUIT, Diagnostics Procedure with Subaru Select Monitor.>
26	Rear right ABS sensor abnormal signal	Rear right ABS sensor abnormal signal	<Ref. to ABS-98, DTC 26 REAR RIGHT ABNORMAL ABS SENSOR SIGNAL, Diagnostics Procedure with Subaru Select Monitor.>
27	Open or short circuit in rear left ABS sensor circuit	Open or short circuit in rear left ABS sensor circuit	<Ref. to ABS-92, DTC 27 OPEN OR SHORT CIRCUIT IN REAR LEFT ABS SENSOR CIRCUIT, Diagnostics Procedure with Subaru Select Monitor.>
28	Rear left ABS sensor abnormal signal	Rear left ABS sensor abnormal signal	<Ref. to ABS-98, DTC 28 REAR LEFT ABNORMAL ABS SENSOR SIGNAL, Diagnostics Procedure with Subaru Select Monitor.>
29	Abnormal ABS sensor signal on any one of four sensor	Abnormal ABS sensor signal on any one of four	<Ref. to ABS-104, DTC 29 ABNORMAL ABS SENSOR SIGNAL ON ANY ONE OF FOUR SENSOR, Diagnostics Procedure with Subaru Select Monitor.>
31	Front right inlet valve malfunction	Front right inlet valve malfunction	<Ref. to ABS-108, DTC 31 FRONT RIGHT INLET VALVE MALFUNCTION, Diagnostics Procedure with Subaru Select Monitor.>
32	Front right outlet valve malfunction	Front right outlet valve malfunction	<Ref. to ABS-112, DTC 32 FRONT RIGHT OUTLET VALVE MALFUNCTION, Diagnostics Procedure with Subaru Select Monitor.>
33	Front left inlet valve malfunction	Front left inlet valve malfunction	<Ref. to ABS-108, DTC 33 FRONT LEFT INLET VALVE MALFUNCTION, Diagnostics Procedure with Subaru Select Monitor.>
34	Front left outlet valve malfunction	Front left outlet valve malfunction	<Ref. to ABS-112, DTC 34 FRONT LEFT OUTLET VALVE MALFUNCTION, Diagnostics Procedure with Subaru Select Monitor.>
35	Rear right inlet valve malfunction	Rear right inlet valve malfunction	<Ref. to ABS-108, DTC 35 REAR RIGHT INLET VALVE MALFUNCTION, Diagnostics Procedure with Subaru Select Monitor.>
36	Rear right outlet valve malfunction	Rear right outlet valve malfunction	<Ref. to ABS-112, DTC 36 REAR RIGHT OUTLET VALVE MALFUNCTION, Diagnostics Procedure with Subaru Select Monitor.>
37	Rear left inlet valve malfunction	Rear left inlet valve malfunction	<Ref. to ABS-108, DTC 37 REAR LEFT INLET VALVE MALFUNCTION, Diagnostics Procedure with Subaru Select Monitor.>

LIST OF DIAGNOSTIC TROUBLE CODE (DTC)

DTC No.	Display screen	Item	Index
38	Rear left outlet valve malfunction	Rear left outlet valve malfunction	<Ref. to ABS-112, DTC 38 REAR LEFT OUTLET VALVE MALFUNCTION, Diagnostics Procedure with Subaru Select Monitor.>
41	ABS control module malfunction	ABS control module and hydraulic control unit malfunction	<Ref. to ABS-116, DTC 41 ABS CONTROL MODULE MALFUNCTION, Diagnostics Procedure with Subaru Select Monitor.>
42	Power supply voltage too low	Power supply voltage too low	<Ref. to ABS-118, DTC 42 POWER SUPPLY VOLTAGE TOO LOW, Diagnostics Procedure with Subaru Select Monitor.>
42	Power supply voltage too high	Power supply voltage too high	<Ref. to ABS-120, DTC 42 POWER SUPPLY VOLTAGE TOO HIGH, Diagnostics Procedure with Subaru Select Monitor.>
44	ABS-AT control (Non Controlled)	ABS-AT control (Non Controlled)	<Ref. to ABS-122, DTC 44 ABS-AT CONTROL (NON CONTROLLED), Diagnostics Procedure with Subaru Select Monitor.>
44	ABS-AT control (Controlled)	ABS-AT control (Controlled)	<Ref. to ABS-124, DTC 44 ABS-AT CONTROL (CONTROLLED), Diagnostics Procedure with Subaru Select Monitor.>
51	Valve relay malfunction	Valve relay malfunction	<Ref. to ABS-126, DTC 51 VALVE RELAY MALFUNCTION, Diagnostics Procedure with Subaru Select Monitor.>
51	Valve relay ON failure	Valve relay ON failure	<Ref. to ABS-128, DTC 51 VALVE RELAY ON FAILURE, Diagnostics Procedure with Subaru Select Monitor.>
52	Open circuit in motor relay circuit	Open circuit in motor relay circuit	<Ref. to ABS-130, DTC 52 OPEN CIRCUIT IN MOTOR RELAY CIRCUIT, Diagnostics Procedure with Subaru Select Monitor.>
52	Motor relay ON failure	Motor relay ON failure	<Ref. to ABS-134, DTC 52 MOTOR RELAY ON FAILURE, Diagnostics Procedure with Subaru Select Monitor.>
52	Motor malfunction	Motor malfunction	<Ref. to ABS-138, DTC 52 MOTOR MALFUNCTION, Diagnostics Procedure with Subaru Select Monitor.>
54	Stop light switch signal circuit malfunction	Stop light switch signal circuit malfunction	<Ref. to ABS-142, DTC 54 STOP LIGHT SWITCH SIGNAL CIRCUIT MALFUNCTION, Diagnostics Procedure with Subaru Select Monitor.>
56	Open or short circuit in G sensor circuit	Open or short circuit in G sensor circuit	<Ref. to ABS-144, DTC 56 OPEN OR SHORT CIRCUIT IN G SENSOR CIRCUIT, Diagnostics Procedure with Subaru Select Monitor.>
56	Battery short in G sensor circuit	Battery short in G sensor circuit	<Ref. to ABS-148, DTC 56 BATTERY SHORT IN G SENSOR CIRCUIT, Diagnostics Procedure with Subaru Select Monitor.>
56	Abnormal G sensor high µ output	Abnormal G sensor high µ output	<Ref. to ABS-152, DTC 56 ABNORMAL G SENSOR HIGH µ OUTPUT, Diagnostics Procedure with Subaru Select Monitor.>
56	Detection of G sensor stick	Detection of G sensor stick	<Ref. to ABS-156, DTC 56 DETECTION OF G SENSOR STICK, Diagnostics Procedure with Subaru Select Monitor.>

NOTE:
High µ means high friction coefficient against road surface.

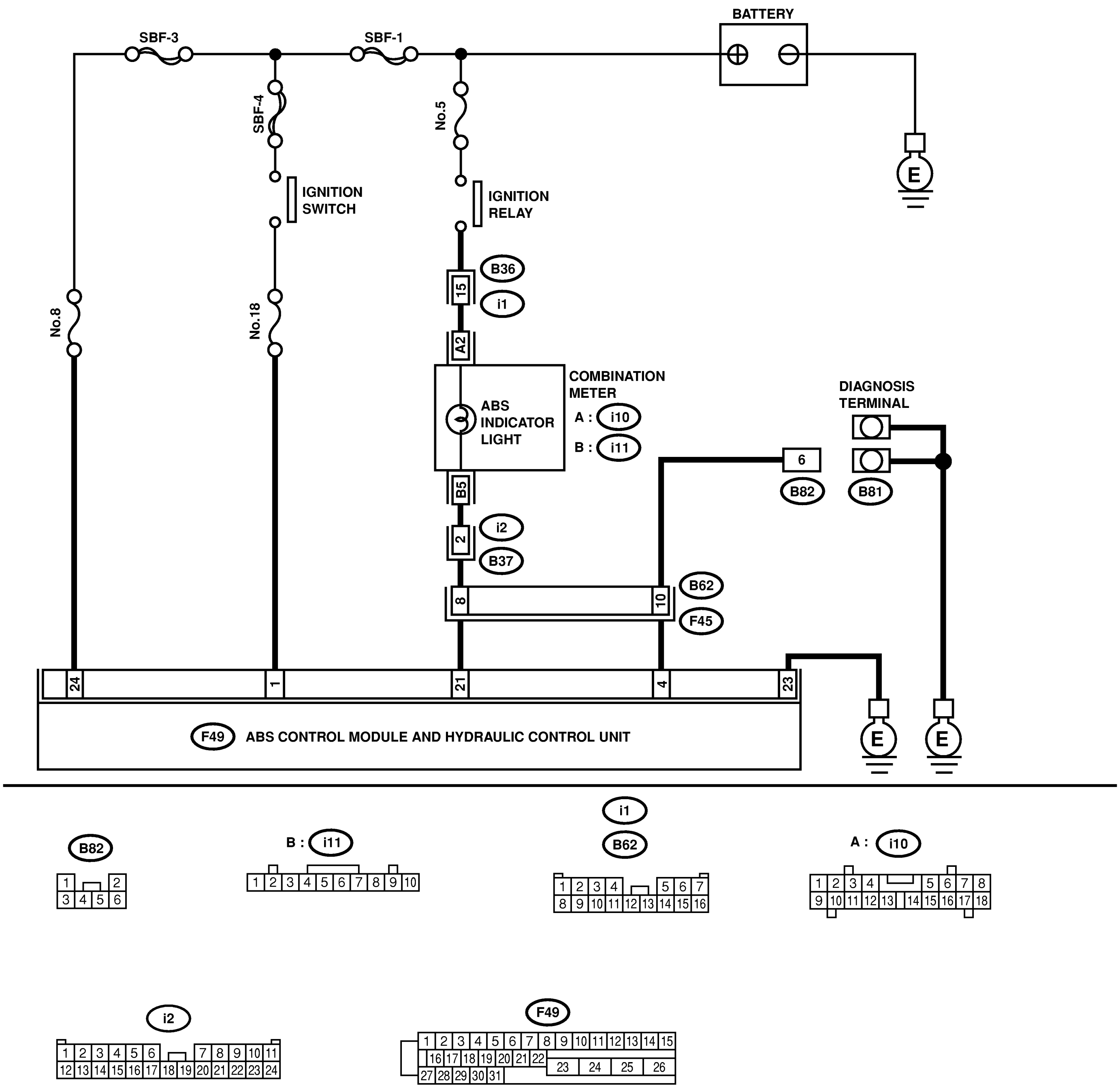
12. Diagnostics Procedure with Diagnosis Connector S006797

A: ABS WARNING LIGHT DOES NOT COME ON. S006797E24

DIAGNOSIS:
- ABS warning light circuit is open or shorted.

TROUBLE SYMPTOM:
- When ignition switch is turned ON (engine OFF), ABS warning light does not come on.

WIRING DIAGRAM:



S4M0579

No.	Step	Check	Yes	No
1	**CHECK IF OTHER WARNING LIGHTS TURN ON.** Turn ignition switch to ON (engine OFF).	Do other warning lights turn on?	Go to step **2**.	Repair combination meter. <Ref. to IDI-12, Combination Meter Assembly.>
2	**CHECK ABS WARNING LIGHT BULB.** 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove ABS warning light bulb from combination meter.	Is ABS warning light bulb OK?	Go to step **3**.	Replace ABS warning light bulb. <Ref. to IDI-12, Combination Meter Assembly.>
3	**CHECK BATTERY SHORT OF ABS WARNING LIGHT HARNESS.** 1) Disconnect connector (B62) from connector (F45). 2) Measure voltage between connector (B62) and chassis ground. ***Connector & terminal*** ***(B62) No. 8 (+) — Chassis ground (−):***	Is the voltage less than 3 V?	Go to step **4**.	Repair warning light harness.
4	**CHECK BATTERY SHORT OF ABS WARNING LIGHT HARNESS.** 1) Turn ignition switch to ON. 2) Measure voltage between connector (B62) and chassis ground. ***Connector & terminal*** ***(B62) No. 8 (+) — Chassis ground (−):***	Is the voltage less than 3 V?	Go to step **5**.	Repair warning light harness.
5	**CHECK WIRING HARNESS.** 1) Turn ignition switch to OFF. 2) Install ABS warning light bulb to combination meter. 3) Install combination meter. 4) Turn ignition switch to ON. 5) Measure voltage between connector (B62) and chassis ground. ***Connector & terminal*** ***(B62) No. 8 (+) — Chassis ground (−):***	Is the voltage between 10 and 15 V?	Go to step **6**.	Repair wiring harness.
6	**CHECK BATTERY SHORT OF ABS WARNING LIGHT HARNESS.** 1) Turn ignition switch to OFF. 2) Measure voltage between connector (F45) and chassis ground. ***Connector & terminal*** ***(F45) No. 8 (+) — Chassis ground (−):***	Is the voltage less than 3 V?	Go to step **7**.	Repair wiring harness.
7	**CHECK BATTERY SHORT OF ABS WARNING LIGHT HARNESS.** 1) Turn ignition switch to ON. 2) Measure voltage between connector (F45) and chassis ground. ***Connector & terminal*** ***(F45) No. 8 (+) — Chassis ground (−):***	Is the voltage less than 3 V?	Go to step **8**.	Repair wiring harness.
8	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** Measure resistance between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***(F49) No. 23 — GND:***	Is the resistance less than 0.5 Ω?	Go to step **9**.	Repair ABSCM&H/U ground harness.

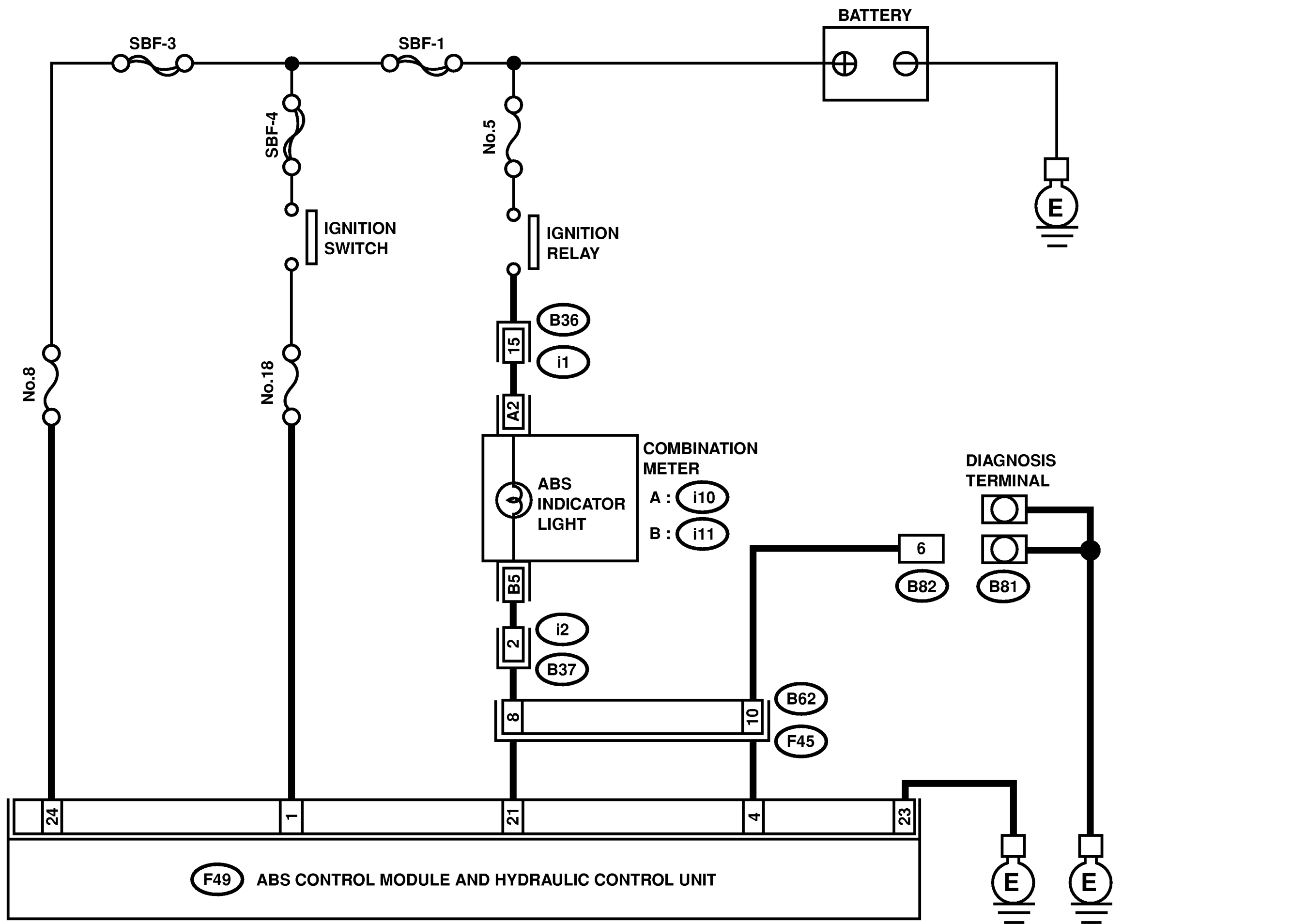
No.	Step	Check	Yes	No
9	**CHECK WIRING HARNESS.** Measure resistance between connector (F45) and chassis ground. ***Connector & terminal*** ***(F45) No. 8 (+) — Chassis ground (−):***	Is the resistance less than 0.5 Ω?	Go to step **10**.	Repair harness/ connector.
10	**CHECK POOR CONTACT IN CONNECTORS.** Turn ignition switch to OFF.	Is there poor contact in connectors between combination meter and ABSCM&H/U?	Repair connector.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

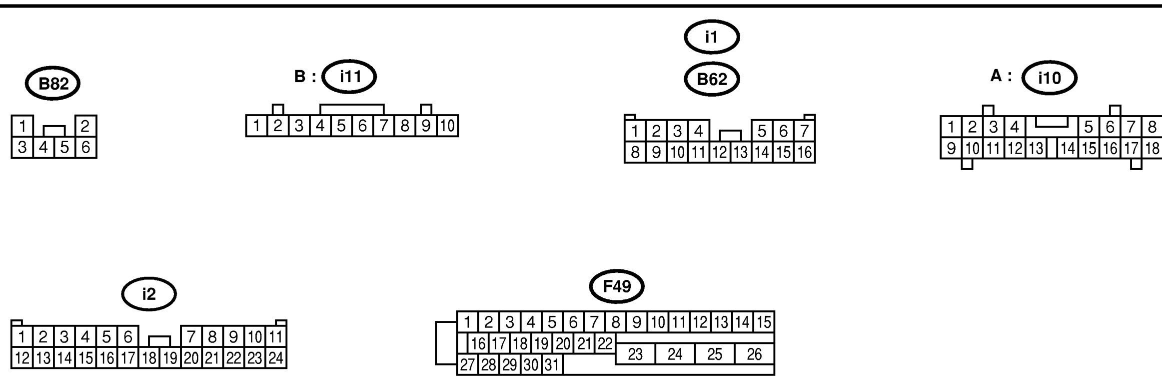
B: ABS WARNING LIGHT DOES NOT GO OFF. *S006797E25*

DIAGNOSIS:
- ABS warning light circuit is open or shorted.

TROUBLE SYMPTOM:
- When starting the engine and while ABS warning light is kept ON.

WIRING DIAGRAM:





S4M0579

No.	Step	Check	Yes	No
1	**CHECK INSTALLATION OF ABSCM&H/U CONNECTOR.** Turn ignition switch to OFF.	Is ABSCM&H/U connector inserted into ABSCM until the clamp locks onto it?	Go to step **2**.	Insert ABSCM&H/U connector into ABSCM&H/U until the clamp locks onto it.
2	**CHECK DIAGNOSIS TERMINAL.** Measure resistance between diagnosis terminals (B81) and chassis ground. ***Terminals*** ***Diagnosis terminal (A) — Chassis ground:*** ***Diagnosis terminal (B) — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3**.	Repair diagnosis terminal harness.
3	**CHECK DIAGNOSIS LINE.** 1) Turn ignition switch to OFF. 2) Connect diagnosis terminal (B81) to diagnosis connector (B82) No. 6. 3) Disconnect connector from ABSCM&H/U. 4) Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 4 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **4**.	Repair harness connector between ABSCM&H/U and diagnosis connector.
4	**CHECK GENERATOR.** 1) Start the engine. 2) Idle the engine. 3) Measure voltage between generator and chassis ground. ***Terminal*** ***Generator B terminal (+) — Chassis ground (−):***	Is the voltage between 10 and 15 V?	Go to step **5**.	Repair generator. <Ref. to SC-12, Generator.>
5	**CHECK BATTERY TERMINAL.** Turn ignition switch to OFF.	Is there poor contact at battery terminal?	Repair battery terminal.	Go to step **6**.
6	**CHECK POWER SUPPLY OF ABSCM.** 1) Disconnect connector from ABSCM&H/U. 2) Start engine. 3) Idle the engine. 4) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 1 (+) — Chassis ground (−):***	Is the voltage between 10 and 15 V?	Go to step **7**.	Repair ABSCM&H/U power supply circuit.
7	**CHECK WIRING HARNESS.** 1) Disconnect connector (F45) from connector (B62). 2) Turn ignition switch to ON.	Does the ABS warning light remain off?	Go to step **8**.	Repair front wiring harness.
8	**CHECK PROJECTION AT ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Check for broken projection at the ABSCM&H/U terminal.	Are the projection broken?	Go to step **9**.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
9	**CHECK ABSCM&H/U.** Measure resistance between ABSCM&H/U terminals. ***Terminal*** ***No. 21 — No. 23:***	Is the resistance more than 1 MΩ?	Go to step **10**.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

No.	Step	Check	Yes	No
10	**CHECK WIRING HARNESS.** Measure resistance between connector (F45) and chassis ground. ***Connector & terminal*** ***(F45) No. 8 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **11**.	Repair harness.
11	**CHECK WIRING HARNESS.** 1) Connect connector to ABSCM&H/U. 2) Measure resistance between connector (F45) and chassis ground. ***Connector & terminal*** ***(F45) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **12**.	Repair harness.
12	**CHECK POOR CONTACT IN ABSCM&H/U CONNECTOR.**	Is there poor contact in ABSCM&H/U connector?	Repair connector.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

MEMO:

C: DIAGNOSTIC TROUBLE CODE (DTC) DOES NOT APPEAR. *S006797I28*

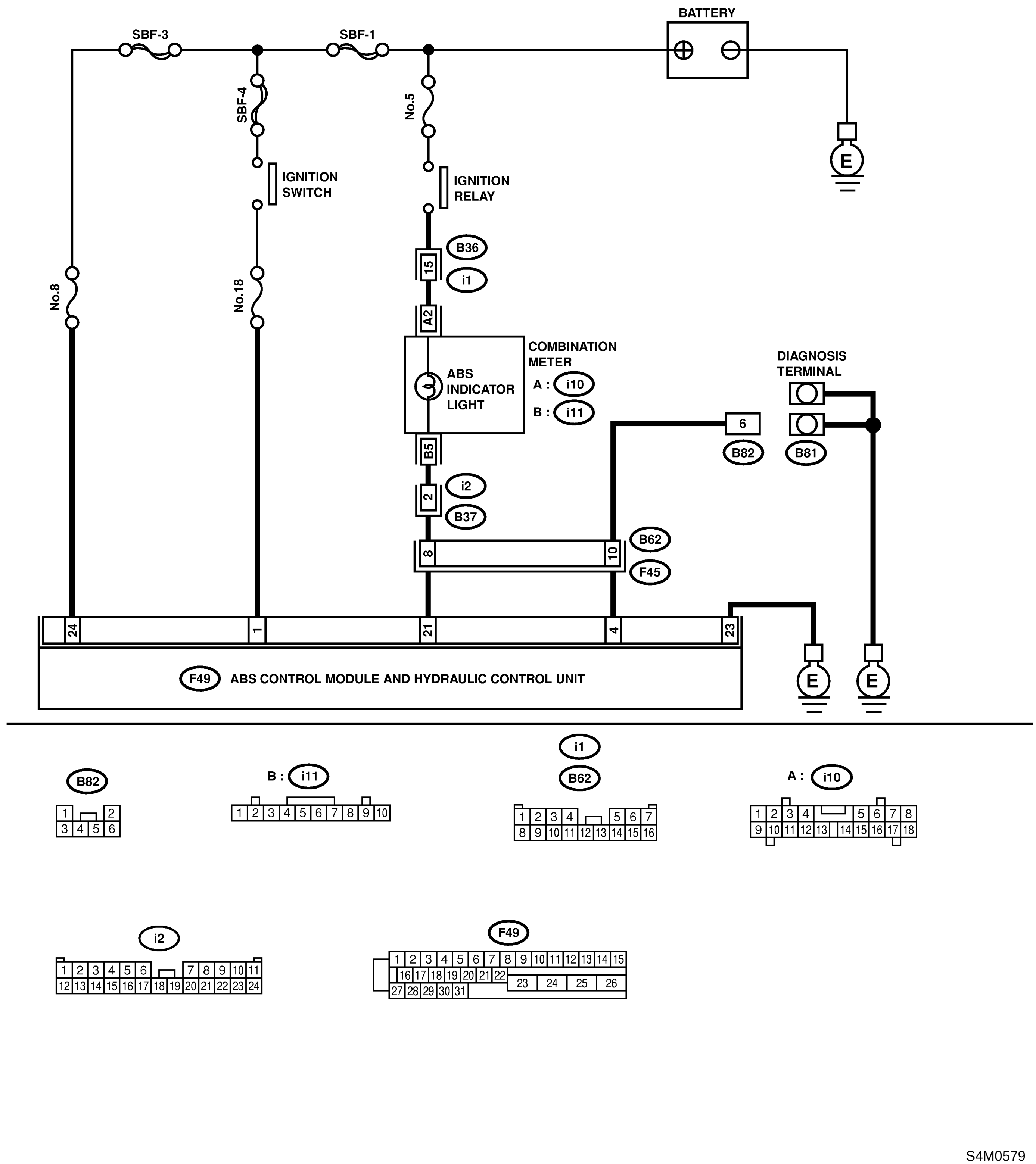
DIAGNOSIS:

- Diagnosis circuit is open.

TROUBLE SYMPTOM:

- The ABS warning light turns on or off normally but the start code cannot be read out in the diagnostic mode.

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK DIAGNOSIS TERMINAL.** 1) Turn ignition switch to OFF. 2) Measure resistance between diagnosis terminals (B81) and chassis ground. ***Terminals*** ***Diagnosis terminal (A) — Chassis ground:*** ***Diagnosis terminal (B) — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **2**.	Repair diagnosis terminal harness.
2	**CHECK DIAGNOSIS LINE.** 1) Turn ignition switch to OFF. 2) Connect diagnosis terminal (B81) to diagnosis connector (B82) No. 6. 3) Disconnect connector from ABSCM&H/U. 4) Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 4 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3**.	Repair harness connector between ABSCM&H/U and diagnosis connector.
3	**CHECK POOR CONTACT IN ABSCM&H/U CONNECTOR.**	Is there poor contact in ABSCM&H/U connector?	Repair connector.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

MEMO:

D: DTC 21 ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (FRONT RH) S006797I29

NOTE:
For the diagnostic procedure, refer to DTC 27. <Ref. to ABS-40, DTC 27 ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (REAR LH), Diagnostics Procedure with Diagnosis Connector.>

E: DTC 23 ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (FRONT LH) S006797I30

NOTE:
For the diagnostic procedure, refer to DTC 27. <Ref. to ABS-40, DTC 27 ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (REAR LH), Diagnostics Procedure with Diagnosis Connector.>

F: DTC 25 ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (REAR RH) S006797I31

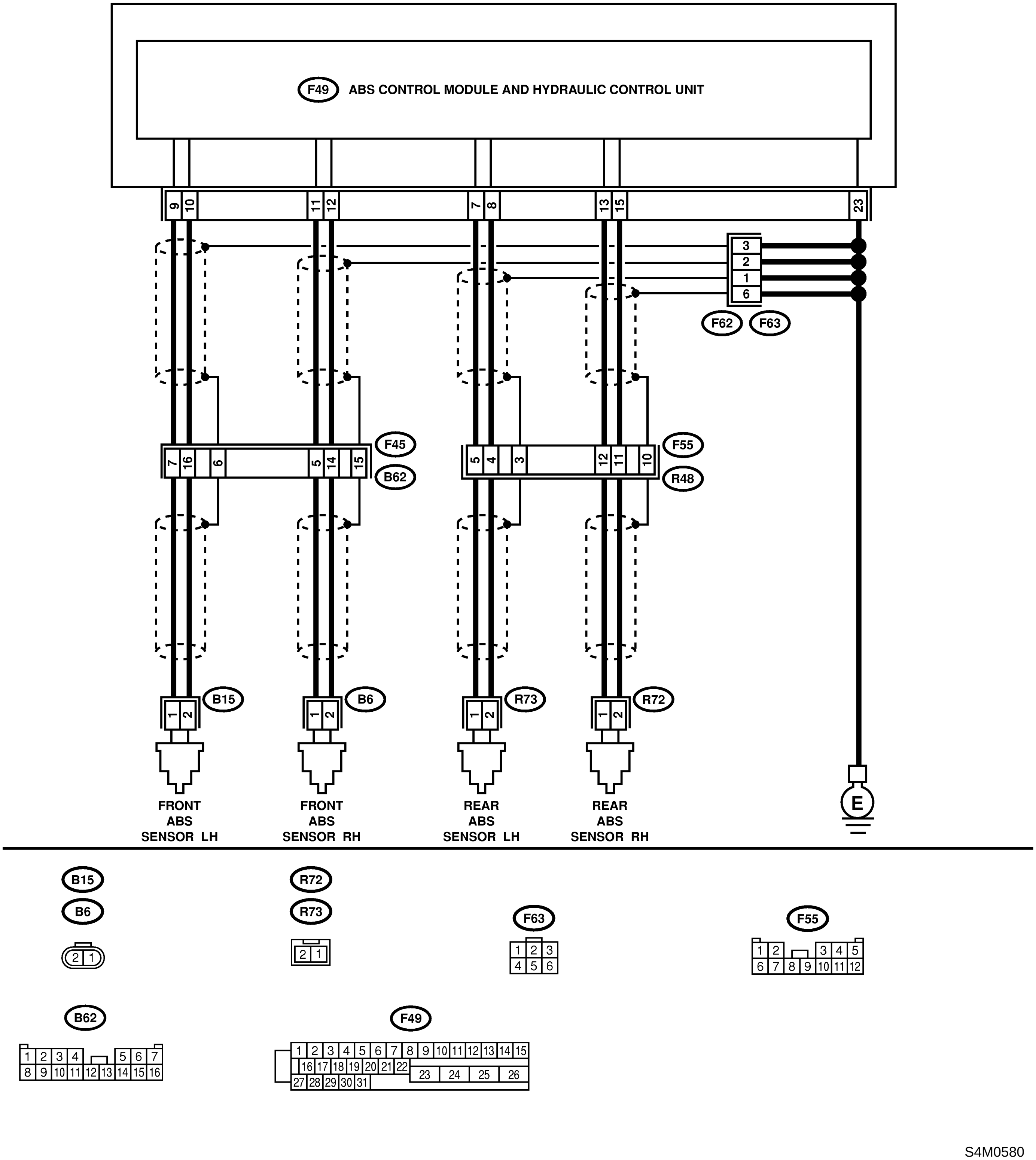
NOTE:
For the diagnostic procedure, refer to DTC 27. <Ref. to ABS-40, DTC 27 ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (REAR LH), Diagnostics Procedure with Diagnosis Connector.>

G: DTC 27 ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (REAR LH) S006797I32

DIAGNOSIS:
- Faulty ABS sensor (Broken wire, input voltage too high)
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK ABS SENSOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABS sensor. 3) Measure resistance of ABS sensor connector terminals. ***Terminal*** ***Front RH No. 1 — No. 2:*** ***Front LH No. 1 — No. 2:*** ***Rear RH No. 1 — No. 2:*** ***Rear LH No. 1 — No. 2:***	Is the resistance between 1 and 1.5 kΩ?	Go to step **2**.	Replace ABS sensor. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.>
2	**CHECK BATTERY SHORT OF ABS SENSOR.** 1) Disconnect connector from ABSCM&H/U. 2) Measure voltage between ABS sensor and chassis ground. ***Terminal*** ***Front RH No. 1 (+) — Chassis ground (−):*** ***Front LH No. 1 (+) — Chassis ground (−):*** ***Rear RH No. 1 (+) — Chassis ground (−):*** ***Rear LH No. 1 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **3**.	Replace ABS sensor. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.>
3	**CHECK BATTERY SHORT OF ABS SENSOR.** 1) Turn ignition switch to ON. 2) Measure voltage between ABS sensor and chassis ground. ***Terminal*** ***Front RH No. 1 (+) — Chassis ground (−):*** ***Front LH No. 1 (+) — Chassis ground (−):*** ***Rear RH No. 1 (+) — Chassis ground (−):*** ***Rear LH No. 1 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **4**.	Replace ABS sensor. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.>
4	**CHECK HARNESS/CONNECTOR BETWEEN ABSCM&H/U AND ABS SENSOR.** 1) Turn ignition switch to OFF. 2) Connect connector to ABS sensor. 3) Measure resistance between ABSCM&H/U connector terminals. ***Connector & terminal*** ***DTC 21 / (F49) No. 11 — No. 12:*** ***DTC 23 / (F49) No. 9 — No. 10:*** ***DTC 25 / (F49) No. 13 — No. 15:*** ***DTC 27 / (F49) No. 7 — No. 8:***	Is the resistance between 1 and 1.5 kΩ?	Go to step **5**.	Repair harness/ connector between ABSCM&H/U and ABS sensor.

No.	Step	Check	Yes	No
5	**CHECK BATTERY SHORT OF HARNESS.** Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***DTC 21 / (F49) No. 11 (+) — Chassis ground (−):*** ***DTC 23 / (F49) No. 9 (+) — Chassis ground (−):*** ***DTC 25 / (F49) No. 13 (+) — Chassis ground (−):*** ***DTC 27 / (F49) No. 7 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **6**.	Repair harness between ABSCM&H/U and ABS sensor.
6	**CHECK BATTERY SHORT OF HARNESS.** 1) Turn ignition switch to ON. 2) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***DTC 21 / (F49) No. 11 (+) — Chassis ground (−):*** ***DTC 23 / (F49) No. 9 (+) — Chassis ground (−):*** ***DTC 25 / (F49) No. 13 (+) — Chassis ground (−):*** ***DTC 27 / (F49) No. 7 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **7**.	Repair harness between ABSCM&H/U and ABS sensor.
7	**CHECK INSTALLATION OF ABS SENSOR.** Turn ignition switch to OFF. ***Tightening torque:*** ***32±10 N·m (3.3±1.0 kgf-m, 24±7 ft-lb)***	Are the ABS sensor installation bolts tightened securely?	Go to step **8**.	Tighten ABS sensor installation bolts securely.
8	**CHECK ABS SENSOR GAP.** Measure tone wheel to ABS sensor piece gap over entire perimeter of the wheel. ***Front wheel*** ***0.3 — 0.8 mm (0.012 — 0.031 in)*** ***Rear wheel*** ***0.7 — 1.2 mm (0.028 — 0.047 in)***	Is the gap within the specifications?	Go to step **9**.	Adjust the gap. NOTE: Adjust the gap using spacers (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.
9	**CHECK TONE WHEEL RUNOUT.** Measure tone wheel runout.	Is the runout less than 0.05 mm (0.0020 in)?	Go to step **10**.	Replace tone wheel. Front: <Ref. to ABS-21, Front Tone Wheel.> Rear: <Ref. to ABS-22, Rear Tone Wheel.>

No.	Step	Check	Yes	No
10	**CHECK GROUND SHORT OF ABS SENSOR.** 1) Turn ignition switch to ON. 2) Measure resistance between ABS sensor and chassis ground. ***Terminal*** ***Front RH No. 1 — Chassis ground:*** ***Front LH No. 1 — Chassis ground:*** ***Rear RH No. 1 — Chassis ground:*** ***Rear LH No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **11**.	Replace ABS sensor and ABSCM&H/U. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.> and <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
11	**CHECK GROUND SHORT OF HARNESS.** 1) Turn ignition switch to OFF. 2) Connect connector to ABS sensor. 3) Measure resistance between ABSCM&H/U connector terminal and chassis ground. ***Connector & terminal*** ***DTC 21 / (F49) No. 11 — Chassis ground:*** ***DTC 23 / (F49) No. 9 — Chassis ground:*** ***DTC 25 / (F49) No. 13 — Chassis ground:*** ***DTC 27 / (F49) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **12**.	Repair harness between ABSCM&H/U and ABS sensor. Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
12	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between ABSCM&H/U and ABS sensor?	Repair connector.	Go to step **13**.
13	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **14**.
14	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact. NOTE: Check harness and connectors between ABSCM&H/U and ABS sensor.

MEMO:

H: DTC 22 ABNORMAL ABS SENSOR (FRONT RH) S006797I33

NOTE:
For the diagnostic procedure, refer to DTC 28. <Ref. to ABS-46, DTC 28 ABNORMAL ABS SENSOR (REAR LH), Diagnostics Procedure with Diagnosis Connector.>

I: DTC 24 ABNORMAL ABS SENSOR (FRONT LH) S006797I34

NOTE:
For the diagnostic procedure, refer to DTC 28. <Ref. to ABS-46, DTC 28 ABNORMAL ABS SENSOR (REAR LH), Diagnostics Procedure with Diagnosis Connector.>

J: DTC 26 ABNORMAL ABS SENSOR (REAR RH) S006797I35

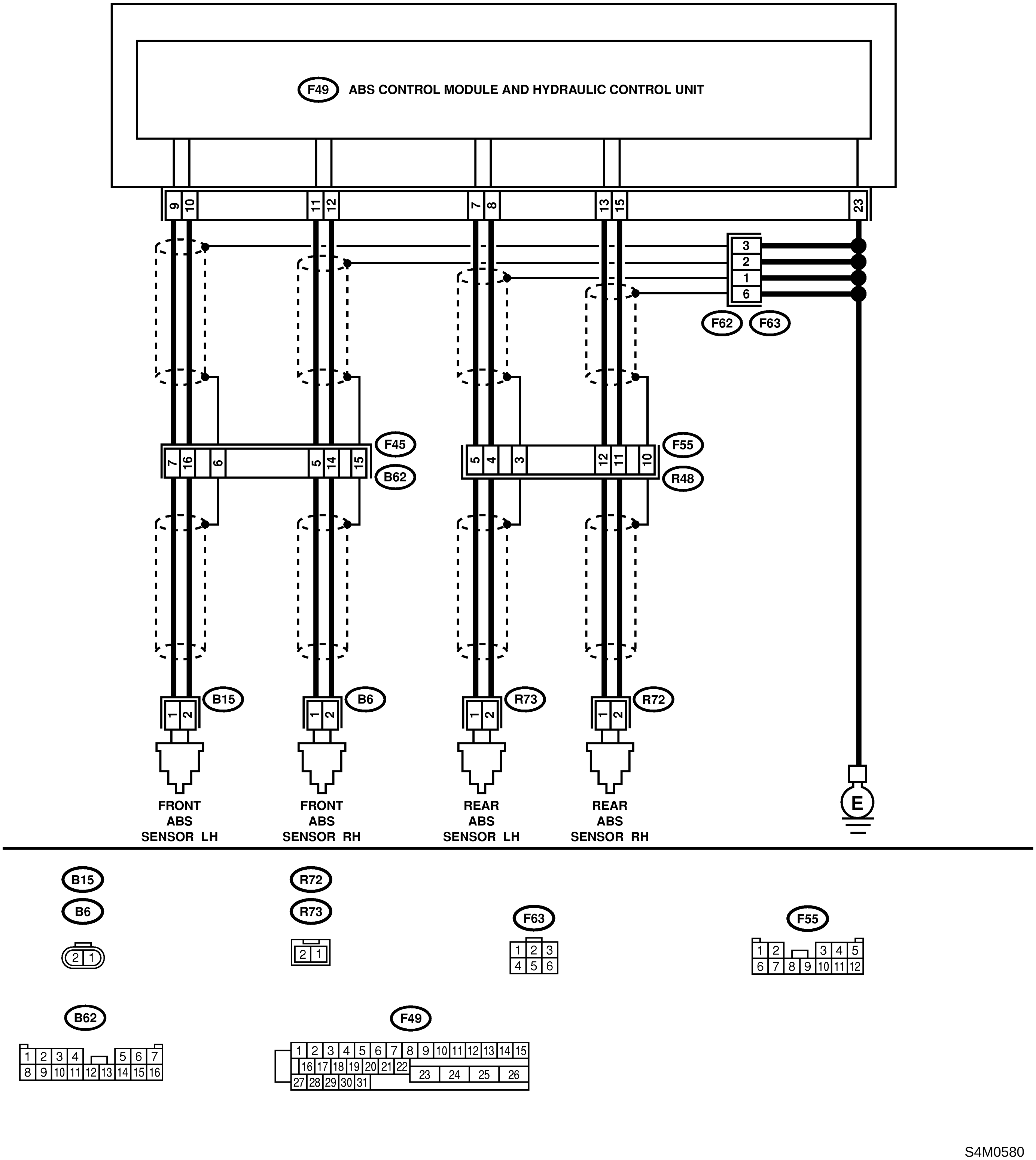
NOTE:
For the diagnostic procedure, refer to DTC 28. <Ref. to ABS-46, DTC 28 ABNORMAL ABS SENSOR (REAR LH), Diagnostics Procedure with Diagnosis Connector.>

K: DTC 28 ABNORMAL ABS SENSOR (REAR LH) S006797I36

DIAGNOSIS:
- Faulty ABS sensor signal (noise, irregular signal, etc.)
- Faulty harness/connector

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK INSTALLATION OF ABS SENSOR.** Turn ignition switch to OFF. ***Tightening torque:*** ***32±10 N·m (3.3±1.0 kgf-m, 24±7 ft-lb)***	Are the ABS sensor installation bolts tightened securely?	Go to step **2**.	Tighten ABS sensor installation bolts securely.
2	**CHECK ABS SENSOR GAP.** Measure tone wheel to ABS sensor piece gap over entire perimeter of the wheel. ***Front wheel*** ***0.3 — 0.8 mm (0.012 — 0.031 in)*** ***Rear wheel*** ***0.7 — 1.2 mm (0.028 — 0.047 in)***	Is the gap within the specifications?	Go to step **3**.	Adjust the gap. NOTE: Adjust the gap using spacer (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.
3	**PREPARE OSCILLOSCOPE.**	Is an oscilloscope available?	Go to step **4**.	Go to step **5**.
4	**CHECK ABS SENSOR SIGNAL.** 1) Raise all four wheels of ground. 2) Turn ignition switch OFF. 3) Connect the oscilloscope to the connector. 4) Turn ignition switch ON. 5) Rotate wheels and measure voltage at specified frequency. <Ref. to ABS-17, WAVEFORM, Control Module I/O Signal.> NOTE: When this inspection is completed, the ABS control module sometimes stores the DTC 29. ***Connector & terminal*** ***DTC 22 /*** ***(B62) No. 5 (+) — No. 14 (−):*** ***DTC 24 /*** ***(B62) No. 7 (+) — No. 16 (−):*** ***DTC 26 /*** ***(F55) No. 12 (+) — No. 11 (−):*** ***DTC 28 /*** ***(F55) No. 5 (+) — No. 4 (−):***	Is oscilloscope pattern smooth, as shown in figure?	Go to step **8**.	Go to step **7**.
5	**CHECK CONTAMINATION OF ABS SENSOR OR TONE WHEEL.** Remove disc rotor or drum from hub in accordance with DTC.	Is the ABS sensor piece or the tone wheel contaminated by dirt or other foreign matter?	Thoroughly remove dirt or other foreign matter.	Go to step **6**.
6	**CHECK DAMAGE OF ABS SENSOR OR TONE WHEEL.**	Are there broken or damaged in the ABS sensor piece or the tone wheel?	Replace ABS sensor or tone wheel. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.> and Front: <Ref. to ABS-21, Front Tone Wheel.> Rear: <Ref. to ABS-22, Rear Tone Wheel.>	Go to step **7**.

No.	Step	Check	Yes	No
7	**CHECK TONE WHEEL RUNOUT.** Measure tone wheel runout.	Is the runout less than 0.05 mm (0.0020 in)?	Go to step **8**.	Replace tone wheel. Front: <Ref. to ABS-21, Front Tone Wheel.> Rear: <Ref. to ABS-22, Rear Tone Wheel.>
8	**CHECK RESISTANCE OF ABS SENSOR.** 1) Turn ignition switch OFF. 2) Disconnect connector from ABS sensor. 3) Measure resistance between ABS sensor connector terminals. ***Terminal*** ***Front RH No. 1 — No. 2:*** ***Front LH No. 1 — No. 2:*** ***Rear RH No. 1 — No. 2:*** ***Rear LH No. 1 — No. 2:***	Is the resistance between 1 and 1.5 kΩ?	Go to step **9**.	Replace ABS sensor. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.>
9	**CHECK GROUND SHORT OF ABS SENSOR.** Measure resistance between ABS sensor and chassis ground. ***Terminal*** ***Front RH No. 1 — Chassis ground:*** ***Front LH No. 1 — Chassis ground:*** ***Rear RH No. 1 — Chassis ground:*** ***Rear LH No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **10**.	Replace ABS sensor. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.>
10	**CHECK HARNESS/CONNECTOR BETWEEN ABSCM&H/U AND ABS SENSOR.** 1) Connect connector to ABS sensor. 2) Disconnect connector from ABSCM&H/U. 3) Measure resistance at ABSCM&H/U connector terminals. ***Connector & terminal*** ***DTC 22 / (F49) No. 11 — No. 12:*** ***DTC 24 / (F49) No. 9 — No. 10:*** ***DTC 26 / (F49) No. 13 — No. 15:*** ***DTC 28 / (F49) No. 7 — No. 8:***	Is the resistance between 1 and 1.5 kΩ?	Go to step **11**.	Repair harness/connector between ABSCM&H/U and ABS sensor.
11	**CHECK GROUND SHORT OF HARNESS.** Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***DTC 22 / (F49) No. 11 — Chassis ground:*** ***DTC 24 / (F49) No. 9 — Chassis ground:*** ***DTC 26 / (F49) No. 13 — Chassis ground:*** ***DTC 28 / (F49) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **12**.	Repair harness/connector between ABSCM&H/U and ABS sensor.
12	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** Measure resistance between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***(F49) No. 23 — GND:***	Is the resistance less than 0.5 Ω?	Go to step **13**.	Repair ABSCM&H/U ground harness.

No.	Step	Check	Yes	No
13	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between ABSCM&H/U and ABS sensor?	Repair connector.	Go to step **14**.
14	**CHECK SOURCES OF SIGNAL NOISE.**	Is the car telephone or the wireless transmitter properly installed?	Go to step **15**.	Properly install the car telephone or the wireless transmitter.
15	**CHECK SOURCES OF SIGNAL NOISE.**	Are noise sources (such as an antenna) installed near the sensor harness?	Install the noise sources apart from the sensor harness.	Go to step **16**.
16	**CHECK SHIELD CIRCUIT.** 1) Connect all connectors. 2) Measure resistance between shield connector and chassis ground. ***Connector & terminal*** ***DTC 22 /*** ***(B62) No. 15 — Chassis ground:*** ***DTC 24 /*** ***(B62) No. 6 — Chassis ground:*** ***DTC 26 /*** ***(F55) No. 10 — Chassis ground:*** ***DTC 28 /*** ***(F55) No. 3 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **17**.	Repair shield harness.
17	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **18**.
18	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary noise interference.

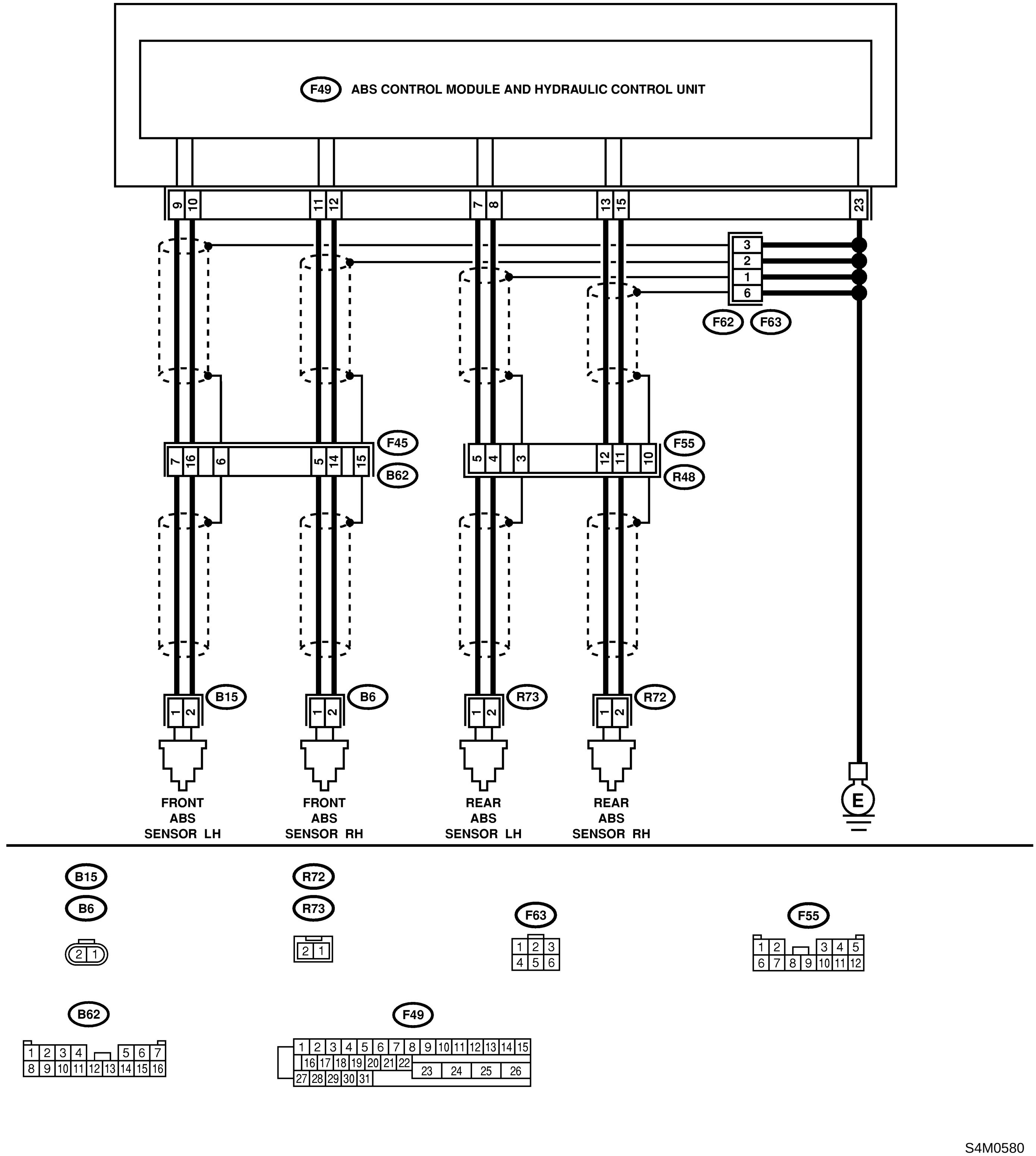
MEMO:

L: DTC 29 ABNORMAL ABS SENSOR SIGNAL (ANY ONE OF FOUR) *S006797I37*

DIAGNOSIS:
- Faulty ABS sensor signal (noise, irregular signal, etc.)
- Faulty tone wheel
- Wheels turning freely for a long time

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK IF THE WHEELS HAVE TURNED FREELY FOR A LONG TIME.**	Check if the wheels have been turned freely for more than one minute, such as when the vehicle is jacked-up, under full-lock cornering or when tire is not in contact with road surface.	The ABS is normal. Erase the DTC. NOTE: When the wheels turn freely for a long time, such as when the vehicle is towed or jacked-up, or when steering wheel is continuously turned all the way, this DTC may sometimes occur.	Go to step **2**.
2	**CHECK TIRE SPECIFICATIONS.** Turn ignition switch to OFF.	Are the tire specifications correct?	Go to step **3**.	Replace tire.
3	**CHECK WEAR OF TIRE.**	Is the tire worn excessively?	Replace tire.	Go to step **4**.
4	**CHECK TIRE PRESSURE.**	Is the tire pressure correct?	Go to step **5**.	Adjust tire pressure.
5	**CHECK INSTALLATION OF ABS SENSOR.** ***Tightening torque:*** ***32±10 N·m (3.3±1.0 kgf-m, 24±7 ft-lb)***	Are the ABS sensor installation bolts tightened securely?	Go to step **6**.	Tighten ABS sensor installation bolts securely.
6	**CHECK ABS SENSOR GAP.** Measure tone wheel to ABS sensor piece gap over entire perimeter of the wheel. ***Specifications*** ***Front wheel*** ***0.3 — 0.8 mm (0.012 — 0.031 in)*** ***Rear wheel*** ***0.7 — 1.2 mm (0.028 — 0.047 in)***	Is the gap within the specifications?	Go to step **7**.	Adjust the gap. NOTE: Adjust the gap using spacer (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.
7	**PREPARE OSCILLOSCOPE.**	Is an oscilloscope available?	Go to step **8**.	Go to step **9**.
8	**CHECK ABS SENSOR SIGNAL.** 1) Raise all four wheels of ground. 2) Turn ignition switch OFF. 3) Connect the oscilloscope to the connector. 4) Turn ignition switch ON. 5) Rotate wheels and measure voltage at specified frequency. <Ref. to ABS-17, WAVEFORM, Control Module I/O Signal.> NOTE: When this inspection is completed, the ABSCM&H/U sometimes stores the DTC 29. ***Connector & terminal*** ***Front RH*** ***(B62) No. 5 (+) — No. 14 (−):*** ***Front LH*** ***(B62) No. 7 (+) — No. 16 (−):*** ***Rear RH*** ***(F55) No. 12 (+) — No. 11 (−):*** ***Rear LH*** ***(F55) No. 5 (+) — No. 4 (−):***	Is oscilloscope pattern smooth, as shown in figure?	Go to step **12**.	Go to step **9**.

No.	Step	Check	Yes	No
9	**CHECK CONTAMINATION OF ABS SENSOR OR TONE WHEEL.** Remove disc rotor from hub.	Is the ABS sensor piece or the tone wheel contaminated by dirt or other foreign matter?	Thoroughly remove dirt or other foreign matter.	Go to step **10**.
10	**CHECK DAMAGE OF ABS SENSOR OR TONE WHEEL.**	Are there broken or damaged teeth in the ABS sensor piece or the tone wheel?	Replace ABS sensor or tone wheel. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.> and Front: <Ref. to ABS-21, Front Tone Wheel.> Rear: <Ref. to ABS-22, Rear Tone Wheel.>	Go to step **11**.
11	**CHECK TONE WHEEL RUNOUT.** Measure tone wheel runout.	Is the runout less than 0.05 mm (0.0020 in)?	Go to step **12**.	Replace tone wheel. Front: <Ref. to ABS-21, Front Tone Wheel.> Rear: <Ref. to ABS-22, Rear Tone Wheel.>
12	**CHECK ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Connect all connectors. 3) Erase the memory. 4) Perform inspection mode. 5) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **13**.
13	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

M: DTC 31 ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT RH) S006797I38

NOTE:
For the diagnostic procedure, refer to DTC 37. <Ref. to ABS-56, DTC 37 ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH), Diagnostics Procedure with Diagnosis Connector.>

N: DTC 33 ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT LH) S006797I39

NOTE:
For the diagnostic procedure, refer to DTC 37. <Ref. to ABS-56, DTC 37 ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH), Diagnostics Procedure with Diagnosis Connector.>

O: DTC 35 ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR RH) S006797I40

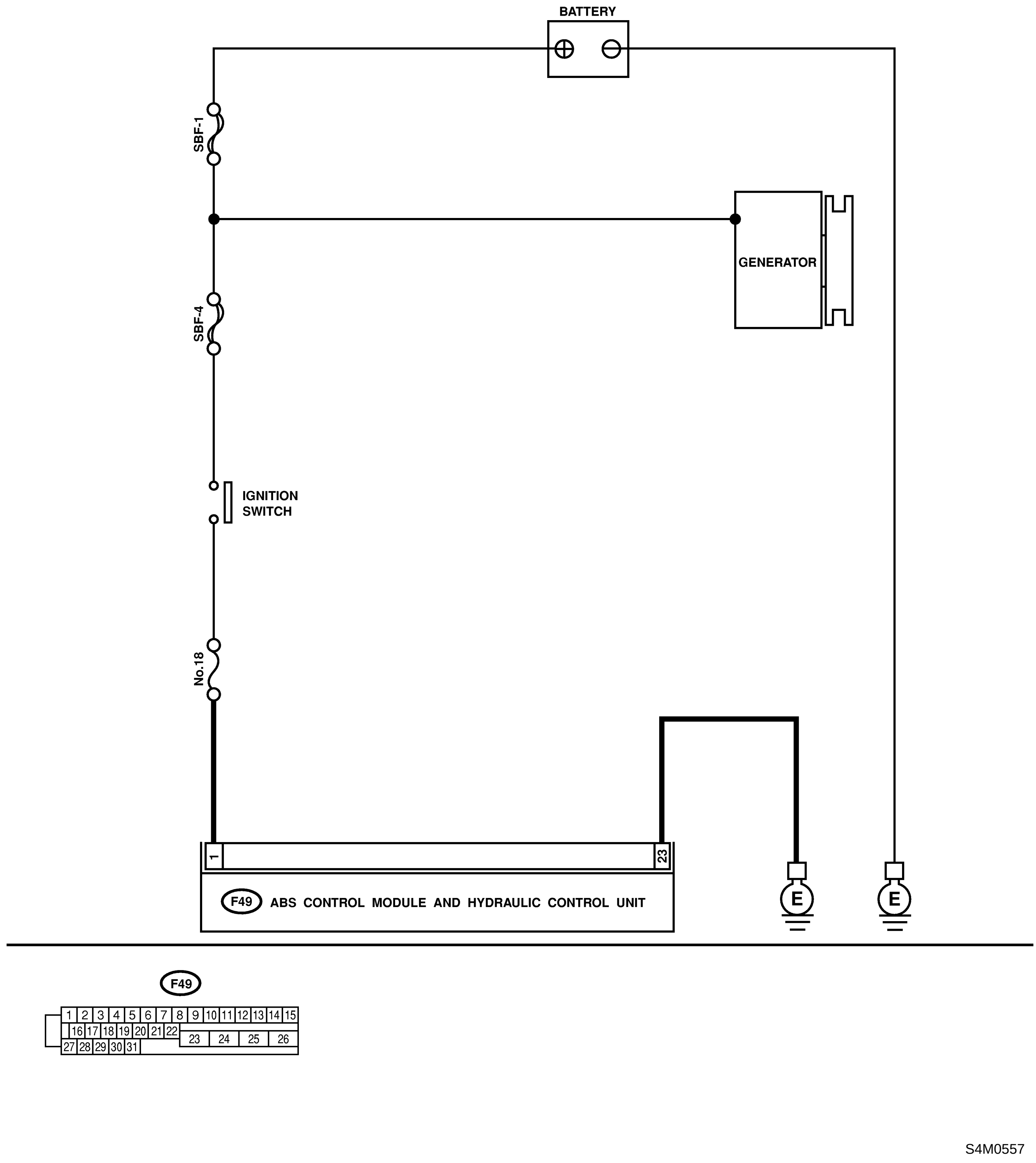
NOTE:
For the diagnostic procedure, refer to DTC 37. <Ref. to ABS-56, DTC 37 ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH), Diagnostics Procedure with Diagnosis Connector.>

P: DTC 37 ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH) S006797I41

DIAGNOSIS:
- Faulty harness/connector
- Faulty inlet solenoid valve in ABSCM&H/U

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK FUSE.**	Is the fuse blown out?	Replace fuse.	Go to step **2**.
2	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Disconnect connector from ABSCM&H/U. 2) Run the engine at idle. 3) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 1 (+) — Chassis ground (−):***	Is the voltage between 10 and 15 V?	Go to step **3**.	Repair harness connector between fuse and ABSCM&H/U.
3	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **4**.	Repair ABSCM&H/U ground harness.
4	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair connector.	Go to step **5**.
5	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6**.
6	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

MEMO:

Q: DTC 32 ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT RH) *S006797I42*

NOTE:
For the diagnostic procedure, refer to DTC 38. <Ref. to ABS-60, DTC 38 ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH), Diagnostics Procedure with Diagnosis Connector.>

R: DTC 34 ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT LH) *S006797I43*

NOTE:
For the diagnostic procedure, refer to DTC 38. <Ref. to ABS-60, DTC 38 ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH), Diagnostics Procedure with Diagnosis Connector.>

S: DTC 36 ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR RH) *S006797I44*

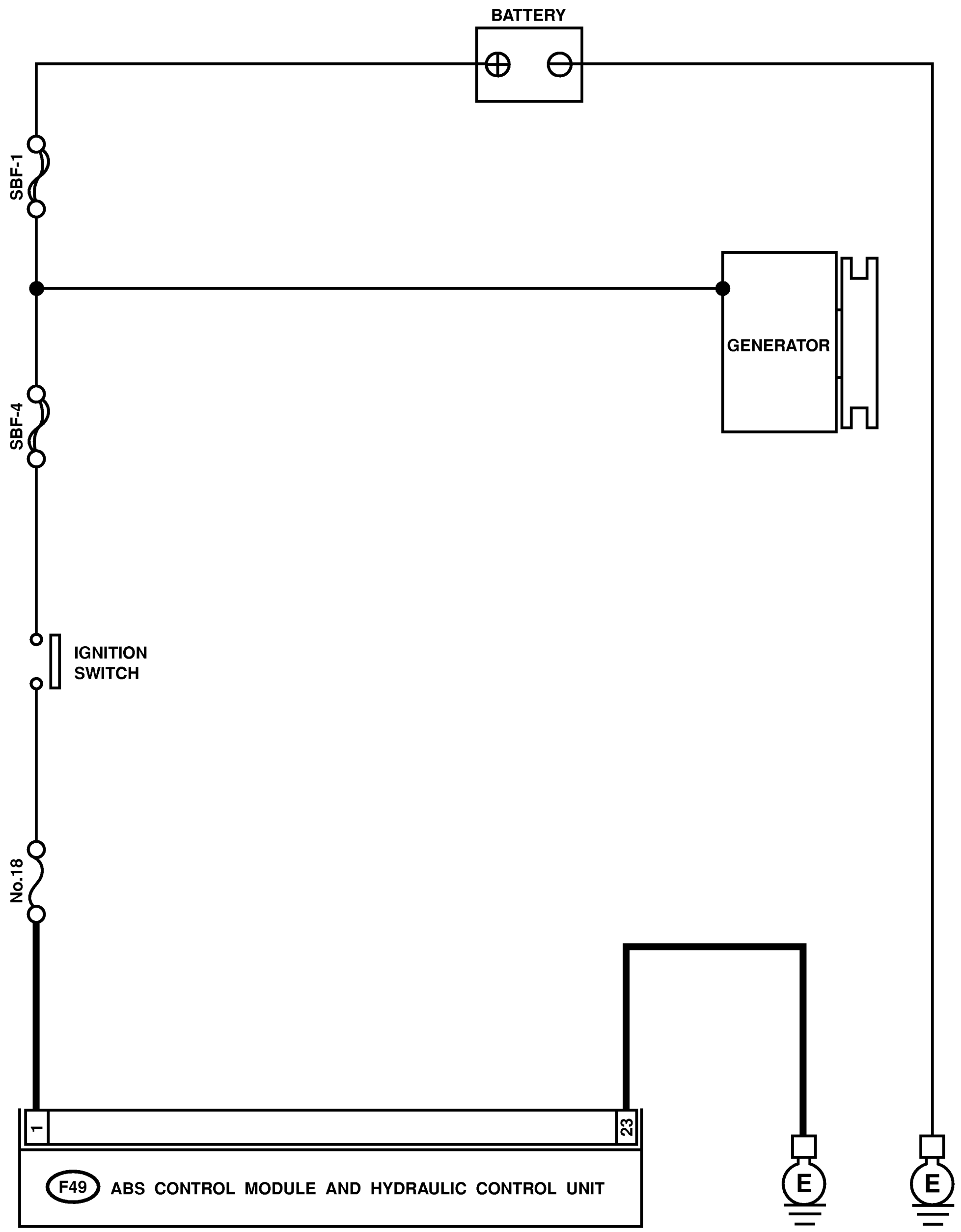
NOTE:
For the diagnostic procedure, refer to DTC 38. <Ref. to ABS-60, DTC 38 ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH), Diagnostics Procedure with Diagnosis Connector.>

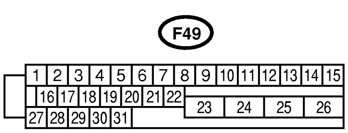
T: DTC 38 ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH) *S006797I45*

DIAGNOSIS:
- Faulty harness/connector
- Faulty outlet solenoid valve in ABSCM&H/U

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0557

No.	Step	Check	Yes	No
1	**CHECK FUSE.**	Is the fuse blown out?	Replace fuse.	Go to step **2**.
2	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Disconnect connector from ABSCM&H/U. 2) Run the engine at idle. 3) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 1 (+) — Chassis ground (−):***	Is the voltage between 10 and 15 V?	Go to step **3**.	Repair harness connector between fuse and ABSCM&H/U.
3	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **4**.	Repair ABSCM&H/U ground harness.
4	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair connector.	Go to step **5**.
5	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6**.
6	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

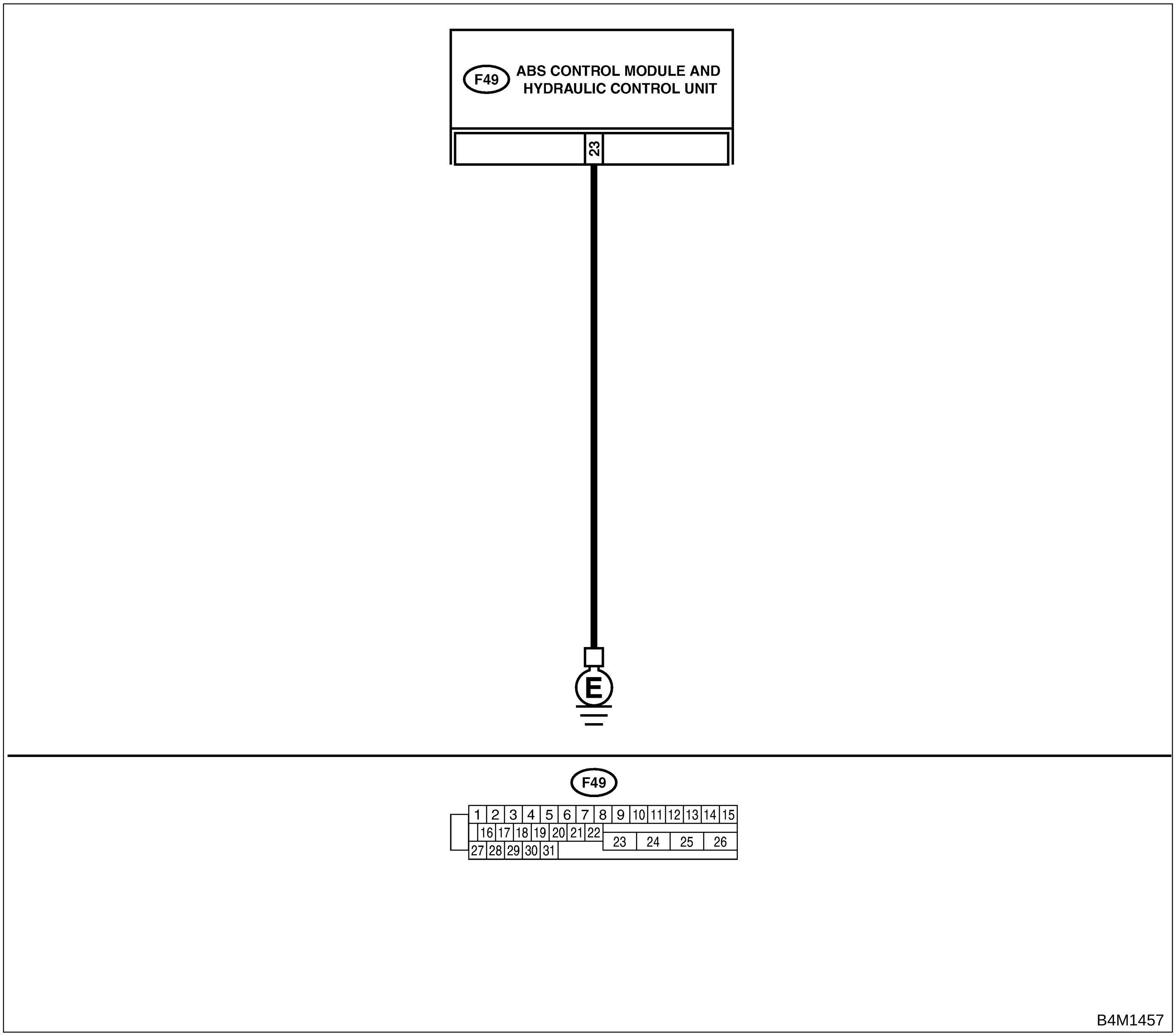
MEMO:

U: DTC 41 ABNORMAL ABS CONTROL MODULE S006797I46

DIAGNOSIS:
- Faulty ABSCM&H/U.

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Measure resistance between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **2**.	Repair ABSCM&H/U ground harness.
2	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between battery, ignition switch and ABSCM&H/U?	Repair connector.	Go to step **3**.
3	**CHECK SOURCES OF SIGNAL NOISE.**	Is the car telephone or the wireless transmitter properly installed?	Go to step **4**.	Properly install the car telephone or the wireless transmitter.
4	**CHECK SOURCES OF SIGNAL NOISE.**	Are noise sources (such as an antenna) installed near the sensor harness?	Install the noise sources apart from the sensor harness.	Go to step **5**.
5	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6**.
6	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

V: DTC 42 SOURCE VOLTAGE IS ABNORMAL. S006797I47

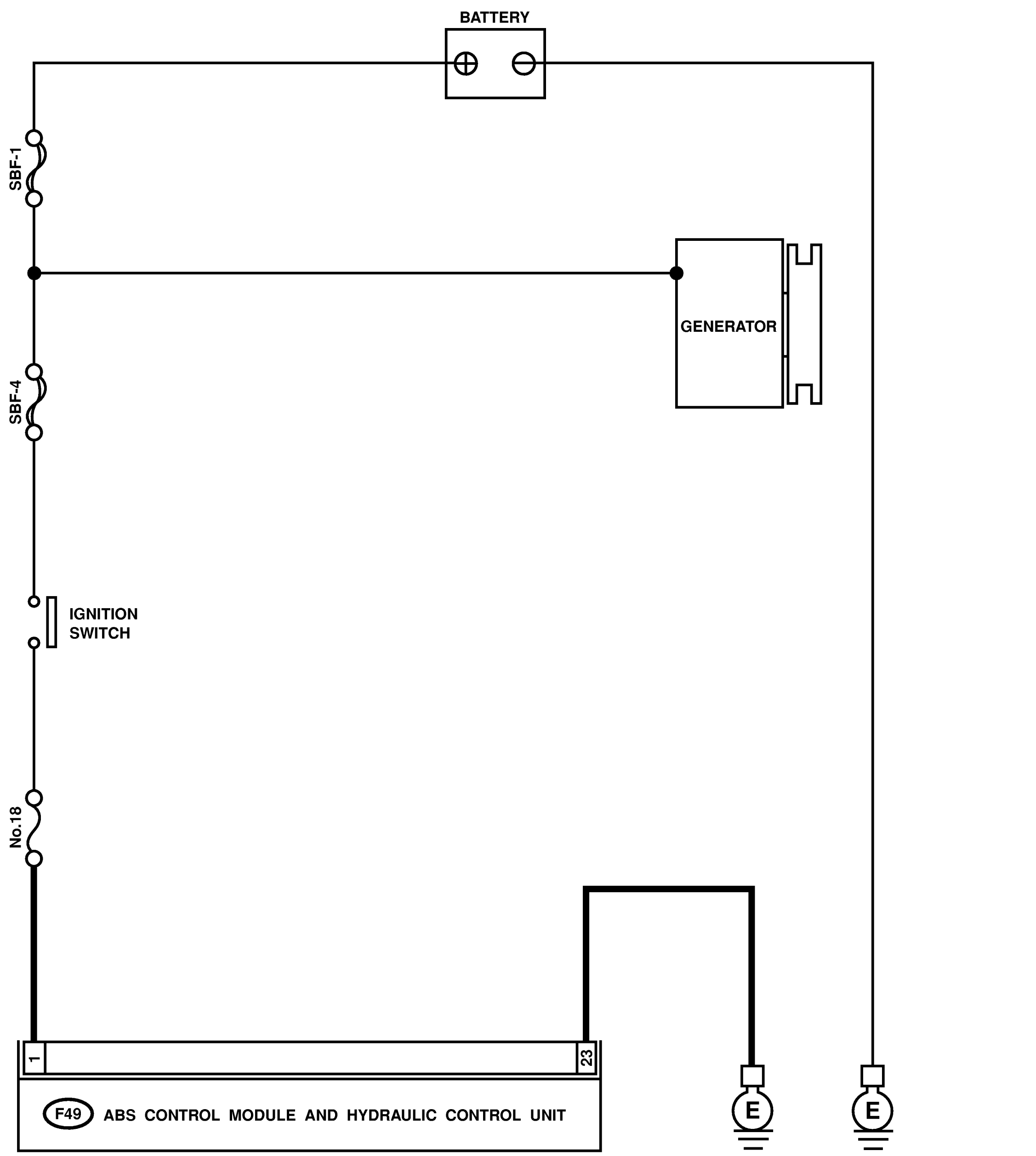
DIAGNOSIS:

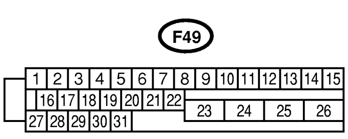
- Power source voltage of the ABSCM&H/U is low or high.

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:





S4M0557

No.	Step	Check	Yes	No
1	**CHECK GENERATOR.** 1) Start engine. 2) Idling after warm-up. 3) Measure voltage between generator B terminal and chassis ground. ***Terminal*** ***Generator B terminal — Chassis ground:***	Is the voltage between 10 and 17 V?	Go to step **2**.	Repair generator. <Ref. to SC-12, Generator.>
2	**CHECK BATTERY TERMINAL.** Turn ignition switch to OFF.	Are the positive and negative battery terminals tightly clamped?	Go to step **3**.	Tighten the clamp of terminal.
3	**CHECK FUSE.**	Is the fuse blown out?	Replace fuse.	Go to step **4**.
4	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Disconnect connector from ABSCM&H/U. 2) Run the engine at idle. 3) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 1 (+) — Chassis ground (−):***	Is the voltage between 10 and 17 V?	Go to step **5**.	Repair harness connector between fuse and ABSCM&H/U.
5	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **6**.	Repair ABSCM&H/U ground harness.
6	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair connector.	Go to step **7**.
7	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **8**.
8	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

W: DTC 44 A COMBINATION OF AT CONTROL ABNORMAL S006797I48

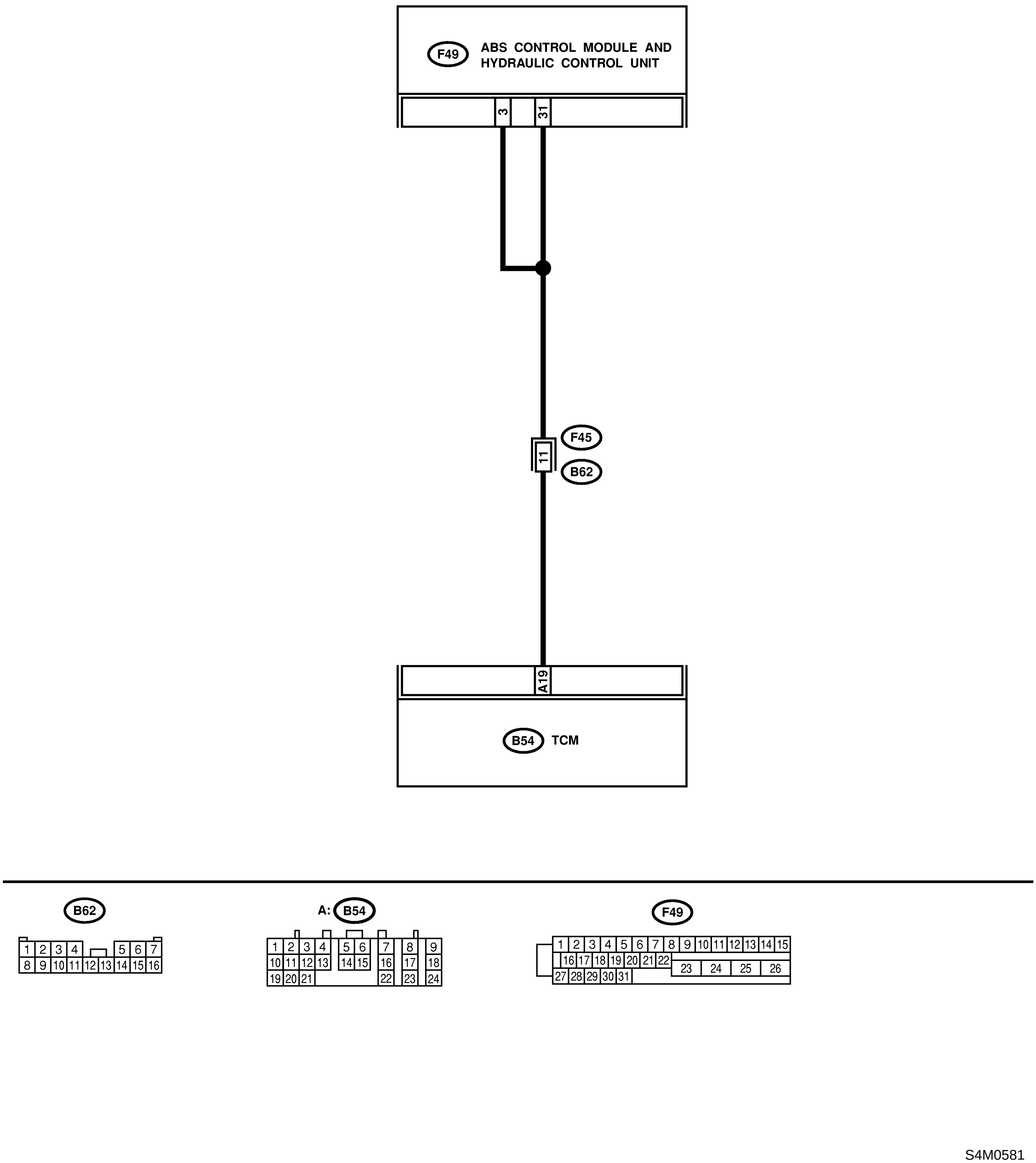
DIAGNOSIS:

- Combination of AT control faults

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK SPECIFICATIONS OF THE ABSCM&H/U.** Check specifications of the mark to the ABSCM&H/U. ***C7: AT*** ***C8: MT***	Is an ABSCM&H/U for AT model installed on a MT model?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **2**.
2	**CHECK GROUND SHORT OF HARNESS.** 1) Turn ignition switch to OFF. 2) Disconnect two connectors from TCM. 3) Disconnect connector from ABSCM&H/U. 4) Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair harness between TCM and ABSCM&H/U.
3	**CHECK BATTERY SHORT OF HARNESS.** Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 3 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **4**.	Repair harness between TCM and ABSCM&H/U.
4	**CHECK BATTERY SHORT OF HARNESS.** 1) Turn ignition switch to ON. 2) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 3 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **5**.	Repair harness between TCM and ABSCM&H/U.
5	**CHECK TCM.** 1) Turn ignition switch to OFF. 2) Connect all connectors to TCM. 3) Turn ignition switch to ON. 4) Measure voltage between TCM connector terminal and chassis ground. ***Connector & terminal*** ***(B54) No. 19 (+) — Chassis ground (−):***	Is the voltage between 10 and 15 V?	Go to step **7**.	Go to step **6**.
6	**CHECK AT.**	Is the AT functioning normally?	Replace TCM.	Repair AT.
7	**CHECK OPEN CIRCUIT OF HARNESS.** Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 3 (+) — Chassis ground (−):*** ***(F49) No. 31 (+) — Chassis ground (−):***	Is the voltage between 10 and 15 V?	Go to step **8**.	Repair harness/ connector between TCM and ABSCM&H/U.
8	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between TCM and ABSCM&H/U?	Repair connector.	Go to step **9**.
9	**CHECK ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Connect all connectors. 3) Erase the memory. 4) Perform inspection mode. 5) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **10**.
10	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

X: DTC 51 ABNORMAL VALVE RELAY S006797I49

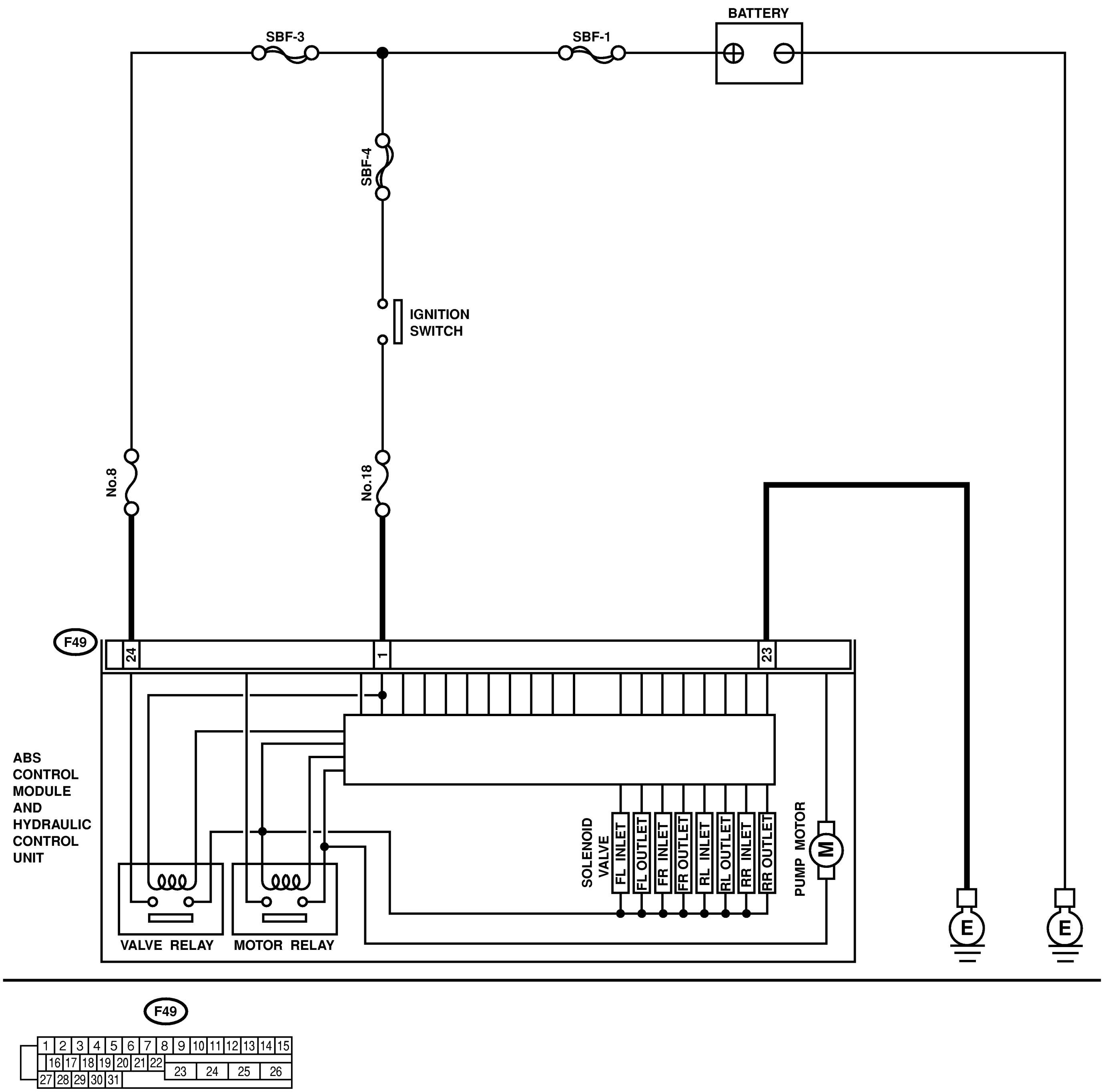
DIAGNOSIS:

- Faulty valve relay

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



S4M0559

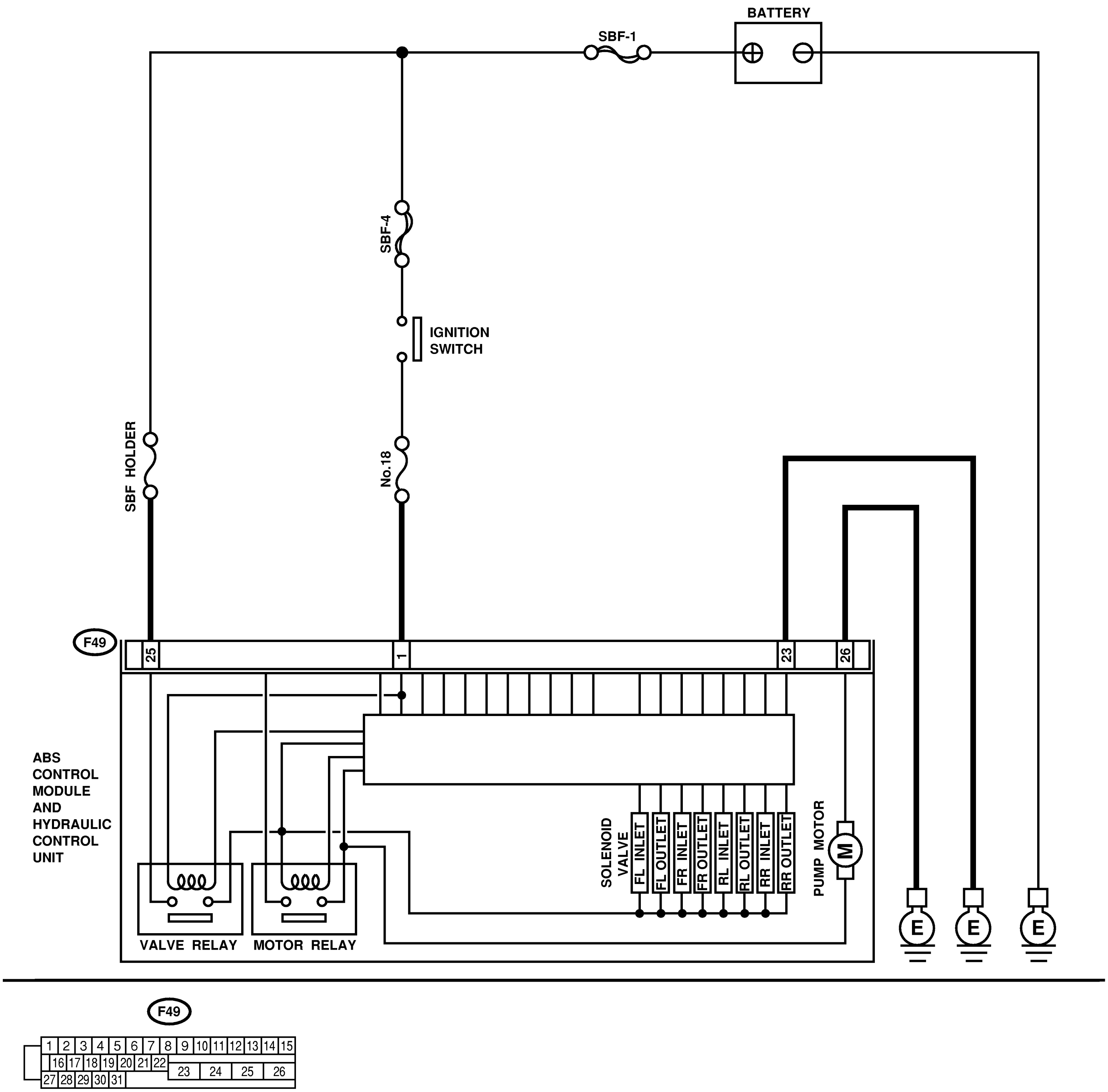
No.	Step	Check	Yes	No
1	**CHECK FUSE.**	Is the fuse blown out?	Replace fuse.	Go to step **2**.
2	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Run the engine at idle. 4) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 1 (+) — Chassis ground (−):*** ***(F49) No. 24 (+) — Chassis ground (−):***	Is the voltage between 10 and 15 V?	Go to step **3**.	Repair harness connector between fuse and ABSCM&H/U.
3	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **4**.	Repair ABSCM&H/U ground harness.
4	**CHECK VALVE RELAY IN ABSCM&H/U.** Measure resistance between ABSCM&H/U and terminals. ***Terminals*** ***No. 23 (+) — No. 24 (−):***	Is the resistance more than 1 MΩ?	Go to step **5**.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
5	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair connector.	Go to step **6**.
6	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7**.
7	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

Y: DTC 52 ABNORMAL MOTOR AND/OR MOTOR RELAY S006797I50

DIAGNOSIS:
- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



S4M0582

No.	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Turn ignition switch to ON. 4) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 25 (+) — Chassis ground (−):***	Is the voltage between 10 and 15 V?	Go to step **2**.	Repair harness/ connector between battery and ABSCM&H/U and check fuse SBF-holder.
2	**CHECK GROUND CIRCUIT OF MOTOR.** 1) Turn ignition switch to OFF. 2) Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 26 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3**.	Repair ABSCM&H/U ground harness.
3	**CHECK FUSE.**	Is the fuse blown out?	Replace fuse.	Go to step **4**.
4	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Run the engine at idle. 2) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 1 (+) — Chassis ground (−):***	Is the voltage between 10 and 15 V?	Go to step **5**.	Repair harness connector between fuse and ABSCM&H/U.
5	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **6**.	Repair ABSCM&H/U ground harness.
6	**CHECK MOTOR OPERATION.** Operate the sequence control. <Ref. to ABS-11, ABS Sequence Control.> NOTE: Use the diagnosis connector to operate the sequence control.	Can motor revolution noise (buzz) be heard when carrying out the sequence control?	Go to step **7**.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
7	**CHECK POOR CONTACT IN CONNECTORS.** Turn ignition switch to OFF.	Is there poor contact in connector between generator, battery and ABSCM&H/U?	Repair connector.	Go to step **8**.
8	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **9**.
9	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

MEMO:

Z: DTC 54 ABNORMAL STOP LIGHT SWITCH *S006797I51*

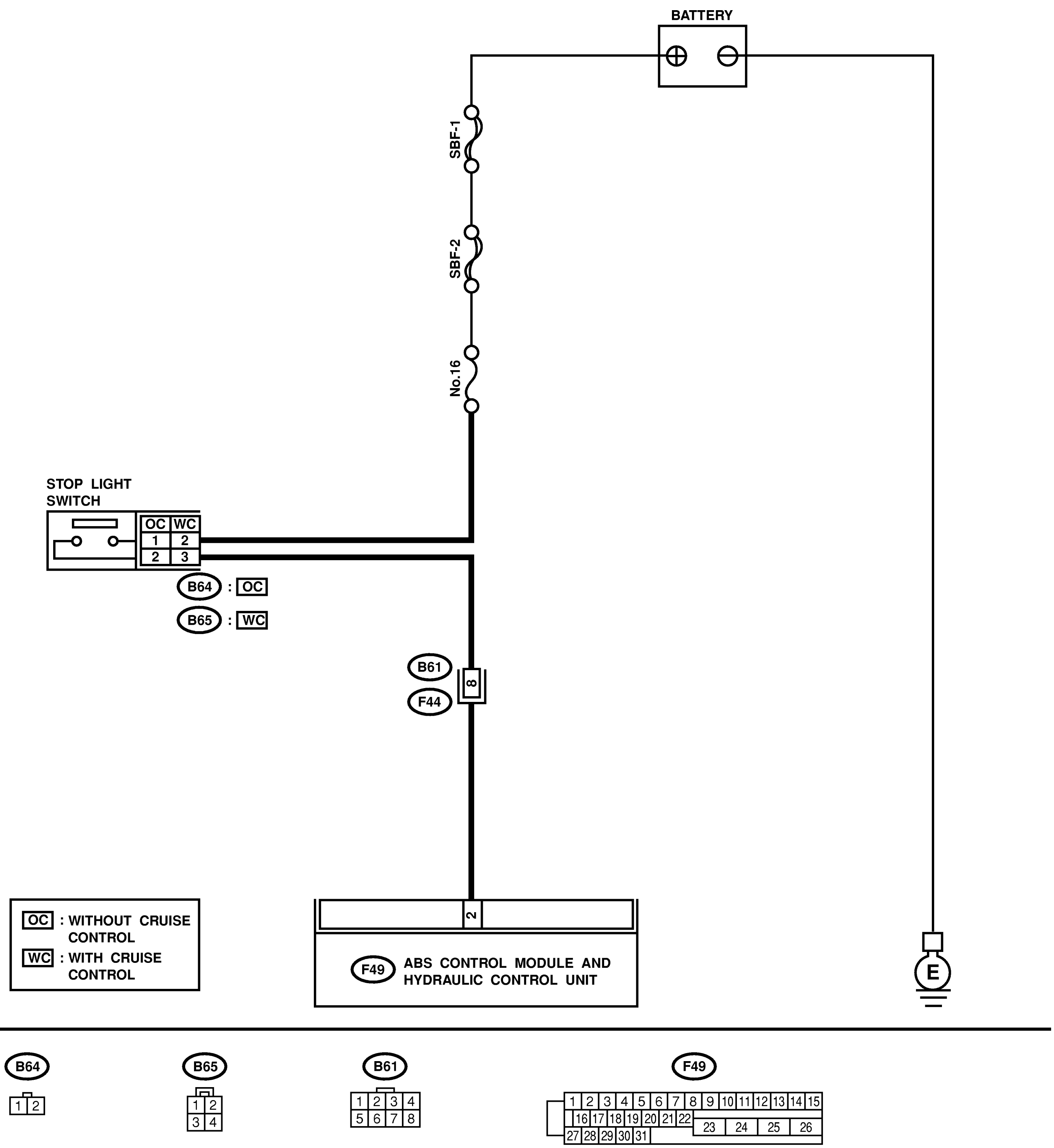
DIAGNOSIS:

- Faulty stop light switch

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



S4M0583

No.	Step	Check	Yes	No
1	**CHECK STOP LIGHTS COME ON.** Depress the brake pedal.	Do stop lights come on?	Go to step **2**.	Repair stop lights circuit.
2	**CHECK OPEN CIRCUIT IN HARNESS.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Depress brake pedal. 4) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 2 (+) — Chassis ground (−):***	Is the voltage between 10 and 15 V?	Go to step **3**.	Repair harness between stop light switch and ABSCM&H/U.
3	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector between stop light switch and ABSCM&H/U?	Repair connector.	Go to step **4**.
4	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **5**.
5	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

AA: DTC 56 ABNORMAL G SENSOR OUTPUT VOLTAGE S006797I52

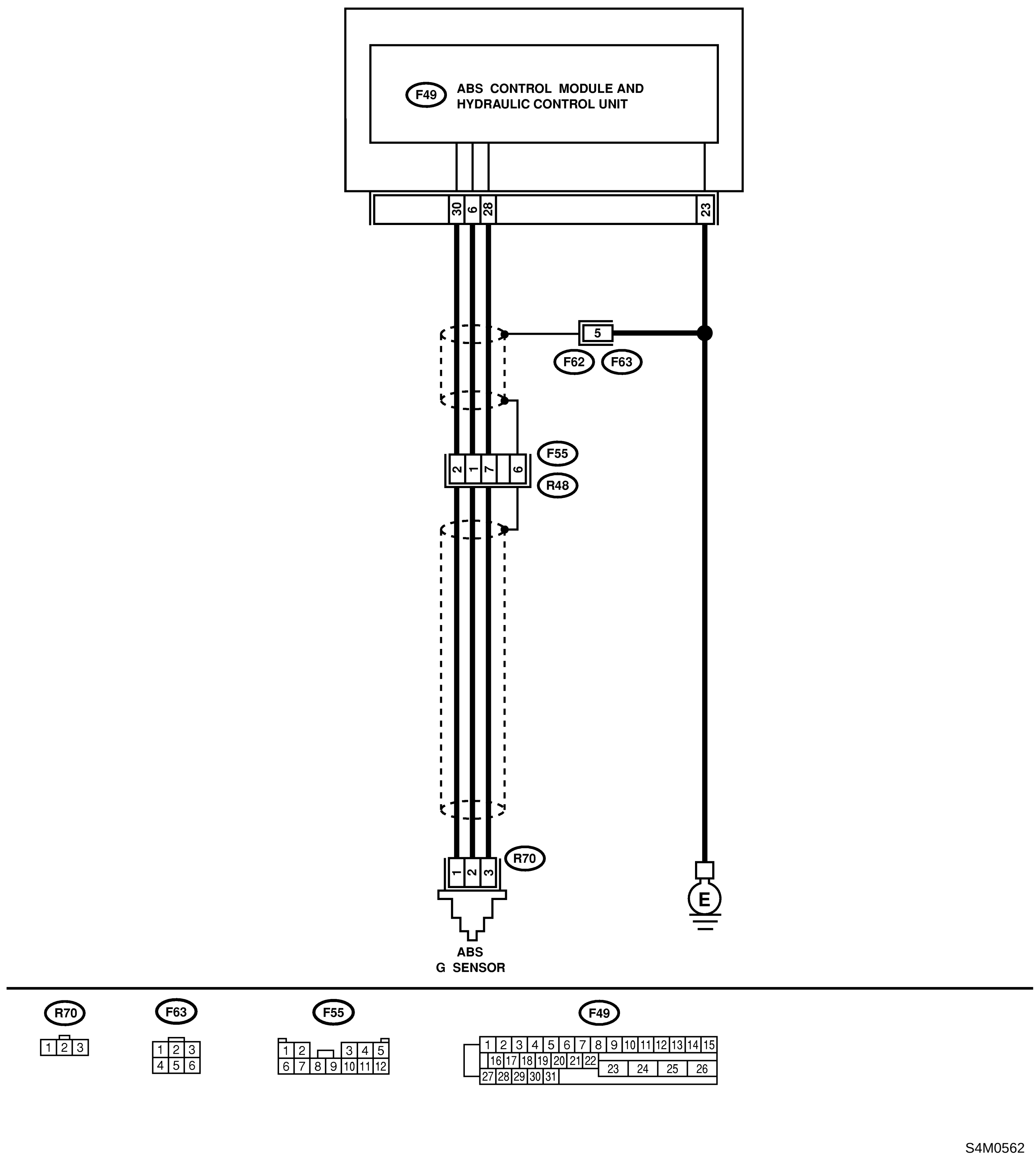
DIAGNOSIS:

- Faulty G sensor output voltage

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK ALL FOUR WHEELS FOR FREE TURNING.**	Have the wheels been turned freely such as when the vehicle is lifted up, or operated on a rolling road?	The ABS is normal. Erase the DTC.	Go to step **2**.
2	**CHECK SPECIFICATIONS OF ABSCM&H/U.** Check specifications of the mark to the ABSCM&H/U. ***C7: AT*** ***C8: MT***	Does the vehicle specification and the ABSCM&H/U specification match?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).> **CAUTION:** **Be sure to turn ignition switch to OFF when removing ABSCM&H/U.**	Go to step **3**.
3	**CHECK INPUT VOLTAGE OF G SENSOR.** 1) Turn ignition switch to OFF. 2) Remove console box. 3) Disconnect G sensor from body. (Do not disconnect connector.) 4) Turn ignition switch to ON. 5) Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 1 (+) — No. 3 (−):***	Is the voltage between 4.75 and 5.25 V?	Go to step **4**.	Repair harness/ connector between G sensor and ABSCM&H/U.
4	**CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Measure resistance between ABSCM&H/U connector terminals. ***Connector & terminal*** ***(F49) No. 6 — No. 28:***	Is the resistance between 4.3 and 4.9 kΩ?	Go to step **5**.	Repair harness/ connector between G sensor and ABSCM&H/U.
5	**CHECK GROUND SHORT IN G SENSOR OUTPUT HARNESS.** 1) Disconnect connector from G sensor. 2) Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Repair harness between G sensor and ABSCM&H/U.
6	**CHECK BATTERY SHORT OF HARNESS.** Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 6 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **7**.	Repair harness between G sensor and ABSCM&H/U.
7	**CHECK BATTERY SHORT OF HARNESS.** 1) Turn ignition switch to ON. 2) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 6 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **8**.	Repair harness between G sensor and ABSCM&H/U.

No.	Step	Check	Yes	No
8	**CHECK GROUND SHORT OF HARNESS.** Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 28 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **9**.	Repair harness between G sensor and ABSCM&H/U. Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
9	**CHECK G SENSOR.** 1) Turn ignition switch to OFF. 2) Remove G sensor from vehicle. 3) Connect connector to G sensor. 4) Connect connector to ABSCM&H/U. 5) Turn ignition switch to ON. 6) Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (−):***	Is the voltage between 2.1 and 2.4 V when G sensor is horizontal?	Go to step **10**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
10	**CHECK G SENSOR.** Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (−):***	Is the voltage between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?	Go to step **11**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
11	**CHECK G SENSOR.** Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (−):***	Is the voltage between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?	Go to step **12**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
12	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair connector.	Go to step **13**.
13	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **14**.
14	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

AB: SELECT MONITOR S006797E48

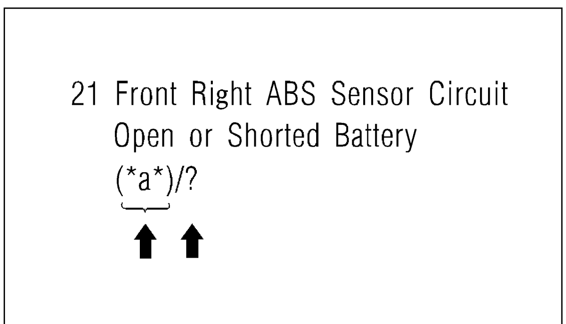
Applicable cartridge of select monitor: <Ref. to ABS-10, SPECIAL TOOLS, PREPARATION TOOL, General Description.>

NOTE:
For basic handling of the select monitor, refer to its Operation Manual.

AC: DIAGNOSTIC TROUBLE CODES (DTCs) are Displayed. S006797I53

A maximum of 3 diagnostic trouble codes (DTCs) are displayed in order of occurrence.

- If a particular diagnostic trouble code (DTC) is not properly stored in memory (due to a drop in ABSCM&H/U power supply, etc.) when a problem occurs, the diagnostic trouble code (DTC), followed by a question mark "?", appears on the select monitor display. This shows it may be an unreliable reading.



S4M0076A

- *a* refers to the troubles in order of occurrence (Latest, Old, Older and Reference).

Display screen	Contents to be monitored
Latest	The most recent diagnostic trouble code (DTC) appears on the select monitor display.
Old	The second most recent diagnostic trouble code (DTC) appears on the select monitor display.
Older	The third most recent diagnostic trouble code (DTC) appears on the select monitor display.
Reference	A specified period of time proceeding diagnostic trouble code (DTC) appears on the select monitor display.

AD: CLEAR MEMORY S006797E33

Display screen	Contents to be monitored
Clear memory?	Function of clearing diagnostic trouble code (DTC) and freeze frame data.

AE: ANALOG DATA ARE DISPLAYED. S006797E29

Display screen	Contents to be monitored
FR wheel speed	Wheel speed detected by the Front Right ABS sensor is displayed in km/h or mile/h.
FL wheel speed	Wheel speed detected by the Front Left ABS sensor is displayed in km/h or mile/h.
RR wheel speed	Wheel speed detected by the Rear Right ABS sensor is displayed in km/h or mile/h.
RL wheel speed	Wheel speed detected by the Rear Left ABS sensor is displayed in km/h or mile/h.
Stop light switch	Stop light switch monitor voltage is displayed.
G sensor output voltage	Refers to vehicle acceleration detecting by the analog G sensor. It appears on the select monitor display in volts.

AF: ON/OFF DATA ARE DISPLAYED. S006797E43

Display screen	Contents to be monitored
Stop light switch	Stop light switch signal
Valve relay signal	Valve relay signal
Motor relay signal	Motor relay signal
ABS signal to TCM	ABS operation signal from ABS control module to TCM
ABS warning light	ABS warning light
Valve relay monitor	Valve relay operation monitor signal
Motor relay monitor	Motor relay operation monitor signal
CCM signal	ABS operation signal from ABS control module to TCM

AG: ABS SEQUENCE CONTROL

S006797E23

Display screen	Contents to be monitored	Index No.
ABS sequence control	Perform ABS sequence control by operating valve and pump motor sequentially.	<Ref. to ABS-11, ABS Sequence Control.>

AH: FREEZE FRAME DATA S006797E39

NOTE:
- Data stored at the time of trouble occurrence is shown on display.
- Each time trouble occurs, the latest information is stored in the freeze frame data in memory.
- If freeze frame data is not properly stored in memory (due to a drop in ABSCM power supply, etc.), a diagnostic trouble code (DTC), preceded by a question mark “?”, appears on the select monitor display. This shows it may be an unreliable reading.

Display screen	Contents to be monitored
FR wheel speed	Wheel speed detected by the Front Right ABS sensor is displayed in km/h or mile/h.
FL wheel speed	Wheel speed detected by the Front Left ABS sensor is displayed in km/h or mile/h.
RR wheel speed	Wheel speed detected by the Rear Right ABS sensor is displayed in km/h or mile/h.
RL wheel speed	Wheel speed detected by the Rear Left ABS sensor is displayed in km/h or mile/h.
ABSCM power voltage	Power (in volts) supplied to ABSCM&H/U appears on the select monitor display.
G sensor output voltage	Refers to vehicle acceleration detected by the analog G sensor. It appears on the select monitor display in volts.
Motor relay monitor	Motor relay operation monitor signal
Stop light switch	Stop light switch signal
ABS signal to TCM	ABS operation signal from ABS control module to TCM
ABS-AT control	ABS operation signal from ABS control module to TCM
ABS operation signal	ABS operation signal

MEMO:

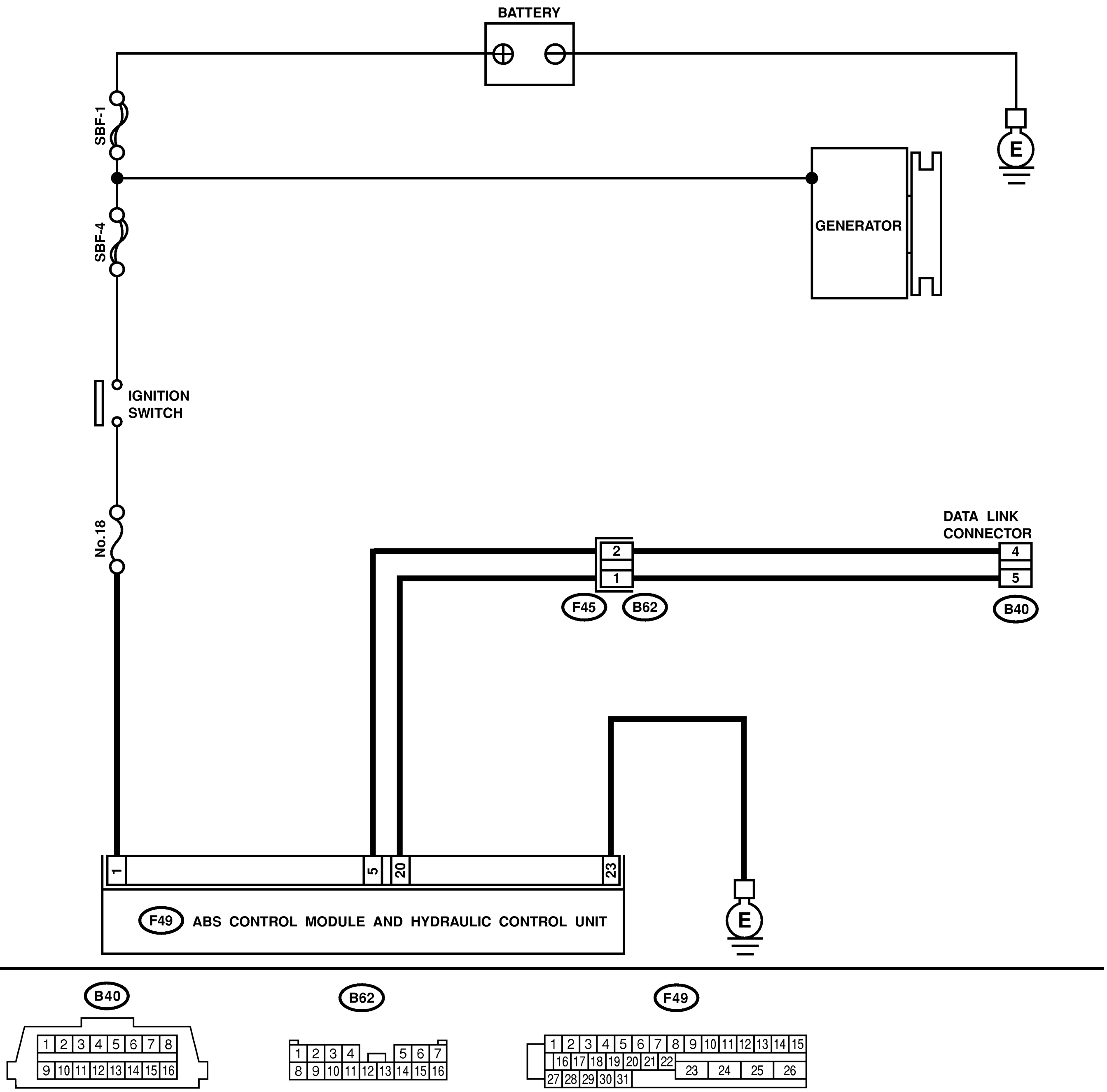
13. Diagnostics Procedure with Subaru Select Monitor S006798

A: COMMUNICATION FOR INITIALIZING IMPOSSIBLE S006798E34

DIAGNOSIS:
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS warning light remains on.

WIRING DIAGRAM:



S4M0584

No.	Step	Check	Yes	No
1	**CHECK IGNITION SWITCH.**	Is ignition switch ON?	Go to step **2**.	Turn ignition switch to ON, and select ABS mode using the select monitor.
2	**CHECK BATTERY.** 1) Turn ignition switch to OFF. 2) Measure battery voltage.	Is voltage more than 11 V?	Go to step **3**.	Charge or replace battery.
3	**CHECK BATTERY TERMINAL.**	Is there poor contact at battery terminal?	Repair or tighten battery terminal.	Go to step **4**.
4	**CHECK COMMUNICATION OF SELECT MONITOR.** 1) Turn ignition switch to OFF. 2) Using the select monitor, check whether communication to other system (such as engine, TCM, etc.) can be executed normally.	Are the name and year of the system displayed on the select monitor?	Go to step **10**.	Go to step **5**.
5	**CHECK COMMUNICATION OF SELECT MONITOR.** 1) Turn ignition switch to OFF. 2) Disconnect ABSCM&H/U connector. 3) Check whether communication to other systems (such as TCM, engine etc.) can be executed normally.	Are the name and year of the system displayed on the select monitor?	Go to step **10**.	Go to step **6**.
6	**CHECK COMMUNICATION OF SELECT MONITOR.** 1) Turn ignition switch to OFF. 2) Connect ABSCM&H/U connector. 3) Disconnect ECM connector. 4) Check whether communication to other systems (such as TCM, engine etc.) can be executed normally.	Are the name and year of the system displayed on the select monitor?	Inspect ECM.	Go to step **7**.
7	**CHECK COMMUNICATION OF SELECT MONITOR.** 1) Turn ignition switch to OFF. 2) Connect ECM connector. 3) Disconnect TCM connector. 4) Check whether communication to other systems (such as engine etc.) can be executed normally.	Are the name and year of the system displayed on the select monitor?	Inspect TCM.	Go to step **8**.
8	**CHECK COMMUNICATION OF SELECT MONITOR.** 1) Turn ignition switch to OFF. 2) Connect TCM connector. 3) Disconnect cruise control module connector. 4) Check whether communication to other systems (such as engine, TCM etc.) can be executed normally. NOTE: If the vehicle is not equipped with cruise control: Go to step **9**.	Are the name and year of the system displayed on the select monitor?	Inspect cruise control module.	Go to step **9**.

No.	Step	Check	Yes	No
9	**CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect TCM, ECM, ABSCM&H/U, and, cruise control module connectors. 3) Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B40) No. 5 — Chassis ground:*** ***(B40) No. 4 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **10**.	Repair harness and connector between each control module and data link connector.
10	**CHECK OUTPUT SIGNAL FOR ABSCM&H/U.** 1) Turn ignition switch to ON. 2) Measure voltage between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***(B40) No. 5 (+) — Chassis ground (−):*** ***(B40) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 1 V?	Repair harness and connector between each control module and data link connector.	Go to step **11**.
11	**CHECK HARNESS/CONNECTOR BETWEEN ABSCM&H/U AND DATA LINK CONNECTOR.** Measure resistance between ABSCM&H/U connector and data link connector. ***Connector & terminal*** ***(F49) No. 20 — (B40) No. 5:*** ***(F49) No. 5 — (B40) No. 4:***	Is the resistance less than 0.5 Ω?	Repair harness and connector between ABSCM&H/U and data link connector.	Go to step **12**.
12	**CHECK INSTALLATION OF ABSCM&H/U CONNECTOR.** Turn ignition switch to OFF.	Is ABSCM&H/U connector inserted into ABSCM&H/U until the clamp locks onto it?	Go to step **13**.	Insert ABSCM&H/U connector into ABSCM&H/U.
13	**CHECK FUSE.**	Is the fuse blown out?	Replace fuse.	Go to step **14**.
14	**CHECK POWER SUPPLY CIRCUIT.** 1) Turn ignition switch to ON (engine OFF). 2) Measure ignition power supply voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **15**.	Repair open circuit in harness between ABSCM&H/U and fuse.
15	**CHECK HARNESS CONNECTOR BETWEEN ABSCM&H/U AND CHASSIS GROUND.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U and transmission. 3) Measure resistance of harness between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **16**.	Repair open circuit in harness between ABSCM&H/U and inhibitor side connector, and poor contact in coupling connector.
16	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in control module power supply, ground line and data link connector?	Repair connector.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

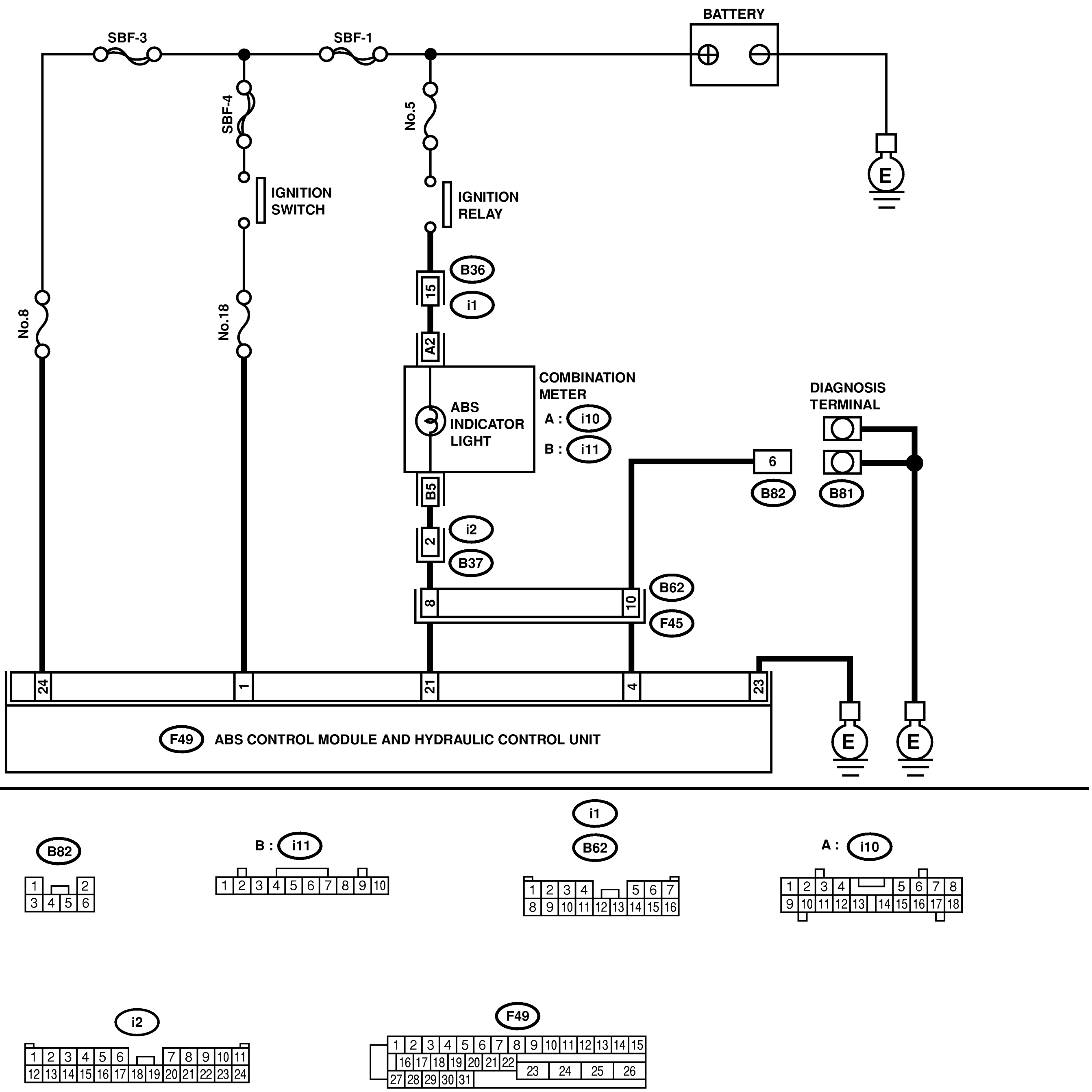
B: NO TROUBLE CODE S006798E41

DIAGNOSIS:
- ABS warning light circuit is shorted.

TROUBLE SYMPTOM:
- ABS warning light remains on.
- NO TROUBLE CODE displayed on the select monitor.

NOTE:
When the ABS warning light is OFF and “NO TROUBLE CODE” is displayed on the select monitor, the system is in normal condition.

WIRING DIAGRAM:



S4M0579

No.	Step	Check	Yes	No
1	**CHECK WIRING HARNESS.** 1) Turn ignition switch to OFF. 2) Disconnect connector (F45) from connector (B62). 3) Turn ignition switch to ON.	Does the ABS warning light remain off?	Go to step **2**.	Repair front wiring harness.
2	**CHECK PROJECTION AT ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Check for broken projection at the ABSCM&H/U terminal.	Are the projection broken?	Go to step **3**.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
3	**CHECK ABSCM&H/U.** Measure resistance between ABSCM&H/U terminals. ***Terminals*** ***No. 21 — No. 23:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
4	**CHECK WIRING HARNESS.** Measure resistance between connector (F45) and chassis ground. ***Connector & terminal*** ***(F45) No. 8 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **5**.	Repair harness.
5	**CHECK WIRING HARNESS.** 1) Connect connector to ABSCM&H/U. 2) Measure resistance between connector (F45) and chassis ground. ***Connector & terminal*** ***(F45) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Repair harness.
6	**CHECK POOR CONTACT IN ABSCM&H/U CONNECTOR.**	Is there poor contact in ABSCM&H/U connector?	Repair connector.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

MEMO:

C: DTC 21 OPEN OR SHORT CIRCUIT IN FRONT RIGHT ABS SENSOR CIRCUIT *S006798I54*

NOTE:
For the diagnostic procedure, refer to DTC 27. <Ref. to ABS-92, DTC 27 OPEN OR SHORT CIRCUIT IN REAR LEFT ABS SENSOR CIRCUIT, Diagnostics Procedure with Subaru Select Monitor.>

D: DTC 23 OPEN OR SHORT CIRCUIT IN FRONT LEFT ABS SENSOR CIRCUIT *S006798I55*

NOTE:
For the diagnostic procedure, refer to DTC 27. <Ref. to ABS-92, DTC 27 OPEN OR SHORT CIRCUIT IN REAR LEFT ABS SENSOR CIRCUIT, Diagnostics Procedure with Subaru Select Monitor.>

E: DTC 25 OPEN OR SHORT CIRCUIT IN REAR RIGHT ABS SENSOR CIRCUIT *S006798I56*

NOTE:
For the diagnostic procedure, refer to DTC 27. <Ref. to ABS-92, DTC 27 OPEN OR SHORT CIRCUIT IN REAR LEFT ABS SENSOR CIRCUIT, Diagnostics Procedure with Subaru Select Monitor.>

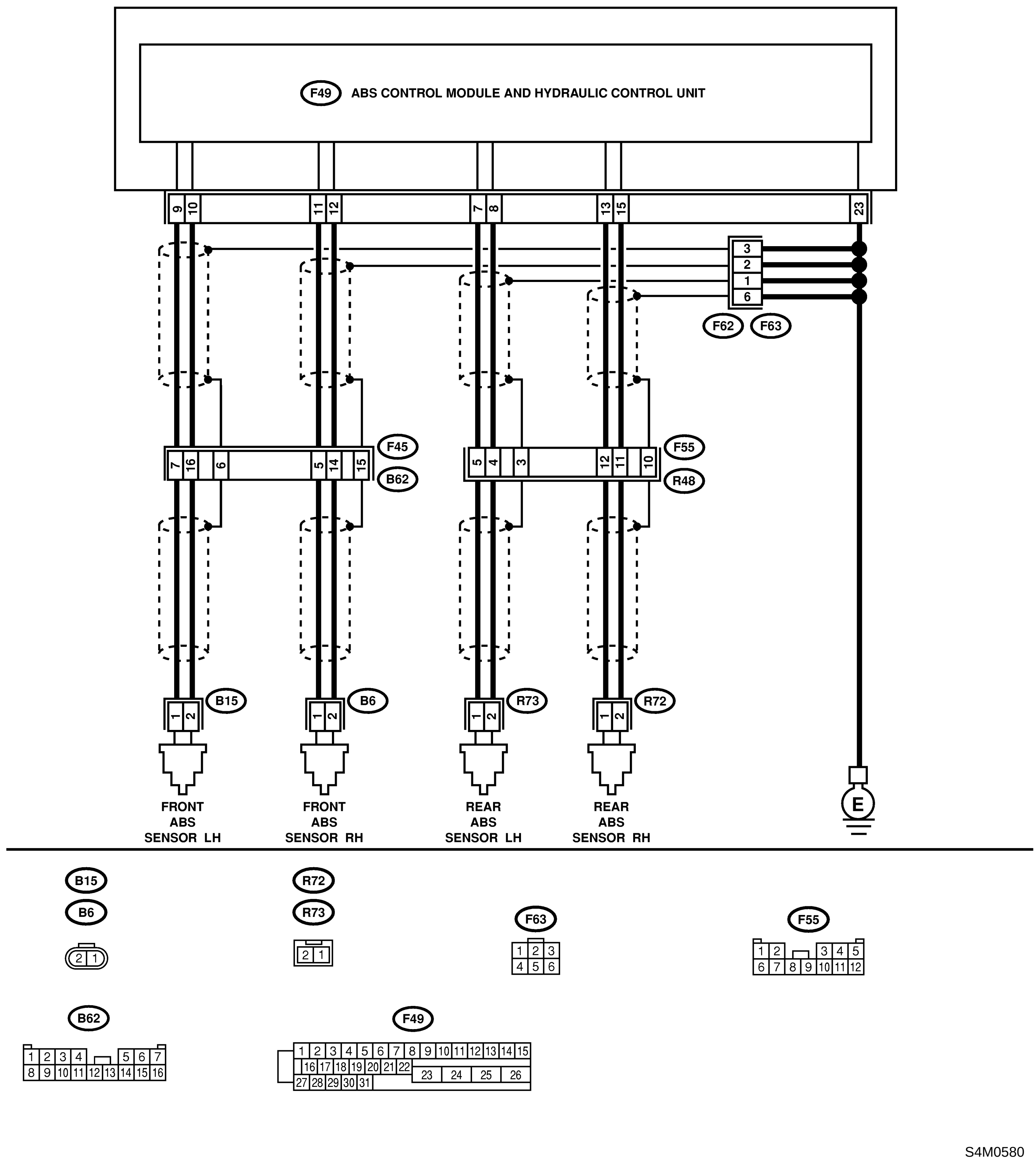
F: DTC 27 OPEN OR SHORT CIRCUIT IN REAR LEFT ABS SENSOR CIRCUIT

S006798I57

DIAGNOSIS:
- Faulty ABS sensor (Broken wire, input voltage too high)
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK OUTPUT OF ABS SENSOR USING SELECT MONITOR.** 1) Select “Current data display & Save” on the select monitor. 2) Read the ABS sensor output corresponding to the faulty system in the select monitor data display mode.	Does the speed indicated on the display change in response to the speedometer reading during acceleration/deceleration when the steering wheel is in the straight-ahead position?	Go to step **2**.	Go to step **8**.
2	**CHECK INSTALLATION OF ABS SENSOR.** ***Tightening torque:*** ***32±10 N·m (3.3±1.0 kgf-m, 24±7 ft-lb)***	Are the ABS sensor installation bolts tightened securely?	Go to step **3**.	Tighten ABS sensor installation bolts securely.
3	**CHECK ABS SENSOR GAP.** Measure tone wheel to ABS sensor piece gap over entire perimeter of the wheel. ***Front wheel*** ***0.3 — 0.8 mm (0.012 — 0.031 in)*** ***Rear wheel*** ***0.7 — 1.2 mm (0.028 — 0.047 in)***	Is the gap within the specifications?	Go to step **4**.	Adjust the gap. NOTE: Adjust the gap using spacers (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.
4	**CHECK TONE WHEEL RUNOUT.** Measure tone wheel runout.	Is the runout less than 0.05 mm (0.0020 in)?	Go to step **5**.	Replace tone wheel. Front: <Ref. to ABS-21, Front Tone Wheel.> Rear: <Ref. to ABS-22, Rear Tone Wheel.>
5	**CHECK POOR CONTACT IN CONNECTORS.** Turn ignition switch to OFF.	Is there poor contact in connectors between ABSCM&H/U and ABS sensor?	Repair connector.	Go to step **6**.
6	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7**.
7	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact. NOTE: Check harness and connectors between ABSCM&H/U and ABS sensor.
8	**CHECK ABS SENSOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABS sensor. 3) Measure resistance of ABS sensor connector terminals. ***Terminal*** ***Front RH No. 1 — No. 2:*** ***Front LH No. 1 — No. 2:*** ***Rear RH No. 1 — No. 2:*** ***Rear LH No. 1 — No. 2:***	Is the resistance between 1 and 1.5 kΩ?	Go to step **9**.	Replace ABS sensor. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.>

No.	Step	Check	Yes	No
9	**CHECK BATTERY SHORT OF ABS SENSOR.** 1) Disconnect connector from ABSCM&H/U. 2) Measure voltage between ABS sensor and chassis ground. ***Terminal*** ***Front RH No. 1 (+) — Chassis ground (−):*** ***Front LH No. 1 (+) — Chassis ground (−):*** ***Rear RH No. 1 (+) — Chassis ground (−):*** ***Rear LH No. 1 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **10**.	Replace ABS sensor. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.>
10	**CHECK BATTERY SHORT OF ABS SENSOR.** 1) Turn ignition switch to ON. 2) Measure voltage between ABS sensor and chassis ground. ***Terminal*** ***Front RH No. 1 (+) — Chassis ground (−):*** ***Front LH No. 1 (+) — Chassis ground (−):*** ***Rear RH No. 1 (+) — Chassis ground (−):*** ***Rear LH No. 1 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **11**.	Replace ABS sensor. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.>
11	**CHECK HARNESS/CONNECTOR BETWEEN ABSCM&H/U AND ABS SENSOR.** 1) Turn ignition switch to OFF. 2) Connect connector to ABS sensor. 3) Measure resistance between ABSCM&H/U connector terminals. ***Connector & terminal*** ***DTC 21 / (F49) No. 11 — No. 12:*** ***DTC 23 / (F49) No. 9 — No. 10:*** ***DTC 25 / (F49) No. 13 — No. 15:*** ***DTC 27 / (F49) No. 7 — No. 8:***	Is the resistance between 1 and 1.5 kΩ?	Go to step **12**.	Repair harness/connector between ABSCM&H/U and ABS sensor.
12	**CHECK BATTERY SHORT OF HARNESS.** Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***DTC 21 / (F49) No. 11 (+) — Chassis ground (−):*** ***DTC 23 / (F49) No. 9 (+) — Chassis ground (−):*** ***DTC 25 / (F49) No. 13 (+) — Chassis ground (−):*** ***DTC 27 / (F49) No. 7 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **13**.	Repair harness between ABSCM&H/U and ABS sensor.

No.	Step	Check	Yes	No
13	**CHECK BATTERY SHORT OF HARNESS.** 1) Turn ignition switch to ON. 2) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***DTC 21 / (F49) No. 11 (+) — Chassis ground (−):*** ***DTC 23 / (F49) No. 9 (+) — Chassis ground (−):*** ***DTC 25 / (F49) No. 13 (+) — Chassis ground (−):*** ***DTC 27 / (F49) No. 7 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **14**.	Repair harness between ABSCM&H/U and ABS sensor.
14	**CHECK INSTALLATION OF ABS SENSOR.** ***Tightening torque:*** ***32±10 N·m (3.3±1.0 kgf-m, 24±7 ft-lb)***	Are the ABS sensor installation bolts tightened securely?	Go to step **15**.	Tighten ABS sensor installation bolts securely.
15	**CHECK ABS SENSOR GAP.** Measure tone wheel to ABS sensor piece gap over entire perimeter of the wheel. ***Front wheel*** ***0.3 — 0.8 mm (0.012 — 0.031 in)*** ***Rear wheel*** ***0.7 — 1.2 mm (0.028 — 0.047 in)***	Is the gap within the specifications?	Go to step **16**.	Adjust the gap. NOTE: Adjust the gap using spacers (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.
16	**CHECK TONE WHEEL RUNOUT.** Measure tone wheel runout.	Is the runout less than 0.05 mm (0.0020 in)?	Go to step **17**.	Replace tone wheel. Front: <Ref. to ABS-21, Front Tone Wheel.> Rear: <Ref. to ABS-22, Rear Tone Wheel.>
17	**CHECK GROUND SHORT OF ABS SENSOR.** 1) Turn ignition switch to ON. 2) Measure resistance between ABS sensor and chassis ground. ***Terminal*** ***Front RH No. 1 — Chassis ground:*** ***Front LH No. 1 — Chassis ground:*** ***Rear RH No. 1 — Chassis ground:*** ***Rear LH No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **18**.	Replace ABS sensor and ABSCM&H/U. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.> and <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

No.	Step	Check	Yes	No
18	**CHECK GROUND SHORT OF HARNESS.** 1) Turn ignition switch to OFF. 2) Connect connector to ABS sensor. 3) Measure resistance between ABSCM&H/U connector terminal and chassis ground. ***Connector & terminal*** ***DTC 21 / (F49) No. 11 — Chassis ground:*** ***DTC 23 / (F49) No. 9 — Chassis ground:*** ***DTC 25 / (F49) No. 13 — Chassis ground:*** ***DTC 27 / (F49) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **19**.	Repair harness between ABSCM&H/U and ABS sensor. And replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
19	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between ABSCM&H/U and ABS sensor?	Repair connector.	Go to step **20**.
20	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U.	Go to step **21**.
21	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact. NOTE: Check harness and connectors between ABSCM&H/U and ABS sensor.

G: DTC 22 FRONT RIGHT ABNORMAL ABS SENSOR SIGNAL S006798I58

NOTE:
For the diagnostic procedure, refer to DTC 28. <Ref. to ABS-98, DTC 28 REAR LEFT ABNORMAL ABS SENSOR SIGNAL, Diagnostics Procedure with Subaru Select Monitor.>

H: DTC 24 FRONT LEFT ABNORMAL ABS SENSOR SIGNAL S006798I59

NOTE:
For the diagnostic procedure, refer to DTC 28. <Ref. to ABS-98, DTC 28 REAR LEFT ABNORMAL ABS SENSOR SIGNAL, Diagnostics Procedure with Subaru Select Monitor.>

I: DTC 26 REAR RIGHT ABNORMAL ABS SENSOR SIGNAL S006798I60

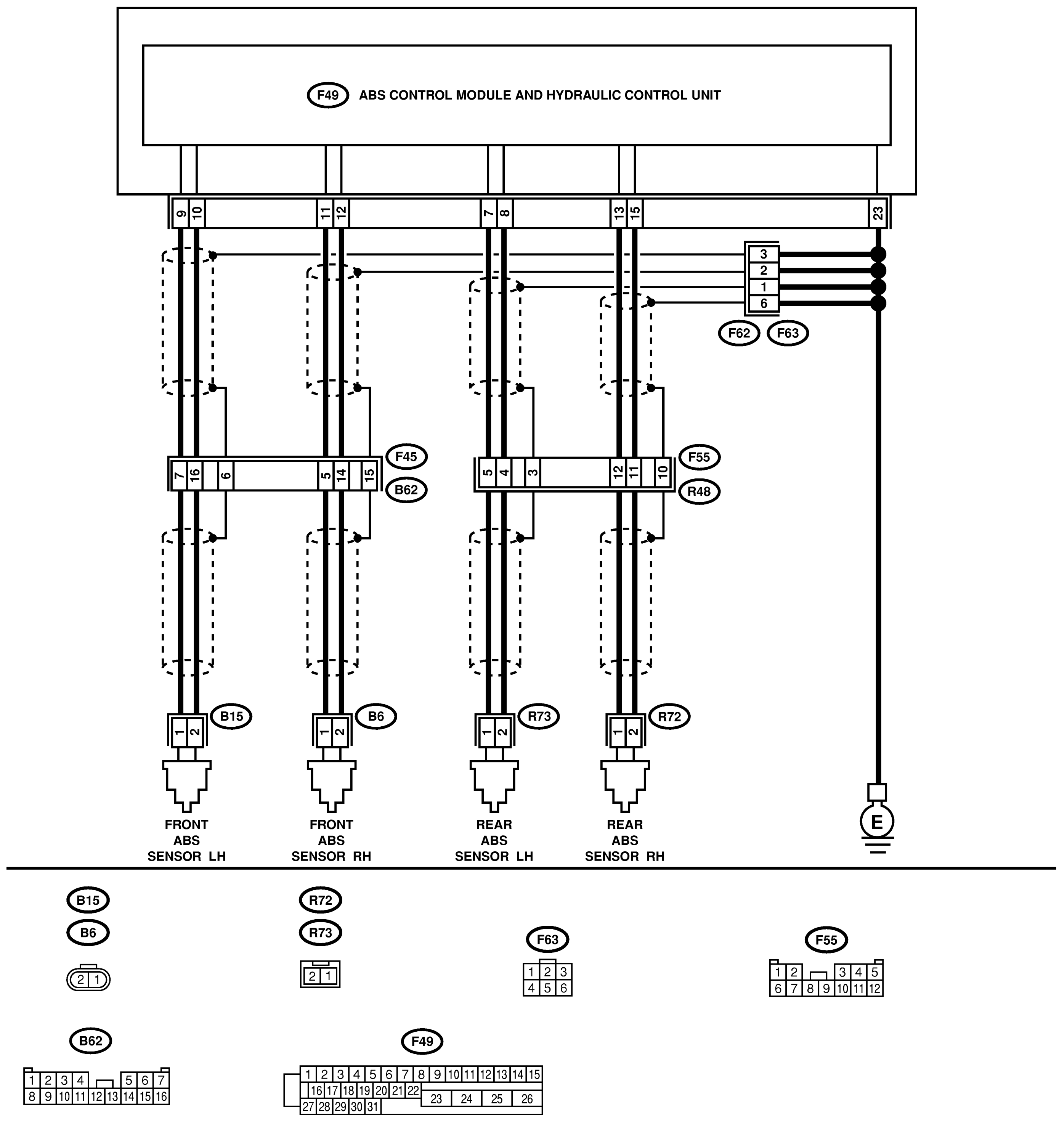
NOTE:
For the diagnostic procedure, refer to DTC 28. <Ref. to ABS-98, DTC 28 REAR LEFT ABNORMAL ABS SENSOR SIGNAL, Diagnostics Procedure with Subaru Select Monitor.>

J: DTC 28 REAR LEFT ABNORMAL ABS SENSOR SIGNAL S006798I61

DIAGNOSIS:
- Faulty ABS sensor signal (noise, irregular signal, etc.)
- Faulty harness/connector

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK OUTPUT OF ABS SENSOR USING SELECT MONITOR.** 1) Select "Current data display & Save" on the select monitor. 2) Read the ABS sensor output corresponding to the faulty system in the select monitor data display mode.	Does the speed indicated on the display change in response to the speedometer reading during acceleration/deceleration when the steering wheel is in the straight-ahead position?	Go to step **2**.	Go to step **8**.
2	**CHECK POOR CONTACT IN CONNECTORS.** Turn ignition switch to OFF.	Is there poor contact in connectors between ABSCM&H/U and ABS sensor?	Repair connector.	Go to step **3**.
3	**CHECK SOURCES OF SIGNAL NOISE.**	Is the car telephone or the wireless transmitter properly installed?	Go to step **4**.	Properly install the car telephone or the wireless transmitter.
4	**CHECK SOURCES OF SIGNAL NOISE.**	Are noise sources (such as an antenna) installed near the sensor harness?	Install the noise sources apart from the sensor harness.	Go to step **5**.
5	**CHECK SHIELD CIRCUIT.** 1) Turn ignition switch to OFF. 2) Connect all connectors. 3) Measure resistance between shield connector and chassis ground. ***Connector & terminal*** ***DTC 22 /*** ***(B62) No. 15 — Chassis ground:*** ***DTC 24 /*** ***(B62) No. 6 — Chassis ground:*** ***DTC 26 /*** ***(F55) No. 10 — Chassis ground:*** ***DTC 28 /*** ***(F55) No. 3 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **6**.	Repair shield harness.
6	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7**.
7	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary noise interference.
8	**CHECK INSTALLATION OF ABS SENSOR.** ***Tightening torque:*** ***32±10 N·m (3.3±1.0 kgf-m, 24±7 ft-lb)***	Are the ABS sensor installation bolts tightened securely?	Go to step **9**.	Tighten ABS sensor installation bolts securely.
9	**CHECK ABS SENSOR GAP.** Measure tone wheel to ABS sensor piece gap over entire perimeter of the wheel. ***Front wheel*** ***0.3 — 0.8 mm (0.012 — 0.031 in)*** ***Rear wheel*** ***0.7 — 1.2 mm (0.028 — 0.047 in)***	Is the gap within the specifications?	Go to step **10**.	Adjust the gap. NOTE: Adjust the gap using spacer (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.

No.	Step	Check	Yes	No
10	**PREPARE OSCILLOSCOPE.**	Is an oscilloscope available?	Go to step **11**.	Go to step **12**.
11	**CHECK ABS SENSOR SIGNAL.** 1) Raise all four wheels of ground. 2) Turn ignition switch OFF. 3) Connect the oscilloscope to the connector. 4) Turn ignition switch ON. 5) Rotate wheels and measure voltage at specified frequency. <Ref. to ABS-17, WAVEFORM, Control Module I/O Signal.> NOTE: When this inspection is completed, the ABSCM&H/U sometimes stores the DTC 29. ***Connector & terminal*** ***DTC 22 /*** ***(B62) No. 5 (+) — No. 14 (−):*** ***DTC 24 /*** ***(B62) No. 7 (+) — No. 16 (−):*** ***DTC 26 /*** ***(F55) No. 12 (+) — No. 11 (−):*** ***DTC 28 /*** ***(F55) No. 5 (+) — No. 4 (−):***	Is oscilloscope pattern smooth, as shown in figure?	Go to step **15**.	Go to step **12**.
12	**CHECK CONTAMINATION OF ABS SENSOR OR TONE WHEEL.** Remove disc rotor or drum from hub in accordance with DTC.	Is the ABS sensor piece or the tone wheel contaminated by dirt or other foreign matter?	Thoroughly remove dirt or other foreign matter.	Go to step **13**.
13	**CHECK DAMAGE OF ABS SENSOR OR TONE WHEEL.**	Are there broken or damaged in the ABS sensor piece or the tone wheel?	Replace ABS sensor or tone wheel. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.> and Front: <Ref. to ABS-21, Front Tone Wheel.> Rear: <Ref. to ABS-22, Rear Tone Wheel.>	Go to step **14**.
14	**CHECK TONE WHEEL RUNOUT.** Measure tone wheel runout.	Is the runout less than 0.05 mm (0.0020 in)?	Go to step **15**.	Replace tone wheel. Front: <Ref. to ABS-21, Front Tone Wheel.> Rear: <Ref. to ABS-22, Rear Tone Wheel.>
15	**CHECK RESISTANCE OF ABS SENSOR.** 1) Turn ignition switch OFF. 2) Disconnect connector from ABS sensor. 3) Measure resistance between ABS sensor connector terminals. ***Terminal*** ***Front RH No. 1 — No. 2:*** ***Front LH No. 1 — No. 2:*** ***Rear RH No. 1 — No. 2:*** ***Rear LH No. 1 — No. 2:***	Is the resistance between 1 and 1.5 kΩ?	Go to step **16**.	Replace ABS sensor. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.>

No.	Step	Check	Yes	No
16	**CHECK GROUND SHORT OF ABS SENSOR.** Measure resistance between ABS sensor and chassis ground. ***Terminal*** ***Front RH No. 1 — Chassis ground:*** ***Front LH No. 1 — Chassis ground:*** ***Rear RH No. 1 — Chassis ground:*** ***Rear LH No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **17**.	Replace ABS sensor. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.>
17	**CHECK HARNESS/CONNECTOR BETWEEN ABSCM&H/U AND ABS SENSOR.** 1) Connect connector to ABS sensor. 2) Disconnect connector from ABSCM&H/U. 3) Measure resistance at ABSCM&H/U connector terminals. ***Connector & terminal*** ***DTC 22 / (F49) No. 11 — No. 12:*** ***DTC 24 / (F49) No. 9 — No. 10:*** ***DTC 26 / (F49) No. 13 — No. 15:*** ***DTC 28 / (F49) No. 7 — No. 8:***	Is the resistance between 1 and 1.5 kΩ?	Go to step **18**.	Repair harness/connector between ABSCM&H/U and ABS sensor.
18	**CHECK GROUND SHORT OF HARNESS.** Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***DTC 22 / (F49) No. 11 — Chassis ground:*** ***DTC 24 / (F49) No. 9 — Chassis ground:*** ***DTC 26 / (F49) No. 13 — Chassis ground:*** ***DTC 28 / (F49) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **19**.	Repair harness/connector between ABSCM&H/U and ABS sensor.
19	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** Measure resistance between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***(F49) No. 23 — GND:***	Is the resistance less than 0.5 Ω?	Go to step **20**.	Repair ABSCM&H/U ground harness.
20	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between ABSCM&H/U and ABS sensor?	Repair connector.	Go to step **21**.
21	**CHECK SOURCES OF SIGNAL NOISE.**	Is the car telephone or the wireless transmitter properly installed?	Go to step **22**.	Properly install the car telephone or the wireless transmitter.
22	**CHECK SOURCES OF SIGNAL NOISE.**	Are noise sources (such as an antenna) installed near the sensor harness?	Install the noise sources apart from the sensor harness.	Go to step **23**.

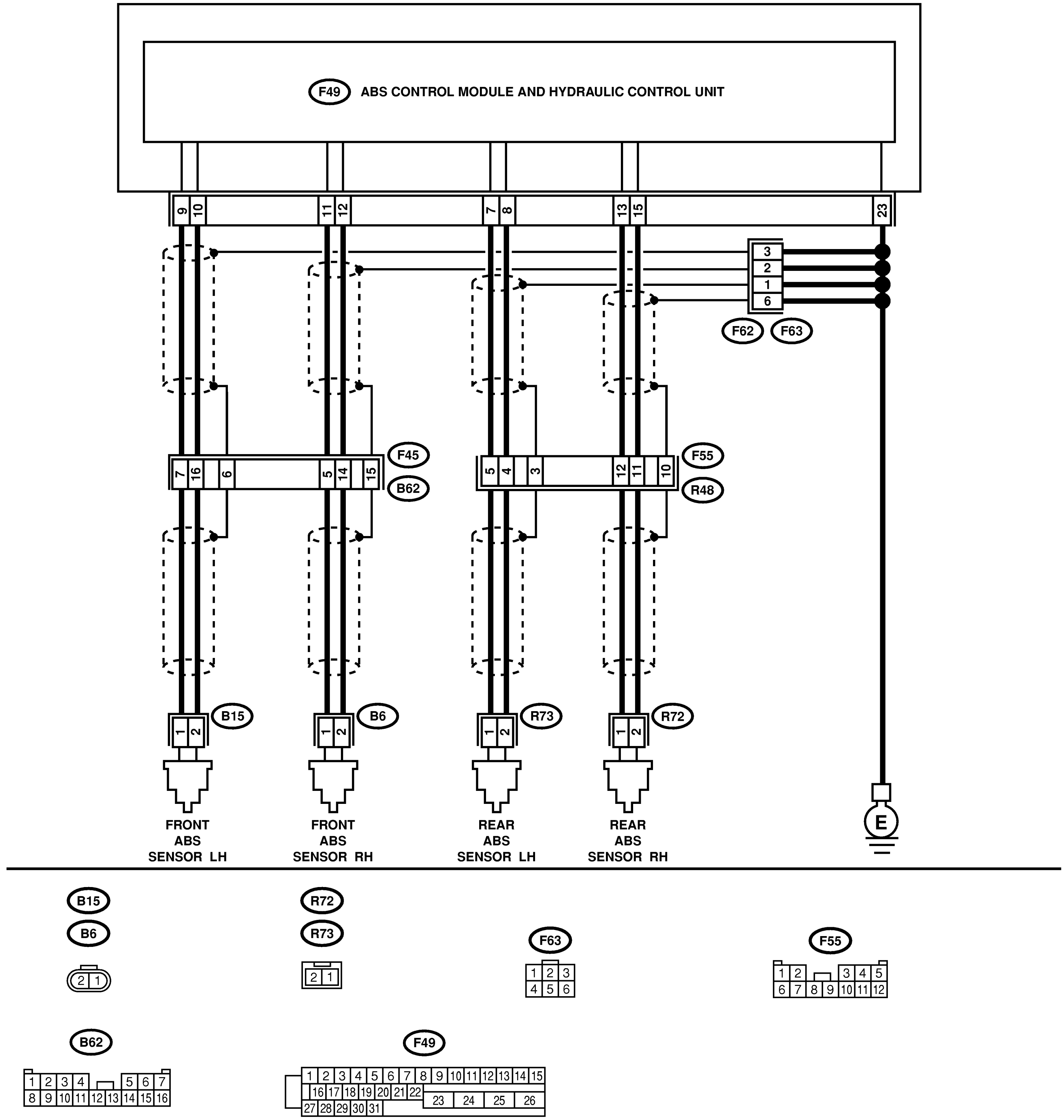
No.	Step	Check	Yes	No
23	**CHECK SHIELD CIRCUIT.** 1) Connect all connectors. 2) Measure resistance between shield connector and chassis ground. ***Connector & terminal*** ***DTC 22 /*** ***(B62) No. 15 — Chassis ground:*** ***DTC 24 /*** ***(B62) No. 6 — Chassis ground:*** ***DTC 26 /*** ***(F55) No. 10 — Chassis ground:*** ***DTC 28 /*** ***(F55) No. 3 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **24**.	Repair shield harness.
24	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **25**.
25	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary noise interference.

K: DTC 29 ABNORMAL ABS SENSOR SIGNAL ON ANY ONE OF FOUR SENSOR *S006798I62*

DIAGNOSIS:
- Faulty ABS sensor signal (noise, irregular signal, etc.)
- Faulty tone wheel
- Wheels turning freely for a long time

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



S4M0580

No.	Step	Check	Yes	No
1	**CHECK IF THE WHEELS HAVE TURNED FREELY FOR A LONG TIME.**	Check if the wheels have been turned freely for more than one minute, such as when the vehicle is jacked-up, under full-lock cornering or when tire is not in contact with road surface.	The ABS is normal. Erase the DTC. NOTE: When the wheels turn freely for a long time, such as when the vehicle is towed or jacked-up, or when steering wheel is continuously turned all the way, this DTC may sometimes occur.	Go to step **2**.
2	**CHECK TIRE SPECIFICATIONS.** Turn ignition switch to OFF.	Are the tire specifications correct?	Go to step **3**.	Replace tire.
3	**CHECK WEAR OF TIRE.**	Is the tire worn excessively?	Replace tire.	Go to step **4**.
4	**CHECK TIRE PRESSURE.**	Is the tire pressure correct?	Go to step **5**.	Adjust tire pressure.
5	**CHECK INSTALLATION OF ABS SENSOR.** ***Tightening torque:*** ***32±10 N·m (3.3±1.0 kgf-m, 24±7 ft-lb)***	Are the ABS sensor installation bolts tightened securely?	Go to step **6**.	Tighten ABS sensor installation bolts securely.
6	**CHECK ABS SENSOR GAP.** Measure tone wheel to ABS sensor piece gap over entire perimeter of the wheel. ***Front wheel*** ***0.3 — 0.8 mm (0.012 — 0.031 in)*** ***Rear wheel*** ***0.7 — 1.2 mm (0.028 — 0.047 in)***	Is the gap within the specifications?	Go to step **7**.	Adjust the gap. NOTE: Adjust the gap using spacer (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.
7	**PREPARE OSCILLOSCOPE.**	Is an oscilloscope available?	Go to step **8**.	Go to step **9**.
8	**CHECK ABS SENSOR SIGNAL.** 1) Raise all four wheels of ground. 2) Turn ignition switch OFF. 3) Connect the oscilloscope to the connector in accordance with DTC. 4) Turn ignition switch ON. 5) Rotate wheels and measure voltage at specified frequency. <Ref. to ABS-17, WAVEFORM, Control Module I/O Signal.> NOTE: When this inspection is completed, the ABSCM&H/U sometimes stores the DTC 29. ***Connector & terminal*** ***Front RH*** ***(B62) No. 5 (+) — No. 14 (−):*** ***Front LH*** ***(B62) No. 7 (+) — No. 16 (−):*** ***Rear RH*** ***(F55) No. 12 (+) — No. 11 (−):*** ***Rear LH*** ***(F55) No. 5 (+) — No. 4 (−):***	Is oscilloscope pattern smooth, as shown in figure?	Go to step **12**.	Go to step **9**.

No.	Step	Check	Yes	No
9	**CHECK CONTAMINATION OF ABS SENSOR OR TONE WHEEL.** Remove disc rotor from hub.	Is the ABS sensor piece or the tone wheel contaminated by dirt or other foreign matter?	Thoroughly remove dirt or other foreign matter.	Go to step **10**.
10	**CHECK DAMAGE OF ABS SENSOR OR TONE WHEEL.**	Are there broken or damaged teeth in the ABS sensor piece or the tone wheel?	Replace ABS sensor or tone wheel. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.> and Front: <Ref. to ABS-21, Front Tone Wheel.> Rear: <Ref. to ABS-22, Rear Tone Wheel.>	Go to step **11**.
11	**CHECK TONE WHEEL RUNOUT.** Measure tone wheel runout.	Is the runout less than 0.05 mm (0.0020 in)?	Go to step **12**.	Replace tone wheel. Front: <Ref. to ABS-21, Front Tone Wheel.> Rear: <Ref. to ABS-22, Rear Tone Wheel.>
12	**CHECK ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Connect all connectors. 3) Erase the memory. 4) Perform inspection mode. 5) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **13**.
13	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

L: DTC 31 FRONT RIGHT INLET VALVE MALFUNCTION S006798I63

NOTE:
For the diagnostic procedure, refer to DTC 37. <Ref. to ABS-108, DTC 37 REAR LEFT INLET VALVE MALFUNCTION, Diagnostics Procedure with Subaru Select Monitor.>

M: DTC 33 FRONT LEFT INLET VALVE MALFUNCTION S006798I64

NOTE:
For the diagnostic procedure, refer to DTC 37. <Ref. to ABS-108, DTC 37 REAR LEFT INLET VALVE MALFUNCTION, Diagnostics Procedure with Subaru Select Monitor.>

N: DTC 35 REAR RIGHT INLET VALVE MALFUNCTION S006798I65

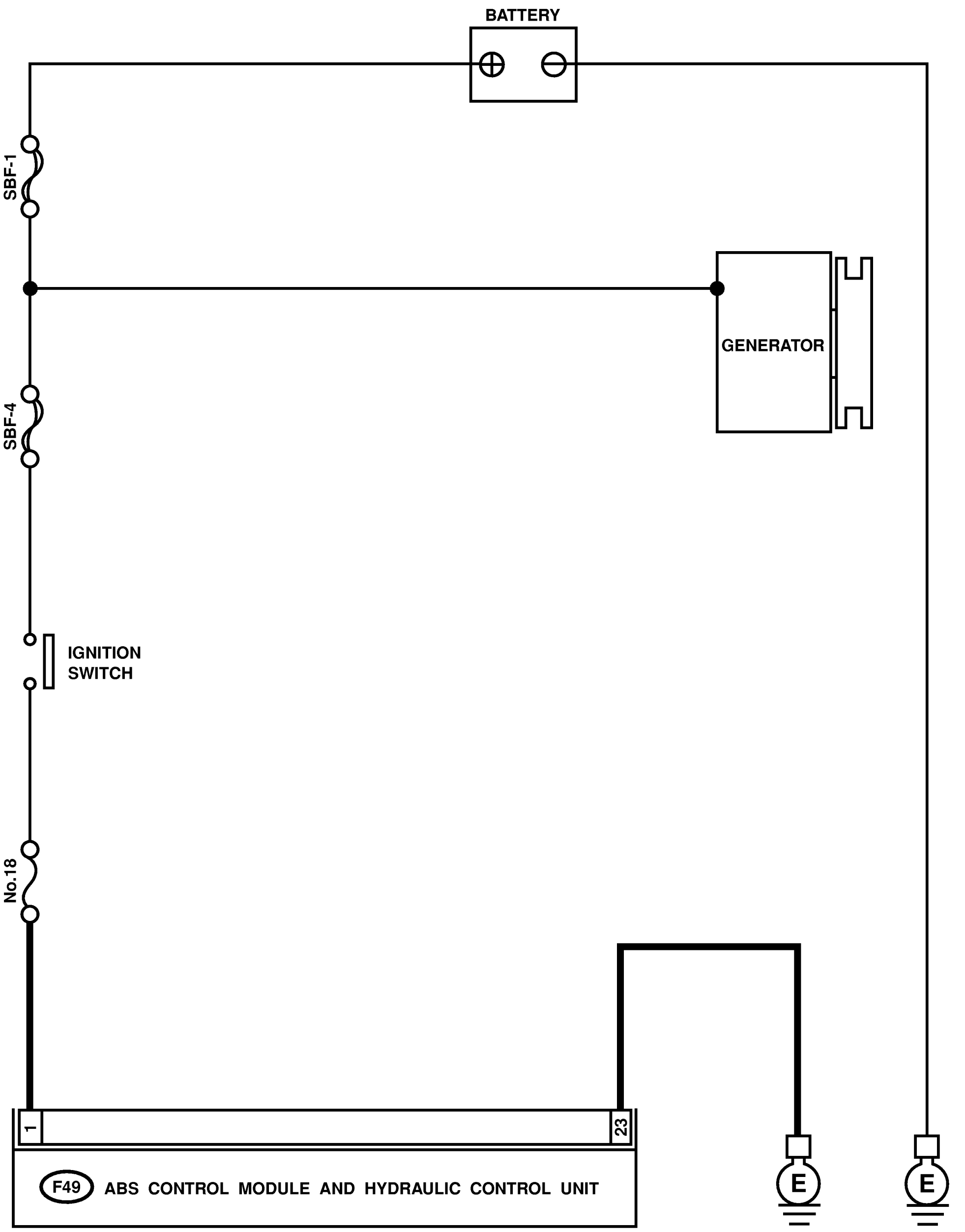
NOTE:
For the diagnostic procedure, refer to DTC 37. <Ref. to ABS-108, DTC 37 REAR LEFT INLET VALVE MALFUNCTION, Diagnostics Procedure with Subaru Select Monitor.>

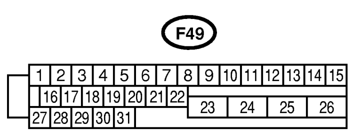
O: DTC 37 REAR LEFT INLET VALVE MALFUNCTION S006798I66

DIAGNOSIS:
- Faulty harness/connector
- Faulty inlet solenoid valve

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0557

No.	Step	Check	Yes	No
1	**CHECK FUSE.**	Is the fuse blown out?	Replace fuse.	Go to step **2**.
2	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Run the engine at idle. 4) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 1 (+) — Chassis ground (−):***	Is the voltage between 10 and 15 V?	Go to step **3**.	Repair harness connector between fuse and ABSCM&H/U.
3	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **4**.	Repair ABSCM&H/U ground harness.
4	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair connector.	Go to step **5**.
5	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6**.
6	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

MEMO:

P: DTC 32 FRONT RIGHT OUTLET VALVE MALFUNCTION *S006798I67*

NOTE:
For the diagnostic procedure, refer to DTC 38. <Ref. to ABS-112, DTC 38 REAR LEFT OUTLET VALVE MALFUNCTION, Diagnostics Procedure with Subaru Select Monitor.>

Q: DTC 34 FRONT LEFT OUTLET VALVE MALFUNCTION *S006798I68*

NOTE:
For the diagnostic procedure, refer to DTC 38. <Ref. to ABS-112, DTC 38 REAR LEFT OUTLET VALVE MALFUNCTION, Diagnostics Procedure with Subaru Select Monitor.>

R: DTC 36 REAR RIGHT OUTLET VALVE MALFUNCTION *S006798I69*

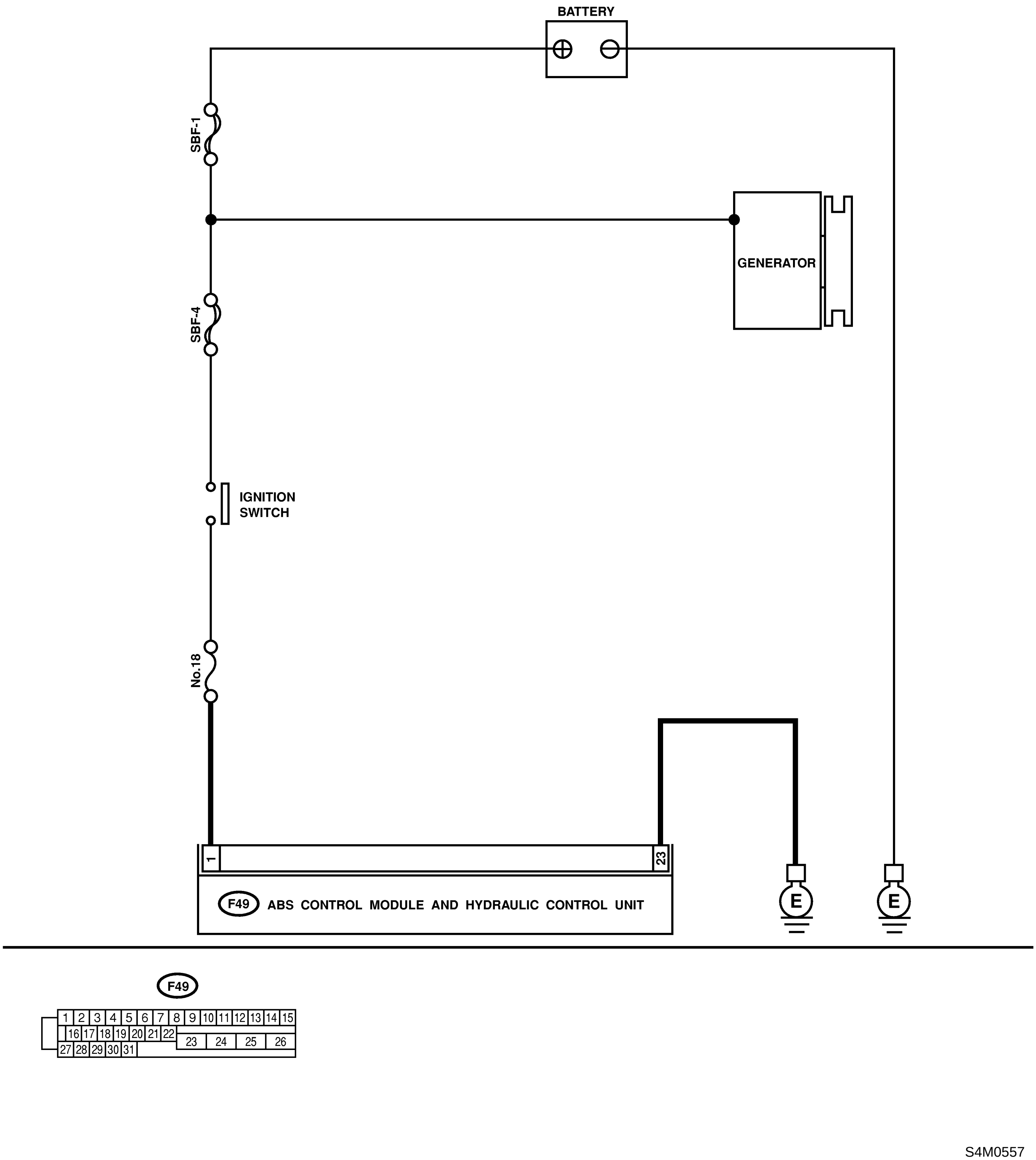
NOTE:
For the diagnostic procedure, refer to DTC 38. <Ref. to ABS-112, DTC 38 REAR LEFT OUTLET VALVE MALFUNCTION, Diagnostics Procedure with Subaru Select Monitor.>

S: DTC 38 REAR LEFT OUTLET VALVE MALFUNCTION *S006798I70*

DIAGNOSIS:
- Faulty harness/connector
- Faulty outlet solenoid valve

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK FUSE.**	Is the fuse blown out?	Replace fuse.	Go to step **2**.
2	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Run the engine at idle. 4) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 1 (+) — Chassis ground (−):***	Is the voltage between 10 and 15 V?	Go to step **3**.	Repair harness connector between fuse and ABSCM&H/U.
3	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **4**.	Repair ABSCM&H/U ground harness.
4	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair connector.	Go to step **5**.
5	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6**.
6	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

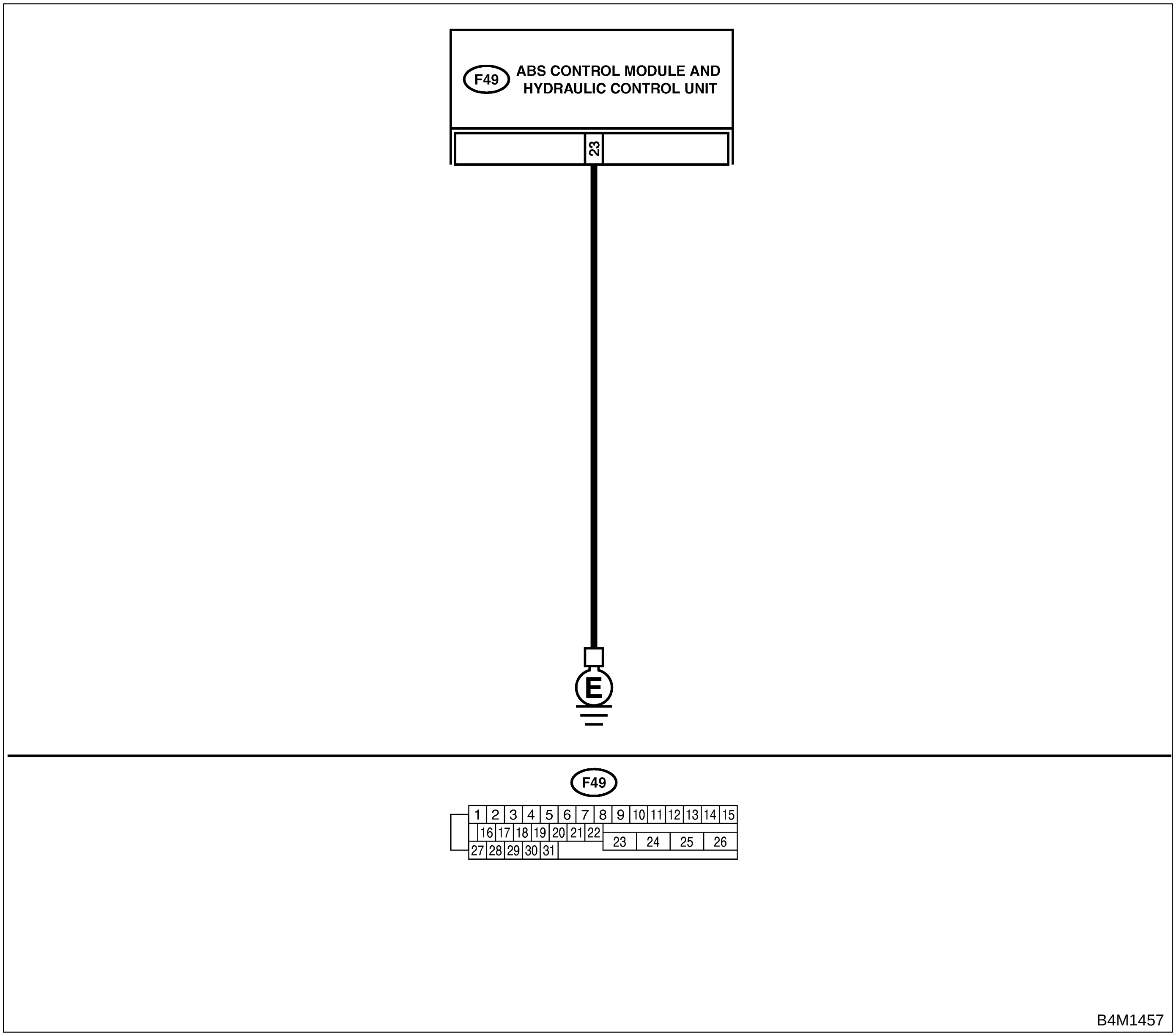
MEMO:

T: DTC 41 ABS CONTROL MODULE MALFUNCTION *S006798I71*

DIAGNOSIS:
- Faulty ABSCM&H/U

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



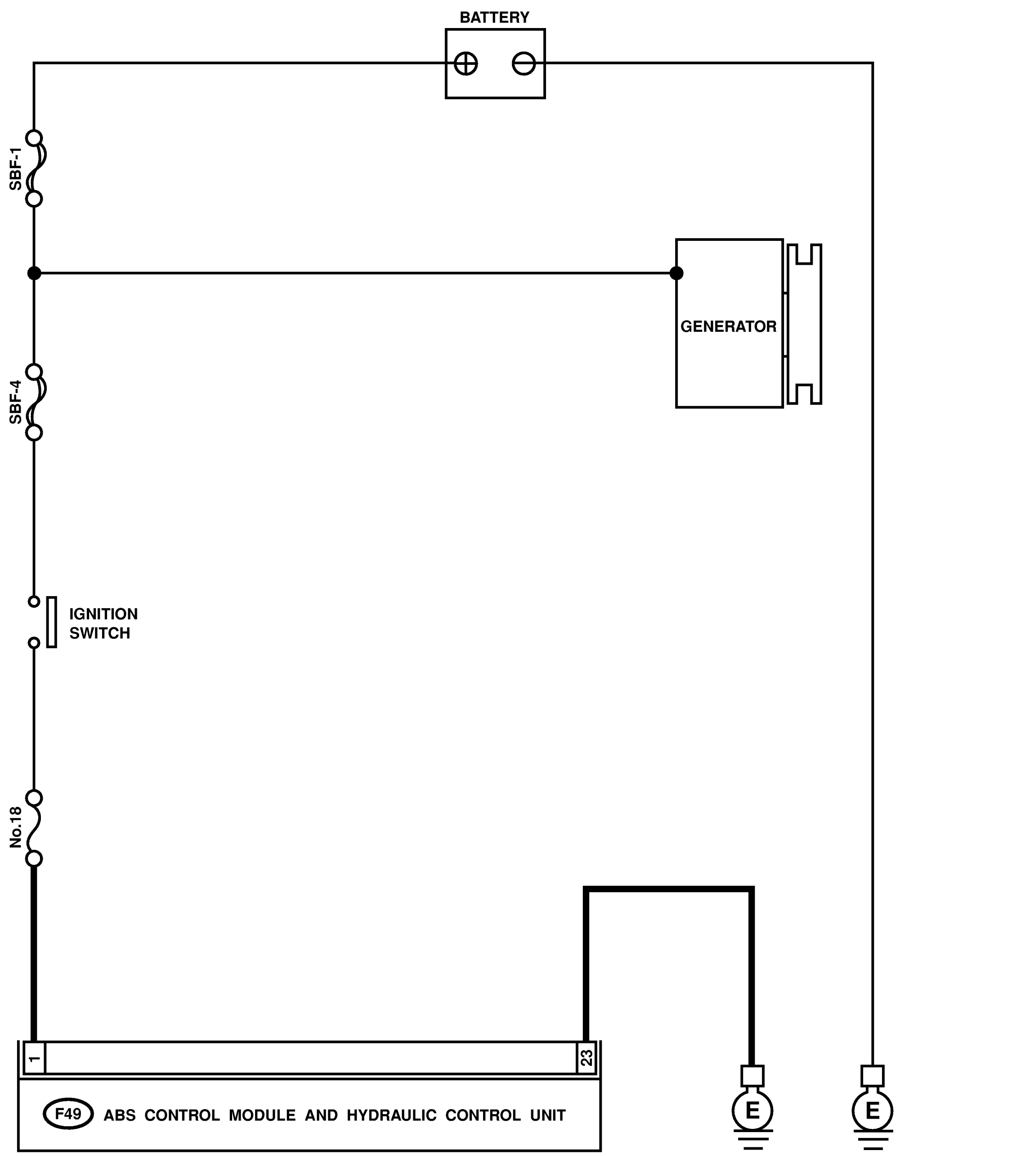
No.	Step	Check	Yes	No
1	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Measure resistance between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **2**.	Repair ABSCM&H/U ground harness.
2	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between battery, ignition switch and ABSCM&H/U?	Repair connector.	Go to step **3**.
3	**CHECK SOURCES OF SIGNAL NOISE.**	Is the car telephone or the wireless transmitter properly installed?	Go to step **4**.	Properly install the car telephone or the wireless transmitter.
4	**CHECK SOURCES OF SIGNAL NOISE.**	Are noise sources (such as an antenna) installed near the sensor harness?	Install the noise sources apart from the sensor harness.	Go to step **5**.
5	**CHECK ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Connect all connectors. 3) Erase the memory. 4) Perform inspection mode. 5) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6**.
6	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

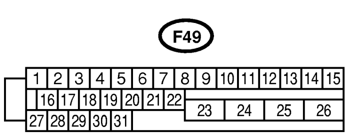
U: DTC 42 POWER SUPPLY VOLTAGE TOO LOW S006798I72

DIAGNOSIS:
- Power source voltage of the ABSCM&H/U is low.

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0557

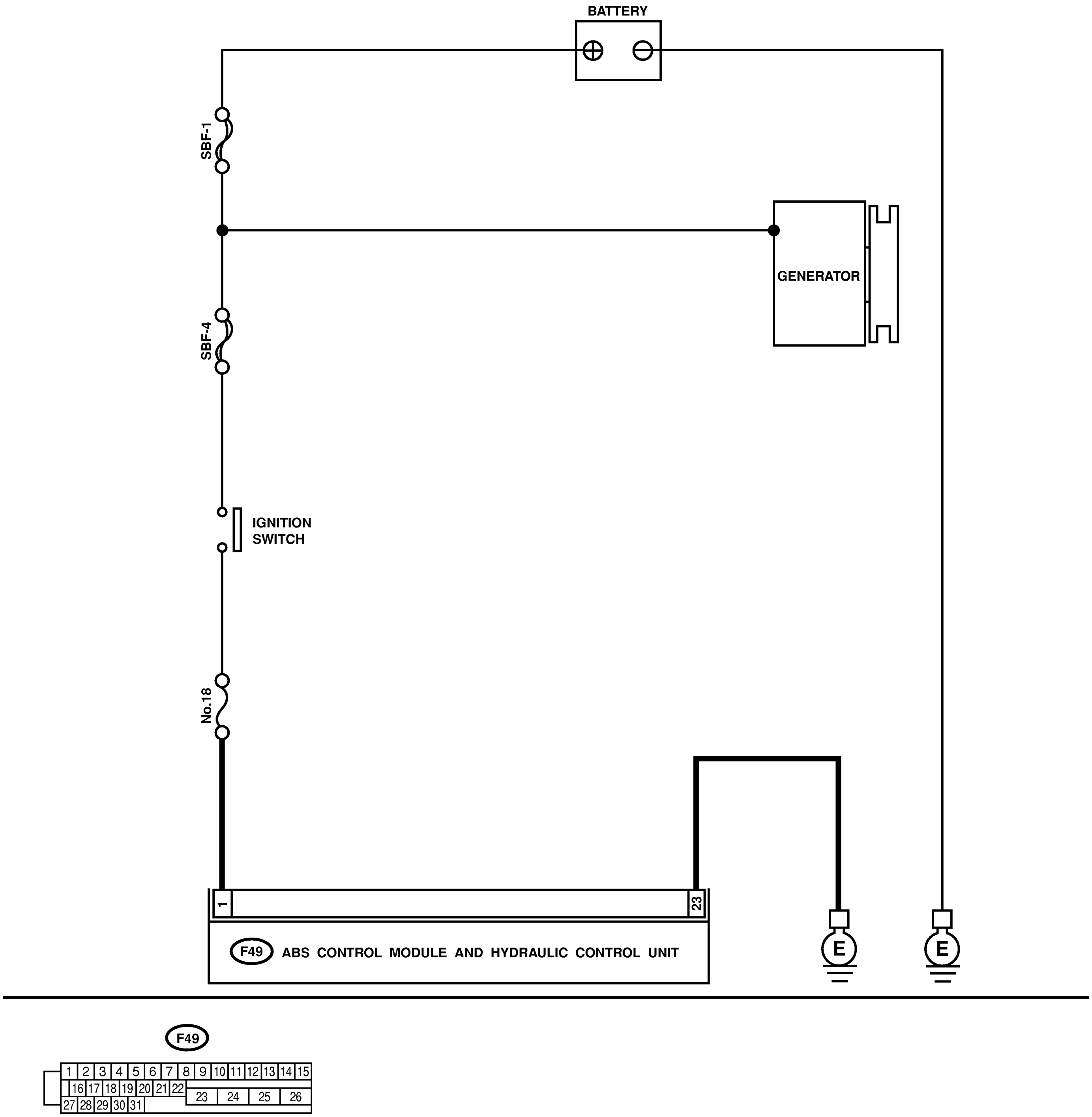
No.	Step	Check	Yes	No
1	**CHECK GENERATOR.** 1) Start engine. 2) Idling after warm-up. 3) Measure voltage between generator B terminal and chassis ground. ***Terminal*** ***Generator B terminal — Chassis ground:***	Is the voltage between 10 and 15 V?	Go to step **2**.	Repair generator. <Ref. to SC-12, Generator.>
2	**CHECK BATTERY TERMINAL.** Turn ignition switch to OFF.	Are the positive and negative battery terminals tightly clamped?	Go to step **3**.	Tighten the clamp of terminal.
3	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Disconnect connector from ABSCM&H/U. 2) Run the engine at idle. 3) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 1 (+) — Chassis ground (−):***	Is the voltage between 10 and 15 V?	Go to step **4**.	Repair harness connector between battery, ignition switch and ABSCM&H/U.
4	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **5**.	Repair ABSCM&H/U ground harness.
5	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair connector.	Go to step **6**.
6	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7**.
7	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

V: DTC 42 POWER SUPPLY VOLTAGE TOO HIGH S006798I73

DIAGNOSIS:
- Power source voltage of the ABSCM&H/U is high.

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



S4M0557

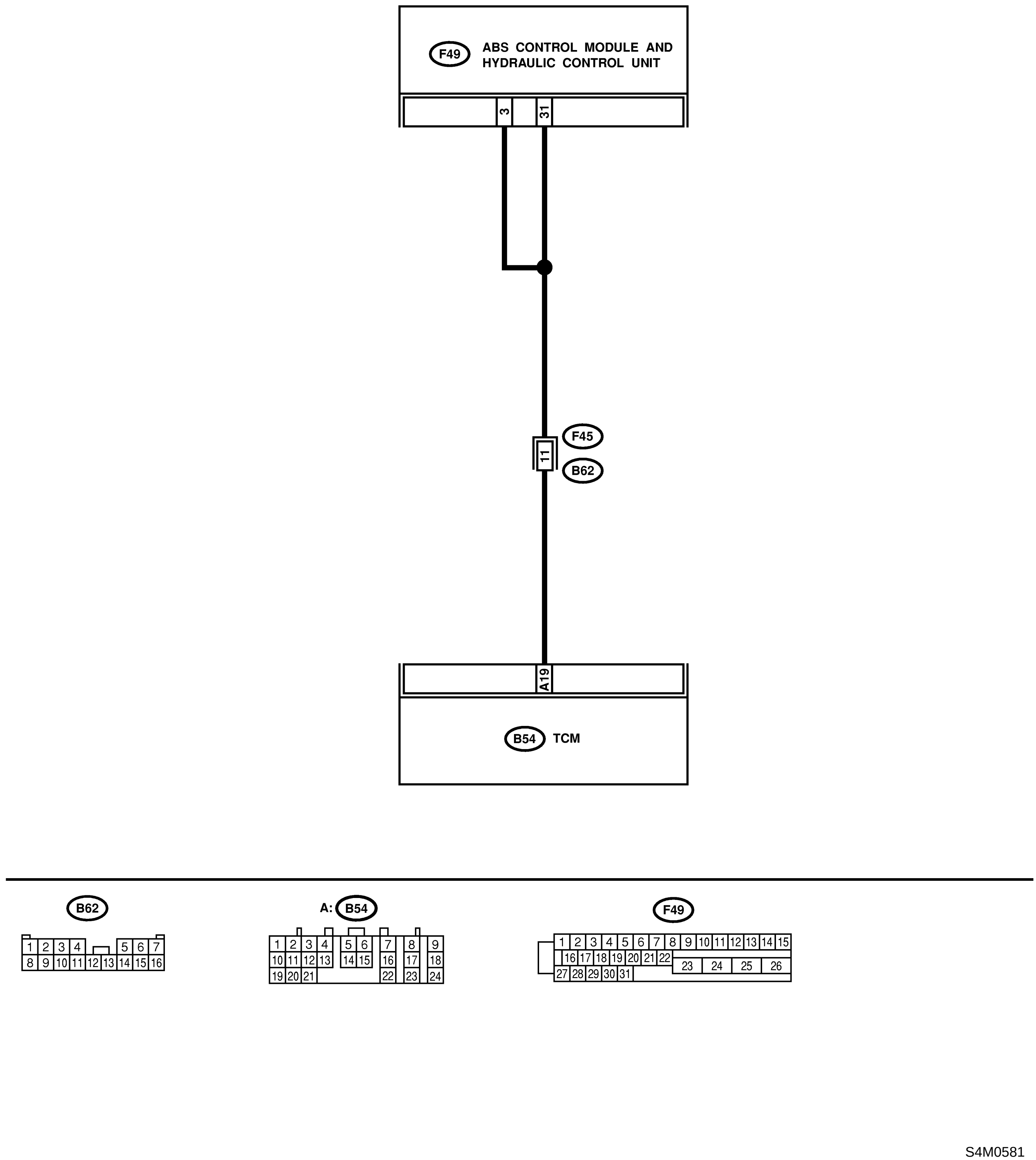
No.	Step	Check	Yes	No
1	**CHECK GENERATOR.** 1) Start engine. 2) Idling after warm-up. 3) Measure voltage between generator B terminal and chassis ground. ***Terminal*** ***Generator B terminal — Chassis ground:***	Is the voltage between 10 and 17 V?	Go to step **2**.	Repair generator. <Ref. to SC-12, Generator.>
2	**CHECK BATTERY TERMINAL.** Turn ignition switch to OFF.	Are the positive and negative battery terminals tightly clamped?	Go to step **3**.	Tighten the clamp of terminal.
3	**CHECK FUSE.**	Is the fuse blown out?	Replace fuse.	Go to step **4**.
4	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Disconnect connector from ABSCM&H/U. 2) Run the engine at idle. 3) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 1 (+) — Chassis ground (−):***	Is the voltage between 10 and 17 V?	Go to step **5**.	Repair harness connector between fuse and ABSCM&H/U.
5	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **6**.	Repair ABSCM&H/U ground harness.
6	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair connector.	Go to step **7**.
7	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **8**.
8	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

W: DTC 44 ABS-AT CONTROL (NON CONTROLLED) *S006798I74*

DIAGNOSIS:
- Combination of AT control faults

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK SPECIFICATIONS OF THE ABSCM&H/U.** Check specifications of the mark to the ABSCM&H/U. ***C7: AT*** ***C8: MT***	Is an ABSCM&H/U for AT model installed on a MT model?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **2**.
2	**CHECK GROUND SHORT OF HARNESS.** 1) Turn ignition switch to OFF. 2) Disconnect two connectors from TCM. 3) Disconnect connector from ABSCM&H/U. 4) Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair harness between TCM and ABSCM&H/U.
3	**CHECK TCM.** 1) Connect all connectors to TCM. 2) Turn ignition switch to ON. 3) Measure voltage between TCM connector terminal and chassis ground. ***Connector & terminal*** ***(B54) No. 19 (+) — Chassis ground (−):***	Is the voltage between 10 and 15 V?	Go to step **5**.	Go to step **4**.
4	**CHECK AT.**	Is the AT functioning normally?	Replace TCM.	Repair AT.
5	**CHECK OPEN CIRCUIT OF HARNESS.** Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 3 (+) — Chassis ground (−):*** ***(F49) No. 31 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **6**.	Repair harness/ connector between TCM and ABSCM&H/U.
6	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between TCM and ABSCM&H/U?	Repair connector.	Go to step **7**.
7	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **8**.
8	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

X: DTC 44 ABS-AT CONTROL (CONTROLLED) S006798I75

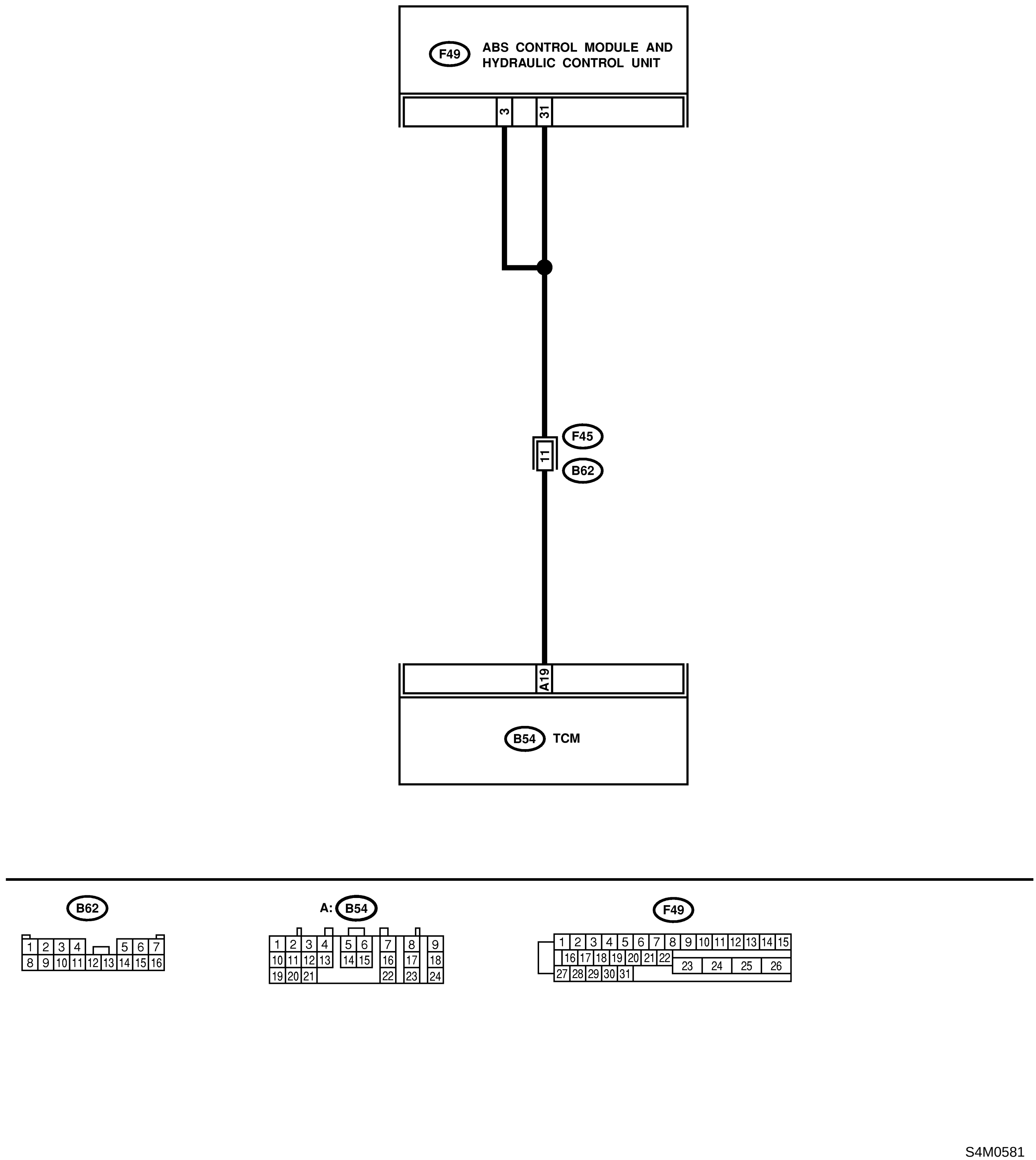
DIAGNOSIS:

- Combination of AT control faults

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK BATTERY SHORT OF HARNESS.** 1) Turn ignition switch to OFF. 2) Disconnect two connectors from TCM. 3) Disconnect connector from ABSCM&H/U. 4) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 3 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **2**.	Repair harness between TCM and ABSCM&H/U.
2	**CHECK BATTERY SHORT OF HARNESS.** 1) Turn ignition switch to ON. 2) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 3 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **3**.	Repair harness between TCM and ABSCM&H/U.
3	**CHECK OPEN CIRCUIT OF HARNESS.** 1) Turn ignition switch to OFF. 2) Connect all connectors to TCM. 3) Turn ignition switch to ON. 4) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 3 (+) — Chassis ground (−):*** ***(F49) No. 31 (+) — Chassis ground (−):***	Is the voltage between 10 and 13 V?	Go to step **4**.	Repair harness/connector between TCM and ABSCM&H/U.
4	**CHECK POOR CONTACT IN CONNECTORS.** Turn ignition switch to OFF.	Is there poor contact in connectors between TCM and ABSCM&H/U?	Repair connector.	Go to step **5**.
5	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6**.
6	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

Y: DTC 51 VALVE RELAY MALFUNCTION S006798I76

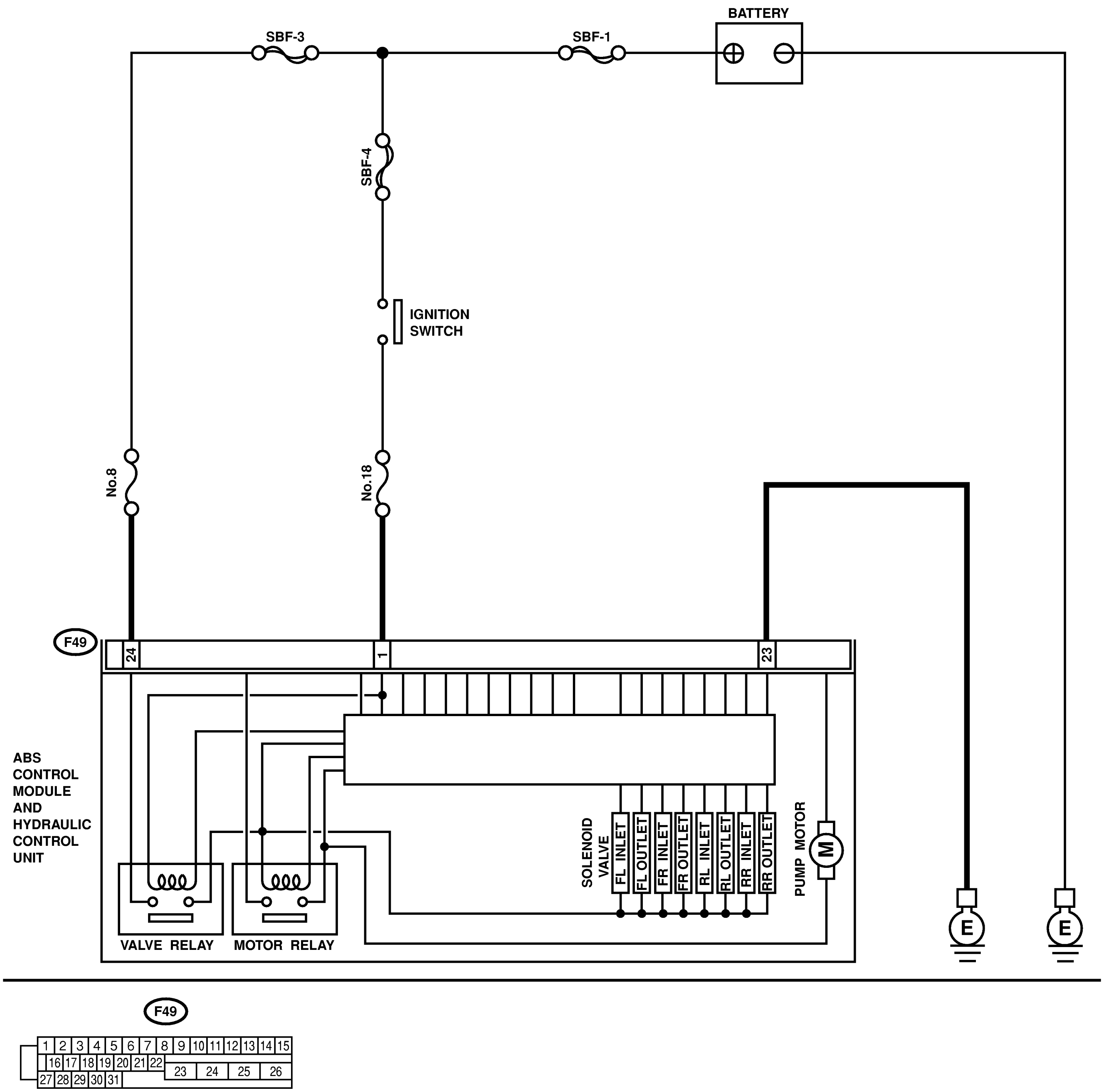
DIAGNOSIS:

- Faulty valve relay

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



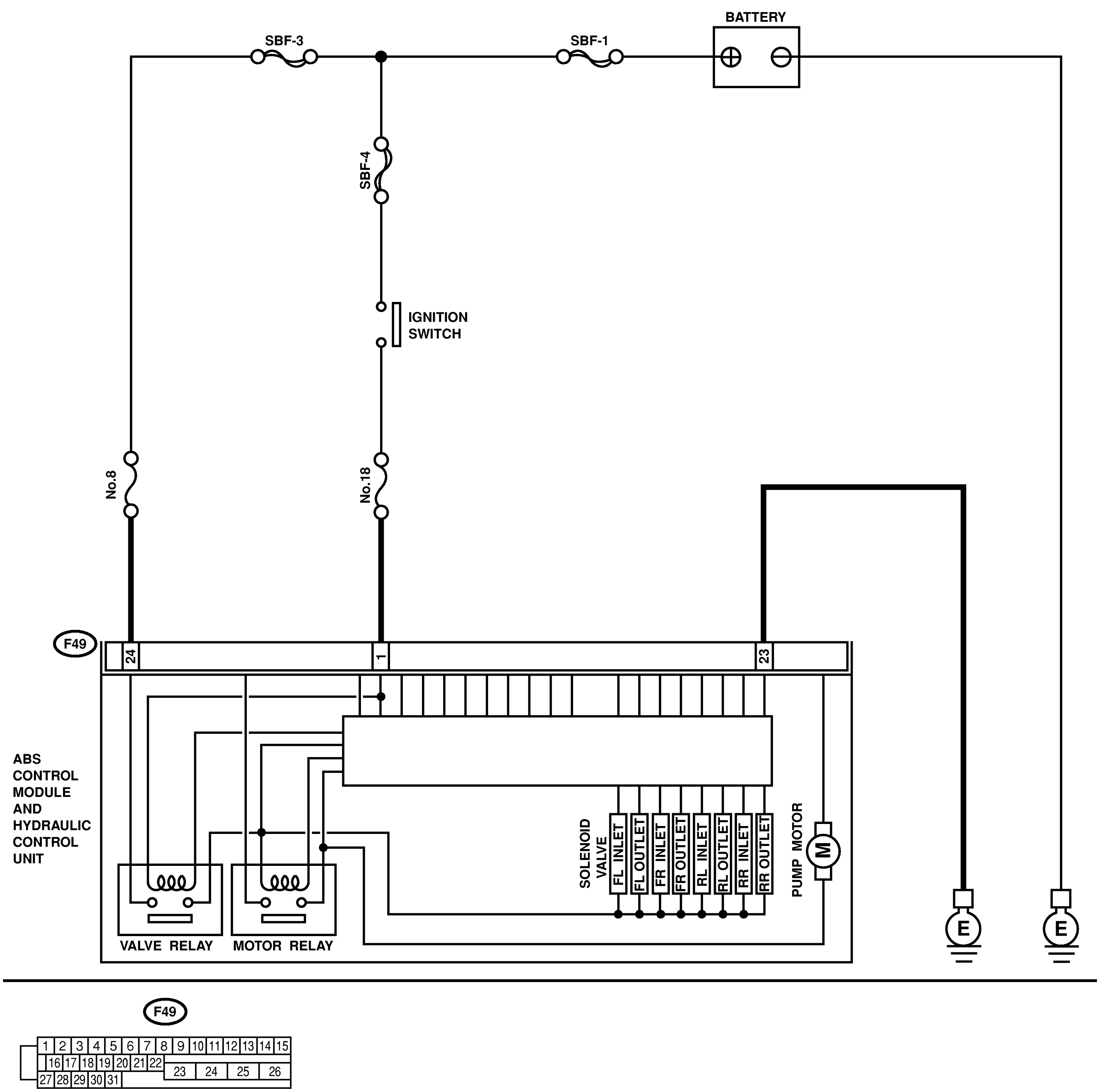
No.	Step	Check	Yes	No
1	**CHECK FUSE.**	Is the fuse blown out?	Replace fuse.	Go to step **2**.
2	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Run the engine at idle. 4) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 1 (+) — Chassis ground (−):*** ***(F49) No. 24 (+) — Chassis ground (−):***	Is the voltage between 10 and 15 V?	Go to step **3**.	Repair harness connector between fuse and ABSCM&H/U.
3	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **4**.	Repair ABSCM&H/U ground harness.
4	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair connector.	Go to step **5**.
5	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6**.
6	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

Z: DTC 51 VALVE RELAY ON FAILURE *S006798I77*

DIAGNOSIS:
- Faulty valve relay

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



S4M0559

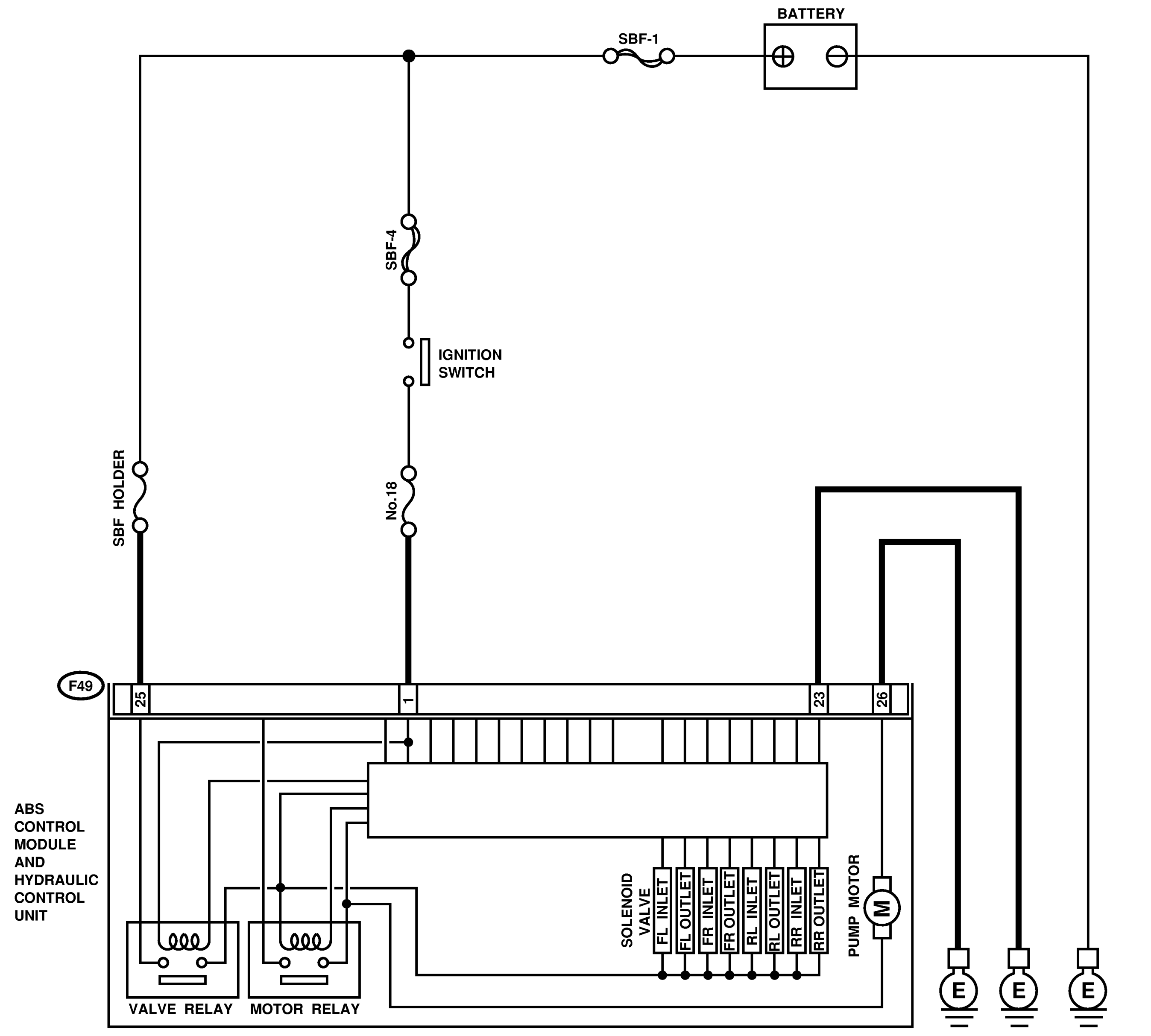
No.	Step	Check	Yes	No
1	**CHECK VALVE RELAY IN ABSCM&H/U.** Measure resistance between ABSCM&H/U terminals. ***Terminals*** ***No. 23 (+) — No. 24 (−):***	Is the resistance more than 1 MΩ?	Go to step **2**.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
2	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair connector.	Go to step **3**.
3	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **4**.
4	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

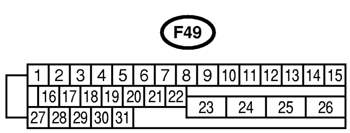
AA: DTC 52 OPEN CIRCUIT IN MOTOR RELAY CIRCUIT *S006798I78*

DIAGNOSIS:
- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0582

No.	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Turn ignition switch to ON. 4) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 25 (+) — Chassis ground (−):***	Is the voltage between 10 and 13 V?	Go to step **2**.	Repair harness/ connector between battery and ABSCM&H/U and check fuse SBF-holder.
2	**CHECK GROUND CIRCUIT OF MOTOR.** 1) Turn ignition switch to OFF. 2) Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 26 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3**.	Repair ABSCM&H/U ground harness.
3	**CHECK MOTOR OPERATION.** Operate the sequence control. <Ref. to ABS-11, ABS Sequence Control.> NOTE: Use the diagnosis connector to operate the sequence control.	Can motor revolution noise (buzz) be heard when carrying out the check sequence?	Go to step **4**.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
4	**CHECK POOR CONTACT IN CONNECTORS.** Turn ignition switch to OFF.	Is there poor contact in connector between hydraulic unit, relay box and ABSCM&H/U?	Repair connector.	Go to step **5**.
5	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6**.
6	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

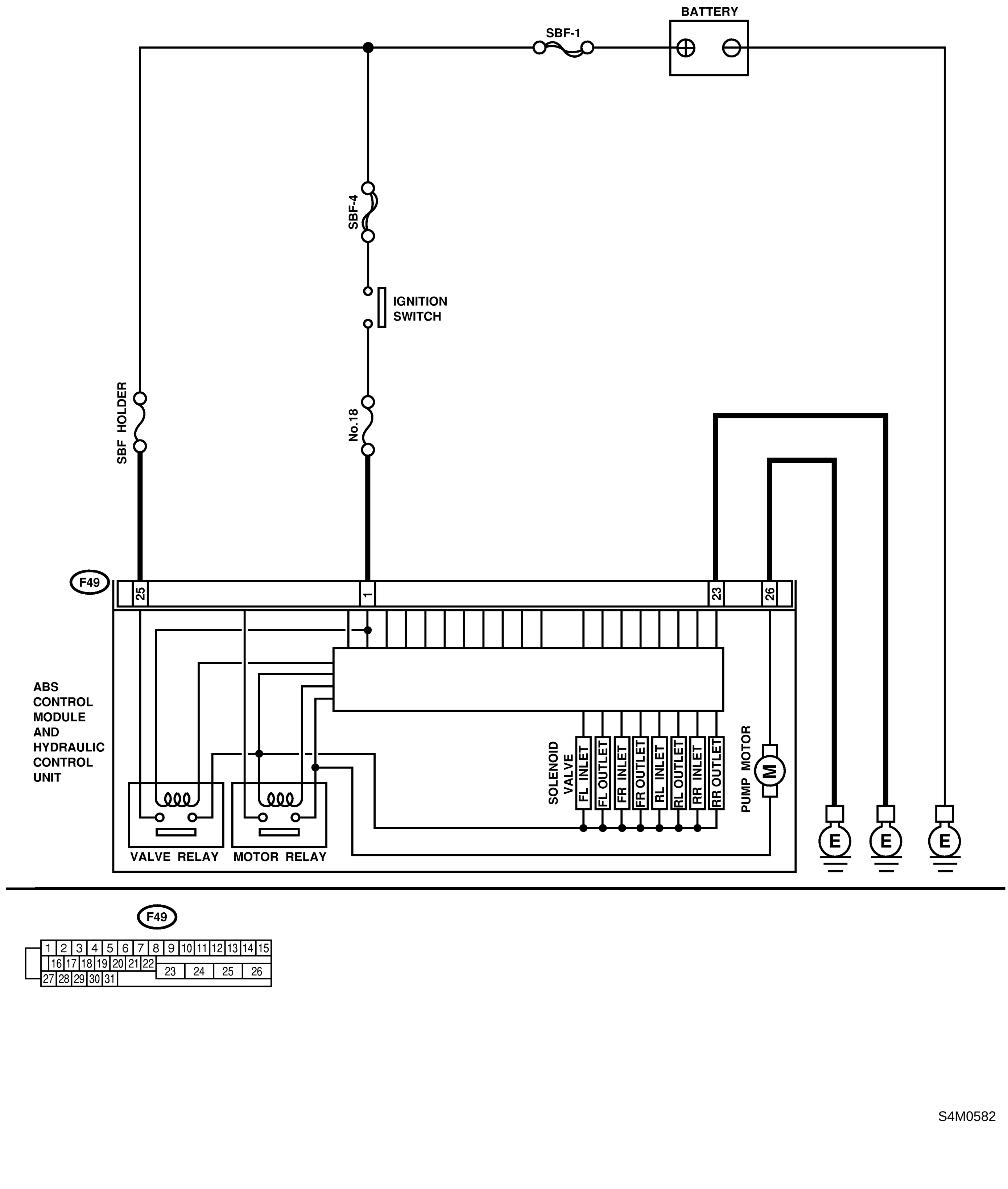
MEMO:

AB: DTC 52 MOTOR RELAY ON FAILURE *S006798I79*

DIAGNOSIS:
- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



S4M0582

No.	Step	Check	Yes	No
1	**CHECK MOTOR RELAY IN ABSCM&H/U.** Measure resistance between ABSCM&H/U terminals. ***Terminals*** ***No. 25 — No. 26:***	Is the resistance more than 1 MΩ?	Go to step **2**.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
2	**CHECK MOTOR OPERATION.** Operate the sequence control. <Ref. to ABS-11, ABS Sequence Control.> NOTE: Use the diagnosis connector to operate the sequence control.	Can motor revolution noise (buzz) be heard when carrying out the sequence control?	Go to step **3**.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
3	**CHECK POOR CONTACT IN CONNECTORS.** Turn ignition switch to OFF.	Is there poor contact in connector between hydraulic unit, relay box and ABSCM&H/U?	Repair connector.	Go to step **4**.
4	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **5**.
5	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

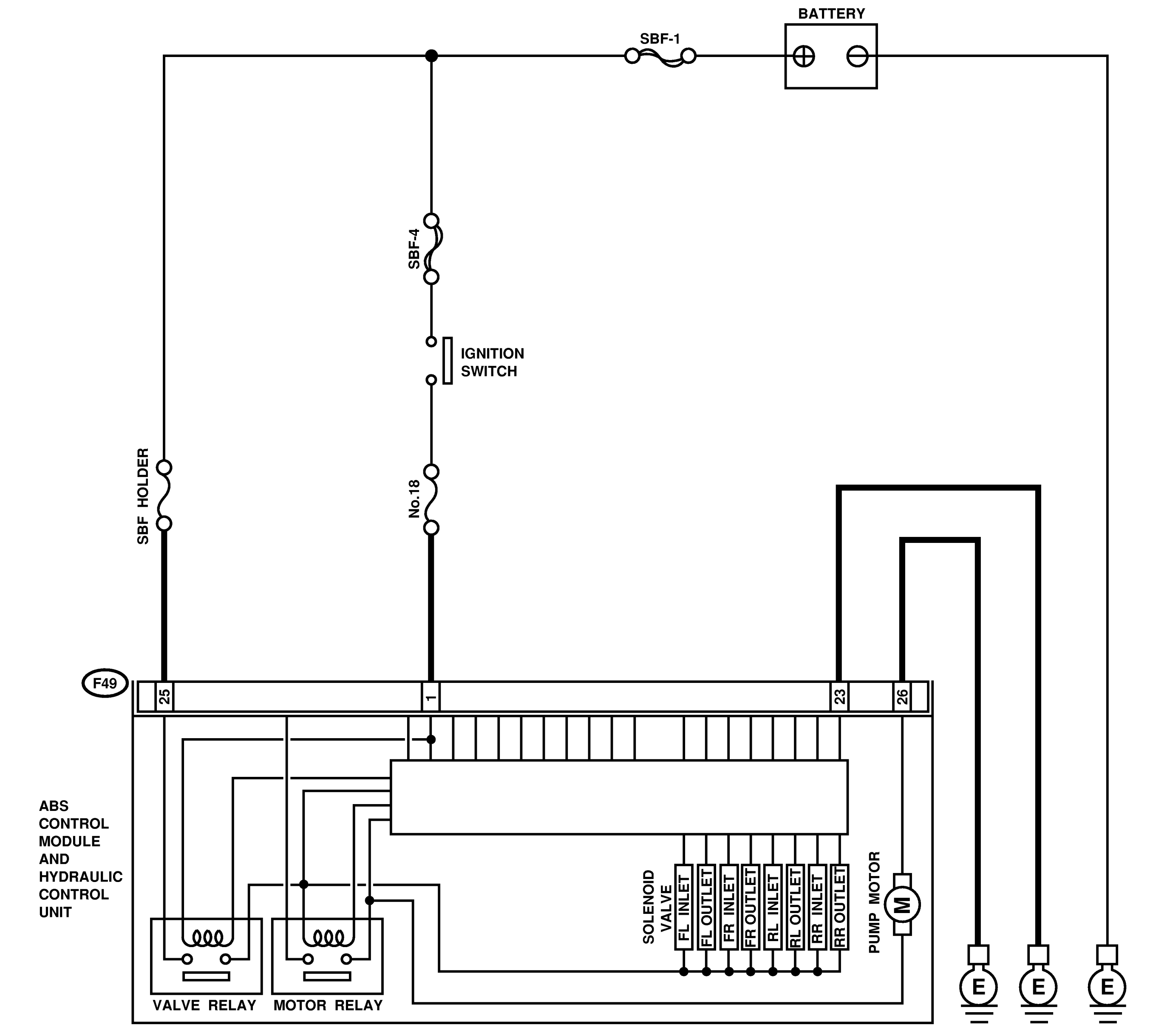
MEMO:

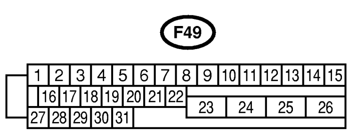
AC: DTC 52 MOTOR MALFUNCTION *S006798I80*

DIAGNOSIS:
- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0582

No.	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Turn ignition switch to ON. 4) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 25 (+) — Chassis ground (−):***	Is the voltage between 10 and 13 V?	Go to step **2**.	Repair harness/ connector between battery and ABSCM&H/U and check fuse SBF-holder.
2	**CHECK GROUND CIRCUIT OF MOTOR.** 1) Turn ignition switch to OFF. 2) Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 26 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3**.	Repair ABSCM&H/U ground harness.
3	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Run the engine at idle. 2) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 1 (+) — Chassis ground (−):***	Is the voltage between 10 and 15 V?	Go to step **4**.	Repair harness connector between battery, ignition switch and ABSCM&H/U.
4	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **5**.	Repair ABSCM&H/U ground harness.
5	**CHECK MOTOR OPERATION.** Operate the sequence control. <Ref. to ABS-11, ABS Sequence Control.> NOTE: Use the diagnosis connector to operate the sequence control.	Can motor revolution noise (buzz) be heard when carrying out the sequence control?	Go to step **6**.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
6	**CHECK POOR CONTACT IN CONNECTORS.** Turn ignition switch to OFF.	Is there poor contact in connector between generator, battery and ABSCM&H/U?	Repair connector.	Go to step **7**.
7	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **8**.
8	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

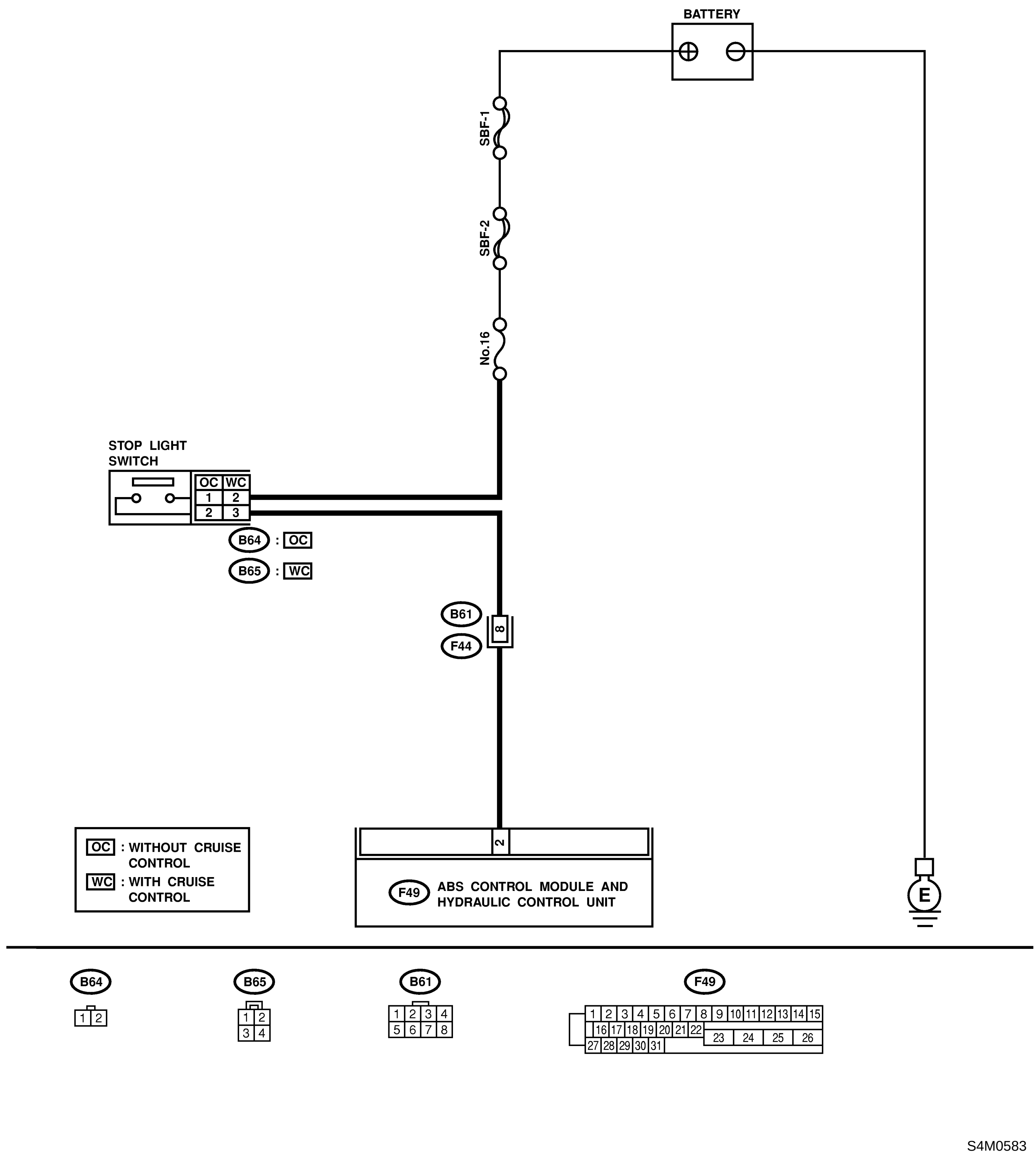
MEMO:

AD: DTC 54 STOP LIGHT SWITCH SIGNAL CIRCUIT MALFUNCTION
S006798I81

DIAGNOSIS:
- Faulty stop light switch

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



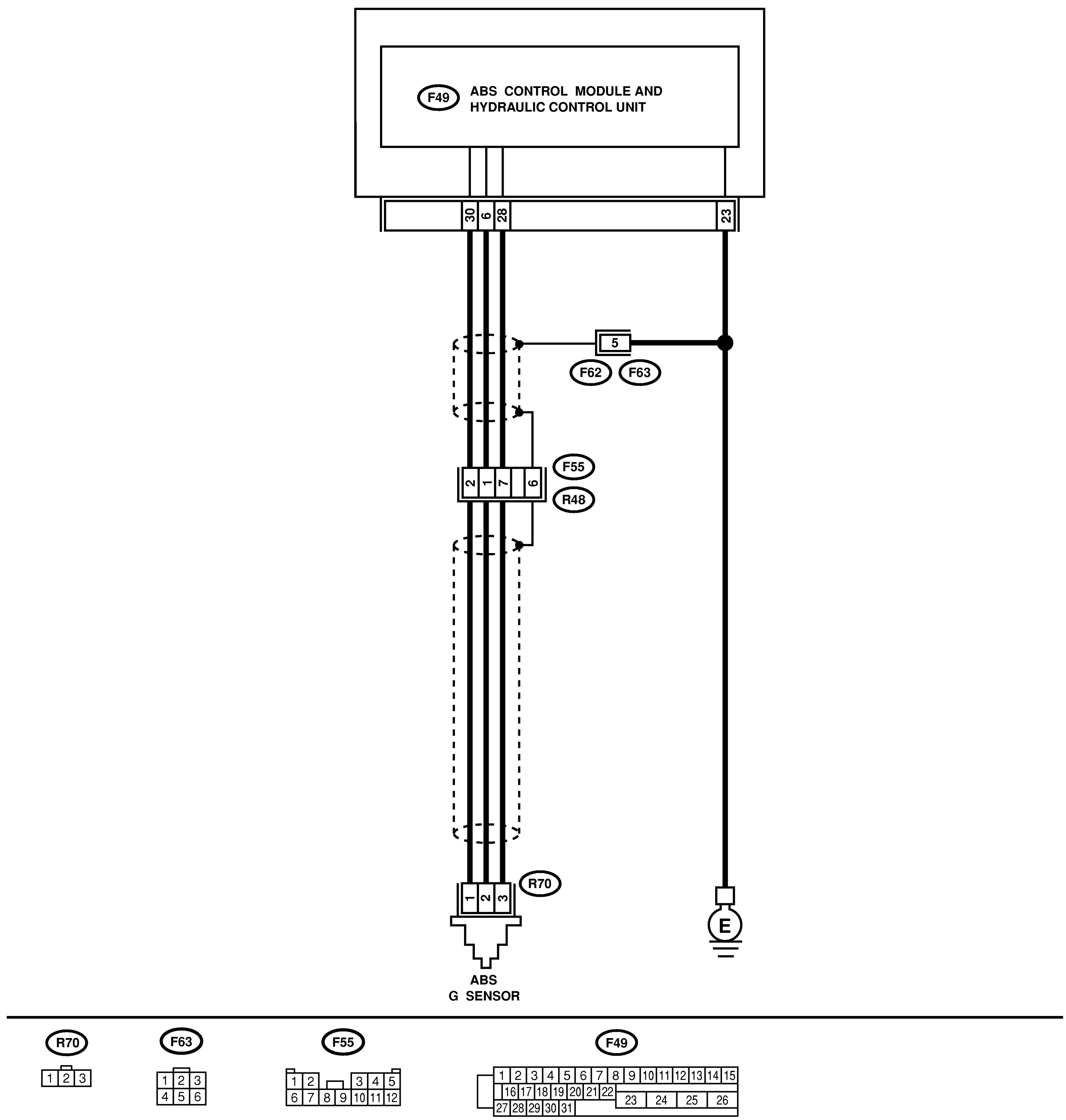
No.	Step	Check	Yes	No
1	**CHECK OUTPUT OF STOP LIGHT SWITCH USING SELECT MONITOR.** 1) Select “Current data display & Save” on the select monitor. 2) Release the brake pedal. 3) Read the stop light switch output in the select monitor data display.	Is the reading indicated on monitor display less than 1.5 V?	Go to step **2**.	Go to step **3**.
2	**CHECK OUTPUT OF STOP LIGHT SWITCH USING SELECT MONITOR.** 1) Depress the brake pedal. 2) Read the stop light switch output in the select monitor data display.	Is the reading indicated on monitor display between 10 and 15 V?	Go to step **5**.	Go to step **3**.
3	**CHECK IF STOP LIGHTS COME ON.** Depress the brake pedal.	Do stop lights turn on?	Go to step **4**.	Repair stop lights circuit.
4	**CHECK OPEN CIRCUIT IN HARNESS.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Depress brake pedal. 4) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 2 — Chassis ground:***	Is the voltage between 10 and 15 V?	Go to step **5**.	Repair harness between stop light switch and ABSCM&H/U connector.
5	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector between stop light switch and ABSCM&H/U?	Repair connector.	Go to step **6**.
6	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7**.
7	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

AE: DTC 56 OPEN OR SHORT CIRCUIT IN G SENSOR CIRCUIT S006798I82

DIAGNOSIS:
- Faulty G sensor output voltage

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



S4M0562

No.	Step	Check	Yes	No
1	**CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.** 1) Select “Current data display & Save” on the select monitor. 2) Read the G sensor output in select monitor data display.	Is the G sensor output on the monitor display between 2.1 and 2.5 V when the G sensor is in horizontal position?	Go to step **2**.	Go to step **5**.
2	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair connector.	Go to step **3**.
3	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **4**.
4	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.
5	**CHECK INPUT VOLTAGE OF G SENSOR.** 1) Turn ignition switch to OFF. 2) Remove console box. 3) Disconnect G sensor from body. (Do not disconnect connector.) 4) Turn ignition switch to ON. 5) Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 1 (+) — No. 3 (−):***	Is the voltage between 4.75 and 5.25 V?	Go to step **6**.	Repair harness/ connector between G sensor and ABSCM&H/U.
6	**CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Measure resistance between ABSCM&H/U connector terminals. ***Connector & terminal*** ***(F49) No. 6 — No. 28:***	Is the resistance between 4.3 and 4.9 kΩ?	Go to step **7**.	Repair harness/ connector between G sensor and ABSCM&H/U.
7	**CHECK GROUND SHORT IN G SENSOR OUTPUT HARNESS.** 1) Disconnect connector from G sensor. 2) Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8**.	Repair harness between G sensor and ABSCM&H/U.
8	**CHECK G SENSOR.** 1) Connect connector to G sensor. 2) Connect connector to ABSCM&H/U. 3) Turn ignition switch to ON. 4) Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (−):***	Is the voltage between 2.1 and 2.5 V when G sensor is horizontal?	Go to step **9**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
9	**CHECK G SENSOR.** Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (−):***	Is the voltage between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?	Go to step **10**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>

No.	Step	Check	Yes	No
10	**CHECK G SENSOR.** Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (−):***	Is the voltage between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?	Go to step **11**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
11	**CHECK POOR CONTACT IN CONNECTORS.** Turn ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair connector.	Go to step **12**.
12	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **13**.
13	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

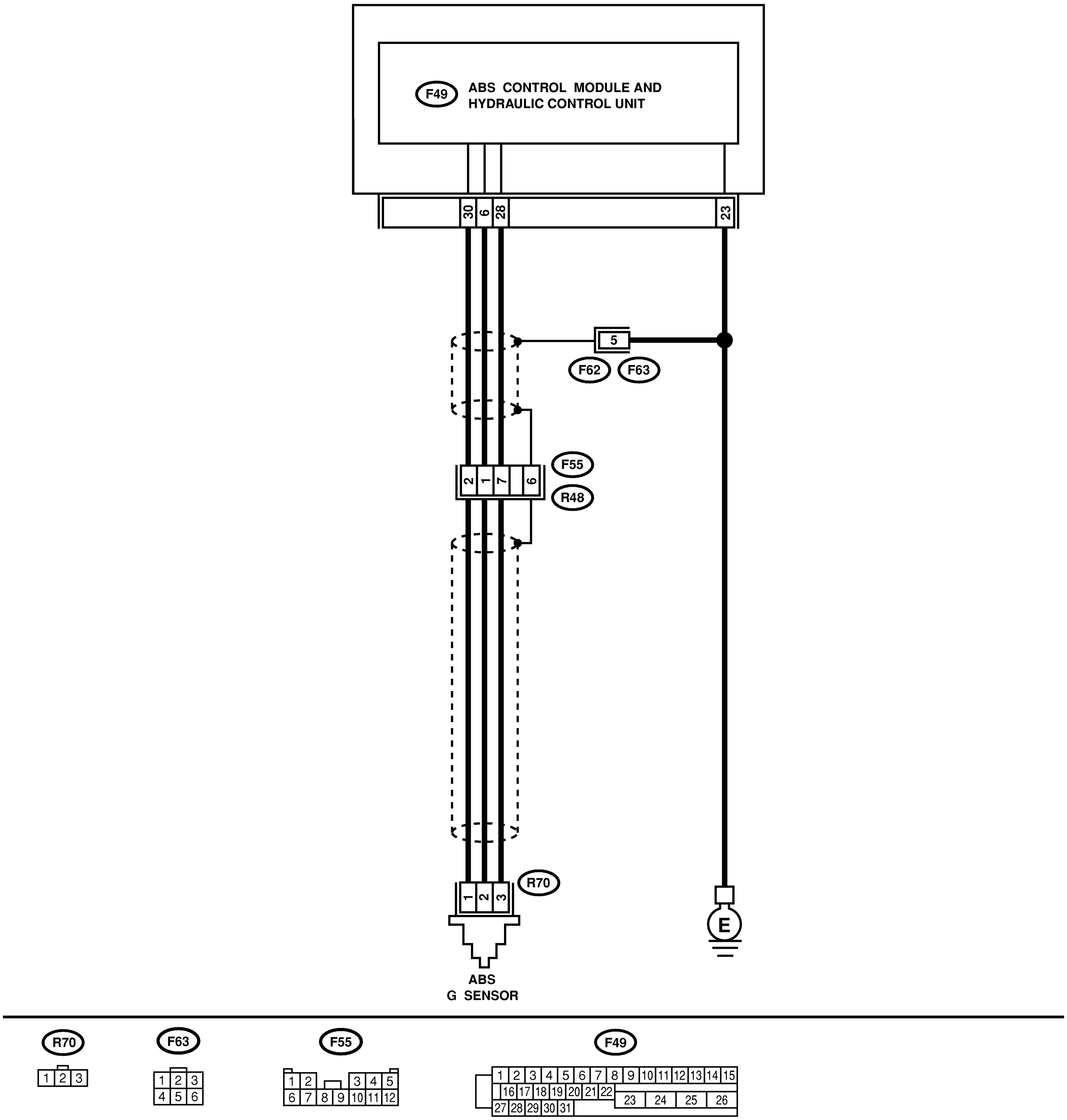
MEMO:

AF: DTC 56 BATTERY SHORT IN G SENSOR CIRCUIT S006798I83

DIAGNOSIS:
- Faulty G sensor output voltage

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



S4M0562

No.	Step	Check	Yes	No
1	**CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.** 1) Select “Current data display & Save” on the select monitor. 2) Read the G sensor output in select monitor data display.	Is the G sensor output on the monitor display between 2.1 and 2.5 V when the G sensor is in horizontal position?	Go to step **2**.	Go to step **5**.
2	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair connector.	Go to step **3**.
3	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **4**.
4	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.
5	**CHECK FREEZE FRAME DATA.** 1) Select “Freeze frame data” on the select monitor. 2) Read front right wheel speed on the select monitor display.	Is the front right wheel speed on monitor display 0 km?	Go to step **6**.	Go to step **16**.
6	**CHECK FREEZE FRAME DATA.** Read front left wheel speed on the select monitor display.	Is the front left wheel speed on monitor display 0 km?	Go to step **7**.	Go to step **16**.
7	**CHECK FREEZE FRAME DATA.** Read rear right wheel speed on the select monitor display.	Is the rear right wheel speed on monitor display 0 km?	Go to step **8**.	Go to step **16**.
8	**CHECK FREEZE FRAME DATA.** Read rear left wheel speed on the select monitor display.	Is the rear left wheel speed on monitor display 0 km?	Go to step **9**.	Go to step **16**.
9	**CHECK FREEZE FRAME DATA.** Read G sensor output on the select monitor display.	Is the G sensor output on monitor display more than 3.65 V?	Go to step **10**.	Go to step **16**.
10	**CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Measure resistance between ABSCM&H/U connector terminals. ***Connector & terminal*** ***(F49) No. 6 — No. 28:***	Is the resistance between 4.3 and 4.9 kΩ?	Go to step **11**.	Repair harness/ connector between G sensor and ABSCM&H/U.
11	**CHECK BATTERY SHORT OF HARNESS.** 1) Turn ignition switch to OFF. 2) Remove console box. 3) Disconnect connector from G sensor. 4) Disconnect connector from ABSCM&H/U. 5) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 6 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **12**.	Repair harness between G sensor and ABSCM&H/U.

No.	Step	Check	Yes	No
12	**CHECK BATTERY SHORT OF HARNESS.** 1) Turn ignition switch to ON. 2) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 6 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **13**.	Repair harness between G sensor and ABSCM&H/U.
13	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair connector.	Go to step **14**.
14	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **15**.
15	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.
16	**CHECK INPUT VOLTAGE OF G SENSOR.** 1) Turn ignition switch to OFF. 2) Remove console box. 3) Disconnect G sensor from body. (Do not disconnect connector.) 4) Turn ignition switch to ON. 5) Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 1 (+) — No. 3 (−):***	Is the voltage between 4.75 and 5.25 V?	Go to step **17**.	Repair harness/ connector between G sensor and ABSCM&H/U.
17	**CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Measure resistance between ABSCM&H/U connector terminals. ***Connector & terminal*** ***(F49) No. 6 — No. 28:***	Is the resistance between 4.3 and 4.9 kΩ?	Go to step **18**.	Repair harness/ connector between G sensor and ABSCM&H/U.
18	**CHECK G SENSOR.** 1) Connect connector to G sensor. 2) Connect connector to ABSCM&H/U. 3) Turn ignition switch to ON. 4) Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (−):***	Is the voltage between 2.1 and 2.5 V when G sensor is horizontal?	Go to step **19**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
19	**CHECK G SENSOR.** Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (−):***	Is the voltage between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?	Go to step **20**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
20	**CHECK G SENSOR.** Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (−):***	Is the voltage between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?	Go to step **21**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>

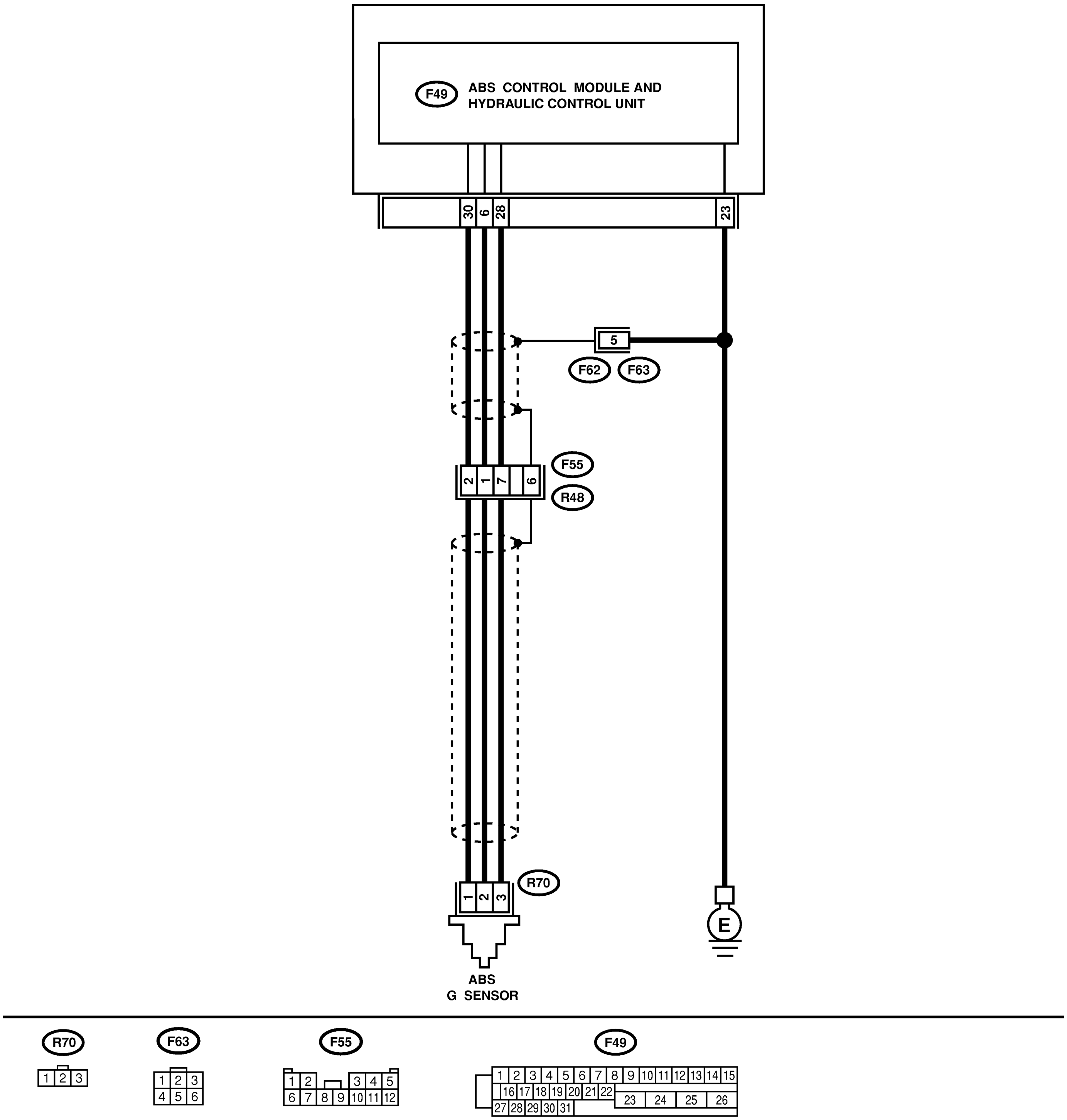
No.	Step	Check	Yes	No
21	**CHECK POOR CONTACT IN CONNECTORS.** Turn ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair connector.	Go to step **22**.
22	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **23**.
23	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

AG: DTC 56 ABNORMAL G SENSOR HIGH μ OUTPUT S006798I84

DIAGNOSIS:
- Faulty G sensor output voltage

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



S4M0562

No.	Step	Check	Yes	No
1	**CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.** 1) Select “Current data display & Save” on the select monitor. 2) Read G sensor output on the select monitor display.	Is the G sensor output on monitor display between 2.1 and 2.5 V when the G sensor is in horizontal position?	Go to step **2**.	Go to step **6**.
2	**CHECK POOR CONTACT IN CONNECTORS.** Turn ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair connector.	Go to step **3**.
3	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **4**.
4	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.
5	**CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Measure resistance between ABSCM&H/U connector terminals. ***Connector & terminal*** ***(F49) No. 6 — No. 28:***	Is the resistance between 4.3 and 4.9 kΩ?	Go to step **6**.	Repair harness/ connector between G sensor and ABSCM&H/U.
6	**CHECK GROUND SHORT OF HARNESS.** Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 28 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7**.	Repair harness between G sensor and ABSCM&H/U. Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
7	**CHECK G SENSOR.** 1) Remove console box. 2) Remove G sensor from vehicle. 3) Connect connector to G sensor. 4) Connect connector to ABSCM&H/U. 5) Turn ignition switch to ON. 6) Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (−):***	Is the voltage between 2.1 and 2.5 V when G sensor is horizontal?	Go to step **8**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
8	**CHECK G SENSOR.** Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (−):***	Is the voltage between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?	Go to step **9**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
9	**CHECK G SENSOR.** Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (−):***	Is the voltage between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?	Go to step **10**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>

No.	Step	Check	Yes	No
10	**CHECK ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Connect all connectors. 3) Erase the memory. 4) Perform inspection mode. 5) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **11**.
11	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

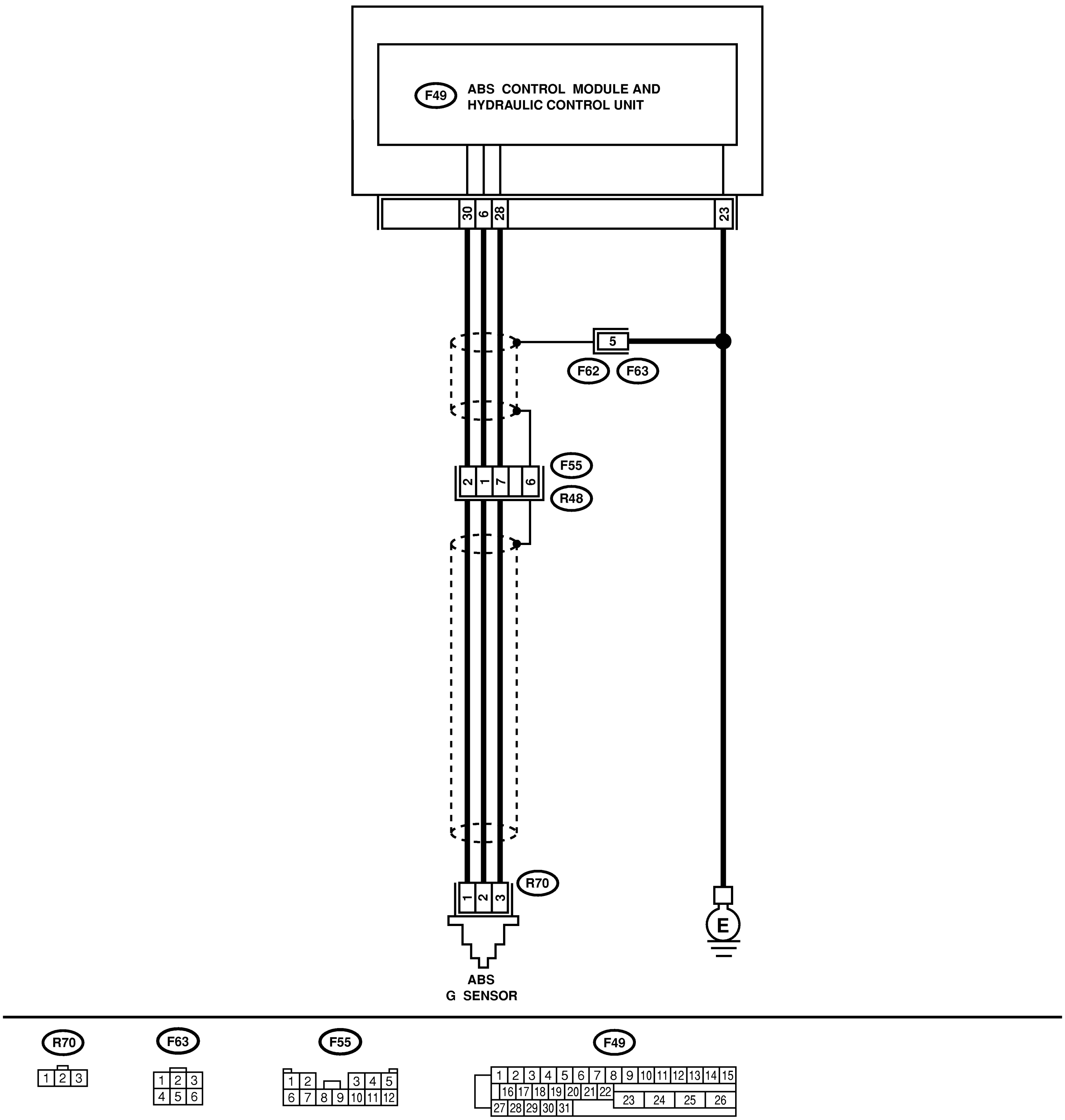
MEMO:

AH: DTC 56 DETECTION OF G SENSOR STICK S006798I85

DIAGNOSIS:
- Faulty G sensor output voltage

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



S4M0562

No.	Step	Check	Yes	No
1	**CHECK ALL FOUR WHEELS FOR FREE TURNING.**	Have the wheels been turned freely such as when the vehicle is lifted up, or operated on a rolling road?	The ABS is normal. Erase the DTC.	Go to step **2**.
2	**CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.** 1) Select "Current data display & Save" on the select monitor. 2) Read the select monitor display.	Is the G sensor output on the monitor display between 2.1 and 2.5 V when the vehicle is in horizontal position?	Go to step **3**.	Go to step **8**.
3	**CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.** 1) Turn ignition switch to OFF. 2) Remove console box. 3) Remove G sensor from vehicle. (Do not disconnect connector.) 4) Turn ignition switch to ON. 5) Select "Current data display & Save" on the select monitor. 6) Read the select monitor display.	Is the G sensor output on the monitor display between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?	Go to step **4**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
4	**CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.** Read the select monitor display.	Is the G sensor output on the monitor display between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?	Go to step **5**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
5	**CHECK POOR CONTACT IN CONNECTORS.** Turn ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair connector.	Go to step **6**.
6	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7**.
7	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.
8	**CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Measure resistance between ABSCM&H/U connector terminals. ***Connector & terminal*** ***(F49) No. 6 — No. 28:***	Is the resistance between 4.3 and 4.9 kΩ?	Go to step **9**.	Repair harness/connector between G sensor and ABSCM&H/U.
9	**CHECK G SENSOR.** 1) Remove console box. 2) Remove G sensor from vehicle. 3) Connect connector to G sensor. 4) Connect connector to ABSCM&H/U. 5) Turn ignition switch to ON. 6) Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (−):***	Is the voltage between 2.1 and 2.5 V when G sensor is horizontal?	Go to step **10**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>

No.	Step	Check	Yes	No
10	**CHECK G SENSOR.** Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (−):***	Is the voltage between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?	Go to step **11**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
11	**CHECK G SENSOR.** Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (−):***	Is the voltage between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?	Go to step **12**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
12	**CHECK ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Connect all connectors. 3) Erase the memory. 4) Perform inspection mode. 5) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **13**.
13	**CHECK ANY OTHER DTCs APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

14. General Diagnostics Table S006121

A: INSPECTION S006121A10

Symptom		Probable faulty units/parts
Vehicle instability during braking	Vehicle pulls to either side.	• ABSCM&H/U (solenoid valve) • ABS sensor • Brake (caliper & piston, pads) • Wheel alignment • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections • Road surface (uneven, camber)
	Vehicle spins.	• ABSCM&H/U (solenoid valve) • ABS sensor • Brake (pads) • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections
Poor braking	Long braking/stopping distance	• ABSCM&H/U (solenoid valve) • Brake (pads) • Air in brake line • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections
	Wheel locks.	• ABSCM&H/U (solenoid valve, motor) • ABS sensor • Incorrect wiring or piping connections
	Brake dragging	• ABSCM&H/U (solenoid valve) • ABS sensor • Master cylinder • Brake (caliper & piston) • Parking brake • Axle & wheels • Brake pedal play
	Long brake pedal stroke	• Air in brake line • Brake pedal play
	Vehicle pitching	• Suspension play or fatigue (reduced damping) • Incorrect wiring or piping connections • Road surface (uneven)
	Unstable or uneven braking	• ABSCM&H/U (solenoid valve) • ABS sensor • Brake (caliper & piston, pads) • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections • Road surface (uneven)
Vibration and/or noise (while driving on slippery roads)	Excessive pedal vibration	• Incorrect wiring or piping connections • Road surface (uneven)
	Noise from ABSCM&H/U	• ABSCM&H/U (mount bushing) • ABS sensor • Brake piping
	Noise from front of vehicle	• ABSCM&H/U (mount bushing) • ABS sensor • Master cylinder • Brake (caliper & piston, pads, rotor) • Brake piping • Brake booster & check valve • Suspension play or fatigue
	Noise from rear of vehicle	• ABS sensor • Brake (caliper & piston, pads, rotor) • Parking brake • Brake piping • Suspension play or fatigue

MEMO:

MEMO:

CONTROL SYSTEMS

CS

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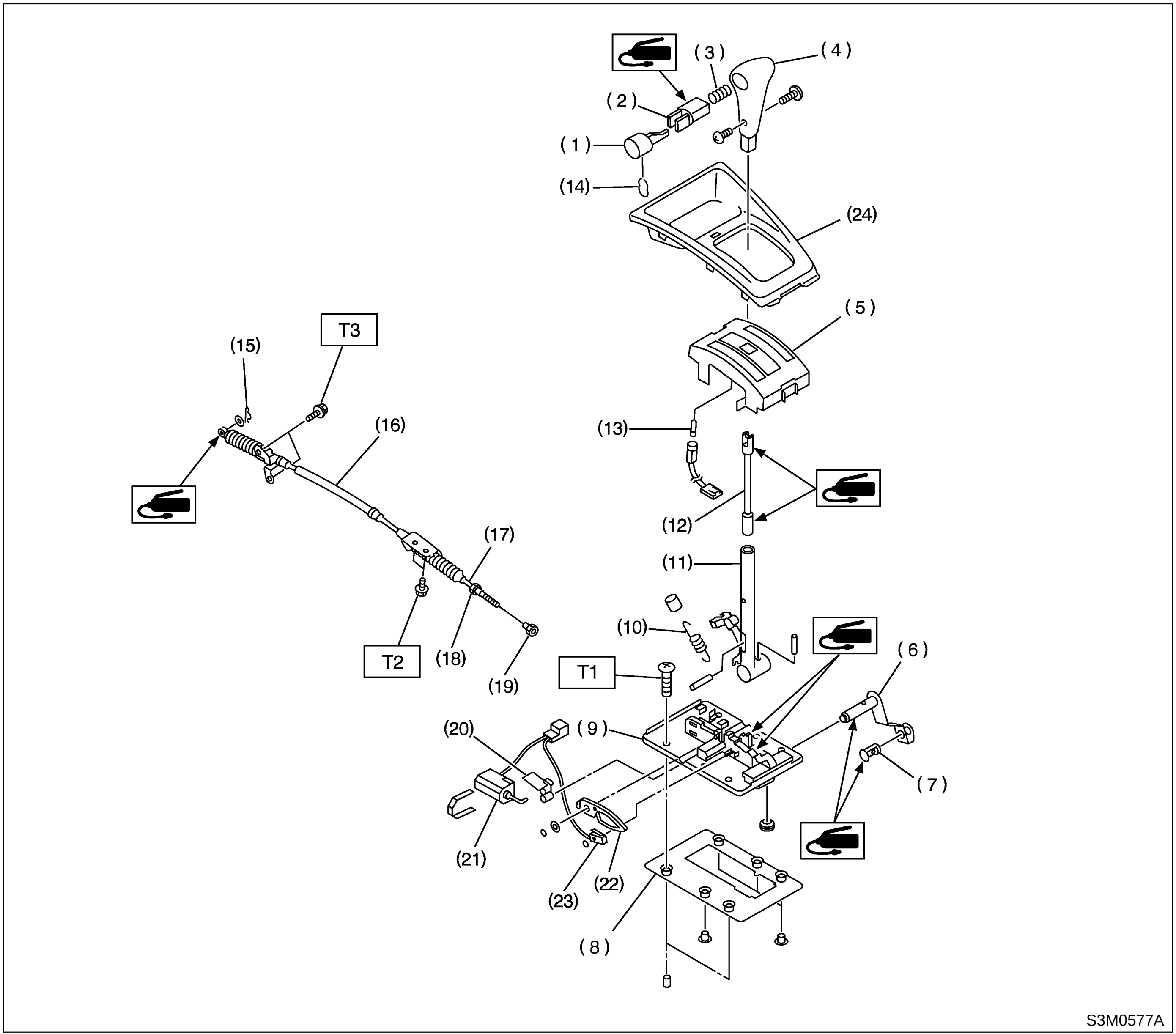
1. General Description S501001

A: SPECIFICATIONS S501001E49

Item		Specification
Vibration torque of rod against lever	N·m (kgf-m, ft-lb)	0.7 (0.07, 0.5) or less

B: COMPONENT *S501001A05*

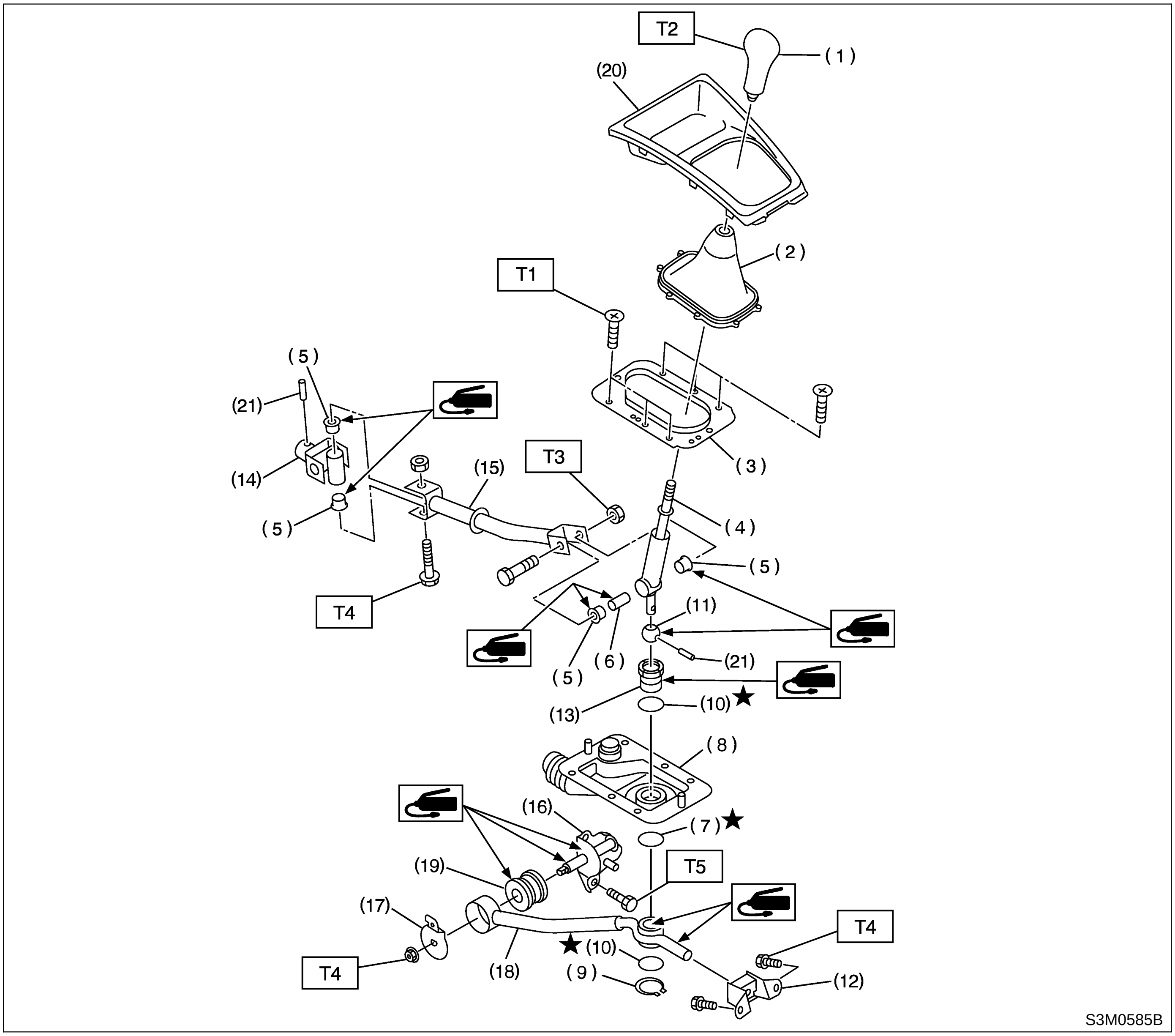
1. AT SELECT LEVER *S501001A0501*



(1) Button A
(2) Button B
(3) Spring (button)
(4) Grip
(5) Indicator cover
(6) Select lever lower
(7) Pin
(8) Packing
(9) Plate
(10) Detent spring
(11) Select lever upper
(12) Rod
(13) Indicator light bulb
(14) Clip
(15) Snap pin
(16) Outer cable
(17) Inner cable
(18) Nut (front)
(19) Nut (rear)
(20) Lock plate
(21) Shift-lock solenoid
(22) Lock arm
(23) “P” position switch
(24) Front cover

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.5 (0.46, 3.3)
T2: 18 (1.8, 13.0)
T3: 32 (3.3, 24)

2. MT GEAR SHIFT LEVER *S501001A0502*



(1) Gear shift knob
(2) Console boot
(3) Boot plate
(4) Lever
(5) Bushing A
(6) Spacer
(7) Locking wire
(8) Boot
(9) Snap ring
(10) O-ring
(11) Bushing A
(12) Cushion rubber
(13) Bushing B
(14) Joint
(15) Rod
(16) Bracket
(17) Washer
(18) Stay
(19) Bushing
(20) Front cover
(21) Spring pin

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.5 (0.46, 3.3)
T2: 5 (0.51, 3.7)
T3: 12 (1.2, 8.7)
T4: 18 (1.8, 13.0)
T5: 24.5 (2.50, 18.07)

C: CAUTION S501001A03

- 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.
- Use SUBARU genuine grease etc. or the equivalent. Do not mix grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply grease onto sliding or revolution surfaces before installation.
- Before installing O-rings or snap rings, apply sufficient amount of grease to avoid damage and deformation.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Before disconnecting electrical connectors, be sure to disconnect ground cable from battery.

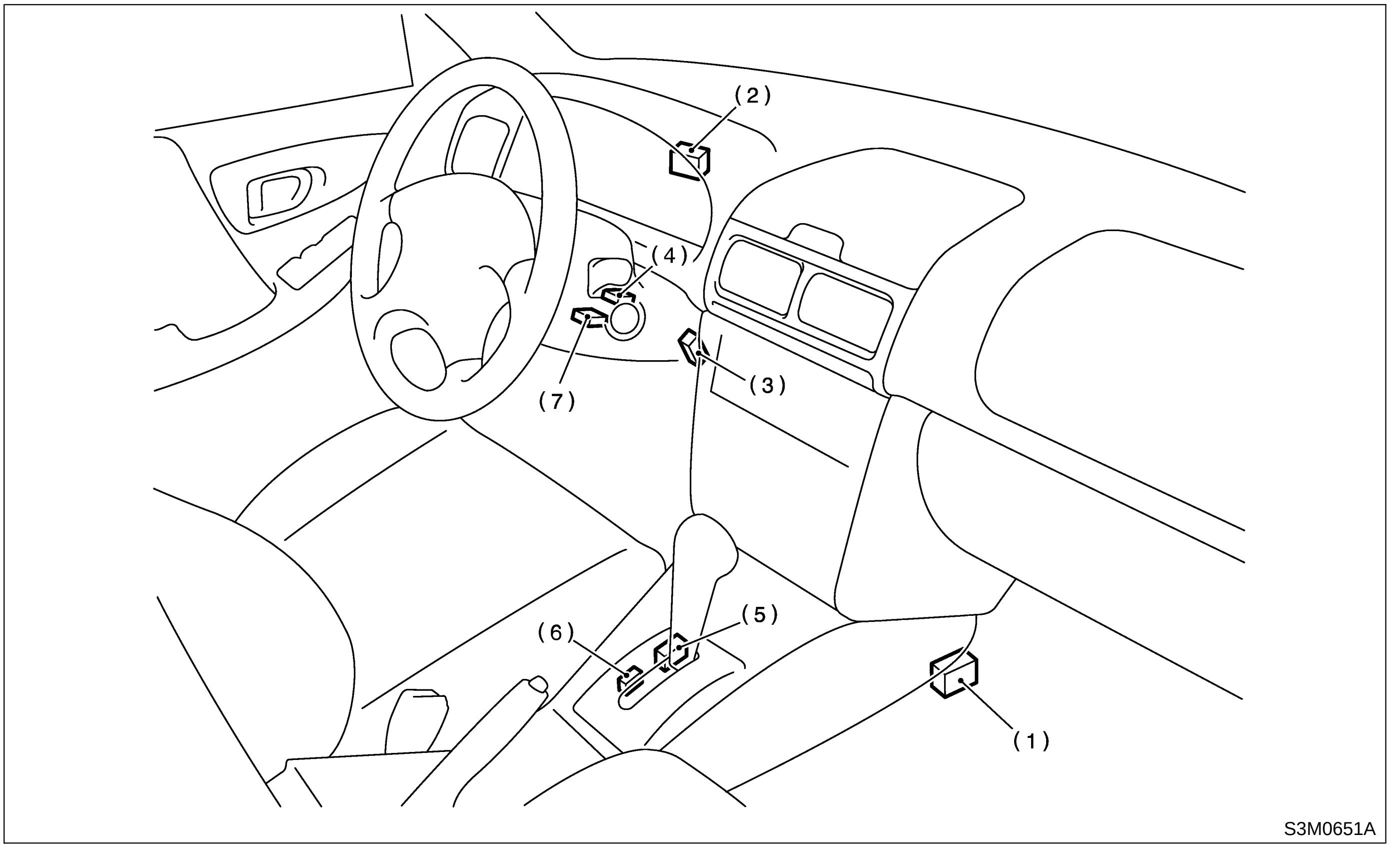
D: PREPARATION TOOL S501001A17

1. GENERAL PURPOSE TOOLS S501001A1701

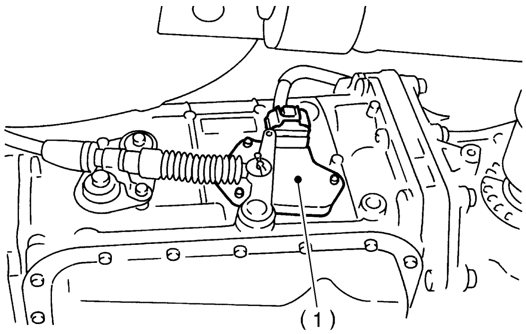
TOOL NAME	REMARKs
Circuit tester	Used for measuring resistance, voltage and ampere.

2. Electrical Component *S501547*

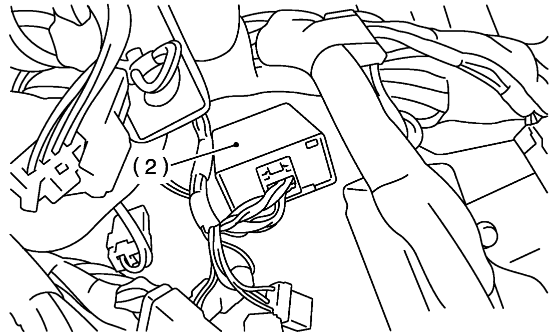
A: LOCATION *S501547A13*



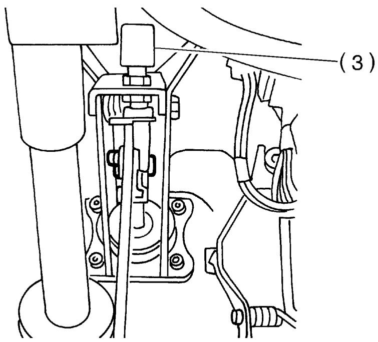
(1) Inhibitor switch
(2) AT shift control module
(3) Stop light switch
(4) Key warning switch
(5) Shift lock solenoid
(6) “P” position switch
(7) Key lock solenoid



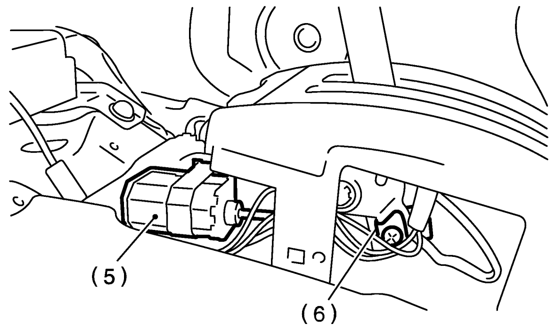
B2M2246E



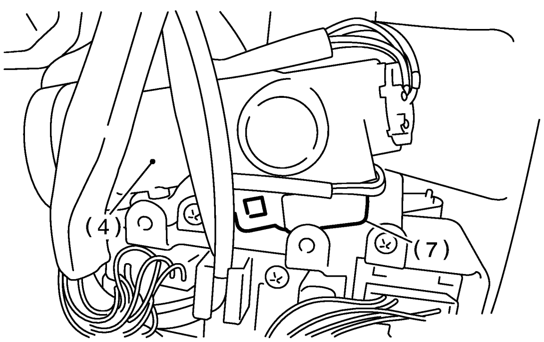
S3M0652A



B4M1747B



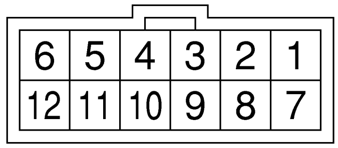
S3M0653A



B3M1860A

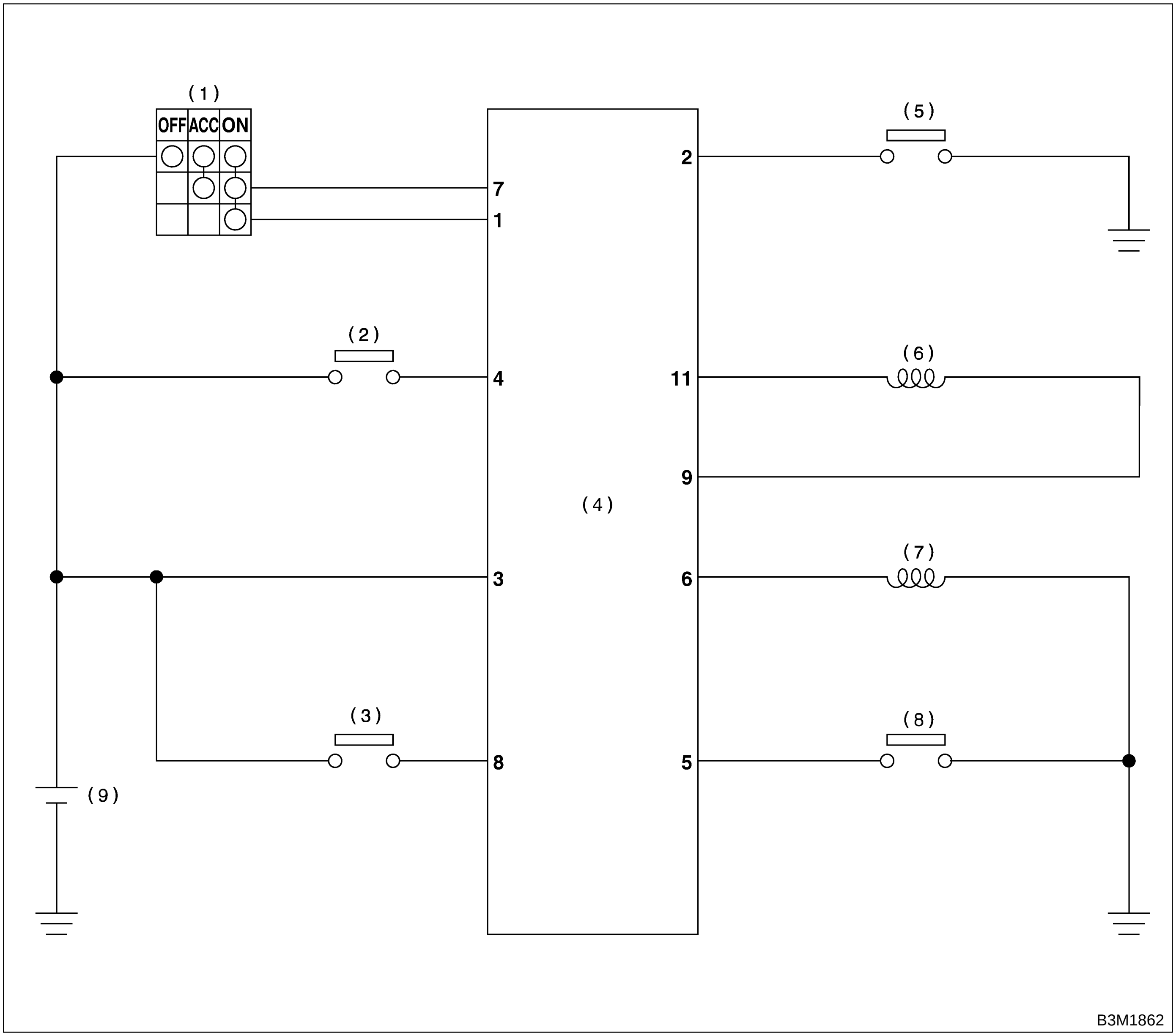
3. AT Shift Lock System S501240

A: ELECTRICAL SPECIFICATION S501240A08



Contents	Terminal No. (+) — (−)	Input/Output signal Measured value and measuring conditions
Battery power supply	3 — 10	10 — 15 V
Ignition power supply	1 — 10	10 — 15 V when ignition switch is ON or START.
Ignition power supply	7 — 10	10 — 15 V when ignition switch is ACC.
Inhibitor Switch (“P” position)	2 — 10	0 V when select lever is in “P” position. 5 - 7 V when select lever is in other positions than “P” position.
Stop light switch	4 — 10	10 - 15 V when stop light switch is ON. 0 V when stop light switch is OFF.
“P” position switch	5 — 10	0 V when select lever is in “P” position. 5 - 7 V when select lever is in other positions than “P” position.
Shift lock solenoid signal	6 — 10	10 - 15 V when shift lock is released. 0 V when shift lock is operating.
Key warning switch signal	8 — 10	10 - 15 V when key is inserted. 0 V when key is removed.
Key lock solenoid signal	9 — 10	8.5 — 15 V when turning ignition switch ON, select lever is in “P” position and brake switch is ON. 0 V at other conditions than above.
Key lock solenoid signal ground	11 — 10	0 V
Ground	10	—

B: SCHEMATIC *S501240A21*



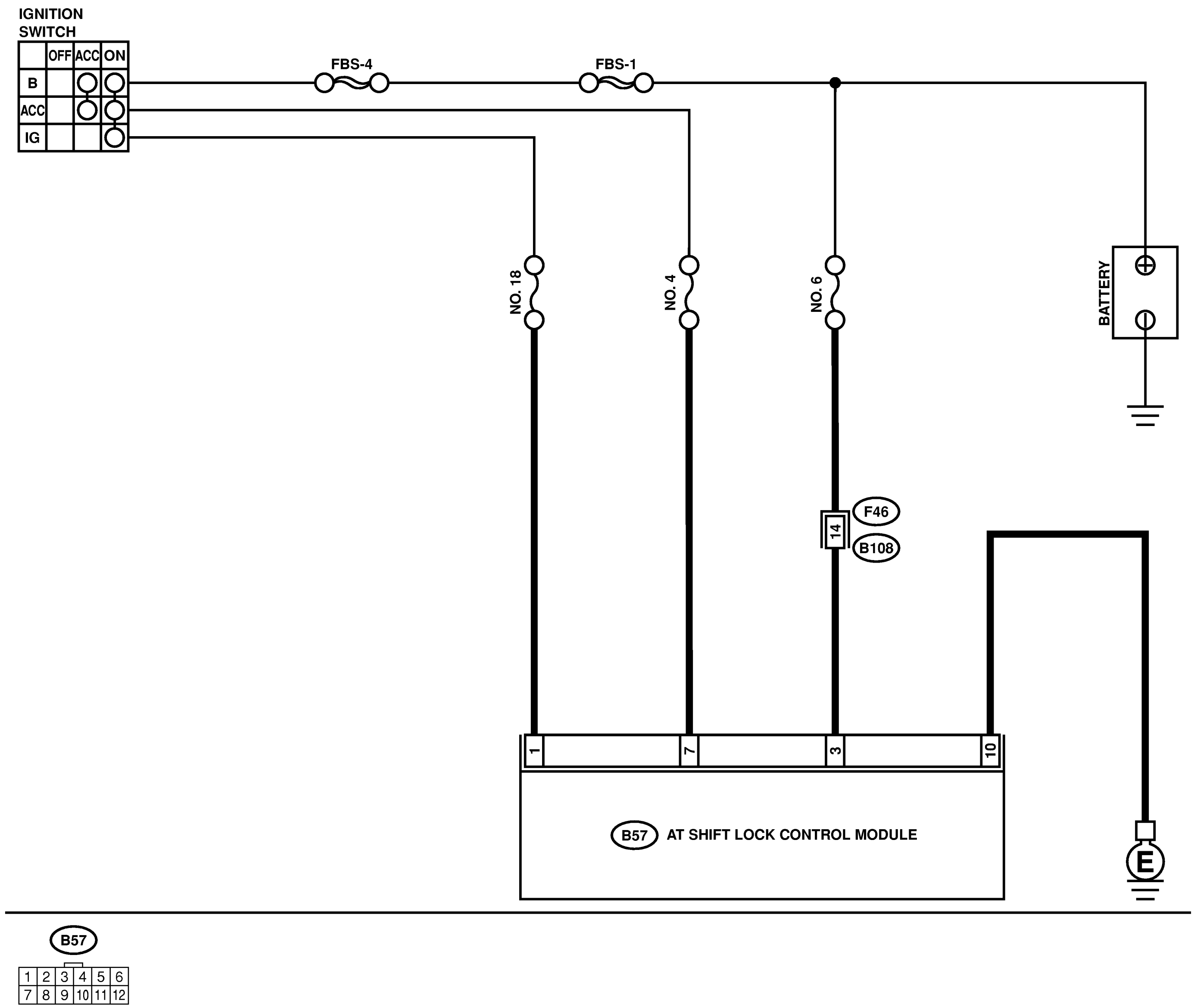
(1)	Ignition switch	(4)	AT shift lock control module	(7)	Shift lock solenoid
(2)	Stop light switch	(5)	Inhibitor switch	(8)	“P” position switch
(3)	Key warning switch	(6)	Key lock solenoid	(9)	Battery

C: INSPECTION *S501240A10*

No.	Step	Check	Yes	No
1	**CHECK SHIFT LOCK.** 1) Turn ignition switch ON. 2) Move select lever to “P” position.	While brake pedal is depressed, can select lever move from “P” rage to other positions?	Go to step **2**.	Inspect “SELECT LEVER CANNOT BE SHIFT LOCKED”. <Ref. to CS-13, SELECT LEVER CANNOT BE SHIFT LOCKED, INSPECTION, AT Shift Lock System.>
2	**CHECK SHIFT LOCK.**	While brake pedal is not depressed, can select lever move from “P” rage to other positions?	Inspect “SELECT LEVER SHIFT LOCK CANNOT BE RELEASED”. <Ref. to CS-15, SELECT LEVER SHIFT LOCK CANNOT BE RELEASED, INSPECTION, AT Shift Lock System.>	Go to step **3**.
3	**CHECK KEY INTER LOCK.**	When select lever is in other than “P” position, does ignition switch turn to “LOCK” position? Or when select lever is in “P” position, does ignition switch not turn to “LOCK” position?	Inspect “KEY INTERLOCK DOES NOT BE LOCKED OR RELEASED. <Ref. to CS-18, KEY INTERLOCK DOES NOT LOCK OR RELEASE, INSPECTION, AT Shift Lock System.>	AT shift lock system is normal.

1. AT SHIFT LOCK CONTROL MODULE POWER SUPPLY AND GROUND LINE S501240A1001

WIRING DIAGRAM:

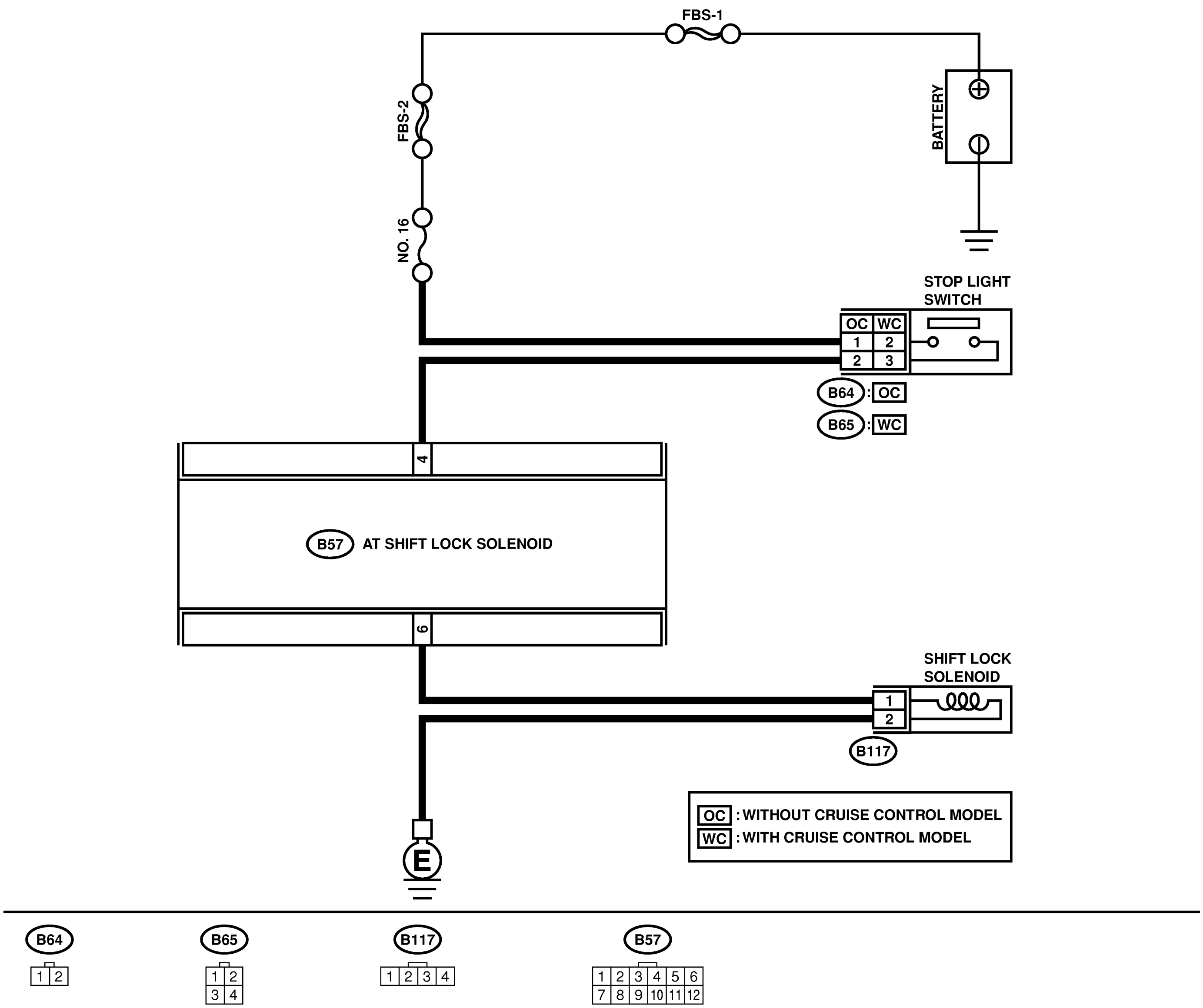


S3M0654

No.	Step	Check	Yes	No
1	**CHECK FUSE (No. 6).** 1) Remove the fuse (No. 6, 18 and 4).	Is the fuse (No. 6, 18 or 4) blown out?	Replace the fuse (No. 6, 18 or 4). If replace fuse (No. 6, 18 or 4) has blown out easily, repair short circuit in harness between fuse and AT shift lock control module.	Go to step **2**.
2	**CHECK HARNESS CONNECTOR BETWEEN AT SHIFT LOCK CONTROL MODULE AND CHASSIS GROUND.** 1) Turn ignition switch to OFF. 2) Measure the resistance of harness between AT shift lock control module and chassis ground. ***Connector & terminal*** ***(B57) No. 10 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair open circuit in harness between AT shift lock control module and body ground.
3	**CHECK BATTERY POWER SUPPLY.** 1) Measure the voltages between AT shift lock control module and chassis ground. ***Connector & terminal*** ***(B57) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **4**.	Repair open or short circuit harness between battery and AT shift lock control module, and poor contact in coupling connector.
4	**CHECK IGNITION POWER SUPPLY CIRCUIT.** 1) Turn ignition switch to ACC. 2) Measure the voltage between AT shift lock control module and chassis ground. ***Connector & terminal*** ***(B57) No. 7 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **5**.	Repair open or short circuit harness between battery and AT shift lock control module, and poor contact in coupling connector.
5	**CHECK IGNITION POWER SUPPLY CIRCUIT.** 1) Turn ignition switch to ON (engine OFF). 2) Measure the voltage between AT shift lock control module and chassis ground. ***Connector & terminal*** ***(B57) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **6**.	Repair open or short circuit harness between battery and AT shift lock control module, and poor contact in coupling connector.
6	**CHECK POOR CONTACT.**	Is there poor contact in power supply and ground line circuit?	Repair poor contact.	Replace AT shift lock control module.

2. SELECT LEVER CANNOT BE SHIFT LOCKED *S501240A1002*

WIRING DIAGRAM:



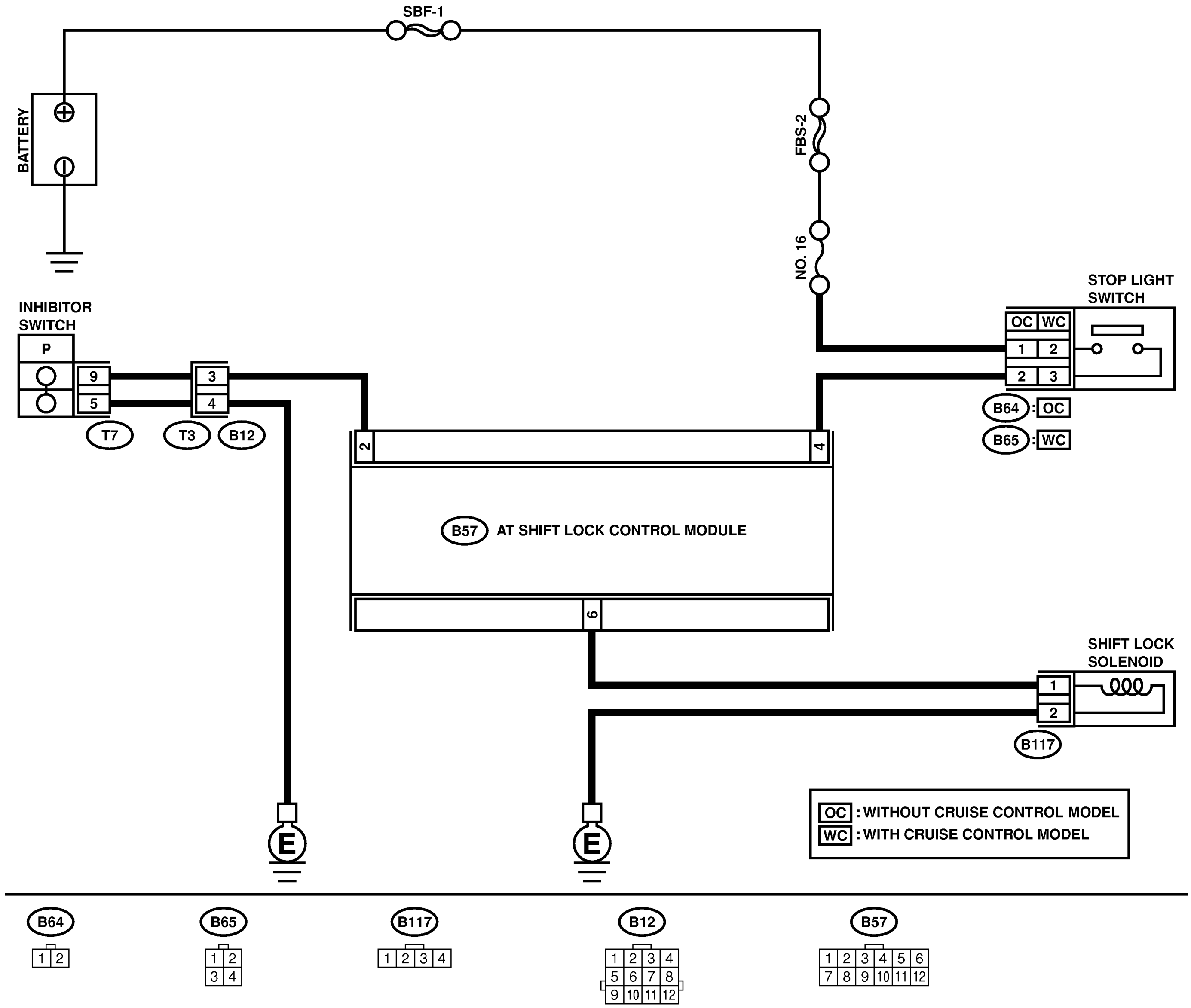
S3M0655

No.	Step	Check	Yes	No
1	**CHECK STOP LIGHT SWITCH.** Depress brake pedal.	Does stop light turn ON?	Go to step **2**.	Inspect stop light system.

No.	Step	Check	Yes	No
2	**CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND AT SHIFT LOCK CONTROL MODULE.** 1) Turn ignition switch to OFF. 2) Disconnect stop light switch and AT shift lock control module. 3) Measure the resistance of harness between stop light switch and AT shift lock control module. ***Connector & terminal*** ***Without cruise control model*** ***(B64) No. 2 — (B57) No. 4:*** ***With cruise control model*** ***(B65) No. 3 — (B57) No. 4:***	Is the resistance more than 1 MΩ?	Repair open circuit in harness between AT shift lock control module and stop light switch.	Go to step **3**.
3	**CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND AT SHIFT LOCK CONTROL MODULE.** 1) Measure the resistance of harness between stop light switch and chassis ground. ***Connector & terminal*** ***Without cruise control model*** ***(B64) No. 2 — Chassis ground:*** ***With cruise control model*** ***(B65) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Repair short circuit in harness between AT shift lock control module and stop light switch.
4	**CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND SHIFT LOCK SOLENOID.** 1) Disconnect shift lock solenoid connector. 2) Measure the resistance of harness between AT shift lock control module and shift lock solenoid. ***Connector & terminal*** ***(B117) No. 1 — (B57) No. 6:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair open circuit in harness between AT shift lock control module and shift lock solenoid.
5	**CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND SHIFT LOCK SOLENOID.** Measure the resistance of harness between shift lock solenoid and chassis ground. ***Connector & terminal*** ***(B117) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Repair short circuit in harness between AT shift lock control module and shift lock solenoid.
6	**CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND CHASSIS GROUND.** Measure the resistance of harness between shift lock solenoid and chassis ground. ***Connector & terminal*** ***(B117) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Repair open circuit in harness between shift lock solenoid and body ground.	Go to step **7**.
7	**CHECK SHIFT LOCK SOLENOID.** Measure the resistance of shift lock solenoid connector terminals. ***Terminal*** ***No. 1 — No. 2:***	Is the resistance between 10 and 20 Ω?	Go to step **8**.	Replace shift lock solenoid.
8	**CHECK SHIFT LOCK SOLENOID.** Connect battery with shift lock solenoid connector terminal and operate solenoid. ***Terminal*** ***No. 1 (+) — No. 2 (−):***	Does shift lock solenoid operate properly?	Go to step **9**.	Replace shift lock solenoid.
9	**CHECK POOR CONTACT.**	Is there poor contact in key lock circuit?	Repair poor contact.	Replace AT shift lock control module.

3. SELECT LEVER SHIFT LOCK CANNOT BE RELEASED S501240A1003

WIRING DIAGRAM:



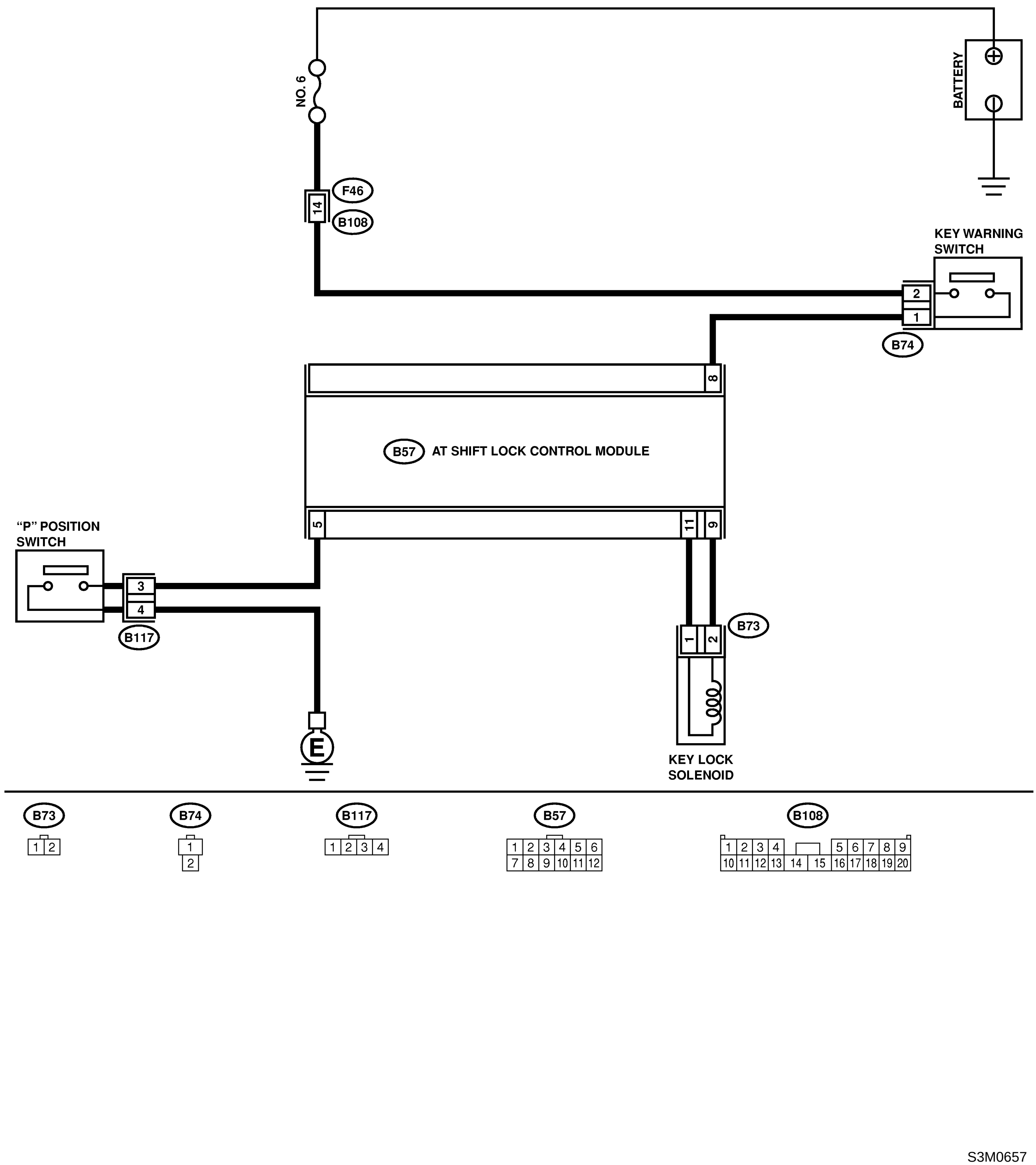
S3M0656

No.	Step	Check	Yes	No
1	**CHECK INHIBITOR SWITCH.** 1) Turn ignition switch to ON (engine OFF). 2) Move select lever from “P” to “1” range.	Combination meter indicator lamp and select lever “P”, “R”, “N”, “3”, “2” and “1” are correctly matched?	Go to step **2**.	Adjust inhibitor switch and select cable.
2	**CHECK HARNESS BETWEEN INHIBITOR SWITCH AND AT SHIFT LOCK CONTROL MODULE.** 1) Turn ignition switch to OFF. 2) Disconnect connector transmission harness and AT shift lock control module. 3) Measure the resistance of harness between AT shift lock control module and chassis ground. ***Connector & terminal*** ***(B57) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair short circuit in harness between AT shift lock control module and transmission connector.
3	**CHECK HARNESS BETWEEN INHIBITOR SWITCH AND AT SHIFT LOCK CONTROL MODULE.** Measure the resistance of harness between AT shift lock control module and inhibitor switch. ***Connector & terminal*** ***(B12) No. 3 — (B57) No. 2:***	Is the resistance more than 1 MΩ?	Repair open circuit in harness between AT shift lock control module and transmission connector.	Go to step **4**.
4	**CHECK HARNESS BETWEEN INHIBITOR SWITCH AND BODY GROUND.** 1) Measure the resistance of harness between AT shift lock control module and chassis ground. ***Connector & terminal*** ***(B12) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Repair open circuit in harness between transmission connector and chassis ground.	Go to step **5**.
5	**CHECK INHIBITOR SWITCH.** 1) Move select lever to “P” position. 2) Measure the resistance of transmission harness connector terminals. ***Connector & terminal*** ***(T3) No. 3 — No. 4:***	Is the resistance more than 1 MΩ?	Repair or replace inhibitor switch.	Go to step **6**.
6	**CHECK OUTPUT SIGNAL FOR AT SHIFT LOCK CONTROL MODULE.** 1) Connect all connectors. 2) Turn ignition switch to ON. 3) Measure the voltage between AT shift lock control module and chassis ground. ***Connector & terminal*** ***(B57) No. 2 (+) — Chassis ground (−):***	Is the voltage between 5 and 7 V?	Go to step **7**.	Go to step **15**.
7	**CHECK STOP LIGHT SWITCH.** 1) Turn ignition switch to ON (engine OFF). 2) Depress brake pedal.	Does stop light turn on?	Go to step **8**.	Inspect stop light system.
8	**CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND AT SHIFT LOCK CONTROL MODULE.** 1) Press brake pedal. 2) Measure the voltage between AT shift lock control module and chassis ground. ***Connector & terminal*** ***(B57) No. 4 — Chassis ground:***	Is the voltage more than 10 V?	Go to step **9**.	Repair open or short circuit in harness between AT shift lock control module and stop light switch.

No.	Step	Check	Yes	No
9	**CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND SHIFT LOCK SOLENOID.** 1) Turn ignition switch to OFF. 2) Disconnect connector from shift lock solenoid. 3) Measure the resistance of harness between shift lock solenoid and AT shift lock control module. ***Connector & terminal*** ***(B57) No. 6 — (B117) No. 1:***	Is the resistance more than 1 MΩ?	Repair open circuit in harness between AT shift lock control module and shift lock solenoid.	Go to step **10**.
10	**CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND SHIFT LOCK SOLENOID.** Measure the resistance of harness between shift lock solenoid and chassis ground. ***Connector & terminal*** ***(B57) No. 6 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **11**.	Repair short circuit in harness between AT shift lock control module and shift lock solenoid.
11	**CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND CHASSIS GROUND.** Measure the resistance of harness between shift lock solenoid and chassis ground. ***Connector & terminal*** ***(B117) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Repair open circuit in harness between shift lock solenoid and chassis ground.	Go to step **12**.
12	**CHECK SHIFT LOCK SOLENOID.** Measure the resistance of shift lock solenoid connector terminals. ***Terminal*** ***No. 1 — No. 2:***	Is the resistance between 10 and 20 Ω?	Go to step **13**.	Replace shift lock solenoid.
13	**CHECK SHIFT LOCK SOLENOID.** Connect battery with shift lock solenoid connector terminal and operate solenoid. ***Terminal*** ***No. 1 (+) — No. 2 (−):***	Is shift lock solenoid operating properly?	Go to step **14**.	Replace shift lock solenoid.
14	**CHECK OUTPUT SIGNAL FOR AT SHIFT LOCK CONTROL MODULE.** 1) Turn ignition switch to ON (engine OFF). 2) Measure the voltage between AT shift lock control module and chassis ground. ***Connector & terminal*** ***(B57) No. 6 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **15**.	Replace AT shift lock control module.
15	**CHECK POOR CONTACT.**	Is there poor contact in key lock circuit?	Repair poor contact.	Replace AT shift lock control module.

4. KEY INTERLOCK DOES NOT LOCK OR RELEASE *S501240A1004*

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN BATTERY AND KEY WARNING SWITCH.** 1) Disconnect connector key warning switch. 2) Measure the voltage of harness between key warning switch and chassis ground. ***Connector & terminal*** ***(B74) No. 2 — Chassis ground:***	Is the voltage more than 10 V?	Go to step **2**.	Repair open or short circuit in harness between battery and key waring switch.
2	**CHECK KEY WARNING SWITCH.** Measure the resistance of stop key warning connector terminals. ***Terminal*** ***No. 1 — No. 2:***	Is the resistance more than 1 MΩ?	Replace key warning switch.	Go to step **3**.
3	**CHECK KEY WARNING SWITCH.** 1) Remove key. 2) Measure the resistance of stop key warning connector terminals. ***Terminal*** ***No. 1 — No. 2:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Replace key warning switch.
4	**CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND KEY WARNING SWITCH.** 1) Disconnect AT shift lock control module. 2) Connect key warning switch. 3) Install key. 4) Measure the voltage of harness between AT shift lock control module and chassis ground. ***Connector & terminal*** ***(B57) No. 8 — Chassis ground:***	Is the resistance more than 10 V?	Go to step **5**.	Repair open or short circuit in harness between AT shift lock control module and key warning switch.
5	**CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND KEY LOCK SOLENOID.** 1) Disconnect connector from key lock solenoid. 2) Measure the resistance of harness between AT shift lock control module and key lock solenoid. ***Connector & terminal*** ***(B73) No. 2 — (B57) No. 9:***	Is the resistance more than 1 MΩ?	Repair open circuit in harness between AT shift lock control module and key lock solenoid.	Go to step **6**.
6	**CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND KEY LOCK SOLENOID.** Measure the resistance of harness between AT sift lock control module and chassis ground. ***Connector & terminal*** ***(B57) No. 9 — Chassis ground:***	Is the resistance less than 1 Ω?	Repair short circuit in harness between AT shift lock control module and key lock solenoid.	Go to step **7**.
7	**CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND KEY LOCK SOLENOID.** Measure the resistance of harness between AT shift lock control module and key lock solenoid. ***Connector & terminal*** ***(B73) No. 1 — (B57) No. 11:*** ***(B73) No. 2 — (B57) No. 9:***	Is the resistance more than 1 MΩ?	Repair open circuit in harness between AT shift lock control module and key lock solenoid.	Go to step **8**.

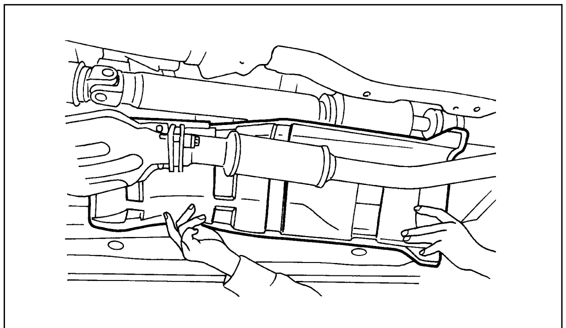
No.	Step	Check	Yes	No
8	**CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND KEY LOCK SOLENOID.** Measure the resistance of harness between key lock solenoid and chassis ground. ***Connector & terminal*** ***(B57) No. 11 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **9**.	Repair short circuit in harness between AT shift lock control module and key lock solenoid.
9	**CHECK KEY LOCK SOLENOID.** Measure the resistance of key lock solenoid connector terminals. ***Connector & terminal*** ***(B73) No. 1 — No. 2:***	Is the resistance between 4 and 8 Ω?	Go to step **10**.	Replace key lock solenoid.
10	**CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND “P” POSITION SWITCH.** 1) Disconnect connector from “P” position switch. 2) Measure the resistance of harness between AT shift lock control module and “P” position switch. ***Connector & terminal*** ***(B117) No. 3 — (B57) No. 5:***	Is the resistance more than 1 MΩ?	Repair open circuit in harness between AT shift lock control module and “P” position switch.	Go to step **11**.
11	**CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND “P” POSITION SWITCH.** Measure the resistance of harness between AT shift lock control module and chassis ground. ***Connector & terminal*** ***(B117) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **12**.	Repair open circuit harness between AT shift lock control module and “P” position switch.
12	**CHECK HARNESS BETWEEN “P” POSITION SWITCH AND CHASSIS GROUND.** Measure the resistance of harness between shift lock solenoid and “P”position switch. ***Connector & terminal*** ***(B117) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Repair open circuit in harness between “P” position switch and body ground.	Go to step **13**.
13	1) Move the select lever to “P” position. 2) Measure resistance between “P” position switch connector terminals. ***Terminal*** ***No. 3 — No. 4:***	Is the resistance less than 1 Ω?	Go to step **14**.	Replace the “P” position switch.
14	1) Move the select lever to other than “P” position. 2) Measure resistance between “P” position switch connector terminals. ***Terminal*** ***No. 3 — No. 4:***	Is the resistance more than 1 MΩ?	Go to step **15**.	Replace the “P” position switch.
15	**CHECK OUTPUT SIGNAL FOR AT SHIFT LOCK CONTROL MODULE.** 1) Turn ignition switch to ON (engine OFF). 2) Measure the voltage between AT shift lock control module and chassis ground. ***Connector & terminal*** ***(B57) No. 5 (+) — Chassis ground (−):***	Is the voltage between 5 and 7 V?	Go to step **16**.	Replace AT sift lock control module.

No.	Step	Check	Yes	No
16	**CHECK OUTPUT SIGNAL FOR AT SHIFT LOCK CONTROL MODULE.** 1) Turn ignition to ON (engine OFF). 2) Move select lever to “P” position. 3) Press brake pedal. 4) Measure the voltage of AT shift lock control module and chassis ground. ***Connector & terminal*** ***(B57) No. 9 (+) — Chassis ground (−):***	Is the voltage 8.5 and 15 V?	Go to step **17**.	Replace AT shift lock control module.
17	**CHECK POOR CONTACT.**	Is there poor contact in AT sift lock circuit?	Repair poor contact.	Replace AT sift lock control module.

4. Select Lever S501548

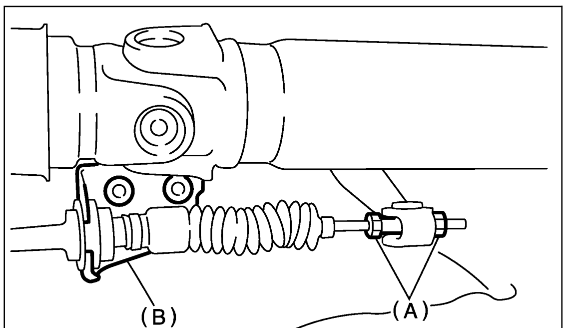
A: REMOVAL S501548A18

1) Set vehicle on a lift.
2) Disconnect ground cable from battery.
3) Move the select lever to the “N” position.
4) Remove heat shield cover.



S3M0025

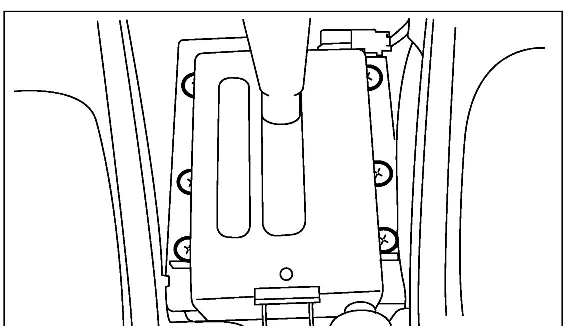
5) Disconnect cable from select lever and then remove cable bracket.



B3M1795A

(A) Adjusting nuts
(B) Cable bracket

6) Remove console box. <Ref. to EI-33, REMOVAL, Console Box.>
7) Disconnect the connectors, then remove the bolts to take out the select lever assembly from the body.

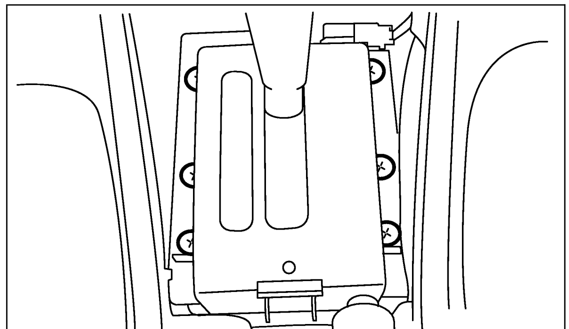


S3M0539

B: INSTALLATION S501548A11

1) Mount the select lever onto the vehicle body.
2) Tighten the bolts to install the select lever to the vehicle body, then connect connector.

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)



S3M0539

3) Install console box.
4) Set location of select lever at “N” position.
5) Set location of select arm installed on the transmission body at “N” position.
6) Insert the thread portion of the other inner cable and into the connector hole of the select lever, and fix the other outer cable end to the bracket.

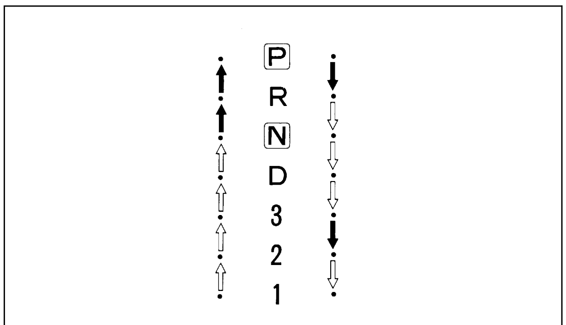
Tightening torque (Cable bracket):
18 N·m (1.8 kgf-m, 13.0 ft-lb)

7) Adjust the select cable. <Ref. to CS-27, ADJUSTMENT, Select Cable.>

8) Check the following items.
(1) The engine starts operating when select lever is in position “P” or “N”, but not in other positions.
(2) The back-up light is lit when the select lever is in position “R”, but not in other positions.
(3) Check select lever operation.

WARNING:
Stop the engine while checking operation of select lever.

- Check that select lever does not move from “N” to “R” without pushing the button.
- Check that select lever does not move from “R” to “P” without pushing the button.
- Check that select lever does not move from “P” to “R” without pushing the button.
- Check that select lever does not move from “3” to “2” without pushing the button.

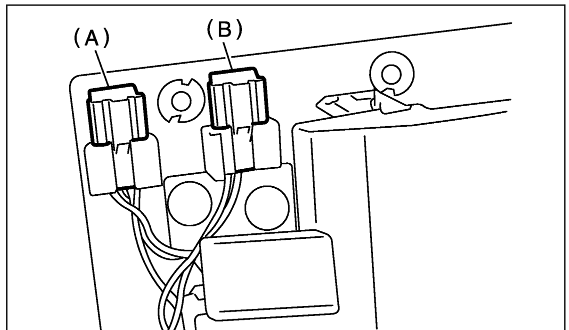


G3M0717

9) Check shift-lock system.
(1) Ensure ignition switch rotates from “ACC” to “LOCK” when the select lever is set at “P”. Also check that ignition key can be removed only from the “LOCK” position.
(2) Ensure select lever moves from “P” to any other position when the brake pedal is depressed with ignition key set at “ON” or “START”.

C: DISASSEMBLY S501548A06

1) Remove connectors from plate

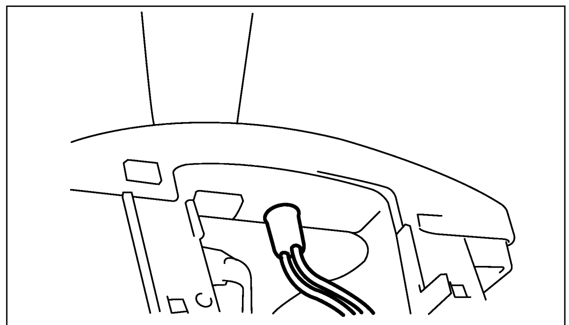


S3M0578A

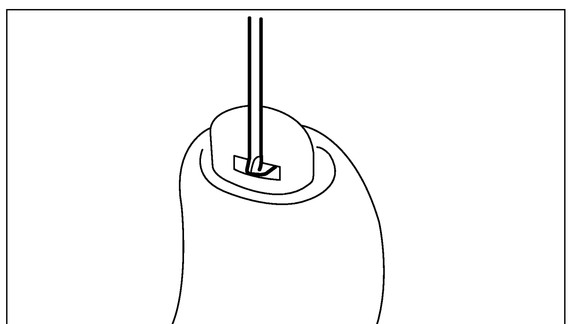
(A) Shift-lock solenoid and “P” position switch connector
(B) Indicator light connector

2) Remove indicator light.

NOTE:
Be careful not to break the indicator light during removal.


S3M0541

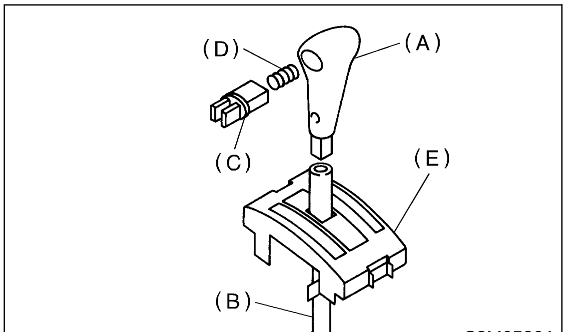
3) Remove the clip.


S3M0579

4) Remove the button A.
5) Remove the two screws from the select lever grip.

6) While pressing the select lever button B, remove the select lever grip and indicator cover from the upper select lever, and then remove the select lever button and spring.

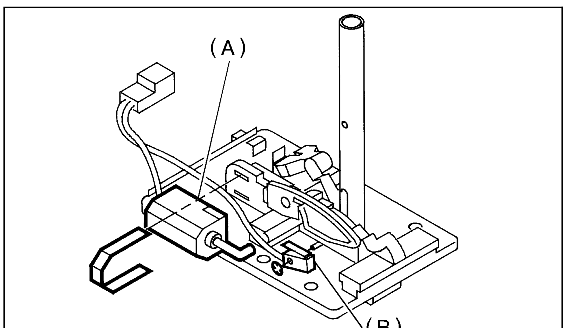
CAUTION:
Position the select lever grip carefully so that the select lever button does not jump out.



S3M0580A

(A) Select lever grip
(B) Upper select lever
(C) Button B
(D) Spring
(E) Indicator

7) Remove shift-lock solenoid and "P" position switch.

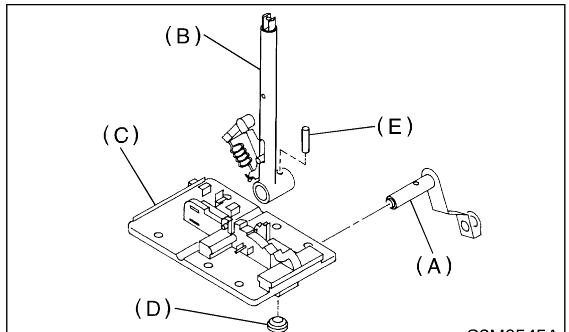


S3M0018B

(A) Shift-lock solenoid
(B) "P" position switch

8) Remove lock plate.
9) Remove the cap, then the straight pin.

10) Remove the lower select lever, and then lift the upper select lever from the plate.



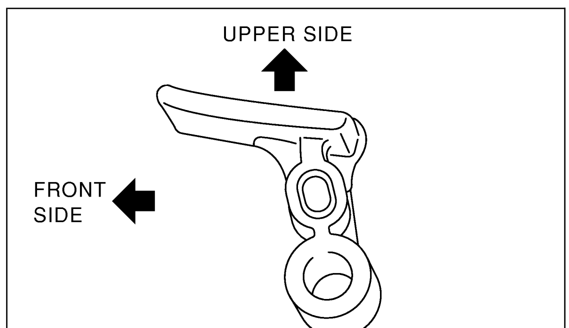
S3M0545A

(A) Lower select lever
(B) Upper select lever
(C) Plate
(D) Cap
(E) Straight pin

D: ASSEMBLY S501548A02

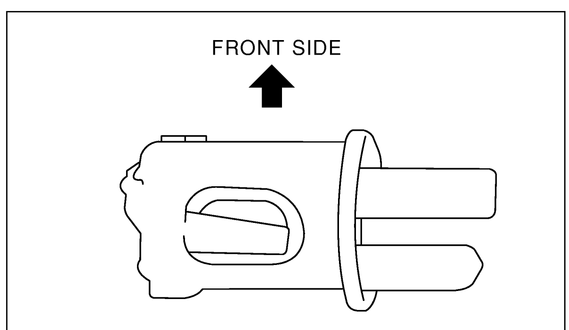
1) Clean all parts before assembly.
2) Apply grease [NIGTIGHT LYW No. 2 or equivalent] to each part. <Ref. to CS-3, COMPONENT, General Description.>
3) Assemble in the reverse order of disassembly.

NOTE:
- When installing the lock plate, be careful to position it in the correct direction.



S3M0583A

- Be careful to install the spring and button into the select lever grip in the correct direction.



S3M0547A

4) After completing the fitting, transfer the select lever to position “P”—“1”, then check whether the indicator and select lever agree, whether the pointer and select lever agree, and what the operating force is.

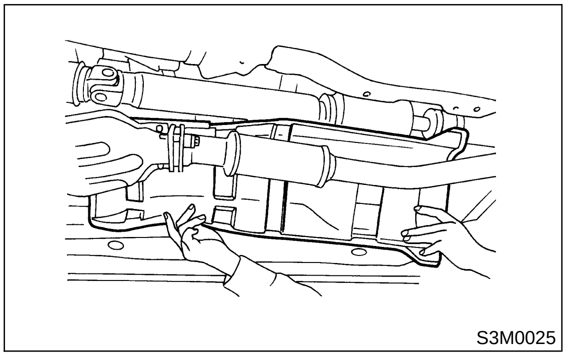
E: INSPECTION *S501548A10*

1) Inspect removed parts by comparing with new ones for deformation, damage and wear. Correct or replace if defective.
2) Confirm the following parts for operating condition before assembly.
   (1) Sliding condition of the button in the grip: it should move smoothly.
   (2) Insertion of the grip on the select lever: when pushing the grip on the select lever by hand, screw holes should be aligned.
   (3) Operation of select lever and rod: they should move smoothly.
3) Inspect “P” position switch and shift lock solenoid. <Ref. to CS-30, INSPECTION, AT Shift Lock Solenoid and “P” Position Switch.>

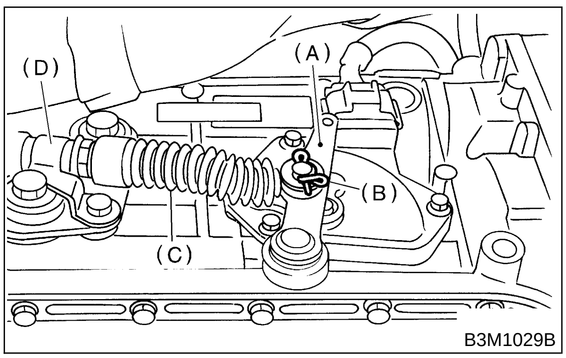
5. Select Cable S501549

A: REMOVAL S501549A18

1) Prior to removal, set lever to "N" position.
2) Remove heat shield cover.

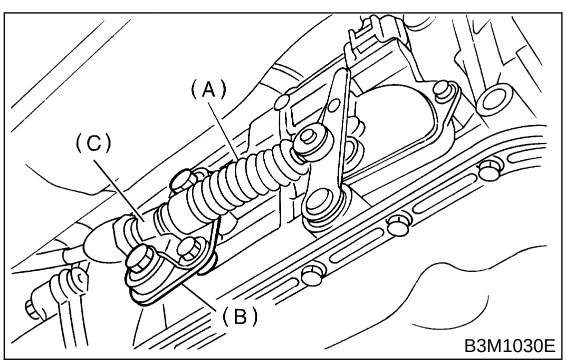


3) Remove snap pin from range select lever.



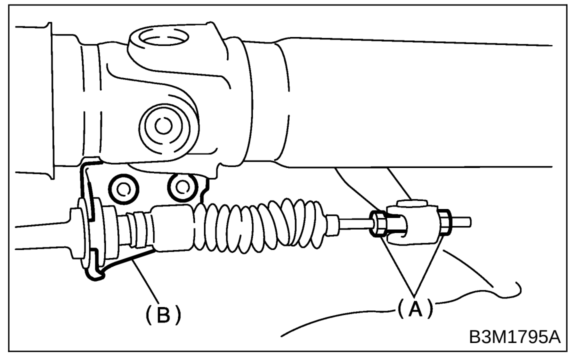
(A) Range select lever
(B) Snap pin
(C) Select cable
(D) Clamp

4) Remove plate assembly from transmission case.



(A) Select cable
(B) Plate ASSY
(C) Clamp

5) Disconnect cable from select lever and then remove cable bracket.



(A) Adjusting nuts
(B) Cable bracket

6) Remove select cable from plate assembly.

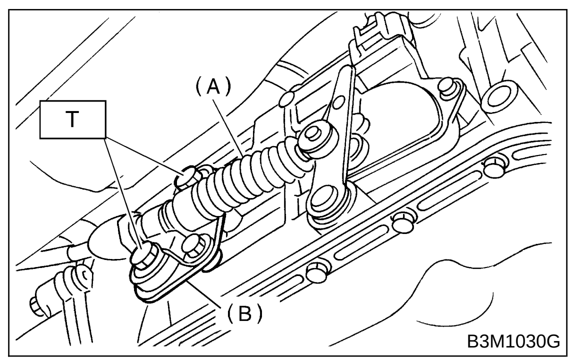
B: INSTALLATION S501549A11

1) Install select cable to plate assembly.

Tightening torque:
32 N·m (3.3 kgf-m, 24 ft-lb)

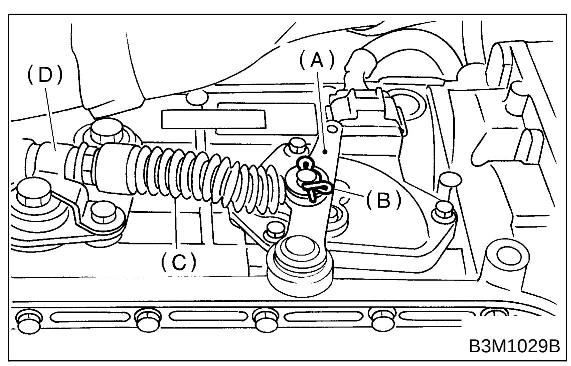
2) Install select cable to range select lever.
3) Install plate assembly to transmission.

Tightening torque:
T: 24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



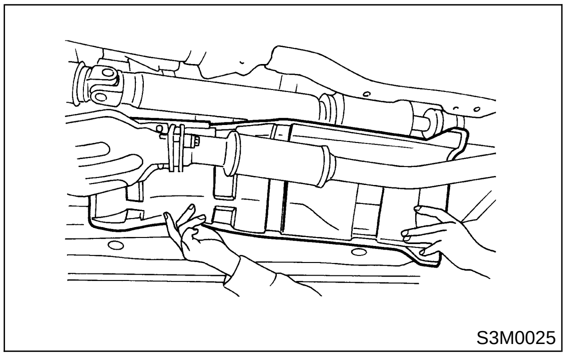
(A) Select cable
(B) Plate ASSY

4) Install snap pin to range select lever.



(A) Range select lever
(B) Snap pin
(C) Select cable
(D) Clamp

5) Move the select lever to the “N” position, then adjust the select cable position. <Ref. to CS-27, ADJUSTMENT, Select Cable.>
6) Install heat shield cover.

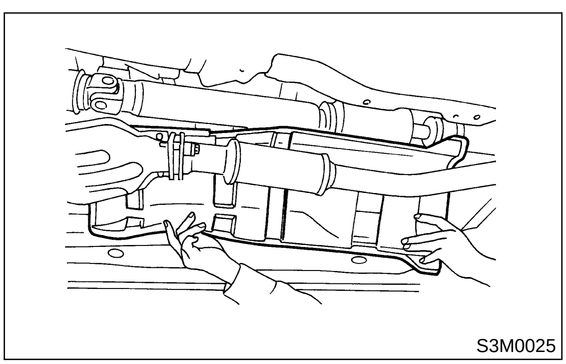


C: INSPECTION S501549A10

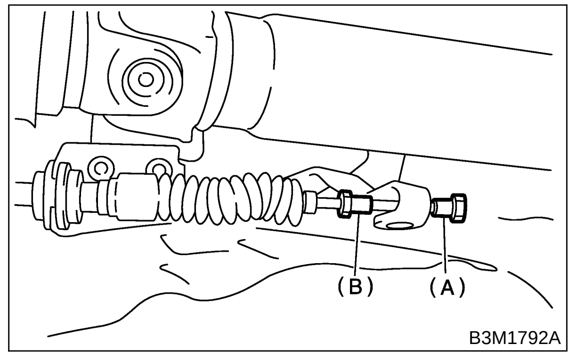
Check the removed cable and replace if damaged, rusty, or malfunctioning.
1) Check for smooth operation of the cable.
2) Check the inner cable for damage and rust.
3) Check the outer cable for damage, bends, and cracks.
4) Check the boot for damage, cracks, and deterioration.
5) Move select lever from “P” position to “1” position. You should be able to feel the detentes in each position. If the detentes cannot be felt or the position pointer is improperly aligned, adjust the cable.

D: ADJUSTMENT S501549A01

1) Prior to removal, set lever to “N” position.
2) Lift-up the vehicle.
3) Remove heat shield cover.

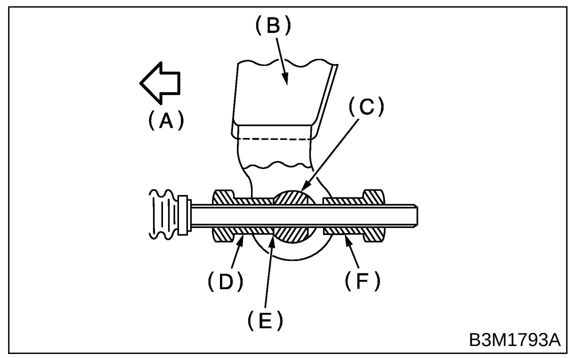


4) Loosen the adjusting nut on each side.



(A) Adjusting nut A
(B) Adjusting nut B

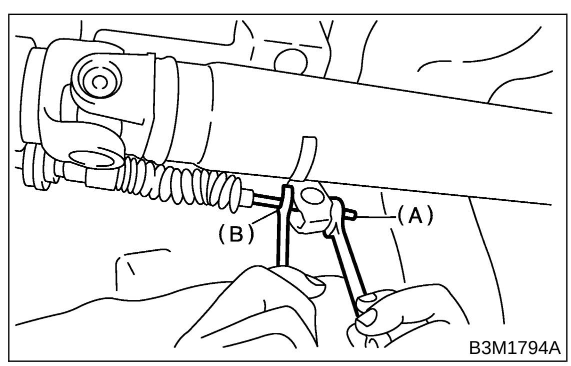
5) Turn adjusting nut B until it lightly touches the connector.



(A) Front side
(B) Select lever
(C) Connector
(D) Adjusting nut B
(E) Contact point
(F) Adjusting nut A

6) While preventing adjusting nut B from moving with a wrench, tighten adjusting nut A.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



(A) Adjusting nut A
(B) Adjusting nut B

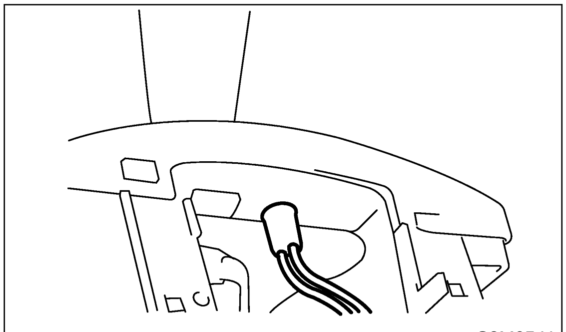
7) After completion of fitting, make sure that the select lever operates smoothly all across the operating range.

6. AT Shift Lock Solenoid and “P” Position Switch S501234

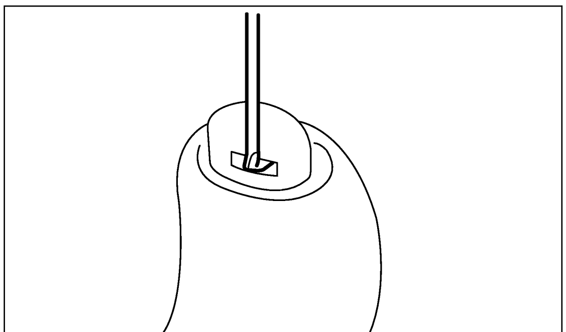
A: REMOVAL S501234A18

1) Disconnect battery ground cable.
2) Remove the console box. <Ref. to EI-33, REMOVAL, Console Box.>
3) Disconnect the connector.
4) Remove indicator light.

NOTE:
Be careful not to break the indicator light during removal.

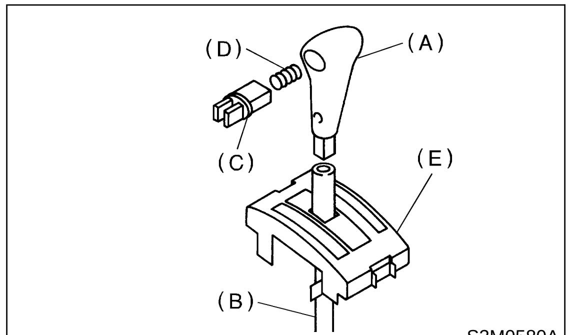

S3M0541

5) Remove the clip.


S3M0579

6) Remove button A.
7) Remove the screws from the select lever grip.
8) Remove retainer spring, then pull up select lever grip with indicator cover for holding select lever button.

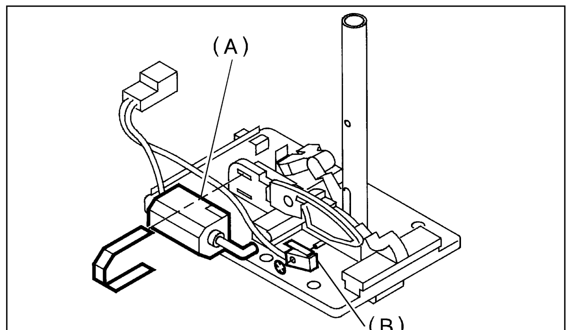
CAUTION:
Pull the select lever grip carefully so that the select lever button may not jump out.



S3M0580A

(A) Select lever grip
(B) Upper select lever
(C) Button B
(D) Spring
(E) Indicator

9) Remove shift-lock solenoid and “P” position switch.



S3M0018B

(A) Shift-lock solenoid
(B) “P” position switch

B: INSTALLATION S501234A11

Install in the reverse order of removal.

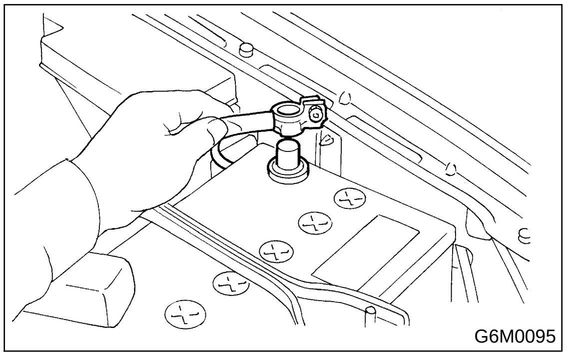
C: INSPECTION *S501234A10*

No.	Step	Check	Yes	No
1	**CHECK SHIFT LOCK SOLENOID.** Measure resistance of shift lock solenoid connector terminals. ***Terminal*** ***No. 1 — No. 2:***	Is the resistance between 10 and 20 Ω?	Go to step **2**.	Replace shift lock solenoid and “P” position switch assembly.
2	**CHECK SHIFT LOCK SOLENOID.** Connect battery with shift lock solenoid connector terminal, operate solenoid. ***Terminal*** ***No. 1 (+) — No. 2 (−):***	Is shift lock solenoid operating properly?	Go to step **3**.	Replace shift lock solenoid and “P” position switch assembly.
3	**CHECK “P” POSITION SWITCH.** When “P” position switch is turned ON, measure resistance between connectors. ***Terminal*** ***No. 3 — No. 4:***	When “P” position switch is ON, is resistance less than 1 Ω?	Go to step **4**.	Replace shift lock solenoid and “P” position switch assembly.
4	**CHECK “P” POSITION SWITCH.** When “P” position switch is turned OFF, measure resistance between connectors. ***Terminal*** ***No. 3 — No. 4:***	When “P” position switch is OFF, is resistance more than 1 MΩ?	Normal	Replace shift lock solenoid and “P” position switch assembly.

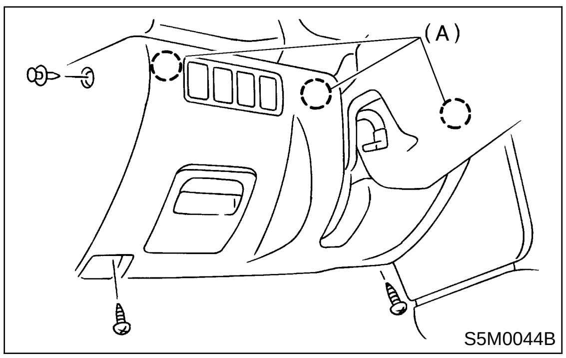
7. AT Shift Lock Control Module *S501237*

A: REMOVAL *S501237A18*

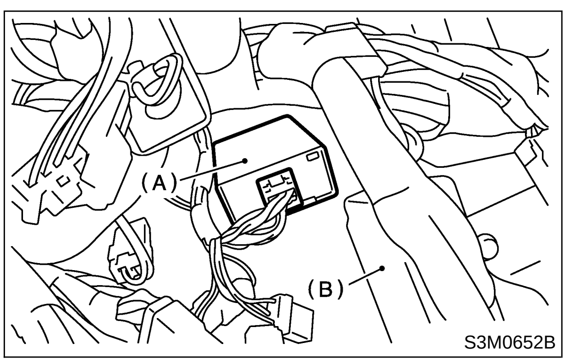
1) Disconnect battery ground cable.



2) Remove the lower cover and then disconnect connector.



3) Disconnect connector from AT shift lock control module.



(A) AT shift lock control module
(B) TCM

4) Remove the AT shift lock control module.

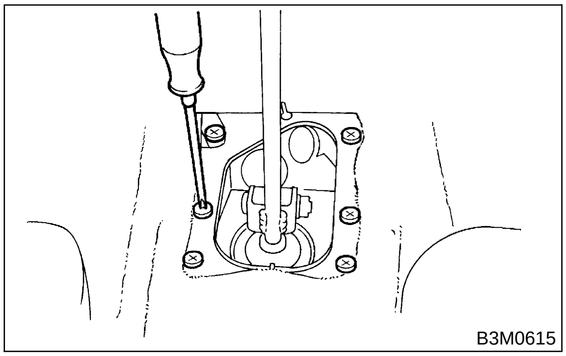
B: INSTALLATION *S501237A11*

Install in the reverse order of removal.

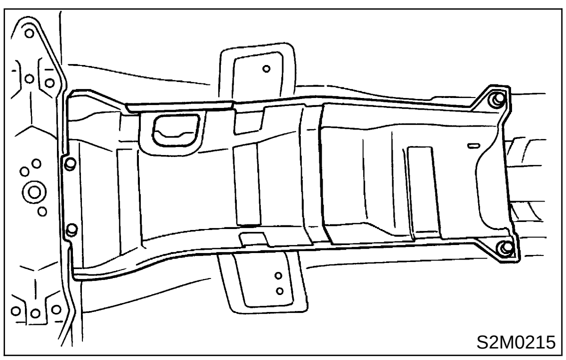
8. MT Gear Shift Lever S501236

A: REMOVAL S501236A18

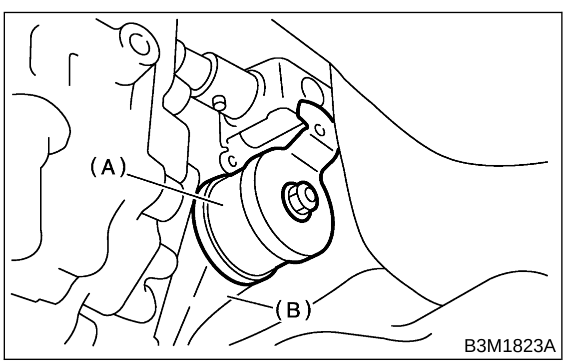
1) Set the vehicle on the lift.
2) Remove gear shift knob.
3) Remove front cover. <Ref. to EI-33, REMOVAL, Console Box.>
4) Remove boot plate from body.



5) Lift-up the vehicle.
6) Remove rear exhaust pipe and muffler. <Ref. to EX-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX-11, REMOVAL, Muffler.>
7) Remove heat shield cover.

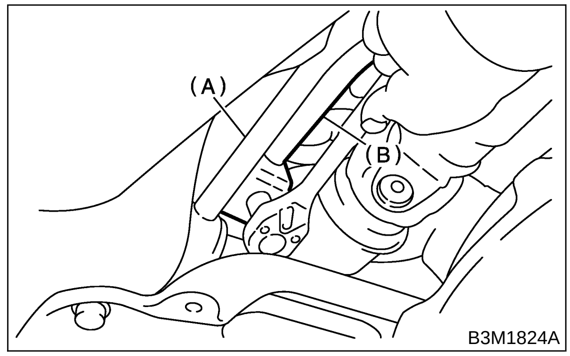


8) Remove stay from transmission bracket.



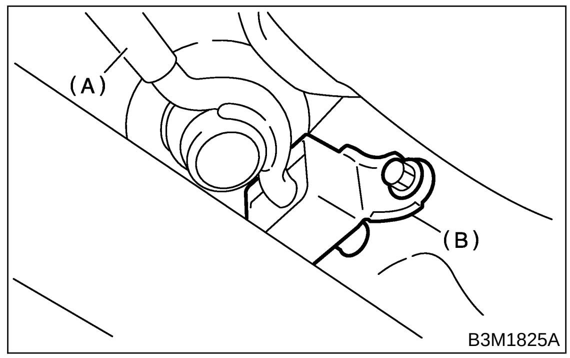
(A) Stay
(B) Transmission bracket

9) Remove rod from joint.



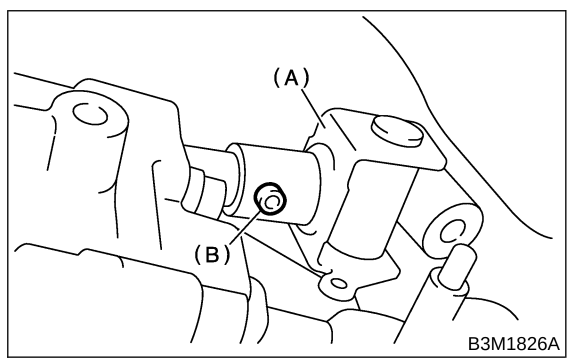
(A) Stay
(B) Rod

10) Remove cushion rubber from body.



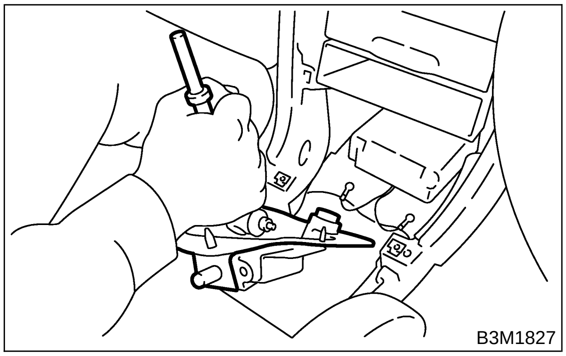
(A) Stay
(B) Cushion rubber

11) Remove joint and then extract straight pin.



(A) Joint
(B) Spring pin

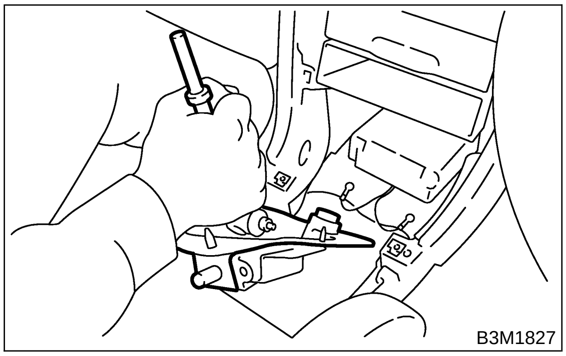
12) Lower the vehicle.
13) Remove gear shift lever.


B3M1827

B: INSTALLATION S501236A11

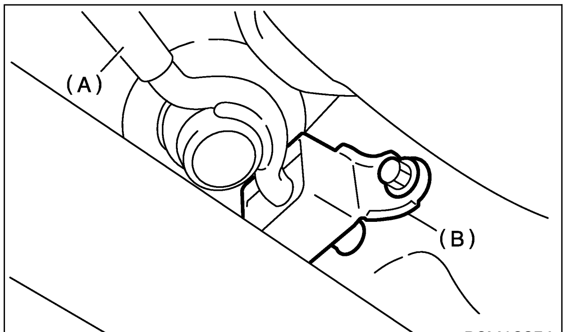
1) Install the joint to the transmission and secure with the spring pin.
2) Insert gear shift lever from room side.

NOTE:
After inserting rod and stay, temporarily put them onto transmission mount.


B3M1827

3) Lift-up the vehicle.
4) Mount cushion rubber on the body.

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

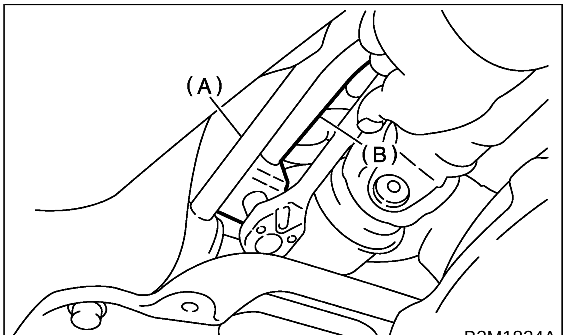


B3M1825A

(A) Cushion rubber
(B) Stay

5) Connect rod to the joint.

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

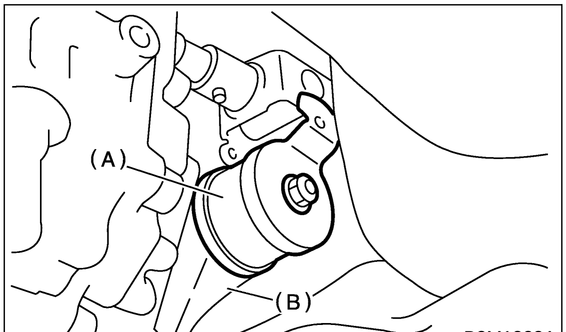


B3M1824A

(A) Joint
(B) Rod

6) Connect stay to transmission bracket.

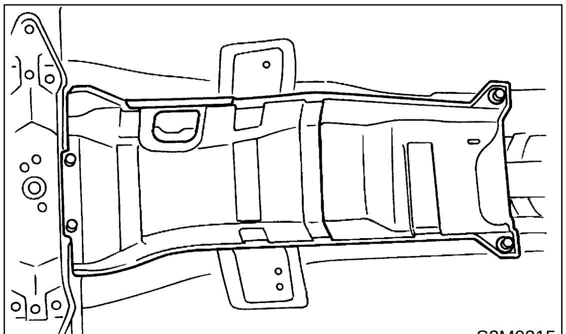
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



B3M1823A

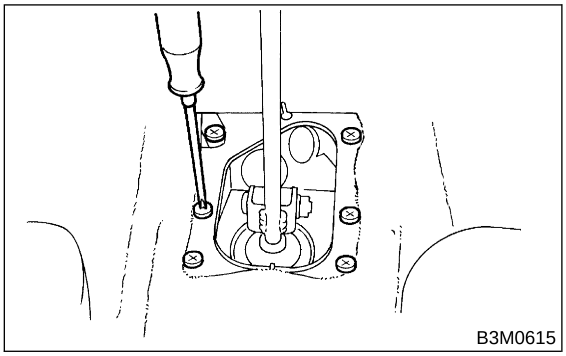
(A) Stay
(B) Transmission bracket

7) Install heat shield cover.


S2M0215

8) Install rear exhaust pipe and muffler.
<Ref. to EX-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX-11, INSTALLATION, Muffler.>
9) Mount boot plate on body.

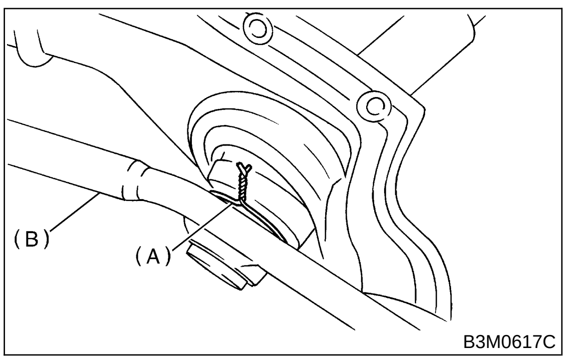
Tightening torque:
4.5 N·m (0.46 kgf-m, 3.3 ft-lb)



10) Install front cover and gear shift knob. <Ref. to EI-33, INSTALLATION, Console Box.>

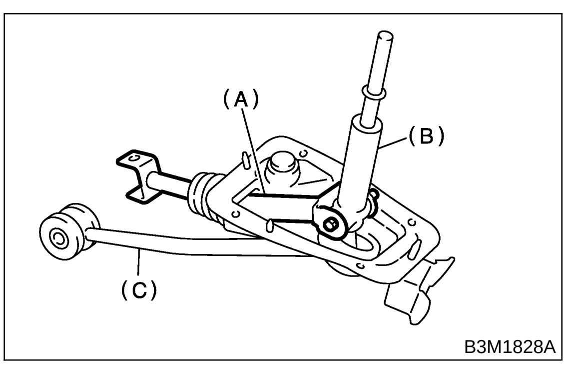
C: DISASSEMBLY *S501236A06*

1) Disassemble locking wire.



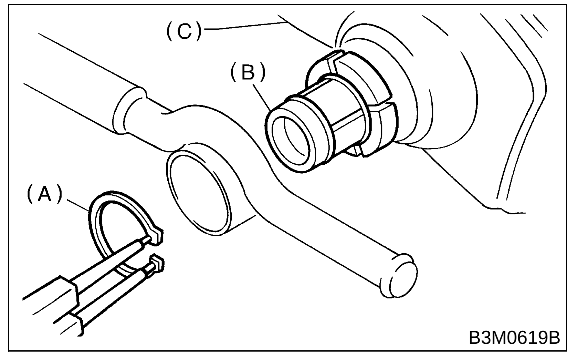
(A) Locking wire
(B) Stay

2) Remove rod from gear shift lever.



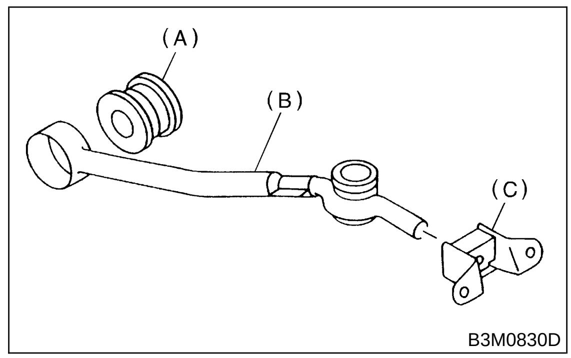
(A) Rod
(B) Lever
(C) Stay

3) Remove snap ring from bushing D, then disconnect stay.



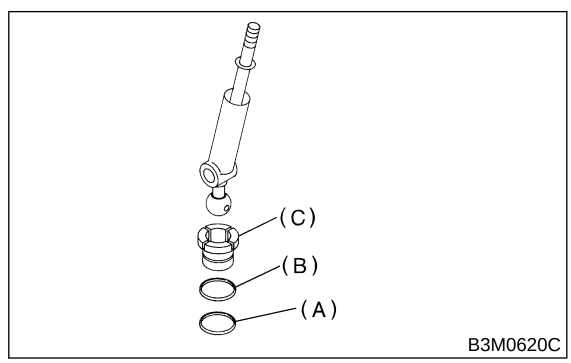
(A) Snap ring
(B) Bushing B
(C) Boot

4) Remove boot from gear shift lever.
5) Remove bushing and cushion rubber from stay.



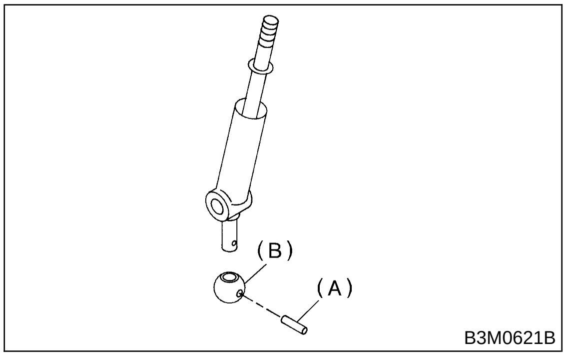
(A) Bushing
(B) Stay
(C) Cushion rubber

6) Remove O-ring, then disconnect bushing B.



(A) O-ring
(B) O-ring
(C) Bushing B

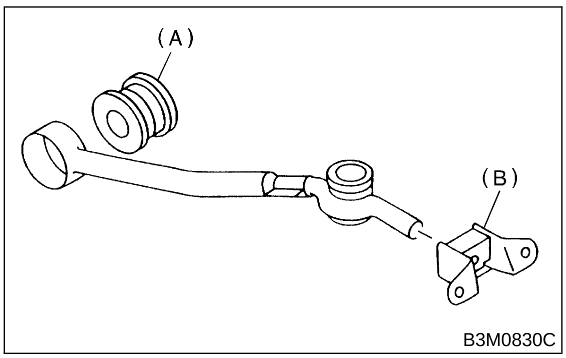
7) Draw out spring pin, then remove bushing A from gear shift lever.



(A) Spring pin
(B) Bushing A

D: ASSEMBLY *S501236A02*

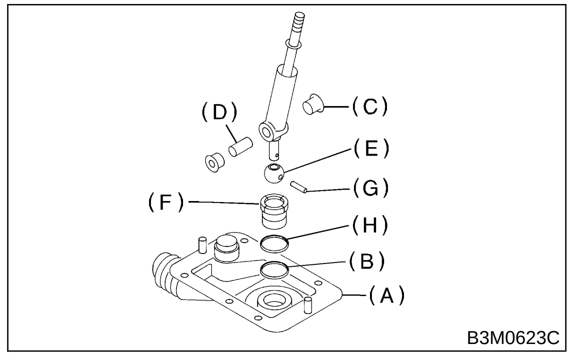
1) Clean all parts before assembly.
2) Mount the bushing B and cushion rubber on the stay.



(A) Bushing
(B) Cushion rubber

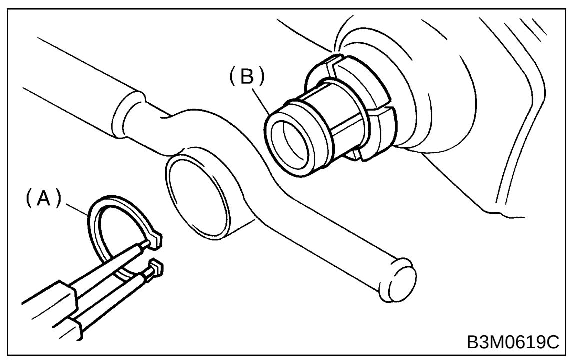
3) Mount each part; boot, O-ring, bushing A, spacer, bushing, bushing B and spring pin on the gear shift lever.

CAUTION:
- **Always use new O-rings.**
- **Apply grease [DNIGTIGHT LYW No. 2 or equivalent] to the inner and side surfaces of the bushing when installing the spacer.**



(A) Boot
(B) O-ring
(C) Bushing
(D) Spacer
(E) Bushing A
(F) Bushing B
(G) Spring pin
(H) O-ring

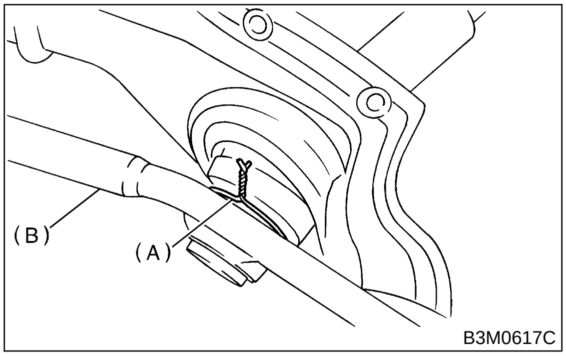
4) Insert the gear shift lever into the boot hole.
5) Install snap ring and stay to the bushing B.



(A) Snap ring
(B) Bushing B

6) Tighten with locking wire to the extent that the boot will not come off.

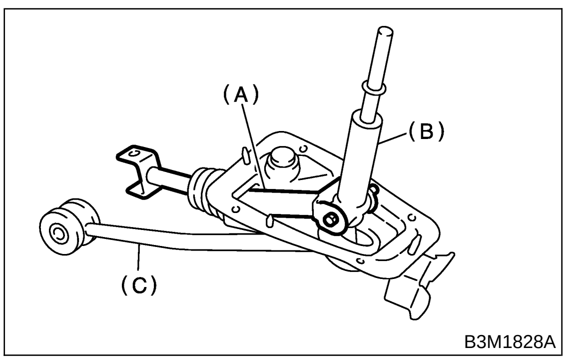
CAUTION:
Always use new locking wire.



(A) Locking wire
(B) Stay

7) Insert the rod into the boot hole.
8) Connect rod to gear shift lever.

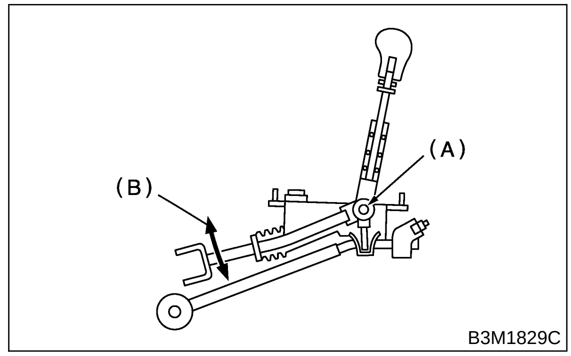
Tightening torque:
11.8 N·m (1.2 kgf-m, 8.7 ft-lb)



(A) Rod
(B) Shift lever
(C) Stay

9) Check the swing torque of the rod in relation to the gear shift lever.
If the torque exceeds the specification, replace bushing or retighten nuts.

Rocking torque:
0.7 N·m (0.07 kgf-m, 0.5 ft-lb) or less

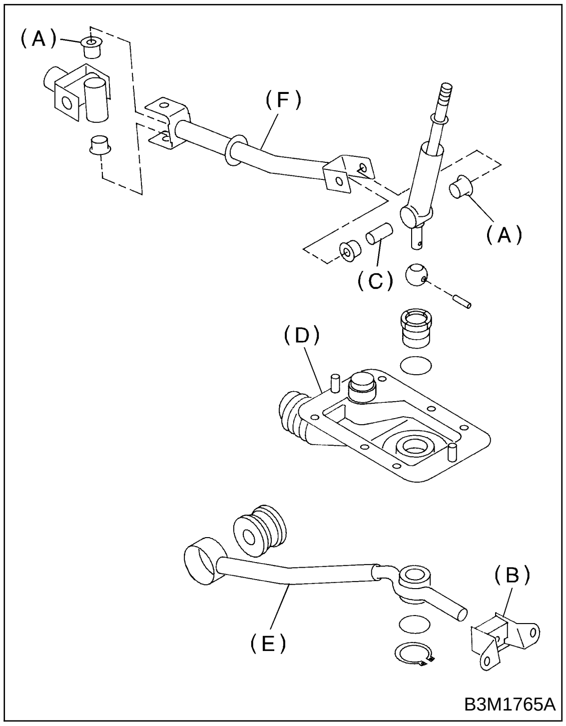


(A) Center of rotation
(B) Swing torque

10) Check that there is no excessive play and that parts move smoothly.

E: INSPECTION *S501236A10*

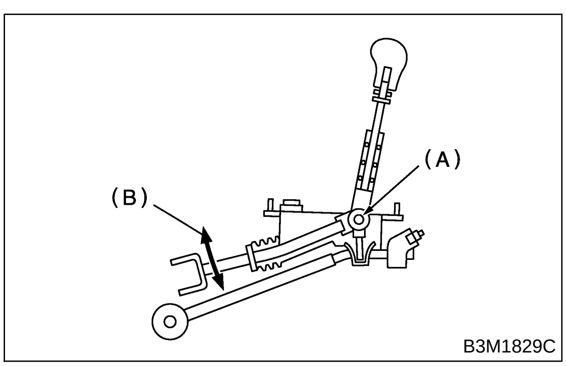
1) Check each part (bushing, cushion rubber, spacer, boot, stay and rod, etc.) for deformation, damage and wear. Repair or replace any defective part. Determine defective parts by comparing with new parts.



(A) Bushing
(B) Cushion rubber
(C) Spacer
(D) Boot
(E) Stay
(F) Rod

2) Check the swing torque of the rod in relation of the gear shift lever.
If the torque exceeds the specification, replace bushing or retighten nuts.

Rocking torque:
0.7 N·m (0.07 kgf-m, 0.5 ft-lb) or less



(A) Center of rotation
(B) Swing torque

9. General Diagostic S501278

A: INSPECTION S501278A10

Symptom	Problem parts
Shift lock does not function.	● Stop light switch ● Shift lock solenoid ● AT shift lock control module
Shift lock cannot be released.	● Stop light switch ● Shift lock solenoid ● AT shift lock control module ● Inhibitor switch ● Ignition switch
Key interlock does not function.	● Key warning switch ● “P” position switch ● Key lock solenoid ● AT shift lock control module ● Ignition switch
Key interlock cannot be released.	● Key waring switch ● “P” position switch ● Key lock solenoid ● AT shift lock control module
Starter does not run.	● Select cable ● Inhibitor switch ● Starter circuit
Back-up light does not light up.	● Select cable ● Inhibitor switch ● Back-up circuit

AUTOMATIC TRANSMISSION

AT

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1. General Description S502001

A: SPECIFICATIONS S502001E49

1. TORQUE CONVERTER CLUTCH S502001E4901

Type	Symmetric, 3 element, single stage, 2 phase torque converter
Stall torque ratio	2.1 — 2.3
Nominal diameter	246 mm (9.69 in)
Stall speed (at sea level)	2,200 — 2,700 rpm
One-way clutch	Sprague type one-way clutch

2. OIL PUMP S502001E4902

Type	Pracoid constant-displacement pump	
Driving method	Driven by engine	
Number of teeth	Inner rotor	9
	Outer rotor	10

3. TRANSMISSION CONTROL ELEMENT S502001E4903

Type	4-forward, 1-reverse, double-row planetary gears
Multi-plate clutch	3 sets
Multi-plate brake	2 sets
One-way clutch (sprague type)	1 set

4. TRANSMISSION GEAR RATIO S502001E4904

	Gear ratio
1st	3.027
2nd	1.619
3rd	1.000
4th	0.694
Rev	2.272

5. PLANETARY GEAR AND PLATE S502001E4905

Tooth number of front sun gear	33
Tooth number of front pinion	21
Tooth number of front internal gear	75
Tooth number of rear sun gear	37
Tooth number of rear pinion	19
Tooth number of rear internal gear	75
Drive & driven plate number of high clutch	4
Drive & driven plate number of low clutch	6
Drive & driven plate number of reverse clutch	2
Drive & driven plate number of 2-4 brake	3
Drive & driven plate number of low & reverse brake	6

6. SELECTOR POSITION S502001E4906

P (Park)	Transmission in neutral, output member immovable, and engine start possible
R (Reverse)	Transmission in reverse for backing
N (Neutral)	Transmission in neutral and engine start possible
D (Drive)	Automatic gear change 1st ⇄ 2nd ⇄ 3rd ⇄ 4th
3 (3rd)	Automatic gear change 1st ⇄ 2nd ⇄ 3rd ← 4th
2 (2nd)	2nd gear locked (Deceleration possible 2nd ← 3rd ← 4th)
1 (1st)	1st gear locked (Deceleration possible 1st ← 2nd ← 3rd ← 4th)
Control method	Hydraulic remote control

7. HYDRAULIC CONTROL AND LUBRICATION S502001E4907

Type	Electronic/hydraulic control [Four forward speed changes by electrical signals of vehicle speed and accelerator (throttle) opening]
Fluid	Dexron III type Automatic transmission fluid
Fluid capacity	9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 8.2 — 8.4 Imp qt)
Lubrication system	Forced feed lubrication with oil pump
Oil	Automatic transmission fluid (above mentioned)

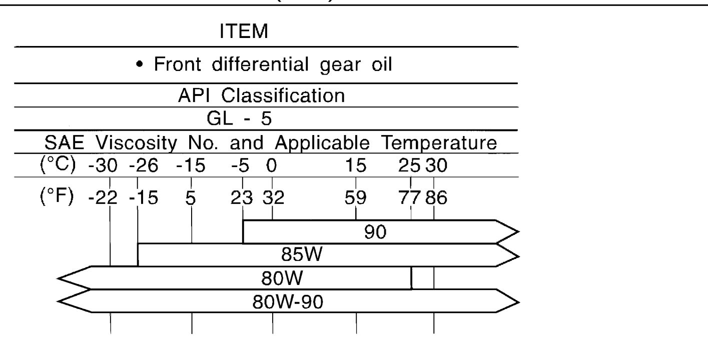
8. COOLING AND HARNESS S502001E4908

Cooling system	Liquid-cooled cooler incorporated in radiator
Inhibitor switch	12 poles
Transmission harness	20 poles

9. TRANSFER S502001E4909

Transfer clutch	Hydraulic multi-plate clutch
Drive & driven plate number of transfer clutch	5
Control method	Electronic, hydraulic type
Lubricant	The same Automatic transmission fluid used in automatic transmission
1st reduction gear ratio	1.000 (53/53)

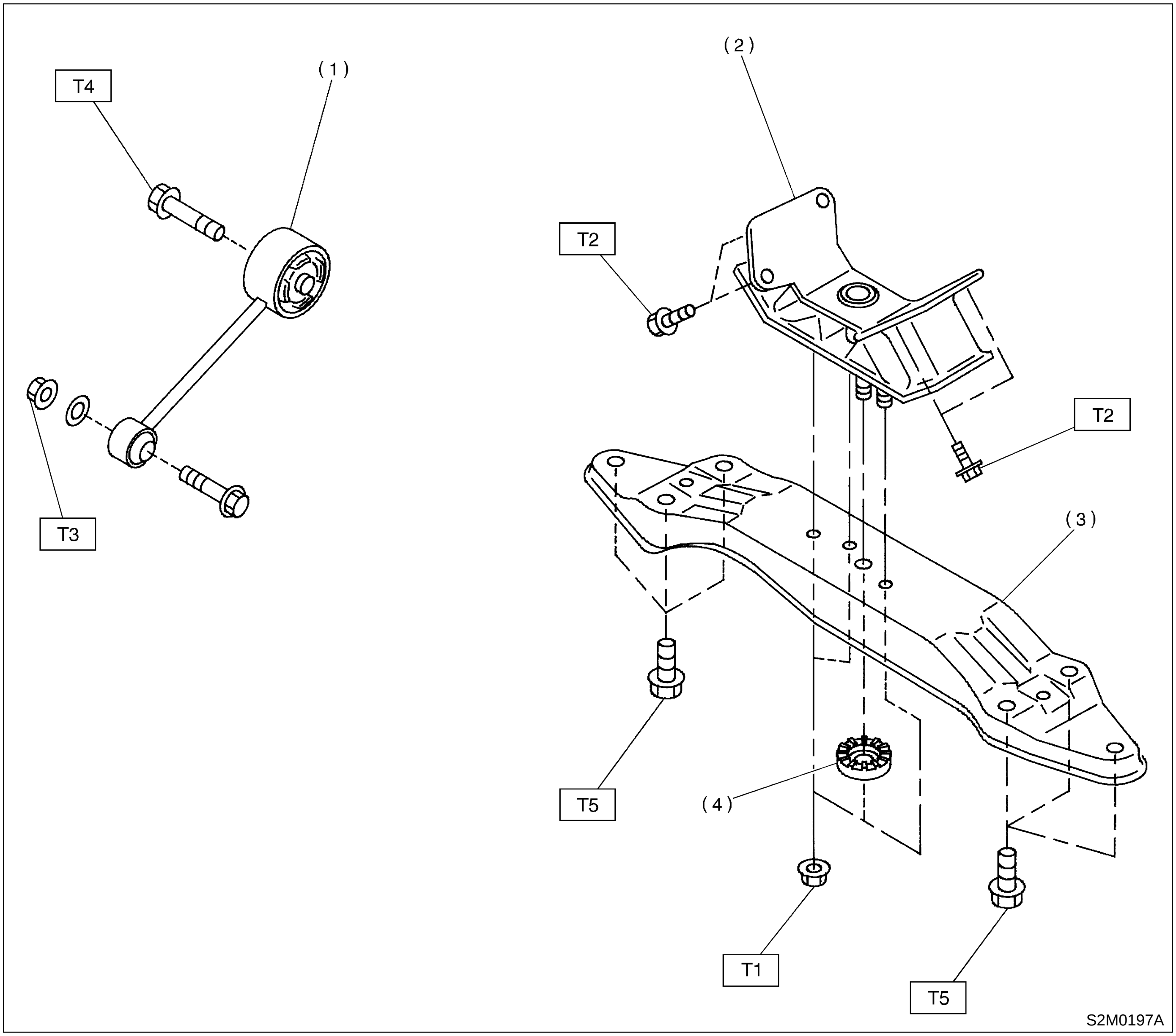
10. FINAL REDUCTION S502001E4910

Front final gear ratio	4.444 (40/9)
Lubrication oil	 H3M1235A
Front differential oil capacity	1.2 ℓ (1.3 US qt, 1.1 Imp qt)

B: COMPONENT *S502001A05*

NOTE:
For information about other transmission mounting components, refer to “AUTOMATIC TRANSMISSION” <Pub. No. G0853ZE> a separate publication.

1. TRANSMISSION MOUNTING *S502001A0501*



(1) Pitching stopper
(2) Rear cushion rubber
(3) Crossmember
(4) Stopper

Tightening torque: N·m (kgf-m, ft-lb)
T1: 35 (3.6, 26)
T2: 39 (4.0, 29)
T3: 50 (5.1, 37)
T4: 58 (5.9, 43)
T5: 70 (7.1, 51)

C: CAUTION S502001A03

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation, and disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Until the oil pan is removed, do not place with the oil pan side facing up to prevent foreign matter from entering the valve body.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- When disassembling the case and other light alloy parts, use a plastic hammer to force it apart. Do not pry it apart with a screwdriver or other tool.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Use SUBARU genuine gear oil, grease etc. or the equivalent. Do not mix gear oil, grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply gear oil onto sliding or revolution surfaces before installation.
- Replace deformed or otherwise damaged snap rings with new ones.
- Before installing O-rings or oil seals, apply sufficient amount of ATF fluid to avoid damage and deformation.
- Be careful not to incorrectly install or fail to install O-rings, snap rings and other such parts.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Avoid damaging the mating surface of the case.
- Before applying sealant, completely remove the old seal.

D: PREPARATION TOOL S502001A17

1. SPECIAL TOOLS S502001A1701

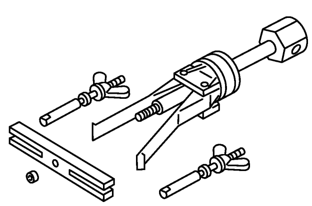
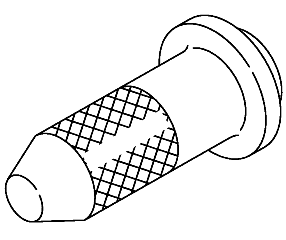
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1977	398527700	PULLER ASSY	Used for removing and installing extension case roller bearing.
 B3M1972	498057300	INSTALLER	Used for installing extension oil seal.

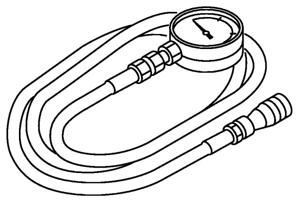
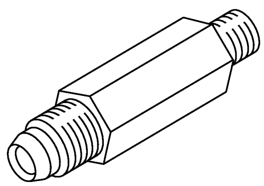
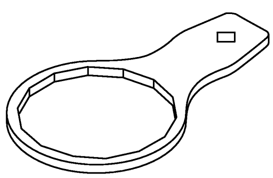
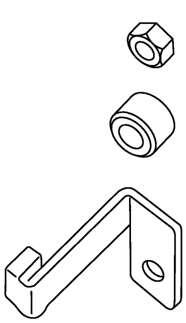
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M2040	498575400	OIL PRESSURE GAUGE ASSY	Used for measuring oil pressure.
 B3M2041	498897200	ADAPTER	Used oil pump housing when measuring reverse clutch pressure and line pressure.
 B3M2042	498545400	FILTER WRENCH	Used for removing and installing ATF filter.
 B3M2043	498277200	STOPPER SET	Used for removing and installing automatic transmission assembly to engine.

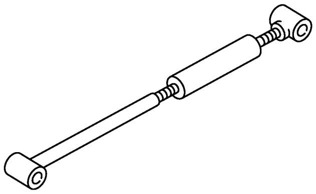
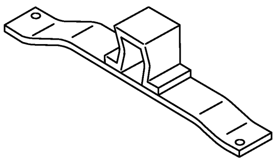
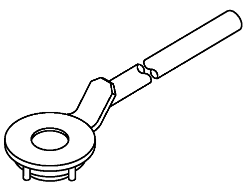
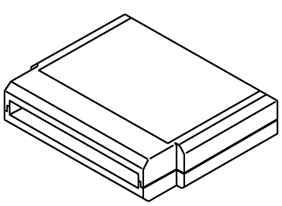
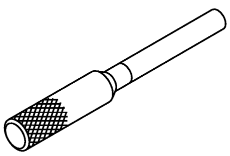
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1976	41099AA020	ENGINE SUPPORT	Used for supporting engine.
 B3M1975	41099AA010	ENGINE SUPPORT BRACKET	Used for supporting engine.
 B2M4157	499977300	CRANK PULLEY WRENCH	Used for removing and installing bolts which hold torque converter clutch and drive plate.
 B2M3876	24082AA150 (Newly adopted tool)	CARTRIDGE	Troubleshooting for electrical systems.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 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)
 B3M2008	499267300	STOPPER PIN	Used for installing and adjusting inhibitor switch.

2. GENERAL PURPOSE TOOLS S502001A1702

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.

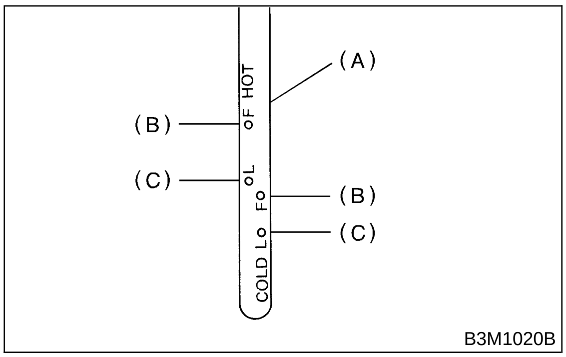
2. Automatic Transmission Fluid S502248

A: INSPECTION S502248A10

1) Check the level of the ATF.

(1) Raise ATF temperature to 60 to 80°C (140 to 176°F) from 40 to 60°C (104 to 140°F) (when cold) by driving a distance of 5 to 10 km (3 to 6 miles).

NOTE:
The level of ATF varies with fluid temperature. Pay attention to the fluid temperature when checking oil level.



(A) ATF level gauge
(B) Upper level
(C) Lower level

(2) Make sure the vehicle is level. After selecting all positions (P, R, N, D, 3, 2, 1), set the select leveler in “P” range. Measure fluid level with the engine idling.

NOTE:
After running, idle the engine for one or two minutes before measurement.

(3) If the fluid level is below the center between upper and lower marks, add the recommended ATF until the fluid level is found within the specified range (above the center between upper and lower marks). When the transmission is hot, the level should be above the center of upper and lower marks, and when it is cold, the level should be found below the center of these two marks.

CAUTION:
- **Use care not to exceed the upper limit level.**
- **ATF level varies with temperature. Remember that the addition of fluid to the upper limit mark when the transmission is cold will result in the overfilling of fluid.**

(4) Fluid temperature rising speed

- By idling the engine

Time for temperature rise to 60°C (140°F) with atmospheric temperature of 0°C (32°F): More than 25 minutes
<Reference>
Time for temperature rise to 30°C (86°F) with atmospheric temperature of 0°C (32°F): Approx. 8 minutes

- By running the vehicle

Time for temperature rise to 60°C (140°F) with atmospheric temperature of 0°C (32°F): More than 10 minutes

(5) Method for checking fluid level upon delivery or at periodic inspection
Check fluid level after a warm-up run of approx. 10 minutes. During the warm-up period, the automatic transmission functions can also be checked.

2) Check the fluid for leaks.
Check for leaks in the transmission. If there are leaks, it is necessary to repair or replace gasket, oil seals, plugs or other parts.

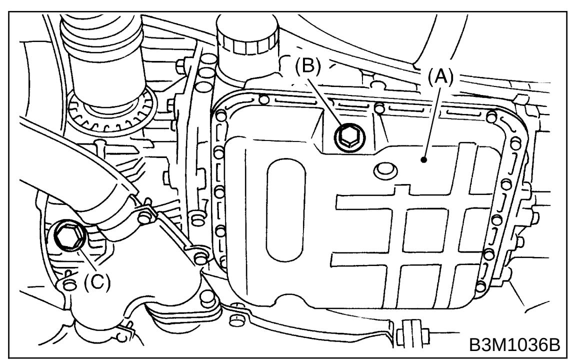
B: REPLACEMENT S502248A20

1) Lift-up the vehicle.
2) Drain ATF completely.

CAUTION:
Directly after the engine has been running, the ATF is hot. Be careful not to burn yourself.

NOTE:
Tighten ATF drain plug after draining ATF.

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



(A) Oil pan
(B) Drain plug
(C) Differential oil drain plug

3) Lower the vehicle.
4) Pour ATF into the oil charge pipe.

Recommended fluid:
Dexron III type automatic transmission fluid

Capacity:
Fill the same amount of fluid drained from drain plug hole.

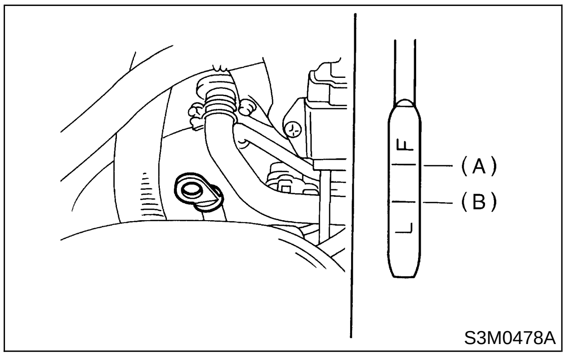
Capacity when transmission is overhauled:
9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 8.2 — 8.4 Imp qt)

5) Check the level and leaks of the ATF.
<Ref. to AT-9, INSPECTION, Automatic Transmission Fluid.>

3. Differential Gear Oil S502150

A: INSPECTION S502150A10

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 differential gear oil level is below the “L” line, add oil to bring the level up to the “F” line.
5) To prevent overfilling the differential gear oil, do not add oil above the “F” line.



(A) Upper level
(B) Lower level

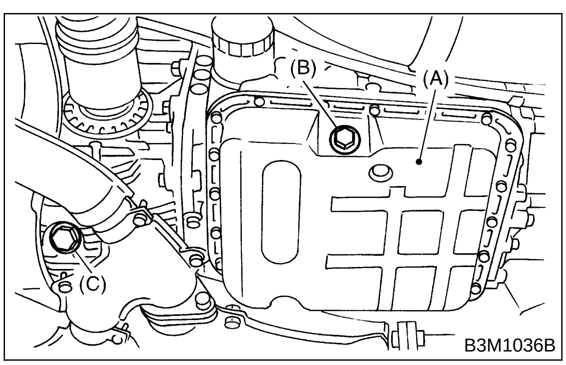
B: REPLACEMENT S502150A20

1) Lift-up the vehicle.
2) Drain differential gear oil completely.

CAUTION:
Directly after the engine has been running, the differential gear oil is hot. Be careful not to burn yourself.

NOTE:
Tighten differential gear oil drain plug after draining differential gear oil.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)



(A) Oil pan
(B) Drain plug
(C) Differential oil drain plug

3) Lower the vehicle.
4) Pour gear oil into the gauge hole.

Recommended fluid:
Use GL-5 or equivalent.

Gear oil capacity:
1.2 ℓ (1.3 US qt, 1.1 Imp qt)

5) Check the level of the differential gear oil. <Ref. to AT-11, INSPECTION, Differential Gear Oil.>

4. Road Test S502247

A: INSPECTION S502247A10

1. GENERAL PRECAUTION S502247A1001

Road tests should be conducted to properly diagnose the condition of the automatic transmission.

CAUTION:
When performing test, do not exceed posted speed limit.

2. D RANGE SHIFT FUNCTION S502247A1002

Check shifting between 1st ⇔ 2nd ⇔ 3rd ⇔ 4th while driving on normal city streets.

3. D RANGE SHIFT SHOCK S502247A1003

Check the shock level when shifting up during normal driving.

4. KICK-DOWN FUNCTION S502247A1004

Check kick-down for each gear. Also check the kick-down shock level.

5. ENGINE BRAKE OPERATION S502247A1005

- Check the 3rd gear engine brake when shifting between D ⇔ 3rd range while driving in 4th gear of D range [50 to 60 km/h (31 to 37 MPH)].
- Check the 2nd gear engine brake when shifting between 3 ⇔ 2 range while driving in the 3 range 3rd gear [40 to 50 km/h (25 to 31 MPH)].
- Check the 1st gear engine brake when shifting between 2 ⇔1 range while driving in the 2 range 2nd gear [20 to 30 km/h (12 to 19 MPH)].

6. LOCK-UP FUNCTION S502247A1006

Check that rpm does not change sharply when the axle pedal is lightly depressed when driving on flat roads at normal speed in the lock-up range.

7. P RANGE OPERATION S502247A1007

Stop the vehicle on an uphill grade of 5% or more and shift to P range. Check that the vehicle does not move when the parking brake is released.

8. UNUSUAL SOUNDS AND VIBRATION S502247A1008

Check for unusual sounds and vibration while driving and during shifting.

9. CLIMBING CONTROL FUNCTION S502247A1009

- Check that gear remains in 3rd when going up a grade.
- Check that gear remains in 3rd when applying the brakes while going down a grade.

10. OIL LEAKS S502247A1010

After the driving test, inspect for oil leaks.

5. Stall Test S502246

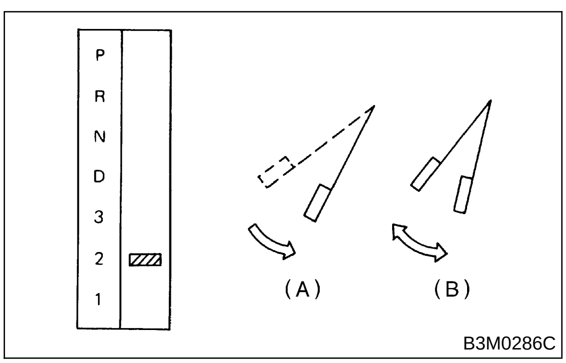
A: INSPECTION S502246A10

1. GENERAL INFORMATION S502246A1001

The stall test is of extreme importance in diagnosing the condition of the automatic transmission and the engine. It should be conducted to measure the engine stall speeds in R and 2 ranges.
Purposes of the stall test:
1) To check the operation of the automatic transmission clutch.
2) To check the operation of the torque converter clutch.
3) To check engine performance.

2. TEST METHODS S502246A1002

1) Preparations before test:
 (1) Check that throttle valve opens fully.
 (2) Check that engine oil level is correct.
 (3) Check that coolant level is correct.
 (4) Check that ATF level is correct.
 (5) Check that differential gear oil level is correct.
 (6) Increase ATF temperature to 50 to 80°C (122 to 176°F) by idling the engine for approximately 30 minutes (with select lever set to "N" or "P").
2) Install an engine tachometer at a location visible from the driver's compartment and mark the stall speed range on the tachometer scale.
3) Place the wheel chocks at the front and rear of all wheels and engage the parking brake.
4) Move the manual linkage to ensure it operates properly, and shift the select lever to the 2 range.
5) While forcibly depressing the foot brake pedal, gradually depress the accelerator pedal until the engine operates at full throttle.



(A) Brake pedal
(B) Accelerator pedal

6) When the engine speed is stabilized, read that speed quickly and release the accelerator pedal.
7) Shift the select lever to Neutral, and cool down the engine by idling it for more than one minute.
8) Record the stall speed.
9) If stall speed in 2 range is higher than specifications, low clutch slipping and 2-4 brake slipping may occur. To identify it, conduct the same test as above in D range.
10) Perform the stall tests with the select lever in the R range.

NOTE:
- Do not continue the stall test for MORE THAN FIVE SECONDS at a time (from closed throttle, fully open throttle to stall speed reading). Failure to follow this instruction causes the engine oil and ATF to deteriorate and the clutch and brake to be adversely affected.
Be sure to cool down the engine for at least one minute after each stall test with the select lever set in the P or N range and with the idle speed lower than 1,200 rpm.
- If the stall speed is higher than the specified range, attempt to finish the stall test in as soon as possible, in order to prevent the automatic transmission from sustaining damage.

Stall speed (at sea level):
  2,200 — 2,700

3. EVALUATION *S502246A1003*

Stall speed (at sea level)	Position	Cause
Less than specifications	2, R	● Throttle valve not fully open ● Erroneous engine operation ● Torque converter clutch's one-way clutch slipping
Greater than specifications	D	● Line pressure too low ● Low clutch slipping ● One-way clutch malfunctioning
	R	● Line pressure too low ● Reverse clutch slipping ● Low & reverse brake slipping
	2	● Line pressure too low ● Low clutch slipping ● 2-4 brake slipping

6. Time Lag Test S502245

A: INSPECTION S502245A10

1. GENERAL INFORMATION S502245A1001

If the select lever is shifted while the engine is idling, there will be a certain time elapse or lag before the shock can be felt. This is used for checking the condition of the low clutch, reverse clutch, low & reverse brake and one-way clutch.

CAUTION:
- **Perform the test at normal operation fluid temperature 60 to 80°C (140 to 176°F).**
- **Be sure to allow a one minute interval between tests.**
- **Make three measurements and take the average value.**

2. TEST METHODS S502245A1002

1) Fully apply the parking brake.
2) Start the engine.
Check idling speed (A/C OFF).
3) Shift the select lever from “N” to “D” range.
Using a stop watch, measure the time it takes from shifting the lever until the shock is felt.
  Time lag: Less than 1.2 seconds
4) In the same manner, measure the time lag for “N” → “R”.
  Time lag: Less than 1.5 seconds

3. EVALUATION S502245A1003

1) If “N” → “D” time lag is longer than specified:
- Line pressure too low
- Low clutch worn
- One-way clutch not operating properly

2) If “N” → “R” time lag is longer than specified:
- Line pressure too low
- Reverse clutch worn
- Low & reverse brake worn

7. Line Pressure Test S502244

A: MEASUREMENT S502244A14

1. GENERAL INFORMATION S502244A1401

If the clutch or the brake shows a sign of slippage or shifting sensation is not correct, the line pressure should be checked.

- Excessive shocks during upshifting or shifting takes place at a higher point than under normal circumstances, may be due to the line pressure being too high.
- Slippage or inability to operate the vehicle may, in most cases, be due to loss of oil pressure for the operation of the clutch, brake or control valve.

1) Line pressure measurement (under no load)

CAUTION:

- **Before measuring line pressure, jack-up all wheels.**
- **Maintain temperature of ATF at approximately 50°C (122°F) during measurement.**
(ATF will reach the above temperature after idling the engine for approximately 30 minutes with select lever in “N” or “P”.)

2) Line pressure measurement (under heavy load)

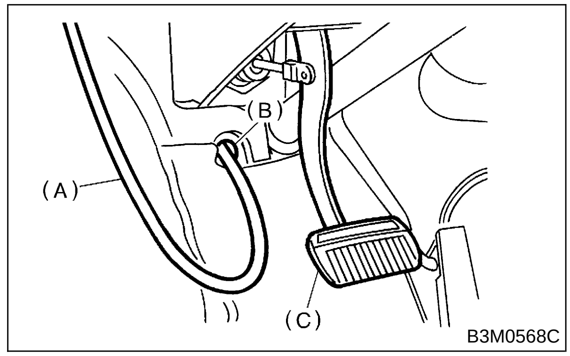
CAUTION:

- **Before measuring line pressure, apply both foot and parking brakes with all wheels chocked. (Same as for “stall” test conditions.)**
- **Measure line pressure when select lever is in “R”, “2” with engine under stall conditions.**
- **Measure line pressure within 5 seconds after shifting the select lever to each position. (If line pressure needs to be measured again, allow the engine to idle and then stop. Wait for at least one minute before measurement.)**
- **Maintain the temperature of ATF at approximately 50°C (122°F) during measurement. (ATF will reach the above temperature after idling the engine for approximately 30 minutes with the select lever in “N” or “P”.)**

2. TEST METHODS S502244A1402

1) Temporarily attach the ST to a suitable place in the driver’s compartment, remove the blind plug located in front of the toe board and pass the hose of the ST to the engine compartment.

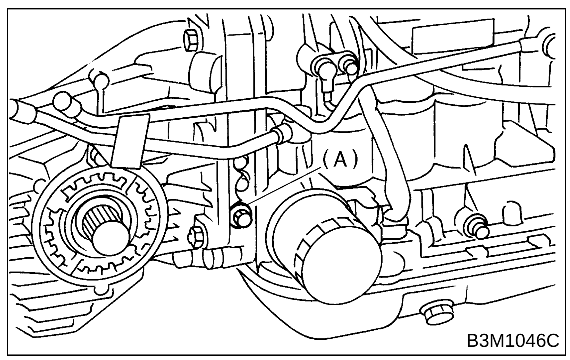
ST 498575400 OIL PRESSURE GAUGE ASSY



(A) Pressure gauge hose
(B) Hole in toe board (blank cap hole)
(C) Brake pedal

2) Remove the test plug and install ST instead.

ST 498897200 OIL PRESSURE GAUGE ADAPTER



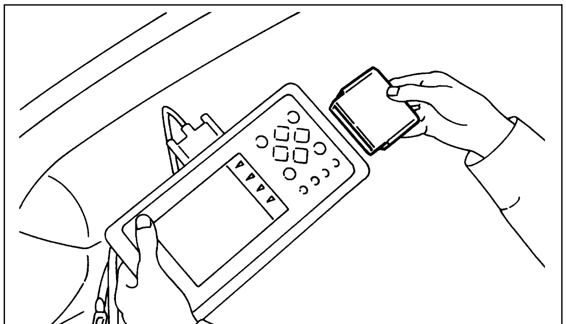
(A) Test plug

3) Connect ST1 with ST2.

ST1 498897200 OIL PRESSURE GAUGE ADAPTER
ST2 498575400 OIL PRESSURE GAUGE ASSY

4) Check for duty ratio changes by opening and closing throttle valve using Subaru Select Monitor.

(1) Insert the cartridge to Subaru Select Monitor. <Ref. to AT-5, PREPARATION TOOL, General Description.>



S2M0286

(2) Connect Subaru Select Monitor to data link connector.

5) Check line pressure in accordance with the following chart.

3. EVALUATION *S502244A1403*

Standard line pressure			
Range position	Line pressure duty ratio (%)	Throttle position	Line pressure kPa (kg/cm^2, psi)
2	5	Full open	1,128 — 1,304 (11.5 — 13.3, 164 — 189)
R	5	Full open	1,520 — 1,716 (15.5 — 17.5, 220 — 249)
D	100	Full closed	304 — 412 (3.1 — 4.2, 44 — 60)

8. Transfer Clutch Pressure Test S502159

A: INSPECTION S502159A10

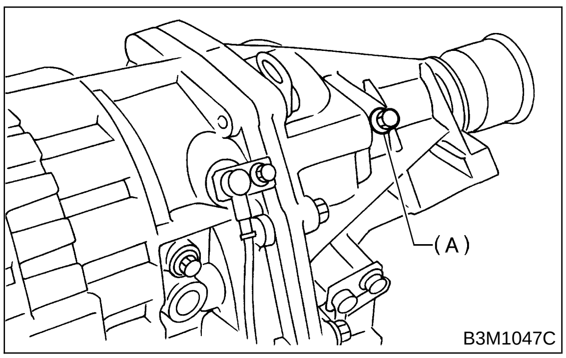
1. TEST METHODS S502159A1001

Check transfer clutch pressure in accordance with the following chart in the same manner as with line pressure. <Ref. to AT-16, Line Pressure Test.>

ST 498897700 OIL PRESSURE ADAPTER SET
ST 498575400 OIL PRESSURE GAUGE ASSY

AWD mode: “D” range
FWD mode: “P” range, engine speed 2,000 rpm

CAUTION:
Before setting in FWD mode, install spare fuse on FWD mode switch.



(A) Test plug

2. EVALUATION S502159A1002

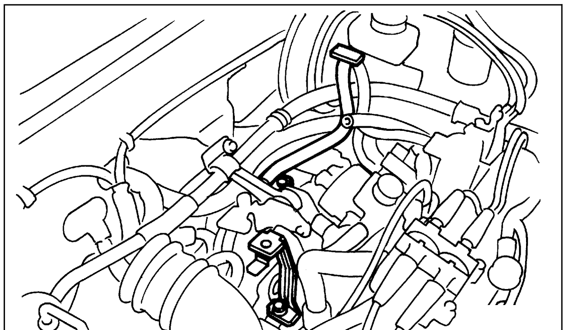
NOTE:
If oil pressure is not produced or if it does not change in the AWD mode, the transfer duty solenoid or transfer valve assembly may be malfunctioning. If oil pressure is produced in the FWD mode, the problem is similar to that in the AWD mode.

Standard transfer clutch pressure kPa (kg/cm^2, psi)			
Duty ratio (%)	Throttle position	AWD mode	FWD mode
5	Full closed	932 — 1,089 (9.5 — 11.1, 135 — 158)	—
60	2/3 throttle	216 — 294 (2.2 — 3.0, 31 — 43)	—
95	Full open	—	0 (0, 0)

9. Automatic Transmission Assembly S502207

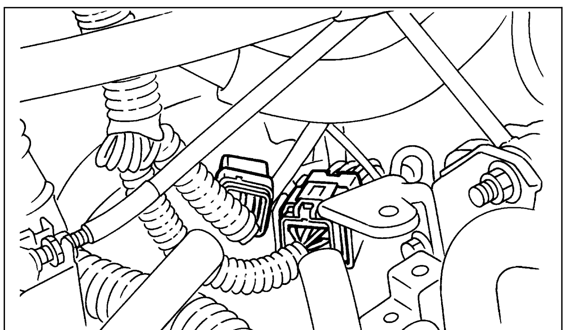
A: REMOVAL S502207A18

1) Set the vehicle on the lift.
2) Open front hood fully, and support with stay.
3) Disconnect battery ground terminal.
4) Remove air intake duct. <Ref. to IN-7, REMOVAL, Air Intake Duct.>
5) Remove air cleaner case. <Ref. to IN-6, REMOVAL , Air Cleaner Case.>
6) Remove air cleaner case stay.



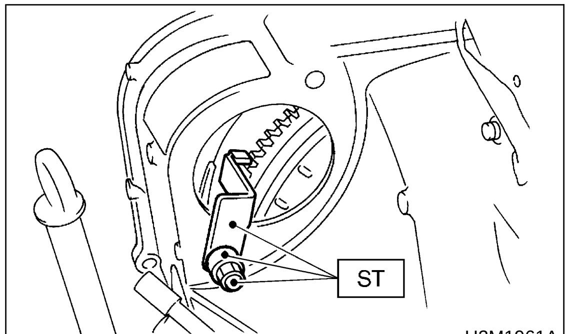
S2M0901

7) Remove front, center, rear exhaust pipe and muffler. <Ref. to EX-5, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX-11, REMOVAL, Muffler.>
8) Disconnect the following connectors.
(1) Transmission harness connector



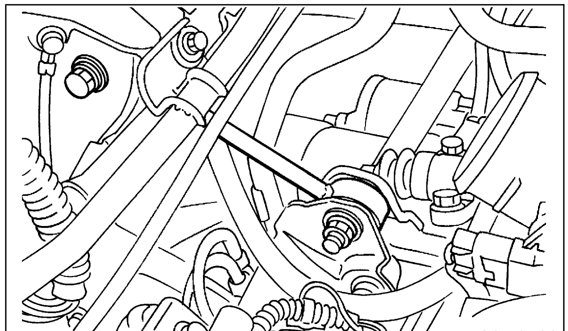
S2M0212

(2) Transmission ground terminal
9) Remove starter. <Ref. to SC-5, REMOVAL, Starter.>
10) Install ST to torque converter clutch case.
ST 498277200 STOPPER SET



H2M1961A

11) Remove pitching stopper.

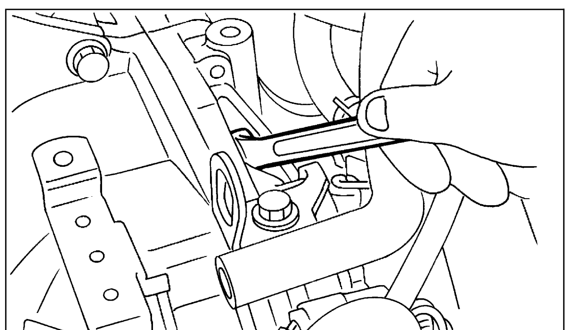


S2M0126

12) Separate torque converter clutch from drive plate.
(1) Remove service hole plug.
(2) Remove bolts which hold torque converter clutch to drive plate.
(3) While rotating the engine, remove other bolts using ST.

CAUTION:
Be careful not to drop bolts into torque converter clutch housing.

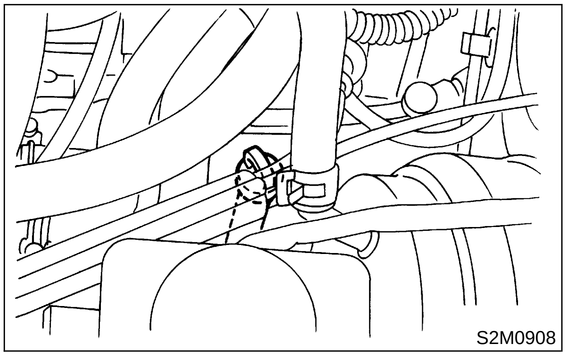
ST 499977300 CRANK PULLEY WRENCH



S2M0207

13) Remove ATF level gauge.

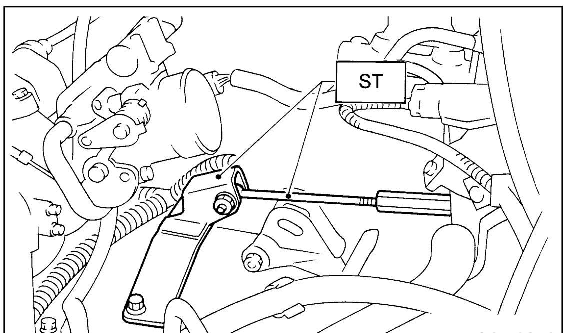
CAUTION:
Plug opening to prevent entry of foreign particles into transmission fluid.


S2M0908

14) Set ST.

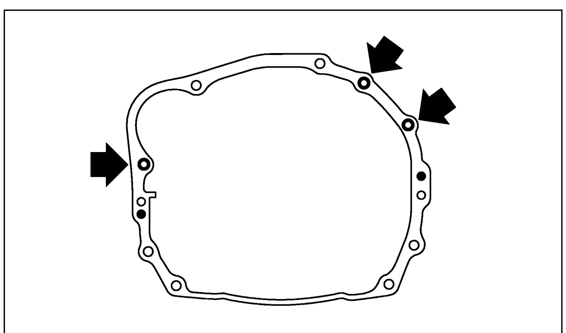
NOTE:
Part No. 927670000 is also available.

ST 41099AA020 ENGINE SUPPORT ASSY

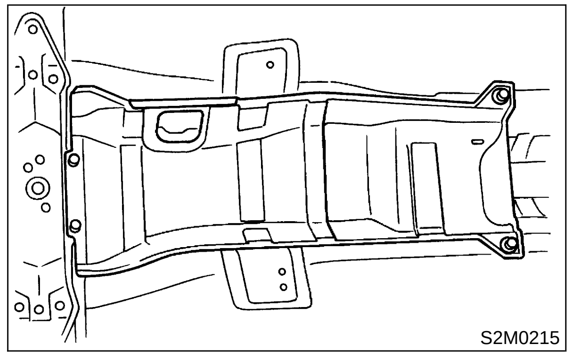


G2M0313

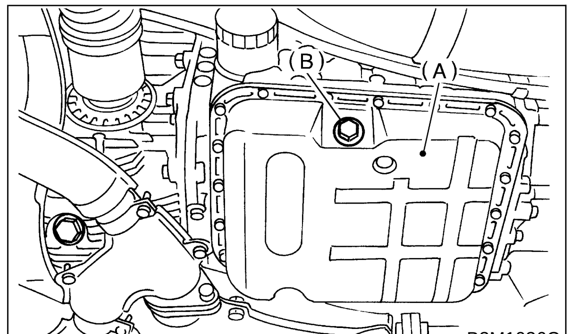
15) Remove bolt which holds right upper side of transmission to engine.


B3M2044

16) Lift-up the vehicle.
17) Remove under cover.
18) Remove heat shield cover.


S2M0215

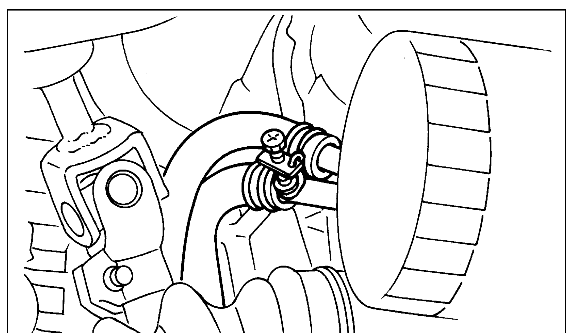
19) Drain ATF to remove ATF drain plug.



B3M1036C

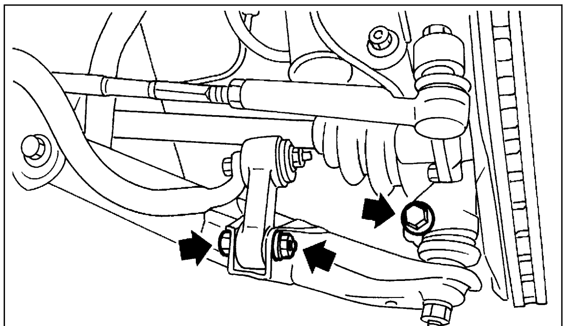
(A) Oil pan
(B) Drain plug

20) Disconnect ATF cooler hoses from pipes of transmission side, and remove ATF level gauge guide.

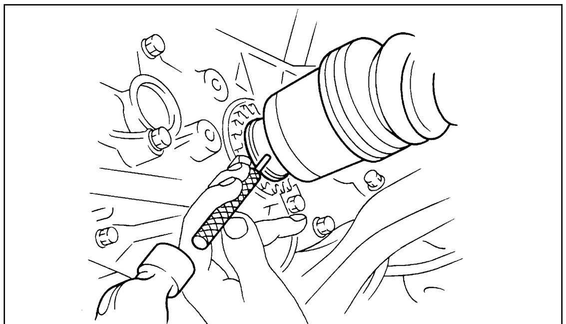

S2M0909

21) Remove propeller shaft.
<Ref. to DS-14, REMOVAL, Propeller Shaft.>
22) Remove shift select cable. <Ref. to CS-26, REMOVAL, Select Cable.>

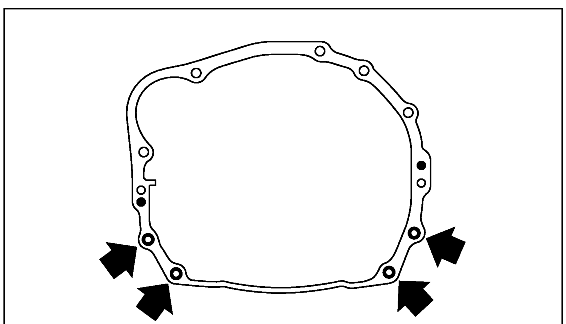
23) Disconnect stabilizer link from transverse link.
24) Remove bolt securing ball joint of transverse link to housing.


S4M0090

25) Remove spring pins and separate front drive shafts from each side of the transmission.


G2M0325

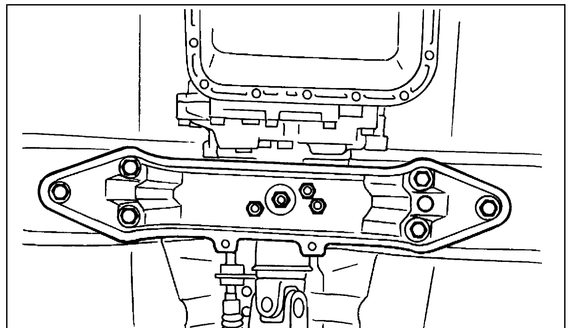
26) Remove nuts which hold lower side of transmission to engine.


B3M2047

27) Place transmission jack under transmission.

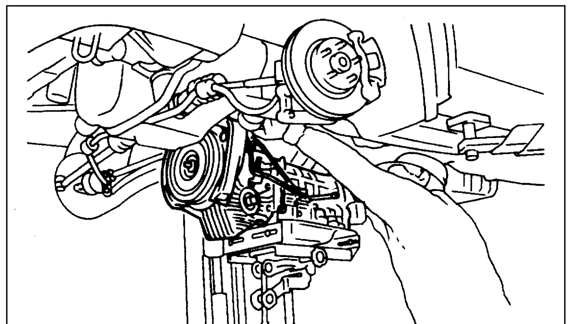
CAUTION:
● **Make sure that the support plates of transmission jack don’t touch the oil pan.**

28) Remove transmission rear crossmember from vehicle.


S2M0221

29) Remove transmission.

CAUTION:
Move transmission and torque converter as a unit away from engine.


B2M0035

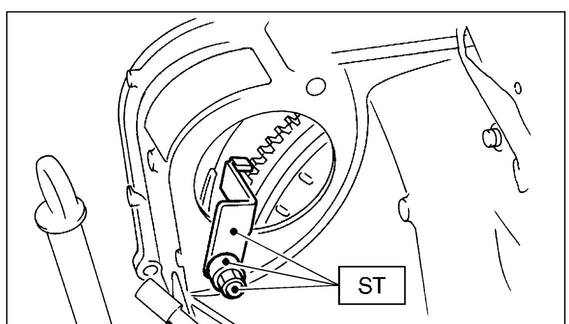
30) Separate transmission assembly and rear cushion rubber.

B: INSTALLATION *S502207A11*

1) Install rear cushion rubber to transmission assembly.

Tightening torque:
38 N·m (3.9 kgf-m, 28 ft-lb)

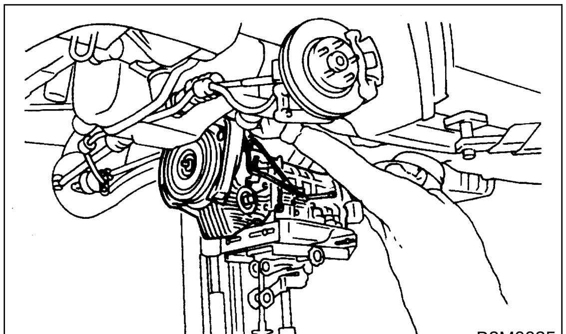
2) Install ST to torque converter clutch case.
ST 498277200 STOPPER SET



H2M1961A

3) Install transmission onto engine.

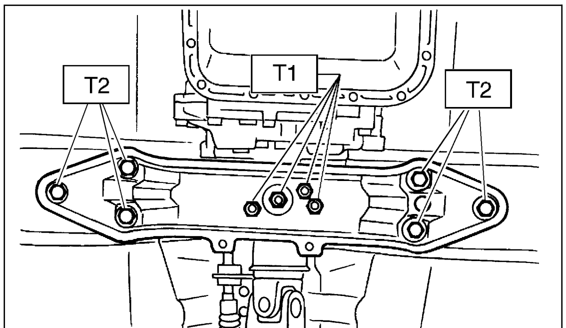
(1) Gradually raise transmission with transmission jack.


B2M0035

(2) Engage them at splines.

4) Install transmission rear crossmember.

Tightening torque:
T1: 35 N·m (3.6 kgf-m, 26 ft-lb)
T2: 70 N·m (7.1 kgf-m, 51.4 ft-lb)

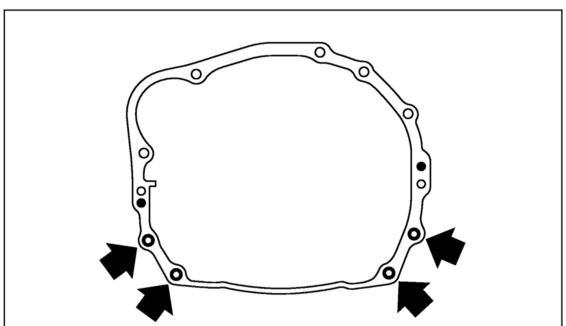


S2M0221A

5) Take off transmission jack.

6) Tighten nuts and bolts which hold lower side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)


B3M2047

7) Lower the vehicle.

8) Connect engine and transmission.

(1) Remove ST from torque converter clutch case.

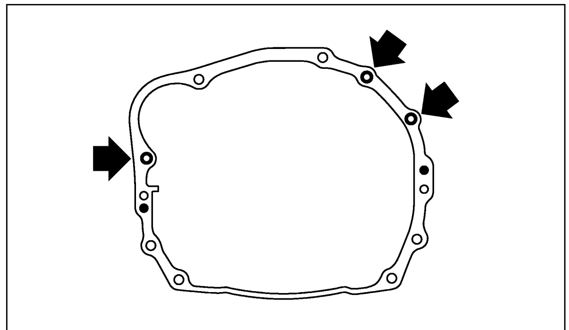
NOTE:
Be careful not to drop the ST into the torque converter clutch case when removing ST.

ST 498277200 STOPPER SET

(2) Install starter.
<Ref. to SC-6, INSTALLATION, Starter.>

(3) Tighten bolt which holds right upper side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)


B3M2044

9) Install torque converter clutch to drive plate.

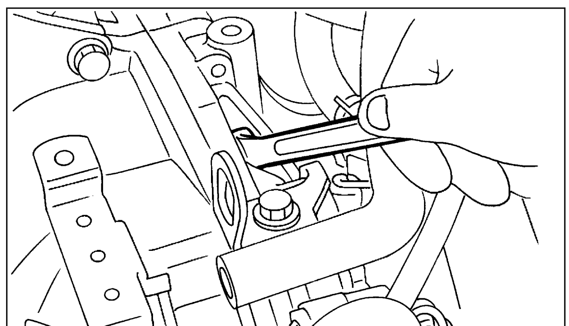
(1) Tighten bolts which hold torque converter clutch to drive plate.

(2) Tighten other bolts while rotating the engine by using ST.

CAUTION:
Be careful not to drop bolts into torque converter clutch housing.

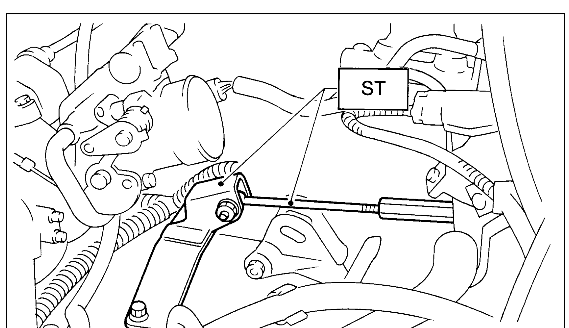
ST 499977300 CRANK PULLEY WRENCH

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


S2M0207

(3) Clog plug onto service hole.

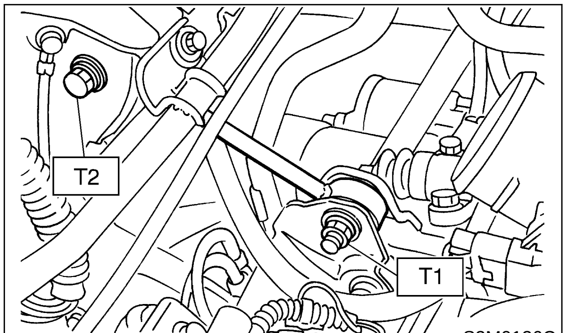
10) Remove ST.



G2M0313

11) Install pitching stopper.

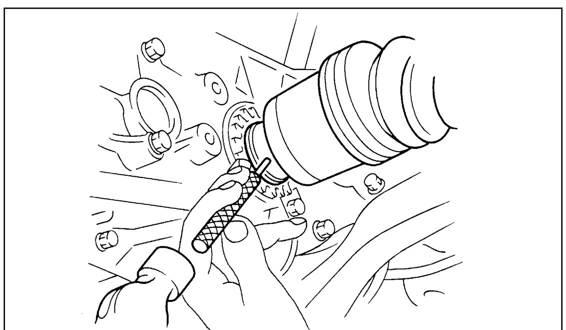
Tightening torque:
T1: 50 N·m (5.1 kgf-m, 37 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



S2M0126C

12) Lift-up the vehicle.
Install front drive shafts into transmission.
(1) Lift-up the vehicle.
(2) Install front drive shaft into transmission.
(3) Drive spring pin into chamfered hole of drive shaft.

CAUTION:
Always use a new spring pin.

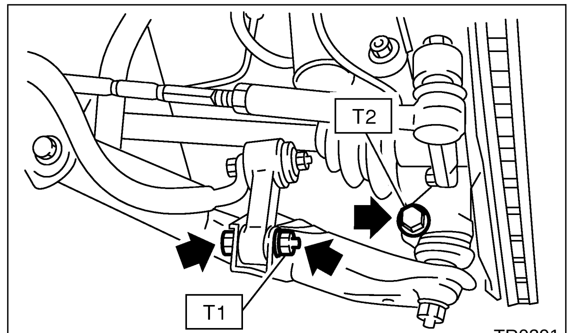

G2M0325

13) Install ball joint into housing.

14) Connect stabilizer link to transverse link, and temporarily tighten bolts.

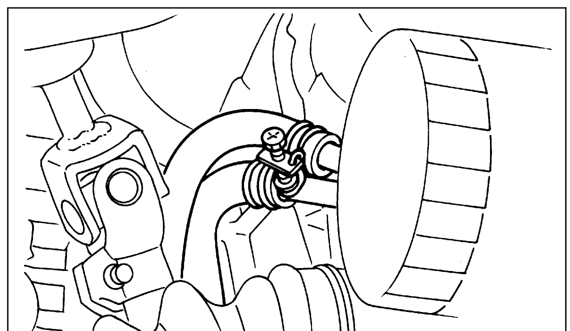
CAUTION:
Discard loosened self-locking nut and replace with a new one.

Tightening torque:
T1: 30 N·m (3.1 kgf-m, 22.4 ft-lb)
T2: 50 N·m (5.1 kgf-m, 37 ft-lb)

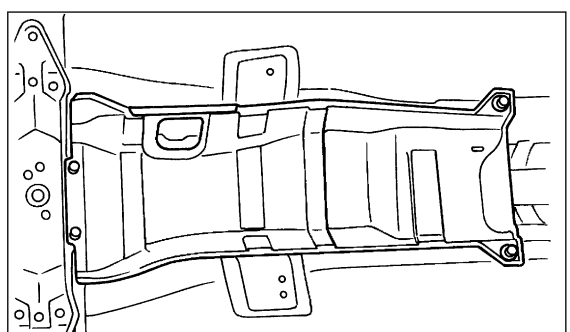


TR0291

15) Install shift select cable onto select lever.
<Ref. to CS-26, INSTALLATION, Select Cable.>
16) Install ATF level gauge guide, and connect ATF cooler hoses to pipe.

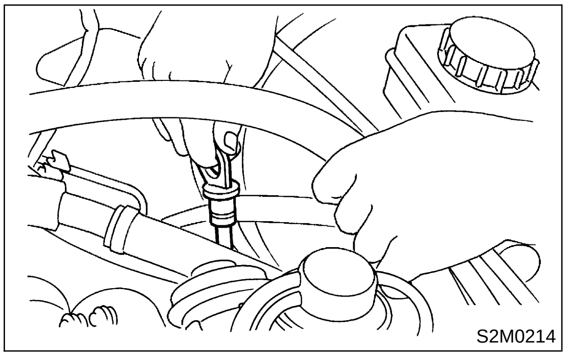

S2M0909

17) Install propeller shaft.
<Ref. to DS-15, INSTALLATION, Propeller Shaft.>
18) Install heat shield cover.


S2M0215

19) Install front, center, rear exhaust pipes and muffler.
<Ref. to EX-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX-11, INSTALLATION, Muffler.>

20) Install under cover.
21) Lower the vehicle.
22) Install ATF level gauge.


S2M0214

23) Connect the following connectors.
  (1) Transmission harness connectors
  (2) Transmission ground terminal
24) Install air cleaner case stay.

Tightening torque:
16 N·m (1.6 kgf-m, 11.6 ft-lb)

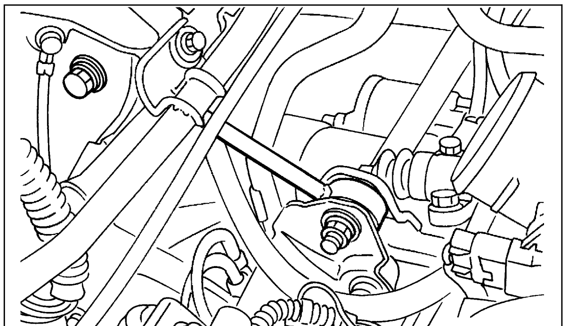
25) Install air cleaner case. <Ref. to IN-6, INSTALLATION, Air Cleaner Case.>
26) Install air intake duct. <Ref. to IN-7, INSTALLATION, Air Intake Duct.>
27) Connect battery ground terminal.
28) Fill ATF up to the middle of the “COLD” side on level gauge by using the gauge hole. <Ref. to AT-9, Automatic Transmission Fluid.>
29) Take off vehicle from lift arms.
30) Check select lever operation.
<Ref. to AT-28, INSPECTION , Inhibitor Switch.>
31) Check the ATF level. <Ref. to AT-9, Automatic Transmission Fluid.>
32) Check the vehicle on the road tester.
<Ref. to AT-12, Road Test.>

10. Transmission Mounting System S502233

A: REMOVAL S502233A18

1. PITCHING STOPPER S502233A1801

1) Disconnect battery ground cable.
2) Remove the air intake duct. <Ref. to IN-7, REMOVAL, Air Intake Duct.>
3) Remove the air cleaner case. <Ref. to IN-6, REMOVAL , Air Cleaner Case.>
4) Remove the pitching stopper.



S2M0126

2. CROSSMEMBER AND CUSHION RUBBER S502233A1802

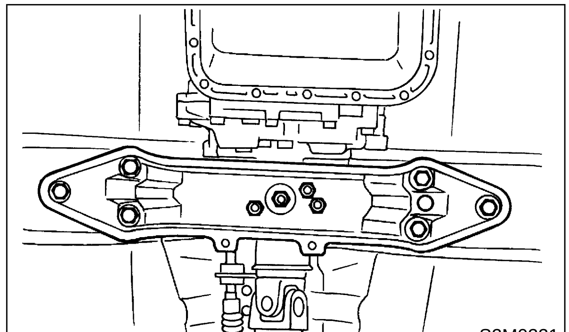
1) Disconnect battery ground cable.
2) Jack-up vehicle and support it with sturdy racks.
3) Remove the front, center, rear exhaust pipes and muffler.
<Ref. to EX-5, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX-11, REMOVAL, Muffler.>

CAUTION:
When removing exhaust pipes, be careful each exhaust pipe does not drop out.

4) Remove the heat shield cover.
5) Set the transmission jack under the transmission.

CAUTION:
● **Make sure that the support plates of transmission jack don't touch the oil pan.**

6) Remove the crossmember.



S2M0221

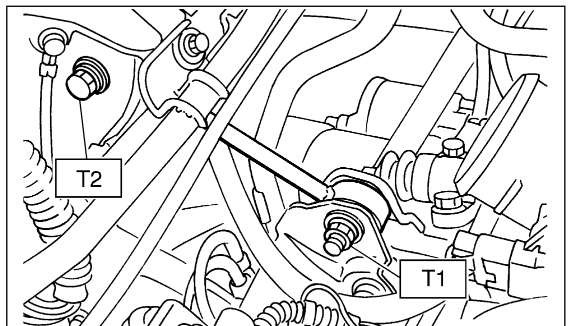
7) Remove the rear cushion rubber.

B: INSTALLATION S502233A11

1. PITCHING STOPPER S502233A1101

1) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 37 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



S2M0126C

2) Install the air intake duct and cleaner case.

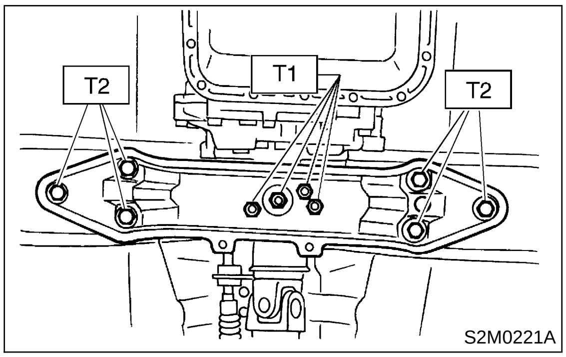
2. CROSSMEMBER AND CUSHION RUBBER S502233A1102

1) Install the rear cushion rubber.

Tightening torque:
38 N·m (3.9 kgf-m, 28 ft-lb)

2) Install the crossmember.

Tightening torque:
T1: 35 N·m (3.6 kgf-m, 26 ft-lb)
T2: 70 N·m (7.1 kgf-m, 51.4 ft-lb)



3) Remove the transmission jack.
4) Install the heat shield cover.
5) Install the front, center, rear exhaust pipes and the muffler.
<Ref. to EX-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX-11, INSTALLATION, Muffler.>

C: INSPECTION S502233A10

Repair or replace parts if the results of the inspection below are not satisfactory.

1. PITCHING STOPPER S502233A1001

Make sure that the pitching stopper is not bent or damaged. Make sure that the rubber is not stiff, cracked, or otherwise damaged.

2. CROSSMEMBER AND CUSHION RUBBER S502233A1002

Make sure that the crossmember is not bent or damaged. Make sure that the cushion rubber is not stiff, cracked, or otherwise damaged.

11. Extension Case Oil Seal *S502718*

A: INSPECTION *S502718A10*

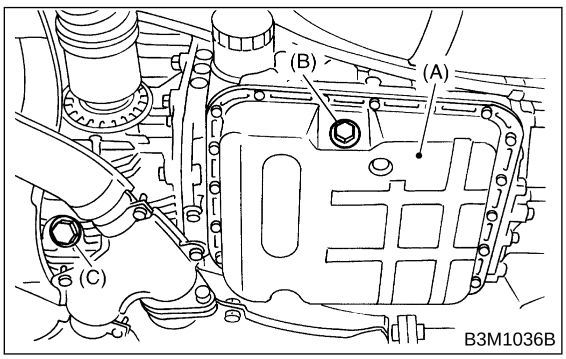
Make sure ATF does not leak from the joint of the transmission and propeller shaft. If so, replace oil seal. <Ref. to AT-27, REPLACEMENT, Extension Case Oil Seal.>

B: REPLACEMENT *S502718A20*

1) Set the vehicle on the lift.
2) Disconnect battery ground cable.
3) Lift up the vehicle.
4) Clean transmission exterior.
5) Drain ATF completely.

NOTE:
Tighten ATF drain plug after draining ATF.

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



(A) Oil pan
(B) Drain plug
(C) Differential oil drain plug

6) Remove the rear exhaust pipe and muffler. <Ref. to EX-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX-11, REMOVAL, Muffler.>
7) Remove the heat shield cover.
8) Remove the propeller shaft. <Ref. to DS-14, REMOVAL, Propeller Shaft.>
9) Using ST, remove the oil seal.
ST 398527700 PULLER ASSY
10) Using ST, install the oil seal.
ST 498057300 INSTALLER
11) Install the propeller shaft. <Ref. to DS-15, INSTALLATION, Propeller Shaft.>
12) Install the heat shield cover.
13) Install the rear exhaust pipe and muffler. <Ref. to EX-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX-11, INSTALLATION, Muffler.>
14) Pour ATF and check the ATF level. <Ref. to AT-9, Automatic Transmission Fluid.>

12. Inhibitor Switch S502243

A: INSPECTION S502243A10

When driving condition or starter motor operation is erroneous, first check the shift linkage for improper operation. If the shift linkage is functioning properly, check the inhibitor switch.

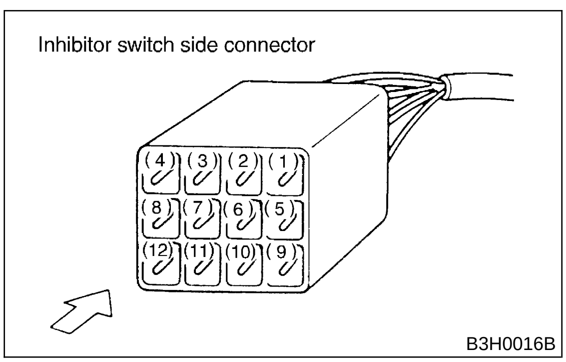
1) Disconnect inhibitor switch connector.

2) Check continuity in inhibitor switch circuits with select lever moved to each position.

CAUTION:
Also check that continuity in ignition circuit does not exist when select lever is in R, D, 3, 2 and 1 ranges.

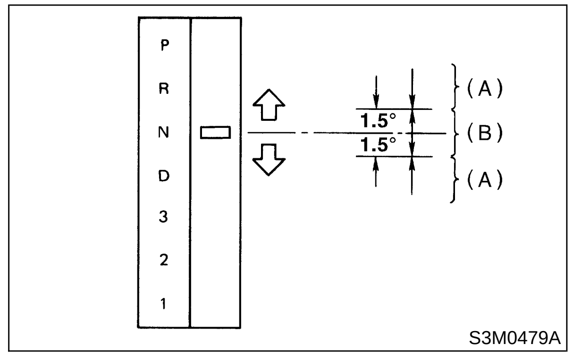
NOTE:
If inhibitor switch is inoperative, check for poor contact of connector on transmission side.

	Position	Pin No.
Signal sent to TCM	P	4 — 3
	R	4 — 2
	N	4 — 1
	D	4 — 8
	3	4 — 7
	2	4 — 6
	1	4 — 5
Starter circuit	P/N	12 — 11
Back-up light circuit	R	10 — 9



B3H0016B

3) Check if there is continuity at equal points when the select lever is turned 1.5° in both directions from the N range.
If there is continuity in one direction and the continuity in the other or if there is continuity at unequal points, adjust the inhibitor switch. <Ref. to AT-28, ADJUSTMENT, Inhibitor Switch.>



S3M0479A

(A) Continuity does not exist.
(B) Continuity exists.

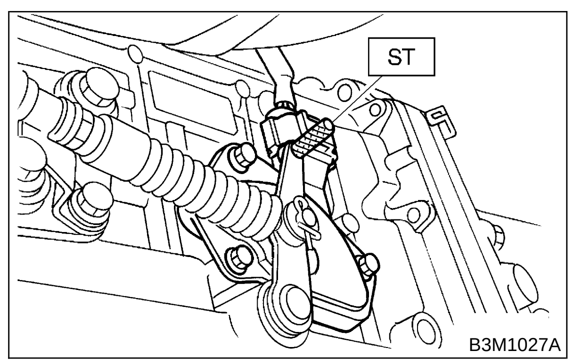
4) Repeat the above checks. If there are abnormalities, adjust the select cable. <Ref. to CS-27, ADJUSTMENT, Select Cable.>

B: ADJUSTMENT S502243A01

1) Shift the select lever to the N range.

2) Loosen the three inhibitor switch securing bolts.

3) Insert ST as vertical as possible into the holes in the inhibitor switch lever and switch body.
ST 499267300 STOPPER PIN



B3M1027A

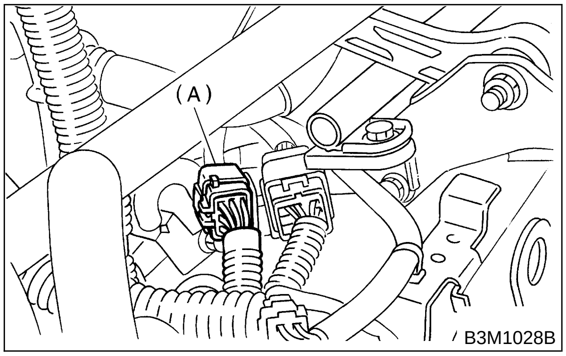
4) Tighten the three inhibitor switch bolts.

Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)

5) Repeat the above checks. If the inhibitor switch is determined to be “faulty”, replace it.

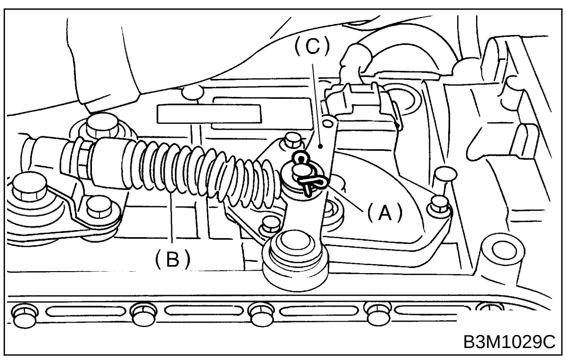
C: REMOVAL *S502243A18*

1) Set up the vehicle on the lift.
2) Move select lever to neutral position.
3) Remove air cleaner case. <Ref. to IN-6, REMOVAL, Air Cleaner Case.>
4) Disconnect inhibitor switch connector.



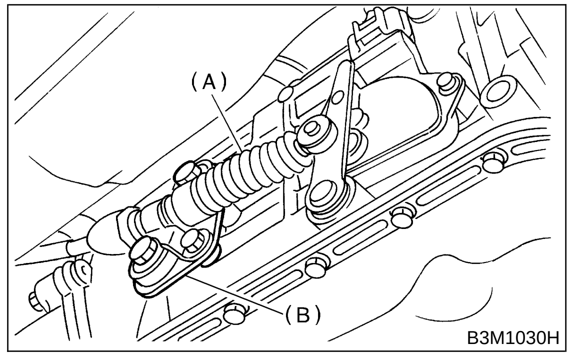
(A) Inhibitor switch

5) Remove inhibitor switch connector from stay.
6) Lift-up the vehicle.
7) Remove front exhaust pipe with center exhaust pipe.
<Ref. to EX-5, REMOVAL, Front Exhaust Pipe.>
8) Remove snap pin from range select lever.



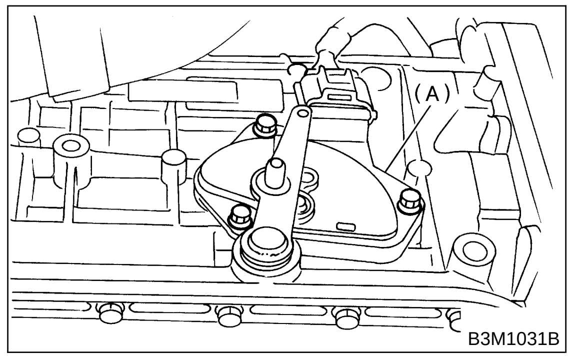
(A) Snap pin
(B) Select cable
(C) Range select lever

9) Remove plate assembly from transmission case.



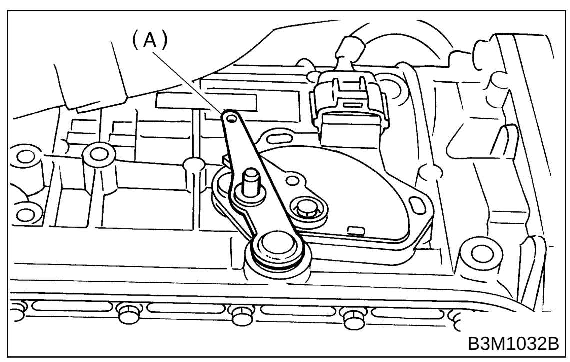
(A) Select cable
(B) Plate ASSY

10) Remove bolts.



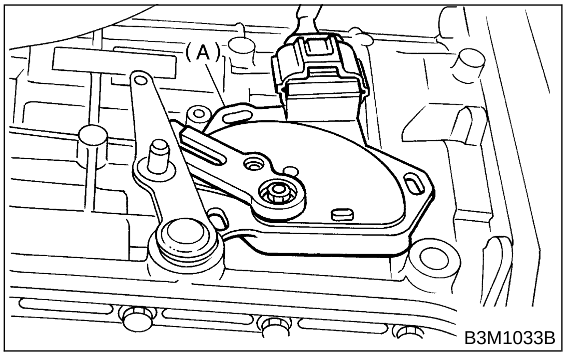
(A) Inhibitor switch

11) Move range select lever to parking position (left side).



(A) Range select lever

12) Remove inhibitor switch from transmission.

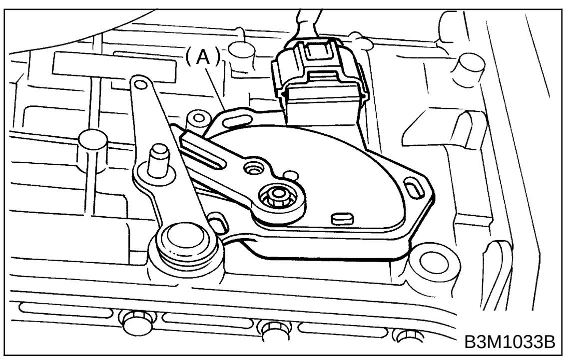


(A) Inhibitor switch

13) Disconnect inhibitor switch harness from inhibitor switch.

D: INSTALLATION S502243A11

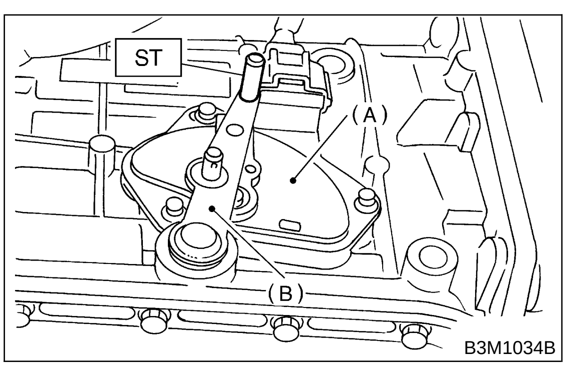
1) Connect inhibitor switch harness to inhibitor switch.
2) Install inhibitor switch to transmission case.



(A) Inhibitor switch

3) Move range select lever to neutral position.
4) Using ST, tighten bolts of inhibitor switch.
ST 499267300 STOPPER PIN

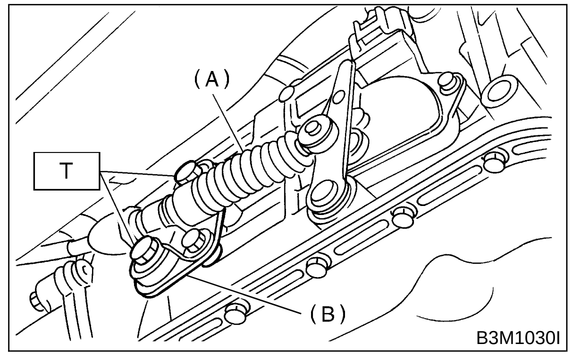
Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)



(A) Inhibitor switch
(B) Range select lever

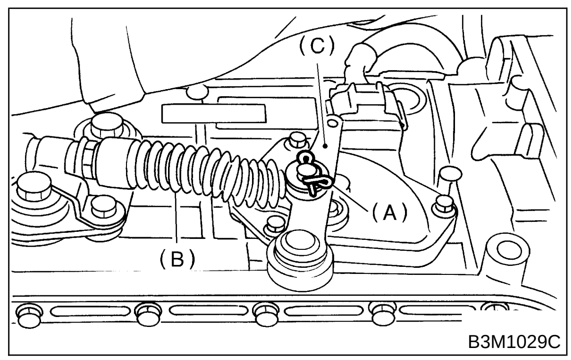
5) Install select cable to range select lever.
6) Install plate assembly to transmission.

Tightening torque:
T: 24.5 N·m (2.50 kgf-m, 18.1 ft-lb)



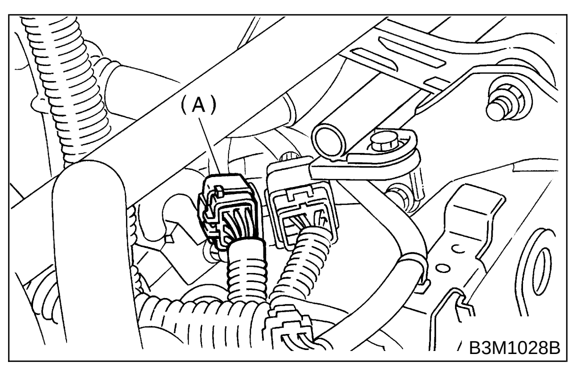
(A) Select cable
(B) Plate ASSY

7) Install snap pin to range select lever.



(A) Snap ring
(B) Select cable
(C) Range select lever

8) Install front exhaust pipe with center exhaust pipe.
<Ref. to EX-6, INSTALLATION, Front Exhaust Pipe.>
9) Lower the vehicle.
10) Install inhibitor switch connector from stay.
11) Connect inhibitor switch connector.



(A) Inhibitor switch

12) Install air cleaner case.
<Ref. to IN-6, INSTALLATION, Air Cleaner Case.>
13) Inspect inhibitor switch. <Ref. to AT-28, INSPECTION, Inhibitor Switch.>

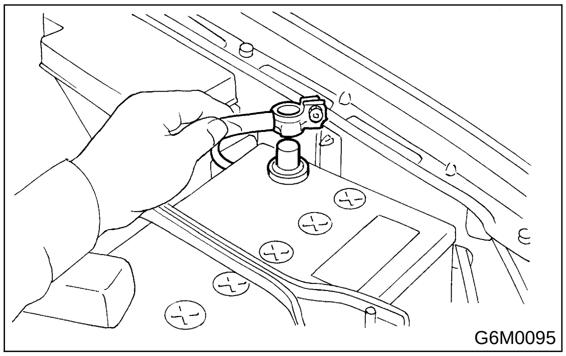
13. Front Vehicle Speed Sensor

S502709

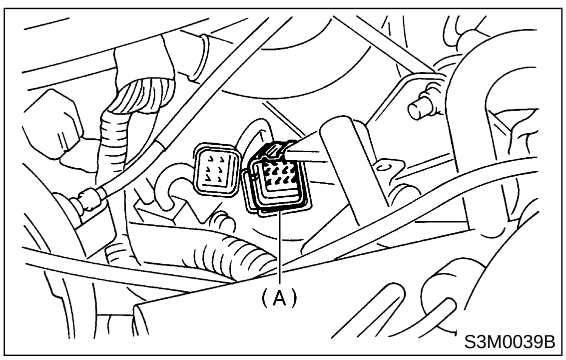
A: REMOVAL

S502709A18

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



3) Remove air cleaner case. <Ref. to IN-6, REMOVAL, Air Cleaner Case.>
4) Disconnect transmission connector.

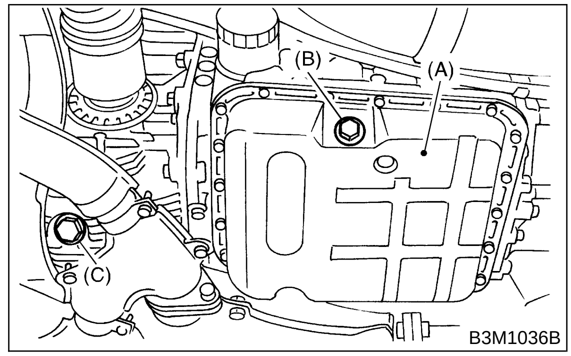


(A) Transmission connector

5) Remove the transmission connector from stay.
6) Lift-up the vehicle.
7) Clean transmission exterior.
8) Drain ATF completely.

NOTE:
Tighten ATF drain plug after draining ATF.

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

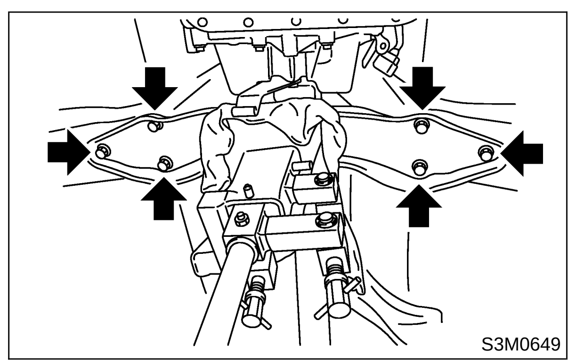


(A) Oil pan
(B) Drain plug
(C) Differential oil drain plug

9) Remove front, center, rear exhaust pipes and muffler.
<Ref. to EX-5, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX-11, REMOVAL, Muffler.>
10) Remove the shield cover.
11) Remove the propeller shaft. <Ref. to DS-14, REMOVAL, Propeller Shaft.>
12) Place transmission jack under crossmember.

CAUTION:
● Make sure that the support plates of transmission jack don’t touch the crossmember.

13) Remove the transmission rear crossmember bolts.



14) Lower the AT jack.

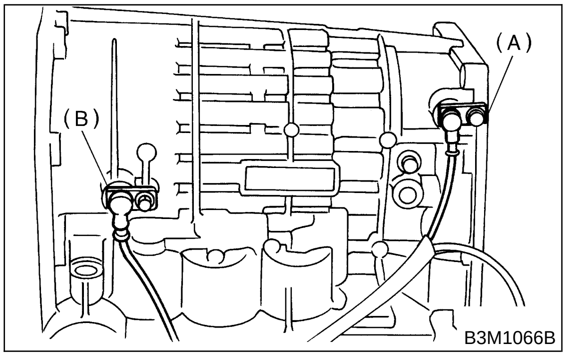
NOTE:
Do not separate the AT jack and transmission.

15) Remove the oil cooler outlet pipe.

CAUTION:
When removing outlet pipe, be careful not to lose balls and springs used with retaining screws.

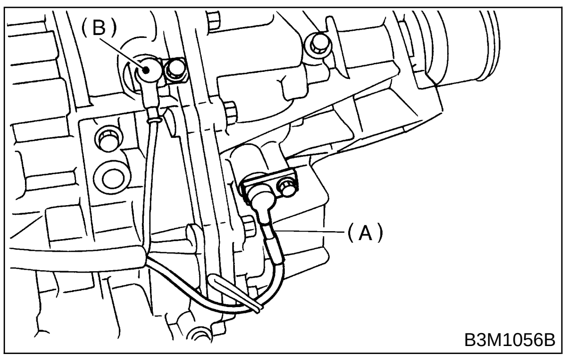
16) Remove front and rear vehicle speed sensor and torque converter turbine speed sensor.

- **Front vehicle speed sensor and torque converter turbine speed sensor**



(A) Front vehicle speed sensor
(B) Torque converter turbine speed sensor

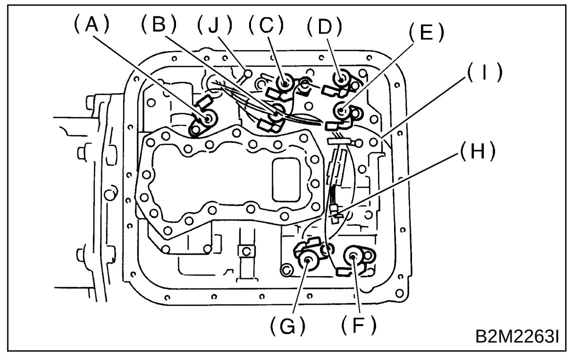
- **Rear vehicle speed sensor**



(A) Rear vehicle speed sensor
(B) Front vehicle speed sensor

17) Remove oil pan.

18) Disconnect duty solenoids and ATF temperature sensor connectors. Remove connectors from clip and disconnect connectors.

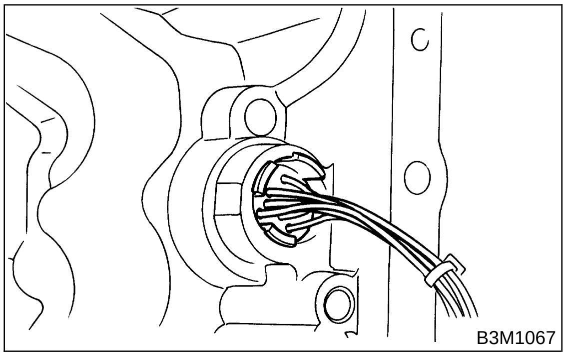


(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) ATF temperature sensor
(I) Transfer duty solenoid (Brown)
(J) Transmission ground

19) Remove harness assembly.

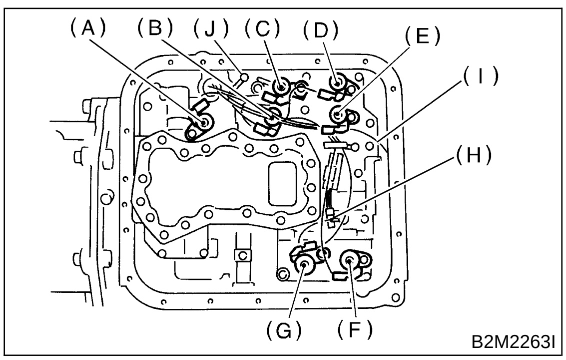
B: INSTALLATION *S502709A11*

1) Pass the harness assembly through the hole in the transmission case.



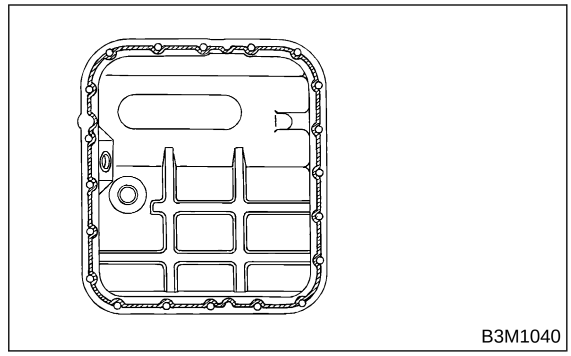
2) Connect harness connectors.
Connect connectors of same color, and secure connectors to valve body sing clips.

Tightening torque (Transmission ground terminal):
8 N·m (0.8 kgf-m, 5.8 ft-lb)



(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) ATF temperature sensor
(I) Transfer duty solenoid (Brown)
(J) Transmission ground

3) Apply proper amount of liquid gasket to the entire oil pan mating surface.
Fluid packing:
Three Bond 1217B



4) Install the oil pan.

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

5) Install the front and rear vehicle speed sensor, and also the torque converter turbine speed sensor, and then fasten the harness.

Tightening torque:
7 N·m (0.7 kgf-m, 5.1 ft-lb)

6) Install oil cooler outlet pipe.

CAUTION:
Be sure to use a new aluminum washer.

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

7) Install transmission rear crossmember bolts.

Tightening torque:
70 N·m (7.1 kgf-m, 51.4 ft-lb)

8) Install propeller shaft. <Ref. to DS-15, INSTALLATION, Propeller Shaft.>
9) Install shield cover.
10) Install front, center, rear exhaust pipes and muffler.
<Ref. to EX-6, INSTALLATION, Front Exhaust Pipe.> and <Ref. to EX-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX-11, INSTALLATION, Muffler.>
11) Lower the vehicle.
12) Install the transmission connector to the stay.
13) Install air cleaner case.
<Ref. to IN-6, INSTALLATION, Air Cleaner Case.>

14. Rear Vehicle Speed Sensor

S502710

A: REMOVAL *S502710A18*

When removing the rear vehicle speed sensor, refer to “Front Vehicle Speed Sensor.” <Ref. to AT-32, REMOVAL, Front Vehicle Speed Sensor.>

B: INSTALLATION *S502710A11*

When installing the rear vehicle speed sensor, refer to “Front Vehicle Speed Sensor.” <Ref. to AT-34, INSTALLATION, Front Vehicle Speed Sensor.>

15. Torque Converter Turbine Speed Sensor S502711

A: REMOVAL S502711A18

When removing the torque converter turbine speed sensor, refer to “Front Vehicle Speed Sensor.” <Ref. to AT-32, REMOVAL, Front Vehicle Speed Sensor.>

B: INSTALLATION S502711A11

When installing the torque converter turbine speed sensor, refer to “Front Vehicle Speed Sensor.” <Ref. to AT-34, INSTALLATION, Front Vehicle Speed Sensor.>

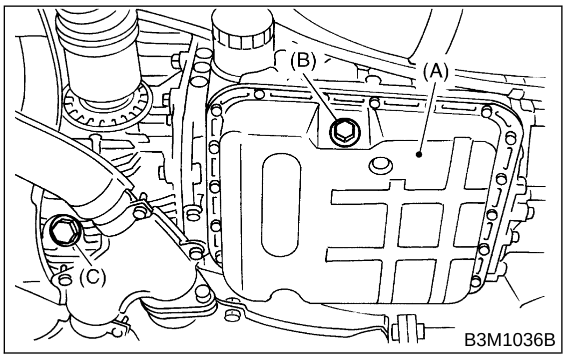
16. Control Valve Body S502564

A: REMOVAL S502564A18

1) Lift-up the vehicle.
2) Clean transmission exterior.
3) Drain ATF completely.

NOTE:
Tighten ATF drain plug after draining ATF.

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

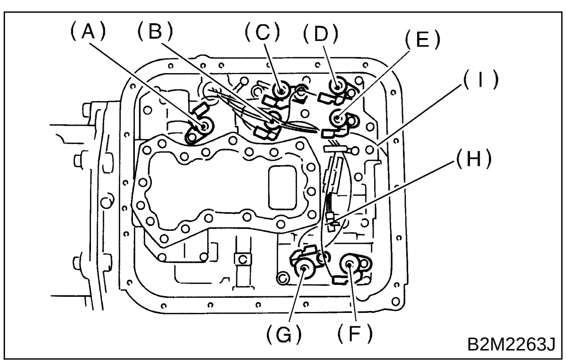


(A) Oil pan
(B) Drain plug
(C) Differential oil drain plug

4) Remove the oil pan.

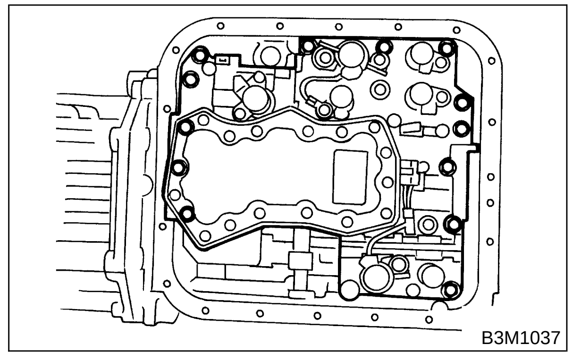
NOTE:
- Remove and clean the magnet.
- Remove the old gasket on the oil pan and transmission case completely.

5) Disconnect duty solenoids and ATF temperature sensor connectors. Remove connectors from clip and disconnect connectors.



(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) ATF temperature sensor
(I) Transfer duty solenoid (Brown)

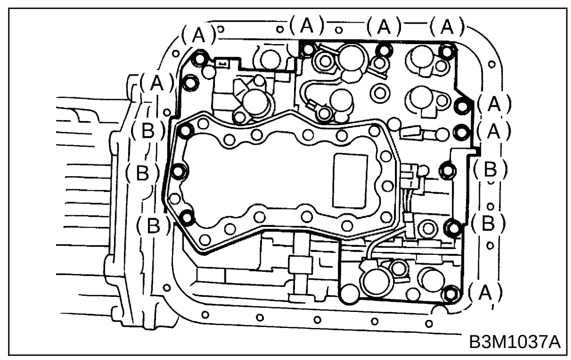
6) Remove the control valve. When removing control valve body, be careful not to interfere with transfer duty solenoid wiring



B: INSTALLATION S502564A11

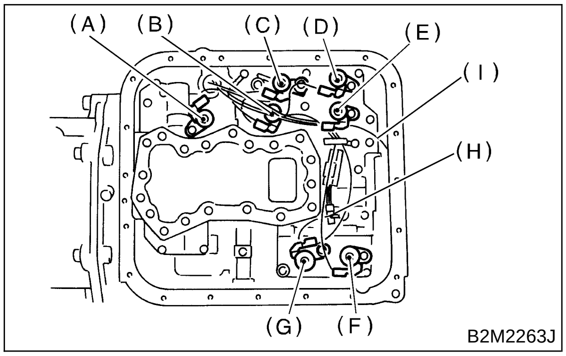
1) Set the range select lever in “N” position.
2) Install the control valve and ground connectors.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



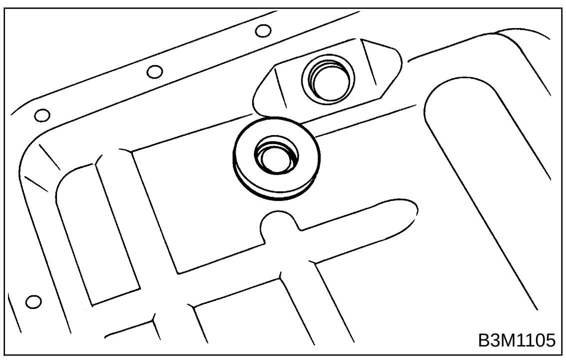
(A) Short bolts
(B) Long bolts

3) Connect all connector.

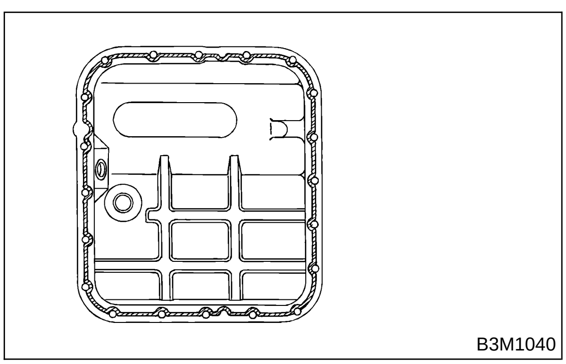


(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) ATF temperature sensor
(I) Transfer duty solenoid (Brown)

4) Attach the magnet at the specified position.



5) Apply proper amount of liquid gasket to the entire oil pan mating surface.
Fluid packing:
Three Bond 1217B



6) Install the oil pan.

Tightening torque:
4.9 N·m (0.5 kgf-m, 3.6 ft-lb)

7) Pour ATF into the oil charge pipe. <Ref. to AT-9, Automatic Transmission Fluid.>
8) Check the level of the ATF.
<Ref. to AT-9, Automatic Transmission Fluid.>

C: DISASSEMBLY *S502564A06*

Refer to “AUTOMATIC TRANSMISSION” <Pub. No. G0853ZE> a separate publication.

D: ASSEMBLY *S502564A02*

Refer to “AUTOMATIC TRANSMISSION” <Pub. No. G0853ZE> a separate publication.

E: INSPECTION *S502564A10*

Refer to “AUTOMATIC TRANSMISSION” <Pub. No. G0853ZE> a separate publication.

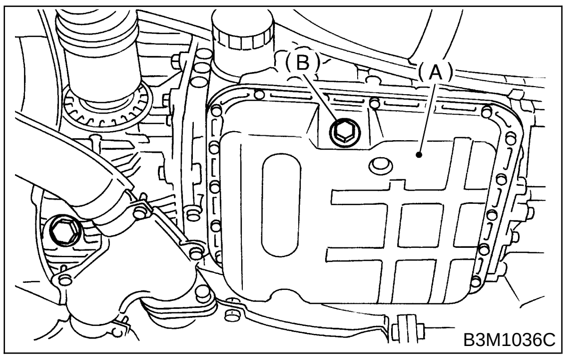
17. Shift Solenoids, Duty Solenoids and ATF Temperature Sensor S502227

A: REMOVAL S502227A18

1) Lift-up the vehicle.
2) Clean transmission exterior.
3) Drain ATF completely.

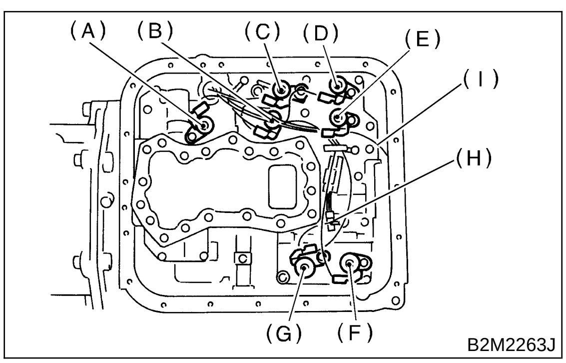
NOTE:
Tighten ATF drain plug after draining ATF.

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



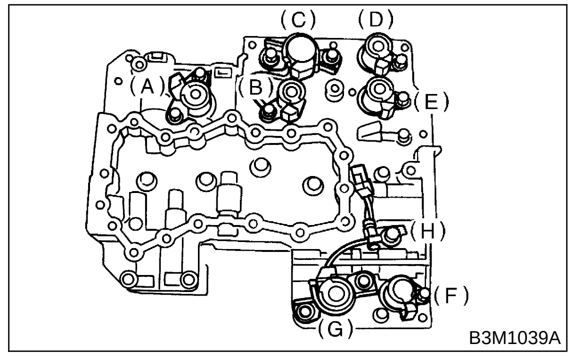
(A) Oil pan
(B) Drain plug

4) Remove oil pan.
5) Disconnect solenoid and sensor connectors.
Remove connectors from clip and disconnect connectors.



(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) ATF temperature sensor
(I) Transfer duty solenoid (Brown)

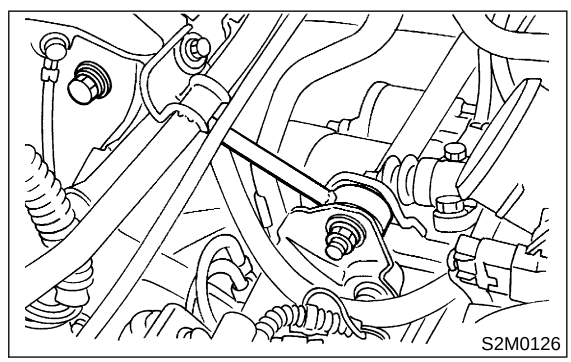
6) Remove solenoids, duty solenoids and ATF temperature sensor.



(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) ATF temperature sensor

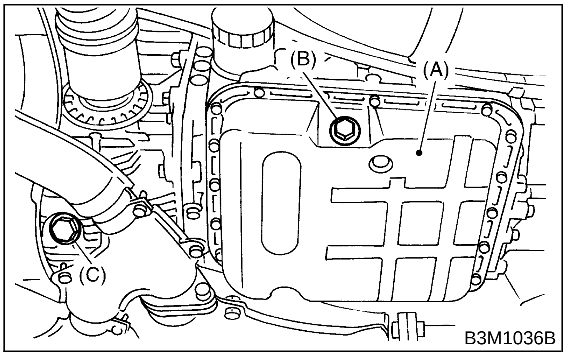
1. TRANSFER DUTY SOLENOID AND TRANSFER VALVE BODY S502227A1801

1) Set up the vehicle on the lift.
2) Disconnect battery ground terminal.
3) Remove air cleaner case. <Ref. to IN-6, REMOVAL , Air Cleaner Case.>
4) Remove pitching stopper.



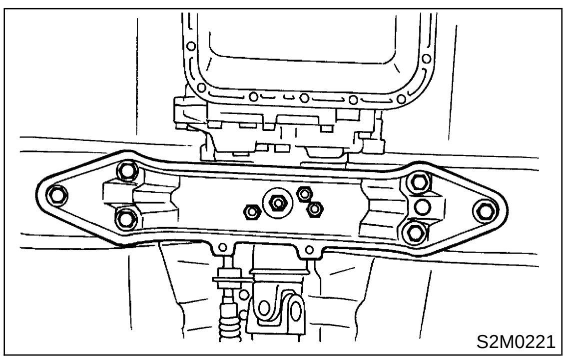
5) Remove front exhaust pipe with center exhaust pipe.
<Ref. to EX-5, REMOVAL, Front Exhaust Pipe.>
6) Remove rear exhaust pipe and muffler.

7) Raise vehicle and drain ATF.

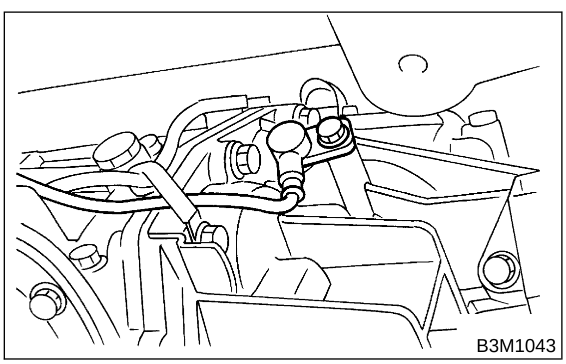


(A) Oil pan
(B) Drain plug
(C) Deferential oil drain plug

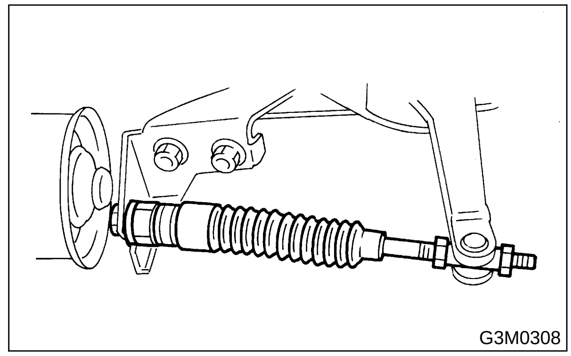
8) Remove heat shield cover.
9) Remove propeller shaft. <Ref. to DS-14, REMOVAL, Propeller Shaft.>
10) Remove rear crossmember.
(1) Support transmission using a transmission jack and raise slightly.
(2) Remove bolts and nuts as shown in Figure.



11) Remove rear vehicle speed sensor.

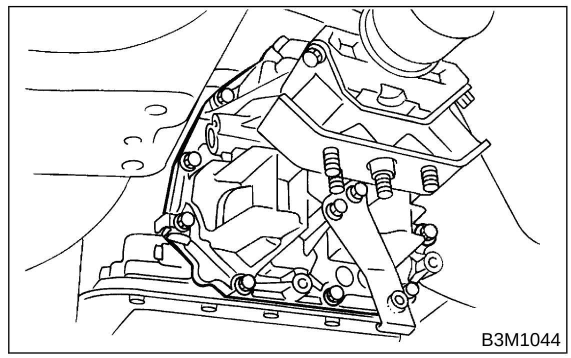


12) Remove select cable nut.

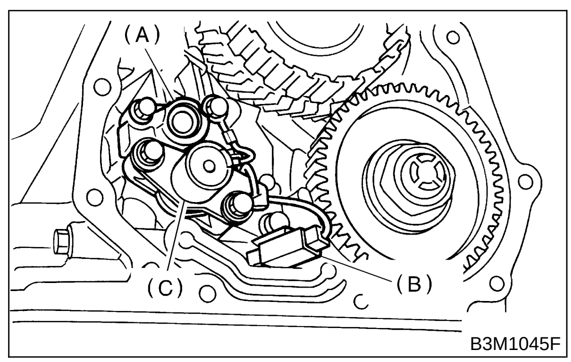


13) Move gear select cable so that extension bolts can be removed.
14) Remove bolts.
15) Remove extension case.

NOTE:
Use a container to catch oil flowing from extension.



16) Disconnect transfer duty solenoid connector.
17) Remove transfer duty solenoid and transfer valve body.

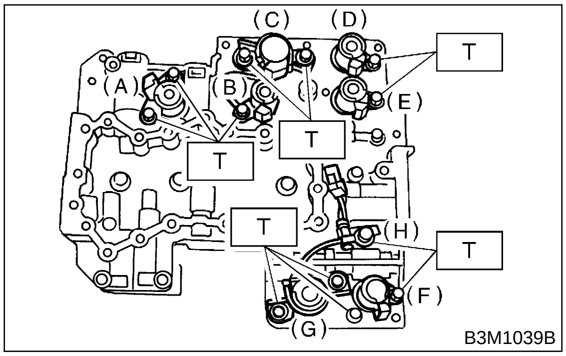


(A) Transfer valve body
(B) Transfer duty solenoid connector
(C) Transfer duty solenoid

B: INSTALLATION S502227A11

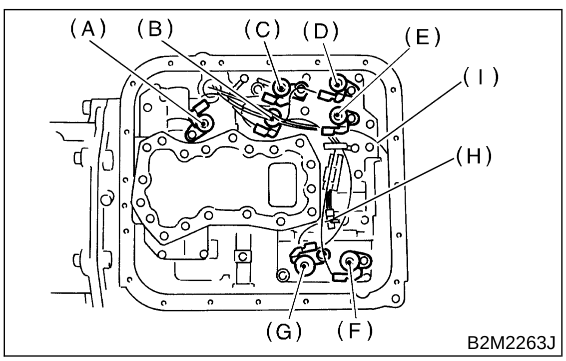
1) Install solenoids and ATF temperature sensor.

Tightening torque:
T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)



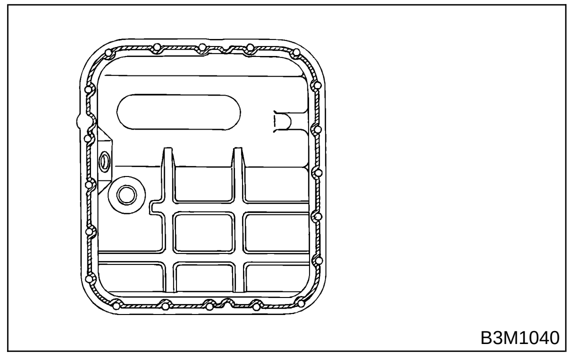
(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) ATF temperature sensor

2) Connect harness connectors.
Connect connectors of same color, and secure connectors to valve body using clips.



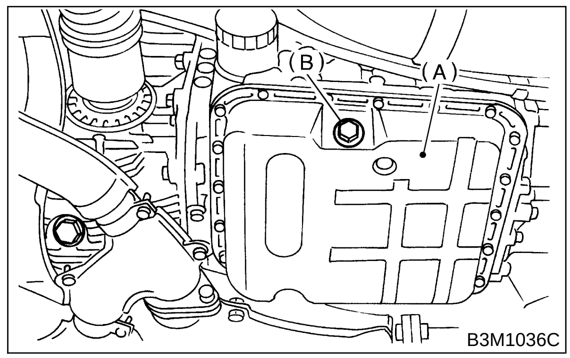
(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) ATF temperature sensor
(I) Transfer duty solenoid (Brown)

3) Apply proper amount of liquid gasket to the entire oil pan mating surface.
Fluid packing:
Three Bond 1217B



4) Install oil pan.

Tightening torque:
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)



(A) Oil pan
(B) Drain plug

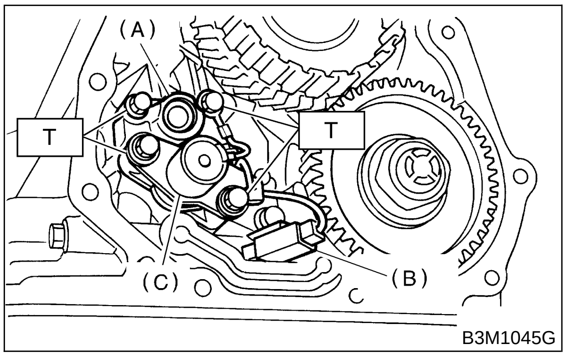
5) Fill ATF up to the middle of the “COLD” side on level gauge by using the gauge hole. <Ref. to AT-9, Automatic Transmission Fluid.>
6) Check the ATF level. <Ref. to AT-9, Automatic Transmission Fluid.>

1. TRANSFER DUTY SOLENOID AND TRANSFER VALVE BODY S502227A1101

1) Install transfer duty solenoid and transfer valve body.
   (1) Install transfer duty solenoid and transfer valve body.

Tightening torque:
T: 8 N·m (0.8 kg-m, 5.8 ft-lb)

   (2) Connect transfer duty solenoid connector.



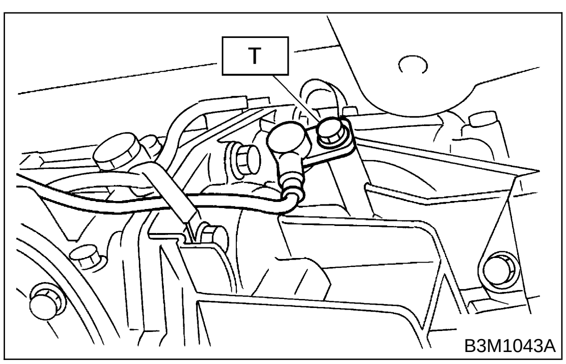
(A) Transfer valve body
(B) Transfer duty solenoid connector
(C) Transfer duty solenoid

2) Install extension case to transmission case.
   (1) Tighten 11 bolts.

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

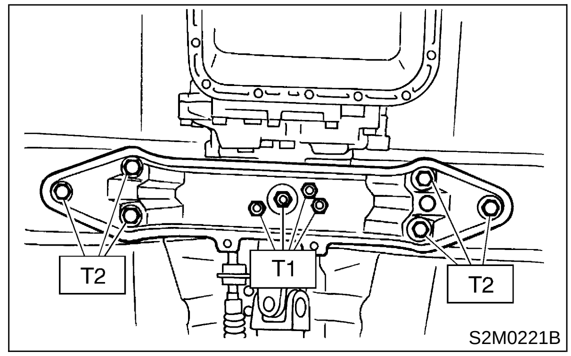
   (2) Adjust the select cable. <Ref. to CS-27, ADJUSTMENT, Select Cable.>
3) Install rear vehicle speed sensor.

Tightening torque:
T: 7 N·m (0.7 kg-m, 5.1 ft-lb)

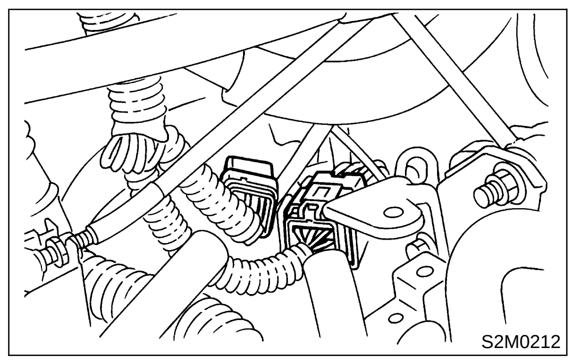


4) Install rear crossmember.
   (1) Tighten bolts.

Tightening torque:
T1: 35 N·m (3.6 kg-m, 26 ft-lb)
T2: 70 N·m (7.1 kg-m, 51.4 ft-lb)

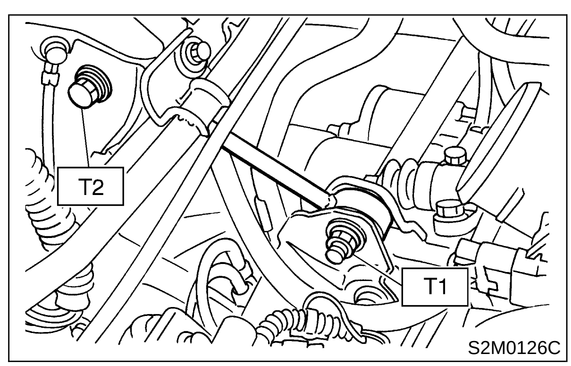


   (2) Lower and remove transmission jack.
5) Install propeller shaft. <Ref. to DS-15, INSTALLATION, Propeller Shaft.>
6) Install front exhaust pipe and center exhaust pipe.
7) Lower and remove jack.
8) Connect the following parts:
   (1) Oxygen sensor connector
   (2) Transmission harness connector



9) Install pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kg-m, 37 ft-lb)
T2: 58 N·m (5.9 kg-m, 43 ft-lb)



10) Install air cleaner case.

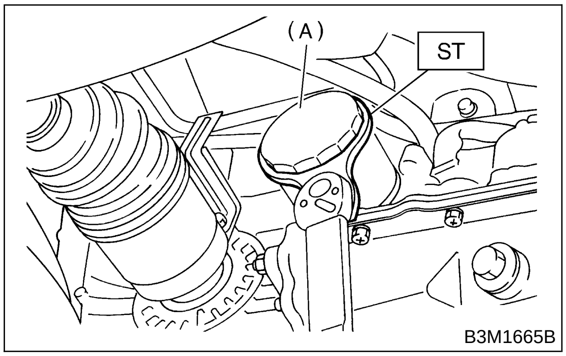
11) Fill ATF up to the middle of the “COLD” side on level gauge by using the gauge hole. <Ref. to AT-9, Automatic Transmission Fluid.>
12) Check the ATF level. <Ref. to AT-9, Automatic Transmission Fluid.>

18. ATF Filter S502226

A: REMOVAL S502226A18

NOTE:
The ATF filter is maintenance-free.

1) Lift-up the vehicle.
2) Using ST, remove ATF filter.
ST 498545400 OIL FILTER WRENCH



(A) ATF filter

3) Get new ATF filter and apply a thin coat of ATF to the oil seal.

B: INSTALLATION S502226A11

1) Apply a thin coat of AT fluid to the seal of filter.
2) Install ATF filter. Turn it by hand, being careful not to damage oil seal.
3) Using ST, tighten ATF filter to transmission case.
Calculate ATF filter torque specifications using the following formula.
$T2 = L2/(L1 + L2) \times T1$
T1: 14 N·m (1.4 kgf-m, 10.1 ft-lb)
[Required torque setting]
T2: Tightening torque
L1: ST length 0.078 m (3.07 in)
L2: Torque wrench length
Example:

Torque wrench length mm (in)	Tightening torque N·m (kgf-m, ft-lb)
100 (3.94)	7.6 (0.78, 5.6)
150 (5.91)	9.0 (0.92, 6.7)
200 (7.87)	10 (1.00, 7.2)

CAUTION:
Align ST with torque wrench while tightening ATF filter.

ST 498545400 OIL FILTER WRENCH
4) Add ATF.
5) Inspect level of ATF. <Ref. to AT-9, Automatic Transmission Fluid.>

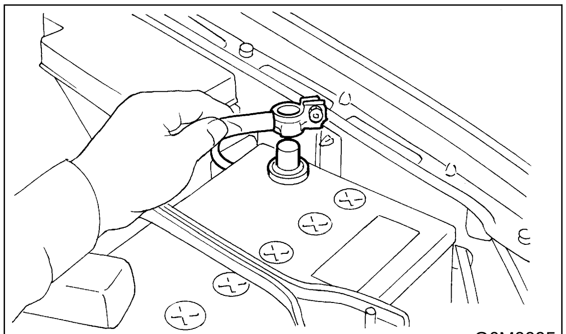
C: INSPECTION S502226A10

Replace the part if any defect is found from the inspection.
Check for rust, hole, ATF leaks, and other damage.

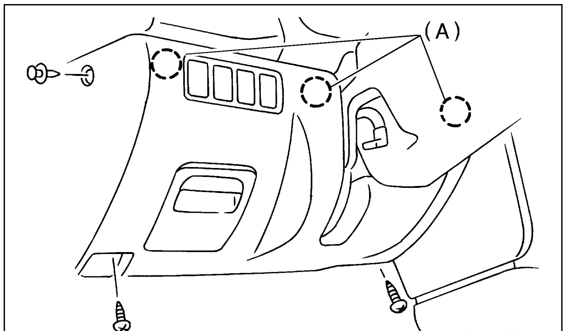
19. Transmission Control Module (TCM) S502225

A: REMOVAL S502225A18

1) Disconnect battery ground cable.

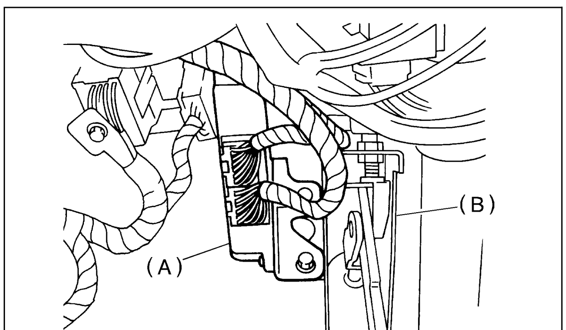

G6M0095

2) Remove lower cover and then disconnect connector.



S5M0044B

3) Disconnect connectors from transmission control module.



B3M1666A

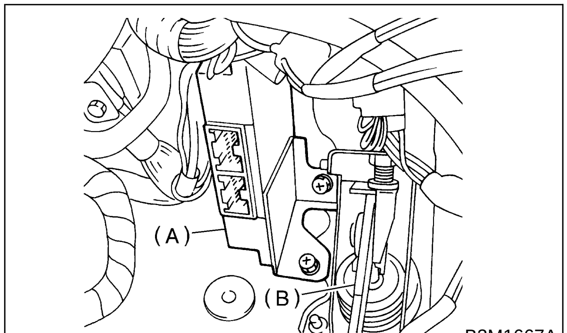
(A) Transmission control module
(B) Brake pedal bracket

4) Remove transmission control module.

B: INSTALLATION S502225A11

1) Install transmission control module.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



B3M1667A

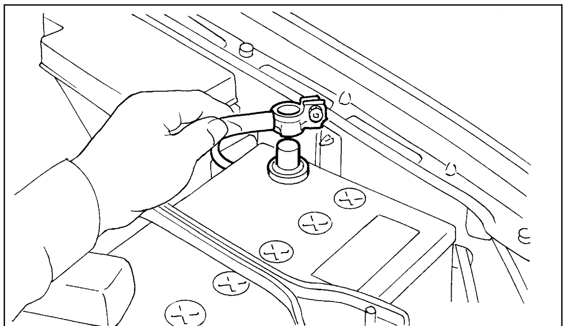
(A) Transmission control module
(B) Brake pedal bracket

2) Connect connectors to transmission control module.
3) Install in the reverse order of removal.

20. Dropping Resistor S502218

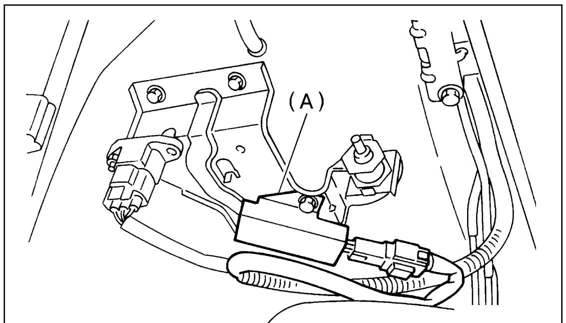
A: REMOVAL S502218A18

1) Disconnect battery ground cable.



G6M0095

2) Remove air intake duct. <Ref. to IN-7, REMOVAL, Air Intake Duct.>
3) Disconnect connector from dropping resistor.
4) Remove dropping resistor.



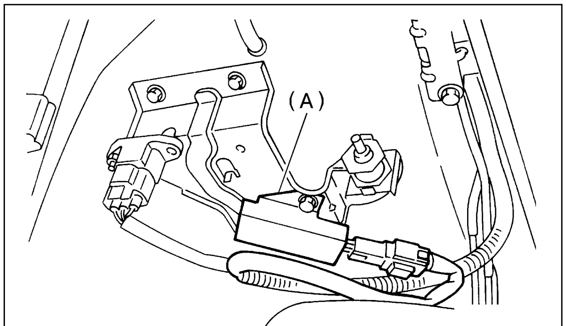
B3M1670E

(A) Dropping resistor

B: INSTALLATION S502218A11

1) Install in the reverse order of removal.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



B3M1670E

(A) Dropping resistor

C: INSPECTION *S502218A10*

No.	Step	Check	Yes	No
1	**CHECK RESISTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from dropping resistor. 3) Measure resistance between dropping resistor terminal. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 9 and 15 Ω?	Go to step **2**.	Replace dropping resistor. <Ref. to AT-46 Dropping Resistor.>
2	**CHECK RESISTOR.** Measure resistance between dropping resistor terminal. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance between 9 and 15 Ω?	Dropping resistor is normal.	Replace dropping resistor. <Ref. to AT-46 Dropping Resistor.>

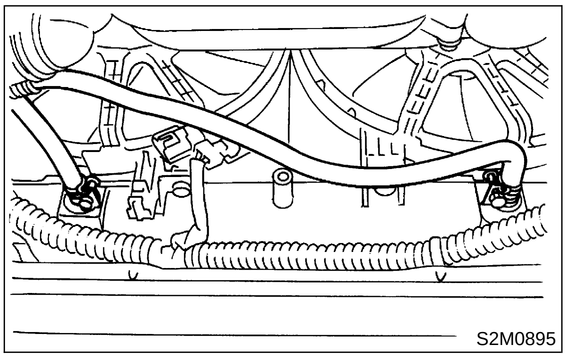
21. ATF Cooler Pipe and Hose

S502565

A: REMOVAL S502565A18

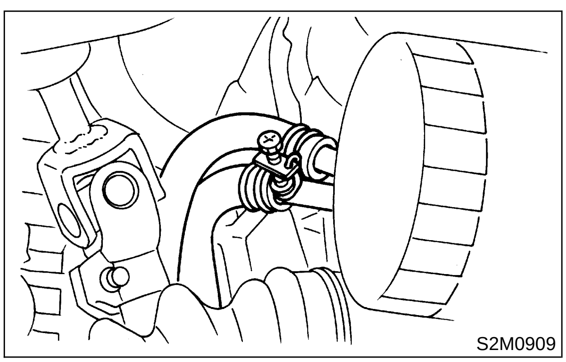
1) Set the vehicle on the lift.
2) Lift-up the vehicle.
3) Remove the under cover.
4) Disconnect ATF cooler hose from radiator.

NOTE:
- Do not remove with a screwdriver or other pointed tools.
- When the hose is difficult to remove, wrap a shop cloth around the hose to protect it. Turn it with pliers, and then pull directly out with your hand.

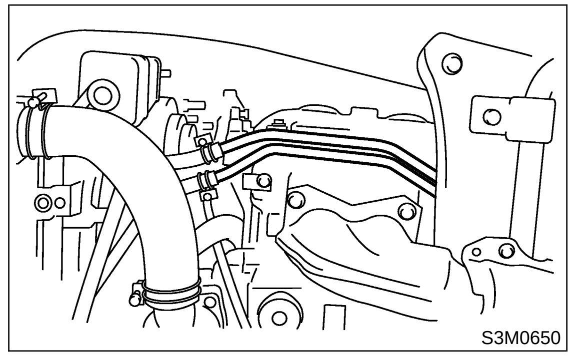


5) Disconnect ATF cooler hoses from pipes.

NOTE:
- Do not remove with a screwdriver or other pointed tools.
- When the hose is difficult to remove, wrap a shop cloth around the hose to protect it. Turn it with pliers, and then pull directly out with your hand.

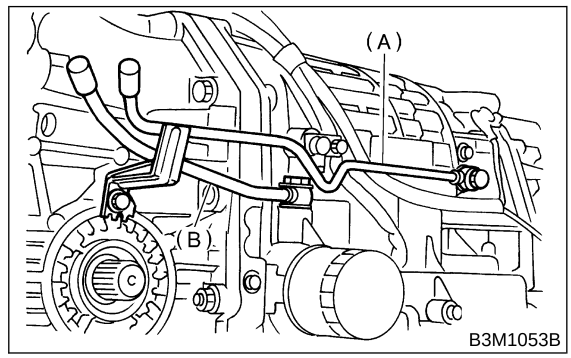


6) Remove ATF cooler pipe from cylinder head.



7) Remove the oil cooler inlet and outlet pipes.

CAUTION:
When removing outlet pipe, be careful not to lose ball and spring used with retaining screw.



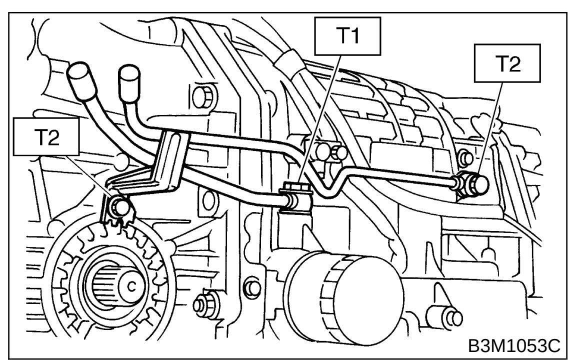
(A) Inlet pipe
(B) Outlet pipe

B: INSTALLATION S502565A11

1) Install the oil cooler outlet and inlet pipes.

CAUTION:
Be sure to use a new aluminum washer.

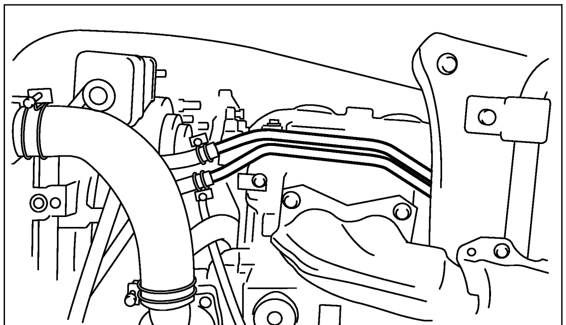
Tightening torque:
T1: 44 N·m (4.5 kgf-m, 32.5 ft-lb)
T2: 25 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Inlet pipe
(B) Outlet pipe

2) Install ATF cooler pipe to frame.

Tightening torque:
7.35 N·m (0.75 kgf-m, 5.4 ft-lb)

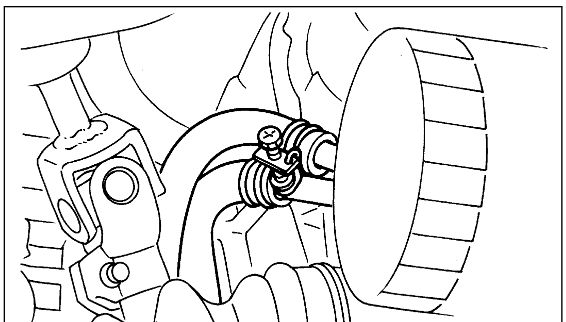


S3M0650

3) Connect ATF cooler hose to pipe transmission side.

NOTE:

- Install so that the hose is not folded over, excessively bent, or twisted.
- Carefully insert the hose to the specified position.

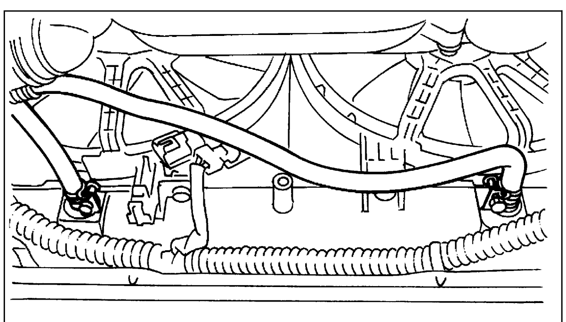


S2M0909

4) Connect ATF cooler hose to pipe of radiator side.

NOTE:

- Install so that the hose is not folded over, excessively bent, or twisted.
- Be careful to insert the hose to the specified position.



S2M0895

5) Install the under cover.
6) Install battery and washer tank.
7) Fill ATF. <Ref. to AT-9, Automatic Transmission Fluid.>

NOTE:
Make sure there are no ATF leaks in joints between the transmission, radiator, pipes, and hoses.

C: INSPECTION *S502565A10*

Repair or replace any defective hoses, pipes, clamps, and washers found from the inspection below.
1) Check for ATF leaks in joints between the transmission, radiator, pipes, and hoses.
2) Check for deformed clamps.
3) Lightly bend the hose and check for cracks in the surface and other damage.
4) Pinch the hose with your fingers and check for poor elasticity. Also check for poor elasticity in the parts where the clamp was by pressing with your fingernail.
5) Check for peeling, cracks, and deformation at the tip of the hose.

MEMO:

MANUAL TRANSMISSION AND DIFFERENTIAL

MT

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1. General Description S503001

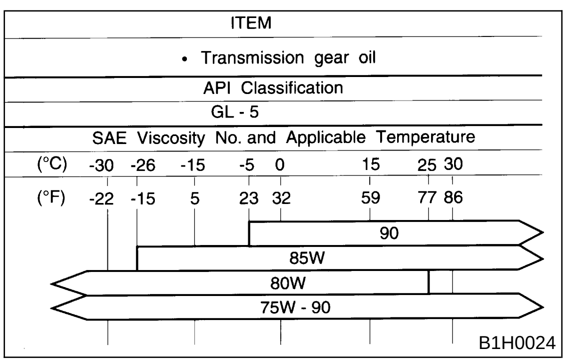
A: SPECIFICATIONS S503001E49

1. MANUAL TRANSMISSION AND DIFFERENTIAL S503001E4901

Type			5-forward speeds and 1-reverse
Transmission gear ratio		1st	3.454
		2nd	2.062
		3rd	1.448
		4th	1.088
		5th	0.780
		Reverse	3.333
Front reduction gear	Final	Type of gear	Hypoid
		Gear ratio	4.111
Rear reduction gear	Transfer	Type of gear	Helical
		Gear ratio	1.000
	Final	Type of gear	Hypoid
		Gear ratio	4.111
Front differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2)
Center differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2 and viscous coupling)
Transmission gear oil			GL-5
Transmission gear oil capacity			3.5 ℓ (3.7 US qt, 3.1 Imp qt)

2. TRANSMISSION GEAR OIL S503001E4902

Recommended oil



3. TRANSMISSION CASE ASSEMBLY

S503001E4903

Drive pinion shim adjustment
Hypoid gear backlash
0.13 — 0.18 mm (0.0051 — 0.0071 in)

Drive pinion shim			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
32295AA031	0.150 (0.0059)	32295AA071	0.250 (0.0098)
32295AA041	0.175 (0.0069)	32295AA081	0.275 (0.0108)
32295AA051	0.200 (0.0079)	32295AA091	0.300 (0.0118)
32295AA061	0.225 (0.0089)	32295AA101	0.500 (0.0197)

Selection of main shaft rear plate

Main shaft rear plate		
Dimension “A” mm (in)	Part No.	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 3.99 (0.1524 — 0.1571)	32294AA051	2

Input shaft holder adjustment

Dimension “D” mm (in)	Number of shim
52.50 — 53.11 (2.0669 — 2.0909)	—
52.00 — 52.49 (2.0472 — 2.0665)	1
51.26 — 51.99 (2.0181 — 2.0468)	2

4. DRIVE PINION ASSEMBLY S503001E4904

Preload adjustment of thrust bearing
Starting torque
0.3 — 0.8 N·m (0.03 — 0.08 kgf-m, 0.2 — 0.6 ft-lb)

Adjusting washer No. 1	
Part No.	Thickness mm (in)
803025051	3.925 (0.1545)
803025052	3.950 (0.1555)
803025053	3.975 (0.1565)
803025054	4.000 (0.1575)
803025055	4.025 (0.1585)
803025056	4.050 (0.1594)
803025057	4.075 (0.1604)

Adjusting washer No. 2	
Part No.	Thickness mm (in)
803025059	3.850 (0.1516)
803025054	4.000 (0.1575)
803025058	4.150 (0.1634)

5. MAIN SHAFT S503001E4911

Snap ring (Outer-25) to synchronizer hub clearance
0.060 — 0.100 mm (0.0024 — 0.0039 in)

Snap ring (Outer-25)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
805025051	2.42 (0.0953)	805025055	2.62 (0.1031)
805025052	2.47 (0.0972)	805025056	2.67 (0.1051)
805025053	2.52 (0.0992)	805025057	2.72 (0.1071)
805025054	2.57 (0.1012)	805025058	2.37 (0.0933)

6. REVERSE IDLER GEAR S503001E4905

Adjustment of reverse idler gear position
Reverse idler gear to transmission case (LH) wall clearance
6.0 — 7.5 mm (0.236 — 0.295 in)

Reverse shifter lever		
Part No.	Mark	Remarks
32820AA070	7	Further from case wall
32820AA080	8	Standard
32820AA090	9	Closer to the case wall

After installing a suitable reverse shifter lever, adjust reverse idler gear to transmission case wall clearance to within 0 to 0.5 mm (0 to 0.020 in) using washers.

Washer (20.5 × 26 × t)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
803020151	0.4 (0.016)	803020154	1.9 (0.075)
803020152	1.1 (0.043)	803020155	2.3 (0.091)
803020153	1.5 (0.059)	—	—

7. SHIFTER FORK AND ROD S503001E4906

Select suitable shifter forks so that both coupling sleeve and reverse driven gear are positioned in the center of their synchromesh mechanisms.
Rod end clearance
A: 1st-2nd — 3rd-4th
0.4 — 1.4 mm (0.016 — 0.055 in)
B: 3rd-4th — 5th
0.5 — 1.3 mm (0.020 — 0.051 in)

1st-2nd shifter fork		
Part No.	Mark	Remarks
32804AA060	1	Approach to 1st gear by 0.2 mm (0.008 in)
32804AA070	No mark	Standard
32804AA080	3	Approach to 2nd gear by 0.2 mm (0.008 in)

3rd-4th shifter fork		
Part No.	Mark	Remarks
32810AA061	1	Approach to 4th gear by 0.2 mm (0.008 in)
32810AA071	No mark	Standard
32810AA101	3	Approach to 3rd gear by 0.2 mm (0.008 in)

5th shifter fork		
Part No.	Mark	Remarks
32812AA201	7	Approach to 5th gear by 0.2 mm (0.008 in)
32812AA211	No mark	Standard
32812AA221	9	Become distant from 5th gear by 0.2 mm (0.008 in)

8. TRANSFER CASE S503001E4907

Neutral position adjustment

Adjustment shim	
Part No.	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

Reverse accent shaft		
Part No.	Mark	Remarks
32188AA090	3	Neutral position is closer to 1st.
32188AA100	0	Standard
32188AA110	1	Neutral position is closer to reverse gear.

Reverse check plate adjustment

Reverse check plate			
Part No.	Mark	Angle θ	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
33189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.

9. EXTENSION ASSEMBLY S503001E4908

Thrust washer (50 × 61 × t) to taper roller bearing table outer race side clearance
0.2 — 0.3 mm T (0.0008 — 0.012 in T)

NOTE:
T: Tight

Thrust washer (50 × 61 × t)	
Part No.	Thickness mm (in)
803050060	0.50 (0.0197)
803050061	0.55 (0.0217)
803050062	0.60 (0.0236)
803050063	0.65 (0.0256)
803050064	0.70 (0.0276)
803050065	0.75 (0.0295)
803050066	0.80 (0.0315)
803050067	0.85 (0.0335)
803050068	0.90 (0.0354)
803050069	0.95 (0.0374)
803050070	1.00 (0.0394)
803050071	1.05 (0.0413)
803050072	1.10 (0.0433)
803050073	1.15 (0.0453)
803050074	1.20 (0.0472)
803050075	1.25 (0.0492)
803050076	1.30 (0.0512)
803050077	1.35 (0.0531)
803050078	1.40 (0.0551)
803050079	1.45 (0.0571)

Thrust washer to center differential side clearance
0.15 — 0.35 mm (0.0059 — 0.0138 in)

Thrust washer	
Part No.	Thickness mm (in)
803036050	0.9 (0.035)
803036054	1.0 (0.039)
803036051	1.1 (0.043)
803036055	1.2 (0.047)
803036052	1.3 (0.051)
803036056	1.4 (0.055)
803036053	1.5 (0.059)
803036057	1.6 (0.063)
803036058	1.7 (0.067)

10. FRONT DIFFERENTIAL S503001E4909

Bevel gear to pinion backlash
0.13 — 0.18 mm (0.0051 — 0.0071 in)

Washer (38.1 × 50 × t)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)	803038023	1.025 — 1.050 (0.0404 — 0.0413)
803038022	0.975 — 1.000 (0.0384 — 0.0394)	—	—

Pinion shaft to axle drive shaft clearance
0 — 0.2 mm (0 — 0.008 in)

Snap ring (Outer-28)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
805028011	1.05 (0.0413)	805028012	1.20 (0.0472)

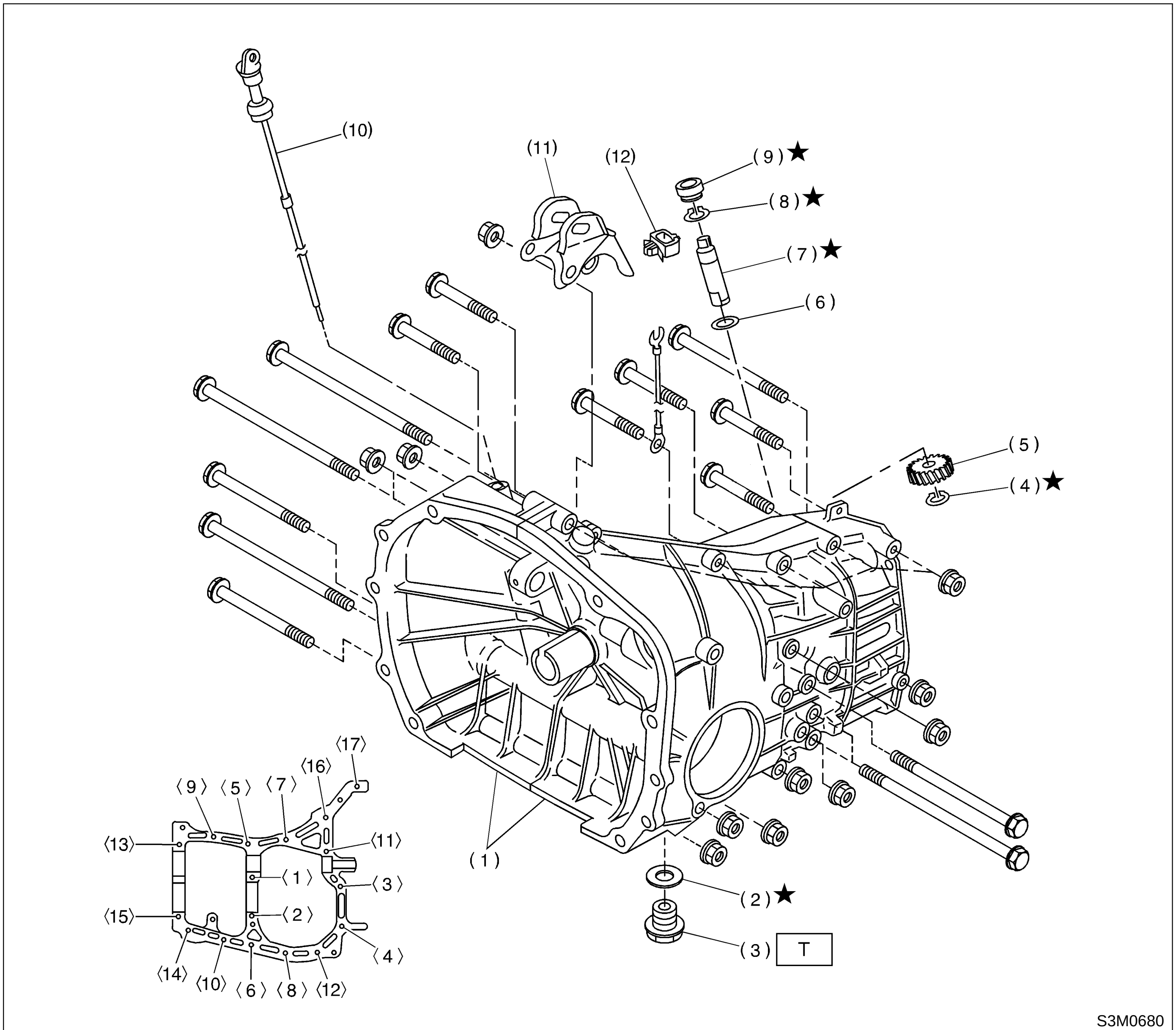
11. TRANSFER DRIVE GEAR S503001E4913

Snap ring (Outer-30) to ball bearing clearance
0.01 — 0.15 mm (0.004 — 0.0050 in)

Snap ring (Outer-30)	
Part No.	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.0697)

B: COMPONENT S503001A05

1. TRANSMISSION CASE S503001A0501

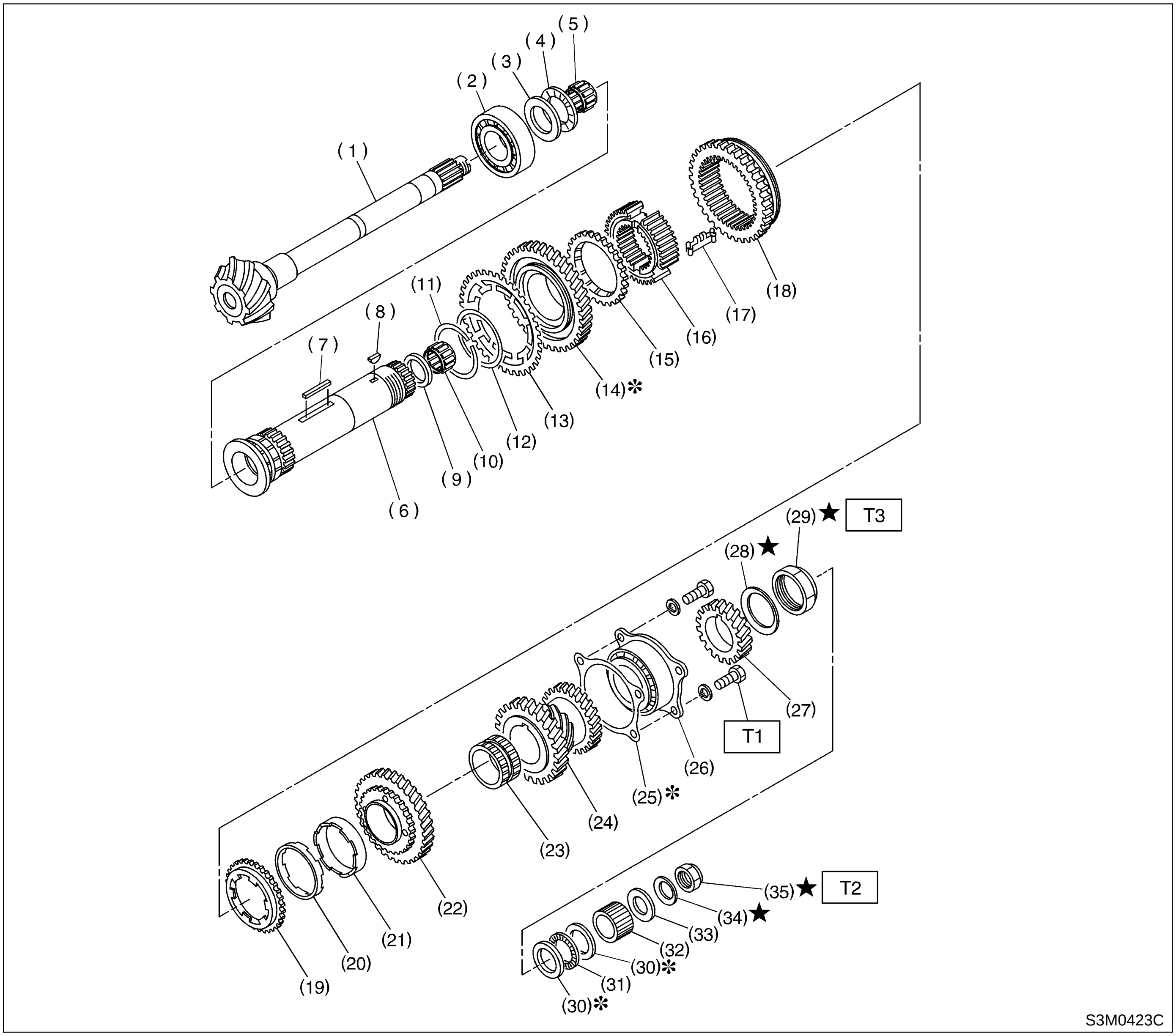


(1) Transmission case ASSY
(2) Gasket
(3) Drain plug
(4) Snap ring (Outer)
(5) Speedometer driven gear
(6) Washer
(7) Speedometer shaft
(8) Snap ring (Outer)
(9) Oil seal
(10) Oil level gauge
(11) Pitching stopper bracket
(12) Clamp

Tightening torque: N·m (kgf-m, ft-lb)
T: 44 (4.5, 32.5)

Size	All models	Torque
8 mm bolt	<5> — <15>	25 N·m (2.5 kgf-m, 18.1 ft-lb)
10 mm bolt	<1> — <4> <16> — <17>	39 N·m (4.0 kgf-m, 28.9 ft-lb)

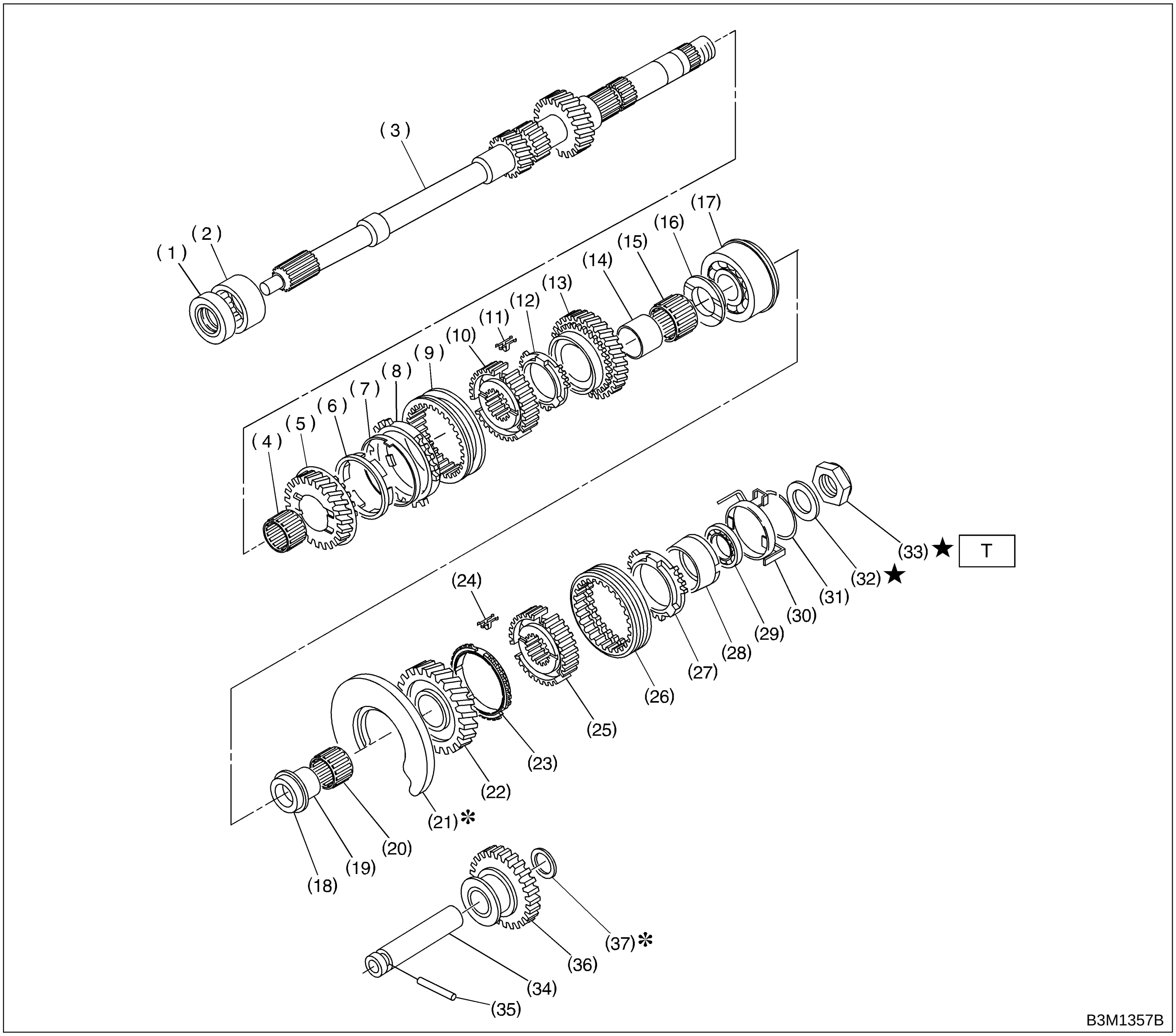
2. DRIVE PINION ASSEMBLY *S503001A0502*



(1) Drive pinion shaft
(2) Roller bearing
(3) Washer
(4) Thrust bearing
(5) Needle bearing
(6) Driven shaft
(7) Key
(8) Woodruff key
(9) Drive pinion collar
(10) Needle bearing
(11) Snap ring (Outer)
(12) Washer
(13) Sub gear
(14) 1st driven gear
(15) Baulk ring
(16) 1st-2nd synchronizer hub
(17) Insert key
(18) Reverse driven gear
(19) Outer baulk ring
(20) Synchro cone
(21) Inner baulk ring
(22) 2nd driven gear
(23) 2nd driven gear bushing
(24) 3rd-4th driven gear
(25) Driven pinion shim
(26) Roller bearing
(27) 5th driven gear
(28) Lock washer
(29) Lock nut
(30) Washer
(31) Thrust bearing
(32) Differential bevel gear sleeve
(33) Washer
(34) Lock washer
(35) Lock nut

Tightening torque: N·m (kgf-m, ft-lb)
T1: 29 (3.0, 21.7)
T2: 118 (12.0, 86.8)
T3: 265 (27, 195)

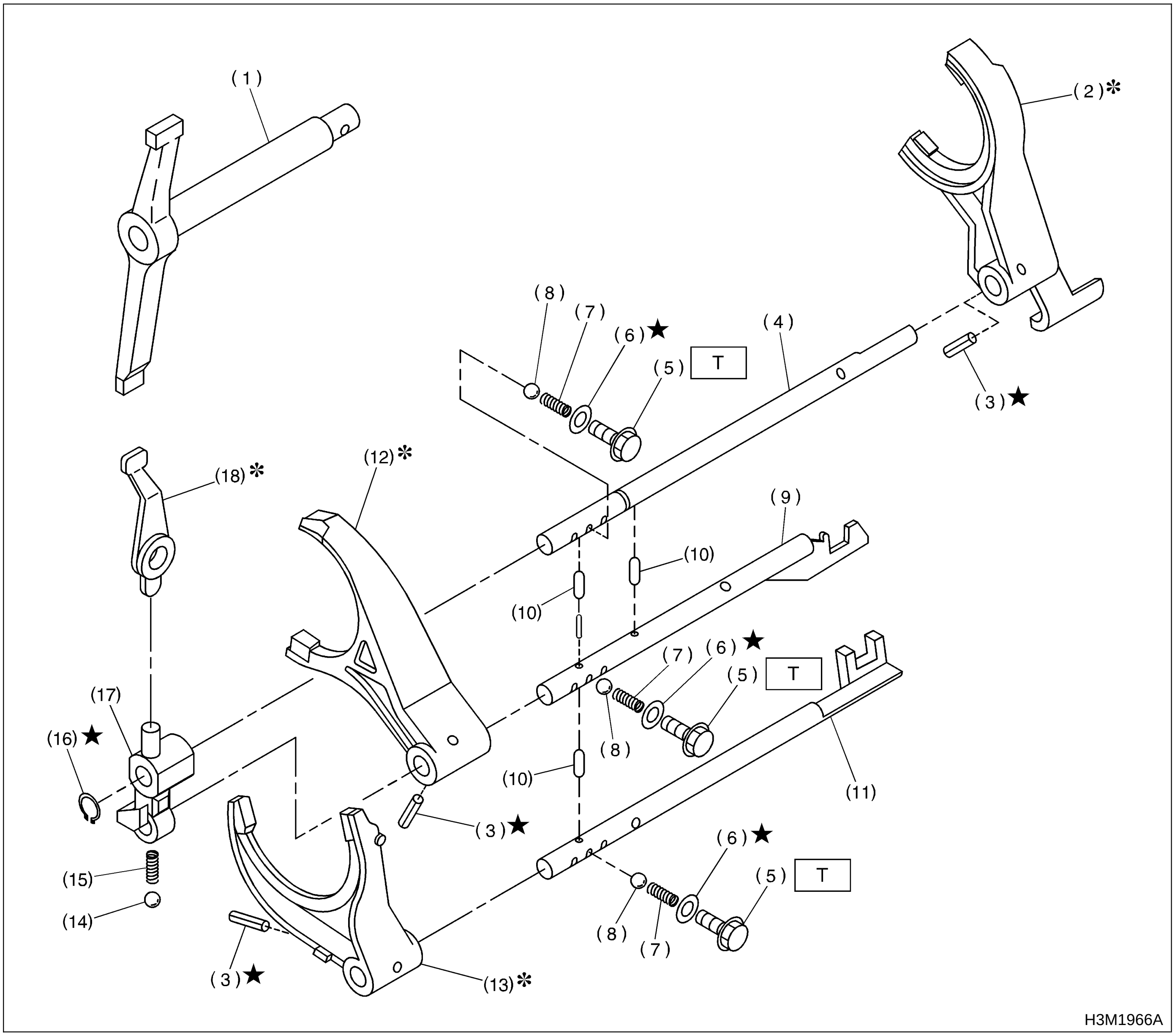
3. MAIN SHAFT ASSEMBLY *S502001A0503*



(1) Oil seal
(2) Needle bearing
(3) Transmission main shaft
(4) Needle bearing
(5) 3rd drive gear
(6) Inner baulk ring
(7) Synchro cone (3rd)
(8) Outer baulk ring
(9) Coupling sleeve (3rd-4th)
(10) Synchronizer hub (3rd-4th)
(11) Shifting insert key (3rd-4th)
(12) 4th baulk ring
(13) 4th drive gear
(14) 4th needle bearing race
(15) Needle bearing
(16) 4th gear thrust washer
(17) Ball bearing
(18) 5th gear thrust washer
(19) 5th needle bearing race
(20) Needle bearing
(21) Main shaft rear plate
(22) 5th drive gear
(23) 5th baulk ring
(24) Shifting insert key (5th-Rev)
(25) Synchronizer hub (5th-Rev)
(26) Coupling sleeve (5th-Rev)
(27) Rev baulk ring
(28) Synchro cone (Rev)
(29) Ball bearing
(30) Synchro cone stopper
(31) Snap ring
(32) Lock washer
(33) Lock nut
(34) Reverse idler gear shaft
(35) Straight pin
(36) Reverse idler gear
(37) Washer

Tightening torque: N·m (kgf-m, ft-lb)
T: 118 (12.0, 86.8)

4. SHIFTER FORK AND SHIFTER ROD *S503001A0504*

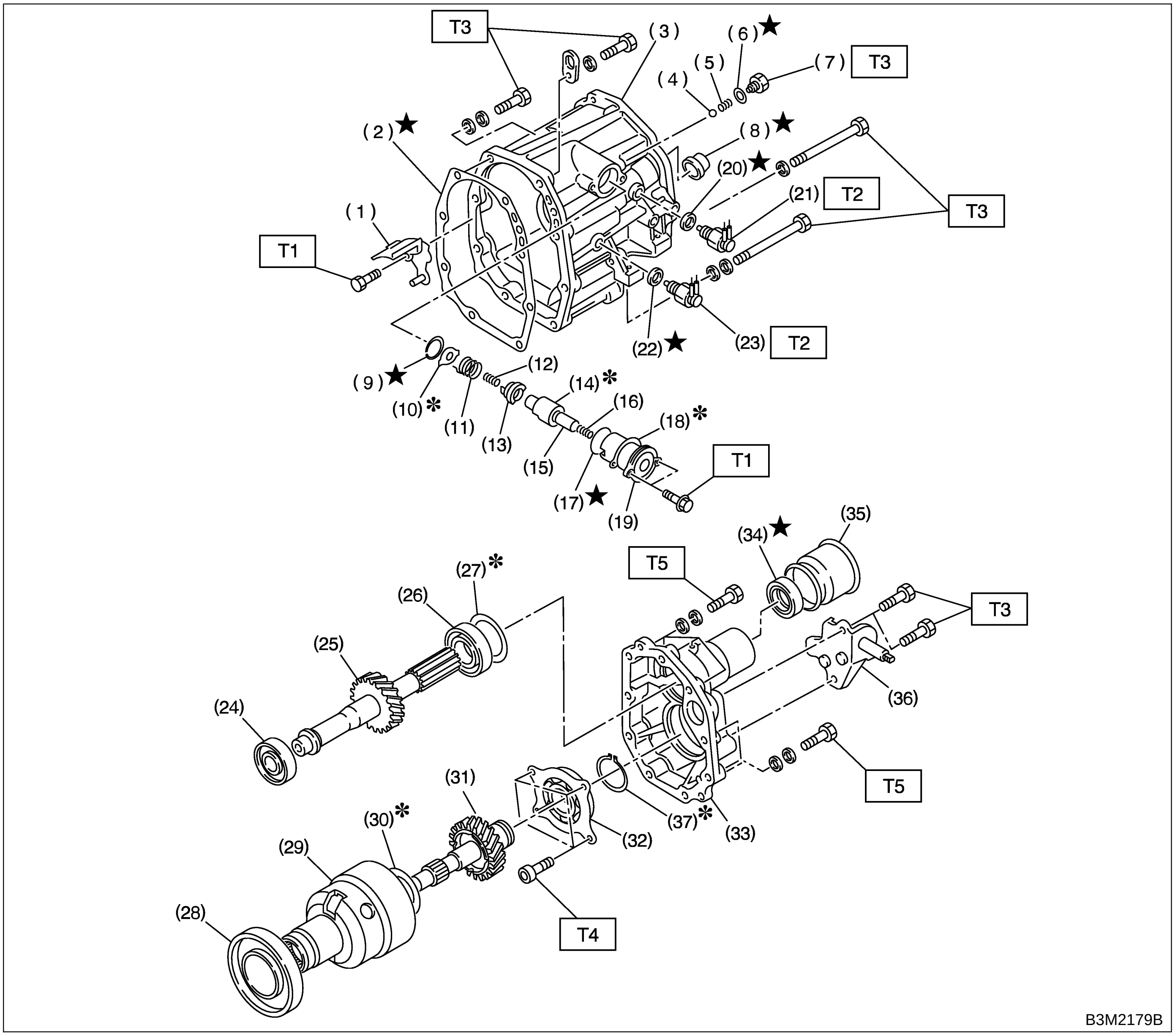


(1) Shifter arm
(2) 5th shifter fork
(3) Straight pin
(4) Reverse fork rod
(5) Checking ball plug
(6) Gasket
(7) Checking ball spring
(8) Ball
(9) 3rd-4th fork rod
(10) Interlock plunger
(11) 1st-2nd fork rod
(12) 3rd-4th shifter fork
(13) 1st-2nd shifter fork
(14) Ball
(15) Spring
(16) Snap ring (Outer)
(17) Reverse fork rod arm
(18) Reverse shifter lever

Tightening torque: N·m (kgf-m, ft-lb)
T: 19.6 (2.0, 14.5)

5. TRANSFER CASE AND EXTENSION

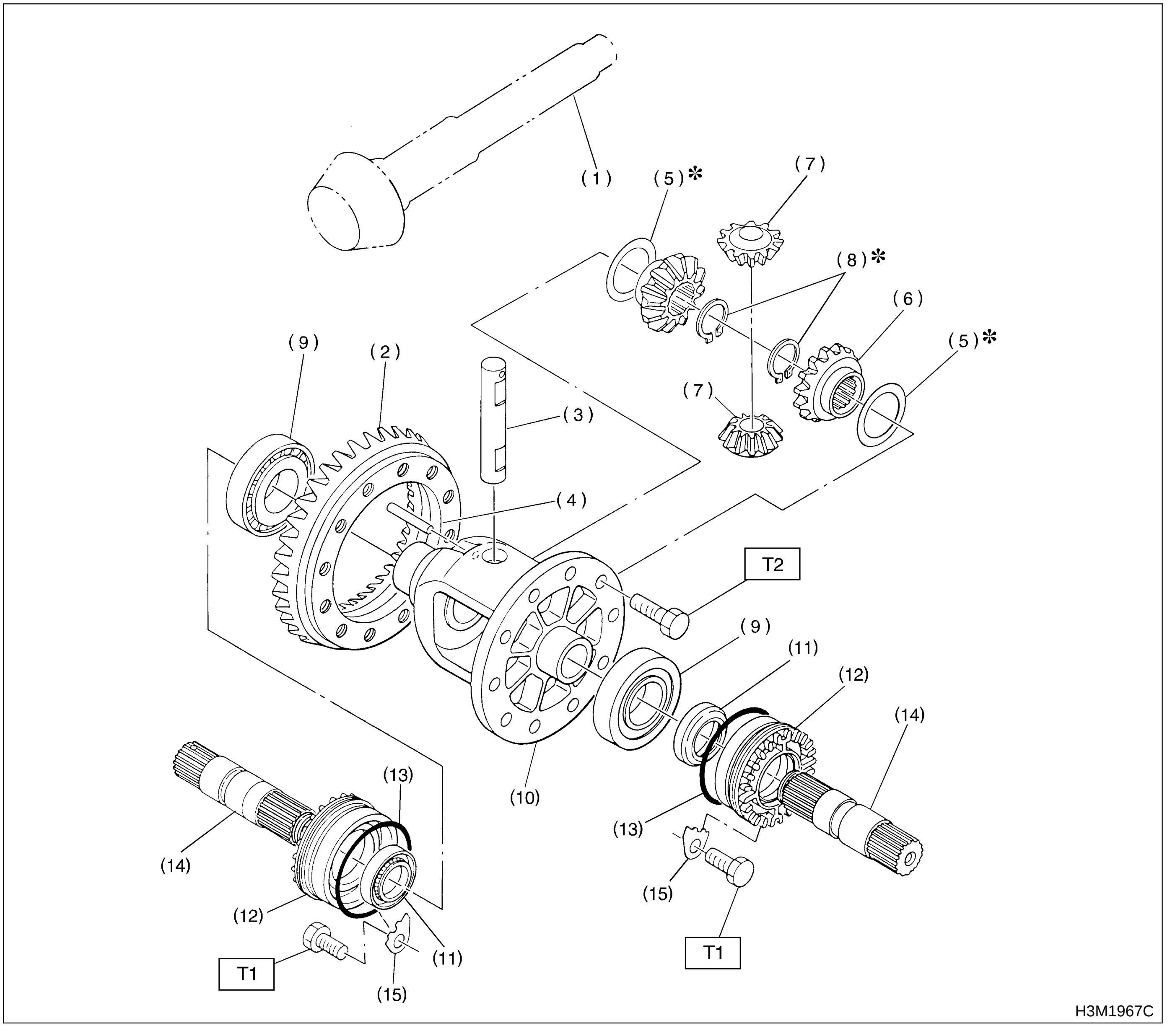
S503001A0505



(1) Oil guide
(2) Gasket
(3) Transfer case
(4) Ball
(5) Reverse accent spring
(6) Gasket
(7) Plug
(8) Oil seal
(9) Snap ring (Inner)
(10) Reverse check plate
(11) Reverse check spring
(12) Reverse return spring
(13) Reverse check cam
(14) Reverse accent shaft
(15) Return spring cap
(16) Return spring
(17) O-ring
(18) Adjusting select shim
(19) Reverse check sleeve
(20) Gasket
(21) Neutral switch
(22) Gasket
(23) Back-up light switch
(24) Roller bearing
(25) Transfer driven gear
(26) Roller bearing
(27) Adjusting washer
(28) Ball bearing
(29) Center differential
(30) Adjusting washer
(31) Transfer drive gear
(32) Ball bearing
(33) Extension
(34) Oil seal
(35) Dust cover
(36) Shift bracket
(37) Snap ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 10 (1.0, 7.2)
T3: 25 (2.5, 18.1)
T4: 26 (2.7, 20)
T5: 40 (4.1, 29.7)

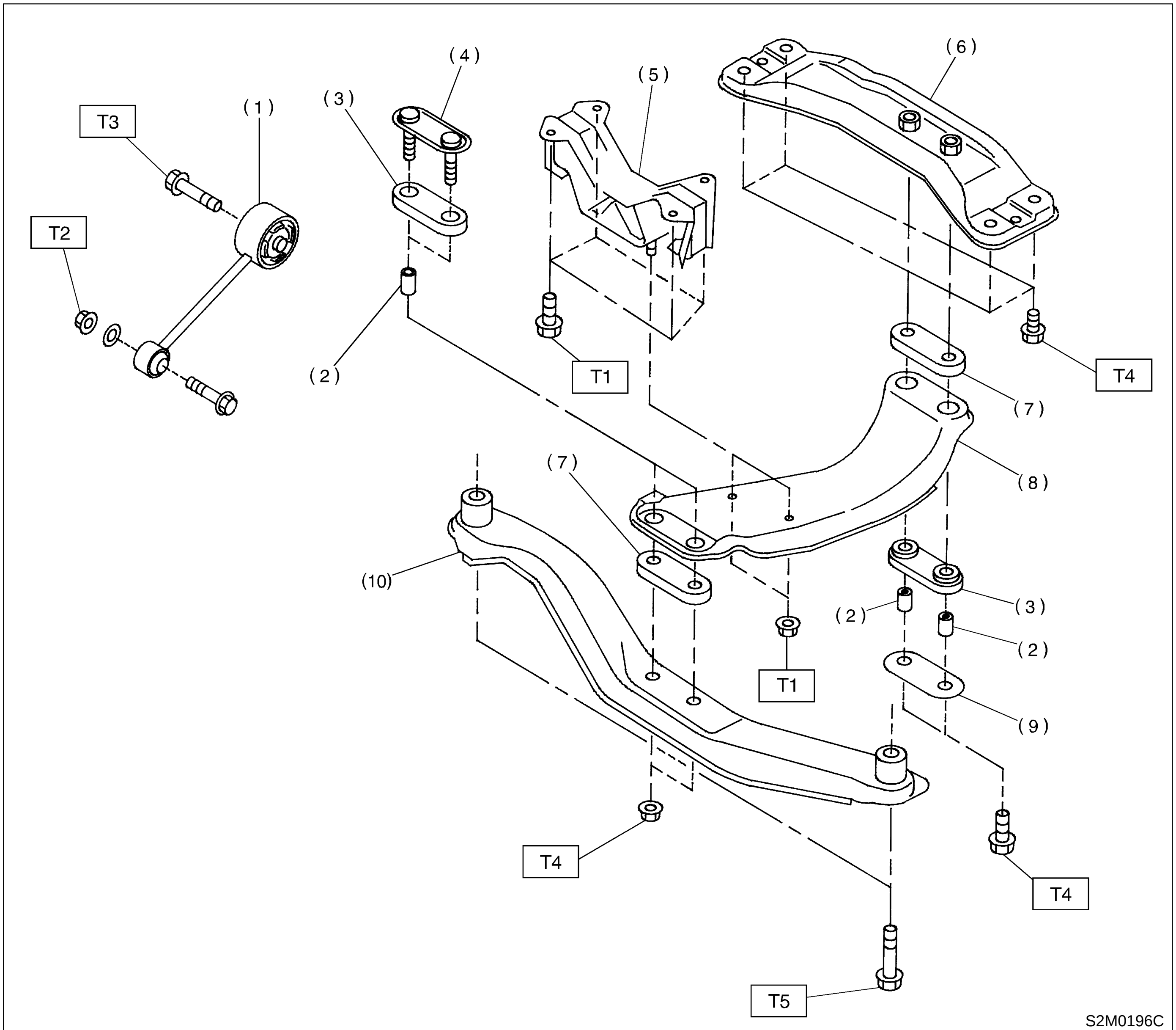
6. FRONT DIFFERENTIAL *S503001A0506*



(1) Drive pinion shaft
(2) Hypoid driven gear
(3) Pinion shaft
(4) Straight pin
(5) Washer
(6) Differential bevel gear
(7) Differential bevel pinion
(8) Snap ring (Outer)
(9) Roller bearing
(10) Differential case
(11) Oil seal
(12) Differential side retainer
(13) O-ring
(14) Axle drive shaft
(15) Retainer lock plate

Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.1)
T2: 62 (6.3, 45.6)

7. TRANSMISSION MOUNTING *S503001A0507*



(1) Pitching stopper
(2) Spacer
(3) Cushion C
(4) Front plate
(5) Rear cushion rubber
(6) Rear crossmember
(7) Cushion D
(8) Center crossmember
(9) Rear plate
(10) Front crossmember

Tightening torque: N·m (kgf-m, ft-lb)
T1: 35 (3.6, 26)
T2: 50 (5.1, 37)
T3: 58 (5.9, 43)
T4: 70 (7.1, 51)
T5: 140 (14.3, 103)

C: CAUTION S503001A03

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation, and 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.
- When disassembling the case and other light alloy parts, use a plastic hammer to force it apart. Do not pry it apart with a screwdriver or other tool.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Use SUBARU genuine gear oil, grease etc. or the equivalent. Do not mix gear oil, grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply gear oil onto sliding or revolution surfaces before installation.
- Replace deformed or otherwise damaged snap rings with new ones.
- Before installing O-rings or oil seals, apply sufficient amount of gear oil to avoid damage and deformation.
- Be careful not to incorrectly install or fail to install O-rings, snap rings and other such parts.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Avoid damaging the mating surface of the case.
- Before applying sealant, completely remove the old seal.

D: PREPARATION TOOL S503001A17

1. SPECIAL TOOLS S503001A1701

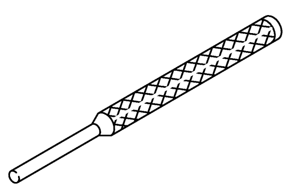
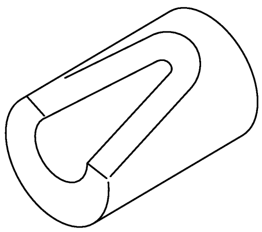
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1938	398791700	REMOVER II	Used for removing and installing spring pin (6 mm).
 B3M1939	399411700	ACCENT BALL INSTALLER	Used for installing reverse shifter rail arm.

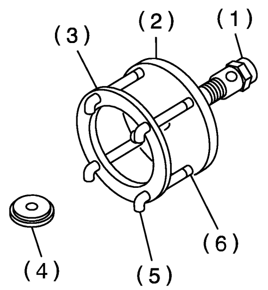
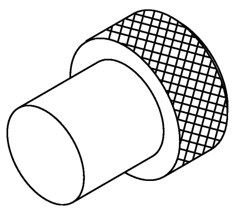
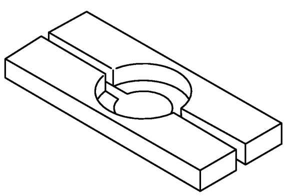
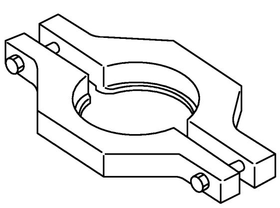
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1940A	399527700	PULLER SET	Used for removing and installing roller bearing (Differential). (1) BOLT (899521412) (2) PULLER (399527702) (3) HOLDER (399527703) (4) ADAPTER (398497701) (5) BOLT (899520107) (6) NUT (021008000)
 B3M1941	399780104	WEIGHT	Used for measuring preload on roller bearing.
 B3M1942	498077000	5TH DRIVEN GEAR REMOVER	Used for removing roller bearing of drive pinion shaft.
 B3M1943	498077300	CENTER DIFFER-ENTIAL BEARING REMOVER	Used for removing the center differential cover ball bearing.

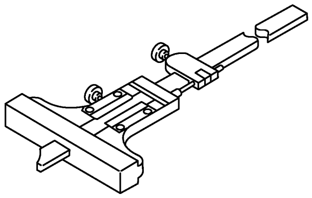
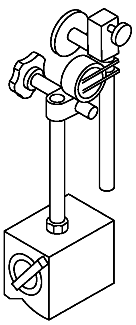
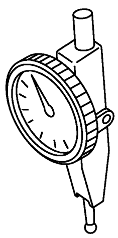
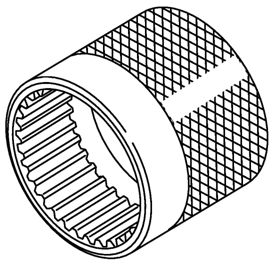
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1944	498147000	DEPTH GAUGE	Used for adjusting main shaft axial end play.
 B3M1945	498247001	MAGNET BASE	● Used for measuring backlash between side gear and pinion, and hypoid gear. ● Used with DIAL GAUGE (498247100).
 B3M1946	498247100	DIAL GAUGE	● Used for measuring backlash between side gear and pinion, and hypoid gear. ● Used with MAGNET BASE (498247001).
 B3M1947	498427100	STOPPER	Used for securing the drive pinion shaft assembly and driven gear assembly when removing the drive pinion shaft assembly lock nut.

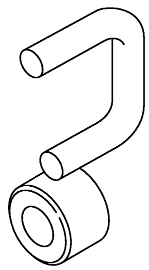
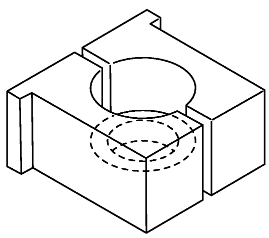
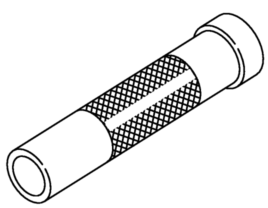
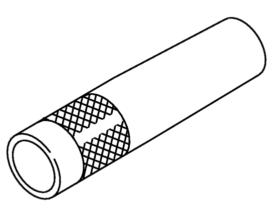
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1948	498787100	MAIN SHAFT STOPPER	Used for removing and installing transmission main shaft lock nut.
 B3M1949	498937000	TRANSMISSION HOLDER	Used for removing and installing transmission main shaft lock nut.
 B3M1950	499277100	BUSHING 1-2 INSTALLER	● Used for installing 1st driven gear thrust plate and 1st-2nd driven gear bushing. ● Used for installing roller bearing outer races to differential case.
 B3M1951	499277200	INSTALLER	Used for press-fitting the 2nd driven gear, roller bearings, and 5th driven gear onto the driven shaft.

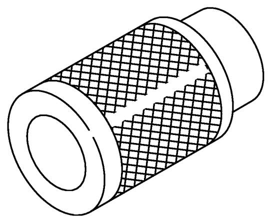
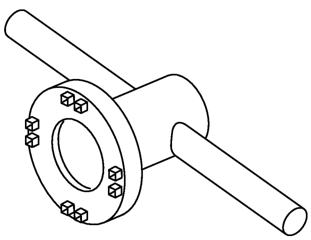
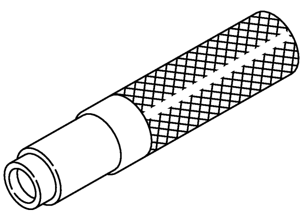
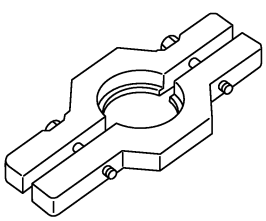
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1952	499757002	INSTALLER	● Used for installing snap ring (OUT 25), and ball bearing (25 x 26 x 17). ● Used for installing bearing cone of transfer driven gear (extension core side).
 B3M1953	499787000	WRENCH ASSY	Used for removing and installing differential side retainer.
 B3M1954	499827000	PRESS	Used for installing speedometer oil seal when installing speedometer cable to transmission.
 B3M1955	499857000	5TH DRIVEN GEAR REMOVER	Used for removing 5th driven gear.

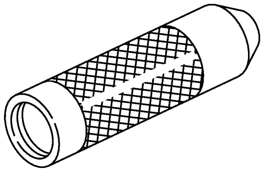
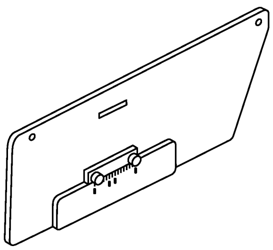
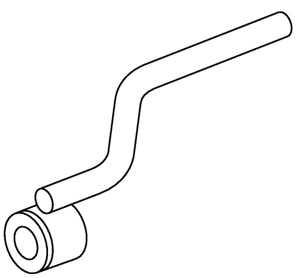
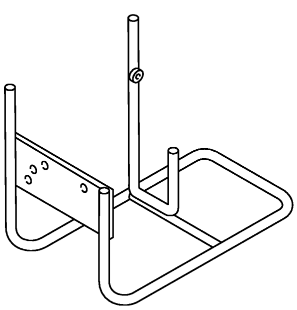
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1956	499877000	RACE 4-5 INSTALLER	● Used for installing 4th needle bearing race and ball bearing onto transmission main shaft. ● Used with REMOVER (899714110).
 B3M1957	499917500	DRIVE PINION GAUGE ASSY	Used for adjusting drive pinion shim.
 B3M1958	499927100	HANDLE	Used for fitting transmission main shaft.
 B3M1959	499937100	TRANSMISSION STAND SET	Stand used for transmission disassembly and assembly.

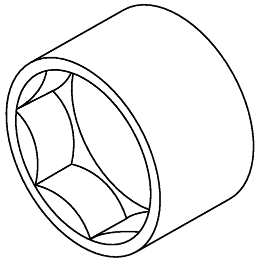
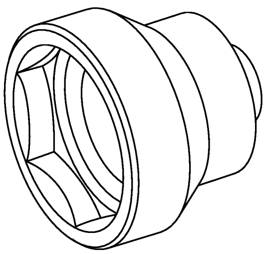
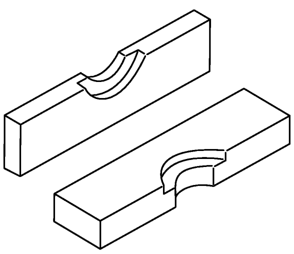
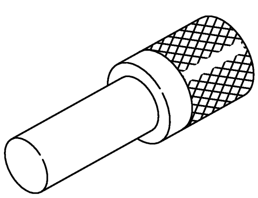
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1960	499987003	SOCKET WRENCH (35)	Used for removing and installing driven pinion lock nut and main shaft lock nut.
 B3M1961	499987300	SOCKET WRENCH (50)	Used for removing and installing driven gear assembly lock nut.
 B3M1962	899714110	REMOVER	Used for fixing transmission main shaft, drive pinion, rear drive shaft.
 B3M1963	899864100	REMOVER	Used for removing parts on transmission main shaft and drive pinion.

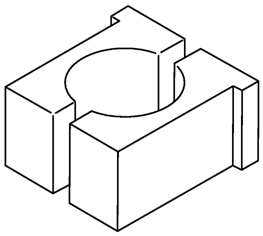
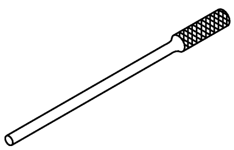
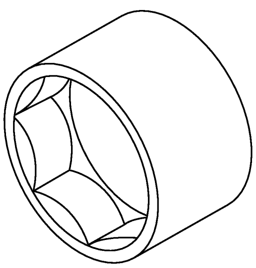
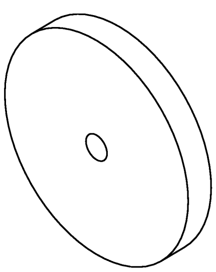
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1964	899884100	HOLDER	Used for tightening lock nut on sleeve.
 B3M1965	899904100	REMOVER	Used for removing and installing straight pin.
 B3M1966	899988608	SOCKET WRENCH (27)	Used for removing and installing drive pinion lock nut.
 B3M1967	398497701	ADAPTER	● Used for installing roller bearing onto differential case. ● Used with INSTALLER (499277100).

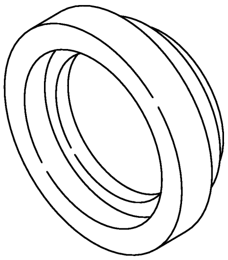
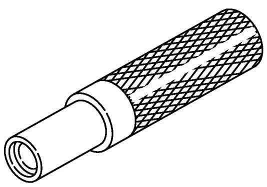
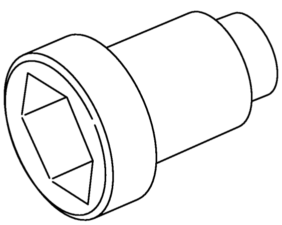
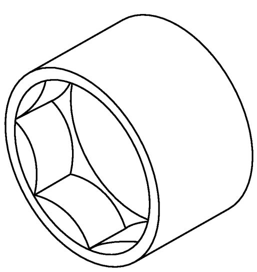
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1968	499587000	INSTALLER	Used for installing driven gears to driven shaft.
 B3M1969	899824100	PRESS	Used for installing speedometer shaft oil seal.
 B3M1970	499987100	SOCKET WRENCH (35)	Used for removing and installing drive pinion lock nut.
 B3M1971	899984103	SOCKET WRENCH (35)	Used for removing and installing drive pinion lock nut.

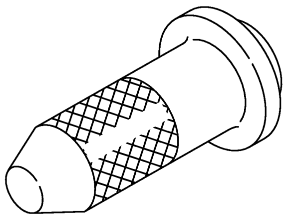
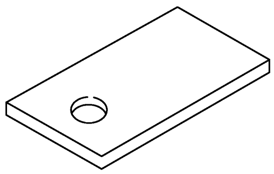
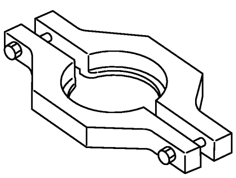
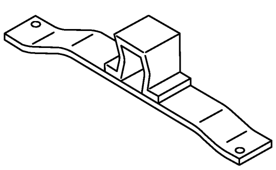
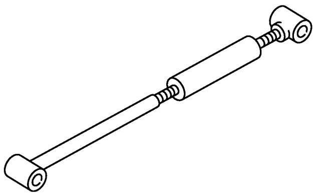
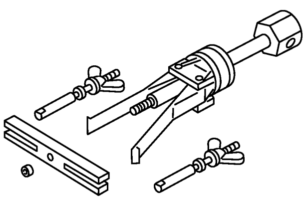
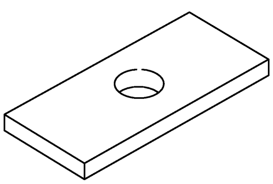
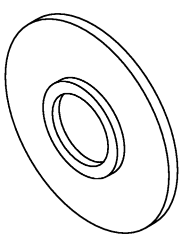
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1972	498057300	INSTALLER	Used for installing extension oil seal.
 B3M1973	498255400	PLATE	Used for measuring backlash.
 B3M1974	498077400	REMOVER	● Used for removing synchronizer cone of main shaft. ● Used for removing 5th driven gear of drive pinion shaft.
 B3M1975	41099AA010	ENGINE SUPPORT BRACKET	Used for supporting engine.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1976	41099AA020	ENGINE SUPPORT	Used for supporting engine.
 B3M1977	398527700	PULLER ASSY	Used for removing and installing extension case roller bearing.
 B3M1978	398643600	GAUGE	Used for measuring total end play, extension end play and drive pinion height.
 B3M1905	38177700	INSTALLER	Used for installing bearing cone of transfer driven gear (transfer case side).

2. GENERAL PURPOSE TOOLS S503001A1702

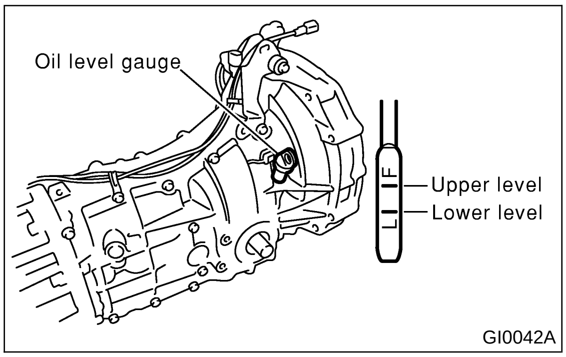
TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.

MEMO:

2. Transmission Gear Oil S503219

A: INSPECTION S503219A10

1) Park vehicle on a level surface.
2) Turn ignition switch to OFF, and wait until the engine cools.
3) Remove oil level gauge and wipe it clean.
4) Reinsert the level gauge all the way. Be sure that the level gauge is correctly inserted and in the proper direction.
5) Pull out the oil level gauge again and check the oil level on it. If it is below the lower level, add oil through the oil level gauge hole to bring the level up to the upper level.



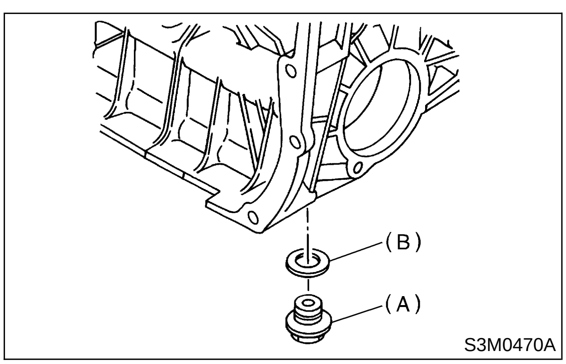
B: REPLACEMENT S503219A20

1) Pull out oil level gauge.
2) Lift-up the vehicle.
3) Drain transmission gear oil completely.

CAUTION:
Directly after the engine has been running, the transmission gear oil is hot. Be careful not to burn yourself.

NOTE:
Tighten transmission gear oil drain plug after draining transmission gear oil.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)



(A) Drain plug
(B) Gasket

4) Lower the vehicle.
5) Pour gear oil into the gauge hole.

Recommended gear oil:
Use GL-5 or equivalent.

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

6) Check the level of the transmission gear oil.

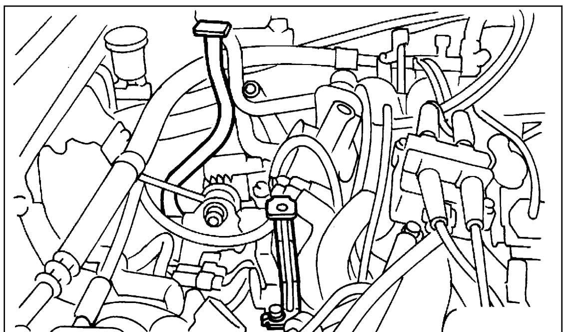
CAUTION:
When inserting the level gauge into transmission gear, align the protrusion on the side of the top part of the level gauge with the notch in the gauge hole.

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

3. Manual Transmission Assembly S503224

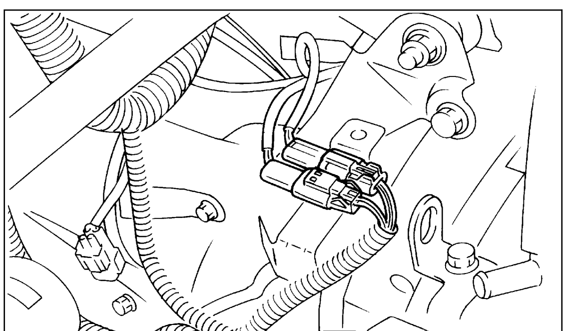
A: REMOVAL S503224A18

1) Set vehicle on a lift.
2) Open front hood fully, and support with stay.
3) Disconnect battery ground cable.
4) Move gear shift lever to “N”, and release the parking brake.
5) Remove air intake duct and cleaner case. <Ref. to IN-7, REMOVAL, Air Intake Duct.> and <Ref. to IN-6, REMOVAL , Air Cleaner Case.>
6) Remove air cleaner case stay.



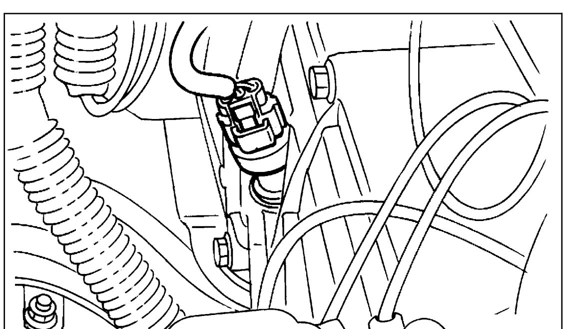
S2M0900

7) Disconnect the following connectors.
 (1) Neutral position switch connector
 (2) Back-up light switch connector



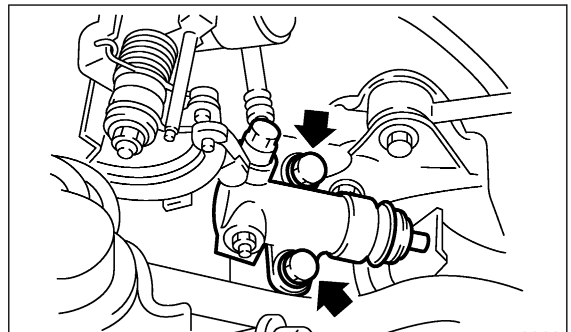
B2M0337

 (3) Vehicle speed sensor



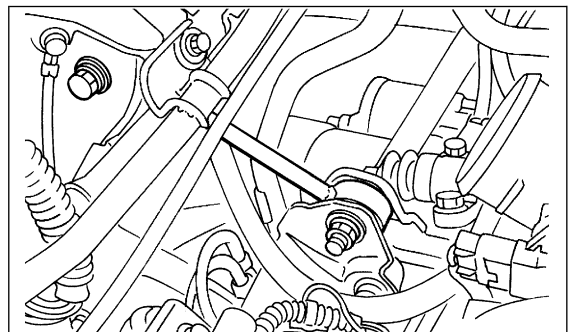
S2M0907

 (4) Transmission ground cable.
8) Remove starter. <Ref. to SC-5, REMOVAL, Starter.>
9) Remove operating cylinder from transmission.



TR0069

10) Remove pitching stopper.

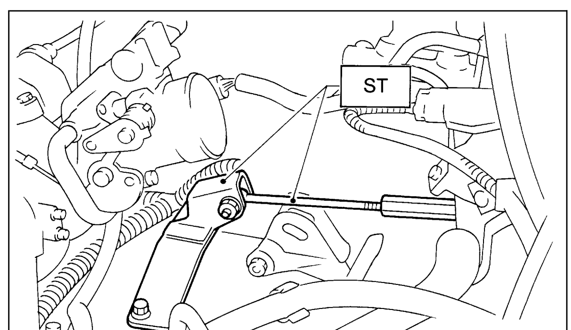


S2M0126

11) Set ST.

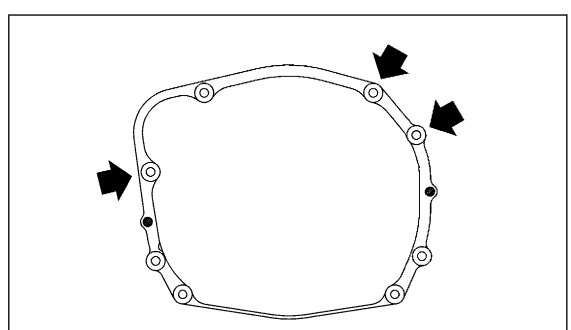
NOTE:
Part No. 41099AA010 is also available.

ST 41099AA020 ENGINE SUPPORT ASSY



G2M0313

12) Remove bolt which holds right upper side of transmission to engine.

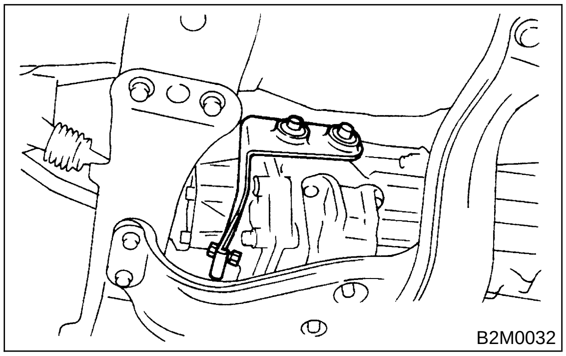


B2M2791

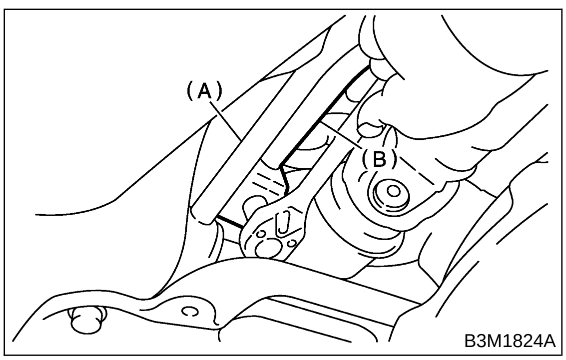
13) Remove front and center exhaust pipes. <Ref. to EX-5, REMOVAL, Front Exhaust Pipe.>
14) Remove rear exhaust pipe and muffler.

CAUTION:
When removing exhaust pipes, be careful each exhaust pipe does not drop out.

15) Remove heat shield cover.
16) Remove hanger bracket from right side of transmission.


B2M0032

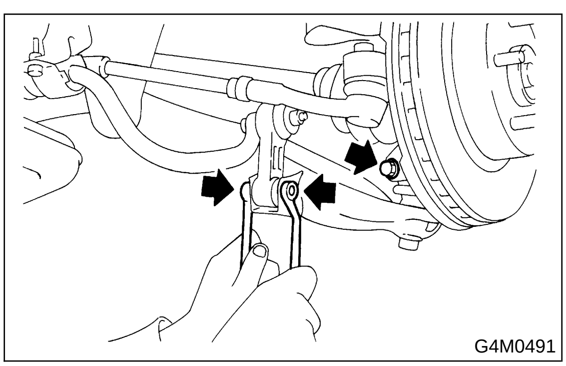
17) Remove propeller shaft. <Ref. to DS-14, REMOVAL, Propeller Shaft.>
18) Remove gear shift rod and stay from transmission.
  (1) Disconnect stay from transmission.
  (2) Disconnect rod from transmission.



B3M1824A

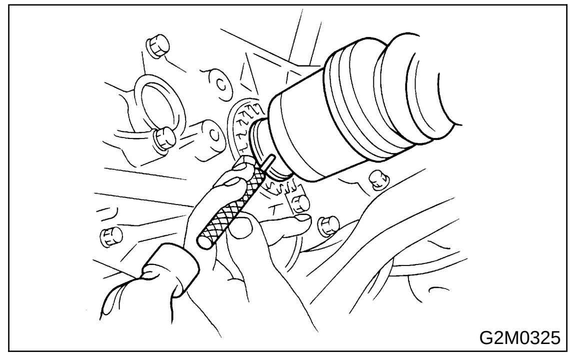
(A) Stay
(B) Rod

19) Disconnect stabilizer link from transverse link.
20) Remove bolt securing ball joint of transverse link to housing.

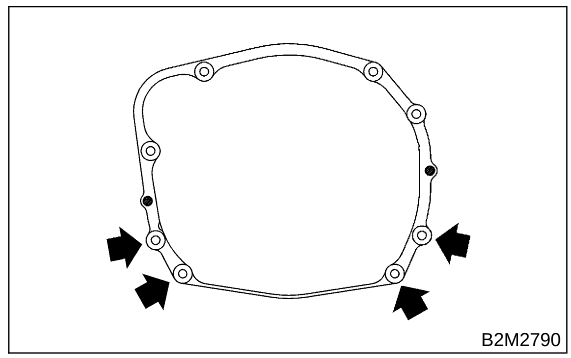

G4M0491

21) Remove spring pins and separate front drive shafts from each side of the transmission.

CAUTION:
Discard removing spring pin. Replace with a new one.

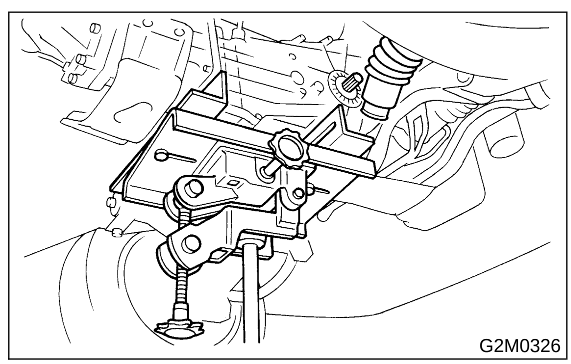

G2M0325

22) Remove nuts which hold lower side of transmission to engine.

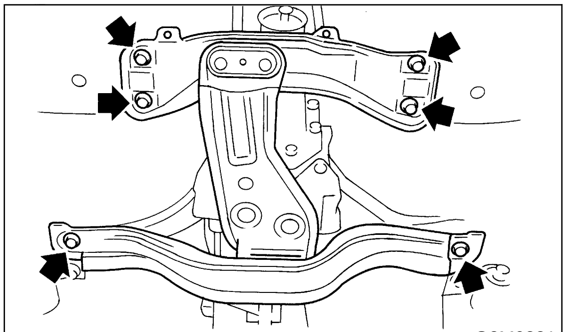

B2M2790

23) Place transmission jack under transmission.

CAUTION:
Always support transmission case with a transmission jack.


G2M0326

24) Remove transmission rear crossmember from vehicle.



G2M0831

25) Remove transmission.

CAUTION:
Move transmission jack toward rear until main shaft is withdrawn from clutch cover.

26) Separate transmission assembly and rear cushion rubber.

B: INSTALLATION *S503224A11*

1) Install rear cushion rubber to transmission assembly.

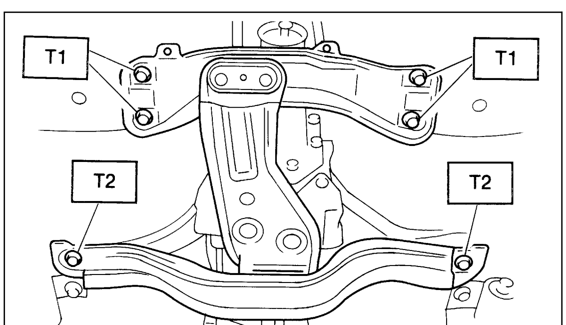
Tightening torque:
34 N·m (3.5 kgf-m, 25.3 ft-lb)

2) Install transmission onto engine.
(1) Gradually raise transmission with transmission jack.
(2) Engage them at splines.

CAUTION:
Be careful not to strike main shaft against clutch cover.

3) Install transmission rear crossmember.

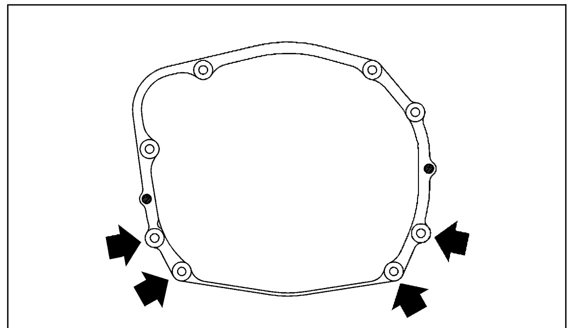
Tightening torque:
T1: 70 N·m (7.1 kgf-m, 51 ft-lb)
T2: 140 N·m (14.3 kgf-m, 103 ft-lb)



G2M0832

4) Take off transmission jack.
5) Tighten nuts which hold lower side of transmission to engine.

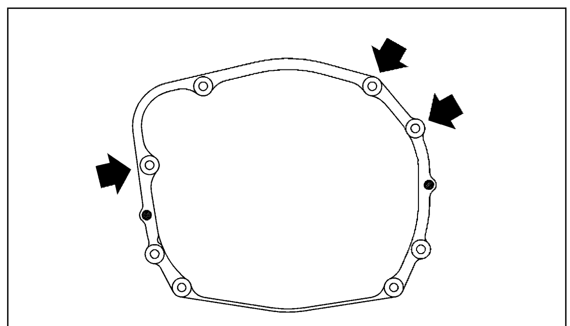
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



B2M2790

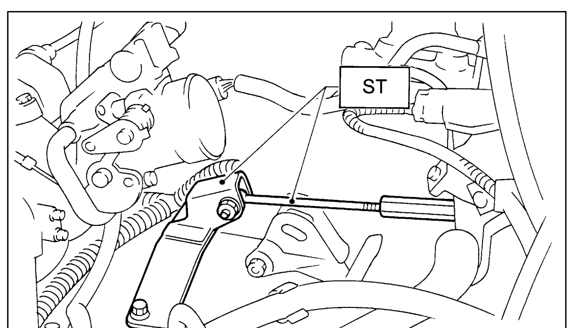
6) Connect engine and transmission.
(1) Install starter.
<Ref. to SC-6, INSTALLATION, Starter.>
(2) Tighten bolt which holds right upper side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



B2M2791

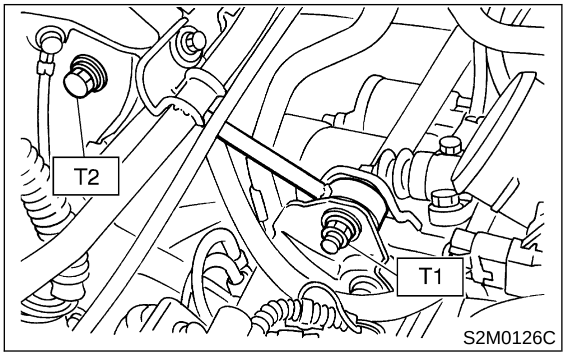
7) Remove ST.



G2M0313

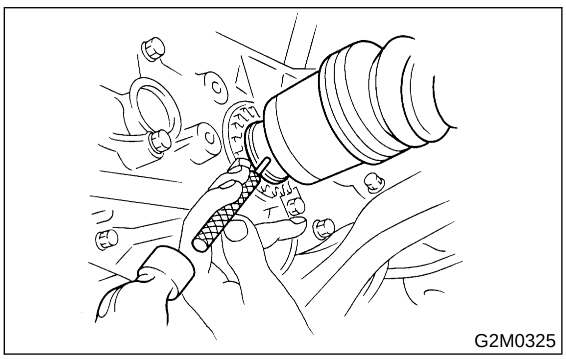
8) Install pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 37 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



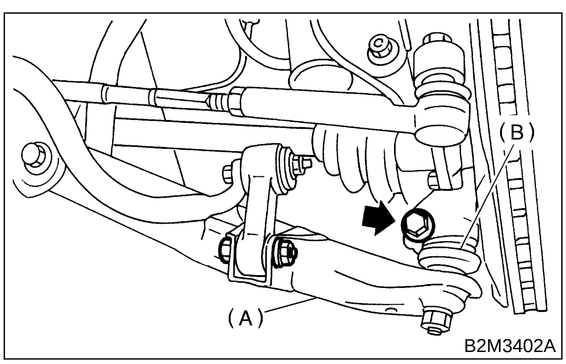
9) Lift-up the vehicle.
10) Install front drive shaft into transmission.
11) Drive spring pin into chamfered hole of drive shaft.

CAUTION:
Always use a new spring pin.



12) Install ball joints of lower arm into knuckle arm of housing, and tighten installing bolts.

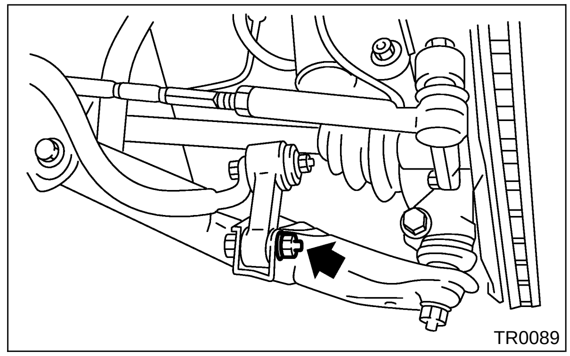
Tightening torque:
49 N·m (5.0 kgf-m, 36 ft-lb)



(A) Transverse link
(B) Ball joint

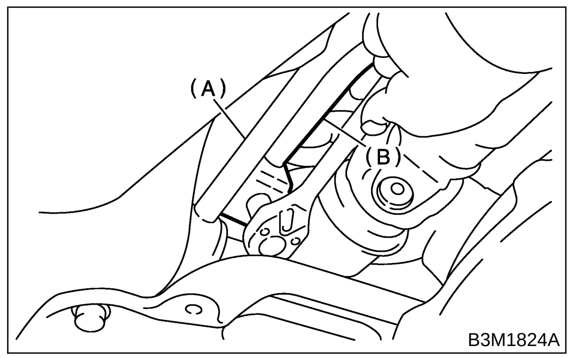
13) Install stabilizer link from transverse link.

Tightening torque:
30 N·m (3.1 kgf-m, 22.1 ft-lb)



14) Connect rod to the joint.

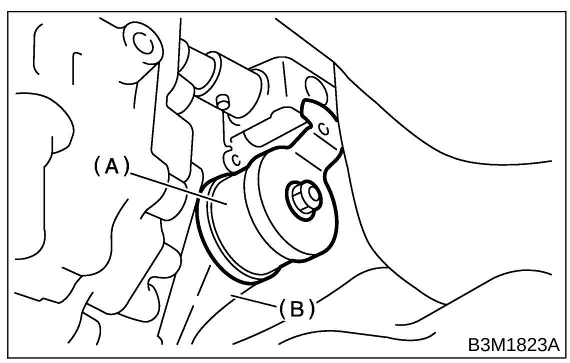
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



(A) Joint
(B) Rod

15) Connect stay to transmission bracket.

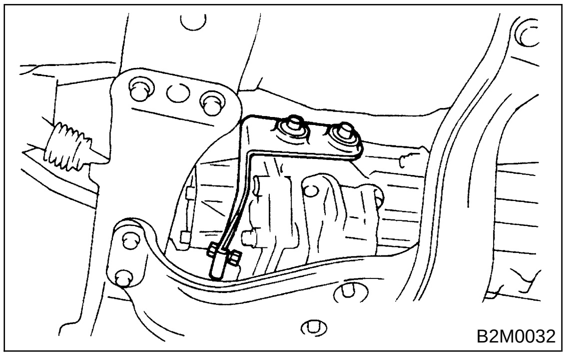
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



(A) Stay
(B) Transmission bracket

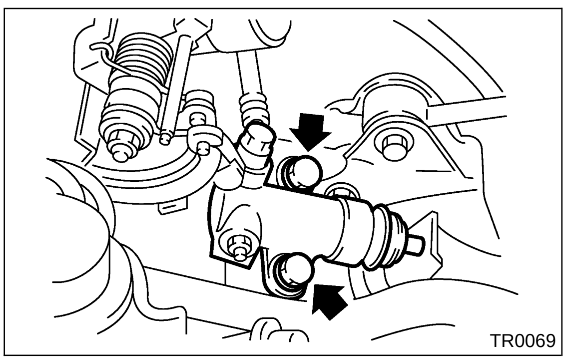
16) Install propeller shaft. <Ref. to DS-15, INSTALLATION, Propeller Shaft.>
17) Install heat shield cover.

18) Install hanger bracket on right side of transmission.



19) Install rear exhaust pipe and muffler.
<Ref. to EX-11, INSTALLATION, Muffler.> and <Ref. to EX-9, INSTALLATION, Rear Exhaust Pipe.>
20) Install front exhaust pipe and center exhaust pipe.
<Ref. to EX-6, INSTALLATION, Front Exhaust Pipe.>
21) Install under cover.
22) Install operating cylinder.

Tightening torque:
37 N·m (3.8 kgf-m, 27.5 ft-lb)



23) Connect the following connectors.
(1) Transmission ground terminal

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)

(2) Vehicle speed sensor connector
(3) Neutral position switch connector
(4) Back-up light switch connector
24) Install air cleaner case stay.

Tightening torque:
16 N·m (1.6 kgf-m, 11.6 ft-lb)

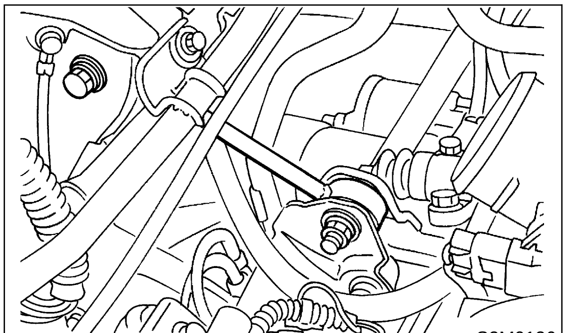
25) Install air cleaner case and intake duct. (Non-turbo model) <Ref. to IN-6, INSTALLATION, Air Cleaner Case.>, <Ref. to IN-7, INSTALLATION, Air Intake Duct.>
26) Connect battery ground cable.
27) Pour gear oil and check the oil level. <Ref. to MT-25, Transmission Gear Oil.>
28) Take off vehicle from lift arms.

4. Transmission Mounting System S503233

A: REMOVAL S503233A18

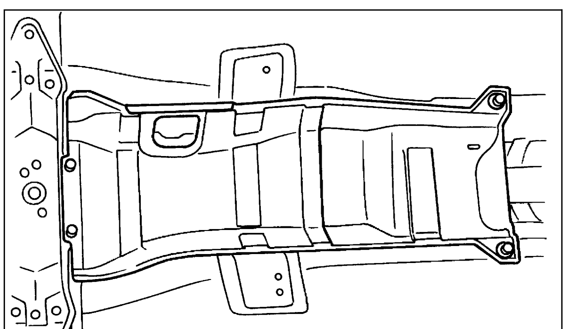
1. PITCHING STOPPER S503233A1801

1) Disconnect battery ground cable.
2) Remove the cleaner case. <Ref. to IN-6, REMOVAL, Air Cleaner Case.>
3) Remove the pitching stopper.


S2M0126

2. CROSSMEMBER AND CUSHION RUBBER S503233A1802

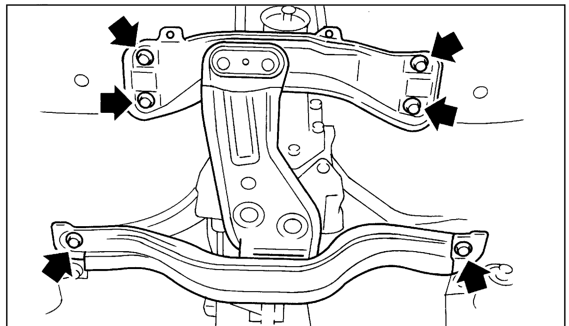
1) Disconnect battery ground cable.
2) Jack-up vehicle and support it with sturdy racks.
3) Remove the front, center, rear exhaust pipes and muffler.
<Ref. to EX-5, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX-11, REMOVAL, Muffler.>
4) Remove the heat shield cover.


S2M0215

5) Set the transmission jack under the transmission body.

CAUTION:
Always support transmission case with a transmission jack.

6) Remove the rear crossmember.


G2M0831

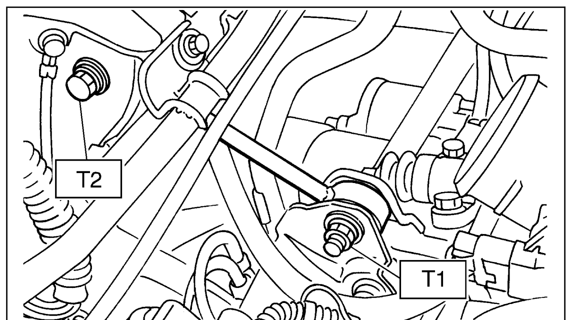
7) Remove the rear cushion rubber.

B: INSTALLATION S503233A11

1. PITCHING STOPPER S503233A1101

1) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 37 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



S2M0126C

2) Install the cleaner case. <Ref. to IN-6, INSTALLATION, Air Cleaner Case.>
3) Connect battery ground cable.

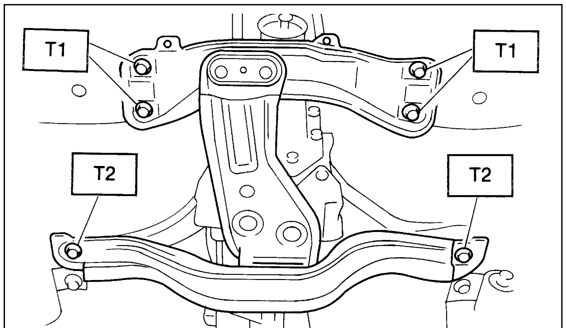
2. CROSSMEMBER AND CUSHION RUBBER S503233A1102

1) Install the rear cushion rubber.

Tightening torque:
35 N·m (3.6 kgf-m, 26 ft-lb)

2) Install the crossmember.

Tightening torque:
T1: 70 N·m (7.1 kgf-m, 51 ft-lb)
T2: 140 N·m (14.3 kgf-m, 103 ft-lb)



G2M0832

3) Remove the transmission jack.
4) Install the heat shield cover.
5) Install the front, center, rear exhaust pipes and the muffler.
<Ref. to EX-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX-11, INSTALLATION, Muffler.>

C: INSPECTION S503233A10

Repair or replace parts if the results of the inspection below are not satisfactory.

1. PITCHING STOPPER S503233A1001

Make sure that the pitching stopper is not bent or damaged. Make sure that the rubber is not stiff, cracked, or otherwise damaged.

2. CROSSMEMBER AND CUSHION RUBBER S503233A1002

Make sure that the crossmember is not bent or damaged. Make sure that the cushion rubber is not stiff, cracked, or otherwise damaged.

5. Oil Seal S503143

A: INSPECTION S503143A10

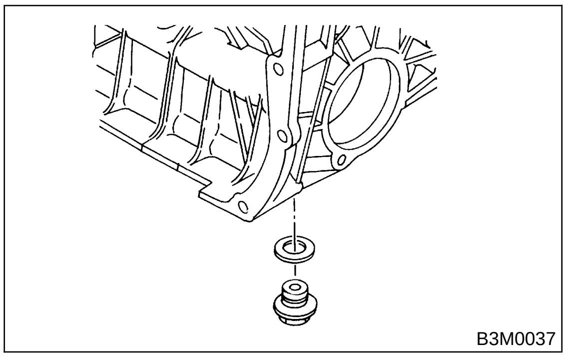
Check oil seal portion for leakage. If leakage is found, replace the oil seal with new one.

B: REPLACEMENT S503143A20

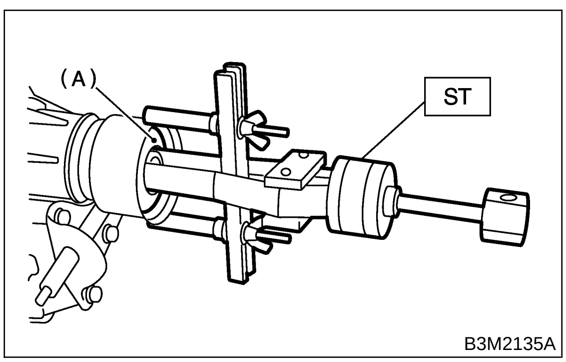
1) Clean transmission exterior.
2) Drain gear oil completely.

NOTE:
Tighten drain plug after draining gear oil.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)

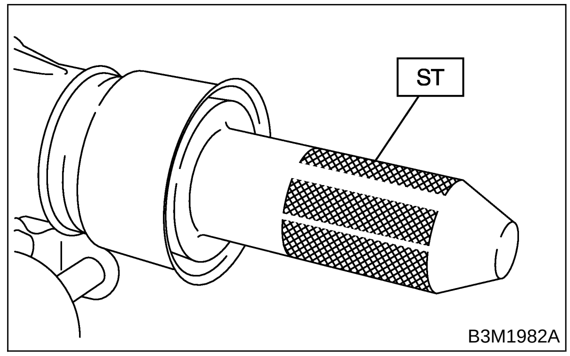


3) Remove rear exhaust pipe and muffler.
4) Remove heat shield cover.
5) Remove propeller shaft. <Ref. to DS-14, REMOVAL, Propeller Shaft.>
6) Using ST, remove the oil seal.
ST 398527700 PULLER ASSY



(A) Oil seal

7) Using ST, install the oil seal.
ST 498057300 INSTALLER

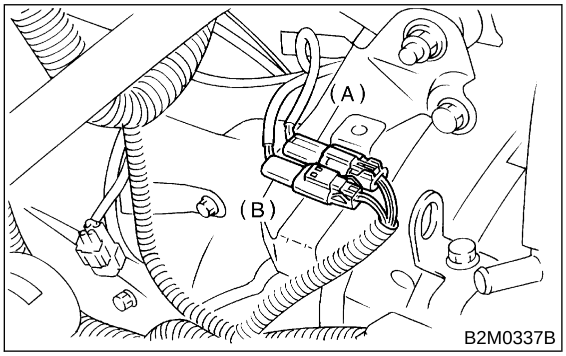


8) Install the propeller shaft. <Ref. to DS-15, INSTALLATION , Propeller Shaft.>
9) Install the heat shield cover.
10) Install the rear exhaust pipe and muffler.
11) Pour gear oil and check the oil level. <Ref. to MT-25, REPLACEMENT, Transmission Gear Oil.>

6. Switches and Harness S503232

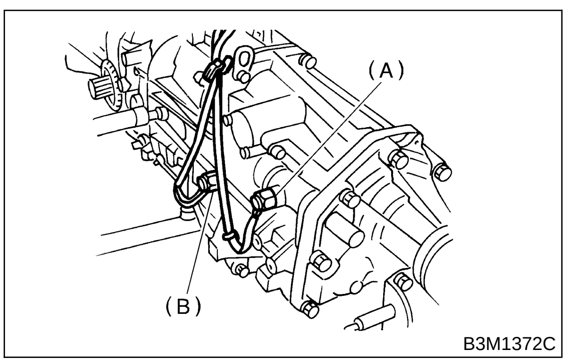
A: REMOVAL S503232A18

1) Disconnect battery ground cable.
2) Remove air intake duct and cleaner case. <Ref. to IN-6, REMOVAL, Air Cleaner Case.> and <Ref. to IN-7, REMOVAL, Air Intake Duct.>
3) Disconnect connector back-up light switch and neutral position switch.



(A) Neutral switch (Brown)
(B) Back-up light switch (Gray)

4) Lift-up the vehicle.
5) Remove back-up light switch and neutral position switch with harness.

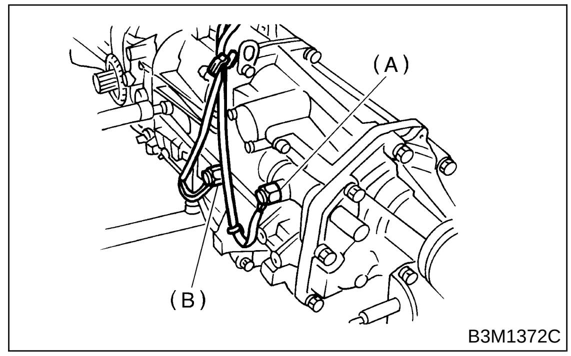


(A) Neutral switch (Brown connector)
(B) Back-up light switch (Gray connector)

B: INSTALLATION S503232A11

1) Install back-up light switch and neutral position switch with harness.

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



(A) Neutral switch (Brown connector)
(B) Back-up light switch (Gray connector)

2) Connect connector of back-up light switch and neutral position switch.
3) Install air cleaner case. <Ref. to IN-6, INSTALLATION, Air Cleaner Case.>
4) Connect battery ground cable.

C: INSPECTION S503232A10

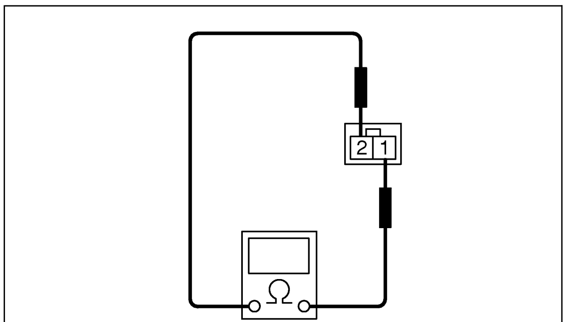
1. BACK-UP LIGHT SWITCH S503232A1001

Inspect the back-up light switch. <Ref. to LI-6, INSPECTION, Back-up Light System.>

2. NEUTRAL POSITION SWITCH S503232A1002

1) Turn ignition switch to OFF.
2) Disconnect neutral position switch connector.
3) Measure resistance between neutral position switch terminals.

Gear shift position	Terminal No.	Specified resistance
Neutral position	1 and 2	Less than 1 Ω
Other positions		More than 1 MΩ



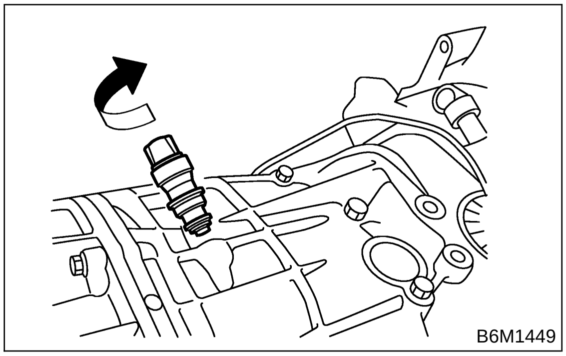
TR0100

4) Replace defective parts.

7. Vehicle Speed Sensor S503231

A: REMOVAL S503231A18

1) Disconnect battery ground cable.
2) Lift-up the vehicle.
3) Remove front and center exhaust pipes.
4) Disconnect connector from vehicle speed sensor.
5) Turn and remove vehicle speed sensor.



B: INSTALLATION S503231A11

NOTE:
- Discard vehicle speed sensor and after removal, replace with a new one.
- Ensure sensor mounting hole is clean and free of foreign matter.
- Align tip end of key with key groove on end of speedometer shaft during installation.

1) Hand tighten vehicle speed sensor.
2) Tighten vehicle speed sensor using suitable tool.

Tightening torque:
5.9 N·m (0.6 kgf-m, 4.3 ft-lb)

3) Connect connector to vehicle speed sensor.
4) Install front and center exhaust pipes.
5) Lower the vehicle.
6) Connect battery ground cable.

C: INSPECTION S503231A10

Inspect the vehicle speed sensor. <Ref. to EN-206, DTC P0500-VEHICLE SPEED SENSOR MALFUNCTION-, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

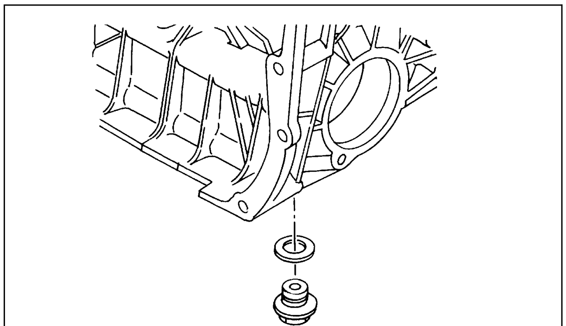
8. Preparation for Overhaul S503091

A: PROCEDURE S503091E45

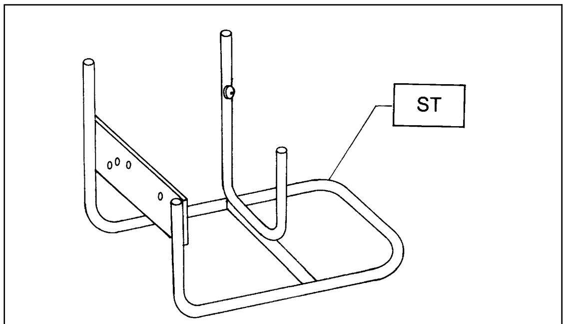
1) Clean oil, grease, dirt and dust from transmission.
2) Remove drain plug to drain oil. After draining, retighten it as before.

CAUTION:
Replace gasket with a new one.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)


B3M0037

3) Attach transmission to ST.
ST 499937100 TRANSMISSION STAND SET



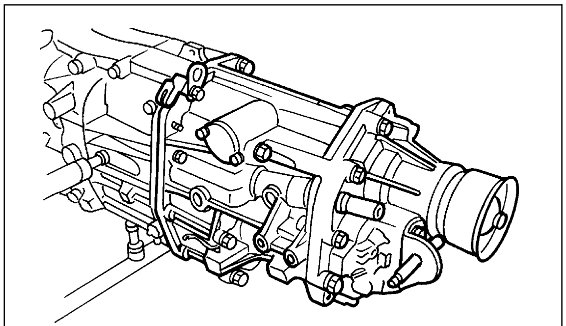
G3M0517

4) Rotating parts should be coated with oil prior to assembly.
5) All disassembled parts, if to be reused, should be reinstalled in the original positions and directions.
6) Gaskets, lock washers and lock nut must be replaced with new ones.
7) Liquid gasket should be used where specified to prevent leakage.

9. Transfer Case and Extension Case Assembly S503561

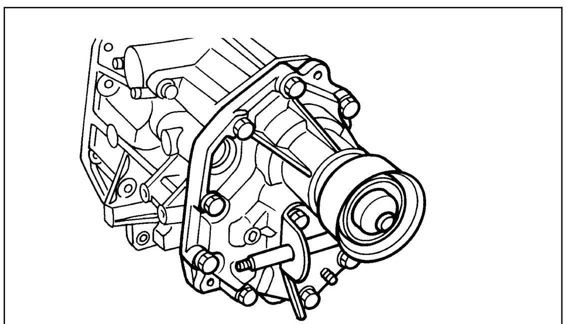
A: REMOVAL S503561A18

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
2) Remove back-up light switch and neutral position switch. <Ref. to MT-34, REMOVAL, Switches and Harness.>
3) Remove transfer case with extension case assembly.



B3M1373

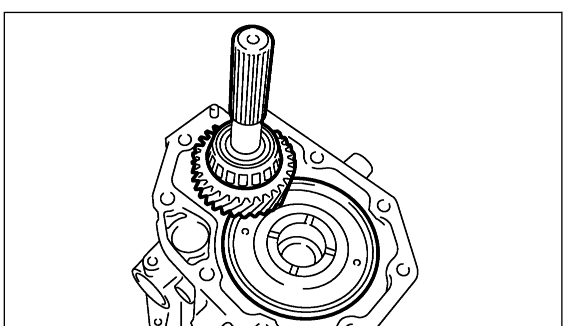
4) Remove shifter arm.
5) Remove extension case assembly.



B3M1374

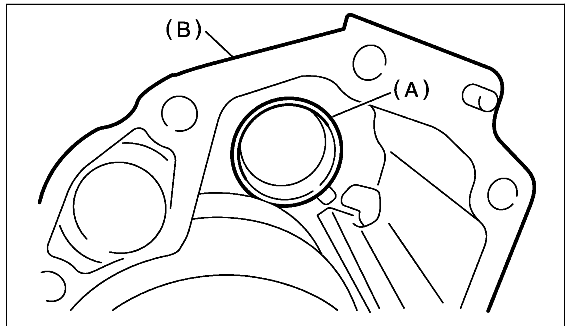
B: INSTALLATION S503561A11

1) Install center differential and transfer driven gear into transfer case.



B3M1983

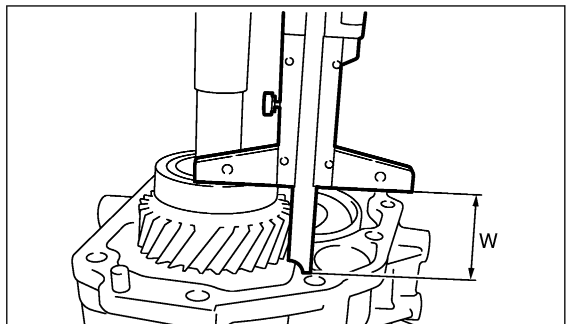
2) Remove bearing cone from the extension case assembly, and install to taper roller bearing of the transfer driven gear.



B3M2172A

(A) Bearing cone (Extension case)
(B) Extension case

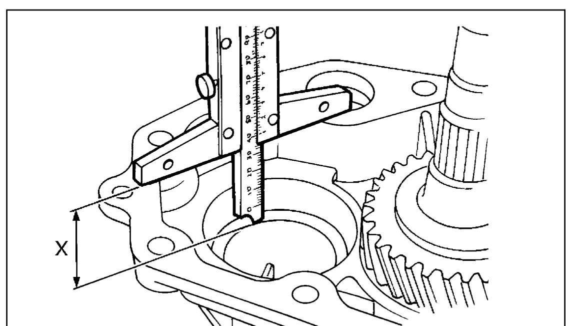
3) While pressing the bearing cone horizontally, turn the driven shaft ten rotations.
4) Measure height “W” between transfer case and taper roller bearing on the transfer driven gear.



B3M1984A

5) Measure depth “X”.

NOTE:
Measure with bearing cone and thrust washer removed.



B3M1406A

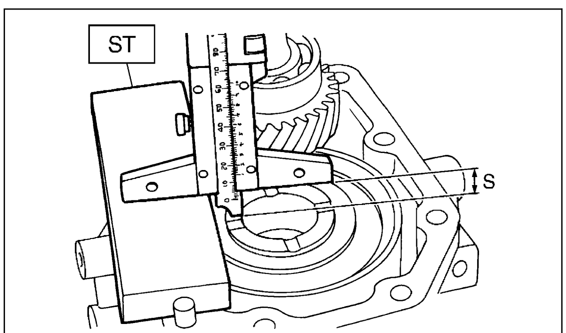
6) Calculate space “t” using the following equation: t = X − W + 0.2 to 0.3 mm (0.008 to 0.012 in)
7) Select nearest washer in the following table:

Standard clearance between thrust washer and taper roller bearing:
0.2 — 0.3 mm T (0.008 — 0.012 in T)

NOTE:
T: Tight

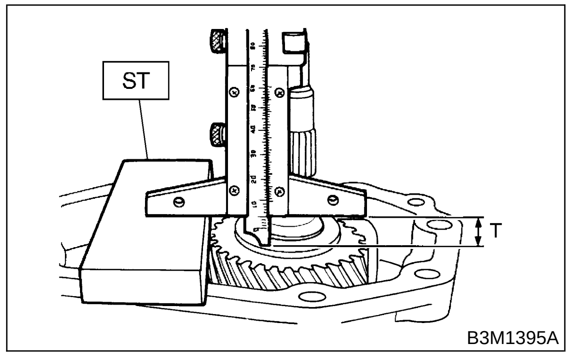
Thrust washer (50 × 61 × t)	
Part No.	Thickness mm (in)
803050060	0.50 (0.0197)
803050061	0.55 (0.0217)
803050062	0.60 (0.0236)
803050063	0.65 (0.0256)
803050064	0.70 (0.0276)
803050065	0.75 (0.0295)
803050066	0.80 (0.0315)
803050067	0.85 (0.0335)
803050068	0.90 (0.0354)
803050069	0.95 (0.0374)
803050070	1.00 (0.0394)
803050071	1.05 (0.0413)
803050072	1.10 (0.0433)
803050073	1.15 (0.0453)
803050074	1.20 (0.0472)
803050075	1.25 (0.0492)
803050076	1.30 (0.0512)
803050077	1.35 (0.0531)
803050078	1.40 (0.0551)
803050079	1.45 (0.0571)

8) Fit thrust washers into extension case.
9) Install bearing cone into extension case.
10) Measure depth “S” between transfer case and center differential.
ST 398643600 GAUGE



B3M1407A

11) Measure depth “T” between extension case and transfer drive gear.
ST 398643600 GAUGE



B3M1395A

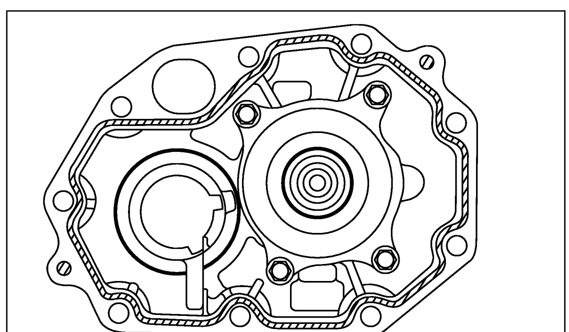
12) Calculate space “U” using the following equation: U = S − T
13) Select suitable washer in the following table:

Standard clearance:
0.15 — 0.35 mm (0.0059 — 0.0138 in)

Thrust washer	
Part No.	Thickness mm (in)
803036050	0.9 (0.035)
803036054	1.0 (0.039)
803036051	1.1 (0.043)
803036055	1.2 (0.047)
803036052	1.3 (0.051)
803036056	1.4 (0.055)
803036053	1.5 (0.059)
803036057	1.6 (0.063)
803036058	1.7 (0.067)

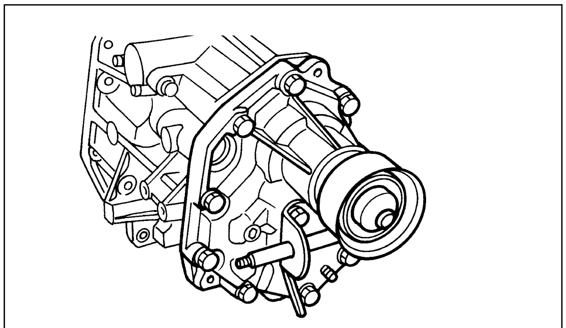
14) Fit thrust washer on center differential.
15) Apply proper amount of liquid gasket to the transfer case mating surface.

Liquid gasket:
THREE BOND 1215B


B3M1985

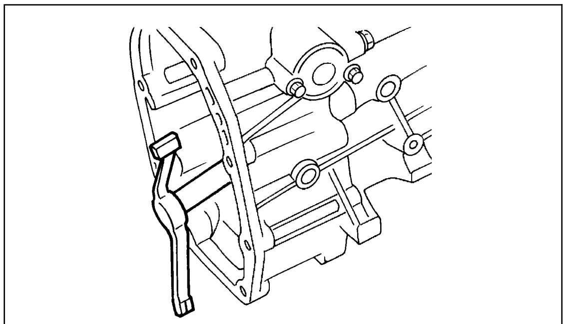
16) Install extension assembly into transfer case.

Tightening torque:
40 N·m (4.1 kgf-m, 29.7 ft-lb)



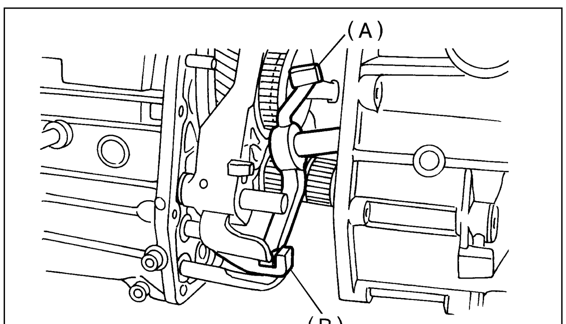
B3M1374

17) Install shifter arm to transfer case.



B3M1396

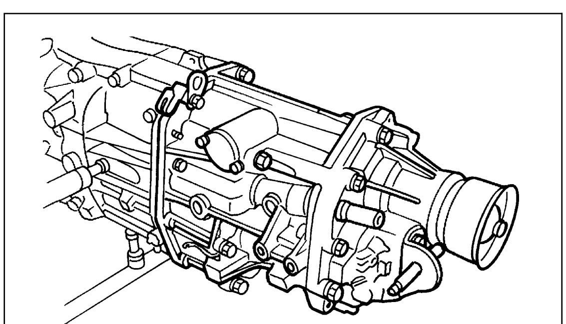
18) Hang the shifter arm on the 3rd-4th fork rod.



B3M1397B

19) Install transfer case with extension case assembly to transmission case.

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

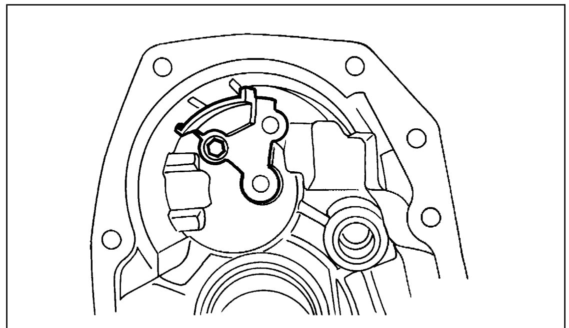


B3M1373

C: DISASSEMBLY S503561A06

1. TRANSFER CASE S503561A0601

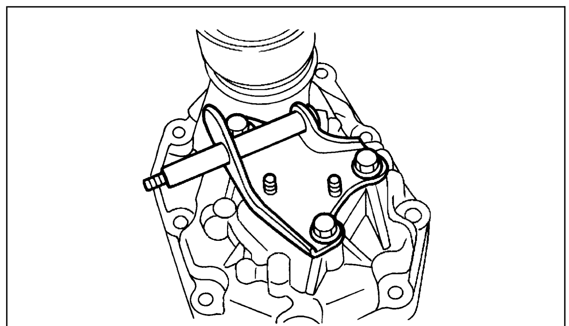
1) Remove reverse check assembly. <Ref. to MT-47, REMOVAL, Reverse Check Sleeve.>
2) Remove oil guide.



B3M1378

2. EXTENSION CASE S503561A0602

1) Remove transfer drive gear assembly. <Ref. to MT-42, REMOVAL, Transfer Drive Gear.>
2) Remove shift bracket.



B3M1381

3) Remove oil seal from extension case. <Ref. to MT-33, Oil Seal.>

D: ASSEMBLY S503561A02

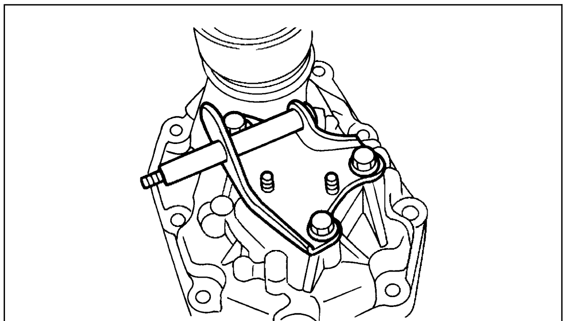
1. EXTENSION CASE S503561A0201

1) Using ST, install oil seal to extension case. <Ref. to MT-33, Oil Seal.>

CAUTION:
Use new oil seal.

2) Install shift bracket to extension case.

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



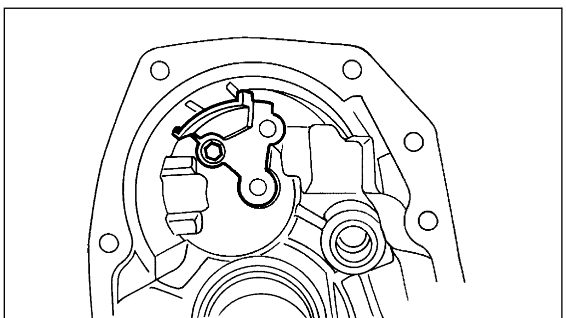
B3M1381

3) Install transfer drive gear to extension case. <Ref. to MT-42, INSTALLATION, Transfer Drive Gear.>

2. TRANSFER CASE S503561A0202

1) Install oil guide to transfer case.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



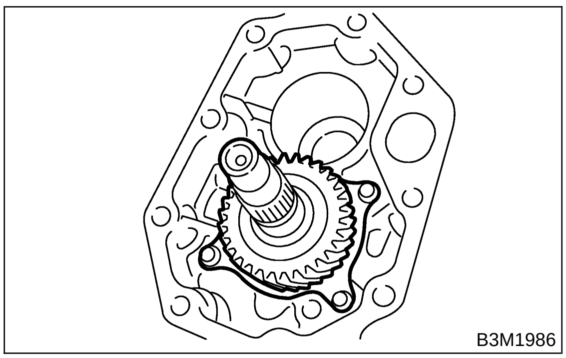
B3M1378

2) Install reverse check sleeve assembly to transfer case. <Ref. to MT-47, INSTALLATION, Reverse Check Sleeve.>

10. Transfer Drive Gear S503229

A: REMOVAL S503229A18

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
2) Remove back-up light switch and neutral position switch. <Ref. to MT-34, REMOVAL, Switches and Harness.>
3) Remove transfer case with extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove extension case assembly.
5) Remove transfer driven gear.
6) Remove transfer drive gear.

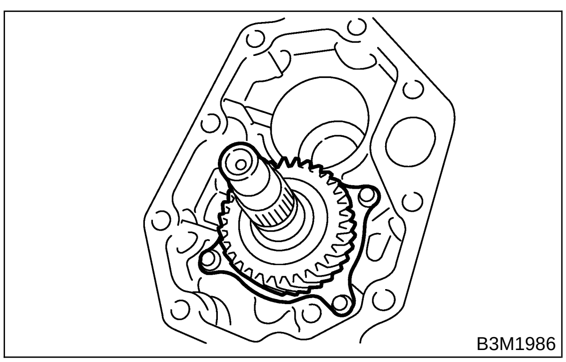


B3M1986

B: INSTALLATION S503229A11

1) Install transfer drive gear.

Tightening torque:
26 N·m (2.7 kgf-m, 20 ft-lb)

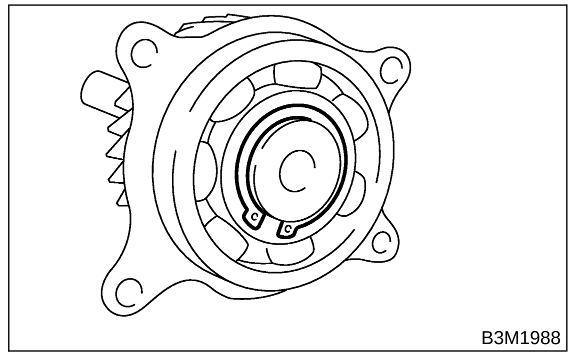


B3M1986

2) Install the extension case assembly.
3) Install transfer driven gear.
4) Install transfer case and extension case assembly. <Ref. to MT-38, INSTALLATION, Transfer Case and Extension Case Assembly.>
5) Install back-up light switch and neutral position switch. <Ref. to MT-34, INSTALLATION, Switches and Harness.>
6) Install the manual transmission assembly from vehicle. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

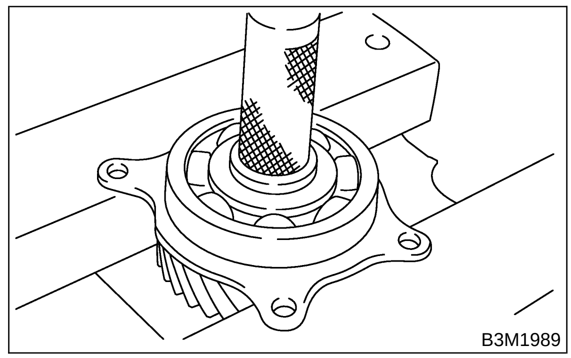
C: DISASSEMBLY S503229A06

1) Remove snap ring.



B3M1988

2) Remove ball bearing.

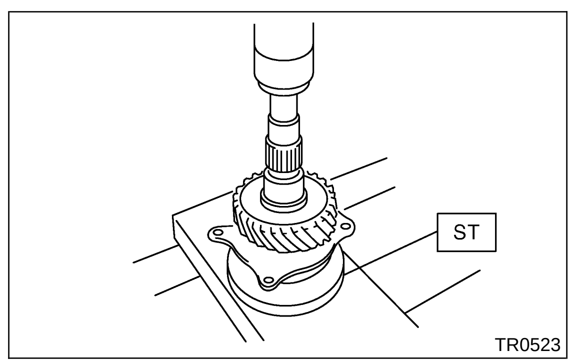


B3M1989

D: ASSEMBLY S503229A02

1) Set the ST to inner race of bearing and install to drive shaft.
ST 39817700 INSTALLER

CAUTION:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton)



TR0523

2) Install snap ring on transfer drive shaft.
3) Inspect clearance between snap ring and inner race of ball bearing. <Ref to MT-43, INSPECTION, Transfer Drive Gear.>

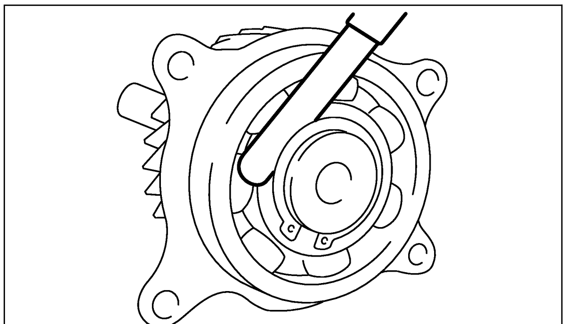
E: INSPECTION S503229A10

1) Bearings
Replace bearings in the following cases:
- Broken or rusty bearings
- Worn or damaged
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.

2) Drive gear
Replace drive gear in the following cases:
- If their tooth surfaces and shaft are excessively broken or damaged.

3) Measure clearance between snap ring and inner race of ball bearing with a thickness gauge.

Clearance:
0.01 — 0.15 mm (0.0004 — 0.0059 in)


B3M1991

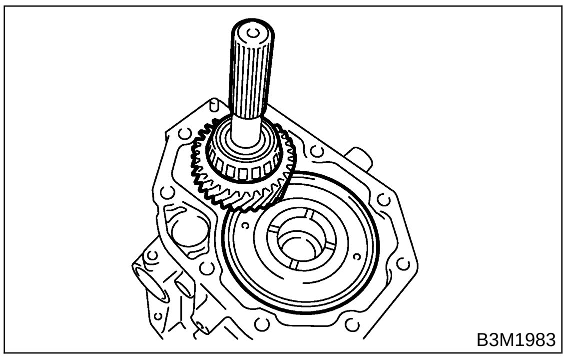
If the measurement is not within the specification, select suitable snap ring.

Snap ring	
Part No.	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.0697)

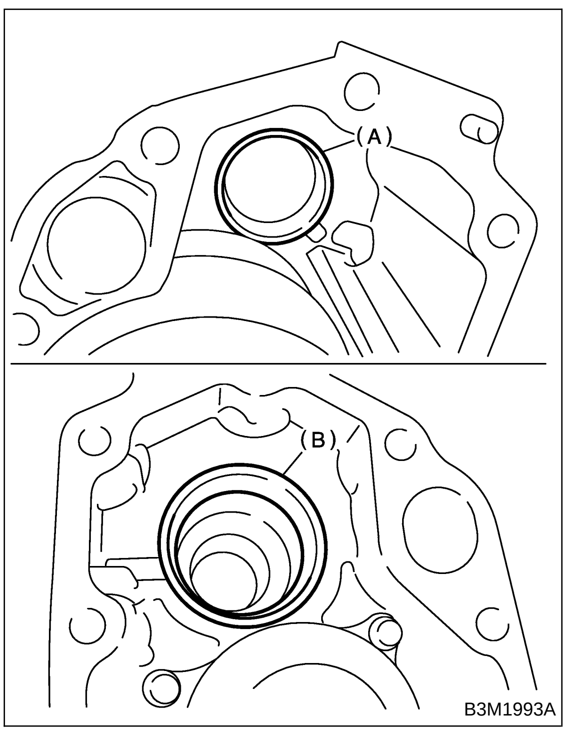
11. Transfer Driven Gear S503223

A: REMOVAL S503223A18

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
2) Remove back-up light switch and neutral position switch. <Ref. to MT-34, REMOVAL, Switches and Harness.>
3) Remove transfer case with extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove extension case assembly.
5) Remove transfer driven gear.



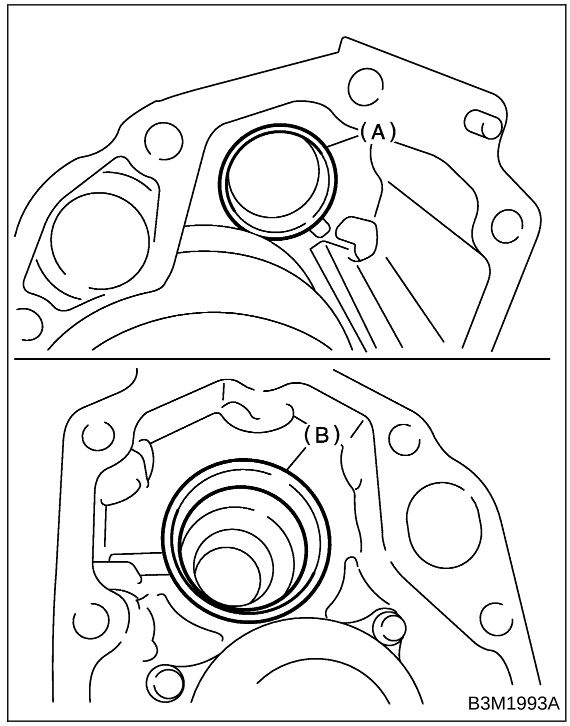
6) Remove bearing cup from extension case and transfer case.



(A) Bearing cup (transfer case)
(B) Bearing cup (extension case)

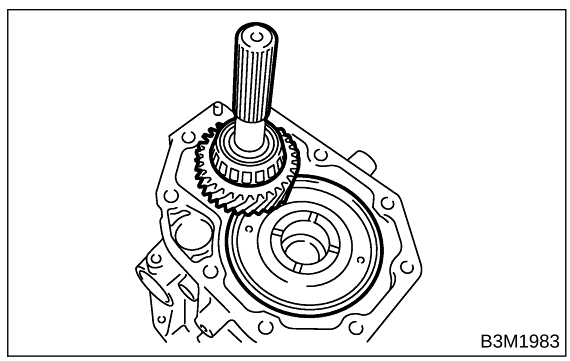
B: INSTALLATION S503223A11

1) Install bearing cup to extension case and transfer case.



(A) Bearing cup (transfer case)
(B) Bearing cup (extension case)

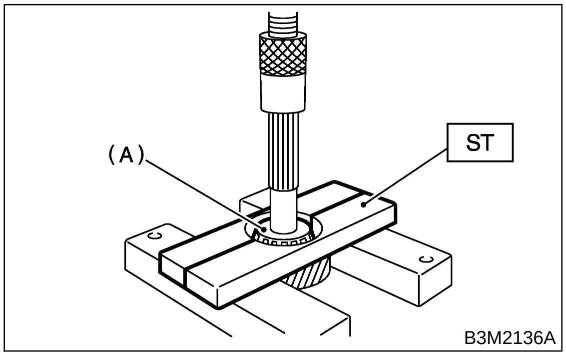
2) Install transfer driven gear.



3) Install transfer case and extension case assembly. <Ref. to MT-38, INSTALLATION, Transfer Case and Extension Case Assembly.>
4) Install back-up light switch and neutral position switch. <Ref. to MT-34, INSTALLATION, Switches and Harness.>
5) Install the manual transmission assembly to vehicle. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

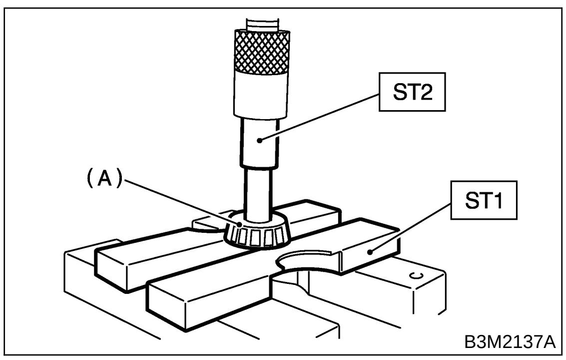
C: DISASSEMBLY S503223A06

1) Using ST, remove roller bearing (extension case side).
ST 498077000 REMOVER



(A) Roller bearing

2) Using ST1 and ST2, remove roller bearing (transfer case side).
ST1 498077000 REMOVER
ST2 899864100 REMOVER

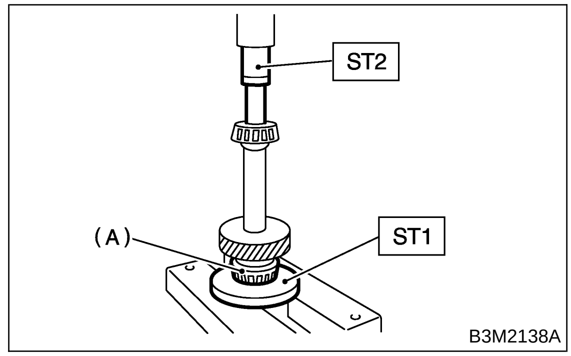


(A) Roller bearing

D: ASSEMBLY S503223A02

1) Using ST, install roller bearing (extension case side).
ST1 398177700 INSTALLER
ST2 899864100 REMOVER

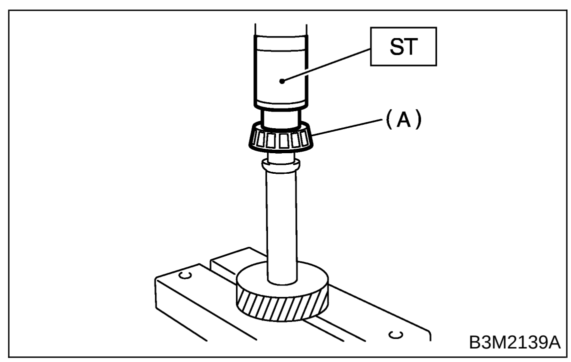
CAUTION:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton)



(A) Roller bearing

2) Using ST, install roller bearing (transfer case side).
ST 499757002 INSTALLER

CAUTION:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton)



(A) Roller bearing

E: INSPECTION S503223A10

1) Bearings
Replace bearings in the following cases:
- Broken or rusty bearings
- Worn or damaged
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.

2) Driven gear
Replace drive gear in the following cases:
- If their tooth surfaces and shaft are excessively broken or damaged.

12. Center Differential *S503158*

A: REMOVAL *S503158A18*

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the transfer driven gear. <Ref. to MT-44, REMOVAL, Transfer Driven Gear.>
5) Remove the center differential.

B: INSTALLATION *S503158A11*

1) Install the center differential into transfer case.
2) Install the transfer driven gear. <Ref. to MT-44, INSTALLATION, Transfer Driven Gear.>
3) Install the extension case assembly. <Ref. to MT-38, INSTALLATION, Extension Case Assembly.>
4) Install the transfer case with extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
5) Install the back-up light switch and neutral position switch. <Ref. to MT-34, REMOVAL, Switches and Harness.>
6) Install the manual transmission assembly to vehicle. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

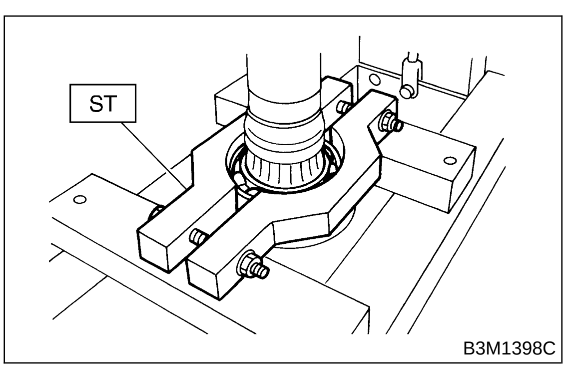
C: DISASSEMBLY *S503158A06*

NOTE:
Do not disassemble center differential because it is a non-disassemble part.

Remove ball bearing using ST.

CAUTION:
Do not reuse ball bearing.

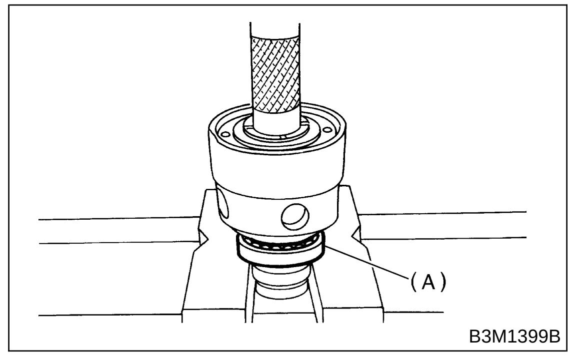
ST 498077300 CENTER DIFFERENTIAL BEARING REMOVER



D: ASSEMBLY *S503158A02*

Install ball bearing to center differential assembly.

CAUTION:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



(A) Ball bearing

E: INSPECTION *S503158A10*

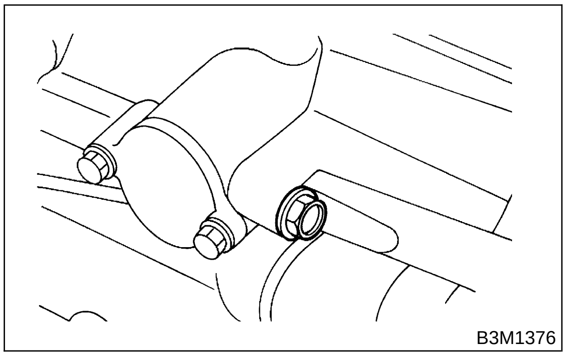
1) Bearings
Replace bearings in the following cases:
- Broken or rusty bearings
- Worn or damaged
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.
- Bearings having other defects

2) Center differential
Replace center differential assembly in the following case:
- Worn or damaged

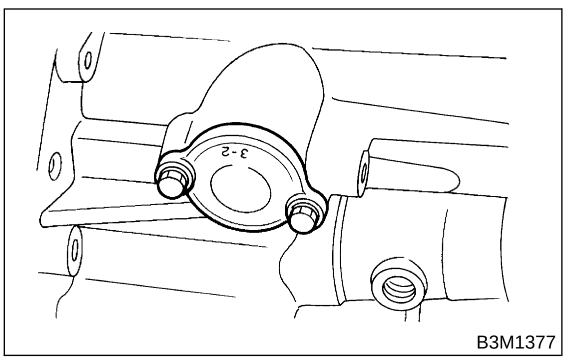
13. Reverse Check Sleeve *S503267*

A: REMOVAL *S503267A18*

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove shifter arm.
4) Remove plug, spring washer and reverse check ball.



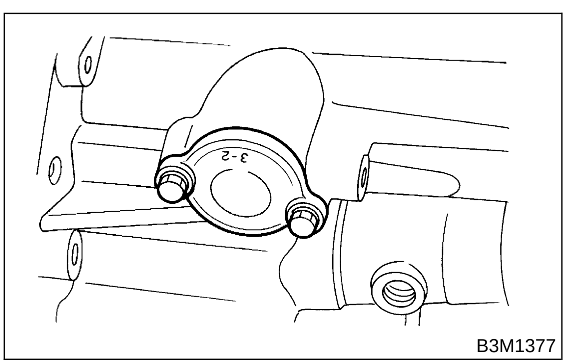
5) Remove the reverse check sleeve.



B: INSTALLATION *S503267A11*

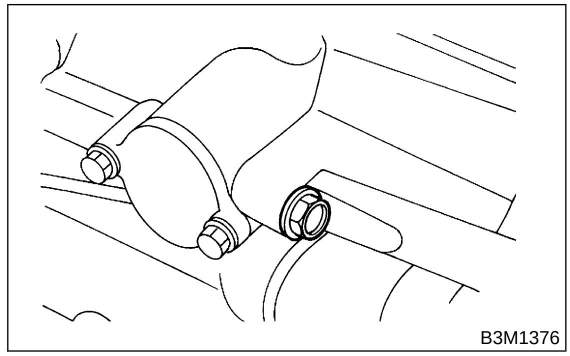
1) Install the reverse check sleeve.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



2) Install ball, spring, washer and plug to transfer case.

Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)

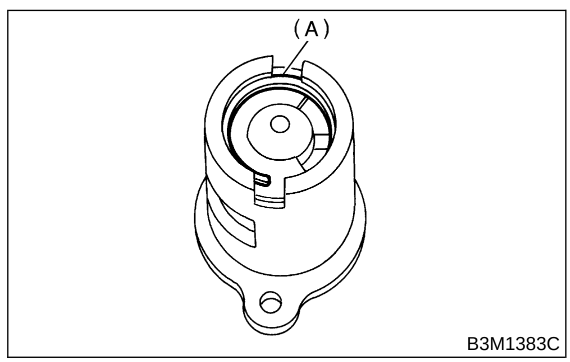


3) Install the shifter arm to transfer case assembly.
4) Install the transfer case with extension case assembly. <Ref. to MT-38, INSTALLATION, Transfer Case and Extension Case Assembly.>
5) Install the manual transmission assembly to vehicle. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY *S503267A06*

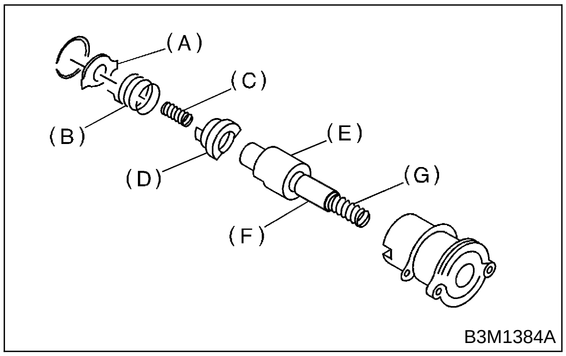
1) Cover the reverse check sleeve with a rag, and remove snap ring using a screwdriver.

NOTE:
Replace snap ring with a new one if deformed or weakened.



(A) Snap ring

2) Remove reverse check plate, reverse check spring, reverse check cam, return spring (5th-Rev), reverse accent shaft, return spring cap and return spring (1st-2nd).



(A) Reverse check plate
(B) Reverse check spring
(C) Return spring (5th-Rev)
(D) Reverse check cam
(E) Reverse accent shaft
(F) Return spring cap
(G) Return spring (1st-2nd)

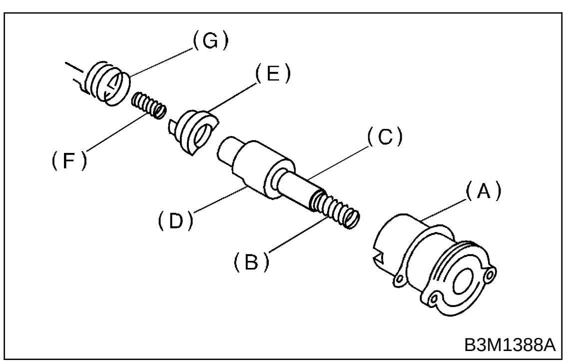
3) Remove O-ring.

NOTE:
- Reverse check sleeve assembly uses an O-ring which should not be scratched.
- Be careful not to break adjustment shim placed between reverse check sleeve assembly and case.

D: ASSEMBLY S503267A02

1) Install return spring (1st-2nd), return spring cap, reverse accent shaft, check cam, return spring and check spring onto reverse check sleeve.

NOTE:
Be sure the bent section of reverse check spring is positioned in the groove in check cam.



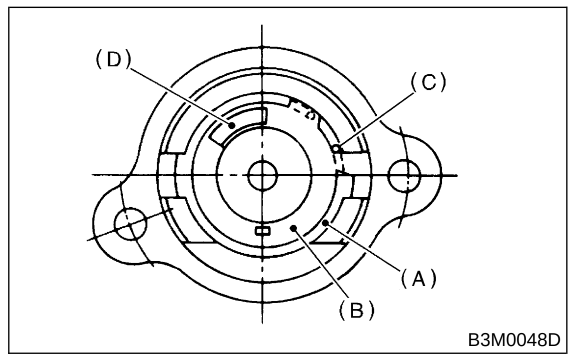
(A) Reverse check sleeve
(B) Return spring (1st-2nd)
(C) Return spring cap
(D) Reverse accent shaft
(E) Return spring (5th-Rev)
(F) Reverse check cam
(G) Reverse check spring

2) Hook the bent section of reverse check spring over reverse check plate.
3) Rotate cam so that the protrusion of reverse check cam is at the opening in plate.
4) With cam held in that position, install plate onto reverse check sleeve and hold with snap ring.
5) Position O-ring in groove in sleeve.

E: INSPECTION S503267A10

- Make sure the cutout section of reverse accent shaft is aligned with the opening in reverse check sleeve.
- Spin cam by hand for smooth rotation.
- Move cam and shaft all the way toward plate and release.

If cam does not return properly, replace reverse check spring; if shaft does not, check for scratches on the inner surface of sleeve. If sleeve is in good order, replace spring.



(A) Snap ring
(B) Reverse check plate
(C) Check spring
(D) Check cam

- Select a suitable reverse accent shaft and reverse check plate. <Ref. to MT-49, ADJUSTMENT, Reverse Check Sleeve.>

F: ADJUSTMENT S503267A01

1. NEUTRAL POSITION ADJUSTMENT

S503267A0101

1) Shift gear into 3rd gear position.
2) Shifter arm turns lightly toward the 1st/2nd gear side but heavily toward the reverse gear side because of the function of the return spring, until arm contacts the stopper.
3) Make adjustment so that the heavy stroke (reverse side) is a little more than the light stroke (1st/2nd side).
4) To adjust, remove bolts holding reverse check sleeve assembly to the case, move sleeve assembly outward, and place adjustment shim (0 to 1 ea.) between sleeve assembly and case to adjust the clearance.

CAUTION:
Be careful not to break O-ring when placing shim(s).

NOTE:
- When shim is removed, the neutral position will move closer to reverse; when shim is added, the neutral position will move closer to 1st gear.
- If shims alone cannot adjust the clearance, replace reverse accent shaft and re-adjust.

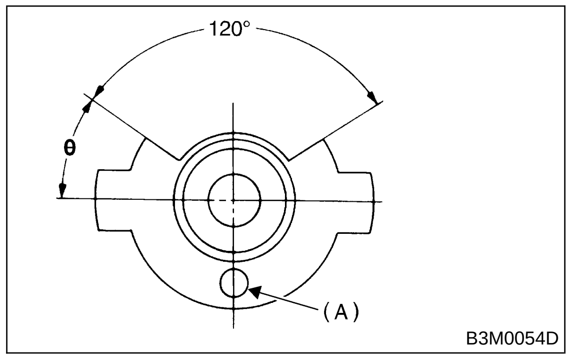
Adjustment shim	
Part No.	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

Reverse accent shaft		
Part No.	Mark	Remarks
32188AA090	3	Neutral position is closer to 1st gear.
32188AA100	0	Standard
32188AA110	1	Neutral position is closer to reverse gear.

2. REVERSE CHECK PLATE ADJUSTMENT S503267A0102

1) Shift shifter arm to “5th” and then to reverse to see if reverse check mechanism operates properly.
2) Also check to see if arm returns to neutral when released from the reverse position. If arm does not return properly, replace reverse check plate.

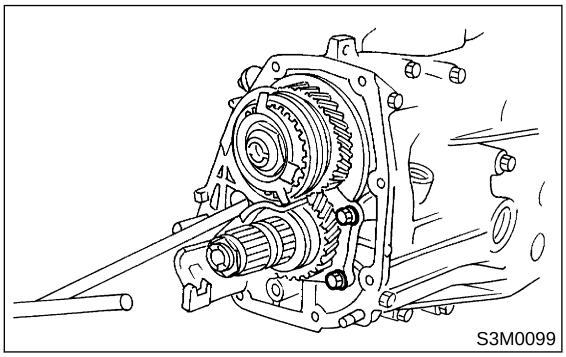
Reverse check plate			
Part No.	(A): No.	Angle θ	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
32189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.



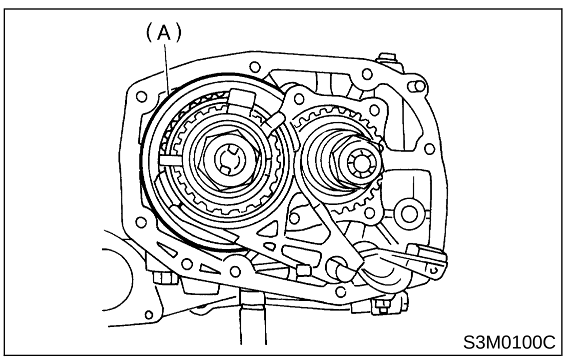
14. Transmission Case S503266

A: REMOVAL S503266A18

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
2) Remove clutch release lever. <Ref. to CL-13, REMOVAL, Release Bearing and Lever.>
3) Remove transfer case with extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove bearing mounting bolts.

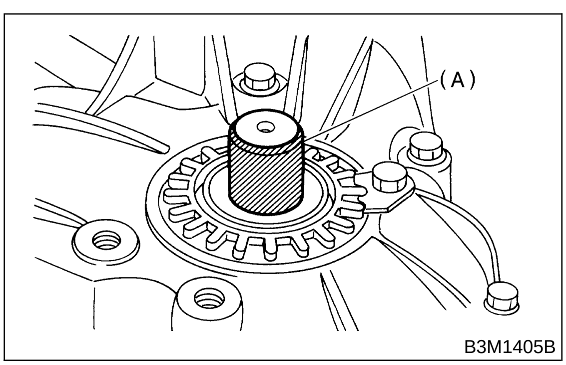


5) Remove main shaft rear plate.



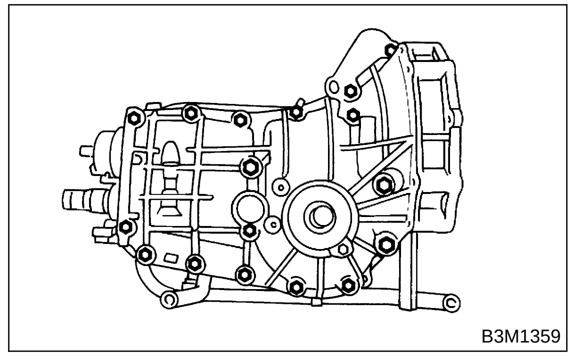
(A) Main shaft rear plate

6) Put vinyl tape around splines of right and left axle drive shafts to prevent damage to oil seal.



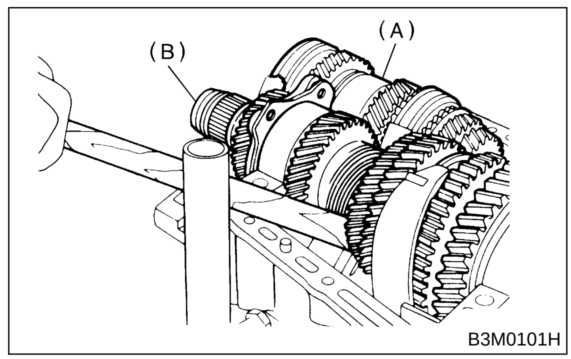
(A) Vinyl tape

7) Separate transmission case into right and left cases by loosening coupling bolts and nuts.



8) Remove drive pinion shaft assembly from left side transmission case.

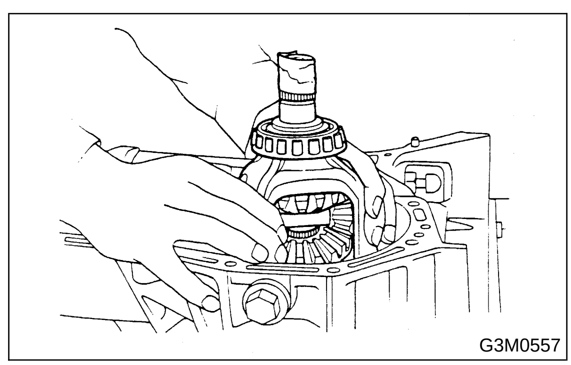
NOTE:
Use a hammer handle, etc. to remove if too tight.



(A) Main shaft assembly
(B) Drive pinion shaft assembly

9) Remove main shaft assembly.
10) Remove differential assembly.

CAUTION:
- **Be careful not to confuse right and left roller bearing outer races.**
- **Be careful not to damage retainer oil seal.**



B: INSTALLATION S503266A11

1) Wipe off grease, oil and dust on the mating surfaces of transmission cases with white gasoline.
2) Install the front differential assembly.

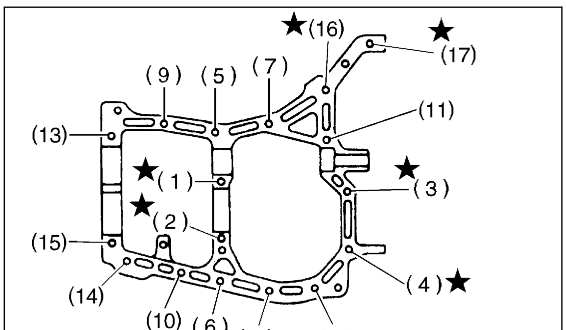
3) Install the main shaft assembly.
Install needle bearing knock pin hole into transmission case knock pin.
4) Install the drive pinion shaft assembly.
Install roller bearing knock pin hole into transmission case knock pin.
5) Apply liquid gasket, and then put case right side and left side together.

Liquid gasket:
THREE BOND 1215 or equivalent

6) Tighten 17 bolts with bracket, clip, etc. as shown in the figure.

NOTE:
- Insert bolts from the bottom and tighten nuts at the top.
- Put cases together so that drive pinion shim and input shaft holder shim are not caught up in between.
- Confirm that speedometer gear is meshed.

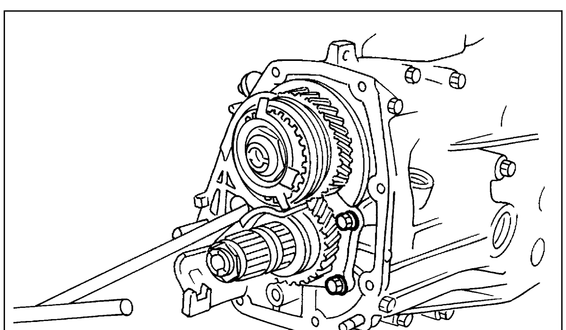
Tightening torque:
8 mm bolt
25 N·m (2.5 kgf-m, 18.1 ft-lb)
★ 10 mm bolt
39 N·m (4.0 kgf-m, 28.9 ft-lb)



B3M0399B

7) Tighten ball bearing attachment bolts.

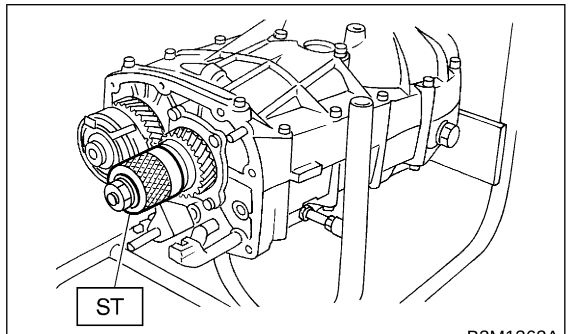
Tightening torque:
29 N·m (3.0 kgf-m, 21.7 ft-lb)


S3M0099

8) Backlash adjustment of hypoid gear and preload adjustment of roller bearing

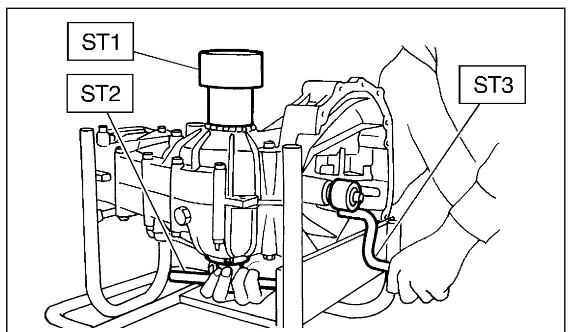
NOTE:
Support drive pinion assembly with ST.

ST 498427100 STOPPER



B3M1362A

9) Place the transmission with case left side facing downward and put ST1 on bearing cup.
10) Screw retainer assembly into left case from the bottom with ST2. Fit ST3 on the transmission main shaft. Shift gear into 4th or 5th and turn the shaft several times. Screw in the retainer while turning ST3 until a slight resistance is felt on ST2. This is the contact point of hypoid gear and drive pinion shaft. Repeat the above sequence several times to ensure the contact point.
ST1 399780104 WEIGHT
ST2 499787000 WRENCH ASSY
ST3 499927100 HANDLE

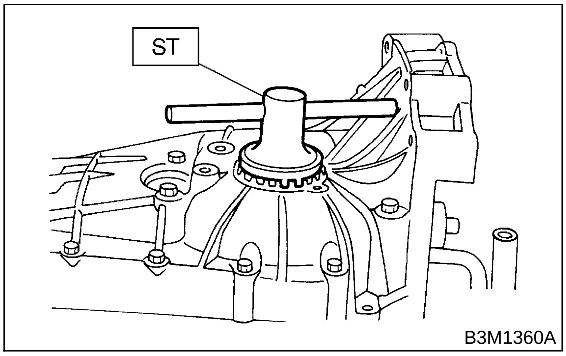


B3M1361A

11) Remove weight and screw in retainer without O-ring on the upper side and stop at the point where slight resistance is felt.

NOTE:
At this point, the backlash between the hypoid gear and drive pinion shaft is zero.

ST 499787000 WRENCH ASSY



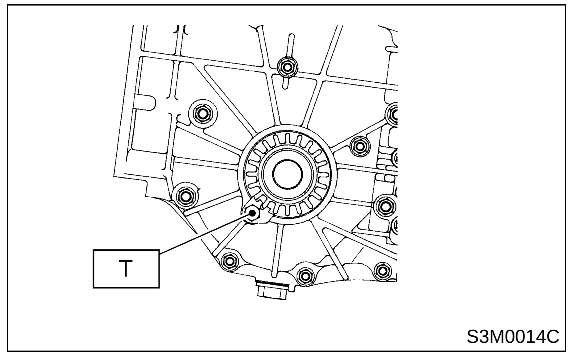
12) Fit lock plate. Loosen the retainer on the lower side by 1-1/2 notches of lock plate and turn in the retainer on the upper side by the same amount in order to obtain the backlash.

NOTE:
The notch on the lock plate moves by 1/2 notch if the plate is turned upside down.

13) Turn in the retainer on the upper side additionally by 1 notch in order to apply preload on taper roller bearing.
14) Tighten temporarily both the upper and lower lock plates and mark both holder and lock plate for later readjustment.
15) Turn transmission main shaft several times while tapping around retainer lightly with plastic hammer.
16) Inspect and adjust backlash and tooth contact of hypoid gear. <Ref. to MT-70, INSPECTION, Front Differential Assembly.>
17) After checking the tooth contact of hypoid gears, remove the lock plate. Then loosen retainer until the O-ring groove appears. Fit O-ring into the groove and tighten retainer into the position where retainer has been tightened in.
Tighten lock plate.

NOTE:
Carry out this job on both upper and lower retainers.

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



18) Selecting of main shaft rear plate <Ref. to MT-58, ADJUSTMENT, Main Shaft Assembly for Single-Range.>
19) Install clutch release lever and bearing. <Ref. to CL-13, INSTALLATION, Release Bearing and Lever.>
20) Install transfer case with extension case assembly. <Ref. to MT-38, INSTALLATION, Transfer Case and Extension Case Assembly.>
21) Install the manual transmission assembly into the vehicle. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION S503266A10

Check the transmission case for cracks, damage, and oil leaks.

15. Main Shaft Assembly for Single-Range S503713

A: REMOVAL S503713A18

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
2) Remove transfer case with extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove transmission case. <Ref. to MT-50, REMOVAL, Transmission Case.>
4) Removes drive pinion shaft assembly. <Ref. to MT-59, REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove main shaft assembly.

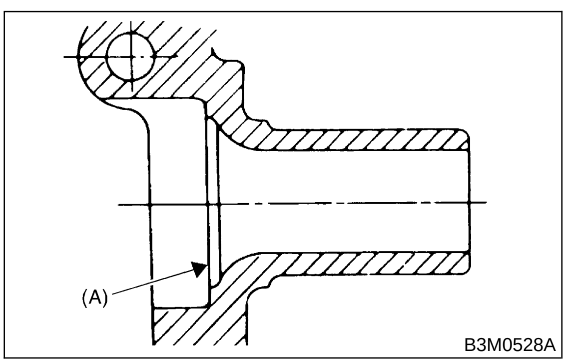
B: INSTALLATION S503713A11

1) Install the needle bearing and oil seal onto the front of transmission main shaft assembly.

CAUTION:
- **Wrap clutch splined section with vinyl tape to prevent damage to oil seal.**
- **Apply grease (Unilube #2 or equivalent) to the sealing lip of oil seal.**
- **Use a new one.**

2) Install needle bearing outer race knock pin hole into transmission case knock pin.

NOTE:
Align the end face of seal with surface (A) when installing oil seal.



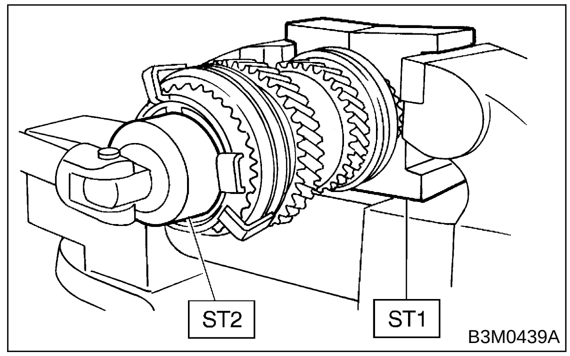
3) Install the drive pinion assembly. <Ref. to MT-59, INSTALLATION, Drive Pinion Shaft Assembly.>
4) Install transmission case. <Ref. to MT-50, INSTALLATION, Transmission Case.>
5) Install transfer case with extension case assembly. <Ref. to MT-38, INSTALLATION, Transfer Case and Extension Case Assembly.>
6) Install the manual transmission assembly to vehicle. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY S503713A06

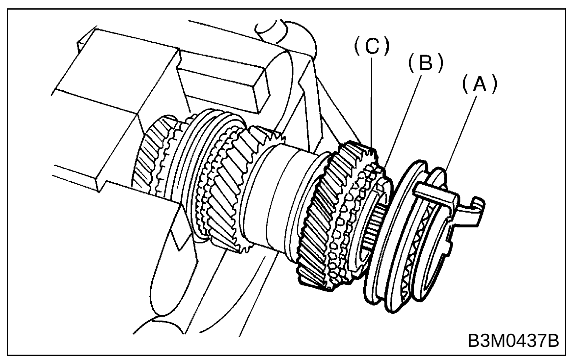
1) Put vinyl tape around main shaft splines to protect oil seal from damage. Then pull out oil seal and needle bearing by hand.
2) Remove lock nut from transmission main shaft assembly.

NOTE:
Remove caulking before taking off lock nut.

ST1 498937000 TRANSMISSION HOLDER
ST2 499987003 SOCKET WRENCH (35)

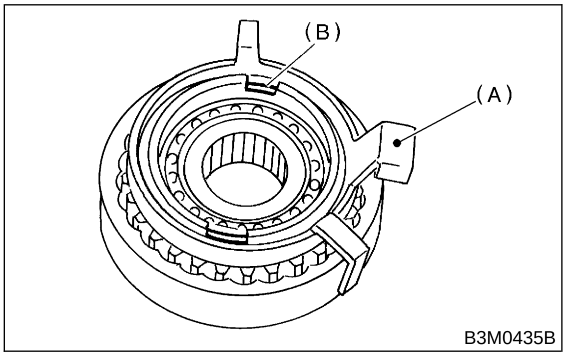


3) Remove 5th-Rev sleeve and hub assembly, baulk ring, 5th drive gear and needle bearing.



(A) 5th-Rev sleeve and hub ASSY
(B) Baulk ring
(C) 5th drive gear

4) Remove snap ring and synchro cone stopper from 5th-Rev sleeve and hub assembly.

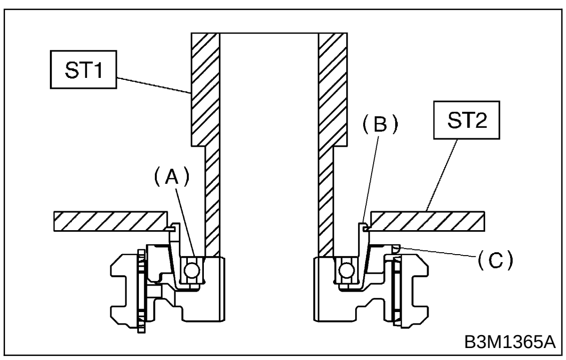


(A) Synchro cone stopper
(B) Snap ring

5) Using ST1, ST2 and a press, remove ball bearing, synchro cone and baulk ring (Rev).

NOTE:
- Replace sleeve and hub with new ones. Do not attempt to disassemble because they must engage at a specified point. If they should be disassembled, mark engagement point on splines beforehand.
- Do not reuse ball bearing.

ST1 499757002 INSTALLER
ST2 498077400 SYNCHRO CONE REMOVER

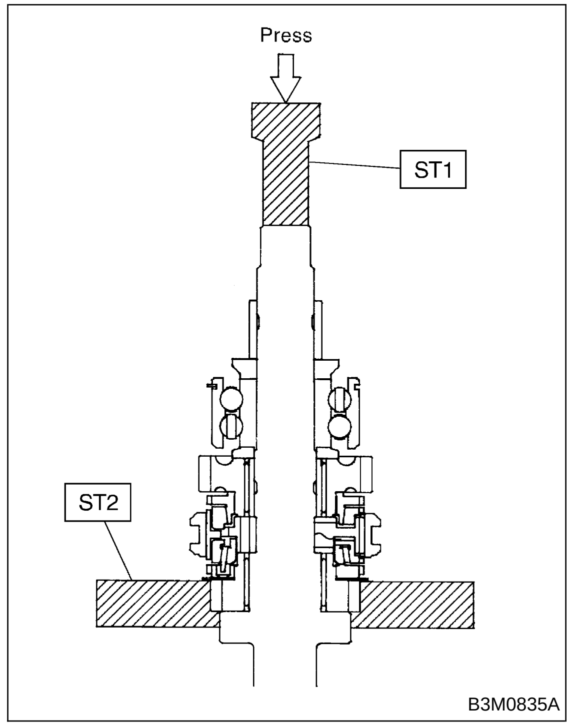


(A) Ball bearing
(B) Synchro cone
(C) Baulk ring

6) Using ST1 and ST2, remove the rest of parts.

NOTE:
Replace sleeve and hub with new ones. Do not attempt to disassemble because they must engage at a specified point. If they should be disassembled, marking engagement point on splines beforehand.

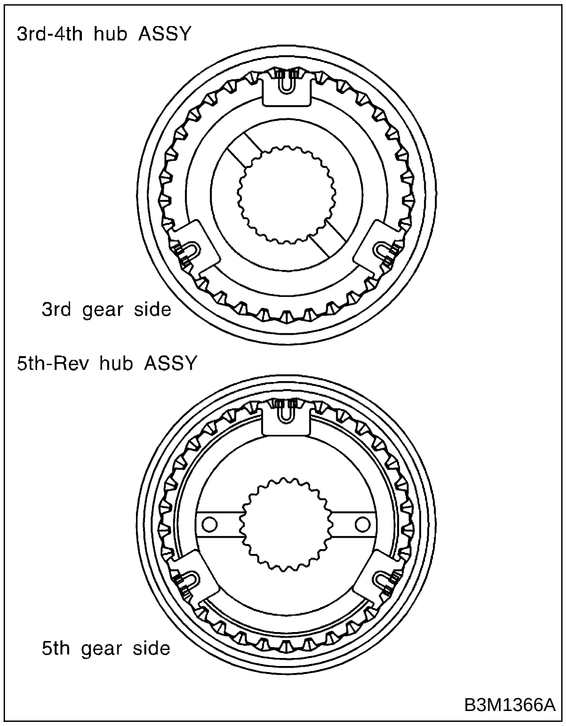
ST1 899864100 REMOVER
ST2 899714110 REMOVER



D: ASSEMBLY S503713A02

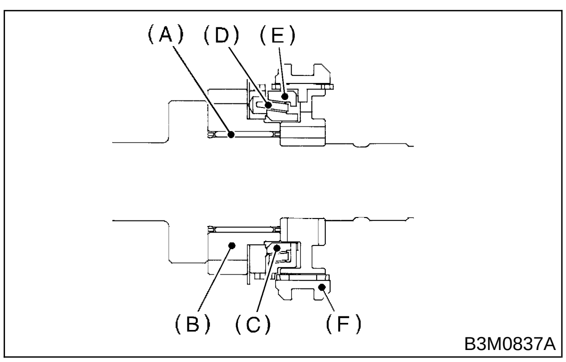
1) Assemble each sleeve and hub assembly.

NOTE:
Position open ends of spring 120° apart.



2) Install 3rd drive gear, outer baulk ring, synchro cone, inner baulk ring, sleeve and hub assembly for 3rd needle bearing on transmission main shaft.

NOTE:
Align groove in baulk ring with shifting insert.

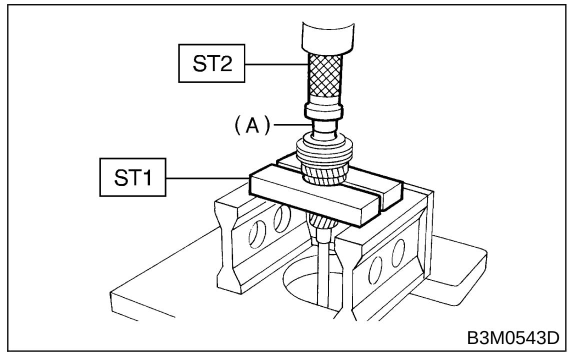


(A) 3rd needle bearing
(B) 3rd drive gear
(C) Inner baulk ring
(D) Synchro cone
(E) Outer baulk ring
(F) Sleeve and hub ASSY

3) Install 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.

CAUTION:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

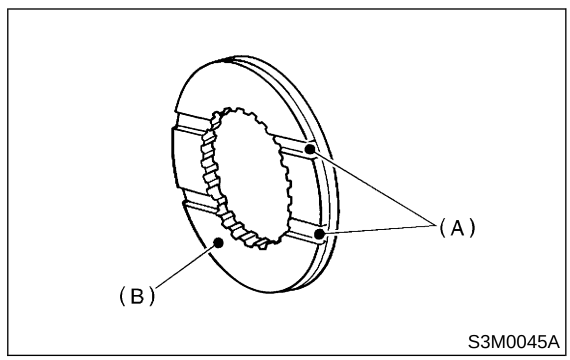
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



(A) 4th needle bearing race

4) Install baulk ring, needle bearing, 4th drive gear and 4th gear thrust washer to transmission main shaft.

NOTE:
Align baulk ring and gear & hub assembly with key groove.

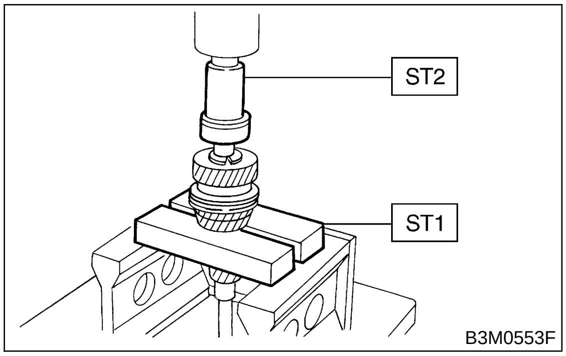


(A) Groove
(B) 4th gear side

5) Drive ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.

CAUTION:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER

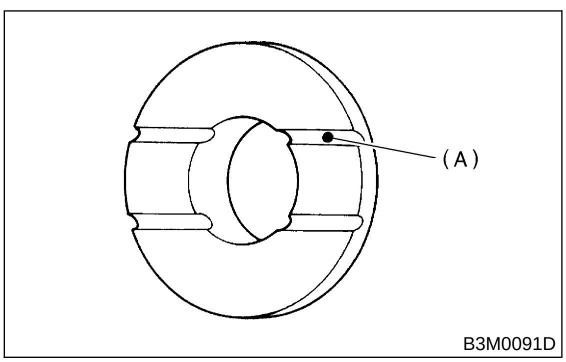


6) Using ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

CAUTION:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:
Face thrust washer in the correct direction.

ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



(A) Face this surface to 5th gear side.

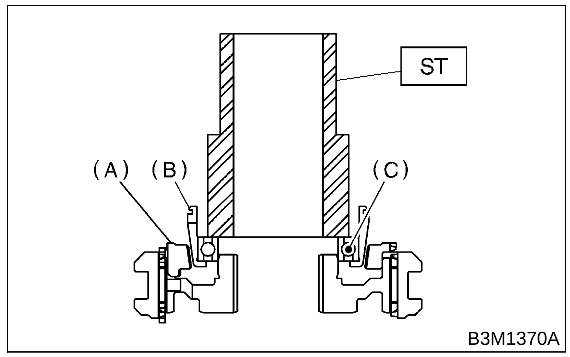
7) Install bearing onto synchro cone.

8) Install baulk ring and synchro cone onto 5th-Rev sleeve and hub assembly using ST and a press.

CAUTION:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

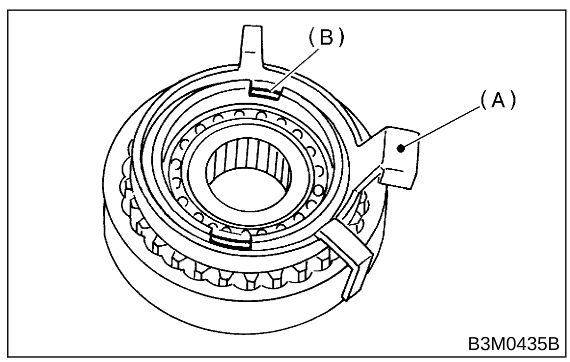
NOTE:
- Use new ball bearing.
- After press fitting, make sure synchro cone rotates freely.

ST 499757002 INSTALLER



(A) Baulk ring
(B) Synchro cone
(C) Ball bearing

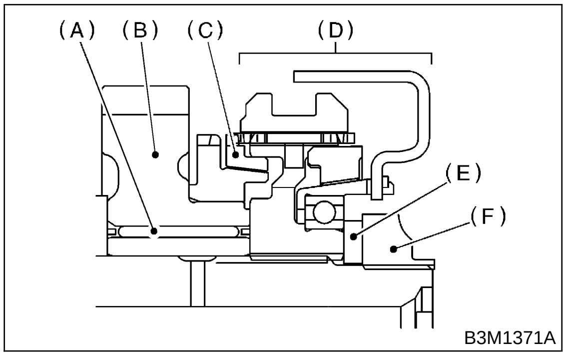
9) Install synchro cone stopper and snap ring to 5th-Rev sleeve and hub assembly.



(A) Synchro cone stopper
(B) Snap ring

10) Install the rest parts to the rear section of transmission main shaft.

NOTE:
Align groove in baulk ring with shifting insert.



(A) Needle bearing
(B) 5th drive gear
(C) Baulk ring
(D) 5th-Rev sleeve and hub ASSY
(E) Lock washer
(F) Lock nuts

11) Tighten lock nuts to the specified torque using ST1 and ST2.

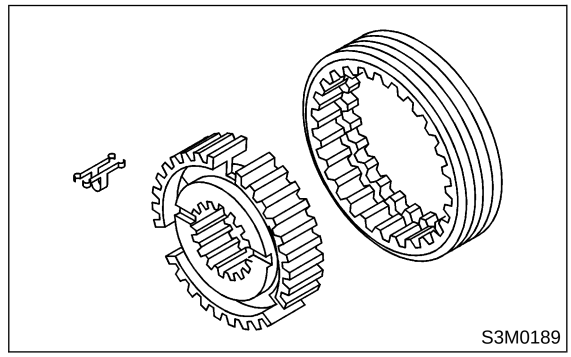
NOTE:
Secure lock nuts in two places after tightening.

ST1 499987003 SOCKET WRENCH
ST2 498937000 TRANSMISSION HOLDER

Tightening torque:
118 N·m (12.0 kgf-m, 86.8 ft-lb)

E: INSPECTION *S503713A10*

Disassembled parts should be washed clean first and then inspected carefully.
1) Bearings
Replace bearings in the following cases:
● Bearings whose balls, outer races and inner races are broken or rusty.
● Worn bearings
● Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.
● Bearings having other defects
2) Bushing (each gear)
Replace the bushing in the following cases:
● When the sliding surface is damaged or abnormally worn.
● When the inner wall is abnormally worn.
3) Gears
● Replace gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.
● Correct or replace if the cone that contacts the baulk ring is rough or damaged.
● Correct or replace if the inner surface or end face is damaged.
4) Baulk ring
Replace the ring in the following cases:
● When the inner surface and end face are damaged.
● When the ring inner surface is abnormally or partially worn down.
● When the contact surface of the synchronizer ring insert is scored or abnormally worn down.
5) Shifting insert key
Replace the insert if deformed, excessively worn, or defective in any way.



6) Oil seal
Replace the oil seal if the lip is deformed, hardened, damaged, worn, or defective in any way.
7) O-ring
Replace the O-ring if the sealing face is deformed, hardened, damaged, worn, or defective in any way.
8) Gearshift mechanism
Repair or replace the gearshift mechanism if excessively worn, bent, or defective in any way.

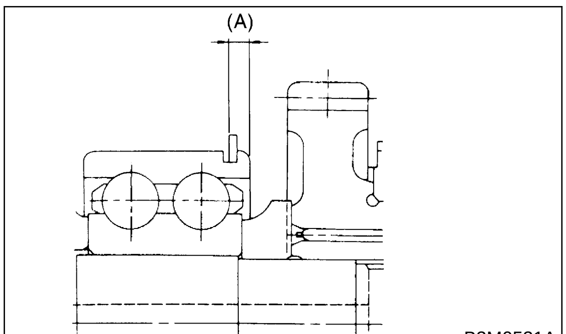
F: ADJUSTMENT *S503713A01*

Selection of main shaft rear plate
Using ST, measure the amount (A) of ball bearing protrusion from transmission main case surface and select the proper plate in the following table:

NOTE:
Before measuring, tap the end of main shaft with a plastic hammer lightly in order to make the clearance zero between the main case surface and the moving flange of bearing.

ST 498147000 DEPTH GAUGE

Dimension (A) mm (in)	Part No.	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 3.99 (0.1524 — 0.1571)	32294AA051	2



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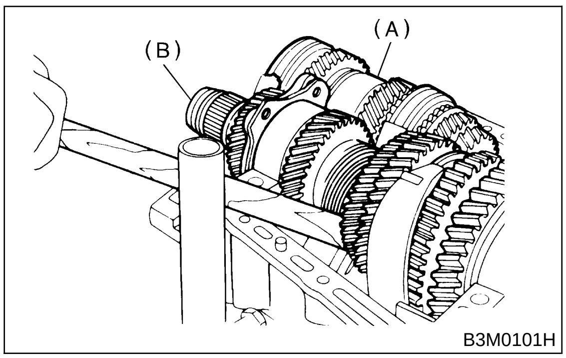
16. Drive Pinion Shaft Assembly S503269

A: REMOVAL S503269A18

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
2) Remove transfer case with extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove transmission case. <Ref. to MT-50, REMOVAL, Transmission Case.>
4) Remove drive pinion shaft assembly.

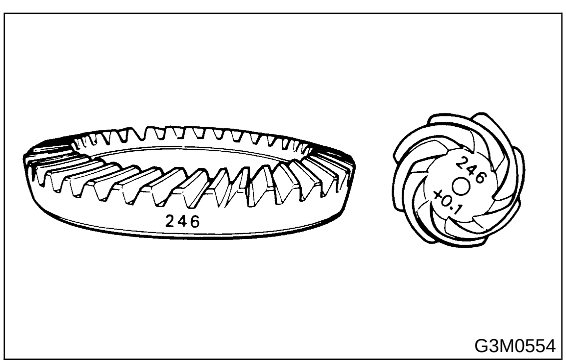
NOTE:
Use a hammer handle, etc. to remove if too tight.



(A) Main shaft assembly
(B) Drive pinion shaft assembly

B: INSTALLATION S503269A11

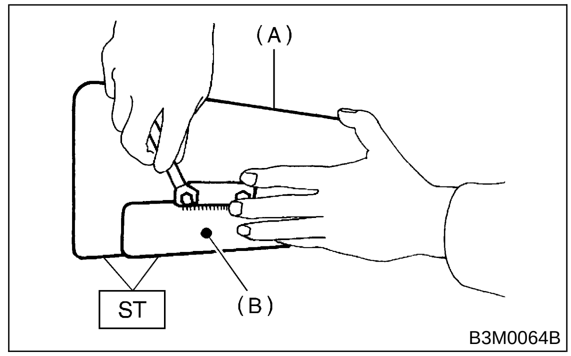
1) Remove differential assembly.
2) Alignment marks/numbers on hypoid gear set
The upper number on driven pinion is the match number for combining it with hypoid driven gear. The lower number is for shim adjustment. If no lower number is shown, the value is zero. The number on hypoid driven gear indicates a number for combination with drive pinion.



3) Place drive pinion shaft assembly on right hand transmission main case without shim and tighten bearing mounting bolts.
4) Inspection and adjustment of ST

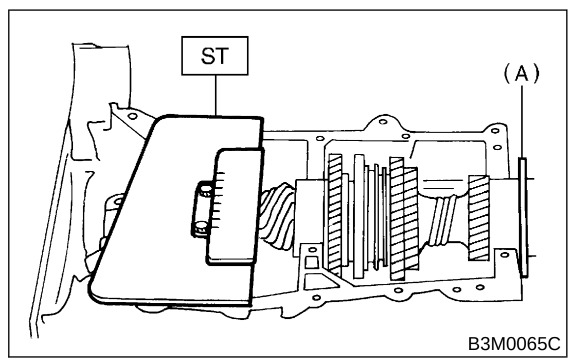
NOTE:
- Loosen the two bolts and adjust so that the scale indicates 0.5 correctly when the plate end and the scale end are on the same level.
- Tighten the two bolts.

ST 499917500 DRIVE PINION GAUGE ASSY



(A) Plate
(B) Scale

5) Position the ST by inserting the knock pin of ST into the knock hole in the transmission case.
ST 499917500 DRIVE PINION GAUGE ASSY
6) Slide the drive pinion gauge scale with fingertip and read the value at the point where it matches with the end face of drive pinion.
ST 499917500 DRIVE PINION GAUGE ASSY



(A) Adjust clearance to zero without shim.

7) The thickness of shim shall be determined by adding the value indicated on drive pinion to the value indicated on the ST. (Add if the number on drive pinion is prefixed by + and subtract if the number is prefixed by −.)
ST 499917500 DRIVE PINION GAUGE ASSY

8) Select one to three shims from the next table for the value determined as described above and take a shim thickness which is closest to the said value.

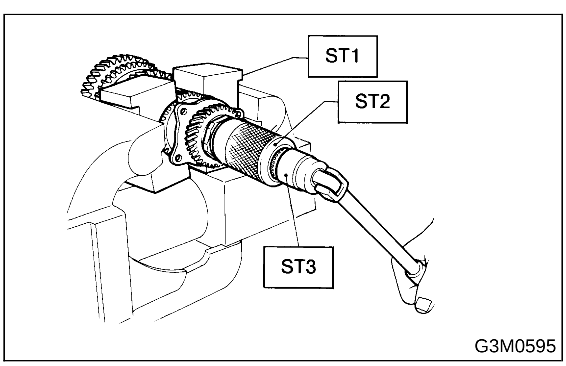
Drive pinion shim	
Part No.	Thickness mm (in)
32295AA031	0.150 (0.0059)
32295AA041	0.175 (0.0069)
32295AA051	0.200 (0.0079)
32295AA061	0.225 (0.0089)
32295AA071	0.250 (0.0098)
32295AA081	0.275 (0.0108)
32295AA091	0.300 (0.0118)
32295AA101	0.500 (0.0197)

9) Install differential assembly. <Ref. to MT-68, INSTALLATION, Front Differential Assembly.>
10) Set transmission main shaft assembly and drive pinion assembly in position. (So there is no clearance between the two when moved all the way to the front). Inspect suitable 1st — 2nd, 3rd — 4th and 5th shifter fork so that coupling sleeve and reverse driven gear are positioned in the center of their cynchronizing mechanisms. <Ref. to MT-64, INSPECTION, Drive Pinion Shaft Assembly.>
11) Install transmission case. <Ref. to MT-50, INSTALLATION, Transmission Case.>
12) Install transfer case with extension case assembly. <Ref. to MT-38, INSTALLATION, Transfer Case and Extension Case Assembly.>
13) Install the manual transmission assembly to vehicle. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

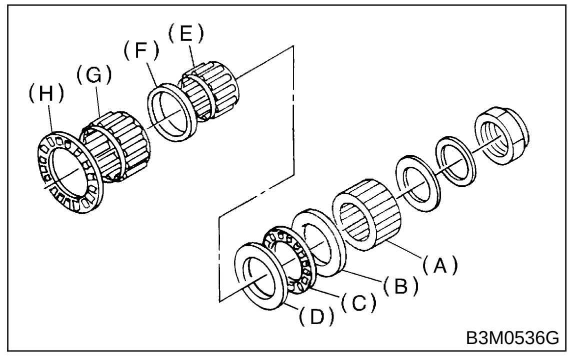
C: DISASSEMBLY *S503269A06*

CAUTION:
Attach a cloth to the end of driven shaft (on the frictional side of thrust needle bearing) during disassembly or reassembly to prevent damage.

1) Straighten lock nut at staked portion. Remove the lock nut using ST1, ST2 and ST3.
ST1 899884100 HOLDER
ST2 498427100 STOPPER
ST3 899988608 SOCKET WRENCH



2) Withdraw drive pinion from driven shaft.
Remove differential bevel gear sleeve, adjusting washer No. 1, adjusting washer No. 2, thrust bearing, needle bearing, drive pinion collar, needle bearing and thrust bearing.

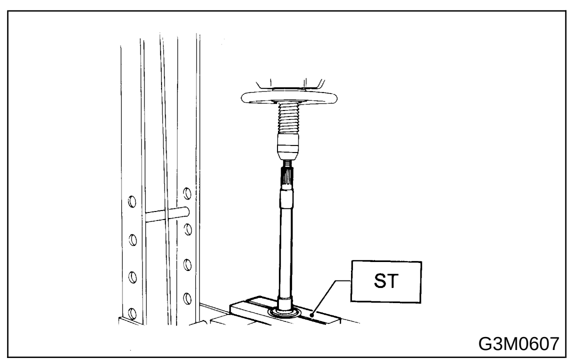


(A) Differential bevel gear sleeve
(B) Washer No. 1 (25 × 37.5 × t)
(C) Thrust bearing (25 × 37.5 × 3)
(D) Washer No. 2 (25 × 37.5 × 4)
(E) Needle bearing (25 × 30 × 20)
(F) Drive pinion collar
(G) Needle bearing (30 × 37 × 23)
(H) Thrust bearing (33 × 50 × 3)

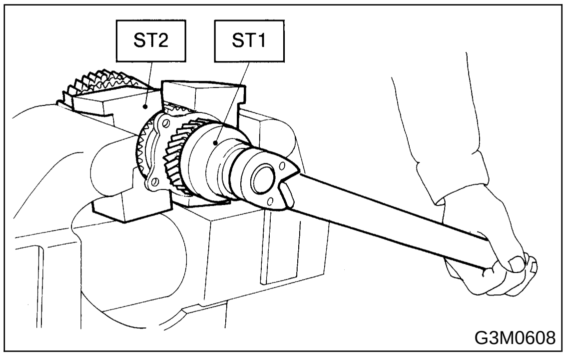
3) Remove roller bearing and washer using ST and press.

CAUTION:
Do not reuse roller bearing.

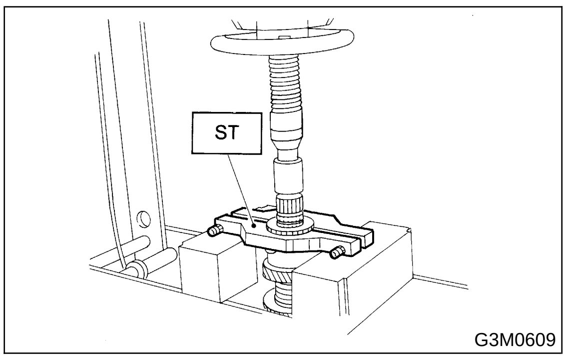
ST 498077000 REMOVER



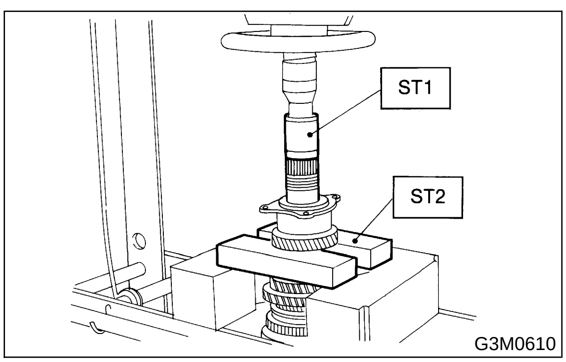
4) Straighten lock nut at staked portion. Remove the lock nut using ST1 and ST2.
ST1 499987300 SOCKET WRENCH (50)
ST2 899884100 HOLDER



5) Remove 5th driven gear using ST.
ST 499857000 5TH DRIVEN GEAR REMOVER

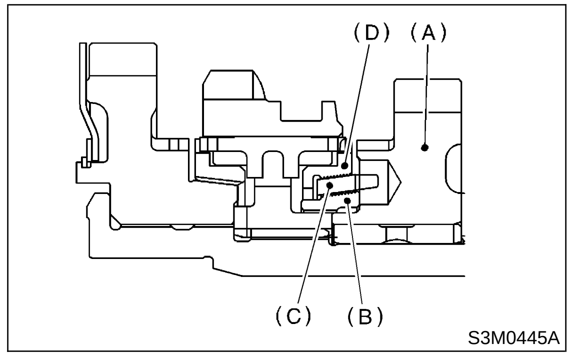


6) Remove woodruff key.
7) Remove roller bearing, 3rd-4th driven gear using ST1 and ST2.
ST1 499757002 INSTALLER
ST2 899714110 REMOVER



8) Remove the key.

9) Remove 2nd driven gear, inner baulk ring, synchro cone and outer baulk ring.

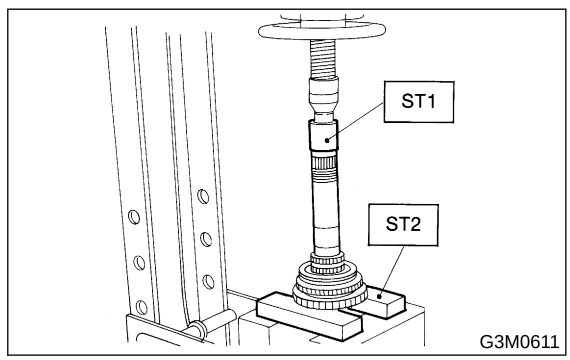


(A) 2nd driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring

10) Remove 1st driven gear, 2nd gear bushing, gear and hub using ST1 and ST2.

NOTE:
Replace gear and hub if necessary. Do not attempt to disassemble if at all possible because they must engage at a specified point. If they have to be disassembled, mark the engaging point beforehand.

ST1 499757002 INSTALLER
ST2 899714110 REMOVER

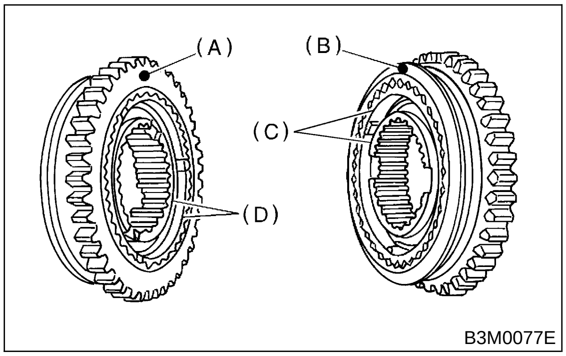


11) Remove sub gear for 1st driven gear.

D: ASSEMBLY S503269A02

1) Install sleeve and assembly by matching alignment marks.

NOTE:
- Use new gear and hub assembly, if gear or hub have been replaced.



(A) 1st gear side
(B) 2nd gear side
(C) Flush surface
(D) Stepped surface

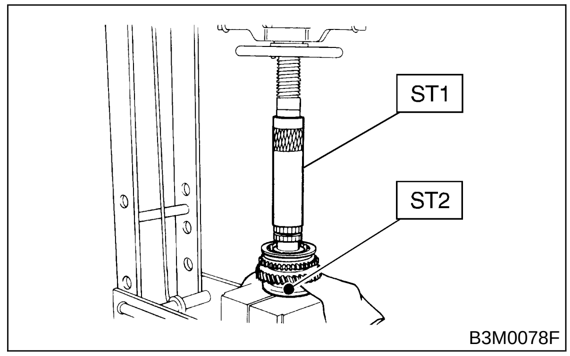
2) Install washer, snap ring and sub gear to 1st driven gear.
3) Install 1st driven gear, 1st baulk ring, gear and hub assembly onto driven shaft.

NOTE:
- Take care to install gear and hub assembly in proper direction.
- Align baulk ring and gear & hub assembly with key groove.

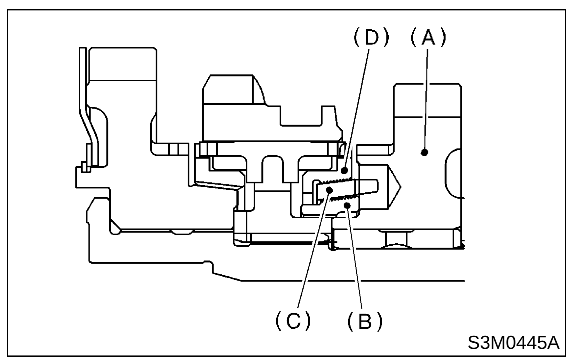
4) Install 2nd driven gear bushing onto driven shaft using ST1, ST2 and press.

CAUTION:
- **Attach a cloth to the end of driven shaft to prevent damage.**
- **Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).**

NOTE:
When press fitting, align oil holes of shaft and bushing.
ST1 499277200 INSTALLER
ST2 499587000 INSTALLER



5) Install 2nd driven gear, inner baulk ring, synchro cone, outer baulk ring and insert onto driven shaft.



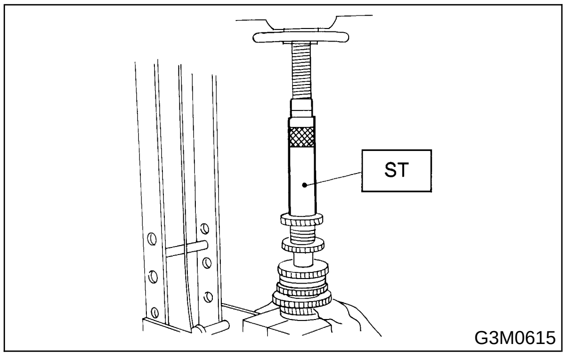
(A) 2nd driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring

6) After installing key on driven shaft, install 3rd-4th driven gear using ST and press.

CAUTION:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:
Align groove in baulk ring with insert.

ST 499277200 INSTALLER

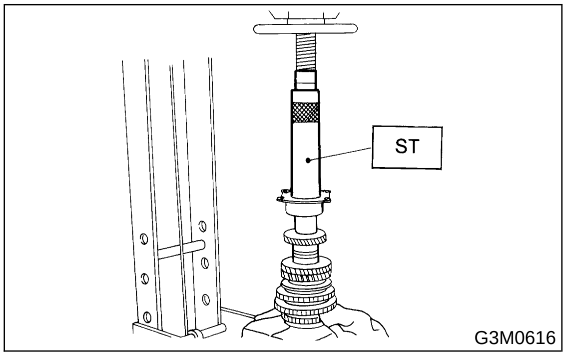


G3M0615

7) Install a set of roller bearings onto the driven shaft using ST and press.

CAUTION:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST 499277200 INSTALLER

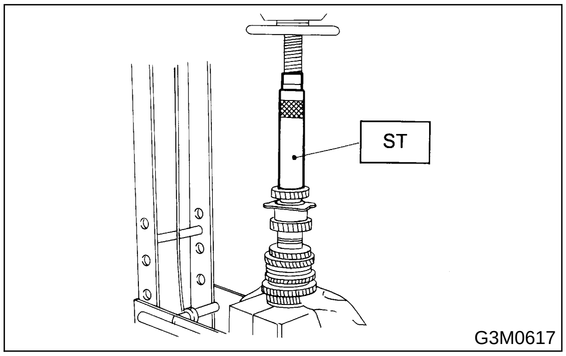


G3M0616

8) Position woodruff key in groove on the rear of driven shaft. Install 5th driven gear onto drive shaft using ST and press.

CAUTION:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

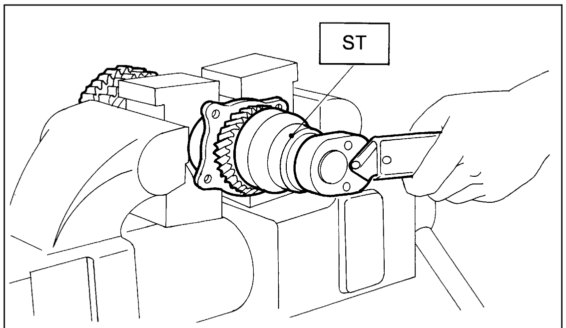
ST 499277200 INSTALLER



G3M0617

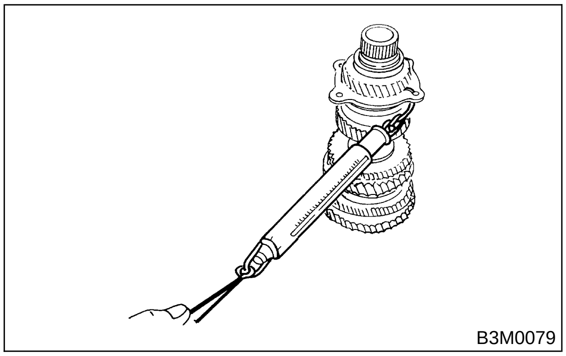
9) Install lock washer. Install lock nut and tighten to the specified torque using ST.
ST 499987300 SOCKET WRENCH (50)

Tightening torque:
265 N·m (27 kgf-m, 195 ft-lb)



G3M0618

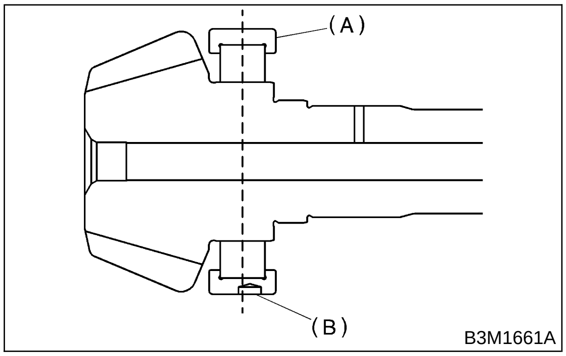
NOTE:
- Stake lock nut at two points.
- Using spring balancer, check that starting torque of roller bearing is 0.1 to 1.5 N (0.01 to 0.15 kgf, 0.02 to 0.33ft).



B3M0079

10) Install roller bearing onto drive pinion.

NOTE:
When installing roller bearing, note its directions (front and rear) because knock pin hole in outer race is offset.

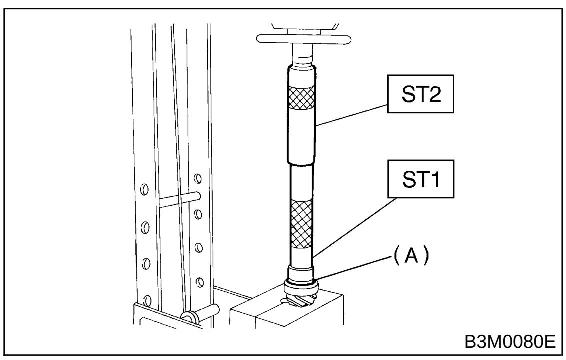


(A) Roller bearing
(B) Knock pin hole

11) Install washer using ST1, ST2 and press.

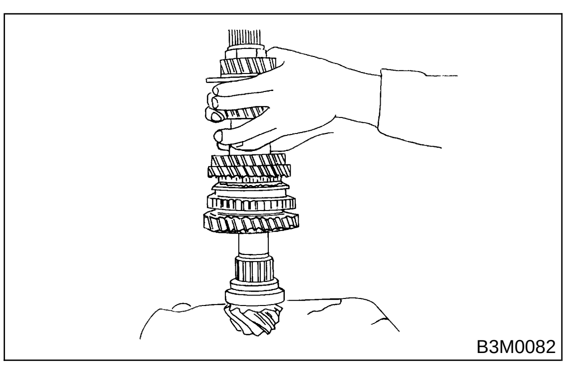
CAUTION:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST1 499277100 BUSHING 1-2 INSTALLER
ST2 499277200 INSTALLER



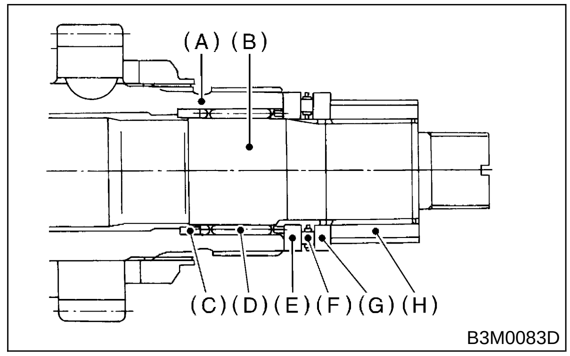
(A) Washer

12) Install thrust bearing and needle bearing. Install driven shaft assembly.



13) Install drive pinion collar, needle bearing, adjusting washer No. 2, thrust bearing, adjusting washer No. 1 and differential bevel gear sleeve in that order.

NOTE:
Be careful to install spacer in proper direction.

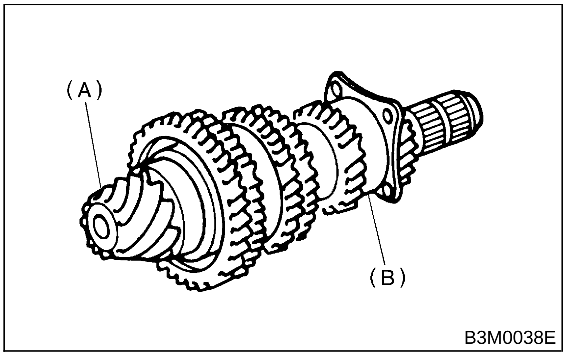


(A) Driven shaft
(B) Drive shaft
(C) Drive pinion collar
(D) Needle bearing (25 × 30 × 20)
(E) Washer No. 2 (25 × 36 × 4)
(F) Thrust bearing (25 × 37.5 × 3)
(G) Washer No. 1 (25 × 36 × t)
(H) Differential bevel gear sleeve

E: INSPECTION S503269A10

Disassembled parts should be washed clean first and then inspected carefully.
1) Bearings
Replace bearings in the following cases:
- Bearings whose balls, outer races and inner races are broken or rusty.
- Worn bearings
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.

- The ball bearing on the rear side of the drive pinion shaft should be checked for smooth rotation before the drive pinion assembly is disassembled. In this case, because a preload is working on the bearing, its rotation feels like it is slightly dragging unlike the other bearings.



(A) Drive pinion shaft
(B) Ball bearing

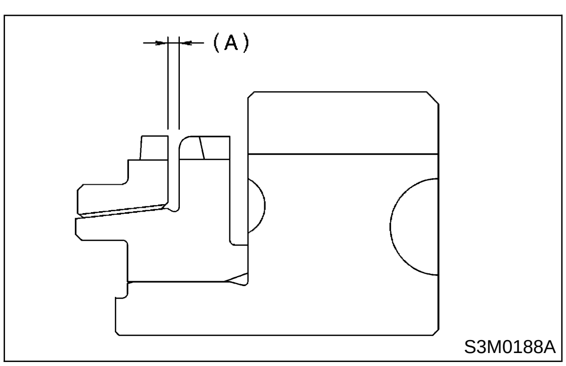
- Bearings having other defects

2) Bushing (each gear)
Replace the bushing in the following cases:
- When the sliding surface is damaged or abnormally worn.
- When the inner wall is abnormally worn.

3) Gears
- Replace gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.
- Correct or replace if the cone that contacts the baulk ring is rough or damaged.
- Correct or replace if the inner surface or end face is damaged.

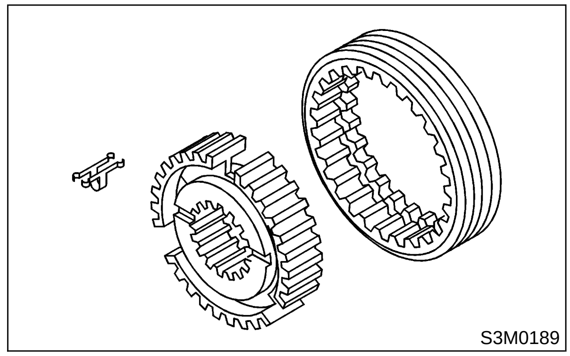
4) Baulk ring
Replace the ring in the following cases:
- When the inner surface and end face are damaged.
- When the ring inner surface is abnormally or partially worn down.
- If the gap between the end faces of the ring and the gear splined part is excessively small when the ring is pressed against the cone.

Clearance (A):
0.5 — 1.0 mm (0.020 — 0.040 in)



- When the contact surface of the synchronizer ring insert is scored or abnormally worn down.

5) Shifting insert key
Replace the insert if deformed, excessively worn, or defective in any way.

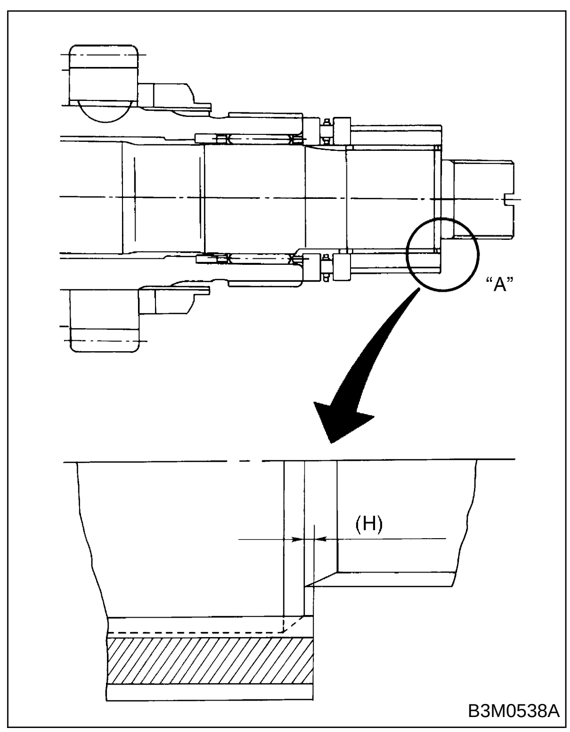


6) Oil seal
Replace the oil seal if the lip is deformed, hardened, damaged, worn, or defective in any way.
7) O-ring
Replace the O-ring if the sealing face is deformed, hardened, damaged, worn, or defective in any way.

F: ADJUSTMENT *S503269A01*

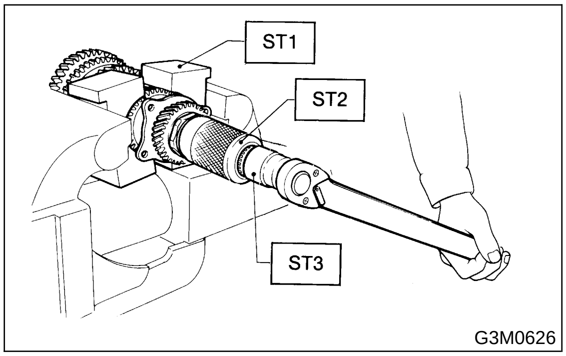
1. THRUST BEARING PRELOAD *S503269A0101*

1) After completing the preceding steps 1) through 3), select adjusting washer No. 1 so that dimension (H) is zero through visual check. Position washer (18.3 × 30 × 4) and lock washer (18 × 30 × 2) and install lock nut (18 × 13.5).



2) Using ST1, ST2 and ST3, tighten lock nut to the specified torque.
ST1 899884100 HOLDER
ST2 498427100 STOPPER
ST3 899988608 SOCKET WRENCH (27)

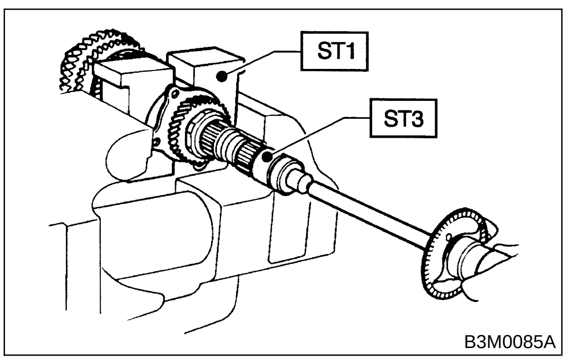
Tightening torque:
118 N·m (12 kgf-m, 86.8 ft-lb)



G3M0626

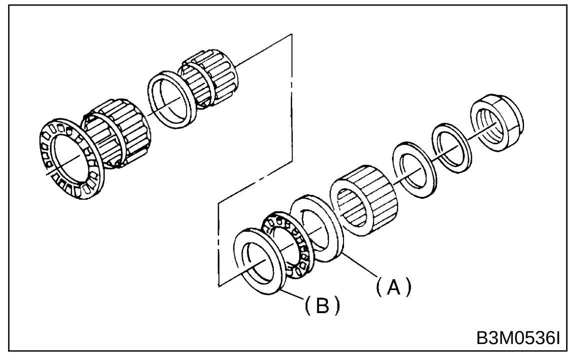
3) After removing ST2, measure starting torque using torque driver.
ST1 899884100 HOLDER
ST3 899988608 SOCKET WRENCH (27)

Starting torque:
0.3 — 0.8 N·m (0.03 — 0.08 kgf-m, 0.2 — 0.6 ft-lb)



B3M0085A

4) If starting torque is not within specified limit, select new adjusting washer No. 1 and recheck starting torque.

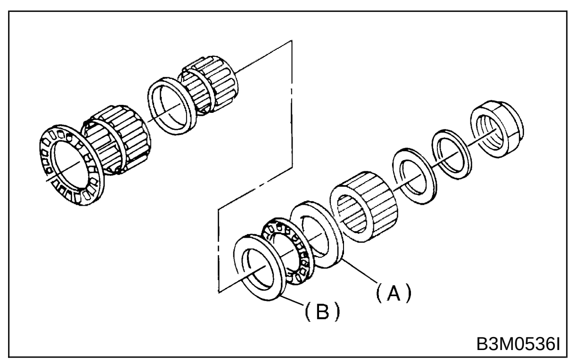


B3M0536I

(A) Adjusting washer No.1
(B) Adjusting washer No.2

Adjusting washer No. 1	
Part No.	Thickness mm (in)
803025051	3.925 (0.1545)
803025052	3.950 (0.1555)
803025053	3.975 (0.1565)
803025054	4.000 (0.1575)
803025055	4.025 (0.1585)
803025056	4.050 (0.1594)
803025057	4.075 (0.1604)

5) If specified starting torque range cannot be obtained when a No. 1 adjusting washer is used, then select a suitable No. 2 adjusting washer from those listed in the following table. Repeat steps 1) through 4) to adjust starting torque.



B3M0536I

(A) Adjusting washer No. 1
(B) Adjusting washer No. 2

Starting torque	Dimension H	Washer No. 2
Low	Small	Select thicker one.
High	Large	Select thinner one.

Adjusting washer No. 2	
Part No.	Thickness mm (in)
803025059	3.850 (0.1516)
803025054	4.000 (0.1575)
803025058	4.150 (0.1634)

6) Recheck that starting torque is within specified range, then clinch lock nut at four positions.

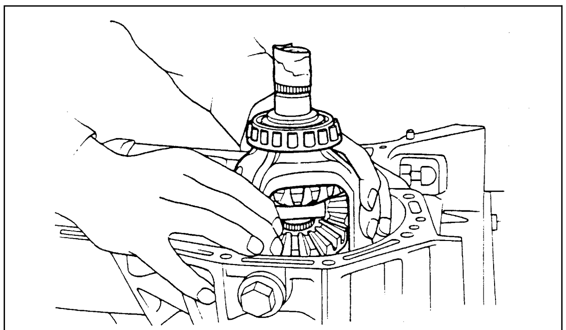
17. Front Differential Assembly

S503152

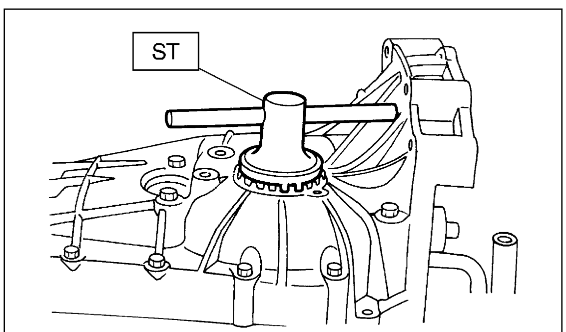
A: REMOVAL S503152A18

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
2) Remove transfer case with extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove transmission case. <Ref. to MT-50, REMOVAL, Transmission Case.>
4) Removes drive pinion shaft assembly. Remove transfer case with extension case assembly. <Ref. to MT-59, REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove main shaft assembly.
<Ref. to MT-53, REMOVAL, Main Shaft Assembly for Single-Range.>
6) Remove differential assembly.

CAUTION:
- **Be careful not to confuse right and left roller bearing outer races.**
- **Be careful not to damage retainer oil seal.**


G3M0557

7) Remove differential side retainers using ST.
ST 499787000 WRENCH ASSY



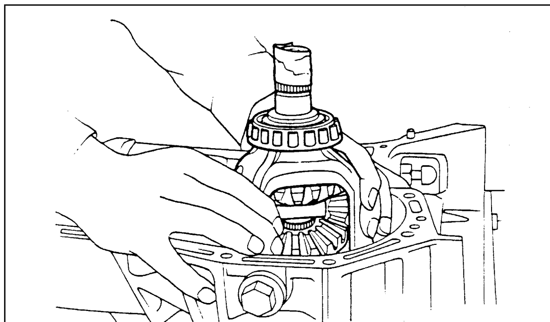
B3M1360A

B: INSTALLATION S503152A11

1) Install differential side retainers using ST.
ST 499787000 WRENCH ASSY
2) Install differential assembly.

CAUTION:
Be careful not to fold the sealing lip of oil seal.

NOTE:
Wrap the left and right splines sections of axle shaft with vinyl tape to prevent scratches.


G3M0557

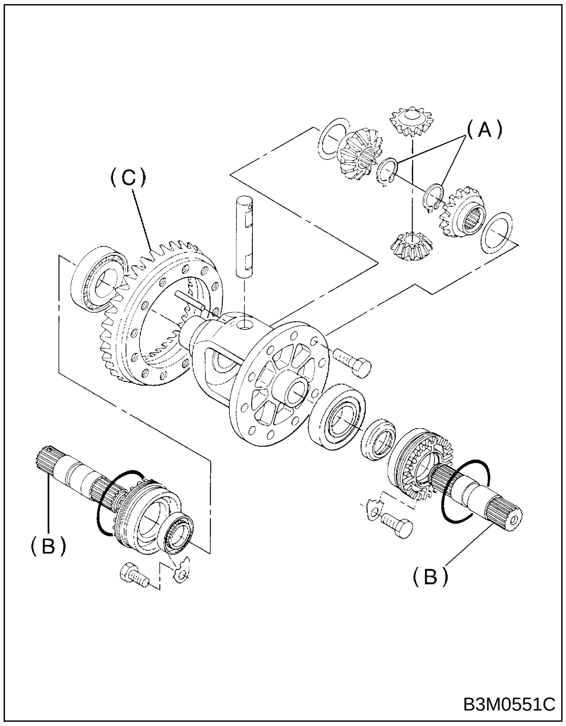
3) Install main shaft assembly.
<Ref. to MT-53, INSTALLATION, Main Shaft Assembly for Single-Range.>
4) Install drive pinion assembly. <Ref. to MT-59, INSTALLATION, Drive Pinion Shaft Assembly.>
5) Install transmission case. <Ref. to MT-50, INSTALLATION, Transmission Case.>
6) Install transfer case with extension case assembly. <Ref. to MT-38, INSTALLATION, Transfer Case and Extension Case Assembly.>
7) Install the manual transmission assembly to vehicle. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY S503152A06

1) Remove right and left snap rings from differential, and then remove two axle drive shafts.

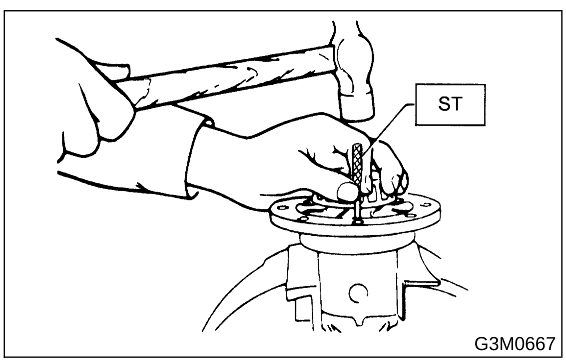
NOTE:
During reassembly, reinstall each axle drive shaft in the same place from which it was removed.

2) Loosen twelve bolts and remove hypoid driven gear.

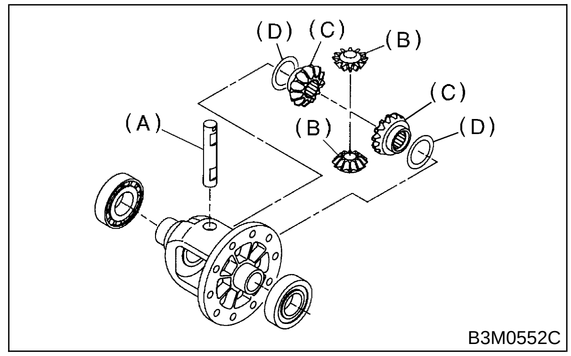


(A) Snap ring
(B) Axle drive shaft
(C) Hypoid driven gear

3) Drive out straight pin from differential assembly toward hypoid driven gear.
ST 899904100 REMOVER

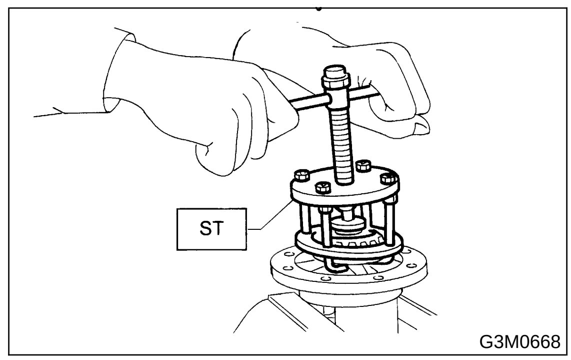


4) Pull out pinion shaft, and remove differential bevel pinion and gear and washer.



(A) Pinion shaft
(B) Bevel pinion
(C) Bevel gear
(D) Washer

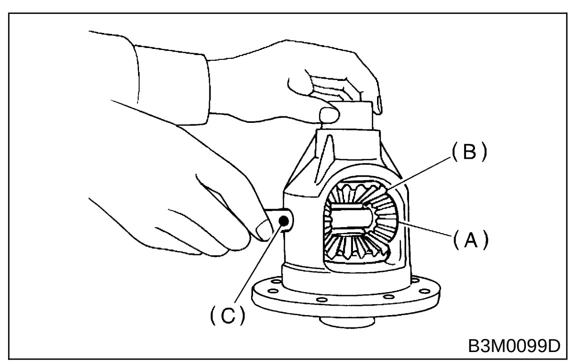
5) Remove roller bearing using ST.
ST 399527700 PULLER SET



D: ASSEMBLY *S503152A02*

1) Install bevel gear and bevel pinion together with washers, and insert pinion shaft.

NOTE:
Face the chamfered side of washer toward gear.



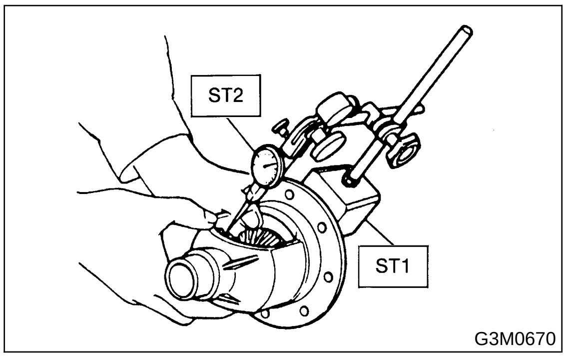
(A) Bevel pinion
(B) Bevel gear
(C) Pinion shaft

2) Measure backlash between bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust it. < Ref. to MT-72, ADJUSTMENT, Front Differential Assembly.>

NOTE:
Be sure the pinion gear tooth contacts adjacent gear teeth during measurement.

ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

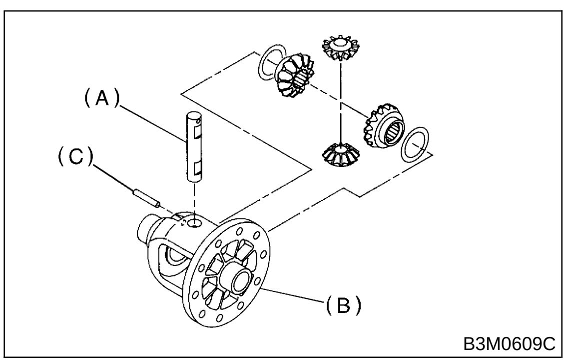
Standard backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



3) Align pinion shaft and differential case at their holes, and drive straight pin into holes from the hypoid driven gear side, using ST.

NOTE:
Lock straight pin after installing.

ST 899904100 REMOVER



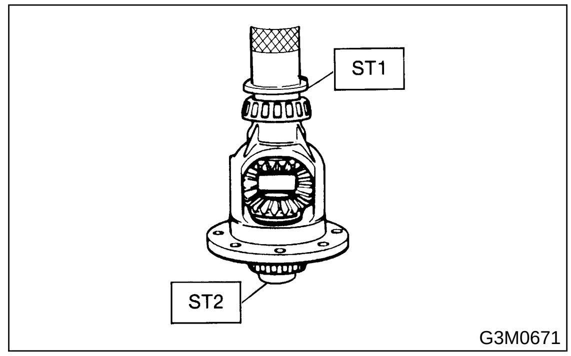
(A) Pinion shaft
(B) Differential case
(C) Straight pin

4) Install roller bearing to differential case.

CAUTION:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

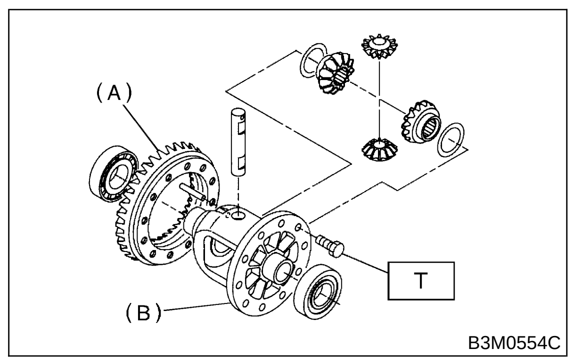
NOTE:
Be careful to use roller bearing outer races as a set.

ST1 499277100 BUSHING 1-2 INSTALLER
ST2 398497701 ADAPTER



5) Install hypoid driven gear to differential case using twelve bolts.

Tightening torque:
T: 62 N·m (6.3 kgf-m, 45.6 ft-lb)

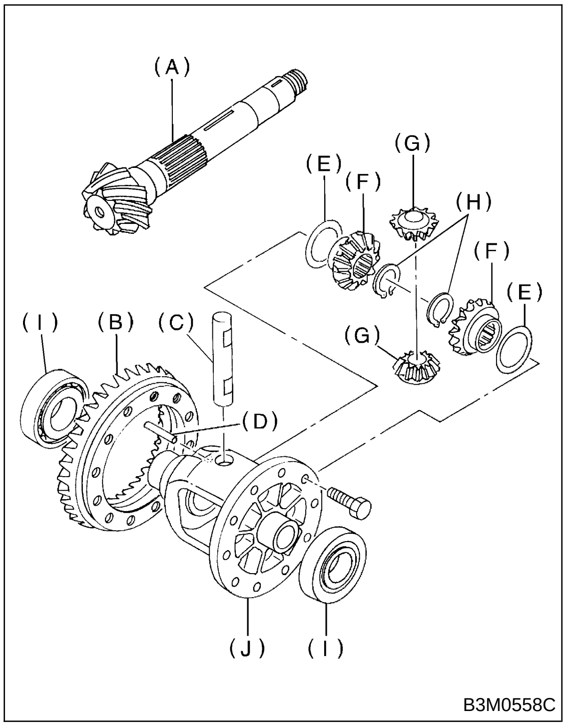


(A) Hypoid driven gear
(B) Differential case

E: INSPECTION S503152A10

Repair or replace the differential gear in the following cases:

- The hypoid drive gear and drive pinion shaft tooth surface are damaged, excessively worn, or seized.
- The roller bearing on the drive pinion shaft has a worn or damaged roller path.
- There is damage, wear, or seizure of the differential bevel pinion, differential bevel gear, washer, pinion shaft, and straight pin.
- The differential case has worn or damaged sliding surfaces.



(A) Drive pinion shaft
(B) Hypoid driven gear
(C) Pinion shaft
(D) Straight pin
(E) Washer
(F) Differential bevel gear
(G) Differential bevel pinion
(H) Snap ring
(I) Roller bearing
(J) Differential case

1. BEVEL PINION GEAR BACKLASH

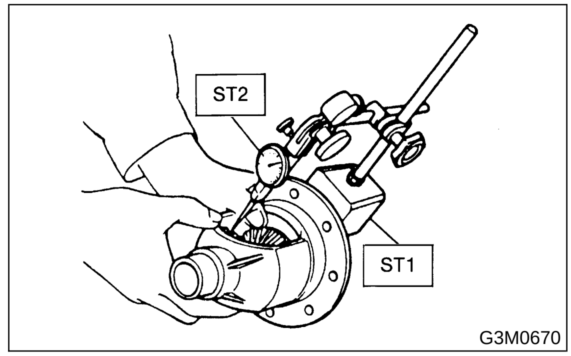
S503152A1001

Measure backlash between bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust it.

NOTE:
Be sure the pinion gear tooth contacts adjacent gear teeth during measurement.

ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

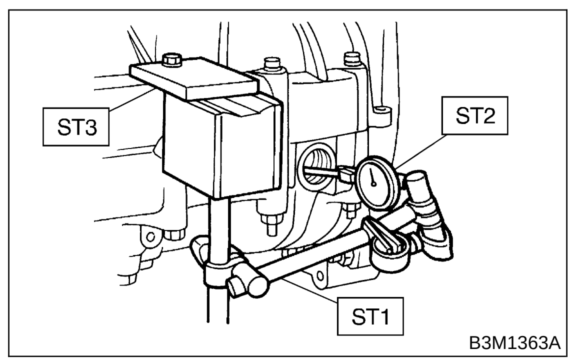
Standard backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



2. HYPOID GEAR BACKLASH *S503152A1002*

Set ST1, ST2 and ST3. Insert the needle through transmission oil drain plug hole so that the needle comes in contact with the tooth surface at a right angle and check the backlash.
ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE
ST3 498255400 PLATE

Backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



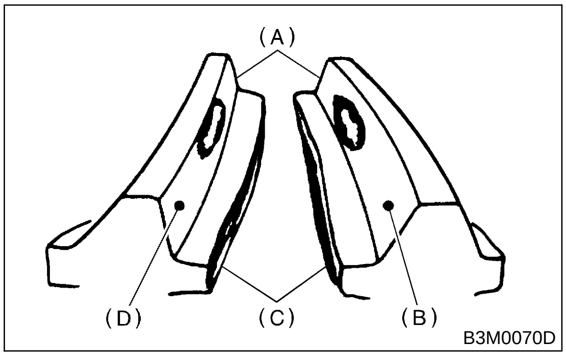
NOTE:
If backlash is outside specified range, adjust it by turning holder in right side case.

3. TOOTH CONTACT OF HYPOID GEAR

S503152A1003

Check tooth contact of hypoid gear as follows: Apply a uniform thin coat of red lead on both tooth surfaces of 3 or 4 teeth of the hypoid gear. Move the hypoid gear back and forth by turning the transmission main shaft until a definite contact pattern is developed on hypoid gear, and judge whether face contact is correct. If it is inaccurate, make adjustment. <Ref. to MT-72, ADJUSTMENT, Front Differential Assembly.>

- Tooth contact is correct.



(A) Toe
(B) Coast side
(C) Heel
(D) Drive side

F: ADJUSTMENT S503152A01

1. BEVEL PINION GEAR BACKLASH

S503152A0101

1) Disassemble the front differential. <Ref. to MT-68, REMOVAL, Front Differential Assembly.>
2) Select a different washer from the table and install.

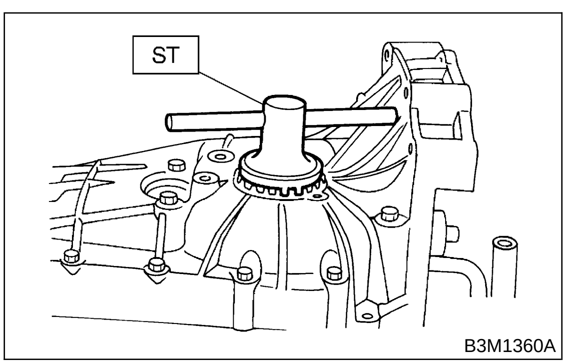
Washer	
Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)
803038022	0.975 — 1.000 (0.0384 — 0.0394)
803038023	1.025 — 1.050 (0.0404 — 0.0413)

3) Adjust until the specified value is obtained.

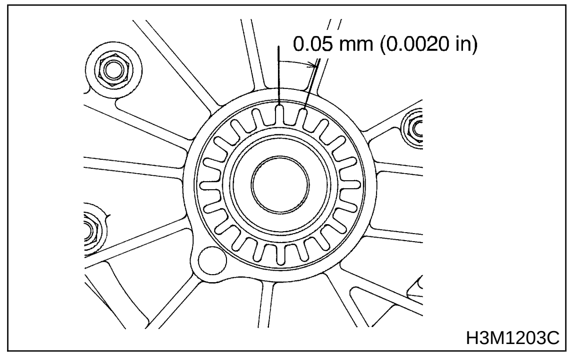
Standard backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)

2. HYPOID GEAR BACKLASH S503152A0102

Adjust backlash by turning holder in the right side case.
ST 499787000 WRENCH ASSY



NOTE:
Each time holder rotates one tooth, backlash changes by 0.05 mm (0.0020 in).



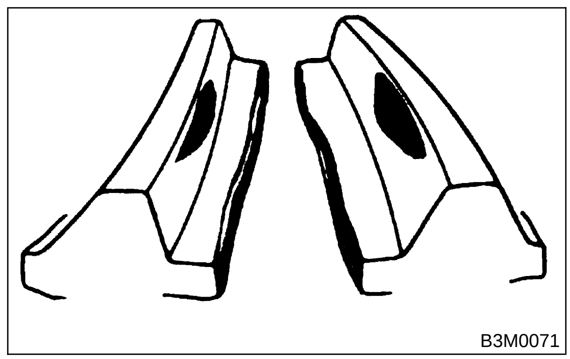
3. TOOTH CONTACT OF HYPOID GEAR

S503152A0103

Adjust until the teeth contact is correct.

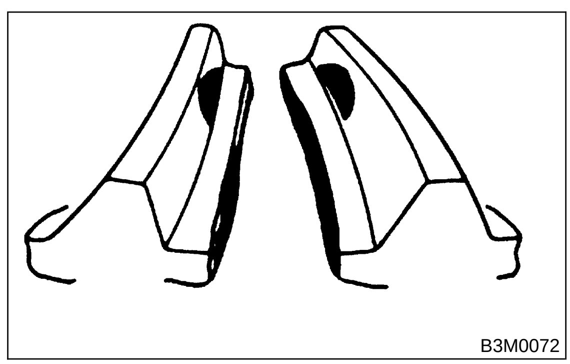
- Backlash is excessive.

To reduce backlash, loosen holder on the upper side (case right side) and turn in the holder on the lower side (case left side) by the same amount.

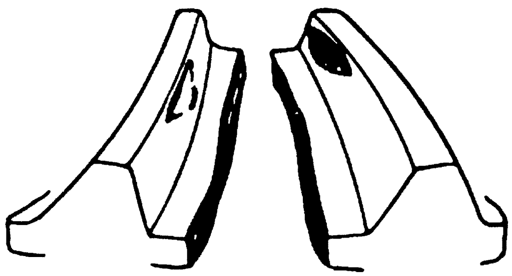


- Backlash is insufficient.

To increase backlash, loosen holder on the lower side (case left side) and turn in the holder on the upper side (case right side) by the same amount.

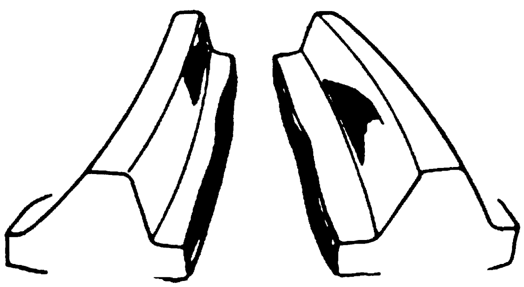


- The drive pinion shim selected before is too thick.
Reduce its thickness.



B3M0073

- The drive pinion shim selected before is too thin.
Increase its thickness.

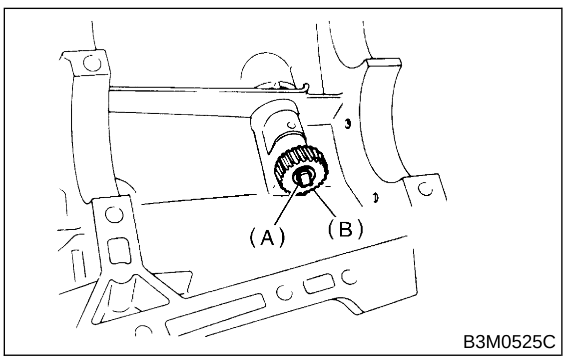


B3M0074

18. Speedometer Gear S503268

A: REMOVAL S503268A18

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
2) Remove back-up light switch and neutral position switch. <Ref. to MT-34, REMOVAL, Switches and Harness.>
3) Remove transfer case with extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove transmission case. <Ref. to MT-50, REMOVAL, Transmission Case.>
5) Remove vehicle speed sensor. <Ref. to MT-36, REMOVAL, Vehicle Speed Sensor.>
6) Remove outer snap ring and pull out speedometer driven gear. Next, remove oil seal, speedometer shaft and washer.



(A) Outer snap ring
(B) Speedometer driven gear

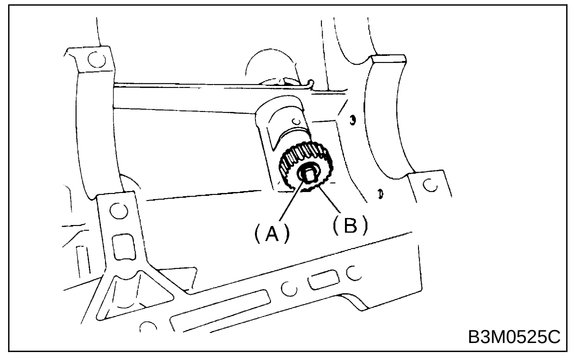
B: INSTALLATION S503268A11

1) Install washer and speedometer shaft, and press fit oil seal with ST.

CAUTION:
Use new oil seal, if it has been removed.

ST 899824100 or 499827000 PRESS
2) Install vehicle speed sensor. <Ref. to MT-36, INSTALLATION, Vehicle Speed Sensor.>
3) Install speedometer driven gear and snap ring.

CAUTION:
Use new snap ring, if it has been removed.



(A) Outer snap ring
(B) Speedometer driven gear

4) Install transmission case. <Ref. to MT-50, INSTALLATION, Transmission Case.>
5) Install transfer case with extension case assembly. <Ref. to MT-38, INSTALLATION, Transfer Case and Extension Case Assembly.>
6) Install back-up light switch and neutral position switch. <Ref. to MT-34, INSTALLATION, Switches and Harness.>
7) Install the manual transmission assembly to vehicle. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

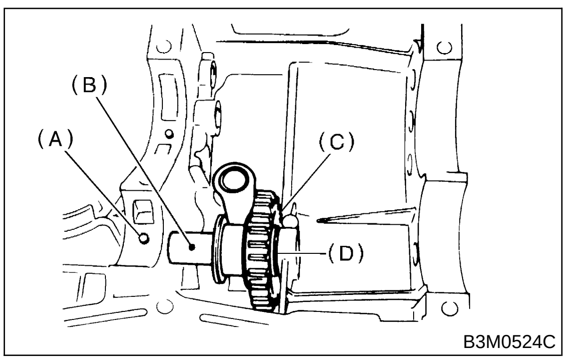
C: INSPECTION S503268A10

Check the speedometer gear, oil seal and speedometer shaft for damage. Replace if damaged.

19. Reverse Idler Gear S503263

A: REMOVAL S503263A18

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
2) Remove back-up light switch and neutral position switch. <Ref. to MT-34, REMOVAL, Switches and Harness.>
3) Remove transfer case with extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove transmission case. <Ref. to MT-50, REMOVAL, Transmission Case.>
5) Remove drive pinion shaft assembly. <Ref. to MT-59, REMOVAL, Drive Pinion Shaft Assembly.>
6) Remove main shaft assembly.
<Ref. to MT-53, REMOVAL, Main Shaft Assembly for Single-Range.>
7) Remove differential assembly. <Ref. to MT-68, REMOVAL, Front Differential Assembly.>
8) Remove shifter forks and rods. <Ref. to MT-77, REMOVAL, Shifter Fork and Rod.>
9) Pull out straight pin, and remove idler gear shaft, reverse idler gear and washer.



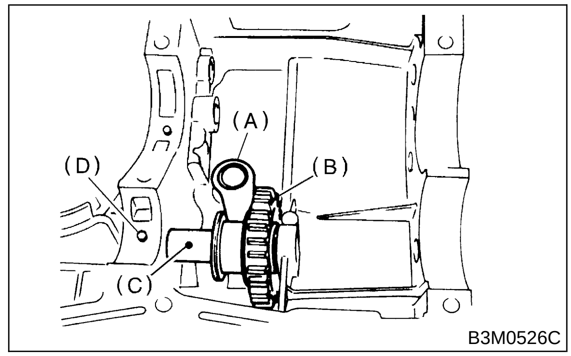
(A) Straight pin
(B) Idler gear shaft
(C) Idler gear
(D) Washer

10) Remove reverse shifter lever.

B: INSTALLATION S503263A11

1) Install reverse shifter lever, reverse idler gear and reverse idler gear shaft, and secure with straight pin.

NOTE:
Be sure to install reverse idler shaft from the rear side.



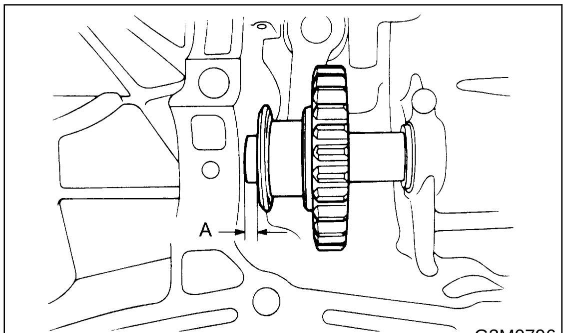
(A) Reverse shifter lever
(B) Reverse idler gear
(C) Reverse idler gear shaft
(D) Straight pin

2) Inspect and adjust clearance between reverse idler gear and transmission case wall. <Ref. to MT-76 INSPECTION, Reverse Idler Gear.> and <Ref. to MT-76, ADJUSTMENT, Reverse Idler Gear.>
3) Install shifter forks and rods. <Ref. to MT-77, INSTALLATION, Shifter Fork and Rod.>
4) Install differential assembly. <Ref. to MT-68, INSTALLATION, Front Differential Assembly.>
5) Install main shaft assembly.
<Ref. to MT-53, INSTALLATION, Main Shaft Assembly for Single-Range.>
6) Install drive pinion shaft assembly. <Ref. to MT-59, INSTALLATION, Drive Pinon Shaft Assembly.>
7) Install transmission case. <Ref. to MT-50, INSTALLATION, Transmission Case.>
8) Install transfer case with extension case assembly. <Ref. to MT-38, INSTALLATION, Transfer Case and Extension Case Assembly.>
9) Install back-up light switch and neutral position switch. <Ref. to MT-34, INSTALLATION, Switches and Harness.>
10) Install the manual transmission assembly to vehicle. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION S503263A10

1) Move the reverse shifter rod toward the reverse side. Inspect clearance between reverse idler gear and transmission case wall.
If out of specification, select the appropriate reverse shifter lever and adjust.

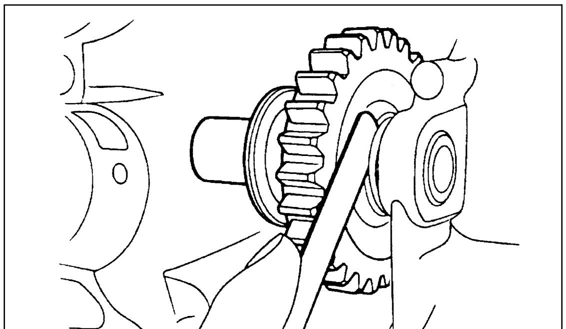
Clearance A:
6.0 — 7.5 mm (0.236 — 0.295 in)



G3M0796

2) After installing a suitable reverse shifter lever, shift into neutral. Inspect clearance between reverse idler gear and transmission case wall.
If out of specification, select the appropriate washer and adjust.

Clearance:
0 — 0.5 mm (0 — 0.020 in)

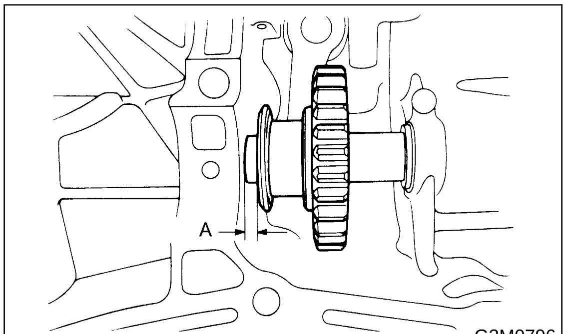

B3M0063

3) Check the reverse idler gear and shaft for damage. Replace if damaged.

D: ADJUSTMENT S503263A01

1) Select the appropriate reverse shifter lever from the table below, and adjust until the gap between the reverse idler gear and transmission case wall is within specification.

Clearance A:
6.0 — 7.5 mm (0.236 — 0.295 in)

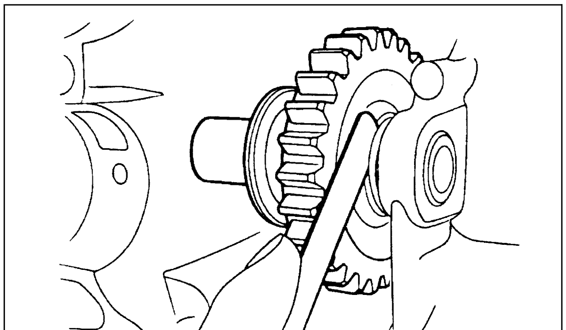


G3M0796

Reverse shifter lever		
Part No.	Mark	Remarks
32820AA070	7	Further from case wall
32820AA080	8	Standard
32820AA090	9	Closer to case wall

2) Select the appropriate washer from the table below, and adjust until the gap between the reverse idler gear and transmission case wall is within specification.

Clearance:
0 — 0.5 mm (0 — 0.020 in)

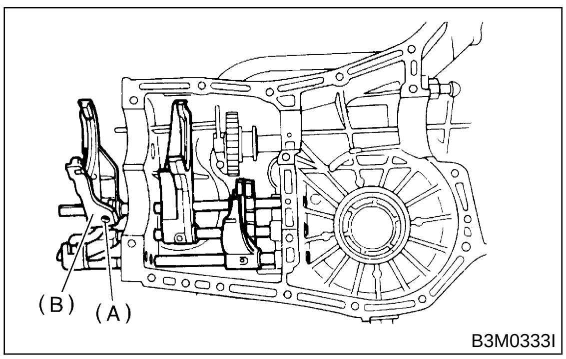

B3M0063

Washer	
Part No.	Thickness mm (in)
803020151	0.4 (0.016)
803020152	1.1 (0.043)
803020153	1.5 (0.059)
803020154	1.9 (0.075)
803020155	2.3 (0.091)

20. Shifter Fork and Rod *S503255*

A: REMOVAL *S503255A18*

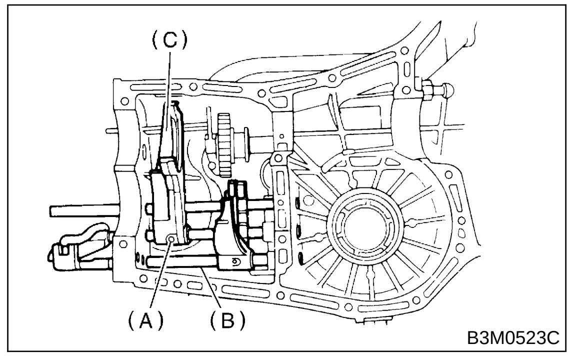
1) Remove the manual transmission assembly from vehicle. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
2) Remove back-up light switch and neutral position switch. <Ref. to MT-34, REMOVAL, Switches and Harness.>
3) Remove transfer case with extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove transmission case. <Ref. to MT-50, REMOVAL, Transmission Case.>
5) Removes drive pinion shaft assembly. <Ref. to MT-59, REMOVAL, Drive Pinon Shaft Assembly.>
6) Remove main shaft assembly.
<Ref. to MT-53, REMOVAL, Main Shaft Assembly for Single-Range.>
7) Remove differential assembly. <Ref. to MT-68, REMOVAL, Front Differential Assembly.>
8) Drive out straight pin with ST, and 5th shifter fork.
ST 398791700 STRAIGHT PIN REMOVER



(A) Straight pin
(B) 5th shifter fork

9) Remove plugs, springs and checking balls.
10) Drive out straight pin, and pull out 3-4 fork rod and shifter fork.

NOTE:
When removing rod, keep other rods in neutral. Also, when pulling out straight pin, remove it toward the inside of the case so that it does not hit against the case.



(A) Straight pin
(B) 3-4 fork rod
(C) Shifter fork

11) Drive out straight pin, and pull out 1-2 fork rod and shifter fork.
12) Remove outer snap ring, and pull out reverse shifter rod arm from reverse fork rod. Then take out ball, spring and interlock plunger from rod.
And then remove rod.

NOTE:
When pulling out reverse shifter rod arm, be careful not to let ball pop out of arm.

13) Remove reverse shifter lever.

B: INSTALLATION *S503255A11*

1) Install reverse arm fork spring, ball and interlock plunger to reverse fork rod arm. Insert reverse fork rod into hole in reverse fork rod arm, and hold it with outer snap ring using ST.

CAUTION:
Apply grease to plunger to prevent it from falling.

ST 399411700 ACCENT BALL INSTALLER
2) Position ball, spring and gasket in reverse shifter rod hole, on left side transmission case, and tighten checking ball plug.

CAUTION:
Replace gasket with a new one.

3) Install 1-2 fork rod into 1-2 shifter fork via the hole on the rear of the transmission case.
4) Align the holes in rod and fork, and drive straight pin into these holes using ST.

CAUTION:
Replace straight pin with a new one.

NOTE:
● Set other rods to neutral.
● Make sure interlock plunger is on the 3-4 fork rod side.

ST 398791700 STRAIGHT PIN REMOVER
5) Install interlock plunger onto 3-4 fork rod.

CAUTION:
Apply a coat of grease to plunger to prevent it from falling.

6) Install 3-4 fork rod into 3-4 shifter fork via the hole on the rear of transmission case.
7) Align the holes in rod and fork, and drive straight pin into these holes.

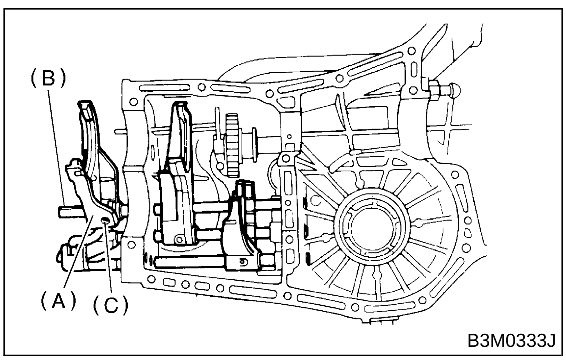
CAUTION:
Replace straight pin with a new one.

NOTE:
- Set reverse fork rod to neutral.
- Make sure interlock plunger (installing before) is on the reverse fork rod side.

ST 398791700 STRAIGHT PIN REMOVER
8) Install 5th shifter fork onto the rear of reverse fork rod. Align holes in the two parts and drive straight pin into place.

CAUTION:
Replace straight pin with a new one.

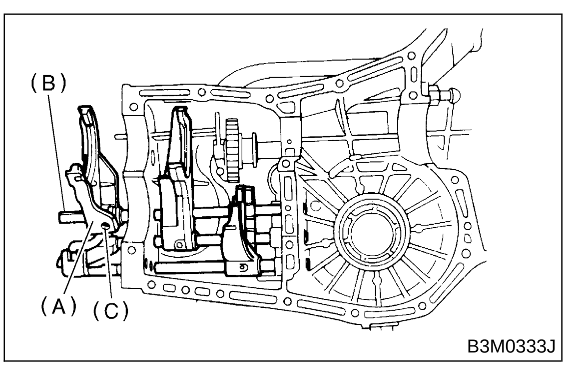
ST 398791700 STRAIGHT PIN REMOVER



(A) 5th shifter fork
(B) Reverse fork rod
(C) Straight pin

9) Position balls, checking ball springs and gaskets into 3-4 and 1-2 rod holes, and install plugs.

CAUTION:
Replace gasket with a new one.

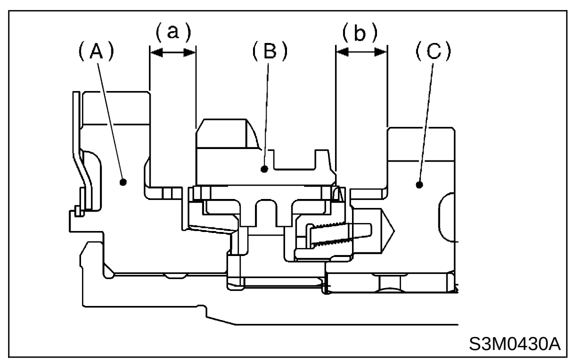


10) Install differential assembly. <Ref. to MT-68, INSTALLATION, Front Differential Assembly.>
11) Install main shaft assembly.
12) Install drive pinion shaft assembly. <Ref. to MT-59, INSTALLATION, Drive Pinon Shaft Assembly.>
13) Install transmission case. <Ref. to MT-50, INSTALLATION, Transmission Case.>
14) Install transfer case with extension case assembly. <Ref. to MT-38, INSTALLATION, Transfer Case and Extension Case Assembly.>
15) Install back-up light switch and neutral position switch. <Ref. to MT-34, INSTALLATION, Switches and Harness.>
16) Install the manual transmission assembly to vehicle. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION S503255A10

1) Check the shift shaft and shift rod for damage. Replace if damaged.
2) Gearshift mechanism
Repair or replace the gearshift mechanism if excessively worn, bent, or defective in any way.
3) Inspect clearance between 1st, 2nd driven gear and reverse driven gear. If any clearance is not within specifications, replace shifter fork as required.

Clearance (a) and (b):
9.5 mm (0.374 in)

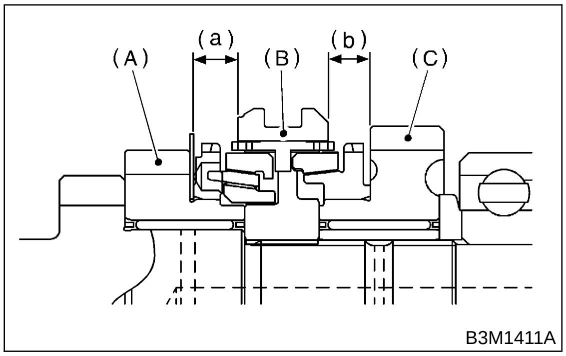


(A) 1st driven gear
(B) Reverse driven gear
(C) 2nd driven gear

1st-2nd shifter fork		
Part No.	Mark	Remarks
32804AA060	1	Approach to 1st gear by 0.2 mm (0.008 in).
32804AA070	—	Standard
32804AA080	3	Become distant from 2nd gear by 0.2 mm (0.008 in).

4) Inspect clearance between 3rd, 4th drive gear and coupling sleeve. If any clearance is not within specifications, replace shifter fork as required.

Clearance (a) and (b):
9.3 mm (0.366 in)

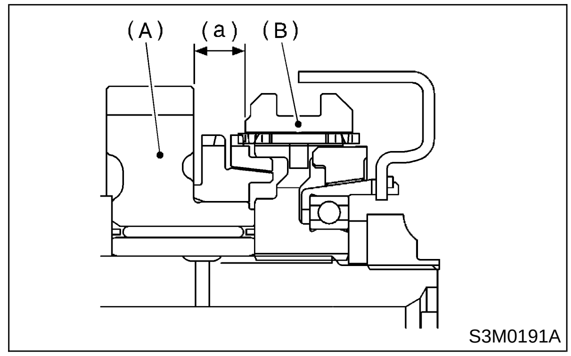


(A) 3rd drive gear
(B) Coupling sleeve
(C) 4th drive gear

3rd-4th shifter fork		
Part No.	Mark	Remarks
32810AA061	1	Approach to 4th gear by 0.2 mm (0.008 in).
32810AA071	—	Standard
32810AA101	3	Become distant from 3rd gear by 0.2 mm (0.008 in).

5) Inspect clearance between 5th drive gear and coupling sleeve. If any clearance is not within specifications, replace shifter fork as required.

Clearance (a):
9.3 mm (0.366 in)



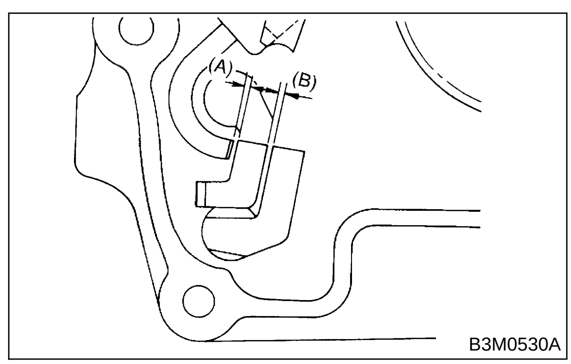
(A) 5th drive gear
(B) Coupling sleeve

5th shifter fork		
Part No.	Mark	Remarks
32812AA201	7	Approach to 5th gear by 0.2 mm (0.008 in).
32812AA211	—	Standard
32812AA221	9	Become distant from 5th gear by 0.2 mm (0.008 in).

6) Inspect rod end clearances (A) and (B). If any clearance is not within specifications, replace rod or fork as required.

Clearance (A):
1st — 2nd to 3rd — 4th:
0.4 — 1.4 mm (0.016 — 0.055 in)

Clearance (B):
3rd — 4th to 5th:
0.5 — 1.3 mm (0.020 — 0.051 in)



21. General Diagnostic S503278

A: INSPECTION S503278A10

1. MANUAL TRANSMISSION S503278A1001

Symptom	Possible cause	Remedy
1. Gears are difficult to intermesh. NOTE: The cause for difficulty in shifting gears can be classified into two kinds: one is malfunction of the gear shift system and the other is malfunction of the transmission. However, if the operation is heavy and engagement of the gears is difficult, defective clutch disengagement may also be responsible. Check whether the clutch is correctly functioning, before checking the gear shift system and transmission.	(a) Worn, damaged or burred chamfer of internal spline of sleeve and reverse driven gear	Replace.
	(b) Worn, damaged or burred chamfer of spline of gears	Replace.
	(c) Worn or scratched bushings	Replace.
	(d) Incorrect contact between synchronizer ring and gear cone or wear	Correct or replace.
2. Gear slips out. ● Gear slips out when coasting on rough road. ● Gear slips out during acceleration.	(a) Defective pitching stopper adjustment	Adjust.
	(b) Loose engine mounting bolts	Tighten or replace.
	(c) Worn fork shifter, broken shifter fork rail spring	Replace.
	(d) Worn or damaged ball bearing	Replace.
	(e) Excessive clearance between splines of synchronizer hub and synchronizer sleeve	Replace.
	(f) Worn tooth step of synchronizer hub (responsible for slip-out of 3rd gear)	Replace.
	(g) Worn 1st driven gear, needle bearing and race	Replace.
	(h) Worn 2nd driven gear, needle bearing and race	Replace.
	(i) Worn 3rd drive gear and bushing	Replace.
	(j) Worn 4th drive gear and bushing	Replace.
	(k) Worn reverse idler gear and bushing	Replace.
3. Unusual noise comes from transmission. NOTE: If an unusual noise is heard when the vehicle is parked with its engine idling and if the noise ceases when the clutch is disengaged, it may be considered that the noise comes from the transmission.	(a) Insufficient or improper lubrication	Lubricate or replace with specified oil.
	(b) Worn or damaged gears and bearings NOTE: If the trouble is only wear of the tooth surfaces, merely a high roaring noise will occur at high speeds, but if any part is broken, rhythmical knocking sound will be heard even at low speeds.	Replace.

2. DIFFERENTIAL *S503278A1002*

Symptom	Possible cause	Remedy
1. Broken differential (case, gear, bearing, etc.) NOTE: Abnormal noise will develop and finally it will become impossible to continue to run due to broken pieces obstructing the gear revolution.	(a) Insufficient or improper oil	Disassemble differential and replace broken components and at the same time check other components for any trouble, and replace if necessary.
	(b) Use of vehicle under severe conditions such as excessive load and improper use of clutch	Readjust bearing preload and backlash and face contact of gears.
	(c) Improper adjustment of taper roller bearing	Adjust.
	(d) Improper adjustment of drive pinion and hypoid driven gear	Adjust.
	(e) Excessive backlash due to worn differential side gear, washer or differential pinion vehicle under severe operating conditions.	Add recommended oil to specified level. Do not use vehicle under severe operating conditions.
	(f) Loose hypoid driven gear clamping bolts	Tighten.
2. Differential and hypoid gear noises Troubles of the differential and hypoid gear always appear as noise problems. Therefore noise is the first indication of the trouble. However noises from the engine, muffler, tire, exhaust gas, bearing, body, etc. are easily mistaken for the differential noise. Pay special attention to the hypoid gear noise because it is easily confused with other gear noises. There are the following four kinds of noises. ● Gear noise when driving: If noise increases as vehicle speed increases it may be due to insufficient gear oil, incorrect gear engagement, damaged gears, etc. ● Gear noise when coasting: Damaged gears due to maladjusted bearings and incorrect shim adjustment ● Bearing noise when driving or when coasting: Cracked, broken or damaged bearings ● Noise which mainly occurs when turning: Unusual noise from differential side gear, differential pinion, differential pinion shaft, etc.	(a) Insufficient oil	Lubricate.
	(b) Improper adjustment of hypoid driven gear and drive pinion	Check tooth contact.
	(c) Worn teeth of hypoid driven gear and drive pinion	Replace as a set. Readjust bearing preload.
	(d) Loose roller bearing	Readjust hypoid driven gear to drive pinion backlash and check tooth contact.
	(e) Distorted hypoid driven gear or differential case	Replace.
	(f) Worn washer and differential pinion shaft	Replace.

MEMO:

CLUTCH SYSTEM

CL

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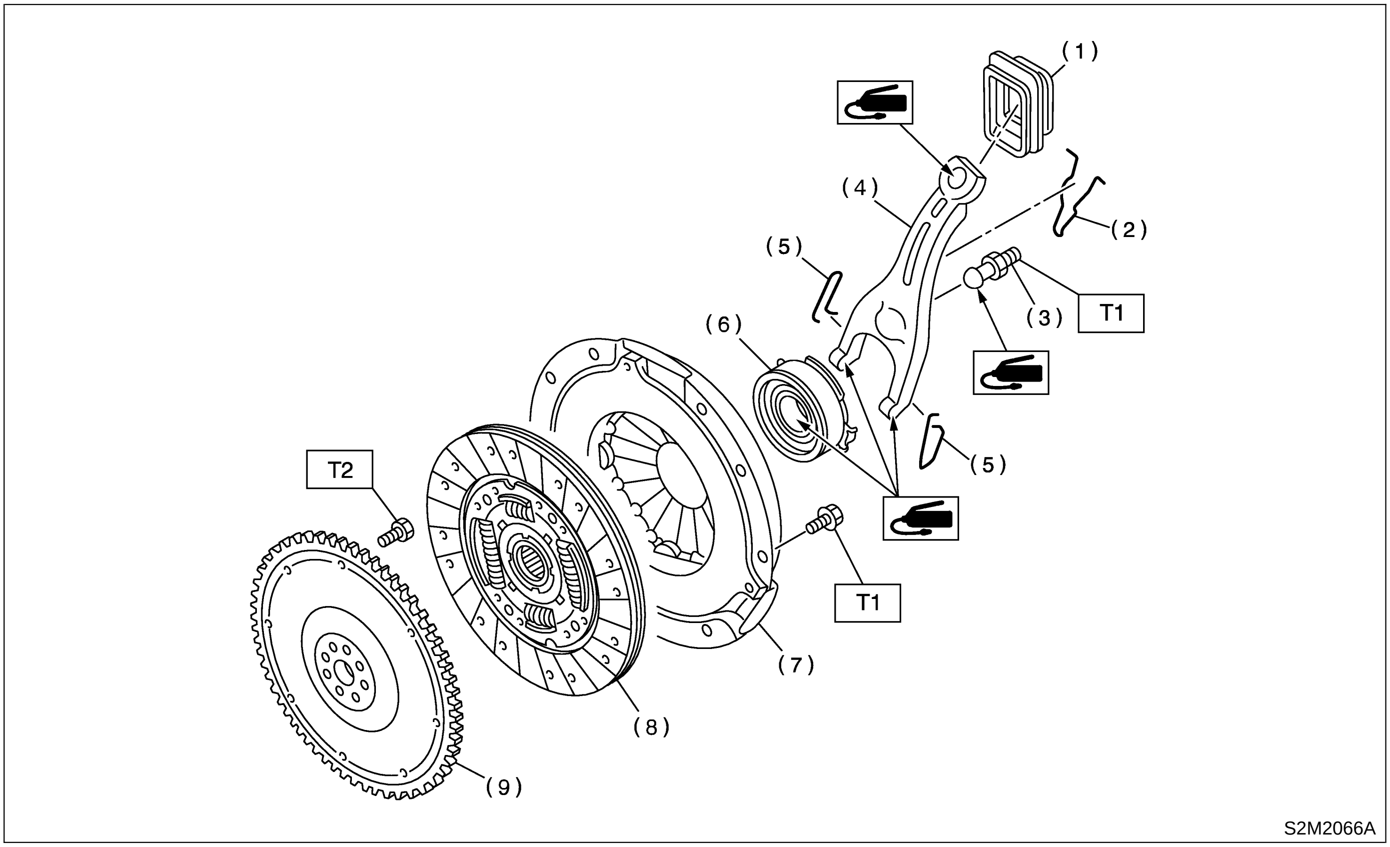
1. General Description S504001

A: SPECIFICATIONS S504001E49

Model				Non-turbo
Clutch cover	Type			Push type
	Diaphragm set load		kg (lb)	580 (1,279)
Clutch disc	Facing material			Woven (Non asbestos)
	O.D. × I.D. × thickness		mm (in)	225 × 150 × 3.5 (8.86 × 5.91 × 0.138)
	Spline O.D.		mm (in)	25.2 (0.992), (No. of teeth: 24)
	Depth of rivet head	Standard	mm (in)	1.65 — 2.25 (0.0650 — 0.0886)
		Limit of sinking	mm (in)	0.3 (0.012)
	Limit for deflection		mm (in)	1.0 (0.039) at R = 107 (4.21)
Clutch release lever ratio				1.6
Clutch release bearing				Grease-packed self-aligning
Clutch pedal	Full stroke		mm (in)	130 — 135 (5.12 — 5.31)
Clutch release lever	Stroke		mm (in)	12 — 13.6 (0.472 — 0.535)

B: COMPONENT *S504001A05*

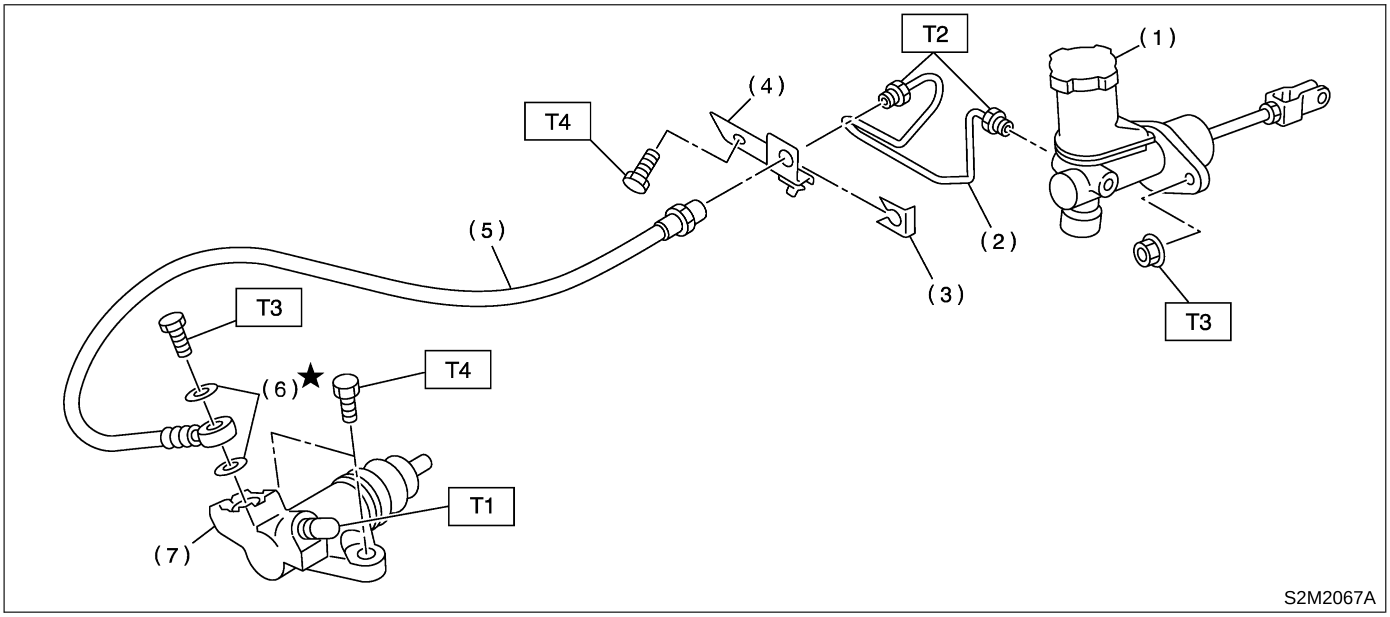
1. CLUTCH ASSEMBLY *S504001A0510*



(1) Clutch release lever sealing
(2) Retainer spring
(3) Pivot
(4) Clutch release lever
(5) Clip
(6) Clutch release bearing
(7) Clutch cover
(8) Clutch disc
(9) Flywheel

Tightening torque: N·m (kgf-m, ft-lb)
T1: 15.7 (1.6, 11.6)
T2: 72 (7.3, 52.8)

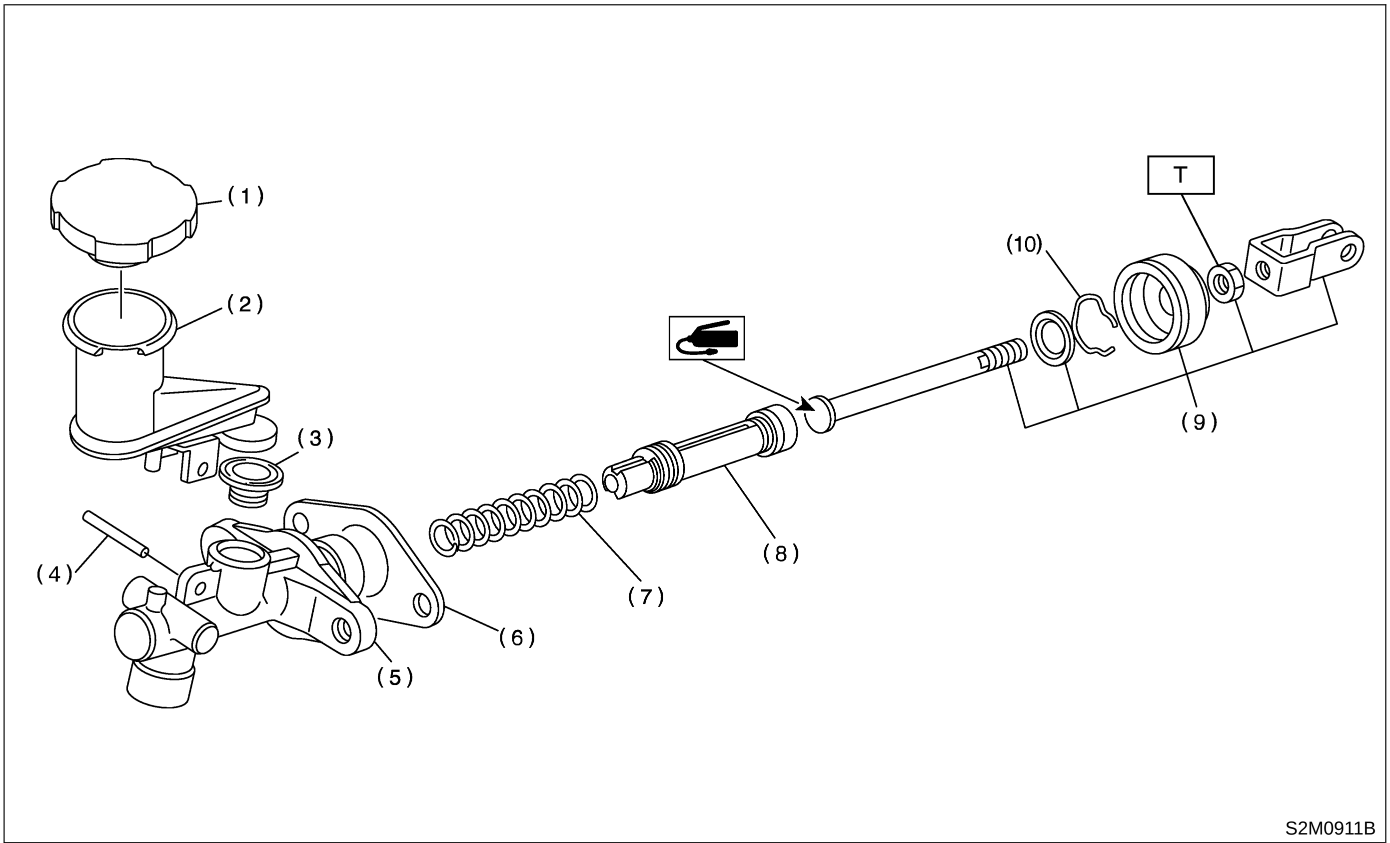
2. CLUTCH PIPE AND HOSE *S504001A0511*



(1) Master cylinder ASSY
(2) Clutch pipe
(3) Clip
(4) Bracket
(5) Clutch hose
(6) Washer
(7) Operating cylinder

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 15 (1.5, 10.8)
T3: 18 (1.8, 13.0)
T4: 37 (3.8, 27.5)

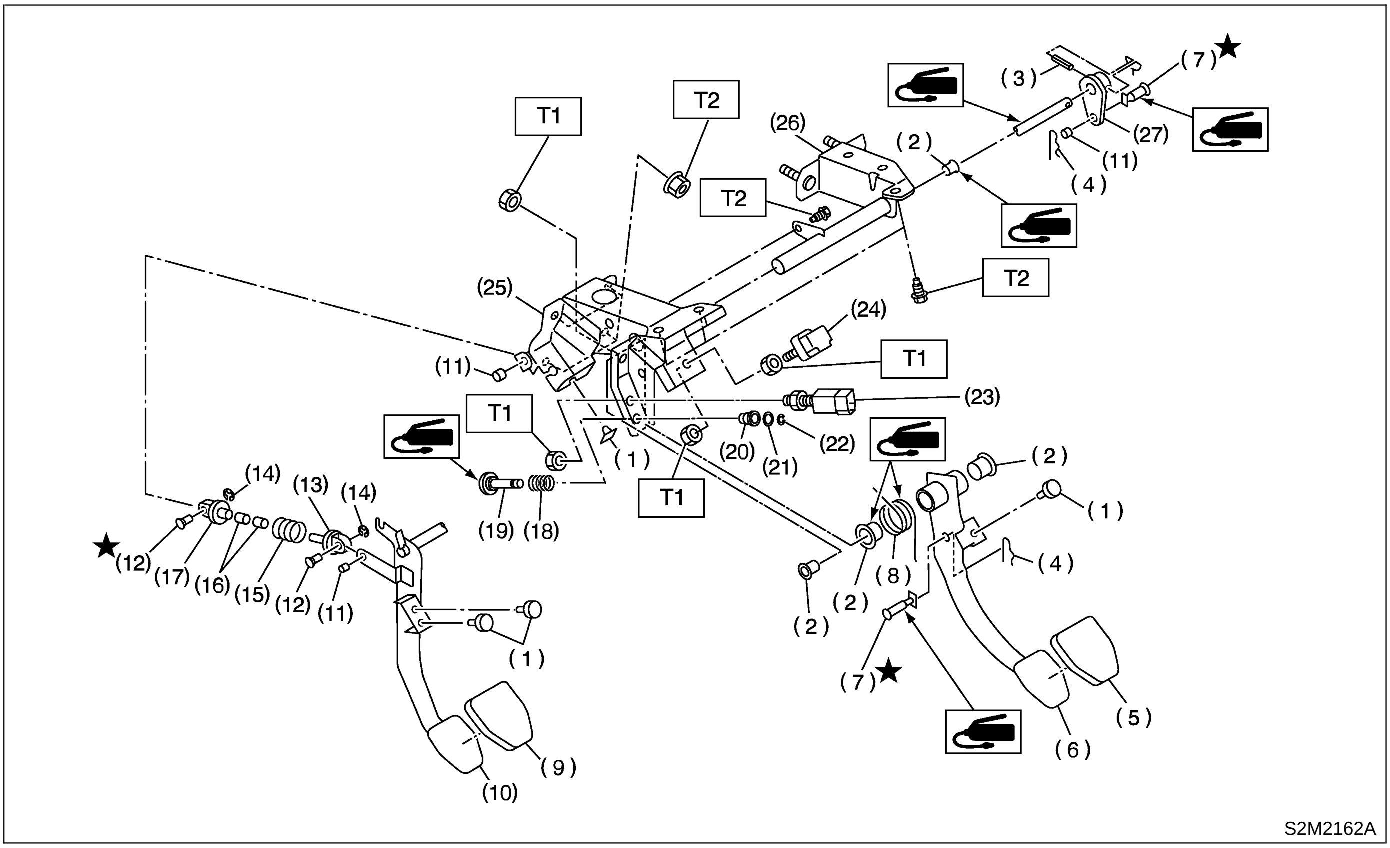
3. MASTER CYLINDER *S504001A0502*



(1) Reservoir cap
(2) Reservoir tank
(3) Oil seal
(4) Straight pin
(5) Master cylinder
(6) Seat
(7) Return spring
(8) Piston
(9) Push rod
(10) Piston stop ring

Tightening torque: N·m (kgf-m, ft-lb)
T: 10 (1.0, 7)

4. CLUTCH PEDAL *S504001A0503*



- (1) Stopper
- (2) Bushing
- (3) Spring pin
- (4) Snap pin
- (5) Brake pedal pad
- (6) Brake pedal
- (7) Clevis pin
- (8) Brake pedal spring
- (9) Clutch pedal pad
- (10) Clutch pedal
- (11) Bushing C
- (12) Clutch clevis pin
- (13) Assist rod A
- (14) Clip
- (15) Assist spring
- (16) Assist bushing
- (17) Assist rod B
- (18) Spring S
- (19) Rod S
- (20) Bushing S
- (21) O-ring
- (22) Clip
- (23) Clutch switch (With cruise control)
- (24) Stop light switch
- (25) Pedal bracket
- (26) Clutch master cylinder bracket
- (27) Lever

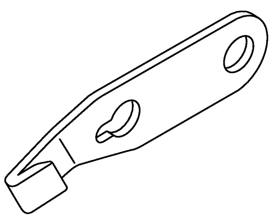
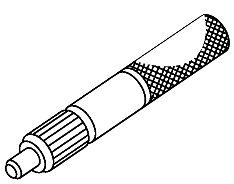
Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.0)

C: CAUTION S504001A03

- 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.
- Use SUBARU genuine fluid, grease etc. or the equivalent. Do not mix fluid, grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply grease onto sliding or revolution surfaces before installation.
- Before installing O-rings or snap rings, apply sufficient amount of fluid to avoid damage and deformation.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Keep fluid away from the vehicle body. If any fluid contacts the vehicle body, immediately flush the area with water.

D: PREPARATION TOOL S504001A17

1. SPECIAL TOOLS S504001A1701

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3853	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel when loosening tightening bolt, etc.
 B2M4112	499747100	CLUTCH DISC GUIDE	Used when installing clutch disc to flywheel.

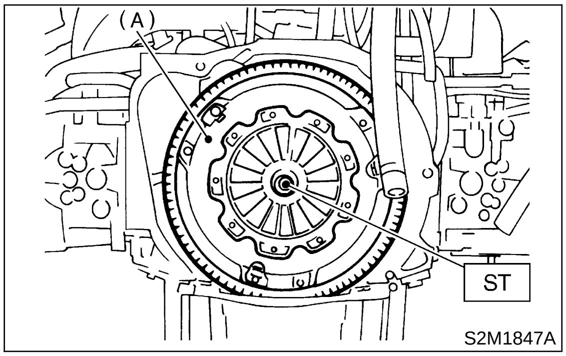
2. GENERAL PURPOSE TOOLS S504001A1702

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.
Dial Gauge	Used for measuring clutch disk run-out.

2. Clutch Disc and Cover S504252

A: REMOVAL S504252A18

1) Remove transmission assembly from vehicle body. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
2) Install ST on flywheel.
ST 498497100 CRANKSHAFT STOPPER



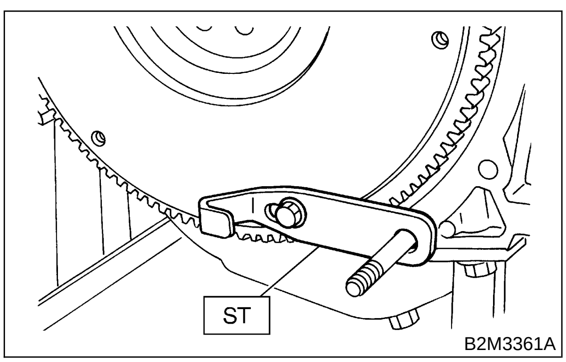
(A) Clutch cover

3) Remove clutch cover and clutch disc.

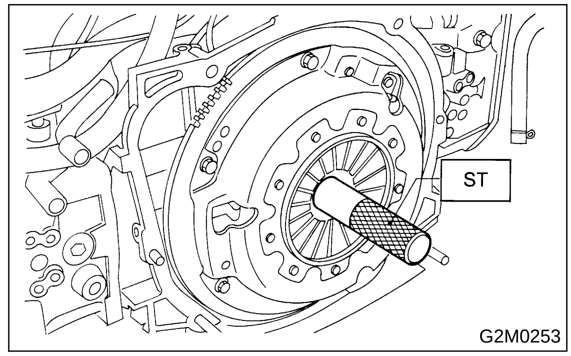
CAUTION:
- **Take care not to allow oil on the clutch disc facing.**
- **Do not disassemble either clutch cover or clutch disc.**

B: INSTALLATION S504252A11

1) Install flywheel and ST.
ST 498497100 CRANKSHAFT STOPPER



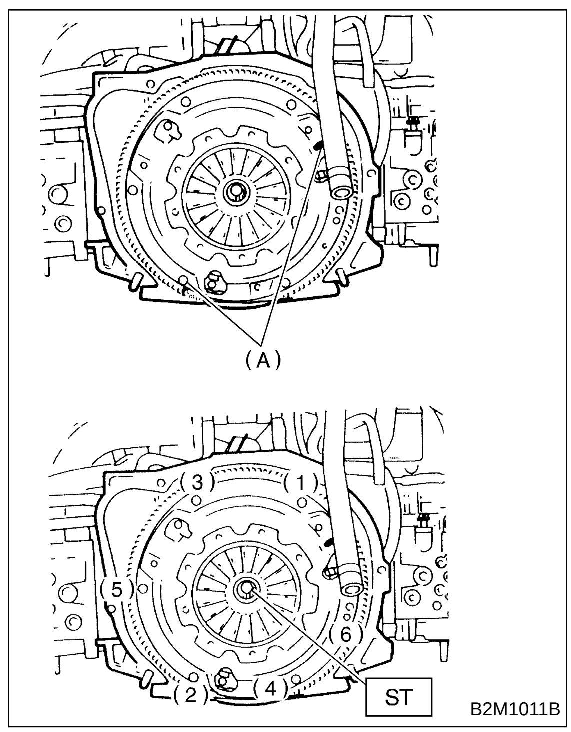
2) Insert ST into the clutch disc and install them on the flywheel by inserting the ST end into the pilot bearing.
ST 499747100 CLUTCH DISC GUIDE



3) Install clutch cover on flywheel and tighten bolts to the specified torque.

NOTE:
- When installing the clutch cover on the flywheel, position the clutch cover so that there is a gap of 120° or more between "0" marks on the flywheel and clutch cover. ("0" marks indicate the directions of residual unbalance.)
- Note the front and rear of the clutch disc when installing.
- Temporarily tighten bolts by hand. Each bolt should be tightened to the specified torque in a crisscross fashion.

Tightening torque:
15.7 N·m (1.6 kgf-m, 11.6 ft-lb)



(A) "0" marks

4) Remove ST.
ST 499747100 CLUTCH DISC GUIDE
5) Install transmission assembly. <Ref. to MT-28, INSTALLATION, Manual Transmission.>

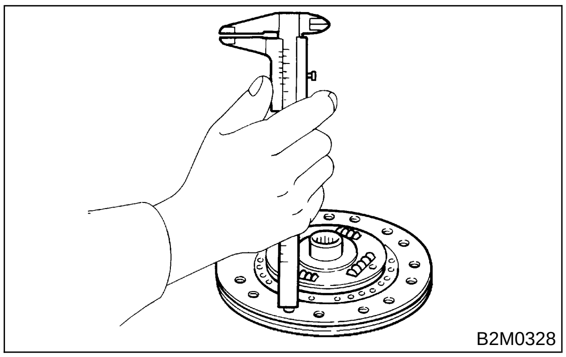
C: INSPECTION S504252A10

1. CLUTCH DISC S504252A1001

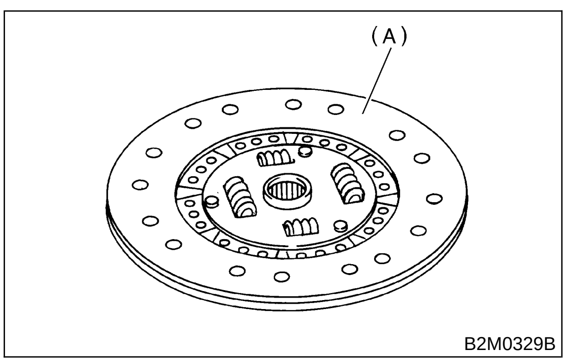
1) Facing wear
Measure the depth of rivet head from the surface of facing. Replace if facings are worn locally or worn down to less than the specified value.

Depth of rivet head:
Limit of sinking
0.3 mm (0.012 in)

CAUTION:
Do not wash clutch disc with any cleaning fluid.



2) Hardened facing
Correct by using emery paper or replace.
3) Oil soakage on facing
Replace clutch disc and inspect transmission front oil seal, transmission case mating surface, engine rear oil seal and other points for oil leakage.

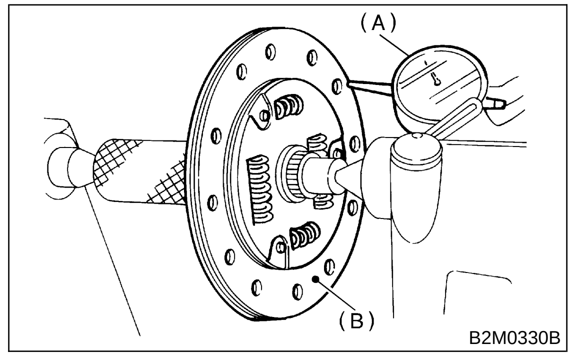


(A) Facing

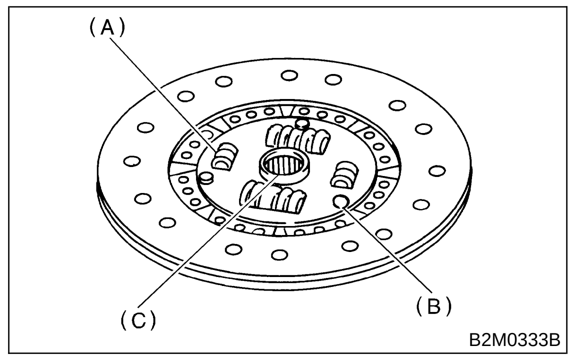
4) Deflection on facing
If deflection exceeds the specified value at the outer circumference of facing, repair or replace.

ST 499747100 CLUTCH DISC GUIDE

Limit for deflection:
1.0 mm (0.039 in) at R = 107 mm (4.21 in)



5) Worn spline, loose rivets and torsion spring failure
Replace defective parts.

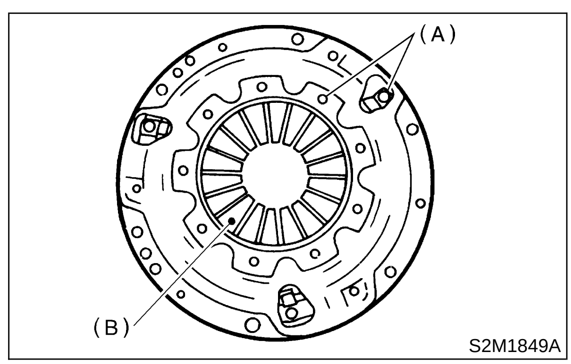


(A) Spline
(B) Rivet
(C) Torsion spring

2. CLUTCH COVER S504252A1002

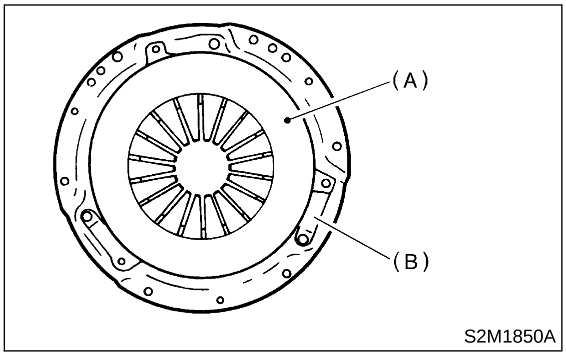
NOTE:
Visually check for the following items without disassembling, and replace or repair if defective.

1) Loose thrust rivet.
2) Damaged or worn bearing contact area at center of diaphragm spring.



(A) Thrust rivet
(B) Diaphragm spring

3) Damaged or worn disc contact surface of pressure plate.
4) Loose strap plate setting bolt.
5) Worn diaphragm sliding surface.

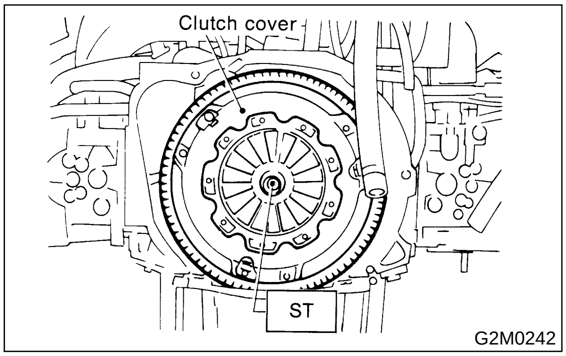


(A) Pressure plate
(B) Strap plate

3. Flywheel S504250

A: REMOVAL S504250A18

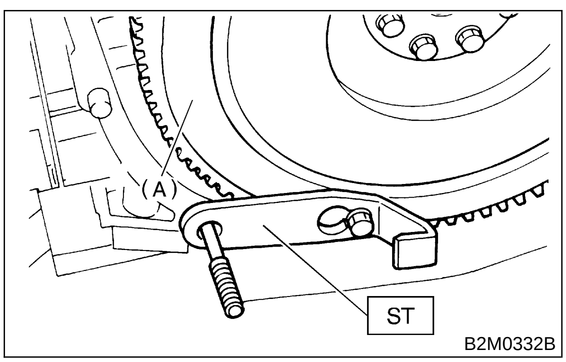
1) Remove transmission assembly. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
2) Install ST on flywheel.
ST 498497100 CRANKSHAFT STOPPER



3) Remove clutch cover and clutch disc. <Ref. to CL-8, REMOVAL, Clutch Disc and Cover.>

CAUTION:
- **Take care not to allow oil on the clutch disc facing.**
- **Do not disassemble either clutch cover or clutch disc.**

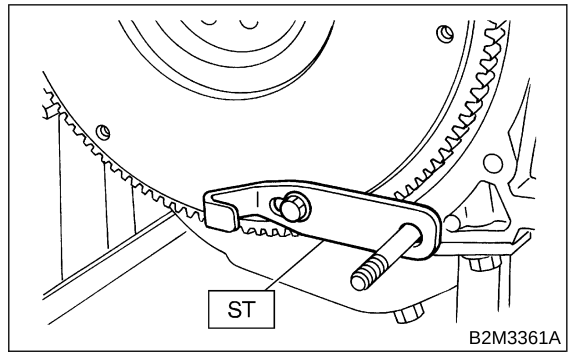
4) Using ST, remove flywheel.
ST 498497100 CRANKSHAFT STOPPER



(A) Flywheel

B: INSTALLATION S504250A11

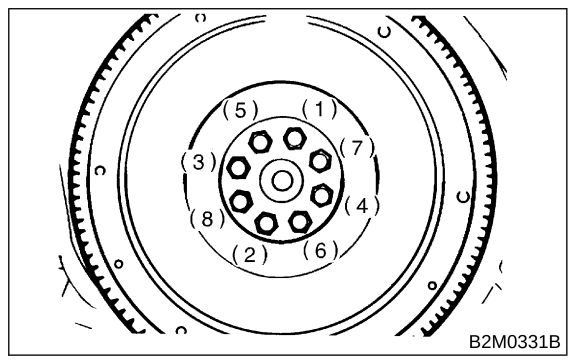
1) Install flywheel and ST.
ST 498497100 CRANKSHAFT STOPPER



2) Tighten the flywheel attaching bolts to the specified torque.

NOTE:
Tighten flywheel installing bolts gradually. Each bolt should be tightened to the specified torque in a crisscross fashion.

Tightening torque:
72 N·m (7.3 kgf-m, 52.8 ft-lb)

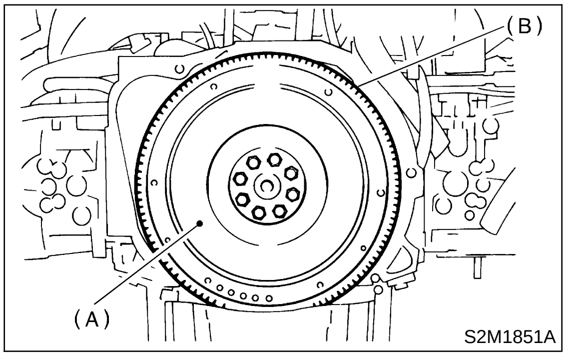


3) Install clutch disc and cover. <Ref. to CL-8, INSTALLATION, Clutch Disc and Cover.>
4) Install transmission assembly. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION *S504250A10*

CAUTION:
Since this bearing is grease sealed and is of a non-lubrication type, do not wash with gasoline or any solvent.

1) Damage of facing and ring gear
If defective, replace flywheel.



(A) Flywheel
(B) Ring gear

2) Smoothness of rotation
Rotate ball bearing applying pressure in thrust direction.
3) If noise or excessive play is noted, replace flywheel.

4. Release Bearing and Lever

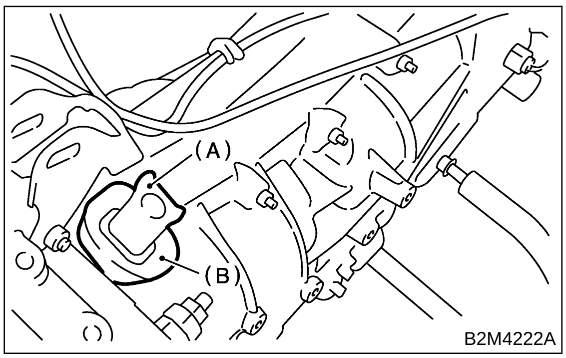
S504251

A: REMOVAL S504251A18

1) Remove transmission assembly from vehicle body.
<Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
2) Remove the two clips from clutch release lever and remove release bearing.

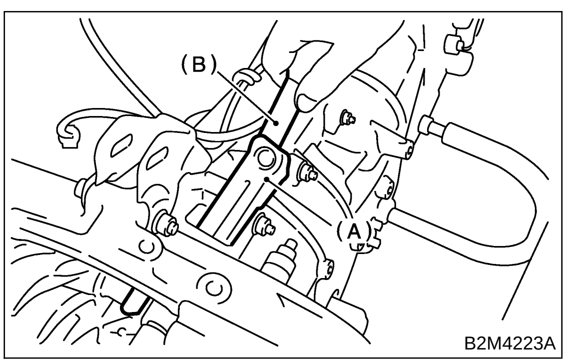
CAUTION:
Be careful not to deform clips.

3) Remove release lever seal.



(A) Clutch release lever
(B) Release lever seal

4) Remove release lever retainer spring from release lever pivot with a screwdriver by accessing it through clutch housing release lever hole. Then remove release lever.



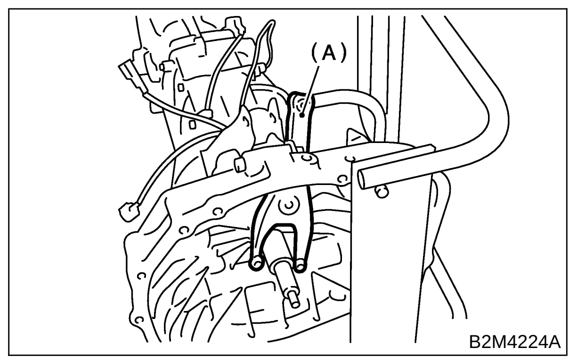
(A) Clutch release lever
(B) Screwdriver

B: INSTALLATION S504251A11

CAUTION:
Before or during assembling, lubricate the following points with a light coat of grease.
- **Contact surface of lever and pivot**
- **Contact surface of lever and bearing**
- **Transmission main shaft spline (Use grease containing molybdenum disulfide.)**
- **Contact surface of lever and operating cylinder**

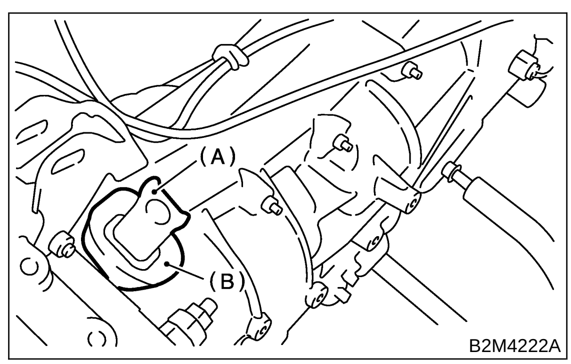
1) While pushing release lever to pivot and twisting it to both sides, fit retainer spring onto the constricted portion of pivot.

NOTE:
- Apply grease (SUNLIGHT 2: P/N 003602010) to contact point of release lever and operating cylinder. <Ref. to CL-3, COMPONENT, General Description.>
- Confirm that retainer spring is securely fitted by observing it through the main case hole.



(A) Release lever

2) Install release bearing and fasten it with two clips.
3) Install release lever seal.



(A) Release lever
(B) Release lever seal

4) Install transmission assembly.
<Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

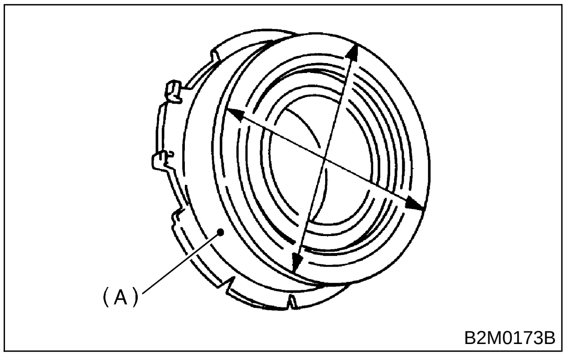
C: INSPECTION S504251A10

1. RELEASE BEARING S504251A1001

CAUTION:
Since this bearing is grease sealed and is of a non-lubrication type, do not wash with gasoline or any solvent when servicing the clutch.

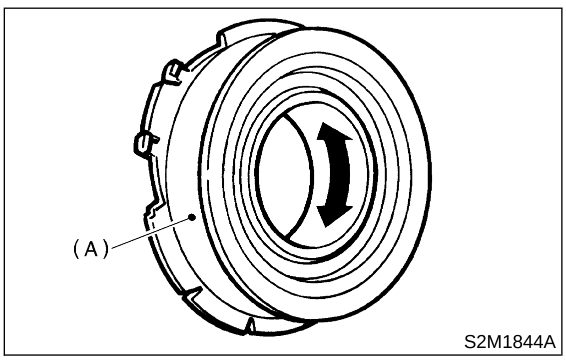
1) Check the bearing for smooth movement by applying force in the radial direction.

Radial direction stroke:
1.4 mm (0.055 in)



(A) Bearing case

2) Check the bearing for smooth rotation by applying pressure in the thrust direction.

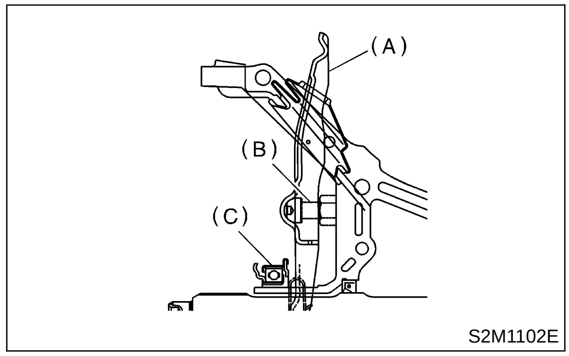


(A) Bearing case

3) Check wear and damage of bearing case surface contacting with lever.

2. RELEASE LEVER S504251A1002

1) Check lever pivot portion and the point of contact with release bearing case for wear.



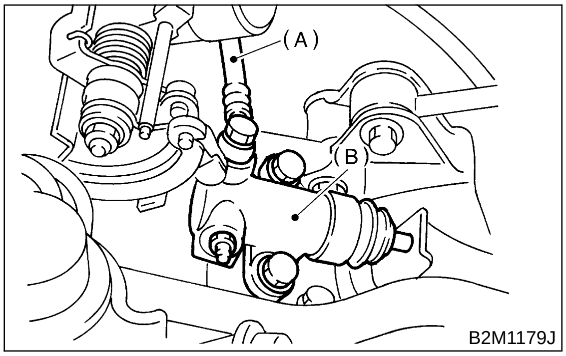
(A) Clutch release lever
(B) Pivot
(C) Clutch release bearing

5. Operating Cylinder S504253

A: REMOVAL S504253A18

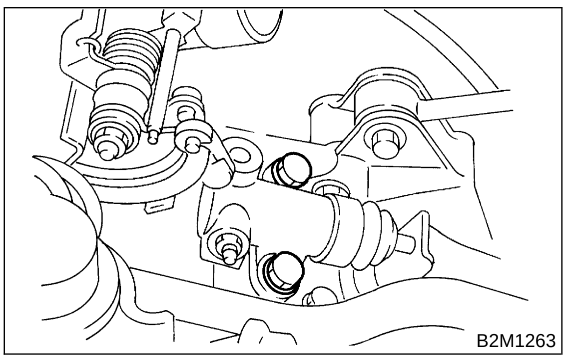
1) Remove air cleaner case. <Ref. to IN-6, REMOVAL, Air Cleaner Case.>
2) Remove clutch hose from operating cylinder.

CAUTION:
Cover hose joint to prevent clutch fluid from flowing out.



(A) Clutch hose
(B) Operating cylinder

3) Remove operating cylinder from transmission.

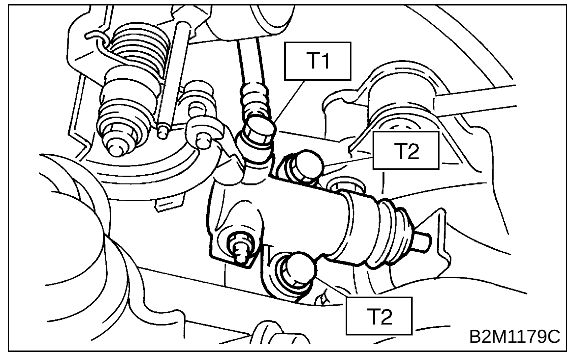


B: INSTALLATION S504253A11

1) Install in the reverse order of removal.

NOTE:
Before installing operating cylinder, apply grease (SUNLIGHT 2: P/N 003602010) to contact point of release lever and operating cylinder.

Tightening torque:
T1: 18 N·m (1.8 kgf-m, 13.0 ft-lb)
T2: 37 N·m (3.8 kgf-m, 27.5 ft-lb)



2) After bleeding air from operating cylinder, ensure that clutch operates properly.
<Ref. to CL-20, Clutch Fluid Air Bleeding.>

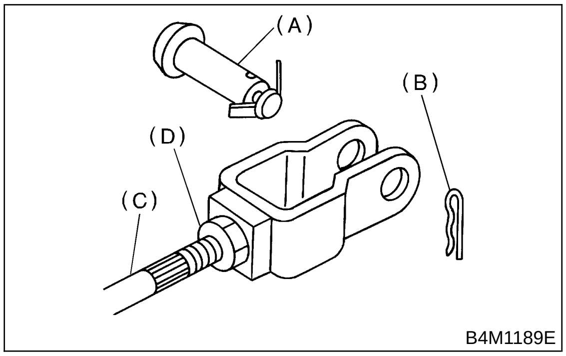
C: INSPECTION S504253A10

1) Check operating cylinder for damage. If operating cylinder is damaged, replace it.
2) Check operating cylinder for fluid leakage or damage on boot. If any leakage or damage is found, replace operating cylinder.

6. Master Cylinder S504168

A: REMOVAL S504168A18

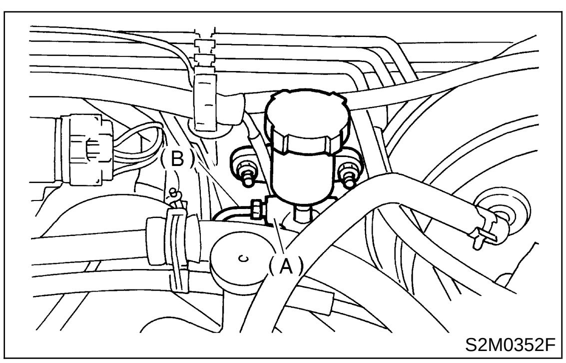
1) Thoroughly drain brake fluid from reservoir tank.
2) Remove snap pin, clevis pin and separate push rod of master cylinder from clutch pedal.



(A) Clevis pin
(B) Snap pin
(C) Push rod
(D) Lock nut

3) Remove air cleaner case. <Ref. to IN-6, REMOVAL, Air Cleaner Case.>
4) Remove clutch pipe from master cylinder.
5) Remove master cylinder with reservoir tank.

CAUTION:
Be extremely careful not to spill brake fluid. Brake fluid spilt on the vehicle body will harm the paint surface; wipe it off quickly if spilt.



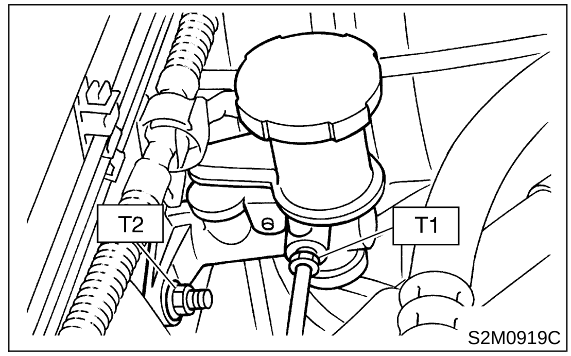
(A) Master cylinder
(B) Clutch pipe

B: INSTALLATION S504168A11

1) Install master cylinder to body, and install clutch pipe to master cylinder.

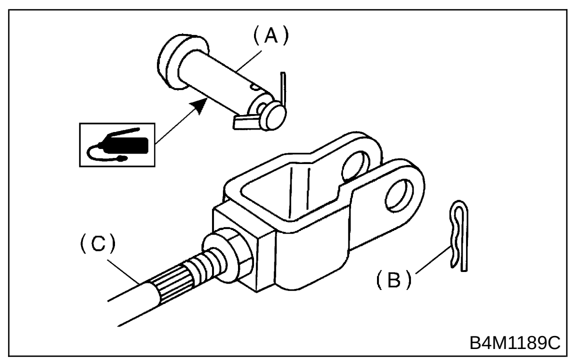
CAUTION:
Check that pipe is routed properly.

Tightening torque:
T1: 15 N·m (1.5 kgf-m, 10.8 ft-lb)
T2: 18 N·m (1.8 kgf-m, 13.0 ft-lb)



2) Connect push rod of master cylinder to clutch pedal, and install clevis pin and snap pin.

NOTE:
Apply grease to clevis pin.

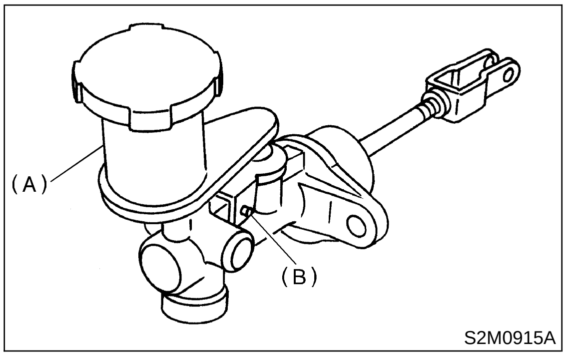


(A) Clevis pin
(B) Snap pin
(C) Push rod

3) After bleeding air from system, ensure that clutch operates properly.
<Ref. to CL-20, Clutch Fluid Air Bleeding.>
4) Install air cleaner case. <Ref. to IN-6, INSTALLATION, Air Cleaner Case.>

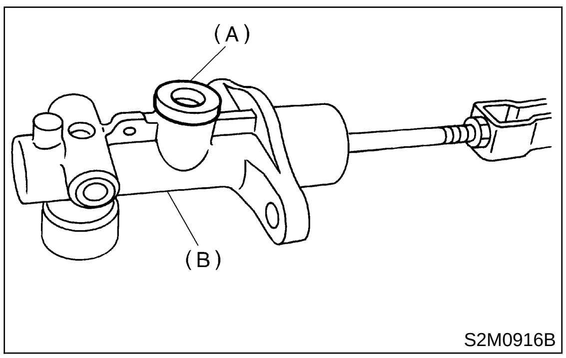
C: DISASSEMBLY *S504168A06*

1) Remove straight pin and reservoir tank.



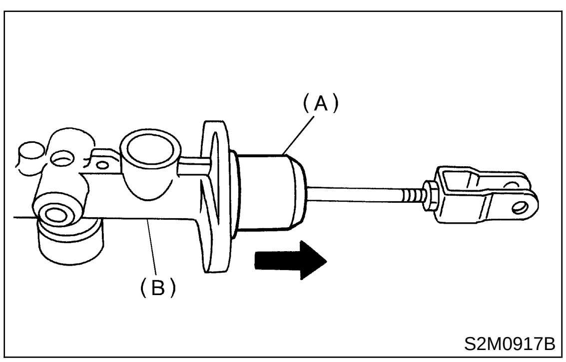
(A) Reservoir tank
(B) Straight pin

2) Remove oil seal.



(A) Oil seal
(B) Master cylinder

3) Move the cylinder boot backward.



(A) Cylinder boot
(B) Master cylinder

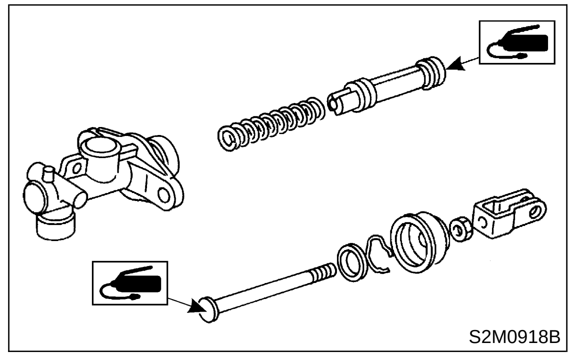
4) Remove snap ring.

CAUTION:
Be careful when removing the snap ring to prevent the rod, washer, piston and return spring from flying out.

D: ASSEMBLY *S504168A02*

1) Apply a coat of grease to the contacting surfaces of the push rod and piston before installation.

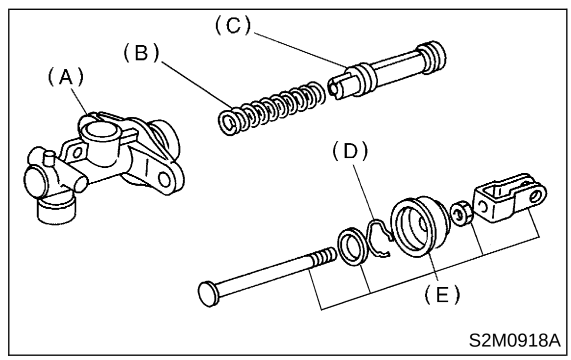
Grease:
SILICONE GREASE G40M (Part No. 004404003)



2) Assemble in the reverse order of disassembly.

E: INSPECTION *S504168A10*

If any damage, deformation, wear, swelling, rust or other faults are found on the cylinder, piston, push rod, fluid reservoir, return spring and seat, replace the faulty part.

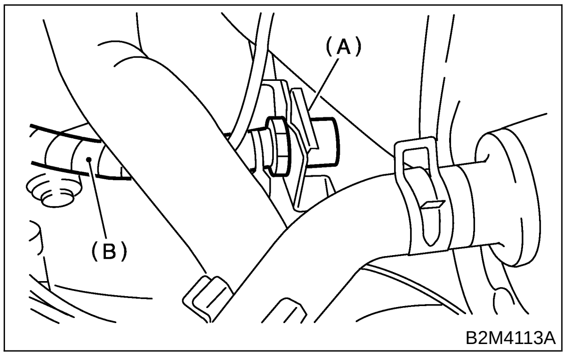


(A) Master cylinder body
(B) Return spring
(C) Piston
(D) Snap ring
(E) Rod ASSY

7. Clutch Pipe and Hose S504262

A: REMOVAL S504262A18

1) Remove air cleaner case. <Ref. to IN-6, REMOVAL, Air Cleaner Case.>
2) Drain clutch fluid. <Ref. to CL-19, Clutch Fluid.>
3) Remove clutch pipe from the clutch hose and master cylinder.
4) Pull out clamp, then remove clutch hose from bracket.



(A) Clamp
(B) Clutch hose

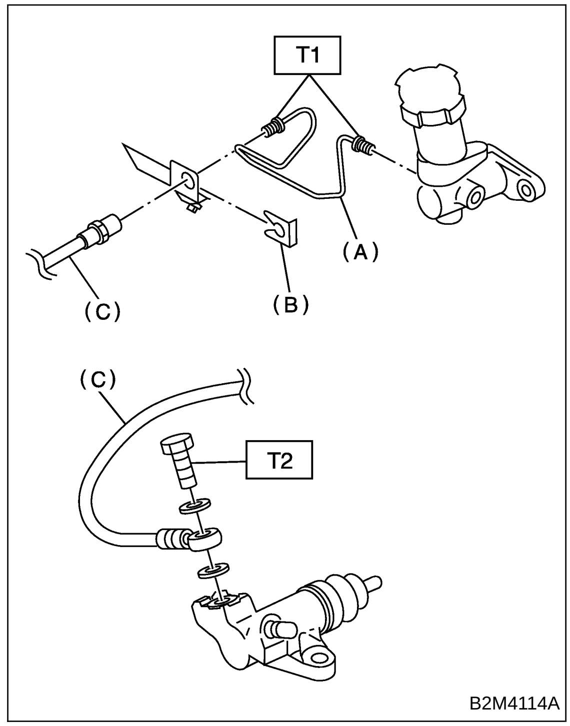
5) Remove hose from operating cylinder.

B: INSTALLATION S504262A11

Install in the reverse order of removal.

NOTE:
Bleed clutch fluid. <Ref. to CL-20, Clutch Fluid Air Bleeding.>

Tightening torque:
T1: 15 N·m (1.5 kgf-m, 10.8 ft-lb)
T2: 18 N·m (1.8 kgf-m, 13.0 ft-lb)



(A) Clutch pipe
(B) Clip
(C) Clutch hose

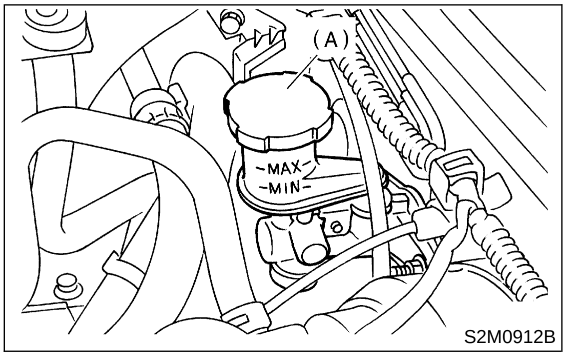
C: INSPECTION S504262A10

Check pipes and hoses for cracks, breakage, or damage. Check joints for fluid leakage. If any cracks, breakage, damage, or leakage is found, repair or replace the applicable pipe or hose.

8. Clutch Fluid S504261

A: INSPECTION S504261A10

1) Park vehicle on a level surface.
2) Check the clutch fluid for significant deterioration. If it is deteriorated, replace it.
3) Inspect the fluid level using the scale on the outside of the clutch master cylinder tank. If the level is below “MIN”, add clutch fluid to bring it up to “MAX”.



(A) Reservoir tank

B: REPLACEMENT S504261A20

CAUTION:
- **The FMVSS No. 116, fresh DOT3 or 4 brake fluid must be used.**
- **Cover bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.**
- **Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.**
- **Be careful not to allow dirt or dust to get into the reservoir tank.**

NOTE:
- During bleeding operation, keep the clutch reservoir tank filled with brake fluid to eliminate entry of air.
- Clutch pedal operating must be very slow.
- For convenience and safety, it is advisable to have two men working.
- The amount of brake fluid required is approximately 70 mℓ (2.4 US fl oz, 2.5 Imp fl oz) for total clutch system.

1) Remove air cleaner case. <Ref. to IN-6, REMOVAL, Air Cleaner Case.>
2) Either jack-up vehicle and place a safety stand under it, or lift-up vehicle.
3) Draw out the brake fluid from reservoir tank with syringe.
4) Refill reservoir tank with recommended brake fluid.

Recommended brake fluid:
FMVSS No. 116, fresh DOT3 or 4 brake fluid

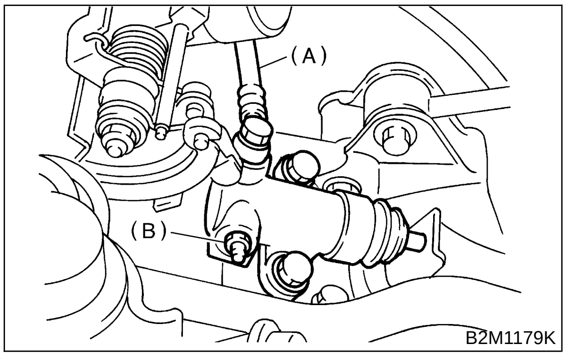
5) Drain fluid in the same method as the air bleeding.
6) Refill brake fluid before reservoir tank becomes empty, and drain contaminated fluid again.
7) Repeat the above procedure until the contaminated fluid is completely drained.

9. Clutch Fluid Air Bleeding S504260

A: PROCEDURE S504260E45

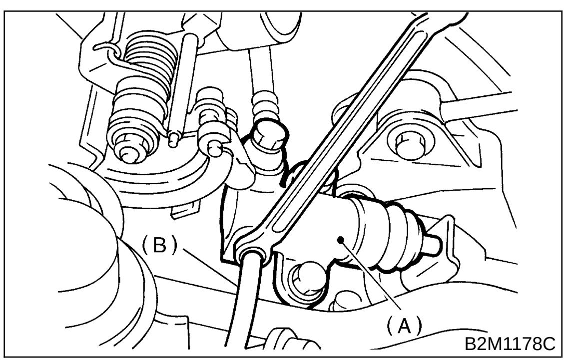
NOTE:
Bleed air from oil line with the help of a co-worker.

1) Remove air cleaner case.
<Ref. to IN-6, REMOVAL, Air Cleaner Case.>
2) Fit one end of a vinyl tube into the air bleeder of operating cylinder and put the other end into a brake fluid container.



(A) Clutch hose
(B) Air bleeder
(C) Operating cylinder

3) Slowly depress the clutch pedal and keep it depressed. Then open the air bleeder to discharge air together with the fluid.
Release the air bleeder for 1 or 2 seconds. Next, with the bleeder closed, slowly release the clutch pedal.



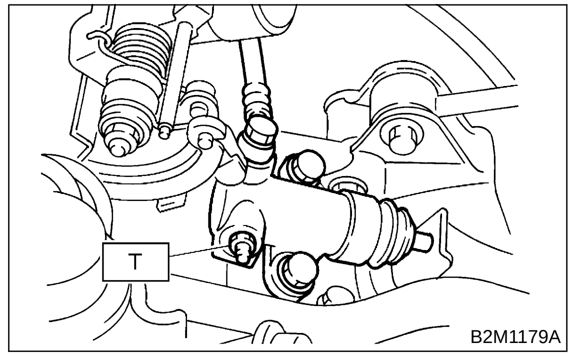
(A) Operating cylinder
(B) Vinyl tube

4) Repeat these steps until there are no more air bubbles in the vinyl tube.

CAUTION:
Cover bleeder with waste cloth when loosening it, to prevent brake fluid from being splashed over surrounding parts.

5) Tighten air bleeder.

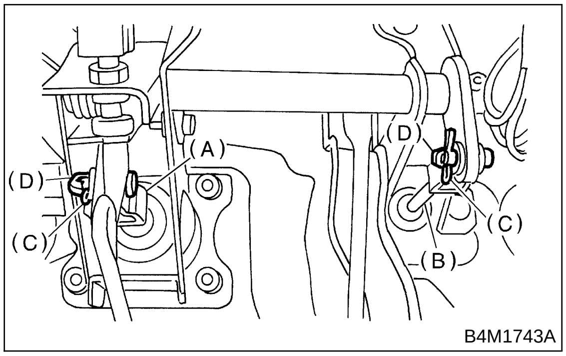
Tightening torque:
T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)



10. Clutch Pedal S504256

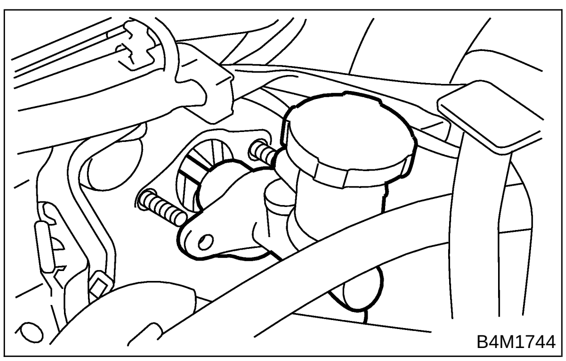
A: REMOVAL S504256A18

1) Remove steering column. <Ref. to PS-17, REMOVAL, Tilt Steering Column.>
2) Disconnect connectors from stop light and clutch switches.
3) Remove snap pins which secure lever to push rod and operating rod.
4) Remove clevis pins which secure lever to push rod and operating rod.



(A) Operating rod
(B) Push rod
(C) Snap pin
(D) Clevis pin

5) Remove nut which secures clutch master cylinder.



6) Remove bolts and nuts which secure brake and clutch pedals, and remove pedal assembly.

B: INSTALLATION S504256A11

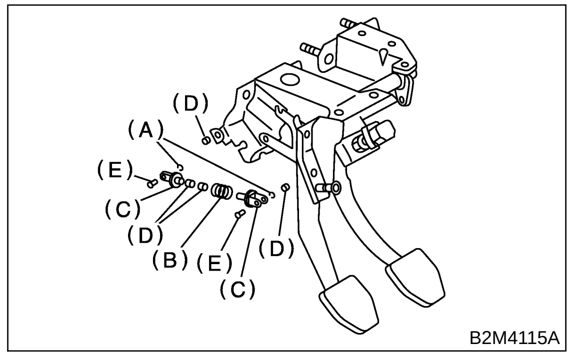
1) Install in the reverse order of removal.

NOTE:
- Be careful not to kink accelerator cable.
- Always use new clevis pins.

2) Adjustment of clutch pedal and adjustment after pedal installation. <Ref. to CL-22, ADJUSTMENT, Clutch Pedal.>

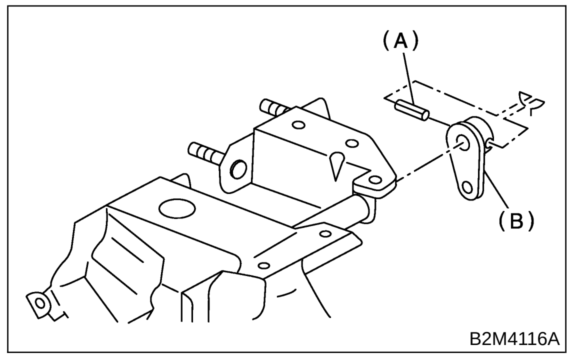
C: DISASSEMBLY S504256A06

1) Remove clutch switches.
2) Remove clips, assist spring, rod and bushing.



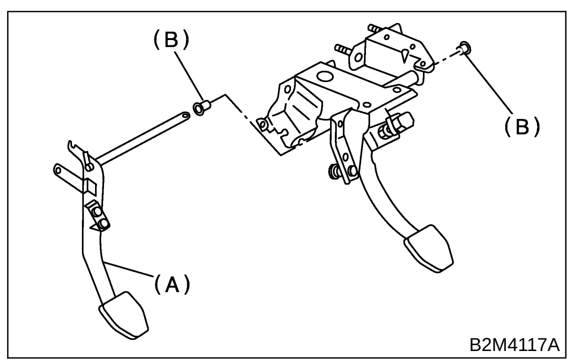
(A) Clip
(B) Assist spring
(C) Assist rod
(D) Bushing
(E) Clevis pin

3) Remove spring pin and lever.



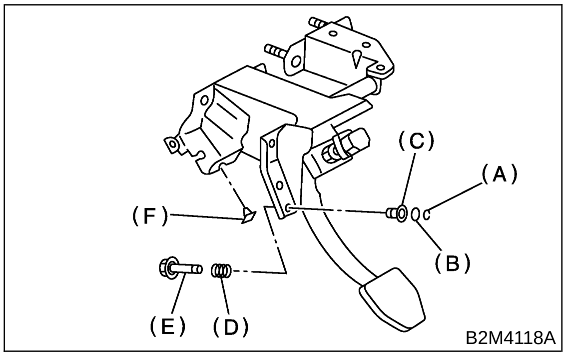
(A) Pin
(B) Lever

4) Remove clutch pedal and bushings.



(A) Clutch pedal
(B) Bushing

5) Remove stopper, clip, O-ring, rod S, and then remove spring and bushing S.



(A) Clip
(B) O-ring
(C) Bushing S
(D) Spring S
(E) Rod S
(F) Stopper

6) Remove stoppers from clutch pedal.
7) Remove clutch pedal pad.

D: ASSEMBLY S504256A02

1) Attach clutch switch, etc. to pedal bracket temporarily.
2) Clean inside of bores of clutch pedal and brake pedal, apply grease, and set bushings into bores.
3) Align bores of pedal bracket, clutch pedal and brake pedal, attach brake pedal return spring, assist rods, and spring, and bushing.

NOTE:
Clean up inside of bushings and apply grease before installing spacer.

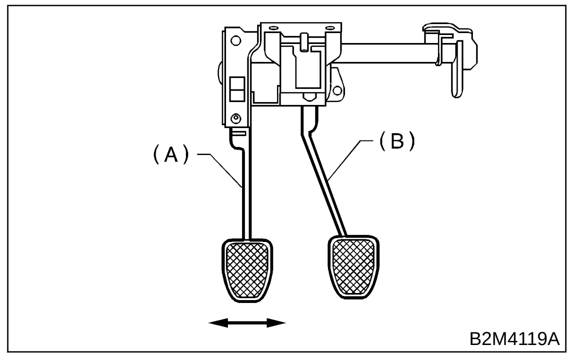
E: INSPECTION S504256A10

1. CLUTCH PEDAL S504256A1001

Move clutch pedal pads in the lateral direction with a force of approximately 10 N (1 kgf, 2 lb) to ensure pedal deflection is in specified range.

CAUTION:
If excessive deflection is noted, replace bushings with new ones.

Deflection of clutch pedal:
Service limit
5.0 mm (0.197 in) or less



(A) Clutch pedal
(B) Brake pedal

F: ADJUSTMENT S504256A01

1. CLUTCH PEDAL S504256A0101

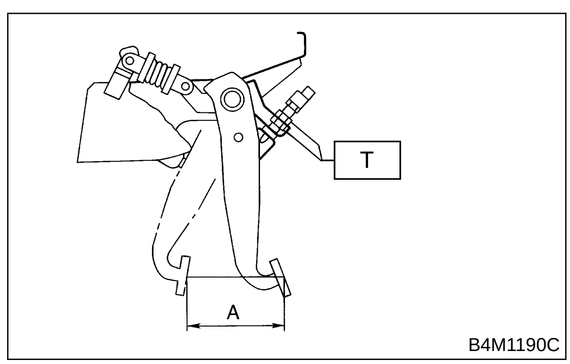
1) Turn clutch switch lock nuts until clutch pedal full stroke length is within specifications.

CAUTION:
Do not attempt to turn clutch switch to adjust clutch pedal full stroke length.

NOTE:
If lock nuts cannot adjust clutch pedal full stroke length to specifications, turn master cylinder push rod to adjust it.

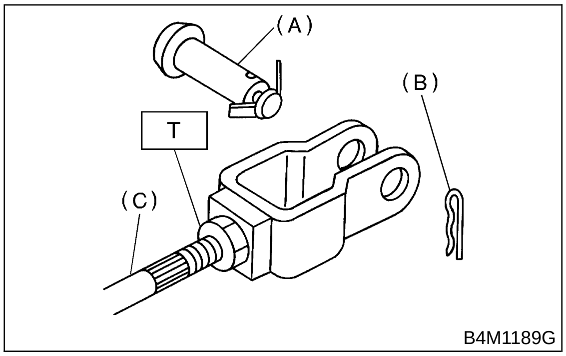
Specified clutch pedal full stroke: A
130 — 135 mm (5.12 — 5.31 in)

Tightening torque (Clutch switch lock nut):
T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)



2) Turn master cylinder push rod so that clevis pin moves to the left and then to the right. Clevis pin must move without resistance while it is rattling.

Tightening torque (Push rod lock nut):
T: 10 N·m (1.0 kgf-m, 7 ft-lb)



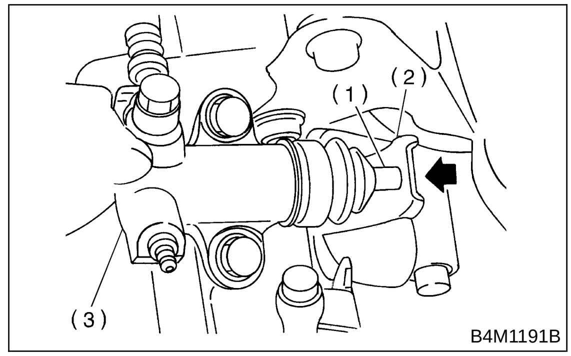
(A) Clevis pin
(B) Snap pin
(C) Push rod
(D) Lock nut

3) Depress and release clutch pedal 2 to 3 times to ensure that clutch pedal and release fork operate smoothly. If clutch pedal and release fork do not operate smoothly, bleed air from clutch hydraulic system. <Ref. to CL-20, Clutch Fluid Air Bleeding.>
4) Measure clutch pedal full stroke length again to ensure that it is within specifications. If it is not, repeat adjustment procedures again from the beginning.

Specified clutch pedal full stroke:
130 — 135 mm (5.12 — 5.31 in)

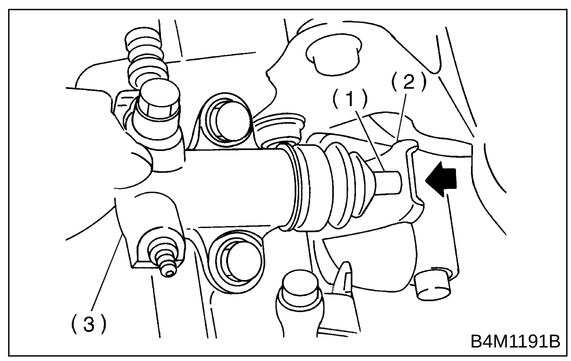
5) Move clevis pin to the left and then to the right. It should move without resistance while it is rattling. If resistance is felt, repeat adjustment procedures again from the beginning.

6) Push release lever until operating cylinder push rod retracts. Ensure that clutch fluid level in reservoir tank increases. If clutch fluid level increases, hydraulic clutch is properly adjusted; if fluid level does not increase or push rod does not retract, replace master cylinder with a new one. <Ref. to CL-16, Master Cylinder.>



(1) Push rod
(2) Release lever
(3) Operating cylinder

7) Push release lever until operating cylinder push rod retracts. Check that clutch fluid level in reservoir tank increases.



(1) Push rod
(2) Release lever
(3) Operating cylinder

8) If clutch fluid level increases, hydraulic clutch play is correct.
9) If clutch fluid level does not increase or push rod does not retract, clutch pedal must be readjusted.
10) Inspect the fluid level. <Ref. to CL-19, Clutch Fluid.>

11. Clutch Switch S504258

A: REMOVAL S504258A18

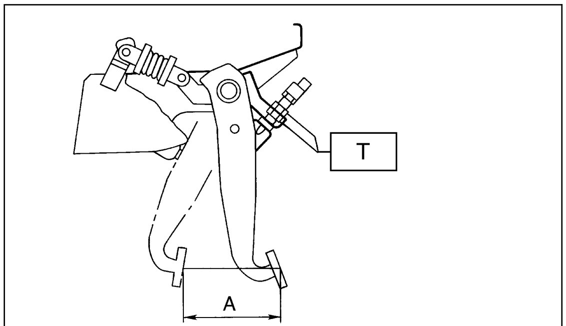
1) Remove battery ground cable.
2) Disconnect connector from clutch switch.
3) Remove clutch switch.

B: INSTALLATION S504258A11

1) Move clevis pin of the push rod right and left and hold where it moves smoothly, then measure stroke of clutch pedal.

Specified clutch pedal full stroke: A
130 — 135 mm (5.12 — 5.31 in)

Tightening torque:
T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)



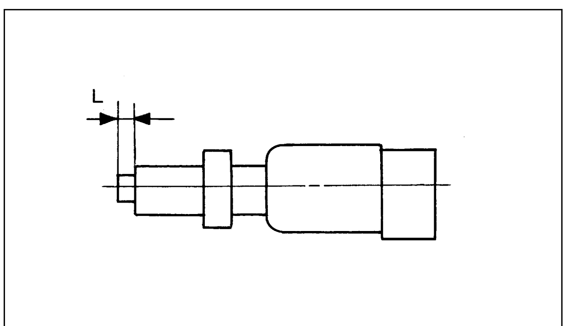
B4M1190C

2) If clutch pedal stroke is out of specification, adjust the stroke. <Ref. to CL-22, ADJUSTMENT, Clutch Pedal.>
3) Connect clutch switch connector.

C: INSPECTION S504258A10

1) If clutch switch does not operate properly (or if it does not stop at the specified position), replace with a new one.

Specified position: L
$2^{+1.5}/_{0}$mm ($0.079^{+0.059}/_{0}$ in)



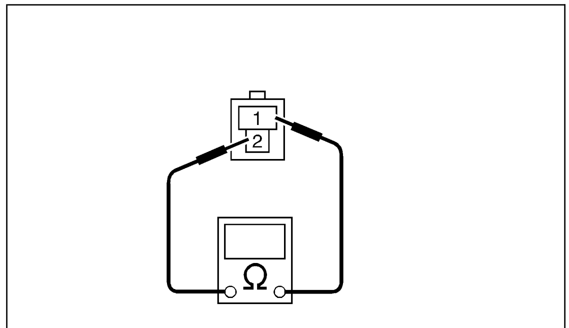
G4M0327

2) Check clutch switch continuity. If continuity is not as specified, replace the switch.
(1) Disconnect the clutch switch connector.
(2) Measure the resistance between 1 and 2 of switch terminal.

Terminals/Specified resistance
When clutch pedal depressed:
1 — 2/Less than 1Ω

Terminals/Specified resistance
When clutch pedal not depressed:
1 — 2/More than 1MΩ

- Clutch switch (Starter interlock)



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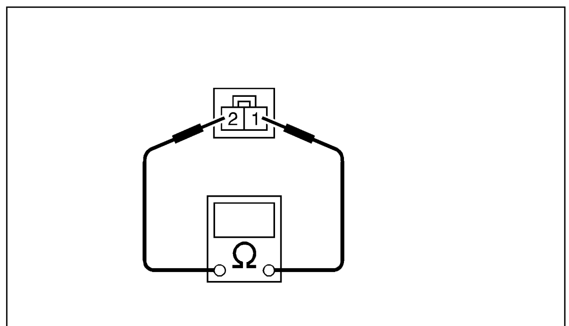
- Clutch switch (With cruise control)



B2M4122

12. General Diagnostic Table

S504257

A: INSPECTION S504257A10

1. CLUTCH S504257A1002

Symptom	Possible cause	Corrective
1. Clutch slippage. It is hard to perceive clutch slippage in the early stage, but pay attention to the following symptoms ● Engine speed up when shifting. ● High speed driving is impossible; especially rapid acceleration impossible and vehicle speed does not increase in proportion to an increase in engine speed. ● Power falls, particularly when ascending a slope, and there is a smell of burning of the clutch facing. ● Method of testing: Put the vehicle in stationary condition with parking brake fully applied. Disengage the clutch and shift the transmission gear into the first. Gradually allow the clutch to engage while gradually increasing the engine speed. The clutch function is satisfactory if the engine stalls. However, the clutch is slipping if the vehicle does not start off and the engine does not stall.	(a) Clutch facing smeared by oil	Replace.
	(b) Worn clutch facing	Replace.
	(c) Deteriorated diaphragm spring	Replace.
	(d) Distorted pressure plate or flywheel	Correct or replace.
	(e) Defective release bearing holder	Correct or replace.
2. Clutch drags. As a symptom of this trouble, a harsh scratching noise develops and control becomes quite difficult when shifting gears. The symptom becomes more apparent when shifting into the first gear. However, because much trouble of this sort is due to defective synchronization mechanism, carry out the test as described after. ● Method of testing: <Ref. to CL-26, DIAGNOSTIC DIAGRAM OF CLUTCH DRAG, INSPECTION, General Diagnostic Table.> It may be judged as insufficient disengagement of clutch if any noise occurs during this test.	(a) Worn or rusty clutch disc hub spline	Replace clutch disc.
	(b) Excessive deflection of clutch disc facing	Correct or replace.
	(c) Seized crankshaft pilot needle bearing	Replace.
	(d) Cracked clutch disc facing	Replace.
	(e) Sticked clutch disc (smeared by oil or water)	Replace.
3. Clutch chatters. Clutch chattering is an unpleasant vibration to the whole body when the vehicle is just started with clutch partially engaged.	(a) Adhesion of oil on the facing	Replace clutch disc.
	(b) Weak or broken torsion spring	Replace clutch disc.
	(c) Defective facing contact or excessive disc	Replace clutch disc defection.
	(d) Warped pressure plate or flywheel	Correct or replace.
	(e) Loose disc rivets	Replace clutch disc.
	(f) Loose engine mounting	Retighten or replace mounting.
	(g) Improper adjustment of pitching stopper	Adjustment.

Symptom	Possible cause	Corrective
4. Noisy clutch Examine whether the noise is generated when the clutch is disengaged, engaged, or partially engaged.	(a) Broken, worn or unlubricated release bearing	Replace release bearing.
	(b) Insufficient lubrication of pilot bearing	Apply grease.
	(c) Loose clutch disc hub	Replace clutch disc.
	(d) Loose torsion spring retainer	Replace clutch disc.
	(e) Deteriorated or broken torsion spring	Replace clutch disc.
5. Clutch grabs. When starting the vehicle with the clutch partially engaged, the clutch engages suddenly and the vehicle jumps instead of making a smooth start.	(a) Grease or oil on facing	Replace clutch disc.
	(b) Deteriorated cushioning spring	Replace clutch disc.
	(c) Worn or rusted spline of clutch disc or main shaft	Take off rust, apply grease or replace clutch disc or main shaft.
	(d) Deteriorated or broken torsion spring	Replace clutch disc.
	(e) Loose engine mounting	Retighten or replace mounting.
	(f) Deteriorated diaphragm spring	Replace.

2. CLUTCH PEDAL *S504257A1003*

Trouble	Corrective action
Insufficient pedal play	Adjust pedal play.
Clutch pedal free play insufficient	Adjust pedal free play.
Excessively worn and damaged pedal shaft and/or bushing	Replace bushing and/or shaft with new one.

3. DIAGNOSTIC DIAGRAM OF CLUTCH DRAG *S504257A1001*

No.	Step	Check	Yes	No
1	**CHECK GEAR NOISE.** 1) Start the engine. 2) Disengage the clutch and shift quickly from neutral to reverse in idling condition.	Is an abnormal noise heard from the transmission gears?	Go to step **2**.	Clutch is normal.
2	**CHECK GEAR NOISE.** With the engine idling, disengage the clutch and shift quickly (between 0.5 to 1.0 s) from neutral to reverse.	Is an abnormal noise heard from the transmission gears?	Go to step **3**.	Defective transmission or excessive clutch drag torque. Inspect pilot bearing, clutch disc, transmission and clutch disc hub spline.
3	**CHECK GEAR NOISE.** With the engine idling, disengage the clutch and shift quickly (between 0.5 to 1.0 s) from neutral to reverse shift repeatedly between neutral and reverse with clutch disengaged.	Is an abnormal noise heard from the transmission gears?	Clutch is not disengaged properly. Inspect clutch disc, clutch cover, clutch release system, and clutch pedal free play.	Clutch disc and flywheel are locked together. Inspect clutch disc and clutch disc hub spline.

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

AT

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1. Basic Diagnostic Procedure *S004501*

A: PROCEDURE *S004501E45*

No.	Step	Check	Yes	No
1	**CHECK PRE-INSPECTION.** 1) Ask the customer when and how the trouble occurred using interview checklist. <Ref. to AT-4, Check List for Interview.> 2) Before performing diagnosis, inspect the following items which might influence the AT problems. ● General inspection <Ref. to AT-5, INSPECTION, General Description.> ● Oil leak ● Stall speed test <Ref. to AT-13, Stall Test.> ● Line pressure test <Ref. to AT-16, Line Pressure Test.> ● Transfer clutch pressure test <Ref. to AT-18, Transfer Clutch Pressure Test.> ● Time lag test <Ref. to AT-15, Time Lag Test.> ● Road test <Ref. to AT-12, Road Test.> ● Inhibitor switch <Ref. to AT-28, Inhibitor Switch.>	Is unit that might influence the AT problem normal?	Go to step **2**.	Repair or replace each item.
2	**CHECK “AT OIL TEMP” WARNING LIGHT.** Turn ignition switch to ON.	Does not the “AT OIL TEMP” warning light light up?	Go to step **3**.	Go to step **4**.
3	**CHECK “AT OIL TEMP” WARNING LIGHT.** 1) Turn ignition switch to OFF. 2) Repair “AT OIL TEMP” warning light circuit or power supply and ground line circuit. <Ref. to AT-24, Diagnostic Procedure for “AT OIL TEMP” Warning Light.> 3) Turn ignition switch to ON.	Is the “AT OIL TEMP” warning light flashing?	Go to step **4**.	Go to step **5**.
4	**CHECK INDICATION OF TROUBLE CODE.** Calling up trouble code. Without SUBARU SELECT MONITOR <Ref. to AT-18, WITHOUT SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).> With SUBARU SELECT MONITOR <Ref. to AT-19, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).> NOTE: If the communication function of the select monitor cannot be executed normally, check the communication circuit. <Ref. to AT-32, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, Diagnostic Procedure for Select Monitor Communication.>	Is the trouble code displayed?	Go to step **6**. NOTE: Record all diagnostic trouble codes (DTC).	Go to step **5**.

No.	Step	Check	Yes	No
5	**PERFORM THE GENERAL DIAGNOSTICS.** 1) Inspect using “Diagnostic Procedure for No-diagnostic Trouble Code (DTC)”. <Ref. to AT-95, Diagnostic Procedure for No-diagnostic Trouble Code (DTC).> 2) Inspect using “Symptom Related Diagnostic”. <Ref. to AT-110, Symptom Related Diagnostic.> 3) Perform the clear memory mode. With SUBARU SELECT MONITOR <Ref. to AT-21, WITH SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> Without SUBARU SELECT MONITOR <Ref. to AT-21, WITHOUT SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> 4) Perform the inspection mode. <Ref. to AT-20, Inspection Mode.> 5) Calling up the diagnostic trouble code (DTC). Without SUBARU SELECT MONITOR <Ref. to AT-18, WITHOUT SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).> With SUBARU SELECT MONITOR <Ref. to AT-19, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the trouble code displayed?	Go to step **6**.	Complete the diagnosis.
6	**PERFORM THE DIAGNOSIS.** 1) Inspect using “Diagnostics Chart with Diagnostic Trouble Code (DTC)”. <Ref. to AT-36, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: For trouble code table, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to AT-23, List of Diagnostic Trouble Code (DTC).> 2) Repair trouble cause. 3) Perform the clear memory mode. With SUBARU SELECT MONITOR <Ref. to AT-21, WITH SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> Without SUBARU SELECT MONITOR <Ref. to AT-21, WITHOUT SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> 4) Perform the inspection mode. <Ref. to AT-20, Inspection Mode.> 5) Calling up the diagnostic trouble code (DTC). Without SUBARU SELECT MONITOR <Ref. to AT-18, WITHOUT SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).> With SUBARU SELECT MONITOR <Ref. to AT-19, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the diagnostic trouble code (DTC) displayed?	Inspect using “Diagnostics Chart with Diagnostic Connector”. <Ref. to AT-36, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Complete the diagnosis.

2. Check List for Interview S004502

A: CHECK S004502A04

Check the following items when problem has occurred.

NOTE:
Use copies of this page for interviewing customers.

Customer's name			
Data vehicle brought in			
Data of repair			
Trans. model	TRANSMISSION		VIN
Odometer reading	km/h or mile		
Frequency	☐ Continuous ☐ Intermittent (times a day)		
Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others ( )		
Place	☐ Highway ☐ Suburbs ☐ Inner city ☐ Uphill ☐ Rough road ☐ Others ( )		
Outdoor temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold		
Vehicle speed	km/h (MPH)		
Malfunction indicator lamp (MIL)	☐ Continuously lit		☐ Not lit
Select lever position	☐ P ☐ R ☐ N ☐ D ☐ 3 ☐ 2 ☐ 1		
Driving condition	☐ Not affected ☐ At racing ☐ While decelerating	☐ At starting ☐ While accelerating ☐ While turning (☐ RH/☐ LH)	☐ While idling ☐ While cruising
Symptoms	☐ No up-shift		
	☐ No down-shift		
	☐ No kick down		
	☐ Vehicle does not move (☐ Any position ☐ Particular position)		
	☐ Lock-up malfunction		
	☐ Noise or vibration		
	☐ Shift shock or slip		
	☐ Select lever does not move		
	☐ Others ( )		

3. General Description S004001

A: CAUTION S004001A03

● **Supplemental Restraint System "Airbag"**
Airbag system wiring harness is routed near the transmission control module (TCM).

CAUTION:
● **All airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.**
● **Be careful not to damage airbag system wiring harness when performing diagnostics and servicing the TCM.**

● **Measurement**
When measuring voltage and resistance of the ECM, TCM or each sensor, use a tapered pin with a diameter of less than 0.64 mm (0.025 in) in order to avoid poor contact. Do not insert the pin more than 6.5 mm (0.256 in).

B: INSPECTION S004001A10

1. BATTERY S004001A1001

Measure battery voltage and specific gravity of electrolyte.

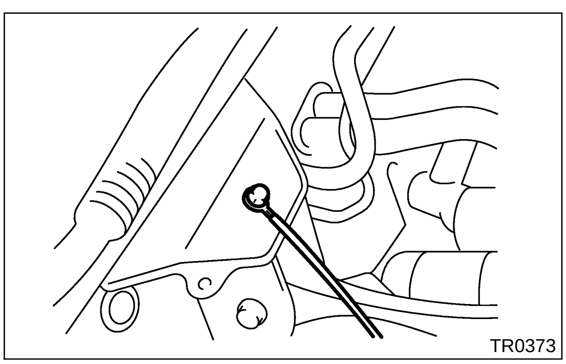
Standard voltage: 12V or more

Specific gravity: Above 1.260

2. TRANSMISSION GROUND S004001A1002

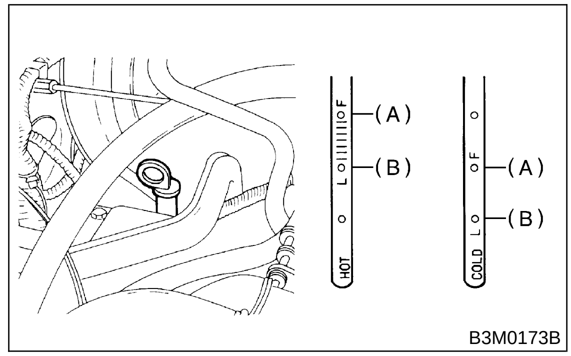
Make sure that the ground terminal bolt is tightened securely.
● **Chassis side**

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)



3. ATF LEVEL S004001A1003

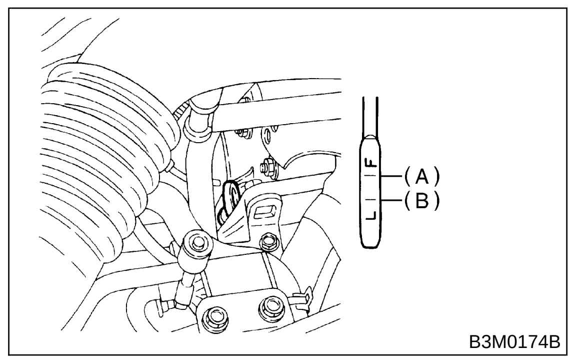
Make sure that ATF level is in the specification.



(A) Upper level
(B) Lower level

4. FRONT DIFFERENTIAL OIL LEVEL S004001A1004

Make sure that front differential oil level is in the specification.



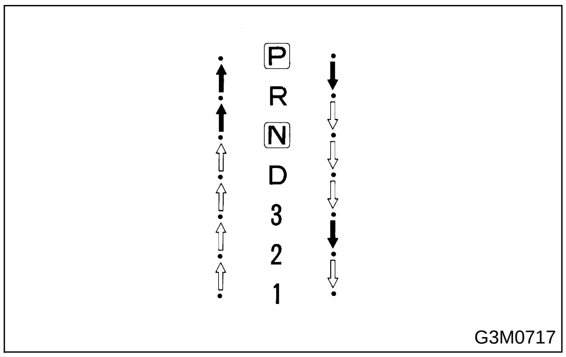
(A) Upper level
(B) Lower level

5. OPERATION OF SHIFT SELECT LEVER

S004001A1005

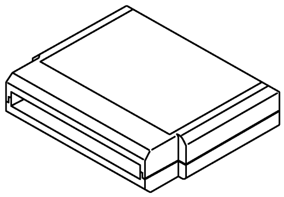
WARNING:
Stop the engine while checking operation of select lever.

1) Check that select lever does not move from “N” to “R” without pushing the button.
2) Check that select lever does not move from “R” to “P” without pushing the button.
3) Check that select lever does not move from “P” to “R” without pushing the button.
4) Check that select lever does not move from “3” to “2” without pushing the button.



C: PREPARATION TOOL S004001A17

1. SPECIAL TOOLS S004001A1701

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)

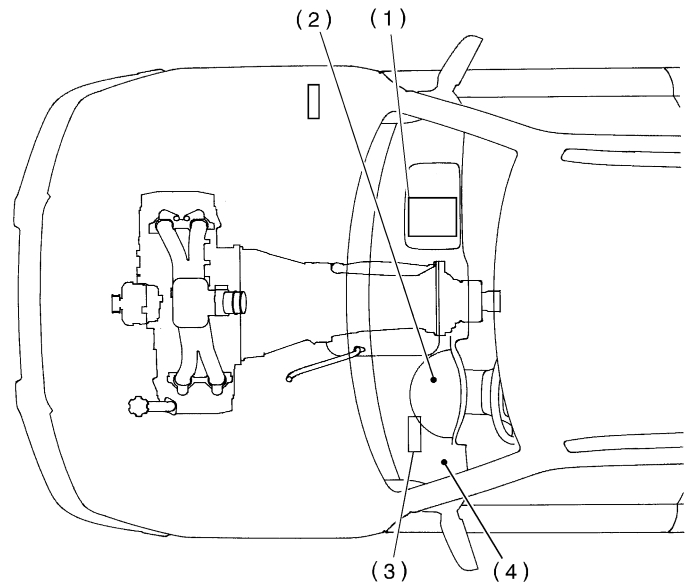
2. GENERAL PURPOSE TOOLS S004001A1702

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.
Oscilloscope	Used for measuring sensor.

4. Electrical Components Location *S004507*

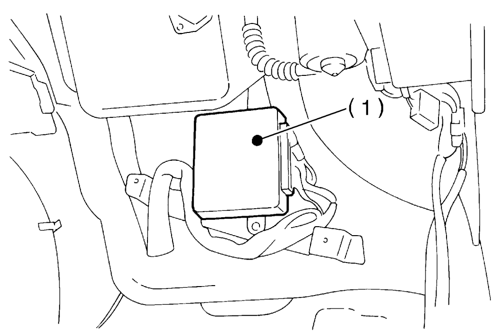
A: LOCATION *S004507A13*

1. CONTROL MODULE *S004507A1301*

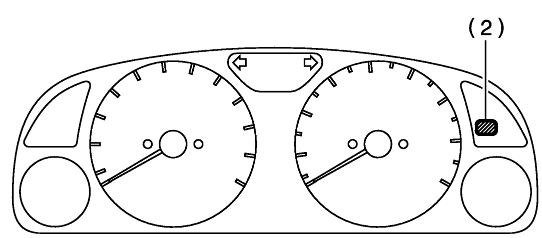


S3M0240A

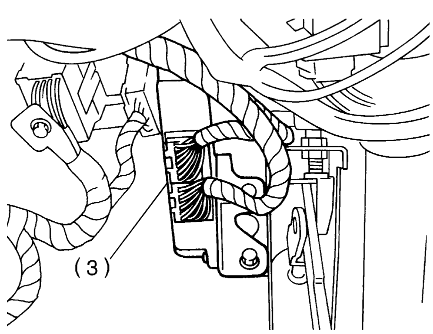
(1) Engine control module (ECM)
(2) "AT OIL TEMP" warning light (AT diagnostic indicator light)
(3) Transmission control module (TCM)
(4) Data link connector



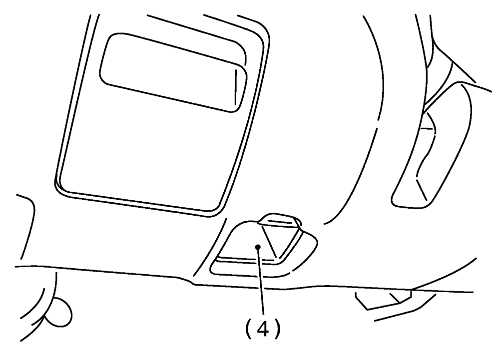
B3M0183E



S3M0593A

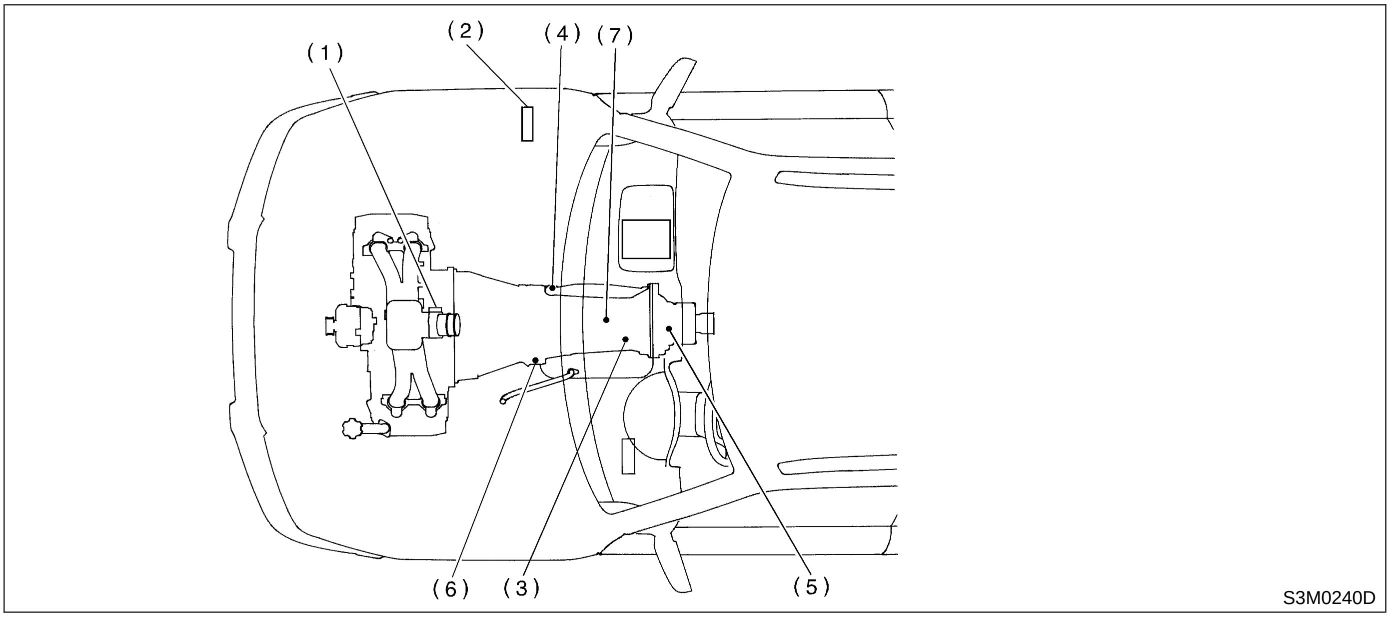


B3M1666C

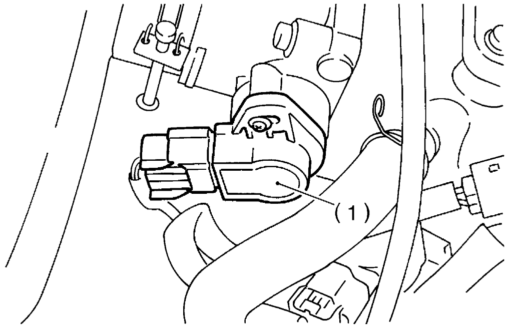


S2M2157E

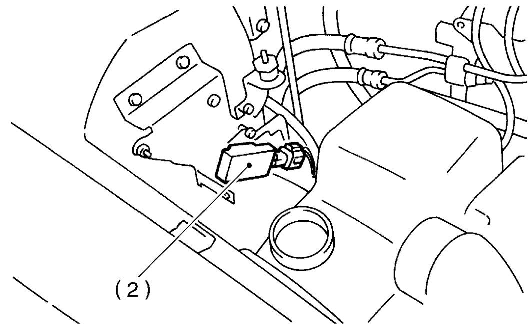
2. SENSOR *S004507A1302*



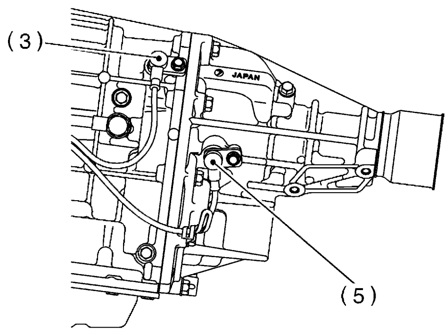
(1) Throttle position sensor
(2) Dropping resistor
(3) Front vehicle speed sensor
(4) Inhibitor switch
(5) Rear vehicle speed sensor
(6) Torque converter turbine speed sensor
(7) ATF temperature sensor



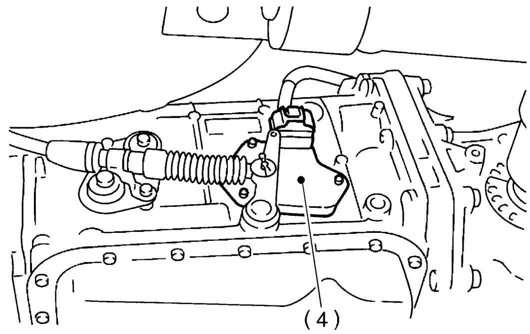
S2M0262B



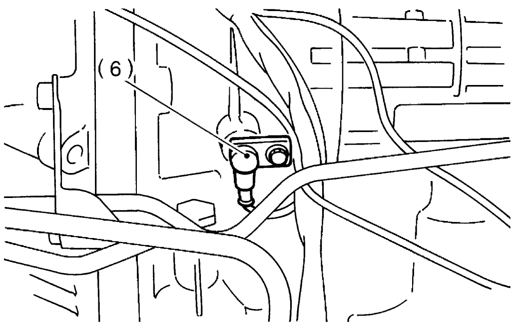
B2M2262C



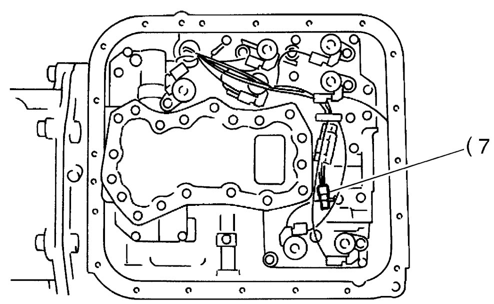
B2M2258C



B2M2246D

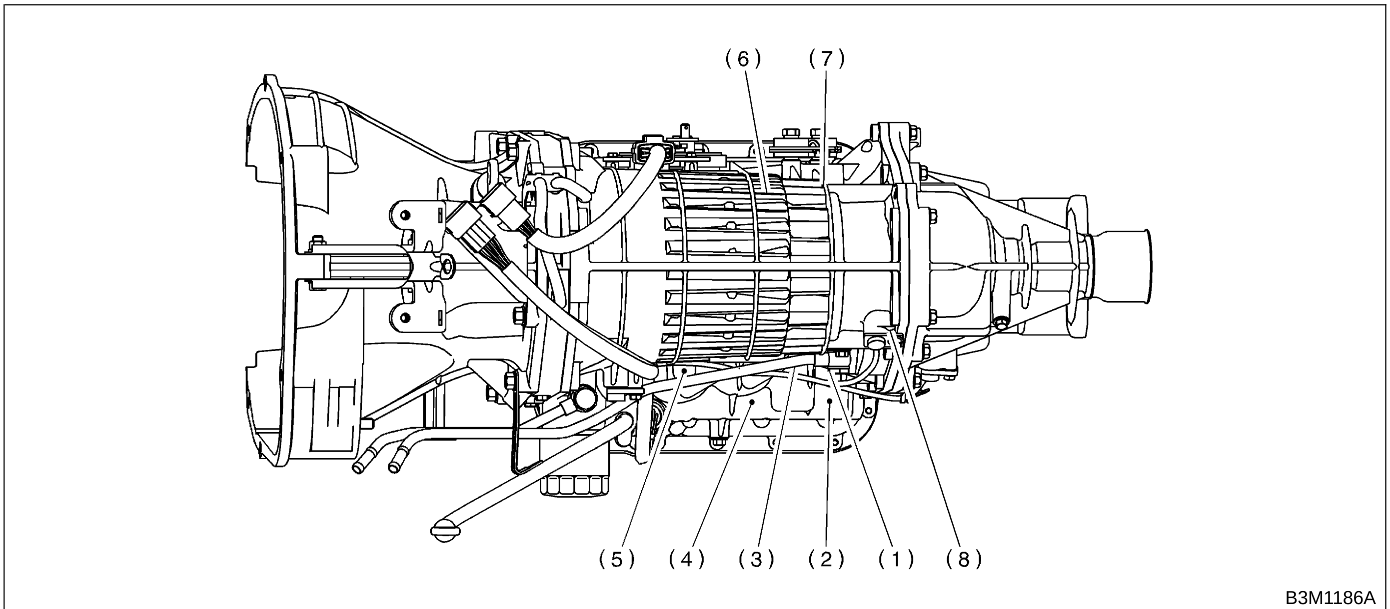


B2M2260C

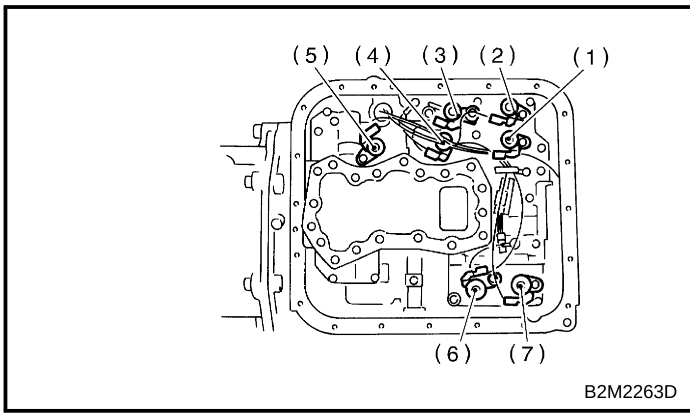


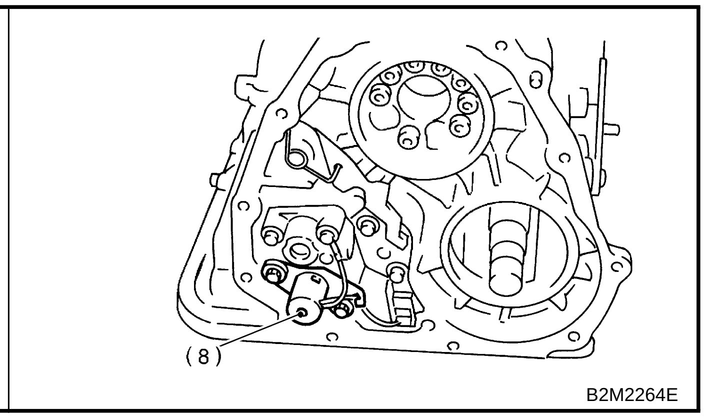
B2M2261C

3. SOLENOID *S004507A1303*



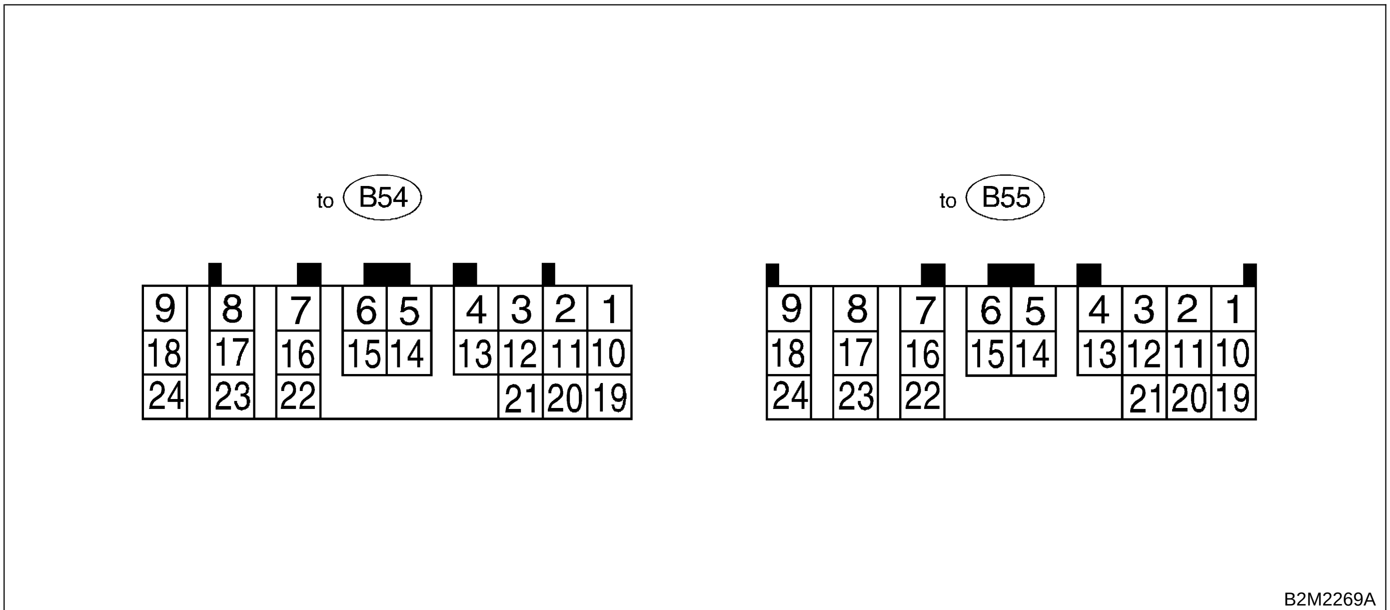
(1) Solenoid 1
(2) Solenoid 2
(3) Line pressure duty solenoid
(4) Low clutch timing solenoid
(5) Lock-up duty solenoid
(6) 2-4 brake duty solenoid
(7) 2-4 brake timing solenoid
(8) Transfer duty solenoid





5. Transmission Control Module (TCM) I/O Signal S004506

A: ELECTRICAL SPECIFICATION S004506A08

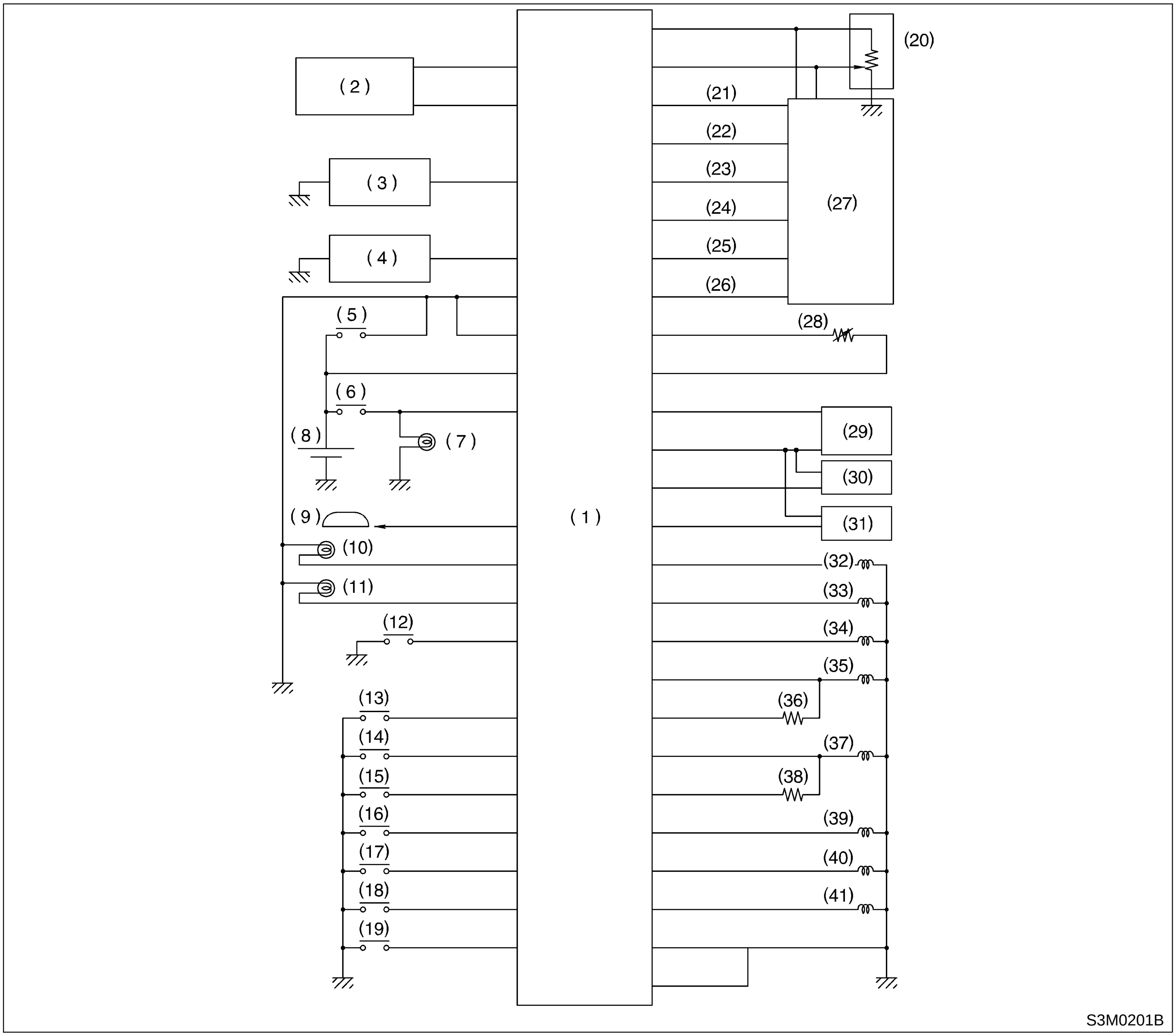


Check with ignition switch ON.						
Content		Connec-tor No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Back-up power supply		B55	6	Ignition switch OFF	10 — 13	—
Ignition power supply		B54	23	Ignition switch ON (with engine OFF)	10 — 13	—
		B54	24			
Inhibitor switch	“P” range switch	B55	23	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	22	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	17	Select lever in “R” range	Less than 1	—
				Select lever in any other than “R” range	More than 8	
	“D” range switch	B55	8	Select lever in “D” range	Less than 1	—
				Select lever in any other than “D” range	More than 8	
	“3” range switch	B55	18	Select lever in “3” range	Less than 1	—
				Select lever in any other than “3” range	More than 8	
	“2” range switch	B54	10	Select lever in “2” range	Less than 1	—
				Select lever in any other than “2” range	More than 8	
	“1” range switch	B54	1	Select lever in “1” range	Less than 1	—
				Select lever in any other than “1” range	More than 8	
Brake switch		B55	24	Brake pedal depressed.	More than 10.5	—
				Brake pedal released.	Less than 1	
ABS signal		B54	19	ABS switch ON	Less than 1	—
				ABS switch OFF	More than 6.5	

Check with ignition switch ON.					
Content	Connec-tor No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
AT OIL TEMP warning light	B54	3	Light ON	Less than 1	—
			Light OFF	More than 9	
Throttle position sensor	B55	2	Throttle fully closed.	Approx 0.5	—
			Throttle fully open.	Approx 4.3	
Throttle position sensor power supply	B55	1	Ignition switch ON (With engine OFF)	Approx. 5	—
ATF temperature sensor	B55	11	ATF temperature 20°C (68°F)	1.6 — 2.0	2.1 k — 2.9 k
			ATF temperature 80°C (176°F)	0.4 — 0.9	275 — 375
Rear vehicle speed sensor	B55	3	Vehicle stopped.	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Front vehicle speed sensor	B55	5	Vehicle stopped.	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Torque converter turbine speed sensor	B55	12	Vehicle stopped	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Vehicle speed output signal	B55	13	Vehicle speed at most 10 km/h (6 MPH)	Less than 1← →More than 5	—
Engine speed signal	B55	4	Ignition switch ON (with engine OFF)	0	—
			Ignition switch ON (with engine ON)	8 — 11	
Cruise set signal	B54	11	When cruise control is set (SET light ON)	Less than 1	—
			When cruise control is not set (SET light OFF)	More than 6.5	
Torque control signal 1	B54	13	Ignition switch ON (with engine ON)	More than 4	—
Torque control signal 2	B54	21	Ignition switch ON (with engine ON)	More than 4	—
Torque control cut signal	B54	2	Ignition switch ON	8	—
Intake manifold pressure signal	B55	20	Engine idling after warm-up.	1.2 — 1.8	—
Shift solenoid 1	B54	7	1st or 4th gear	More than 9	10 — 16
			2nd or 3rd gear	Less than 1	
Shift solenoid 2	B54	6	1st or 2nd gear	More than 9	10 — 16
			3rd or 4th gear	Less than 1	
Line pressure duty solenoid	B54	9	Ignition switch to ON (with engine OFF) throttle fully closed after warm-up.	1.5 — 5.0	2.0 — 4.5
			Ignition switch to ON (with engine OFF) throttle fully open after warm-up.	Less than 1	
Line pressure dropping resistor	B54	18	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	16	When lock up occurs.	More than 8.5	10 — 17
			When lock up is released.	Less than 0.5	

Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Transfer duty solenoid	B54	15	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	8	Ignition switch to ON (with engine OFF) throttle fully closed after warm-up.	1.5 — 5.0	2.0 — 4.5
			Ignition switch to ON (with engine OFF) throttle fully open after warm-up.	Less than 1	
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	5	1st gear	Less than 1	10 — 16
			3rd gear	More than 9	
Low clutch timing solenoid	B54	14	2nd gear	Less than 1	10 — 16
			4th gear	More than 9	
Sensor ground line 1	B55	10	—	0	Less than 1
Sensor ground line 2	B55	21	—	0	Less than 1
System ground line	B55	9	—	0	Less than 1
		19			
FWD switch	B55	14	Fuse removed.	More than 9	—
			Fuse installed.	Less than 1	
FWD indicator light	B54	12	Fuse ON FWD switch	Less than 1	—
			Fuse removed from FWD switch	More than 9	
AT diagnosis signal (Wave form)	B54	4	Ignition switch ON	Less than 1← →More than 4	—
Data link signal (Subaru Select Monitor)	B55	7	—	—	—
		16	—	—	

B: SCHEMATIC S004506A21



(1) Transmission control module
(2) Data link connector
(3) Cruise control module
(4) ABS control module
(5) Ignition switch
(6) Brake switch
(7) Brake light
(8) Battery
(9) Combination meter (Speedometer circuit)
(10) AT OIL TEMP warning light
(11) FWD indicator light
(12) FWD switch
(13) “P” range switch
(14) “R” range switch
(15) “N” range switch
(16) “D” range switch
(17) “3” range switch
(18) “2” range switch
(19) “1” range switch
(20) Throttle position sensor
(21) Engine speed signal
(22) Torque control cut signal
(23) Torque control signal 2
(24) Torque control signal 1
(25) AT load signal
(26) AT diagnostics signal
(27) Engine control module
(28) ATF temperature sensor
(29) Torque converter turbine speed sensor
(30) Front vehicle speed sensor
(31) Rear vehicle speed sensor
(32) Shift solenoid 1
(33) Shift solenoid 2
(34) 2-4 brake timing solenoid
(35) Line pressure duty solenoid
(36) Line pressure dropping resistor
(37) 2-4 brake duty solenoid
(38) 2-4 brake dropping resistor
(39) Lock-up duty solenoid
(40) Low clutch timing solenoid
(41) Transfer duty solenoid

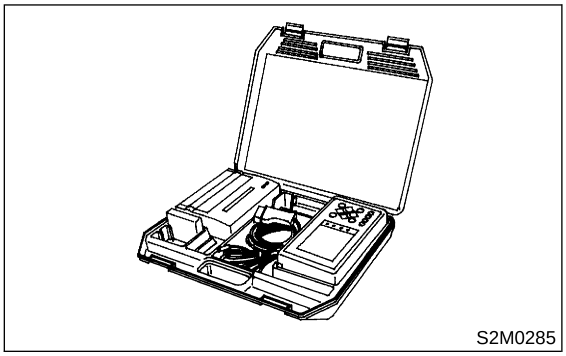
6. Subaru Select Monitor *S004503*

A: OPERATION *S004503A16*

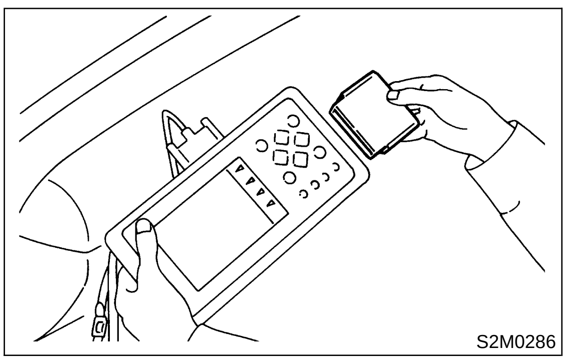
1. READ DIAGNOSTIC TROUBLE CODE

S004503A1601

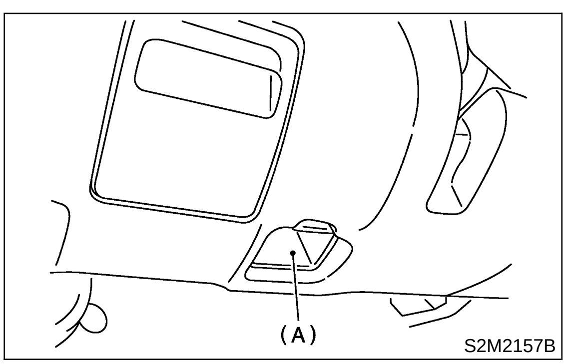
1) Prepare Subaru Select Monitor kit.



2) Connect diagnosis cable to Subaru Select Monitor.
3) Insert cartridge into Subaru Select Monitor. <Ref. to AT-7, 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).

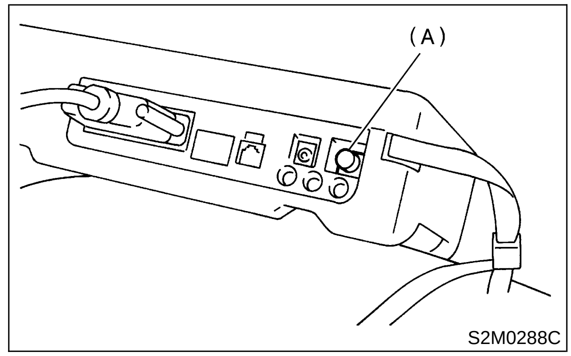


(A) Data link connector

(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.



(A) Power switch

6) On the ≪Main Menu≫ display screen, select the {Each System Check} and press the [YES] key.
7) On the ≪System Selection Menu≫ display screen, select the {Transmission Control System} and press the [YES] key.
8) Press the [YES] key after displayed the information of transmission type.
9) On the ≪Transmission Diagnosis≫ display screen, select the {Diagnostic Code(s) Display} and press the [YES] key.
10) On the ≪Diagnostic Code(s) Display≫ display screen, select the {Latest Diagnostic Code(s)} or {Memorized 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 DIAGNOSTIC TROUBLE CODE LIST. <Ref. to AT-23, List of Diagnostic Trouble Code (DTC).>

2. READ CURRENT DATA *S004503A1602*

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	Rear Wheel Speed	km/h or MPH
Front vehicle speed sensor signal	Front Wheel Speed	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	Turbine Revolution Speed	rpm
2-4 brake timing pressure control duty ratio	Brake Clutch Duty Ratio	%
Intake manifold pressure sensor voltage	Mani. Pressure Voltage	V
2 wheel drive switch signal	FWD Switch	ON or OFF
Stop lamp switch signal	Stop Light 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	Diagnosis Lamp	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.

3. CLEAR MEMORY MODE S004503A1603

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 {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 {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.

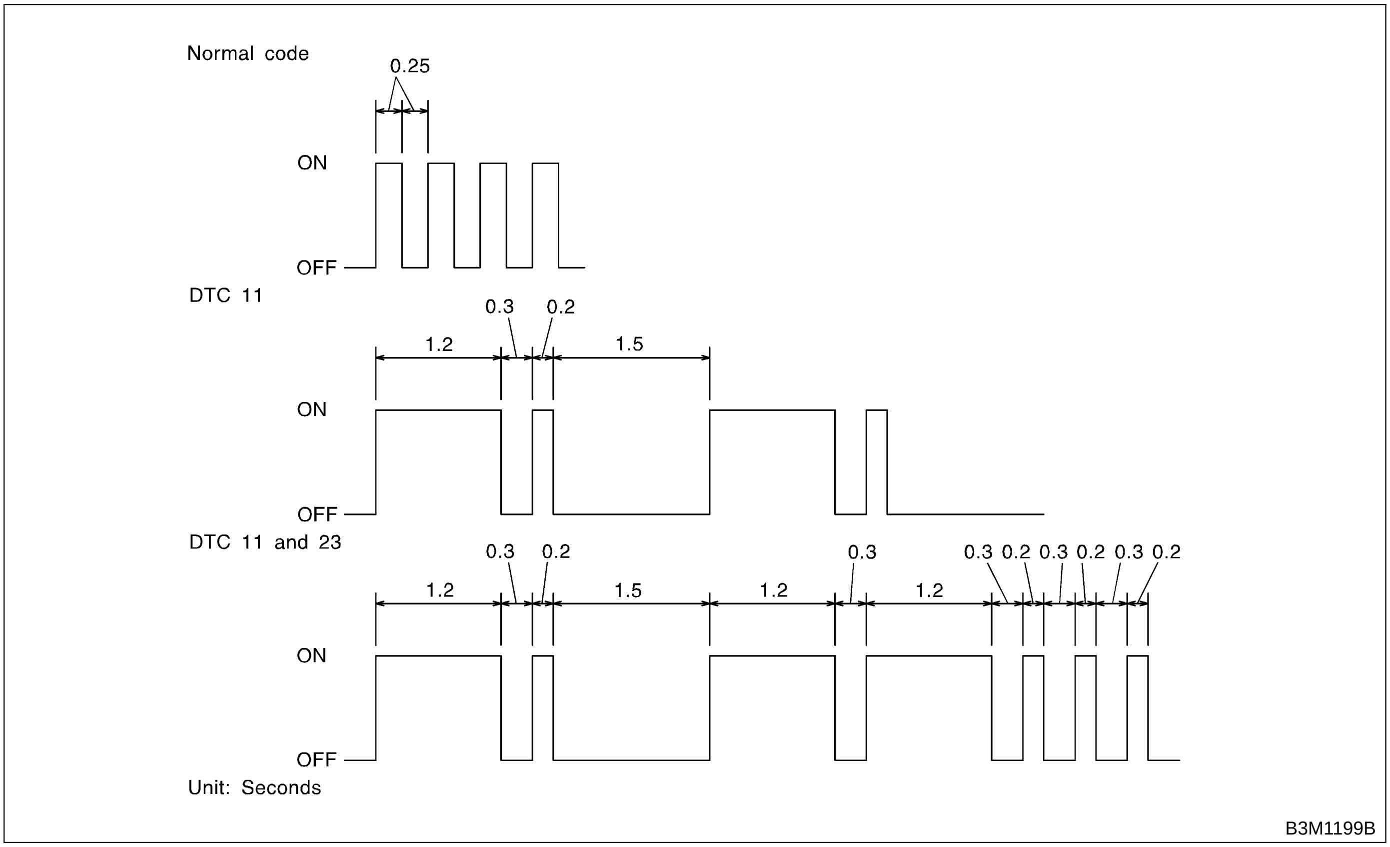
7. Read Diagnostic Trouble Code (DTC) S004792

A: OPERATION S004792A16

1. WITHOUT SUBARU SELECT MONITOR S004792A1601

No.	Step	Check	Yes	No
1	**PERFORM READ DIAGNOSTIC TROUBLE CODE.** 1) Warm-up the engine. 2) Turn ignition switch to OFF. 3) Turn ignition switch to ON. 4) Start the engine. 5) Drive vehicle at speeds greater than 20 km/h (12 MPH). 6) Stop vehicle. 7) Brake pedal depressed and move select lever to 1 range. 8) Turn ignition switch to OFF. 9) Turn ignition switch to ON. 10) Move select lever 2 range. 11) Move select lever 1 range. 12) Move select lever 2 range. 13) Move select lever 3 range. 14) Move select lever D range.	Does indicator light blinks at 4-Hz intervals? NOTE: Blinks every 0.125 (1/8) seconds (until ignition switch is turned OFF).	Repair power supply and ground circuit.<Ref. to AT-28, CHECK POWER SUPPLY AND GROUND LINE, Diagnostic Procedure for “AT OIL TEMP” Warning Light.>	Go to step **2**.
2	**CHECK INDICATOR LIGHT.**	Does indicator light blinks at 2-Hz intervals? NOTE: Blinks every 0.25 (1/4) seconds (until ignition switch is turned OFF).	AT system is normal.	Go to step **3**.
3	**CHECK INDICATOR LIGHT.**	Is trouble code outputted?	Inspect problem corresponding with diagnostic trouble code (DTC). NOTE: Record all diagnostic trouble code (DTC).	Go to step **4**.
4	**CHECK INDICATOR LIGHT.**	Does indicator light remains illuminated?	Repair power indicator light circuit <Ref. to AT-24, Diagnostic Procedure for “AT OIL TEMP” Warning Light.>, or Inspect inhibitor switch, wiring, TCM, etc.	Calling up diagnostic trouble code (DTC) again.

The AT OIL TEMP warning light flashes the code corresponding to the faulty part.
The long segment (1.2 sec on) indicates a “ten”, and the short segment (0.2 sec on) signifies a “one”.



2. WITH SUBARU SELECT MONITOR

S004792A1602

Refer to SUBARU SELECT MONITOR for information about how to obtain and understand trouble codes. <Ref. to AT-16, OPERATION, Subaru Select Monitor.>

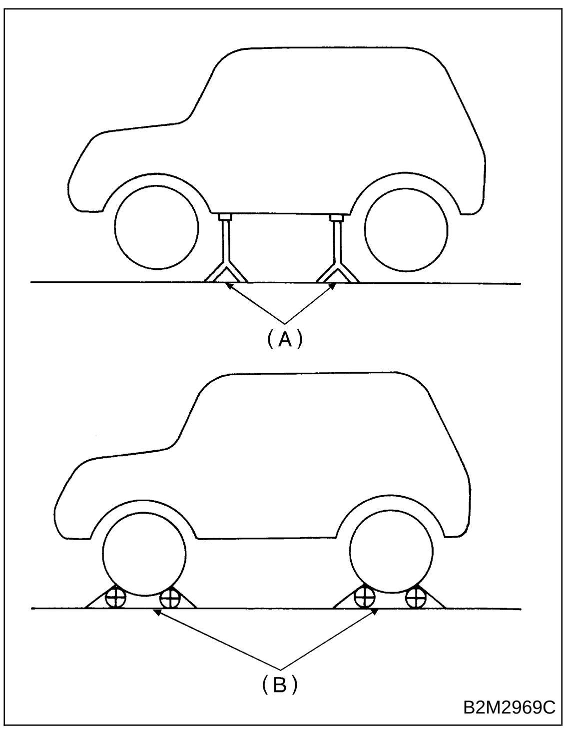
8. Inspection Mode S004510

A: OPERATION S004510A16

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.**



(A) Safety stand
(B) Free rollers

9. Clear Memory Mode *S004513*

A: OPERATION *S004513A16*

1. WITHOUT SUBARU SELECT MONITOR

S004513A1602

Current trouble codes shown on the display are cleared by turning the ignition switch OFF after conducting on-board diagnostics operation. Previous trouble codes, however, cannot be cleared since they are stored in the TCM memory which is operating on the back-up power supply. These trouble codes can be cleared by removing the specified fuse (located under the right or left lower position of the instrument panel).

CLEAR MEMORY:
Removal of No. 4 fuse (for at least one minute)

- The No. 4 fuse is located in the line to the memory back-up power supply of the TCM. Removal of this fuse clears the previous diagnostic trouble codes (DTC) stored in the TCM memory.
- Be sure to remove the No. 4 fuse for at least the specified length of time. Otherwise, diagnostic trouble codes (DTC) may not be cleared.

2. WITH SUBARU SELECT MONITOR

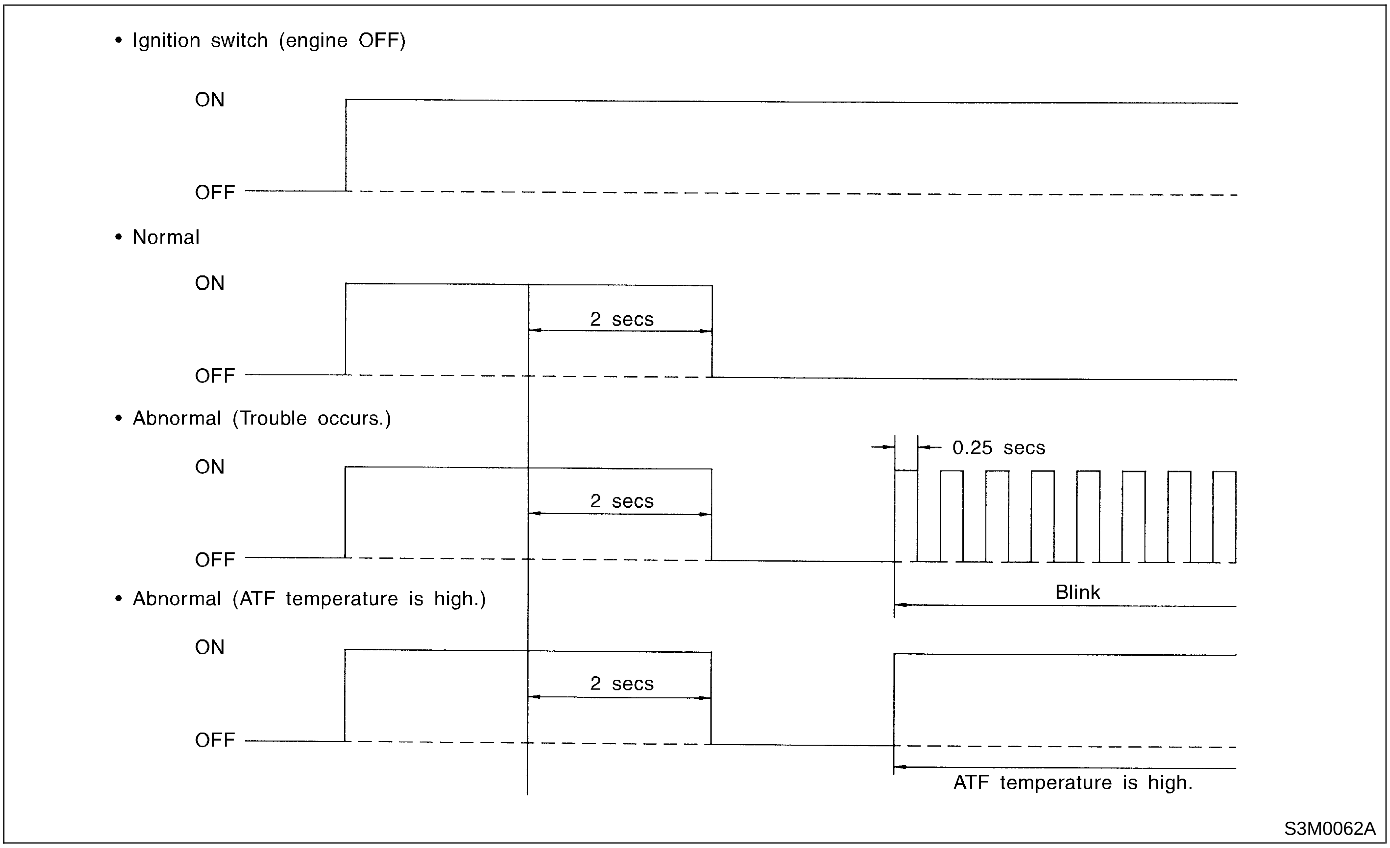
S004513A1601

Refer to SUBARU SELECT MONITOR for information about how to clear diagnostic trouble codes (DTC).
<Ref. to AT-17, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

10. "AT OIL TEMP" Warning Light Display S004793

A: INSPECTION S004793A10

When any on-board diagnostics item is malfunctioning, the display on the AT OIL TEMP warning light blinks from the time the malfunction is detected after starting the engine until the ignition switch is turned OFF. The malfunctioning part or unit can be determined by a trouble code during on-board diagnostics operation. Problems which occurred previously can also be identified through the memory function. If the AT OIL TEMP warning does not indicate a problem (although a problem is occurring), the problem can be determined by checking the performance characteristics of each sensor using the select monitor. Indicator signal is as shown in the figure.



11. List of Diagnostic Trouble Code (DTC) *S004525*

A: LIST *S004525A12*

DTC	Item	Content of diagnosis	Index
11	Engine speed signal	Detects open or shorted input signal circuit.	<Ref. to AT-36, DTC 11 ENGINE SPEED SIGNAL, Diagnostic Procedure with Trouble Code (DTC).>
27	ATF temperature sensor	Detects open or shorted input signal circuit.	<Ref. to AT-38, DTC 27 ATF TEMPERATURE SENSOR, Diagnostic Procedure with Trouble Code (DTC).>
31	Throttle position sensor	Detects open or shorted input signal circuit.	<Ref. to AT-42, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Trouble Code (DTC).>
33	Front vehicle speed sensor	Detects open or shorted input signal circuit.	<Ref. to AT-46, DTC 33 FRONT VEHICLE SPEED SENSOR, Diagnostic Procedure with Trouble Code (DTC).>
36	Torque converter turbine speed sensor	Detects open or shorted input signal circuit.	<Ref. to AT-52, DTC 36 TORQUE CONVERTER TURBINE SPEED SENSOR, Diagnostic Procedure with Trouble Code (DTC).>
38	Torque control signal	Detects open or shorted input signal circuit.	<Ref. to AT-56, DTC 38 TORQUE CONTROL SIGNAL, Diagnostic Procedure with Trouble Code (DTC).>
45	Intake manifold pressure signal	Detects open or shorted input signal circuit.	<Ref. to AT-58, DTC 45 INTAKE MANIFOLD PRESSURE SIGNAL, Diagnostic Procedure with Trouble Code (DTC).>
71	Shift solenoid 1	Detects open or shorted output signal circuit.	<Ref. to AT-60, DTC 71 SHIFT SOLENOID 1, Diagnostic Procedure with Trouble Code (DTC).>
72	Shift solenoid 2	Detects open or shorted output signal circuit.	<Ref. to AT-64, DTC 72 SHIFT SOLENOID 2, Diagnostic Procedure with Trouble Code (DTC).>
73	Low clutch timing solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-68, DTC 73 LOW CLUTCH TIMING SOLENOID, Diagnostic Procedure with Trouble Code (DTC).>
74	2-4 brake timing solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-72, DTC 74 2-4 BRAKE TIMING SOLENOID, Diagnostic Procedure with Trouble Code (DTC).>
75	Line pressure duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-76, DTC 75 LINE PRESSURE DUTY SOLENOID, Diagnostic Procedure with Trouble Code (DTC).>
76	2-4 brake duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-80, DTC 76 2-4 BRAKE DUTY SOLENOID —, Diagnostic Procedure with Trouble Code (DTC).>
77	Lock-up duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-84, DTC 77 LOCK-UP DUTY SOLENOID, Diagnostic Procedure with Trouble Code (DTC).>
79	Transfer duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-88, DTC 79 TRANSFER DUTY SOLENOID, Diagnostic Procedure with Trouble Code (DTC).>
93	Rear vehicle speed sensor	Detects open or shorted input signal circuit.	<Ref. to AT-92, DTC 93 REAR VEHICLE SPEED SENSOR, Diagnostic Procedure with Trouble Code (DTC).>

12. Diagnostic Procedure for “AT OIL TEMP” Warning Light S004795

A: “AT OIL TEMP” WARNING LIGHT DOES NOT COME ON OR GO OFF S004795I26

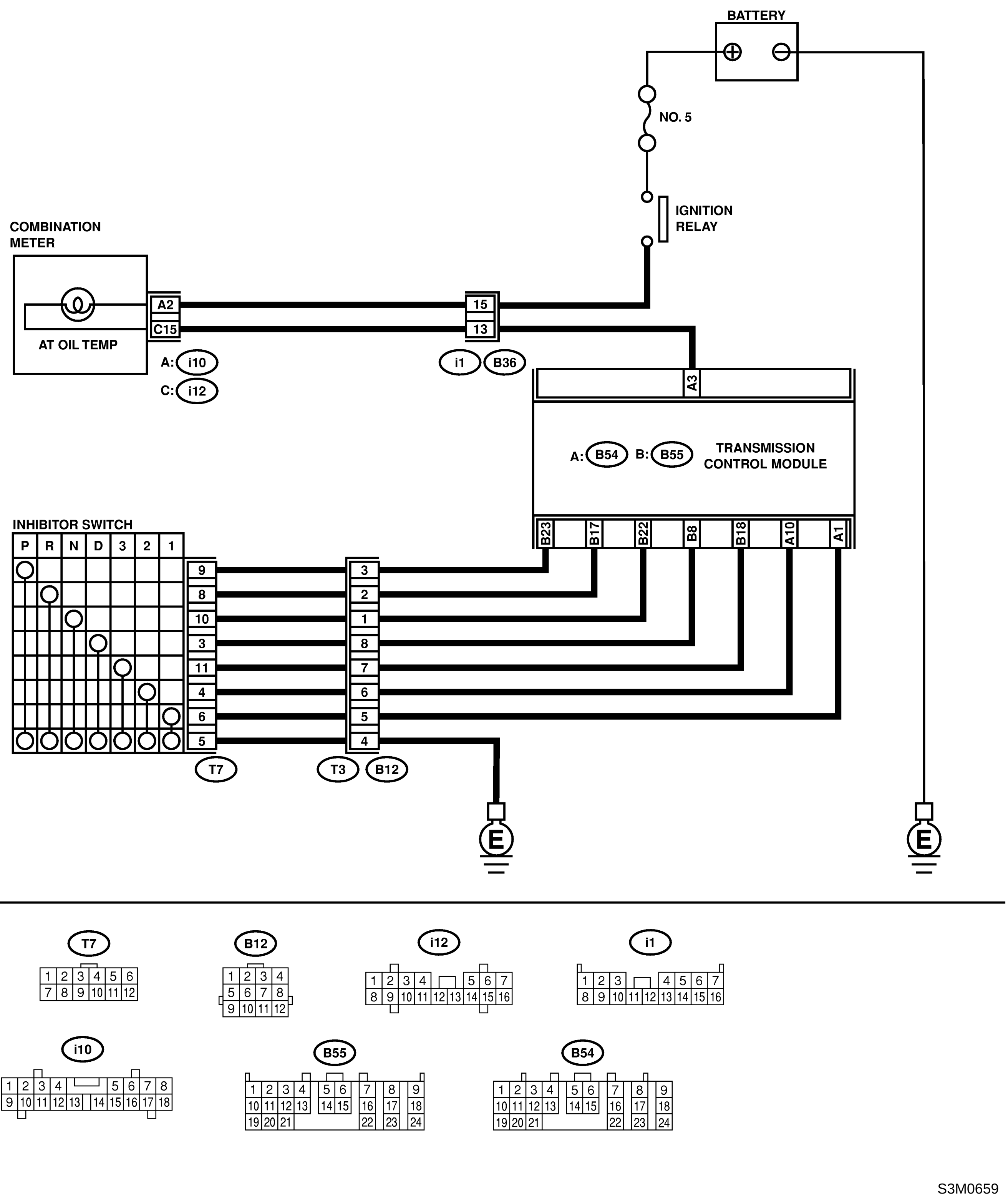
DIAGNOSIS:

The “AT OIL TEMP” warning light circuit is open or shorted.

TROUBLE SYMPTOM:

- When ignition switch is turned to ON (engine OFF), “AT OIL TEMP” warning light does not illuminate.
- When on-board diagnostics is performed, “AT OIL TEMP” warning light remains illuminated.

WIRING DIAGRAM:



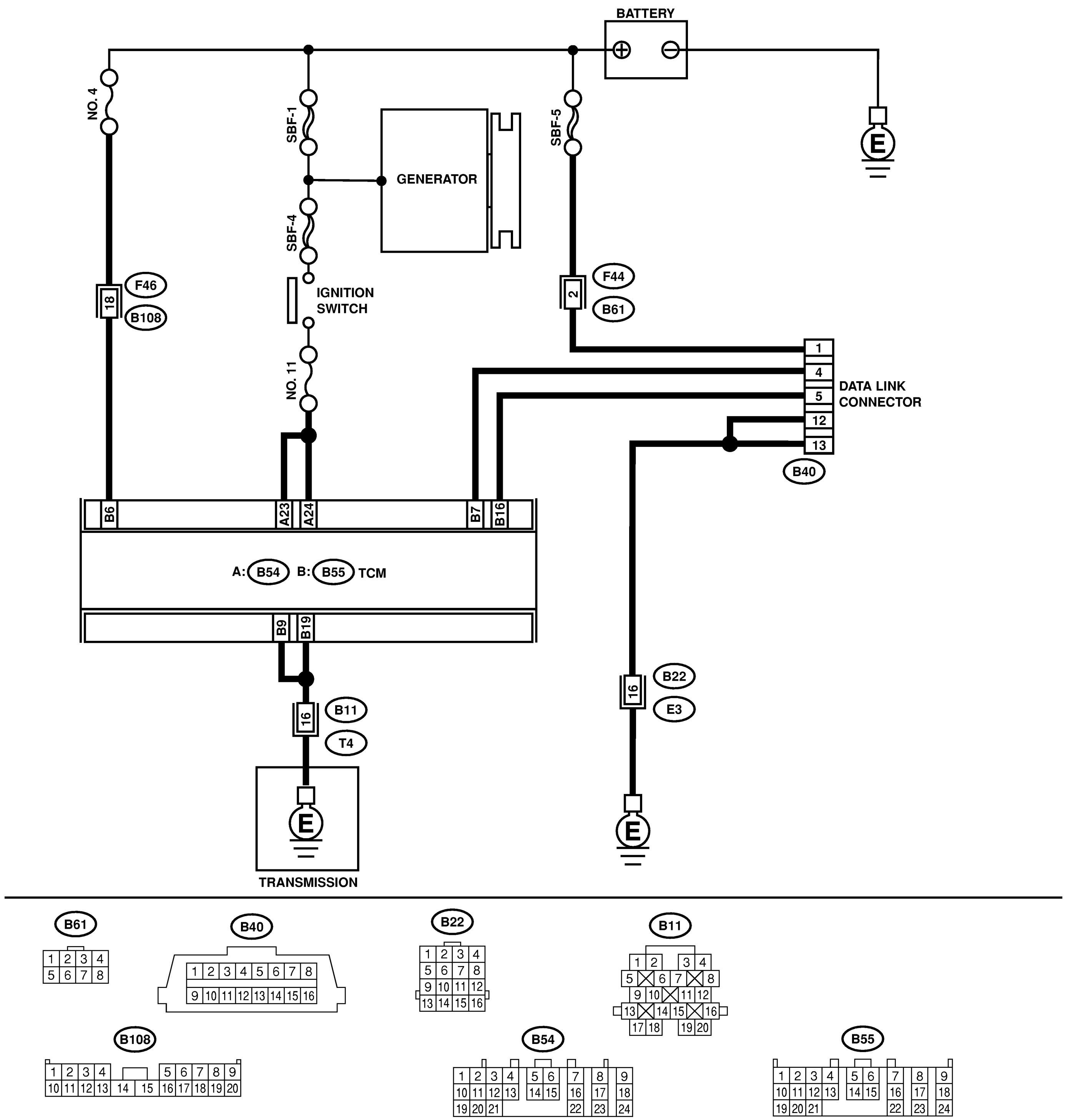
No.	Step	Check	Yes	No
1	**CHECK "AT OIL TEMP" WARNING LIGHT.** Turn ignition switch to ON (engine OFF).	Does "AT OIL TEMP" warning light illuminate?	Go to step **3**.	Go to step **2**.

No.	Step	Check	Yes	No
2	**CHECK "AT OIL TEMP" WARNING LIGHT.** 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove "AT OIL TEMP" warning light bulb from combination meter.	Is "AT OIL TEMP" warning light bulb OK?	Go to step **4**.	Replace "AT OIL TEMP" warning light bulb.
3	**CHECK "AT OIL TEMP" WARNING LIGHT.** Perform "Read Diagnostic Trouble Code (DTC)". <Ref. to AT-18, WITHOUT SUBARU SELECT MONITOR OPERATION, Read Diagnostic Trouble Code (DTC).>	Does "AT OIL TEMP" warning light blink?	A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM, inhibitor switch and combination meter.	Go to step **9**.
4	**CHECK FUSE (No. 5).** Remove fuse (No. 5).	Is the fuse (No. 5) blown out?	Replace fuse (No. 5). If replaced fuse (No. 5) is blown out easily, repair short circuit in harness between fuse (No. 5) and combination meter.	Go to step **5**.
5	**CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND IGNITION RELAY.** 1) Turn ignition switch to ON (engine OFF). 2) Measure voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 2 (+) — Chassis ground (−):***	Is voltage more than 9 V?	Go to step **6**.	Repair open or short circuit in harness between combination meter and battery.
6	**CHECK COMBINATION METER.** Measure voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i12) No. 15 (+) — Chassis ground (−):***	Is voltage less than 1 V?	Go to step **7**.	Repair combination meter. <Ref. to IDI-12, Combination Meter Assembly.>
7	**CHECK OPEN CIRCUIT OF HARNESS.** 1) Turn ignition switch to OFF. 2) Disconnect TCM and combination meter connector. 3) Measure resistance of harness between combination meter. ***Connector & terminal*** ***(B54) No. 3 — (i12) No. 15:***	Is the resistance less than 1 Ω?	Go to step **8**.	Repair open circuit in harness between TCM and combination meter, and poor contact in coupling connector.
8	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect connector to TCM and combination meter. 2) Turn ignition switch to ON (engine OFF). 3) Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 3 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Even if "AT OIL TEMP" warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>
9	**CHECK SUBARU SELECT MONITOR.**	Do you have SUBARU SELECT MONITOR?	Go to step **10**.	Go to step **11**.

No.	Step	Check	Yes	No
10	**CHECK INHIBITOR SWITCH.** 1) Connect Subaru Select Monitor to data link connector. 2) Turn ignition switch to ON. 3) Subaru Select Monitor to ON. 4) Read data of range switch using Subaru Select Monitor. ● Range switch is indicated in ON ⇔ OFF.	When each range is selected, does LED of Subaru Select Monitor light up?	Go to step **11**.	Check inhibitor switch circuit. <Ref. to AT-102, CHECK INHIBITOR SWITCH., Diagnostic Procedure for No-diagnostic Trouble Code (DTC).>
11	**CHECK SHORT CIRCUIT OF HARNESS.** 1) Disconnect connector from TCM. 2) Remove combination meter. 3) Disconnect connector from combination meter. 4) Measure resistance of harness connector between TCM and chassis ground. ***Connector & terminal/specified resistance*** ***(B54) No. 3 (+) — Chassis ground (−):***	Is the resistance less than 1 MΩ?	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>	Repair short circuit in harness between combination meter connector and TCM connector.

B: CHECK POWER SUPPLY AND GROUND LINE S004795G86

WIRING DIAGRAM:



S3M0660

No.	Step	Check	Yes	No
1	**CHECK IGNITION SWITCH.**	Is ignition switch ON?	Go to step **2**.	Turn ignition switch ON.
2	**CHECK GENERATOR.** 1) Start the engine. 2) Idle the engine. 3) Measure voltage between generator and chassis ground. ***Terminal*** ***Generator B terminal (+) — Chassis ground (−):***	Is the voltage between 10 and 15 V?	Go to step **3**.	Repair generator. <Ref. to SC-12, Generator.>
3	**CHECK BATTERY TERMINAL.** Turn ignition switch to OFF.	Is there poor contact at battery terminal?	Repair battery terminal.	Go to step **4**.
4	**CHECK POWER SUPPLY OF TCM.** 1) Disconnect connector from TCM. 2) Turn ignition switch to ON. 3) Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 6 (+) — Chassis ground (−):***	Is the voltage between 10 and 15 V?	Go to step **6**.	Go to step **5**.
5	**CHECK FUSE (NO. 4).** Remove fuse (No. 4).	Is the fuse (No. 4) blown out?	Replace fuse (No. 4). If replaced fuse (No. 4) has blown out easily, repair short circuit in harness between fuse (No. 4) and TCM.	Repair open circuit in harness between fuse (No. 4) and TCM, or fuse (No. 4) and battery, and poor contact in coupling connector.
6	**CHECK IGNITION POWER SUPPLY CIRCUIT.** 1) Turn ignition switch to ON (engine OFF). 2) Measure ignition power supply voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 23 (+) — Chassis ground (–):*** ***(B54) No. 24 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **8**.	Go to step **7**.
7	**CHECK FUSE (NO. 11).** Remove fuse (No. 11).	Is the fuse (No. 11) blown out?	Replace fuse (No. 11). If replaced fuse (No. 11) has blown out easily, repair short circuit in harness between fuse (No. 11) and TCM.	Repair open circuit in harness between fuse (No. 11) and TCM, or fuse (No. 11) and battery, and poor contact in coupling connector.
8	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 19 — (B11) No. 16*** ***(B55) No. 9 — (B11) No. 16***	Is the resistance less than 1 Ω?	Go to step **9**.	Repair open circuit in harness between TCM and transmission harness connector, and poor contact in coupling connector.

No.	Step	Check	Yes	No
9	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND TRANSMISSION GROUND.** Measure resistance of harness between transmission and transmission ground. ***Connector & terminal*** ***(T4) No. 16 — Transmission ground:***	Is the resistance less than 1 Ω?	Go to step **10**.	Repair open circuit in harness between transmission and transmission ground.
10	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in control module power supply and ground line?	Repair connector.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>

MEMO:

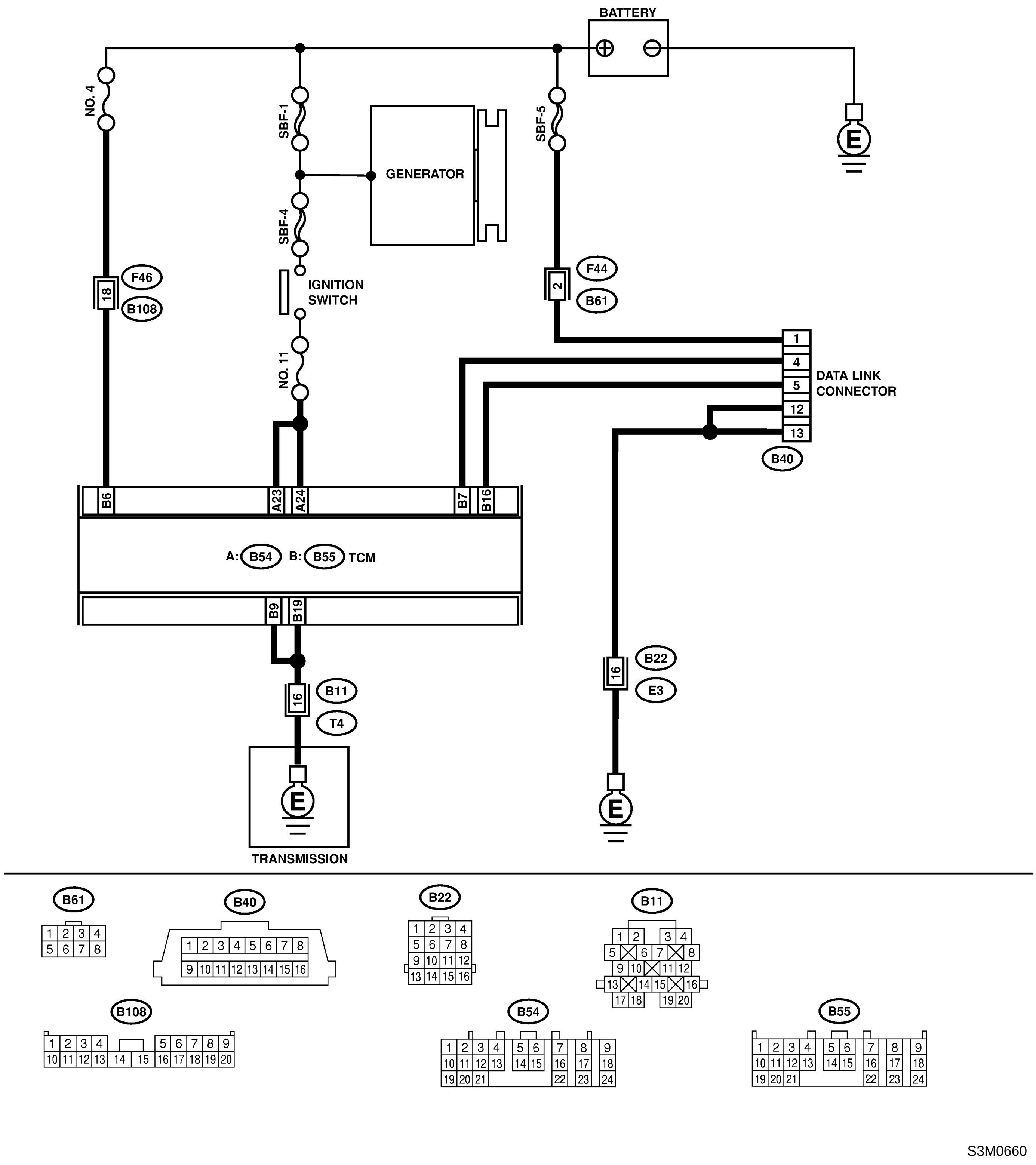
13. Diagnostic Procedure for Select Monitor Communication S004782

A: COMMUNICATION FOR INITIALIZING IMPOSSIBLE S004782E34

DIAGNOSIS:
- Faulty harness connector

TROUBLE SYMPTOM:
- Select monitor communication failure

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK SUBARU SELECT MONITOR POWER SUPPLY CIRCUIT.** Measure voltage between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 1 — Chassis ground:***	Is the voltage more than 10 V?	Go to step **2**.	Repair harness and connector between battery and data link connector, and poor contact in coupling connector.
2	**CHECK SUBARU SELECT MONITOR GROUND CIRCUIT.** Measure resistance of harness between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 12 — Chassis ground:*** ***(B40) No. 13 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair open circuit in harness between data link connector and ground terminal, and poor contact in coupling connector.
3	**CHECK COMMUNICATION OF SELECT MONITOR.** 1) Turn ignition switch to ON. 2) Using the select monitor, check whether communication to other systems (such as engine, ABS etc.) can be executed normally.	Are the name and year of the system displayed on the select monitor?	Go to step **8**.	Go to step **4**.
4	**CHECK COMMUNICATION OF SELECT MONITOR.** 1) Turn ignition switch to OFF. 2) Disconnect TCM connector. 3) Check whether communication to other systems (such as ABS etc.) can be executed normally.	Are the name and year of the system displayed on the select monitor?	Go to step **10**.	Go to step **5**.
5	**CHECK COMMUNICATION OF SELECT MONITOR.** 1) Turn ignition switch to OFF. 2) Connect TCM connector. 3) Disconnect ECM connector. 4) Check whether communication to other systems (such as ABS etc.) can be executed normally.	Are the name and year of the system displayed on the select monitor?	Inspect ECM.	Go to step **6**.
6	**CHECK COMMUNICATION OF SELECT MONITOR.** 1) Turn ignition switch to OFF. 2) Connect ECM connector. 3) Disconnect ABSCM&H/U connector. 4) Check whether communication to other systems (such as engine etc.) can be executed normally.	Are the name and year of the system displayed on the select monitor?	Inspect ABSCM&H/U.	Go to step **7**.
7	**CHECK COMMUNICATION OF SELECT MONITOR.** 1) Turn ignition switch to OFF. 2) Connect ABSCM&H/U module connector. 3) Disconnect cruise control module connector. 4) Check whether communication to other systems (such as engine etc.) can be executed normally. NOTE: If the vehicle is not equipped with cruise control, Go to step **8**.	Are the name and year of the system displayed on the select monitor?	Inspect cruise control module.	Go to step **8**.

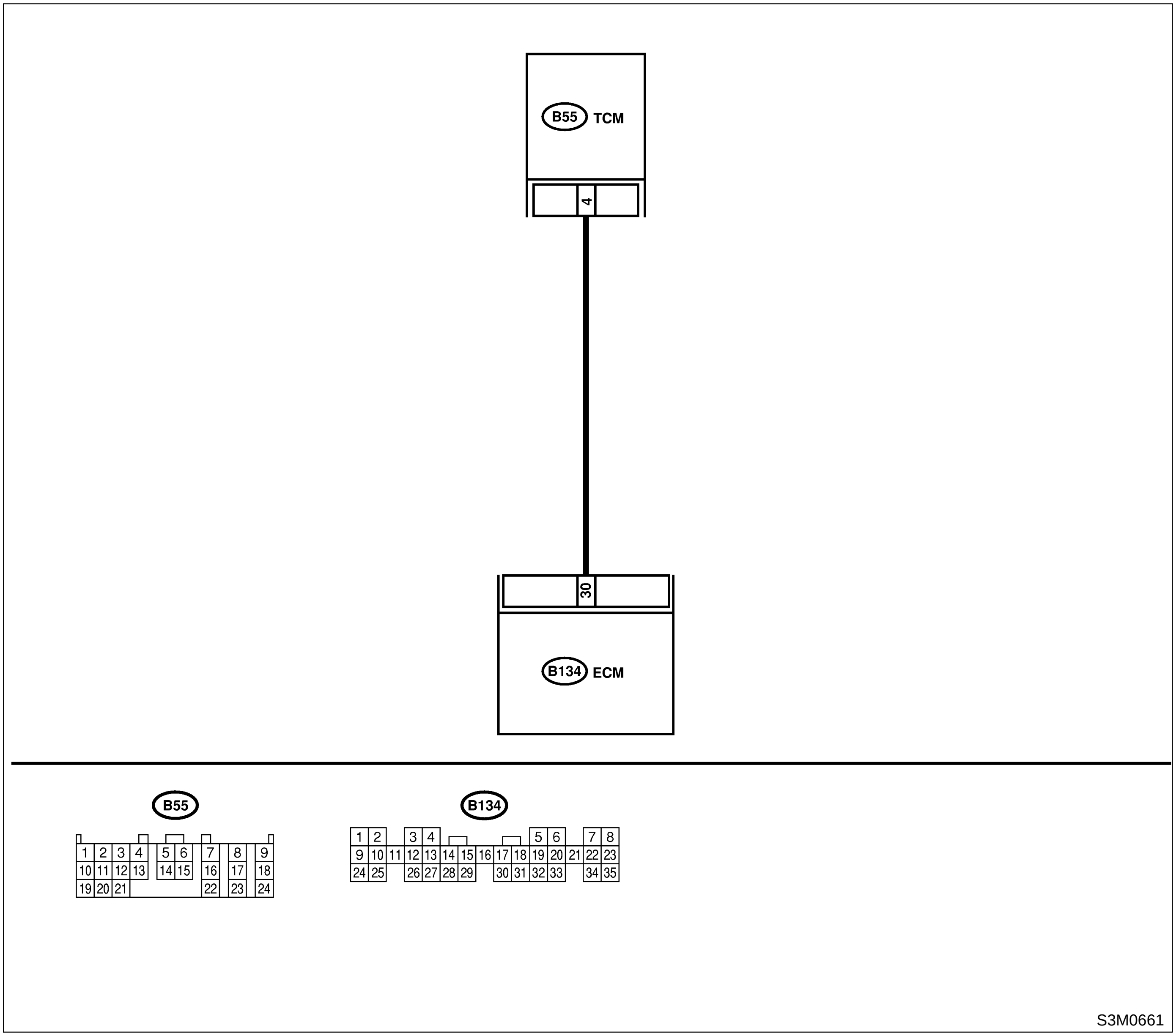
No.	Step	Check	Yes	No
8	**CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect TCM, ECM, ABSCM&H/U and cruise control module connectors. 3) Measure resistance between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 5 — Chassis ground:*** ***(B40) No. 4 — Chassis ground:***	Is the resistance more than 1M Ω?	Go to step **9**.	Repair harness and connector between each control module and data link connector.
9	**CHECK OUTPUT SIGNAL FOR TCM.** 1) Turn ignition switch to ON. 2) Measure voltage between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 5 — Chassis ground:*** ***(B40) No. 4 — Chassis ground:***	Is the voltage more than 1 V?	Repair harness and connector between each control module and data link connector.	A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the circuit.
10	**CHECK HARNESS/CONNECTOR BETWEEN TCM AND DATA LINK CONNECTOR.** Measure resistance between TCM connector and data link connector. ***Connector & terminal*** ***(B56) No. 6 — (B40) No. 5:*** ***(B56) No. 15 — (B40) No. 4:***	Is the resistance less than 0.5 Ω?	Go to step **11**.	Repair harness and connector between TCM and data link connector.
11	**CHECK INSTALLATION OF TCM CONNECTOR.** Turn ignition switch to OFF.	Is TCM connector inserted into TCM?	Go to step **12**.	Insert TCM connector into TCM.
12	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in control module and data link connector?	Repair poor contact.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>

14. Diagnostic Procedure with Diagnostic Trouble Code (DTC) S004521

A: DTC 11 ENGINE SPEED SIGNAL S004521I10

DIAGNOSIS:
Engine speed input signal circuit is open or shorted.
TROUBLE SYMPTOM:
- No lock-up (after engine warm-up).
- AT OIL TEMP warning light remains on when vehicle speed is "0".

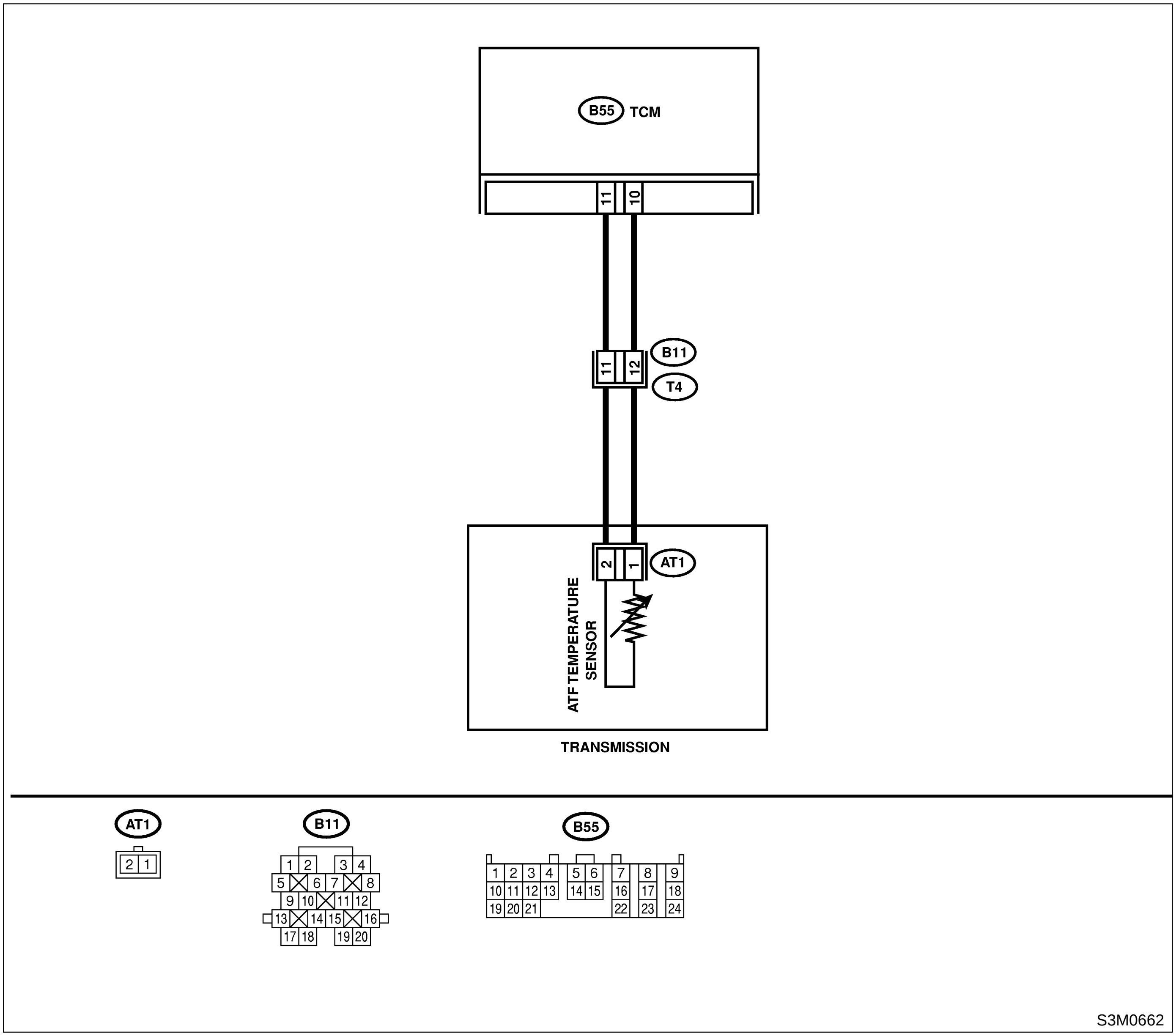
WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and ECM. 3) Measure resistance of harness between TCM and ECM connector. ***Connector & terminal*** ***(B55) No. 4 — (B134) No. 30:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair open circuit in harness between TCM and ECM connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** Measure resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair short circuit in harness between TCM and ECM connector.
3	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **5**.	Go to step **4**.
4	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect connectors to TCM and ECM. 2) Turn ignition switch to ON (engine OFF). 3) Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 10.5 V?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step **6**.
5	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect connectors to TCM and ECM. 2) Connect Subaru Select Monitor to data link connector. 3) Start the engine, and turn Subaru Select Monitor switch to ON. 4) Warm-up the engine until engine coolant temperature is above 80°C (176°F). 5) Engine idling. 6) Read data of engine speed using Subaru Select Monitor. ● Display shows engine speed signal value sent from ECM.	Is the revolution value the same as the tachometer reading shown on the combination meter?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step **6**.
6	**CHECK POOR CONTACT.**	Is there poor contact in engine speed signal circuit?	Repair poor contact.	Go to step **7**.
7	**CONFIRM DTC 11.**	Replace ECM with a new one. Does the trouble code appear again, after the memory has been cleared?	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>	Replace ECM.

B: DTC 27 ATF TEMPERATURE SENSOR *S004521I11*

DIAGNOSIS:
Input signal circuit of TCM to ATF temperature sensor is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



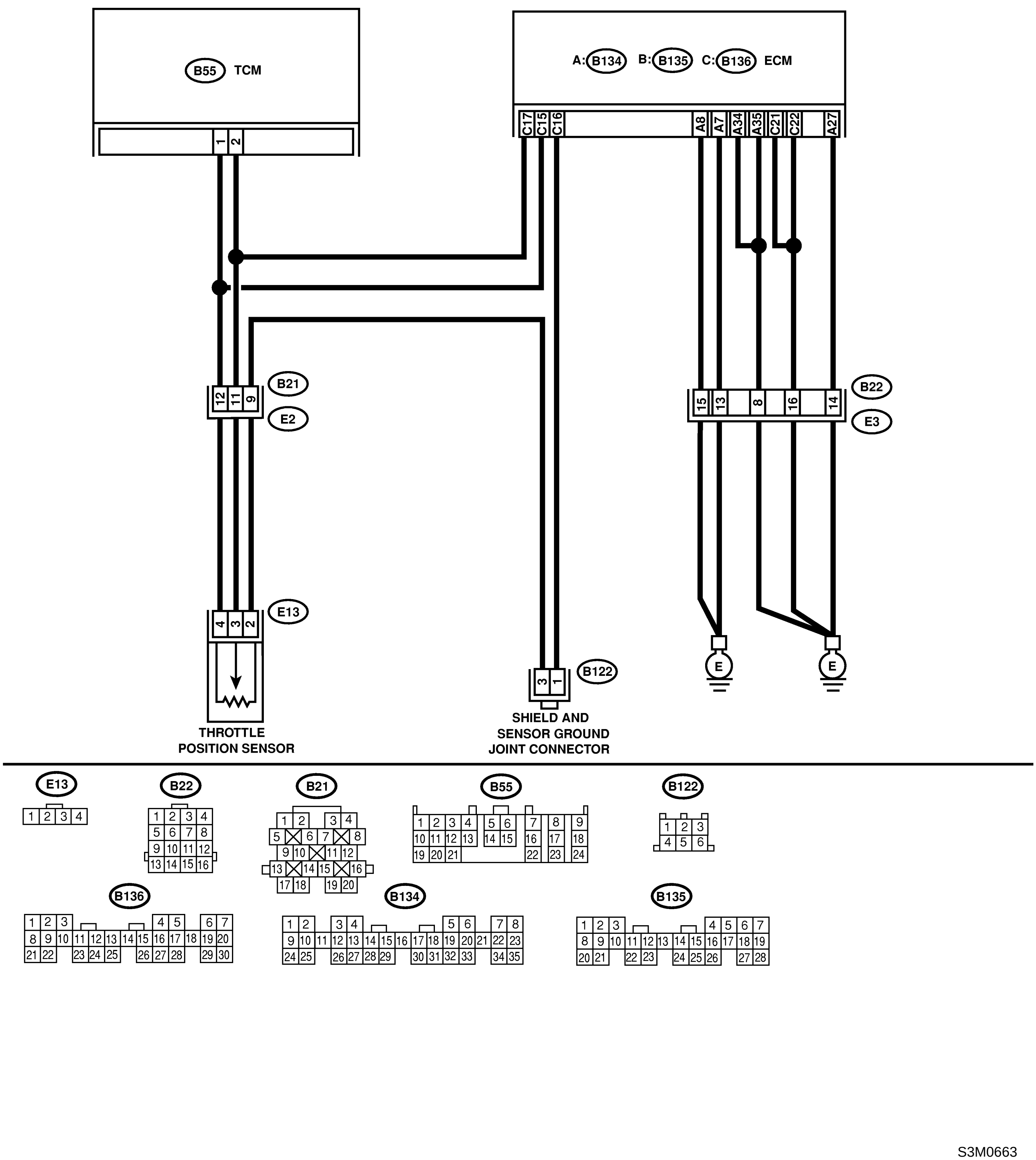
No.	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission and TCM. 3) Measure resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 10 — (B11) No. 12:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.** Measure resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 11 — (B11) No. 11:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair open circuit in harness between TCM and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.** Measure resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Repair short circuit in harness between TCM and transmission connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.** Measure resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Repair short circuit in harness between TCM and transmission connector.
5	**CHECK ATF TEMPERATURE SENSOR.** 1) Turn ignition switch to OFF. 2) Connect connectors to transmission and TCM. 3) Turn ignition switch to ON and start engine. 4) Warm-up the transmission until ATF temperature reaches to 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Disconnect connector from transmission. 6) Measure resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 11 — No. 12:***	Is the resistance between 275 and 375 Ω?	Go to step **6**.	Go to step **11**.
6	**CHECK ATF TEMPERATURE SENSOR.** 1) Turn ignition switch to ON (engine OFF). 2) Measure resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 11 — No. 12:***	Does the resistance value increase while the ATF temperature decreases?	Go to step **7**.	Go to step **11**.
7	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **9**.	Go to step **8**.

No.	Step	Check	Yes	No
8	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect connector to transmission. 2) Warm-up the transmission until ATF temperature is about 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3) Measure voltage between TCM connector terminal. ***Connector & terminal*** ***(B55) No. 11 (+) — No. 10 (−):***	Is the voltage between 0.4 and 0.9 V?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. Temporary poor contact of the connector or harness may be the case. Repair harness or contact in the ATF temperature sensor and transmission connector.	Go to step **10**.
9	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect connector to transmission. 2) Turn ignition switch to ON (engine OFF).	Does the ATF temperature gradually decrease?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. Temporary poor contact of the connector or harness may be the case. Repair harness or contact in the ATF temperature sensor and transmission connector.	Go to step **10**.
10	**CHECK POOR CONTACT.**	Is there poor contact in ATF temperature sensor circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>
11	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission. 3) Remove transmission connector from bracket. 4) Lift-up the vehicle and place safety stand. **CAUTION:** **On AWD models, raise all wheels off ground.** 5) Drain automatic transmission fluid. **CAUTION:** **Do not drain the automatic transmission fluid until it cools down.** 6) Remove oil pan, and disconnect connector from ATF temperature sensor connector. 7) Measure resistance of harness between ATF temperature sensor and transmission connector. ***Connector & terminal*** ***(T4) No. 11 — (AT1) No. 2:***	Is the resistance less than 1 Ω?	Go to step **12**.	Repair open circuit in harness between ATF temperature sensor and transmission connector.

No.	Step	Check	Yes	No
12	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.** Measure resistance of harness between ATF temperature sensor and transmission connector. ***Connector & terminal*** ***(T4) No. 12 — (AT1) No. 1:***	Is the resistance less than 1 Ω?	Go to step **13**.	Repair open circuit in harness between ATF temperature sensor and transmission connector.
13	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.** Measure resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 11 — Transmission ground:***	Is the resistance more than 1 MΩ?	Go to step **14**.	Repair short circuit in harness between ATF temperature sensor and transmission connector.
14	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.** Measure resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 12 — Transmission ground:***	Is the resistance more than 1 MΩ?	Replace ATF temperature sensor. <Ref. to AT-39, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>	Repair short circuit in harness between ATF temperature sensor and transmission connector.

C: DTC 31 THROTTLE POSITION SENSOR *S004521G62*

DIAGNOSIS:
Input signal circuit of throttle position sensor is open or shorted.
TROUBLE SYMPTOM:
Shift point too high or too low; excessive shift shock; excessive tight corner “braking”.
WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK ENGINE GROUND TERMINALS.**	Have engine ground terminals been tightened?	Go to step **2**.	Tighten engine ground terminals.
2	**CHECK GROUND CIRCUIT OF ECM.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between ECM and engine ground. ***Connector & terminal*** ***(B134) No. 27 — Engine ground:*** ***(B134) No. 8 — Engine ground:*** ***(B134) No. 7 — Engine ground:*** ***(B136) No. 21 — Engine ground:*** ***(B136) No. 22 — Engine ground:*** ***(B134) No. 35 — Engine ground:*** ***(B134) No. 34 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **3**.	Repair open circuit in harness between ECM connector and engine grounding terminal.
3	**CHECK THROTTLE POSITION SENSOR.** 1) Disconnect connector from throttle position sensor. 2) Measure resistance between throttle position sensor connector receptacle's terminals. ***Terminals*** ***No. 4 — No. 2:***	Is the resistance between 3.0 and 4.2 kΩ?	Go to step **4**.	Replace throttle position sensor.
4	**CHECK THROTTLE POSITION SENSOR.** Measure resistance between throttle position sensor connector receptacle's terminals. ***Terminals*** ***No. 2 — No. 3:***	Is the resistance between 0.35 and 0.5 kΩ?	Go to step **5**.	Replace throttle position sensor.
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.** 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM and throttle position sensor connector. ***Connector & terminal*** ***(B55) No. 2 — (E13) No. 3:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.
6	**CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.** Measure resistance of harness between TCM and throttle position sensor connector. ***Connector & terminal*** ***(B55) No. 1 — (E13) No. 4:***	Is the resistance less than 1 Ω?	Go to step **7**.	Repair open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.
7	**CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.** Measure resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8**.	Repair short circuit in harness between TCM and throttle position sensor connector.
8	**CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.** Measure resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **9**.	Repair short circuit in harness between TCM and throttle position sensor connector.

No.	Step	Check	Yes	No
9	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** Measure resistance of harness between TCM and ECM connector. ***Connector & terminal*** ***(B55) No. 2 — (B136) No. 17:***	Is the resistance less than 1 Ω?	Go to step **10**.	Repair open circuit in harness between TCM and ECM connector.
10	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** Measure resistance of harness between TCM and ECM connector. ***Connector & terminal*** ***(B55) No. 1 — (B136) No. 15:***	Is the resistance less than 1 Ω?	Go to step **11**.	Repair open circuit in harness between TCM and ECM connector.
11	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **14**.	Go to step **12**.
12	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect connectors to TCM, throttle position sensor and ECM. 2) Turn ignition switch to ON (engine OFF). 3) Close the throttle completely. 4) Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 2 (+) — Chassis ground (−):***	Is the voltage approx. 0.5 V in throttle fully closed?	Go to step **13**.	Go to step **18**.
13	**CHECK INPUT SIGNAL FOR TCM.** 1) Open the throttle completely. 2) Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 2 (+) — Chassis ground (−):***	Is the voltage approx. 4.3 V with throttle fully open?	Go to step **16**.	Go to step **18**.
14	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect connectors to TCM, throttle position sensor and ECM. 2) Connect Subaru Select Monitor to data link connector. 3) Turn ignition switch to ON (engine OFF). 4) Turn Subaru Select Monitor switch to ON. 5) Throttle fully closed. 6) Read data of throttle position sensor using Subaru Select Monitor. ● Throttle position sensor input signal is indicated.	Is the value voltage approx. 0.5 V?	Go to step **15**.	Go to step **18**.
15	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** Throttle fully open. NOTE: Must be changed correspondingly with accelerator pedal operation (from “released” to “depressed” position).	Is the value voltage approx. 4.3 V?	Go to step **17**.	Go to step **18**.

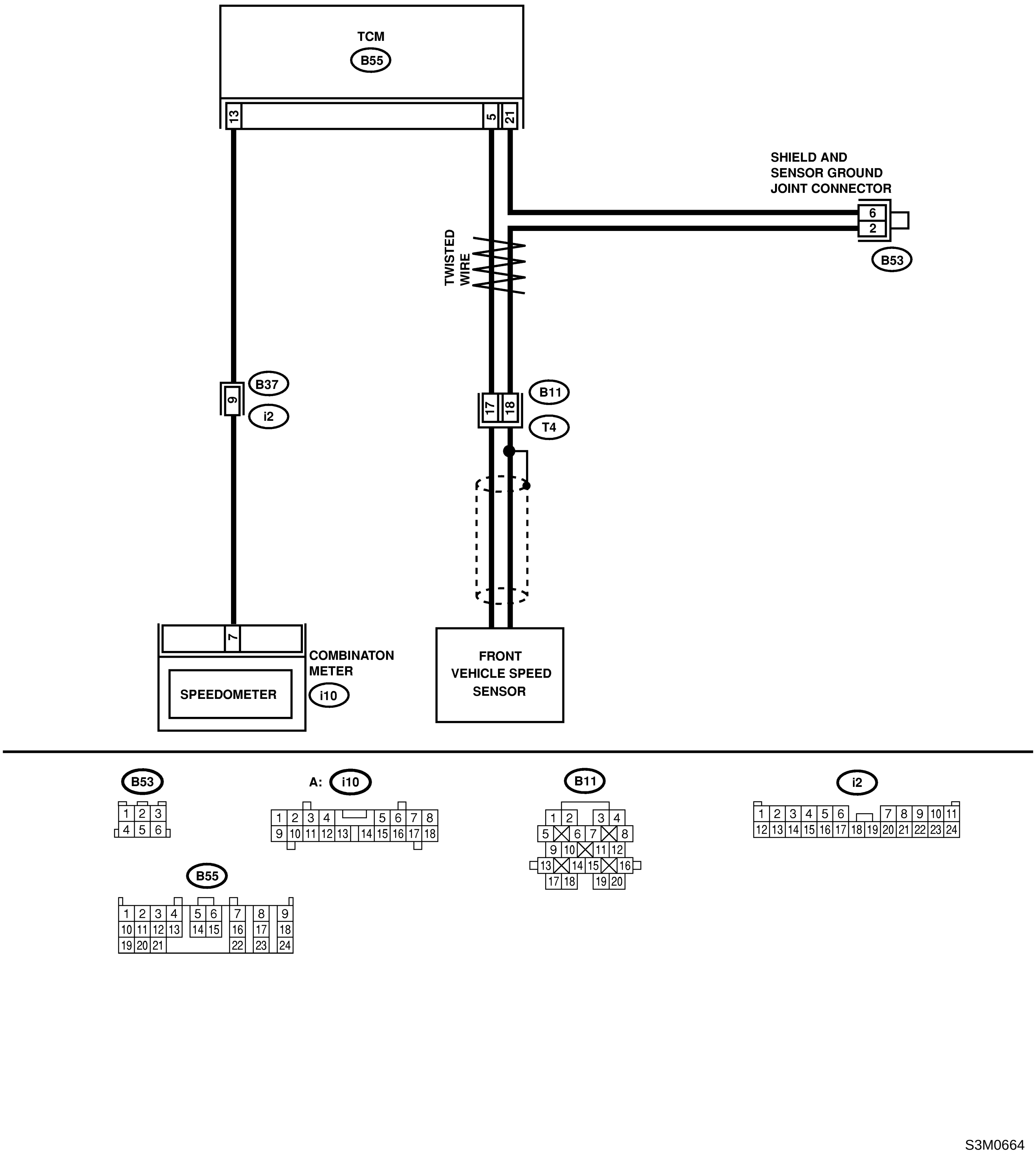
No.	Step	Check	Yes	No
16	**CHECK INPUT SIGNAL FOR TCM (THROTTLE POSITION SENSOR POWER SUPPLY).** Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B51) No. 1 (+) — Chassis ground (−):***	Is the voltage approx. 5 V?	Even if “AT OIL TEMP” warning —lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in throttle position sensor circuit.	Go to step **18**.
17	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR (THROTTLE POSITION SENSOR POWER SUPPLY).** Read data of throttle position sensor power supply using Subaru Select Monitor. ● Throttle position sensor power supply voltage is indicated.	Is the value voltage approx. 5 V?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in throttle position sensor circuit.	Go to step **18**.
18	**CHECK POOR CONTACT.**	Is there poor contact in throttle position sensor circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>

D: DTC 33 FRONT VEHICLE SPEED SENSOR S004521I13

DIAGNOSIS:
- The vehicle speed signal is abnormal.
- The circuit in combination meter is faulty.
- The harness connector between TCM and vehicle speed sensor is in short or open.

TROUBLE SYMPTOM:
- Erroneous idling.
- Engine stalls.
- Poor driving performance.

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 5 — (B11) No. 17:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 21 — (B11) No. 18:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 21 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Repair short circuit in harness between TCM and transmission connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Repair short circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
5	**CHECK FRONT VEHICLE SPEED SENSOR.** Measure resistance between transmission connector receptacle's terminals. ***Connector & terminal*** ***(T4) No. 17 — No. 18:***	Is the resistance between 450 and 650 Ω?	Go to step **6**.	Replace front vehicle speed sensor. <Ref. to AT-32, Front Vehicle Speed Sensor.>
6	**PREPARE OSCILLOSCOPE.**	Do you have oscilloscope?	Go to step **9**.	Go to step **7**.
7	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **10**.	Go to step **8**.

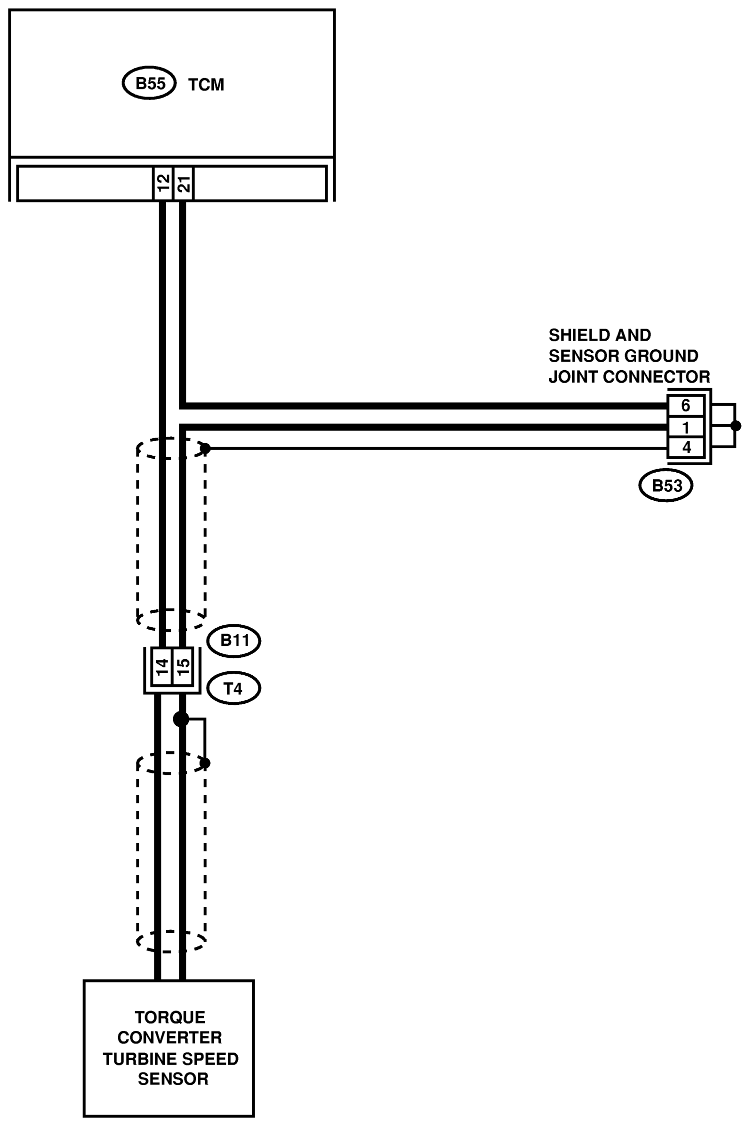
No.	Step	Check	Yes	No
8	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect all connectors. 2) Lift-up or raise the vehicle and place safety stands. **CAUTION:** **On AWD models, raise all wheels off floor.** 3) Start the engine and set vehicle in 20 km/h (12 MPH) condition. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.> 4) Measure voltage between TCM connector terminals. ***Connector & terminal*** ***(B55) No. 5 (+) — No. 21 (−):***	Is the voltage more than AC 1 V?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor connector or harness may be the case. Repair harness or connector in the front vehicle speed sensor circuit.	Go to step **11**.
9	**CHECK FRONT VEHICLE SPEED SENSOR USING OSCILLOSCOPE.** 1) Connect all connectors. 2) Lift-up the vehicle and place safety stand. **CAUTION:** **On AWD models, raise all wheels off ground.** 3) Set oscilloscope to TCM connector terminals. Positive probe; (B55) No. 5 Earth lead; (B54) No. 21 4) Start the engine, and drive the wheels slowly. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunctions. When AT control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system. <Ref. to ABS-22, Clear Memory Mode.> 5) Measure signal voltage indicated on oscilloscope.	Is the voltage more than AC 4 V?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor connector or harness may be the case. Repair harness or connector in the front vehicle speed sensor circuit.	Go to step **11**.

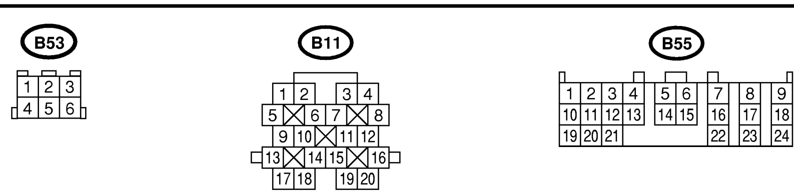
No.	Step	Check	Yes	No
10	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all connectors. 2) Connect Subaru Select Monitor to data link connector. 3) Lift-up or raise the vehicle and place safety stands. **CAUTION:** **On AWD models, raise all wheels off floor.** 4) Turn ignition switch to ON and turn Subaru Select Monitor switch to ON. 5) Start the engine. 6) Read data of vehicle speed using Subaru Select Monitor. ● Compare speedometer with Subaru Select Monitor indications. ● Vehicle speed is indicated in “km/h” or “MPH”. 7) Slowly increase vehicle speed to 60 km/h or 37 MPH. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.>	Does the speedometer indication increase as the Subaru Select Monitor data increases?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor connector or harness may be the case. Repair harness or connector in the front vehicle speed sensor circuit.	Go to step **11**.
11	**CHECK POOR CONTACT.**	Is there poor contact in front vehicle speed sensor circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>

MEMO:

E: DTC 36 TORQUE CONVERTER TURBINE SPEED SENSOR S004521I14

DIAGNOSIS:
Input signal circuit of TCM is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:





S3M0665

No.	Step	Check	Yes	No
1	**CHECK TORQUE CONVERTER TURBINE SPEED SENSOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission. 3) Measure resistance between transmission connector receptacle's terminals. ***Connector & terminal*** ***(T4) No. 14 — No. 15:***	Is the resistance between 450 and 650 Ω?	Go to step **2**.	Replace turbine speed sensor. <Ref. to AT-36, Torque Converter Turbine Speed Sensor.>
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 12 — (B11) No. 14:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair open circuit in harness between TCM and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 21— (B11) No. 15:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 21 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Repair short circuit in harness between TCM and transmission connector.
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 12 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Repair short circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
6	**PREPARE OSCILLOSCOPE.**	Do you have oscilloscope?	Go to step **10**.	Go to step **7**.
7	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **9**.	Go to step **8**.
8	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect connectors to TCM and transmission. 2) Start the engine and move select lever to "P" or "N" range. 3) Measure voltage between TCM connector terminals. ***Connector & terminal*** ***(B55) No. 12 (+) — No. 21 (−):***	Is the voltage more than AC 1 V?	Even if "AT OIL TEMP" warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step **11**.

No.	Step	Check	Yes	No
9	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect connectors to TCM and transmission. 2) Connect Subaru Select Monitor to data link connector. 3) Turn ignition switch to ON and turn Subaru Select Monitor switch to ON. 4) Start the engine. 5) Move select lever to “P” or “N” range. 6) Read data of turbine speed using Subaru Select Monitor. ● Compare tachometer with Subaru Select Monitor indications.	Is the revolution value same as the tachometer reading shown on the combination meter?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step **11**.
10	**CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.** 1) Connect connectors to TCM and transmission. 2) Set oscilloscope to TCM connector terminals. Positive probe; (B55) No. 12 Earth lead; (B55) No. 21 3) Start the engine and move select lever to “P” or “N” range.	Is the signal voltage more than AC 1 V?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step **11**.
11	**CHECK POOR CONTACT.**	Is there poor contact in torque converter turbine speed sensor circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>

MEMO:

F: DTC 38 TORQUE CONTROL SIGNAL S004521G66

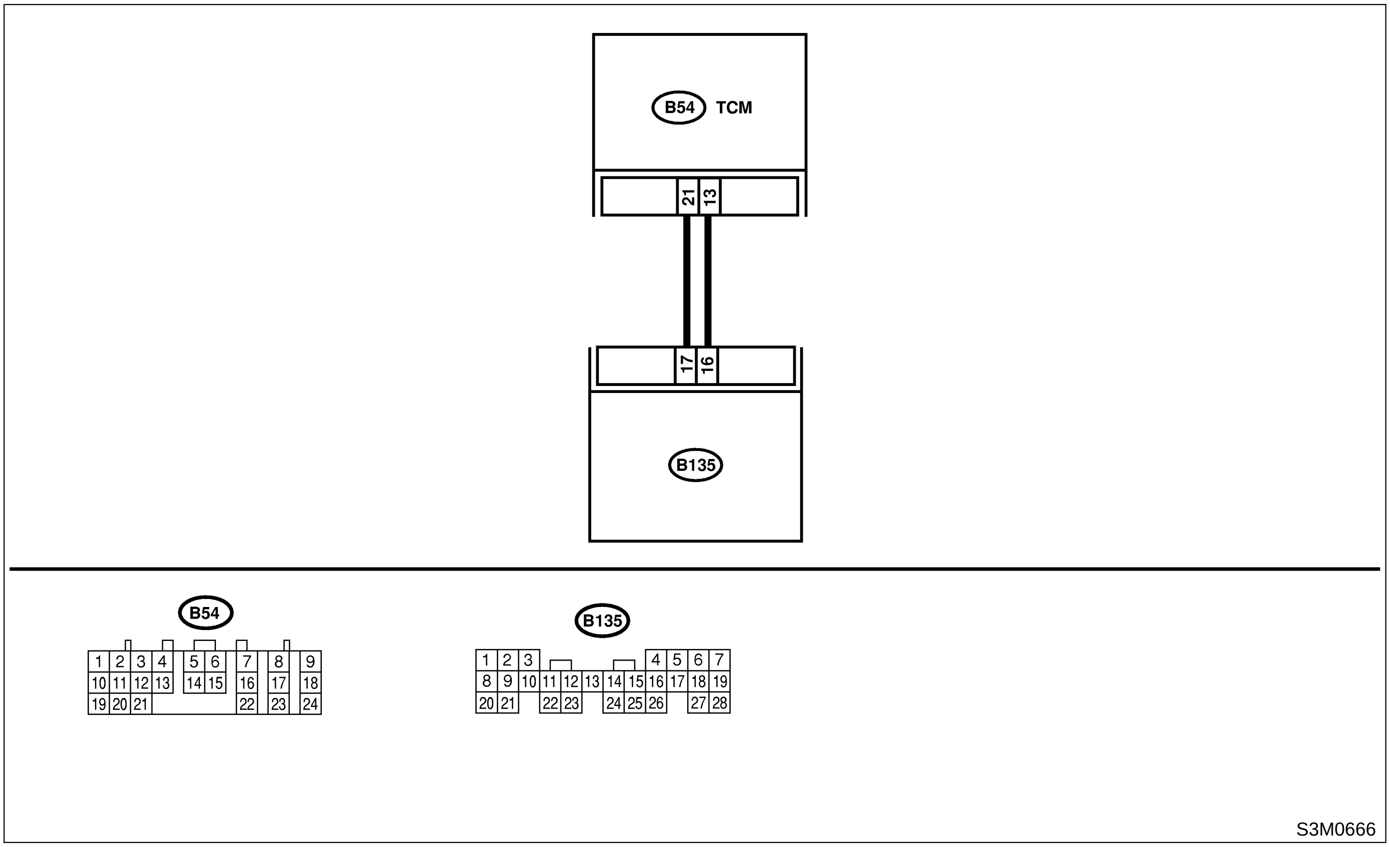
DIAGNOSIS:

- The signal circuit is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and ECM. 3) Measure resistance of harness between TCM and ECM connector. ***Connector & terminal*** ***(B54) No. 21 — (B135) No. 17:*** ***(B54) No. 13 — (B135) No. 16:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair open circuit in harness between TCM and ECM connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** Measure resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 21 — Chassis ground:*** ***(B54) No. 13 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair short circuit in harness between TCM and ECM connector.

No.	Step	Check	Yes	No
3	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Connect connectors to TCM and ECM. 2) Turn ignition switch to ON (engine OFF). 3) Measure voltage between TCM connector terminals. ***Connector & terminal*** ***(B54) No. 21 (+) — Chassis ground (−):*** ***(B54) No. 13 (+) — Chassis ground (−):***	Is the voltage more than 4 V?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step **4**.
4	**CHECK POOR CONTACT.**	Is there poor contact in torque control signal circuit?	Repair poor contact.	Go to step **5**.
5	**CHECK GROUND LINE BETWEEN TRANSMISSION AND BODY.** Check installing condition of ground line in transmission and body.	Is there any dirt or rust at ground line installing point?	Remove dirt and rust.	Go to step **6**.
6	**CHECK GROUND LINE BETWEEN TRANSMISSION AND BODY.** Check installing condition of ground line in transmission and body. ***Tightening torque:*** ***13±3 N·m (1.3±0.3 kgf-m, 9.4±2.2 ft-lb)***	Is tightening torque value within specification?	Go to step **7**.	Tighten to specified torque.
7	**CHECK GROUND LINE INSIDE TRANSMISSION.** 1) Drain AT fluid and remove oil pan. 2) Check tightening torque value of ground line installing bolt. ***Tightening torque:*** ***T: 8±1 N·m (0.8±0.1 kgf-m, 5.8±0.7 ft-lb)***	Is tightening torque value within specification?	Go to step **9**.	Tighten to specified torque.
8	**CHECK GROUND CIRCUIT OF ECM.** <Ref. to AT-42, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Repair ground terminal and/or ground circuit of ECM.	Go to step **9**.
9	**RECHECK OUTPUT SIGNAL EMITTED FROM TCM.** Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 21 (+) — Chassis ground (−):*** ***(B55) No. 13 (+) — Chassis ground (−):***	Is each voltage more than 4 V?	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>	Replace ECM.

G: DTC 45 INTAKE MANIFOLD PRESSURE SIGNAL S004521I16

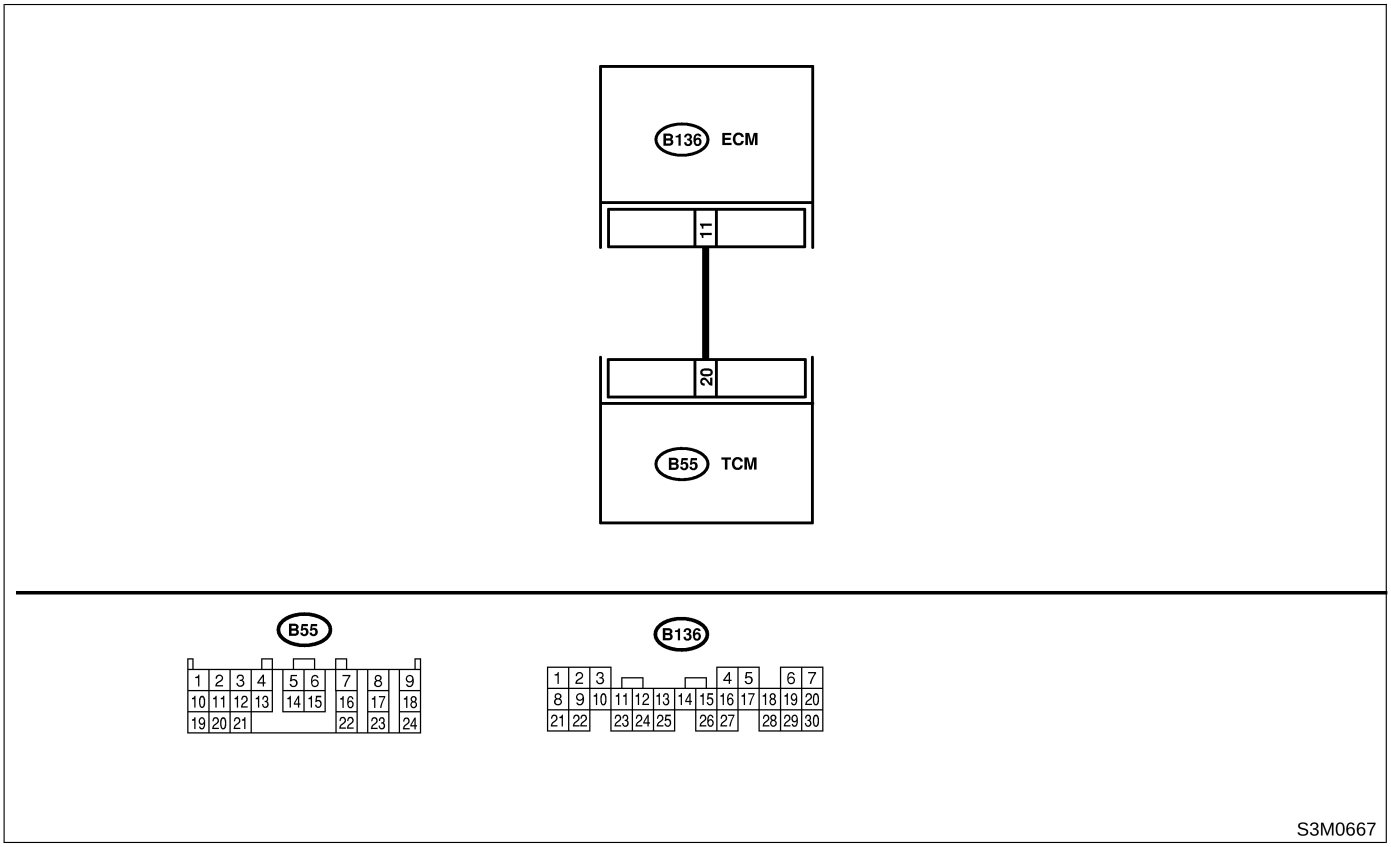
DIAGNOSIS:

Input signal circuit of TCM from ECM is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:

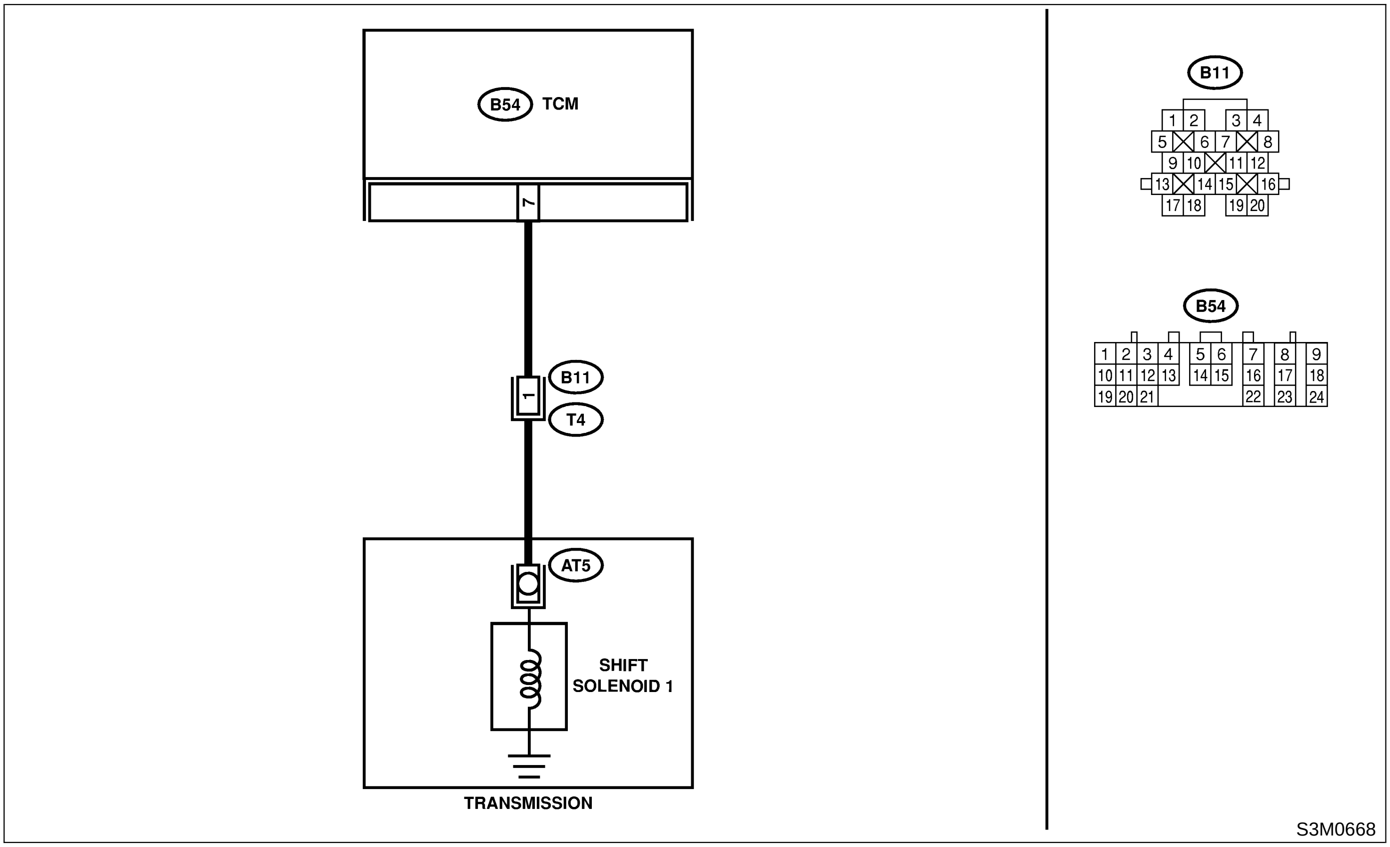


No.	Step	Check	Yes	No
1	**CHECK ENGINE GROUND TERMINALS AND GROUND CIRCUIT OF ECM** <Ref. to AT-42, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Repair ground terminal and/or ground circuit of ECM.	Go to step **2**.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and ECM. 3) Measure resistance of harness between TCM and ECM connector. ***Connector & terminal*** ***(B55) No. 20 — (B136) No. 11:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair open circuit in harness between TCM and ECM connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** Measure resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 20 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Repair short circuit in harness between TCM and ECM connector.
4	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **6**.	Go to step **5**.

No.	Step	Check	Yes	No
5	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect connectors to TCM and ECM. 2) Start the engine, and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3) Engine idling. 4) Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 20 (+) — Chassis ground (−):***	Is the voltage between 1.2 and 1.8 V?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step **7**.
6	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect connectors to TCM and ECM. 2) Connect Subaru Select Monitor to data link connector. 3) Start the engine, and turn Subaru Select monitor switch to ON. 4) Warm-up the engine until engine coolant temperature is above 80°C (176°F). 5) Engine idling. 6) Read data of intake manifold pressure signal using Subaru Select Monitor. ● Display shows intake manifold pressure signal value sent from ECM.	Is the value between 1.2 and 1.8 V?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step **7**.
7	**CHECK POOR CONTACT.**	Is there poor contact in intake manifold pressure signal circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>

H: DTC 71 SHIFT SOLENOID 1 S004521I17

DIAGNOSIS:
Output signal circuit of shift solenoid 1 is open or shorted.
TROUBLE SYMPTOM:
Does not shift.
WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and shift solenoid 1 connector. ***Connector & terminal*** ***(B54) No. 7 — (B11) No. 1:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair short circuit in harness between TCM and transmission connector.
3	**CHECK SHIFT SOLENOID 1.** Measure resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 1 — No. 16:***	Is the resistance between 10 and 16 Ω?	Go to step **4**.	Go to step **7**.

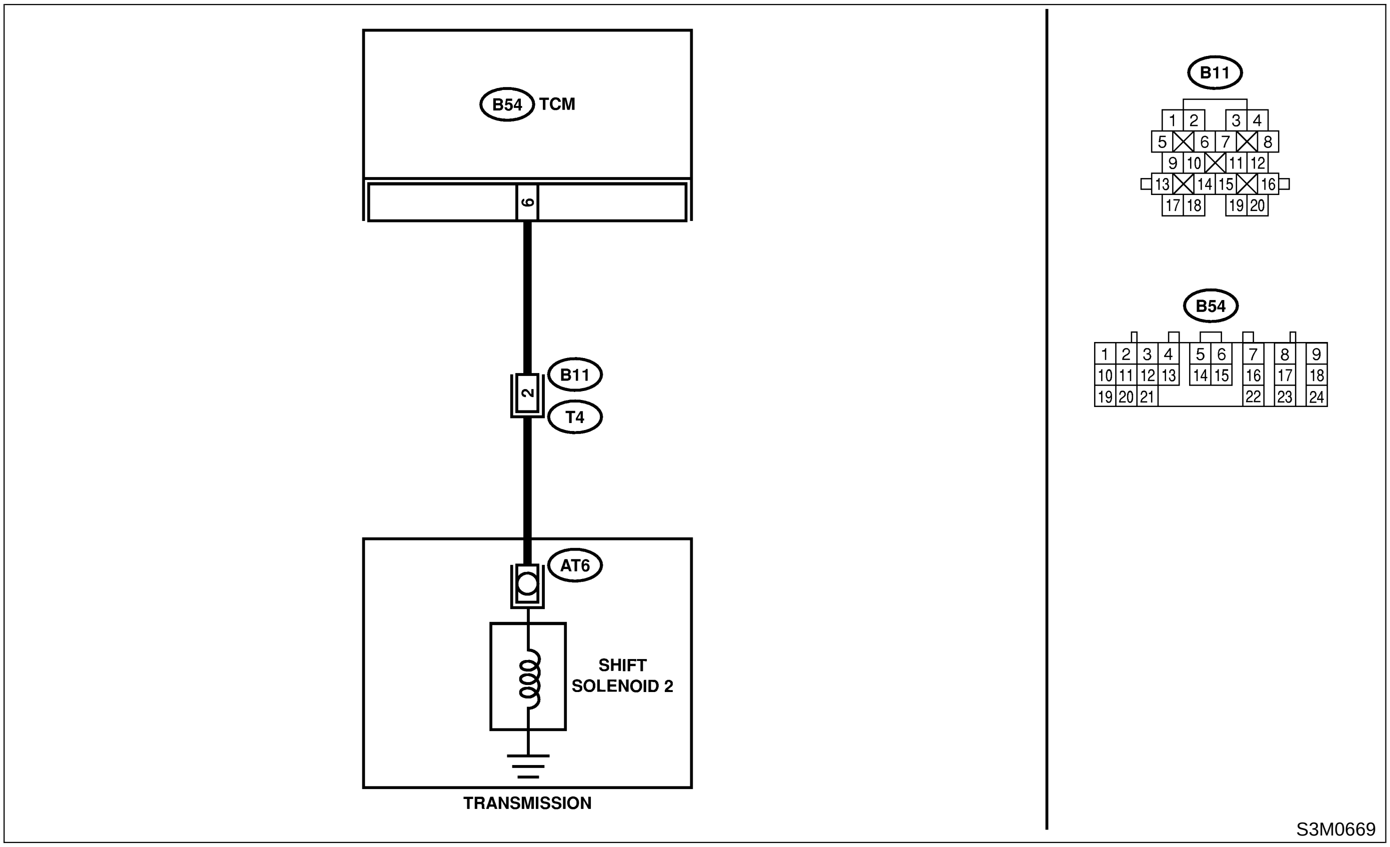
No.	Step	Check	Yes	No
4	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Connect connectors to TCM and transmission. 2) Turn ignition switch to ON (engine OFF). 3) Move select lever to “D” range. 4) Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 7 (+) — Chassis ground (−):***	Is the voltage more than 9V?	Go to step **5**.	Go to step **6**.
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Move select lever to “2” range. Hold switch to ON. 2) Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 7 (+) — Chassis ground (−):***	Is the voltage less than 1V?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the TCM.	Go to step **6**.
6	**CHECK POOR CONTACT.**	Is there poor contact in shift solenoid 1 circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>
7	**CHECK SHIFT SOLENOID 1 (IN TRANSMISSION).** 1) Remove transmission connector from bracket. 2) Lift-up or raise the vehicle and support with safety stand. **CAUTION:** **On AWD models, raise all wheels off ground.** 3) Drain automatic transmission fluid. **CAUTION:** **Do not drain the automatic transmission fluid until it cools down.** 4) Remove oil pan, and disconnect connector from shift solenoid 1. 5) Measure resistance between shift solenoid 1 connector and transmission ground. ***Terminal*** ***No. 1 — Transmission ground:***	Is the resistance between 10 and 16 Ω?	Go to step **8**.	Replace shift solenoid 1. <Ref. to AT-45, Transmission Control Module (TCM).>
8	**CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 1 AND TRANSMISSION.** Measure resistance of harness between shift solenoid 1 and transmission connector. ***Connector & terminal*** ***(AT5) No. 1 — (T4) No. 1:***	Is the resistance less than 1 Ω?	Go to step **9**.	Repair open circuit in harness between shift solenoid 1 and transmission connector.

No.	Step	Check	Yes	No
9	**CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 1 AND TRANSMISSION.** Measure resistance of harness between shift solenoid 1 connector and transmission ground. ***Connector & terminal*** ***(T4) No. 1 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in shift solenoid 1 and transmission.	Repair short circuit harness between shift solenoid 1 and transmission connector.

MEMO:

I: DTC 72 SHIFT SOLENOID 2 S004521I18

DIAGNOSIS:
Output signal circuit of shift solenoid 2 is open or shorted.
TROUBLE SYMPTOM:
Does not shift.
WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and shift solenoid 2 connector. ***Connector & terminal*** ***(B54) No. 6 — (B11) No. 2:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure resistance of harness between TCM connector and transmission ground. ***Connector & terminal*** ***(B54) No. 6 — Transmission ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair short circuit in harness between TCM and transmission connector.
3	**CHECK SHIFT SOLENOID 2.** Measure resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 2 — No. 16:***	Is the resistance between 10 and 16 Ω?	Go to step **4**.	Go to step **6**.

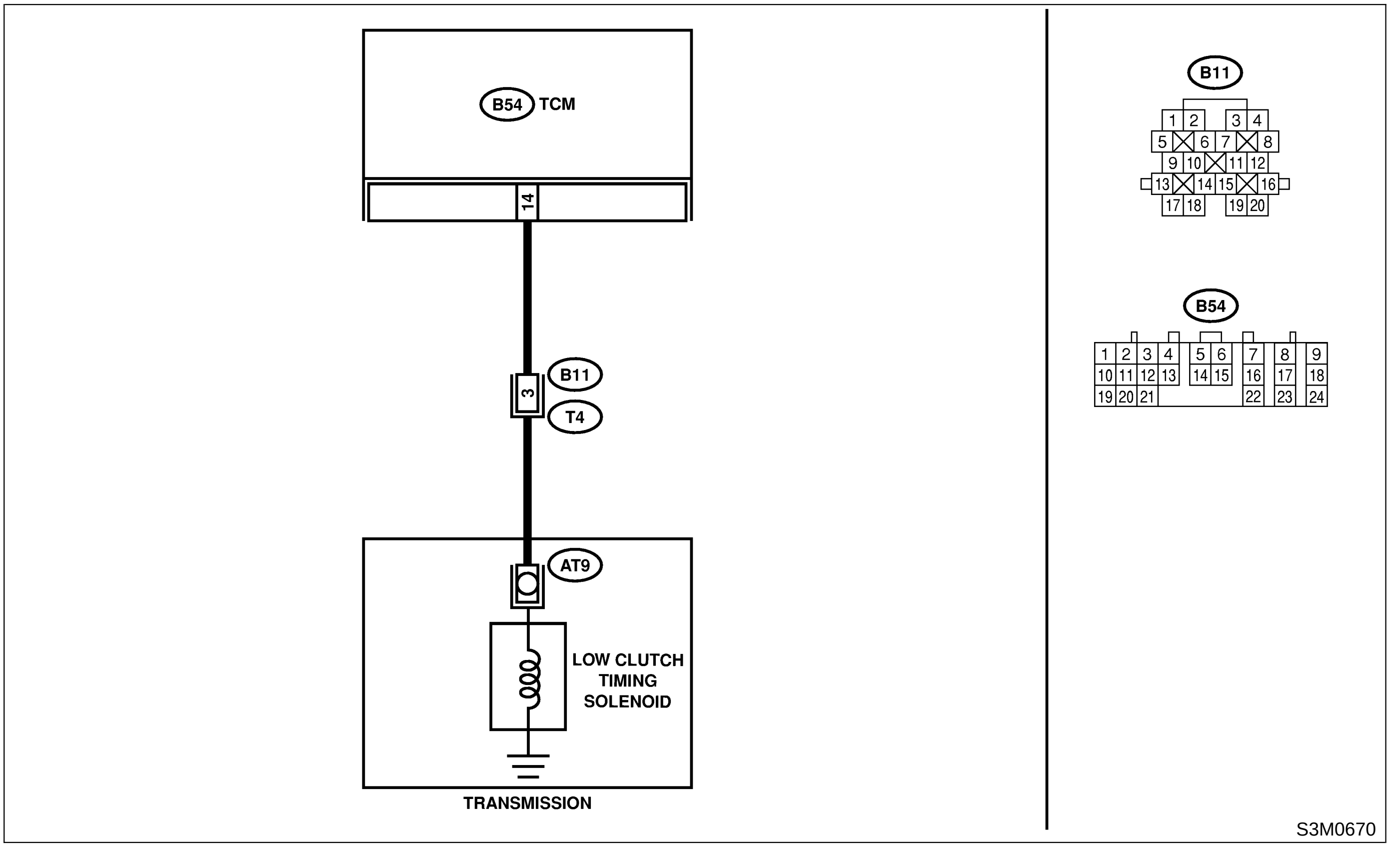
No.	Step	Check	Yes	No
4	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Connect connectors to TCM and transmission. 2) Lift-up or raise the vehicle and support with safety stand. **CAUTION:** **On AWD models, raise all wheels off ground.** 3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 4) Move selector lever to “D”, and slowly increase vehicle speed to 50 km/h (31 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.> 5) Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 6 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step **5**.
5	**CHECK POOR CONTACT.**	Is there poor contact in shift solenoid 2 circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>
6	**CHECK SHIFT SOLENOID 2 (IN TRANSMISSION).** 1) Remove transmission connector from bracket. 2) Drain automatic transmission fluid. **CAUTION:** **Do not drain the automatic transmission fluid until it cools down.** 3) Remove oil pan, and disconnect connector from shift solenoid 2. 4) Measure resistance between shift solenoid 2 connector and transmission ground. ***Connector & terminal*** ***No. 1 — Transmission ground:***	Is the resistance between 10 and 16 Ω?	Go to step **7**.	Replace shift solenoid 2 assembly. <Ref. to AT-39, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
7	**CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 2 AND TRANSMISSION.** Measure resistance of harness between shift solenoid 2 and transmission connector. ***Connector & terminal*** ***(AT6) No. 1 — (T4) No. 2:***	Is the resistance less than 1 Ω?	Go to step **8**.	Repair open circuit in harness between shift solenoid 2 and transmission connector.

No.	Step	Check	Yes	No
8	**CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 2 AND TRANSMISSION.** Measure resistance of harness between shift solenoid 2 connector and transmission ground. ***Connector & terminal*** ***(T4) No. 2 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in shift solenoid 2 and transmission.	Repair short circuit harness between shift solenoid 2 and transmission connector.

MEMO:

J: DTC 73 LOW CLUTCH TIMING SOLENOID S004521I19

DIAGNOSIS:
Output signal circuit of low clutch timing solenoid is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 14 — (B11) No. 3:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure resistance of harness between TCM connector and transmission ground. ***Connector & terminal*** ***(B54) No. 14 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair short circuit in harness between TCM and transmission connector.
3	**CHECK LOW CLUTCH TIMING SOLENOID.** Measure resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 3 — No. 16:***	Is the resistance between 10 and 16 Ω?	Go to step **4**.	Go to step **7**.

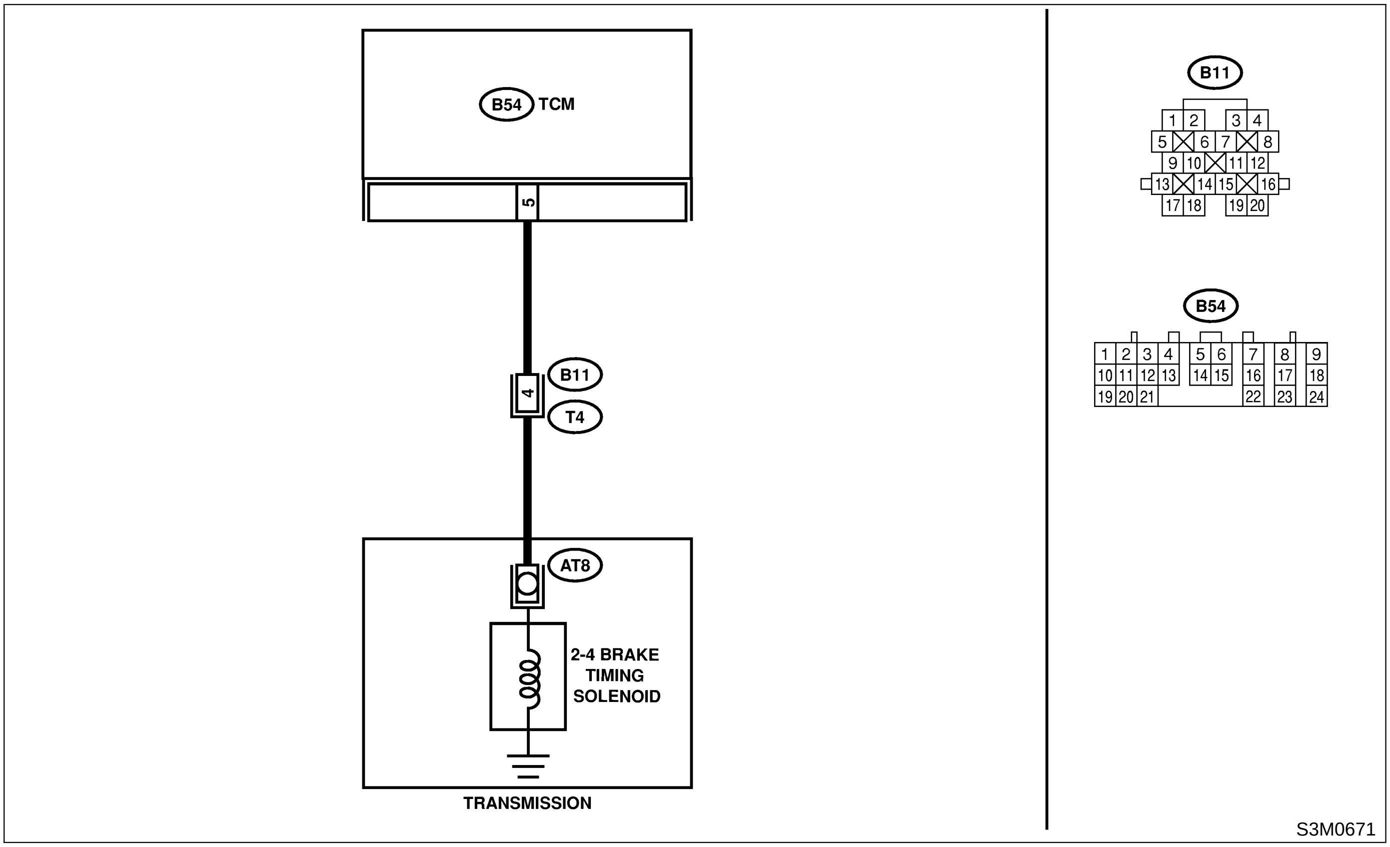
No.	Step	Check	Yes	No
4	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Connect connectors to TCM and transmission. 2) Turn ignition switch to ON (engine OFF). 3) Move select lever to “D” range. 4) Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 14 (+) — Chassis ground (−):***	Is the voltage more than 9V?	Go to step **5**.	Go to step **6**.
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Move select lever to “2” range. Hold switch to ON. 2) Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 14 (+) — Chassis ground (−):***	Is the voltage less than 1V?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the TCM and transmission.	Go to step **6**.
6	**CHECK POOR CONTACT.**	Is there poor contact in low clutch timing solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>
7	**CHECK LOW CLUTCH TIMING SOLENOID (IN TRANSMISSION).** 1) Remove transmission connector from bracket. 2) Lift-up or raise the vehicle and support with safety stand. **CAUTION:** **On AWD models, raise all wheels off ground.** 3) Drain automatic transmission fluid. **CAUTION:** **Do not drain the automatic transmission fluid until it cools down.** 4) Remove oil pan, and disconnect connector from low clutch timing solenoid. 5) Measure resistance between low clutch timing solenoid connector and transmission ground. ***Terminal*** ***No. 1 — Transmission ground:***	Is the resistance between 10 and 16 Ω?	Go to step **8**.	Replace low clutch timing solenoid. <Ref. to AT-39, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
8	**CHECK HARNESS CONNECTOR BETWEEN LOW CLUTCH TIMING SOLENOID AND TRANSMISSION.** Measure resistance of harness between low clutch timing solenoid and transmission connector. ***Connector & terminal*** ***(AT9) No. 1 — (T4) No. 3:***	Is the resistance less than 1 Ω?	Go to step **9**.	Repair open circuit in harness between low clutch timing solenoid and transmission connector.

No.	Step	Check	Yes	No
9	**CHECK HARNESS CONNECTOR BETWEEN LOW CLUTCH TIMING SOLENOID AND TRANSMISSION.** Measure resistance of harness between low clutch timing solenoid connector and transmission ground. ***Connector & terminal*** ***(T4) No. 3 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in low clutch timing solenoid and transmission.	Repair short circuit harness between low clutch timing solenoid and transmission connector.

MEMO:

K: DTC 74 2-4 BRAKE TIMING SOLENOID *S004521I20*

DIAGNOSIS:
Output signal circuit of 2-4 brake timing solenoid is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 5 — (B11) No. 4:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure resistance of harness between TCM connector and transmission ground. ***Connector & terminal*** ***(B54) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair short circuit in harness between TCM and transmission connector.
3	**CHECK 2-4 BRAKE TIMING SOLENOID.** Measure resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 4 — No. 16:***	Is the resistance between 10 and 16 Ω?	Go to step **4**.	Go to step **7**.

No.	Step	Check	Yes	No
4	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Connect connectors to TCM and transmission. 2) Lift-up or raise the vehicle and support with safety stand. **CAUTION:** **On AWD models, raise all wheels off ground.** 3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 4) Move selector lever to “1”, and slowly increase vehicle speed to 10 km/h (6 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.> 5) Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 5 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **5**.	Go to step **6**.
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Move selector lever to “3”, and slowly increase vehicle speed to 65 km/h (40 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.> 2) Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 5 (+) — Chassis ground (−):***	Is the voltage more than 9 V?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the transmission.	Go to step **6**.
6	**CHECK POOR CONTACT.**	Is there poor contact in 2-4 brake timing solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>

No.	Step	Check	Yes	No
7	**CHECK 2-4 BRAKE TIMING SOLENOID (IN TRANSMISSION).** 1) Remove transmission connector from bracket. 2) Lift-up or raise the vehicle and support with safety stand. **CAUTION:** **On AWD models, raise all wheels off ground.** 3) Drain automatic transmission fluid. **CAUTION:** **Do not drain the automatic transmission fluid until it cools down.** 4) Remove oil pan, and disconnect connector from 2-4 brake timing solenoid. 5) Measure resistance between 2-4 brake timing solenoid connector and transmission ground. ***Terminal*** ***No. 1 — Transmission ground:***	Is the resistance between 10 and 16 Ω?	Go to step **8**.	Replace 2-4 brake timing solenoid. <Ref. to AT-39, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
8	**CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE TIMING SOLENOID AND TRANSMISSION.** Measure resistance of harness between 2-4 brake timing solenoid and transmission connector. ***Connector & terminal*** ***(AT8) No. 1 — (T4) No. 4:***	Is the resistance less than 1 Ω?	Go to step **9**.	Repair open circuit in harness between 2-4 brake timing solenoid and transmission connector.
9	**CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE TIMING SOLENOID AND TRANSMISSION.** Measure resistance of harness between 2-4 brake timing solenoid connector and transmission ground. ***Connector & terminal*** ***(T4) No. 4 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in 2-4 brake timing solenoid and transmission.	Repair short circuit harness between 2-4 brake timing solenoid and transmission connector.

MEMO:

L: DTC 75 LINE PRESSURE DUTY SOLENOID S004521I21

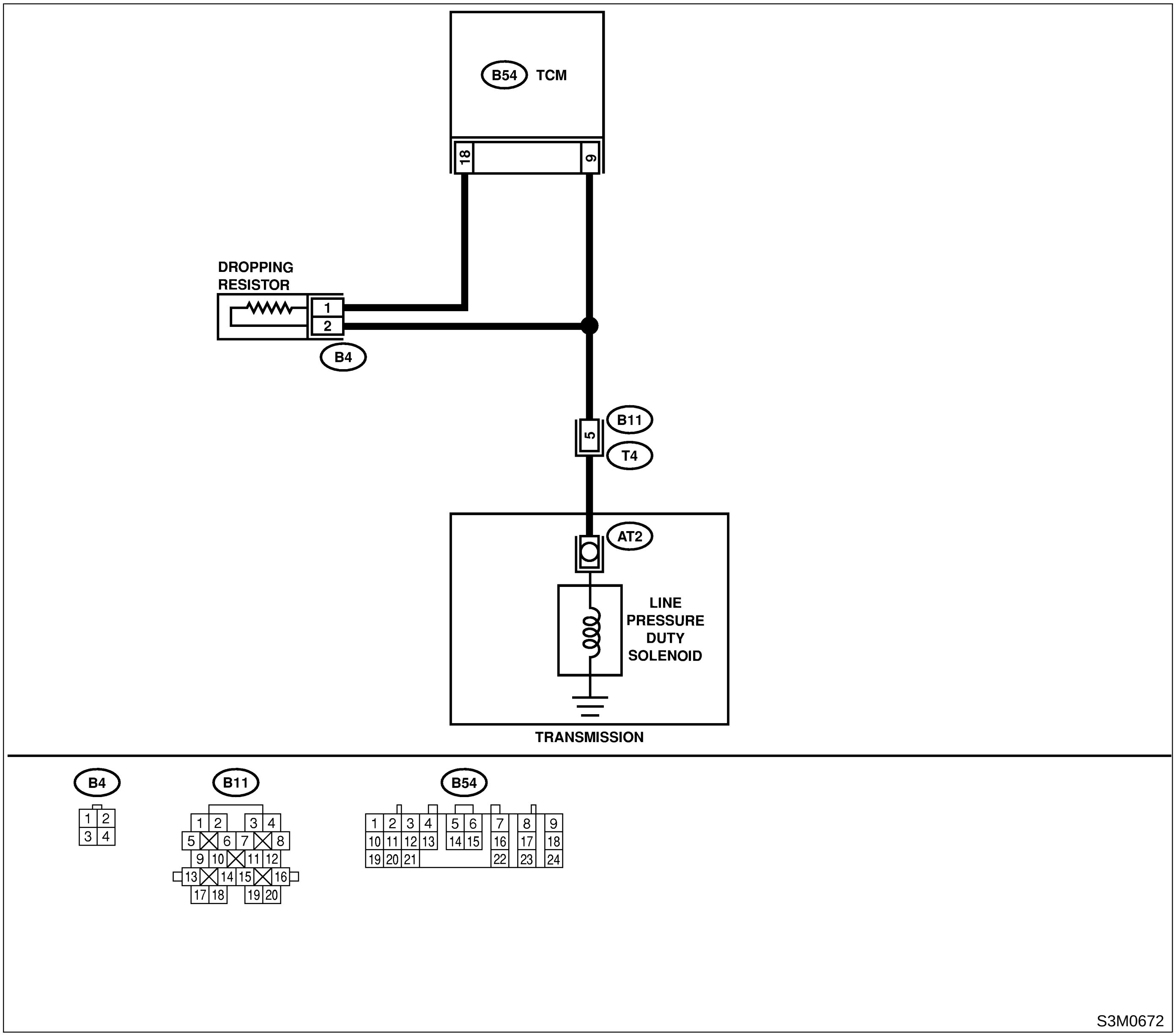
DIAGNOSIS:

Output signal circuit of line pressure duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK RESISTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from dropping resis-tor. 3) Measure resistance between dropping resistor terminal. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 9 and 15 Ω?	Go to step **2**.	Replace dropping resistor. <Ref. to AT-46, Dropping Resistor.>

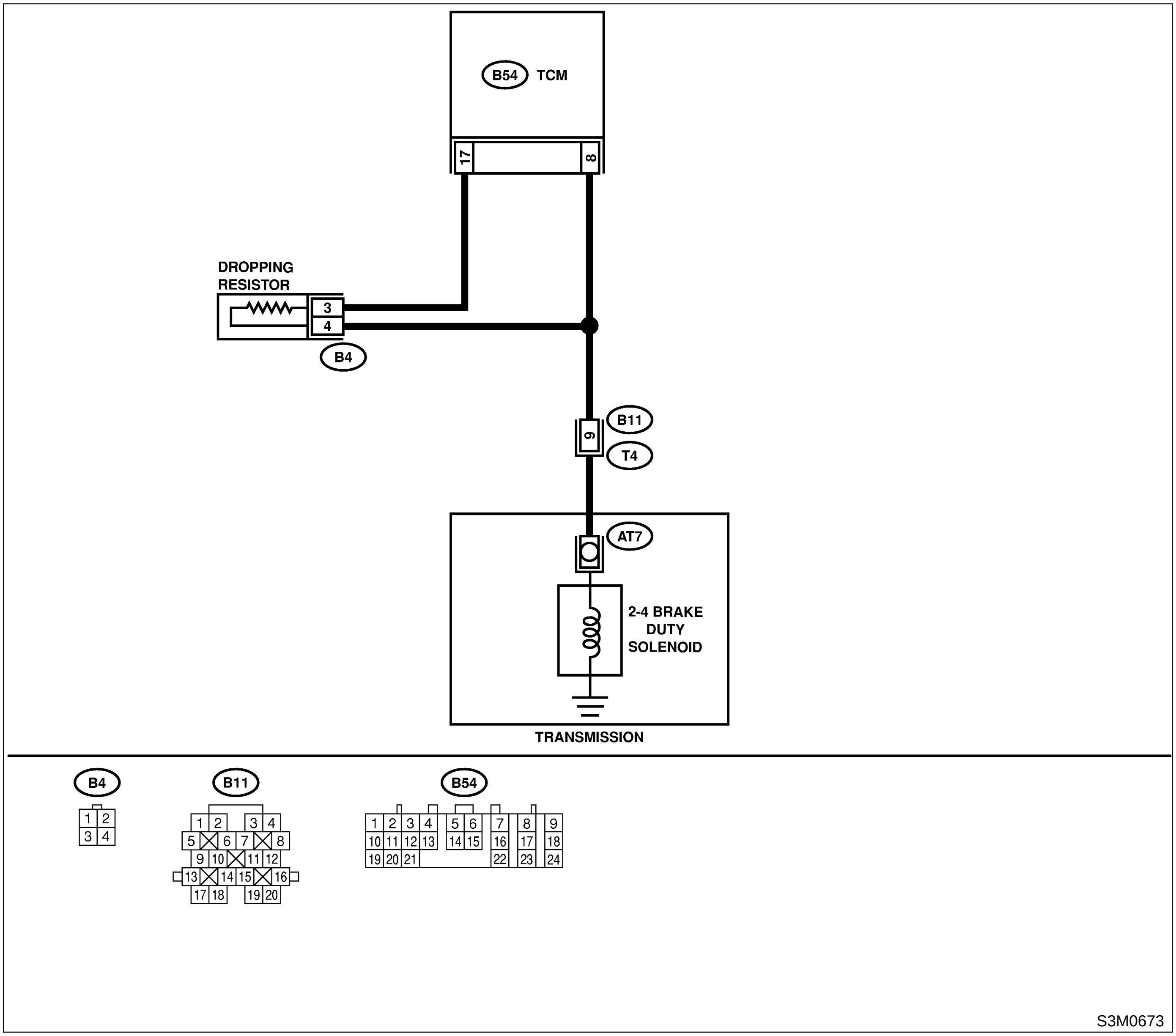
No.	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR.** 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM connector and dropping resistor connector. ***Connector & terminal*** ***(B54) No. 18 — (B4) No. 1:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair open circuit in harness between TCM and dropping resistor connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR.** Measure resistance of harness between dropping resistor connector and chassis ground. ***Connector & terminal*** ***(B4) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Repair short circuit in harness between TCM and dropping resistor connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR.** 1) Disconnect connector from transmission. 2) Measure resistance of harness between transmission and dropping resistor connector. ***Connector & terminal*** ***(B4) No. 2 — (B11) No. 5:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair open circuit in harness between dropping resistor and transmission connector.
5	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR.** Measure resistance of harness between dropping resistor connector and chassis ground. ***Connector & terminal*** ***(B4) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Repair short circuit in harness between dropping resistor and transmission connector.
6	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission and TCM. 3) Measure resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 9 — (B11) No. 5:***	Is the resistance less than 1 Ω?	Go to step **7**.	Repair open circuit in harness between TCM and transmission connector.
7	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8**.	Repair short circuit in harness between TCM and transmission connector.
8	**CHECK LINE PRESSURE DUTY SOLENOID.** Measure resistance between transmission connector receptacle's terminals. ***Terminal*** ***(T4) No. 5 — No. 16:***	Is the resistance between 2.0 and 4.5 Ω?	Go to step **9**.	Go to step **15**.
9	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **12**.	Go to step **10**.

No.	Step	Check	Yes	No
10	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Connect all connectors. 2) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3) Turn ignition switch to ON (engine OFF). 4) Move select lever to “N”. 5) Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 9 (+) — Chassis ground (−):***	Is the voltage between 1.5 and 5.0 V with throttle fully closed?	Go to step **11**.	Go to step **14**.
11	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 9 (+) — Chassis ground (−):***	Is the voltage less than 1 V with throttle fully open?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in transmission.	Go to step **14**.
12	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1) Connect connectors to TCM and transmission. 2) Connect Subaru Select Monitor to data link connector. 3) Start the engine, and turn Subaru Select Monitor switch to ON. 4) Warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Stop the engine and turn ignition switch to ON (engine OFF). 6) Move select lever to “N”. 7) Read data of line pressure duty solenoid using Subaru Select Monitor. ● Line pressure duty solenoid is indicated in “%”. 8) Throttle is fully closed.	Is the value 100%?	Go to step **13**.	Go to step **14**.

No.	Step	Check	Yes	No
13	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1) Turn ignition switch to ON (Engine OFF). 2) Throttle is fully open.	Is the value less than 25%?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in transmission.	Go to step **14**.
14	**CHECK POOR CONTACT.**	Is there poor contact in line pressure duty solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>
15	**CHECK LINE PRESSURE DUTY SOLENOID (IN TRANSMISSION).** 1) Remove transmission connector from bracket. 2) Drain automatic transmission fluid. **CAUTION:** **Do not drain the automatic transmission fluid until it cools down.** 3) Remove oil pan, and disconnect connector from line pressure duty solenoid. 4) Measure resistance between line pressure duty solenoid connector and transmission ground. ***Terminal*** ***No. 1 — Transmission ground:***	Is the resistance between 2.0 and 4.5 Ω?	Go to step **16**.	Replace line pressure duty solenoid. <Ref. to AT-39, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
16	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE DUTY SOLENOID.** Measure resistance of harness between line pressure duty solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 5 — (AT2) No. 1:***	Is the resistance less than 1 Ω?	Go to step **17**.	Repair open circuit in harness between line pressure duty solenoid and transmission connector.
17	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE DUTY SOLENOID.** Measure resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 5 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in line pressure duty solenoid and transmission.	Repair short circuit in harness between line pressure duty solenoid and transmission connector.

M: DTC 76 2-4 BRAKE DUTY SOLENOID *S004521I22*

DIAGNOSIS:
Output signal circuit of 2-4 brake duty solenoid is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK RESISTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from dropping resis-tor. 3) Measure resistance between dropping resistor terminal. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance between 9 and 15 Ω?	Go to step **2**.	Replace dropping resistor. <Ref. to AT-46 Dropping Resistor.>

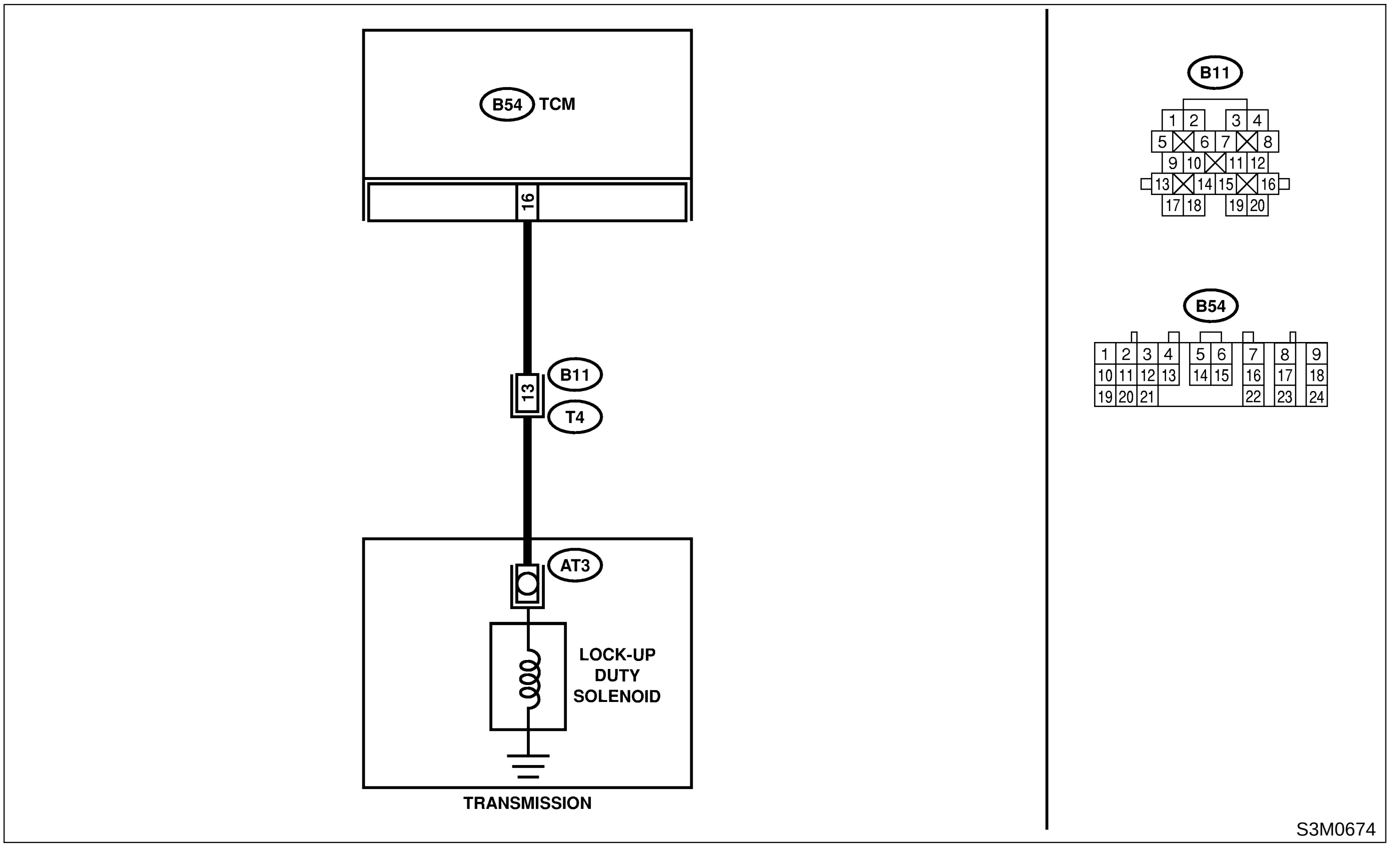
No.	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR.** 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM connector and dropping resistor connector. ***Connector & terminal*** ***(B54) No. 17 — (B4) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair open circuit in harness between TCM and dropping resistor connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR.** Measure resistance of harness between dropping resistor connector and chassis ground. ***Connector & terminal*** ***(B4) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Repair short circuit in harness between TCM and dropping resistor connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR.** 1) Disconnect connector from transmission. 2) Measure resistance of harness between transmission and dropping resistor connector. ***Connector & terminal*** ***(B4) No. 4 — (B11) No. 9:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair open circuit in harness between dropping resistor and transmission connector.
5	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR.** Measure resistance of harness between dropping resistor connector and chassis ground. ***Connector & terminal*** ***(B4) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Repair short circuit in harness between dropping resistor and transmission connector.
6	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission and TCM. 3) Measure resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 8 — (B11) No. 9:***	Is the resistance less than 1 Ω?	Go to step **7**.	Repair open circuit in harness between TCM and transmission connector.
7	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8**.	Repair short circuit in harness between TCM and transmission connector.
8	**CHECK 2-4 BRAKE DUTY SOLENOID.** Measure resistance between transmission connector receptacle's terminals. ***Terminal*** ***(T4) No. 16 — No. 9:***	Is the resistance between 2.0 and 4.5 Ω?	Go to step **9**.	Go to step **15**.
9	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **12**.	Go to step **10**.

No.	Step	Check	Yes	No
10	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Connect all connectors. 2) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3) Turn ignition switch to ON (engine OFF). 4) Move select lever to “N”. 5) Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 8 (+) — Chassis ground (−):***	Is the voltage between 1.5 and 5.0 V with throttle fully closed?	Go to step **11**.	Go to step **14**.
11	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 8 (+) — Chassis ground (−):***	Is the voltage less than 1 V with throttle fully open?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM and transmission.	Go to step **14**.
12	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1) Connect all connectors. 2) Connect Subaru Select Monitor to data link connector. 3) Start the engine, and turn Subaru Select Monitor switch to ON. 4) Warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Stop the engine and turn ignition switch to ON (engine OFF). 6) Move select lever to “N”. 7) Read data of 2-4 brake duty solenoid using Subaru Select Monitor. ● 2-4 brake duty solenoid is indicated in “%”. 8) Throttle is fully closed.	Is the value 100%?	Go to step **13**.	Go to step **14**.

No.	Step	Check	Yes	No
13	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1) Turn ignition switch to ON (Engine OFF). 2) Throttle is fully open.	Is the value less than 25%?	Even if "AT OIL TEMP" warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM and transmission.	Go to step **14**.
14	**CHECK POOR CONTACT.**	Is there poor contact in 2-4 brake duty solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>
15	**CHECK 2-4 BRAKE DUTY SOLENOID (IN TRANSMISSION).** 1) Remove transmission connector from bracket. 2) Drain automatic transmission fluid. **CAUTION:** **Do not drain the automatic transmission fluid until it cools down.** 3) Remove oil pan, and disconnect connector from 2-4 brake duty solenoid. 4) Measure resistance between 2-4 brake duty solenoid connector and transmission ground. ***Terminal*** ***No. 1 — Transmission ground:***	Is the resistance between 2.0 and 4.5 Ω?	Go to step **16**.	Replace 2-4 brake duty solenoid. <Ref. to AT-39, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
16	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND 2-4 BRAKE DUTY SOLENOID.** Measure resistance of harness between 2-4 brake duty solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 9 — (AT7) No. 1:***	Is the resistance less than 1 Ω?	Go to step **17**.	Repair open circuit in harness between 2-4 brake duty solenoid and transmission connector.
17	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND 2-4 BRAKE DUTY SOLENOID.** Measure resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 9 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if "AT OIL TEMP" warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in line pressure duty solenoid and transmission.	Repair short circuit in harness between 2-4 brake duty solenoid and transmission connector.

N: DTC 77 LOCK-UP DUTY SOLENOID S004521I23

DIAGNOSIS:
Output signal circuit of lock-up duty solenoid is open or shorted.
TROUBLE SYMPTOM:
No “lock-up” (after engine warm-up).
WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK TROUBLE CODE.**	Do multiple trouble codes appear in the on-board diagnostics test mode?	Go to another trouble code.	Go to step **2**.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 16 — (B11) No. 13:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair open circuit in harness between TCM and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure resistance of harness connector between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Repair short circuit in harness between TCM and transmission connector.
4	**CHECK LOCK-UP DUTY SOLENOID.** Measure resistance between transmission connector receptacle’s terminals. ***Connector & terminal*** ***(T4) No. 13 — No. 16:***	Is the resistance between 10 and 17 Ω?	Go to step **5**.	Go to step **11**.

No.	Step	Check	Yes	No
5	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **8**.	Go to step **6**.
6	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Connect connectors to TCM and transmission. 2) Lift-up the vehicle and place safety stand. **CAUTION:** **On AWD models, raise all wheels off ground.** 3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 4) Move selector lever to “D” and slowly increase vehicle speed to 75 km/h (47 MPH). Wheels will lock-up. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.> 5) Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 16 (+) — Chassis ground (−):***	Is the voltage more than 8.5 V?	Go to step **7**.	Go to step **10**.
7	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Return the engine to idling speed and move select lever to “N”. 2) Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 16 (+) — Chassis ground (−):***	Is the voltage less than 0.5 V?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM and transmission.	Go to step **10**.

No.	Step	Check	Yes	No
8	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1) Connect connectors to TCM and transmission. 2) Lift-up the vehicle and place safety stand. **CAUTION:** **On AWD models, raise all wheels off ground.** 3) Connect Subaru Select Monitor to data link connector. 4) Start the engine, and turn Subaru Select Monitor switch to ON. 5) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 6) Read data of lock-up duty solenoid using Subaru Select Monitor. ● Lock-up duty solenoid is indicated in “%”. 7) Move selector lever to “D” and slowly increase vehicle speed to 75 km/h (47 MPH). Wheels will lock-up. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.>	Is the value 95%?	Go to step **9**.	Go to step **10**.
9	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** Return the engine to idling speed and move selector lever to “N”. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.>	Is the value 5%?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM and transmission.	Go to step **10**.
10	**CHECK POOR CONTACT.**	Is there poor contact in lock-up duty solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>

No.	Step	Check	Yes	No
11	**CHECK LOCK-UP DUTY SOLENOID (IN TRANSMISSION).** 1) Remove transmission connector from bracket. 2) Drain automatic transmission fluid. **CAUTION:** **Do not drain the automatic transmission fluid until it cools down.** 3) Remove oil pan, and disconnect connector from lock-up duty solenoid. 4) Measure resistance between lock-up duty solenoid connector and transmission ground. ***Terminal*** ***No. 1 — Transmission ground:***	Is the resistance between 10 and 17 Ω?	Go to step **12**.	Replace lock-up duty solenoid. <Ref. to AT-39, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
12	**CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION.** Measure resistance of harness between lock-up duty solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 13 — (AT3) No. 1:***	Is the resistance less than 1 Ω?	Go to step **13**.	Repair open circuit in harness between TCM and transmission connector.
13	**CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION.** Measure resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 13 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in lock-up duty solenoid and transmission.	Repair short circuit in harness between lock-up duty solenoid and transmission connector.

O: DTC 79 TRANSFER DUTY SOLENOID S004521I24

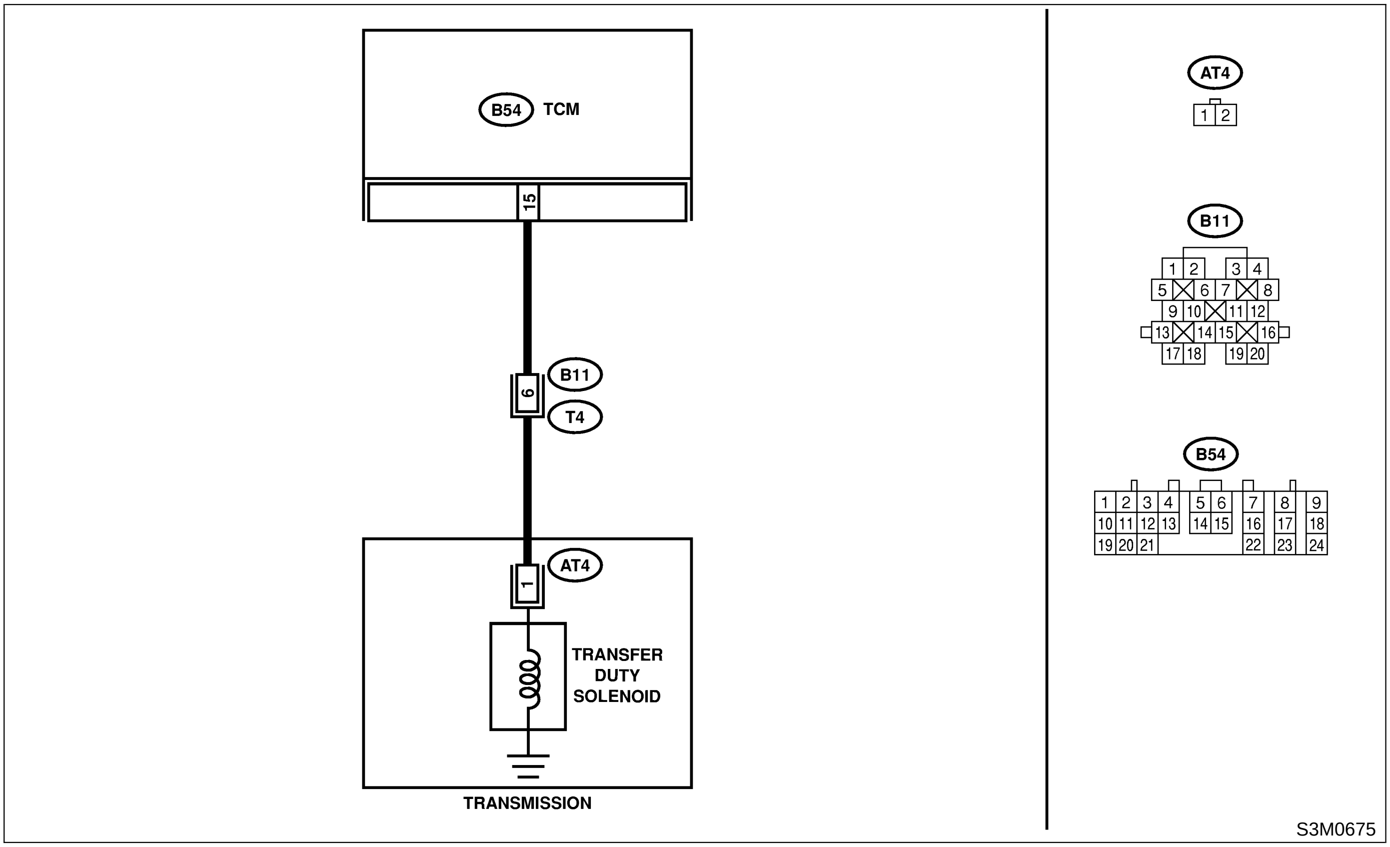
DIAGNOSIS:

Output signal circuit of transfer duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive “braking” in tight corners.

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 15 — (B11) No. 6:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure resistance harness connector between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 15 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair short circuit in harness between TCM and transmission connector.
3	**CHECK TRANSFER DUTY SOLENOID.** Measure resistance between transmission connector and transmission terminals. ***Connector & terminal*** ***(T4) No. 6 — No. 16:***	Is the resistance between 10 and 17 Ω?	Go to step **4**.	Go to step **10**.
4	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **7**.	Go to step **5**.

No.	Step	Check	Yes	No
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Connect connectors to TCM and transmission. 2) Turn ignition switch to ON (engine OFF). 3) Throttle is fully closed. 4) Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 15 (+) — Chassis ground (−):***	Is the voltage less than 1 V in “P” range?	Go to step **6**.	Go to step **9**.
6	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 15 (+) — Chassis ground (−):***	Is the voltage between 5 and 7 V in “D” range?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step **9**.
7	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1) Connect connectors to TCM and transmission. 2) Connect Subaru Select Monitor to data link connector. 3) Turn ignition switch to ON (engine OFF) and turn Subaru Select Monitor switch to ON. 4) Move select lever to “D” with throttle fully open (vehicle speed 0 km/h or 0 MPH). 5) Read data of transfer duty solenoid using Subaru Select Monitor. ● Transfer duty solenoid is indicated in “%”.	Is the value between 5 and 10%?	Go to step **8**.	Go to step **9**.
8	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1) Move select lever to “N” with throttle fully closed (vehicle speed 0 km/h or 0 MPH). 2) Rear data of transfer duty solenoid using Subaru Select Monitor. ● Transfer duty solenoid is indicated in “%”.	Is the value between approx. 60% and approx. 70%?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step **9**.
9	**CHECK POOR CONTACT.**	Is there poor contact in transfer duty solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>

No.	Step	Check	Yes	No
10	**CHECK TRANSFER DUTY SOLENOID (IN TRANSMISSION).** 1) Lift-up the vehicle and place safety stand. **CAUTION:** **On AWD models, raise all wheels off ground.** 2) Drain automatic transmission fluid. **CAUTION:** **Do not drain the automatic transmission fluid until it cools down.** 3) Remove extension case, and disconnect connector from transfer duty solenoid. 4) Measure resistance between transfer duty solenoid connector and transmission ground. ***Connector & terminal*** ***(AT4) No. 1 — Transmission ground:***	Is the resistance between 10 and 17 Ω?	Go to step **11**.	Replace transfer duty solenoid.
11	**CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION.** Measure resistance of harness between transfer duty solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 6 — (AT4) No. 1:***	Is the resistance less than 1 Ω?	Go to step **12**.	Repair open circuit in harness between transfer duty solenoid and transmission connector.
12	**CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION.** Measure resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 6 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the transfer duty solenoid and transmission.	Repair short circuit in harness between transfer duty solenoid and transmission connector.

MEMO:

P: DTC 93 REAR VEHICLE SPEED SENSOR S004521I25

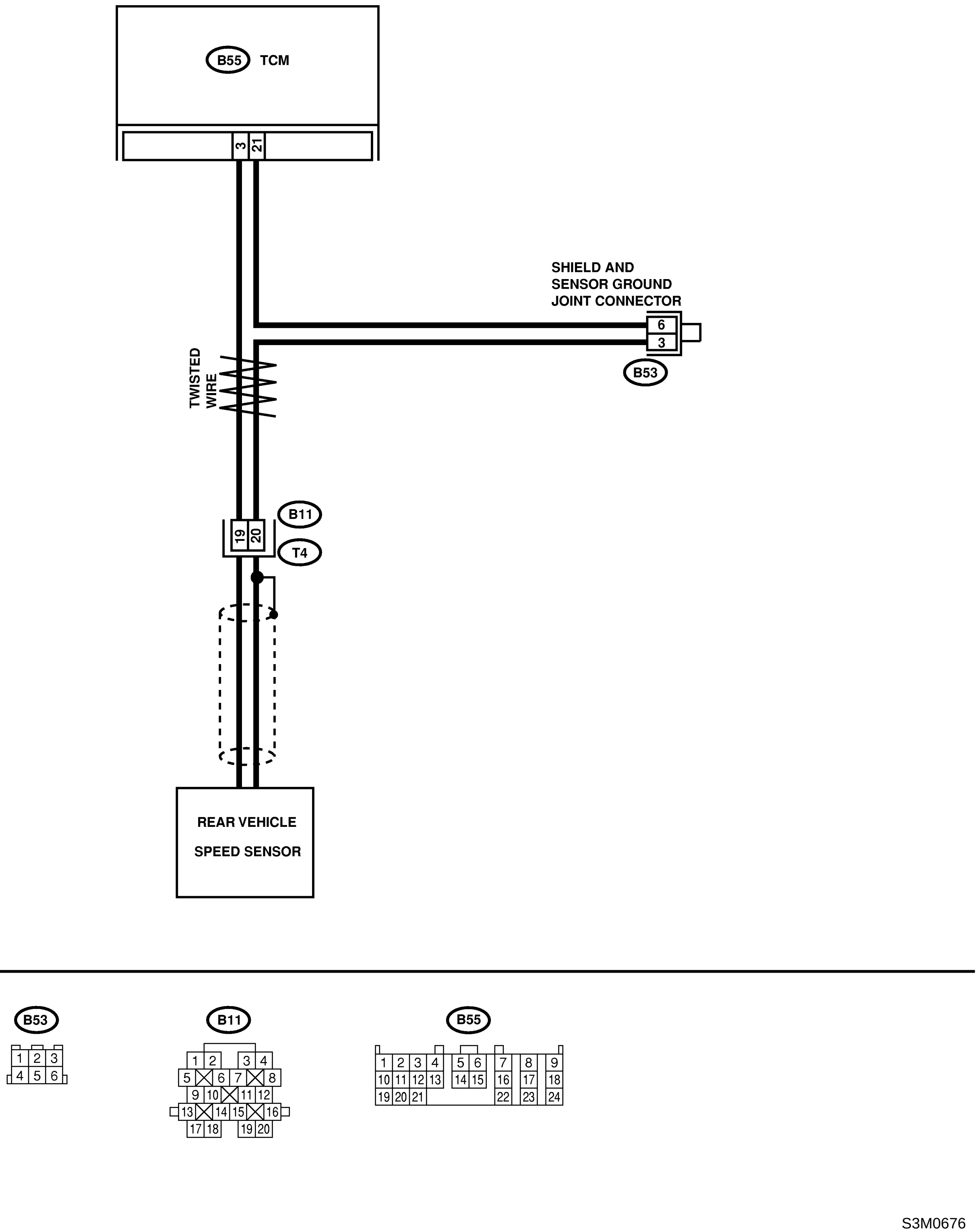
DIAGNOSIS:

Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

No lock-up or excessive tight corner “braking”.

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 3 — (B11) No. 19:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 21 — (B11) No. 20:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair open circuit in harness between TCM and transmission, and poor contact in coupling connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Repair short circuit in harness between TCM and transmission connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 21 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Repair short circuit in harness between TCM and transmission connector.
5	**CHECK REAR VEHICLE SPEED SENSOR.** Measure resistance between transmission connector receptacle's terminals. ***Connector & terminal*** ***(T4) No. 19 — No. 20:***	Is the resistance between 450 and 650 Ω?	Go to step **6**.	Replace rear vehicle speed sensor. <Ref. to AT-35, Rear Vehicle Speed Sensor.>
6	**PREPARE OSCILLOSCOPE.**	Do you have oscilloscope?	Go to step **10**.	Go to step **7**.
7	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **9**.	Go to step **8**.
8	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect connectors to TCM and transmission. 2) Lift-up or raise the vehicle and place safety stands. **CAUTION:** **On AWD models, raise all wheels off floor.** 3) Start the engine and set vehicle in 20 km/h (12 MPH) condition. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.> 4) Measure voltage between TCM connector terminals. ***Connector & terminal*** ***(B55) No. 3 (+) — No. 21 (−):***	Is the voltage more than AC 1 V?	Even if "AT OIL TEMP" warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step **11**.

No.	Step	Check	Yes	No
9	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect connectors to TCM and transmission. 2) Connect Subaru Select Monitor to data link connector. 3) Lift-up or raise the vehicle and place safety stands. **CAUTION:** **On AWD models, raise all wheels off floor.** 4) Turn ignition switch to ON and turn Subaru Select Monitor switch to ON. 5) Start the engine. 6) Read data of vehicle speed using Subaru Select Monitor. ● Compare speedometer with Subaru Select Monitor indications. ● Vehicle speed is indicated in “km/h” or “MPH”. 7) Slowly increase vehicle speed to 60 km/h or 37 MPH. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.>	Does the speedometer indication increase as the Subaru Select Monitor data increases?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step **11**.
10	**CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.** 1) Connect connectors to TCM and transmission. 2) Lift-up or raise the vehicle and place safety stands. **CAUTION:** **On AWD models, raise all wheels off floor.** 3) Set oscilloscope to TCM connector terminals. Positive probe; (B55) No. 3 Earth lead; (B54) No. 21 4) Start the engine and set vehicle in 20 km/h (12 MPH) condition. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.> 5) Measure signal voltage indicated on oscilloscope.	Is the signal voltage more than AC 1 V?	Even if “AT OIL TEMP” warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step **11**.
11	**CHECK POOR CONTACT.**	Is there poor contact in rear vehicle speed sensor circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>

15. Diagnostic Procedure for No-diagnostic Trouble Code (DTC) S004794

A: CHECK GEAR POSITION. S004794F15

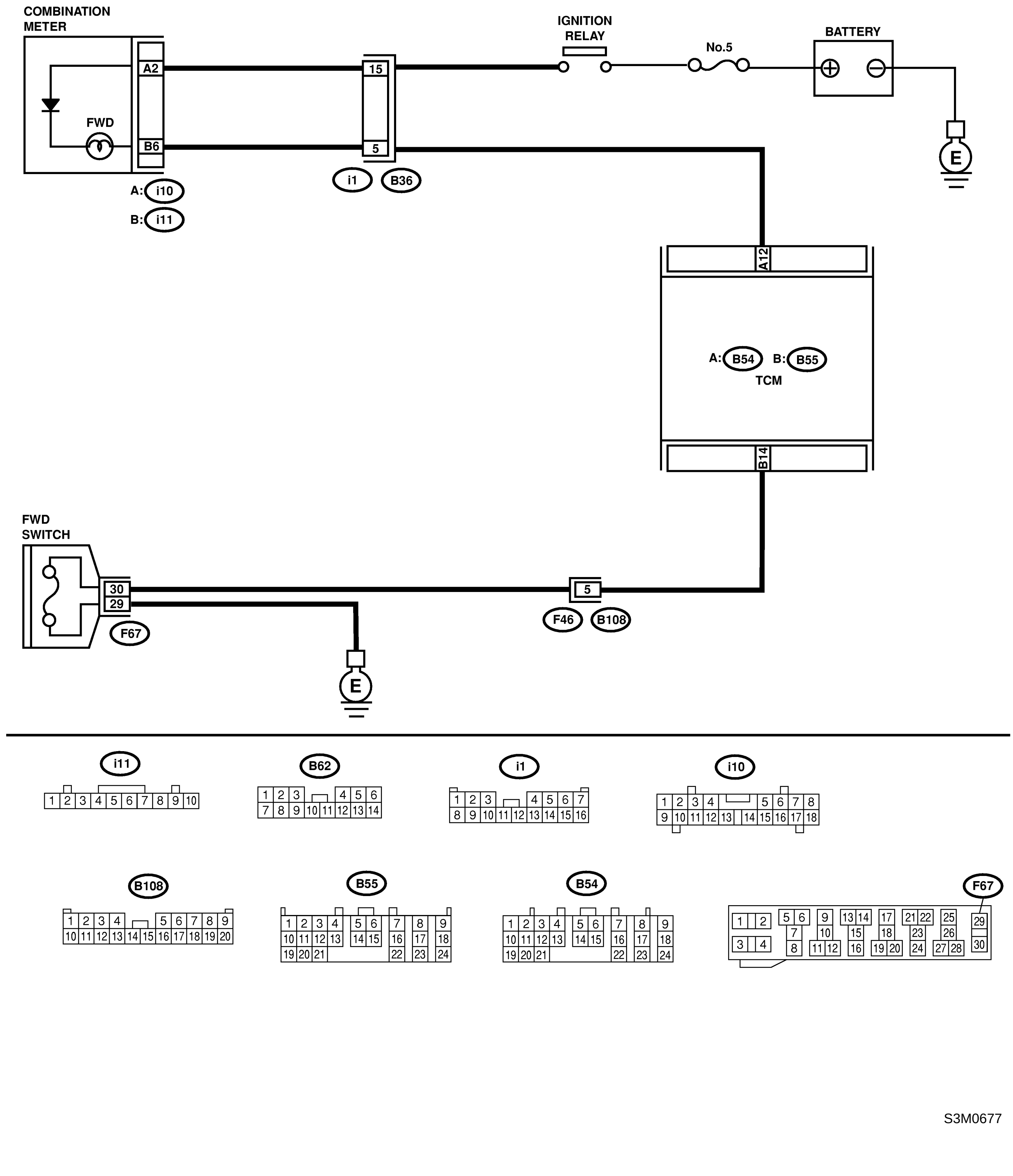
No.	Step	Check	Yes	No
1	**CHECK GEAR POSITION.** 1) Lift-up the vehicle and place safety stand. **CAUTION:** **On AWD models, raise all wheels off ground.** 2) Start the engine. 3) Move select lever to “D”, and drive vehicle. 4) Read data of gear position using Subaru Select Monitor. ● Gear position is indicated. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.>	Does the transmission gear correspond to the gear which is shown on display?	Go to step CHECK FWD SWITCH. <Ref. to AT-96, CHECK FWD SWITCH., Diagnostic Procedure for No-diagnostic Trouble Code (DTC).>	Check shift solenoid 1 and shift solenoid 2 signal circuit. <Ref. to AT-60, TROUBLE CODE 71 SHIFT SOLENOID 1, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> and <Ref. to AT-64, TROUBLE CODE 72 SHIFT SOLENOID 2, Diagnostic Procedure with Trouble Code.>

B: CHECK FWD SWITCH. S004794F16

DIAGNOSIS:

- LED does not come on even if FWD switch is ON.
- FWD switch circuit is open or short.

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK FWD SWITCH.**	When fuse is inserted to FWD switch, does LED light up?	Go to step CHECK BRAKE SWITCH. <Ref. to AT-99, CHECK BRAKE SWITCH., Diagnostic Procedure for No-diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK FWD INDICATOR LIGHT.** 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove FWD indicator light bulb from combination meter.	Is FWD indicator light bulb OK?	Go to step **3**.	Replace FWD indicator light bulb. <Ref. to IDI-12, Combination Meter Assembly.>
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH.** 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and FWD switch. 3) Measure resistance of harness between TCM and FWD switch connector. ***Connector & terminal*** ***(B55) No. 14 — (F67) No. 30:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair open circuit in harness between TCM and FWD switch connector.
4	**CHECK HARNESS CONNECTOR BETWEEN FWD SWITCH AND CHASSIS GROUND.** Measure resistance of harness between FWD switch and chassis ground. ***Connector & terminal*** ***(F67) No. 29 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair open circuit in harness between FWD switch connector and chassis ground.
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH.** Measure resistance of harness connector between TCM and body to make sure that circuit does not short. ***Connector & terminal*** ***(B55) No. 14 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Repair short circuit in harness between TCM and FWD switch connector.
6	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn ignition switch to OFF. 2) Connect connector to TCM and FWD switch. 3) Turn ignition switch to ON. 4) Measure signal voltage for TCM while installing the fuse to FWD switch connector. ***Connector & terminal*** ***(B55) No. 14 (+) — Chassis ground (−):***	Is the voltage less than 1 V in FWD switch while installing?	Go to step **7**.	Go to step **11**.
7	**CHECK INPUT SIGNAL FOR TCM.** Measure signal voltage for TCM while removing the fuse from FWD switch connector. ***Connector & terminal*** ***(B55) No. 14 (+) — Chassis ground (−):***	Is the voltage more than 9 V in FWD switch while removing?	Go to step **8**.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>

No.	Step	Check	Yes	No
8	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and combination meter. 3) Measure resistance of harness between TCM and diagnosis connector. ***Connector & terminal*** ***(B54) No. 12 — (i11) No. 6:***	Is the resistance less than 1 Ω?	Go to step **9**.	Repair open circuit in harness between TCM and combination meter and poor contact in coupling connector.
9	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** Measure resistance of harness connector between TCM and chassis ground to make sure that circuit does not short. ***Connector & terminal*** ***(B54) No. 12 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **10**.	Repair short circuit in harness between TCM and combination meter connector.
10	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Turn ignition switch to OFF. 2) Connect connector to TCM and combination meter. 3) Turn ignition switch to ON. 4) Measure signal voltage for TCM while installing and removing the fuse to FWD switch connector. ***Connector & terminal*** ***(B54) No. 12 — Chassis ground:***	Is the voltage less than 1 V in FWD switch while installing?	Go to step **11**.	Go to step **12**.
11	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** Measure signal voltage for TCM while removing the fuse from FWD switch connector. ***Connector & terminal*** ***(B54) No. 12 — Chassis ground:***	Is the voltage more than 9 V in FWD switch while removing?	Go to step **12**.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>
12	**CHECK POOR CONTACT.**	Is there poor contact in FWD switch circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>

C: CHECK BRAKE SWITCH. *S004794F17*

No.	Step	Check	Yes	No
1	**CHECK BRAKE SWITCH.**	When the brake pedal is depressed, does LED light up?	Go to step CHECK ABS SWITCH. <Ref. to AT-100, CHECK ABS SWITCH., Diagnostic Procedure for No-diagnostic Trouble Code (DTC).>	Check brake switch circuit. <Ref. WI-38, A/T Control System.>

D: CHECK ABS SWITCH. S004794F18

No.	Step	Check	Yes	No
1	**CHECK ABS SWITCH.**	Does the LED of ABS switch light up?	Check ABS switch circuit. <Ref. to ABS-122, DTC 44 ABS-AT CONTROL (NON CONTROLLED), Diagnostics Procedure with Subaru Select Monitor.> and <Ref. to ABS-124, DTC 44 ABS-AT CONTROL (CONTROLLED), Diagnostics Procedure with Subaru Select Monitor.>	Go to step CHECK CRUISE CONTROL SWITCH. <Ref. to AT-100, CHECK CRUISE CONTROL SWITCH., Diagnostic Procedure for No-diagnostic Trouble Code (DTC).>

E: CHECK CRUISE CONTROL SWITCH. S004794F19

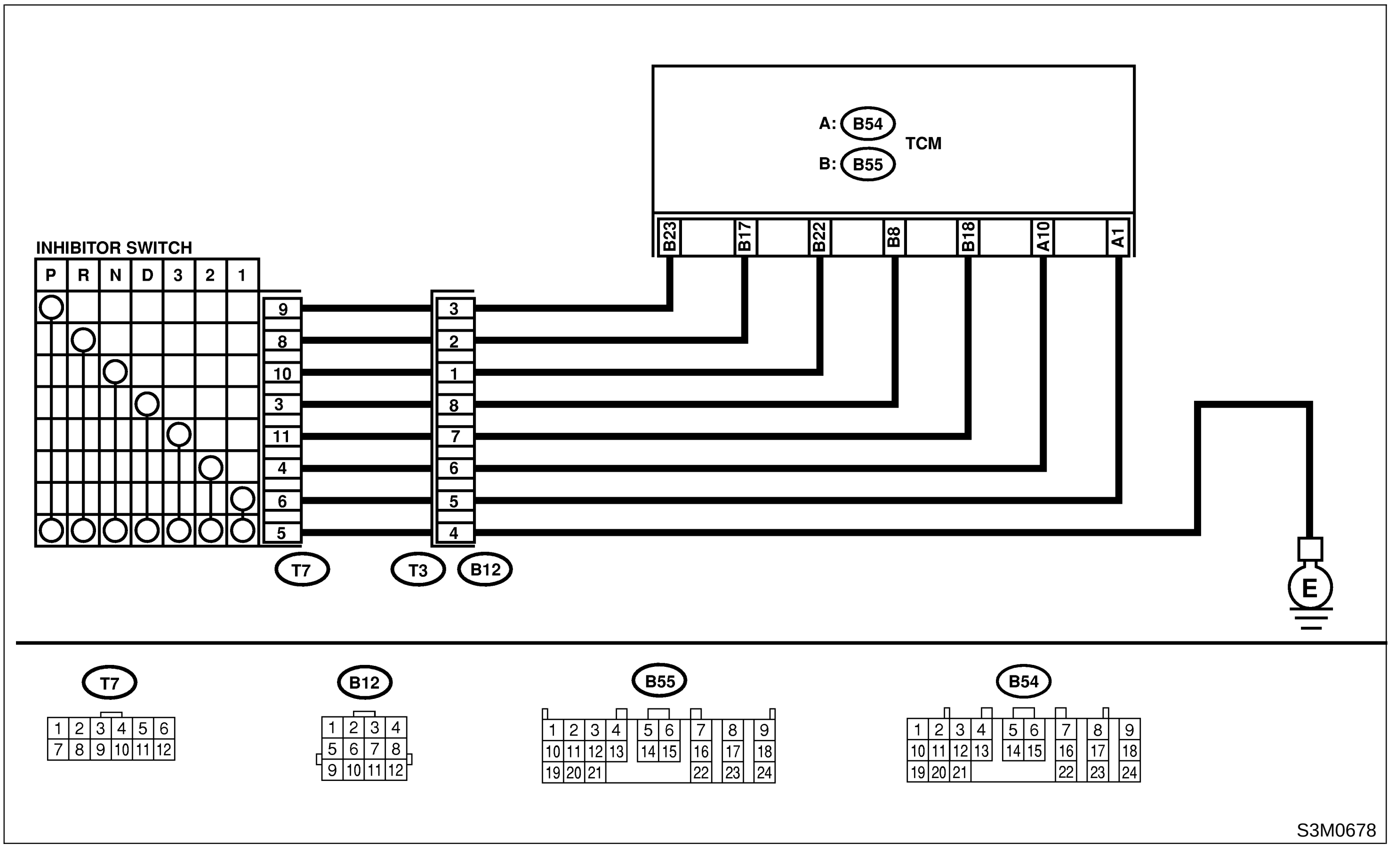
No.	Step	Check	Yes	No
1	**CHECK CRUISE CONTROL SWITCH.**	When cruise control is set, does LED light up?	Go to step CHECK INHIBITOR SWITCH. <Ref. to AT-102, CHECK INHIBITOR SWITCH., Diagnostic Procedure for No-diagnostic Trouble Code (DTC).>	Check cruise control. <Ref. to CC-20, Diagnostics Chart with Diagnostic Trouble Code.>

MEMO:

F: CHECK INHIBITOR SWITCH. S004794F20

DIAGNOSIS:
Input signal circuit of inhibitor switch is open or shorted.
TROUBLE SYMPTOM:
- Shift characteristics are erroneous.
- Engine brake is not effected when selector lever is in “3” range.
- Engine brake is not effected when selector lever is in “2” range.
- Engine brake is not effected when selector lever is in “1” range.

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK "P" RANGE SWITCH.**	When "P" range is selected, does LED light up?	Go to step **2**.	Go to step **15**.
2	**CHECK "P" RANGE SWITCH.**	When the "R" range is selected, does "P" range LED light up?	Go to step **19**.	Go to step **3**.
3	**CHECK "R" RANGE SWITCH.**	When the "R" range is selected, does LED light up?	Go to step **4**.	Go to step **20**.
4	**CHECK "R" RANGE SWITCH.**	When the "N" range is selected, does "R" range LED light up?	Go to step **23**.	Go to step **5**.
5	**CHECK "N" RANGE SWITCH.**	When the "N" range is selected, does LED light up?	Go to step **6**.	Go to step **24**.
6	**CHECK "N" RANGE SWITCH.**	When the "D" range is selected, does "N" range LED light up?	Go to step **27**.	Go to step **7**.
7	**CHECK "D" RANGE SWITCH.**	When the "D" range is selected, does LED light up?	Go to step **8**.	Go to step **28**.
8	**CHECK "D" RANGE SWITCH.**	When the "3" range is selected, does "D" range LED light up?	Go to step **31**.	Go to step **9**.
9	**CHECK "3" RANGE SWITCH.**	When the "3" range is selected, does LED light up?	Go to step **10**.	Go to step **32**.

No.	Step	Check	Yes	No
10	**CHECK "3" RANGE SWITCH.**	When the "2" range is selected, does "3" range LED light up?	Go to step **35**.	Go to step **11**.
11	**CHECK "2" RANGE SWITCH.**	When the "2" range is selected, does LED light up?	Go to step **12**.	Go to step **36**.
12	**CHECK "2" RANGE SWITCH.**	When the "1" range is selected, does "2" range LED light up?	Go to step **39**.	Go to step **13**.
13	**CHECK "1" RANGE SWITCH.**	When the "1" range is selected, does LED light up?	Go to step **14**.	Go to step **40**.
14	**CHECK "1" RANGE SWITCH.**	When the "P" range is selected, does "1" range LED light UP?	Go to step **43**.	Go to step Symptom Related Diagnostic. <Ref. to AT-110, Symptom Related Diagnostic.>
15	**CHECK HARNESS CONNECTOR BETWEEN INHIBITOR SWITCH AND CHASSIS GROUND.** 1) Turn ignition switch to OFF. 2) Disconnect connector from inhibitor switch. 3) Measure resistance of harness between inhibitor switch and chassis ground. ***Connector & terminal*** ***(T7) No. 5 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **16**.	Repair open circuit in harness between inhibitor switch connector and chassis ground, and poor contact in coupling connector.
16	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B55) No. 23 — (T7) No. 9***	Is the resistance less than 1 Ω?	Go to step **17**.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
17	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Measure voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 23 (+) — Chassis ground (–):***	Is the voltage less than 1 V in "P" range?	Go to step **18**.	Go to step **44**.
18	**CHECK INPUT SIGNAL FOR TCM.** Measure voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 23 (+) — Chassis ground (–):***	Is the voltage more than 8 V in other ranges?	Go to step **44**.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>
19	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 23 — Chassis ground:***	Is the resistance less than 1 MΩ?	Go to step **20**.	Repair ground short circuit in "P" range circuit.

No.	Step	Check	Yes	No
20	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B55) No. 17 — (T7) No. 8:***	Is the resistance less than 1 Ω?	Go to step **21**.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
21	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Measure voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 17 (+) — Chassis ground (–):***	Is the voltage less than 1 V in “R” range?	Go to step **22**.	Go to step **44**.
22	**CHECK INPUT SIGNAL FOR TCM.** Measure voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 17 (+) — Chassis ground (–):***	Is the voltage more than 8 V in other ranges?	Go to step **44**.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>
23	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 17 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **24**.	Repair ground short circuit in “R” range circuit.
24	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B55) No. 22 — (T7) No. 10:***	Is the resistance less than 1 Ω?	Go to step **25**.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
25	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Measure voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 22 (+) — Chassis ground (–):***	Is the voltage less than 1 V in “N” range?	Go to step **26**.	Go to step **44**.
26	**CHECK INPUT SIGNAL FOR TCM.** Measure voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 22 (+) — Chassis ground (–):***	Is the voltage more than 8 V in other ranges?	Go to step **44**.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>

No.	Step	Check	Yes	No
27	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 22 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **28**.	Repair ground short circuit in “N” range circuit.
28	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B55) No. 8 — (T7) No. 3:***	Is the resistance less than 1 Ω?	Go to step **29**.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
29	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Measure voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 8 (+) — Chassis ground (–):***	Is the voltage less than 1 V in “D” range?	Go to step **30**.	Go to step **44**.
30	**CHECK INPUT SIGNAL FOR TCM.** Measure voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 8 (+) — Chassis ground (–):***	Is the voltage more than 8 V in other ranges?	Go to step **44**.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>
31	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **32**.	Repair ground short circuit in “D” range circuit.
32	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B55) No. 18 — (T7) No. 11:***	Is the resistance less than 1 Ω?	Go to step **33**.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
33	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Measure voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 18 (+) — Chassis ground (–):***	Is the voltage less than 1 V in “3” range?	Go to step **34**.	Go to step **44**.

No.	Step	Check	Yes	No
34	**CHECK INPUT SIGNAL FOR TCM.** Measure voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 18 (+) — Chassis ground (–):***	Is the voltage more than 8 V in other ranges?	Go to step **44**.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>
35	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 18 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **36**.	Repair ground short circuit in “3” range circuit.
36	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B54) No. 10 — (T7) No. 4:***	Is the resistance less than 1 Ω?	Go to step **37**.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
37	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Measure voltage between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 10 (+) — Chassis ground (–):***	Is the voltage less than 1 V in “2” range?	Go to step **38**.	Go to step **44**.
38	**CHECK INPUT SIGNAL FOR TCM.** Measure voltage between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 10 (+) — Chassis ground (–):***	Is the voltage more than 8 V in other ranges?	Go to step **44**.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>
39	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **40**.	Repair ground short circuit in “2” range circuit.
40	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B54) No. 1 — (T7) No. 6:***	Is the resistance less than 1 Ω?	Go to step **41**.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

No.	Step	Check	Yes	No
41	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Measure voltage between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 1 (+) — Chassis ground (–):***	Is the voltage less than 1 V in “1” range?	Go to step **42**.	Go to step **44**.
42	**CHECK INPUT SIGNAL FOR TCM.** Measure voltage between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 8 V in other ranges?	Go to step **44**.	Replace TCM. <Ref. to AT-45, Transmission Control Module (TCM).>
43	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **44**.	Repair ground short circuit in “1” range circuit.
44	**CHECK POOR CONTACT.**	Is there poor contact in inhibitor switch circuit?	Repair poor contact.	Adjust inhibitor switch and select cable or replace TCM. <Ref. to AT-28, ADJUSTMENT, Inhibitor Switch.> and <Ref. to CS-26, Select Cable.> <Ref. to AT-45, Transmission Control Module (TCM).>

MEMO:

16. Symptom Related Diagnostic S004519

A: INSPECTION S004519A10

<table>
<tr><th>Symptom</th><th>Problem parts</th></tr>
<tr><td>Starter does not rotate when select lever is in “P” or “N”; starter rotates when select lever is in “R”, “D”, “3” or “2”.</td><td>● Inhibitor switch
● Select cable
● Select lever
● Starter motor and harness</td></tr>
<tr><td>Abnormal noise when select lever is in “P” or “N”.</td><td>● Strainer
● Transfer duty solenoid
● Oil pump
● Drive plate
● ATF level too high or too low</td></tr>
<tr><td>Hissing noise occurs during standing start.</td><td>● Strainer
● ATF level too high or too low</td></tr>
<tr><td>Noise occurs while driving in “D1”.</td><td rowspan="2">● Final gear
● Planetary gear
● Reduction gear
● Differential gear oil level too high or too low</td></tr>
<tr><td>Noise occurs while driving in “D2”.</td></tr>
<tr><td>Noise occurs while driving in “D3”.</td><td>● Final gear
● Low & reverse brake
● Reduction gear
● Differential gear oil level too high or too low</td></tr>
<tr><td>Noise occurs while driving in “D4”.</td><td>● Final gear
● Low & reverse brake
● Planetary gear
● Reduction gear
● Differential gear oil level too high or too low</td></tr>
<tr><td>Engine stalls while shifting from one range to another.</td><td>● Control valve
● Lock-up damper
● Engine performance
● Input shaft</td></tr>
<tr><td>Vehicle moves when select lever is in “N”.</td><td>● TCM
● Low clutch</td></tr>
<tr><td>Shock occurs when select lever is moved from “N” to “D”.</td><td>● TCM
● Harness
● Control valve
● ATF deterioration
● Dropping resistor</td></tr>
<tr><td>Excessive time lag occurs when select lever is moved from “N” to “D”.</td><td>● Control valve
● Low clutch
● Line pressure duty solenoid
● Seal ring
● Front gasket transmission case</td></tr>
<tr><td>Shock occurs when select lever is moved from “N” to “R”.</td><td>● TCM
● Harness
● Control valve
● ATF deterioration
● Dropping resistor</td></tr>
<tr><td>Excessive time lag occurs when select lever is moved from “N” to “R”.</td><td>● Control valve
● Low & reverse clutch
● Reverse clutch
● Line pressure duty solenoid
● Seal ring
● Front gasket transmission case</td></tr>
<tr><td>Vehicle does not start in any shift range (engine stalls).</td><td>● Parking brake mechanism
● Planetary gear</td></tr>
</table>

Symptom	Problem parts
Vehicle does not start in any shift range (engine revving up).	● Strainer ● Line pressure duty solenoid ● Control valve ● Drive pinion ● Hypoid gear ● Axle shaft ● Differential gear ● Oil pump ● Input shaft ● Output shaft ● Planetary gear ● Drive plate ● ATF level too low ● Front gasket transmission case
Vehicle does not start in “R” range only (engine revving up).	● Select cable ● Select lever ● Control valve ● Low & reverse clutch ● Reverse clutch
Vehicle does not start in “R” range only (engine stalls).	● Low clutch ● 2-4 brake ● Planetary gear ● Parking brake mechanism
Vehicle does not start in “D”, “3” range only (engine revving up).	● Low clutch ● One-way clutch
Vehicle does not start in “D”, “3” or “2” range only (engine revving up).	● Low clutch
Vehicle does not start in “D”, “3” or “2” range only (engine stalls).	● Reverse clutch
Vehicle starts in “R” range only (engine revving up).	● Control valve
Acceleration during standing starts is poor (high stall rpm).	● Control valve ● Low clutch ● Reverse clutch ● ATF level too low ● Front gasket transmission case ● Differential gear oil level too high or too low
Acceleration during standing starts is poor (low stall rpm).	● Oil pump ● Torque converter one-way clutch ● Engine performance
Acceleration is poor when select lever is in “D”, “3” or “2” range (normal stall rpm).	● TCM ● Control valve ● High clutch ● 2-4 brake ● Planetary gear
Acceleration is poor when select lever is in “R” (normal stall rpm).	● Control valve ● High clutch ● 2-4 brake ● Planetary gear
No shift occurs from 1st to 2nd gear.	● TCM ● Rear vehicle speed sensor ● Front vehicle speed sensor ● Throttle position sensor ● Shift solenoid 1 ● Control valve ● 2-4 brake
No shift occurs from 2nd to 3rd gear.	● TCM ● Control valve ● High clutch ● Shift solenoid 2

Symptom	Problem parts
No shift occurs from 3rd to 4th gear.	● TCM ● Shift solenoid 1 ● ATF temperature sensor ● Control valve ● 2-4 brake
Engine brake is not effective when select lever is in “3” range.	● Inhibitor switch ● TCM ● Throttle position sensor ● Control valve
Engine brake is not effective when select lever is in “3” or “2” range.	● Control valve
Engine brake is not effective when select lever is in “1” range.	● Control valve ● Low & reverse brake
Shift characteristics are erroneous.	● Inhibitor switch ● TCM ● Front vehicle speed sensor ● Rear vehicle speed sensor ● Throttle position sensor ● Control valve ● Ground earth
No lock-up occurs.	● TCM ● Throttle position sensor ● ATF temperature sensor ● Control valve ● Lock-up facing ● Engine speed signal
Parking brake is not effective. Shift lever cannot be moved or is hard to move from “P” range.	● Select cable ● Select lever ● Parking mechanism
ATF spurts out.	● ATF level too high
Differential oil spurts out.	● Differential gear oil too high
Differential oil level changes excessively.	● Seal pipe ● Double oil seal
Odor is produced from ATF supply pipe.	● High clutch ● 2-4 brake ● Low & reverse clutch ● Reverse clutch ● Lock-up facing ● ATF deterioration
Shock occurs from 1st to 2nd gear.	● TCM ● Throttle position sensor ● 2-4 brake duty solenoid ● ATF temperature sensor ● Line pressure duty solenoid ● Control valve ● 2-4 brake ● ATF deterioration ● Engine performance ● 2-4 brake timing solenoid ● Dropping resistor
Slippage occurs from 1st to 2nd gear.	● TCM ● Throttle position sensor ● 2-4 brake duty solenoid ● ATF temperature sensor ● Line pressure duty solenoid ● Control valve ● 2-4 brake ● 2-4 brake timing solenoid ● High clutch

Symptom	Problem parts
Shock occurs from 2nd to 3rd gear.	● TCM ● Throttle position sensor ● 2-4 brake duty solenoid ● ATF temperature sensor ● Line pressure duty solenoid ● Control valve ● High clutch ● 2-4 brake ● ATF deterioration ● Engine performance ● 2-4 brake timing solenoid
Slippage occurs from 2nd to 3rd gear.	● TCM ● Throttle position sensor ● 2-4 brake duty solenoid ● ATF temperature sensor ● Line pressure duty solenoid ● Control valve ● High clutch ● 2-4 brake ● 2-4 brake timing solenoid
Shock occurs from 3rd to 4th gear.	● TCM ● Throttle position sensor ● 2-4 brake duty solenoid ● ATF temperature sensor ● Line pressure duty solenoid ● Control valve ● 2-4 brake timing solenoid ● 2-4 brake ● ATF deterioration ● Engine performance ● Low clutch timing solenoid ● Low clutch
Slippage occurs from 3rd to 4th gear.	● TCM ● Throttle position sensor ● 2-4 brake duty solenoid ● ATF temperature sensor ● Line pressure duty solenoid ● Control valve ● 2-4 brake ● 2-4 brake timing solenoid
Shock occurs when select lever is moved from “3” to “2” range.	● TCM ● Throttle position sensor ● ATF temperature sensor ● Line pressure duty solenoid ● Control valve ● 2-4 brake duty solenoid ● 2-4 brake ● ATF deterioration ● 2-4 brake timing solenoid
Shock occurs when select lever is moved from “D” to “1” range.	● TCM ● Throttle position sensor ● ATF temperature sensor ● Line pressure duty solenoid ● Control valve ● ATF deterioration ● 2-4 brake duty solenoid ● 2-4 brake timing solenoid ● Low clutch timing solenoid

Symptom	Problem parts
Shock occurs when select lever is moved from “2” to “1” range.	● TCM ● Throttle position sensor ● ATF temperature sensor ● Line pressure duty solenoid ● Control valve ● Low & reverse clutch ● ATF deterioration ● 2-4 brake duty solenoid ● 2-4 brake timing solenoid ● Low clutch timing solenoid
Shock occurs when accelerator pedal is released at medium speeds.	● TCM ● Throttle position sensor ● ATF temperature sensor ● Line pressure duty solenoid ● Control valve ● Lock-up damper ● Engine performance ● 2-4 brake duty solenoid ● 2-4 brake timing solenoid ● Low clutch timing solenoid
Vibration occurs during straight-forward operation.	● TCM ● Lock-up duty solenoid ● Lock-up facing ● Lock-up damper
Vibration occurs during turns (tight corner “braking” phenomenon).	● TCM ● Front vehicle speed sensor ● Rear vehicle speed sensor ● Throttle position sensor ● ATF temperature sensor ● Transfer clutch ● Transfer valve ● Transfer duty solenoid ● ATF deterioration ● Harness
Front wheel slippage occurs during standing starts.	● TCM ● Front vehicle speed sensor ● Throttle position sensor ● ATF temperature sensor ● Control valve ● Transfer clutch ● Transfer valve ● Transfer pipe ● Transfer duty solenoid
Vehicle is not set in FWD mode.	● TCM ● Transfer clutch ● Transfer valve ● Transfer duty solenoid
Select lever is hard to move.	● Select cable ● Select lever ● Detent spring ● Manual plate
Select lever is too high to move (unreasonable resistance).	● Detent spring ● Manual plate
Select lever slips out of operation during acceleration or while driving on rough terrain.	● Select cable ● Select lever ● Detent spring ● Manual plate

POWER ASSISTED SYSTEM (POWER STEERING)

PS

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1. General Description S601001

A: SPECIFICATIONS S601001E49

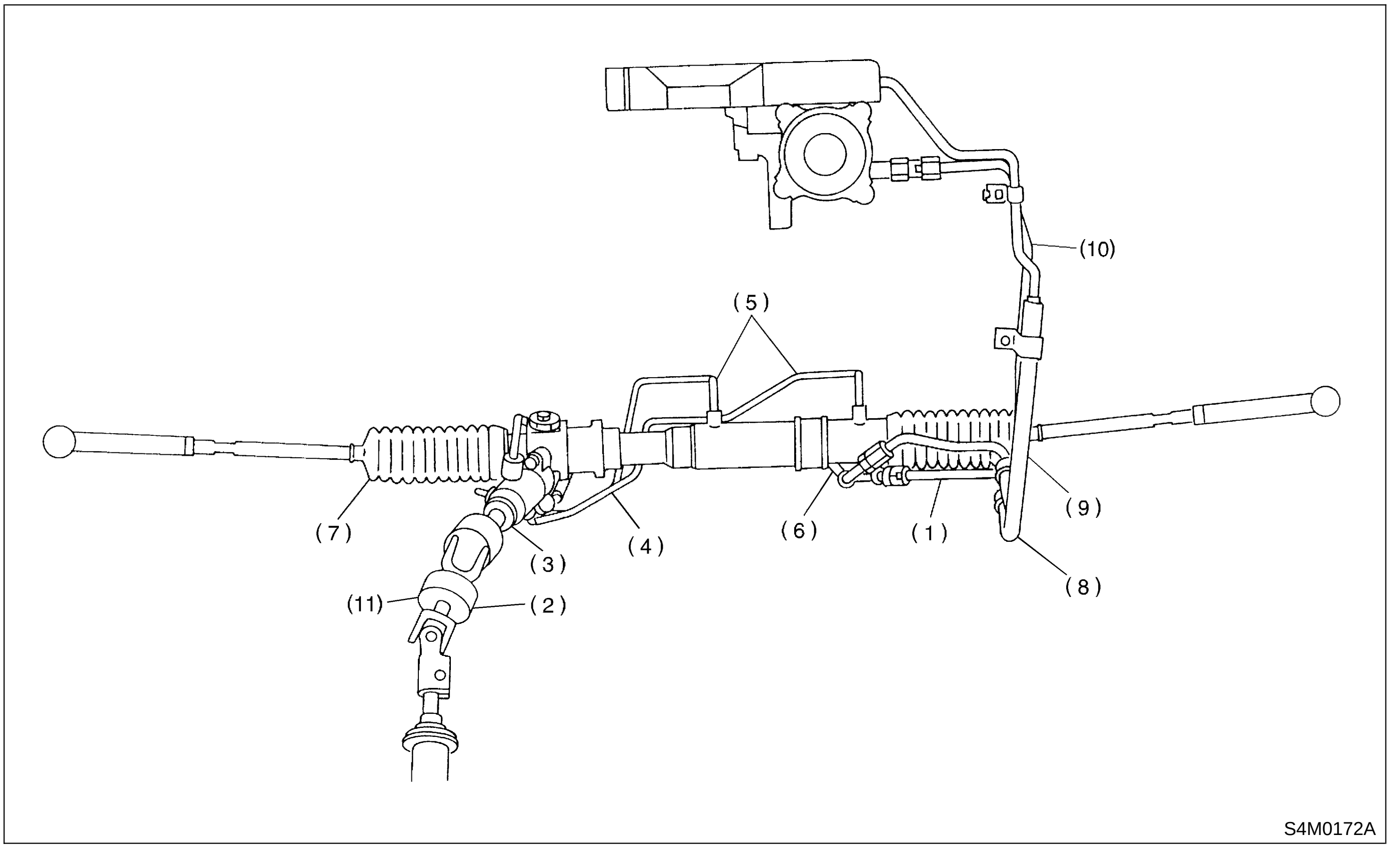
<table>
<tr><td>Steering wheel</td><td colspan="2">Free play</td><td>mm (in)</td><td>17 (0.67)</td></tr>
<tr><td rowspan="2">Turning angle</td><td colspan="3">Inner tire & wheel</td><td>34.4°±1.5°</td></tr>
<tr><td colspan="3">Outer tire & wheel</td><td>30.2°±1.5°</td></tr>
<tr><td>Steering shaft</td><td colspan="2">Clearance between steering wheel and column cover</td><td>mm (in)</td><td>3.0 (0.118)</td></tr>
<tr><td rowspan="6">Steering gearbox
(Power steering system)</td><td colspan="2">Sliding resistance</td><td>N (kgf, lb)</td><td>304.0 (31.0, 68.4) or less</td></tr>
<tr><td rowspan="2">Rack shaft play in radial direction</td><td>Right-turn steering</td><td>mm (in)</td><td>0.15 (0.0059) or less</td></tr>
<tr><td>Left-turn steering</td><td>mm (in)</td><td>Horizontal movement:
0.3 (0.012) or less
Vertical movement:
0.15 (0.0059) or less</td></tr>
<tr><td rowspan="2">Input shaft play</td><td>In radial direction</td><td>mm (in)</td><td>0.18 (0.0071) or less</td></tr>
<tr><td>In axial direction</td><td>mm (in)</td><td>0.1 (0.004) or less</td></tr>
<tr><td colspan="2">Turning resistance</td><td>N (kgf, lb)</td><td>Within 30 mm (1.18 in) from rack center in straight ahead position:
Less than 11.18 (1.14, 2.51)
Maximum allowable value: 12.7 (1.3, 2.9)</td></tr>
<tr><td rowspan="6">Oil pump
(Power steering system)</td><td rowspan="2">Pulley shaft</td><td>Radial play</td><td>mm (in)</td><td>0.4 (0.016) or less</td></tr>
<tr><td>Axial play</td><td>mm (in)</td><td>0.9 (0.035) or less</td></tr>
<tr><td rowspan="2">Pulley</td><td>Ditch deflection</td><td>mm (in)</td><td>1.0 (0.039) or less</td></tr>
<tr><td>Resistance to rotation</td><td>N (kgf, lb)</td><td>9.22 (0.94, 2.07) or less</td></tr>
<tr><td colspan="2">Regular pressure</td><td>kPa (kg/cm^2, psi)</td><td>981 (10, 142) or less</td></tr>
<tr><td colspan="2">Relief pressure</td><td>kPa (kg/cm^2, psi)</td><td>7,355 (75, 1,067)</td></tr>
<tr><td rowspan="2">Steering wheel effort
(Power steering system)</td><td colspan="2">At standstill with engine idling on a concrete road</td><td>N (kgf, lb)</td><td>29.4 (3.0, 6.6) or less</td></tr>
<tr><td colspan="2">At standstill with engine stalled on a concrete road</td><td>N (kgf, lb)</td><td>294.2 (30, 66.2) or less</td></tr>
</table>

<table>
<tr><th>Recommended power steering fluid</th><th>Manufacturer</th></tr>
<tr><td rowspan="6">ATF DEXRON III or equivalent</td><td>B.P.</td></tr>
<tr><td>CALTEX</td></tr>
<tr><td>CASTROL</td></tr>
<tr><td>MOBIL</td></tr>
<tr><td>SHELL</td></tr>
<tr><td>TEXACO</td></tr>
</table>

Whole system	Minimum turning radius		m (ft)	5.4 (17.7)
	Steering angle (Inside-Outside)			34.4°±1.5° — 30.2°±1.5°
	Steering wheel diameter		mm (in)	With AIRBAG: 385 (15.16) Without AIRBAG: 385 (15.16)
	Overall gear ratio (Turns, lock to lock)			19.0 (3.4)
Gearbox	Type			Rack and pinion, Integral
	Backlash			0 (Automatically adjustable)
	Valve (Power steering system)			Rotary valve
Pump (Power steering system)	Type			Vane pump
	Oil tank			Installed on pump
	Output		cm^3 (cu in)/rev.	7.2 — 0.6 (0.439 — 0.037)
	Relief pressure		kPa (kg/cm^2, psi)	7,355 (75, 1,067)
	Hydraulic fluid control			Drooping in response to increased engine revolutions
	Hydraulic fluid		ℓ (US qt, Imp qt)	1,000 rpm: 7 (7.4, 6.2) 3,000 rpm: 5 (5.3, 4.4)
	Range of revolution		rpm	500 — 7,500
	Revolving direction			Clockwise
Working fluid (Power steering system)	Name			ATF DEXRON III or equivalent
	Capacity	Oil tank	ℓ (US qt, Imp qt)	0.3 (0.3, 0.3)
		Total	ℓ (US qt, Imp qt)	0.7 (0.7, 0.6)

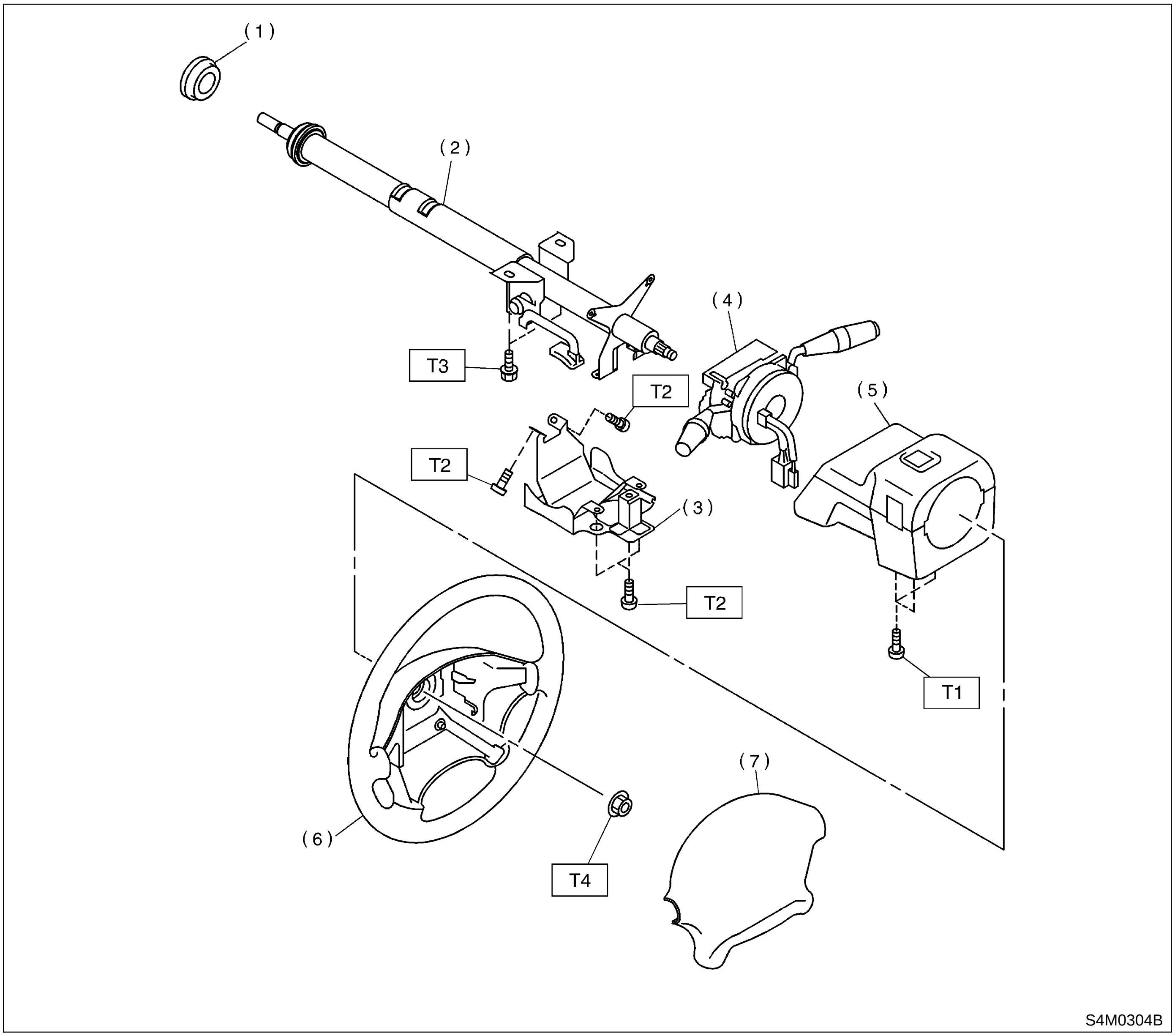
CAUTION:
This table lists various clearances that must be correctly adjusted to ensure normal vehicle driving without interfering noise, or any other faults.

Location	Minimum allowance
(1) Crossmember — Pipe	5 mm (0.20 in)
(2) DOJ — Shaft or joint	14 mm (0.55 in)
(3) DOJ — Valve housing	11 mm (0.43 in)
(4) Pipe — Pipe	2 mm (0.08 in)
(5) Stabilizer — Pipe	5 mm (0.20 in)
(6) Exhaust pipe — Pipe	15 mm (0.59 in)
(7) Exhaust pipe — Gearbox bolt	15 mm (0.59 in)
(8) Side frame — Hose A and B	15 mm (0.59 in)
(9) Cruise control pump — Hose A and B	15 mm (0.59 in)
(10) Pipe portion of hose A — Pipe portion of hose B	1.5 mm (0.059 in)
(11) AT cooling hose — Joint	20 mm (0.79 in)


(1)
(2)
(3)
(4)
(5)
(6)
(7)
(8)
(9)
(10)
(11)
S4M0172A

B: COMPONENT S601001A05

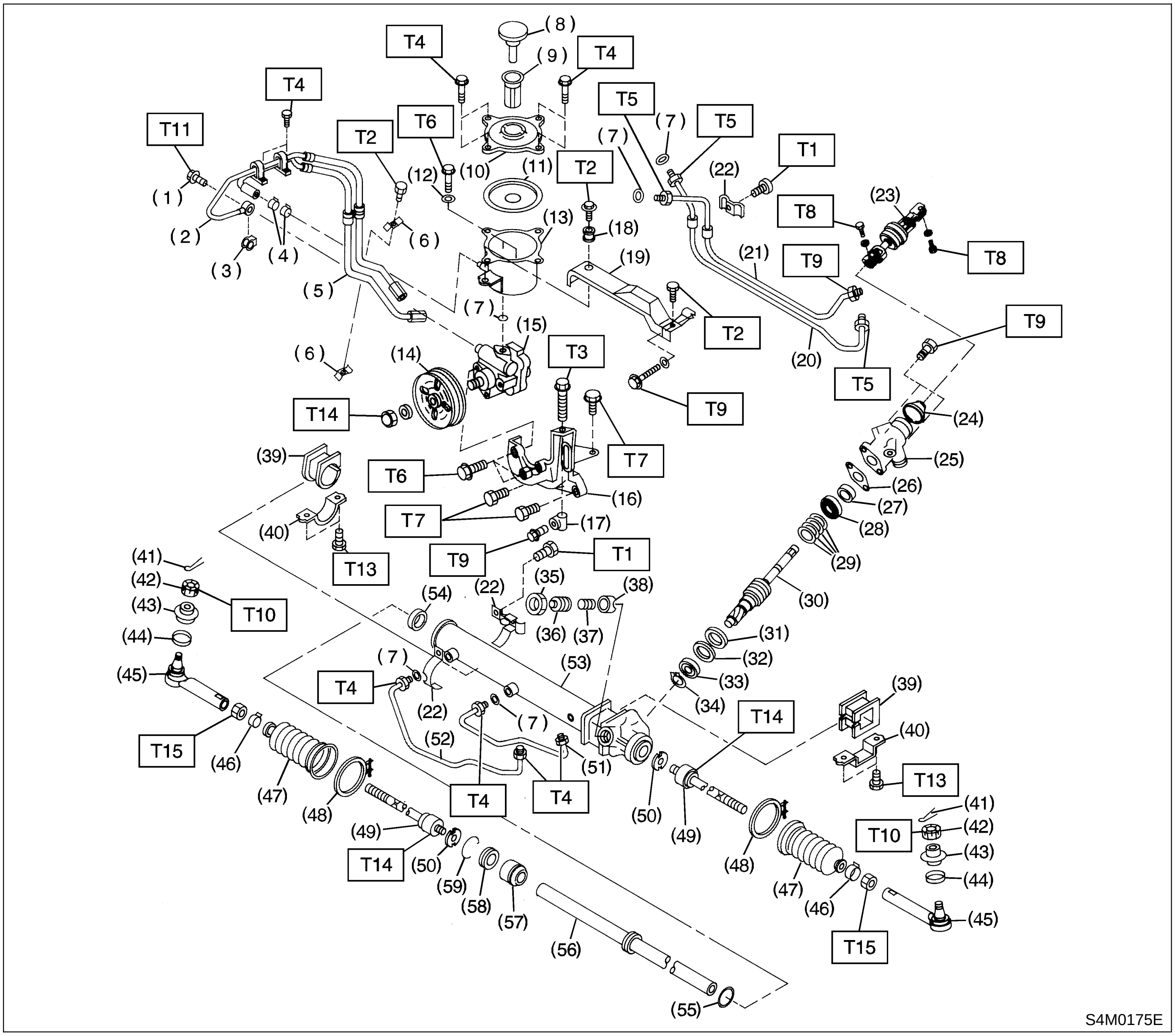
1. STEERING WHEEL AND COLUMN S601001A0501



(1) Bushing
(2) Steering shaft
(3) Knee protector
(4) Steering roll connector
(5) Column cover
(6) Steering wheel
(7) Airbag module

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.2 (0.12, 0.9)
T2: 3.4 (0.35, 2.5)
T3: 25 (2.5, 18.1)
T4: 44 (4.5, 32.5)

2. POWER ASSISTED SYSTEM *S601001A0502*



(1) Eye bolt
(2) Pipe C
(3) Gasket
(4) Clip
(5) Pipe D
(6) Clamp E
(7) O-ring
(8) Cap
(9) Strainer
(10) Upper shell
(11) Buffle
(12) Seal washer
(13) Lower shell
(14) Pulley
(15) Oil pump
(16) Bracket
(17) Belt tension nut
(18) Bushing
(19) Belt cover
(20) Pipe E
(21) Pipe F
(22) Clamp plate
(23) Universal joint
(24) Dust cover
(25) Valve housing
(26) Gasket
(27) Oil seal
(28) Special bearing
(29) Seal ring
(30) Pinion and valve ASSY
(31) Oil seal
(32) Back-up washer
(33) Ball bearing
(34) Snap ring
(35) Lock nut
(36) Adjusting screw
(37) Spring
(38) Sleeve
(39) Adapter
(40) Clamp
(41) Cotter pin
(42) Castle nut
(43) Dust seal
(44) Clip
(45) Tie-rod end
(46) Clip
(47) Boot
(48) Band
(49) Tie-rod
(50) Lock washer
(51) Pipe B
(52) Pipe A
(53) Steering body
(54) Oil seal
(55) Piston ring
(56) Rack
(57) Rack bushing
(58) Rack stopper
(59) Circlip

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6 (0.6, 4.3)
T2: 7.4 (0.75, 5.4)
T3: 8 (0.8, 5.8)
T4: 13 (1.3, 9.4)
T5: 15 (1.5, 10.8)
T6: 18 (1.8, 13.0)
T7: 22 (2.2, 15.9)
T8: 24 (2.4, 17.4)
T9: 25 (2.5, 18.1)
T10: 27.0 (2.75, 19.9)
T11: 39 (4.0, 28.9)
T12: 52 (5.3, 38)
T13: 59 (6.0, 43)
T14: 78 (8.0, 58)
T15: 83 (8.5, 61.5)

C: CAUTION *S601001A03*

- This section includes Airbag related repair works. For those corresponding to the repair procedures, read carefully CAUTION items in AB section before working and be sure to follow the instructions.
- 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.
- Use SUBARU genuine steering fluid, grease etc. or the equivalent. Do not mix steering fluid, grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply steering fluid onto sliding or revolution surfaces before installation.
- Before installing O-rings or snap rings, apply sufficient amount of steering fluid to avoid damage and deformation.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.

D: PREPARATION TOOL *S601001A17*

1. SPECIAL TOOLS *S601001A1701*

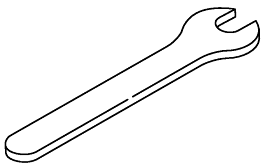
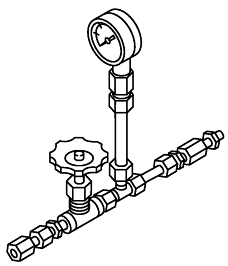
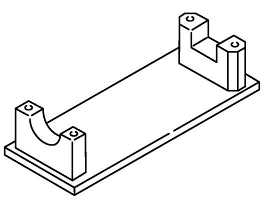
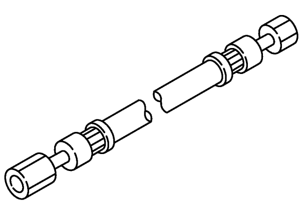
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2411	925700000	WRENCH	● Used for removing and installing tie-rod. ● Apply this tool to rack.
 B4M2412	925711000	PRESSURE GAUGE	Used for measuring oil pump pressure.
 B4M2413	926200000	STAND	Used when inspecting characteristic of gearbox assembly and disassembling it.
 B4M2414	34099AC010	ADAPTER HOSE A	Used with PRESSURE GAUGE (925711000).

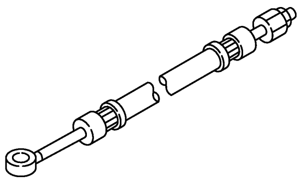
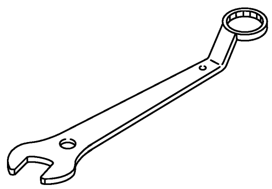
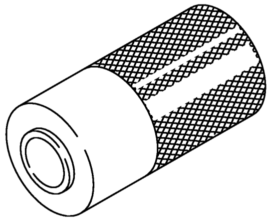
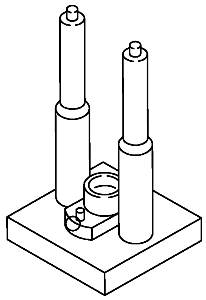
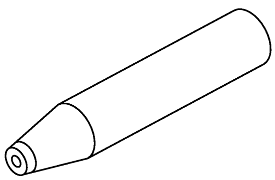
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2415	34099AC020	ADAPTER HOSE B	Used with PRESSURE GAUGE (925711000).
 B4M2416	926230000	SPANNER	● For the lock nut when adjusting backlash of gearbox. ● Measurement of rotating resistance of gear-box assembly.
 B4M2420	927640000	INSTALLER B	Used for installing ball bearing into housing.
 B4M2421	926370000	INSTALLER A	● Used for installing valve assembly into valve housing assembly. ● Used with STAND BASE (927630000).
 B4M2422	926390001	COVER & REMOVER ASSY	Used for assembling rack assembly.

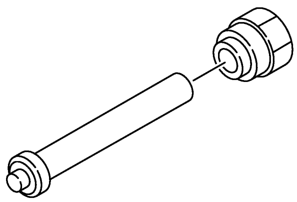
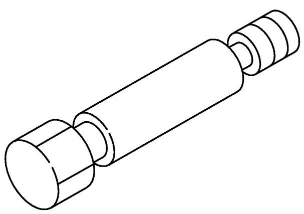
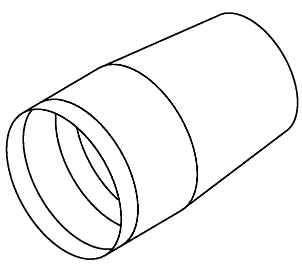
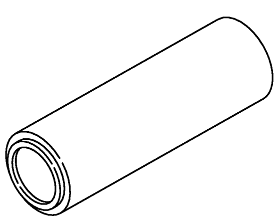
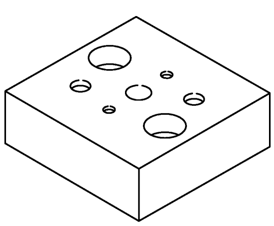
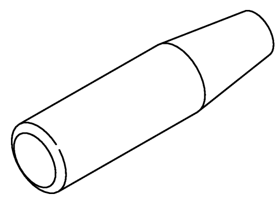
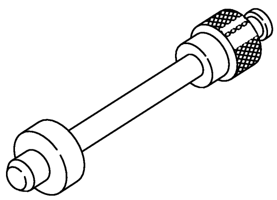
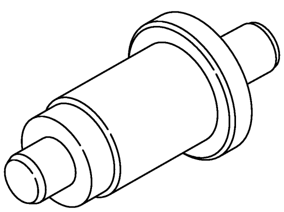
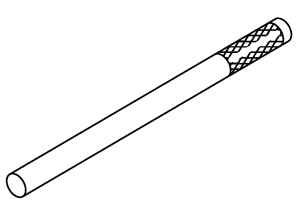
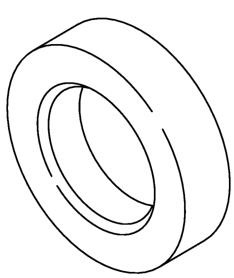
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2423	926420000	PLUG	When oil leaks from pinion side of gearbox assembly, remove pipe B from valve housing, attach this tool and check oil leaking points.
 B4M2424	926400000	GUIDE	● Right side of rack when installing rack bushing. ● Used with GUIDE (927660000).
 B4M2425	927660000	GUIDE	● Right side of rack when installing rack bushing. ● Used with GUIDE (926400000).
 B4M2426	927620000	INSTALLER B	● Used for installing oil seal of valve housing. ● Used with INSTALLER A (926360000).
 B4M2427	34099FA100	STAND BASE	Used for assembling power steering gearbox.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2428	926360000	INSTALLER A	● Used as a guide to install oil seal. ● Used with INSTALLER B (927620000).
 B4M2429	34199AE050	INSTALLER	Used for installing oil seal.
 B4M2430	34099FA120	INSTALLER	Used for installing valve housing oil seal.
 B4M2432	34199AE050	REMOVER OIL SEAL	Used for removing back-up ring and oil seal.
 B4M2431	34099FA130	INSTALLER SEAL	● Used for installing valve housing oil seal. ● Used with INSTALLER AND REMOVER SEAL (34099FA120).

2. GENERAL PURPOSE TOOLS *S601001A1702*

TOOL NAME	REMARKS
Spring scale	Used for measuring tightening torque.
Snap ring pliers	Used for removing and installing snap ring.
Dial gauge	Used for measuring steering gearbox.

2. Steering Wheel *S601274*

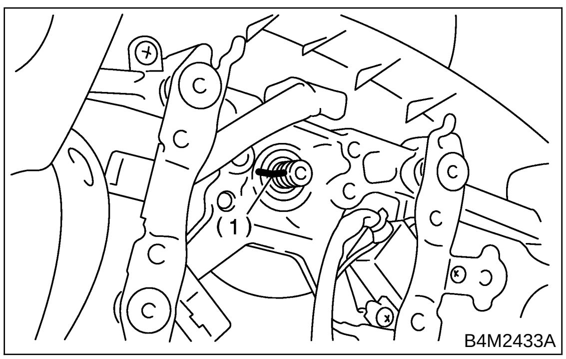
A: REMOVAL *S601274A18*

1) Disconnect battery ground cable.
2) Set tires to straight-ahead position.
3) Remove airbag module. <Ref. to AB-13, REMOVAL, Driver's Airbag Module.>

WARNING:
Always refer to "Airbag System" before performing airbag module service. <Ref. to AB-13, CAUTION, Driver's Airbag Module.>

4) Remove steering wheel nut, and then draw out steering wheel from shaft using steering puller.

NOTE:
Make matching marks on steering wheel and steering column in advance.



(1) Matching mark

B: INSTALLATION *S601274A11*

1) Align center of roll connector. <Ref. to AB-20, ADJUSTMENT, Roll Connector.>
2) Install in the reverse order of removal.

NOTE:
Align matching marks on steering wheel and steering column.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)

Column cover-to-steering wheel clearance:
2 — 4 mm (0.08 — 0.16 in)

WARNING:
Always refer to "Airbag System" before performing airbag module service. <Ref. to AB-13, CAUTION, Driver's Airbag Module.>

CAUTION:
Insert roll connector guide pin into guide hole on lower end of surface of steering wheel to prevent damage. Draw out airbag system connector, horn connector and cruise control connectors from guide hole of steering wheel lower end.

C: INSPECTION *S601274A10*

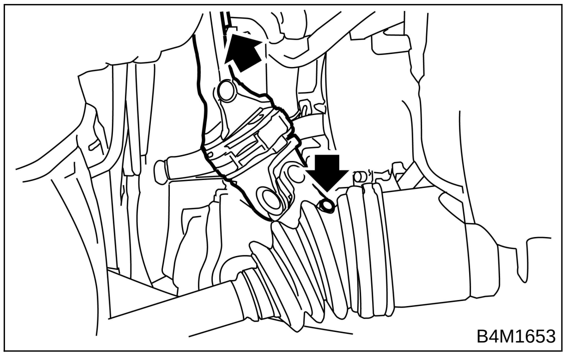
1) Check steering wheel for deformation. If the deformation is excessive, replace steering wheel.
2) Check splines on steering wheel for damage. If the damage is excessive, replace steering wheel.

3. Universal Joint S601273

A: REMOVAL S601273A18

1) Set the vehicle on the lift.
2) Remove the steering wheel. <Ref. to PS-14, REMOVAL, Steering Wheel.>
3) Lift-up the vehicle.
4) Remove universal joint bolts and then remove universal joint.

CAUTION:
Scribe alignment marks on universal joint so that it can be reassembled at the original serration.


B4M1653

B: INSTALLATION S601273A11

1) Install universal joint.
(1) Align bolts hole on the long yoke side of universal joint with the cutout at the serrated section of shaft end, and insert universal joint.
(2) Align bolt hole on the short yoke side of universal joint with the cutout at the serrated section of gearbox assembly. Lower universal joint completely.
(3) Temporarily tighten bolt on the short yoke side. Raise universal joint to make sure the bolt is properly passing through the cutout at the serrated section.
(4) Tighten bolt on the long yoke, then that on the short yoke side.

Tightening torque:
24 N·m (2.4 kgf-m, 17.4 ft-lb)

CAUTION:
- **Make sure that universal joint bolt is tightened through notch in shaft serration.**
- **Excessively large tightening torque of universal joint bolts may lead to heavy steering wheel operation.**

Standard clearance between gearbox to DOJ:
Over 15 mm (0.59 in)

2) Lower the vehicle.
3) Align center of roll connector. <Ref. to AB-20, ADJUSTMENT, Roll Connector.>

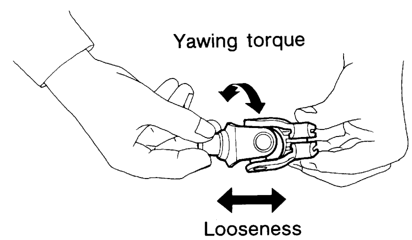
CAUTION:
Ensure that front wheel are set straight forward direction.

4) Install steering wheel and airbag module. <Ref. to PS-14, INSTALLATION, Steering Wheel.>

WARNING:
Always refer to "Airbag System" before performing airbag module service. <Ref. to AB-13, CAUTION, Driver's Airbag Module.> and <Ref. to AB-13, INSTALLATION, Driver's Airbag Module.>

C: INSPECTION S601273A10

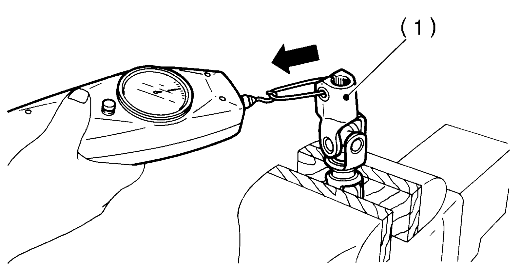
Clean the disassembled parts with a cloth, and check for wear, damage, or any other faults. If necessary, repair or replace faulty parts.

Inspection	Corrective action
● Free play ● Swinging torque Yawing torque Looseness  G4M0089 **Standard value of universal joint free play: 0 mm (0 in)** **Max. value of universal joint swinging torque: 0.3 N·m (0.03 kgf-m, 0.2 ft-lb)**	Replace if faulty.

Measurement of folding torque of universal joint is as shown in the figures.

Service limit:

Maximum load; 5.49 N (0.56 kgf, 1.23 lb) or less

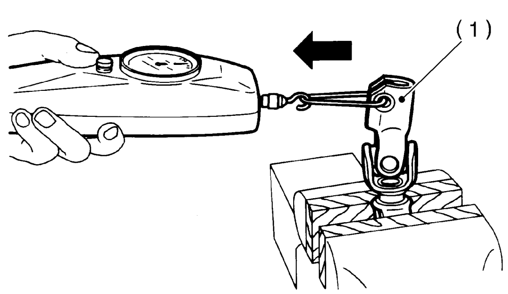


S4M0443A

(1) Long yoke

Service limit:

Maximum load; 5.49 N (0.56 kgf, 1.23 lb) or less

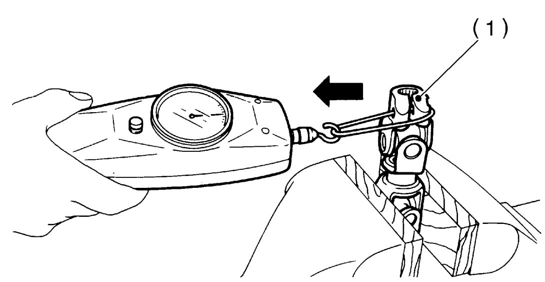


S4M0444A

(1) Long yoke

Service limit:

Maximum load; 8.43 N (0.86 kgf, 1.90 lb) or less

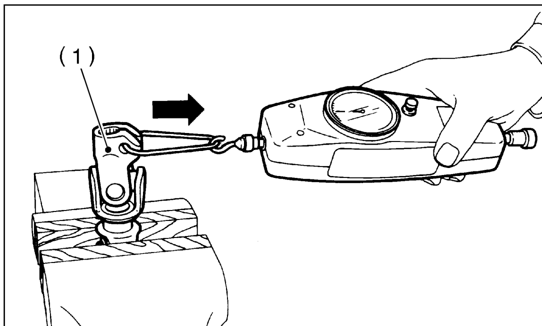


S4M0445A

(1) Short yoke

Service limit:

Maximum load; 8.43 N (0.86 kgf, 1.90 lb) or less

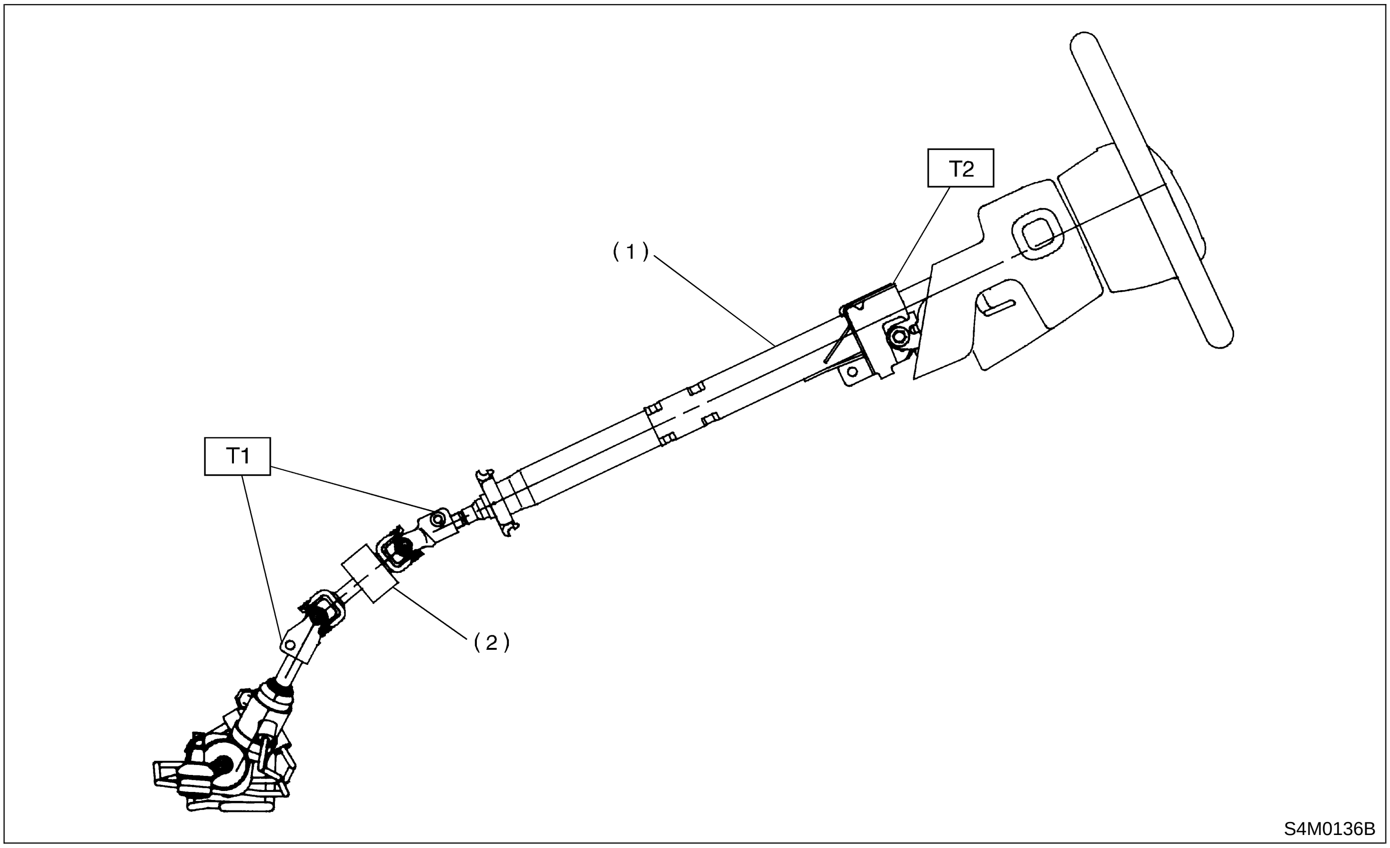


S4M0446A

(1) Short yoke

4. Tilt Steering Column *S601544*

A: REMOVAL *S601544A18*



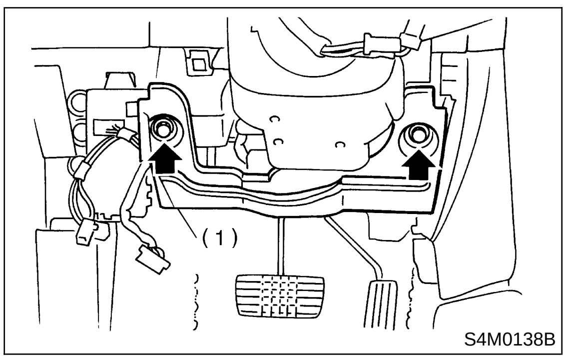
(1) Tilt steering column
(2) Universal joint

Tightening torque: N·m (kgf-m, ft-lb)
T1: 24 (2.4, 17.4)
T2: 25 (2.5, 18.1)

1) Set the vehicle on the lift.
2) Disconnect battery ground cable.
3) Remove airbag module. <Ref. to AB-13, REMOVAL, Driver's Airbag Module.>

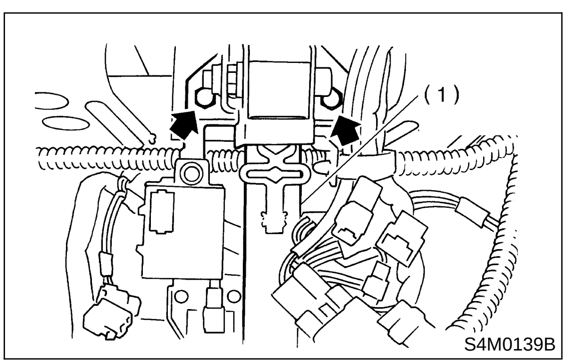
WARNING:
Always refer to "Airbag System" before performing airbag module service. <Ref. to AB-13, CAUTION, Driver's Airbag Module.>

4) Remove steering wheel. <Ref. to PS-14, REMOVAL, Steering Wheel.>
5) Lift-up the vehicle.
6) Remove universal joint. <Ref. to PS-15, REMOVAL, Universal Joint.>
7) Lower the vehicle.
8) Remove trim panel under instrument panel.
9) Remove knee bolster.



(1) Knee bolster

10) Disconnect connectors for ignition switch and combination switch wiring harness under instrument panel.
11) Remove the two bolts under instrument panel securing steering column.



(1) Steering column

12) Pull out steering shaft assembly from hole on toe board.

CAUTION:
Be sure to remove universal joint before removing steering shaft assembly installing bolts when removing steering shaft assembly or when lowering it for servicing of other parts.

B: INSTALLATION S601544A11

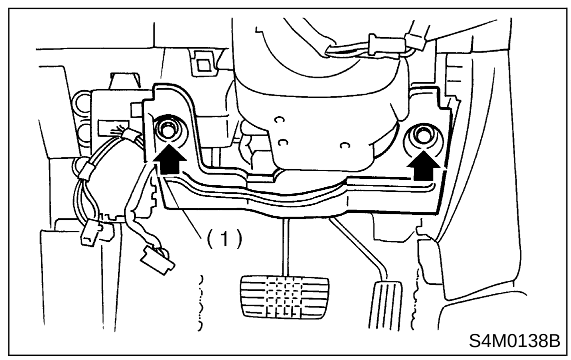
1) Insert end of steering shaft into toe board grommet.
2) Tighten steering shaft mounting bolts under instrument panel.

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

3) Connect all connectors under instrument panel.
4) Connect airbag system connector at harness spool.

NOTE:
Make sure to apply double lock.

5) Install lower column cover with tilt lever held in the lowered position.
6) Install universal joint. <Ref. to PS-15, INSTALLATION, Universal Joint.>
7) Install knee bolster.



(1) Knee bolster

8) Align center of roll connector. <Ref. to AB-20, ADJUSTMENT, Roll Connector.>

CAUTION:
Ensure that front wheels are set in straight forward direction.

9) Install steering wheel. <Ref. to PS-14, INSTALLATION, Steering Wheel.>
Set steering wheel to neutral and install it onto steering shaft.

CAUTION:
Insert roll connector guide pin into guide hole on lower end of surface of steering wheel to prevent damage. Draw out airbag system connector, horn connector and cruise control connectors from guide hole of steering wheel lower end.

10) Install airbag module to steering wheel. <Ref. to AB-13, INSTALLATION, Driver's Airbag Module.>

WARNING:
Always refer to "Airbag System" before performing the service operation. <Ref. to AB-13, CAUTION, Driver's Airbag Module.>

C: DISASSEMBLY S601544A06

Remove the two screws securing upper steering column covers, and the two screws securing combination switch, then remove related parts.

D: ASSEMBLY S601544A02

1) Insert combination switch to upper column shaft, and install upper column cover. Then route ignition key harness and combination switch harness between column cover mounting bosses.

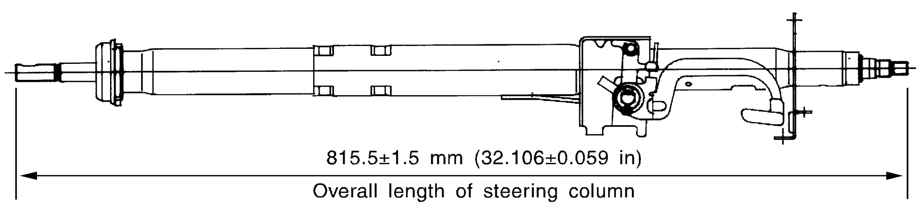
Tightening torque:
1.2 N·m (0.12 kgf-m, 0.9 ft-lb)

CAUTION:
Don't overtorque screw.

E: INSPECTION S601544A10

1. BASIC INSPECTION S601544A1001

Clean the disassembled parts with a cloth, and check for wear, damage, or any other faults. If necessary, repair or replace faulty parts.

Inspection	Corrective action
● Overall length of steering column Measure overall length of steering column. Standard overall length of steering column:  S4M0141A	Replace steering column assembly.

2. AIRBAG MODEL INSPECTION S601544A1002

WARNING:
For airbag model inspection procedures, refer to "Airbag System". <Ref. to AB-13, CAUTION, Driver's Airbag Module.> and <Ref. to AB-13, INSPECTION, Driver's Airbag Module.>

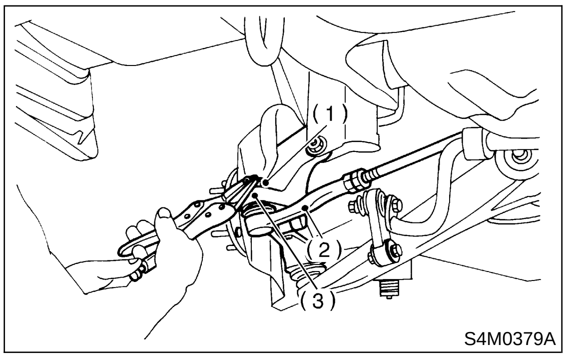
5. Steering Gearbox S601545

A: REMOVAL S601545A18

1) Disconnect battery ground cable.
2) Loosen front wheel nut.
3) Lift vehicle and remove front wheels.
4) Remove front exhaust pipe assembly. <Ref. to EX-5, REMOVAL, Front Exhaust Pipe.>

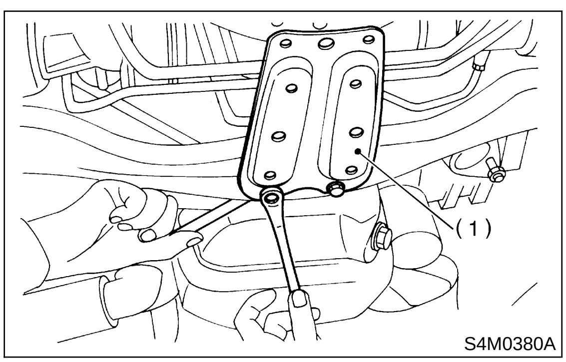
WARNING:
Be careful, exhaust pipe is hot.

5) Using a puller, remove tie-rod end from knuckle arm after pulling off cotter pin and removing castle nut.



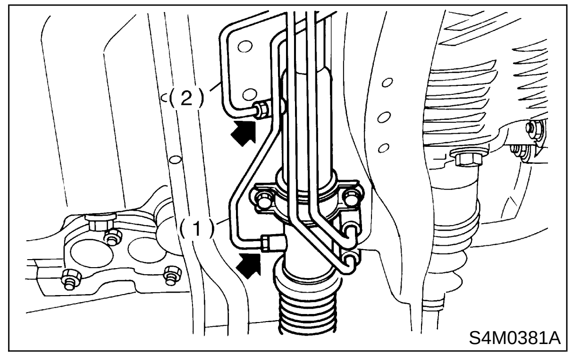
(1) Castle nut
(2) Tie-rod end
(3) Knuckle arm

6) Remove jack-up plate and front stabilizer. <Ref. to FS-21, REMOVAL, Front Stabilizer.>



(1) Jack-up plate

7) Remove one pipe joint at the center of gearbox, and connect vinyl hose to pipe and joint. Discharge fluid by turning steering wheel fully clockwise and counterclockwise. Discharge fluid similarly from the other pipe.

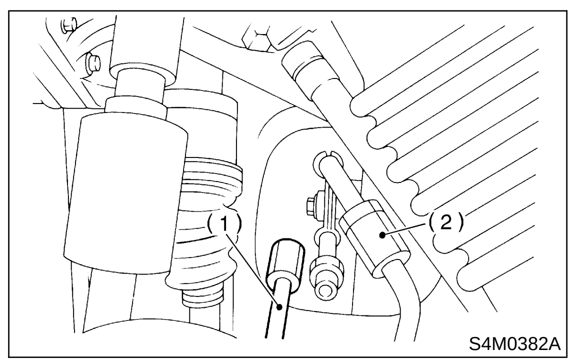


(1) Pipe A
(2) Pipe B

8) Remove universal joint. <Ref. to PS-15, REMOVAL, Universal Joint.>
9) Disconnect pipes C and D from pipe of gearbox.

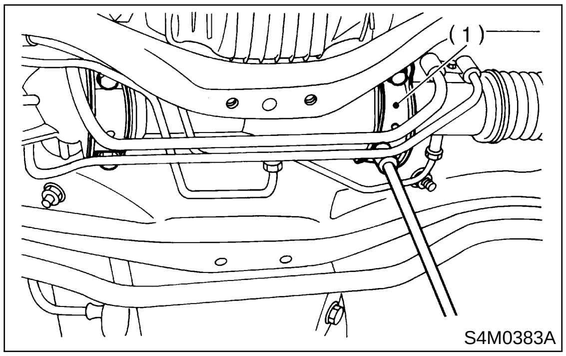
CAUTION:
Be careful not to damage these pipes.

NOTE:
Disconnect upper pipe D first, and lower pipe C second.



(1) Pipe C
(2) Pipe D

10) Remove clamp bolts securing gearbox to crossmember, and remove gearbox.

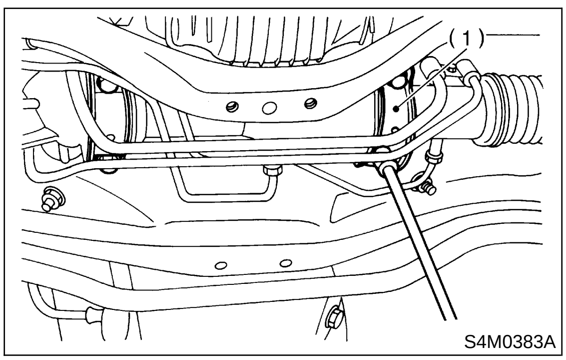


(1) Clamp

B: INSTALLATION S601545A11

1) Insert gearbox into crossmember, being careful not to damage gearbox boot.
2) Tighten gearbox to crossmember bracket via clamp with bolt to the specified torque.

Tightening torque:
59 N·m (6.0 kgf-m, 43 ft-lb)

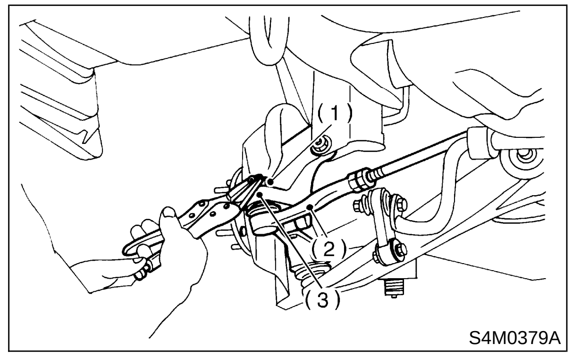


(1) Clamp

3) Install pipe assembly. <Ref. to PS-41, INSTALLATION, Pipe Assembly.>
4) Install universal joint. <Ref. to PS-15, INSTALLATION, Universal Joint.>
5) Connect tie-rod end and knuckle arm, and tighten with castle nut. Fit cotter pin into the nut and bend the pin to lock.

Castle nut tightening torque:
Tighten to 27.0 N·m (2.75 kgf-m, 19.9 ft-lb), and tighten further within 60° until cotter pin hole is aligned with a slot in the nut.

CAUTION:
When connecting, do not hit cap at the bottom of tie-rod end with hammer.



(1) Castle nut
(2) Tie-rod end
(3) Knuckle arm

6) Install front stabilizer to vehicle. <Ref. to FS-21, INSTALLATION, Front Stabilizer.>
7) Install front exhaust pipe assembly. <Ref. to EX-6 INSTALLATION, Front Exhaust Pipe.>
8) Install tires.
9) Tighten wheel nuts to the specified torque.

Tightening torque:
88 N·m (9.0 kgf-m, 65 ft-lb)

10) Connect battery ground cable.
11) Pour fluid into oil tank, and bleed air.
<Ref. to PS-54, Power Steering Fluid.>
12) Check for fluid leaks. <Ref. to PS-38, OIL LEAKING, INSPECTION, Steering Gearbox.>
13) Install jack-up plate.

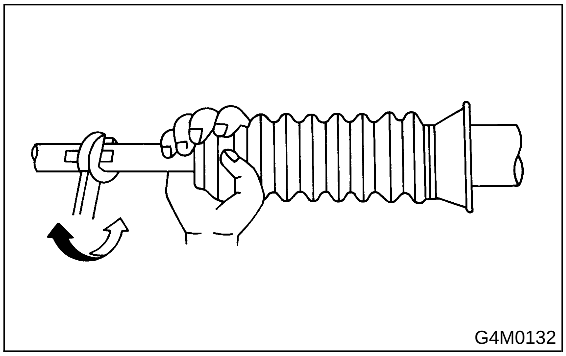
WARNING:
Be careful, exhaust manifold is hot.

14) Lower vehicle.
15) Check fluid level in oil tank.

16) After adjusting toe-in and steering angle, tighten lock nut on tie-rod end.

Tightening torque:
83 N·m (8.5 kgf-m, 61.5 ft-lb)

CAUTION:
When adjusting toe-in, hold boot as shown to prevent it from being rotated or twisted. If twisted, straighten it.

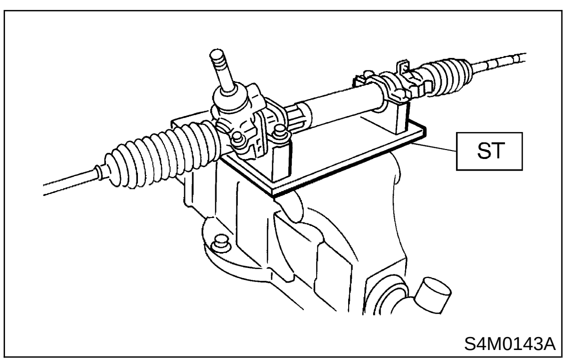


C: DISASSEMBLY *S601545A06*

1. RACK HOUSING ASSEMBLY *S601545A0601*

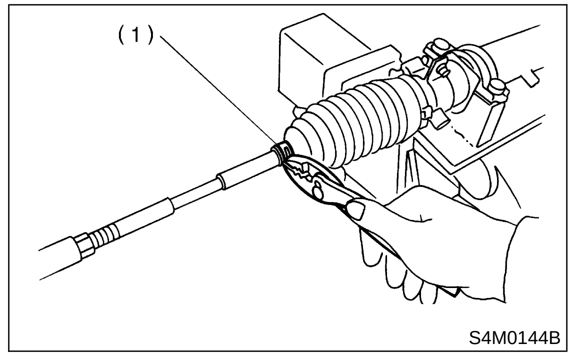
1) Disconnect four pipes from gearbox.
2) Secure gearbox removed from vehicle in vise using ST.
ST 926200000 STAND

CAUTION:
Secure the gearbox in a vise using the ST as shown. Do not attempt to secure it without this ST.



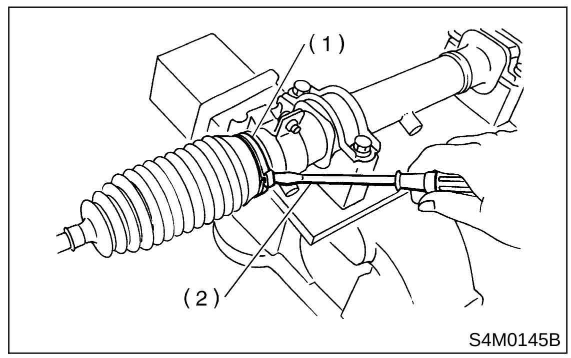
3) Remove tie-rod end and lock nut from gearbox.

4) Remove small clip from boot using pliers, and move boot to tie-rod end side.



(1) Clip

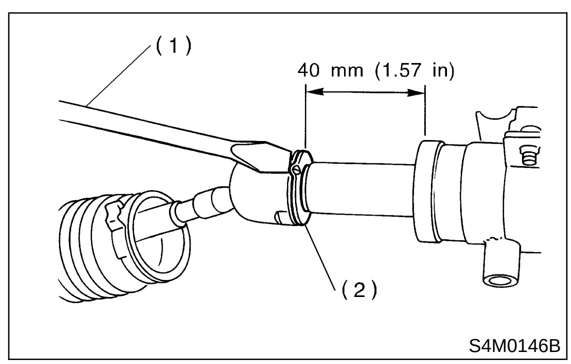
5) Using standard screwdriver, remove band from boot.



(1) Band
(2) Standard screwdriver

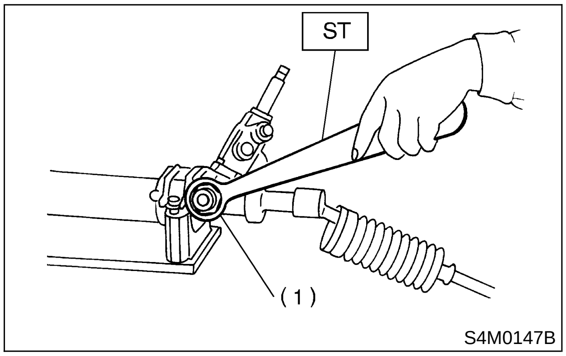
6) Extend rack approximately 40 mm (1.57 in) out. Unlock lock wire at lock washer on each side of tie-rod end using a standard screwdriver.

CAUTION:
Be careful not to scratch rack surface as oil leaks may result.



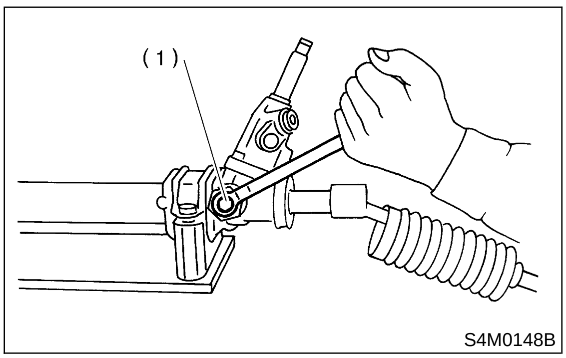
(1) Standard screwdriver
(2) Lock washer

7) Using ST, loosen lock nut.
ST 926230000 SPANNER



(1) Lock nut

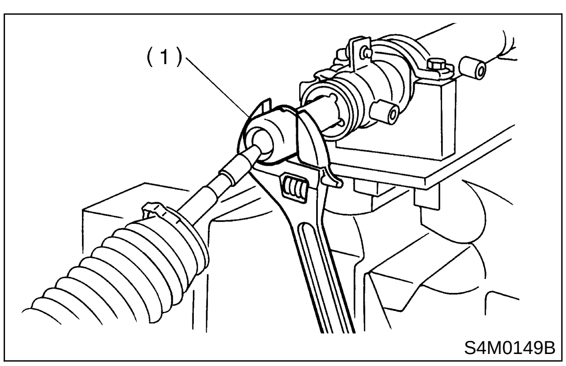
8) Tighten adjusting screw until it no longer tightens.



(1) Adjusting screw

9) Using a wrench [32 mm (1.26 in) width across flats] or adjustable wrench, remove tie-rod.

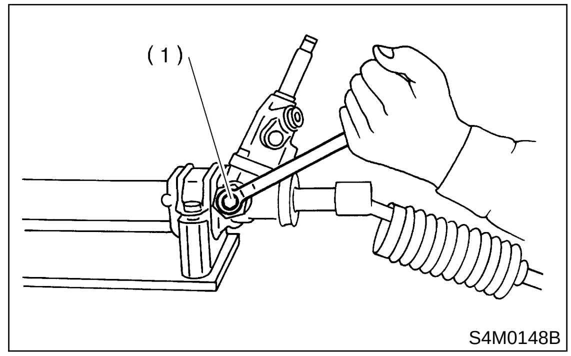
CAUTION:
● Check ball joint for free play, and tie-rod for bends. Replace if necessary.
● Check dust seals used with tie-rod end ball joint for damage or deterioration. Replace if necessary.



(1) Tie-rod

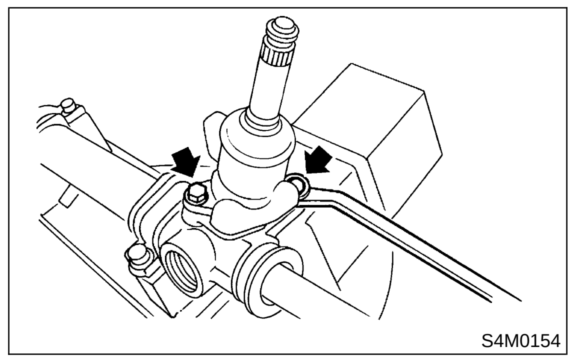
10) Loosen adjusting screw and remove spring and sleeve.

CAUTION:
Replace spring and/or sleeve if damaged.

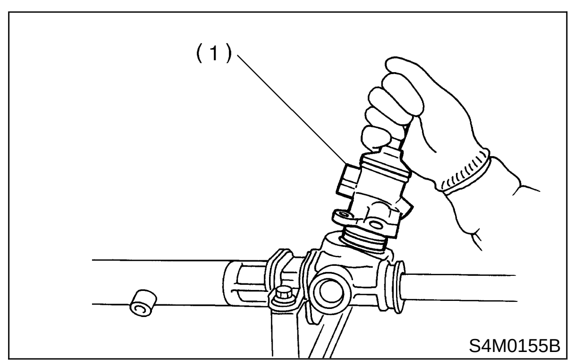


(1) Adjusting screw

11) Remove two bolts securing valve assembly.

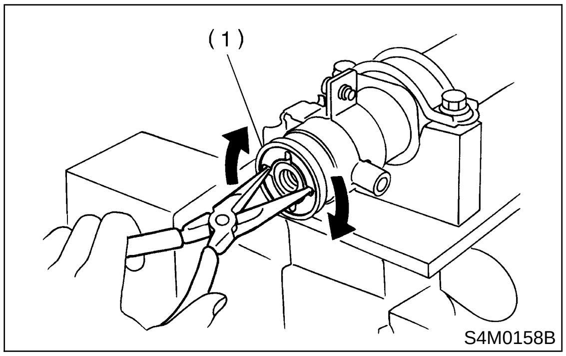


12) Carefully draw out input shaft and remove valve assembly.



(1) Valve ASSY

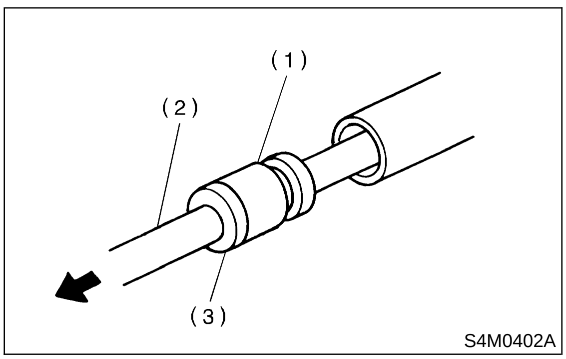
13) Using a sharp pointed pliers, rotate the rack stopper in the direction of the arrow until the end of the circlip comes out of the stopper. Rotate the circlip in the opposite direction and pull it out.



(1) Rack stopper

14) Pull rack assembly from cylinder side, and draw out rack bushing and rack stopper together with rack assembly.

CAUTION:
Be careful not to contact rack to inner wall of cylinder when drawing out. Any scratch on cylinder inner wall will cause oil leakage.

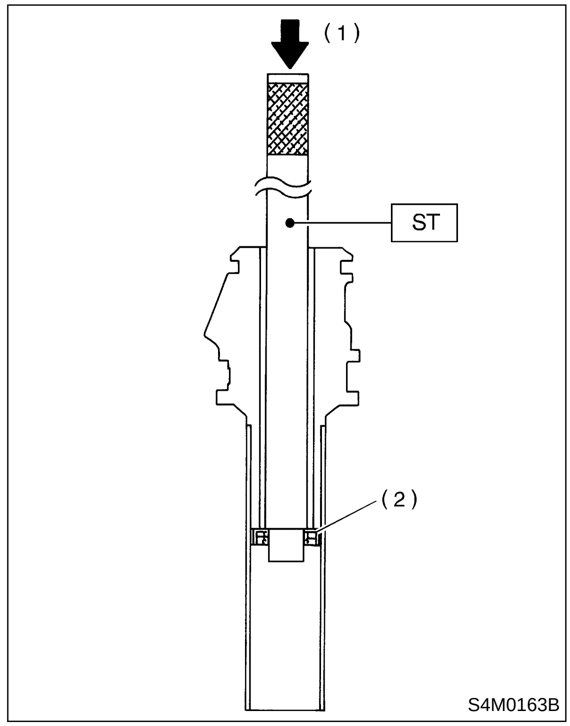


(1) Rack bushing
(2) Rack ASSY
(3) Rack stopper

15) Remove rack bushing and rack stopper from rack assembly.

CAUTION:
Do not reuse removed rack bushing and circlip.

16) Insert ST from pinion housing side and remove oil seal using a press.
ST 34199AE050 OIL SEAL REMOVER



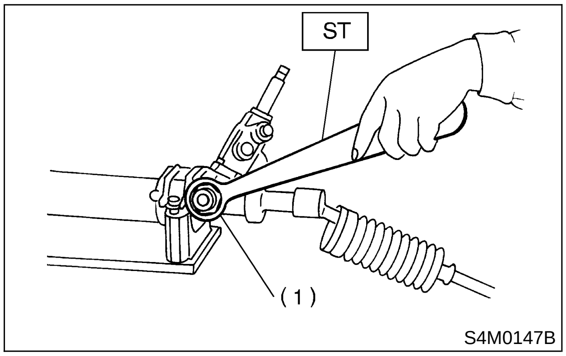
(1) Press
(2) Oil seal

NOTE:
Discard removed oil seal.

2. CONTROL VALVE ASSEMBLY *S601545A0602*

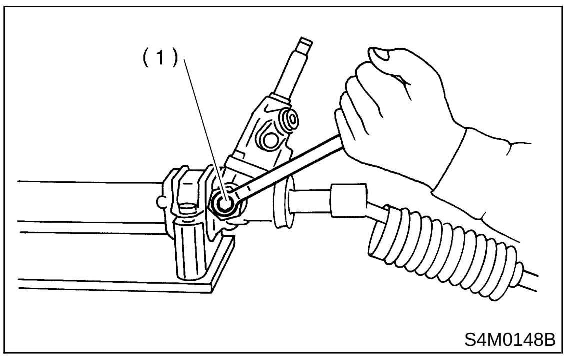
NOTE:
Parts requiring replacement are described in the smallest unit of spare parts including damaged parts and spare parts damaged. In actual disassembly work, accidental damage as well as inevitable damage to some related parts must be taken into account, and spare parts for them must also be prepared. However, it is essential to pinpoint the cause of trouble, and limit the number of replacement parts as much as possible.

1) Using ST, loosen lock nut.
ST 926230000 SPANNER



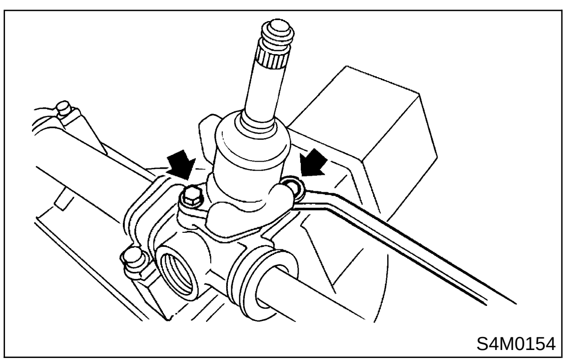
(1) Lock nut

2) Tighten adjusting screw until it no longer tightens.

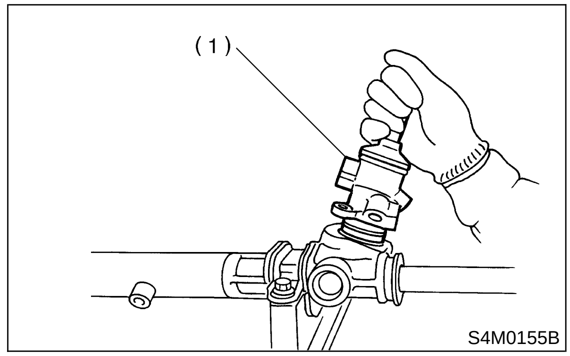


(1) Adjusting screw

3) Remove two bolts securing valve assembly.

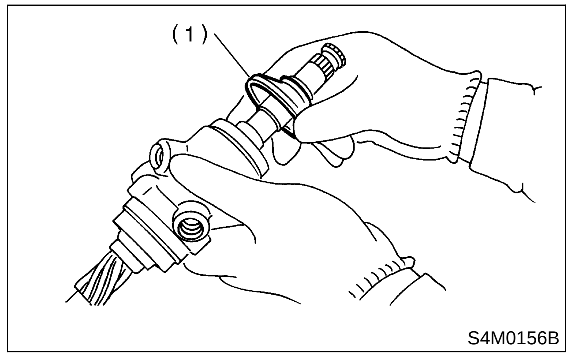


4) Carefully draw out input shaft and remove valve assembly.



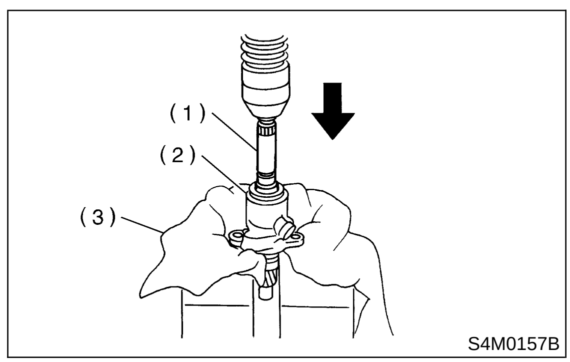
(1) Valve ASSY

5) Slide dust cover out.



(1) Dust cover

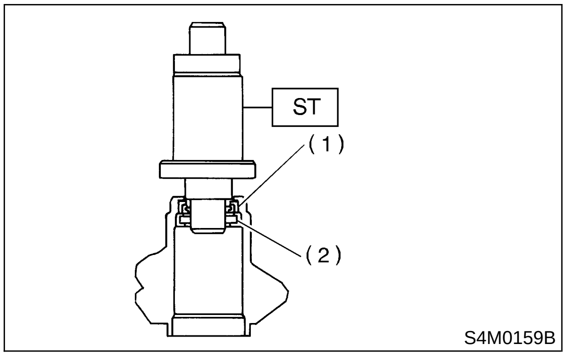
6) Using a press remove pinion and valve assembly from valve housing.



(1) Valve ASSY
(2) Valve housing
(3) Cloth

7) Using ST and press, remove dust seal, oil seal and special bearing from valve housing.
ST 34099FA120 SEAL INSTALLER & REMOVER

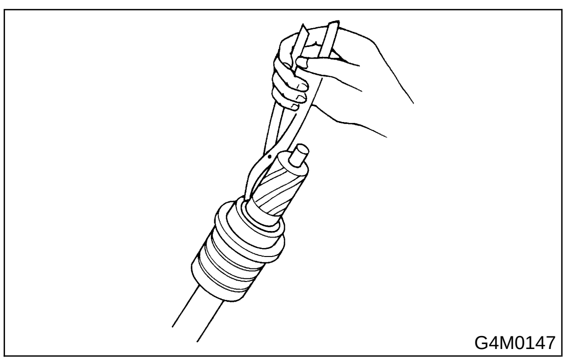
CAUTION:
- **Do not apply a force to end surface of valve housing.**
- **Do not reuse oil seal after removal.**



(1) Oil seal
(2) Special bearing

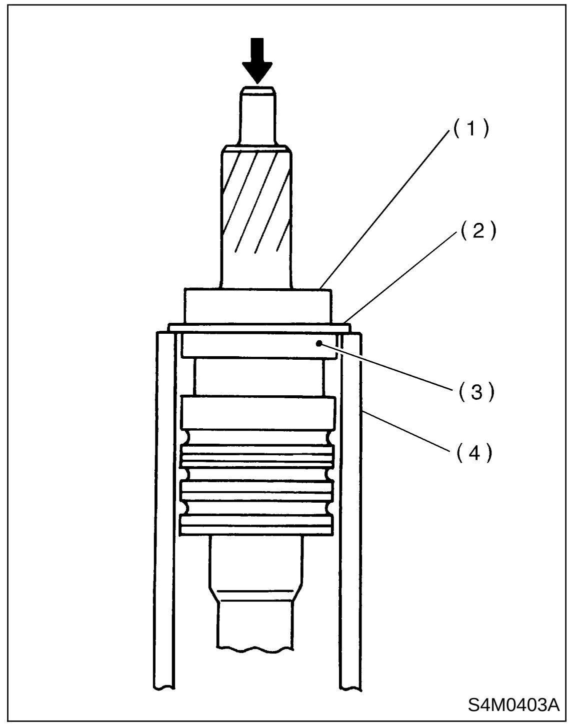
8) Remove snap ring using snap ring pliers.

CAUTION:
- **Do not reuse removed snap ring.**
- **Be careful not to scratch pinion and valve assembly.**



9) Press out bearing together with backing washer using pipe of I.D. 38.5 to 39.5 mm (1.516 to 1.555 in) and press.

CAUTION:
Do not reuse removed bearing.



(1) Bearing
(2) Backing washer
(3) Oil seal
(4) Pipe

10) Remove oil seal.

CAUTION:
Do not reuse removed oil seal.

D: ASSEMBLY S601545A02

1. RACK HOUSING ASSEMBLY S601545A0201

CAUTION:
Use only SUBARU genuine grease for gearbox.

Grease:
VALIANT GREASE M2
[Part No. 003608001, net 0.5 kg (1.1 lb)]

1) Clean all parts and tools before reassembling.
2) Apply grease to teeth of rack so that grease applied is about as high as teeth, and also apply a thin film of grease to sliding portion of rack shaft.

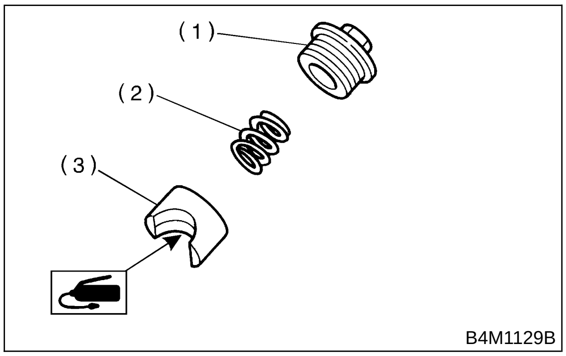
CAUTION:
- **When moving rack to stroke end without tie-rod attached, prevent shocks from being applied at the end.**
- **Do not apply grease to threaded portion at end of rack shaft.**

● Move rack shaft to stroke end two (2) or three (3) times to squeeze grease which accumulates on both ends. Remove grease to prevent it from choking air passage hole.

3) Apply grease to sleeve insertion hole.
4) Apply grease to dust seal insertion hole.

CAUTION:
Apply clean grease with clean hands. If material having a sharp edge is used for applying grease, oil seal at the inside might be damaged.

5) Apply grease to sliding surface of sleeve and spring seat, then insert sleeve into pinion housing. Fit spring into sleeve screw, pack grease inside of screw, then install the screw.

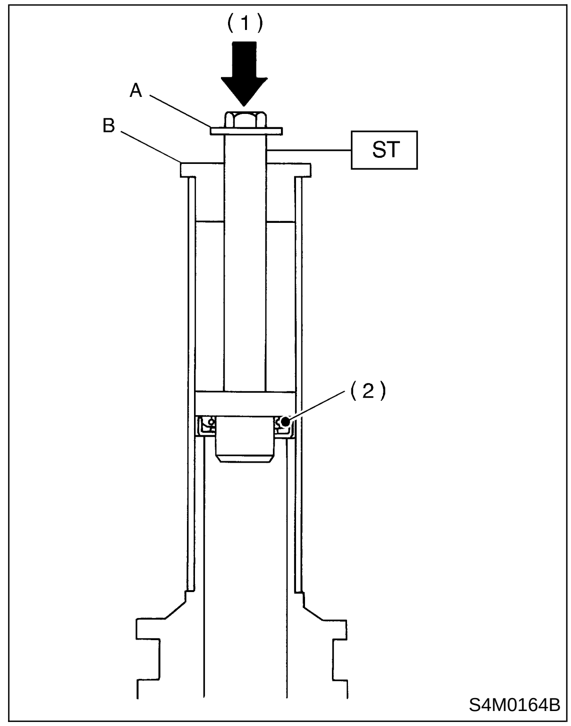


(1) Adjusting screw
(2) Spring
(3) Sleeve

6) Force-fit oil seal using ST.
ST 34099FA110 INSTALLER

CAUTION:
Be careful not to damage or scratch cylinder inner wall.

NOTE:
● Apply specified power steering fluid to oil seal.
● Pay special attention not to install oil seal in wrong direction.
● Push oil seal until the stepped portion of A contacts end face of B.

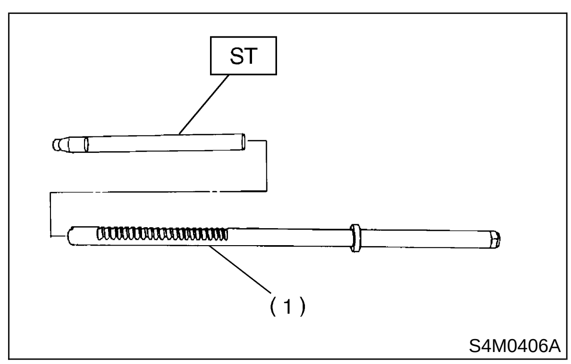


(1) Press
(2) Oil seal

7) Fixing rack housing
Fix rack housing in vise using ST.
ST 926200000 STAND

CAUTION:
● When fixing rack housing in vise, be sure to use this special tool. Do not fix rack housing in vise using pad such as aluminum plates, etc.
● When using old rack housing, be sure to clean and remove rust before assembling. Check pinion housing bushing carefully.

8) Fit ST over toothed portion of rack assembly, and check for binding or unsmooth insertion. If any deformation is noted on flats at the end of rack, shape by using file, and wash with cleaning fluid.
ST 926390001 COVER & REMOVER



(1) Rack ASSY

9) Apply genuine grease to teeth of thoroughly washed rack assembly, and fit ST over the toothed portion.

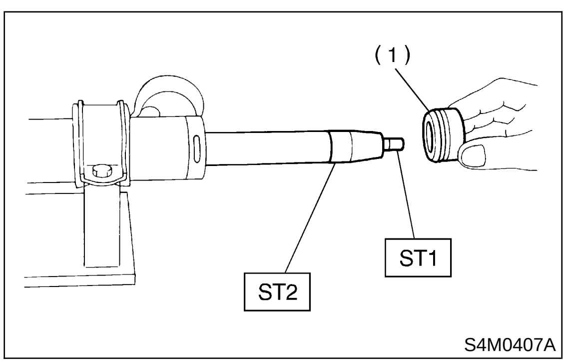
CAUTION:
- **Be careful not to block air passage hole with grease. Remove excessive grease.**
- **After fitting cover, check air passage hole for clogging. If clogged, open by removing grease from the hole.**
- **Check rack shaft for damage.**
- **Apply specified power steering fluid to this ST and surface of piston ring to prevent seal from being damaged.**

10) Insert rack assembly into rack housing from cylinder side, and remove ST after it has passed completely through oil seal.

NOTE:
Before inserting rack assembly, apply a coat of specified power steering fluid to surfaces of ST and rack piston.

ST 926390001 COVER & REMOVER
11) Fit ST1 and ST2 over the end of rack, and install rack bushing.
ST1 926400000 GUIDE
ST2 927660000 GUIDE

CAUTION:
- **If burrs, or nicks are found on this guide and rack shaft portion, remove by filing.**
- **Dip rack bushing in specified power steering fluid before installing, and pay attention not to damage O-ring and oil seal.**

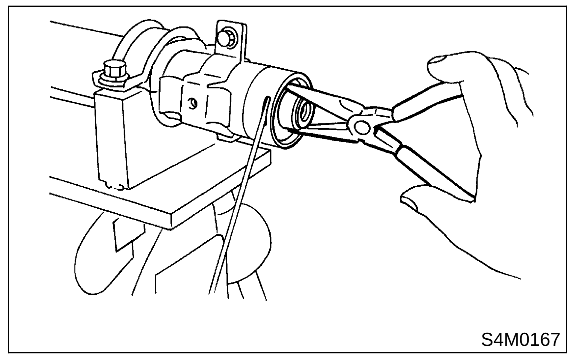


(1) Rack bushing ASSY

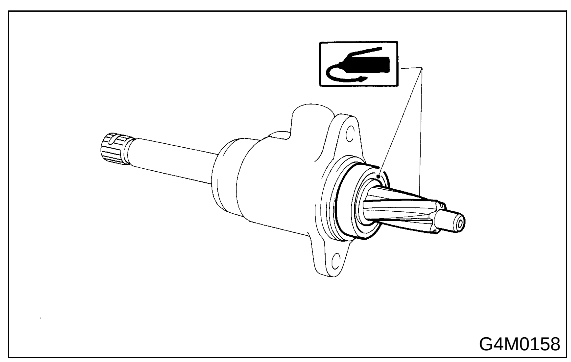
12) Insert rack stopper into cylinder tube until internal groove (on cylinder side) is aligned with external groove (on rack stopper). Turn rack stopper with ST so that rack stopper hole is seen through cylinder slits.
13) Insert rack stopper into rack housing, and wrap circlip using a sharp pointed pliers to secure rack stopper in position.

CAUTION:
Be careful not to scratch rack while winding circlip.

NOTE:
Rotate wrench another 90 to 180° after the end of circlip has been wrapped in.



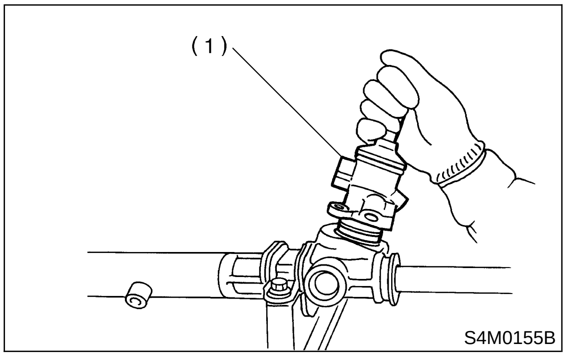
14) Fit mounting rubber onto rack housing.
15) Apply genuine grease to pinion gear and bearing of valve assembly.



16) Install gasket on valve assembly. Insert valve assembly into place while facing rack teeth toward pinion.

CAUTION:
Be sure to use a new gasket.

NOTE:
Do not allow packing to be caught when installing valve assembly.



(1) Valve ASSY

17) Tighten bolts alternately to secure valve assembly.

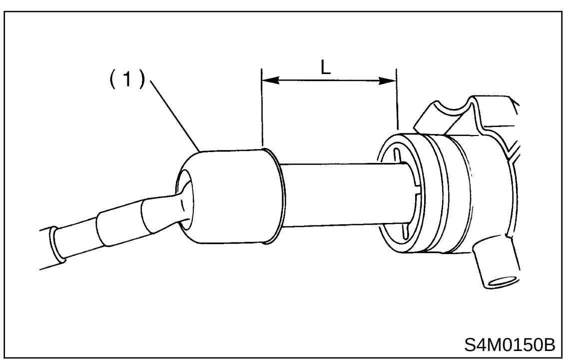
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

CAUTION:
Be sure to alternately tighten bolts.

18) Install lock washers and tighten left and right tie-rods into rack ends.

On condition
L: Approximately 40 mm (1.57 in)

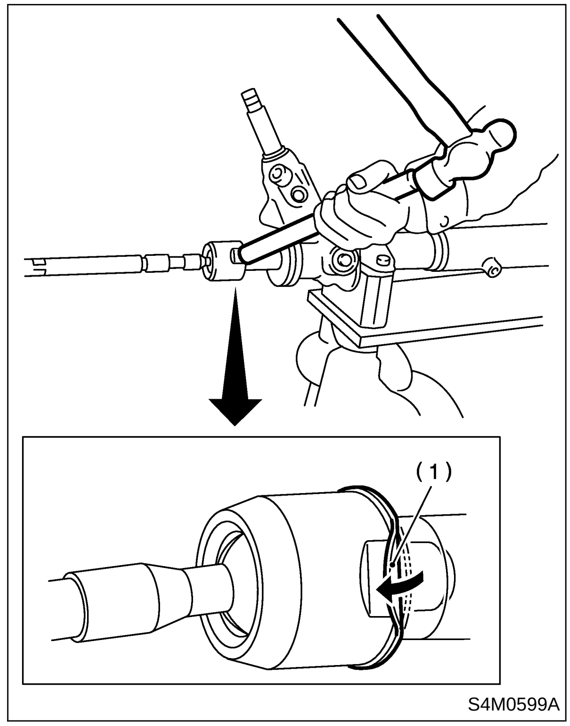
Tightening torque:
78 N·m (8.0 kgf-m, 58 ft-lb)



(1) Tie-rod

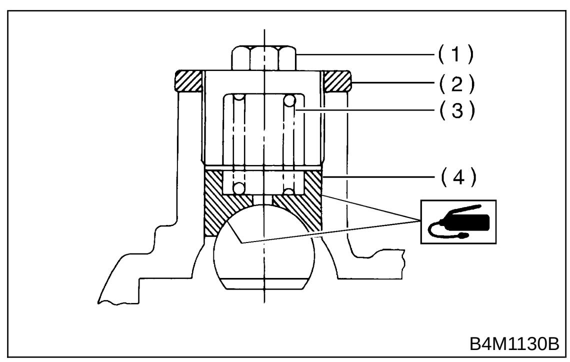
19) Bend lock washer.

CAUTION:
Be careful not to scratch rack when bending lock washer.



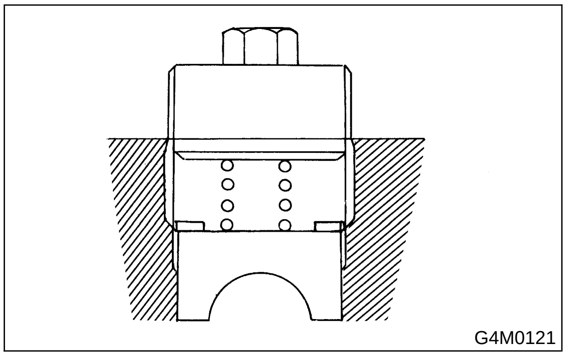
(1) Lock washer

20) Rack and pinion backlash adjustment
(1) Loosen adjusting screw.
(2) Rotate input shaft so that rack is in the straight ahead direction.
(3) Apply grease to sleeve.



(1) Adjusting screw
(2) Lock nut
(3) Spring
(4) Sleeve

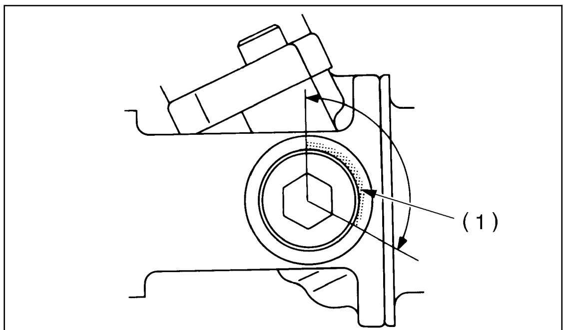
(4) Tighten adjusting screw by two threads.



G4M0121

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

Liquid packing:
THREE BOND 1141



S4M0385A

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

(6) Tighten adjusting screw to 7.4 N·m (0.75 kgf-m, 5.4 ft-lb) and back off 25°.
(7) Install lock nut. While holding adjusting screw with a wrench, tighten lock nut using ST.
ST 926230000 SPANNER

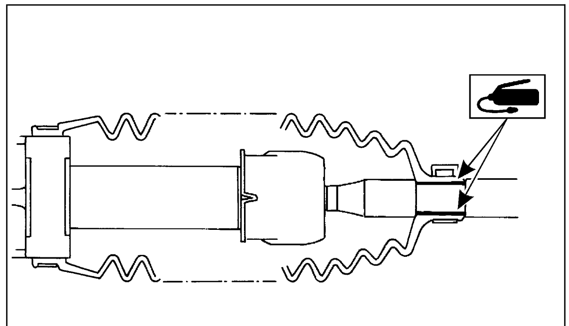
Tightening torque (Lock nut):
39 N·m (4.0 kgf-m, 29 ft-lb)

NOTE:
- Hold adjusting screw with a wrench to prevent it from turning while tightening lock nut.
- Make adjustment so that steering wheel can be rotated fully from lock to lock without binding.

21) Inspect for service limit as per article of "Service limit". <Ref. to PS-36, SERVICE LIMIT, INSPECTION, Steering Gearbox.> Make replacement and adjustment if necessary.

22) Install boot to housing.

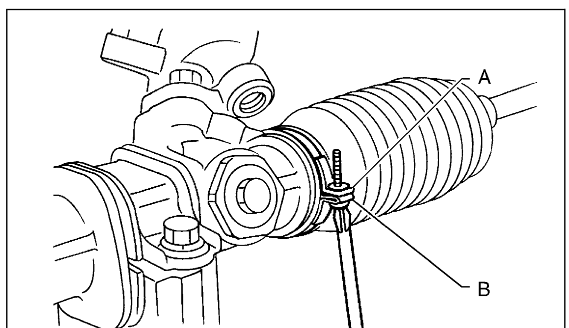
NOTE:
- Before installing boot, be sure to apply grease to the groove of tie-rod.
- Install fitting portions of boots to the following portions in both sides of assembled steering gearbox.
The groove on gearbox
The groove on the rod
- Make sure that boot is installed without unusual inflation or deflation.



S4M0151A

23) Using a screwdriver, tighten the screw until the ends "A" and "B" of the band come into contact with each other.

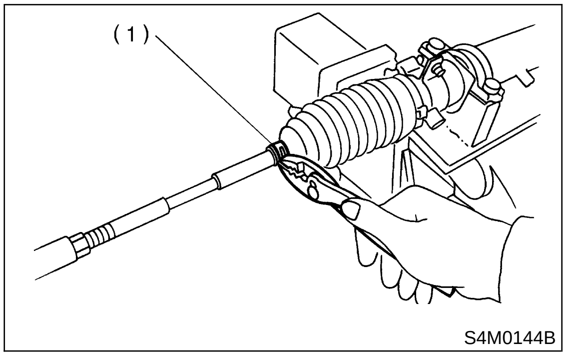
NOTE:
Always tighten the band from the underside of the gearbox.



S4M0152A

24) Fix boot end with clip (small).

CAUTION:
After installing, check boot end is positioned into groove on tie-rod.

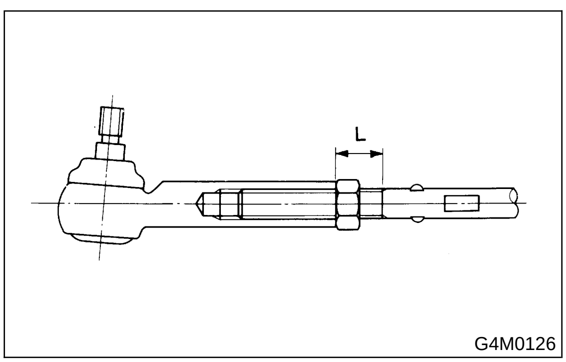


(1) Clip

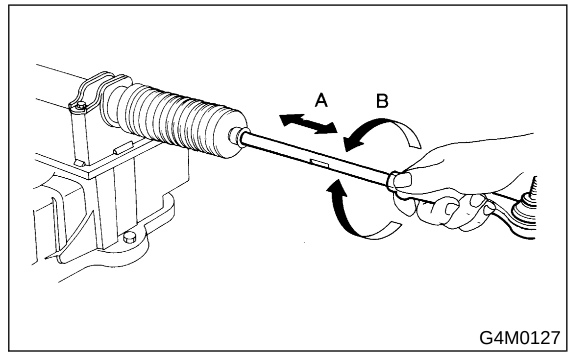
25) If tie-rod end was removed, screw in lock nut and tie-rod end to screwed portion of tie-rod, and tighten lock nut temporarily in a position as shown in figure.

Installed tie-rod length: L
15 mm (0.59 in)

NOTE:
Pay attention to difference between right and left tie-rod ends.



26) Inspect gearbox as follows:
"A" Holding tie-rod end, repeat lock to lock two or three times as quickly as possible.
"B" Holding tie-rod end, turn it slowly at a radius one or two times as large as possible.
After all, make sure that boot is installed in the specified position without deflation.



27) Remove gearbox from ST.
ST 926200000 STAND
28) Install four pipes on gearbox.
(1) Connect pipes A and B to four pipe joints of gearbox. Connect upper pipe B first, and lower pipe A.

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)

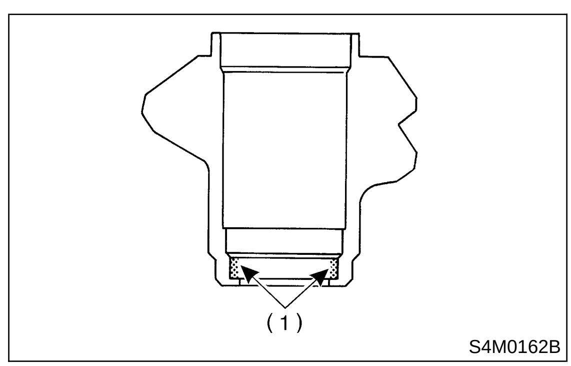
(2) Connect pipes C and D to gearbox.
Connect lower pipe C first, and upper pipe D second.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

2. CONTROL VALVE ASSEMBLY *S601545A0202*

Specified steering grease:
VALIANT GREASE M2 (Part No. 003608001)

1) Clean all parts and tools before reassembling.
2) Apply a coat of specified power steering fluid to inner wall of valve housing.

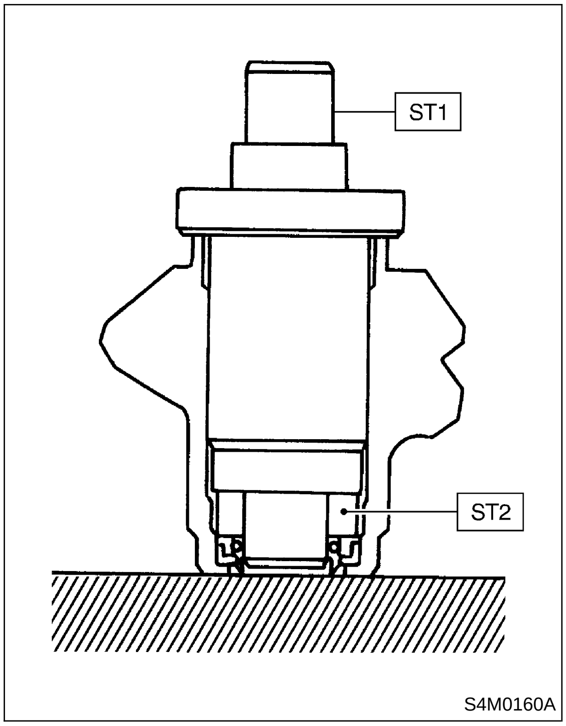


(1) Fluid

3) Attach ST2 to ST1, and press oil seal into place using a press.

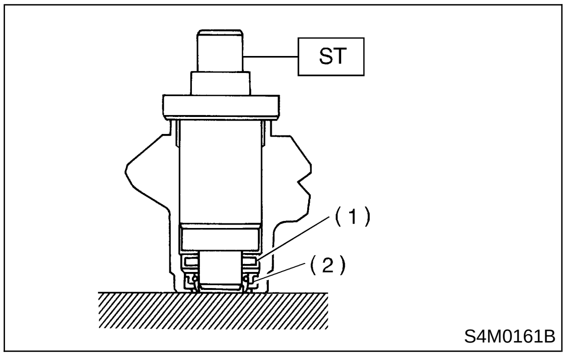
ST1 34099FA120 SEAL INSTALLER & REMOVER
ST2 34099FA130 SEAL INSTALLER

(1) Face oil seal in the direction shown in figure when installing.
(2) To avoid scratching oil seal, apply a coat of grease to contact surface of installer and oil seal.
(3) To facilitate installation, attach oil seal to installer and position in valve housing before pressing into place.



4) Using ST and press, install special bearing in valve housing.
ST 34099FA120 SEAL INSTALLER & REMOVER

NOTE:
To facilitate installation, attach ball bearing to remover and position in valve housing before pressing it into place.

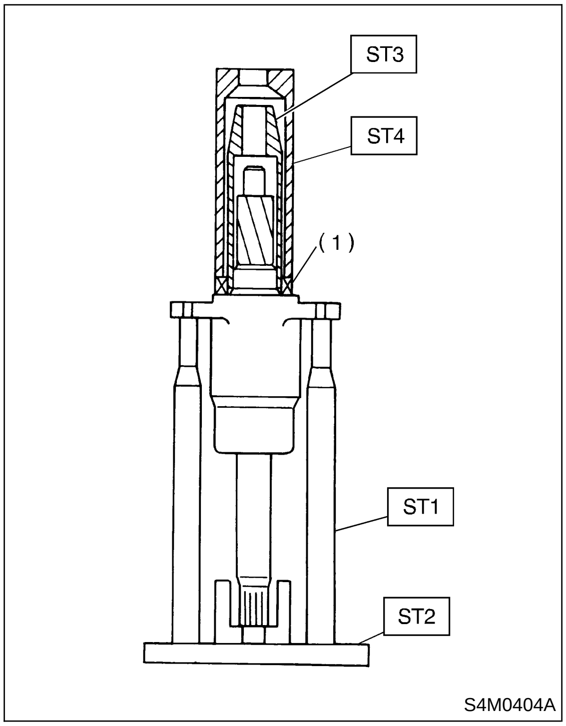


(1) Special bearing
(2) Oil seal

5) Put vinyl tape around pinion shaft splines to protect oil seal from damage.
6) Fit pinion and valve assembly into valve housing.

NOTE:
Apply specified power steering fluid to outer diameter surface of input shaft and outer surface of valve body seal ring, and pay special attention not to damage seal when inserting pinion and valve assembly.

7) Secure valve assembly to ST1 and ST2.
8) Put ST3 over pinion, and insert oil seal, then force-fit oil seal into housing using ST4.
ST1 926370000 INSTALLER A
ST2 34099FA100 STAND BASE
ST3 926360000 INSTALLER A
ST4 927620000 INSTALLER B

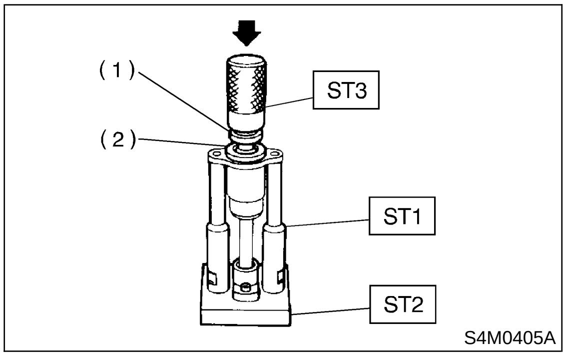


(1) Oil seal

NOTE:
- Apply specified power steering fluid to oil seal and ST3, being careful not to damage oil seal lip.
- Push oil seal until ST3 contacts housing end face.

9) Remove ST3, and fit backing washer.

10) Force-fit ball bearing using ST3.
ST1 926370000 INSTALLER A
ST2 34099FA100 STAND BASE
ST3 927640000 INSTALLER B



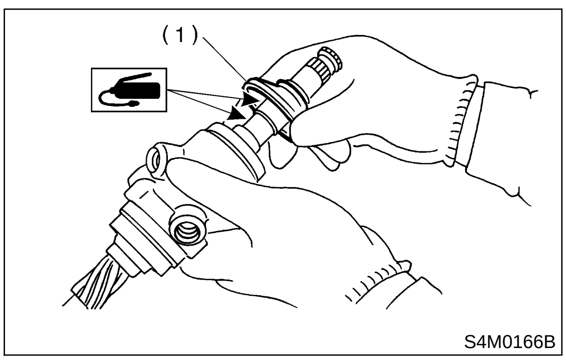
(1) Ball bearing
(2) Backing washer

NOTE:
Be careful not to tilt ball bearing during installation.

11) Install snap ring using snap ring pliers.

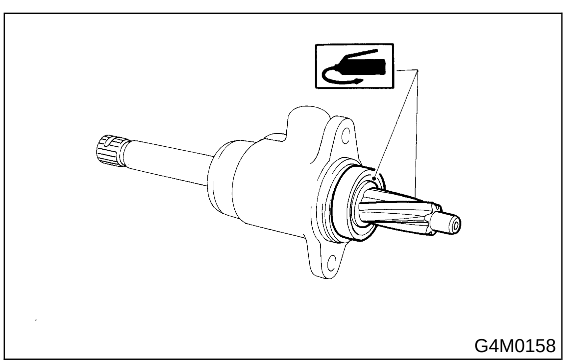
NOTE:
Rotate snap ring to check for proper installation.

12) Apply specified grease to dust cover.



(1) Dust cover

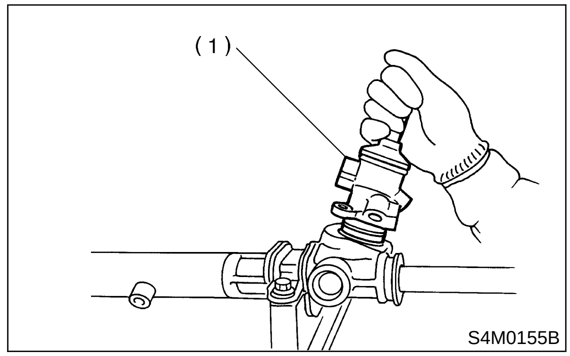
13) Install dust cover on valve assembly.
14) Apply genuine grease to pinion gear and bearing of valve assembly.



15) Install gasket on valve assembly. Insert valve assembly into place while facing rack teeth toward pinion.

CAUTION:
Be sure to use a new gasket.

NOTE:
Do not allow packing to be caught when installing valve assembly.



(1) Valve ASSY

16) Tighten bolts alternately to secure valve assembly.

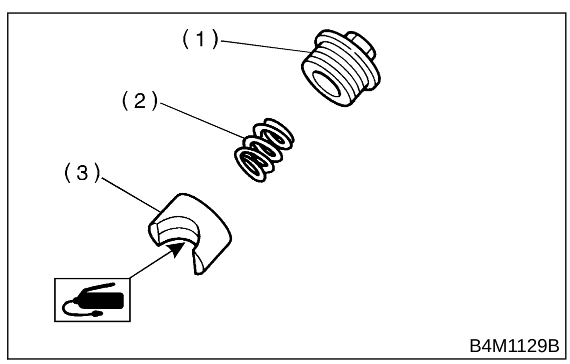
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

CAUTION:
Be sure to alternately tighten bolts.

17) Apply grease to sleeve insertion hole.
18) Apply grease to dust seal insertion hole.

CAUTION:
Apply clean grease with clean hands. If material having a sharp edge is used for applying grease, oil seal at the inside might be damaged.

19) Apply grease to sliding surface of sleeve and spring seat, then insert sleeve into pinion housing. Fit spring into sleeve screw, pack grease inside of screw, then install the screw.



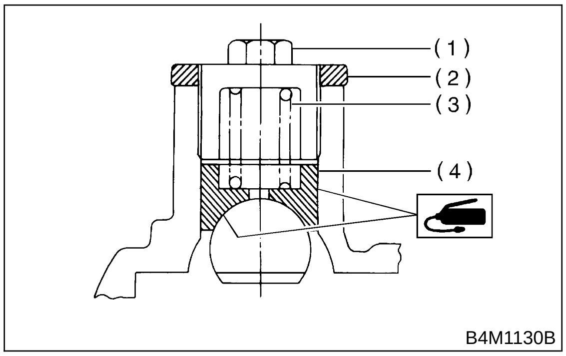
(1) Adjusting screw
(2) Spring
(3) Sleeve

20) Rack and pinion backlash adjustment

(1) Loosen adjusting screw.

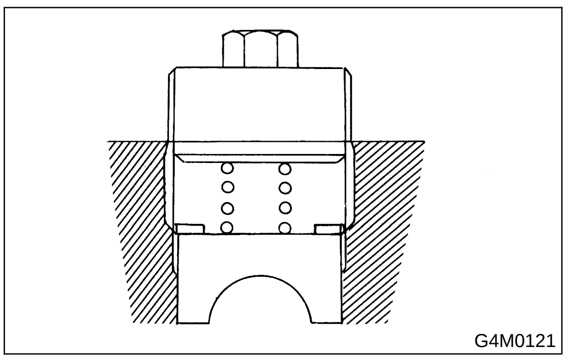
(2) Rotate input shaft so that rack is in the straight ahead direction.

(3) Apply grease to sleeve.



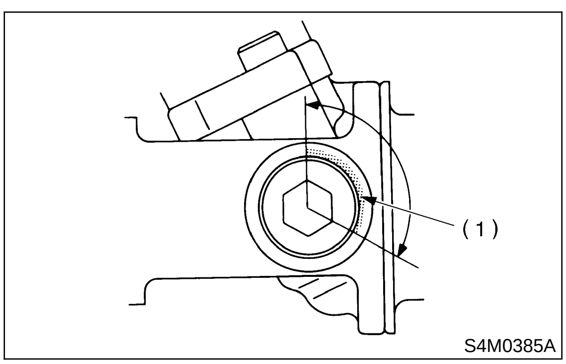
(1) Adjusting screw
(2) Lock nut
(3) Spring
(4) Sleeve

(4) Tighten adjusting screw by two threads.



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

Liquid packing:
THREE BOND 1141



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

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

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

ST 926230000 SPANNER

Tightening torque (Lock nut):
39 N·m (4.0 kgf-m, 29 ft-lb)

NOTE:

- Hold adjusting screw with a wrench to prevent it from turning while tightening lock nut.
- Make adjustment so that steering wheel can be rotated fully from lock to lock without binding.

21) Check for service limit as per article of “Service limit”. <Ref. to PS-36, SERVICE LIMIT, INSPECTION, Steering Gearbox.> Make replacement and adjustment if necessary.

E: INSPECTION S601545A10

1. BASIC INSPECTION S601545A1001

1) Clean all disassembled parts, and check for wear, damage, or any other faults, then repair or replace as necessary.
2) When disassembling, check inside of gearbox for water. If any water is found, carefully check boot for damage, input shaft dust seal, adjusting screw and boot clips for poor sealing. If faulty, replace with new parts.

No.	Parts	Inspection	Corrective action
1	Input shaft	(1) Bend of input shaft (2) Damage on serration	If bend or damage is excessive, replace entire gearbox.
2	Dust seal	(1) Crack or damage (2) Wear	If outer wall slips, lip is worn out or damage is found, replace it with new one.
3	Rack and pinion	Poor mating of rack with pinion	(1) Adjust backlash properly. By measuring turning torque of gearbox and sliding resistance of rack, check if rack and pinion engage uniformly and smoothly with each other. (Refer to “Service limit”.) (2) Keeping rack pulled out all the way so that all teeth emerge, check teeth for damage. Even if abnormality is found in either (1) or (2), replace entire gearbox.
4	Gearbox unit	(1) Bend of rack shaft (2) Bend of cylinder portion (3) Crack or damage on cast iron portion	Replace gearbox with new one.
		(4) Wear or damage on rack bush	If free play of rack shaft in radial direction is out of the specified range, replace gearbox with new one. (Refer to “Service limit”.)
		(5) Wear on input shaft bearing	If free plays of input shaft in radial and axial directions are out of the specified ranges, replace gearbox with new one. (Refer to “Service limit”.)
5	Boot	Crack, damage or deterioration	Replace.
6	Tie-rod	(1) Looseness of ball joint (2) Bend of tie-rod	Replace.
7	Tie-rod end	Damage or deterioration on dust seal	Replace.
8	Adjusting screw spring	Deterioration	Replace.
9	Boot clip	Deterioration	Replace.
10	Sleeve	Damage	Replace.
11	Pipes	(1) Damage to flared surface (2) Damage to flare nut (3) Damage to pipe	Replace.

2. SERVICE LIMIT S601545A1002

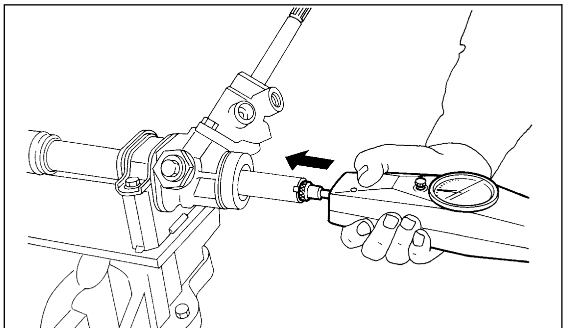
Make a measurement as follows. If it exceeds the specified service limit, adjust or replace.

NOTE:
When making a measurement, vise gearbox by using ST. Never vise gearbox by inserting aluminum plates, etc. between vise and gearbox.

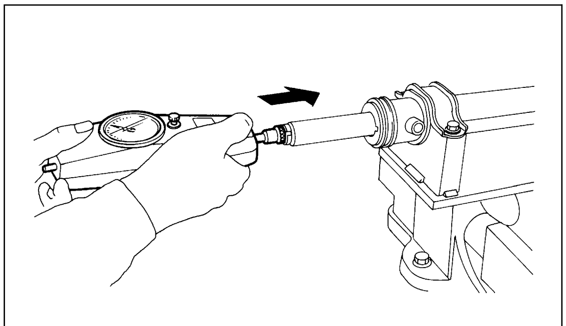
ST 926200000 STAND

Sliding resistance of rack shaft:

Service limit
304 N (31 kgf, 68 lb) or less



G4M0109



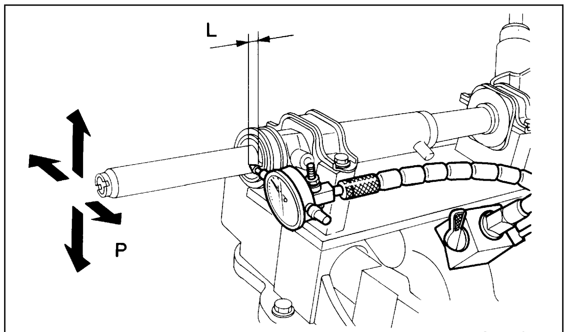
G4M0110

3. RACK SHAFT PLAY IN RADIAL DIRECTION S601545A1003

Right-turn steering:

Service limit
0.19 mm (0.0075 in) or less

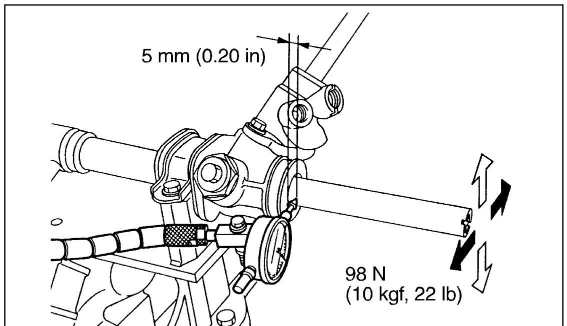
On condition
L: 5 mm (0.20 in)
P: 122.6 N (12.5 kgf, 27.6 lb)



G4M0111

Left-turn steering:

Service limit
Direction ⇦ ⇨
0.3 mm (0.012 in) or less
Direction ⬅ ➡
0.15 mm (0.0059 in) or less



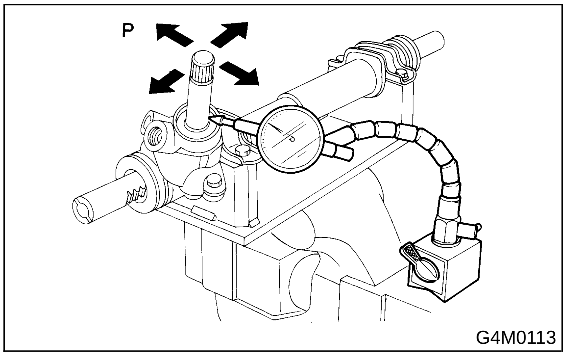
G4M0112

4. INPUT SHAFT PLAY S601545A1004

In radial direction:

Service limit
0.18 mm (0.0071 in) or less

On condition
P: 98 N (10 kgf, 22 lb)

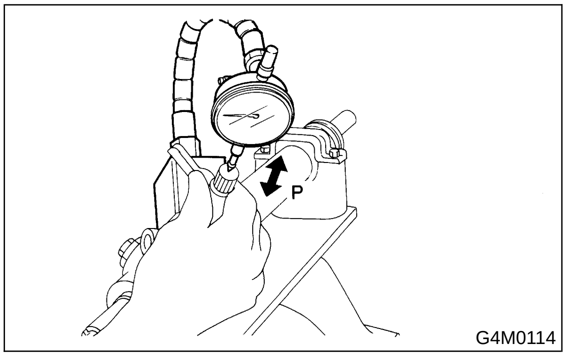


G4M0113

In axial direction:

Service limit
0.5 mm (0.020 in) or less

On condition
P: 20 — 49 N (2 — 5 kgf, 4 — 11 lb)



G4M0114

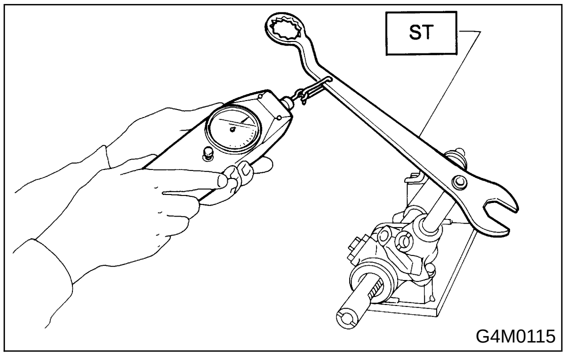
5. TURNING RESISTANCE OF GEARBOX

S601545A1005

Using ST, measure gearbox turning resistance.

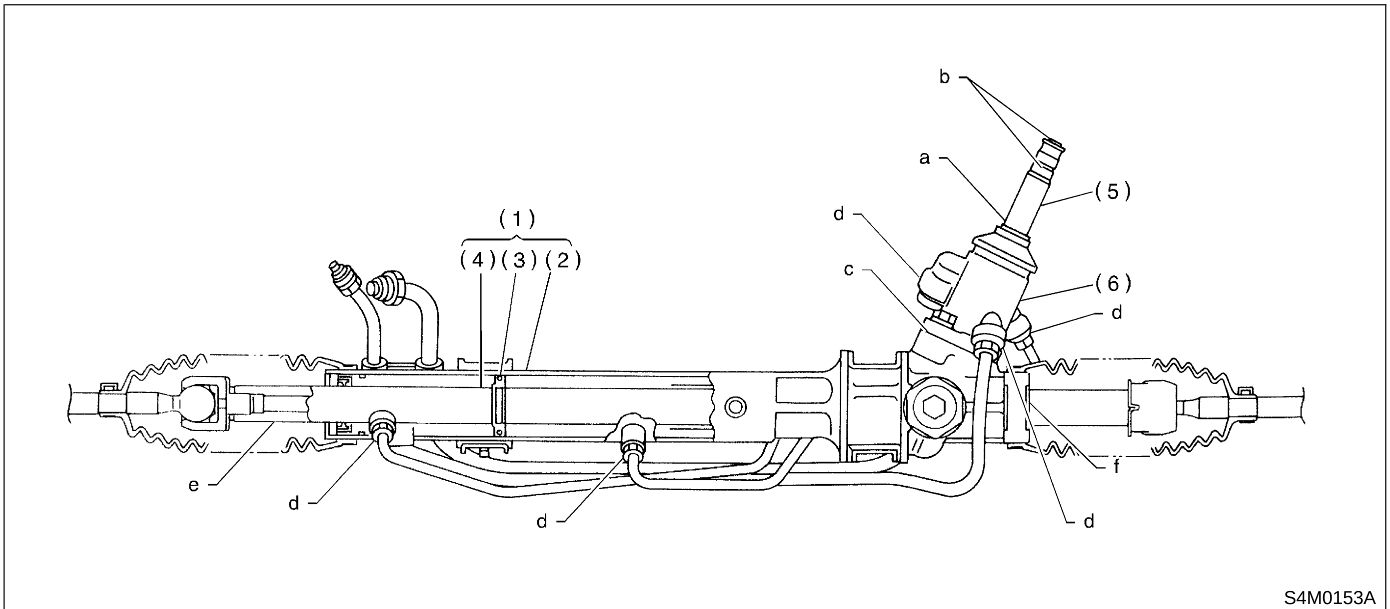
ST 926230000 SPANNER

Service limit:
Straight-ahead position within 30 mm (1.18 in) from rack center
Less than 11.18 N (1.14 kgf, 2.51 lb)
Maximum allowable resistance
12.7 N (1.3 kgf, 2.9 lb)



G4M0115

6. OIL LEAKING *S601545A1006*



(1) Power cylinder	(3) Rack piston	(5) Input shaft
(2) Cylinder	(4) Rack axle	(6) Valve housing

NOTE:
If gearbox is dismounted without confirming where the leak is, it must be mounted again to locate the leak point.

1) Even if the location of the leak can be easily found by observing the leaking condition, it is necessary to thoroughly remove the oil from the suspected portion and turn the steering wheel from lock to lock about 30 to 40 times with engine running, then make comparison of the suspected portion between immediately after and several hours after this operation.
2) Inspect leakage from “a”.
The oil seal is damaged. Replace valve assembly with a new one.
3) Inspect leakage from “b”.
The torsion bar O-ring is damaged. Replace valve assembly with a new one.
4) Inspect leakage from “c”.
The oil seal is damaged. Replace valve assembly or oil seal with a new one.
5) Inspect leakage from “d”.
The pipe is damaged. Replace the faulty pipe or O-ring.
6) If leak is other than a, b, c, or d, and if oil is leaking from the gearbox, move the right and left boots toward tie-rod end side, respectively, with the gearbox mounted to the vehicle, and remove oil from the surrounding portions. Then, turn the steering wheel from lock to lock 30 to 40 times with the engine running, then make comparison of the leaked portion immediately after and several hours after this operation.

(1) Inspect leakage from “e”.
The cylinder seal is damaged. Replace rack bushing with a new one.
(2) Inspect leakage from “f”.
There are two possible causes. Take following step first. Remove the pipe assembly B from the valve housing, and close the circuit with ST.

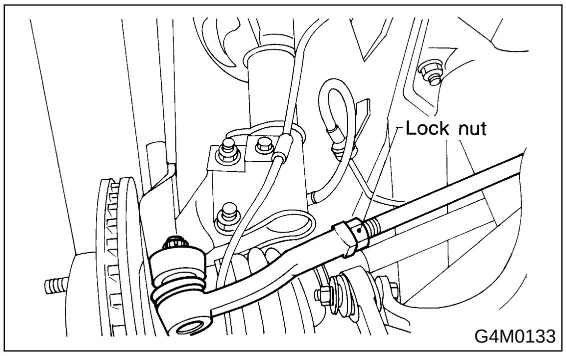
ST 926420000 PLUG

CAUTION:
- **If leakage from “f” is noted again:**
The oil seal of pinion and valve assembly is damaged. Replace pinion and valve assembly with a new one. Or replace the oil seal and the parts that are damaged during disassembly with new ones.
- **If oil stops leaking from “f”:**
The oil seal of rack housing is damaged. Replace the oil seal and the parts that are damaged during disassembly with new ones.

F: ADJUSTMENT *S601545A01*

1) Adjust front toe.

Standard of front toe:
IN 3 — OUT 3 mm (IN 0.12 — OUT 0.12 in)



G4M0133

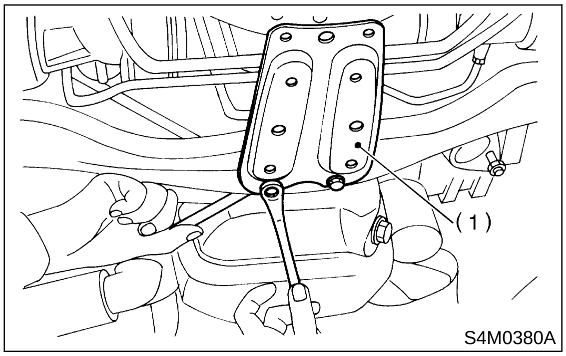
2) Adjust steering angle of wheels.

Standard of steering angle:
Inner wheel: 34.4°±1.5°
Outer wheel: 30.2°±1.5°

6. Pipe Assembly *S601277*

A: REMOVAL *S601277A18*

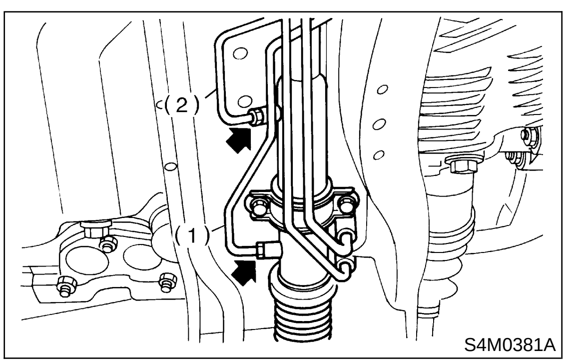
1) Set the vehicle on the lift.
2) Disconnect battery ground cable.
3) Lift vehicle and remove jack-up plate.



(1) Jack-up plate

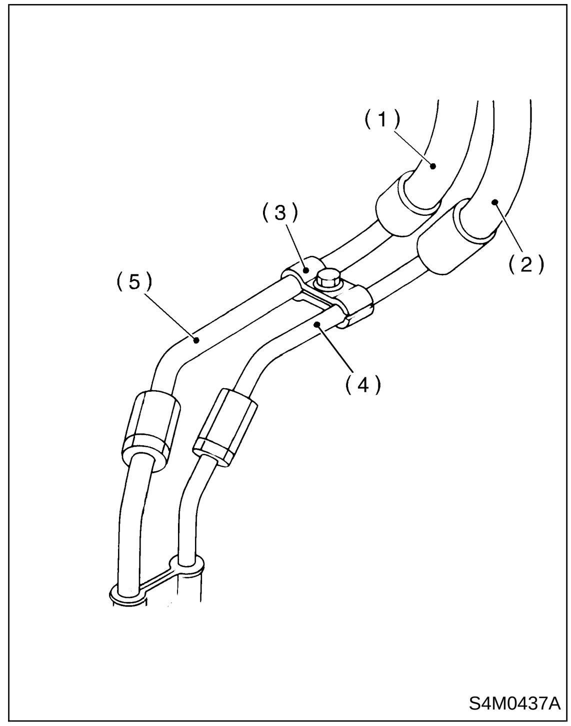
4) Remove one pipe joint at the center of gearbox, and connect vinyl hose to pipe and joint. Discharge fluid by turning steering wheel fully clockwise and counterclockwise. Discharge fluid similarly from the other pipe.

CAUTION:
Improper removal and installation of parts often causes fluid leak trouble. To prevent this, clean the surrounding portions before disassembly and reassembly, and pay special attention to keep dirt and other foreign matter from mating surfaces.



(1) Pipe A
(2) Pipe B

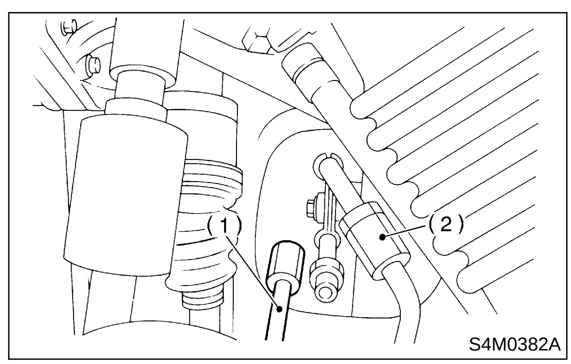
5) Remove clamp E from pipes.



(1) Return hose
(2) Pressure hose
(3) Clamp E
(4) Pipe C
(5) Pipe D

6) Disconnect pipe C·D from pipe (on the gearbox side).

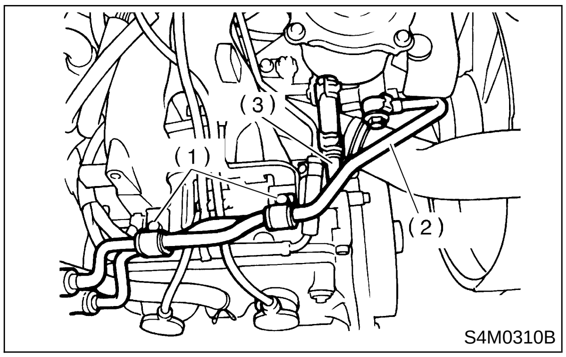
CAUTION:
- **When disconnecting pipe C·D, use two wrenches to prevent deformities.**
- **Be careful to keep pipe connections free from foreign matter.**



(1) Pipe C
(2) Pipe D

7) Lower the vehicle.
8) Remove intake duct and cleaner case. <Ref. IN-7, REMOVAL, Air Intake Duct.> and <Ref. IN-6, REMOVAL, Air Cleaner Case.>
9) Remove bolt A.
10) Disconnect pipe C from oil pump. Disconnect pipe D from return hose.

CAUTION:
- **Do not allow fluid from the hose end to come into contact with pulley belt.**
- **To prevent foreign matter from entering the hose and pipe, cover the open ends of them with a clean cloth.**



(1) Bolt A
(2) Pipe C
(3) Pipe D

B: INSTALLATION *S601277A11*

1) Tighten bolt A.

CAUTION:
Visually check that hose between tank and pipe D is free from bending or twisting.

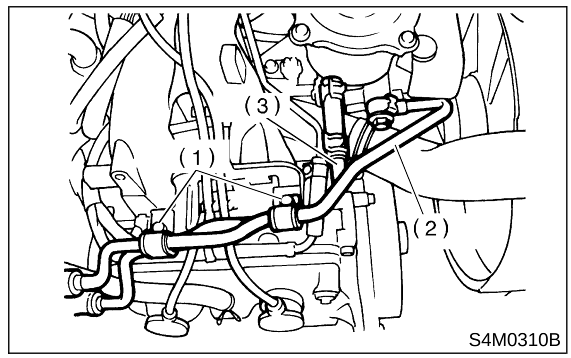
(1) Connect pipe D to oil tank.
(2) Connect pipe C or pressure hose to oil pump.

CAUTION:
Use a new gasket.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

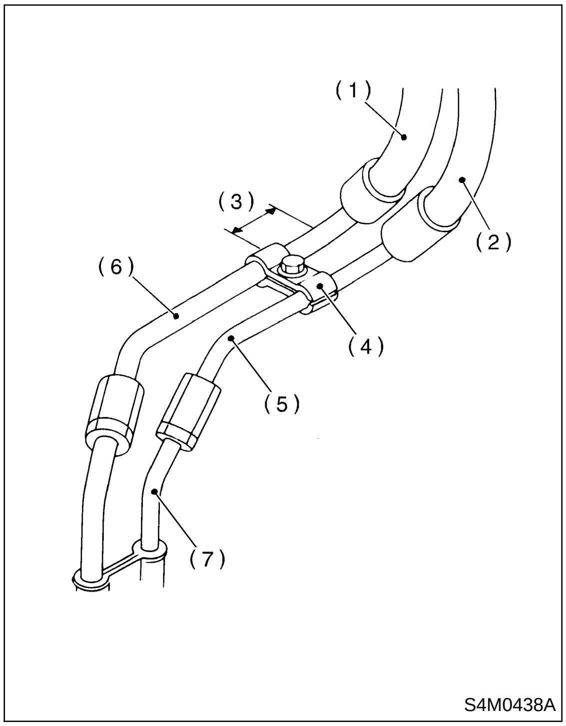
(3) Tighten bolt A.

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)



(1) Bolt A
(2) Pipe C
(3) Pipe D

2) Temporarily connect pipes C and D.

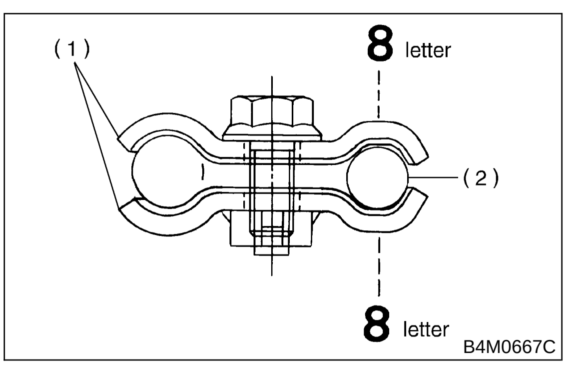


(1) Return hose
(2) Pressure hose
(3) Approx. 30 mm (1.18 in)
(4) Clamp E
(5) Pipe C
(6) Pipe
(7) Pipe (on gearbox side)

3) Temporarily install clamp E on pipes C and D, and tighten clamp E firmly.

CAUTION:
Ensure that the letter “8” on each clamp are diagonally opposite each other as shown in figure.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)



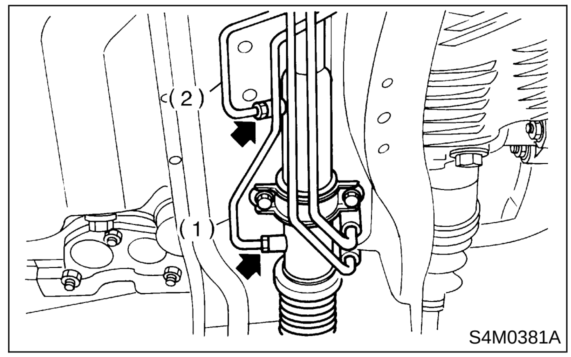
(1) Clamp E
(2) Pipe C

4) Tighten joint nut.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

5) Connect pipe A and B.
Connect pipes A and B to four pipe joints of gearbox. Connect upper pipe B first, and lower pipe A second.

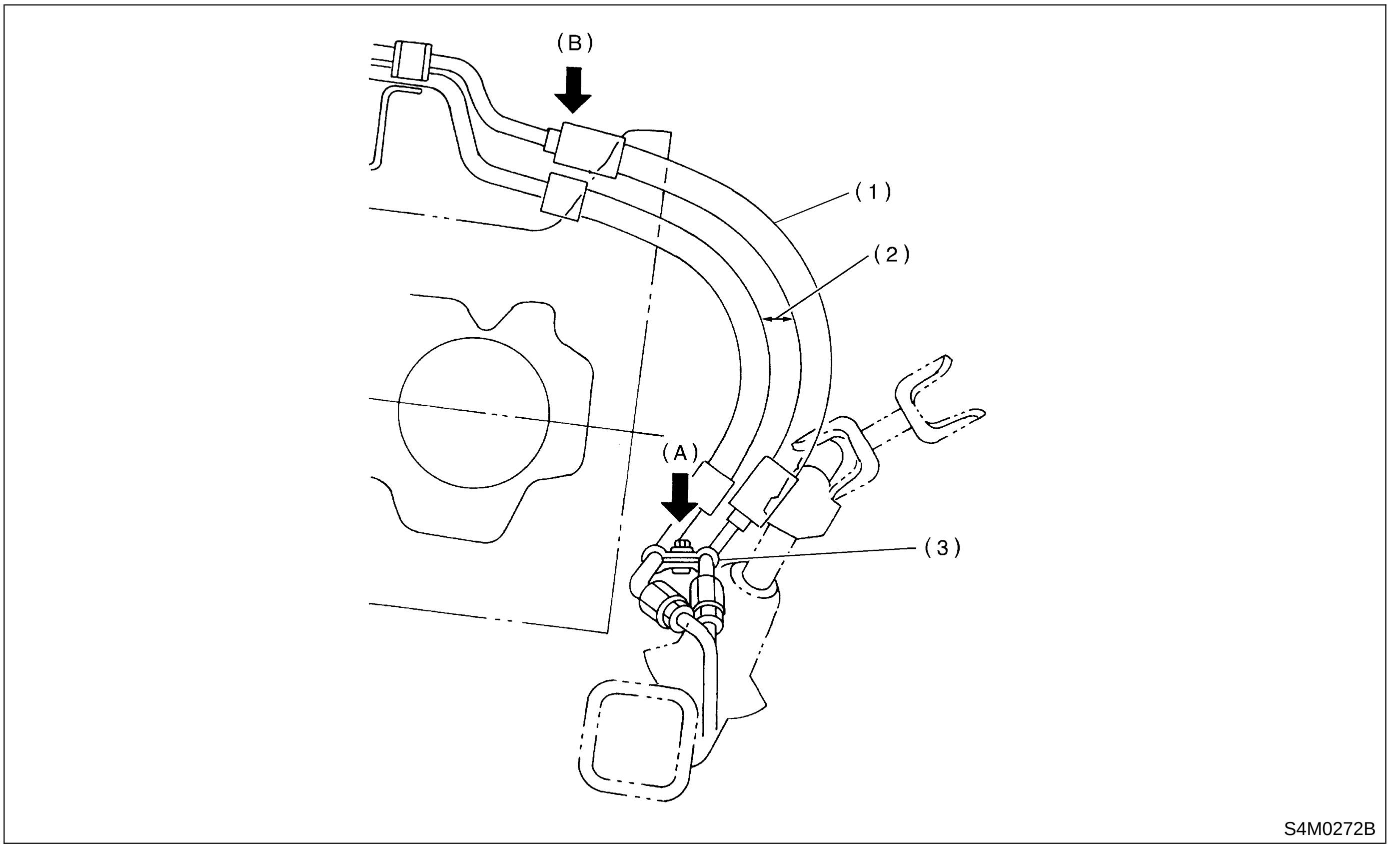
Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)



(1) Pipe A
(2) Pipe B

6) Install jack-up plate.
7) Connect battery ground cable.
8) Feed the specified fluid.

NOTE:
Never start the engine before feeding the fluid; otherwise vane pump might be seized up.



(1) High-pressure hose
(2) No interference is allowed between hoses.
(3) Clearance between crossmember and pipe: 3 — 8 mm (0.12 — 0.31 in)

9) Finally check clearance between pipes and/or hoses, as shown above.
If clearance between cruise control pump and power steering hose is less than 10 mm (0.39 in), proceed as follows:

(1) Move clamped section (A) (refer to figure above.) down to a point where pipe is close to crossmember.

Pipe-to-crossmember clearance:
10 mm (0.39 in), min.

(2) Check that clearance between cruise control pump and power steering hose is at least 10 mm (0.39 in). If it is not, bend section (B) down until a clearance of at least 10 mm (0.39 in) is obtained.

C: INSPECTION S601277A10

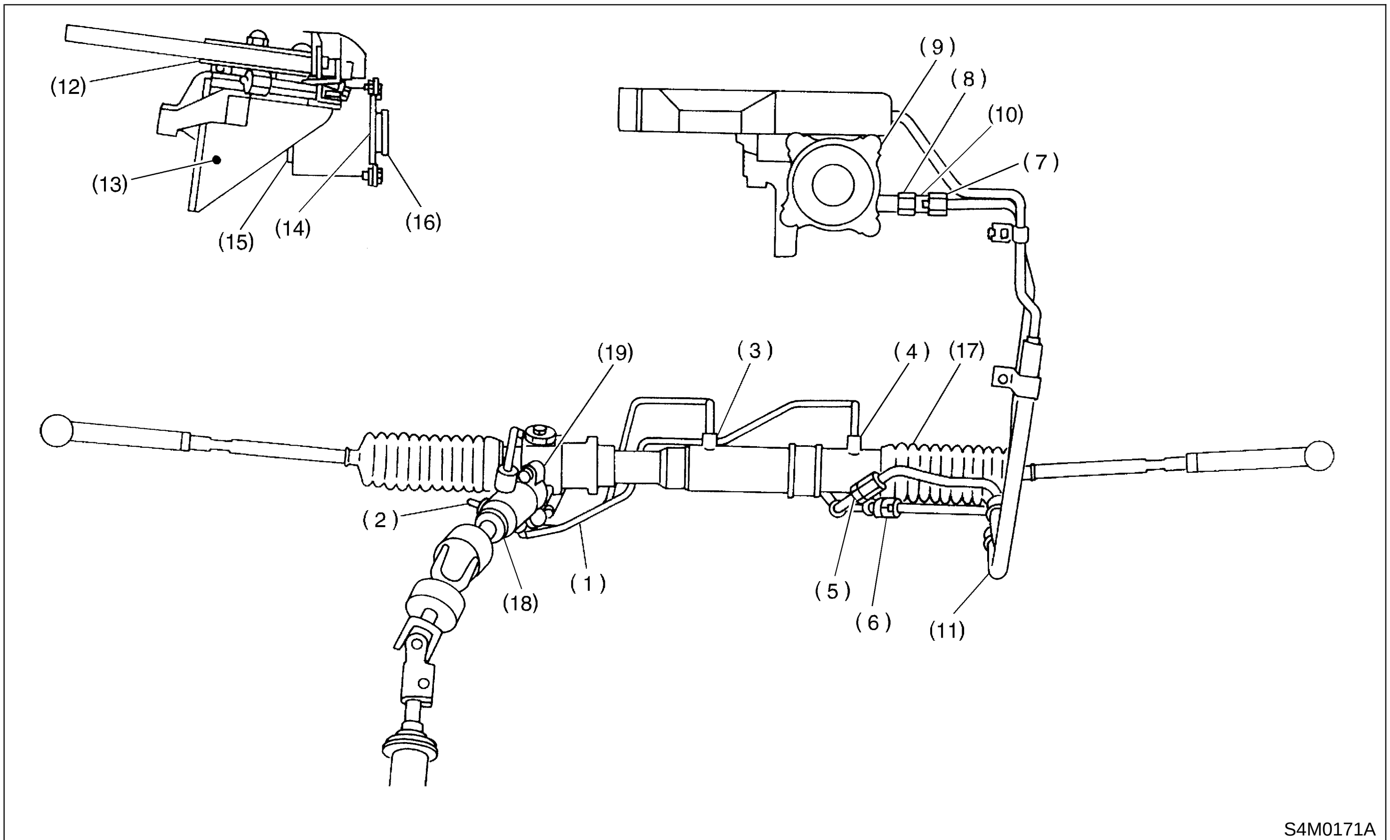
Check all disassembled parts for wear, damage or other abnormalities. Repair or replace faulty parts as required.

Part name	Inspection	Remedy
Pipe	● O-ring fitting surface for damage ● Nut for damage ● Pipe for damage	Replace with new one.
Clamp B	● Clamps for weak clamping force	Replace with new one.
Clamp C		
Clamp E		
Hose	● Flared surface for damage ● Flare nut for damage ● Outer surface for cracks ● Outer surface for wear ● Clip for damage ● End coupling or adapter for degradation	Replace with new one.

CAUTION:
Although surface layer materials of rubber hoses have excellent weathering resistance, heat resistance and resistance for low temperature brittleness, they are likely to be damaged chemically by brake fluid, battery electrolyte, engine oil and automatic transmission fluid and their service lives are to be very shortened. It is very important to keep the hoses free from before mentioned fluids and to wipe out immediately when the hoses are adhered with the fluids.
Since resistances for heat or low temperature brittleness are gradually declining according to time accumulation of hot or cold conditions for the hoses and their service lives are shortening accordingly, it is necessary to perform careful inspection frequently when the vehicle is used in hot weather areas, cold weather area and/or a driving condition in which many steering operations are required in short time.
Particularly continuous work of relief valve over 5 seconds causes to reduce service lives of the hoses, the oil pump, the fluid, etc. due to over heat.
So, avoid to keep this kind of condition when servicing as well as driving.

Trouble	Possible cause	Corrective action
Pressure hose burst	Excessive holding time of relief status	Instruct customers.
	Malfunction of relief valve	Replace oil pump.
	Poor cold characteristic of fluid	Replace fluid.
Forced out return hose	Poor connection	Correct.
	Poor holding of clip	Retighten.
	Poor cold characteristic of fluid	Replace fluid.
Fluid bleeding out of hose slightly	Wrong layout, tensioned	Replace hose.
	Excessive play of engine due to deterioration of engine mounting rubber	Replace defective parts.
	Improper stop position of pitching stopper	Replace defective parts.
Crack on hose	Excessive holding time of relief status	Replace. Instruct customer.
	Excessive tightening torque for return hose clip	Replace.
	Power steering fluid, brake fluid, engine oil, electrolyte adhere on the hose surface	Replace. Pay attention on service work.
	Too many times use in extremely cold weather	Replace. Instruct customers.

CAUTION:
It is likely that although one judges fluid leakage, there is actually no leakage. This is because the fluid spilt during the last maintenance was not completely wiped off. Be sure to wipe off spilt fluid thoroughly after maintenance.



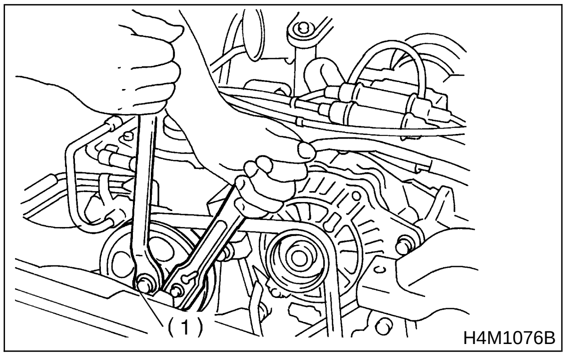
Fluid leaking area	Possible cause	Corrective action
Leakage from connecting portions of pipes and hoses, numbered with (1) through (9) in figure	Insufficient tightening of flare nut, catching dirt or the like, damage to flare or flare nut or eye bolt	Loosen and retighten, if ineffective, replace.
	Poor insertion of hose, poor clamping	Retighten or replace clamp.
	Damaged O-ring or gasket	Replace O-ring or gasket pipe or hose with new one, if ineffective, replace gear-box also.
Leakage from hose (10) and (11) in figure	Crack or damage in hose	Replace with a new one.
	Crack or damage in hose hardware	Replace with a new one.
Leakage from surrounding of cast iron portion of oil pump (12) and (13) in figure	Damaged O-ring	Replace oil pump.
	Damaged gasket	Replace oil pump.
Leakage from oil tank (14) and (15) in figure	Crack in oil tank, (14)	Replace oil tank.
	Damaged O-ring, (15)	Replace O-ring.
Leakage from filler neck (16)	Damaged cap packing	Replace cap.
	Crack in root of filler neck	Replace oil tank.
	High fluid level *1	Adjust fluid level.
Leakage from surrounding of power cylinder of gearbox (17) in figure	Damaged oil seal	Replace oil seal.
Leakage from control valve of gear-box (18) and (19) in figure	Damaged packing or oil seal	Replace problem parts.
	Damage in control valve	Replace control valve.

NOTE:
Fluid level is specified at optimum position (range) for ordinary use. Accordingly, if the vehicle is used often under hard conditions such as on very rough roads or in mountainous areas, fluid may bleed out from cap air vent hole. This is not a problem. If a customer complains strongly and is not likely to be satisfied with the leakage, lower the fluid level to the extent that fluid will not bleed out under the conditions described, and have the customer check the fluid level and its quality more frequency than usual.

7. Oil Pump S601070

A: REMOVAL S601070A18

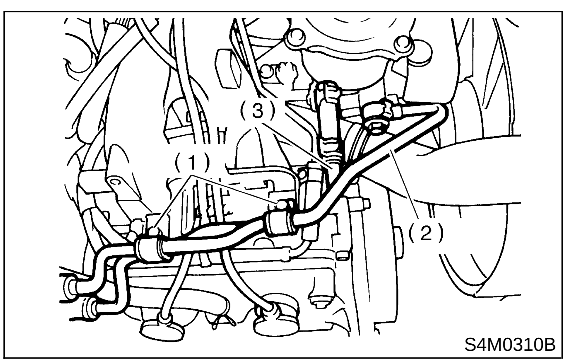
1) Disconnect battery ground cable.
2) Drain the working fluid about 0.3 ℓ (0.3 US qt, 0.3 Imp qt) from oil tank.
3) Remove pulley belt cover bracket.
4) Loosen oil pump pulley nut, then remove bolts which secure alternator.



(1) Oil pump pulley nut

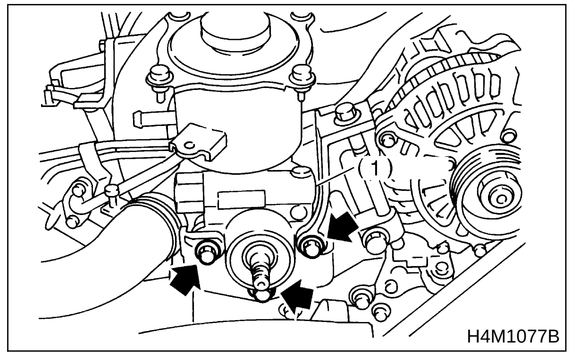
5) Loosen pulley belt(s).
6) Remove the nut and detach oil pump pulley.
7) Disconnect pipe C from oil pump. Disconnect pipe D from oil tank.

CAUTION:
- **Do not allow fluid from the hose end to come into contact with pulley belt.**
- **To prevent foreign matter from entering the hose and pipe, cover the open ends of them with a clean cloth.**
- **Except when only oil tank needs to be inspected, detach oil tank and oil pump as a unit. Then separate one from the other on a work bench to prevent oil from spilling on any part of the engine.**



(1) Bolt A
(2) Pipe C
(3) Pipe D

8) Remove three bolts from the front side of oil pump and detach the pump.



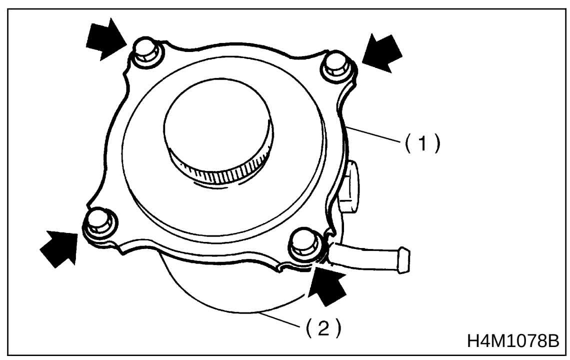
(1) Oil pump

9) Remove three bolts from the lower side of bracket and detach the bracket.

CAUTION:
The bracket does not need to be removed unless it is damaged.

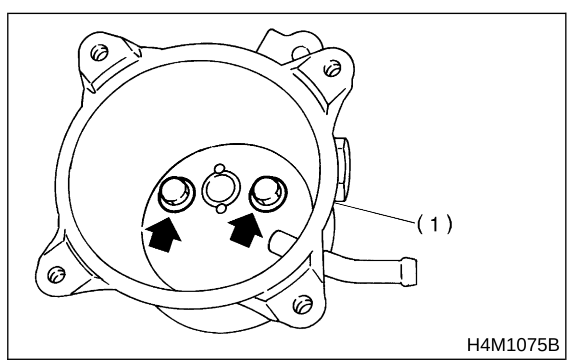
10) Place oil pump in a vise, and remove upper shell and baffle from lower shell.

CAUTION:
Do not clamp oil pump too hard; otherwise oil pump may be dented.



(1) Upper shell
(2) Lower shell

11) Remove lower shell from oil pump.



(1) Lower shell

B: INSTALLATION S601070A11

1) Install bracket on engine.

Tightening torque:
22 N·m (2.2 kgf-m, 15.9 ft-lb)

2) Install oil pump on oil tank as follows outside the vehicle.

NOTE:
Prior to installation, make sure that all oil is removed from oil pump, oil tank and pipe.

3) Place oil pump in a vise and install stay to oil pump.

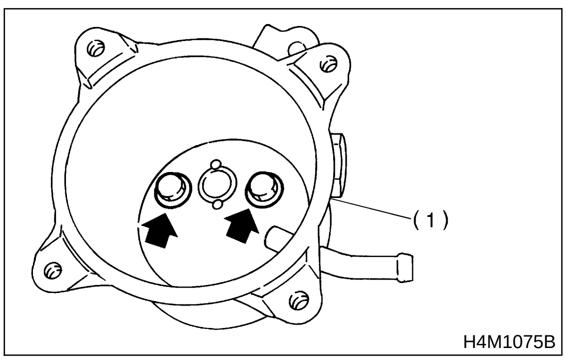
CAUTION:
Do not place oil pump directly in vise; use soft pads and hold oil pump lightly to protect it.

Tightening torque:
15.7 N·m (1.60 kgf-m, 11.6 ft-lb)

4) Install lower shell to oil pump.

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

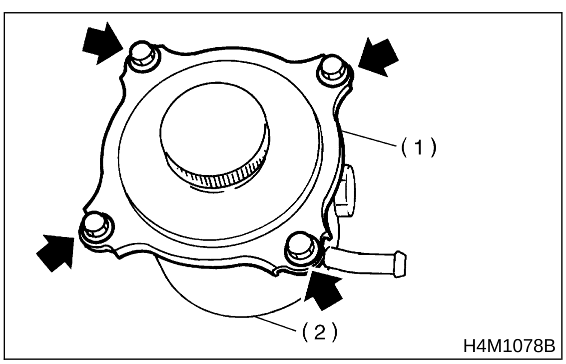
CAUTION:
Be sure to use a new seal washer.



(1) Lower shell

5) Install upper shell and baffle to lower shell.

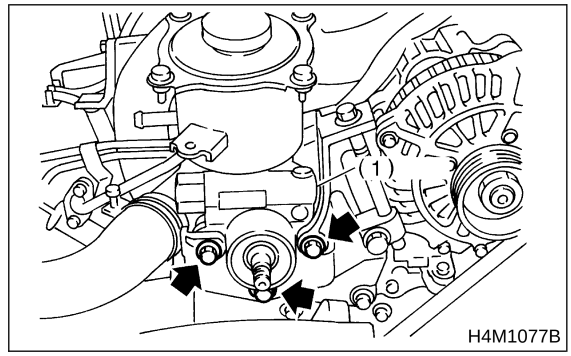
Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)



(1) Upper shell
(2) Lower shell

6) Install oil pump, previously assembled to oil tank, on bracket.

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



(1) Oil pump

7) Install in the reverse order of removal.
8) Inspect pulley belt tension. <Ref. to ME-43, INSPECTION, V-belt.>
9) Feed the specified power steering fluid. <Ref. to PS-54, Power Steering Fluid.>

CAUTION:
Never start the engine before feeding the fluid; otherwise vane pump might be seized up.

C: INSPECTION S601070A10

1. BASIC INSPECTION S601070A1002

- In accordance with the following table, check all removed parts for wear and damage, and make repair or replacement if necessary.

No.	Parts	Inspection	Corrective action
1	Oil pump (Exterior)	(1) Crack, damage or oil leakage	Replace oil pump with a new one.
		(2) Play of pulley shaft	Measure radial play and axial play. If any of these exceeds the service limit, replace oil pump with a new one.
2	Pulley	(1) Damage	Replace it with a new one.
		(2) Bend	Measure V ditch deflection. If it exceeds the service limit, replace pulley with a new one.
3	Cap	Crack or damage	Replace it with a new one.
4	Strainer	(1) Clogging with dirt	Wash it.
		(2) Breakage	Replace it with a new one.
5	Oil pump (Interior)	(1) Defect or burning of vane pump	Check resistance to rotation of pulley. If it is past the service limit, replace oil pump with a new one.
		(2) Bend in the shaft or damage to bearing	Oil pump emits a noise that is markedly different in tone and loudness from a sound of a new oil pump when turning with a string put around its pulley, replace oil pump with a new one.
6	O-ring	Crack or deterioration	Replace it with a new one.
7	Oil tank	Crack, damage or oil leakage	Replace it with a new one.
8	Bracket	Crack	Replace it with a new one.

2. SERVICE LIMIT S601070A1001

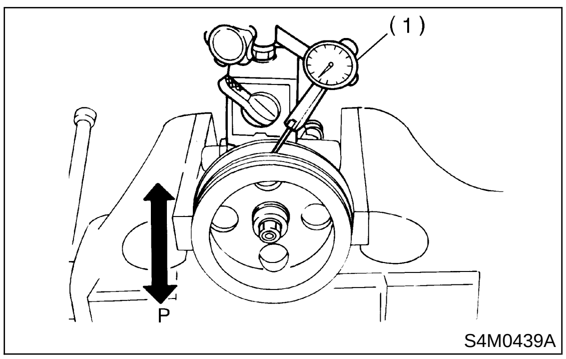
Make a measurement as follows. If it exceeds the specified service limit, replace the parts with new ones.

CAUTION:
- **Fix oil pump on a vise to make a measurement. At this time, hold oil pump with the least possible force between two wood pieces.**
- **Do not set outside of flow control valve or pulley on a vise; otherwise outside or pulley might be deformed. Select properly sized wood pieces.**

1) Play of pulley shaft

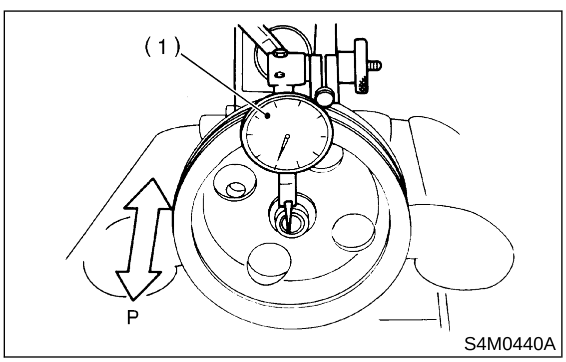
On condition:
P: 9.8 N (1.0 kgf, 2.2 lb)

Service limit:
Radial play (Direction ⬌)
0.4 mm (0.016 in) or less



(1) Dial indicator

Axial play (Direction ⇔)
0.9 mm (0.035 in) or less

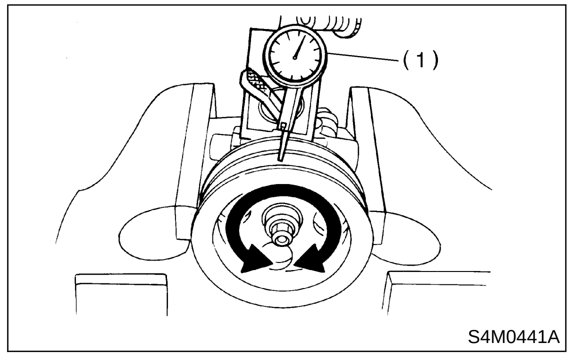


(1) Dial indicator

2) Ditch deflection of pulley

Service limit:
1.0 mm (0.039 in) or less

NOTE:
Read the value for one surface of V ditch, and then the value for another off the dial.

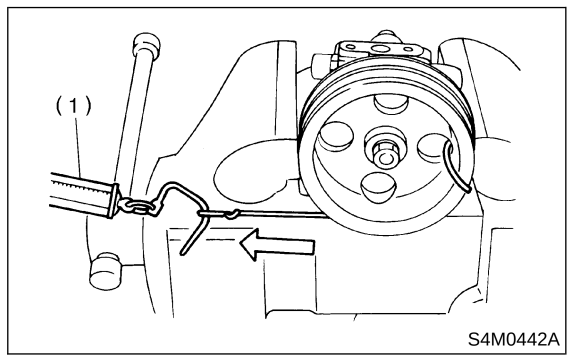


(1) Dial indicator

3) Resistance to rotation of pulley

Service limit:
Maximum load; 9.22 N (0.94 kgf, 2.07 lb) or less

NOTE:
- A rather higher value may be indicated when pulley starts turning.
- Measure the load during rotation and make a judgment.



(1) Spring balance

3. HYDRAULIC PRESSURE S601070A1003

CAUTION:
- **Be sure to complete all items aforementioned in “INSPECTION”, prior to measuring hydraulic pressure. Otherwise, pressure can not be measured correctly. <Ref. to PS-56, INSPECTION, General Diagnostic Table.>**
- **Do not leave the valve of pressure gauge closed or hold the steering wheel at stop end for 5 seconds or more in any case, as the oil pump may be damaged due to long keep of these conditions.**
- **Put cotton cloth waste at a place where fluid drops before pressure gauge is installed. Wipe off split fluid thoroughly after the measurement.**

NOTE:
Keep engine idling during the measurement.

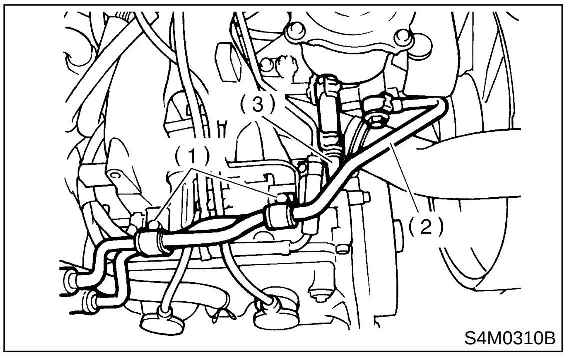
1) MEASURE REGULAR PRESSURE.

(1) Connect ST1, ST2 and ST3.

ST1 925711000 PRESSURE GAUGE
ST2 34099AC020 ADAPTER HOSE B
ST3 34099AC010 ADAPTER HOSE A

(2) Remove two bolts (1), then disconnect pipe C (2) from the pump.

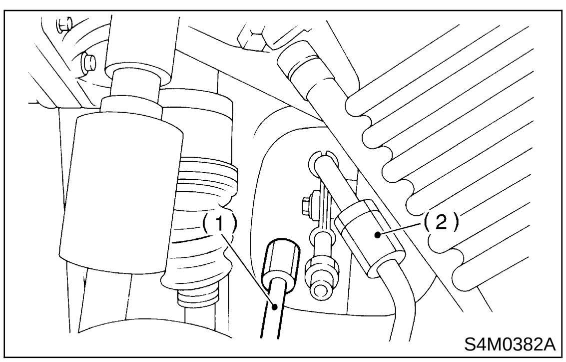
(3) Using gasket (Part No. 34621AC021) and bolt (Part No. 34620AC010), install ST2 to the pump instead of pipe C (2).



(1) Bolt A
(2) Pipe C
(3) Pipe D

(4) Disconnect the pipe from pipe C (1).

(5) Install ST3 to pipe C (1).



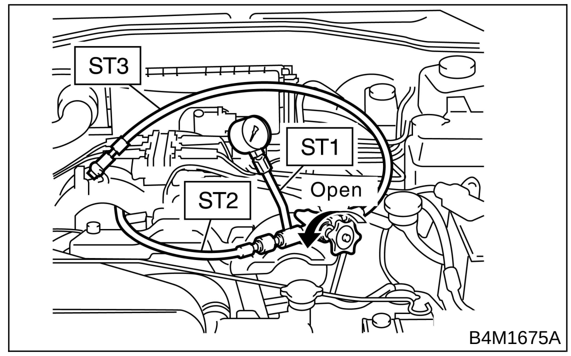
(1) Pipe C
(2) Pipe D

(6) Replenish power steering fluid up to specified level.

(7) Open valve, and start the engine.

(8) Measure regular pressure.

ST1 925711000 PRESSURE GAUGE
ST2 34099AC020 ADAPTER HOSE B
ST3 34099AC010 ADAPTER HOSE A



Service limit:
981 kPa (10 kg/cm^2, 142 psi) or less

(9) If it is not within the specified value, replace the troubled part caused by the following symptoms; pipe or hose clogged, leaks from fluid line, and mix of foreign objects in fluid line.

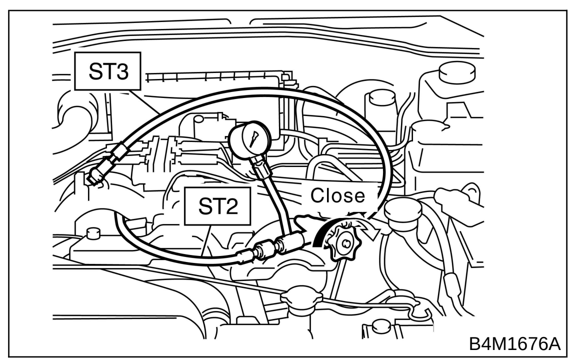
2) Measure relief pressure.

(1) Using STs, measure relief pressure.

(2) Close valve.

(3) Measure relief pressure.

ST1 925711000 PRESSURE GAUGE
ST2 34099AC020 ADAPTER HOSE B
ST3 34099AC010 ADAPTER HOSE A

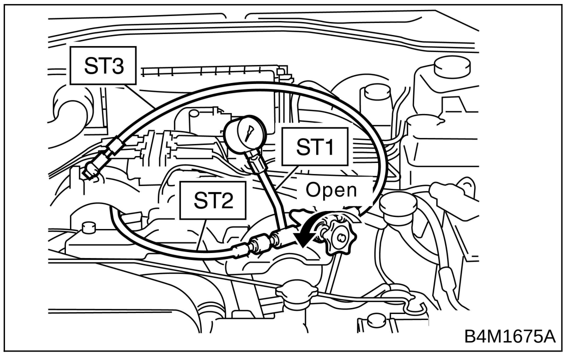


Service limit:
7,159 — 7,748 kPa (73 — 79 kg/cm^2, 1,038 — 1,123 psi)

(4) If it is not within the specified value, replace the oil pump.

3) Measure working pressure.
(1) Using STs, measure working pressure.
(2) Open valve.
(3) Measure working pressure of control valve by turning wheel from stop to stop.

ST1 925711000 PRESSURE GAUGE
ST2 34099AC020 ADAPTER HOSE B
ST3 34099AC010 ADAPTER HOSE A



Service limit:
7,159 — 7,748 kPa (73 — 79 kg/cm^2, 1,038 — 1,123 psi)

(4) If it is within the specified value, measure steering effort. <Ref. to PS-59, MEASUREMENT OF STEERING EFFORT, INSPECTION, General Diagnostic Table.> If it is not within specified value, replace control valve itself or control valve and pinion as a single unit with new ones.

8. Reservoir Tank S601075

A: REMOVAL S601075A18

Refer to “Oil Pump” section for details of reservoir tank removal order. <Ref. to PS-47, REMOVAL, Oil Pump.>

B: INSTALLATION S601075A11

Refer to “Oil Pump” section for details of reservoir tank installation order. <Ref. to PS-48, INSTALLATION, Oil Pump.>

C: INSPECTION S601075A10

Check reservoir tank for cracks, breakage, or damage. If any cracks, breakage, or damage is found, replace reservoir tank.

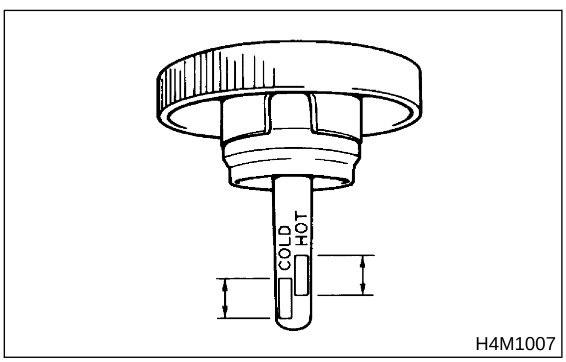
9. Power Steering Fluid S601275

A: SPECIFICATION S601275A22

Recommended power steering fluid	Manufacturer
DEXRON III or equivalent	B.P.
	CALTEX
	CASTROL
	MOBIL
	SHELL
	TEXACO

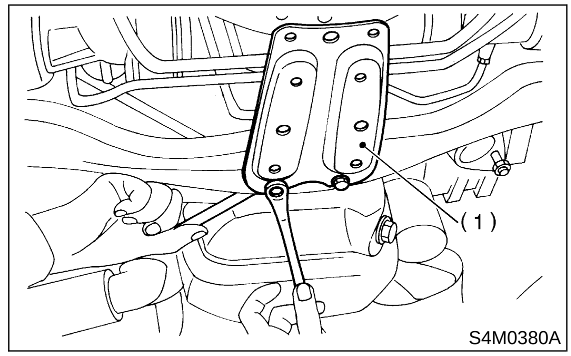
B: INSPECTION S601275A10

1) Check power steering fluid for deterioration or contamination. If the fluid is highly deteriorated or contaminated, drain it and refill with new fluid.
2) Check joints and units for oil leakage. If any oil leaks are found, repair or replace the applicable part.
3) Inspect fluid level on flat and level surface with engine “OFF” by indicator of reservoir tank.
If the level is at lower point or below, add fluid to keep the level in the specified range of the indicator. If at upper point or above, drain fluid by using a syringe or the like.
   (1) Check at temperature 20°C (68°F) on reservoir surface of oil pump; read the fluid level on the “COLD” side.
   (2) Check at temperature 80°C (176°F) on reservoir surface of oil pump; read the fluid level on the “HOT” side.



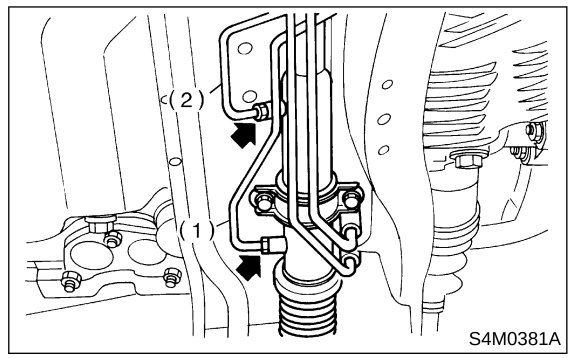
C: REMOVAL S601275A18

1) Set the vehicle on the lift.
2) Disconnect battery ground cable.
3) Remove air intake duct.
4) Drain fluid from the reservoir tank.
5) Lift-up the vehicle.
6) Remove under cover.
7) Remove jack-up plate.



(1) Jack-up plate

8) Disconnect one pipe joint A from center of gearbox assembly, and connect a vinyl hose to it. While turning steering wheel to the left and right, drain fluid through the hose. Similarly, drain fluid from the other pipe joint B.



(1) Pipe A
(2) Pipe B

9) Connect pipe joint A and B.
10) When pouring power steering fluid, refer to “Installation” under “Power Steering Fluid”. <Ref. to PS-54, INSTALLATION, Power Steering Fluid.>
11) Install in the reverse order of removal.

D: INSTALLATION S601275A11

1) Feed the specified fluid with its level being about 4 cm (1.6 in) lower than the mouth of tank.
2) Jack up the vehicle and support it with safety stands, then turn steering wheel with engine stopped.
3) Continue to turn steering wheel slowly from lock to lock until bubbles stop appearing in the tank while keeping the fluid at that level.
4) In case air is absorbed to deliver bubbles into piping because the fluid level is lower, leave it about half an hour and then do the step 3) all over again.
5) Start, and idle the engine.
6) Continue to turn steering wheel slowly from lock to lock again until bubbles stop appearing in the tank while keeping the fluid at that level.

It is normal that bubbles stop appearing after three times turning of steering wheel.

7) In case bubbles do not stop appearing in the tank, leave it about half an hour and then do the step 5) all over again.

8) Stop the engine, and take out safety stands after jacking up vehicle again.

Then lower the vehicle, and idle the engine.

9) Continue to turn steering wheel from lock to lock until bubbles stop appearing and change of the fluid level is within 3 mm (0.12 in).

10) In case the following happens, leave it about half an hour and then do step 8) again.

(1) The fluid level changes over 3 mm (0.12 in).

(2) Bubbles remain on the upper surface of the fluid.

(3) Grinding noise is generated from oil pump.

11) Check the fluid leakage at flare nuts after turning steering wheel from lock to lock with engine running.

CAUTION:

- **Before checking, wipe off any fluid on flare nuts and piping.**
- **In case the fluid leaks from flare nut, it is caused by dust (or the like) and/or damage between flare and tapered seat in piping.**
- **So remove the flare nut, tighten again it to the specified torque after cleaning flare and tapered seat. If flare or tapered seat is damaged, replace it with a new one.**

10. General Diagnostic Table

S601257

A: INSPECTION S601257A10

Trouble	Possible cause	Corrective action
● Heavy steering effort in all ranges ● Heavy steering effort at stand still ● Steering wheel surges when turning.	1. Pulley belt ● Unequal length of pulley belts ● Adhesion of oil and grease ● Loose or damage of pulley belt ● Poor uniformity of pulley belt cross section ● Pulley belt touches to pulley bottom ● Poor revolution of pulleys except oil pump pulley ● Poor revolution of oil pump pulley	Adjust or replace.
	2. Tire and rim ● Improper tires out of specification ● Improper rims out of specification ● Tires not properly inflated*1	Replace or reinflate.
	3. Fluid ● Low fluid level ● Aeration ● Dust mix ● Deterioration of fluid ● Poor warming-up of fluid *2	Refill, bleed air, replace or instruct customer.
	4. Idling speed ● Lower idling speed ● Excessive drop of idling speed at start or at turning steering wheel *3	Adjust or instruct customer.
	5. Measure hydraulic pressure. <Ref. to PS-49, INSPECTION, Oil Pump.>	Replace problem parts.
	6. Measure steering effort. <Ref. PS-56, INSPECTION, General Diagnostic Table.>	Adjust or replace.
● Vehicle leads to one side or the other. ● Poor return of steering wheel to center ● Steering wheel surges when turning.	1. Fluid line ● Folded hose ● Flattened pipe	Reform or replace.
	2. Tire and rim ● Flat tire ● Mix use of different tires ● Mix use of different rims ● Abnormal wear of tire ● Unbalance of remained grooves ● Unbalance of tire pressure	Fix or replace.
	3. Front alignment ● Improper or unbalance caster ● Improper or unbalance toe-in ● Loose connection of suspension	Adjust or retighten.
	4. Others ● Damaged joint assembly ● Unbalanced height ● One-sided weight	Replace, adjust or instruct customer.
	5. Measure steering effort. <Ref. to PS-56, INSPECTION, General Diagnostic Table.>	Adjust or replace.

*1 If tires and/or rims are wider, the load to power steering system is the more. Accordingly, in a condition, for example before fluid warms-up, relief valve may work before maximum turning angle. In this case, steering effort may be heavy. When measured hydraulic pressure is normal, there is no abnormal thing.
*2 In cold weather, steering effort may be heavy due to increased flow resistance of cold fluid. After warming-up engine, turn steering wheel from stop to stop several times to warm-up fluid. Then if steering effort reduces normally, there is no abnormal thing.
*3 In cold weather or with insufficient warm-up of engine, steering effort may be heavy due to excessive drop of idling when turning steering wheel. In this case, it is recommended to start the vehicle with increasing engine speed than usual. Then if steering effort reduces normally, there is no abnormal thing.

1. NOISE AND VIBRATION *S601257A1001*

CAUTION:
Don't keep the relief valve operated over 5 seconds at any time or inner parts of the oil pump may be damaged due to rapid increase of fluid temperature.

NOTE:
- Grinding noise may be heard immediately after the engine start in extremely cold condition. In this case, if the noise goes off during warm-up there is no abnormal function in the system. This is due to the fluid characteristic in extremely cold condition.
- Oil pump makes whine or growl noise slightly due to its mechanism. Even if the noise can be heard when steering wheel is turned at stand still there is no abnormal function in the system provided that the noise eliminates when the vehicle is running.
- When stopping with service brake and/or parking brake applied, power steering can be operated easily due to its light steering effort. If doing so, the disk rotates slightly and makes creaking noise. The noise is generated by creaking between the disk and pads. If the noise goes off when the brake is released, there is no abnormal function in the system.
- There may be a little vibration around the steering devices when turning steering wheel at standstill, even though the component parts are properly adjusted and have no defects.

Hydraulic systems are likely to generate this kind of vibration as well as working noise and fluid noise because of combined conditions, i.e., road surface and tire surface, engine speed and turning speed of steering wheel, fluid temperature and braking condition.

This phenomena does not indicate there is some abnormal function in the system.

The vibration can be known when steering wheel is turned repeatedly at various speeds from slow to rapid step by step with parking brake applied on concrete road and in "D" range for automatic transmission vehicle.

GENERAL DIAGNOSTIC TABLE

Trouble	Possible cause	Corrective action
Hiss noise (continuous) While engine is running.	Relief valve emits operating sound when steering wheel is completely turned in either direction. (Don't keep this condition over 5 seconds.)	Normal
	Relief valve emits operating sound when steering wheel is not turned. This means that the relief valve is faulty.	Defective Replace oil pump.
Rattling noise (intermittent) While engine is running.	Interference with adjacent parts	Check clearance. Correct if necessary. <Ref. to PS-44, INSPECTION, Pipe Assembly.>
	Loosened installation of oil pump, oil tank, pump bracket, gearbox or crossmember	Retighten.
	Loosened installation of oil pump pulley or other pulley(s)	Retighten.
	Loosened linkage or play of steering or suspension Loosened tightening of joint or steering column	Retighten or replace.
	Sound generates from the inside of gearbox or oil pump.	Replace bad parts of the gearbox or oil pump.
Knocking When turning steering wheel in both direction with small angle repeatedly at engine ON or OFF.	Excessive backlash Loosened lock nut for adjusting backlash	Adjust and retighten.
	Loosened tightening or play of tie-rod, tie-rod end	Retighten or replace.
Grinding noise (continuous) While engine is running.	Vane pump aeration	Inspect and retighten fluid line connection. Refill fluid and vent air.
	Vane pump seizing	Replace oil pump.
	Pulley bearing seizing of oil pump	Replace oil pump.
	Folded hose, flat pipe	Replace.
Squeal, squeak (intermittent or continuous) While engine is running.	Maladjustment of pulley belt Damaged or charged pulley belt Unequal length of pulley belts	Adjust or replace. (Replace two belts as a set.)
	Run out or soilage of V-groove surface of oil pump pulley	Clean or replace.
Sizzling noise (continuous) While engine is running.	Fluid aeration	Fix wrong part causing aeration. Replace fluid and vent air.
	Damaged pipe of gearbox	Replace pipe.
	Abnormal inside of hose or pipe Flat hose or pipe	Rectify or replace.
	Abnormal inside of oil tank	Replace.
	Removed oil tank cap	Install cap.
Whistle (continuous) While engine is running.	Abnormal pipe of gearbox or abnormal inside of hose	Replace bad parts of gearbox or hose.
Whine or growl (continuous or intermittent) While engine is running with/without steering turned.	Loosened installation of oil pump, oil pump bracket	Retighten.
	Abnormal inside of oil pump, hose	Replace oil pump, hose, if the noise can be heard when running as well as stand still.
	Torque converter growl, air conditioner compression growl	Remove power steering pulley belt and confirm.
Creaking noise (intermittent) While engine is running with steering turned.	Abnormal inside of gearbox	Replace bad parts of gearbox.
	Abnormal bearing for steering shaft	Apply grease or replace.
	Generates when turning steering wheel with brake (service or parking) applied.	If the noise goes off when brake is released, it is normal.
Vibration While engine is running with/without steering turned.	Too low engine speed at start	Adjust and instruct customers.
	Vane pump aeration	Fix wrong part. Vent air.
	Damaged valve in oil pump, gearbox	Replace oil pump, bad parts of gearbox.
	Looseness of play of steering, suspension parts	Retighten.

2. MEASUREMENT OF STEERING EFFORT *S601257A1002*

No.	Step	Check	Yes	No
1	**CHECK STEERING EFFORT.** 1) Stop the vehicle on a concrete road. 2) Start the engine. 3) Idle the engine. 4) Install spring scale on the steering wheel. 5) Pull spring scale at an right angle to the steering wheel, and measure both right and left steering wheel effort. NOTE: When turning steering more quickly than necessary from a direction to the other direction at an engine speed over 2,000 rpm, steering effort may be heavy. This is caused by flow characteristic of oil pump and is not a problem.	Is the steering effort 29.4 N (3.0 kgf, 6.6 lb) or less?	Go to step **2**.	Adjustment backlash.
2	**CHECK STEERING EFFORT.** 1) Stop the engine. 2) Pull spring scale at an right angle to the steering wheel, and measure both right and left steering wheel effort.	Is the steering effort 29.4 N (3.0 kgf, 6.6 lb) or less?	Go to step **3**.	Adjustment.
3	**CHECK STEERING WHEEL EFFORT.** 1) Remove universal joint. 2) Measure steering wheel effort.	Is the maximum force steering wheel effort 2.26 N (0.23 kgf, 0.51 lb) or less?	Go to step **4**.	Check, adjust and replace if necessary.
4	**CHECK STEERING WHEEL EFFORT.** Measure steering wheel effort.	Is the fluctuation width 1.08 N (0.11 kgf, 0.24 lb) or less?	Go to step **5**.	Check, adjust and replace if necessary.
5	**CHECK UNIVERSAL JOINT.** Measure folding torque of the joint (short yoke). <Ref. to PS-16, INSPECTION, Universal Joint.>	Is the folding torque 8.43 N (0.86 kgf, 1.90 lb) or less?	Go to step **6**.	Replace with new one.
6	**CHECK UNIVERSAL JOINT.** Measure folding torque of the joint (long yoke). <Ref. to PS-16, INSPECTION, Universal Joint.>	Is the folding torque 5.49 N (0.56 kgf, 1.23 lb) or less?	Go to step **7**.	Replace with new one.
7	**CHECK FRONT WHEEL.**	Are front wheels for unsteady revolution or rattling and brake for dragging?	Inspect, readjust and replace if necessary.	Go to step **8**.
8	**CHECK TIE-ROD ENDS.** Remove the tie-rod ends.	Are tie-rod ends of suspension for unsteady revolution or ratting?	Inspect and replace if necessary.	Go to step **9**.
9	**CHECK BALL JOINT.**	Are ball joints of suspension for unsteady revolution or ratting?	Inspect and replace if necessary.	Go to step **10**.
10	**CHECK GEARBOX.** Measure rotating of gearbox. <Ref. to PS-37, TURNING RESISTANCE OF GEAR BOX, INSPECTION, Steering Gearbox.>	Is rotating resistance is 11.18 N (1.14 kgf, 2.51 lb) or less around center position and 15.79 N (1.61 kgf, 3.55 lb) or less in all positions within 20% difference between clockwise and counterclockwise?	Go to step **11**.	Readjust backlash, and if ineffective, replace bad parts.
11	**CHECK GEARBOX.** Measure sliding of gearbox. <Ref. to PS-36, SERVICE LIMIT, INSPECTION, Steering Gearbox.>	Is rotating resistance is 304 N (31 kgf, 68 lb) or less with 20% difference between left and right direction?	Steering effort is normal.	Readjust backlash, and if ineffective, replace bad parts.

MEMO:

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

AC

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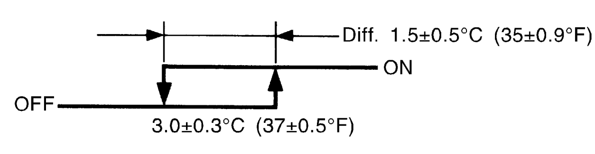
1. General Description S701001

A: SPECIFICATIONS S701001E49

1. HEATER SYSTEM S701001E4901

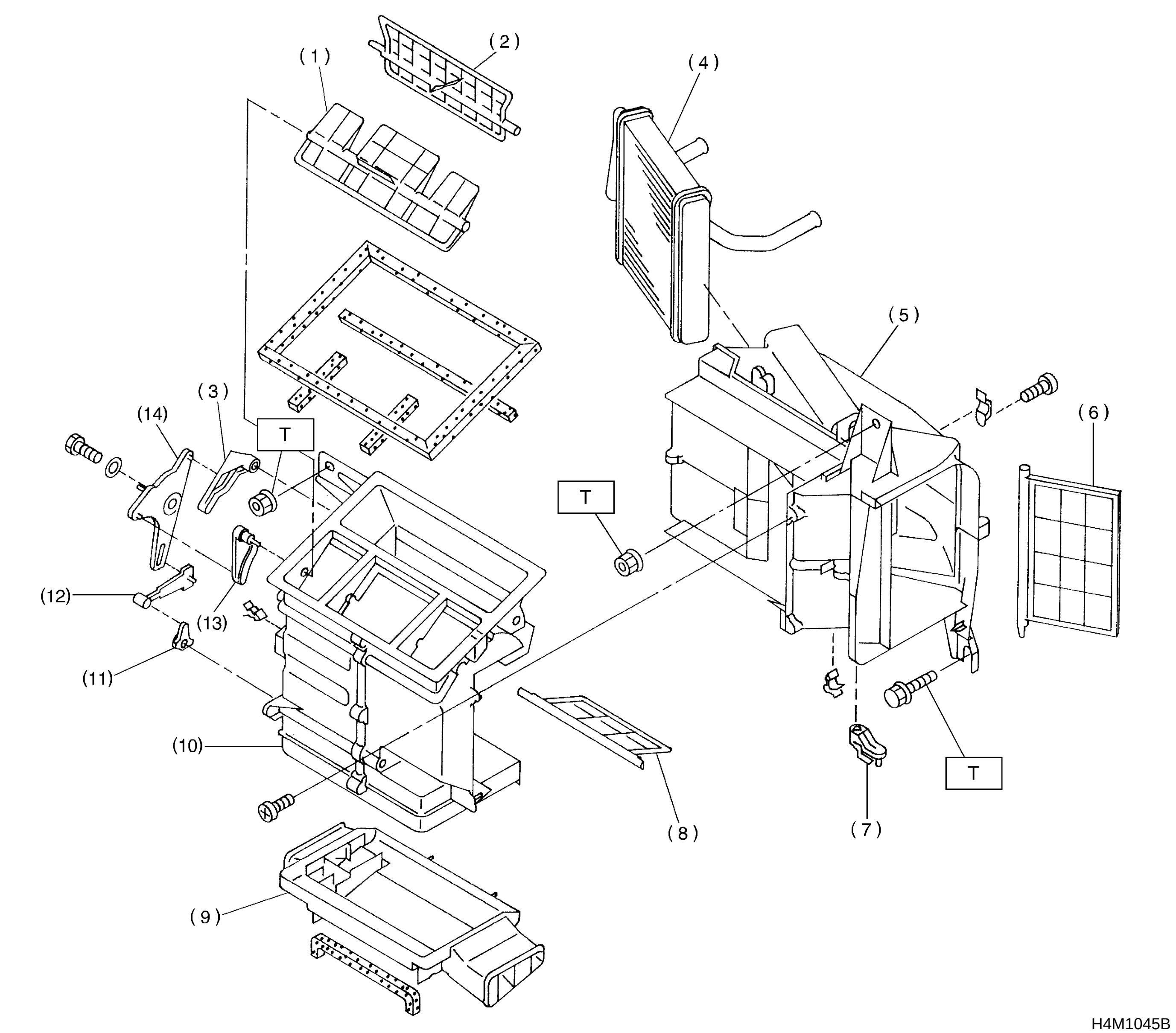
Item		Specifications	Condition
Heating capacity		5.1 kW (4,386 kcal/h, 17,404 BTU/h) or more	● Mode selector switch: HEAT ● Temperature control switch: FULL HOT ● Temperature difference between hot water and inlet air: 65°C (149°F) ● Hot water flow rate: 360 ℓ (95.1 US gal, 79.2 Imp gal)/h
Air flow rate		280 m^3 (9,887 cu ft)/h	Heat mode (FRESH), FULL HOT at 12.5 V
Max air flow rate		480 m^3 (16,949 cu ft)/h	● Temperature control switch: FULL COLD ● Blower fan speed: 4th position ● Mode selector lever: RECIRC
Heater core size (height × length × width)		193.5 × 152 × 35.0 mm (7.62 × 5.98 × 1.378 in)	—
Blower motor	Type	Magnet motor 260 W or less	at 12 V
	Fan type and size (diameter × width)	Sirocco fan type 150 × 75 mm (5.91 × 2.95 in)	—

2. A/C SYSTEM *S701001E4902*

Item			Specifications
Type of air conditioner			Reheat air-mix type
Cooling capacity			5.117 kW (4,400 kcal/h, 17,459 BTU/h)
Refrigerant			HFC-134a (CH_2FCF_3) [0.65±0.05 kg (1.43±0.11 lb)]
Compressor		Type	5-vane rotary, fix volume (KC50G)
		Discharge	140 cm^3 (8.54 cu in)/rev
		Max. permissible speed	7,000 rpm
Magnet clutch		Type	Dry, single-disc type
		Power consumption	38 W
		Type of belt	V-Ribbed 4 PK
		Pulley dia. (effective dia.)	125 mm (4.92 in)
		Pulley ratio	1.064
Condenser		Type	Corrugated fin (Multi-flow)
		Core face area	0.255 m^2 (2.74 sq ft)
		Dimensions (W × H × T)	22 × 374 × 683 mm (0.87 × 14.72 × 26.89 in)
		Radiation area	6.52 m^2 (70 sq ft)
Receiver drier		Effective inner capacity	250 cm^3 (15.26 cu in)
Expansion valve		Type	Internal equalizing
Evaporator		Type	Single tank
		Dimensions (W × H × T)	60 × 224 × 235 mm (2.36 × 8.82 × 9.25 in)
Blower fan		Fan type	Sirocco fan
		Outer diameter × width	150 × 75 mm (5.91 × 2.95 in)
		Power consumption	260 W at 12 V
Condenser fan (Sub fan)		Motor type	Magnet
		Power consumption	70 W at 12 V
		Fan outer diameter	320 mm (12.60 in)
Radiator fan (Main fan)		Motor type	Magnet
		Power consumption	70 W at 12 V
		Fan outer diameter	320 mm (12.60 in)
Dual switch (Pressure switch)	Low-pressure switch operating pressure	ON → OFF	177±25 kPa (1.80±0.25 kg/cm^2, 25.6±3.6 psi)
		OFF → ON	Less than 216 kPa (2.2 kg/cm^2, 31 psi)
	High-pressure switch operating pressure	ON → OFF	2,940±200 kPa (29.98±2.04 kg/cm^2, 426.3±29.0 psi)
		DIFF	590±200 kPa (6.02±2.04 kg/cm^2, 85.6±29.0 psi)
Compressor relief valve blow-out pressure			3,600±300 kPa (36.71±3.06 kg/cm^2, 522.0±43.5 psi)
Thermo control amplifier working temperature (Evaporator outlet air)			 S4M0511A

B: COMPONENT S701001A05

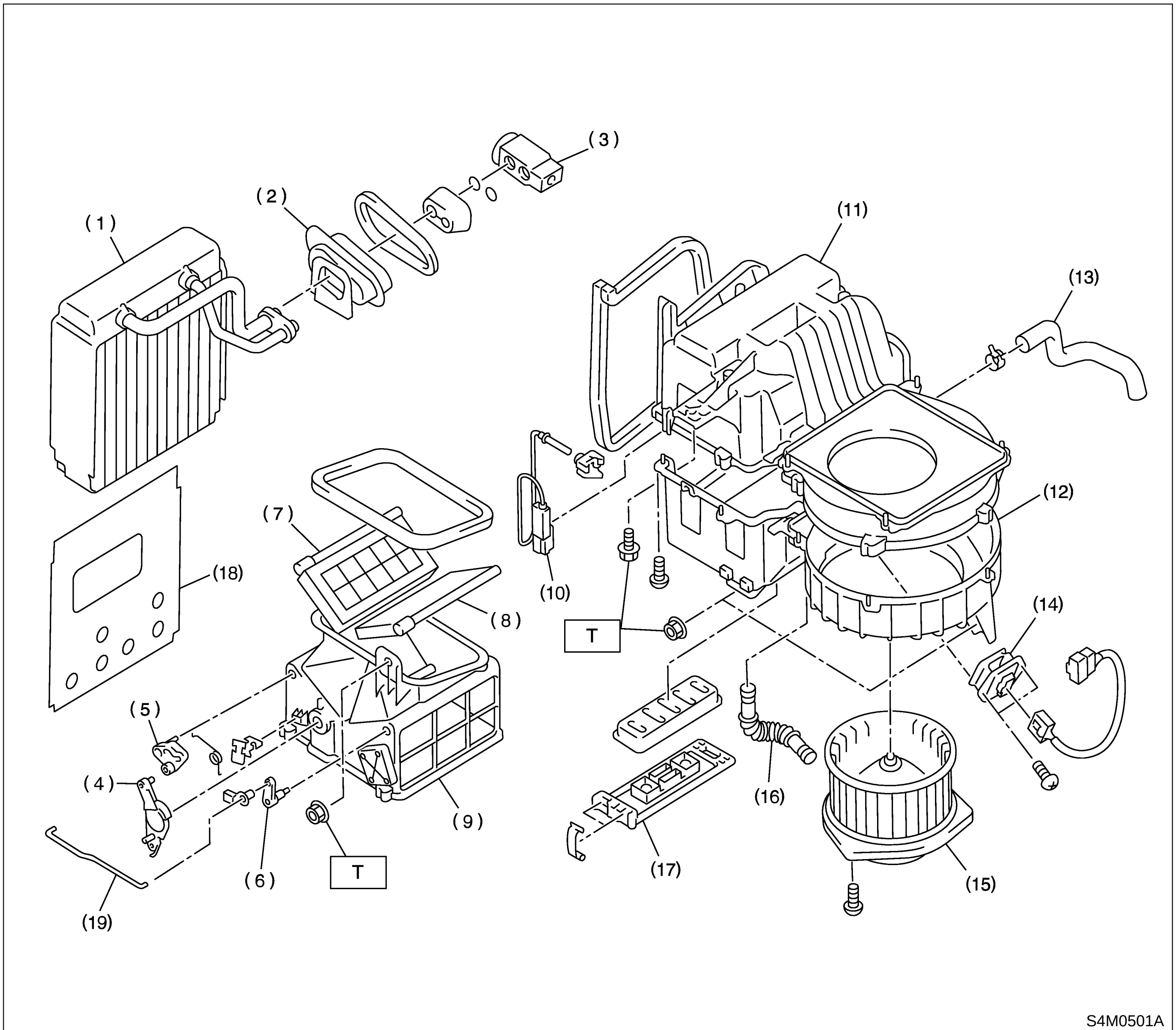
1. HEATER UNIT S701001A0501



(1) Vent door
(2) DEF door
(3) DEF lever
(4) Heater core
(5) Heater case FRONT
(6) Mix door
(7) Mix lever
(8) Foot door
(9) Foot duct
(10) Heater case REAR
(11) Foot lever lower
(12) Foot lever upper
(13) Vent lever
(14) Side link

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.35 (0.750, 5.421)

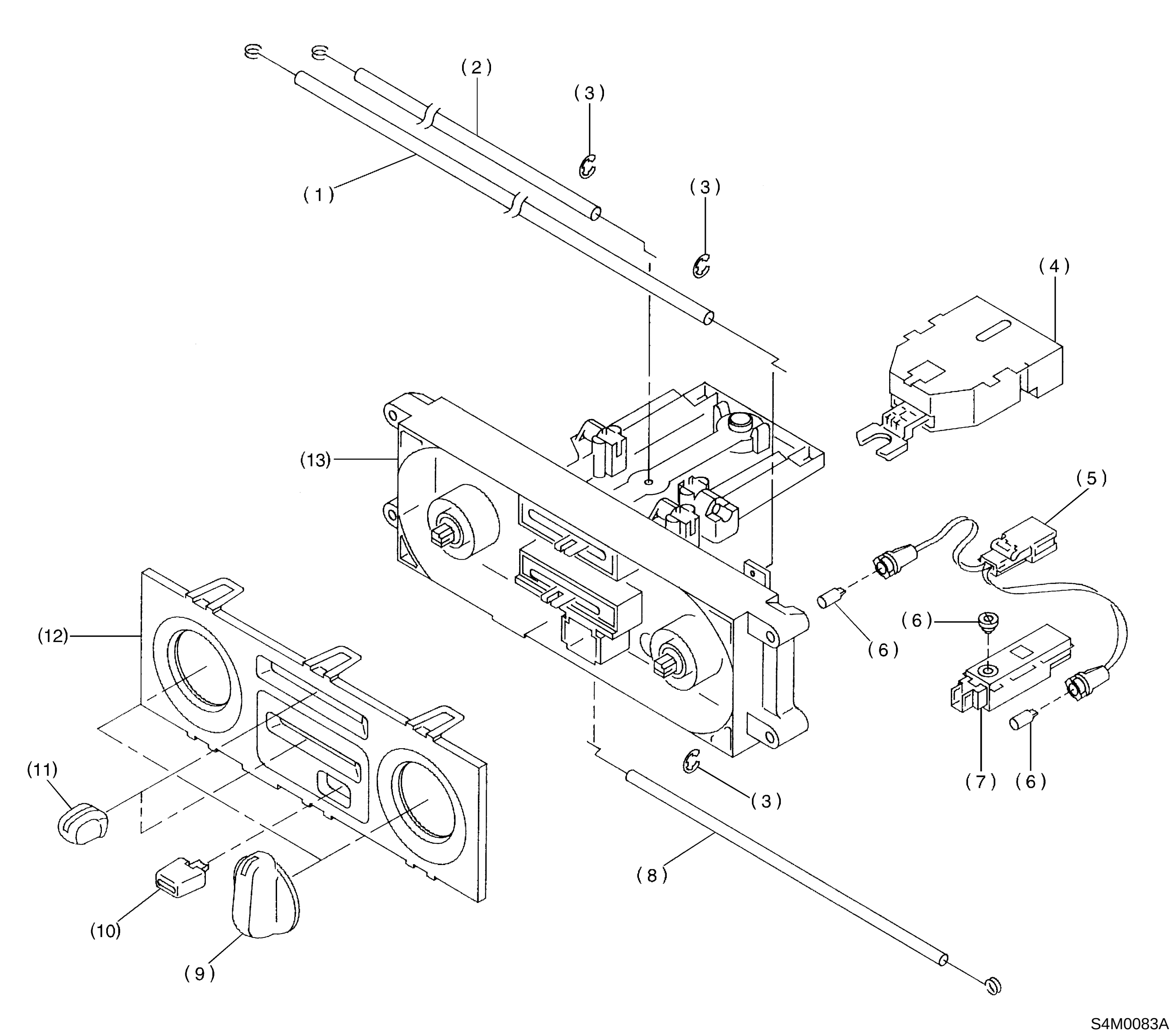
2. INTAKE UNIT WITH EVAPORATOR *S701001A0505*



(1) Evaporator (With A/C model)
(2) Boot
(3) Block expansion valve (With A/C model)
(4) Link
(5) Lever (A)
(6) Lever (B)
(7) Door (A)
(8) Door (B)
(9) Intake unit case inlet
(10) Thermistor (With A/C model)
(11) Intake unit case upper
(12) Intake unit case lower
(13) Drain hose
(14) Resistor
(15) Blower motor ASSY
(16) Aspirator pipe
(17) Cover
(18) Separator
(19) Rod

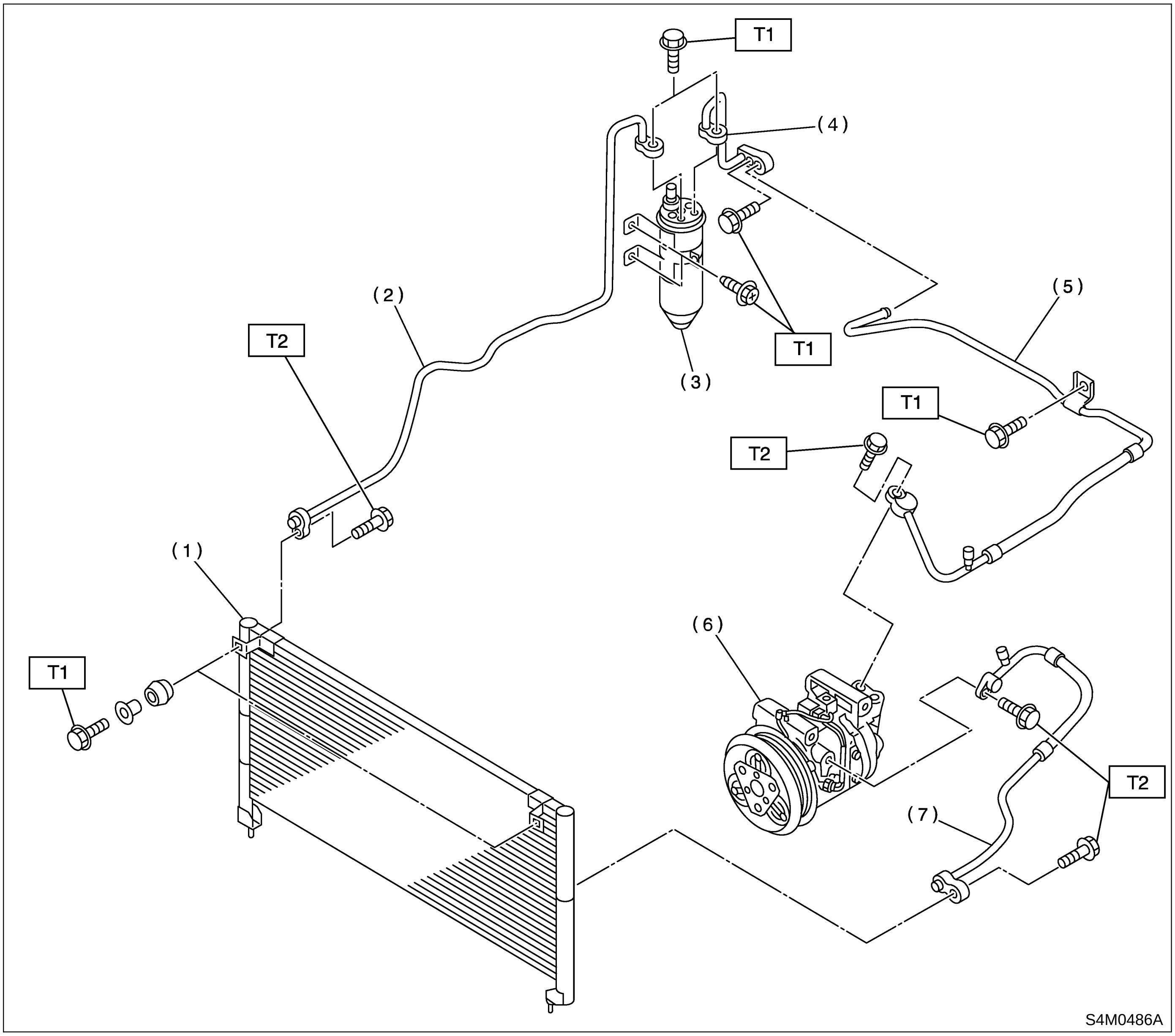
Tightening torque: N·m (kgf-m, ft-lb)
T: 7.35 (0.750, 5.421)

3. CONTROL UNIT *S701001A0503*



(1) Temperature control cable
(2) Recirc control cable
(3) Clip
(4) Blower switch ASSY
(5) Harness ASSY
(6) Bulb
(7) A/C switch ASSY
(8) Mode control cable
(9) Control dial knob
(10) A/C switch knob
(11) Control lever knob
(12) Plate
(13) Base unit

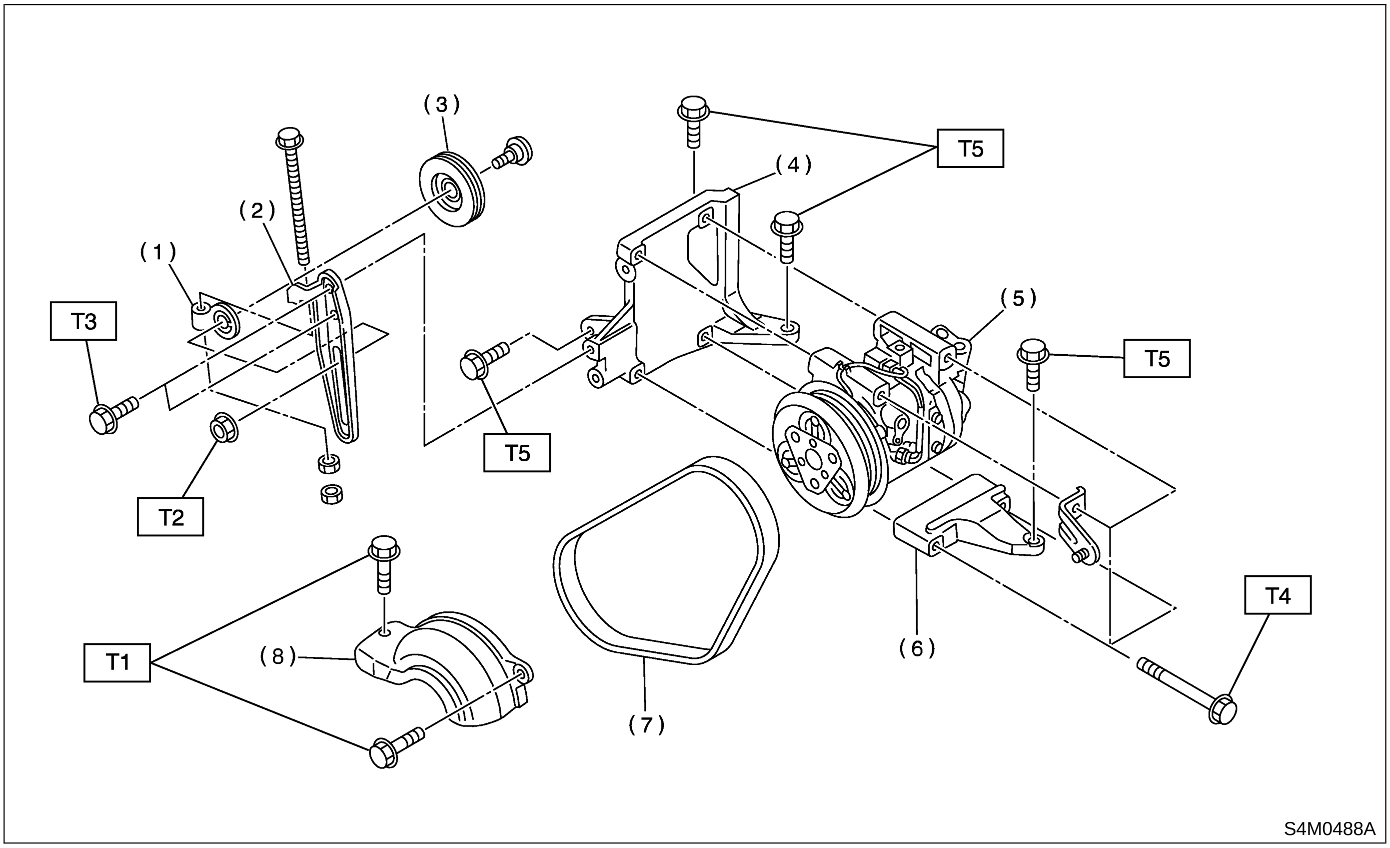
4. AIR CONDITIONING UNIT *S701001A0504*



(1) Condenser
(2) Pipe (From condenser to receiver drier)
(3) Receiver drier
(4) Pipe (From receiver drier to intake unit)
(5) Hose (Low-pressure)
(6) Compressor
(7) Hose (High-pressure)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.4 (0.75, 5.4)
T2: 15 (1.5, 10.8)

5. COMPRESSOR *S701001A0506*



(1) Idler pulley adjuster
(2) Idler pulley bracket
(3) Idler pulley
(4) Compressor bracket upper
(5) Compressor
(6) Compressor bracket lower
(7) V-belt
(8) Compressor belt cover

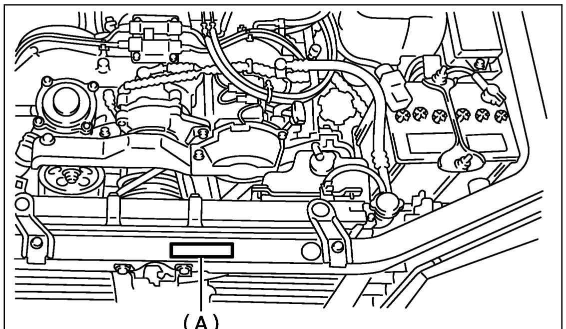
Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.4 (0.75, 5.4)
T2: 23 (2.3, 17)
T3: 23.0 (2.35, 17.0)
T4: 28.9 (2.95, 21.3)
T5: 35 (3.6, 26)

C: CAUTION S701001A03

1. HFC-134a A/C SYSTEM S701001A0301

- Unlike the old conventional HFC-12 system components, the cooling system components for the HFC-134a system such as the refrigerant and compressor oil are incompatible.
- Vehicles with the HFC-134a system can be identified by the label “A” attached to the vehicle.

Before maintenance, check which A/C system is installed in the vehicle.



S4M0547A

2. COMPRESSOR OIL S701001A0302

- HFC-134a compressor oil has no compatibility with that for R12 system.
- Use only the manufacturer-authorized compressor oil for the HFC-134a system; only use ZXL200PG.
- Do not mix multiple compressor oils.

If HFC-12 compressor oil is used in a HFC-134a A/C system, the compressor may become stuck due to poor lubrication, or the refrigerant may leak due to swelling of rubber parts.
On the other hand, if HFC-134a compressor oil is used in a HFC-12 A/C system, the durability of the A/C system will be lowered.

- HFC-134a compressor oil is very hygroscopic. When replacing or installing/removing A/C parts, immediately isolate the oil from the atmosphere using a plug or tape. In order to avoid moisture, store the oil in a container with its cap tightly closed.

3. REFRIGERANT S701001A0303

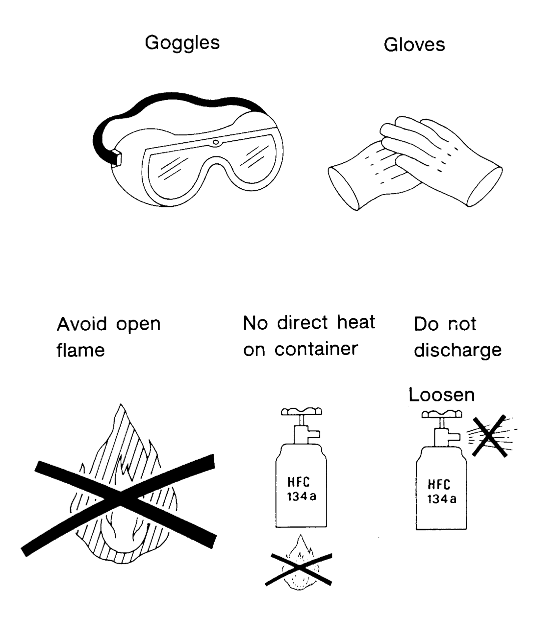
- The HFC-12 refrigerant cannot be used in the HFC-134a A/C system. The HFC-134a refrigerant, also, cannot be used in the HFC-12 A/C system.
- If an incorrect or no refrigerant is used, poor lubrication will result and the compressor itself may be damaged.

4. HANDLING OF REFRIGERANT S701001A0304

- The refrigerant boils at approx. −30°C (−22°F). When handling it, be sure to wear safety goggles and protective gloves. Direct contact of the refrigerant with skin may cause frostbite.

If the refrigerant gets into your eye, avoid rubbing your eyes with your hands. Wash your eye with plenty of water, and receive medical treatment from an eye doctor.

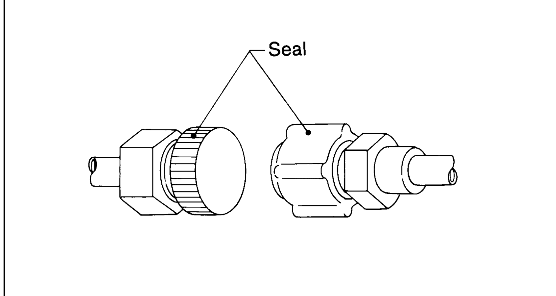
- Do not heat a service can. If a service can is directly heated, or put into boiling water, the inside pressure will become extremely high. This may cause the can to explode. If a service can must be warmed up, use hot water in 40°C (104°F), max.
- Do not drop or impact a service can. (Observe the precautions and operation procedure described on the refrigerant can.)
- When the engine is running, do not open the high-pressure valve of the manifold gauge. The high-pressure gas will back-flow resulting in an explosion of the can.
- The refrigerant is non-toxic and harmless under normal operating circumstance, but it may change to phosgene (a noxious fume) under open flames or high temperatures (caused by a cigarette or heater).
- Provide good ventilation and do not work in a closed area.
- Never perform a gas leak test using a halide torch-type leak tester.
- In order to avoid destroying the ozone layer, prevent HFC-134a from being released into the atmosphere. Using a refrigerant recovery system, discharge and reuse it.



G4M0979

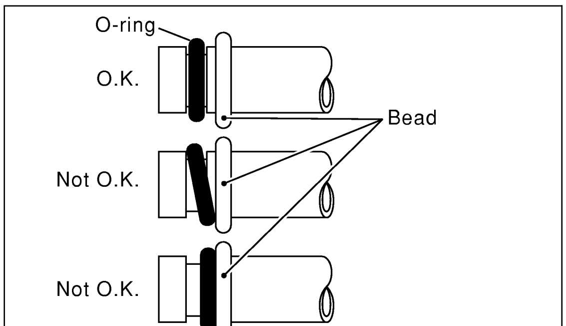
5. O-RING CONNECTIONS *S701001A0305*

- Use new O-rings.
- In order to keep the O-rings free of lint which will cause a refrigerant gas leak, perform operations without gloves and shop towels.
- Apply the compressor oil to the O-rings to avoid sticking, then install them.
- Use a torque wrench to tighten the O-ring fittings: Over-tightening will damage the O-ring and tube end distortion.
- If the operation is interrupted before completing a pipe connection, recap the tubes, components, and fittings with a plug or tape to prevent contamination from entering.



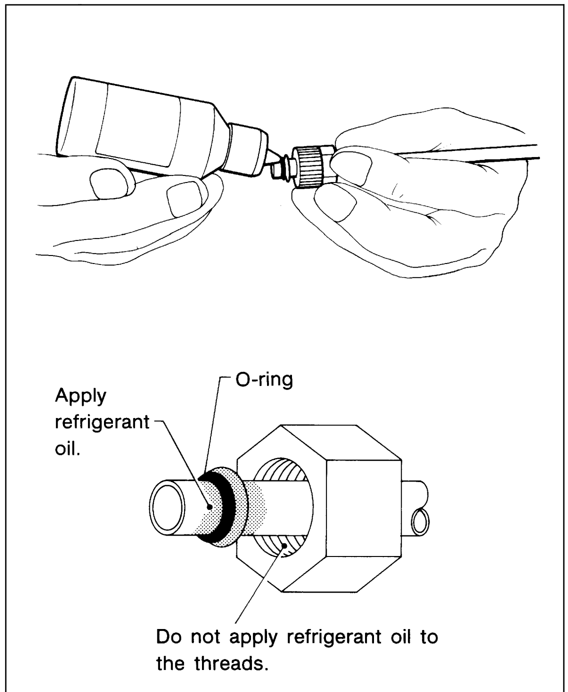
G4M0581

- Visually check the surfaces and mating surfaces of O-rings, threads, and connecting points. If a failure is found, replace the applicable parts.
- Install the O-rings at right angle to the tube beards.



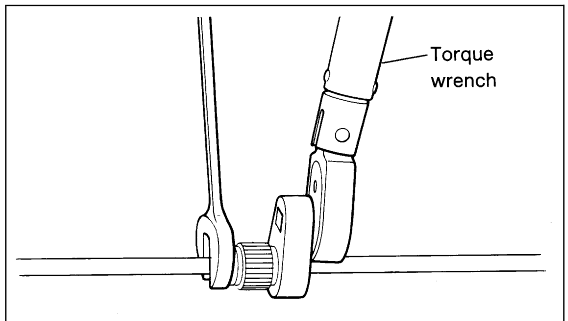
S4M0586A

- Use the oil specified in the service manual to lubricate the O-rings.
Apply the oil to the top and sides of the O-rings before installation.
Apply the oil to the area including the O-rings and tube beads.



G4M0583

- When connecting hoses or pipes, use 2 wrenches (a torque wrench for tightening). While securing one side with a wrench, tighten the other side to the specified torque with a torque wrench. If only one wrench is used to tighten, the tightening torque will be excessive or insufficient. This may cause a pipe distortion or gas leak, resulting in damage to hoses and pipes.
- After tightening, use a clean shop towel to remove excess oil from the connections and any oil which may have run on the vehicle body or other parts.
- If any leakage is suspected after tightening, do not retighten the connections, Disconnect the connections, remove the O-rings, and check the O-rings, threads, and connections.



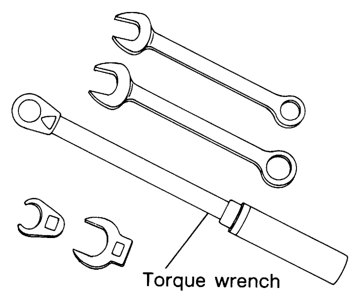
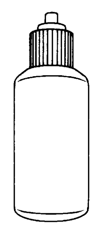
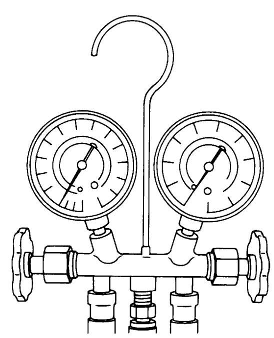
G4M0584

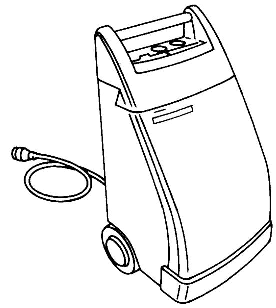
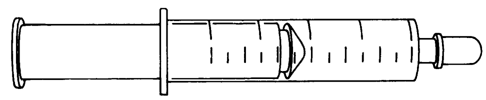
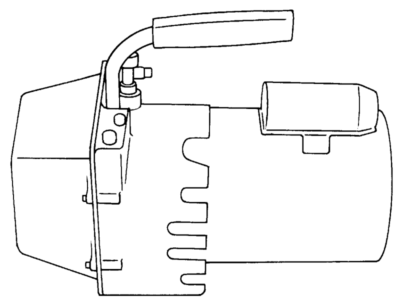
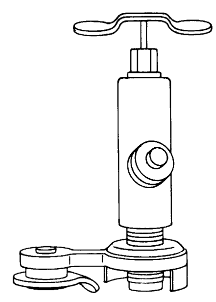
D: PREPARATION TOOL *S701001A17*

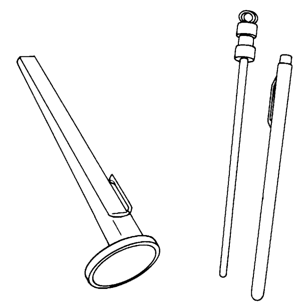
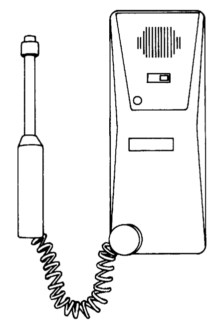
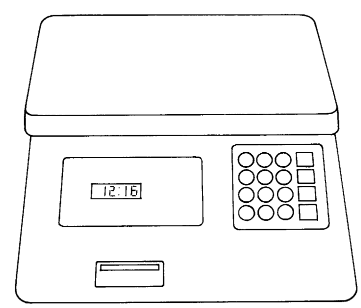
CAUTION:

When working on vehicles with the HFC-134a system, only use HFC-134a specified tools and parts. Do not mix with CFC-12 tools and parts. If HFC-134a and CFC-12 refrigerant or compressor oil is mixed, poor lubrication will result and the compressor itself may be destroyed.
In order to help prevent mixing HFC-134a and CFC-12 parts and liquid, the tool and screw type and the type of service valves used are different. The gas leak detectors for the HFC-134a and CFC-12 systems must also not be interchanged.

	HFC-134a	CFC-12
Tool & screw type	Millimeter size	Inch size
Valve type	Quick joint type	Screw-in type

Tools and Equipment	Description
Wrench Various **WRENCHES** will be required to service any A/C system. A 7 to 40 N·m (0.7 to 4.1 kg-m, 5 to 30 ft-lb) torque wrench with various crowfoot wrenches will be needed. Open end or flare nut wrenches will be needed for back-up on the tube and hose fittings.	 G4M0571
Applicator bottle A small **APPLICATOR BOTTLE** is recommended to apply refrigerant oil to the various parts. They can be obtained at a hardware or drug store.	 G4M0572
Manifold gauge set A **MANIFOLD GAUGE SET** (with hoses) can be obtained from either a commercial refrigeration supply house or from an auto shop equipment supplier.	 G4M0573

Tools and Equipment	Description
Refrigerant recovery system A **REFRIGERANT RECOVERY SYSTEM** is used for the recovery and reuse of A/C system refrigerant after contaminants and moisture have been removed from the refrigerant.	 G4M0574
Syringe A graduated plastic **SYRINGE** will be needed to add oil back into the system. The syringe can be found at a pharmacy or drug store.	 G4M0575
Vacuum pump A **VACUUM PUMP** (in good working condition) is necessary, and may be obtained from either a commercial refrigeration supply house or an automotive equipment supplier.	 G4M0576
Can tap A **CAN TAP** for the 397 g (14 oz) can is available from an auto supply store.	 G4M0577

Tools and Equipment	Description
Thermometer Pocket **THERMOMETERS** are available from either industrial hardware store or commercial refrigeration supply houses.	 G4M0578
Electronic leak detector An **ELECTRONIC LEAK DETECTOR** can be obtained from either a specialty tool supply or an A/C equipment supplier.	 G4M0579
Weight scale A **WEIGHT SCALE** such as an electronic charging scale or a bathroom scale with digital display will be needed if a 13.6 kg (30 lb) refrigerant container is used.	 G4M0580

2. Refrigerant Pressure with Manifold Gauge Set S701631

A: OPERATION S701631A16

1) Place vehicle in a shady and draft free location.
2) Connect a manifold gauge set.
3) Open front windows and close all doors.
4) Open hood.
5) Increase engine speed to 1,500 rpm.
6) Turn ON A/C switch.
7) Turn temperature control switch to MAX COOL.
8) Put in RECIRC position.
9) Turn blower control switch to HI.
10) Read the gauge.

Standard:

Low pressure: 127 - 196 kPa (1.3 - 2.0 kg/cm^2, 18 - 28 psi)
High pressure: 1,471 - 1,667 kPa (15 - 17 kg/cm^2, 213 - 242 psi)
Ambient temperature: 30 - 35 °C (86 - 95 °F)

B: INSPECTION S701631A10

Symptom	Probable cause	Repair order
High-pressure side is unusually high.	● Defective condenser fan motor ● Clogged condenser fan ● Too much refrigerant ● Air inside the system ● Defective receiver dryer	● Replace the fan motor. ● Clean the condenser fin. ● Discharge refrigerant. ● Replace the receiver dryer.
High-pressure side is unusually low.	● Defective compressor ● Not enough refrigerant ● Clogged expansion valve ● Expansion valve frozen temporarily by moisture	● Replace the compressor. ● Check for leaks. ● Replace the expansion valve.
Low-pressure side is unusually high.	● Defective compressor ● Defective expansion valve ● Too much refrigerant	● Replace the compressor. ● Replace the expansion valve. ● Discharge refigerant.
Low-pressure side is unusually low.	● Not enough refrigerant ● Clogged expansion valve ● Expansion valve frozen temporarily by moisture ● Saturated receiver dryer	● Check for leaks. ● Replace the expansion valve ● Replace the receiver dryer.

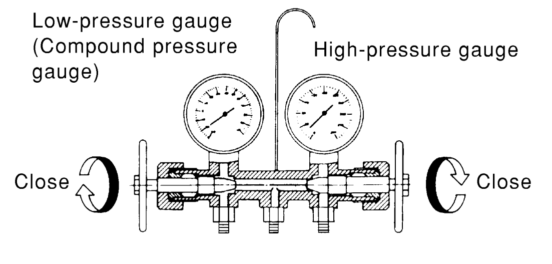
3. Refrigerant Recovery Procedure *S701291*

A: OPERATION *S701291A16*

CAUTION:

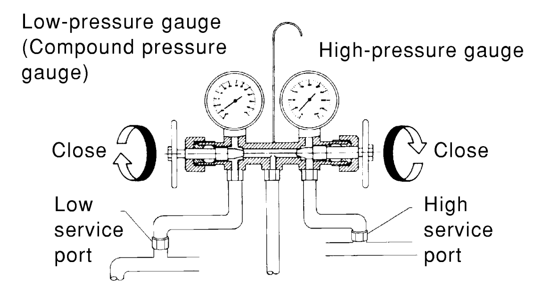
- **During operation, be sure to wear safety goggles and protective gloves.**
- **Connect the refrigerant recovery system with the manifold gauge set to discharge the refrigerant from the A/C system and reuse it.**
- **When reusing the discharged refrigerant, keep service cans on hand. Because the discharge rate with the recovery system is approx. 90%, service cans are necessary to charge the refrigerant.**
- **Follow the detailed operation procedure described in the operation manual attached to the refrigerant recovery system.**

1) Perform the compressor oil return operation. <Ref to AC-21, OPERATION, Compressor Oil.>
2) Stop the engine.
3) Close the valves on the low-/high-pressure sides of the manifold gauge set.



S4M0617A

4) Install the low-/high-pressure hoses to the service ports on the low-/high-pressure sides of the vehicle respectively.



S4M0618A

5) Connect the center hose to the refrigerant recovery system.
6) Follow the operation manual to activate the refrigerant recovery system.

4. Refrigerant Charging Procedure S701292

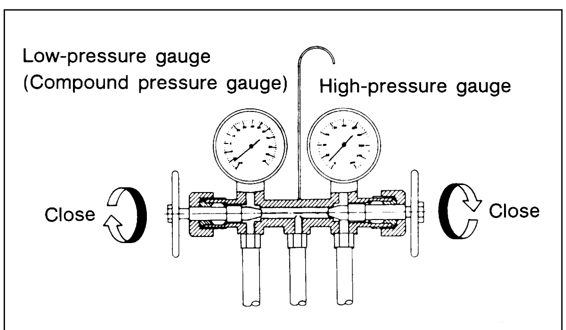
A: OPERATION S701292A16

CAUTION:

- **During operation, be sure to wear safety goggles and protective gloves.**
- **Before charging the refrigerant, evacuate the system to remove small amounts of moisture remaining in the system.**
The moisture in the system can be completely evacuated only under the minimum vacuum level. The minimum vacuum level affects the temperature in the system.
- **The list below shows the vacuum values necessary to boil water in various temperature. In addition, the vacuum levels indicated on the gauge are approx. 3.3 kPa (25 mmHg, 0.98 inHg) lower than those measured at 304.8 m (1,000 ft) above sea level.**

Vacuum level required to boil water (at sea level)	
Temperature	Vacuum
1.7°C (35°F)	100.9 kPa (757 mmHg, 29.8 inHg)
7.2°C (45°F)	100.5 kPa (754 mmHg, 29.7 inHg)
12.8°C (55°F)	99.8 kPa (749 mmHg, 29.5 inHg)
18.3°C (65°F)	99.2 kPa (744 mmHg, 29.3 inHg)
23.9°C (75°F)	98.5 kPa (739 mmHg, 29.1 inHg)
29.4°C (85°F)	97.2 kPa (729 mmHg, 28.7 inHg)
35°C (95°F)	95.8 kPa (719 mmHg, 28.3 inHg)

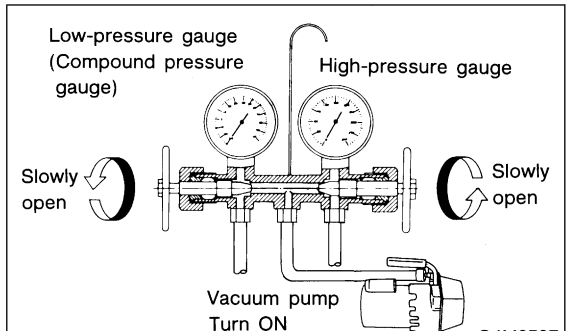
1) Close the valves on low-/high-pressure sides of the manifold gauge.



G4M0596

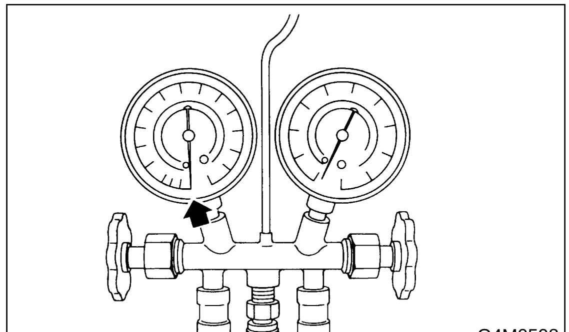
2) Install the low-/high-pressure hoses to the corresponding service ports on the vehicle respectively.
3) Connect the center hose of the manifold gauge set with the vacuum pump.

4) Carefully open the valves on the low-/high-pressure sides to activate the vacuum pump.



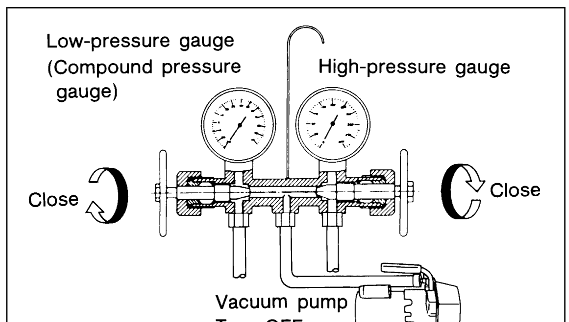
G4M0597

5) After the low-pressure gauge reaches 100.0 kPa (750 mmHg, 29.5 inHg) or higher, evacuate the system for approx. 15 minutes.



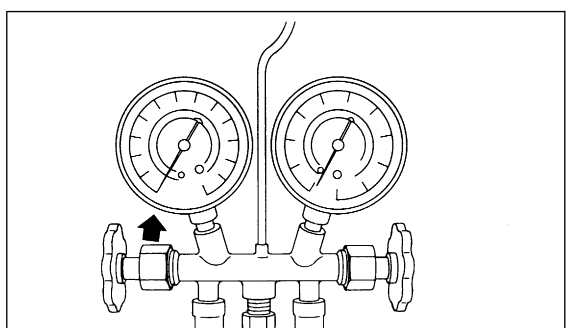
G4M0598

6) After 15 minutes of evacuation, if the reading shows 100.0 kPa (750 mmHg, 29.5 inHg) or higher, close the valves on the both sides to stop the vacuum pump.



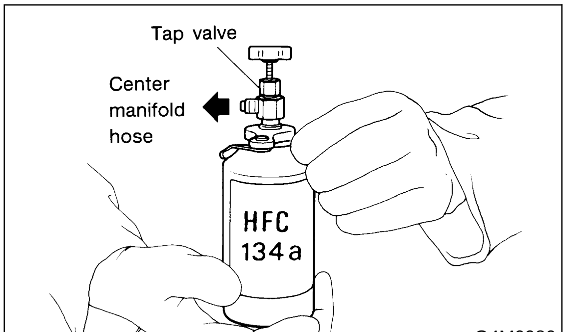
G4M0599

7) Note the low-pressure gauge reading.



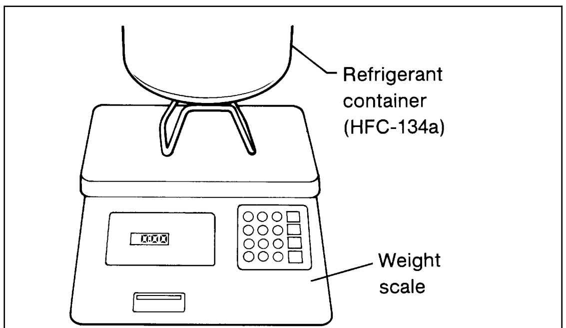
G4M0600

8) Leave it at least 5 minutes, and then check the low-pressure gauge reading for any changes.
When a gauge indicator shows near to zero point, this is a sign of leakage. Check pipe connector points, repair them, make sure there is no leakage by air bleeding.
9) Following the can tap operation manual instructions, install it to the refrigerant can.



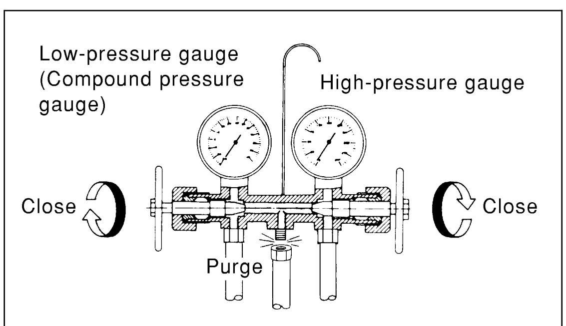
G4M0980

10) Disconnect the center manifold hose from the vacuum pump, and connect the hose to the tap valve.
11) When a 13.6 kg (30 lb) refrigerant container is used, measure the refrigerant amount in use using a weight scale.



G4M0981

12) Confirm that all the 3 hoses are tightly connected to the manifold gauge set.

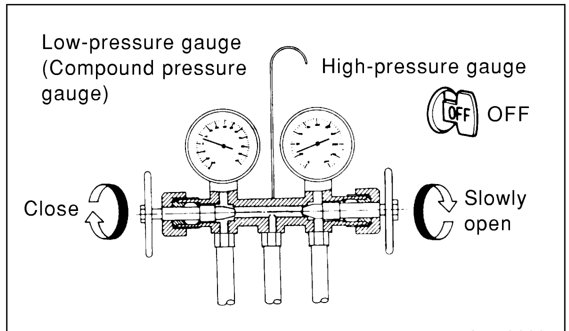


S4M0619A

13) Open the valve on the HFC-134a source.
14) Loosen the center hose connection on the manifold gauge set (if applicable, press a purge valve on the manifold gauge set) only for a couple of seconds to allow the air in the center hose to escape by the refrigerant.

15) Carefully open the high-pressure valve with the engine stopping.

CAUTION:
Do not open the low-pressure valve.



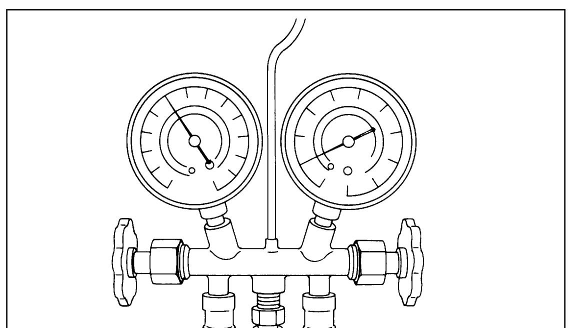
S4M0620A

CAUTION:
Never run the engine during charging from the high-pressure side.

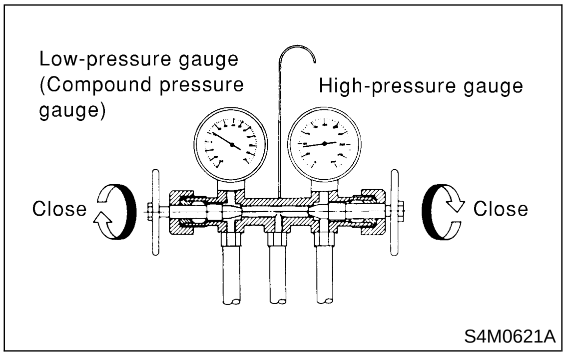
16) Close the high-pressure valve when the low-pressure gauge reaches 98 kPa (1 kg/cm^2, 14 psi).
Using a leak tester, check the system for leaks.
If any leakage is found after the refrigerant recovery is completed, repair the applicable area.
17) After confirming that there are no leaks with the leak test, charge the required amount of refrigerant.

CAUTION:
Never run the engine during charging from the high-pressure side.

18) Close the high-pressure valve when;
- the readings of low/high-pressure gauges become almost equal, after the charging speed is reduced,
- the HFC-134a source becomes empty, or
- the system is filled with the gas.


G4M0605

19) If the HFC-134a source is empty, close the high-pressure valve, close the valve on the can tap, and replace the HFC-134a source with a new one to restart the operation.

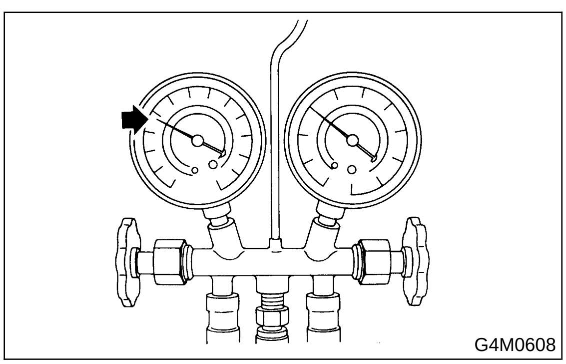


S4M0621A

20) Confirm that both the low/high-pressure valves can be closed. Start the engine with the A/C switch OFF.
21) Quickly repeat ON-OFF cycles a few times to prevent initial compressor damage.
22) Set up the vehicle to the following status:
- A/C switch ON
- Engine running at 1,500 rpm
- Blower speed setting to “HI”
- Temperature setting to “MAX COOL”
- Air inlet setting to “RECIRC”
- Windows open

23) While reading the low-pressure gauge, carefully open the low-pressure valve with the refrigerant source connected and the service hose purged.

CAUTION:
Never open high-pressure valve with the engine running.


G4M0608

24) Adjust the refrigerant flow to maintain the pressure on the low-pressure side at 276 kPa (2.81 kg/cm^2, 40 psi) max.
25) After the system is fully charged, close the low-pressure valve.
26) Close the valve on the refrigerant source.

Refrigerant amount		
Refrigerant	Minimum	Maximum
HFC-134a	0.6 kg (1.3 lb)	0.7 kg (1.5 lb)

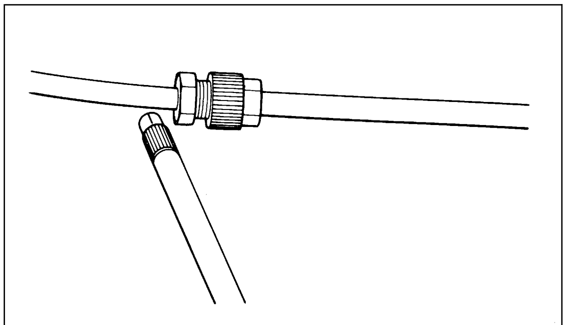
27) Disconnect the hose from the service port, and install the service port cap.

5. Refrigerant Leak Check S701293

A: INSPECTION S701293A10

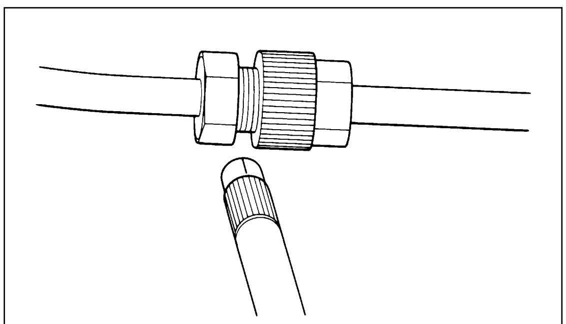
1) Operate the A/C system for approx. 10 minutes, and confirm that the high-side pressure shows at least 690 kPa (7.03 kg/cm^2, 100 psi). Then stop the engine to start the leak test.
2) Starting from the connection between the high-pressure tube and evaporator, check the system for leaks along the high-pressure side through the compressor. The following items must be checked thoroughly.

- Connection between the tube and tube fitting



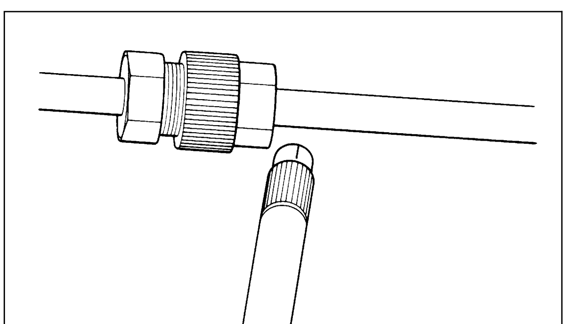
G4M0612

- Connection between 2 parts



G4M0613

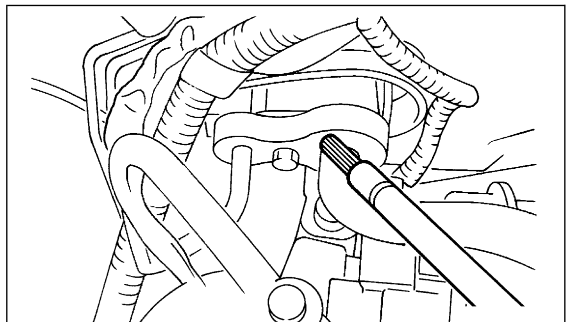
- Connection between the tube and nut



G4M0614

3) Check the joint and seam between the pressure switch (dual switch) and receiver dryer.
4) Check the connections between the condenser and tubes, and welded joints on the condenser.
The leak tester may detect the oil on the condenser fins as a leak.
5) Check the joint between the compressor and hoses.
6) Check the machined area of compressor and other joints on the compressor.
7) Check the thermal limiter (if equipped) on the compressor housing.
8) Check the compressor shaft seal at the area near the center of compressor clutch pulley.
Some shaft seals show a slight amount of leakage about 28 g (1.0 oz) per year. This is not a problem.
9) Starting from the connection between the low-pressure tube and evaporator, check the system for leakage along the high-pressure side through the compressor. The following items must be checked thoroughly.

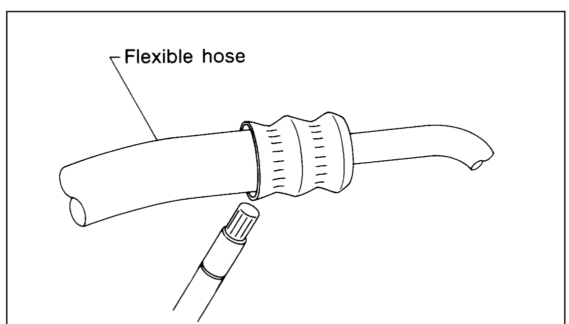
- Connection between the tube and tube fitting
- Connection between 2 parts
- Connection between the tube and nut



S4M0038

10) Visually check the rubber area of the flexible hose for cracks.
Check the entire length of the flexible hose, especially the connection with the metal hose end.

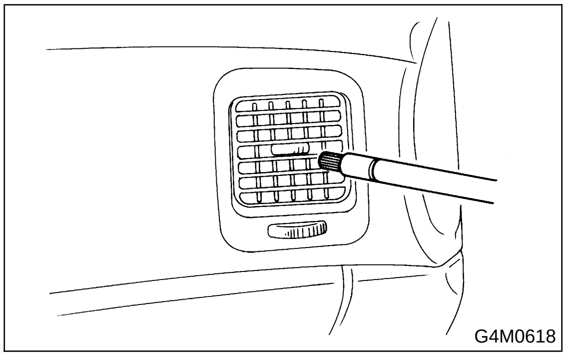
CAUTION:
Carefully check the external surface of hoses and tubes at approx. 25 mm (0.98 in) per second.



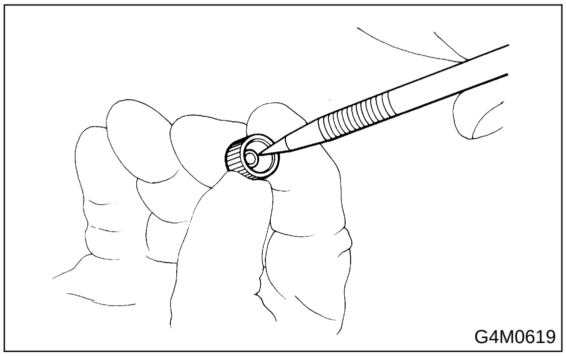
G4M0617

11) Disconnect the drain hose from the evaporator case, and check the hose end for at least 10 seconds.
After the test is finished, reconnect the drain hose.

12) Turn the ignition key to ON position, and run the blower at high speed for 1 minute. Stop the blower to check the ventilation grille on the instrument panel. While moving the tester closer to the grille, run the blower for 1 or 2 seconds, then stop it. Check the grille at that point for at least 10 seconds.


G4M0618

13) Check the valve in the service port.
14) Visually check the rubber seal in the service port cap.


G4M0619

6. Compressor Oil *S701294*

A: OPERATION *S701294A16*

NOTE:
Before making repairs, conduct the oil return operation to return the compressor oil in circulation with the refrigerant to the compressor.

1) Increase engine speed to 1,500 rpm.
2) Turn ON the A/C switch.
3) Turn the temperature control switch to MAX COOL.
4) Put in RECIRC position.
5) Turn the blower control switch to HI.
6) Maintain this condition for 10 minutes.

B: REPLACEMENT *S701294A20*

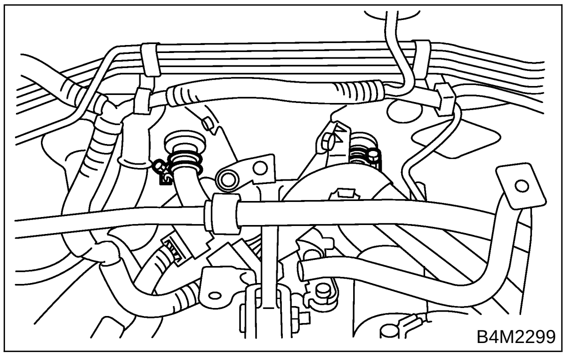
NOTE:
- If a component is replaced, add an appropriate amount of compressor oil.
- When replacing the compressor, the new compressor will already have the specified amount of oil in it. Install the new compressor after removing the same amount of oil that is remaining in the compressor removed.

Replacement parts	Amount of oil replenishment
Evaporator	70 mℓ (2.4 US fl oz, 2.5 Imp fl oz)
Receiver drier	5 mℓ (0.2 US fl oz, 0.2 Imp fl oz)
Condenser	50 mℓ (1.7 US fl oz, 1.8 Imp fl oz)
Hose	50 mℓ (1.7 US fl oz, 1.8 Imp fl oz)

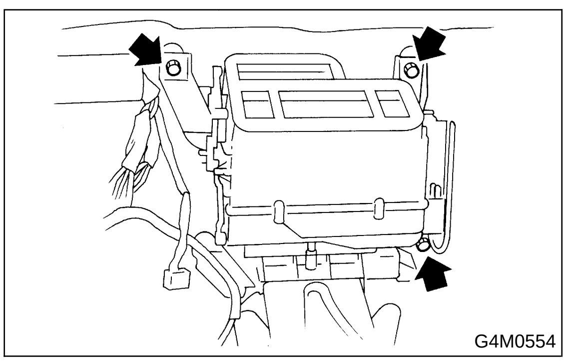
7. Heater Unit *S701290*

A: REMOVAL *S701290A18*

1) Disconnect ground cable from battery.
2) Drain engine coolant. <Ref. to CO-12, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
3) Remove air cleaner case. <Ref. to IN-5, REMOVAL, Air Cleaner.>
4) Release the heater hose clamps in engine compartment to remove the hoses.



5) Remove the instrument panel. <Ref. to EI-34, REMOVAL, Instrument Panel Assembly.>
6) Loosen support beam nuts and bolts to remove support beam.
7) Remove the A/C unit. <Ref. to AC-32, REMOVAL, Intake Unit.>
8) Loosen heater unit nuts and bolts to remove heater unit.



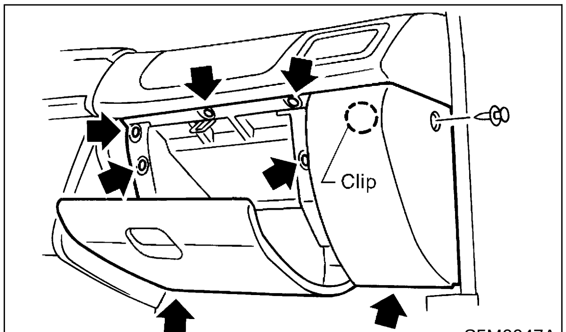
B: INSTALLATION *S701290A11*

1) Install in the reverse order of removal.
2) Refill engine coolant. <Ref. to CO-12, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

8. Blower Motor Assembly *S701295*

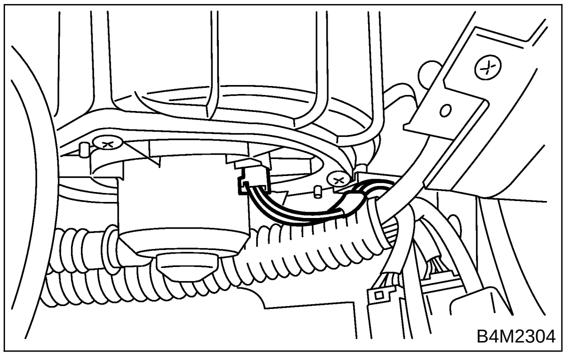
A: REMOVAL *S701295A18*

1) Disconnect ground cable from battery.
2) Remove glove box.



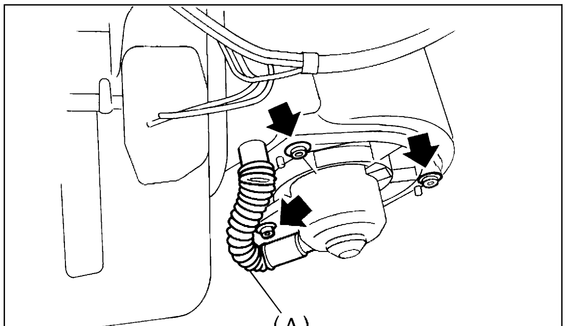
S5M0047A

3) Disconnect blower motor connector.



B4M2304

4) Remove 3 mounting screws.
5) Disconnect aspirator pipe (A) and remove blower motor.



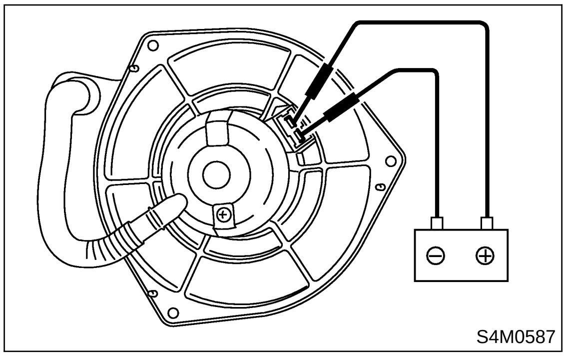
S4M0033A

B: INSTALLATION *S701295A11*

Install in the reverse order of removal.

C: INSPECTION *S701295A10*

Connect blower motor connector terminal 1 from the battery to the positive (+) lead and terminal 2 to the negative (−) lead. Make sure the motor runs smoothly.

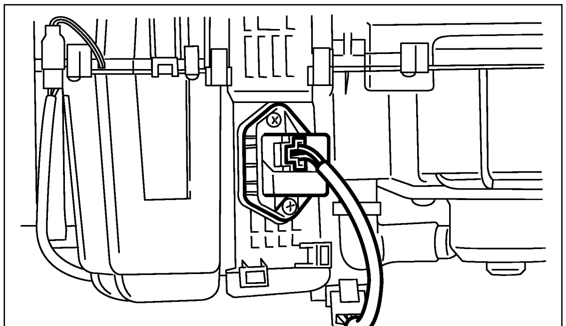


S4M0587

9. Heater Blower Resistor S701296

A: REMOVAL S701296A18

1) Remove glove box. <Ref. to EI-29, REMOVAL, Glove Box.>
2) Disconnect power transistor connector.
3) Loosen 2 screws to remove power transistor.

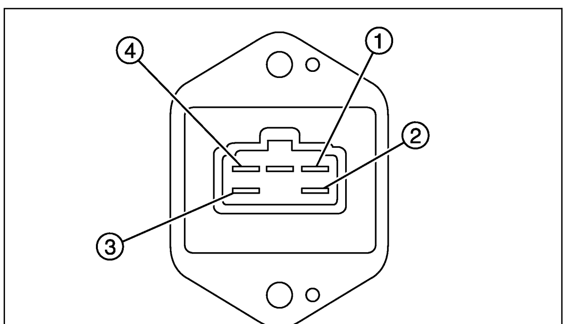


B4M2305

B: INSTALLATION S701296A11

Install in the reverse order of removal.

C: INSPECTION S701296A10



B4M2463A

Measure switch resistance.

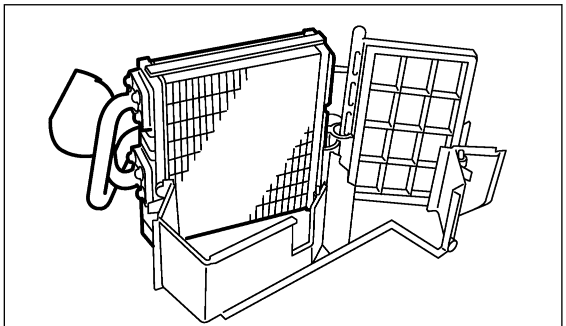
Terminal No.	Condition	Standard
4 and 3	Constant	Approx. 0.4 Ω
3 and 2	Constant	Approx. 0.7 Ω
2 and 1	Constant	Approx. 1.5 Ω

If NG, replace the blower resistor.

10. Heater Core *S701554*

A: REMOVAL *S701554A18*

1) Remove heater unit. <Ref. to AC-22, REMOVAL, Heater Unit.>
2) Remove screws to separate heater unit case.
3) Remove heater core.



B4M2306

B: INSTALLATION *S701554A11*

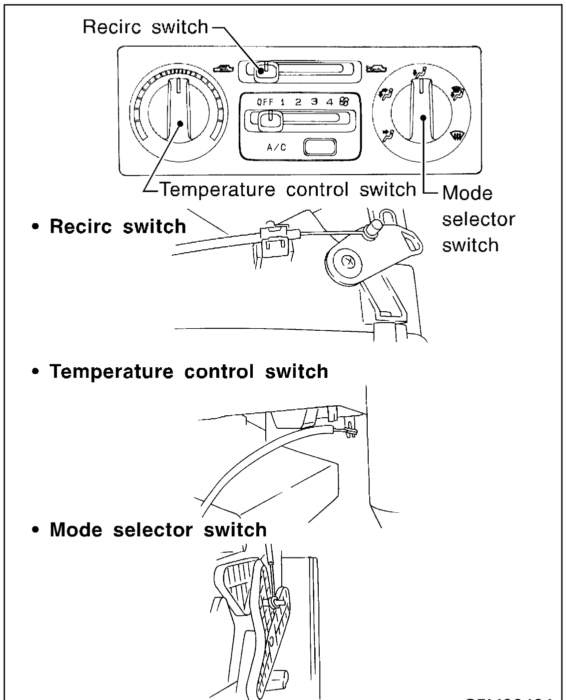
Install in the reverse order of removal.

11. Control Unit S701285

A: REMOVAL S701285A18

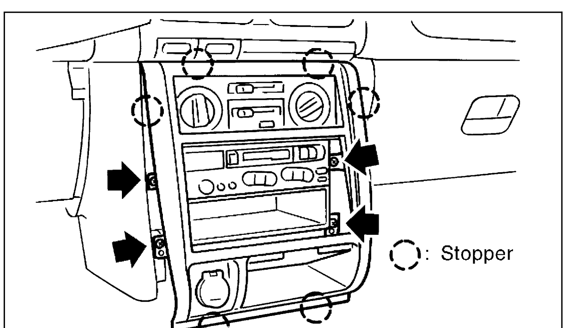
1) Disconnect ground cable from battery.
2) Set the temperature control switch to "FULL HOT" and mode selector switch to "DEF" position and recirc switch to "FRESH" position.
3) Disconnect the temperature control cable and mode door control cable from heater unit then disconnect recirc control cable from intake unit.

NOTE:
Do not attempt to move links during installation.



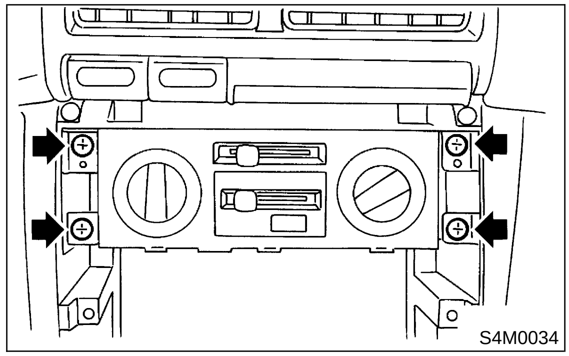
S5M0049A

4) Remove console box. <Ref. to EI-33, REMOVAL, Console Box.>
5) Remove center panel and then disconnect connector.
6) Remove audio.



S5M0048A

7) Remove control unit assembly from center console.


S4M0034

B: INSTALLATION S701285A11

Install in the reverse order of removal.

NOTE:
Before installing control unit, set temperature control switch to "FULL HOT" and mode selector switch to "DEF" position and recirc switch to "FRESH" position.

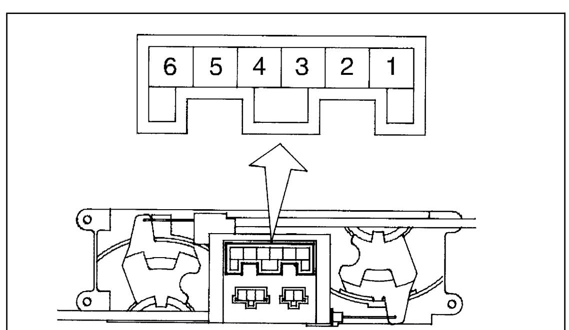
C: INSPECTION S701285A10

1. FAN SWITCH S701285A1003

Check continuity between terminals at each switch position.

Switch position	Terminals					
	1	2	3	4	5	6
1	○				○	○
2	○			○		○
3	○		○			○
4	○	○				○
	IGN					GND

H5M1280A



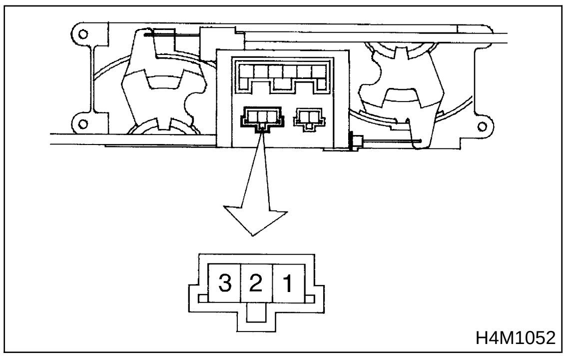
H4M1051

2. A/C SWITCH *S701285A1004*

Check A/C switch continuity between each terminal.

Terminal	Switch ON	Illumi.
1		○
2	○	○
3	○	○

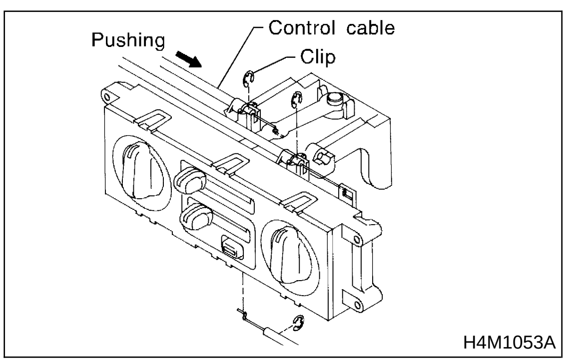
H5M1281A



H4M1052

D: ADJUSTMENT *S701285A01*

1) Operate temperature control switch to “FULL COLD” and mode selector switch to “VENT” position and recirc switch to “RECIRC” position.
2) Install control cable to lever. While pushing outer cable, secure control cable with clip.



H4M1053A

12. Compressor *S701281*

A: INSPECTION *S701281A10*

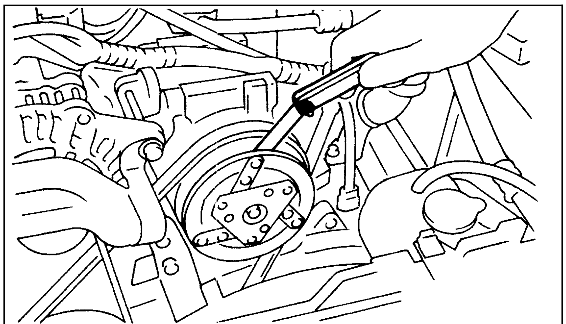
1. MAGNETIC CLUTCH CLEARANCE

S701281A1001

1) Check the clearance of the entire circumference around the drive plate and pulley.

Standard:

0.45±0.15 mm (0.0177±0.0059 in)

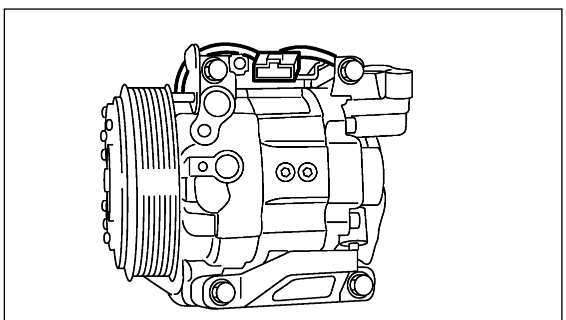


B4M0091

2. MAGNETIC CLUTCH OPERATION

S701281A1002

1) Disconnect the compressor connector.
2) Connect the No. 3 terminal of the compressor connector from the battery to the positive (+) lead. Ground the negative (−) lead to the body.



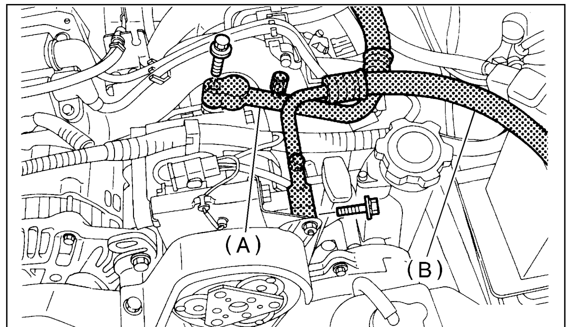
B4M2407

3) Make sure the magnet clutch engages.
If NG, replace the compressor.

B: REMOVAL *S701281A18*

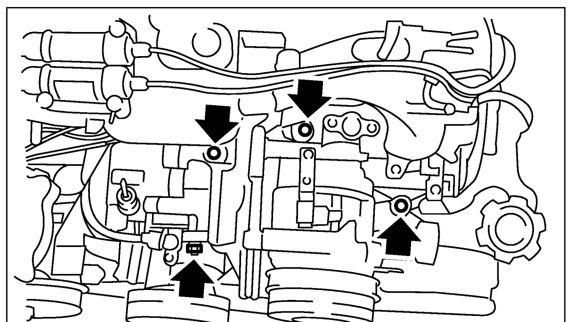
1) Perform oil return operation. <Ref. to AC-21, OPERATION, Compressor Oil.>
2) Turn A/C switch OFF and stop the engine.
3) Using refrigerant recovery system, discharge refrigerant. <Ref. to AC-15, OPERATION, Refrigerant Recovery Procedure.>
4) Disconnect ground cable from battery.
5) Disconnect low-pressure hose (A) and high-pressure hose (B).

CAUTION:
Be careful not to lose O-rings on hose. Immediately seal hose with a plug or vinyl tape to prevent the entry of contamination.



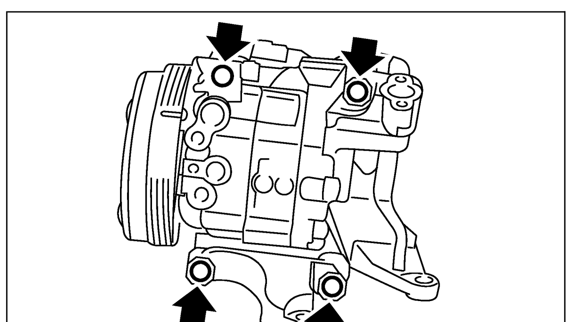
H4M1159C

6) Remove V-belt. <Ref. to ME-42, REMOVAL, V-belt.>
7) Remove generator. <Ref. to SC-12, REMOVAL, Generator.>
8) Disconnect compressor harness from body harness.
9) Remove bolts from compressor bracket.



B4M2311

10) Loosen bolts to remove compressor from bracket.



B4M2312

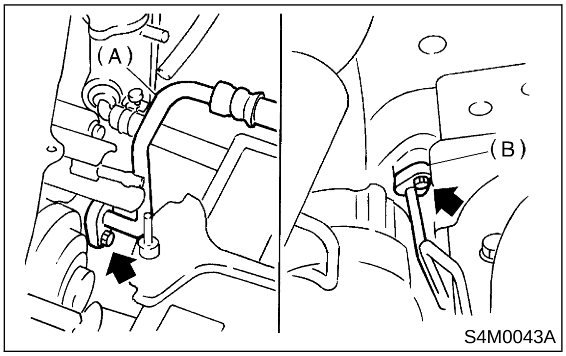
C: INSTALLATION S701281A11

1) Install in the reverse order of removal.
2) Replace O-rings on low-/high-pressure hoses with new ones, then apply compressor oil.
3) When replacing compressor, adjust amount of compressor oil. <Ref. to AC-21, Compressor Oil.>
4) Charge refrigerant. <Ref. to AC-16, OPERATION, Refrigerant Charging Procedure.>

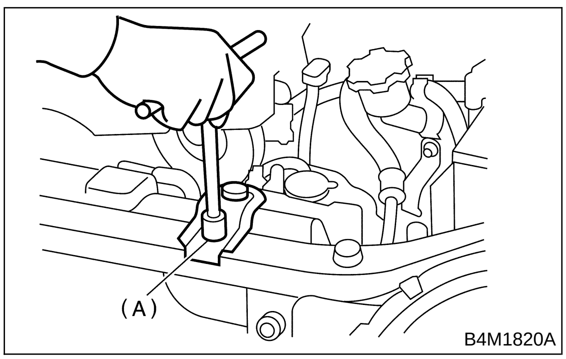
13. Condenser S701282

A: REMOVAL S701282A18

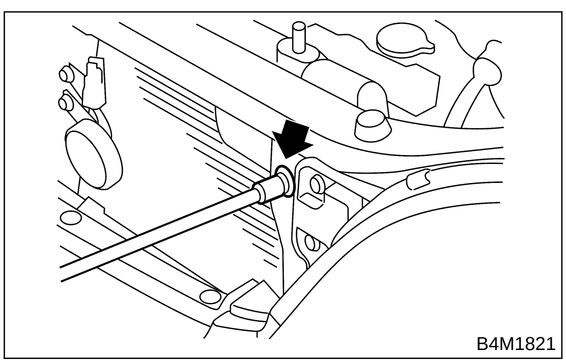
1) Using refrigerant recovery system, discharge refrigerant. <Ref. to AC-15, OPERATION, Refrigerant Recovery Procedure.>
2) Disconnect ground cable from battery.
3) Disconnect high-pressure hose (A) and high-pressure pipe (B) from condenser.



4) Remove radiator bracket (A).



5) Remove 2 mounting bolts. While lifting condenser, pull it out through the space between the radiator and the radiator panel.

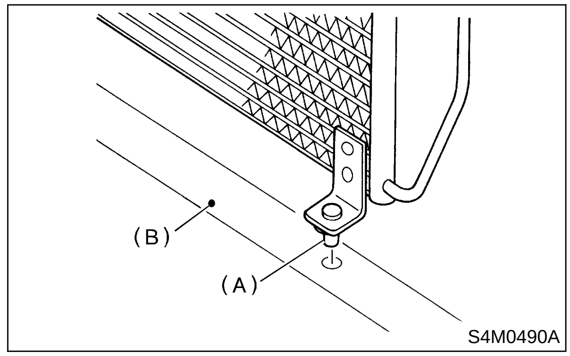


CAUTION:
Be careful not to damage the condenser fins. If a damaged fin is found, repair it using a thin screwdriver.
If the condenser is replaced, add appropriate amount of compressor oil to the compressor. <Ref. to AC-21, REPLACEMENT, Compressor Oil.>

B: INSTALLATION S701282A11

1) Install in the reverse order of removal.

CAUTION:
Replace O-rings on hoses or pipes with new ones, and then apply compressor oil. Confirm that lower guide (A) of condenser has been fitted into holes on radiator panel (B).



2) Charge refrigerant. <Ref. to AC-16, OPERATION, Refrigerant Charging Procedure.>

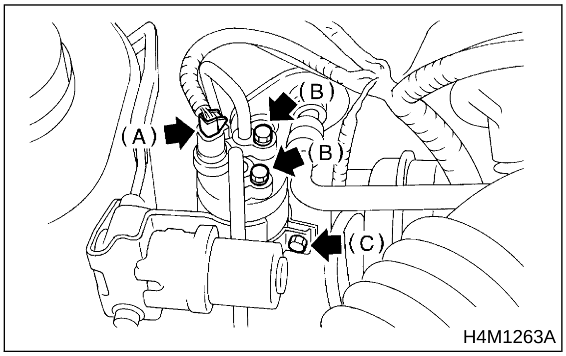
C: INSPECTION S701282A10

1) Confirm that no dust or insects are found on the condenser fins. Air-blow or flush fins with water as needed.
2) Confirm that no oil leaks from condenser. If a failure is found, replace condenser with a new one.

14. Receiver Drier S701283

A: REMOVAL S701283A18

1) Disconnect ground cable from battery.
2) Using refrigerant recovery system, discharge refrigerant. <Ref. to AC-15, OPERATION, Refrigerant Recovery Procedure.>
3) Disconnect pressure switch harness (A).
4) Disconnect pipe (B).
5) Loosen mounting bolts (C) to remove receiver dryer.



CAUTION:
The receiver drier contains a desiccant. After disconnecting receiver drier, plug it to avoid moisture.
If receiver drier is replaced, add appropriate amount of compressor oil to the compressor. <Ref. to AC-21, REPLACEMENT, Compressor Oil.>

B: INSTALLATION S701283A11

1) Install in the reverse order of removal.

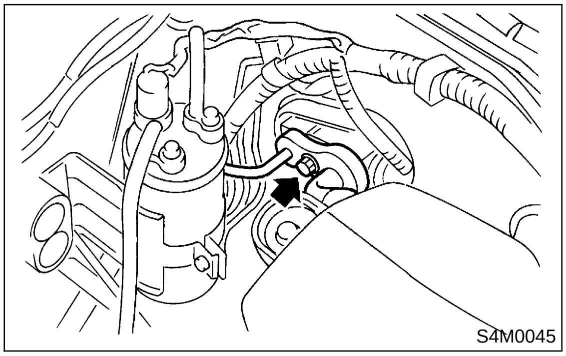
CAUTION:
Replace O-rings with new ones, and apply compressor oil.

2) Charge refrigerant. <Ref. to AC-16, OPERATION, Refrigerant Charging Procedure.>

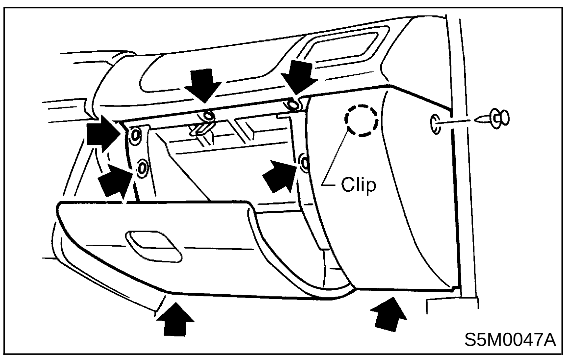
15. Intake Unit S701632

A: REMOVAL S701632A18

1) Using refrigerant recovery system, discharge refrigerant. <Ref. to AC-15, OPERATION, Refrigerant Recovery Procedure.>
2) Disconnect ground cable from battery.
3) Remove bolt then disconnect discharge pipe and suction pipe.

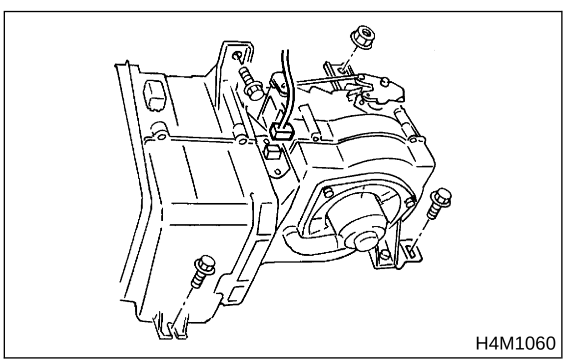

S4M0045

4) Remove glove box.



S5M0047A

5) Disconnect the harness connector from intake unit.
6) Disconnect drain hose.
7) Remove intake unit mounting bolt and nut.


H4M1060

B: INSTALLATION S701632A11

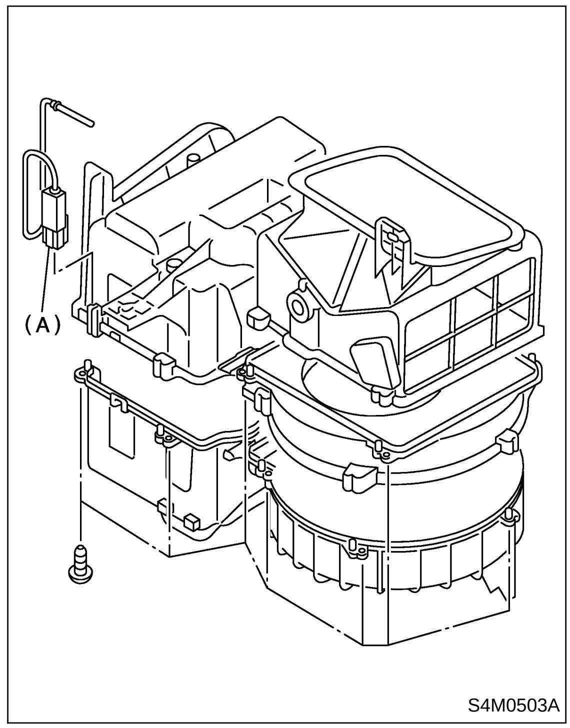
1) Install in the reverse order of removal.

CAUTION:
Replace O-rings with new ones, and apply compressor oil.

2) Charge refrigerant. <Ref. to AC-16, OPERATION, Refrigerant Charging Procedure.>

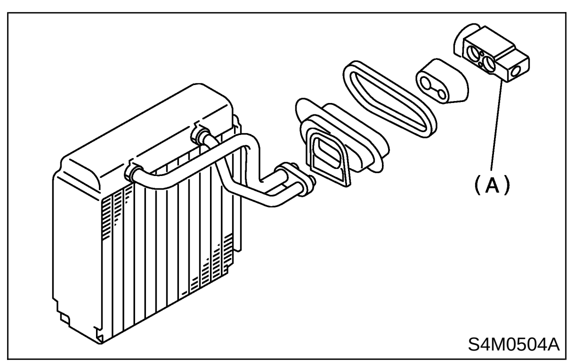
C: DISASSEMBLY S701632A06

1) Remove thermistor (A) from intake unit case.
2) Remove some screws then separate intake unit case.
3) Remove thermistor from clip with the evaporator.



S4M0503A

4) Remove the block expansion valve (A) from pipes.



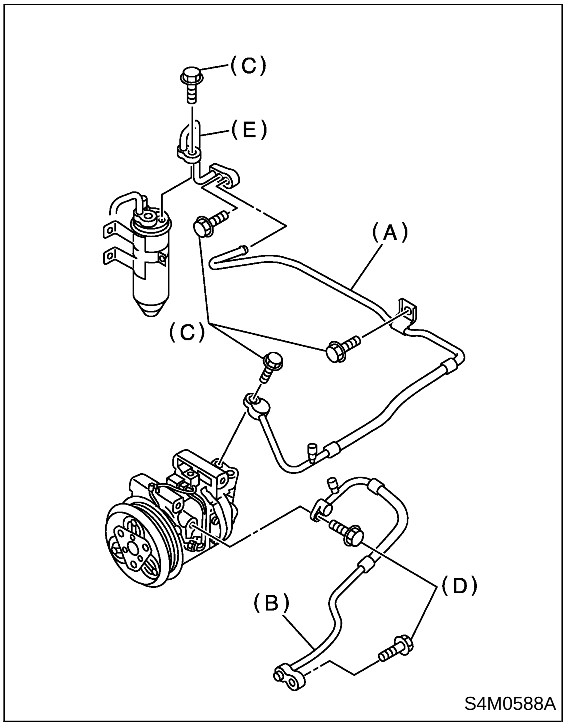
S4M0504A

16. Flexible Hose S701286

A: REMOVAL S701286A18

CAUTION:
- **When disconnecting/connecting hoses, do not apply excessive force. Confirm that no torsion and excessive tension exist after installing.**
- **Seal the disconnected hose with a plug or vinyl tape to prevent contamination from entering.**

1) Disconnect ground cable from battery.
2) Using refrigerant recovery system, discharge refrigerant. <Ref. to AC-15, OPERATION, Refrigerant Recovery Procedure.>
3) Remove hose attaching bolts (C).
4) Disconnect hose from evaporator unit.
5) Disconnect hose from compressor.
6) Remove low-pressure hose (A) from the vehicle.
7) Remove hose attaching bolts (D).
8) Disconnect hose from compressor.
9) Disconnect hose from condenser.
10) Disconnect high-pressure hose (B) from the vehicle.



S4M0588A

B: INSTALLATION S701286A11

CAUTION:
- **When disconnecting/connecting hoses, do not apply excessive force. Confirm that no torsion and excessive tension exist after installing.**
- **Seal the disconnected hose with a plug or vinyl tape to prevent contamination from entering.**

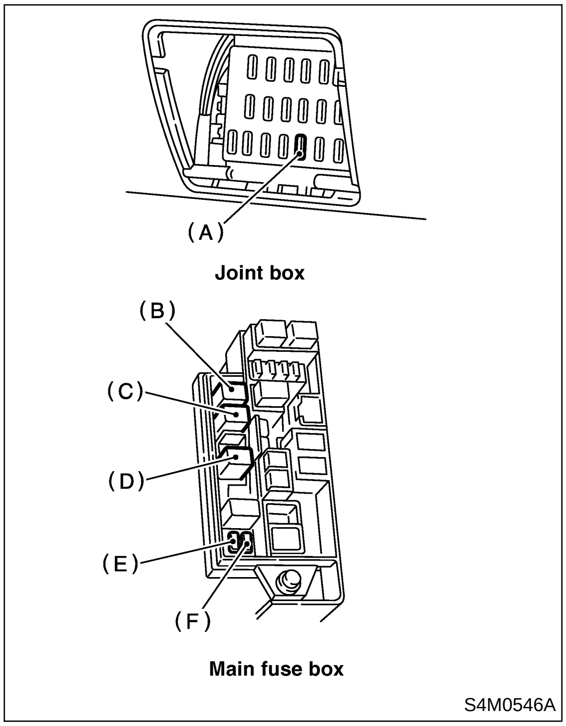
1) Install in the reverse order of removal.
2) Charge refrigerant. <Ref. to AC-16, OPERATION, Refrigerant Charging Procedure.>

C: INSPECTION S701286A10

NOTE:
If cracking, damage, or swelling is found on a hose, replace it with a new one.

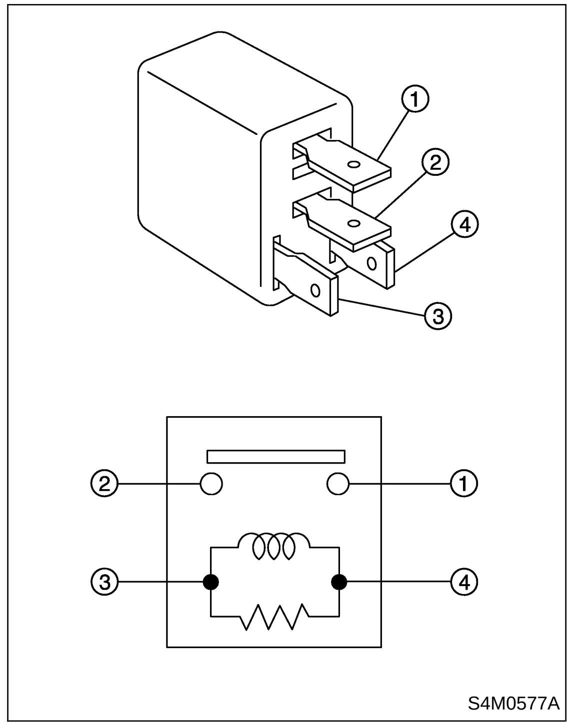
17. Relay and Fuse S701287

A: LOCATION S701287A13



(A) A/C fuse
(B) Main fan relay
(C) Sub fan relay
(D) A/C relay
(E) Main fan fuse
(F) Sub fan fuse

B: INSPECTION S701287A10

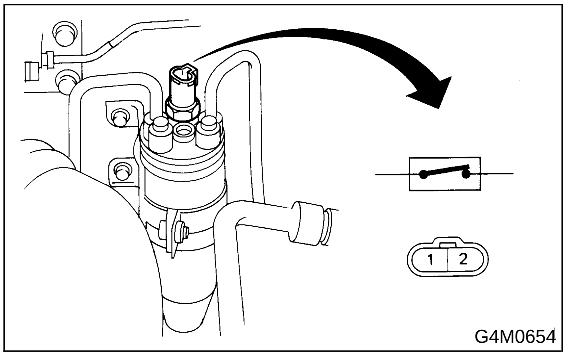


(3) — (4): Continuity exists.
(1) — (2): No continuity
While applying battery voltage to the cable between (3) and (4), check continuity between (1) and (2).
If no continuity exists, replace the relay with a new one.

18. Pressure Switch (Dual Switch) *S701555*

A: INSPECTION *S701555A10*

1) Connect the manifold gauge to the service valve on the high-pressure side.
2) Remove the pressure switch harness connector. Using a circuit tester, inspect the ON-OFF operation of the pressure switch.



G4M0654

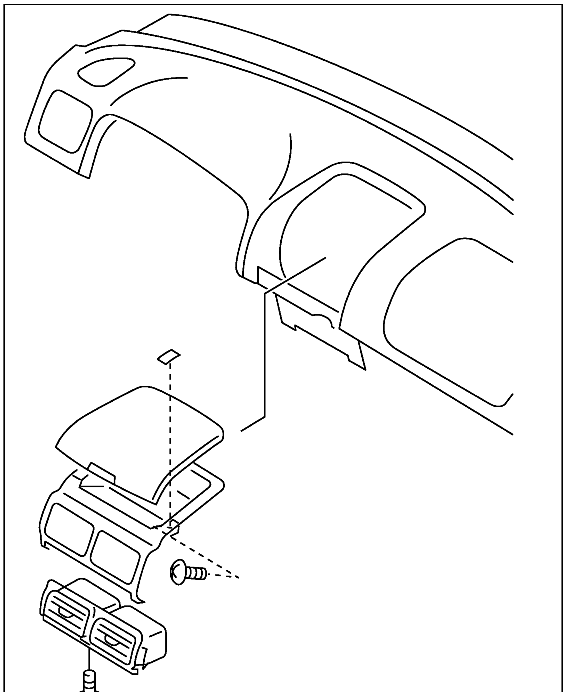
	Terminal	Operation	High-pressure side line pressure
High and low pressure switch	1 — 2	Turns OFF.	Increasing to 2,940±200 kPa (29.98±2.04 kg/cm^2, 426.3±29.0 psi)
			Decreasing to 177±25 kPa (1.80±0.25 kg/cm^2, 25.6±3.6 psi):
		Turns ON.	Increasing to Less than 216 kPa (2.2 kg/cm^2, 31 psi):
			Decreasing to 2,350±200 kPa (23.97±2.04 kg/cm^2, 341±29 psi)

19. Air Vent Grille *S701284*

A: REMOVAL *S701284A18*

1. CENTER AIR VENT GRILLE *S701284A1803*

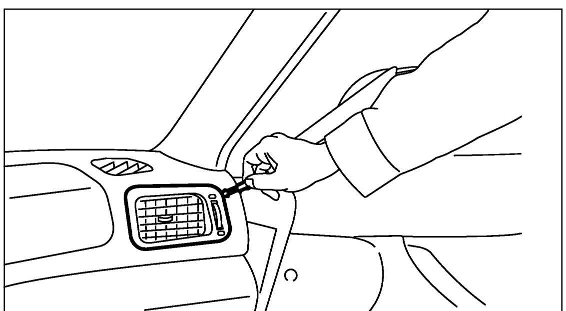
1) Remove center panel.
2) Loosen screw to remove grille.



S4M0517

2. SIDE AIR VENT GRILLE *S701284A1804*

1) Remove grille using flat-bladed screwdriver.



B4M2314

CAUTION:
Wrap screwdriver with vinyl tape to prevent damage to interior parts.

B: INSTALLATION *S701284A11*

Install in the reverse order of removal.

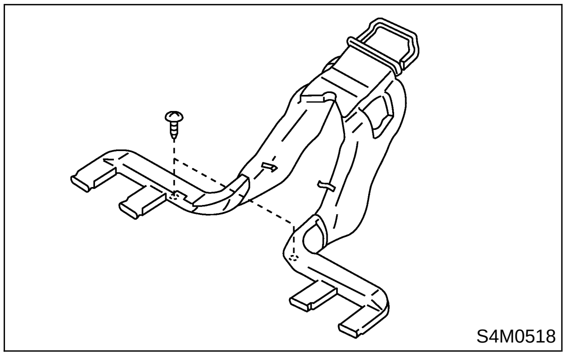
C: INSPECTION *S701284A10*

The direction and amount of air should be adjusted smoothly.
The adjustment should be kept in each position.

20. Heater Duct *S701556*

A: REMOVAL *S701556A18*

1) Remove front seat. <Ref. to SE-5, REMOVAL, Front Seat.>
2) Remove heater unit. <Ref. to AC-22, REMOVAL, Heater Unit.>
3) Remove front side sill cover.
4) Pull off floor mat to remove the heater duct.



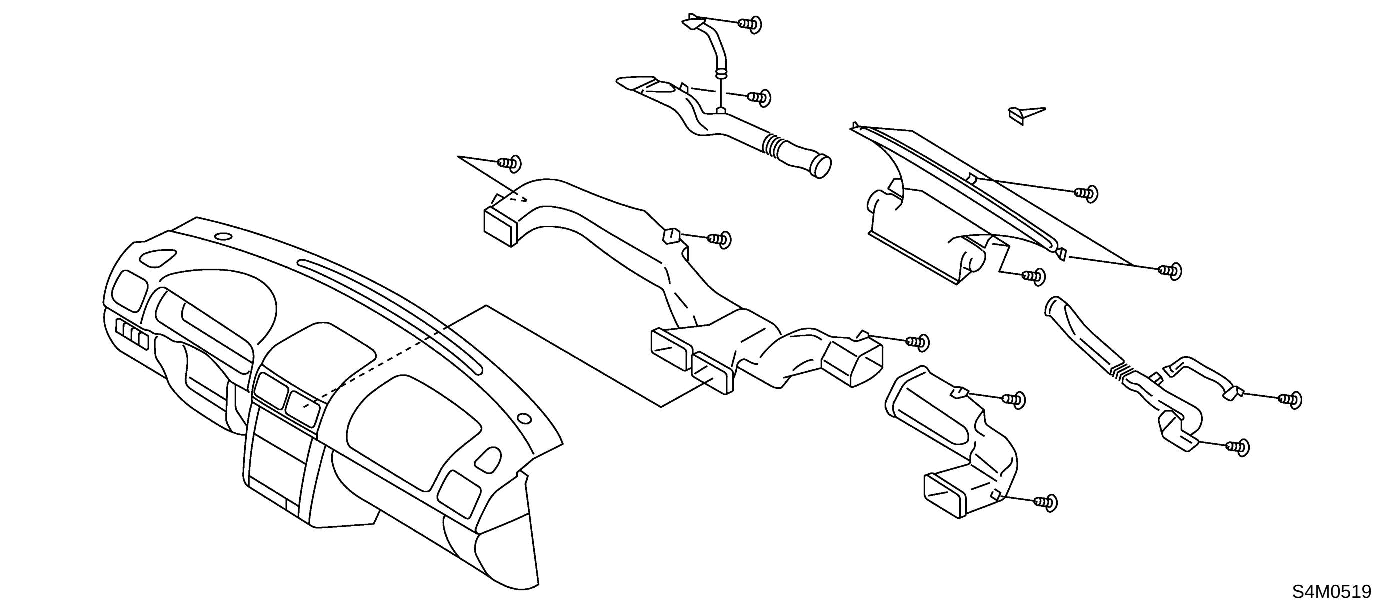
B: INSTALLATION *S701556A11*

Install in the reverse order of removal.

21. Heater Vent Duct S701557

A: REMOVAL S701557A18

1) Remove instrument panel. <Ref. to EI-34, REMOVAL, Instrument Panel.>
2) Remove screws.
3) Remove heater vent duct.



S4M0519

B: INSTALLATION S701557A11

Install in the reverse order of removal.

22. General Diagnostics S701278

A: INSPECTION S701278A10

Symptom		Repair order
Blower motor	Doesn’t move.	Fuse
		Blower motor relay
		Blower motor
		Blower motor resistor
		Blower switch
		Wire harness
	Strange noise	Blower motor
Compressor	Doesn’t move.	Refrigerant
		Fuse
		Air conditioning relay
		Magnet clutch
		Compressor
		Pressure switch
		A/C switch
		Blower switch
		Wire harness
	Strange noise	V-Belt
		Magnet clutch
		Compressor
Cold air not emitted.		Refrigerant
		V-Belt
		Magnet clutch
		Compressor
		Pressure switch
		A/C switch
		Blower switch
		Wire harness
		Heater duct
		Heater vent duct
Warm air not emitted.		Engine coolant
		Blower switch
		Heater core
Temperature of air from vents does not change.		Engine coolant
		Mode actuator
		Wire harness
Unable to switch blow vents.		Mode actuator
		Air flow switch
		Wire harness
Unable to switch suction vents.		Air inlet select switch
		FRESH/RECIRC actuator
		Wire harness

MEMO:

AIRBAG SYSTEM

AB

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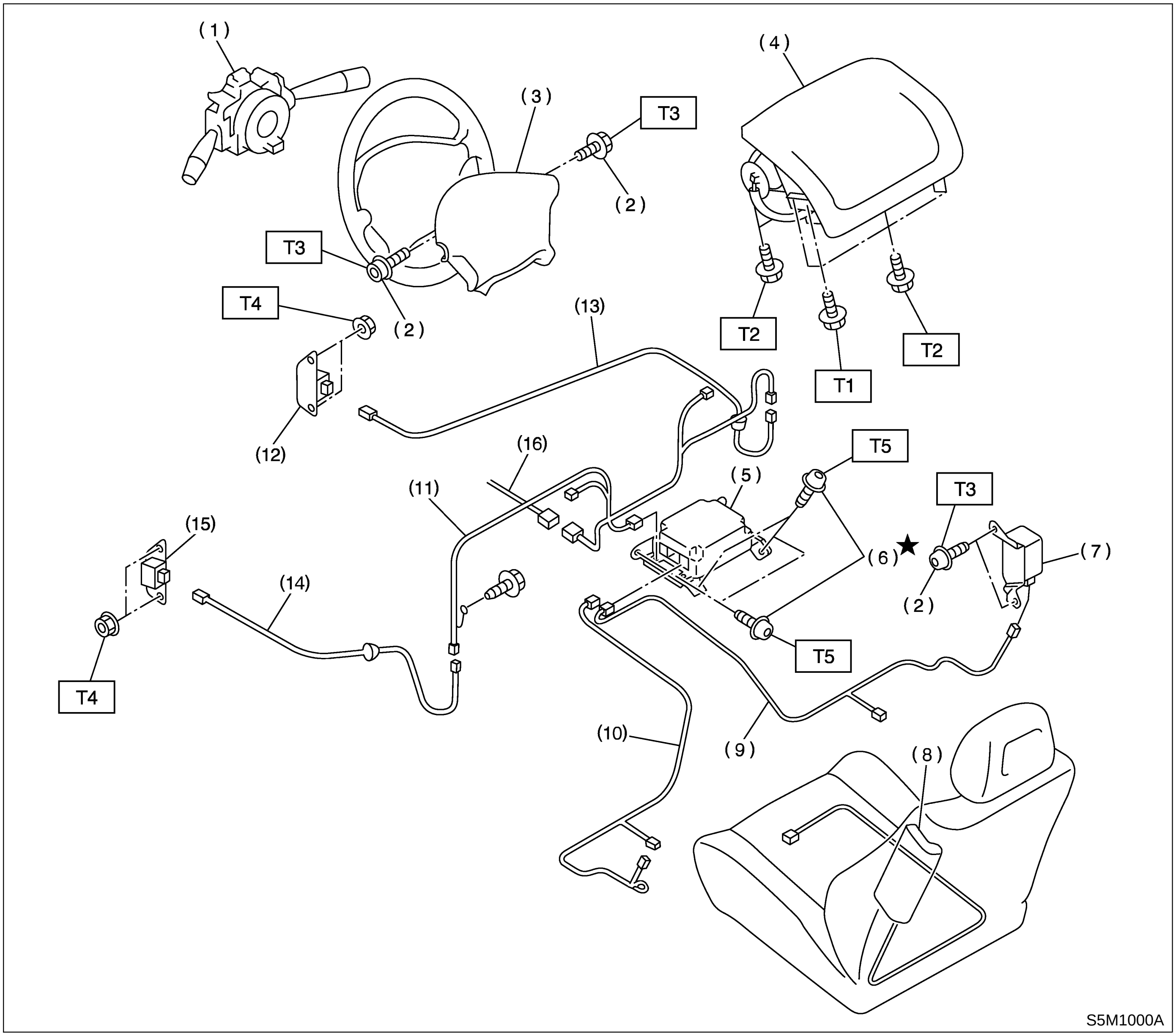
1. General Description S802001

A: COMPONENT S802001A05

1. SRS AIRBAG S802001A0501

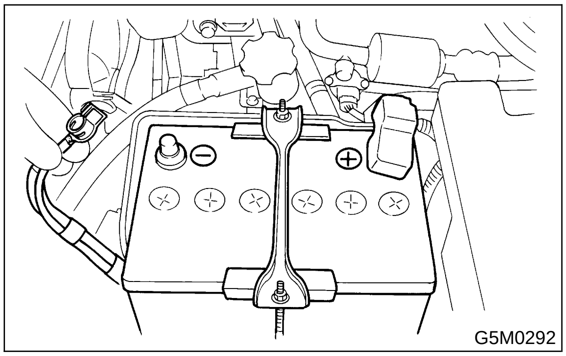


(1) Combination switch ASSY with roll connector
(2) TORX® bolt T30
(3) Airbag module ASSY (Driver)
(4) Airbag module ASSY (Passenger)
(5) Airbag control module
(6) TORX® bolt T40
(7) Side airbag sensor
(8) Side airbag module
(9) Side airbag harness (RH)
(10) Side airbag harness (LH)
(11) Airbag main harness
(12) Front sub sensor (RH)
(13) Front sub sensor harness (RH)
(14) Front sub sensor harness (LH)
(15) Front sub sensor (LH)
(16) Body harness

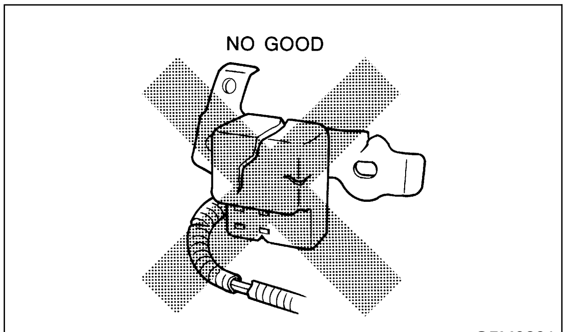
Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.3)
T2: 7.4 (0.75, 5.4)
T3: 10 (1.0, 7.2)
T4: 20 (2.0, 14.5)
T5: 25 (2.5, 18.1)

B: CAUTION S802001A03

● When servicing a vehicle, be sure to turn the ignition switch OFF, disconnect the ground cable from the battery, and wait for more than 20 seconds before starting work.
● The airbag system is fitted with a backup power source. If the airbag system is serviced within 20 seconds after the ground cable is disconnected, it may inflate.


G5M0292

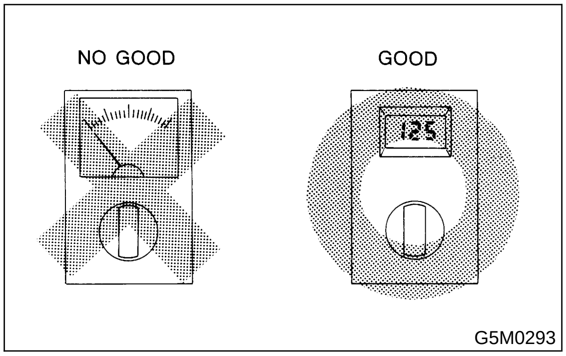
● If sensors, airbag module, airbag control module and harness are deformed or damaged, replace them with new genuine parts.



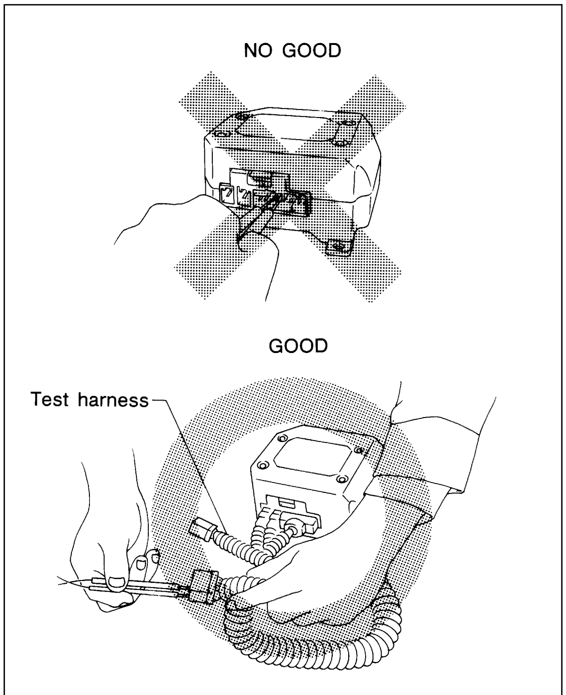
G5M0291

● Do not use the airbag parts from other vehicles. Always replace defective parts with new parts.
● Never re-use a deployed airbag.
● When checking the system, be sure to use a digital circuit tester.
Use of an analog circuit tester may cause the airbag to activate erroneously.

● When checking, use a test harness. Do not directly apply the tester probe to any connector terminal of the airbag.

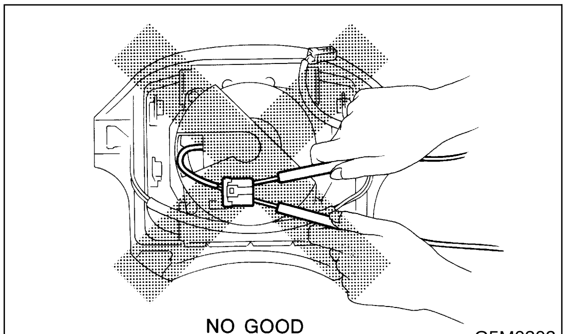


G5M0293



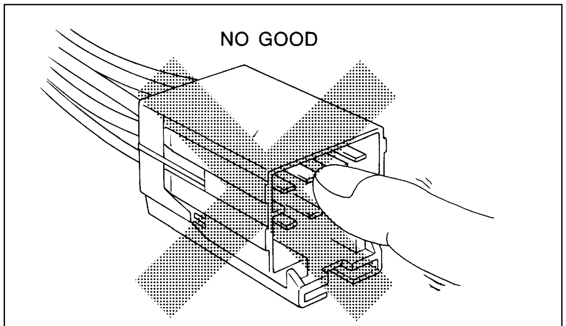
G5M0294

● Do not check continuity of the driver, passenger and side airbag modules.



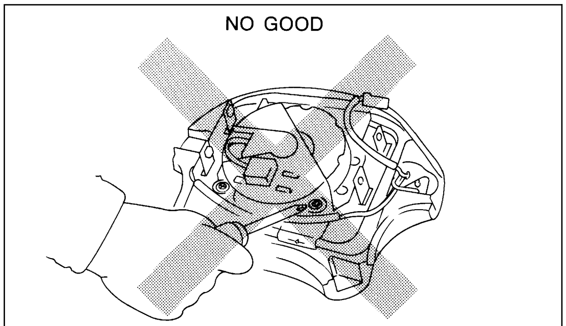
G5M0302

● Do not allow water or oil to come in contact with the connector terminals. Do not touch the connector terminals.



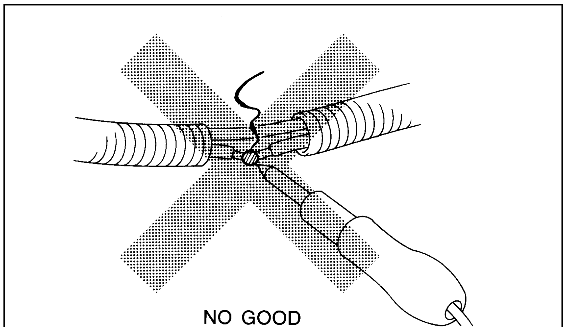
G5M0298

● Either of the airbag modules for driver, passenger or side, must not be disassembled.



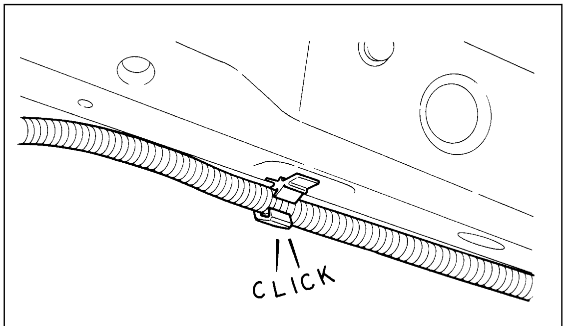
G5M0299

● If any damage, opening, or rust is found on the airbag system wire harness, do not attempt to repair using soldering equipment. Be sure to replace the faulty harness with a new genuine part.



G5M0296

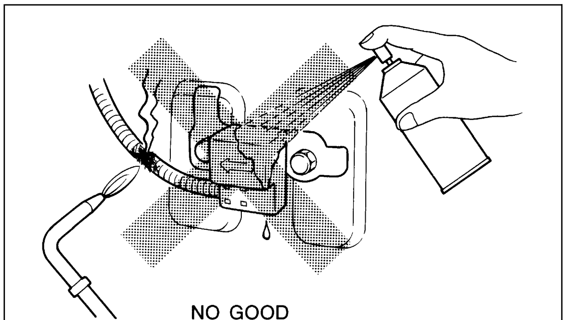
● Install the wire harness securely with the specified clips to avoid interference or tangled up with other parts.



G5M0297

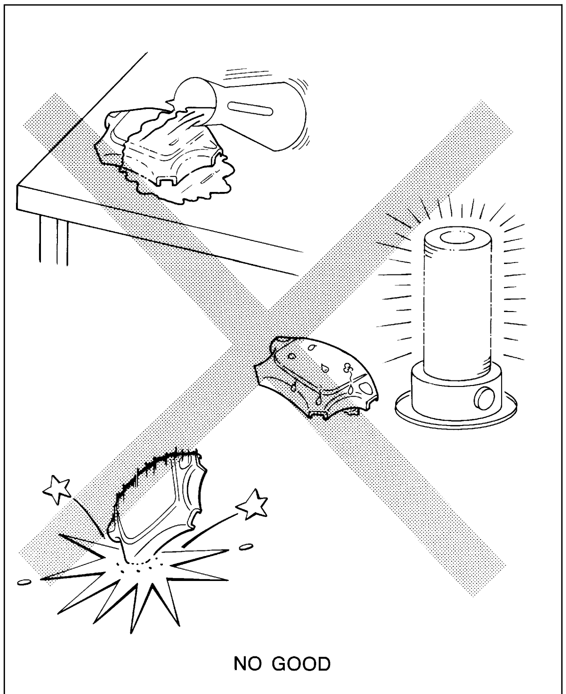
● When painting or performing sheet metal work on the front part of the vehicle, including the front wheel apron, front fender, and front side frame, remove the front sub sensors and wire harness of the airbag system.

● When painting or performing sheet metal work on the side of the vehicle, including the side sill, center pillar, and front and rear doors, remove the side airbag sensors and wire harness of the airbag system.



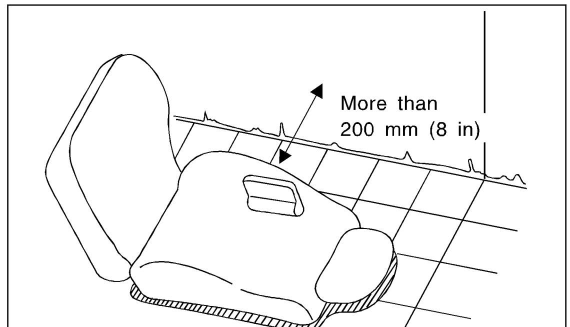
G5M0310

- Do not drop the airbag modulator parts, subject them to high temperature over 93°C (199°F), or let water, oil, or grease get on them; otherwise, the internal parts may be damaged and reliability greatly lowered.



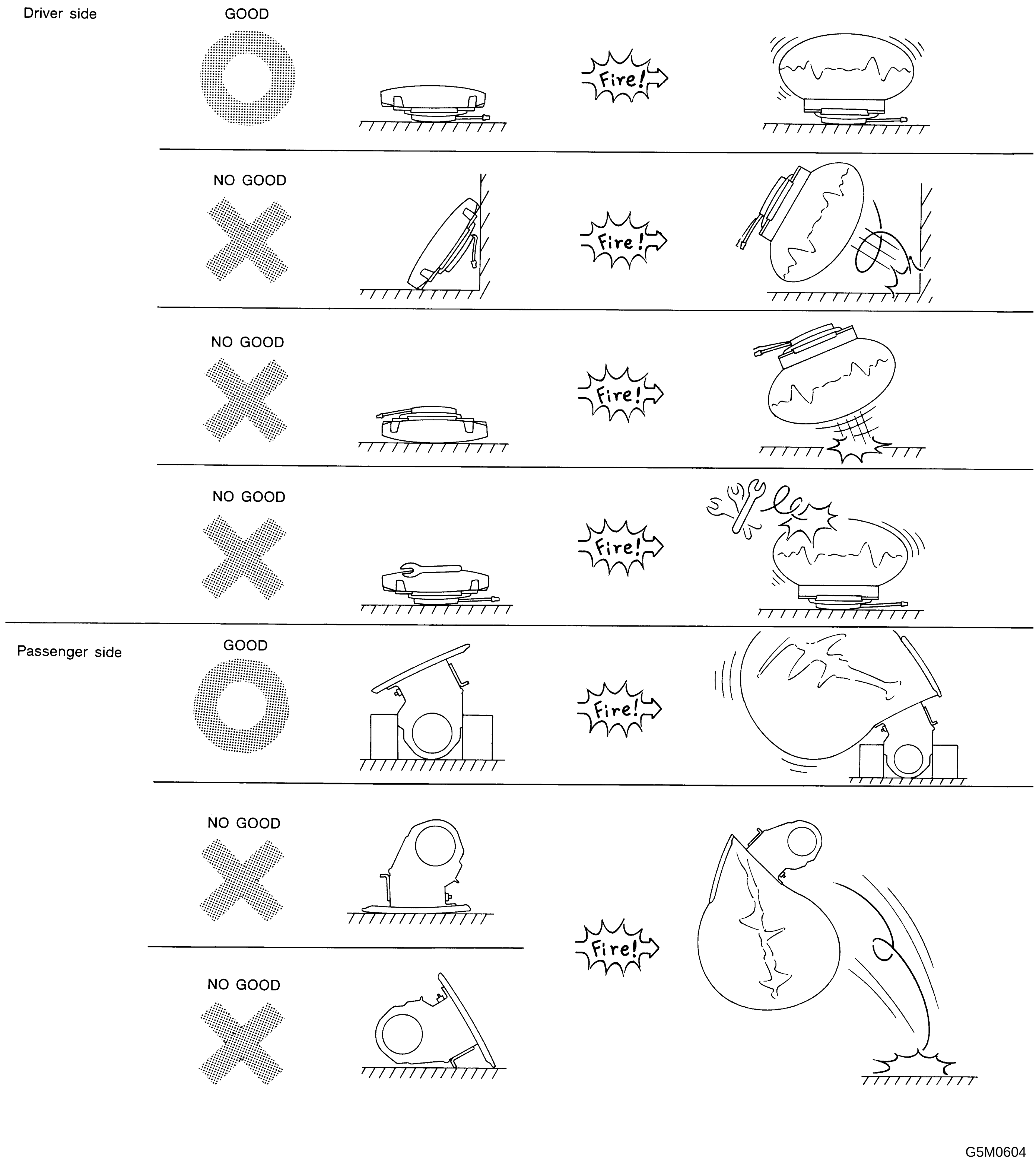
G5M0295

- The removed front seat with the airbag module must be kept at least 200 mm (8 in) away from walls and other objects.



B5M1072A

- When storing a removed airbag module, do not place any objects on it or pile airbag modules on top of each other. If the airbag inflates for some reason when it is placed with its pad side facing downward or under any object, a serious accident may result.


Driver side
GOOD
Fire!
NO GOOD
Fire!
NO GOOD
Fire!
NO GOOD
Fire!
Passenger side
GOOD
Fire!
NO GOOD
NO GOOD
Fire!

G5M0604

C: PREPARATION TOOL S802001A17

1. GENERAL TOOL S802001A1702

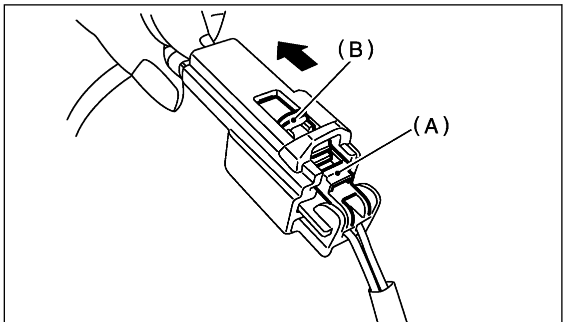
TOOL NAME	REMARKS
TORX® T30 (Tamper resistant type)	Used for removal/installation of drivers airbag module and side airbag sensor
TORX® T40 (Tamper resistant type)	Used for removal/installation of airbag control module

2. Airbag Connector S802659

A: OPERATION S802659A16

1. DRIVER'S AIRBAG, PASSENGER'S AIRBAG, SIDE AIRBAG S802659A1605

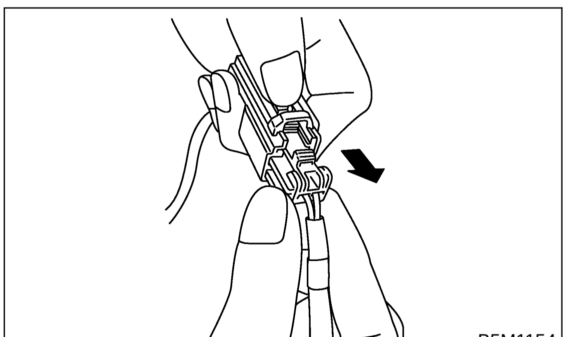
1) How to disconnect:
(1) Push lock arm (A).
(2) With lock arm (A) pushed in, move slide lock (B) in direction of the arrow.



B5M1153A

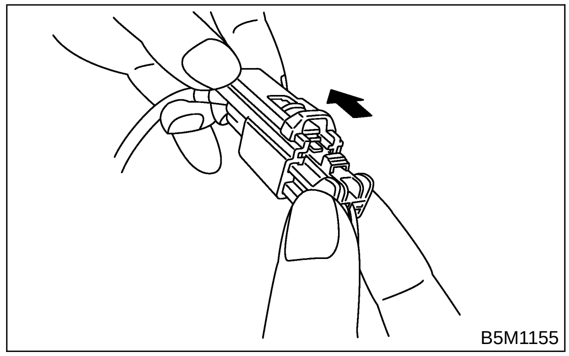
(3) While holding slide lock (B), return lock arm (A) to its original position and then separate the connector by pulling in the direction of the arrow.

CAUTION:
When pulling, be sure to hold onto the connector and not the wire.


B5M1154

2) How to connect:
(1) Holding the connector, and push it in carefully until a connecting sound is heard.

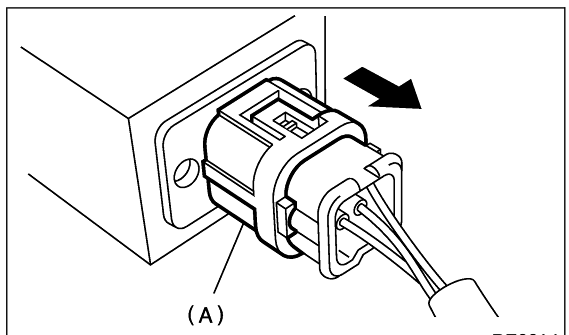
CAUTION:
Be sure to insert the connector in until it locks. Then pull on it gently to make sure that it is locked.


B5M1155

2. FRONT SUB-SENSOR, SIDE AIRBAG SENSOR S802659A1603

1) How to disconnect:
(1) Holding outer part (A), pull in the direction of the arrow.

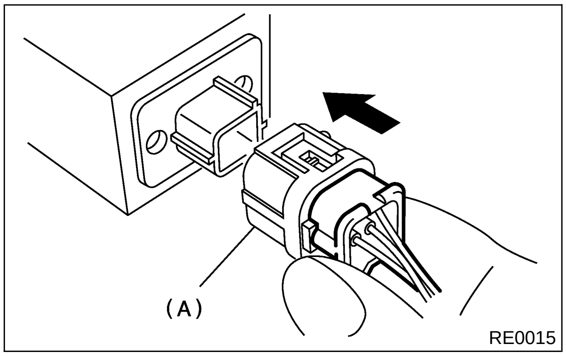
CAUTION:
When pulling, be sure to hold onto the connector and not the wire.



RE0014

2) How to connect:
(1) Holding the connector, and push it in carefully until a connecting sound is heard.

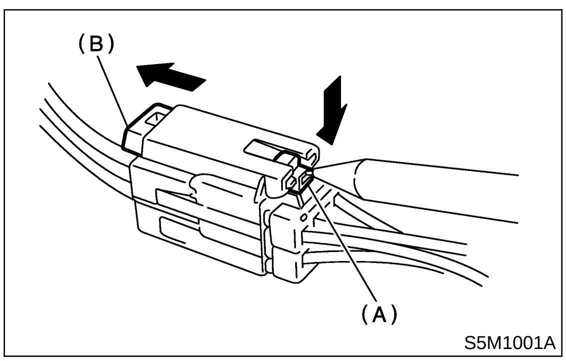
CAUTION:
- **Outer (A) moves back, and so do not put your hand on the outer part.**
- **Be sure to insert the connector in until it locks. Then pull on it gently to make sure that it is locked.**



RE0015

3. AIRBAG MAIN HARNESS TO BODY HARNESS CONNECTOR *S802659A1608*

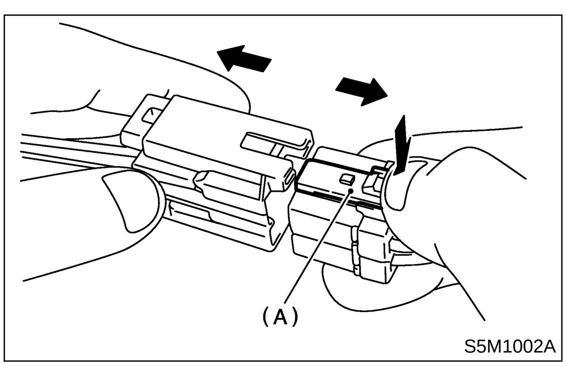
1) How to disconnect:
(1) Push lock arm (A) to let green lever (B) pop out.



S5M1001A

(2) Then separate the connector halves by pulling them apart while pressing lever (A).

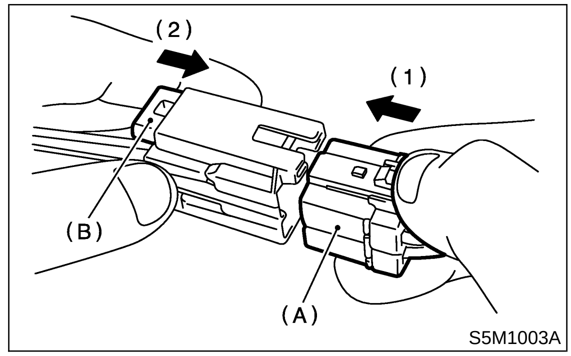
CAUTION:
When pulling, be sure to hold onto the connector and not the wire.



S5M1002A

2) How to connect:
(1) Insert the (A) connector half into the other until a “click” is heard.
(2) Push in green lever (B) until a “click” is heard.
This engages the double lock mechanism.

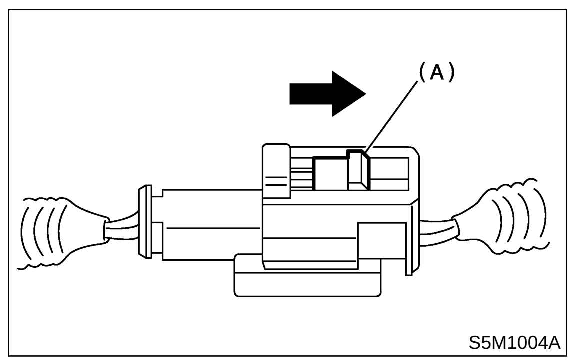
CAUTION:
Be sure to insert the connector in until it locks. Then pull on it gently to make sure that it is locked.



S5M1003A

4. FRONT SUB SENSOR HARNESS TO AIRBAG MAIN HARNESS *S802659A1609*

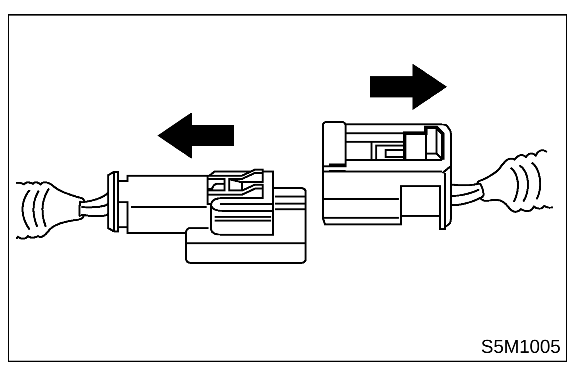
1) How to disconnect:
(1) Move slide lock (A) in direction of the arrow.



S5M1004A

(2) Pull slide lock (A) in direction of the arrow and disconnect the connector.

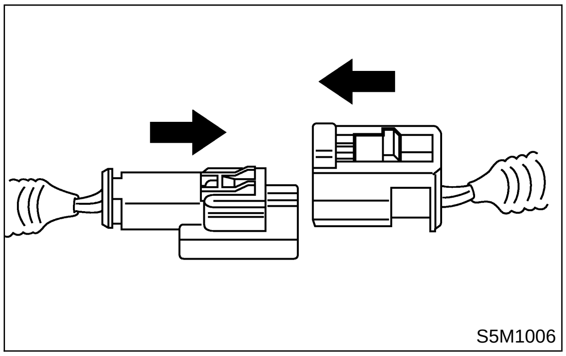
CAUTION:
When pulling, be sure to hold onto the connector and not the wire.


S5M1005

2) How to connect:

(1) Hold the connector, and push it carefully until a connecting sound is heard.

CAUTION:
Be sure to insert the connector in until it locks. Then pull on it gently to make sure that it is locked.



3. Inspection Locations After a Collision S802306

A: INSPECTION S802306A10

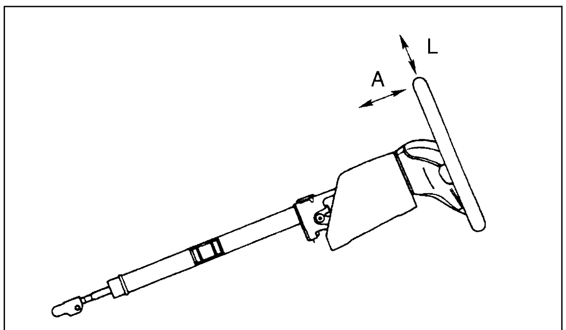
If the vehicle is involved in a collision on any side, even if it is a slight collision, be sure to check the following system parts.

1. AIRBAG MODULE (DRIVER) S802306A1001

1) Check for the following, and replace damaged parts with new parts.
- Airbag module is cracked or deformed.
- Harness and/or connector is cracked, deformed or open. Lead wire is exposed.

2) When installing a new driver's airbag module, check the following. If necessary, install a new airbag module and steering wheel.
- The steering wheel is in the way, making it difficult to install the airbag module.
- The clearance between the driver's airbag module and steering wheel is not constant.
- When steering wheel deformation in axial and radial directions exceed limits.

Deformation limit:
Axial direction play A
Less than 6 mm (0.24 in)
Radial direction play L
Less than 17 mm (0.67 in)



B5M0096A

2. AIRBAG MODULE (PASSENGER) S802306A1002

Check for the following, and replace damaged parts with new parts.
- Airbag module is cracked or deformed.
- Harness and/or connector is cracked, deformed or open. Lead wire is exposed.
- Mounting bracket is cracked or deformed.

3. AIRBAG MODULE (SIDE) S802306A1003

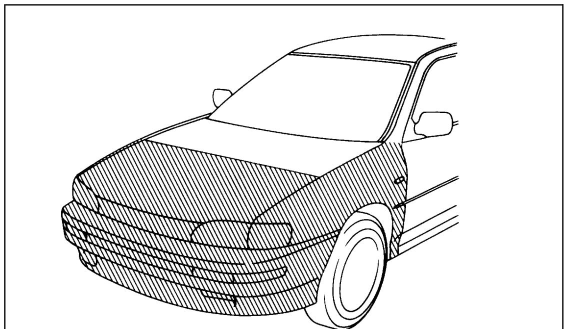
Check for the following, and replace damaged parts with new parts.
- Front seat is damaged or deformed.
- Harness and/or connector is cracked, deformed or open.
- Lead wire is exposed.

4. AIRBAG CONTROL MODULE S802306A1004

Check for the following, and replace damaged parts with new parts.
- Control module is cracked or deformed.
- Mounting bracket is cracked or deformed.
- Connector is scratched or deformed.
- Airbag is deployed.
- Side airbag is deployed.

5. FRONT SUB SENSOR S802306A1005

If the front section of vehicle as shown in the figure is damaged:


G5M0311

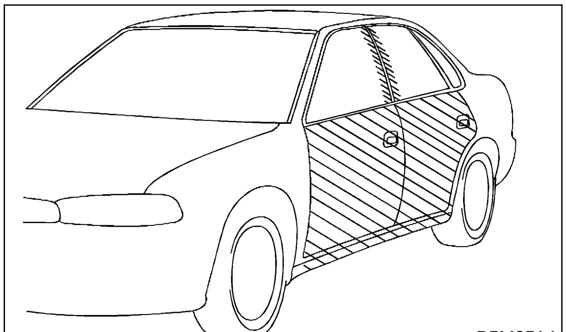
Check for the following, and replace damaged parts with new parts.
- Front sub sensor is cracked or deformed.
- Mounting bracket is cracked or deformed.
- Connector is scratched or cracked.
- Airbag is deployed.

6. FRONT SUB SENSOR HARNESS S802306A1006

Check for the following, and replace damaged parts with new parts.
- Harness is open, lead wire is exposed, and corrugated tube is noticeably cracked.
- Connector is scratched or cracked.

7. SIDE AIRBAG SENSOR S802306A1007

If the side section of vehicle as shown in the figure is damaged:


B5M0514

Check for the following, and replace damaged parts with new parts.
- Side airbag sensor is cracked or deformed.
- Mounting bracket is cracked or deformed.
- Connector is scratched or cracked.
- Side airbag is deployed. (operating side)

8. SIDE AIRBAG SENSOR HARNESS

S802306A1008

Check for the following, and replace damaged parts with new parts.
- Harness is open, lead wire is exposed, and corrugated tube is noticeably cracked.
- Connector is scratched or cracked.

9. MAIN HARNESS S802306A1009

Check for the following, and replace damaged parts with new parts.
- Harness is open, lead wire is exposed, and corrugated tube is noticeably cracked.
- Connector is scratched or cracked.

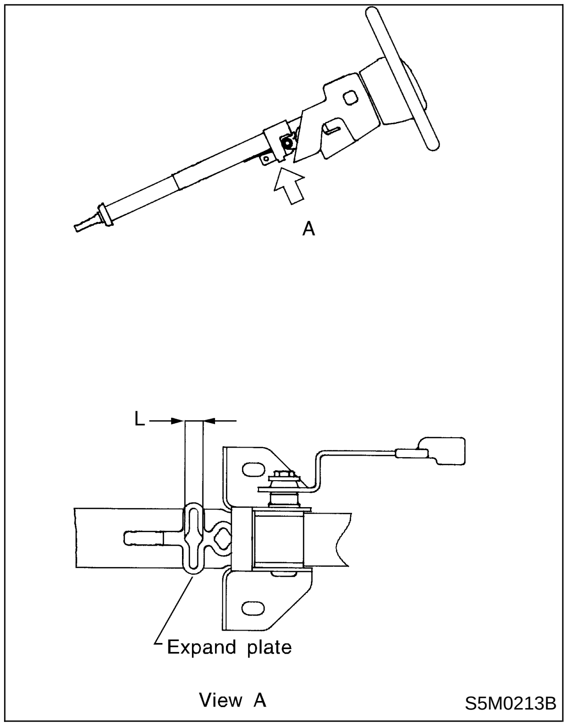
10. ROLL CONNECTOR S802306A1010

Check for the following, and replace damaged parts with new parts.
- Combination switch or steering roll connector is cracked or deformed.

11. STEERING SHAFT S802306A1011

Check for the following, and replace damaged parts with new parts.
The clearance between capsule (A) and tip of column bracket (B) on steering column upper side should be within specifications.

Specifications:
Clearance of expand plate: L
More than 15 mm (0.59 in): OK
Less than 15 mm (0.59 in): Not OK



S5M0213B

If necessary, replace them with new parts.

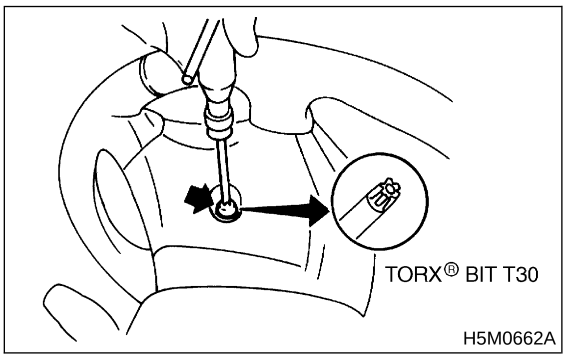
4. Driver's Airbag Module S802307

A: CAUTION S802307A03

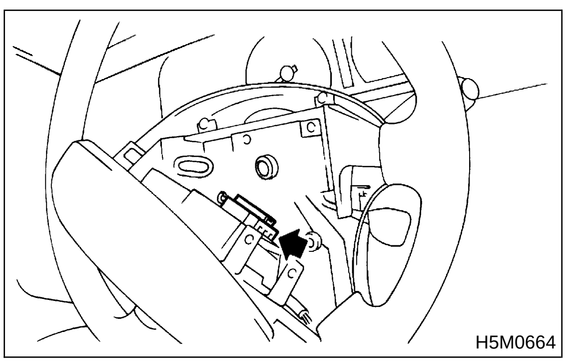
Refer to the "CAUTION" of General Description before handling the airbag module. <Ref. to AB-3, CAUTION, General Description.>

B: REMOVAL S802307A18

1) Position front wheels straight ahead. [After moving a vehicle more than 5 m (16 ft) with front wheels positioned straight ahead, make sure that the vehicle moves straight ahead.]
2) Turn ignition switch OFF.
3) Disconnect ground cable from battery, and wait for at least 20 seconds before starting work.
4) Using TORX® BIT T30, remove two TORX® bolts on side of the steering wheel.



5) Disconnect airbag connector on back of airbag module, and then remove airbag module.



6) Refer to "CAUTION" for handling of a removed airbag module. <Ref. to AB-3, CAUTION, General Description.>

C: INSTALLATION S802307A11

1) Install in the reverse order of removal.

CAUTION:
Do not allow harness and connectors to interfere or get tangled up with other parts.

D: INSPECTION S802307A10

Check for the following, and replace damaged parts with new parts.
- Airbag module, harness, connector, and mounting bracket are damaged.

5. Passenger's Airbag Module

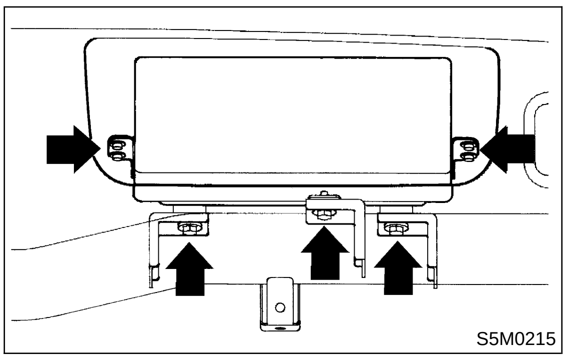
S802308

A: CAUTION S802308A03

Refer to the "CAUTION" of General Description before handling the airbag module. <Ref. to AB-3, CAUTION, General Description.>

B: REMOVAL S802308A18

1) Turn ignition switch OFF.
2) Disconnect ground cable from battery, and wait for at least 20 seconds before starting work.
3) Remove glove box. <Ref. to EI-29, REMOVAL, Glove Box.>
4) Detach airbag connector from support beam bracket, and then disconnect airbag connector.
5) Remove the seven bolts, and then carefully remove airbag module.



6) Refer to "CAUTION" for handling of a removed airbag module. <Ref. to AB-3, CAUTION, General Description.>

C: INSTALLATION S802308A11

Install in the reverse order of removal.

CAUTION:
Do not allow harness and connectors to interfere or get tangled up with other parts.

D: INSPECTION S802308A10

Check for the following, and replace damaged parts with new parts.
- Airbag module, harness, connector, and mounting bracket are damaged.

6. Side Airbag Module *S802311*

A: CAUTION *S802311A03*

Refer to the “CAUTION” of General Description before handling the airbag module. <Ref. to AB-3, CAUTION, General Description.>

B: REMOVAL *S802311A18*

CAUTION:

- **The side airbag module cannot be detached from the front seat assembly.**
- **When replacing side airbag module, replace front seat assembly.**

<Ref. to SE-5, REMOVAL, Front Seat.>

C: INSTALLATION *S802311A11*

<Ref. to SE-5, INSTALLATION, Front Seat.>

D: INSPECTION *S802311A10*

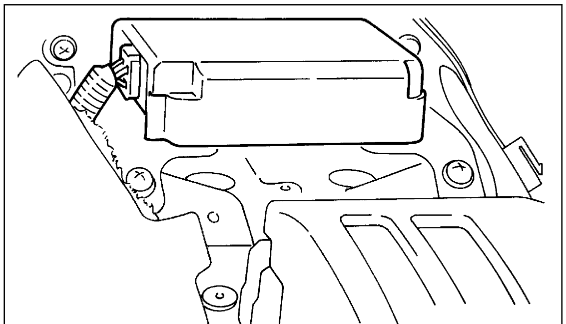
Check for the following, and replace damaged parts with new parts.

- Front seat is deformed or damaged.
- Harness and/or connector is cracked, deformed or open.
- Lead wire is exposed.

7. Main Harness S802310

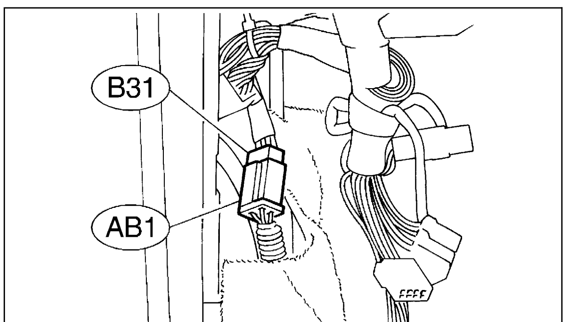
A: REMOVAL S802310A18

1) Turn ignition switch OFF.
2) Disconnect ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove instrument panel. <Ref. to EI-34, REMOVAL, Instrument Panel Assembly.>
4) Disconnect connector from airbag control module.



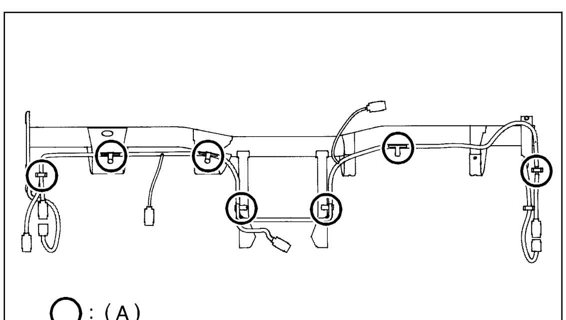
S5M0216

5) Disconnect body harness connector (B31) from airbag connector (AB1) located at front pillar lower (driver side).



S5M0217A

6) Disconnect front sub sensor connector (yellow) from airbag main harness located at front pillar (both sides).
7) Detach clips (A) from steering support beam, and remove main harness.



H5M0933B

B: INSTALLATION S802310A11

Install in the reverse order of removal.

C: INSPECTION S802310A10

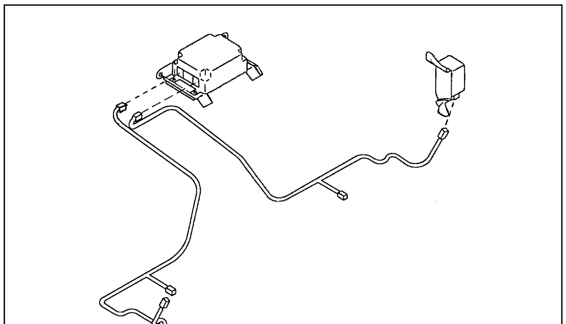
Check for the following, and replace damaged parts with new parts.

- Harness and/or connector is damaged.

8. Side Airbag Harness *S802309*

A: REMOVAL *S802309A18*

1) Turn ignition switch OFF.
2) Disconnect ground cable from battery, and wait for at least 20 seconds before starting work.
3) Remove front seat. <Ref. to SE-5, REMOVAL, Front Seat.>
4) Remove console box. <Ref. to EI-33, REMOVAL, Console Box.>
5) Roll up floor mat, and then disconnect two 12-pin yellow connectors from airbag control module.
6) Disconnect connector from side airbag sensor. <Ref. to AB-19, REMOVAL, Side Airbag Sensor.>
7) Detach clips, and then remove side airbag harness.


S5M0307

B: INSTALLATION *S802309A11*

Install in the reverse order of removal.

C: INSPECTION *S802309A10*

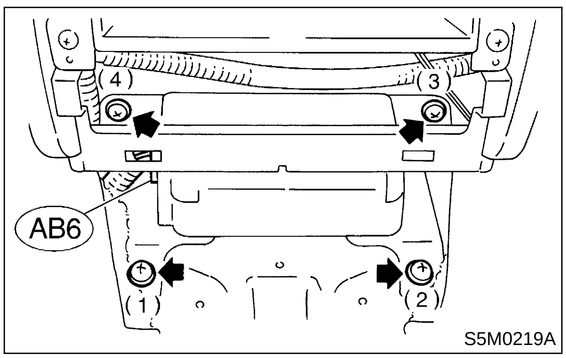
Check for the following, and replace damaged parts with new parts.
- Harness and/or connector is damaged.

9. Airbag Control Module S802302

A: REMOVAL S802302A18

CAUTION:
- **Do not disassemble the airbag control module.**
- **If the airbag control module is deformed or if water damage is suspected, replace the airbag control module with a new genuine part.**
- **Do not drop the airbag control module.**
- **After removal, keep the airbag control module on a dry, clean surface away from moisture, heat, and dust.**

1) Turn ignition switch OFF.
2) Disconnect ground cable from battery, and wait for at least 20 seconds before starting work.
3) Remove console box. <Ref. to EI-33, REMOVAL, Console Box.>
4) Disconnect the airbag control module connector.
5) Using T40® TORX bit (Tamper resistant type), remove four TORX® bolts in the order shown in the figure.



B: INSTALLATION S802302A11

CAUTION:
Use new TORX® bolts during installation.
Install in the reverse order of removal.

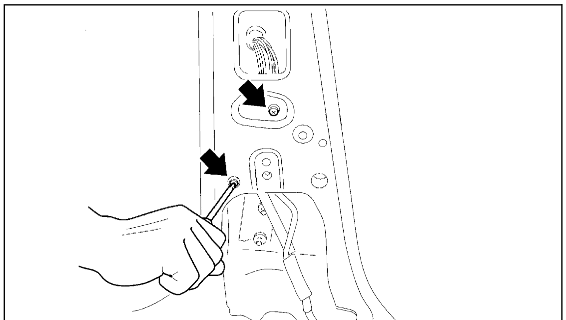
C: INSPECTION S802302A10

Check for the following, and replace damaged parts with new parts.
- Control module, connector, and mounting bracket are damaged.
- Airbag is deployed.
- Side airbag is deployed.

10. Side Airbag Sensor S802298

A: REMOVAL S802298A18

1) Turn ignition switch OFF.
2) Disconnect ground cable from battery, and wait for at least 20 seconds before starting work.
3) Remove center pillar lower trim. <Ref. to EI-40, REMOVAL, Lower Inner Trim.>
4) Remove Outer Belt (FRONT). <Ref. to SB-5, OUTER BELT (FRONT), REMOVAL, Front Seat Belt.>
5) Remove two TORX® bolts, and then detach side airbag sensor.


S5M0308

B: INSTALLATION S802298A11

CAUTION:
Use new TORX® nuts during installation.
Install in the reverse order of removal.

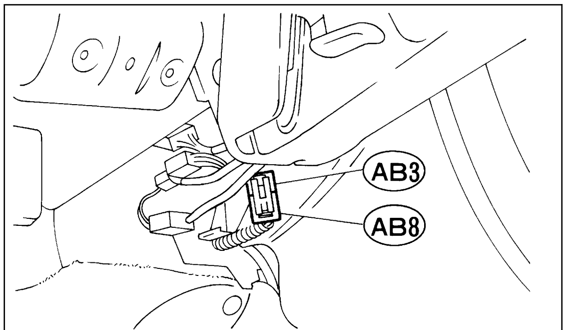
C: INSPECTION S802298A10

Check for the following, and replace damaged parts with new parts.
- Bracket connector for side airbag sensor is damaged.

11. Roll Connector S802299

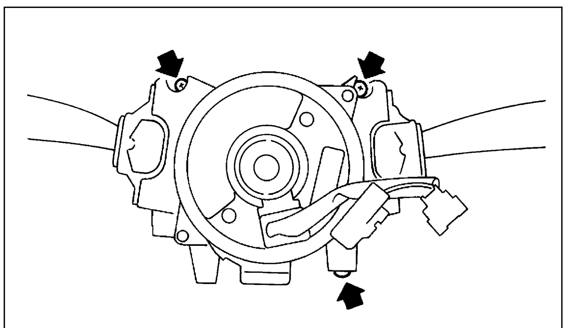
A: REMOVAL S802299A18

1) Turn ignition switch OFF.
2) Disconnect ground cable from battery, and wait for at least 20 seconds before starting work.
3) Remove instrument panel lower cover.
4) Disconnect airbag connector (AB3) and (AB8) below steering column.

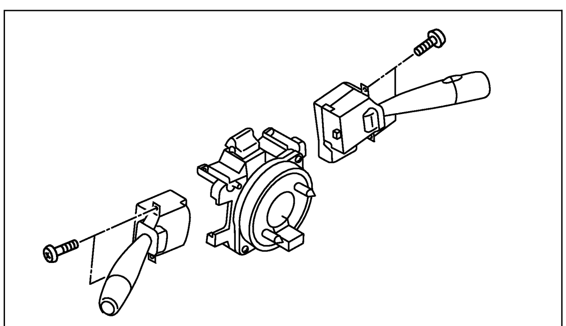


G5M0312

5) Remove driver's airbag module. <Ref. to AB-13, Driver's Airbag Module.>
6) Remove steering wheel. <Ref. to PS-14, REMOVAL, Steering Wheel.>
7) Remove steering column cover.
8) Remove screws, and then remove combination switch assembly.


S5M0220

9) Remove lighting switch and wiper switch from roll connector.


B5M0940

B: INSTALLATION S802299A11

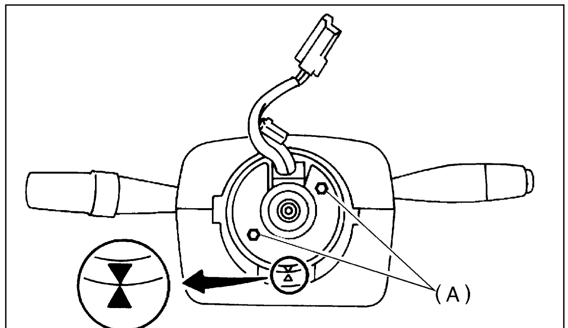
1) Install combination switch assembly and steering column cover in the reverse order of removal.
2) Adjust centering roll connector. <Ref. to AB-20, ADJUSTMENT, Roll Connector.>
3) Install steering wheel and airbag module.

C: INSPECTION S802299A10

Check for the following, and replace damaged parts with new parts.
- Combination switch and roll connector is cracked or deformed.

D: ADJUSTMENT S802299A01

1) Check that front wheels are positioned in straight ahead direction.
2) Turn roll connector pin (A) clockwise until it stops.
3) Turn roll connector pin (A) counterclockwise approximately 2.65 turns until "▲" marks are aligned.

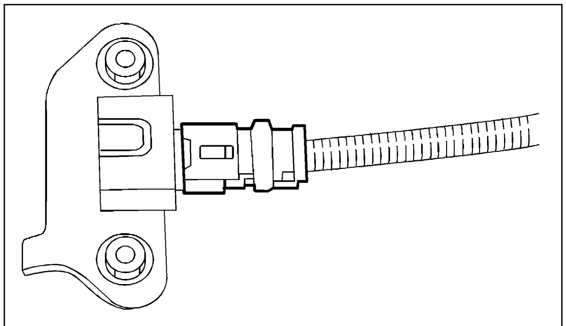


H5M0663B

12. Front Sub Sensor *S802300*

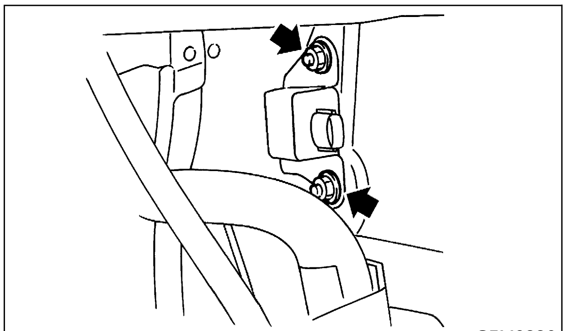
A: REMOVAL *S802300A18*

1) Turn ignition switch OFF.
2) Disconnect ground cable from battery, and wait for at least 20 seconds before starting work.
3) Remove front wheel and mud guard. <Ref. to EI-22 REMOVAL, Mud Guard.>
4) Disconnect the front sub sensor connector.



S5M0335

5) Remove the front sub sensor.



S5M0336

B: INSTALLATION *S802300A11*

Install in the reverse order of removal.

C: INSPECTION *S802300A10*

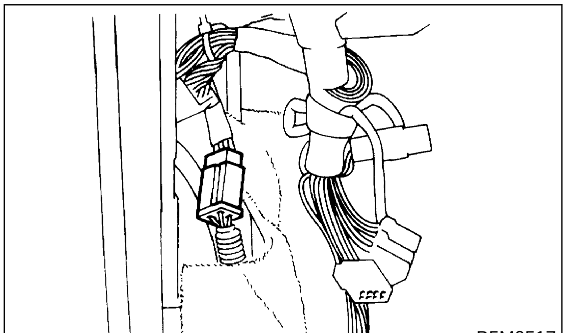
Check for the following, and replace damaged parts with new parts.
- Front sub sensor, mounting bracket, and connector are damaged.

13. Front Sub Sensor Harness

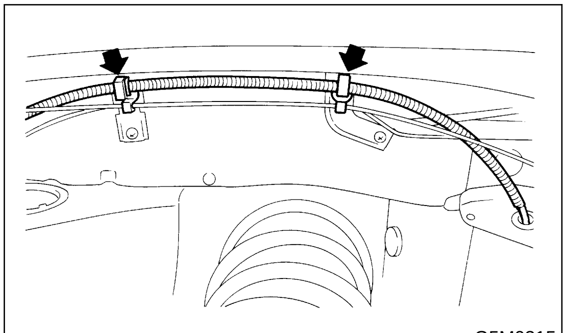
S802572

A: REMOVAL S802572A18

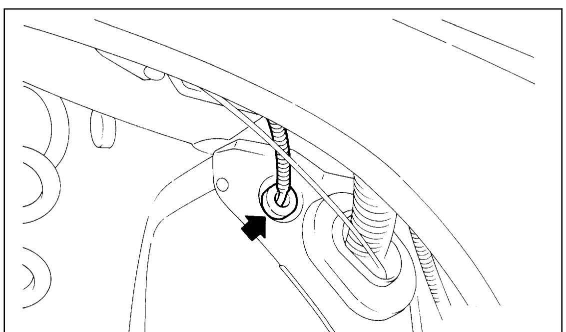
1) Turn ignition switch OFF.
2) Disconnect ground cable from battery, and wait for at least 20 seconds before starting work.
3) Remove the front side sill cover, and then disconnect front sub sensor connector.


B5M0517

4) Disconnect the front sub sensor connector. <Ref. to AB-21, REMOVAL, Front Sub Sensor.>
5) Remove wiring harness clips.


G5M0315

6) Remove grommet, and then detach front sub sensor harness.


G5M0316

B: INSTALLATION S802572A11

Install in the reverse order of removal.

C: INSPECTION S802572A10

Check for the following, and replace damaged parts.

- Harness and/or connector is damaged.

SEAT BELT SYSTEM

SB

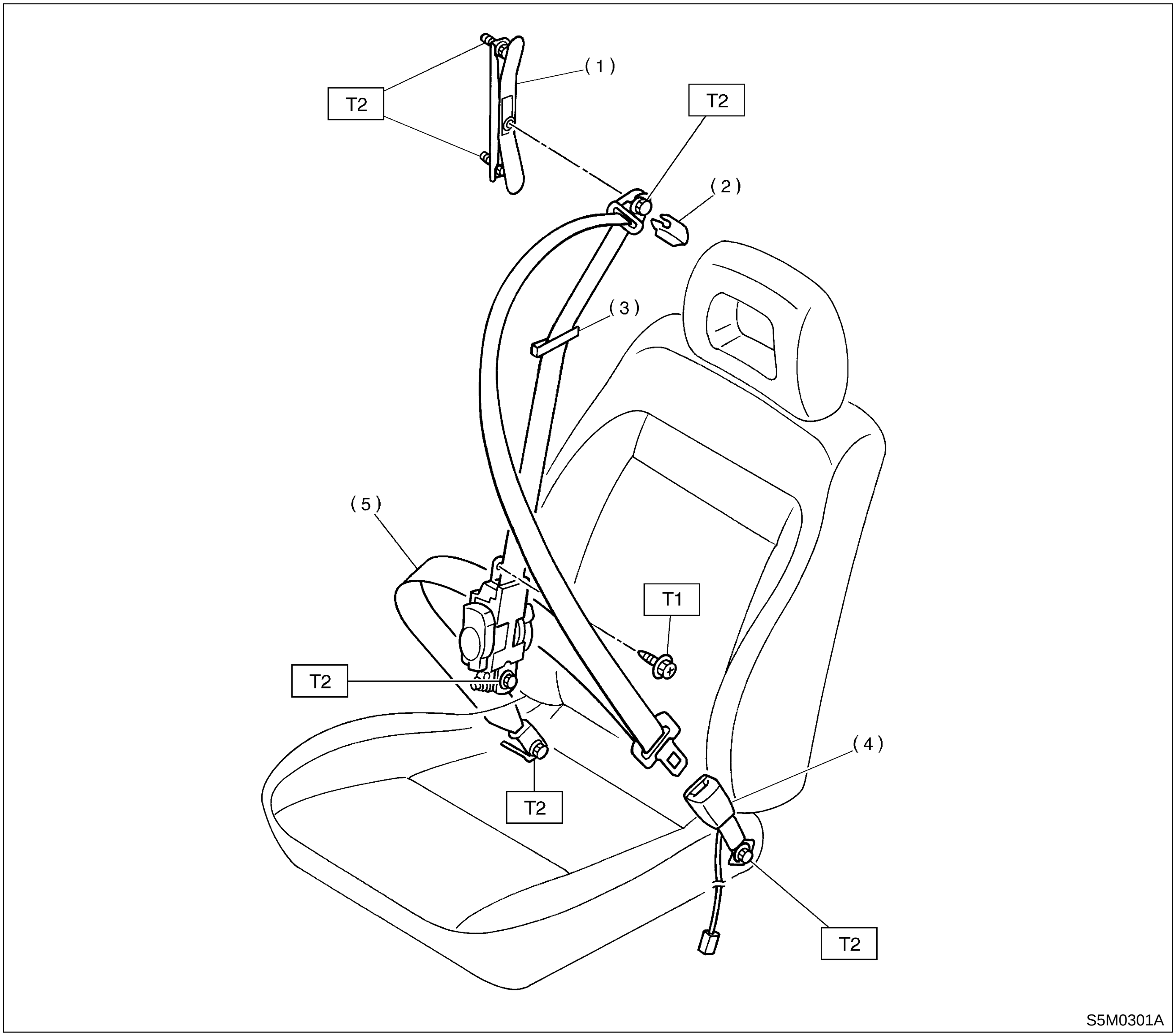
Page

1. General Description 2
2. Inspection Locations After a Collision 4
3. Front Seat Belt 5
4. Rear Seat Belt 7

1. General Description S801001

A: COMPONENT S801001A05

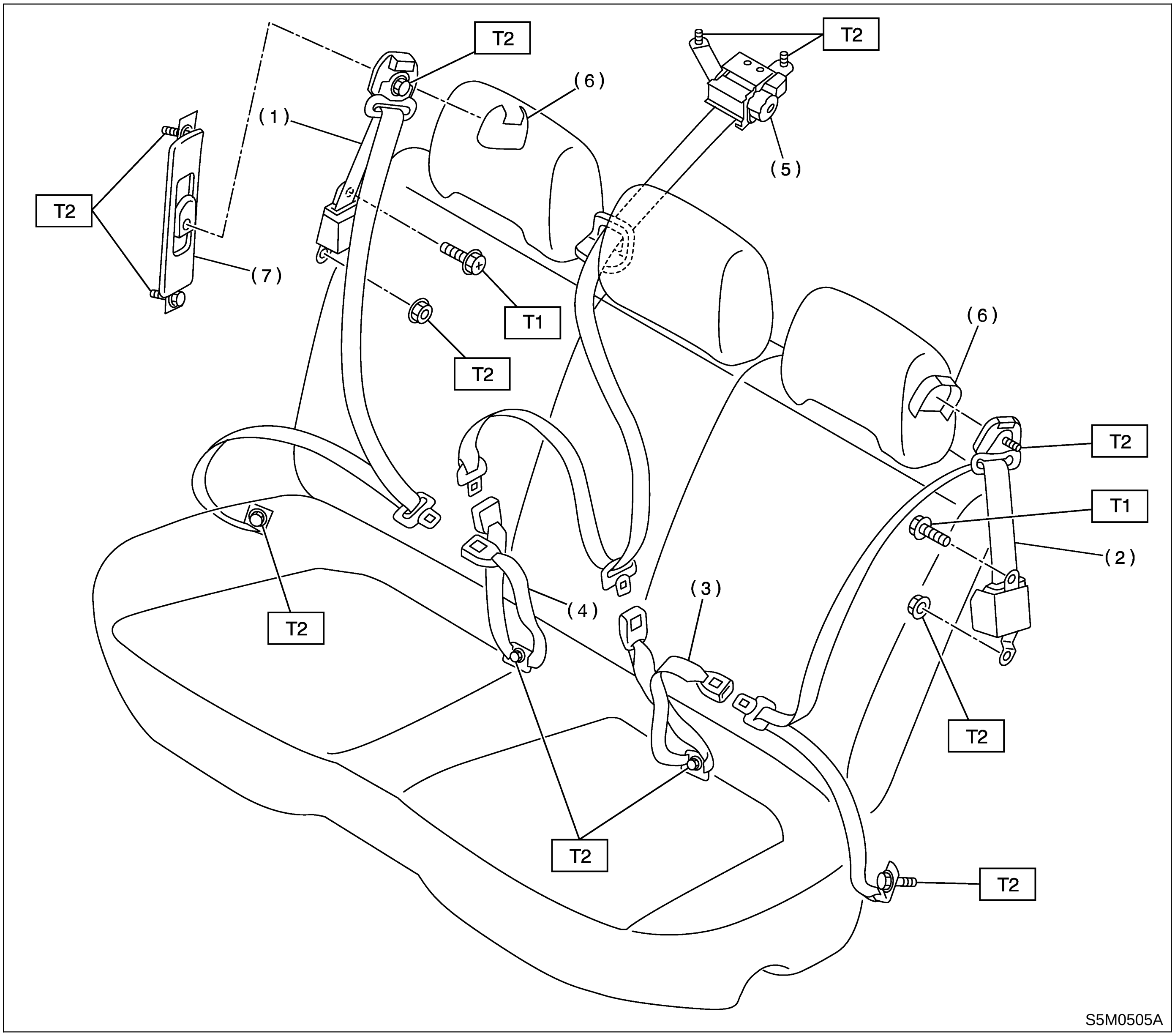
1. FRONT SEAT BELT S801001A0501



(1) Adjuster anchor ASSY
(2) Anchor cover
(3) Webbing guide
(4) Inner belt ASSY
(5) Outer belt ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 30 (3.1, 22)

2. REAR SEAT BELT *S801001A0504*



(1) Outer seat belt RH
(2) Outer seat belt LH
(3) Inner seat belt LH
(4) Inner seat belt RH
(5) Outer seat belt CENTER
(6) Anchor cover
(7) Adjustable anchor ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 30 (3.1, 22)

2. Inspection Locations After a Collision *S801306*

A: INSPECTION *S801306A10*

Check for the following, and then replace with new parts if necessary.

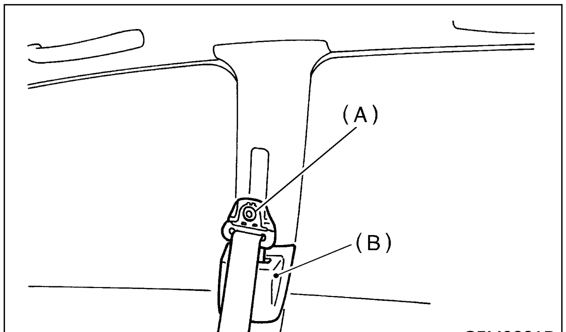
- Center pillar lower garnish is discolored or cracked.
- Wire harness and/or connector is damaged.

3. Front Seat Belt S801303

A: REMOVAL S801303A18

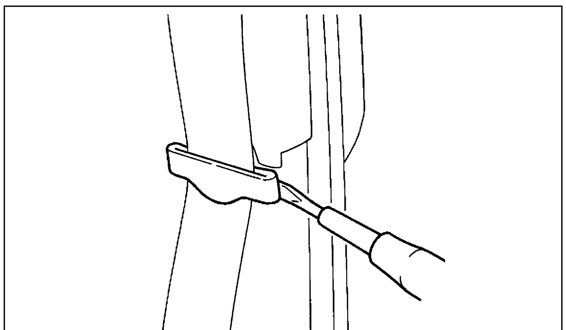
1. OUTER BELT (FRONT) S801303A1807

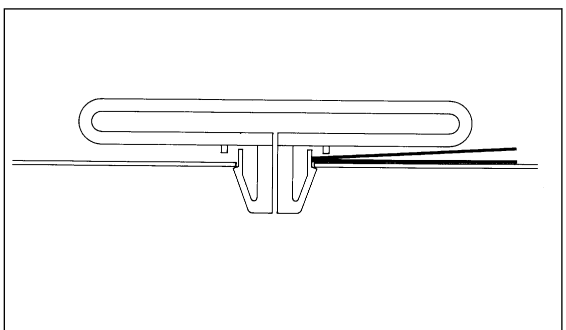
1) Fold backrest all the way forward, and then move front seat all the way forward.
2) Remove anchor cover and shoulder anchor bolt (A).
3) Remove center pillar cover (B) and center pillar lower trim. <Ref. to EI-40 REMOVAL, Lower Inner Trim.>



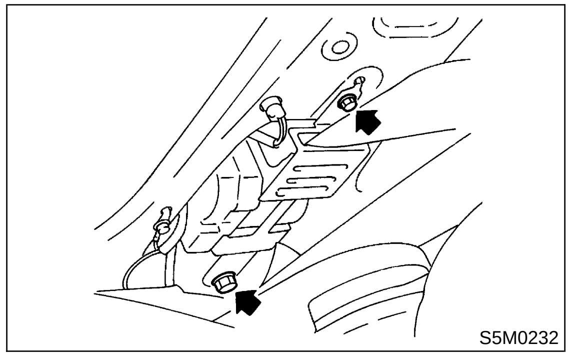
S5M0231B

4) Remove webbing guide.

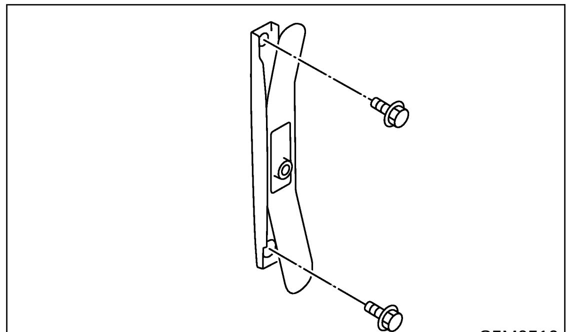

S5M0233


G5M0653

5) Remove lap anchor bolt.
6) Remove belt retractor and outer belt.


S5M0232

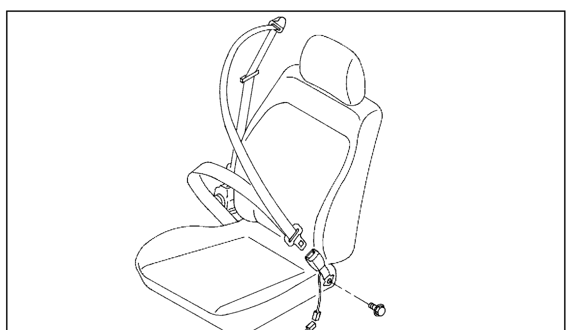
7) Remove adjustable shoulder anchor assembly.


S5M0519

CAUTION:
● The left and right ELR's are not mutually interchangeable because different sensors are used.
● Be careful not to twist belts during installation.

2. INNER BELT (FRONT) S801303A1802

1) Disconnect connector.
2) Remove anchor bolt, and then detach inner belt.


S5M0234

B: INSTALLATION S801303A11

1. OUTER BELT (FRONT) S801303A1107

Install in the reverse order of removal.

CAUTION:
- **The parts on left and right are not identical. Before installation, make sure that the correct part is used.**
- **Be careful not to twist belts during installation.**

2. INNER BELT (FRONT) S801303A1102

Install in the reverse order of removal.

C: INSPECTION S801303A10

1. OUTER BELT (FRONT) S801303A1005

Check for the following, and replace with new parts if necessary.
- Seat belt is slackened, bent, or frayed. Seat belt is abnormally wound or extended.

2. INNER BELT (FRONT) S801303A1002

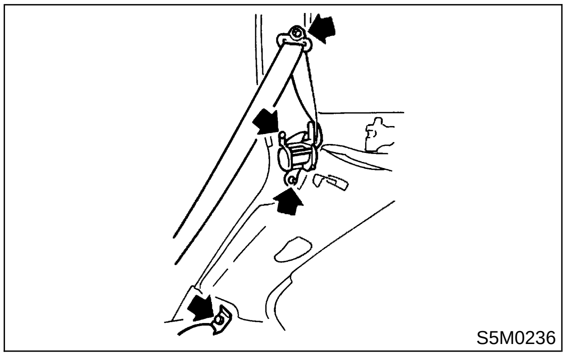
Check for the following, and replace with new parts if necessary.
- Inner belt is deformed or damaged.
- Seat belt buckle is engaged improperly.

4. Rear Seat Belt *S801304*

A: REMOVAL *S801304A18*

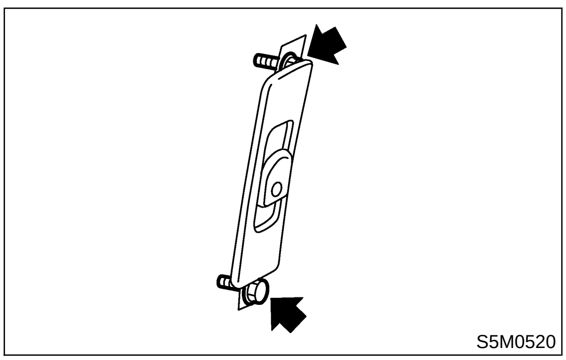
1. OUTER BELT SIDE *S801304A1809*

1) Remove rear seat. <Ref. to SE-6, REMOVAL, Rear Seat.>
2) Remove side sill rear upper cover. <Ref. to EI-40, REMOVAL, Lower Inner Trim.>
3) Remove quarter trim. <Ref. to EI-41, REMOVAL, Rear Quarter Trim.>
4) Remove bolts, then detach outer belt side.



S5M0236

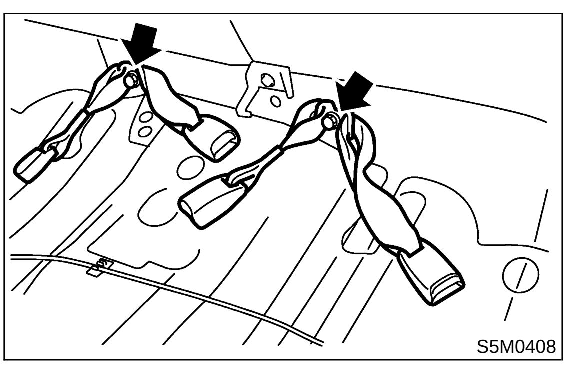
5) Remove adjustable shoulder anchor.



S5M0520

2. INNER BELT *S801304A1810*

1) Remove the rear cushion. <Ref. to SE-6 REMOVAL, Rear Seat.>
2) Remove bolts, and then detach inner belt.

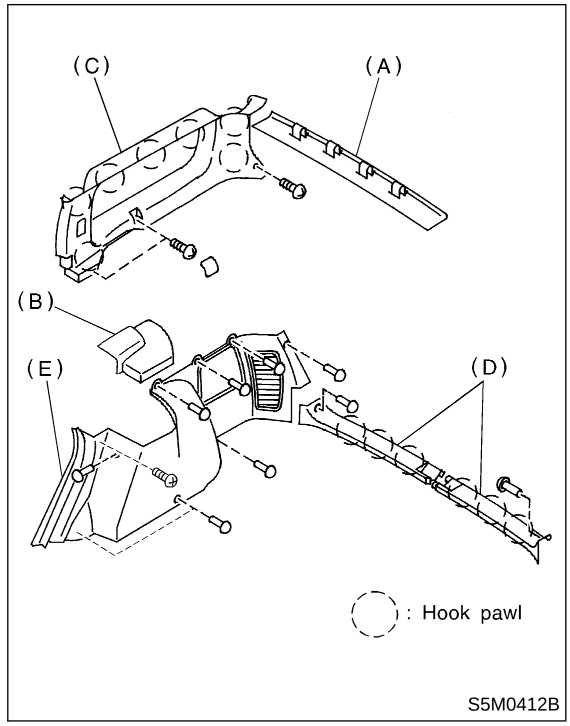


S5M0408

3. OUTER BELT CENTER *S801304A1811*

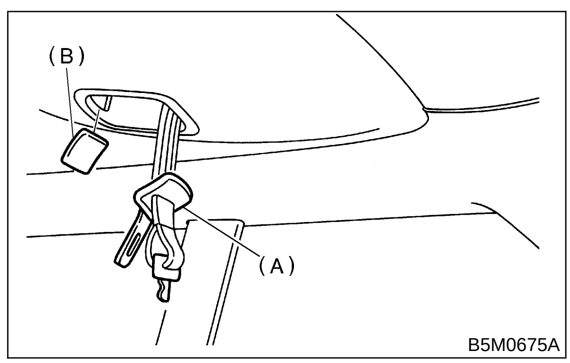
CAUTION:
When removing clip, use great care not to damage the roof trim.

1) Remove rear rail trim (A).
2) Remove strut cover (B).
3) Remove rear outer belt side anchor bolt.
4) Remove rear quarter upper trim.
5) Remove caps and screws then remove rear quarter upper trim (C).



S5M0412B

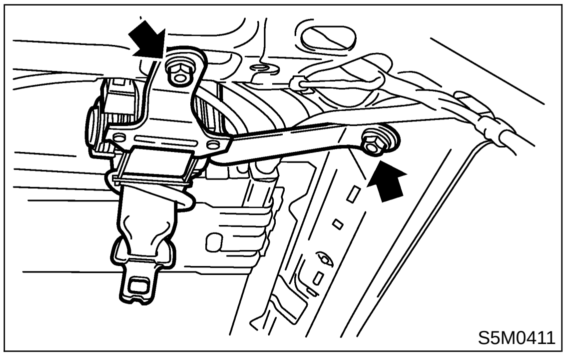
6) Remove cover (B) while detaching snap lock carefully. Put the outer belt center tongue (A) out to the other side of the trim through the hole.



B5M0675A

7) Remove clips and hang down rear end of roof trim.

8) Disconnect harness and connector, and then remove outer belt center assembly.



B: INSTALLATION S801304A11

1. OUTER BELT SIDE S801304A1109

Install in the reverse order of removal.

CAUTION:
- **During installation, make sure that seat belts are not twisted.**
- **After installation, make sure that seat belts can be smoothly extended and wound.**

2. OUTER BELT CENTER S801304A1110

Install in the reverse order of removal.

CAUTION:
- **During installation, make sure that seat belts are not twisted.**
- **After installation, make sure that seat belts can be smoothly extended and wound.**

3. INNER BELT S801304A1111

Install in the reverse order of removal.

CAUTION:
During installation, make sure that seat belts are not twisted.

C: INSPECTION S801304A10

1. OUTER BELT SIDE S801304A1009

Check for the following, and replace with new parts if necessary.
- Seat belt is slackened, bent, or frayed. Seat belt is abnormally wound or extended.

2. OUTER BELT CENTER S801304A1010

Check for the following, and replace with new parts if necessary.
- Seat belt is slackened, bent, or frayed. Seat belt is abnormally wound or extended.

3. INNER BELT S801304A1011

Check for the following, and replace with new parts if necessary.
- Inner belt is deformed or damaged.
- Seat belt buckle is engaged improperly.

AIRBAG SYSTEM (DIAGNOSTICS)

AB

Page

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1. Basic Diagnostic Procedure

S002501

A: PROCEDURE *S002501E45*

No.	Step	Check	Yes	No
1	**Read Diagnostic Trouble Code.** <Ref. to AB-21, Read Diagnostics Trouble Code.>	Is the normal code being detected?	Finish the diagnosis.	Go to step **2**.
2	**Read Diagnostic Trouble Code.** <Ref. to AB-21, Read Diagnostics Trouble Code.>	Is the trouble code being detected?	Go to step **3**.	Go to “Airbag Warning Light Failure”. <Ref. to AB-24, Airbag Warning Light Failure.>
3	**Perform the diagnosis.** 1) Judge the possible cause from “List of Diagnostic Trouble Code” <Ref. to AB-30, List of Diagnostic Trouble Code (DTC).>. 2) Inspect using “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. 3) Repair the cause of the trouble. 4) Perform the clear memory mode. <Ref. to AB-23, Clear Memory Mode.> 5) Perform the inspection mode. <Ref. to AB-22, Inspection Mode.> 6) Read diagnostic trouble code.	Is the trouble code being detected?	Perform the procedure 1) to 5) in step 3.	Finish the diagnosis.

2. Check List for Interview *S002502*

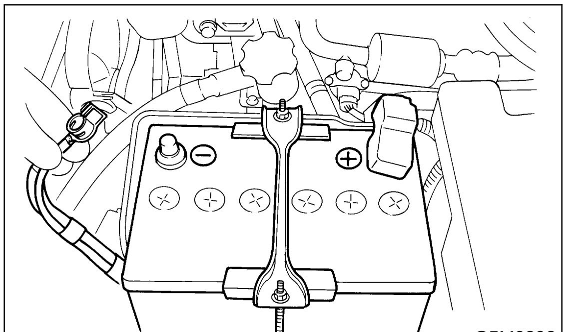
A: CHECK *S002502A04*

Customer’s Name		Inspector’s Name	
Date Vehicle Brought In	/ /	Registration No.	
Odometer Reading	Km Miles	Vin No.	
Date Problem Occurred	/ /	Registration Year	/ /
Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Other:		
Temperature	°C (°F)		
Road Condition	☐ Level road ☐ Uphill ☐ Downhill ☐ Rough road ☐ Other:		
Vehicle Operation	☐ Starting ☐ Idling ☐ Driving (☐ Constant Speed ☐ Acceleration ☐ Deceleration ☐ Steering wheel turn ☐ Other:)		
Details of Problem			
Check Airbag Warning Light	☐ Remains ON ☐ Remains OFF		
Check DTC	☐ Normal Code ☐ Trouble Code: (Code:)		

3. General Description S002001

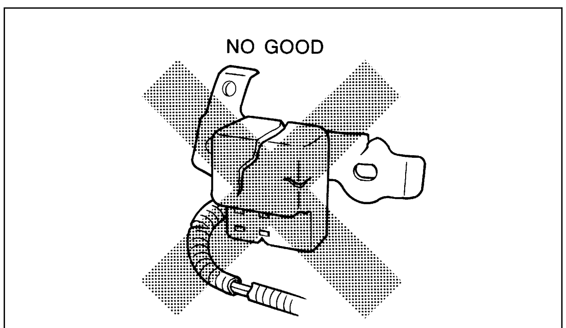
A: CAUTION S002001A03

- When servicing a vehicle, be sure to turn the ignition switch OFF, disconnect the ground cable from the battery, and wait for more than 20 seconds before starting work.
- The airbag system is fitted with a backup power source. If the airbag system is serviced within 20 seconds after the ground cable is disconnected, it may inflate.



G5M0292

- If sensors, airbag module, airbag control module and harness are deformed or damaged, replace them with new genuine parts.
- Do not use the airbag system on other vehicles. When replacing parts, be sure to replace them with new parts.

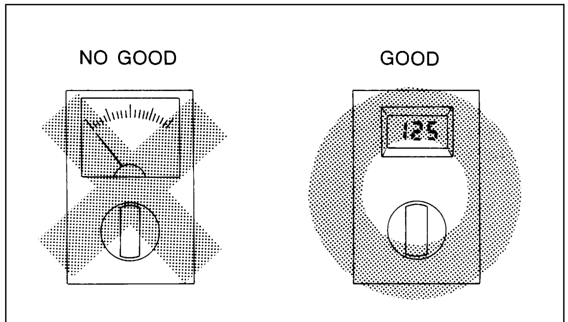


G5M0291

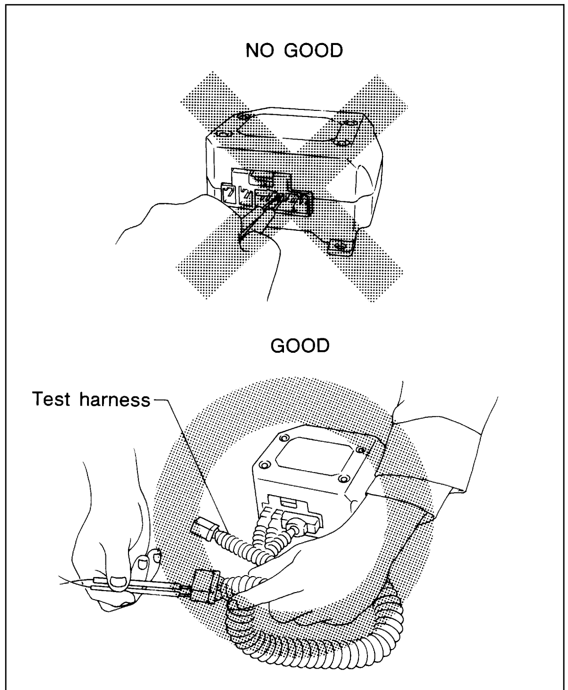
- When checking the system, be sure to use a digital circuit tester.

Use of an analog circuit tester may cause the airbag to activate erroneously.

- When checking, use a test harness. Do not directly apply the tester probe to any connector terminal of the airbag.

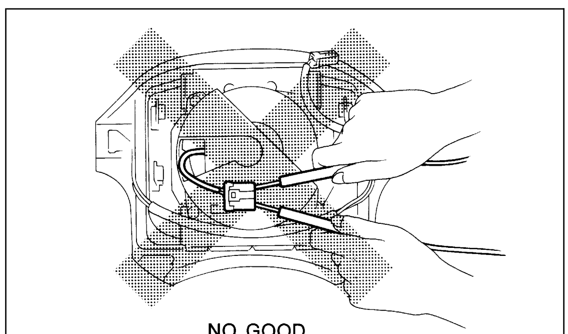


G5M0293



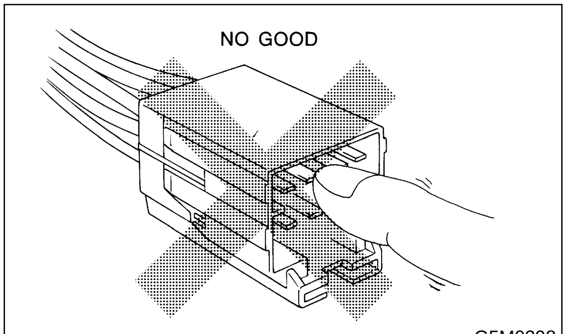
G5M0294

- Do not check continuity of the airbag module (driver, passenger, and side).



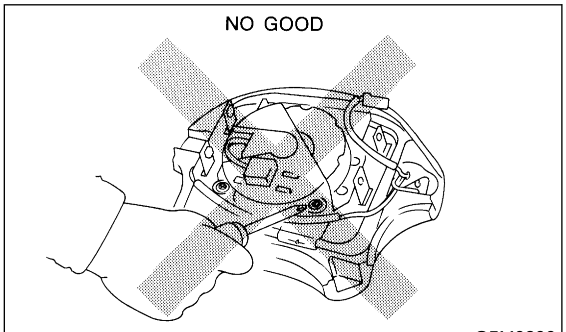
G5M0302

- Do not allow water or oil to come in contact with the connector terminals. Do not touch the connector terminals.



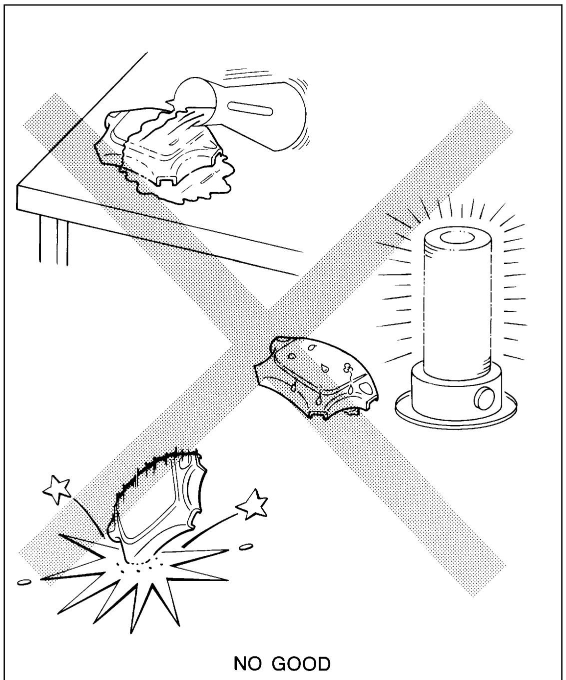
G5M0298

- The airbag module (driver, passenger, and side) must not be disassembled.
- The airbag module cannot be used again once inflated.



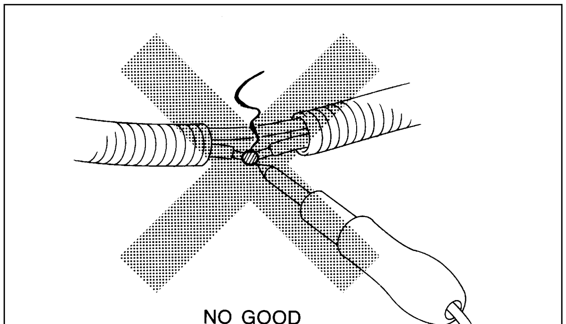
G5M0299

- Do not drop the airbag modulator parts, subject them to high temperature over 93°C (199°F), or let water, oil, or grease get on them; otherwise, the internal parts may be damaged and reliability greatly lowered.



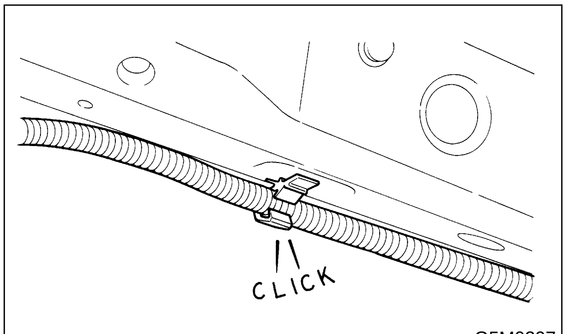
G5M0295

- If any damage, opening or rust is found on the airbag system wire harness, do not attempt to repair using soldering equipment. Be sure to replace the faulty harness with a new genuine part.



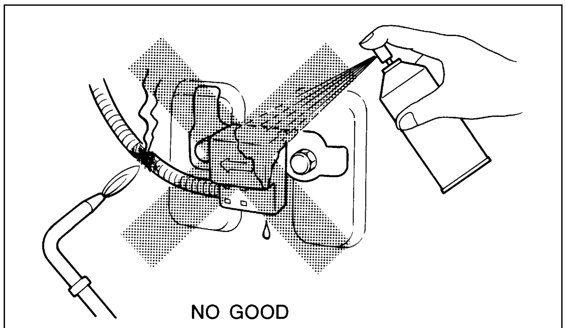
G5M0296

- Install the wire harness securely with the specified clips to avoid interference or tangled up with other parts.



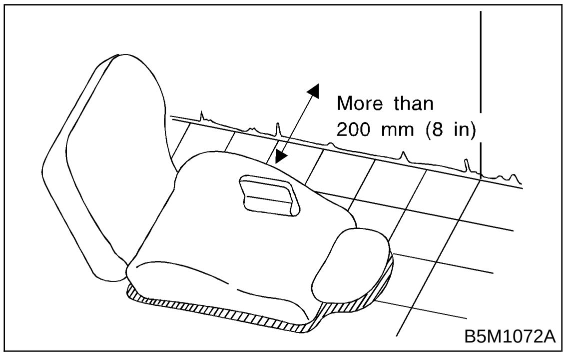
G5M0297

- When painting or performing sheet metal work on the front part of the vehicle, including the front wheel apron, front fender, and front side frame, remove the front sub sensors and wire harness of the airbag system.
- When painting or performing sheet metal work on the side of the vehicle, including the side sill, center pillar, and front and rear doors, remove the side airbag sensors and wire harness of the airbag system.



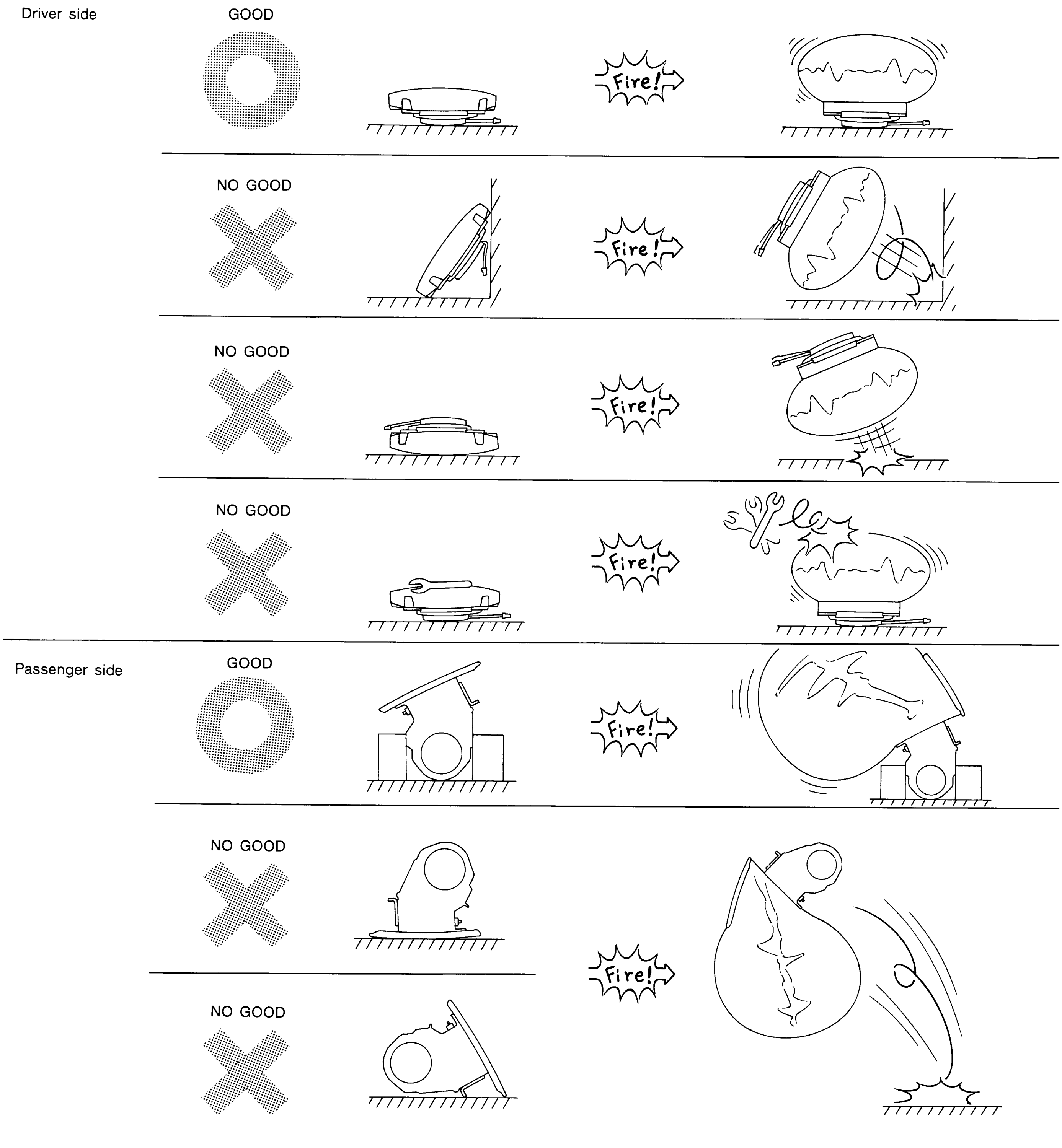
G5M0310

- The removed front seat with the airbag module must be kept at least 200 mm (8 in) away from walls and other objects.



B5M1072A

- When storing a removed airbag module, do not place any objects on it or pile airbag modules on top of each other. If the airbag inflates for some reason when it is placed with its pad side facing downward or under any object, a serious accident may result.


Driver side
GOOD
Fire!
NO GOOD
Fire!
NO GOOD
Fire!
NO GOOD
Fire!
Passenger side
GOOD
Fire!
NO GOOD
NO GOOD
Fire!

G5M0604

- Do not discard undeployed airbag modules. They could easily cause a serious accident if accidentally deployed.

B: INSPECTION *S002001A10*

Before diagnosing, check the following items that might be related to the engine problem:

1. BATTERY *S002001A1001*

Measure battery voltage and specific gravity of electrolyte.

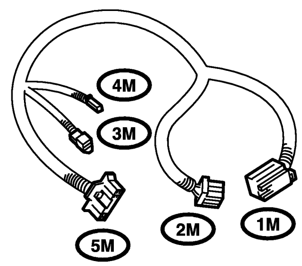
Standard voltage: 12V

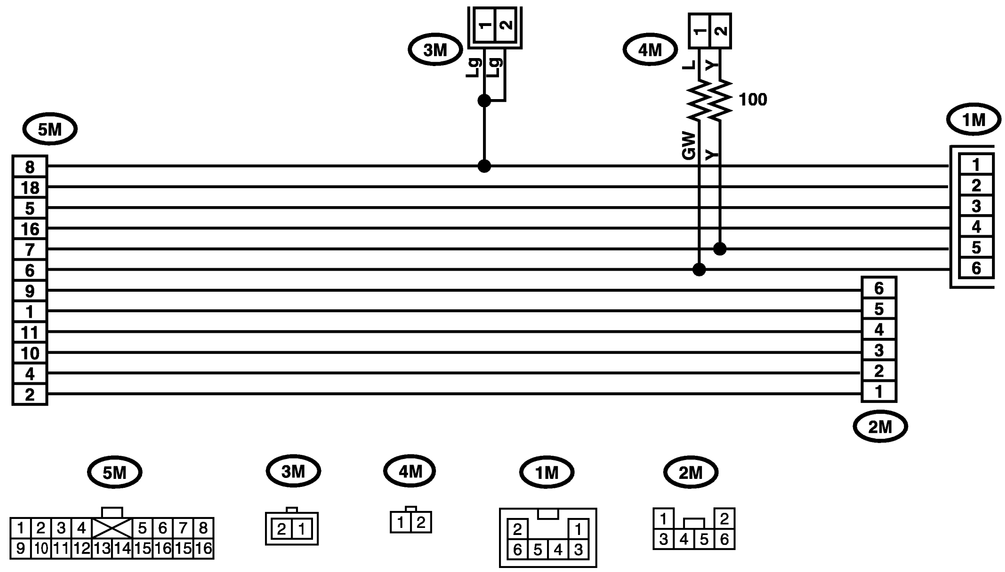
Specific gravity: Above 1.260

C: PREPARATION TOOL S002001A17

1. SPECIAL TOOL S002001A1711

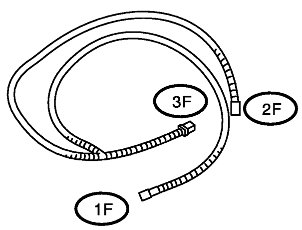
- **Test Harness M**

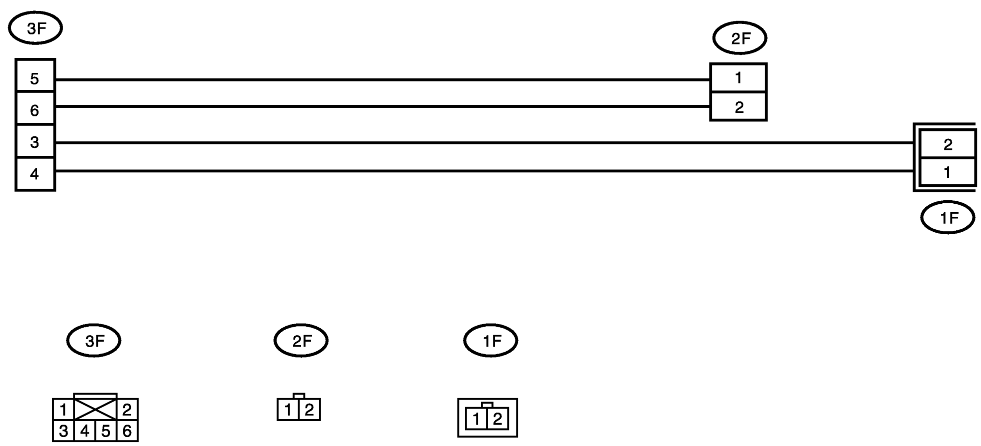
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 RE0033	98299FE02	TEST HARNESS M	Used when measuring voltage, resistance of airbag system.



RE0034

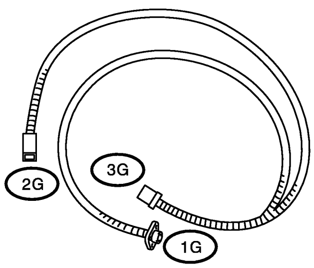
- **Test Harness F**

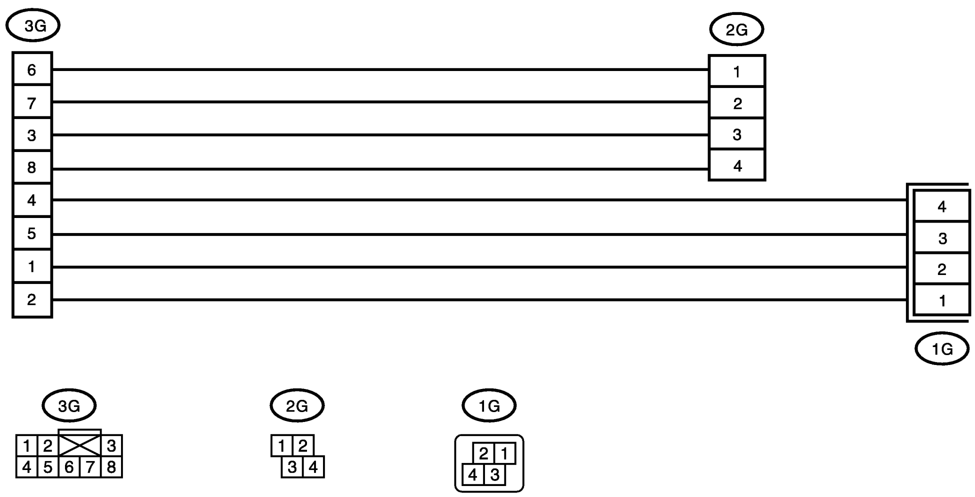
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 RE0035	98299FC010	TEST HARNESS F	Used when measuring voltage, resistance of airbag module harnesses.



RE0036

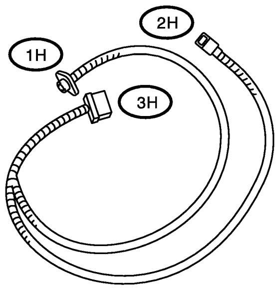
- **Test Harness G**

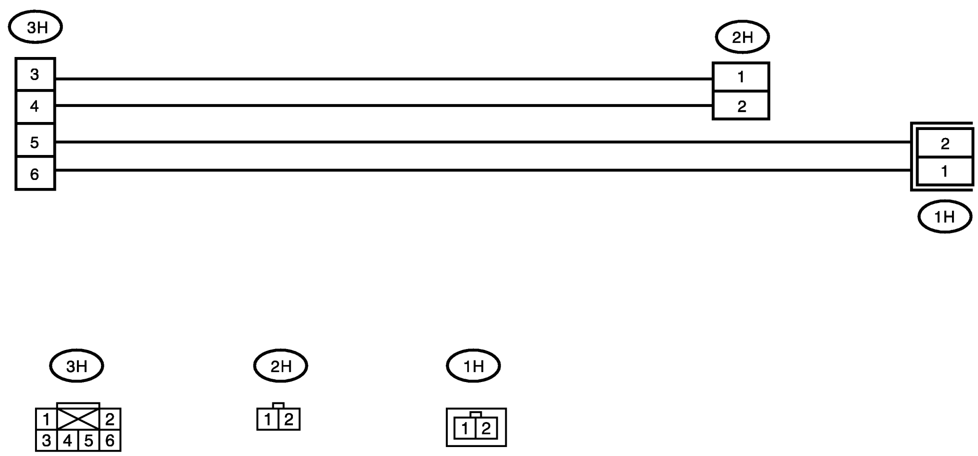
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 RE0037	98299FC020	TEST HARNESS G	Used when measuring voltage, resistance of airbag sensor.



RE0038

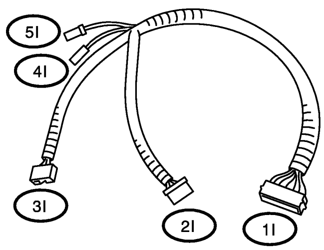
- **Test Harness H**

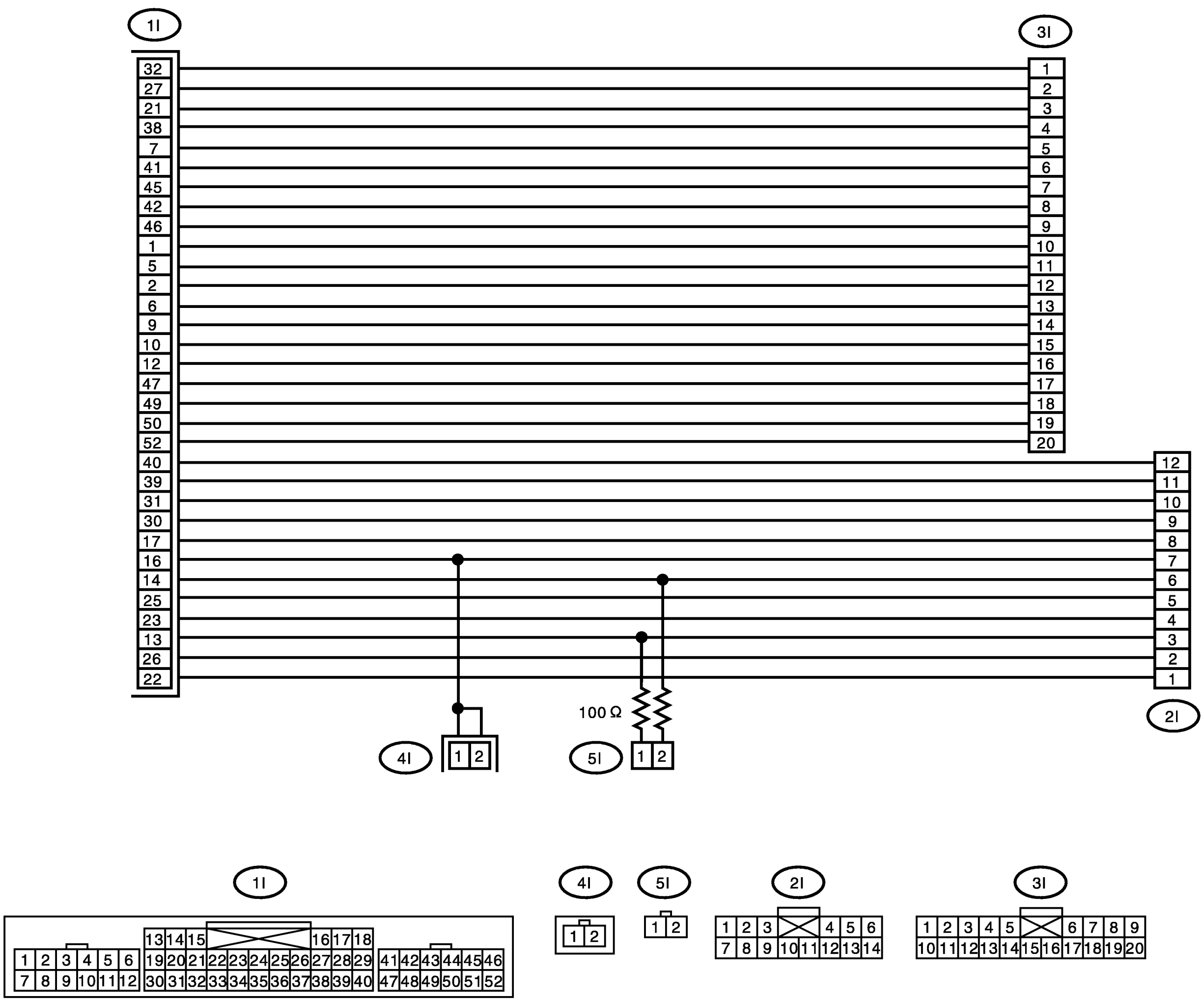
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 RE0039	98299FA030	TEST HARNESS H	Used when measuring voltage, resistance of front sub-sensor.



RE0040

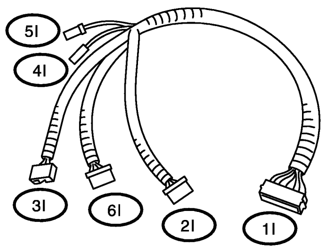
- **Test Harness I**

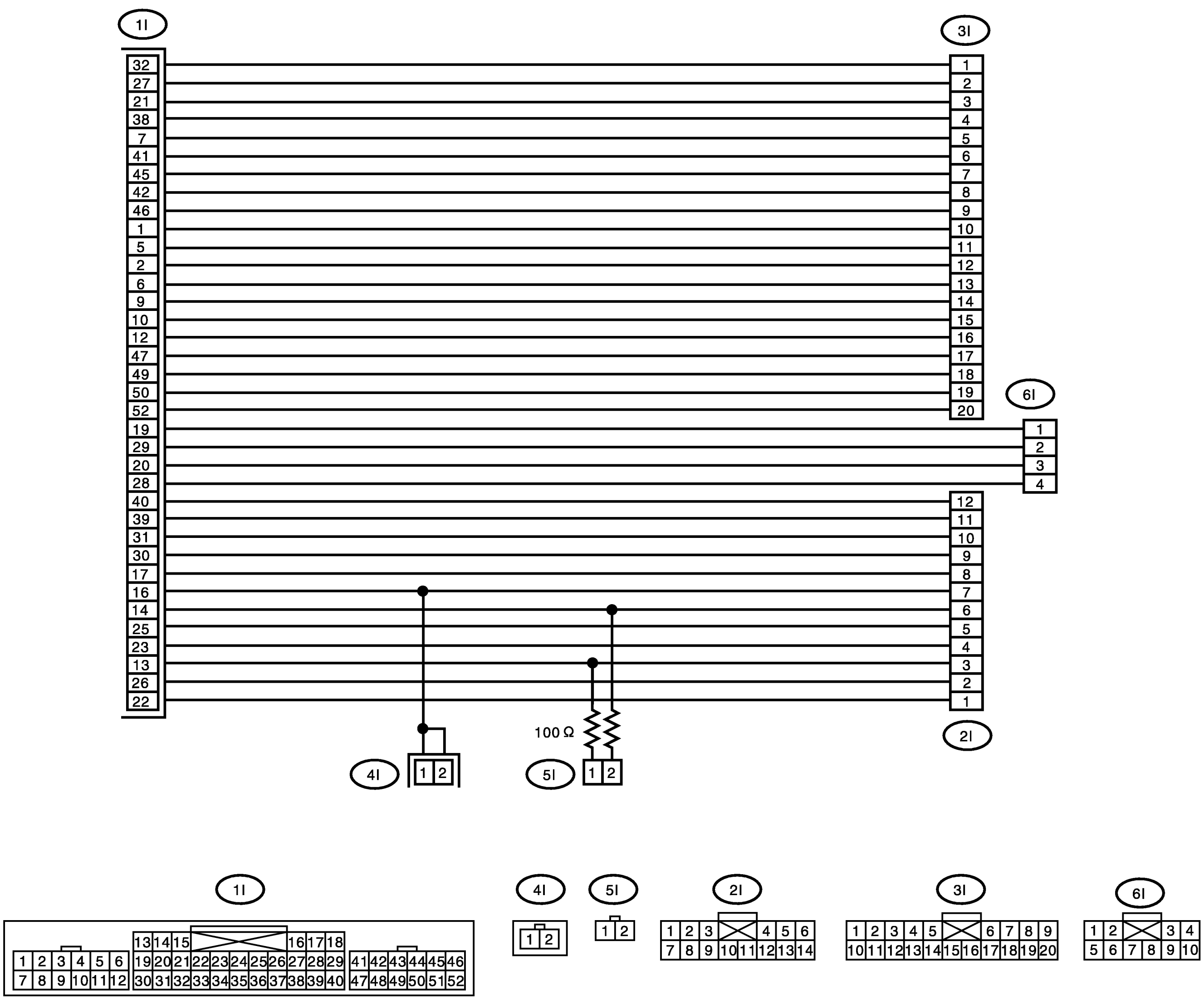
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 RE0043	98299FC040	TEST HARNESS I	Used when measuring voltage, resistance of airbag control module.



RE0044

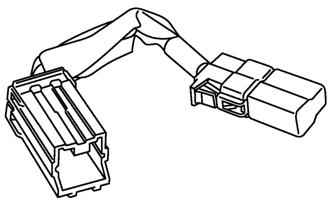
● Test Harness I2

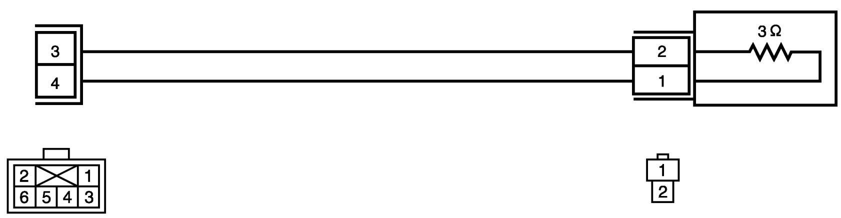
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 RE0045	98299FC041	TEST HARNESS I2	Used when measuring voltage, resistance of airbag control module.



RE0046

● Airbag Resistor

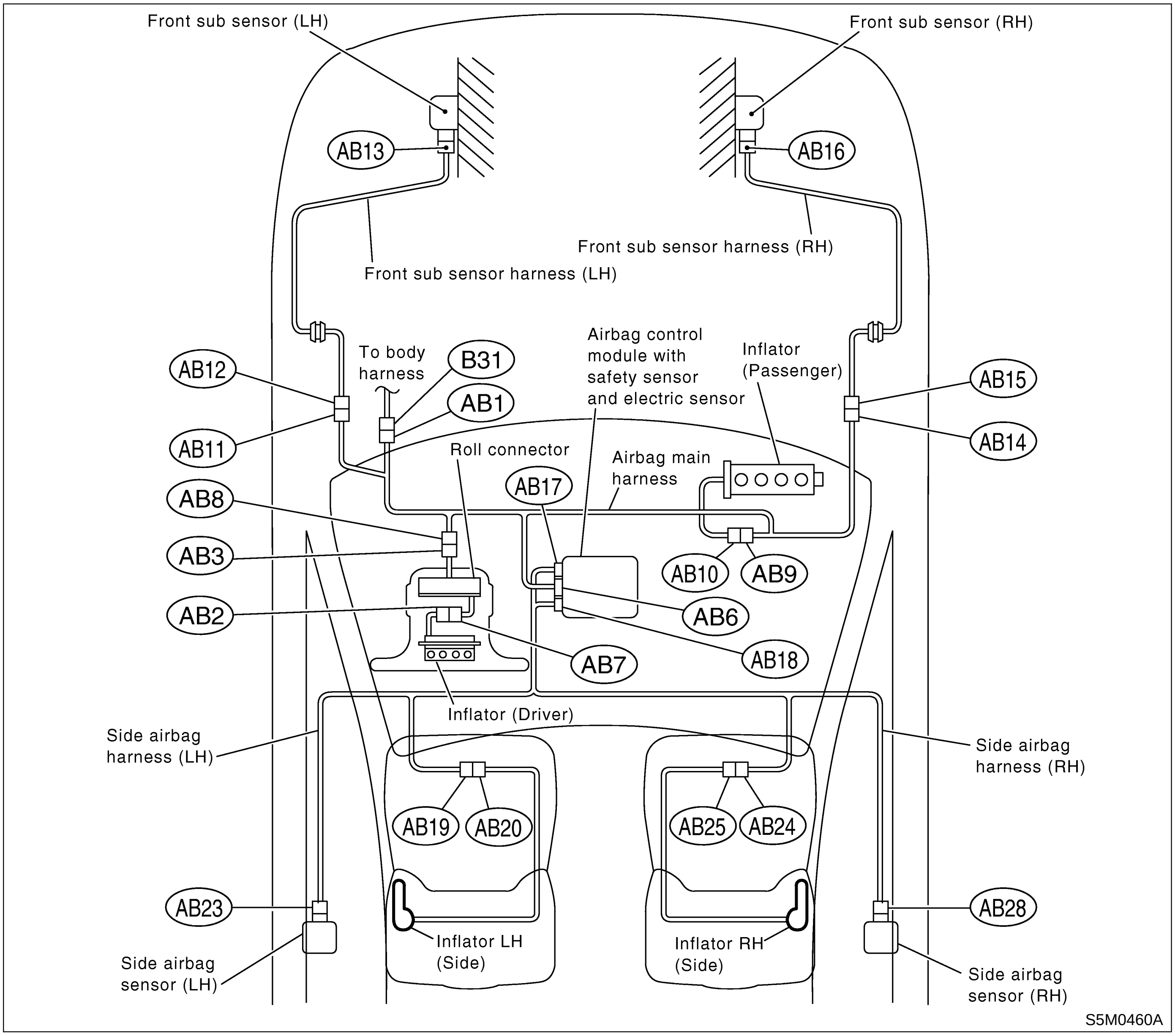
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 RE0047	98299PA040	AIRBAG RESISTOR	Used replacement of air bag module which resistance value is same as airbag module.



RE0048

4. Electrical Components Location S002507

A: LOCATION S002507A13



Connector No.	(AB1)	(AB2)	(AB3)	(AB6)	(AB7)	(AB8)	(AB9)	(AB10)	(AB11)	(AB12)	(AB13)
Pole	7	2	2	28	2	2	2	2	2	2	2
Color	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Blue	Blue	Yellow
Male/ Female	Male	Male	Male	Female	Female	Female	Female	Male	Female	Male	Female
Connector No.	(AB14)	(AB15)	(AB16)	(AB17)	(AB18)	(AB19)	(AB20)	(AB23)	(AB24)	(AB25)	(AB28)
Pole	2	2	2	12	12	2	2	4	2	2	4
Color	Blue	Blue	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Male/ Female	Female	Male	Female	Female	Female	Female	Male	Female	Female	Male	Female

5. A/B Control Module I/O Signal *S002745*

A: SCHEMATIC *S002745A21*

<Ref. to WI-28, SCHEMATIC, Airbag System.>

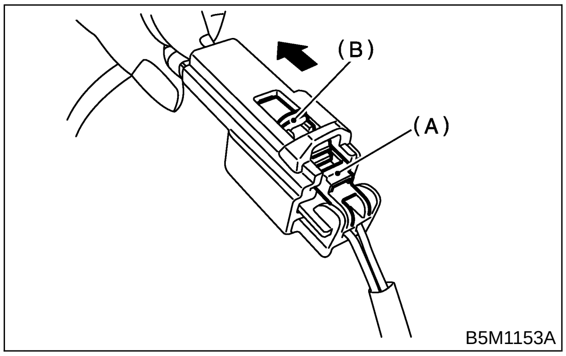
6. Airbag Connector *S002659*

A: OPERATION *S002659A16*

1. DRIVER'S AIRBAG, PASSENGER'S AIRBAG, SIDE AIRBAG *S002659A1607*

- **How to disconnect:**

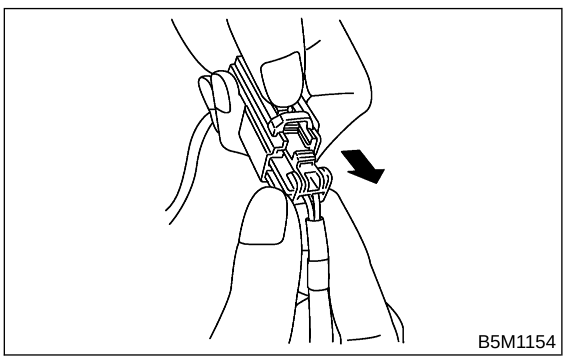
1) Push lock arm (A).
2) With lock arm (A) pushed in, move slide lock (B) in the direction of the arrow.



B5M1153A

3) With slide lock (B) pulled, return lock arm (A) to its original position, and then pull in the direction of the arrow to separate the connector.

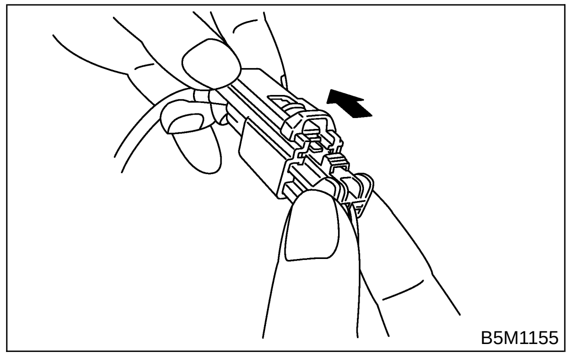
CAUTION:
When pulling, be sure to hold onto the connector and not the wire.


B5M1154

- **How to connect:**

Holding the connector, and push it in carefully until a connecting sound is heard.

CAUTION:
Be sure to insert the connector in until it locks. Then pull on it gently to make sure that it is locked.

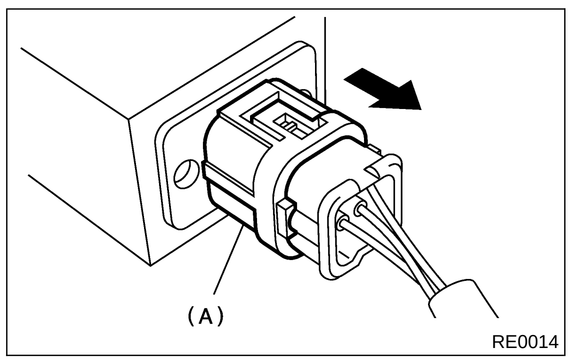

B5M1155

2. FRONT SUB-SENSOR, SIDE AIRBAG SENSOR *S002659A1603*

- **How to disconnect:**

1) Holding outer part (A), pull in the direction of the arrow.

CAUTION:
When pulling, be sure to hold onto the connector and not the wire.

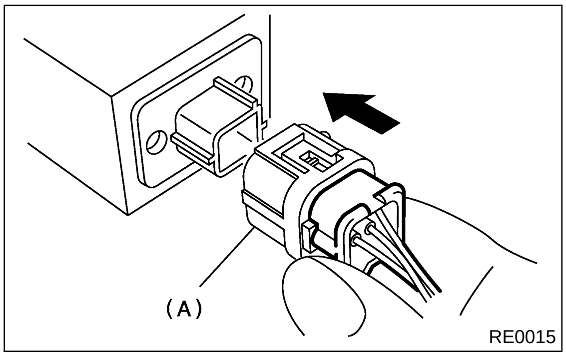


RE0014

● **How to connect:**

Holding the connector, and push in carefully until a connecting sound is heard.

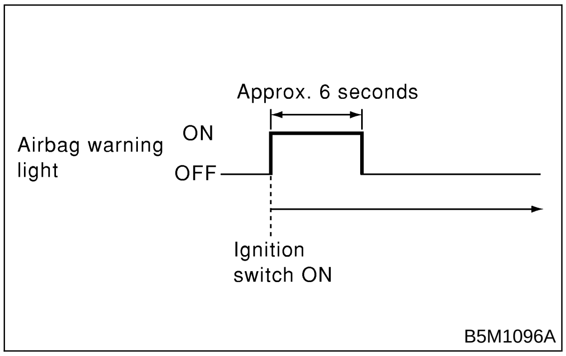
CAUTION:
● Outer (A) moves back, and so do not put your hand on the outer part.
● Be sure to insert the connector in until it locks. Then pull on it gently to make sure that it is locked.



7. Airbag Warning Light Illumination Pattern S002629

A: INSPECTION S002629A10

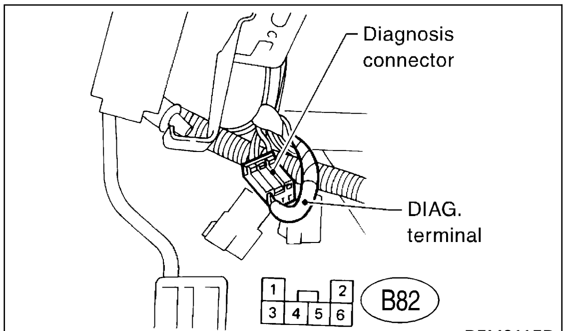
Keep the ignition switch ON, and confirm that the airbag warning light remains off approximately 6 seconds after being turned on.



8. Read Diagnostic Trouble Code S002508

A: OPERATION S002508A16

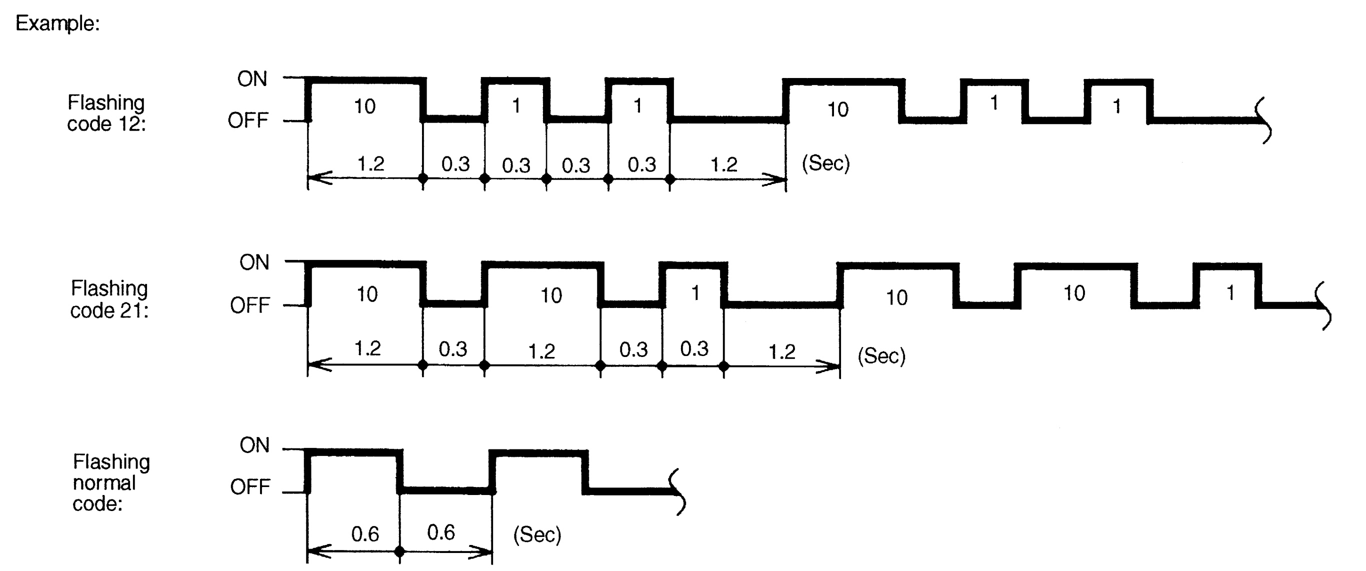
1) Turn the ignition switch ON.
2) Connect the diagnosis terminal to diagnosis connector terminal No. 1 in the driver's seat lower cover area.



B5M0115D

3) Read trouble code by identifying the way the air bag warning light flashes.
The airbag warning light flashes a code corresponding to the faulty parts.
The long segment (1.2 sec on) indicates a "ten", and the short segment (0.3 sec on) indicates a "one".

NOTE:
- "List of Diagnostic Trouble Code" <Ref. to AB-30, List of Diagnostic Trouble Code (DTC).>
- "Airbag Warning Light Failure" <Ref. to AB-24, Airbag Warning Light Failure.>



B5M0117A

4) Turn the ignition switch OFF, and disconnect the diagnosis terminal from the diagnosis connector terminal No 1.
5) Wind tape around the diagnosis terminal and return it to its original position.

9. Inspection Mode *S002510*

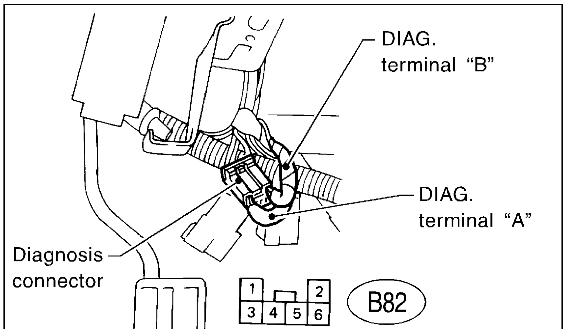
A: OPERATION *S002510A16*

Recreate the circumstance by referring to the conditions described in the checklist.

10. Clear Memory Mode *S002513*

A: OPERATION *S002513A16*

1) Turn the ignition switch ON.
2) Connect the diagnosis terminal “A” to diagnosis connector terminal No. 1 in the driver’s seat lower cover area.



B5M0116D

3) While the warning light flashes, connect another diagnosis terminal “B” to diagnosis connector terminal No.2.
4) Once the memory is erased, the warning light returns to the normal flash rate (0.6 sec on). The failure to recover the normal flash rate indicates that trouble parts still remain. Having repaired such parts, erase the memory again and confirm that the normal flash rate has returned.
5) When the memory has been cleared, disconnect the diagnosis terminal from the diagnosis connector.
6) Wind tape around the diagnosis terminal and return it to its original position.

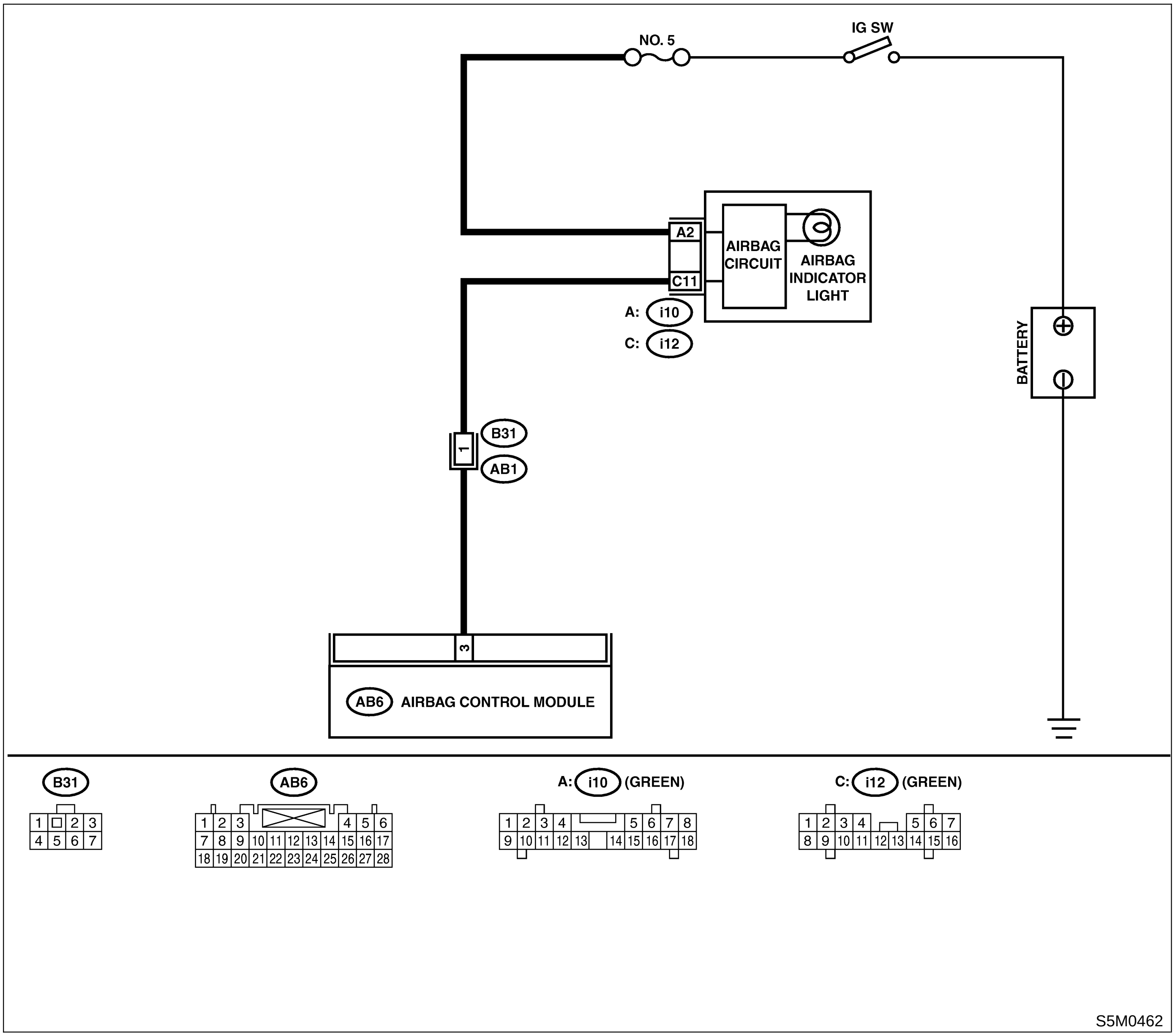
11. Airbag Warning Light Failure *S002681*

A: AIRBAG WARNING LIGHT REMAINS ON. *S002681E28*

DIAGNOSIS:
- Airbag warning light unit is faulty.
- Airbag control module to airbag warning light circuit is shorted or open.
- Grounding circuit is faulty.
- Airbag control module is faulty.
- (AB1) and (B31) are not connected properly.
- (AB6) is not connected properly to airbag control module.

CAUTION:
- **Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground cable from the battery, and wait more than 20 seconds before starting to work.**
- **Before replacing the airbag module, roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.**
- **When inspecting the airbag main harness, disconnect the airbag module connector of the driver and passenger seats for safety reasons.**

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK POOR CONTACT IN CONNECTORS (AB1) AND (B31).** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Remove front pillar lower trim. (Driver's side) 3) Confirm that firm contact is secured between connectors (AB1) and (B31).	Is the poor contact in double lock of connectors (AB1) and (B31)?	Repair the body harness or replace airbag main harness.<Ref. to AB-16, Main Harness.>	Go to step **2**.

No.	Step	Check	Yes	No
2	**CHECK AIRBAG WARNING LIGHT.** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Connect the connector (1A) in test harness A to the body harness connector (B31). 3) Connect the battery ground cable and turn the ignition switch ON. 4) Connect two connectors, (3A) and (4A) in test harness A.	Is the airbag warning light turned off?	Go to step **4**.	Go to step **3**.
3	**CHECK BODY HARNESS.** Check the body harness. NOTE: After problem has been eliminated, disconnect connectors (3A) and (4A).	Is the anything unusual to body harness?	Repair the body harness.	Replace combination meter printed circuit. <Ref. to IDI-12, Combination Meter Assembly.>
4	**CHECK POOR CONTACT.** Confirm that firm contact is secured between the airbag control module and the connector (AB6). <Ref. to AB-18, Airbag Control Module.>	Is the poor contact in connector (AB6)?	Replace airbag main harness. <Ref. to AB-16, Main Harness.> or Replace the airbag control module. <Ref. to AB-18, Airbag Control Module.>	Go to step **5**.
5	**CHECK AIRBAG MAIN HARNESS.** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Connect the connector (AB1) to (B31). 3) Disconnect connectors (AB3) and (AB8). 4) Remove glove box and disconnect connectors (AB10) and (AB9). 5) Disconnect the connector (AB6) from the airbag control module, and connect the connector (1I) in test harness I or I2. <Ref. to AB-18, Airbag Control Module.> 6) Connect the battery ground cable and turn the ignition switch ON. 7) Connect connectors (4I) and (5I) in test harness I or I2. NOTE: After problem has been eliminated, disconnect connectors (4I) and (5I).	Is the airbag warning light turned off?	Go to step **6**.	Replace airbag main harness. <Ref. to AB-16, Main Harness.>
6	**CHECK GROUNDING CIRCUIT.** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB1) from the body harness connector (B31). 3) Connect the connector (1A) in test harness A to body harness connector (B31). 4) Measure the resistance between connector (5A) in test harness A and the chassis ground. ***Connector & terminal*** ***(5A) No. 17 — Chassis ground:*** ***(5A) No. 18 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **7**.	Repair body-grounding circuit.

No.	Step	Check	Yes	No
7	**CHECK AIRBAG MAIN HARNESS.** 1) Connect the connector (AB1) to (B31). 2) Disconnect the connector (AB6) from the airbag control module, and connect the connector (1I) in test harness I or I2. <Ref. to AB-18, Airbag Control Module.> 3) Measure the resistance between connector (2I) in test harness I or I2 and the chassis ground. ***Connector & terminal*** ***(2I) No. 9 — Chassis ground:*** ***(2I) No. 10 — Chassis ground:***	Is the resistance less than 10 Ω?	Replace the airbag control module. <Ref. to AB-18, Airbag Control Module.>	Replace airbag main harness. <Ref. to AB-16, Main Harness.>

B: AIRBAG WARNING LIGHT REMAINS OFF. S002681E27

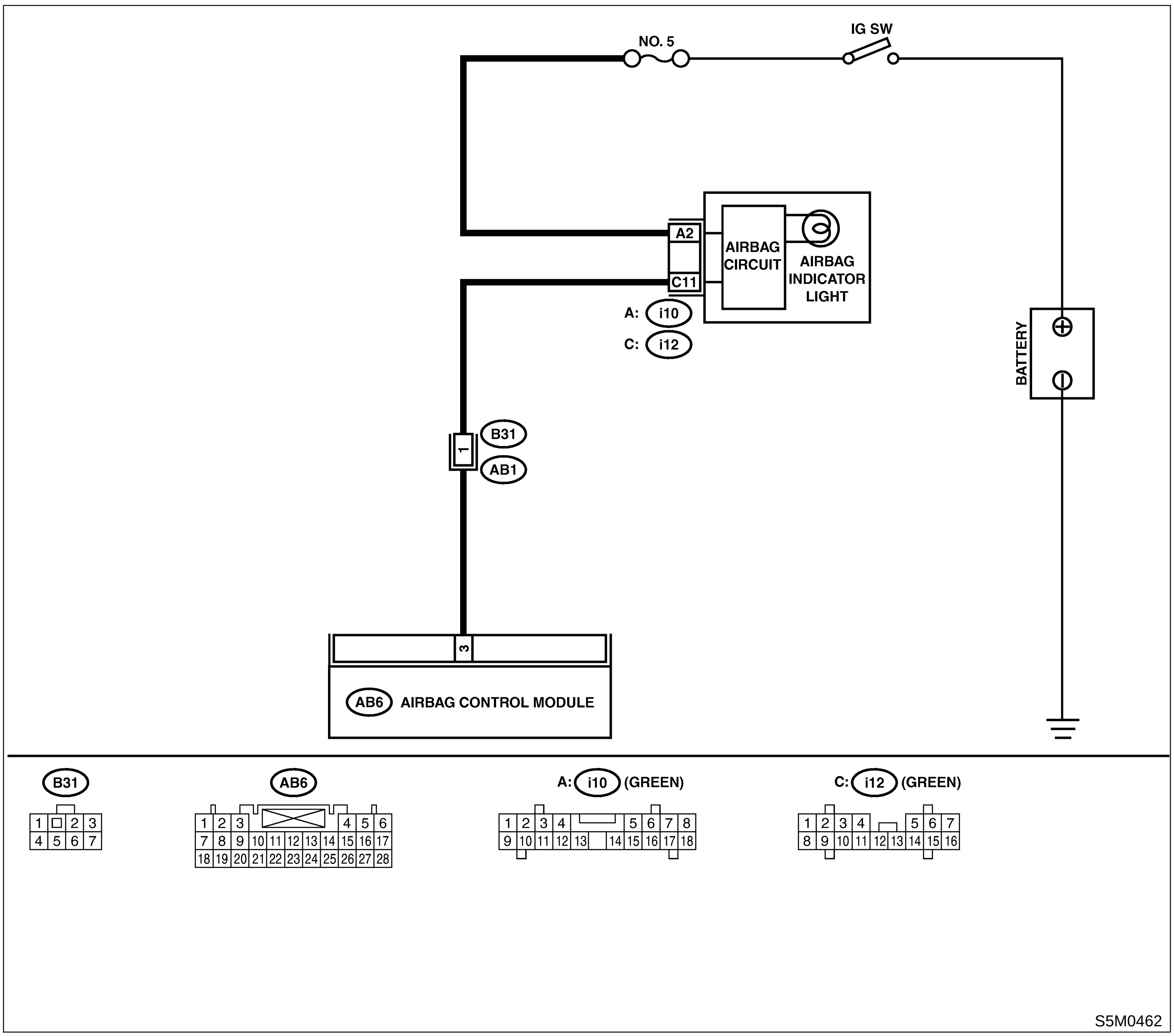
DIAGNOSIS:

- Fuse No. 5 (in fuse box) is blown.
- Body harness circuit is open.
- Airbag warning light is faulty.
- Airbag main harness is faulty.
- Airbag control module is faulty.

CAUTION:

- **Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground cable from the battery, and wait more than 20 seconds before starting to work.**
- **Before replacing the airbag module, roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.**
- **When inspecting the airbag main harness, disconnect the airbag module connector of the driver and passenger seats for safety reasons.**

WIRING DIAGRAM:



AIRBAG WARNING LIGHT FAILURE

No.	Step	Check	Yes	No
1	**CHECK COMBINATION METER.** Turn the ignition switch ON, and confirm that warning lights equipped in the combination meter are turned on.	Do warning lights not for the airbag turn on?	Go to step **2**.	Repair combination meter power supply. <Ref. to IDI-4, Combination Meter System.>
2	**CHECK FUSE NO. 5 (IN MAIN FUSE BOX).** Remove fuse No. 5 and perform visual inspection.	Is fuse No. 5 (in main fuse box) blown?	Replace fuse No. 5. If fuse No. 5 blows again, go to step 3.	Go to step **3**.
3	**CHECK AIRBAG WARNING LIGHT CIRCUIT (IN COMBINATION METER).** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB1) from (B31). 3) Connect the battery ground cable and turn the ignition switch ON.	Is the airbag warning light turned on?	Go to step **4**.	Replace airbag warning light bulb or combination meter printed circuit. <Ref. to IDI-12, Combination Meter Assembly.>
4	**CHECK AIRBAG MAIN HARNESS.** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Connect the connector (AB1) to (B31). 3) Disconnect the connector (AB6) from the airbag control module. <Ref. to AB-18, Airbag Control Module.> 4) Connect the battery ground cable and turn the ignition switch ON.	Is the airbag warning light turned on?	Replace the airbag control module. <Ref. to AB-18, Airbag Control Module.>	Replace airbag main harness. <Ref. to AB-16, Main Harness.>

12. List of Diagnostic Trouble Code (DTC) S002525

A: LIST S002525A12

DTC No.	Memory function	Contents of diagnosis	Index No.
11	Provided.	● Airbag main harness circuit is open, shorted or shorted to ground. ● Airbag module harness (driver) circuit is open, shorted or shorted to ground. ● Roll connector circuit is open, shorted or shorted to ground. ● Airbag control module is faulty. ● Driver's airbag module is faulty.	<Ref. to AB-33, DTC 11, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
12	Provided.	● Airbag main harness circuit is open, shorted or shorted to ground. ● Airbag module harness (passenger) circuit is open, shorted or shorted to ground. ● Airbag control module is faulty. ● Passenger's airbag module is faulty.	<Ref. to AB-37, DTC 12, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
15	Provided.	● Airbag main harness circuit (driver) is shorted to power supply. ● Airbag module harness (driver) is shorted to power supply. ● Roll connector is shorted to power supply. ● Airbag control module is faulty. ● Driver's airbag module is faulty.	<Ref. to AB-39, DTC 15, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
16	Provided.	● Airbag main harness circuit (passenger) is shorted to power supply. ● Airbag module harness (passenger) is shorted to power supply. ● Airbag control module is faulty. ● Passenger's airbag module is faulty.	<Ref. to AB-41, DTC 16, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
21	Provided.	Airbag control module is faulty.	<Ref. to AB-42, DTC 21, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
22	Provided.	Front airbag module is inflated.	<Ref. to AB-43, DTC 22, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
23	Not provided.	(AB6), (AB17) and (AB18) are not connected properly to airbag control module.	<Ref. to AB-45, DTC 23, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
24	Not provided.	● Airbag control module is faulty. ● Airbag main harness circuit is open. ● Fuse No. 11 (in joint box) is blown. ● Body harness circuit is open.	<Ref. to AB-45, DTC 24, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
25	Provided.	● Airbag control module is faulty. ● Airbag main harness circuit is open. ● Fuse No. 6 (in joint box) is blown. ● Body harness circuit is open.	<Ref. to AB-47, DTC 25, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
31	Provided.	● Front sub-sensor harness (RH) circuit is shorted. ● Front sub-sensor harness (RH) circuit is open. ● Front sub-sensor (RH) is faulty. ● Airbag control module is faulty.	<Ref. to AB-49, DTC 31, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
32	Provided.	● Front sub-sensor harness (LH) circuit is shorted. ● Front sub-sensor harness (LH) circuit is open. ● Front sub-sensor (LH) is faulty. ● Airbag control module is faulty.	<Ref. to AB-53, DTC 32, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC No.	Memory function	Contents of diagnosis	Index No.
41	Provided.	● Side airbag harness (RH) is faulty. ● Side airbag module (RH) is faulty. ● Airbag control module is faulty.	<Ref. to AB-57, DTC 41, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
42	Provided.	● Side airbag harness (LH) is faulty. ● Side airbag module (LH) is faulty. ● Airbag control module is faulty.	<Ref. to AB-59, DTC 42, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
45	Provided.	● Side airbag harness (RH) is shorted to power supply. ● Airbag control module is faulty.	<Ref. to AB-61, DTC 45, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
46	Provided.	● Side airbag harness (LH) is shorted to power supply. ● Airbag control module is faulty.	<Ref. to AB-63, DTC 46, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
51	Provided.	● Side airbag sensor (RH) is faulty. ● Side airbag harness (RH) is faulty. ● Airbag control module is faulty.	<Ref. to AB-65, DTC 51, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
52	Provided.	● Side airbag sensor (LH) is faulty. ● Side airbag harness (LH) is faulty. ● Airbag control module is faulty.	<Ref. to AB-67, DTC 52, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
53	Provided.	Side airbag sensor (RH) is faulty.	<Ref. to AB-68, DTC 53, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
54	Provided.	Side airbag sensor (LH) is faulty.	<Ref. to AB-68, DTC 54, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
55	Provided.	Side airbag module is inflated.	<Ref. to AB-68, DTC 55, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

MEMO:

13. Diagnostic Procedure with Diagnostic Trouble Code (DTC) S002521

A: DTC 11 S002521I86

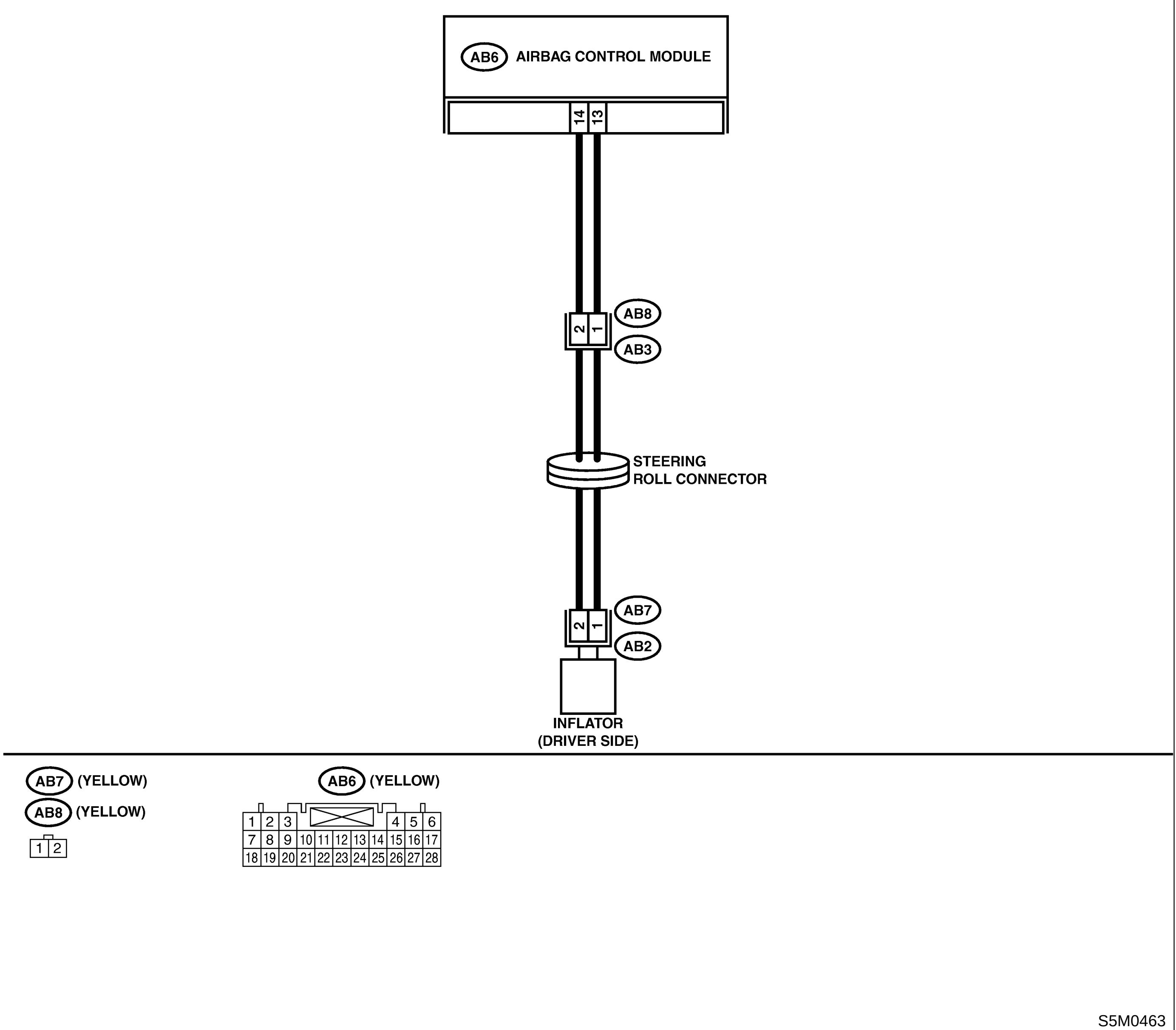
DIAGNOSIS:

- Airbag main harness circuit is open, shorted or shorted to ground.
- Airbag module harness (Driver) circuit is open, shorted or shorted to ground.
- Roll connector circuit is open, shorted or shorted to ground.
- Driver's airbag module is faulty.
- Airbag control module is faulty.

CAUTION:

- **Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground cable from the battery, and wait more than 20 seconds before starting to work.**
- **Before replacing the airbag module, roll controller, control module, and sensor, reconnect each part and confirm that the warning light operates properly.**
- **When inspecting the airbag main harness, disconnect the driver's airbag module and passenger's airbag module connectors for safety reasons.**

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK DRIVER'S AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Remove the driver's airbag module. <Ref. to AB-13, Driver's Airbag Module.> 3) Connect the connector (1F) in test harness F to connector (AB7). 4) Connect airbag resistor to connector (3F) in test harness F. 5) Connect the battery ground cable and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the driver's airbag module. <Ref. to AB-13, Driver's Airbag Module.>	Go to step **2**.

No.	Step	Check	Yes	No
2	**CHECK ROLL CONNECTOR.** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 second. 2) Disconnect the test harness from the connector (AB7). 3) Remove the lower cover panel, disconnect the connector (AB3) from (AB8) and connect the connector (1F) in test harness F to connector (AB8). 4) Connect the airbag resistor to connector (3F) in test harness F. 5) Connect the battery ground cable and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the roll connector. <Ref. to AB-20, Roll Connector.>	Go to step **3**.
3	**CHECK AIRBAG MAIN HARNESS.** 1) Turn the ignition switch OFF, disconnect the ground cable, and wait more than 20 seconds. 2) Disconnect the airbag resistor from the connector (3F) in test harness F. 3) Remove the glove box, <Ref. to AB-14, Passenger's Airbag Module.> and disconnect connectors (AB10) and (AB9). 4) Disconnect the connector (AB6) from the airbag control module, and connect the connector (1I) in test harness I or I2. <Ref. to AB-18, Airbag Control Module.> 5) Measure the resistance between connector (2I) in test harness I or I2 and the connector (3F) in test harness F. ***Connector & terminal*** ***(2I) No. 1 — (3F) No. 3:*** ***(2I) No. 4 — (3F) No. 4:***	Is the resistance less than 10 Ω?	Go to step **4**.	Replace airbag main harness. <Ref. to AB-16, Main Harness.>
4	**CHECK AIRBAG MAIN HARNESS.** Measure the resistance of the connector (2I) in test harness I or I2. ***Connector & terminal*** ***(2I) No. 1 — No. 4:*** ***(2I) No. 4 — Chassis ground:*** ***(2I) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-18, Airbag Control Module.>	Replace airbag main harness. <Ref. to AB-16, Main Harness.>

MEMO:

B: DTC 12 *S002521I87*

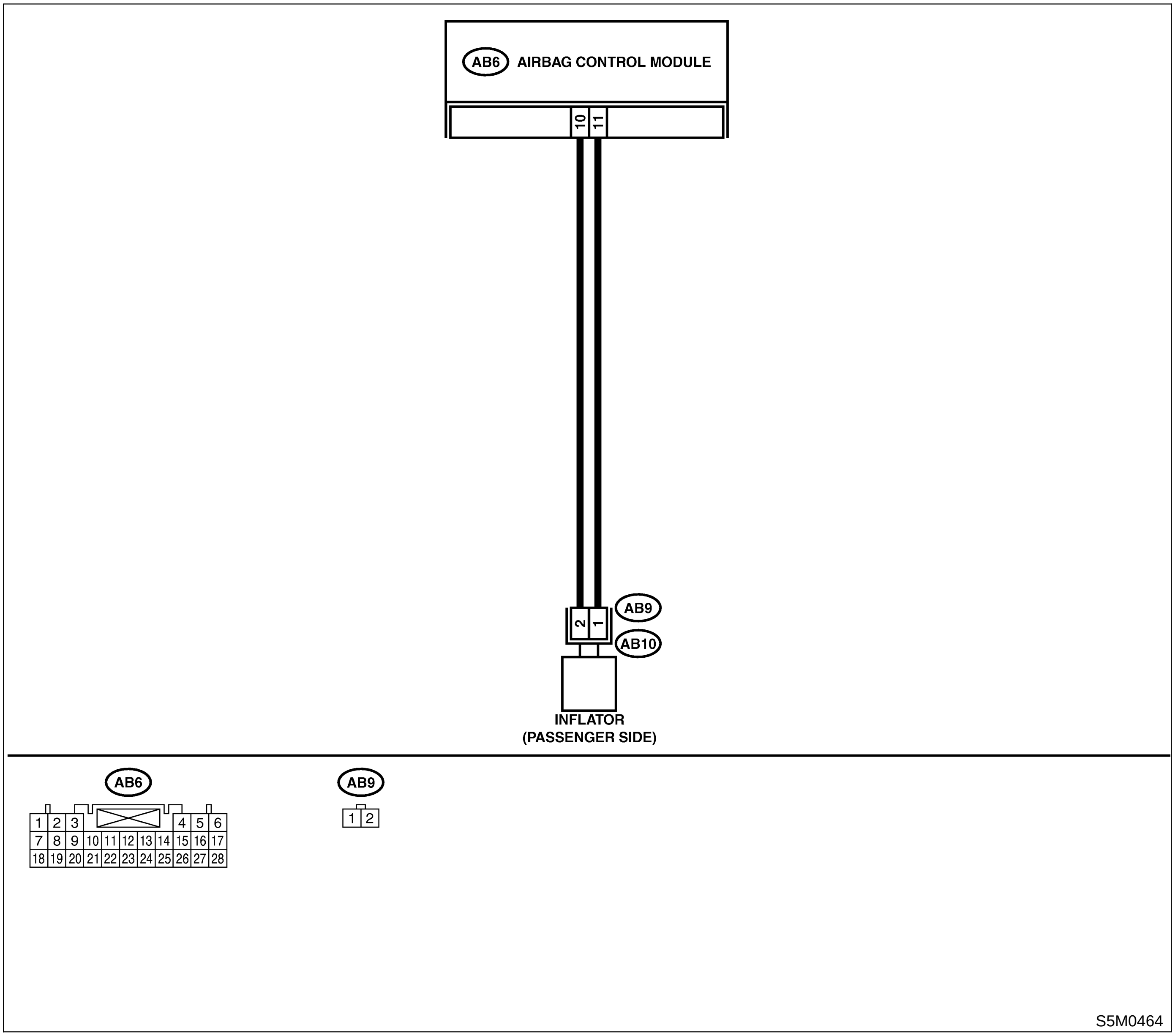
DIAGNOSIS:

- Airbag main harness circuit is open, shorted or shorted to ground.
- Airbag module harness (Passenger) circuit is open, shorted or shorted to ground.
- Passenger's airbag module is faulty.
- Airbag control module is faulty.

CAUTION:

- **Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground cable from the battery, and wait more than 20 seconds before starting to work.**
- **Before replacing the airbag module, roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.**
- **When inspecting the airbag main harness, disconnect the airbag module connector of the driver and passenger seats for safety reasons.**

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK PASSENGER'S AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Remove the glove box. 3) Disconnect the connector (AB10) from (AB9). 4) Connect the connector (1F) in test harness F to connector (AB9). 5) Connect the airbag resistor to connector (3F) in test harness F. 6) Connect the battery ground cable and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the passenger airbag module. <Ref. to AB-14, Passenger's Airbag Module.>	Go to step **2**.
2	**CHECK AIRBAG MAIN HARNESS.** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the airbag resistor from the connector (3F) in test harness F. 3) Remove lower cover and disconnect the connector (AB3) from (AB8). 4) Disconnect the connector (AB6) from the airbag control module, and connect the connector (1I) in test harness I or I2. <Ref. to AB-18, Airbag Control Module.> 5) Measure the resistance between connector (2I) in test harness I or I2 and the connector (3F) in test harness F. ***Connector & terminal*** ***(2I) No. 2 — (3F) No. 3:*** ***(2I) No. 5 — (3F) No. 4:***	Is the resistance less than 10 Ω?	Go to step **3**.	Replace airbag main harness. <Ref. to AB-16, Main Harness.>
3	**CHECK AIRBAG MAIN HARNESS.** Measure the resistance of the connector (2I) in test harness I or I2. ***Connector & terminal*** ***(2I) No. 2 — No. 5:*** ***(2I) No. 2 — Chassis ground:*** ***(2I) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace airbag control module. <Ref. to AB-18, Airbag Control Module.>	Replace airbag main harness. <Ref. to AB-16, Main Harness.>

C: DTC 15 S002521I88

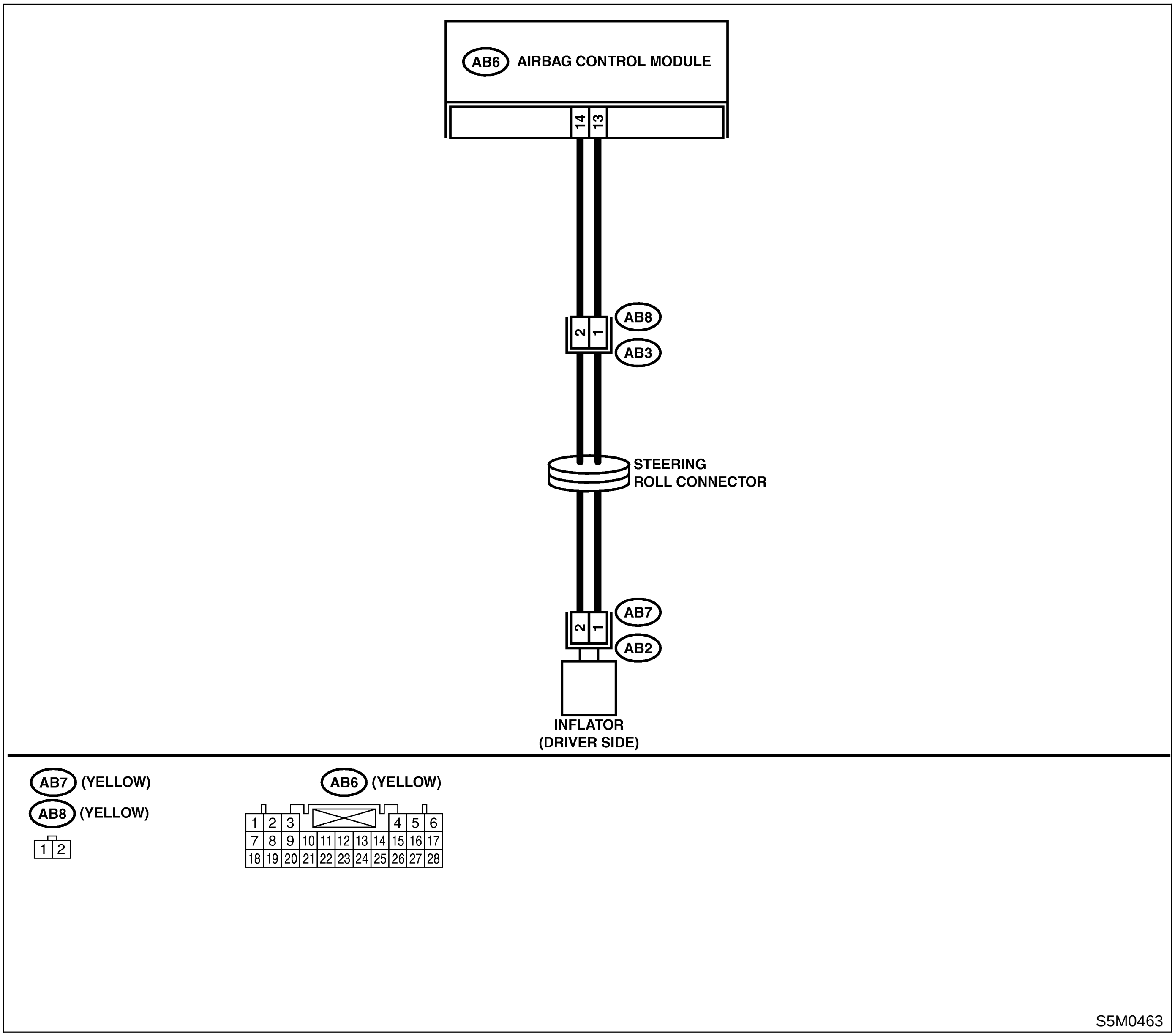
DIAGNOSIS:

- Airbag main harness circuit (Driver) is shorted to the power supply.
- Airbag module harness (Driver) is shorted to the power supply.
- Roll connector is shorted to the power supply.
- Driver's airbag module is faulty.
- Airbag control module is faulty.

CAUTION:

- **Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground cable from the battery, and wait more than 20 seconds before starting to work.**
- **Before replacing the airbag module, roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.**
- **When inspecting the airbag main harness, disconnect the driver's airbag module and passenger's airbag module connectors for safety reasons.**

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK DRIVER'S AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Remove the driver's airbag module. <Ref. to AB-13, Driver's Airbag Module.> 3) Connect the connector (AB7) to connector (1F) in test harness F. 4) Connect the airbag resistor to connector (3F) in test harness F. 5) Connect the battery ground cable and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the driver's airbag module. <Ref. to AB-13, Driver's Airbag Module.>	Go to step **2**.
2	**CHECK ROLL CONNECTOR.** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the test harness from the connector (AB7). 3) Remove the lower cover panel and disconnect the connector (AB3) from (AB8). 4) Connect the connector (1F) in test harness F to connector (AB8). 5) Connect the airbag resistor to connector (3F) in test harness F. 6) Connect the battery ground cable and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the roll connector. <Ref. to AB-20, Roll Connector.>	Go to step **3**.
3	**CHECK AIRBAG MAIN HARNESS.** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the airbag resistor from the connector (3F) in test harness F. 3) Remove the glove box, and disconnect connectors (AB10) and (AB9). 4) Disconnect the connector (AB6) from the airbag control module, and connect the connector (1I) in test harness I or I2. <Ref. to AB-18, Airbag Control Module.> 5) Connect the battery ground cable and turn the ignition switch ON. (Engine OFF) 6) Measure the voltage between connector (2I) in test harness I or I2 and the chassis ground. ***Connector & terminal*** ***(2I) No. 4 (+) — Chassis ground (−):*** ***(2I) No. 1 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Replace the airbag control module. <Ref. to AB-18, Airbag Control Module.>	Replace airbag main harness. <Ref. to AB-16, Main Harness.>

D: DTC 16 S002521I89

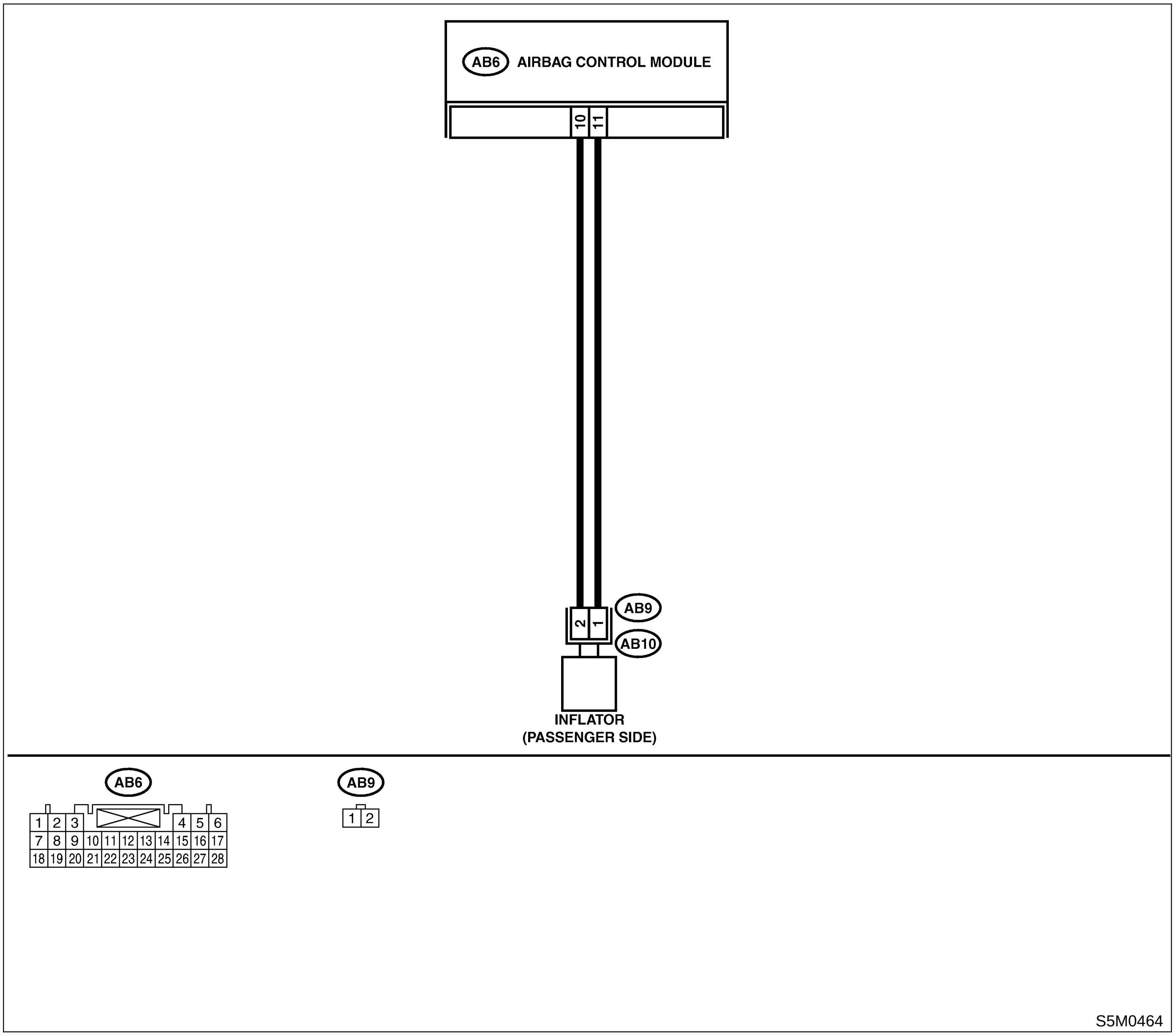
DIAGNOSIS:

- Airbag main harness circuit (Passenger) is shorted to the power supply.
- Airbag module harness (Passenger) is shorted to the power supply.
- Passenger's airbag module is faulty.
- Airbag control module is faulty.

CAUTION:

- **Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground cable from the battery, and wait more than 20 seconds before starting to work.**
- **Before replacing the airbag module, roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.**
- **When inspecting the airbag main harness, disconnect the airbag module connector of the driver and passenger seats for safety reasons.**

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK PASSENGER’S AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Remove the glove box. 3) Disconnect the connector (AB10) from (AB9) 4) Connect the connector (1F) in test harness F to connector (AB9). 5) Connect the airbag resistor to connector (3F) in test harness F. 6) Connect the battery ground cable and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the passenger airbag module. <Ref. to AB-14, Passenger’s Airbag Module.>	Go to step **2**.
2	**CHECK AIRBAG MAIN HARNESS.** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the airbag resistor from the connector (3F) in test harness F. 3) Remove the lower cover and disconnect the connector (AB3) from (AB8). 4) Disconnect the connector (AB6) from the airbag control module, and connect the connector (1I) in test harness I or I2. <Ref. to AB-18, Airbag Control Module.> 5) Measure the voltage between connector (2I) in test harness I or I2 and the chassis ground. ***Connector & terminal*** ***(2I) No. 2 — Chassis ground:*** ***(2I) No. 5 — Chassis ground:***	Is the voltage less than 1 V?	Replace the airbag control module. <Ref. to AB-18, Airbag Control Module.>	Replace airbag main harness. <Ref. to AB-16, Main Harness.>

E: DTC 21 *S002521I90*

DIAGNOSIS:

- Airbag control module is faulty.

CAUTION:

- **Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground cable from the battery, and wait more than 20 seconds before starting to work.**
- **Before replacing the airbag module, roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.**

No.	Step	Check	Yes	No
1	**CHECK IF TROUBLE CODE 21 IS INDICATED.** Read Diagnostic Trouble Code. <Ref. to AB-21, Read Diagnostics Trouble Code.>	Is airbag warning light trouble code 21 indicated?	Replace the airbag control module. <Ref. to AB-18, Airbag Control Module.>	Perform clear memory. <Ref. to AB-23, Clear Memory Mode.>

F: DTC 22 *S002521I91*

This code is indicated when the front airbag is in operation.
Once this code is indicated, memory is not erasable; therefore replace the following parts.

- Airbag control module. <Ref. to AB-18, Airbag Control Module.>
- Driver’s airbag module. <Ref. to AB-13, Driver’s Airbag Module.>
- Passenger’s airbag module. <Ref. to AB-14, Passenger’s Airbag Module.>
- Front sub-sensor of both sides. <Ref. to AB-21, Front Sub Sensor.>

G: DTC 23 *S002521I92*

DIAGNOSIS:

(AB6), (AB17) and (AB18) are not connected properly to airbag control module.

CAUTION:

Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground cable from the battery, and wait more than 20 seconds before starting to work.

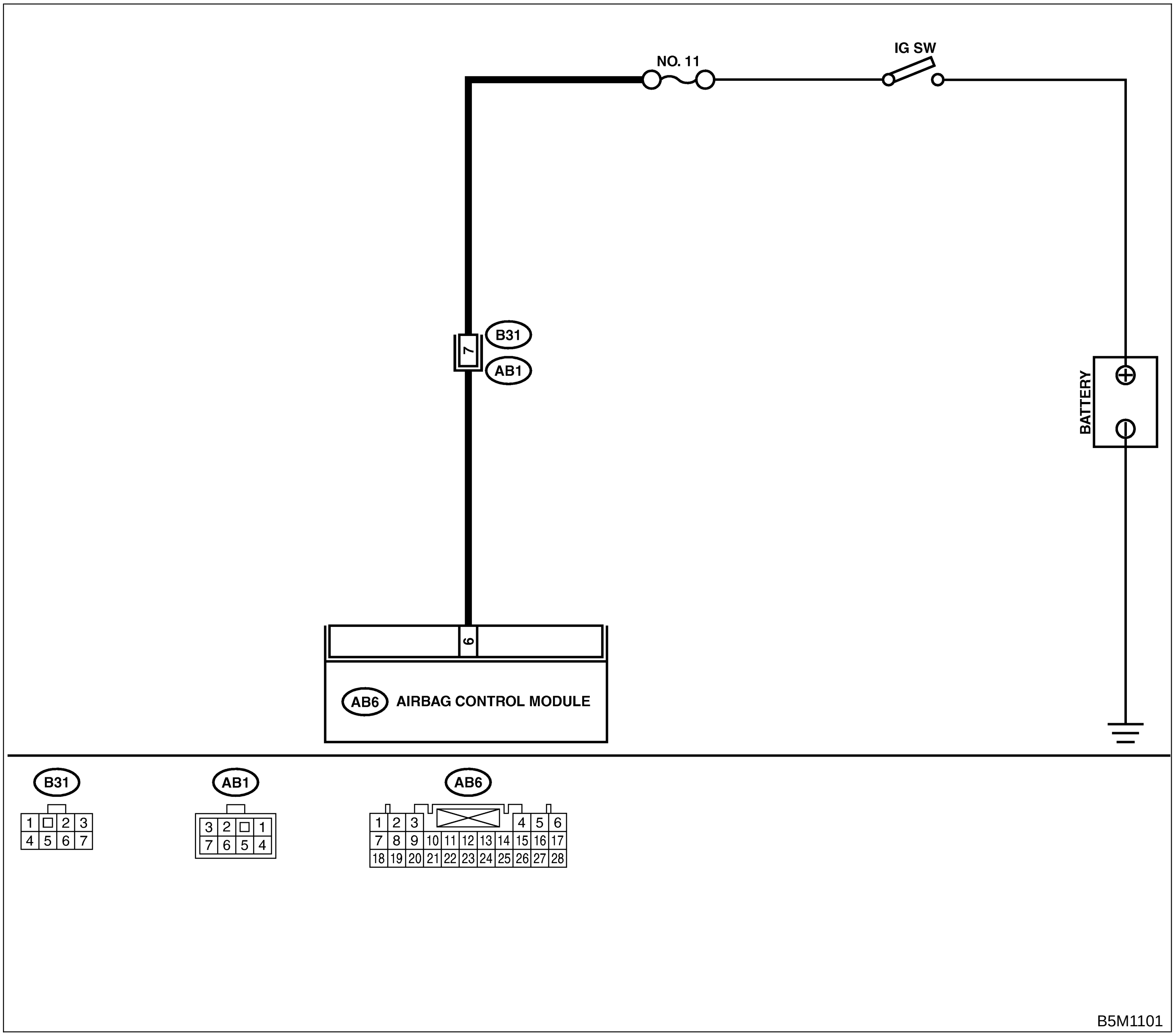
No.	Step	Check	Yes	No
1	**CHECK POOR CONTACT IN CONNECTORS (AB6), (AB17) and (AB18).** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connectors (AB6), (AB17) and (AB18) from the airbag control module. <Ref. to AB-18, Airbag Control Module.>	Check if rust or damage appear on the harness connector and the control module connector.	Replace the airbag control module. <Ref. to AB-18, Airbag Control Module.> Replace airbag main harness. <Ref. to AB-16, Main Harness.> Replace side airbag harness. <Ref. to AB-17, Side Airbag Harness.>	Go to step **2**.
2	**CHECK POOR CONTACT IN CONNECTORS (AB6), (AB17) and (AB18).** 1) Ensure that connectors are firmly reconnected. 2) Connect the battery ground cable and turn the ignition switch ON.	Does the airbag warning light operate properly?	Finish the diagnosis.	Replace the airbag control module. <Ref. to AB-18, Airbag Control Module.>

H: DTC 24 S002521I93

DIAGNOSIS:
- Airbag control module is faulty.
- Airbag main harness circuit is open.
- Fuse No, 11 (in joint box) is blown.
- Body harness circuit is open.

CAUTION:
- **Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground cable from the battery, and wait more than 20 seconds before starting to work.**
- **Before replacing the airbag module, roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.**
- **When inspecting the airbag main harness, disconnect the driver's airbag module and passenger's airbag module connectors for safety reasons.**

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK AIRBAG CONTROL MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB6) from the airbag control module. <Ref. to AB-18, Airbag Control Module.> 3) Connect the connector (1I) in test harness I or I2 to connector (AB6). 4) Connect the battery ground cable and turn the ignition switch ON. 5) Measure the voltage between connector (2I) in test harness I or I2 and chassis ground. ***Connector & terminal*** ***(2I) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the airbag control module. <Ref. to AB-18, Airbag Control Module.>	Go to step **2**.
2	**CHECK AIRBAG MAIN HARNESS.** 1) While checking control module, turn the ignition switch OFF and disconnect the battery ground cable. Wait more than 20 seconds before operation. 2) Disconnect the airbag connector (AB1) from the body harness (B31). 3) Connect the connector (2A) in test harness A to connector (AB1). 4) Measure the resistance between connector (5A) in test harness A and the connector (2I) in test harness I or I2. ***Connector & terminal*** ***(5A) No. 9 — (2I) No. 3:***	Is the resistance less than 10 Ω?	Go to step **3**.	Replace airbag main harness. <Ref. to AB-16, Main Harness.>
3	**CHECK AIRBAG MAIN HARNESS.** Measure the following resistance with the above-mentioned condition maintained. ***Connector & terminal*** ***(5A) No. 9 — Chassis ground:*** ***(2I) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Replace airbag main harness. <Ref. to AB-16, Main Harness.>
4	**CHECK FUSE No. 11 (IN JOINT BOX).** 1) Confirm that the ignition switch is turned OFF. 2) Remove fuse No. 11 (in joint box) and perform visual inspection.	Is fuse No. 11 blown?	Replace fuse No. 11. If fuse No. 11 blows again, repair the body harness.	Repair the body harness.

I: DTC 25 S002521I94

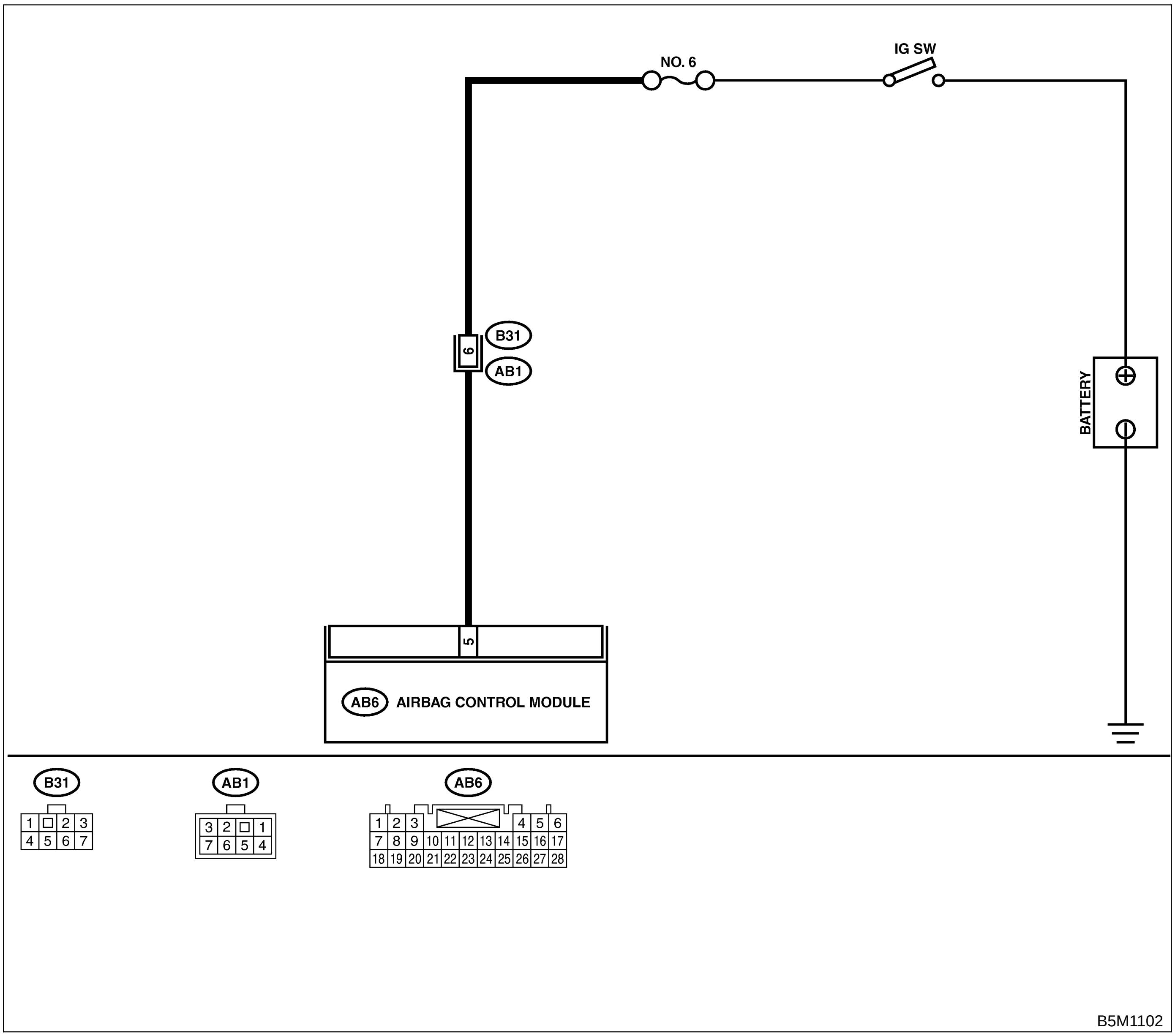
DIAGNOSIS:

- Airbag control module is faulty.
- Airbag main harness circuit is open.
- Fuse No. 6 (in joint box) is blown.
- Body harness circuit is open.

CAUTION:

- **Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground cable from the battery, and wait more than 20 seconds before starting to work.**
- **Before replacing the airbag module, roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.**
- **When inspecting the airbag main harness, disconnect the driver's airbag module and passenger's airbag module connectors for safety reasons.**

WIRING DIAGRAM:



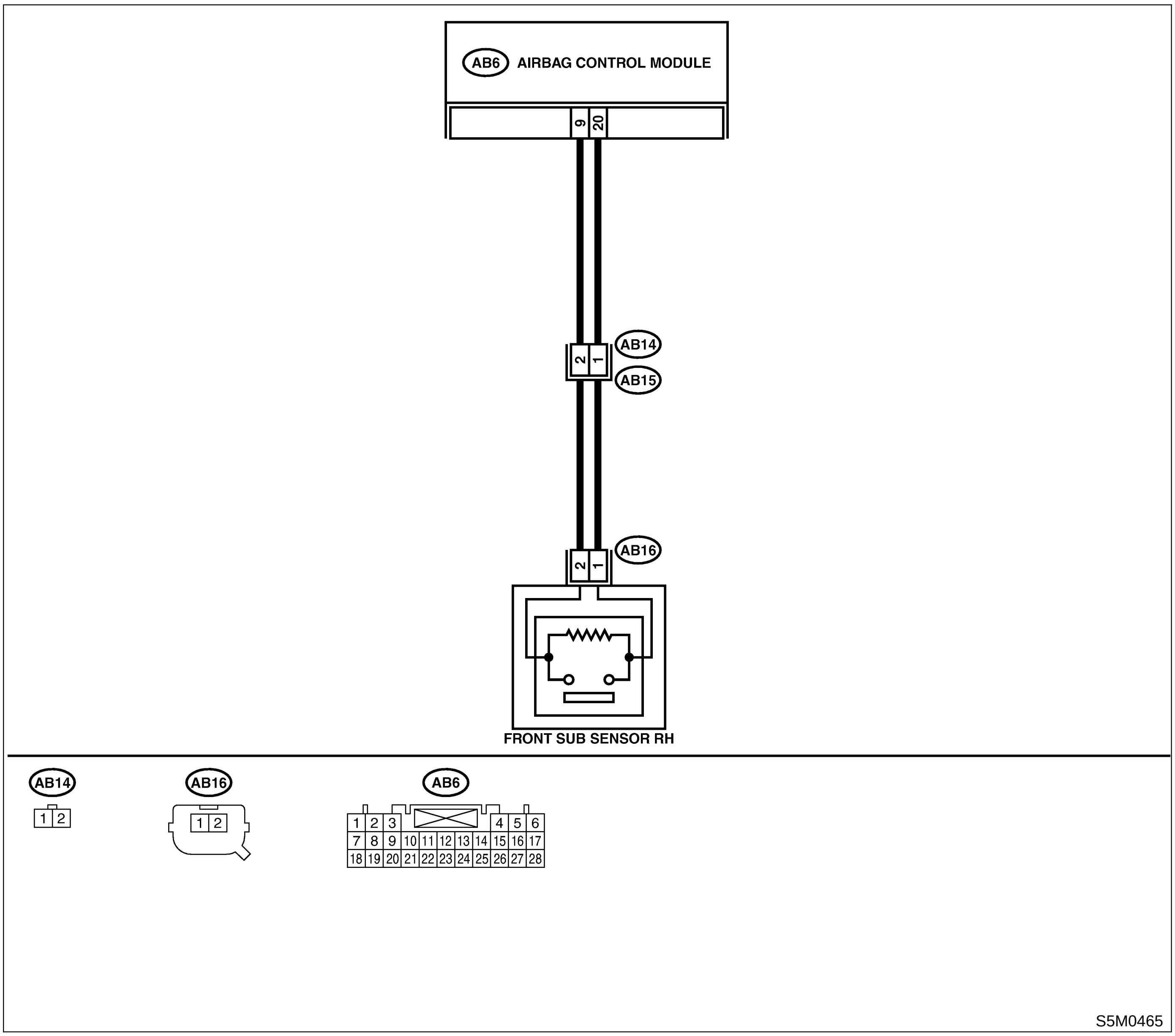
No.	Step	Check	Yes	No
1	**CHECK AIRBAG CONTROL MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB6) from airbag control module. <Ref. to AB-18, Airbag Control Module.> 3) Connect the connector (1I) in test harness I or I2 to connector (AB6). 4) Connect the battery ground cable, and turn the ignition switch ON. 5) Measure the voltage between the connector (2I) in test harness I or I2 and the chassis ground. ***Connector & terminal*** ***(2I) No. 6 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the airbag control module. <Ref. to AB-18, Airbag Control Module.>	Go to step **2**.
2	**CHECK AIRBAG MAIN HARNESS.** 1) While checking control module, turn the ignition switch OFF and disconnect the battery ground cable. Wait more than 20 seconds before operation. 2) Disconnect the airbag connector (AB1) from the body harness (B31). 3) Connect the connector (2A) in test harness A to the airbag connector (AB1). 4) Measure the resistance between the connector (5A) in test harness A and the connector (2I) in test harness I or I2. ***Connector & terminal*** ***(5A) No. 1 — (2I) No. 6:***	Is the resistance less than 10 Ω?	Go to step **3**.	Replace the airbag main harness. <Ref. to AB-16, Main Harness.>
3	**CHECK AIRBAG MAIN HARNESS.** Measure the following resistance with the above-mentioned condition maintained. ***Connector & terminal*** ***(5A) No. 1 — Chassis ground:*** ***(2I) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Replace the airbag main harness. <Ref. to AB-16, Main Harness.>
4	**CHECK FUSE NO. 6 (IN JOINT BOX).** 1) Confirm that the ignition switch is turned OFF. 2) Remove No. 6 fuse (in joint box) and perform visual inspection.	Is fuse No. 6 blown?	Replace fuse No. 6. If fuse No. 6 is blown again, repair the body harness.	Repair the body harness.

J: DTC 31 *S002521I95*

DIAGNOSIS:
- Front sub-sensor harness (RH) circuit is shorted.
- Front sub-sensor harness (RH) circuit is open.
- Front sub-sensor (RH) is faulty.
- Airbag control module is faulty.

CAUTION:
- **Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground cable from the battery, and wait more than 20 seconds before starting to work.**
- **Before replacing the airbag module, roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.**
- **When inspecting the airbag main harness, disconnect the driver's airbag module and passenger's airbag module connectors for safety reasons.**

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK FRONT SUB-SENSOR (RH) AND FRONT SUB-SENSOR HARNESS (RH).** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB6) from the airbag control module , and connect the connector (1I) in test harness I or I2. <Ref. to AB-18, Airbag Control Module.> 3) Measure the resistance of the connector (3I) in test harness I or I2. ***Connector & terminal*** ***(3I) No. 2 — No. 4:***	Is the resistance between 750Ω and 1 KΩ?	Go to step **2**.	Go to step **3**.
2	**CHECK FRONT SUB-SENSOR (RH) AND FRONT SUB-SENSOR HARNESS (RH).** Measure the resistance between connector (3I) in test harness I or I2 and the chassis ground. ***Connector & terminal*** ***(3I) No. 2 — Chassis ground:*** ***(3I) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-18, Airbag Control Module.>	Go to step **3**.
3	**CHECK AIRBAG MAIN HARNESS AND FRONT SUB-SENSOR HARNESS (RH).** 1) Disconnect connector (AB16) from the front sub-sensor. <Ref. to AB-21, Front Sub Sensor.> 2) Connect connector (1H) in test harness H to connector (AB16). 3) Measure the resistance between connector (3I) in test harness I or I2 and connector (3H) in test harness H. ***Connector & terminal*** ***(3I) No. 2 — (3H) No. 5:*** ***(3I) No. 4 — (3H) No. 6:***	Is the resistance less than 10Ω?	Go to step **4**.	Go to step **5**.
4	**CHECK AIRBAG MAIN HARNESS AND FRONT SUB-SENSOR HARNESS (RH).** Measure the resistance between connector (3I) in test harness I or I2 and the chassis ground. ***Connector & terminal*** ***(3I) No. 2 — Chassis ground:*** ***(3I) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **9**.	Go to step **5**.
5	**CHECK AIRBAG MAIN HARNESS** 1) Remove the instrument panel. <Ref. to EI-34, Instrument Panel Assembly.> 2) Disconnect connector (AB15) from (AB14), and connect connector (1F) in test harness F to connector (AB14). 3) Measure the resistance between connector (3I) in test harness I or I2 and connector (3F) in test harness F. ***Connector & terminal*** ***(3I) No. 2 — (3F) No. 3:*** ***(3I) No. 4 — (3F) No. 4:***	Is the resistance less than 10 Ω?	Go to step **6**.	Replace airbag main harness. <Ref. to AB-16, Main Harness.>

No.	Step	Check	Yes	No
6	**CHECK AIRBAG MAIN HARNESS** Measure the resistance between connector (3I) in test harness I or I2 and the chassis ground. ***Connector & terminal*** ***(3I) No. 2 — Chassis ground:*** ***(3I) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7**.	Replace airbag main harness. <Ref. to AB-16, Main Harness.>
7	**CHECK FRONT SUB-SENSOR HARNESS (RH).** 1) Connect connector (2F) in test harness F to the connector (AB15). 2) Measure the resistance between connector (3H) in test harness H and connector (3F) in the test harness F. ***Connector & terminal*** ***(3F) No. 6 — (3H) No. 5:*** ***(3F) No. 5 — (3H) No. 6:***	Is the resistance less than 10 Ω?	Go to step **8**.	Replace the front sub-sensor harness (RH) <Ref. to AB-22, Front Sub Sensor Harness.>
8	**CHECK FRONT SUB-SENSOR HARNESS (RH).** Measure the resistance between connector (3H) in test harness H and connector (3F) in test harness F. ***Connector & terminal*** ***(3F) No. 6 — (3H) No. 6:*** ***(3F) No. 5 — (3H) No. 5:***	Is the resistance more than 1 MΩ?	Go to step **9**.	Replace the front sub-sensor harness (RH). <Ref. to AB-22, Front Sub Sensor Harness.>
9	**CHECK FRONT SUB-SENSOR HARNESS (RH).** Measure the resistance between connector (3F) in test harness F and the chassis ground. ***Connector & terminal*** ***(3F) No. 6 — Chassis ground:*** ***(3F) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **10**.	Replace the front sub-sensor harness (RH) <Ref. to AB-22, Front Sub Sensor Harness.>
10	**CHECK FRONT SUB-SENSOR (RH).** 1) Connect connector (2H) in test harness H to front sub-sensor (RH). 2) Measure the resistance of the connector (3H) in test harness H. ***Connector & terminal*** ***(3H) No. 3 — No. 4:***	Is the resistance between 750Ω and 1 KΩ?	Go to step **11**.	Replace the front sub-sensor (RH) <Ref. to AB-21, Front Sub Sensor.>
11	**CHECK FRONT SUB-SENSOR (RH).** Measure the resistance between connector (3H) in test harness H and the chassis ground. ***Connector & terminal*** ***(3H) No. 3 — Chassis ground:*** ***(3H) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Finish the diagnosis.	Replace the front sub-sensor (RH) <Ref. to AB-21, Front Sub Sensor.>

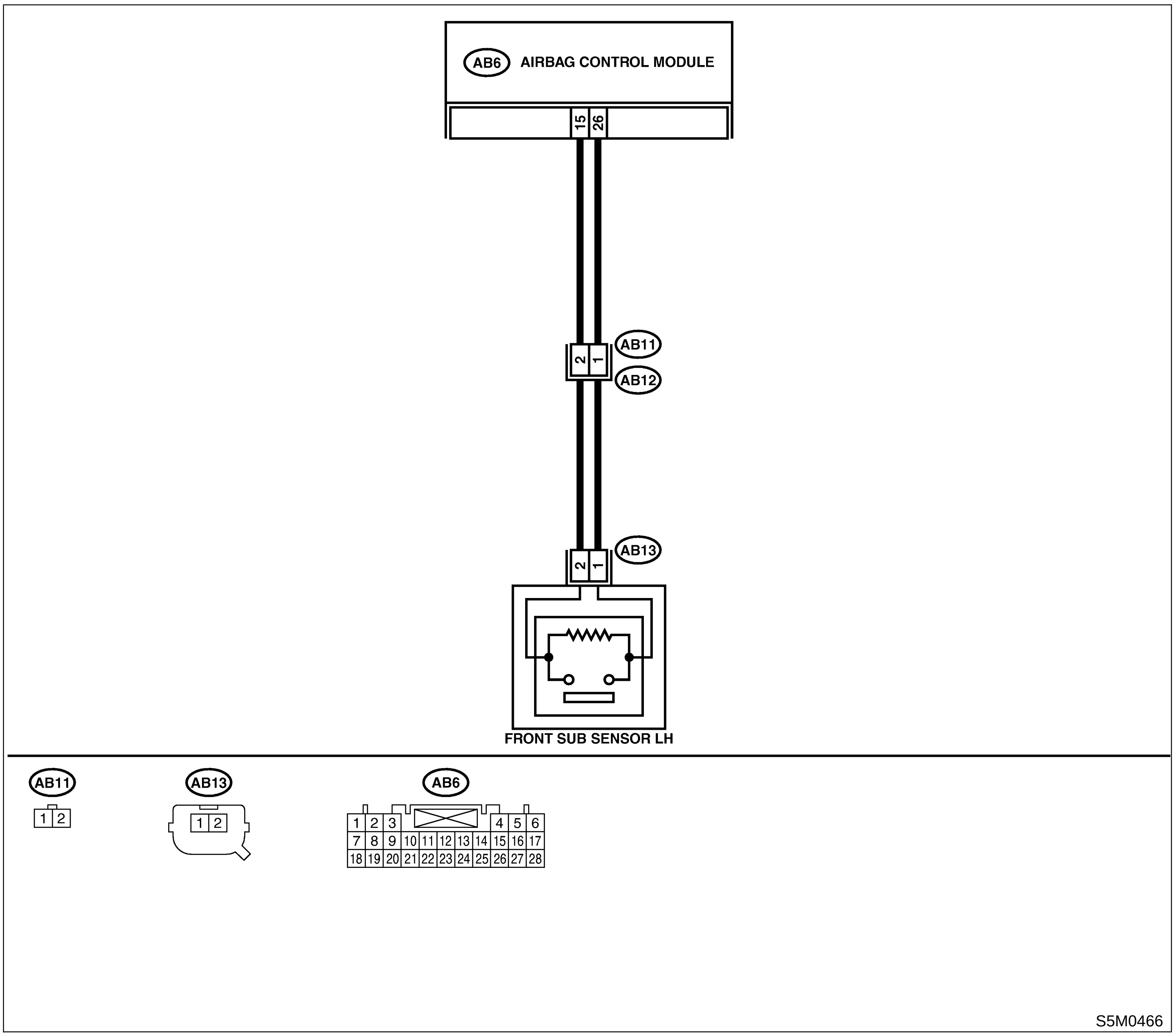
MEMO:

K: DTC 32 S002521I96

DIAGNOSIS:
- Front sub-sensor harness (LH) circuit is shorted.
- Front sub-sensor harness (LH) circuit is open.
- Front sub-sensor (LH) is faulty.
- Airbag control module is faulty.

CAUTION:
- **Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground cable from the battery, and wait more than 20 seconds before starting to work.**
- **Before replacing the airbag module, roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.**
- **When inspecting the airbag main harness, disconnect the driver's airbag module and passenger's airbag module connectors for safety reasons.**

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK FRONT SUB-SENSOR (LH) AND FRONT SUB-SENSOR HARNESS (RH).** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect connector (AB6) from the airbag control module, and connect connector (1I) in the test harness I or I2 to connector (AB6). <Ref. to AB-18, Airbag Control Module.> 3) Measure the resistance of the connector (3I) in the test harness I or I2. ***Connector & terminal*** ***(3I) No. 1 — No. 3:***	Is the resistance between 750Ω and 1 KΩ?	Go to step **2**.	Go to step **3**.
2	**CHECK FRONT SUB-SENSOR (LH) AND FRONT SUB-SENSOR HARNESS (RH).** Measure the resistance between connector (3I) in test harness I or I2 and the chassis ground. ***Connector & terminal*** ***(3I) No. 1 — Chassis ground:*** ***(3I) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-18, Airbag Control Module.>	Go to step **3**.
3	**CHECK AIRBAG MAIN HARNESS AND FRONT SUB-SENSOR HARNESS (LH).** 1) Disconnect the connector (AB13) from the front sub-sensor. <Ref. to AB-21, Front Sub Sensor.> 2) Connect connector (1H) in test harness H to connector (AB13). 3) Measure the resistance between connector (3I) in test harness I or I2 and connector (3H) in test harness H. ***Connector & terminal*** ***(3I) No. 3 — (3H) No. 5:*** ***(3I) No. 1 — (3H) No. 6:***	Is the resistance less than 10 Ω?	Go to step **4**.	Go to step **5**.
4	**CHECK AIRBAG MAIN HARNESS AND FRONT SUB-SENSOR HARNESS (LH).** Measure the resistance between connector (3I) in test harness I or I2 and the chassis ground. ***Connector & terminal*** ***(3I) No. 3 — Chassis ground:*** ***(3I) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **9**.	Go to step **5**.
5	**CHECK AIRBAG MAIN HARNESS.** 1) Remove the instrument panel. <Ref. to EI-34, Instrument Panel Assembly.> 2) Disconnect connector (AB11) from (AB12), and connect connector (1F) in test harness F to (AB11). 3) Measure the resistance between connector (3I) in test harness I or I2 and connector (3F) in test harness F. ***Connector & terminal*** ***(3I) No. 3 — (3F) No. 3:*** ***(3I) No. 1 — (3F) No. 4:***	Is the resistance less than 10 Ω?	Go to step **6**.	Replace the airbag main harness. <Ref. to AB-16, Main Harness.>

No.	Step	Check	Yes	No
6	**CHECK AIRBAG MAIN HARNESS.** Measure the resistance between connector (3I) in the test harness I or I2 and the chassis ground. ***Connector & terminal*** ***(3I) No. 3 — Chassis ground:*** ***(3I) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7**.	Replace the airbag main harness. <Ref. to AB-16, Main Harness.>
7	**CHECK FRONT SUB-SENSOR HARNESS (LH).** 1) Connect connector (2F) in test harness F to connector (AB12). 2) Measure the resistance between connector (3H) in test harness H and connector (3F) in test harness F. ***Connector & terminal*** ***(3F) No. 6 — (3H) No. 5:*** ***(3F) No. 5 — (3H) No. 6:***	Is the resistance less than 10 Ω?	Go to step **8**.	Replace the front sub-sensor harness (LH). <Ref. to AB-22, Front Sub Sensor Harness.>
8	**CHECK FRONT SUB-SENSOR HARNESS (LH).** Measure the resistance between connector (3H) in test harness H and connector (3F) in test harness F. ***Connector & terminal*** ***(3F) No. 6 — (3H) No. 6:*** ***(3F) No. 5 — (3H) No. 5:***	Is the resistance more than 1 MΩ?	Go to step **9**.	Replace the front sub-sensor harness (LH). <Ref. to AB-22, Front Sub Sensor Harness.>
9	**CHECK FRONT SUB-SENSOR HARNESS (LH).** Measure the resistance between connector (3F) in test harness F and the chassis ground. ***Connector & terminal*** ***(3F) No. 6 — Chassis ground:*** ***(3F) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **10**.	Replace the front sub-sensor harness (LH). <Ref. to AB-22, Front Sub Sensor Harness.>
10	**CHECK FRONT SUB-SENSOR (LH).** 1) Connect connector (2H) in test harness H to front sub-sensor (LH). 2) Measure the resistance of the connector (3H) in test harness H. ***Connector & terminal*** ***(3H) No. 3 — No. 4:***	Is the resistance between 750Ω and 1 KΩ?	Go to step **11**.	Replace the front sub-sensor (LH). <Ref. to AB-21, Front Sub Sensor.>
11	**CHECK FRONT SUB-SENSOR (LH).** Measure the resistance between connector (3H) in test harness H and the chassis ground. ***Connector & terminal*** ***(3H) No. 3 — Chassis ground:*** ***(3H) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Finish the diagnosis.	Replace the front sub-sensor (LH). <Ref. to AB-21, Front Sub Sensor.>

MEMO:

L: DTC 41 S002521I97

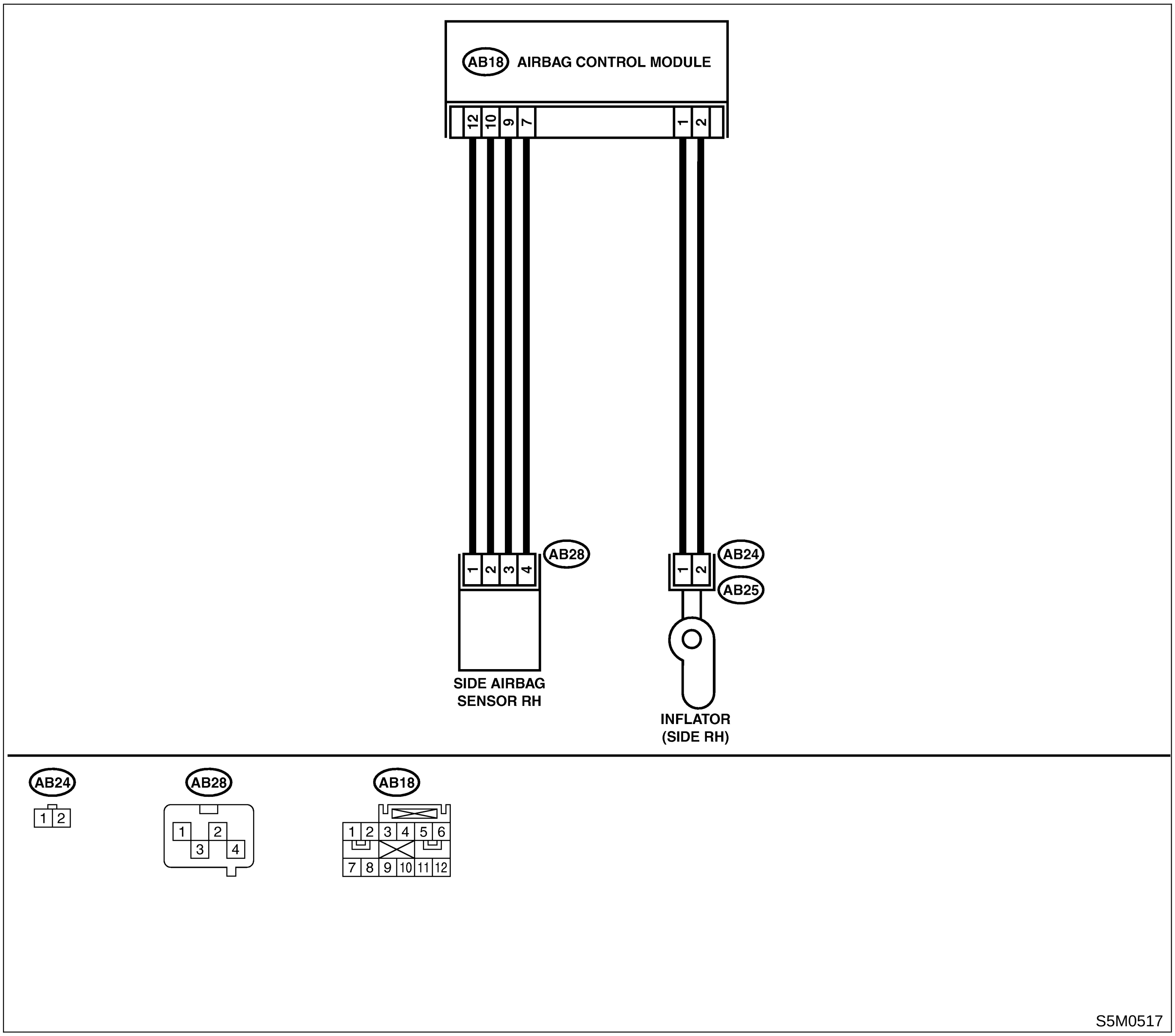
DIAGNOSIS:

- Side airbag harness (RH) is faulty.
- Side airbag module (RH) is faulty.
- Airbag control module is faulty.

CAUTION:

- **Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground cable from the battery, and wait more than 20 seconds before starting to work.**
- **Before replacing the airbag module, roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.**
- **When inspecting the side airbag harness, disconnect the side airbag module connector for the safety reasons.**

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK SIDE AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect connector (AB25) from (AB24), and connect connector (1F) in test harness F to (AB24). 3) Connect airbag resistor to connector (3F) in test harness F. 4) Connect the battery ground cable, and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace front seat with side airbag module (RH). <Ref. to SE-5, Front Seat.>	Go to step **2**.
2	**CHECK SIDE AIRBAG HARNESS (RH).** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect airbag resistor from test harness. 3) Disconnect the connector (AB18) from air bag control module. <Ref. to AB-18, Airbag Control Module.> 4) Connect connector (1I) in test harness I or I2 to connector (AB18). 5) Measure the resistance between connector (3I) in test harness I or I2 and connector (3F) in test harness F. ***Connector & terminal*** ***(3I) No. 7 — (3F) No. 3:*** ***(3I) No. 9 — (3F) No. 4:***	Is the resistance less than 10 Ω?	Go to step **3**.	Replace side airbag harness. <Ref. to AB-17, Side Airbag Harness.>
3	**CHECK SIDE AIRBAG HARNESS (RH).** Measure the resistance of the connector (3I) in test harness I or I2. ***Connector & terminal*** ***(3I) No. 7 — No. 9:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Replace side airbag harness. <Ref. to AB-17, Side Airbag Harness.>
4	**CHECK SIDE AIRBAG HARNESS (RH).** Measure the resistance of the connector (3F) in test harness F. ***Connector & terminal*** ***(3F) No. 3 — No. 4:***	Is the resistance more 1MΩ?	Go to step **5**.	Replace side airbag harness. <Ref. to AB-17, Side Airbag Harness.>
5	**CHECK SIDE AIRBAG HARNESS (RH).** Measure the resistance between connector (3F) in test harness F and the chassis ground. ***Connector & terminal*** ***(3F) No. 3 — Chassis ground:*** ***(3F) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Replace side airbag harness. <Ref. to AB-17, Side Airbag Harness.>
6	**CHECK SIDE AIRBAG HARNESS (RH).** Measure the resistance between connector (3I) in test harness I or I2 and the chassis ground. ***Connector & terminal*** ***(3I) No. 7 — Chassis ground:*** ***(3I) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-18, Airbag Control Module.>	Replace side airbag harness. <Ref. to AB-17, Side Airbag Harness.>

M: DTC 42 *S002521I98*

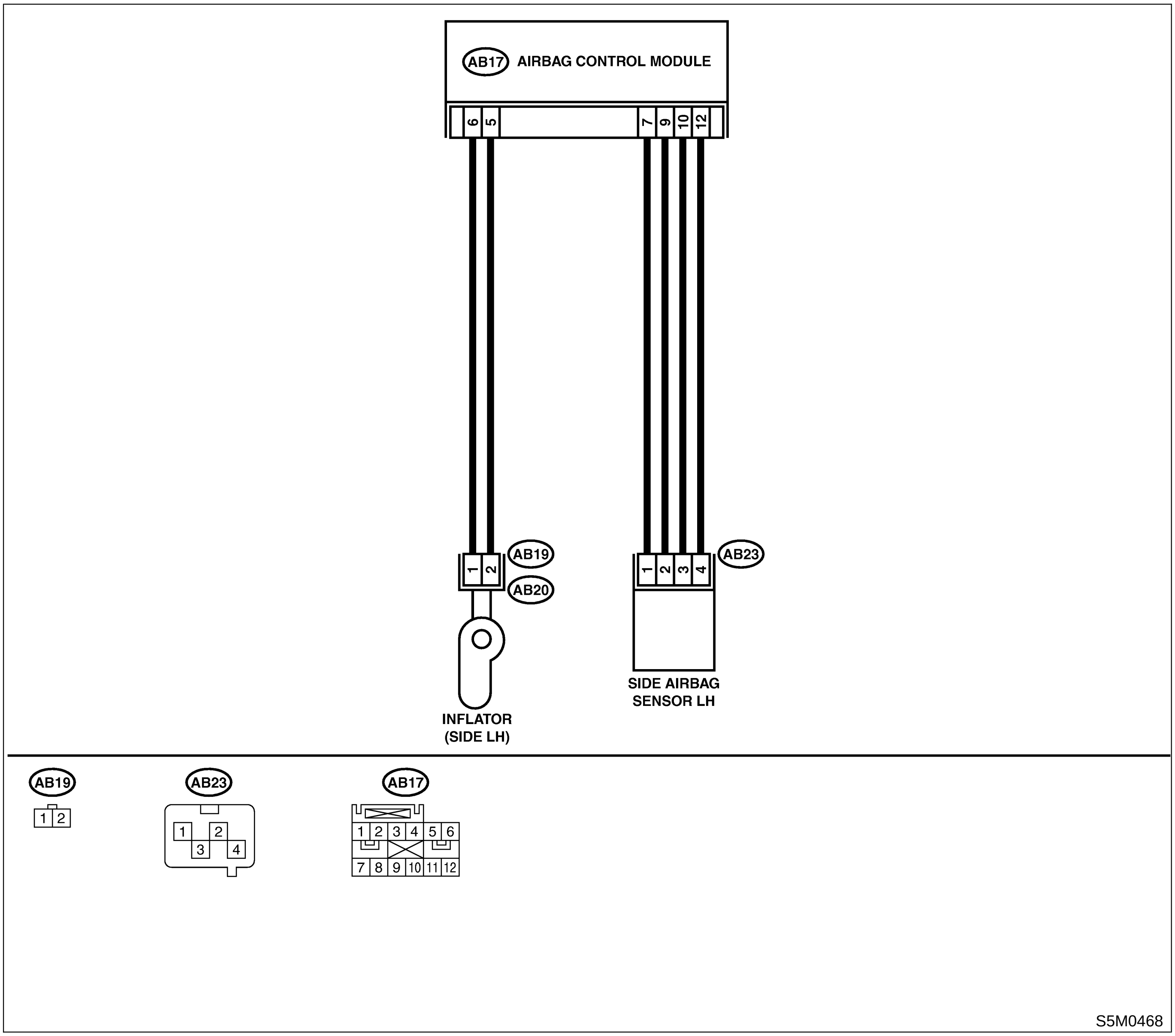
DIAGNOSIS:

- Side airbag harness (LH) is faulty.
- Side airbag module (LH) is faulty.
- Airbag control module is faulty.

CAUTION:

- **Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground cable from the battery, and wait more than 20 seconds before starting to work.**
- **Before replacing the airbag module, roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.**
- **When inspecting the side airbag harness, disconnect the side airbag module connector for the safety reasons.**

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK SIDE AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect connector (AB20) from (AB19), and connect connector (1F) in test harness F to (AB19). 3) Connect airbag resistor to connector (3F) in test harness F. 4) Connect the battery ground cable, and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace front seat with side airbag module (LH). <Ref. to SE-5, Front Seat.>	Go to step **2**.
2	**CHECK SIDE AIRBAG HARNESS (LH).** 1) Turn ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect airbag resistor from the test harness. 3) Disconnect the connector (AB17) from the airbag control module. <Ref. to AB-18, Airbag Control Module.> 4) Connect connector (1I) in test harness I or I2 to connector (AB17). 5) Measure the resistance between connector (3I) in test harness I or I2 and connector (3F) in test harness F. ***Connector & terminal*** ***(3I) No. 10 — (3F) No. 4:*** ***(3I) No. 12 — (3F) No. 3:***	Is the resistance less than 10 Ω?	Go to step **3**.	Replace side airbag harness. <Ref. to AB-17, Side Airbag Harness.>
3	**CHECK SIDE AIRBAG HARNESS (LH).** Measure the resistance of the connector (3I) in test harness I or I2. ***Connector & terminal*** ***(3I) No. 10 — No. 12:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Replace side airbag harness. <Ref. to AB-17, Side Airbag Harness.>
4	**CHECK SIDE AIRBAG HARNESS (LH).** Measure the resistance of the connector (3F) in test harness F. ***Connector & terminal*** ***(3F) No. 3 — No. 4:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Replace side airbag harness. <Ref. to AB-17, Side Airbag Harness.>
5	**CHECK SIDE AIRBAG HARNESS (LH).** Measure the resistance between connector (3F) in test harness F and the chassis ground. ***Connector & terminal*** ***(3F) No. 3 — Chassis ground:*** ***(3F) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Replace side airbag harness. <Ref. to AB-17, Side Airbag Harness.>
6	**CHECK SIDE AIRBAG HARNESS (LH).** Measure the resistance between connector (3I) in test harness I or I2 and the chassis ground. ***Connector & terminal*** ***(3I) No. 10 — Chassis ground:*** ***(3I) No. 12 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace airbag control module. <Ref. to AB-18, Airbag Control Module.>	Replace side airbag harness. <Ref. to AB-17, Side Airbag Harness.>

N: DTC 45 *S002521I99*

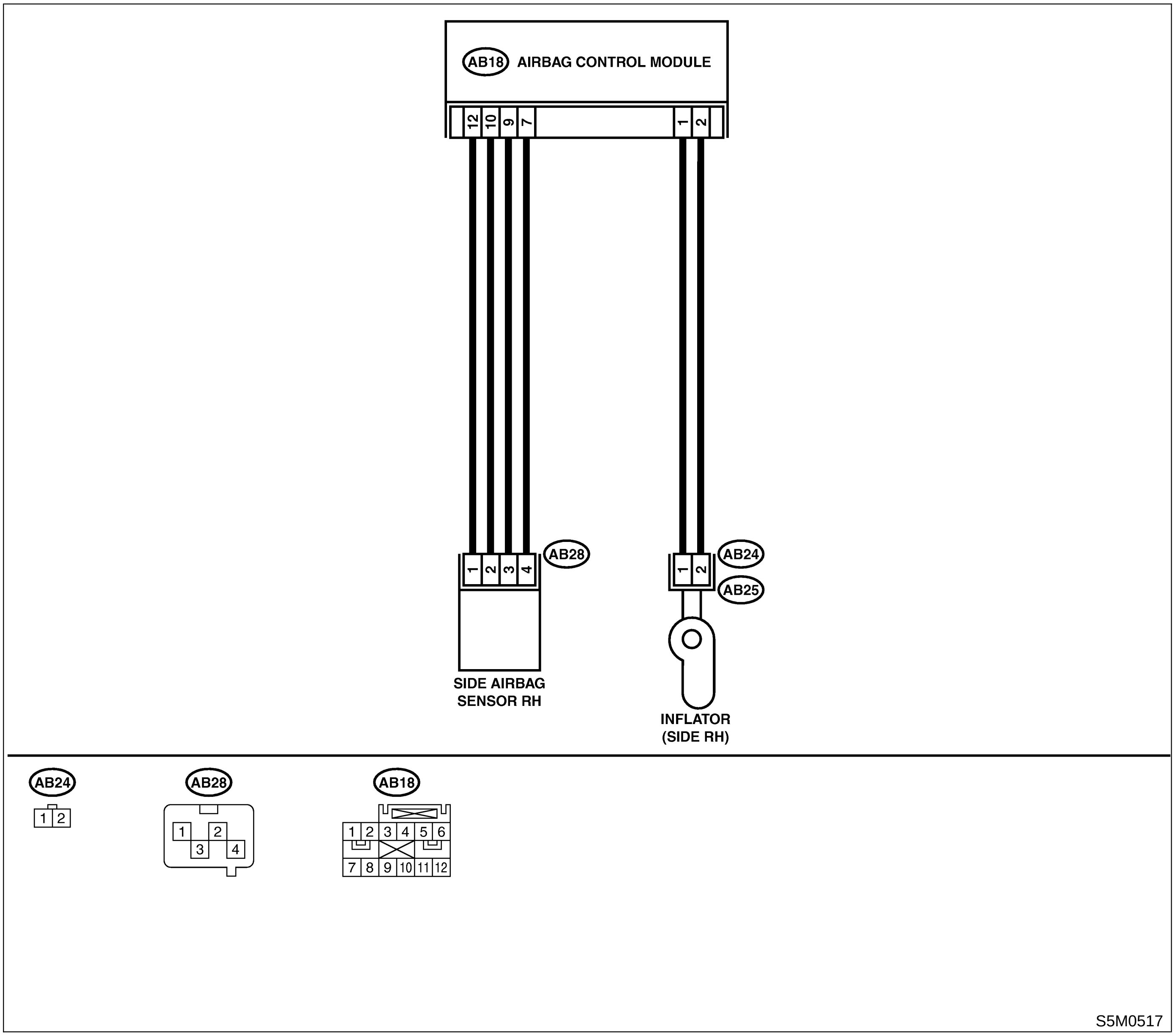
DIAGNOSIS:

- Side airbag harness (RH) is shorted to power supply.
- Airbag control module is faulty.

CAUTION:

- **Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground cable from the battery, and wait more than 20 seconds before starting to work.**
- **Before replacing the airbag module, roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.**
- **When inspecting the side airbag harness, disconnect the side airbag module connector for the safety reasons.**

WIRING DIAGRAM:



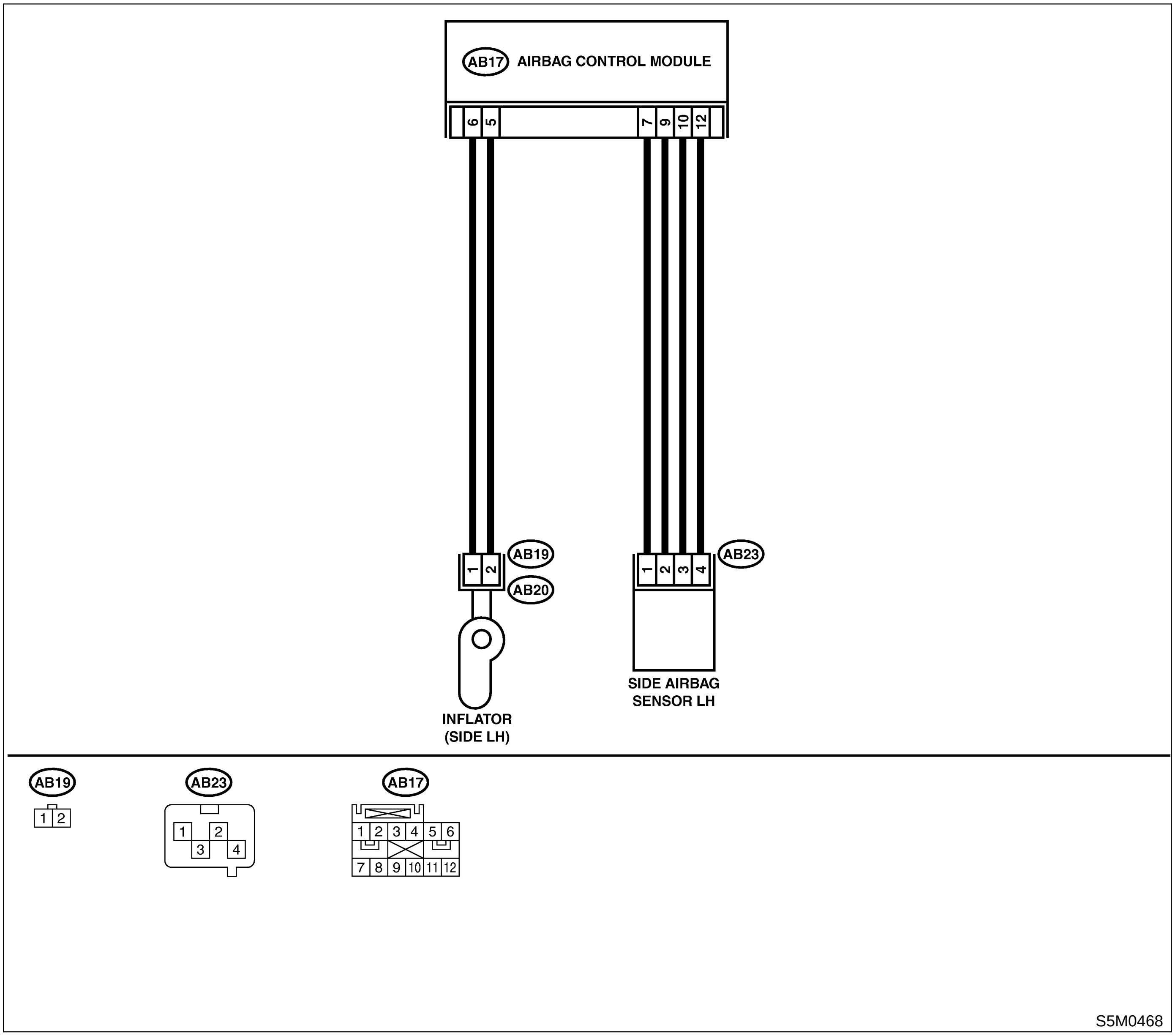
No.	Step	Check	Yes	No
1	**CHECK SIDE AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB25) from (AB24), and connect connector (1F) in test harness F to (AB24). 3) Connect airbag resistor to connector (3F) in test harness F. 4) Connect the battery ground cable, and turn the ignition switch ON.	Does airbag warning light operate properly?	Replace front seat with side airbag module (RH). <Ref. to SE-5, Front Seat.>	Go to step **2**.
2	**CHECK SIDE AIRBAG HARNESS (RH).** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect airbag resistor from the test harness. 3) Disconnect the connector (AB18) from the airbag control module. <Ref. to AB-18, Airbag Control Module.> 4) Connect connector (1I) in test harness I or I2 to connector (AB18). 5) Connect the battery ground cable, and turn the ignition switch ON. 6) Measure the voltage between connector (3I) in test harness I or I2 and the chassis ground. ***Connector & terminal*** ***(3I) No. 7 (+) — Chassis ground (−):*** ***(3I) No. 9 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Replace the airbag control module. <Ref. to AB-18, Airbag Control Module.>	Replace side airbag harness. <Ref. to AB-17, Side Airbag Harness.>

O: DTC 46 S002521J01

DIAGNOSIS:
- Side airbag harness (LH) is shorted to power supply.
- Airbag control module is faulty.

CAUTION:
- **Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground cable from the battery, and wait more than 20 seconds before starting to work.**
- **Before replacing the airbag module, roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.**
- **When inspecting the side airbag harness, disconnect the side airbag module connector for the safety reasons.**

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK SIDE AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect connector (AB20) from (AB19), and connect connector (1F) in test harness F to (AB19). 3) Connect airbag resistor to connector (3F) in test harness F. 4) Connect the battery ground cable and turn the ignition switch ON.	Does airbag warning light operate properly?	Replace front seat with side airbag module (LH). <Ref. to SE-5, Front Seat.>	Go to step **2**.
2	**CHECK SIDE AIRBAG HARNESS (LH).** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect airbag resistor from the test harness. 3) Disconnect the connector (AB17) from the airbag control module. <Ref. to AB-18, Airbag Control Module.> 4) Connect connector (1I) in test harness I or I2 to connector (AB17). 5) Connect the battery ground cable, and turn the ignition switch ON. 6) Measure the voltage between connector (3I) in test harness I or I2 and the chassis ground. ***Connector & terminal*** ***(3I) No. 10 (+) — Chassis ground (−):*** ***(3I) No. 12 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Replace the airbag control module. <Ref. to AB-18, Airbag Control Module.>	Replace side airbag harness. <Ref. to AB-17, Side Airbag Harness.>

P: DTC 51 *S002521J02*

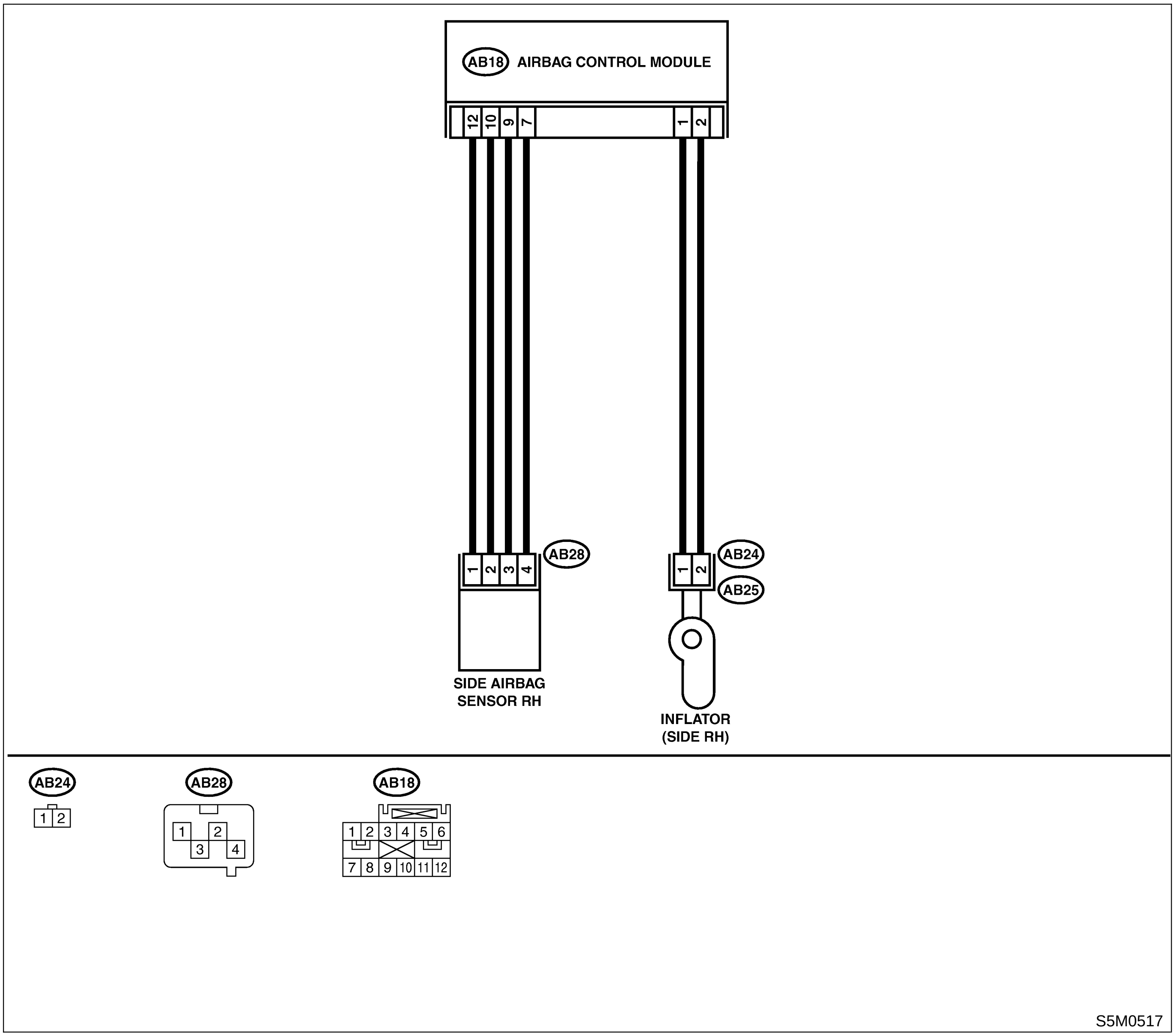
DIAGNOSIS:

- Side airbag sensor (RH) is faulty.
- Side airbag harness (RH) is faulty.
- Airbag control module is faulty.

CAUTION:

- **Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground cable from the battery, and wait more than 20 seconds before starting to work.**
- **Before replacing the airbag module, roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.**
- **When inspecting the side airbag harness, disconnect the side airbag module connector for the safety reasons.**

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK SIDE AIRBAG HARNESS (RH).** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect connector (AB25) from (AB24). 3) Disconnect connector (AB18) from the airbag control module. <Ref. to AB-18, Airbag Control Module.> 4) Connect connector (1I) in test harness I or I2 to the connector (AB18). 5) Disconnect connector (AB28) from the side airbag sensor (RH), and connect connector (1G) in test harness G to connector (AB28). 6) Measure the resistance between connector (3I) in test harness I or I2 and connector (3G) in test harness G. ***Connector & terminal*** ***(3I) No. 17 — (3G) No. 2:*** ***(3I) No. 18 — (3G) No. 1:*** ***(3I) No. 19 — (3G) No. 5:*** ***(3I) No. 20 — (3G) No. 4:***	Is the resistance less than 10 Ω?	Go to step **2**.	Replace side airbag harness. <Ref. to AB-17, Side Airbag Harness.>
2	**CHECK SIDE AIRBAG HARNESS (RH).** Measure the resistance between connector (3I) in test harness I or I2 and the chassis ground. ***Connector & terminal*** ***(3I) No. 17 — Chassis ground:*** ***(3I) No. 18 — Chassis ground:*** ***(3I) No. 19 — Chassis ground:*** ***(3I) No. 20 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace side airbag sensor (RH). <Ref. to AB-19, Side Airbag Sensor.> When sensor replacement is not OK, replace the airbag control module. <Ref. to AB-18, Airbag Control Module.>	Replace side airbag harness. <Ref. to AB-17, Side Airbag Harness.>

Q: DTC 52 S002521J03

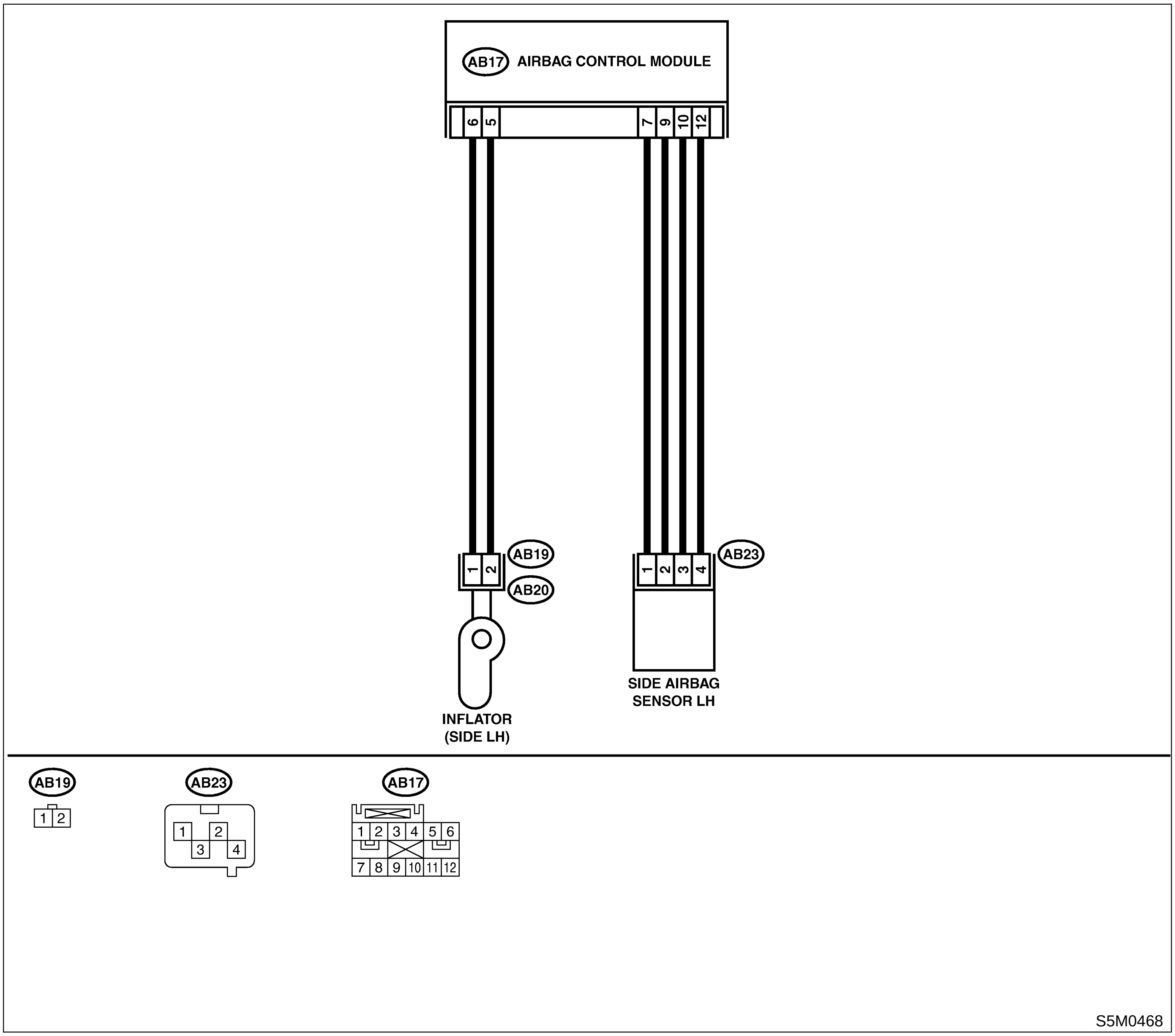
DIAGNOSIS:

- Side airbag sensor (LH) is faulty.
- Side airbag harness (LH) is faulty.
- Airbag control module is faulty.

CAUTION:

- **Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground cable from the battery, and wait more than 20 seconds before starting to work.**
- **Before replacing the airbag module, roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.**
- **When inspecting the side airbag harness, disconnect the side airbag module connector for the safety reasons.**

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK SIDE AIRBAG HARNESS (LH).** 1) Turn the ignition switch OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect connector (AB20) from (AB19). 3) Disconnect connector (AB17) from the airbag control module. <Ref. to AB-18, Airbag Control Module.> 4) Connect connector (1I) in test harness I or I2 to connector (AB17). 5) Disconnect connector (AB23) from the side airbag sensor (LH), and connect connector (1G) in test harness G to connector (AB23). 6) Measure the resistance between connector (3I) in test harness I or I2 and connector (3G) in test harness G. ***Connector & terminal*** ***(3I) No. 5 — (3G) No. 4:*** ***(3I) No. 14 — (3G) No. 5:*** ***(3I) No. 15 — (3G) No. 1:*** ***(3I) No. 16 — (3G) No. 2:***	Is the resistance less than 10 Ω?	Go to step **2**.	Replace side airbag harness. <Ref. to AB-17, Side Airbag Harness.>
2	**CHECK SIDE AIRBAG HARNESS (RH).** Measure the resistance between connector (3I) in test harness I or I2 and the chassis ground. ***Connector & terminal*** ***(3I) No. 5 — Chassis ground:*** ***(3I) No. 14 — Chassis ground:*** ***(3I) No. 15 — Chassis ground:*** ***(3I) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace side airbag sensor (LH). <Ref. to AB-19, Side Airbag Sensor.> When sensor replacement is not OK, replace the airbag control module. <Ref. to AB-18, Airbag Control Module.>	Replace side airbag harness. <Ref. to AB-17, Side Airbag Harness.>

R: DTC 53 *S002521J04*

DIAGNOSIS:

- Side airbag sensor (RH) is faulty.

When Code 53 is displayed, the circuit within the side airbag sensor (RH) is faulty. Replace the side airbag sensor (RH).
<Ref. to AB-19, Side Airbag Sensor.>

S: DTC 54 *S002521J05*

DIAGNOSIS:

- Side airbag sensor (LH) is faulty.

When Code 54 is displayed, the circuit within the side airbag sensor (LH) is faulty. Replace the side airbag sensor (LH).
<Ref. to AB-19, Side Airbag Sensor.>

T: DTC 55 *S002521J06*

This code is displayed when the side airbag is deployed.
When this code is displayed, the memory cannot be erased. Replace the following parts.

- Airbag control module. <Ref. to AB-18, Airbag Control Module.>
- Front seat with side airbag module. (Operating side) <Ref. to SE-5, Front Seat.>
- Side airbag sensor. (Operating side) <Ref. to AB-19, Side Airbag Sensor.>

LIGHTING SYSTEM

LI

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1. General Description S914001

A: SPECIFICATIONS S914001E49

Headlight		12 V — 60 W/55 W (Halogen)
Front turn signal side marker/parking light		12 V — 8/27 W
Front fog light		12 V — 55 W
Rear combination light	Tail/Stop light	12 V — 8/27 W
	Turn signal light	12 V — 27 W
Rear finisher light	Back-up light	12 V — 27 W
	Tail light	12 V — 5 W
License plate light		12 V — 5 W
High-mounted stop light		12 V — 13 W
Room light		12 V — 8 W
Spot light		12 V — 8 W
Luggage room light		12 V — 5 W

B: PRECAUTIONS S914001E59

- Before disassembling or reassembling parts, always disconnect battery ground cable. When replacing radio, control module, and other parts provided with memory functions, record memory contents before disconnecting the battery ground cable. Otherwise, the memory will be erased.
- Reassemble in reverse order of disassembly, unless otherwise indicated.
- Adjust parts to the given specifications.
- Connect connectors and hoses securely during reassembly.
- After reassembly, make sure functional parts operate smoothly.

WARNING:
- **Air bag system wiring harness is routed near electrical parts and switches. All air bag system wiring harnesses and connectors are yellow. Do not use electric test equipment on these circuits.**
- **Be careful not to damage the air bag system wiring harness when servicing electrical parts and switches.**

C: PREPARATION TOOL S914001A17

1. GENERAL TOOLS S914001A1701

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance and voltage.

2. Headlight and Tail Light System S914415

A: SCHEMATIC S914415A21

1. HEADLIGHT S914415A2110

<Ref. to WI-76, SCHEMATIC, Headlight System.>

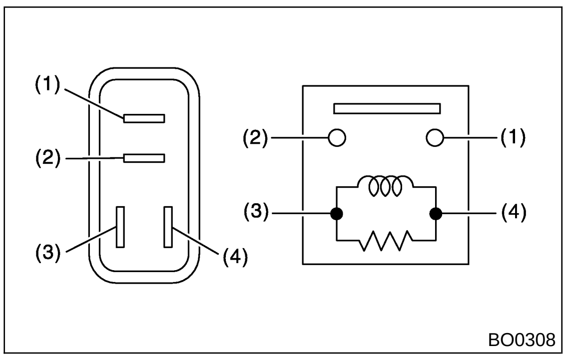
2. CLEARANCE LIGHT AND ILLUMINATION LIGHT S914415A2103

<Ref. to WI-48, SCHEMATIC, Clearance Light and Illumination Light System.>

B: INSPECTION S914415A10

1. HEADLIGHT RELAY S914415A1001

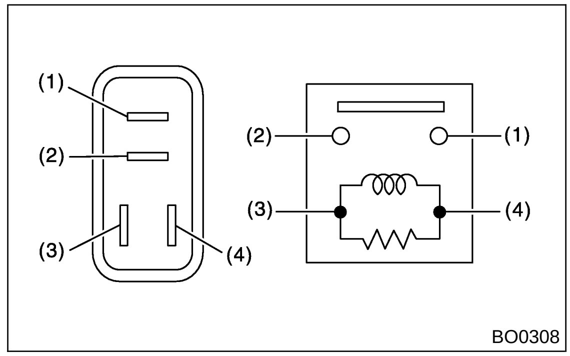
Measure the headlight relay resistance between terminals when connecting terminal No. 4 to battery positive terminal No. 3 to battery ground terminal.



Current	Terminal No.	Standard
Flow	1 and 2	Less than 1 Ω
No flow		More than 1 MΩ

2. TAIL AND ILLUMINATION RELAY S914415A1002

Measure the tail and illumination relay resistance between terminals when connecting terminal No. 4 to battery positive terminal No. 3 to battery ground terminal.



Current	Terminal No.	Standard
Flow	1 and 2	Less than 1 Ω
No flow		More than 1 MΩ

3. Front Fog Light System S914473

A: SCHEMATIC S914473A21

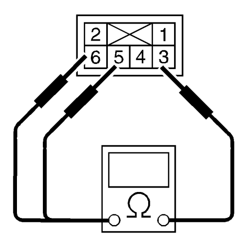
1. FRONT FOG LIGHT S914473A2109

<Ref. to WI-74, SCHEMATIC, Front Fog Light System.>

B: INSPECTION S914473A10

1. FRONT FOG LIGHT SWITCH S914473A1001

Measure the front fog light switch resistance.

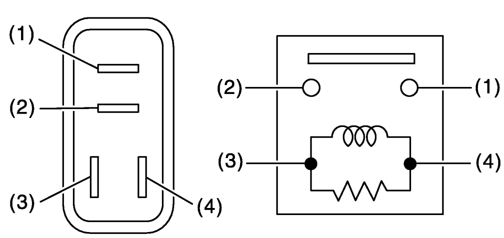


B6M1583

Switch position	Terminal No.	Standard
OFF	—	More than 1 MΩ
ON	3, 5 and 6	Less than 1 Ω

2. FRONT FOG LIGHT RELAY S914473A1002

Measure the front fog light relay resistance between terminals when connecting terminal No. 4 to battery positive terminal and terminal No. 3 to battery ground terminal.



BO0308

Switch position	Terminal No.	Standard
Flow	1 and 2	Less than 1 Ω
No flow		More than 1 MΩ

4. Turn Signal and Hazard Light System S914481

A: SCHEMATIC S914481A21

1. TURN SIGNAL LIGHT AND HAZARD LIGHT S914481A2101

<Ref. to WI-108, SCHEMATIC, Turn Signal Light and Hazard Light System.>

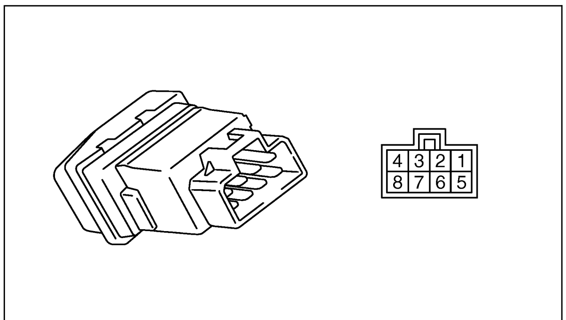
B: INSPECTION S914481A10

1. TURN SIGNAL SWITCH S914481A1001

<Ref. to LI-9, REMOVAL, Combination Switch (Light).>

2. HAZARD SWITCH S914481A1002

Measure the hazard switch resistance.



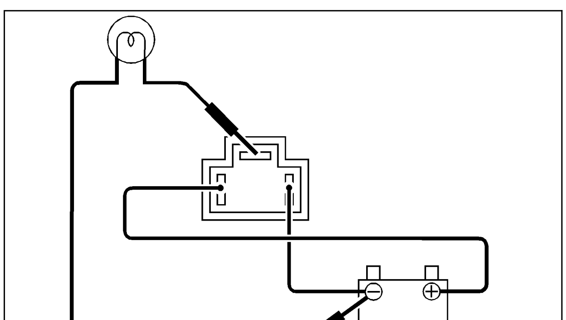
B6M1483

Switch position	Terminal No.	Standard
OFF	6 and 7	Less than 1 Ω
ON	1, 3 and 4	Less than 1 Ω
	7 and 8	Less than 1 Ω

3. TURN SIGNAL & HAZARD MODULE

S914481A1003

Connect battery and turn signal light bulb to the module, as shown in the figure. The module is properly functioning if it blinks when power is supplied to the circuit.


B6M1584

5. Back-up Light System S914414

A: SCHEMATIC S914414A21

1. BACK-UP LIGHT S914414A2101

<Ref. to WI-46, SCHEMATIC, Back-up Light System.>

B: INSPECTION S914414A10

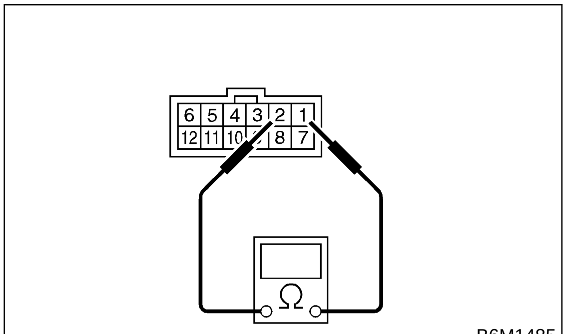
1. BACK-UP LIGHT SWITCH (M/T) S914414A1001

Measure the back-up light switch resistance.

Switch position	Terminal No.	Standard
When shift lever is set in reverse position	1 and 2	Less than 1 Ω
Other positions		More than 1 MΩ

2. INHIBITOR SWITCH (A/T) S914414A1002

Measure the inhibitor switch resistance.



B6M1485

Switch position	Terminal No.	Standard
When select lever is set in “R” position	1 and 2	Less than 1 Ω
Other positions		More than 1 MΩ

6. Stop Light System S914417

A: SCHEMATIC S914417A21

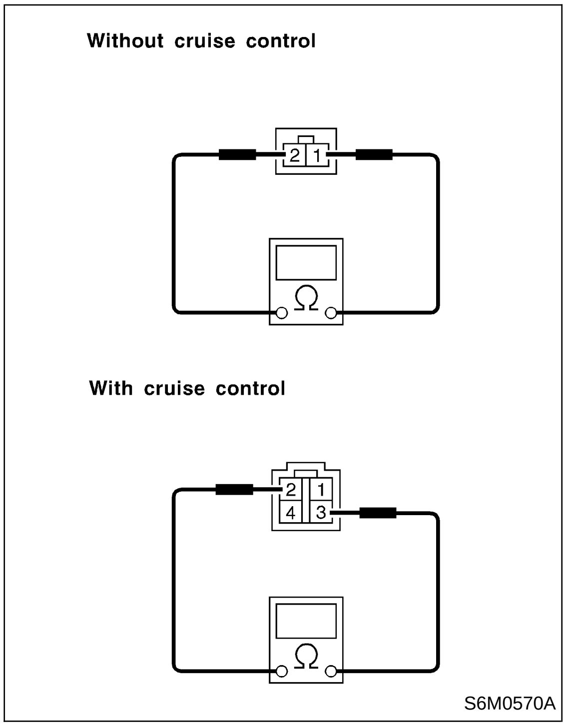
1. STOP LIGHT S914417A2103

<Ref. to WI-106, SCHEMATIC, Stop Light System.>

B: INSPECTION S914417A10

1. STOP LIGHT SWITCH S914417A1001

Measure the stop light switch resistance.



Switch position	Terminal No.	Standard
When brake pedal is depressed	1 and 2: Without cruise control 2 and 3: With cruise control	Less than 1 Ω
When brake pedal is released		More than 1 MΩ

7. Interior Light System S914418

A: SCHEMATIC S914418A21

1. INTERIOR LIGHT S914418A2101

<Ref. to WI-80, SCHEMATIC, In Compartment Light System.>

B: INSPECTION S914418A10

1. DOOR SWITCH S914418A1001

Measure the door switch resistance.

Switch position	Terminal No.	Standard
When door is open.	1 and ground	Less than 1 Ω
When door is closed.		More than 1 MΩ

2. REAR GATE LATCH SWITCH S914418A1002

Measure the rear gate latch switch resistance.

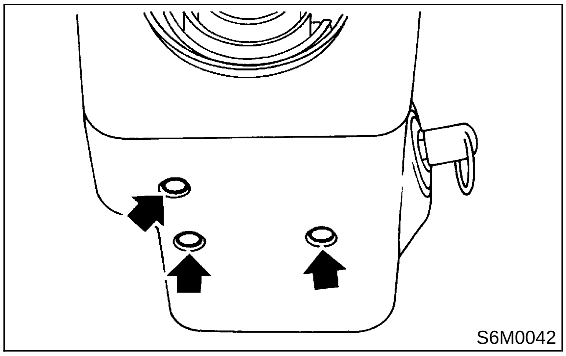
Switch position	Terminal No.	Standard
When rear gate is open.	1 and 2	Less than 1 Ω
When rear gate is closed.		More than 1 MΩ

8. Combination Switch (Light)

S914411

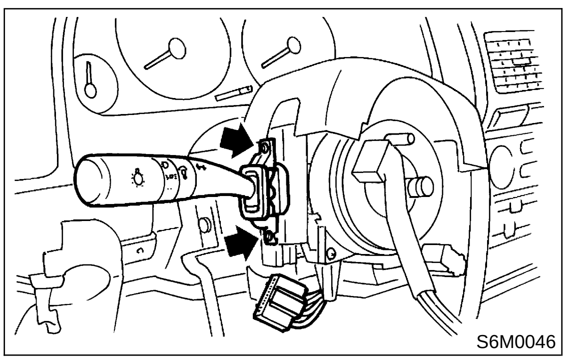
A: REMOVAL S914411A18

1) Disconnect ground cable from battery.
2) Remove instrument panel lower cover. <Ref. to EI-34, REMOVAL, Instrument Panel Assembly.>
3) Remove screws which secure upper column cover to lower column cover.



S6M0042

4) Disconnect connector from combination switch.
5) Remove screws which secure switch and remove switch.



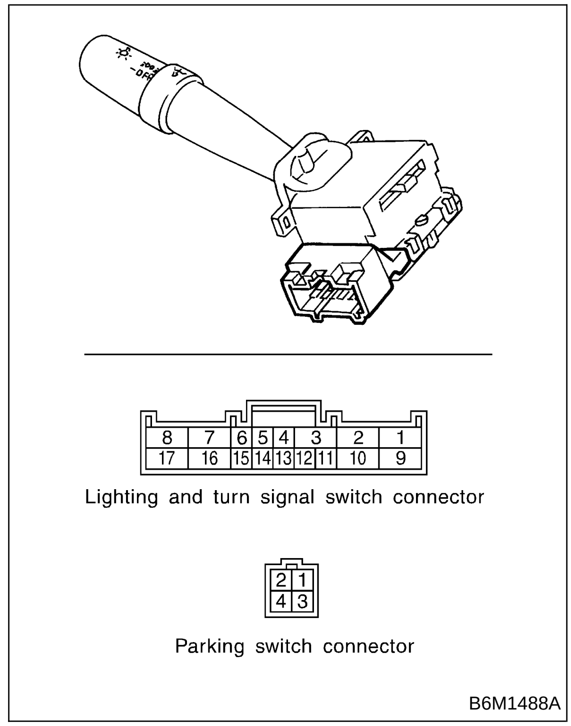
S6M0046

B: INSTALLATION S914411A11

Install in the reverse order of removal.

C: INSPECTION S914411A10

Measure the combination switch resistance.



B6M1488A

1. LIGHTING SWITCH S914411A1001

Switch position	Terminal No.	Standard
OFF	—	More than 1 MΩ
Tail	14 and 16	Less than 1 Ω
Head	13, 14 and 16	Less than 1 Ω

2. DIMMER AND PASSING SWITCH S914411A1002

Switch position	Terminal No.	Standard
Passing	7, 8 and 16	Less than 1 Ω
Low beam	16 and 17	Less than 1 Ω
High beam	7 and 16	Less than 1 Ω

3. TURN SIGNAL SWITCH S914411A1003

Switch position	Terminal No.	Standard
Left	1 and 2	Less than 1 Ω
Neutral	—	More than 1 MΩ
Right	2 and 3	Less than 1 Ω

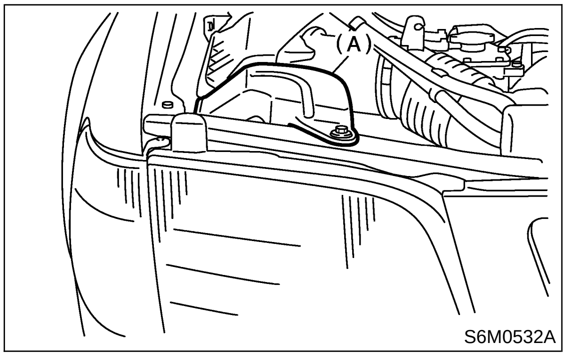
4. PARKING SWITCH S914411A1004

Switch position	Terminal No.	Standard
OFF	2 and 4	Less than 1 Ω
ON	1 and 4	Less than 1 Ω

9. Headlight Assembly S914409

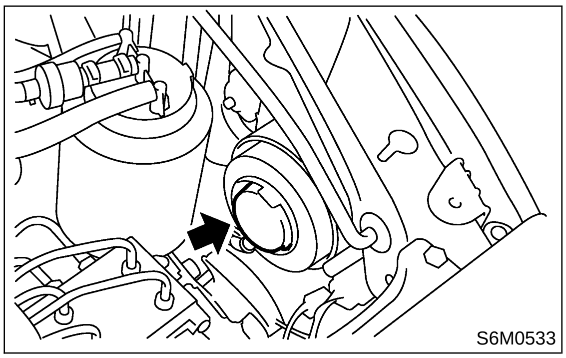
A: REMOVAL S914409A18

1) Disconnect ground cable from battery.
2) Remove duct (A) (when right side headlight is removed).

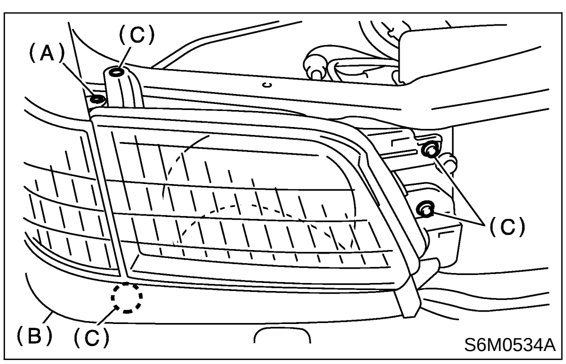


S6M0532A

3) Disconnect headlight bulb connector.


S6M0533

4) Remove front grille. <Ref. to EI-11, REMOVAL, Front Grille.>
5) Remove screw (A) then remove front turn signal light while disconnecting connector.
6) Remove extension (B). <Ref. to EI-13, REMOVAL, Front Bumper.>
7) Remove bolts (C) which secure headlight and remove headlight.



S6M0534A

B: INSTALLATION S914409A11

Install in the reverse order of removal.

C: ADJUSTMENT S914409A01

1. HEADLIGHT AIMING S914409A0101

NOTE:
As this headlight is the "VISUAL AIMING TYPE", it is possible to adjust aiming only in the vertical direction. It cannot be adjusted in the horizontal direction.

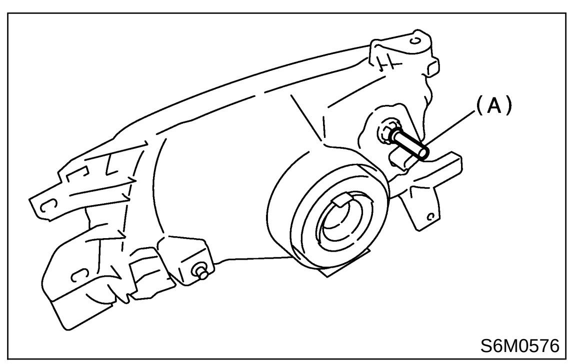
CAUTION:
Turn off the light before adjusting headlight aiming. If the light is necessary to check aiming, do not turn on for more than two minutes.

NOTE:
Before checking the headlight aiming, be sure of the following:
- The area around the headlight has not sustained any accident, damage or other type of deformation.
- Vehicle is parked on level ground.
- The inflation pressure of tires is correct.
- Vehicle's gas tank is fully charged.
- Bounce the vehicle several times to normalize the suspension.
- Make certain that someone is seated in the driver's seat.

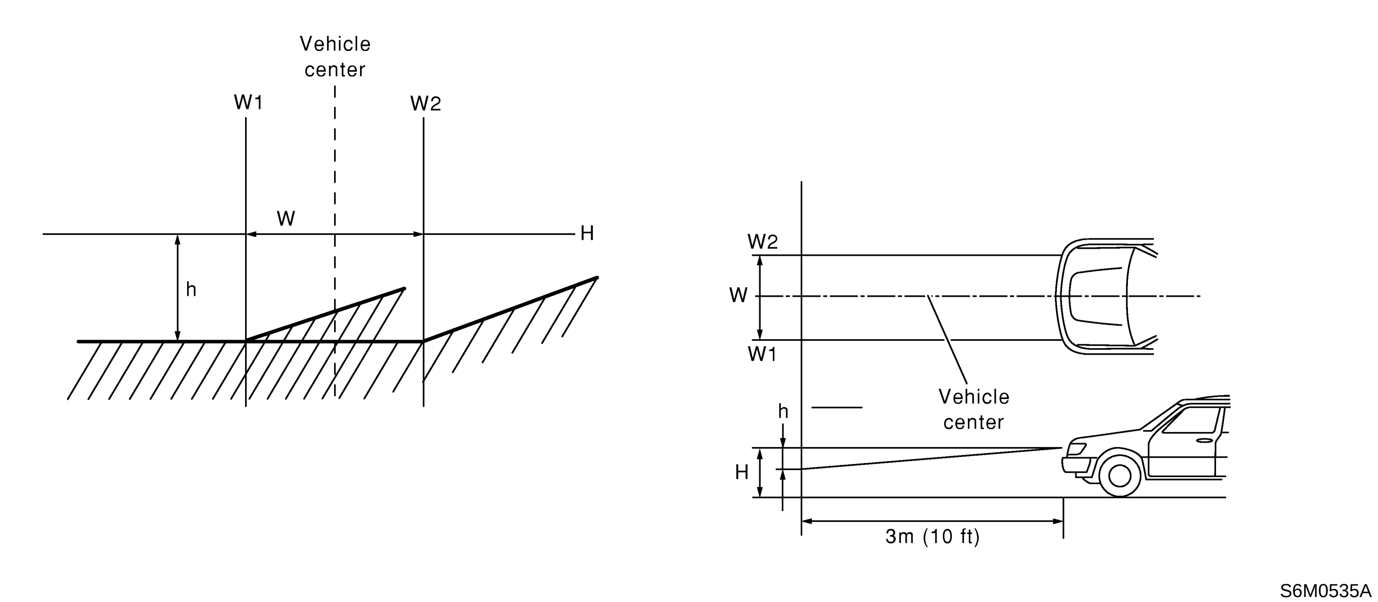
1) Place a cloth over the headlight that does not require aiming adjustment.
2) Turn the headlight on and then adjust the low beam pattern to the following positions on the screen.

CAUTION:
Do not perform lateral headlight aiming adjustment.

NOTE:
Adjust the headlight aiming by turning the adjusting screw (A).



S6M0576



W mm (in)	H mm (in)	h mm (in) at 3 m (10 ft)
1,090 (42.91)	710 (27.95)	21 (0.83)

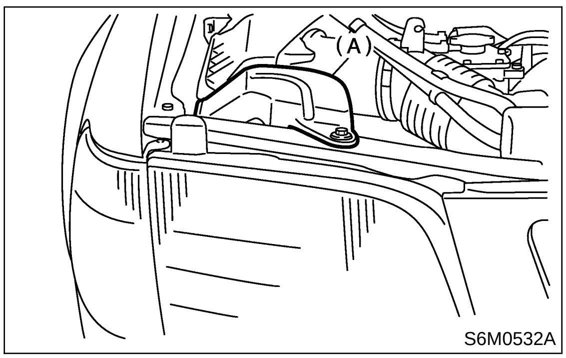
10. Headlight Bulb *S914410*

A: REMOVAL *S914410A18*

CAUTION:

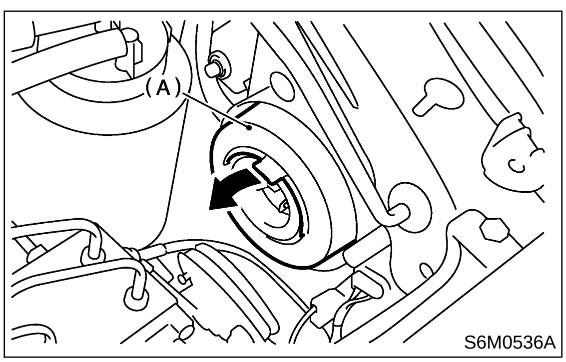
- **Because the tungsten halogen bulb operates at a high temperature, dirt and oil on the bulb surface reduces the bulb's service life. Hold the flange portion when replacing the bulb. Never touch the glass portion.**
- **Do not leave the headlight without a bulb for a long time. Dust, moisture, etc. entering the headlight may affect its performance.**

1) Disconnect ground cable from battery.
2) Remove duct (A) (when right side headlight is removed).



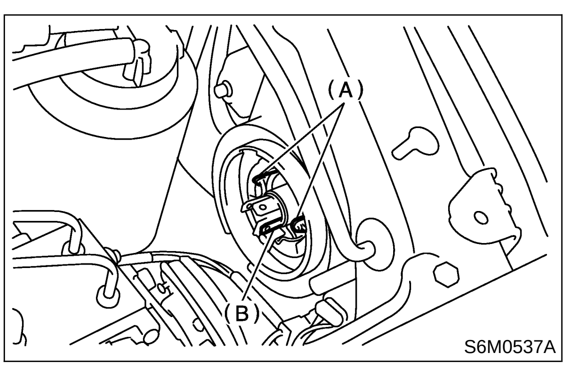
S6M0532A

3) Disconnect headlight bulb connector.
4) Remove back cover (A).



S6M0536A

5) Push to remove spring retainer (A) and then detach headlight bulb (B).



S6M0537A

B: INSTALLATION *S914410A11*

Install in the reverse order of removal.

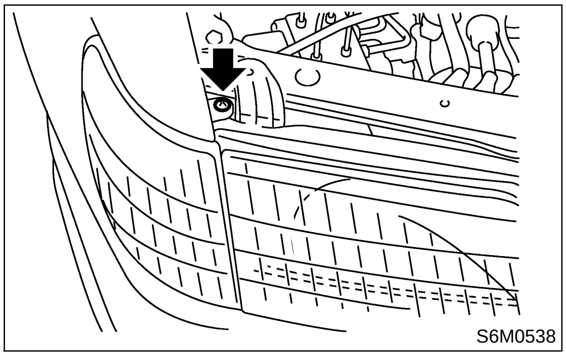
C: INSPECTION *S914410A10*

1) Visually check bulb for blow out.
2) Check the bulb specification.
<Ref. to LI-2, SPECIFICATIONS, General Description.>
3) If NG, replace bulb with a new one.

11. Front Turn Signal Light Assembly S914408

A: REMOVAL S914408A18

1) Disconnect ground cable from battery.
2) Remove screw and disconnect connector, and then detach front turn signal light assembly.



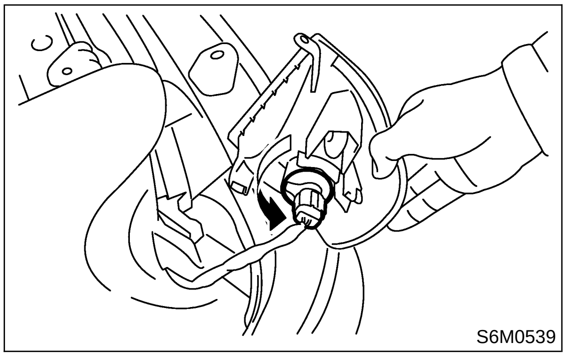
B: INSTALLATION S914408A11

Install in the reverse order of removal.

12. Front Turn Signal/Side Marker/Parking Light Bulb *S914799*

A: REMOVAL *S914799A18*

1) Remove front turn signal light assembly. <Ref. to LI-13, REMOVAL, Front Turn Signal Light Assembly.>
2) Turn the socket and remove the bulb.



B: INSTALLATION *S914799A11*

Install in the reverse order of removal.

C: INSPECTION *S914799A10*

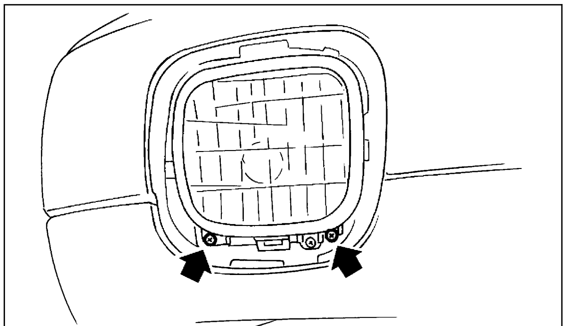
1) Visually check bulb for blow out.
2) Check the bulb specification.
<Ref. to LI-2, SPECIFICATIONS, General Description.>
3) If NG, replace bulb with a new one.

13. Front Fog Light Assembly

S914427

A: REMOVAL *S914427A18*

1) Disconnect ground cable from battery.
2) Remove the two screws, then draw out the front fog light from front bumper.



S6M0085

3) Disconnect the connector.

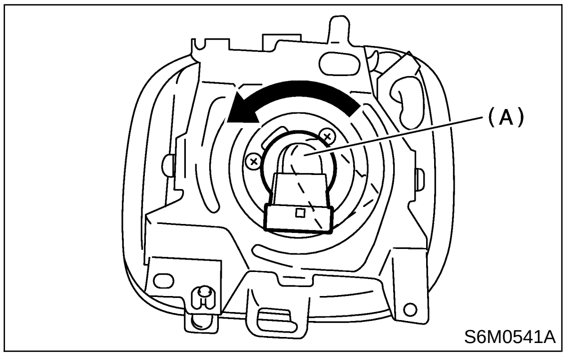
B: INSTALLATION *S914427A11*

Install in the reverse order of removal.

14. Front Fog Light Bulb *S914428*

A: REMOVAL *S914428A18*

1) Remove front fog light assembly. <Ref. to LI-15, REMOVAL, Front Fog Light Assembly.>
2) Remove front fog light bulb (A).



B: INSTALLATION *S914428A11*

Install in the reverse order of removal.

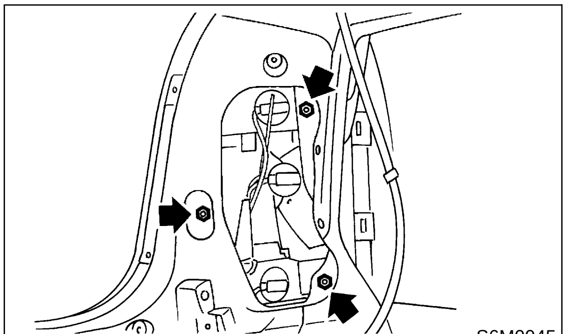
C: INSTALLATION *S914428A10*

1) Visually check bulb for blow out.
2) Check the bulb specification.
<Ref. to LI-2, SPECIFICATIONS, General Description.>
3) If NG, replace bulb with a new one.

15. Rear Combination Light Assembly *S914426*

A: REMOVAL *S914426A18*

1) Disconnect ground cable from battery.
2) Remove rear quarter upper and lower trim. <Ref. to EI-41, REMOVAL, Rear Quarter Trim.>
3) Remove nuts and disconnect connector.


S6M0045

4) Attach adhesive cloth tape to body area around rear combination light.
5) Using a standard screwdriver, carefully pry rear combination light off.

CAUTION:
- **Do not pry on the rear combination light forcefully as this may scratch the vehicle body.**

B: INSTALLATION *S914426A11*

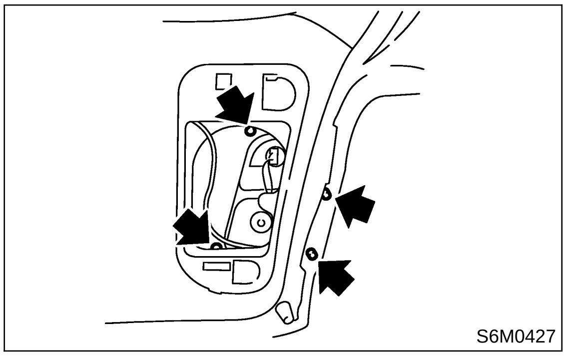
Install in the reverse order of removal.

CAUTION:
- **Remove all traces of adhesive tape from body before installation.**
- **Attach butyl rubber tape to back of rear combination light before installing rear combination light on body for sealing purposes.**

16. Rear Finisher Light Assembly S914429

A: REMOVAL S914429A18

1) Disconnect ground cable from battery.
2) Remove rear gate trim access hole cover.
3) Remove the four nuts.



S6M0427

4) Detach rear finisher light while disconnecting connector.
5) Install in the reverse order of removal.

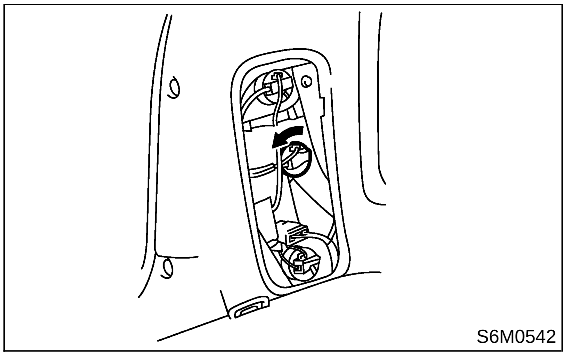
B: INSTALLATION S914429A11

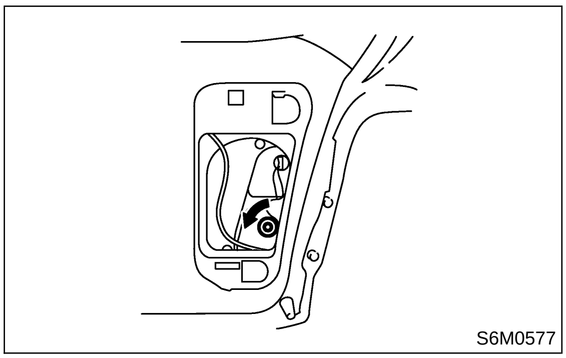
Install in the reverse order of removal.

17. Stop/Tail Light Bulb S914790

A: REMOVAL S914790A18

1) Remove rear combination light cover.
2) Remove rear gate trim access hole cover.
3) Turn the socket and remove the bulb.





B: INSTALLATION S914790A11

Install in the reverse order of removal.

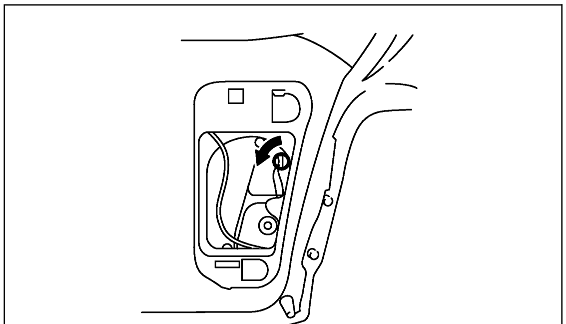
C: INSPECTION S914790A10

1) Visually check bulb for blow out.
2) Check the bulb specification.
<Ref. to LI-2, SPECIFICATIONS, General Description.>
3) If NG, replace bulb with a new one.

18. Back-up Light Bulb *S914424*

A: REMOVAL *S914424A18*

1) Remove rear gate trim access hole cover.
2) Turn the socket and remove the bulb.


S6M0543

B: INSTALLATION *S914424A11*

Install in the reverse order of removal.

C: INSPECTION *S914424A10*

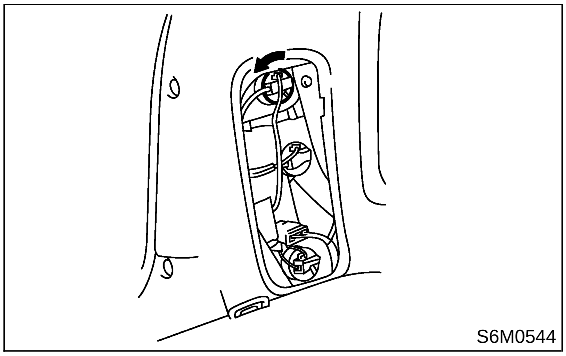
1) Visually check the bulb for blow out.
2) Check the bulb specification.
<Ref. to LI-2, SPECIFICATIONS, General Description.>
3) If NG, replace the bulb with a new one.

19. Rear Turn Signal Light Bulb

S914421

A: REMOVAL *S914421A18*

1) Remove rear combination light cover.
2) Turn the socket and remove the bulb.



B: INSTALLATION *S914421A11*

Install in the reverse order of removal.

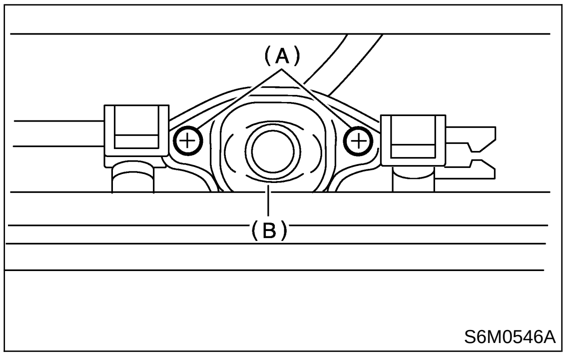
C: INSPECTION *S914421A10*

1) Visually check bulb for blow out.
2) Check the bulb specification.
<Ref. to LI-2, SPECIFICATIONS, General Description.>
3) If NG, replace bulb with a new one.

20. License Plate Light *S914420*

A: REMOVAL *S914420A18*

1) Disconnect ground cable from battery.
2) Remove license plate light mounting screw (A) and then remove the lens (B).



3) Remove the bulb.

B: INSTALLATION *S914420A11*

Install in the reverse order of removal.

C: INSPECTION *S914420A10*

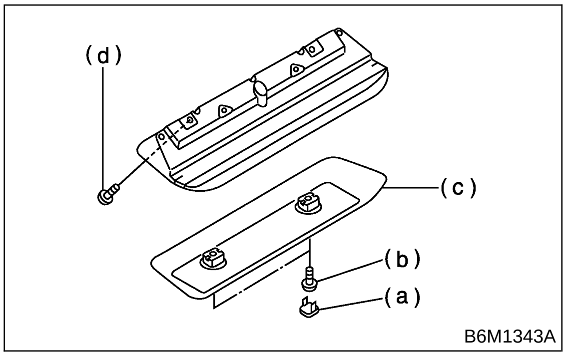
1) Visually check bulb for blow out.
2) Check the bulb specification.
<Ref. to LI-2, SPECIFICATIONS, General Description.>
3) If NG, replace bulb with a new one.

21. High-mounted Stop Light

S914425

A: REMOVAL S914425A18

1) Disconnect ground cable from battery.
2) Remove cap (a) by prying on the edge with a screwdriver.
3) Remove screws (b) and then detach cover (c).
4) Remove screws (d) and then detach high-mounted stop light while disconnecting connector.



B: INSTALLATION S914425A11

Install in the reverse order of removal.

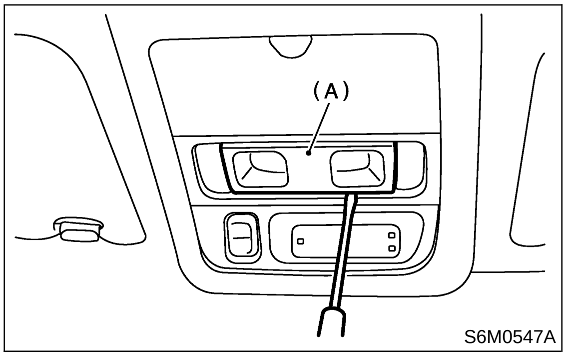
C: INSPECTION S914425A10

1) Visually check bulb for blow out.
2) Check the bulb specification.
<Ref. to LI-2, SPECIFICATIONS, General Description.>
3) If NG, replace bulb with a new one.

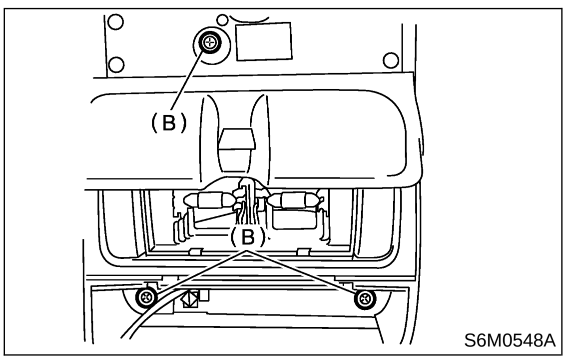
22. Spot Light S914398

A: REMOVAL S914398A18

1) Disconnect ground cable from battery.
2) Remove spot light lens (A).



3) Remove sunroof switch. <Ref. to SR-10, REMOVAL, Sunroof Switch.>
4) Remove spot light mounting screw (B).



5) Disconnect harness connectors and remove spot light.

B: INSTALLATION S914398A11

Install in the reverse order of removal.

C: INSPECTION S914398A10

1. SPOT LIGHT BULB S914398A1001

1) Visually check bulb for blow out.
2) Check the bulb specification.
<Ref. to LI-2, SPECIFICATIONS, General Description.>
3) If NG, replace bulb with a new one.

2. SPOT LIGHT SWITCH S914398A1002

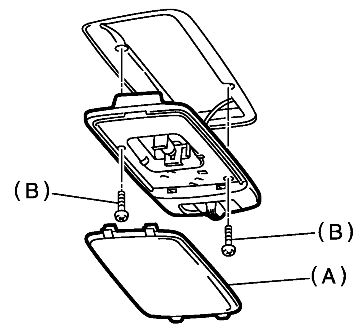
Measure spot light resistance.

Switch position	Terminal No.	Standard
OFF	—	More than 1 MΩ
ON	1 and 2	1.5±0.5 Ω

23. Room Light *S914397*

A: REMOVAL *S914397A18*

1) Disconnect ground cable from battery.
2) Remove lens (A) and room light mounting screws (B).



B6M1479A

3) Disconnect harness connectors and remove room light.

B: INSTALLATION *S914397A11*

Install in the reverse order of removal.

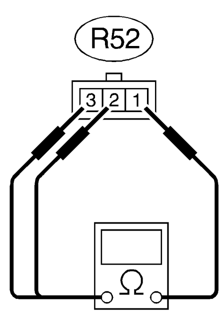
C: INSPECTION *S914397A10*

1. ROOM LIGHT BULB *S914397A1001*

1) Visually check bulb for blow out.
2) Check the bulb specification.
<Ref. to LI-2, SPECIFICATIONS, General Description.>
3) If NG, replace bulb with a new one.

2. ROOM LIGHT *S914397A1002*

Measure the room light resistance.



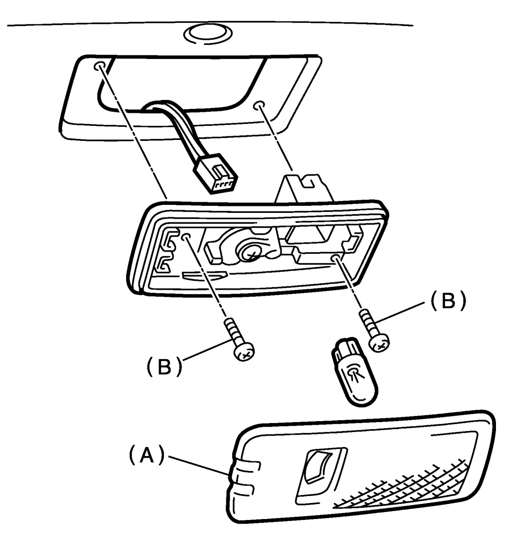
B6M1489A

Switch position	Terminal No.	Standard
OFF	—	More than 1 MΩ
ON	1 and 3	1.5±0.5 Ω
DOOR	1 and 2	1.5±0.5 Ω

24. Luggage Room Light S914399

A: REMOVAL S914399A18

1) Disconnect ground cable from battery.
2) Remove lens (A) and luggage room light mounting screws (B).



B6M1480A

3) Disconnect harness connectors and remove luggage room light.

B: INSTALLATION S914399A11

Install in the reverse order of removal.

C: INSPECTION S914399A10

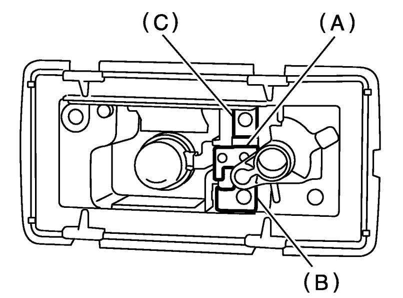
1. LUGGAGE ROOM LIGHT BULB S914399A1001

1) Visually check bulb for blow out.
2) Check the bulb specification.
<Ref. to LI-2, SPECIFICATIONS, General Description.>
3) If NG, replace bulb with a new one.

2. LUGGAGE ROOM LIGHT SWITCH

S914399A1002

Measure luggage room light resistance.



B6M1490A

Switch position	Terminal No.	Standard
OFF	—	More than 1 MΩ
ON	1 and 3	1.5±0.5 Ω
DOOR	1 and 2	1.5±0.5 Ω

WIPER AND WASHER SYSTEMS

WW

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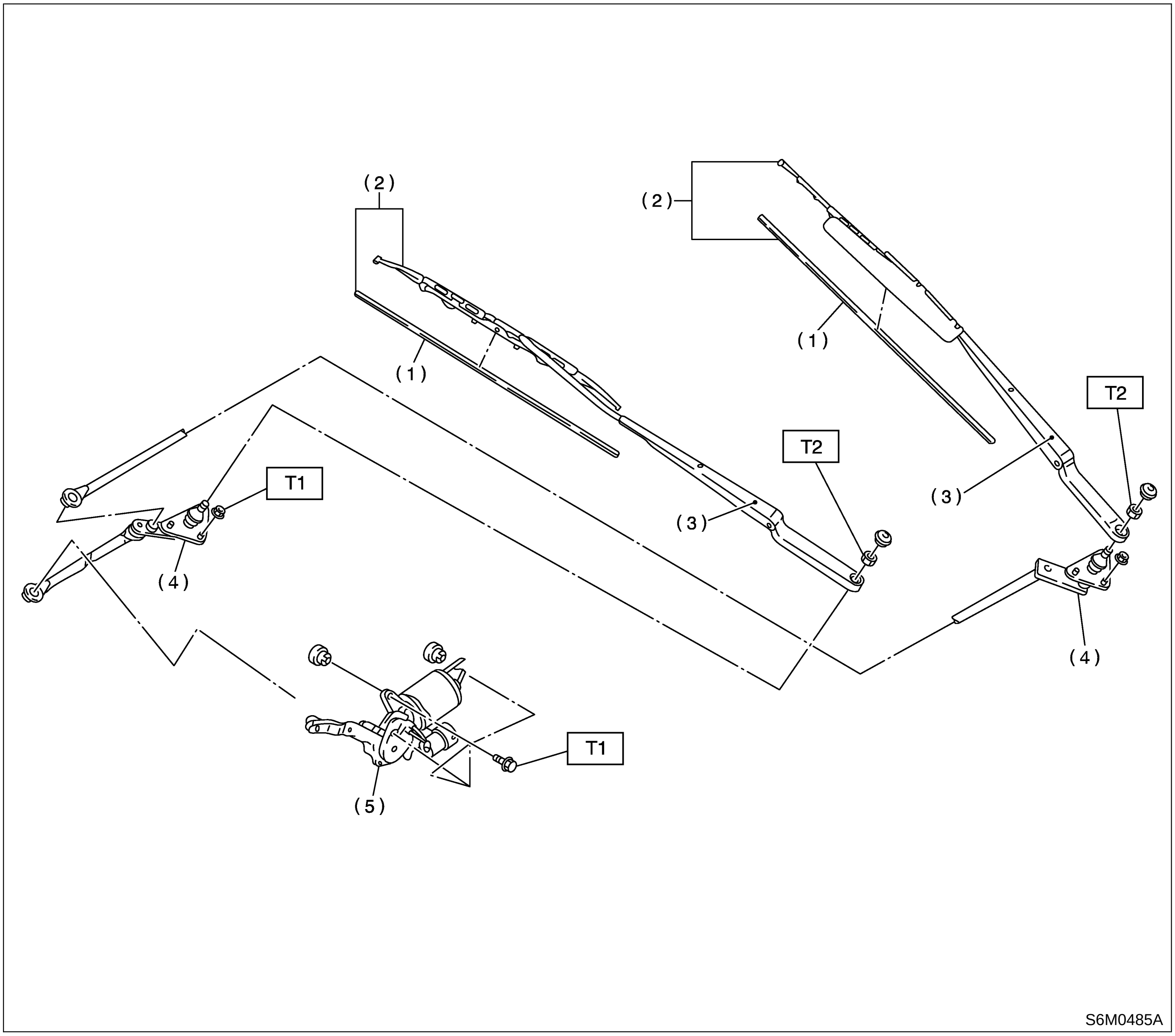
1. General Description S902001

A: SPECIFICATIONS S902001E49

Front wiper motor	Input	12 V — 54 W or less
Rear wiper motor	Input	12 V — 42 W or less
Front washer motor	Pump type	Centrifugal
	Input	12 V — 36 W or less
Rear washer motor	Pump type	Centrifugal
	Input	12 V — 36 W or less

B: COMPONENT S902001A05

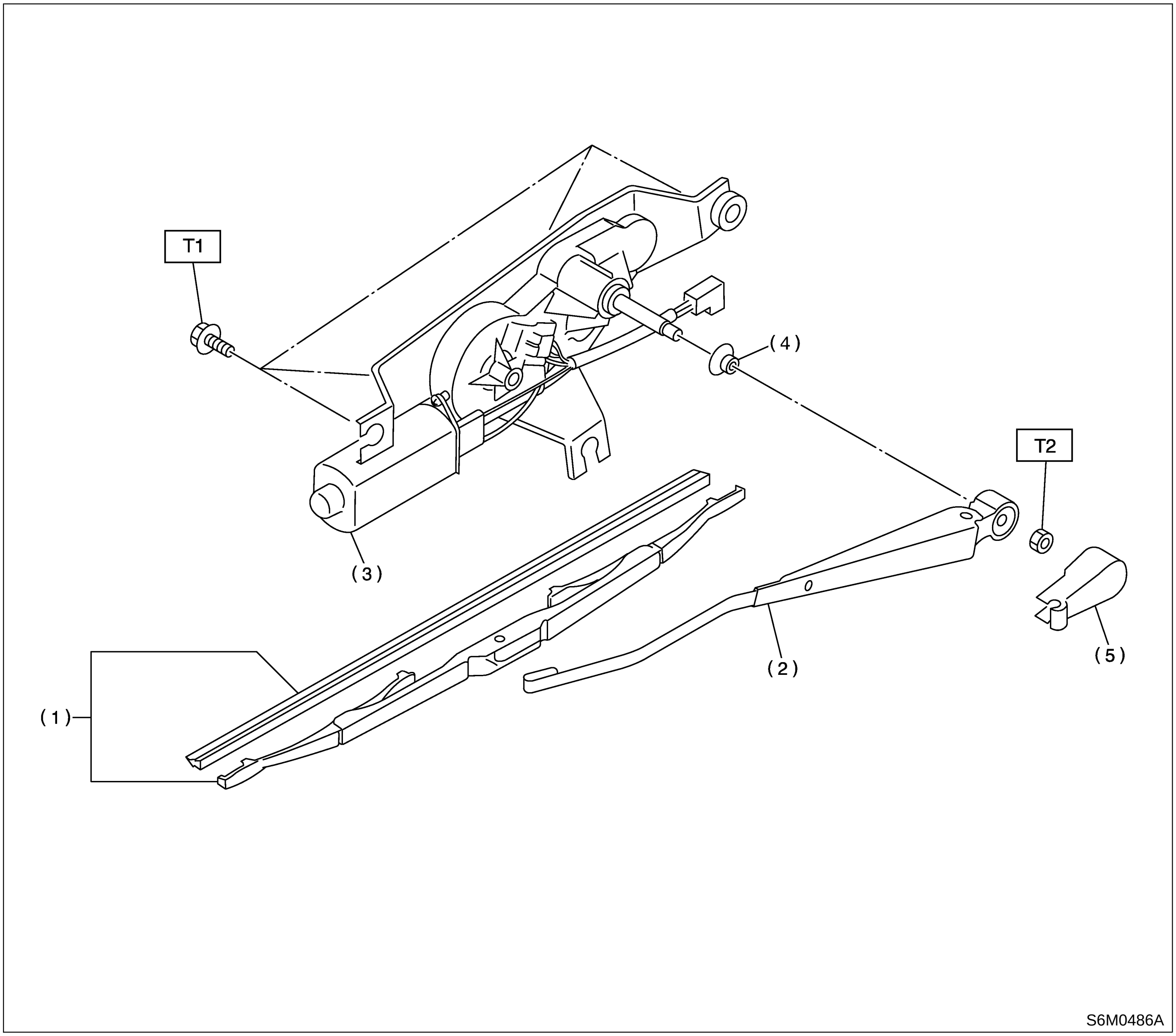
1. FRONT WIPER S902001A0501



(1) Wiper rubber
(2) Wiper blade ASSY
(3) Wiper arm
(4) Wiper link
(5) Wiper motor

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.0 (0.61, 4.4)
T2: 20 (2.0, 14.5)

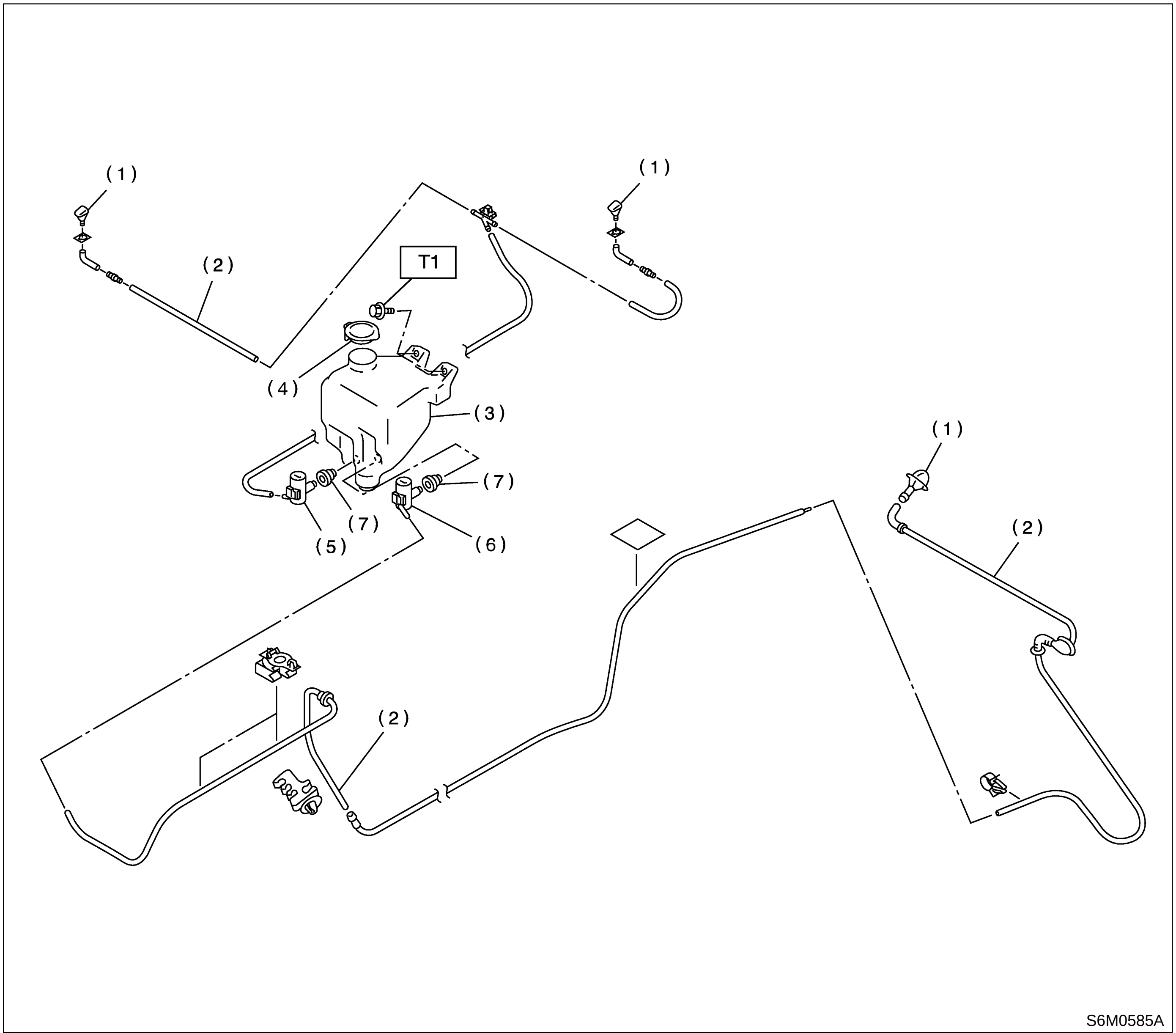
2. REAR WIPER *S902001A0502*



(1) Wiper blade ASSY
(2) Wiper arm
(3) Wiper motor
(4) Pivot cap
(5) Wiper arm cover

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5.9 (0.6, 4.3)
T2: 7.8 (0.8, 5.6)

3. WASHER TANK *S902001A0503*



(1) Washer nozzle
(2) Washer hose
(3) Washer tank
(4) Washer tank cap
(5) Front washer motor
(6) Rear washer motor
(7) Grommet

Tightening torque: N·m (kgf-m, ft-lb)
T: 6.0 (0.61, 4.4)

C: CAUTION *S902001A03*

- Reconnect connectors and hoses securely.

After reconnecting, confirm that each function operates normally.
- Be careful, the airbag system wiring harness passes near other electrical parts and switches.
- The wiring harness and connectors of all airbag systems are yellow. Do not use a tester on these circuits.
- Care must be taken when installing the piping hose so that no bending, jamming, etc. are caused.
- If even a little oil or grease such as silicon oil gets in the tank and washer passages, an oil film easily forms on the glass, causing the wiper to chatter and judder. Therefore, be careful not to let this happen.

MEMO:

2. Wiper and Washer System *S902394*

A: SCHEMATIC *S902394A21*

1. WIPER AND WASHER (FRONT) *S902394A2101*

<Ref. to WI-110, Wiper and Washer System (Front).>

2. WIPER AND WASHER (REAR) *S902394A2102*

<Ref. to WI-111, Wiper and Washer System (Rear).>

B: INSPECTION S902394A10

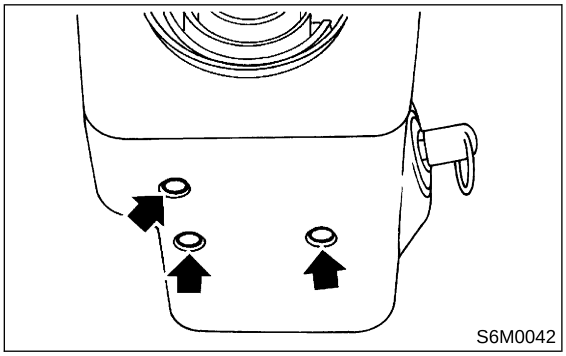
Symptom	Repair order
Wiper and washers do not operate.	(1) Wiper fuse (F/B No. 14, 15) (2) Combination switch (3) Wiper motor (4) Wire harness
Wipers do not operate in LO or HI.	(1) Combination switch (2) Wiper motor (3) Wire harness
Wipers do not operate in INT.	(1) Combination switch (2) Wiper motor (3) Wire harness
Washer motor does not operate.	(1) Washer switch (2) Washer motor (3) Wire harness
Wipers do not operate when washer switch is ON.	(1) Washer motor (2) Wire harness
Washer fluid spray does not operate.	(1) Washer hose and nozzle

3. Combination Switch (Wiper)

S902395

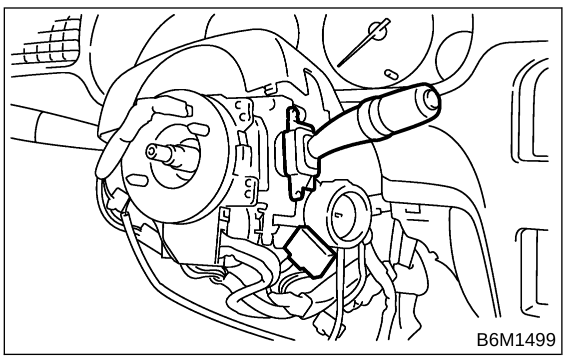
A: REMOVAL S902395A18

1) Loosen screws to remove steering column cover.



S6M0042

2) Disconnect connectors from combination switches.
3) Loosen screw to remove combination switch.



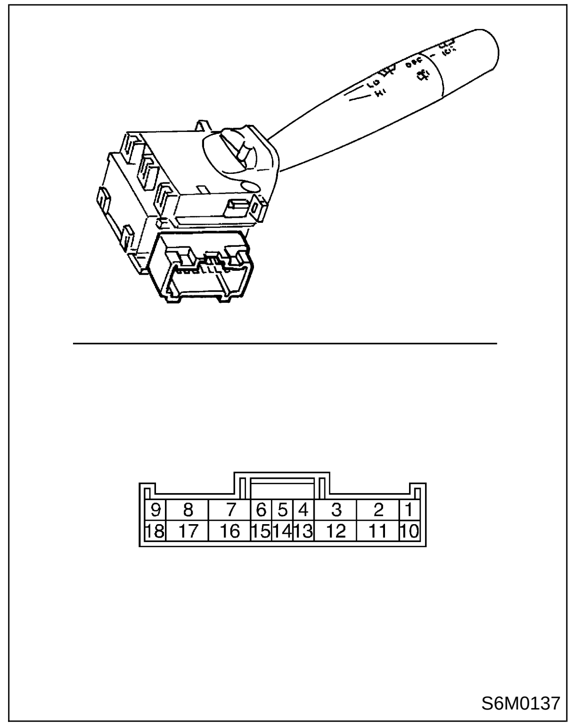
B6M1499

B: INSTALLATION S902395A11

Install in the reverse order of removal.

C: INSPECTION S902395A10

- Inspect the continuity between each connector terminal.



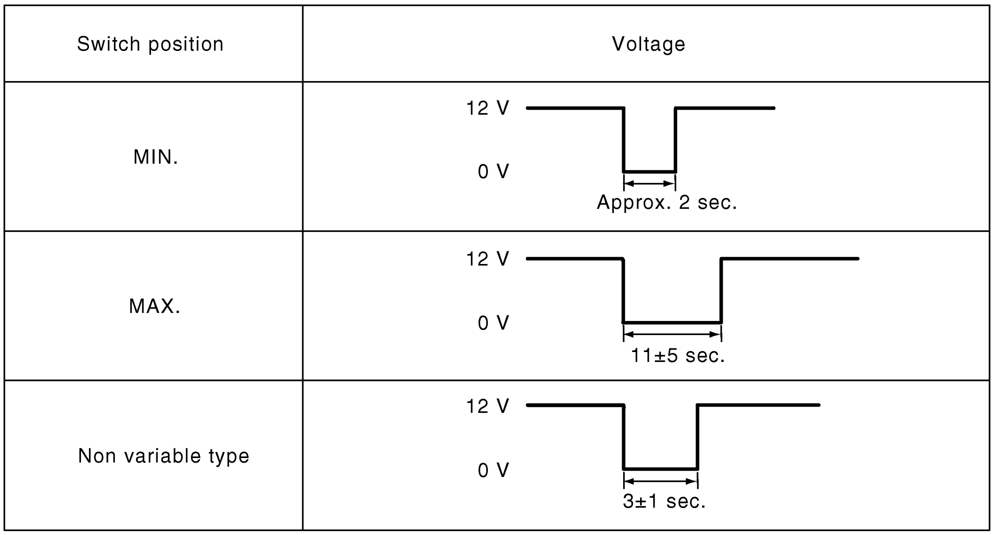
S6M0137

	Switch position	Terminal No.	Standard
FRONT	OFF	7 and 16	Less than 1 Ω
	INT	7 and 16	Less than 1 Ω
	LO	7 and 17	Less than 1 Ω
	HI	8 and 17	Less than 1 Ω
	Washer ON	2 and 11	Less than 1 Ω
	Washer ON	2 and 10 2 and 12 10 and 12	Less than 1 Ω
REAR	OFF	—	More than 1 MΩ
	INT	2 and 10	Less than 1 Ω
	ON	2 and 10	Less than 1 Ω
	Washer ON	2 and 10 2 and 12 10 and 12	Less than 1 Ω

If continuity is not as specified, replace the switch.

- Intermittent operation inspection

1) Turn the wiper switch to INT.
2) Adjust the intermittent control switch to MAX.
3) Apply battery voltage to switch terminals 16 and 2, and inspect the voltage of terminals 7 and 2. (Measure the voltage after the second time the wiper stops.)



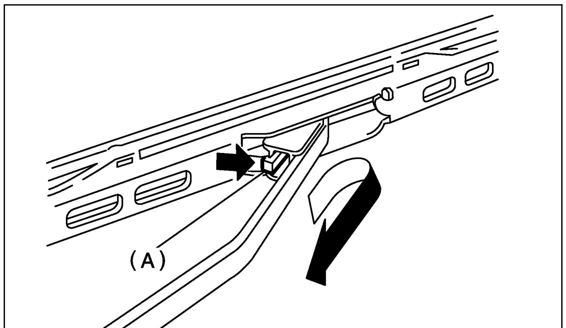
B6M1465A

If operation is not as specified, replace the switch.

4. Wiper Blade S902392

A: REMOVAL S902392A18

While pushing lock clip (A) up, pull out blade from arm to arrow direction.



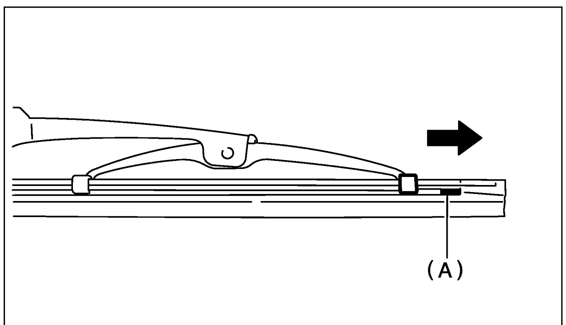
B6M1570A

B: INSTALLATION S902392A11

1) Install in the reverse order of removal.
2) Confirm that the clip is securely locked.

C: DISASSEMBLY S902392A06

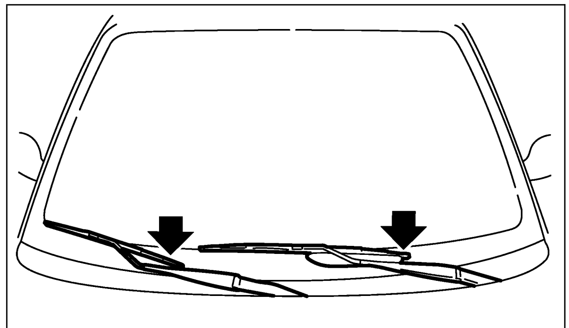
Pull on side (A) of the wiper rubber stopper and remove the rubber from the blade assembly.



B6M1496A

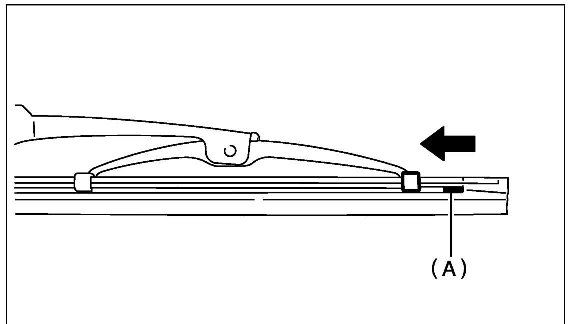
D: ASSEMBLY S902392A02

1) Insert the wiper rubber onto the blade so that the stopper is in the position shown (at the bottom of the wiper arm).



B6M1497

2) Make sure the wiper rubber is securely fastened to the pull stopper (A).



B6M1498A

E: INSPECTION S902392A10

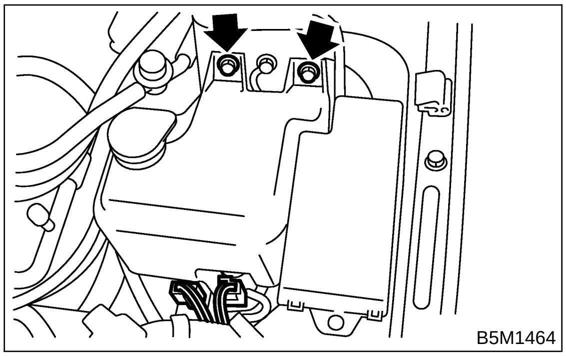
1) When the wiper does not perform well, inspect the following:
- Make sure the movable part of the blade assembly moves smoothly.
- Make sure the wiper rubber is not deformed or damaged.

2) Replace with a new part if damage is found.

5. Washer Tank and Motor S902405

A: REMOVAL S902405A18

1) Disconnect battery ground cable.
2) Remove the two bolts, and then disconnect the connectors from washer motors.



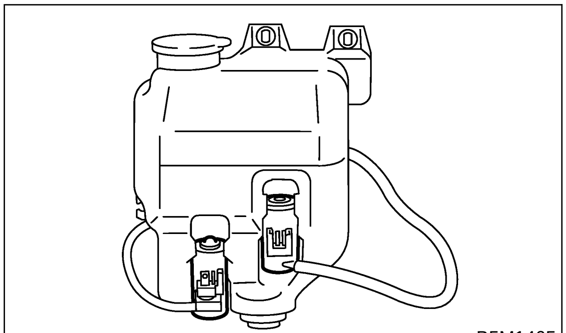
B5M1464

B: INSTALLATION S902405A11

Install in the reverse order of removal.

C: DISASSEMBLY S902405A06

Remove the bolt, and then pull out washer motor from tank.



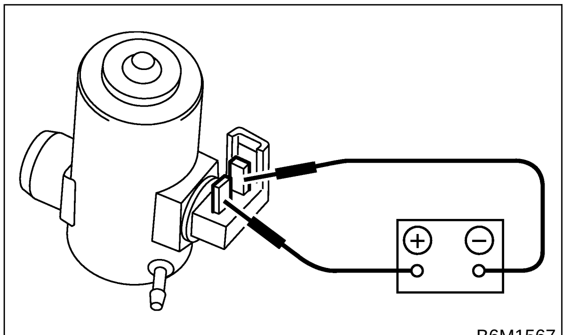
B5M1465

D: ASSEMBLY S902405A02

1) Assemble in the reverse order of disassembly.
2) Confirm that water does not leak from installation area of motor.

E: INSPECTION S902405A10

Apply battery voltage to the connector terminal of the washer motor and make sure the motor operates.

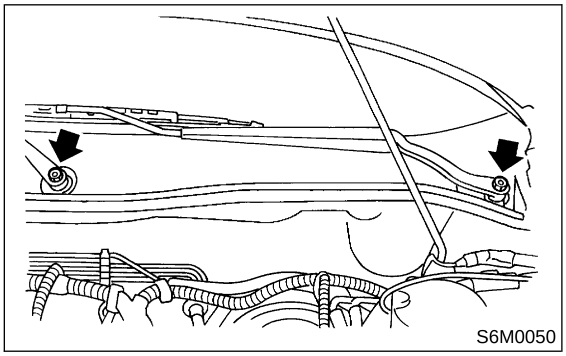


B6M1567

6. Front Wiper Arm S902404

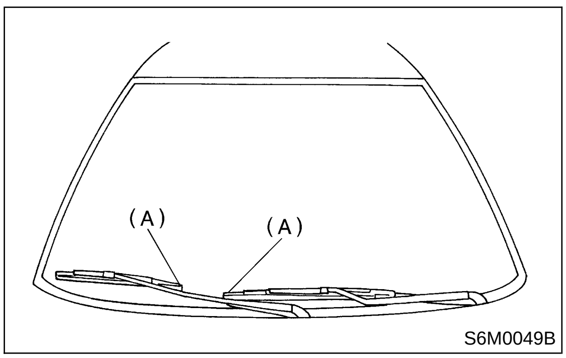
A: REMOVAL S902404A18

1) Open the hood.
2) Remove cap.
3) Loosen nut to remove wiper arm.



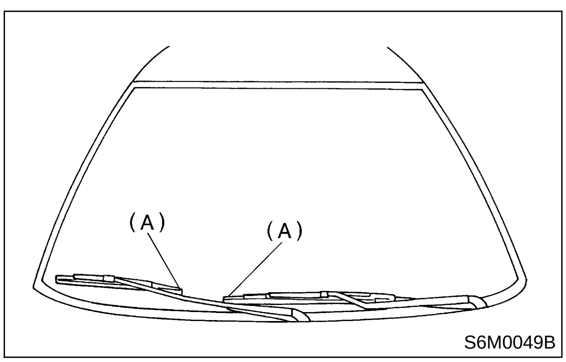
B: INSTALLATION S902404A11

1) Install in the reverse order of removal.
2) Operate wiper once.
3) Align wiper blade to ceramic print point mark (A) of front window pane.



C: ADJUSTMENT S902404A01

Operate wiper once. Align wiper blade to ceramic print point mark (A) of front window pane.

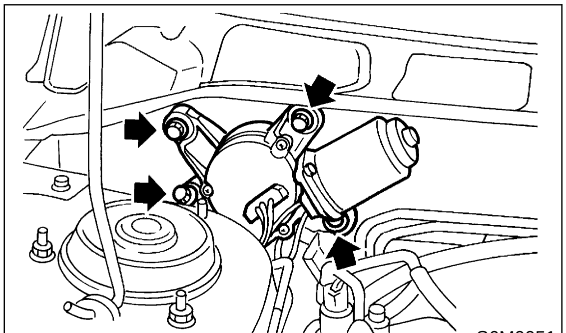


7. Front Wiper Motor and Link

S902406

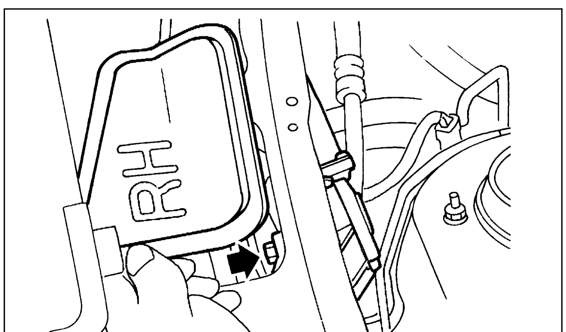
A: REMOVAL S902406A18

1) Disconnect battery ground cable.
2) Remove cowl panel. <Ref. to EI-26, REMOVAL, Cowl Panel.>
3) Disconnect motor connector, and remove motor attaching bolts.



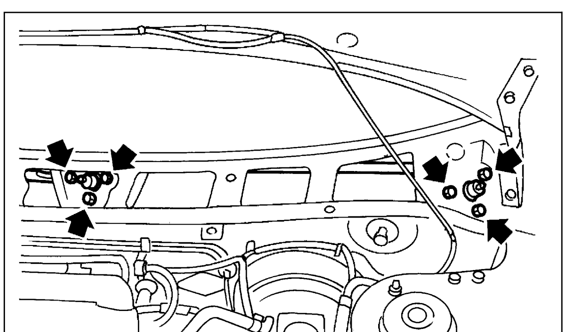
S6M0051

4) Remove cowl cover, and remove motor link nut on back side of motor.



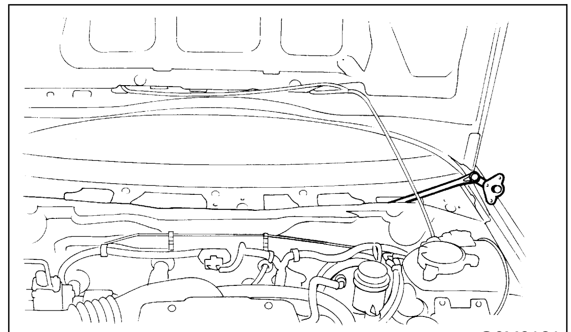
S6M0052

5) Remove bolts which secure sleeve unit.



S6M0053

6) Remove wiper link from front panel service hole.



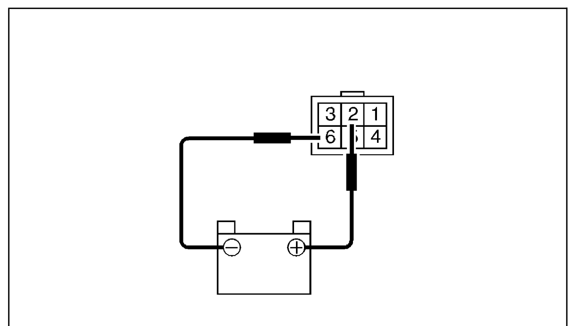
G6M0121

B: INSTALLATION S902406A11

Install in the reverse order of removal.

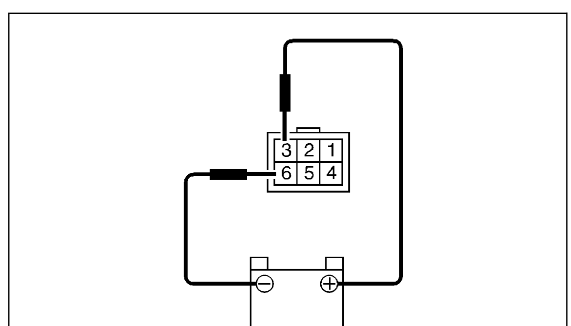
C: INSPECTION S902406A10

1) When the battery is connected to the appropriate connectors, confirm that motor operates at low speed.



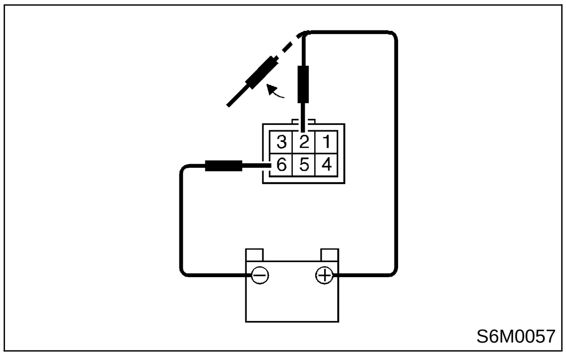
S6M0055

2) When the battery is connected to the appropriate connectors, confirm that motor operates at high speed.

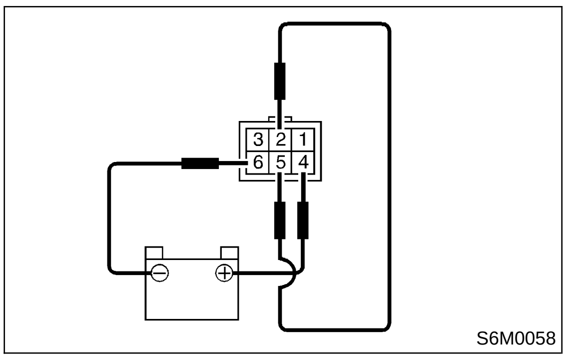


S6M0056

3) Connect the battery to terminals of connector, and remove terminal connection with motor rotated at low speed, and stop wiper motor through operation.



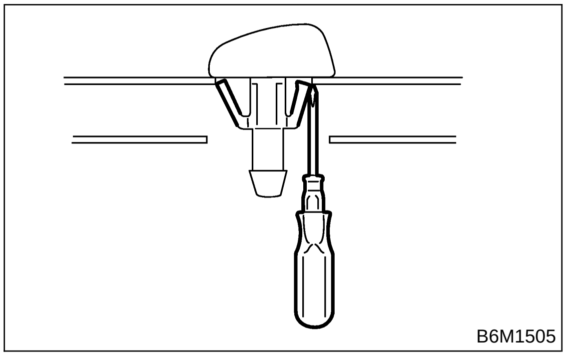
4) Connect the battery and confirm that motor stops at automatic stop position after motor operates at low speed again.



8. Front Washer Nozzle S902788

A: REMOVAL S902788A18

1) Remove the washer hose from the washer nozzle.
2) Open the clips on the underside of the hood with a thin screwdriver or other tool, and remove the washer nozzle.



B6M1505

B: INSTALLATION S902788A11

1) Install in the reverse order of removal.
2) Adjust the position of the washer liquid sprayer. <Ref. to WW-15, ADJUSTMENT, Front Washer.>

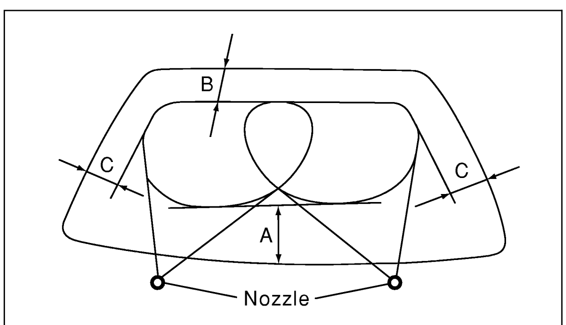
C: INSPECTION S902788A10

- Make sure the nozzle and hose are not clogged.
- Make sure the hose is not bent.

D: ADJUSTMENT S902788A01

1) Turn wiper switch to OFF position.
2) When vehicle stops, adjust washer injection position as shown in the figure.

Injection position:
A: 300 mm (11.81 in)
B: 100 mm (3.94 in)
C: 100 mm (3.94 in)

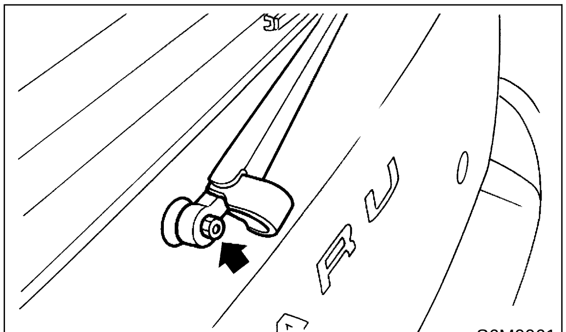


S6M0586A

9. Rear Wiper Arm *S902402*

A: REMOVAL *S902402A18*

1) Raise wiper arm cover.
2) Loosen nut to remove wiper arm.



S6M0061

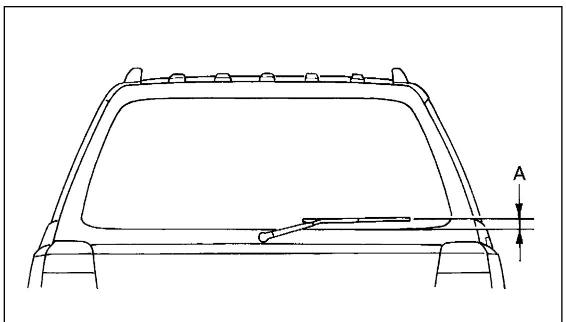
B: INSTALLATION *S902402A11*

1) Install in the reverse order of removal.
2) Adjust the position of the wiper blade. <Ref. to WW-16, ADJUSTMENT, Rear Wiper Arm.>

C: ADJUSTMENT *S902402A01*

1) Operate the rear wiper once.
2) Adjust wiper blade to original position as shown in figure.

Original position:
A: 30±5 mm (1.18±0.20 in)



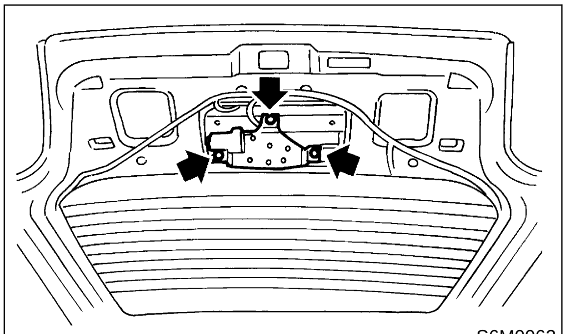
S6M0059A

10. Rear Wiper Motor S902532

A: REMOVAL S902532A18

1) Disconnect battery ground cable.
2) Remove rear wiper arm.
<Ref. to WW-16, REMOVAL, Rear Wiper Arm.>
3) Remove rear gate lower trim. <Ref. to EI-44, REMOVAL, Rear Gate Trim.>
4) Unclip harness clip and disconnect wiper motor connector.
5) Loosen bolts to remove wiper motor assembly.

CAUTION:
Be careful not to damage O-ring when removing wiper motor assembly.



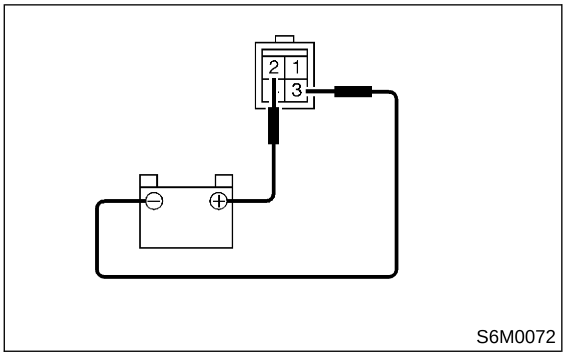
S6M0062

B: INSTALLATION S902532A11

1) Install in the reverse order of removal.

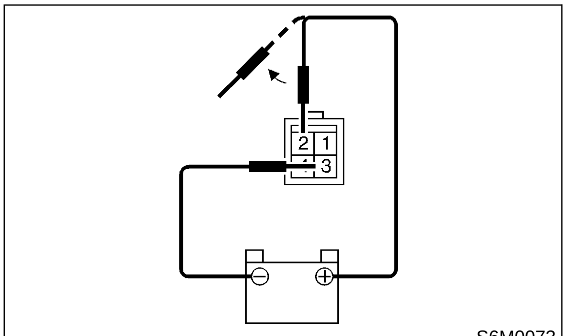
C: INSPECTION S902532A10

1) Connect battery to wiper motor connector and confirm that wiper motor operates.



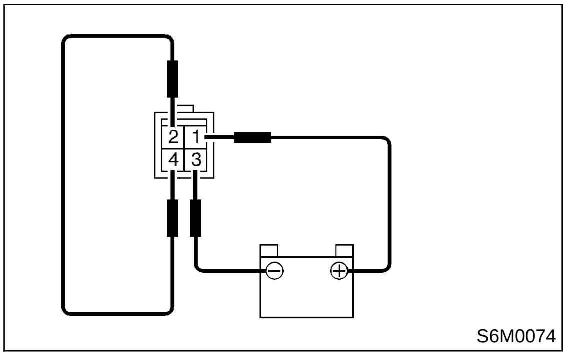
S6M0072

2) Connect battery to terminal of connector and remove terminal connections with motor rotated, and stop wiper motor through operation.



S6M0073

3) Connect battery and confirm that motor stops at automatic stop position after motor operates at low speed again.

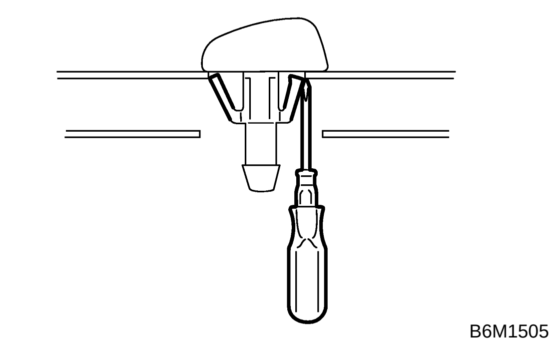


S6M0074

11. Rear Washer Nozzle S902789

A: REMOVAL S902789A18

1) Remove the high-mount stop light. <Ref. to LI-23, REMOVAL, High-mount Stop Light.>
2) Remove the washer hose from the washer nozzle.
3) Open the clips on the underside of the hood with a thin screwdriver or other tool, and remove the washer nozzle.



B6M1505

B: INSTALLATION S902789A11

1) Install in the reverse order of removal.
2) Adjust the position of the washer liquid sprayer. <Ref. to WW-18, ADJUSTMENT, Rear Washer.>

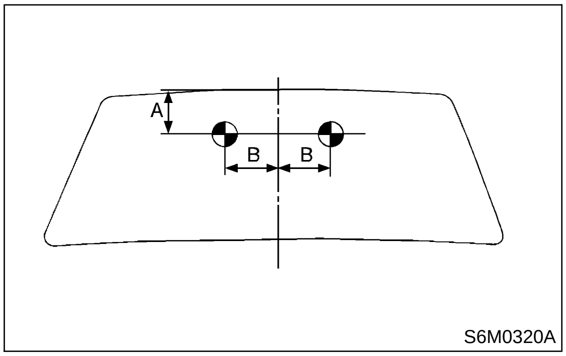
C: INSPECTION S902789A10

- Make sure the nozzle and hose are not clogged.
- Make sure the hose is not bent.

D: ADJUSTMENT S902789A01

1) Turn wiper switch to OFF position.
2) When vehicle stops, adjust washer injection position as shown in the figure.

Injection position:
A: 100 mm (3.94 in)
B: 77 mm (3.03 in)

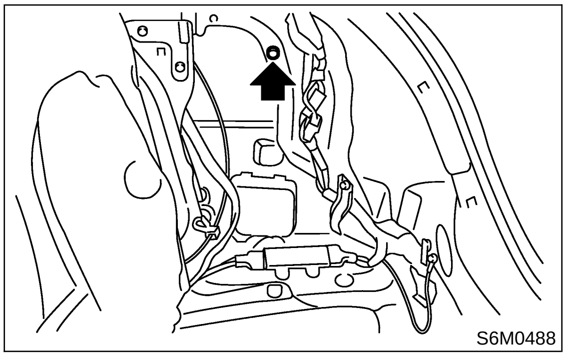


S6M0320A

12. Wiper Control Relay *S902403*

A: REMOVAL *S902403A18*

1) Disconnect battery ground cable.
2) Remove the right quarter lower trim. <Ref. to EI-41, REMOVAL, Rear Quarter Trim.>
3) Remove the quarter pocket.
4) Loosen nut to remove control unit.



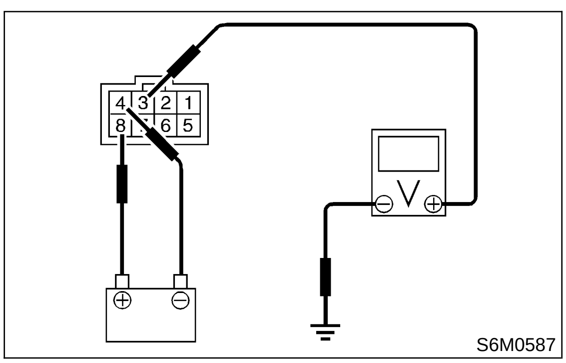
S6M0488

B: INSTALLATION *S902403A11*

Install in the reverse order of removal.

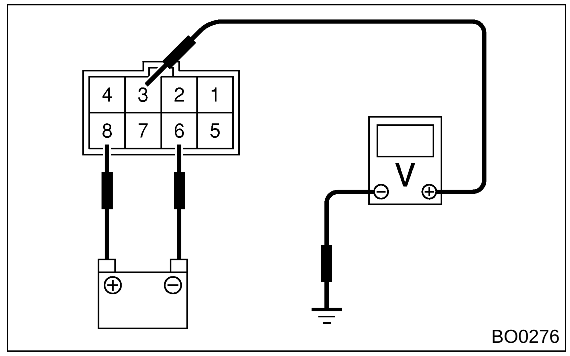
C: INSPECTION *S902403A10*

1) Disconnect the connector from the wiper control relay.
2) ON position: Connect the positive (+) lead from the battery to terminal 8 and the negative (−) lead to terminal 4. Connect the positive (+) lead from the voltmeter to terminal 3 and negative lead to ground.



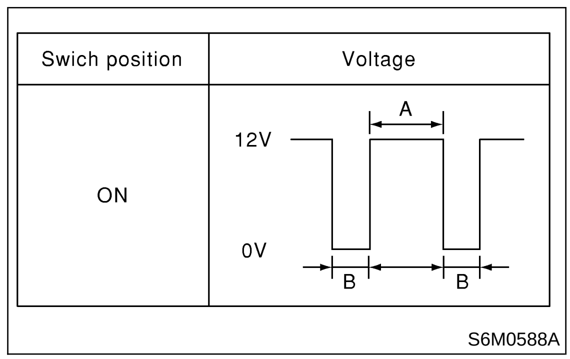
S6M0587

3) INT position: Connect the positive (+) lead from the battery to terminal 8 and the negative (−) lead to terminal 6. Connect the positive (+) lead from the voltmeter to terminal 3 and negative lead to ground.



BO0276

4) Measure the voltage when the wiper relay is operated.



S6M0588A

A) 9±2 sec.
B) Approximately 1.35 sec.
If operation is not as specified, replace the switch.

MEMO:

ENTERTAINMENT

ET

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3. Cigarette Lighter System....................4
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10. Cigarette Lighter....................11
11. Accessory Power Socket....................12

1. General Description S901001

A: CAUTION S901001A03

- Before disassembling or reassembling parts, always disconnect the battery ground cable. When replacing radio, control module, and other parts provided with memory functions, record the memory contents before disconnecting the battery ground cable. Otherwise, the memory will be erased.
- Reassemble in reverse order of disassembly, unless otherwise indicated.
- Adjust parts to the given specifications.
- Connect connectors and hoses securely during reassembly.
- After reassembly, make sure the functional parts operate smoothly.

B: PREPARATION TOOL S901001A17

1. GENERAL TOOLS S901001A1701

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance and voltage.
Conductive Silver Composition (DUPONT NO. 4817 or equivalent)	Used for repairing antenna wire.

2. Radio System *S901467*

A: SCHEMATIC *S901467A21*

1. RADIO *S901467A2105*

<Ref. to WI-44, SCHEMATIC, Audio System.>

B: INSPECTION *S901467A10*

Symptom	Repair order
No power coming in (No display and no sound from speakers)	(1) Check fuse and power supply for radio. (2) Check radio ground. (3) Remove radio for repair.
A specific speaker does not operate.	(1) Check speaker. (2) Check output circuit between radio and speaker.
Radio generates noise with engine running.	(1) Check radio ground. (2) Check generator. (3) Check ignition coil. (4) Remove radio for repair.
AM and FM modes are weak or noisy.	(1) Check antenna. (2) Check antenna amplifier. (3) Check radio ground. (4) Remove radio for repair.

3. Cigarette Lighter System *S901494*

A: SCHEMATIC *S901494A21*

1. CIGARETTE LIGHTER *S901494A2101*

<Ref. to WI-73, SCHEMATIC, Front Accessory Power Supply System.>

4. Accessory Power Socket System *S901785*

A: SCHEMATIC *S901785A21*

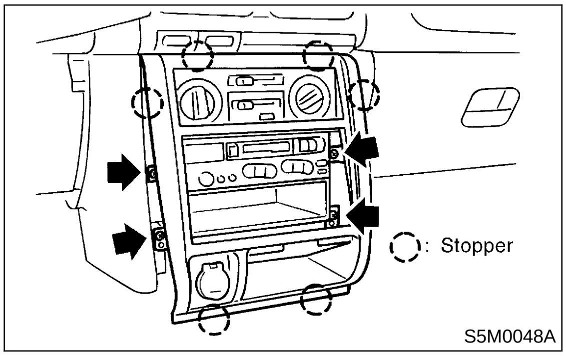
1. ACCESSORY POWER SOCKET *S901785A2101*

<Ref. to WI-95, SCHEMATIC, Rear Accessory Power Supply System.>

5. Radio Body S901469

A: REMOVAL S901469A18

1) Disconnect ground cable from battery.
2) Remove console box. <Ref. to EI-33, REMOVAL, Console Box.>
3) Remove AT cover (AT model).
4) Remove center panel.
5) Remove fitting screws, and slightly pull radio out from center console.



6) Disconnect electric connectors and antenna feeder cord.

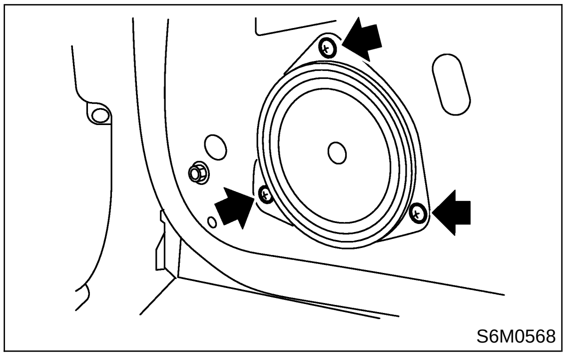
B: INSTALLATION S901469A11

Install in the reverse order of removal.

6. Front Speaker *S901466*

A: REMOVAL *S901466A18*

1) Disconnect ground cable from battery.
2) Remove front door trim. <Ref. to EI-27, REMOVAL, Front Door Trim.>
3) Remove front speaker mounting screws.



4) Disconnect harness connector and remove front speaker.

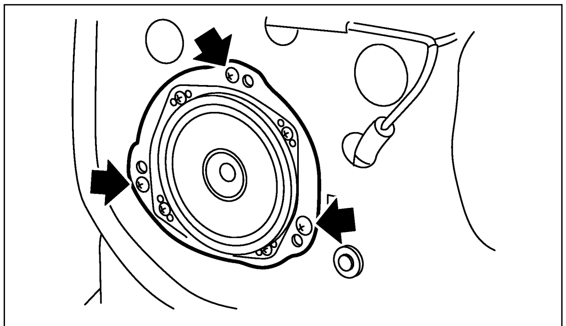
B: INSTALLATION *S901466A11*

Install in the reverse order of removal.

7. Rear Speaker *S901470*

A: REMOVAL *S901470A18*

1) Disconnect ground cable from battery.
2) Remove rear door trim. <Ref. to EI-28, REMOVAL, Rear Door Trim.>
3) Remove rear speaker mounting screws.



S6M0569

4) Disconnect harness connector and remove rear speaker.

B: INSTALLATION *S901470A11*

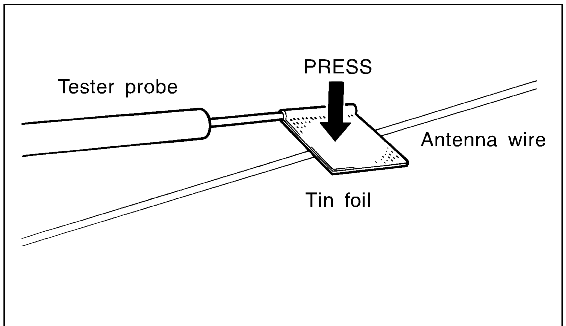
Install in the reverse order of removal.

8. Antenna S901463

A: INSPECTION S901463A10

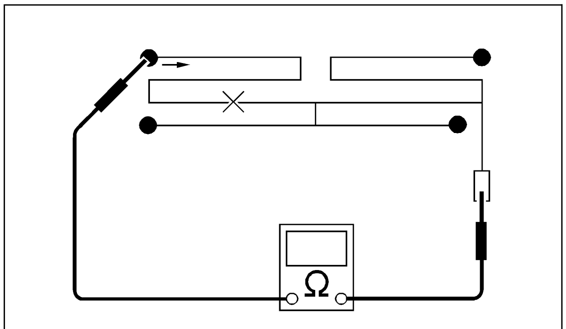
Measure resistance between antenna terminal and each antenna wire.
If an antenna wire is OK, resistance will be less than 1 Ω. If an antenna wire is broken, resistance will be more than 1 MΩ.

NOTE:
When measuring resistance, wind a piece of tin foil around tester probe tip and press foil against the wire with your finger.



B6M1494A

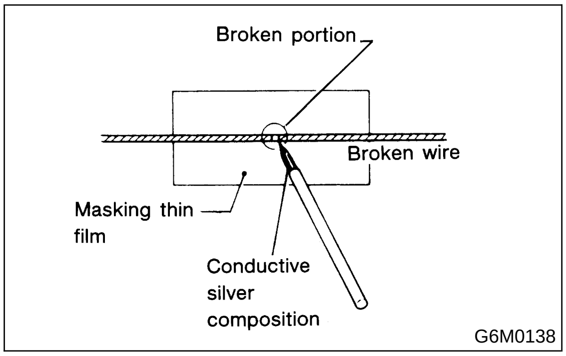
To locate a broken point, move probe along antenna wire.



B6M1495

B: REPAIR S901463A19

1) Clean antenna wire and surrounding area with a cloth dampened by alcohol.
2) Paste a thin masking film on glass along the broken wire.
3) Deposit conductive silver composition (DUPONT NO. 4817) on the broken portion with a drawing pen.



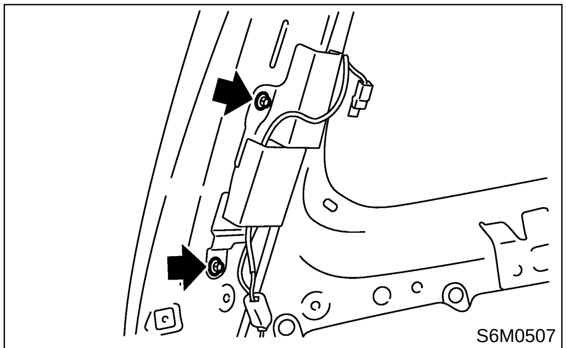
G6M0138

4) Dry out deposited portion.
5) After repair has been completed, measure resistance in the repaired wire.

9. Antenna Amplifier *S901460*

A: REMOVAL *S901460A18*

1) Disconnect ground cable from battery.
2) Remove rear quarter lower trim. <Ref. to EI-41, REMOVAL, Rear Quarter Trim.>
3) Disconnect harness connector and terminal.
4) Remove mounting screw and detach antenna amplifier.



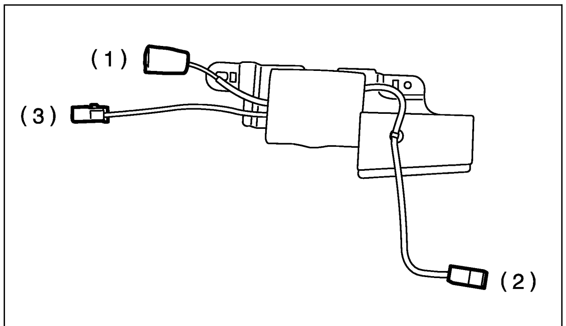
S6M0507

B: INSTALLATION *S901460A11*

Install in reverse order of removal.

C: INSPECTION *S901460A10*

Measure antenna amplifier resistance.



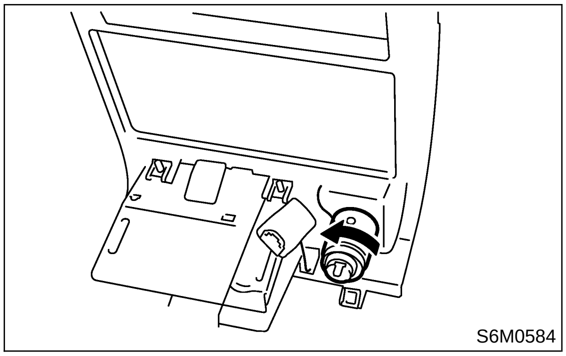
S6M0508B

Terminal No.	Standard
1 and Amplifier body	More than 100 kΩ
2 and Amplifier body	More than 100 kΩ
3 and Amplifier body	More than 100 kΩ

10. Cigarette Lighter *S901461*

A: REMOVAL *S901461A18*

1) Disconnect ground cable from battery.
2) Remove center panel. <Ref. to ET-6, REMOVAL, Radio Body.>
3) Disconnect harness connectors and remove cigarette lighter.



S6M0584

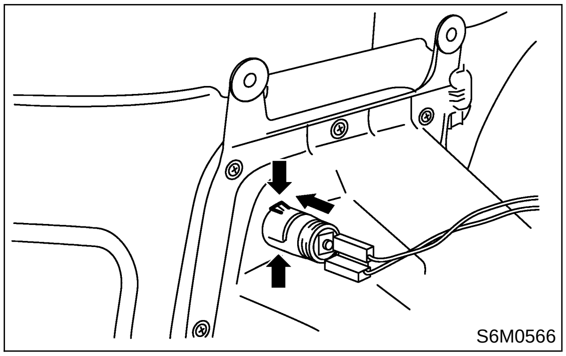
B: INSTALLATION *S901461A11*

Install in the reverse order of removal.

11. Accessory Power Socket *S901786*

A: REMOVAL *S901786A18*

1) Disconnect ground cable from battery.
2) Remove rear quarter lower trim. <Ref. to EI-41, REMOVAL, Rear Quarter Trim.>
3) Disconnect harness connectors and remove accessory power socket.



B: INSTALLATION *S901786A11*

Install in the reverse order of removal.

COMMUNICATION SYSTEM

COM

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1. General Description....................2
2. Horn System....................3
3. Horn....................4
4. Horn Switch....................5

1. General Description S904001

A: PREPARATION TOOL S904001A17

1. GENERAL TOOLS S904001A1701

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance and voltage.

2. Horn System S904436

A: SCHEMATIC S904436A21

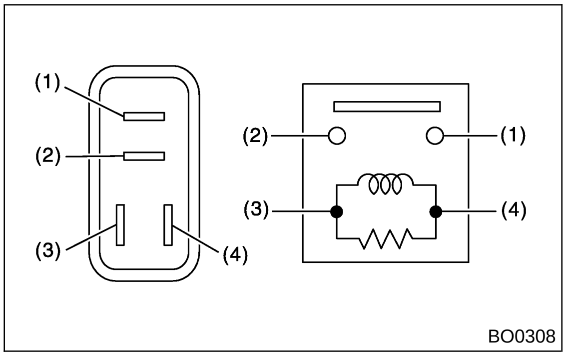
1. HORN S904436A2101

<Ref. to WI-79, SCHEMATIC, Horn System.>

B: INSPECTION S904436A10

1. HORN RELAY S904436A1001

Measure horn relay resistance between the terminals (indicated in table below) while connecting terminal No. 4 to battery positive terminal and terminal No. 3 to battery ground terminal.

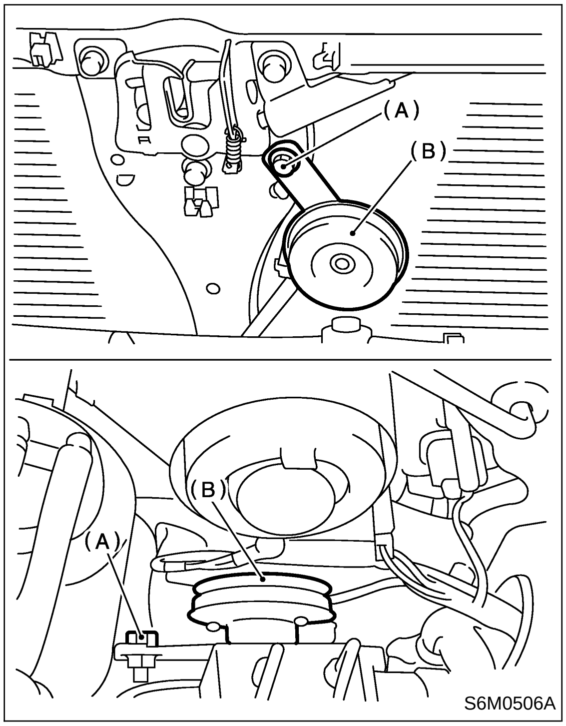


Current	Terminal No.	Standard
Flow	1 and 2	Less than 1 Ω
No flow		More than 1 MΩ

3. Horn *S904437*

A: REMOVAL *S904437A18*

1) Disconnect ground cable from battery.
2) Remove horn bracket mounting bolt (A).
3) Disconnect harness connector and remove horn assembly (B).

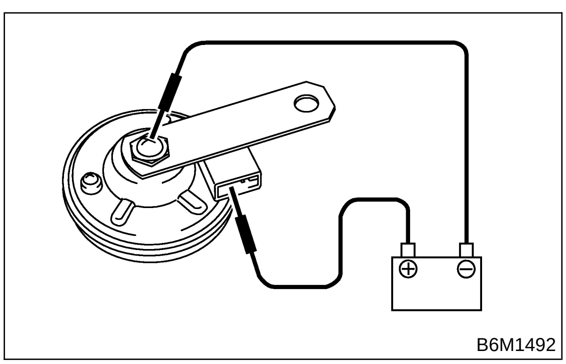


B: INSTALLATION *S904437A11*

Install in the reverse order of removal.

C: INSPECTION *S904437A10*

With 12 V direct current supply between horn terminal and case ground, check that the horn sounds properly.

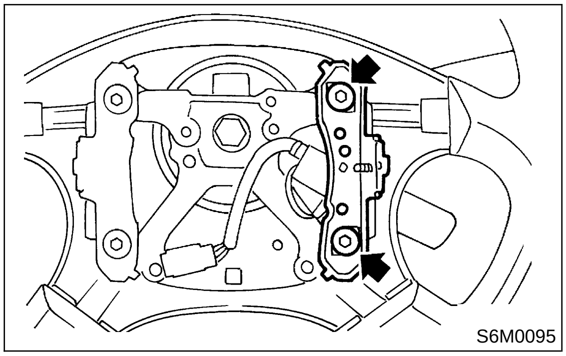


4. Horn Switch *S904434*

A: REMOVAL *S904434A18*

WARNING:
Before servicing, be sure to read the notes in the AB section for proper handling of the driver airbag module. <Ref. to AB-3, CAUTION, General Description.>

1) Disconnect ground cable from battery.
2) Remove the driver's airbag module. <Ref. to AB-13, Driver's Airbag Module.>
3) Remove horn switch from the steering wheel as shown.

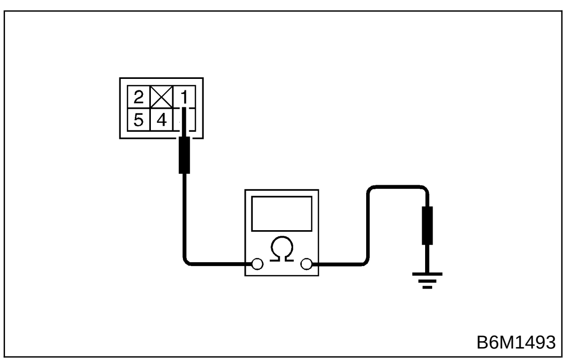


B: INSTALLATION *S904434A11*

Install in the reverse order of removal.

C: INSPECTION *S904434A10*

Measure horn switch resistance.



<table>
<tr><td>Switch position</td><td>Terminal No.</td><td>Standard</td></tr>
<tr><td>When horn switch is pushed.</td><td rowspan="2">1 and Body ground</td><td>Less than 1 Ω</td></tr>
<tr><td>When horn switch is not pushed.</td><td>More than 1 MΩ</td></tr>
</table>

MEMO:

GLASS/WINDOWS/MIRRORS

GW

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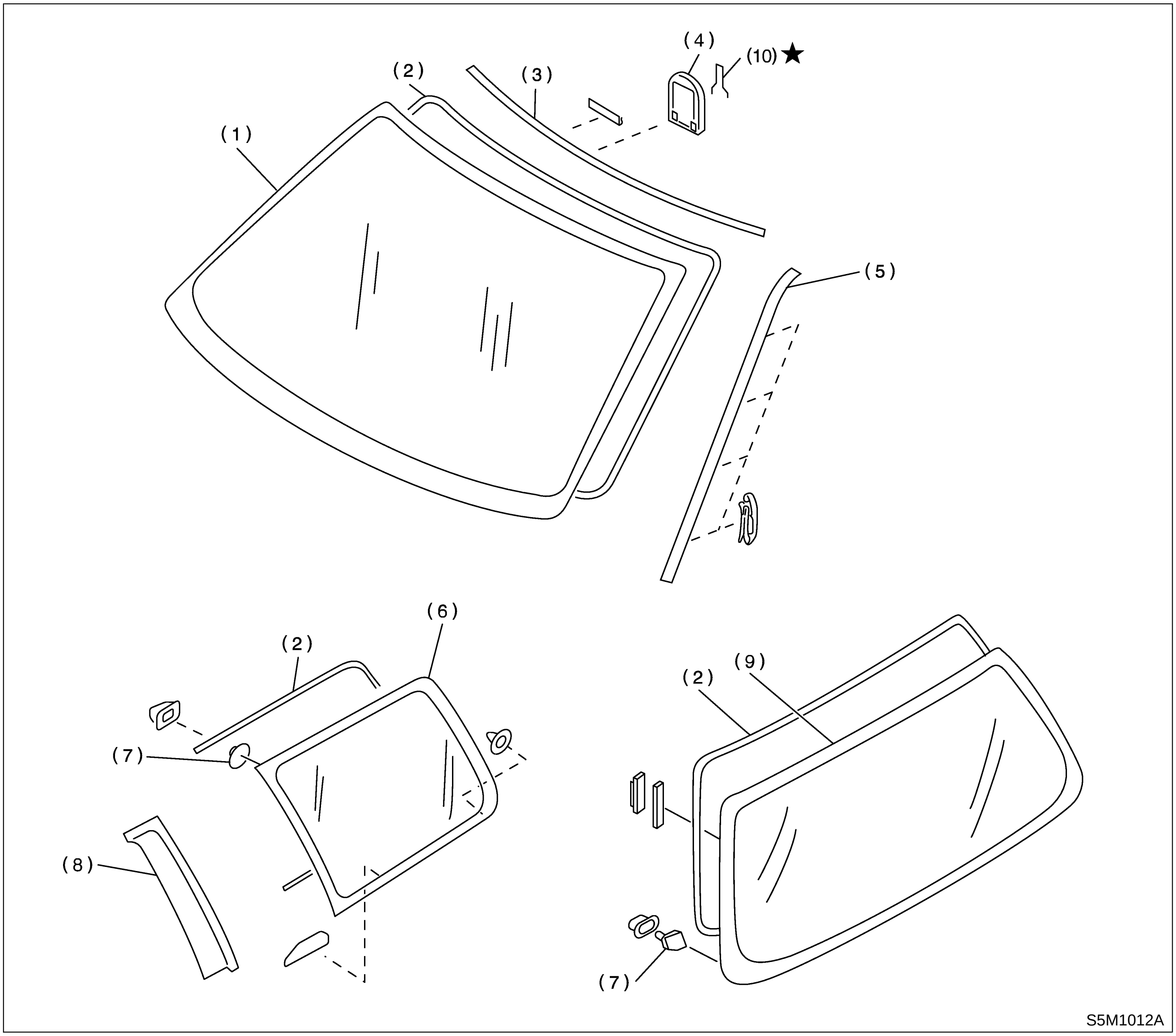
1. General Description *S905001*

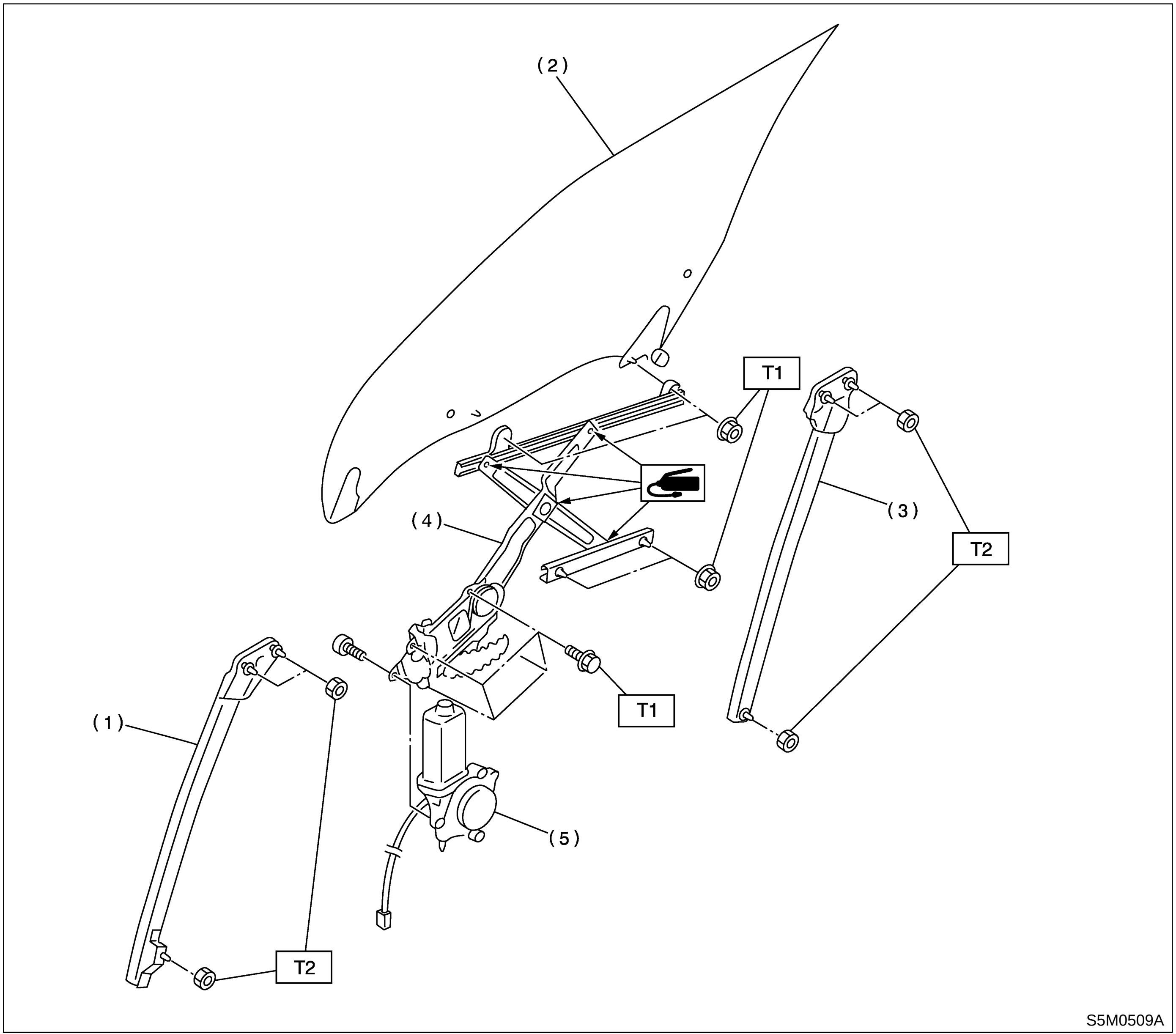
A: COMPONENT *S905001A05*

1. FIXED GLASS *S905001A0506*



(1) Windshield glass	(5) Side molding	(9) Rear gate glass
(2) Dam rubber	(6) Rear quarter glass	(10) Spring
(3) Molding	(7) Locate pin	
(4) Rearview mirror mount	(8) Rear quarter garnish	

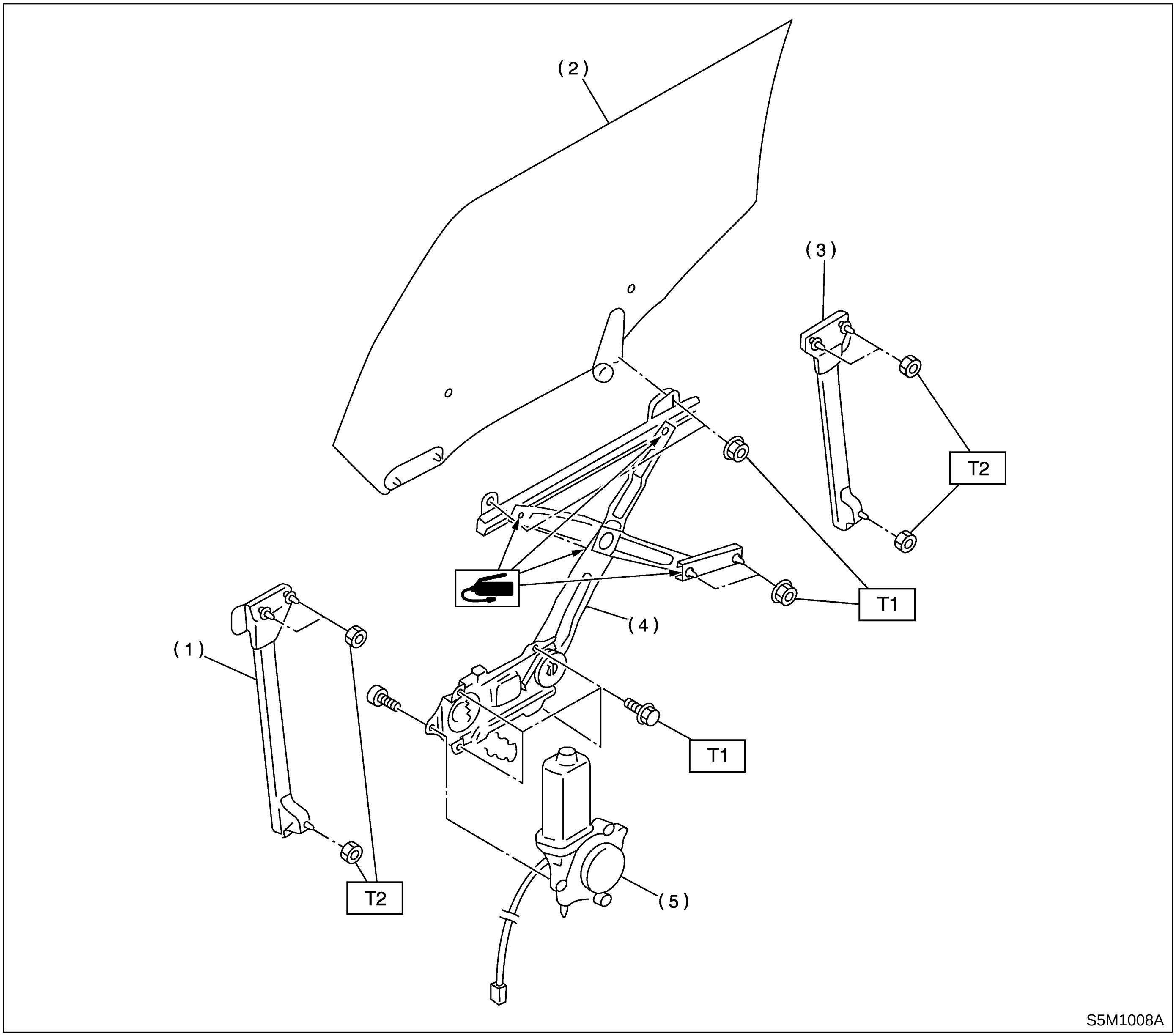
2. FRONT DOOR GLASS *S905001A0503*



(1) Door sash (Front)
(2) Glass
(3) Door sash (Rear)
(4) Regulator ASSY
(5) Motor ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 14 (1.4, 10.1)

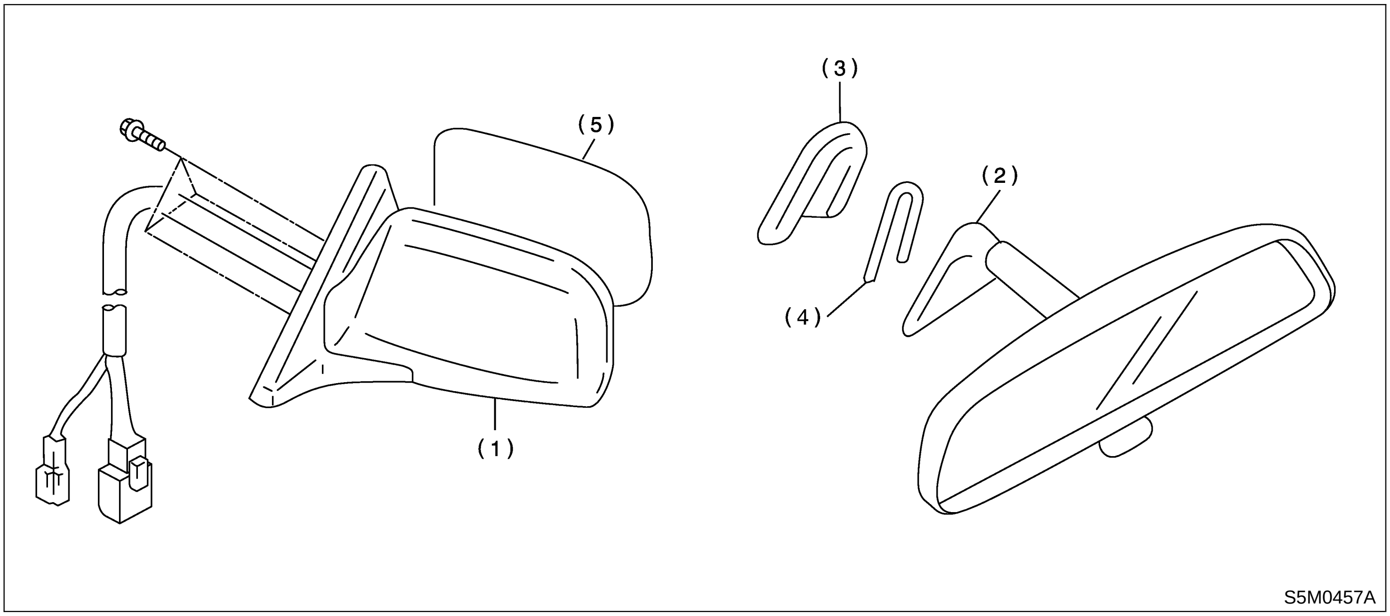
3. REAR DOOR GLASS *S905001A0504*



(1) Door sash (Front)
(2) Glass
(3) Door sash (Rear)
(4) Regulator ASSY
(5) Motor ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 14 (1.4, 10.1)

4. MIRRORS *S905001A0505*



(1) Outer mirror	(3) Mount	(5) Mirror
(2) Inner rearview mirror	(4) Spring	

B: CAUTION *S905001A03*

- When electrical connectors are disconnected, always conduct an operational check after connecting them again.
- Avoid impact and damage to the glass.

C: PREPARATION TOOL *S905001A17*

TOOL NAME	REMARKS
Circuit Tester	Used for checking voltage and continuity.
Piano Wire	Used for window glass removal.
Windshield Knife	Used for window glass removal.

2. Power Window System *S905456*

A: SCHEMATIC *S905456A21*

<Ref. to WI-90, SCHEMATIC, Power Window System.>

B: INSPECTION S905456A10

Symptom	Repair order
All power windows does not operate.	(1) Fuse (SBF-6) (F/B No. 18) (2) Power window circuit breaker (3) Power window relay (4) Wire harness
One window does not operate.	(1) Power window main switch (2) Power window sub switch (3) Power window motor (4) Wire harness
“Window Lock” does not operate.	(1) Power window main switch

3. Rear Window Defogger System *S905455*

A: SCHEMATIC *S905455A21*

<Ref. to WI-96, SCHEMATIC, Rear Window Defogger System.>

B: INSPECTION *S905455A10*

Symptom	Repair order
Rear window defogger does not operate.	(1) Fuse (M/B No. 1) (2) Rear defogger relay (3) Defogger switch (4) Rear defogger condenser (5) Deffogger wire (6) Wire harness

4. Windshield Wiper Deicer System *S905457*

A: SCHEMATIC *S905457A21*

<Ref. to WI-112, SCHEMATIC, Wiper Deicer System.>

B: INSPECTION S905457A10

Symptom	Repair order
Wiper deicer does not operate.	(1) Fuse (F/B No. 18, 19) (2) Wiper deicer relay (3) Wiper deicer switch (4) Wire harness

5. Remote Control Mirror System *S905458*

A: SCHEMATIC *S905458A21*

<Ref. to WI-97, SCHEMATIC, Remote Controlled Rearview Mirror System.>

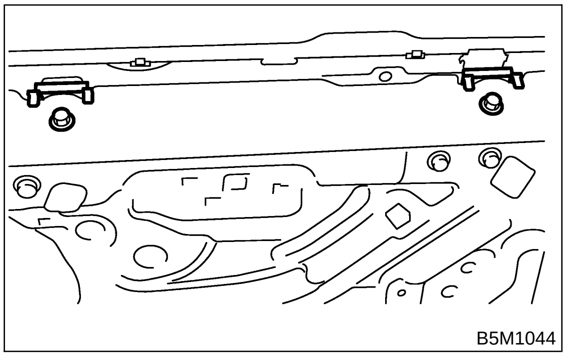
B: INSPECTION S905458A10

Symptom	Repair order
All function does not operate.	(1) Fuse (F/B No. 4) (2) Mirror switch (3) Wire harness
One side of the mirror motor does not operate.	(1) Mirror switch (2) Mirror motor (3) Wire harness
Mirror heater does not operate.	(1) Mirror switch (2) Mirror heater (3) Wire harness

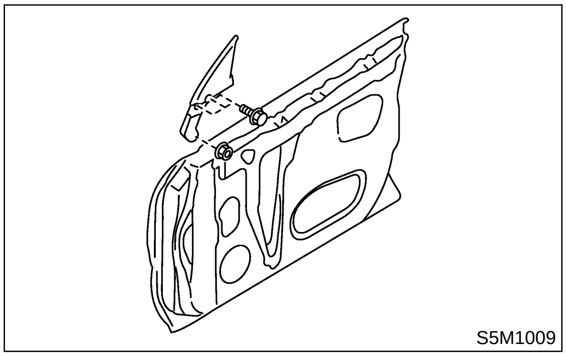
6. Front Door Glass S905452

A: REMOVAL S905452A18

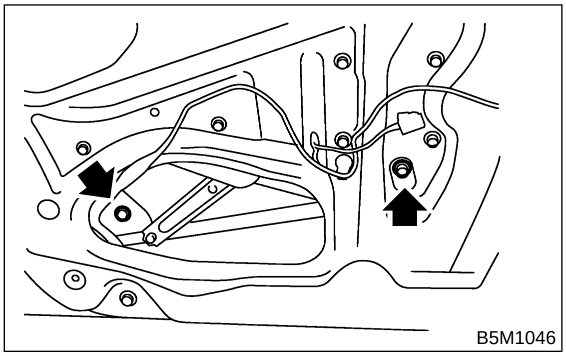
1) Remove door trim. <Ref. to EI-27, REMOVAL, Front Door Trim.>
2) Remove sealing cover. <Ref. to EB-13, REMOVAL, Front Sealing Cover.>
3) Remove inner stabilizer.


B5M1044

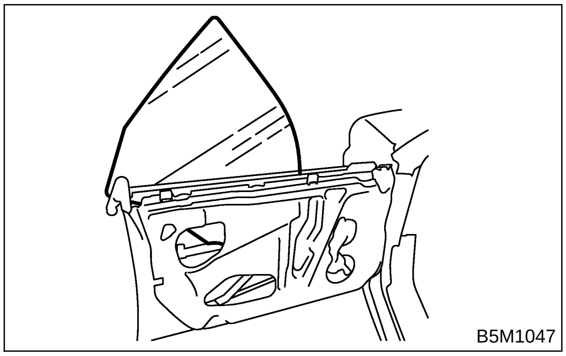
4) Remove outer mirror. <Ref. to GW-36, REMOVAL, Outer Mirror Assembly.>
5) Remove gusset.


S5M1009

6) Operate the power window switch to move glass to the position shown in the figure, and then remove the two nuts from service holes.


B5M1046

7) Take out glass door panel upward.


B5M1047

CAUTION:
- **Do not turn regulator in the closing direction after removal of the glass. Otherwise gear may be disengaged.**
- **Avoid impact and damage to the glass.**

B: INSTALLATION S905452A11

1) Install in the reverse order of removal.

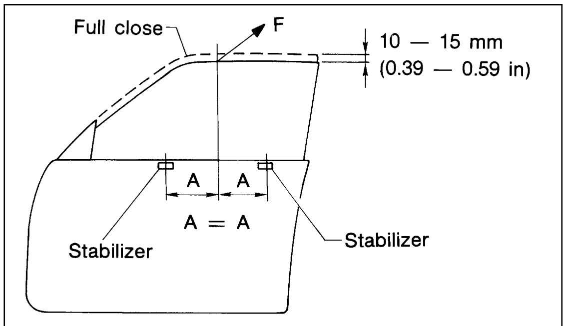
CAUTION:
Make sure that glass stay is placed securely in sash.

2) Adjust front door glass. <Ref. to GW-17, ADJUSTMENT, Front Door Glass.>

C: ADJUSTMENT *S905452A01*

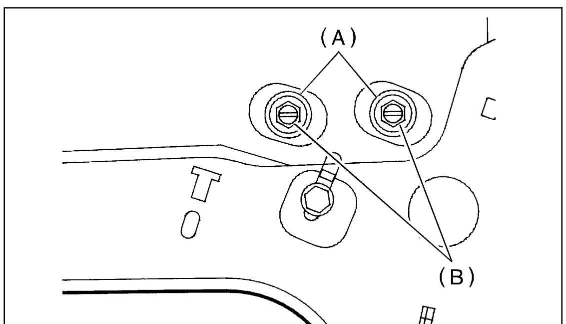
NOTE:
Before adjustment, ensure that all adjusting bolts of stabilizer, upper stopper, and sash are loose and door glass is raised so that it is in contact with weatherstrip.

1) Temporarily tighten one adjusting bolt on one side of rear sash at the midpoint of slotted hole in the inner panel.
2) Temporarily tighten regulator B-channel in a position slightly lower than midpoint of slotted hole.
3) Lower door glass 10 to 15 mm (0.39 to 0.59 in) from fully closed position. While applying outward pressure of 44.1±5.0 N (4.5±0.51 kgf, 9.9±1.12 lb) (F) to upper edge of glass above midpoint of two outer stabilizers, press inner stabilizer until it just touches the glass, then secure it.

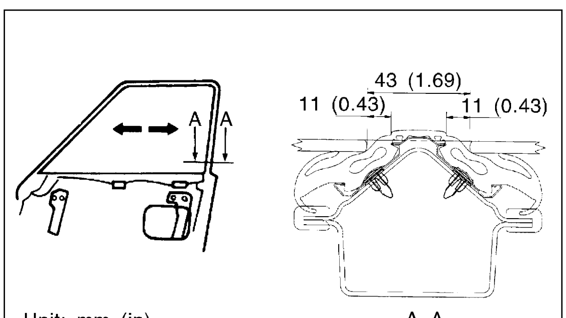


G5M0421

4) For adjustment of clearance between front and rear glasses, loosen nuts (A), and move glass sash back and forward until clearance becomes the value shown.

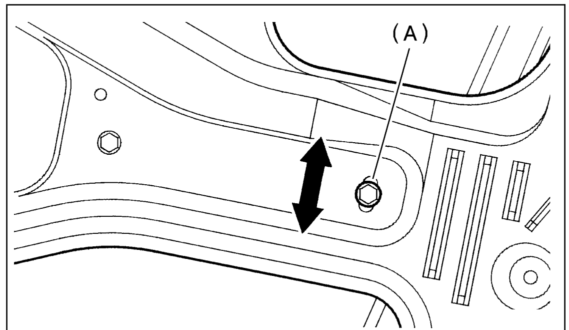


S5M0199B



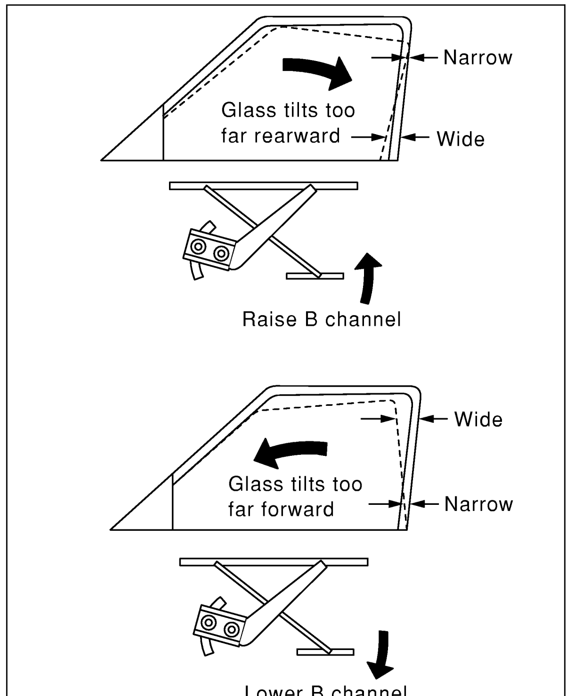
S5M0198A

5) For adjustment of upper and lower ends of center pillar, loosen adjusting nut (A).



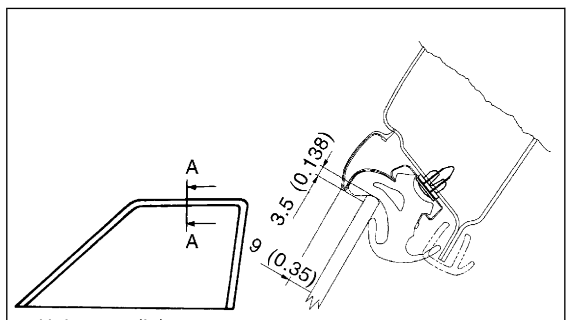
S5M0197B

6) Adjust so that upper and lower ends of center pillar are the same size.



S5M1010A

7) For glass stroke adjustment, close door, raise glass until positional relationship between glass and weatherstrip becomes as shown. And secure the glass so that upper stopper lightly touches the glass holder.

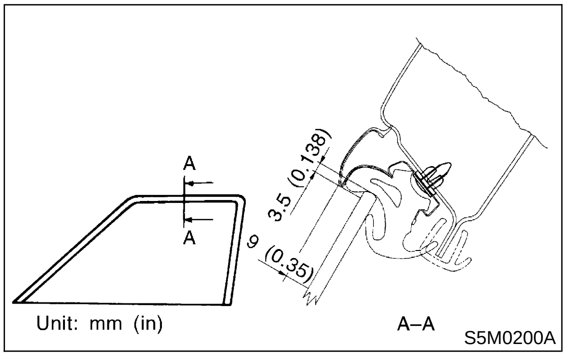


S5M0200A

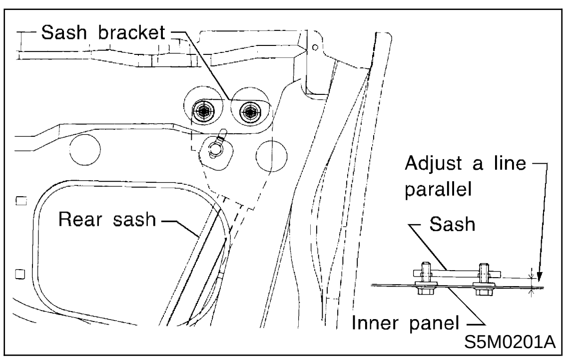
8) After stabilizer adjustment, carry out glass crimp adjustment. First, visually ensure positional relationship between retainer & molding and glass of the roof side, and then begin with rear sash adjustment. Adjust two adjusting bolts alternately step by step to obtain dimensions shown below (cross-section A).

NOTE:
If two nuts are loosened at the same time, sash moves back and forth. Therefore, when one nut is adjusted, secure the other.

9) Make the same adjustment of two adjusting bolts of rear sash.



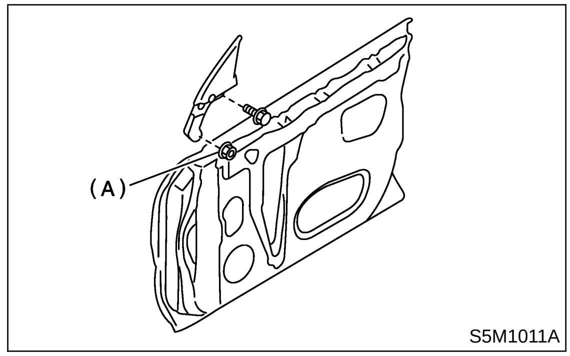
CAUTION:
Do not tilt sash bracket to inner panel during adjustment. Otherwise smooth regulator operation cannot be achieved.



10) Make adjustment of front sash in the same manner as that of rear sash.

CAUTION:
Although front and rear sashes must, as a rule, be adjusted in the same manner, in some door installation, the adjustment in a different manner may be required. However, adjustment of one sash to the maximum amount and the other to the minimum amount is not permitted. Such adjustment may result in application of excessive load to regulator.

11) After adjustments, tighten nuts.
12) After adjustment of glass, if there is a gap between outer lip of gusset and glass surface, adjust the gap with adjusting bolt (A) in lower fitting part of gusset to prevent generation of wind noise.
13) During adjustments, loosen other three clamping bolts.

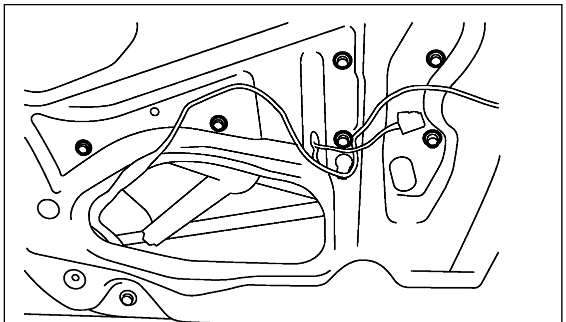


14) After adjustment, tighten bolts and nuts.

7. Front Regulator and Motor Assembly *S905449*

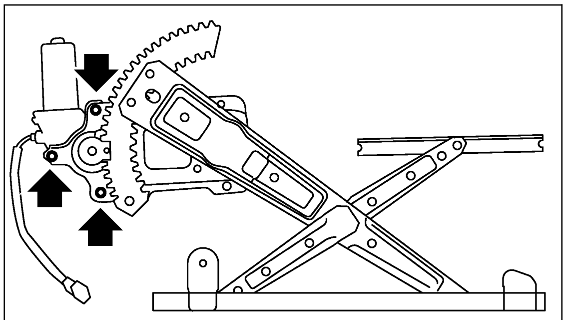
A: REMOVAL *S905449A18*

1) Remove door trim. <Ref. to EI-27, REMOVAL, Front Door Trim.>
2) Remove sealing cover. <Ref. to EB-13, REMOVAL, Front Sealing Cover.>
3) Remove door glass. <Ref. to GW-16, REMOVAL, Front Door Glass.>
4) Disconnect electrical connector.
5) Loosen four bolts and two nuts to pull out regulator assembly.



B5M1049

6) Loosen screws to remove motor assembly.



B5M1050

B: INSTALLATION *S905449A11*

1) Install in the reverse order of removal.
2) Adjust front door glass. <Ref. to GW-17, ADJUSTMENT, Front Door Glass.>

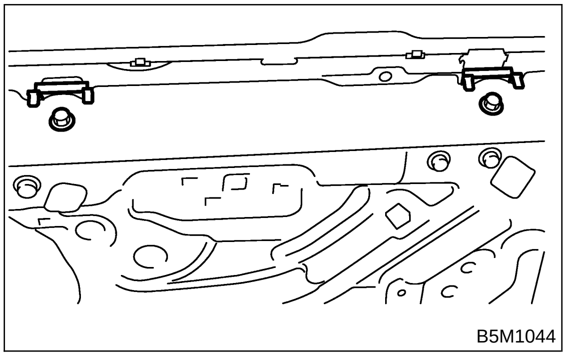
C: INSPECTION *S905449A10*

1) Make sure that power window motor rotates properly when battery voltage is applied to terminals of motor connector.
2) Change polarity of battery connections to terminals to ensure that motor rotates in reverse direction.

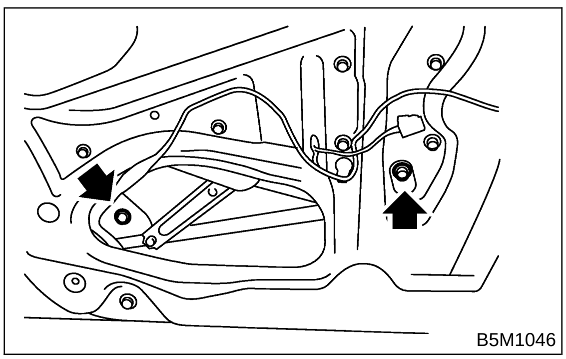
8. Rear Door Glass S905450

A: REMOVAL S905450A18

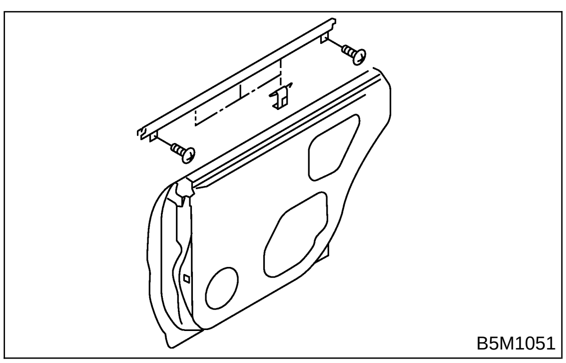
1) Remove door trim. <Ref. to EI-28, REMOVAL, Rear Door Trim.>
2) Remove sealing cover. <Ref. to EB-16, REMOVAL, Rear Sealing Cover.>
3) Remove stabilizer.


B5M1044

4) Operate power window switch to move glass as shown in the figure, and remove two nuts.


B5M1046

5) Loosen two screws to remove weatherstrip.


B5M1051

6) Pull out glass.

CAUTION:
Avoid impact and damage to the glass.

B: INSTALLATION S905450A11

1) Install in the reverse order of removal.

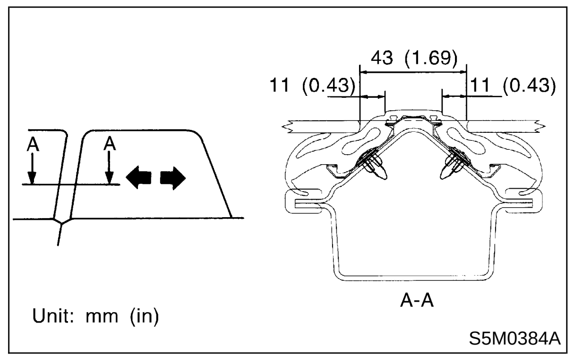
CAUTION:
Make sure that glass stay is placed securely in sash.

2) Adjust rear door glass. <Ref. to GW-20, ADJUSTMENT, Rear Door Glass.>

C: ADJUSTMENT S905450A01

NOTE:
Rear door glass, as a rule, should be adjusted in the same manner as front glass, although they are different in dimension. Special notes for rear glass are given below.

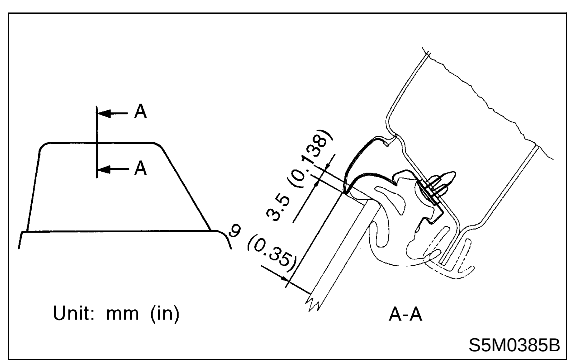
1) Adjust glass position using the following dimensions as a guide line.



S5M0384A

CAUTION:
- **If dimensions are smaller than the given dimensions, glass may get caught in weatherstrip during lifting/lowering operation. In the worst case, it may cause glass not to open fully.**
- **After adjustment, move glass up and down to check whether it is caught.**

2) Adjust crimp of glass using the following dimensions as a guide line.



S5M0385B

CAUTION:
- **If crimp of rear glass is higher than necessary, glass may get caught in weatherstrip of center pillar corner, resulting in early**

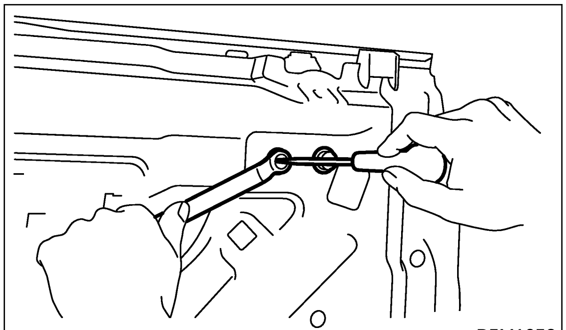
wear of weatherstrip. Be careful when adjusting.

- **After adjustment, move glass up and down to check whether it is caught.**

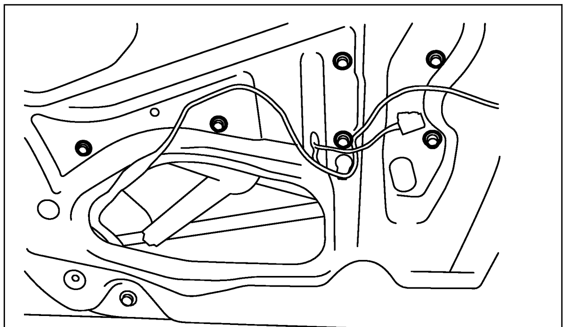
9. Rear Regulator and Motor Assembly S905451

A: REMOVAL S905451A18

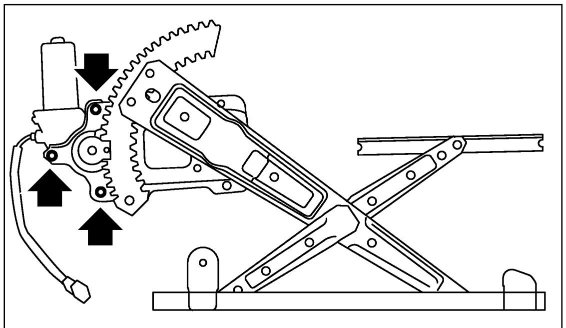
1) Remove door trim. <Ref. to EI-28, REMOVAL, Rear Door Trim.>
2) Remove sealing cover. <Ref. to EB-16, REMOVAL, Rear Sealing Cover.>
3) Remove door glass. <Ref. to GW-20, REMOVAL, Rear Door Glass.>
4) Secure bolts using screwdriver to remove front sash adjusting nut.


B5M1052

5) Remove front sash.
6) Disconnect electrical connector.
7) Loosen four bolts and two nuts to remove regulator assembly.


B5M1049

8) Loosen screws to remove motor assembly.


B5M1050

B: INSTALLATION S905451A11

1) Install in the reverse order of removal.
2) Adjust rear door glass. <Ref. to GW-20, ADJUSTMENT, Rear Door Glass.>

C: INSPECTION S905451A10

1) Make sure that power window motor rotates properly when battery voltage is applied to terminals of motor connector.
2) Change polarity of battery connections to terminals to ensure that motor rotates in reverse direction.

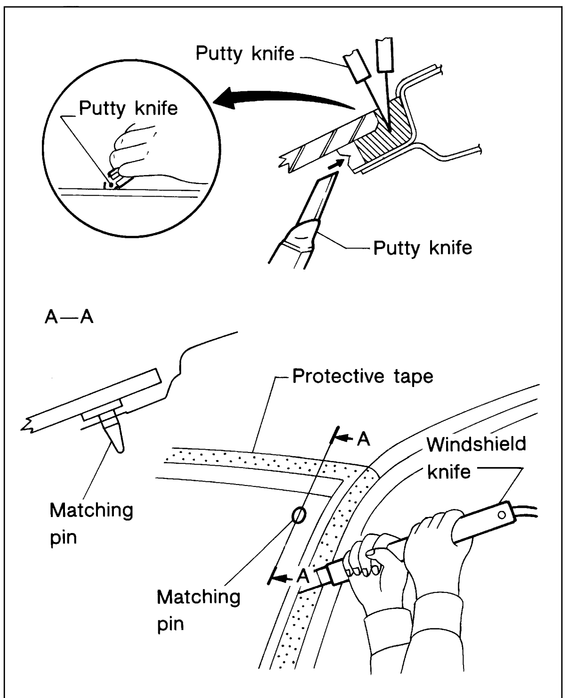
10. Windshield Glass S905448

A: REMOVAL S905448A18

1. USING WINDSHIELD KNIFE S905448A1801

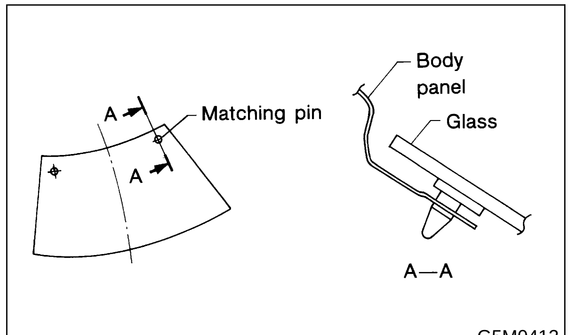
1) Remove cowl panel. <Ref. to EI-26, REMOVAL, Cowl Panel.>
2) Remove front side molding and upper front molding.
3) Tape body side of the circumference of windshield glass for protection.
4) Apply sufficient amount of soapy water to adhesive layer.
5) Insert windshield knife into the adhesive layer.
6) While holding the knife edge and windshield glass edge at a right angle, move windshield knife in parallel to windshield glass edge along face and edge of windshield glass to cut the adhesive layer.

CAUTION:
- **Do not twist windshield knife.**
- **Cutting of adhesive layer shall be started with wider gap between windshield glass and body.**



G5M0418

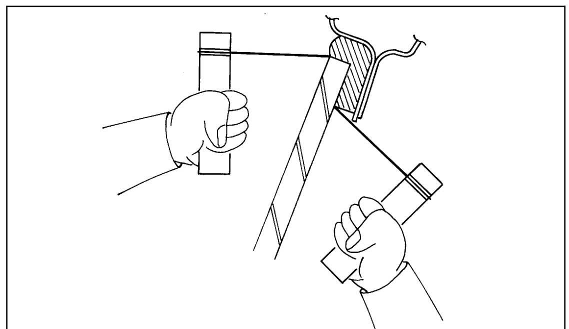
NOTE:
Because matching pins are bonded to the corners of glass, use piano wire to cut the pin.



G5M0412

2. USING PIANO WIRE S905448A1802

1) Remove cowl panel. <Ref. to EI-26, REMOVAL, Cowl Panel.>
2) Remove roof molding and upper front molding.
3) Tape the body side of the circumference of windshield glass for protection.
4) Make a hole in adhesive layer using drill or knife.
5) Pass piano wire through the hole, and attach securely both the wire ends to pieces of wood.


G5M0494

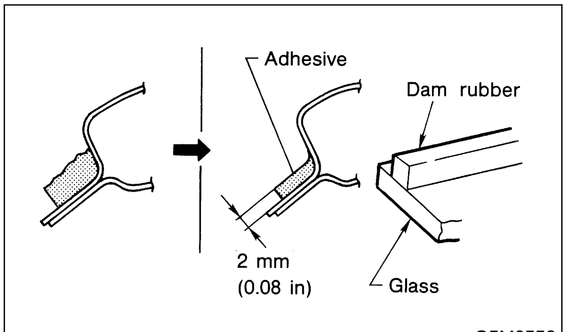
6) Pull the wire ends alternately to cut off the adhesive layer.

CAUTION:
- **Do not tightly pull the piano wire against the windshield glass edge.**
- **Be careful not to damage interior and exterior parts.**
- **When removal is made with area close to instrument panel, place a protection plate over it. Pay particular attention to the removal.**
- **Do not cross piano wires. Otherwise they may be cut.**

B: INSTALLATION S905448A11

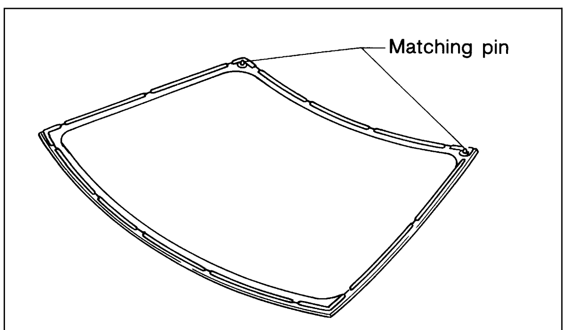
1) Clean external circumference of windshield glass with alcohol or white gasoline.
2) Remove adhesive layer on the body using cutter knife to obtain smooth face 2 mm (0.08 in) thick.

CAUTION:
Be careful not to damage the body and paint surface.



G5M0553

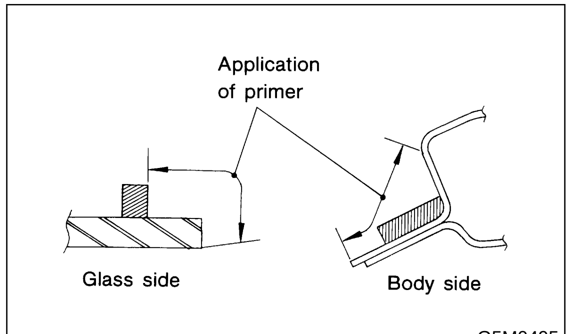
3) Clean body with alcohol or white gasoline to remove thoroughly chips, dusts, and dirts from body face.
4) Place glass on body.
5) Adjust glass position to make uniform clearance between body and glass in four corners.
6) Place matching pins and body on glass.



G5M0407

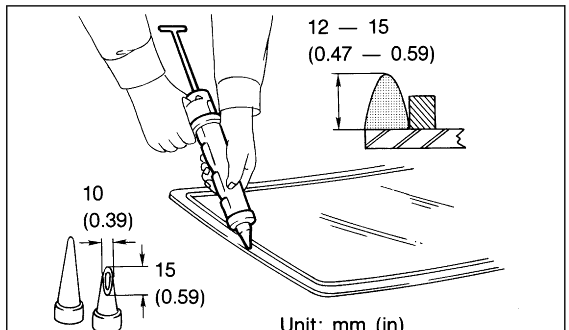
7) Remove glass from body.
8) Apply primer to adhesive layer of glass using sponge.
9) Apply primer to adhesive layer of body.

CAUTION:
- **Primer once attached to the painted surface of the body and internal trim is hard to wipe off. Mask the circumference of such areas.**
- **Let primer dry for about ten minutes before installing the glass.**
- **Do not touch surface coated with primer.**



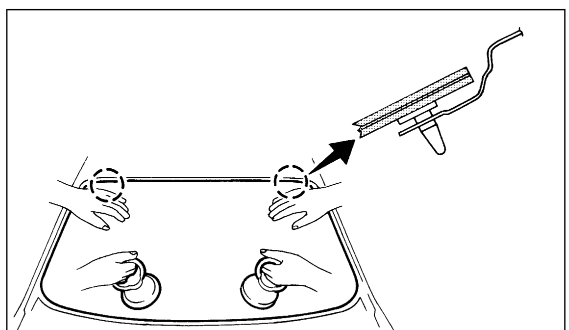
G5M0495

10) Cut off cartridge nozzle tip and set it in sealant gun as shown.



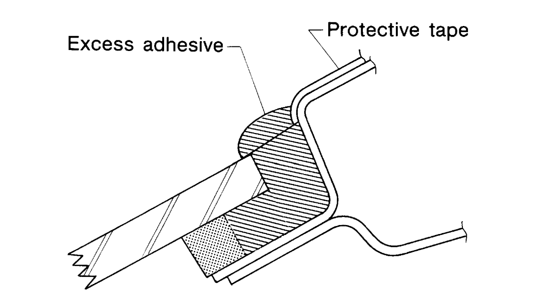
G5M0408

11) Apply adhesive to glass end surface as shown.
12) Fit matching pins using suction rubber cup to install windshield glass.


G5M0409

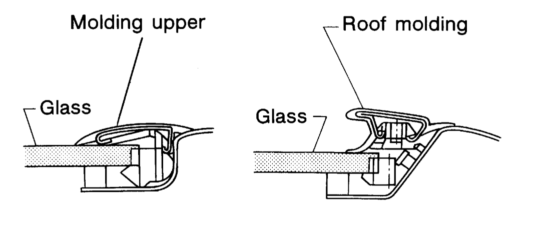
13) Lightly press windshield glass for tight fit.

14) Remove adhesive overflowing from outside of glass until it becomes level with outer height of glass. Then, add adhesive to portions that need it, and clean with alcohol or white gasoline.



G5M0496

15) First, press-fit upper front window molding and last, roof molding.



G5M0417

CAUTION:
- **When door is open/closed after glass is bonded, always lower door glass and then open/close it carefully.**
- **Move vehicle slowly.**

16) After completion of all work, allow vehicle to stand for about 24 hours.

NOTE:
For minimum drying time and time the vehicle must be left standing before driving after bonding, follow instructions or instruction manual from the adhesive manufacturer.

17) After curing of adhesive, pour water on external surface of vehicle to check that there are no water leaks.

CAUTION:
When a vehicle is returned to the user, tell him or her that the vehicle should not be subjected to heavy impact for at least three days.

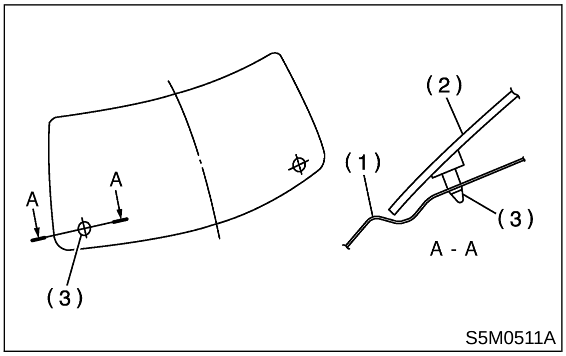
18) Install cowl panel. <Ref. to EI-26, INSTALLATION, Cowl Panel.>

11. Rear Gate Glass *S905376*

A: REMOVAL *S905376A18*

1) Remove real wiper. <Ref. to WW-17, REMOVAL, Rear Wiper Motor.>
2) Remove rear gate trim. <Ref. to EI-44, REMOVAL, Rear Gate Trim.>
3) Remove electrical connector from rear defogger terminal.
4) Remove glass in the same procedure as for windshield glass. <Ref. to GW-23, REMOVAL, Windshield Glass.>

NOTE:
A matching pin is cemented to corners of the glass on the compartment side. Use a piano wire when cutting each pin.

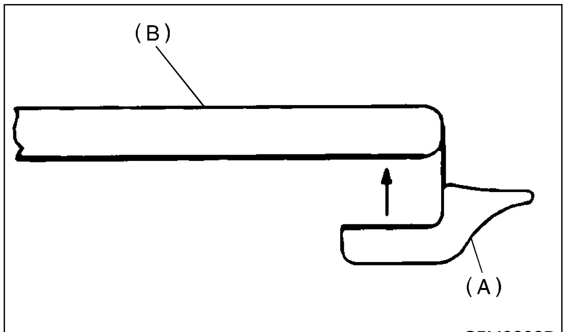


S5M0511A

(1) Body panel
(2) Glass
(3) Matching pin

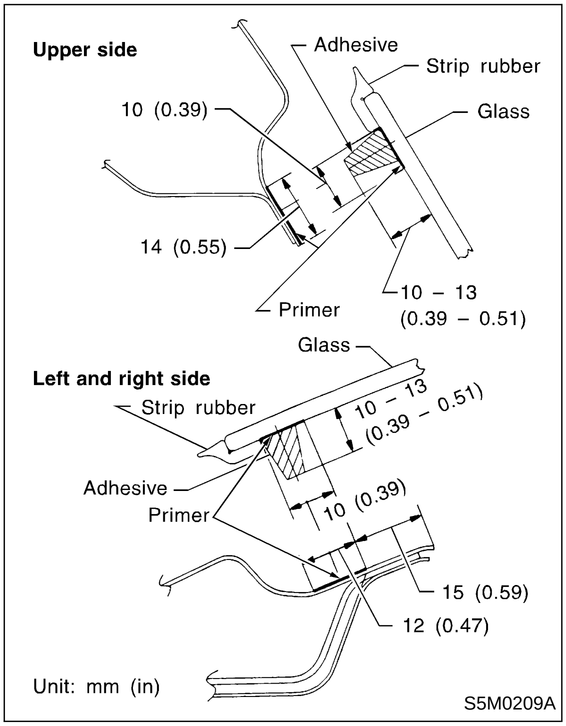
B: INSTALLATION *S905376A11*

1) Install a new rubber strip (A) by aligning it with the end of the rear gate glass (B).



S5M0208B

2) Install glass in the same procedure as for windshield glass. <Ref. to GW-24, INSTALLATION, Windshield Glass.>



S5M0209A

3) About one hour after installation, conduct a leak test.

CAUTION:
- **When door is open/closed after glass is bonded, always lower door glass and then open/close it carefully.**
- **Move vehicle slowly.**

4) After completion of all work, allow vehicle to stand for about 24 hours.

NOTE:
For minimum drying time and time the vehicle must be left standing before driving after bonding, follow instructions or instruction manual from the adhesive manufacturer.

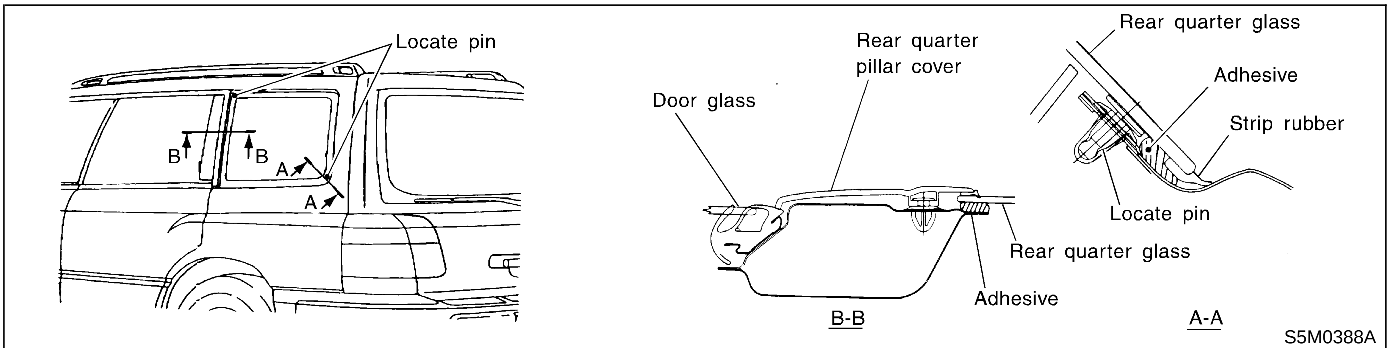
CAUTION:
When a vehicle is returned to the user, tell him or her that the vehicle should not be subjected to heavy impact for at least three days.

5) Connect rear defogger terminals.
6) Install rear gate trim. <Ref. to EI-44, INSTALLATION, Rear Gate Trim.>
7) Install rear wiper. <Ref. to WW-17, INSTALLATION, Rear Wiper Motor.>

12. Rear Quarter Glass S905453

A: REMOVAL S905453A18

1) Remove rear quarter molding on corner.
2) Remove glass in the same procedure as for windshield glass. <Ref. to GW-23, REMOVAL, Windshield Glass.>

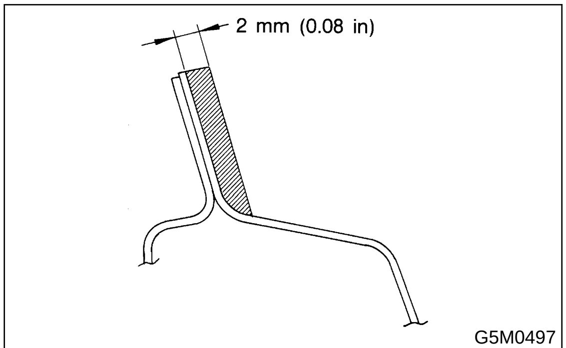


S5M0388A

B: INSTALLATION S905453A11

1) Using a putty knife, etc., cut layer of adhesive stick firmly to body and finish it into a smooth surface of about 2 mm (0.08 in) in thickness.

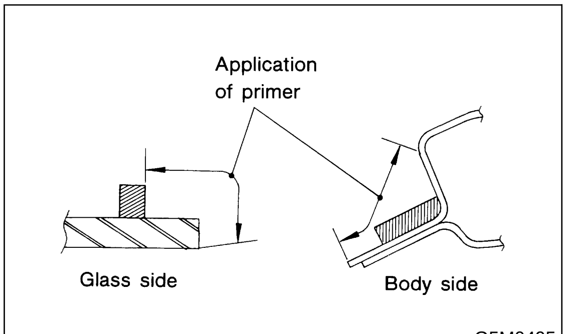
CAUTION:
Be careful not to damage body finish.



G5M0497

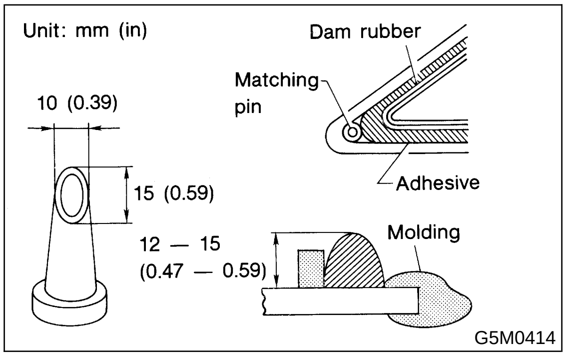
2) Remove chips, dirt and dust from body surface.
3) Clean body wall surface and upper surface of adhesive layer with a solvent such as alcohol or white gasoline.
4) Remove dirt and dust from surface of glass to be adhered.
5) Clean surface of glass to be adhered with alcohol or white gasoline.
6) Using a sponge, apply primer to surface of glass to be adhered.
7) Apply primer to surface of body to be adhered.

CAUTION:
- **If primer has dropped on body finish, it is hard to wipe it off. So protect with masking.**
- **Primer must not project from black frame of glass.**
- **After applying primer, let it dry naturally for about 10 minutes.**



G5M0495

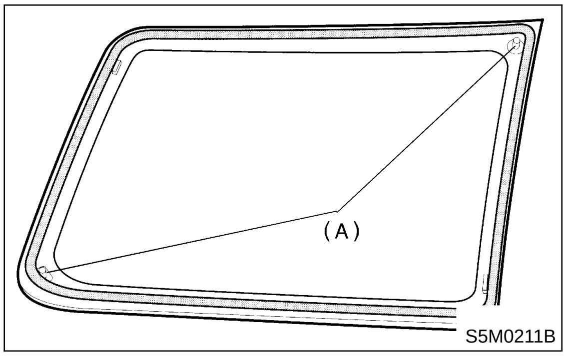
8) Cut nozzle tip as shown in the figure.



G5M0414

9) Open cartridge and put it into a gun with nozzle attached.
10) Apply adhesive uniformly to all sides of adhesion surface while operating gun along glass end face.

11) Hold glass with rubber suction cups.
12) Mount glass on body with matching pins (A) aligned.



13) Attach quickly and press all sides lightly.

CAUTION:
- **When door is open/closed after glass is bonded, always lower door glass and then open/close it carefully.**
- **Move vehicle slowly.**

14) After completion of all work, allow vehicle to stand for about 24 hours.

NOTE:
For minimum drying time and time the vehicle must be left standing before driving after bonding, follow instructions or instruction manual from the adhesive manufacturer.

15) After curing of adhesive, pour water on external surface of vehicle to check that there are no water leaks.

CAUTION:
When a vehicle is returned to the user, tell him or her that the vehicle should not be subjected to heavy impact for at least three days.

13. Roof Window Glass *S905339*

A: REMOVAL *S905339A18*

<Ref. to SR-6, REMOVAL, Sunroof Lid.>

B: INSTALLATION *S905339A11*

<Ref. to SR-6, INSTALLATION, Sunroof Lid.>

C: ADJUSTMENT *S905339A01*

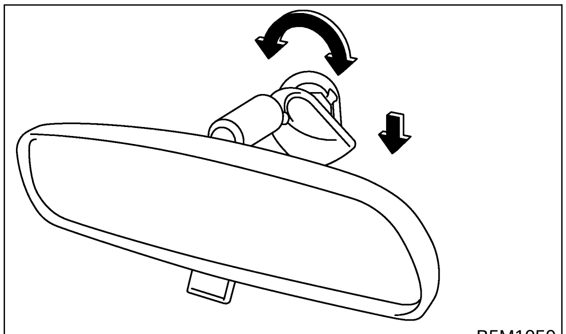
<Ref. to SR-6, ADJUSTMENT, Sunroof Lid.>

14. Inner Rearview Mirror S905340

A: REMOVAL S905340A18

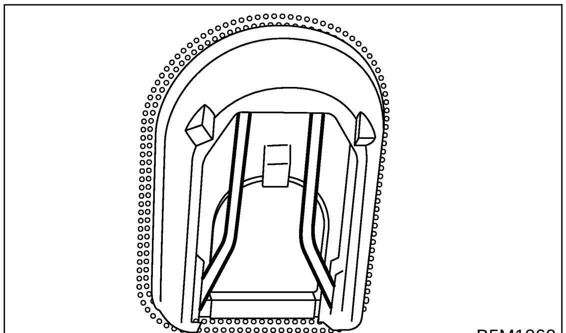
NOTE:
The spring cannot be reused. Prepare a new spring before removal.

1) Turn mirror base 90 degrees clockwise or counterclockwise to remove it.



B5M1059

2) Remove spring from mirror base.



B5M1060

CAUTION:
Be careful not to damage the mirror surface.

B: INSTALLATION S905340A11

Install in the reverse order of removal.

C: INSPECTION S905340A10

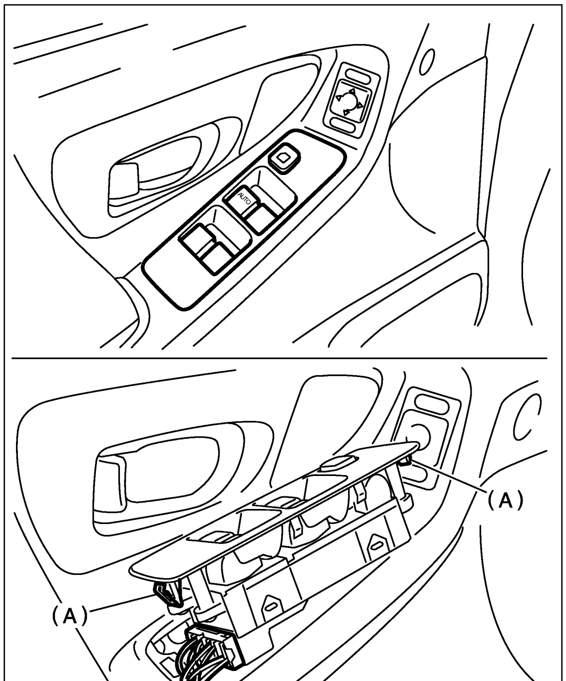
Do not let mirror be damaged.

15. Power Window Control Switch S905621

A: REMOVAL S905621A18

1. MAIN SWITCH S905621A1801

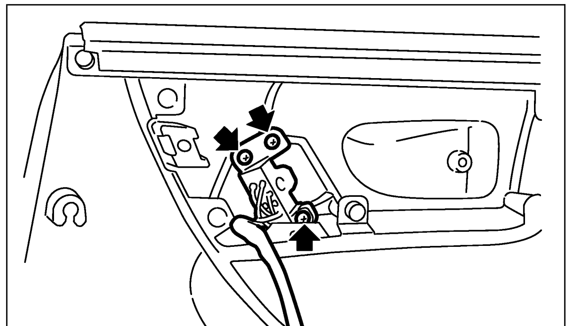
1) Release two hooks (A) of switch panel to remove power window main switch.
2) Disconnect electrical connector from power window main switch.



S5M0512A

2. SUB-SWITCH S905621A1802

1) Remove door trim. <Ref. to EI-28, REMOVAL, Rear Door Trim.>
2) Remove screws and sub-switch.


S5M0494

B: INSTALLATION S905621A11

1. MAIN SWITCH S905621A1101

Install in the reverse order of removal.

2. SUB-SWITCH S905621A1102

Install in the reverse order of removal.

C: INSPECTION S905621A10

1. MAIN SWITCH S905621A1001

Measure switch resistance.

Driver's switch:

Switch position	Terminal No.	Standard
UP	12 and 1, 2 and 7	Less than 1 Ω
OFF	1 and 2 and 7	Less than 1 Ω
DOWN	12 and 2, 1 and 7	Less than 1 Ω
AUTO DOWN	12 and 2, 1 and 7	Less than 1 Ω

Front passenger's switch:

Switch position	Terminal No.	Standard
UP	12 and 5, 6 and 7	Less than 1 Ω
OFF	5 and 6 and 7	Less than 1 Ω
DOWN	12 and 6, 5 and 7	Less than 1 Ω

Rear left switch:

Switch position	Terminal No.	Standard
UP	12 and 9, 10 and 7	Less than 1 Ω
OFF	9 and 10 and 7	Less than 1 Ω
DOWN	12 and 10, 9 and 7	Less than 1 Ω

Rear right switch:

Switch position	Terminal No.	Standard
UP	12 and 14, 13 and 7	Less than 1 Ω
OFF	14 and 13 and 7	Less than 1 Ω
DOWN	12 and 13, 14 and 7	Less than 1 Ω

If NG, replace the main switch.

2. SUB-SWITCH (FRONT) *S905621A1005*

Measure switch resistance.
Front passenger's door switch:

Switch position	Terminal No.	Standard
UP	8 and 3 and 5, 4 and 7	Less than 1 Ω
OFF	4 and 7, 6 and 5	Less than 1 Ω
DOWN	8 and 3 and 7, 6 and 5	Less than 1 Ω

If NG, replace the sub-switch.

3. SUB-SWITCH (REAR) *S905621A1006*

Measure switch resistance.
Rear door switch:

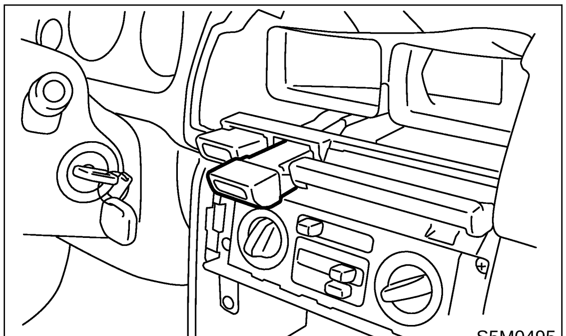
Switch position	Terminal No.	Standard
UP	6 and 5, 1 and 4	Less than 1 Ω
OFF	1 and 4, 2 and 5	Less than 1 Ω
DOWN	6 and 4, 2 and— 5	Less than 1 Ω

If NG, replace the sub-switch.

16. Rear Window Defogger Switch S905559

A: REMOVAL S905559A18

1) Remove center air vent grille. <Ref. to AC-36, REMOVAL, Air Vent Grille.>
2) Pull out switch and disconnect the connector.



S5M0495

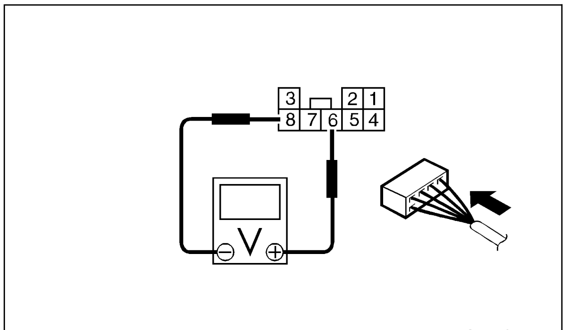
B: INSTALLATION S905559A11

Install in the reverse order of removal.

C: INSPECTION S905559A10

1) Turn the ignition switch ON.
2) Check continuity between terminals on the wire harness side with connectors connected.

Connector & terminal
(i18) No. 6 (+) — No. 8 (−):



S5M0514A

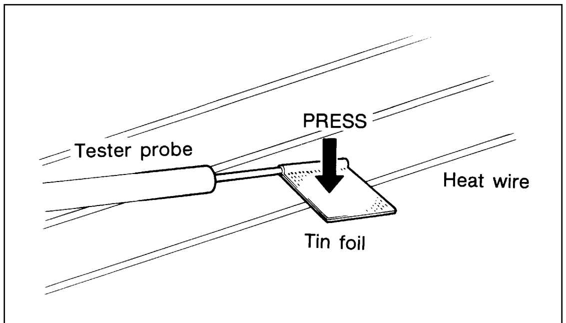
IGN SW	Switch position	Terminal No.	Standard
ON	OFF	(i18) 6 and (i18) 8	10V — 14V
ON	ON	6 and 8	0V

17. Rear Window Defogger S905341

A: INSPECTION S905341A10

CAUTION:
When wiping stain on glass off with cloth, use a dry and soft cloth and move it in the direction of the heat wire extension to avoid damage to the heat wire.

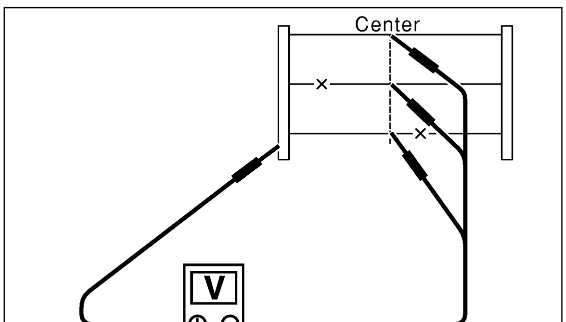
1) Turn ignition switch to ON.
2) Turn defogger switch to ON.
3) Wrap tips of tester pins with aluminum foil to avoid damage to heat wire.



G6M0136

4) Measure voltage at wire center with DC voltmeter.

Standard voltage:
Approx. 6 volts



B5M1053A

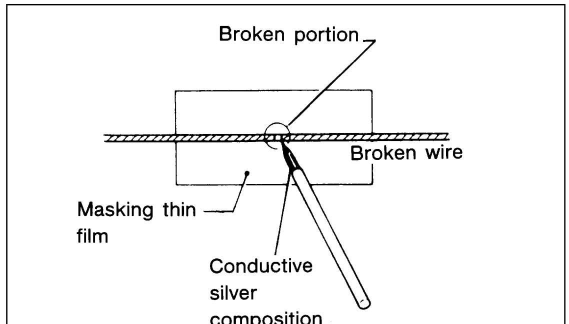
Voltage	Criteria
Approx. 6 V	OK
Approx. 12 V or 0 V	Broken

NOTE:
- If the measured value is 12 volts, heat wire is open between wire center and positive (+) end.
- If zero volt, heat wire is open between wire center and ground.

5) Apply positive lead of voltmeter to positive terminal of voltmeter, and then move negative lead along the wire up to the negative terminal end. If voltage changes from zero to several volts during movement of lead, heat wire is open at the voltage change point.

B: REPAIR S905341A19

1) Clean broken portion with alcohol or white gasoline.
2) Mask both side of wire with thin film.
3) Apply conductive silver composition (DUPONT No. 4817) to broken portion.



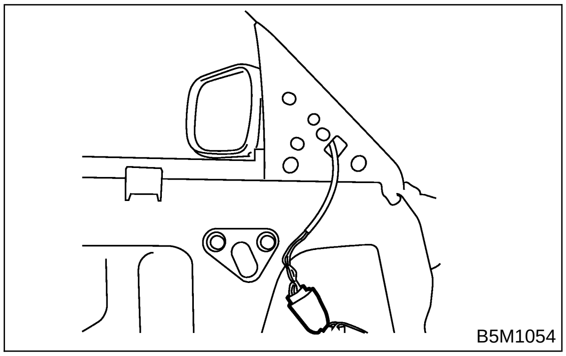
G6M0138

4) After repair, check wire.

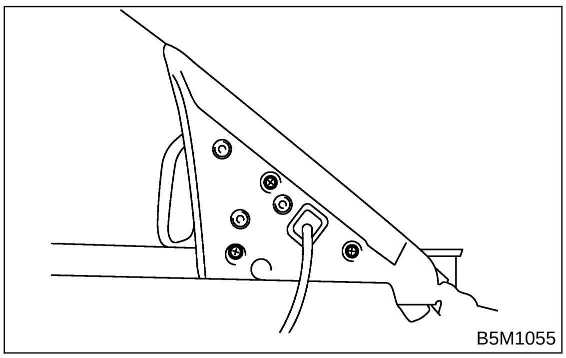
18. Outer Mirror Assembly S905338

A: REMOVAL S905338A18

1) Remove door trim. <Ref. to EI-27, REMOVAL, Front Door Trim.>
2) Pull off sealing cover to disconnect mirror electrical connector.



3) Loosen screws to remove mirror assembly.



B: INSTALLATION S905338A11

Install in the reverse order of removal.

C: INSPECTION *S905338A10*

Check to ensure that rearview mirror moves properly when battery voltage is applied to terminals.

Mirror heater not-equipped model:

Switch position	Terminal No.
OFF	—
UP	1 (+) and 3 (−)
DOWN	3 (+) and 1 (−)
LEFT	2 (+) and 3 (−)
RIGHT	3 (+) and 2 (−)

If NG, replace the mirror.

Mirror heater equipped model:

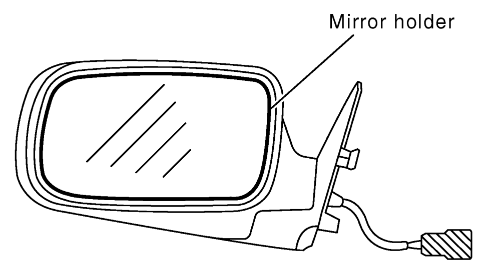
Switch position	Terminal No.
OFF	—
UP	2 (+) and 4 (−)
DOWN	4 (+) and 2 (−)
LEFT	3 (+) and 4 (−)
RIGHT	4 (+) and 3 (−)

If NG, replace the mirror.

19. Outer Mirror *S905658*

A: REPLACEMENT *S905658A20*

1) Remove the door mirror assembly. <Ref. to GW-36, REMOVAL, Outer Mirror Assembly.>
2) Warm the area around the mirror holder with a hair drier until the edges of the mirror holder become soft (about 2 or 3 minutes with a 1,000 W drier.)
3) Use a flat-bladed screwdriver without sharp edges to lift the mirror out of the mirror holder. (Also remove the connector from the back of mirrors with heaters.)



B5M1144A

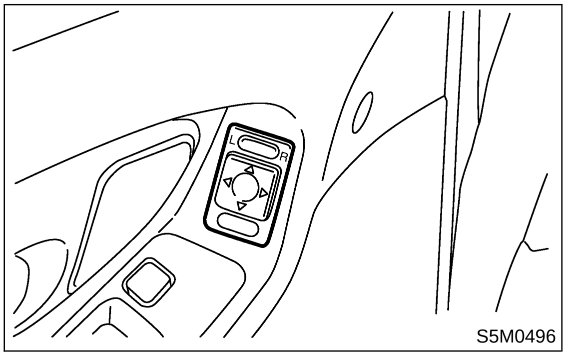
4) Warm the area around the mirror holder with a hair drier until the edges of the mirror holder become soft (about 2 or 3 minutes with a 1,000 W drier.)
5) Remove the backing of the new two-sided tape, and push the mirror in to install it.

CAUTION:
Unless the mirror holder is warmed sufficiently, the mirror holder edges may be damaged or the mirror cracked.

20. Remote Control Mirror Switch *S905342*

A: REMOVAL *S905342A18*

Using a thin flat-bladed screwdriver, remove the switch and disconnect the connector.



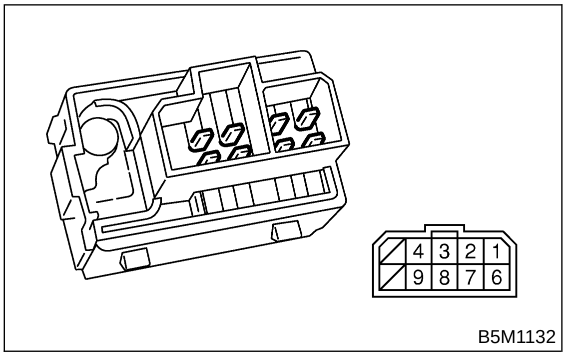
S5M0496

B: INSTALLATION *S905342A11*

Install in the reverse order of removal.

C: INSPECTION S905342A10

Move rearview mirror switch to each position and check continuity between terminals.



Change over switch left position:

Switch position	Terminal No.	Standard
NEUTRAL	All terminals	More than 1 MΩ
UP	7 and 4, 2 and 1	Less than 1 Ω
DOWN	7 and 2, 4 and 1	Less than 1 Ω
LEFT	9 and 4, 2 and 1	Less than 1 Ω
RIGHT	9 and 2, 4 amd 1	Less than 1 Ω

Change over switch right position:

Switch position	Terminal No.	Standard
NEUTRAL	All terminals	More than 1 MΩ
UP	6 and 4, 2 and 1	Less than 1 Ω
DOWN	6 and 2, 4 and 1	Less than 1 Ω
LEFT	8 and 4, 2 amd 1	Less than 1 Ω
RIGHT	8 and 2, 4 and 1	Less than 1 Ω

If NG, replace the switch.

21. Wiper Deicer S905622

A: INSPECTION S905622A10

Refer to INSPECTION under Rear Window Defogger. <Ref. to GW-35, INSPECTION, Rear Window Defogger.>

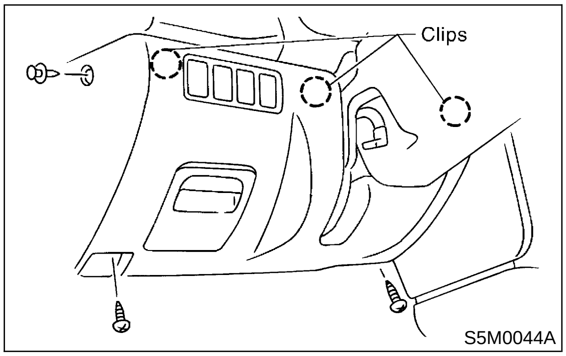
B: REPAIR S905622A11

Refer to REPAIR under Rear Window Defogger. <Ref. to GW-35, REPAIR, Rear Window Defogger.>

22. Wiper Deicer Switch S905623

A: REMOVAL S905623A18

1) Remove lower cover.
2) Disconnect the connector and remove the switch.



B: INSTALLATION S905623A11

Install in the reverse order of removal.

C: INSPECTION S905623A10

Move wiper deicer switch to each position and check continuity between terminals.

Switch position	Terminal No.	Specified condition
OFF	3 and 5	More than 1MΩ
ON	3 and 5	Less than 1 Ω

If NG, replace the switch.

BODY STRUCTURE

BS

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1. General Description..2
2. Datum Points...3
3. Datum Dimensions..15

1. General Description S906001

A: PREPARATION TOOL S906001A17

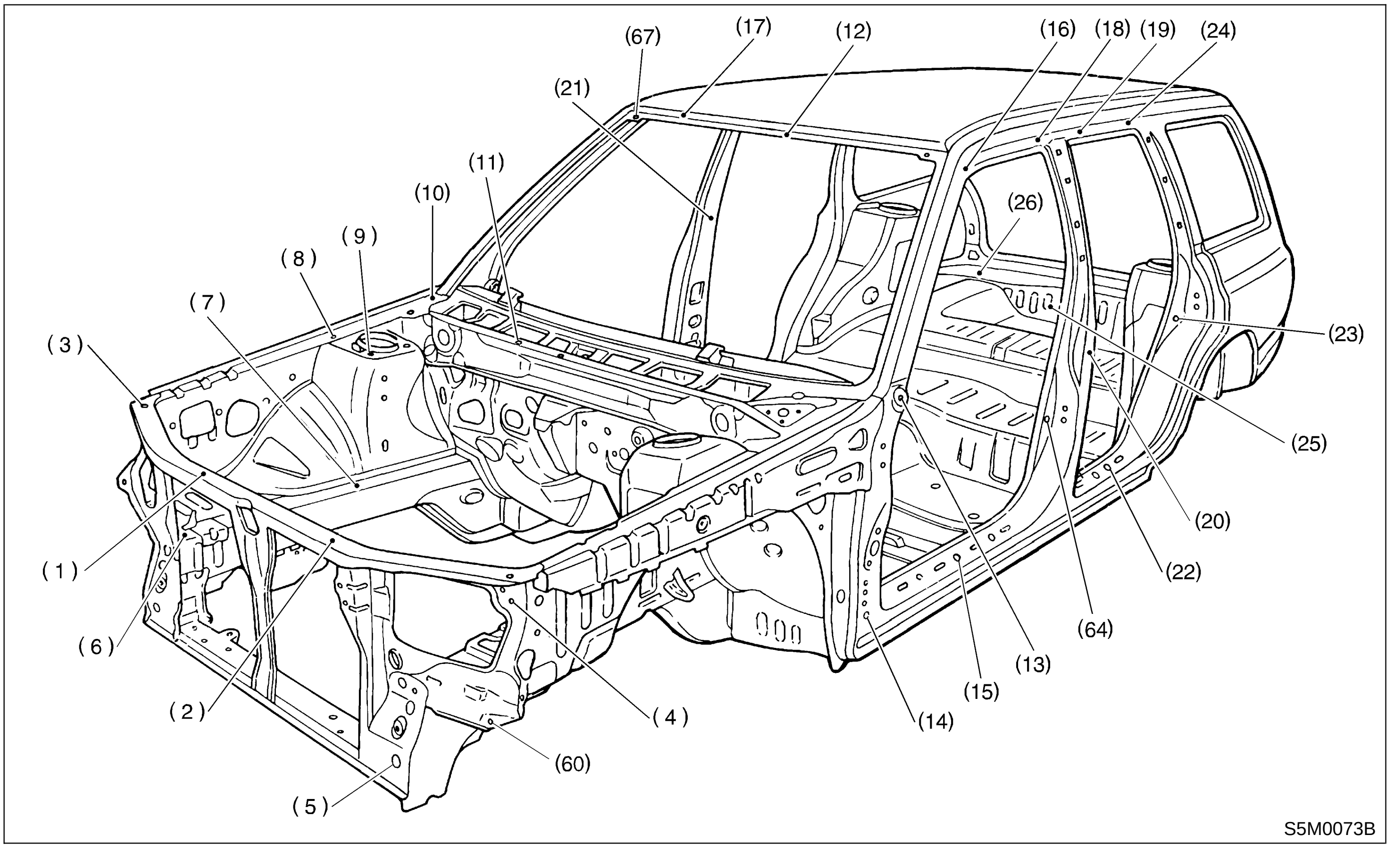
TOOL NAME	REMARKS
Tram tracking gauge	Used for measuring dimension.
Tape measure	Used for measuring dimension

2. Datum Points *S906540*

A: LOCATION *S906540A13*

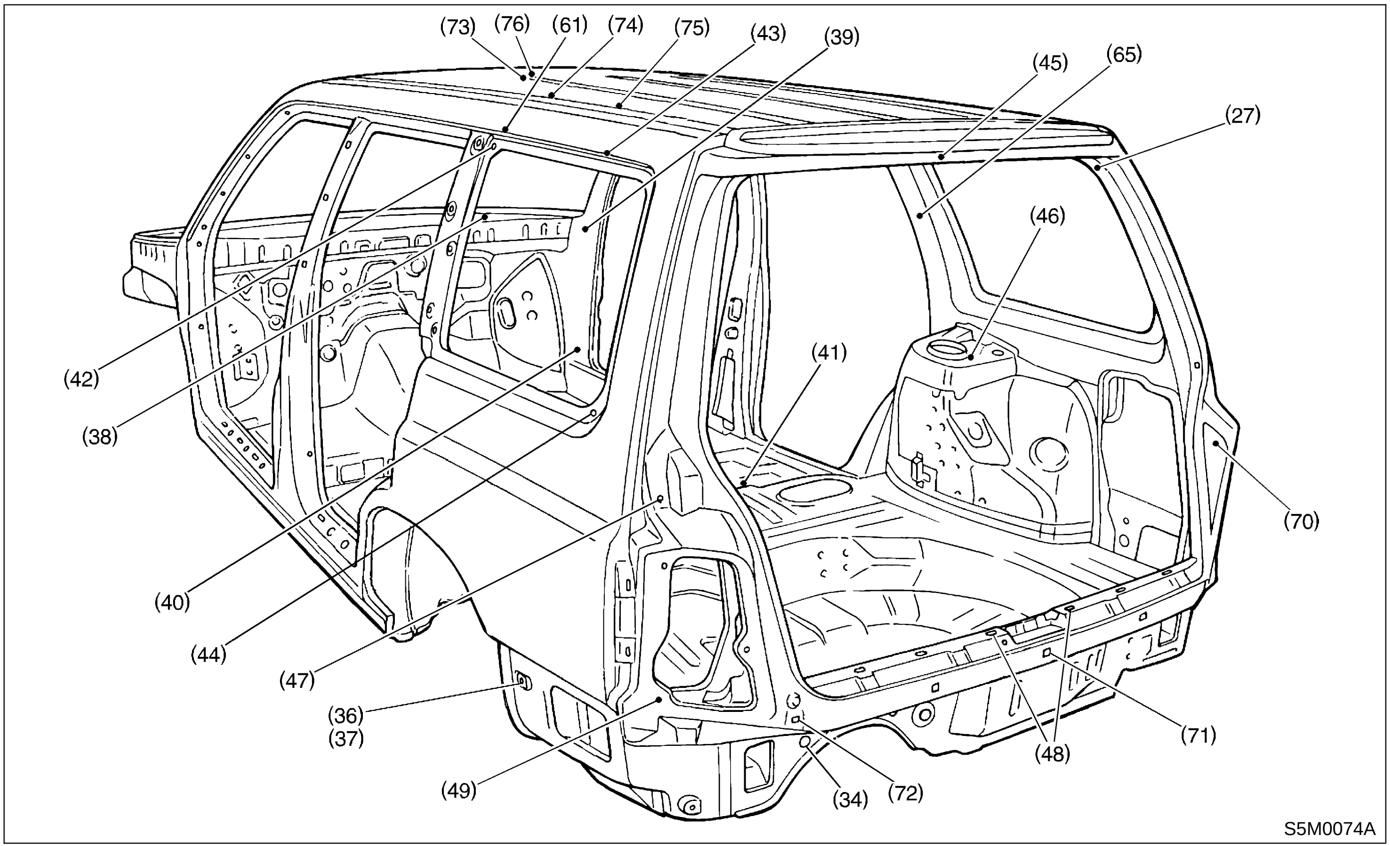
NOTE:
- Datum points are specified for body repair.
- Guide holes, locators, and indents are provided to facilitate panel replacement and to increase alignment accuracy.
- Both right and left reference points are symmetrical.

1. ROOM SECTION *S906540A1301*



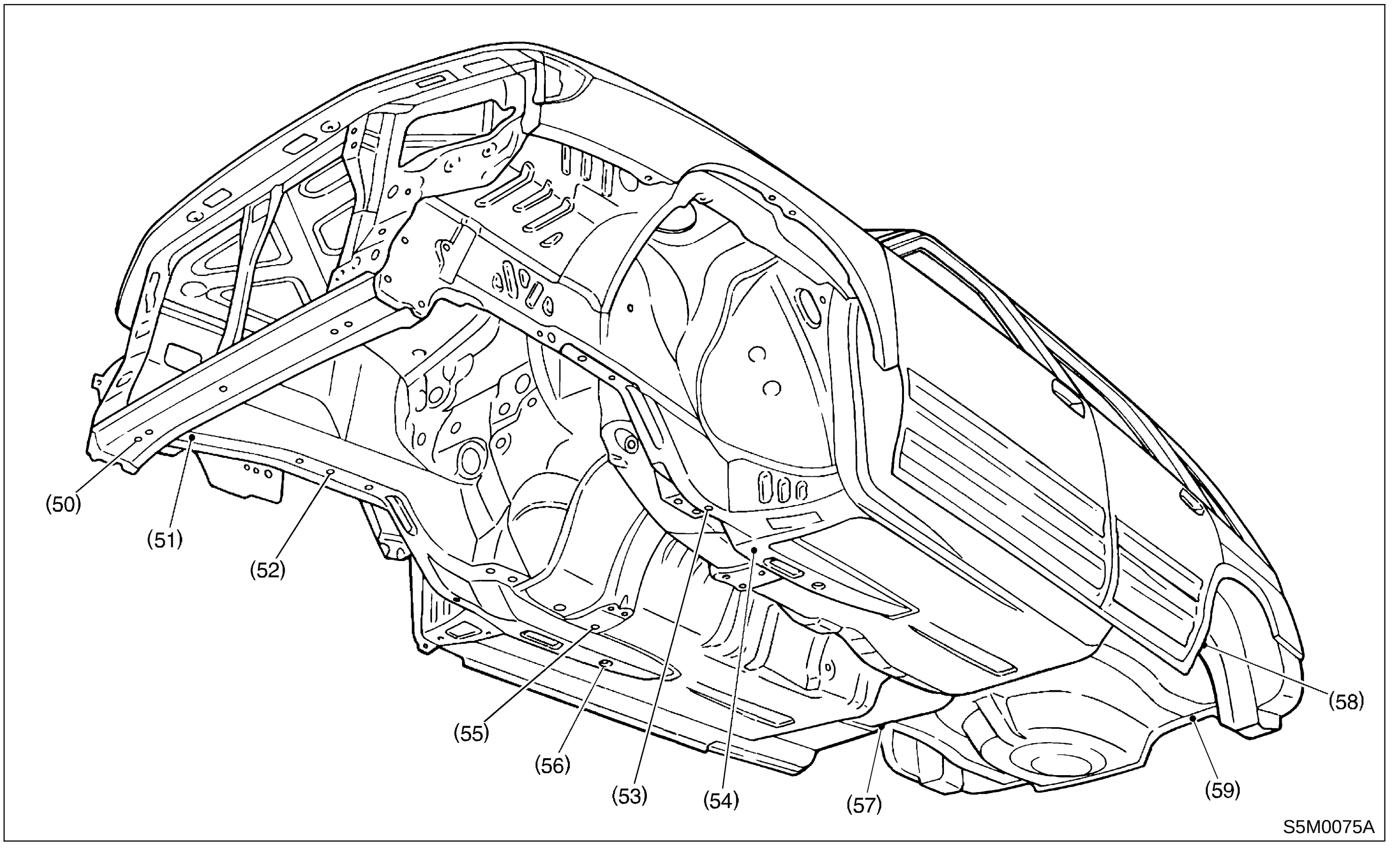
(1) Radiator panel (UPR) repair bolt hole M8 (Right)
(2) Radiator panel (UPR) repair bolt hole M8 (Left)
(3) Fender attaching bolt hole M6 (Symmetrical)
(4) Repair locator 8 mm (0.31 in) dia. (Symmetrical)
(5) Radiator panel side gauge hole 24 mm (0.94 in) dia. (Symmetrical)
(6) Front bumper mounting hole 14 × 16 mm (0.55 × 0.63 in) dia. (Symmetrical)
(7) Front crossmember attaching bolt hole 12.4 mm (0.488 in) dia. (Symmetrical)
(8) Fender attaching bolt hole M6 (Symmetrical)
(9) Front strut mounting hole 9.5 mm (0.374 in) dia. (Symmetrical)
(10) Hood hinge attaching bolt hole M8 (Symmetrical)
(11) Cowl panel mounting hole 6 mm (0.24 in) dia. (Symmetrical)
(12) Roof inner trim attaching bolt hole 8 mm (0.31 in) dia.
(13) Fender attaching bolt hole M6 (Symmetrical)
(14) Front pillar gauge hole 20 mm (0.79 in) dia. (Symmetrical)
(15) Wax coat hole 20 mm (0.79 in) dia. (Symmetrical)
(16) Retainer attaching square hole 7 mm (0.28 in) (Symmetrical)
(17) Sun visor attaching hole 17 mm (0.67 in) dia. (Symmetrical)
(18) Retainer attaching square hole 7 mm (0.28 in) (Symmetrical)
(19) Retainer attaching square hole 7 mm (0.28 in) (Symmetrical)
(20) Center pillar gauge hole 12 mm (0.47 in) dia. (Symmetrical)
(21) Belt anchor attaching bolt hole 11.1 mm (7/16 in) dia. (Symmetrical)
(22) Wax coat hole, 20 mm (0.79 in) dia. (Symmetrical)
(23) Rear door switch attaching hole 20 mm (0.79 in) dia. (Symmetrical)
(24) Retainer attaching square hole 7 mm (0.28 in) (Symmetrical)
(25) Spare tire attaching bolt hole M8
(26) Air draw hole 7 mm (0.28 in) dia. (Symmetrical)
(60) Fender attaching bolt hole M6 (Symmetrical)
(64) Door switch attaching hole 13.5 mm (0.531 in) dia. (Symmetrical)
(67) Front glass attaching hole Right 6.5 mm (0.256 in) dia. Left 6.5 × 10 mm (0.256 × 0.39 in) dia.

2. REAR SECTION *S906540A1302*

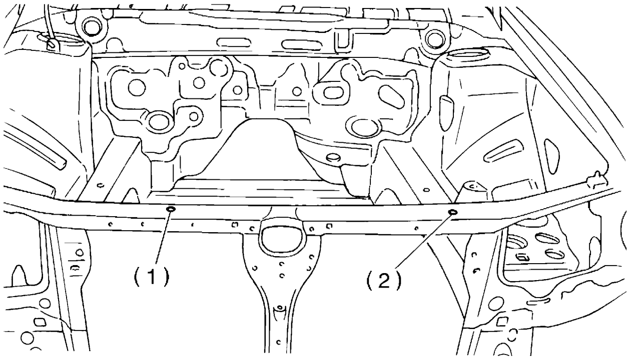


(27) Rear pillar (Inner) harness and hose clip attaching hole 7 mm (0.28 in) dia. (Symmetrical)
(34) Rear skirt gauge hole 20 mm (0.79 in) dia. (Symmetrical)
(36) Rear quarter bumper side gauge hole 20 mm (0.79 in) dia. (Left)
(37) Rear quarter bumper side gauge hole 20 mm (0.79 in) dia. (Right)
(38) Instrument panel attaching square hole 22 × 34.5 mm (0.87 × 1.358 in) (Right)
(39) Steering support beam attaching bolt hole M8 (Symmetrical)
(40) Front pillar (Inner) gauge hole 10 mm (0.39 in) dia. (Symmetrical)
(41) Floor mat attaching clip hole 8 mm (0.31 in) dia. (Symmetrical)
(42) Rear quarter glass attaching hole 8 × 15 mm (0.31 × 0.59 in) dia. (Symmetrical)
(43) Pad attaching square hole 9 mm (0.35 in) dia. (Symmetrical)
(44) Rear quarter glass attaching hole 8 mm (0.31 in) dia. (Symmetrical)
(45) Rear locator hollow 4 mm (0.16 in) dia.
(46) Rear strut mounting hole 10 mm (0.39 in) dia. (Symmetrical)
(47) Rear gate stay attaching bolt hole M8 (Symmetrical)
(48) Inner trim clip attaching hole 8 × 20 mm (0.31 × 0.79 in) dia. (Symmetrical)
(49) Rear combination light mounting hole 8 mm (0.31 in) dia. (Symmetrical)
(61) Side rail (Inner) gauge hole 10 mm (0.39 in) dia. (Symmetrical)
(65) Repair location hole 16 mm (0.63 in) dia. (Symmetrical)
(70) Buffer attaching hole M6 (Symmetrical)
(71) Bumper face attaching square hole 8 × 9 mm (0.31 × 0.35 in)
(72) Bumper face attaching square hole 8 × 9 mm (0.31 × 0.35 in) (Symmetrical)
(73) Head console bracket gauge hole 8 mm (0.31 in) dia.
(74) Inner system carrier attaching bolt hole 8 mm (0.31 in) (Symmetrical)
(75) Inner system carrier attaching bolt hole 8 mm (0.31 in) (Symmetrical)
(76) Head console bracket gauge hole 8 mm (0.31 in) dia.

3. UNDERBODY SECTION *S906540A1303*



(50) Radiator panel (LWR) frame gauge hole 15 mm (0.59 in) dia. (Symmetrical)
(51) Front side frame gauge hole 20 mm (0.79 in) dia. (Symmetrical)
(52) Front crossmember attaching hole 12.4 mm (0.488 in) dia. (Symmetrical)
(53) Front suspension attaching bolt hole M14
(54) Side frame gauge hole 20 mm (0.79 in) dia. (Symmetrical)
(55) Repair location hole 12 mm (0.47 in) dia. (Symmetrical)
(56) Side frame gauge hole 15 mm (0.59 in) dia. (Symmetrical)
(57) Rear differential attaching bolt hole M12 (Symmetrical)
(58) Rear suspension attaching bolt hole M12 (Symmetrical)
(59) Rear side frame gauge hole 15 mm (0.59 in) dia. (Symmetrical)



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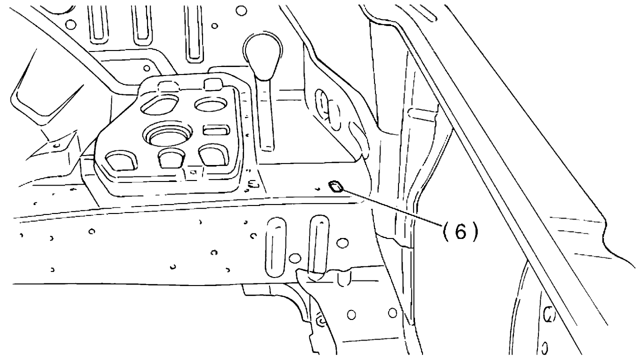

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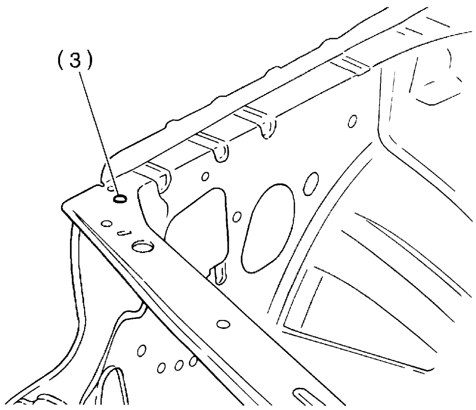

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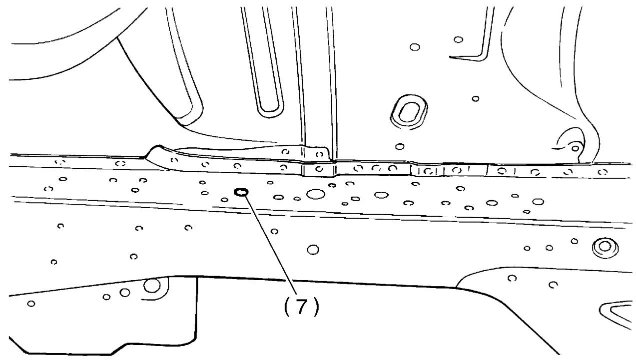

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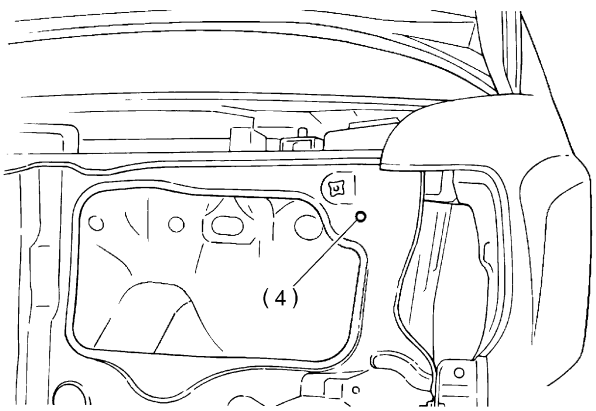

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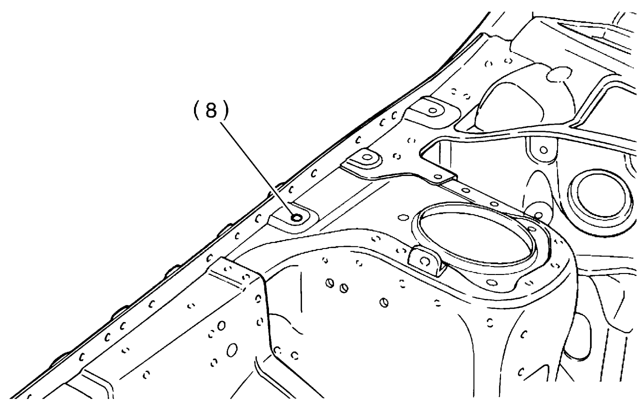

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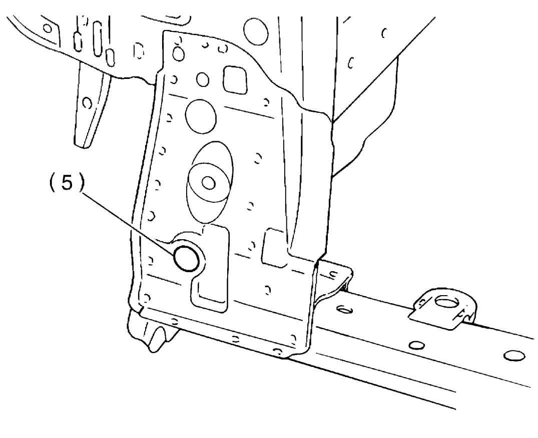

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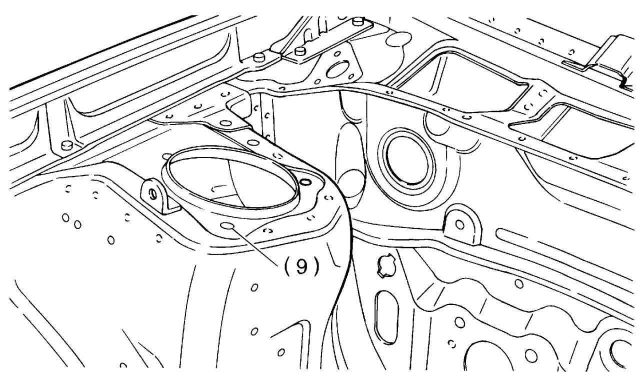

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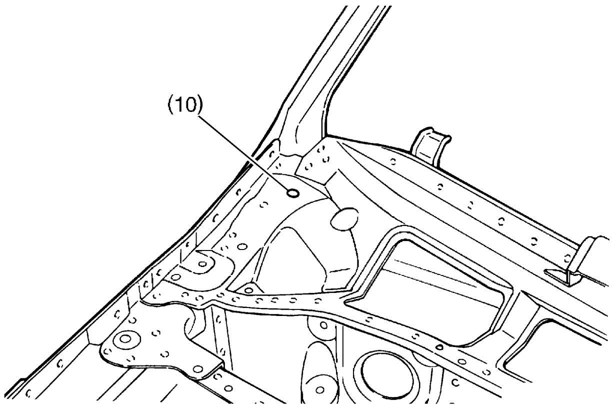

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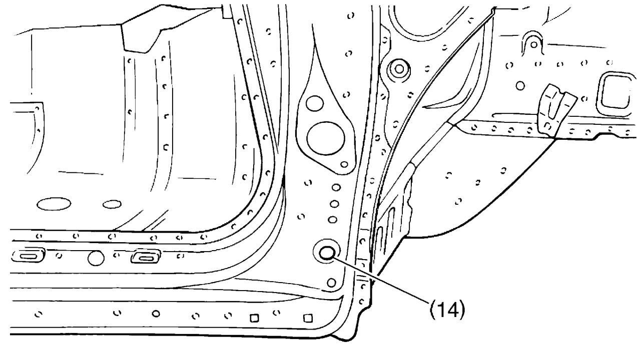

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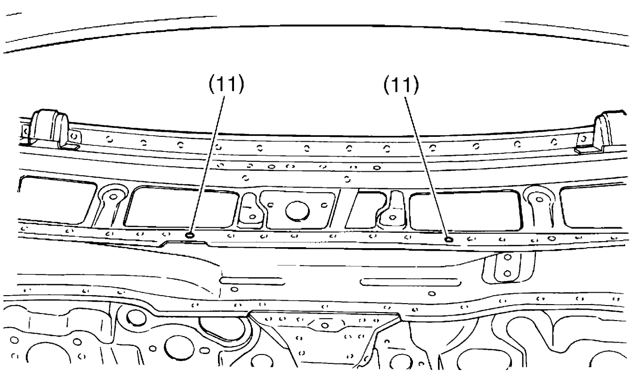

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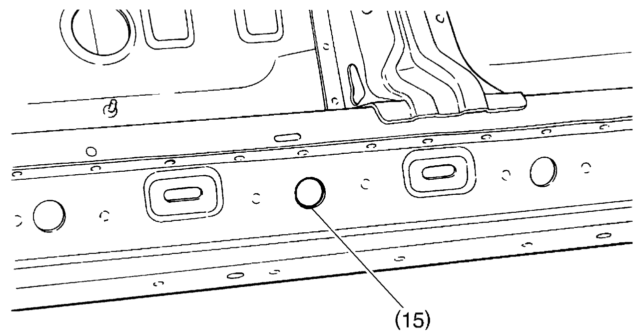

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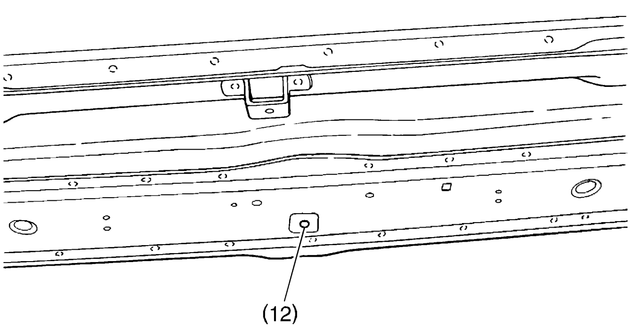

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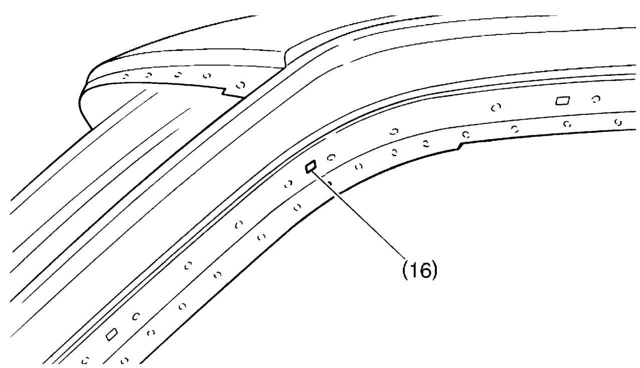

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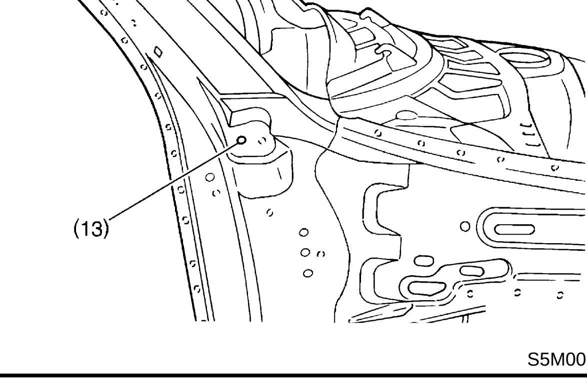

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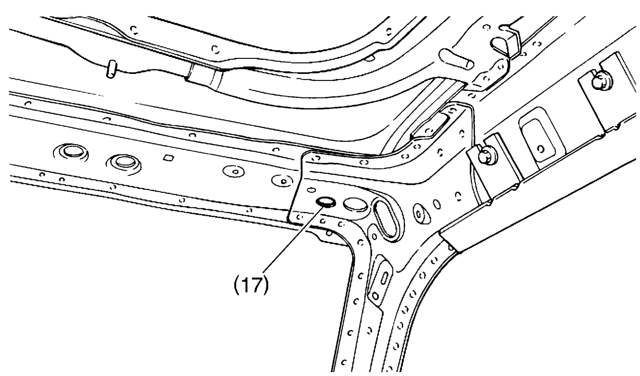

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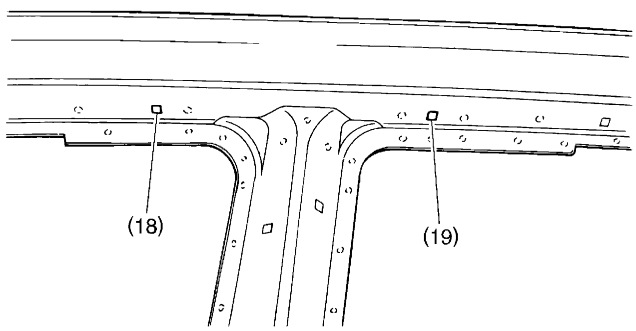
DATUM POINTS



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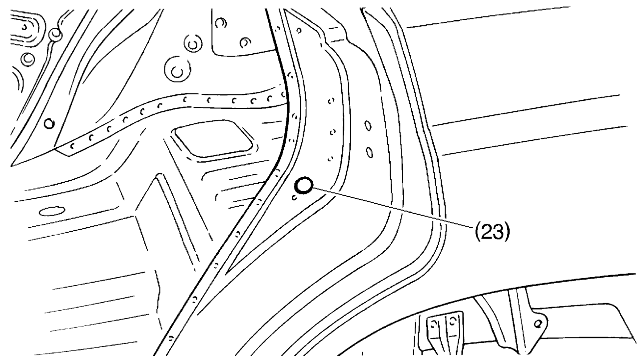

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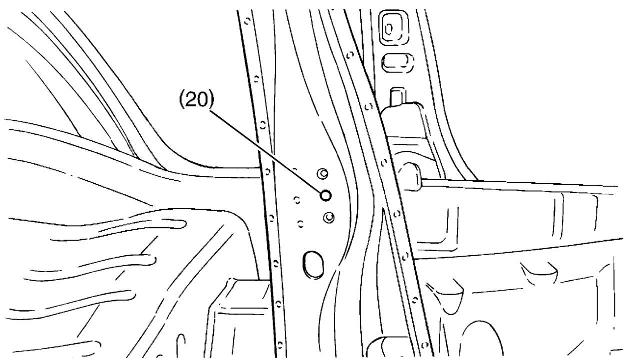

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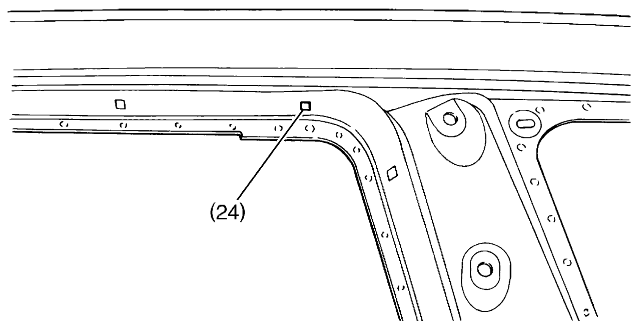

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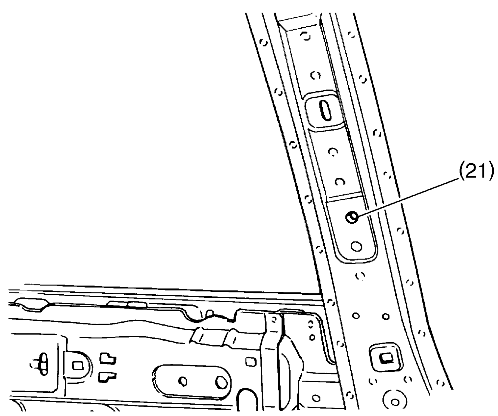

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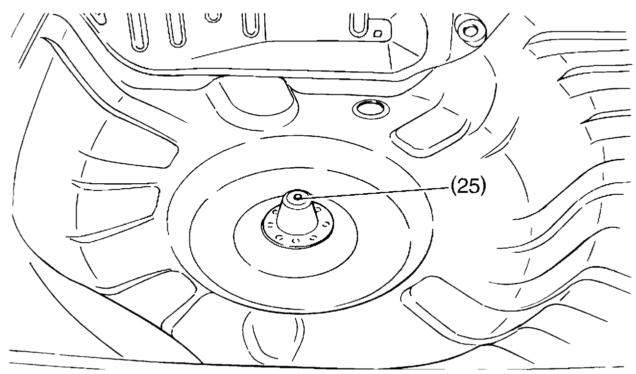

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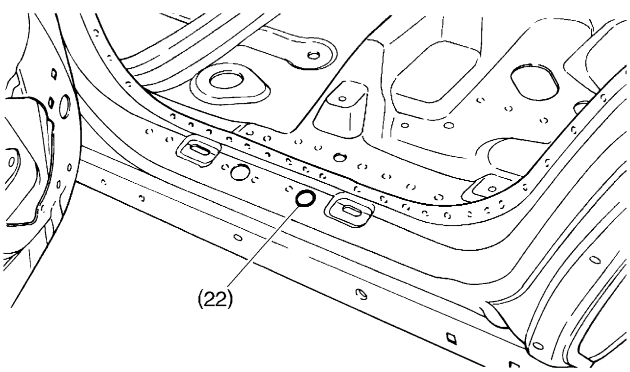

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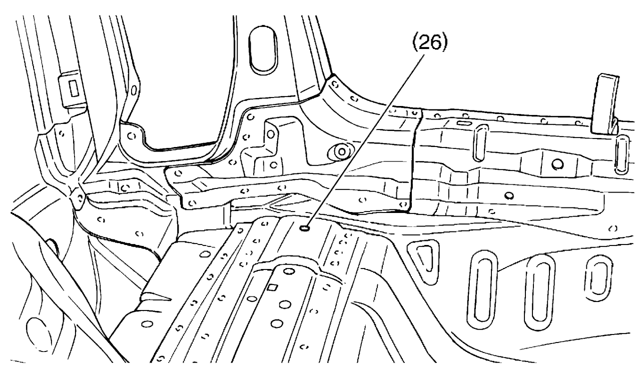

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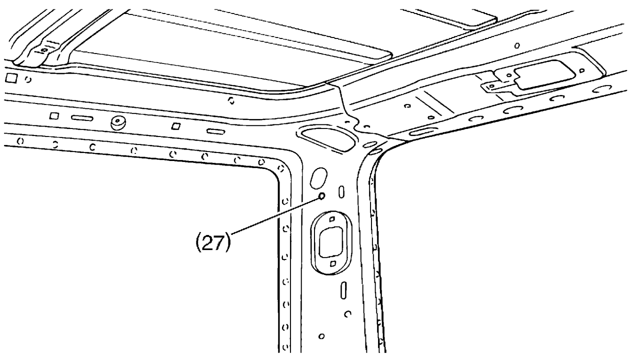

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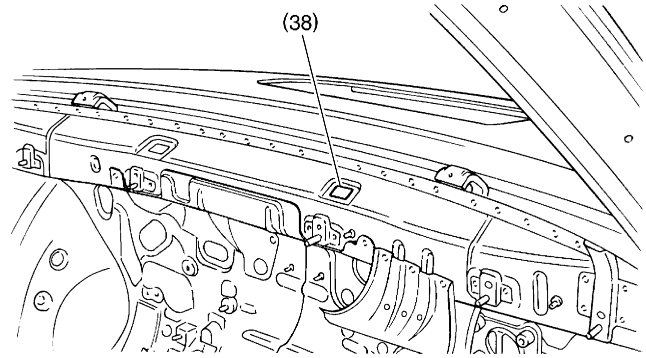

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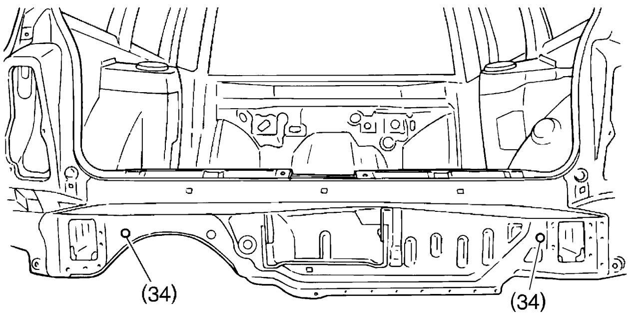

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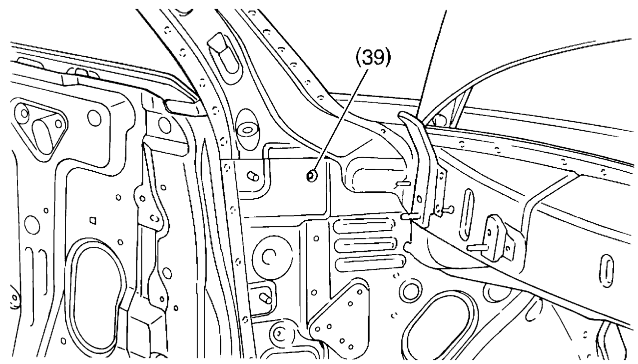

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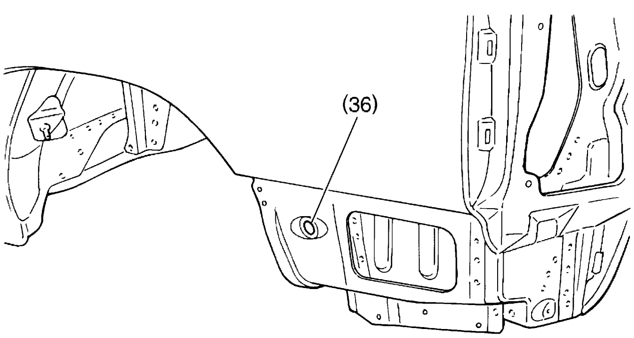

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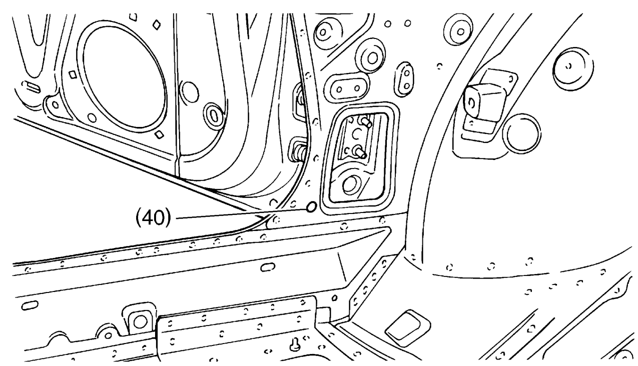

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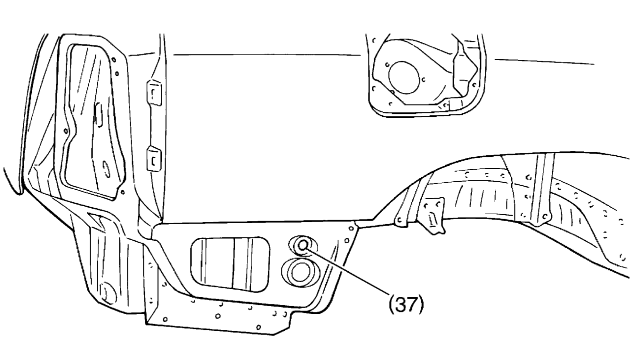

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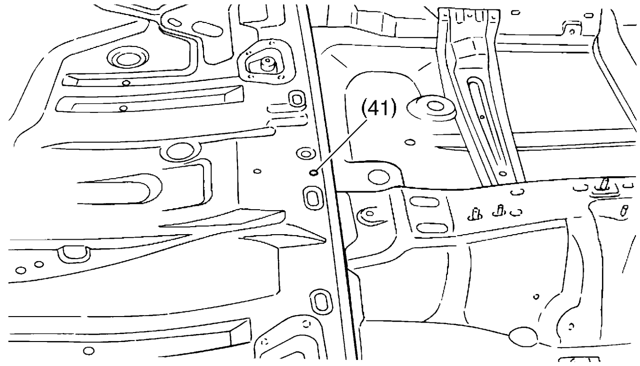

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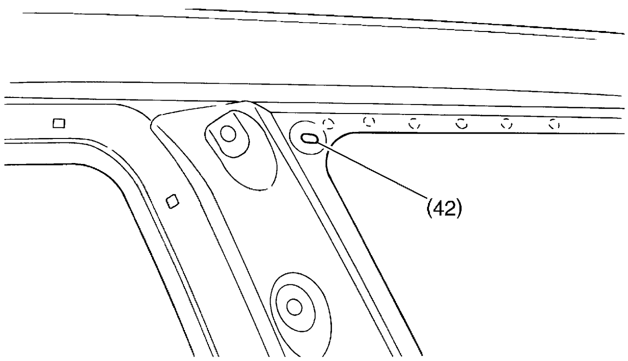

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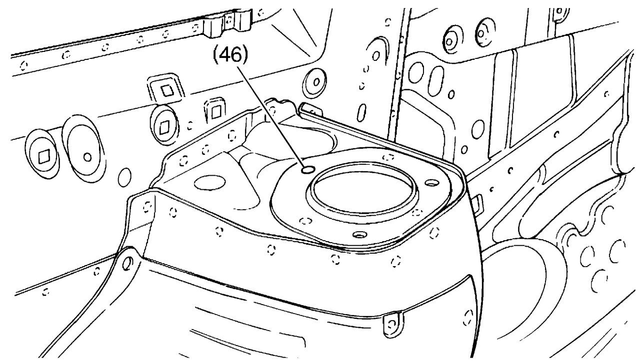

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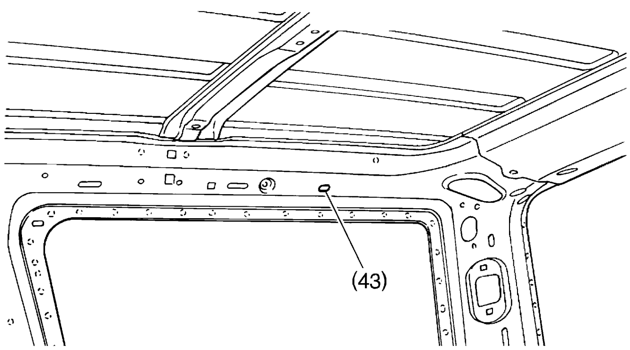

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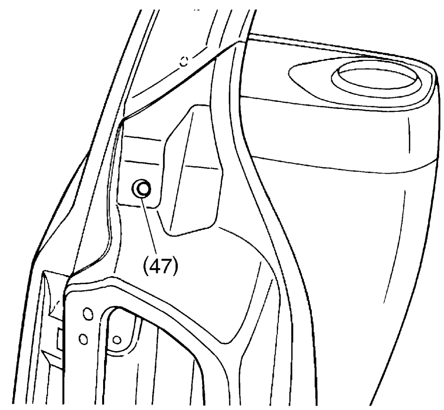

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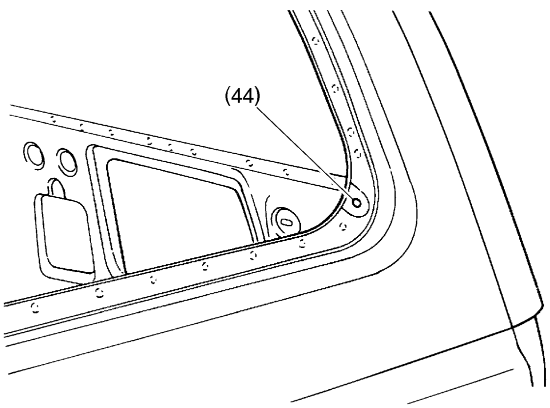

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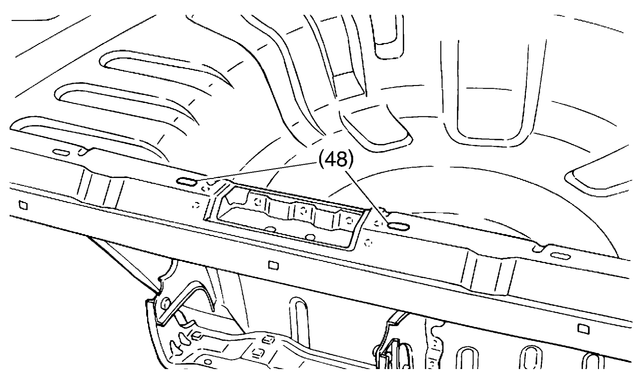

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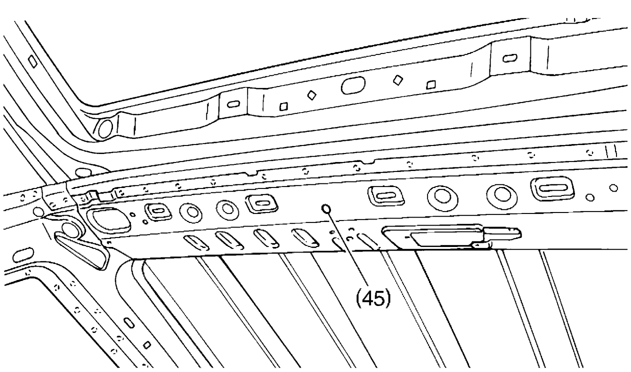

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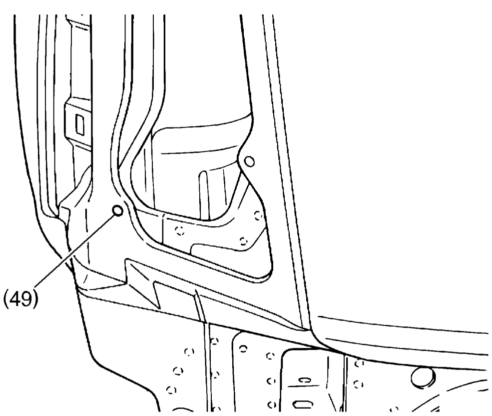

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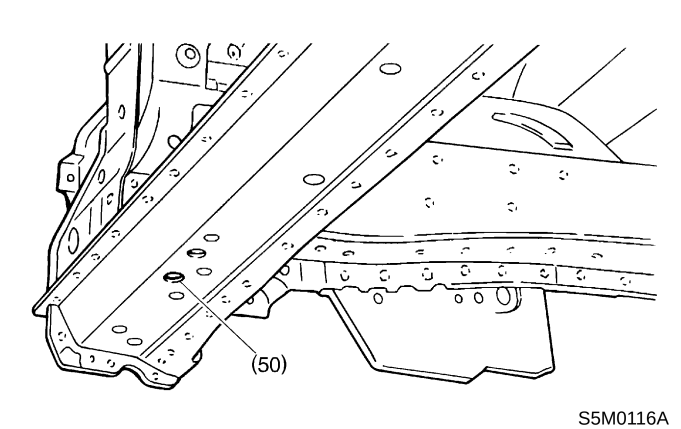
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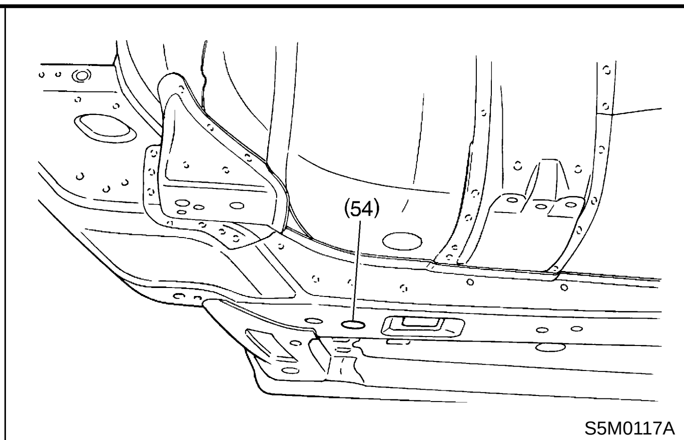
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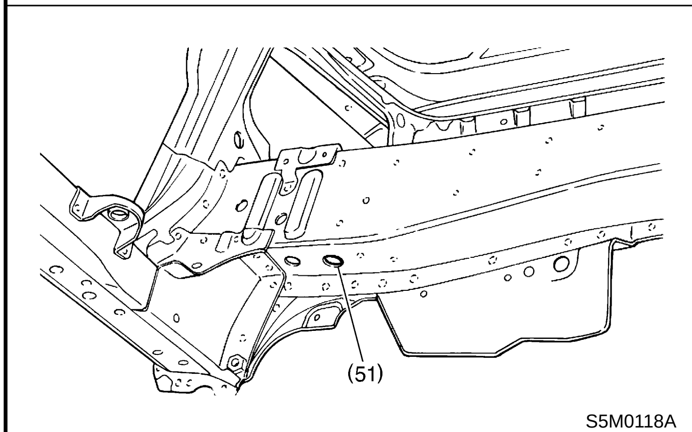
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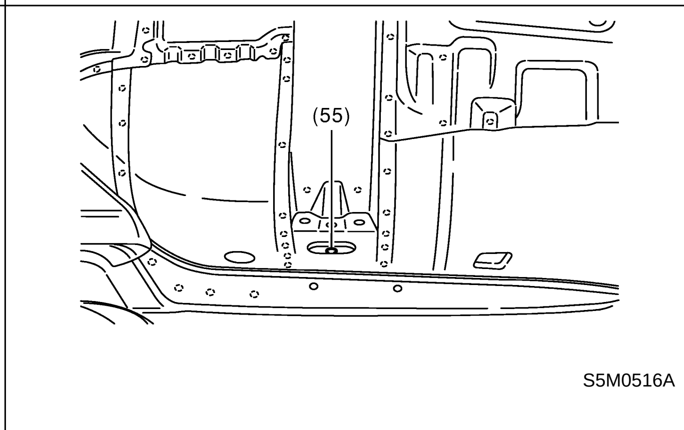
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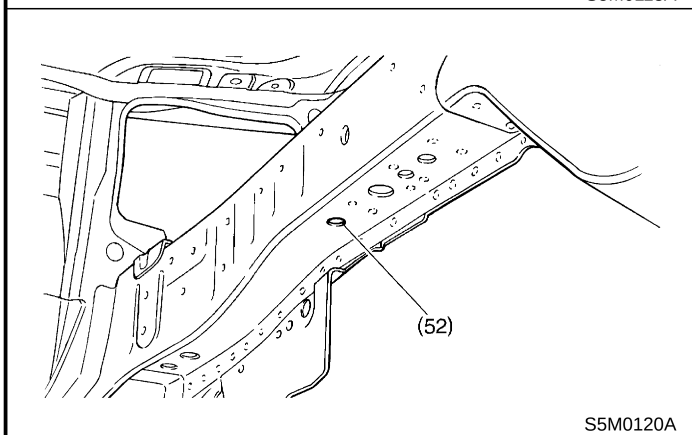
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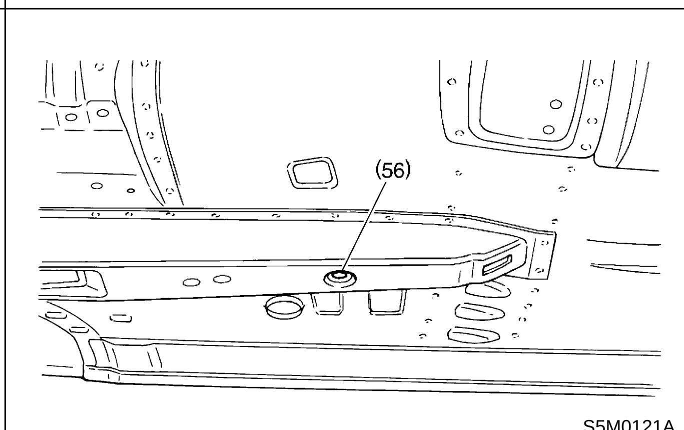
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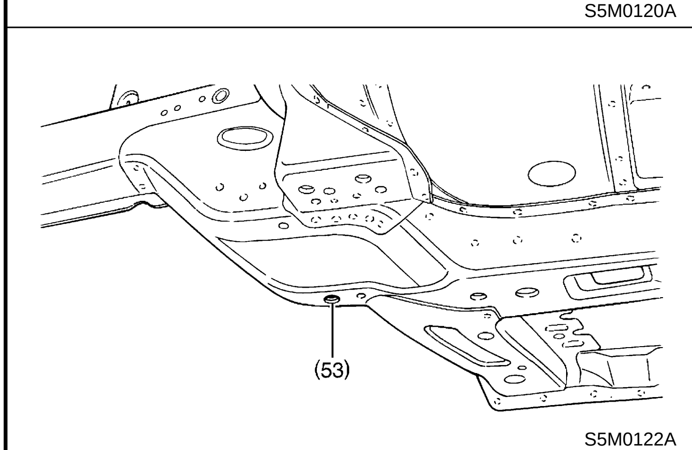
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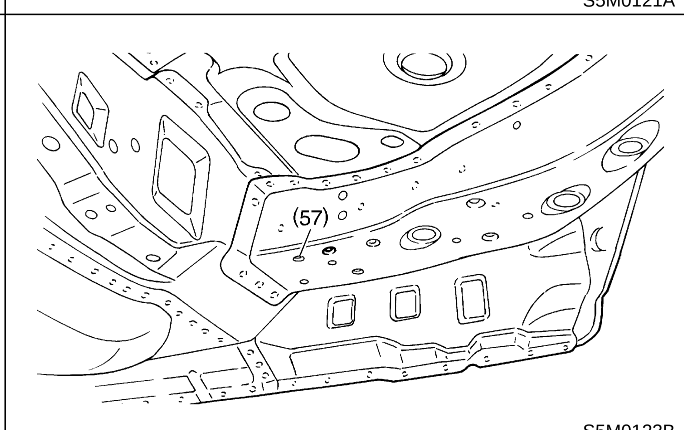
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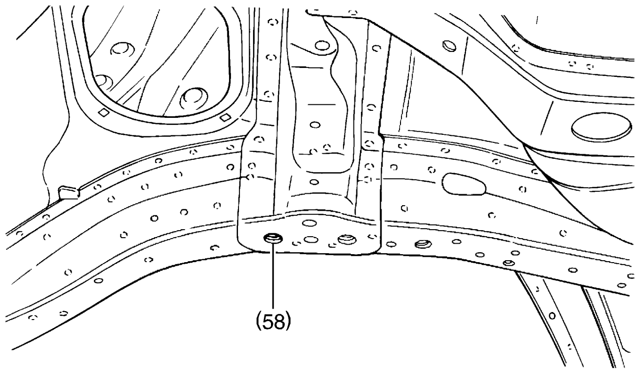

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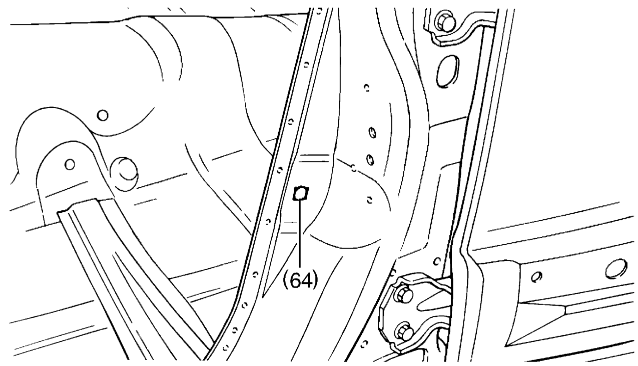

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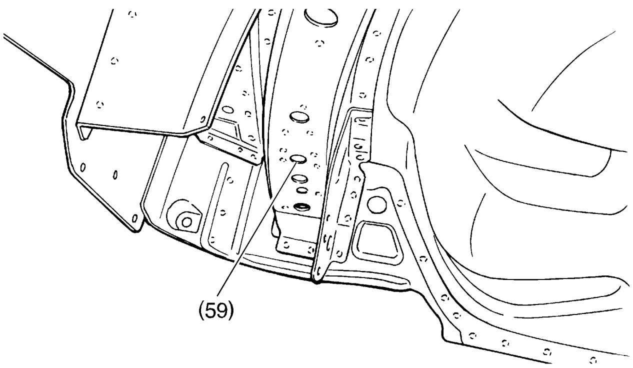

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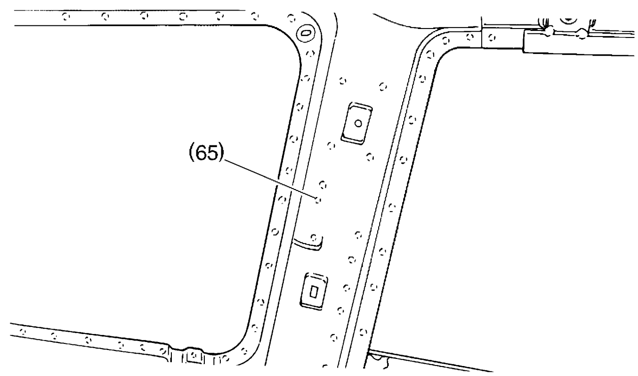
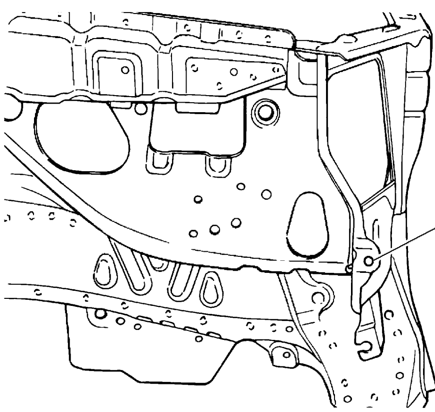


S5M0127A



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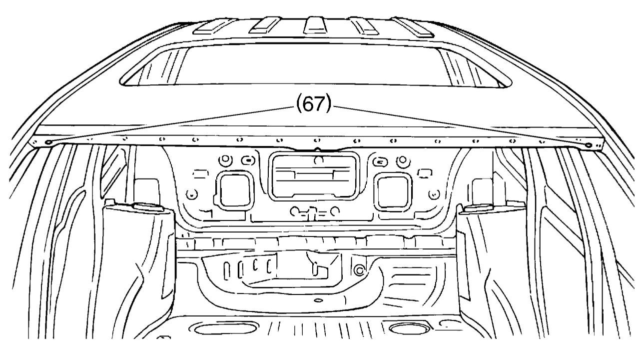

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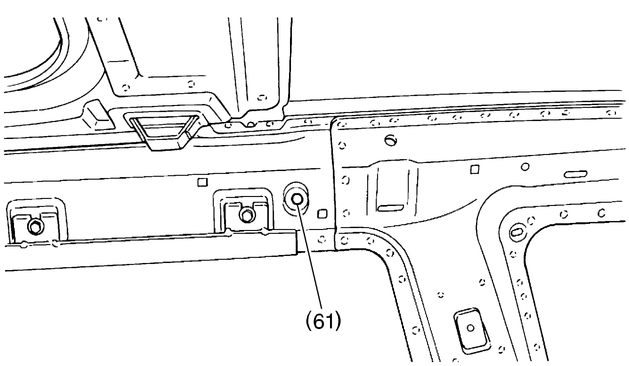

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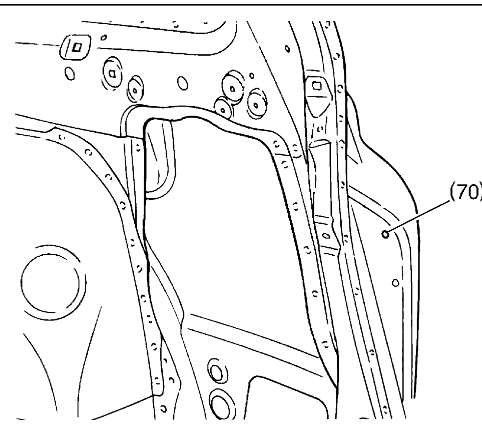

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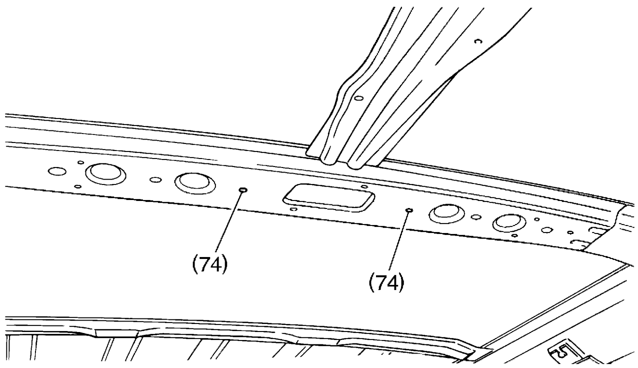
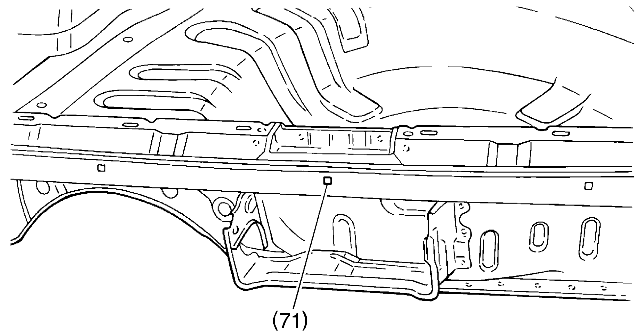
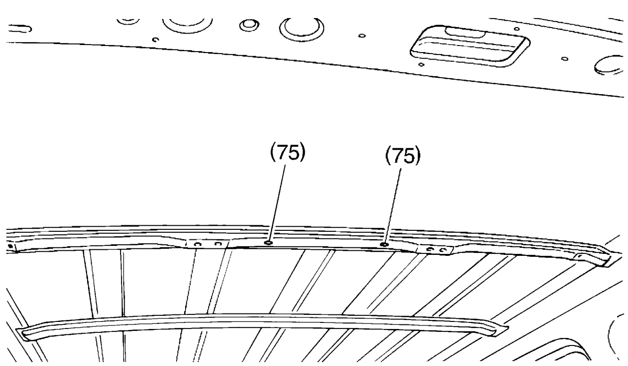


S5M0132A



S5M0133A



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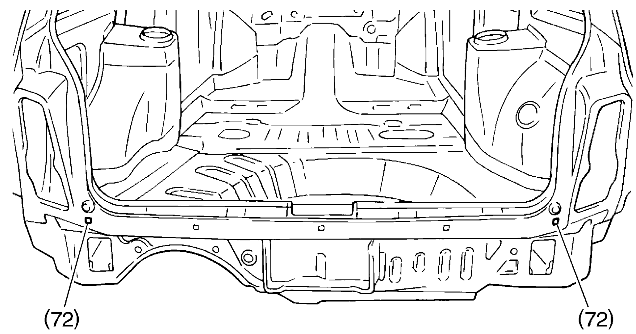

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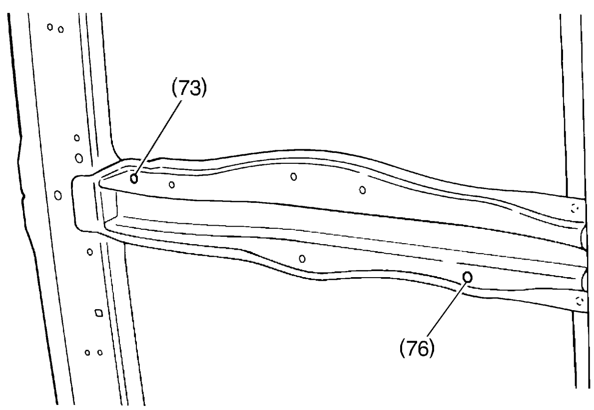


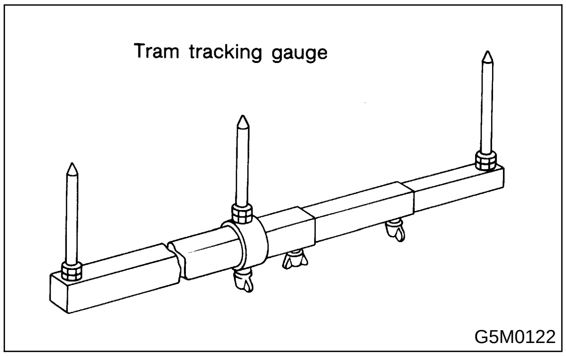
S5M0136A

3. Datum Dimensions *S906337*

A: MEASUREMENT *S906337A14*

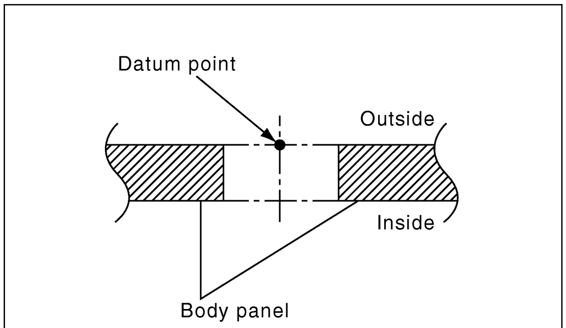
Refer to LOCATION for details on measurement points. <Ref. to BS-3, LOCATION, Datum Points.>

NOTE:
- Using a tram tracking gauge, measure all the dimensions.
- When using a tape measure, carefully measure dimensions without letting the tape measure sag or twist.
- Measure the linear dimensions between CENTERS of holes.
- Suffixes “RH” and “LH” indicate right-hand and left-hand.



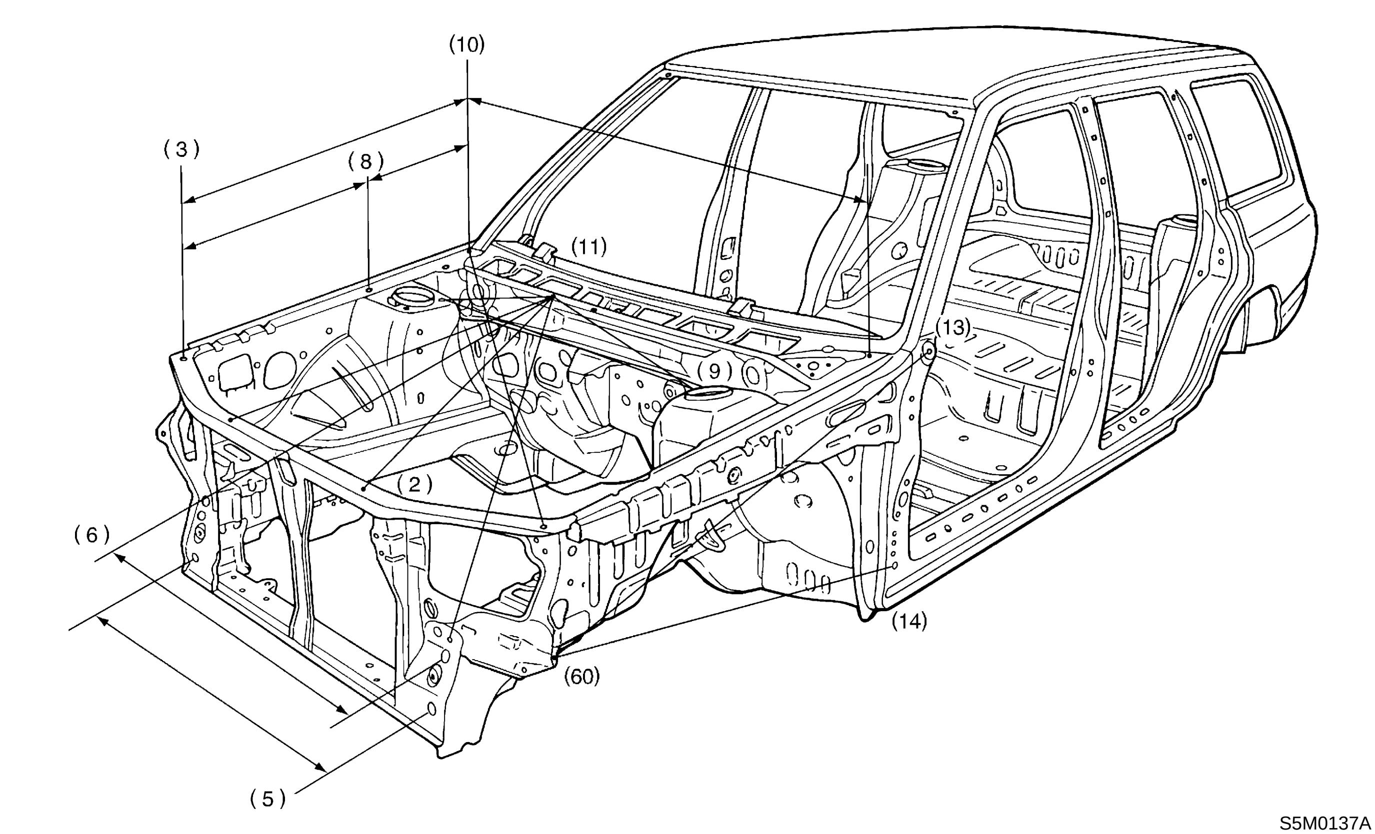
G5M0122

- Measure at the center of the circle around the outside of the body panel.



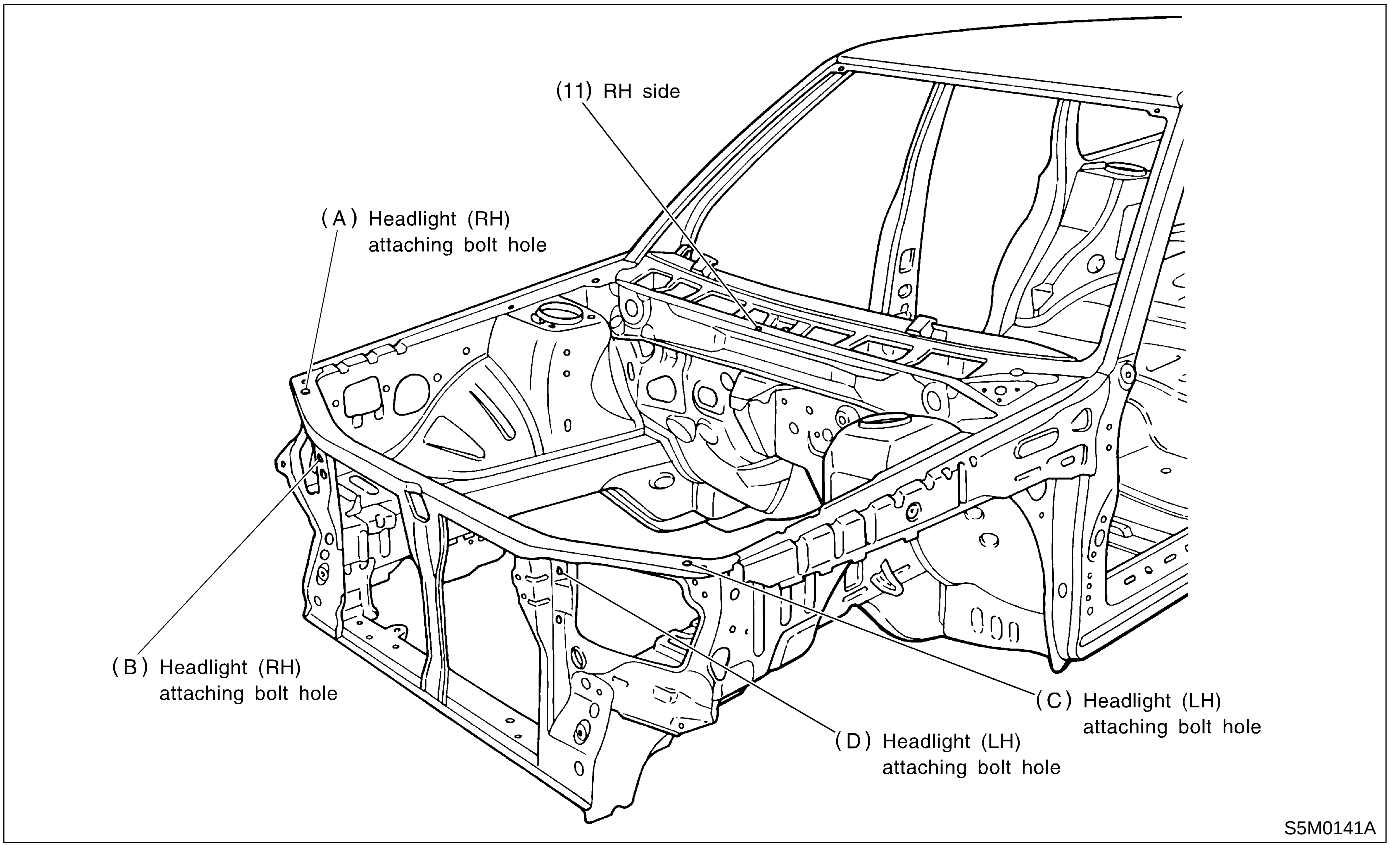
B5M1133A

1. FRONT STRUCTURE *S906337A1401*



Unit: mm (in)

Point to point	Dimension		Point to point	Dimension
(11) R to (1)	852 (33.54)		(10) R to (8) R	390 (15.35)
(11) L to (1)	913 (35.94)		(10) L to (8) L	390 (15.35)
(11) R to (2)	960 (37.80)		(11) L to (9) R	659 (25.94)
(11) L to (2)	865 (34.06)		(11) R to (9) L	659 (25.94)
(11) R to (9) R	392 (15.43)		(9) R to (9) L	966 (38.03)
(11) L to (9) L	392 (15.43)		(11) L to (6) R	1,059 (41.69)
(11) R to (6) R	926 (36.46)		(11) R to (6) L	1,059 (41.69)
(11) L to (6) L	926 (36.46)		(6) R to (6) L	914 (35.98)
(11) R to (3) R	891 (35.08)		(6) R to (10) L	1,549 (60.98)
(11) L to (3) L	891 (35.08)		(6) L to (10) R	1,549 (60.98)
(10) R to (3) R	917 (36.10)		(8) R to (3) R	528 (20.79)
(10) L to (3) L	917 (36.10)		(8) L to (3) L	528 (20.79)
(10) R to (10) L	1,374 (54.09)		(10) L to (3) R	1,637 (64.45)
(3) R to (3) L	1,338 (52.68)		(8) R to (8) L	1,396 (54.96)
(5) R to (5) L	924 (36.38)		(8) R to (10) L	1,438 (56.61)
(4) R to (4) L	1,296 (51.02)		(8) L to (10) R	1,438 (56.61)
(5) R to (4) L	1,176 (46.30)		(3) R to (8) L	1,465 (57.68)
(5) L to (4) R	1,176 (46.30)		(3) L to (8) R	1,465 (57.68)
(60) R to (13) R	1,174 (46.22)		(7) R to (7) L	860 (33.86)
(60) L to (13) L	1,174 (46.22)		(7) R to (6) L	982 (38.66)
(60) R to (14) R	1,076 (42.36)		(7) L to (6) R	982 (38.66)
(60) L to (14) L	1,076 (42.36)		(7) R to (10) L	1,302 (51.26)
(10) R to (3) L	1,637 (64.45)		(7) L to (10) R	1,302 (51.26)

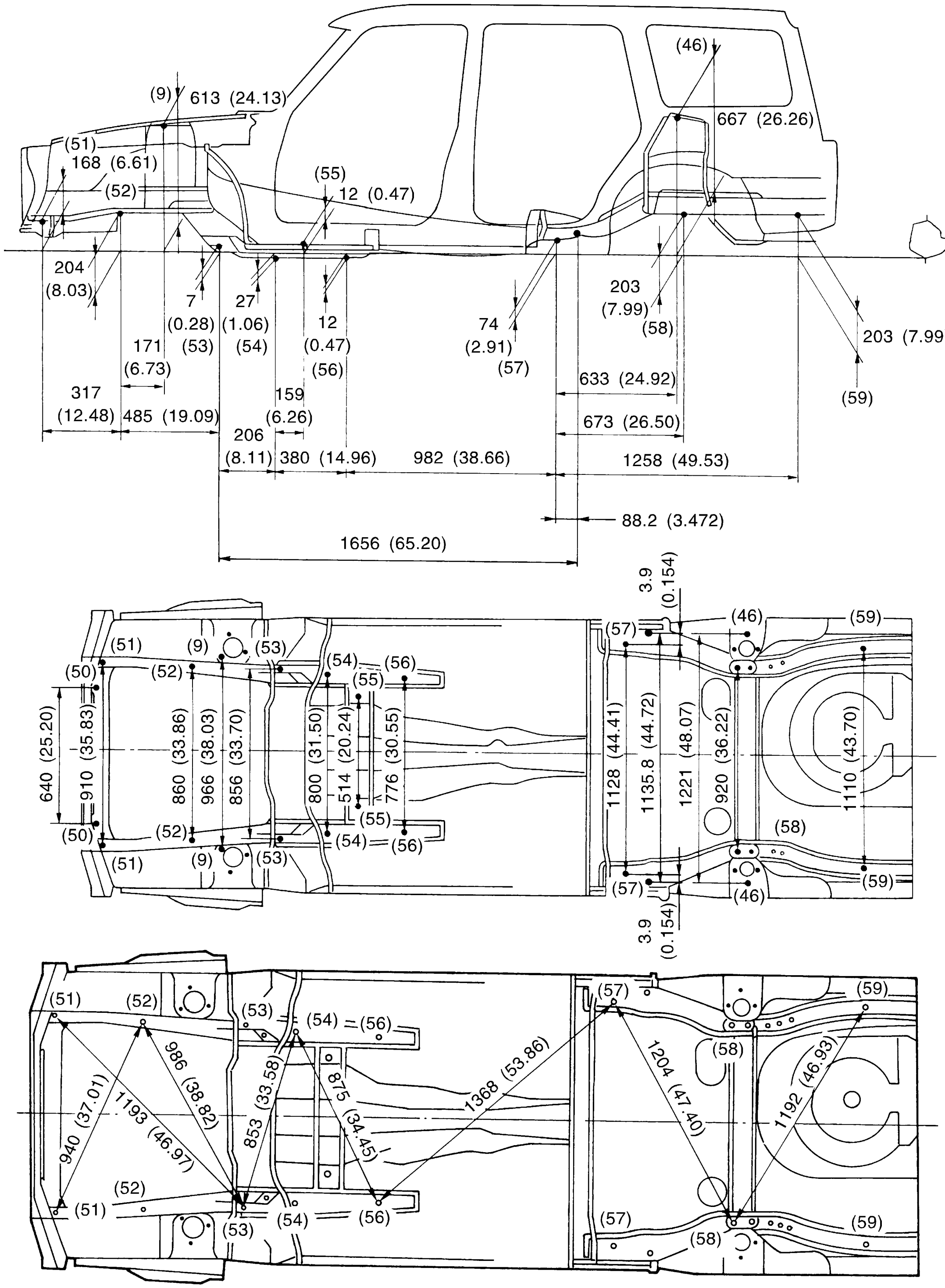


Unit: mm (in)

Point to point	Dimension		Point to point	Dimension
(11) to (A)	909.9 (35.82)		(11) to (C)	1,097.7 (43.22)
(11) to (B)	915 (36.02)		(11) to (D)	1,022 (40.24)

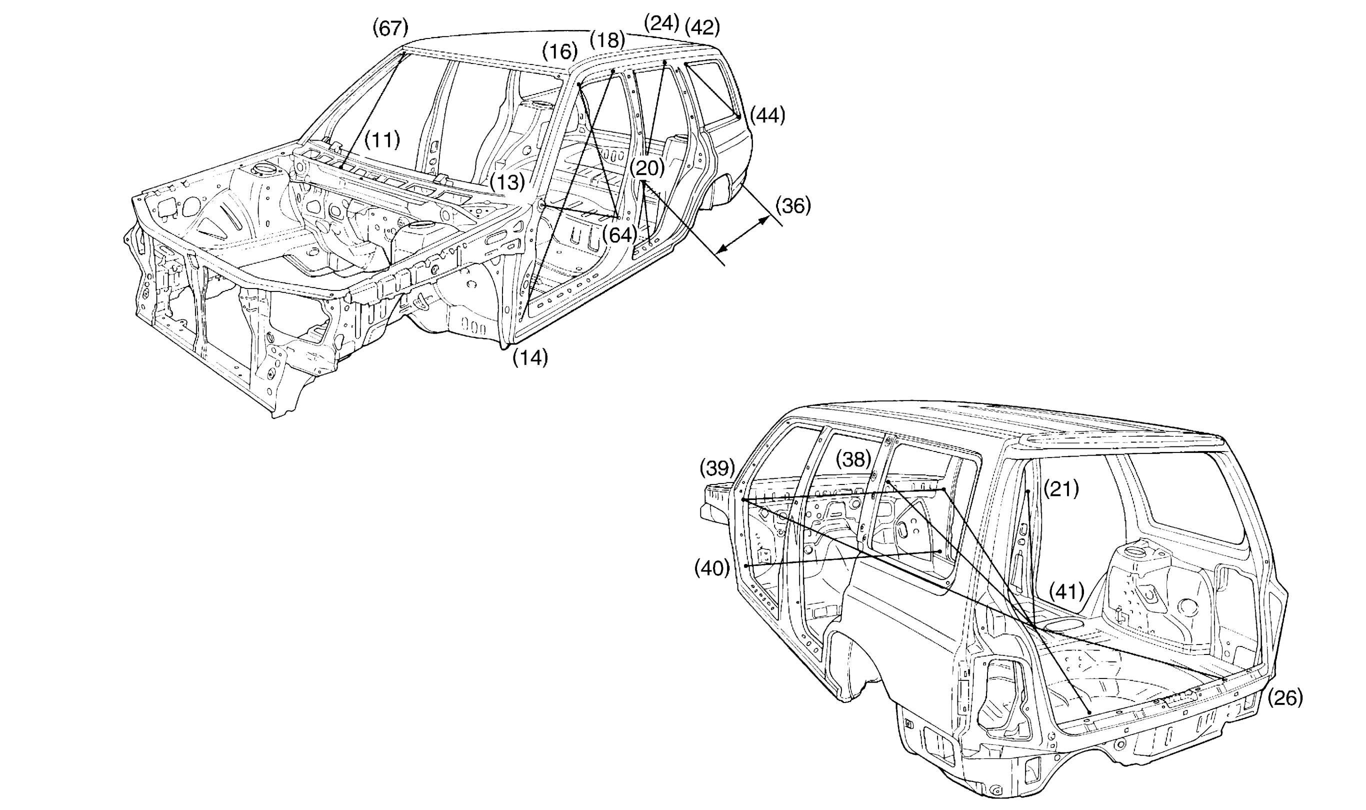
2. CENTER STRUCTURE *S906337A1402*

Unit: mm (in)



S5M0138B

3. WINDSHIELD AND DOORS *S906337A1403*

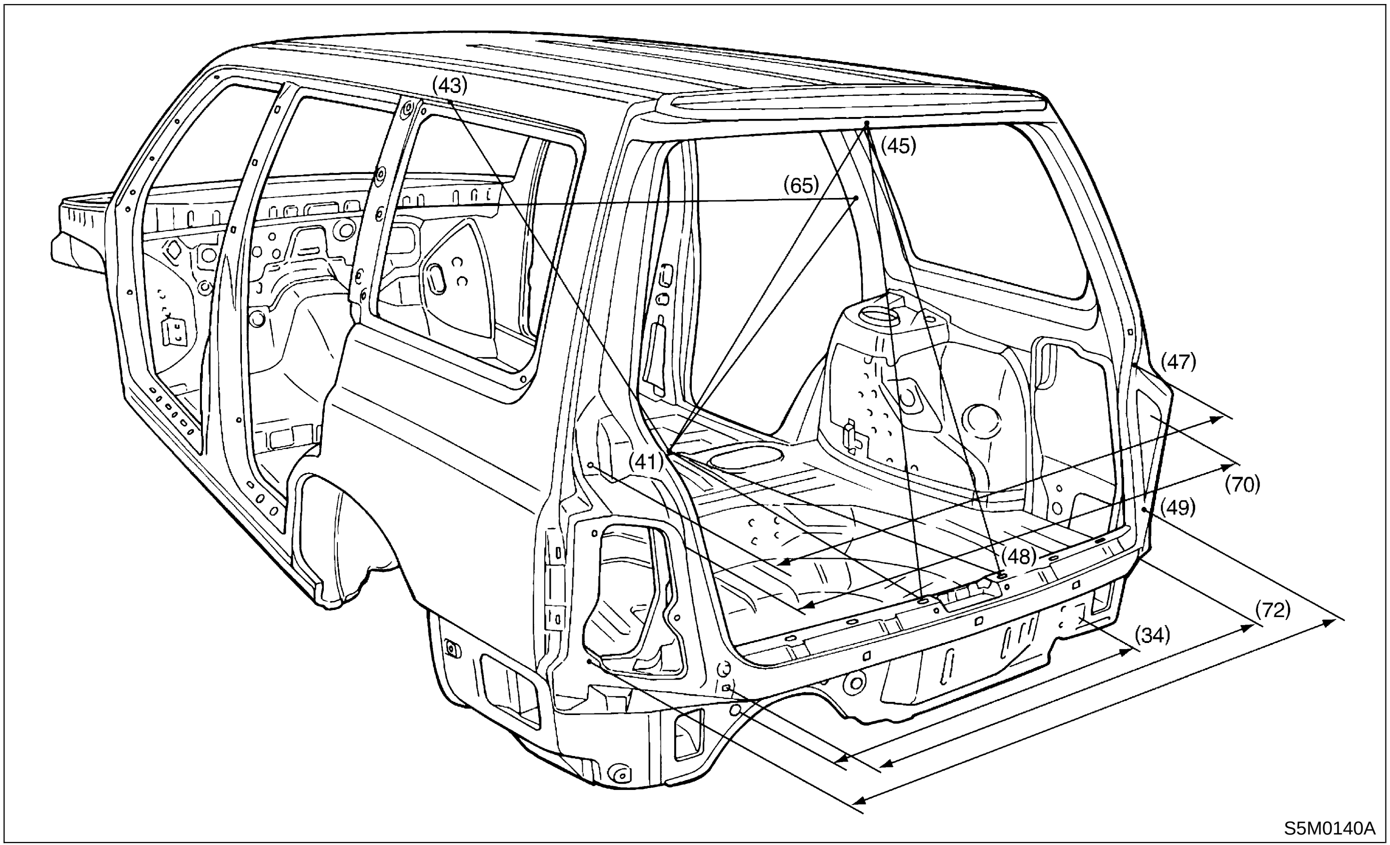


S5M0139A

Unit: mm (in)

Point to point	Dimension	Point to point	Dimension
(14) L to (18) L	1,453 (57.20)	(16) L to (64) L	859 (33.82)
(14) R to (18) R	1,453 (57.20)	(16) R to (64) R	859 (33.82)
(13) L to (64) L	944 (37.17)	(20) L to (23) L	845 (33.27)
(13) R to (64) R	944 (37.17)	(20) R to (23) R	845 (33.27)
(20) L to (24) L	947 (37.28)	(19) L to (23) L	885 (34.84)
(20) R to (24) R	947 (37.28)	(19) R to (23) R	885 (34.84)
(20) L to (36)	1,484 (58.43)	(11) L to (67) R	1,147 (45.16)
(20) R to (37)	1,488 (58.58)	(11) R to (67) L	1,147 (45.16)
(42) L to (44) L	769 (30.28)	(41) to (38)	1,517 (59.72)
(42) R to (44) R	769 (30.28)	(41) to (39) R	1,530 (60.24)
(11) R to (12)	918 (36.14)	(41) to (39) L	1,530 (60.24)
(11) L to (12)	918 (36.14)	(41) to (40) R	1,447 (56.97)
(67) R to (67) L	1,045 (41.14)	(41) to (40) L	1,447 (56.97)
(11) R to (67) R	1,006 (39.61)	(41) to (15) R	1,140 (44.88)
(11) L to (67) L	1,006 (39.61)	(41) to (15) L	1,140 (44.88)
(12) to (67) L	525 (20.67)	(41) to (22) R	733 (28.86)
(12) to (67) R	525 (20.67)	(41) to (22) L	733 (28.86)
(12) to (10) L	1,027 (40.43)	(41) to (26) R	1,568 (61.73)
(12) to (10) R	1,027 (40.43)	(41) to (26) L	1,568 (61.73)
(21) R to (21) L	1,322 (52.05)	(41) to (25)	1,212 (47.72)
(15) R to (15) L	1,453 (57.20)	(41) to (12)	1,298 (51.10)
(22) R to (22) L	1,453 (57.20)	(41) to (21) R	944 (37.17)
(39) R to (39) L	1,392 (54.80)	(41) to (21) L	944 (37.17)
(40) R to (40) L	1,402 (55.20)	(41) to (17) R	1,332 (52.44)
(11) L to (17) R	1,168 (45.98)	(41) to (17) L	1,332 (52.44)
(11) R to (17) L	1,168 (45.98)		

4. COMPARTMENT *S906337A1404*



Unit: mm (in)

Point to point	Dimension		Point to point	Dimension
(45) to (48) L	862 (33.94)		(41) to (65) R	1,131 (44.53)
(45) to (48) R	862 (33.94)		(41) to (65) L	1,131 (44.53)
(45) to (47) L	876 (34.49)		(41) to (45)	1,569 (61.77)
(45) to (47) R	876 (34.49)		(41) to (43) R	1,435 (56.50)
(47) R to (47) L	1,426 (56.14)		(41) to (43) L	1,435 (56.50)
(49) R to (49) L	1,479 (58.23)		(41) to (48) L	1,576 (62.05)
(34) R to (34) L	945 (37.20)		(41) to (48) R	1,576 (62.05)
(48) R to (46) R	992 (39.06)		(65) R to (65) L	1,267 (49.88)
(48) L to (46) L	992 (39.06)		(17) R to (76)	627 (24.68)
(70) R to (70) L	1,218 (47.95)		(17) L to (76)	680 (26.77)
(61) R to (75) R	447 (17.60)		(72) R to (72) L	1,111 (43.74)
(61) L to (75) L	447 (17.60)		(74) R to (75) R	480 (18.90)
(17) R to (75) R	1,137 (44.76)		(74) L to (75) L	480 (18.90)
(17) L to (75) L	1,137 (44.76)		(17) R to (73)	518 (20.39)
(45) to (71)	913 (35.94)		(17) L to (73)	476 (18.74)

MEMO:

INSTRUMENTATION/DRIVER INFO

IDI

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3. Combination Meter Assembly 12
4. Speedometer..14
5. Tachometer...15
6. Fuel Gauge..16
7. Water Temperature Gauge..17
8. Ambient Sensor...18

1. General Description S907001

A: SPECIFICATIONS S907001E49

Combination meter	Speedometer	Electric pulse type
	Temperature gauge	Thermistor cross coil type
	Fuel gauge	Resistance cross coil type
	Tachometer	Electric impulse type
	Turn signal indicator light	14 V — 1.4 W
	Charge indicator light	14 V — 1.4 W
	Oil pressure indicator light	14 V — 1.4 W
	ABS warning light	14 V — 1.4 W
	CHECK ENGINE warning light (Malfunction indicator light)	14 V — 1.4 W
	HI-beam indicator light	14 V — 1.4 W
	Door open warning light	LED
	Seat belt warning light	14 V — 1.4 W
	Brake fluid and parking brake warning light	14 V — 1.4 W
	FWD indicator light	14 V — 1.4 W
	AIRBAG warning light	14 V — 1.4 W
	Meter illumination light	14 V — 3 W, 1.4 W
	AT OIL TEMP. warning light	14 V — 1.4 W
	Security indicator light	LED
	Low fuel warning light	14 V — 1.4 W
	LCD back light	14 V — 1.4 W

B: CAUTION S907001A03

- Be careful not to damage meters and instrument panel.
- Be careful not to damage meter glasses.
- Make sure that electrical connector is connected securely.
- After installation, make sure that each meter operates normally.
- Use gloves to avoid damage and getting fingerprints on the glass surface and meter surfaces.
- Do not apply excessive force to printed circuit.
- Do not drop or otherwise apply impact.

C: PREPARATION TOOL S907001A17

1. GENERAL TOOLS S907001A1701

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance and voltage.

2. Combination Meter System S907607

A: SCHEMATIC S907607A21

1. COMBINATION METER S907607A2101

<Ref. to WI-52, SCHEMATIC, Combination Meter.>

2. OUTSIDE TEMPERATURE INDICATOR S907607A2103

<Ref. to WI-87, SCHEMATIC, Outside Temperature Display System.>

B: INSPECTION S907607A10

CAUTION:
When measuring voltage and resistance of the ECM, TCM, or each sensor, use a tapered pin with a diameter of less than 0.64 mm (0.025 in) in order to avoid poor contact. Do not insert the pin more than 2 mm (0.08 in).

1. SYMPTOM CHART S907607A1007

Symptom	Repair order	Reference
Combination meter assembly does not operate.	(1) Power supply (2) Ground circuit	<Ref. to IDI-5, CHECK POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, Combination Meter System.>
Speedometer does not operate.	(1) (MT) Vehicle speed sensor (AT) Transmission control module (2) Harness (3) Speedometer	MT: <Ref. to IDI-6, CHECK VEHICLE SPEED SENSOR, INSPECTION, Combination Meter System.> AT: <Ref. to IDI-7, CHECK TRANSMISSION CONTROL MODULE, INSPECTION, Combination Meter System.>
Tachometer does not operate.	(1) Engine control module (2) Harness (3) Tachometer	<Ref. to IDI-8, CHECK ENGINE CONTROL MODULE, INSPECTION, Combination Meter System.>
Fuel gauge does not operate.	(1) Fuel level sensor (2) Harness (3) Fuel gauge	<Ref. to IDI-9, CHECK FUEL LEVEL SENSOR, INSPECTION, Combination Meter System.>
Water temperature gauge does not operate.	(1) Engine coolant temperature sensor (2) Harness (3) Water temperature gauge	<Ref. to IDI-10, CHECK ENGINE COOLANT TEMPERATURE SENSOR, INSPECTION, Combination Meter System.>
Outside temperature indicator does not operate.	(1) Ambient sensor (2) Harness (3) Combination meter	<Ref. to IDI-11, CHECK OUTSIDE TEMPERATURE INDICATOR, INSPECTION, Combination Meter System.>

2. CHECK POWER SUPPLY AND GROUND CIRCUIT S907607A1001

No.	Step	Check	Yes	No
1	**CHECK POWER SUPPLY FOR COMBINATION METER.** 1) Remove combination meter. <Ref. to IDI-12, REMOVAL, Combination Meter Assembly.> 2) Disconnect combination meter harness connector. 3) Turn ignition switch to ON. 4) Measure voltage between combination meter connector (i10) and chassis ground. ***Connector & terminal*** ***(i10) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2**.	Check harness for open or short between fuse and combination meter.
2	**CHECK POWER SUPPLY FOR COMBINATION METER.** Measure voltage between combination meter connector (i10) and chassis ground. ***Connector & terminal*** ***(i10) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3**.	Check harness for open or short between ignition relay and combination meter.
3	**CHECK GROUND CIRCUIT OF COMBINATION METER.** 1) Turn ignition switch to OFF. 2) Measure resistance of harness between combination meter connector (i10) and chassis ground. ***Connector & terminal*** ***(i10) No. 3 (+) — Chassis ground (−):***	Is the resistance less than 10 Ω?	Replace combination meter printed circuit.	Repair wiring harness.

3. CHECK VEHICLE SPEED SENSOR

S907607A1002

No.	Step	Check	Yes	No
1	**CHECK VEHICLE SPEED SENSOR.** 1) Set the vehicle on a free roller, or lift-up the vehicle and support it with safety stands. 2) Remove the combination meter with harness connector. **WARNING:** **Be careful not to get caught in the running wheels.** 3) Drive the vehicle at a speed greater than 20 km/h (12 MPH). 4) Measure voltage between combination meter connector (i10) and chassis ground. ***Connector & terminal*** ***(i10) No. 7 (+) — Chassis ground (−):***	Is the voltage less than 1 V ←→ more than 4?	Check speedometer. <Ref. to IDI-14, REMOVAL, Speedometer.>	Go to step **2**.
2	**CHECK VEHICLE SPEED SENSOR POWER SUPPLY.** 1) Turn ignition switch to OFF. 2) Disconnect vehicle speed sensor harness connector. 3) Turn ignition switch to ON. 4) Measure voltage between vehicle speed sensor connector (B17) and engine ground. ***Connector & terminal*** ***(B17) No. 3 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **3**.	Check harness for open or short between ignition relay and vehicle speed sensor.
3	**CHECK HARNESS BETWEEN VEHICLE SPEED SENSOR AND ENGINE GROUND.** 1) Turn ignition switch to OFF. 2) Measure resistance between vehicle speed sensor connector (B17) and engine ground. ***Connector & terminal*** ***(B17) No. 2 (+) — Engine ground (−):***	Is the resistance less than 10 Ω?	Go to step **4**.	Repair wiring harness.
4	**CHECK HARNESS BETWEEN VEHICLE SPEED SENSOR AND COMBINATION METER.** 1) Disconnect connector from combination meter. 2) Measure resistance between vehicle speed sensor harness connector and combination meter harness connector. ***Connector & terminal*** ***(B17) No. 1 — (i10) No. 7:***	Is the resistance less than 10 Ω?	Replace vehicle speed sensor.	Repair wiring harness.

4. CHECK TRANSMISSION CONTROL MODULE *S907607A1008*

No.	Step	Check	Yes	No
1	**CHECK TRANSMISSION CONTROL MODULE SIGNAL.** 1) Set the vehicle on a free roller, or lift-up the vehicle and support it with safety stands. **WARNING:** **Be careful not to get caught in the running wheels.** 2) Drive the vehicle faster than 10 km/h (6 MPH). 3) Measure voltage between transmission control module connector (B55) and chassis ground. ***Connector & terminal*** ***(B55) No. 13 (+) — Chassis ground (−):***	Is the voltage less than 1 V ←→ more than 4 V?	Go to step **2**.	Check transmission control module. <Ref. to AT-2, Basic Diagnostic Procedure.>
2	**CHECK HARNESS BETWEEN TRANSMISSION CONTROL MODULE AND COMBINATION METER.** 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission control module and combination meter. 3) Measure resistance between transmission control module harness connector (B55) and combination meter harness connector (i10). ***Connector & terminal*** ***(B55) No. 13 — (i10) No. 7:***	Is the resistance less than 10 Ω?	Check speed meter. <Ref. to IDI-14 REMOVAL, Speedometer.>	Repair wiring harness.

5. CHECK ENGINE CONTROL MODULE

S907607A1004

No.	Step	Check	Yes	No
1	**CHECK ENGINE CONTROL MODULE SIGNAL.** 1) Start the engine. 2) Measure voltage between engine control module connector (B134) and engine ground. ***Connector & terminal*** ***(B134) No. 30 (+) — Engine ground (−):***	Is the voltage 0 ←→ 13 V or more?	Go to step **2**.	Check engine control module. <Ref. to EN-2, Basic Diagnostic Procedure.>
2	**CHECK HARNESS BETWEEN COMBINATION METER AND ENGINE CONTROL MODULE.** 1) Turn ignition switch to OFF. 2) Disconnect connector from engine control module and combination meter. 3) Measure resistance between engine control module harness connector (B134) and combination meter harness connector (i11). ***Connector & terminal*** ***(B134) No. 30 — (i10) No. 8:***	Is the resistance less than 10 Ω?	Check tachometer. <Ref. to IDI-15, REMOVAL, Tachometer.>	Repair wiring harness.

6. CHECK FUEL LEVEL SENSOR S907607A1005

No.	Step	Check	Yes	No
1	**CHECK FUEL LEVEL SENSOR.** 1) Remove fuel level sensor. <Ref. to FU-65, REMOVAL, Fuel Level Sensor.> 2) Measure resistance between fuel level sensor terminals when setting the float to FULL and EMPTY position. ***Terminals*** ***No. 5 — No. 3:***	Is the resistance 0.5 to 2.5 Ω (FULL) and 50 to 52 Ω (EMPTY)?	Go to step **2**.	Replace the fuel level sensor.
2	**CHECK FUEL SUB LEVEL SENSOR.** 1) Remove fuel sub level sensor. <Ref. to FU-66, REMOVAL, Fuel Sub Level Sensor.> 2) Measure resistance between fuel sub level sensor terminals when setting the float to FULL and EMPTY position. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 0.5 to 2.5 Ω (FULL) and 42 to 44 Ω (EMPTY)?	Go to step **3**.	Replace the fuel sub level sensor.
3	**CHECK HARNESS BETWEEN FUEL SUB LEVEL SENSOR AND COMBINATION METER.** 1) Disconnect connector from combination meter. 2) Measure resistance between fuel sub level sensor harness connector terminal and combination meter harness connector terminal. ***Connector & terminal*** ***(R59) No. 1 — (i11) No. 1:***	Is the resistance less than 10 Ω?	Go to step **4**.	Repair wiring harness.
4	**CHECK HARNESS BETWEEN FUEL LEVEL SENSOR AND FUEL SUB LEVEL SENSOR.** Measure resistance between fuel level sensor harness connector terminal and fuel sub level sensor harness connector terminal. ***Connector & terminal*** ***(R58) No. 3 — (R59) No. 2:***	Is the resistance less than 10 Ω?	Go to step **5**.	Repair wiring harness.
5	**CHECK FUEL LEVEL SENSOR GROUND CIRCUIT.** Measure resistance between fuel level sensor harness connector terminal and chassis ground. ***Connector & terminal*** ***(R58) No. 5 — Chassis ground:***	Is the resistance less than 10 Ω?	Check fuel gauge. <Ref. to IDI-16, REMOVAL, Fuel Gauge.>	Repair wiring harness.

7. CHECK ENGINE COOLANT TEMPERATURE SENSOR *S907607A1006*

No.	Step	Check	Yes	No
1	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** Check engine coolant temperature sensor. <Ref. to EN-100, DTC P0116—ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT LOW INPUT—, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is engine coolant temperature sensor OK?	Go to step **2**.	Replace engine coolant temperature sensor.
2	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND COMBINATION METER.** 1) Turn ignition switch to OFF. 2) Disconnect connector from engine coolant temperature sensor and combination meter. 3) Measure resistance between engine coolant temperature sensor harness connector (E8) and combination meter harness connector (i12). ***Connector & terminal*** ***(E8) No. 3 — (i12) No. 13:***	Is the resistance less than 10 Ω?	Check water temperature gauge. <Ref. to IDI-17, REMOVAL, Water Temperature Gauge.>	Repair wiring harness.

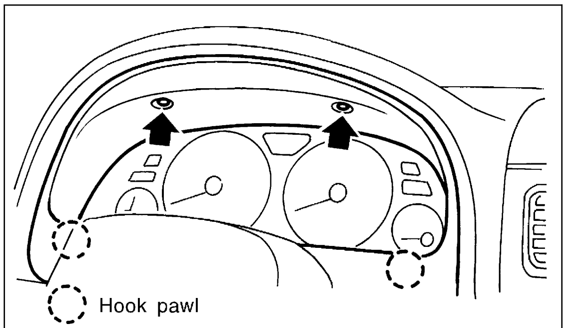
8. CHECK OUTSIDE TEMPERATURE INDICATOR *S907607A1009*

No.	Step	Check	Yes	No
1	**CHECK POWER SUPPLY FOR AMBIENT SENSOR.** 1) Turn ignition switch OFF. 2) Disconnect connector from ambient sensor. 3) Turn ignition switch ON. 4) Measure voltage between ambient sensor harness connector terminal and chassis ground. ***Connector & terminal*** ***(F78) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 4 V?	Go to step **2**.	Check harness for open or short between ambient sensor and combination meter.
2	**CHECK AMBIENT SENSOR.** 1) Turn ignition switch OFF. 2) Remove ambient sensor. 3) Check ambient sensor. <Ref. to IDI-18, INSPECTION, Ambient Sensor.>	Is the ambient sensor OK?	Go to step **3**.	Replace the ambient sensor.
3	**CHECK HARNESS BETWEEN AMBIENT SENSOR AND COMBINATION METER.** 1) Disconnect connector from combination meter. 2) Measure resistance between ambient sensor harness connector terminal and combination meter harness connector terminal. ***Connector & terminal*** ***(F78) No. 1 — (i10) No. 4:*** ***(F78) No. 2 — (i10) No. 5:***	Is the resistance less than 10 Ω?	Go to step **4**.	Repair wiring harness.
4	**CHECK OUTSIDE TEMPERATURE INDICATOR.** 1) Connect combination meter harness connector. 2) Connect a resistor (3.0 kΩ) between terminals of ambient sensor harness connector. 3) Turn ignition switch ON and check the outside temperature indicator display.	Is the outside temperature indicator indicating 25°C (77°F)?	Check poor contact in ambient sensor harness connector.	Replace combination meter printed circuit.

3. Combination Meter Assembly S907335

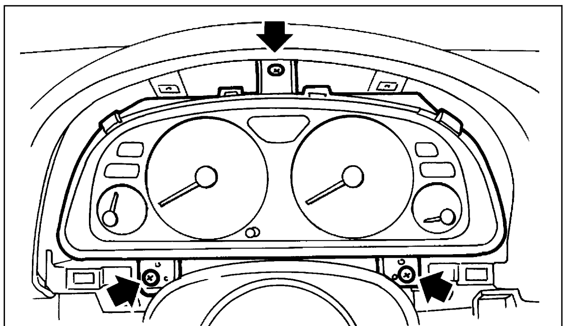
A: REMOVAL S907335A18

1) Disconnect ground cable from battery.
2) Set tilt steering at the lowest position.
3) Remove screws and detach meter visor.



S6M0076A

4) Remove screws of combination meter and pull out the meter toward you.


S6M0077

5) Disconnect connector in the upper area of combination meter to remove meter.

CAUTION:
- **Be careful not to damage meter or instrument panel.**
- **Pay particular attention to avoid damaging the meter glass.**

B: INSTALLATION S907335A11

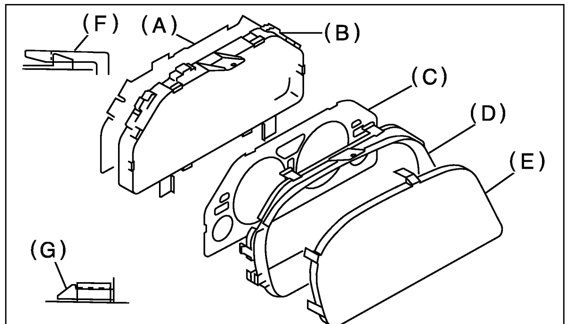
Install in the reverse order of removal.

CAUTION:
- **Make sure that electrical connector is connected securely.**
- **Make sure that each meter operates normally.**

C: DISASSEMBLY S907335A06

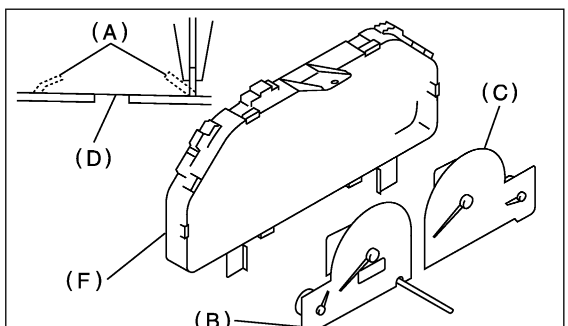
CAUTION:
Use gloves to avoid damage and getting fingerprints on the glass surface and meter surfaces.

1) Disengage claw (F) to remove case (B) from back cover (A).
2) Disengage claw (G) to remove meter glass (E), reflector (D) and window plate (C) from inner case.



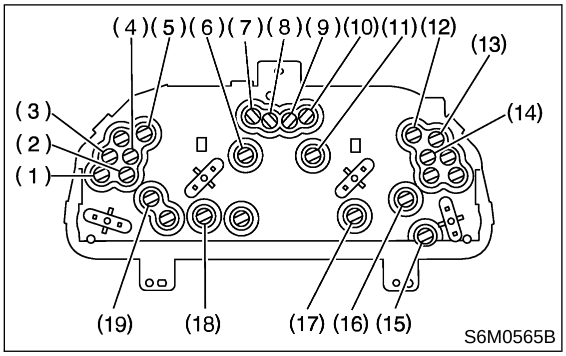
S6M0511A

3) Pull up claw (A) of combination meter printed circuit with combination pliers. Push out speedometer assembly (B) and tachometer assembly (C) using hole (D).
4) Pull up claw in the center of combination meter printed circuit and remove combination meter printed circuit from case (F).



S6M0512A

1. BULB REPLACEMENT S907335A0601



(1) Check engine
(2) Oil pressure
(3) Charge
(4) AT oil temp.
(5) Brake
(6) Tachometer
(7) Turn RH
(8) Airbag warning light
(9) HI-beam
(10) Turn LH
(11) Speedometer
(12) FWD
(13) Seat belt
(14) ABS
(15) Low fuel
(16) Speedometer and fuel gauge
(17) Odometer and trip meter
(18) Outside air temperature display
(19) Tachometer and temperature gauge

D: ASSEMBLY S907335A02

Assemble in the reverse order of disassembly.

4. Speedometer *S907608*

A: REMOVAL *S907608A18*

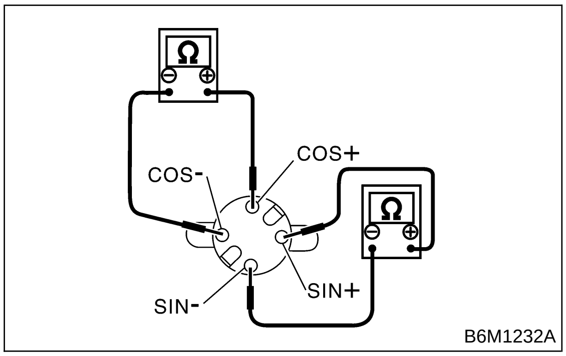
Disassemble combination meter, and then remove speedometer and fuel gauge assembly. <Ref. to IDI-12, DISASSEMBLY, Combination Meter Assembly.>

B: INSTALLATION *S907608A11*

Install in the reverse order of removal.

C: INSPECTION *S907608A10*

Measure speedometer resistance.



Terminal	Resistance
SIN+ and SIN−	200±8 Ω
COS+ and COS−	200±8 Ω

If NG, replace speedometer and fuel gauge assembly.
If OK, replace combination meter printed circuit.

5. Tachometer S907609

A: REMOVAL S907609A18

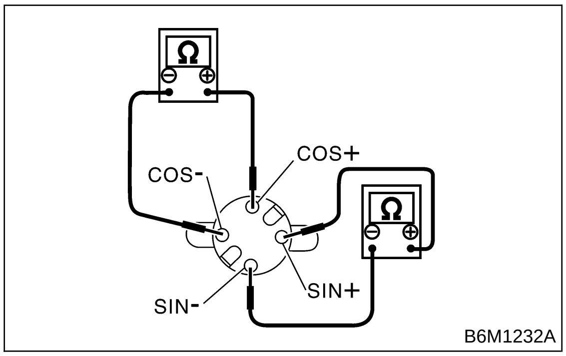
Disassemble combination meter, and then remove tachometer and water temperature gauge assembly. <Ref. to IDI-12, DISASSEMBLY, Combination Meter Assembly.>

B: INSTALLATION S907609A11

Install in the reverse order of removal.

C: INSPECTION S907609A10

Measure tachometer resistance.



Terminal	Resistance
SIN+ and SIN−	200±8 Ω
COS+ and COS−	200±8 Ω

If NG, replace tachometer and water temperature gauge assembly.
If OK, replace combination meter printed circuit.

6. Fuel Gauge S907610

A: REMOVAL S907610A18

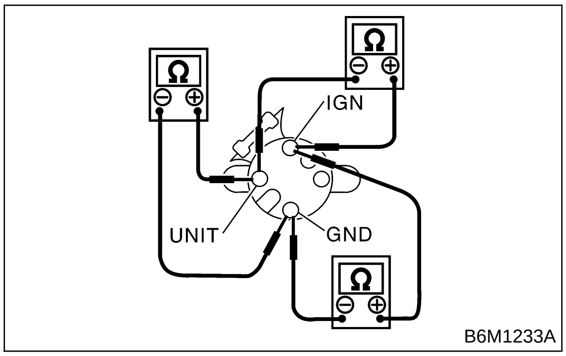
Disassemble combination meter, and then remove speedometer and fuel gauge assembly. <Ref. to IDI-12, DISASSEMBLY, Combination Meter Assembly.>

B: INSTALLATION S907610A11

Install in the reverse order of removal.

C: INSPECTION S907610A10

Measure fuel gauge resistance.



Terminal	Resistance
IGN and GND	170±10 Ω
IGN and UNIT	35±10 Ω
UNIT and GND	136±10 Ω

If NG, replace speedometer and fuel gauge assembly.
If OK, replace combination meter printed circuit.

7. Water Temperature Gauge *S907611*

A: REMOVAL *S907611A18*

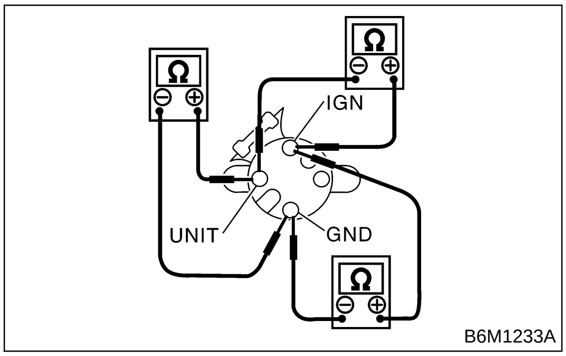
Disassemble combination meter, and then remove tachometer and water temperature gauge assembly. <Ref. to IDI-12, DISASSEMBLY, Combination Meter Assembly.>

B: INSTALLATION *S907611A11*

Install in the reverse order of removal.

C: INSPECTION *S907611A10*

Measure water temperature gauge resistance.



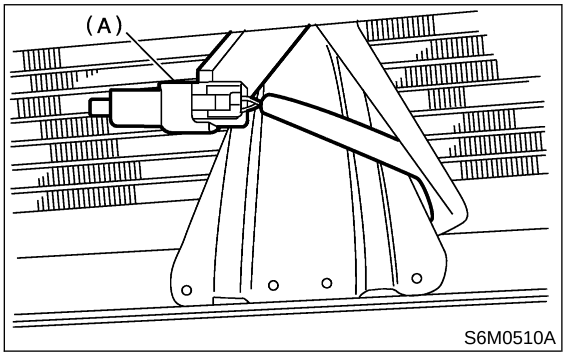
Terminal	Resistance
IGN and GND	208±10 Ω
IGN and UNIT	56±10 Ω
UNIT and GND	264±10 Ω

If NG, replace tachometer and water temperature gauge assembly.
If OK, replace combination meter printed circuit.

8. Ambient Sensor S907644

A: REMOVAL S907644A18

1) Disconnect ground cable from battery.
2) Disconnect ambient sensor connector.
3) Remove ambient sensor (A) from radiator lower panel.

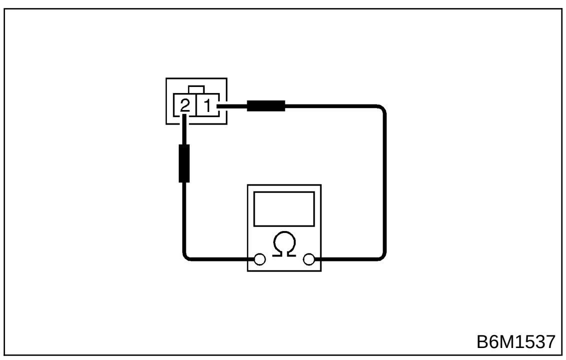


B: INSTALLATION S907644A11

Install in the reverse order of removal.

C: INSPECTION S907644A10

Measure ambient sensor resistance.



Terminal	Resistance
1 and 2	3.0 kΩ/25°C (77°F)

If NG, replace the ambient sensor.

SEATS

SE

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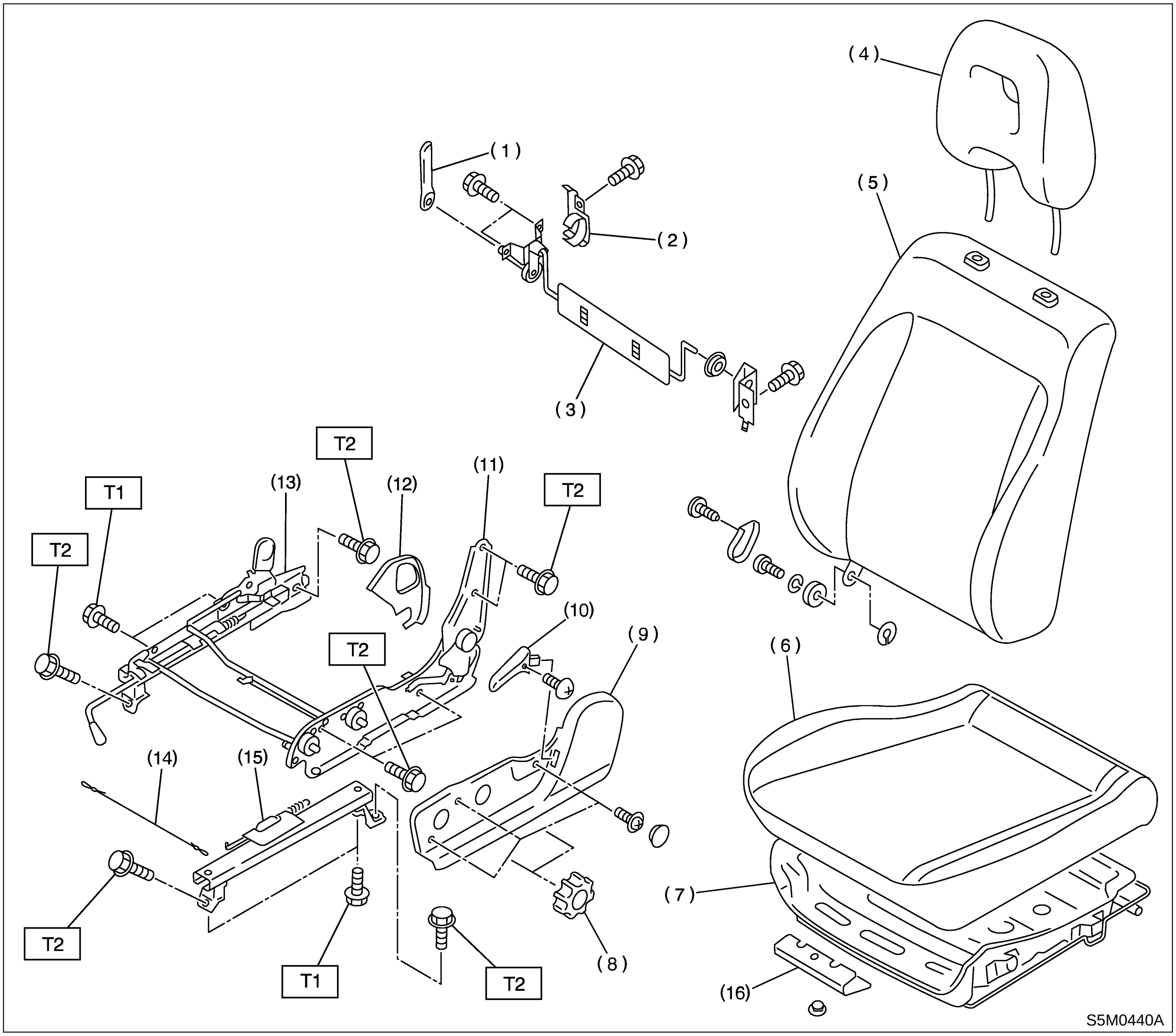
1. General Description S908001

A: COMPONENT S908001A05

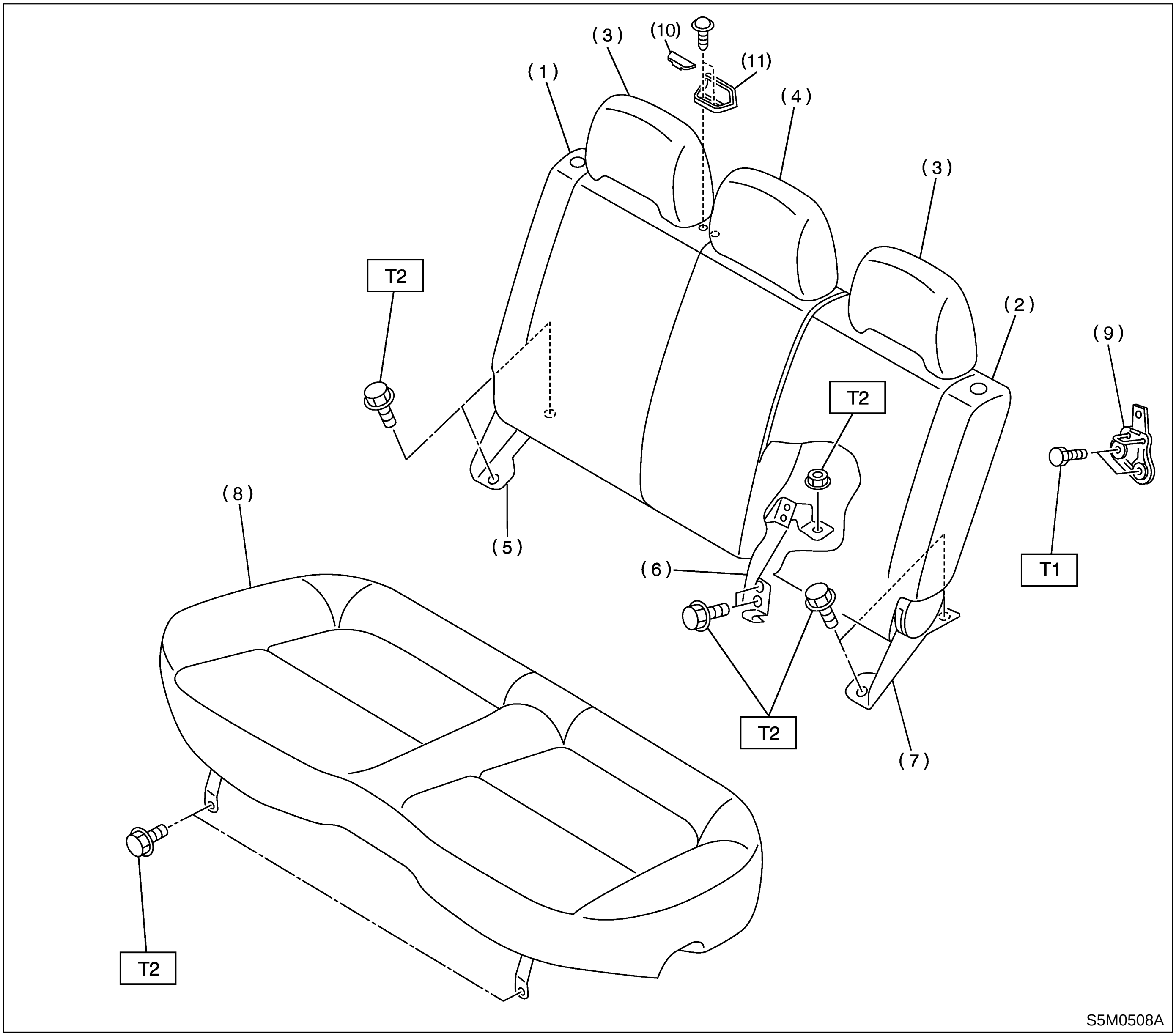
1. FRONT SEAT S908001A0501



(1) Lumbar lever
(2) Lumbar cover
(3) Lumbar unit
(4) Headrest
(5) Backrest
(6) Cushion
(7) Cushion frame
(8) Lifter dial
(9) Hinge cover OUT
(10) Reclining lever
(11) Hinge ASSY
(12) Hinge spring cover
(13) Slide rail ASSY IN
(14) Connecting wire
(15) Slide rail ASSY OUT
(16) Bracket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 18 (1.8, 13)
T2: 52 (5.3, 38)

2. REAR SEAT *S908001A0505*



(1) Backrest RH
(2) Backrest LH
(3) Headrest OUTSIDE
(4) Headrest CENTER
(5) Hinge RH
(6) Hinge CENTER
(7) Hinge LH
(8) Cushion
(9) Striker
(10) Cap
(11) Webbing guide

Tightening torque: N·m (kgf-m, ft-lb)
T1: 24.5 (2.5, 18.1)
T2: 25 (2.5, 18.1)

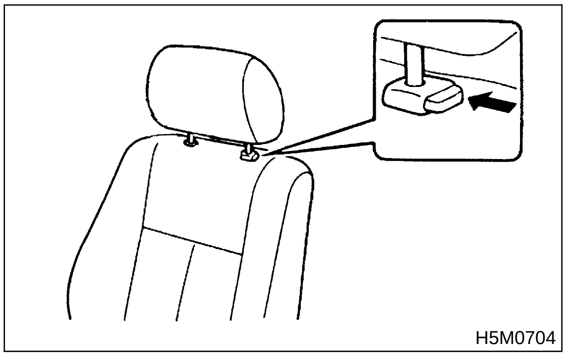
B: CAUTION *S908001A03*

- Take care not to contaminate or damage seat surface.
- While loading to or unloading to vehicle, take care not to contact body.
- When removing front seat from a side airbag loaded vehicle, follow cautions given in the airbag section.

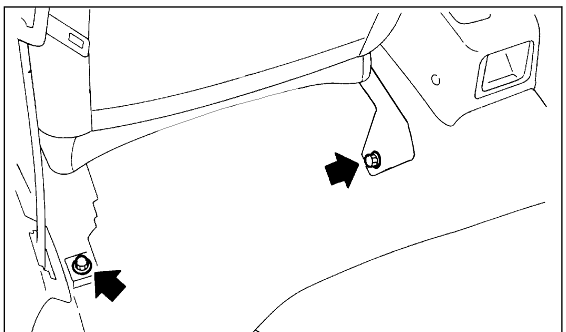
2. Front Seat S908343

A: REMOVAL S908343A18

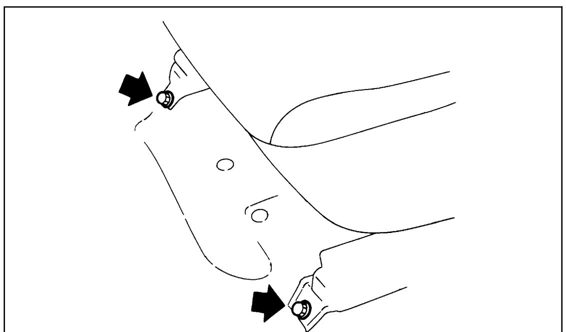
1) While operating button (located on top of backrest), lift headrest out with hand placed between backrest and headrest.


H5M0704

2) Pull reclining lever back to fold backrest all the way forward. While pulling slide adjuster lever, move seat all the way forward.
3) Remove bolt cover at rear end of slide rail.
4) Remove bolts securing seat rear.


S5M0366

5) While pulling slide adjuster lever, slide seat all the way back.
6) Remove bolts securing front of seat.

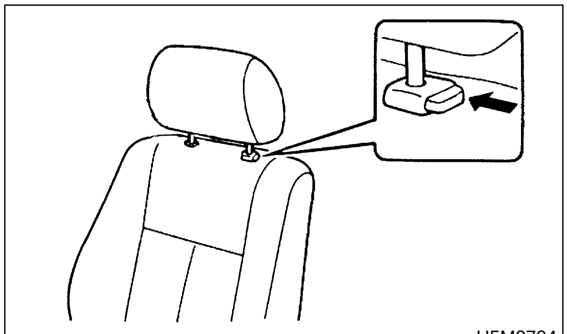

G5M0344

7) While disconnecting side airbag connector, detach front seat. (Side airbag equipped vehicle) and inner belt connector.

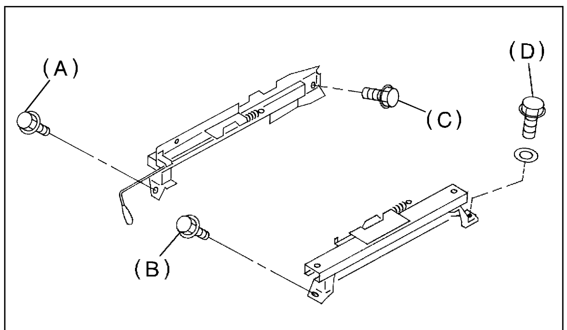
CAUTION:
- **When removing seat from vehicle, take care not to damage body, seat, or trim.**
- **After the front seat has been removed from side airbag equipped vehicle, store it as instructed in AIRBAG REPAIR SECTION. <Ref. to AB-15, CAUTION, Side Airbag Module.>**

B: INSTALLATION S908343A11

1) While operating button (located on top of backrest), lift headrest out by placing your hand between backrest and headrest.


H5M0704

2) Pull reclining lever back to fold backrest all the way forward. Pull slide adjuster lever and move lower slide rail all the way backward.
3) Position seat in compartment and align the holes on the seat with the holes on the vehicle body side.
4) Secure the front of seat using inward and outward bolts (A) and (B) in that order.
5) While pulling slide adjuster lever, move seat all the way forward.
6) Secure the rear of seat using inward and outward bolts (C) and (D).



S5M0227A

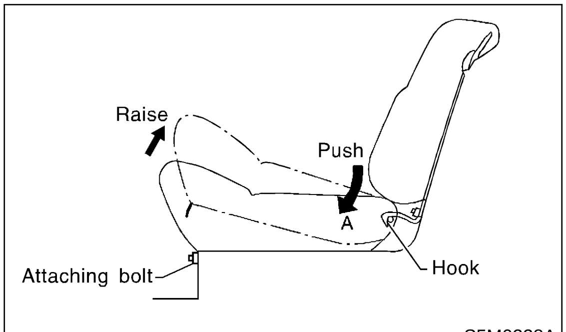
7) Connect inner belt connector.
8) Connect side airbag connector. (Side airbag equipped model)
9) Install bolt cover on rear end of slide rail.
10) Install headrest on backrest.

CAUTION:
Confirm that seat can move smoothly and be locked securely at any position.

3. Rear Seat S908350

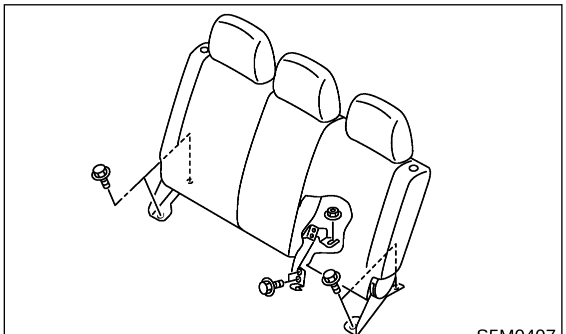
A: REMOVAL S908350A18

1) Remove bolts securing hinges (located at front of cushion) to body.
2) Slightly raise front of cushion while pushing down on cushion in the direction of “A”. With cushion held in that position, move it forward until it is unhooked.



S5M0228A

3) Remove rear quarter lower trim. <Ref. to EI-41, REMOVAL, Rear Quarter Trim.>
4) Remove bolts and nuts.


S5M0407

5) Detach backrest.

B: INSTALLATION S908350A11

Install in the reverse order of removal.

SECURITY AND LOCKS

SL

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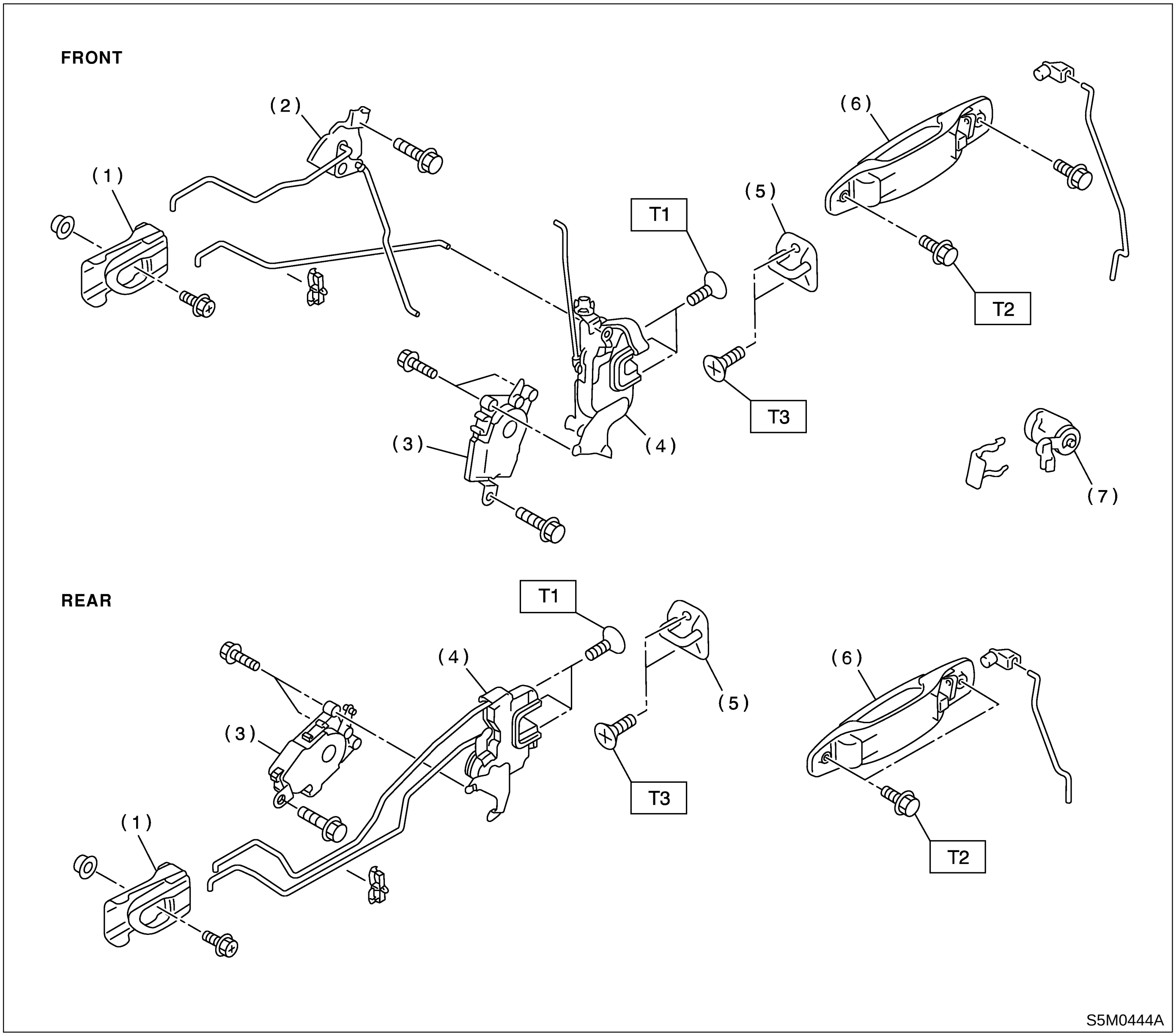
1. General Description S909001

A: SPECIFICATIONS S909001E49

B: COMPONENT S909001A05

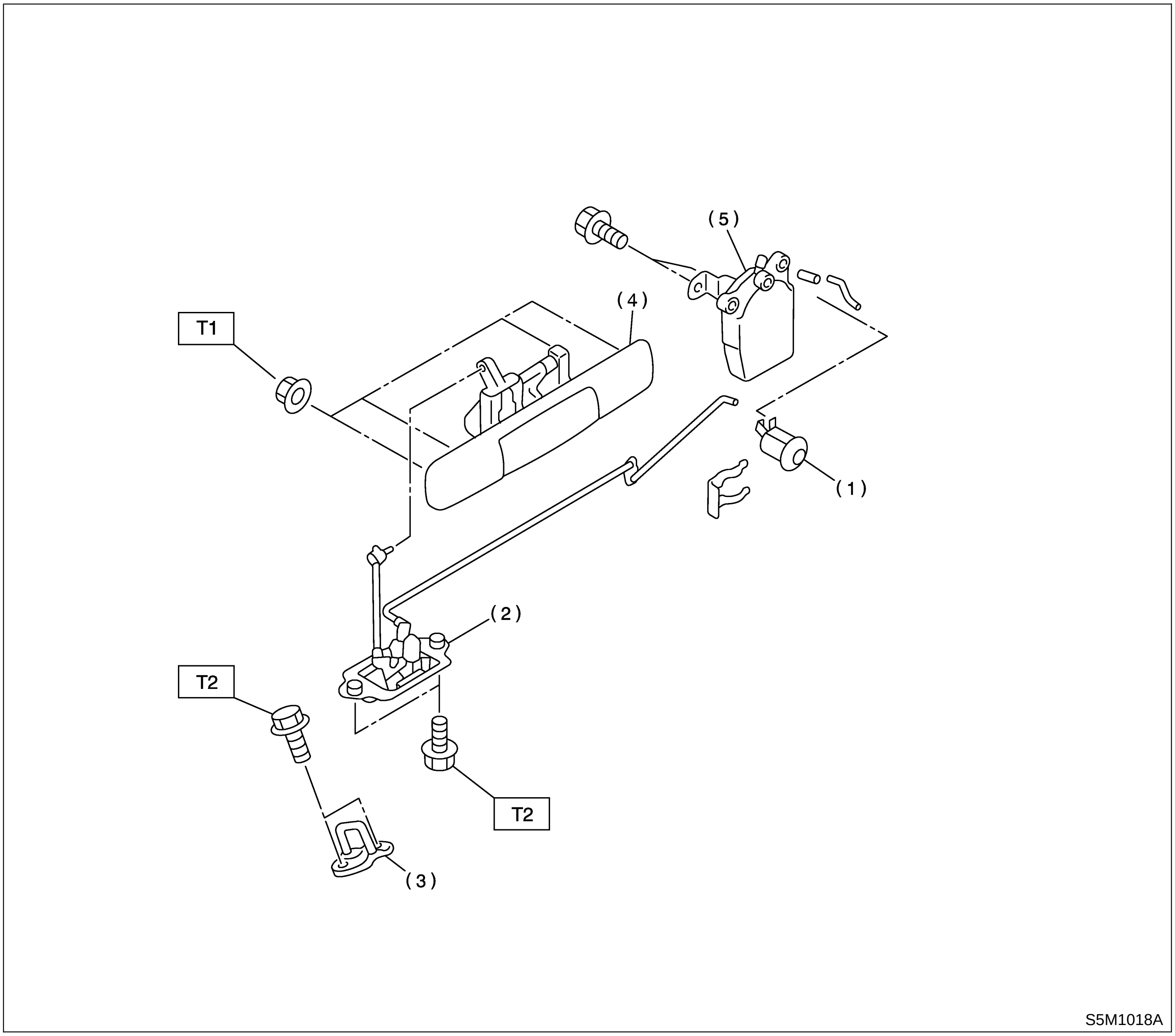
1. DOOR LOCK ASSEMBLY S909001A0501



(1) Inner remote ASSY
(2) Bell crank
(3) Auto-door lock actuator
(4) Door latch
(5) Striker
(6) Door outer handle
(7) Key cylinder

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.5 (0.66, 4.8)
T2: 7.5 (0.76, 5.5)
T3: 18 (1.8, 13.0)

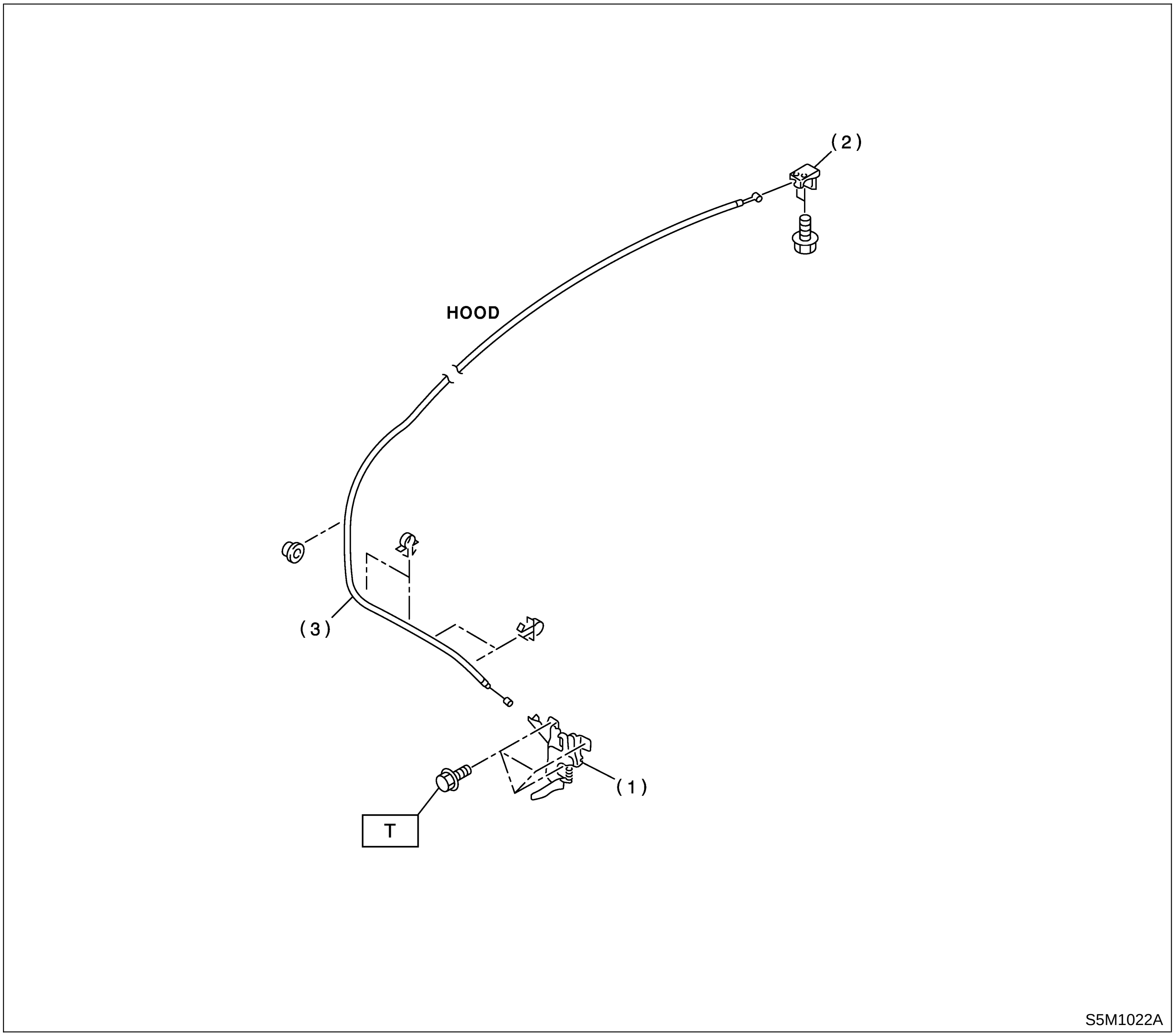
2. REAR GATE LOCK *S909001A0510*



(1) Key cylinder
(2) Rear gate latch
(3) Striker
(4) Rear gate outer handle
(5) Rear gate actuator

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 25 (2.5, 18.1)

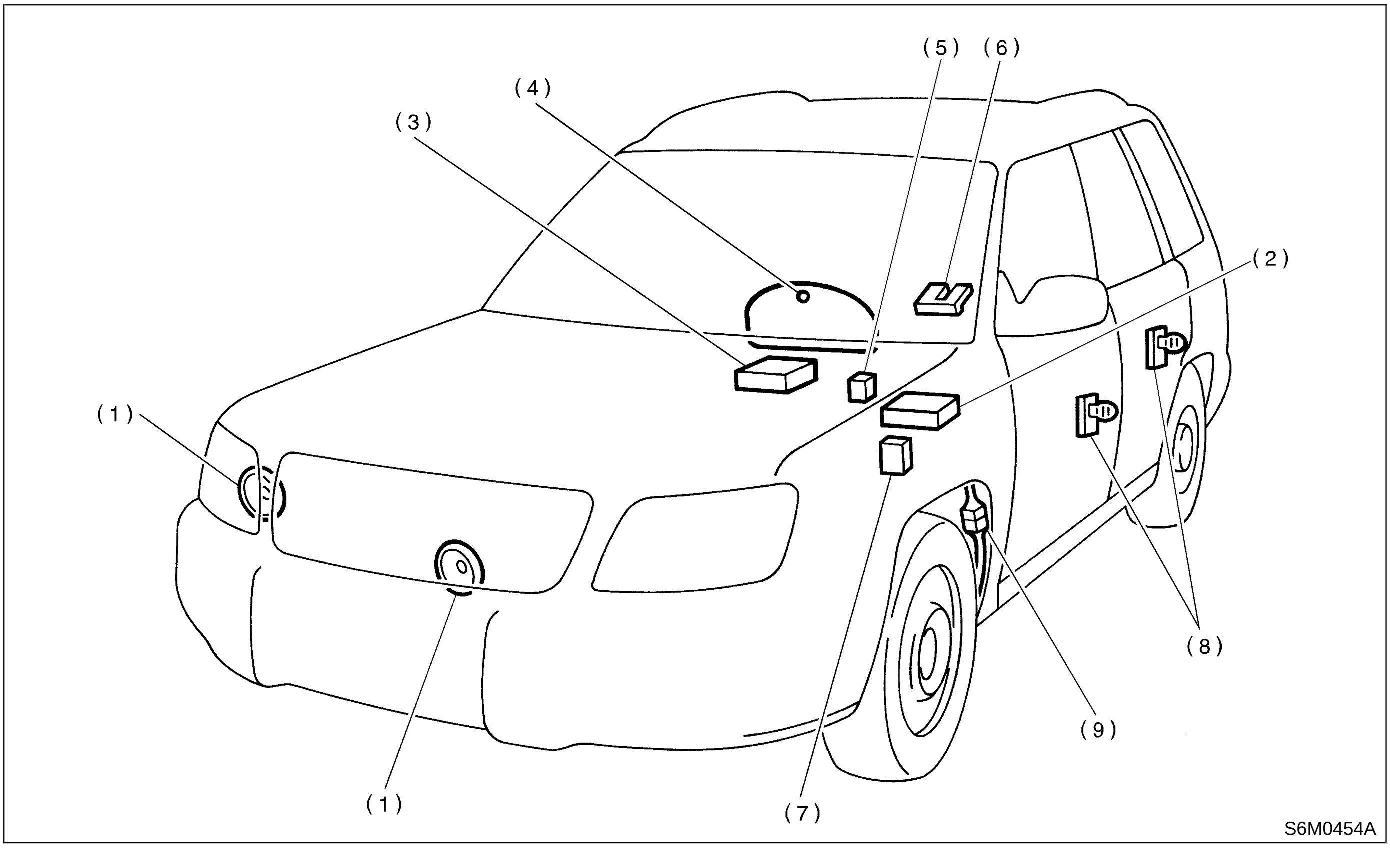
3. HOOD LOCK AND REMOTE OPENERS *S909001A0503*



(1) Hood lock ASSY
(2) Lever ASSY
(3) Cable

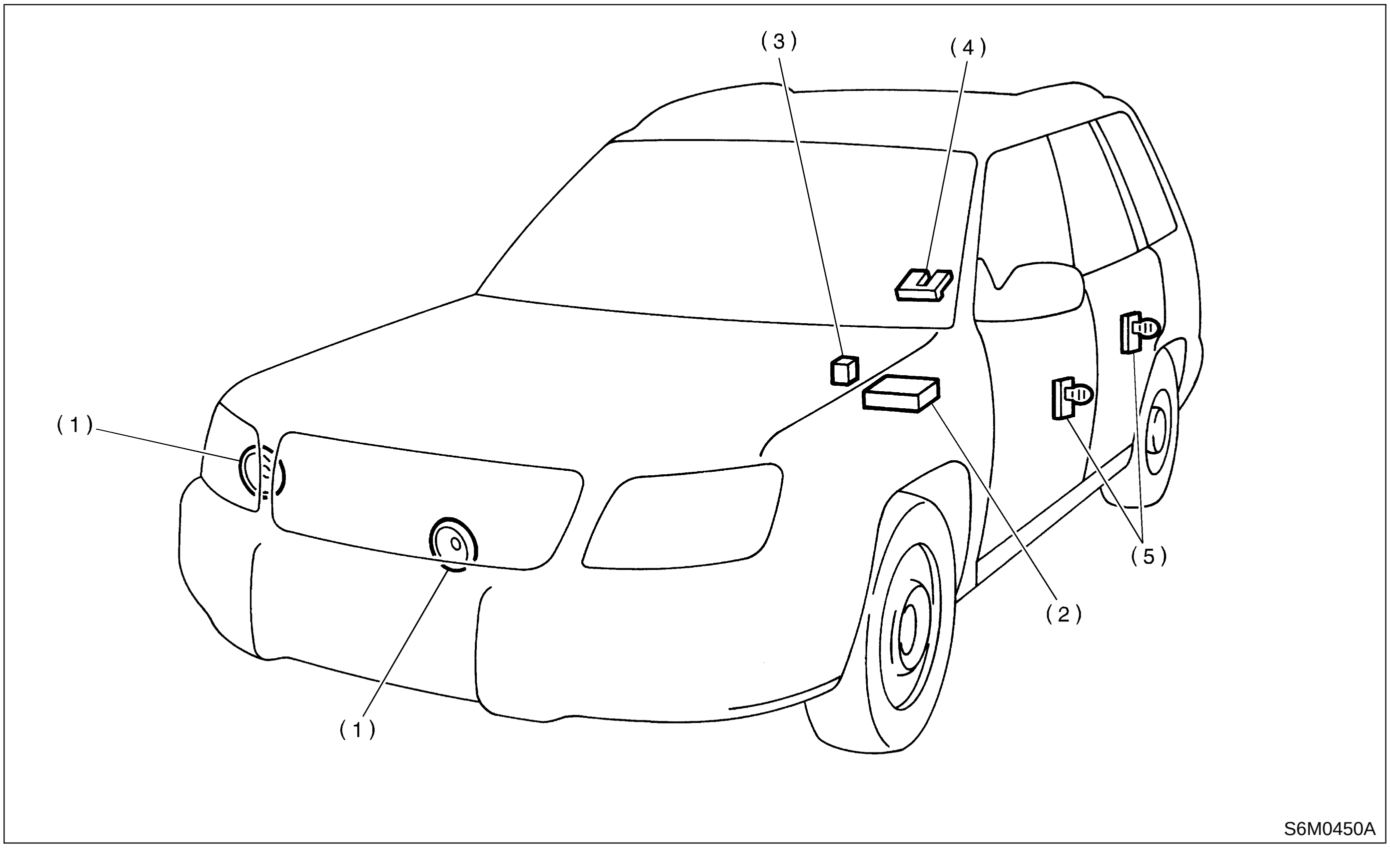
Tightening torque: N·m (kgf-m, ft-lb)
T: 33 (3.4, 25)

4. SECURITY SYSTEM *S909001A0504*



(1) Horn
(2) Keyless entry control module
(3) Security control module (under console box)
(4) Security indicator light (in combination meter)
(5) Horn relay (in main fuse box)
(6) Rear gate latch switch
(7) Interrupt relay (behind the fuse box)
(8) Door switch
(9) Passive arm connector (on driver side front lower pillar)

5. KEYLESS ENTRY SYSTEM *S909001A0505*



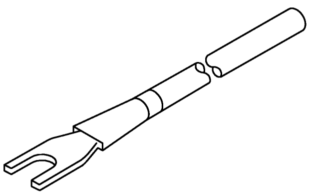
(1) Horn
(2) Keyless entry control module
(3) Horn relay (in main fuse box)
(4) Rear gate latch switch
(5) Door switch

C: CAUTION *S909001A03*

● Before disassembling or reassembling parts, always disconnect battery ground cable. When repairing radio, control module, etc. which are provided with memory functions, record memory contents before disconnecting battery ground cable. Otherwise, these contents are cancelled upon disconnection.
● Reassemble parts in reverse order of disassembly procedure unless otherwise indicated.
● Adjust parts to specifications contained in this manual if so designated.
● Connect connectors and hoses securely during reassembly.
● After reassembly, ensure functional parts operate smoothly.
● Airbag system wiring harness is routed near the electrical parts and switch.
● All airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.
● Be careful not to damage Airbag system wiring harness when servicing the ignition key cylinder.

D: PREPARATION TOOL S909001A17

1. SPECIAL TOOLS S909001A1701

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B5M1120	925580000	PULLER	Used for removing trim clip

2. GENERAL TOOLS S909001A1702

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance and voltage.
Drill	Used for replacing ignition key lock.

2. Door Lock Control System S909348

A: SCHEMATIC S909348A21

1. DOOR LOCK WITHOUT KEYLESS ENTRY MODEL S909348A2110

<Ref. to WI-60, WITHOUT KEYLESS ENTRY MODEL, SCHEMATIC, Door Lock System.>

2. DOOR LOCK WITH KEYLESS ENTRY MODEL S909348A2111

<Ref. to WI-58, WITH KEYLESS ENTRY MODEL, SCHEMATIC, Door Lock System.>

B: INSPECTION S909348A10

1. SYMPTOM CHART S909348A1001

Symptom	Repair order	Reference
The door lock control system does not operate.	1. Check the fuse.	<Ref. to SL-8, CHECK FUSE, INSPECTION, Door Lock Control System.>
	2. Check the power supply and ground circuit for the door lock timer (without keyless entry) or keyless entry control module (with keyless entry).	<Ref. to SL-9, CHECK POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, Door Lock Control System.>
	3. Check the door lock switch and the circuit.	<Ref. to SL-9, CHECK DOOR LOCK SWITCH AND CIRCUIT, INSPECTION, Door Lock Control System.>
	4. Check the door lock actuator and the circuit.	<Ref. to SL-10, CHECK DOOR LOCK ACTUATOR AND CIRCUIT, INSPECTION, Door Lock Control System.>
The driver side or passenger side door lock switch does not operate.	Check the door lock switch and the circuit.	<Ref. to SL-9, CHECK DOOR LOCK SWITCH AND CIRCUIT, INSPECTION, Door Lock Control System.>
A specific door lock actuator does not operate.	Check the door lock actuator and the circuit.	<Ref. to SL-10, CHECK DOOR LOCK ACTUATOR AND CIRCUIT, INSPECTION, Door Lock Control System.>

2. CHECK FUSE S909348A1002

No.	Step	Check	Yes	No
1	**CHECK FUSE.** Remove and visually check fuse No. 3 (in the fuse and relay box).	Is the fuse blown (15A)?	Replace the fuse with a new one.	Check power supply and ground circuit. <Ref. to SL-9, CHECK POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, Door Lock Control System.>

3. CHECK POWER SUPPLY AND GROUND CIRCUIT S909348A1003

No.	Step	Check	Yes	No
1	**CHECK POWER SUPPLY.** 1) Disconnect the door lock timer or keyless entry control module harness connector. 2) Measure the voltage between the harness connector terminal and chassis ground. ***Connector & terminal*** ***Without keyless entry:*** ***(B92) No. 2 (+) — chassis ground (–):*** ***With keyless entry:*** ***(B176) No. 3 (+) — chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Check the harness for open circuits and shorts between the door lock timer or keyless entry control module and the fuse.
2	**CHECK GROUND CIRCUIT.** Measure the resistance between the harness connector terminal and chassis ground. ***Connector & terminal*** ***Without keyless entry:*** ***(B92) No. 6 (+) — chassis ground (–):*** ***With keyless entry:*** ***(B176) No. 8 (+) — chassis ground (–):***	Is the resistance less than 10 Ω?	Power supply and ground circuit is OK.	Repair harness.

4. CHECK DOOR LOCK SWITCH AND CIRCUIT S909348A1004

No.	Step	Check	Yes	No
1	**CHECK DOOR LOCK SWITCH CIRCUIT.** 1) Disconnect the door lock timer or keyless entry control module harness connector. 2) Measure the resistance between the harness connector terminal and chassis ground when moving the door lock switch to LOCK. ***Connector & terminal*** ***Without keyless entry:*** ***(B92) No. 5 (+) — chassis ground (–):*** ***With keyless entry:*** ***(B176) No. 5 (+) — chassis ground (–):***	Is the resistance less than 10 Ω?	Go to step **2**.	Go to step **3**.
2	**CHECK DOOR LOCK SWITCH CIRCUIT.** Measure the resistance between the harness connector terminal and chassis ground when the door lock switch is moved to UNLOCK. ***Connector & terminal*** ***Without keyless entry:*** ***(B92) No. 1 — chassis ground:*** ***With keyless entry:*** ***(B176) No. 15 (+) — chassis ground (–):***	Is the resistance less than 10 Ω?	The door lock switch is OK.	Go to step **3**.
3	**CHECK DOOR LOCK SWITCH.** 1) Disconnect the door lock switch harness connector. 2) Measure the resistance between the door lock switch terminals when moving the door lock switch to LOCK. ***Terminal*** ***Driver side No. 7 — No. 16:*** ***Passenger side No. 7 — No. 8:***	Is the resistance less than 1 Ω?	Go to step **4**.	Replace the door lock switch.

No.	Step	Check	Yes	No
4	**CHECK DOOR LOCK SWITCH.** Measure the resistance between the door lock switch terminals when moving the door lock switch to UNLOCK. ***Terminal*** ***Driver side No. 7 — No. 15:*** ***Passenger side No. 5 — No. 8:***	Is the resistance less than 1 Ω?	Check the harness for open circuits and shorts between the door lock timer or keyless entry control module and the door lock switch.	Replace the door lock switch.

5. CHECK DOOR LOCK ACTUATOR AND CIRCUIT *S909348A1005*

No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL.** Measure the voltage between the harness connector terminal and chassis ground when moving the door lock switch to LOCK. ***Connector & terminal*** ***Without keyless entry:*** ***(B92) No. 3 — chassis ground:*** ***With keyless entry:*** ***(B176) No. 2 (+) — chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Replace the door lock timer or keyless entry control module.
2	**CHECK OUTPUT SIGNAL.** Measure the voltage between the harness connector terminal and chassis ground when moving the door lock switch to UNLOCK. ***Connector & terminal*** ***Without keyless entry:*** ***(B92) No. 4 — chassis ground:*** ***With keyless entry:*** ***(B176) No. 1, No. 9 (+) — chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	Replace the door lock timer or keyless entry control module.
3	**CHECK DOOR LOCK ACTUATOR.** Check the door lock actuator. Front door lock actuator: <Ref. to SL-30, Front Door Lock Actuator.> Rear door lock actuator: <Ref. to SL-34, Rear Door Lock Actuator.> Rear gate latch lock actuator: <Ref. to SL-37, Rear Gate Latch Lock Actuator.>	Is the door lock actuator OK?	Check the harness for open circuits and shorts between the door lock timer or keyless entry control module and the door lock actuator.	Replace the door lock actuator.

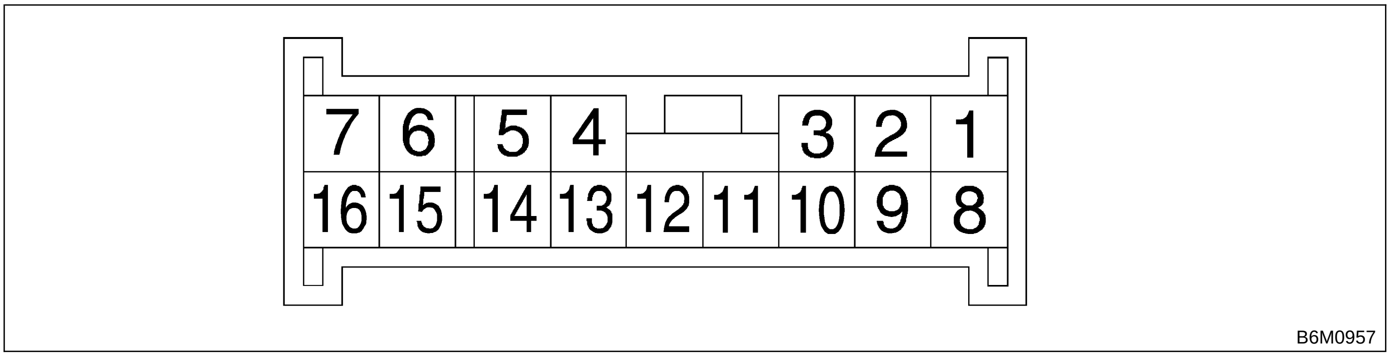
MEMO:

3. Keyless Entry System S909345

A: SCHEMATIC S909345A21

<Ref. to WI-82, SCHEMATIC, Keyless Entry System.>

B: ELECTRICAL SPECIFICATION S909345A08



Content	Terminal No.	Measuring condition
Door and rear gate lock actuator (Except driver side)	1 (OUTPUT)	Battery voltage is present when pressing the transmitter UNLOCK/ DISARM button two times.
Door and rear gate lock actuator	2 (OUTPUT)	Battery voltage is present when pressing the transmitter LOCK/ARM button one time.
Power supply (Back-up)	3	Battery voltage is constantly present.
Room light	4 (OUTPUT)	0 V is present when pressing the transmitter UNLOCK/DISARM button one time.
Door lock switch	5 (INPUT)	0 V is present when operating the door lock switch.
Rear gate latch switch	6 (INPUT)	0 V is present when opening the trunk lid or rear gate.
Door switch	7 (INPUT)	0 V is present when any door is open.
Ground	8	0 V is constantly present.
Door lock actuator (Driver side)	9 (OUTPUT)	Battery voltage is present when pressing the transmitter UNLOCK/ DISARM button one time.
Security control module	10	—
Security control module	11	—
Horn relay	12 (OUTPUT)	0 V is present when pressing the transmitter UNLOCK/DISARM or LOCK/ARM button.
Security control module	13	—
Ignition switch (ON)	14 (INPUT)	Battery voltage is present when ignition switch is turned ON.
Door unlock switch	15 (INPUT)	0 V is present when operating the door lock switch.
Key warning switch	16 (INPUT)	Battery voltage is present when inserting the key into the ignition switch.

C: INSPECTION S909345A10

1. SYMPTOM CHART S909345A1001

Symptom	Repair order	Reference
None of the functions of the keyless entry system operate.	1. Check the transmitter battery and function.	<Ref. to SL-15, CHECK TRANSMITTER BATTERY AND FUNCTION, INSPECTION, Keyless Entry System.>
	2. Check the fuse.	<Ref. to SL-16, CHECK FUSE, INSPECTION, Keyless Entry System.>
	3. Check the keyless entry control module power supply and ground circuit.	<Ref. to SL-16, CHECK POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, Keyless Entry system.>
	4. Replace the keyless entry control module.	<Ref. to SL-44, Keyless Entry Control Module.>
The transmitter cannot be programmed.	1. Check the transmitter battery and function.	<Ref. to SL-15, CHECK TRANSMITTER BATTERY AND FUNCTION, INSPECTION, Keyless Entry System.>
	2. Check the ignition switch circuit.	<Ref. to SL-16, CHECK IGNITION SWITCH CIRCUIT, INSPECTION, Keyless Entry System.>
	3. Check the door switch.	<Ref. to SL-16, CHECK DOOR SWITCH, INSPECTION, Keyless Entry System.>
	4. Replace the keyless entry control module.	<Ref. to SL-44, Keyless Entry Control Module.>
The door lock or unlock does not operate. NOTE: If the door lock control system does not operate when using the door lock switch, check the door lock control system. <Ref. to SL-8 INSPECTION, Door Lock Control System.>	1. Check the transmitter battery and function.	<Ref. to SL-15, CHECK TRANSMITTER BATTERY AND FUNCTION, INSPECTION, Keyless Entry System.>
	2. Check the key warning switch.	<Ref. to SL-17, CHECK KEY WARNING SWITCH, INSPECTION, Keyless Entry System.>
	3. Check the door switch.	<Ref. to SL-16, CHECK DOOR SWITCH, INSPECTION, Keyless Entry System.>
	4. Replace the keyless entry control module.	<Ref. to SL- 44, Keyless Entry Control Module.>
The panic alarm does not operate.	1. Check the transmitter battery and function.	<Ref. to SL-15, CHECK TRANSMITTER BATTERY AND FUNCTION, INSPECTION, Keyless Entry System.>
	2. Check the horn operation.	<Ref. to SL-18, CHECK HORN OPERATION, INSPECTION, Keyless Entry System.>
	3. Replace the keyless entry control module.	<Ref. to SL-44, Keyless Entry Control Module.>

Symptom	Repair order	Reference
The horn chirp does not operate.	1. Check the horn chirp function.	<Ref. to SL-15, CHECK HORN CHIRP SETTING, INSPECTION, Keyless Entry System.>
	2. Check the transmitter battery and function.	<Ref. to SL-15, CHECK TRANSMITTER BATTERY AND FUNCTION, INSPECTION, Keyless Entry System.>
	3. Check the key warning switch.	<Ref. to SL-17, CHECK KEY WARNING SWITCH, INSPECTION, Keyless Entry System.>
	4. Check the door switch.	<Ref. to SL-16, CHECK DOOR SWITCH, INSPECTION, Keyless Entry System.>
	5. Check the horn operation.	<Ref. to SL-18, CHECK HORN OPERATION, INSPECTION, Keyless Entry System.>
	6. Replace the keyless entry control module.	<Ref. to SL-44, Keyless Entry Control Module.>
The room light operation does not activate.	1. Check the transmitter battery and function.	<Ref. to SL-15, CHECK TRANSMITTER BATTERY AND FUNCTION, INSPECTION, Keyless Entry System.>
	2. Check the room light operation.	<Ref. to SL-19, CHECK ROOM LIGHT OPERATION, INSPECTION, Keyless Entry System.>
	3. Check the key warning switch.	<Ref. to SL-17, CHECK KEY WARNING SWITCH, INSPECTION, Keyless Entry System.>
	4. Check the door switch.	<Ref. to SL-16, CHECK DOOR SWITCH, INSPECTION, Keyless Entry System.>
	5. Replace the keyless entry control module.	<Ref. to SL-44, Keyless Entry Control Module.>
The door warning does not operate.	1. Check the transmitter battery and function.	<Ref. to SL-15, CHECK TRANSMITTER BATTERY AND FUNCTION, INSPECTION, Keyless Entry System.>
	2. Check the door switch.	<Ref. to SL-16, CHECK DOOR SWITCH, INSPECTION, Keyless Entry System.>
	3. Check the horn operation.	<Ref. to SL-18, CHECK HORN OPERATION, INSPECTION, Keyless Entry System.>
	4. Replace the keyless entry control module.	<Ref. to SL-44, Keyless Entry Control Module.>

2. CHECK TRANSMITTER BATTERY AND FUNCTION *S909345A1002*

No.	Step	Check	Yes	No
1	**CHECK TRANSMITTER BATTERY.** 1) Remove the battery from the transmitter. <Ref. to SL-45, REMOVAL, Keyless Transmitter.> 2) Check the battery voltage. <Ref. to SL-45, INSPECTION, Keyless Transmitter.>	Is the voltage more than 2 V?	Go to step **2**.	Replace the transmitter battery.
2	**CHECK LED OF TRANSMITTER.** 1) Press the LOCK/ARM or UNLOCK/DISARM button six times to synchronize with the keyless entry control module. 2) Press the LOCK/ARM button.	Does the LED blink one time?	Go to step **3**.	Replace the transmitter. <Ref. to SL-45, REPLACEMENT, Keyless Transmitter.>
3	**CHECK LED OF TRANSMITTER.** Keep the LOCK/ARM button pressed.	Does the LED blink one time and then turn on?	Go to step **4**.	Replace the transmitter. <Ref. to SL-45, REPLACEMENT, Keyless Transmitter.>
4	**CHECK LED OF TRANSMITTER.** Press the UNLOCK/DISARM button.	Does the LED blink one time?	Go to step **5**.	Replace the transmitter. <Ref. to SL-45, REPLACEMENT, Keyless Transmitter.>
5	**CHECK LED OF TRANSMITTER.** Keep the UNLOCK/DISARM button pressed.	Does the LED blink two times?	The transmitter is OK.	Replace the transmitter. <Ref. to SL-45, REPLACEMENT, Keyless Transmitter.>

3. CHECK HORN CHIRP SETTING *S909345A1003*

No.	Step	Check	Yes	No
1	**CHECK HORN CHIRP SETTING.** Check the current setting of the horn chirp. 1) Remove the key from the ignition switch. 2) Close all doors and the rear gate. 3) Press the LOCK/ARM button.	Does the horn signal chirp?	The horn chirp function is OK.	Go to step **2**.
2	**CHECK HORN CHIRP SETTING.** 1) Press the UNLOCK/DISARM button once. 2) Press both the LOCK/ARM and UNLOCK/DISARM button for more than 2 seconds. 3) Press the LOCK/ARM or UNLOCK/DISARM button.	Does the horn signal chirp?	The horn chirp function is OK.	Check the transmitter function. <Ref. to SL-15, CHECK TRANSMITTER BATTERY AND FUNCTION, INSPECTION, Keyless Entry System.>

4. CHECK FUSE S909345A1004

No.	Step	Check	Yes	No
1	**CHECK FUSE.** Remove and visually check fuse No. 3 (in the fuse and relay box) and SBF-6 (in the main fuse box)	Is the fuse blown? (15 A and 30 A)	Replace the fuse with a new one.	Check power supply and ground circuit. <Ref. to SL-16, CHECK POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, Keyless Entry system.>

5. CHECK POWER SUPPLY AND GROUND CIRCUIT S909345A1005

No.	Step	Check	Yes	No
1	**CHECK POWER SUPPLY.** 1) Disconnect the keyless entry control module harness connector. 2) Measure the voltage between the harness connector terminal and chassis ground. ***Connector & terminal*** ***(B176) No. 3 (+) — chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Check the harness for open circuits and shorts between the keyless entry control module and fuse.
2	**CHECK GROUND CIRCUIT.** Measure the resistance between the harness connector terminal and chassis ground. ***Connector & terminal*** ***(B176) No. 8 (+) — chassis ground (–):***	Is the resistance less than 10 Ω?	The power supply and ground circuit are OK.	Repair the harness.

6. CHECK IGNITION SWITCH CIRCUIT

S909345A1006

No.	Step	Check	Yes	No
1	**CHECK IGNITION SWITCH SIGNAL.** 1) Disconnect the keyless entry control module harness connector. 2) Turn the ignition switch ON. 3) Measure the voltage between the harness connector terminal and chassis ground. ***Connector & terminal*** ***(B176) No. 14 (+) — chassis ground (–):***	Is the voltage more than 10 V?	The ignition switch circuit is OK.	Check the harness for open circuits and shorts between the keyless entry control module and ignition switch.

7. CHECK DOOR SWITCH S909345A1007

No.	Step	Check	Yes	No
1	**CHECK DOOR SWITCH CIRCUIT.** Measure the voltage between the keyless entry control module harness connector terminal and chassis ground. ***Connector & terminal*** ***Front and rear door:*** ***(B176) No. 7 (+) — chassis ground (–):*** ***Rear gate:*** ***(B176) No. 6 (+) — chassis ground (–):***	Is the voltage 0 V when each door or rear gate is open?	Go to step **2**.	Go to step **3**.

No.	Step	Check	Yes	No
2	**CHECK DOOR SWITCH CIRCUIT.** Measure the voltage between the keyless entry control module harness connector terminal and chassis ground. ***Connector & terminal*** ***Front and rear door:*** ***(B176) No. 7 (+) — chassis ground (–):*** ***Rear gate:*** ***(B176) No. 6 (+) — chassis ground (–):***	Is the voltage approx. 10 V when each door or rear gate is closed?	The door switch is OK.	Go to step **3**.
3	**CHECK DOOR SWITCH.** 1) Disconnect the door switch harness connector. 2) Measure the resistance between the door switch terminals. ***Terminal*** ***Front LH No. 1 — chassis ground:*** ***Front RH No. 1 — chassis ground:*** ***Rear LH No. 1 — chassis ground:*** ***Rear RH No. 1 — chassis ground:*** ***Rear gate No. 1 — No. 2:***	Is the resistance more than 1 MΩ when the door switch is pushed?	Go to step **4**.	Replace the door switch.
4	**CHECK DOOR SWITCH.** Measure the resistance between the door switch terminals. ***Terminal*** ***Front LH No. 1 — chassis ground:*** ***Front RH No. 1 — chassis ground:*** ***Rear LH No. 1 — chassis ground:*** ***Rear RH No. 1 — chassis ground:*** ***Rear gate No. 1 — No. 2:***	Is the resistance less than 1Ω when the door switch is released?	Check the harness for open circuits and shorts between the keyless entry control module and door switch.	Replace the door switch.

8. CHECK KEY WARNING SWITCH *S909345A1008*

No.	Step	Check	Yes	No
1	**CHECK FUSE.** Remove and visually check fuse No. 6 (in the main fuse box).	Is the fuse blown? (15A)	Replace the fuse with a new one.	Go to step **2**.
2	**CHECK KEY WARNING SWITCH CIRCUIT.** 1) Disconnect the keyless entry control module harness connector. 2) Insert the key into the ignition switch. (LOCK position) 3) Measure the voltage between the harness connector terminal and chassis ground. ***Connector & terminal*** ***(B176) No. 16 (+) — chassis ground (–):***	Is the voltage approx. 10 V?	Go to step **3**.	Go to step **4**.
3	**CHECK KEY WARNING SWITCH CIRCUIT.** 1) Remove the key from the ignition switch. 2) Measure the voltage between the harness connector terminal and chassis ground. ***Connector & terminal*** ***(B176) No. 16 (+) — chassis ground (–):***	Is the voltage 0 V?	The key warning switch is OK.	Go to step **4**.

No.	Step	Check	Yes	No
4	**CHECK KEY WARNING SWITCH.** 1) Disconnect the key warning switch harness connector. 2) Insert the key into the ignition switch. (LOCK position) 3) Measure the resistance between the key warning switch terminals. ***Terminal*** ***No. 1 — No. 2:***	Is the resistance less than 1Ω ?	Go to step **5**.	Replace key warning switch.
5	**CHECK KEY WARNING SWITCH.** 1) Remove the key from the ignition switch. 2) Measure the resistance between the key warning switch terminals. ***Terminal*** ***No. 1 — No. 2:***	Is the resistance more than 1 MΩ ?	**Check the following:** ● Harness for open circuits and shorts between the key warning switch and fuse ● Harness for open circuits and shorts between the keyless entry control module and key warning switch	Replace key warning switch.

9. CHECK HORN OPERATION *S909345A1009*

No.	Step	Check	Yes	No
1	**CHECK HORN OPERATION.** Make sure the horn sounds when the horn switch is pushed.	Does the horn sound?	Go to step **2**.	Check the horn circuit.
2	**CHECK HORN OPERATION.** 1) Disconnect the keyless entry control module harness connector. 2) Ground the harness connector terminal with a suitable wire. ***Connector & terminal*** ***(B176) No. 12 — chassis ground:***	Does the horn sound?	Replace the keyless entry control module.	Check the harness for open circuits and shorts between the keyless entry control module and horn relay.

10. CHECK ROOM LIGHT OPERATION

S909345A1010

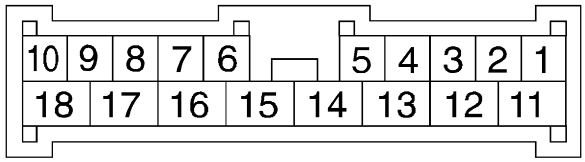
No.	Step	Check	Yes	No
1	**CHECK ROOM LIGHT OPERATION.** Make sure the room light illuminates when the room light switch is turned ON.	Does the room light illuminate?	Go to step **2**.	Check the room light circuit.
2	**CHECK HARNESS BETWEEN ROOM LIGHT AND KEYLESS ENTRY CONTROL MODULE.** 1) Disconnect the keyless entry control module harness connector and room light harness connector. 2) Measure the resistance between the keyless entry control module harness connector terminal and the room light harness connector terminal. ***Connector & terminal*** ***Without sunroof:*** ***(B176) No. 4 — (R52) No. 2:*** ***With sunroof:*** ***(B176) No. 4 — (R52) No. 1:***	Is resistance less than 10 Ω?	The room light operation circuit is OK.	Check the harness for open circuits and shorts between the keyless entry control module and room light.

4. Security System S909347

A: SCHEMATIC S909347A21

<Ref. to WI-101, SCHEMATIC, Security System.>

B: ELECTRICAL SPECIFICATION S909347A08



B6M0972

Content	Terminal No.	Measuring condition
Empty	1	—
Ignition switch (ON)	2 (INPUT)	Battery voltage is present when ignition switch is turned ON.
Passive arm	3	—
Rear gate latch switch	4 (INPUT)	0 V is present when rear gate latch switch is turned ON.
Door switch	5 (INPUT)	0 V is present when any door is open.
Empty	6	—
Keyless entry control module	7	—
Keyless entry control module	8	—
Security indicator light	9 (OUTPUT)	0 V is present when activating the alarm operation.
Keyless entry control module	10	—
Power supply for clearance light (Back-up)	11	Battery voltage is constantly present.
Clearance light	12 (OUTPUT)	Battery voltage is present when activating the alarm operation.
Power supply (Back-up)	13	Battery voltage is constantly present.
Ground	14	0 V is constantly present.
Interrupt relay	15 (OUTPUT)	Battery voltage is present when activating the alarm operation.

C: INSPECTION S909347A10

1. BASIC DIAGNOSTIC PROCEDURE

S909347A1001

No.	Step	Check	Yes	No
1	**CHECK SECURITY SYSTEM SET OPERATION.** 1) Before starting this diagnosis, open all windows. 2) Remove key from ignition key cylinder, and then close all doors and rear gate. 3) Press LOCK/ARM button of transmitter.	Can security system be set?	Go to step **2**.	Go to symptom 1. <Ref. to SL-22, SYMPTOM CHART, INSPECTION, Security System.>
2	**CHECK SECURITY INDICATOR LIGHT AND CLEARANCE LIGHT BLINKING.** Check security indicator light and clearance light blinking.	Do security indicator light and clearance light blink?	Go to step **3**.	Go to symptom 2. <Ref. to SL-22, SYMPTOM CHART, INSPECTION, Security System.>

No.	Step	Check	Yes	No
3	**CHECK SECURITY ALARM OPERATION.** 1) Unlock all doors using door lock switch on front door. 2) Open any door or rear gate.	Does security system not alarm when one of the doors is open?	Go to symptom 3. <Ref. to SL-22, SYMPTOM CHART, INSPECTION, Security System.>	Go to step **4**.
4	**CHECK SECURITY ALARM OPERATION.** Check security alarm operation.	Does security alarm (horn, clearance light and security indicator light) operate? And is starter motor deactivated?	Go to step **5**.	Go to symptom 4. <Ref. to SL-22, SYMPTOM CHART, INSPECTION, Security System.>
5	**CHECK SECURITY ALARM CANCEL OPERATION.** Press UNLOCK/DISARM button of transmitter.	Does security alarm (horn and clearance light) stop? And is starter motor activated?	Go to step **6**.	Go to symptom 5. <Ref. to SL-22, SYMPTOM CHART, INSPECTION, Security System.>
6	**CHECK BATTERY DISCONNECT PROTECTION.** Check battery disconnect protection. <Ref. to SL-21, CHECK BATTERY DISCONNECT PROTECTION, INSPECTION, Security System.>	Is battery disconnect protection OK?	Go to step **7**.	Replace security control module.
7	**PERFORM IMPACT SENSITIVITY TEST.** Perform impact sensitivity test. <Ref. to SL-42, IMPACT SENSITIVITY TEST, INSPECTION, Security Control Module.>	Is impact sensitivity OK?	Press UNLOCK/DISARM button of transmitter, and finish the diagnosis.	Replace security control module.

2. CHECK BATTERY DISCONNECT PROTECTION S909347A1002

1) Remove the key from the ignition switch.
2) Close all the doors and rear gate.
3) Open the front hood.
4) Press the LOCK/ARM button of the transmitter.
5) Disconnect the ground cable from the battery.
6) Reconnect the cable to the battery.
7) Check that the security indicator light blinks after reconnecting the battery cable.

If NG, replace the security control module.

3. SYMPTOM CHART *S909347A1004*

Symptom			Repair order	Reference
1	The security system cannot be set.		1. Check the transmitter function.	<Ref. to SL-15, CHECK TRANSMITTER BATTERY AND FUNCTION, INSPECTION, Keyless Entry System.>
			2. Check the fuse.	<Ref. to SL-23, CHECK FUSE, INSPECTION, Security System.>
			3. Check the security control module power supply and ground circuit.	<Ref. to SL-23, CHECK POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, Security System.>
			4. Check the door switch.	<Ref. to SL-23, CHECK DOOR SWITCH, INSPECTION, Security System.>
			5. Replace the security control module.	<Ref. to SL-42, Security Control Module.>
2	The security system can be set, but the security indicator light or clearance light does not blink.	Security indicator light	Check the security indicator light circuit.	<Ref. to SL-24, CHECK SECURITY INDICATOR LIGHT CIRCUIT, INSPECTION, Security System.>
		Clearance light	Check the clearance light operation.	<Ref. to SL-25, CHECK CLEARANCE LIGHT OPERATION, INSPECTION, Security System.>
3	The security system does not alarm when one of the door is open.		Check the door switch.	<Ref. to SL-23, CHECK DOOR SWITCH, INSPECTION, Security System.>
4	The security alarm does not activate.	All functions	Check the door switch.	<Ref. to SL-23, CHECK DOOR SWITCH, INSPECTION, Security System.>
		Security indicator light	Check the security indicator light circuit.	<Ref. to SL-24, CHECK SECURITY INDICATOR LIGHT CIRCUIT, INSPECTION, Security System.>
		Horn	Check the horn operation.	<Ref. to SL-24 CHECK HORN OPERATION, INSPECTION, Security System.>
		Clearance light	Check the clearance light operation.	<Ref. to SL-25, CHECK CLEARANCE LIGHT OPERATION, INSPECTION, Security System.>
		Starter motor deactivation	Check the interrupt relay circuit.	<Ref. to SL-26, CHECK INTERRUPT RELAY CIRCUIT, INSPECTION, Security System.>
5	The security system cannot be canceled.	Transmitter	Check the transmitter function.	<Ref. to SL-15, CHECK TRANSMITTER BATTERY AND FUNCTION, INSPECTION, Keyless Entry System.>
		Ignition switch	Check the ignition switch circuit.	<Ref. to SL-26, CHECK IGNITION SWITCH CIRCUIT, INSPECTION, Security System.>

4. CHECK FUSE *S909347A1005*

No.	Step	Check	Yes	No
1	**CHECK FUSE.** Remove and visually check fuse No. 2 and 7 (in main fuse box).	Is the fuse blown? (15 A and 20 A)	Replace the fuse with a new one.	Check power supply and ground circuit. <Ref. to SL-23, CHECK POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, Security System.>

5. CHECK POWER SUPPLY AND GROUND CIRCUIT *S909347A1006*

No.	Step	Check	Yes	No
1	**CHECK POWER SUPPLY.** 1) Disconnect the security control module harness connector. 2) Measure the voltage between the harness connector terminal and chassis ground. ***Connector & terminal*** ***(B93) No. 11 (+) — chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Check the harness for open circuits and shorts between the security control module and fuse.
2	**CHECK POWER SUPPLY.** 1) Disconnect the security control module harness connector. 2) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B93) No. 13 (+) — chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	Check the harness for open circuits and shorts between the security control module and fuse.
3	**CHECK GROUND CIRCUIT.** Measure the resistance between the harness connector terminal and chassis ground. ***Connector & terminal*** ***(B93) No. 14 (+) — chassis ground (–):***	Is the resistance less than 10 Ω?	The power supply and ground circuit are OK.	Repair the harness.

6. CHECK DOOR SWITCH *S909347A1007*

No.	Step	Check	Yes	No
1	**CHECK DOOR SWITCH CIRCUIT.** Measure the voltage between the security control module harness connector terminal and chassis ground. ***Connector & terminal*** ***Front and rear door:*** ***(B93) No. 5 (+) — chassis ground (–):*** ***Rear gate:*** ***(B93) No. 4 (+) — chassis ground (–):***	Is voltage 0 V when each door or rear gate is open?	Go to step **2**.	Go to step **3**.
2	**CHECK DOOR SWITCH CIRCUIT.** Measure voltage between security control module harness connector terminal and chassis ground. ***Connector & terminal*** ***Front and rear door:*** ***(B93) No. 5 (+) — chassis ground (–):*** ***Rear gate:*** ***(B93) No. 4 (+) — chassis ground (–):***	Is the voltage more than 10 V when each door or rear gate is closed?	Door switch is OK.	Go to step **3**.

No.	Step	Check	Yes	No
3	**CHECK DOOR SWITCH.** 1) Disconnect door switch harness connector. 2) Measure the resistance between door switch terminal and chassis ground. ***Terminal*** ***Front LH No. 1 — chassis ground:*** ***Front RH No. 1 — chassis ground:*** ***Rear LH No. 1 — chassis ground:*** ***Rear RH No. 1 — chassis ground:*** ***Rear gate No. 1 — No. 2:***	Is the resistance more than 1 MΩ when the door switch is pushed?	Go to step **4**.	Replace the door switch.
4	**CHECK DOOR SWITCH.** Measure the resistance between the door switch terminal and chassis ground. ***Terminal*** ***Front LH No. 1 — chassis ground:*** ***Front RH No. 1 — chassis ground:*** ***Rear LH No. 1 — chassis ground:*** ***Rear RH No. 1 — chassis ground:*** ***Rear gate No. 1 — No. 2:***	Is the resistance less than 1 Ω when the door switch is released?	Check the harness for open circuits and shorts between the security control module and door switch.	Replace the door switch.

7. CHECK SECURITY INDICATOR LIGHT CIRCUIT *S909347A1008*

No.	Step	Check	Yes	No
1	**CHECK SECURITY INDICATOR LIGHT.** 1) Disconnect the security control module harness connector. 2) Ground the harness connector terminal with a suitable wire. ***Connector & terminal*** ***(B93) No. 9 — chassis ground:***	Does the security indicator light illuminate?	Replace the security control module.	Go to step **2**.
2	**CHECK POWER SUPPLY FOR SECURITY INDICATOR LIGHT.** 1) Disconnect the connector from the combination meter. 2) Measure the voltage between the combination meter harness connector terminal and chassis ground. ***Connector & terminal*** ***(i10) No. 1 (+) — chassis ground (–):***	Is voltage more than 10 V?	Go to step **3**.	Check the harness for open circuits and shorts between the combination meter and the fuse.
3	**CHECK SECURITY INDICATOR LIGHT CIRCUIT.** Measure the resistance between the combination meter harness connector terminal and security control module harness connector terminal. ***Connector & terminal*** ***(i12) No. 18 — (B93) No. 9:***	Is resistance less than 10 Ω?	Replace the combination meter printed circuit.	Check the harness for open circuits and shorts between the combination meter and security control module.

8. CHECK HORN OPERATION *S909347A1015*

No.	Step	Check	Yes	No
1	**CHECK HORN OPERATION.** Make sure the horn sounds when the horn switch is pushed.	Does the horn sound?	Go to step **2**.	Check the horn circuit.

No.	Step	Check	Yes	No
2	**CHECK SECURITY CONTROL MODULE OUTPUT SIGNAL.** 1) Remove the key from the ignition switch. 2) Close all doors and rear gate. 3) Lock all doors with the transmitter or door lock switch to arm the security system. 4) Unlock all doors with the door lock switch. 5) Measure the voltage between the security control module harness connector terminal and chassis ground when any door is open. ***Connector & terminal*** ***(B93) No. 10 — Chassis ground:***	Is the voltage 1 to 4 V?	Go to step **3**.	Replace the security control module.
3	**CHECK HARNESS BETWEEN SECURITY CONTROL MODULE AND KEYLESS ENTRY CONTROL MODULE.** 1) Disconnect the security control module harness connector and keyless entry control module harness connector. 2) Measure the resistance between the security control module harness connector terminal and keyless entry control module harness connector terminal. ***Connector & terminal*** ***(B93) No. 10 — (B176) No. 13:***	Is the resistance less than 10 Ω?	Go to step **4**.	Check the harness for open circuit and shorts between the security control module and keyless entry control module.
4	**CHECK KEYLESS ENTRY CONTROL MODULE OUTPUT SIGNAL CIRCUIT.** Ground the keyless entry control module harness connector terminal with a suitable wire. ***Connector & terminal*** ***(B176) No. 12 — Chassis ground:***	Does the horn sound?	Replace the keyless entry control module.	Check the harness for open circuit and shorts between the keyless entry control module and horn relay.

9. CHECK CLEARANCE LIGHT OPERATION *S909347A1010*

No.	Step	Check	Yes	No
1	**CHECK CLEARANCE LIGHT OPERATION.** Turn the parking switch ON and check if the clearance light illuminates.	Does the clearance light illuminate?	Go to step **2**.	Check the clearance light circuit.
2	**CHECK POWER SUPPLY FOR SECURITY CONTROL MODULE.** 1) Turn the parking switch OFF. 2) Disconnect the security control module harness connector. 3) Measure the voltage between the security control module harness connector terminal and chassis ground. ***Connector & terminal*** ***(B93) No. 11 (+) — chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	Check the harness for open circuits and shorts between the security control module and the fuse.
3	**CHECK HARNESS BETWEEN SECURITY CONTROL MODULE AND FUSE BOX.** 1) Disconnect the fuse box harness connector (B158). 2) Measure the resistance between the security control module harness connector terminal and fuse box harness connector terminal. ***Connector & terminal*** ***(B93) No. 12 — (B158) No. 11:***	Is the resistance less than 10 Ω?	Replace the security control module.	Check the harness for open circuits and shorts between the security control module and the fuse.

10. CHECK INTERRUPT RELAY CIRCUIT

S909347A1011

No.	Step	Check	Yes	No
1	**CHECK INTERRUPT RELAY.** Remove and check the interrupt relay. <Ref. to SL-43, Interrupt Relay.>	Is the interrupt relay OK?	Go to step **2**.	Replace the interrupt relay.
2	**CHECK POWER SUPPLY FOR INTERRUPT RELAY.** Measure the voltage between the interrupt relay harness connector terminal and chassis ground. ***Connector & terminal*** ***(B59) No. 1 (+) — chassis ground (–):***	Is the voltage more than 10 V when the ignition switch is turned to START?	Go to step **3**.	Check the harness for open circuits and shorts between the interrupt relay and ignition switch.
3	**CHECK HARNESS BETWEEN INTERRUPT RELAY AND SECURITY CONTROL MODULE.** Measure the resistance between the interrupt relay harness connector terminal and security control module harness connector terminal. ***Connector & terminal*** ***(B59) No. 4 — (B93) No. 15:***	Is the resistance less than 10 Ω?	Replace the security control module.	Check the harness for open circuits and shorts between the interrupt relay and security control module.

11. CHECK IGNITION SWITCH CIRCUIT

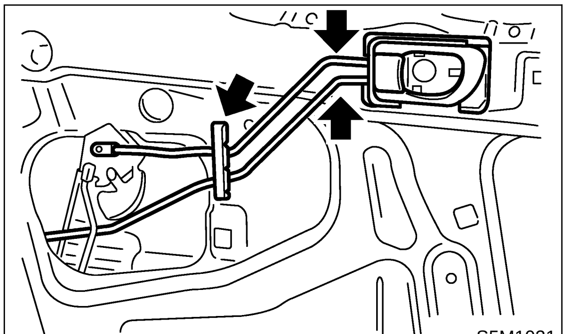
S909347A1012

No.	Step	Check	Yes	No
1	**CHECK IGNITION SWITCH SIGNAL.** 1) Disconnect the security control module harness connector. 2) Turn the ignition switch ON. 3) Measure the voltage between the harness connector terminal and chassis ground. ***Connector & terminal*** ***(B93) No. 2 (+) — chassis ground (–):***	Is the voltage more than 10 V?	Ignition switch circuit is OK.	Check the harness for open circuits and shorts between the security control module and ignition switch.

5. Front Inner Remote S909344

A: REMOVAL S909344A18

1) Remove the door trim. <Ref. to EI-27, REMOVAL, Front Door Trim.>
2) Remove the sealing cover. <Ref. to EB-13, REMOVAL, Front Sealing Cover.>
3) Unlatch rod holder.
4) Remove the two rod joints.
5) Remove the front inner remote.



S5M1021

B: INSTALLATION S909344A11

Install in the reverse order of removal.

NOTE:
Make sure the inner remote works properly after installation.

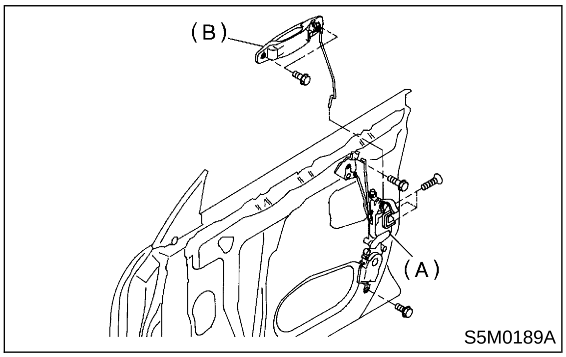
C: INSPECTION S909344A10

1) Make sure the rod is not deformed.
2) Make sure the lever and rod work smoothly.

6. Front Outer Handle *S909349*

A: REMOVAL *S909349A18*

1) Completely close the door glass.
2) Remove the door trim. <Ref. to EI-27, REMOVAL, Front Door Trim.>
3) Remove the sealing cover. <Ref. to EB-13, REMOVAL, Front Sealing Cover.>
4) Remove the front inner remote. <Ref. to SL-27, REMOVAL, Front Inner Remote.>
5) Remove the front side bolt of outer handle (B).
6) Move the door glass downward and remove the rear side bolt.
7) Remove the front outer handle (B).



CAUTION:
Do not use excessive force to remove the door panel. This will deform it.

B: INSTALLATION *S909349A11*

Install in the reverse order of removal.

NOTE:
Make sure outer handle works properly after installation.

C: INSPECTION *S909349A10*

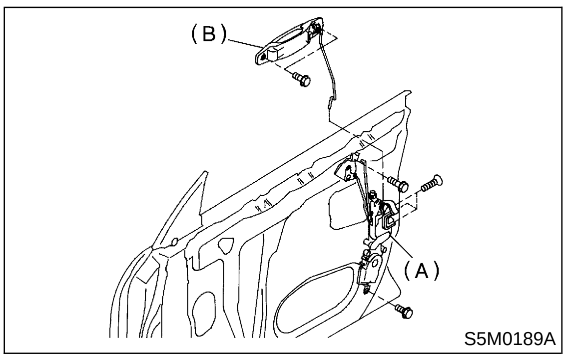
1) Make sure the rod is not deformed.
2) Make sure the lever and rod work smoothly.

7. Front Door Latch Assembly

S909334

A: REMOVAL S909334A18

1) Completely close the door glass.
2) Disconnect battery ground cable.
3) Remove the front door trim. <Ref. to EI-27, REMOVAL, Front Door Trim.>
4) Remove the sealing cover. <Ref. to EB-13, REMOVAL, Front Sealing Cover.>
5) Remove the front inner remote. <Ref. to SL-27, REMOVAL, Front Inner Remote.>
6) Turn rod holder to disconnect joint between key lock and rod.
7) Turn rod holder to disconnect joint between outer handle and rod.
8) Turn rod holder to disconnect joint between crank and rod.
9) Remove the three screws and bolt.



10) Disconnect the connector. Remove the front door latch assembly (A).

B: INSTALLATION S909334A11

Install in the reverse order of removal.

NOTE:
Make sure parts work properly after installation.

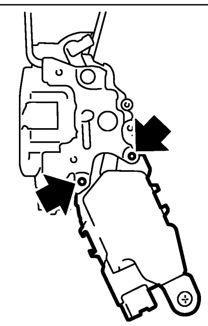
C: INSPECTION S909334A10

1) Make sure the rod is not deformed.
2) Make sure the lever and rod work smoothly.

8. Front Door Lock Actuator *S909319*

A: REMOVAL *S909319A18*

1) Remove the front door latch assembly. <Ref. to SL-29, REMOVAL, Front Door Latch Assembly.>
2) Remove the bolt. Remove the front door lock actuator.



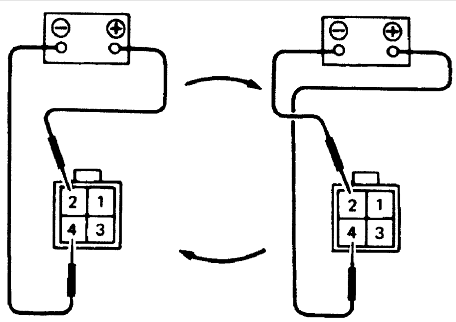
B5M0998

B: INSTALLATION *S909319A11*

Install in the reverse order of removal.

C: INSPECTION *S909319A10*

1) Disconnect the door lock actuator harness connector.
2) Connect the battery to the door lock actuator terminals.



B6M0135

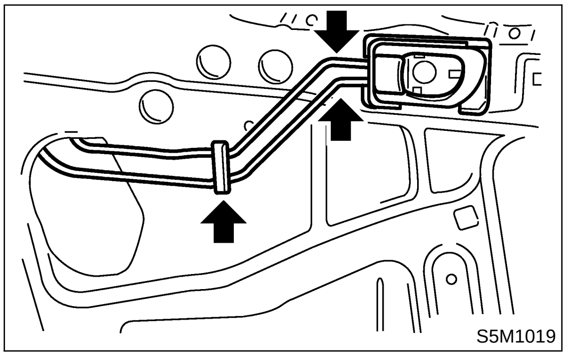
Terminal No.	Actuator operation
No. 2 (+) and No. 4 (–)	Locked → Unlocked
No. 4 (+) and No. 2 (–)	Unlocked → Locked

If NG, replace the door lock actuator.

9. Rear Inner Remote *S909321*

A: REMOVAL *S909321A18*

1) Remove the rear door trim. <Ref. to EI-28, REMOVAL, Rear Door Trim.>
2) Remove the sealing cover. <Ref. to EB-16, REMOVAL, Rear Sealing Cover.>
3) Unlatch rod holder.
4) Remove the two rod joints.
5) Remove the inner remote.



B: INSTALLATION *S909321A11*

Install in the reverse order of removal.

NOTE:
Make sure the inner remote works properly after installation.

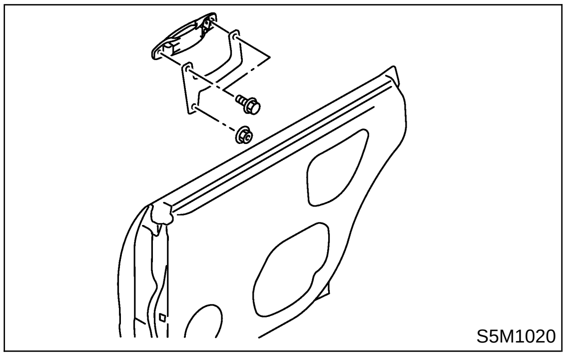
C: INSPECTION *S909321A10*

1) Make sure the rod is not deformed.
2) Make sure the lever and rod work smoothly.
3) Make sure the child safety lock on rear doors work properly, when applicable.

10. Rear Outer Handle S909322

A: REMOVAL S909322A18

1) Completely close the door glass.
2) Remove the rear door trim. <Ref. to EI-28, REMOVAL, Rear Door Trim.>
3) Remove the sealing cover. <Ref. to EB-16, REMOVAL, Rear Sealing Cover.>
4) Remove the rear inner remote. <Ref. to SL-31, REMOVAL, Rear Inner Remote.>
5) Remove the rear door latch assembly. <Ref. to SL-33, REMOVAL, Rear Door Latch Assembly.>
6) Remove the two bolts and nut. Remove the rear outer handle.


S5M1020

CAUTION:
Do not use excessive force to remove the door panel. This will deform it.

B: INSTALLATION S909322A11

Install in the reverse order of removal.

NOTE:
Make sure the outer handle works properly after installation.

C: INSPECTION S909322A10

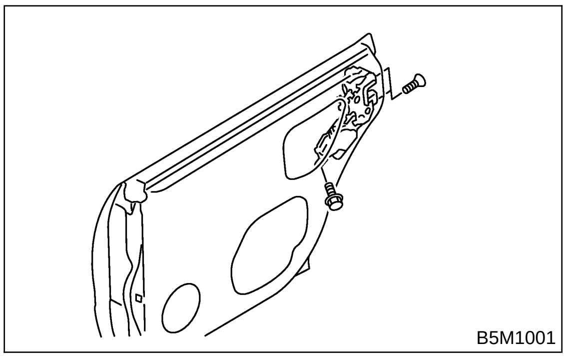
1) Make sure the rod is not deformed.
2) Make sure the lever and rod work smoothly.

11. Rear Door Latch Assembly

S909320

A: REMOVAL S909320A18

1) Completely close the door glass.
2) Disconnect battery ground cable.
3) Remove the rear door trim. <Ref. to EI-28, REMOVAL, Rear Door Trim.>
4) Remove the sealing cover. <Ref. to EB-16, REMOVAL, Rear Sealing Cover.>
5) Remove the rear inner remote. <Ref. to SL-31, REMOVAL, Rear Inner Remote.>
6) Remove the three screws and bolt.



7) Disconnect the connector. Remove the rear door latch assembly.

B: INSTALLATION S909320A11

Install in the reverse order of removal.

NOTE:
Make sure parts work properly after installation.

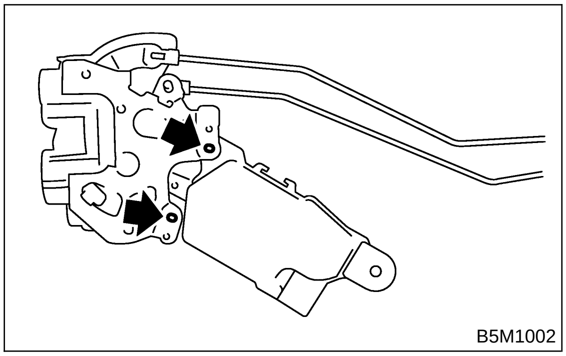
C: INSPECTION S909320A10

1) Make sure the rod is not deformed.
2) Make sure the lever and rod work smoothly.

12. Rear Door Lock Actuator S909323

A: REMOVAL S909323A18

1) Remove the rear door latch assembly. <Ref. to SL-33, REMOVAL, Rear Door Latch Assembly.>
2) Remove the bolt. Remove the rear door lock actuator.



B5M1002

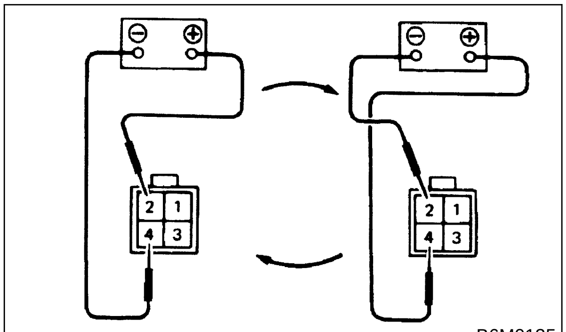
B: INSTALLATION S909323A11

Install in the reverse order of removal.

NOTE:
Make sure the lock works properly after installation.

C: INSPECTION S909323A10

1) Disconnect the door lock actuator harness connector.
2) Connect the battery to the door lock actuator terminals.



B6M0135

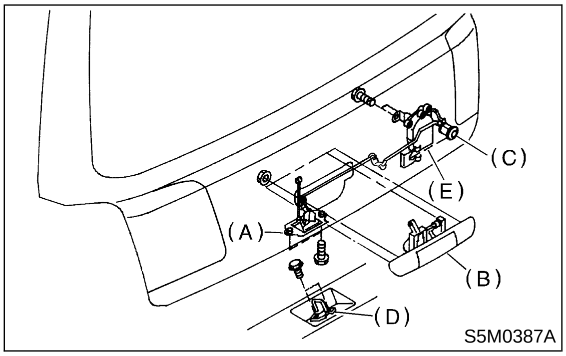
Terminal No.	Actuator operation
No. 2 (+) and No. 4 (–)	Locked → Unlocked
No. 4 (+) and No. 2 (–)	Unlocked → Locked

If NG, replace the door lock actuator.

13. Rear Gate Outer Handle S909626

A: REMOVAL S909626A18

1) Remove the rear gate lower trim. <Ref. to EI-44, REMOVAL, Rear Gate Trim.>
2) Disconnect rod (latch to outer handle) from outer handle (B).
3) Remove the four nuts used to hold outer handle (B) to the inside of rear gate and detach outer handle.



B: INSTALLATION S909626A11

Install in the reverse order of removal.

NOTE:
Make sure the outer handle works properly after installation.

C: INSPECTION S909626A10

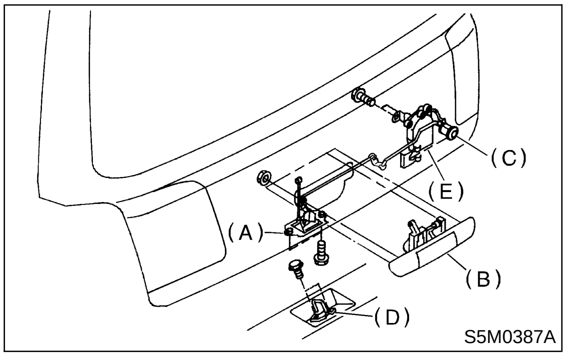
1) Inspect the rod for deformation.
2) Make sure the lever and rod move smoothly.

14. Rear Gate Latch Assembly

S909316

A: REMOVAL *S909316A18*

1) Disconnect battery ground cable.
2) Remove the rear gate lower trim. <Ref. to EI-44, REMOVAL, Rear Gate Trim.>
3) Disconnect rod (latch to link) from latch (A).
4) Disconnect rod (latch to outer handle) from outer handle (B).
5) Remove bolts from latch (A).



6) Disconnect rear gate switch connector from latch (A) and then detach the latch.

B: INSTALLATION *S909316A11*

Install in the reverse order of removal.

NOTE:
Make sure parts work properly after installation.

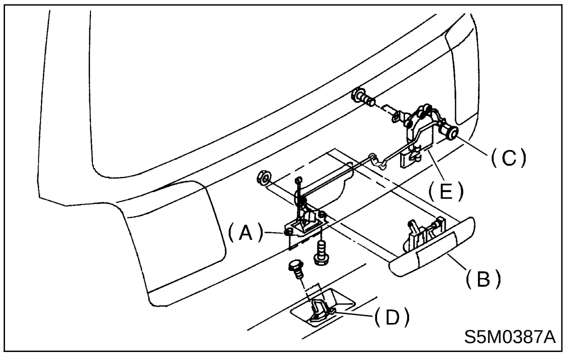
C: INSPECTION *S909316A10*

1) Make sure the rod is not deformed.
2) Make sure the lever and rod work smoothly.

15. Rear Gate Latch Lock Actuator S909313

A: REMOVAL S909313A18

1) Remove rear gate trim. <Ref. to EI-44, REMOVAL, Rear Gate Trim.>
2) Disconnect rod from key cylinder.
3) Loosen two bolts to remove rear gate actuator (E).



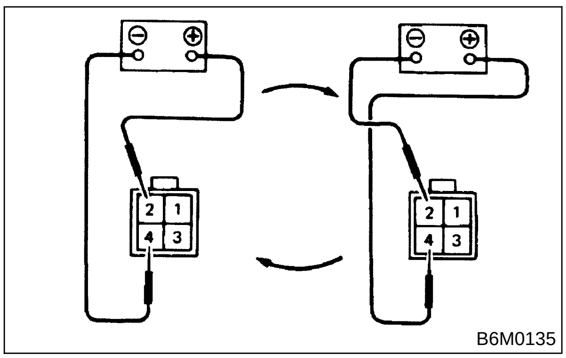
B: INSTALLATION S909313A11

Install in the reverse order of removal.

NOTE:
Make sure the lock works properly after installation.

C: INSPECTION S909313A10

1) Disconnect the door lock actuator harness connector.
2) Connect the battery to the door lock actuator terminals.



Terminal No.	Actuator operation
No. 2 (+) and No. 4 (–)	Locked → Unlocked
No. 4 (+) and No. 2 (–)	Unlocked → Locked

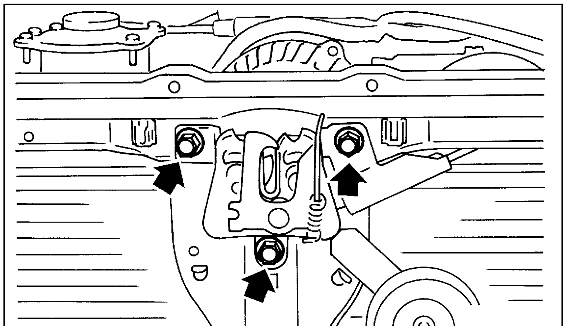
If NG, replace the rear gate latch lock actuator.

16. Front Hood Lock Assembly

S909595

A: REMOVAL S909595A18

1) Open the hood.
2) Remove the bolt. Remove the hood lock assembly.
3) Remove the release cable from the lock assembly.


S5M0148

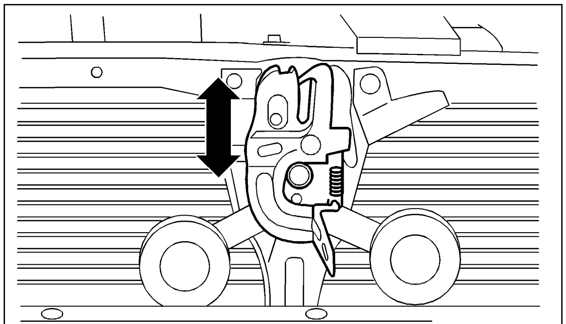
B: INSTALLATION S909595A11

Install in the reverse order of removal.

CAUTION:
- **Apply grease to parts that rub.**
- **Make sure the release cable works properly after installation.**

C: ADJUSTMENT S909595A01

Loosen the bolt. Adjust the lock assembly while moving it up and down.


B5M0752

D: INSPECTION S909595A10

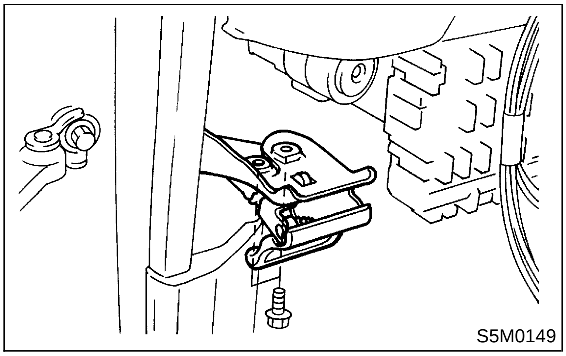
1) Check the striker for bending or abnormal wear.
2) Check the safety lever for improper movement.
3) Check other levers and the spring for rust formation and unsmooth movement.

17. Remote Openers *S909317*

A: REMOVAL *S909317A18*

1. HOOD OPENER *S909317A1801*

1) Remove the release cable from the hood lock.
2) Remove the bolt. Remove the opener lever.



S5M0149

B: INSTALLATION *S909317A11*

1. HOOD OPENER *S909317A1101*

Install in the reverse order of removal.

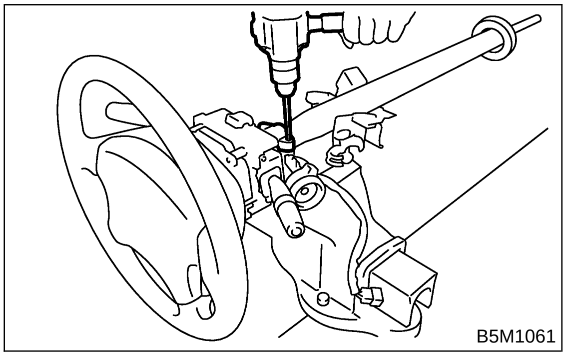
C: INSPECTION *S909317A10*

Make sure the fuel flap opens and closes smoothly.

18. Ignition Key Lock *S909318*

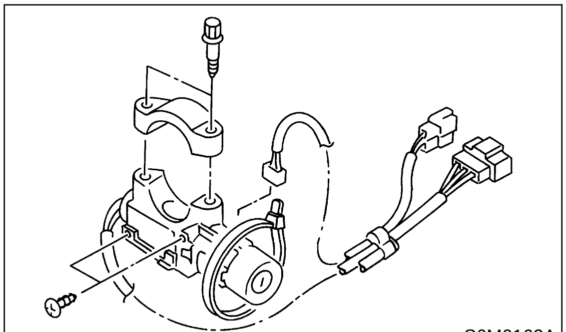
A: REPLACEMENT *S909318A20*

1) Disconnect battery ground cable.
2) Remove the steering column. <Ref. to PS-17, REMOVAL, Tilt Steering Column.>
3) Secure the steering column in a vise. Remove the bolt with a drill.



B5M1061

4) Remove the ignition key lock.
5) Use a new torn bolt. Tighten the torn bolt to the end of the thread.



S6M0162A

B: INSPECTION *S909318A10*

1) Remove the instrument panel lower cover.
2) Remove the lower column cover.
3) Unfasten the hold-down clip which secures the harness and disconnect the connector of the ignition switch from the body harness.
4) Turn the ignition key plate to each position and measure the ignition switch resistance.

Switch position	Terminal No.	Standard
LOCK	—	—
ACC	No. 1 and No. 2	Less than 1 Ω
ON	No. 1 and No. 2 No. 1 and No. 4 No. 2 and No. 4	Less than 1 Ω
ST	No. 1 and No. 3 No. 1 and No. 4 No. 3 and No. 4	Less than 1 Ω

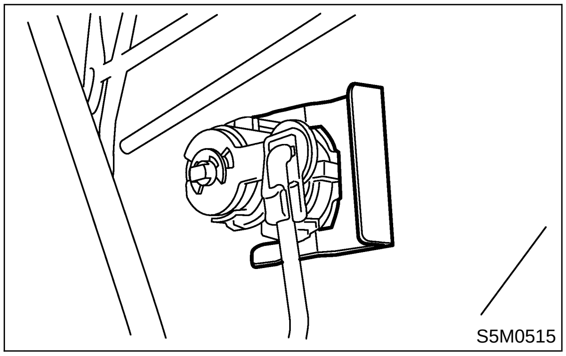
If NG, replace the ignition switch.

19. Key Lock Cylinders S909326

A: REPLACEMENT S909326A20

1. FRONT DOOR S909326A2001

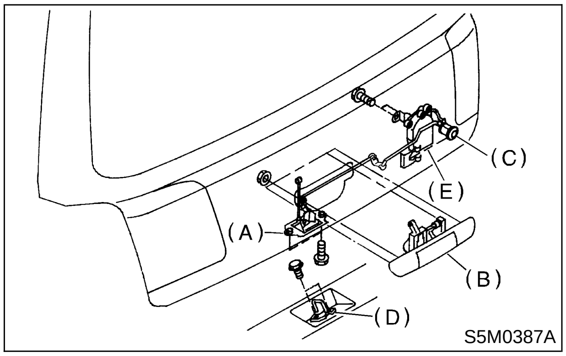
1) Remove the door trim. <Ref. to EI-27, REMOVAL, Front Door Trim.>
2) Pull back the sealing cover.
3) Remove the rod clamp. Remove the lock plate. Replace the key cylinder.



S5M0515

2. REAR GATE S909326A2003

1) Remove the rear gate lower trim. <Ref. to EI-44, REMOVAL, Rear Gate Trim.>
2) Remove the rod clamp. Remove the lock plate. Replace the key cylinder (C).

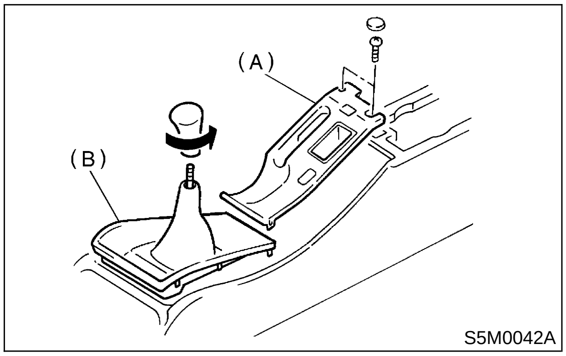


S5M0387A

20. Security Control Module S909330

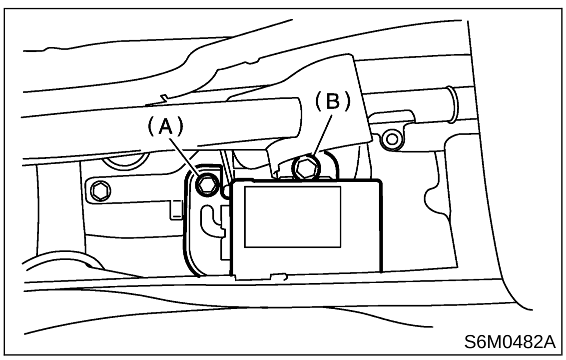
A: REMOVAL S909330A18

1) Disconnect battery ground cable.
2) Remove shift knob (MT model).
3) Remove console cover (A) and front cover (B) while disconnecting connector.



4) Disconnect connector from security control module.
5) Remove bolt (A) and loosen bolt (B).

NOTE:
Loosen bolt (B) without completely removing it.



6) Remove security control module.

B: INSTALLATION S909330A11

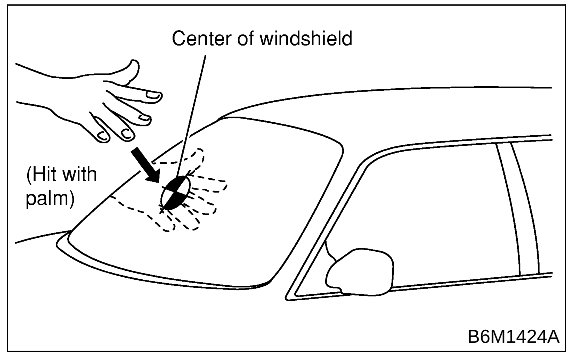
Install in the reverse order of removal.

NOTE:
To install the security control module, tighten bolts securely so that the bolts do not come loose.

C: INSPECTION S909330A10

1. IMPACT SENSITIVITY TEST S909330A1001

1) Remove the key from the ignition switch.
2) Close all windows.
3) Close all doors and the rear gate.
4) Cover the hood with a blanket.
5) Press the LOCK/ARM button of the transmitter.
6) Confirm that the security indicator light blinks every 2 seconds.
7) Hit the center of the windshield with your palm and make sure the alarm operates.



If NG, adjust the impact sensitivity. <Ref. to SL-42, ADJUSTMENT, Security Control Module.>

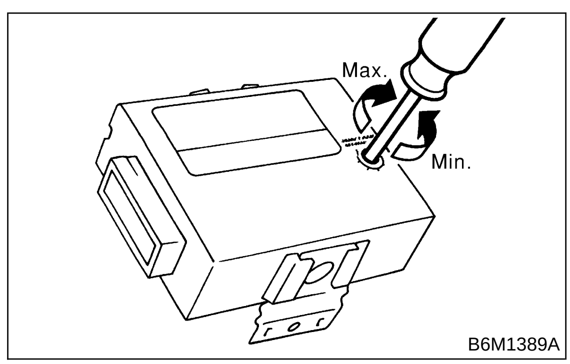
D: ADJUSTMENT S909330A01

1. IMPACT SENSITIVITY S909330A0101

NOTE:
Before adjustment, make sure the security control module has been securely installed on the bracket.

1) Remove security control module. <Ref. to SL-42, REMOVAL, Security Control Module.>
2) Adjust the sensitivity adjust screw in security control module.

NOTE:
After adjusting, be sure to plug the adjust screw hole.

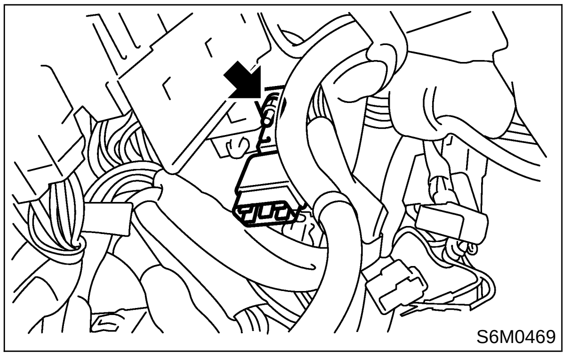


3) Install security control module.
4) Perform impact sensitivity test.

21. Interrupt Relay *S909597*

A: REMOVAL *S909597A18*

1) Disconnect battery ground cable.
2) Remove the mounting nut and detach the interrupt relay (behind the fuse box).



S6M0469

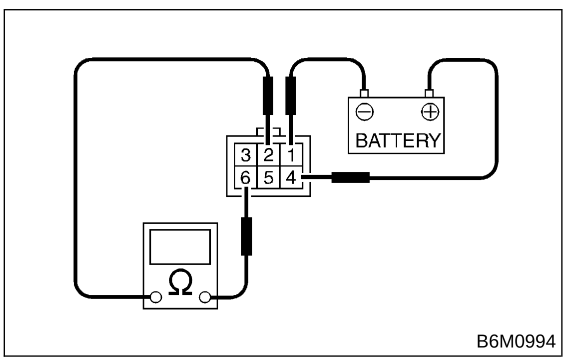
B: INSTALLATION *S909597A11*

Install in the reverse order of removal.

C: INSPECTION *S909597A10*

Measure interrupt relay resistance between terminals (indicated in the table below) when connecting the battery to terminals No. 1 and No. 4.

Current	Terminal No.	Standard
Flow	2 and 6	Less than 1 Ω
No flow		More than 1 MΩ



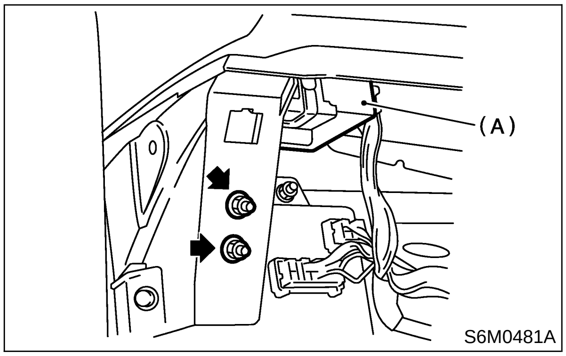
B6M0994

If NG, replace the interrupt relay.

22. Keyless Entry Control Module S909324

A: REMOVAL S909324A18

1) Disconnect battery ground cable.
2) Remove instrument panel lower cover. <Ref. to EI-34, REMOVAL, Instrument Panel Assembly.>
3) Remove nut, then remove keyless entry control module (A) while disconnecting connector.



4) Disconnect keyless entry control module.

B: INSTALLATION S909324A11

Install in the reverse order of removal.

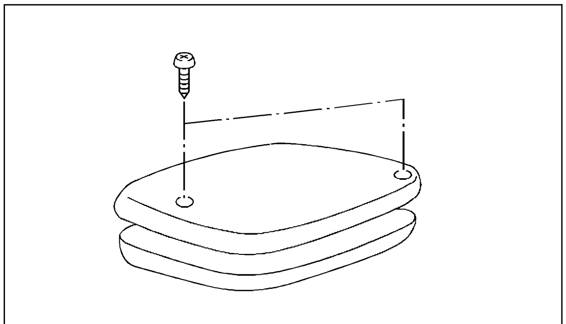
23. Keyless Transmitter S909325

A: REMOVAL S909325A18

1. TRANSMITTER BATTERY S909325A1801

Remove battery from transmitter.

NOTE:
To prevent static electricity damage to transmitter printed circuit board, touch steel area of building with hand to discharge static electricity carried on body or clothes before disassembling transmitter.



B6M0950

B: INSTALLATION S909325A11

1. TRANSMITTER BATTERY S909325A1101

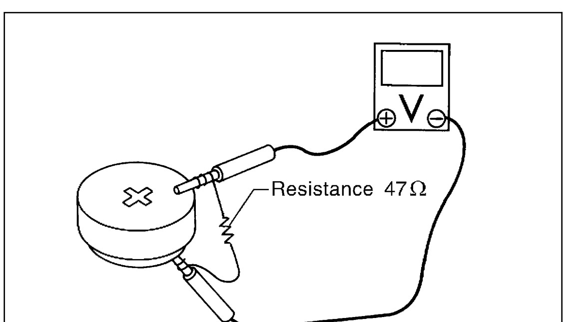
Install in the reverse order of removal.

C: INSPECTION S909325A10

1. TRANSMITTER BATTERY S909325A1001

Measure voltage between battery (+) terminal and (–) terminal.

NOTE:
- Battery discharge occurs during measurement. Complete measurement within 5 seconds.
- During battery voltage measurement, voltage falls more than 1.8 volts in 3 seconds period.



S6M0291A

Tester connection		Voltage (V)
(+)	(–)	
Battery (+) terminal	Battery (–) terminal	More than 2

If NG, replace the battery. (Use CR2032 or equivalent.)

D: REPLACEMENT S909325A20

1. TRANSMITTER REGISTRATION S909325A2001

NOTE:
Perform programming when the transmitter is replaced and when an additional transmitter is required.

NOTE:
Finish operation from step 1) through 4) within 45 seconds.

1) Sit on the driver's seat and close all doors, rear gate.
2) Open the driver's door.
3) Close the driver's door.
4) Turn the ignition switch from ON to LOCK ten times within 15 seconds.

NOTE:
Do not start the engine at this time.

5) The horn chirps one time to indicate that the system has entered in the programming mode.
6) Open the driver's door.
7) Close the driver's door.
8) Press any button on the transmitter that you wish to program into the system.
9) Horn will chirp two times to indicate that the transmitter has been programmed.

NOTE:
Any additional transmitter can also be programmed at this time. Repeat steps 6) through 9) for an additional transmitter.

10) Remove the ignition key from the ignition switch.
11) The horn will chirp three times to indicate that the system has exited the programming mode.
12) Check the keyless entry system properly operates by operating each transmitter.

MEMO:

SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)

SR

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3. Sunroof Lid 6
4. Sunroof Assembly 7
5. Sunroof Motor...9
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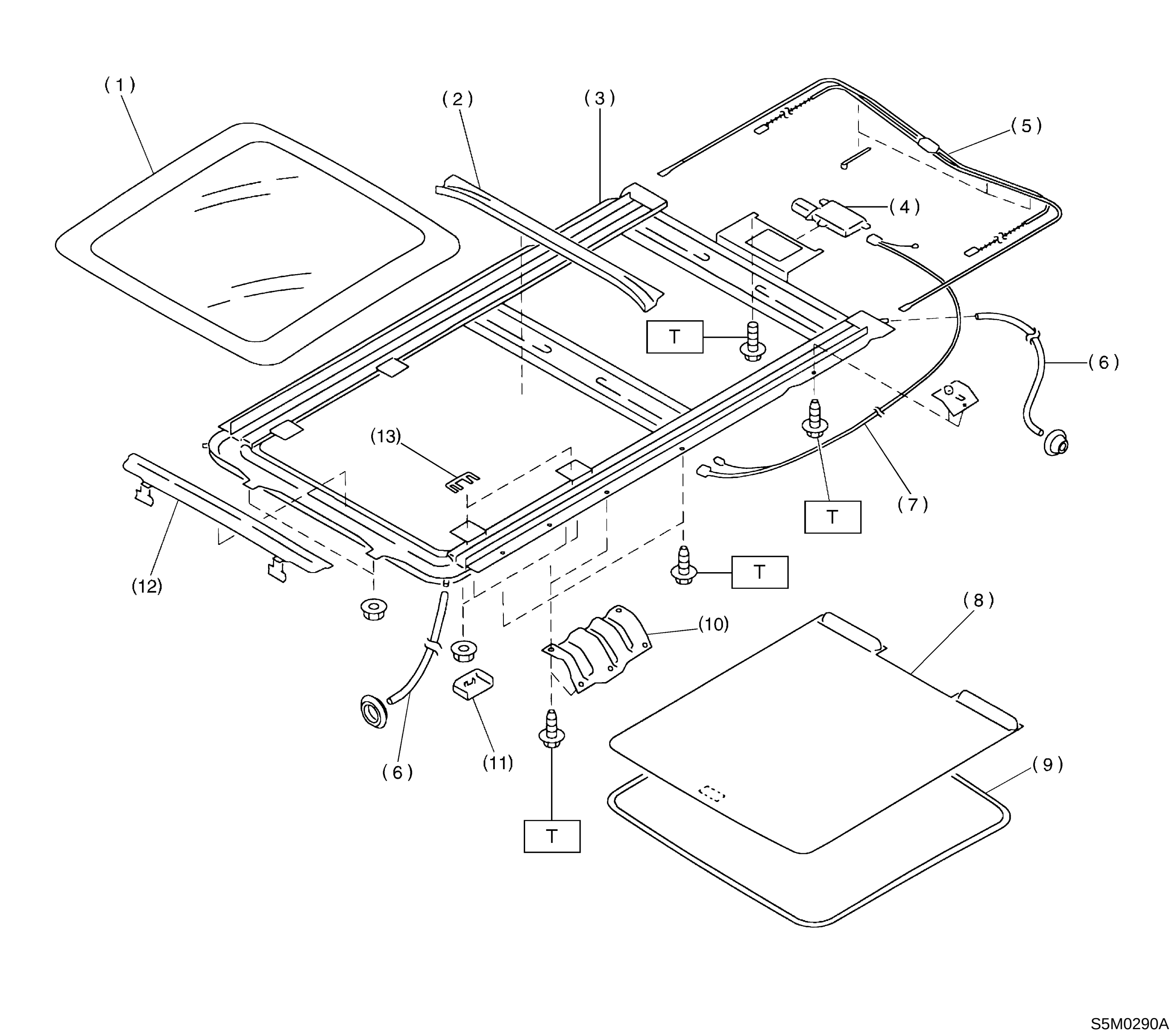
1. General Description S910001

A: COMPONENT S910001A05



(1) Glass lid
(2) Rear drain ASSY
(3) Frame ASSY
(4) Motor ASSY
(5) Drive unit
(6) Drain tube
(7) Harness
(8) Sunshade
(9) Garnish
(10) Frame bracket
(11) Cover
(12) Deflector
(13) Shim

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.4 (0.75, 5.4)

B: CAUTION S910001A03

- Before disassembling or reassembling parts, always disconnect the battery ground cable. When replacing radio, control module, and other parts provided with memory functions, record memory contents before disconnecting the battery ground cable. Otherwise, the memory will be erased.
- Reassemble in reverse order of disassembly, unless otherwise indicated.
- Adjust parts to the given specifications.
- Connect connectors and hoses securely during reassembly.
- After reassembly, make sure functional parts operate smoothly.

C: PREPARATION TOOL S910001A17

1. GENERAL TOOLS S910001A1701

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance and voltage.

2. Sunroof Control System S910328

A: SCHEMATIC S910328A21

1. SUNROOF S910328A2101

<Ref. to WI-107, SCHEMATIC, Sunroof System.>

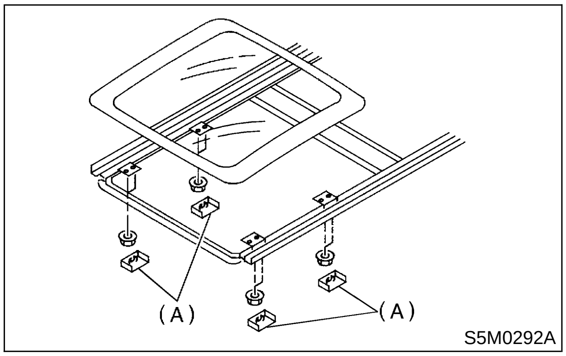
B: INSPECTION S910328A10

Symptom	Checking order
Water leaks.	(1) Check roof panel and sunroof lid for improper or poor sealing. (2) Check drain tube for clogging. (3) Check sunroof frame seal and body for improper fit.
Booming noise	(1) Check sunroof lid and roof panel for improper clearance. (2) Check sunshade and roof trim for improper clearance.
Abnormal motor noise	(1) Check motor for looseness. (2) Check gears and bearings for wear. (3) Check cables for wear. (4) Check cable pipe for deformities.
Failure of sunroof (Motor operates properly.)	(1) Check guide rail for foreign particles. (2) Check guide rail for improper installation. (3) Check parts for mutual interference. (4) Check cable slider for improper clinching. (5) Check cable for improper installation. (6) Check clutch adjustment nut for improper tightness.
Motor does not rotate or rotates improperly.	(1) Check fuse for blow-out. (2) Check switch for improper function. (3) Check motor for incorrect terminal voltage. (4) Check relay for improper operation. (5) Check poor grounding system. (6) Check harness for open or short and terminals for poor connections. (7) Check limit switch for improper operation.

3. Sunroof Lid S910536

A: REMOVAL S910536A18

1) Completely close glass lid and open sunshade.
2) Detach the four covers (A) and then remove the eight nuts.



S5M0292A

3) Carefully remove glass lid.

B: INSTALLATION S910536A11

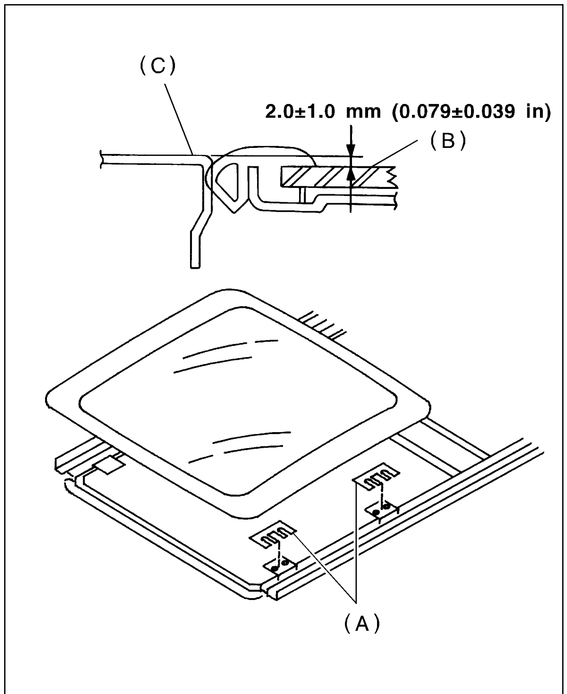
Install in the reverse order of removal.

C: ADJUSTMENT S910536A01

1. ALIGNMENT OF HEIGHT BETWEEN SUNROOF LID AND ROOF PANEL S910536A0101

Loosen sunroof lid nuts and then adjust height by adding (max: two pieces) or extracting (max: two pieces) shims (A) (standard: two pieces) between sunroof lid (B) and roof panel (C).

Difference in height between sunroof lid and roof panel
2.0±1.0 mm (0.079±0.039 in)

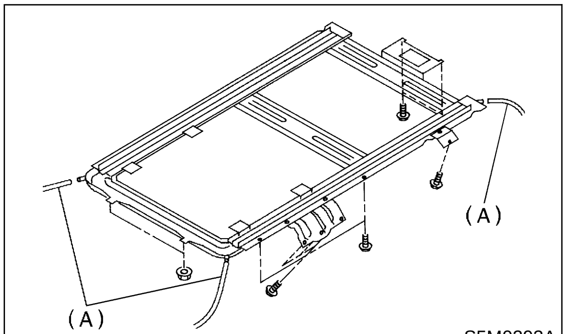


S5M0294C

4. Sunroof Assembly S910329

A: REMOVAL S910329A18

1) Disconnect battery ground cable.
2) Remove roof trim. <Ref. to EI-43, REMOVAL, Roof Trim.>
3) Remove sunroof lid. <Ref. to SR-6, REMOVAL, Sunroof Lid.>
4) Disconnect the four drain tubes (A) from sunroof frame.
5) Disconnect sunroof harness connector.
6) Remove bolts and nuts and then detach sunroof frame.



S5M0293A

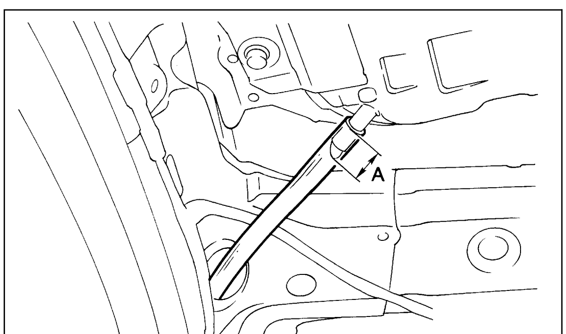
B: INSTALLATION S910329A11

Install in the reverse order of removal.

CAUTION:
Be careful not to snag harness.

NOTE:
- Make sure to connect harness connector.
- When installing drain tube, insert it securely into drain pipe.

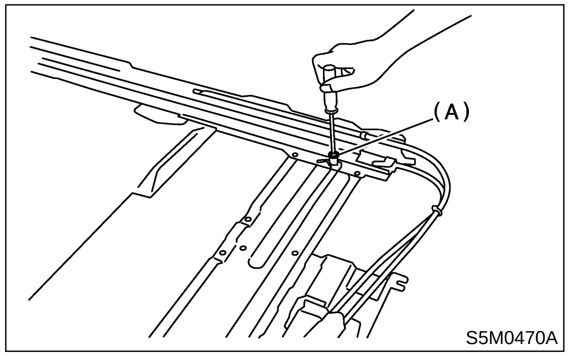
Length A:
15 mm (0.59 in) or more



G5M0205

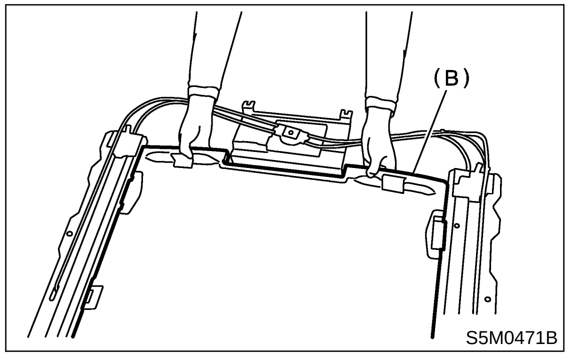
C: DISASSEMBLY S910329A06

1) Remove sunroof frame.
2) Remove rail stoppers (A).



S5M0470A

3) Pull out the sunshade (B) from sunroof frame.



S5M0471B

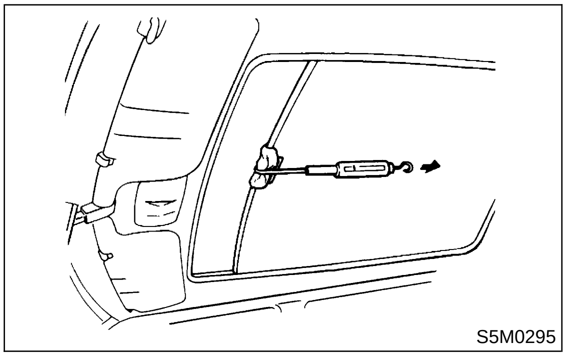
D: ASSEMBLY S910329A02

Assemble in the reverse order of disassembly.

E: INSPECTION S910329A10

1. CHECK FOR MOVEMENT OF SUNSHADE S910329A1001

1) Place a cloth on sunshade, and attach a spring scale to sunshade edge using a cloth.



2) Pull spring scale to measure force required to move the sunshade.

Force required to move sunshade:
Less than 24.5±9.8 N (2.5±1.0 kgf, 5.5±2.2 lb)

NOTE:
Considerable effort is required to start sunshade moving, so take scale reading while sunroof panel is moving smoothly.

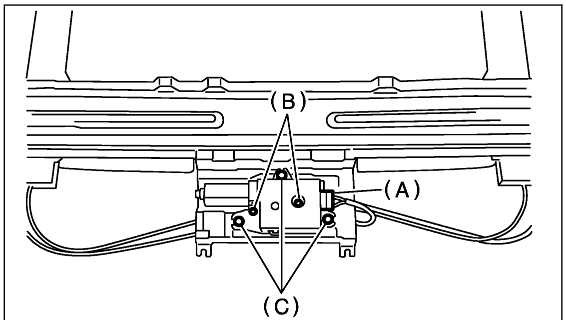
3) If force required exceeds specifications, check the sunroof glass lid, sunshade and deflector, and guide rail assembly for improper installation.

5. Sunroof Motor S910537

A: REMOVAL S910537A18

CAUTION:
- **Fully open sunroof when removing sunroof the motor.**
- **When removing clip, use great care not to damage the roof trim.**

1) Disconnect battery ground cable.
2) Completely open the sunroof.
3) Remove roof trim. <Ref. to EI-43, REMOVAL, Roof Trim.>
4) Disconnect harness connector (A) and remove sunroof motor mounting screw (B) and nut (C).



S5M0472A

B: INSTALLATION S910537A11

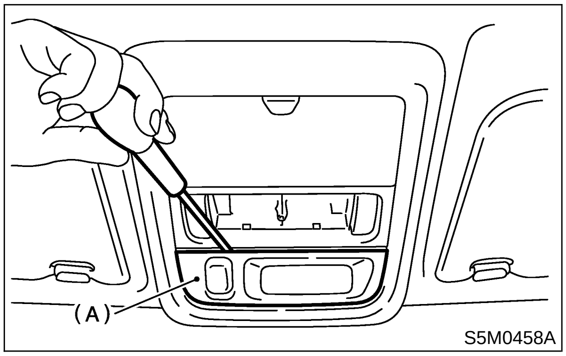
CAUTION:
- **Never rotate the sunroof motor while removed.**
- **Be careful not to move the sunroof cable when installing sunroof motor.**

1) Install sunroof motor.
2) Connect sunroof motor harness connector and then connect battery ground cable.
3) Press and hold sunroof switch in CLOSE position.
4) Check that sunroof stops 150 mm (5.91 in) away from completely closed position.
5) Press sunroof switch to CLOSE position again, check that sunroof completely closes.
6) Press and hold sunroof switch in OPEN position.
7) Check that sunroof stops 550 mm (21.65 in) away from completely closed position.
8) Press sunroof switch to OPEN position again, check that sunroof completely opens.
9) Completely close the sunroof.
10) Install roof trim in reverse order of removal.

6. Sunroof Switch S910538

A: REMOVAL S910538A18

1) Disconnect battery ground cable.
2) Remove sunroof switch panel (A).



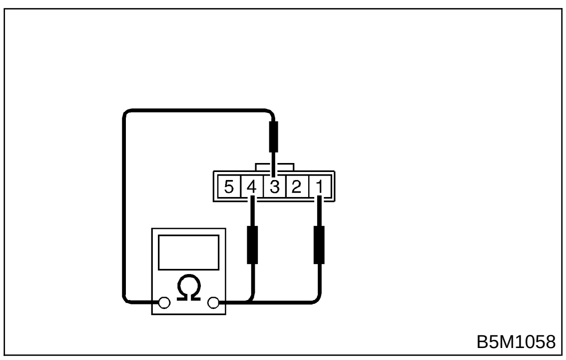
3) Disconnect harness connectors and remove sunroof switch.

B: INSTALLATION S910538A11

Install in reverse order of removal.

C: INSPECTION S910538A10

Measure sunroof switch resistance.



Switch position	Terminal No.	Standard
Open	3 and 4	Less than 1 Ω
Closed	1 and 3	Less than 1 Ω

EXTERIOR/INTERIOR TRIM

EI

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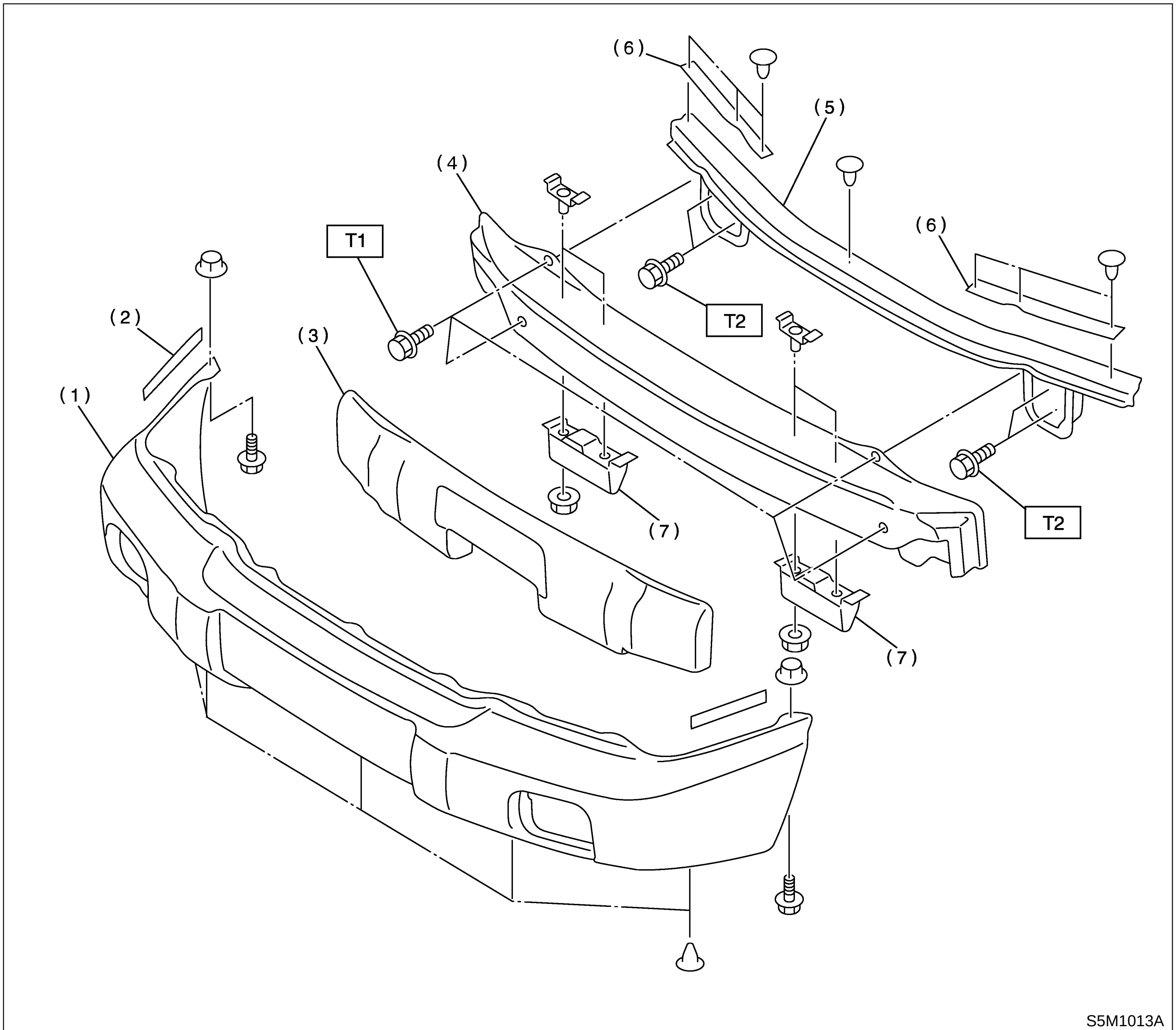
1. General Description S911001

A: COMPONENT S911001A05

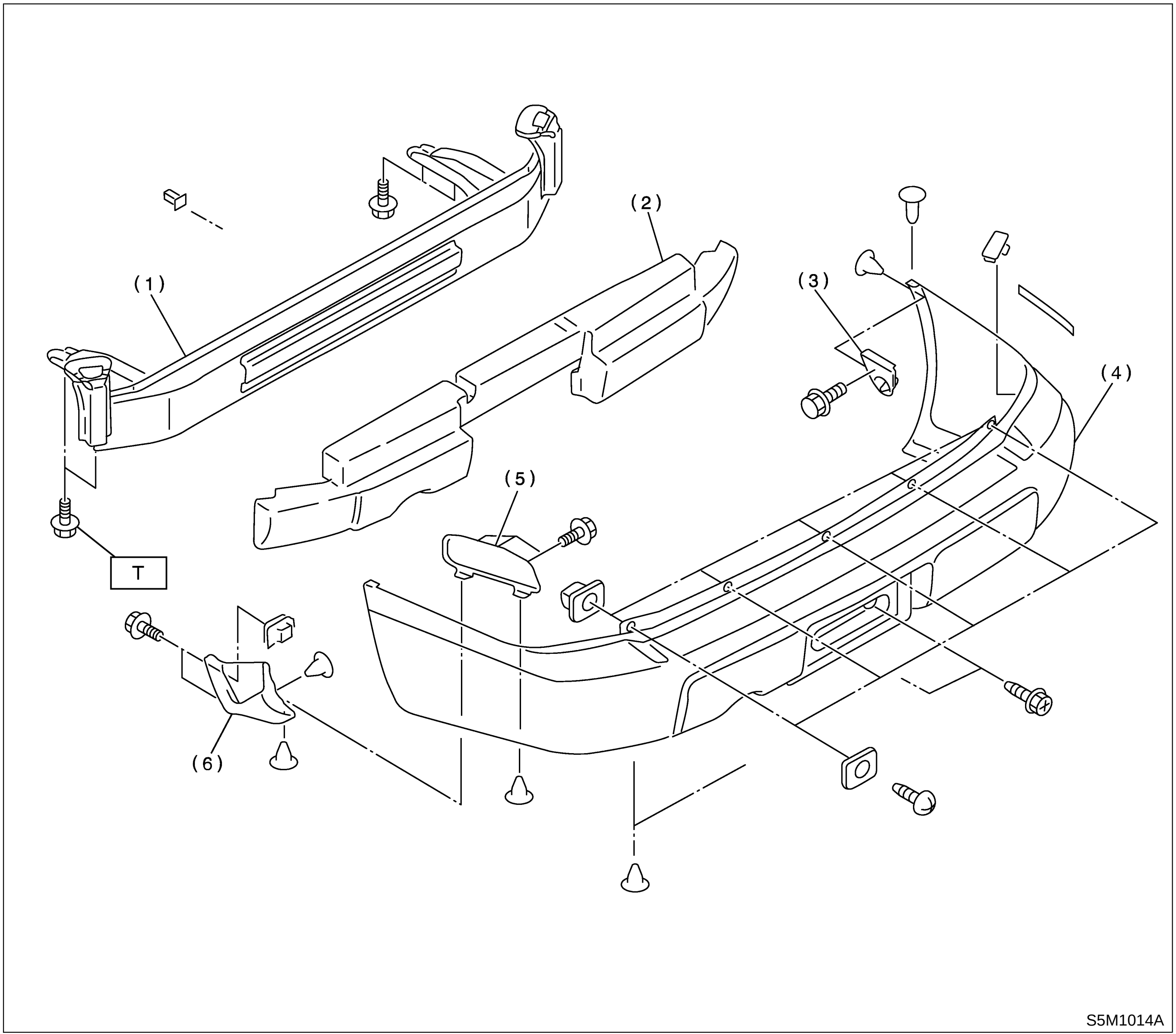
1. FRONT BUMPER S911001A0501



(1) Bumper face
(2) Spacer
(3) E/A foam
(4) Back beam
(5) Beam upper
(6) Plate
(7) Bracket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 33 (3.4, 25)
T2: 70 (7.1, 51)

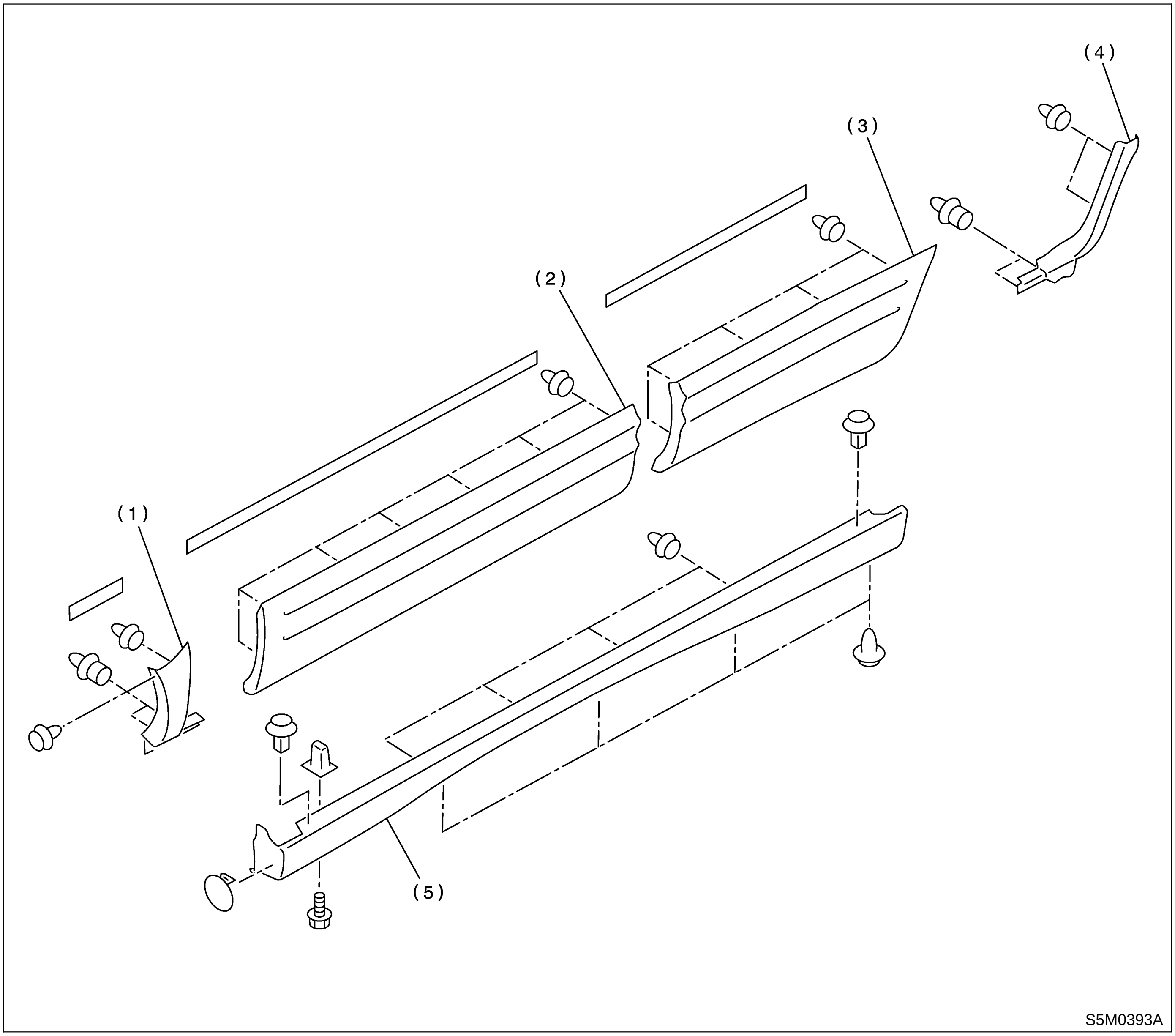
2. REAR BUMPER *S911001A0511*



(1) Bumper beam
(2) E/A foam
(3) Side upper bracket
(4) Bumper face
(5) Bumper side plate
(6) Rear arch cover

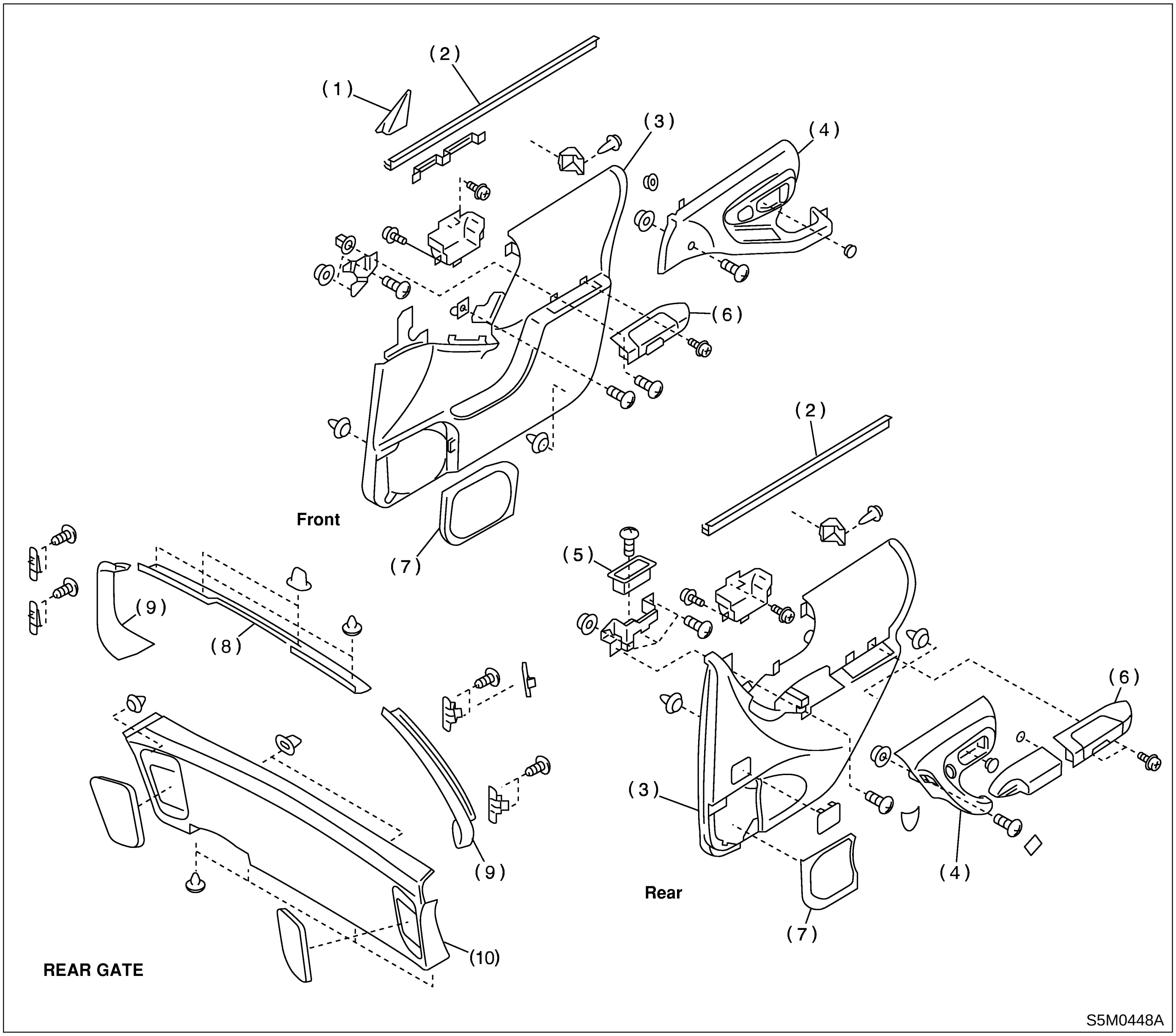
Tightening torque: N·m (kgf-m, ft-lb)
T: 93 (9.5, 69)

3. SIDE PROTECTOR *S911001A0504*



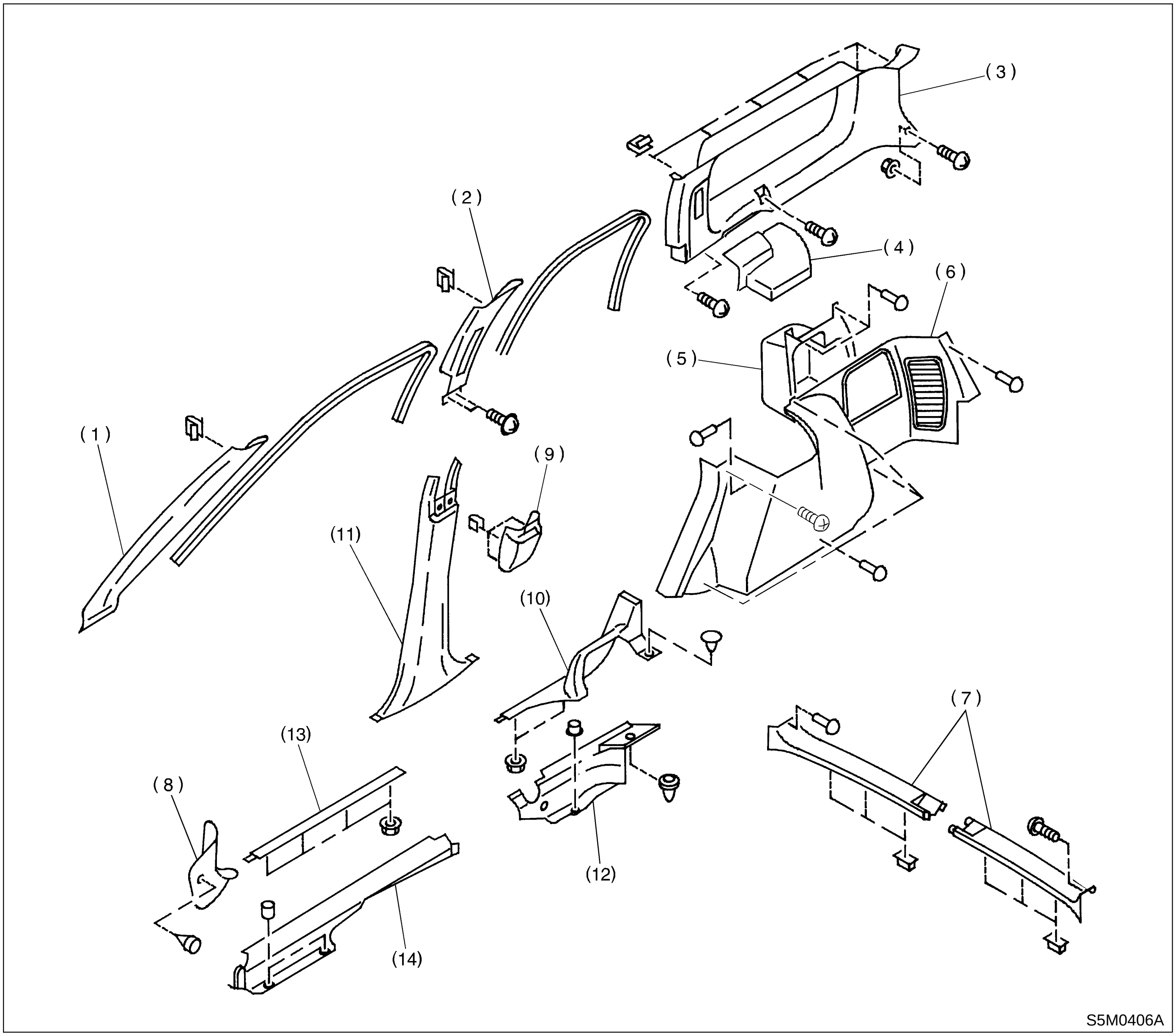
(1) Side protector (Front fender)
(2) Side protector (Front door)
(3) Side protector (Rear door)
(4) Side protector (Rear quarter)
(5) Side protector (Side sill)

4. DOOR TRIM *S911001A0505*



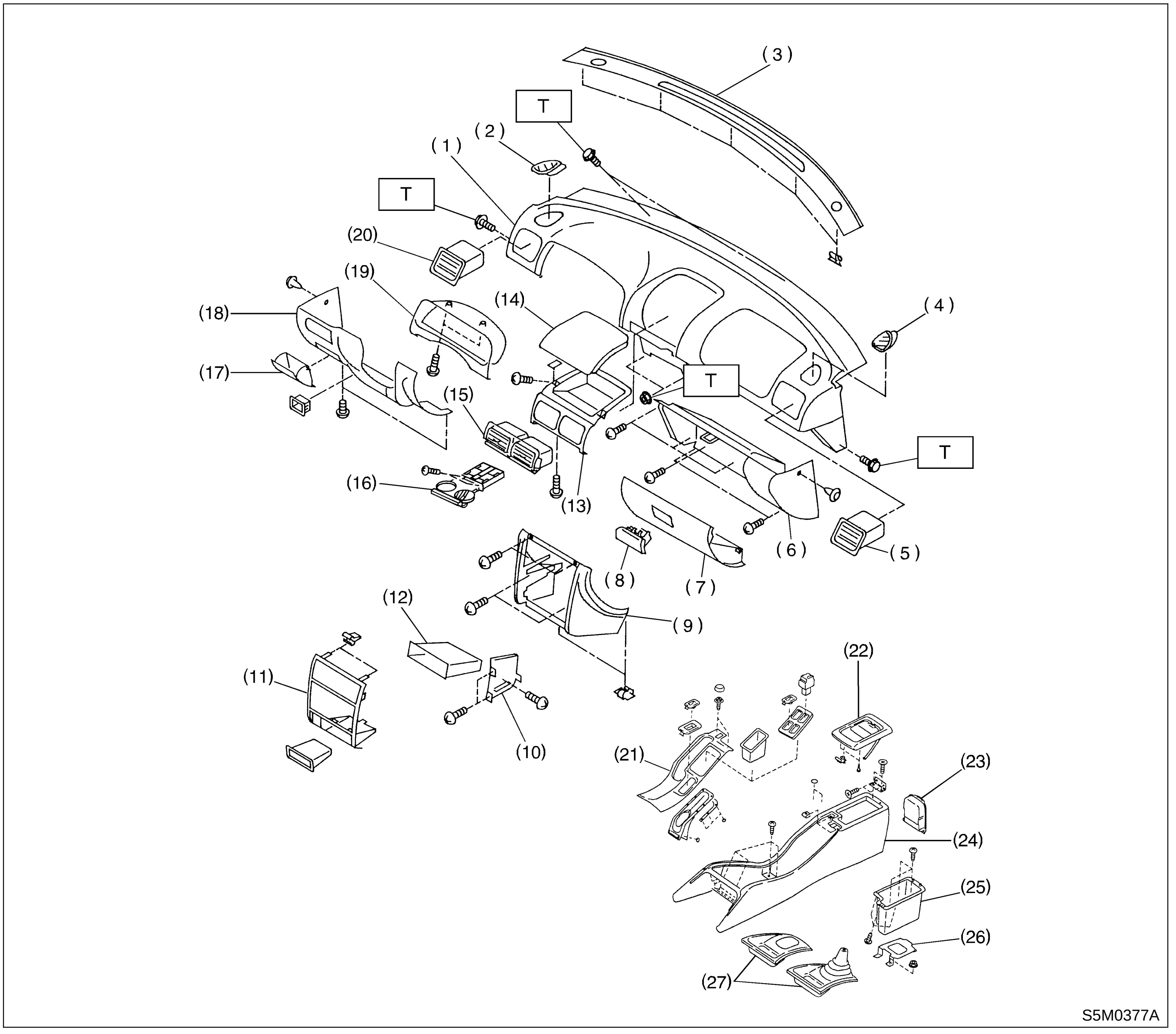
(1) Gusset cover
(2) Weatherstrip
(3) Trim panel
(4) Pull handle
(5) Handle
(6) Pocket
(7) Speaker grille
(8) Upper trim
(9) Side trim
(10) Lower trim

5. INNER TRIM *S911001A0512*



(1) Front pillar upper trim
(2) Center pillar upper trim
(3) Rear pillar upper trim
(4) Cover
(5) Pocket
(6) Rear quarter lower trim
(7) Rear skirt trim
(8) Front pillar lower trim
(9) Center pillar cover
(10) Side sill rear upper cover
(11) Center pillar lower trim
(12) Side sill rear lower cover
(13) Side sill front upper cover
(14) Side sill front lower cover

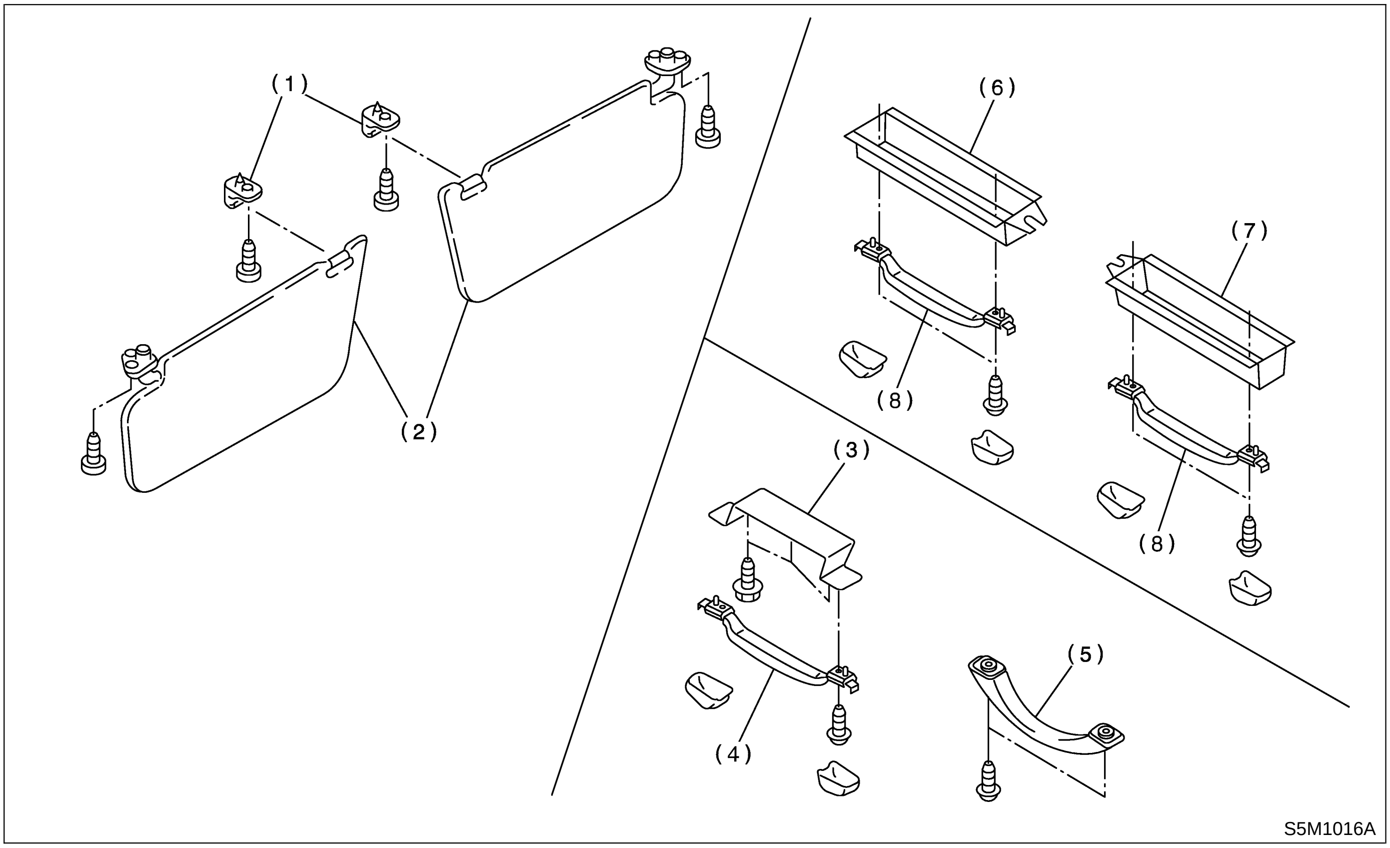
6. INSTRUMENT PANEL *S911001A0508*



(1) Pad & frame
(2) Grille side (D)
(3) Front defroster grille
(4) Grille side (P)
(5) Grille vent (P)
(6) Glove box panel
(7) Glove box lid
(8) Knob
(9) Instrument panel center console
(10) BRKT (Radio)
(11) Center console cover
(12) Pocket
(13) Panel center
(14) Center pocket lid
(15) Grille center
(16) Cup holder
(17) Side pocket
(18) Lower cover ASSY
(19) Meter visor
(20) Grille vent (D)
(21) Console cover
(22) Console lid
(23) Rear cup holder
(24) Console box
(25) Console pocket
(26) Rear console BRKT
(27) Front cover

Tightening torque: N·m (kgf-m, ft-lb)
T: 7 (0.7, 5.1)

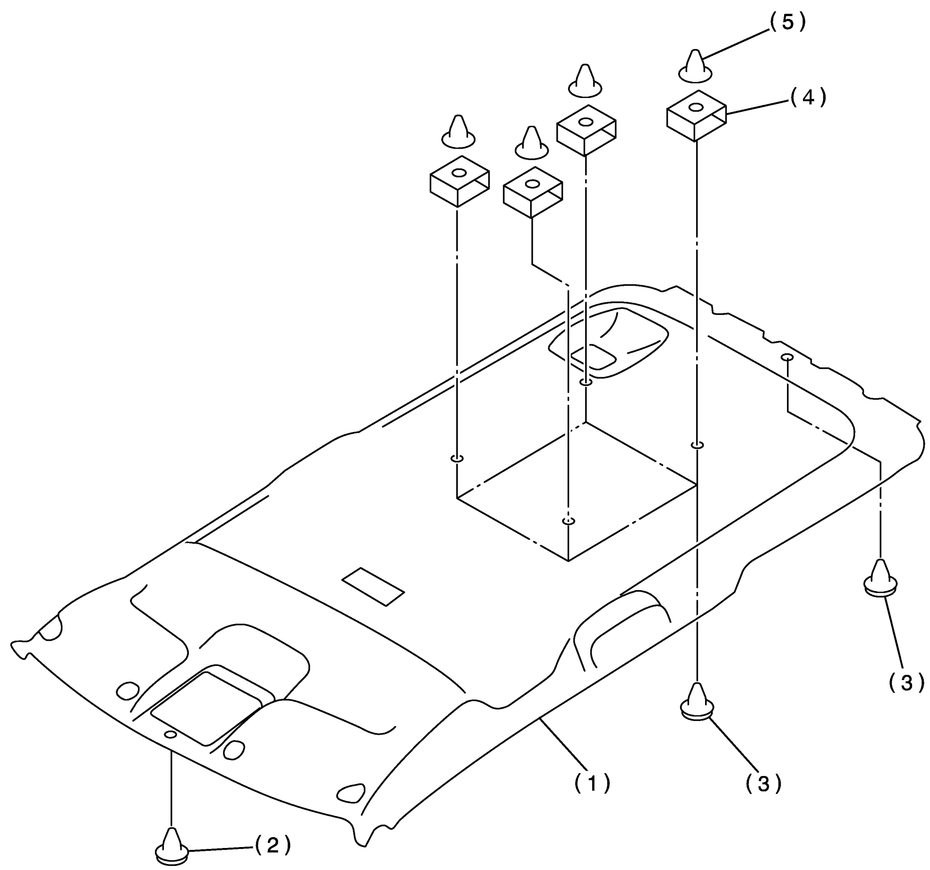
7. INNER ACCESSORIES *S911001A0510*



(1) Hook
(2) Sun visor
(3) Assist rail bracket
(4) Assist grip (retractable)
(5) Assist grip (fixed)
(6) Pad side rail front
(7) Pad side rail rear
(8) Assist grip (retractable)

(3), (4), (5): with sunroof model
(6), (7), (8): without sunroof model

8. ROOF TRIM *S911001A0513*



(1) Roof trim
(2) Clip A
(3) Clip B
(4) Spacer
(5) Clip C

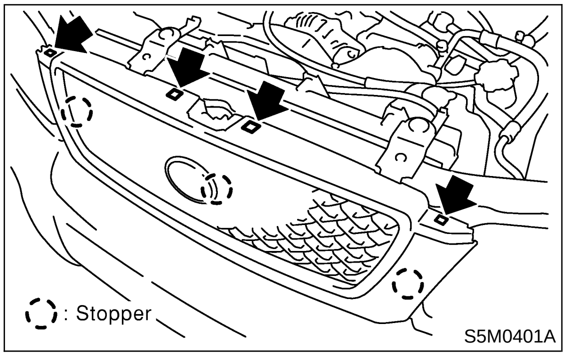
B: PREPARATION TOOL S911001A17

TOOL NAME	REMARKS
Clip remover	Used for removal of trim.
Adhesive remover	Used for removal of side protector.
Primer	Used for installation of side protector.
Infrared lamp	Used for disassembly/assembly of side protector.
Tow-sided tape	Used for installation of side protector.

2. Front Grille *S911379*

A: REMOVAL *S911379A18*

1) Open hood.
2) Remove the four upper clips from the body panel. Push the part shown in the figure by using a screwdriver while lightly pulling the front grille.



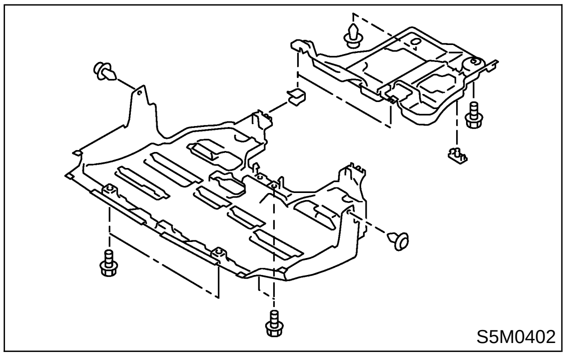
B: INSTALLATION *S911379A11*

1) Attach all clips to front grille.
2) Align them with clip holes in body and push them into place.

3. Front Under Cover S911372

A: REMOVAL S911372A18

1) Lift-up the vehicle.
2) Loosen bolts and clips to remove under cover.



B: INSTALLATION S911372A11

Install in the reverse order of removal.

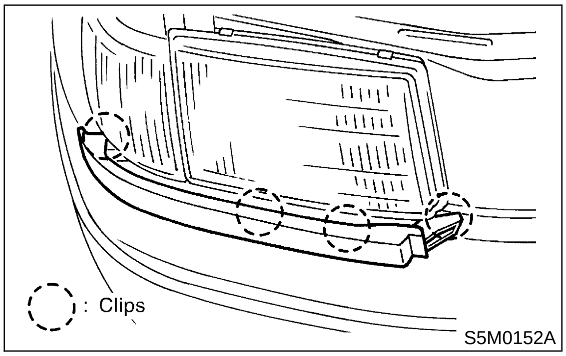
Tightening torque:
18.4 N·m (1.88 kg-m, 3.6 ft-lb)

4. Front Bumper S911371

A: REMOVAL S911371A18

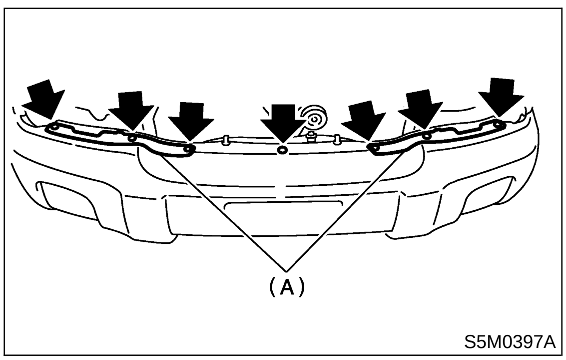
CAUTION:
- **Handle bumper carefully to avoid damage to bumper face.**
- **Do not damage body during removal or installation of bumper.**
- **To avoid damage to bumper, lay removed bumper on sheet spread on the floor. Do not lay it directly on the floor.**

1) Disconnect ground cable from battery.
2) Remove front fog light. <Ref. to LI-15, REMOVAL, Front Fog Light Assembly.>
3) Remove the front grille. <Ref. to EI-11, REMOVAL, Front Grille.>
4) Remove the extension of both sides.



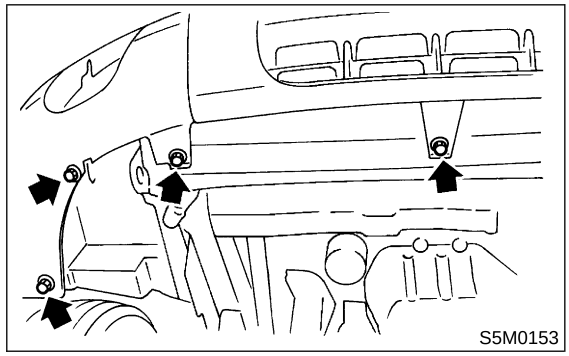
S5M0152A

5) Remove the seven clips and then detach plate (A).

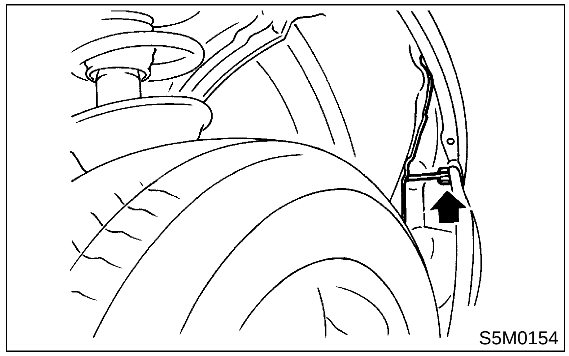


S5M0397A

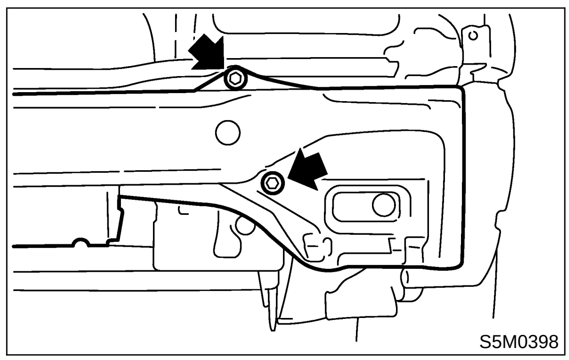
6) Remove under cover. <Ref. to EI-12, REMOVAL, Front Under Cover.>
7) Remove the seven clips from under side of bumper.


S5M0153

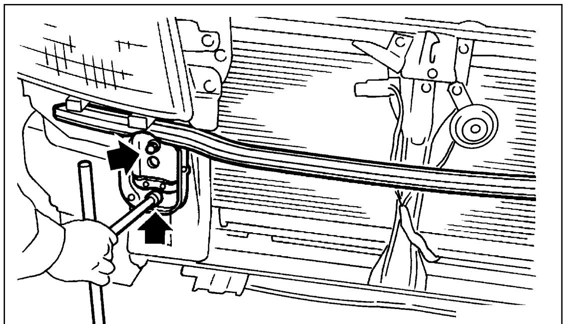
8) Turn over the front mud guard of the front portion and then remove bolt.


S5M0154

9) Remove bumper face and E/A foam.
10) Remove the four bolts and then detach the back beam.


S5M0398

11) Remove the four bolts and then detach the beam upper.



S5M0156

B: INSTALLATION S911371A11

Install in the reverse order of removal.

CAUTION:

● Handle bumper carefully to avoid damage to bumper face.

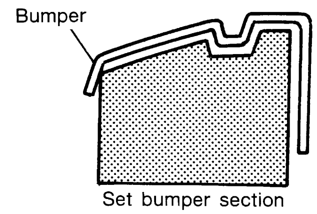
● Do not damage body during removal or installation of bumper.

Tightening torque:

Refer to COMPONENT of General Description. <Ref. to EI-2, FRONT BUMPER, COMPONENT, General Description.>

C: REPAIR S911371A19

1. COATING METHOD FOR PP BUMPER S911371A1901

Process No.	Process name	Job contents	
1	Bumper mounting	Set bumper on paint worktable if required. Use paint worktable conforming to inner shape of bumper when possible.	 G5M0164
2	Masking	Mask specified part (black base) with masking tape. Use masking tape for PP (example, Nichiban No. 533, etc.).	
3	Degreasing, cleaning	Clean all parts to be painted with white gasoline, normal alcohol, etc. to remove dirt, oil, fat, etc.	
4	Primer paint	Apply primer one to all parts to be painted, using air gun. Use primer (clear).	
5	Drying	Dry at normal temperature [10 to 15 min. at 20°C (68°F)]. In half-dried condition, PP primer paint is dissolved by solvent, e.g. thinner, etc. Therefore, if dust or dirt must be removed, use ordinary alcohol, etc.	
6	Top coat paint (I)	**Solid color** Use section (block) paint for top coat. ● Paint in use (for each color): Solid paint Hardener PB Thinner T-301 ● Mixing ratio: Main agent vs. hardener = 4:1 ● Viscosity: 10 — 13 sec/20°C (68°F) ● Film thickness: 35 — 45µ ● Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm^2, 36 — 50 psi)	**Metallic color** Use section (block) paint for top coat. ● Paint in use (for each color): Metallic paint Hardener PB Thinner T-306 ● Mixing ratio: Main agent vs. hardener = 10:1 ● Viscosity: 10 — 13 sec/20°C (68°F) ● Film thickness: 15 — 20µ ● Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm^2, 36 — 50 psi)
7	Drying	Not required.	Dry at normal temperature [10 min. or more at 20°C (68°F)]. In half-dried condition, avoid dust, dirt.
8	Top coat paint (II)	Not required.	Apply a clear coat to parts with top coat paint (I), three times, at 5 — 7 minutes intervals. ● Paint in use: Metallic paint Hardener PB Thinner T-301 ● Mixing ratio: Clear vs. hardener = 6:1 ● Viscosity: 14 — 16 sec/20°C (68°F) ● Film thickness: 25 — 30µ ● Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm^2, 36 — 50 psi)
9	Drying	60°C (140°F), 60 min. or 80°C (176°F), 30 min. If higher than 80°C (176°F), PP may be deformed. Keep maximum temperature of 80°C (176°F).	
10	Inspection	Paint check.	
11	Masking removal	Remove masking in process No. 2.	

2. REPAIR INSTRUCTIONS FOR COLORED PP BUMPER S911371A1902

NOTE:
All PP bumpers are provided with a grained surface, and if the surface is damaged, it cannot normally be restored to its former condition. Damage limited to shallow scratches that cause only a change in the lustre of the base material or coating, can be almost fully restored. Before repairing a damaged area, explain this point to the customer and get an understanding about the matter. Repair methods are outlined below, based on a classification of the extent of damage.

- **Minor damage causing only a change in the lustre of the bumper due to a light touch**

Almost restorable.

<table>
<tr><th>Process No.</th><th>Process name</th><th colspan="2">Job contents</th></tr>
<tr><td>1</td><td>Cleaning</td><td colspan="2">Clean the area to be repaired using water.</td></tr>
<tr><td>2</td><td>Sanding</td><td colspan="2">Grind the repairing area with #500 sand paper in a “feathering” motion.</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">Finish</td><td>Resin section</td><td>Coated section</td></tr>
<tr><td>Repeatedly apply wax to the affected area using a soft cloth (such as flannel). Recommended wax: NITTO KASEI Soft 99 TIRE WAX BLACK, or equivalent.</td><td rowspan="2">Perform either the same operation as for the resin section or process No. 18 and subsequent operations in the “(3)” section, depending on the degree and nature of damage.</td></tr>
<tr><td>Polish the waxed area with a clean cloth after 5 to 10 minutes.</td></tr>
</table>

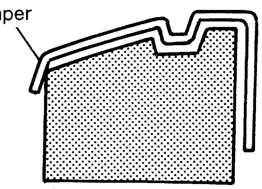
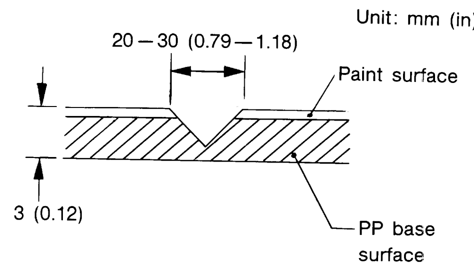
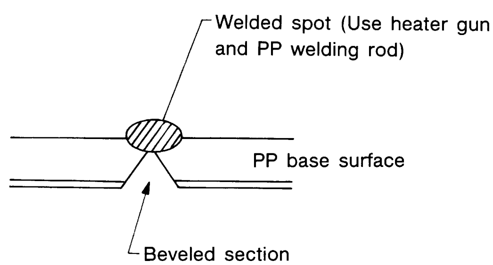
- **Deep damage caused by scratching fences, etc.**

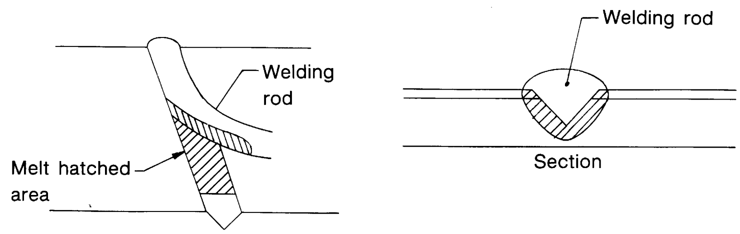
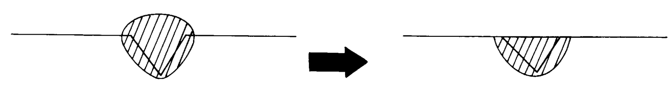
A dent cannot be repaired but a whitened or swelled part can be removed.

<table>
<tr><th>Process No.</th><th>Process name</th><th colspan="2">Job contents</th></tr>
<tr><td>1</td><td>Cleaning</td><td colspan="2">Clean damaged area with water.</td></tr>
<tr><td>2</td><td>Removal of damaged area</td><td colspan="2">Cut off protruding area, if any, due to collision, using a putty knife.</td></tr>
<tr><td>3</td><td>Sanding</td><td colspan="2">Grind the affected area with #100 to #500 sand paper.</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Finish</td><td>Resin section</td><td>Coated section</td></tr>
<tr><td>Same as Process No. 3 in the “(1)” section.</td><td>Perform Process No. 12 and subsequent operations in the “(3)” section.</td></tr>
</table>

● Deep damage such as a break or hole that requires filling

Much of the peripheral grained surface must be sacrificed for repair, and the degree of restoration is not really worth the expense. (The surface, however, will become almost flush with adjacent areas.)
Recommended repair kit: PP Part Repair Kit (NRM)

Process No.	Process name	Job contents	
1	Bumper removal	Remove bumper as required.	
2	Part removal	Remove parts built into bumper as required.	
3	Bumper placement	Place bumper on a paint worktable as required. It is recommended that contour of worktable accommodate internal shape of bumper.	 G5M0164
4	Surface preparation	Remove dust, oil, etc. from areas to be repaired and surrounding areas, using a suitable solvent (NRM No. 900 Precleno, white gasoline, or alcohol).	
5	Cutting	If nature of damage are cracks or holes, cut a guide slit of 20 to 30 mm (0.79 to 1.18 in) in length along the crack or hole up to the bumper's base surface. Then, bevel or "vee-out" the affected area using a knife or grinder.	 G5M0165
6	Sanding (I)	Grind beveled surface with sand paper (#40 to #60) to smooth finish.	
7	Cleaning	Clean the sanded surface with the same solvent as used in Process No. 4.	
8	Temporary welding	Grind the side just opposite the beveled area with sand paper (#40 to #60) and clean using a solvent. Temporarily spot-weld the side, using a PP welding rod and heater gun.  G5M0166 NOTE: ● Do not melt welding rod until it flows out. This results in reduced strength. ● Leave the welded spot unattended until it cools completely.	

Process No.	Process name	Job contents
9	Welding	Using a heater gun and PP welding rod, weld the beveled spot while melting the rod and damaged area.  G5M0167 NOTE: ● Melt the sections indicated by hatched area. ● Do not melt welding rod until it flows out, in order to provide strength. ● Always keep the heater gun 1 to 2 cm (0.4 to 0.8 in) away from the welding spot. ● Leave the welded spot unattended until it cools completely.
10	Sanding (II)	Remove excess part of weld with a putty knife. If a drill or disc wheel is used instead of the knife, operate it at a rate lower than 1,500 rpm and grind the excess part little by little. A higher rpm will cause the PP substrate to melt from the heat.  G5M0168 Sand the welded spot smooth with #240 sand paper.
11	Masking	Mask the black substrate section using masking tape. Recommended masking tape: Nichiban No. 533 or equivalent
12	Cleaning/ degreasing	Completely clean the entire coated area, using solvent similar to that used in Process No. 4.
13	Primer coating	Apply a coat of primer to the repaired surface and its surrounding areas. Mask these areas, if necessary. Recommended primer: Mp/ 364 PP Primer NOTE: Be sure to apply one coat of primer at a spraying pressure of 245 to 343 kPa (2.5 to 3.5 kg/cm^2, 36 to 50 psi) with a spray gun.
14	Leave unattended.	Leave the repaired area unattended at 20°C (68°F) for 10 to 15 minutes until primer is half-dry. NOTE: If dirt or dust comes in contact with the coated area, wipe it off with a cloth dampended with alcohol. (Do not use thinner since the coated area tends to melt.)
15	Primer surfacer coating	Apply a coat of primer surfacer to the repaired area two or three times at an interval of 3 to 5 minutes. Recommended surfacer: ● UPS 300 Flex Primer ● No. 303 UPS 300 Exclusive hardener ● NPS 725 Exclusive Reducer (thinner) ● Mixing ratio: 2 : 1 (UPS 300: No. 303) ● Viscosity: 12 — 14 sec/20°C (68°F) ● Coated film thickness: 40 — 50µ
16	Drying	Allow the coated surface to dry for 60 minutes at 20°C (68°F) [or 30 minutes at 60°C (140°F)].
17	Sanding (III)	Sand the coated surface and its surrounding areas using #400 sand paper and water.
18	Cleaning/ degreasing	Same as Process No. 12.

<table>
<tr><th>Process No.</th><th>Process name</th><th colspan="2">Job contents</th></tr>
<tr><td rowspan="2">19</td><td rowspan="2">Top coat (I)</td><td>Solid color</td><td>Metallic color</td></tr>
<tr><td>Use a “block” coating method.
● Recommended paint:
Suncryl (SC)
No. 307 Flex Hardener
SC Reducer (thinner)
● Mixing ratio: 3 : 1
Suncryl (SC) vs. No. 307 Flex Hardener
● Viscosity: 11 — 13 sec/20°C (68°F)
● Coated film thickness: 40 — 50µ
● Spraying thickness: 245 — 343 kPa
(2.5 — 3.5 kg/cm^2, 36 — 50 psi)</td><td>Use a “block” coating method.
● Recommended paint:
Suncryl (SC)
No. 307 Flex Hardener
SC Reducer (thinner)
● Mixing ratio: 3 : 1
Suncryl (SC) vs. No. 307 Flex Hardener
● Viscosity: 11 — 13 sec/20°C (68°F)
● Coated film thickness: 20 — 30µ
● Spraying thickness: 245 — 343 kPa
(2.5 — 3.5 kg/cm^2, 36 — 50 psi)</td></tr>
<tr><td>20</td><td>Leave unattended.</td><td>Not required.</td><td>Leave unattended at 20°C (68°F) for at least 10 minutes until the topcoated area is half-dry.
NOTE:
Be careful to keep dust or dirt from coming in contact with the affected area.</td></tr>
<tr><td>21</td><td>Top coat (II)</td><td>Not required.</td><td>Apply a clear coat three times at an interval of 3 to 5 minutes.
● Recommended paint:
SC710 Overlay Clear
No. 307 Flex Hardener
SC Reducer (thinner)
● Mixing ratio: 3 : 1
Suncryl (SC) vs. No. 307 Flex Hardener
● Viscosity: 10 — 13 sec/20°C (68°F)
● Coated film thickness: 20 — 30µ
● Spraying pressure: 245 — 343 kPa
(2.5 — 3.5 kg/cm^2, 36 — 50 psi)</td></tr>
<tr><td>22</td><td>Drying</td><td colspan="2">Allow the coated surface to dry at 20°C (68°F) for two hours or 60°C (140°F) for 30 minutes.
NOTE:
Do not allow the temperature to exceed 80°C (176°F) since this will deform the PP substrate.</td></tr>
<tr><td>23</td><td>Inspection</td><td colspan="2">Carefully check the condition of the repaired area.</td></tr>
<tr><td>24</td><td>Masking removal</td><td colspan="2">Remove masking tape applied in Process No. 11 and 13.</td></tr>
<tr><td>25</td><td>Parts installation</td><td colspan="2">Install parts on bumper in reverse order of removal.</td></tr>
<tr><td>26</td><td>Bumper installation</td><td colspan="2">Install bumper.</td></tr>
</table>

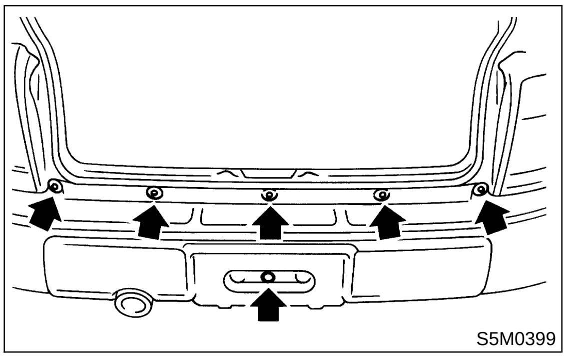
5. Rear Bumper S911370

A: REMOVAL S911370A18

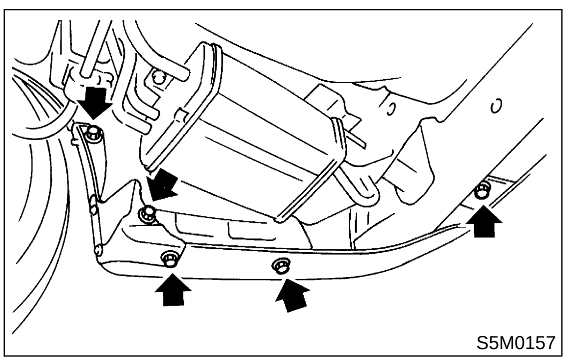
CAUTION:

- **Handle bumper carefully to avoid damage to bumper face.**
- **Do not damage body during removal or installation of bumper.**
- **To avoid damage to bumper, lay removed bumper on sheet spread on the floor. Do not lay it directly on the floor.**

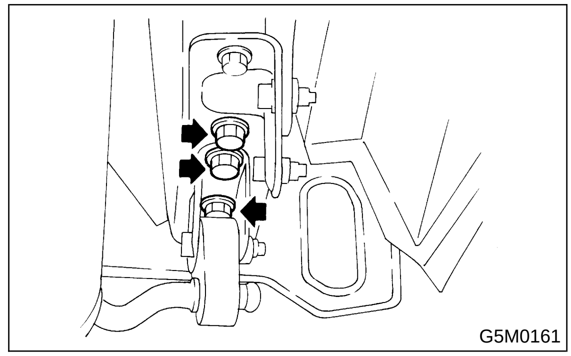
1) Disconnect ground cable from battery.
2) Open rear gate.
3) Remove the five screws and the clip from the rear bumper.



4) Disconnect license plate light connectors.
5) Remove bolts and clips from under side of bumper.



6) Remove bumper face and E/A foam.
7) Remove the canister. <Ref. to EC-5, REMOVAL, Canister.>
8) Remove bolts from bumper stay.



9) Remove rear bumper beam.

B: INSTALLATION S911370A11

CAUTION:
- **Handle bumper carefully to avoid damage to bumper face.**
- **Do not damage body during removal or installation of bumper.**

Install in the reverse order of removal.

Tightening torque:
Refer to COMPONENT of General Description. <Ref. to EI-3, REAR BUMPER, COMPONENT, General Description.>

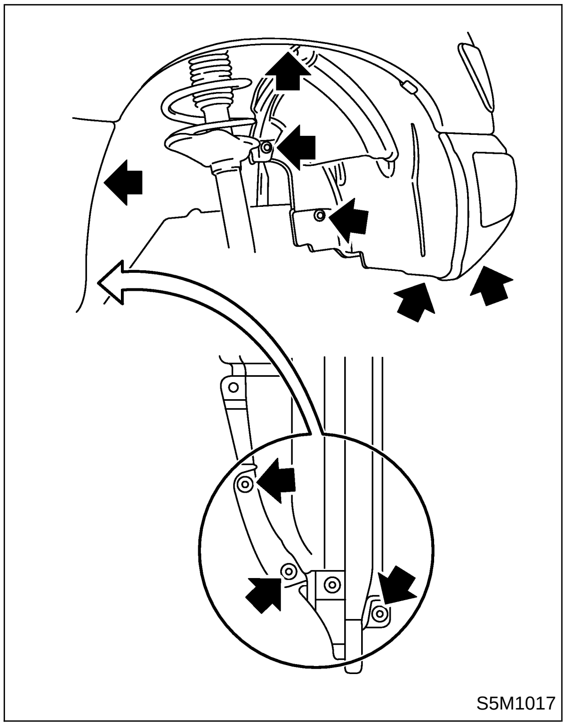
C: REPAIR S911370A19

Refer to front bumper repair. <Ref. to EI-13, REMOVAL, Front Bumper.>

6. Mud Guard *S911374*

A: REMOVAL *S911374A18*

1) Jack-up the vehicle.
2) Remove screws and clips. Move mud guard toward the center of the body and remove mud guard.

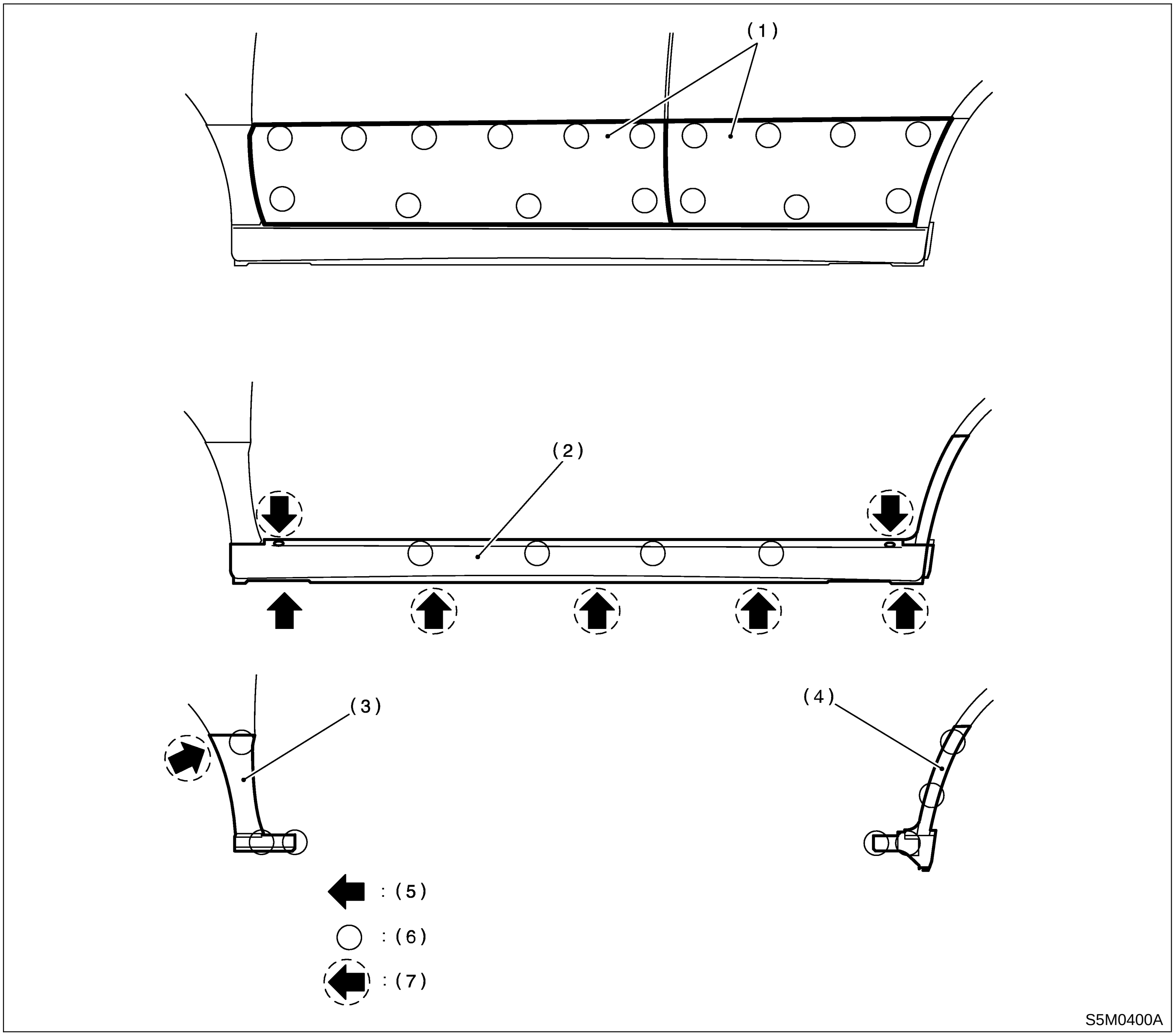


B: INSTALLATION *S911374A11*

Insert hook into body, and tighten it with screw and clip.

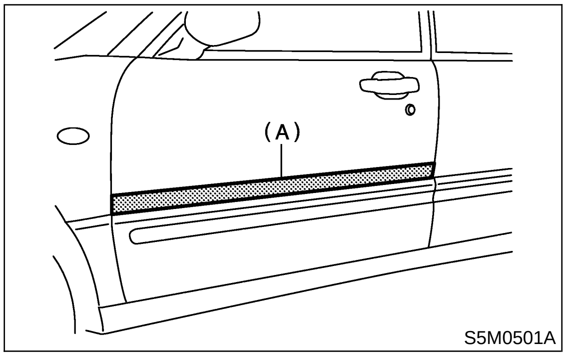
7. Protector *S911380*

A: REMOVAL *S911380A18*



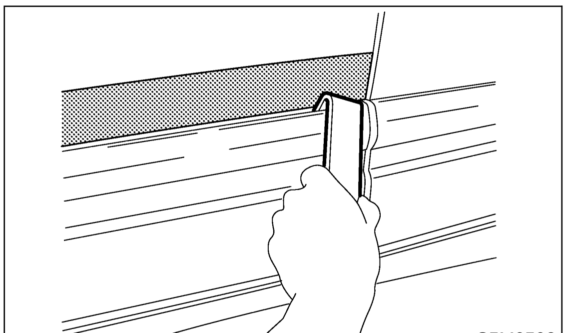
(1) Side protector (Door)
(2) Side protector (Side sill)
(3) Side protector (Front fender)
(4) Side protector (Rear quarter)
(5) Screw
(6) Clip
(7) Clip

1) Attach masking tape (A) on the upper painted area of the protector.



S5M0501A

2) Release clip engagement using clip remover, and remove the protector while peeling off two-sided tape.


S5M0502

NOTE:
- To increase adhesive remover strength, leave two-sided tape on body and side protector.
- If two-sided tape is too thick, use a putty knife to cut it thin so that adhesive remover is ready for use.
- If two-sided tape is hard to remove, heat to approximately 40°C (104°F).

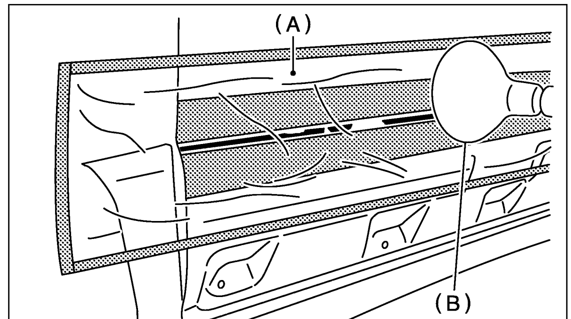
3) Apply an even coat of adhesive remover to the two-sided tape.

Recommended adhesive remover:
SUMITOMO 3M4000 or equivalent

CAUTION:
Do not apply adhesive remover to lacquer base coated body panels.

4) Attach plastic wrap (A) to adhesive remover coated areas and heat to 40 to 60°C (104 to 140°F) for 5 to 10 minutes using an infrared lamp (B).

CAUTION:
Do not overheat until plastic wrap is somewhat white.



S5M0503A

5) Using a plastic spatula, remove traces of two-sided tape from body panel.
6) Remove masking tape and clean traces of two-sided tape using a cloth dampened with white gasoline.
7) Similarly, clean traces of adhesive from two-sided tape on side protector.

CAUTION:
Make sure side protector is clean and free of adhesive remover. Clean if necessary.

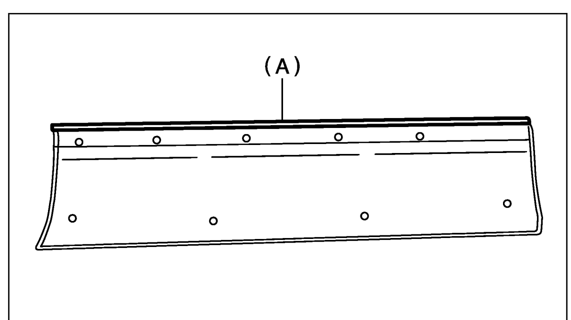
B: INSTALLATION *S911380A11*

1) Apply primer to original side protector (if used), and attach two-sided tape (A) to upper of side protectors as shown.

Two-sided tape:
Thickness; 1.2 mm (0.047 in)
Width; 5 mm (0.20 in)

Recommended primer:
SUMITOMO 3MK-500 or equivalent

Recommended two-sided tape:
SUMITOMO 3M5305 or equivalent



S5M0504A

2) Using an infrared lamp, heat body panel to 40 to 60°C (104 to 140°F) and rear surface of side protector to 20 to 30°C (68 to 86°F).

3) Remove tack paper from two-sided paper. While aligning clips with holes in body panel, attach two-sided tape to side protector and body panel with a force of more than 49 N (5 kgf, 11 lb) with roller. Do not allow air to enter mating surface of the two.

CAUTION:

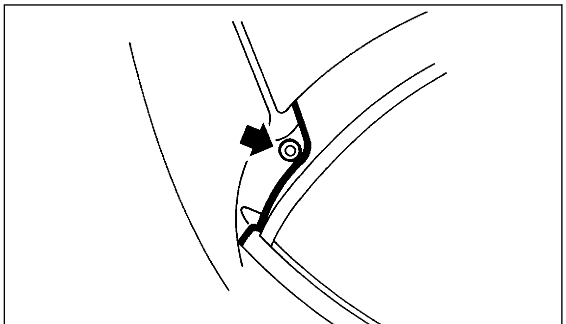
- **To maintain adhesive power, do not wash the vehicle for 24 hours after tape application.**
- **Push clip in securely using hands.**

(To prevent deformation, do not use excessive force.)

8. Cowl Panel *S911387*

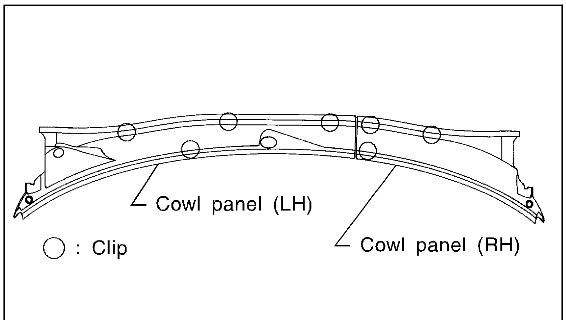
A: REMOVAL *S911387A18*

1) Remove cowl panel side.



S5M0167

2) Open the front hood.
3) Remove wiper arm. <Ref. to WW-12, REMOVAL, Front Wiper Arm.>
4) Lift cowl panel (RH), and then lift cowl panel (LH).



S5M0168A

B: INSTALLATION *S911387A11*

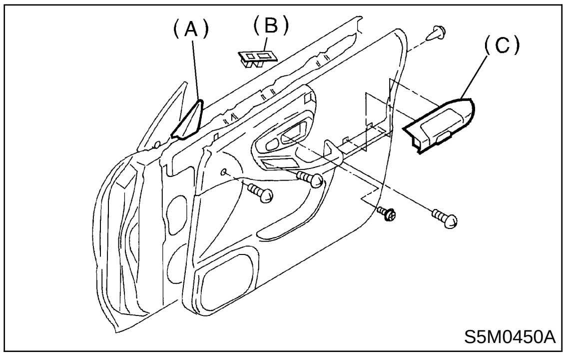
Install in the reverse order of removal.

9. Front Door Trim S911356

A: REMOVAL S911356A18

CAUTION:
Do not apply excessive force to clip. Otherwise the clip may be broken.

1) Remove gusset cover (A), power window switch assembly (B) and pocket (C).
2) Remove screws, and then detach trim panel.



B: INSTALLATION S911356A11

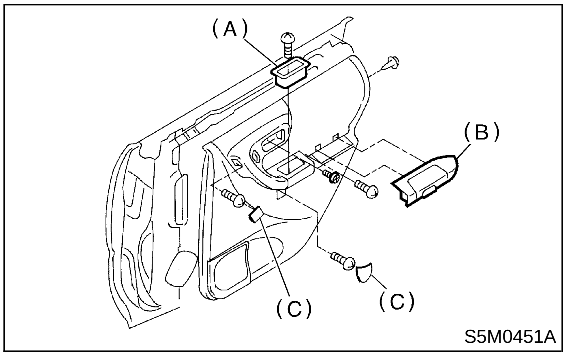
Install in the reverse order of removal.

10. Rear Door Trim *S911354*

A: REMOVAL *S911354A18*

CAUTION:
Do not apply excessive force to clip. Otherwise the clip may be broken.

1) Remove handle (A), pocket (B) and clips (C).
2) Remove screws, and then detach trim panel.



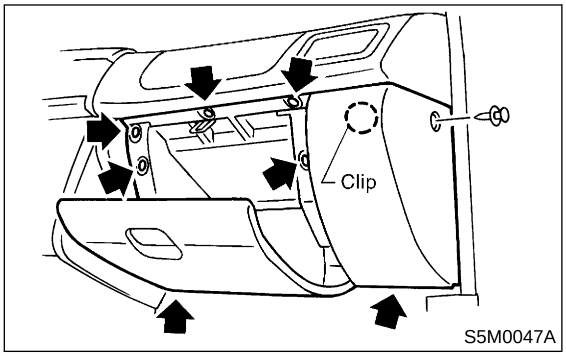
B: INSTALLATION *S911354A11*

Install in the reverse order of removal.

11. Glove Box *S911558*

A: REMOVAL *S911558A18*

Loosen screws to remove glove box.



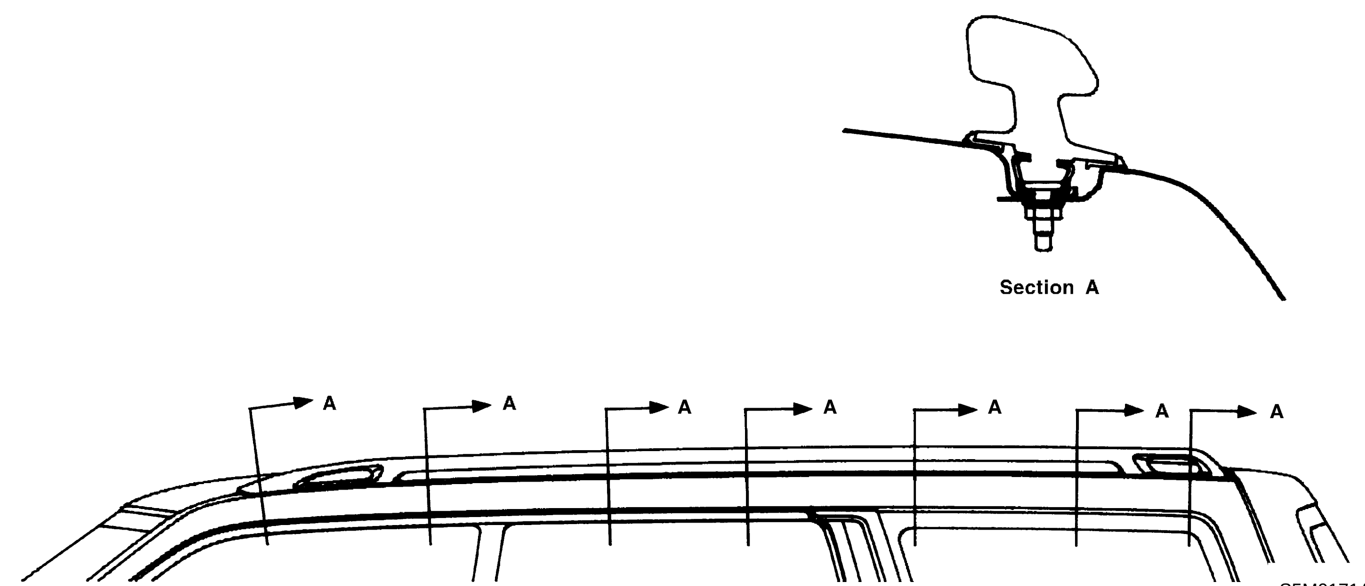
B: INSTALLATION *S911558A11*

Install in the reverse order of removal.

12. Roof Rail S911383

A: REMOVAL S911383A18

1) Remove roof trim. <Ref. to EI-43, REMOVAL, Roof Trim.>
2) Remove seven mounting nuts and then detach roof rail carefully.



S5M0171A

B: INSTALLATION S911383A11

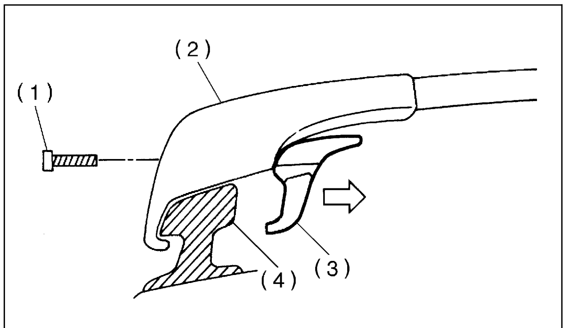
Install in the reverse order of removal.

CAUTION:
Be careful not to scratch body panels with roof rail stud bolts when removing and installing them.

13. Crossbar S911388

A: REMOVAL S911388A18

1) Loosen and remove TORX bolt T30 from the top of each crossbar end support, and then remove inner clamp.



S5M0330A

(1) TORX bolt T30
(2) End support
(3) Inner clamp
(4) Roof rail

2) Remove crossbar.

NOTE:
When removing the front crossbar from the roof rail, first move the front crossbar to the center of the roof rail.

B: INSTALLATION S911388A11

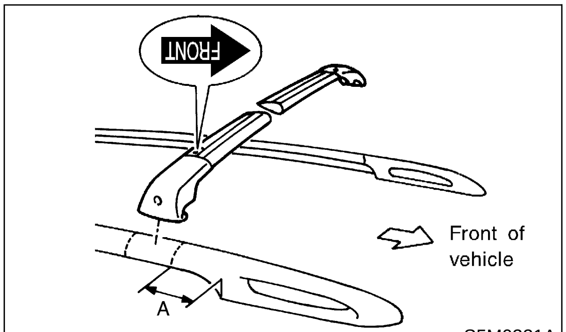
1. FRONT CROSSBAR S911388A1101

NOTE:
Front crossbar has “MAXIMUM LOAD ROOF RACK-150LBS. EVENLY DISTRIBUTED ROOF SURFACE-100LBS. EVENLY DISTRIBUTED” label on LH side.

1) Loosen and remove TORX bolt T30 from the top of each crossbar end support, and then remove the inner clamp.

2) With the front direction arrow label on the top right side of the crossbar pointing toward the front of the vehicle, carefully place the crossbar across the top of the vehicle so that the crossbar end supports rest on the top of the roof rails approximately 152.4 mm (6 in) rearward in the front radius of the roof rail.

Length:
A: 152.4 mm (6 in)



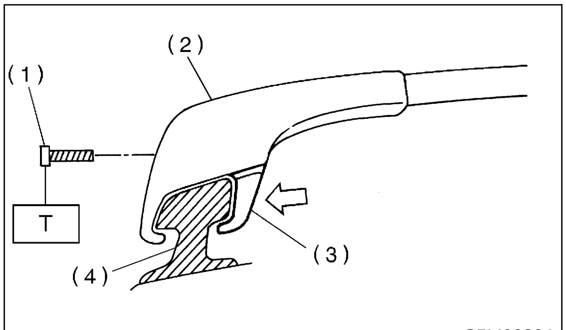
S5M0331A

3) Rotate the end support and inner clamp to hook under the bottom of the roof rail on both sides and loose assemble the TORX bolt T30, through the side of the end support and into the threaded insert in the inner clamp on each end of the crossbar.

NOTE:
It may be necessary to start the inner clamp and the end support at the center of the roof rail for better installation of the pieces, then move the crossbar forward.

4) Tighten TORX bolt T30.

Tightening torque:
3.7 N·m (0.38 kgf-m, 2.75 ft-lb)



S5M0332A

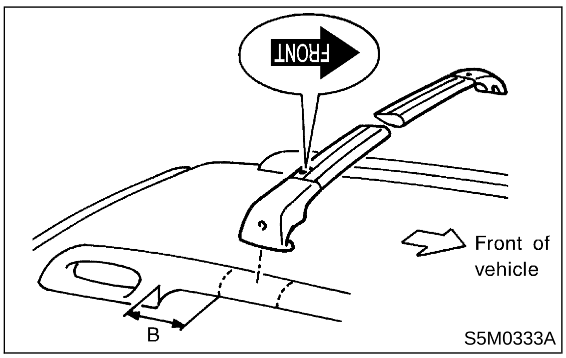
(1) TORX bolt T30
(2) End support
(3) Inner clamp
(4) Roof rail

2. REAR CROSSBAR S911388A1102

NOTE:
Rear crossbar does not have the “MAXIMUM LOAD ROOF RACK-150LBS. EVENLY DISTRIBUTED ROOF SURFACE-100LBS. EVENLY DISTRIBUTED” label.

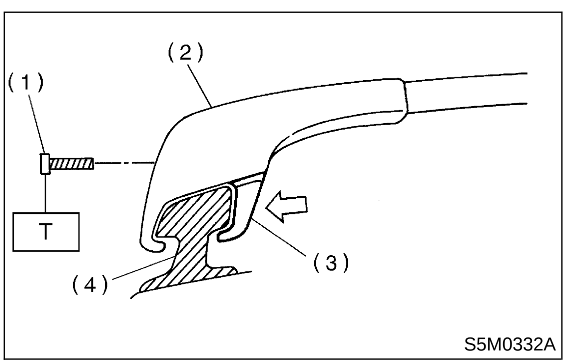
1) Loosen and remove TORX bolt T30 from the top of each crossbar end support, and then remove the inner clamp.
2) With the front direction arrow label on the top right side of the crossbar pointing toward the front of the vehicle, carefully place the crossbar across the top of the vehicle so that the crossbar end supports rest on the top of the roof rails approximately 152.4 mm (6 in) forward in the rear radius of the roof rail.

Length:
B: 152.4 mm (6 in)



3) Rotate the end support and inner clamp to hook under the bottom of the roof rail on both sides and loose assemble the TORX bolt T30, through the side of the end support and into the threaded insert in the inner clamp on each end of the crossbar.
4) Tighten TORX bolt T30.

Tightening torque:
3.7 N·m (0.38 kgf-m, 2.75 ft-lb)

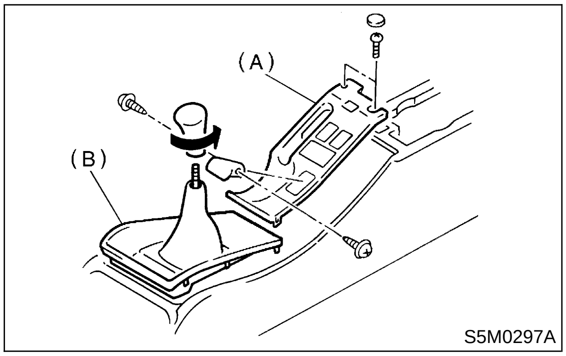


(1) TORX bolt T30
(2) End support
(3) Inner clamp
(4) Roof rail

14. Console Box *S911382*

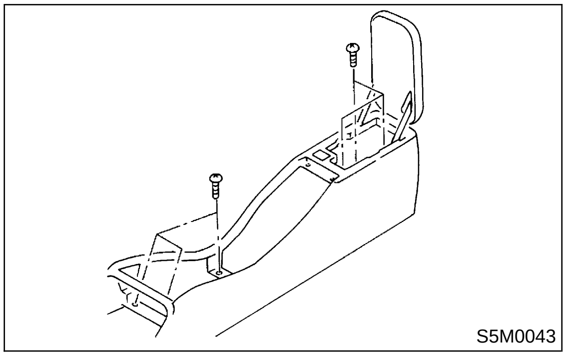
A: REMOVAL *S911382A18*

1) Remove shift knob and drive select lever (MT model).
2) Remove console cover (A) and front cover (B).



S5M0297A

3) Remove console box.



S5M0043

B: INSTALLATION *S911382A11*

Install in the reverse order of removal.

15. Instrument Panel Assembly

S911381

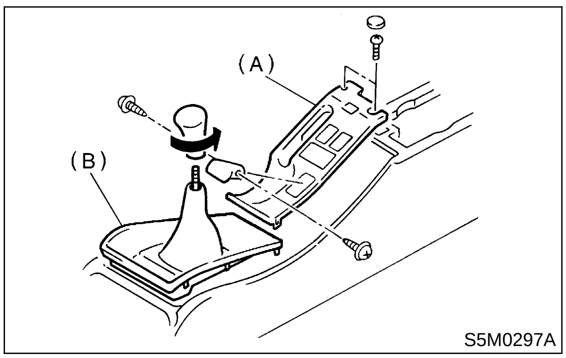
A: REMOVAL S911381A18

Airbag system wiring harness is routed near combination meter.

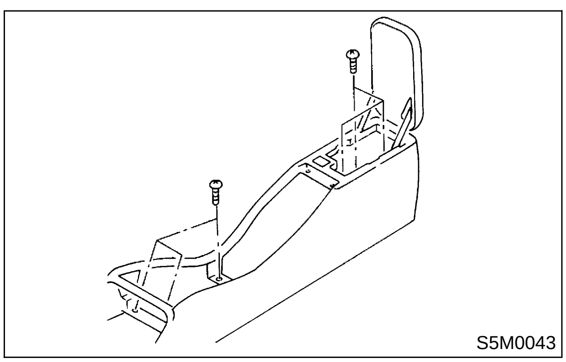
CAUTION:

- **All airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.**
- **Be careful not to damage airbag system wiring harness when servicing the instrument panel.**

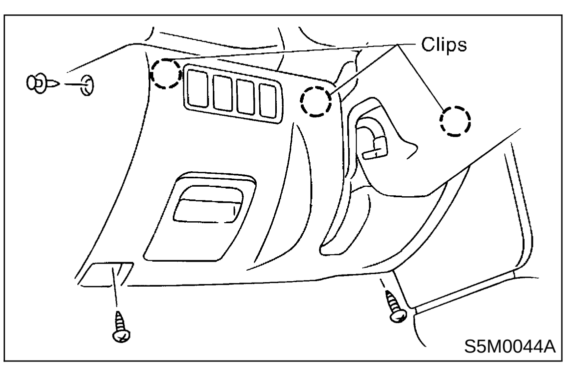
1) Disconnect ground cable from battery.
2) Remove shift knob and drive select lever. (MT model)
3) Remove console cover (A) and front cover (B).



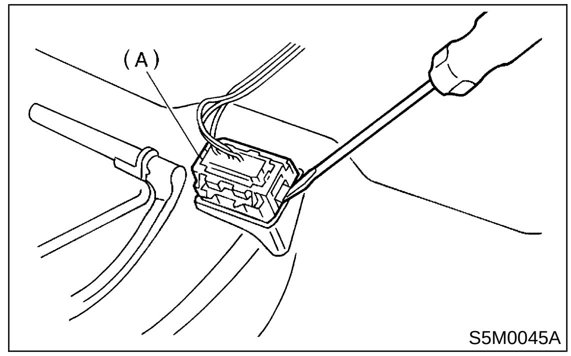
4) Remove console box.



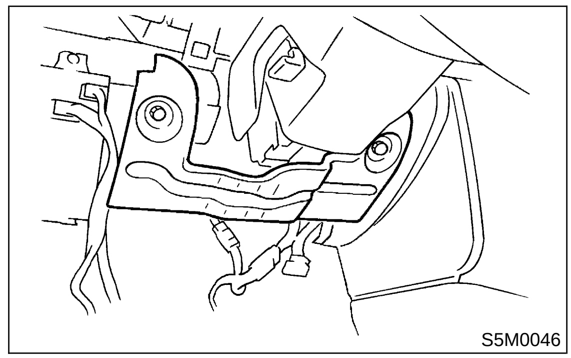
5) Remove lower cover and then disconnect connector.



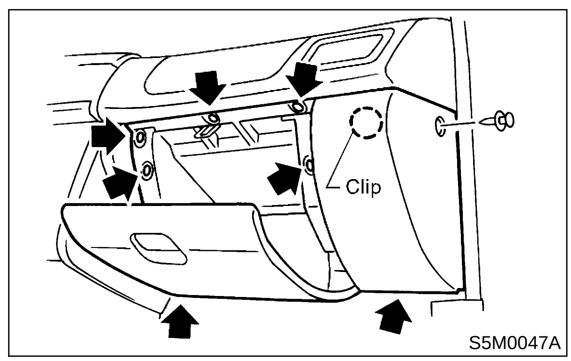
6) Disconnect data link connector (A) from lower cover.



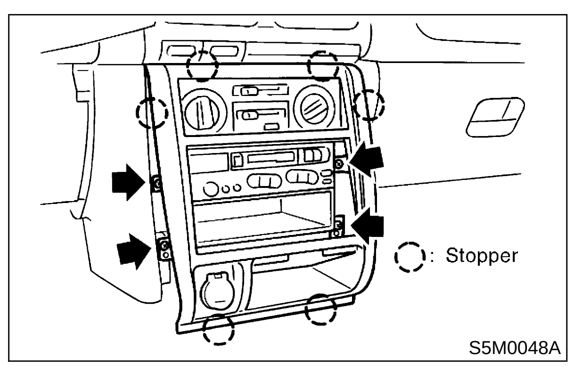
7) Remove knee panel.



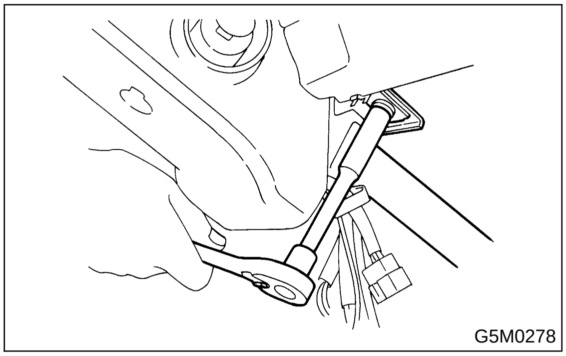
8) Remove glove box.



9) Remove center panel and disconnect connector.
10) Remove audio.



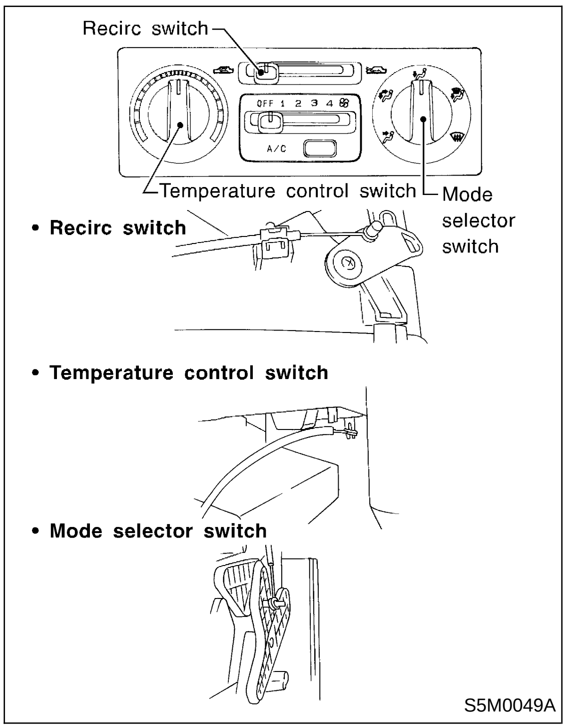
11) Remove two bolts and lower steering column.



G5M0278

12) Set temperature control switch to "FULL HOT", mode selector switch to "DEF" position and recirc switch to "FRESH" position.
13) Disconnect temperature control cable and mode control cable from heater unit then disconnect recirc control cable from intake unit.

NOTE:
Do not move switches and link when installing.

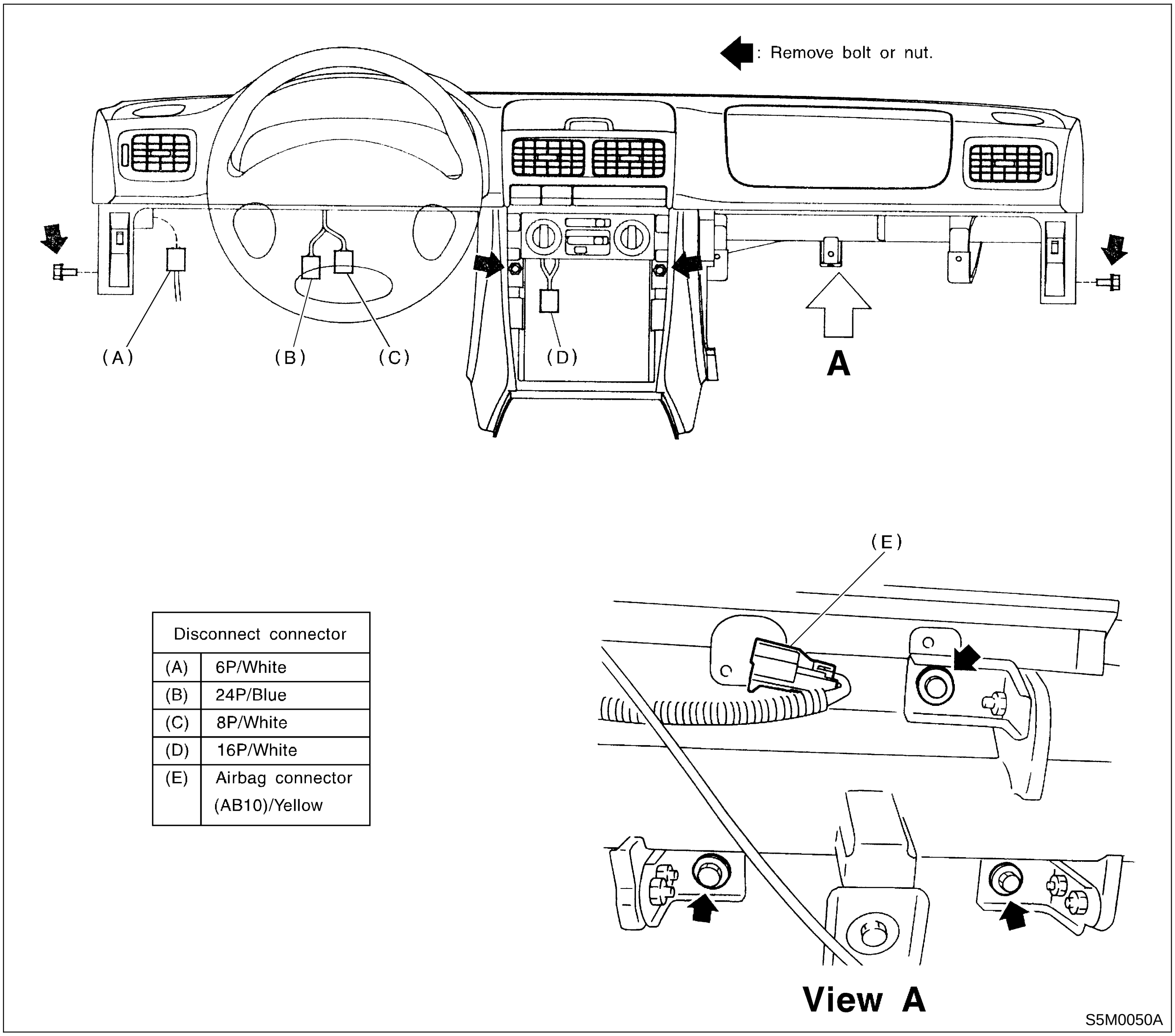


S5M0049A

14) Disconnect harness connectors and then remove the installing bolts and nuts.

CAUTION:
Be sure to hold socket section and not harness when disconnecting.

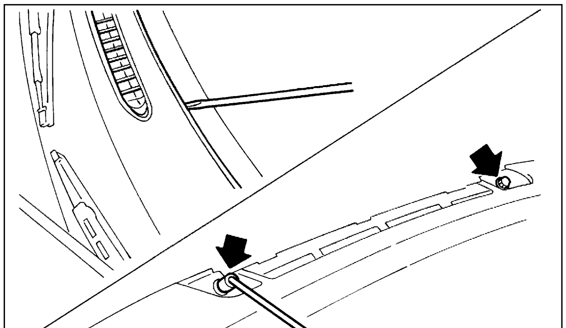
NOTE:
Put matching mark, if necessary, for easy reassembly.



Disconnect connector	
(A)	6P/White
(B)	24P/Blue
(C)	8P/White
(D)	16P/White
(E)	Airbag connector (AB10)/Yellow

S5M0050A

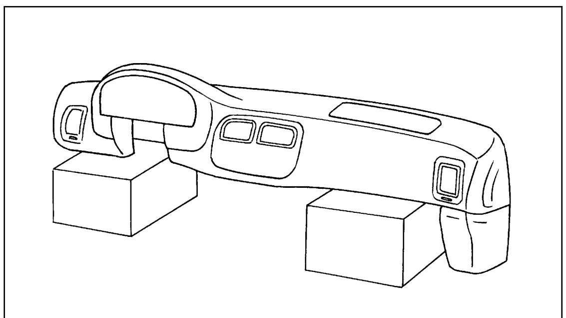
15) Remove front defroster grille and two bolts.


S5M0051

16) Remove instrument panel carefully from the body.

CAUTION:

- **Do not pull the harness when disconnecting the connector.**
- **Take care not to scratch the instrument panel and related parts.**
- **When storing removed instrument panel with passenger airbag module, place it standing up on the floor.**

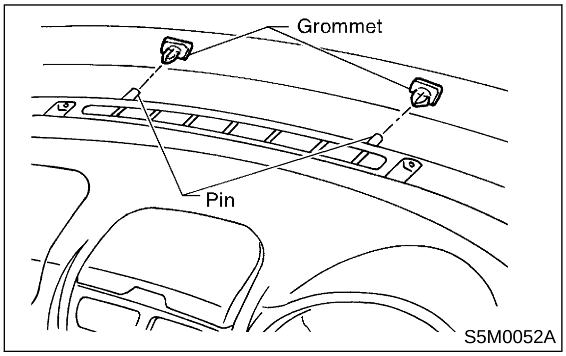

G5M0602

B: INSTALLATION *S911381A11*

Install in the reverse order of removal.

CAUTION:
- **Be careful not to snag the harness.**
- **Make sure to connect harness connector.**
- **Take care not to scratch the instrument panel and related parts.**

NOTE:
When setting the instrument panel into position, push the two pins into grommet on the body panel.

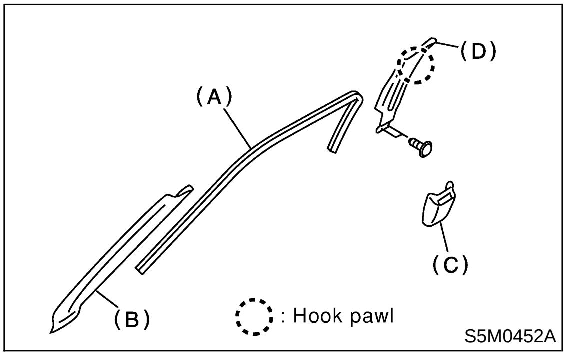


Tightening torque:
Refer to COMPONENT of General Description. <Ref. to EI-7, INSTRUMENT PANEL, COMPONENT, General Description.>

16. Upper Inner Trim *S911384*

A: REMOVAL *S911384A18*

1) Remove front mole (A).
2) Remove front pillar upper trim (B).
3) Remove center pillar cover (C).
4) Detach front seat belt shoulder anchor.
5) Loosen screws to remove center pillar upper trim (D).

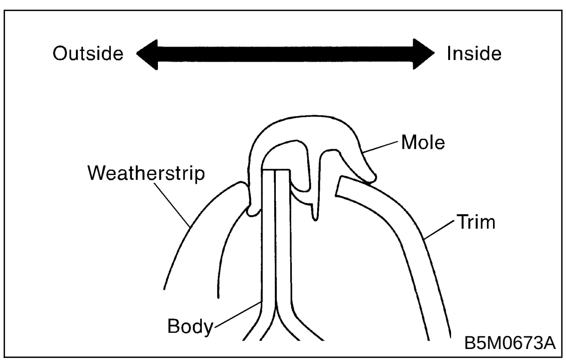


B: INSTALLATION *S911384A11*

Install in the reverse order of removal.

CAUTION:
Be sure to securely hook pawls of inner trim panel to body flange.

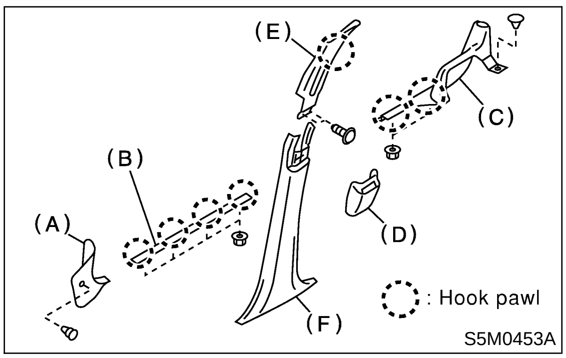
NOTE:
When installing center pillar upper trim and front pillar upper trim, be sure to set front mole as shown in figure.



17. Lower Inner Trim *S911369*

A: REMOVAL *S911369A18*

1) Remove front pillar lower trim (A).
2) Remove side sill front upper cover (B).
3) Remove rear seat cushion <Ref. to SE-6, REMOVAL, Rear Seat.>, then remove side sill rear upper cover (C).
4) Remove center pillar cover (D).
5) Remove front seat belt shoulder anchor.
6) Loosen screws to remove center pillar upper trim (E).
7) Remove center pillar lower trim (F).



B: INSTALLATION *S911369A11*

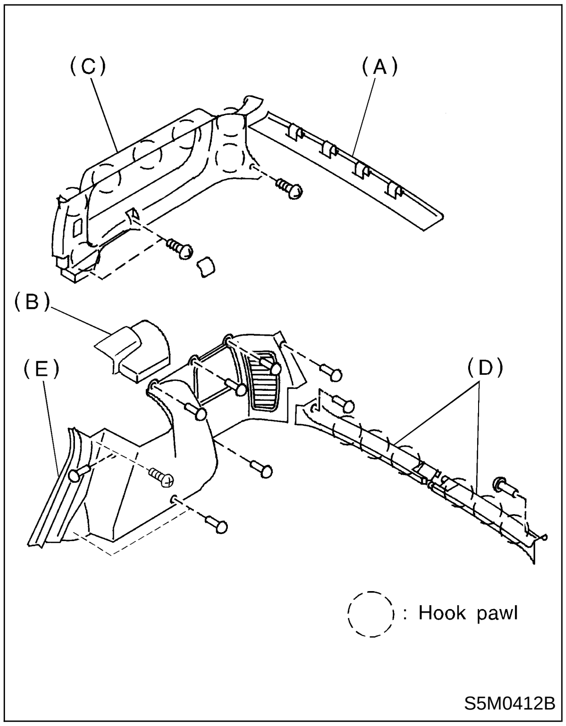
Install in the reverse order of removal.

CAUTION:
Be sure to securely hook pawls of inner trim panel to body flange.

18. Rear Quarter Trim S911358

A: REMOVAL S911358A18

1) Remove rear rail trim (A).
2) Remove strut cover (B).
3) Remove rear seat belt anchor.
4) Remove caps and screws, and then remove rear quarter upper trim (C).
5) Remove rear skirt trim (D).
6) Remove luggage floor mat. <Ref. to EI-46, REMOVAL, Luggage Floor Mat.>
7) Remove rear quarter lower trim (E).

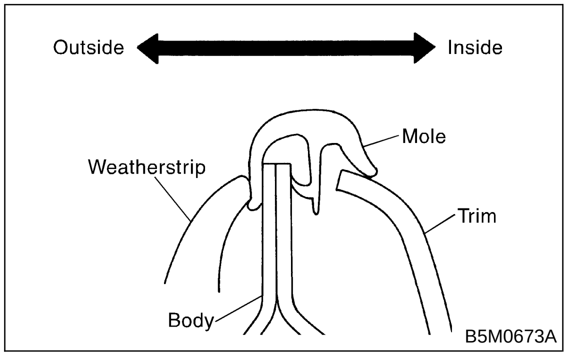


B: INSTALLATION S911358A11

Install in the reverse order of removal.

CAUTION:
Be sure to securely hook pawls of inner trim panel to body flange.

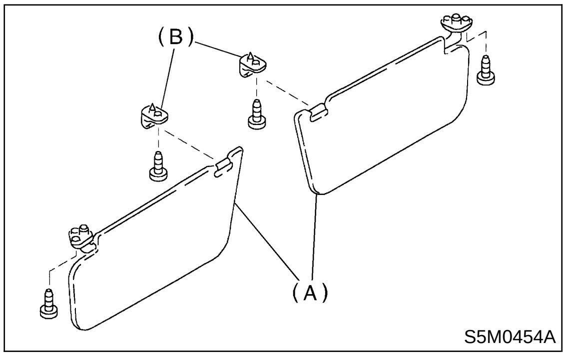
NOTE:
When installing rear quarter upper trim, be sure to set rear mole as shown in the figure.



19. Sun Visor *S911359*

A: REMOVAL *S911359A18*

Remove mounting screws then detach sun visor (A) and hook (B).



B: INSTALLATION *S911359A11*

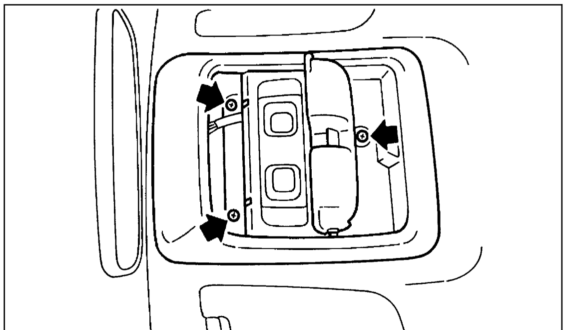
Install in the reverse order of removal.

20. Roof Trim S911360

A: REMOVAL S911360A18

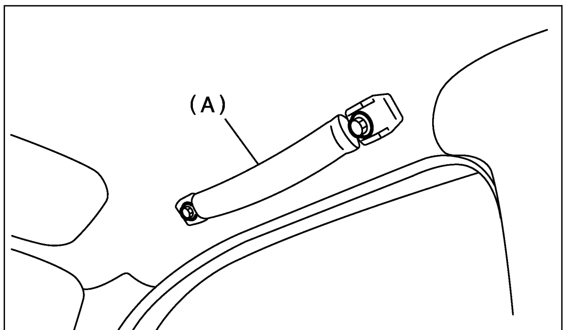
CAUTION:
When removing clip, use great care not to damage the roof trim.

1) Disconnect ground cable from battery.
2) Remove head console.



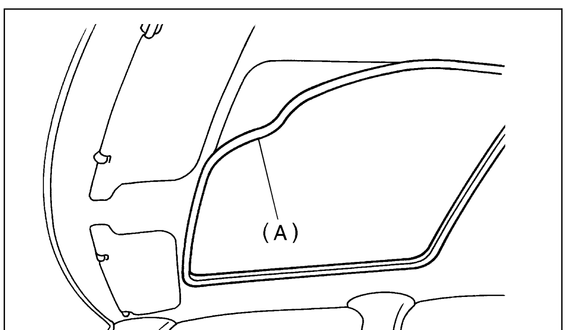
S5M0243

3) Remove sun visor and hook of both sides. <Ref. to EI-42, REMOVAL, Sun Visor.>
4) Remove assist grips (A).



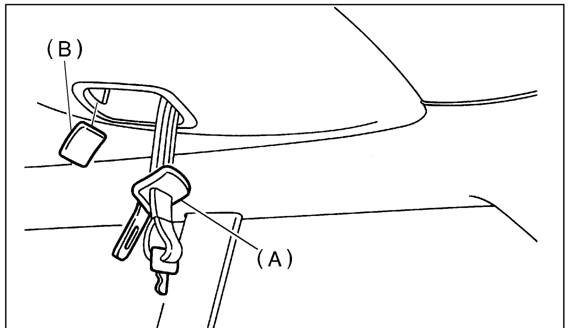
B5M1025A

5) Remove upper inner trim. <Ref. to EI-39, REMOVAL, Upper Inner Trim.>
6) Remove rear quarter trim. <Ref. to EI-41, REMOVAL, Rear Quarter Trim.>
7) Detach sunroof garnish (A). (Sunroof equipped model)



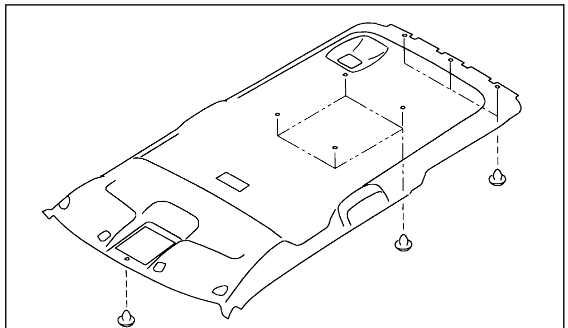
S5M0305B

8) Remove cover (B) while detaching snap lock carefully. Put the rear seat belt tongue (A) out to the other side of the trim through the hole.



B5M0675A

9) Remove clips and then remove roof trim.



S5M0413

B: INSTALLATION S911360A11

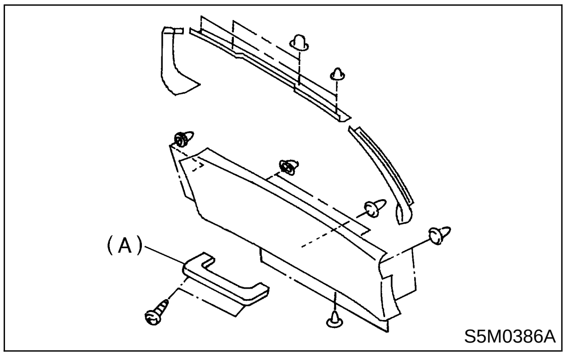
Install in the reverse order of removal.

21. Rear Gate Trim *S911357*

A: REMOVAL *S911357A18*

CAUTION:
Be careful not to damage clips or their holes.

Remove rear gate inner handle (A) from rear gate and then detach trim panel.



B: INSTALLATION *S911357A11*

Install in the reverse order of removal.

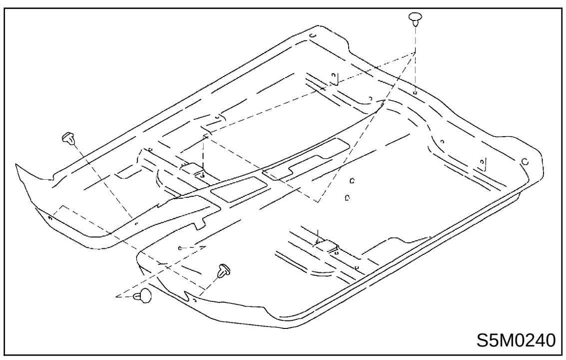
22. Floor Mat *S911362*

A: REMOVAL *S911362A18*

1) Remove front seats. <Ref. to SE-5, REMOVAL, Front Seat.>
2) Remove rear seat cushion. <Ref. to SE-6, REMOVAL, Rear Seat.>
3) Remove console box. <Ref. to EI-33, REMOVAL, Console Box.>
4) Remove front pillar lower trim, side sill rear upper cover and center pillar lower trim. <Ref. to EI-40, REMOVAL, Lower Inner Trim.>
5) Remove clips from floor mat.

NOTE:
When pulling out edge, do not pull mat alone; pull mat together with edge. Ply off two steel clips on side sill front cover and one on side sill rear cover using screwdriver.

6) Remove mat hook.
7) Remove mat from toe board area.
8) Remove mat from rear heater duct.
9) Roll mat, and then take it out of opened rear door.



B: INSTALLATION *S911362A11*

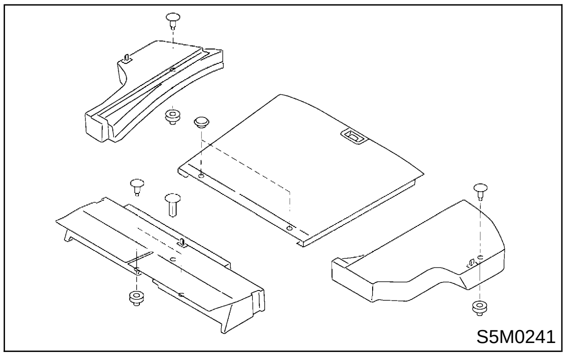
Install in the reverse order of removal.

NOTE:
- Secure mat firmly with hook and Velcro tape.
- Insert mat edge firmly into the groove of side sill cover.

23. Luggage Floor Mat *S911353*

A: REMOVAL *S911353A18*

Remove clips, then detach rear floor mats and boxes.



B: INSTALLATION *S911353A11*

Install in the reverse order of removal.

EXTERIOR BODY PANELS

EB

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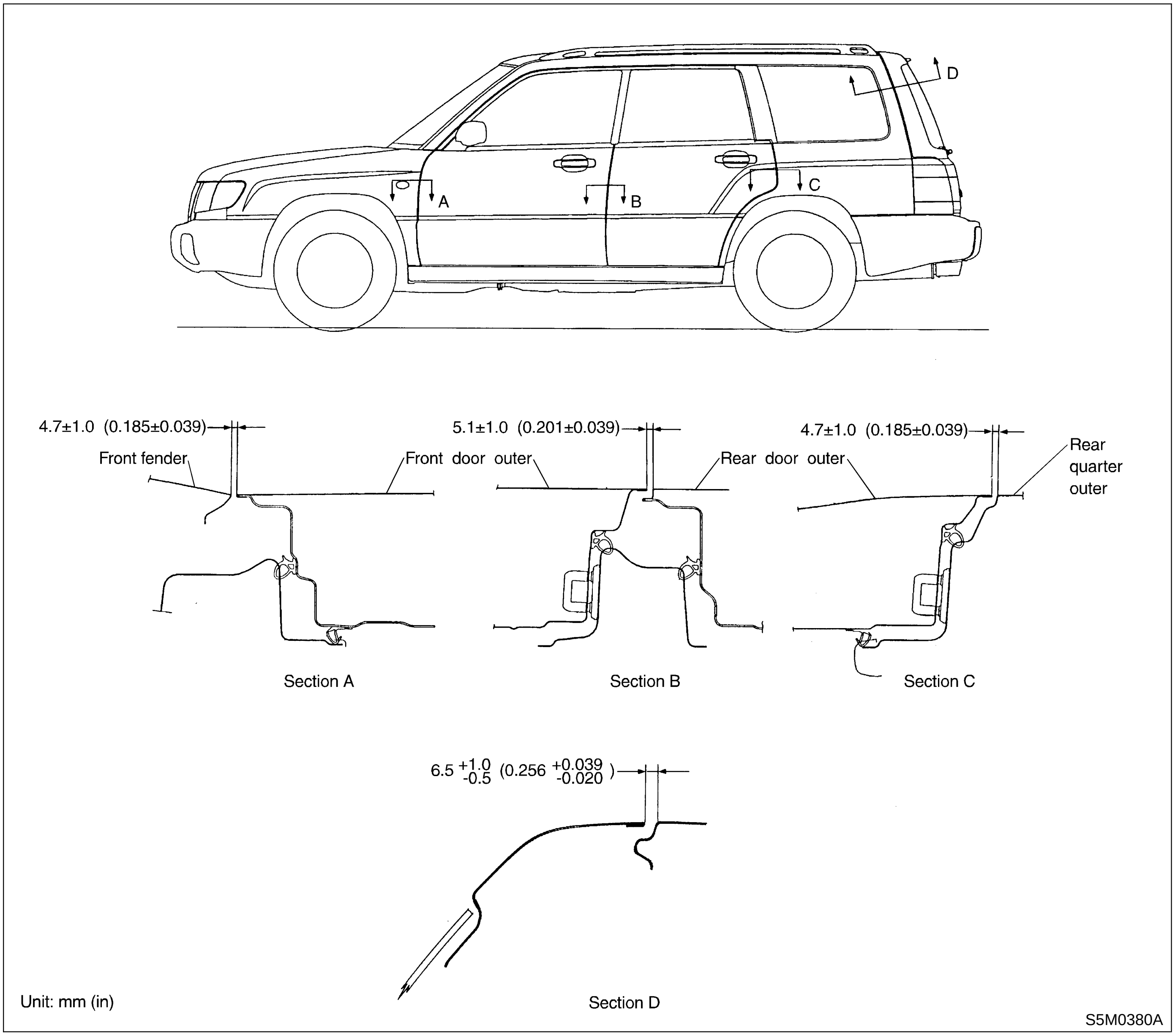
3. Fender Panel....10
4. Front Door Panel....11
5. Front Sealing Cover....13
6. Rear Door Panel....14
7. Rear Sealing Cover....16
8. Rear Gate Panel....17

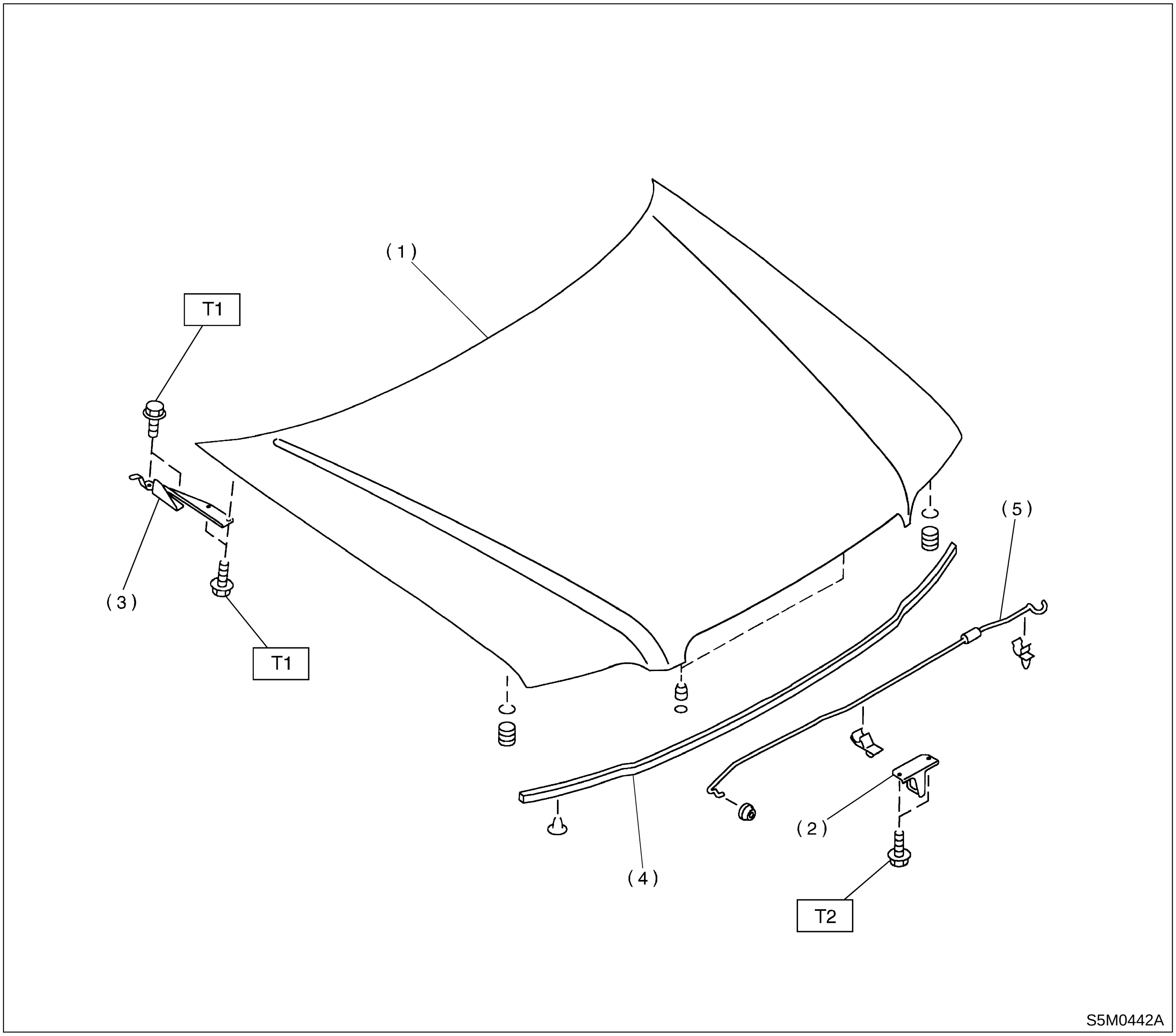
1. General Description *S913001*

A: SPECIFICATIONS *S913001E49*



B: COMPONENT S913001A05

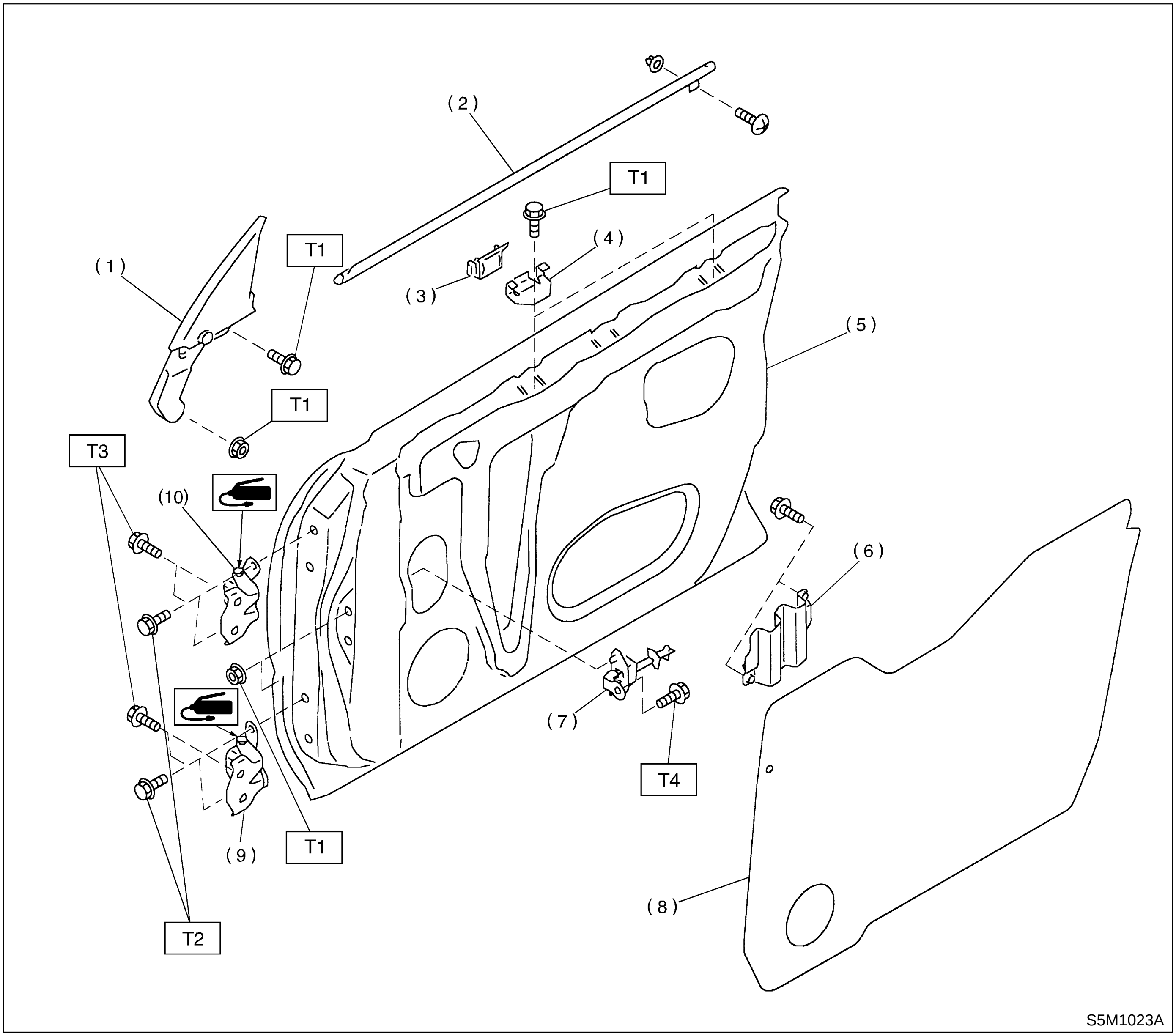
1. FRONT HOOD S913001A0501



(1) Front hood
(2) Striker
(3) Hinge
(4) Seal
(5) Front hood stay

Tightening torque: N·m (kgf-m, ft-lb)
T1: 24.5 (2.5, 18.1)
T2: 33 (3.4, 25)

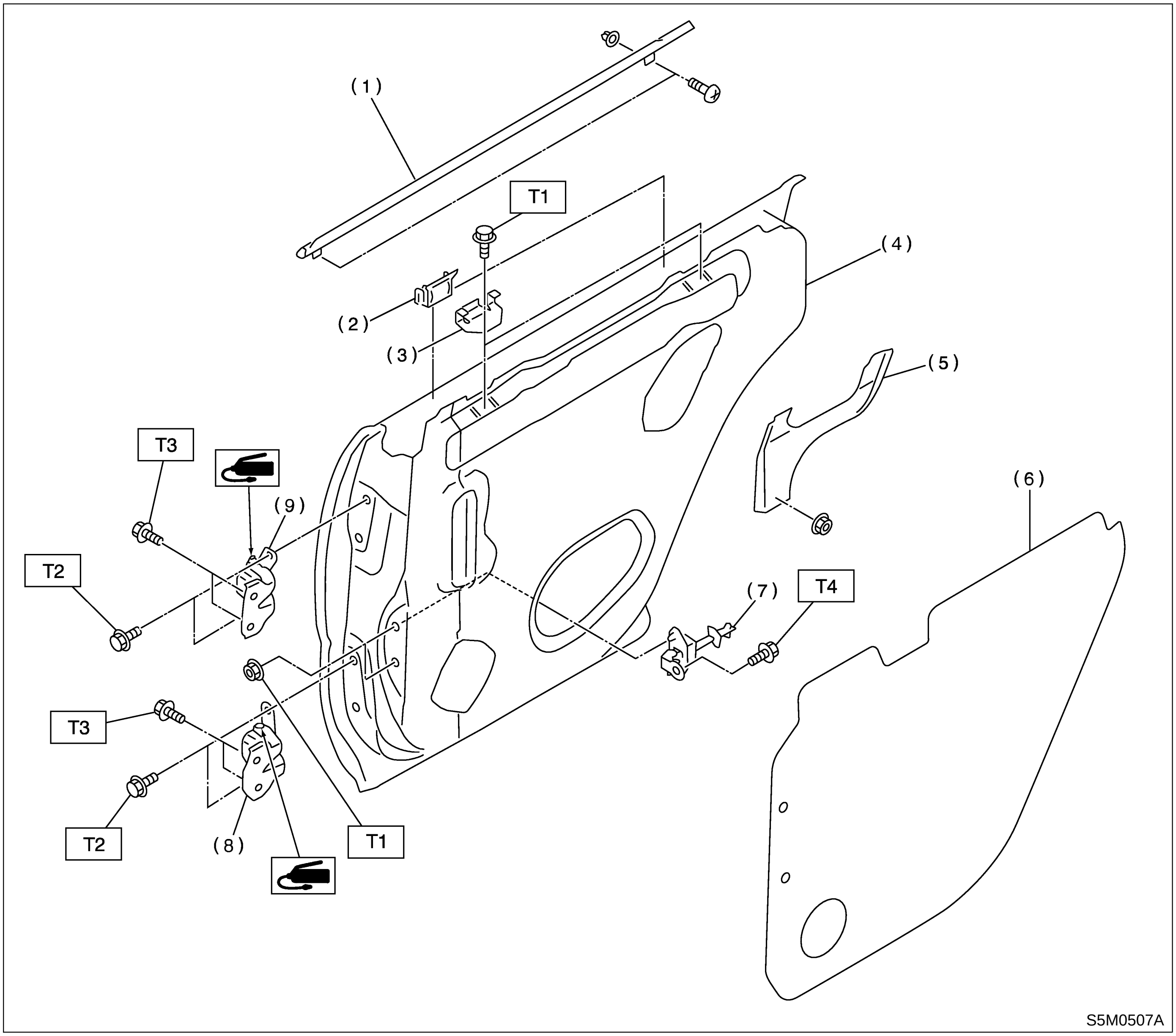
2. FRONT DOOR PANEL *S913001A0502*



(1) Gusset
(2) Weatherstrip
(3) Stabilizer (Outer)
(4) Stabilizer (Inner)
(5) Door panel
(6) Plate
(7) Checker
(8) Sealing cover
(9) Lower hinge
(10) Upper hinge

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 25 (2.5, 18)
T3: 30 (3.1, 22)
T4: 33 (3.4, 25)

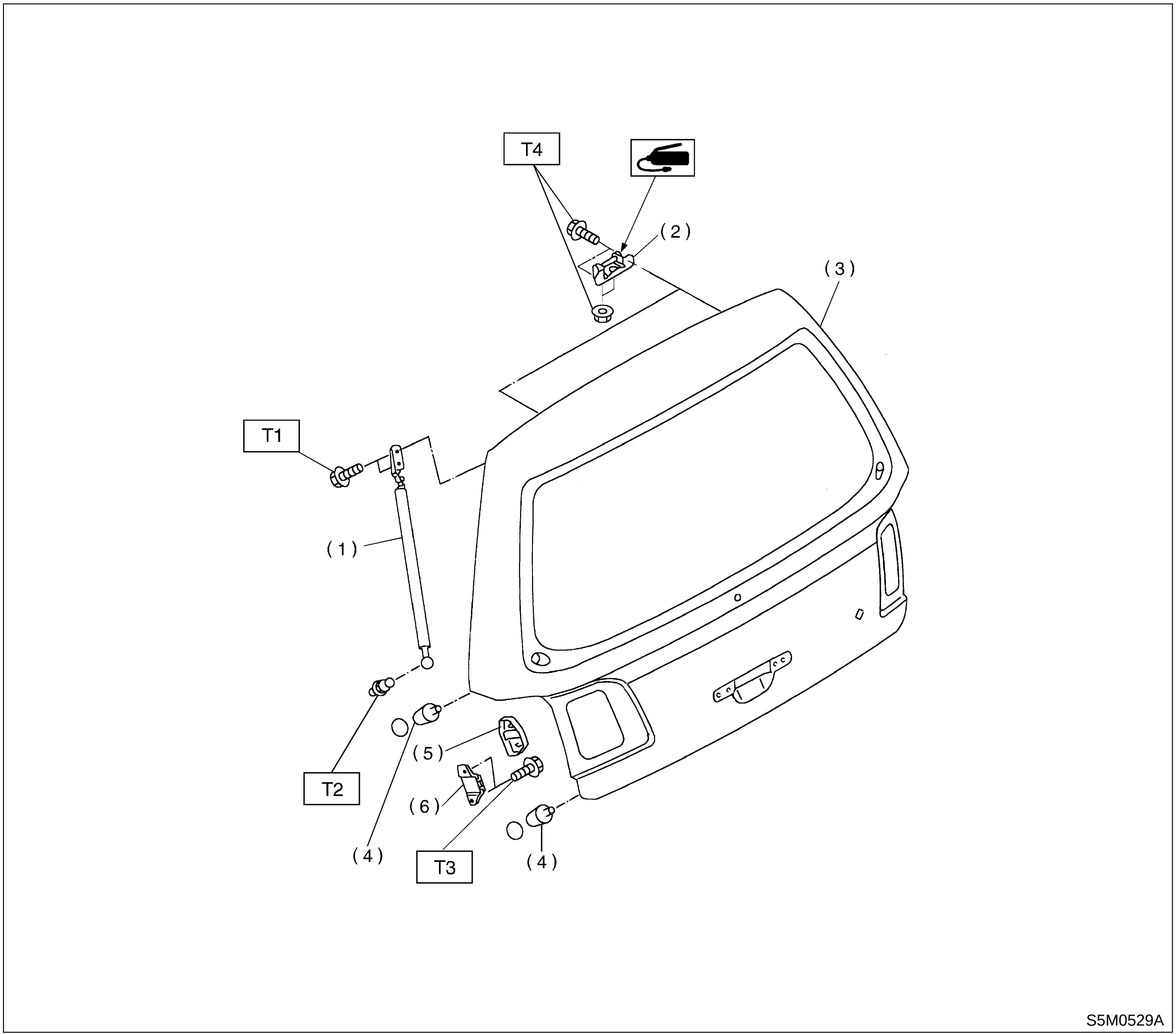
3. REAR DOOR PANEL *S913001A0503*



(1) Weatherstrip
(2) Stabilizer (Outer)
(3) Stabilizer (Inner)
(4) Door panel
(5) Plate
(6) Sealing cover
(7) Checker
(8) Lower hinge
(9) Upper hinge

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 25 (2.5, 18)
T3: 30 (3.1, 18)
T4: 33 (3.4, 25)

4. REAR GATE PANEL *S913001A0505*



(1) Gas stay
(2) Hinge
(3) Rear gate
(4) Stopper
(5) Buffer cover
(6) Buffer (Back door)

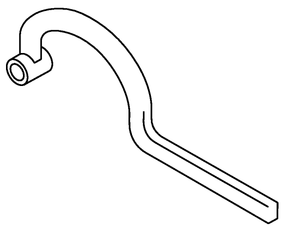
Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 14 (1.4, 10.1)
T3: 13 (1.3, 9.4)
T4: 25 (2.5, 18.1)

C: CAUTION *S913001A03*

- Exterior body panels are heavy. Do not drop and damage the panels. During removal and installation, do not damage the panel painting surface.
- While removing mounting bolts, using assistance devices such as a support jack will help support the panel.
- Be careful not to lose small parts.

D: PREPARATION TOOL S913001A17

1. SPECIAL TOOLS S913001A1701

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B5M1117	925610000	WRENCH	Used for removing and installing door hing.

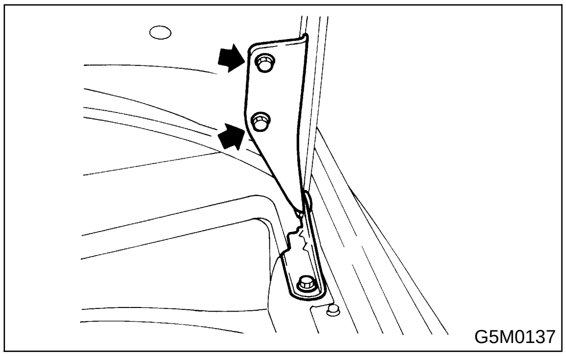
2. GENERAL TOOL S913001A1702

TOOL NAME	REMARKS
Support Jack	Used for supporting door panel.

2. Front Hood S913367

A: REMOVAL S913367A18

1) Open front hood to remove washer nozzles.
2) Remove bolts to detach hood from hinges.



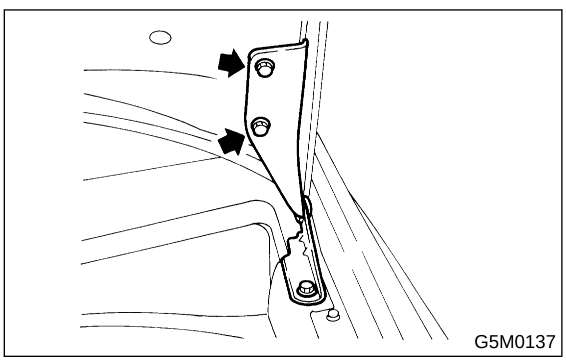
B: INSTALLATION S913367A11

1) Install in the reverse order of removal.
2) Adjust clearance between hood and fender. Clearance must be equal at both sides.

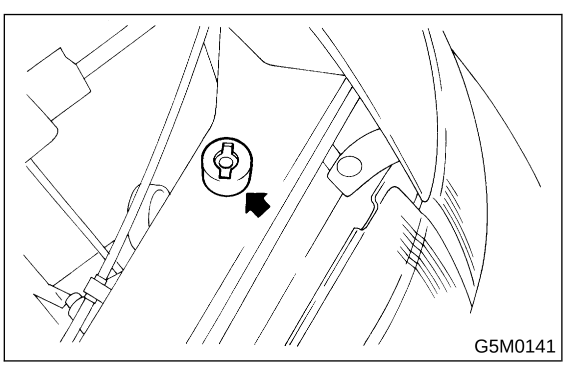
Tightening torque:
24.5 N·m (2.5 kgf-m, 18 ft-lb)

C: ADJUSTMENT S913367A01

1) Use hinge mounting holes to align front hood longitudinally and laterally.



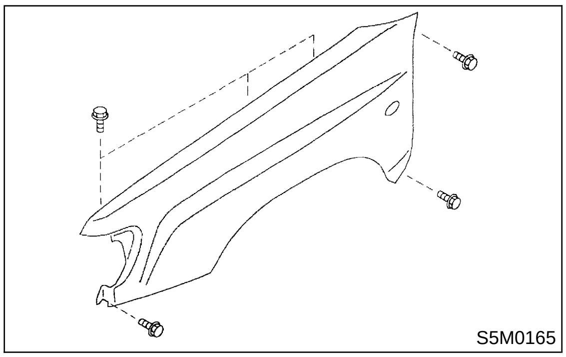
2) Adjust height at front end of hood. <Ref. to SL-38, ADJUSTMENT, Front Hood Lock Assembly.>
3) Rotate hood buffer to adjust lateral height.



3. Fender Panel *S913368*

A: REMOVAL *S913368A18*

1) Disconnect ground cable from battery.
2) Remove side protectors and fender protectors. <Ref. to EI-23, REMOVAL, Protector.>
3) Remove mud guard. <Ref. to EI-22, REMOVAL, Mud Guard.>
4) Remove front bumper face. <Ref. to EI-13, REMOVAL, Front Bumper.>
5) Remove headlights. <Ref. to LI-10, REMOVAL, Headlight Assembly.>
6) Remove bolts to remove front fender.



S5M0165

B: INSTALLATION *S913368A11*

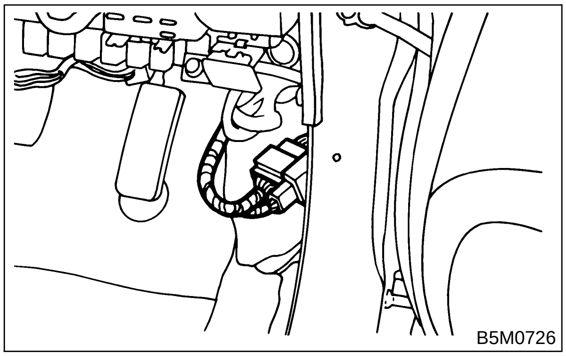
1) Install in the reverse order of removal.
2) When fender panel is installed, clearance between fender panel and hood or front fender must be equal.

Tightening torque:
7.35 N·m (0.75 kgf-m, 5.4 ft-lb)

4. Front Door Panel S913366

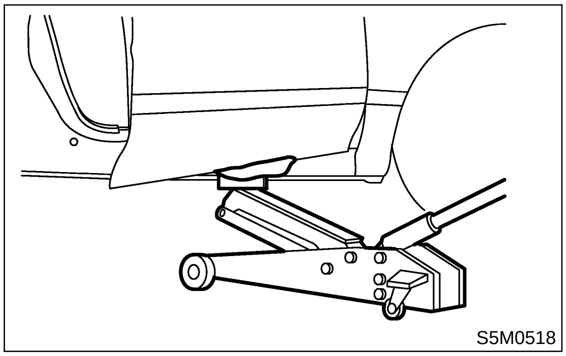
A: REMOVAL S913366A18

1) Disconnect ground cable from battery.
2) Remove front pillar lower trim to disconnect connector from body harness.



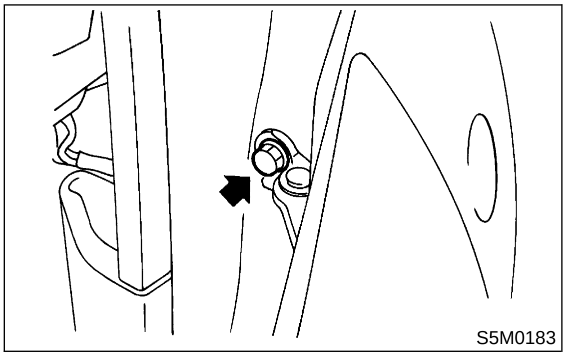
B5M0726

3) Put wooden block on jack and place jack under door. Support door with a jack to protect it from damage.



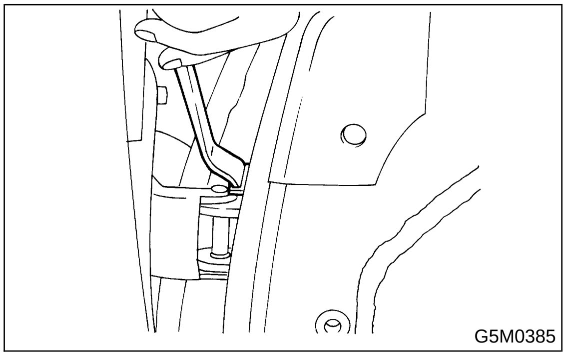
S5M0518

4) Remove checker bolts.



S5M0183

5) Remove door-side bolts for upper and lower hinges to remove door.



G5M0385

CAUTION:
- **During removal and installation of doors, do not damage body.**
- **Doors are heavy. Be careful not to drop and damage them.**

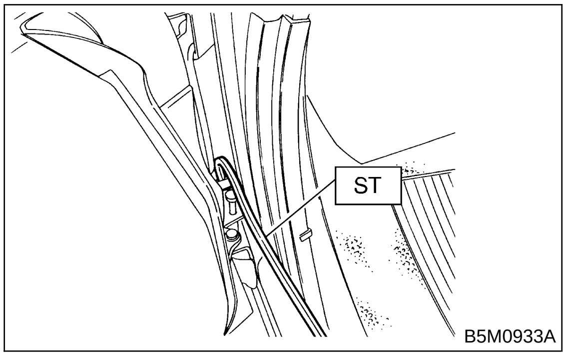
B: INSTALLATION S913366A11

1) Install in the reverse order of removal.
2) Apply grease to sliding area of door hinges.

Tightening torque:
Refer to COMPONENT of General Description. <Ref. to EB-4, FRONT DOOR PANEL, COMPONENT, General Description.>

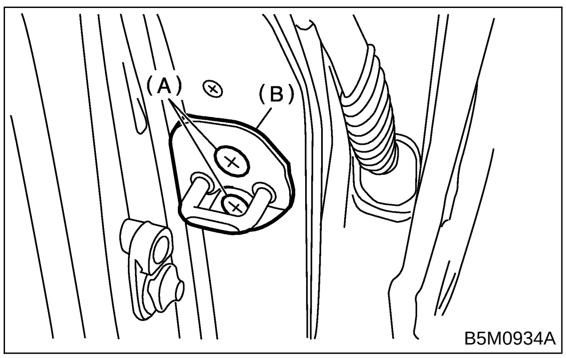
C: ADJUSTMENT *S913366A01*

1) Using special tool, loosen body-side bolts of upper and lower hinges to align the position of front door panel longitudinally and vertically.
ST 925610000 DOOR HINGE WRENCH



B5M0933A

2) Loosen screw (A) and lightly tap striker (B) using plastic hammer to adjust striker to align the position of front door panel vertically and laterally at the rear end.



B5M0934A

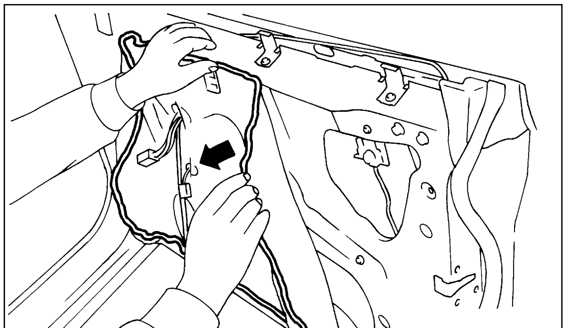
CAUTION:
Do not use impact wrench. Welding area on striker nut plate is easily broken.

5. Front Sealing Cover *S913564*

A: REMOVAL *S913564A18*

1) Remove front door trim. <Ref. to EI-27, REMOVAL, Front Door Trim.>
2) Remove front speaker. <Ref. to ET-7, REMOVAL, Front Speaker.>

CAUTION:
- **Carefully remove butyl tape. Excessive force will easily break the cover.**
- **If cover gets broken, replace it with a new one.**



G5M0391

B: INSTALLATION *S913564A11*

1) Install in the reverse order of removal.
2) When replacing sealing cover, use butyl tape.
3) Press sealer-applied area firmly to prevent any floating on surface.

Butyl tape:
3M8626 or equivalent

CAUTION:
- **Apply a continuous bead of butyl tape at a constant width.**
- **Attach sealing cover, keeping it from becoming wrinkled.**
- **Breaks in the bead will allow water leakage and contamination.**

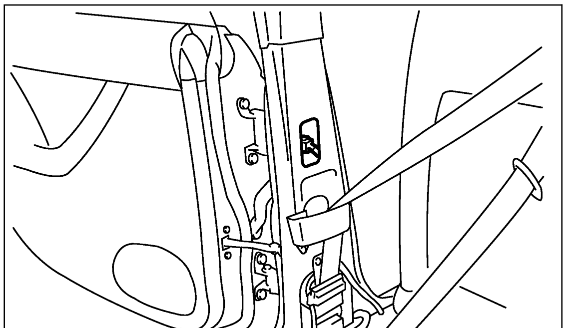
C: INSPECTION *S913564A10*

If sealing cover is damaged, replace it with a new one.

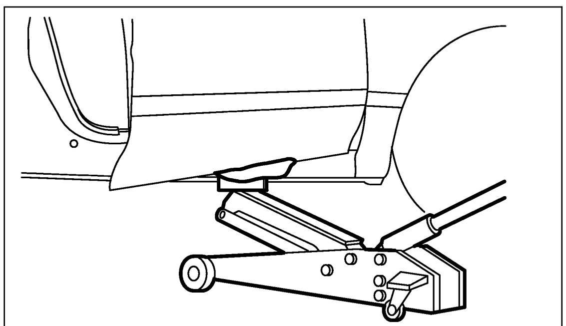
6. Rear Door Panel *S913364*

A: REMOVAL *S913364A18*

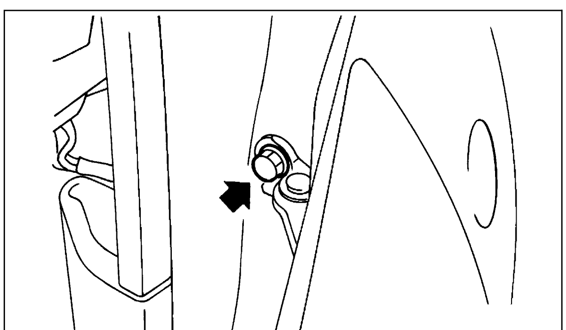
1) Disconnect ground cable from battery.
2) Remove center pillar lower trim. <Ref. to EI-40, REMOVAL, Lower Inner Trim.>
3) Remove seatbelt bracket and blind plug. Disconnect connector of door harness.


B5M1062

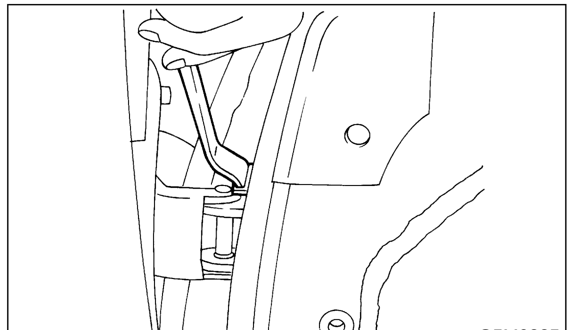
4) Put a wooden block on the jack and place the jack under the door. Support the door with the jack to protect it.


S5M0518

5) Remove checker bolts.


S5M0183

6) Remove door-side bolts for upper and lower hinges to remove door.


G5M0385

7) Using special tool, remove body-side bolts for upper and lower hinges, and remove door hinges.

CAUTION:
- **During removal and installation of doors, do not damage body.**
- **Doors are heavy. Be careful not to drop and damage them.**

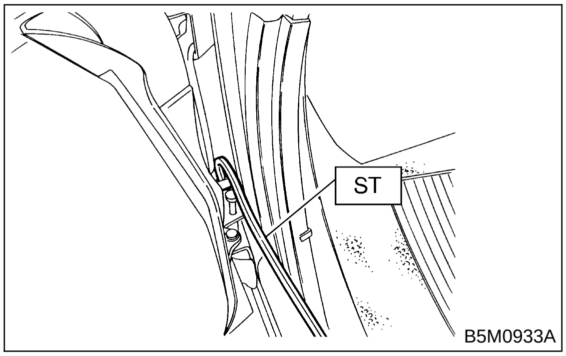
B: INSTALLATION *S913364A11*

1) Install in the reverse order of removal.
2) Apply grease to sliding area of door hinges.

Tightening torque:
Refer to COMPONENT of General Description. <Ref. to EB-5, REAR DOOR PANEL, COMPONENT, General Description.>

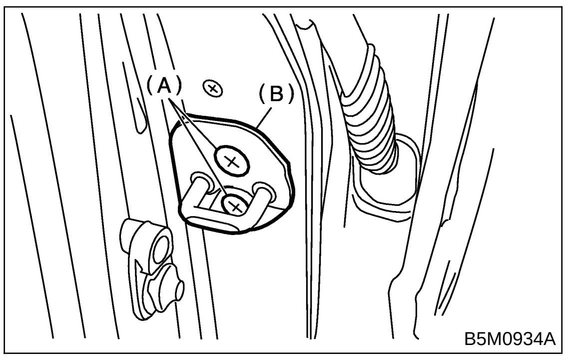
C: ADJUSTMENT *S913364A01*

1) Using special tool, loosen body-side bolts of upper and lower hinges to align the position of rear door panel longitudinally and vertically.



B5M0933A

2) Loosen screw (A) and lightly tap striker (B) using plastic hammer to adjust striker to align the position of front door panel vertically and laterally at the rear end.



B5M0934A

CAUTION:
Do not use an impact wrench. The welding area on the striker nut plate is easily broken.

7. Rear Sealing Cover S913565

A: REMOVAL S913565A18

1) Remove rear door trim. <Ref. to EI-28, REMOVAL, Rear Door Trim.>
2) Remove rear speaker. <Ref. to ET-8, REMOVAL, Rear Speaker.>

CAUTION:
- **Carefully remove butyl tape. Excessive force will easily break the cover.**
- **If cover gets broken, replace it with a new one.**

G5M0391

B: INSTALLATION S913565A11

1) Install in the reverse order of removal.
2) When replacing sealing cover, use butyl tape.
3) Press sealer-applied area firmly to prevent any floating on surface.

Butyl tape:
3M8626 or equivalent

CAUTION:
- **Apply a continuous bead of butyl tape at a constant width.**
- **Attach sealing cover, keeping it from becoming wrinkled.**
- **Breaks in the bead will allow water leakage and contamination.**

C: INSPECTION S913565A10

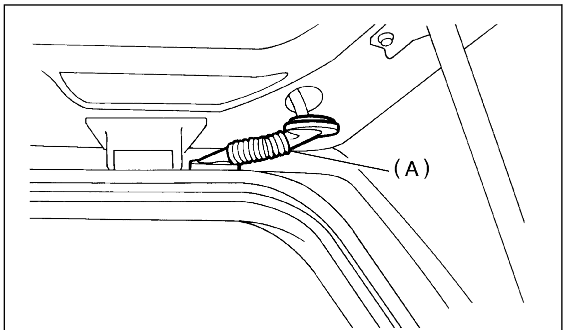
If sealing cover gets damaged, replace it with a new one.

8. Rear Gate Panel S913363

A: REMOVAL S913363A18

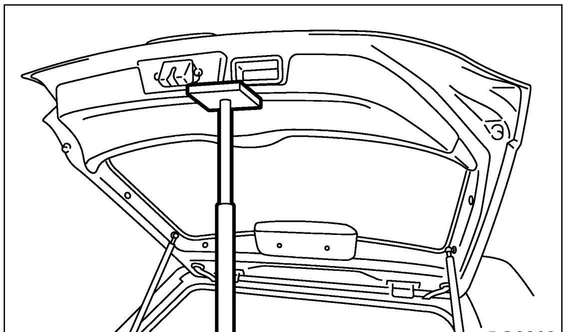
1. REAR GATE PANEL S913363A1801

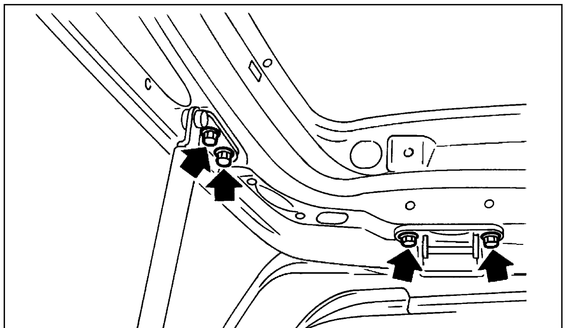
1) Open rear gate.
2) Disconnect washer hose.
3) Remove rubber duct (A) connection, and pull out harness and washer hose from rear gate.



B5M0733A

4) Using a support, support the rear gate while removing gas stay mounting bolts.
5) Loosen rear gate bolts to remove rear gate.

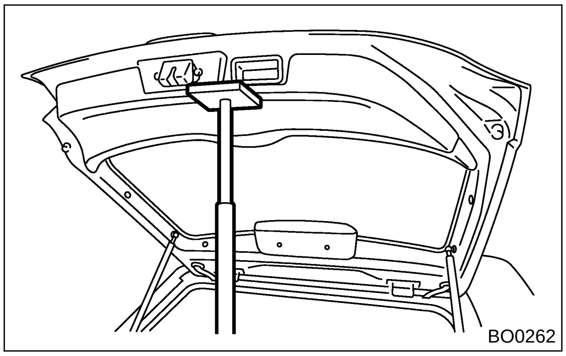

BO0262


S5M0206

CAUTION:
When the rear gate is released, it may hit and damage the body. To prevent this, place a shop cloth between body and gate.

2. GAS STAY S913363A1802

1) Open rear gate. Using a jack to support the rear gate.


BO0262

CAUTION:
- **After gas stay is removed, rear gate cannot stay open. Supporting the rear gate with a jack, remove the bolts.**
- **Do not damage piston rods and oil seals.**
- **Never disassemble cylinders: They contain gas.**

2) Loosen bolts to remove gas stay from rear gate.

B: INSTALLATION S913363A11

1. REAR GATE PANEL S913363A1101

1) Install in the reverse order of removal.
2) Install rear gate panel with uniform clearance to body.

CAUTION:
Do not damage painted surfaces of body and rear gate.

2. GAS STAY S913363A1102

Install in the reverse order of removal.

CAUTION:
- **Do not confuse right and left sides of gas stay.**
- **After supporting rear gate with a jack, start operation.**

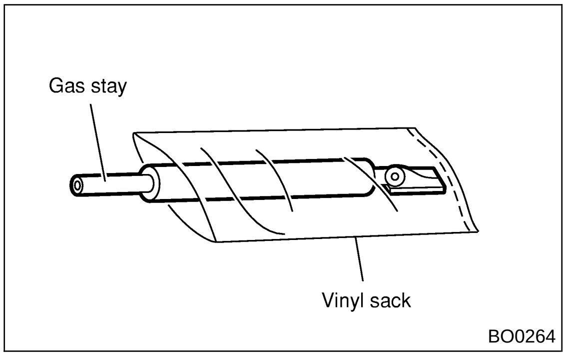
Tightening torque:
Refer to COMPONENT of General Description. <Ref. EB-6, REAR GATE PANEL, COMPONENT, General Description.>

C: DISPOSAL *S913363A07*

1. GAS STAY *S913363A0701*

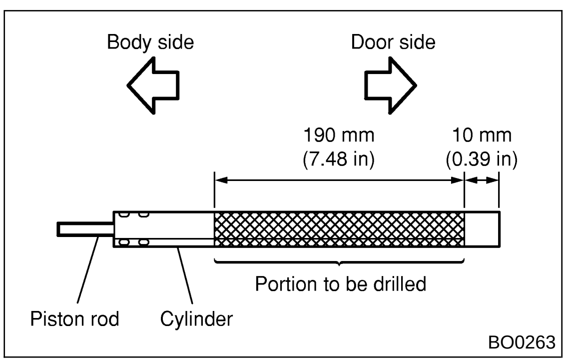
CAUTION:
Gas is colorless, odorless, and harmless. However, gas pressure may spray cutting powder or oil. Be sure to wear dust-resistant goggles.

1) Cover with a vinyl case as shown in the figure.



CAUTION:
Prevent the vinyl case from being caught by drill cutting edge

2) Lift body side slightly with piston rods fully extended, and secure body side on vise stand.
Drill a hole in 2 to 3 mm (0.08 to 0.12 in) diameter at a point 10 to 200 mm (0.39 to 7.87 in) from door side, and bleed gas stay completely.



CRUISE CONTROL SYSTEM

CC

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5. Cruise Control Command Switch....................7
6. Stop and Brake Switch....................8
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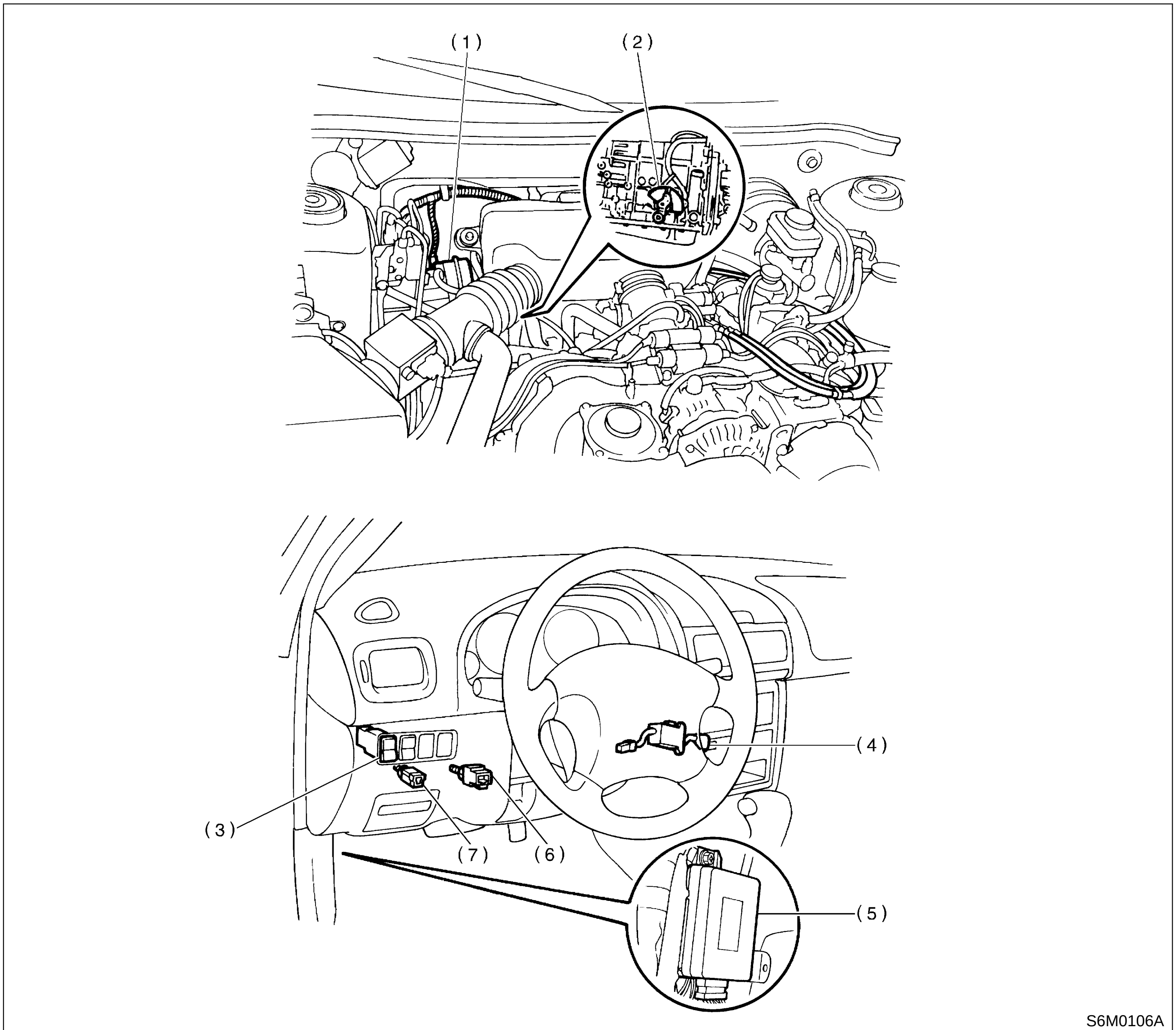
8. Inhibitor Switch....................10

1. General Description S912001

A: COMPONENT S912001A05



(1) Actuator (with valves)
(2) Inhibitor switch (AT)
(3) Cruise control main switch
(4) Cruise control command switch
(5) Cruise control module
(6) Stop and brake switch
(7) Clutch switch (MT)

B: CAUTION S912001A03

- Before disassembling or reassembling parts, always disconnect the battery ground cable. When repairing the radio, control module and other parts with memory functions, make note of the memory before disconnecting the battery ground cable. All memory will be erased.
- Reassemble parts in the reverse order of disassembly unless otherwise indicated.
- Adjust parts to specifications specified in this manual.
- Connect connectors and hoses securely during reassembly.
- After reassembly, ensure functional parts operate properly.

C: PREPARATION TOOL S912001A17

1. GENERAL TOOLS S912001A1701

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance and voltage.

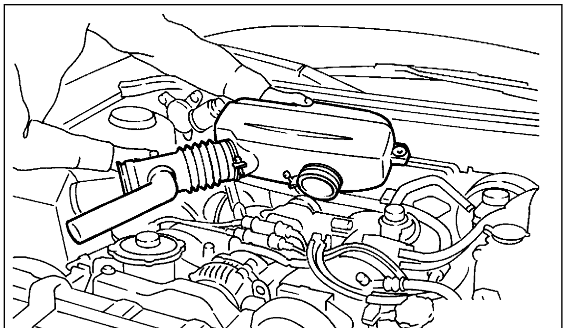
2. Actuator S912499

A: REMOVAL S912499A18

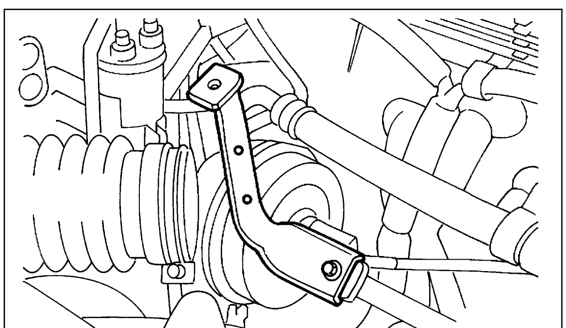
CAUTION:

- **Be careful not to apply excessive load to the wire cable when adjusting and/or installing; otherwise, the actuator may be deformed or damaged.**
- **Do not bend cable sharply with a radius less than 100 mm (3.94 in); otherwise, cable may bend permanently, resulting in poor performance.**
- **When installing cable, be careful not to sharply bend or pinch the inner cable; otherwise, the cable may break.**

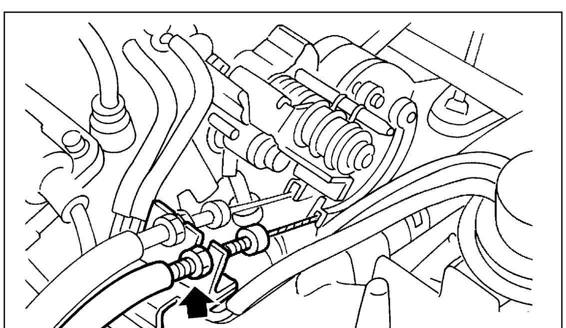
1) Disconnect ground cable from battery.
2) Remove air intake chamber.


S6M0007

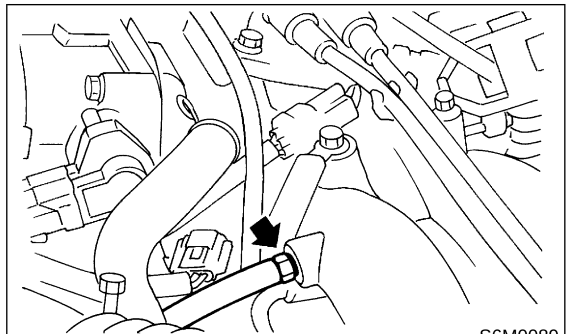
3) Remove air intake chamber stay.
4) Remove clip bands from cruise control cable.


S6M0087

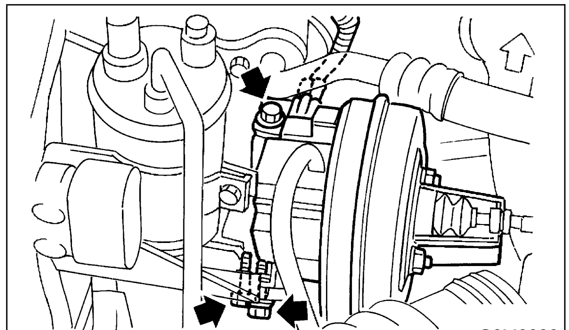
5) Remove cruise control cable end from throttle cam.


S6M0088

6) Disconnect cruise control vacuum hose from intake manifold.


S6M0089

7) Remove actuator attaching bolts.
8) Disconnect the connector from the actuator, then remove the actuator.


S6M0090

B: INSTALLATION S912499A11

Install in the reverse order of removal.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)

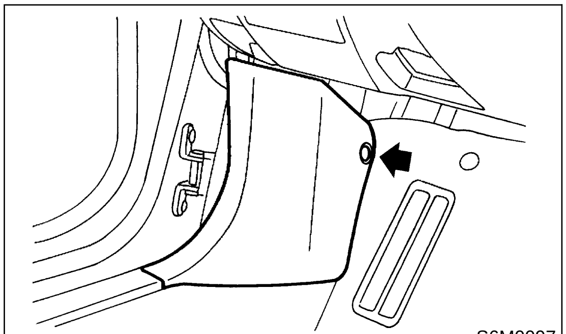
CAUTION:
When inserting vacuum hose to intake manifold, apply sealant to the fitting hose.

Fluid packing:
THREE BOND 1105 or equivalent

3. Cruise Control Module S912500

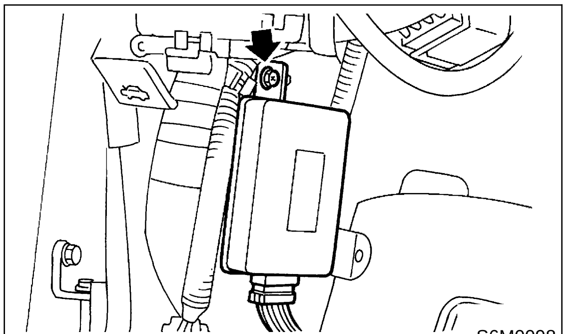
A: REMOVAL S912500A18

1) Disconnect ground cable from battery.
2) Remove front pillar lower trim.



S6M0097

3) Disconnect connector from cruise control module.
4) Remove bolt, then remove cruise control module.



S6M0098

B: INSTALLATION S912500A11

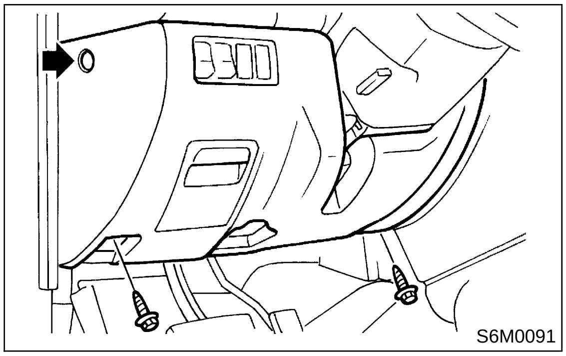
Install in the reverse order of removal.

4. Cruise Control Main Switch

S912498

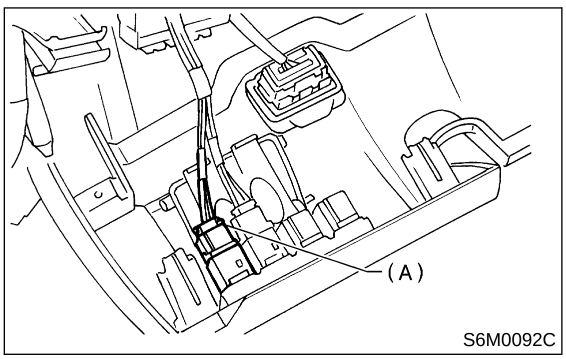
A: REMOVAL S912498A18

1) Disconnect ground cable from battery.
2) Remove screws and clip from instrument panel lower cover.
3) Remove panel lower cover.



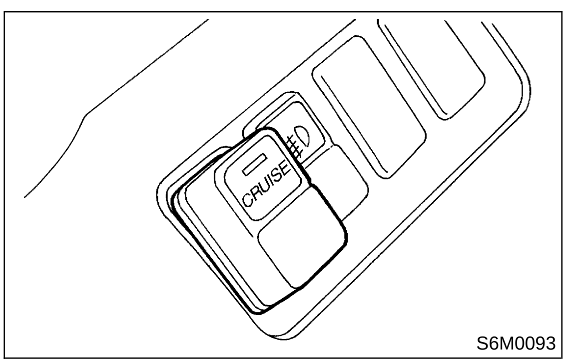
S6M0091

4) Disconnect connector from cruise control main switch (A).



S6M0092C

5) Remove main switch by pushing it outward.



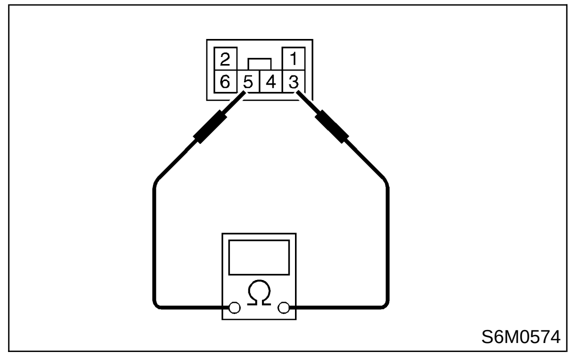
S6M0093

B: INSTALLATION S912498A11

Install in the reverse order of removal.

C: INSPECTION S912498A10

Measure cruise control main switch resistance.



S6M0574

Switch position	Terminal No.	Standard
OFF	3 and 5	More than 1 MΩ
ON	3 and 5	Less than 1 Ω

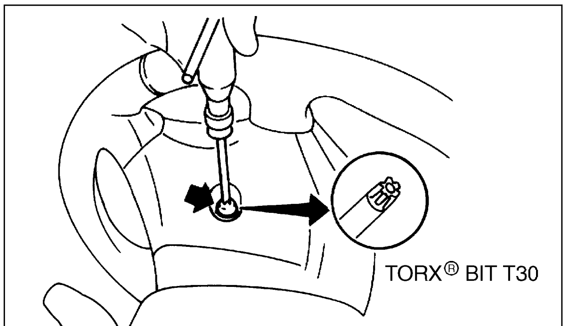
If NG, replace cruise control main switch.

5. Cruise Control Command Switch S912497

A: REMOVAL S912497A18

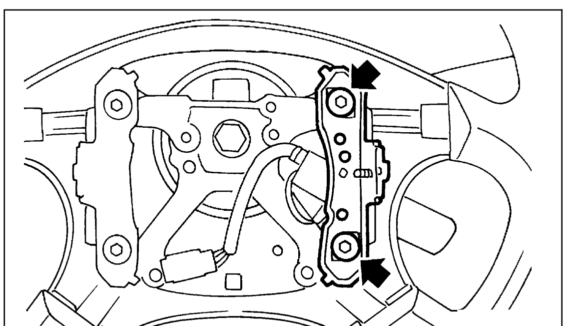
WARNING:
Before servicing, be sure to read the notes in the AB section for proper handling of the driver's airbag module. <Ref. to AB-3, CAUTION, General Description.>

1) Set front wheels in straight ahead position.
2) Turn ignition switch OFF.
3) Disconnect battery ground cable and wait for at least 20 seconds before starting work.
4) Using TORX® BIT T30 (Tamper resistant type), loosen two TORX® bolts which secure driver's airbag module.

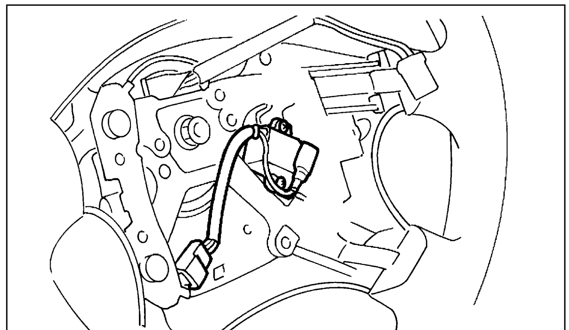


H5M0662A

5) Disconnect airbag module connector on back of airbag module.
6) Remove horn switch from steering wheel as shown.


S6M0095

7) Disconnect horn and cruise control command switch connector, then remove cruise control command switch.

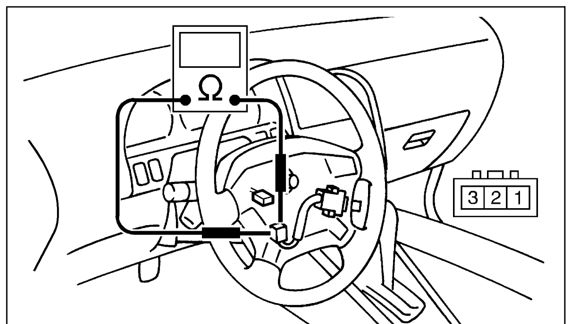

S6M0096

B: INSTALLATION S912497A11

Install is in the reverse order of removal.

C: INSPECTION S912497A10

Measure cruise control command switch resistance.



B6M1406

Switch	Position	Terminal No.	Standard
CANCEL	ON	1 (+) and 2 (−)	Less than 1 Ω
	ON	1 (+) and 3 (−)	Less than 1 Ω
SET/COAST	OFF	1 and 2	More than 1 MΩ
	ON	1 and 2	Less than 1 Ω
RESUME/ ACCEL	OFF	1 and 3	More than 1 MΩ
	ON	1 and 3	Less than 1 Ω

If NG, replace cruise control command switch.

6. Stop and Brake Switch *S912496*

A: REMOVAL *S912496A18*

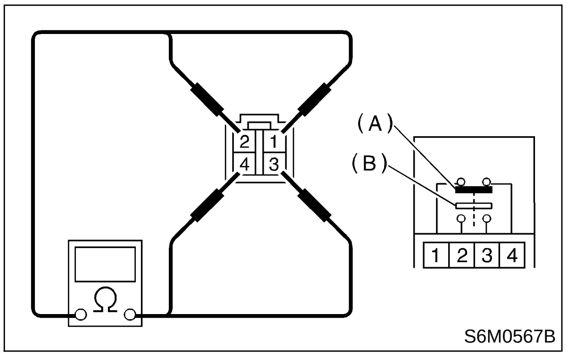
1) Disconnect ground cable from battery.
2) Disconnect the stop and brake switch connectors, and then remove the switch. <Ref. to BR-50 REMOVAL, Stop Light Switch.>

B: INSTALLATION *S912496A11*

Install in the reverse order of removal.

C: INSPECTION *S912496A10*

Measure the brake switch (A) and stop light switch (B) resistance.



Switch	Pedal	Terminal No.	Standard
Brake	Released	1 and 4	Less than 1 Ω
	Depressed	1 and 4	More than 1 MΩ
Stop light	Released	2 and 3	More than 1 MΩ
	Depressed	2 and 3	Less than 1 Ω

If NG, replace stop and brake switch.

7. Clutch Switch *S912258*

A: REMOVAL *S912258A18*

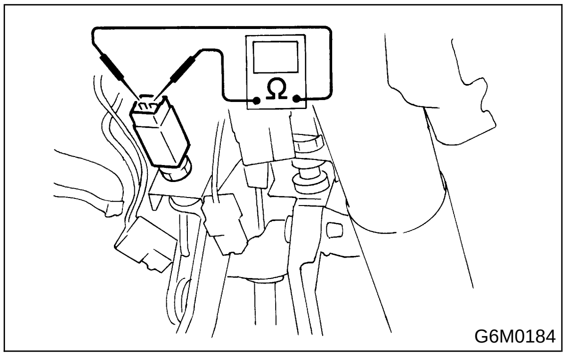
1) Disconnect ground cable from battery.
2) Disconnect clutch switch connector, and then remove the switch. <Ref. to CL-21 DISASSEMBLY, Clutch Pedal.>

B: INSTALLATION *S912258A11*

Install in the reverse order of removal.

C: INSPECTION *S912258A10*

Measure clutch switch resistance.



G6M0184

Switch	Pedal	Terminal No.	Standard
Clutch	Released	1 and 2	Less than 1 Ω
	Depressed	1 and 2	More than 1 MΩ

If NG, replace clutch switch.

8. Inhibitor Switch S912243

A: REMOVAL S912243A18

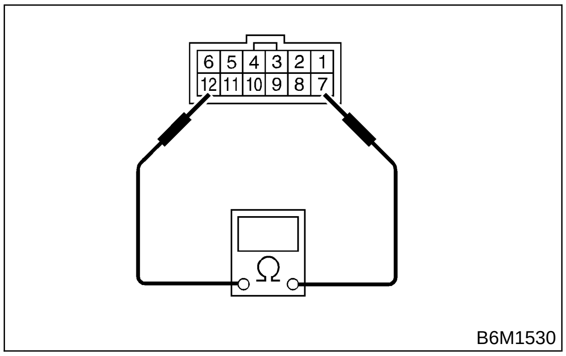
1) Disconnect ground cable from battery.
2) Disconnect inhibitor switch connector, and then remove the switch. <Ref. to AT-29 REMOVAL, Inhibitor Switch.>

B: INSTALLATION S912243A11

Installation is in the reverse order of removal.

C: INSPECTION S912243A10

Measure inhibitor switch resistance.



Selector lever position	Terminal No.	Standard
P	7 and 12	Less than 1 Ω
N		Less than 1 Ω
Except P and N		More than 1 MΩ

If NG, replace inhibitor switch.

CRUISE CONTROL SYSTEM (DIAGNOSTICS)

CC

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5. Subaru Select Monitor...9
6. Diagnostics Chart with Symptom 11
7. List of Diagnostic Trouble Code (DTC)...19
8. Diagnostics Chart with Diagnostic Trouble Code 20

1. Basic Diagnostic Procedure S003501

A: PROCEDURE S003501E45

No.	Step	Check	Yes	No
1	**START DIAGNOSIS.** 1) Perform pre-inspection. <Ref. to CC-4, INSPECTION, General Description.> 2) Check cruise control main switch operation.	Is cruise control main switch turned ON?	Go to step **2**.	Go to symptom 1. <Ref. to CC-11, SYMPTOM CHART, Diagnostics Chart with Symptom.>
2	**PREPARE SUBARU SELECT MONITOR.**	Is the select monitor available?	Go to step **3**.	Go to step **4**.
3	**PERFORM CRUISE CANCEL CONDITIONS DIAGNOSIS.** Perform cruise cancel conditions diagnosis. <Ref. to CC-9, Subaru Select Monitor.>	Is diagnostic trouble code indicated?	Go to “Diagnostic Chart with Diagnostics Trouble Code”.	Go to step **4**.
4	**CHECK CRUISE CONTROL SET OPERATION.** Check cruise control set operation.	Can cruise control be set while driving at 40 km/h (25 MPH)?	Go to step **5**.	Go to symptom 2. <Ref. to CC-11, SYMPTOM CHART, Diagnostics Chart with Symptom.>
5	**CHECK VEHICLE SPEED IS HELD WITHIN SET SPEED.** Make sure vehicle speed is held within set speed.	Is vehicle speed held within set speed ±3 km/h (±2 MPH) ?	Go to step **6**.	Go to symptom 3. <Ref. to CC-11, SYMPTOM CHART, Diagnostics Chart with Symptom.>
6	**CHECK RESUME/ACCEL OPERATION.** Check RESUME/ACCEL operation.	Does vehicle speed increase or return to set speed after RESUME/ ACCEL switch has been pressed?	Go to step **7**.	Go to symptom 4. <Ref. to CC-11, SYMPTOM CHART, Diagnostics Chart with Symptom.>
7	**CHECK SET/COAST OPERATION.** Check SET/COAST operation.	Does vehicle speed decrease after SET/COAST switch has been pressed?	Go to step **8**.	Go to symptom 5. <Ref. to CC-11, SYMPTOM CHART, Diagnostics Chart with Symptom.>
8	**CHECK CANCEL OPERATION.** Check CANCEL operation.	Is cruise control released after CANCEL switch has been pressed?	Go to step **9**.	Go to symptom 6. <Ref. to CC-11, SYMPTOM CHART, Diagnostics Chart with Symptom.>
9	**CHECK CRUISE CONTROL RELEASE OPERATION.** Check cruise control release operation.	Is cruise control released after brake pedal has been depressed?	Go to step **10**.	Go to symptom 7. <Ref. to CC-11, SYMPTOM CHART, Diagnostics Chart with Symptom.>
10	**CHECK CRUISE CONTROL RELEASE OPERATION.** Check cruise control release operation.	Is cruise control released after clutch pedal has been depressed? (MT)	Finish the diagnostics.	Go to symptom 8. <Ref. to CC-11, SYMPTOM CHART, Diagnostics Chart with Symptom.>

2. General Description S003001

A: CAUTION S003001A03

1. SUPPLEMENTAL RESTRAINT SYSTEM “AIRBAG” S003001A0301

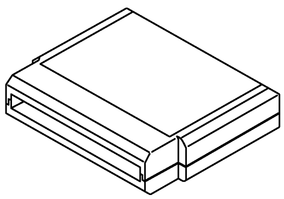
Airbag system wiring harness is routed near the cruise control module and cruise control command switch.

CAUTION:

- **All airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.**
- **Be careful not to damage airbag system wiring harness when servicing the cruise control module and cruise control command switch.**

B: PREPARATION TOOL S003001A17

1. SPECIAL TOOLS S003001A1701

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)

2. GENERAL TOOLS S003001A1702

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.

C: INSPECTION S003001A10

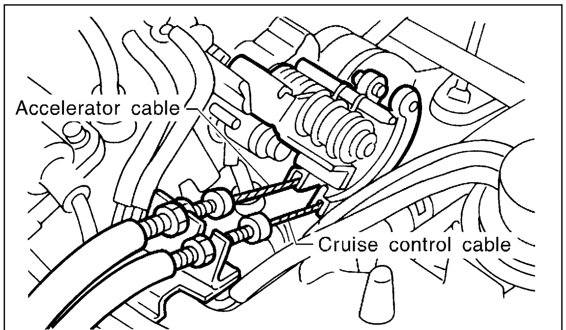
1. BATTERY S003001A1002

Measure battery voltage and specific gravity of electrolyte.

Standard voltage:
12 V, or more

Specific gravity:
Above 1.260

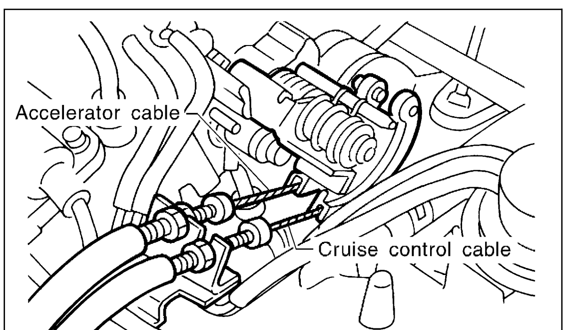
2. CRUISE CONTROL CABLE S003001A1003



S6M0099A

Check the cruise control cable installation.
If NG, install the cable securely.

3. ACCELERATOR CABLE S003001A1004



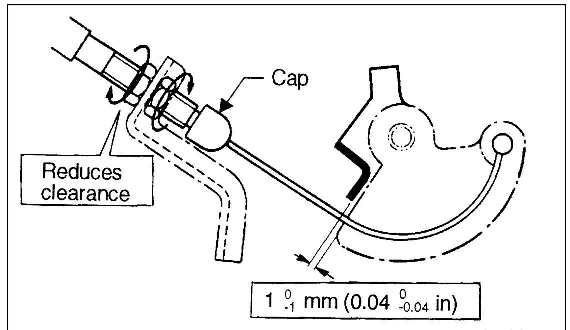
S6M0099A

Check movement of the accelerator cable when the cruise control throttle is moved by hand.
If NG, check throttle cam.

4. THROTTLE CAM S003001A1005

Check that the throttle cam moves smoothly.
If NG, repair throttle cam.

5. CABLE FREE PLAY S003001A1006



B6M0241A

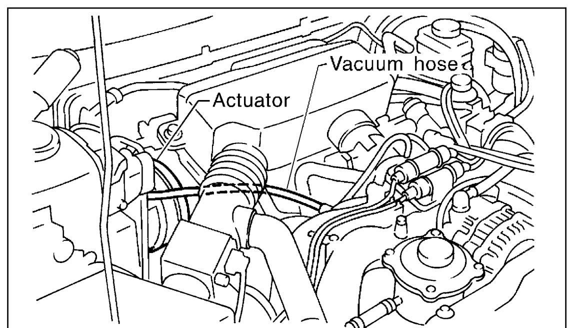
Check that the throttle cam-to-lever clearance is within specifications.

Throttle cam-to-lever clearance:
0 — 1 mm (0 — 0.04 in)

If NG, adjust the clearance with the adjust nut.

NOTE:
Check that the cap is positioned in the groove.

6. VACUUM HOSE S003001A1007



S6M0101A

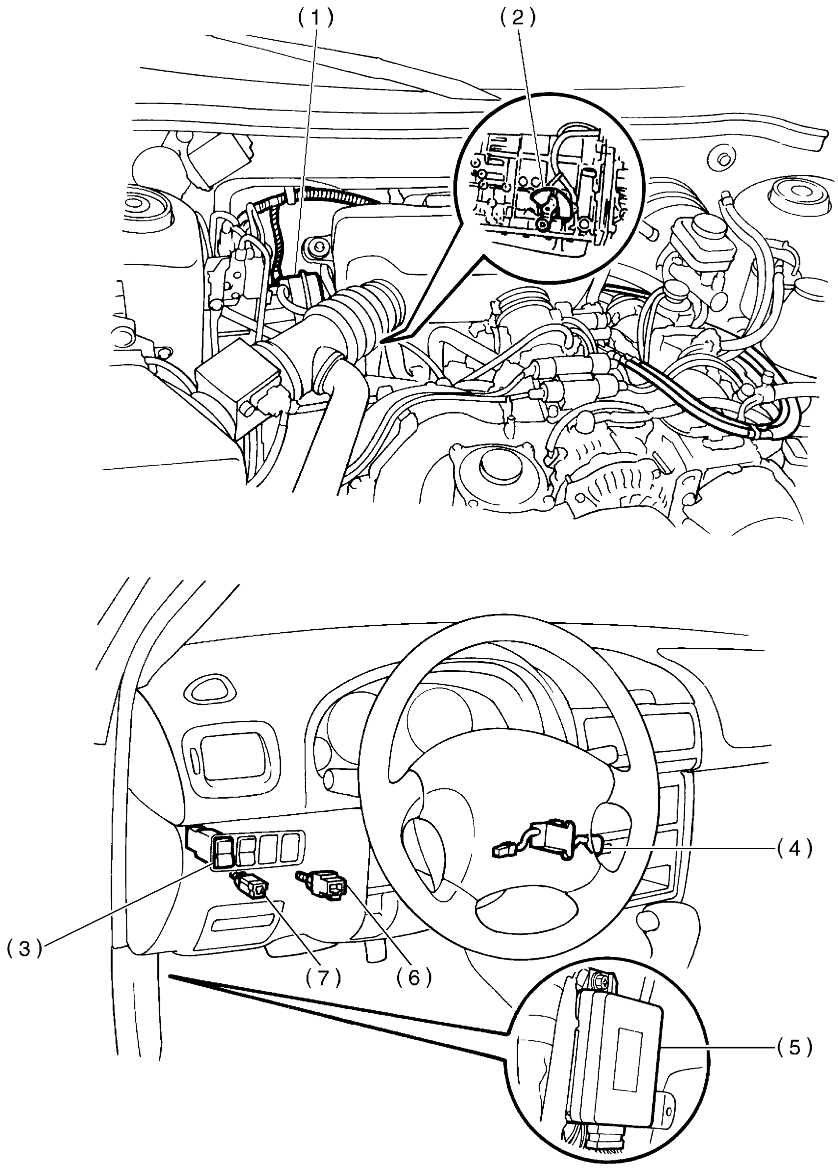
Check vacuum hose (which connects actuator and intake manifold).
If NG, replace vacuum hose.

7. ACTUATOR *S003001A1008*

No.	Step	Check	Yes	No
1	**MEASURE RESISTANCE OF VALVE.** 1) Disconnect connector from actuator. 2) Measure resistance between terminals of actuator. ***Terminals*** ***No. 2 — No. 3:***	Is resistance less than 22 Ω?	Go to step **2**.	Replace actuator. <Ref. to CC-4, REMOVAL, Actuator.>
2	**MEASURE RESISTANCE OF VALVE.** Measure resistance between terminals of actuator. ***Terminals*** ***No. 2 — No. 1:***	Is resistance less than 55 Ω?	Go to step **3**.	Replace actuator. <Ref. to CC-4, REMOVAL, Actuator.>
3	**MEASURE RESISTANCE OF VALVE.** Measure resistance between terminals of actuator. ***Terminals*** ***No. 2 — No. 4:***	Is resistance less than 55 Ω?	Go to step **4**.	Replace actuator. <Ref. to CC-4, REMOVAL, Actuator.>
4	**CHECK FOR LEAKAGE AND STICKING OF VALVES.** 1) Disconnect connector from actuator. 2) Disconnect vacuum hose from actuator. 3) Connect a vacuum pump. 4) Apply a vacuum pressure of 40.0 kPa (300 mmHg, 11.81 inHg) to actuator. 5) Make sure that cruise control cable moves smoothly when connecting + (positive) battery cable to terminal No. 2 and − (negative) battery cable to terminals No. 1, 3 and 4 of actuator connector.	Does cruise control cable have a stroke of 35 mm (1.38 in) within 3 seconds?	Go to step **5**.	Replace actuator. <Ref. to CC-4, REMOVAL, Actuator.>
5	**CHECK FOR LEAKAGE AND STICKING OF VALVES.** When the battery cable is disconnected from former condition, make sure the cable returns to its original position smoothly.	Does cruise control cable get back to its original position within 1.5 seconds?	Go to step **6**.	Replace actuator. <Ref. to CC-4, REMOVAL, Actuator.>
6	**CHECK CABLE MOVEMENT.** 1) Connect + (positive) battery cable to terminal No. 2 and − (negative) battery cable to terminals No. 1, 3 and 4 of actuator connector. 2) Apply a vacuum pressure of 40 kPa (300 mmHg, 11.81 inHg) to actuator.	Does cruise control perform pull operation?	Go to step **7**.	Replace actuator. <Ref. to CC-4, REMOVAL, Actuator.>
7	**CHECK CABLE MOVEMENT.** After step 6, disconnect − (negative) battery cable from terminal 3 of actuator connector and remove vacuum pump.	Does cruise control perform hold operation?	Go to step **8**.	Replace actuator. <Ref. to CC-4, REMOVAL, Actuator.>
8	**CHECK CABLE MOVEMENT.** After step 7, disconnect − (negative) battery cable from terminal 1 of actuator connector.	Does cruise control perform release operation?	End of actuator inspection.	Replace actuator. <Ref. to CC-4, REMOVAL, Actuator.>

3. Electrical Components Location *S003507*

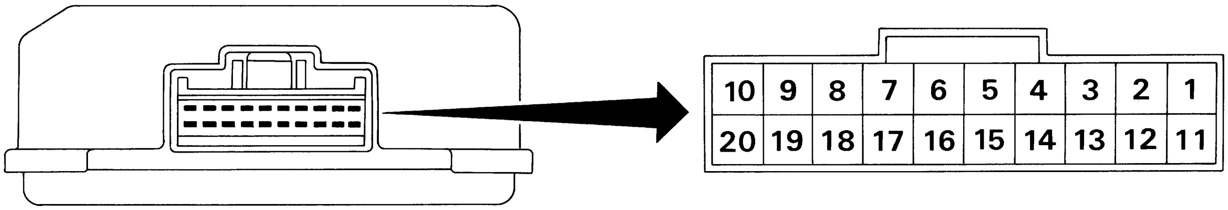
A: LOCATION *S003507A13*



(1) Actuator (with valves)
(2) Inhibitor switch (AT)
(3) Cruise control main switch
(4) Cruise control command switch
(5) Cruise control module
(6) Stop and brake switch
(7) Clutch switch (MT)

4. Cruise Control Module I/O Signal S003515

A: ELECTRICAL SPECIFICATION S003515A08



G6M0015

Content	Terminal No.	Measuring conditions and I/O signals (ignition switch ON and engine idling)
Vent valve	1	● Power supply is ON when vehicle is stopped. ● ON-and-OFF (“0”-and-battery voltage) operation is alternately repeated while cruise control is operating.
Safety valve	2	● Power supply is ON when vehicle is stopped. ● ON-and-OFF (“0”-and-battery voltage) operation is alternately repeated while cruise control is operating.
Ignition switch	3	● Battery voltage is present when ignition switch is turned ON. ● “0” volt is present when ignition switch is turned OFF.
Cruise control main switch	4	● Battery voltage is present when main power is turned ON. ● “0” volt is present when main power is turned OFF.
Power supply to vacuum valve, vent valve, safety valve and indicator light	5	● Battery voltage is present when main power is turned ON. ● “0” volt is present when main power is turned OFF.
SET/COAST switch	6	● Battery voltage is present when command switch is turned to SET/COAST position. ● “0” volt is present when command switch is released.
RESUME/ACCEL switch	7	● Battery voltage is present when command switch is turned to RESUME/ ACCEL position. ● “0” volt is present when command switch is released.
Brake switch	8	Set selector lever to any position other than “P” or “N” position (AT) / leave clutch pedal released (MT), while cruise control main switch is turned ON. Then check that; ● Battery voltage is present when brake pedal is released. ● “0” volt is present when brake pedal is depressed, or ● Battery voltage is present when clutch pedal is released (MT). ● “0” volt is present when clutch pedal is depressed (MT). ● Battery voltage is present when selector lever is in any position other than “P” or “N” position (AT). ● “0” volt is present when selector lever is set to “P” or “N” position (AT).
Clutch switch (MT)/ Inhibitor switch (AT)	9	● Battery voltage is present when clutch pedal is released (MT). ● “0” volt is present when clutch pedal is depressed (MT). ● Battery voltage is present when selector lever is in any position other than “P” or “N” position (AT). ● “0” volt is present when selector lever is set to “P” or “N” position (AT).
Vacuum valve	11	● Power supply is ON when vehicle is stopped. ● ON-and-OFF (“0”-and-battery voltage) operation is alternately repeated while cruise control is operating.
Set signal to transmission control module (AT)	12	● TCM emits a ground-level signal while driving vehicle at least 40 km/h (25 MPH) with SET switch ON.
Ground	13	—

Content	Terminal No.	Measuring conditions and I/O signals (ignition switch ON and engine idling)
Check connector/ Data link connector	14	—
Check connector/ Data link connector	15	—
Vehicle speed sensor 2 (MT) Automatic transmission control module (AT)	18	Lift-up the vehicle until all four wheels are raised off ground, and then rotate any wheel manually. Approx. 5 and 0 volt pulse signals are alternately input to cruise control module.
Stop light switch	19	Turn ignition switch to OFF. Then check that; ● Battery voltage is present when brake pedal is depressed. ● “0” volt is present when brake pedal is released.
Ground	20	—
NOTE: Voltage at terminals 1, 2, 11 and 12 cannot be checked unless vehicle is driven by cruise control operation.		

B: SCHEMATIC *S003515A21*

<Ref. to WI-54, SCHEMATIC, Cruise Control System.>

5. Subaru Select Monitor S003503

A: OPERATION S003503A16

1. GENERAL S003503A1604

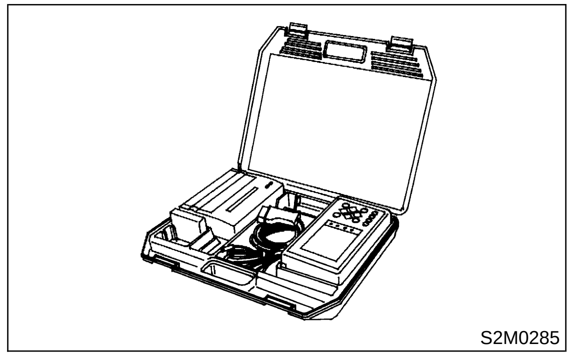
The on-board diagnosis function of the cruise control system uses an external Subaru Select Monitor.
The on-board diagnosis function operates in two categories, which are used depending on the type of problems;
1) Cruise cancel conditions diagnosis
(1) This category of diagnosis requires actual vehicle driving in order to determine the cause, (as when cruise speed is cancelled during driving although cruise cancel condition is not entered).
(2) Cruise control module memory stores the cancel condition (Code No.) which occurred during driving. When there are plural cancel conditions (Code No.), they are shown on the Subaru Select Monitor.

CAUTION:
- **The cruise control memory stores not only the cruise "cancel" which occurred (although "cancel" operation is not entered by the driver), but also the "cancel" condition input by the driver.**
- **The content of memory is cleared when ignition switch or cruise main switch is turned OFF.**

2) Real-time diagnosis
The real-time diagnosis function is used to determine whether or not the input signal system is in good order, according to signal emitted from switches, sensors, etc.
(1) Vehicle cannot be driven at cruise speed because problem occurs in the cruise control system or its associated circuits.
(2) Monitor the signal conditions from switches and sensors.

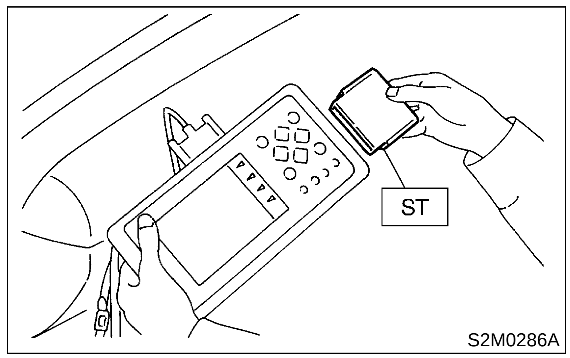
2. CRUISE CANCEL CONDITIONS DIAGNOSIS S003503A1605

1) Prepare Subaru Select Monitor kit.



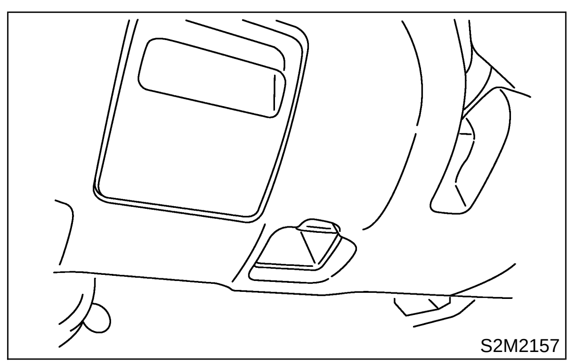
S2M0285

2) Connect diagnosis cable to Subaru Select Monitor.
3) Insert cartridge into Subaru Select Monitor.
<Ref. to CC-3, SPECIAL TOOLS, PREPARATION TOOL, General Description.>



S2M0286A

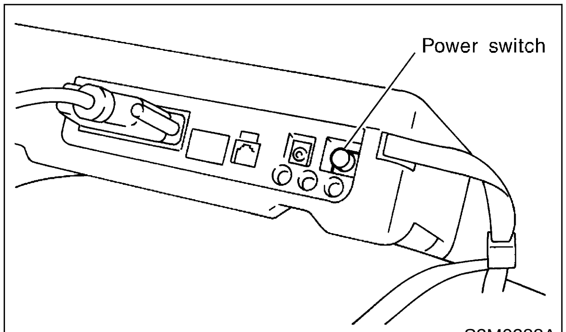
4) Connect Subaru Select Monitor to data link connector.
(1) Data link connector located in the lower portion of the instrument panel (on the driver's side).



S2M2157

(2) Connect diagnosis cable to data link connector.

5) Start engine and turn cruise control main switch to ON.
6) Turn Subaru Select Monitor switch to ON.



S2M0288A

7) On the ≪Main Menu≫ display screen, select the {All System Diagnosis} and press the [YES] key.

NOTE:
The diagnostic trouble code is also shown in the {Each System Check} mode. This mode is called up on the ≪Cruise Control Diagnosis≫ screen by selecting the item {Cancel Code(s) Display}.

8) Drive vehicle at least 30 km/h (19 MPH) with cruise speed set.
9) If cruise speed is canceled itself (without doing any cancel operations), a diagnostic trouble code will appear on select monitor display.

CAUTION:
● A diagnostic trouble code will also appear when cruise cancel is effected by driver. Do not confuse.
● Have a co-worker ride in vehicle to assist in diagnosis during driving.

NOTE:
Diagnostic trouble code will be cleared by turning ignition switch or cruise control main switch to OFF.

3. REAL-TIME DIAGNOSIS S003503A1606

1) Connect select monitor.
2) Turn ignition switch and cruise control main switch to ON.
3) Turn Subaru Select Monitor switch to ON.
4) On the ≪Main Menu≫ display screen, select the {Each System Check} and press the [YES] key.
5) On the ≪System Selection Menu≫ display screen, select the {Cruise Control} and press the [YES] key.
6) Press the [YES] key after displayed the information of engine type.
7) On the ≪Cruise Control Diagnosis≫ display screen, select the {Current Data Display & Save} and press the [YES] key.
8) Make sure that normal indication is displayed when controls are operated as indicated below:
- Depress/release the brake pedal. (Stop light switch and brake switch turn ON.)
- Turn ON the “SET/COAST” switch.
- Turn ON the “RESUME/ACCEL” switch.
- Depress/release the clutch pedal. (MT)
- Set the selector lever to P or N. (AT)

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. <Ref. to CC-19, List of Diagnostic Trouble Code (DTC).>

6. Diagnostics Chart with Symptom S003619

A: SYMPTOM CHART S003619F22

Symptom		Repair area	Reference
1	Cruise control main switch is not turned ON.	(1) Check power supply.	<Ref. to CC-13, CHECK POWER SUPPLY, Diagnostics Chart with Symptom.>
		(2) Check cruise control main switch.	<Ref. to CC-15, CHECK CRUISE CONTROL MAIN SWITCH, Diagnostics Chart with Symptom.>
2	Cruise control cannot be set.	(1) Check SET/COAST switch.	<Ref. to CC-27, DTC 14 SET/COAST SWITCH, RESUME/ACCEL SWITCH AND CANCEL SWITCH, Diagnostics Chart with Diagnostic Trouble Code.>
		(2) Check stop light switch and brake switch.	<Ref. to CC-20, DTC 11 BRAKE SWITCH AND STOP LIGHT SWITCH, Diagnostics Chart with Diagnostic Trouble Code.>
		(3) Check clutch switch (MT).	<Ref. to CC-22, DTC 12 CLUTCH SWITCH AND INHIBITOR SWITCH, Diagnostics Chart with Diagnostic Trouble Code.>
		(4) Check inhibitor switch (AT).	<Ref. to CC-22, DTC 12 CLUTCH SWITCH AND INHIBITOR SWITCH, Diagnostics Chart with Diagnostic Trouble Code.>
		(5) Check vehicle speed sensor.	<Ref. to CC-24, DTC 13 AND 24 VEHICLE SPEED SENSOR SYSTEM, Diagnostics Chart with Diagnostic Trouble Code.>
		(6) Check actuator.	<Ref. to CC-29, DTC 21, 22 AND 23 VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE, Diagnostics Chart with Diagnostic Trouble Code.>
3	Vehicle speed is not held within set speed ±3 km/h (±2 MPH).	(1) Check vehicle speed sensor.	<Ref. to CC-24, DTC 13 AND 24 VEHICLE SPEED SENSOR SYSTEM, Diagnostics Chart with Diagnostic Trouble Code.>
		(2) Check actuator.	<Ref. to CC-29, DTC 21, 22 AND 23 VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE, Diagnostics Chart with Diagnostic Trouble Code.>
4	Vehicle speed does not increase or does not return to set speed after RESUME/ ACCEL switch has been pressed.	(1) Check RESUME/ACCEL switch.	<Ref. to CC-27, DTC 14 SET/COAST SWITCH, RESUME/ACCEL SWITCH AND CANCEL SWITCH, Diagnostics Chart with Diagnostic Trouble Code.>
		(2) Check actuator.	<Ref. to CC-29, DTC 21, 22 AND 23 VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE, Diagnostics Chart with Diagnostic Trouble Code.>
5	Vehicle speed does not decrease after SET/COAST switch has been pressed.	(1) Check SET/COAST switch.	<Ref. to CC-27, DTC 14 SET/COAST SWITCH, RESUME/ACCEL SWITCH AND CANCEL SWITCH, Diagnostics Chart with Diagnostic Trouble Code.>
		(2) Check actuator.	<Ref. to CC-29, DTC 21, 22 AND 23 VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE, Diagnostics Chart with Diagnostic Trouble Code.>
6	Cruise control is not released after CANCEL switch has been pressed.	(1) Check CANCEL switch.	<Ref. to CC-27, DTC 14 SET/COAST SWITCH, RESUME/ACCEL SWITCH AND CANCEL SWITCH, Diagnostics Chart with Diagnostic Trouble Code.>
		(2) Check actuator.	<Ref. to CC-29, DTC 21, 22 AND 23 VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE, Diagnostics Chart with Diagnostic Trouble Code.>
7	Cruise control is not released after brake pedal has been depressed.	(1) Check stop light switch and brake switch.	<Ref. to CC-20, DTC 11 BRAKE SWITCH AND STOP LIGHT SWITCH, Diagnostics Chart with Diagnostic Trouble Code.>
		(2) Check actuator.	<Ref. to CC-29, DTC 21, 22 AND 23 VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE, Diagnostics Chart with Diagnostic Trouble Code.>

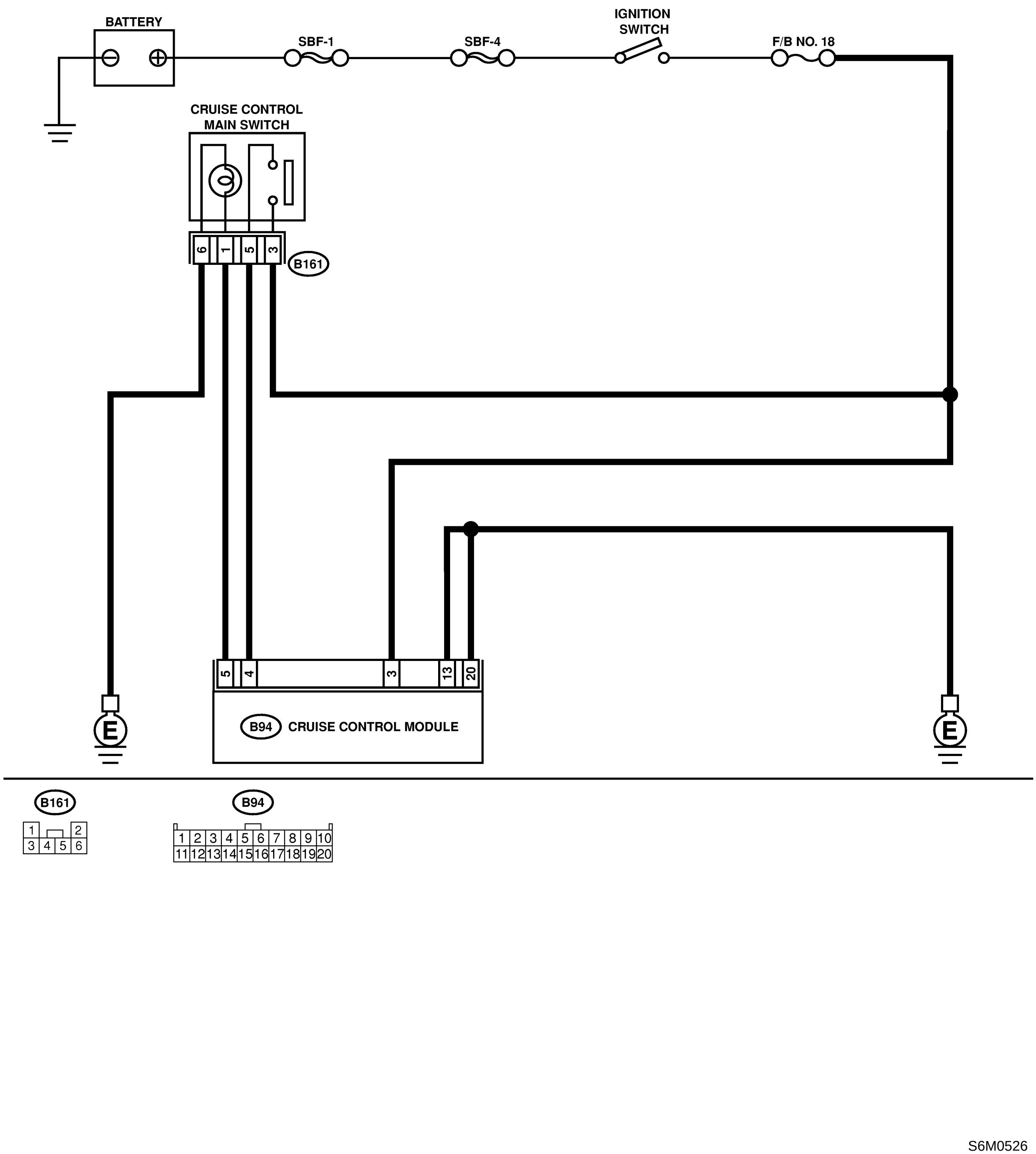
Symptom		Repair area	Reference
8	Cruise control is not released after clutch pedal has been depressed (MT).	(1) Check clutch switch.	<Ref. to CC-22, DTC 12 CLUTCH SWITCH AND INHIBITOR SWITCH, Diagnostics Chart with Diagnostic Trouble Code.>
		(2) Check actuator.	<Ref. to CC-29, DTC 21, 22 AND 23 VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE, Diagnostics Chart with Diagnostic Trouble Code.>

B: CHECK POWER SUPPLY *S003619F23*

TROUBLE SYMPTOM:

Cruise control can be set normally, but indicator does not come on. (When main switch is pressed.)

WIRING DIAGRAM:



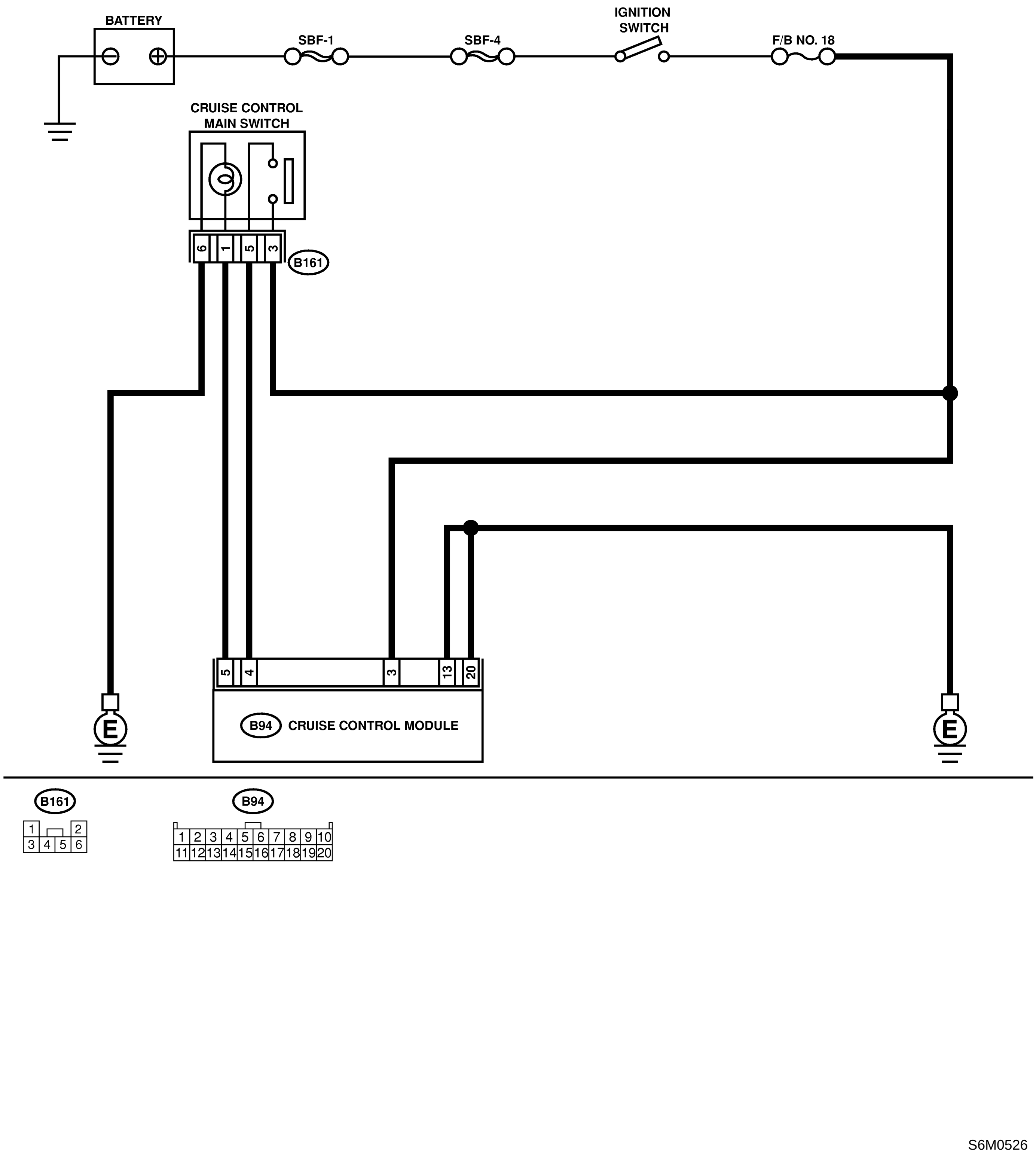
No.	Step	Check	Yes	No
1	**CHECK POWER SUPPLY.** 1) Disconnect cruise control module harness connector. 2) Turn ignition switch ON. 3) Measure voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B94) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2**.	● Check fuse No. 18 (in fuse & relay box). ● Check harness for open or short between cruise control module and fuse & relay box.
2	**CHECK GROUND CIRCUIT.** Measure resistance between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B94) No. 13, No. 20 (+) — Chassis ground (−):***	Is the resistance less than 10 Ω?	Power supply and ground circuit are OK.	Repair harness.

C: CHECK CRUISE CONTROL MAIN SWITCH *S003619F24*

TROUBLE SYMPTOM:
Cruise control main switch is not turned ON and cruise control cannot be set.

NOTE:
When the main relay (built-in cruise control module) operates, the main switch circuit is in normal condition.
The main relay operation can be checked by hearing the operation sounds.
This operation sounds will be heard when ignition switch and cruise control main switch is turned to ON.

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK CRUISE CONTROL MAIN SWITCH CIRCUIT.** 1) Disconnect cruise control main switch harness connector. 2) Turn ignition switch ON. 3) Measure voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B161) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2**.	● Check fuse No. 18 (in fuse & relay box). ● Check harness for open or short between cruise control main switch and fuse & relay box.
2	**CHECK CRUISE CONTROL MAIN SWITCH CIRCUIT.** 1) Turn ignition switch OFF. 2) Disconnect cruise control module harness connector. 3) Measure resistance between cruise control module harness connector terminal and cruise control main switch harness connector terminal. ***Connector & terminal*** ***(B94) No. 4 (+) — (B161) No. 5 (−):*** ***(B94) No. 5 (+) — (B161) No. 1 (−):*** ***(B161) No. 6 (+) — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **3**.	Repair harness.
3	**CHECK CRUISE CONTROL MAIN SWITCH.** Remove and check cruise control main switch. <Ref. to CC-6, Cruise Control Main Switch.>	Is cruise control main switch OK?	Replace cruise control module.	Replace cruise control main switch.

MEMO:

7. List of Diagnostic Trouble Code (DTC) S003525

A: LIST S003525A12

DTC	Item	Contents of diagnosis	Index No.
11	BRAKE SW/STOP SW	Input signals from brake switch “OFF”, stop light switch “ON” (Brake pedal is depressed.)	<Ref. to CC-20, DTC 11 BRAKE SWITCH AND STOP LIGHT SWITCH, Diagnostics Chart with Diagnostic Trouble Code.>
12	CLUTCH SW/INHIBITOR SW	Input signals from clutch switch “OFF” (MT), or inhibitor switch “P or N” (AT) [Clutch pedal is depressed (MT), or selector lever is set to P or N position (AT).]	<Ref. to CC-22, DTC 12 CLUTCH SWITCH AND INHIBITOR SWITCH, Diagnostics Chart with Diagnostic Trouble Code.>
13	LOW SPEED LIMIT	Low-speed control limiter	<Ref. to CC-24, DTC 13 AND 24 VEHICLE SPEED SENSOR SYSTEM, Diagnostics Chart with Diagnostic Trouble Code.>
14	CANCEL SW	Input signal from cancel switch (faulty SET/COAST switch or RESUME/ACCEL switch)	<Ref. to CC-27, DTC 14 SET/COAST SWITCH, RESUME/ACCEL SWITCH AND CANCEL SWITCH, Diagnostics Chart with Diagnostic Trouble Code.>
21	VACUUM VALVE	Faulty vacuum valve or valve drive system	<Ref. to CC-29, DTC 21, 22 AND 23 VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE, Diagnostics Chart with Diagnostic Trouble Code.>
22	VENT 2 VALVE	Faulty vent 2 valve or valve drive system	<Ref. to CC-29, DTC 21, 22 AND 23 VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE, Diagnostics Chart with Diagnostic Trouble Code.>
23	VENT 1 VALVE	Faulty vent 1 valve or valve drive system	<Ref. to CC-29, DTC 21, 22 AND 23 VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE, Diagnostics Chart with Diagnostic Trouble Code.>
24	SPEED SENSOR	Faulty vehicle speed sensor 2 (MT) or transmission control module (AT)	<Ref. to CC-24, DTC 13 AND 24 VEHICLE SPEED SENSOR SYSTEM, Diagnostics Chart with Diagnostic Trouble Code.>
25	CONTROL MODULE	Faulty CPU RAM included in cruise control module	<Ref. to CC-31, DTC 25 CRUISE CONTROL MODULE BUILT-IN RELAY AND CPU RAM, Diagnostics Chart with Diagnostic Trouble Code.>

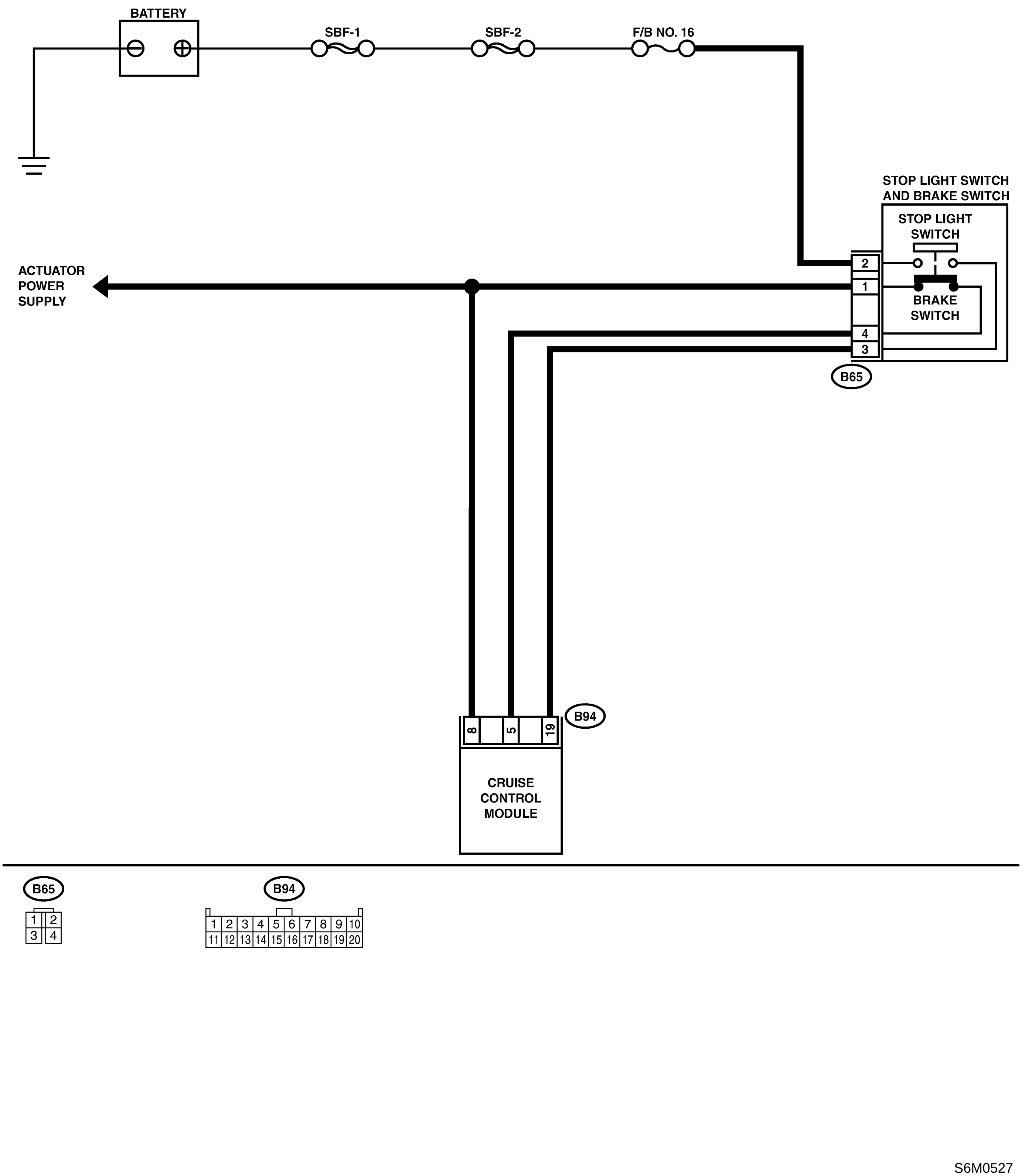
8. Diagnostics Chart with Diagnostic Trouble Code S003791

A: DTC 11 BRAKE SWITCH AND STOP LIGHT SWITCH S003791I04

DIAGNOSIS:

- Failure or disconnection of the stop light switch and brake switch.

WIRING DIAGRAM:



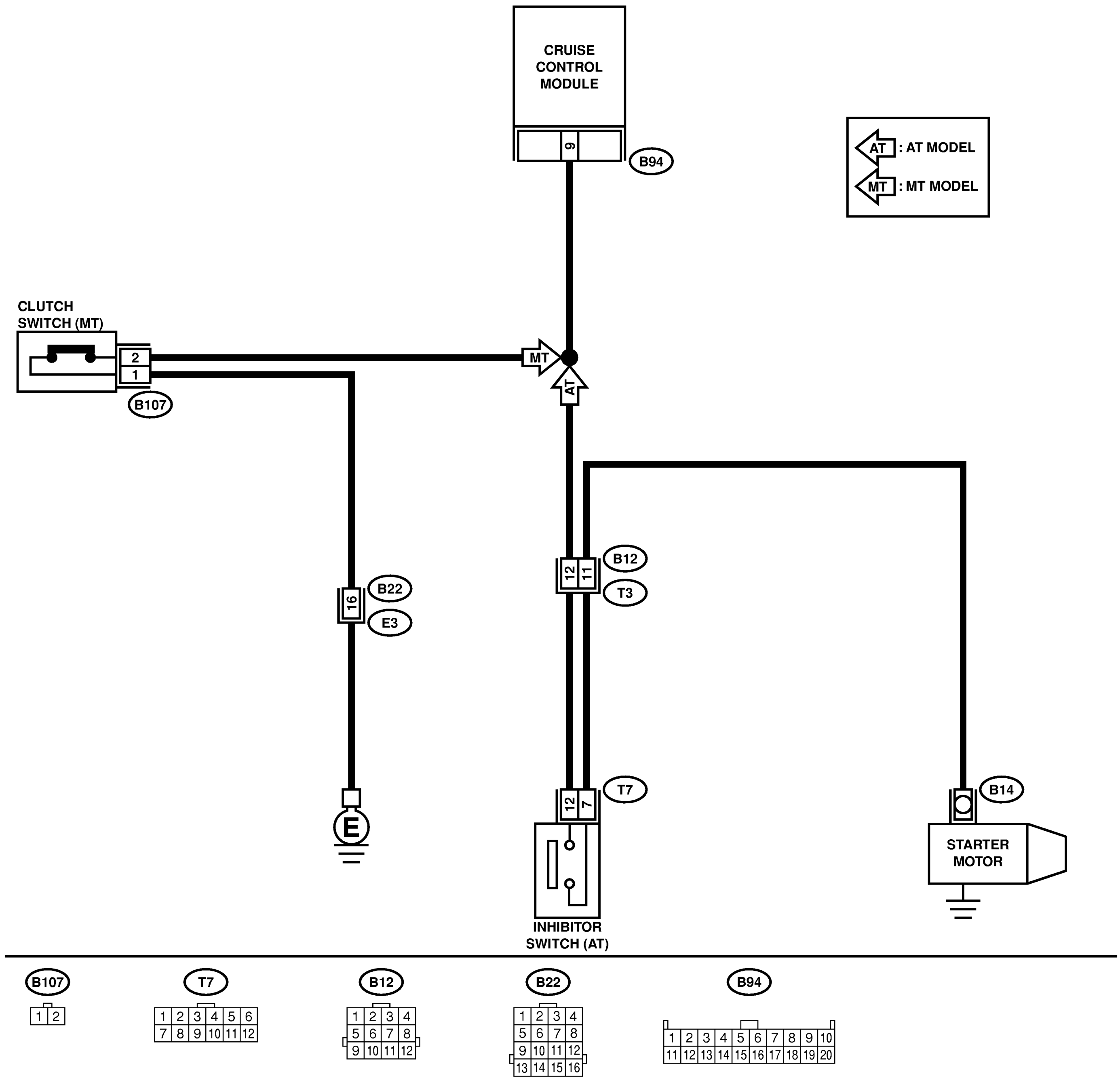
No.	Step	Check	Yes	No
1	**CHECK STOP LIGHT SWITCH AND BRAKE SWITCH CIRCUIT.** 1) Disconnect stop light switch and brake switch harness connector. 2) Turn ignition switch ON. 3) Turn cruise control main switch ON. 4) Measure voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B65) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2**.	● Check fuse No. 16 (in fuse & relay box). ● Check harness for open or short between stop light/brake switch and fuse & relay box.
2	**CHECK STOP LIGHT SWITCH AND BRAKE SWITCH CIRCUIT.** Measure voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B65) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3**.	● Check harness for open or short between stop light/brake switch and cruise control module.
3	**CHECK STOP LIGHT SWITCH AND BRAKE SWITCH CIRCUIT.** 1) Turn cruise control main switch and ignition switch OFF. 2) Disconnect cruise control module harness connector. 3) Measure resistance between cruise control module harness connector terminal and stop light switch and brake switch harness connector terminal. ***Connector & terminal*** ***(B94) No. 8 (+) — (B65) No. 1 (−):*** ***(B94) No. 19 (+) — (B65) No. 3 (−):***	Is the resistance less than 10 Ω?	Go to step **4**.	Repair harness.
4	**CHECK STOP LIGHT SWITCH AND BRAKE SWITCH.** Remove and check stop light switch and brake switch. <Ref. to CC-8, Stop and Brake Switch.>	Are stop light switch and brake switch OK?	Stop light switch and brake switch circuit are OK.	Replace stop light switch and brake switch.

B: DTC 12 CLUTCH SWITCH AND INHIBITOR SWITCH S003791I05

DIAGNOSIS:

- Failure or disconnection of the clutch switch. (MT)
- Failure or disconnection of the inhibitor switch. (AT)

WIRING DIAGRAM:



S6M0571

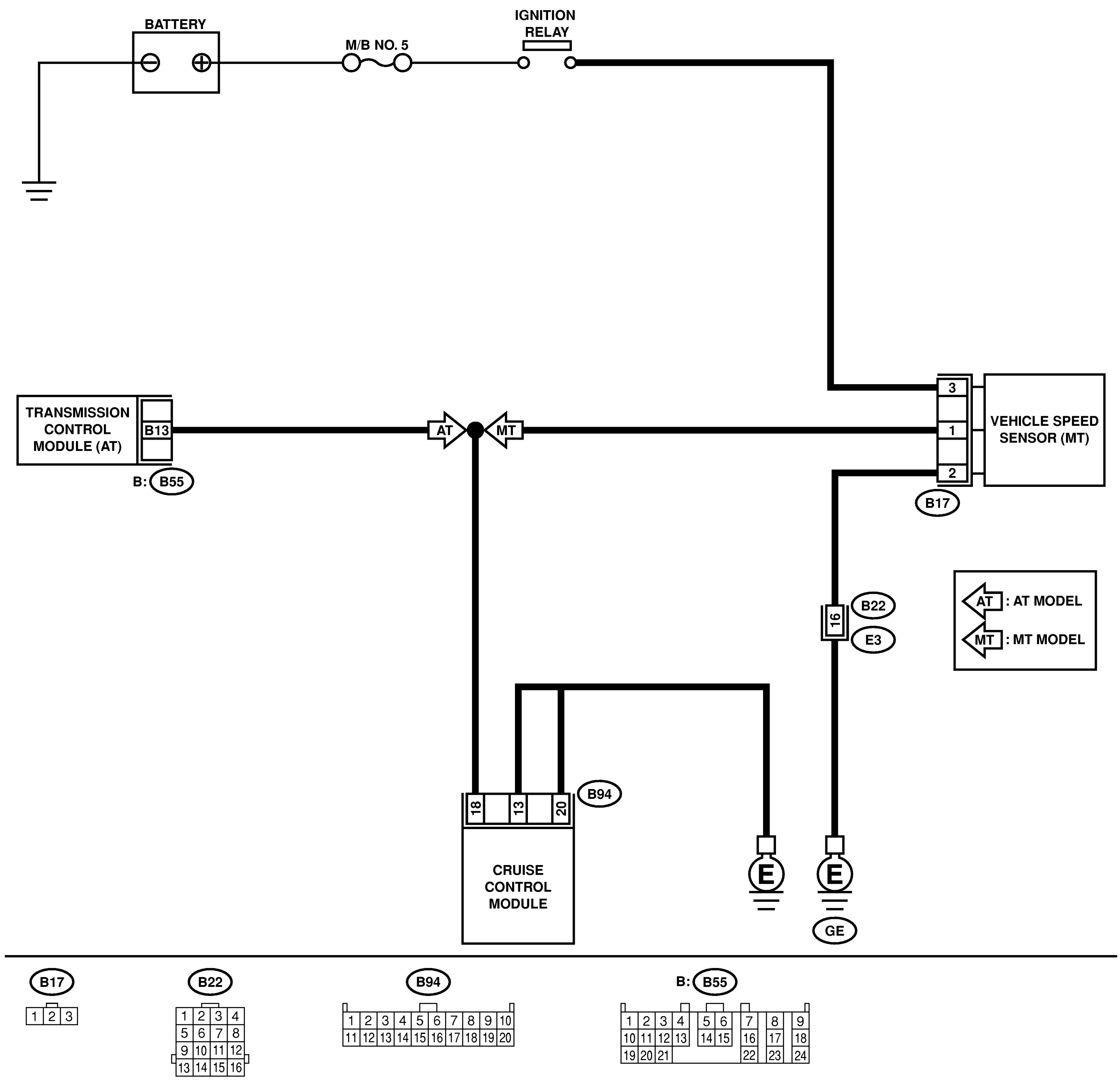
No.	Step	Check	Yes	No
1	**CHECK INHIBITOR SWITCH CIRCUIT (AT).** 1) Disconnect inhibitor switch harness connector. 2) Turn ignition switch ON. 3) Turn cruise control main switch ON. 4) Measure voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(T7) No. 12 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2**.	Check harness for open or short between inhibitor switch and cruise control module.
2	**CHECK INHIBITOR SWITCH CIRCUIT (AT).** 1) Turn cruise control main switch and ignition switch OFF. 2) Disconnect starter motor harness connector. 3) Measure resistance between inhibitor switch harness connector terminal and starter motor harness connector terminal. ***Connector & terminal*** ***(T7) No. 7 (+) — (B14) No. 1 (−):***	Is the resistance less than 10 Ω?	Go to step **3**.	Repair harness.
3	**CHECK INHIBITOR SWITCH (AT).** Remove and check inhibitor switch. <Ref. to CC-10 Inhibitor Switch.>	Is inhibitor switch OK?	Inhibitor switch circuit is OK.	Replace inhibitor switch.
4	**CHECK CLUTCH SWITCH CIRCUIT (MT).** 1) Disconnect clutch switch harness connector. 2) Turn ignition switch ON. 3) Turn cruise control main switch ON. 4) Measure voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B107) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **5**.	Check harness for open or short between clutch switch and cruise control module.
5	**CHECK CLUTCH SWITCH CIRCUIT (MT).** 1) Turn cruise control main switch and ignition switch OFF. 2) Measure resistance between clutch switch harness connector terminal and chassis ground. ***Connector & terminal*** ***(B107) No. 1 (+) — Chassis ground (−):***	Is the resistance less than 10 Ω?	Go to step **6**.	Repair harness.
6	**CHECK CLUTCH SWITCH (MT).** Remove and check clutch switch. <Ref. to CC-9, Clutch Switch.>	Is clutch switch OK?	Clutch switch circuit is OK.	Replace clutch switch.

C: DTC 13 AND 24 VEHICLE SPEED SENSOR SYSTEM S003791I06

DIAGNOSIS:

- Disconnection or short circuit of vehicle speed sensor (MT model) or transmission control module (AT model).

WIRING DIAGRAM:



S6M0572

No.	Step	Check	Yes	No
1	**CHECK TRANSMISSION TYPE.**	Is the transmission type MT?	Go to step **2**.	Go to step **6**.
2	**CHECK HARNESS BETWEEN BATTERY AND VEHICLE SPEED SENSOR.** 1) Disconnect harness connector from vehicle speed sensor. 2) Turn ignition switch to ON. 3) Measure voltage between vehicle speed sensor harness connector terminal and chassis ground. ***Connector & terminal*** ***(B17) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3**.	Check harness for open or short between ignition relay and vehicle speed sensor.
3	**CHECK HARNESS BETWEEN CRUISE CONTROL MODULE AND VEHICLE SPEED SENSOR.** 1) Turn ignition switch to OFF. 2) Disconnect harness connector from cruise control module. 3) Measure resistance between vehicle speed sensor harness connector terminal and cruise control module harness connector terminal. ***Connector & terminal*** ***(B17) No. 1 — (B94) No. 18:***	Is the resistance less than 10 Ω?	Go to step **4**.	Repair harness.
4	**CHECK HARNESS BETWEEN VEHICLE SPEED SENSOR AND ENGINE GROUND.** Measure resistance between vehicle speed sensor harness connector terminal and engine ground. ***Connector & terminal*** ***(B17) No. 2 (+) — Engine ground (−):***	Is the resistance less than 10 Ω?	Go to step **5**.	Repair harness.
5	**CHECK VEHICLE SPEED SENSOR.** 1) Connect harness connector to vehicle speed sensor. 2) Set the vehicle on free roller, or lift-up the vehicle and support with safety stands. **WARNING:** **Be careful not to be caught up by the running wheels.** 3) Drive the vehicle at speed greater than 20 km/h (12 MPH). 4) Measure voltage between cruise control module harness connector terminal and chassis ground. ***Connector & terminal*** ***(B94) No. 18 (+) — Chassis ground (−):***	Is the voltage less than 1 ←→ more than 4 V?	Replace cruise control module. <Ref. to CC-5, Cruise Control Module.>	Replace vehicle speed sensor.

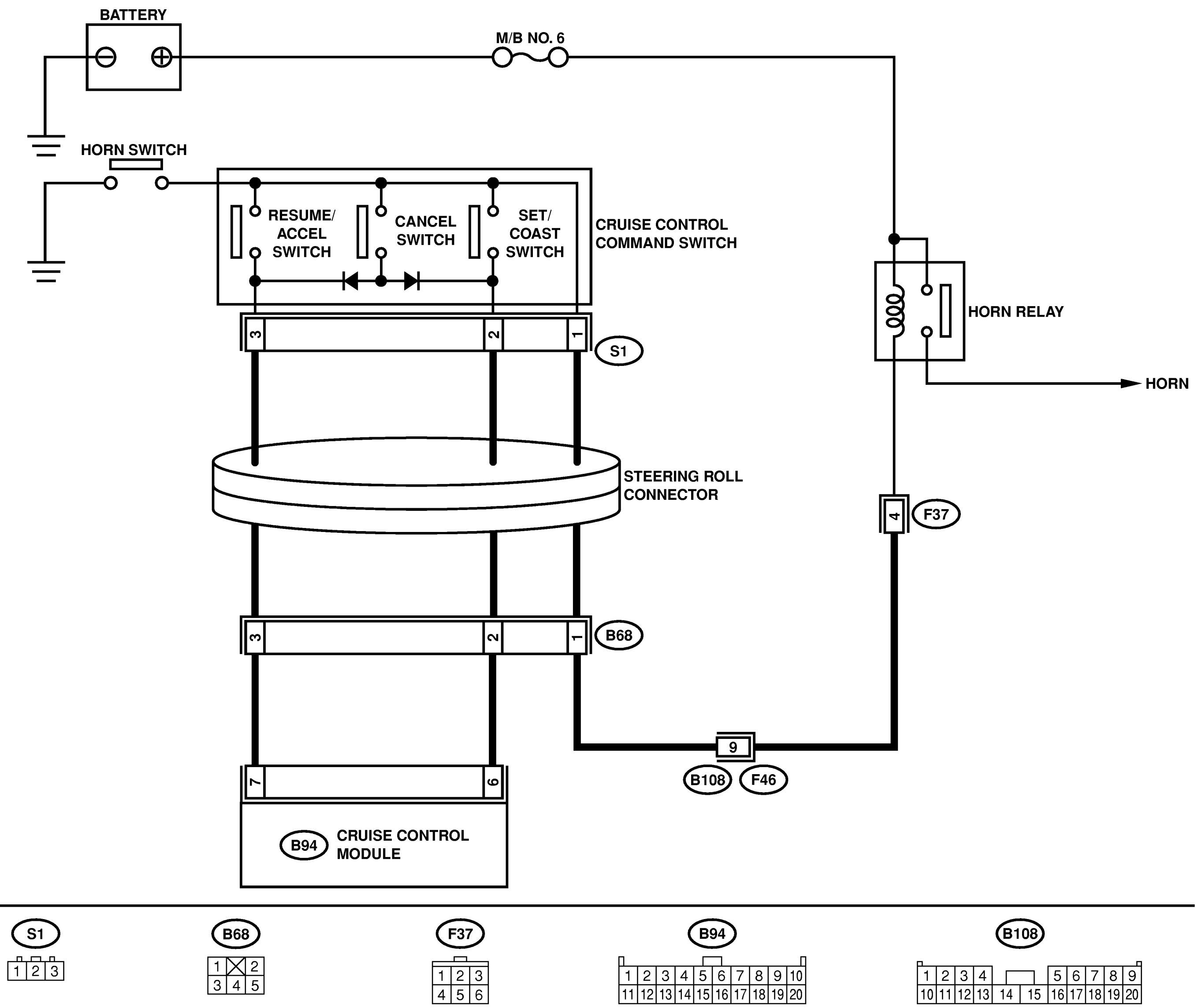
No.	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN CRUISE CONTROL MODULE AND TRANSMISSION CONTROL MODULE.** 1) Disconnect harness connector from transmission control module and cruise control module. 2) Measure resistance between cruise control module harness connector terminal and transmission control module harness connector terminal. **CAUTION:** **To measure the voltage and/or resistance, 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).** ***Connector & terminal*** ***(B94) No. 18 — (B55) No. 13:***	Is the resistance less than 10 Ω?	Go to step **7**.	Repair harness connector between cruise control module and transmission control module.
7	**CHECK TRANSMISSION CONTROL MODULE.** 1) Connect harness connector to transmission control module. 2) Set the vehicle on free roller, or lift-up the vehicle and support with safety stands. **WARNING:** **Be careful not to be caught by the running wheels.** 3) Drive the vehicle faster than 10 km/h (6 MPH). 4) Measure voltage between transmission control module harness connector terminal and chassis ground. **CAUTION:** **To measure the voltage and/or resistance, 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).** ***Connector & terminal*** ***(B55) No. 13 (+) — Chassis ground (−):***	Is the voltage less than 1 V ←→ more than 4 V?	Replace cruise control module. <Ref. to CC-5, Cruise Control Module.>	Replace transmission control module. <Ref. to AT-45, Transmission Control Module (TCM).>

D: DTC 14 SET/COAST SWITCH, RESUME/ACCEL SWITCH AND CANCEL SWITCH S003791I07

DIAGNOSIS:

- Short circuit inside the SET SW and RESUME SW.

WIRING DIAGRAM:



S6M0573

No.	Step	Check	Yes	No
1	**CHECK SET/COAST SWITCH CIRCUIT.** 1) Disconnect cruise control module harness connector. 2) Turn ignition switch ON. 3) Measure voltage between harness connector terminal and chassis ground when SET/COAST switch is pressed and not pressed. ***Connector & terminal*** ***(B94) No. 6 (+) — Chassis ground (−):***	Is the voltage 0 V when SET/COAST switch is not pressed? Is the voltage more than 10 V when SET/COAST switch is pressed?	Go to step **2**.	Go to step **4**.
2	**CHECK RESUME/ACCEL SWITCH CIRCUIT.** Measure voltage between harness connector terminal and chassis ground when RESUME/ACCEL switch is pressed and not pressed. ***Connector & terminal*** ***(B94) No. 7 (+) — Chassis ground (−):***	Is the voltage 0 V when RESUME/ACCEL switch is not pressed? Is the voltage more than 10 V when RESUME/ACCEL switch is pressed?	Go to step **3**.	Go to step **4**.
3	**CHECK CANCEL SWITCH CIRCUIT.** Measure voltage between harness connector terminal and chassis ground when CANCEL switch is pressed and not pressed. ***Connector & terminal*** ***(B94) No. 7 (+) — Chassis ground (−):*** ***(B94) No. 6 (+) — Chassis ground (−):***	Is the voltage 0 V when CANCEL switch is not pressed? Is the voltage more than 10 V when CANCEL switch is pressed?	Cruise control command switch circuit is OK.	Go to step **4**.
4	**CHECK POWER SUPPLY FOR COMMAND SWITCH.** Check horn operation.	Does horn sound?	Go to step **5**.	● Check fuse No. 6 (in main fuse box). ● Check horn relay. <Ref. to COM-3, HORN RELAY, INSPECTION, Horn System.> ● Check harness for open or short between cruise control command switch and main fuse box.
5	**CHECK CRUISE CONTROL COMMAND SWITCH.** Remove and check cruise control command switch. <Ref. to CC-7, Cruise Control Command Switch.>	Is cruise control command switch OK?	Check harness between cruise control command switch and cruise control module.	Replace cruise control command switch.

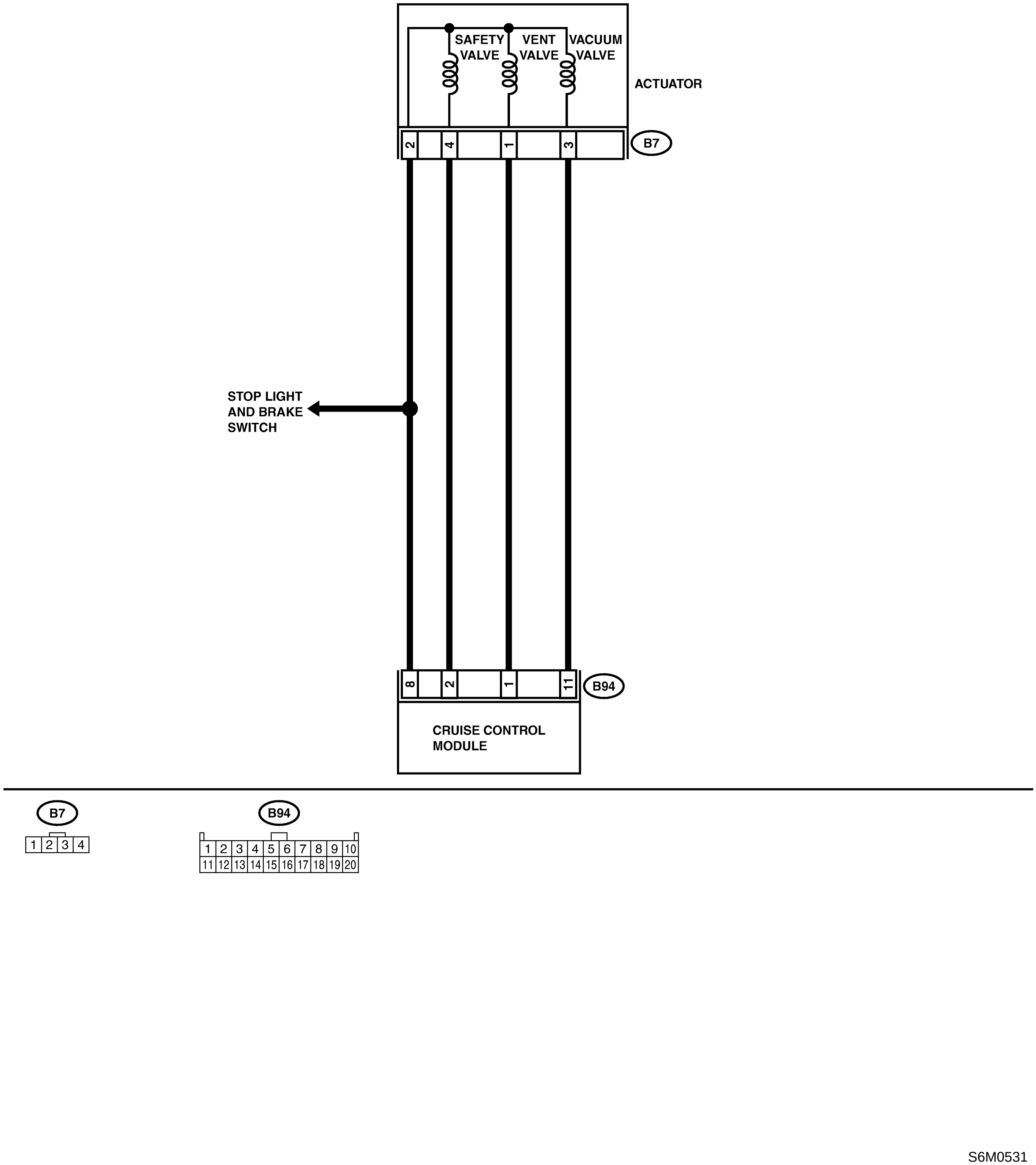
E: DTC 21, 22 AND 23 VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE

S003791I08

DIAGNOSIS:

- Open or poor contact of vacuum valve, vent 2 valve and vent 1 valve.

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**MEASURE RESISTANCE OF VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE.** 1) Disconnect connector from actuator. 2) Measure resistance of vacuum valve, vent 2 valve and vent 1 valve. ***Terminals*** ***No. 2 — No. 3:***	Is resistance less than 22 Ω?	Go to step **2**.	Replace actuator. <Ref. to CC-4, REMOVAL, Actuator.>
2	**MEASURE RESISTANCE OF VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE.** Measure resistance of vacuum valve, vent 2 valve and vent 1 valve. ***Terminals*** ***No. 2 — No. 1:***	Is resistance less than 55 Ω?	Go to step **3**.	Replace actuator. <Ref. to CC-4, REMOVAL, Actuator.>
3	**MEASURE RESISTANCE OF VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE.** Measure resistance of vacuum valve, vent 2 valve and vent 1 valve. ***Terminals*** ***No. 2 — No. 4:***	Is resistance less than 55 Ω?	Go to step **4**.	Replace actuator. <Ref. to CC-4, REMOVAL, Actuator.>
4	**PERFORM A CIRCUIT TEST IN HARNESS BETWEEN ACTUATOR AND CRUISE CONTROL MODULE.** 1) Disconnect connector from cruise control module. 2) Measure resistance of harness connector between cruise control module and actuator. ***Connector & terminal*** ***(B7) No. 1 — (B94) No. 1:***	Is resistance less than 10 Ω?	Go to step **5**.	Repair or replace wiring harness between actuator and cruise control module.
5	**PERFORM A CIRCUIT TEST IN HARNESS BETWEEN ACTUATOR AND CRUISE CONTROL MODULE.** Measure resistance of harness connector between cruise control module and actuator. ***Connector & terminal*** ***(B7) No. 2 — (B94) No. 8:***	Is resistance less than 10 Ω?	Go to step **6**.	Repair or replace wiring harness between actuator and cruise control module.
6	**PERFORM A CIRCUIT TEST IN HARNESS BETWEEN ACTUATOR AND CRUISE CONTROL MODULE.** Measure resistance of harness connector between cruise control module and actuator. ***Connector & terminal*** ***(B7) No. 3 — (B94) No. 11:***	Is resistance less than 10 Ω?	Go to step **7**.	Repair or replace wiring harness between actuator and cruise control module.
7	**PERFORM A CIRCUIT TEST IN HARNESS BETWEEN ACTUATOR AND CRUISE CONTROL MODULE.** Measure resistance of harness connector between cruise control module and actuator. ***Connector & terminal*** ***(B7) No. 4 — (B94) No. 2:***	Is resistance less than 10 Ω?	Replace cruise control module. <Ref. to CC-5, REMOVAL, Cruise Control Module.>	Repair or replace wiring harness between actuator and cruise control module.

F: DTC 25 CRUISE CONTROL MODULE BUILT-IN RELAY AND CPU RAM S003791I09

DIAGNOSIS:

- Poor welding of built-in relay of cruise control module.
- Failure of built-in CPU RAM of cruise control module.

TROUBLE SYMPTOM:

- Cruise control is canceled and memorized cruise speed is also canceled.
- Once cruise control is canceled, cruise control cannot be set until the ignition switch and cruise control main switch turns OFF, and then turns ON again.

NOTE:
Check input/output signal and vehicle speed signal with select monitor. When signals are in good condition, failure is in cruise control module. (Check power supply and ground conditions of cruise control module.)

MEMO:

WIRING SYSTEM

WI

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1. Basic Diagnostics Procedure

S903627

A: BASIC PROCEDURES S903267E31

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.

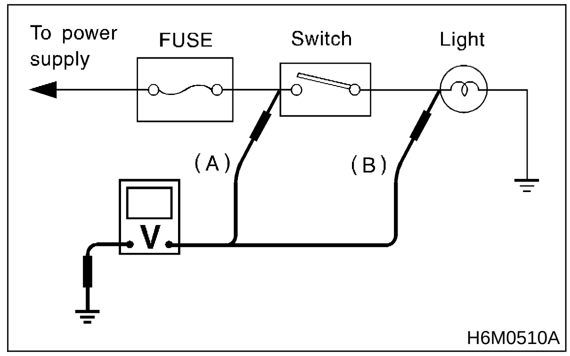
5. CONFIRMATION OF SYSTEM OPERATION S903267E3105

After repairing, ensure that the system operates properly.

B: BASIC INSPECTION S903627G51

1. VOLTAGE MEASUREMENT S903627G5101

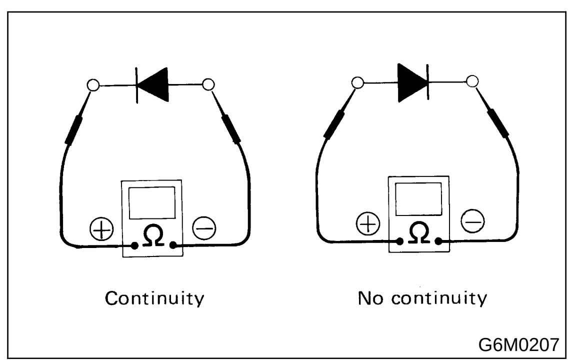
1) Using a voltmeter, connect the negative lead to a good ground point or negative battery terminal and the positive lead to the connector or component terminal.
2) Contact the positive probe of the voltmeter on connector (A).
The voltmeter will indicate a voltage.
3) Shift the positive probe to connector (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 cable or connector so there is no voltage between the check points.
Contact the two leads of an ohmmeter to each of the check points.
If the circuit has diodes, reverse the two leads and check again.
2) Use an ohmmeter to check for diode continuity.
When contacting the negative lead to the diode positive side and the positive lead to the negative side, there should be continuity.
When contacting the two leads in reverse, there should be no continuity.

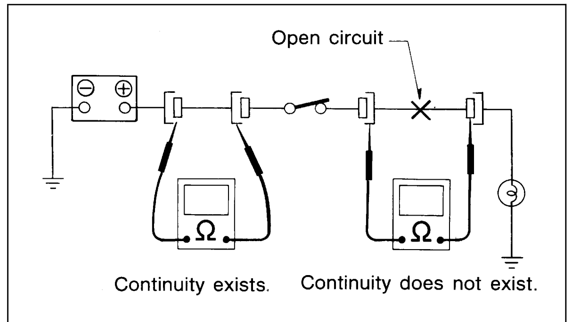


3) Symbol "○—○" indicates that continuity exists between two points or terminals. For example, when a switch position is "3", continuity exists among terminals 1, 3 and 6, as shown in table below.

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

B6M0749

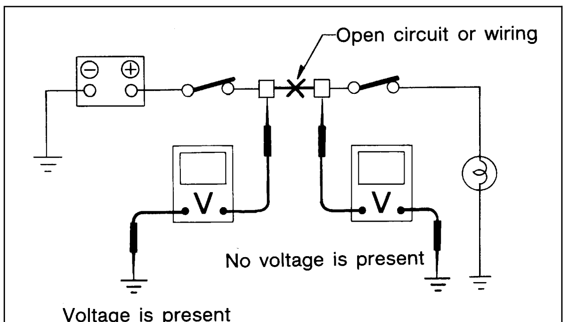
2) Ohmmeter method:
Disconnect all connectors affected, and check continuity in the wiring between adjacent connectors. When the ohmmeter indicates "infinite", the wiring is open.



G6M0209

3. HOW TO DETERMINE AN OPEN CIRCUIT *S903627G5103*

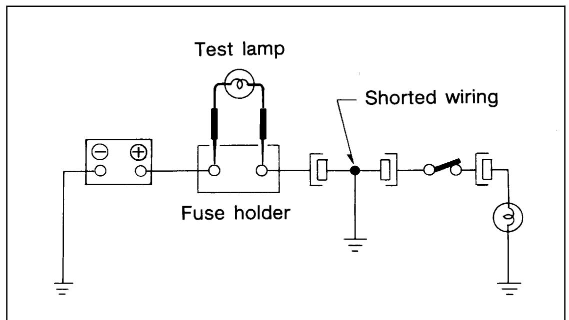
1) Voltmeter Method:
An open circuit is determined by measuring the voltage between respective connectors and ground using a voltmeter, starting with the connector closest to the power supply. The power supply must be turned ON so that current flows in the circuit. If voltage is not present between a particular connector and ground, the circuit between that connector and the previous connector is open.



G6M0208

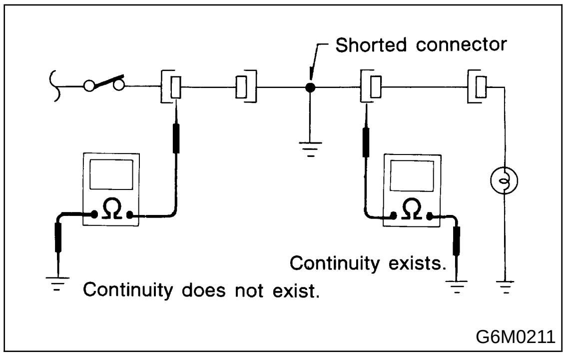
4. HOW TO DETERMINE A SHORT CIRCUIT *S903627G5104*

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.



G6M0210

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.

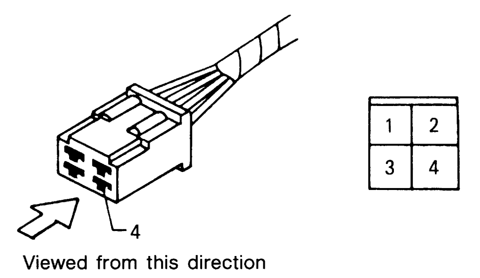


C: HOW TO READ WIRING DIAGRAMS S903627G52

1. WIRING DIAGRAM S903627G5201

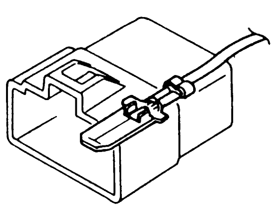
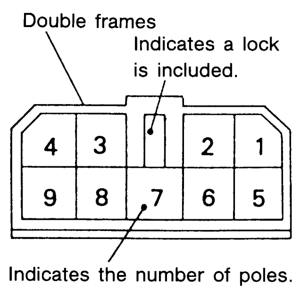
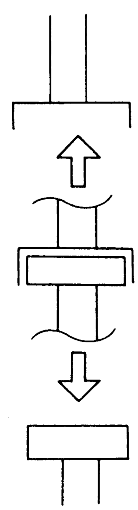
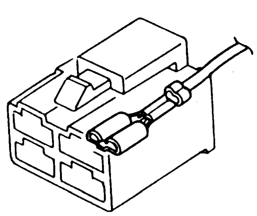
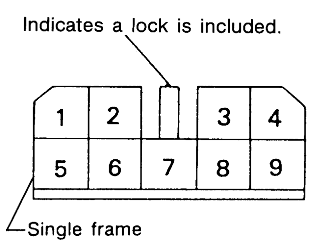
The wiring diagram of each system is illustrated so that you can understand the path through which the electric current flows from the battery.
Sketches and codes are used in the diagrams. They should read as follows:

- Each connector and its terminal position are indicated by a sketch of the connector in a disconnected state which is viewed from the front.

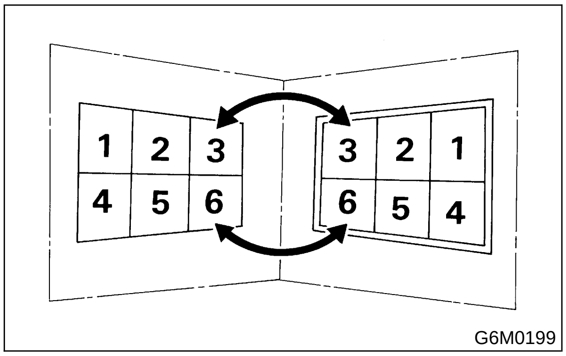


G6M0193

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

Connector used in vehicle	Connector shown in wiring diagram		
	Sketch	Symbol	Number of poles
 G6M0194	 G6M0196	 G6M0198	Numbered in order from upper right to lower left.
 G6M0195	 G6M0197		Numbered in order from upper left to lower right.

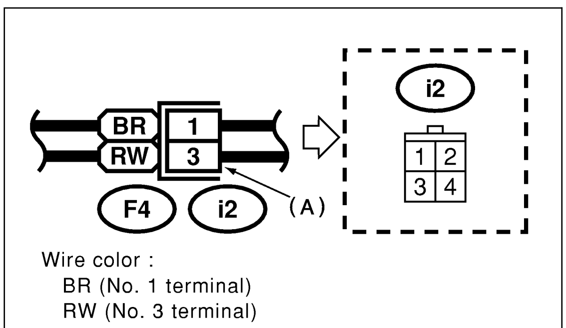
● When one set of connectors is viewed from the front side, the pole numbers of one connector are symmetrical to those of the other. When these two connectors are connected as a unit, the poles which have the same number are joined.



G6M0199

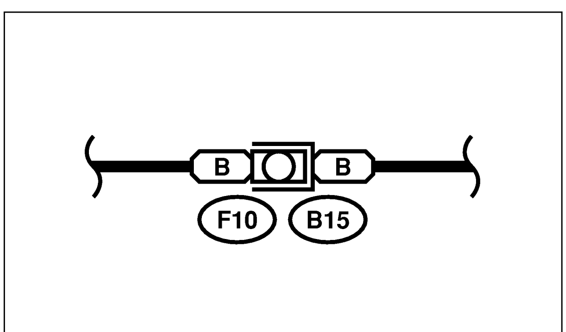
● Electrical wiring harness:
The connectors are numbered along with the number of poles, external colors, and mating connections in the accompanying list.
● The sketch of each connector in the wiring diagram usually shows the (A) side of the connector. The relationship between the wire color, terminal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



B6M1585A

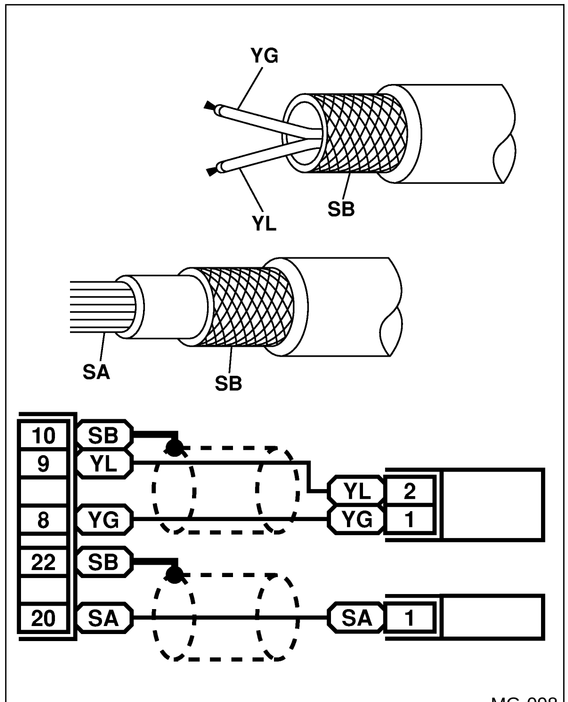
● In wiring diagram, connectors which have no terminal number refer to one-pole types. Sketches of these connectors are omitted intentionally.



B6M1586A

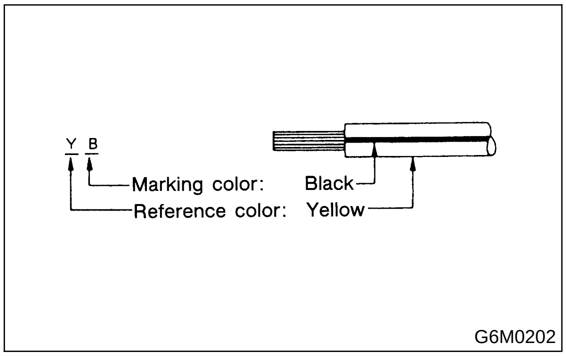
● The following color codes are used to indicate the colors of the wires used.

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)



MG-098

- 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.



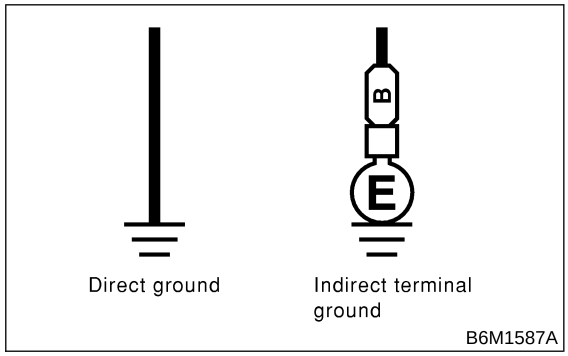
- The table lists the nominal sectional areas and allowable currents of the wires.

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.

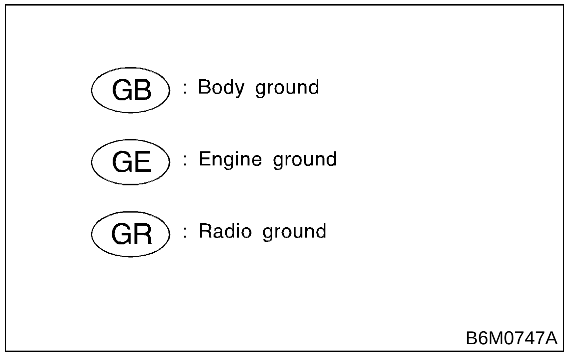
Nominal sectional area mm^2	No. of strands/ strand diameter	Outside diameter of finished wiring mm	Allowable current Amps/ 40°C (104°F)
0.3	7/0.26	1.8	7
0.5	7/0.32	2.2 (or 2.0)	12
0.75	30/0.18	2.6 (or 2.4)	16
0.85	11/0.32	2.4 (or 2.2)	16
1.25	16/0.32	2.7 (or 2.5)	21
2	26/0.32	3.1 (or 2.9)	28
3	41/0.32	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.



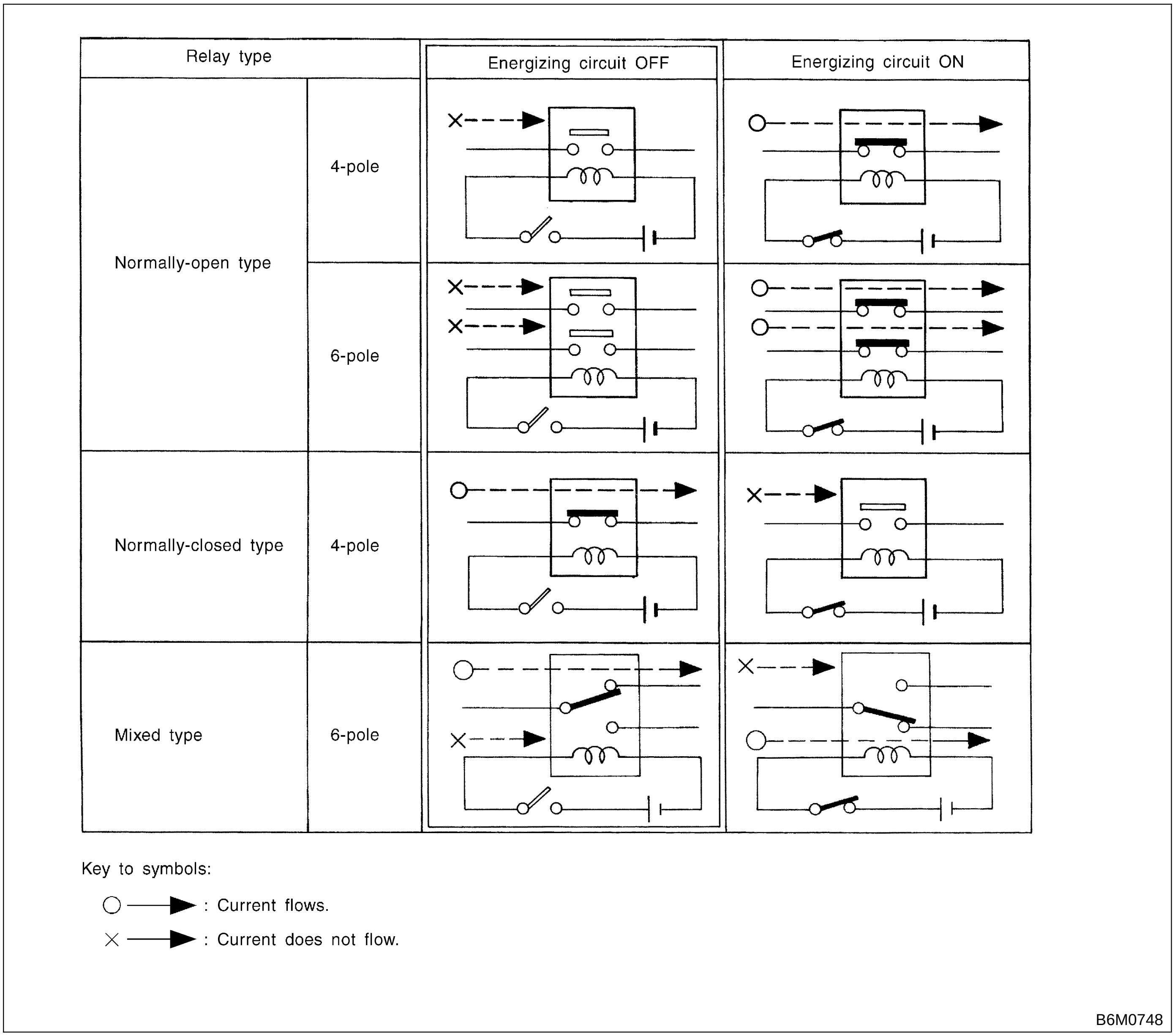
- The ground points shown in the wiring diagram refer to the following:

NOTE:
All wiring harnesses are provided with a ground point which should be securely connected.



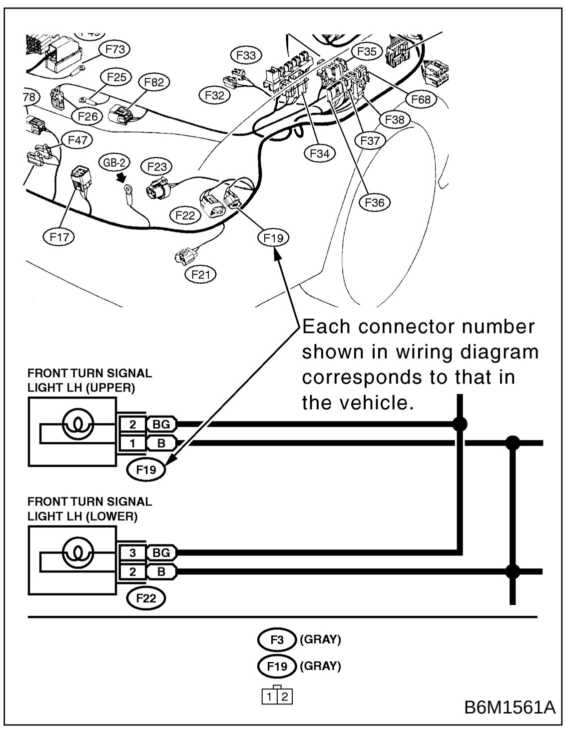
- Relays are classified as normally-open or normally-closed. The normally-closed relay has one or more contacts.

The wiring diagram shows the relay mode when the energizing circuit is OFF.



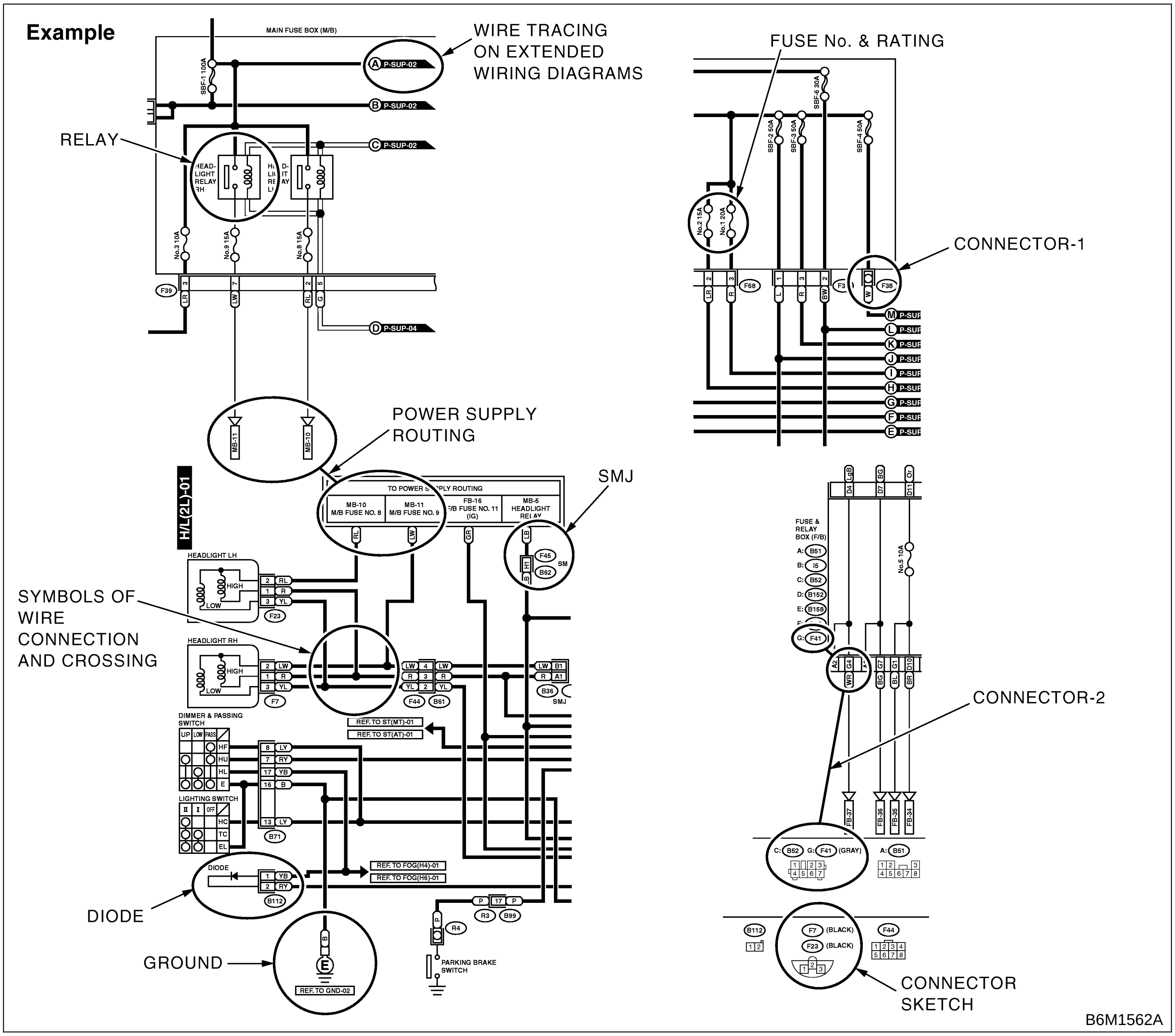
● Each connector number shown in the wiring diagram corresponds to that in the wiring harness. The location of each connector in the actual vehicle is determined by reading the first character of the connector (for example, a "F" for F8, "i" for i16, etc.) and the type of wiring harness.
The first character of each connector number refers to the area or system of the vehicle.

Symbol	Wiring harness and cord
F	Front wiring harness
B	Bulkhead wiring harness
E	Engine wiring harness
T	Transmission cord
D	Door cord LH & RH, Rear door cord LH & RH Rear gate cord
i	Instrument panel wiring harness
R	Rear wiring harness, Fuel tank cord, Roof cord



D: SYMBOLS IN WIRING DIAGRAMS *S903627G53*

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



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.

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.

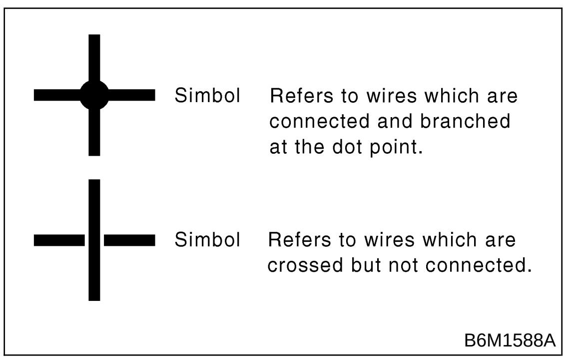
8. DIODE S903627G5308

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 ←→ A, B ←→ 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 S903627H99

Abbr.	Full name
ABS	Antilock Brake System
ACC	Accessory
A/C	Air Conditioning
AD	Auto Down
AT	Automatic Transmission
AU	Auto Up
+B	Battery
DN	Down
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

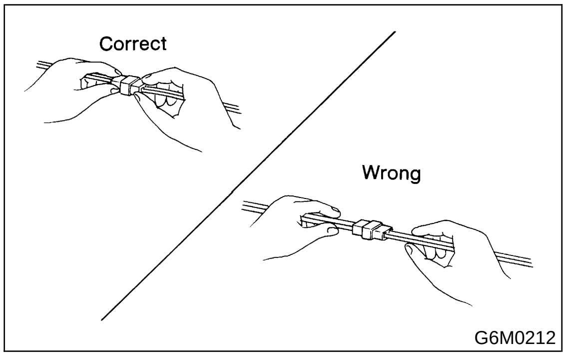
2. Working Precautions S903706

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.

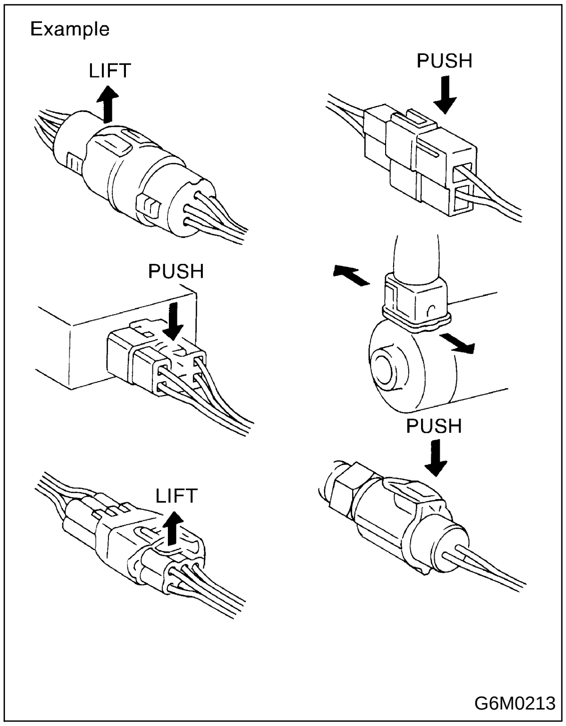
B: PRECAUTIONS IN TROUBLE DIAGNOSIS AND REPAIR OF ELECTRIC PARTS S903706G39

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.



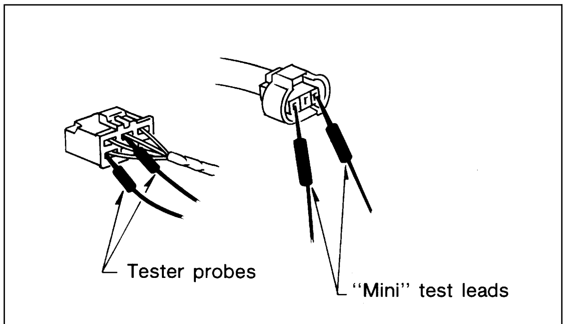
G6M0212

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.



G6M0213

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 waterproof 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.



G6M0214

7) Sensors, relays, electrical unit, etc., are sensitive to strong impacts.
Handle them with care so that they are not dropped or mishandled.

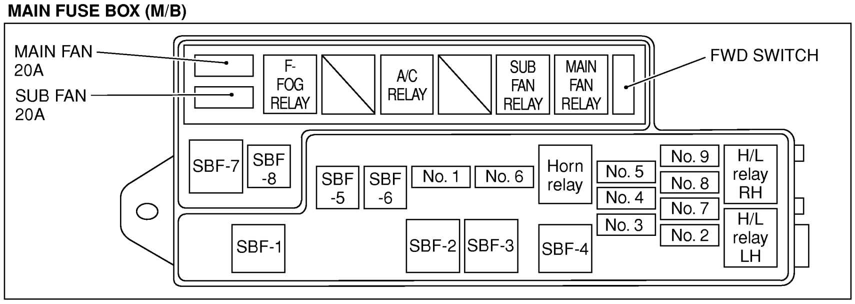
3. Power Supply Routing *S903465*

A: SCHEMATIC *S903465A21*

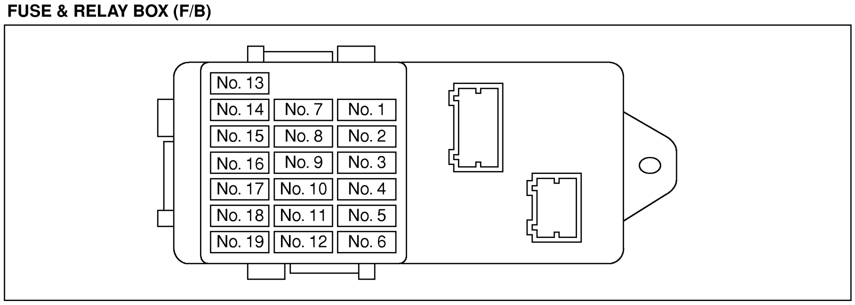
P-SUP-01

P-SUP-01

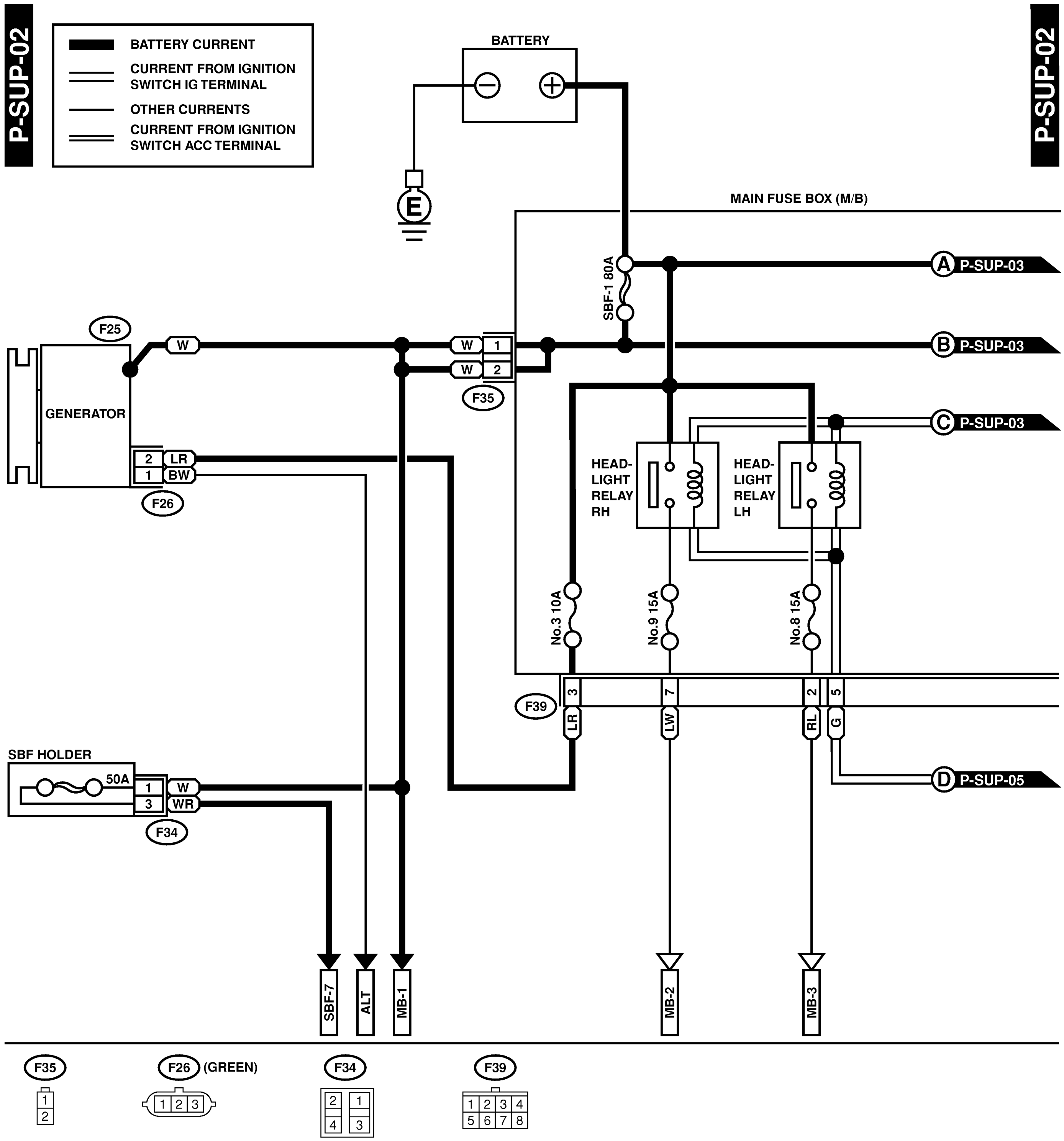
MAIN FUSE BOX (M/B)



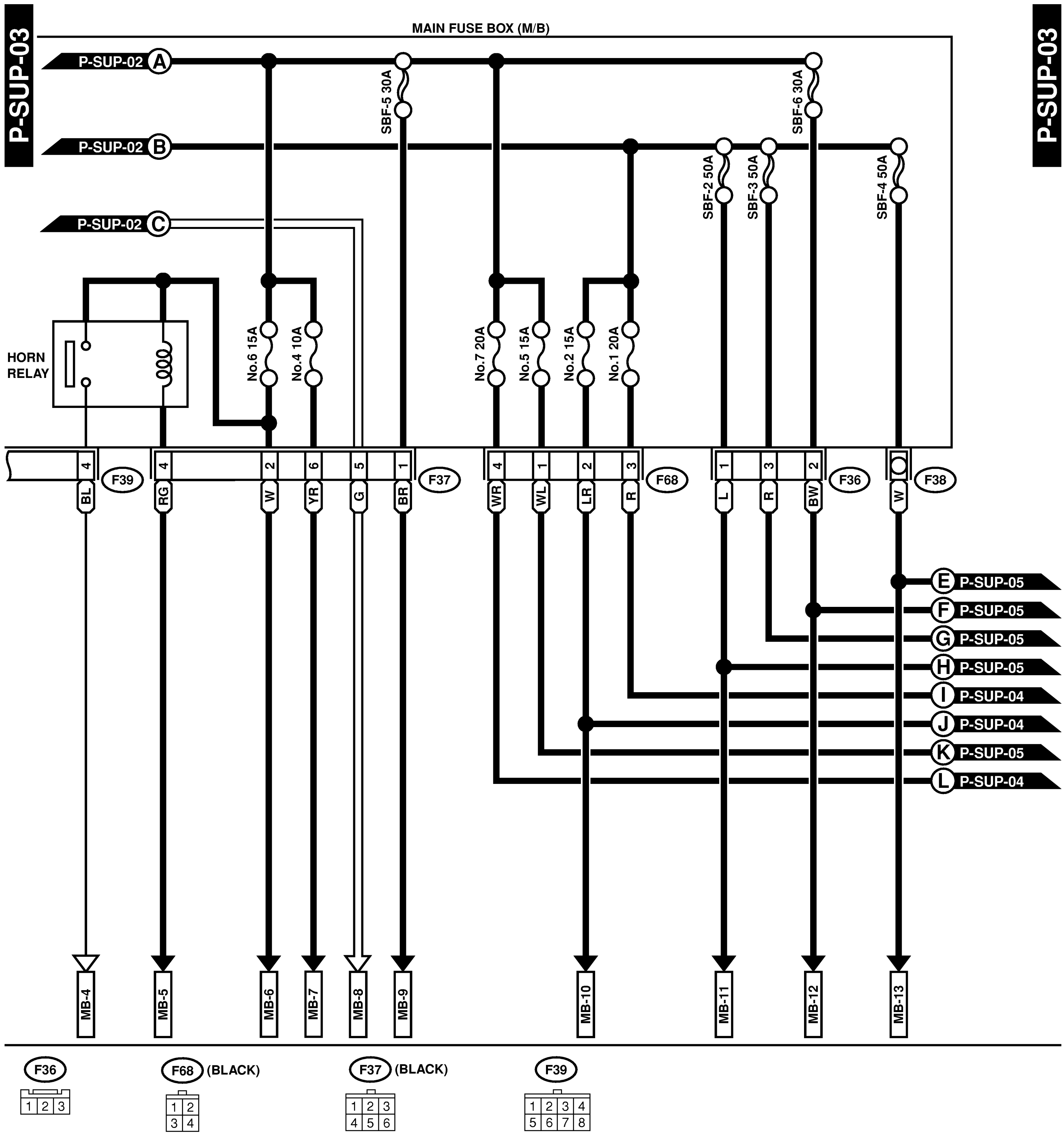
FUSE & RELAY BOX (F/B)

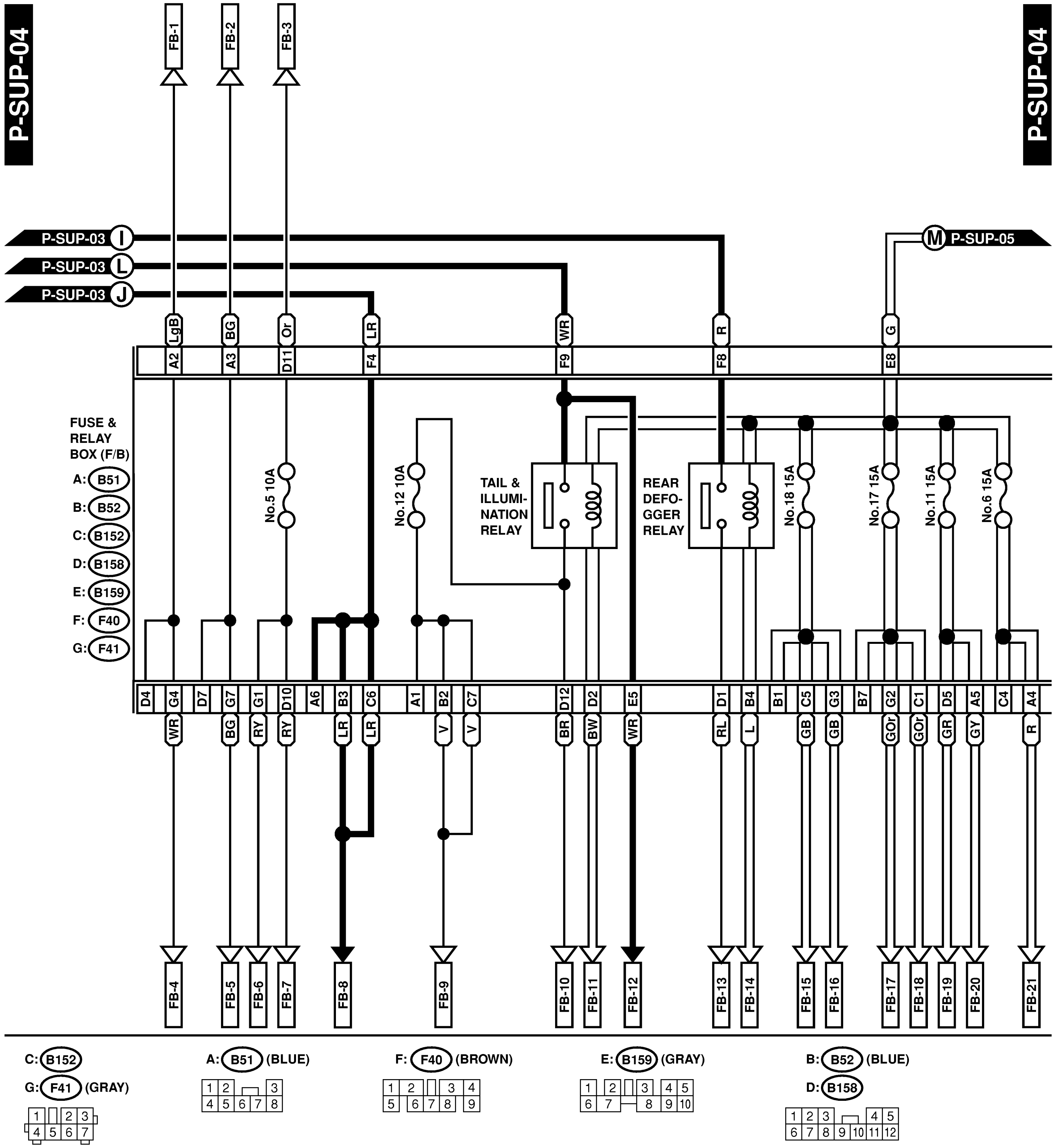


SU01-20A

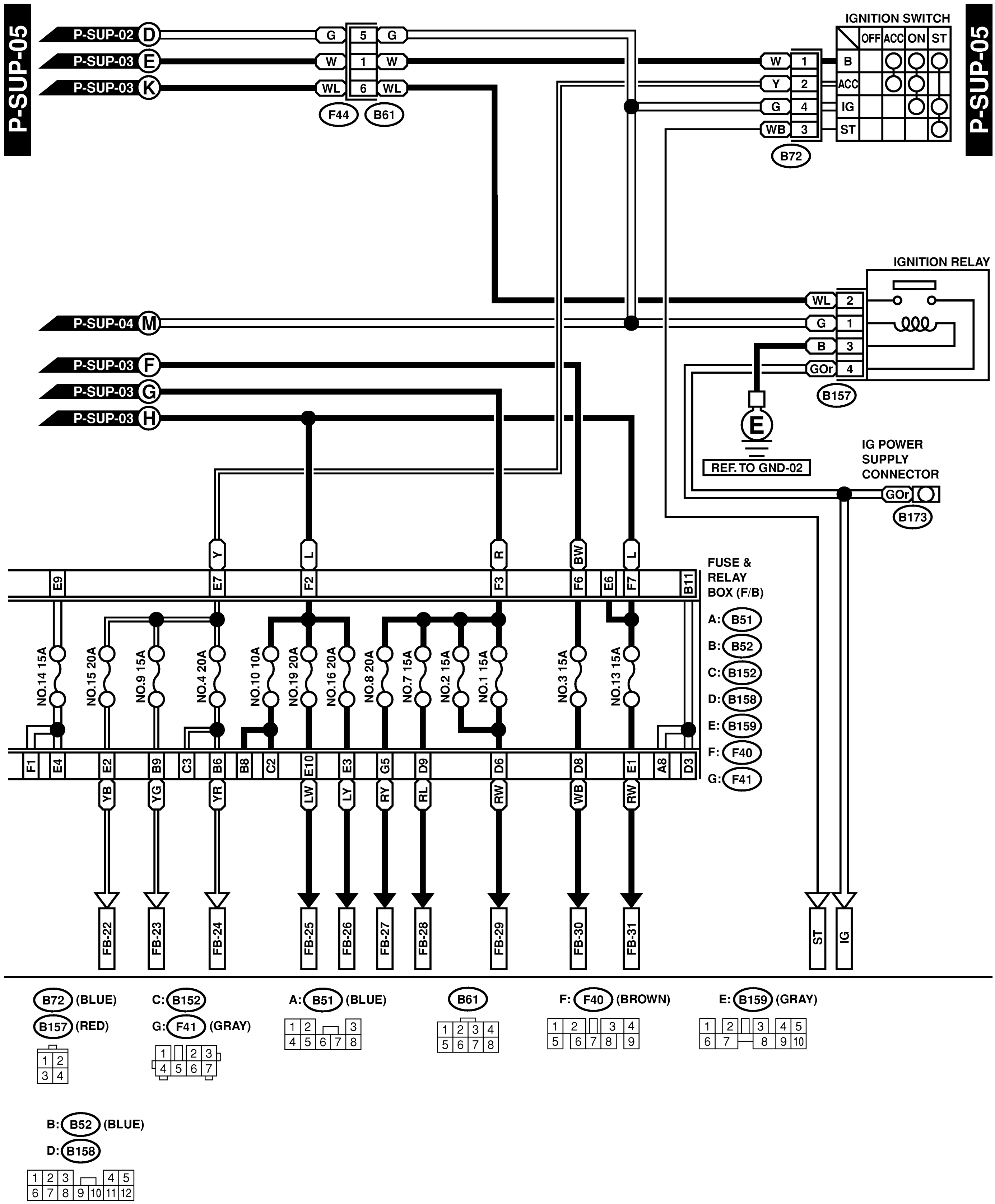

P-SUP-02
BATTERY CURRENT
CURRENT FROM IGNITION SWITCH IG TERMINAL
OTHER CURRENTS
CURRENT FROM IGNITION SWITCH ACC TERMINAL
BATTERY
E
MAIN FUSE BOX (M/B)
SBF-1 80A
A P-SUP-03
B P-SUP-03
C P-SUP-03
D P-SUP-05
F25
W
GENERATOR
F35
F26
LR
BW
HEAD-LIGHT RELAY RH
HEAD-LIGHT RELAY LH
No.3 10A
No.9 15A
No.8 15A
F39
LR
LW
RL
G
SBF HOLDER
50A
WR
F34
SBF-7
ALT
MB-1
MB-2
MB-3
F35
F26 (GREEN)
F34
F39
SU01-20B

POWER SUPPLY ROUTING




P-SUP-04
P-SUP-04
FB-1
FB-2
FB-3
P-SUP-03 I
P-SUP-03 L
P-SUP-03 J
M P-SUP-05
LgB
BG
Or
LR
WR
R
G
A2
A3
D11
F4
F9
F8
E8
FUSE & RELAY BOX (F/B)
A: B51
B: B52
C: B152
D: B158
E: B159
F: F40
G: F41
No.5 10A
No.12 10A
TAIL & ILLUMI-NATION RELAY
REAR DEFO-GGER RELAY
No.18 15A
No.17 15A
No.11 15A
No.6 15A
D4
G4
D7
G7
G1
D10
A6
B3
C6
A1
B2
C7
D12
D2
E5
D1
B4
B1
C5
G3
B7
G2
C1
D5
A5
C4
A4
WR
BG
RY
RY
LR
LR
V
V
BR
BW
WR
RL
L
GB
GB
GOr
GOr
GR
GY
R
FB-4
FB-5
FB-6
FB-7
FB-8
FB-9
FB-10
FB-11
FB-12
FB-13
FB-14
FB-15
FB-16
FB-17
FB-18
FB-19
FB-20
FB-21
C: B152
G: F41 (GRAY)
A: B51 (BLUE)
F: F40 (BROWN)
E: B159 (GRAY)
B: B52 (BLUE)
D: B158

SU01-20D


P-SUP-05
P-SUP-02 D
P-SUP-03 E
P-SUP-03 K
G 5 G
W 1 W
WL 6 WL
F44
B61
IGNITION SWITCH
OFF ACC ON ST
B
ACC
IG
ST
W 1
Y 2
G 4
WB 3
B72
P-SUP-05
IGNITION RELAY
WL 2
G 1
B 3
GOr 4
B157
P-SUP-04 M
P-SUP-03 F
P-SUP-03 G
P-SUP-03 H
E
REF. TO GND-02
IG POWER SUPPLY CONNECTOR
GOr
B173
Y
L
R
BW
L
E9
E7
F2
F3
F6
E6
F7
B11
FUSE & RELAY BOX (F/B)
A: B51
B: B52
C: B152
D: B158
E: B159
F: F40
G: F41
NO.14 15A
NO.15 20A
NO.9 15A
NO.4 20A
NO.10 10A
NO.19 20A
NO.16 20A
NO.8 20A
NO.7 15A
NO.2 15A
NO.1 15A
NO.3 15A
NO.13 15A
F1
E4
E2
B9
C3
B6
B8
C2
E10
E3
G5
D9
D6
D8
E1
A8
D3
YB
YG
YR
LW
LY
RY
RL
RW
WB
RW
FB-22
FB-23
FB-24
FB-25
FB-26
FB-27
FB-28
FB-29
FB-30
FB-31
ST
IG
B72 (BLUE)
B157 (RED)
C: B152
G: F41 (GRAY)
A: B51 (BLUE)
B61
F: F40 (BROWN)
E: B159 (GRAY)
B: B52 (BLUE)
D: B158
SU01-20E

No.	Load
MB-1	Fuse (Air conditioning relay holder)
MB-2	Headlight RH Combination meter
MB-3	Headlight LH
MB-4	Horn
MB-5	Cruise control sub switch Horn switch Keyless entry control module
MB-6	AT shift lock control module Hazard switch Key warning switch
MB-7	Transmission control module
MB-8	Daytime running light control module Diode
MB-9	Data link connector Engine control module Fuel pump relay Main relay
MB-12	Power window circuit breaker
SBF-7	ABS motor relay
IG	Check connector Combination meter Hazard switch Mirror heater condenser Mirror heater LH Mirror heater RH Power window relay Seat belt warning and key warning module Vehicle speed sensor (MT)
ST	Engine control module (AT) Interrupt relay (With security system) Short connector (Without security system)
FB-1	Combination meter Hazard switch Rear turn signal light RH Trailer connector Turn signal switch
FB-2	Combination meter Hazard switch Rear turn signal light LH Trailer connector Turn signal switch
FB-3	Parking switch Security control module
FB-4	Front turn signal light RH
FB-5	Front turn signal light LH
FB-6	Front clearance light LH Front clearance light RH
FB-7	License plate light Rear combination light LH Rear combination light RH Rear finisher light LH Rear finisher light RH Trailer connector

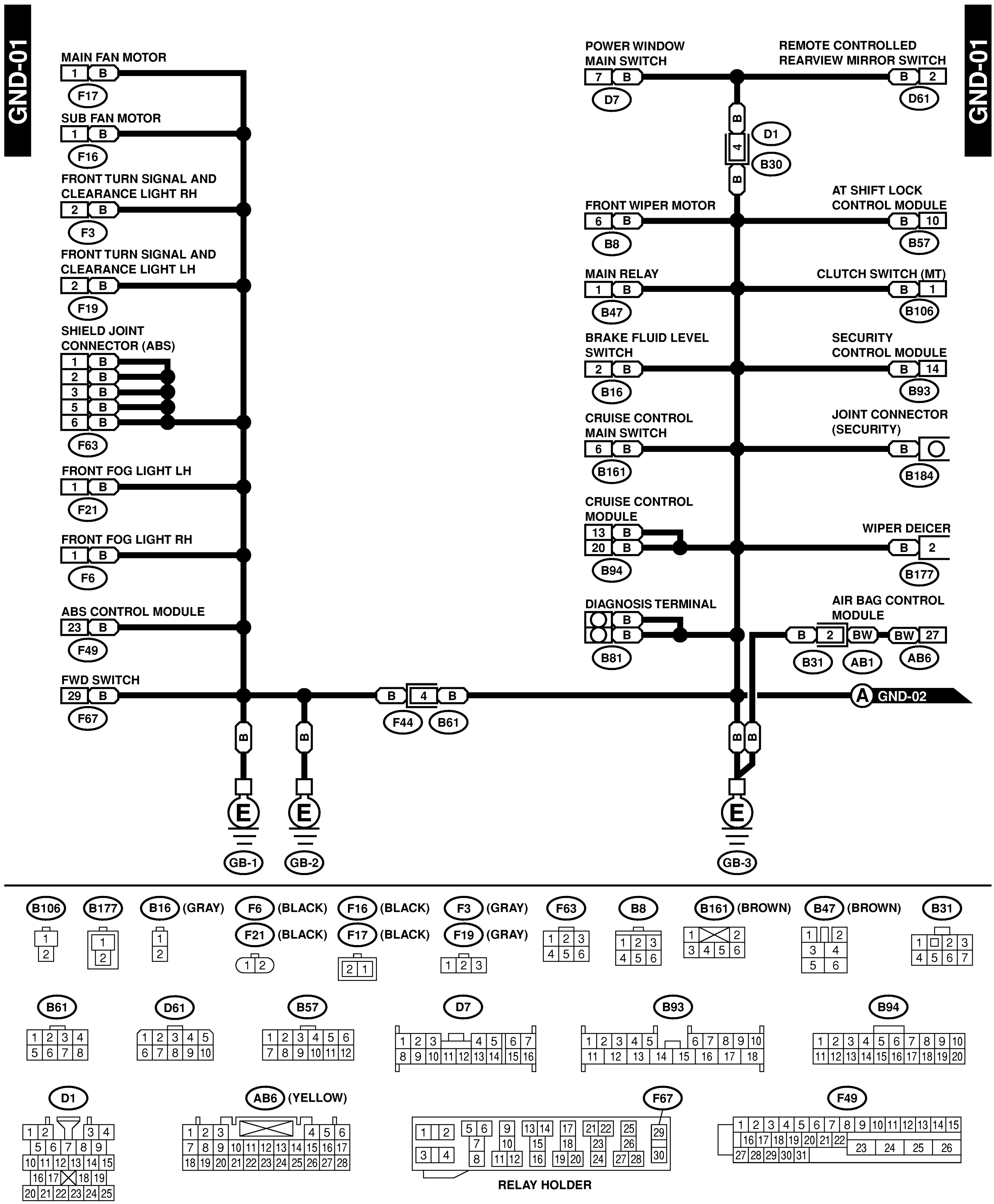
No.	Load
FB-8	Clock Combination meter Luggage room light Radio Room light Security control module Spot light Trailer connector
FB-9	Clock Combination meter Illumination control module Illumination light
FB-10	Parking switch
FB-11	Engine control module Lighting switch
FB-12	Parking switch Security control module
FB-13	Mirror heater relay Rear defogger Rear defogger switch
FB-14	Rear defogger switch
FB-15	AT shift lock control module Back-up light switch (MT) Cruise control main switch Cruise control module Daytime running light control module Daytime running light relay High-beam relay Inhibitor switch (AT) Keyless entry control module Security control module Wiper deicer relay Wiper deicer timer
FB-16	ABS control module ABS valve relay Main fan relay
FB-17	Air conditioner relay Sub fan relay
FB-18	A/C pressure switch A/C switch Blower motor relay Rear defogger switch
FB-19	Engine control module Fuel pump relay Ignition coil and ignitor Transmission control module
FB-20	Airbag control module
FB-21	Airbag control module
FB-22	Combination switch Front washer motor Front wiper motor Rear washer motor Rear wiper intermittent module Rear wiper motor
FB-23	Clock Compass mirror Radio

No.	Load
FB-24	AT shift lock control module Front accessory power supply socket Remote controlled rearview mirror switch Seat heater rear accessory power supply relay
FB-25	Seat heater and rear accessory power supply relay
FB-26	Stop light switch
FB-27	ABS valve relay
FB-28	Front fog light relay
FB-29	Blower motor relay
FB-30	Door lock timer Keyless entry control module
FB-31	Wiper deicer relay

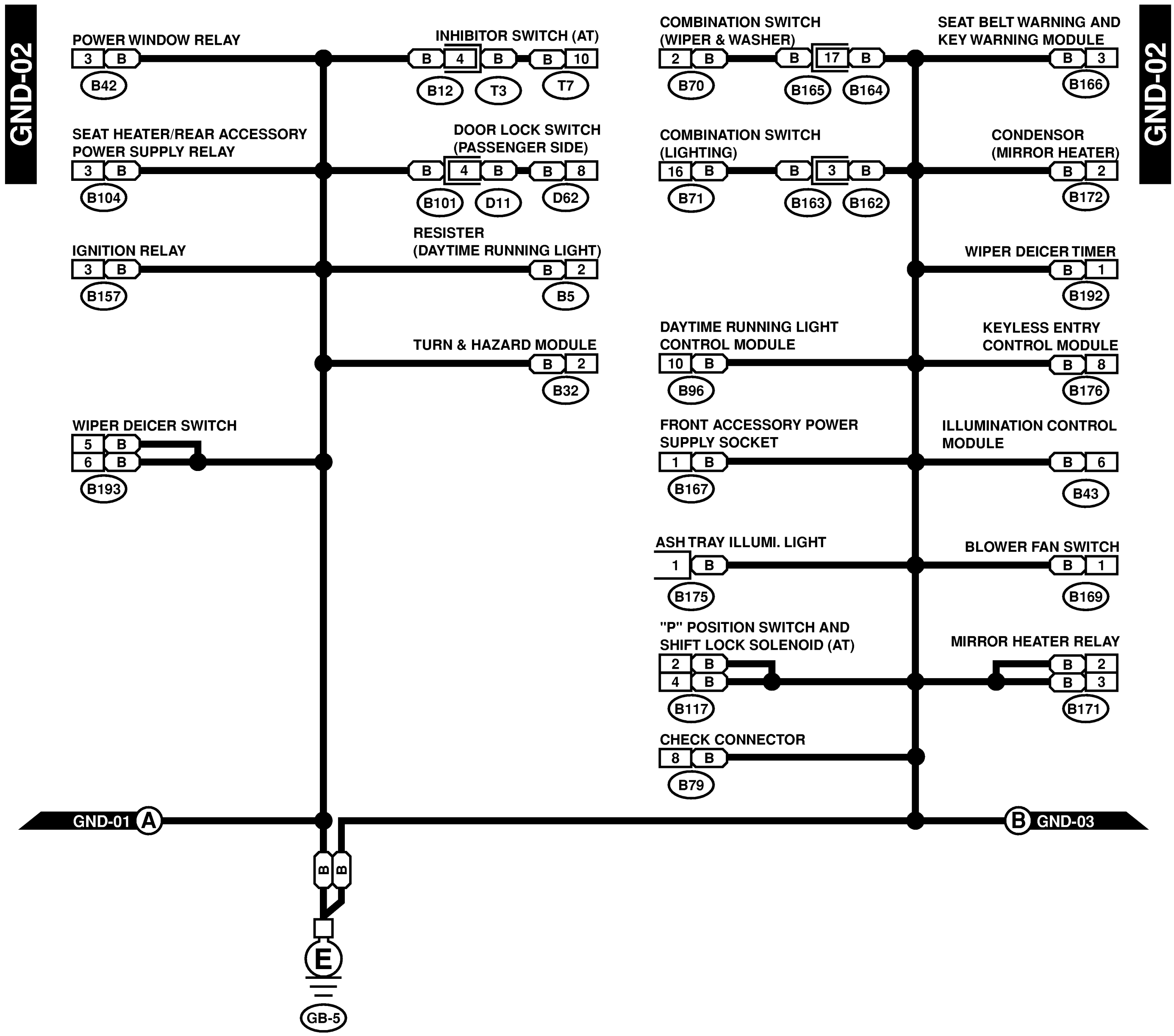
MEMO:

4. Ground Distribution S903472

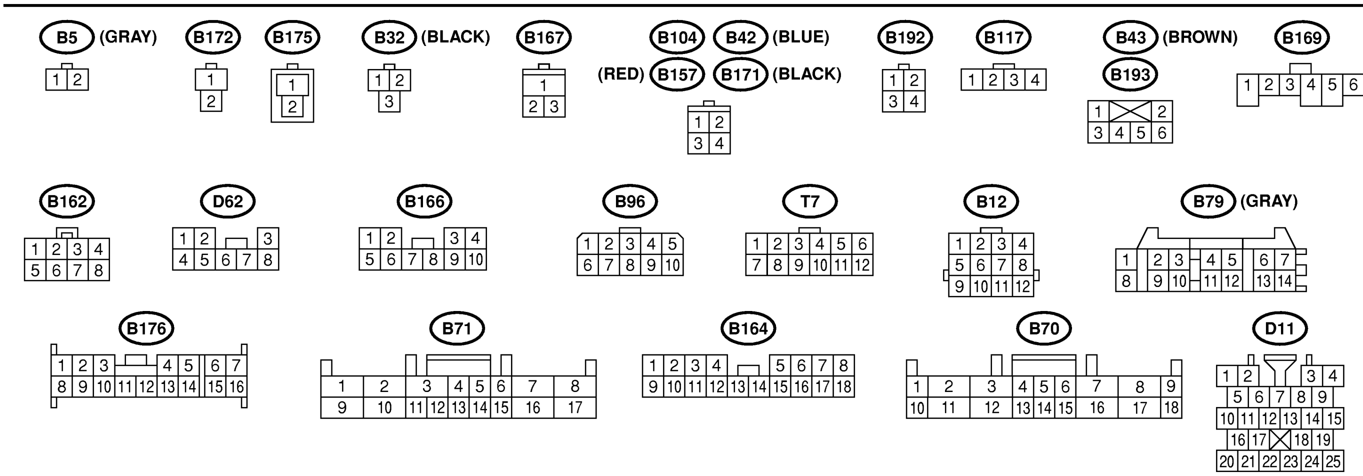
A: SCHEMATIC S903472A21



SU04-20A

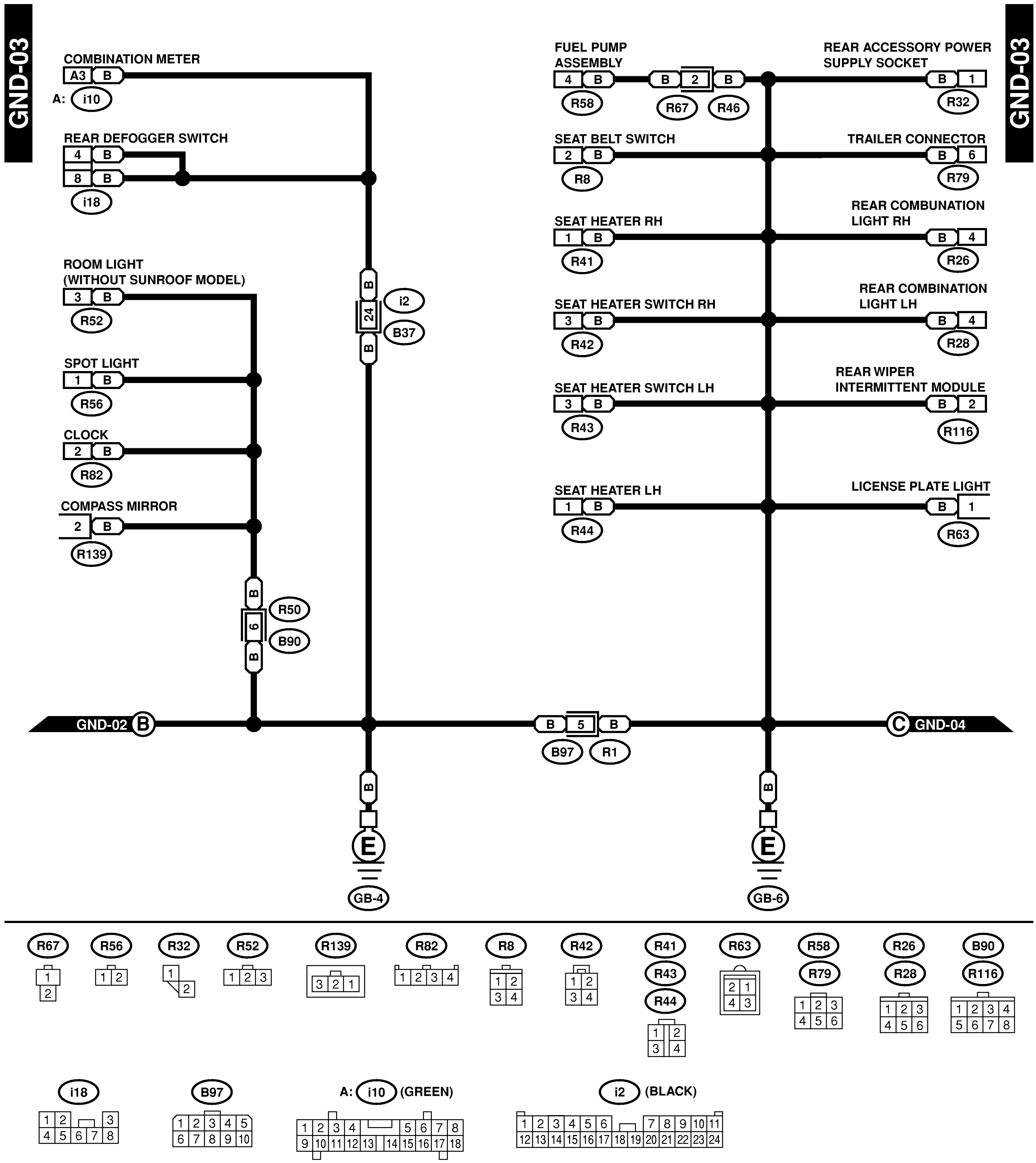


GND-02
POWER WINDOW RELAY
B42
INHIBITOR SWITCH (AT)
B12
T3
T7
SEAT HEATER/REAR ACCESSORY POWER SUPPLY RELAY
B104
DOOR LOCK SWITCH (PASSENGER SIDE)
B101
D11
D62
IGNITION RELAY
B157
RESISTER (DAYTIME RUNNING LIGHT)
B5
TURN & HAZARD MODULE
B32
WIPER DEICER SWITCH
B193
COMBINATION SWITCH (WIPER & WASHER)
B70
B165
B164
SEAT BELT WARNING AND KEY WARNING MODULE
B166
COMBINATION SWITCH (LIGHTING)
B71
B163
B162
CONDENSOR (MIRROR HEATER)
B172
WIPER DEICER TIMER
B192
DAYTIME RUNNING LIGHT CONTROL MODULE
B96
KEYLESS ENTRY CONTROL MODULE
B176
FRONT ACCESSORY POWER SUPPLY SOCKET
B167
ILLUMINATION CONTROL MODULE
B43
ASH TRAY ILLUMI. LIGHT
B175
BLOWER FAN SWITCH
B169
"P" POSITION SWITCH AND SHIFT LOCK SOLENOID (AT)
B117
MIRROR HEATER RELAY
B171
CHECK CONNECTOR
B79
GND-01 A
B GND-03
E
GB-5

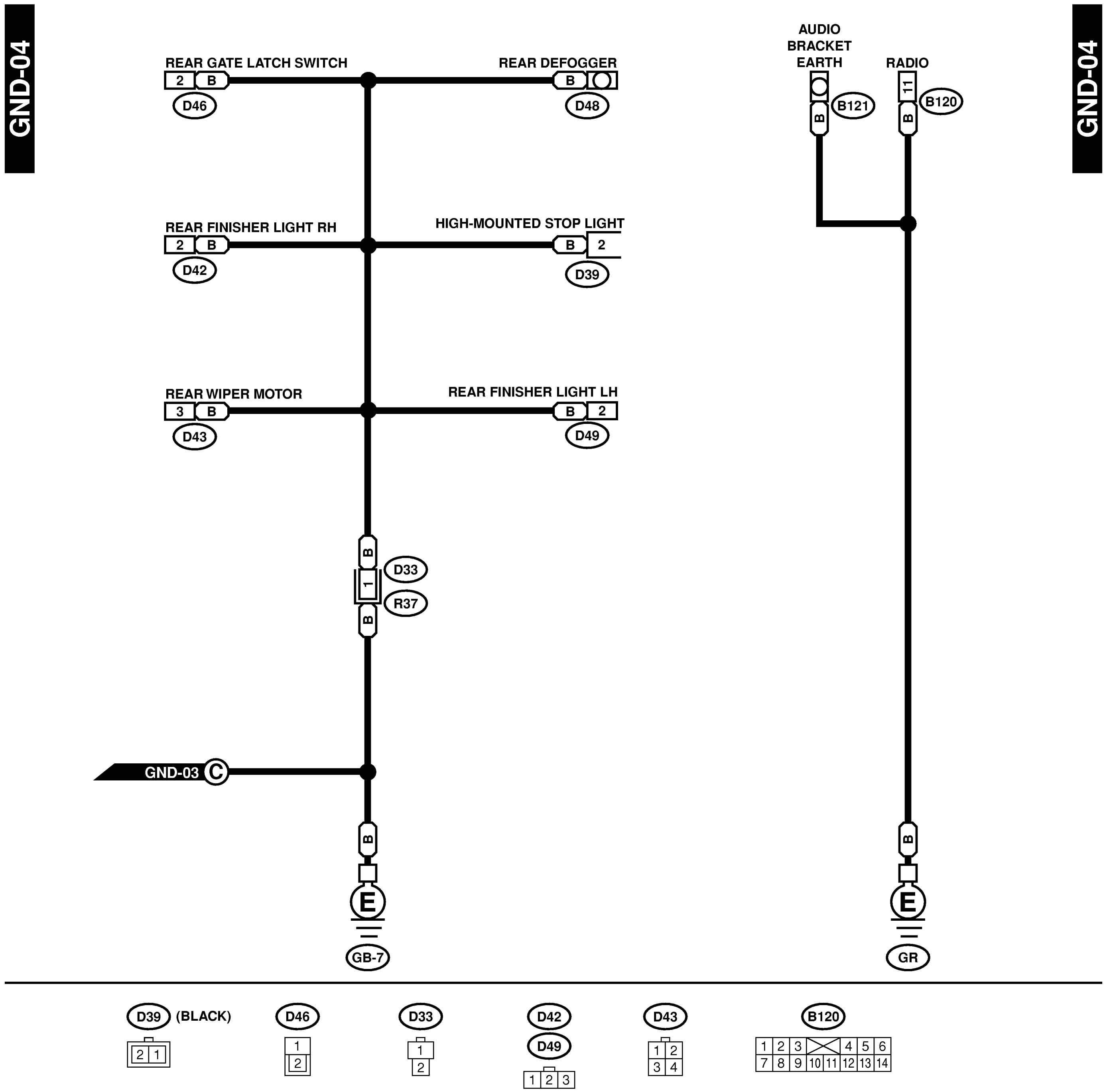


B5 (GRAY)
B172
B175
B32 (BLACK)
B167
B104
B42 (BLUE)
(RED) B157
B171 (BLACK)
B192
B117
B43 (BROWN)
B193
B169
B162
D62
B166
B96
T7
B12
B79 (GRAY)
B176
B71
B164
B70
D11

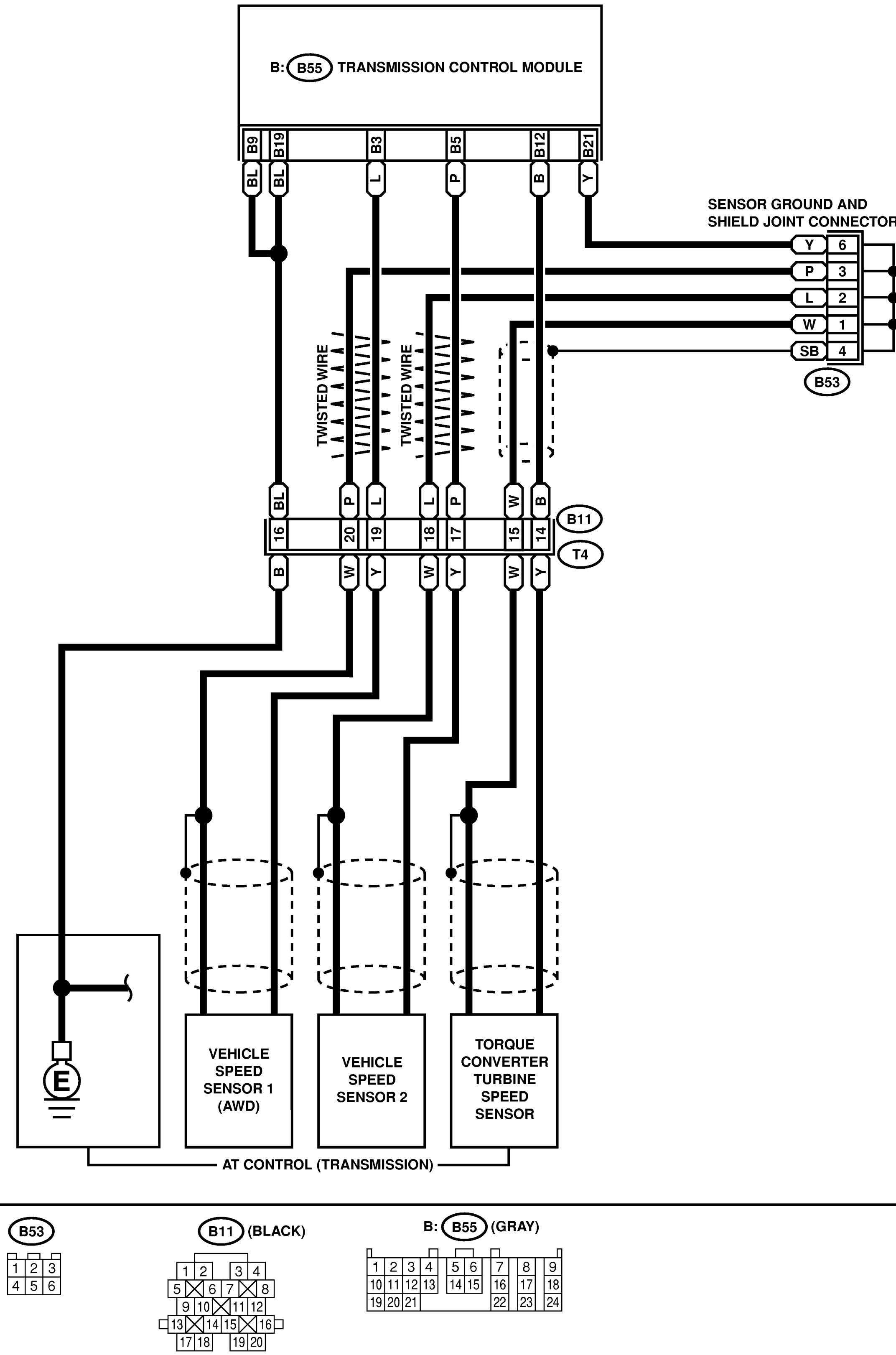
SU04-20B


GND-03
COMBINATION METER
A3 B
A: i10
REAR DEFOGGER SWITCH
4 B
8 B
i18
ROOM LIGHT
(WITHOUT SUNROOF MODEL)
3 B
R52
SPOT LIGHT
1 B
R56
CLOCK
2 B
R82
COMPASS MIRROR
2 B
R139
i2
B37
24
R50
B90
6
FUEL PUMP
ASSEMBLY
4 B
R58
B 2 B
R67 R46
REAR ACCESSORY POWER
SUPPLY SOCKET
B 1
R32
SEAT BELT SWITCH
2 B
R8
TRAILER CONNECTOR
B 6
R79
SEAT HEATER RH
1 B
R41
REAR COMBUNATION
LIGHT RH
B 4
R26
SEAT HEATER SWITCH RH
3 B
R42
REAR COMBINATION
LIGHT LH
B 4
R28
SEAT HEATER SWITCH LH
3 B
R43
REAR WIPER
INTERMITTENT MODULE
B 2
R116
SEAT HEATER LH
1 B
R44
LICENSE PLATE LIGHT
B 1
R63
GND-02 B
B 5 B
B97 R1
C GND-04
E
GB-4
GB-6
R67 R56 R32 R52 R139 R82 R8 R42 R41 R43 R44 R63 R58 R79 R26 R28 B90 R116
i18
B97
A: i10 (GREEN)
i2 (BLACK)

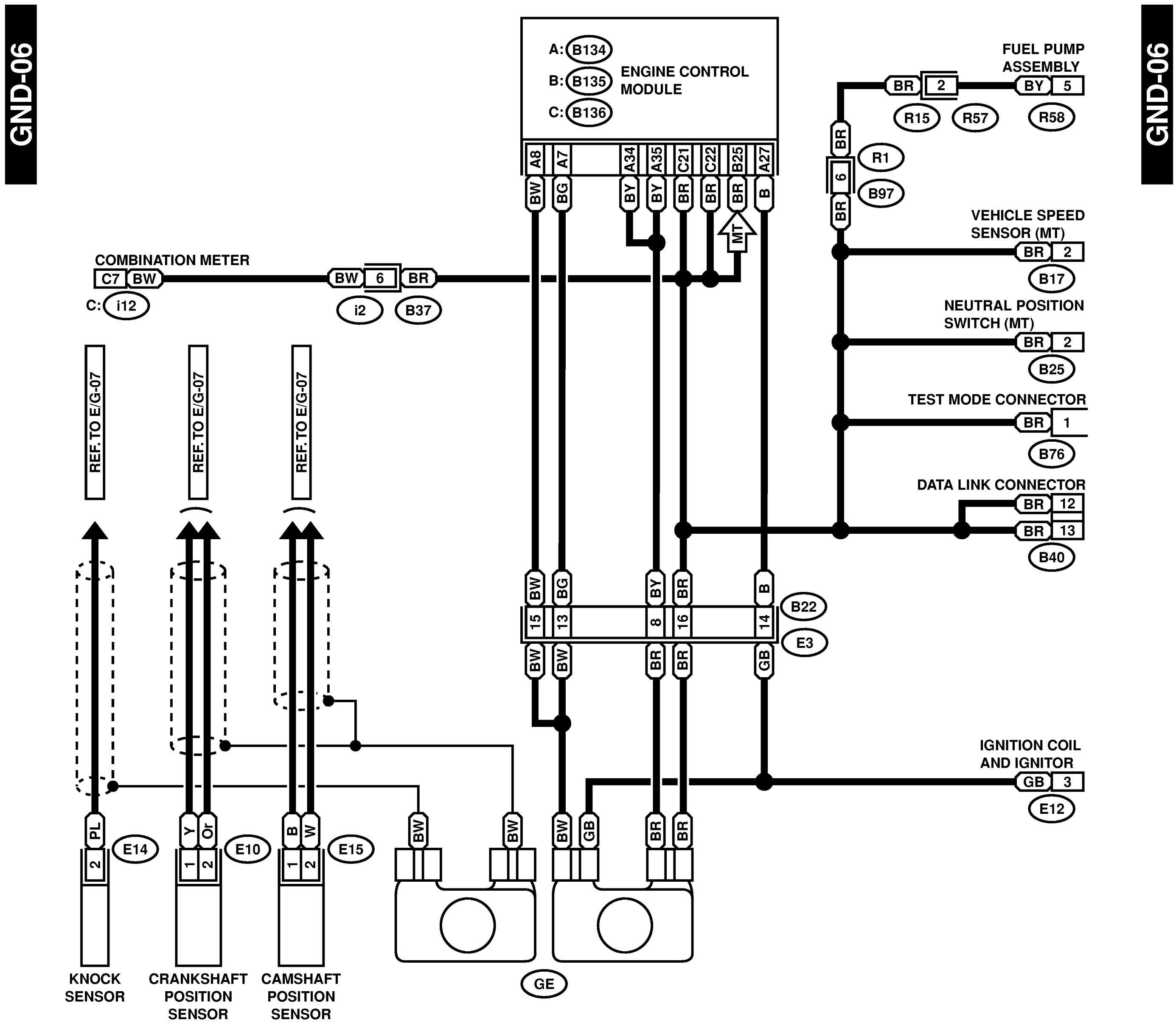
SU04-20C

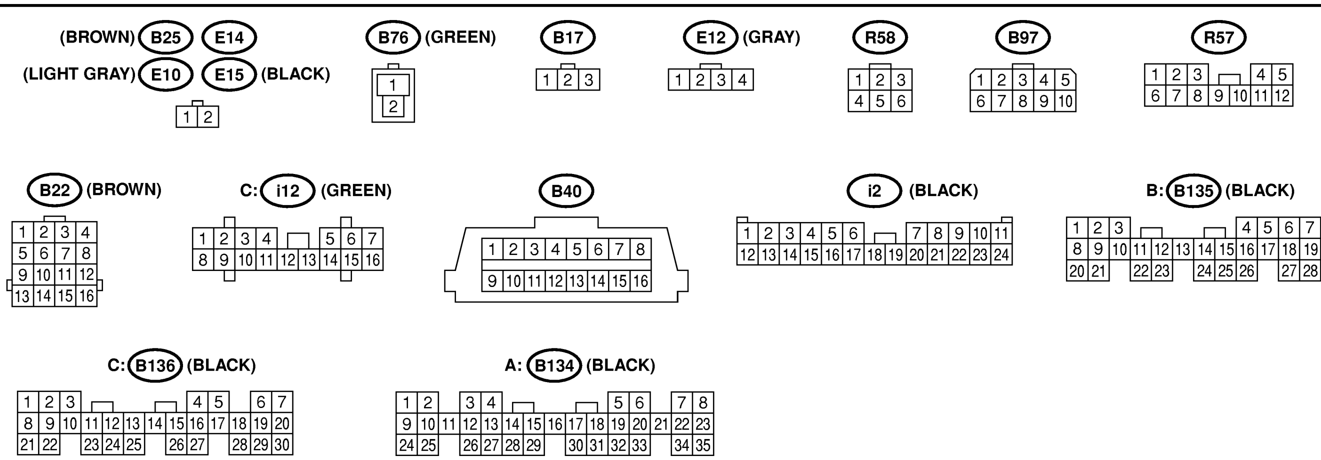

GND-04
REAR GATE LATCH SWITCH
2 B
D46
REAR DEFOGGER
B
D48
REAR FINISHER LIGHT RH
2 B
D42
HIGH-MOUNTED STOP LIGHT
B 2
D39
REAR WIPER MOTOR
3 B
D43
REAR FINISHER LIGHT LH
B 2
D49
B
1
D33
R37
B
GND-03
C
B
E
GB-7
AUDIO BRACKET EARTH
B
B121
RADIO
11
B
B120
B
E
GR
GND-04
D39 (BLACK)
2 1
D46
1 2
D33
1 2
D42
D49
1 2 3
D43
1 2 3 4
B120
1 2 3 4 5 6
7 8 9 10 11 12 13 14

SU04-20D


B: B55 TRANSMISSION CONTROL MODULE
B9
B19
B3
B5
B12
B21
SENSOR GROUND AND
SHIELD JOINT CONNECTOR
B53
TWISTED WIRE
TWISTED WIRE
B11
T4
VEHICLE SPEED SENSOR 1 (AWD)
VEHICLE SPEED SENSOR 2
TORQUE CONVERTER TURBINE SPEED SENSOR
AT CONTROL (TRANSMISSION)
B53
B11 (BLACK)
B: B55 (GRAY)

SU04-20E

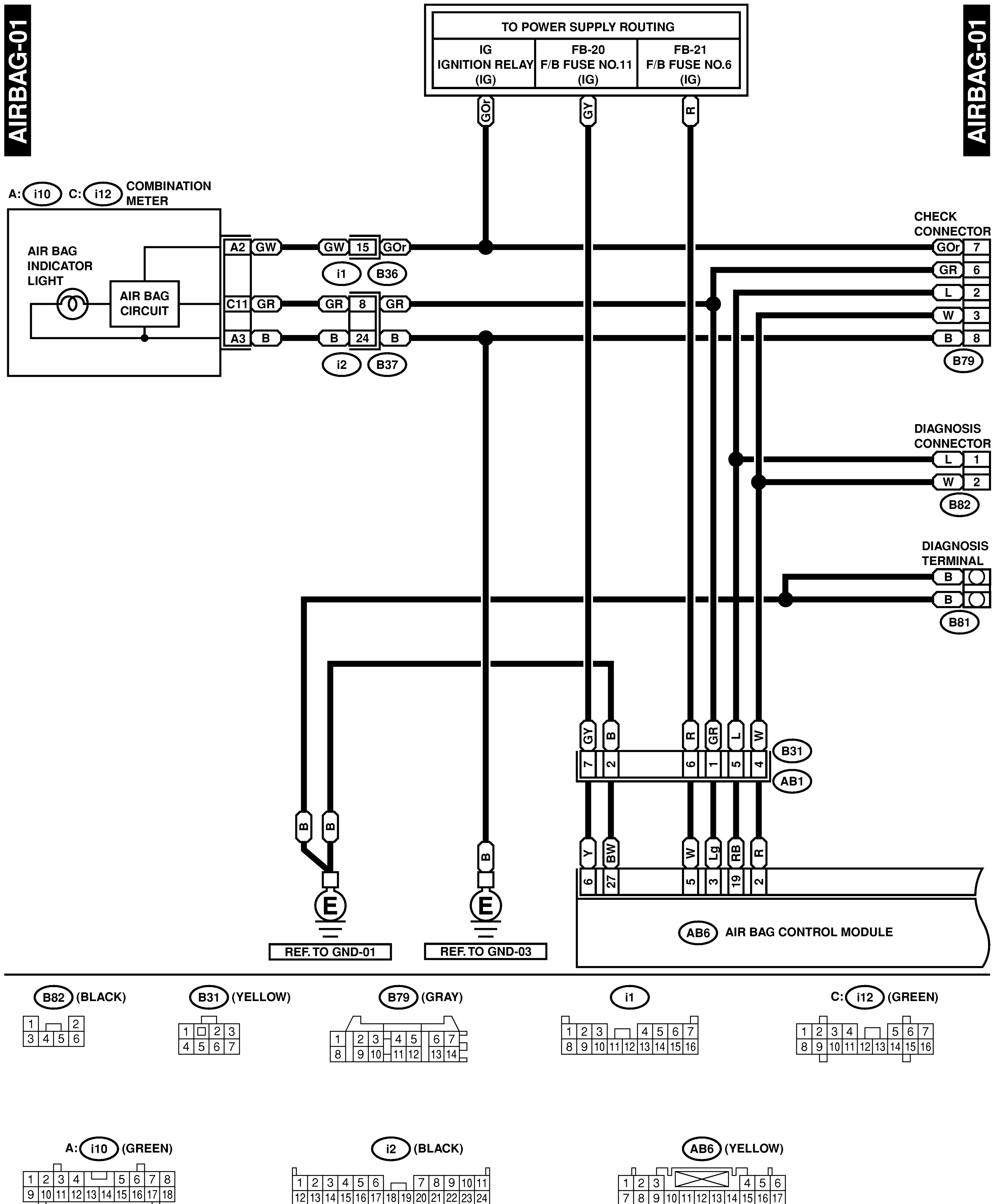

GND-06
ENGINE CONTROL MODULE
A: B134
B: B135
C: B136
A8 A7 A34 A35 C21 C22 B25 A27
FUEL PUMP ASSEMBLY
R15 R57 R58
R1
B97
VEHICLE SPEED SENSOR (MT)
B17
NEUTRAL POSITION SWITCH (MT)
B25
TEST MODE CONNECTOR
B76
DATA LINK CONNECTOR
B40
COMBINATION METER
C: i12
i2 B37
REF. TO E/G-07
REF. TO E/G-07
REF. TO E/G-07
B22
E3
IGNITION COIL AND IGNITOR
E12
E14
E10
E15
KNOCK SENSOR
CRANKSHAFT POSITION SENSOR
CAMSHAFT POSITION SENSOR
GE


(BROWN) B25 E14
(LIGHT GRAY) E10 E15 (BLACK)
B76 (GREEN)
B17
E12 (GRAY)
R58
B97
R57
B22 (BROWN)
C: i12 (GREEN)
B40
i2 (BLACK)
B: B135 (BLACK)
C: B136 (BLACK)
A: B134 (BLACK)

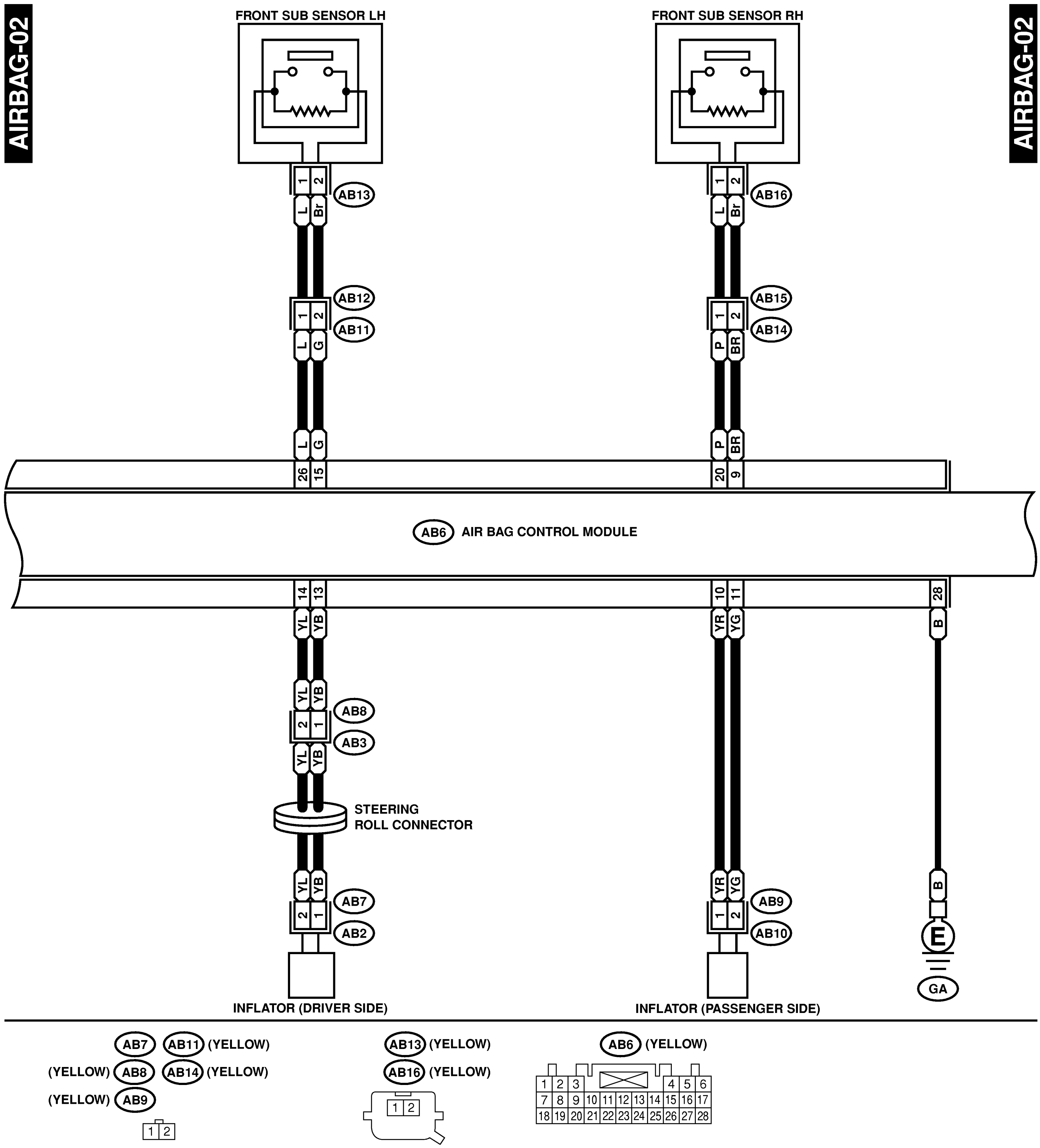
SU04-20F

5. Airbag System S903491

A: SCHEMATIC S903491A21

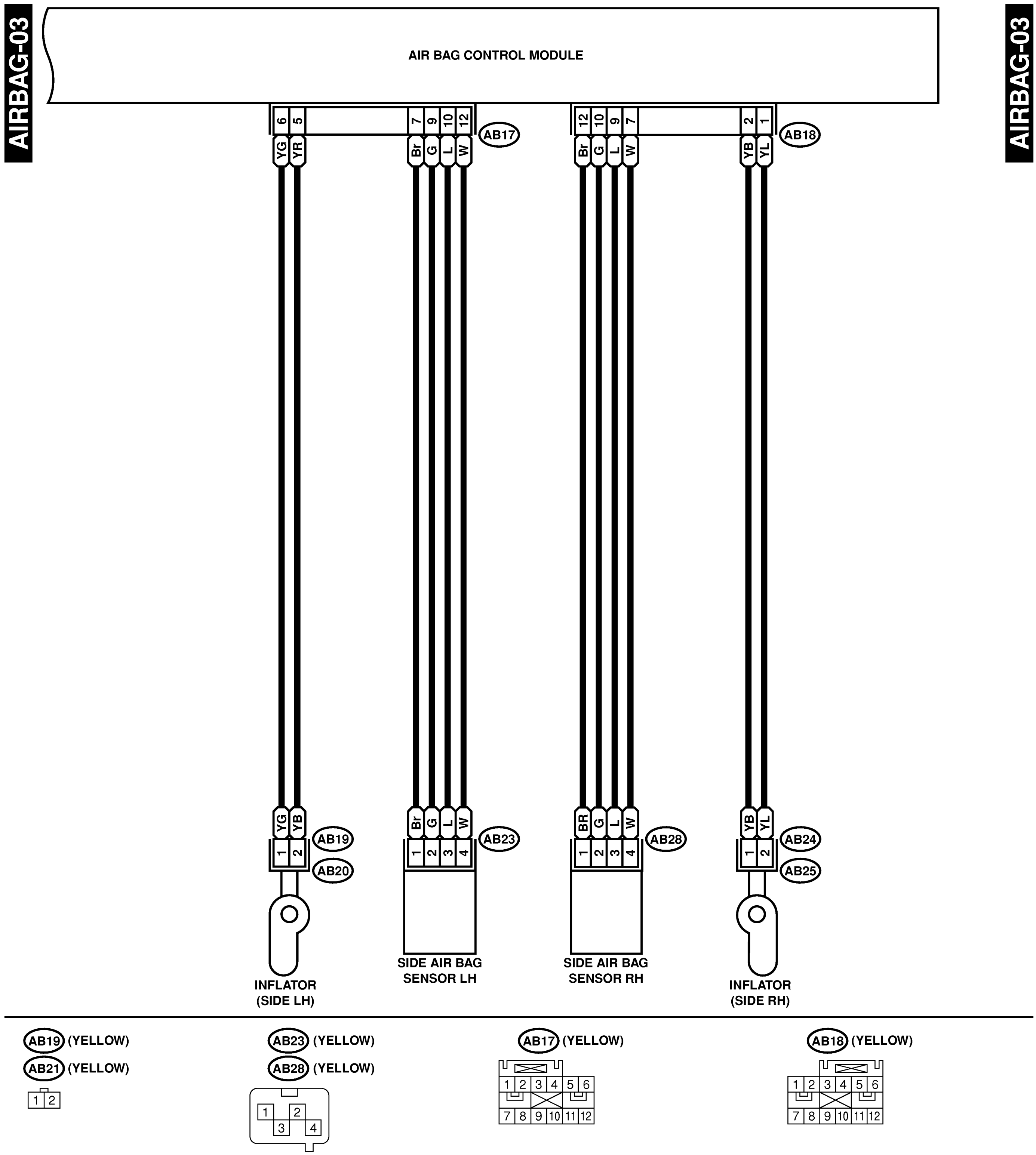


SU86-20A



AIRBAG-02
FRONT SUB SENSOR LH
FRONT SUB SENSOR RH
AIRBAG-02
AB13
AB16
AB12
AB11
AB15
AB14
AB6 AIR BAG CONTROL MODULE
AB8
AB3
STEERING ROLL CONNECTOR
AB7
AB2
AB9
AB10
E
GA
INFLATOR (DRIVER SIDE)
INFLATOR (PASSENGER SIDE)
AB7 AB11 (YELLOW)
(YELLOW) AB8 AB14 (YELLOW)
(YELLOW) AB9
AB13 (YELLOW)
AB16 (YELLOW)
AB6 (YELLOW)

SU86-20B

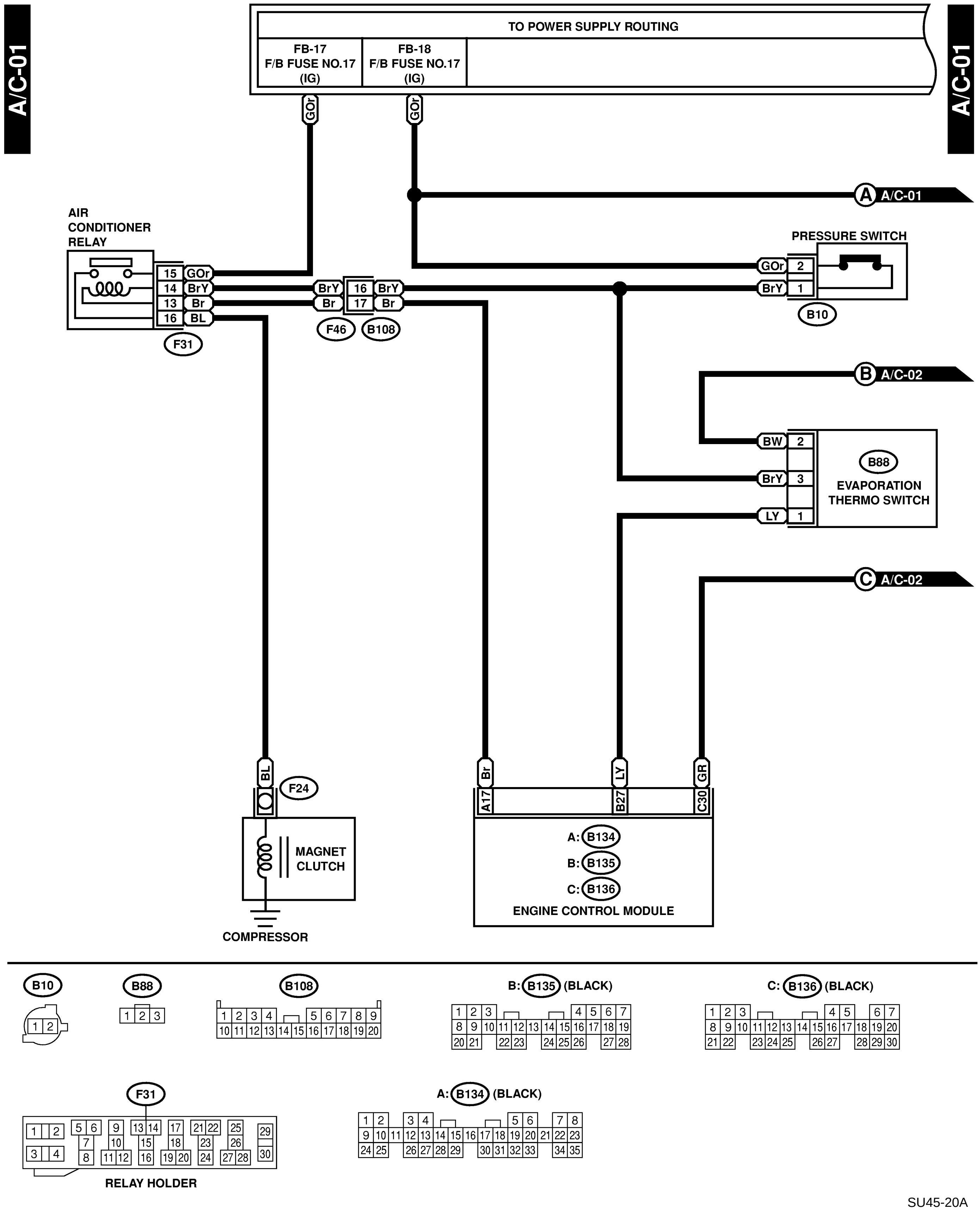

AIR BAG CONTROL MODULE
AB17
AB18
YG
YR
Br
G
L
W
YB
YL
AB19
AB20
AB23
AB28
AB24
AB25
BR
INFLATOR (SIDE LH)
SIDE AIR BAG SENSOR LH
SIDE AIR BAG SENSOR RH
INFLATOR (SIDE RH)
AB19 (YELLOW)
AB21 (YELLOW)
AB23 (YELLOW)
AB28 (YELLOW)
AB17 (YELLOW)
AB18 (YELLOW)

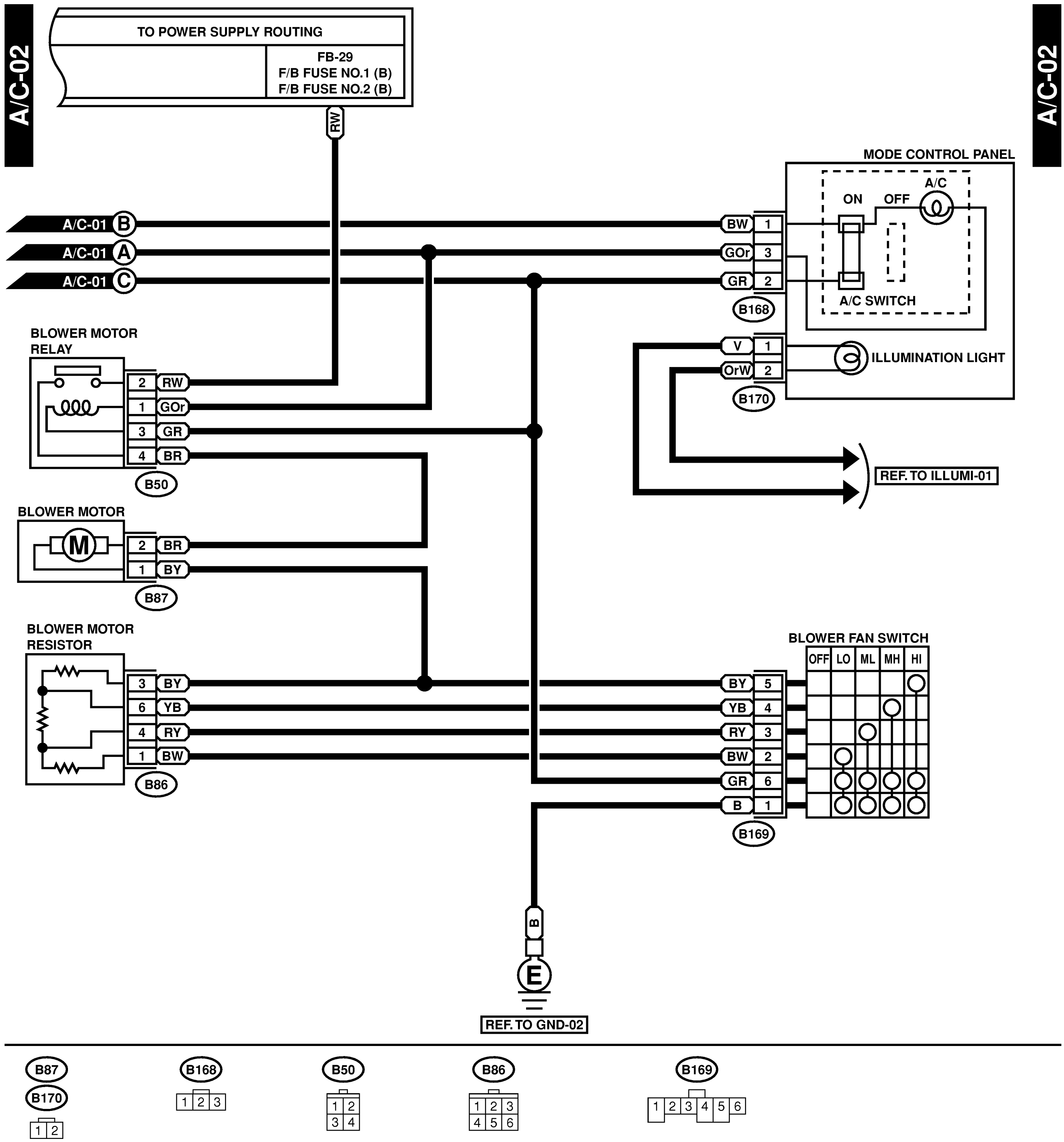
SU86-20C

MEMO:

6. Air Conditioning System *S903471*

A: SCHEMATIC *S903471A21*

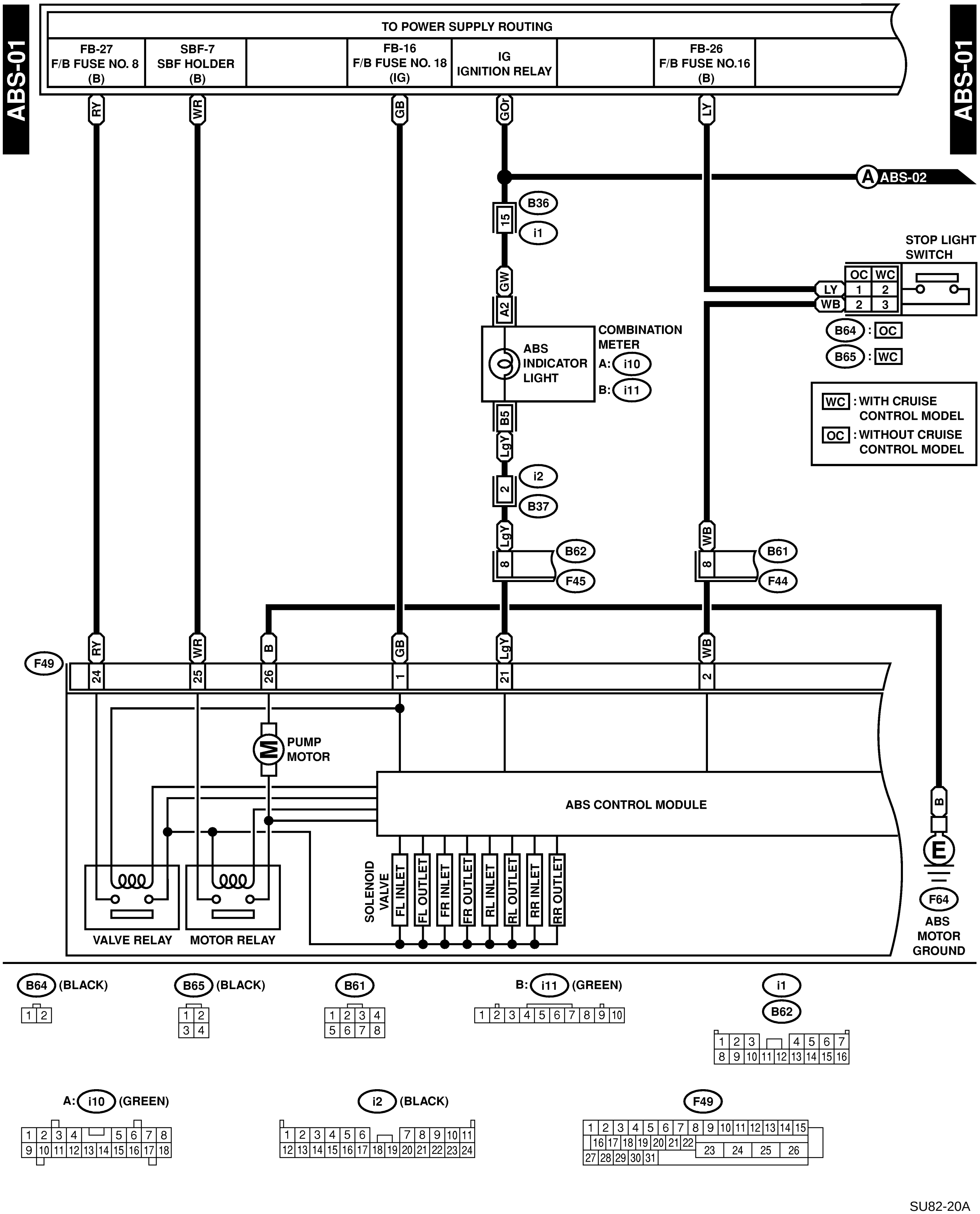


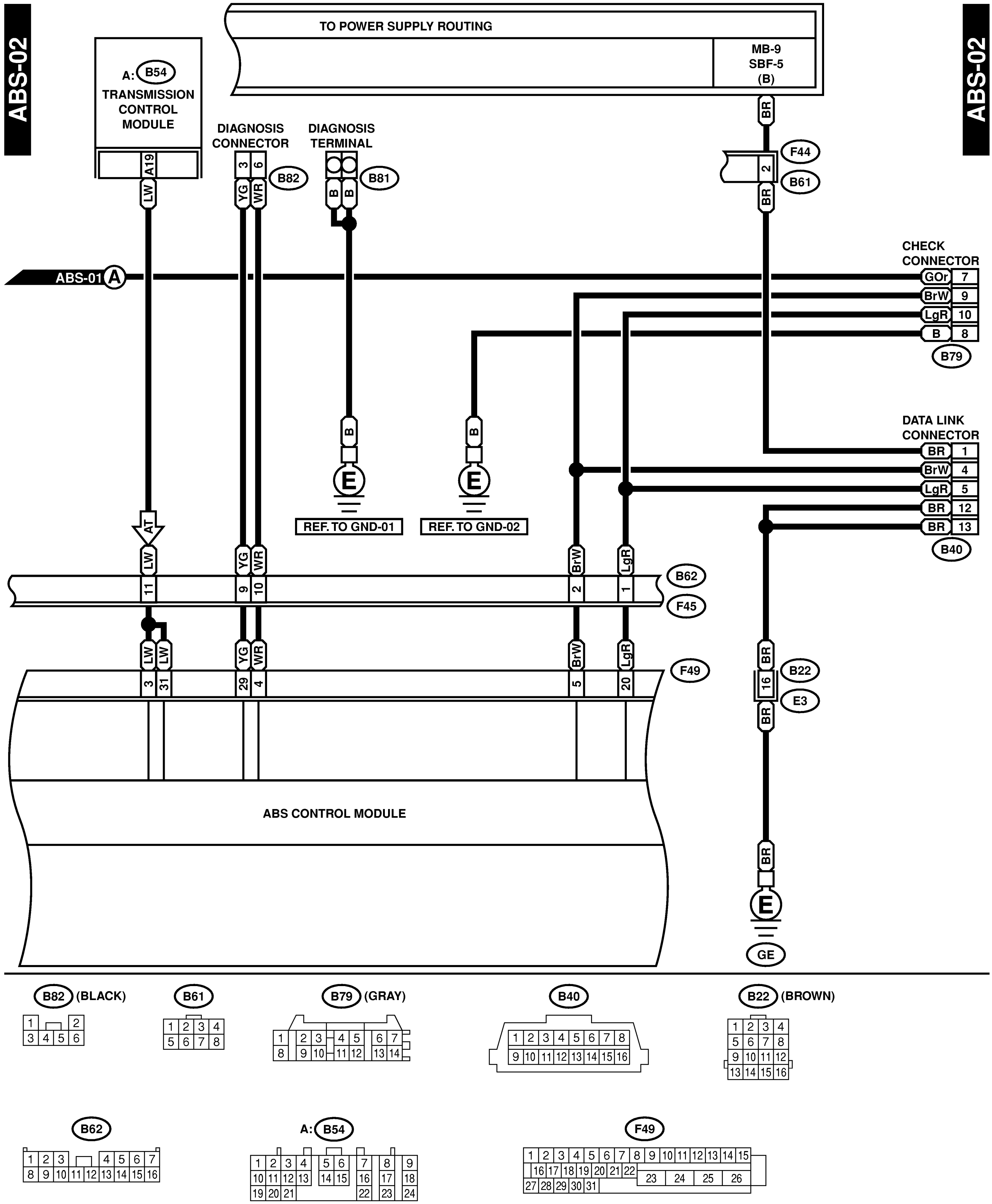

A/C-02
TO POWER SUPPLY ROUTING
FB-29
F/B FUSE NO.1 (B)
F/B FUSE NO.2 (B)
RW
A/C-01 B
A/C-01 A
A/C-01 C
MODE CONTROL PANEL
A/C
ON
OFF
A/C SWITCH
ILLUMINATION LIGHT
BW
GOr
GR
B168
V
OrW
B170
REF. TO ILLUMI-01
BLOWER MOTOR RELAY
RW
GOr
GR
BR
B50
BLOWER MOTOR
M
BR
BY
B87
BLOWER MOTOR RESISTOR
BY
YB
RY
BW
B86
BLOWER FAN SWITCH
OFF
LO
ML
MH
HI
BY
YB
RY
BW
GR
B
B169
B
E
REF. TO GND-02
B87
B170
B168
B50
B86
B169

SU45-20B

7. Anti-lock Brake System S903484

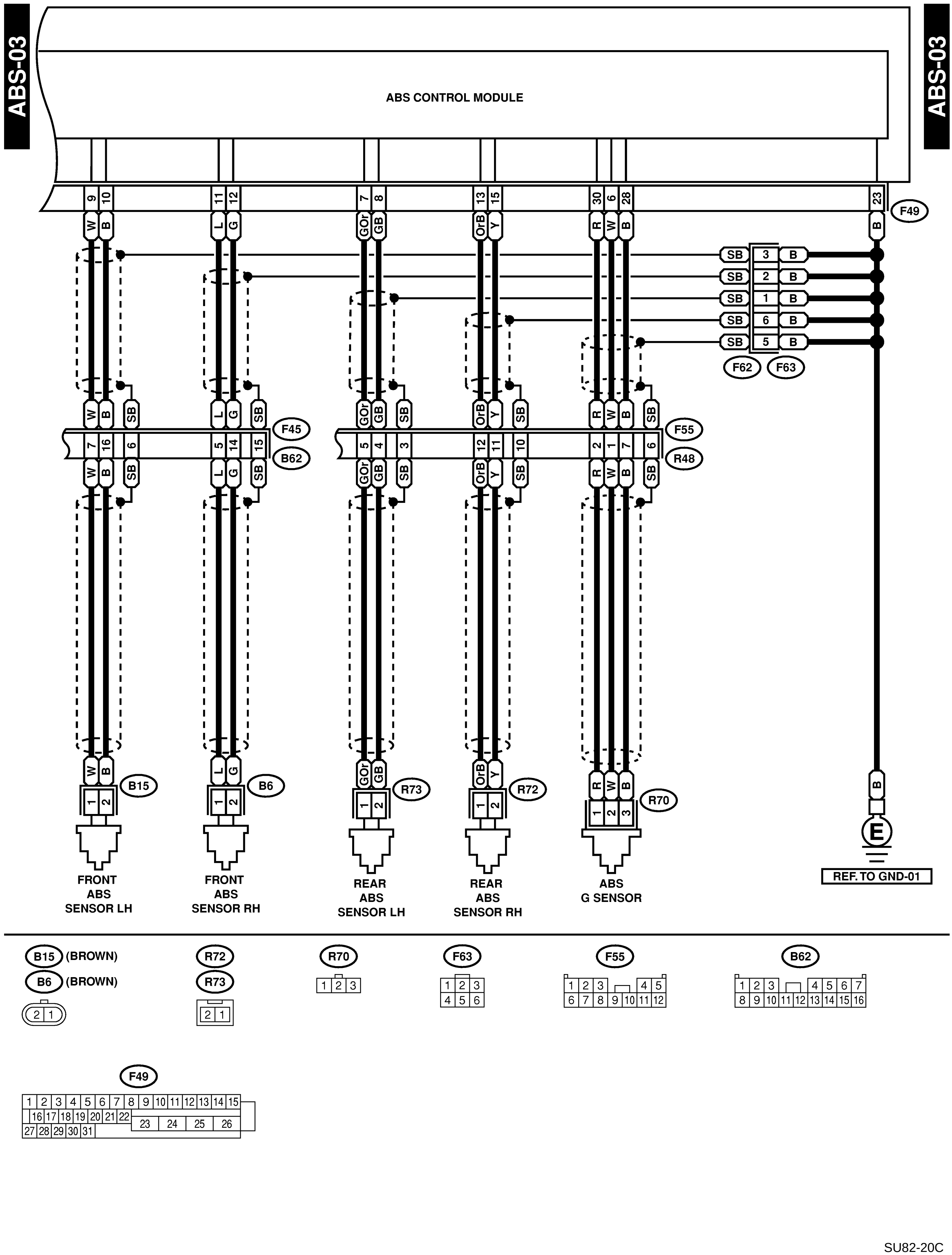
A: SCHEMATIC S903484A21





ABS-02
ABS-02
TO POWER SUPPLY ROUTING
MB-9
SBF-5
(B)
A: B54
TRANSMISSION CONTROL MODULE
DIAGNOSIS CONNECTOR
DIAGNOSIS TERMINAL
B82
B81
F44
B61
ABS-01 A
CHECK CONNECTOR
B79
DATA LINK CONNECTOR
B40
REF. TO GND-01
REF. TO GND-02
B62
F45
F49
B22
E3
ABS CONTROL MODULE
GE
B82 (BLACK)
B61
B79 (GRAY)
B40
B22 (BROWN)
B62
A: B54
F49

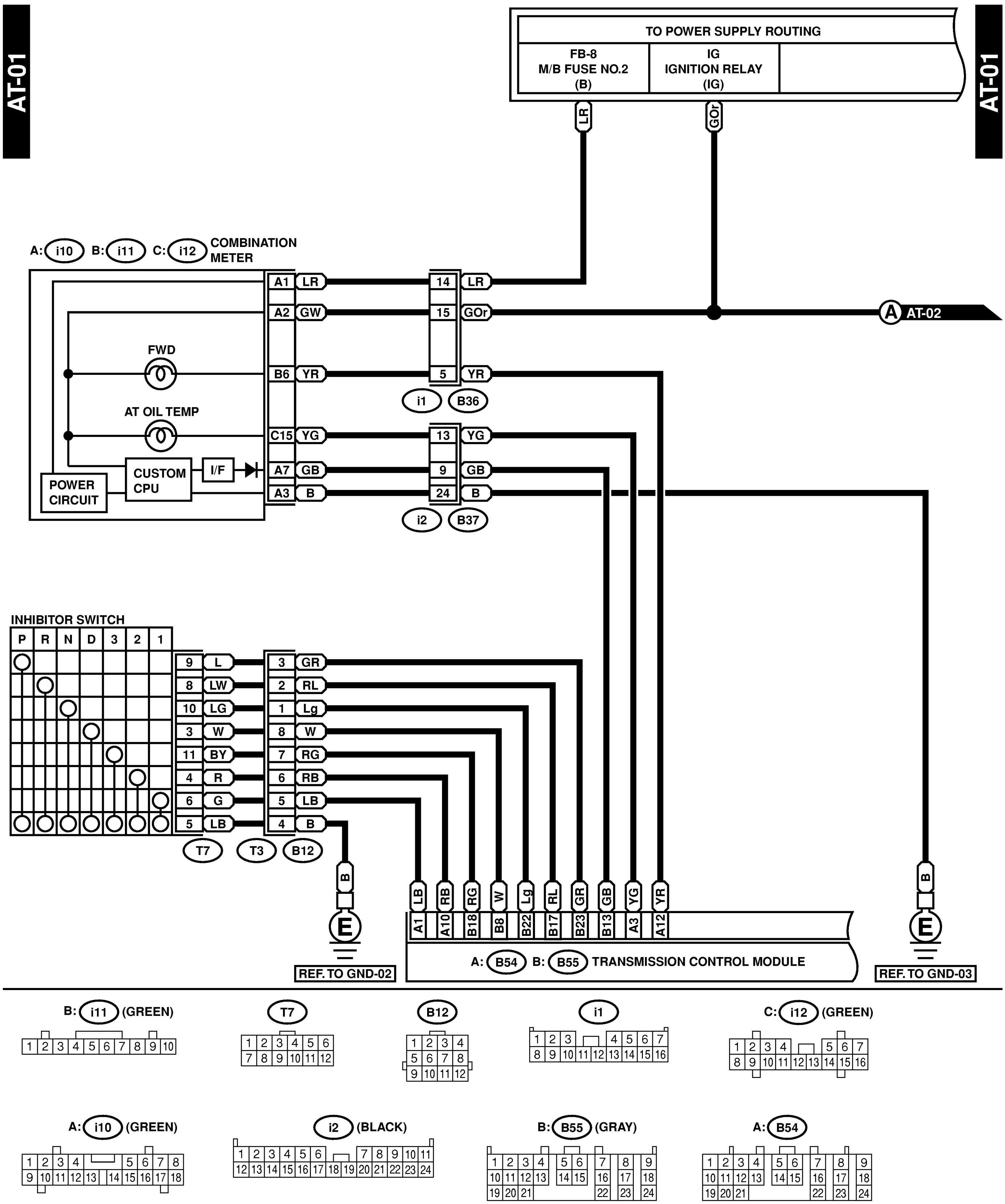
SU82-20B


ABS-03
ABS CONTROL MODULE
F49
F62
F63
F45
B62
F55
R48
B15
B6
R73
R72
R70
FRONT ABS SENSOR LH
FRONT ABS SENSOR RH
REAR ABS SENSOR LH
REAR ABS SENSOR RH
ABS G SENSOR
REF. TO GND-01
B15 (BROWN)
B6 (BROWN)
R72
R73
R70
F63
F55
B62
F49
SU82-20C

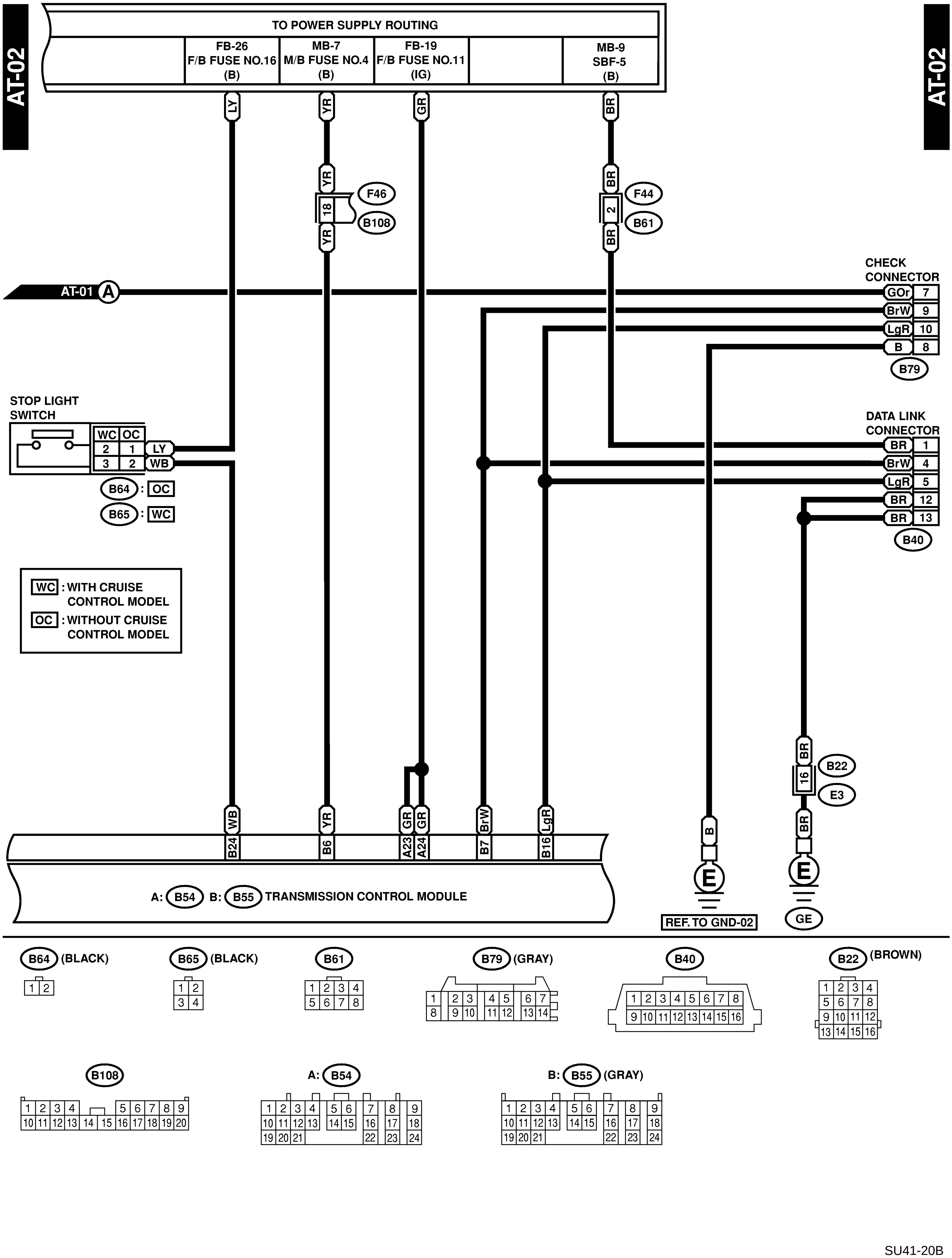
MEMO:

8. A/T Control System *S903485*

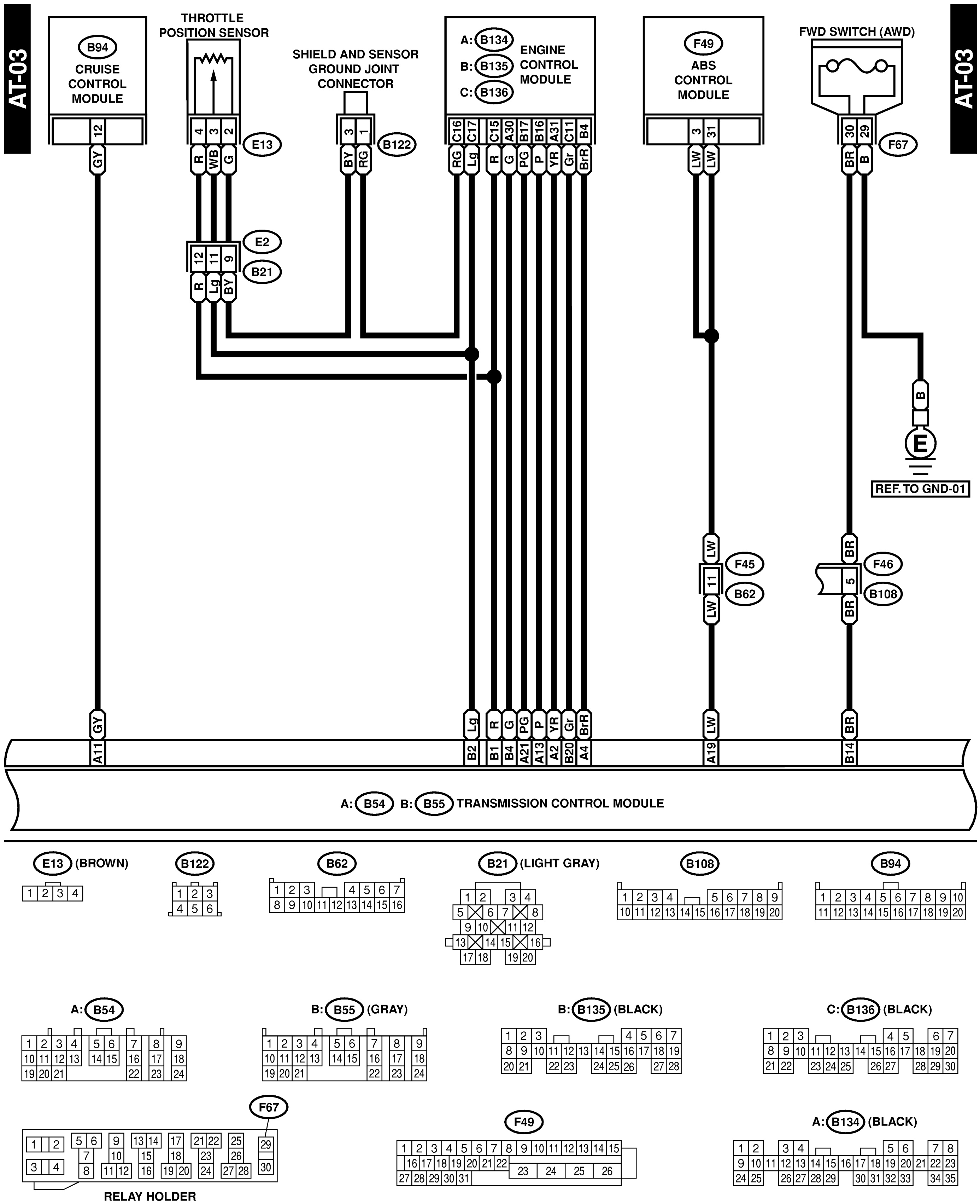
A: SCHEMATIC *S903485A21*



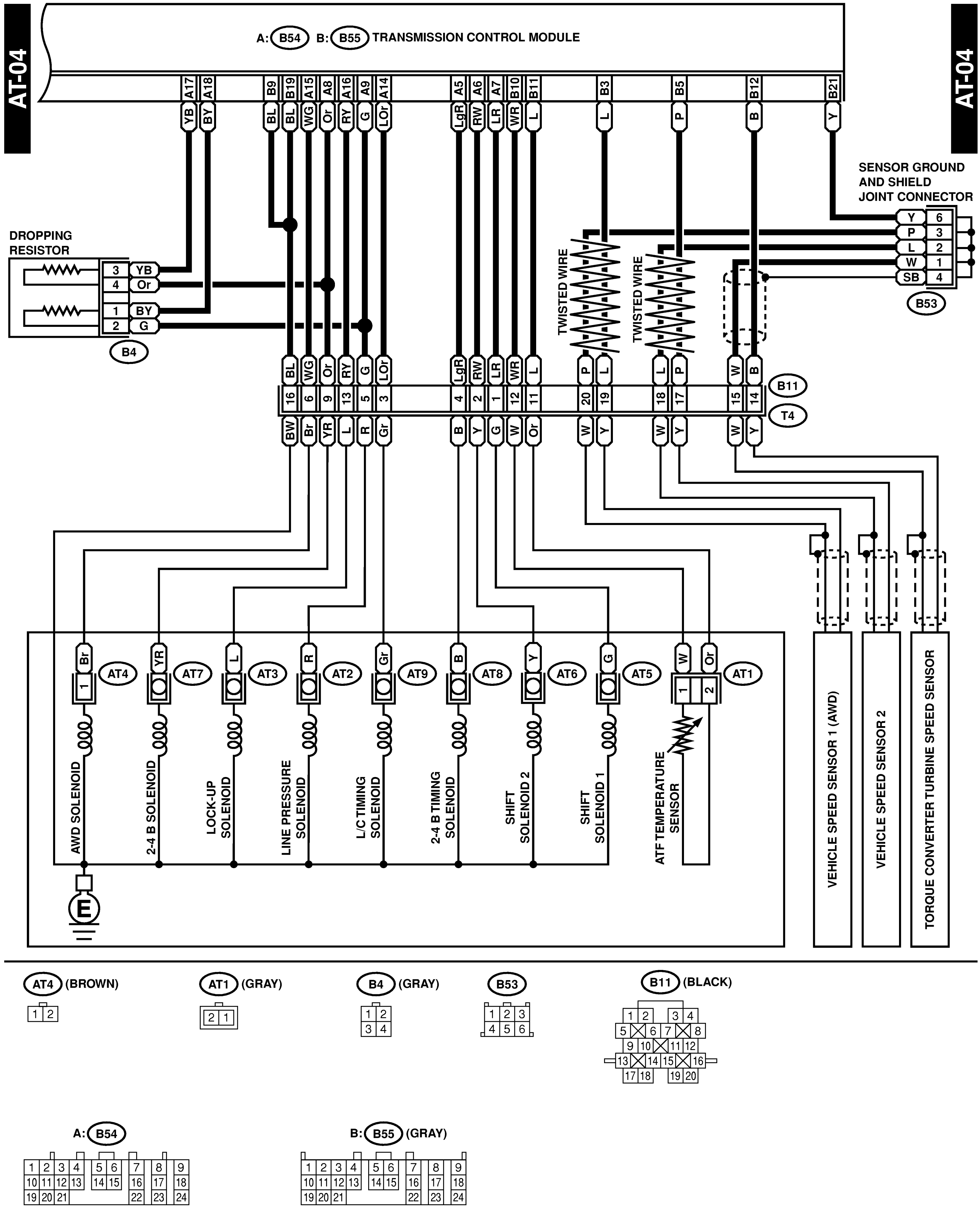
SU41-20A



AT-02
TO POWER SUPPLY ROUTING
FB-26 F/B FUSE NO.16 (B)
MB-7 M/B FUSE NO.4 (B)
FB-19 F/B FUSE NO.11 (IG)
MB-9 SBF-5 (B)
LY
YR
GR
BR
F46
B108
F44
B61
AT-01
A
CHECK CONNECTOR
GOr 7
BrW 9
LgR 10
B 8
B79
STOP LIGHT SWITCH
WC OC
2 1 LY
3 2 WB
B64 : OC
B65 : WC
DATA LINK CONNECTOR
BR 1
BrW 4
LgR 5
BR 12
BR 13
B40
WC : WITH CRUISE CONTROL MODEL
OC : WITHOUT CRUISE CONTROL MODEL
B22
E3
WB B24
YR B6
GR A23
GR A24
BrW B7
LgR B16
A: B54 B: B55 TRANSMISSION CONTROL MODULE
E
REF. TO GND-02
GE
B64 (BLACK)
B65 (BLACK)
B61
B79 (GRAY)
B40
B22 (BROWN)
B108
A: B54
B: B55 (GRAY)
SU41-20B


AT-03
B94
CRUISE CONTROL MODULE
THROTTLE POSITION SENSOR
SHIELD AND SENSOR GROUND JOINT CONNECTOR
A: B134
B: B135
C: B136
ENGINE CONTROL MODULE
F49
ABS CONTROL MODULE
FWD SWITCH (AWD)
E13
B122
F67
E2
B21
REF. TO GND-01
F45
B62
F46
B108
A: B54 B: B55 TRANSMISSION CONTROL MODULE
E13 (BROWN)
B122
B62
B21 (LIGHT GRAY)
B108
B94
A: B54
B: B55 (GRAY)
B: B135 (BLACK)
C: B136 (BLACK)
F67
RELAY HOLDER
F49
A: B134 (BLACK)

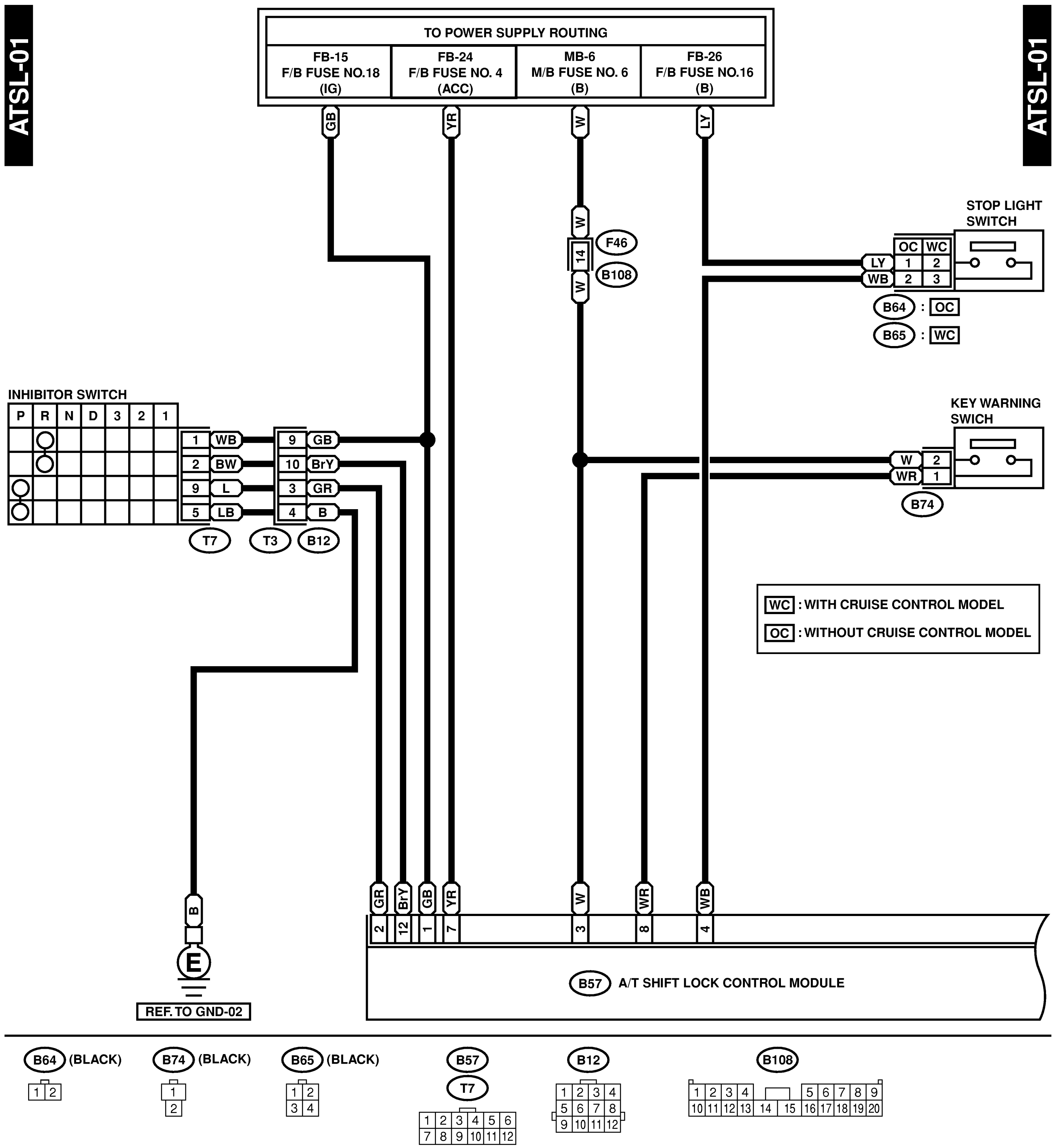
SU41-20C

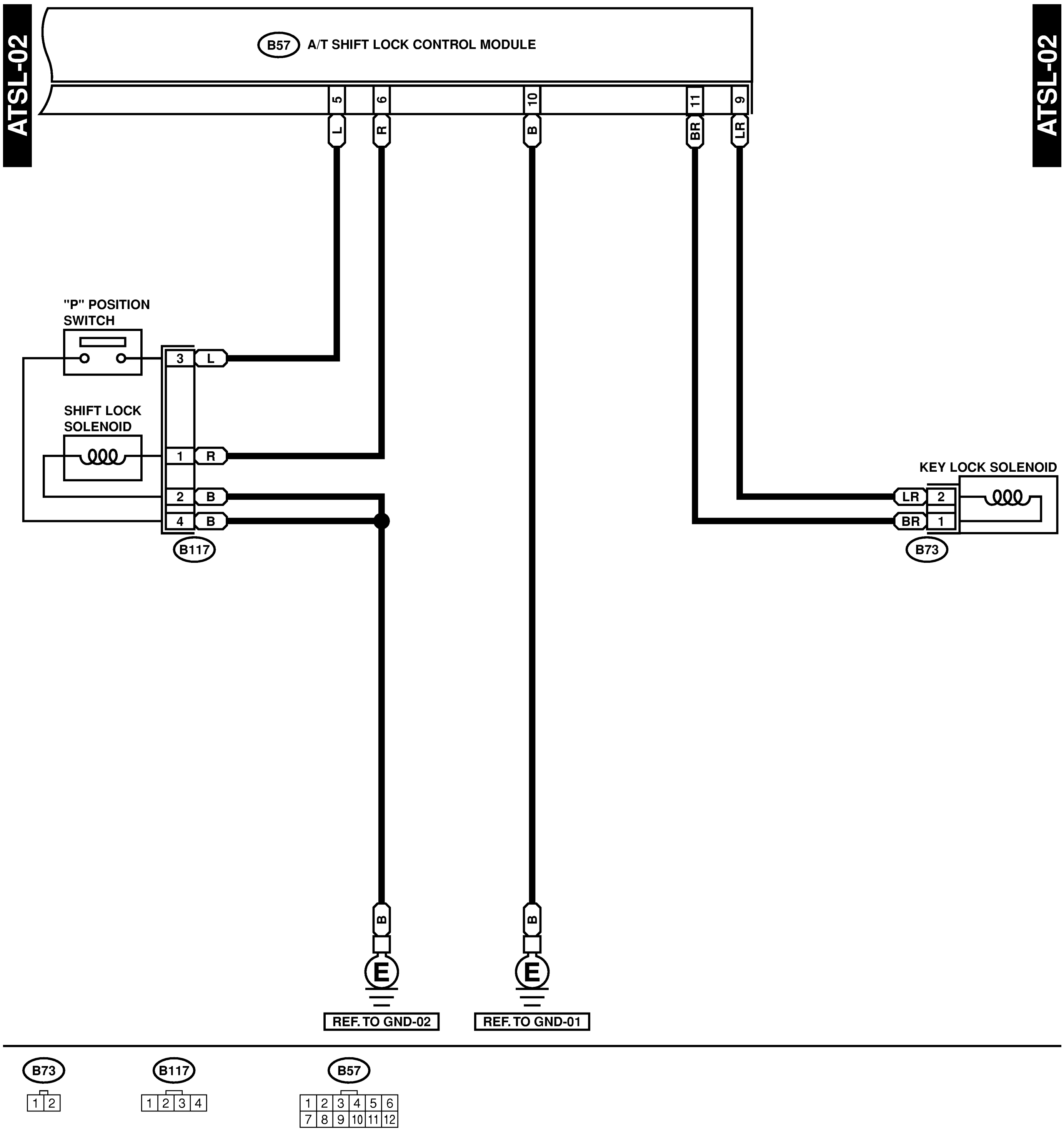


AT-04
A: B54 B: B55 TRANSMISSION CONTROL MODULE
DROPPING RESISTOR
SENSOR GROUND AND SHIELD JOINT CONNECTOR
TWISTED WIRE
TWISTED WIRE
B4
B53
B11
T4
AT4
AT7
AT3
AT2
AT9
AT8
AT6
AT5
AT1
AWD SOLENOID
2-4 B SOLENOID
LOCK-UP SOLENOID
LINE PRESSURE SOLENOID
L/C TIMING SOLENOID
2-4 B TIMING SOLENOID
SHIFT SOLENOID 2
SHIFT SOLENOID 1
ATF TEMPERATURE SENSOR
VEHICLE SPEED SENSOR 1 (AWD)
VEHICLE SPEED SENSOR 2
TORQUE CONVERTER TURBINE SPEED SENSOR
E
AT4 (BROWN)
AT1 (GRAY)
B4 (GRAY)
B53
B11 (BLACK)
A: B54
B: B55 (GRAY)
SU41-20D

9. A/T Shift Lock Control System *S903662*

A: SCHEMATIC *S903662A21*



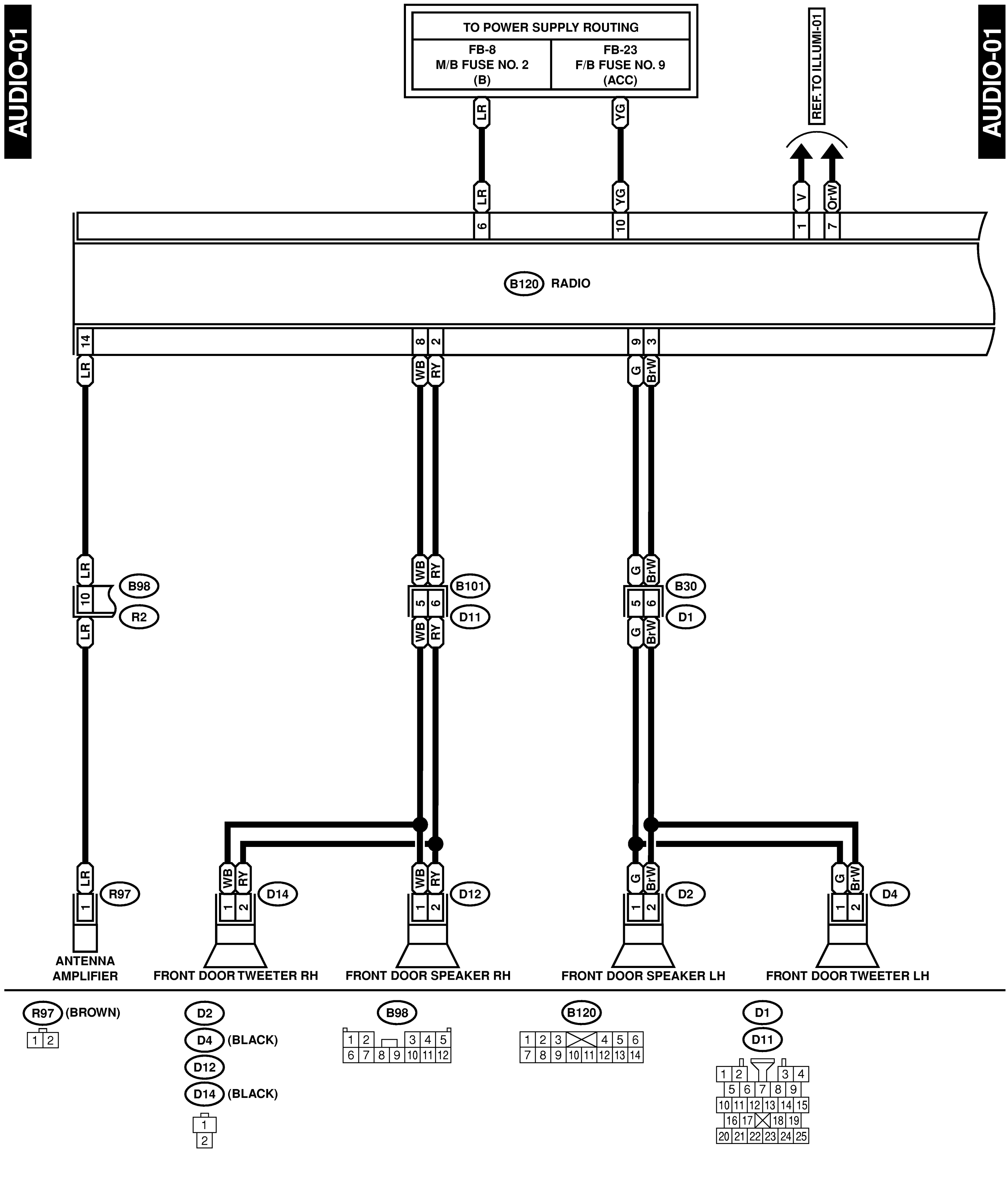


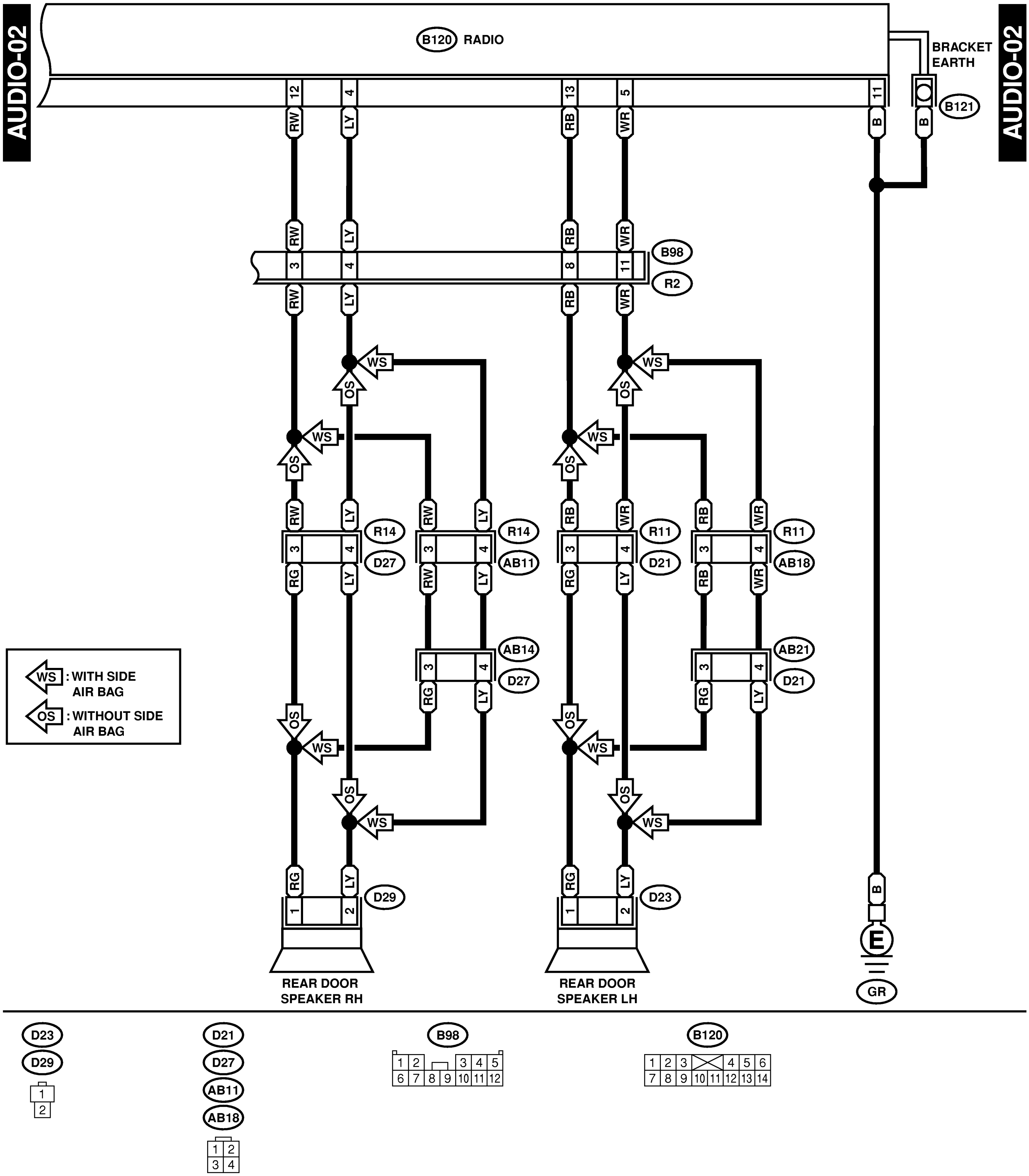
ATSL-02
ATSL-02
B57 A/T SHIFT LOCK CONTROL MODULE
5
6
10
11
9
L
R
B
BR
LR
"P" POSITION SWITCH
SHIFT LOCK SOLENOID
3
L
1
R
2
B
4
B
B117
KEY LOCK SOLENOID
LR
2
BR
1
B73
B
B
E
E
REF. TO GND-02
REF. TO GND-01
B73
1 2
B117
1 2 3 4
B57
1 2 3 4 5 6
7 8 9 10 11 12

SU42-20B

10. Audio System *S903486*

A: SCHEMATIC *S903486A21*

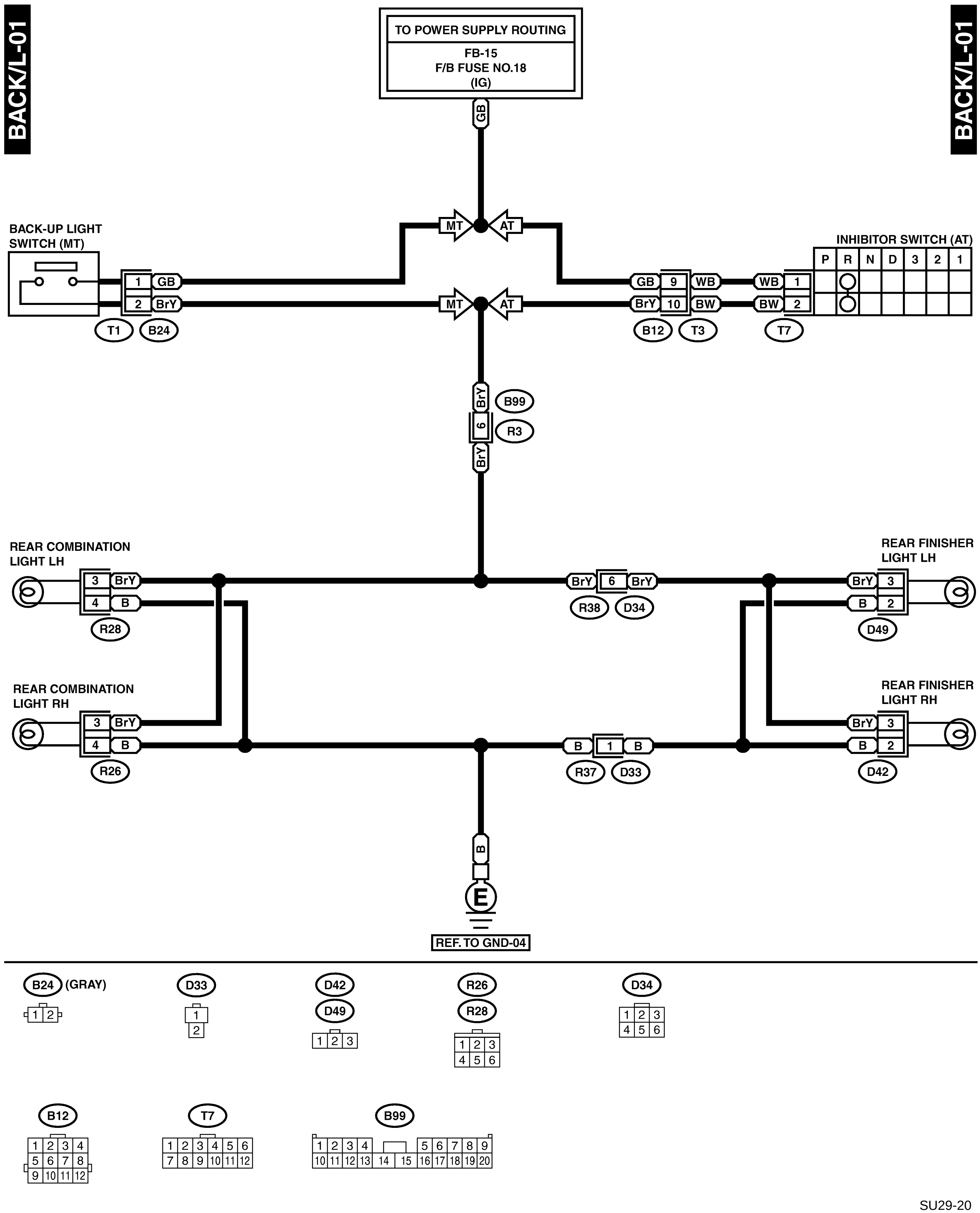



AUDIO-02
B120
RADIO
BRACKET
EARTH
B121
AUDIO-02
B98
R2
R14
D27
R14
AB11
R11
D21
R11
AB18
AB14
D27
AB21
D21
WS : WITH SIDE
AIR BAG
OS : WITHOUT SIDE
AIR BAG
D29
D23
REAR DOOR
SPEAKER RH
REAR DOOR
SPEAKER LH
E
GR
D23
D29
D21
D27
AB11
AB18
B98
B120

SU76-20B

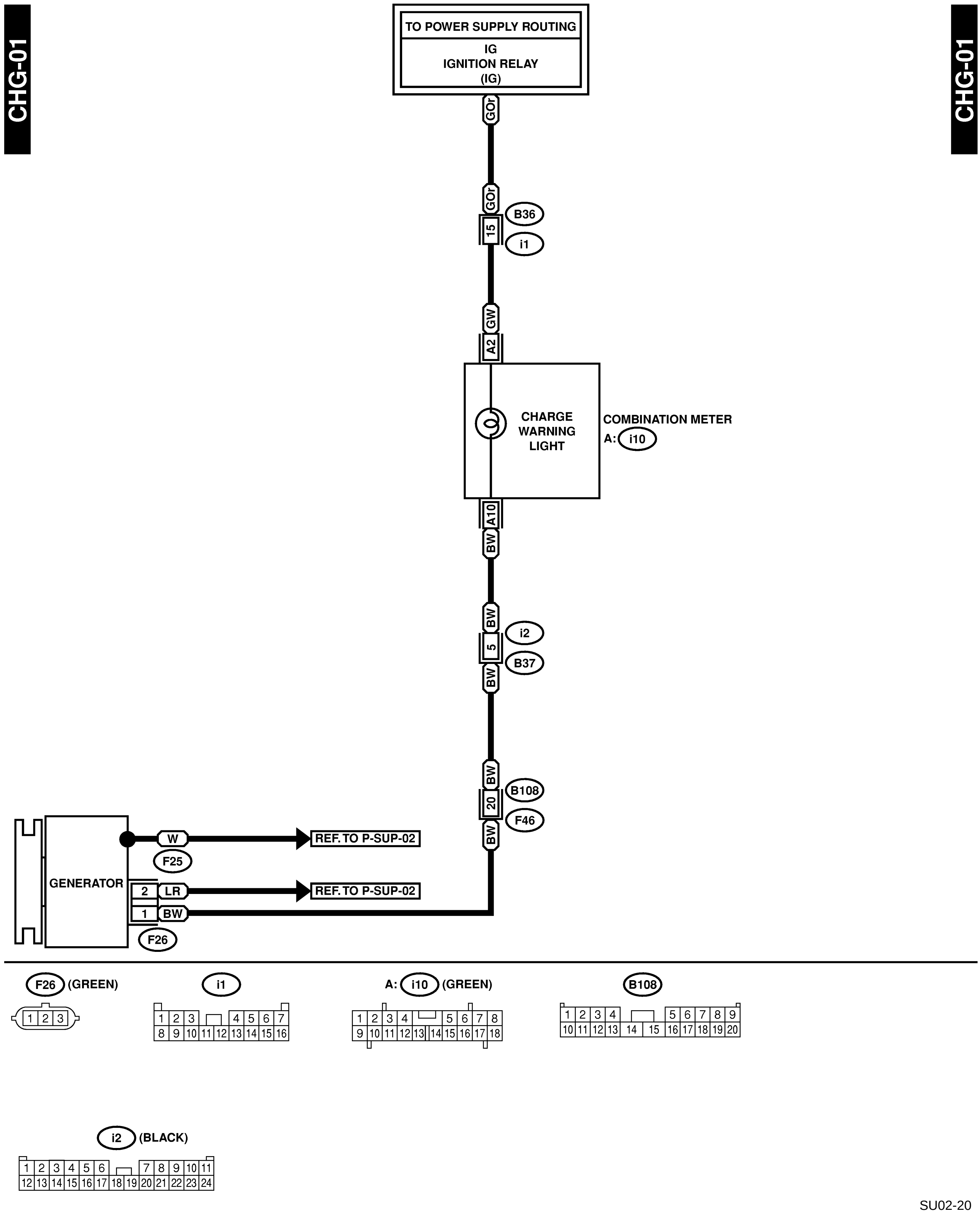
11. Back-up Light System *S903414*

A: SCHEMATIC *S903414A21*



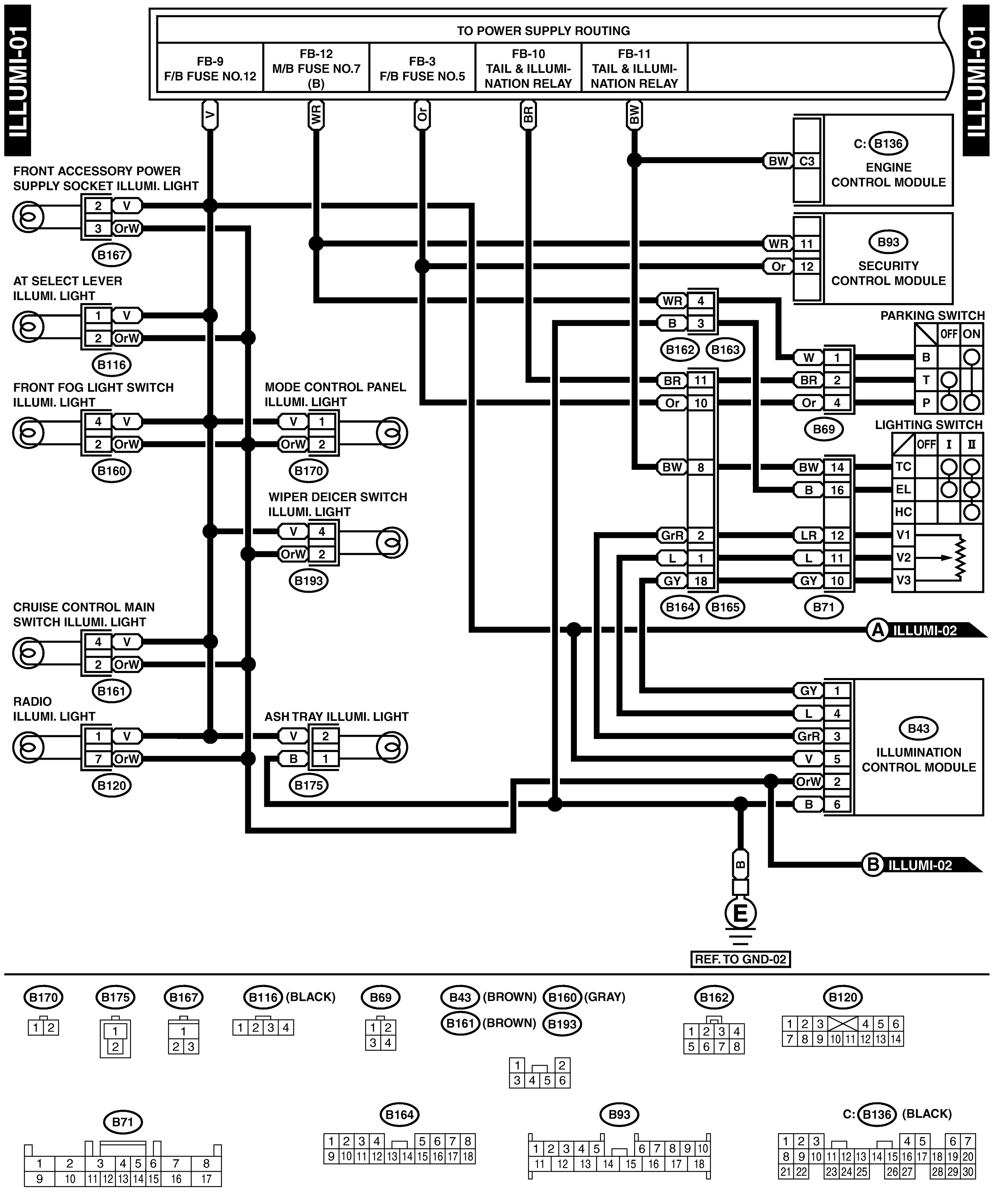
12. Charging System *S903487*

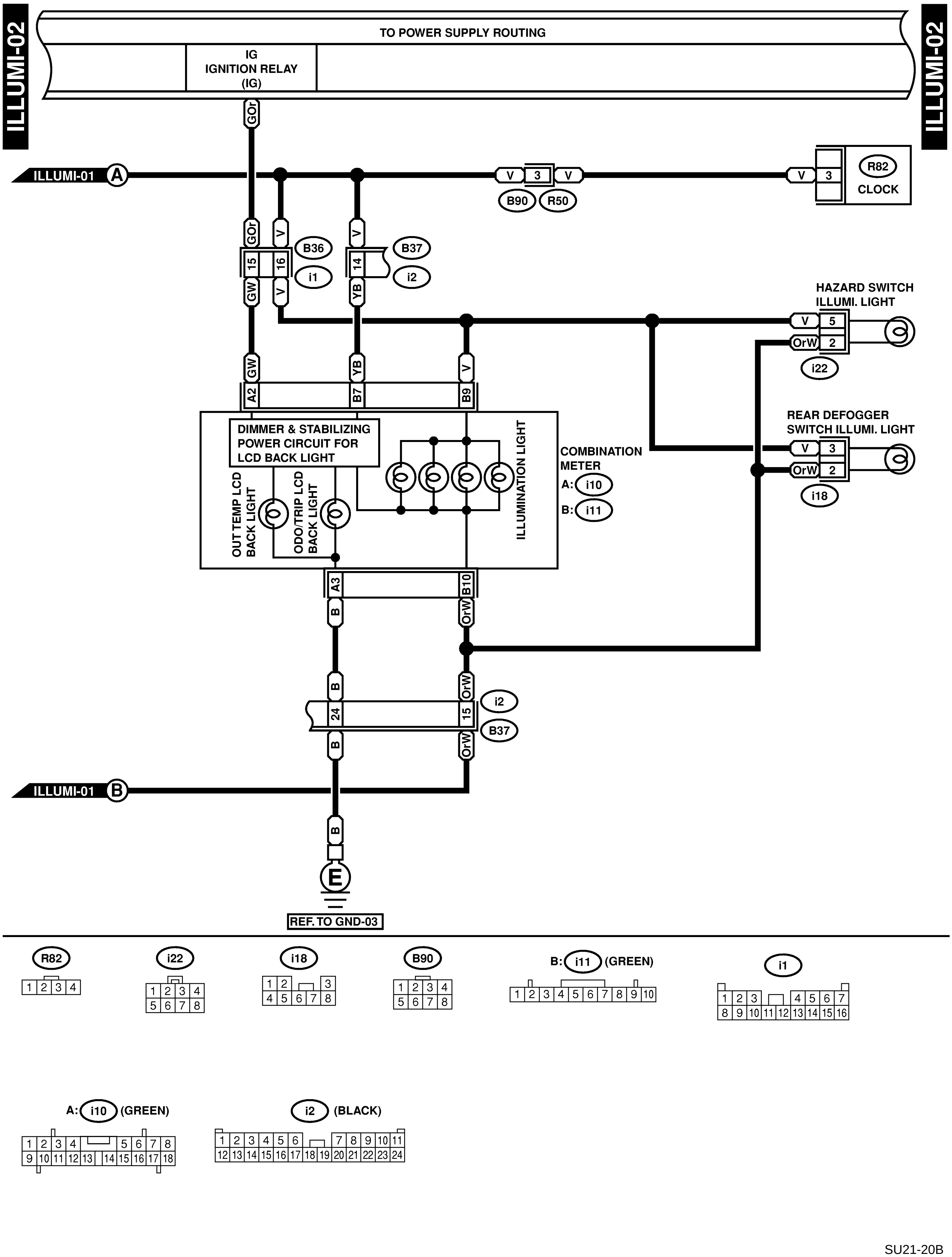
A: SCHEMATIC *S903487A21*

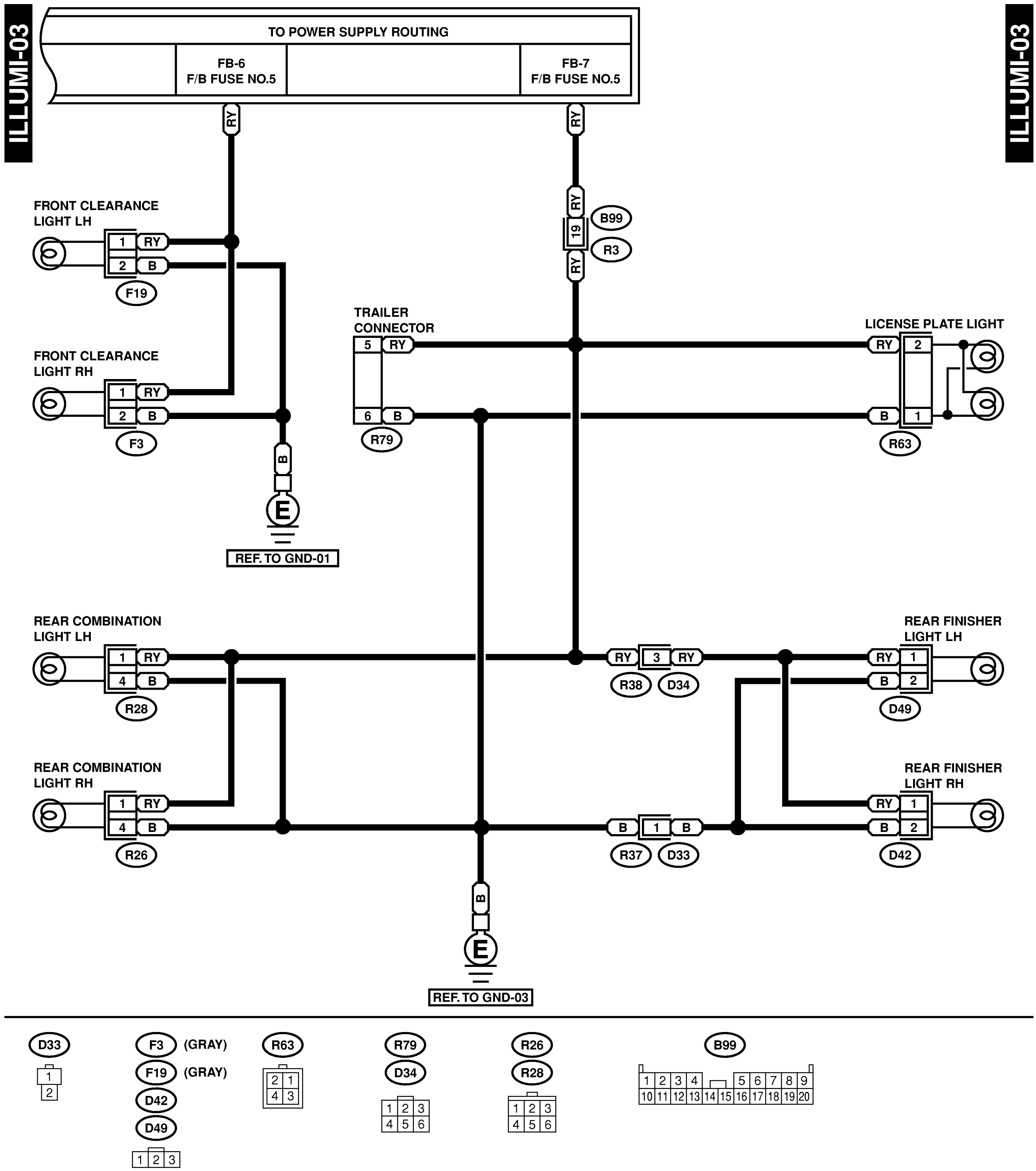


13. Clearance Light and Illumination Light System S903489

A: SCHEMATIC S903489A21




ILLUMI-02
TO POWER SUPPLY ROUTING
IG
IGNITION RELAY
(IG)
ILLUMI-01 A
B90 R50
R82
CLOCK
B36
i1
B37
i2
HAZARD SWITCH
ILLUMI. LIGHT
i22
REAR DEFOGGER
SWITCH ILLUMI. LIGHT
i18
DIMMER & STABILIZING
POWER CIRCUIT FOR
LCD BACK LIGHT
OUT TEMP LCD
BACK LIGHT
ODO/TRIP LCD
BACK LIGHT
ILLUMINATION LIGHT
COMBINATION
METER
A: i10
B: i11
ILLUMI-01 B
E
REF. TO GND-03
R82
i22
i18
B90
B: i11 (GREEN)
i1
A: i10 (GREEN)
i2 (BLACK)
SU21-20B

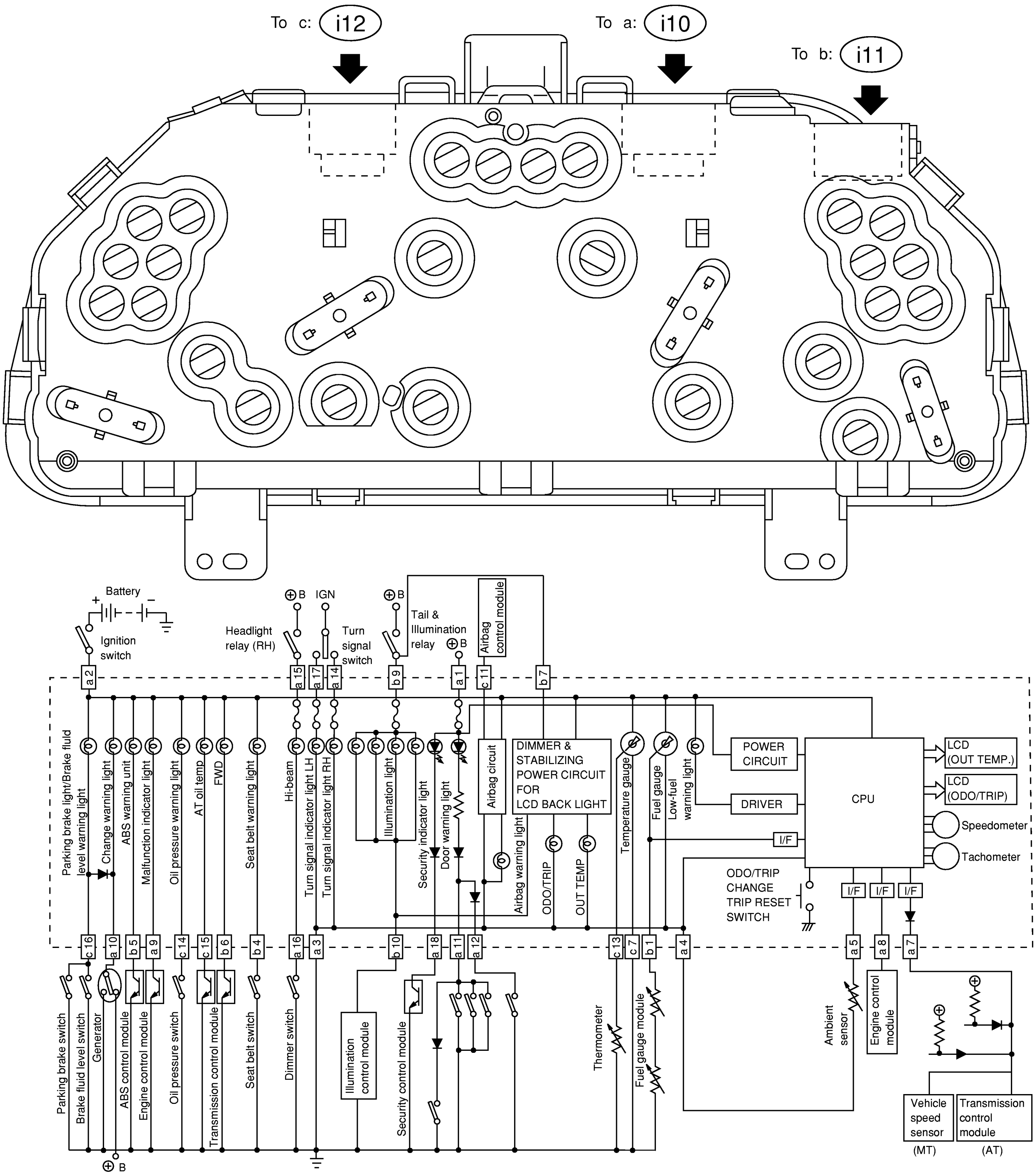

ILLUMI-03
TO POWER SUPPLY ROUTING
FB-6
F/B FUSE NO.5
FB-7
F/B FUSE NO.5
FRONT CLEARANCE LIGHT LH
FRONT CLEARANCE LIGHT RH
TRAILER CONNECTOR
LICENSE PLATE LIGHT
REF. TO GND-01
REAR COMBINATION LIGHT LH
REAR COMBINATION LIGHT RH
REAR FINISHER LIGHT LH
REAR FINISHER LIGHT RH
REF. TO GND-03
B99
R3
F19
F3
R79
R63
R28
R26
R38
D34
R37
D33
D49
D42
(GRAY)
(GRAY)

SU21-20C

MEMO:

14. Combination Meter *S903488*

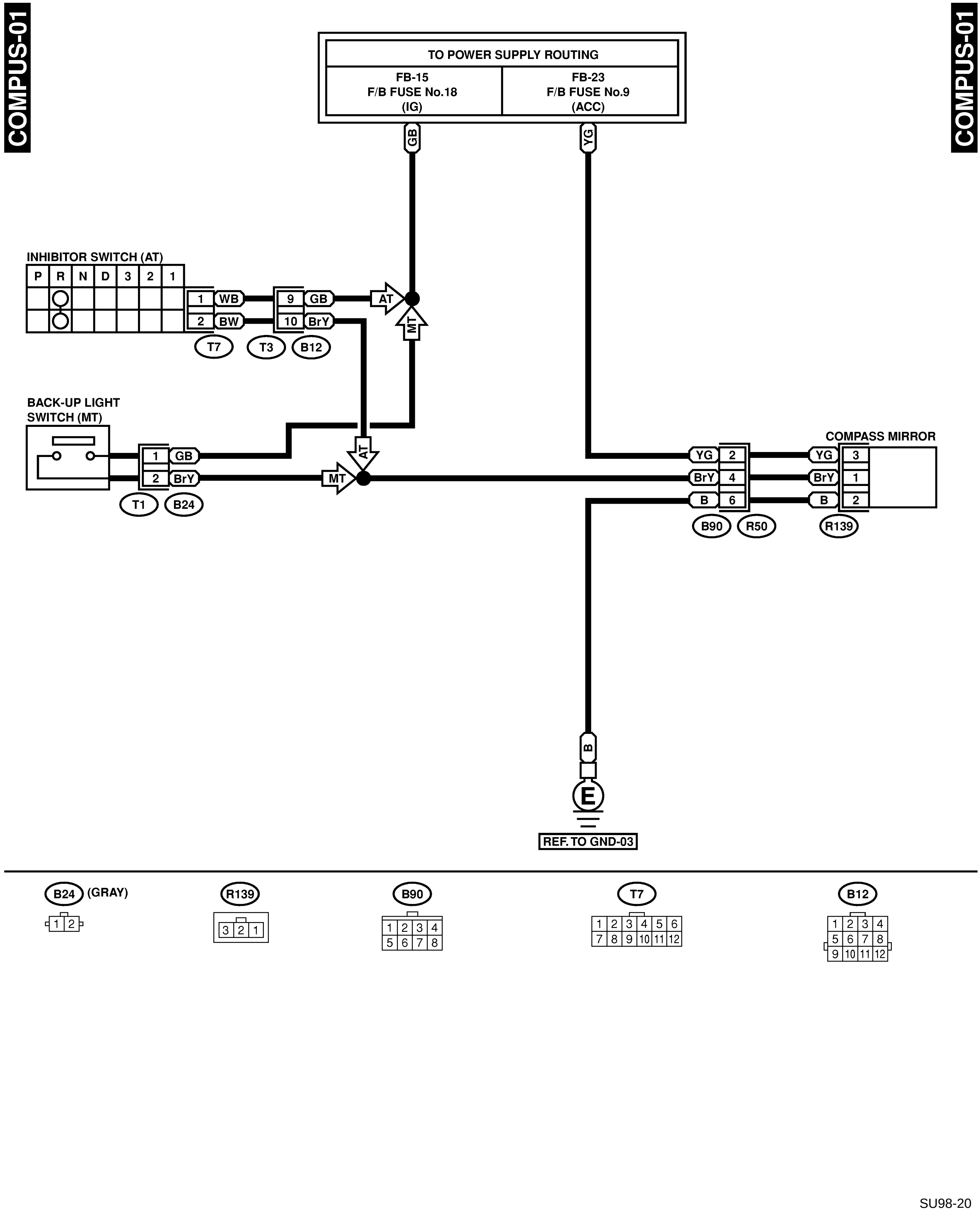
A: SCHEMATIC *S903488A21*



SU64-20

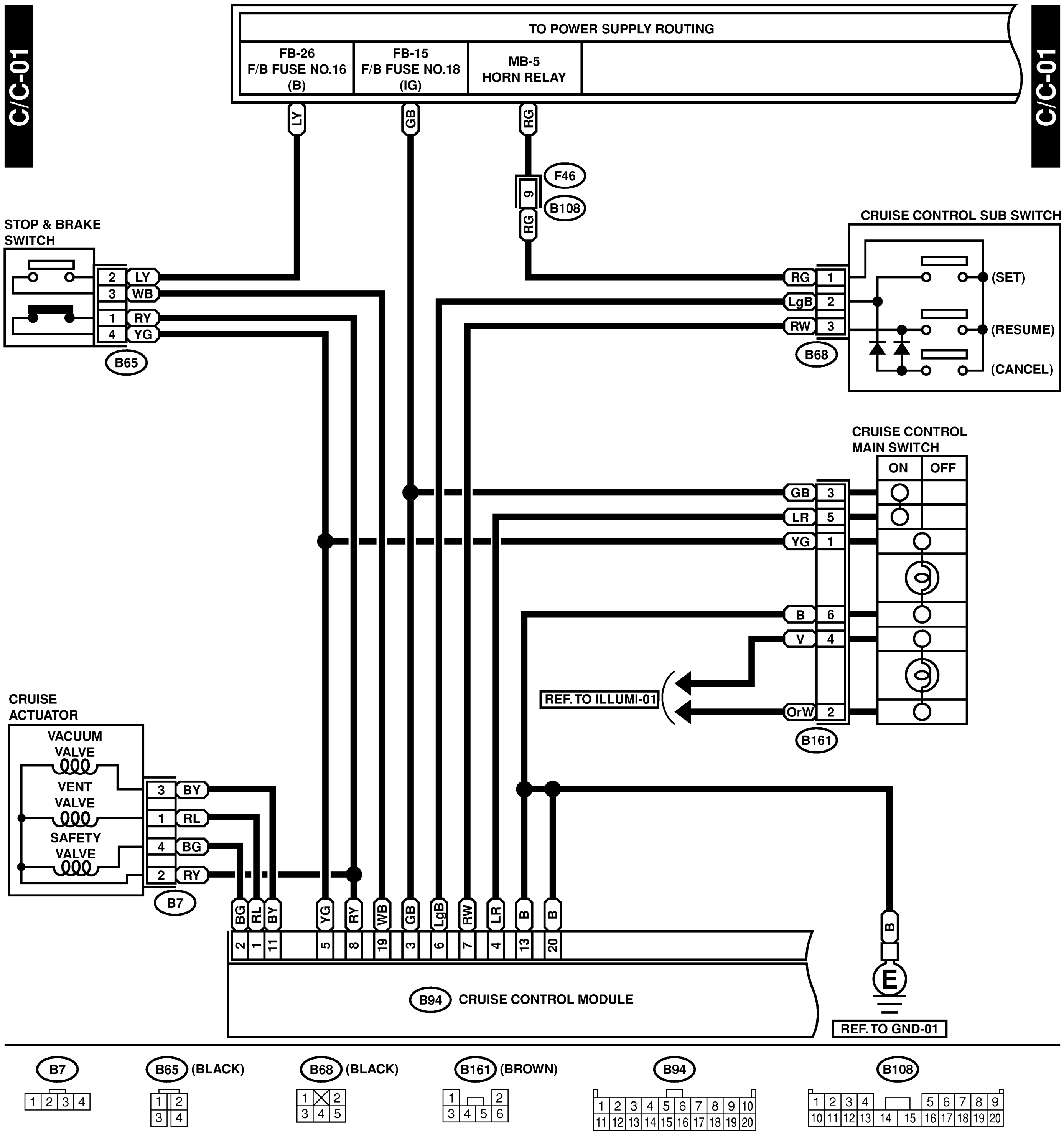
15. Compass Mirror System *S903796*

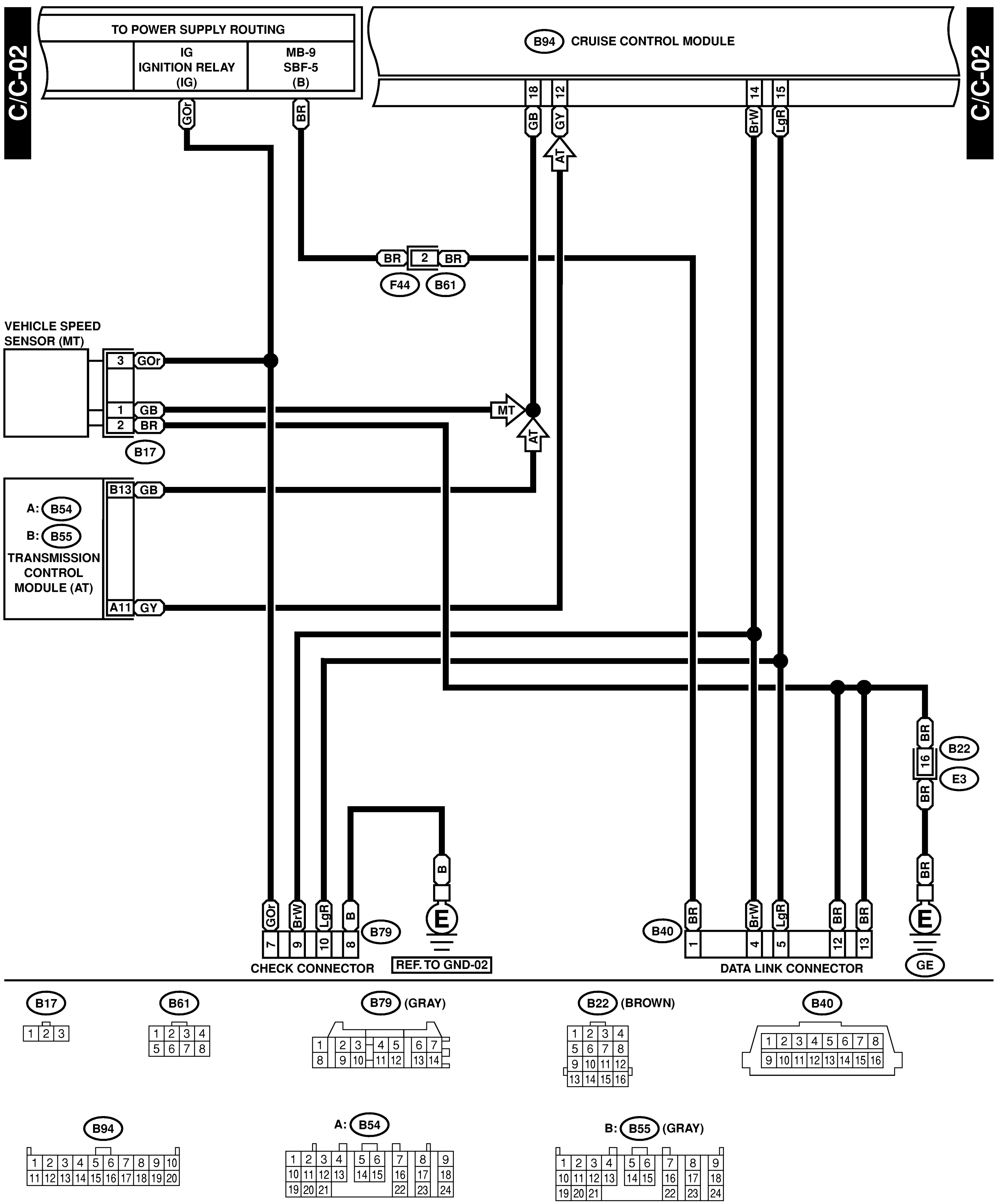
A: SCHEMATIC *S903796A21*



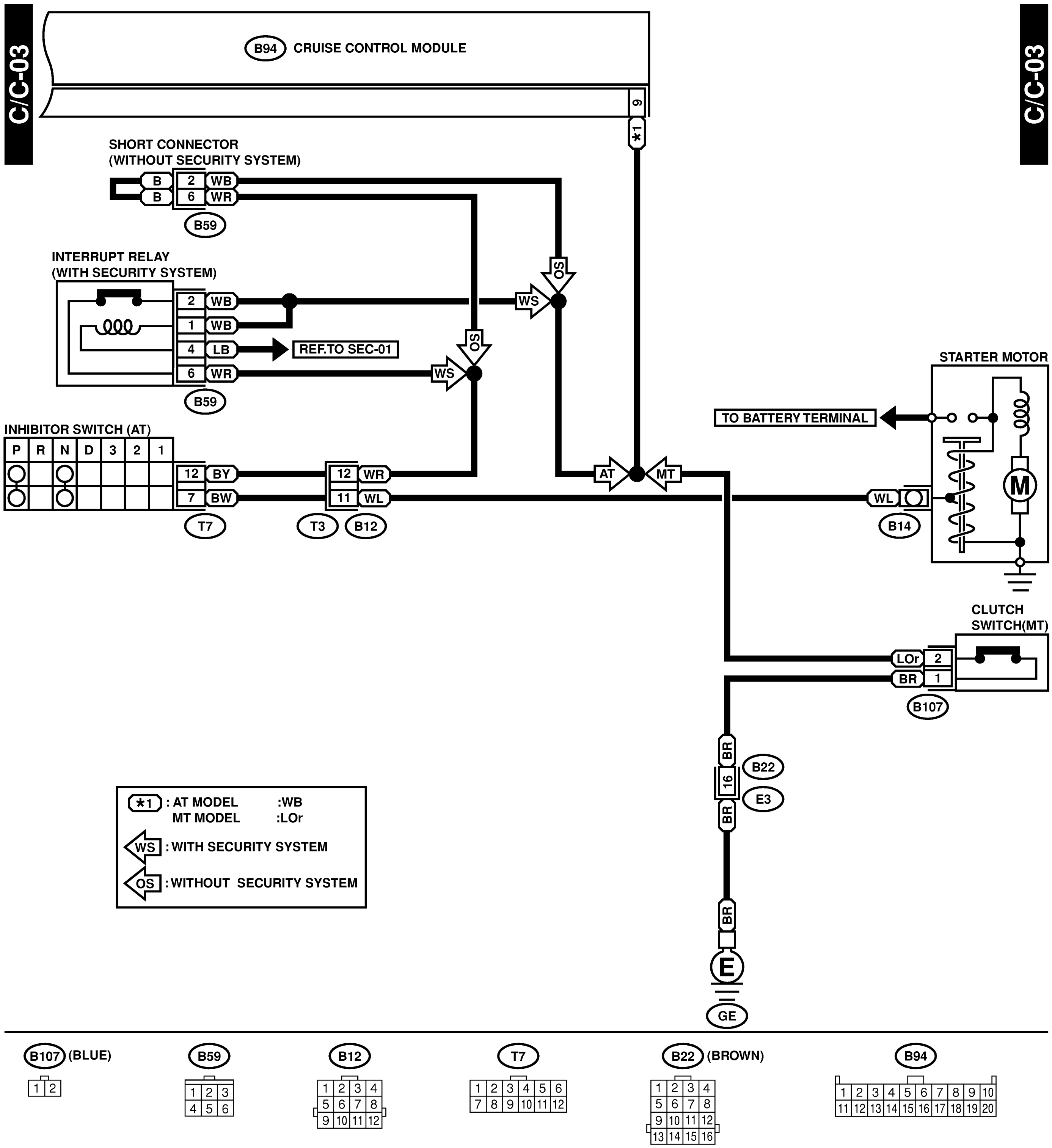
16. Cruise Control System *S903495*

A: SCHEMATIC *S903495A21*




C/C-02
TO POWER SUPPLY ROUTING
IG
IGNITION RELAY
(IG)
MB-9
SBF-5
(B)
B94 CRUISE CONTROL MODULE
VEHICLE SPEED SENSOR (MT)
B17
A: B54
B: B55
TRANSMISSION CONTROL MODULE (AT)
F44
B61
B22
E3
B79
CHECK CONNECTOR
REF. TO GND-02
B40
DATA LINK CONNECTOR
GE
B17
B61
B79 (GRAY)
B22 (BROWN)
B40
B94
A: B54
B: B55 (GRAY)

SU71-20B


C/C-03
C/C-03
B94 CRUISE CONTROL MODULE
9
*1
SHORT CONNECTOR
(WITHOUT SECURITY SYSTEM)
B 2 WB
B 6 WR
B59
INTERRUPT RELAY
(WITH SECURITY SYSTEM)
2 WB
1 WB
4 LB
REF.TO SEC-01
6 WR
B59
OS
WS
OS
WS
INHIBITOR SWITCH (AT)
P R N D 3 2 1
12 BY
7 BW
T7
12 WR
11 WL
T3 B12
AT
MT
STARTER MOTOR
TO BATTERY TERMINAL
M
WL
B14
CLUTCH
SWITCH(MT)
LOr 2
BR 1
B107
BR
16
BR
B22
E3
BR
E
GE
*1 : AT MODEL :WB
MT MODEL :LOr
WS : WITH SECURITY SYSTEM
OS : WITHOUT SECURITY SYSTEM
B107 (BLUE)
B59
B12
T7
B22 (BROWN)
B94

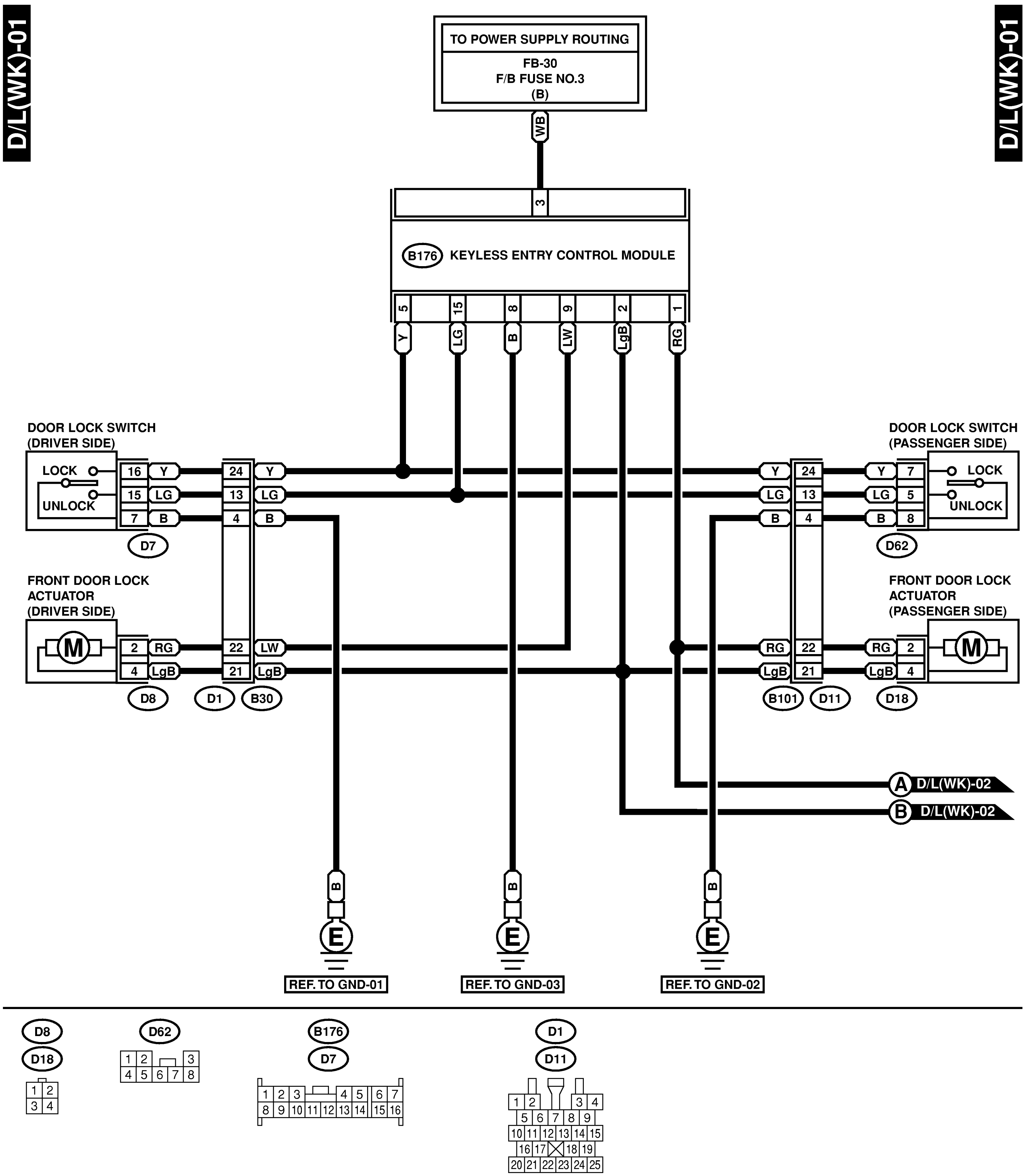
SU71-20C

MEMO:

17. Door Lock System S903490

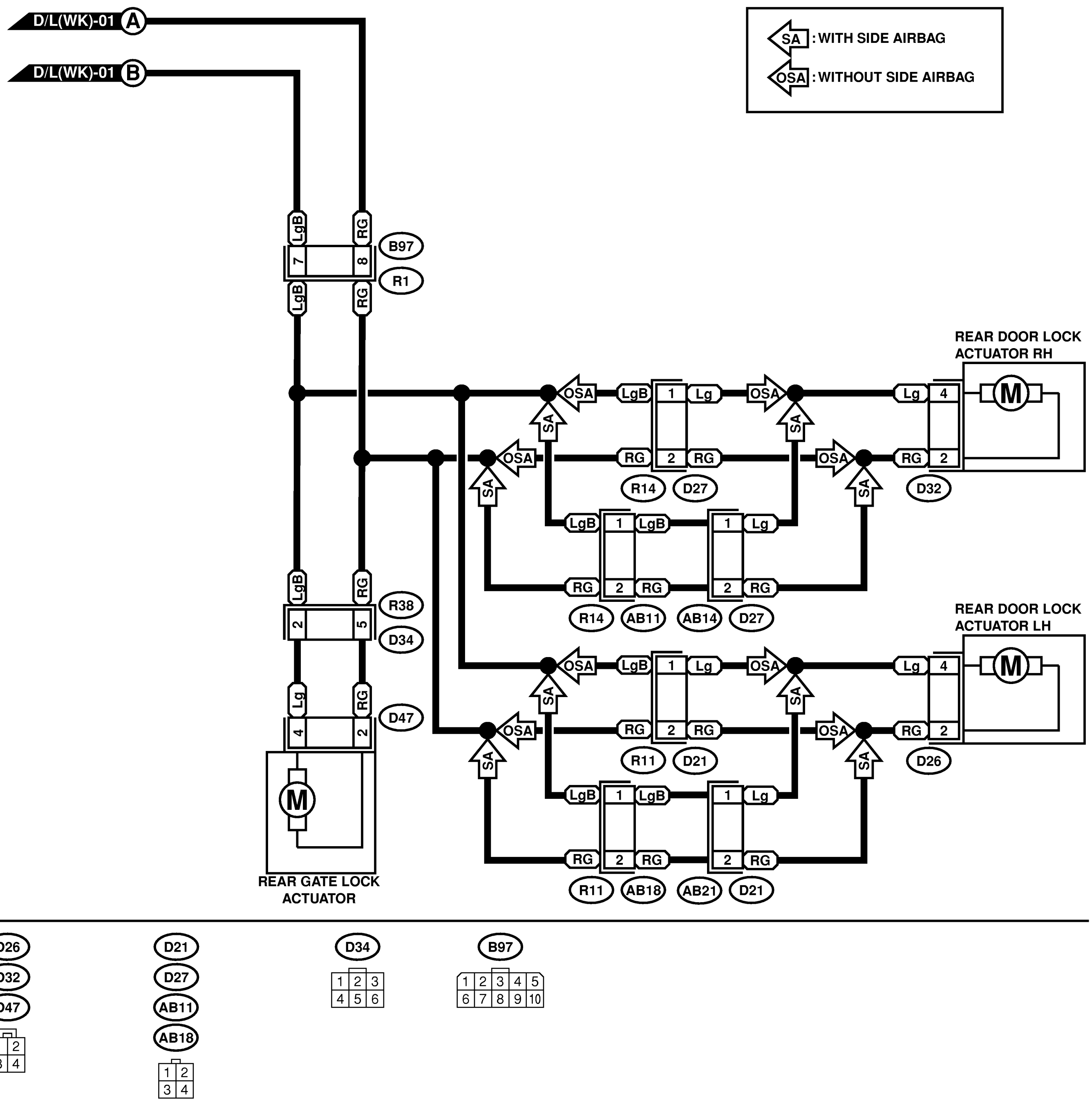
A: SCHEMATIC S903490A21

1. WITH KEYLESS ENTRY MODEL S903490A2104



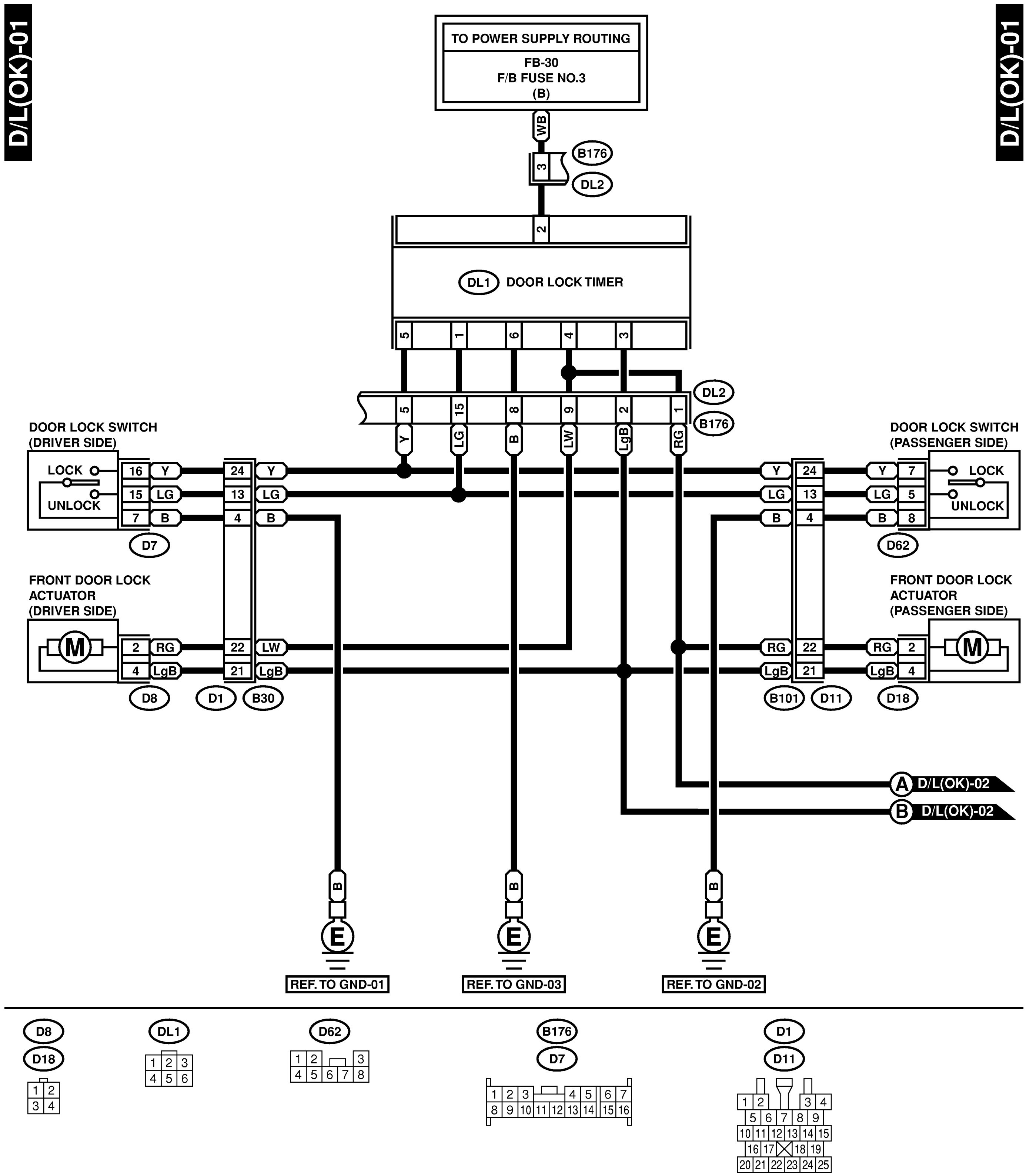
SU73-21A

D/L(WK)-02

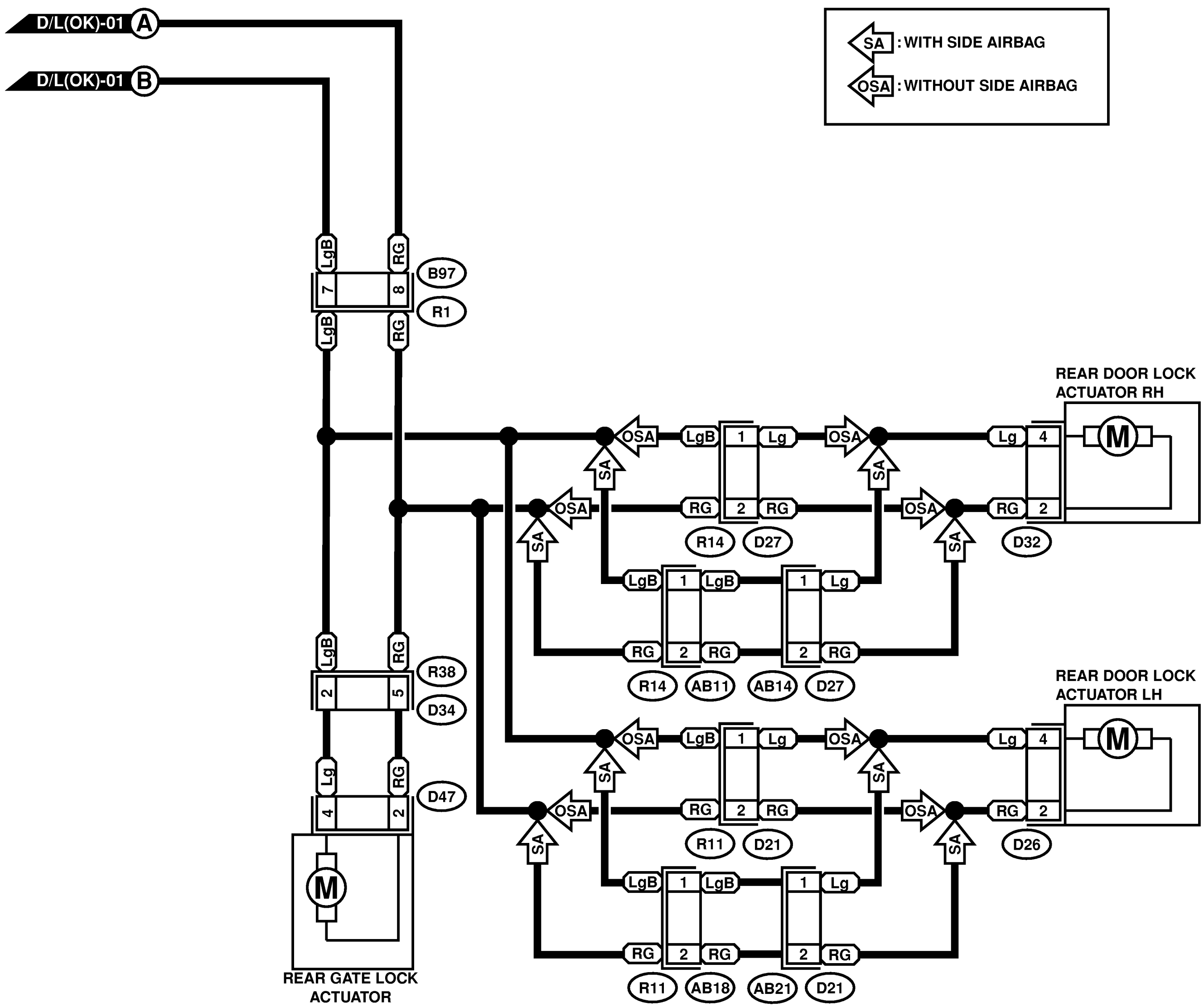


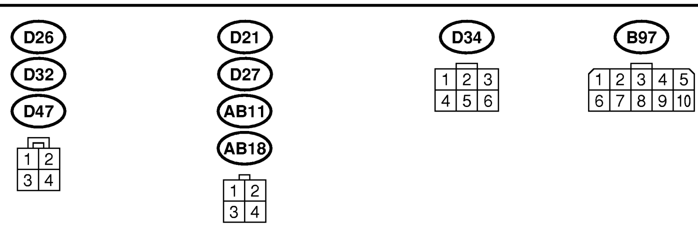
SU73-21B

2. WITHOUT KEYLESS ENTRY MODEL *S903490A2103*



D/L(OK)-02

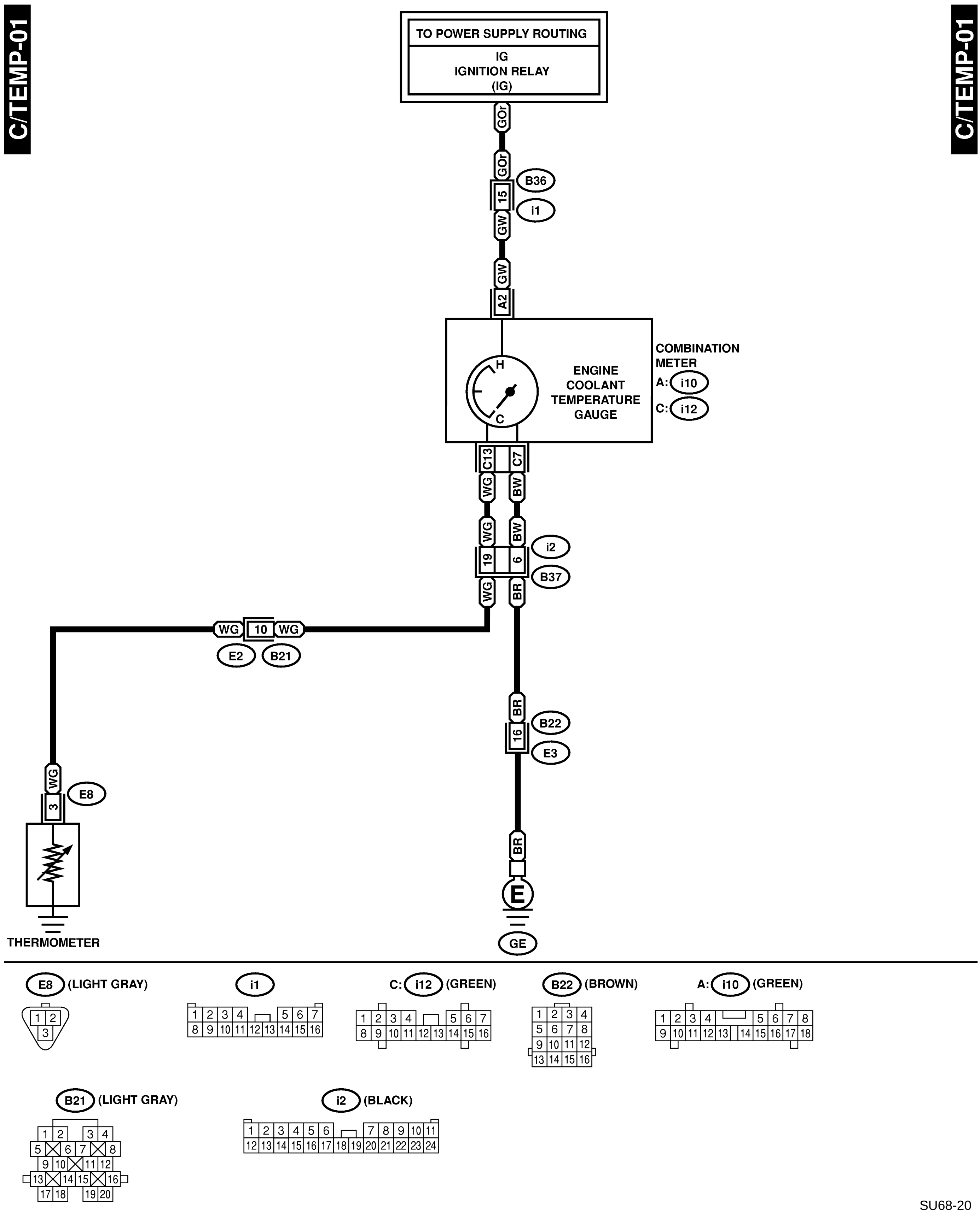




SU73-20B

18. Engine Coolant Temperature Gauge System *S903663*

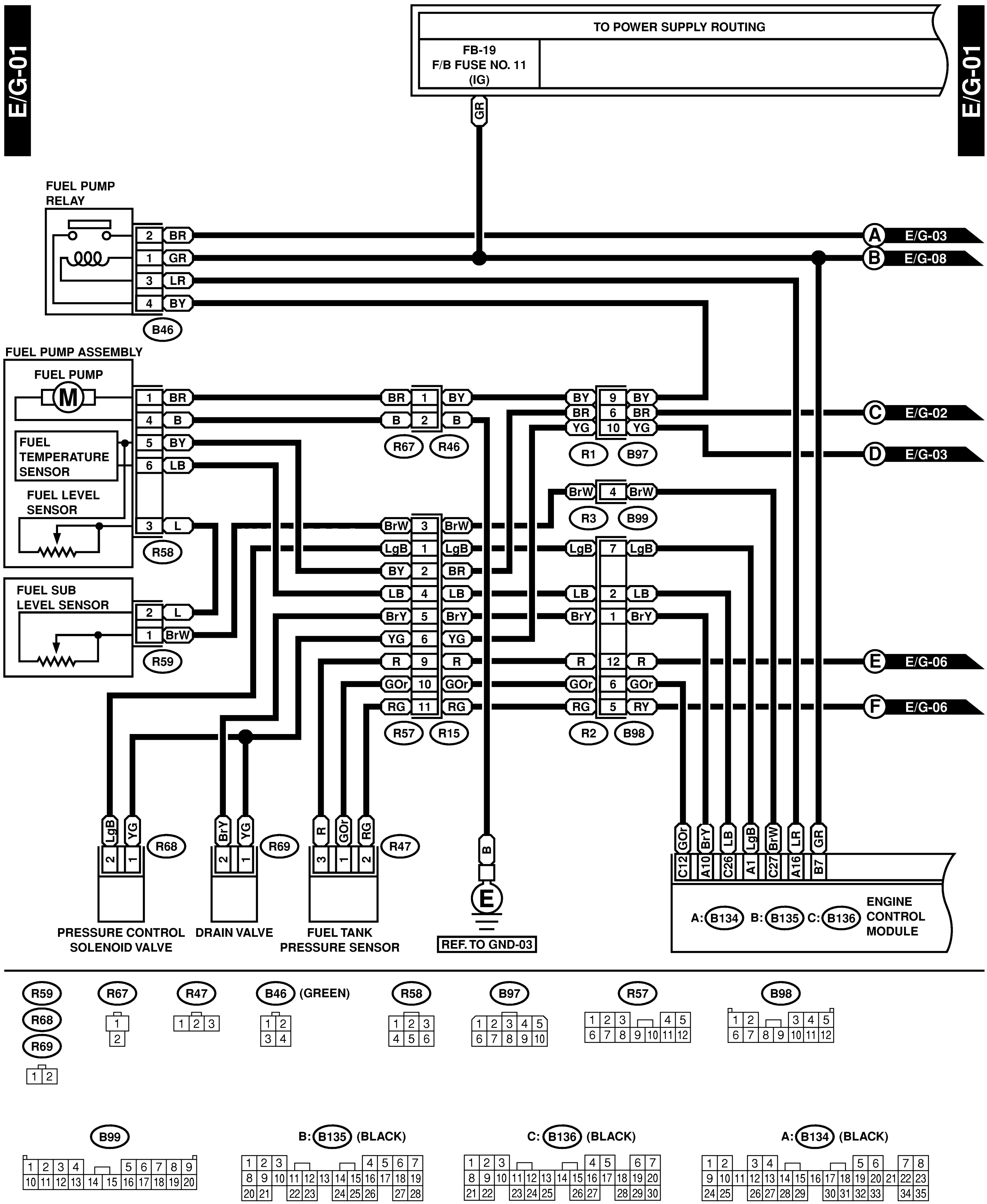
A: SCHEMATIC *S903663A21*



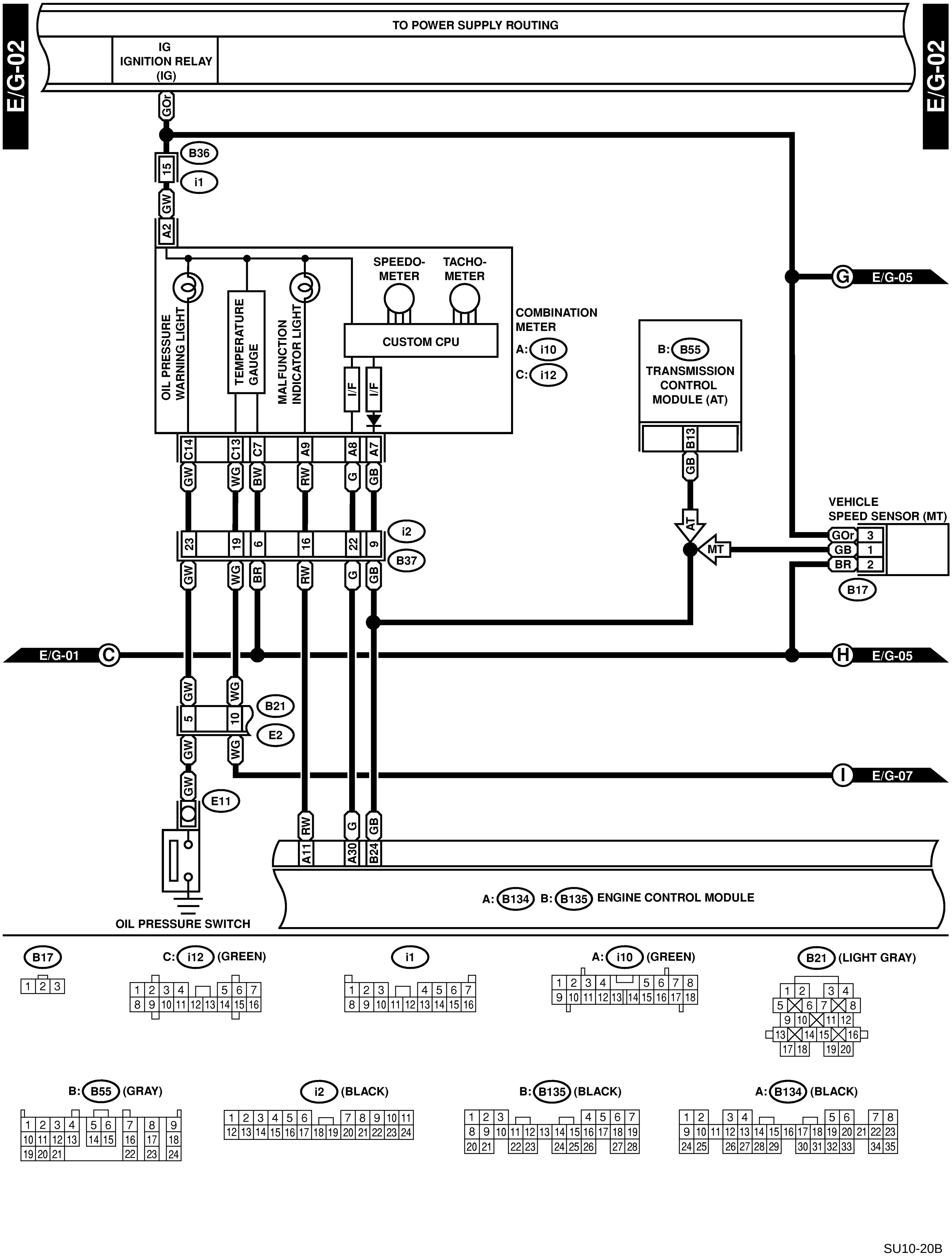
MEMO:

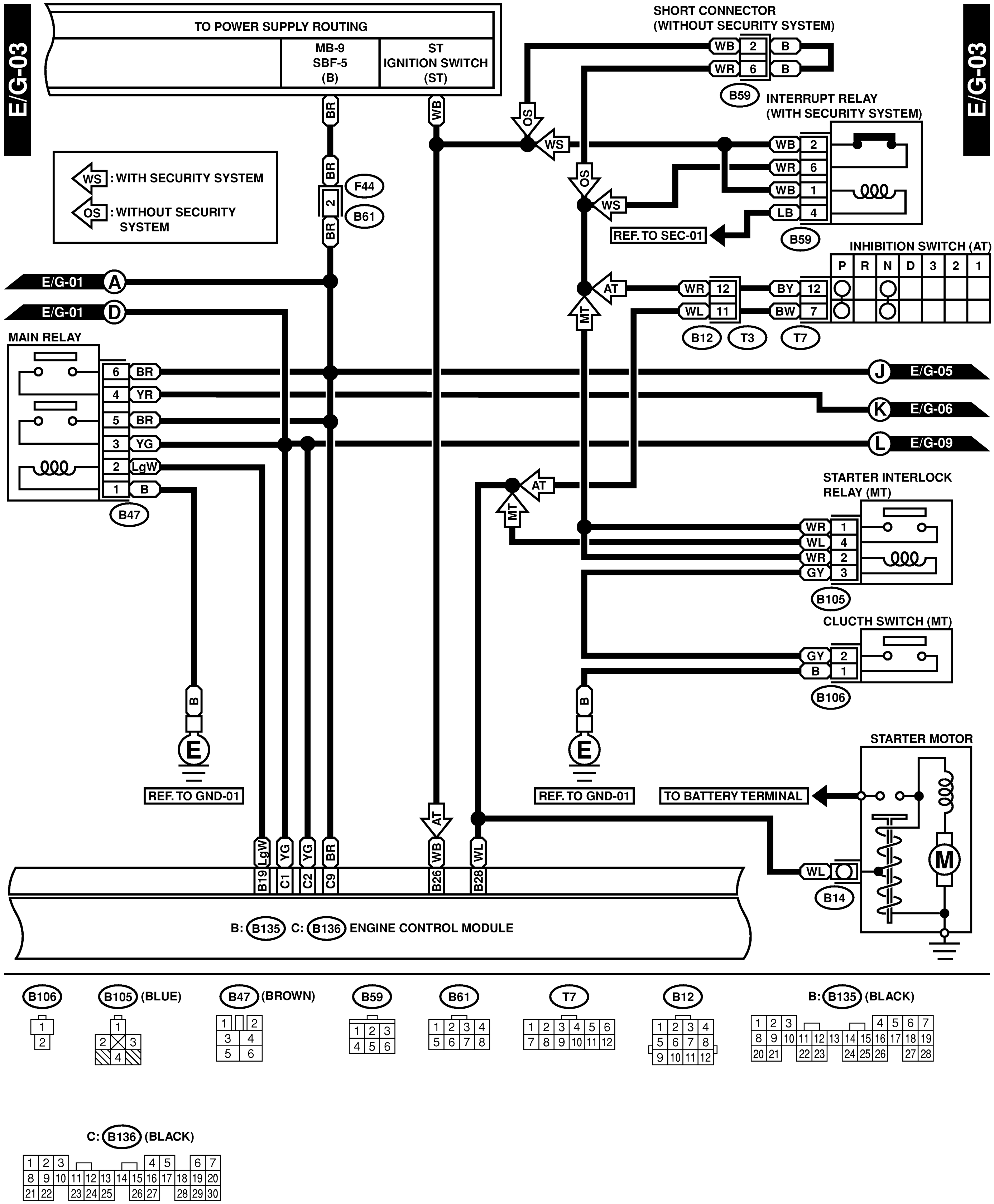
19. Engine Electrical System *S903482*

A: SCHEMATIC *S903482A21*

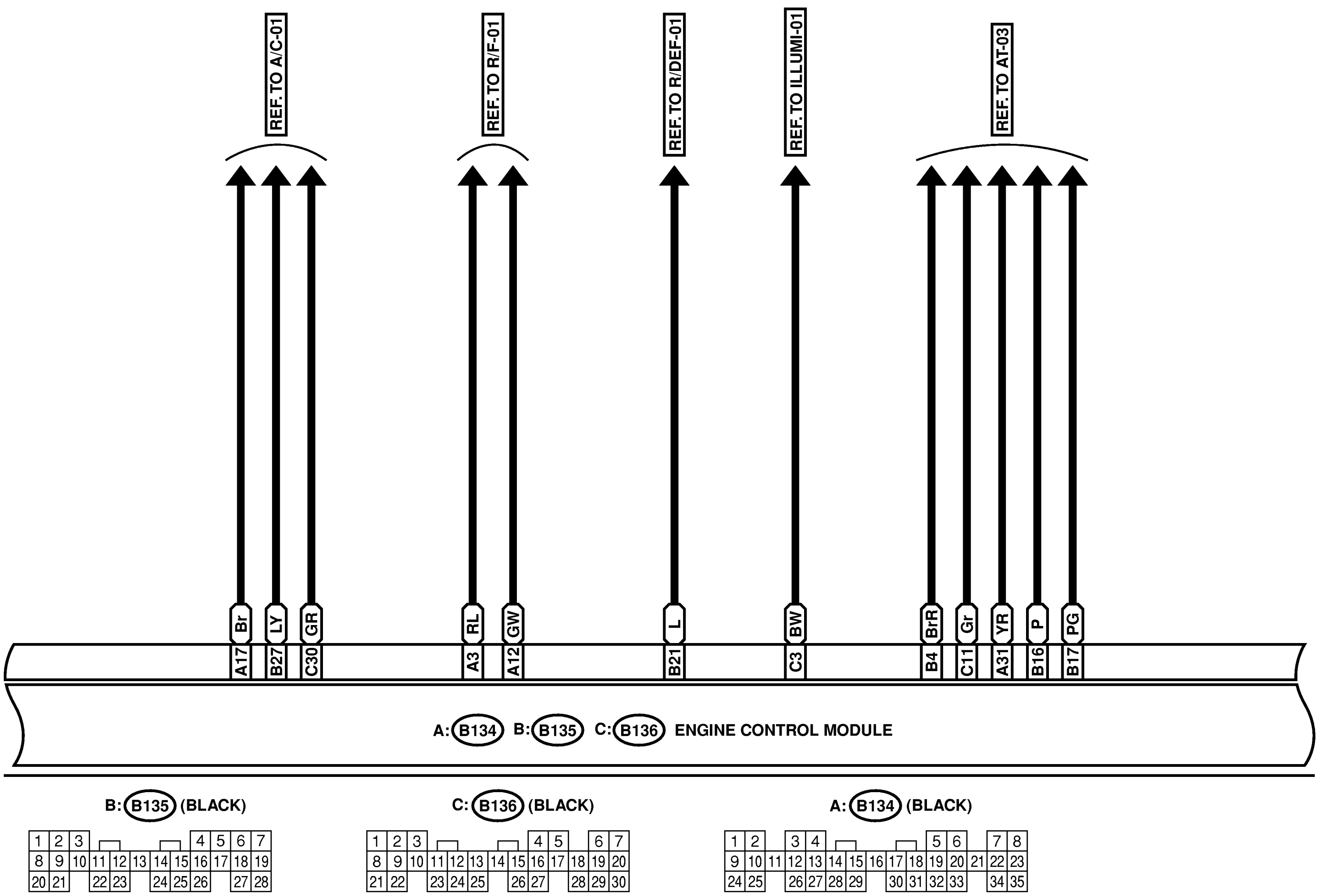


SU10-20A

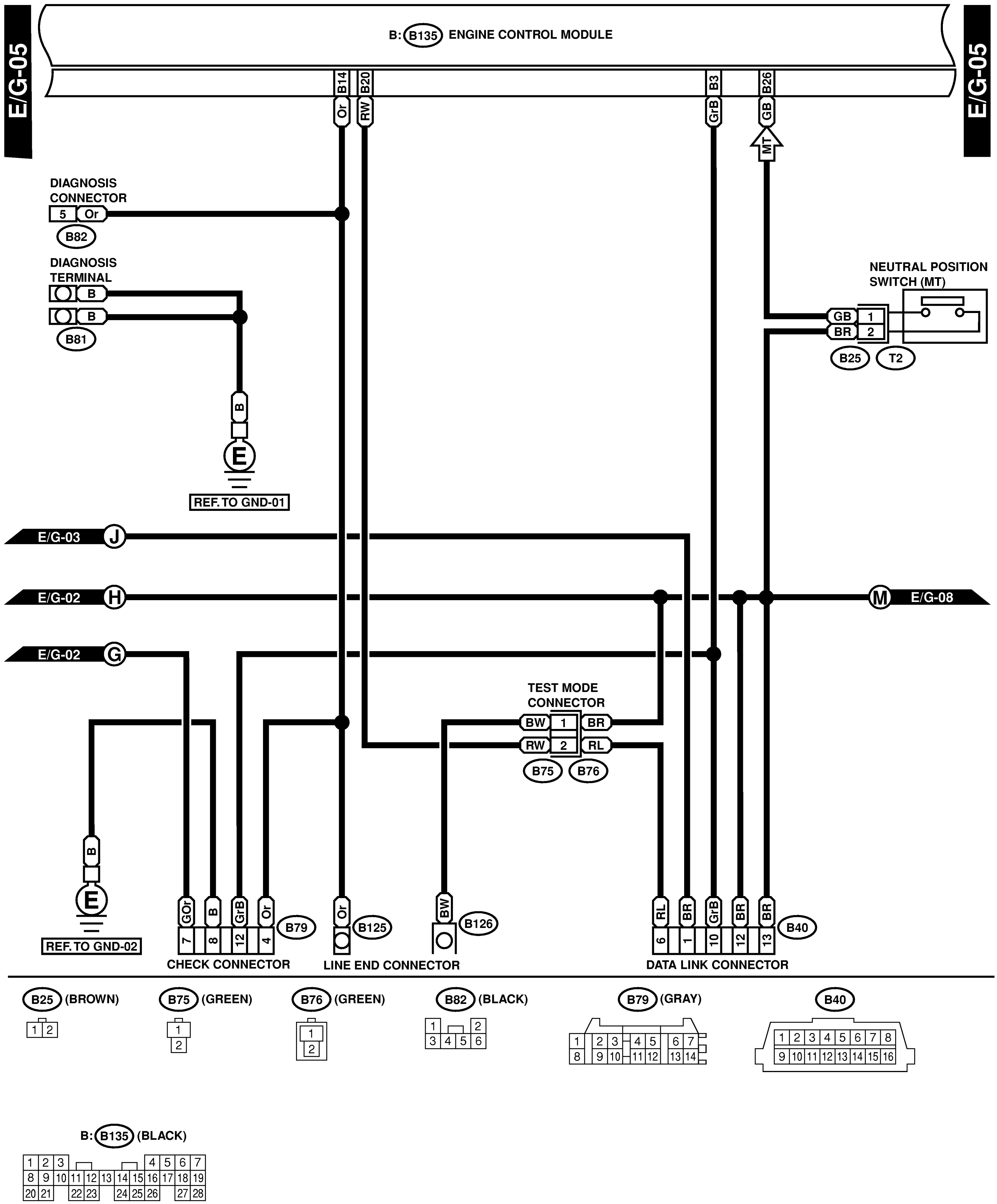

E/G-02
TO POWER SUPPLY ROUTING
IG
IGNITION RELAY
(IG)
GOr
B36
15
i1
GW
A2
SPEEDO-
METER
TACHO-
METER
COMBINATION
METER
A: i10
C: i12
OIL PRESSURE
WARNING LIGHT
TEMPERATURE
GAUGE
MALFUNCTION
INDICATOR LIGHT
CUSTOM CPU
I/F
I/F
C14 C13 C7 A9 A8 A7
GW WG BW RW G GB
i2
23 19 6 16 22 9
B37
GW WG BR RW G GB
B: B55
TRANSMISSION
CONTROL
MODULE (AT)
B13
GB
AT
MT
VEHICLE
SPEED SENSOR (MT)
GOr 3
GB 1
BR 2
B17
G E/G-05
E/G-01 C
H E/G-05
B21
5 10
E2
GW WG
I E/G-07
E11
RW G GB
A11 A30 B24
A: B134 B: B135 ENGINE CONTROL MODULE
OIL PRESSURE SWITCH
B17
1 2 3
C: i12 (GREEN)
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16
i1
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16
A: i10 (GREEN)
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16 17 18
B21 (LIGHT GRAY)
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
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
i2 (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
B: B135 (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
A: B134 (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
SU10-20B


E/G-03
TO POWER SUPPLY ROUTING
MB-9
SBF-5
(B)
ST
IGNITION SWITCH
(ST)
SHORT CONNECTOR
(WITHOUT SECURITY SYSTEM)
INTERRUPT RELAY
(WITH SECURITY SYSTEM)
WS : WITH SECURITY SYSTEM
OS : WITHOUT SECURITY SYSTEM
REF. TO SEC-01
INHIBITION SWITCH (AT)
P R N D 3 2 1
E/G-01
E/G-01
MAIN RELAY
E/G-05
E/G-06
E/G-09
STARTER INTERLOCK
RELAY (MT)
CLUCTH SWITCH (MT)
STARTER MOTOR
REF. TO GND-01
REF. TO GND-01
TO BATTERY TERMINAL
B: B135 C: B136 ENGINE CONTROL MODULE
B106
B105 (BLUE)
B47 (BROWN)
B59
B61
T7
B12
B: B135 (BLACK)
C: B136 (BLACK)
SU10-20C

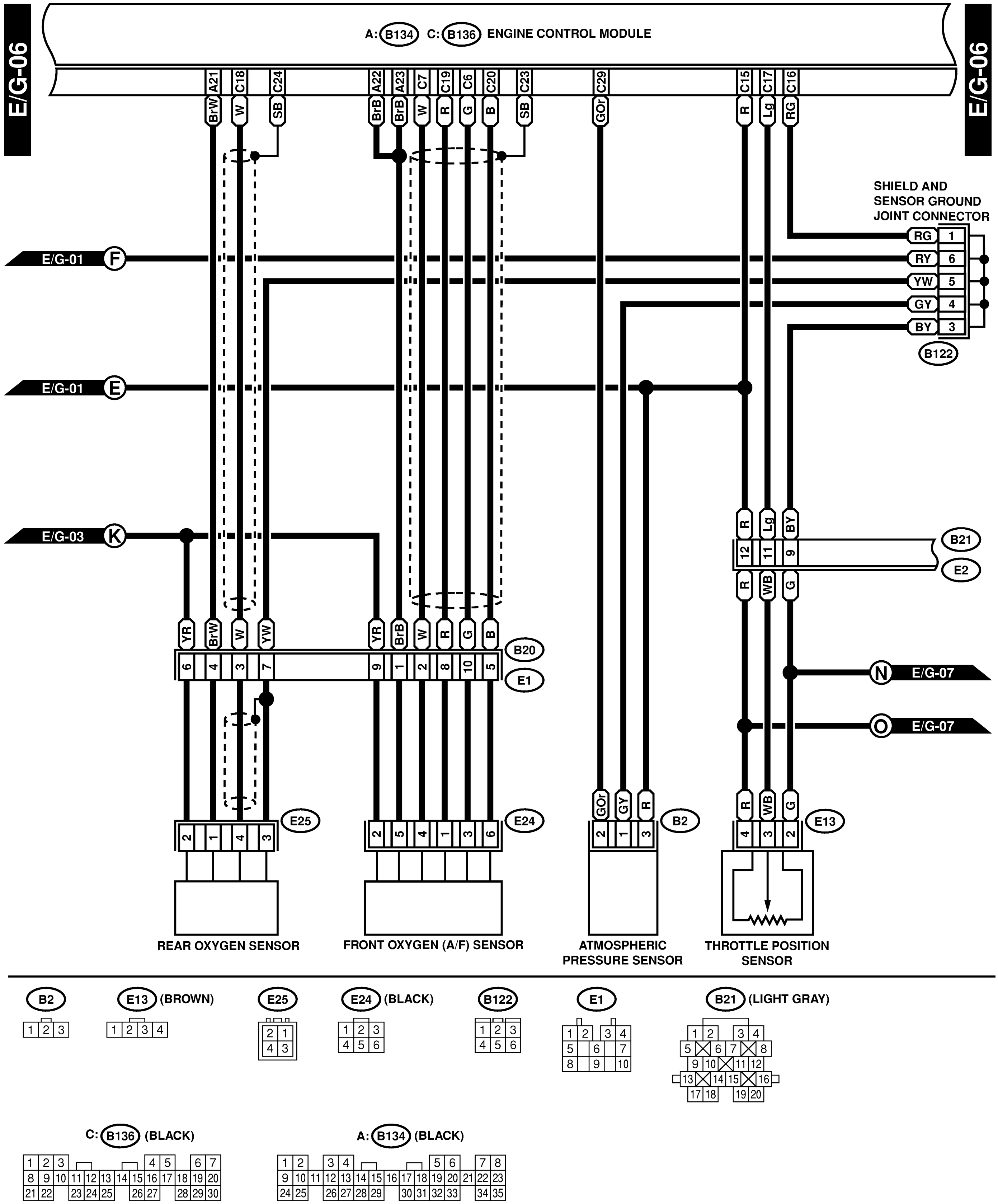
E/G-04



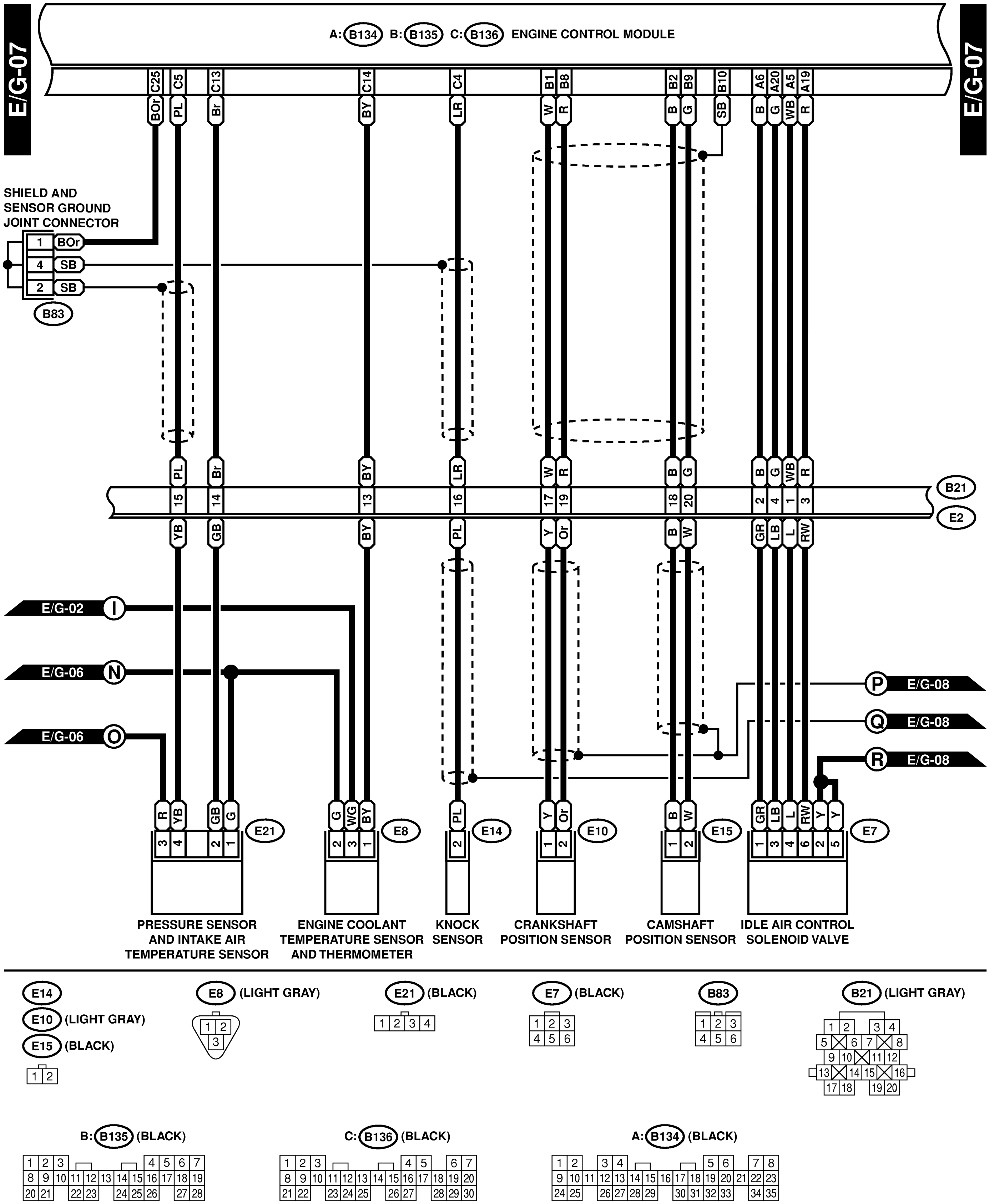
SU10-20D


E/G-05
B: B135 ENGINE CONTROL MODULE
E/G-05
B14
B20
B3
B26
Or
RW
GrB
GB
MT
DIAGNOSIS CONNECTOR
5 Or
B82
DIAGNOSIS TERMINAL
B
B
B81
B
E
REF. TO GND-01
NEUTRAL POSITION SWITCH (MT)
GB 1
BR 2
B25
T2
E/G-03
J
E/G-02
H
M
E/G-08
E/G-02
G
TEST MODE CONNECTOR
BW 1 BR
RW 2 RL
B75
B76
B
E
REF. TO GND-02
GOr B GrB Or
7 8 12 4
B79
CHECK CONNECTOR
Or
B125
LINE END CONNECTOR
BW
B126
RL BR GrB BR BR
6 1 10 12 13
B40
DATA LINK CONNECTOR
B25 (BROWN)
1 2
B75 (GREEN)
1 2
B76 (GREEN)
1 2
B82 (BLACK)
1 2 3 4 5 6
B79 (GRAY)
1 2 3 4 5 6 7 8 9 10 11 12 13 14
B40
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
B: B135 (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

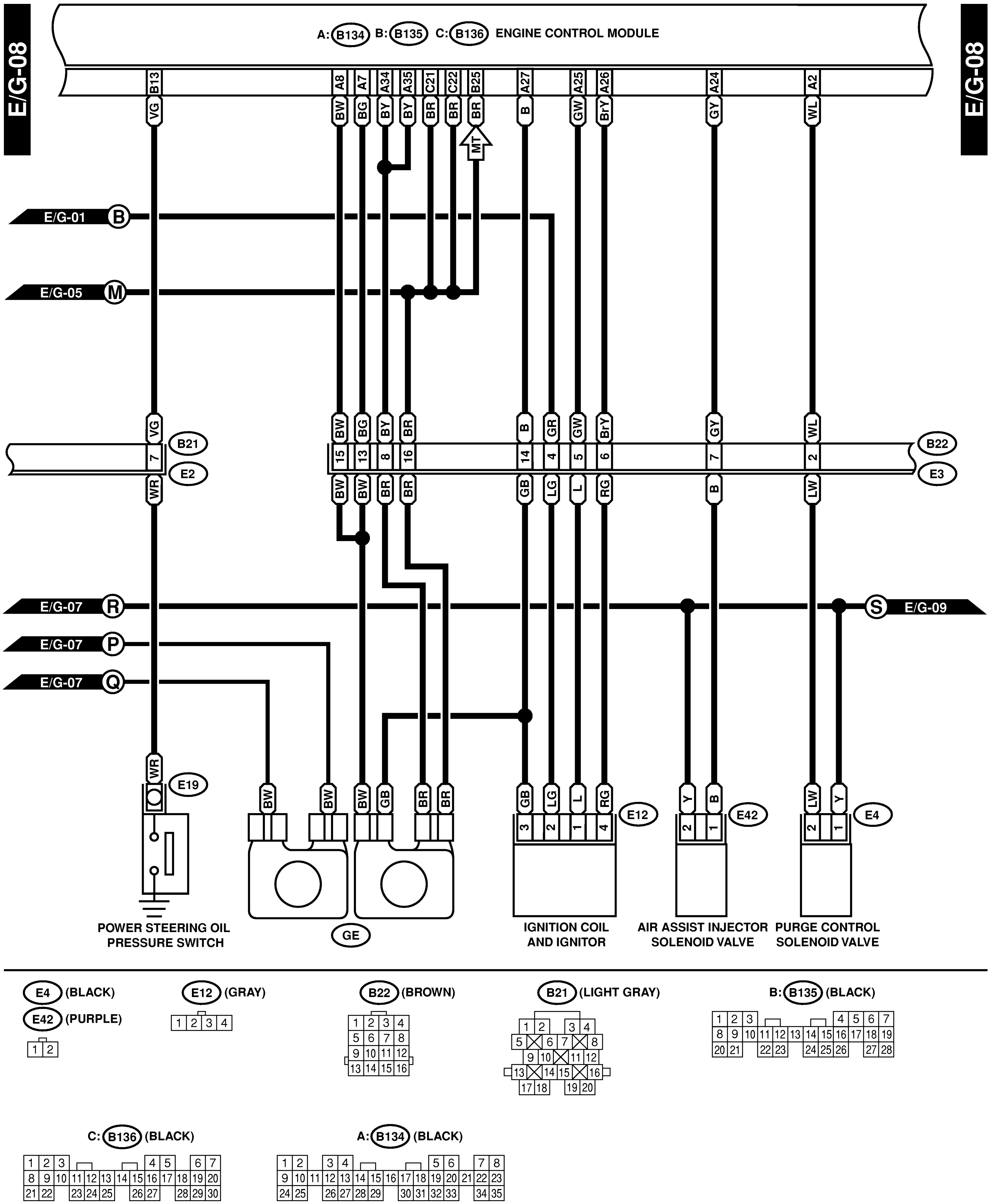
SU10-20E


E/G-06
A: B134 C: B136 ENGINE CONTROL MODULE
A21 C18 C24 A22 A23 C7 C19 C6 C20 C23 C29 C15 C17 C16
BrW W SB BrB BrB W R G B SB GOr R Lg RG
SHIELD AND
SENSOR GROUND
JOINT CONNECTOR
RG 1
RY 6
YW 5
GY 4
BY 3
B122
E/G-01 F
E/G-01 E
E/G-03 K
R Lg BY
12 11 9
B21
E2
R WB G
YR BrW W YW YR BrB W R G B
6 4 3 7 9 1 2 8 10 5
B20
E1
N E/G-07
O E/G-07
GOr GY R
R WB G
E25
2 1 4 3
E24
2 5 4 1 3 6
B2
2 1 3
E13
4 3 2
REAR OXYGEN SENSOR
FRONT OXYGEN (A/F) SENSOR
ATMOSPHERIC
PRESSURE SENSOR
THROTTLE POSITION
SENSOR
B2
1 2 3
E13 (BROWN)
1 2 3 4
E25
2 1
4 3
E24 (BLACK)
1 2 3
4 5 6
B122
1 2 3
4 5 6
E1
1 2 3 4
5 6 7
8 9 10
B21 (LIGHT GRAY)
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
C: B136 (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
A: B134 (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

SU10-20F

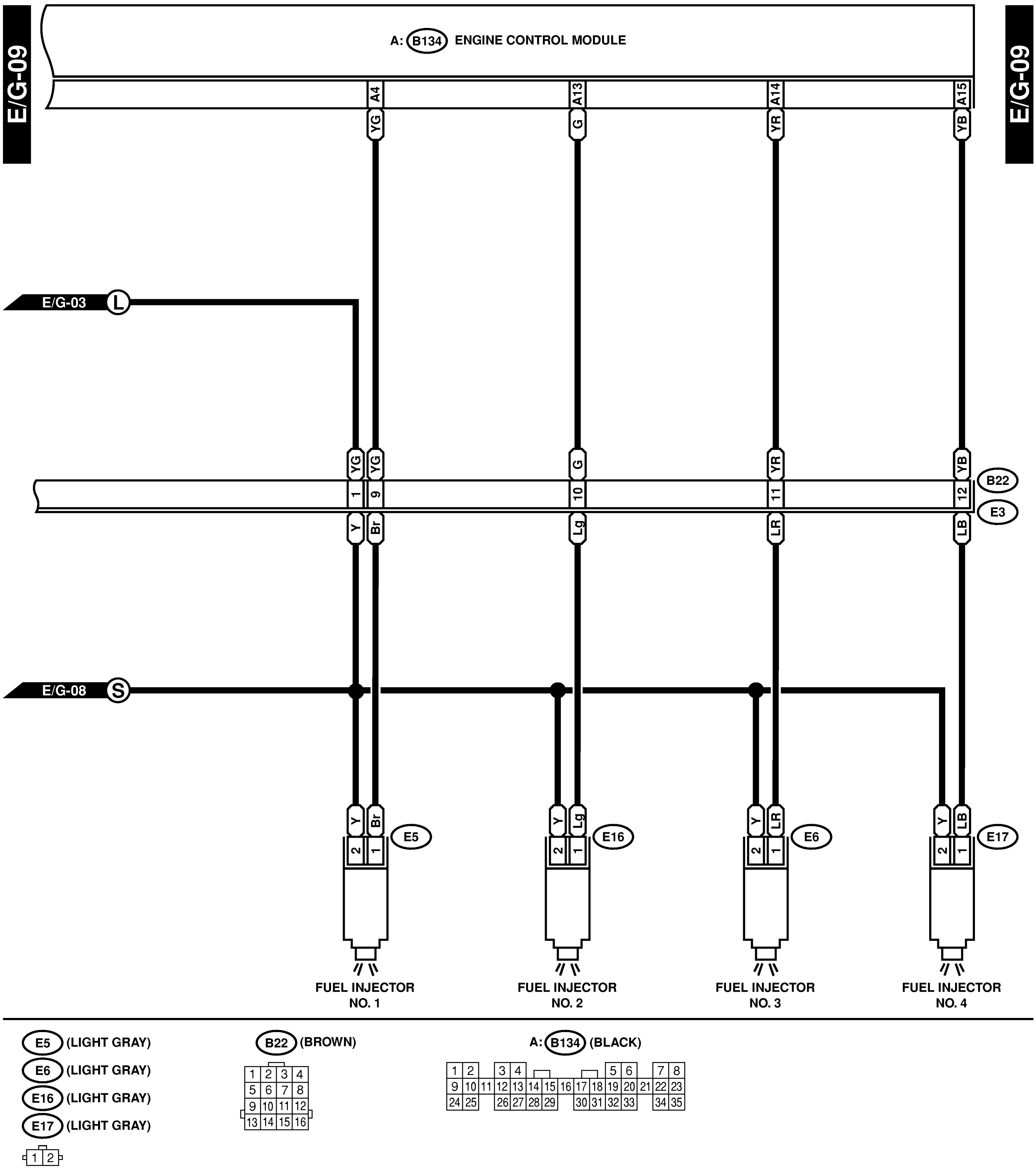

E/G-07
A: B134 B: B135 C: B136 ENGINE CONTROL MODULE
SHIELD AND
SENSOR GROUND
JOINT CONNECTOR
B83
B21
E2
E/G-02
E/G-06
E/G-08
E21
E8
E14
E10
E15
E7
PRESSURE SENSOR
AND INTAKE AIR
TEMPERATURE SENSOR
ENGINE COOLANT
TEMPERATURE SENSOR
AND THERMOMETER
KNOCK
SENSOR
CRANKSHAFT
POSITION SENSOR
CAMSHAFT
POSITION SENSOR
IDLE AIR CONTROL
SOLENOID VALVE
E14
E10 (LIGHT GRAY)
E15 (BLACK)
E8 (LIGHT GRAY)
E21 (BLACK)
E7 (BLACK)
B83
B21 (LIGHT GRAY)
B: B135 (BLACK)
C: B136 (BLACK)
A: B134 (BLACK)

SU10-20G



E/G-08
A: B134 B: B135 C: B136 ENGINE CONTROL MODULE
E/G-01
E/G-05
E/G-07
E/G-09
MT
B21
E2
B22
E3
E19
E12
E42
E4
GE
POWER STEERING OIL PRESSURE SWITCH
IGNITION COIL AND IGNITOR
AIR ASSIST INJECTOR SOLENOID VALVE
PURGE CONTROL SOLENOID VALVE
E4 (BLACK)
E42 (PURPLE)
E12 (GRAY)
B22 (BROWN)
B21 (LIGHT GRAY)
B: B135 (BLACK)
C: B136 (BLACK)
A: B134 (BLACK)

SU10-20H

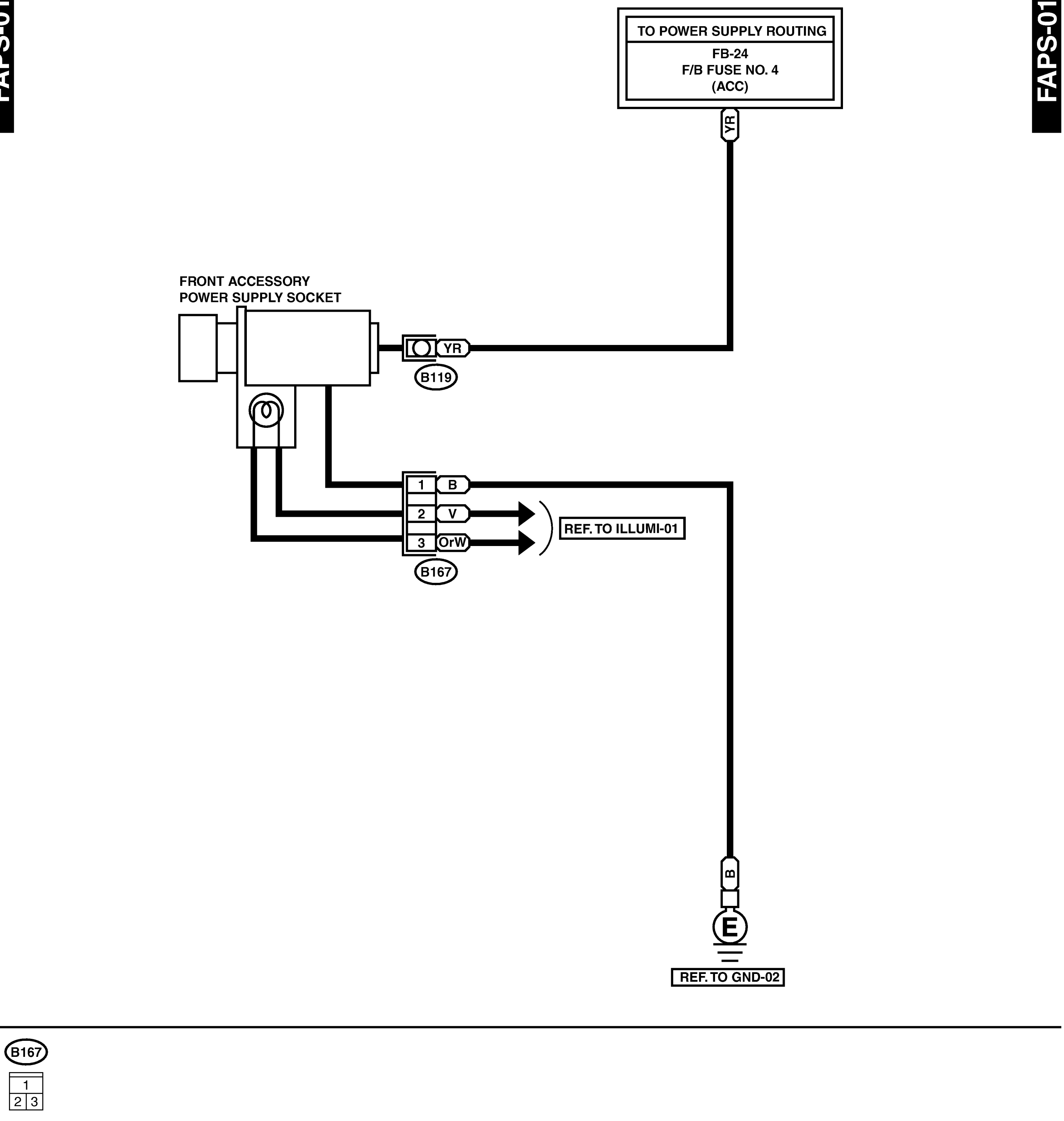

E/G-09
A: B134 ENGINE CONTROL MODULE
A4
A13
A14
A15
YG
G
YR
YB
E/G-03 L
1
9
10
11
12
B22
E3
Y
Br
Lg
LR
LB
E/G-08 S
E5
E16
E6
E17
FUEL INJECTOR NO. 1
FUEL INJECTOR NO. 2
FUEL INJECTOR NO. 3
FUEL INJECTOR NO. 4
E5 (LIGHT GRAY)
E6 (LIGHT GRAY)
E16 (LIGHT GRAY)
E17 (LIGHT GRAY)
B22 (BROWN)
A: B134 (BLACK)

SU10-20I

20. Front Accessory Power Supply System S903664

A: SCHEMATIC S903664A21

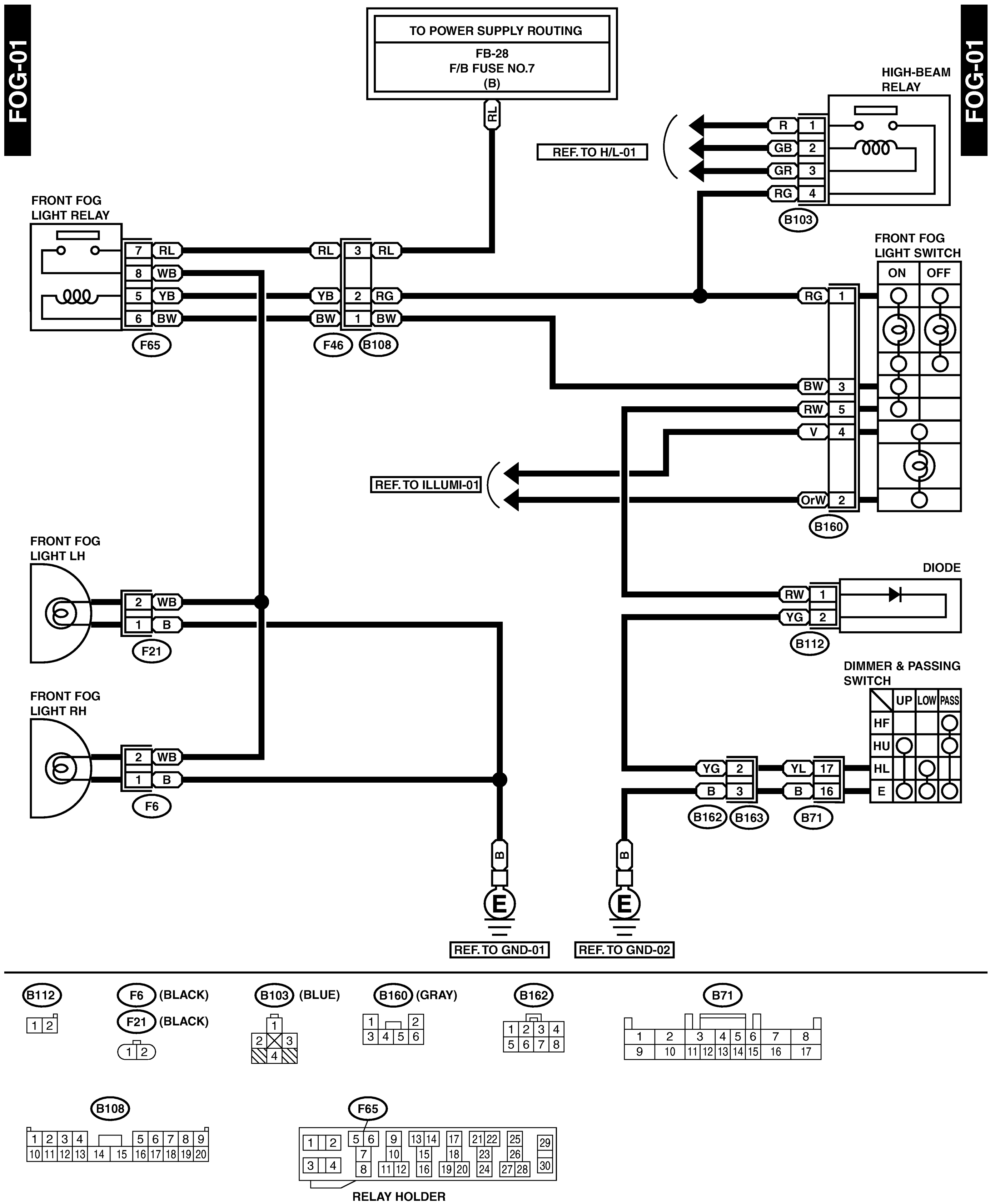
FAPS-01



SU97-20

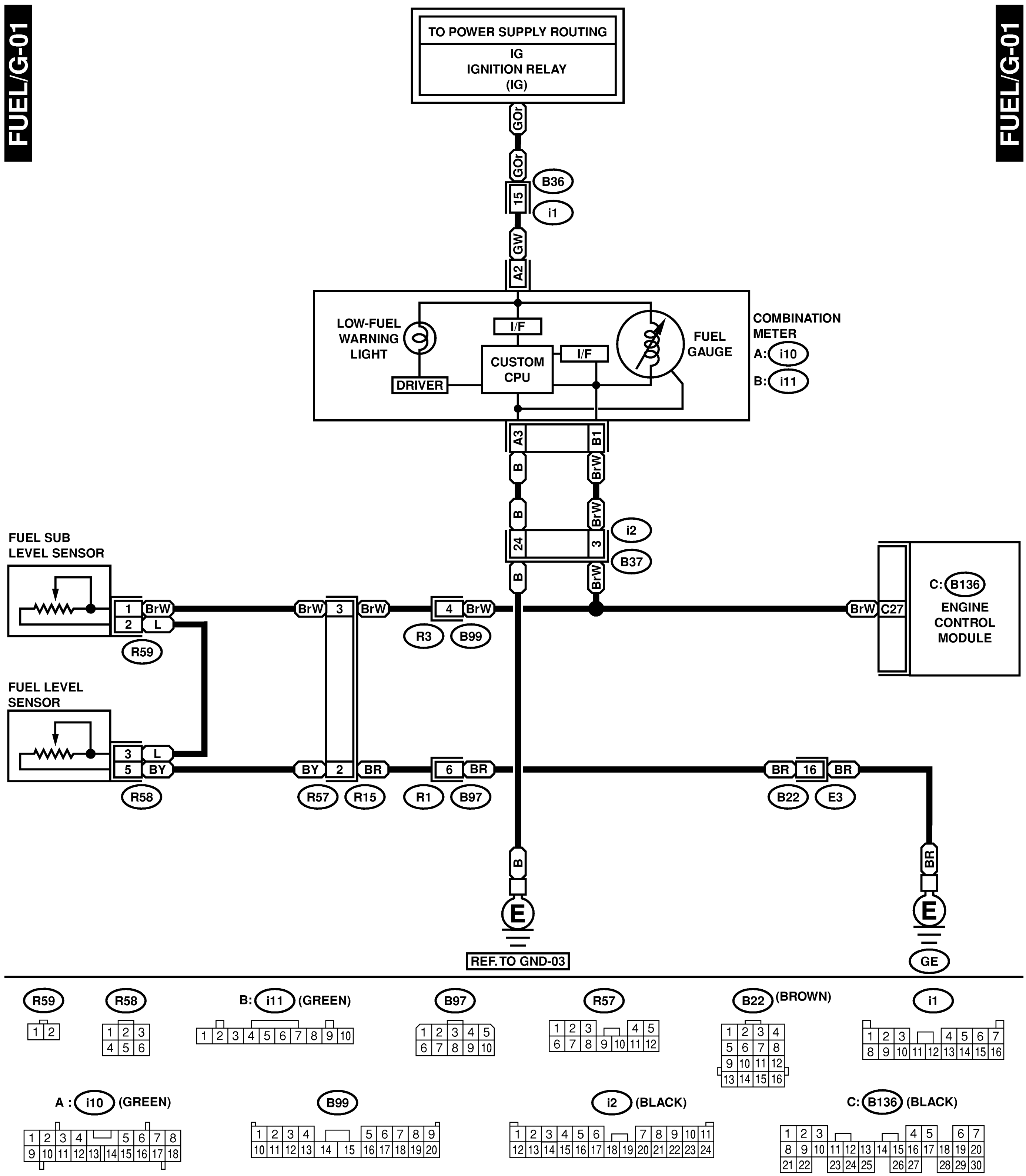
21. Front Fog Light System *S903473*

A: SCHEMATIC *S903473A21*



22. Fuel Gauge System *S903046*

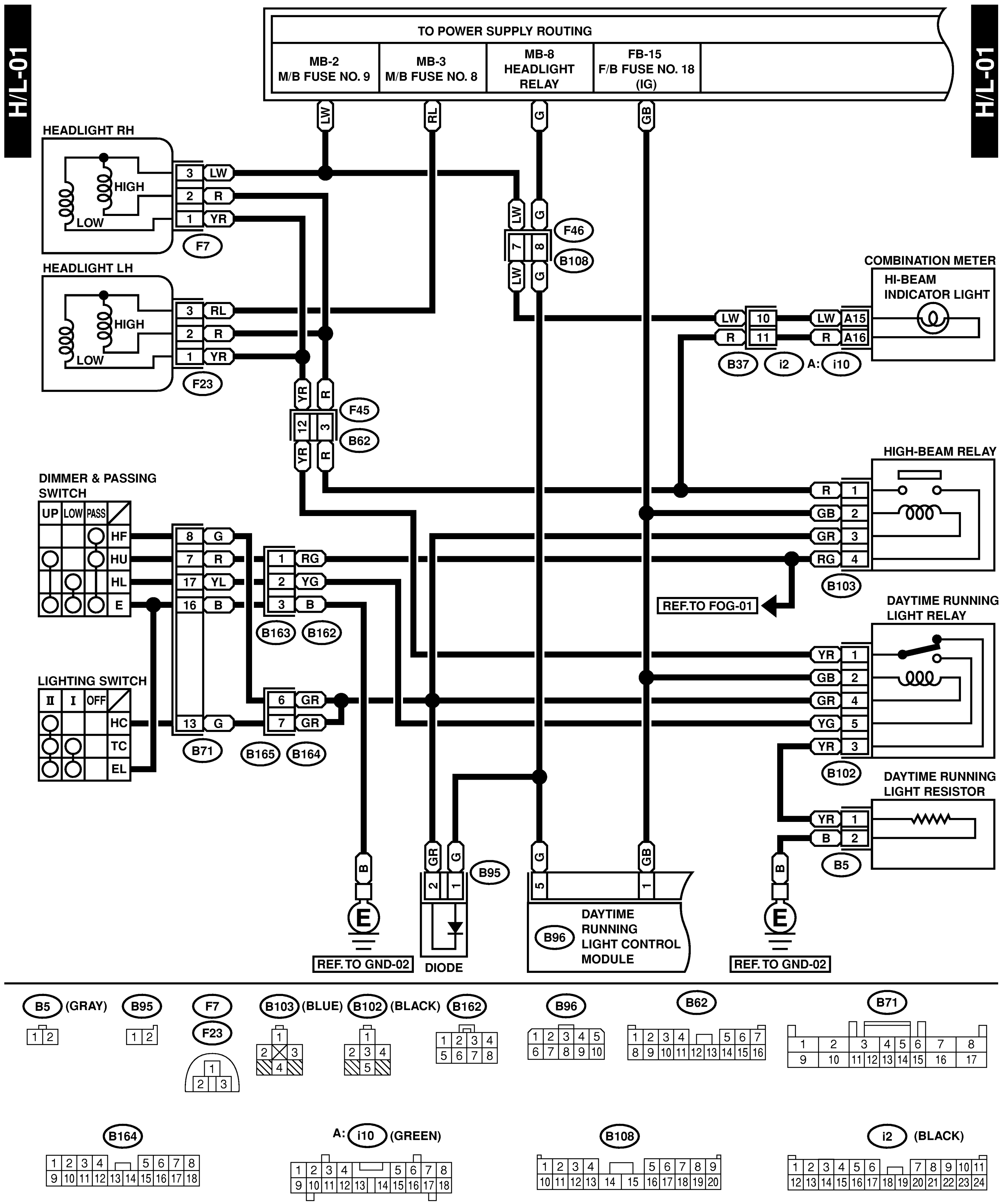
A: SCHEMATIC *S903046A21*



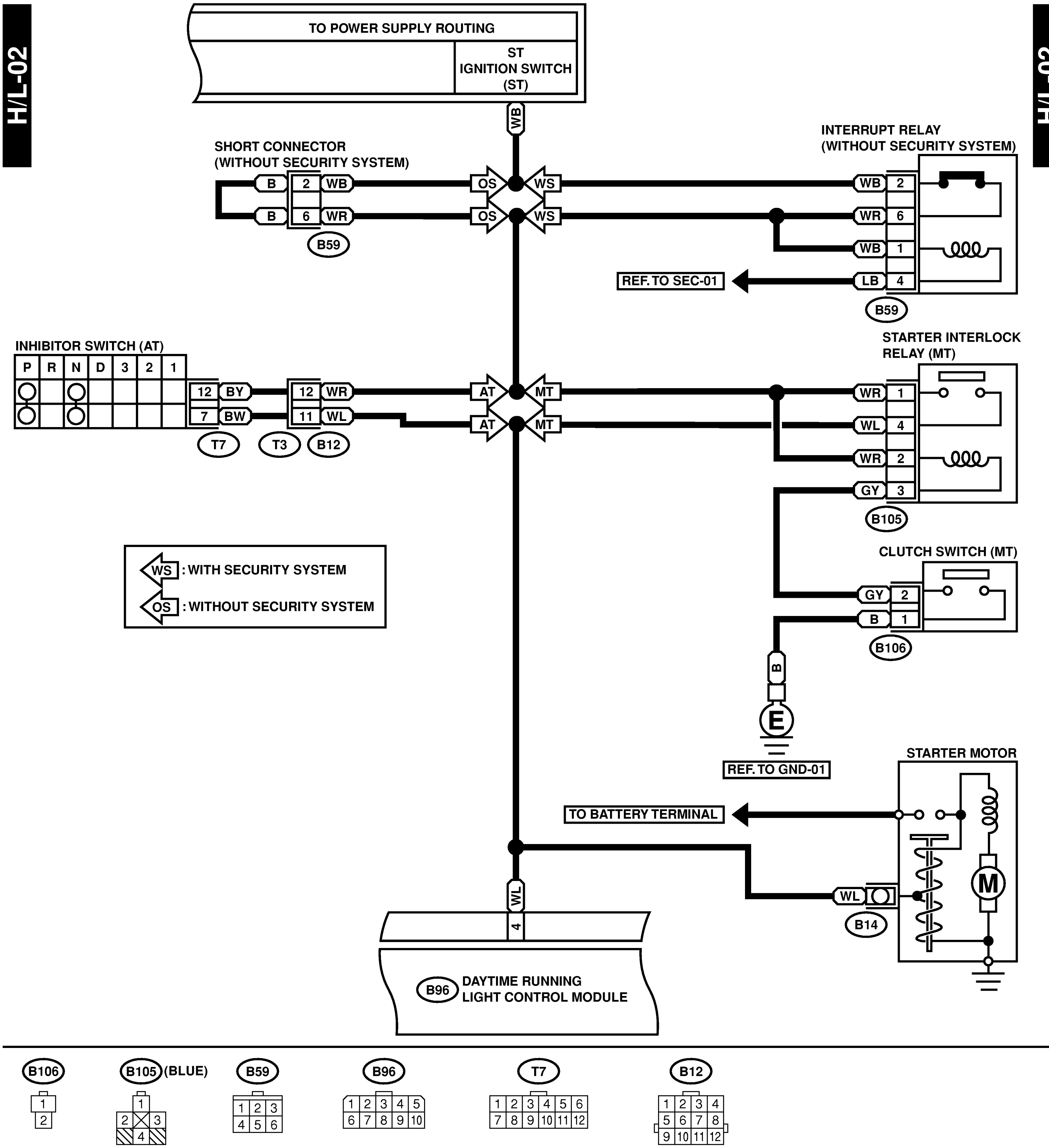
SU61-20

23. Headlight System *S903474*

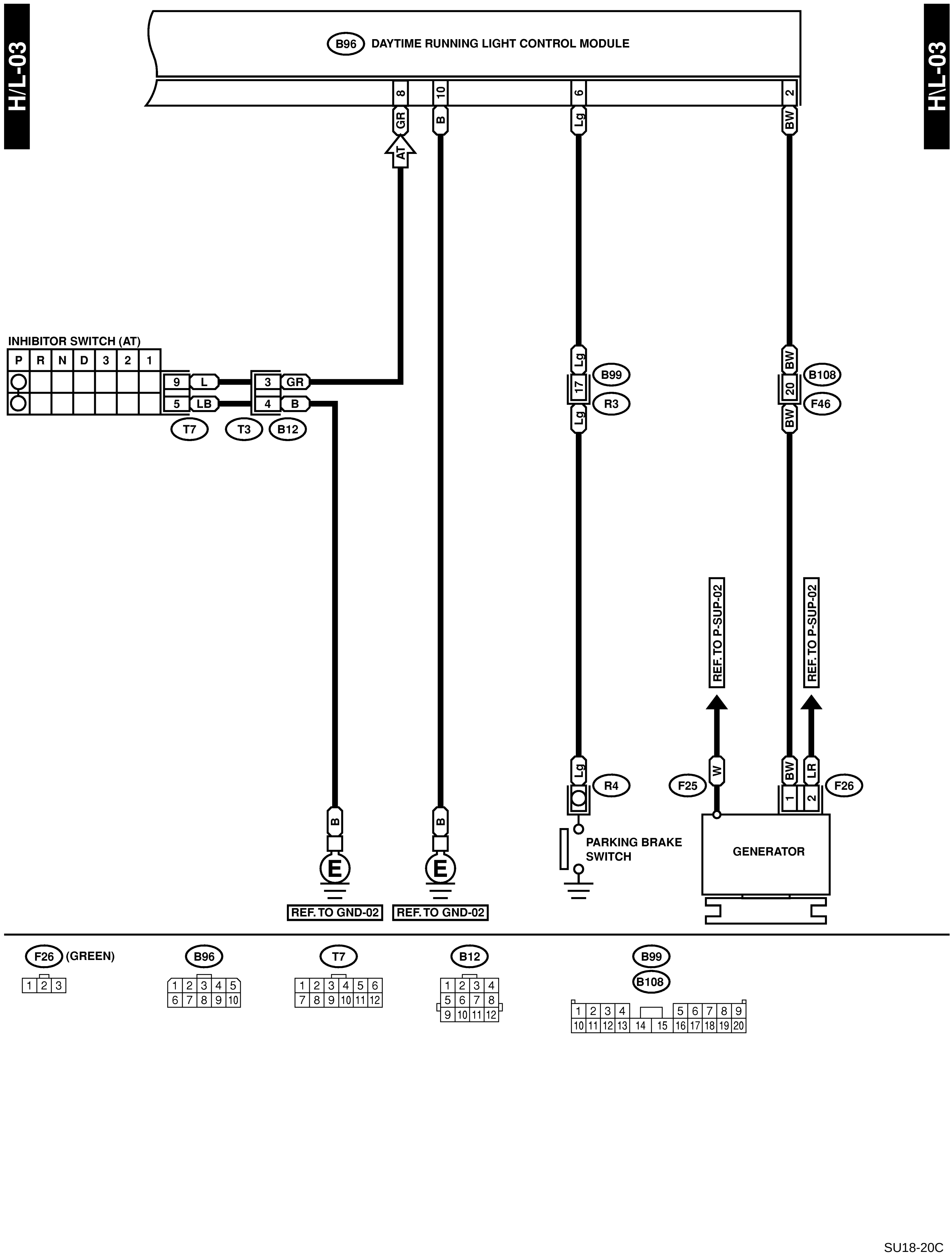
A: SCHEMATIC *S903474A21*



SU18-20A


TO POWER SUPPLY ROUTING
ST
IGNITION SWITCH
(ST)
WB
SHORT CONNECTOR
(WITHOUT SECURITY SYSTEM)
B
2
WB
B
6
WR
B59
OS
WS
OS
WS
INTERRUPT RELAY
(WITHOUT SECURITY SYSTEM)
WB 2
WR 6
WB 1
LB 4
B59
REF. TO SEC-01
INHIBITOR SWITCH (AT)
P R N D 3 2 1
12 BY
7 BW
12 WR
11 WL
T7
T3
B12
AT
MT
AT
MT
STARTER INTERLOCK
RELAY (MT)
WR 1
WL 4
WR 2
GY 3
B105
WS : WITH SECURITY SYSTEM
OS : WITHOUT SECURITY SYSTEM
CLUTCH SWITCH (MT)
GY 2
B 1
B106
B
E
REF. TO GND-01
STARTER MOTOR
TO BATTERY TERMINAL
M
WL
B14
WL
4
B96
DAYTIME RUNNING
LIGHT CONTROL MODULE
B106
1
2
B105 (BLUE)
1
2 3
4
B59
1 2 3
4 5 6
B96
1 2 3 4 5
6 7 8 9 10
T7
1 2 3 4 5 6
7 8 9 10 11 12
B12
1 2 3 4
5 6 7 8
9 10 11 12

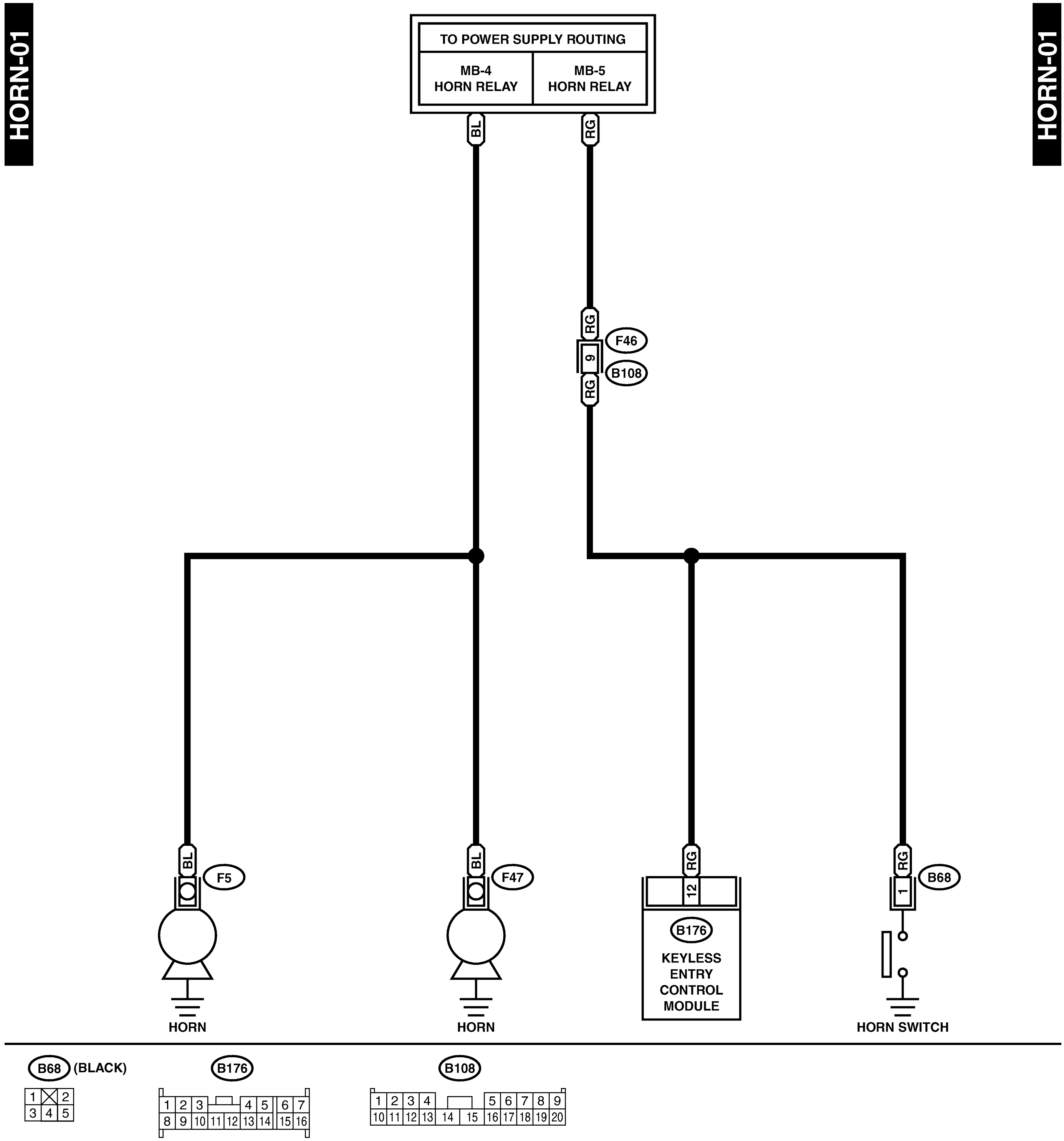
SU18-20B


H/L-03
H/L-03
B96 DAYTIME RUNNING LIGHT CONTROL MODULE
8
10
6
2
GR
B
Lg
BW
AT
INHIBITOR SWITCH (AT)
P R N D 3 2 1
9 L
5 LB
3 GR
4 B
T7
T3
B12
Lg
17
Lg
B99
R3
BW
20
BW
B108
F46
REF. TO P-SUP-02
REF. TO P-SUP-02
Lg
R4
W
F25
BW
LR
1
2
F26
B
B
E
E
REF. TO GND-02
REF. TO GND-02
PARKING BRAKE SWITCH
GENERATOR
F26 (GREEN)
B96
T7
B12
B99
B108
SU18-20C

24. Horn System *S903436*

A: SCHEMATIC *S903436A21*

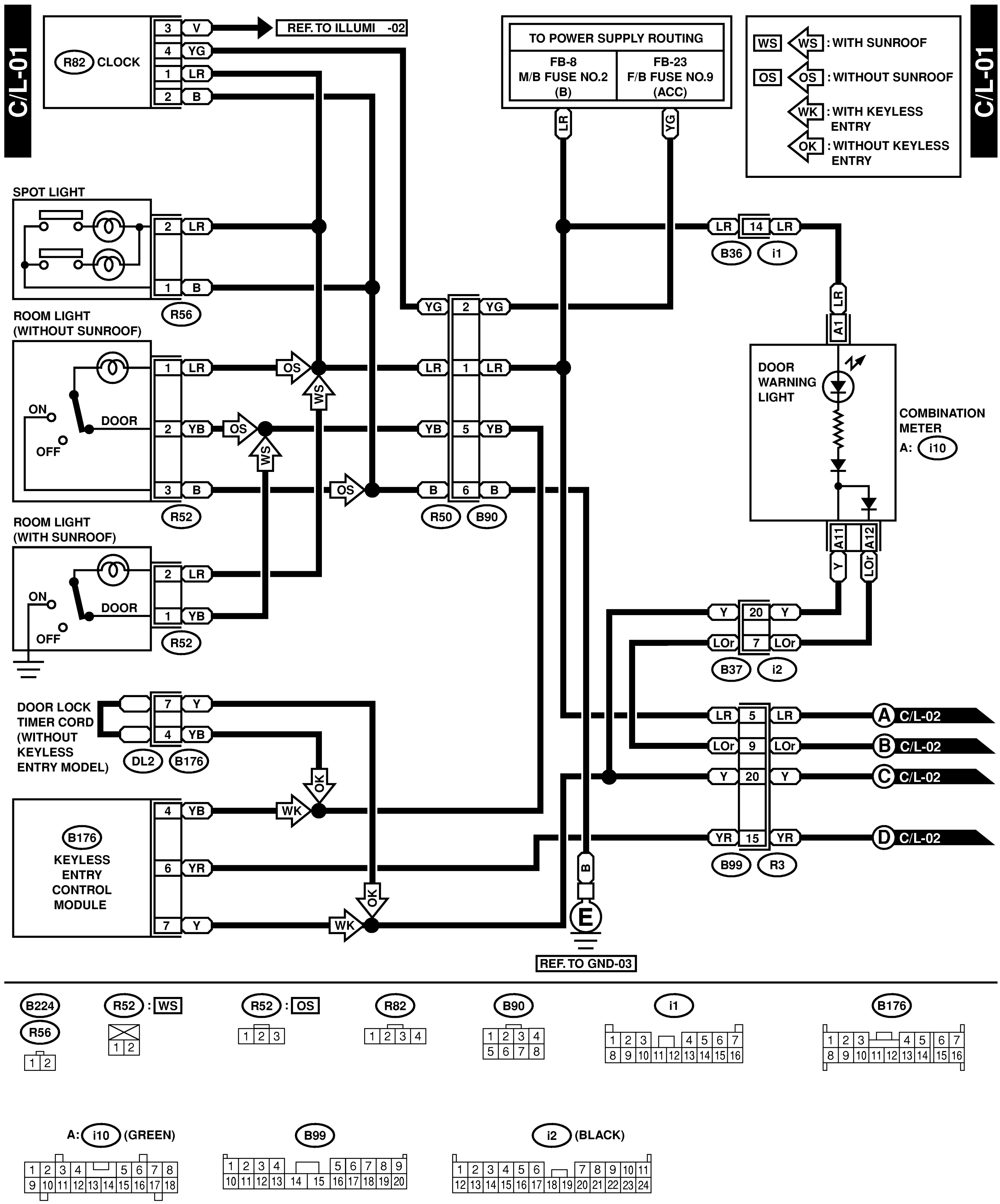
HORN-01



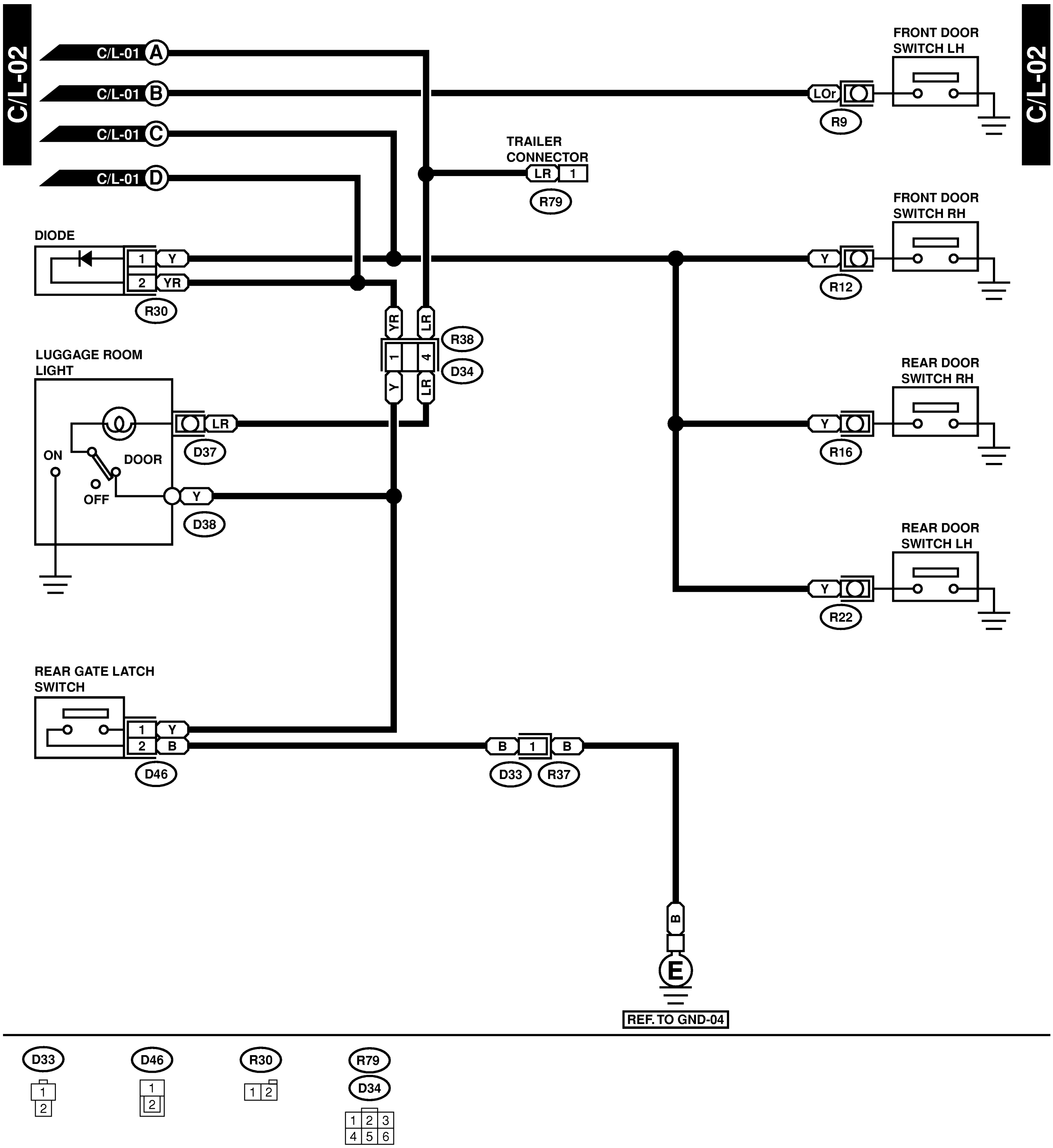
SU74-20

25. In Compartment Light System *S903665*

A: SCHEMATIC *S903665A21*



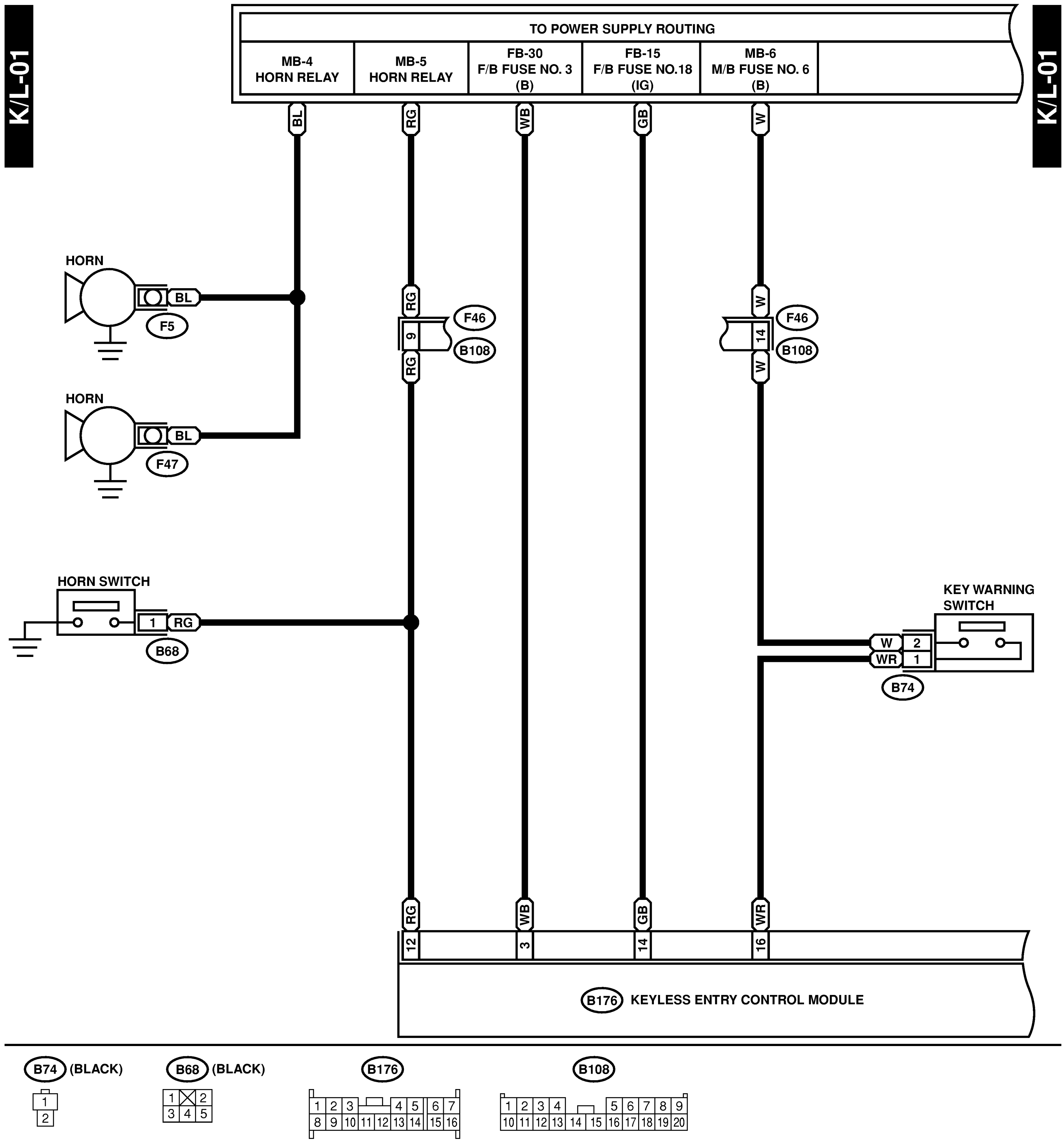
SU24-20A


C/L-02
C/L-01 A
C/L-01 B
C/L-01 C
C/L-01 D
FRONT DOOR SWITCH LH
LOr
R9
TRAILER CONNECTOR
LR 1
R79
FRONT DOOR SWITCH RH
Y
R12
DIODE
1 Y
2 YR
R30
YR LR
R38
1 4
D34
Y LR
LUGGAGE ROOM LIGHT
LR
D37
ON
DOOR
OFF
Y
D38
REAR DOOR SWITCH RH
Y
R16
REAR DOOR SWITCH LH
Y
R22
REAR GATE LATCH SWITCH
1 Y
2 B
D46
B 1 B
D33 R37
B
E
REF. TO GND-04
D33
1 2
D46
1 2
R30
1 2
R79
D34
1 2 3
4 5 6

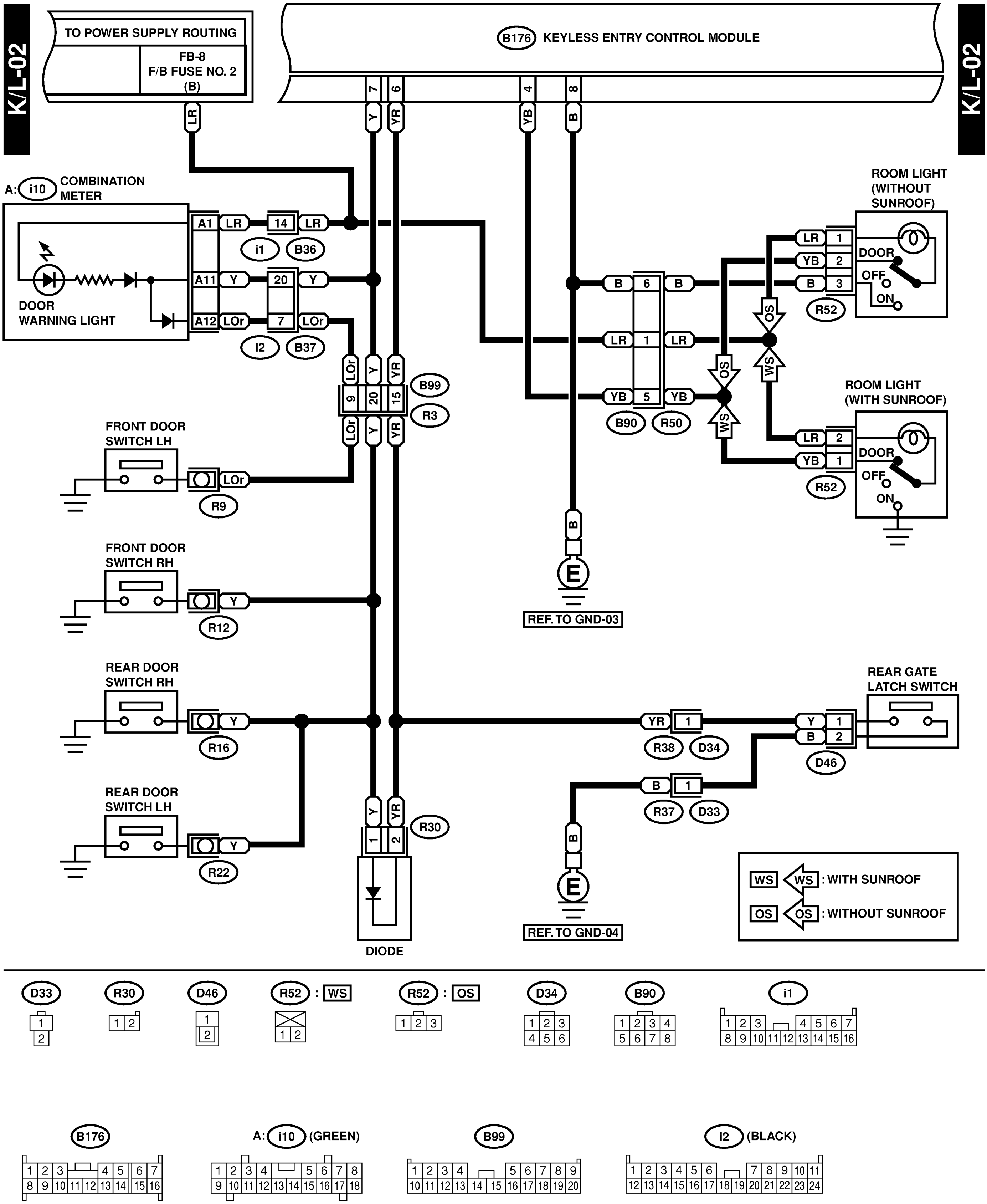
SU24-20B

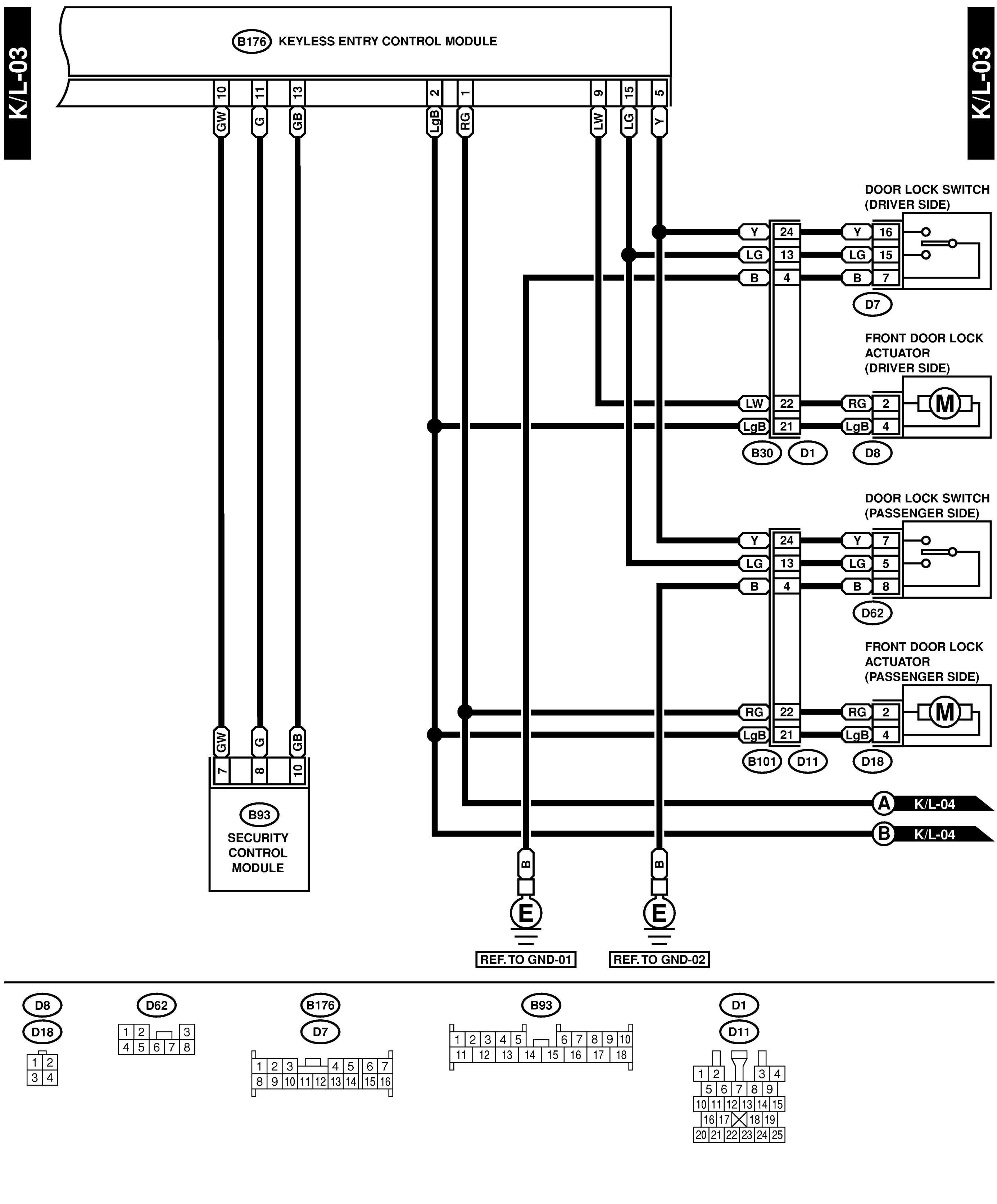
26. Keyless Entry System *S903345*

A: SCHEMATIC *S903345A21*

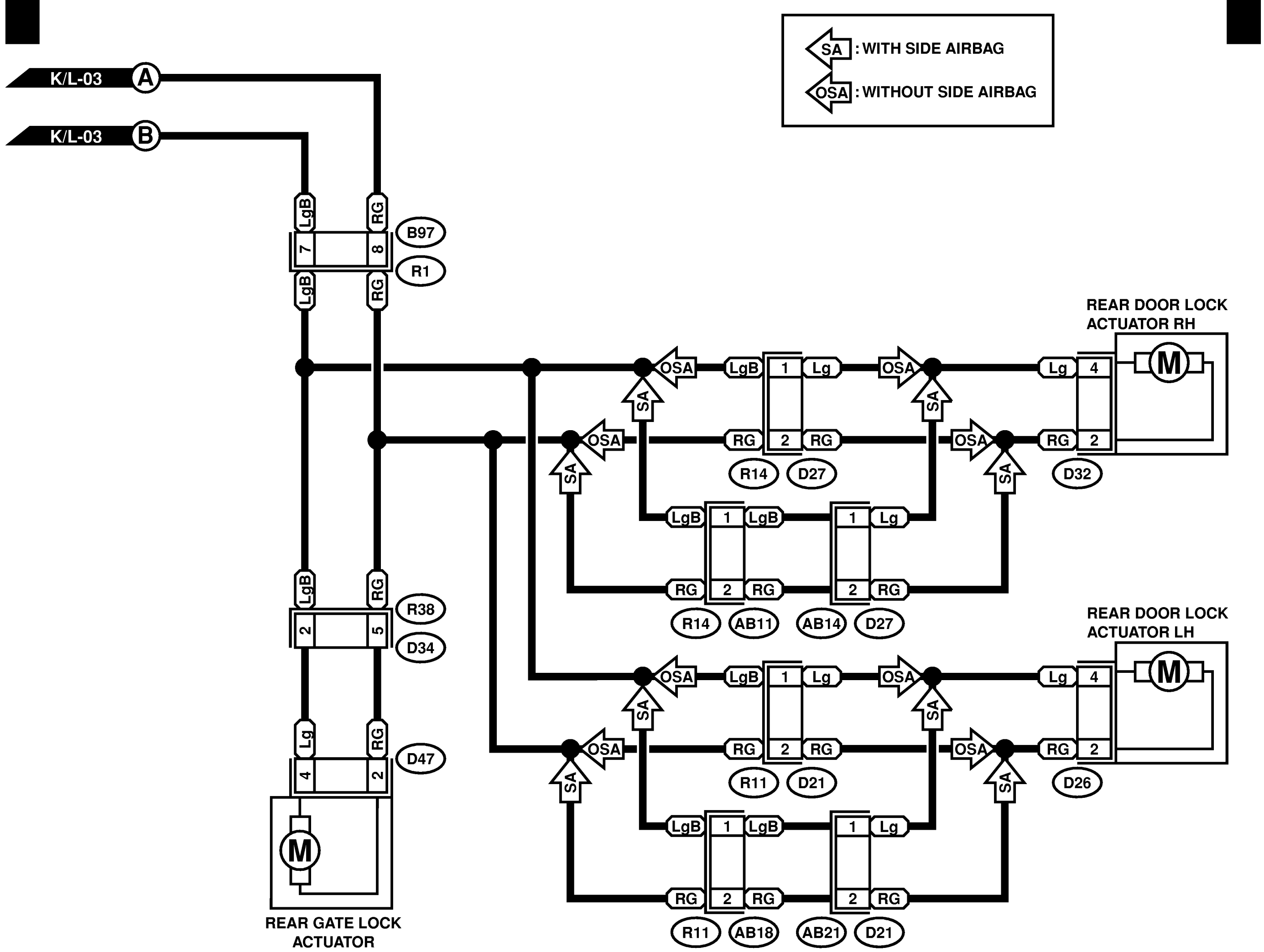


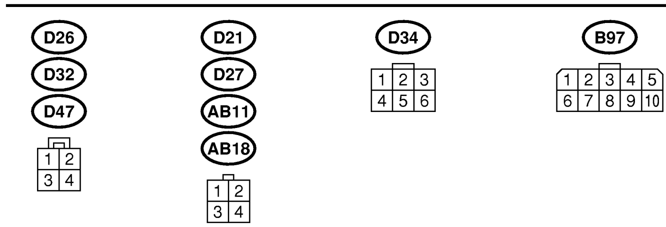
SU77-20A


K/L-02
TO POWER SUPPLY ROUTING
FB-8
F/B FUSE NO. 2
(B)
B176 KEYLESS ENTRY CONTROL MODULE
A: i10 COMBINATION METER
DOOR WARNING LIGHT
ROOM LIGHT (WITHOUT SUNROOF)
ROOM LIGHT (WITH SUNROOF)
DOOR
OFF
ON
FRONT DOOR SWITCH LH
FRONT DOOR SWITCH RH
REAR DOOR SWITCH RH
REAR DOOR SWITCH LH
REAR GATE LATCH SWITCH
DIODE
REF. TO GND-03
REF. TO GND-04
WS : WITH SUNROOF
OS : WITHOUT SUNROOF
A: i10 (GREEN)
i2 (BLACK)
SU77-20B


K/L-03
B176 KEYLESS ENTRY CONTROL MODULE
10 11 13 2 1 9 15 5
GW G GB LgB RG LW LG Y
DOOR LOCK SWITCH (DRIVER SIDE)
Y 24 Y 16
LG 13 LG 15
B 4 B 7
D7
FRONT DOOR LOCK ACTUATOR (DRIVER SIDE)
LW 22 RG 2
LgB 21 LgB 4
M
B30 D1 D8
DOOR LOCK SWITCH (PASSENGER SIDE)
Y 24 Y 7
LG 13 LG 5
B 4 B 8
D62
FRONT DOOR LOCK ACTUATOR (PASSENGER SIDE)
RG 22 RG 2
LgB 21 LgB 4
B101 D11 D18
B93 SECURITY CONTROL MODULE
7 8 10
A K/L-04
B K/L-04
E
REF. TO GND-01
REF. TO GND-02
D8 D18
D62
B176 D7
B93
D1 D11
SU77-20C

K/L-04

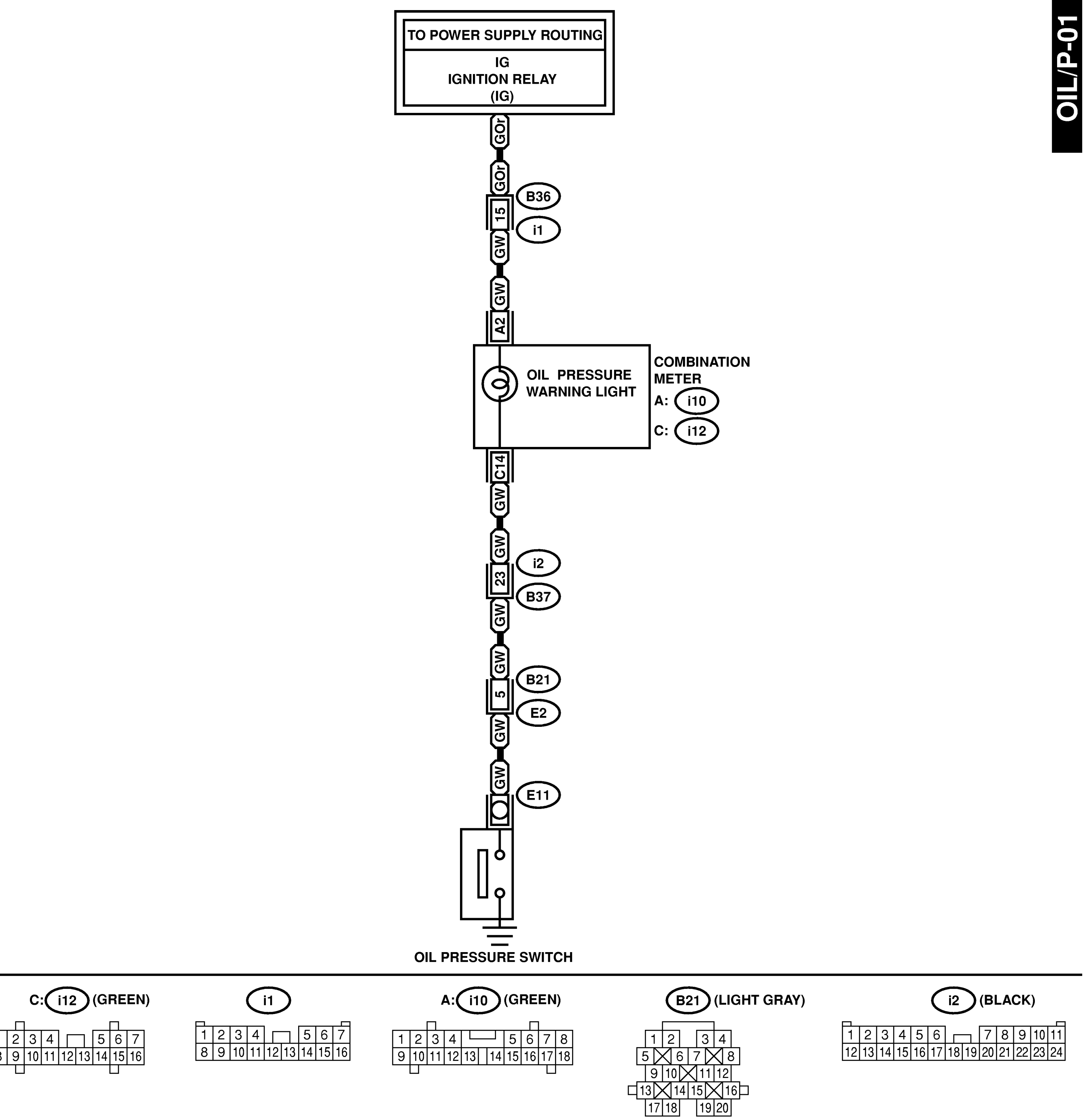




SU77-20D

27. Oil Pressure Warning Light System *S903667*

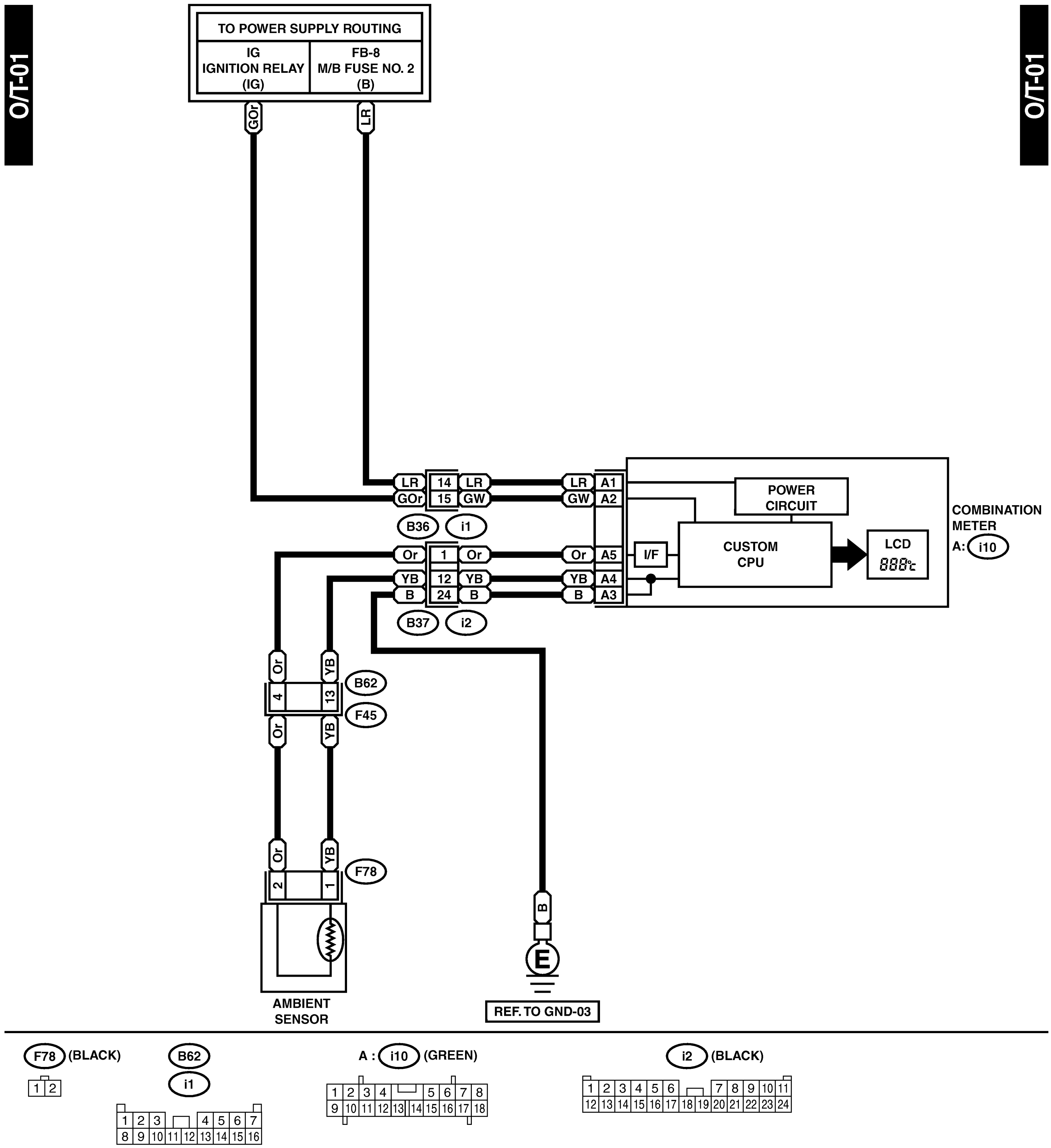
A: SCHEMATIC *S903667A21*



SU66-20

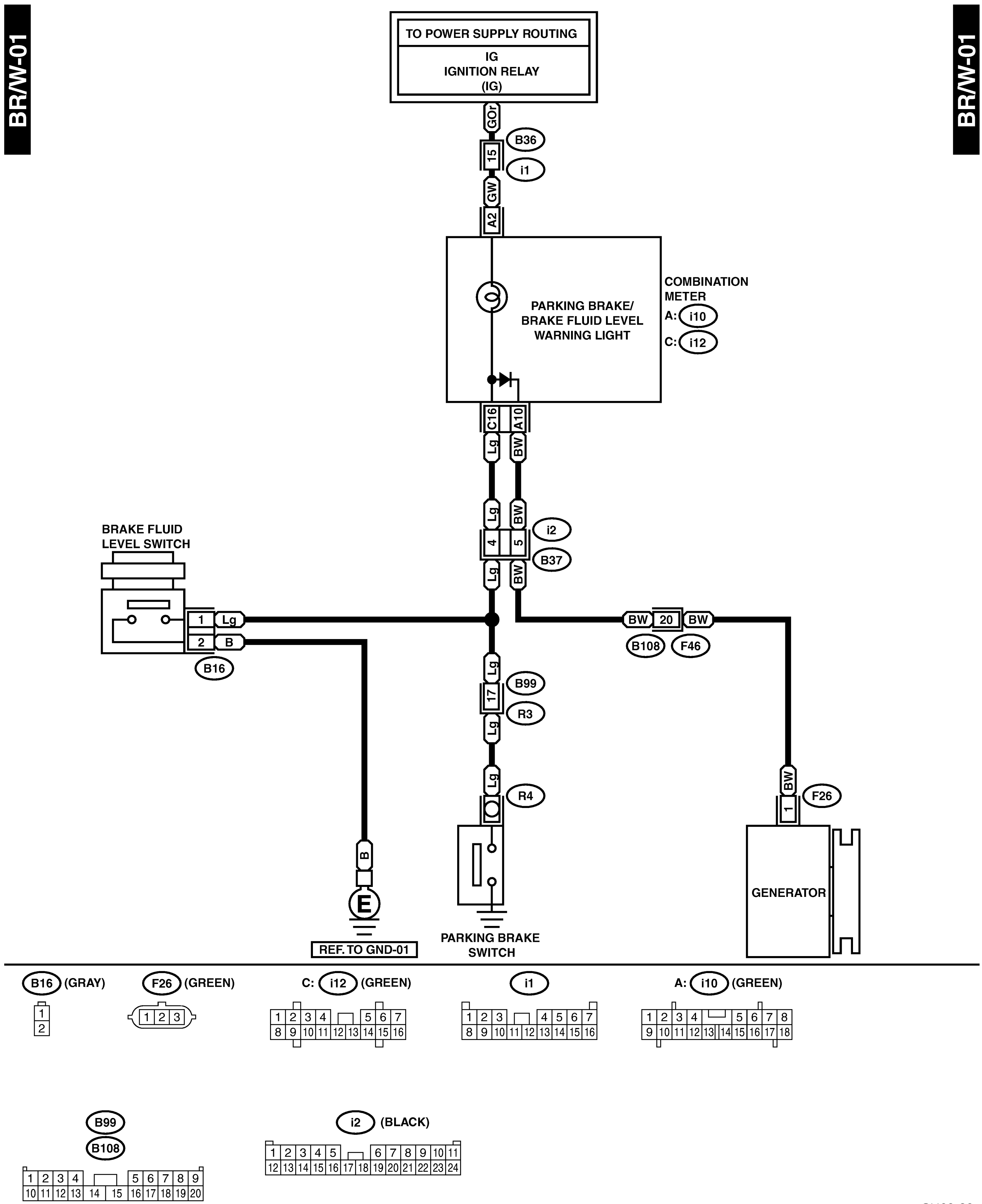
28. Outside Temperature Display System S903668

A: SCHEMATIC S903668A21



29. Parking Brake and Brake Fluid Level Warning System S903478

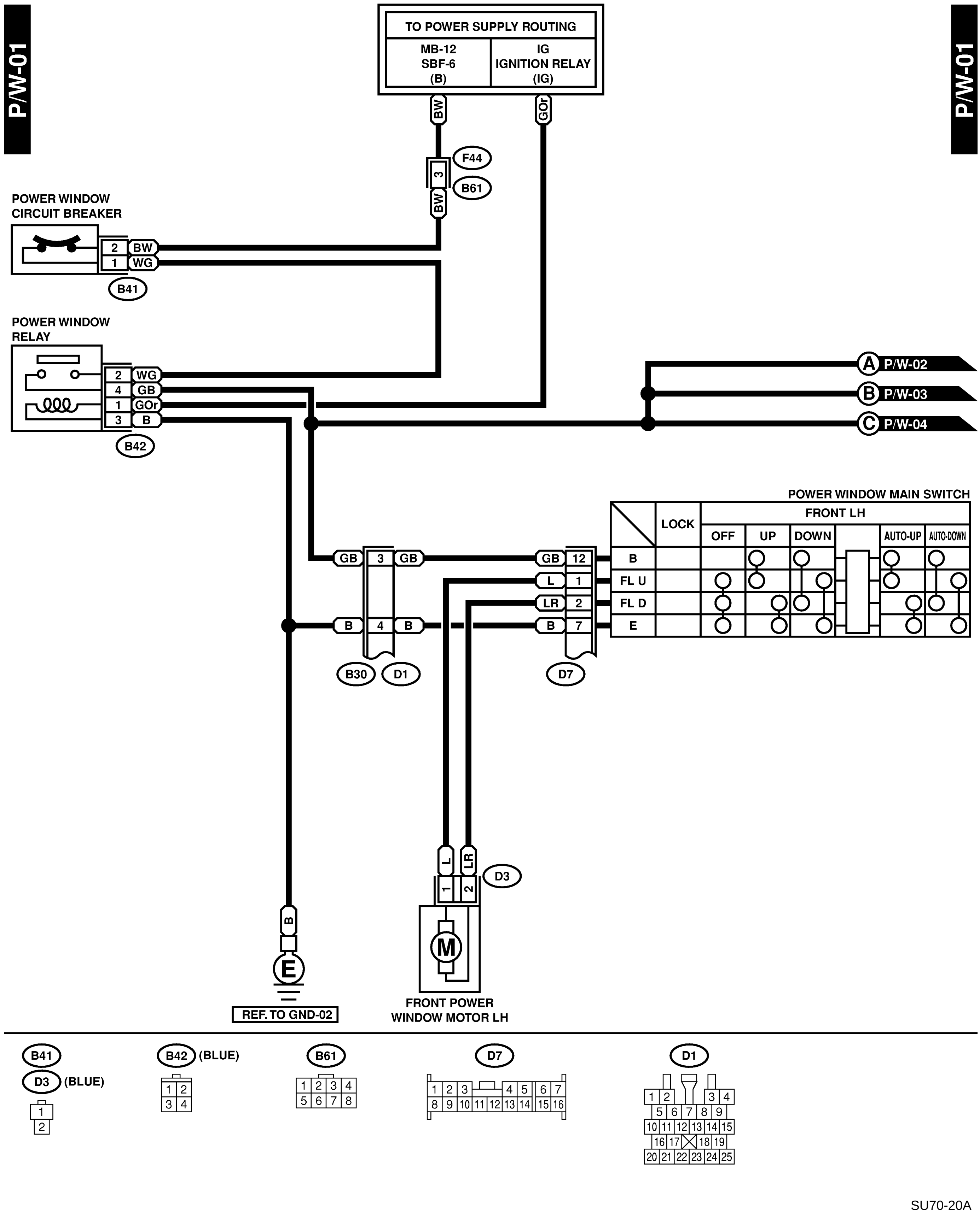
A: SCHEMATIC S903478A21

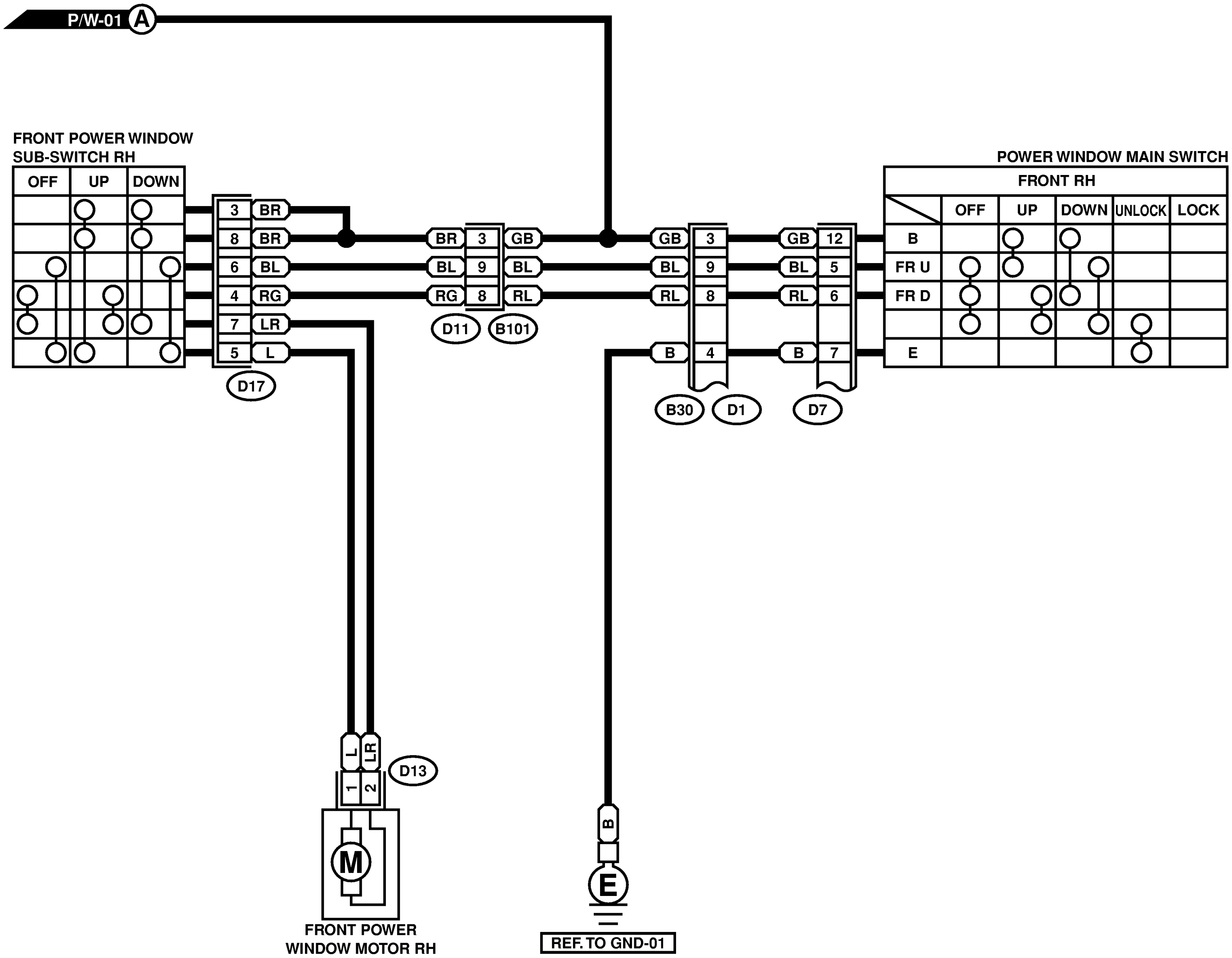


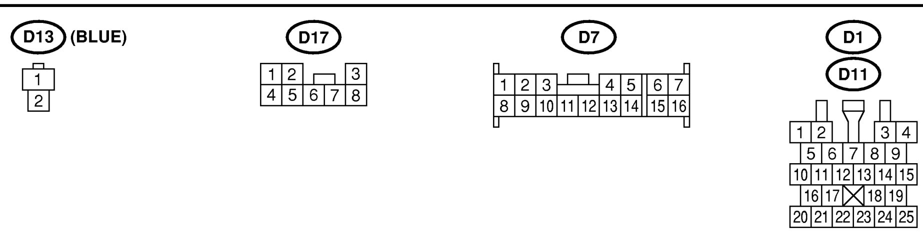
MEMO:

30. Power Window System *S903456*

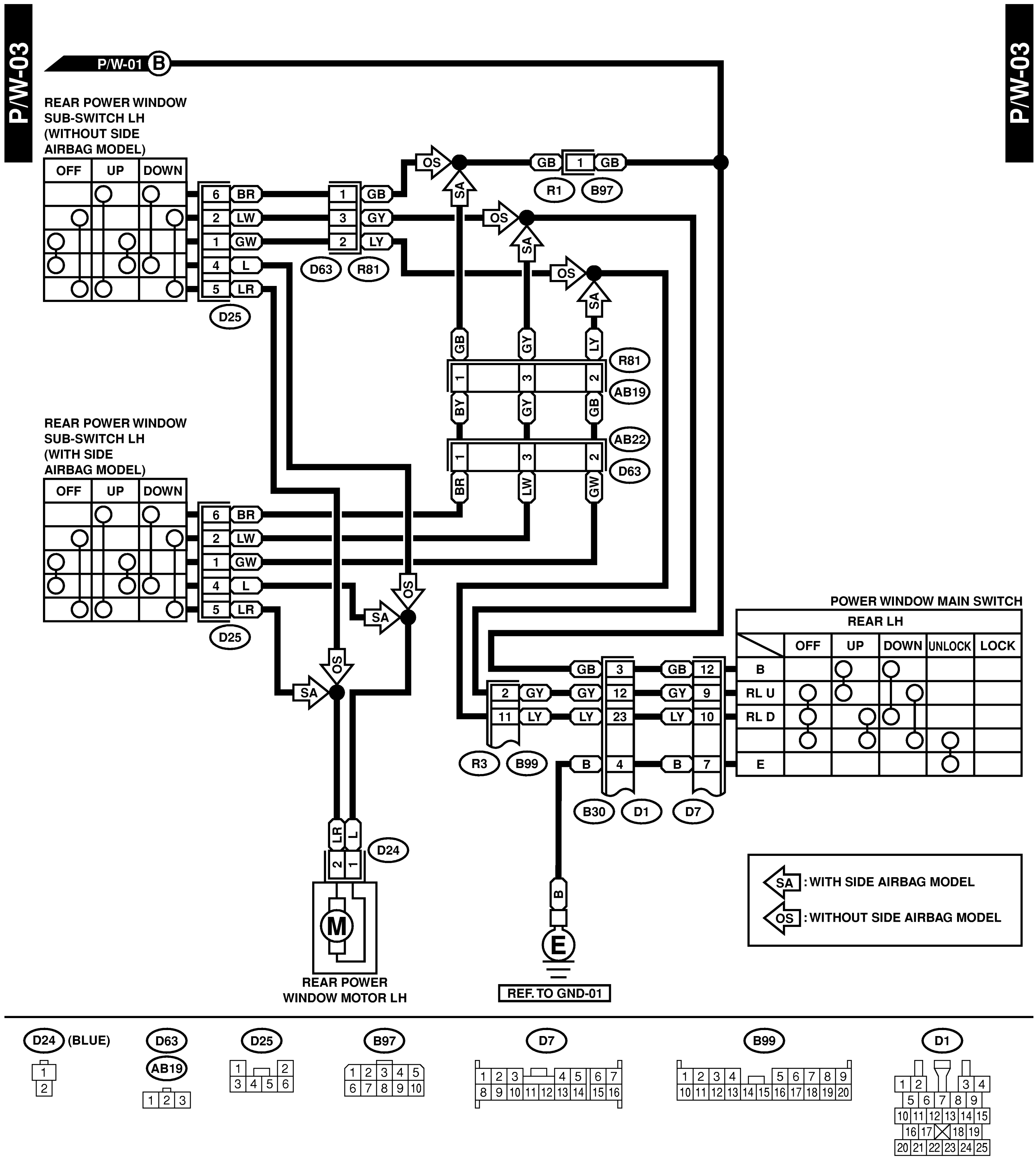
A: SCHEMATIC *S903456A21*



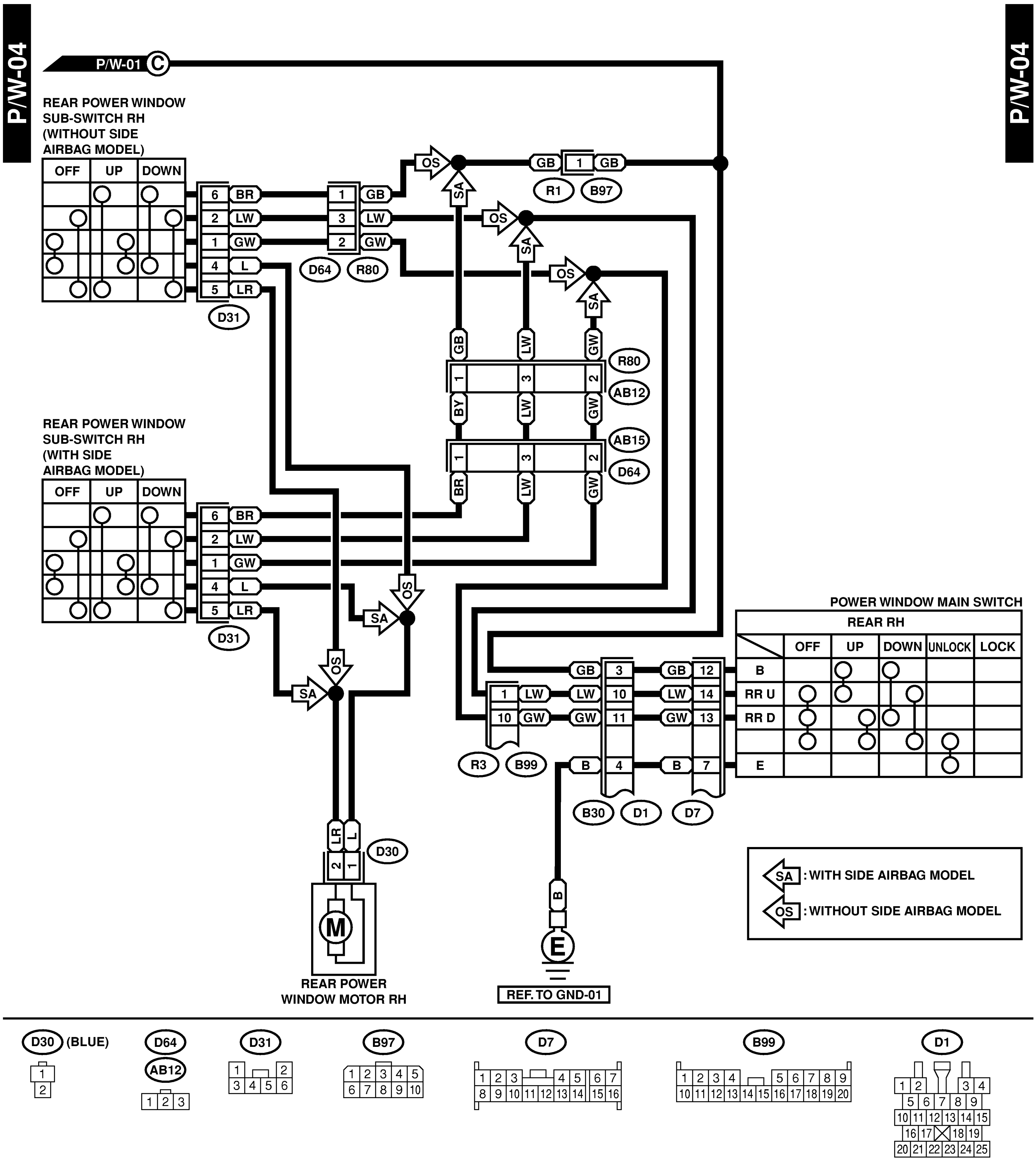

P/W-01 A
FRONT POWER WINDOW SUB-SWITCH RH
OFF
UP
DOWN
POWER WINDOW MAIN SWITCH
FRONT RH
OFF
UP
DOWN
UNLOCK
LOCK
B
FR U
FR D
E
BR
BL
RG
LR
L
GB
RL
D17
D11
B101
B30
D1
D7
D13
FRONT POWER WINDOW MOTOR RH
REF. TO GND-01


D13 (BLUE)
D17
D7
D1
D11

SU70-20B


P/W-03
P/W-01
B
REAR POWER WINDOW SUB-SWITCH LH (WITHOUT SIDE AIRBAG MODEL)
OFF
UP
DOWN
D25
D63
R81
R1
B97
REAR POWER WINDOW SUB-SWITCH LH (WITH SIDE AIRBAG MODEL)
AB19
AB22
POWER WINDOW MAIN SWITCH
REAR LH
UNLOCK
LOCK
RL U
RL D
E
R3
B99
B30
D1
D7
D24
REAR POWER WINDOW MOTOR LH
REF. TO GND-01
SA : WITH SIDE AIRBAG MODEL
OS : WITHOUT SIDE AIRBAG MODEL
D24 (BLUE)

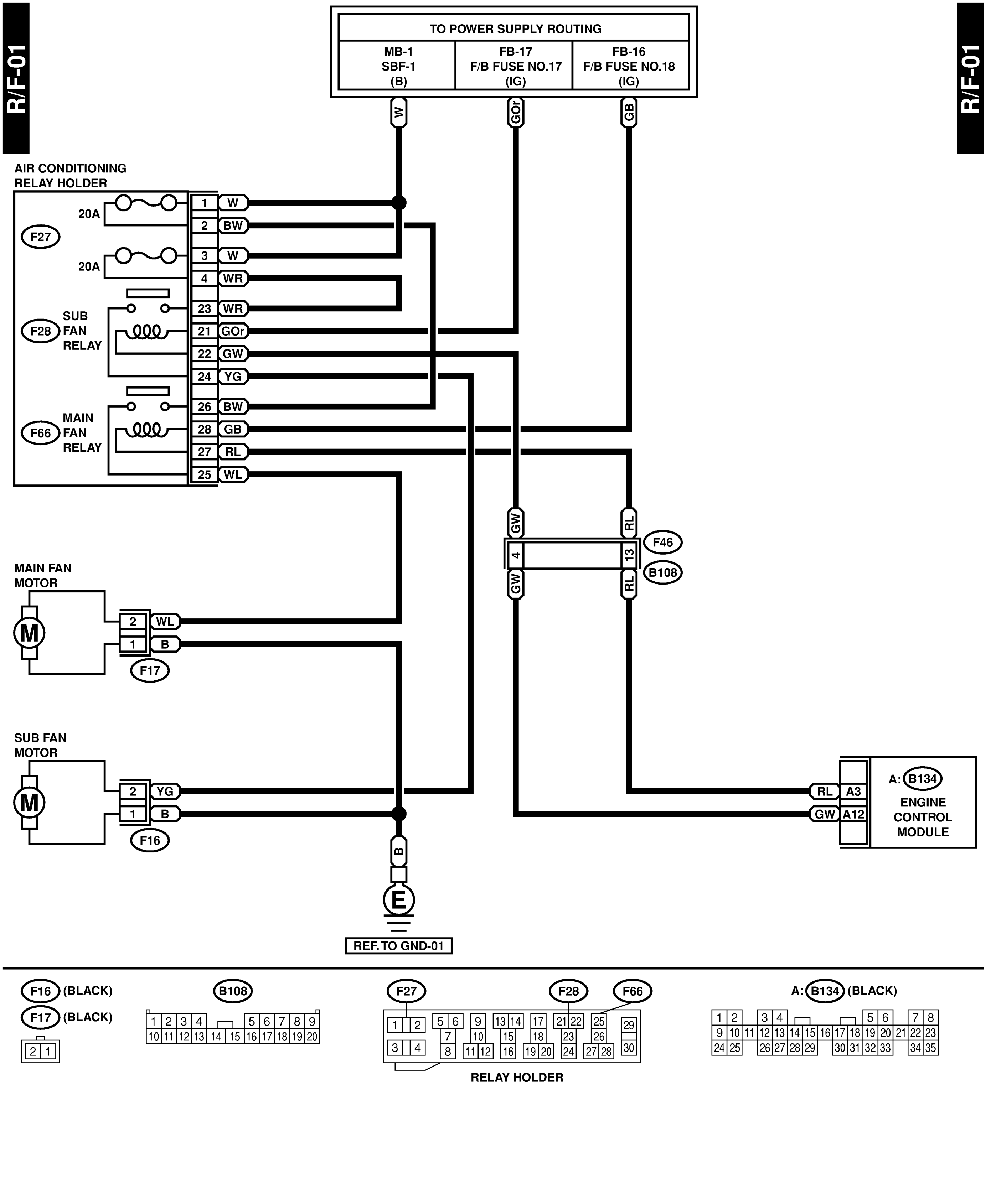
SU70-20C


P/W-04
P/W-04
P/W-01
C
REAR POWER WINDOW SUB-SWITCH RH (WITHOUT SIDE AIRBAG MODEL)
OFF
UP
DOWN
REAR POWER WINDOW SUB-SWITCH RH (WITH SIDE AIRBAG MODEL)
POWER WINDOW MAIN SWITCH
REAR RH
UNLOCK
LOCK
B
RR U
RR D
E
REAR POWER WINDOW MOTOR RH
M
E
REF. TO GND-01
SA : WITH SIDE AIRBAG MODEL
OS : WITHOUT SIDE AIRBAG MODEL
D31
D64
R80
R1
B97
AB12
AB15
R3
B99
B30
D1
D7
D30
D30 (BLUE)
BR
LW
GW
L
LR
GB
BY
B

SU70-20D

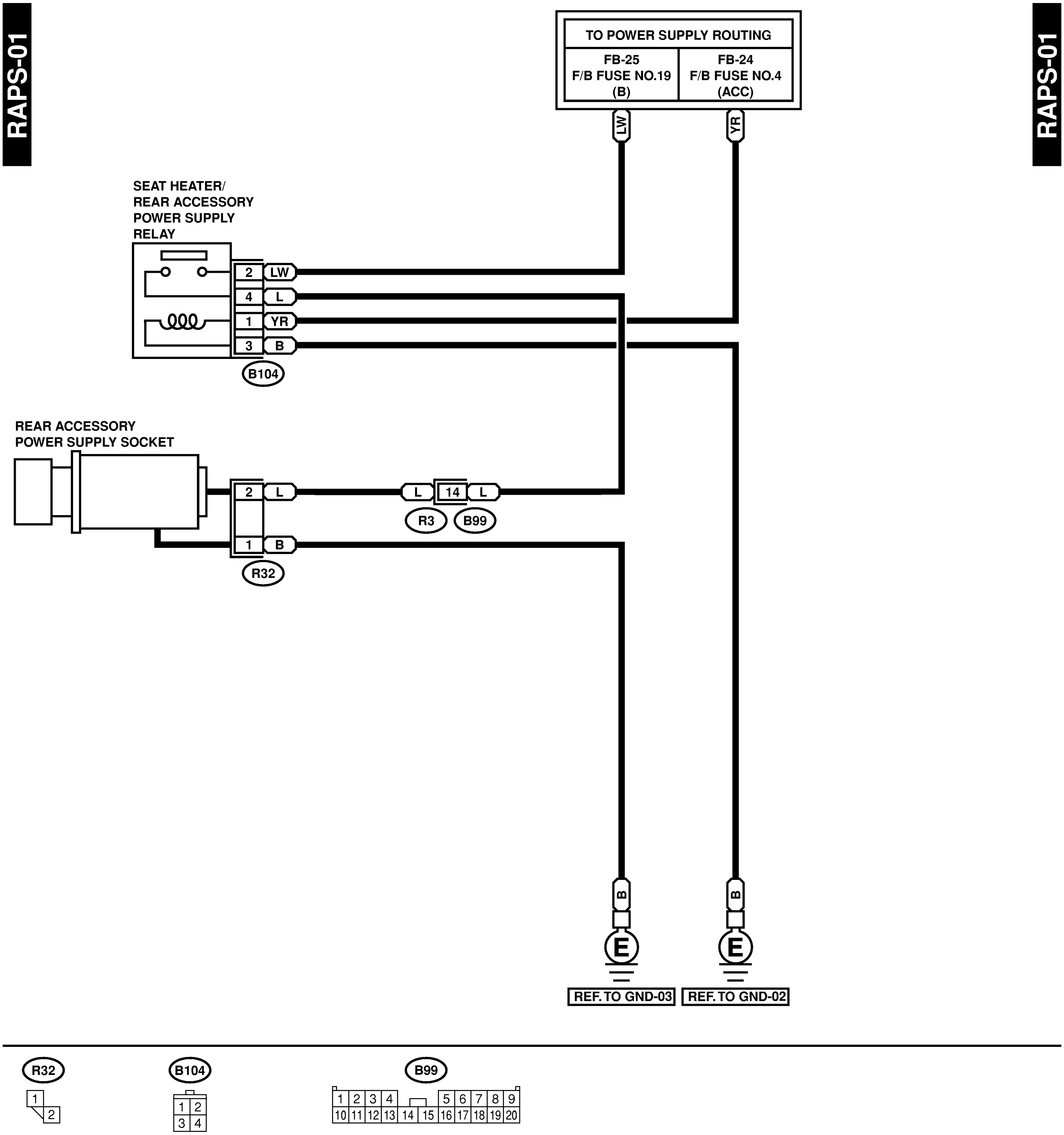
31. Radiator Fan System S903480

A: SCHEMATIC S903480A21



32. Rear Accessory Power Supply System S903670

A: SCHEMATIC S903670A21

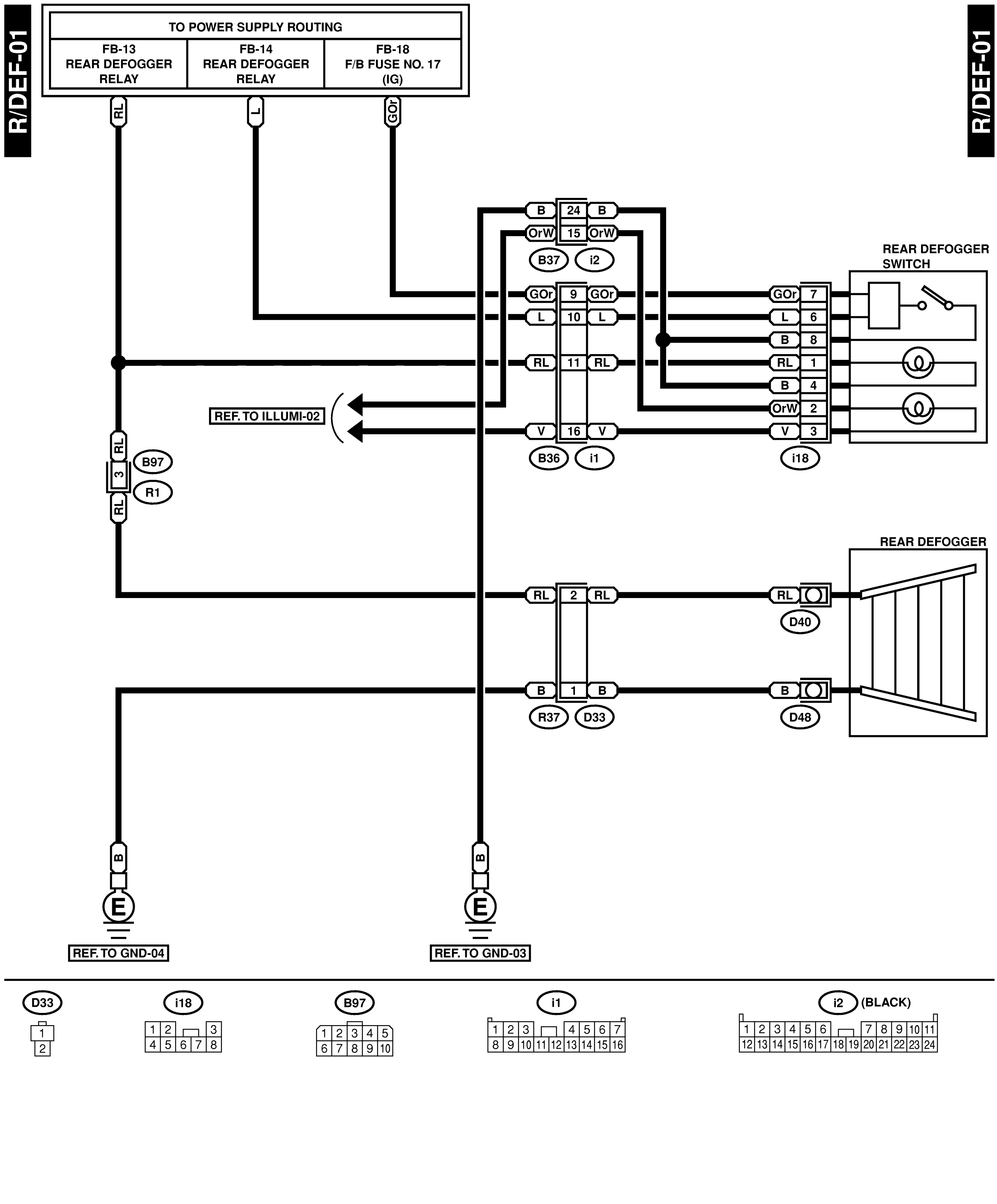


RAPS-01

SU90-20

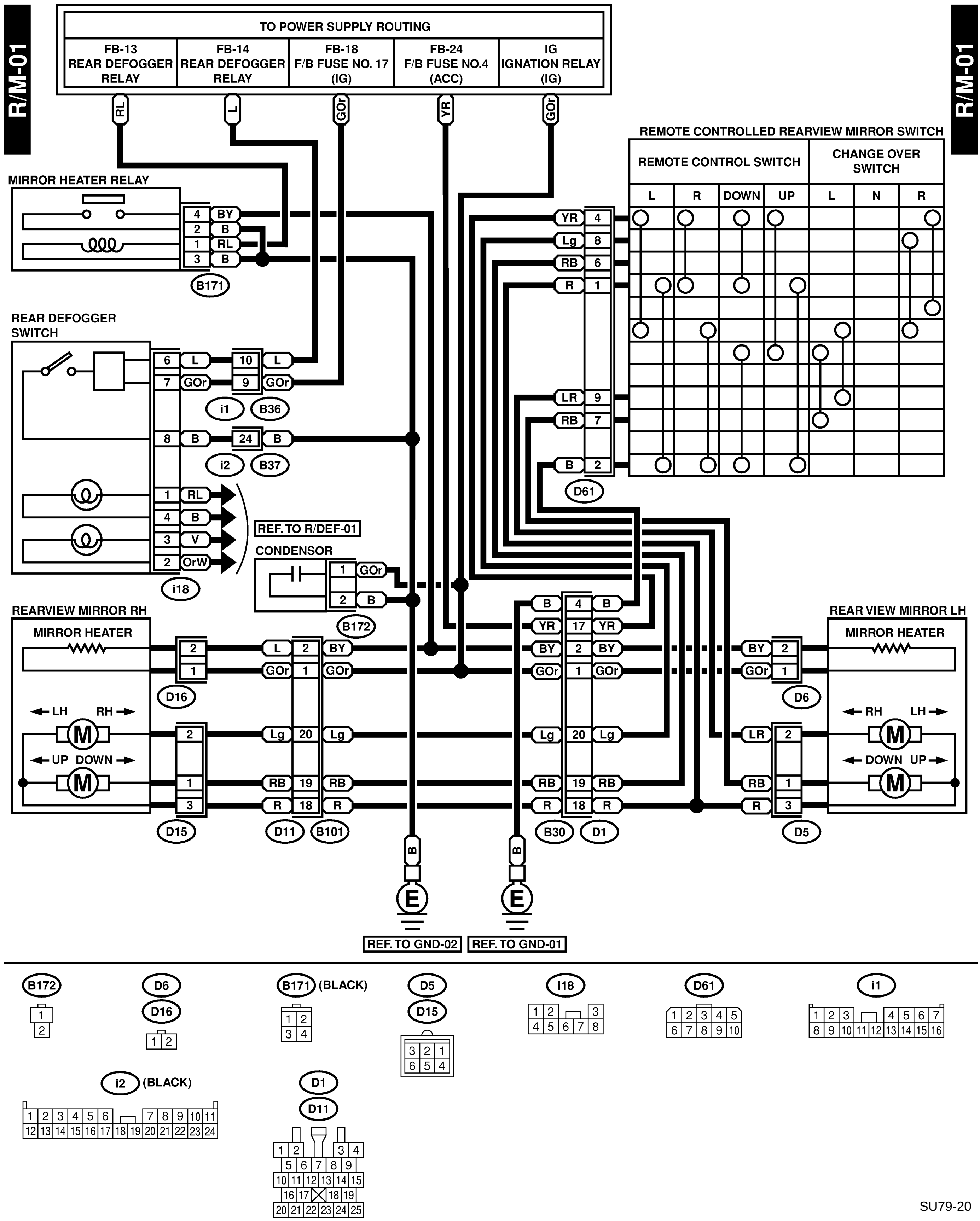
33. Rear Window Defogger System *S903455*

A: SCHEMATIC *S903455A21*



34. Remote Controlled Rearview Mirror System S903459

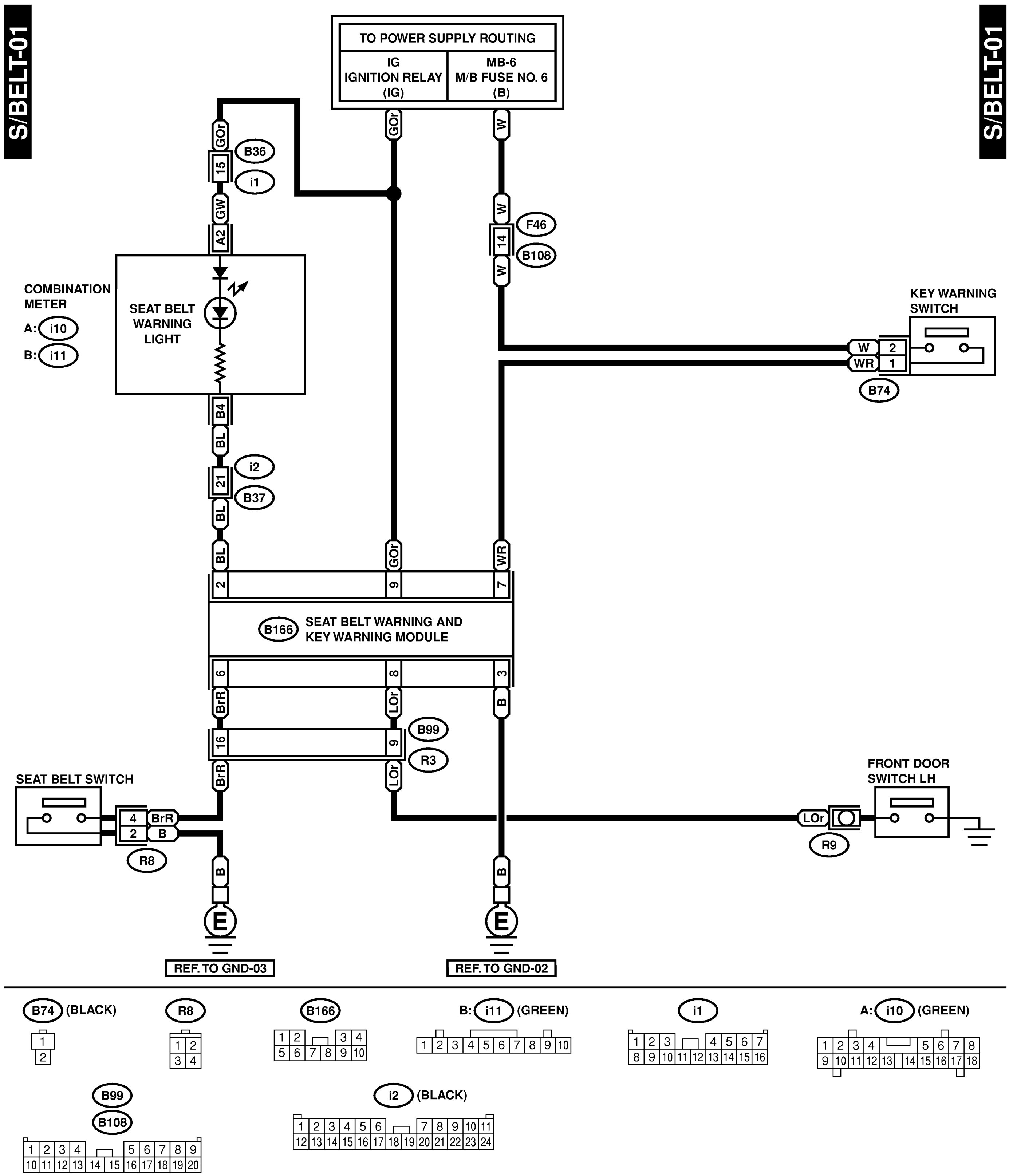
A: SCHEMATIC S903459A21



MEMO:

35. Seat Belt Warning and Key Warning System S903726

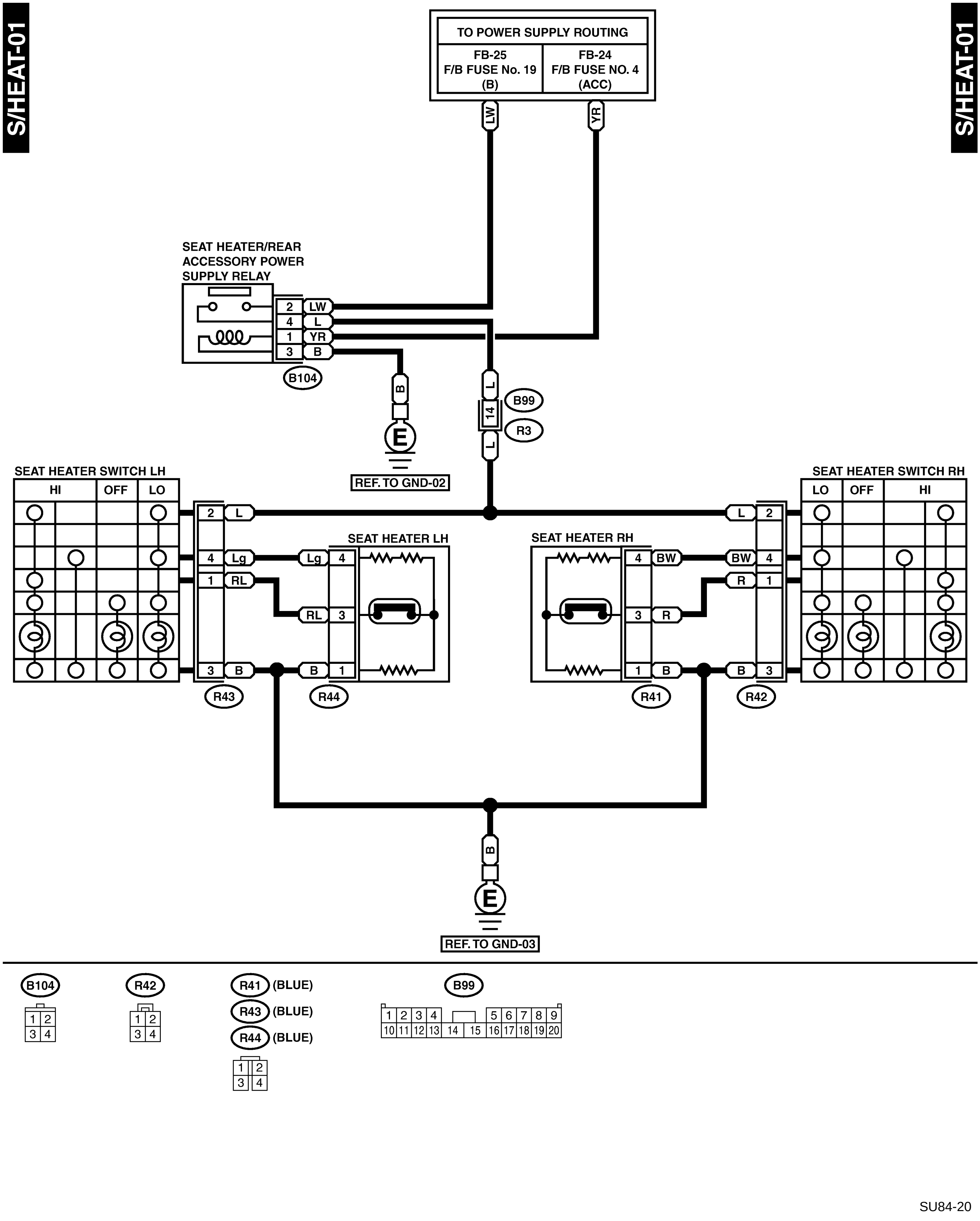
A: SCHEMATIC S903726A21



SU87-20

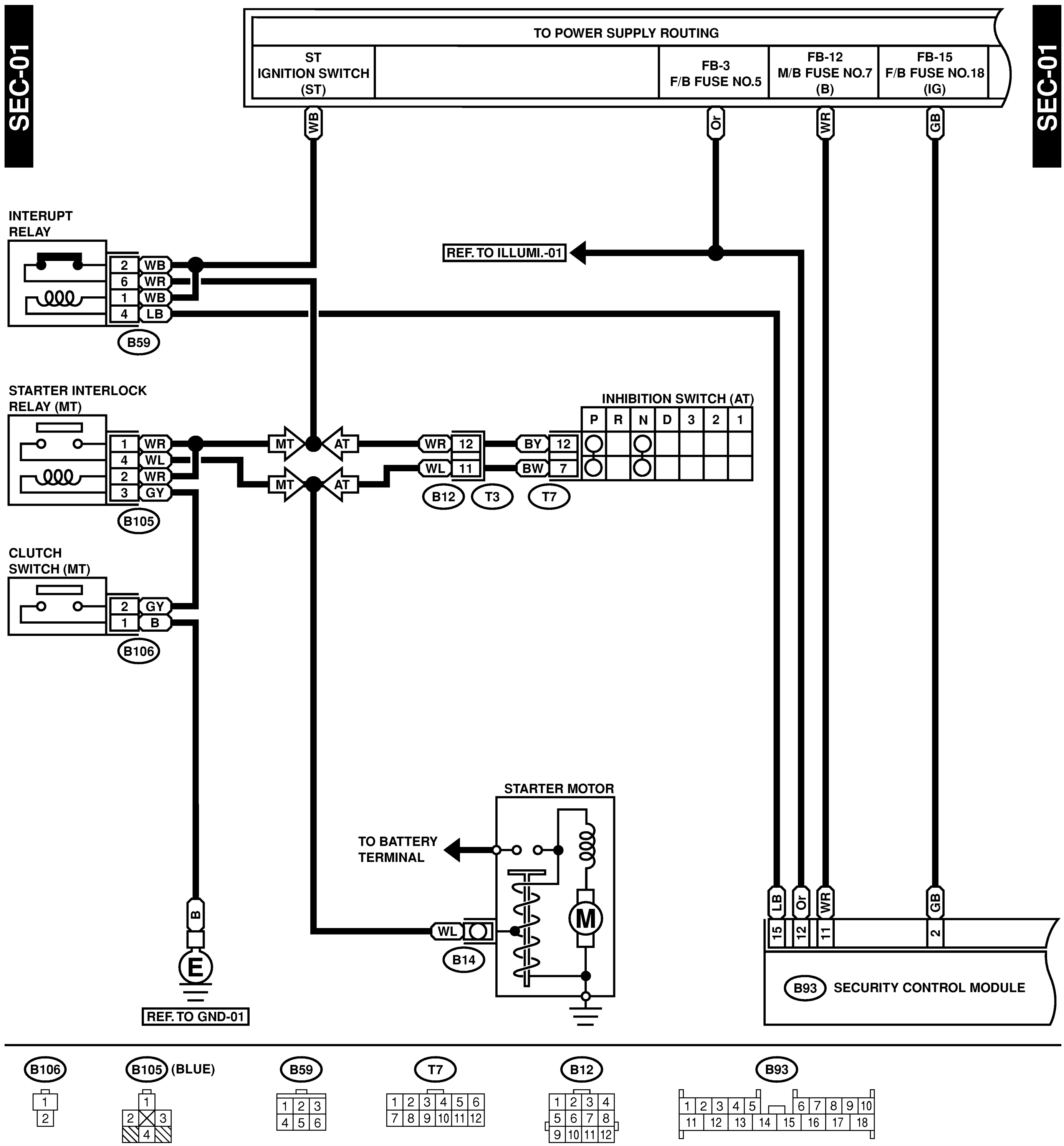
36. Seat Heater System *S903462*

A: SCHEMATIC *S903462A21*

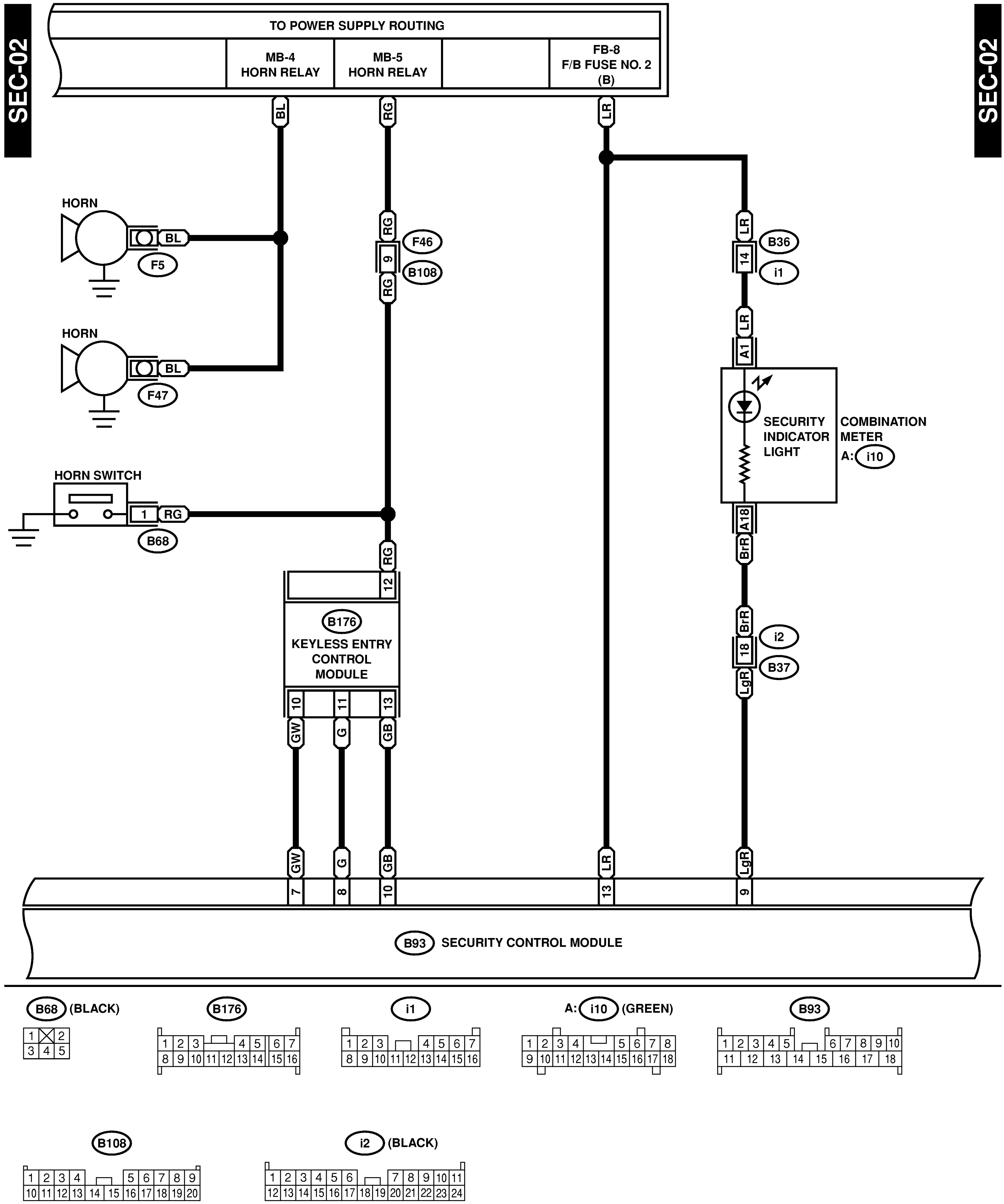


37. Security System S903347

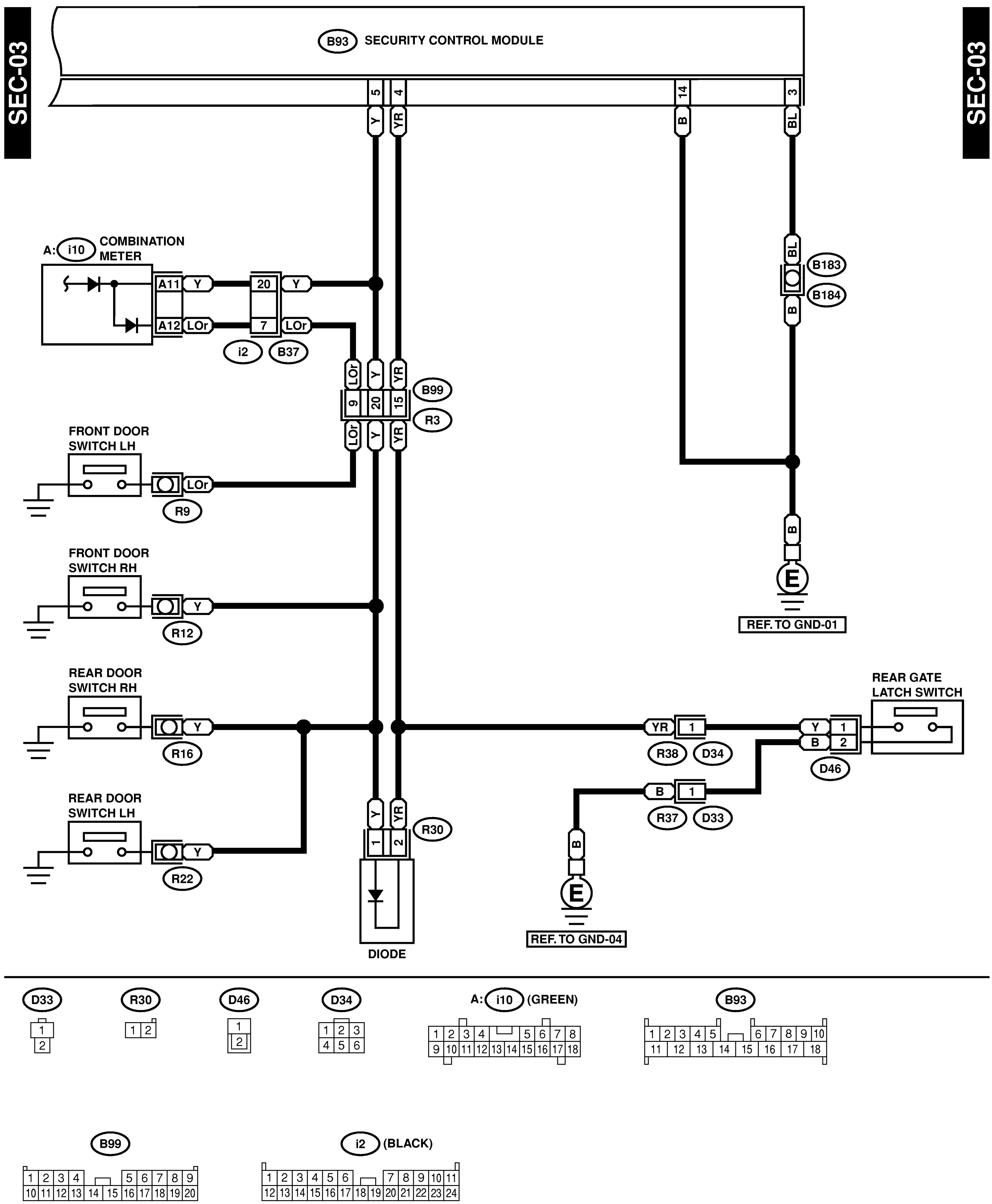
A: SCHEMATIC S903347A21



SU91-20A


SEC-02
SEC-02
TO POWER SUPPLY ROUTING
MB-4
HORN RELAY
MB-5
HORN RELAY
FB-8
F/B FUSE NO. 2
(B)
BL
RG
LR
HORN
BL
F5
HORN
BL
F47
HORN SWITCH
1
RG
B68
RG
9
F46
B108
RG
LR
14
B36
i1
LR
A1
SECURITY
INDICATOR
LIGHT
COMBINATION
METER
A: i10
A18
BrR
BrR
18
i2
B37
LgR
RG
12
B176
KEYLESS ENTRY
CONTROL
MODULE
10
11
13
GW
G
GB
GW
G
GB
LR
LgR
7
8
10
13
9
B93 SECURITY CONTROL MODULE
B68 (BLACK)
1 2
3 4 5
B176
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16
i1
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16
A: i10 (GREEN)
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16 17 18
B93
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18
B108
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19 20
i2 (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

SU91-20B

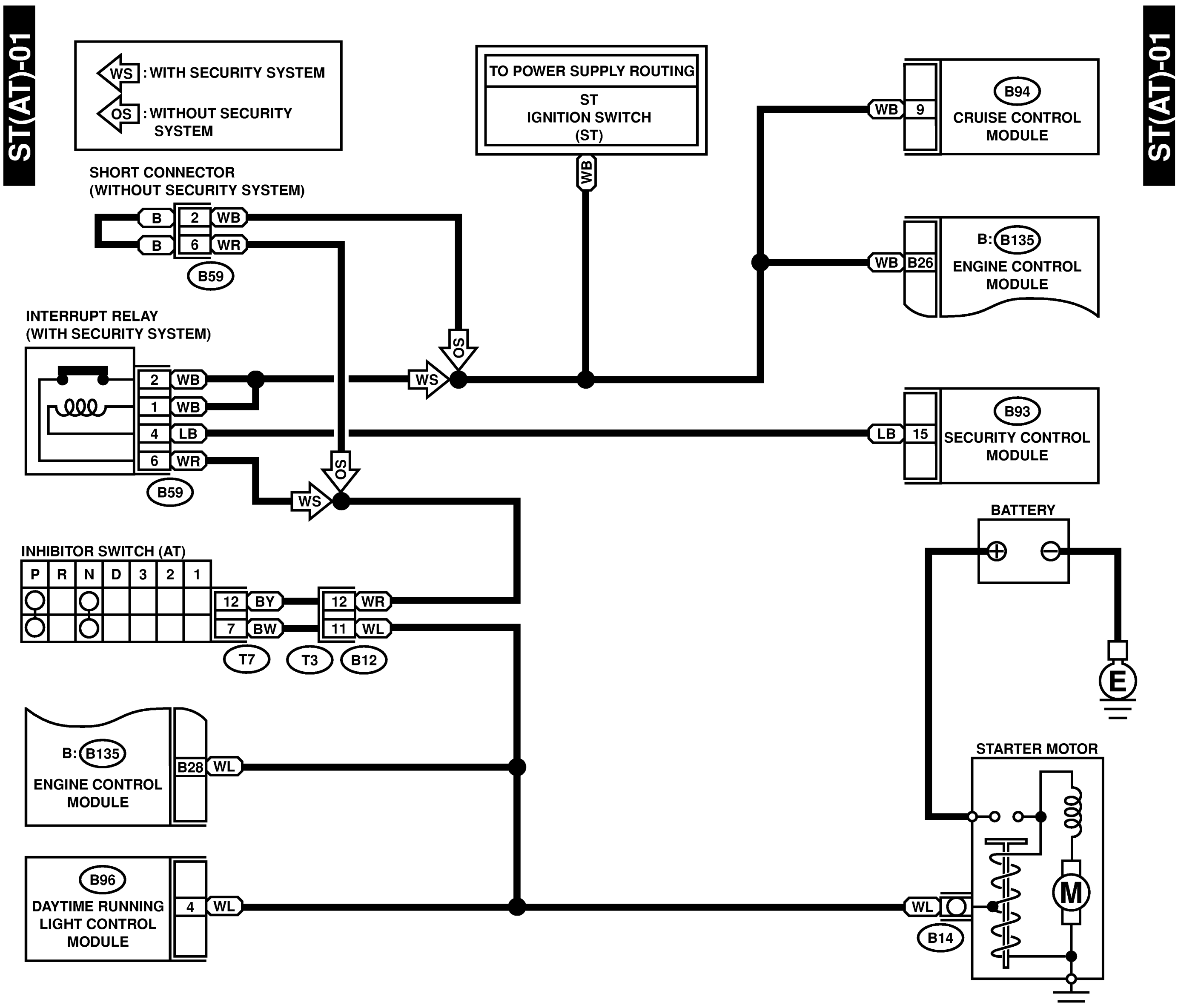

SEC-03
B93 SECURITY CONTROL MODULE
5
4
14
3
Y
YR
B
BL
A: i10 COMBINATION METER
A11
A12
Y
LOr
20
7
i2
B37
BL
B183
B184
B
LOr
Y
YR
9
20
15
B99
R3
FRONT DOOR SWITCH LH
R9
FRONT DOOR SWITCH RH
R12
REF. TO GND-01
REAR DOOR SWITCH RH
R16
REAR GATE LATCH SWITCH
1
2
R38
D34
D46
R37
D33
REAR DOOR SWITCH LH
R22
R30
DIODE
REF. TO GND-04
E
D33
R30
D46
D34
A: i10 (GREEN)
B93
B99
i2 (BLACK)

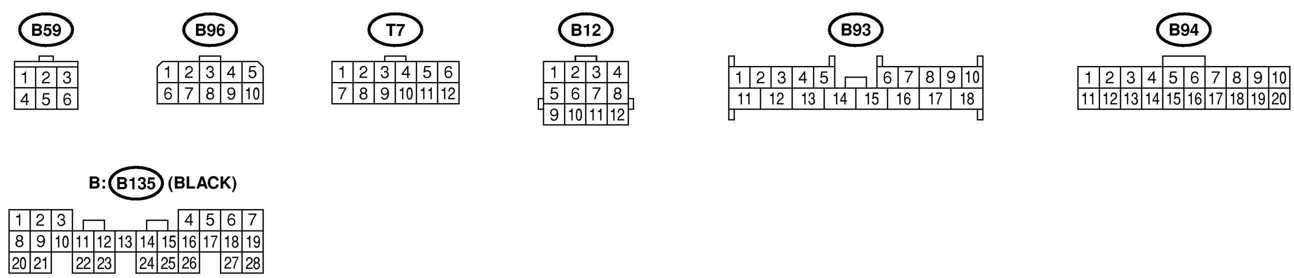
SU91-20C

38. Starter System S903439

A: SCHEMATIC S903439A21

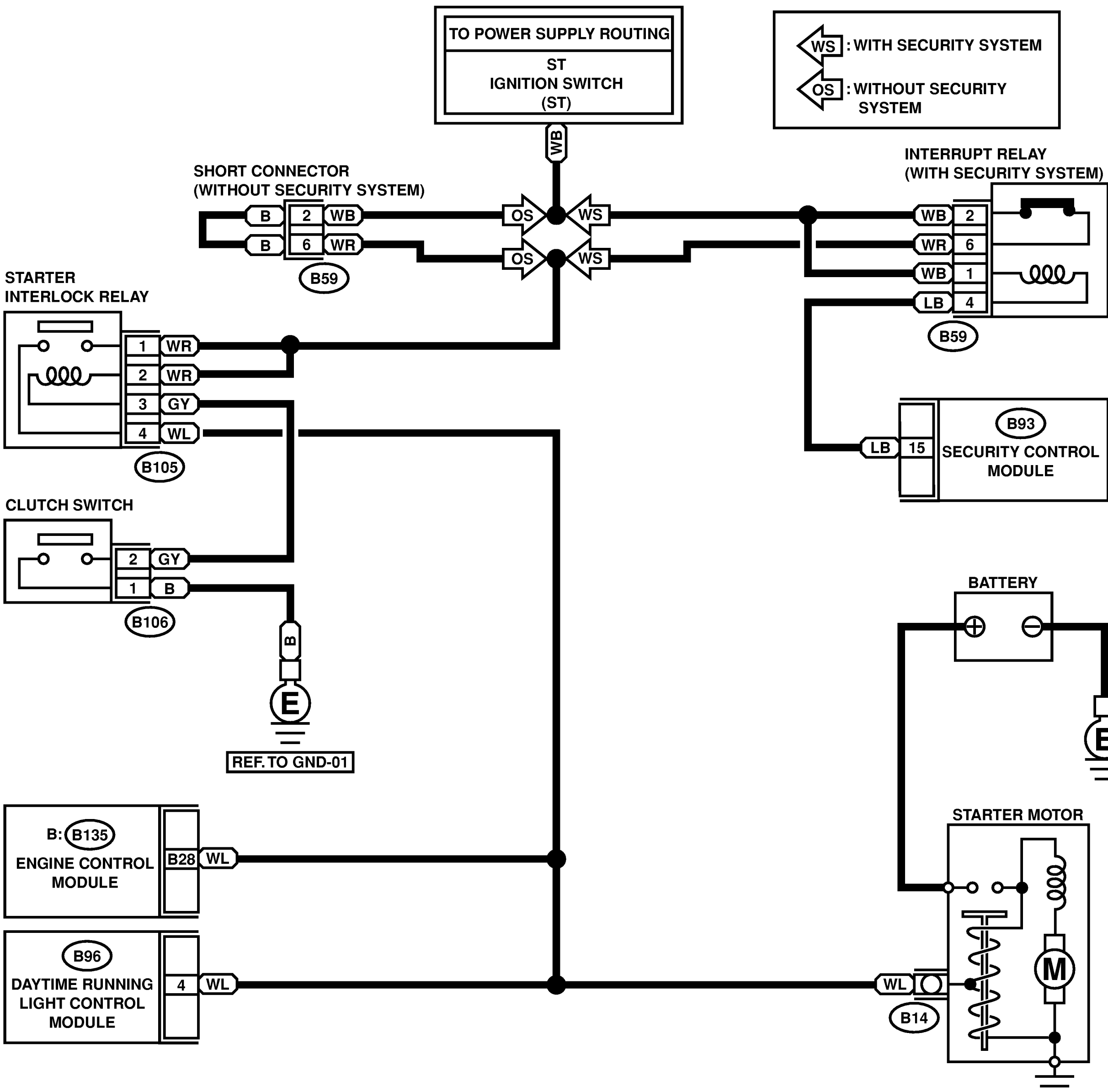
1. AT MODEL S903439A2102

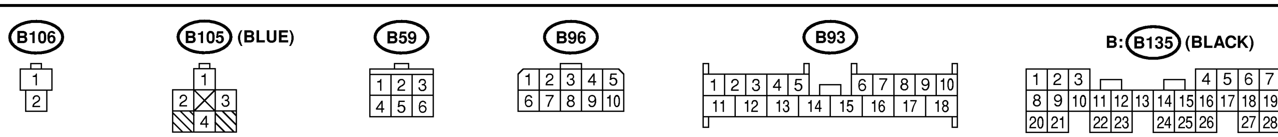




SU03-20

2. MT MODEL *S903439A2101*



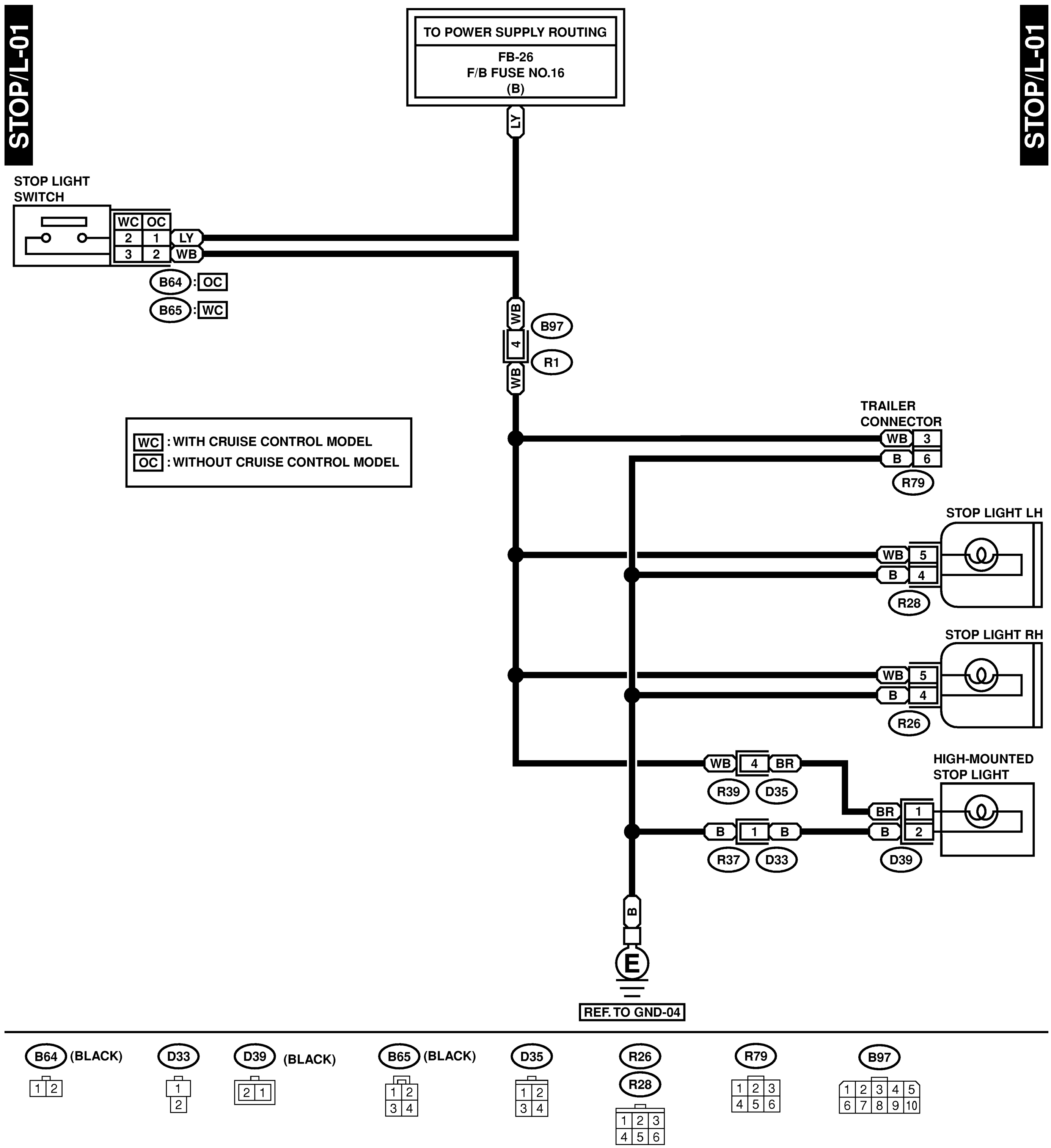


ST(MT)-01

SU03-21

39. Stop Light System *S903417*

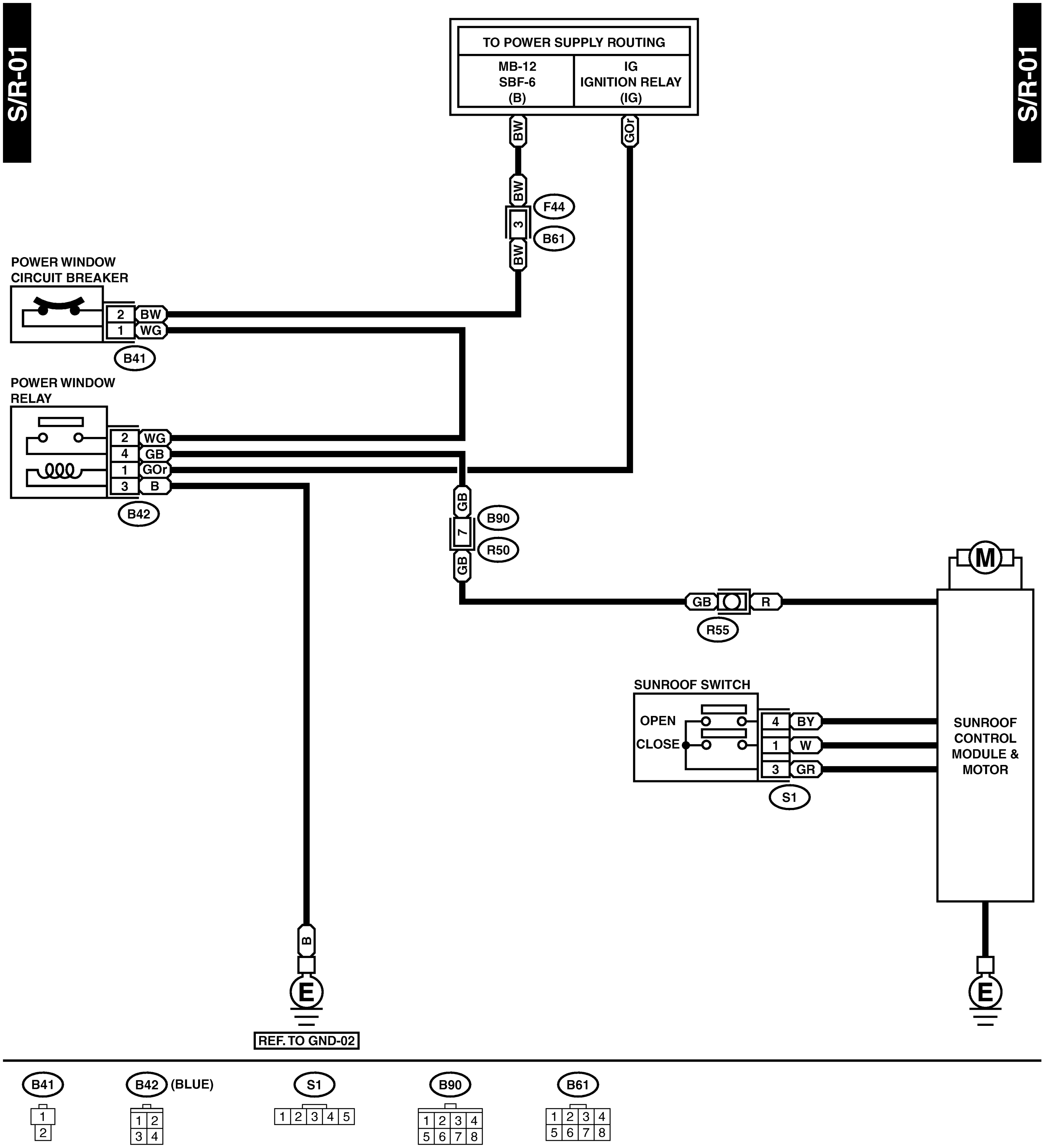
A: SCHEMATIC *S903417A21*



SU25-20

40. Sunroof System *S903440*

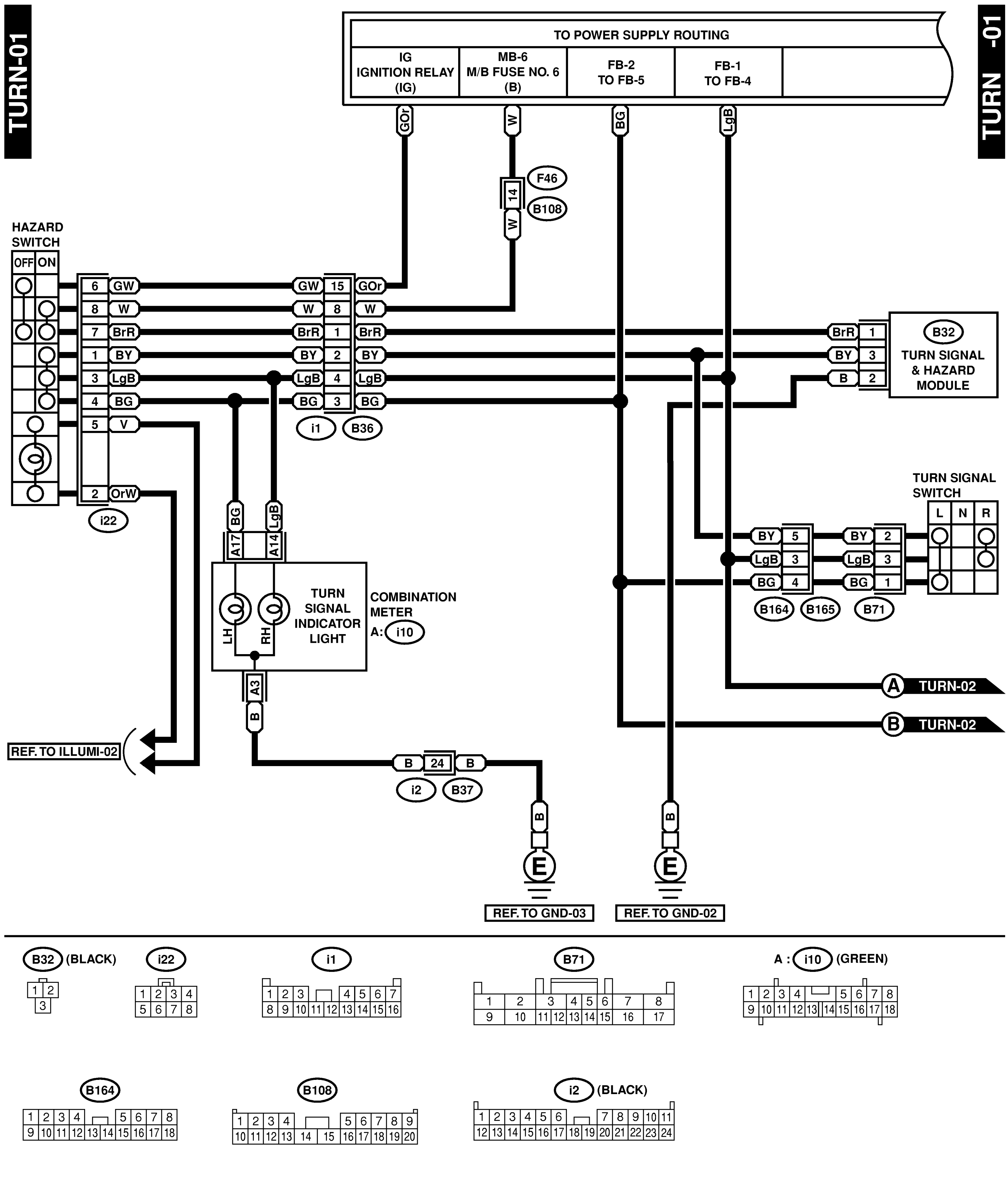
A: SCHEMATIC *S903440A21*



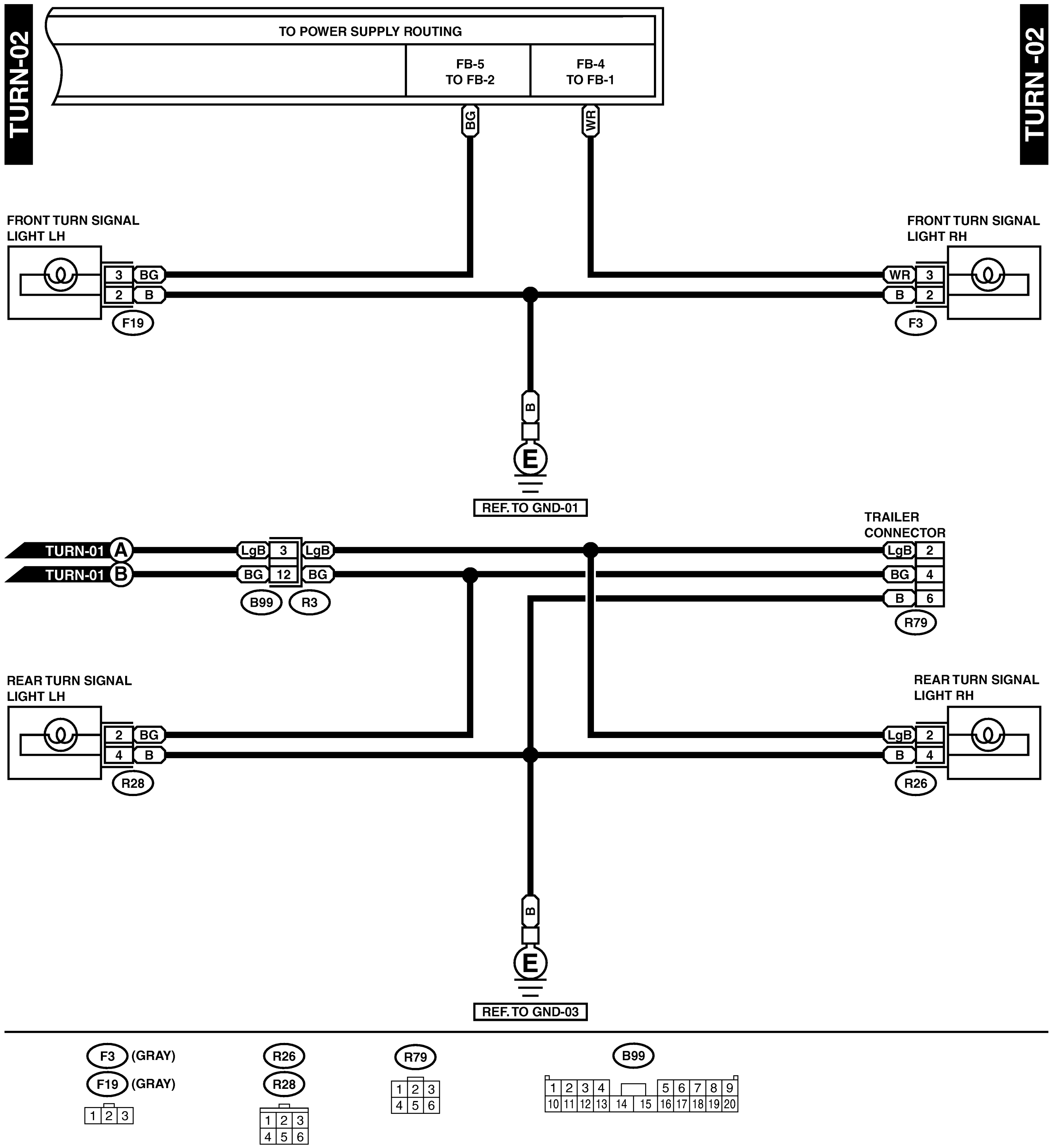
SU75-20

41. Turn Signal Light and Hazard Light System S903481

A: SCHEMATIC S903481A21



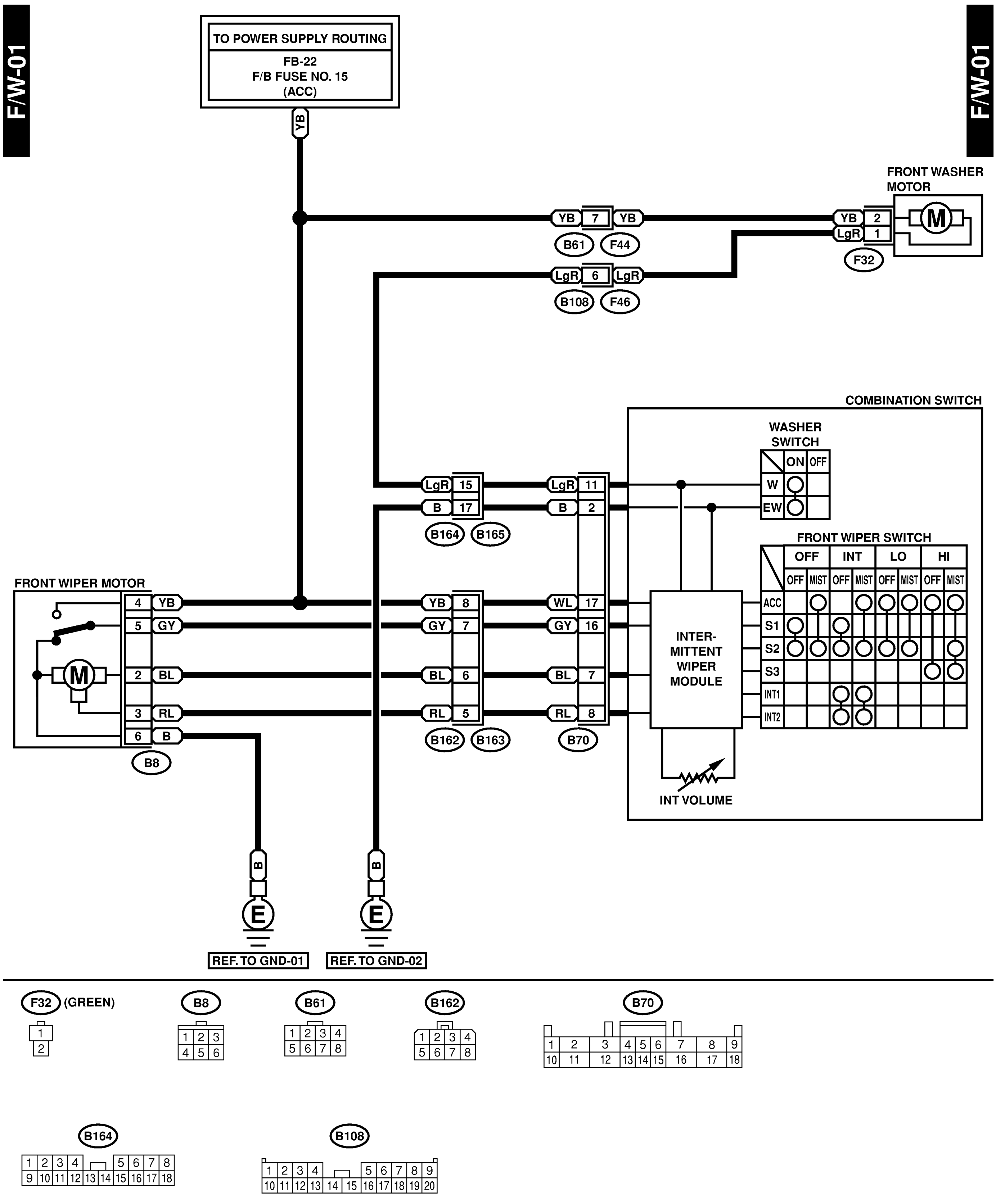
SU26-20A


TURN-02
TURN -02
TO POWER SUPPLY ROUTING
FB-5
TO FB-2
FB-4
TO FB-1
BG
WR
FRONT TURN SIGNAL
LIGHT LH
FRONT TURN SIGNAL
LIGHT RH
F19
F3
B
E
REF. TO GND-01
TURN-01 A
TURN-01 B
LgB
BG
B99
R3
TRAILER
CONNECTOR
R79
REAR TURN SIGNAL
LIGHT LH
REAR TURN SIGNAL
LIGHT RH
R28
R26
REF. TO GND-03
F3 (GRAY)
F19 (GRAY)

SU26-20B

42. Wiper and Washer System (Front) S903442

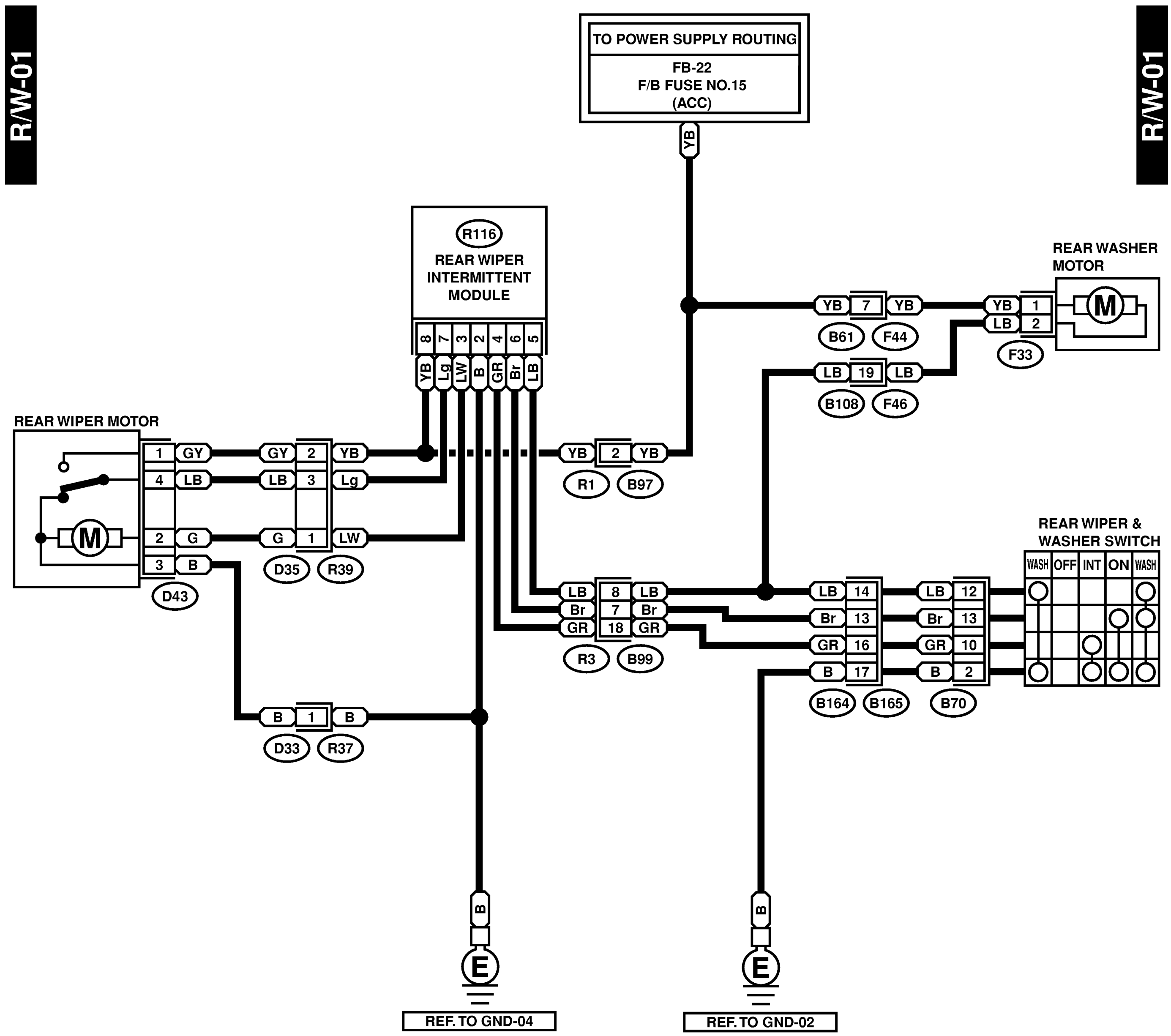
A: SCHEMATIC S903442A21

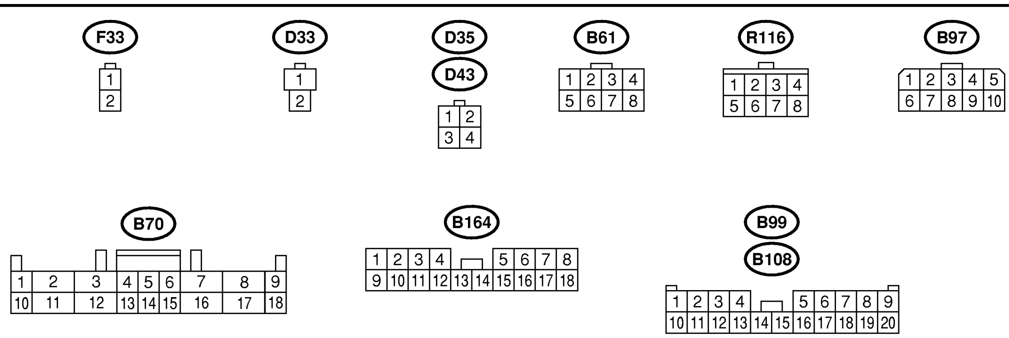


SU50-20

43. Wiper and Washer System (Rear) *S903443*

A: SCHEMATIC *S903443A21*

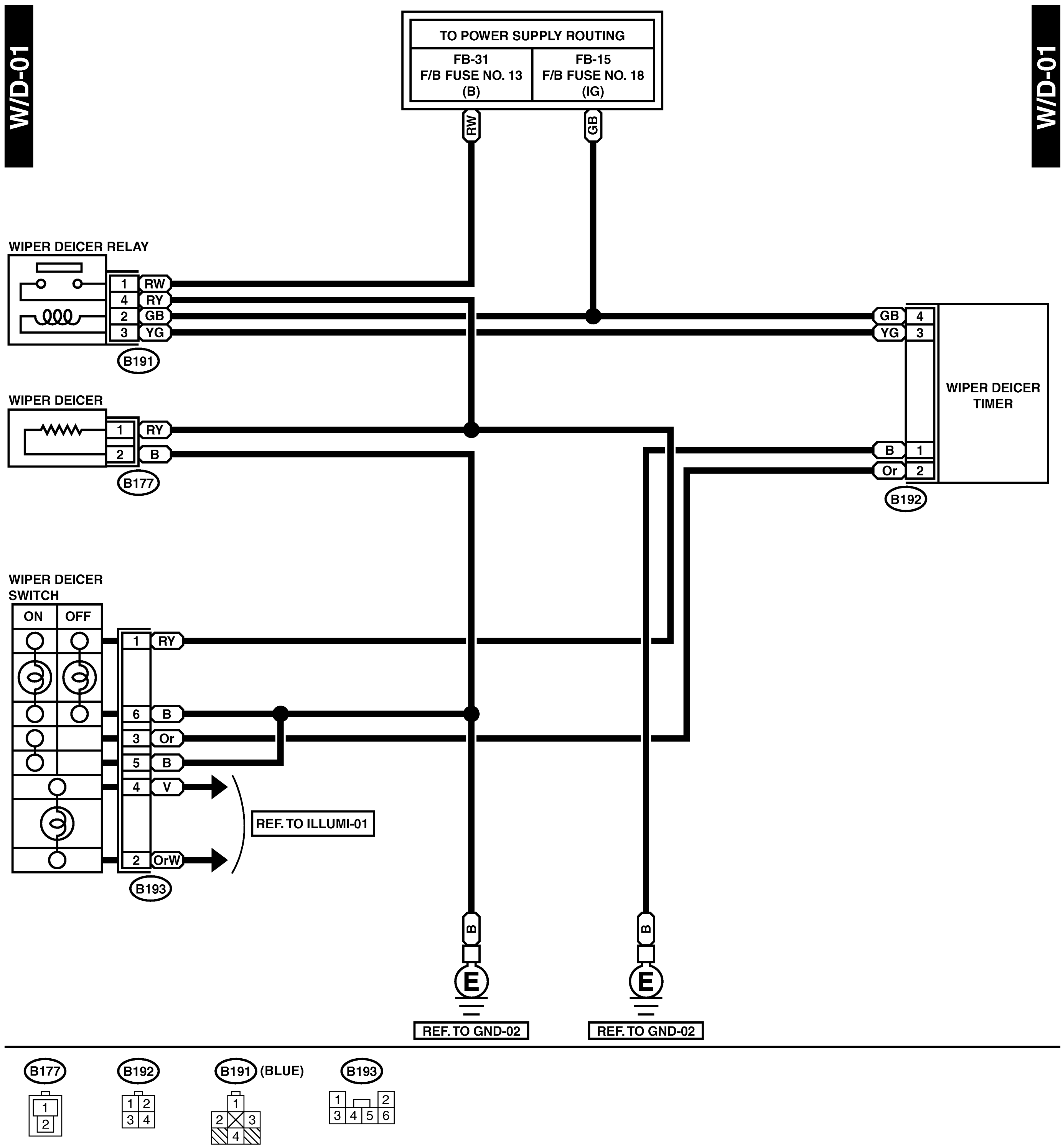




SU51-20

44. Wiper Deicer System S903444

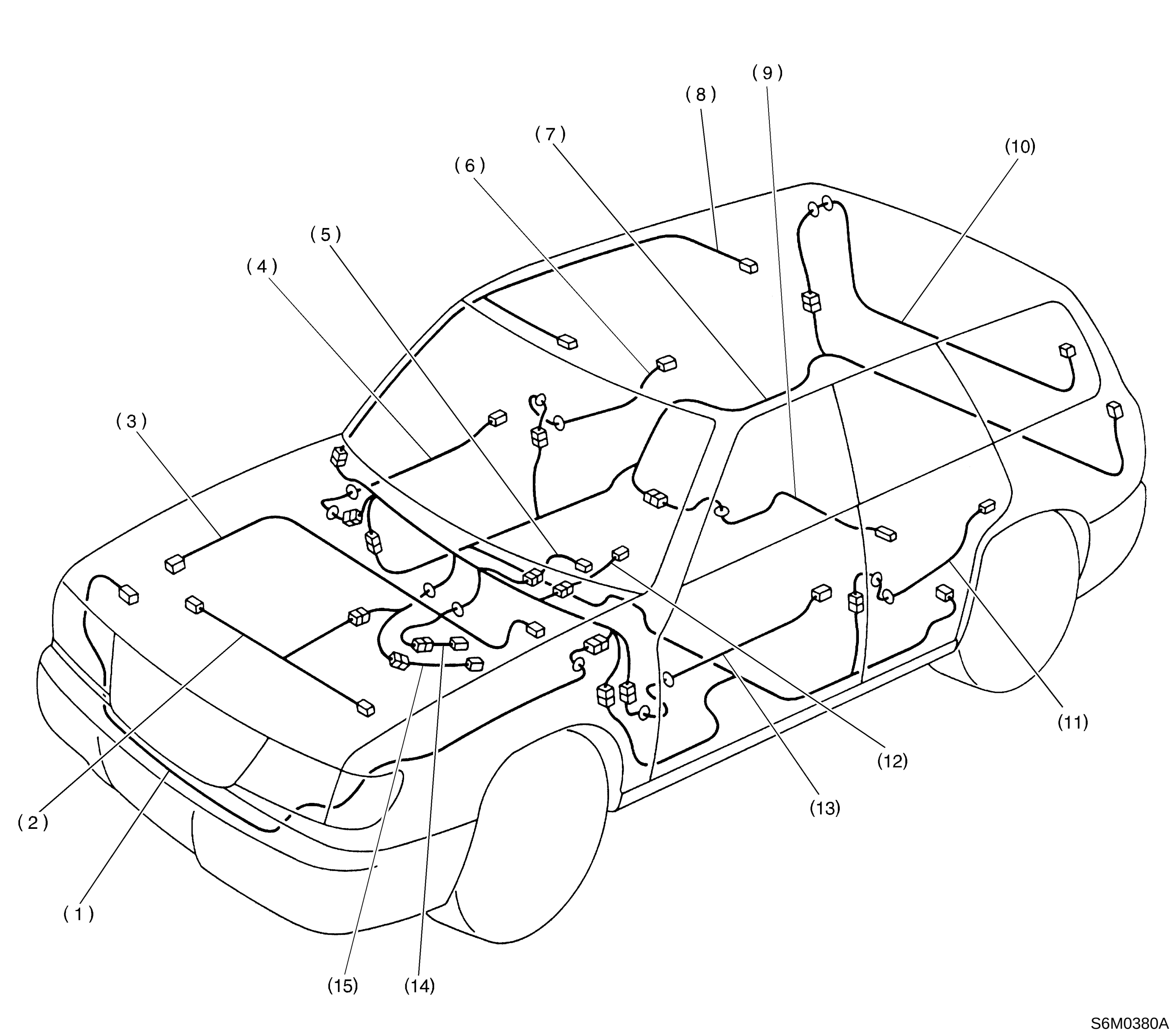
A: SCHEMATIC S903444A21



MEMO:

45. Overall Systems S903672

A: LOCATION S903672A13



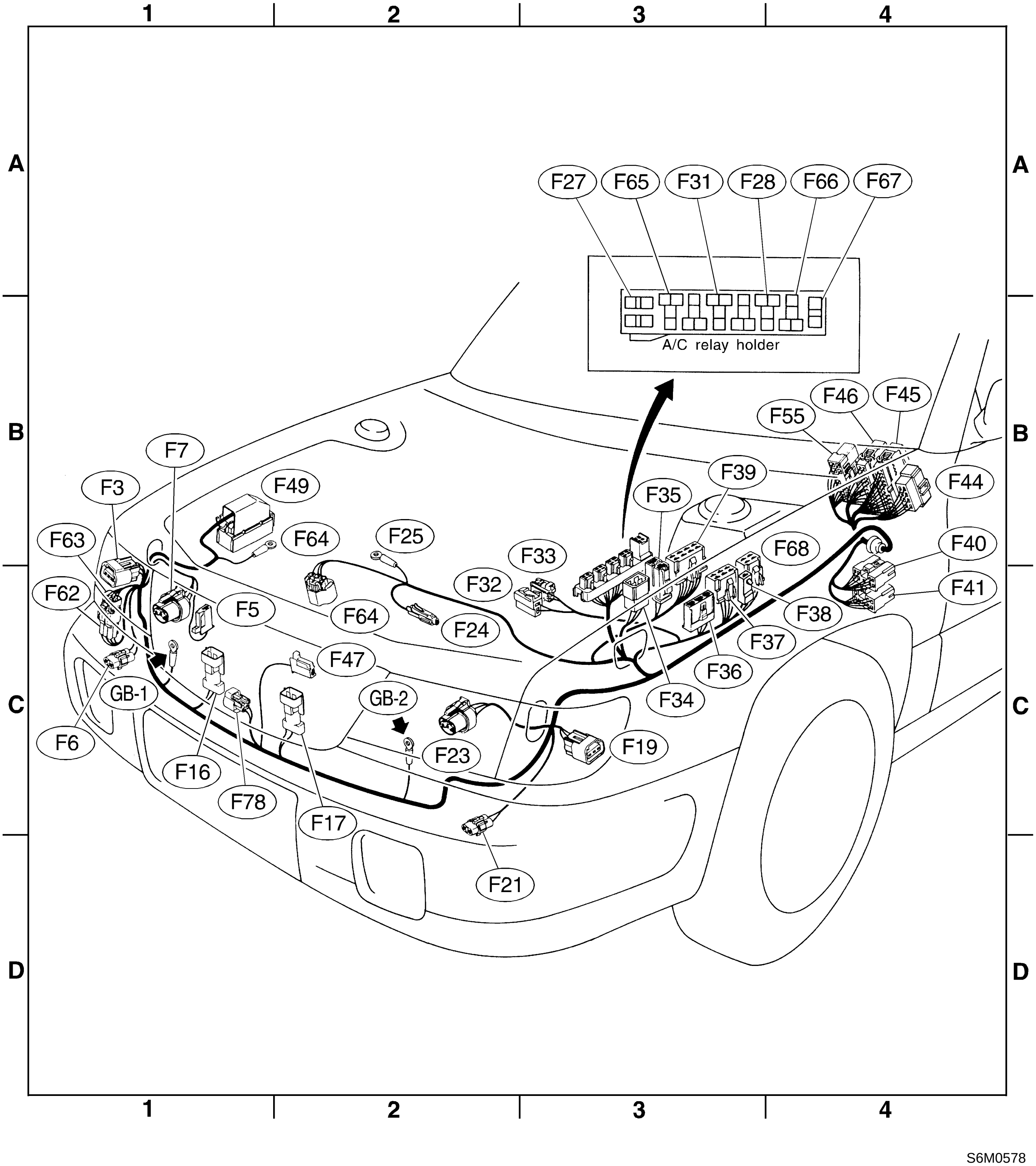
(1) Front wiring harness
(2) Engine wiring harness
(3) Bulkhead wiring harness
(4) Front door cord RH
(5) Instrument panel wiring harness
(6) Rear door cord RH
(7) Rear wiring harness
(8) Roof cord
(9) Fuel tank cord
(10) Rear gate cord
(11) Rear door cord LH
(12) Combination switch cord
(13) Front door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

46. Front Wiring Harness S903445

A: LOCATION S903445A13

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
F3	3	Gray	B-1		Front turn signal light & clearance light RH
F5	1	★	B-1		Horn
F6	2	Black	B-1		Front fog light RH
F7	3	★	B-1		Headlight RH
F16	2	Black	B-1		Sub fan motor
F17	2	Black	B-2	B-2	Radiator main fan motor
F19	3	Gray	C-3		Front turn signal light & clearance light LH
F21	2	Black	C-2		Front fog light LH
F23	3	★	B-2		Headlight LH
F24	1	Black	B-2		A/C compressor
F25	1	★	B-2		Generator
F26	3	Green	B-2		
F27	4	★	B-3		A/C fuse (Relay holder)
F28	4	★	B-3		A/C sub fan relay (Relay holder)
F31	4	★	B-3		A/C relay (Relay holder)
F32	2	Green	B-3		Front washer motor
F33	2	★	B-3		Rear washer motor
F34	4	★	B-3		SBF holder (ABS)
F35	2	★	B-3		Main fuse box (M/B)
F36	3	★	B-3		
F37	6	Black	B-3		
F38	1	★	B-3		
F39	8	Black	B-3		
F40	9	Brown	B-4		Fuse and relay box (F/B)
F41	7	Gray	B-4		
F44	8	★	B-4	B61	Bulkhead wiring harness
F45	16	★	B-4	B62	
F46	20	★	B-4	B108	
F47	1	★	B-2		Horn
F49	31	★	B-2		ABS control module
F55	12	★	B-4	R48	Rear wiring harness (ABS)
F62	6	★	B-1	F63	Shield joint connector (ABS)
F63	6	★	B-1	F62	
F64	1	★	B-2		ABS motor ground
F65	4	★	B-3		Front fog light relay (Relay holder)
F66	4	★	B-3		Radiator main fan relay (Relay holder)
F67	2	★	B-3		FWD switch (Relay holder)
F68	4	Black	B-3		Main fuse box (M/B)
F78	2	Black	C-2		Outside temperature sensor

★: Non-colored


1
2
3
4
A
B
C
D
F27
F65
F31
F28
F66
F67
A/C relay holder
F46
F45
F55
F7
F39
F44
F3
F49
F35
F64
F25
F33
F68
F40
F63
F32
F62
F5
F64
F24
F38
F41
F47
F37
GB-1
F36
GB-2
F34
F6
F19
F23
F16
F78
F17
F21
S6M0578

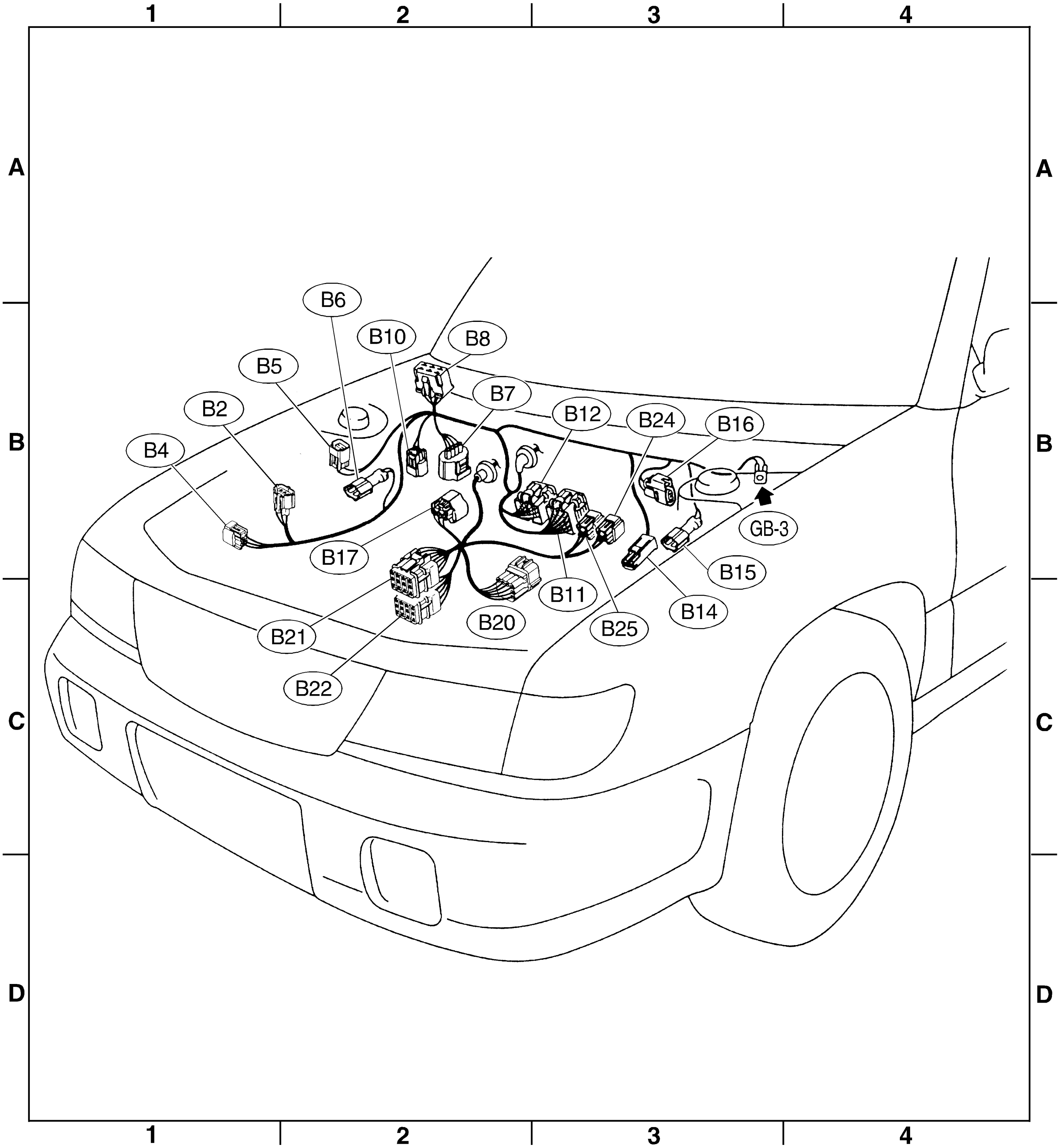
47. Bulkhead Wiring Harness (In Engine Room) S903438

A: LOCATION S903438A13

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B2	3	★	B-1		Atmospheric pressure sensor
B4	4	Gray	B-1		AT dropping resistor
B5	2	Gray	B-2		Resistor (Daytime running light)
B6	2	Brown	B-2		ABS front sensor RH
B7	4	★	B-2		Cruise control actuator
B8	6	★	A-2		Front wiper motor
B10	2	Gray	B-2		A/C pressure switch
B11	20	Black	B-3	T4	Transmission (AT)
B12	12	★	B-3	T3	
B14	1	★	B-3		Starter (Magnet)
B15	2	Brown	B-3		ABS front sensor LH
B16	2	Gray	B-3		Brake fluid level switch
B17	3	★	B-2		Vehicle speed sensor (M/T)
B20	10	★	B-2	E1	Oxygen sensor cord
B21	20	Light gray	B-2	E2	Engine wiring harness
B22	16	Brown	B-2	E3	Engine wiring harness
B24	2	Gray	B-3	T1	Back-up light switch (MT)
B25	2	Brown	B-3	T2	Neutral position switch (MT)

★: Non-colored

BULKHEAD WIRING HARNESS (IN ENGINE ROOM)



S6M0381A

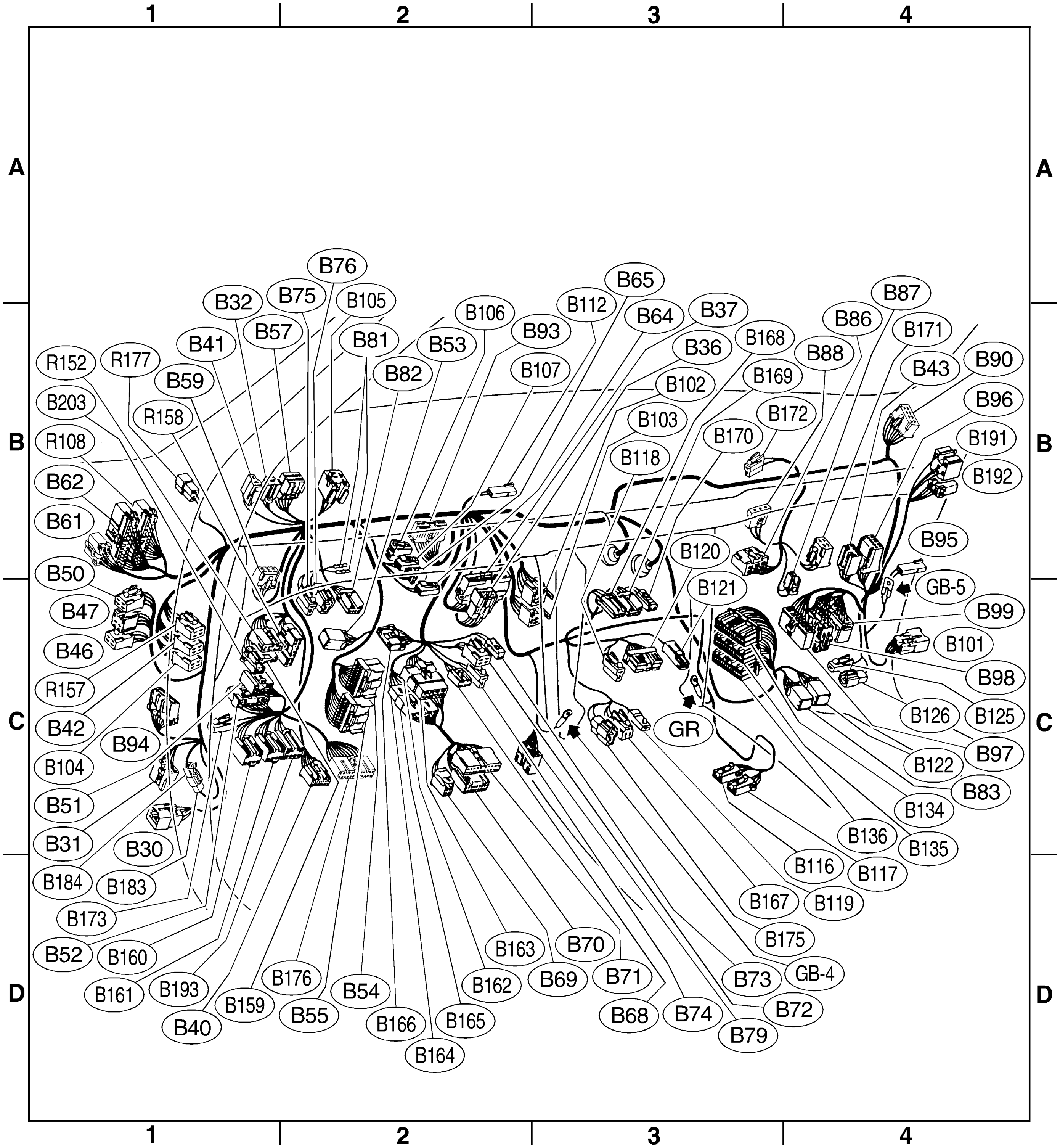
48. Bulkhead Wiring Harness (In Compartment) S903446

A: LOCATION S903446A13

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B30	25	★	C-1	D1	Front door cord LH
B31	7	★	C-1	AB1	SRS (Airbag) harness
B32	3	Black	B-1		Turn & hazard module
B36	16	★	B-2	i1	Instrument panel meter harness
B37	24	Black	B-2	i2	
B40	16	★	C-2		Data link connector
B41	2	★	B-1		Power window circuit breaker
B42	4	Blue	C-1		Power window relay
B43	6	Brown	B-4		Illumination control module
B46	4	Green	C-1		Fuel pump relay
B47	6	Brown	C-1		Main relay
B50	4	★	B-1		Blower relay
B51	8	Blue	C-1		Fuse and relay box (F/B)
B52	12	Blue	C-1		
B53	6	★	C-2		Shield joint connector (AT)
B54	24	★	C-2		Transmission control module
B55	24	Gray	C-2		
B57	12	★	B-1		Shift lock control module (A/T)
B59	6	★	B-1		Interrupt relay
B61	8	★	B-1	F44	Front wiring harness
B62	16	★	B-1	F45	
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	★	C-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 (AT)
B74	2	Black	C-2		Key warning switch
B75	2	Green	B-2	B76	Test mode connector
B76	2	Green	B-2	B75	
B79	14	Gray	C-3		Check connector
B81	1 × 2	★	B-2		Diagnosis terminal (Ground)
B82	6	Black	B-2		Diagnosis connector
B83	6	★	C-4		Shield joint connector (E/G)
B86	6	★	B-3		Blower motor resistor
B87	2	★	B-4		Blower motor
B88	3	★	B-3		Evaporator thermoswitch
B90	8	★	B-4	R50	Roof cord
B93	18	★	B-2		Security control module
B94	20	★	C-1		Cruise control module
B95	2	★	B-4		Diode (Daytime running light)
B96	10	★	B-4		Daytime running light control module
B97	10	Blue	C-4	R1	Rear wiring harness
B98	12	★	C-4	R2	
B99	20	★	C-4	R3	
B101	25	★	C-4	D11	Front door cord RH
B102	5	Black	B-2		Daytime running light relay
B103	4	Blue	B-2		HI-beam relay (Daytime running light)

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B104	4	★	C-1		Seat heater/rear accessory power supply relay
B105	4	Blue	B-2		Starter interlock relay (MT)
B106	2	★	B-2		Clutch switch (MT)
B107	2	Blue	B-2		Clutch switch (Cruise control)
B108	20	★	B-1	F46	Front wiring harness
B112	2	★	B-2		Diode (Front fog light)
B116	4	Black	C-3		Select lever illumination light (AT)
B117	4	★	C-3		Parking position switch & shift lock solenoid (AT)
B118	2	★	C-3		CD player illumination light
B119	1	★	C-3		Front accessory power supply (Power)
B120	14	★	C-3		Radio
B121	1	★	C-3		Audio bracket ground
B122	6	★	C-4		Sensor ground joint connector (E/G)
B125	1	Green	C-4	B126	Test mode connector
B126	1	Green	C-4	B125	
B134	35	Black	C-3		Engine control module
B135	28	Black	C-3		
B136	30	Black	C-3		
B152	7	★	C-1		Fuse and relay box (F/B)
B157	4	Red	C-1		Ignition relay
B158	12	★	C-1		Fuse and relay box (F/B)
B159	10	Gray	C-1		Fuse and relay box (F/B)
B160	6	Gray	C-1		Front fog light switch
B161	6	Brown	C-1		Cruise control main switch
B162	8	★	C-2	B163	Combination switch cord
B163	8	★	C-2	B162	Bulkhead wiring harness
B164	18	★	C-2	B165	Combination switch cord
B165	18	★	C-2	B164	Bulkhead wiring harness
B166	10	★	C-2		Key warning module
B167	3	★	C-3		Front accessory power supply (Ground)
B168	3	★	B-3		A/C switch
B169	6	★	B-3		Blower fan switch
B170	2	★	B-3		Mode control panel illumination light
B171	4	Black	B-4		Mirror heater relay
B172	2	★	B-3		Condensor (Mirror heater)
B173	1	★	C-1		IG power supply connector
B175	2	★	C-3		Ash tray illumination light
B176	16	★	C-2		Keyless entry control module
B177	2	★	B-1		Wiper deicer
B183	1	★	C-1	B184	Program connector +
B184	1	★	C-1	B183	Program connector −
B191	4	Blue	B-4		Wiper deicer relay
B192	4	★	B-4		Wiper deicer timer
B193	6	★	C-1		Wiper deicer switch
B203	4	Black	C-1		Noise filter

★: Non-colored


1
2
3
4
A
B
C
D
B76
B65
B32
B75
B105
B106
B112
B64
B37
B87
B41
B57
B81
B53
B93
B36
B168
B86
B171
R152
R177
B59
B82
B107
B102
B169
B88
B43
B90
B203
R158
B103
B172
B96
R108
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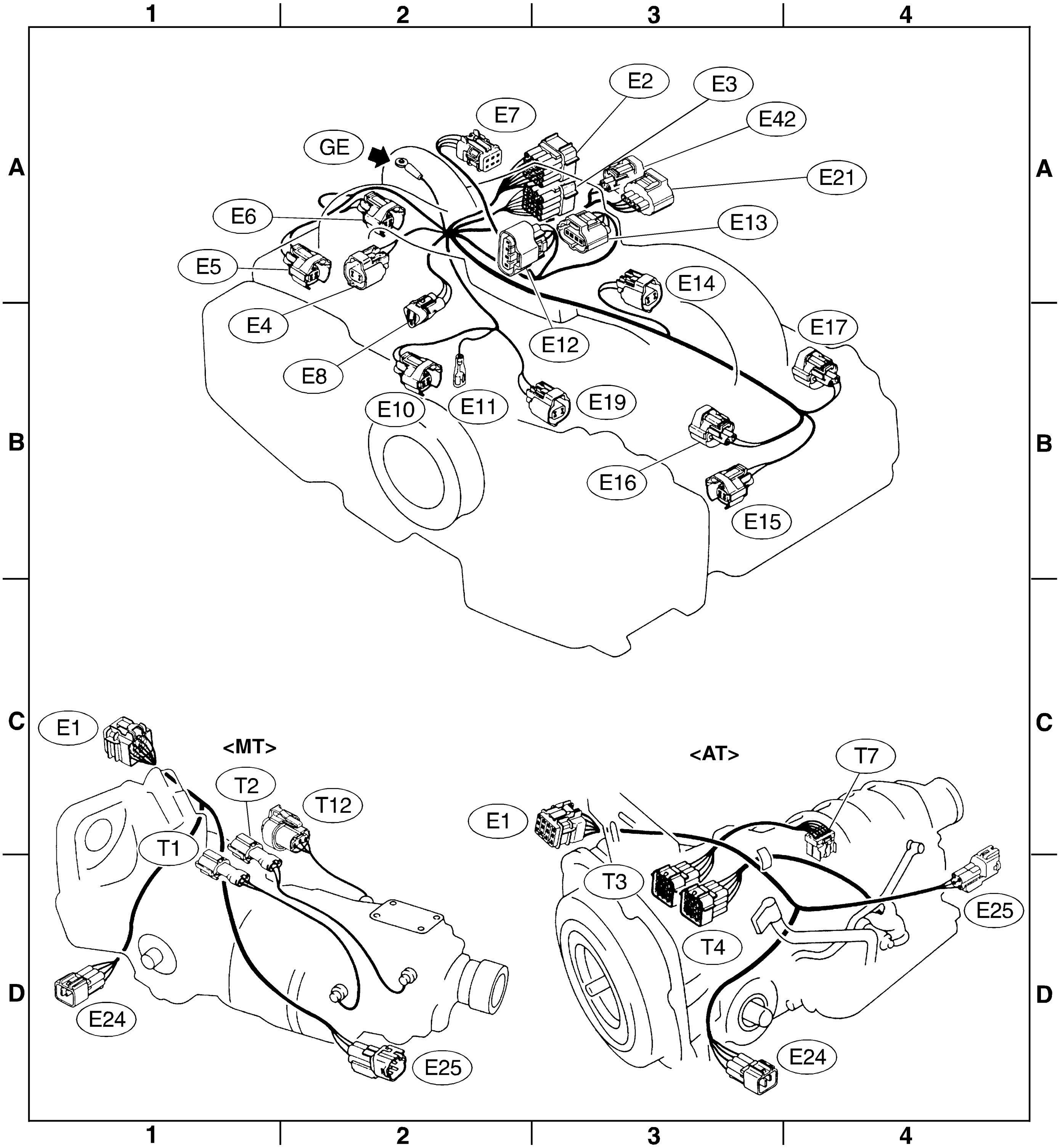
B119
B175
B52
B160
B163
B70
B161
B193
B176
B54
B162
B69
B71
B73
GB-4
B159
B55
B166
B165
B68
B74
B72
B40
B79
B164
S6M0579

49. Engine Wiring Harness and Transmission Cord S903447

A: LOCATION S903447A13

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
E1	10	★	C-1/C-3	B20	Bulkhead wiring harness
E2	20	Light gray	A-3	B21	
E3	16	Brown	A-3	B22	
E4	2	Black	A-2		Purge control solenoid valve
E5	2	Light gray	A-2		Injector #1
E6	2	Light gray	A-2		Injector #3
E7	6	Black	A-2		Idle air control solenoid valve
E8	3	Light gray	B-2		Engine coolant temperature sensor and thermometer
E10	2	Light gray	B-2		Crankshaft position sensor
E11	1	★	B-2		Oil pressure switch
E12	4	Gray	A-3		Ignition coil and ignitor
E13	4	Brown	A-3		Throttle position sensor
E14	2	★	B-3		Knock sensor
E15	2	Black	B-3		Camshaft position sensor
E16	2	Light gray	B-3		Injector #2
E17	2	Light gray	B-4		Injector #4
E19	2	★	B-3		Power steering oil pressure swtich
E21	4	Black	A-3		Pressure sensor and intake air temperature sensor
E24	6	★	D-1/D-3		Front oxygen (A/F) sensor
E25	4	★	D-2/D-4		Rear oxygen sensor
E42	2	Purple	A-3		Air assist solenoid valve
★: Non-colored					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
T1	2	Gray	C-1	B24	Bulkhead wiring harness (MT)
T2	2	Brown	C-1	B25	
T3	12	★	D-3	B12	Bulkhead wiring harness (AT)
T4	20	★	D-3	B11	
T7	12	★	C-4		Inhibitor switch (AT)
T12	3	★	C-2		Speed sensor cord (MT)
★: Non-colored					


1
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E2
E3
E7
E42
GE
E21
E6
E13
E5
E14
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E12
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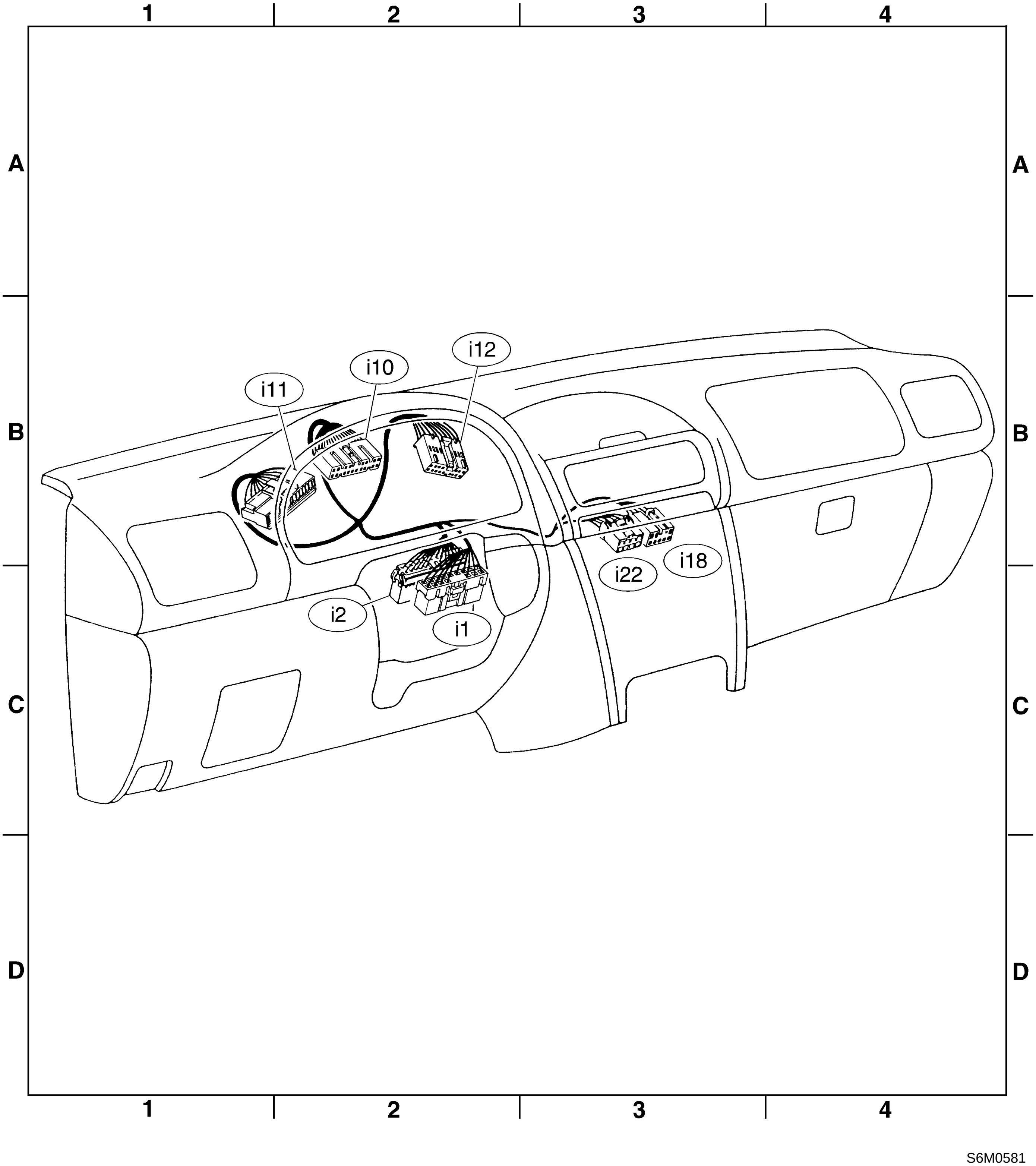
E19
E10
E11
E16
E15
E1
<MT>
T2
T12
T1
E24
E25
<AT>
T7
E1
T3
E25
T4
E24

S6M0580

50. Instrument Panel Wiring Harness S903435

A: LOCATION S903435A13

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
i1	16	★	B-2	B36	Bulkhead wiring harness
i2	24	Black	B-2	B37	
i10	18	Green	B-2		Combination meter
i11	10	Green	B-2		
i12	16	Green	B-2		
i18	8	★	B-3		Rear defogger switch
i22	8	★	B-3		Hazard switch
★: Non-colored					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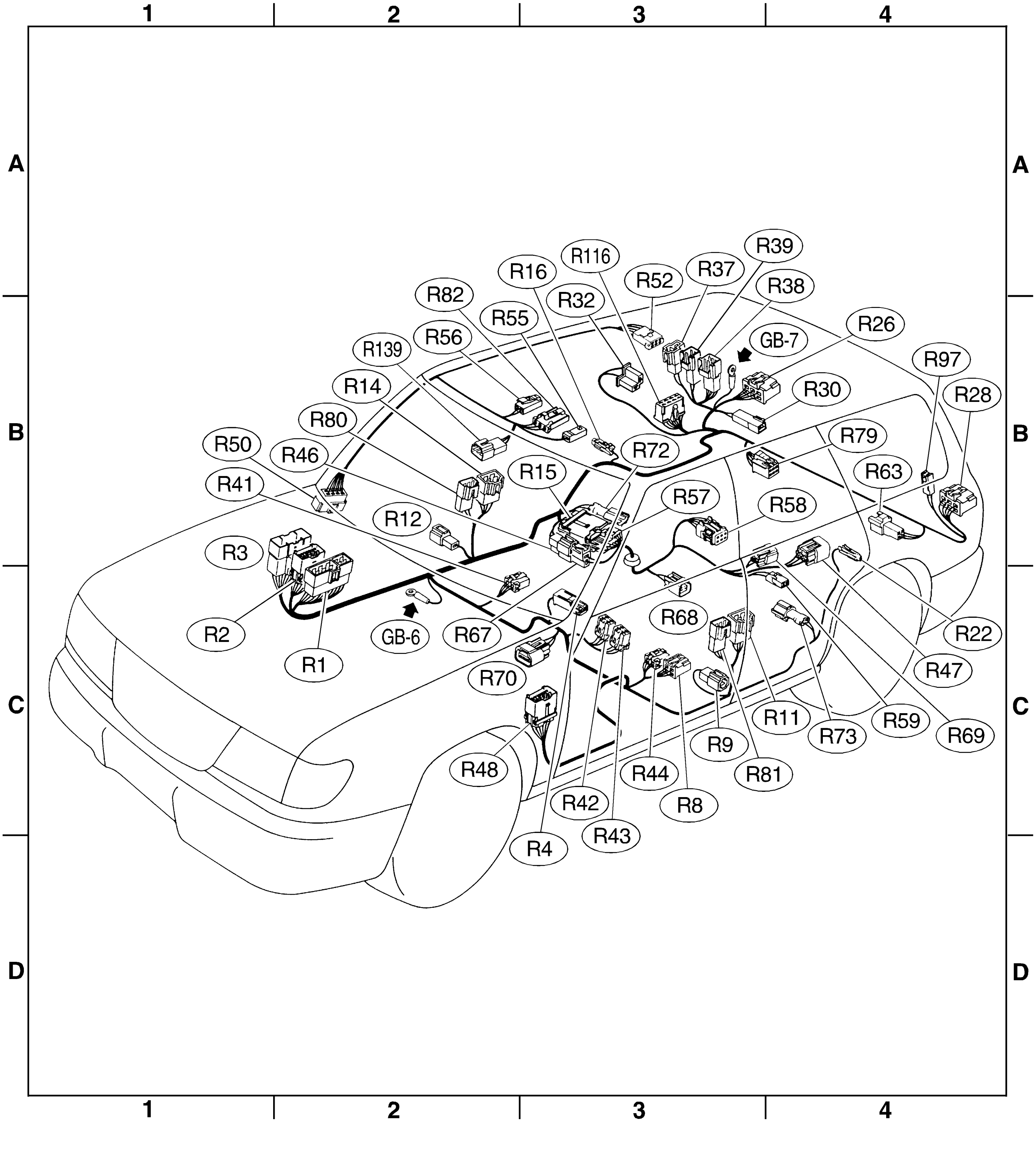
C
D
i12
i10
i11
i22
i18
i2
i1
S6M0581

51. Rear Wiring Harness S903431

A: LOCATION S903431A13

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
R1	10	Blue	B-2	B97	Bulkhead wiring harness
R2	12	★	B-2	B98	
R3	20	★	B-2	B99	
R4	1	Black	B-3		Parking brake switch
R8	4	★	B-3		Seat belt switch
R9	1	★	B-3		Front door switch LH
R11	4	★	B-3	D21	Rear door cord LH
R12	1	★	B-2		Front door switch RH
R14	4	★	B-2	D27	Rear door cord RH
R15	12	★	B-3	R57	Fuel tank cord
R16	1	Brown	B-3		Rear door switch RH
R22	1	Brown	B-4		Rear door switch LH
R26	6	★	A-3		Rear combination light RH
R28	6	★	B-4		Rear combination light LH
R30	2	★	A-3		Diode (Luggage room light)
R32	2	★	A-3		Rear accessory power supply socket
R37	2	★	A-3	D33	Rear gate cord
R38	6	★	A-3	D34	
R39	4	★	A-3	D35	
R41	4	Blue	B-2		Seat heater RH
R42	4	★	B-3		Seat heater switch RH
R43	4	Blue	B-3		Seat heater switch LH
R44	4	Blue	B-3		Seat heater LH
R46	2	★	B-3	R67	Fuel tank cord
R47	3	★	B-3		Fuel tank pressure sensor
R48	12	★	C-3	F55	Front wiring harness (ABS)
R50	8	★	B-2	B90	Bulkhead wiring harness
R52	2	★	A-3		Room light (With sunroof)
	3	★	A-3		Room light (Without sunroof)
R55	1	★	B-3		Sunroof motor
R56	2	★	A-2		Spot light
R57	12	★	B-3	R15	Rear wiring harness
R58	6	★	B-3		Fuel gauge module & fuel pump assembly
R59	2	★	B-3		Fuel gauge sub module
R63	4	★	B-4		License plate light
R67	2	★	B-3	R46	Rear wiring harness
R68	2	★	B-3		Pressure control solenoid valve
R69	2	★	B-3		Drain valve
R70	3	★	B-2		ABS G sensor
R72	2	★	B-3		Rear ABS sensor RH
R73	2	★	B-4		Rear ABS sensor LH
R79	6	★	B-3		Trailer connector
R80	3	★	B-2	D64	Rear door cord RH
R81	3	★	B-3	D63	Rear door cord LH
R82	4	★	A-3		Clock
R97	2	Brown	B-4		Antenna amplifier
R116	8	★	A-3		Rear wiper intermittent module
R139	3	★	B-2		Compass mirror
★: Non-colored					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R116
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R16
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R82
R32
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R26
R56
GB-7
R139
R97
R14
R30
R28
R80
R79
R72
R50
R46
R15
R63
R41
R57
R58
R12
R3
R68
R22
R2
R67
GB-6
R47
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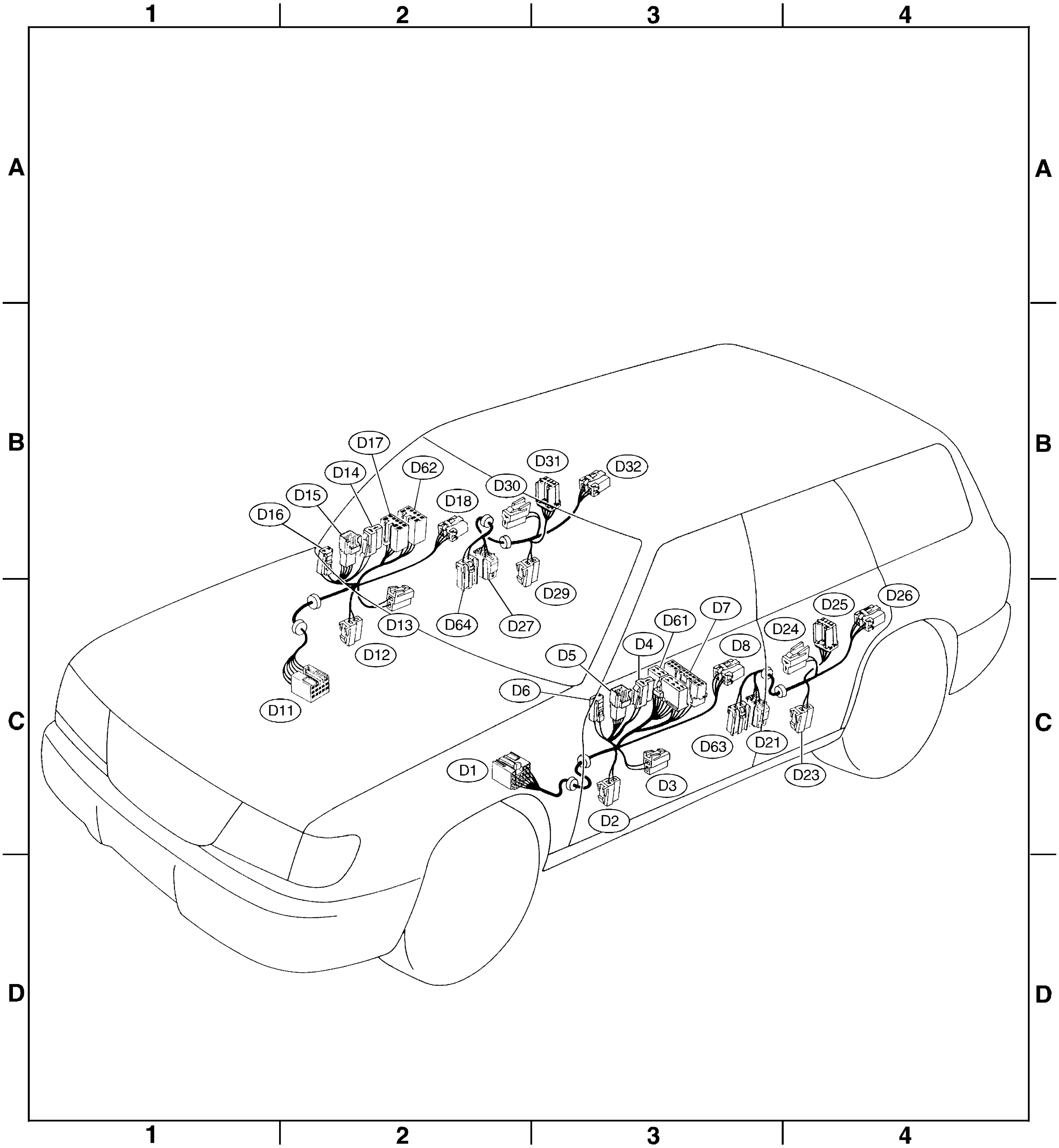
R73
R69
R9
R48
R44
R81
R42
R8
R43
R4
S6M0582

52. Door Cord S903432

A: LOCATION S903432A13

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
D1	25	★	C-2	B30	Bulkhead wiring harness
D2	2	★	C-3		Front door speaker LH
D3	2	Blue	C-3		Front power window motor LH
D4	2	Black	B-3		Front door tweeter LH
D5	6	★	B-3		Remote control rearview mirror LH
D6	2	★	B-3		Mirror heater LH
D7	16	★	B-3		Power window main switch
D8	4	★	B-3		Front door lock actuator LH
D11	25	★	B-2	B101	Bulkhead wiring harness
D12	2	★	B-2		Front door speaker RH
D13	2	Blue	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
D16	2	★	B-2		Mirror heater RH
D17	8	★	B-2		Front power window sub switch RH
D18	4	★	B-2		Front door lock actuator RH
D21	4	★	C-3	R11	Rear wiring harness
D23	2	★	C-4		Rear door speaker LH
D24	2	Blue	B-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	4	★	B-2	R14	Rear wiring harness
D29	2	★	B-3		Rear door speaker RH
D30	2	Blue	B-2		Rear power window motor RH
D31	6	★	B-3		Rear power window sub switch RH
D32	4	★	B-3		Rear door lock actuator RH
D61	10	★	B-3		Remote control rearview mirror switch
D62	8	★	B-2		Door lock switch RH
D63	3	★	C-3	R81	Rear wiring harness
D64	3	★	B-2	R80	Rear wiring harness

★: Non-colored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D63
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D1
D3
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D2
S6M0344A

53. Rear Gate Cord S903748

A: LOCATION S903748A13

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
D33	2	★	B-4	R37	Rear wiring harness
D34	6	★	B-4	R38	
D35	4	★	B-4	R39	
D37	1	★	A-3		Luggage room light (Power)
D38	1	★	A-3		Luggage room light
D39	2	Black	A-3		High-mount stop light
D40	1	Black	B-4		Rear defogger (Power)
D42	3	★	B-4		Rear finisher light RH
D43	4	★	B-3		Rear wiper motor
D46	2	Black	B-3		Rear gate latch switch
D47	4	★	B-4		Rear gate lock actuator
D48	1	Black	B-3		Rear defogger (Ground)
D49	3	★	B-3		Rear finisher light LH
★: Non-colored					

REAR GATE CORD