WIRING SYSTEM 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.

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.

G8050GE7

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 2001MY.

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

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

MEMO:

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. SI UNITS SA02675F6909

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

MEMO:

HOW TO USE THIS MANUALS

SPECIFICATIONS

SPC

Page

1. Forester 2

1. Forester SA08758

A: DIMENSIONS SA08758G28

Model			2.0 L Non-TURBO	2.0 L TURBO
Overall length		mm (in)	4,460 (175.6), 4,530 (178.3)*1	
Overall width		mm (in)	1,735 (68.3), 1,765 (69.5)*2	
Overall height (at CW)		mm (in)	1,595 (62.8)	1,585 (62.4)
Compartment	Length	mm (in)	1,745 (68.7)	
	Width	mm (in)	1,435 (56.5)	
	Height	mm (in)	1,245 (49.0), 1,220 (48.0)*3	
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		mm (in)	190 (7.5), 200 (7.9)*4	

*1: With bushing bar
*2: With fender flare
*3: With sunroof
*4: Australia spec. vehicles

B: ENGINE SA08758G29

Model	2.0 L Non-TURBO	2.0 L TURBO
Engine type	Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine	
Valve arrangement	Overhead camshaft type	
Bore × Stroke mm (in)	92 × 75 (3.62 × 2.95)	
Displacement cm^3 (cu in)	1,994 (121.67)	
Compression ratio	10.0	8.0
Firing order	1 — 3 — 2 — 4	
Idle speed at Park/Neutral position rpm	700±100	
Maximum output kW (HP)/rpm	101 (137)/5,600	130 (174)/5,600
Maximum torque N·m (kgf-m, ft-lb)/rpm	186 (19.0, 137.0)/3,600	245 (25, 181)/3,200

C: ELECTRICAL SA08758G30

Model			2.0 L Non-TURBO	2.0 L TURBO
Ignition timing at idling speed BTDC/rpm			12°±10°/700	
Spark plug	Type and manufacturer		NGK: BK5E-11 (without catalyst) CHAMPION: RC10YC4 (with catalyst)	NGK: PFR6B
Generator			12 V — 75 A	
Battery	Type and capacity (5HR)	For Europe	5MT: 12 V — 48AH 4AT: 12 V — 52AH	
		For Australia	12 V — 40AH	
		Others	12 V — 40AH	

D: TRANSMISSION SA08758G31

Model			2.0 L Non-TURBO		2.0 L TURBO	
			AWD			
Transmission type			5MT*1	4AT*2	5MT*1	4AT*2
Clutch type			DSPD	TCC	DSPD	TCC
Gear ratio		1st	3.454	2.785	3.454	2.785
		2nd	2.062	1.545	1.947	1.545
		3rd	1.448	1.000	1.366	1.000
		4th	1.088	0.694	0.972	0.694
		5th	0.871	—	0.738	—
		Reverse	3.333	2.272	3.333	2.272
Auxiliary transmission gear ratio		High	1.000	—	—	—
		Low	1.447	—	—	—
Reduction gear (Front drive)	1st reduction	Type of gear	—	Helical	—	Helical
		Gear ratio	—	1.000	—	1.000
	Final reduction	Type of gear	Hypoid	Hypoid	Hypoid	Hypoid
		Gear ratio	4.111	4.444	4.444	4.111
Reduction gear (Rear drive)	Transfer reduction	Type of gear	Hypoid	—	Hypoid	—
		Gear ratio	1.000	—	1.081*4, 1.000*5	—
	Final reduction	Type of gear	Hypoid	Hypoid	Hypoid	Hypoid
		Gear ratio	4.111	4.444	4.111*4, 4.444*5	4.111

5MT*1: 5 × 2 forward speeds with synchromesh and 1-reverse — with center differential and viscous coupling
4AT*2: Electronically controlled fully-automatic, 4-forward speeds and 1-reverse — with hydraulically controlled transfer clutch
5MT*3: 5-forward speeds with synchromesh and 1-reverse — with center differential and viscous coupling
DSPD: Dry Single Plate Diaphragm
TCC: Torque Converter Clutch
*4: For Europe
*5: Others

E: STEERING SA08758G32

Model	LHD	RHD
Type	Rack and Pinion	
Turns, lock to lock	3.4	3.0
Minimum turning circle m (ft)	Curb to curb: 10.8 (35.4)	

F: SUSPENSION SA08758G33

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

G: BRAKE SA08758G34

Model	Australia spec. vehicles and 2000 TURBO	Others
Service brake system	Dual circuit hydraulic with vacuum suspended power unit	
Front	Ventilated disc brake	
Rear	Disc brake	Drum brake
Parking brake	Mechanical on rear brakes	

H: TIRE SA08758G35

Rim size	15 × 6J	16 × $6^{1}/_{2}$JJ
Tire size	205/70R15	215/60R16
Type	Steel belted radial, Tubeless	

I: CAPACITY SA08758G36

Model			2000 Non-TURBO		2000 TURBO	
			AWD		AWD	
			5MT	4AT	5MT	4AT
Fuel tank		ℓ (US gal, Imp gal)	60 (15.9, 13.2)		60 (15.9, 13.2)	
Engine oil	Upper level	ℓ (US qt, Imp qt)	4.5 (4.8, 4.0)		5.0 (5.3, 4.4)	
	Lower level	ℓ (US qt, Imp qt)	3.5 (3.7, 3.1)		4.0 (4.2, 3.5)	
Transmission gear oil		ℓ (US qt, Imp qt)	4.0 (4.2, 3.5)	—	3.5 (3.7, 3.1)	—
Automatic transmission fluid		ℓ (US qt, Imp qt)	—	8.4 (8.9, 7.4)	—	9.3 (9.8, 8.2)
AT differential gear oil		ℓ (US qt, Imp qt)	—	1.2 (1.3, 1.1)	—	1.2 (1.3, 1.1)
AWD rear differential gear oil		ℓ (US qt, Imp qt)	0.8 (0.8, 0.6)		0.8 (0.8, 0.6)	
Power steering fluid		ℓ (US qt, Imp qt)	0.7 (0.7, 0.6)		0.7 (0.7, 0.6)	
Engine coolant		ℓ (US qt, Imp qt)	6.4 (6.8, 5.6)	6.3 (6.7, 5.5)	6.4 (6.8, 5.6)	6.3 (6.7, 5.5)

J: WEIGHT SA08758G37

1. EXCEPT AUSTRALIA SPEC. VEHICLE SA08758G3706

Model			2.0 L Non-TURBO			
			AWD			
			LHD		RHD	
			5MT	4AT	5MT	4AT
Curb weight (CW)	Front	kg (lb)	730 (1,610)	745 (1,643)	745 (1,643)	760 (1,676)
	Rear	kg (lb)	615 (1,356)	615 (1,356)	620 (1,367)	620 (1,367)
	Total	kg (lb)	1,345 (2,966)	1,360 (2,999)	1,365 (3,010)	1,380 (3,043)
Maximum permissible axle weight (MPAW)	Front	kg (lb)	920 (2,029)	930 (2,051)	920 (2,029)	930 (2,051)
	Rear	kg (lb)	990 (2,183)	990 (2,183)	990 (2,183)	990 (2,183)
Maximum permissible weight (MPW)	Total	kg (lb)	1,875 (4,134)	1,890 (4,163)	1,875 (4,134)	1,890 (4,167)

Model			2.0 L Non-TURBO			
			AWD			
			LHD		RHD	
			5MT	4AT	5MT	4AT
Curb weight (CW)	Front	kg (lb)	795 (1,753)	815 (1,797)	790 (1,742)	810 (1,786)
	Rear	kg (lb)	635 (1,400)	630 (1,389)	630 (1,389)	630 (1,389)
	Total	kg (lb)	1,430 (3,153)	1,445 (3,186)	1,420 (3,131)	1,440 (3,185)
Maximum permissible axle weight (MPAW)	Front	kg (lb)	975 (2,150)	995 (2,195)	975 (2,150)	975 (2,150)
	Rear	kg (lb)	1,010 (2,225)	1,010 (2,225)	1,010 (2,225)	1,010 (2,225)
Maximum permissible weight (MPW)	Total	kg (lb)	1,950 (4,300)	1,970 (4,344)	1,950 (4,300)	1,970 (4,344)

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

Weight of optional parts	ABS (Turbo model)	ABS (Non-Turbo model)	Cruise control	Self-levelizer	Fog lamp	Air conditioner	Sunroof	SRS airbag (Driver & Passenger)	SRS airbag (Side)	Cold weather pack	Cold weather pack (Leather seat)
Front kg (lb)	10 (22)	11 (24)	2 (4)	–1 (–2)	3.6 (7.9)	17 (37)	9 (20)	3 (7)	2 (4.4)	2 (4)	2.6 (5.7)
Rear kg (lb)	–1 (–2)	–1 (–2)	0 (0)	2 (4)	–1 (–2)	–3 (7)	14 (31)	2 (4)	2 (4.4)	–1 (–2)	4.4 (9.7)
Total kg (lb)	9 (20)	10 (22)	2 (4)	1 (2)	2.6 (5.7)	14 (31)	23 (51)	5 (11)	4 (8.8)	1 (2)	7.0 (15.4)

2. AUSTRALIA SPEC. VEHICLE SA08758G3704

Model			2.0 L Non-TURBO		2.0 L TURBO	
			AWD		AWD	
			RHD		RHD	
			5MT	4AT	5MT	4AT
Unladen mass (UM)	Front	kg (lb)	740 (1,632)	755 (1,665)	810 (1,786)	835 (1,841)
	Rear	kg (lb)	625 (1,378)	625 (1,378)	630 (1,389)	625 (1,378)
	Total	kg (lb)	1,365 (3,010)	1,380 (3,043)	1,440 (3,175)	1,460 (3,219)
Gross vehicle mass (GVM)	Front	kg (lb)	885 (1,951)	910 (2,007)	960 (2,117)	980 (2,161)
	Rear	kg (lb)	990 (2,183)	980 (2,161)	990 (2,183)	990 (2,183)
	Total	kg (lb)	1,875 (4,134)	1,890 (4,167)	1,950 (4,300)	1,970 (4,344)

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

Weight of optional parts	ABS	Cruise control	Self-levelizer	Fog lamp	Air conditioner	Sunroof	SRS airbag (Driver & Passenger)	SRS airbag (Side)	Cold weather pack
Front kg (lb)	10 (22)	2 (4)	–1 (–2)	3.6 (7.9)	17 (38)	9 (20)	3 (7)	2 (4.4)	2.6 (5.7)
Rear kg (lb)	–1 (–2)	0 (0)	2 (4)	–1 (–2)	–3 (7)	14 (31)	2 (4)	2 (4.4)	4.4 (9.7)
Total kg (lb)	9 (20)	2 (4)	1 (2)	2.6 (5.7)	14 (31)	23 (51)	5 (11)	4 (8.8)	7.0 (15.4)

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 20 seconds to discharge electricity before beginning work.
- Step 1: Turn the ignition switch OFF.
- Step 2: Remove the negative battery terminal.

6. AIRBAG DISPOSAL SA04677F5906

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

7. AIRBAG MODULE SA04677F5907

Adhere to the following when 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.

MEMO:

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.

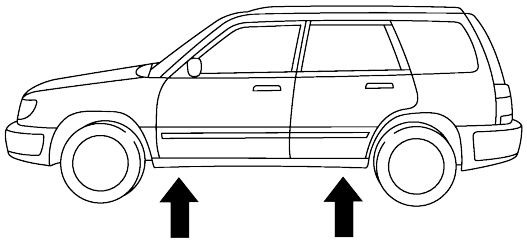
4. SERVICE PARTS SA03676A1504

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.

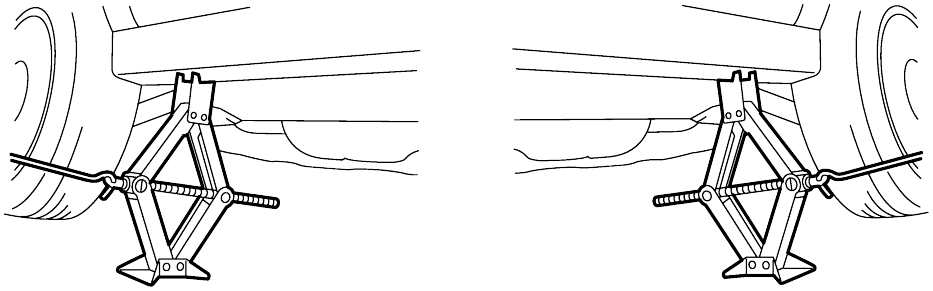
5. LIFTS AND JACKS SA03676A1505

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.

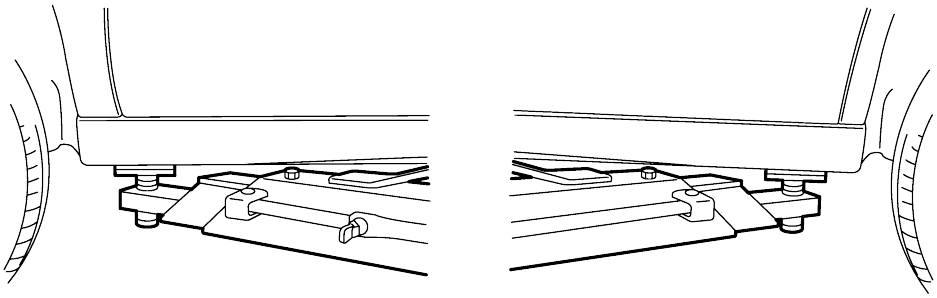
Support locations



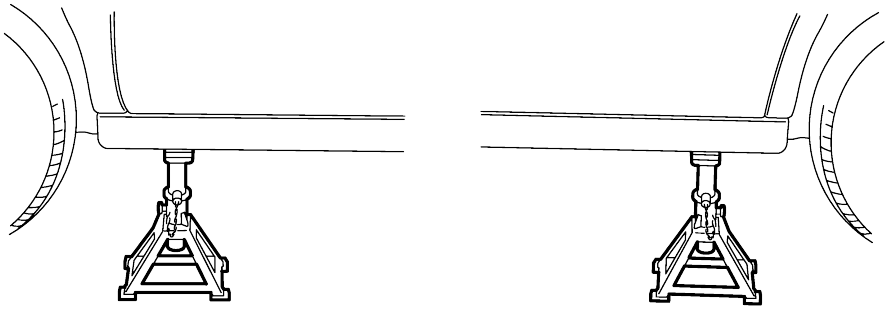
Pantograph jack



Lift



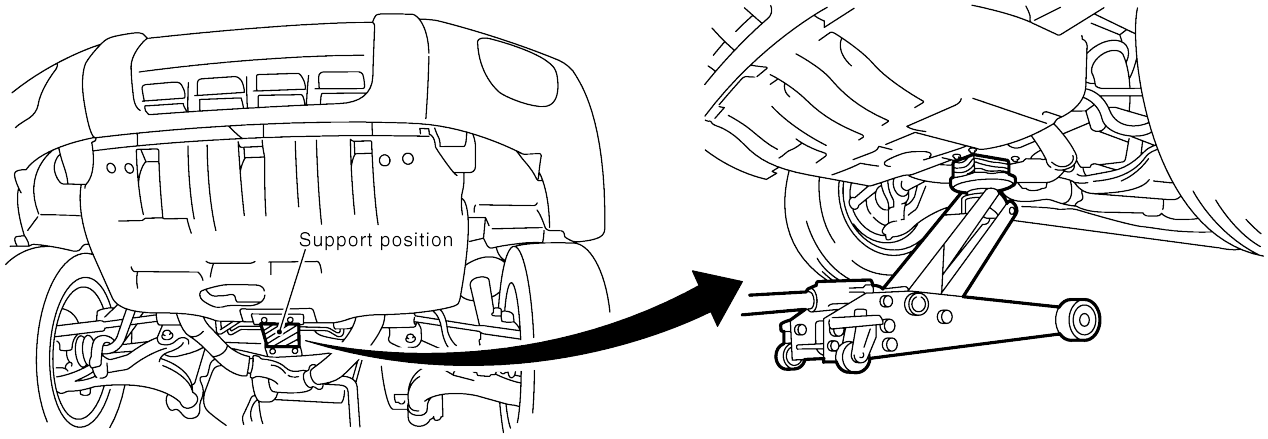
Safety stand



S1M0137A

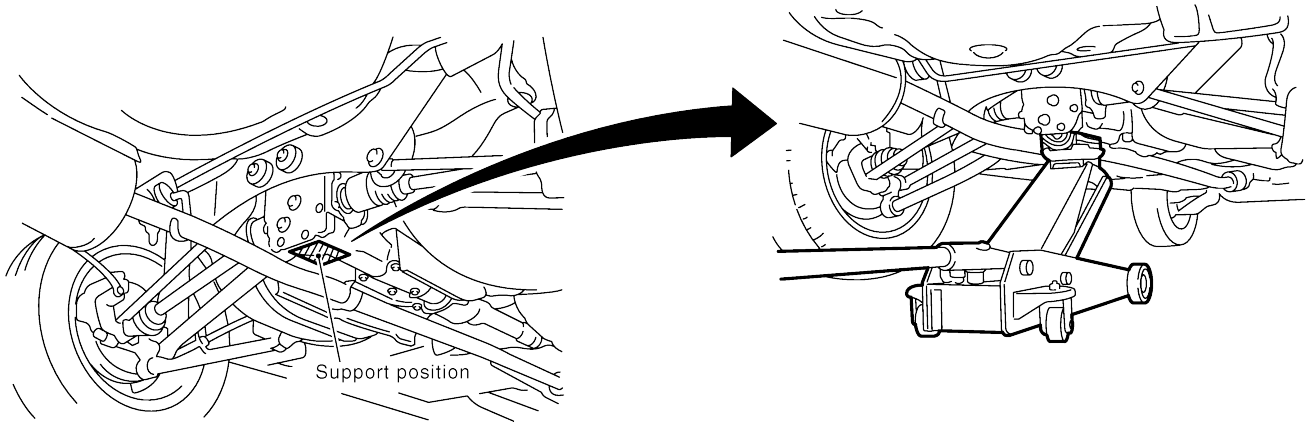
Note

Front



S1M0138A

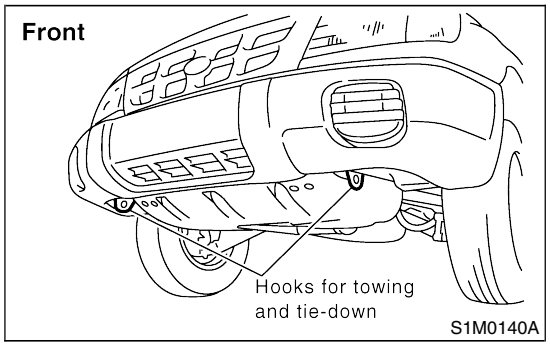
Rear

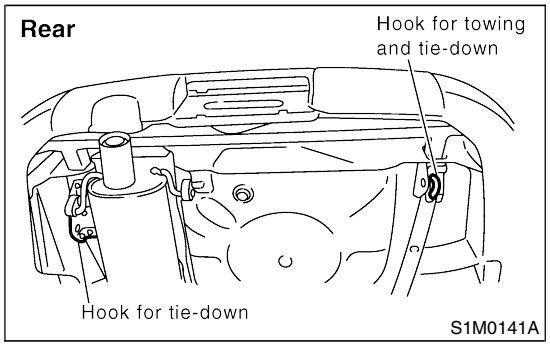


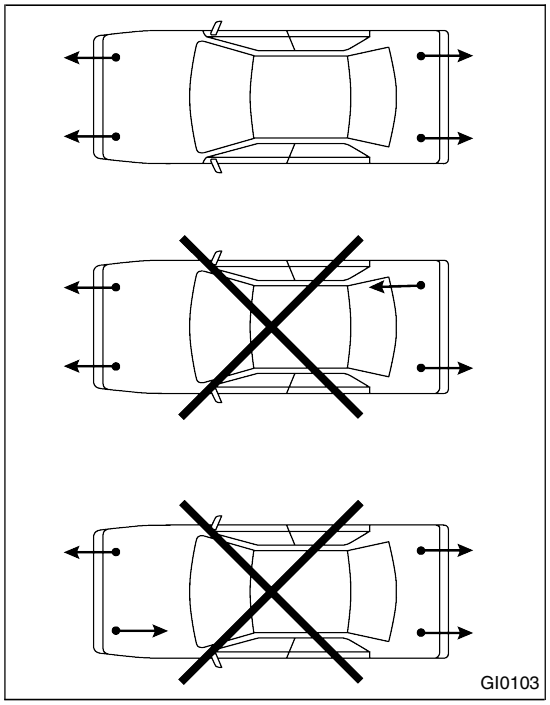
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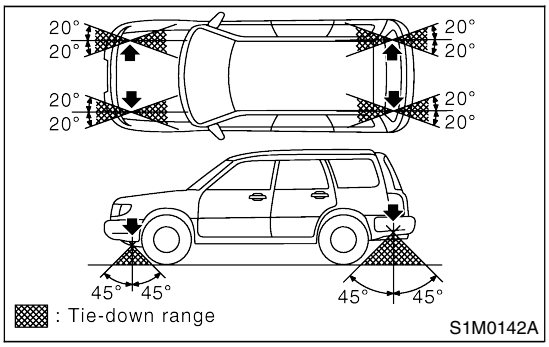
6. TIE DOWNS SA03676A1506

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









7. TOWING SA03676A1507

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

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

NOTE

Note

MEMO:

IDENTIFICATION

ID

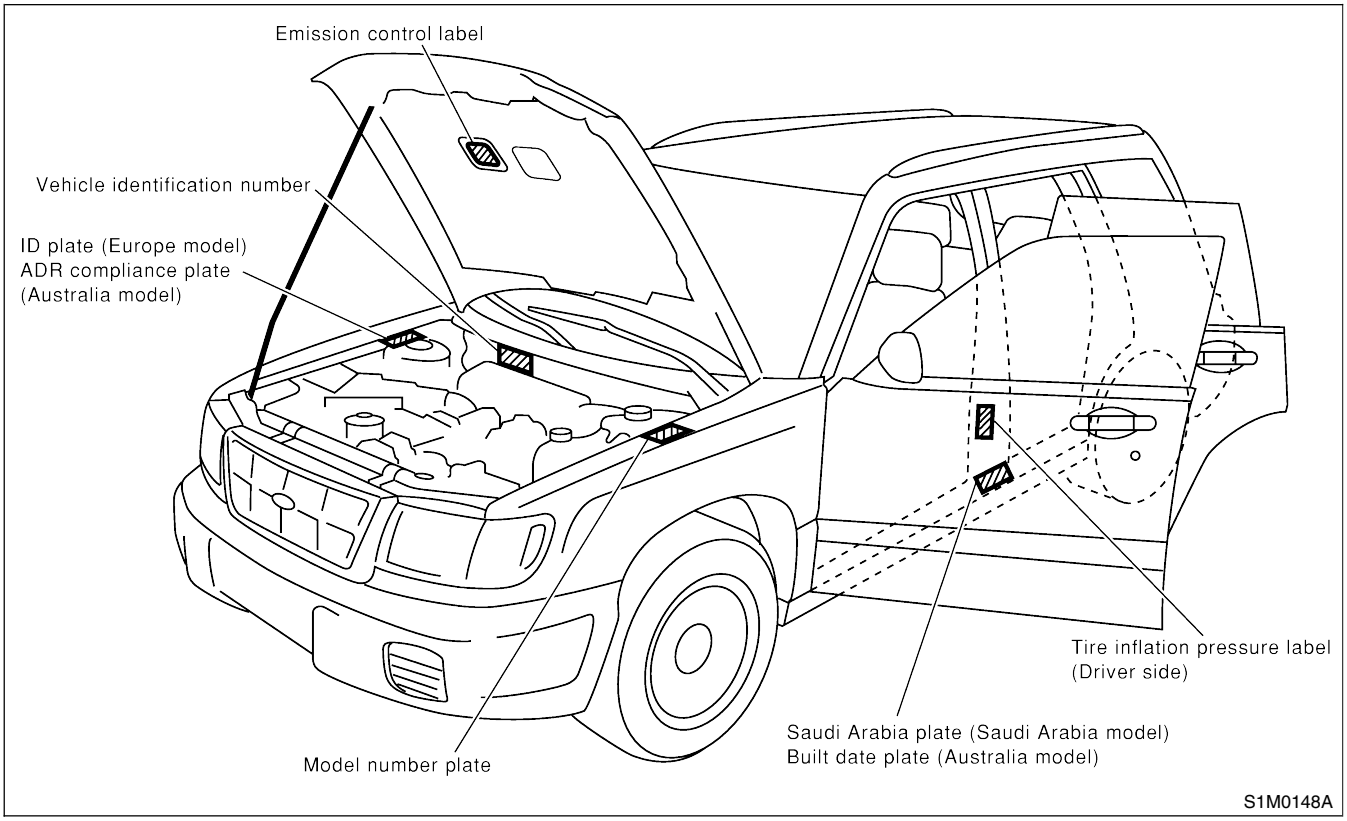
Page
1. Identification 2

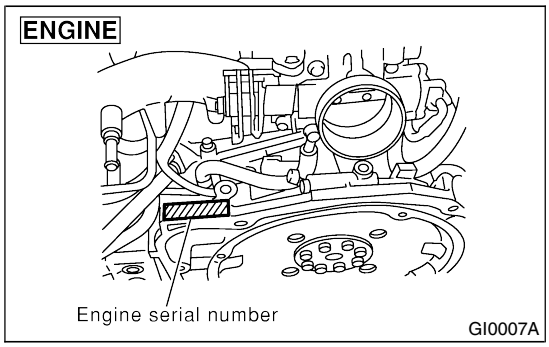
1. Identification SA06679

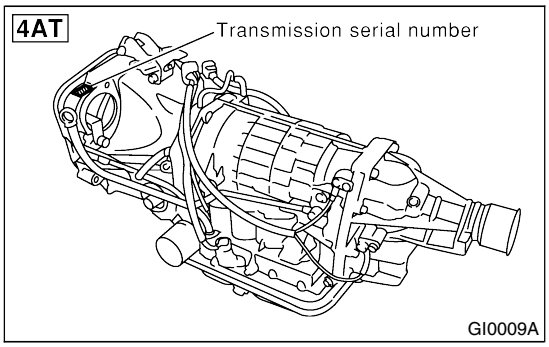
A: IDENTIFICATION SA06679F70

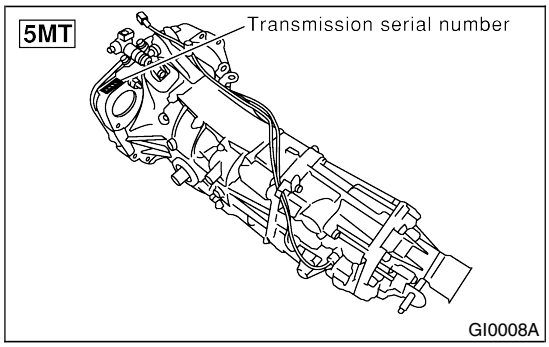
1. IDENTIFICATION NUMBER AND LABEL LOCATIONS SA06679F7001

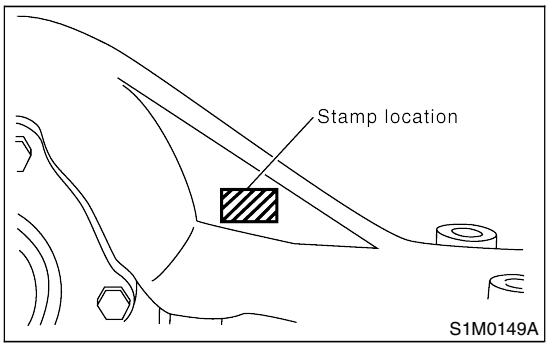
The VIN (Vehicle Identification Numbers) is used to classify the vehicle.
Positioning of the plate label for identification



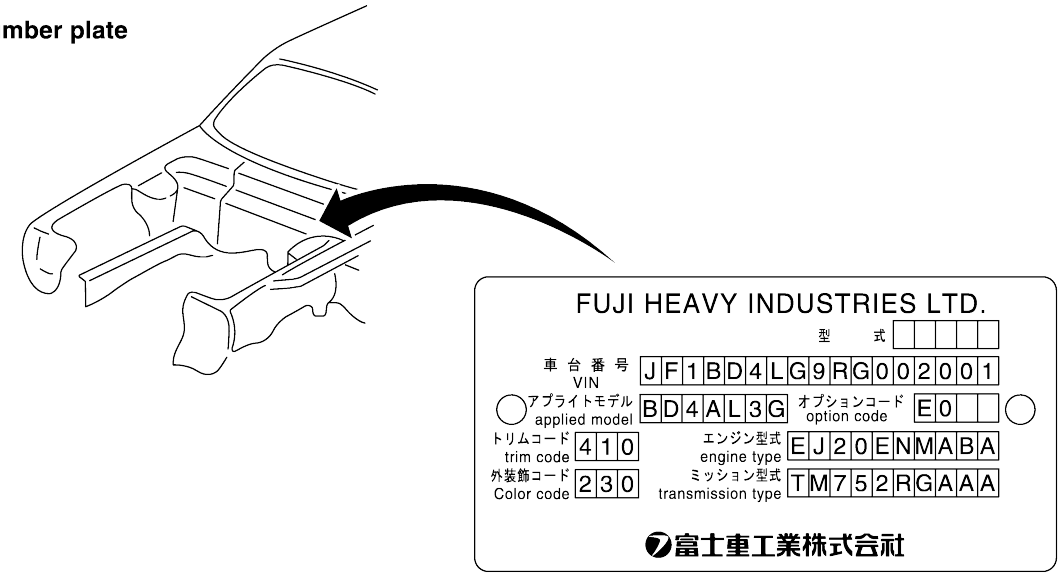








Model number plate



2. MEANING OF V.I.N. SA06679F7002

The meaning of the VIN is as follows:

• Europe, Australia and General (Except GCC)

]JF1SF5LJ31G002001[
The starting and ending brackets ( ][ ) are stop marks.

Digits	Code	Meaning	Details
1 to 3	JF1	Manufacturer body area	JF1: Passenger car, FHI made JF2: MPV, FHI made
4	S	Car line	Forester
5	F	Body type	F: Wagon
6	5	Displacement	5: 2.0 L AWD
7	L	Steering position	K: RHD (Right-hand drive) L: LHD (Left-hand drive)
8	J	Engine & transmission	J: SOHC MPI Full-time AWD 5-speed MT R: SOHC MPI 4-speed AT D: DOHC Turbo Full-time AWD 5-speed MT P: DOHC Turbo 4-speed AT
9	3	Drive type	3: Full-time AWD 5-speed MT single range 4: Full-time AWD 5-speed MT dual range 5: Full-time AWD 4-speed AT
10	1	Model year	1: 2001MY 2: 2002MY
11	G	Factory location	G: FHI (Gunma)
12 to 17	002001	Serial number	

• GCC countries (Saudi Arabia, etc.)

]JF1SF53MX1J002001[
The starting and ending brackets ( ][ ) are stop marks.

Digits	Code	Meaning	Details
1 to 3	JF1	Manufacturer body area	JF1: Passenger car, FHI made
4	S	Car line	Forester
5	F	Body type	E: Wagon
6	5	Displacement	5: 2.0 L AWD
7	3	Grade	3: BASE 5: NA SPRT
8	M	Restraint	M: Manual belts, dual airbag
9	X	Check digit	
10	1	Model year	1: 2001MY 2: 2002MY
11	J	Transmission type	H: Full-time AWD 4-speed AT J: Full-time AWD 5-speed MT dual range
12 to 17	002001	Serial number	

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.
SF9CL7R

Digits	Code	Meaning	Details
1	S	Series	Forester
2	F	Body style	F: Wagon
3	9	Engine displacement Drive system Suspension system	5: 2.0 L AWD 9: 2.5 L AWD
4	C	Minor change	2001MY
5	L	Destination	K: Right-hand drive for general market L: Left-hand drive for general market Y: For United States, Canada
6	7	Grade	2: BASE 3: HUNTER Ver. 4: NA SPORT 5: TYPES
7	R	Transmission, fuel feed system	E: DOHC MPI 4-speed AT P: DOHC MPI Turbo 4-speed AT D: DOHC MPI Turbo center differential AWD J: SOHC MPI center differential AWD R: SOHC MPI 4-speed AT

The engine and transmission type are as follows:

- **Engine**

EJ20DAXBBB

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

● Transmission

TZ1A3ZS3AA

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 specifications	V: Full-time AWD 5-speed MT with viscous coupling center differential single range X: Full-time AWD 5-speed MT with viscous coupling center differential dual range Z: Full-time AWD 4-speed AT with MPT
7 to 10	AAA	Detailed specifications	Used when ordering parts. See the parts catalog for details.

● Rear differential 1

VA1RFF

Digits	Code	Meaning	Details
1	V	For AWD	V: AWD
2	A	Type	A: A type
3	1	Hypoid gear diameter	1: 152 dia. 2: 160 dia.
4	R	Installation position	R: Rear
5	F	Reduction gear ratio	F: 4.444
6	F	Specification differences	F: Case A

● Rear differential 2

T1

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

RECOMMENDED MATERIALS

RM

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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**

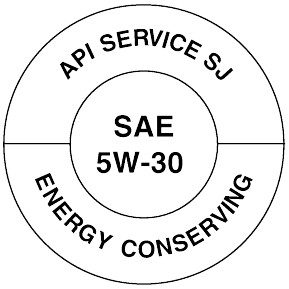
Use unleaded gasoline and not leaded gasoline on vehicles with catalytic converter installed to reduce air pollution. Using leaded gasoline will damage the catalytic converter.

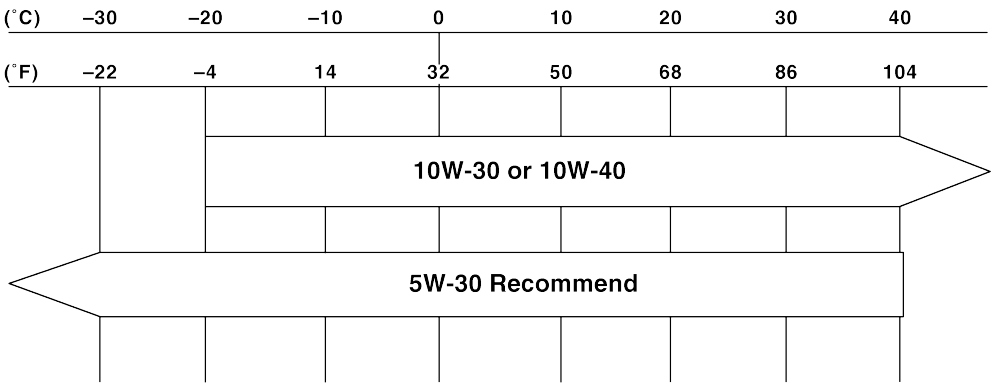
- **Leaded gasoline**

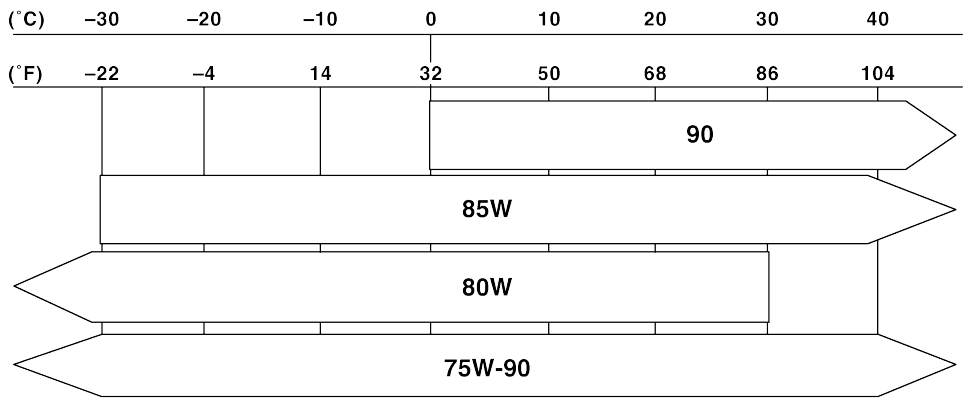
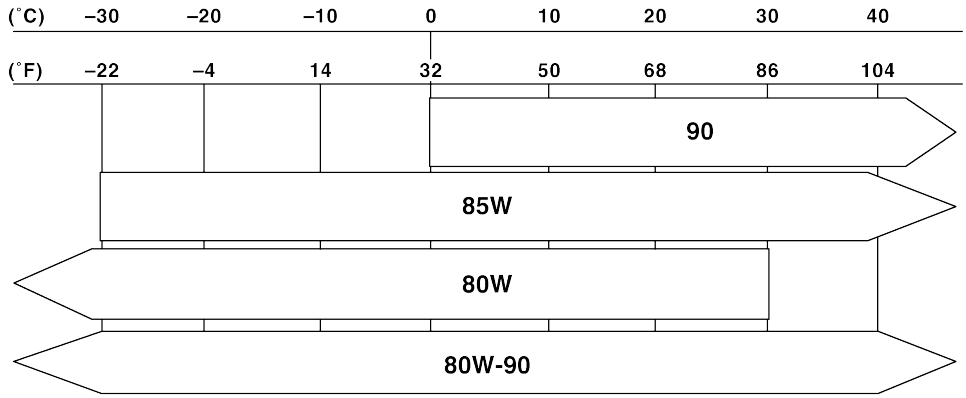
On vehicles without catalytic converter, use gasoline with an octane value of 90 RON or higher.

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	 GI0004A
Rear differential	
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.

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

The table below shows the ratio of coolant to distilled water.

Coolant Specifications							
Lowest anticipated atmospheric temperature	SUBARU coolant-to-*water ratio (Volume) %	Specification gravity					Freezing point
		at 10°C (50°F)	at 20°C (68°F)	at 30°C (86°F)	at 40°C (104°F)	at 50°C (122°F)	
Above –30°C (–22°F)	50 — 50	1.084	1.079	1.074	1.068	1.062	–36°C (–33°F)
Above –15°C (5°F)	30 — 70	1.050	1.049	1.042	1.037	1.032	–16°C (3°F)

*: It is recommended that distilled water be used.

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 and DENSO OIL 9.

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 bearing • Gear shift bush	SUNLIGHT2	003602010	—
	Steering gear box	Valiant grease M-2	003608001	—
	Disc brake	Niglube RX-2	003606000 or 725191040	—
	Drum brake	Molykote No. 7439	72519460	—
	• Brake pad • Brake shoe	Molykote AS-880N	26298AC000	—
	Front axle SFJ	SSG-6003	28093TA000	—
	Front BJ	NTG 2218	28093AA000	—
	Rear axle BJ	Molykote No. 2	723223010	—
	Rear axle EBJ (Turbo-model)	NTG 2218	28093AA000	—
	Rear axle DOJ	VU-3A702	23223GA050	—
	• Control cable • Throttle linkage • Water pump • Door latch • Door striker	Slicolube G-30M	004404002	—

8. ADHESIVES SA05678G2210

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

Adhesive	Application point	Recommended	Item number	Alternative
Adhesive	Windshield and body	Essex Chemical Crop's Urethane E	—	Sunstar 580
	Weatherstrip, rubber parts	Cemedine 5430L	—	3M's EC-1770 EC-1368
	Soft vinyl	Cemedine 540	—	3M's EC-776 EC-847 or EC-1022 (Spray type)
	Momentary sealant	Cemedine 3000 RS-300	—	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 1215B	004403007	Dow Corning's No. 7038
	Transmission	Three Bond 1217B	K0877YA020	—
	Rear differential	Three Bond 1324	004403042	—
	Rear differential	Three Bond 1105	004403010	Dow Corning's No. 7038
	Weatherstrip	Starcalking B-33A	000018901	Butyl Rubber sealant
	Steering adjusting screw	Three Bond 1102	004403006	—
	SOHC cam cap	Three Bond 1280B	K0877YA018	—

PRE-DELIVERY INSPECTION

PI

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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 room lamp 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. Operation check of trunk lock release lever	(1) Operate the trunk lock release lever to check that the trunk opens normally.
6. Check the rear gate 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 doors to see that there are no abnormal conditions.
7. Operation check of fuel lid opener lock release lever	(1) Operate the fuel lid opener to check that the fuel lid is unlocked normally.
8. Operation check of child lock system.	(1) Check that the child lock operates normally.
9. Accessory check	Check the following accessories are provided: • Owner's manual • Warranty booklet • Service booklet • Spare key • Jack • Tool set • Spare tire
10. Operation check of hood lock release system	(1) Operate the hood lock release lever to check that the hood opens normally.
11. Connection of air conditioner harness	(1) If the vehicle is about to be delivered to the customer, connect the air conditioner harness.
12. Battery	(1) Check the battery for any abnormal conditions such as rust and trace of battery fluid leaks.
13. Brake fluid	(1) Check the fluid amount.
14. Engine oil	(1) Check the oil amount.
15. Transmission fluid	(1) Check the fluid amount. (2) For AT, check the front differential oil.
16. AT front differential oil	(1) Check the AT front differential oil amount.
17. Coolant	(1) Check the coolant amount.
18. Clutch fluid	(1) Check the clutch fluid amount.
19. Window washer fluid	(1) Check the window washer fluid amount.
20. Hood latch check	(1) Check that the hood is closed and latched securely.
21. Keyless entry system	(1) Check that the keyless entry system operates normally.
22. 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. Read memory and test mode connectors	(1) Read memory and test mode connectors
2. Starting condition	(1) Start the engine and check that the engine starts smoothly.
3. Exhaust system	(1) Check that the exhaust noise is normal and no leaks are found.
4. Indicator light	(1) Check that all the indicator lights operate normally.
5. Clock	(1) Check that the clock operate normally.
6. Radio	(1) Check that the radio system operates normally.
7. Cigarette lighter	(1) Check that the cigarette lighter operates normally.
8. Lighting system	(1) Check that the lighting systems operate normally.
9. Window washer	(1) Check that the window washer system operates normally.
10. Wiper	(1) Check that the wiper system operates normally.
11. Power window operation check	(1) Check the power window for correct operations.

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
Non-TURBO	P205/70R15 95S* 205/70R15 95H 205/70R15 95Q (SNOW)	Light load	200 (2.0, 29)	190 (1.9, 28)
		Full load	200 (2.0, 29)	250 (2.5, 36)
TURBO	P215/60R16 94H* 215/60R16 95V 215/60R16 95Q (SNOW)	Light load	200 (2.0, 29)	190 (1.9, 28)
		Full load	200 (2.0, 29)	250 (2.5, 36)

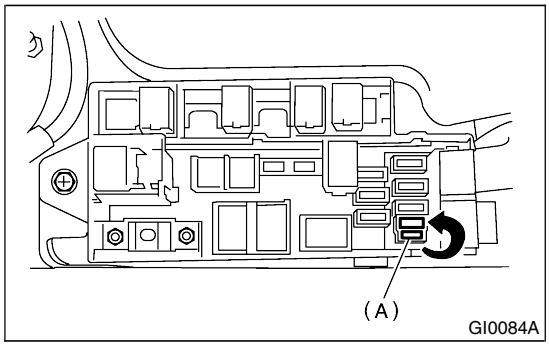
*: Australia model

NOTE:
- After inspecting and adjusting the tire pressure, be sure to put the valve cap back.
- When towing, adjust the tire inflation pressures as follows:

Front: 200 kPa (2.0 kg/cm^2, 29 psi)
Rear: 280 kPa (2.8 kg/cm^2, 41 psi)

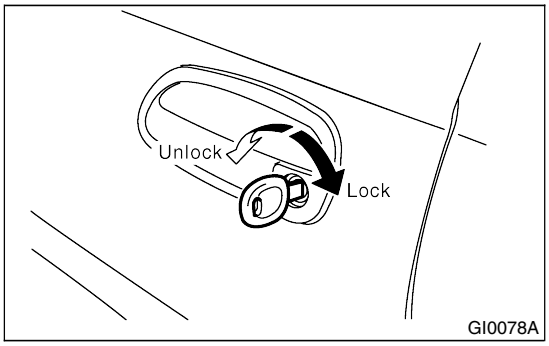
3. FUSE INSTALLATION SA09719G5010

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



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.

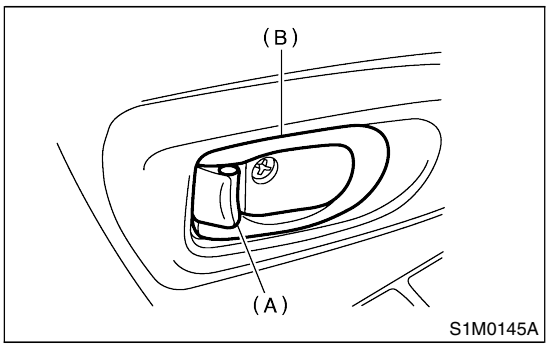


- **Vehicles with manual door locks:**

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

- **Vehicles with power door locks:**

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



5. OPERATION CHECK OF TRUNK LOCK RELEASE LEVER SA09719G5005

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

6. OPERATION CHECK OF REAR GATE LOCK RELEASE LEVER SA09719G5006

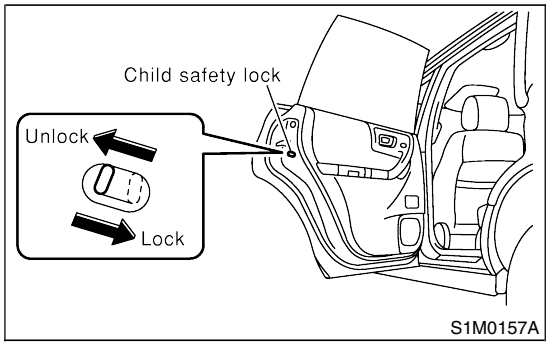
● Operate the rear gate lock release lever and verify that the rear gate is unlocked and opened smoothly.
● Using the key, lock and unlock the door several times to check for normal operation. Open and close the door several times for smooth movement.

7. OPERATION CHECK OF FUEL LID OPENER LOCK RELEASE LEVER SA09719G5007

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

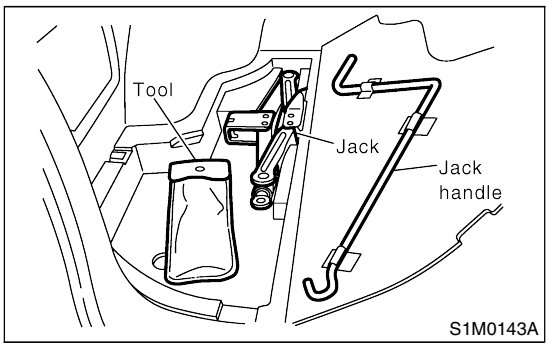
8. CHECK THE OPERATION OF CHILD SAFETY LOCKS SA09719G5052

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.



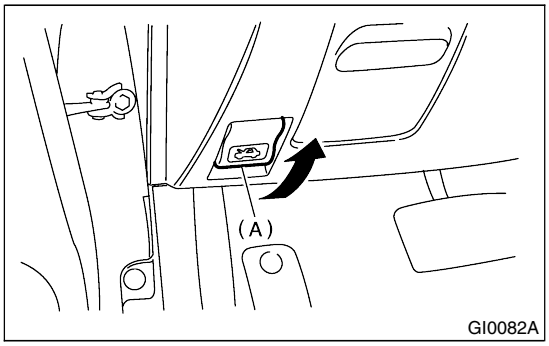
9. ACCESSORY CHECK SA09719G5008

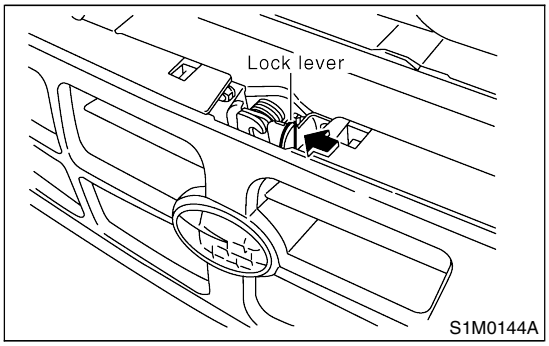
Check that the following accessories are provided in the luggage compartment or cargo area.
● Owner's manual
● Warranty booklet
● Service booklet
● Spare key
● Jack
● Tool set
● Spare tire



10. OPERATION CHECK OF HOOD LOCK RELEASE SYSTEM SA09719G5009

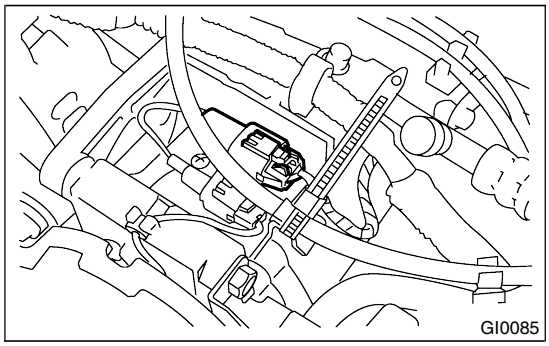
Unlatch and open the hood while checking that no abnormal conditions are found. Then, support the hood with the hood stay.





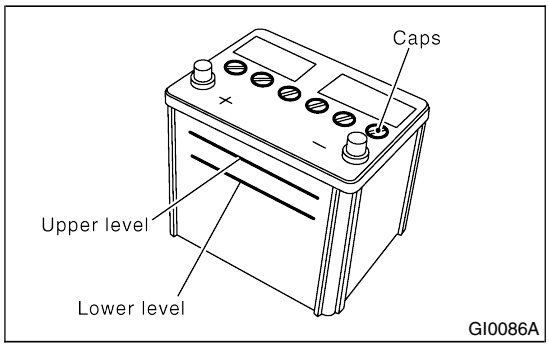
11. CONNECTION OF AIR CONDITIONER HARNESS SA09719G5011

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



12. 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.

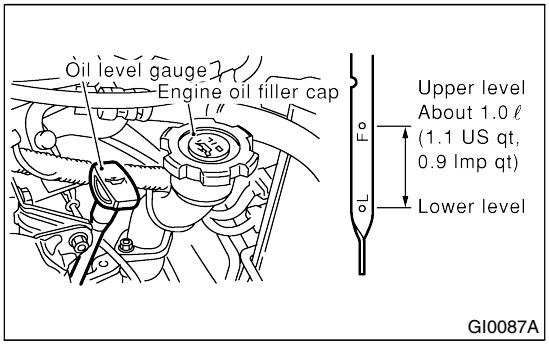


13. BRAKE FLUID SA09719G5013

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

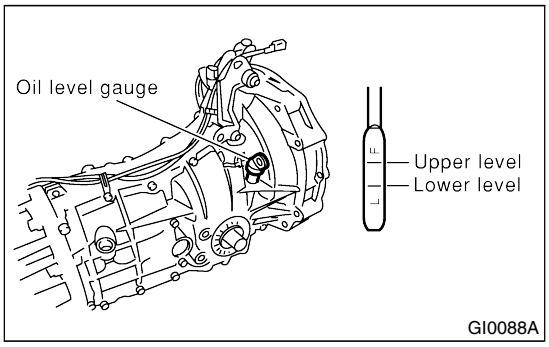
14. ENGINE OIL SA09719G5014

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



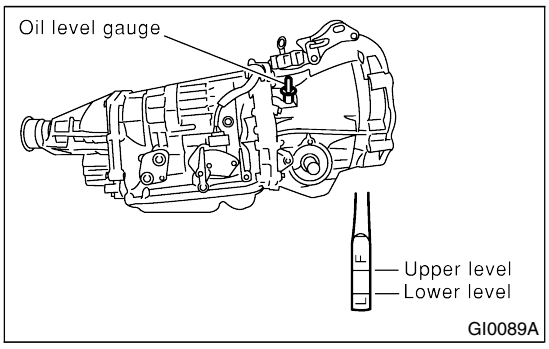
15. TRANSMISSION FLUID SA09719G5015

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



16. AT FRONT DIFFERENTIAL OIL SA09719G5016

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

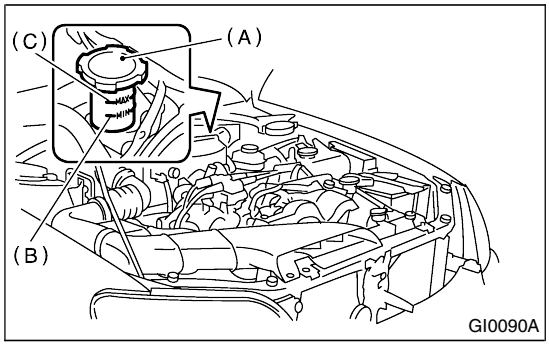


17. COOLANT SA09719G5017

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

18. CLUTCH FLUID SA09719G5018

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



19. WINDOW WASHER FLUID SA09719G5019

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

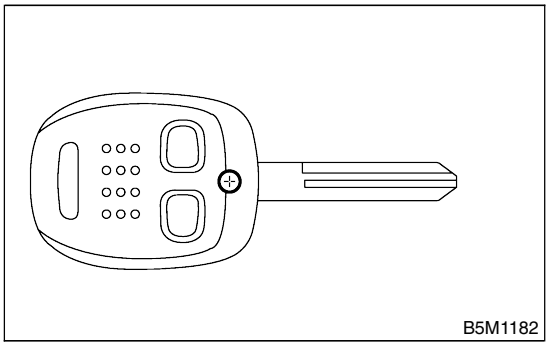
20. HOOD LATCH CHECK SA09719G5020

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

21. KEYLESS ENTRY SYSTEM SA09719G5021

Check the keyless entry system operations as follows.

- Remove the key from the ignition switch and close all the doors including rear gate (wagon).
- Press the “LOCK” button on the transmitter momentarily once and check if all the doors are locked and the hazard light flashes ones.



- Press the “OPEN” button on the transmitter momentarily once and check if the driver’s door is unlocked, the hazard light flashes twice and the dome light illuminates.
- Close all doors and rear gate, press the “LOCK” button of the transmitter. Press the “OPEN” button of the transmitter and wait for 30 seconds. Check that all doors and the rear gate are automatically locked again.

22. SEAT SA09719G5023

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

23. SEAT BELT SA09719G5024

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

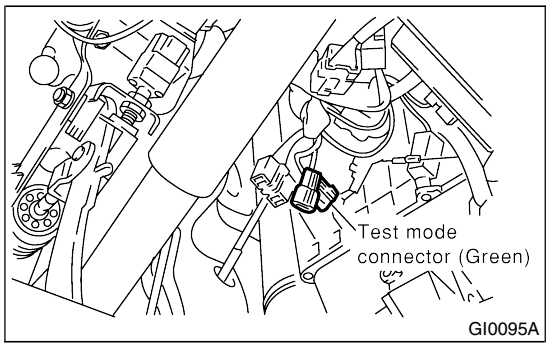
24. WHEEL ALIGNMENT SA09719G5026

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

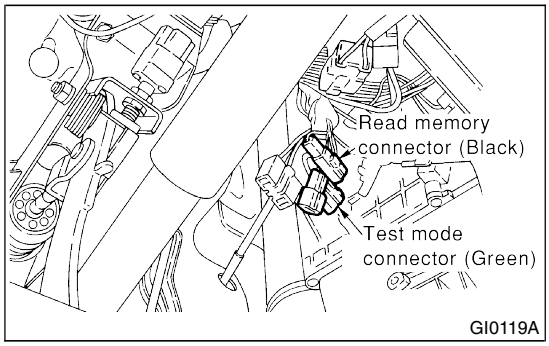
25. READ MEMORY AND TEST MODE CONNECTORS SA09719G5050

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.

With OBD model



Without OBD model



26. 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.

27. EXHAUST SYSTEM SA09719G5030

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

28. INDICATOR LIGHT SA09719G5031

Check that all the indicator lights are off.

29. CLOCK SA09719G5032

Check the clock for normal operations and enough accuracy.

30. RADIO SA09719G5033

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

31. CIGARETTE LIGHTER SA09719G5034

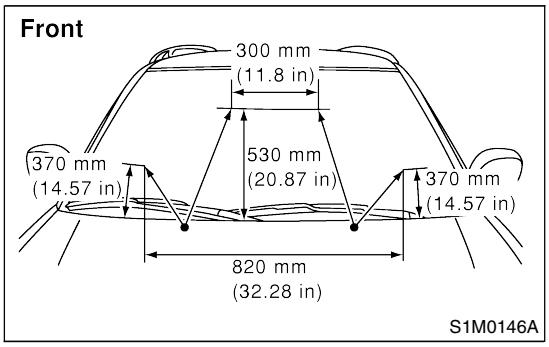
Check that the cigarette lighter operations.

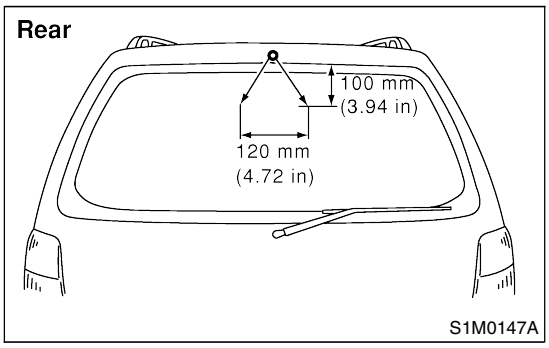
32. LIGHTING SYSTEM SA09719G5035

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

33. WINDOW WASHER SA09719G5036

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





34. WIPER SA09719G5037

Check the front and rear wipers for normal operations.

35. 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.

36. BRAKE TEST SA09719G5038

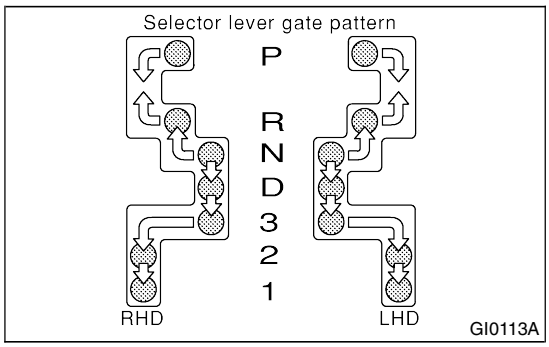
Check the foot brake for normal operations.

37. PARKING BRAKE SA09719G5039

Check the parking brake for normal operations.

38. AT SHIFT CONTROL SA09719G5041

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



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

39. HEATER & VENTILATION SA09719G5042

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

40. AIR CONDITIONER SA09719G5043

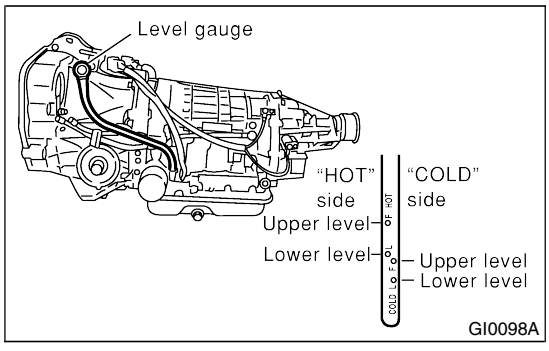
Operate the air conditioner. Check that the A/C compressor operates normally and enough cooling is provided.

41. CRUISE CONTROL SA09719G5044

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

42. 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.

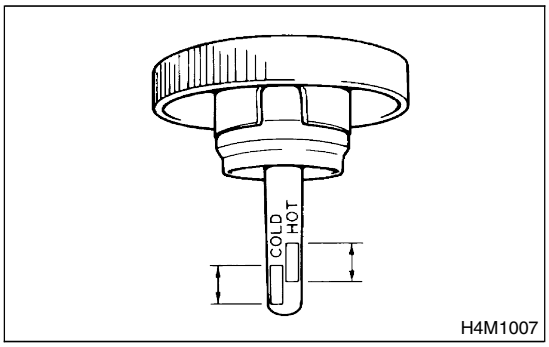


43. POWER STEERING FLUID LEVEL

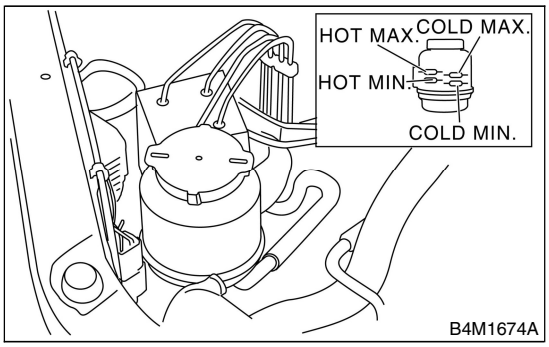
SA09719G5046

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.

Non-turbo model



Turbo model



44. FLUID LEAK CHECK SA09719G5047

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

45. WATER LEAK TEST SA09719G5048

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

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

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

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

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

46. APPEARANCE CHECK 2 SA09719G5049

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

MEMO:

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

1. MAINTENANCE SCHEDULE 1 – (1) SA07682G2401

For periodic maintenance of over 50,000 km (30,000 miles) or 48 months, carry out inspections by referring to the following tables. For a maintenance period gone beyond these tables, apply them repeatedly as a set of 50,000 km (30,000 miles) or 48 months.

		Maintenance Interval [Number of months or km (miles), whichever occurs first]					
	Months		12	24	36	48	Remarks
	× 1,000 km	5	12.5	25	37.5	50	
	× 1,000 miles	3	7.5	15	22.5	30	
1	Engine oil		R	R	R	R	
2	Engine oil filter		R	R	R	R	

2. MAINTENANCE SCHEDULE 1 – (2) SA07682G2402

For periodic maintenance of over 100,000 km (60,000 miles) or 48 months, carry out inspections by referring to the following tables. For a maintenance period gone beyond these tables, apply them repeatedly as a set of 100,000 km (60,000 miles) or 48 months.

			Maintenance Interval [Number of months or km (miles), whichever occurs first]					
	Months			12	24	36	48	Remarks
	× 1,000 km		1.6	25	50	75	100	
	× 1,000 miles		1	15	30	45	60	
3	Spark plugs				R		R	
4	Drive belt(s)			I	I	I	I	
5	Camshaft drive belt						R	
6	Valve clearance	Use in Europe countries						Inspect every 100,000 km (60,000 miles)
		Use in others						Inspect every 160,000 km (100,000 miles)
7	Fuel line				I		I	
8	Fuel filter						R	
9	Air cleaner element			I	R	I	R	
10	Cooling system				I		I	
11	Coolant				R		R	
12	Idle mixture		I	I	I	I	I	For models without catalyst converter
13	Clutch system			I	I	I	I	
14	Hill-holder system		I	I	I	I	I	
15	Transmission oil				R		R	
16	ATF				R		R	
17	Front & rear differential oil				R		R	
18	Brake line				I		I	
19	Brake fluid				R		R	
20	Disc brake pads & discs			I	I	I	I	
21	Brake linings and drums				I		I	
22	Parking brake			I	I	I	I	
23	Suspension			I	I	I	I	

			Maintenance Interval [Number of months or km (miles), whichever occurs first]					
	Months			12	24	36	48	Remarks
	× 1,000 km		1.6	25	50	75	100	
	× 1,000 miles		1	15	30	45	60	
24	Wheel bearing				I		I	
25	Axle boots & joints			I	I	I	I	
26	Steering system (Power steering)			I	I	I	I	

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

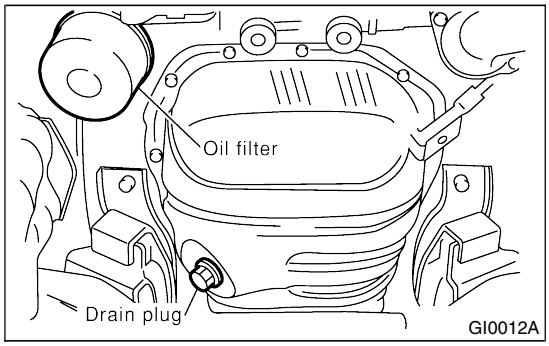
B: MAINTENANCE SCHEDULE 2 SA07682G25

Item	Every	Repeat short distance drive	Repeat rough/muddy road drive	Extremely cold weather area	Salt or other corrosive used or coastal area	High humidity or mountain area	Repeat towing trailer
Engine oil		Replace more frequently		Replace more frequently			Replace more frequently
Engine oil filter		Replace more frequently		Replace more frequently			Replace more frequently
Fuel line	6 months				I		
	12,500 km						
	7,500 miles						
Transmission oil							Replace more frequently
ATF							Replace more frequently
Front & rear differential oil							Replace more frequently
Brake line	6 months	I	I		I		I
	12,500 km						
	7,500 miles						
Brake fluid	12 months					R	
	25,000 km						
	15,000 miles						
Brake pads	6 months	I	I		I		I
	12,500 km						
	7,500 miles						
Brake linings and drums	6 months	I	I		I		I
	12,500 km						
	7,500 miles						
Parking brake	6 months	I	I		I		I
	12,500 km						
	7,500 miles						
Suspension	6 months		I	I	I		I
	12,500 km						
	7,500 miles						
Axle boots & joints	6 months	I	I	I	I		I
	12,500 km						
	7,500 miles						
Steering system (Power steering)	6 months	I	I	I	I		I
	12,500 km						
	7,500 miles						

3. Engine Oil SA07077

A: REPLACEMENT SA07077A20

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



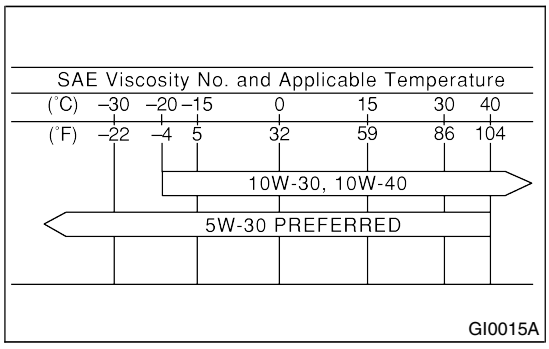
2) Open engine oil filler cap for quick draining of the engine oil.
3) Replace drain plug gasket.
4) Tighten engine oil drain plug after draining engine oil.

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 (Non-TURBO model):
Upper level
4.5 ℓ (4.8 US qt, 4.0 Imp qt)
Lower level
3.5 ℓ (3.7 US qt, 3.1 Imp qt)

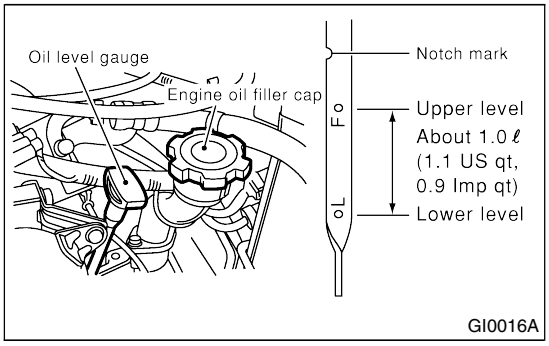
Engine oil capacity (TURBO model):
Upper level
5.0 ℓ (5.3 US qt, 4.4 Imp qt)
Lower level
4.0 ℓ (4.2 US qt, 3.5 Imp qt)



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

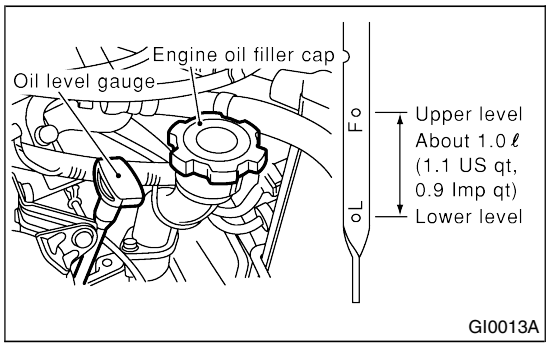
NOTE:
● When replenishing oil, it does not matter if the oil to be added is a different brand from that in the engine; however, use oil having the API classification and SAE viscosity No. designated by SUBARU.
● If vehicle is used in desert areas with very high temperatures or for other heavy duty applications,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

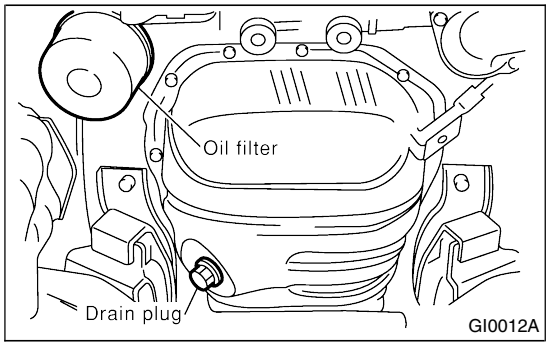


5) After turning off the engine, wait a few minutes for the oil to drain back into the oil pan before checking the level.
6) Just after driving or while the engine is warm, engine oil level may show in the range between the “F” line and the notch mark. This is caused by thermal expansion of the engine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

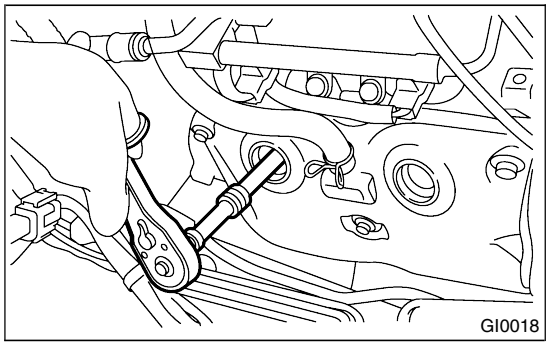
5. Spark Plugs SA07683

A: REPLACEMENT SA07683A20

1. NON-TURBO MODEL SA07683A2003

NOTE:
For spark plug replacement procedure details, refer to IG section. <Ref. to IG(SOHC)-4, Spark Plug.> and <Ref. to IG(SOHCw/oOBD)-5, 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.



7) Set new spark plug.

Recommended spark plug:
With OBD
CHAMPION RC10YC4
CHAMPION RC8YC4
NGK BKR6E-11
NIPPONDENSO K20PR-U11
Spark plug gap
1.0 — 1.1 mm (0.039 — 0.043 in)
Without OBD
NGK BKR6E (Without catalytic converter)
CHAMPION RC10YC4 (With catalytic converter)
NGK BKR5E-11 (With catalytic converter)
Spark plug gap
0.7— 0.8 mm (0.028 — 0.031 in) (Without catalytic converter)
1.0 — 1.1 mm (0.039 — 0.043 in) (With catalytic converter)

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)

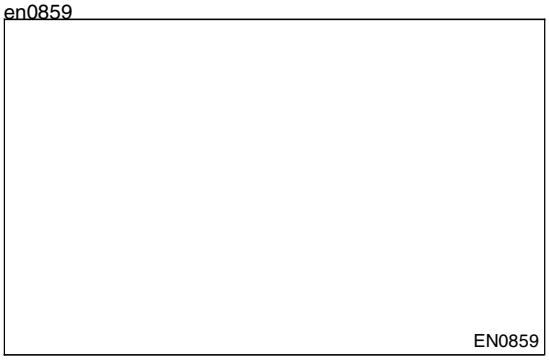
NOTE:
● Be sure to place the gasket between the cylinder head and spark plug.
● If torque wrench is not available, tighten spark plug until gasket contacts cylinder head; then tighten further 1/4 to 1/2 turns.

2. TURBO MODEL SA07683A2004

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

1) Disconnect battery ground cable, and then remove battery and battery carrier.
2) Remove air cleaner lower case. <Ref. to IN(DOHC TURBO)-7, Air Cleaner.>
3) Remove washer tank and put it aside.
4) Disconnect connector from ignition coil.
5) Remove ignition coil.
6) Remove spark plug with a plug-wrench.

en0859



7) Set new spark plug.

Recommended spark plug:
NGK: PFR6B

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

Tightening torque:
Spark plug
21 N·m (2.1 kgf-m, 15 ft-lb)
Ignition coil
16 N·m (1.63 kgf-m, 11.8 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.

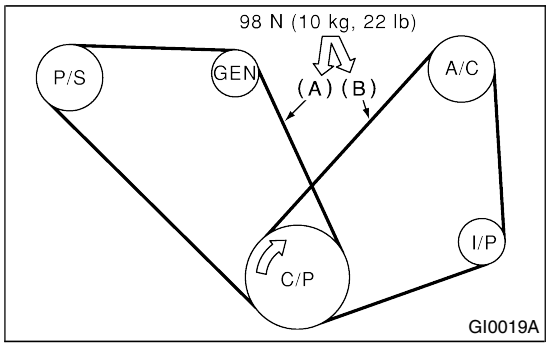
6. Drive Belt(s) SA07684

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.

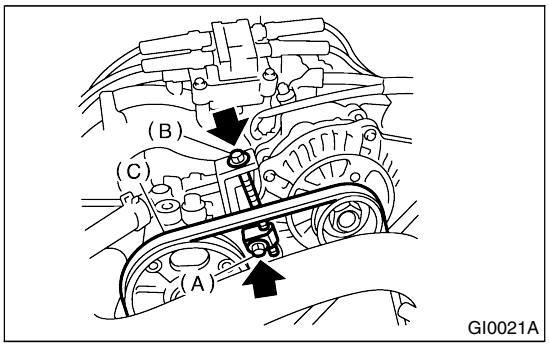


C/P Crankshaft pulley
GEN Generator
P/S Power steering oil pump pulley
A/C Air conditioning compressor pulley
I/P Idler pulley

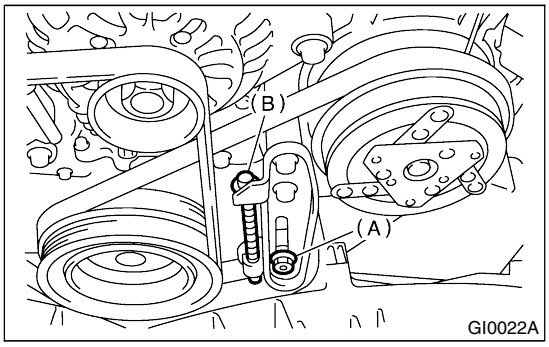
B: REPLACEMENT SA07684A20

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).

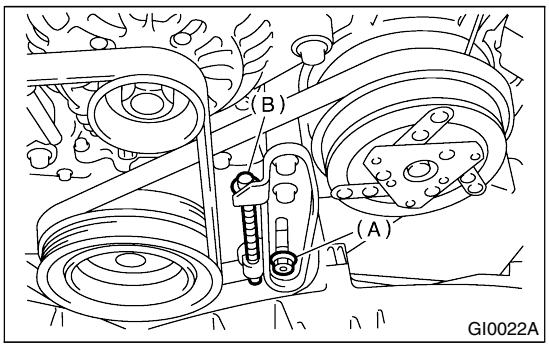


4) Loosen the lock nut (A).
5) Loosen the slider bolt (B).
6) Remove the rear side belt.



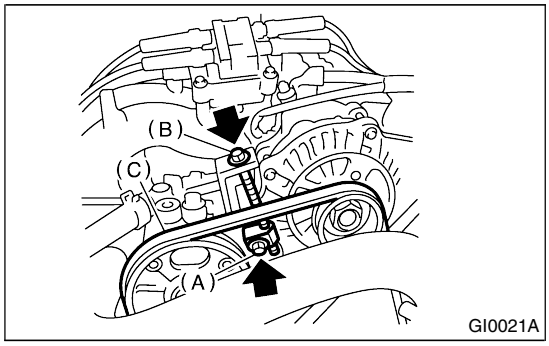
7) Install a new belt, and tighten the slider bolt so as to obtain the specified belt tension.
8) Tighten the slider bolt (B).
9) Tighten the lock nut (A).

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



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)



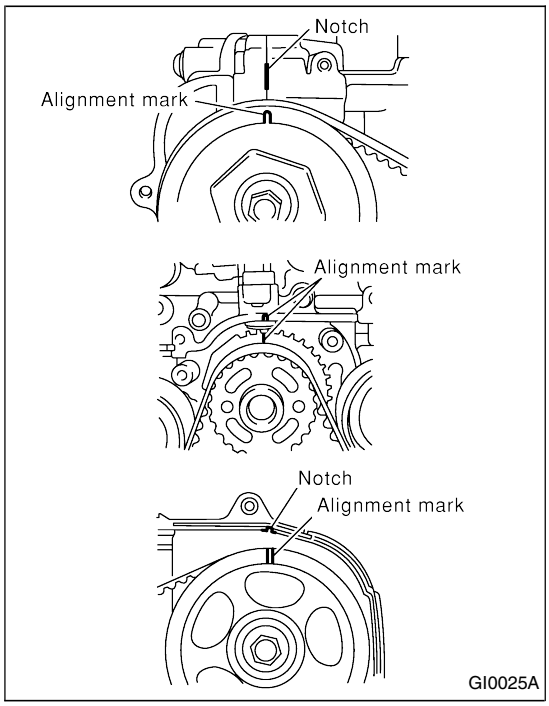
7. Camshaft Drive Belt SA07685

A: REPLACEMENT SA07685A20

1. SOHC MODEL SA07685A2001

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

1) Remove radiator fan <Ref. to CO-32, Radiator Main Fan and Fan Motor.> and air conditioner fan <Ref. to CO-34, Radiator Sub Fan and Fan Motor.>.
2) Remove V-belt cover.
3) Remove V-belts. <Ref. to ME(SOHC)-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

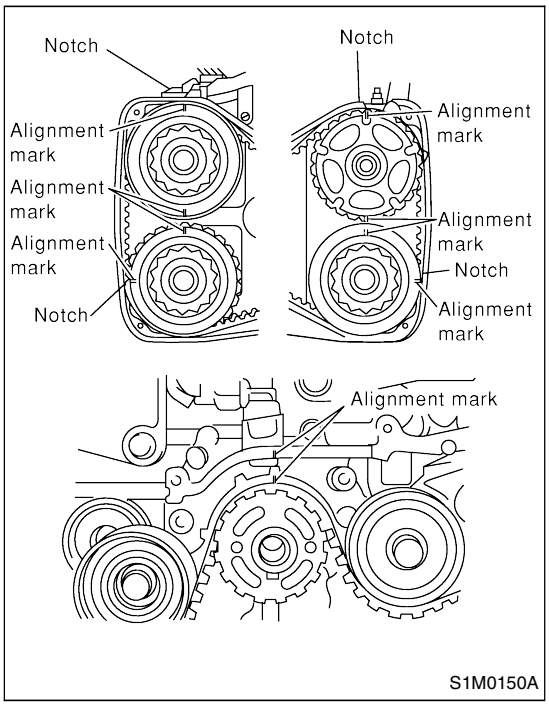


11) Remove belt idler.
12) Remove belt idler (No. 2).
13) Remove timing belt.
14) Remove automatic belt tension adjuster assembly.

2. DOHC MODEL SA07685A2002

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

1) Remove radiator fan and air conditioning fan. <Ref. to CO-32, Radiator Main Fan and Fan Motor.> and <Ref. to CO-34, Radiator Sub Fan and Fan Motor.>
2) Remove V-belts. <Ref. to ME(DOHC TURBO)-44, V-belt.>
3) Remove air conditioning compressor drive belt tensioner.
4) Remove pulley bolt.
ST 499977300 CRANKSHAFT PULLEY WRENCH
5) Remove crankshaft pulley.
6) Remove air conditioning compressor drive belt tensioner.
7) Remove left side belt cover.
8) Remove right side belt cover.
9) Remove front belt cover.
10) Remove timing belt guide. (MT vehicle only)
11) Turn crankshaft and align alignment marks on crankshaft, and left and right camshaft sprockets with notches of belt cover and cylinder block. To turn crankshaft, Use ST:
ST 499987500 CRANKSHAFT SOCKET



12) Remove belt idler.
13) Remove timing belt.
14) Remove automatic belt tension adjuster assembly.

B: INSTALLATION SA07685A11

1. SOHC MODEL SA07685A1101

Install in the reverse order of removal. <Ref. to ME(SOHC)-46, Timing Belt Assembly.>

2. DOHC MODEL SA07685A1102

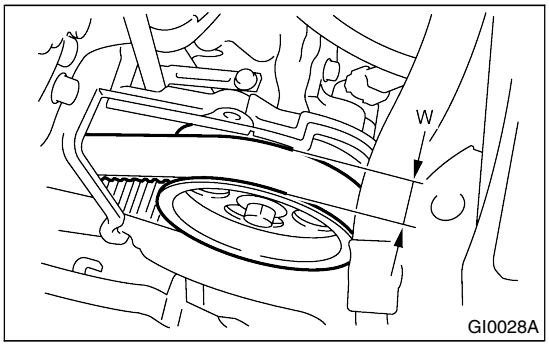
Install in the reverse order of removal. <Ref. to ME(DOHC TURBO)-48, Timing Belt Assembly.>

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. SOHC MODEL SA07685A1001

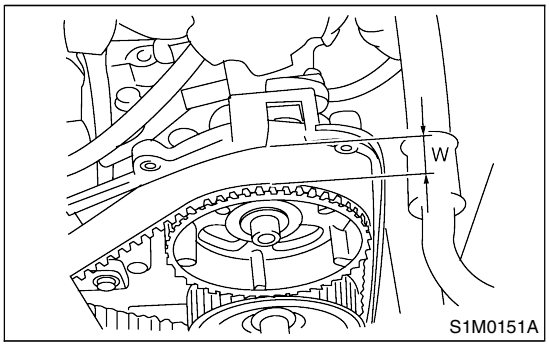
1) Remove left and right timing belt covers.
2) While cranking engine at least four rotations, check timing belt back surface for cracks or damage. Replace faulty timing belt as needed.
3) Measure timing belt width W. If it is less than 27 mm (1.06 in), check idlers, tensioner, water pump pulley and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



4) Install left and right timing belt covers.

2. DOHC MODEL SA07685A1002

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



8. Valve Clearance SA07083

A: INSPECTION SA07083A10

For the inspection procedures of the valve clearance: <Ref. to ME(SOHC)-29, Valve Clearance.> or <Ref. to ME(DOHC TURBO)-28, Valve Clearance.>

9. Fuel Line SA07686

A: INSPECTION SA07686A10

The fuel line is located mostly internally, so check pipes, areas near pipes, and engine compartment piping for rust, hose damage, loose bands, etc. If faulty parts are found, repair or replace them. <Ref. to FU(SOHC)-69, Fuel Delivery, Return and Evaporation Lines.> or <Ref. to FU(SOHCw/oOBD)-56, Fuel Delivery, Return and Evaporation Lines.> or <Ref. to FU(DOHC TURBO)-67, Fuel Delivery, Return and Evaporation Lines.>

10. Fuel Filter SA07027

A: REPLACEMENT SA07027A20

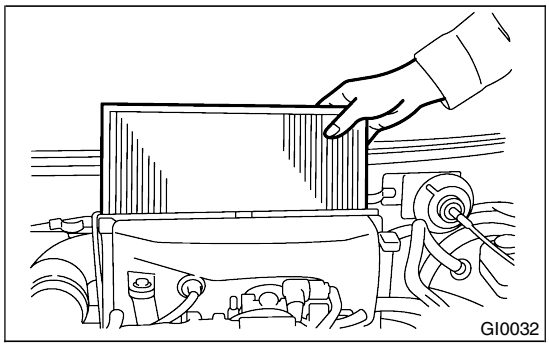
For fuel filter replacement procedures, refer to “FU” section.
<Ref. to FU(SOHC)-66, Fuel Filter.> or <Ref. to FU(SOHCw/oOBD)-54 Fuel Filter.> or <Ref. to FU(DOHC TURBO)-64, Fuel Filter.>

11. Air Cleaner Element SA07687

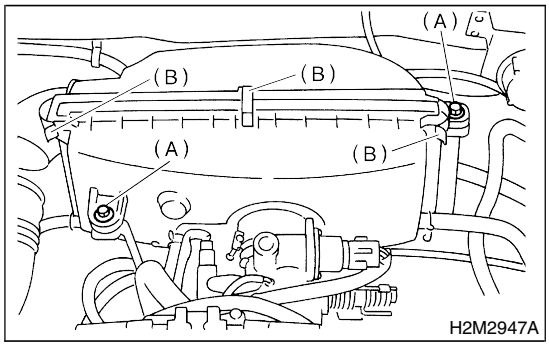
A: REPLACEMENT SA07687A20

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.

1. NON-TURBO MODEL SA07687A2001


GI0032

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



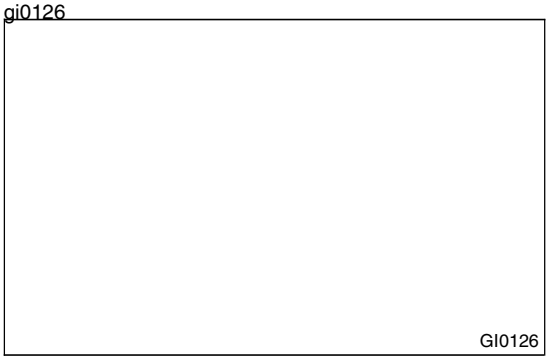
H2M2947A

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.

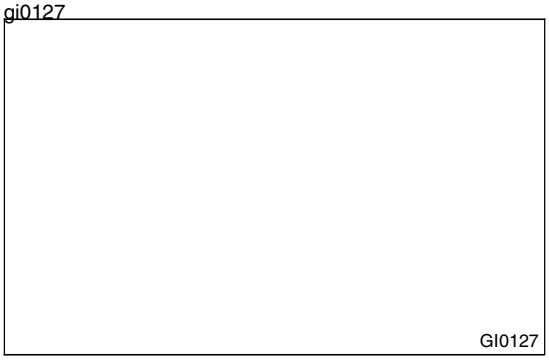
2. TURBO MODEL SA07687A2002

gi0126


GI0126

1) Remove the clip (B) above the air cleaner case.

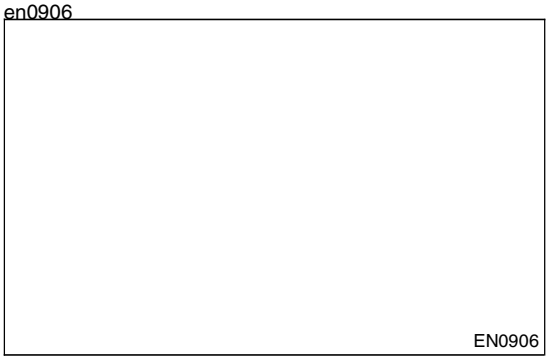
gi0127


GI0127

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

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

en0906

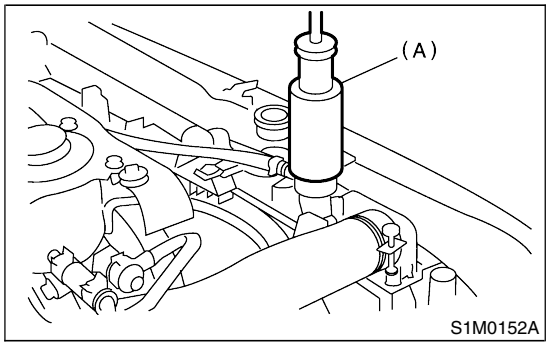

EN0906

12. Cooling System SA07688

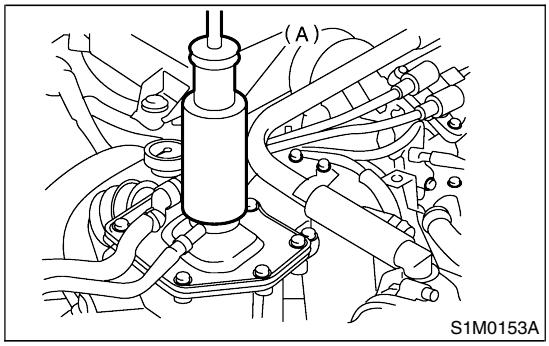
A: INSPECTION SA07688A10

1) Check radiator for leakage, filling it with coolant and attach radiator cap tester (A) to the filler neck. Then apply a pressure of 157 kPa (1.6 kg/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.
Non-TURBO model



TURBO model



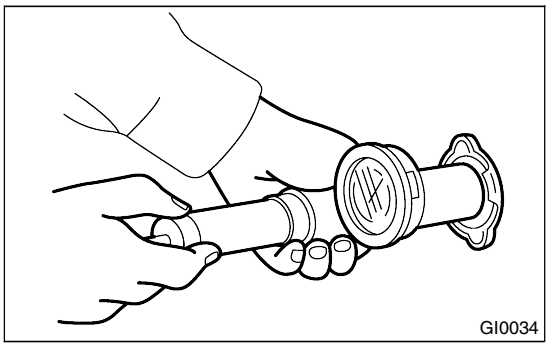
• When performing this check, be sure to keep the engine stationary and fill radiator with coolant.
• Wipe off check points before applying pressure.
• Use care not to spill coolant when detaching tester from radiator.

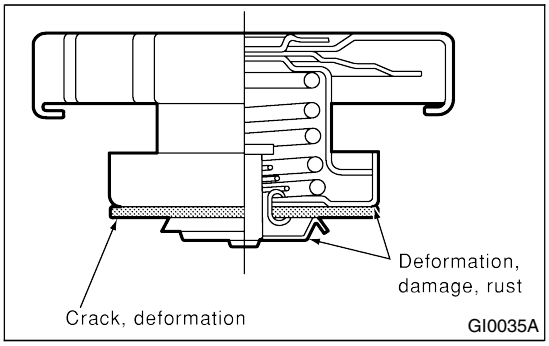
2) Check the radiator cap valve open pressure using radiator cap tester.

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)





3) If the coolant temperature exceeds 76.0 to 80.0°C (169 to 176°F) while radiator is not so hot, check thermostat. If thermostat does not open at 76.0 to 80.0°C (169 to 176°F), replace it with a new one.
4) If electric fan does not operate when coolant temperature exceeds 90 to 94°C (194 to 201°F), check thermoswitch or fan motor.

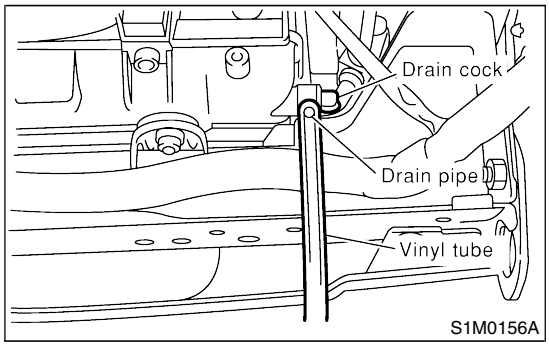
13. Coolant SA07689

A: REPLACEMENT SA07689A20

1. REPLACEMENT OF COOLANT SA07689A2001

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

1) Lift up the vehicle.
2) Remove under cover.
3) 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) Non-TURBO model.
(1) 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)
MT model:
Approx. 6.4 ℓ (6.8 US qt, 5.6 Imp qt)
AT model:
Approx. 6.3 ℓ (6.7 US qt, 5.5 Imp qt)

NOTE:
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.

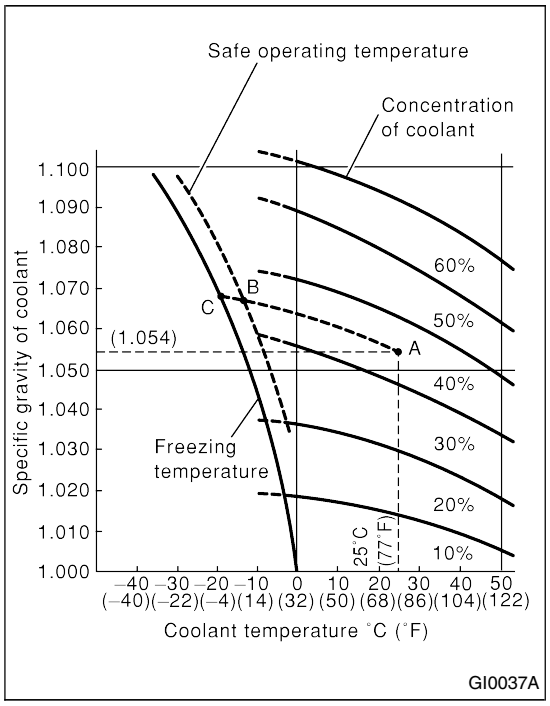
(2) Securely install radiator cap.
(3) Run engine for more than five minutes at 2,000 to 3,000 rpm. (Run engine until radiator becomes hot in order to purge air trapped in cooling system.)
(4) Stop engine and wait until coolant temperature lowers. Then open radiator cap to check coolant level and add coolant up to radiator filler neck. Next, add coolant into reservoir tank up to “FULL” level.
(5) After adding coolant, securely install radiator and reservoir tank caps.
11) TURBO model.
(1) Slowly pour prepared coolant from coolant flow tank filler port up to the brim of port, and install cap, then pour coolant into reserve tank up to “FULL” level.
(2) Run engine for about 15 minutes, not exceeding 2,000 rpm. (Run engine until radiator becomes hot in order to purge air trapped in cooling system.)
(3) Stop engine and wait until coolant temperature lowers. [below 50°C (122°F) or 60°C (140°F)] Open coolant flow tank cap and add coolant up to the brim of the port.
(4) Wait until coolant temperature lowers further [below 30°C (86°F)], then pour into reserve tank up to the “FULL” level.
(5) Run the vehicle until the coolant temperature rises to 80°C (176°F) and check the level in the coolant flow tank, add coolant up to the “FULL” level.

Coolant capacity (fill up to “FULL” level)
MT model
Approx. 6.4ℓ (6.8 US qt, 5.6 Imp qt)
AT model
Approx. 6.3ℓ (6.7 US qt, 5.5 Imp qt)

2. RELATIONSHIP OF SUBARU COOLANT CONCENTRATION AND FREEZING TEMPERATURE

SA07689A2002

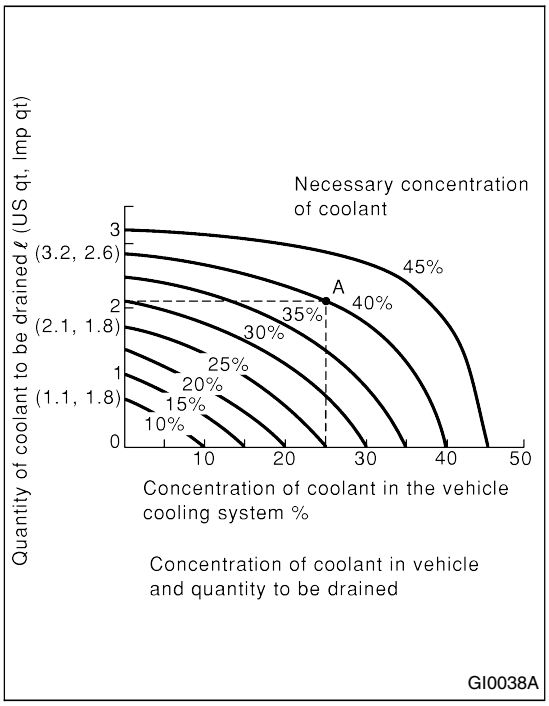
The concentration and safe operating temperature of the SUBARU coolant is shown in the diagram. Measuring the temperature and specific gravity of the coolant will provide this information.
[Example]
If the coolant temperature is 25°C (77°F) and its specific gravity is 1.054, the concentration is 35% (point A), the safe operating temperature is –14°C (7°F) (point B), and the freezing temperature is –20°C (–4°F) (point C).



3. PROCEDURE TO ADJUST THE CONCENTRATION OF THE COOLANT

SA07689A2003

To adjust the concentration of the coolant according to temperature, find the proper fluid concentration in the above diagram and replace the necessary amount of coolant with an undiluted solution of SUBARU genuine coolant (concentration 50).
The amount of coolant that should be replaced can be determined using the diagram.
[Example]
Assume that the coolant concentration must be increased from 25% to 40%. Find point A, where the 25% line of coolant concentration intersects with the 40% curve of the necessary coolant concentration, and read the scale on the vertical axis of the graph at height A. The quantity of coolant to be drained is 2.1 liters (2.2 US qt, 1.8 Imp qt). Drain 2.1 liters (2.2 US qt, 1.8 Imp qt) of coolant from the cooling system and add 2.1 liters (2.2 US qt, 1.8 Imp qt) of the undiluted solution of SUBARU coolant.
If a coolant concentration of 50% is needed, drain all the coolant and refill with the undiluted solution only.



14. Idle Mixture SA07734

A: INSPECTION AND ADJUSTMENT

SA07734G26

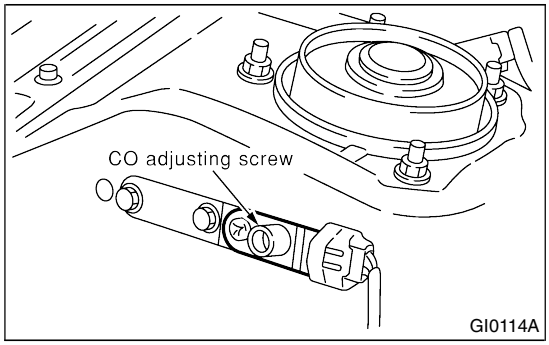
1. IDLE MIXTURE SA07734G2601

Before measuring the idle mixture, make sure that the ignition timing and the engine idle speed are within specifications.
1) Set the gear position at “Neutral” for MT, or “N” or “P” for AT.
2) Warm up engine sufficiently until cooling fan starts to operate.
3) Measure the idle mixture with the CO meter.

Engine idle speed	CO
700±100 rpm	1.0±0.5%

4) If out of specification, adjust the idle mixture using CO adjusting screw of mass air flow sensor.
5) After adjusting the CO value, check and adjust increment coefficient of CO resistor by using Select Monitor.
   (1) Select “Current data display & Save” on the select monitor.
   (2) If out of specified data, adjust the increment coefficient of CO resistor while rotating CO adjusting screw.

Specified data:
0.28 — 4.22 V



NOTE:
If driving the vehicle on out of specified data, the “trouble code 49” is indicated in many case.

15. Clutch System SA07690

A: INSPECTION AND ADJUSTMENT

SA07690G26

1. MECHANICAL CLUTCH TYPE SA07690G2601

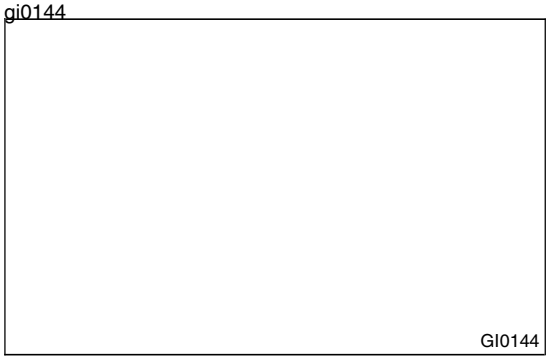
1) Inspect free play of clutch pedal by operating pedal by hand.
If it is out of the specified value, adjust it by turning wing nut on engine side of clutch cable at release fork.

Tightening torque

(Adjusting nut on release fork):
4.4 — 7.4 N·m (0.45 — 0.75 kgf-m, 3.3 — 5.4 ft-lb)

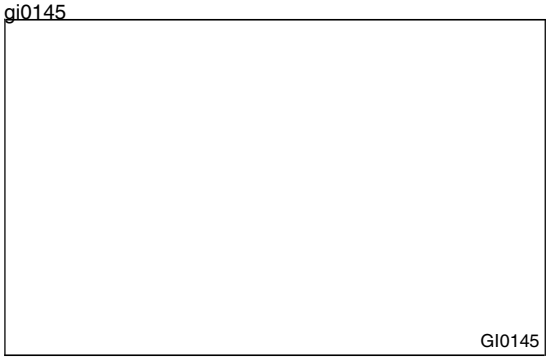
Standard free play:
AT clutch pedal
10 — 20 mm (0.39 — 0.79 in)

gi0144



Fork lever free play allowance:
2 — 4 mm (0.08 — 0.16 in)

gi0145



2) Pedal-to-floor plate gap in disengaged position.
(1) With the engine idling, pull parking brake lever completely.
(2) Slowly depress clutch pedal while moving shift lever into reverse.
(3) Stop depressing clutch pedal when gear-shifting is complete. With clutch pedal in this position, measure the distance between the upper side of pedal pad and the lower end of front panel (intersection of front panel with floor). Check that the measured value is within the specified standard.

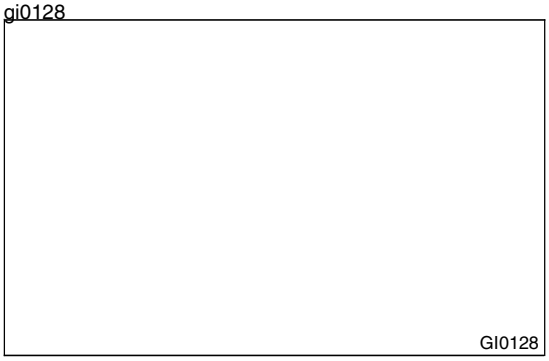
Standard:
80 mm (3.15 in) or more

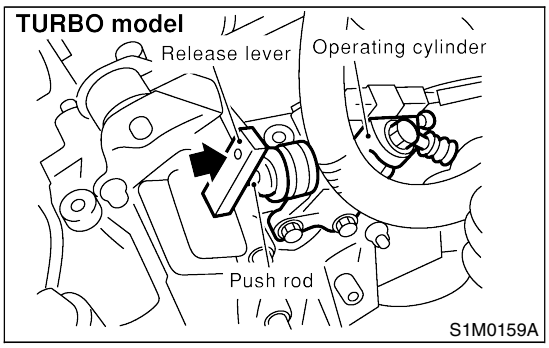
3) Pedal height
Check that the clutch pedal pad surface is level with or higher than brake pedal pad surface.

2. HYDRAULIC CLUTCH TYPE SA07690G2602

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.

gi0128

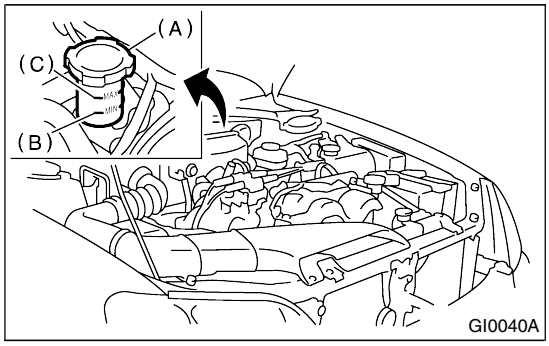




2) If the fluid level rises, pedal free play is correct.
3) If the fluid level does not rise, or the push rod cannot be retracted, adjust the clutch pedal. <Ref. to CL-37 Clutch Pedal.>
4) Inspect the underside of master cylinder, clutch damper and operating cylinder for clutch system, hoses, piping and their couplings for fluid leaks.
If fluid leaks are found, correct them by retightening their fitting bolt and/or replacing their parts.
5) Check the fluid level using the scale on the outside of the clutch master cylinder tank (A). If the level is below “MIN” (B), add clutch fluid to bring it up to “MAX” (C).

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

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



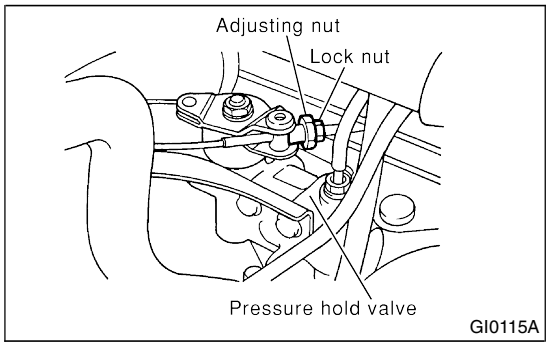
16. Hill-holder System SA07735

A: INSPECTION AND ADJUSTMENT

SA07735G26

1) Confirm stopping and starting performance by activating hill-holder on an uphill road of 3° or higher inclination.
(1) When vehicle does not stop;
Tighten adjusting nut of PHV cable.
(2) When vehicle does not start properly;
A; When hill-holder is released later than engagement of clutch (engine tends to stall): Loosen adjusting nut gradually until smooth starting is enabled.
B; When hill-holder is released earlier than engagement to clutch (vehicle slips down slightly): Tighten adjusting nut so that hill-holder is released later than engagement of clutch (status in A). Then make adjustment the same as in A.

NOTE:
● Whenever turning adjusting nut, hold inner cable with pliers to prevent it from turning.
● Replace pressure hold valve (PHV), return spring of PHV or PHV cable with new one, if they are defective and/or damaged.



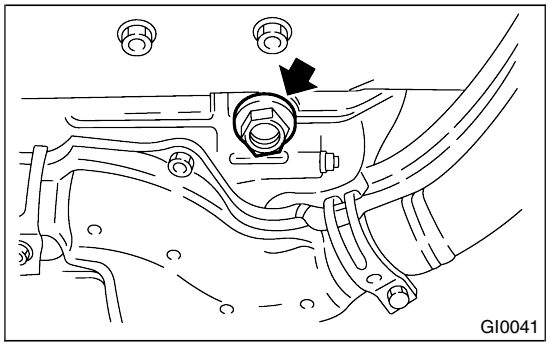
17. Transmission Oil SA07691

A: REPLACEMENT SA07691A20

1. MANUAL TRANSMISSION SA07691A2001

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

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



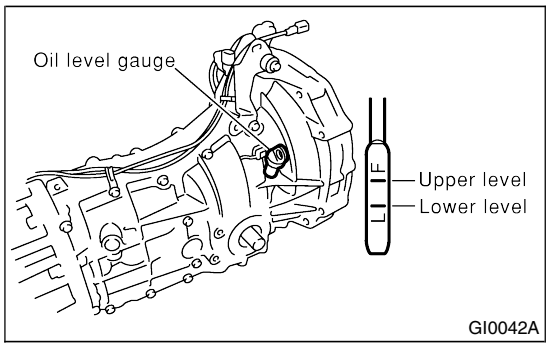
2) Reinstall drain plug after draining gear oil and tighten it to the specified torque.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)

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

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

Gear oil capacity:
Single range model
3.5 ℓ (3.7 US qt, 3.1 Imp qt)
Dual range model
4.0 ℓ (4.2 US qt, 3.5 Imp qt)



18. ATF SA07692

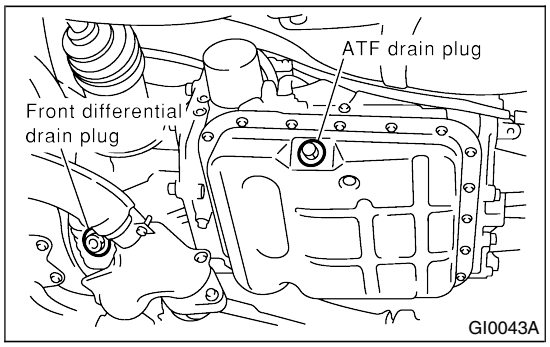
A: REPLACEMENT SA07692A20

1. AUTOMATIC TRANSMISSION FLUID

SA07692A2001

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

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



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

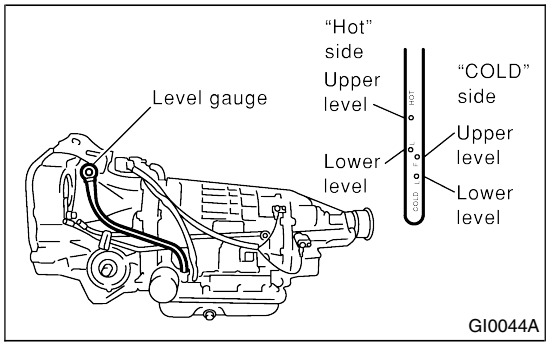
Tightening torque:
25.0 N·m (2.55 kgf-m, 18.4 ft-lb)

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.



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-46, ATF Filter.>

19. Front & Rear Differential Oil

SA07693

A: REPLACEMENT SA07693A20

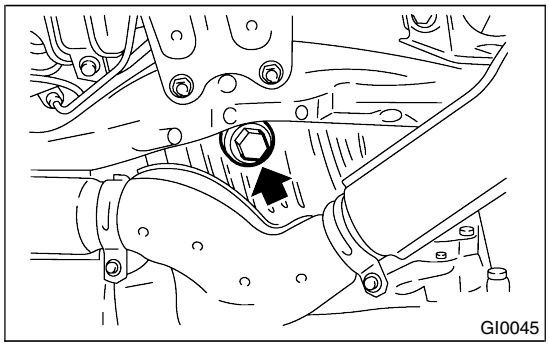
1. FRONT DIFFERENTIAL (MANUAL TRANSMISSION) SA07693A2001

For M/T vehicle, manual transmission oil works as differential oil to lubricate differential. Refer to “Transmission Oil”. <Ref. to PM-25 MANUAL TRANSMISSION, REPLACEMENT, Transmission Oil.>

2. FRONT DIFFERENTIAL (AUTOMATIC TRANSMISSION) SA07693A2002

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

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



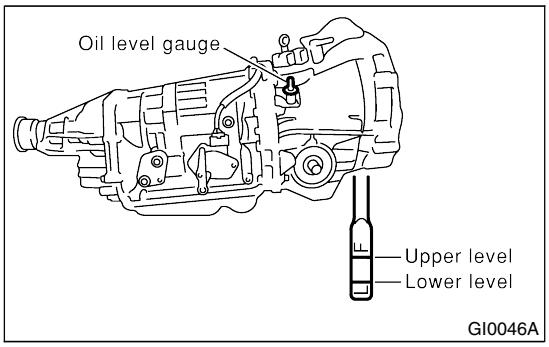
2) Reinstall drain plug after draining differential gear oil and tighten it to the specified torque.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)

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

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

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



3. REAR DIFFERENTIAL SA07693A2003

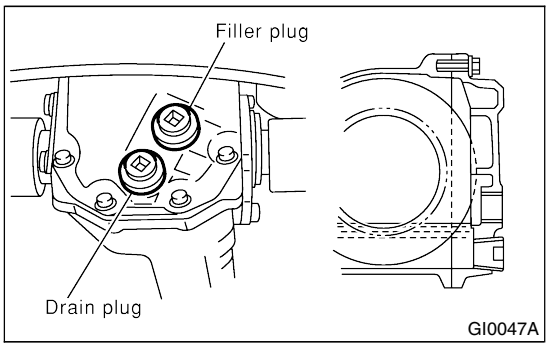
1) Drain oil by removing drain plug.
2) Remove filler plug for quick draining oil.
3) Reinstall drain plug after draining oil.

NOTE:
- Apply fluid packing to drain plug threads before installation in T-type.
- VA-type uses a new aluminum gasket.

Fluid packing:
Three Bond 1105

Tightening torque:
T-type:
49.0 N·m (5.0 kgf-m, 36.2 ft-lb)
VA-type:
34 N·m (3.5 kgf-m, 25.3 ft-lb)

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



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

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

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

NOTE:
- Apply fluid packing to filler plug before installation in T-type.
- VA-type uses a new aluminum gasket.

Fluid packing:
Three Bond 1105

Tightening torque:
T-type:
49.0 N·m (5.0 kgf-m, 36.2 ft-lb)
VA-type:
34 N·m (3.5 kgf-m, 25.3 ft-lb)

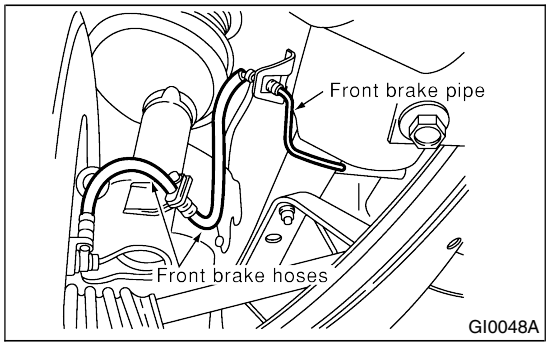
20. Brake Line SA07694

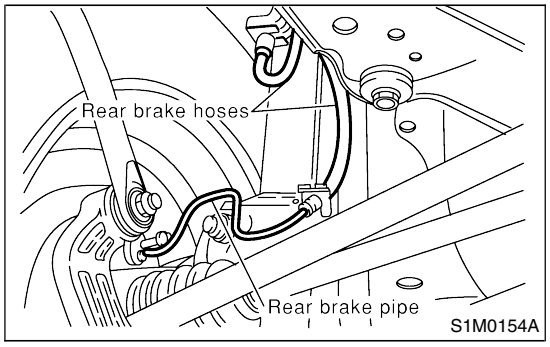
A: INSPECTION SA07694A10

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.



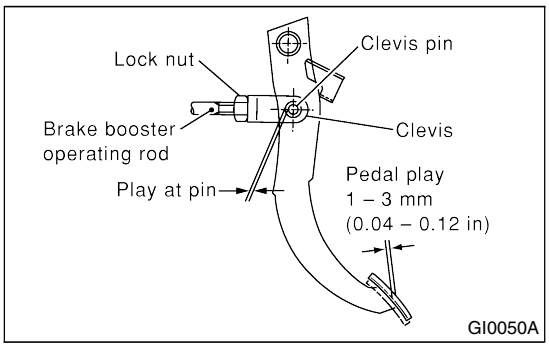


B: CHECKING SA07694G27

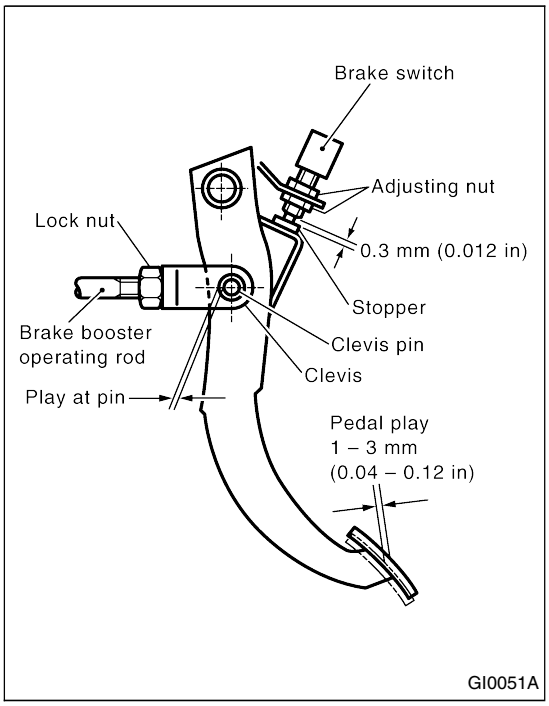
1. SERVICE BRAKE SA07694G2701

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)

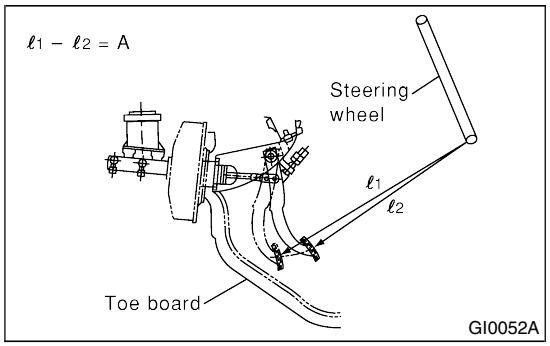


2) If the free play is out of specifications above, adjust the brake pedal as follows:
(1) Be sure engine is off. (No vacuum is applied to brake booster.)
(2) There should be play between brake booster clevis and pin at brake pedal installing portion.
[Depress brake pedal pad with a force of less than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

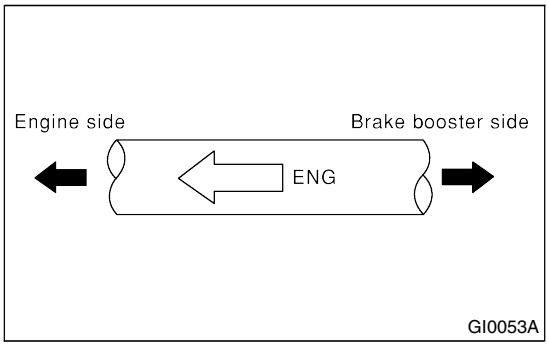


4) Check to see if air is in the hydraulic brake line by the feel of pedal operation. If air appears to exist in the line, bleed it from the system.
5) Check for even operation of all brakes, using a brake tester or by driving the vehicle for a short distance on a straight road.

2. BRAKE SERVO SYSTEM SA07694G2702

1) With the engine off, depress the brake pedal several times applying the same pedal force: Make sure the travel distance should not change.
2) With the brake pedal depressed, start the engine: Make sure the pedal should move slightly toward the floor.
3) With the brake pedal depressed, stop the engine and keep the pedal depressed for 30 seconds: Make sure the pedal height should not change.

4) Check valve is built into vacuum hose. Disconnect vacuum hose to inspect function of check valve.
Blow air into vacuum hose from its brake booster side end: Air must flow out of engine side end of hose. Next blow air into hose from engine side: Air should not flow out of hose.
Replace both check valve and vacuum hose if check valve is faulty. Engine side of vacuum hose is indicated by marking “ENGINE” as shown.



5) Check vacuum hose for cracks or other damage.

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

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

21. Brake Fluid SA07162

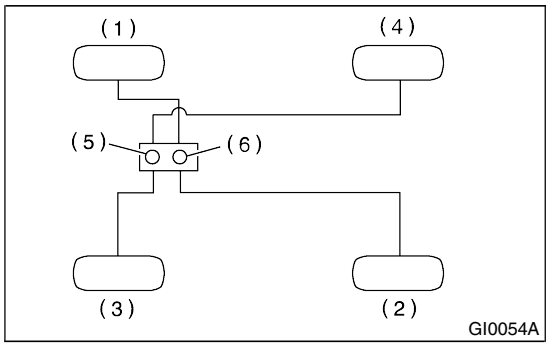
A: REPLACEMENT SA07162A20

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

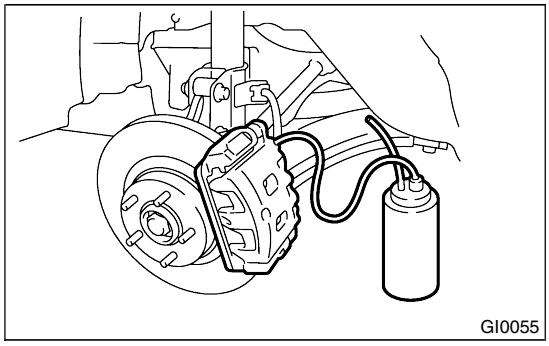
NOTE:
- Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
- Be careful not to allow dirt or dust to get into the reservoir tank.

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.

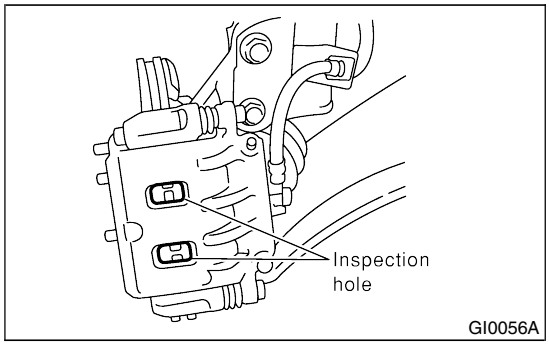
22. Disc Brake Pads and Discs

SA07695

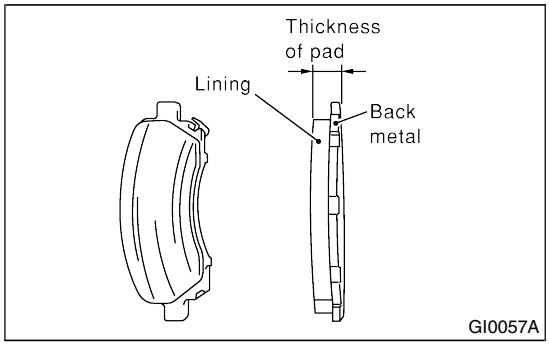
A: INSPECTION SA07695A10

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.



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



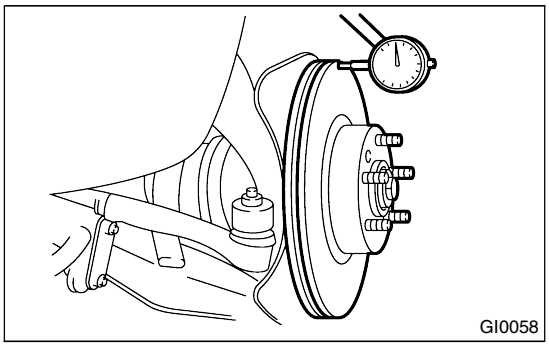
3) Check the disc rotor, and correct or replace if it is damaged or worn.

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

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

Disc rotor runout limit:
Front: 0.075 mm (0.0030 in)
Rear: 0.075 mm (0.0030 in)

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.



23. Brake Linings and Drums

SA07696

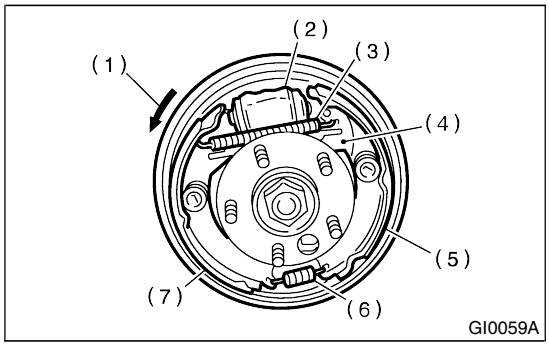
A: INSPECTION SA07696A10

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-34, Rear Drum Brake Drum.>
2) Inspect brake shoes for damage or deformities and check brake linings for wear.

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

Thickness of lining (except back metal)
Standard value: 4.1 mm (0.161 in)
Service limit: 1.5 mm (0.059 in)

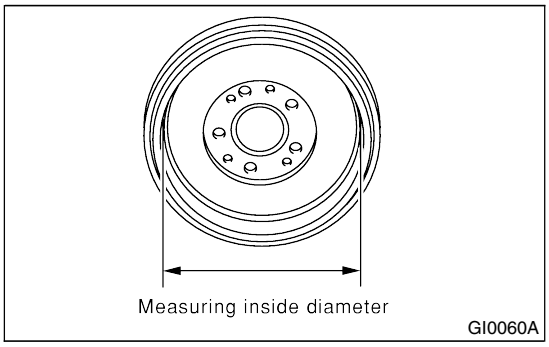


(1) Rotational direction of drum (Forward)
(2) Wheel cylinder
(3) Upper shoe return spring
(4) Adjusting lever
(5) Trailing shoe
(6) Lower shoe return spring
(7) Leading shoe

To replace trailing shoe, remove cotter pin. Clevis pin should also be replaced if worn.
3) Check brake drum for wear, dents or other damage.
If the inside surface of brake drum is streaked, correct the surface with emery cloth (#200 or more). If it is unevenly worn, tapered, or the outside surface of brake drum is damaged, correct or replace it.

Brake drum inner diameter
Standard value: 228.6 mm (9.000 in)
Service limit: 230.6 mm (9.079 in)

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



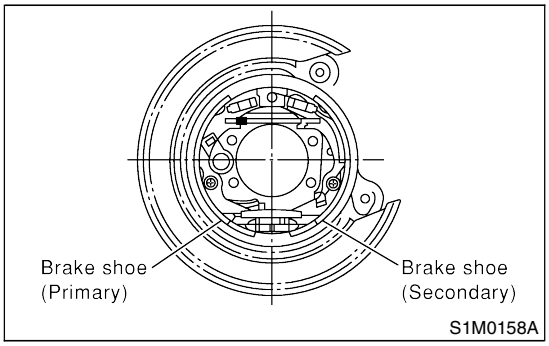
2. PARKING BRAKE (REAR DISC BRAKE)

SA07696A1002

Inspect brake linings and drums of both sides of the rear brake at the same time by removing brake drums.
1) Inspect brake shoes for damage or deformation and check brake linings for wear.

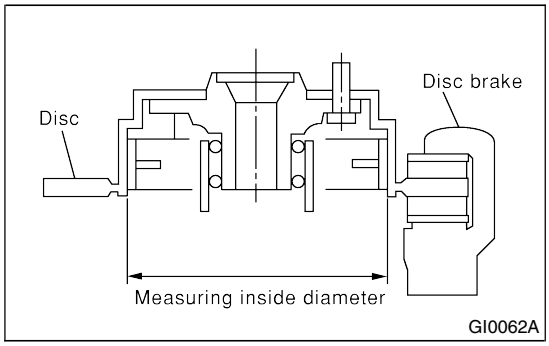
NOTE:
Always replace both primary and secondary brake shoes for the left and right wheels at the same time.

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



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

Brake drum inside diameter
Standard value: 170 mm (6.69 in)
Wear limit: 171 mm (6.73 in)



3) If the deformation or wear of back plate, shoe, etc. is noticeable, replace them.
4) When the shoe return spring tension is excessively weakened, replace it, taking care to identify upper and lower springs.

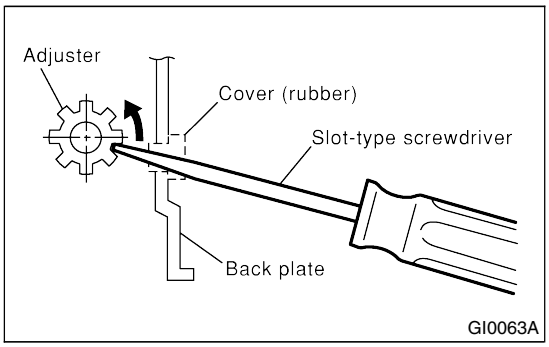
B: ADJUSTMENT SA07696A01

1. REAR DRUM BRAKE SA07696A0101

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

2. PARKING BRAKE (REAR DISC BRAKE) SA07696A0102

For rear disc brake, adjust parking brake after bleeding the air.
1) Remove rear cover (rubber) installed at back plate.
2) Turn adjuster toward arrow mark (upward) until it is locked slightly, by using slot-type screwdriver as shown in illustration.



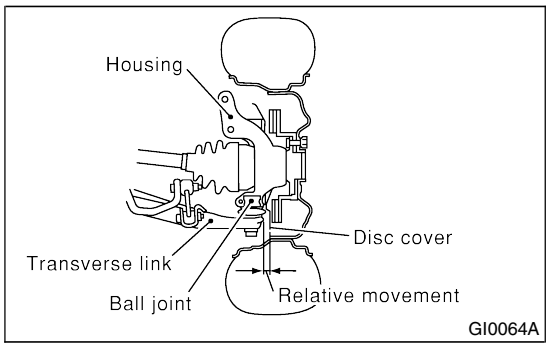
3) Turn back (downward) adjuster 3 to 4 notches.
4) Install cover (rubber) at original position correctly.

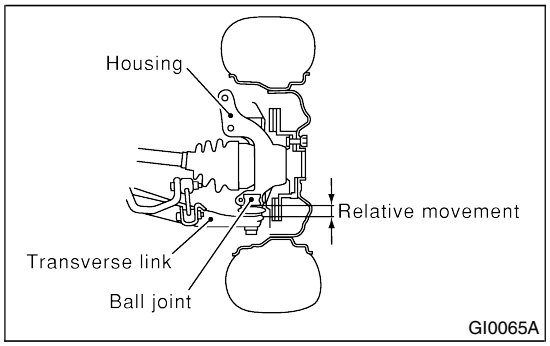
24. Suspension SA07697

A: INSPECTION SA07697A10

1. SUSPENSION BALL JOINT SA07697A1001

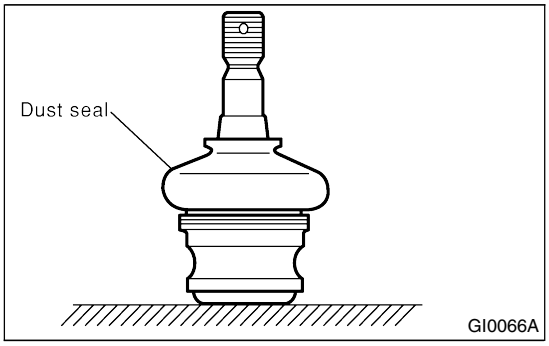
1) Jack up vehicle until front wheels are off ground.
2) Next, grasp bottom of tire and move it in and out. If relative movement is observed between brake disc cover and end of transverse link, ball joint may be excessively worn.
3) Next, grasp end of transverse link and move it up and down. Relative 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-17, Front Ball Joint.>





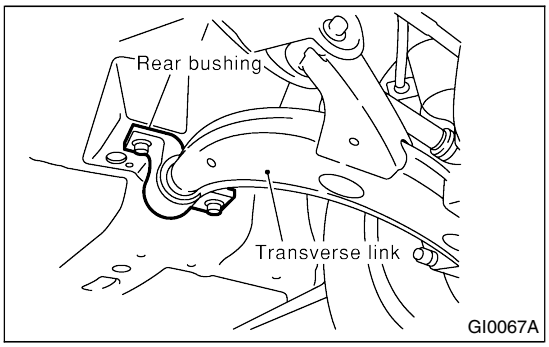
5) Damage of dust seal
Visually inspect ball joint dust seal. If it is damaged, remove transverse link. <Ref. to FS-14, Front Transverse Link.> And measure free play of ball joint. <Ref. to FS-17, Front Ball Joint.>
(1) When looseness exceeds standard value, replace ball joint.
(2) If the dust seal is damaged, replace with the new ball joint.

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



2. TRANSVERSE LINK'S REAR BUSHING SA07697A1002

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



3. WHEEL ARCH HEIGHT SA07697A1003

1) Unload cargoes and set vehicle in curb weight 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
  - 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.

25. Wheel Bearing SA07698

A: INSPECTION SA07698A10

1. FRONT WHEEL BEARING SA07698A1001

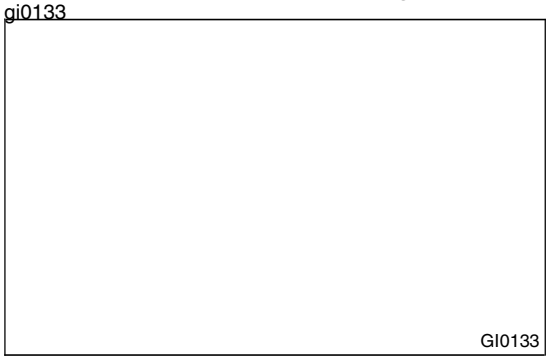
NOTE:
Inspect the condition of front wheel bearing grease.

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.

gi0133



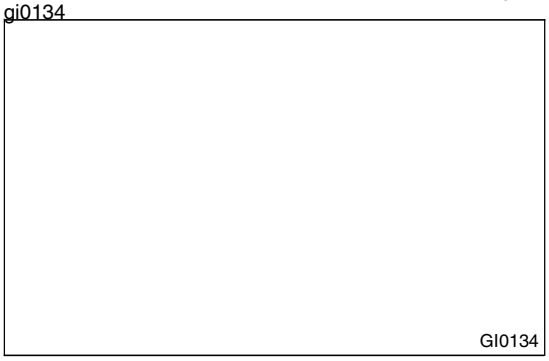
2. REAR WHEEL BEARING SA07698A1002

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

Service limit:
Straight-ahead position within 0.05 mm (0.0020 in)

5) Remove the DOJ of rear drive shaft from rear differential. <Ref. to DS-38, Rear Drive Shaft.>
6) 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.

gi0134

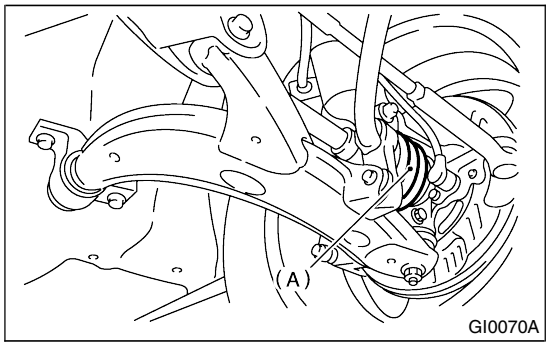


26. Axle Boots & Joints SA07699

A: INSPECTION SA07699A10

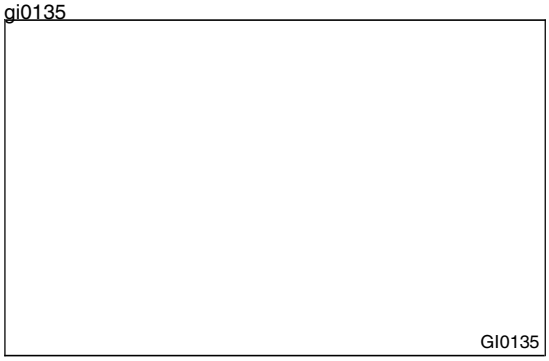
1. FRONT AND REAR AXLE BOOTS SA07699A1001

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



GI0070A

gi0135


GI0135

2. PROPELLER SHAFT SA07699A1002

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

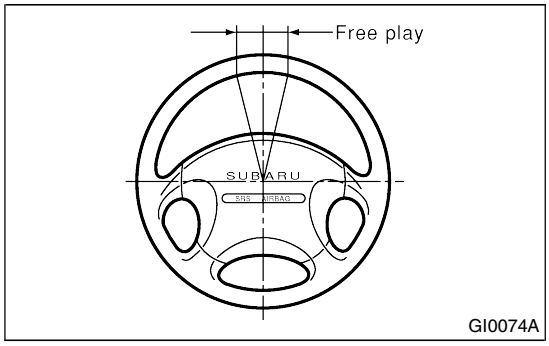
27. Steering System (Power Steering) SA07701

A: INSPECTION SA07701A10

1. STEERING WHEEL SA07701A1001

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

Steering wheel free play:
0 — 17 mm (0 — 0.67 in)



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

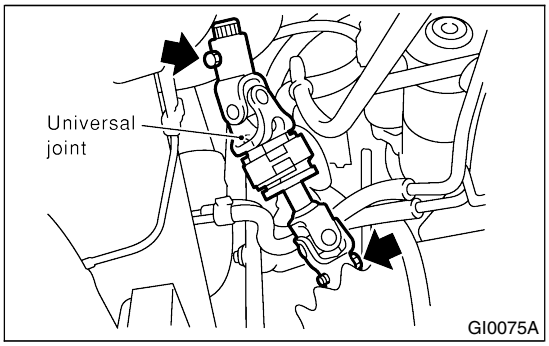
Maximum permissible play:
0.5 mm (0.020 in)

3) Drive vehicle and check the following items during operation.
(1) Steering force .....
The effort required for steering should be smooth and even at all points, and should not vary.
(2) Pull to one side .....
Steering wheel should not be pulled to either side while driving on a level surface.
(3) Wheel runout .....
Steering wheel should not show any sign of runout.
(4) Return factor .....
Steering wheel should return to its original position after it has been turned and then released.

2. STEERING SHAFT JOINT SA07701A1002

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

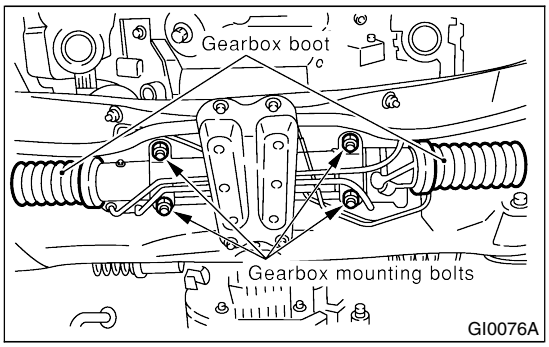
Tightening torque:
24 N·m (2.4 kgf-m, 17.4 ft-lb)



3. GEARBOX SA07701A1003

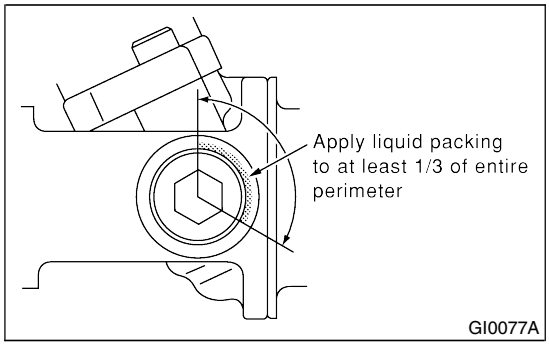
1) With wheels placed on a level surface, turn steering wheel 90° in both the left and right directions.
While wheel is being rotated, reach under vehicle and check for looseness in gearbox.

Tightening torque:
59 N·m (6.0 kgf-m, 43.4 ft-lb)



2) Check boot for damage, cracks or deterioration.

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°.



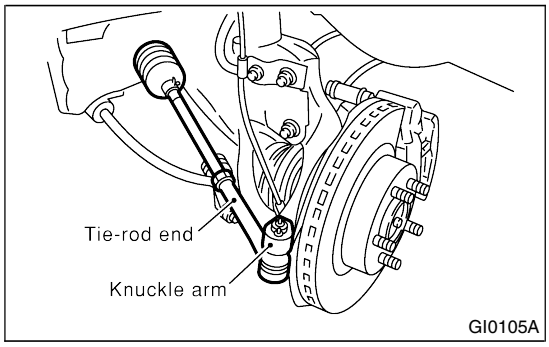
(5) Install lock nut. While holding adjusting screw with a wrench, tighten lock nut using ST.
ST 926230000 SPANNER

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.



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.

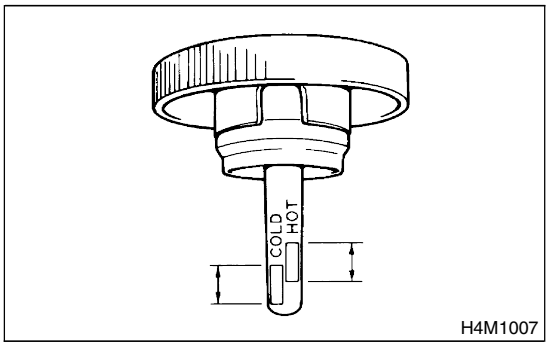
Tightening torque:
83 N·m (8.5 kgf-m, 61.5 ft-lb)

5. POWER STEERING FLUID LEVEL

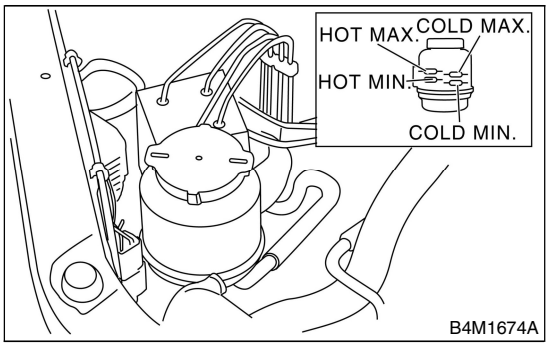
SA07701A1005

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.

Non-turbo model



Turbo model



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

Recommended fluid:
Dexron 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.

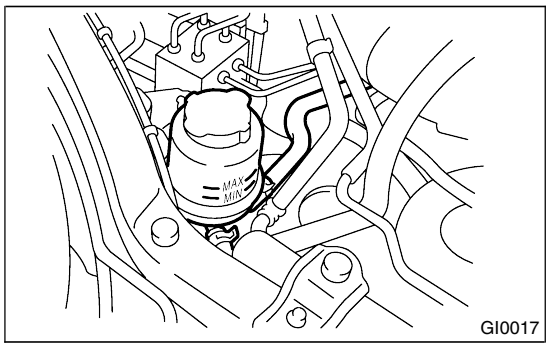
NOTE:
● Wipe the leakage fluid off after correcting fluid leaks, or a wrong diagnosis is taken later.
● Also pay attention to clearances between hoses (or pipings) and other parts when inspecting fluid leaks.

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 new one if necessary.

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



8. POWER STEERING PIPES FOR DAMAGE

SA07701A1008

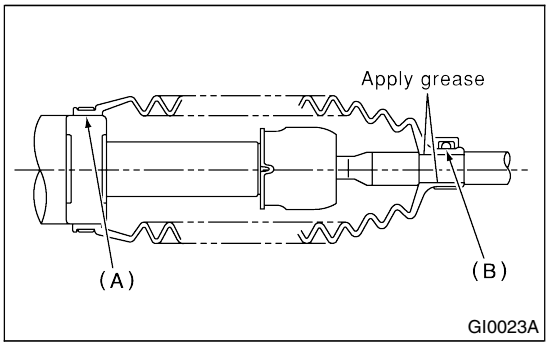
Check power steering pipes for corrosion and damage.
Replace pipes with new one if necessary.

9. GEARBOX BOOTS

SA07701A1009

Inspect both sides of gearbox boots as follows, and correct the defects if necessary.
1) (A) and (B) positions of gearbox boot are fitted correspondingly in (A) and (B) grooves of gearbox and the rod.
2) Clips are fitted outside of (A) and (B) positions of boot.
3) Boot does not have crack and hole.

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



10. FITTING BOLTS AND NUTS

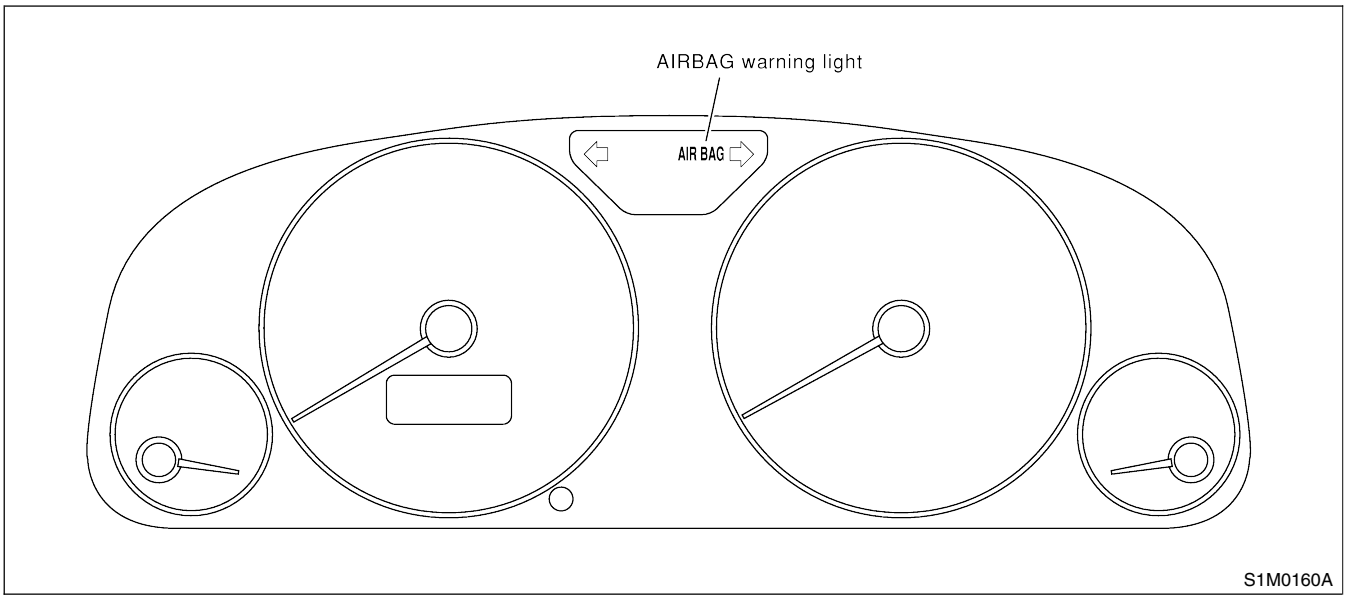
SA07701A1010

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.

28. 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.



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(SOHC)

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1. General Description S155001

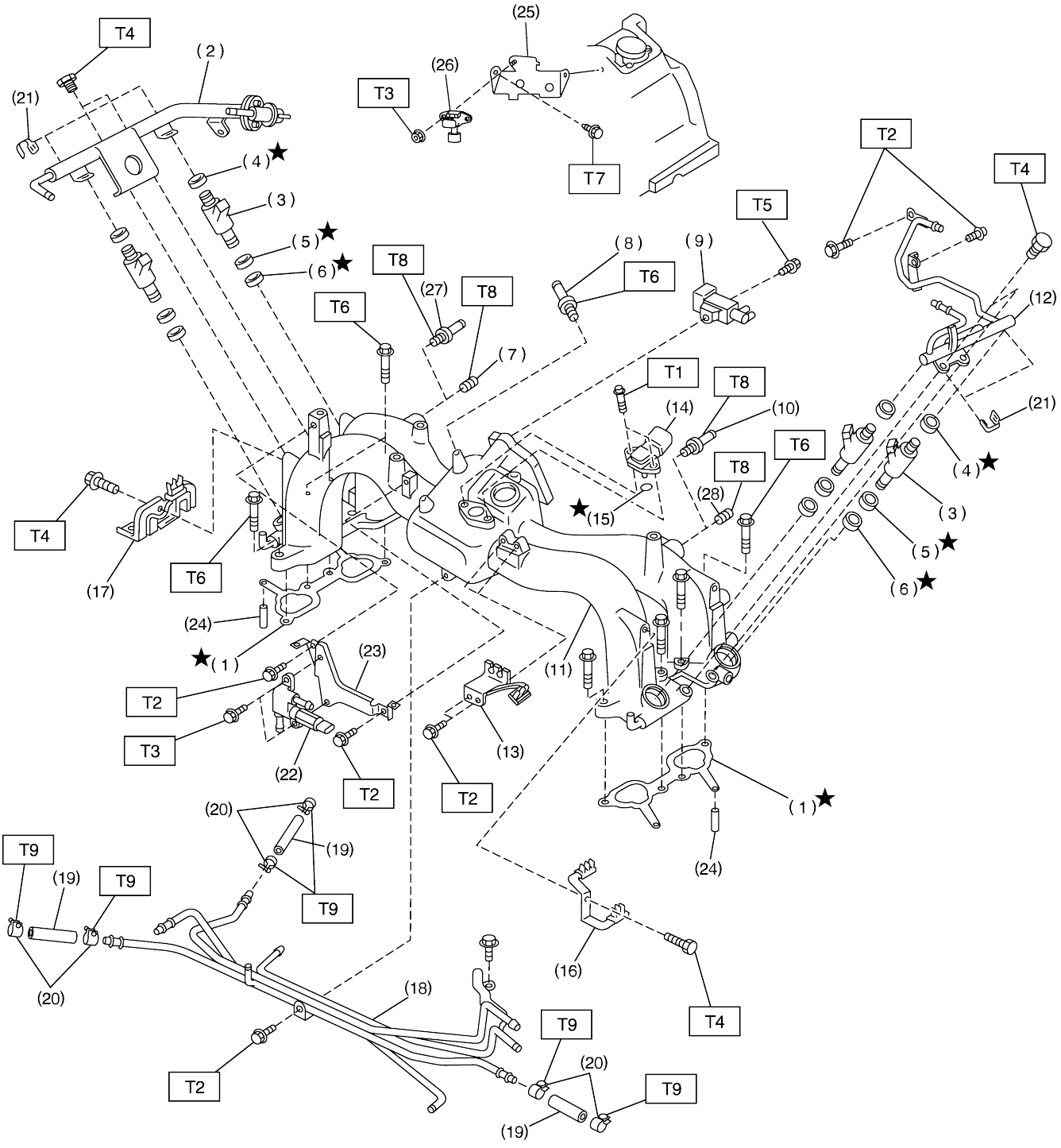
A: SPECIFICATIONS S155001E49

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 S155001A05

1. INTAKE MANIFOLD S155001A0501

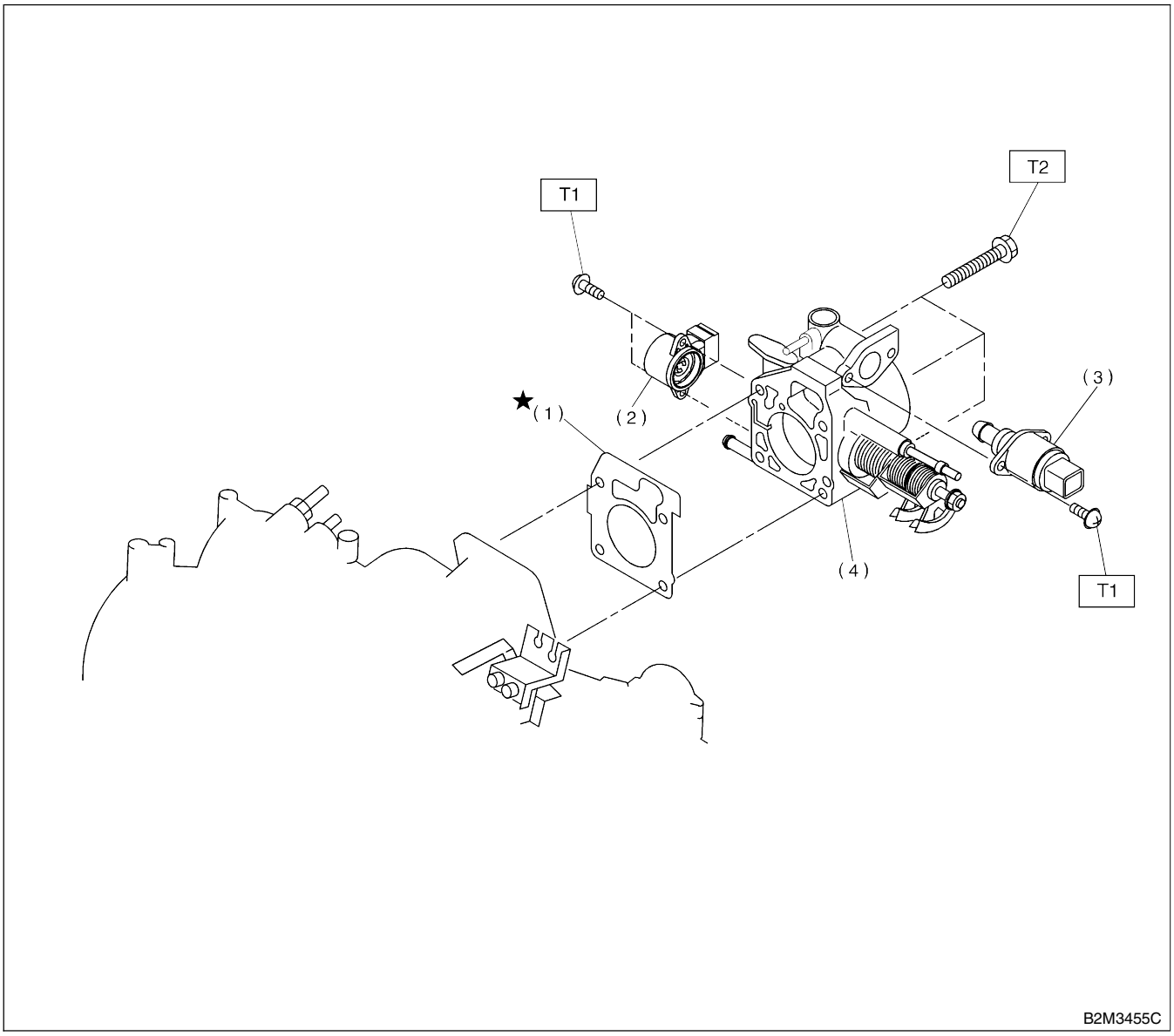


S2M2151A

(1) Intake manifold gasket
(2) Fuel injector pipe RH
(3) Fuel injector
(4) O-ring
(5) O-ring
(6) O-ring
(7) Plug (LHD model)
(8) PCV valve
(9) Purge control solenoid valve
(10) Nipple (LHD model)
(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
(27) Nipple (RHD model)
(28) Plug (RHD model)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 3.4 (0.35, 2.5)
T2: 4.9 (0.50, 3.6)
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: 7.35 (0.75, 5.421)
T8: 17 (1.7, 12)
T9: 1.5 (0.15, 1.1)

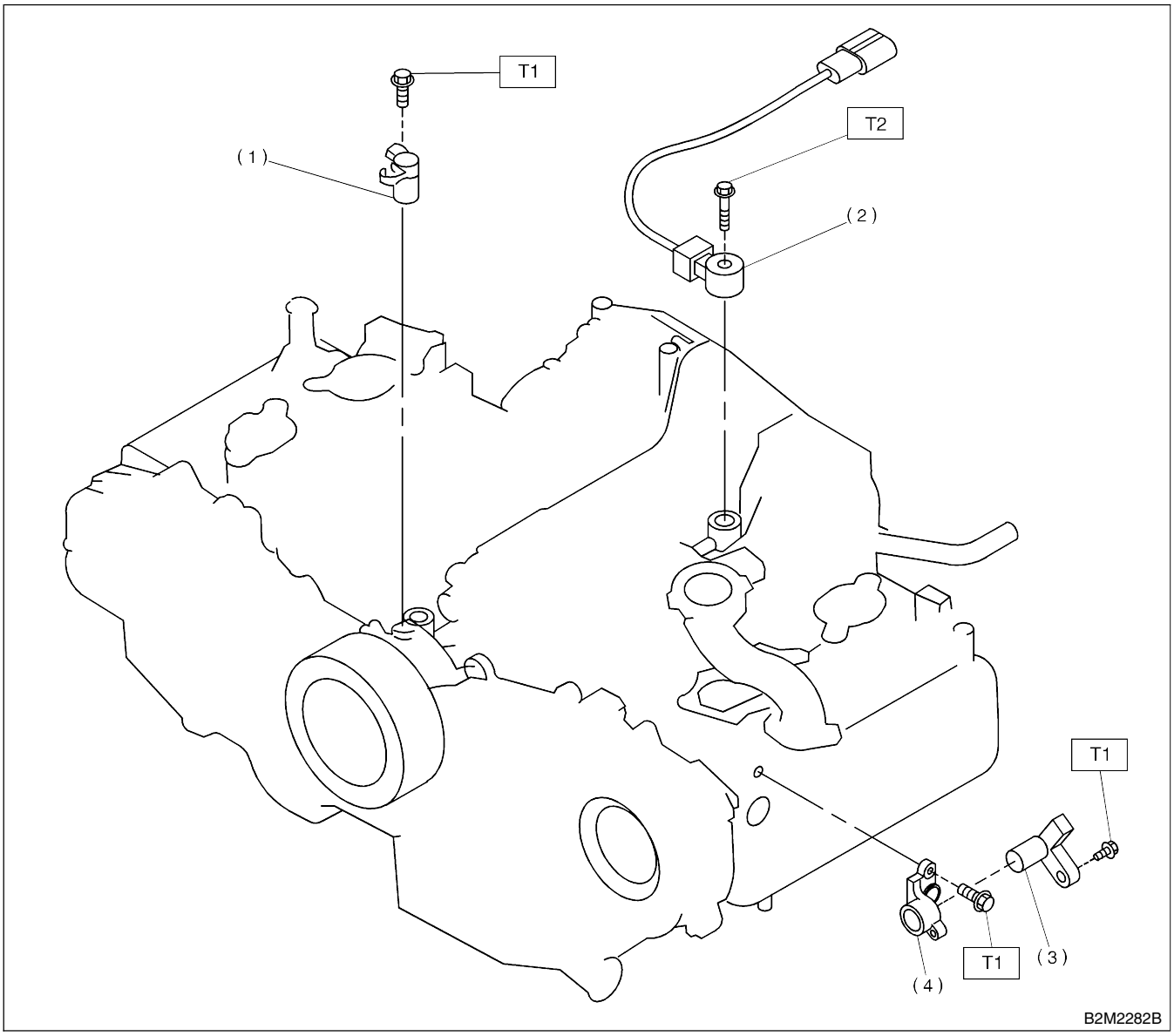
2. AIR INTAKE SYSTEM S155001A0502



(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)

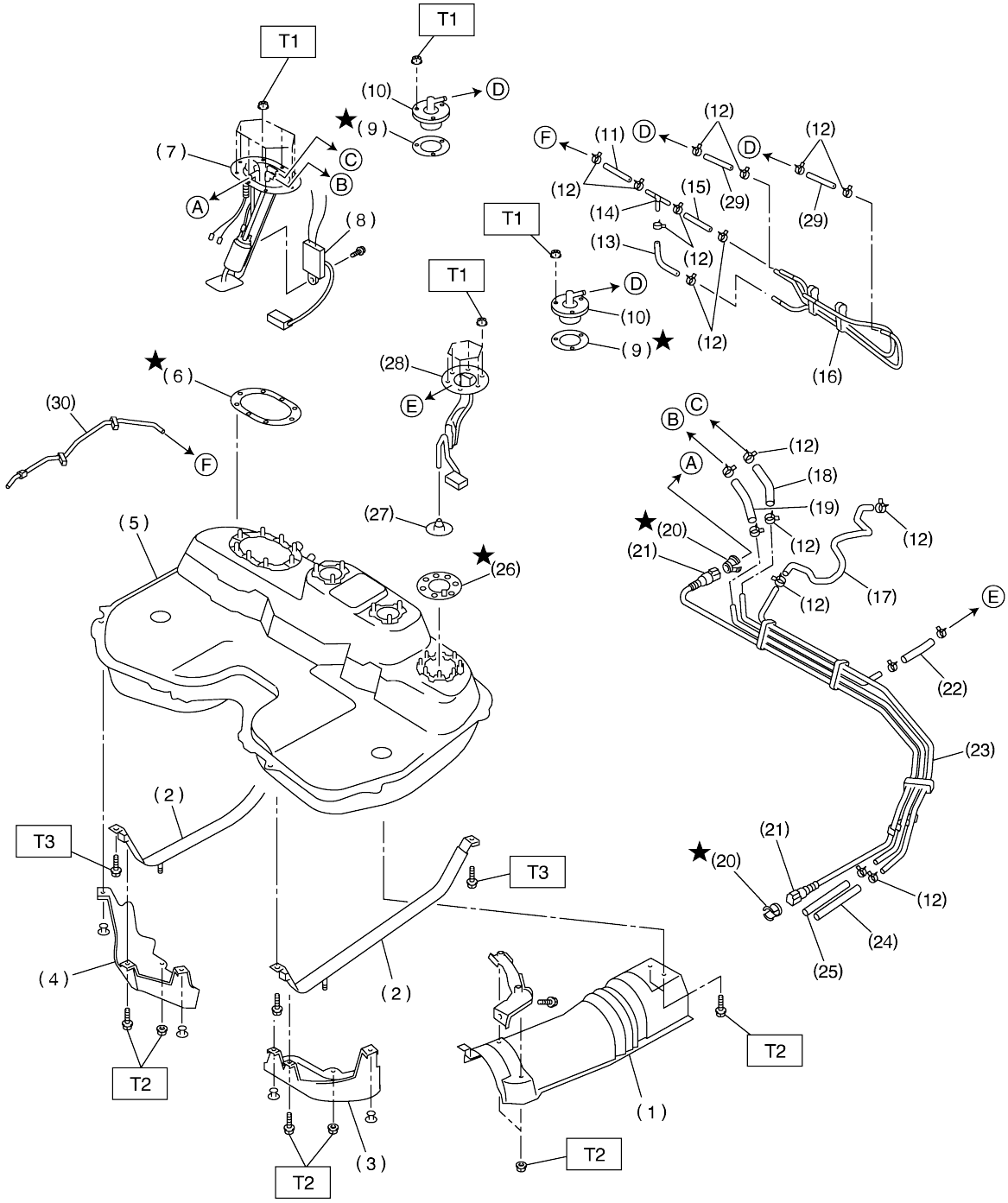
3. CRANKSHAFT POSITION, CAMSHAFT POSITION AND KNOCK SENSORS S155001A0503



(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 S155001A0504

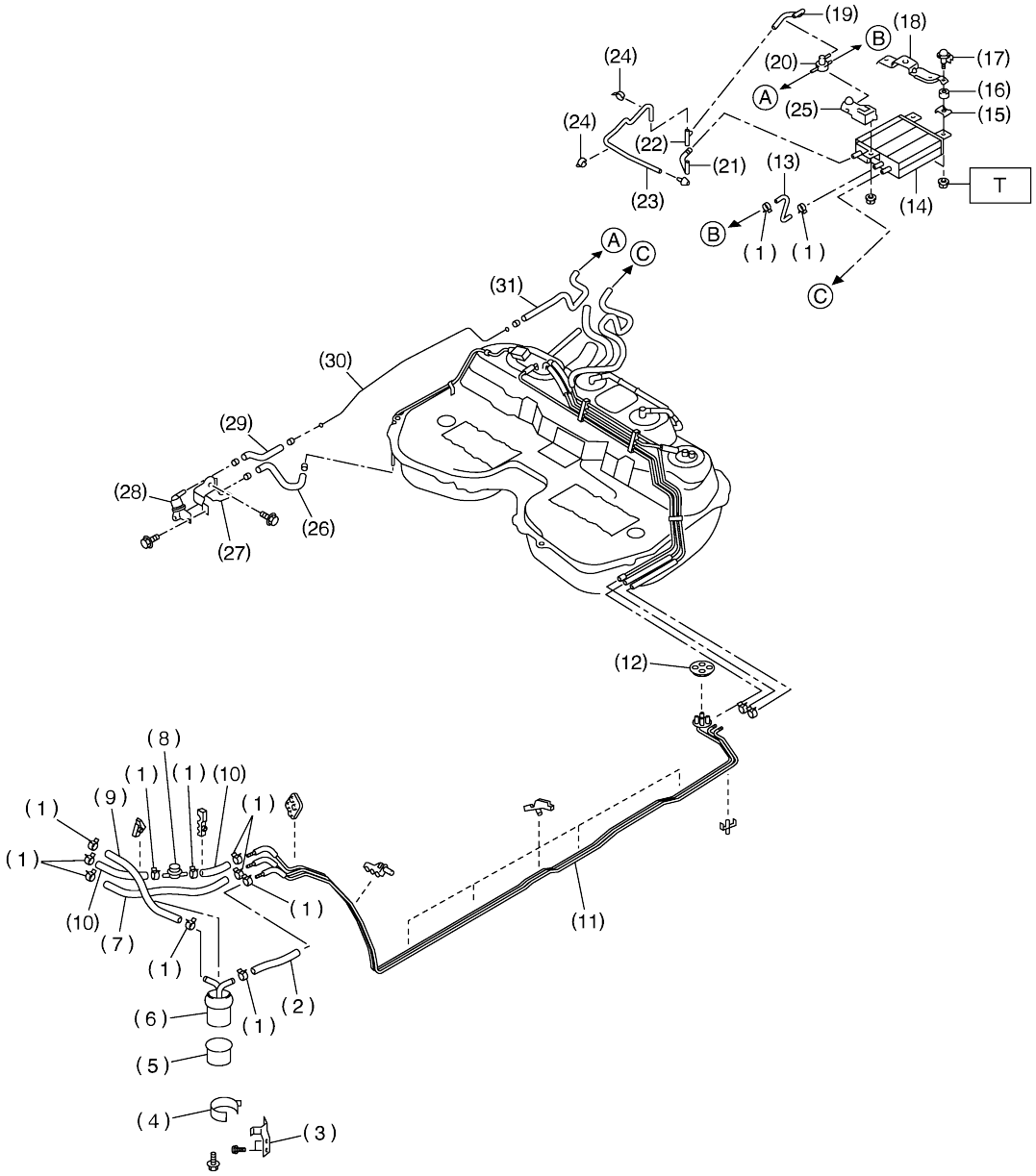


S2M2152A

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

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 S155001A0505

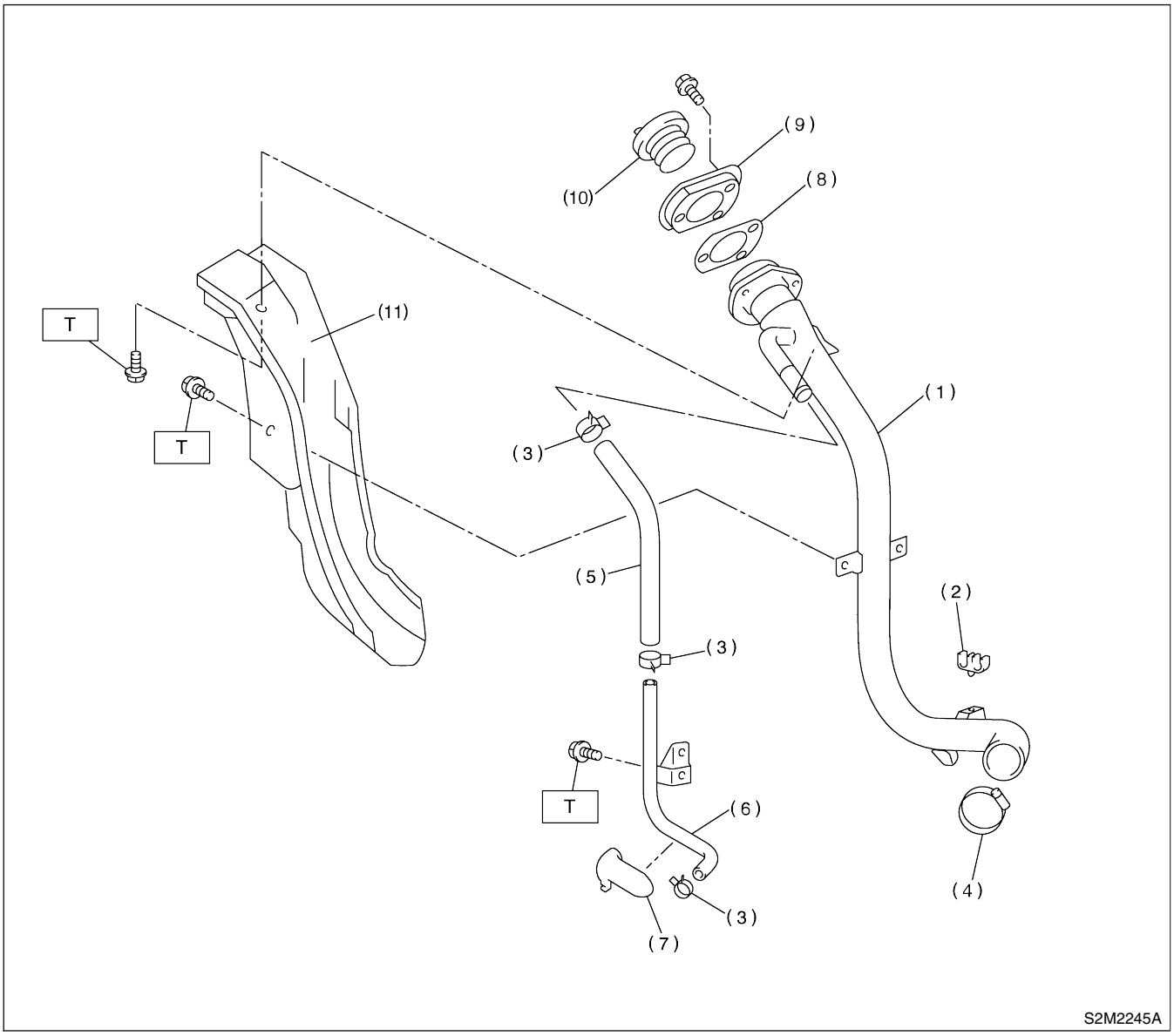


S2M2153A

(1) Clip
(2) Fuel delivery hose A
(3) Fuel filter bracket
(4) Fuel filter holder
(5) Fuel filter cup
(6) Fuel filter
(7) Evaporation hose A
(8) Fuel damper
(9) Fuel delivery hose B
(10) Fuel return hose
(11) Fuel pipe ASSY
(12) Grommet
(13) Canister hose A
(14) Canister
(15) Canister bracket plate
(16) Cushion
(17) Canister bracket spacer
(18) Rear canister bracket
(19) Two-way valve return hose
(20) Two-way valve
(21) Two-way valve drain hose A
(22) Connector
(23) Two-way valve drain hose B
(24) Clamp
(25) Front canister bracket
(26) Evaporation hose B
(27) Roll over valve bracket
(28) Roll over valve
(29) Evaporation hose C
(30) Evaporation pipe
(31) Canister hose B

Tightening torque: N·m (kgf-m, ft-lb)
T: 23 (2.34, 17.0)

6. FUEL FILLER PIPE S155001A0506



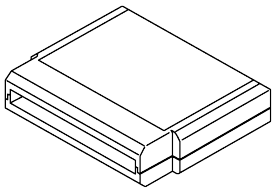
(1) Fuel filler pipe ASSY
(2) Evaporation hose holder
(3) Clamp
(4) Clamp
(5) Air vent hose
(6) Air vent pipe
(7) Air vent pipe holder
(8) Filler pipe packing
(9) Filler ring
(10) Filler cap
(11) Fuel filler pipe protector

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.5 (0.76, 5.53)

C: CAUTION S155001A03

- 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.

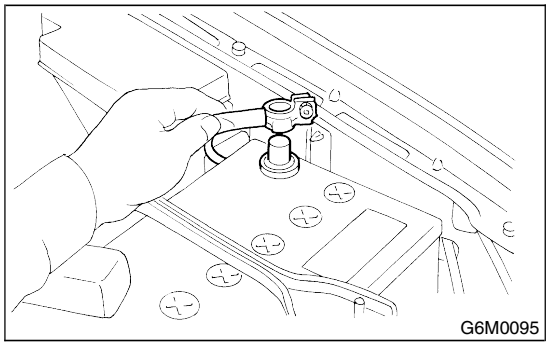
D: PREPARATION TOOL S155001A17

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)

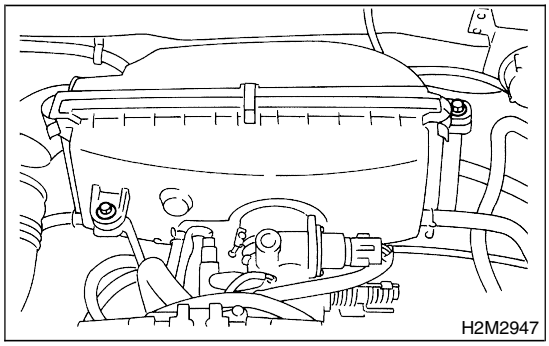
2. Throttle Body S155010

A: REMOVAL S155010A18

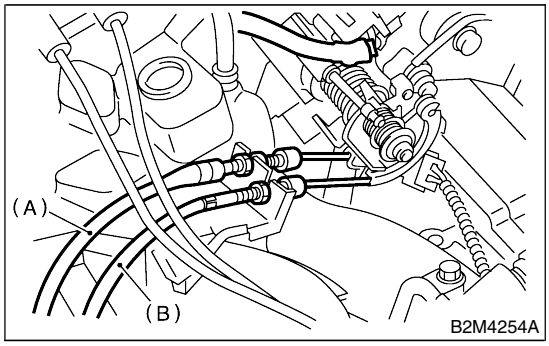
1) Disconnect battery ground cable.



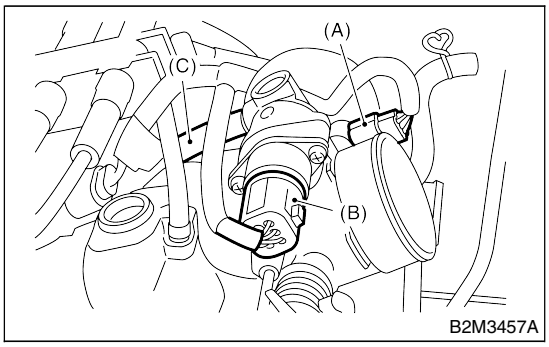
2) Remove air cleaner case.



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

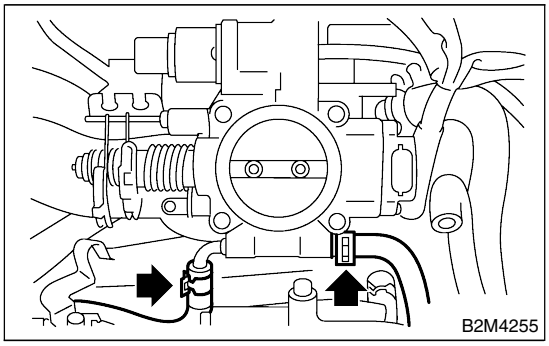


5) Disconnect connectors from idle air control solenoid valve, throttle position sensor.
6) Disconnect air by-pass hose from throttle body.



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

7) Disconnect engine coolant hoses from throttle body.



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

B: INSTALLATION S155010A11

Install in the reverse order of removal.

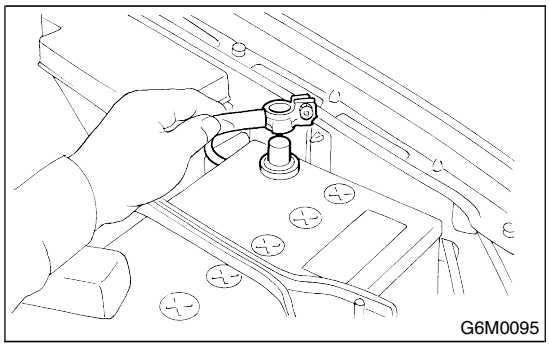
NOTE:
Always use a new gasket.

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)

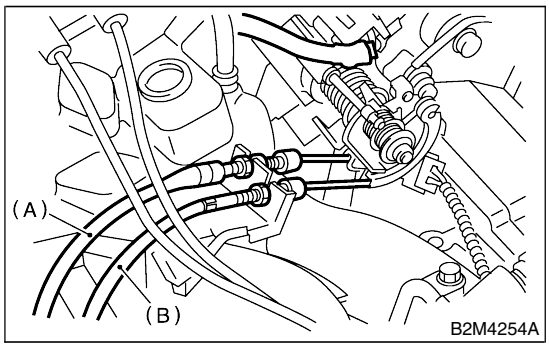
3. Intake Manifold S155034

A: REMOVAL S155034A18

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


G6M0095

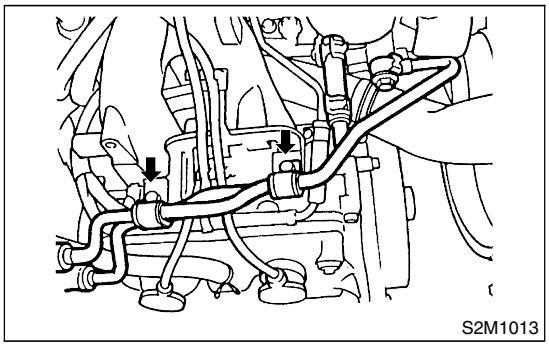
4) Remove air intake duct and air cleaner assembly. <Ref. to IN(SOHC)-8, REMOVAL, Air Intake Duct.> and <Ref. to IN(SOHC)-7, REMOVAL , Air Cleaner Case.>
5) Disconnect accelerator cable (A).
6) Disconnect cruise control cable (B). (With cruise control model)



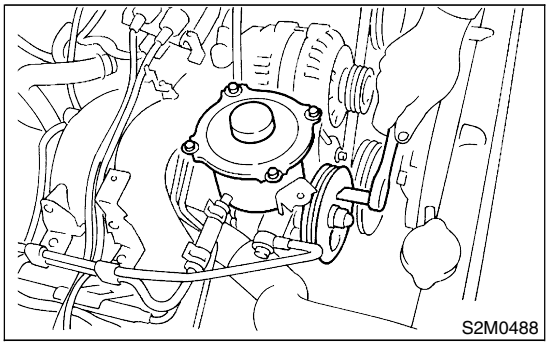
B2M4254A

7) Remove power steering pump and tank from brackets.
(1) Remove resonator chamber. <Ref. to IN(SOHC)-9, REMOVAL, Resonator Chamber.>
(2) Remove front side V-belt. <Ref. to ME(SOHC)-42, REMOVAL, V-belt.>
(3) Remove bolts which hold power steering pipes brackets onto intake manifold.

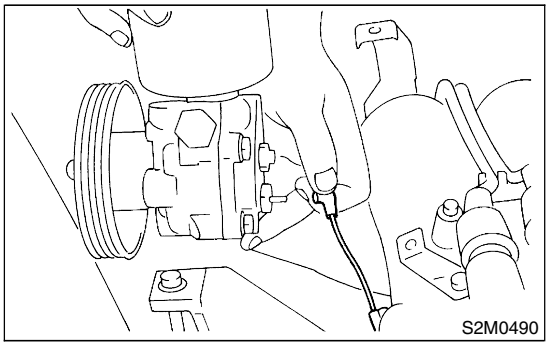
NOTE:
Do not disconnect power steering hose.


S2M1013

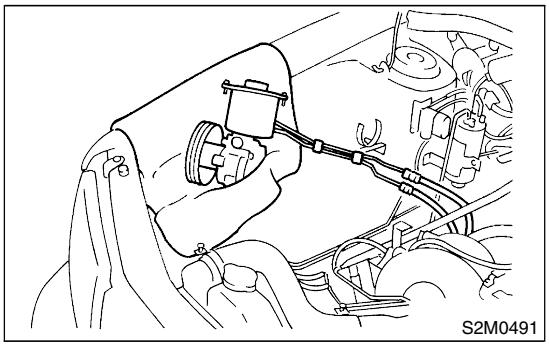
(4) Remove bolts which install power steering pump bracket.


S2M0488

(5) Disconnect connector from power steering pump switch.

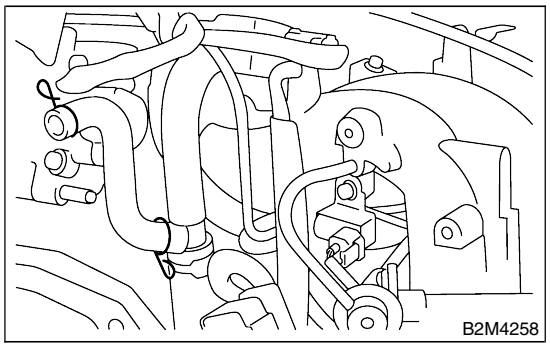

S2M0490

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

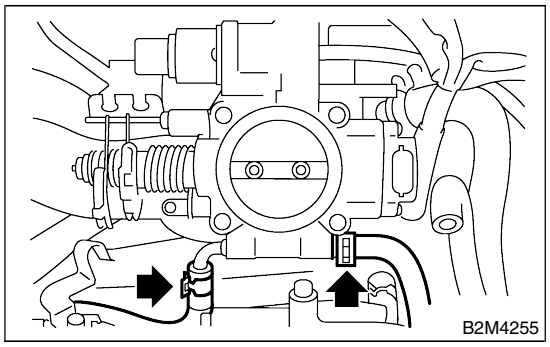

S2M0491

8) Disconnect spark plug cords from spark plugs.

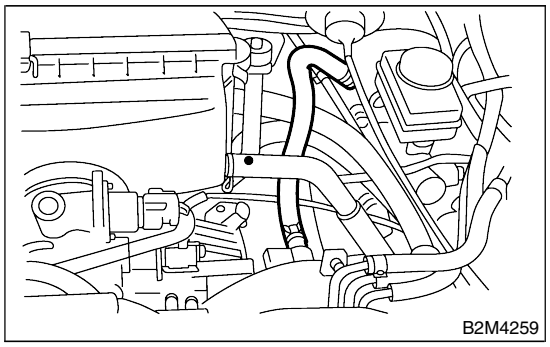
9) Disconnect PCV hose from intake manifold.



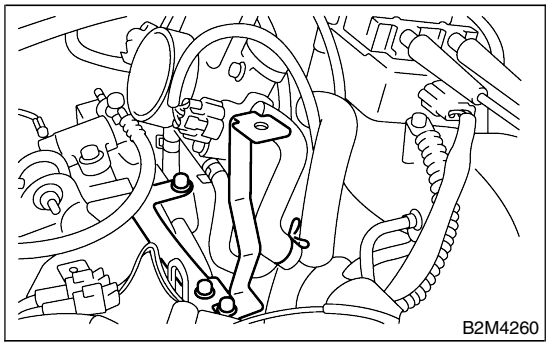
10) Disconnect engine coolant hose from throttle body.



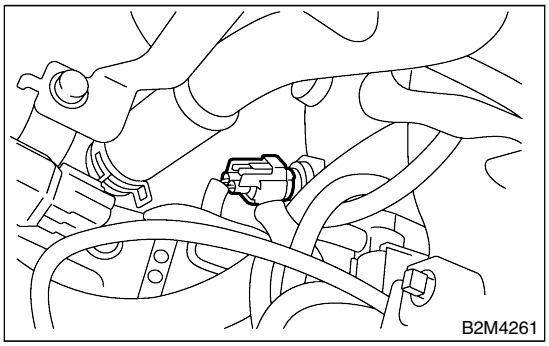
11) Disconnect brake booster hose.



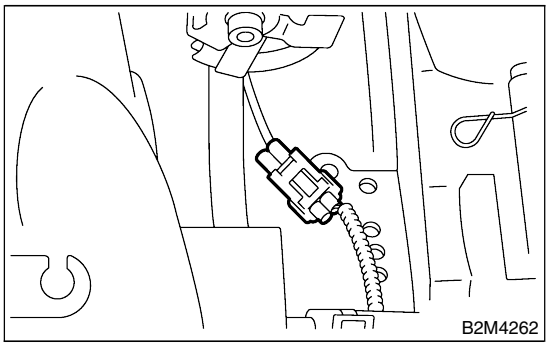
12) Remove air cleaner case stay RH and engine harness bracket, and disconnect engine harness connectors from bulkhead harness connectors.



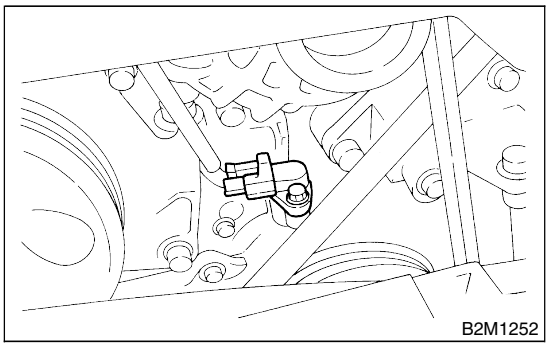
13) Disconnect connectors from engine coolant temperature sensor.



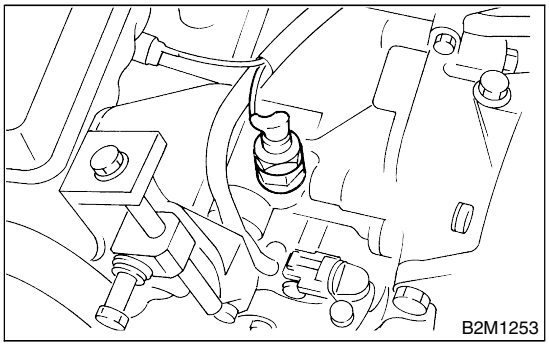
14) Disconnect knock sensor connector.



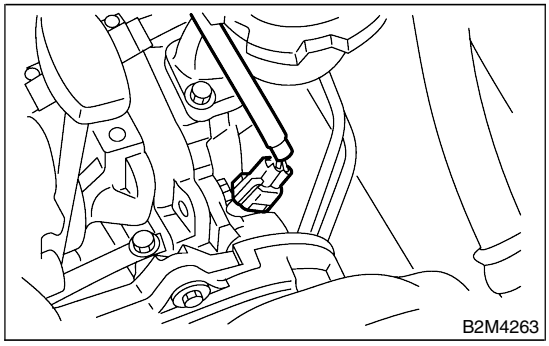
15) Disconnect connector from crankshaft position sensor.



16) Disconnect connector from oil pressure switch.

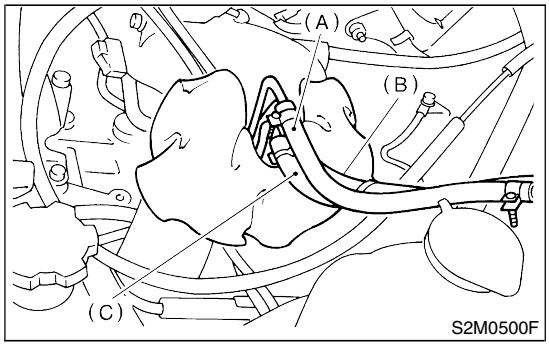


17) Disconnect connector from camshaft position sensor.


B2M4263

18) Disconnect fuel hoses from fuel pipes.

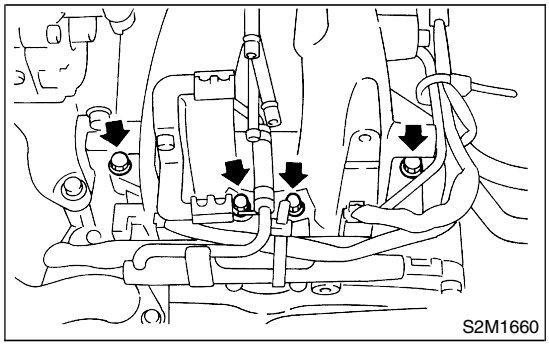
WARNING:
- **Do not spill fuel.**
- **Catch fuel from hoses in a container or cloth.**



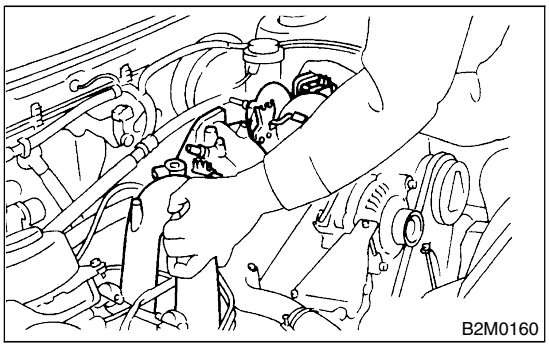
S2M0500F

(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.

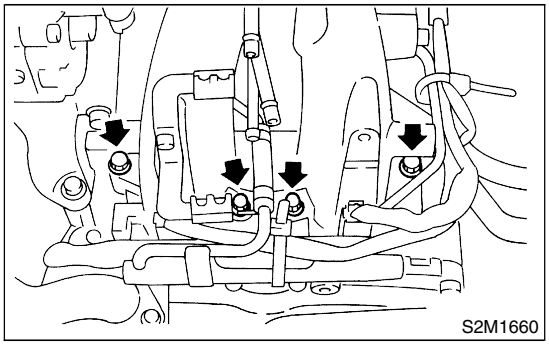

B2M0160

B: INSTALLATION S155034A11

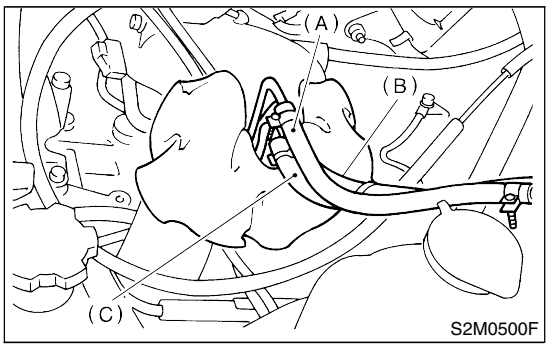
1) Install intake manifold onto cylinder heads.

NOTE:
Always use new gaskets.

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


S2M1660

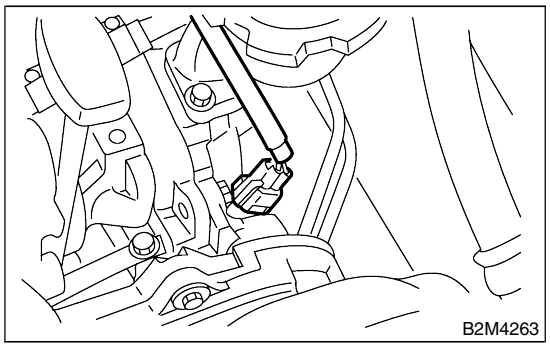
2) Connect fuel hoses.



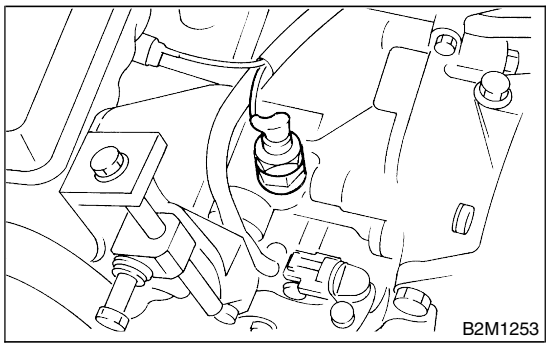
S2M0500F

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

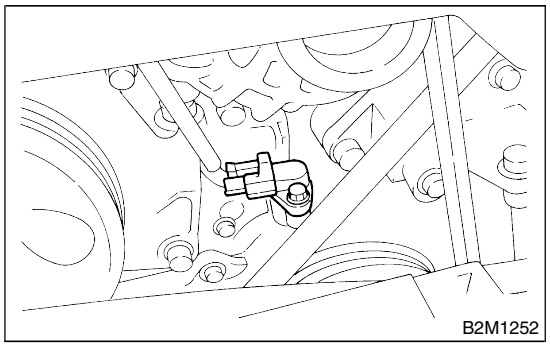
3) Connect connector to camshaft position sensor.



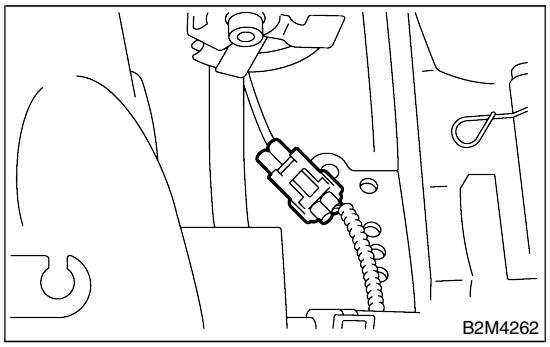
4) Connect connector to oil pressure switch.



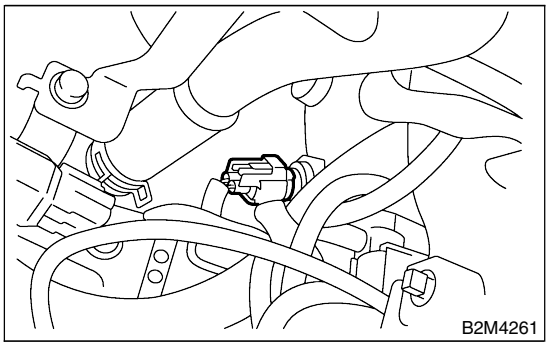
5) Connect connector to crankshaft position sensor.



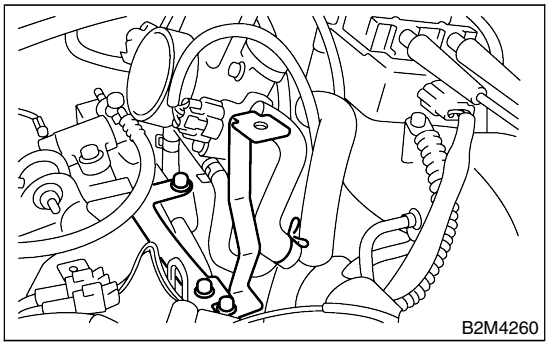
6) Connect knock sensor connector.



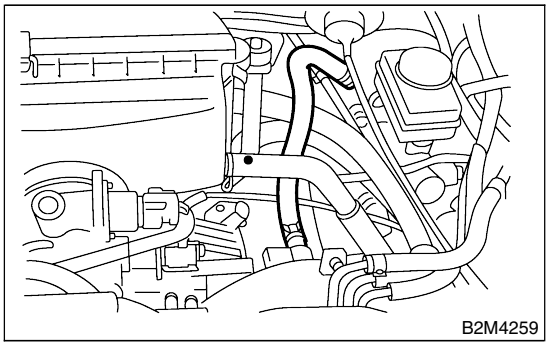
7) Connect connectors to engine coolant temperature sensor.



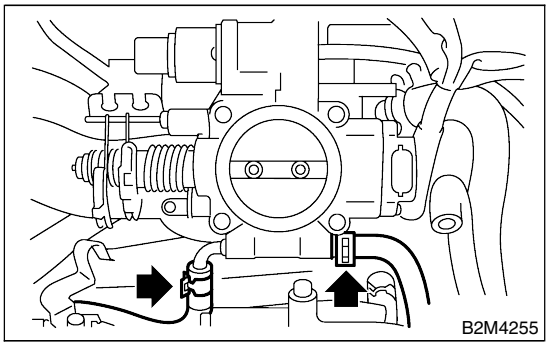
8) Install air cleaner case stay RH and engine harness bracket, and connect engine harness connectors to bulkhead connectors.



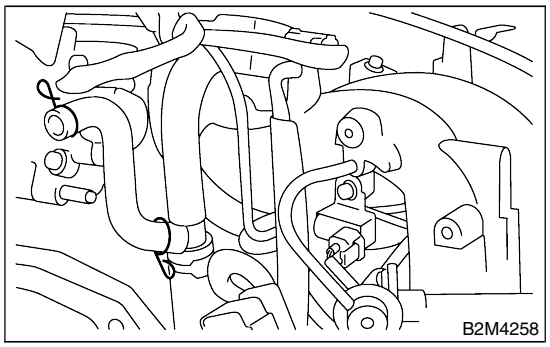
9) Connect brake booster hose.



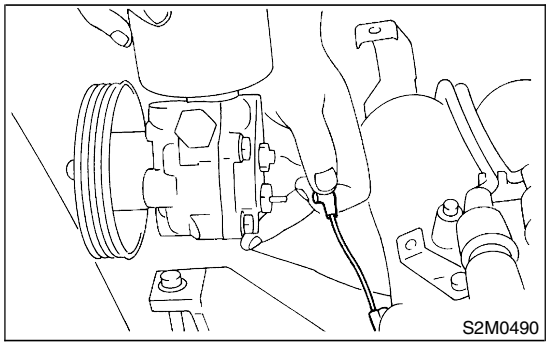
10) Connect engine coolant hose to throttle body.



11) Connect PCV hose to intake manifold.

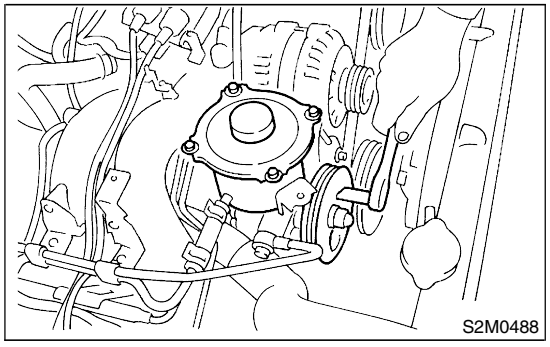


12) Connect spark plug cords to spark plugs.
13) Install power steering pump on brackets.
(1) Connect terminal to power steering pump switch.

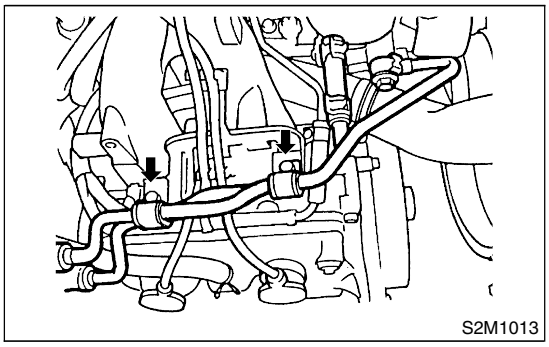


(2) Tighten bolts which install power steering pump on bracket.

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

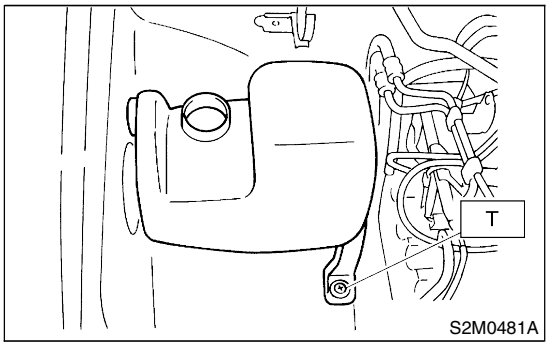


(3) Install power steering pipe brackets onto right side intake manifold.

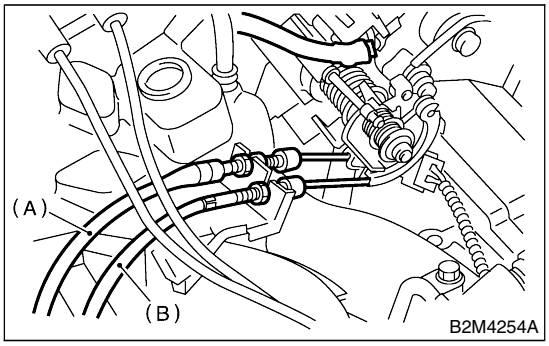


(4) Install front side V-belt. <Ref. to ME(SOHC)-42, INSTALLATION, V-belt.>
(5) Install resonator chamber.

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

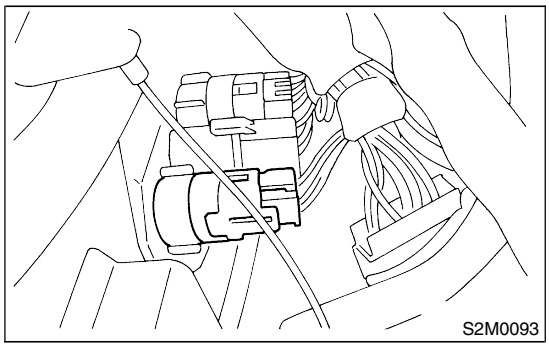


14) Connect accelerator cable (A).
15) Connect cruise control cable (B). (With cruise control models)

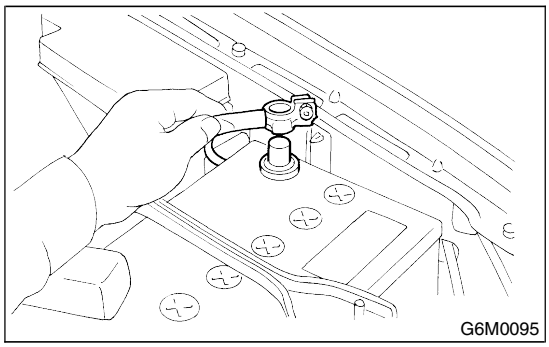


16) Install air intake duct and air cleaner assembly. <Ref. to IN(SOHC)-8, REMOVAL, Air Intake Duct.> and <Ref. to IN(SOHC)-7, INSTALLATION, Air Cleaner Case.>

17) Connect connector to fuel pump relay.

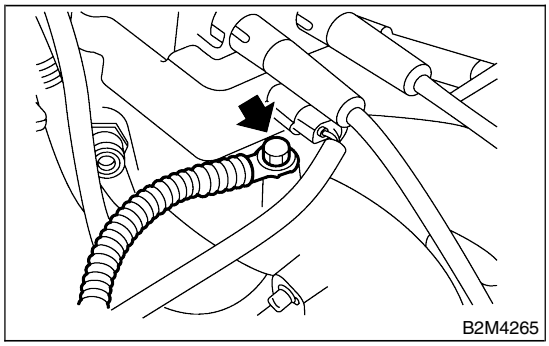

S2M0093

18) Connect battery ground cable.

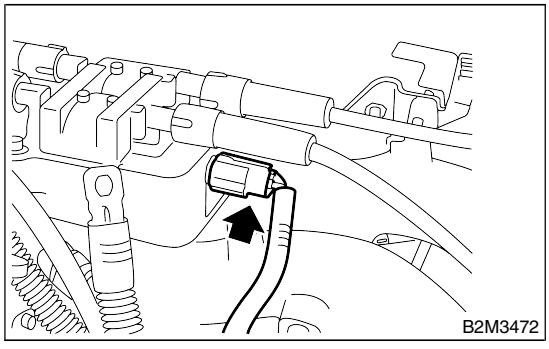

G6M0095

C: DISASSEMBLY S155034A06

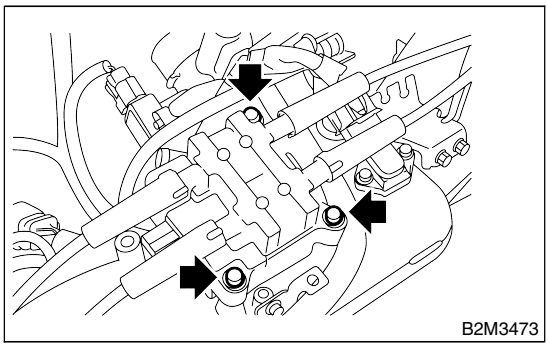
1) Disconnect engine ground terminal from intake manifold.


B2M4265

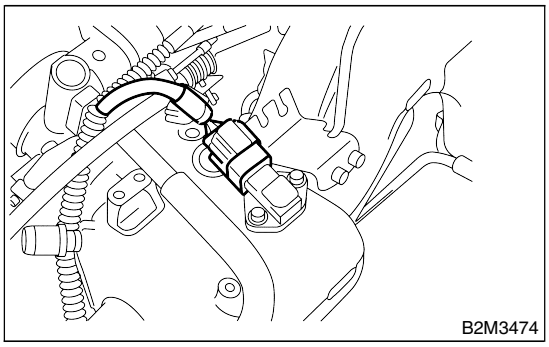
2) Disconnect connector from ignition coil and ignitor assembly.


B2M3472

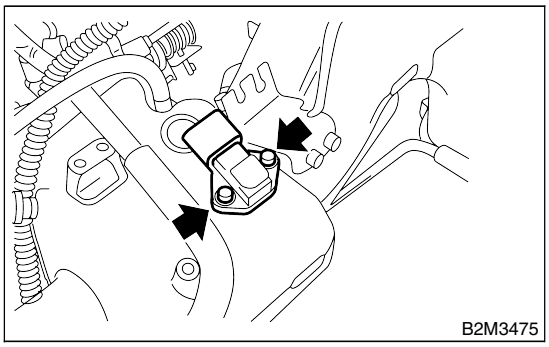
3) Remove ignition coil and ignitor assembly.


B2M3473

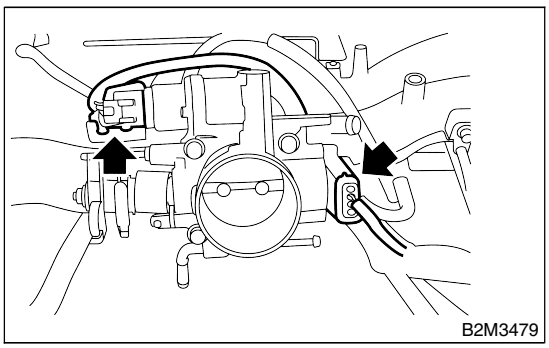
4) Disconnect connector from intake air temperature and pressure sensor.


B2M3474

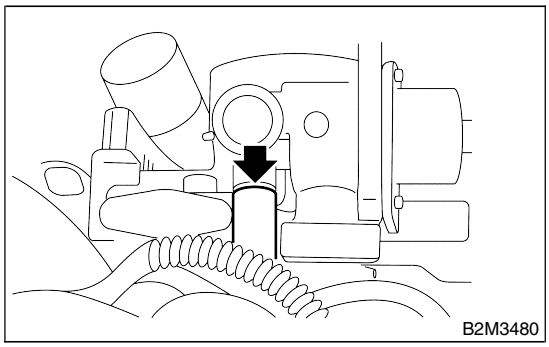
5) Remove intake air temperature and pressure sensor from intake manifold.


B2M3475

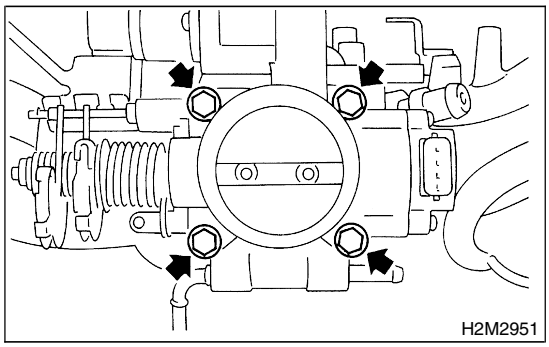
6) Disconnect connectors from throttle position sensor and idle air control solenoid valve.


B2M3479

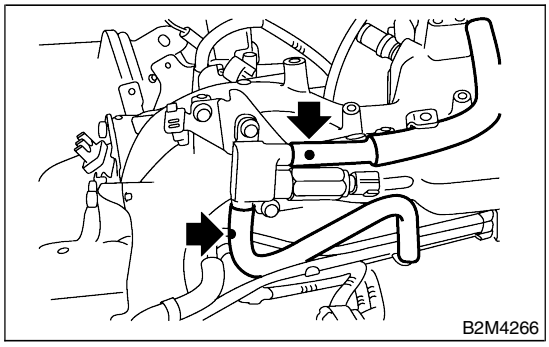
7) Disconnect air by-pass hose from throttle body.



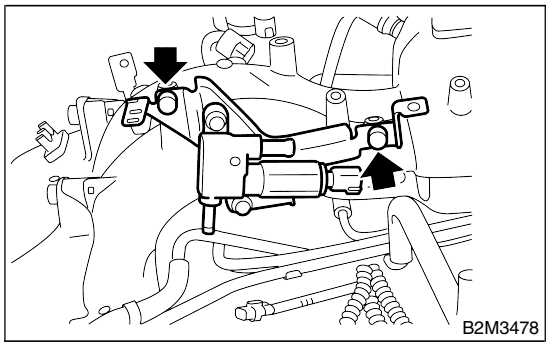
8) Remove throttle body.



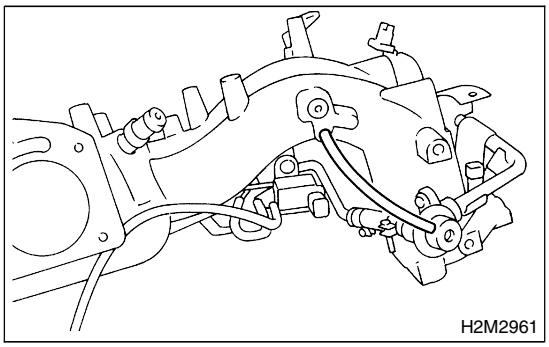
9) Disconnect connector from air assist injector solenoid valve.
10) Disconnect air by-pass hoses from air assist solenoid valve.



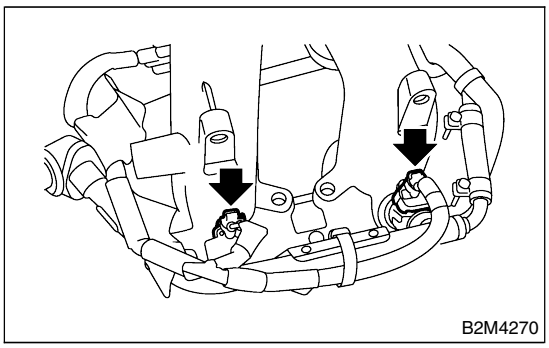
11) Remove air assist injector solenoid valve from intake manifold.



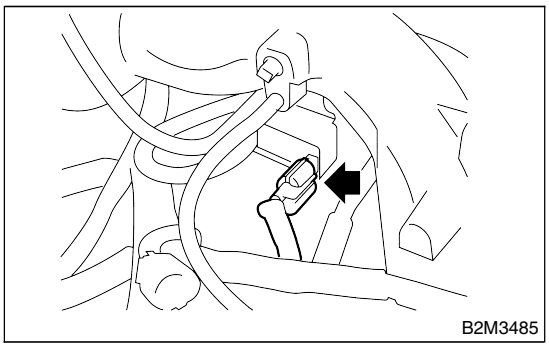
12) Disconnect pressure regulator vacuum hose from intake manifold.



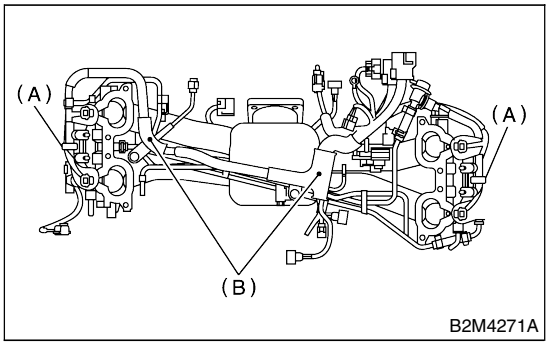
13) Disconnect connectors from fuel injectors.



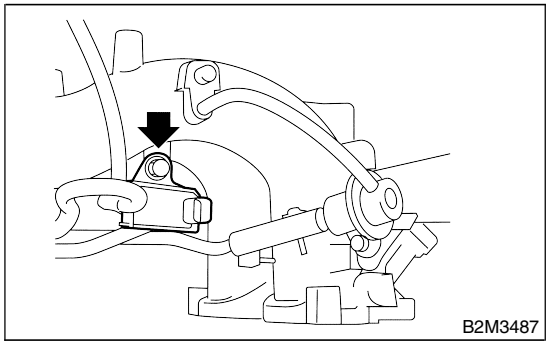
14) Disconnect connector from purge control solenoid valve.



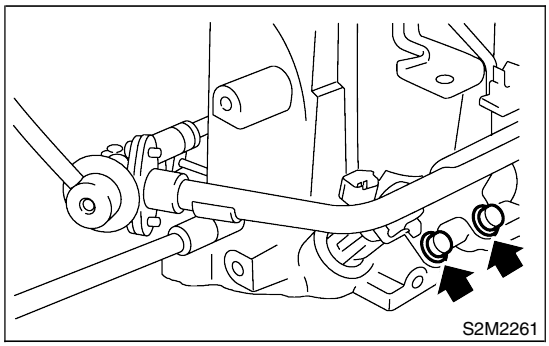
15) Disconnect air by-pass hose from purge control solenoid valve.
16) Remove harness bands (A) and harness bracket (B) which hold engine harness onto intake manifold.



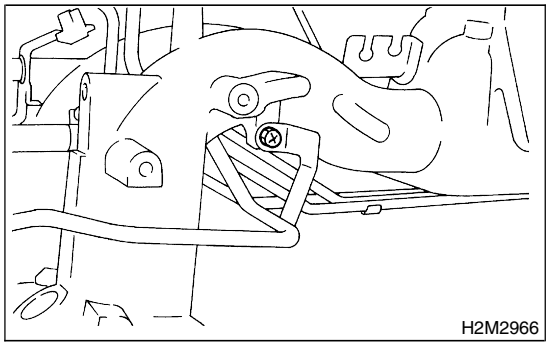
17) Remove engine harness from intake manifold.
18) Remove purge control solenoid valve.



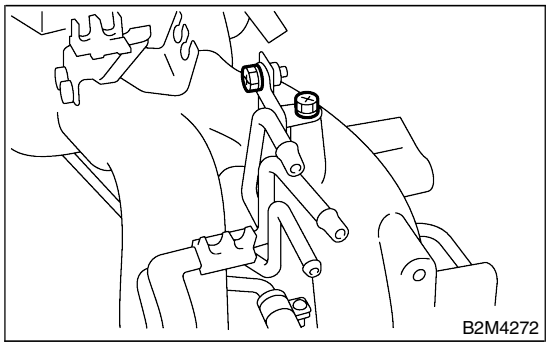
19) Remove bolt which installs injector pipe on intake manifold as shown in figure.



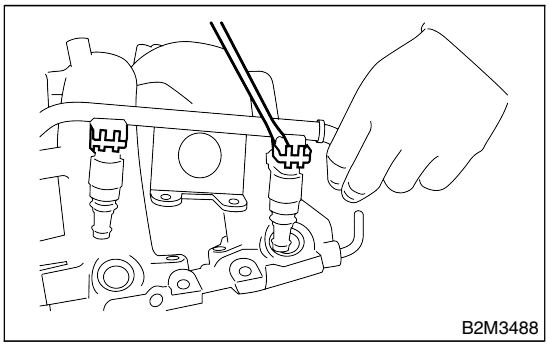
20) Remove bolt which installs injector pipe on intake manifold.



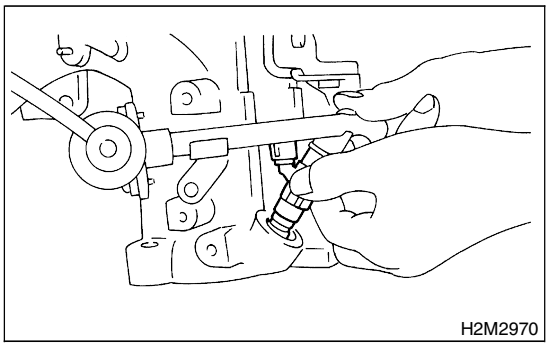
21) Remove two bolts which hold fuel pipes on the left side of intake manifold.



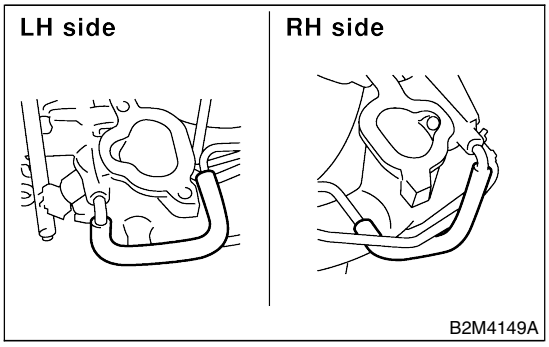
22) Remove fuel injectors.
(1) Remove fuel injector securing clip.



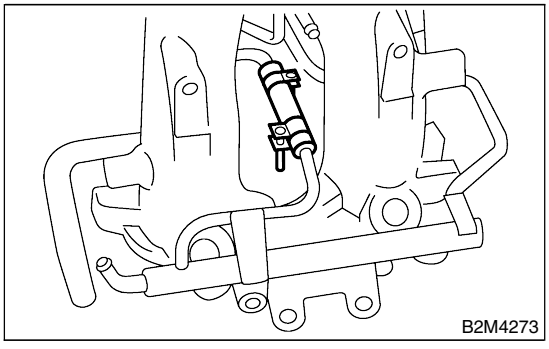
(2) Remove fuel injector while lifting up fuel injector pipe.



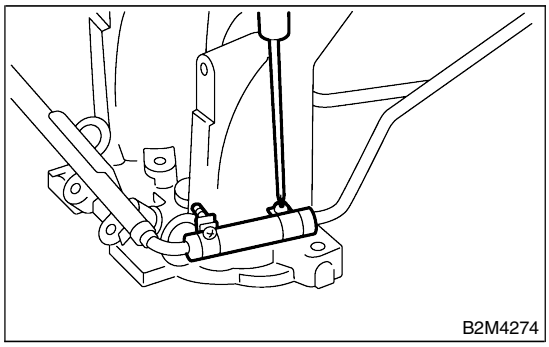
23) Disconnect air by-pass hoses from intake manifold.



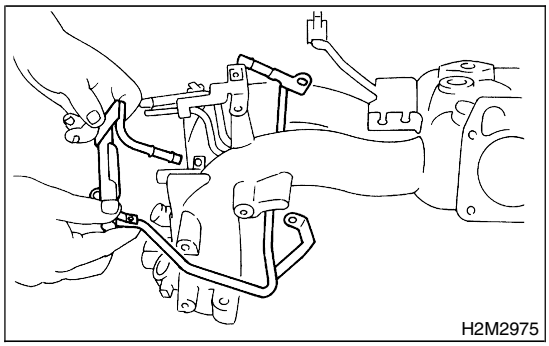
24) Loosen clamp which holds front left side fuel hose to injector pipe and remove the pipe from fuel hose.



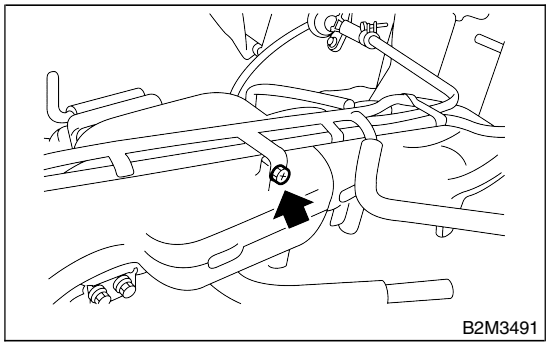
25) Loosen clamp which holds front right side fuel hose to injector pipe and remove the pipe from fuel hose.


B2M4274

26) Remove fuel injector pipe.


H2M2975

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


B2M3491

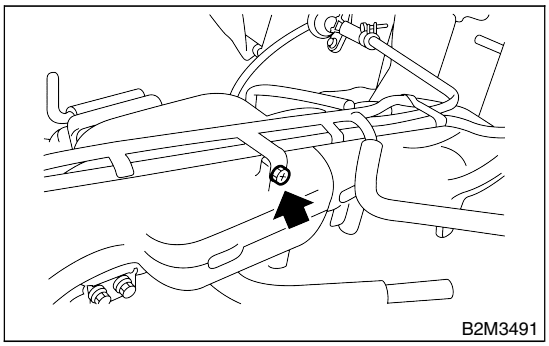
28) Remove fuel pipe assembly and pressure regulator, from intake manifold.

D: ASSEMBLY S155034A02

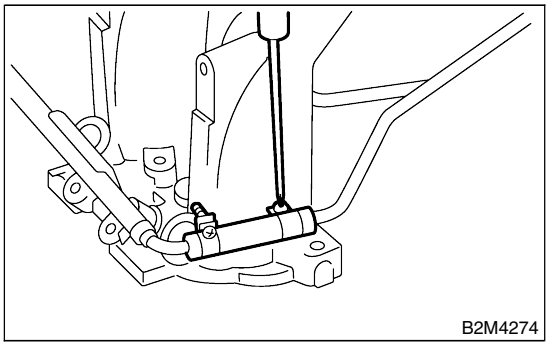
1) Install fuel pipe assembly and pressure regulator, etc. to intake manifold.

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

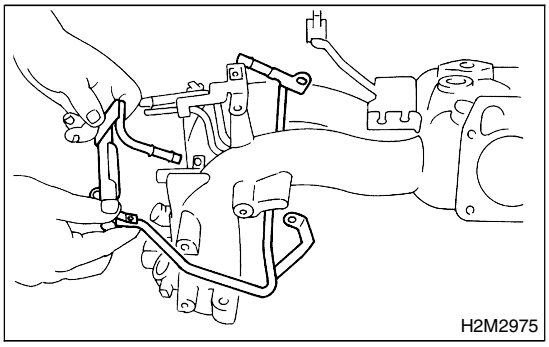
Tightening torque:
4.9 N·m (0.5 kgf-m, 3.6 ft-lb)


B2M3491

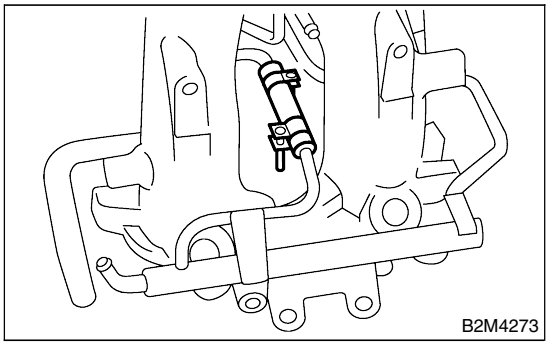
3) Connect right side fuel hose to injector pipe, and tighten clamp screw.


B2M4274

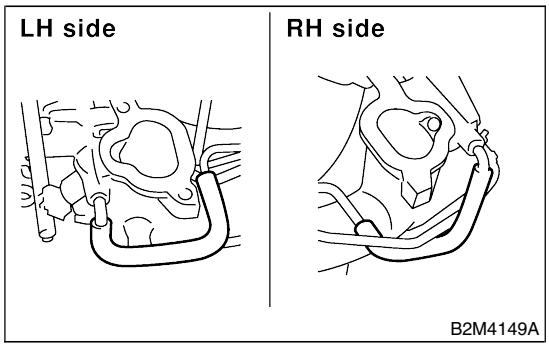
4) Install fuel injector pipe.


H2M2975

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

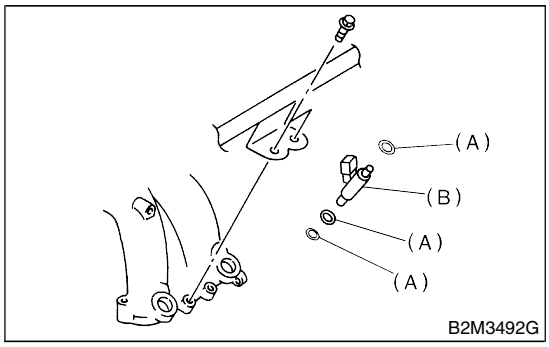

B2M4273

6) Connect air assist hoses.



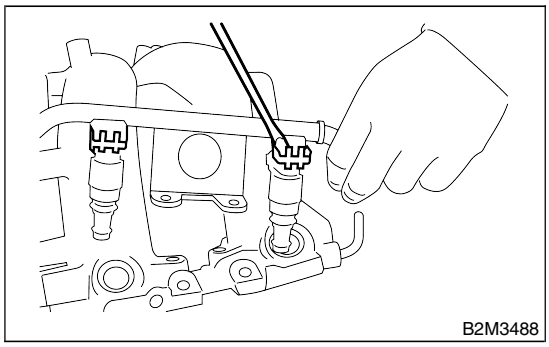
7) Install fuel injectors.

NOTE:
Always use new O-rings.



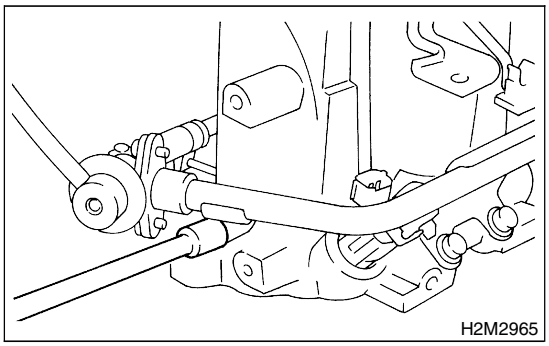
(A) O-ring
(B) Fuel injector

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



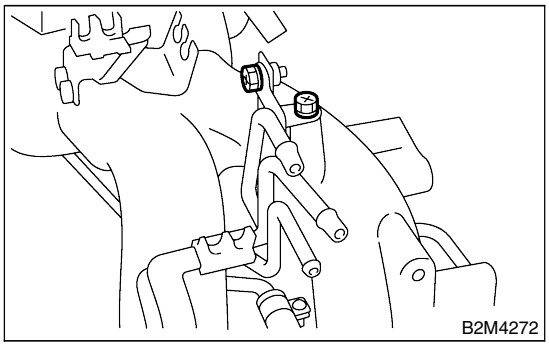
8) Tighten bolt which installs injector pipe on intake manifold.

Tightening torque:
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)



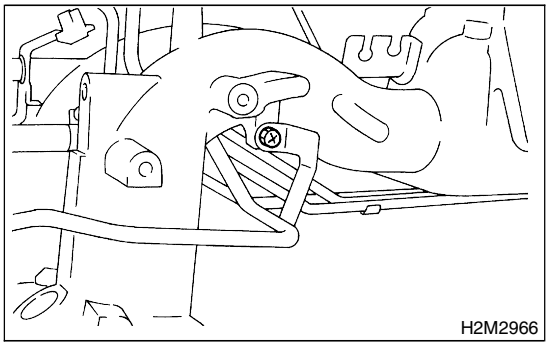
9) Tighten two bolts which install fuel pipes on the left side of intake manifold.

Tightening torque:
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)



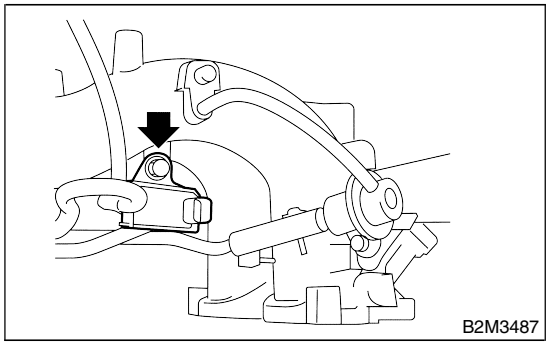
10) Tighten bolt which installs injector pipe on intake manifold.

Tightening torque:
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)



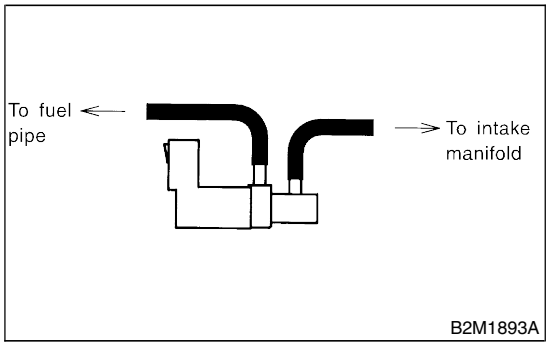
11) Install purge control solenoid valve.

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



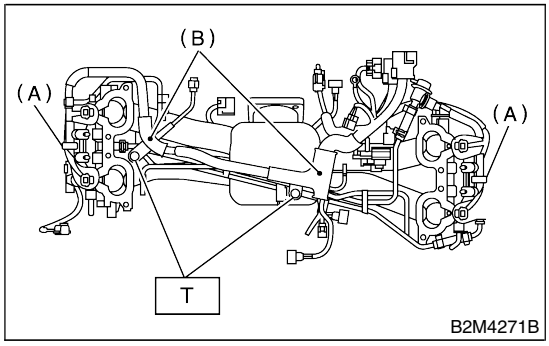
12) Connect hoses to purge control solenoid valve.

CAUTION:
Carefully connect the evaporation hoses.

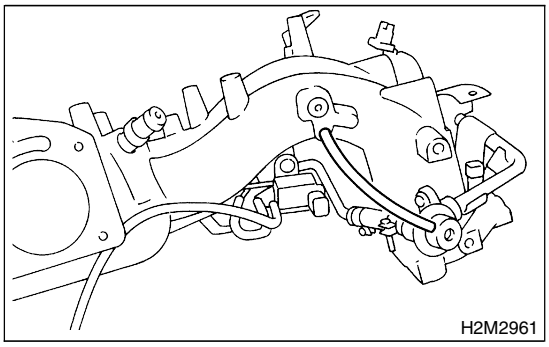


13) Install engine harness onto intake manifold.
14) Connect connectors to fuel injectors and purge control solenoid valve.
15) Hold engine harness by harness band (A) and harness bracket (B).

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

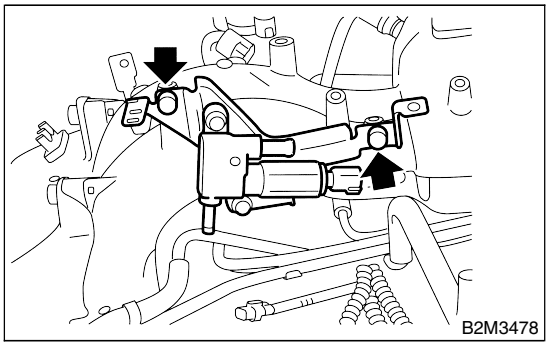


16) Connect pressure regulator vacuum hose to intake manifold.

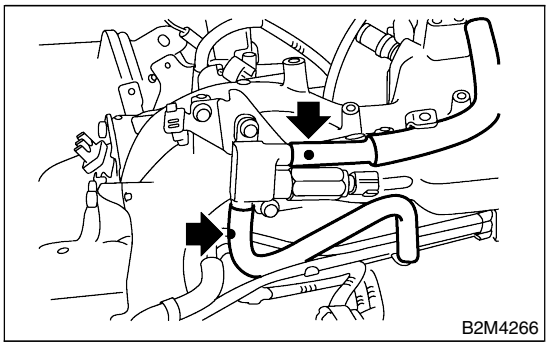


17) Install air assist injector solenoid valve to bracket.

Tightening torque:
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)



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

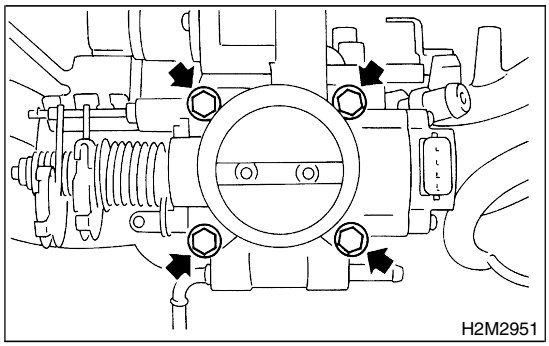


19) Connect connector to air assist solenoid valve.

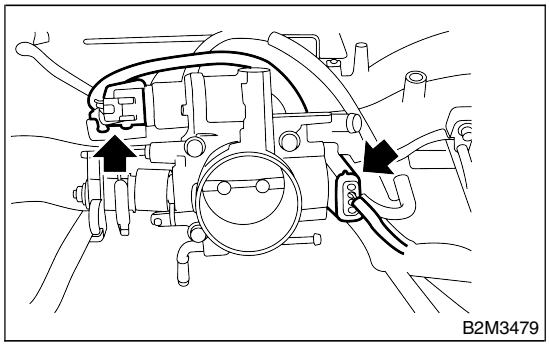
20) Install throttle body to intake manifold.

NOTE:
Replace gasket with a new one.

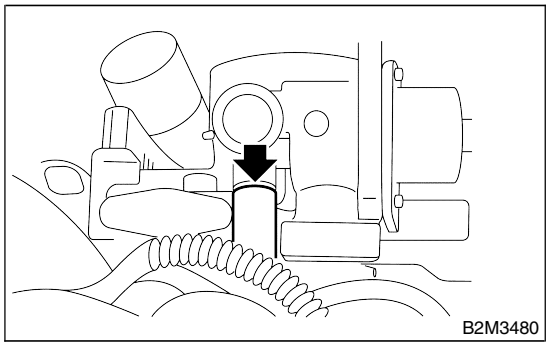
Tightening torque:
22 N·m (2.2 kgf-m, 15.9 ft-lb)



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

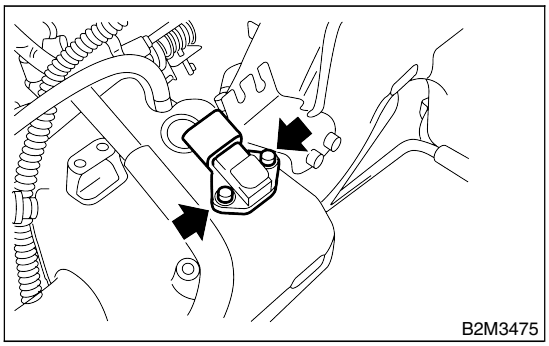


22) Connect air by-pass hose to throttle body.

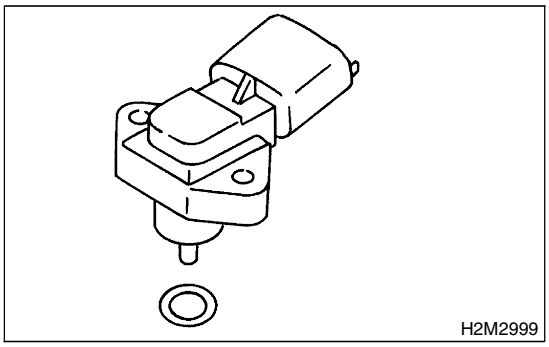


23) Install intake air temperature and pressure sensor.

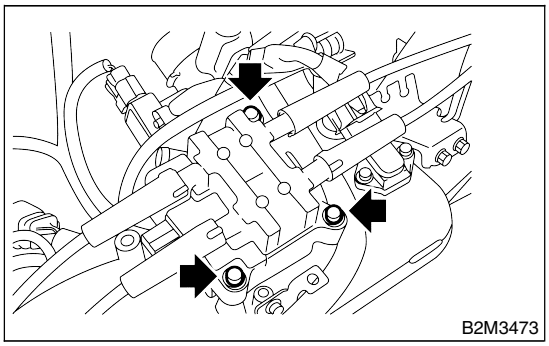
Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)



NOTE:
Replace O-ring with a new one.

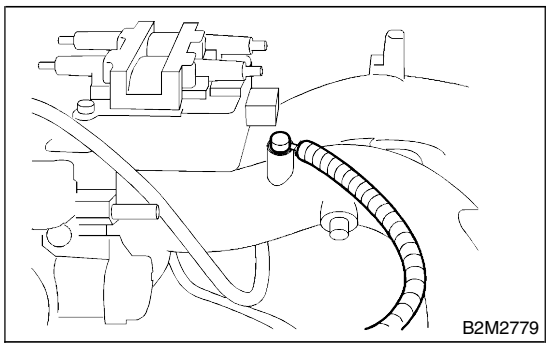


24) Connect connector to intake air temperature and pressure sensor.
25) Install ignition coil and ignitor assembly.



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)



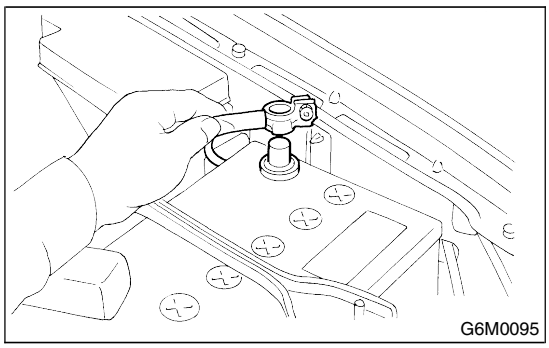
E: INSPECTION *S155034A10*

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

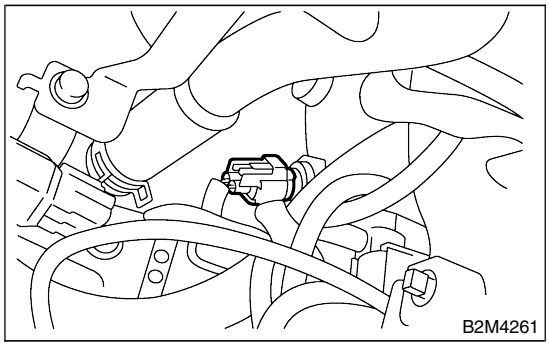
4. Engine Coolant Temperature Sensor S155047

A: REMOVAL S155047A18

1) Disconnect battery ground cable.



2) Remove air intake duct and air cleaner assembly. <Ref. to IN(SOHC)-8, REMOVAL, Air Intake Duct.> and <Ref. to IN(SOHC)-7, REMOVAL , Air Cleaner Case.>
3) Disconnect connector from engine coolant temperature sensor.

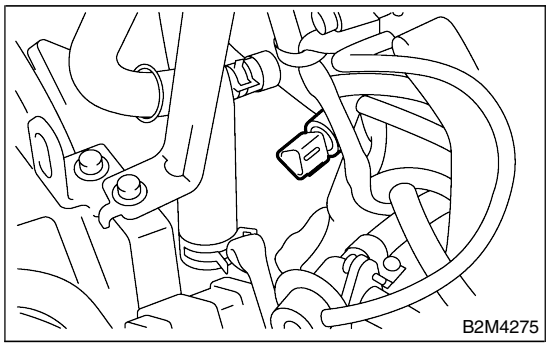


4) Remove engine coolant temperature sensor.

B: INSTALLATION S155047A11

Install in the reverse order of removal.

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

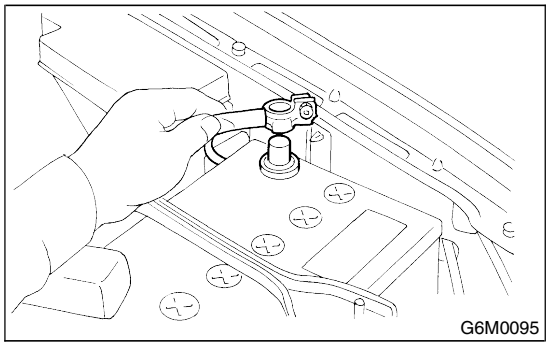


5. Crankshaft Position Sensor

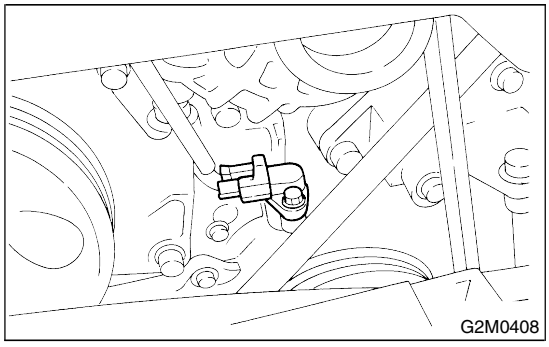
S155043

A: REMOVAL S155043A18

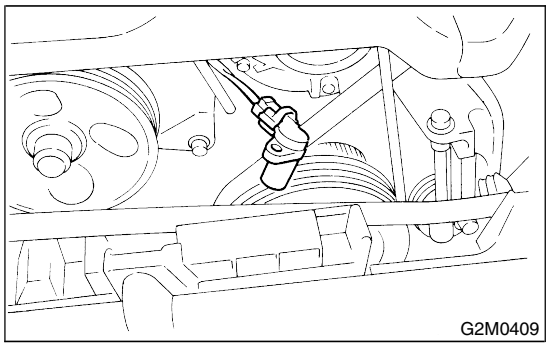
1) Disconnect battery ground cable.


G6M0095

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


G2M0408

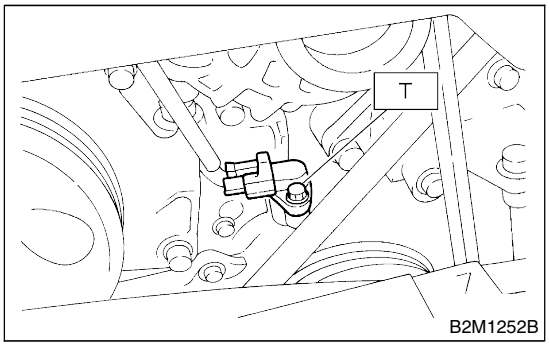
3) Remove crankshaft position sensor, and disconnect connector from it.


G2M0409

B: INSTALLATION S155043A11

Install in the reverse order of removal.

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



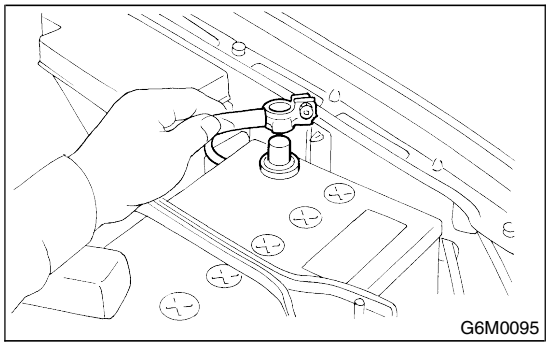
B2M1252B

6. Camshaft Position Sensor

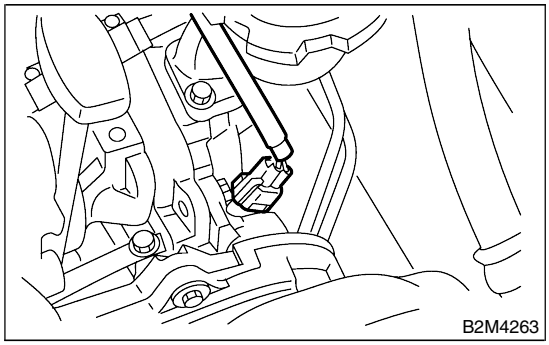
S155041

A: REMOVAL S155041A18

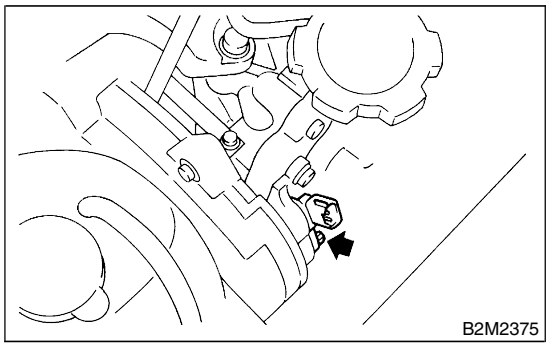
1) Disconnect battery ground cable.


G6M0095

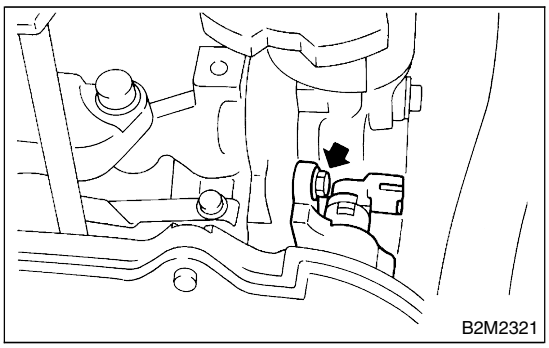
2) Disconnect connector from camshaft position sensor.


B2M4263

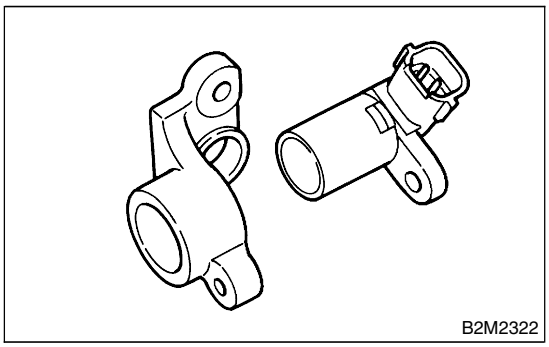
3) Remove bolt which installs camshaft position sensor to camshaft position sensor support.


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 S155041A11

Install in the reverse order of removal.

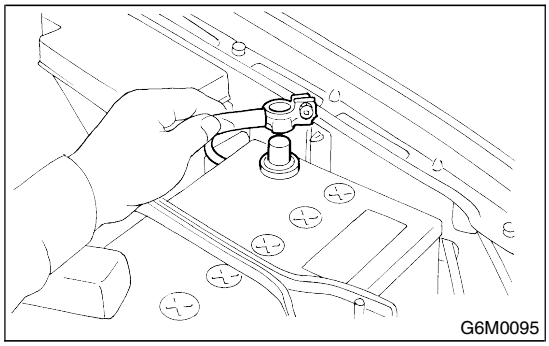
Tightening torque:

- ***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)***

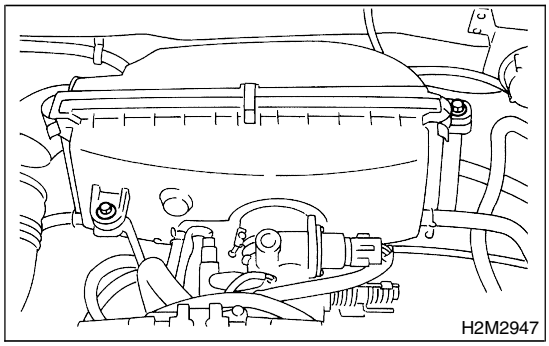
7. Knock Sensor S155042

A: REMOVAL S155042A18

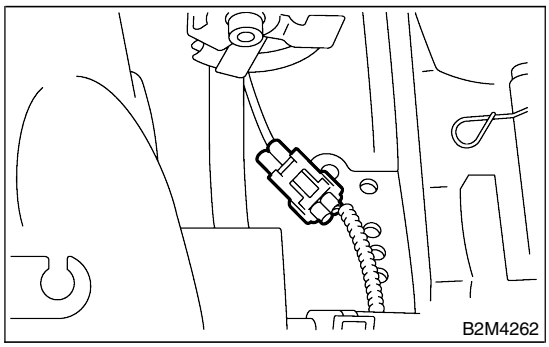
1) Disconnect battery ground cable from battery ground terminal.



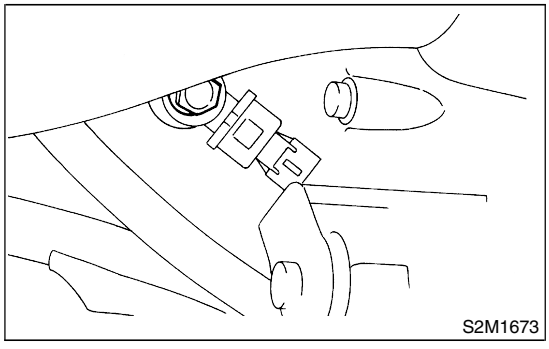
2) Remove air cleaner case.



3) Disconnect knock sensor connector.



4) Remove knock sensor from cylinder block.

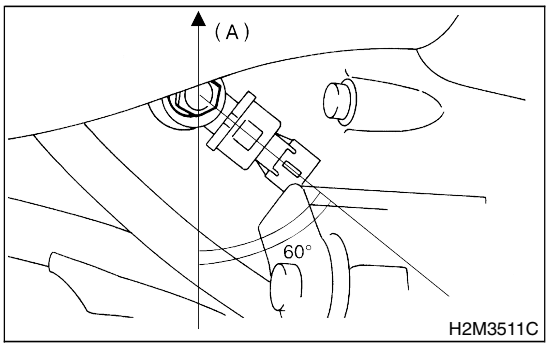


B: INSTALLATION S155042A11

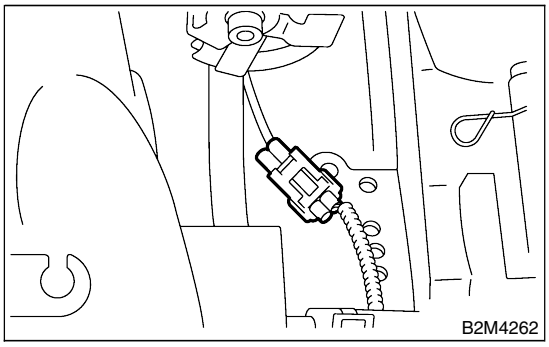
1) Install knock sensor to cylinder block.

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

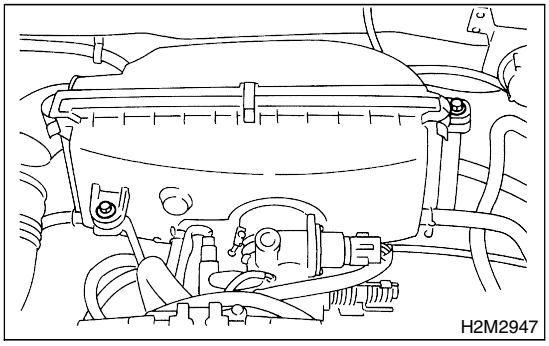
NOTE:
The extraction area of the knock sensor cord must be positioned at a 60° angle relative to the engine rear.



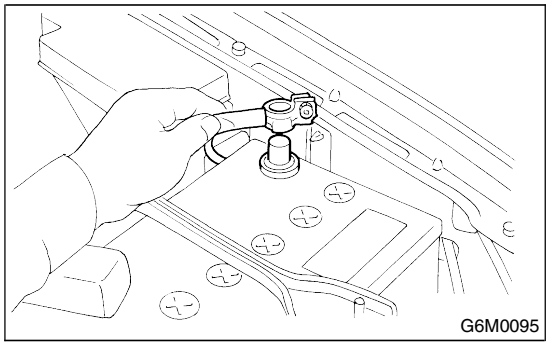
2) Connect knock sensor connector.



3) Install air cleaner case.



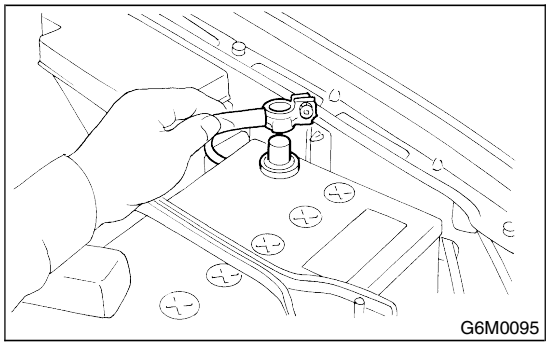
4) Connect battery ground cable.



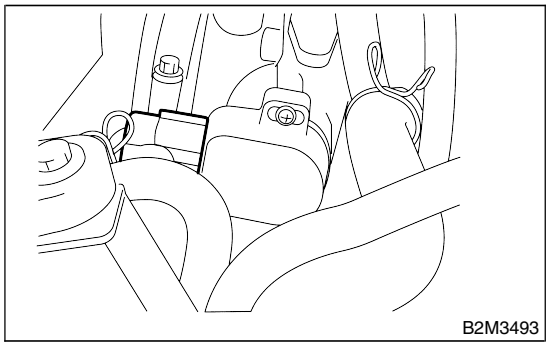
8. Throttle Position Sensor S155039

A: REMOVAL S155039A18

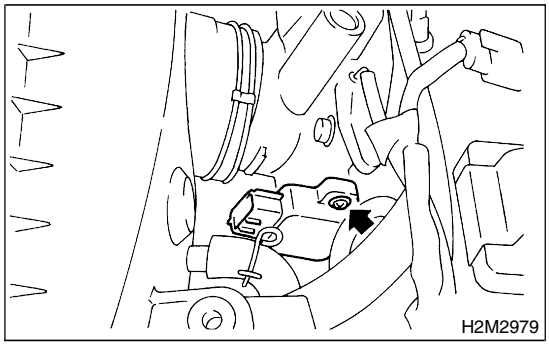
1) Disconnect battery ground cable.



2) Disconnect connector from throttle position sensor.



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

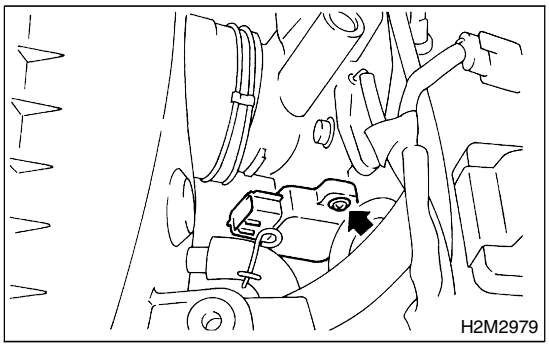


B: INSTALLATION S155039A11

Install in the reverse order of removal.

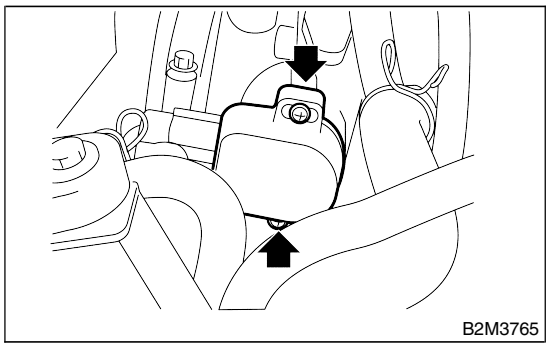
Tightening torque:
1.6 N·m (0.16 kgf-m, 1.2 ft-lb)

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



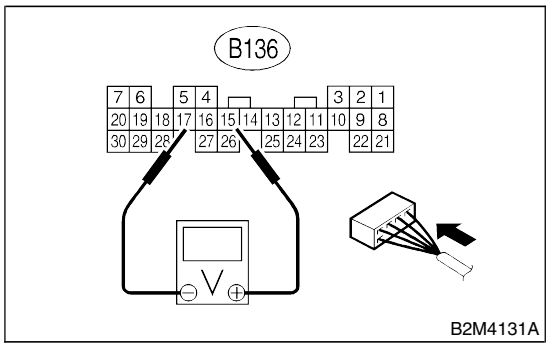
C: ADJUSTMENT S155039A01

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



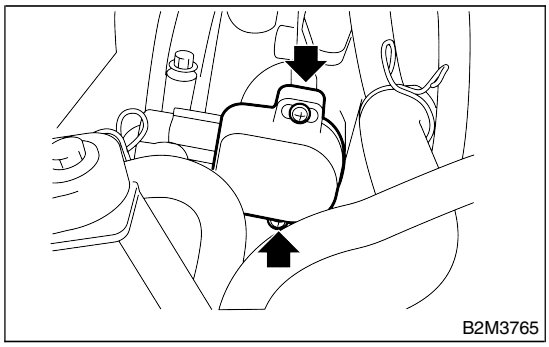
3) When using voltage meter;
   (1) Take out ECM.
   (2) Turn ignition switch to ON.
   (3) Adjust throttle position sensor to the proper position to allow the voltage signal to ECM to be in specification.

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

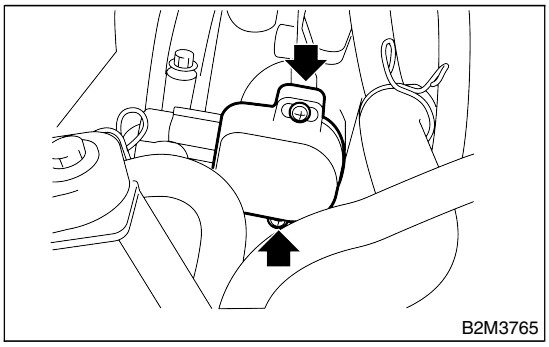


(4) Tighten throttle position sensor holding screws.

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

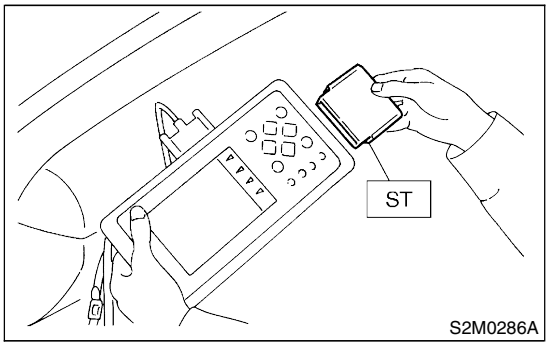


4) When using Subaru Select Monitor;
   (1) Turn ignition switch to OFF.
   (2) Loosen throttle position sensor holding screws.

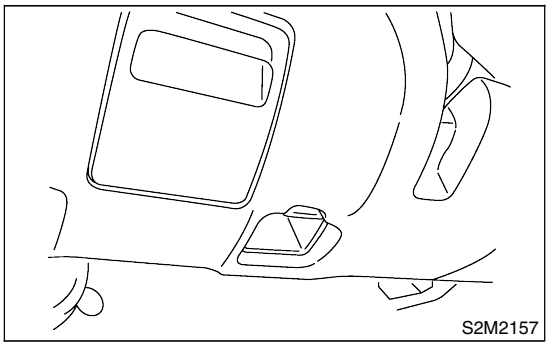


NOTE:
For detailed operation procedures, refer to the Subaru Select Monitor Operation Manual.

   (3) Insert the cartridge to Subaru Select Monitor.



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

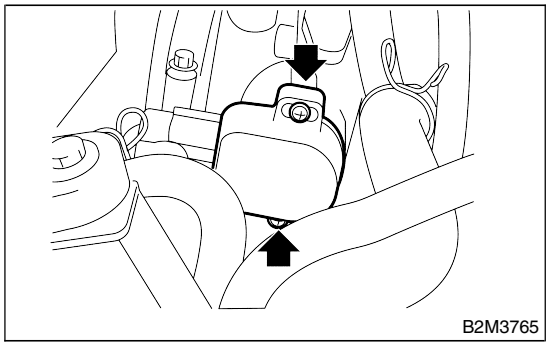


5) Turn ignition switch to ON, and Subaru Select Monitor switch to ON.
6) Select {2. Each System Check} in Main Menu.
7) Select {Engine Control System} in Selection Menu.
8) Select {1. Current Data Display & Save} in Engine Control System Diagnosis.
9) Select {1.12 Data Display} in Data Display Menu.
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.

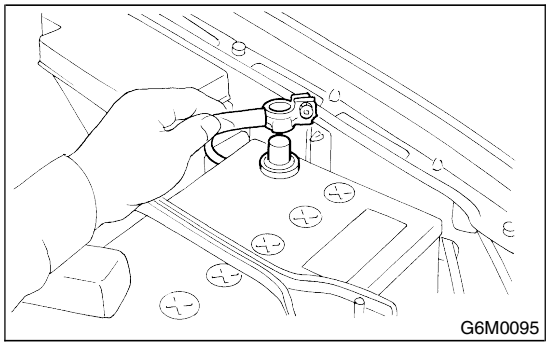
Tightening torque:
1.6 N·m (0.16 kgf-m, 1.2 ft-lb)



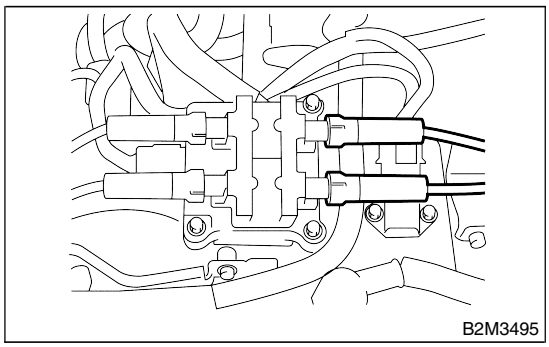
9. Intake Air Temperature and Pressure Sensor S155044

A: REMOVAL S155044A18

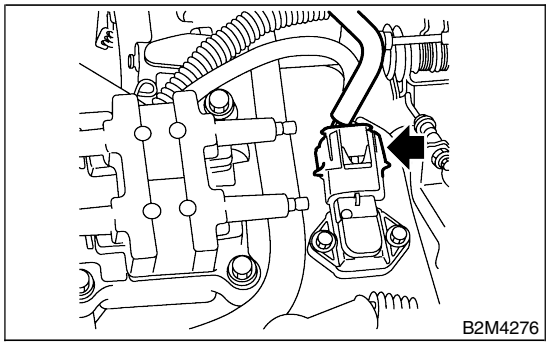
1) Disconnect battery ground cable.


G6M0095

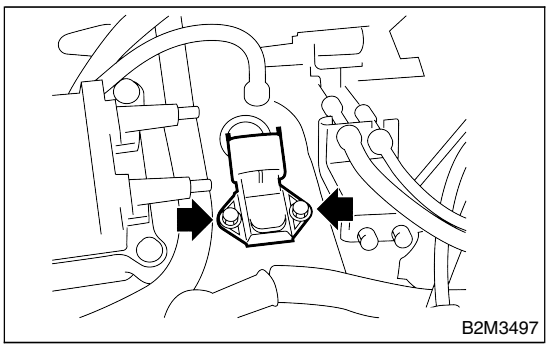
2) Disconnect spark plug cord from ignition coil and ignitor assembly.


B2M3495

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


B2M4276

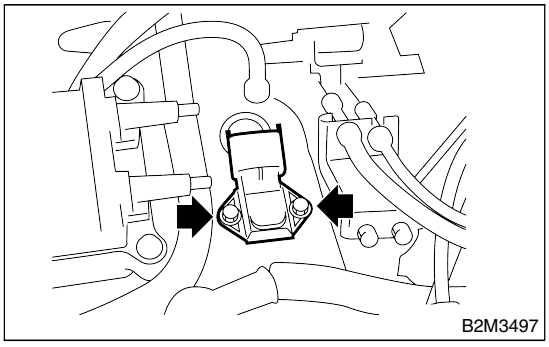
4) Remove intake air temperature and pressure sensor.


B2M3497

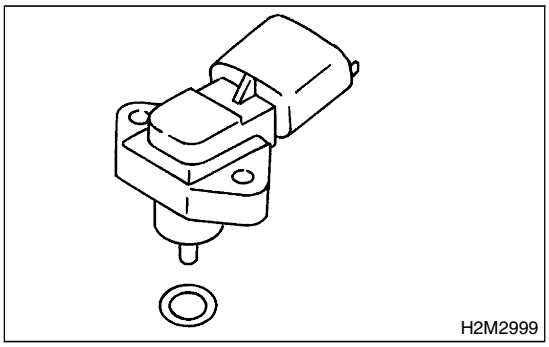
B: INSTALLATION S155044A11

Install in the reverse order of removal.

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


B2M3497

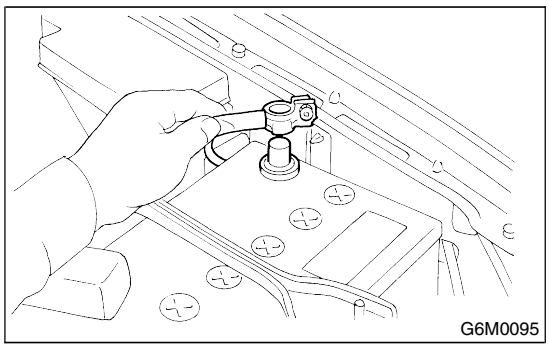
NOTE:
Replace O-ring with a new one.


H2M2999

10. Atmospheric Pressure Sensor S155045

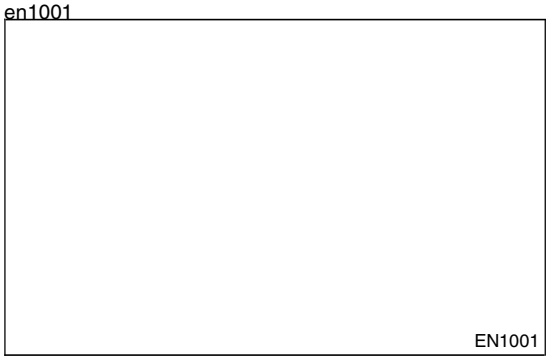
A: REMOVAL S155045A18

1) Disconnect battery ground cable.



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

en1001

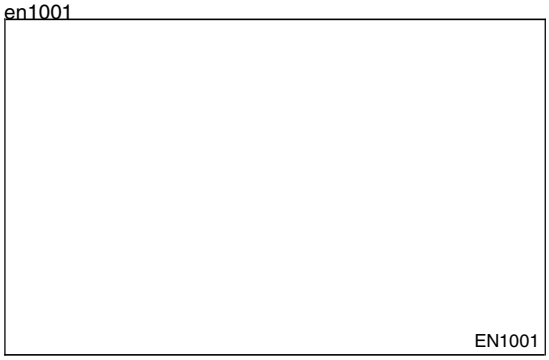


B: INSTALLATION S155045A11

Install in the reverse order of removal.

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

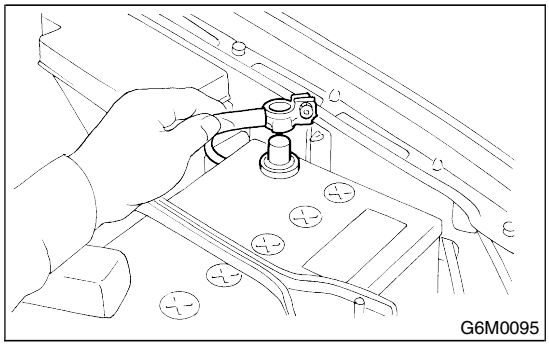
en1001



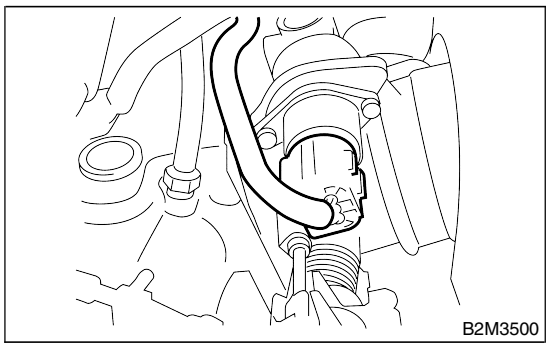
11. Idle Air Control Solenoid Valve S155056

A: REMOVAL S155056A18

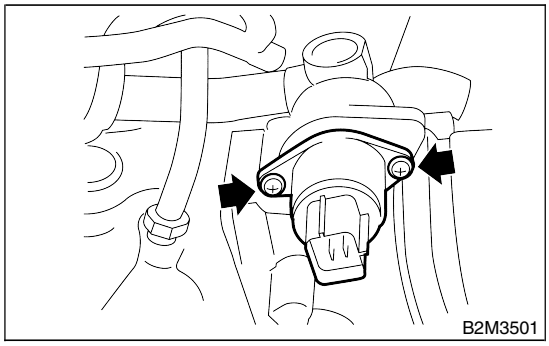
1) Disconnect battery ground cable.



2) Disconnect connector from idle air control solenoid valve.



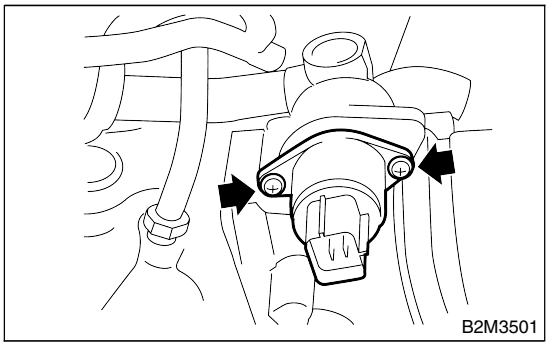
3) Remove idle air control solenoid valve from throttle body.



B: INSTALLATION S155056A11

Install in the reverse order of removal.

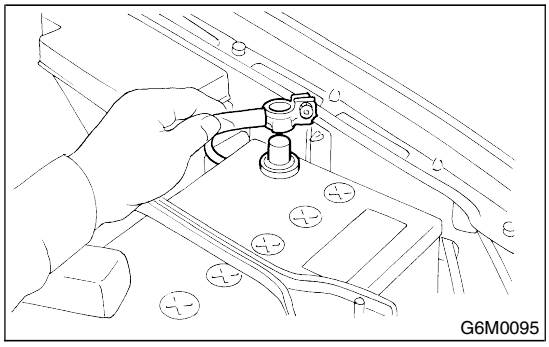
Tightening torque:
1.6 N·m (0.16 kgf-m, 1.2 ft-lb)



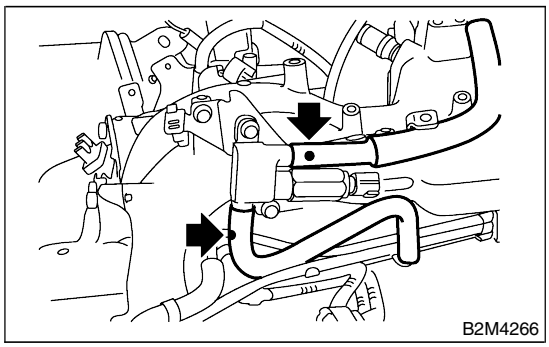
12. Air Assist Injector Solenoid Valve S155570

A: REMOVAL S155570A18

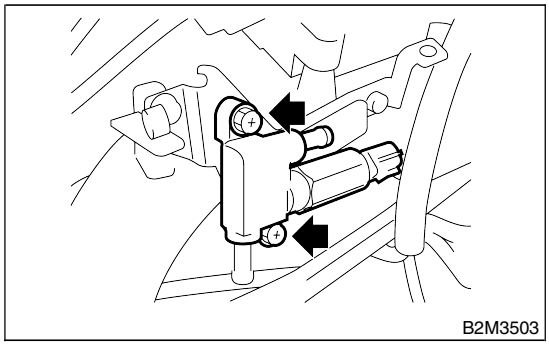
1) Disconnect battery ground cable.



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



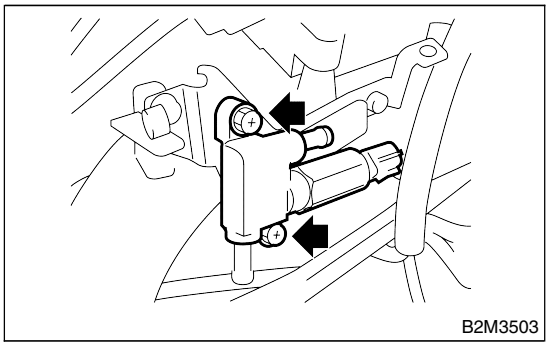
3) Remove air assist injector solenoid valve from intake manifold.



B: INSTALLATION S155570A11

Install in the reverse order of removal.

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

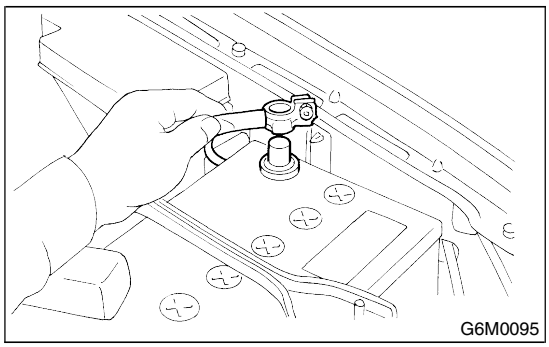


13. Fuel Injector S155051

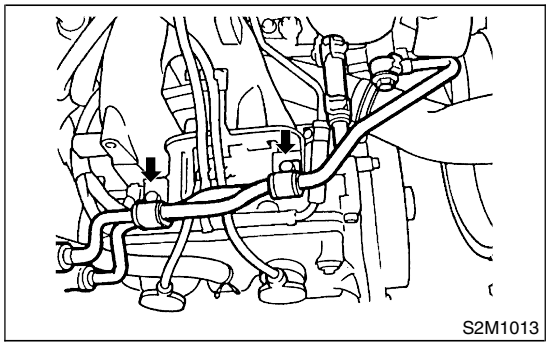
A: REMOVAL S155051A18

1. RH SIDE S155051A1801

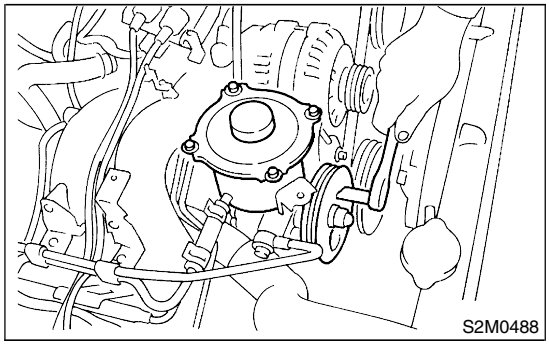
1) Release fuel pressure.
<Ref. to FU(SOHC)-52, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open fuel flap lid, and remove fuel filler cap.
3) Disconnect battery ground cable.


G6M0095

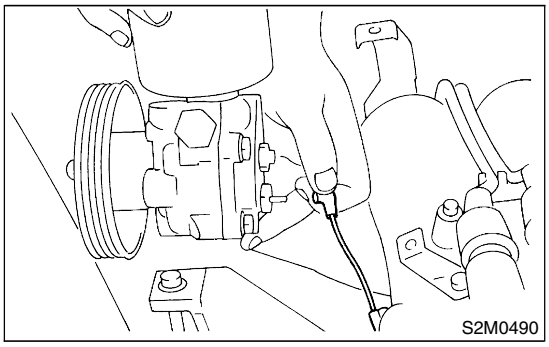
4) Remove resonator chamber. <Ref. to IN(SOHC)-9, REMOVAL, Resonator Chamber.>
5) Remove power steering pump and tank from brackets.
(1) Remove front side V-belt. <Ref. to ME(SOHC)-42, REMOVAL, V-belt.>
(2) Remove bolts which hold power steering pipe bracket onto intake manifold.


S2M1013

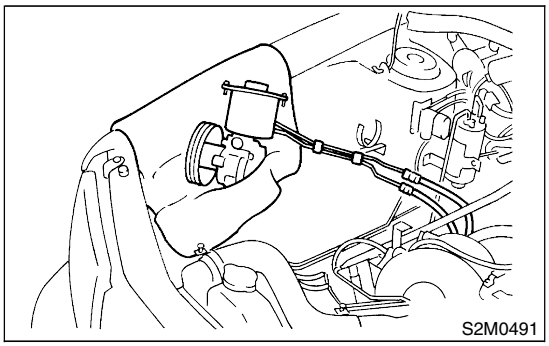
(3) Remove bolts which install power steering pump to bracket.


S2M0488

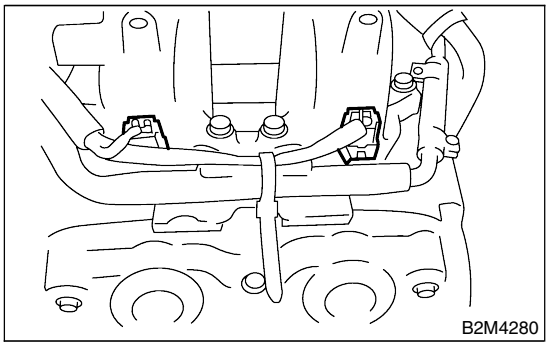
(4) Disconnect connector from power steering pump switch.


S2M0490

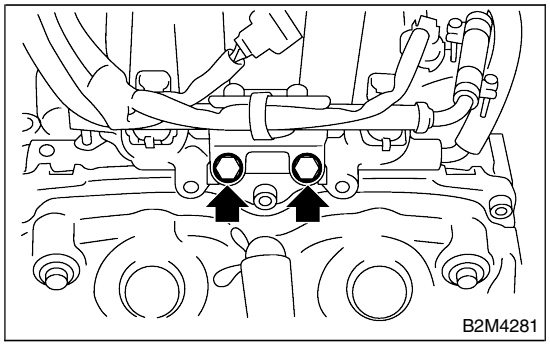
(5) Place power steering pump and tank on the right side wheel apron.

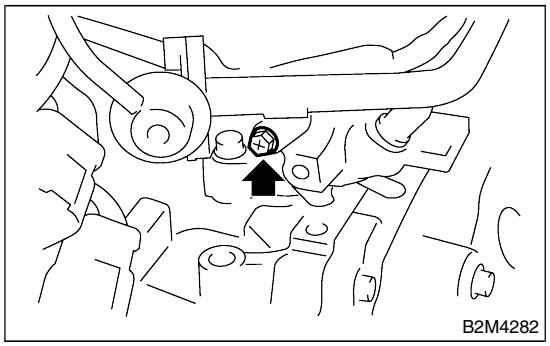

S2M0491

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

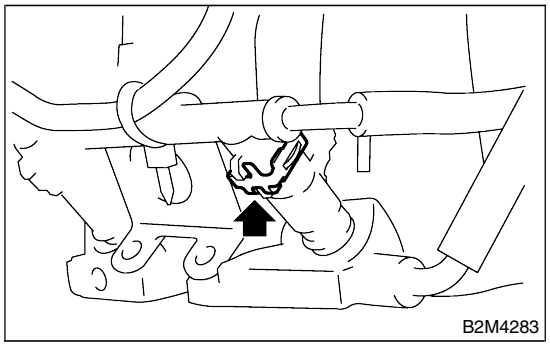

B2M4280

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

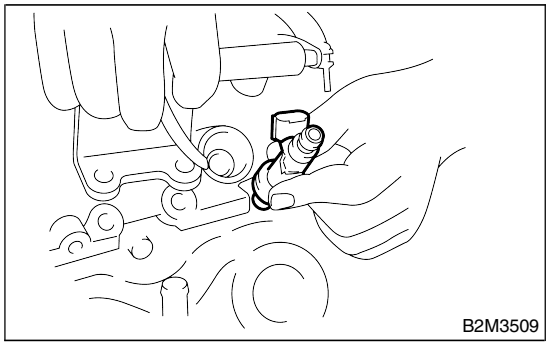

B2M4281


B2M4282

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

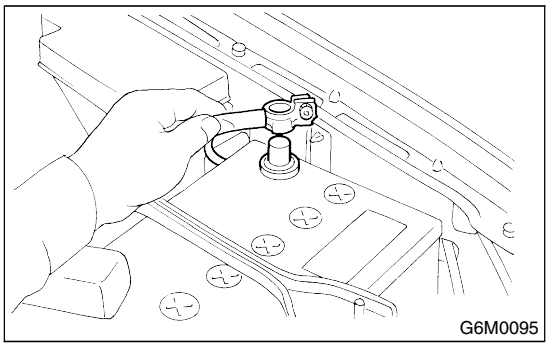

B2M4283

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

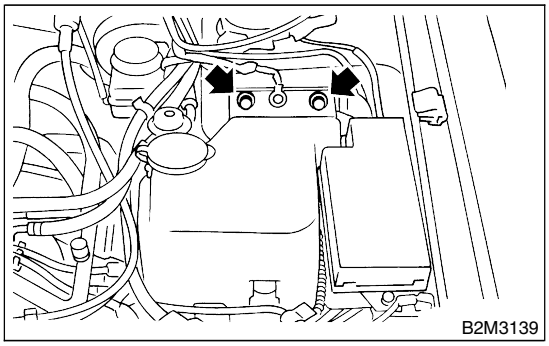

B2M3509

2. LH SIDE S155051A1802

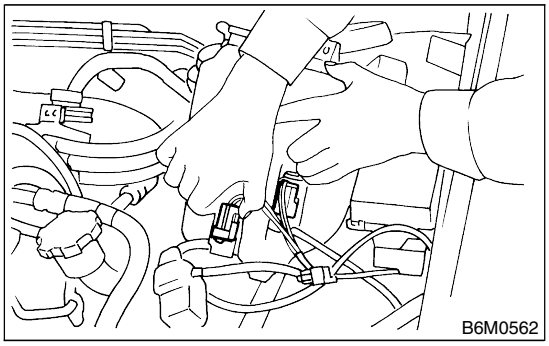
1) Release fuel pressure. <Ref. to FU(SOHC)-52, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open fuel flap lid, and remove fuel filler cap.
3) Disconnect battery ground cable.


G6M0095

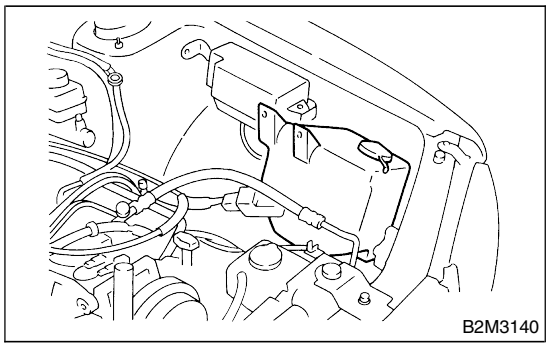
4) Remove two bolts which install washer tank on body.


B2M3139

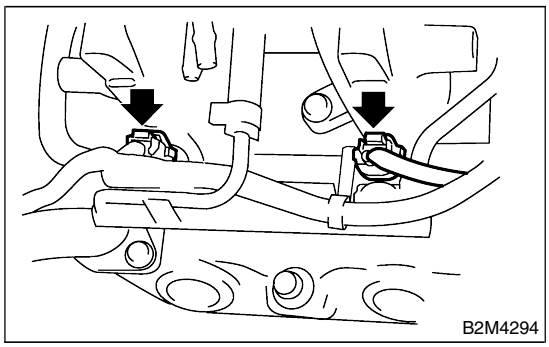
5) Disconnect connector from front window washer motor.
6) Disconnect connector from rear gate glass washer motor.


B6M0562

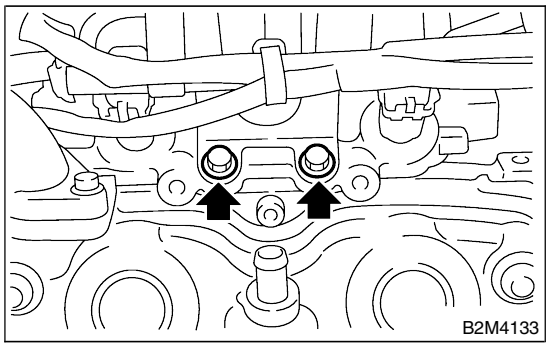
7) Disconnect rear window glass washer hose from washer motor, then plug connection with a suitable cap.
8) Move washer tank, and secure it away from working area.

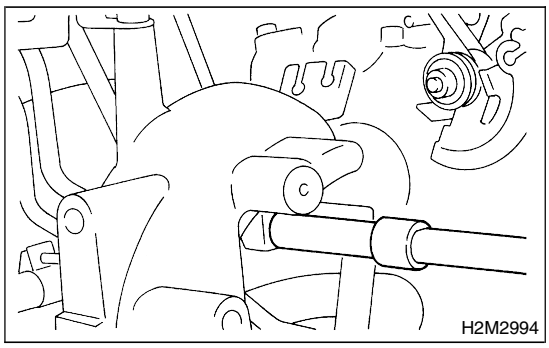

B2M3140

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

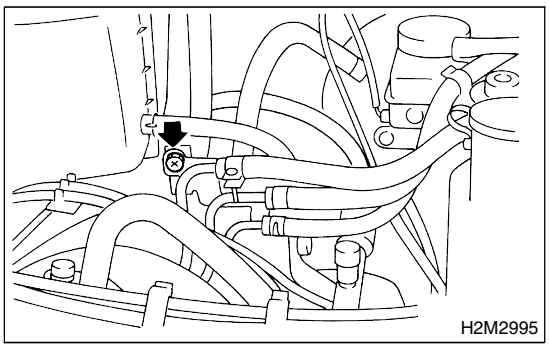

B2M4294

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

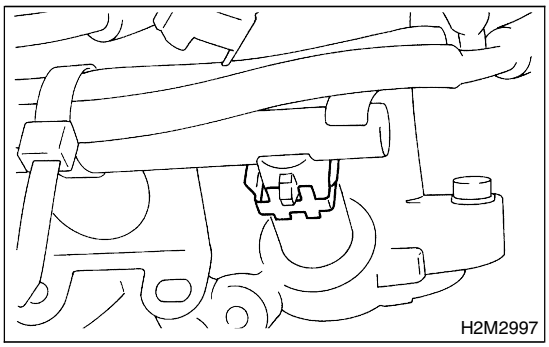

B2M4133


H2M2994

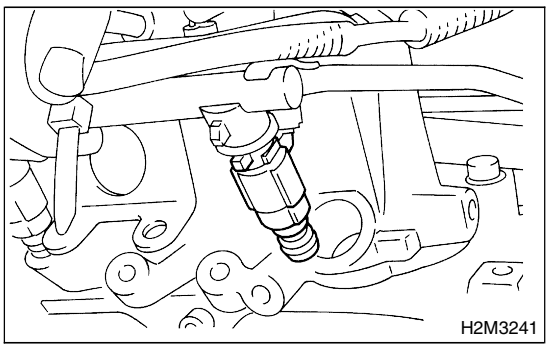
12) Remove bolt which holds fuel pipe on the left side intake manifold.


H2M2995

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


H2M2997

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

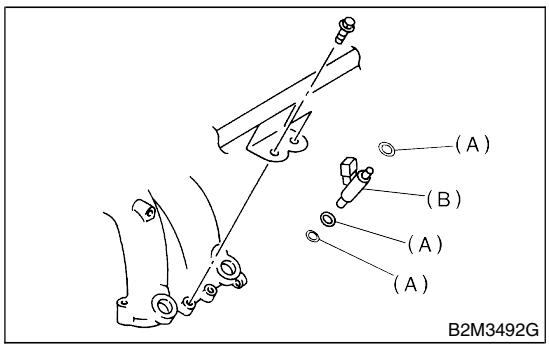

H2M3241

B: INSTALLATION S155051A11

1. RH SIDE S155051A1101

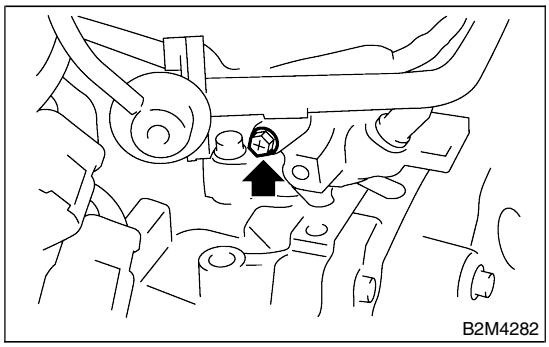
Install in the reverse order of removal.

NOTE:
Replace O-rings with new ones.

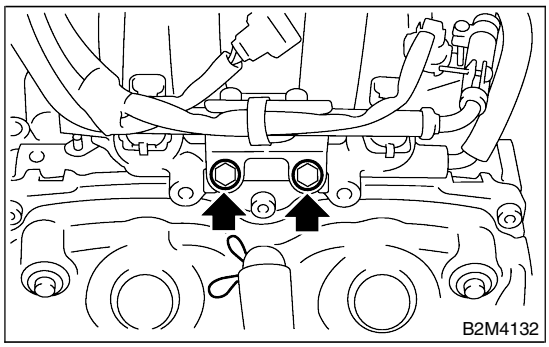


(A) O-ring
(B) Fuel injector

Tightening torque:
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)



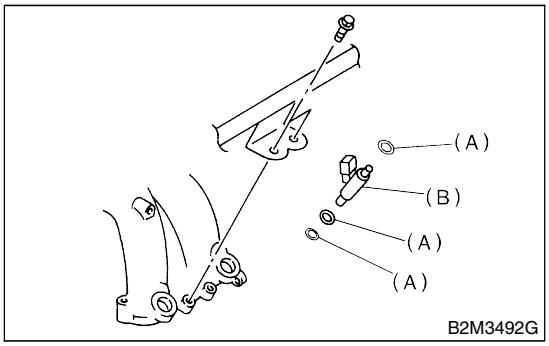
Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)



2. LH SIDE S155051A1102

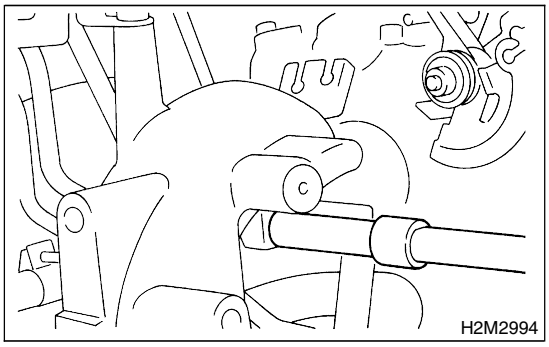
Install in the reverse order of removal.

NOTE:
Replace O-rings with new ones.

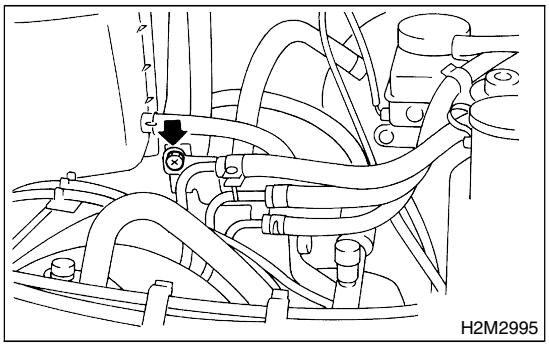


(A) O-ring
(B) Fuel injector

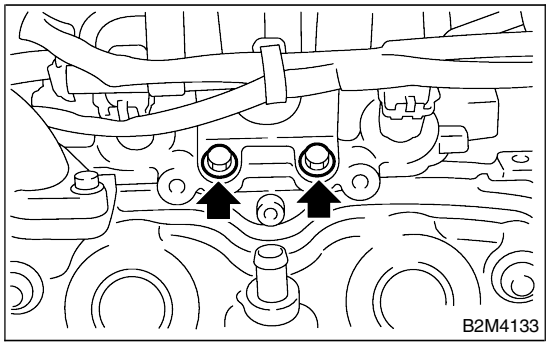
Tightening torque:
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)



Tightening torque:
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)



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

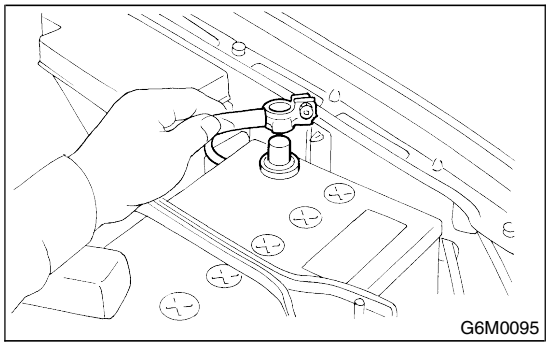


14. Front Oxygen (A/F) Sensor

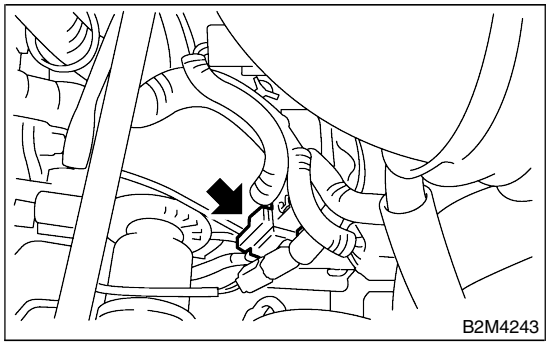
S155642

A: REMOVAL S155642A18

1) Disconnect battery ground cable.



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

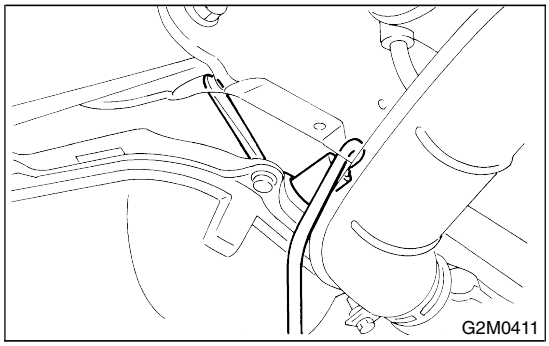


3) Lift-up the vehicle.
4) Apply SUBARU CRC or its equivalent to threaded portion of front oxygen (A/F) sensor, and leave it for one minute or more.

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.

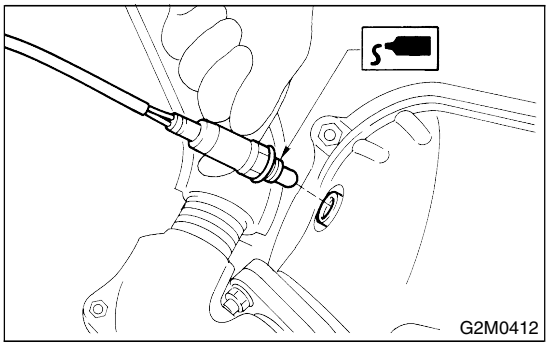


B: INSTALLATION S155642A11

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

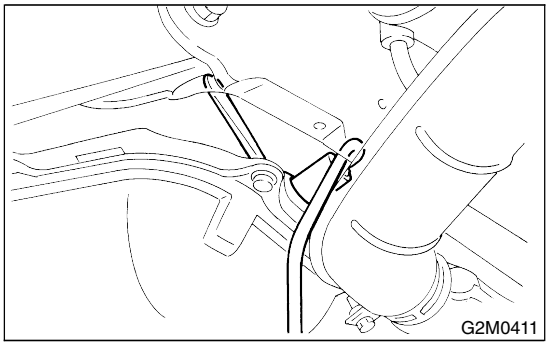
Anti-seize compound:
SS-30 by JET LUBE

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

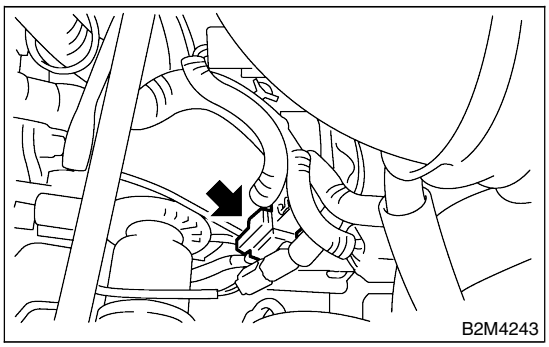


2) Install front oxygen (A/F) sensor.

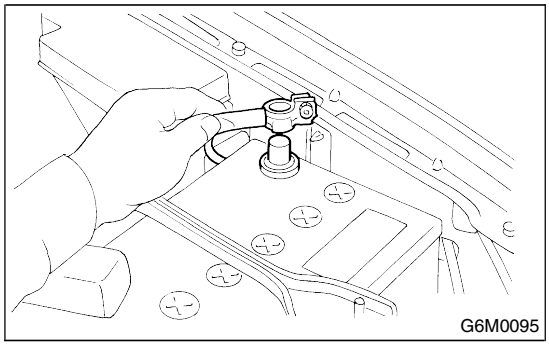
Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)



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



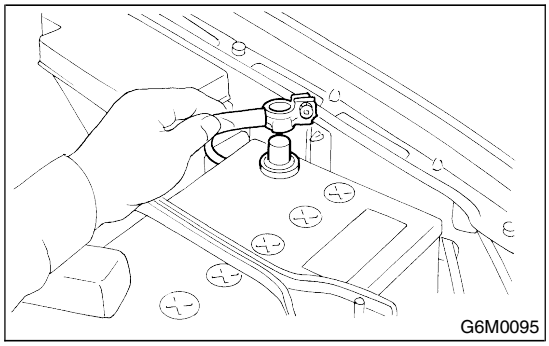
5) Connect battery ground cable.



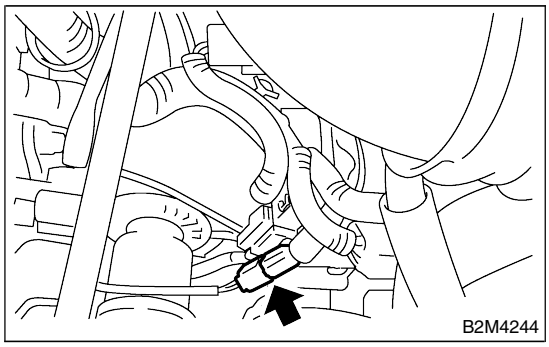
15. Rear Oxygen Sensor S155657

A: REMOVAL S155657A18

1) Disconnect battery ground cable.



2) Disconnect connector from rear oxygen sensor.

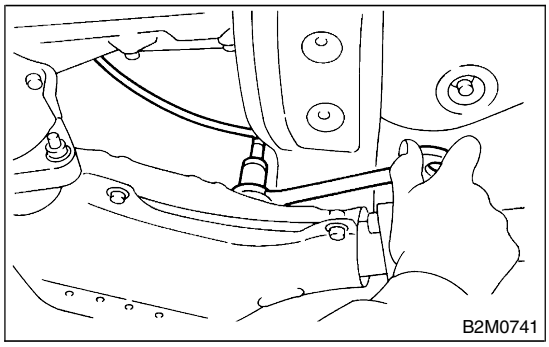


3) Lift-up the vehicle.
4) Apply SUBARU CRC or its equivalent to threaded portion of rear oxygen sensor, and leave it for one minute or more.

SUBARU CRC (Part No. 004301003)

5) Remove rear oxygen sensor.

CAUTION:
When removing the oxygen sensor, wait until exhaust pipe cools, otherwise it will damage exhaust pipe.

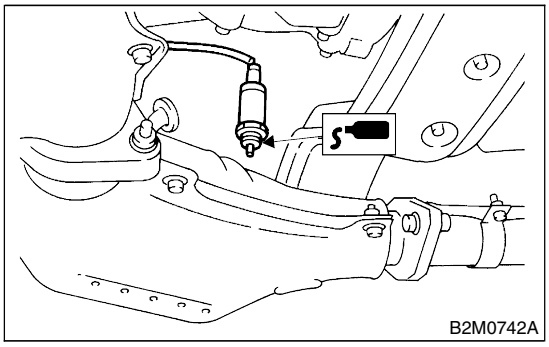


B: INSTALLATION S155657A11

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

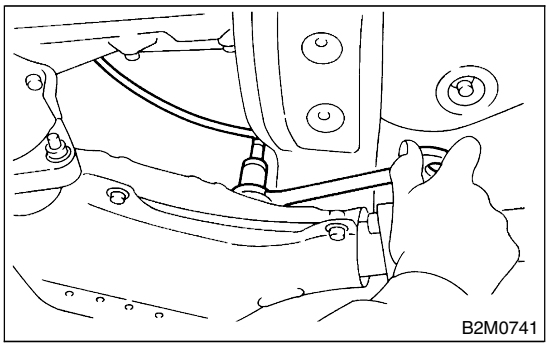
CAUTION:
Never apply anti-seize compound to protector of rear oxygen sensor.

Anti-seize compound:
SS-30 by JET LUBE

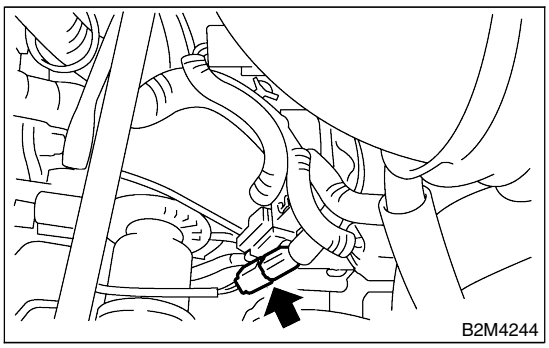


2) Install rear oxygen sensor.

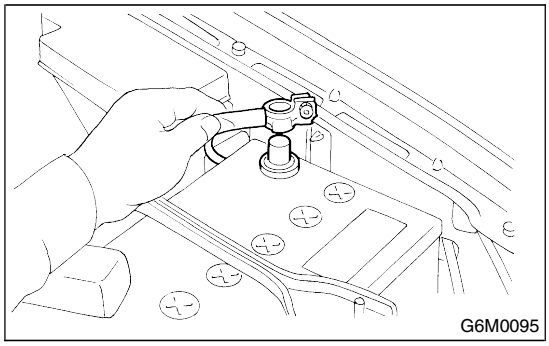
Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)



3) Lower the vehicle.
4) Connect connector to rear oxygen sensor.



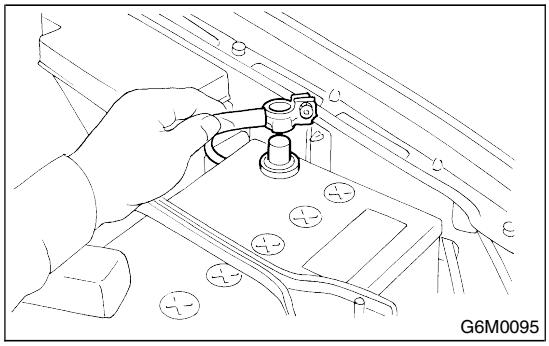
5) Connect battery ground cable.



16. Engine Control Module S155049

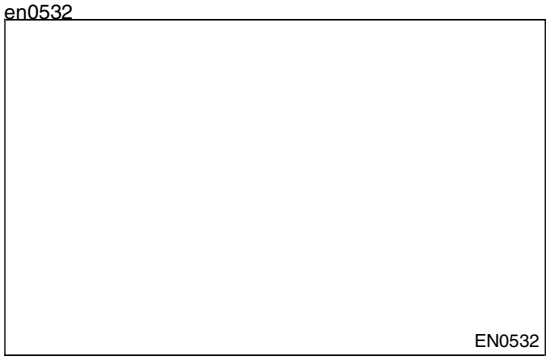
A: REMOVAL S155049A18

1) Disconnect battery ground cable.


G6M0095

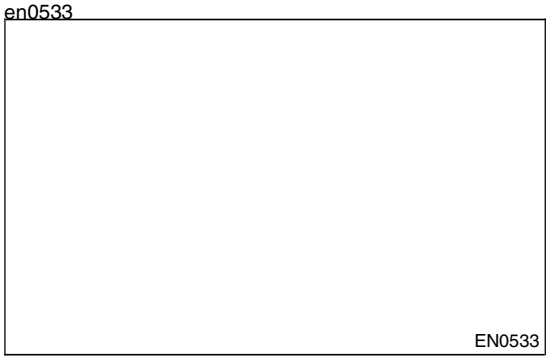
2) Remove lower inner trim of passenger side. <Ref. to EI-38, REMOVAL, Lower Inner Trim.>
3) Detach floor mat of front passenger seat.
4) Remove protect cover.

en0532


EN0532

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

en0533


EN0533

7) Disconnect ECM connectors and take out ECM.

B: INSTALLATION S155049A11

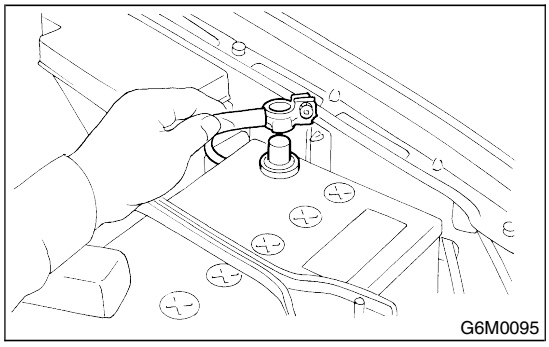
Install in the reverse order of removal.

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

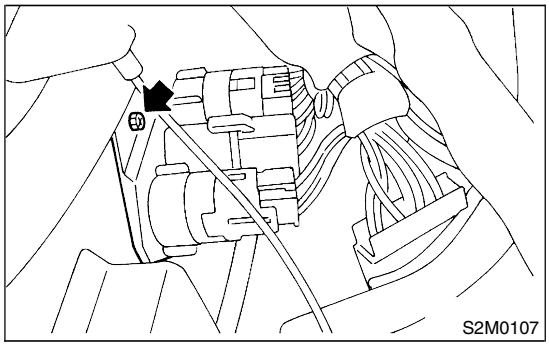
17. Main Relay S155050

A: REMOVAL S155050A18

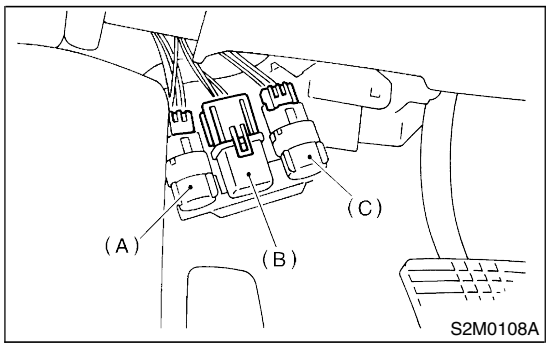
1) Disconnect battery ground cable.



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

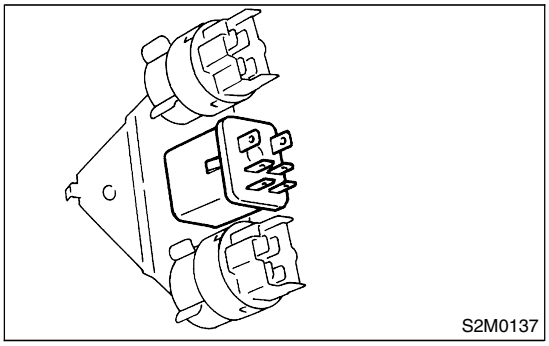


3) Disconnect connectors from relays.



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

4) Remove main relay from mounting bracket.



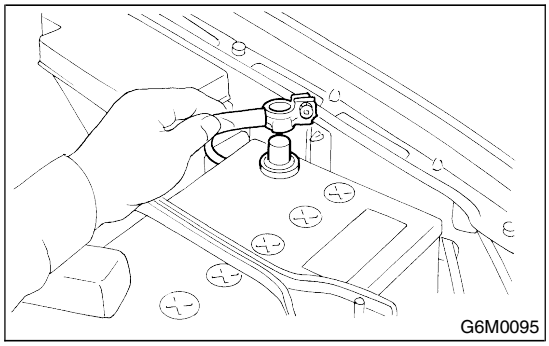
B: INSTALLATION S155050A11

Install in the reverse order of removal.

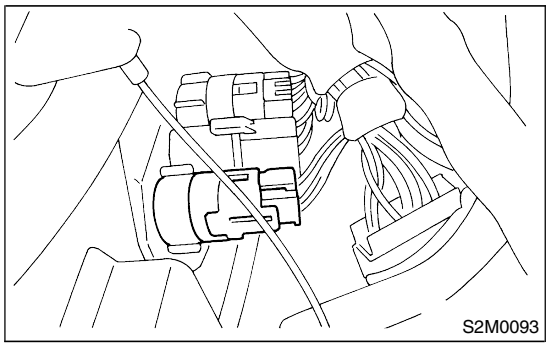
18. Fuel Pump Relay S155048

A: REMOVAL S155048A18

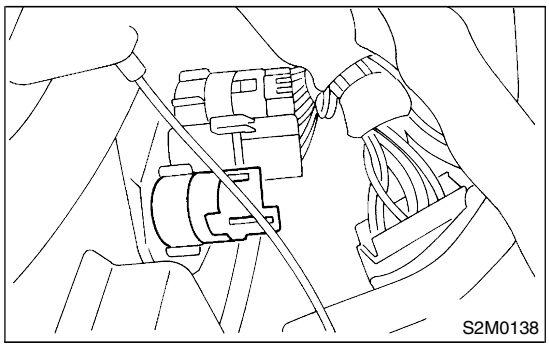
1) Disconnect battery ground cable.


G6M0095

2) Disconnect connector from fuel pump relay.


S2M0093

3) Remove fuel pump relay from mounting bracket.


S2M0138

B: INSTALLATION S155048A11

Install in the reverse order of removal.

19. Fuel S155052

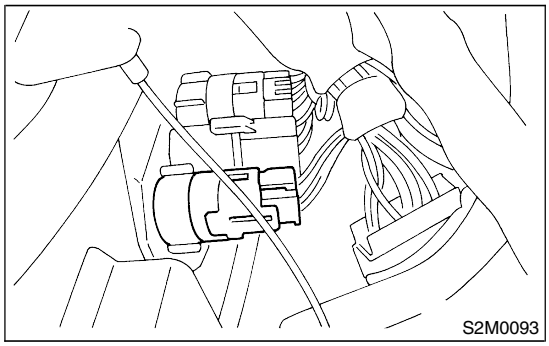
A: OPERATION S155052A16

1. RELEASING OF FUEL PRESSURE

S155052A1601

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

1) Disconnect connector from fuel pump relay.

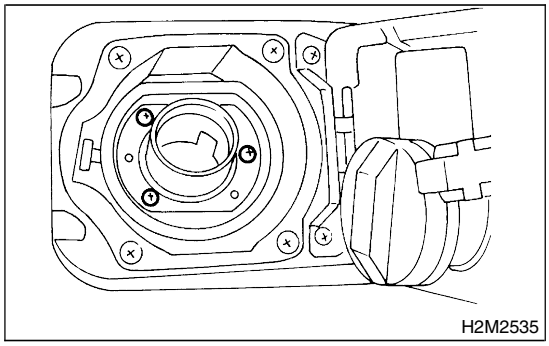

S2M0093

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.

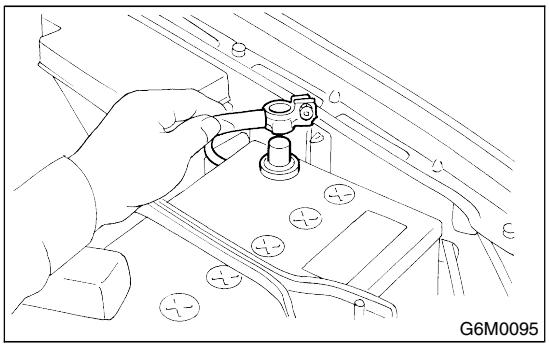
2. DRAINING OF FUEL S155052A1603

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

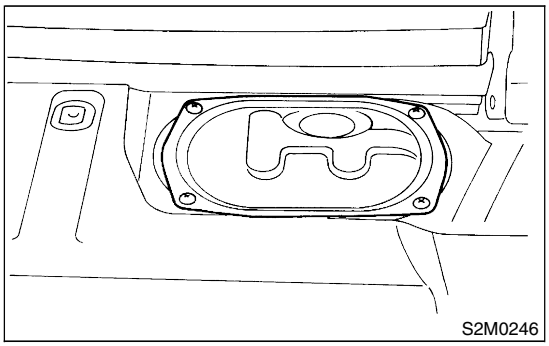
1) Release fuel pressure. <Ref. to FU(SOHC)-52, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open fuel flap lid, and remove fuel filler cap.


H2M2535

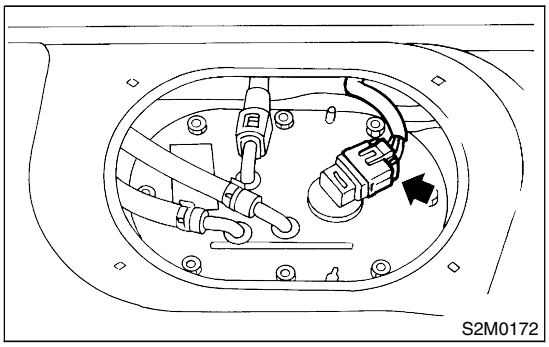
3) Disconnect battery ground cable.


G6M0095

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

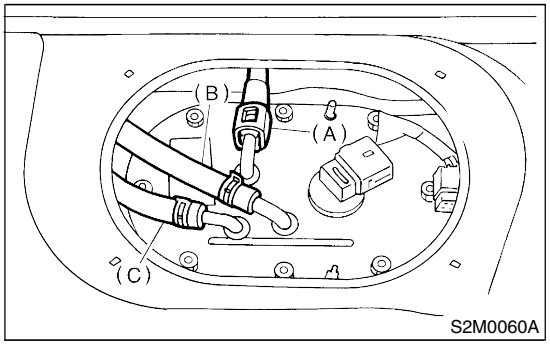

S2M0246

6) Disconnect connector from fuel pump.

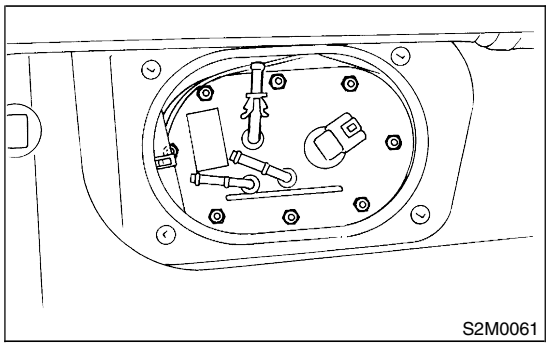

S2M0172

7) Disconnect quick connector, and then disconnect fuel delivery hose (A). <Ref. to FU(SOHC)-69, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>

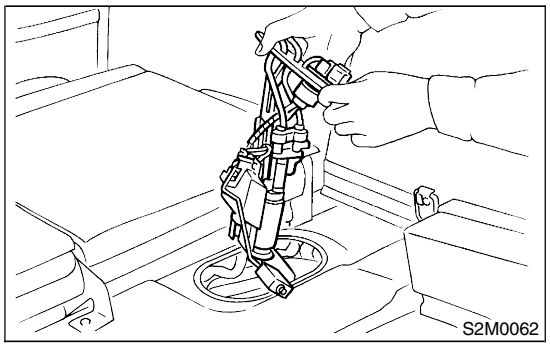
8) Move clips, and then disconnect fuel return hose (B) and jet pump hose (C).



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

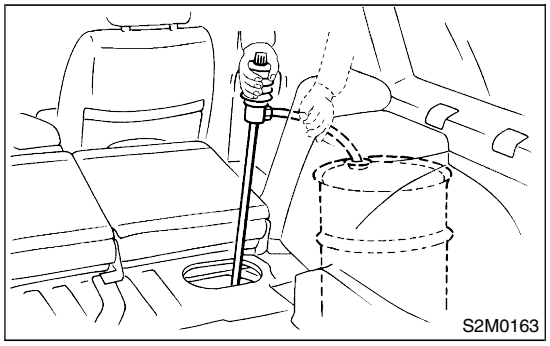


10) Take off fuel pump from fuel tank.

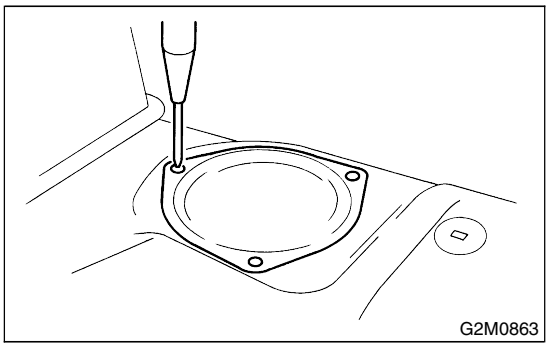


11) Drain fuel from fuel tank by using a hand pump.

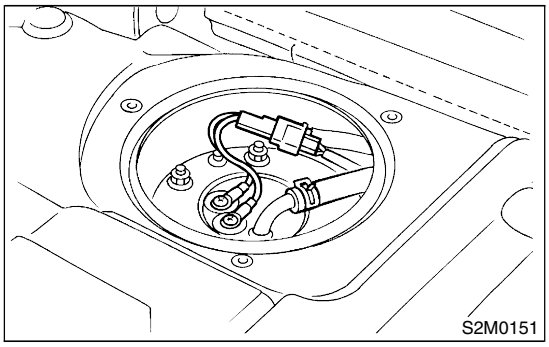
WARNING:
Do not use a motor pump when draining fuel.



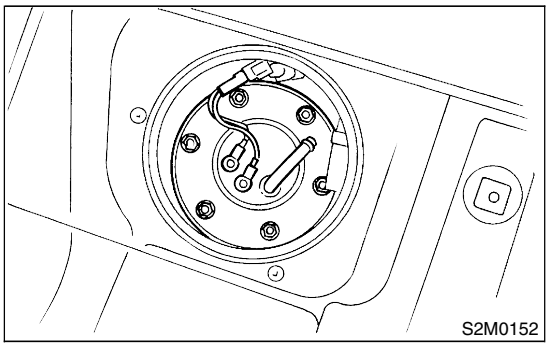
12) Remove service hole cover.



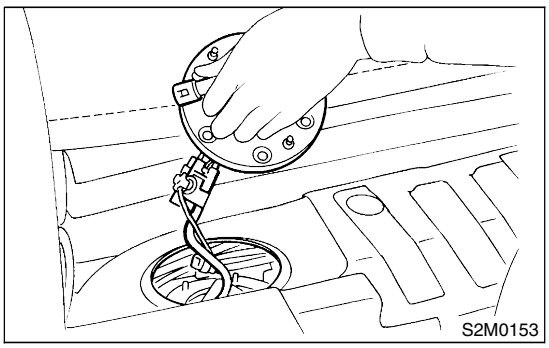
13) Disconnect connector from fuel sub meter.
14) Disconnect fuel jet pump hose.



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

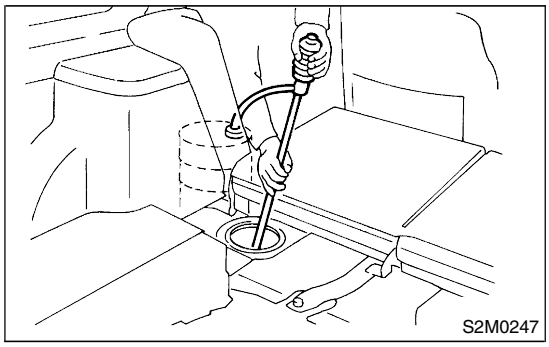


16) Remove fuel sub meter unit.



17) Drain fuel from there.

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

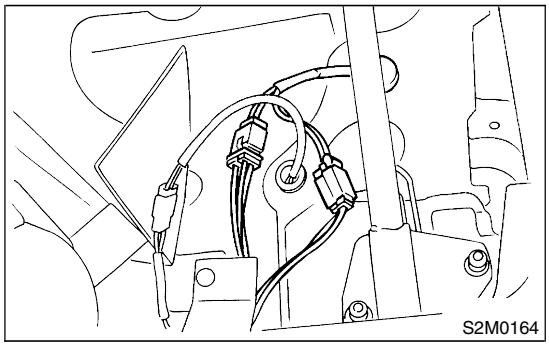


20. Fuel Tank S155053

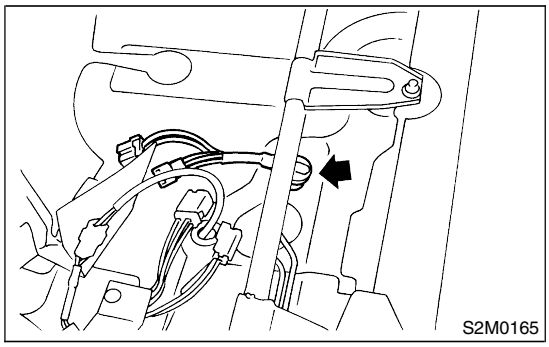
A: REMOVAL S155053A18

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(SOHC)-52, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
3) Drain fuel from fuel tank. <Ref. to FU(SOHC)-52, DRAINING FUEL, OPERATION, Fuel.>
4) Remove rear seat.
5) Disconnect connector of fuel tank cord to rear harness.

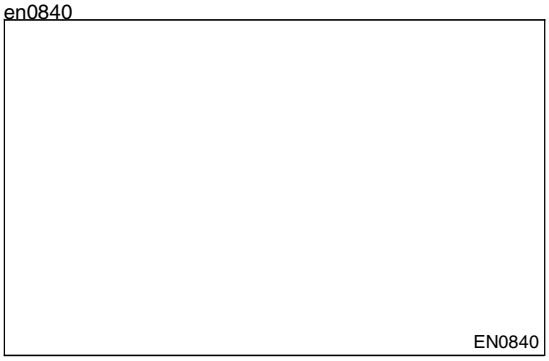

S2M0164

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

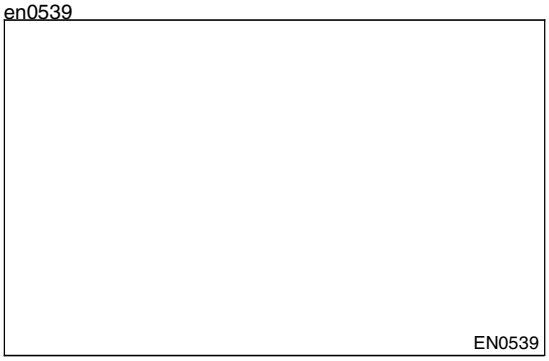

S2M0165

7) Remove rear crossmember. <Ref. to RS-20, REMOVAL, Rear Crossmember.>

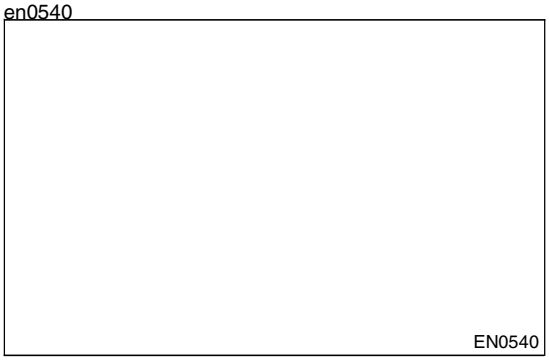
8) Disconnect two-way valve hose (A) from two-way valve and disconnect canister hose (B) from canister.

en0840

EN0840

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

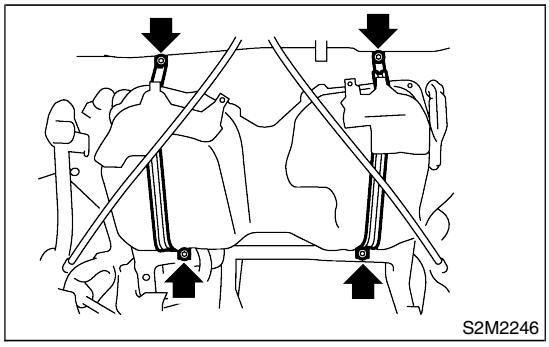
en0539

EN0539

10) Move clips, and disconnect quick connector. <Ref. to FU(SOHC)-69, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>
11) Disconnect fuel hoses.

en0540

EN0540

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

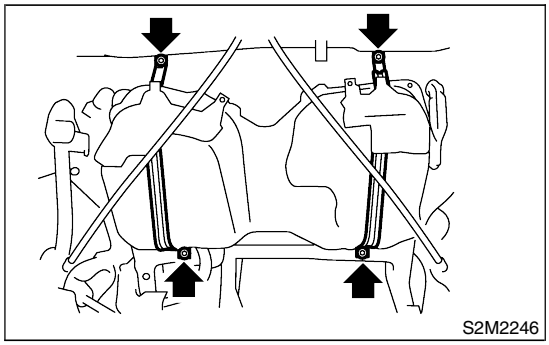
WARNING:
A helper is required to perform this work.


S2M2246

B: INSTALLATION S155053A11

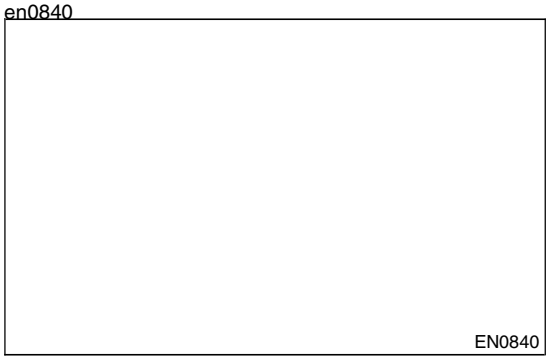
1) Support fuel tank with transmission jack and push fuel tank harness into access hole with grommet.
2) Set fuel tank and temporarily tighten bolts of fuel tank bands.

WARNING:
A helper is required to perform this work.


S2M2246

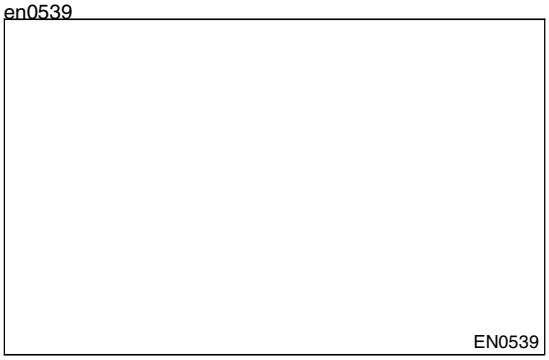
3) Connect two-way valve hose (A) to two-way valve and connect canister hose (B) to canister.

en0840


EN0840

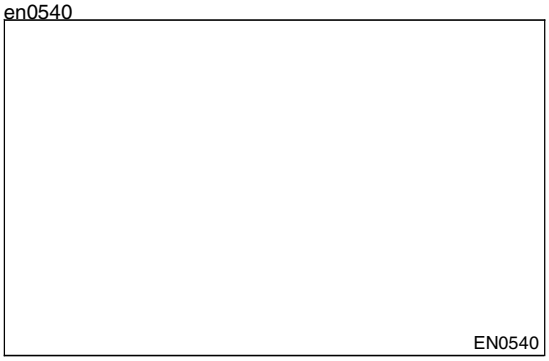
4) Connect fuel filler hose and air vent hose.

en0539


EN0539

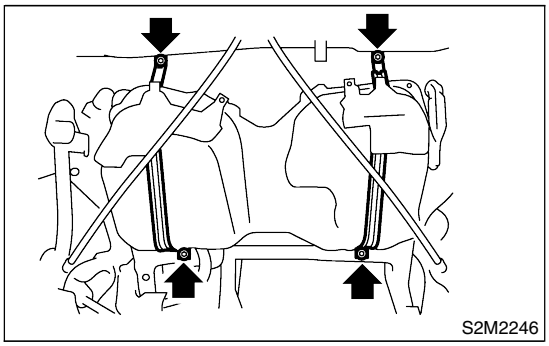
5) Connect fuel hoses, and hold then with clips and quick connector. <Ref. to FU(SOHC)-69, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>

en0540


EN0540

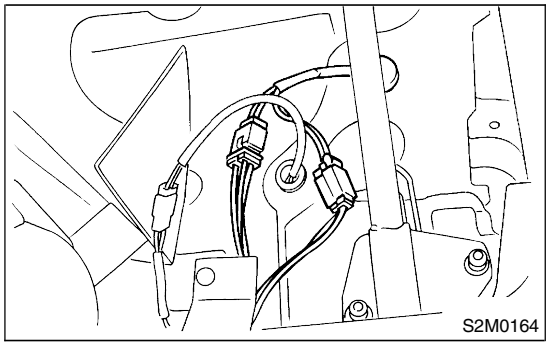
6) Tighten band mounting bolts.

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

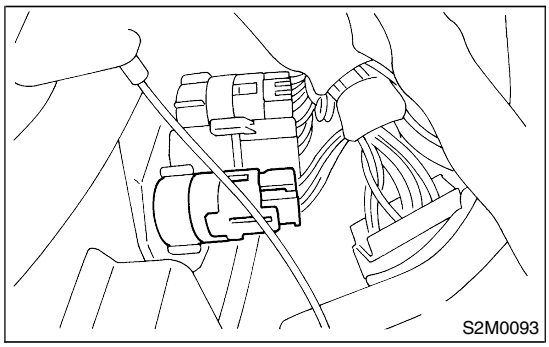

S2M2246

7) Install rear crossmember. <Ref. to RS-20, INSTALLATION, Rear Crossmember.>

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



9) Set rear seat and floor mat.
10) Connect connector to fuel pump relay.



C: INSPECTION S155053A10

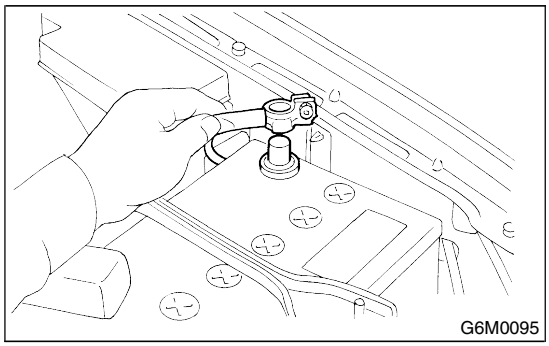
1) Make sure there are no cracks, holes, or other damage on the fuel tank.
2) Make sure that the fuel hoses and fuel pipes are not cracked and that connections are tight.

21. Fuel Filler Pipe S155022

A: REMOVAL S155022A18

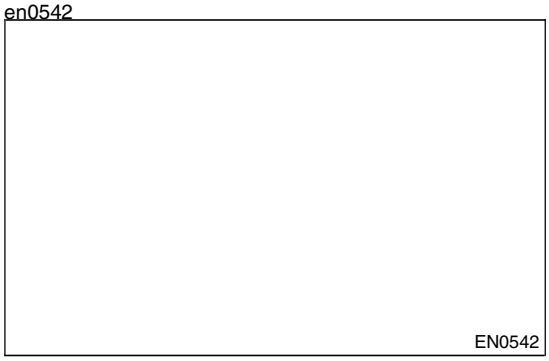
WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

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

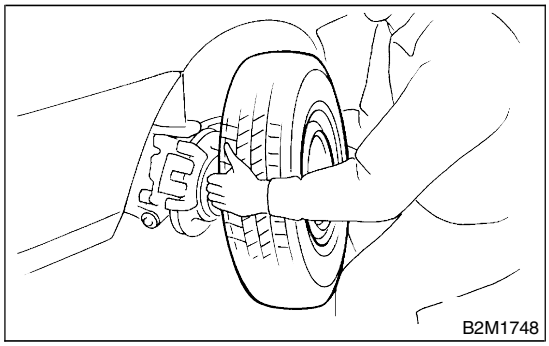

G6M0095

4) Remove screws holding packing in place.

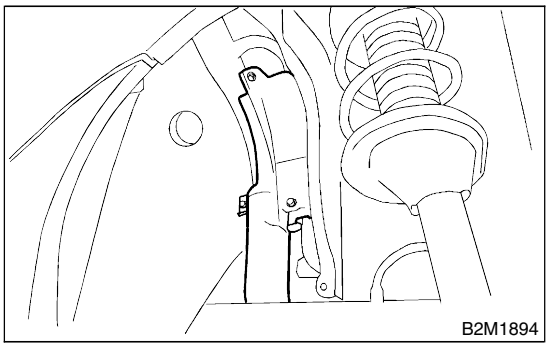
en0542


EN0542

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

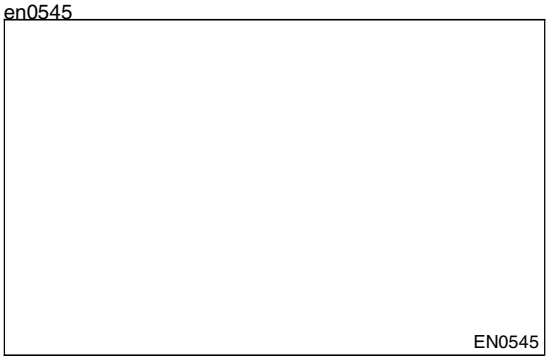

B2M1748

8) Remove fuel filler pipe protector.

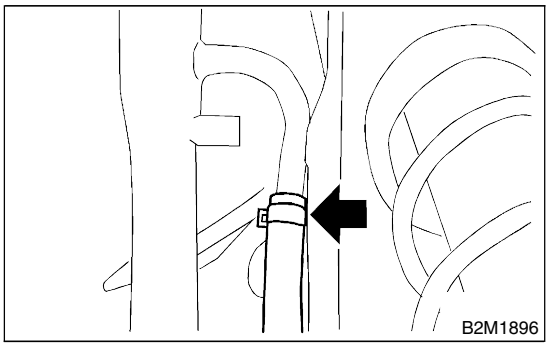

B2M1894

9) Separate evaporation hoses from clip of fuel filler pipe.

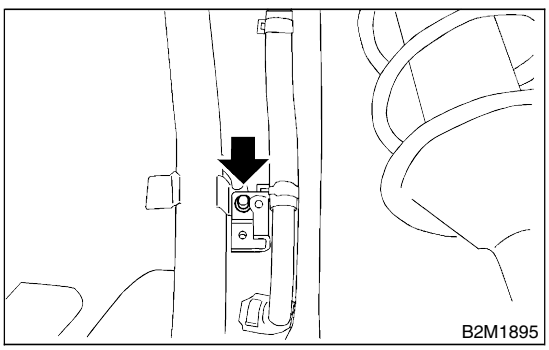
en0545


EN0545

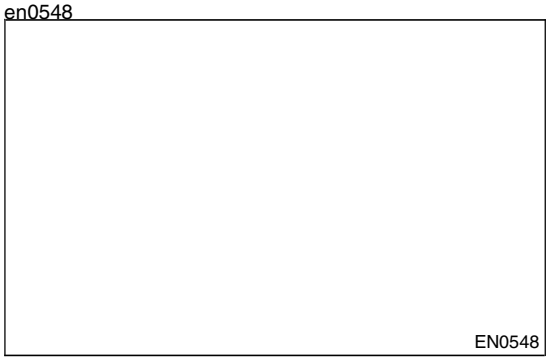
10) Disconnect air vent hose from fuel filler pipe.


B2M1896

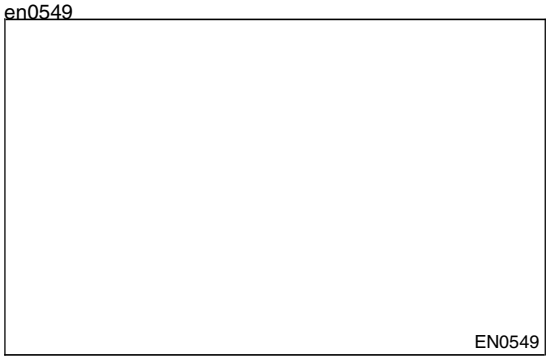
11) Remove bolts which hold fuel filler pipe bracket on body.


B2M1895

12) Loosen clamp and separate fuel filler hose (A) from fuel filler pipe.
13) Move clip and separate air vent hose (B).

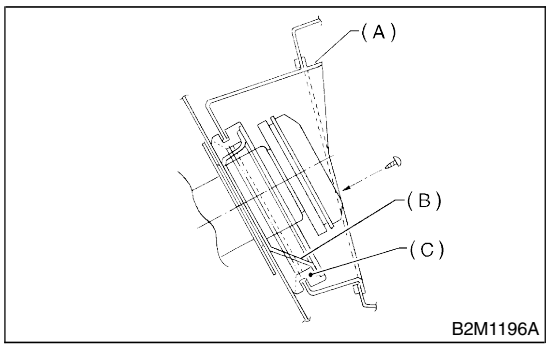
en0548

EN0548

14) Remove fuel filler pipe to under side of the vehicle.
15) Remove air vent pipe together with clip from body.

en0549

EN0549

B: INSTALLATION S155022A11

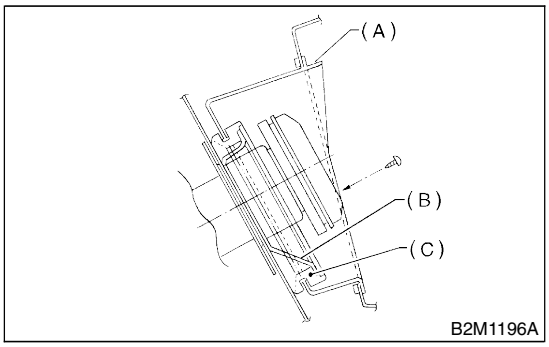
1) Hold fuel filler flap open.
2) Set fuel saucer (A) with rubber packing (C) and insert fuel filler pipe into hole from the inner side of apron.



B2M1196A

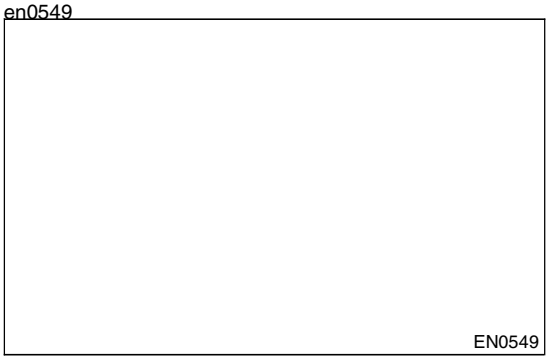
3) Align holes in fuel filler pipe neck and set cup (B), and tighten screws.

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

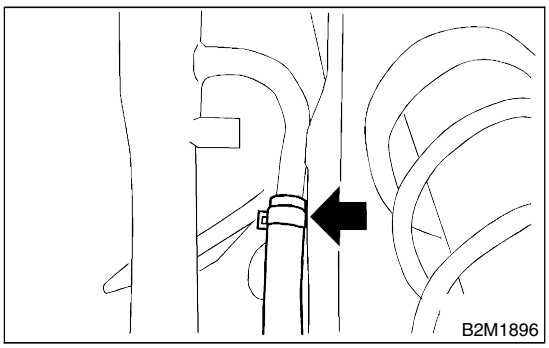


B2M1196A

4) Install air vent pipe.

en0549

EN0549

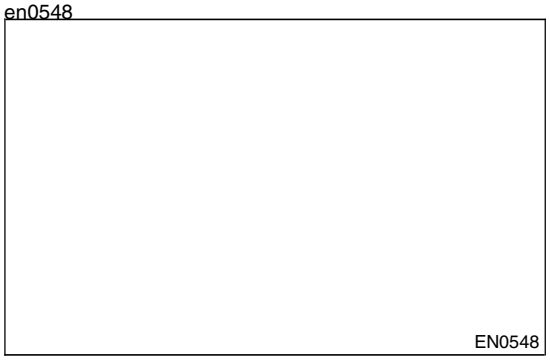
5) Connect air vent hose to fuel filler pipe.


B2M1896

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

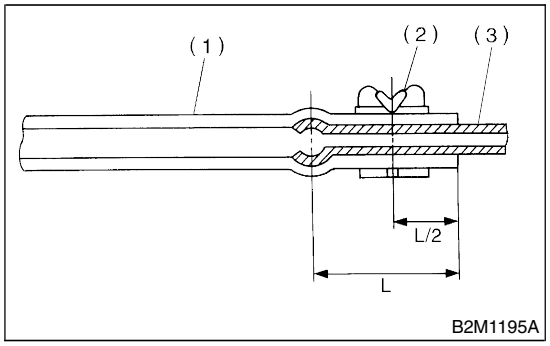
CAUTION:
Do not allow clips to touch air vent hose (B) and rear suspension crossmember.

en0548



7) Insert air vent hose approximately 25 to 30 mm (0.98 to 1.18 in) into the lower end of air vent pipe and hold clip.

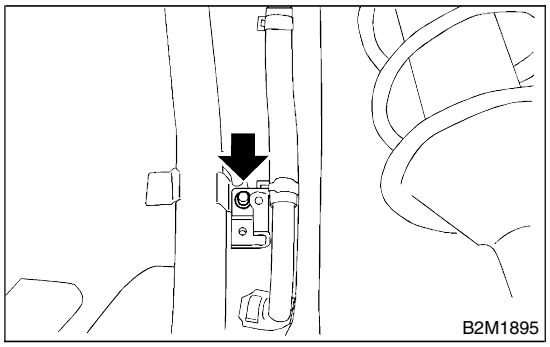
L = 27.5±2.5 mm (1.083±0.098 in)



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

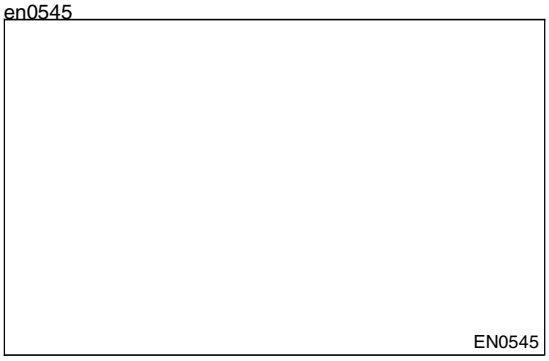
8) Tighten bolt which holds fuel filler pipe bracket on body.

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

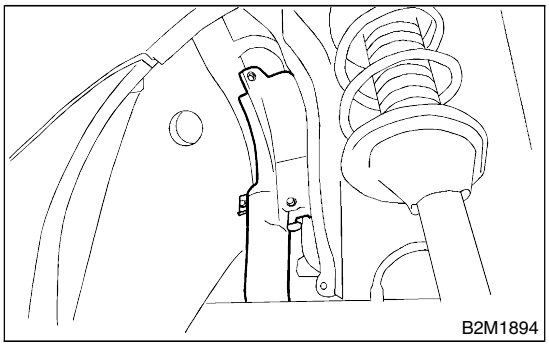


9) Tighten bolts which hold evaporation hoses onto clip of fuel filler pipe.

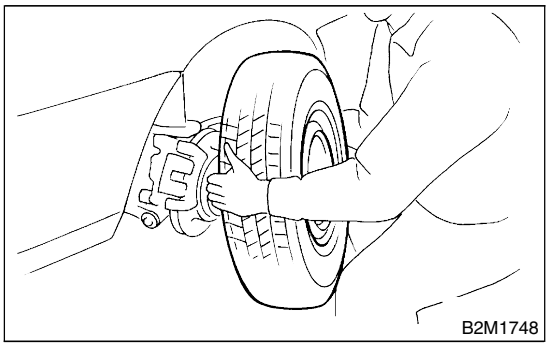
en0545



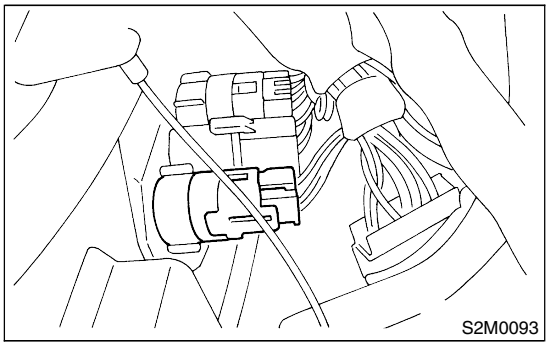
10) Install fuel filler pipe protector.



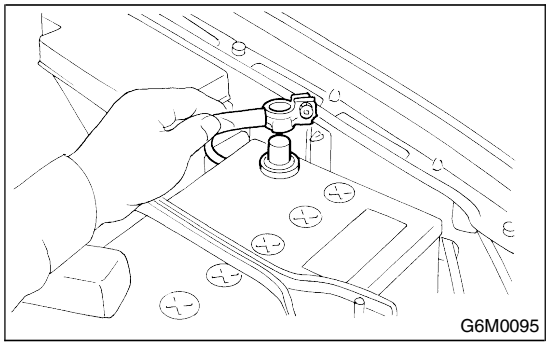
11) Install rear right wheel.



12) Lower the vehicle.
13) Tighten wheel nuts.
14) Connect connector to fuel pump relay.



15) Connect battery ground terminal.

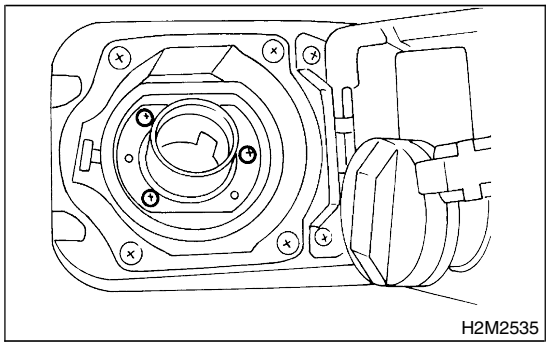


22. Fuel Pump S155025

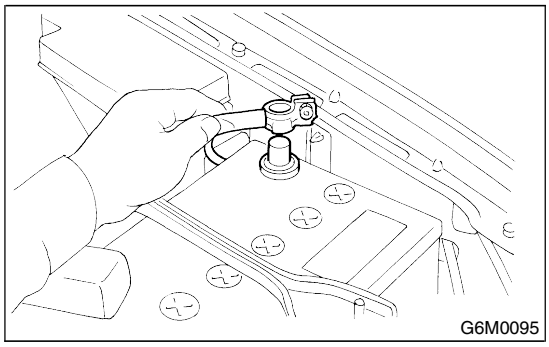
A: REMOVAL S155025A18

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

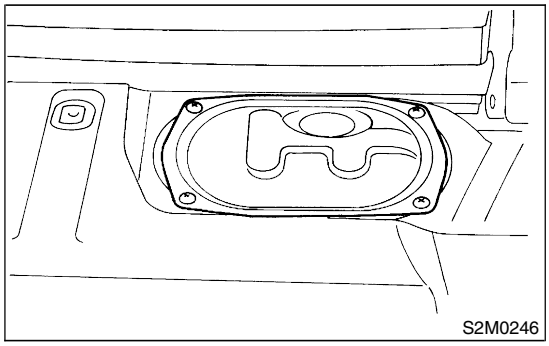
1) Release fuel pressure. <Ref. to FU(SOHC)-52, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open fuel filler flap lid, and remove fuel filler cap.


H2M2535

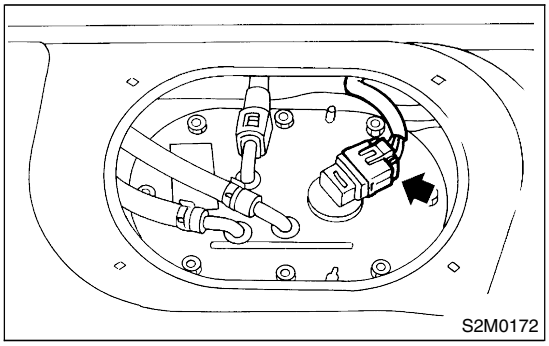
3) Disconnect battery ground cable.


G6M0095

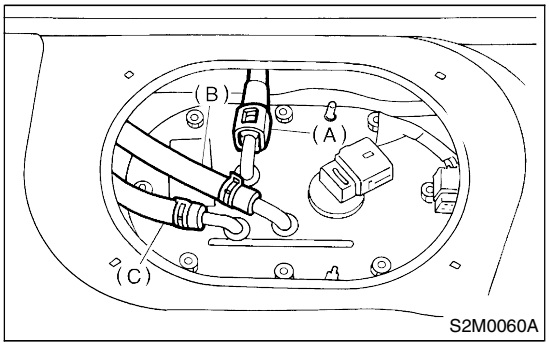
4) Remove the floor box located just behind the rear seats.
5) Remove access hole lid.


S2M0246

6) Disconnect connector from fuel pump.

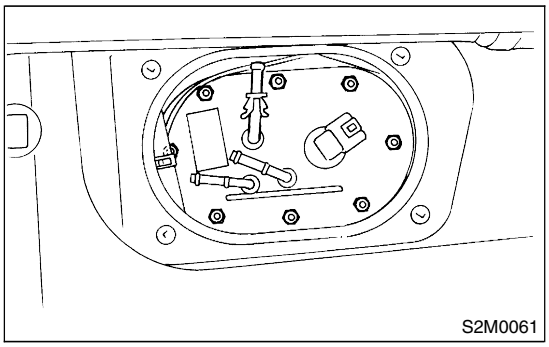

S2M0172

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(SOHC)-69, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>

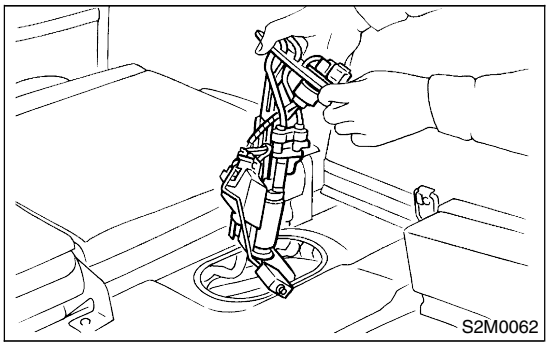


S2M0060A

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


S2M0061

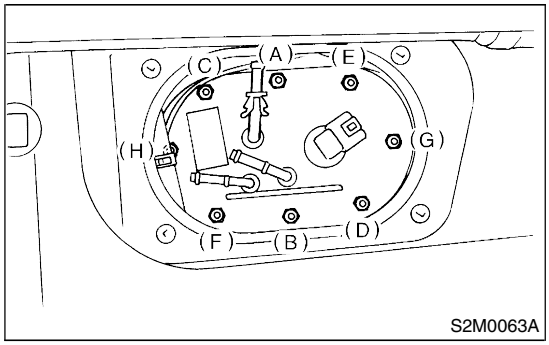
10) Take off fuel pump from fuel tank.


S2M0062

B: INSTALLATION S155025A11

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.

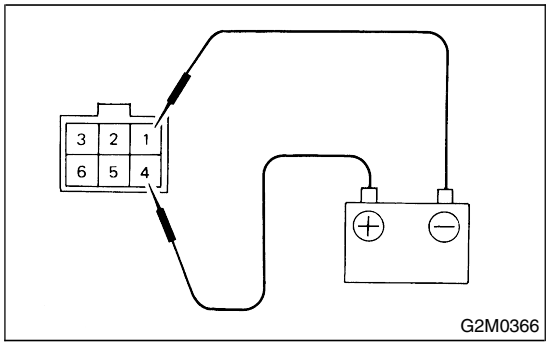
Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



C: INSPECTION S155025A10

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.



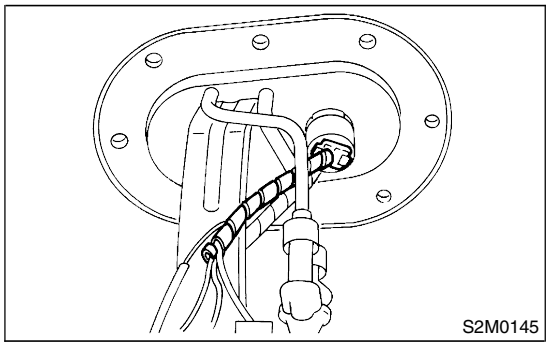
23. Fuel Level Sensor S155026

A: REMOVAL S155026A18

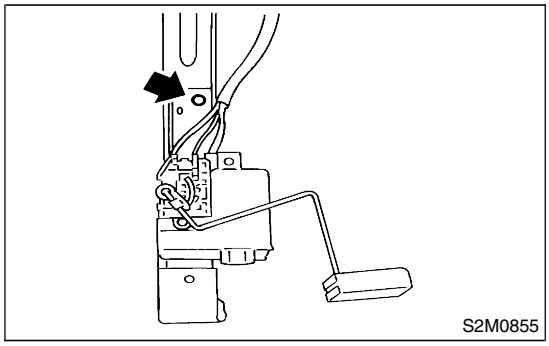
WARNING:
• Place “NO FIRE” signs near the working area.
• Be careful not to spill fuel on the floor.

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

1) Remove fuel pump assembly. <Ref. to FU(SOHC)-62, REMOVAL , Fuel Pump.>
2) Disconnect connector from fuel pump bracket.



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



B: INSTALLATION S155026A11

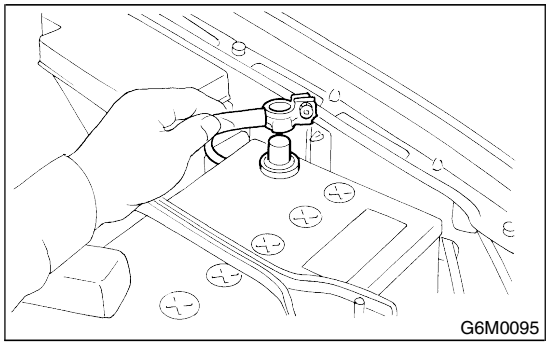
Install in the reverse order of removal.

24. Fuel Sub Level Sensor S155023

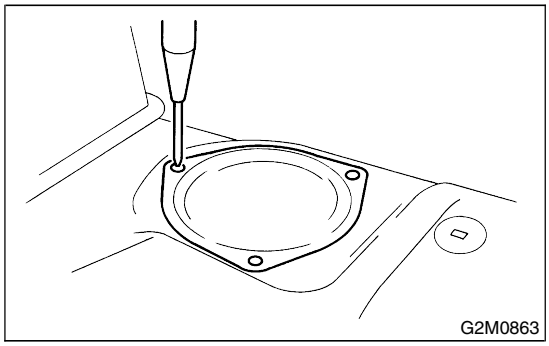
A: REMOVAL S155023A18

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

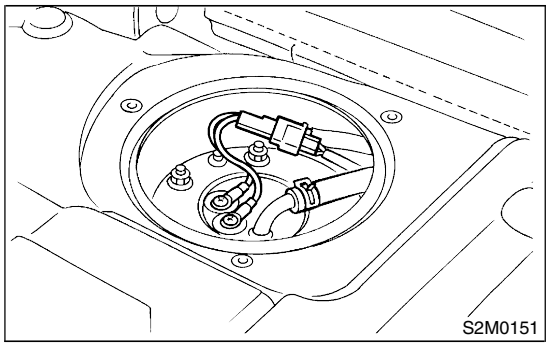
1) Disconnect battery ground cable.


G6M0095

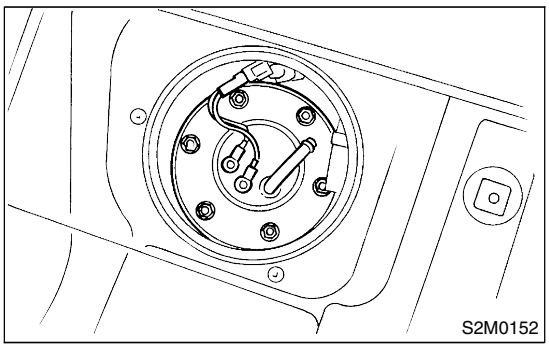
2) Remove the floor box located just behind the rear seats.
3) Remove service hole cover.


G2M0863

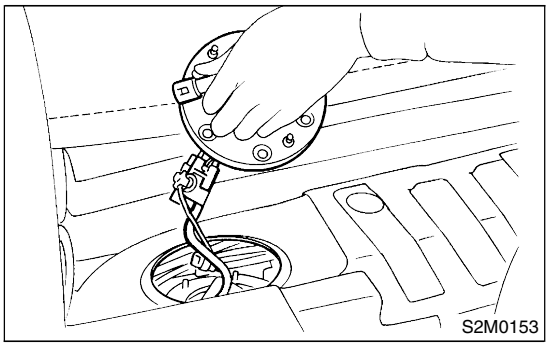
4) Disconnect connector from fuel sub meter.
5) Disconnect fuel jet pump hose.


S2M0151

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


S2M0152

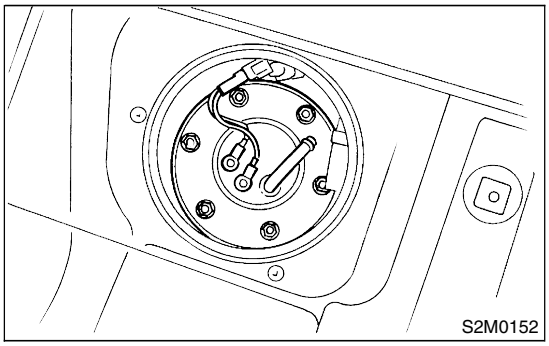
7) Remove fuel sub meter unit.


S2M0153

B: INSTALLATION S155023A11

Install in the reverse order of removal.

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

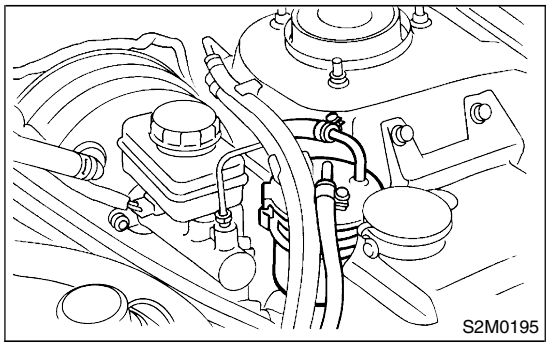

S2M0152

25. Fuel Filter S155027

A: REMOVAL S155027A18

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



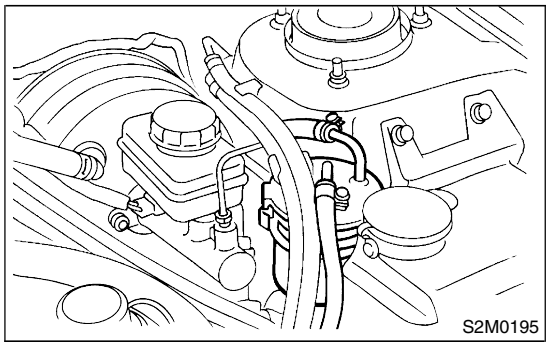
3) Remove filter from holder.

B: INSTALLATION S155027A11

CAUTION:
• If fuel hoses are damaged at the connecting portion, replace it with a new one.
• If clamps are badly damaged, replace with new ones.

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

Tightening torque:
12.5 N·m (1.27 kgf-m, 9.22 ft-lb)



C: INSPECTION S155027A10

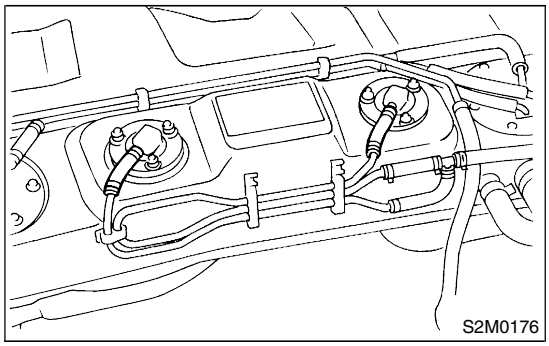
1) Check the inside of fuel filter for dirt and water sediment.
2) If it is clogged, or if replacement interval has been reached, replace it.
3) If water is found in it, shake and expel the water from inlet port.

26. Fuel Cut Valve S155021

A: REMOVAL S155021A18

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(SOHC)-55, REMOVAL, Fuel Tank.>
2) Move clip and disconnect evaporation hose from fuel cut valve.

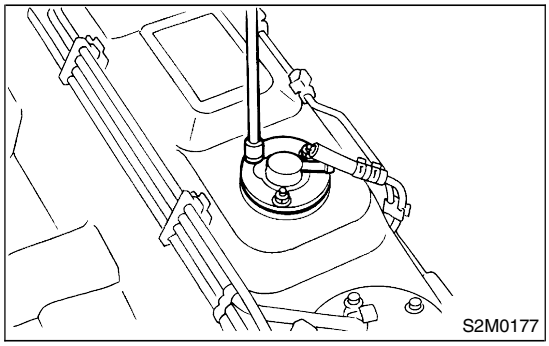

S2M0176

3) Remove bolts which install fuel cut valve.

B: INSTALLATION S155021A11

Install in the reverse order of removal.

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

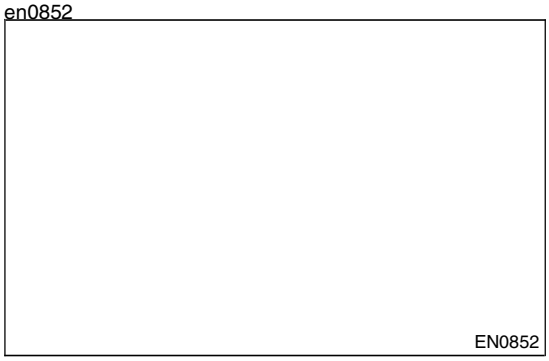

S2M0177

27. Fuel Damper Valve S155708

A: REMOVAL S155708A18

1) Release fuel pressure. <Ref. to FU(SOHC)-52, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Remove fuel damper valve from fuel return line.

en0852



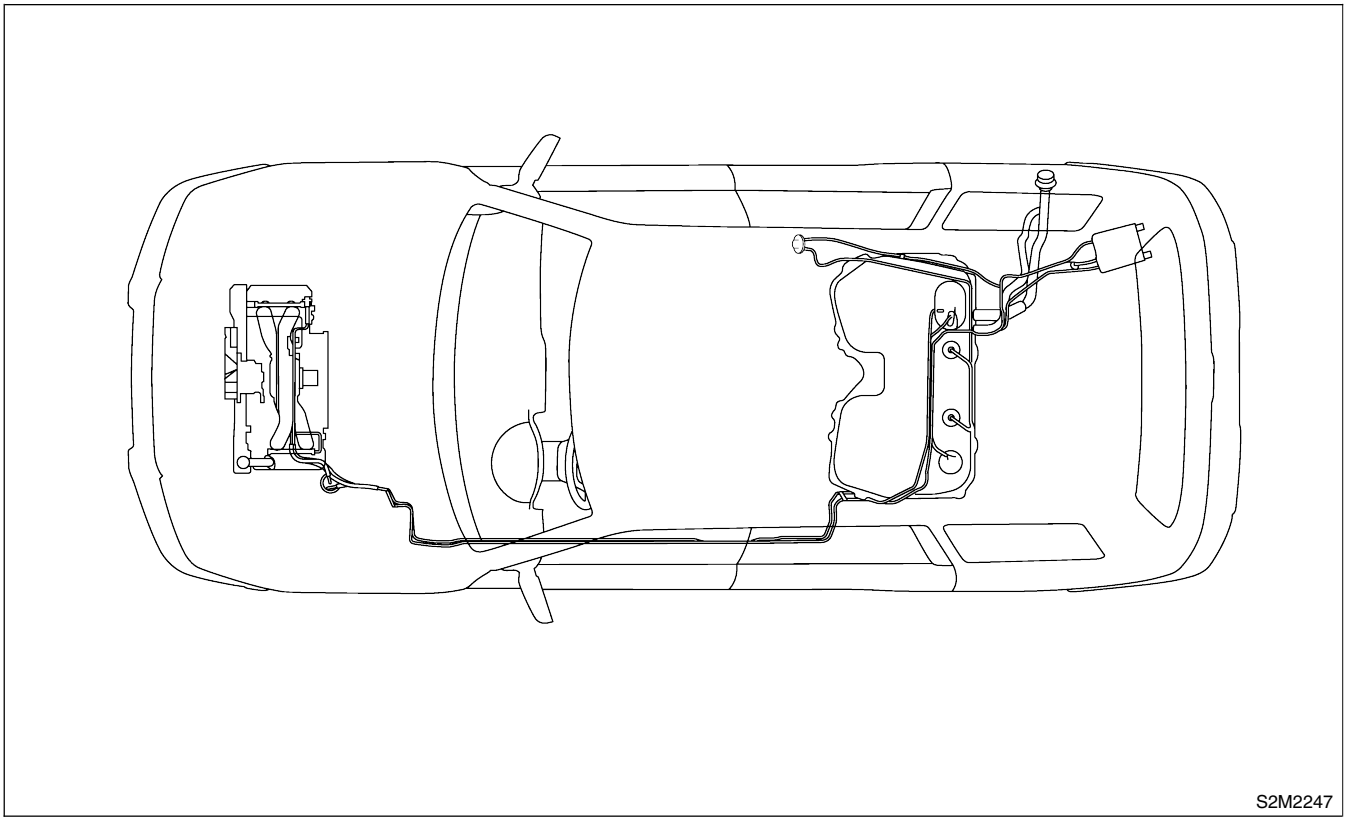
B: INSTALLATION S155708A11

Install in the reverse order of removal.

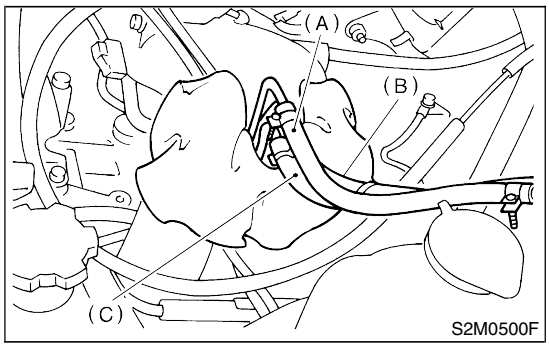
28. Fuel Delivery, Return and Evaporation Lines S155019

A: REMOVAL S155019A18

1) Set vehicle on the lift.
2) Release fuel pressure. <Ref. to FU(SOHC)-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-43, REMOVAL, Floor Mat.>
5) Remove fuel delivery pipes and hoses, fuel return pipes and hoses, evaporation pipes and hoses.


S2M2247

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



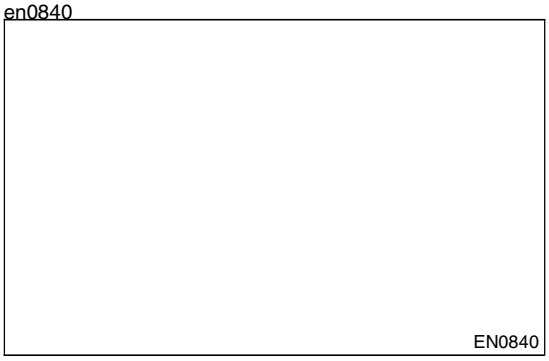
S2M0500F

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

7) Lift-up the vehicle.

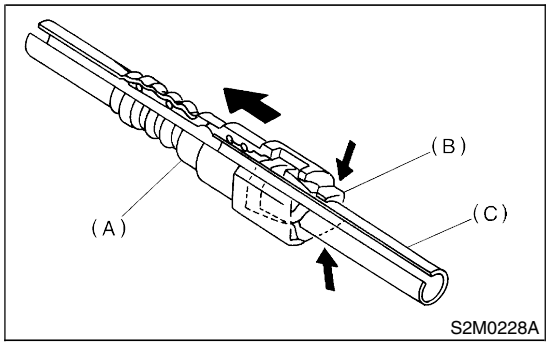
8) Disconnect two-way valve hose (A) from two-way valve and disconnect canister hose (B) from canister.

en0840


EN0840

9) 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.

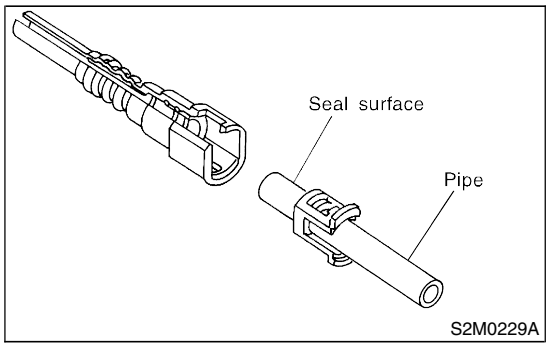


(A) Connector
(B) Retainer
(C) Pipe

B: INSTALLATION S155019A11

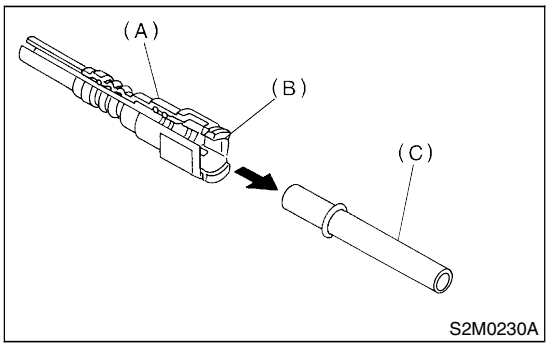
1) Connect quick connector on fuel delivery line.

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.



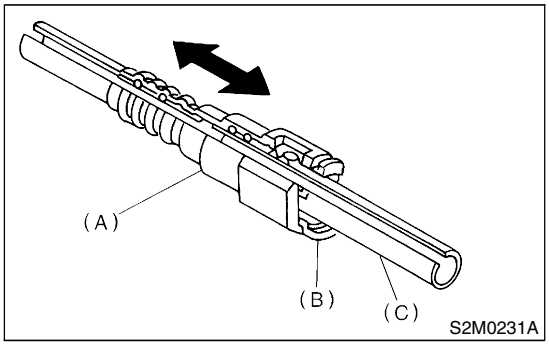
(1) Set new retainer (B) to connector (A).
(2) Push pipe into connector completely.

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



(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.

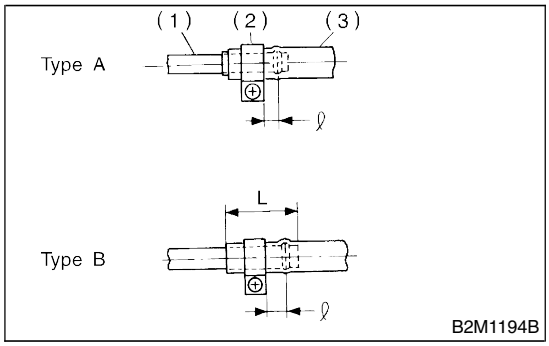


(A) Connector
(B) Retainer
(C) Pipe

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)

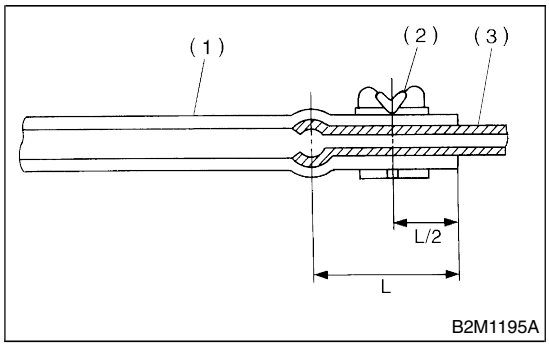


(1) Fitting
(2) Clamp
(3) Hose

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 *S155019A10*

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 S155571

A: INSPECTION S155571A10

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

EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)

EC(SOHC)

Page

1. General Description....2
2. Front Catalytic Converter....3
3. Rear Catalytic Converter....6
4. Canister....7
5. Purge Control Solenoid Valve....8
6. Two-way Valve....9

1. General Description S150001

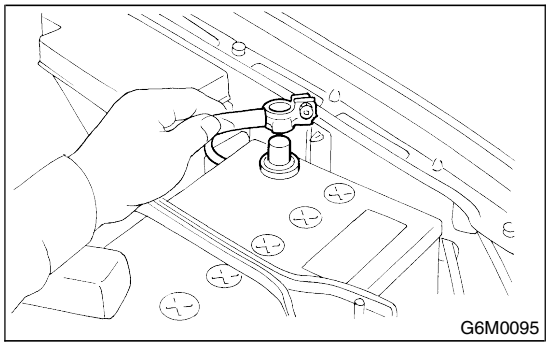
A: CAUTION S150001A03

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

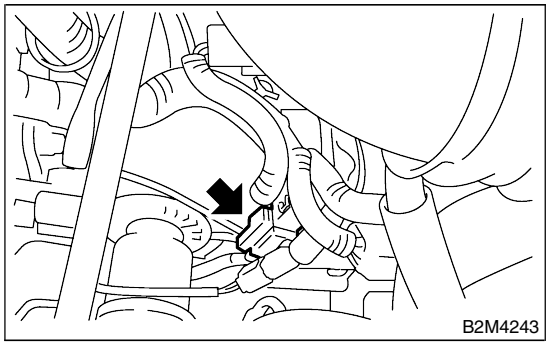
2. Front Catalytic Converter S150017

A: REMOVAL S150017A18

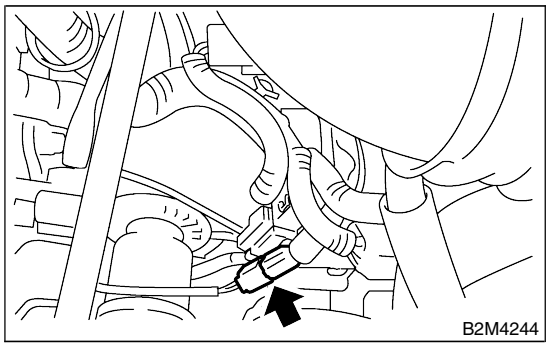
1) Set the vehicle on the lift.
2) Disconnect battery ground cable.


G6M0095

3) Disconnect front oxygen (A/F) sensor connector.

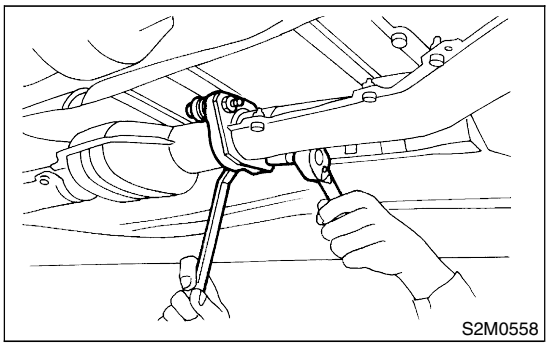

B2M4243

4) Disconnect connector from rear oxygen sensor connector.

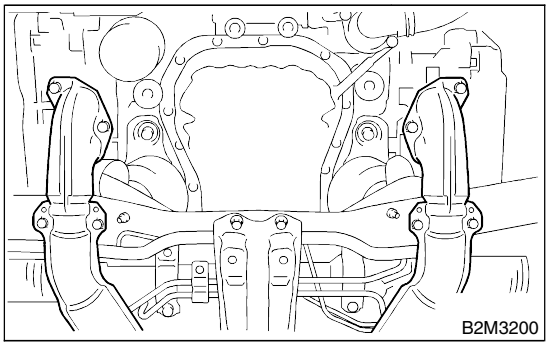

B2M4244

5) Lift-up the vehicle.
6) Remove under cover.
7) Separate center exhaust pipe from rear exhaust pipe.

CAUTION:
Be careful, exhaust pipe is hot.

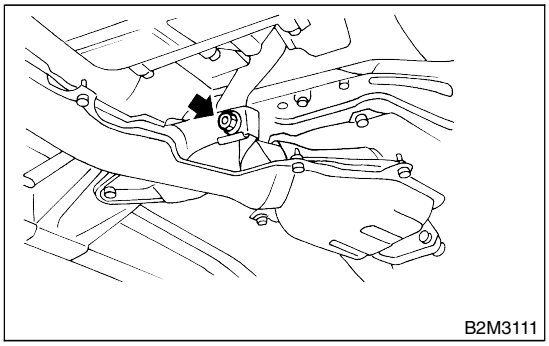

S2M0558

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


B2M3200

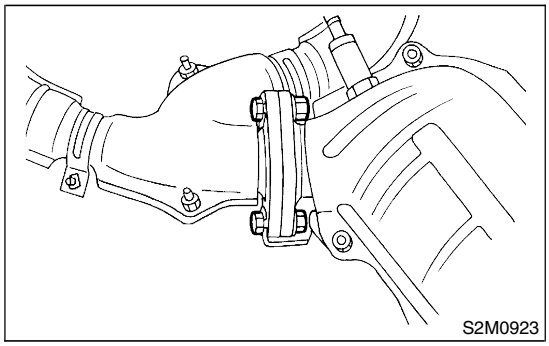
9) Remove front exhaust pipe and center exhaust pipe from hanger bracket.

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


B2M3111

10) Separate front catalytic converter from front exhaust pipe.

NOTE:
The rear catalytic converter is integrated with front catalytic converter. Therefore, the procedure for removing rear catalytic converter is the same as the description above.

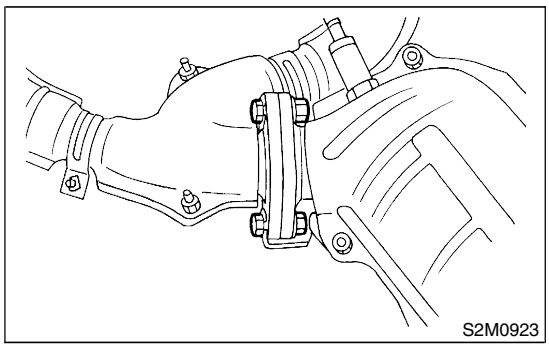

S2M0923

B: INSTALLATION S150017A11

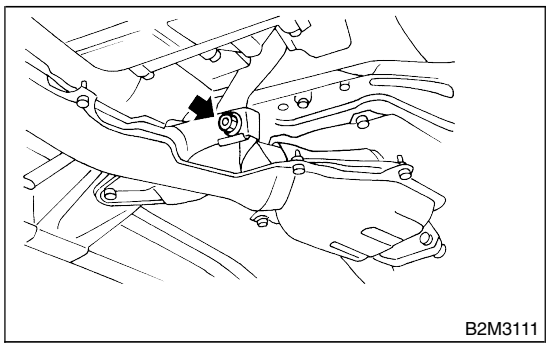
CAUTION:
Replace gaskets with new ones.

1) Install front catalytic converter to front exhaust pipe.

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

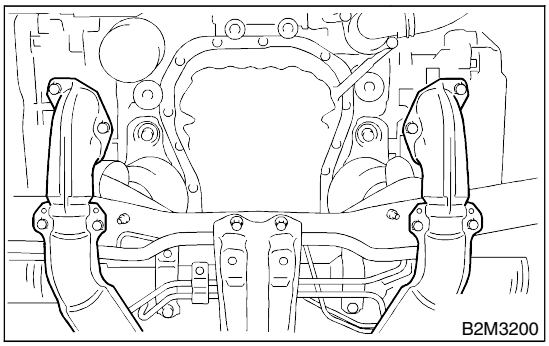

S2M0923

2) Install front exhaust pipe and center exhaust pipe. And temporarily tighten bolt which installs center exhaust pipe to hanger bracket.


B2M3111

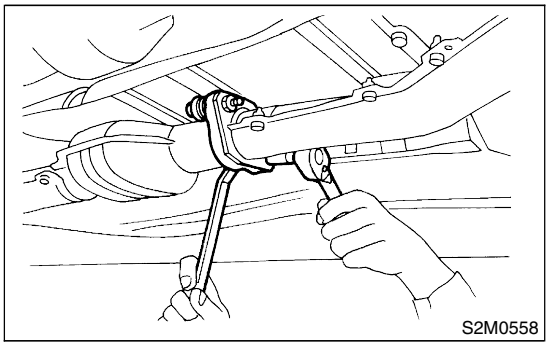
3) Tighten bolts which hold front exhaust pipe onto cylinder heads.

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


B2M3200

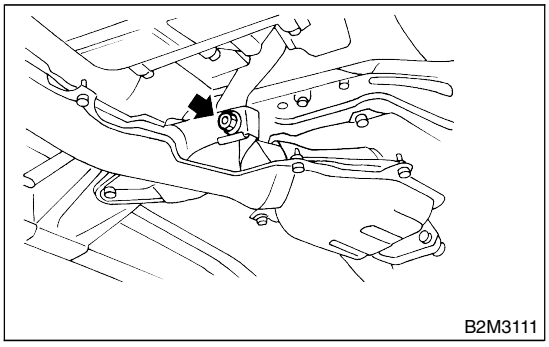
4) Install center exhaust pipe to rear exhaust pipe.

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


S2M0558

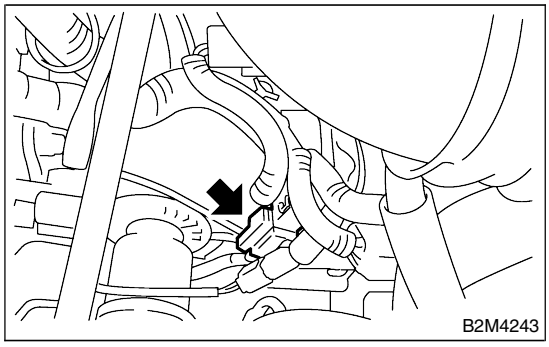
5) Tighten bolt which holds center exhaust pipe to hanger bracket.

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

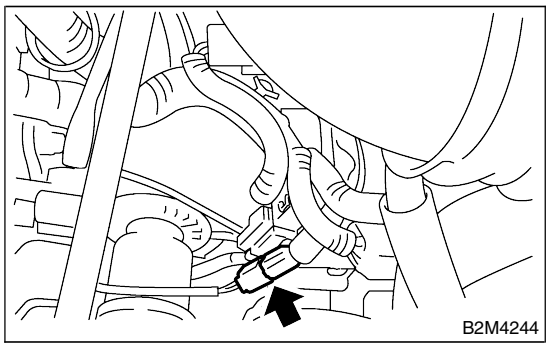

B2M3111

6) Install under cover.

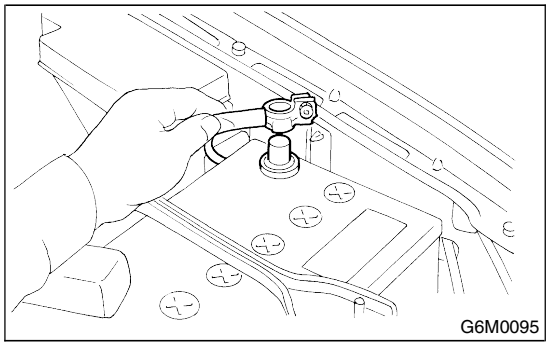
7) Lower the vehicle.
8) Connect front oxygen (A/F) sensor connector.



9) Connect connector to rear oxygen sensor connector.



10) Connect battery ground cable.



NOTE:
The rear catalytic converter is integrated with front catalytic converter. Therefore, the procedure for installing rear catalytic converter is the same as the description above.

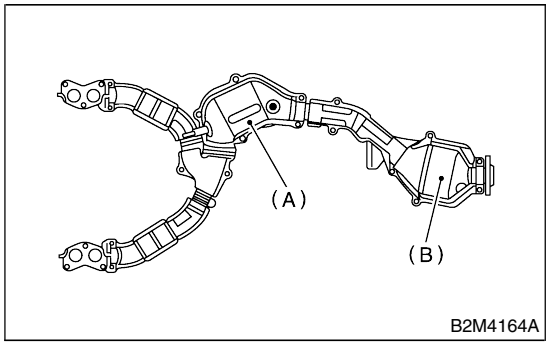
C: INSPECTION *S150017A10*

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 S150036

A: REMOVAL S150036A18

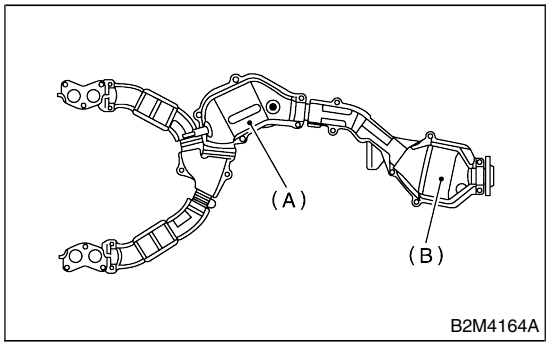
The front and rear catalytic converter and center exhaust pipe are integrated into one unit. Therefore, the removal and installation procedures are the same as the those for the front catalytic converter. <Ref. to EC(SOHC)-3 REMOVAL, Front Catalytic Converter.>



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

B: INSTALLATION S150036A11

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(SOHC)-4 INSTALLATION, Front Catalytic Converter.>



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

C: INSPECTION S150036A10

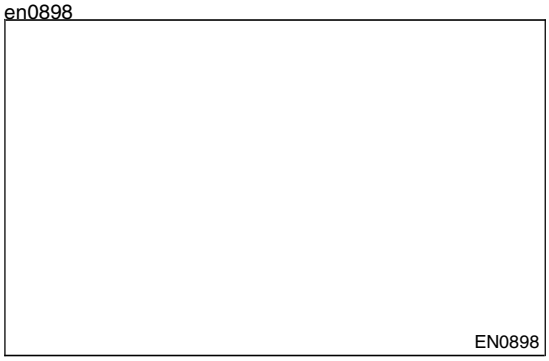
1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

4. Canister S150037

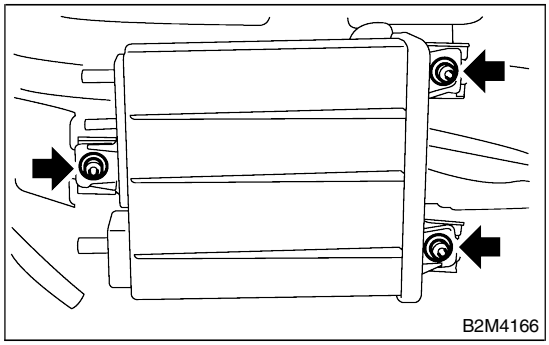
A: REMOVAL S150037A18

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

en0898



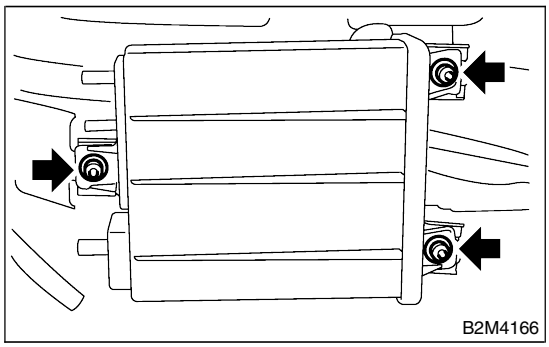
3) Remove canister from body.



B: INSTALLATION S150037A11

Install in the reverse order of removal.

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



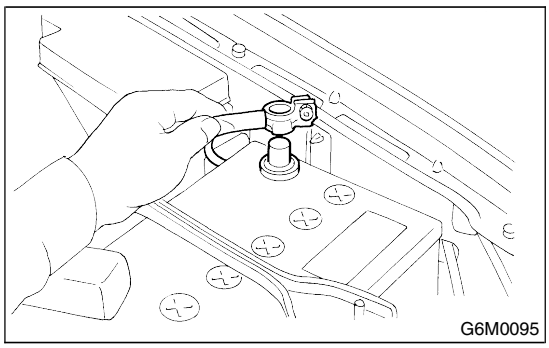
C: INSPECTION S150037A10

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

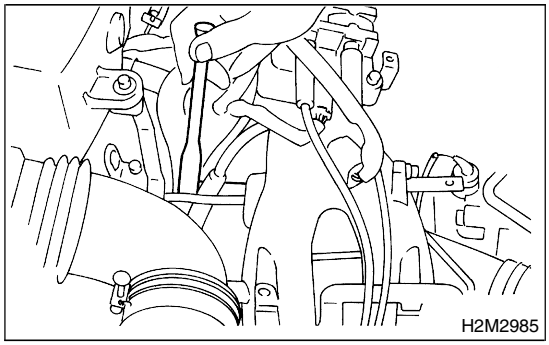
5. Purge Control Solenoid Valve S150035

A: REMOVAL S150035A18

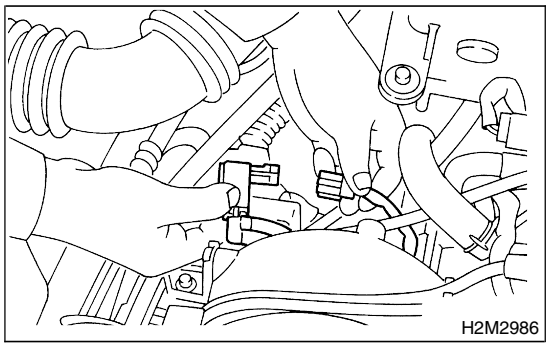
1) Disconnect battery ground cable.



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



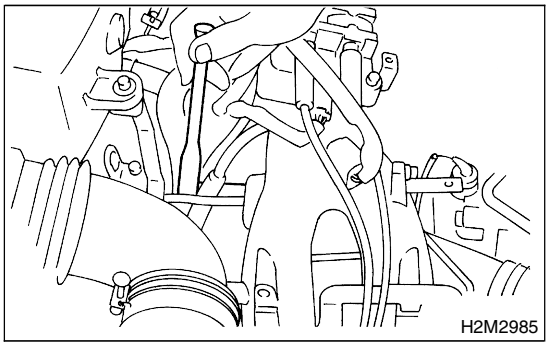
3) Take out purge control solenoid valve through the bottom of the intake manifold.
4) Disconnect connector and hoses from purge control solenoid valve.



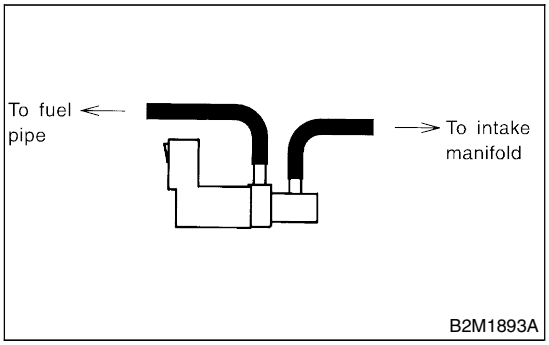
B: INSTALLATION S150035A11

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 S150035A10

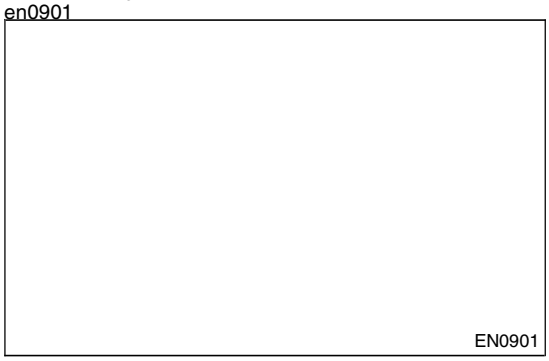
Make sure hoses are not cracked or loose.

6. Two-way Valve S150707

A: REMOVAL S150707A18

1) Lift-up the vehicle.
2) Remove canister from body. <Ref. to EC(SOHC)-7, REMOVAL, Canister.>
3) Remove two-way valve with bracket as a single unit from body.

en0901



4) Remove two-way valve from bracket.

B: INSTALLATION S150707A11

Install in the reverse order of removal.

C: INSPECTION S150707A10

Make sure that hoses are not cracked or loose.

MEMO:

INTAKE (INDUCTION)

IN(SOHC)

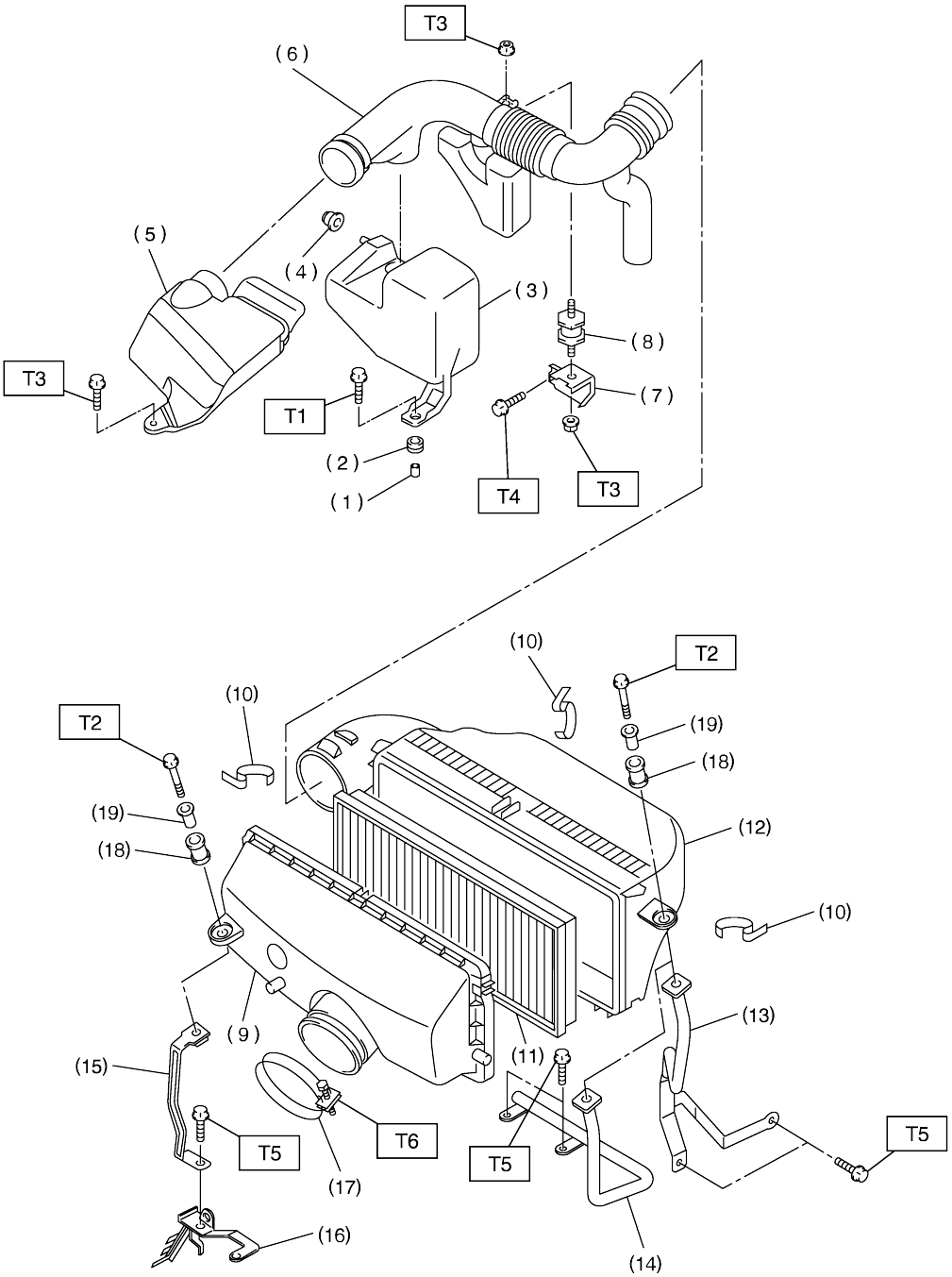
Page

1. General Description....2
2. Air Cleaner 6
3. Air Cleaner Case....7
4. Air Intake Duct....8
5. Resonator Chamber....9

1. General Description S154001

A: COMPONENT S154001A05

1. MODEL WITH OBD S154001A0501

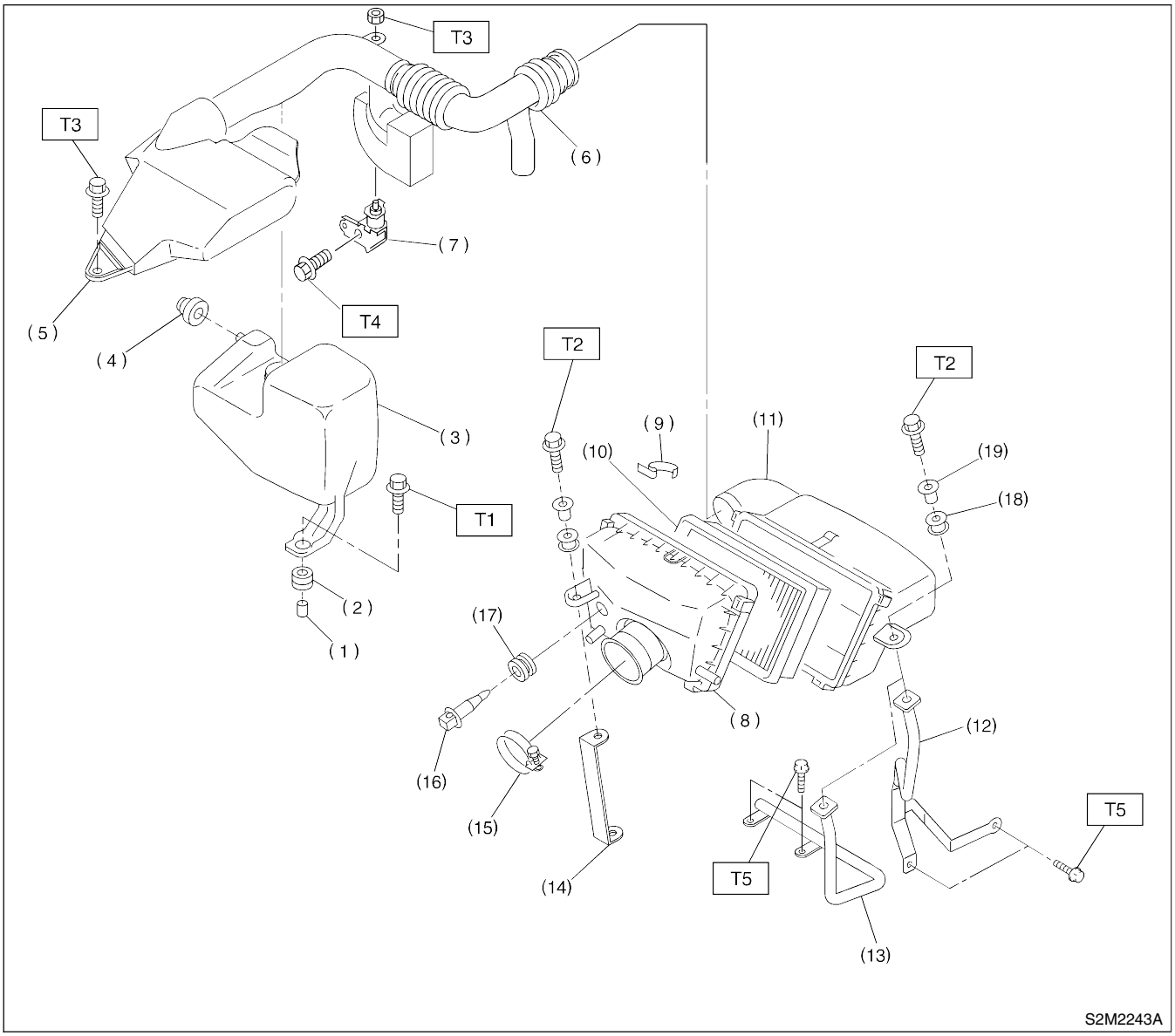


S2M2236A

(1) Spacer
(2) Bushing
(3) Resonator chamber
(4) Cushion rubber
(5) Air intake duct A
(6) Air intake duct B
(7) Holder
(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: 6.5 (0.66, 4.8)
T3: 7.5 (0.76, 5.5)
T4: 14 (1.4, 10)
T5: 16 (1.6, 11.6)
T6: 3 (0.3, 2.2)

2. MODEL WITHOUT OBD S154001A0502



(1) Spacer
(2) Bushing
(3) Resonator chamber
(4) Cushion rubber
(5) Air intake duct A
(6) Air intake duct B
(7) Holder
(8) Air cleaner case A
(9) Clip
(10) Air cleaner element
(11) Air cleaner case B
(12) Air cleaner case stay LH (MT vehicles)
(13) Air cleaner case stay LH (AT vehicles)
(14) Air cleaner case stay RH
(15) Clamp
(16) Intake air temperature sensor
(17) Rubber holder
(18) Bushing
(19) Spacer

Tightening torque: N·m (kgf-m, ft-lb)
T1: 33 (3.4, 25)
T2: 6.5 (0.66, 4.8)
T3: 7.5 (0.76, 5.5)
T4: 14 (1.4, 10.1)
T5: 16 (1.6, 11.6)

B: CAUTION S154001A03

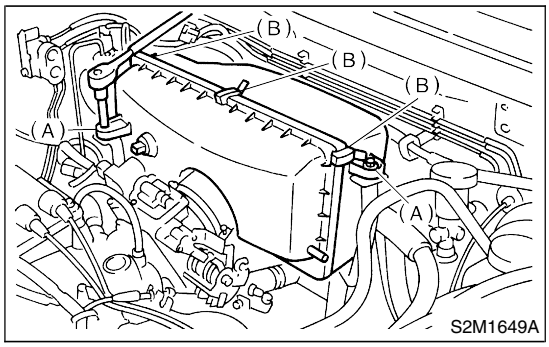
- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation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

2. Air Cleaner S154087

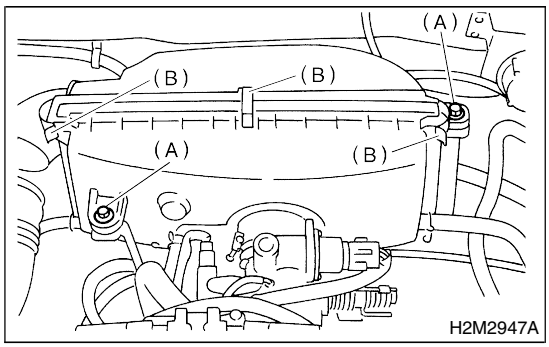
A: REMOVAL S154087A18

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

- Model without OBD



- Model with OBD



3) Remove air cleaner element.

B: INSTALLATION S154087A11

Install in the reverse order of removal.

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

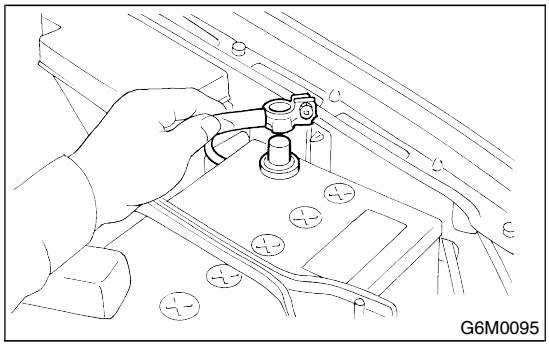
C: INSPECTION S154087A10

Replace if excessively damaged or dirty.

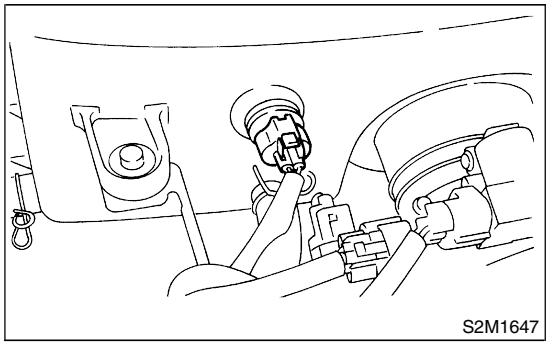
3. Air Cleaner Case S154089

A: REMOVAL S154089A18

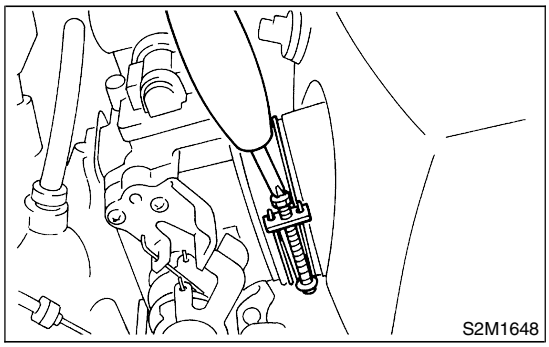
1) Disconnect battery ground cable. (Model without OBD)


G6M0095

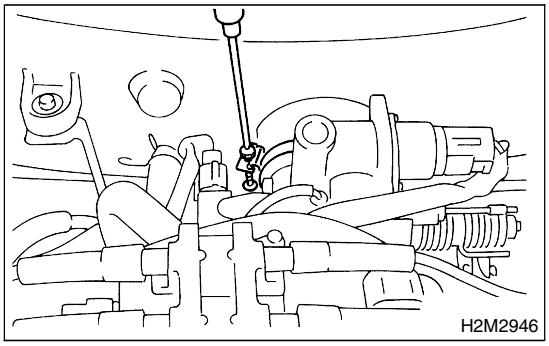
2) Disconnect intake air temperature sensor connector. (Model without OBD)


S2M1647

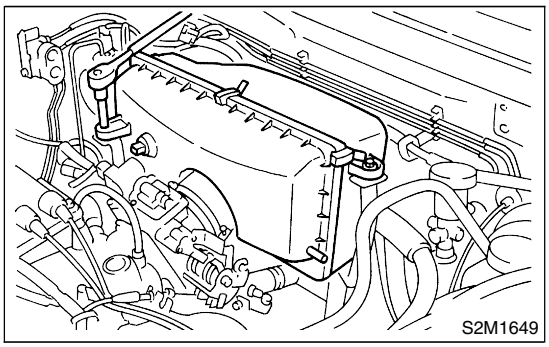
3) Loosen clamp which connects air cleaner case to throttle body.
- Model without OBD


S2M1648

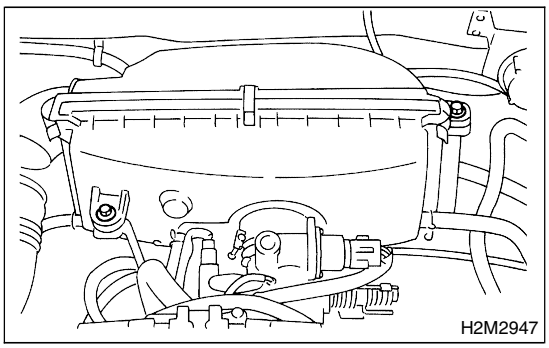
- Model with OBD


H2M2946

4) Disconnect hoses from air cleaner case.
5) Remove bolts which secure air cleaner case to stays.
- Model without OBD


S2M1649

- Model with OBD


H2M2947

6) Remove air cleaner case.

B: INSTALLATION S154089A11

Install in the reverse order of removal.

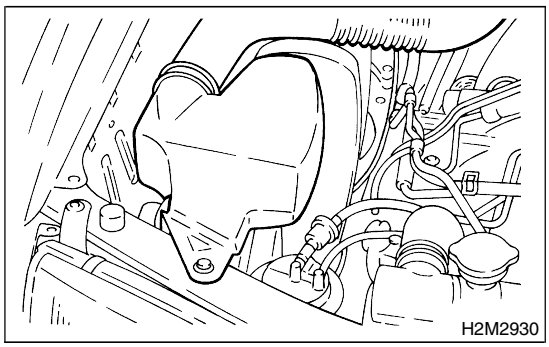
C: INSPECTION S154089A10

Inspect for cracks and loose connections.

4. Air Intake Duct S154566

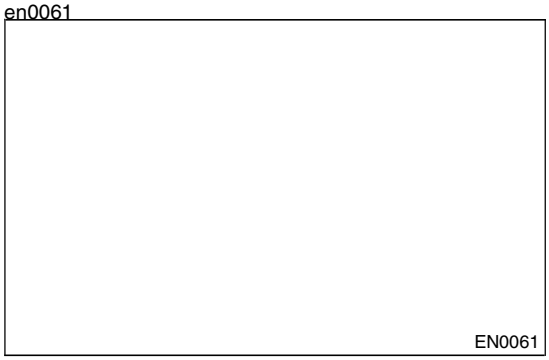
A: REMOVAL S154566A18

1) Remove bolts which secure air intake duct on the front side of body.
- Model without OBD

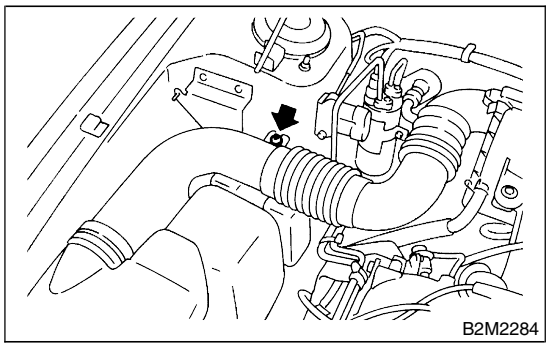


- Model with OBD

en0061

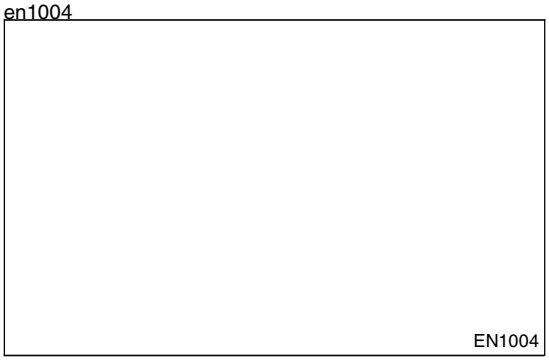


2) Remove bolt which secures air intake duct on body.
- Model without OBD

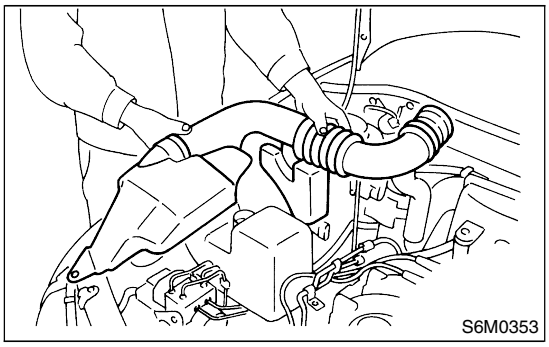


- Model with OBD

en1004

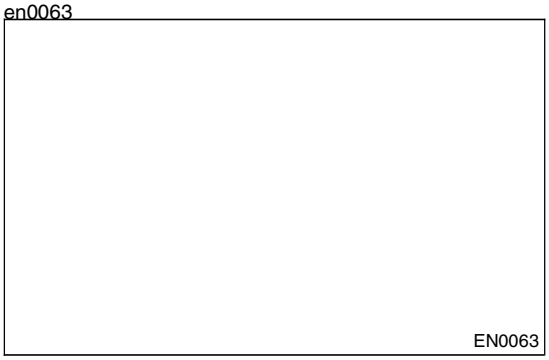


3) Remove air intake ducts as a unit.
- Model without OBD



- Model with OBD

en0063



B: INSTALLATION S154566A11

Install in the reverse order of removal.

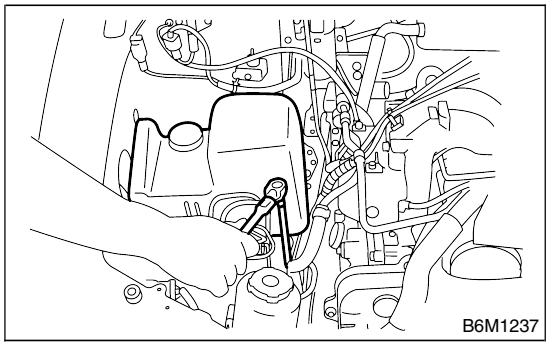
C: INSPECTION S154566A10

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

5. Resonator Chamber S154639

A: REMOVAL S154639A18

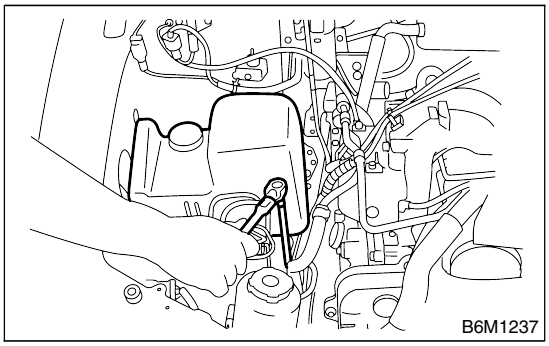
1) Remove air intake duct. <Ref. to IN(SOHC)-8, REMOVAL, Air Intake Duct.>
2) Remove resonator chamber.



B: INSTALLATION S154639A11

Install in the reverse order of removal.

Tightening torque:
33 N·m (3.4 kgf-m, 24.4 ft-lb)



C: INSPECTION S154639A10

Inspect for cracks and loose connections.

MEMO:

MECHANICAL

ME(SOHC)

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1. General Description S153001

A: SPECIFICATIONS S153001E49

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)	92 x 75 (3.62 x 2.95)	
	Displacement		cm^3 (cu in)	1,994 (121.67)	
	Compression ratio			10.0	
	Compression pressure (at 200 — 300 rpm)		kPa (kg/cm^2, psi)	1,020 — 1,275 (10.4 — 13.0, 148 — 185)	
	Number of piston rings			Pressure ring: 2, Oil ring: 1	
	Intake valve timing	Opening		4° BTDC	
		Closing		48° ABDC	
	Exhaust valve timing	Opening		48° BBDC	
		Closing		4° 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	With OBD	700±100 (No load) 850±100 (A/C switch ON)
				Without OBD	MT: 650±100 (No load) AT: 675±100 (No load) 800±100 (A/C switch ON)
	Firing order			1 → 3 → 2 → 4	
	Ignition timing		BTDC/rpm	With OBD	10°±10°/700
				Without OBD	MT: 10°±10°/650 AT: 10°±10°/675

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 bush I.D.		18.00 — 18.08 mm (0.7087 — 0.7118 in)
	Clearance between spacer and bush	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)

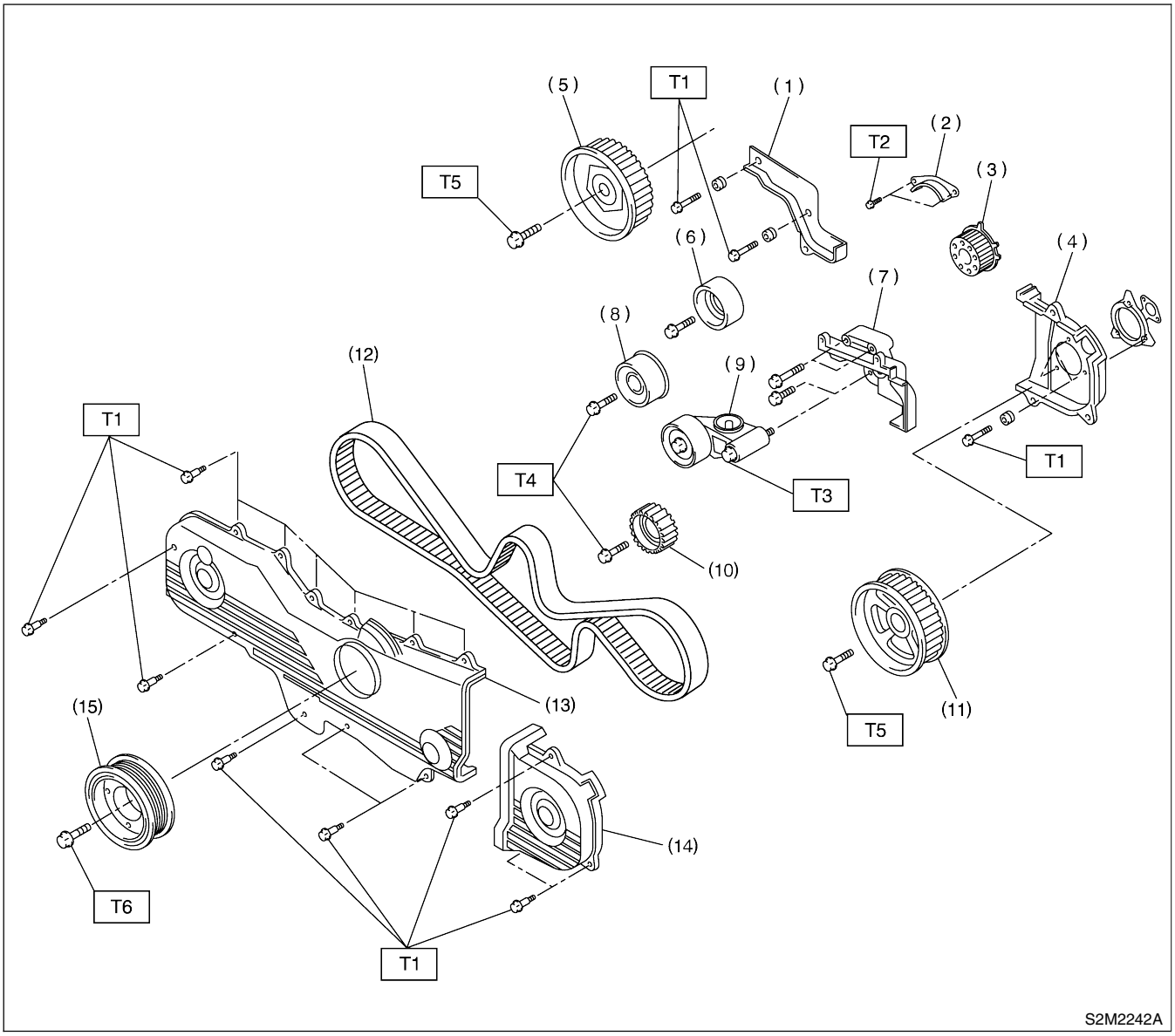
Camshaft	Bend limit			0.020 mm (0.0008 in)
	Thrust clearance		STD	0.030 — 0.090 mm (0.0012 — 0.0035 in)
			Limit	0.11 mm (0.0043 in)
	Cam lobe height	Intake	STD	38.732 — 38.832 mm (1.5249 — 1.5288 in)
			Limit	38.632 mm (1.5209 in)
		Exhaust	STD	39.257 — 39.357 mm (1.5455 — 1.5495 in)
			Limit	39.157 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 (3.84 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			218.7 — 242.5 N (22.3 — 24.7 kgf, 49.2 — 54.5 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	92.005 — 92.015 mm (3.6222 — 3.6226 in)
			B	91.995 — 92.005 mm (3.6218 — 3.6222 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	91.985 — 91.995 mm (3.6214 — 3.6218 in)
				B	91.975 — 91.985 mm (3.6211 — 3.6214 in)
			0.25 mm (0.0098 in) OS		92.225 — 92.235 mm (3.6309 — 3.6313 in)
			0.50 mm (0.0197 in) OS		92.475 — 92.485 mm (3.6407 — 3.6411 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		0.010 — 0.038 mm (0.0004 — 0.0015 in)
			Limit		0.05 mm (0.0020 in)
	Thickness at center portion		STD		1.492 — 1.501 mm (0.0587 — 0.0591 in)
			0.03 mm (0.0012 in) US		1.510 — 1.513 mm (0.0594 — 0.0596 in)
			0.05 mm (0.0020 in) US		1.520 — 1.523 mm (0.0598 — 0.0600 in)
			0.25 mm (0.0098 in) US		1.620 — 1.623 mm (0.0638 — 0.0639 in)
Connecting rod bushing	Clearance between piston pin and bushing		STD		0 — 0.022 mm (0 — 0.0009 in)
			Limit		0.030 mm (0.0012 in)
Crankshaft	Bend limit				0.035 mm (0.0014 in)
	Crank pin and crank journal	Out-of-roundness			0.020 mm (0.0008 in) or less
		Grinding limit			0.250 mm (0.0098 in)
	Crank pin outer diameter		STD		51.984 — 52.000 mm (2.0466 — 2.0472 in)
			0.03 mm (0.0012 in) US		51.954 — 51.970 mm (2.0454 — 2.0461 in)
			0.05 mm (0.0020 in) US		51.934 — 51.950 mm (2.0446 — 2.0453 in)
			0.25 mm (0.0098 in) US		51.734 — 51.750 mm (2.0368 — 2.0374 in)
	Crank journal outer diameter	#1, #3	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, #5	STD		59.992 — 60.008 mm (2.3619 — 2.3625 in)
			0.03 mm (0.0012 in) US		59.962 — 59.978 mm (2.3607 — 2.3613 in)
			0.05 mm (0.0020 in) US		59.942 — 59.958 mm (2.3599 — 2.3605 in)
			0.25 mm (0.0098 in) US		59.742 — 59.758 mm (2.3520 — 2.3527 in)
	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 S153001A05

1. TIMING BELT S153001A0501

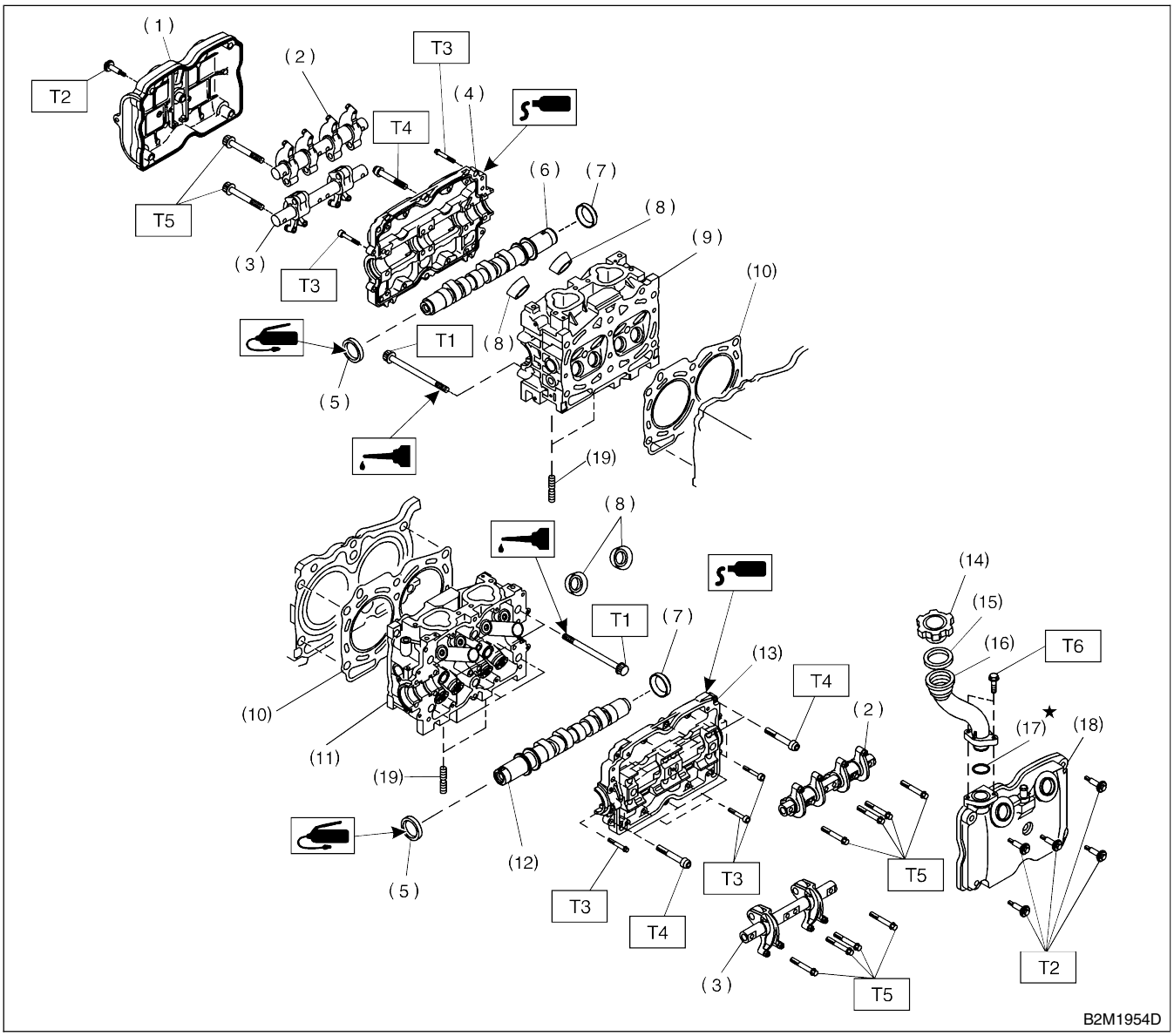


(1) Belt cover No. 2 (RH)
(2) Timing belt guide (MT vehicles only)
(3) Crankshaft sprocket
(4) Belt cover No. 2 (LH)
(5) Camshaft sprocket No. 1
(6) Belt idler (No. 1)
(7) Tensioner bracket
(8) Belt idler (No. 2)
(9) Automatic belt tension adjuster ASSY
(10) Belt idler No. 2
(11) Camshaft sprocket No. 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: 127 (13.0, 94)

2. CYLINDER HEAD AND CAMSHAFT

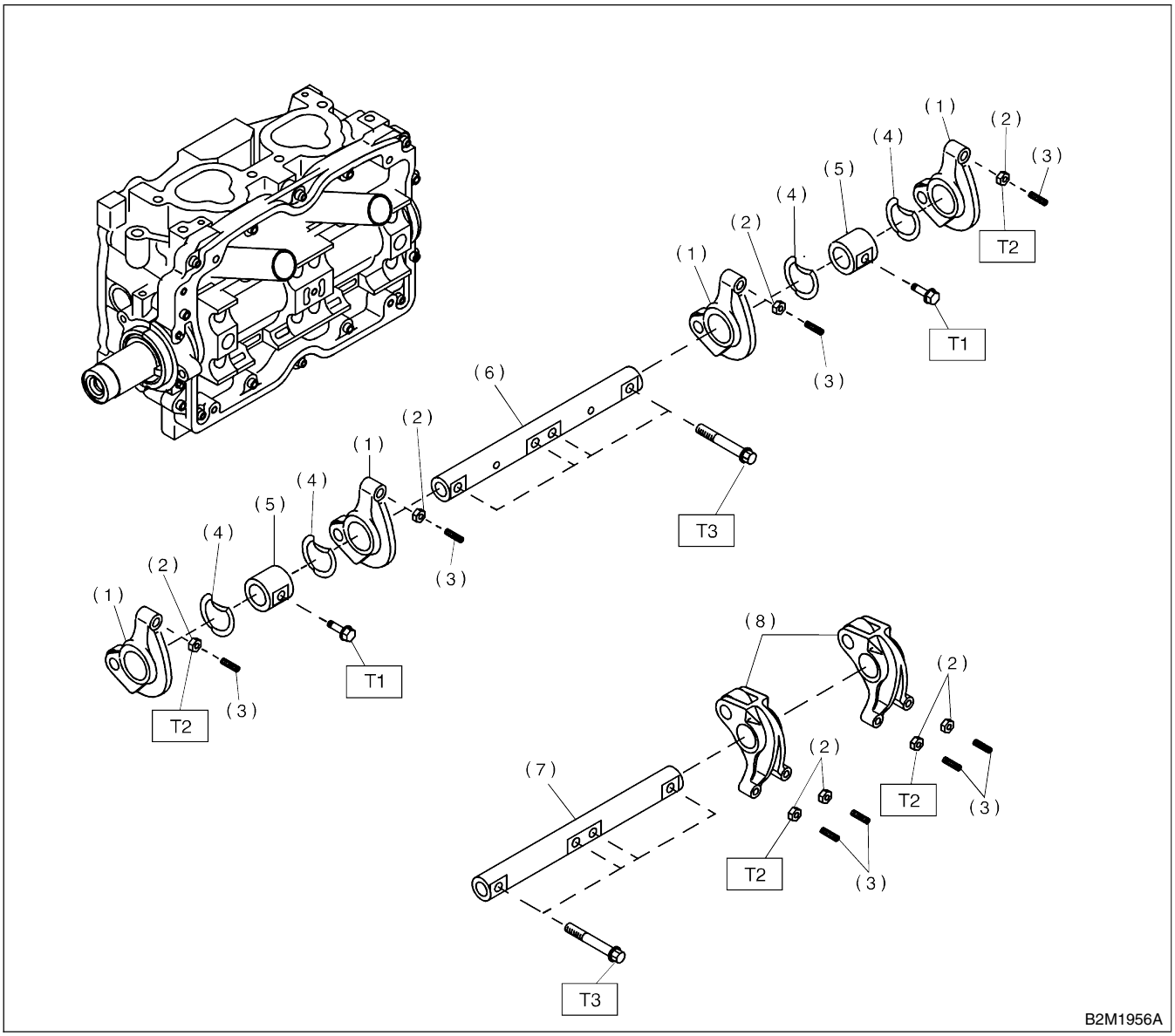
S153001A0502



(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(SOHC)-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)

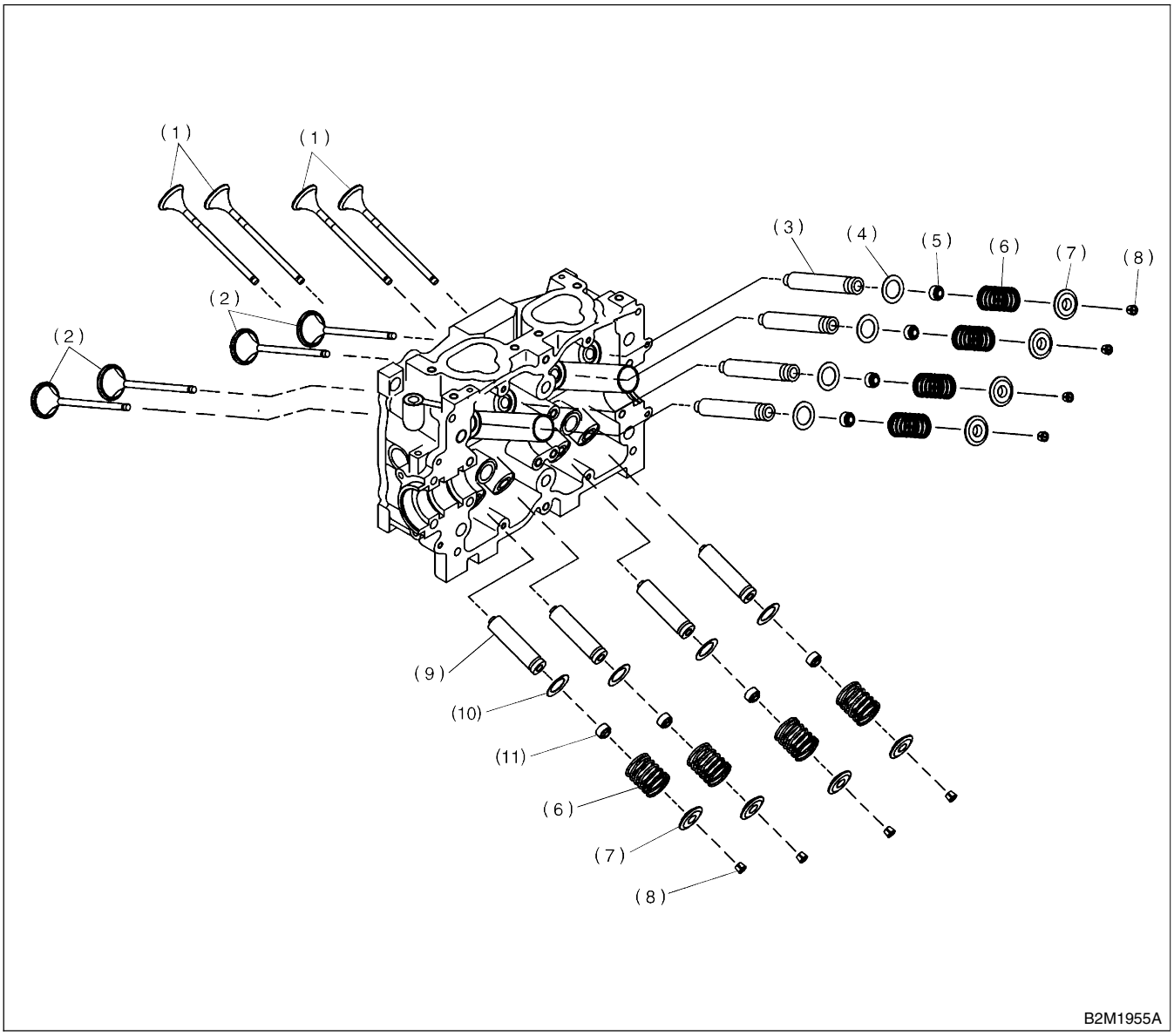
3. VALVE ROCKER ASSEMBLY S153001A0503



(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

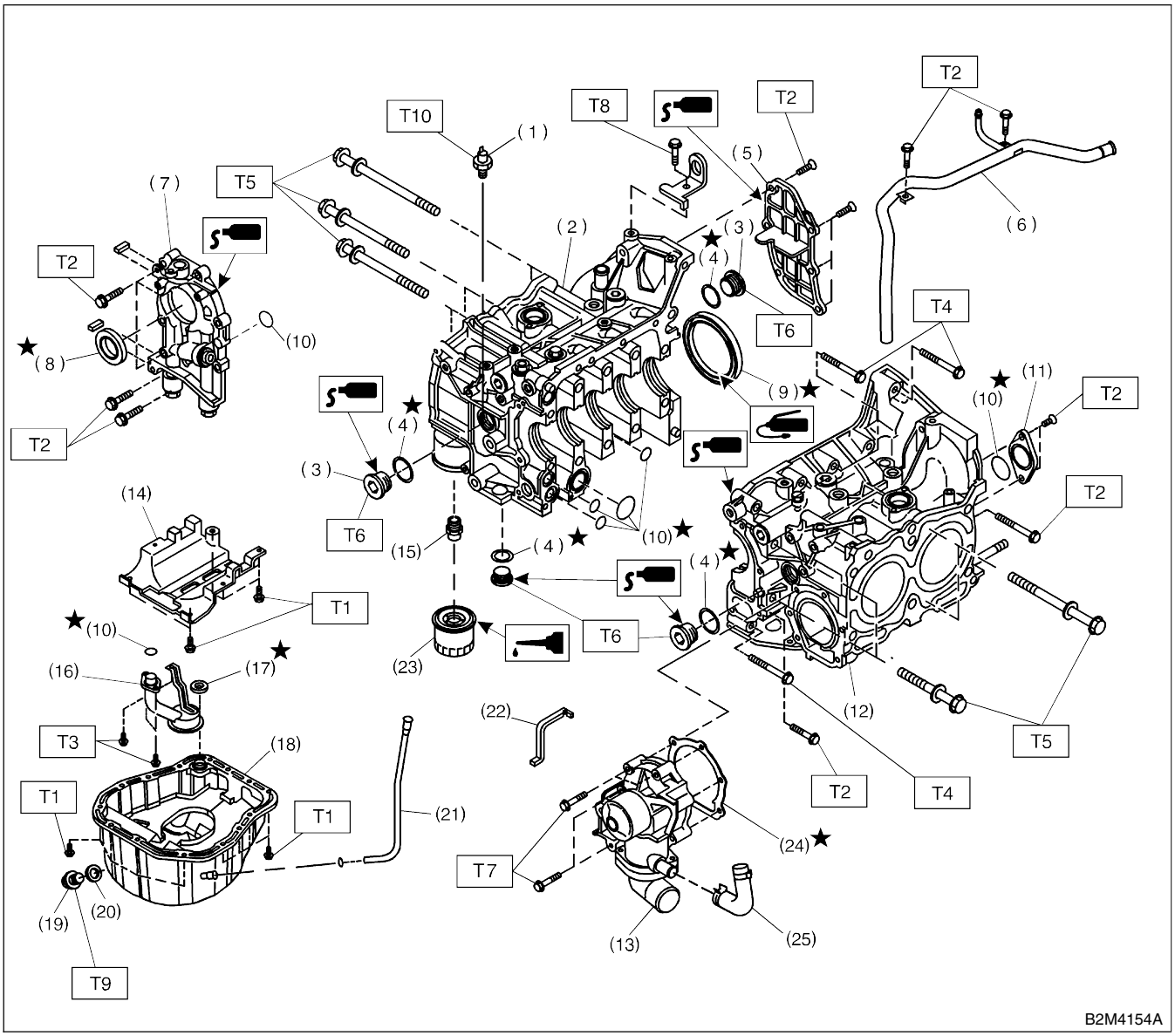
Tightening torque: N·m (kgf-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: 10 (1.0, 7.2)
T3: 25 (2.5, 18.1)

4. CYLINDER HEAD AND VALVE ASSEMBLY S153001A0504



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

5. CYLINDER BLOCK S153001A0505

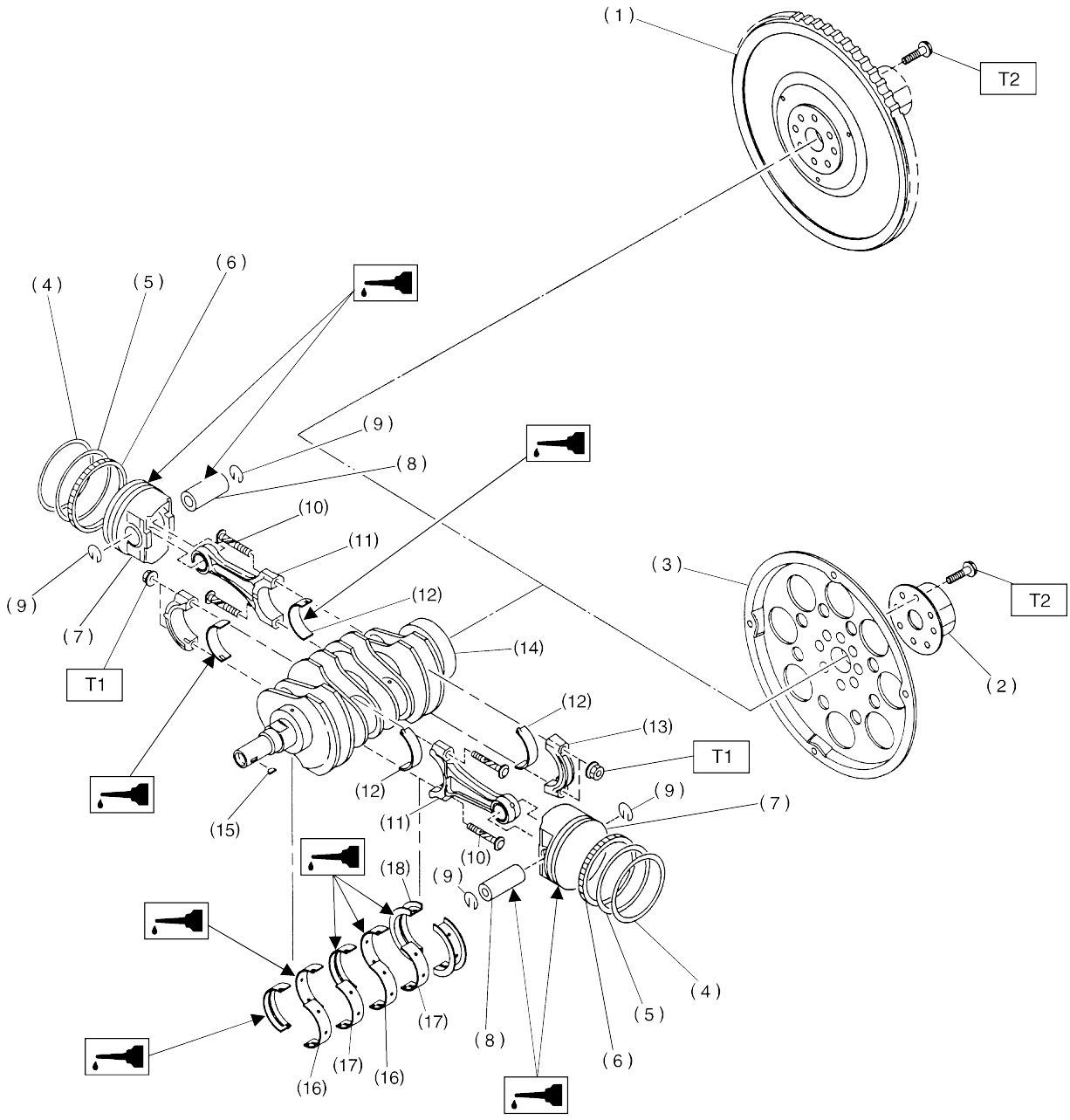


(1) Oil pressure switch
(2) Cylinder block (RH)
(3) Service hole plug
(4) Gasket
(5) Oil separator cover
(6) Water by-pass pipe
(7) Oil pump
(8) Front oil seal
(9) Rear oil seal
(10) O-ring
(11) Service hole cover
(12) Cylinder block (LH)
(13) Water pump
(14) Baffle plate
(15) Oil filter connector
(16)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

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)

MEMO:

6. CRANKSHAFT AND PISTON S153001A0506



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 S153001A0507

en1005



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

Tightening torque: N·m (kgf-m, ft-lb)
T1: 35 (3.6, 25.8)
T2: 42 (4.2, 31.0)
T3: 85 (8.7, 63)

C: CAUTION S153001A03

- 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 S153001A17

1. SPECIAL TOOLS S153001A1701

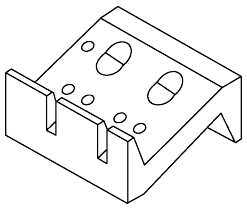
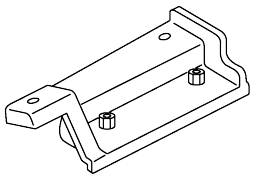
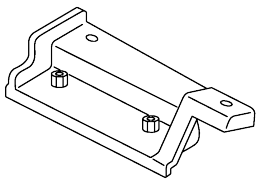
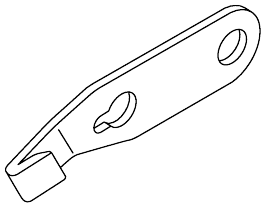
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3850	498267800	CYLINDER HEAD TABLE	• Used for replacing valve guides. • Used for removing and installing valve springs.
 B2M3851	498457000	ENGINE STAND ADAPTER RH	Used with ENGINE STAND (499817000).
 B2M3852	498457100	ENGINE STAND ADAPTER LH	Used with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

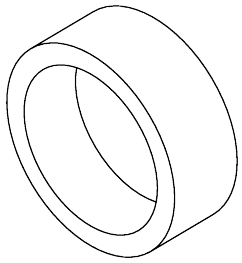
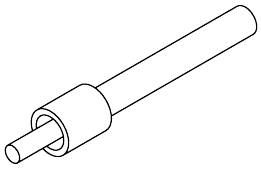
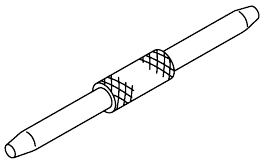
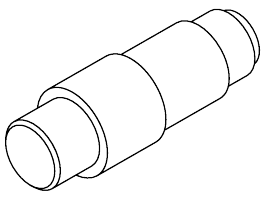
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3854	498747100	PISTON GUIDE	Used for installing piston in cylinder.
 B2M3855	498857100	VALVE OIL SEAL GUIDE	Used for press-fitting of intake and exhaust valve guide oil seals.
 B2M3856	499017100	PISTON PIN GUIDE	Used for installing piston pin, piston and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

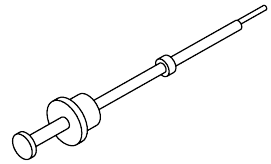
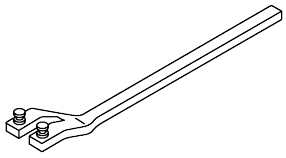
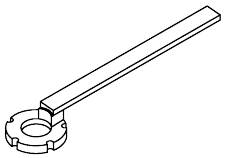
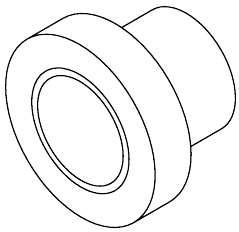
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3858	499097700	PISTON PIN REMOVER ASSY	Used for removing piston pin.
 B2M3859	499207100	CAMSHAFT SPROCKET WRENCH	Used for removing and installing camshaft sprocket. (LH side)
 B2M4158	499207400	CAMSHAFT SPROCKET WRENCH	Used for removing and installing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

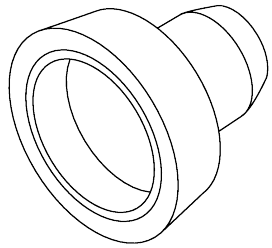
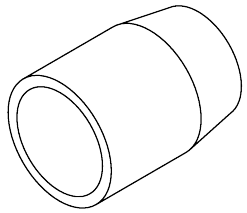
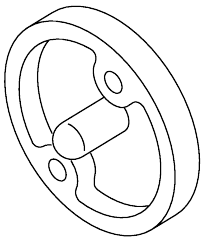
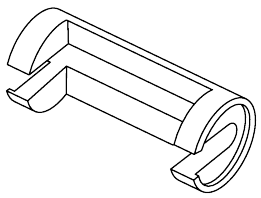
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3861	499587200	CRANKSHAFT OIL SEAL INSTALLER	• Used for installing crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL GUIDE (499597100).
 B2M3862	499597000	OIL SEAL GUIDE	• Used for installing camshaft oil seal. • Used with CAMSHAFT OIL SEAL INSTALLER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

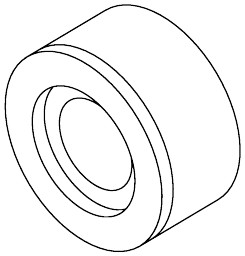
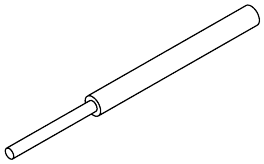
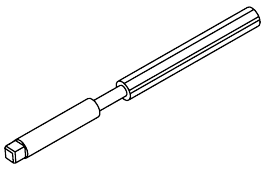
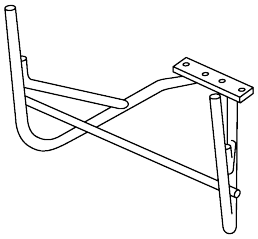
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3865	499767700 (Intake side) 499767800 (Exhaust side)	VALVE GUIDE ADJUSTER	Used for installing valve guides.
 B2M3867	499767200	VALVE GUIDE REMOVER	Used for removing valve guides.
 B2M3868	499767400	VALVE GUIDE REAMER	Used for reaming valve guides.
 B2M3869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

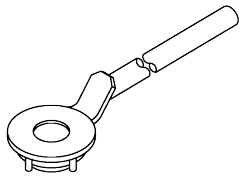
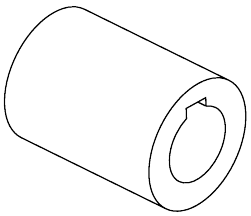
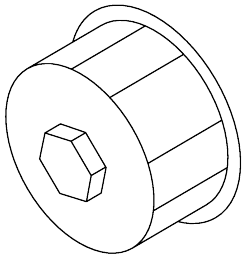
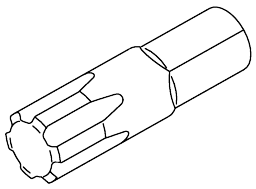
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M4157	499977300	CRANK PULLEY WRENCH	Used for stopping rotation of crankshaft pulley when loosening and tightening crankshaft pulley bolts.
 B2M3871	499987500	CRANKSHAFT SOCKET	Used for rotating crankshaft.
 B2M3872	498547000	OIL FILTER WRENCH	Used for removing and installing oil filter.
 B2M3873	499497000	TORX PLUS	Used for removing and installing camshaft cap.

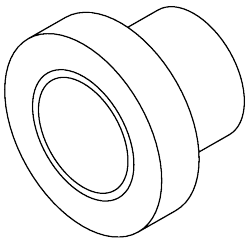
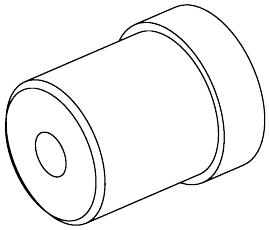
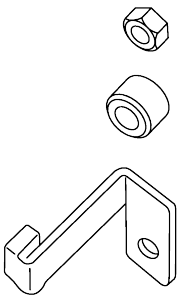
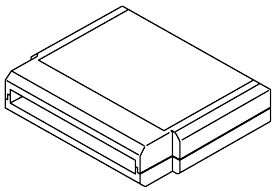
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3874	499587500	OIL SEAL INSTALLER	Used for installing front camshaft oil seal.
 B2M3875	499587100	OIL SEAL INSTALLER	Used for installing oil pump oil seal.
 B3M2043	498277200	STOPPER SET	Used for installing automatic transmission assembly to engine.
 B2M3876	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 S153001A1702

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 S153001E45

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 S153081

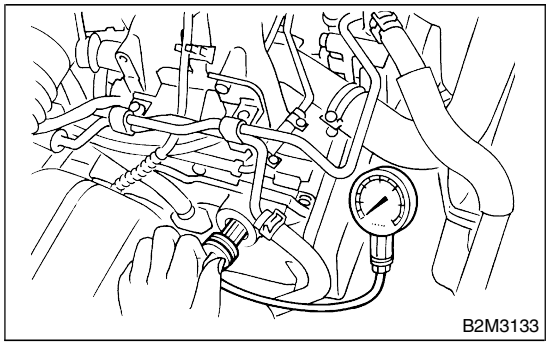
A: INSPECTION S153081A10

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(SOHC)-52, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.> or <Ref. to FU(SOHCw/oOBD)-41, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
4) Remove all the spark plugs. <Ref. to IG(SOHC)-4, REMOVAL, Spark Plug.> or <Ref. to IG(SOHCw/oOBD)-5, 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

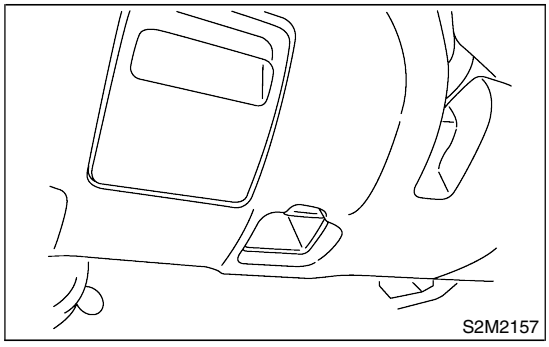
9) Perform at least two measurements per cylinder, and make sure that the values are correct.

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

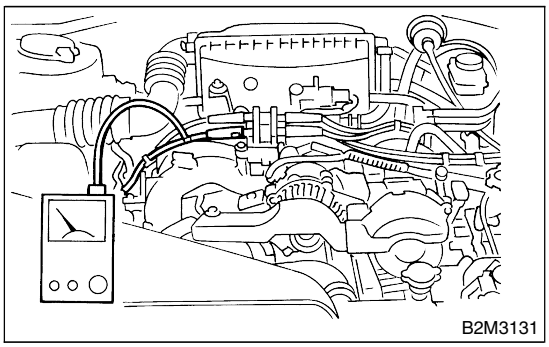
3. Idle Speed S153082

A: INSPECTION S153082A10

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

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

Idle speed (No load and gears in neutral (MT), or N or P (AT) position):
With OBD Model;
700±100 rpm
Without OBD Model;
MT: 650±100 rpm
AT: 675±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]:
With OBD Model;
850±100 rpm
Without OBD Model;
800±100 rpm

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

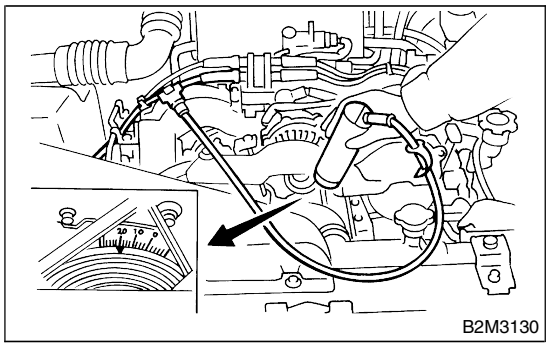
4. Ignition Timing S153086

A: INSPECTION S153086A10

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]:
With OBD Model;
10°±10°/700 rpm
Without OBD Model;
MT: 10°±10°/650 rpm
AT: 10°±10°/675 rpm


B2M3130

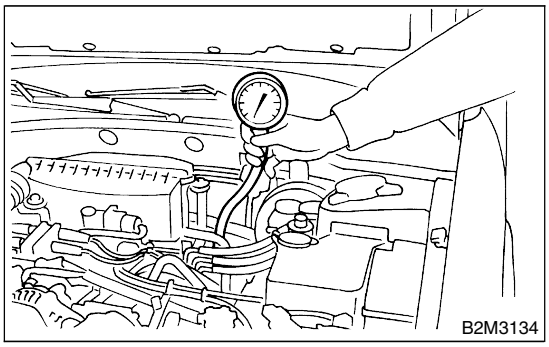
If the timing is not correct, check the ignition control system.
Refer to Engine Control System. <Ref. to EN(SOHC)-2, Basic Diagnostic Procedure.> or <Ref. to EN(SOHCw/oOBD)-2, Basic Diagnostic Procedure.>

5. Intake Manifold Vacuum S153654

A: INSPECTION S153654A10

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

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



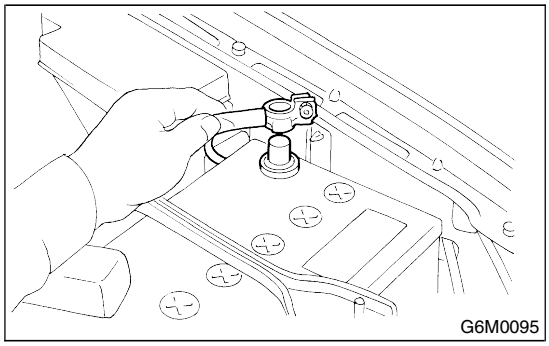
Vacuum pressure (at idling, A/C "OFF"):
Less than −60.0 kPa (−450 mmHg, −17.72 inHg)

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

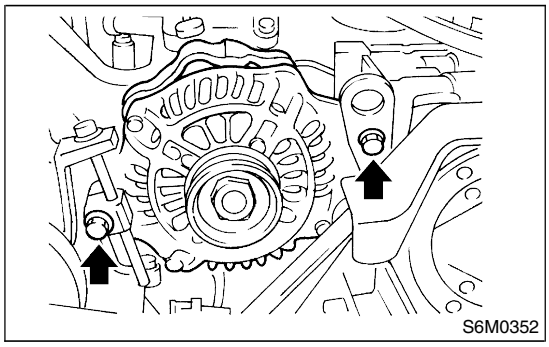
6. Engine Oil Pressure S153655

A: INSPECTION S153655A10

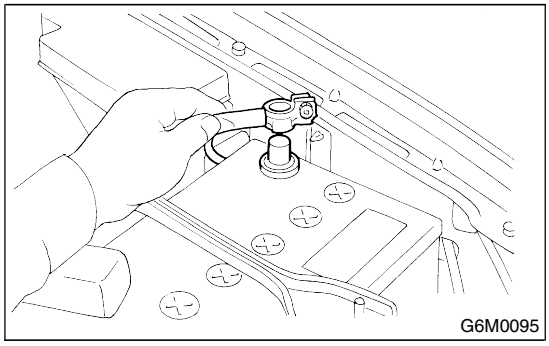
1) Disconnect battery ground cable.



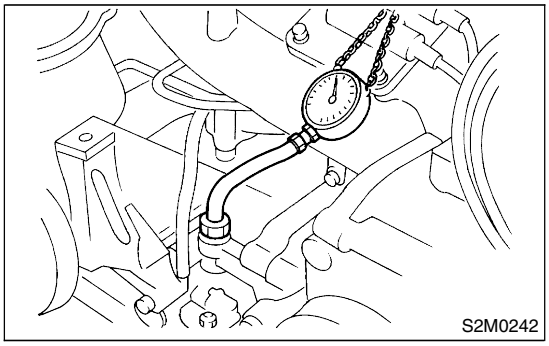
2) Remove generator from bracket.
(1) Loosen lock bolt and slider bolt, and remove front side V-belt. <Ref. to ME(SOHC)-42, REMOVAL, V-belt.>
(2) Remove generator lock bolt.
(3) Remove bolt which install generator on bracket.



3) Disconnect connector from oil pressure switch.
4) Remove oil pressure switch from engine cylinder block. <Ref. to LU-21, REMOVAL, Oil Pressure Switch.>
5) Connect oil pressure gauge hose to cylinder block.
6) Connect battery ground cable.



7) Start the engine, and measure oil pressure.



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

CAUTION:
• If oil pressure is out of specification, check oil pump, oil filter and lubrication line. <Ref. to LU-25, 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-25, 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-21, 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(SOHC)-42, INSTALLATION, V-belt.>

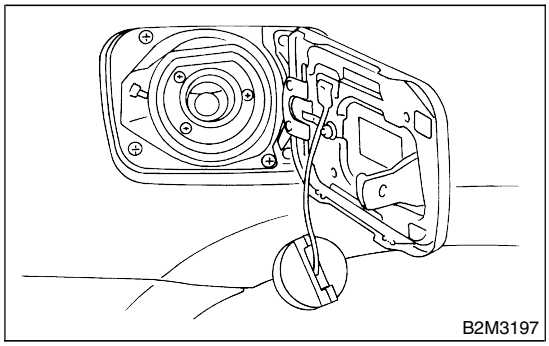
7. Fuel Pressure S153656

A: INSPECTION S153656A10

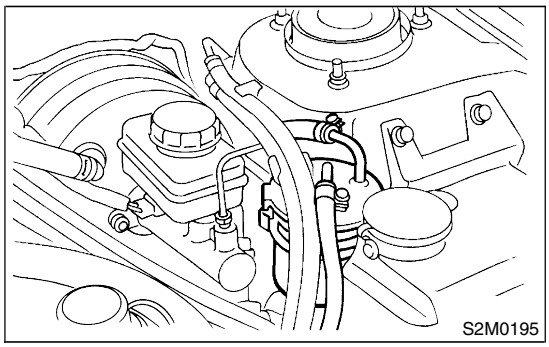
WARNING:
Before removing fuel pressure gauge, release fuel pressure.

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

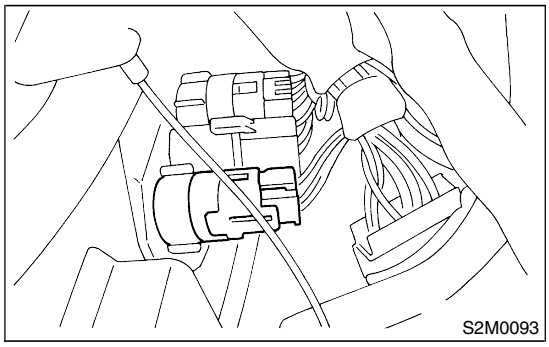
1) Release fuel pressure. <Ref. to FU(SOHC)-52, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.> or <Ref. to FU(SOHCw/oOBD)-41, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open fuel flap lid, and remove fuel filler cap.


B2M3197

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

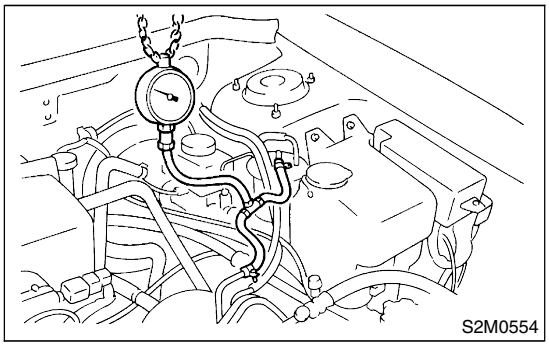

S2M0195

4) Connect connector of fuel pump relay.


S2M0093

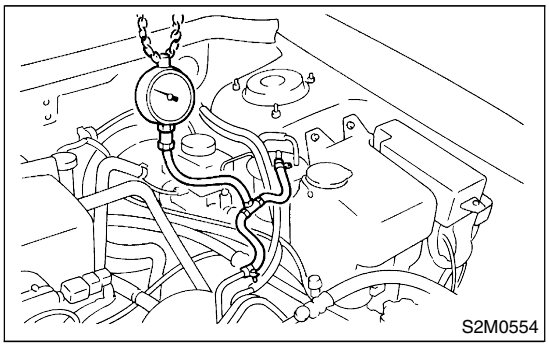
5) Start the engine.
6) Measure fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold.

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


S2M0554

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)


S2M0554

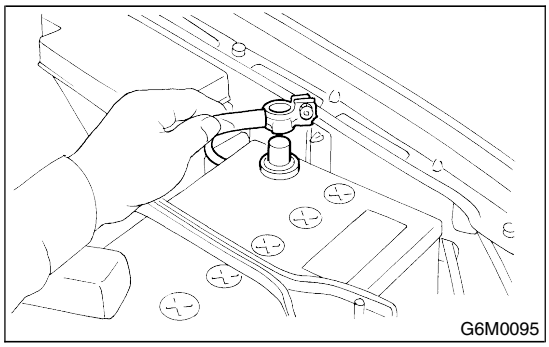
NOTE:
The fuel pressure gauge registers 10 to 20 kPa (0.1 to 0.2 kg/cm^2, 1 to 3 psi) higher than standard values during high-altitude operations.

8. Valve Clearance S153083

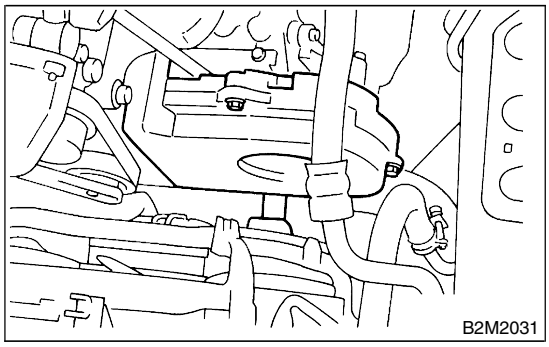
A: INSPECTION S153083A10

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.

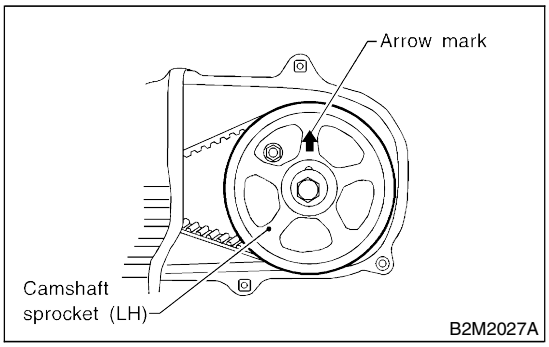

G6M0095

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


B2M2031

7) When inspecting #1 and #3 cylinders;
   (1) Disconnect spark plug cords from spark plugs RH side. <Ref. to IG(SOHC)-4, RH SIDE, REMOVAL, Spark Plug.> or <Ref. to IG(SOHCw/oOBD)-5, RH SIDE, REMOVAL, Spark Plug.>
   (2) Disconnect PCV hose from rocker cover (RH).
   (3) Remove bolts, then remove rocker cover (RH).
8) When inspecting #2 and #4 cylinders;
   (1) Disconnect spark plug cords from spark plugs (LH Side) <Ref. to IG(SOHC)-5, LH SIDE, REMOVAL, Spark Plug.> or <Ref. to IG(SOHCw/oOBD)-6, LH SIDE, REMOVAL, Spark Plug.>.
   (2) Disconnect PCV hose from rocker cover (LH).
   (3) 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 499977300 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.

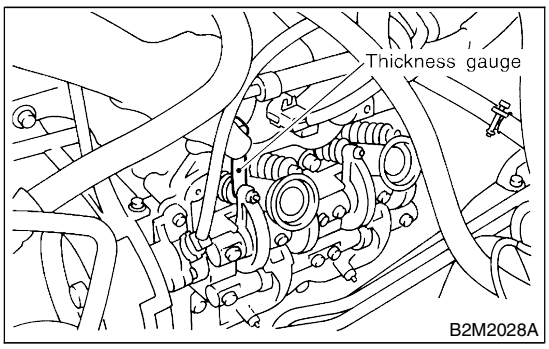


B2M2027A

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.**

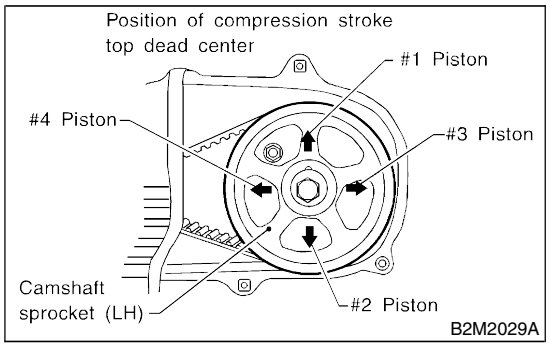
Valve clearance:
Intake;
0.20±0.02 mm (0.0079±0.0008 in)
Exhaust;
0.25±0.02 mm (0.0098±0.0008 in)



B2M2028A

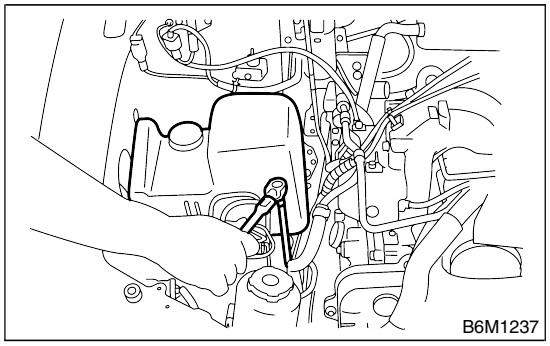
11) If necessary, adjust the valve clearance. <Ref. to ME(SOHC)-30, ADJUSTMENT, Valve Clearance.>
12) Similar to measurement procedures used for #1 cylinder, measure #2, #3 and #4 cylinder valve clearances.

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, 24 ft-lb)

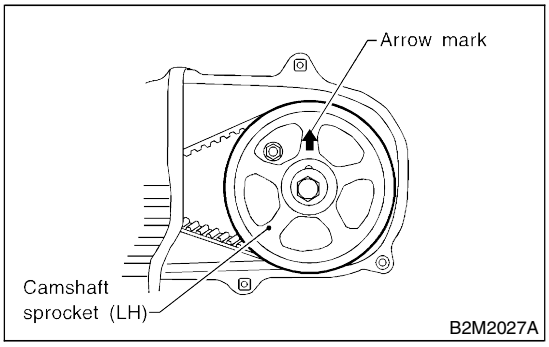


B: ADJUSTMENT S153083A01

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 499977300 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.

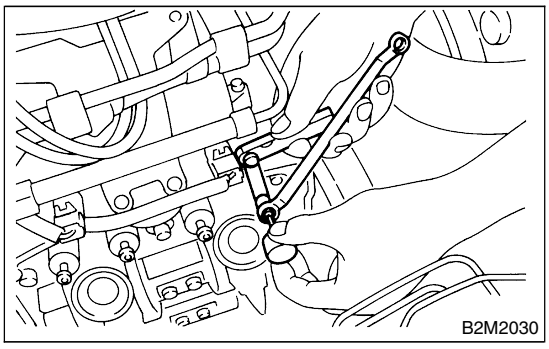


2) Adjust the #1 cylinder valve clearance.
(1) Loosen the valve rocker nut and screw.
(2) Place suitable thickness gauge.
(3) While noting valve clearance, tighten valve rocker adjust screw.
(4) When specified valve clearance is obtained, tighten valve rocker nut.

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.

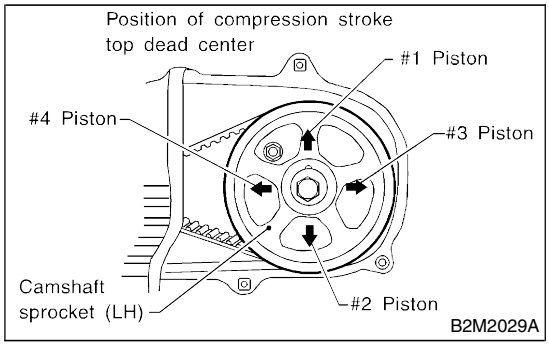
Valve clearance:
Intake;
0.20±0.02 mm (0.0079±0.0008 in)
Exhaust;
0.25±0.02 mm (0.0098±0.0008 in)



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.

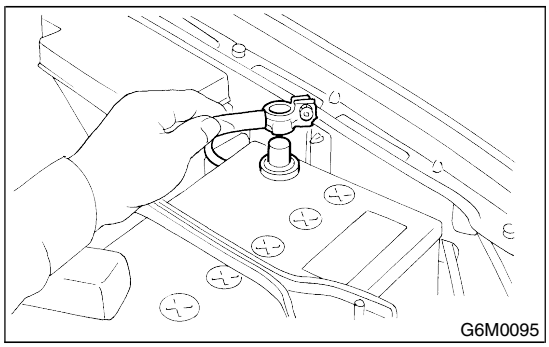
NOTE:
- Be sure to set cylinder pistons to their respective top dead centers on compression stroke before adjusting valve clearances.
- To set #3, #2 and #4 cylinder pistons to their top dead centers on compression stroke, turn crankshaft pulley clockwise 90° at a time starting with arrow mark on left-hand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



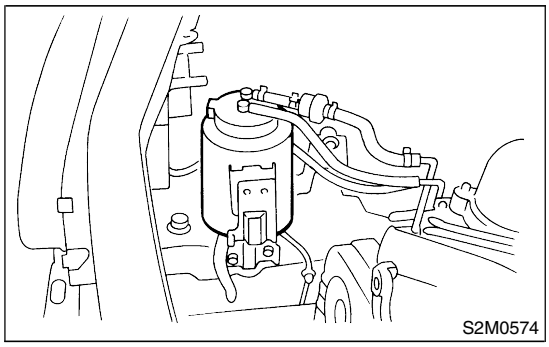
9. Engine Assembly S153079

A: REMOVAL S153079A18

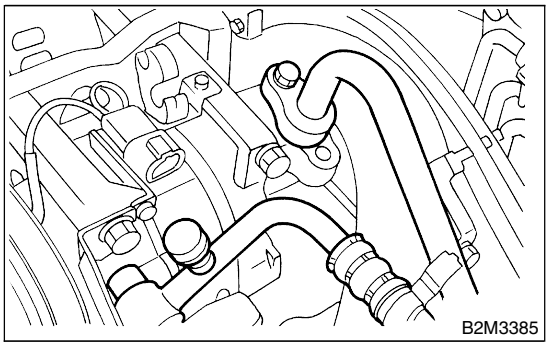
1) Set the vehicle on lift arms.
2) Open front hood fully and support with stay.
3) Release fuel pressure. <Ref. to FU(SOHC)-52, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.> or <Ref. to FU(SOHCw/oOBD)-41, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
4) Remove filler cap.
5) Disconnect battery ground terminal.


G6M0095

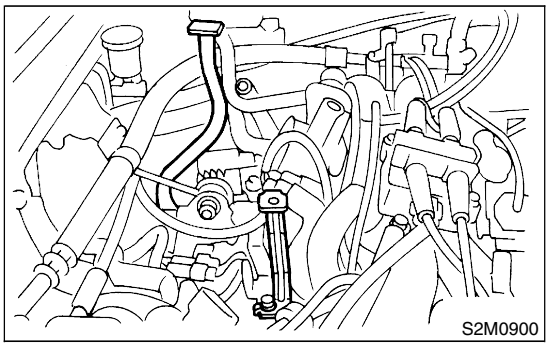
6) Remove air intake duct and air cleaner case. <Ref. to IN(SOHC)-8, REMOVAL, Air Intake Duct.> and <Ref. to IN(SOHC)-7, REMOVAL , Air Cleaner Case.>
7) Remove canister and bracket. (Without OBD)


S2M0574

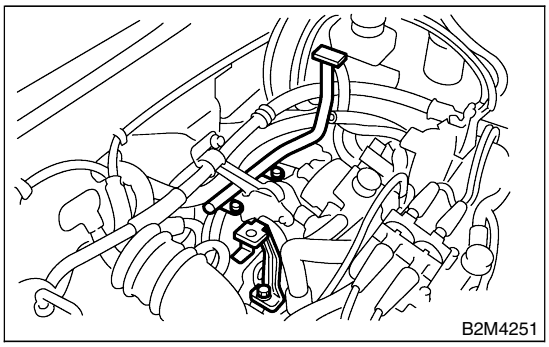
8) Remove under cover.
9) Remove radiator from vehicle. <Ref. to CO-25, REMOVAL, Radiator.>
10) Remove ATF cooler pipe from cylinder head. <Ref. to AT-49, REMOVAL, ATF Cooler Pipe and Hose.>
11) Collect refrigerant, and remove pressure hoses. (With A/C)
(1) Place and connect the attachment hose to the refrigerant recycle system.
(2) Collect refrigerant from A/C system.
(3) Disconnect A/C pressure hoses from A/C compressor.


B2M3385

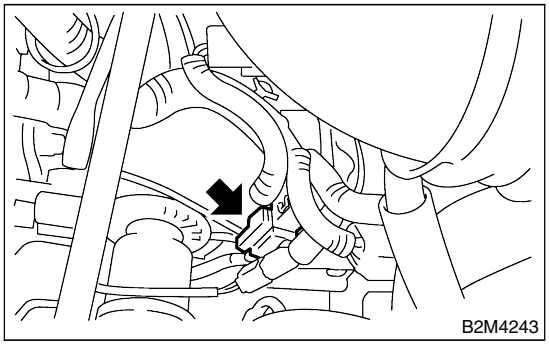
12) Remove air cleaner case stay.
- **MT model**


S2M0900

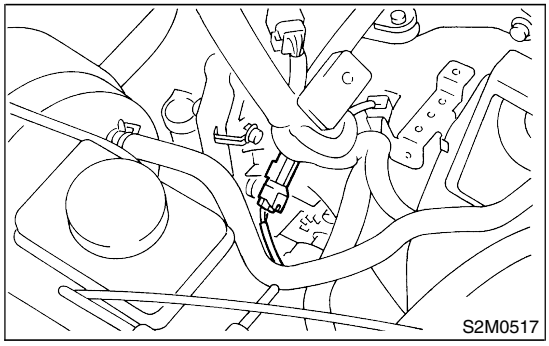
- **AT model**


B2M4251

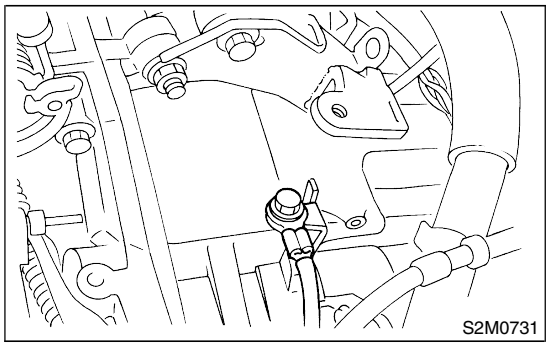
13) Disconnect the following connectors and cables.
(1) Front oxygen (A/F) sensor connector (With OBD)


B2M4243

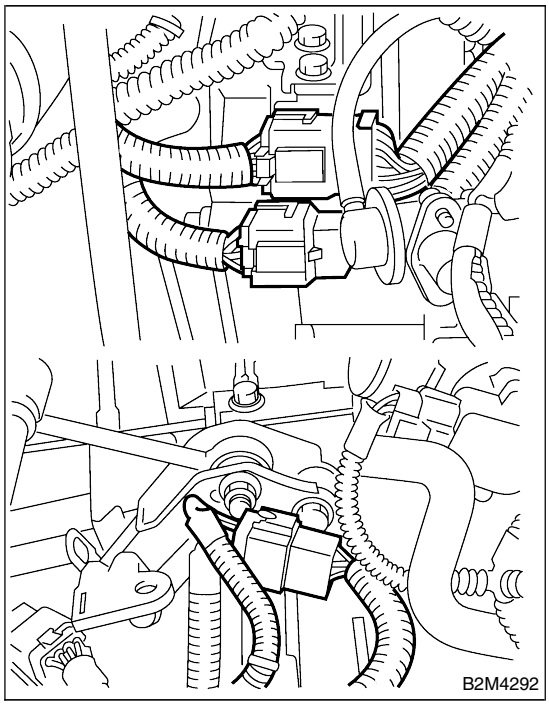
(2) Front oxygen sensor connector (Without OBD)



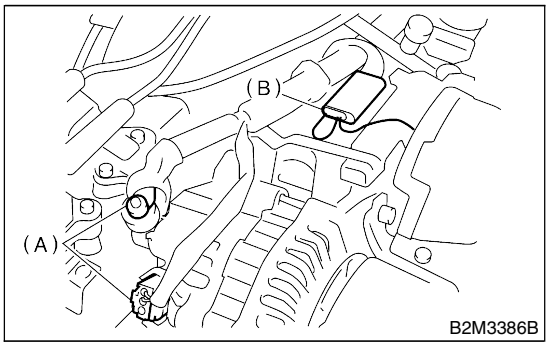
(3) Engine ground terminal



(4) Engine harness connectors

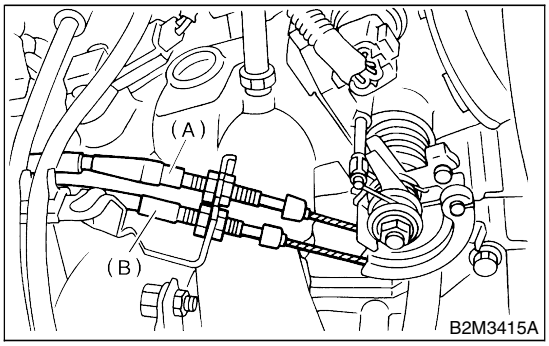


(5) Generator connector, terminal and A/C compressor connector



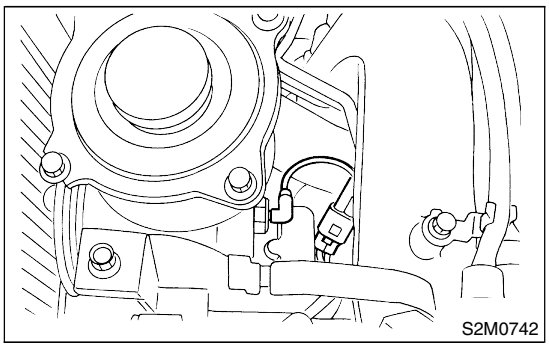
(A) Generator connector and terminal
(B) A/C compressor connector

(6) Accelerator cable and cruise control cable

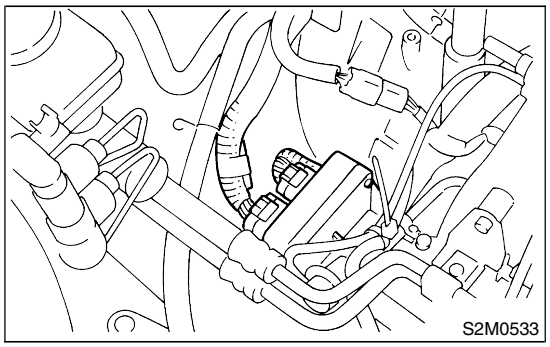


(A) Accelerator cable
(B) Cruise control cable

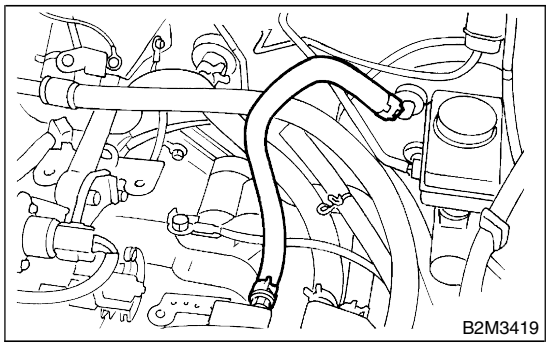
(7) Pressure switch



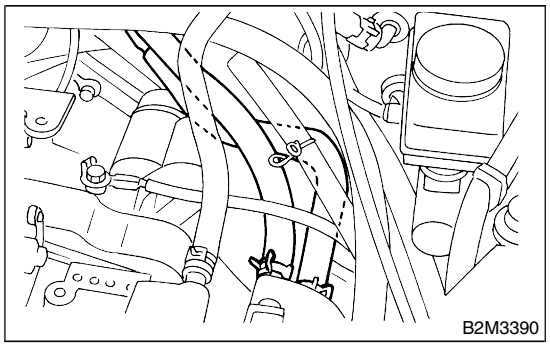
(8) Engine control module connector



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

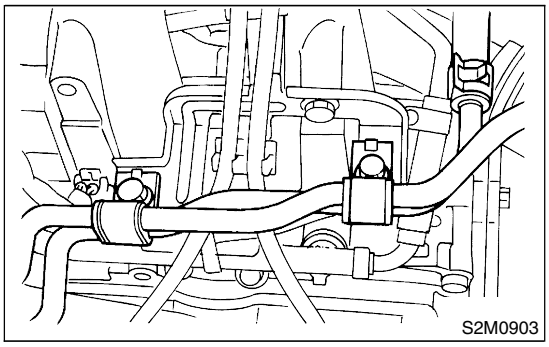


(2) Heater inlet outlet hose

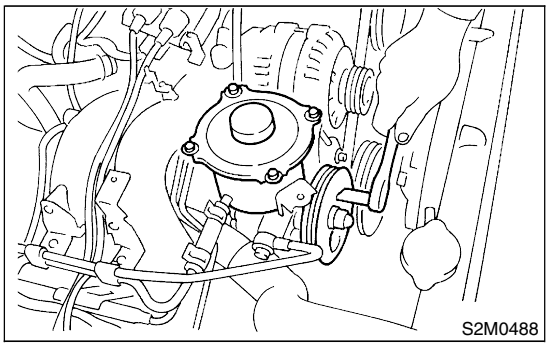


15) Remove power steering pump from bracket.
(1) Remove resonator chamber.
(2) Loosen lock bolt and slider bolt, and remove front side V-belt.<Ref. to ME(SOHC)-42, FRONT SIDE BELT, REMOVAL, V-belt.>

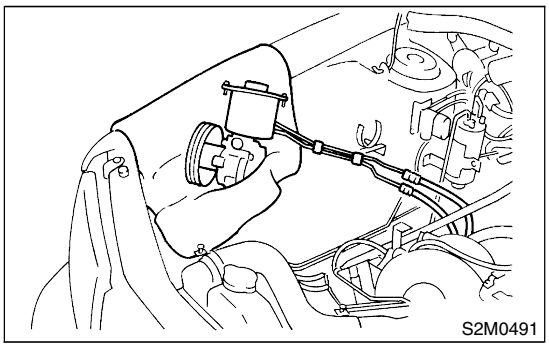
(3) Remove pipe with bracket from intake manifold.



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

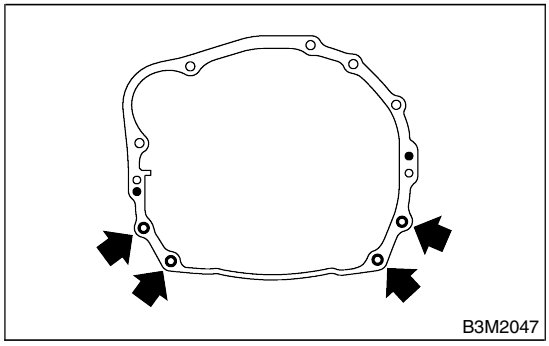


(5) Remove bolt which installs power steering pump bracket on cylinder head.
(6) Place power steering pump on the right side wheel apron.

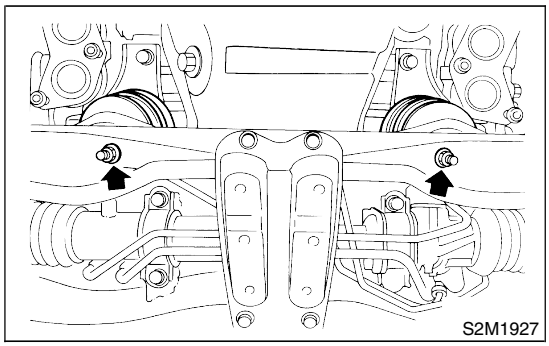


16) Remove front and center exhaust pipe.
<Ref. to EX(SOHC)-5, REMOVAL, Front Exhaust Pipe.> or <Ref. to EX(SOHCw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>

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



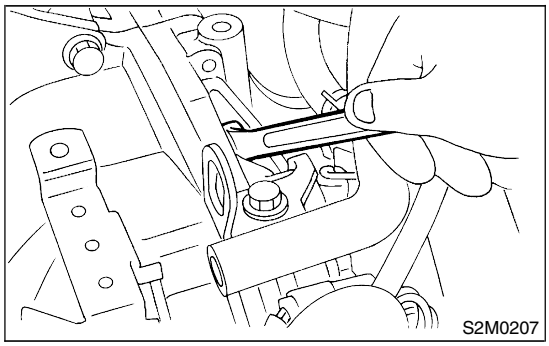
18) Remove nuts which install front cushion rubber onto front crossmember.



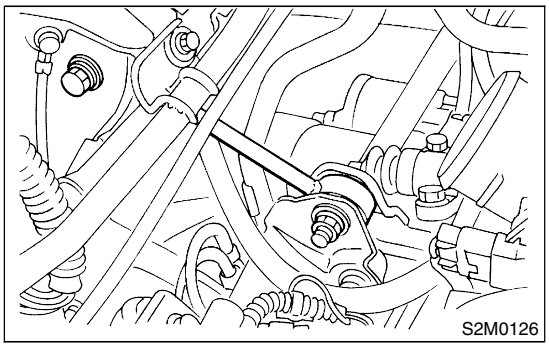
19) Separate torque converter clutch from drive plate. (AT model)

(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

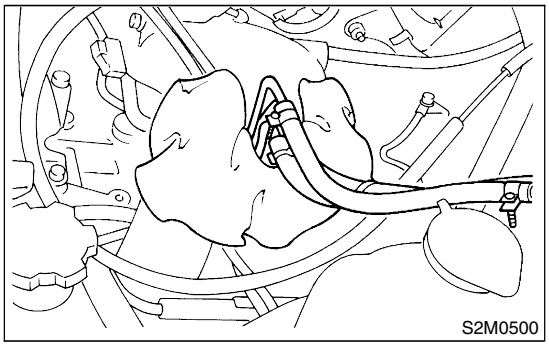


20) Remove pitching stopper.

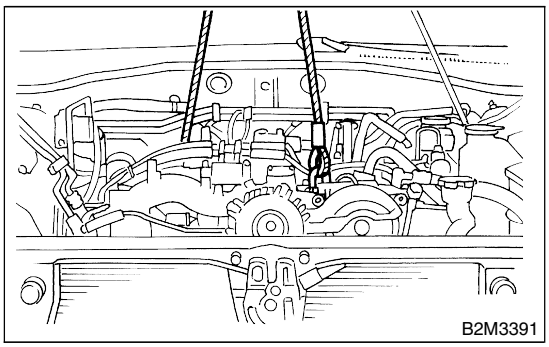


21) Disconnect fuel delivery hose, return hose and evaporation hose.

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

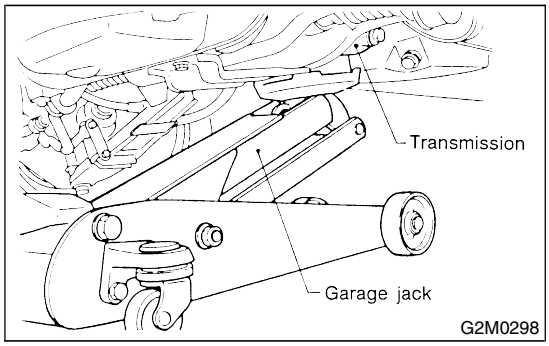


22) Support engine with a lifting device and wire ropes.

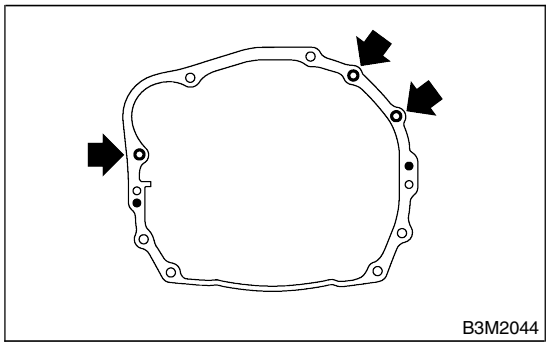


23) Support transmission with a garage jack.

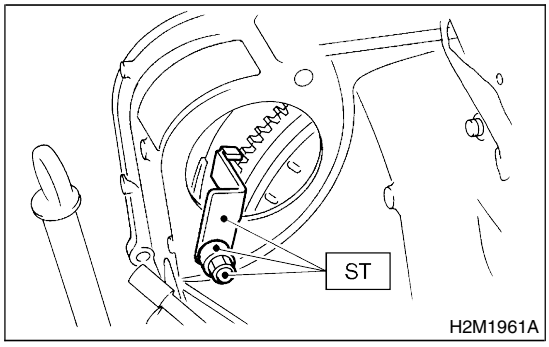
CAUTION:
Before moving engine away from transmission, check to be sure no work has been overlooked. Doing this is very important in order to facilitate re-installation and because transmission lowers under its own weight.



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

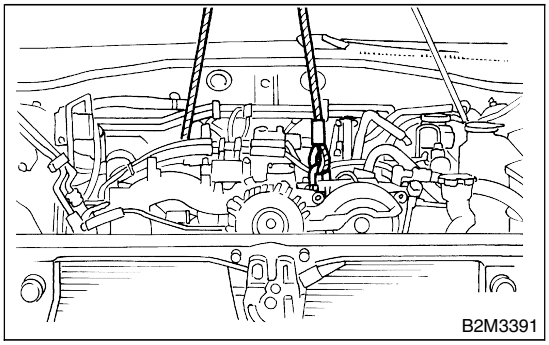


25) Install ST to torque converter clutch case. (AT model)
ST 498277200 STOPPER SET



26) Remove engine from vehicle.
(1) Slightly raise engine.
(2) Raise transmission with garage jack.
(3) Move engine horizontally until main shaft is withdrawn from clutch cover.
(4) Slowly move engine away from engine compartment.

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



27) Remove front cushion rubbers.

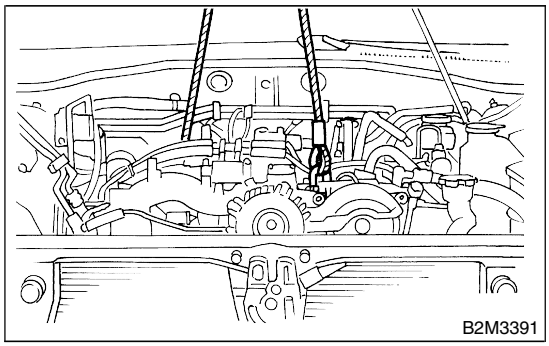
B: INSTALLATION S153079A11

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.

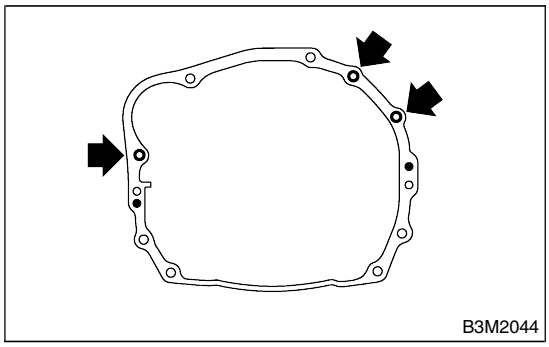
CAUTION:
Be careful not to damage adjacent parts or body panels with crank pulley, oil level gauge, etc.


B2M3391

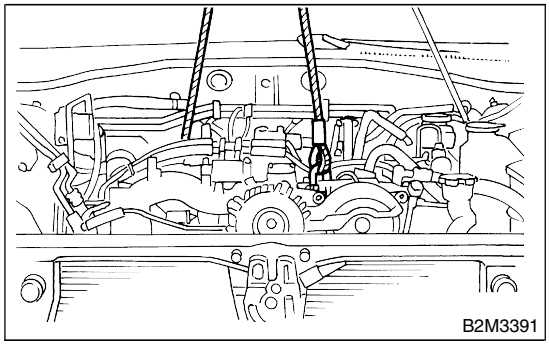
(2) Apply a small amount of grease to spline of main shaft. (MT model)

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

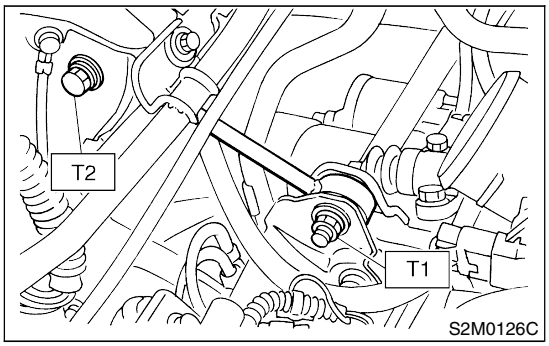
4) Remove lifting device and wire ropes.


B2M3391

5) Remove garage jack.

6) Install pitching stopper.

Tightening torque:
T1: 49 N·m (5.0 kgf-m, 36.2 ft-lb)
T2: 57 N·m (5.8 kgf-m, 42 ft-lb)



S2M0126C

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

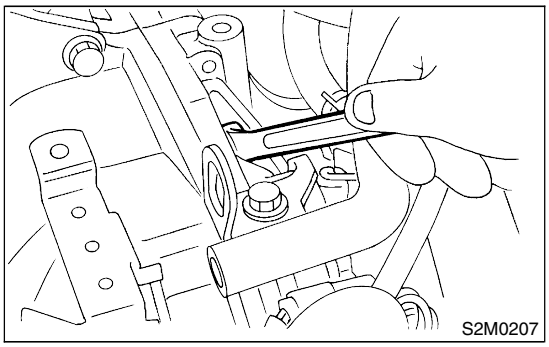
8) Install starter. <Ref. to SC-6, INSTALLATION, Starter.>

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 499977300 CRANK PULLEY WRENCH

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

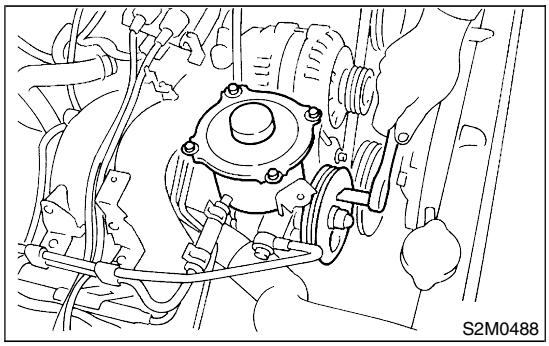

S2M0207

(3) Clog plug onto service hole.

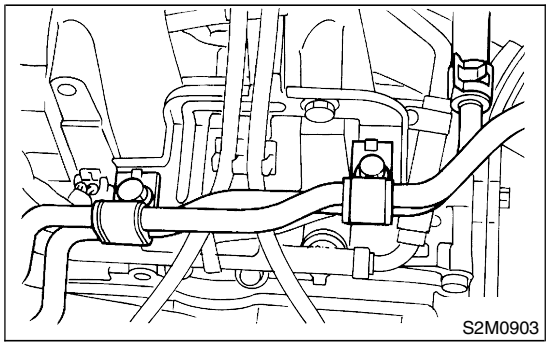
10) Install power steering pump on bracket.

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

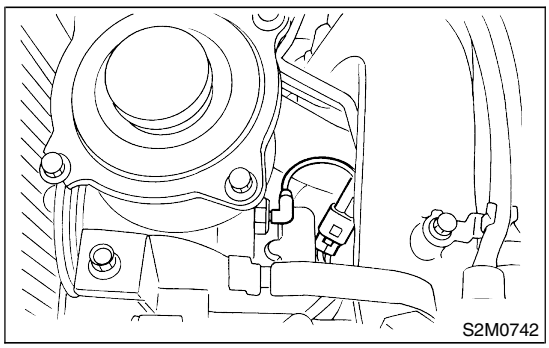
Tightening torque:
20.1 N·m (2.05 kgf-m, 14.8 ft-lb)


S2M0488

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


S2M0903

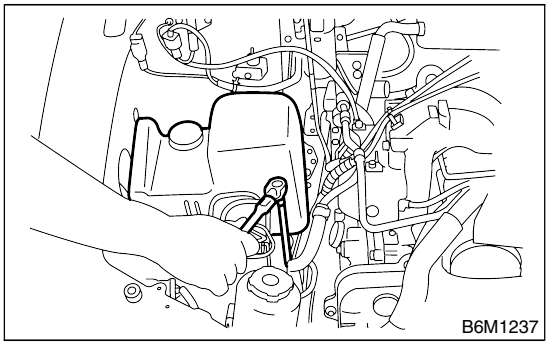
(3) Connect power steering switch connector.


S2M0742

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

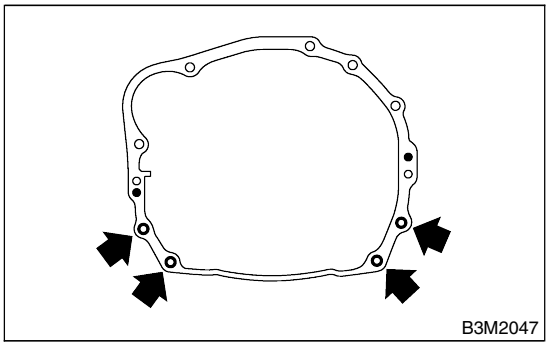
(5) Install resonator chamber.

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.

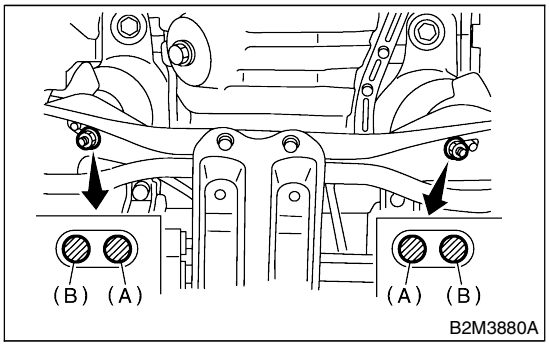
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)


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(SOHC)-6, INSTALLATION, Front Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-7, 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
(5) Engine control module connector (Without OBD)

16) Connect the following cables.
(1) Accelerator cable
(2) Cruise control cables (With cruise control)

CAUTION:
After connecting each cable, adjust them.

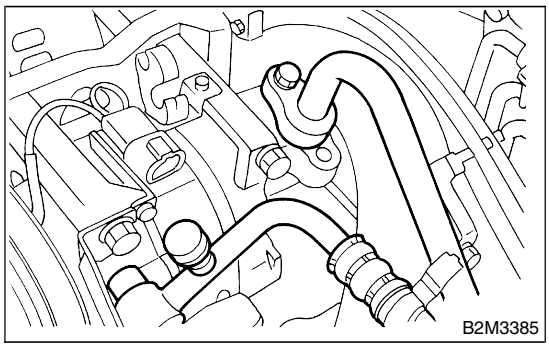
17) Install air cleaner case stay.

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

18) Install A/C pressure hoses.
<Ref. to AC-38, INSTALLATION, Flexible Hose.>

CAUTION:
Use new O-rings.

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



19) Install radiator to vehicle. <Ref. to CO-27, INSTALLATION, Radiator.>
20) Install ATF cooler pipe to cylinder head. <Ref. to AT-50, 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-14, 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-20, OPERATION, Refrigerant Charging Procedure.>
26) Remove front hood stay, and close front hood.
27) Take off the vehicle from lift arms.

C: INSPECTION S153079A10

1) Make sure pipes and hoses are installed correctly.
2) Make sure the engine coolant and ATF are at specified levels.

10. Engine Mounting S153085

A: REMOVAL S153085A18

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

B: INSTALLATION S153085A11

Install in the reverse order of removal.

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

C: INSPECTION S153085A10

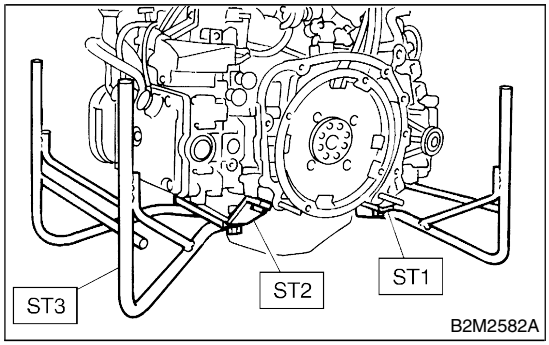
Make sure there are no cracks or other damage.

11. Preparation for Overhaul S153091

A: PROCEDURE S153091E45

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.

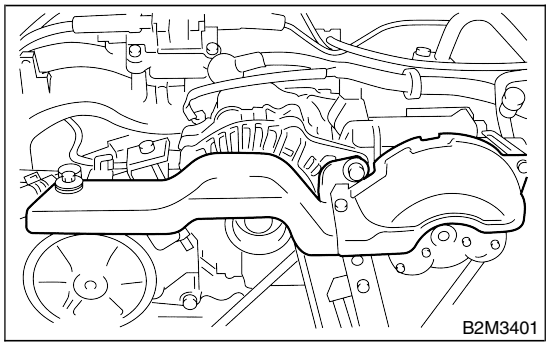
12. V-belt S153080

A: REMOVAL S153080A18

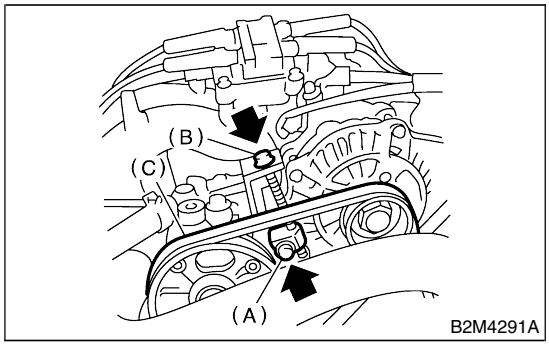
1. FRONT SIDE BELT S153080A1801

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

1) Remove V-belt cover.


B2M3401

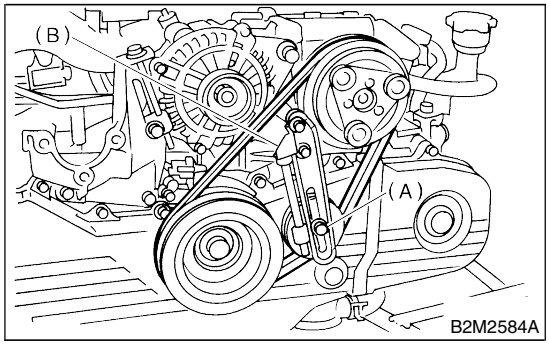
2) Loosen the lock bolt (A).
3) Loosen the slider bolt (B).
4) Remove the front side belt (C).



B2M4291A

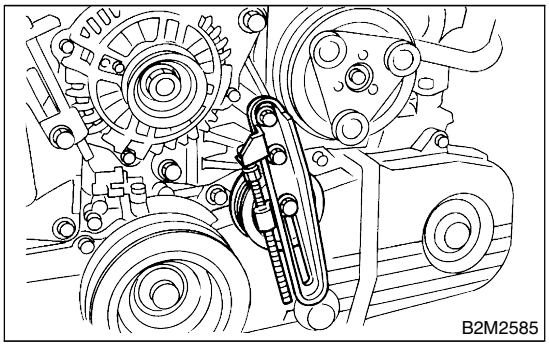
2. REAR SIDE BELT S153080A1802

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

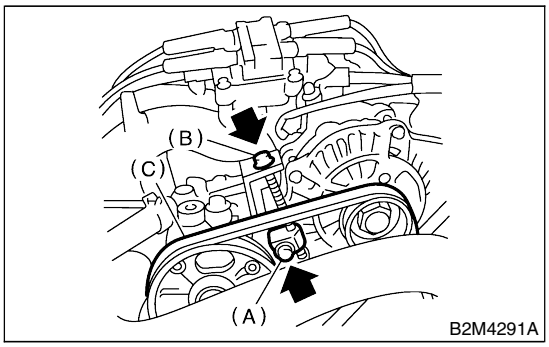
B: INSTALLATION S153080A11

1. FRONT SIDE BELT S153080A1101

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(SOHC)-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, 5.5 ft-lb)



B2M4291A

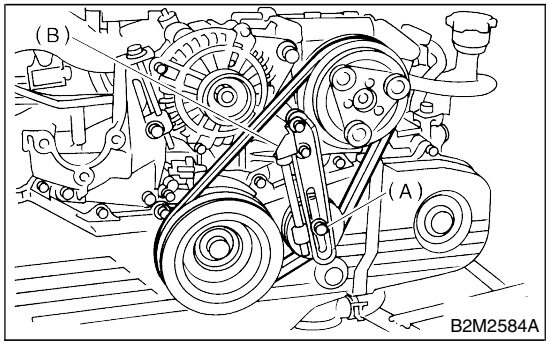
4) Install V-belt cover.

2. REAR SIDE BELT S153080A1102

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

2) Tighten the lock nut (A).

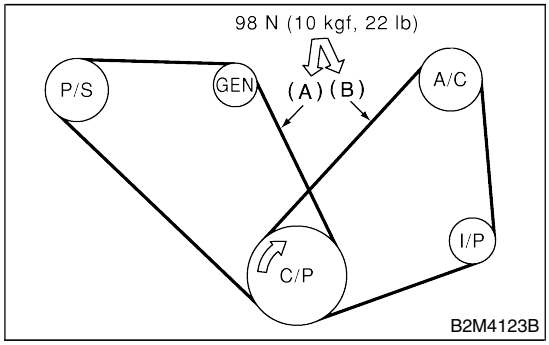
Tightening torque:
Lock nut (A);
22.6 N·m (2.3 kgf-m, 16.6 ft-lb)



C: INSPECTION S153080A10

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)

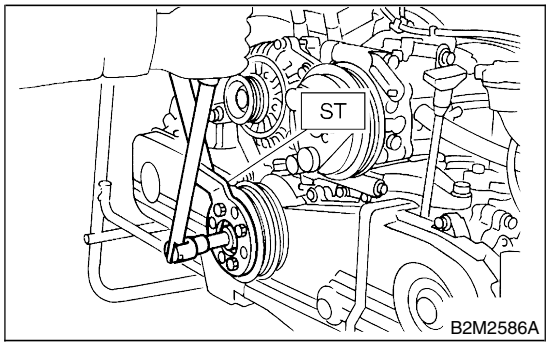


C/P Crankshaft pulley
GEN Generator
P/S Power steering oil pump pulley
A/C Air conditioning compressor pulley
I/P Idler pulley

13. Crankshaft Pulley S153098

A: REMOVAL S153098A18

1) Remove V-belt. <Ref. to ME(SOHC)-42, REMOVAL, V-belt.>
2) Remove crankshaft pulley bolt. To lock crankshaft, use ST.
ST 499977300 CRANKSHAFT PULLEY WRENCH

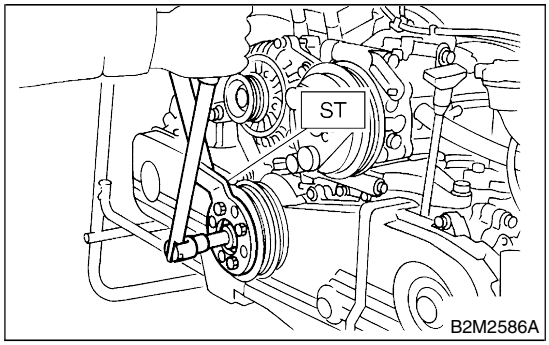


3) Remove crankshaft pulley.

B: INSTALLATION S153098A11

1) Install crankshaft pulley.
2) Install pulley bolt.
To lock crankshaft, use ST.
ST 499977300 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:
127 N·m (13.0 kgf-m, 94.0 ft-lb)



3) Confirm that the tightening angle of the crankshaft pulley bolt is 45 degrees or more. If not, conduct the following procedures.

CAUTION:
If the tightening angle of crankshaft pulley bolt is less than 45 degrees, the bolt should be damaged. In this case, the bolt must be replaced.

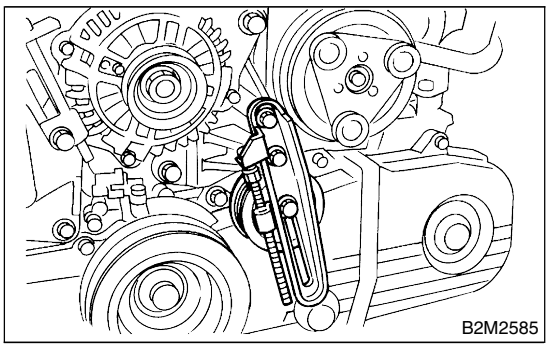
(1) Replace the crankshaft pulley bolts and clean them.

Crankshaft pulley bolt:
12369AA011

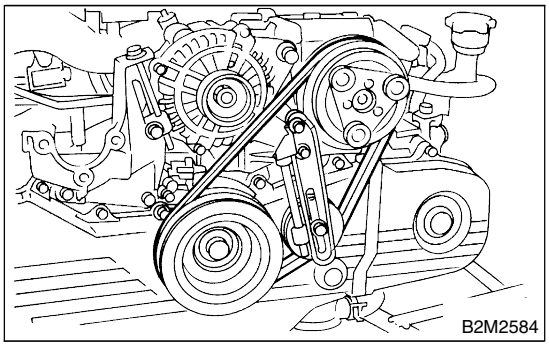
(2) Clean the crankshaft thread using an air gun.
(3) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kgf-m, 33 ft-lb).
(4) Tighten the crankshaft pulley bolts keeping them in an angle between 45 degrees and 60 degrees.

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.



5) Install A/C belt.



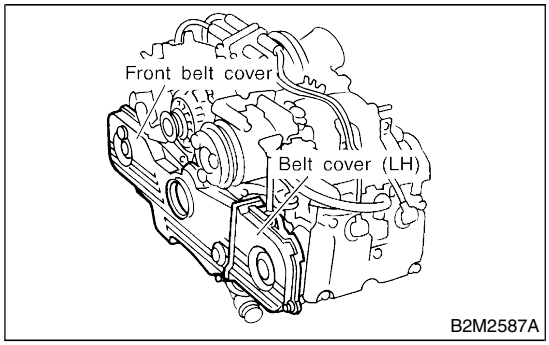
C: INSPECTION S153098A10

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

14. Belt Cover S153582

A: REMOVAL S153582A18

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



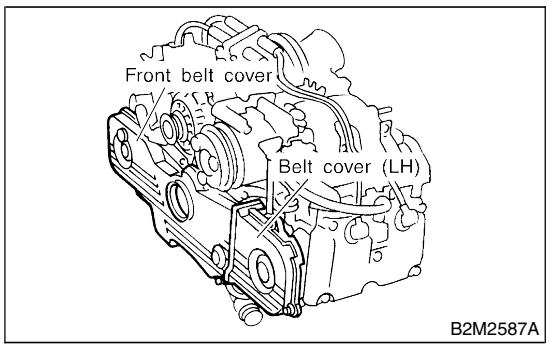
B: INSTALLATION S153582A11

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)



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

C: INSPECTION S153582A10

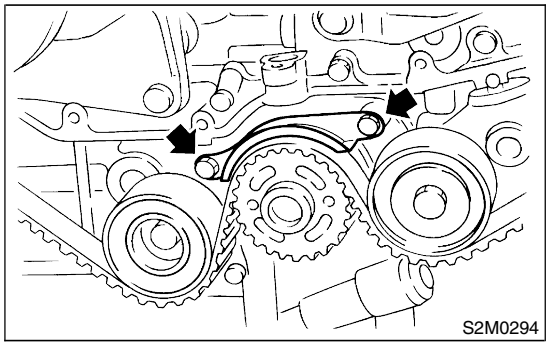
Make sure the cover is not damaged.

15. Timing Belt Assembly S153099

A: REMOVAL S153099A18

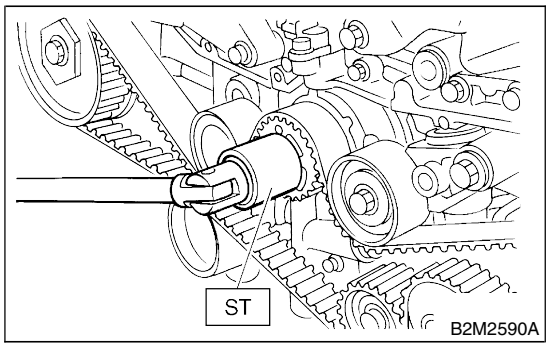
1. TIMING BELT S153099A1801

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


S2M0294

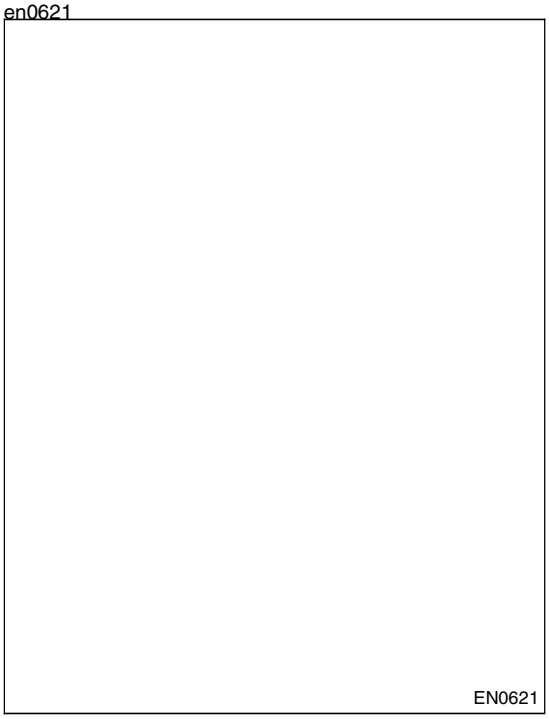
5) If alignment mark (a) and/or arrow mark (which indicates rotation direction) on timing belt fade away, put new marks before removing timing belt as shown in procedures below.
   (1) Turn crankshaft using ST. Align mark (a) of sprocket to cylinder block notch (b) and ensure that right side cam sprocket 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

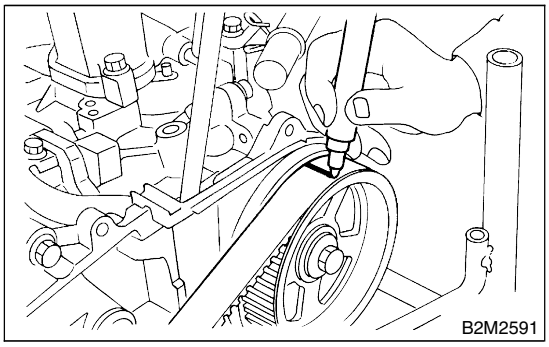


B2M2590A

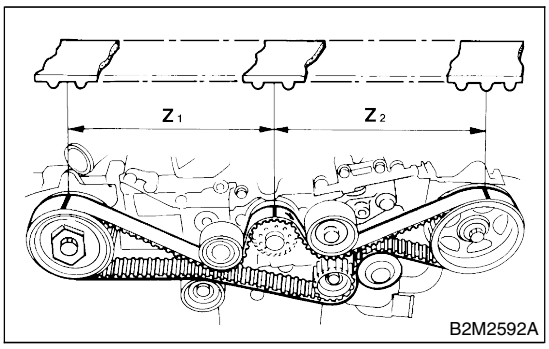
en0621


EN0621

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

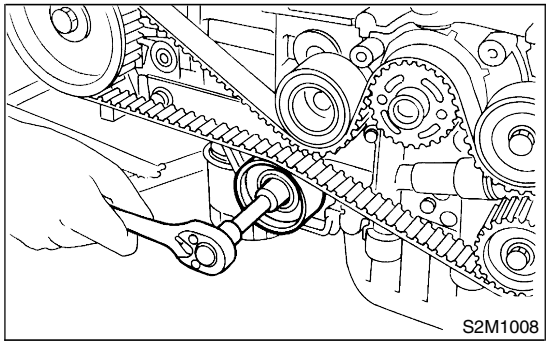

B2M2591

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

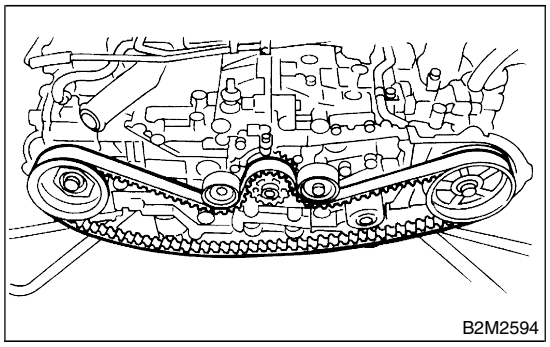


B2M2592A

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

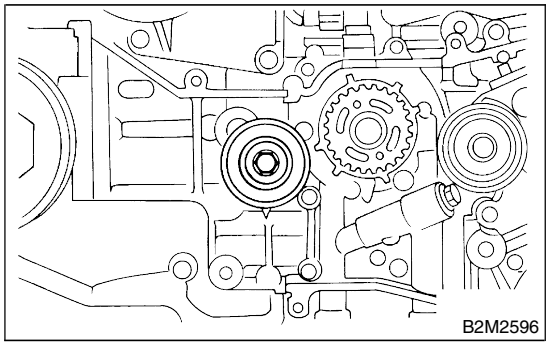

S2M1008

8) Remove timing belt.

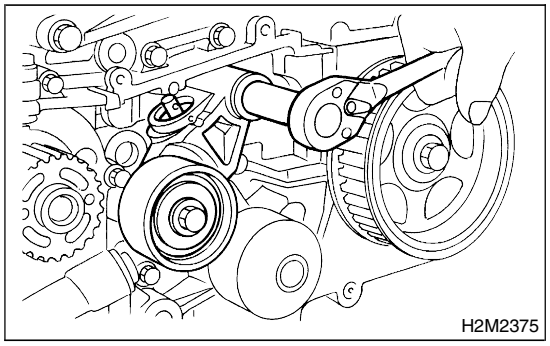

B2M2594

2. BELT IDLER AND AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY S153099A1802

1) Remove belt idler (No. 1).


B2M2596

2) Remove automatic belt tension adjuster assembly.


H2M2375

B: INSTALLATION S153099A11

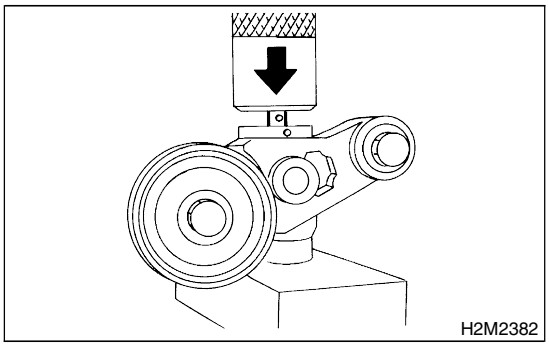
1. AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER

S153099A1101

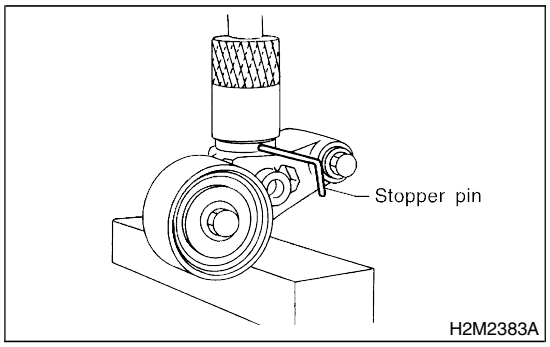
1) Preparation for installation of automatic belt tension adjuster assembly;

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.

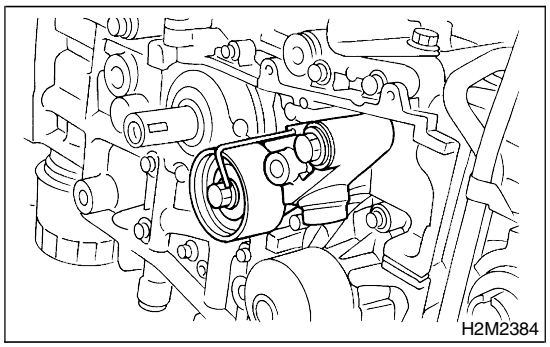

H2M2382

(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.



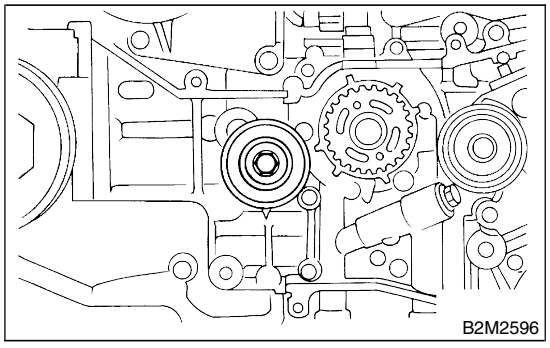
2) Install automatic belt tension adjuster assembly.

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)



3) Install belt idler (No. 1).

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

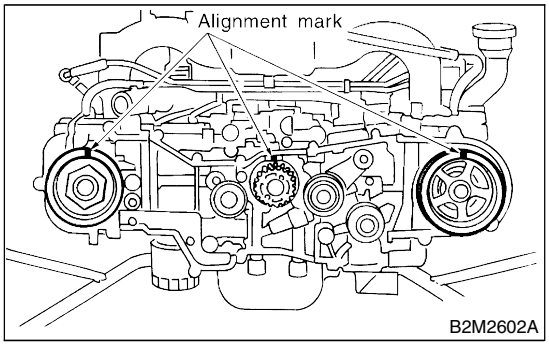


2. TIMING BELT *S153099A1102*

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

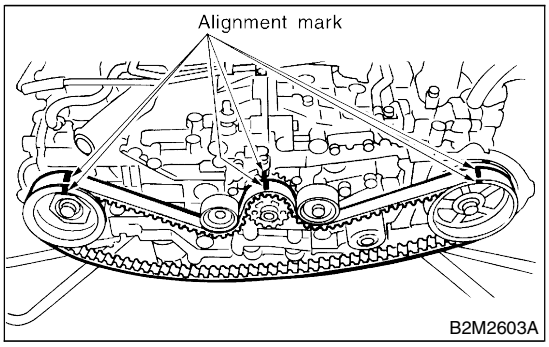
(1) Turn camshaft sprocket No. 2 using ST1, and turn camshaft sprocket No. 1 using ST2 so that their alignment marks come to top positions.

ST1	499207100	CAMSHAFT SPROCKET WRENCH
ST2	499207400	CAMSHAFT SPROCKET WRENCH



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

CAUTION:
Ensure belt's rotating direction is correct.

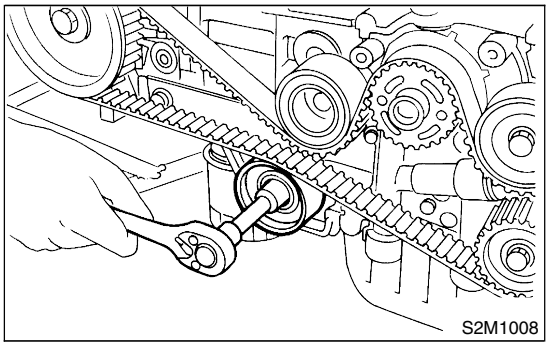


3) Install belt idler No. 2.

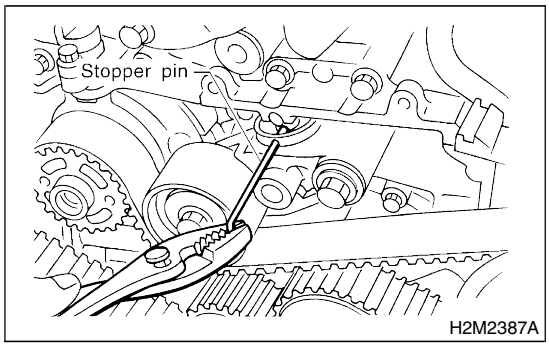
Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

4) Install belt idler (No. 2).

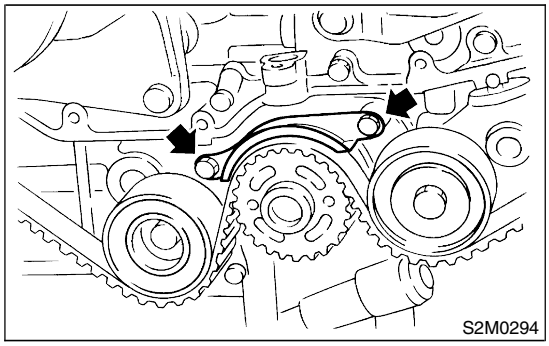
Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)



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

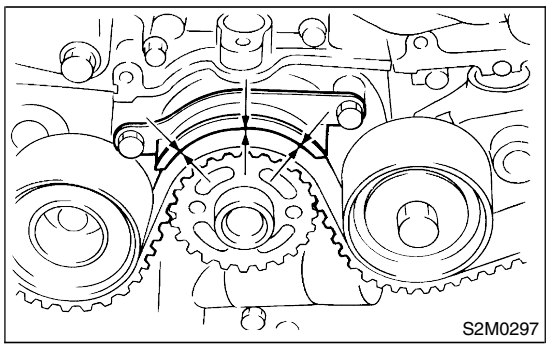


6) Install timing belt guide. (MT vehicles only)
(1) Temporarily tighten remaining bolts.



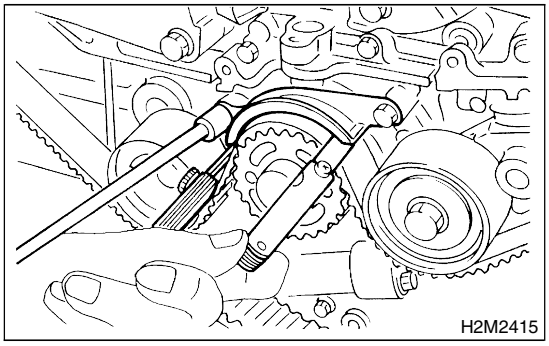
(2) Check and adjust clearance between timing belt and timing belt guide by using thickness gauge.

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



(3) Tighten remaining bolts.

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



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

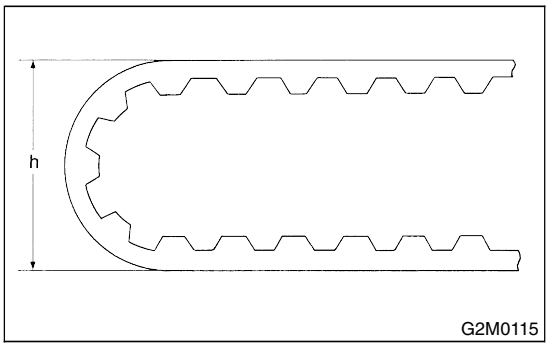
C: INSPECTION S153099A10

1. TIMING BELT S153099A1001

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

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

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



2. AUTOMATIC BELT TENSION ADJUSTER S153099A1002

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

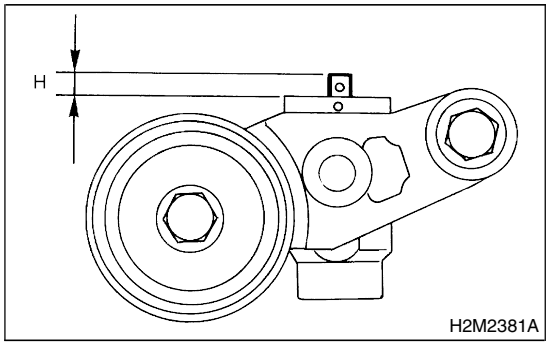
CAUTION:
Slight traces of oil at rod's oil seal does not indicate a problem.

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)



3. BELT TENSION PULLEY S153099A1003

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 S153099A1004

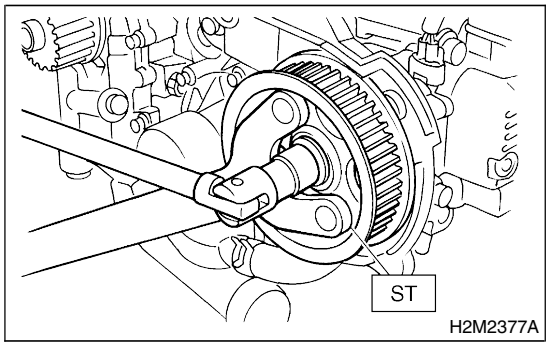
1) Check belt idler for smooth rotation. Replace if noise or excessive play is noted.
2) Check belt outer contacting surfaces of idler pulley for abnormal wear and scratches.
3) Check belt idler for grease leakage.

16. Camshaft Sprocket S153097

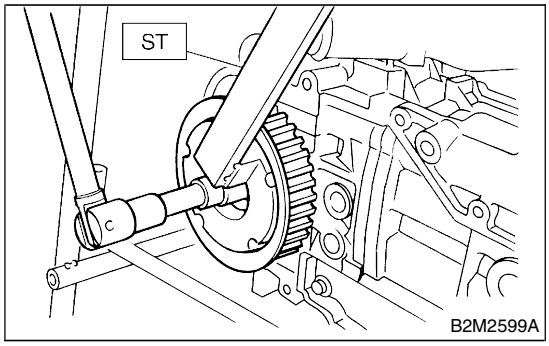
A: REMOVAL S153097A18

1. REMOVAL S153097A1801

1) Remove V-belt. <Ref. to ME(SOHC)-42, REMOVAL, V-belt.>
2) Remove crankshaft pulley. <Ref. to ME(SOHC)-44, REMOVAL, Crankshaft Pulley.>
3) Remove belt cover. <Ref. to ME(SOHC)-45, REMOVAL, Belt Cover.>
4) Remove timing belt assembly. <Ref. to ME(SOHC)-46, REMOVAL, Timing Belt Assembly.>
5) Remove camshaft position sensor. (With OBD) <Ref. to FU(SOHC)-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

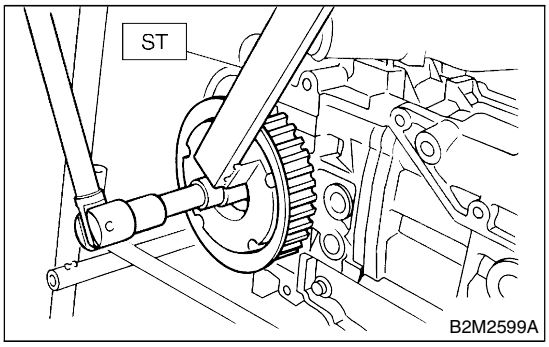


B: INSTALLATION S153097A11

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

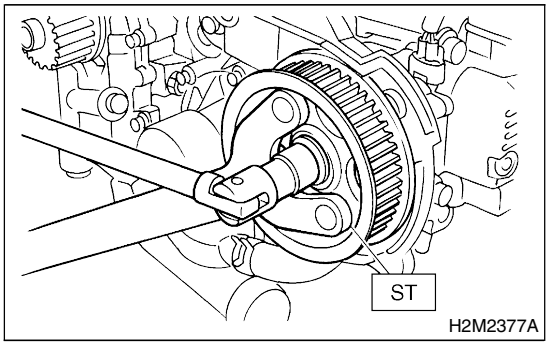
Tightening torque:
78 N·m (8.0 kgf-m, 57.9 ft-lb)

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

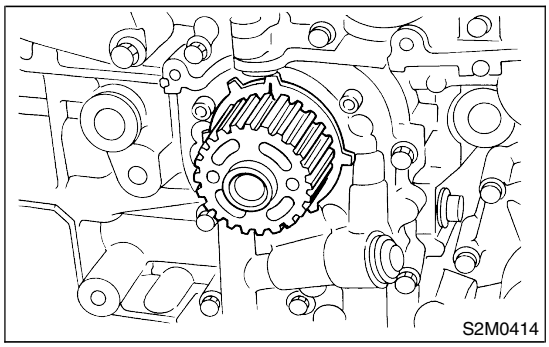
C: INSPECTION S153097A10

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 S153101

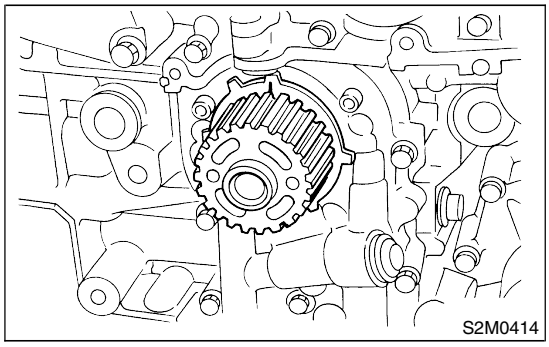
A: REMOVAL S153101A18

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


S2M0414

B: INSTALLATION S153101A11

1) Install crankshaft sprocket.


S2M0414

2) Install camshaft sprocket. <Ref. to ME(SOHC)-51, INSTALLATION, Camshaft Sprocket.>
3) Install timing belt assembly. <Ref. to ME(SOHC)-47, INSTALLATION, Timing Belt Assembly.>
4) Install belt cover. <Ref. to ME(SOHC)-45, INSTALLATION, Belt Cover.>
5) Install crankshaft pulley. <Ref. to ME(SOHC)-44, INSTALLATION, Crankshaft Pulley.>
6) Install V-belt. <Ref. to ME(SOHC)-42, INSTALLATION, V-belt.>

C: INSPECTION S153101A10

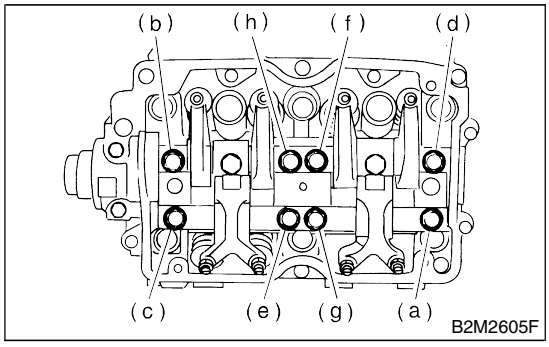
1) Check sprocket teeth for abnormal wear and scratches.
2) Make sure there is no free play between sprocket and key.
3) Check crankshaft sprocket notch for sensor for damage and contamination of foreign matter.

18. Valve Rocker Assembly S153094

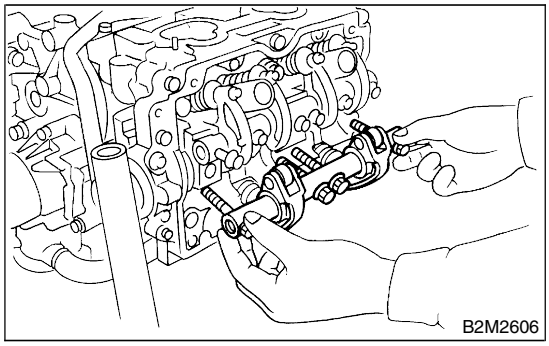
A: REMOVAL S153094A18

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



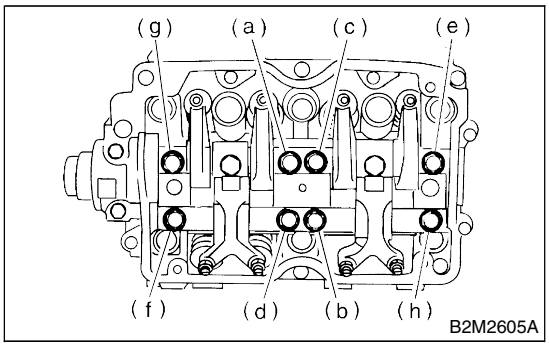
B: INSTALLATION S153094A11

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

C: DISASSEMBLY S153094A06

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 S153094A02

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.

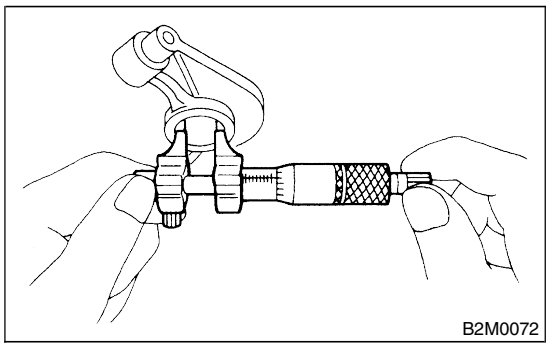
3) Install valve rocker shaft securing bolts.

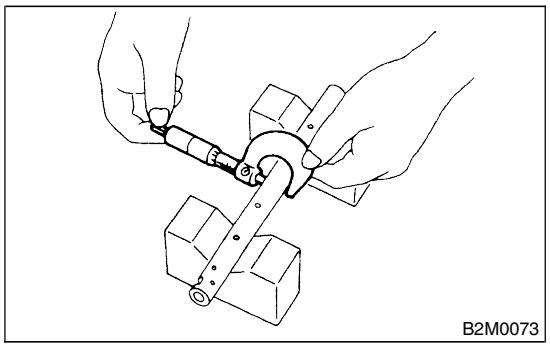
E: INSPECTION S153094A10

1. VALVE ROCKER ARM S153094A1001

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 S153094A1002

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

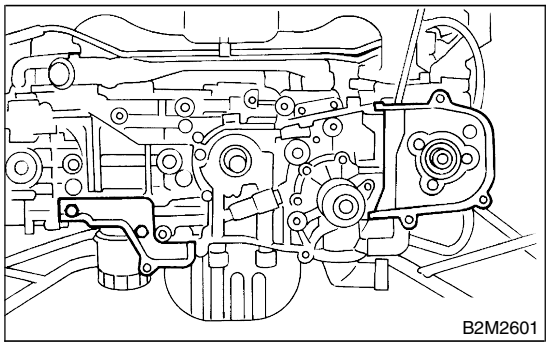
CAUTION:
Repair or replace valve rocker shaft as necessary.

19. Camshaft S153092

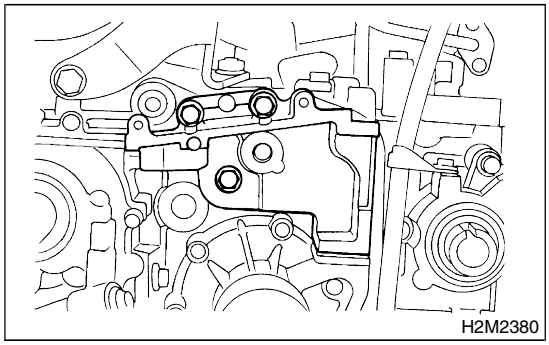
A: REMOVAL S153092A18

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

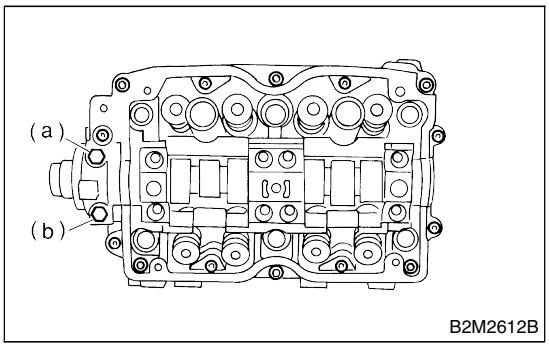

B2M2601

9) Remove tensioner bracket.


H2M2380

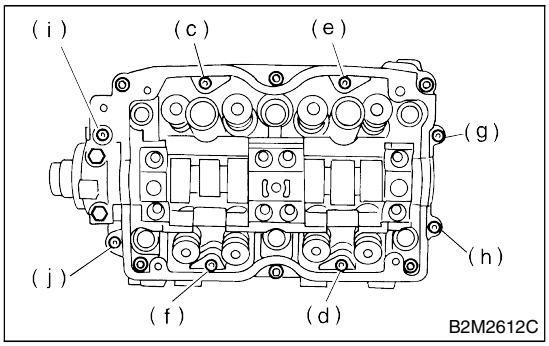
10) Remove camshaft position sensor support. (LH side only)
11) Remove oil level gauge guide. (LH side only)
12) Remove valve rocker assembly. <Ref. to ME(SOHC)-54, REMOVAL, Valve Rocker Assembly.>
13) Remove camshaft cap.

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



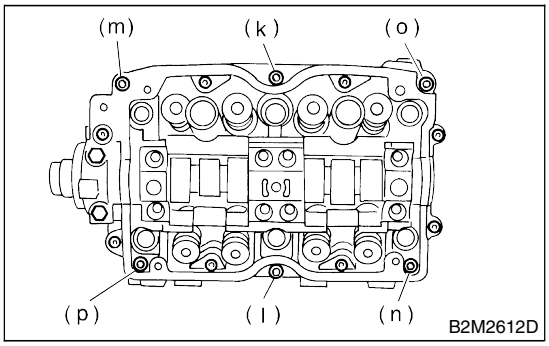
B2M2612B

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



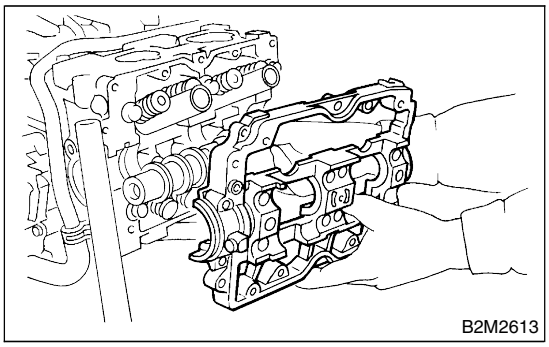
B2M2612C

(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.

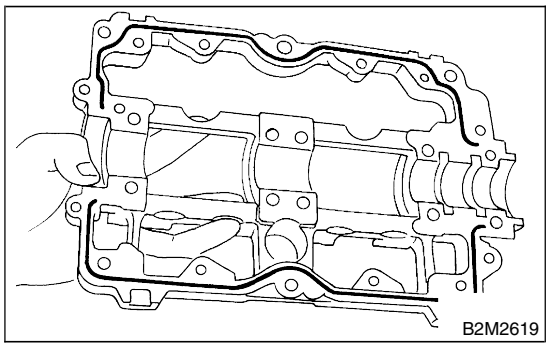
16) Remove plug from rear side of camshaft.

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

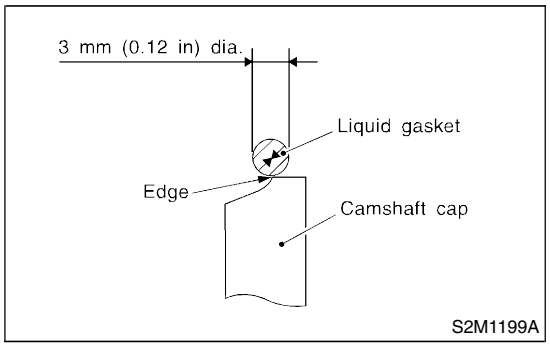
B: INSTALLATION S153092A11

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

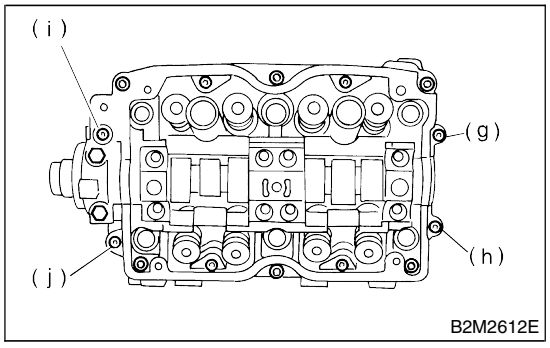

B2M2619

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



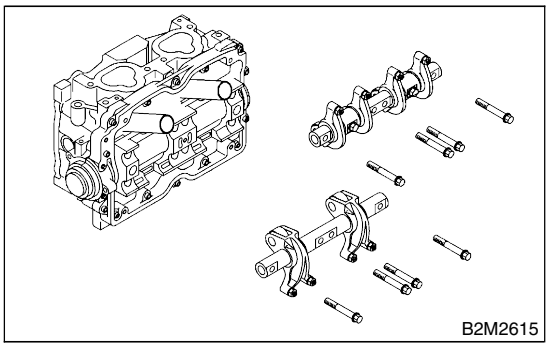
S2M1199A

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



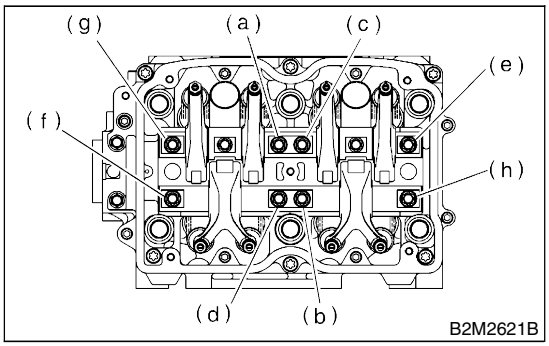
B2M2612E

(3) Install valve rocker assembly.


B2M2615

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

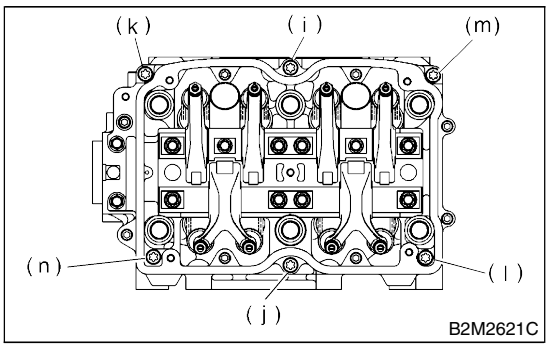
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



B2M2621B

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

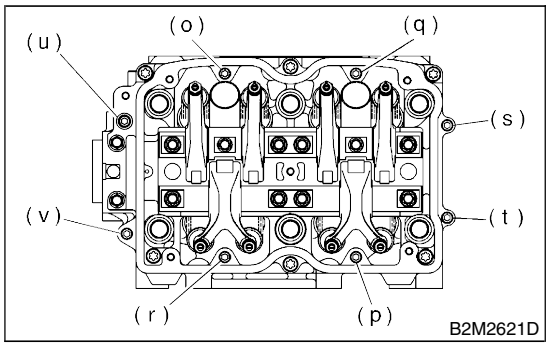
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



B2M2621C

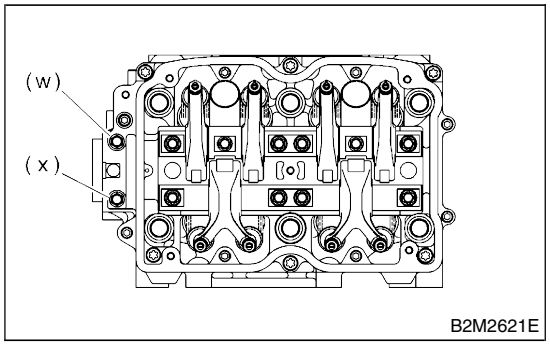
(6) Tighten bolts (o) through (v) in alphabetical sequence.

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



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

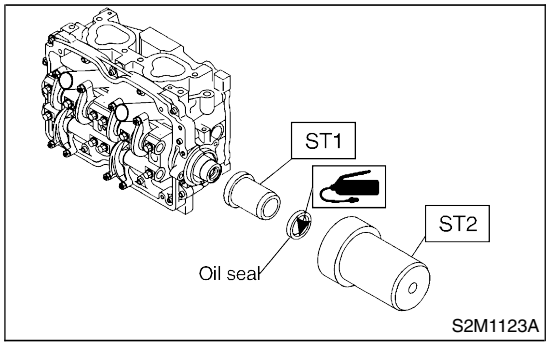
Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)



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

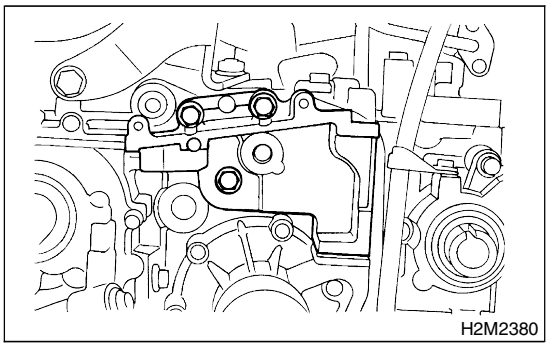
CAUTION:
Use a new oil seal.

ST1 499597000 OIL SEAL GUIDE
ST2 499587500 OIL SEAL INSTALLER



4) Install plug using ST.
ST 499587700 OIL SEAL INSTALLER
5) Adjust the valve clearance. <Ref. to ME(SOHC)-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)

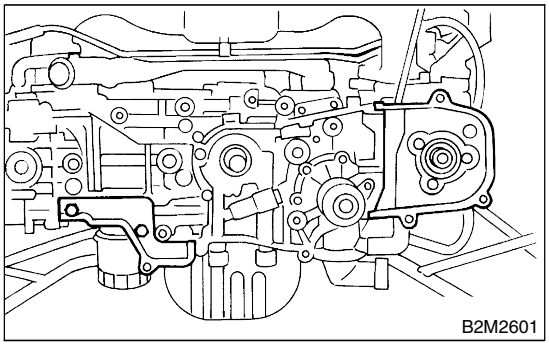


10) Install belt cover No. 2 (RH).

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)



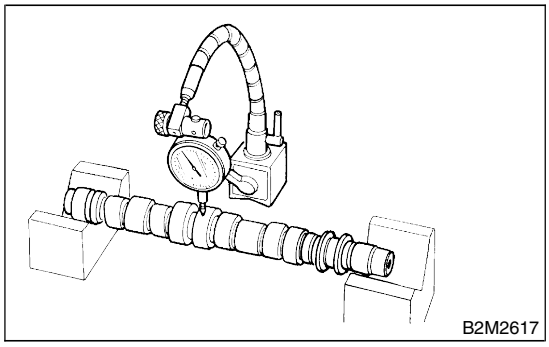
12) Install crankshaft sprocket. <Ref. to ME(SOHC)-53, INSTALLATION, Crankshaft Sprocket.>
13) Install camshaft sprocket. <Ref. to ME(SOHC)-51, INSTALLATION, Camshaft Sprocket.>
14) Install timing belt assembly. <Ref. to ME(SOHC)-47, INSTALLATION, Timing Belt Assembly.>
15) Install belt cover. <Ref.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

C: INSPECTION S153092A10

1. CAMSHAFT S153092A1001

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

Limit:
0.025 mm (0.0010 in)



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

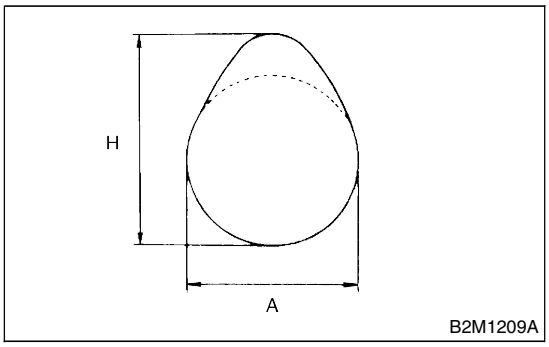
		Unit: mm (in)
Clearance at journal	Standard	0.055 — 0.090 (0.0022 — 0.0035)
	Limit	0.10 (0.0039)
Camshaft journal O.D.		31.928 — 31.945 (1.2570 — 1.2577)
Journal hole I.D.		32.000 — 32.018 (1.2598 — 1.2605)

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	38.732 — 38.832 (1.5249 — 1.528885)
	Limit	39.632 (1.5209)
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)

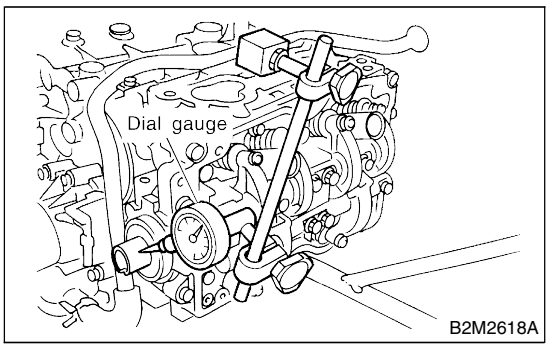


2. CAMSHAFT SUPPORT S153092A1002

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)

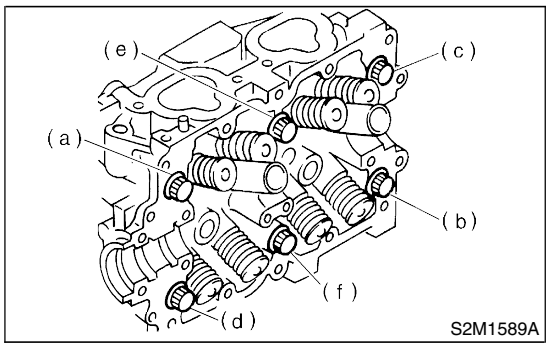


20. Cylinder Head Assembly S153093

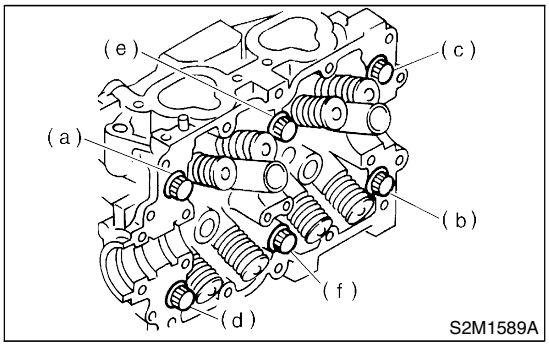
A: REMOVAL S153093A18

1) Remove V-belt. <Ref. to ME(SOHC)-42, REMOVAL, V-belt.>
2) Remove crankshaft pulley. <Ref. to ME(SOHC)-44, REMOVAL, Crankshaft Pulley.>
3) Remove belt cover. <Ref. to ME(SOHC)-45, REMOVAL, Belt Cover.>
4) Remove timing belt assembly. <Ref. to ME(SOHC)-46, REMOVAL, Timing Belt Assembly.>
5) Remove camshaft sprocket. <Ref. to ME(SOHC)-51, REMOVAL, Camshaft Sprocket.>
6) Remove intake manifold. <Ref. to FU(SOHC)-15, REMOVAL, Intake Manifold.> or <Ref. to FU(SOHCw/oOBD)-12, REMOVAL, Intake Manifold.>
7) Remove bolt which installs A/C compressor bracket on cylinder head.
8) Remove valve rocker assembly. <Ref. to ME(SOHC)-54, REMOVAL, Valve Rocker Assembly.>
9) Remove camshaft. <Ref. to ME(SOHC)-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.



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.

B: INSTALLATION S153093A11

1) Install cylinder head and gaskets on cylinder block.

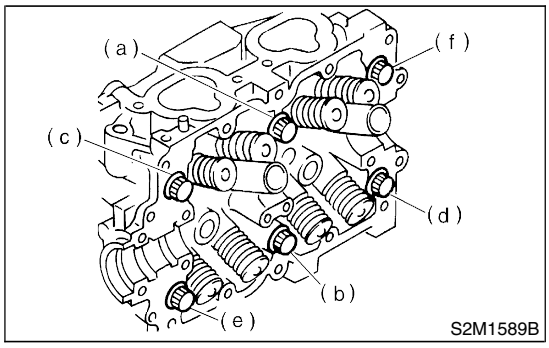
CAUTION:
- **Use new cylinder head gaskets.**
- **Be careful not to scratch the mating surface of cylinder block and cylinder head.**

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°.

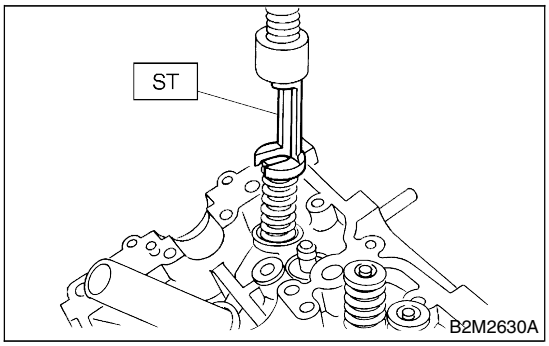


3) Install camshaft. <Ref. to ME(SOHC)-57, INSTALLATION, Camshaft.>
4) Install valve rocker assembly. <Ref. to ME(SOHC)-54, INSTALLATION, Valve Rocker Assembly.>
5) Install A/C compressor bracket on cylinder head.
6) Install intake manifold. <Ref. to FU(SOHC)-17, INSTALLATION, Intake Manifold.> or <Ref. to FU(SOHCw/oOBD)-15, INSTALLATION, Intake Manifold.>
7) Install camshaft sprocket. <Ref. to ME(SOHC)-51, INSTALLATION, Camshaft Sprocket.>
8) Install timing belt assembly. <Ref. to ME(SOHC)-47, INSTALLATION, Timing Belt Assembly.>
9) Install belt cover. <Ref. to ME(SOHC)-45, INSTALLATION, Belt Cover.>
10) Install crankshaft pulley. <Ref. to ME(SOHC)-44, INSTALLATION, Crankshaft Pulley.>
11) Install V-belt. <Ref. to ME(SOHC)-42, INSTALLATION, V-belt.>

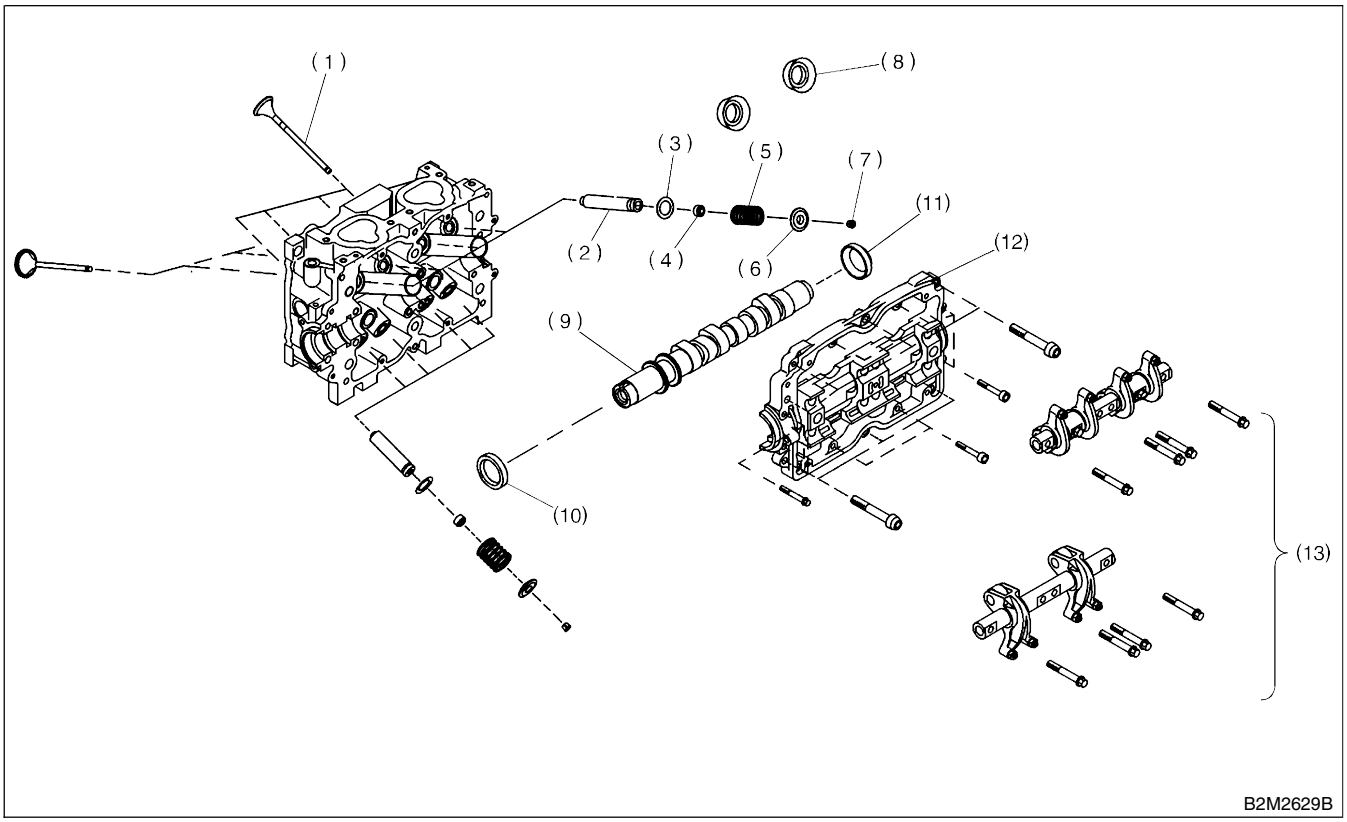
C: DISASSEMBLY S153093A06

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 S153093A02



(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.

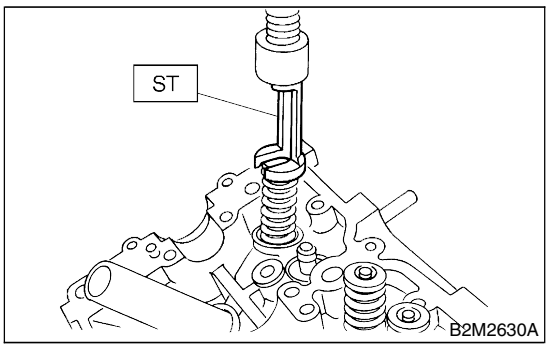
CAUTION:
When inserting valve into valve guide, use special care not to damage the oil seal lip.

(3) Install valve spring and retainer.

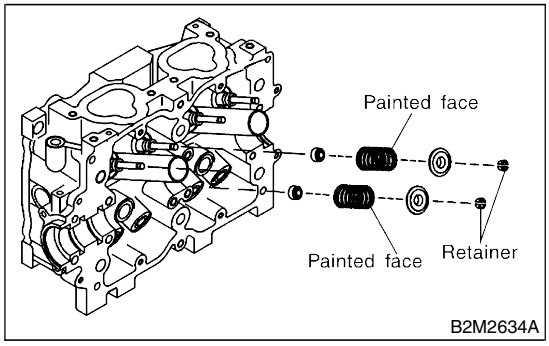
CAUTION:
Be sure to install the valve springs with their close-coiled end facing the seat on the cylinder head.

(4) Set ST on valve spring.

ST 499718000 VALVE SPRING REMOVER



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



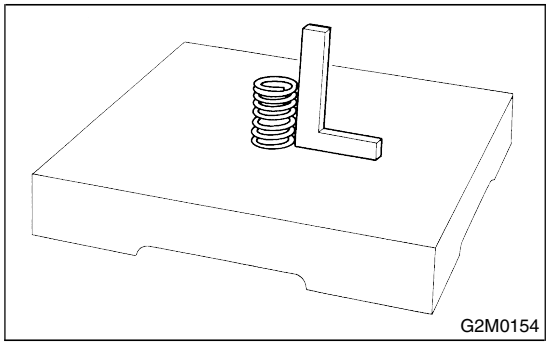
(6) After installing, tap valve spring retainers lightly with wooden hammer for better seating.

E: INSPECTION S153093A10

1. VALVE SPRING S153093A1001

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	218.7 — 242.5 N (22.3 — 24.7 kgf, 49.2 — 54.5 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 S153093A1002

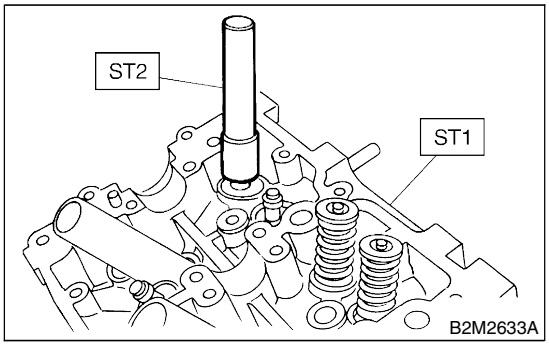
Replace oil seal with new one, if lip is damaged or spring out of place, or when the surfaces of intake valve and valve seat are reconditioned or intake valve guide is replaced. Use pliers to pinch and remove oil seal from valve.
1) Place cylinder head on ST1.
2) Press-fit oil seal to the specified dimension 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 S153093A01

1. CYLINDER HEAD S153093A0101

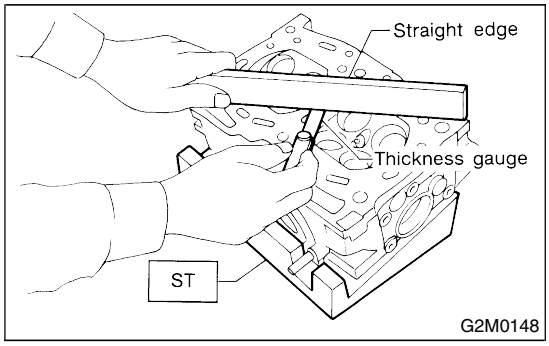
1) Make sure that no crack or other damage exists. In addition to visual inspection, inspect important areas by means of red lead check.
Also make sure that gasket installing surface shows no trace of gas and water leaks.
2) Place cylinder head on ST.
ST 498267800 CYLINDER HEAD TABLE
3) Measure the warping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

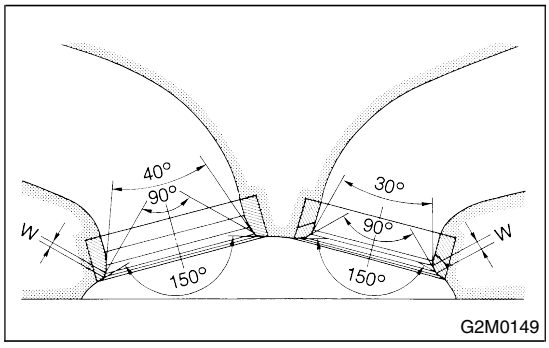
CAUTION:
Uneven torque for the cylinder head bolts can cause warping. When reassembling, pay special attention to the torque so as to tighten evenly.

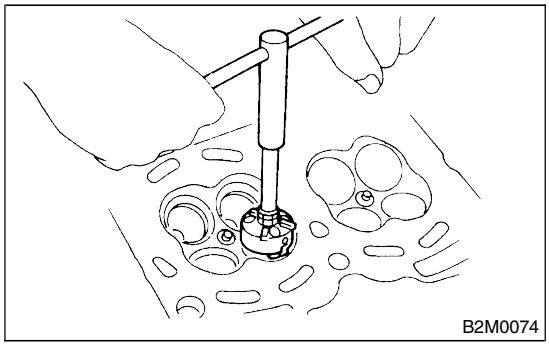


2. VALVE SEAT S153093A0102

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)

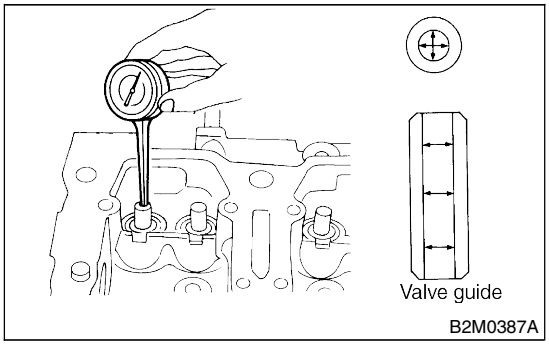


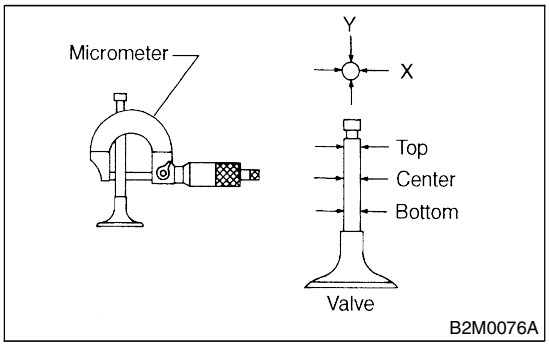


3. VALVE GUIDE S153093A0103

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)





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.

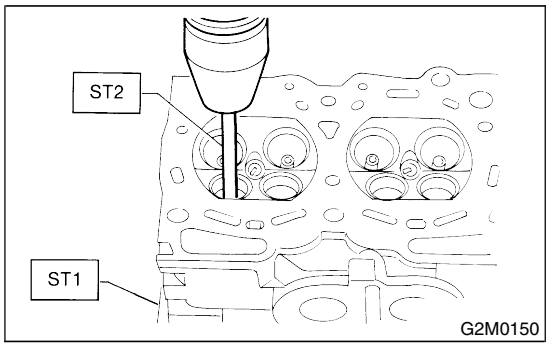
Valve guide inner diameter:
6.000 — 6.012 mm (0.2362 — 0.2367 in)

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.

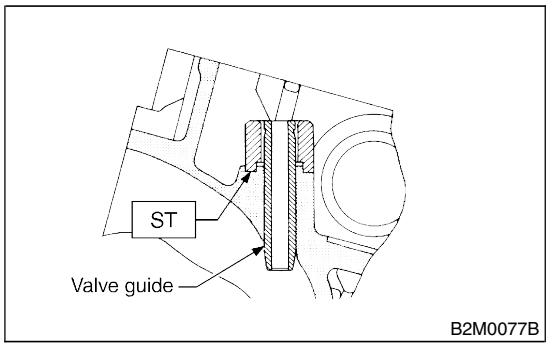
(2) Insert ST2 into valve guide and press it down to remove valve guide.

ST1 498267800 CYLINDER HEAD TABLE
ST2 499767200 VALVE GUIDE REMOVER



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

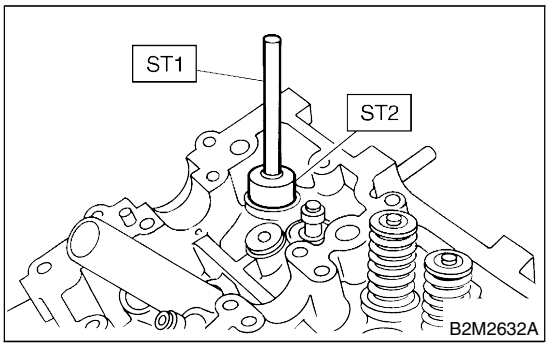
Intake side:
ST 499767700 VALVE GUIDE ADJUSTER
Exhaust side:
ST 499767800 VALVE GUIDE ADJUSTER



(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.

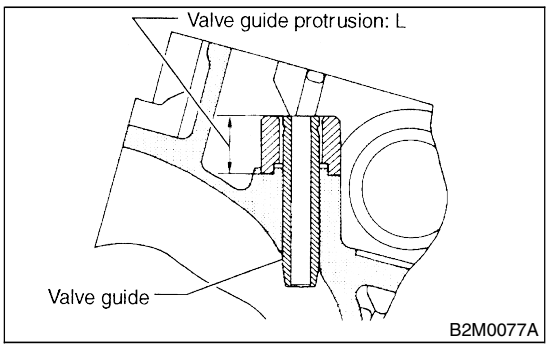
(5) Put new valve guide, coated with sufficient oil, in cylinder, and insert ST1 into valve guide. Press in until the valve guide upper end is flush with the upper surface of ST2.

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.

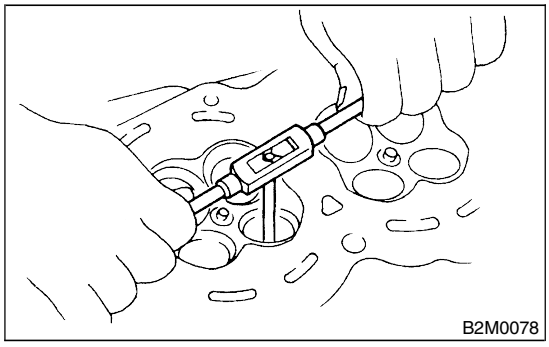
Valve guide protrusion: L
Intake
20.0 — 20.5 mm (0.787 — 0.807 in)
Exhaust
16.5 — 17.0 mm (0.650 — 0.669 in)



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

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

ST 499767400 VALVE GUIDE REAMER



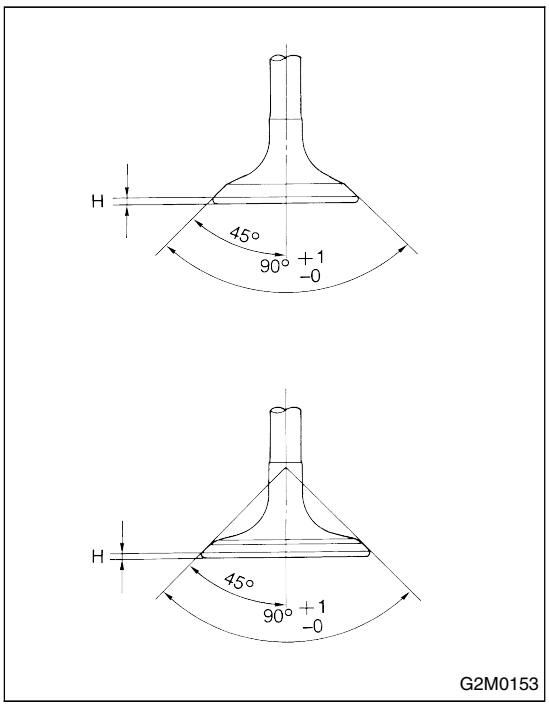
(8) Recheck the contact condition between valve and valve seat after replacing valve guide.

4. INTAKE AND EXHAUST VALVE S153093A0104

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)



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

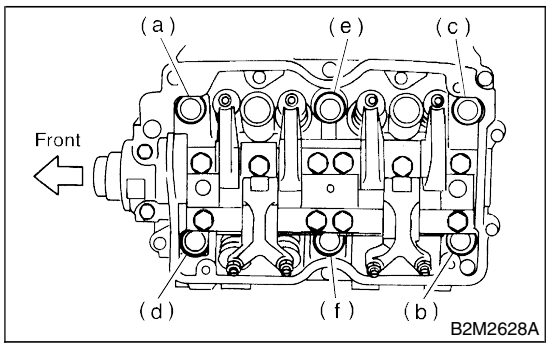
21. Cylinder Block S153090

A: REMOVAL S153090A18

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

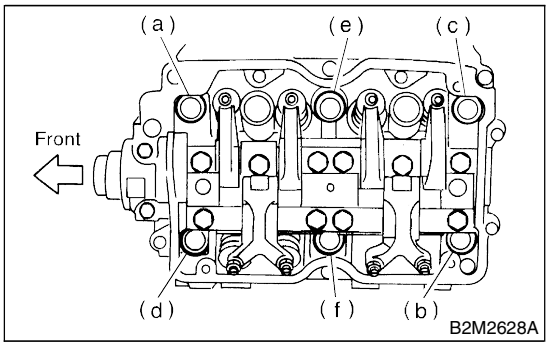
1) Remove intake manifold. <Ref. to FU(SOHC)-15, REMOVAL, Intake Manifold.> or <Ref. to FU(SOHCw/oOBD)-12, REMOVAL, Intake Manifold.>
2) Remove V-belt. <Ref. to ME(SOHC)-42, REMOVAL, V-belt.>
3) Remove crankshaft pulley. <Ref. to ME(SOHC)-44, REMOVAL, Crankshaft Pulley.>
4) Remove belt cover. <Ref. to ME(SOHC)-45, REMOVAL, Belt Cover.>
5) Remove timing belt assembly. <Ref. to ME(SOHC)-46, REMOVAL, Timing Belt Assembly.>
6) Remove camshaft sprocket. <Ref. to ME(SOHC)-51, REMOVAL, Camshaft Sprocket.>
7) Remove crankshaft sprocket. <Ref. to ME(SOHC)-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.

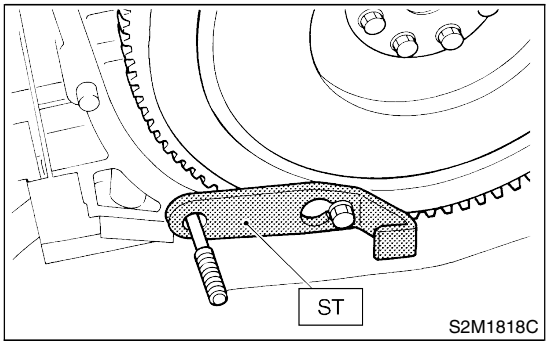
12) Remove bolts (a) and (b) to remove cylinder head.

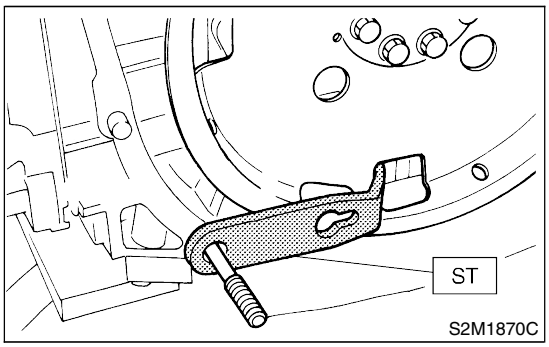


13) Remove cylinder head gasket.

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

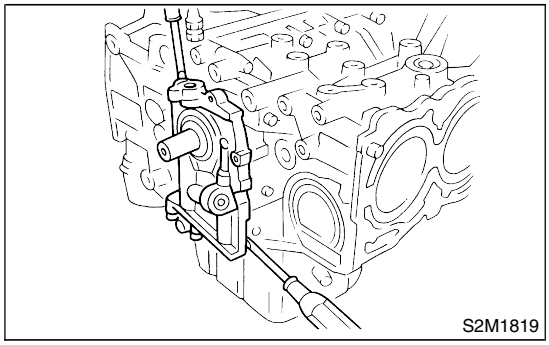




17) Remove oil separator cover.
18) Remove water by-pass pipe for heater.
19) Remove water pump.

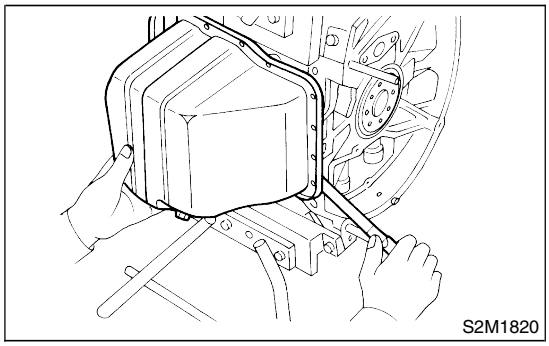
20) Remove oil pump from cylinder block.
Use a flat-bladed screwdriver as shown in figure when removing oil pump.

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

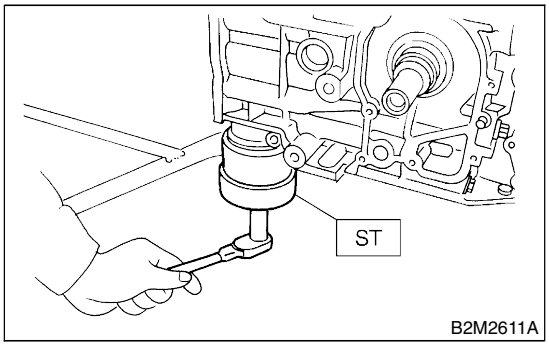

S2M1819

21) 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.

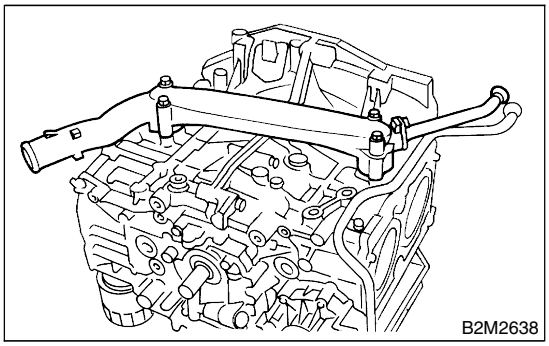

S2M1820

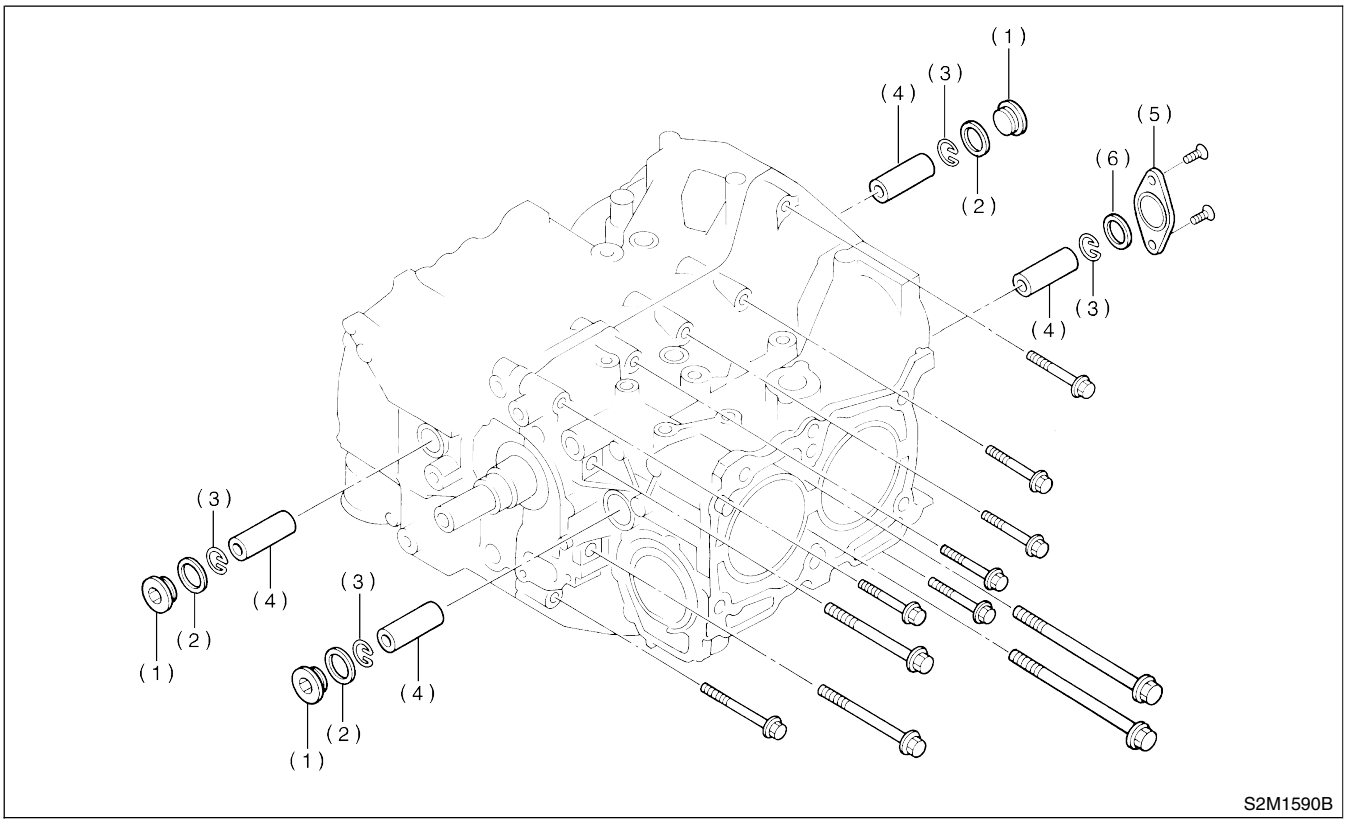
22) Remove oil strainer stay.
23) Remove oil strainer.
24) Remove baffle plate.
25) Remove oil filter using ST.
ST 498547000 OIL FILTER WRENCH



B2M2611A

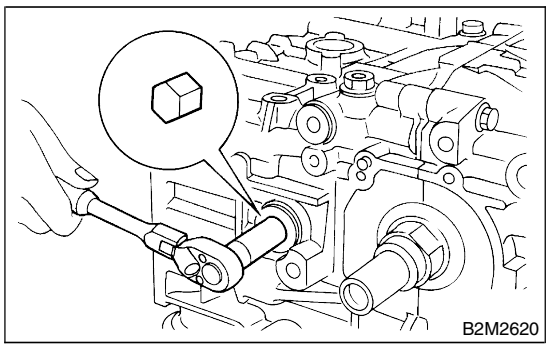
26) Remove water pipe.


B2M2638

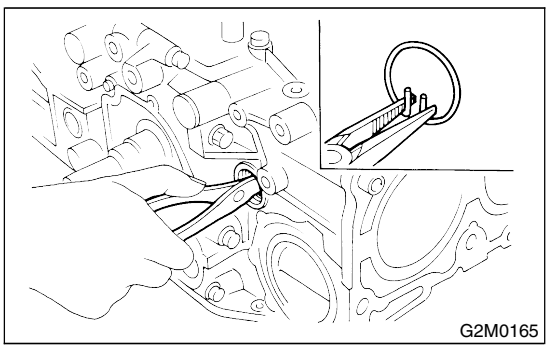


(1) Service hole plug
(2) Gasket
(3) Circlip
(4) Piston pin
(5) Service hole cover
(6) O-ring

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

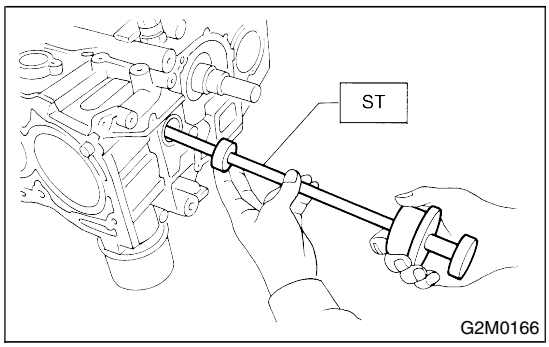


28) Rotate crankshaft to bring #1 and #2 pistons to bottom dead center position, then remove piston circlip through service hole of #1 and #2 cylinders.



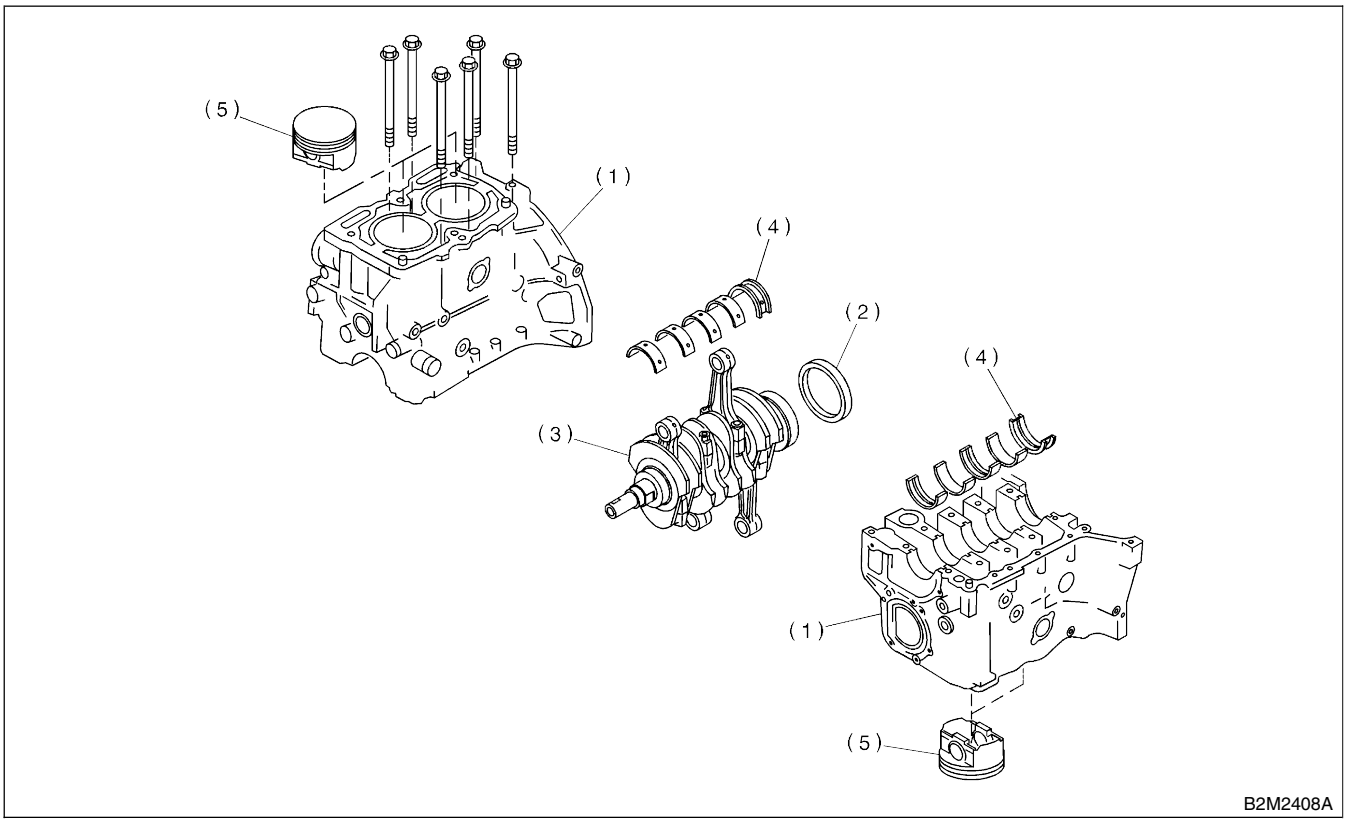
29) Draw out piston pin from #1 and #2 pistons using ST.
ST 499097700 PISTON PIN REMOVER

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



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



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

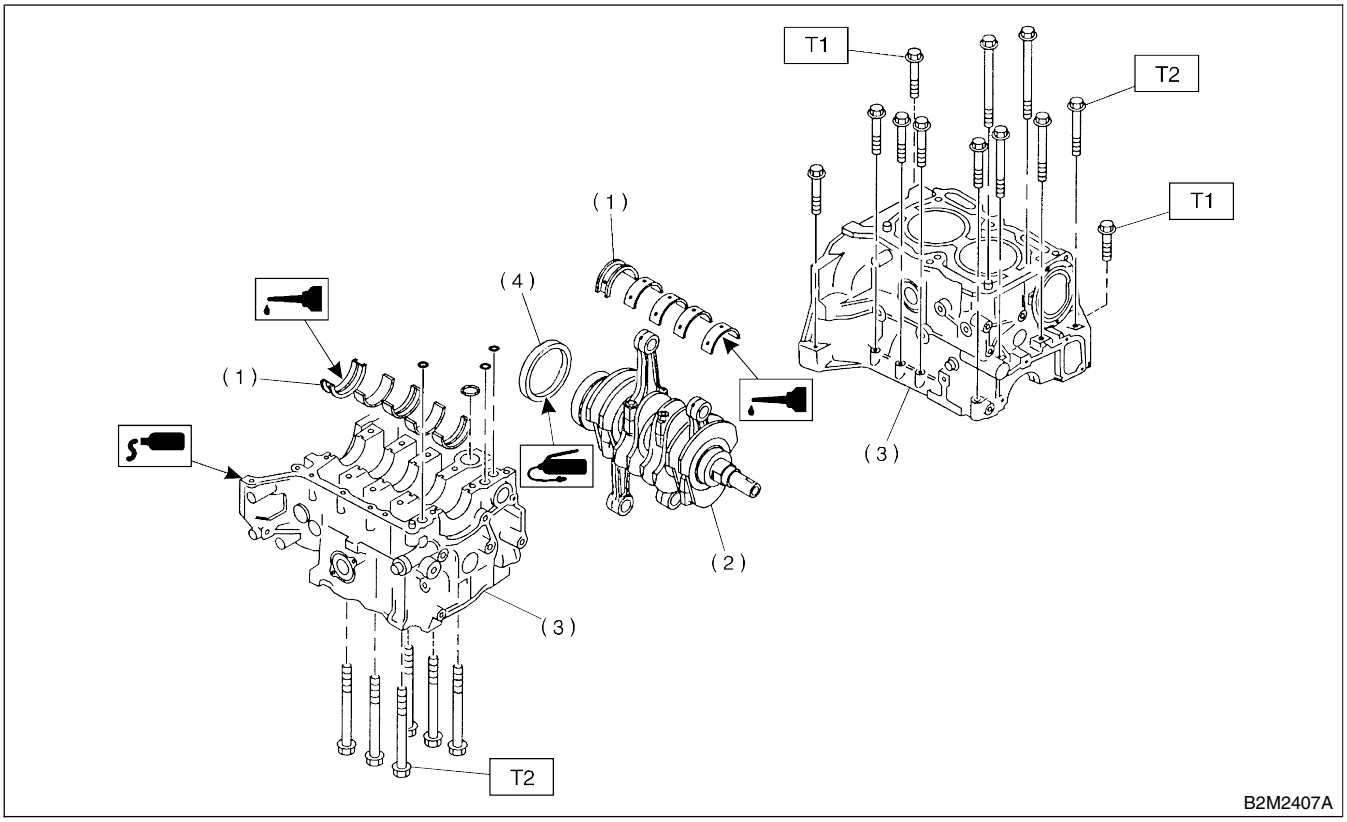
35) Remove rear oil seal.
36) Remove crankshaft together with connecting rod.
37) Remove crankshaft bearings from cylinder block using hammer handle.

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

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

CAUTION:
Do not confuse combination of piston and cylinder.

B: INSTALLATION S153090A11



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

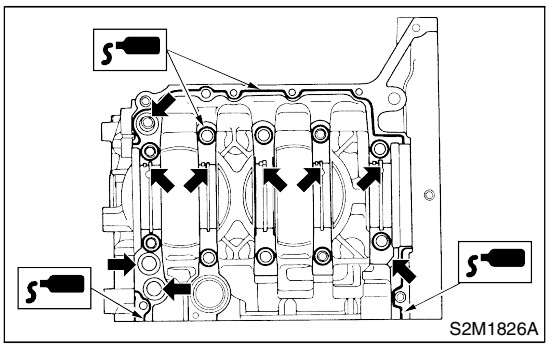
Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.1)
T2: 47 (4.8, 34.7)

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

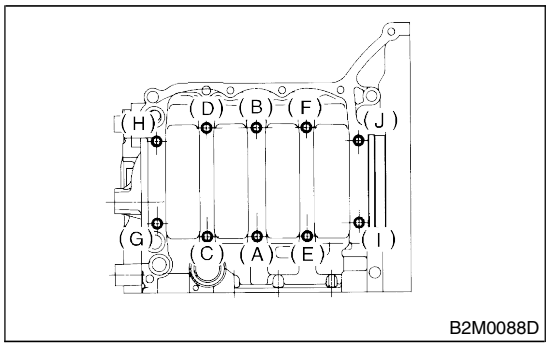
1) Position crankshaft on the #2 and #4 cylinder block.
2) Apply fluid packing to the mating surface of #1 and #3 cylinder block, and position it on #2 and #4 cylinder block.

Fluid packing:
THREE BOND 1215 or equivalent

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

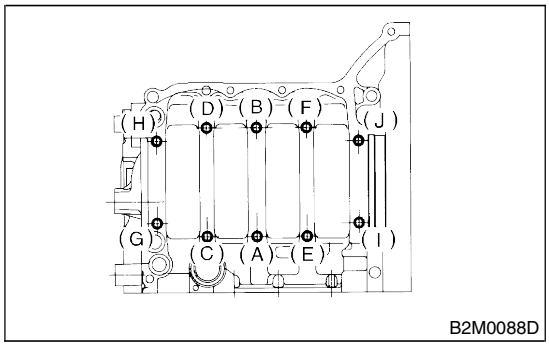


3) Temporarily tighten 10 mm cylinder block connecting bolts in alphabetical sequence shown in figure.



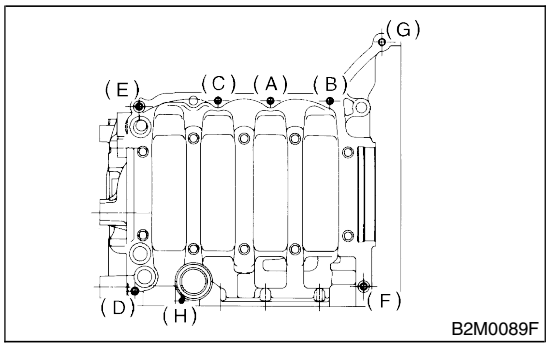
4) Tighten 10 mm cylinder block connecting bolts in alphabetical sequence.

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

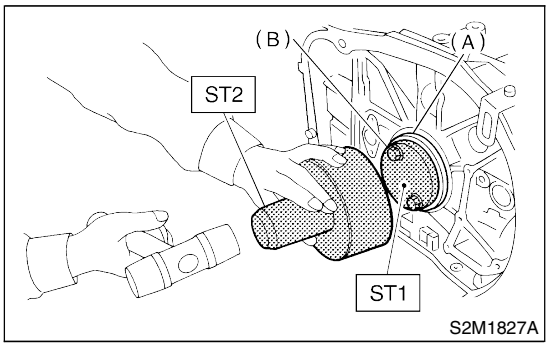


5) Tighten 8 mm and 6 mm cylinder block connecting bolts in alphabetical sequence shown in figure.

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)

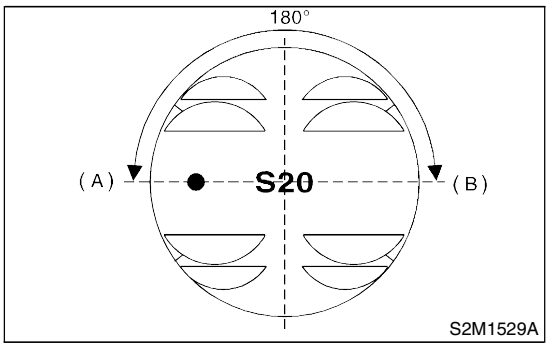


6) Install rear oil seal using ST1 and ST2.
ST1 499597100 OIL SEAL GUIDE
ST2 499587200 OIL SEAL INSTALLER

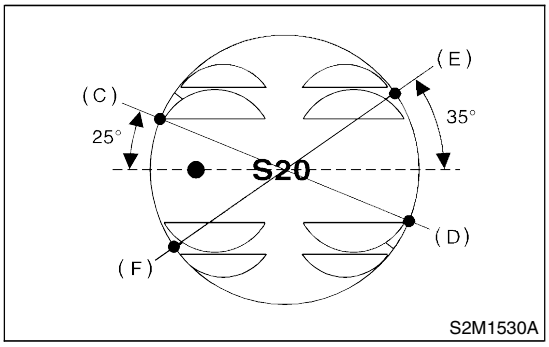


(A) Rear oil seal
(B) Flywheel attaching bolt

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



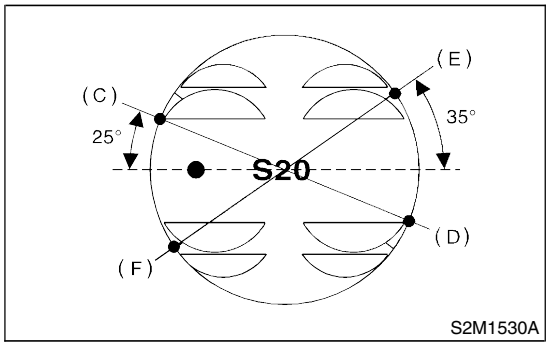
8) Position the second ring gap at 180° on the reverse side for the top ring gap.
9) Position the upper rail gap at (C) or (D) in the figure.



10) Position the expander gap at 180° of the reverse side for the upper rail gap.

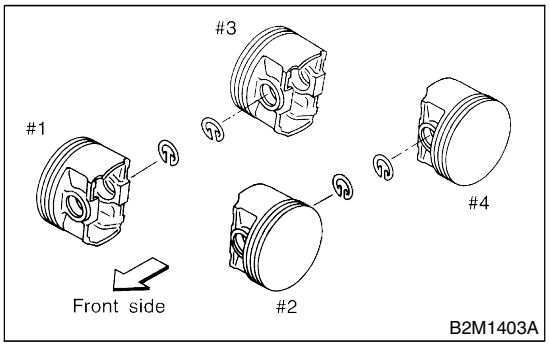
11) Position the lower rail gap at (E) or (F) in the figure.

CAUTION:
• Ensure ring gaps do not face the same direction.
• Ensure ring gaps are not within the piston skirt area.

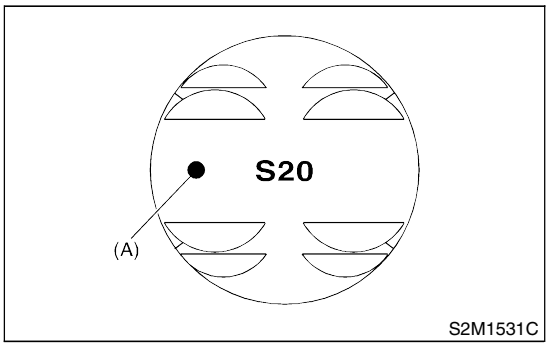


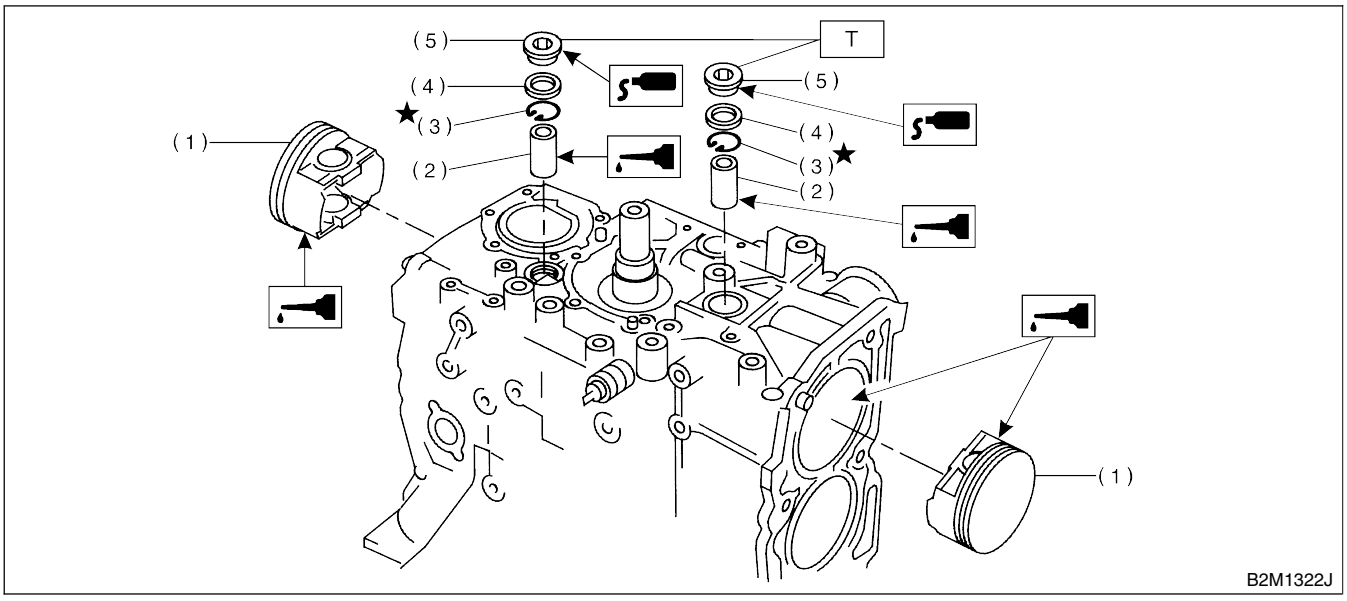
12) Install circlip.
Install circlips in piston holes located opposite service holes in cylinder block, when positioning all pistons in the corresponding cylinders.

CAUTION:
Use new circlips.



CAUTION:
Piston front mark faces towards the front of the engine.





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

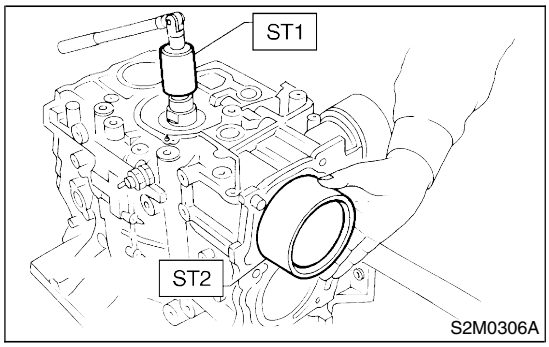
Tightening torque: N·m (kgf-m, ft-lb)
T: 69 (7.0, 50.6)

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.

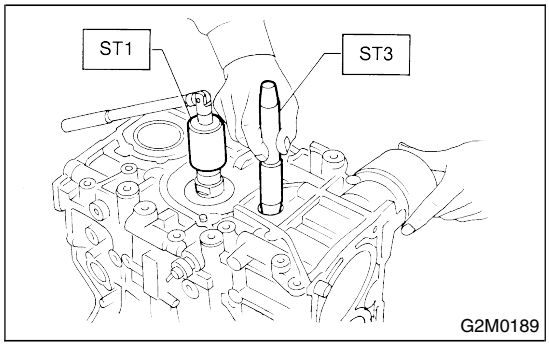
ST2 498747100 PISTON GUIDE



14) Installing piston pin
(1) Insert ST3 into service hole to align piston pin hole with connecting rod small end.

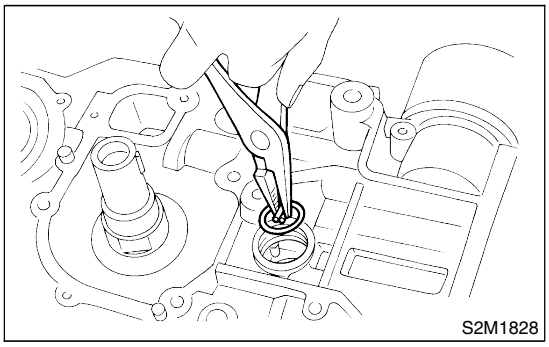
CAUTION:
Apply a coat of engine oil to ST3 before insertion.

ST3 499017100 PISTON PIN GUIDE



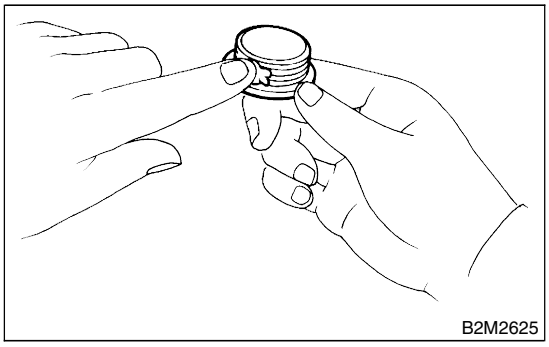
(2) Apply a coat of engine oil to piston pin and insert piston pin into piston and connecting rod through service hole.
(3) Install circlip.

CAUTION:
Use new circlips.



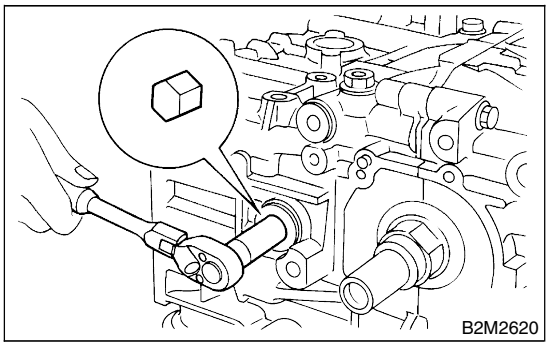
(4) Apply fluid packing around the service hole plug.

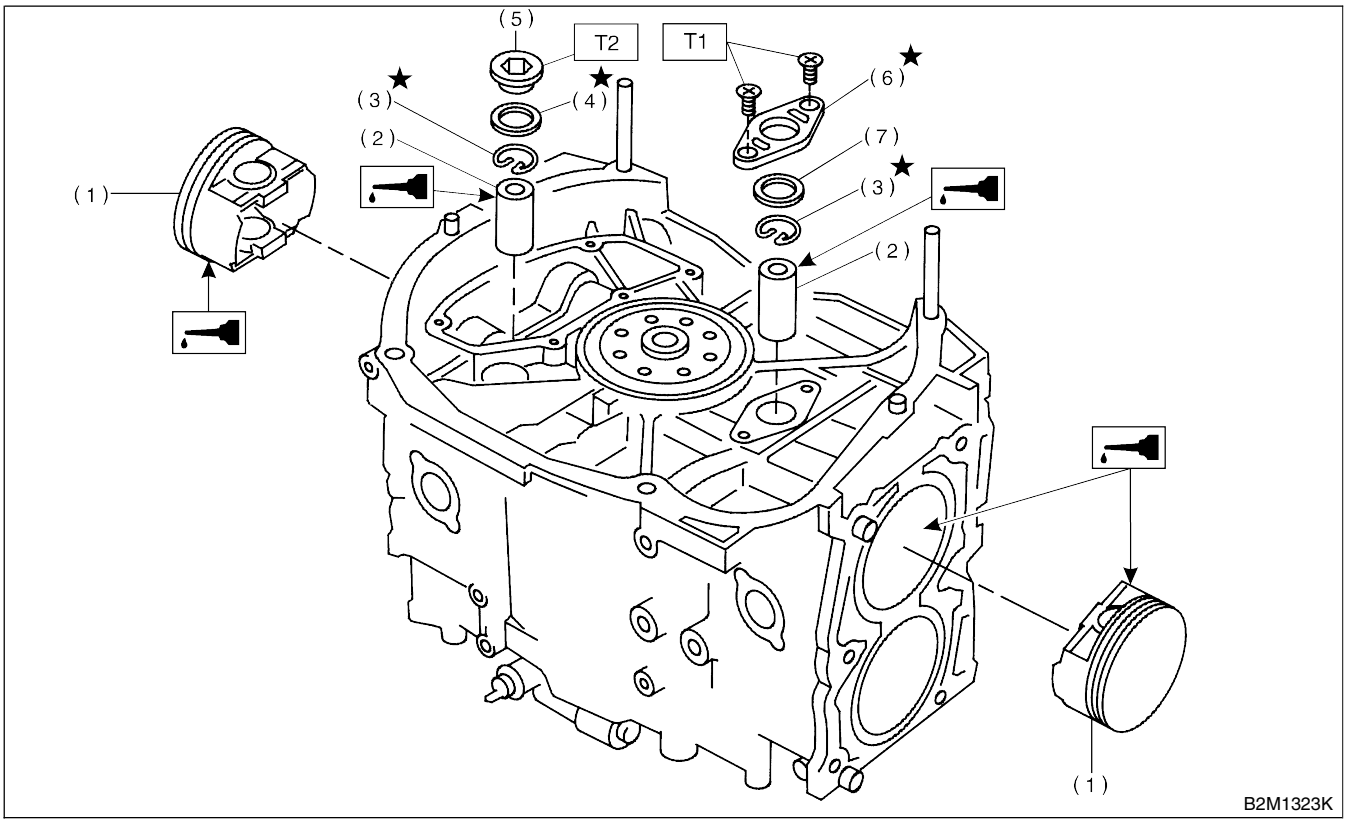
Fluid packing:
THREE BOND 1215 or equivalent



(5) Install service hole plug and gasket.

CAUTION:
Use a new gasket.



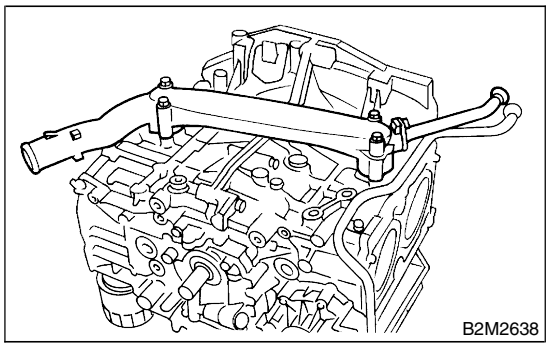


(1) Piston
(2) Piston pin
(3) Circlip
(4) Gasket
(5) Service hole plug
(6) Service hole cover
(7) O-ring

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.



16) Install baffle plate.

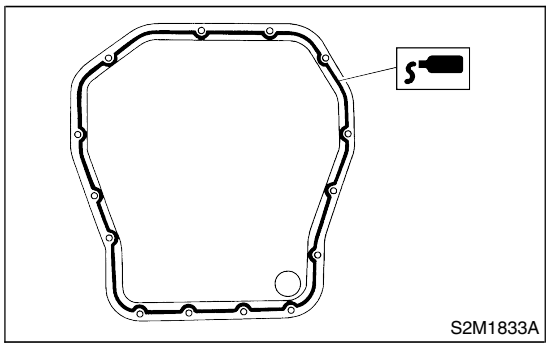
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

17) Install oil strainer and O-ring

Tightening torque:
10 N·m (1.0 kgf-m, 7 ft-lb)

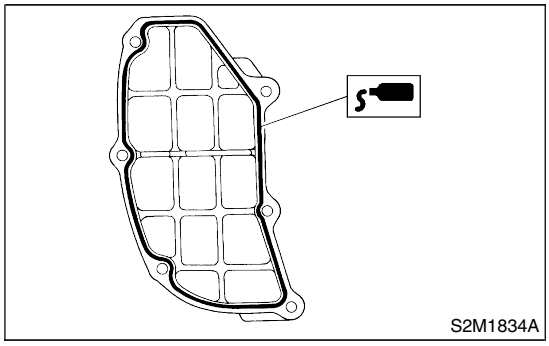
18) Install oil strainer stay.
19) Apply fluid packing to matching surfaces and install oil pan.

Fluid packing:
THREE BOND 1215 or equivalent



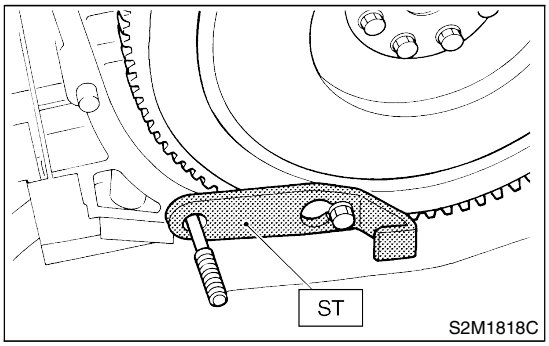
20) Apply fluid packing to matching surfaces and install oil separator cover.

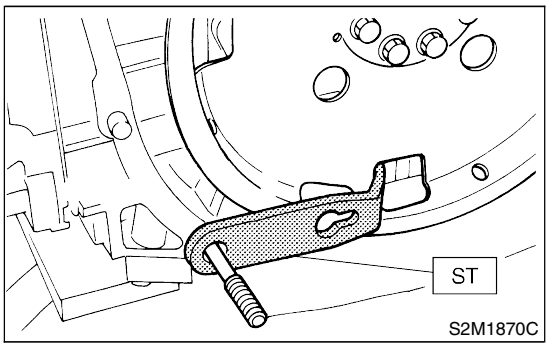
Fluid packing:
THREE BOND 1215 or equivalent



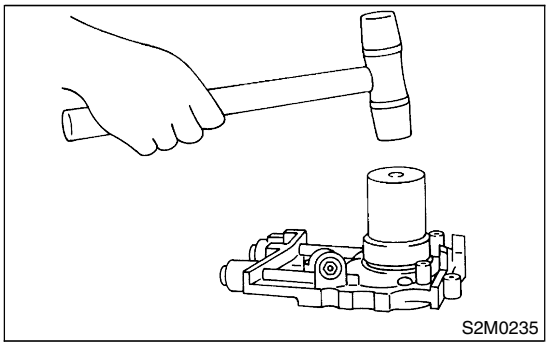
21) Install flywheel or drive plate.
To lock crankshaft, use ST.
ST 498497100 CRANKSHAFT STOPPER

Tightening torque:
72 N·m (7.3 kgf-m, 52.8 ft-lb)



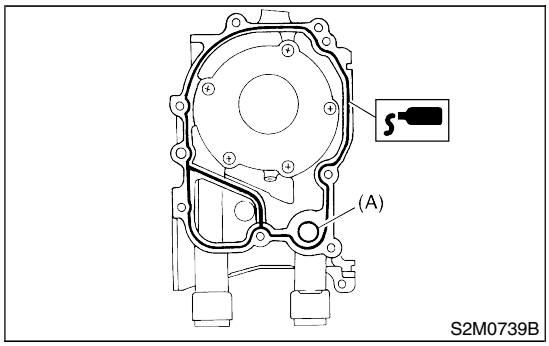


22) Install housing cover.
23) Installation of oil pump.
(1) Discard front oil seal after removal. Replace with a new one using ST.
ST 499587100 OIL SEAL INSTALLER

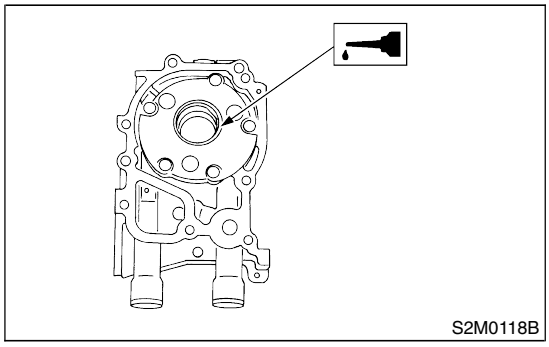


(2) Apply fluid packing to matching surface of oil pump.

Fluid packing:
THREE BOND 1215 or equivalent



(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.

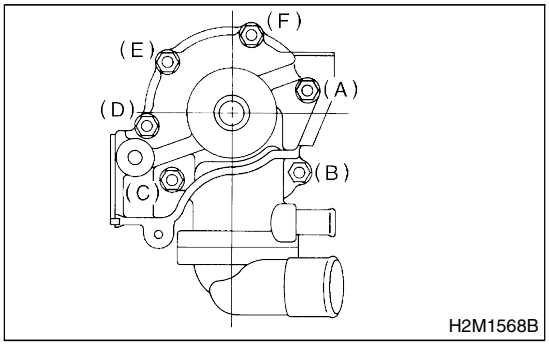
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

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.

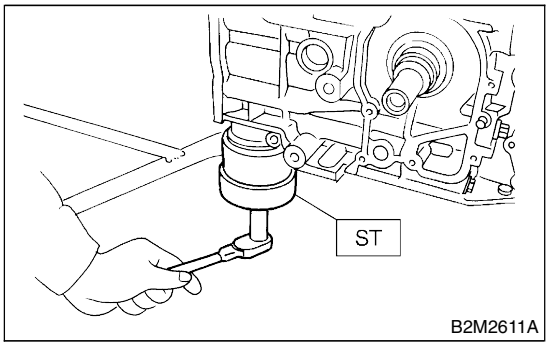
24) Install water pump and gasket.

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 filter using ST.
ST 498547000 OIL FILTER WRENCH

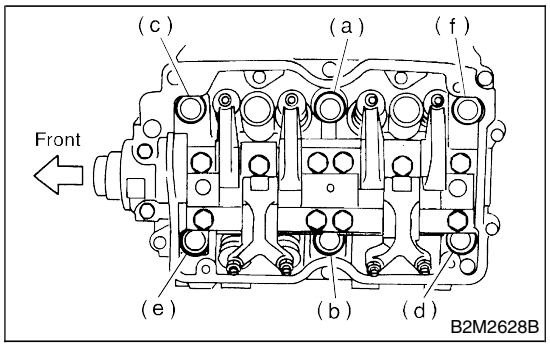


27) Tighten cylinder head bolts.
(1) Apply a coat of engine oil to washers and bolt threads.
(2) Tighten all bolts to 29 N·m (3.0 kgf-m, 22 ft-lb) in alphabetical sequence.
Then tighten all bolts to 69 N·m (7.0 kgf-m, 51 ft-lb) in alphabetical sequence.
(3) Back off all bolts by 180° first; back them 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°.

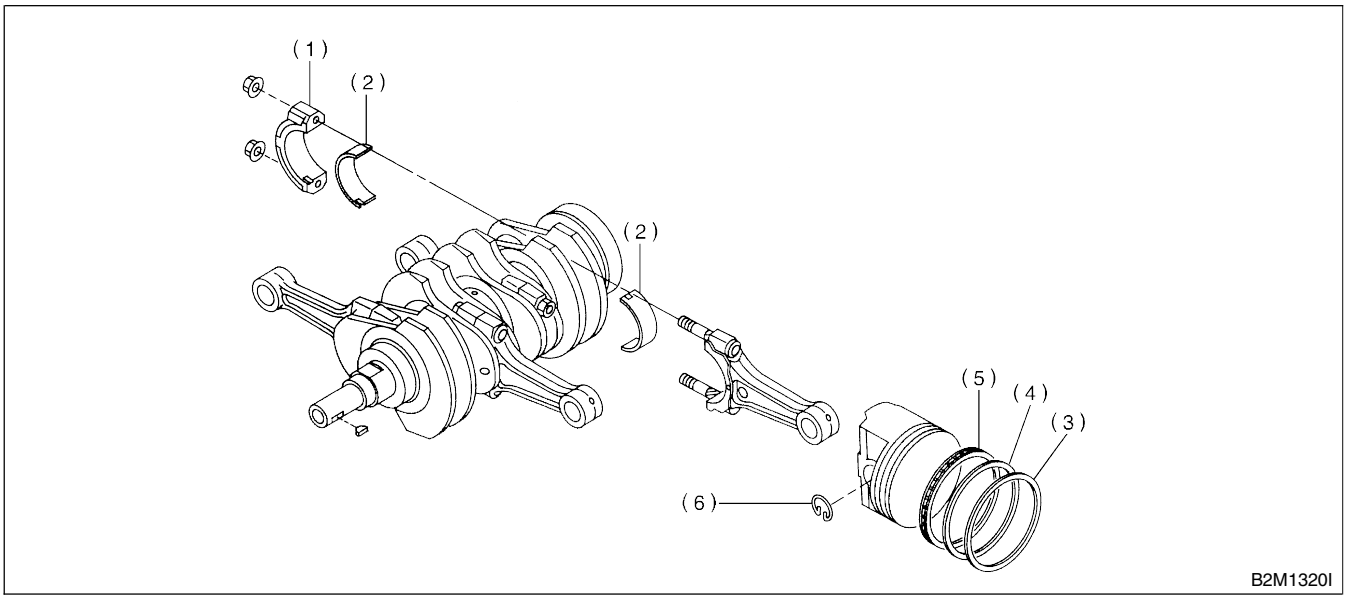
(7) Further tighten all bolts by 80 to 90° in alphabetical sequence.

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



28) Install oil level gauge guide and tighten attaching bolt (left side only).
29) Install rocker cover.
30) Install crankshaft sprocket. <Ref. to ME(SOHC)-53, INSTALLATION, Crankshaft Sprocket.>
31) Install camshaft sprocket. <Ref. to ME(SOHC)-51, INSTALLATION, Camshaft Sprocket.>
32) Install timing belt assembly. <Ref. to ME(SOHC)-47, INSTALLATION, Timing Belt Assembly.>
33) Install belt cover. <Ref. to ME(SOHC)-45, INSTALLATION, Belt Cover.>
34) Install crankshaft pulley. <Ref. to ME(SOHC)-44, INSTALLATION, Crankshaft Pulley.>
35) Install generator and A/C compressor brackets on cylinder head.
36) Install V-belt. <Ref. to FU(SOHC)-17, INSTALLATION, Intake Manifold.> <Ref. to ME(SOHC)-42, INSTALLATION, V-belt.>
37) Install intake manifold. <Ref. to FU(SOHC)-17, INSTALLATION, Intake Manifold.> or <Ref. to FU(SOHCw/oOBD)-15, INSTALLATION, Intake Manifold.>

C: DISASSEMBLY S153090A06



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

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

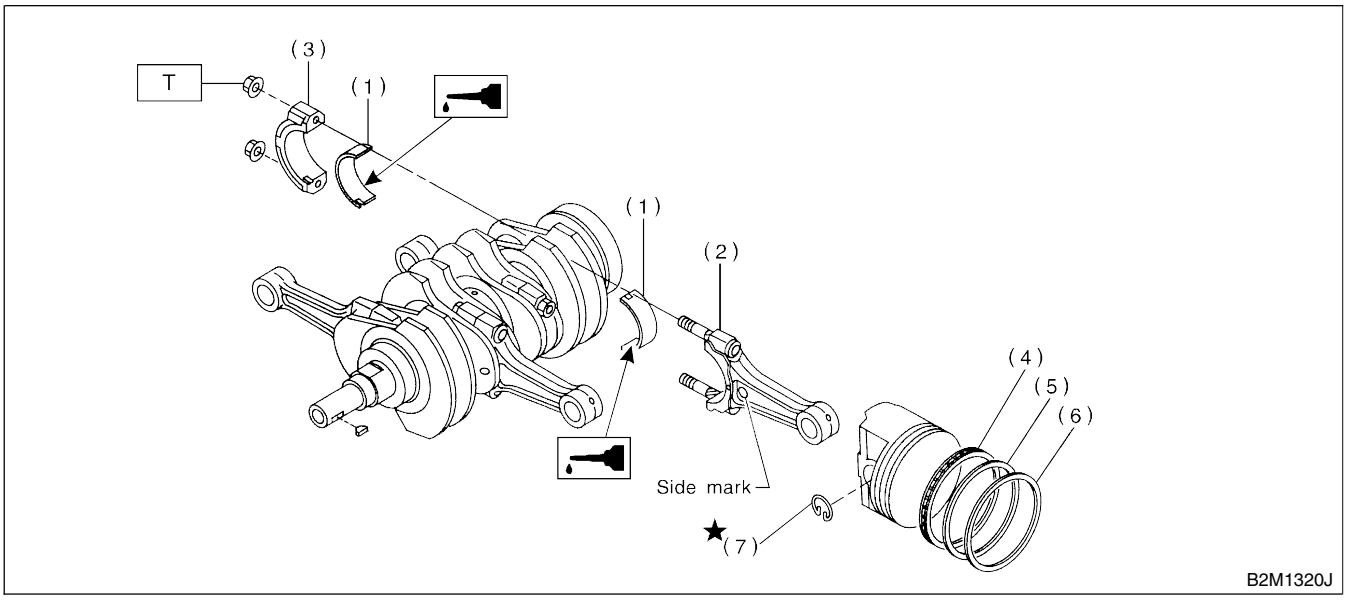
CAUTION:
Arrange removed connecting rod, connecting rod cap and bearing in order to prevent confusion.

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

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

5) Remove circlip.

D: ASSEMBLY S153090A02



(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 S153090A10

1. CYLINDER BLOCK S153090A1001

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)

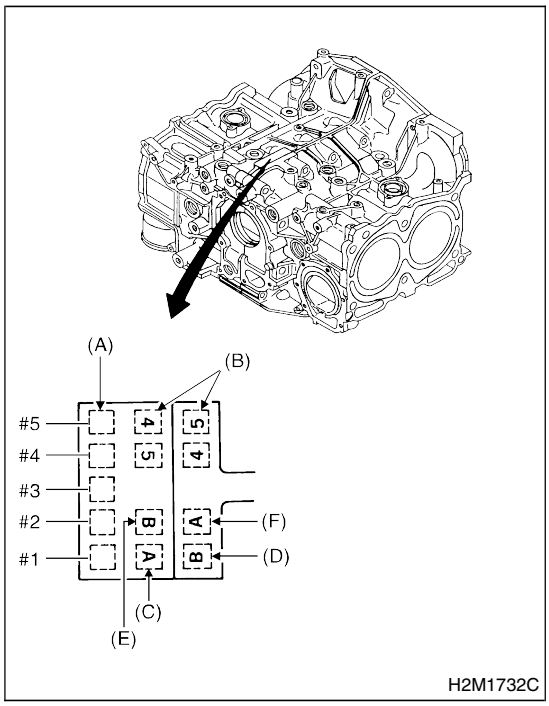
2. CYLINDER AND PISTON S153090A1002

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: 92.005 — 92.015 mm (3.6222 — 3.6226 in)
B: 91.995 — 92.005 mm (3.6218 — 3.6222 in)



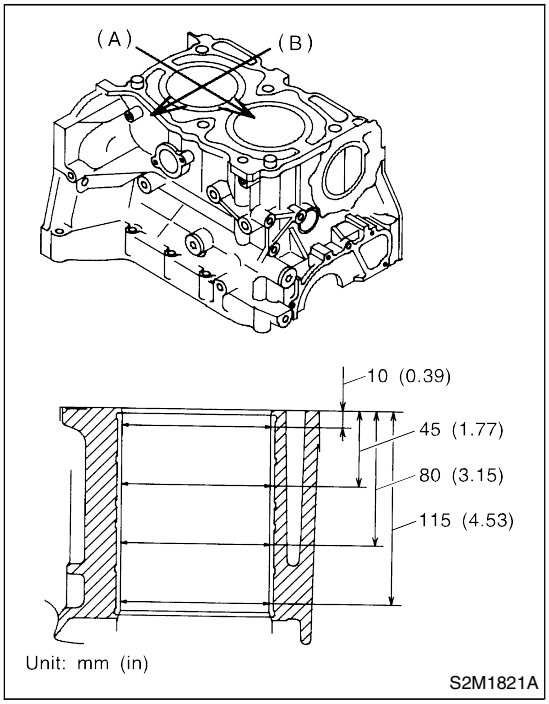
(A) Main jourual size mark
(B) Cylinder block RH-LH combination mark
(C) #1 cylinder bore size mark
(D) #2 cylinder bore size mark
(E) #3 cylinder bore size mark
(F) #4 cylinder bore size mark

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

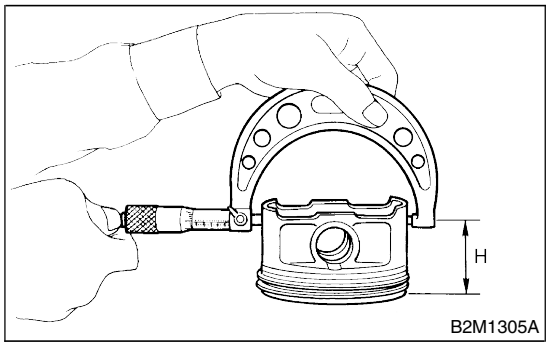
3) When piston is to be replaced due to general or cylinder wear, determine a suitable sized piston by measuring the piston clearance.

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:
40.0 mm (1.575 in)

Piston outer diameter:
Standard
A: 91.985 — 91.995 mm (3.6214 — 3.6218 in)
B: 91.975 — 91.985 mm (3.6211 — 3.6214 in)
0.25 mm (0.0098 in) oversize
92.225 — 92.235 mm (3.6309 — 3.6313 in)
0.50 mm (0.0197 in) oversize
92.475 — 92.485 mm (3.6407 — 3.6411 in)



5) Calculate the clearance between cylinder and piston.

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

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

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

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

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

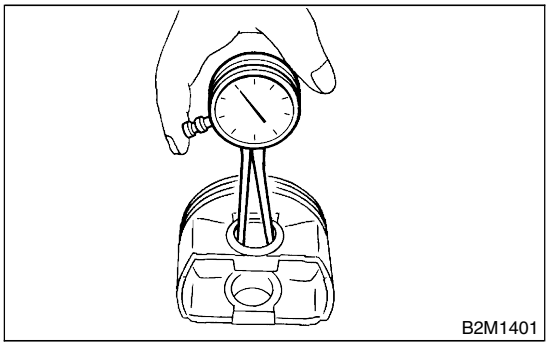
CAUTION:
Immediately after reboring, the cylinder diameter may differ from its real diameter due to temperature rise. Thus, pay attention to this when measuring the cylinder diameter.

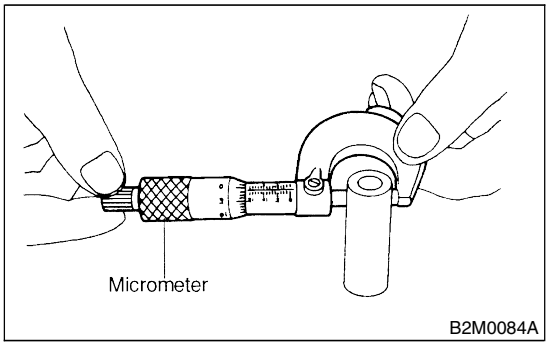
Limit of cylinder enlarging (boring):
0.5 mm (0.020 in)

3. PISTON AND PISTON PIN *S153090A1003*

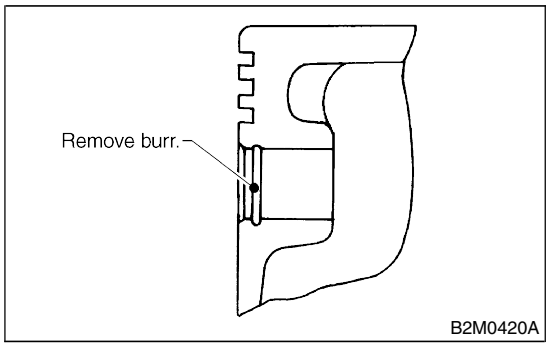
1) Check pistons and piston pins for damage, cracks, and wear and the piston ring grooves for wear and damage. Replace if defective.
2) Measure the piston-to-cylinder clearance at each cylinder. <Ref. to ME(SOHC)-81, CYLINDER AND PISTON, INSPECTION, Cylinder Block.> If any of the clearances is not to 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)





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.



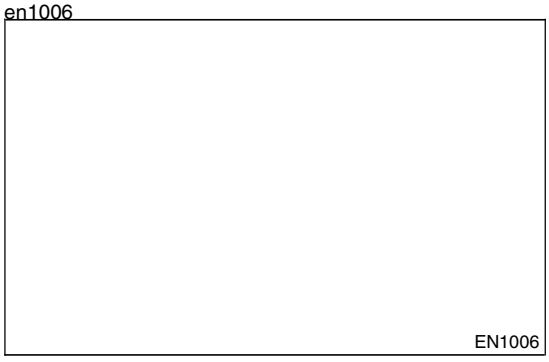
5) Check piston pin circlip for distortion, cracks and wear.

4. PISTON RING S153090A1004

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

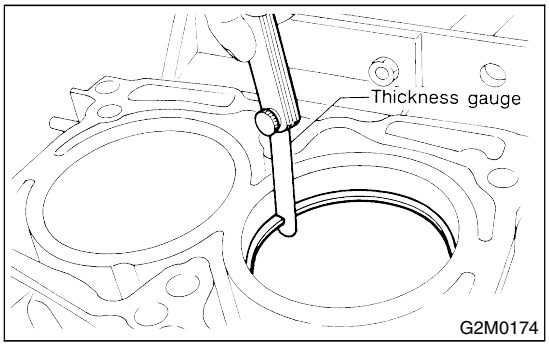


(A) Top ring
(B) Second ring
(C) Oil ring
(a) Upper rail
(b) Spacer
(c) Lower rail

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)

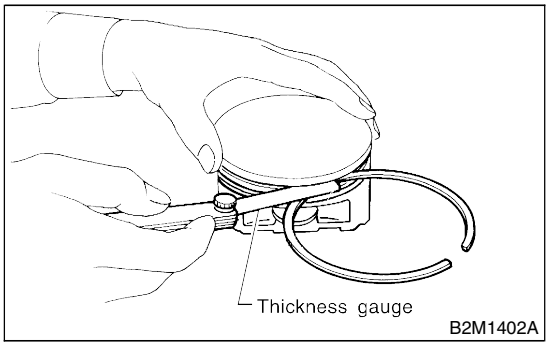


3) Measure the clearance between piston ring and piston ring groove with a thickness gauge.

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

Unit: mm (in)

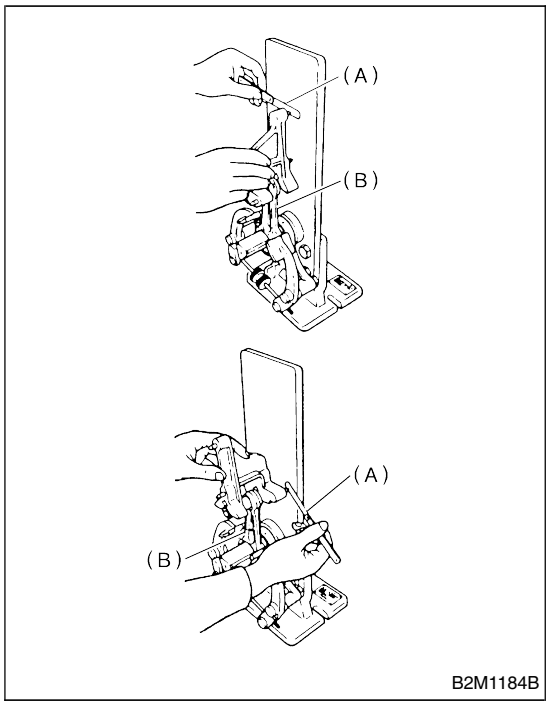
		Standard	Limit
Clearance between piston ring and piston ring groove	Top ring	0.040 — 0.080 (0.0016 — 0.0031)	0.15 (0.0059)
	Second ring	0.030 — 0.070 (0.0012 — 0.0028)	0.15 (0.0059)



5. CONNECTING ROD S153090A1005

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)

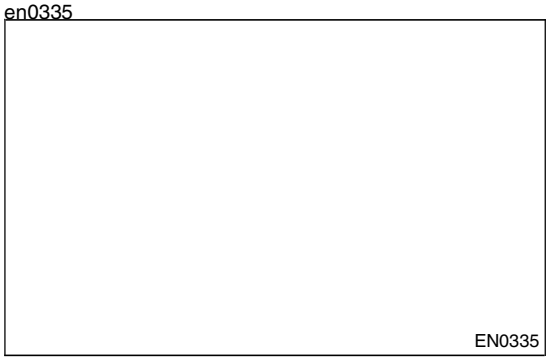


(A) Thickness gauge
(B) Connecting rod

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)

en0335



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.)

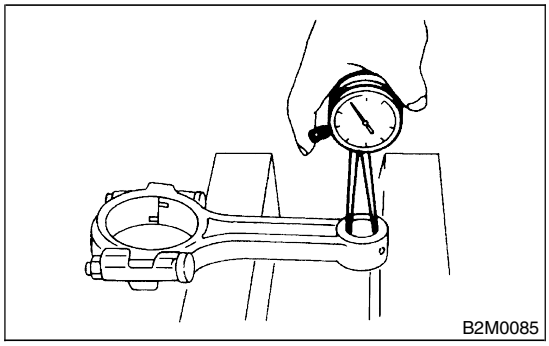
Connecting rod oil clearance:
Standard
0.010 — 0.038 mm (0.0004 — 0.0015 in)
Limit
0.05 mm (0.0020 in)

Unit: mm (in)

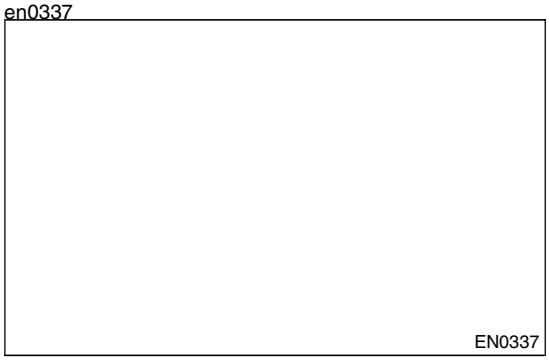
Bearing	Bearing size (Thickness at center)	Outer diameter of crank pin
Standard	1.492 — 1.501 (0.0587 — 0.0591)	51.984 — 52.000 (2.0466 — 2.0472)
0.03 (0.0012) undersize	1.510 — 1.513 (0.0594 — 0.0596)	51.954 — 51.970 (2.0454 — 2.0461)
0.05 (0.0020) undersize	1.520 — 1.523 (0.0598 — 0.0600)	51.934 —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

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

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

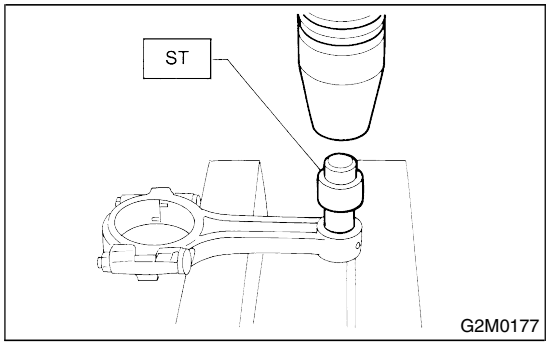

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en0337


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.

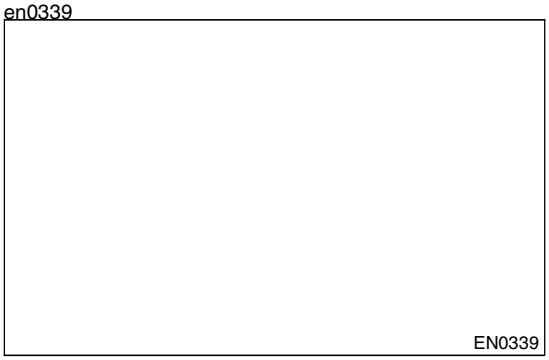
6. CRANKSHAFT AND CRANKSHAFT BEARING S153090A1006

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.

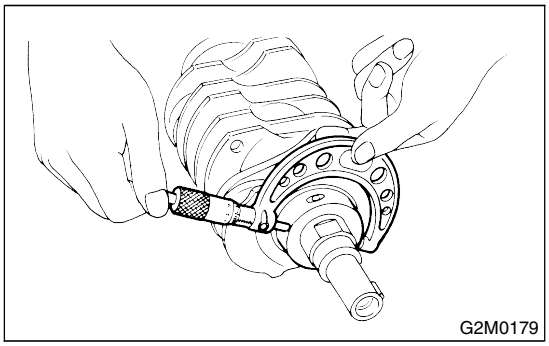
Crankshaft bend limit:
0.035 mm (0.0014 in)

en0339


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

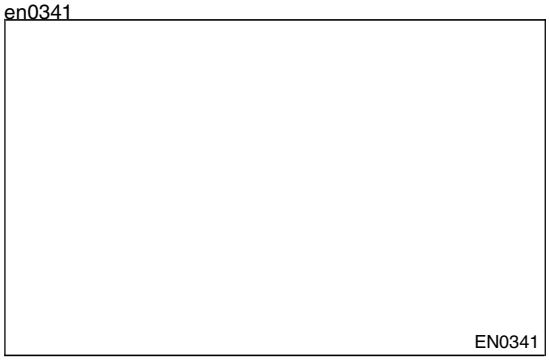
				Unit: mm (in)
		Crank journal diameter		Crank pin diameter
		#1, #3	#2, #4, #5	
Standard	Journal O.D.	59.992 — 60.008 (2.3619 — 2.3625)	59.992 — 60.008 (2.3619 — 2.3625)	51.984 — 52.000 (2.0466 — 2.0472)
	Bearing size (Thickness at center)	1.998 — 2.011 (0.0787 — 0.0792)	2.000 — 2.013 (0.0787 — 0.0793)	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

S153095

A: INSPECTION S153095A10

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(SOHC)-2, Basic Diagnostic Procedure.> or <Ref. to EN(SOHCw/oOBD)-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(SOHC)-2, Basic Diagnostic Procedure.> or <Ref. to EN(SOHCw/oOBD)-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(SOHC)-2, Basic Diagnostic Procedure.> or <Ref. to EN(SOHCw/oOBD)-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(SOHC)-2, Basic Diagnostic Procedure.> or <Ref. to EN(SOHCw/oOBD)-2, Basic Diagnostic Procedure.>		A
	• Intake system	• Loosened or cracked intake duct	A
		• Loosened or cracked PCV hose	A
		• Loosened or cracked vacuum hose	A
		• Defective intake manifold gasket	B
		• Defective throttle body gasket	B
		• Defective PCV valve	C
		• Loosened oil filter cap	B
		• Dirty air cleaner element	C
	• Fuel line	• Defective fuel pump and relay	C
		• Clogged fuel line	C
		• Lack of or insufficient fuel	B
	• 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(SOHC)-2, Basic Diagnostic Procedure.> or <Ref. to EN(SOHCw/oOBD)-2, Basic Diagnostic Procedure.>		A
	• Intake system	• Loosened or cracked intake duct	A
		• Loosened or cracked PCV hose	A
		• Loosened or cracked vacuum hose	B
		• Defective intake manifold gasket	B
		• Defective throttle body gasket	B
		• Defective PCV valve	B
		• Loosened oil filter cap	B
		• Dirty air cleaner element	A
	• Fuel line	• Defective fuel pump and relay	B
		• Clogged fuel line	B
		• Lack of or insufficient fuel	C
	• 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(SOHC)-2, Basic Diagnostic Procedure.> or <Ref. to EN(SOHC)-2, Basic Diagnostic Procedure.>		A
	• Intake system	• Loosened or cracked intake duct	A
		• Loosened or cracked PCV hose	A
		• Loosened or cracked vacuum hose	A
		• Defective intake manifold gasket	B
		• Defective throttle body gasket	B
		• Defective PCV valve	B
		• Loosened oil filter cap	B
		• Dirty air cleaner element	B
	• Fuel line	• Defective fuel pump and relay	B
		• Clogged fuel line	B
		• Lack of or insufficient fuel	C
	• 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(SOHC)-2, Basic Diagnostic Procedure.> or <Ref. to EN(SOHCw/oOBD)-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(SOHC)-2, Basic Diagnostic Procedure.> or <Ref. to EN(SOHCw/oOBD)-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(SOHC)-2, Basic Diagnostic Procedure.> or <Ref. to EN(SOHCw/oOBD)-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(SOHC)-2, Basic Diagnostic Procedure.> or <Ref. to EN(SOHCw/oOBD)-2, Basic Diagnostic Procedure.>		A
	• Intake system	• Loosened oil filter cap	B
	• Belt	• Defective timing	B
	• Compression	• Incorrect valve clearance	C
		• Incorrect valve timing	B
	• Cooling system	• Overheating	A
9. Excessive engine oil consumption	• Intake system	• Loosened or cracked PCV hose	A
		• Defective PCV valve	B
		• Loosened oil filter cap	C
	• Compression	• Defective valve stem	A
		• Worn or stuck piston rings, cylinder and piston	A
	• Lubrication system	• Loosened oil pump attaching bolts and defective gasket	B
		• Defective oil filter seal	B
		• Defective crankshaft oil seal	B
		• Defective rocker cover gasket	B
		• Loosened oil drain plug or defective gasket	B
		• Loosened oil pan fitting bolts or defective oil pan	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
10. Excessive fuel consumption	• Engine control system <Ref. to EN(SOHC)-2, Basic Diagnostic Procedure.> or <Ref. to EN(SOHCw/oOBD)-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 S153096

A: INSPECTION S153096A10

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(SOHC)-45, OPERATION, Clear Memory Mode.> or <Ref. to EN(SOHCw/oOBD)-31, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.> or <Ref. to EN(SOHCw/oOBD)-29, OPERATION, Inspection Mode.> after connecting fuel injector connector.

MEMO:

EXHAUST

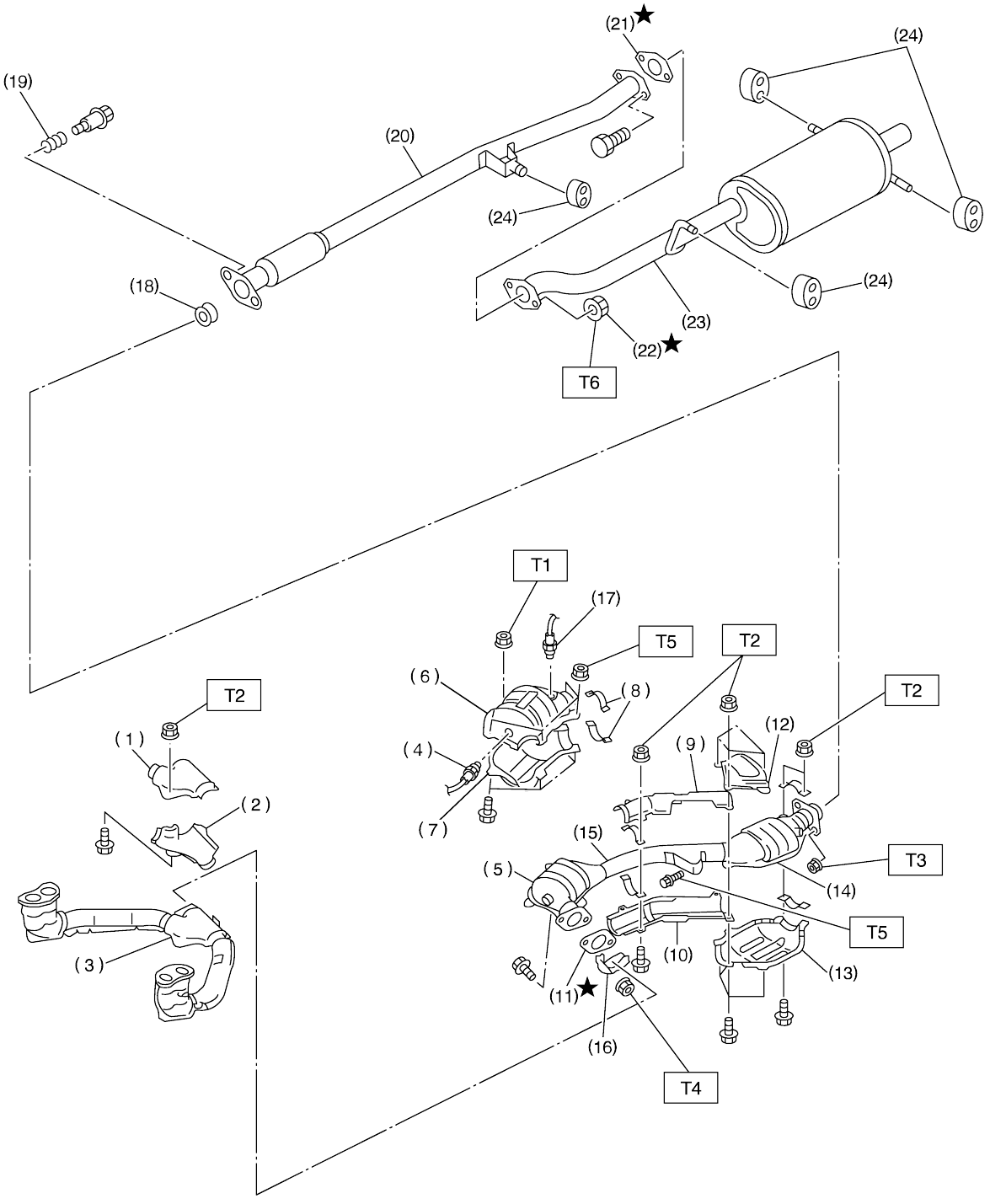
EX(SOHC)

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2. Front Exhaust Pipe....5
3. Center Exhaust Pipe....8
4. Rear Exhaust Pipe....9
5. Muffler....11

1. General Description S152001

A: COMPONENT S152001A05



S2M2132A

(1) Upper front exhaust pipe cover CTR
(2) Lower front exhaust pipe cover CTR
(3) Front exhaust pipe
(4) Front oxygen (A/F) sensor
(5) Front catalytic converter
(6) Upper front catalytic converter cover
(7) Lower front catalytic converter cover
(8) Clamp
(9) Upper center exhaust pipe cover
(10) Lower center exhaust pipe cover
(11) Gasket
(12) Upper rear catalytic converter cover
(13) Lower rear catalytic converter cover
(14) Rear catalytic converter
(15) Center exhaust pipe
(16) Protector
(17) Rear oxygen sensor
(18) Gasket
(19) Spring
(20) Rear exhaust pipe
(21) Gasket
(22) Self-lock nut
(23) Muffler
(24) Cushion rubber

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)

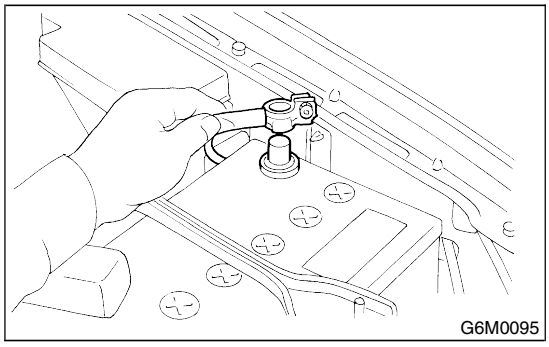
B: CAUTION S152001A03

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

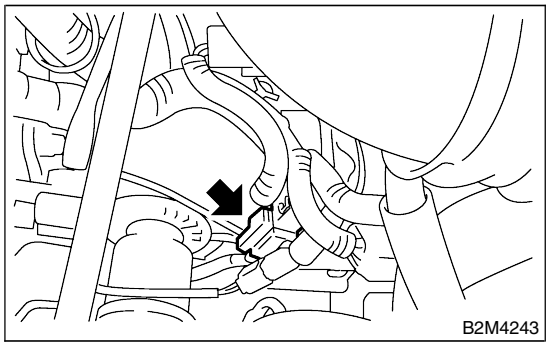
2. Front Exhaust Pipe S152065

A: REMOVAL S152065A18

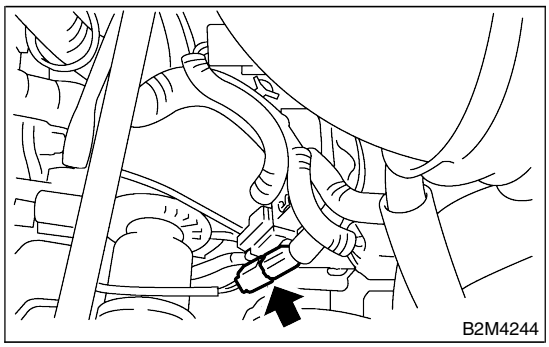
1) Disconnect battery ground cable.


G6M0095

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

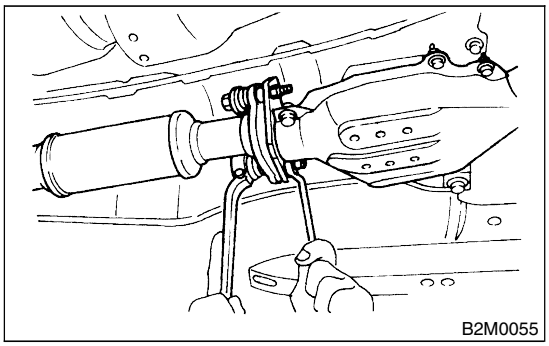

B2M4243

3) Disconnect rear oxygen sensor connector.


B2M4244

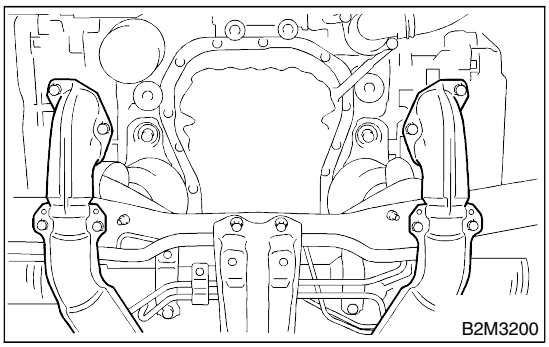
4) Lift-up the vehicle.
5) Remove under cover. <Ref. EI-11, REMOVAL, Front Under Cover.>
6) Separate front and center exhaust pipe assembly from rear exhaust pipe.

WARNING:
Be careful, exhaust pipe is hot.

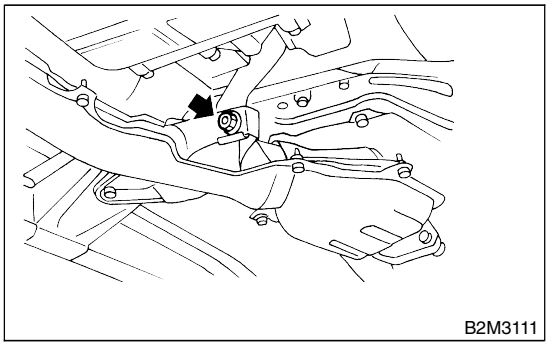

B2M0055

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

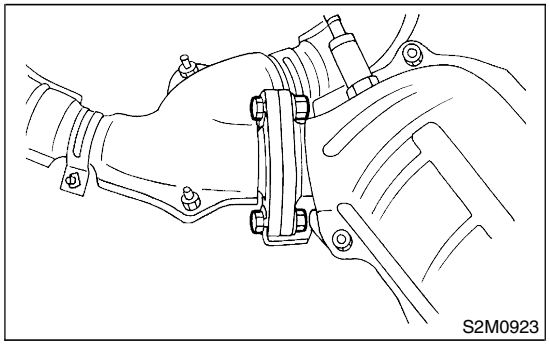
8) Remove bolt which installs front and center exhaust pipe assembly to hanger bracket.


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.

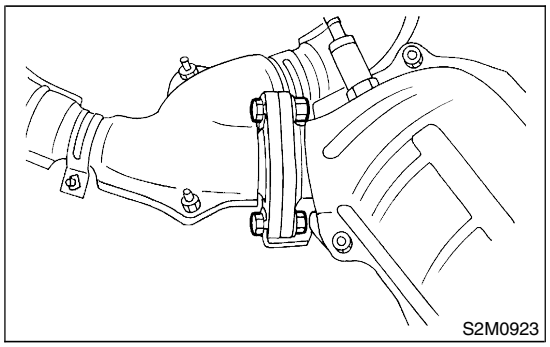

S2M0923

B: INSTALLATION S152065A11

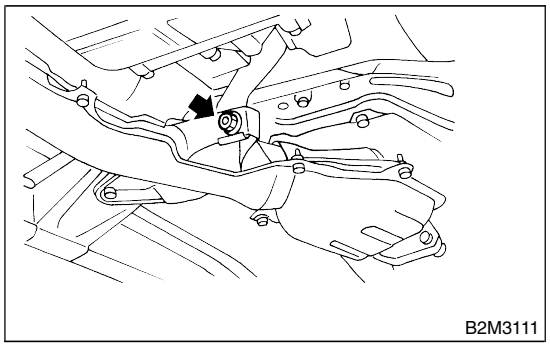
1) Install front exhaust pipe to center exhaust pipe.

CAUTION:
Replace gaskets with new ones.

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

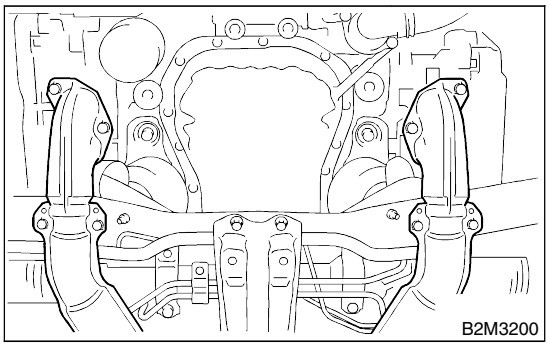

S2M0923

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

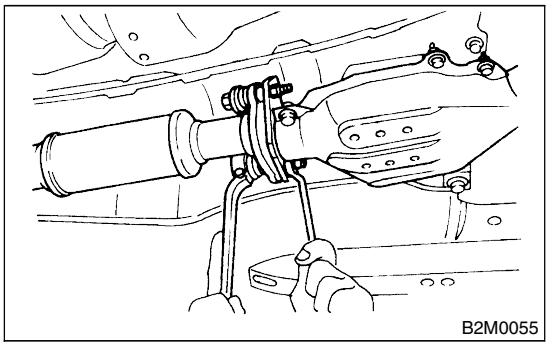
4) Tighten bolts which hold front exhaust pipe onto cylinder heads.

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


B2M3200

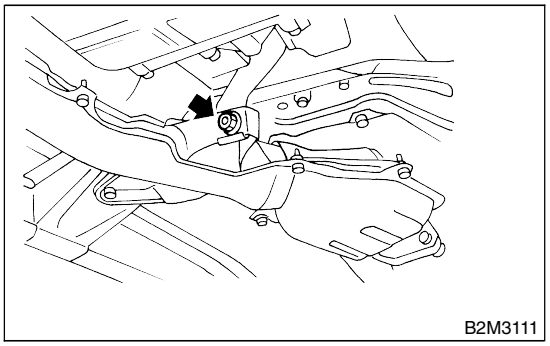
5) Tighten bolts which install front and center exhaust pipe assembly to rear exhaust pipe.

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


B2M0055

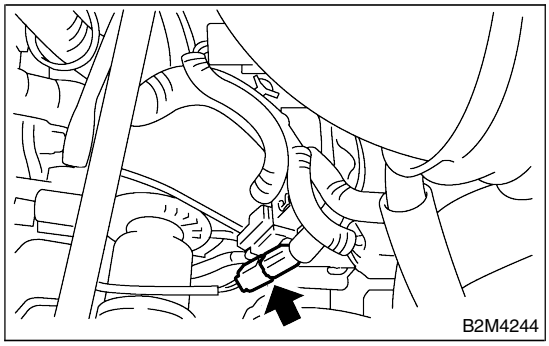
6) Tighten bolt which holds front and center exhaust pipe assembly to hanger bracket.

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

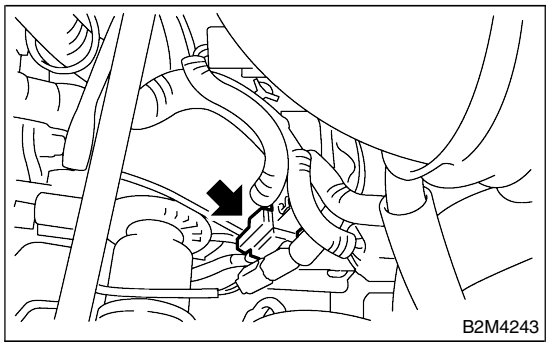

B2M3111

7) Install under cover. <Ref. EI-11, INSTALLATION, Front Under Cover.>
8) Lower the vehicle.

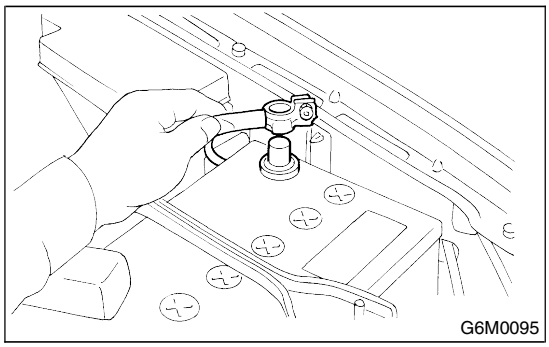
9) Connect rear oxygen sensor connector.



10) Connect front oxygen (A/F) sensor connector.



11) Connect battery ground cable.



C: INSPECTION S152065A10

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 S152067

A: REMOVAL S152067A18

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(SOHC)-5 REMOVAL, Front Exhaust Pipe.>

B: INSTALLATION S152067A11

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(SOHC)-6 INSTALLATION, Front Exhaust Pipe.>

C: INSPECTION S152067A10

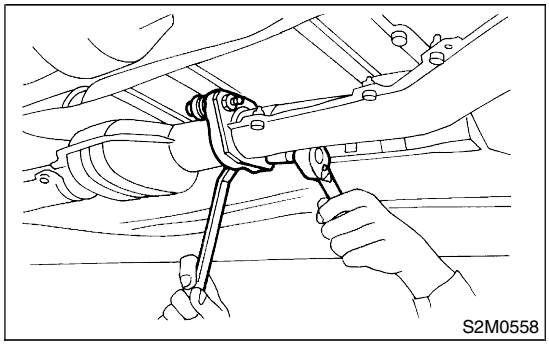
1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

4. Rear Exhaust Pipe S152068

A: REMOVAL S152068A18

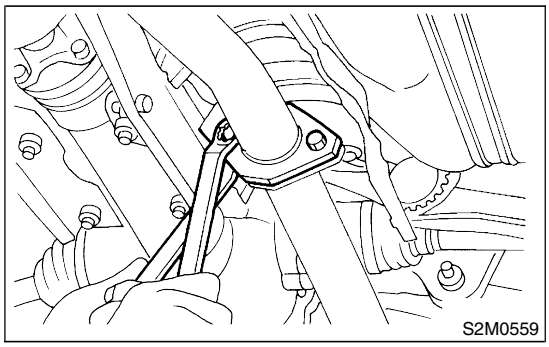
1) Separate rear exhaust pipe from center exhaust pipe.

CAUTION:
Be careful, exhaust pipe is hot.



2) Separate rear exhaust pipe from muffler.

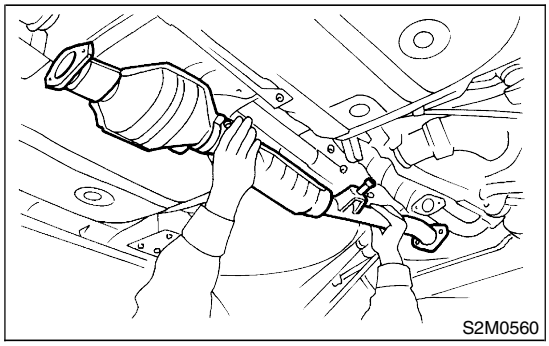
CAUTION:
Be careful not to pull down rear exhaust pipe.



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)



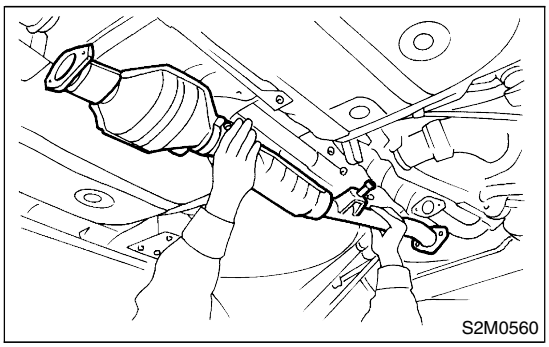
B: INSTALLATION S152068A11

CAUTION:
Replace gaskets with new ones.

1) Install rear exhaust pipe bracket to rubber cushion.

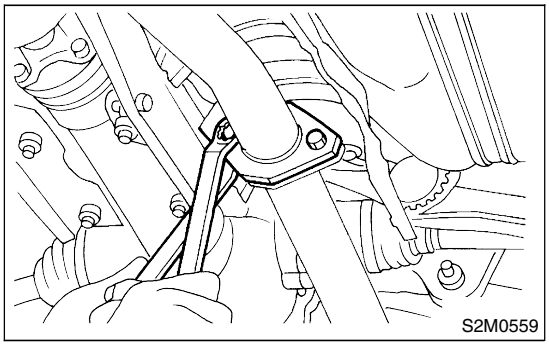
NOTE:
To facilitate removal, apply a coat of SUBARU CRC to mating area of rubber cushion in advance.

SUBARU CRC (Part No. 004301003)



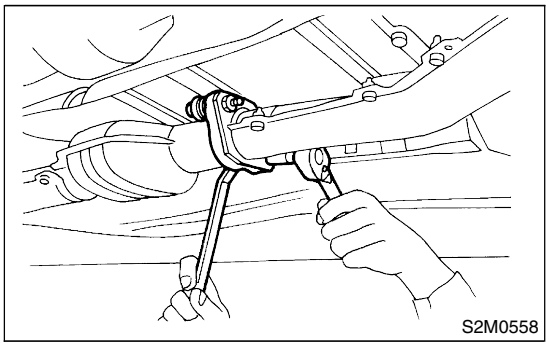
2) Install rear exhaust pipe to muffler.

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 S152068A10

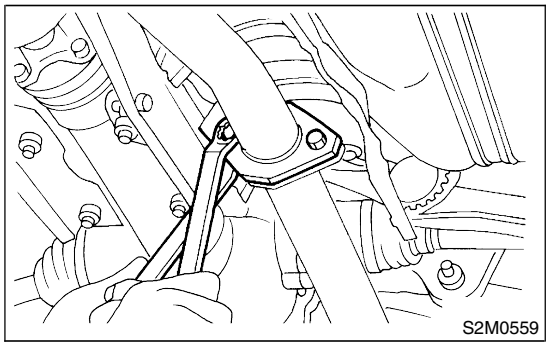
1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.
3) Make sure the cushion rubber is not worn or cracked.

5. Muffler S152066

A: REMOVAL S152066A18

1) Separate muffler from rear exhaust pipe.

CAUTION:
Be careful, exhaust pipe is hot.

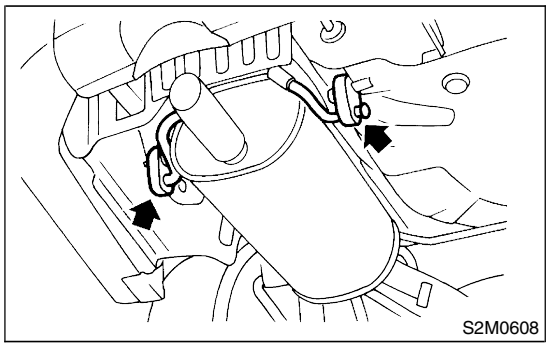

S2M0559

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.

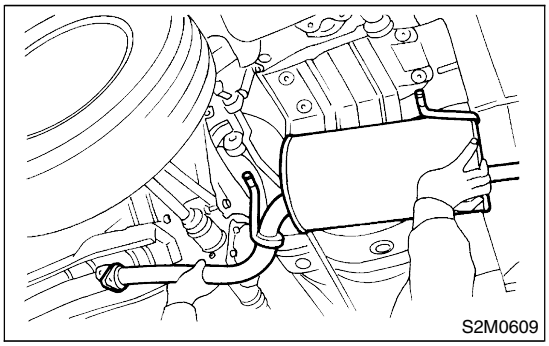
SUBARU CRC (Part No. 004301003)


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)

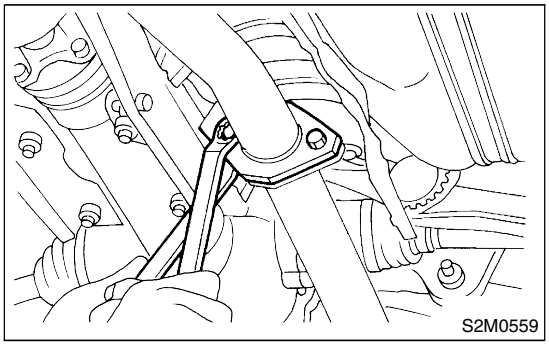

S2M0609

B: INSTALLATION S152066A11

Install in the reverse order of removal.

CAUTION:
Replace gasket with a new one.

Tightening torque:
48 N·m (4.9 kgf-m, 35.4 ft-lb)


S2M0559

C: INSPECTION S152066A10

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.
3) Make sure the cushion rubber is not worn or cracked.

MUFFLER

MEMO:

COOLING

CO

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1. General Description S176001

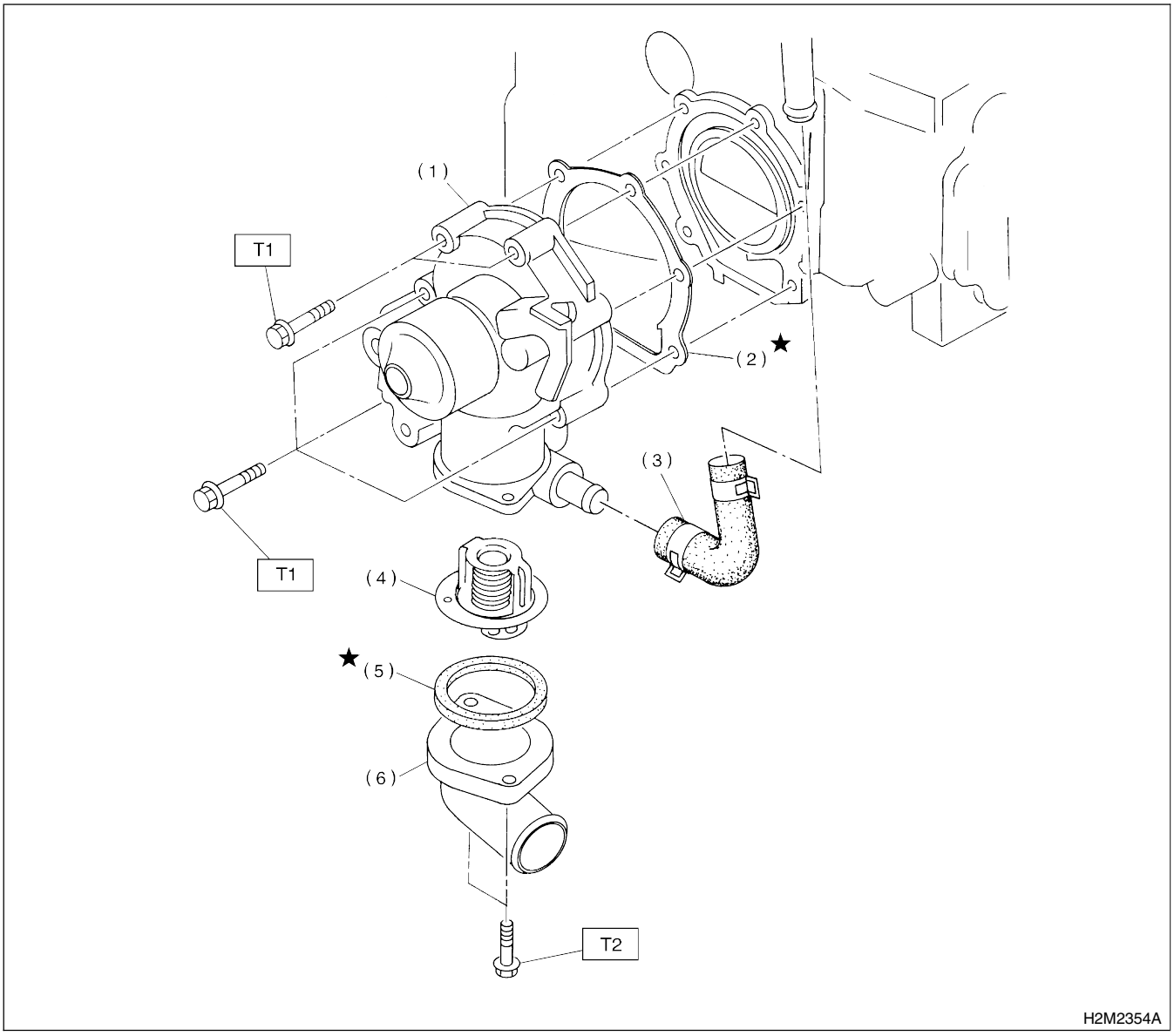
A: SPECIFICATIONS S176001E49

Model			Non-turbo	Turbo
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)	Approx. 7.2 (7.6, 6.3)
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 opened		91°C (196°F)	
	Valve lift		9.0 mm (0.354 in) or more	
	Valve bore		35 mm (1.38 in)	
Radiator fan	Motor	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

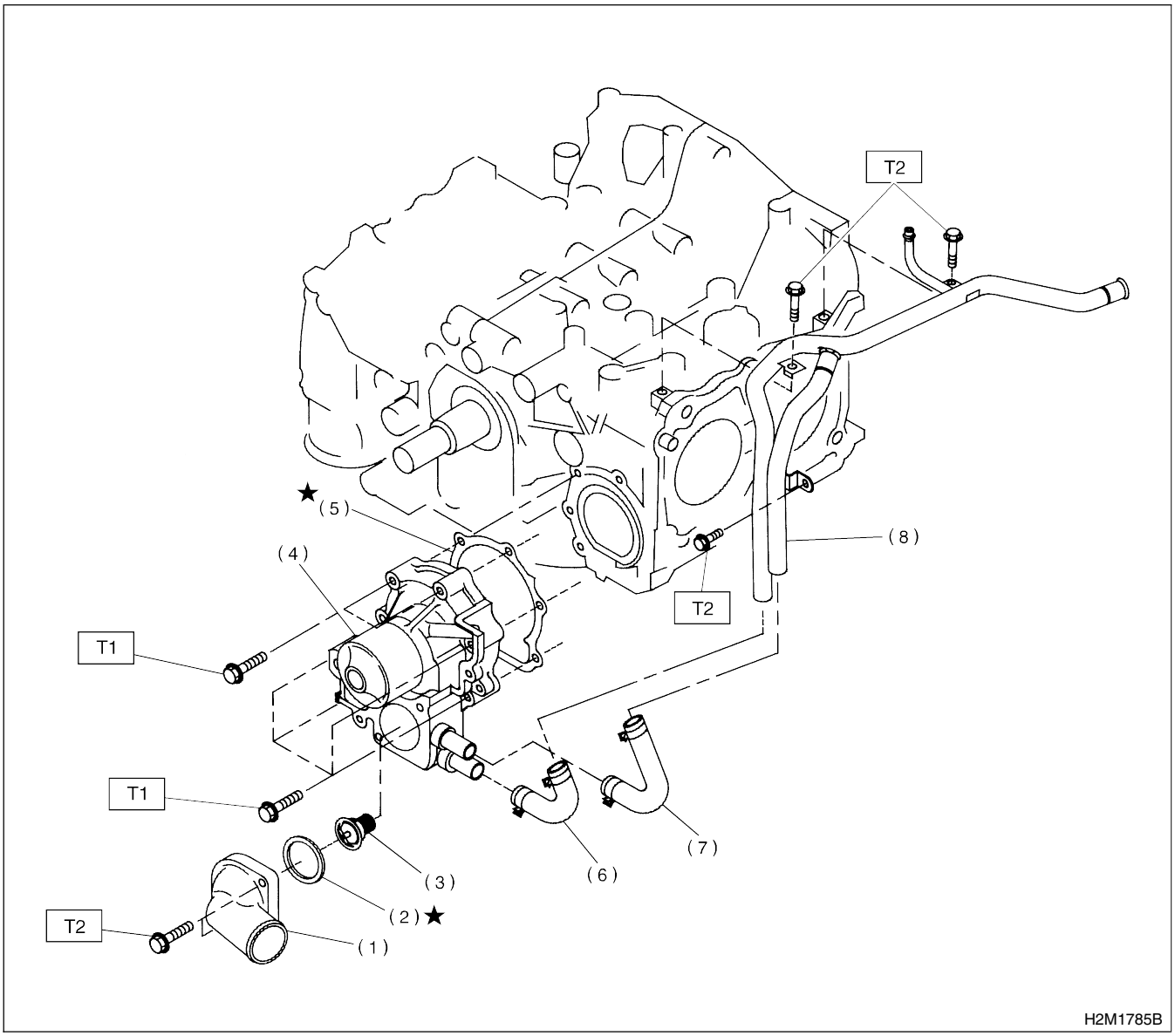
● **NON-TURBO MODEL**



(1) Water pump ASSY
(2) Gasket
(3) Heater by-pass hose
(4) Thermostat
(5) Gasket
(6) 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)

● TURBO MODEL

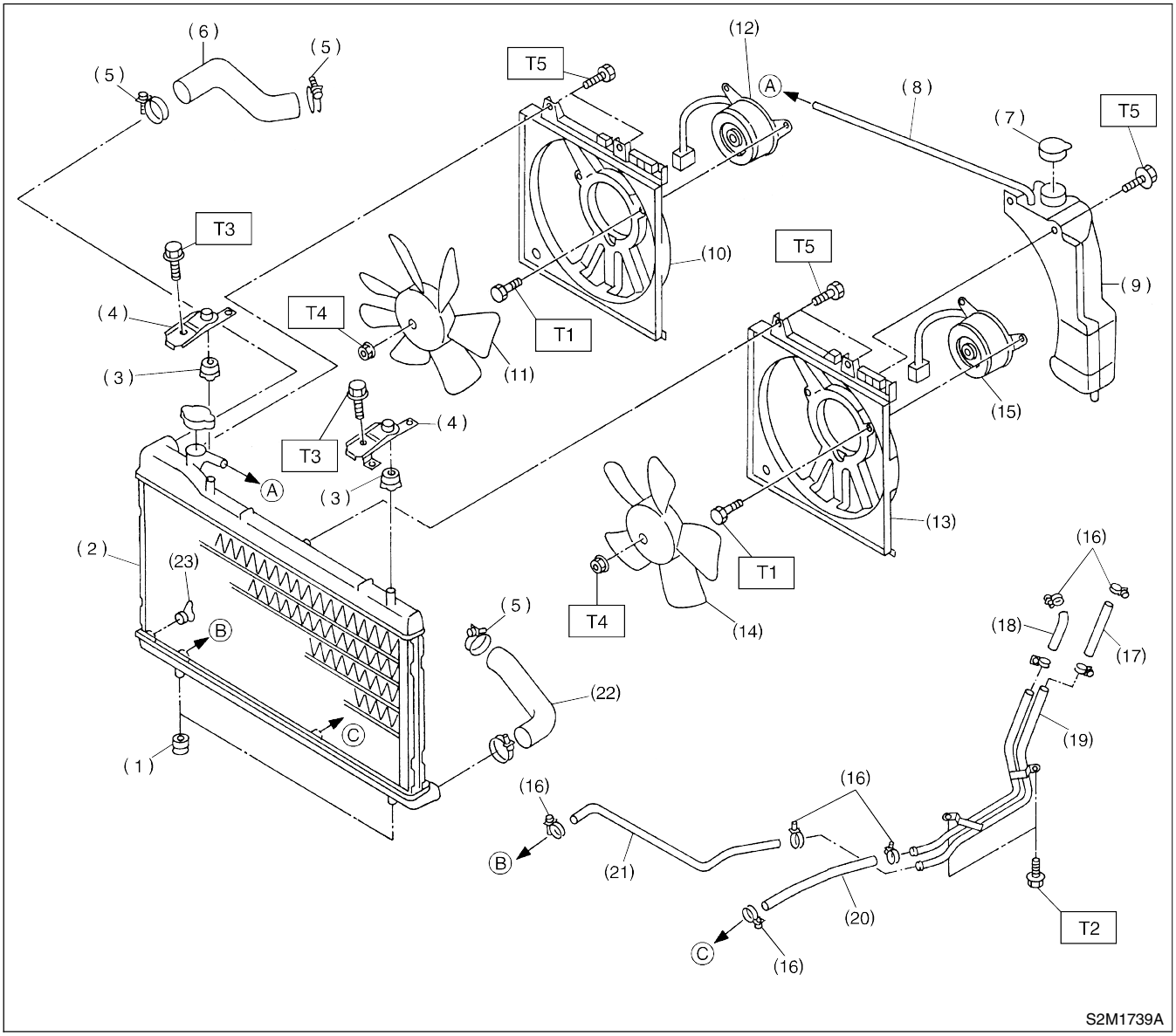


(1) Thermostat case
(2) Gasket
(3) Thermostat
(4) Water pump ASSY
(5) Gasket
(6) Header by-pass hose
(7) Coolant filler tank by-pass hose
(8) Water by-pass pipe

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

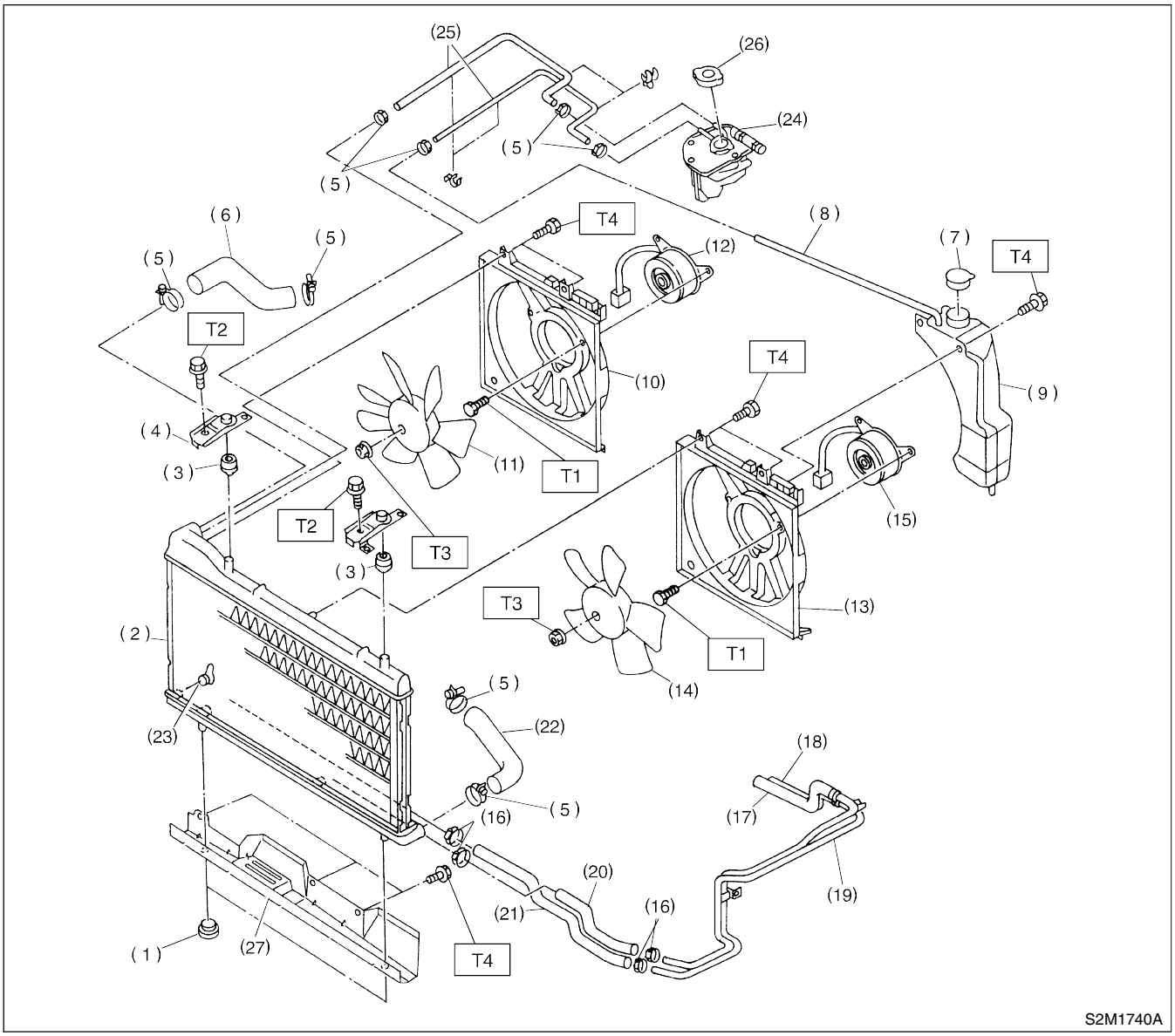
● NON-TURBO MODEL



(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)

● TURBO MODEL



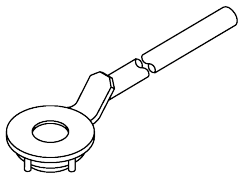
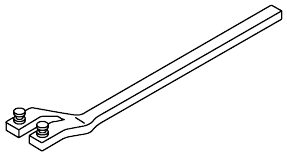
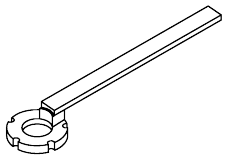
(1) Radiator lower cushion
(2) Radiator
(3) Radiator upper cushion
(4) Radiator upper bracket
(5) Clamp
(6) Radiator inlet hose
(7) Engine coolant reservoir tank cap
(8) Over flow hose
(9) Engine coolant reservoir tank
(10) Sub fan shroud
(11) Radiator sub fan
(12) Radiator sub fan motor
(13) Main fan shroud
(14) Radiator main fan
(15) Radiator main fan motor
(16) Oil cooler hose clamp
(17) Oil cooler inlet hose A
(18) Oil cooler outlet hose A
(19) Oil cooler pipe
(20) Oil cooler outlet hose B
(21) Oil cooler inlet hose B
(22) Radiator outlet hose
(23) Radiator drain plug
(24) Engine coolant filler tank
(25) Engine coolant hose
(26) Engine coolatn filler tank cap
(27) Radiator under cover (AT vehicle)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.3)
T2: 18 (1.8, 13.0)
T3: 3.4 (0.35, 2.5)
T4: 4.9 (0.50, 3.6)

C: CAUTION S176001A03

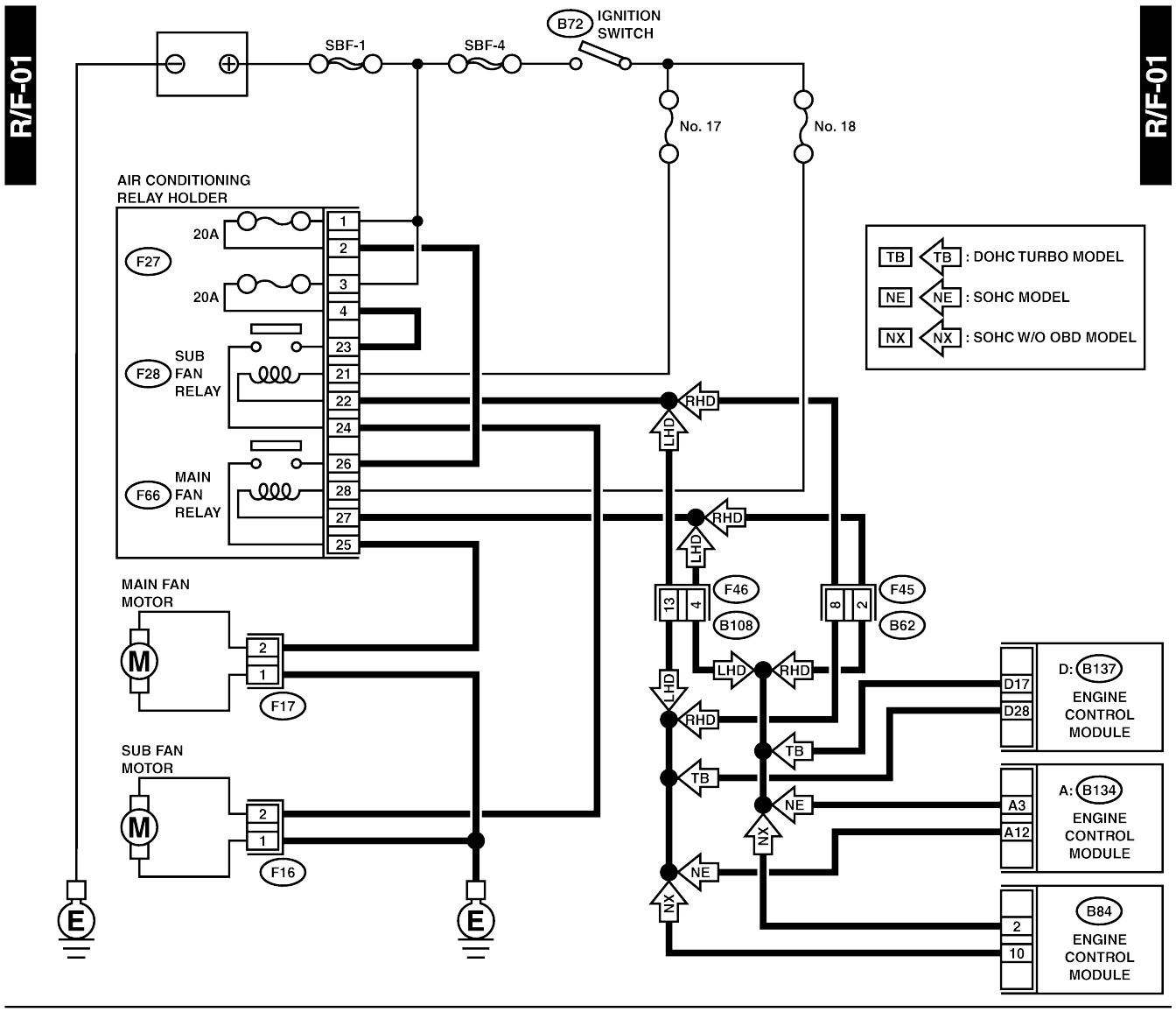
- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation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

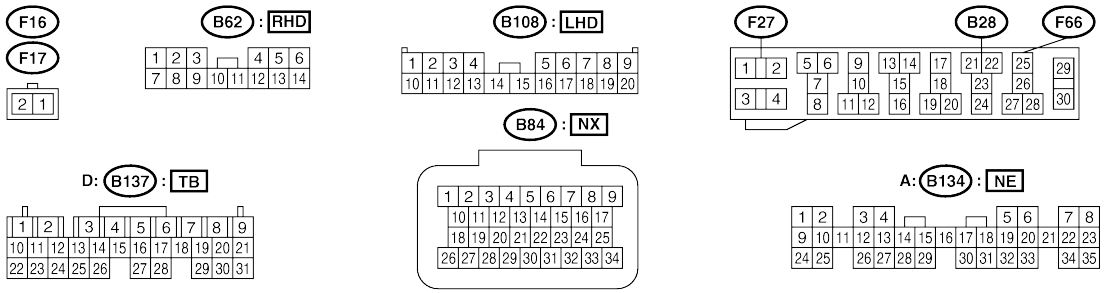
D: PREPARATION TOOL S176001A17

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. (Non-turbo LH side only)
 B2M4158	499207400	CAMSHAFT SPROCKET WRENCH	Used for removing and installing camshaft sprocket.

2. Radiator Main Fan System S176732

A: SCHEMATIC S176732A21





S2M2148

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**.

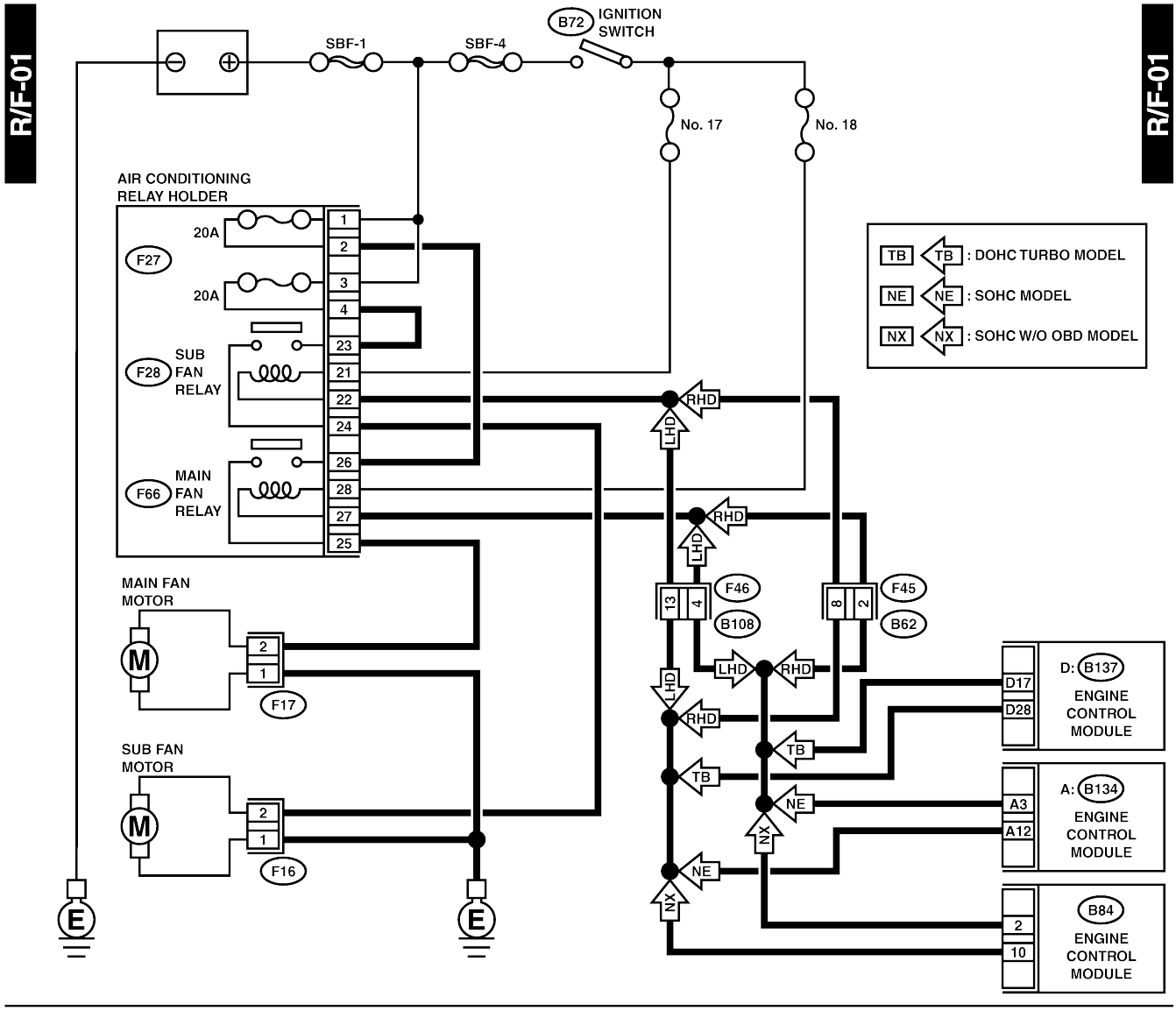
RADIATOR MAIN FAN SYSTEM

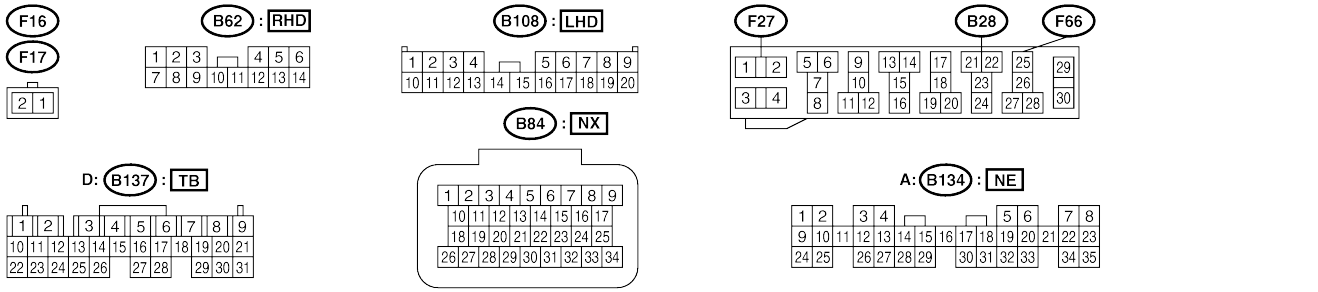
No.	Step	Check	Yes	No
8	**CHECK POWER SUPPLY TO A/C RELAY HOLDER 20 A FUSE TERMINAL.** Measure voltage of harness between A/C relay holder 20 A fuse terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair open circuit in 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 (SOHC MODEL):*** ***(F66) No. 27 — (B84) No. 2 (SOHC w/o OBD MODEL):*** ***(F66) No. 27 — (B137) No. 17 (DOHC TURBO MODEL):***	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 your Subaru distributor.

NOTE:
Inspection by your Subaru distributor is required, because probable cause is deterioration of multiple parts.

3. Radiator Sub Fan System S176733

A: SCHEMATIC S176733A21





S2M2148

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 (SOHC MODEL):*** ***(F28) No. 22 — (B84) No. 10 (SOHC w/o OBD MODEL):*** ***(F28) No. 22 — (B137) No. 28 (DOHC TURBO MODEL):***	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 your Subaru distributor.

NOTE:
Inspection by your Subaru distributor is required, because probable cause is deterioration of multiple parts.

4. Engine Coolant S176060

A: REPLACEMENT S176060A20

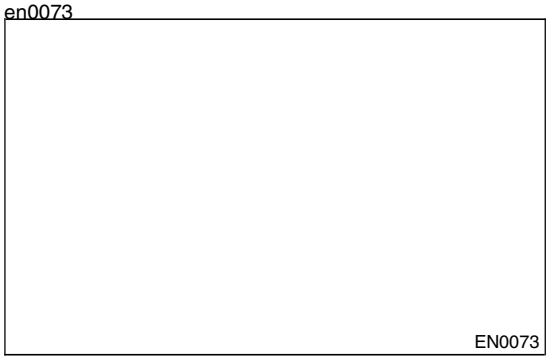
1. DRAINING OF ENGINE COOLANT

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



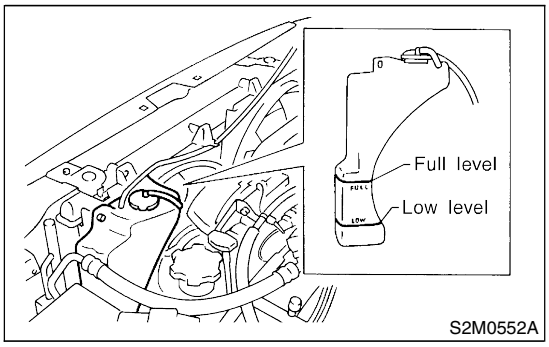
2. FILLING OF ENGINE COOLANT S176060A2002

1) Fill engine coolant into radiator up to filler neck position.

Coolant capacity (fill up to "FULL" level):
Non-turbo AT model
Approx. 6.4 ℓ (6.8 US qt, 5.6 Imp qt)
Non-turbo MT model
Approx. 6.3 ℓ (6.7 US qt, 5.5 Imp qt)
Turbo model
Approx. 7.2 ℓ (7.6 US qt, 6.3 Imp qt)

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

2) Fill engine coolant into reservoir tank up to upper level.



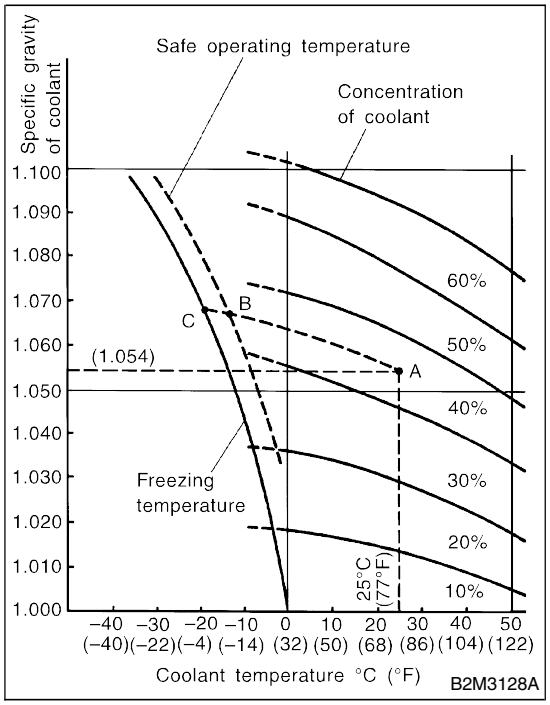
3) Warm-up engine completely for more than five minutes at 2,000 to 3,000 rpm.
4) If engine coolant level drops in radiator, add engine coolant to filler neck position.
5) If engine coolant level drops from upper level of reservoir tank, add engine coolant to upper level.
6) Attach radiator cap and reservoir 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).

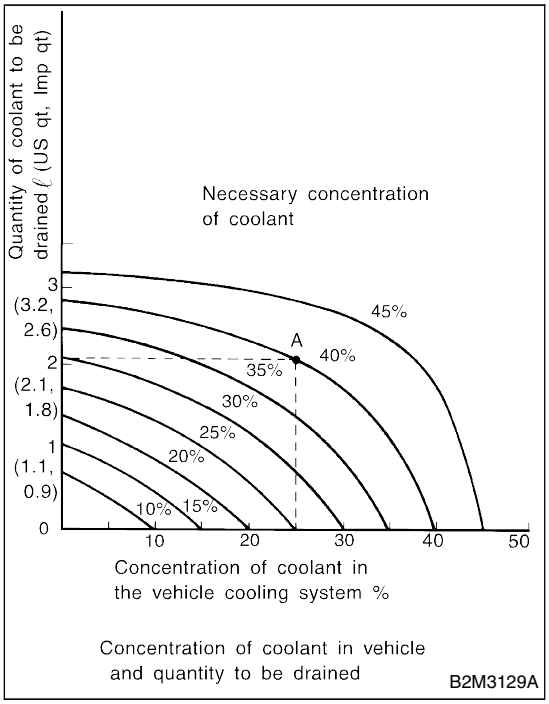


2. PROCEDURE TO ADJUST THE CONCENTRATION OF THE COOLANT

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.

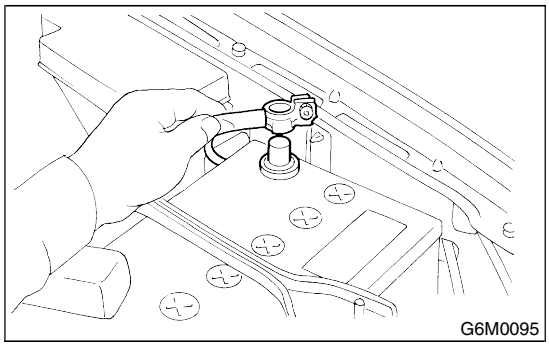


5. Water Pump S176061

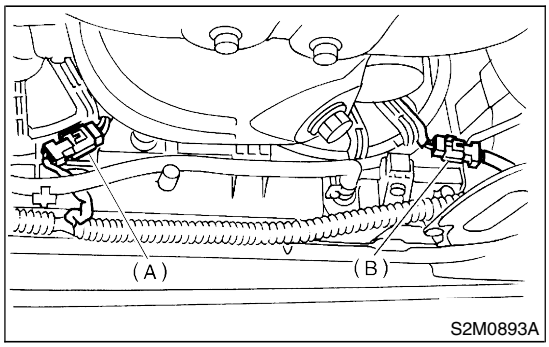
A: REMOVAL S176061A18

1. NON-TURBO MODEL S176061A1801

1) Disconnect ground cable from the battery.

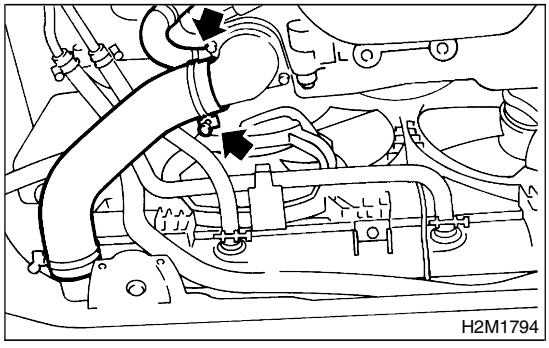

G6M0095

2) Lift-up the vehicle.
3) Remove under cover.
4) Drain engine coolant completely.
<Ref. to CO-14, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
5) Disconnect connectors from radiator main fan (A) and sub fan (B) motors.



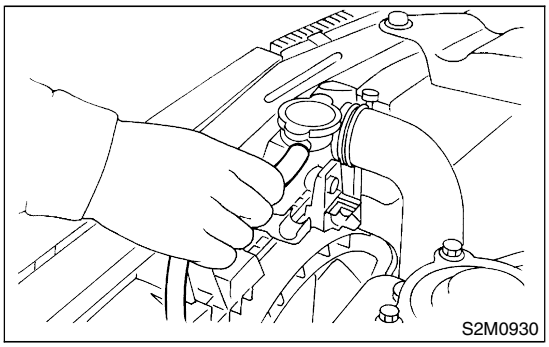
S2M0893A

6) Disconnect radiator outlet hose and heater hose from water pump.

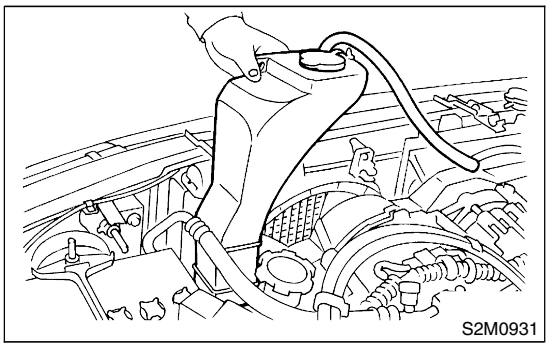

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7) Lower the vehicle.

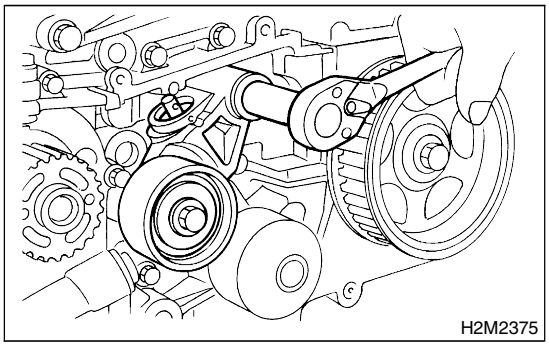
8) Disconnect over flow hose.


S2M0930

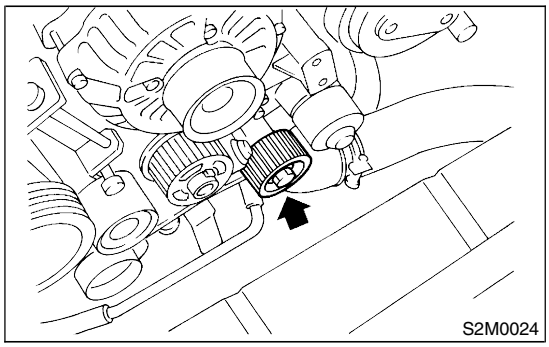
9) Remove reservoir tank.


S2M0931

10) Remove radiator main fan and sub fan assemblies. <Ref. to CO-32, REMOVAL, Radiator Main Fan and Fan Motor.> and <Ref. to CO-34, REMOVAL, Radiator Sub Fan and Fan Motor.>
11) Remove V-belts.
<Ref. to ME(SOHC)-42, REMOVAL, V-belt.>
12) Remove timing belt.
<Ref. to ME(SOHC)-46, TIMING BELT, REMOVAL, Timing Belt Assembly.>
13) Remove automatic belt tension adjuster.

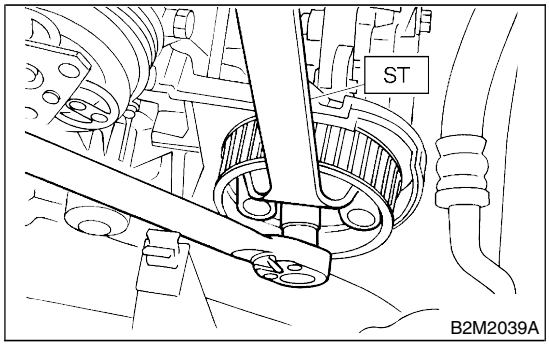

H2M2375

14) Remove belt idler No. 2.

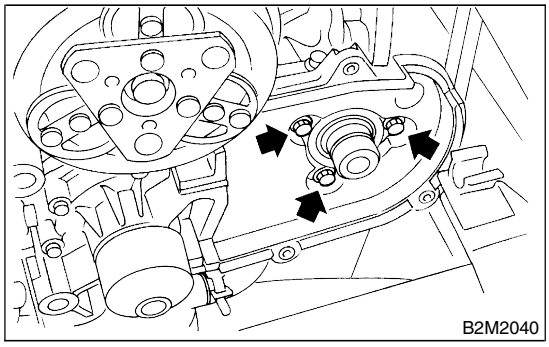


15) Remove left-hand camshaft sprocket by using ST.

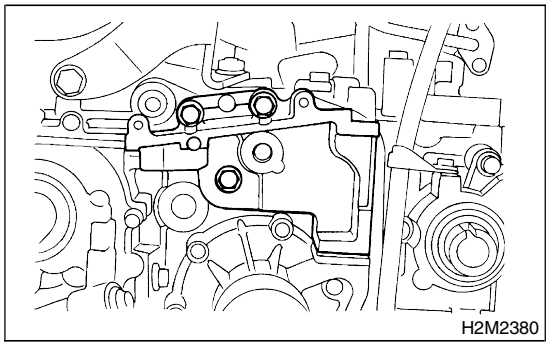
ST 499207100 CAMSHAFT SPROCKET WRENCH



16) Remove left-hand belt cover No. 2.

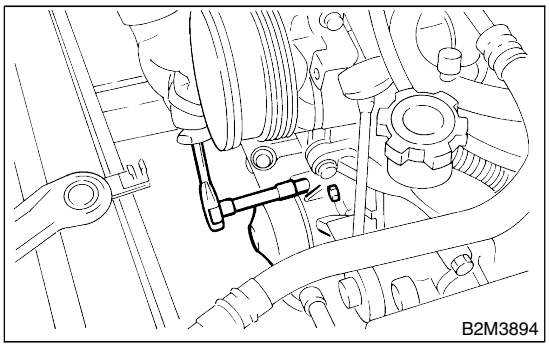


17) Remove tensioner bracket.



18) Disconnect heater hose from water pump.

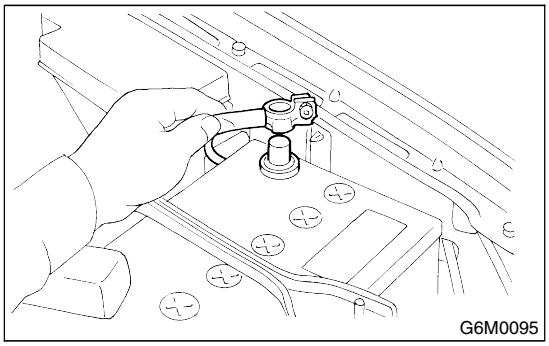
19) Remove water pump.



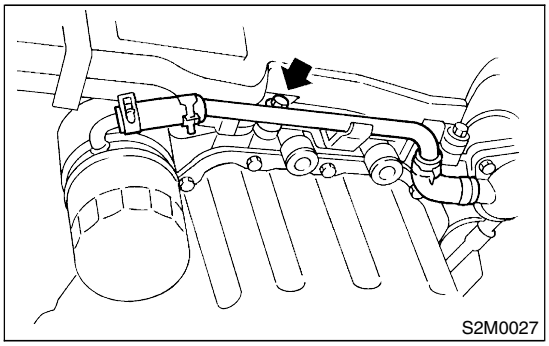
2. TURBO MODEL *S176061A1802*

WARNING:
The radiator is pressurized. Wait until engine cools down before working on the radiator.

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

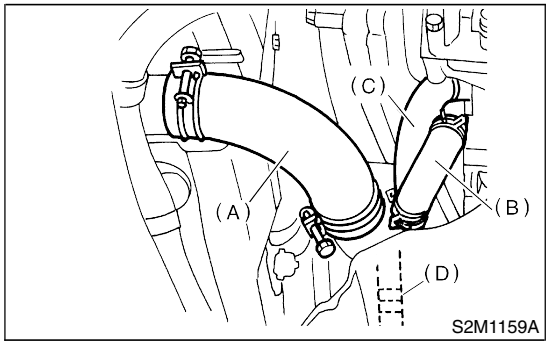


3) Lift-up the vehicle.
4) Remove under cover.
5) Drain engine coolant completely. <Ref. to CO-14, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
6) Disconnect connectors from radiator main fan and sub fan motors.
7) Remove bolt which installs water by-pass pipe of oil cooler onto oil pump.

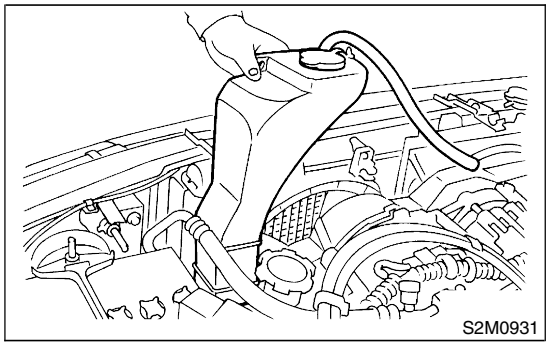


8) Disconnect radiator outlet hose (A) and heater hose (B) from water pump.

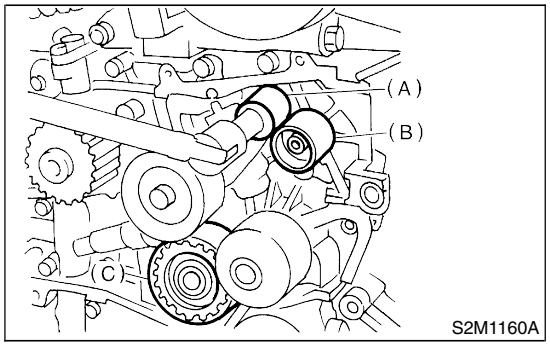
9) Disconnect water by-pass hose (C) and oil cooler hose (D).



10) Lower the vehicle.
11) Disconnect over flow hose.
12) Remove reservoir tank.

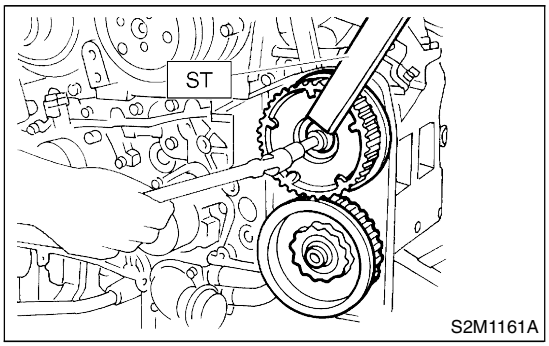


13) Remove radiator main fan and sub fan assemblies. <Ref. to CO-32, REMOVAL, Radiator Main Fan and Fan Motor.> and <Ref. to CO-34, REMOVAL, Radiator Sub Fan and Fan Motor.>
14) Remove V-belts. <Ref. to ME(DOHC TURBO)-44, REMOVAL, V-belt.>
15) Remove timing belt. <Ref. to ME(DOHC TURBO)-48, REMOVAL, Timing Belt Assembly.>
16) Remove automatic belt tension adjuster (A).
17) Remove belt idler (B).
18) Remove belt idler No. 2 (C).

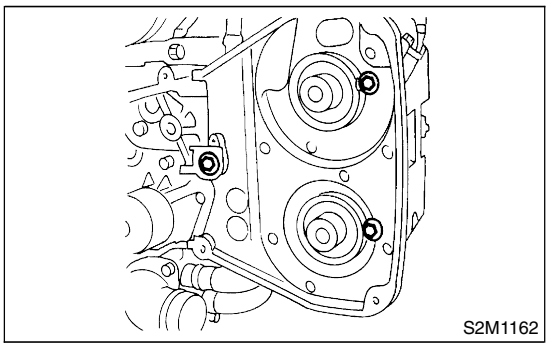


19) Remove camshaft position sensor. <Ref. to FU(DOHC TURBO)-31, REMOVAL, Camshaft Position Sensor.>

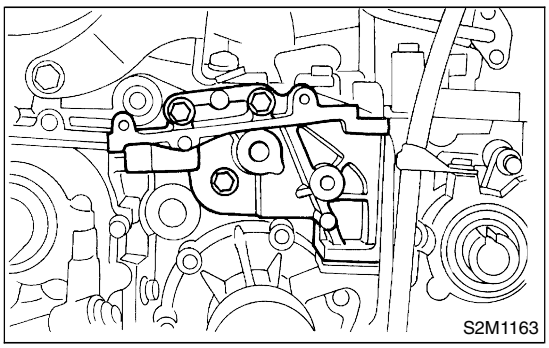
20) Remove left-hand camshaft sprockets by using ST.
ST 499207400 CAMSHAFT SPROCKET WRENCH



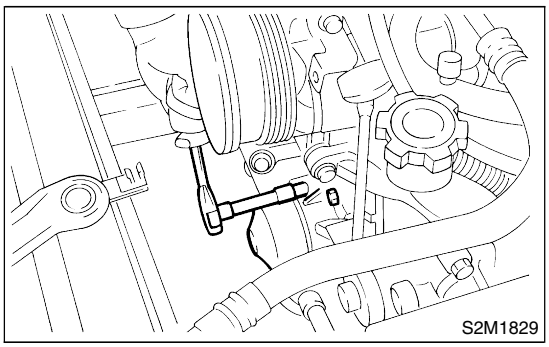
21) Remove left-hand belt cover No. 2.



22) Remove tensioner bracket.



23) Disconnect heater hose from water pump.
24) Remove water pump.



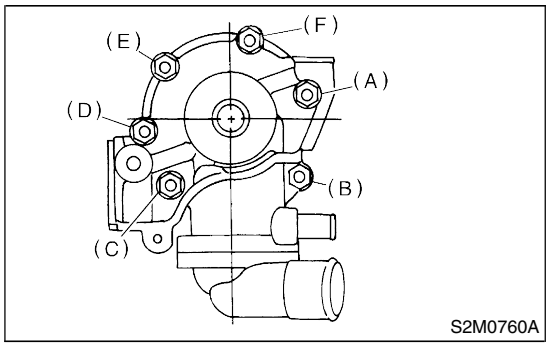
B: INSTALLATION S176061A11

1. NON-TURBO MODEL S176061A1101

1) Install water pump onto left-hand cylinder head.

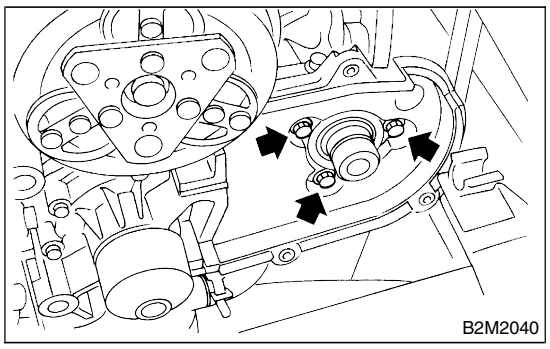
CAUTION:
- **Replace gasket with a new one.**
- **When installing water pump, tighten bolts in two stages in alphabetical sequence as shown in figure.**

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)



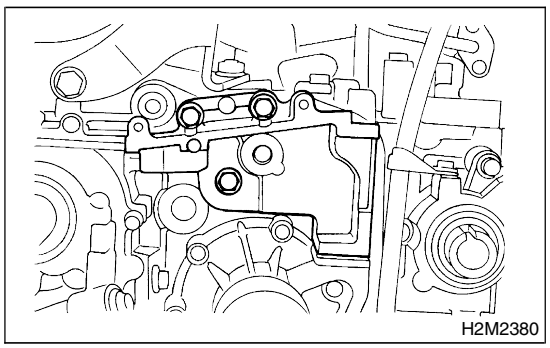
2) Install left-hand belt cover No. 2.

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



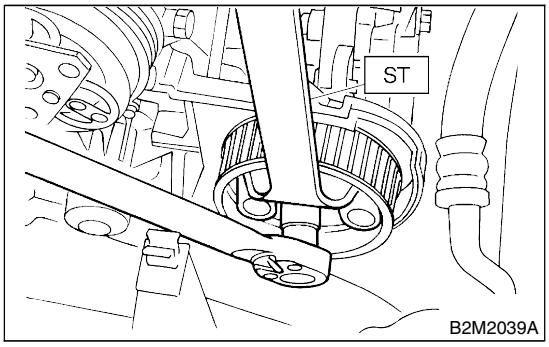
3) Install tensioner bracket.

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



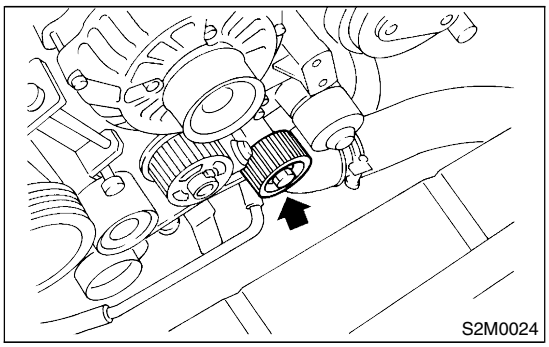
4) Install left-hand camshaft sprockets by using ST.
ST 4992707100 CAMSHAFT SPROCKET WRENCH

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



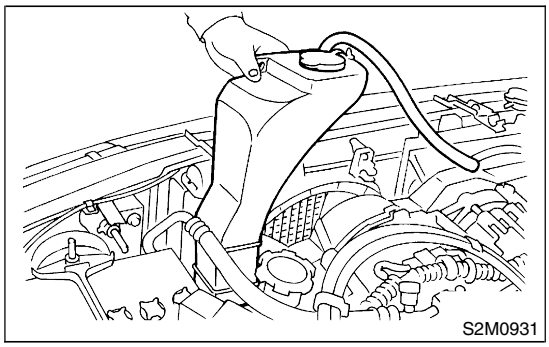
5) Install belt idler No. 2.

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

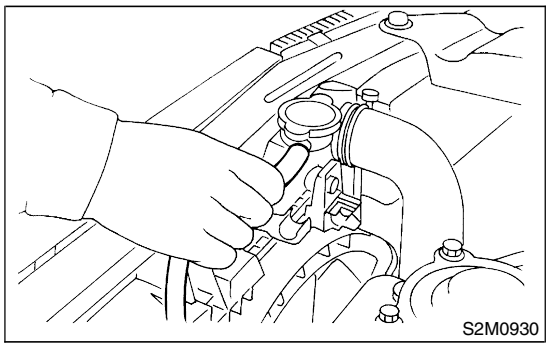


6) Install automatic belt tension adjuster which tension rod is holded with pin. <Ref. to ME(SOHC)-47, AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER, INSTALLATION, Timing Belt Assembly.>
7) Install timing belt. <Ref. to ME(SOHC)-48, TIMING BELT, INSTALLATION, Timing Belt Assembly.>
8) Install V-belts. <Ref. to ME(SOHC)-42, INSTALLATION, V-belt.>
9) Install radiator main fan and sub fan motor assemblies. <Ref. to CO-32, INSTALLATION, Radiator Main Fan and Fan Motor.> and <Ref. to CO-34, INSTALLATION, Radiator Sub Fan and Fan Motor.>

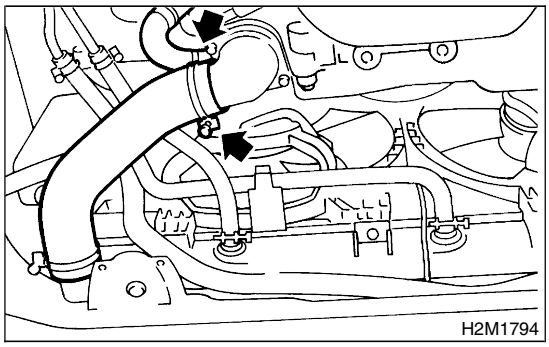
10) Install reservoir tank.


S2M0931

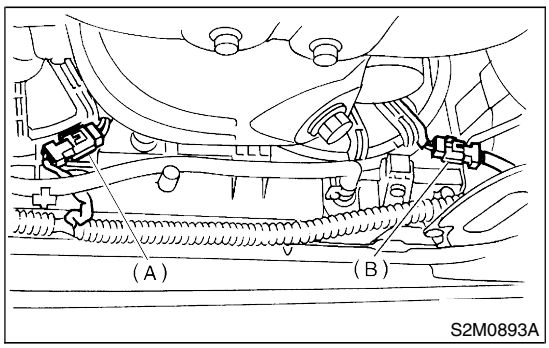
11) Connect over flow hose.


S2M0930

12) Lift-up the vehicle.
13) Connect radiator outlet hose and heater hose to water pump.


H2M1794

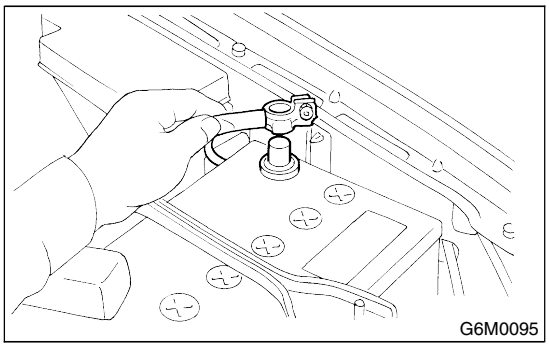
14) Connect connectors to radiator main fan (A) and sub fan (B) motors.



S2M0893A

15) Install under cover.
16) Lower the vehicle.

17) Connect battery ground cable.


G6M0095

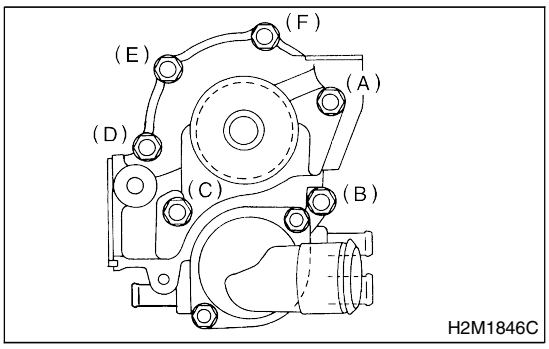
18) Fill coolant. <Ref. to CO-14, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

2. TURBO MODEL *S176061A1102*

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.**

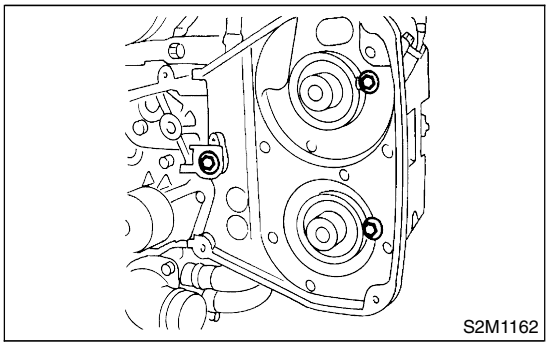
Tightening torque:
First:
12 N·m (1.2 kgf-m, 8.7 ft-lb)
Second:
12 N·m (1.2 kgf-m, 8.7 ft-lb)



H2M1846C

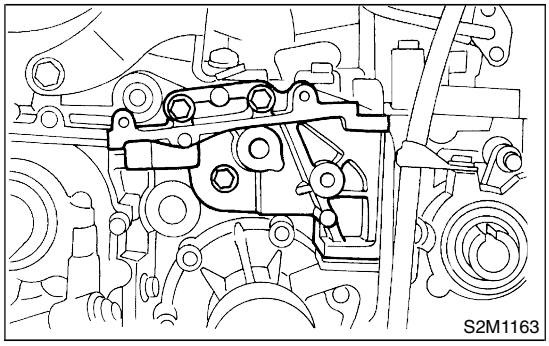
2) Install left-hand belt cover No. 2.

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


S2M1162

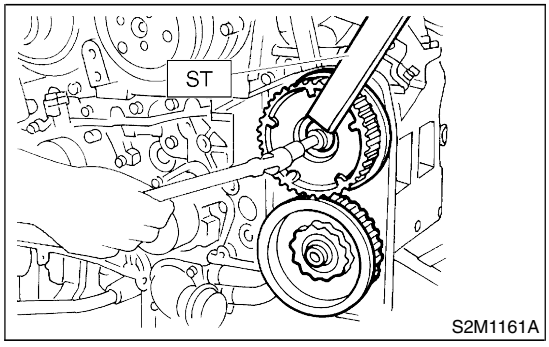
3) Install tensioner bracket.

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



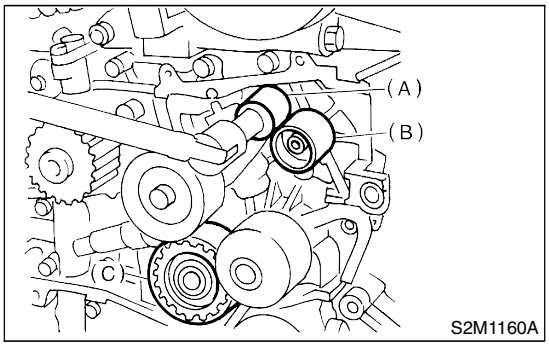
4) Install left-hand camshaft sprockets by using ST.
ST 499207400 CAMSHAFT SPROCKET WRENCH

Tightening torque:
98 N·m (10.0 kgf-m, 72.4 ft-lb)

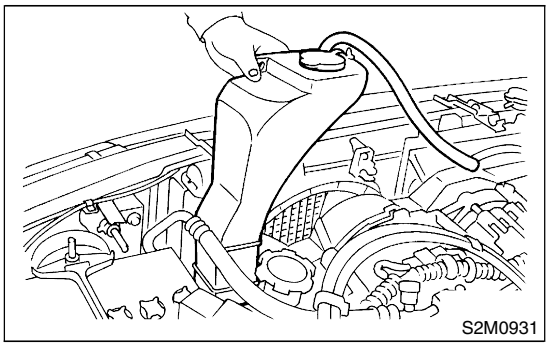


5) Install camshaft position sensor. <Ref. to FU(DOHC TURBO)-31, INSTALLATION, Camshaft Position Sensor.>
6) Install belt idler No. 2 (C).
7) Install belt idler (B).
8) Install automatic belt tension adjuster (A) which has a tension rod held by a pin. <Ref. to ME(DOHC TURBO)-49, AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER, INSTALLATION, Timing Belt Assembly.>

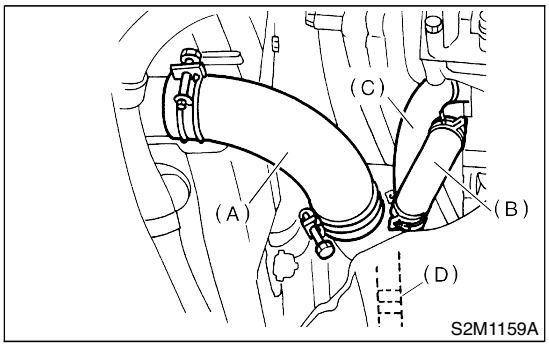
Tightening torque:
39.4 N·m (4.0 kgf-m, 28.9 ft-lb)



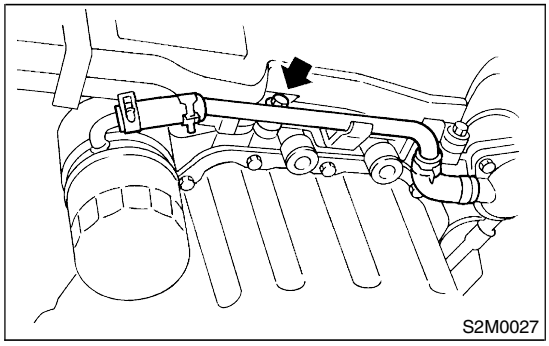
9) Install timing belt. <Ref. to ME(DOHC TURBO)-50, TIMING BELT, INSTALLATION, Timing Belt Assembly.>
10) Install V-belts. <Ref. to ME(DOHC TURBO)-44, INSTALLATION, V-belt.>
11) Install radiator main fan and sub fan motor assemblies. <Ref. to CO-32, INSTALLATION, Radiator Main Fan and Fan Motor.> and <Ref. to CO-34, INSTALLATION, Radiator Sub Fan and Fan Motor.>
12) Install reservoir tank.



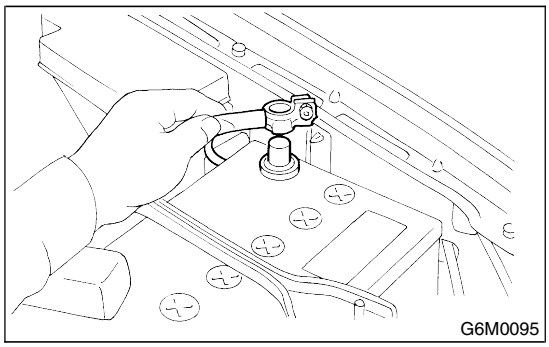
13) Connect over flow hose.
14) Lift-up the vehicle.
15) Connect radiator outlet hose (A) and heater hose (B) to water pump.
16) Connect water by-pass hose (C) and oil cooler hose (D).



17) Install bolt which installs water by-pass pipe onto oil pump.


S2M0027

18) Connect connectors to radiator main fan and sub fan motors.
19) Install under cover.
20) Lower the vehicle.
21) Connect battery ground cable.

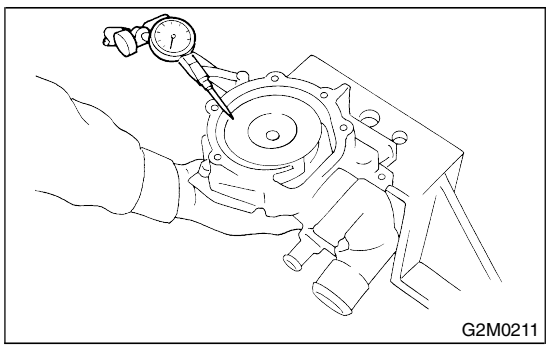

G6M0095

22) Fill coolant. <Ref. to CO-14, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

C: INSPECTION S176061A10

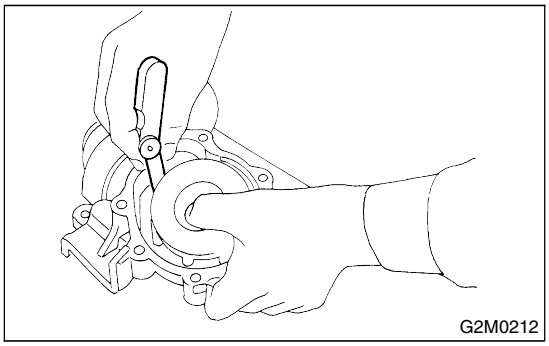
1) Check water pump bearing for smooth rotation.
2) Check water pump pulley for abnormalities.
3) Using a dial gauge, measure impeller runout in thrust direction while rotating the pulley.

"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

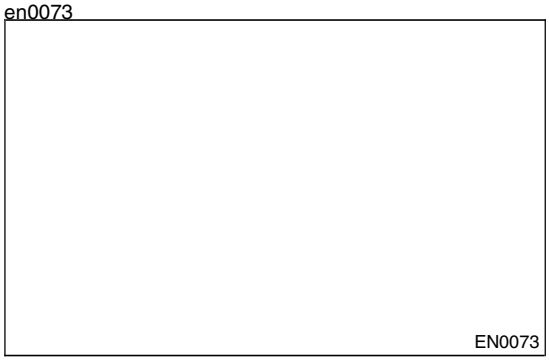
5) After water pump installation, check pulley shaft for engine coolant leaks. If leaks are noted, replace water pump assembly.

6. Thermostat S176062

A: REMOVAL S176062A18

1) Lift-up the vehicle.
2) Remove under cover.
3) Drain engine coolant completely. <Ref. to CO-14, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

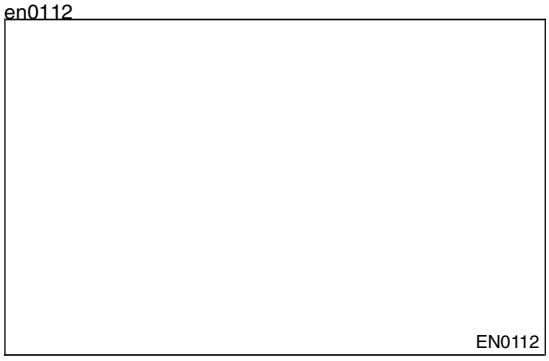
en0073



4) Disconnect radiator outlet hose from thermostat cover.

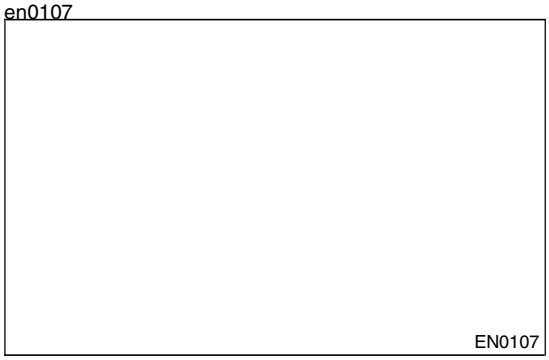
- Non-Turbo model

en0112

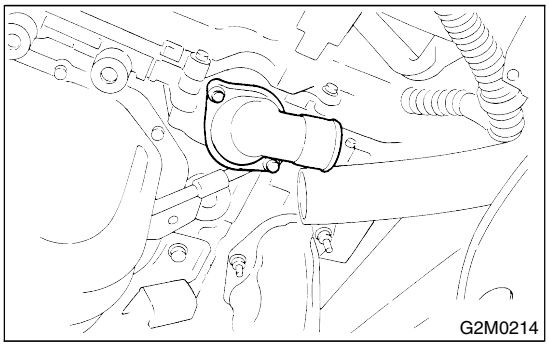


- Turbo model

en0107



5) Remove thermostat cover and gasket, and pull out the thermostat.



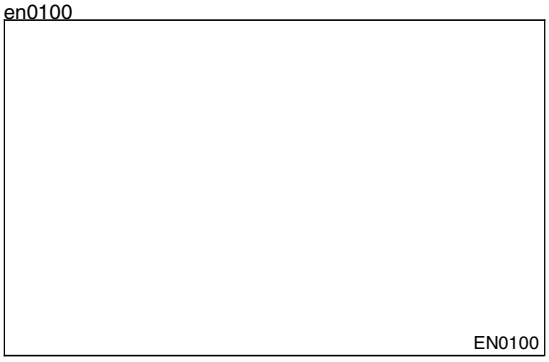
B: INSTALLATION S176062A11

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



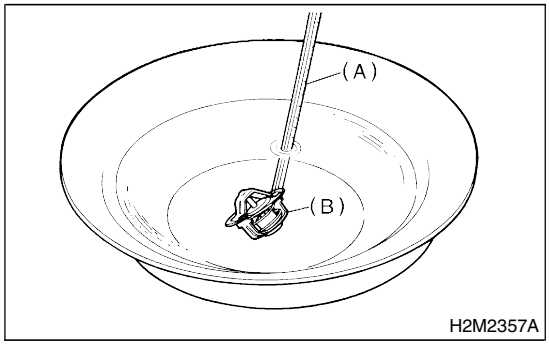
2) Fill coolant. <Ref. to CO-14, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

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 opened. 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)



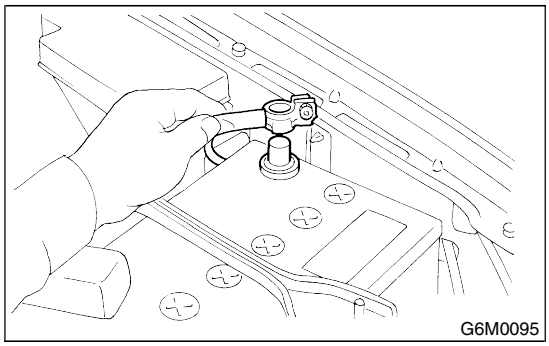
(A) Thermometer
(B) Thermostat

7. Radiator S176058

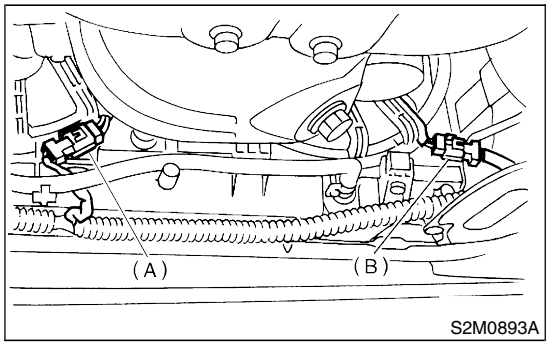
A: REMOVAL S176058A18

1. NON-TURBO MODEL S176058A1801

1) Disconnect battery ground cable.

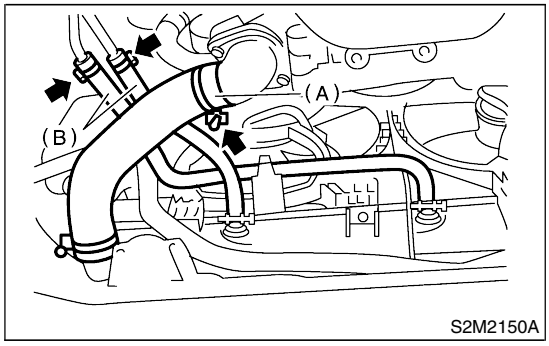

G6M0095

2) Lift-up the vehicle.
3) Drain engine coolant completely. <Ref. to CO-14, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
4) Disconnect connectors of radiator main fan (A) and sub fan (B) motor.



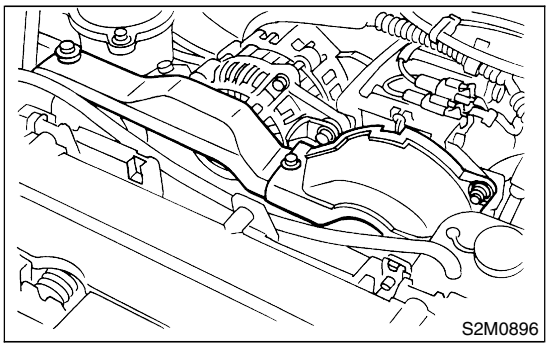
S2M0893A

5) Disconnect radiator outlet hose (A) from thermostat cover.
6) Disconnect ATF cooler hoses (B) from radiator. (AT vehicles only)

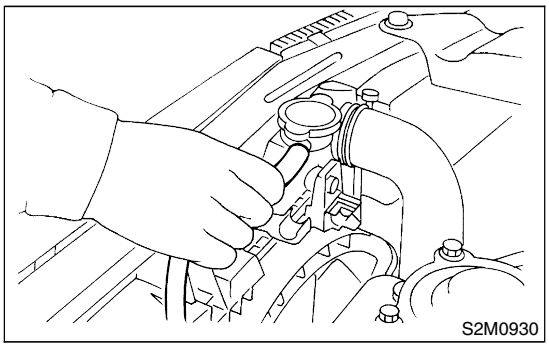


S2M2150A

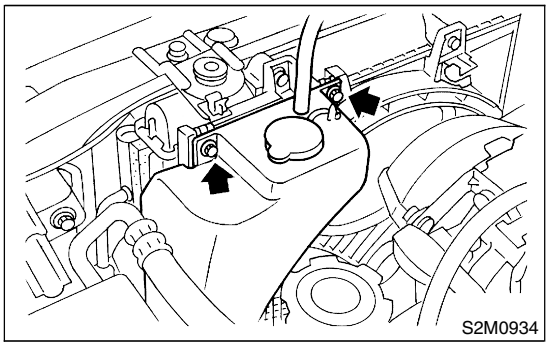
7) Lower the vehicle.
8) Remove V-belt covers.


S2M0896

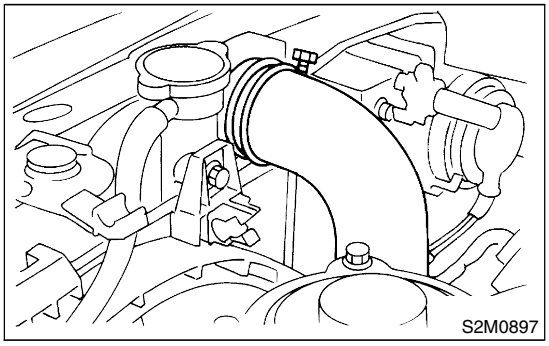
9) Disconnect over flow hose.


S2M0930

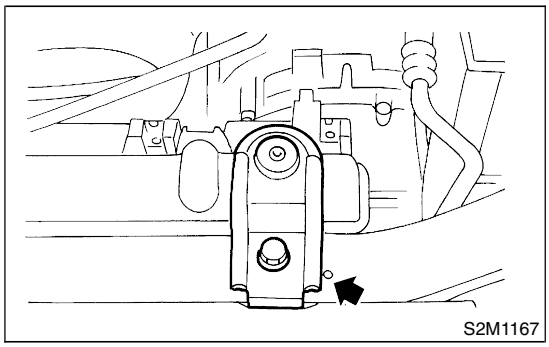
10) Remove reservoir tank.


S2M0934

11) Disconnect radiator inlet hose from radiator.


S2M0897

12) Remove radiator upper brackets.

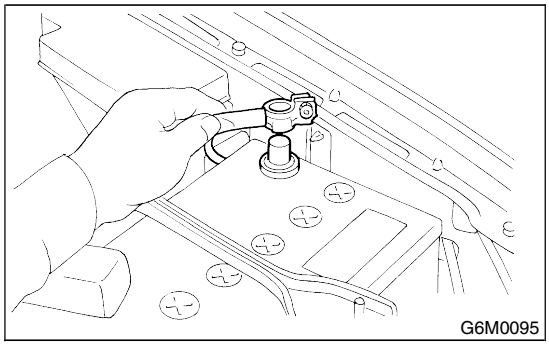

S2M1167

13) While slightly lifting radiator, slide it to left.
14) Lift radiator up and away from vehicle.

2. TURBO MODEL *S176058A1802*

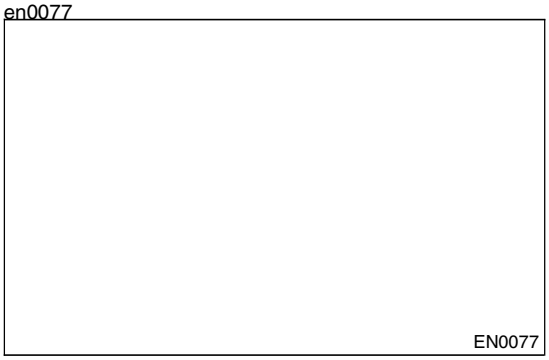
WARNING:
The radiator is pressurized. Wait until engine cools down before working on the radiator.

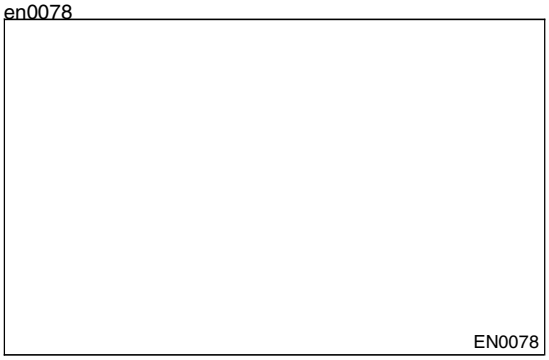
1) Set the vehicle on the lift.
2) Disconnect battery ground cable.


G6M0095

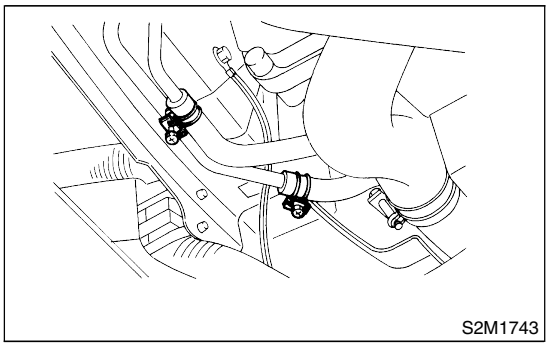
3) Lift-up the vehicle.
4) Remove under cover.
5) Drain engine coolant completely. <Ref. to CO-14, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

6) Disconnect connectors of radiator main fan (A) and sub fan motor (B).

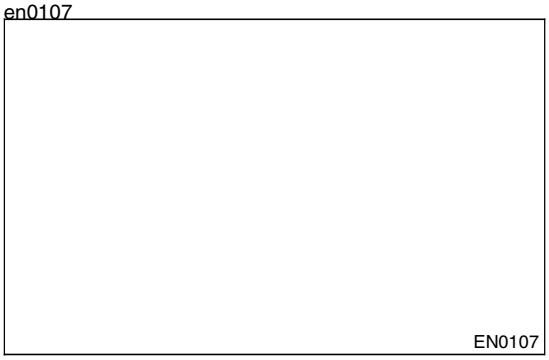
en0077

EN0077

en0078

EN0078

7) Disconnect oil cooler hoses from oil cooler pipes. (if equipped)

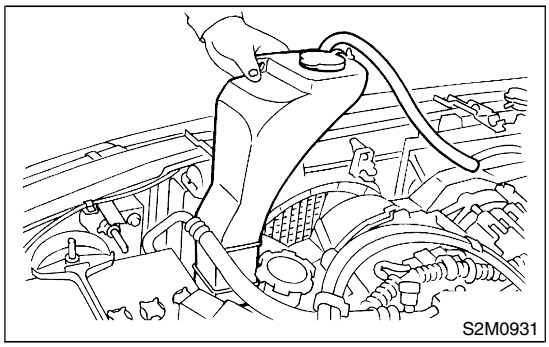

S2M1743

8) Disconnect radiator outlet hose from thermostat cover.

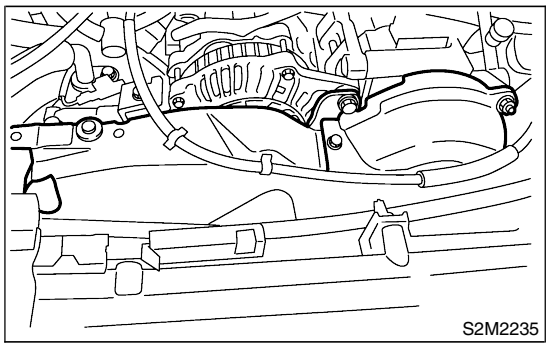
en0107

EN0107

9) Lower the vehicle.
10) Disconnect over flow hose.

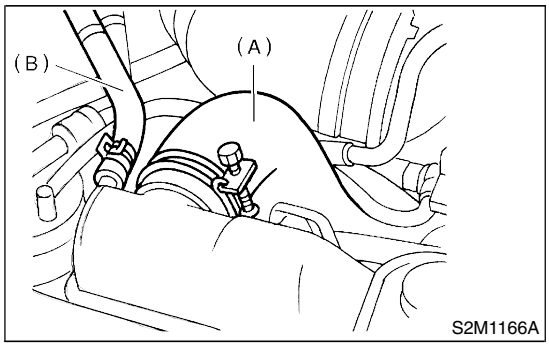
11) Remove reservoir tank.


S2M0931

12) Remove V-belt covers.

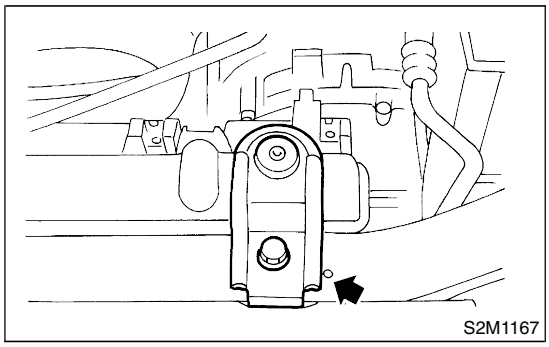

S2M2235

13) Disconnect radiator inlet hose (A) and water tank hose (B) from radiator.



S2M1166A

14) Remove radiator upper brackets.

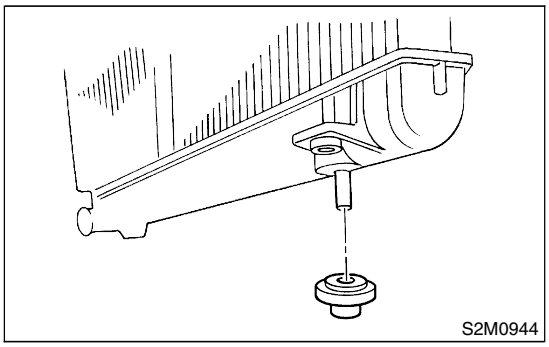

S2M1167

15) While slightly lifting radiator, slide it to left.
16) Lift radiator up and away from vehicle.

B: INSTALLATION S176058A11

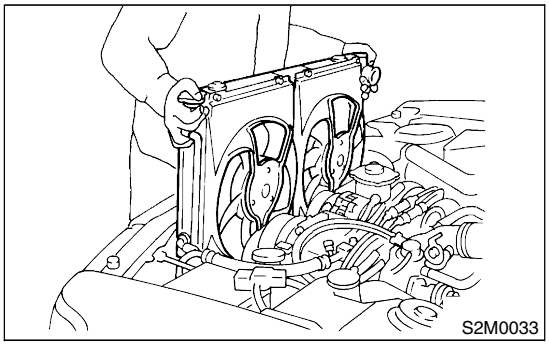
1. NON-TURBO MODEL S176058A1101

1) Attach radiator mounting cushions to pins on the lower side of radiator.


S2M0944

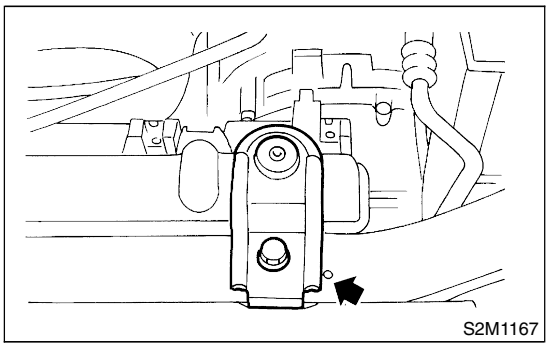
2) Install radiator while fitting radiator pins to cushions.

NOTE:
Fit pins on lower side of radiator into cushions on body side.

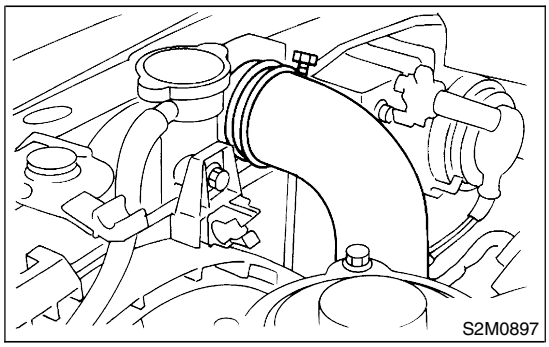

S2M0033

3) Install radiator brackets and tighten bolts.

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

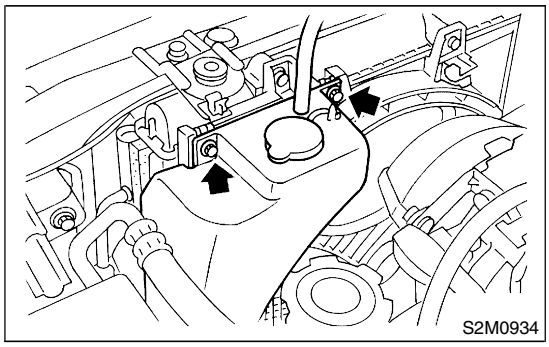

S2M1167

4) Connect radiator inlet hose.

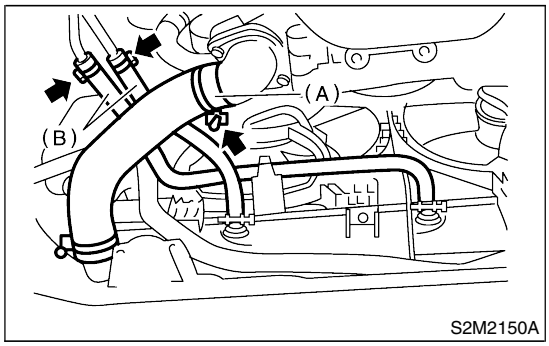

S2M0897

5) Install reservoir tank.

Tightening torque:
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)

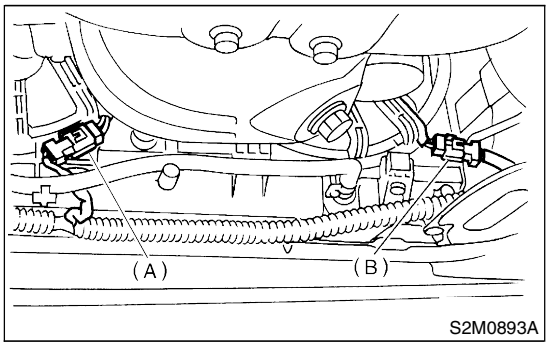

S2M0934

6) Lift-up the vehicle.
7) Connect radiator outlet hose (A).
8) Connect ATF cooler hoses (B). (AT vehicles only)



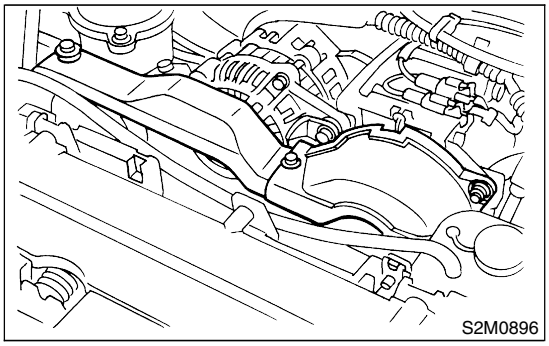
S2M2150A

9) Connect connectors to radiator main fan motor (A) and sub fan motor (B).

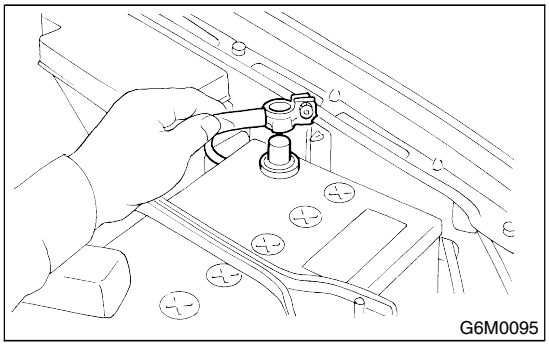


S2M0893A

10) Install under cover.
11) Lower the vehicle.
12) Install V-belt covers.


S2M0896

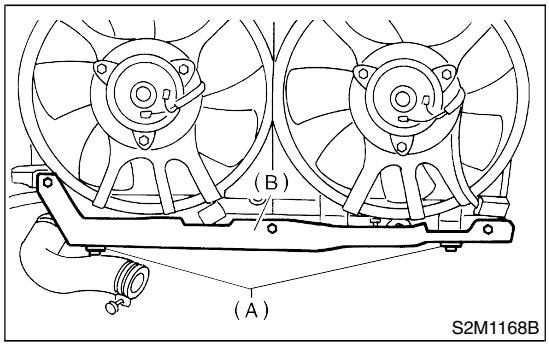
13) Connect battery ground cable.


G6M0095

14) Fill coolant. <Ref. to CO-14, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
15) Check ATF level. <Ref. to AT-9, INSPECTION, Automatic Transmission Fluid.>

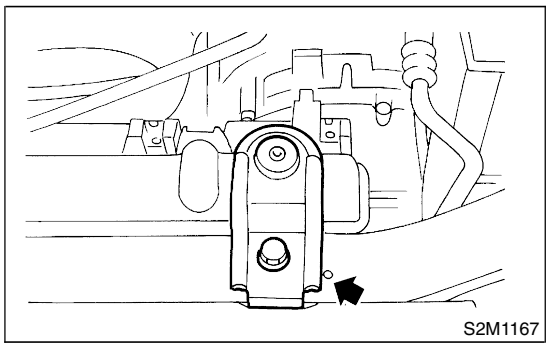
2. TURBO MODEL S176058A1102

1) Attach radiator mounting cushions (A) to pins on the lower side of radiator under cover (B).

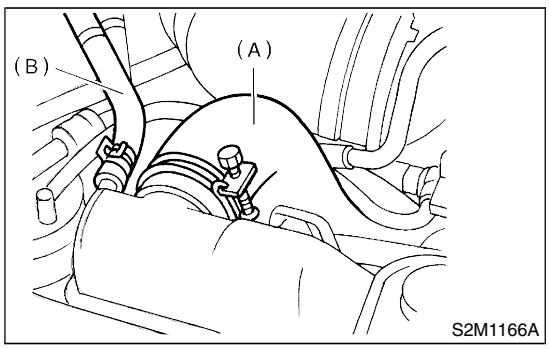


2) Install radiator brackets and tighten bolts.

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

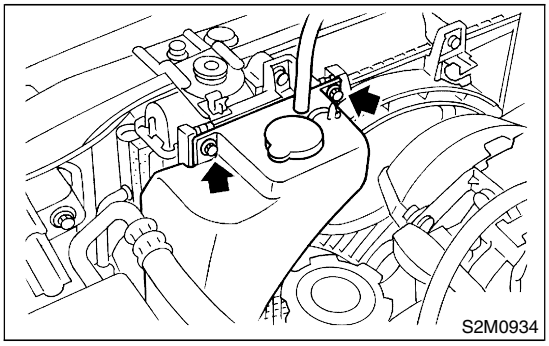


3) Connect radiator inlet hose (A) and water tank hose (B).



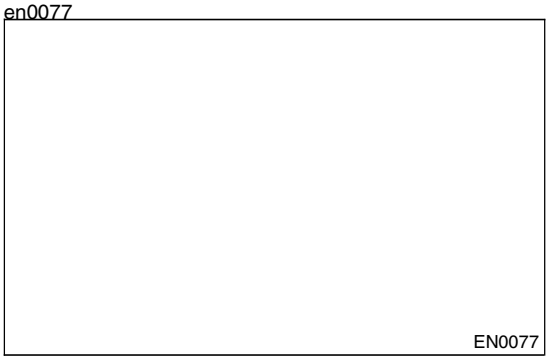
4) Install reservoir tank.

Tightening torque:
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)

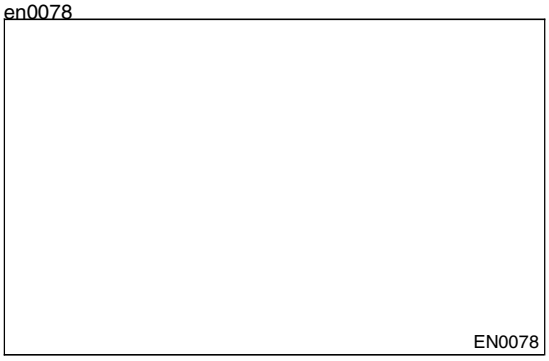


5) Connect over flow hose.
6) Lift-up the vehicle.
7) Connect connectors to radiator main fan motor (A) and sub fan motor (B).

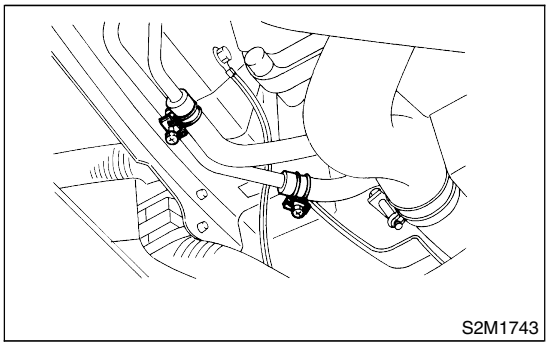
en0077



en0078

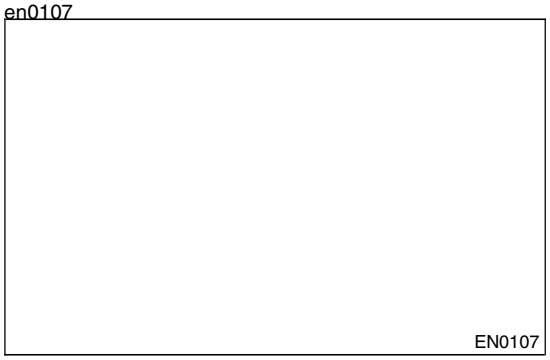


8) Connect oil cooler hoses. (if equipped)

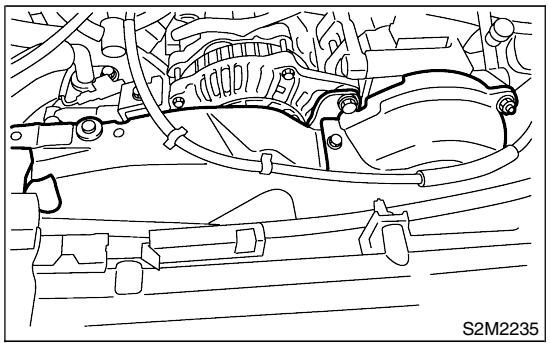


9) Connect radiator outlet hose.

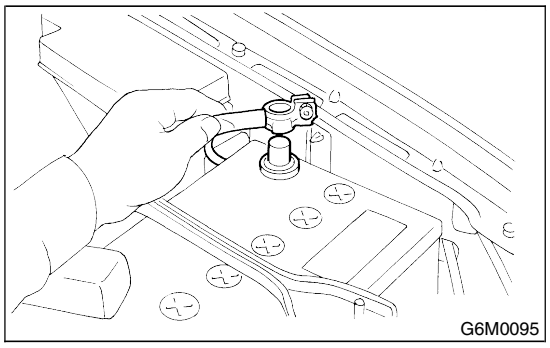
en0107



10) Install under cover.
11) Lower the vehicle.
12) Install V-belt covers.



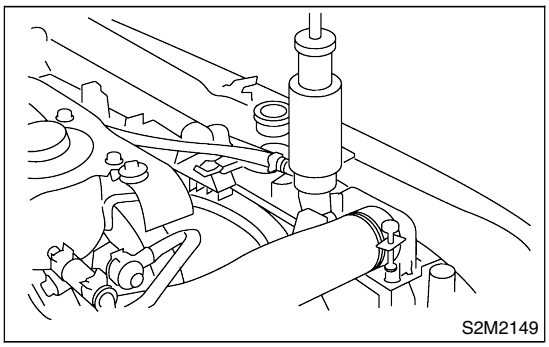
13) Connect battery ground cable.



14) Fill coolant. <Ref. to CO-14, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

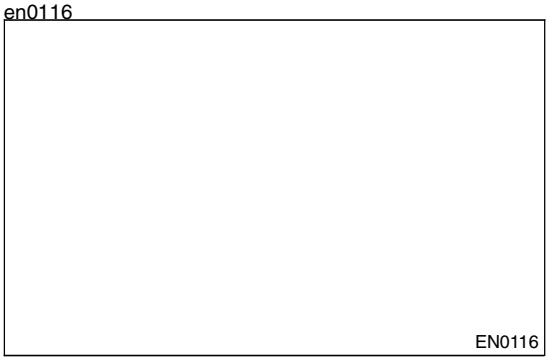
C: INSPECTION S176058A10

1) Remove radiator cap, top off radiator, and attach tester to radiator in place of cap.
- Non-Turbo model



- Turbo model

en0116



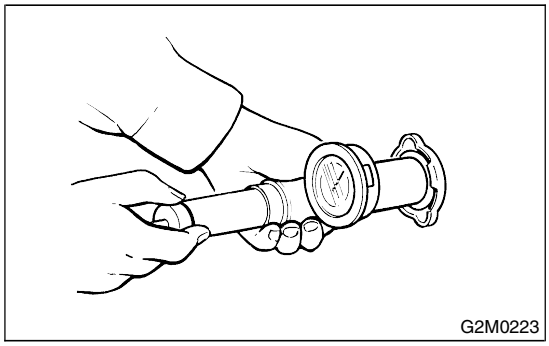
2) Apply a pressure of 157 kPa (1.6 kg/cm^2, 23 psi) to radiator to check if:
   (1) Engine coolant leaks at/around radiator.
   (2) Engine coolant leaks at/around hoses or connections.

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.



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)

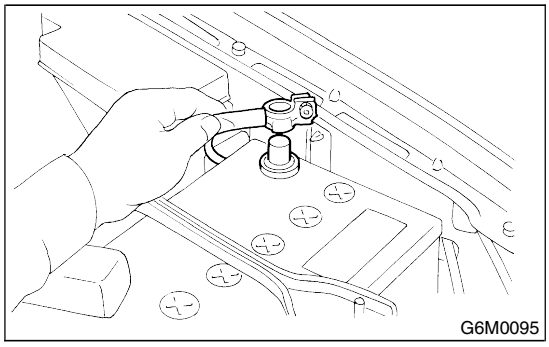
Service limit pressure:
83 kPa (0.85 kg/cm^2, 12 psi)

CAUTION:
Be sure to remove foreign matter and rust from the cap in advance otherwise, results of pressure test will be incorrect.

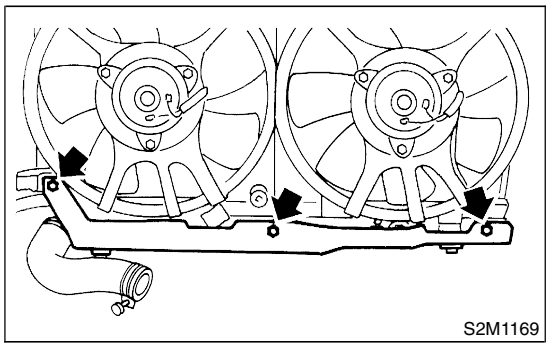
9. Radiator Main Fan and Fan Motor S176059

A: REMOVAL S176059A18

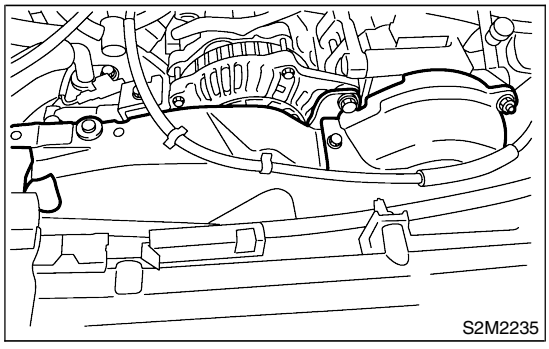
1) Disconnect battery ground cable.


G6M0095

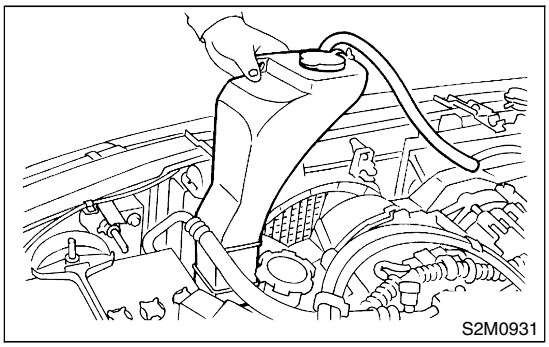
2) Lift-up the vehicle.
3) Remove under cover.
4) Disconnect connector of main fan motor.
5) Remove bolts which install radiator onto radiator cover. (Turbo model)


S2M1169

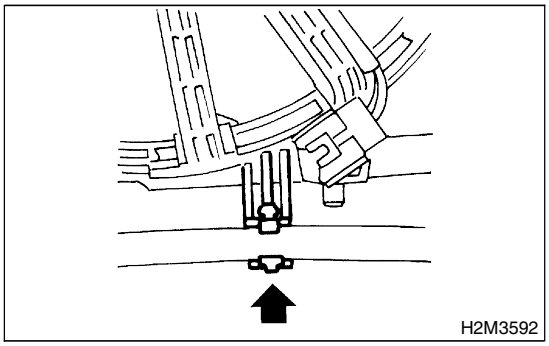
6) Lower the vehicle.
7) Remove V-belt cover.


S2M2235

8) Disconnect over flow hose.
9) Remove reservoir tank.


S2M0931

10) Lift-up radiator main fan motor assembly.
11) While lifting up radiator main fan motor assembly, detach oil cooler hose attached to a clip under the radiator main fan shroud. (Oil cooler equipped vehicles only)


H2M3592

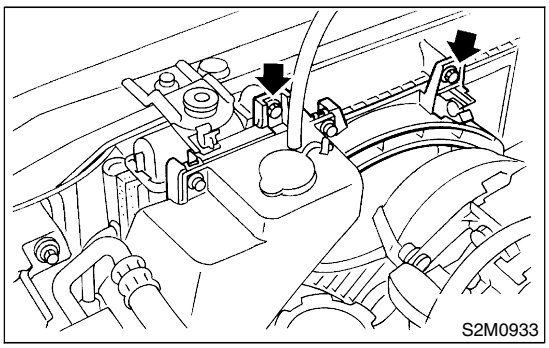
12) Remove radiator main fan motor assembly.

B: INSTALLATION S176059A11

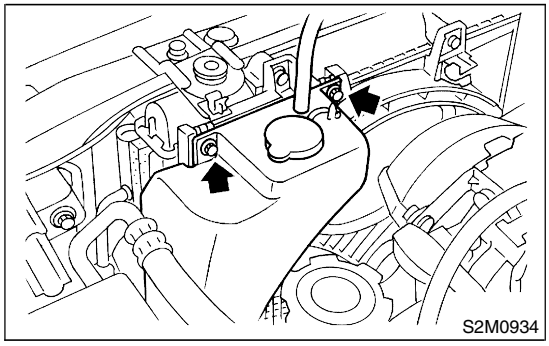
Install in the reverse order of removal.

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)

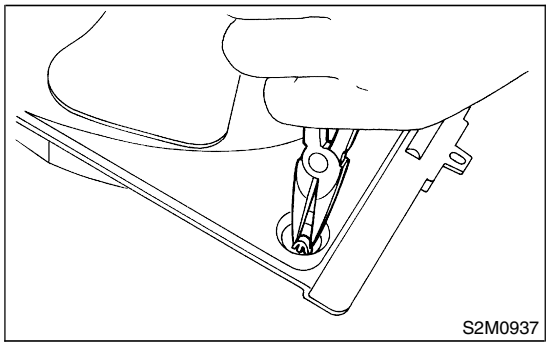

S2M0933

Tightening torque:
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)

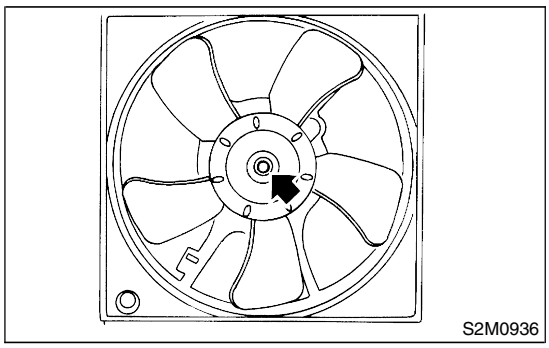


C: DISASSEMBLY S176059A06

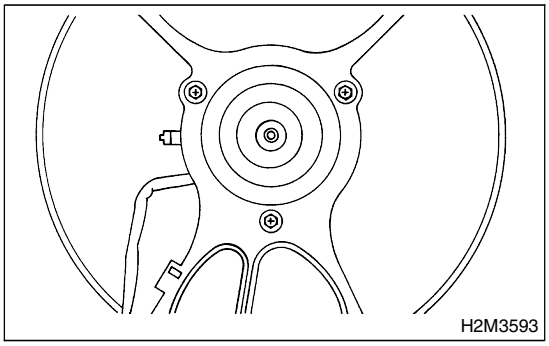
1) Remove clip which holds motor connector onto shroud.



2) Remove nut which holds fan itself onto fan motor and shroud assembly.



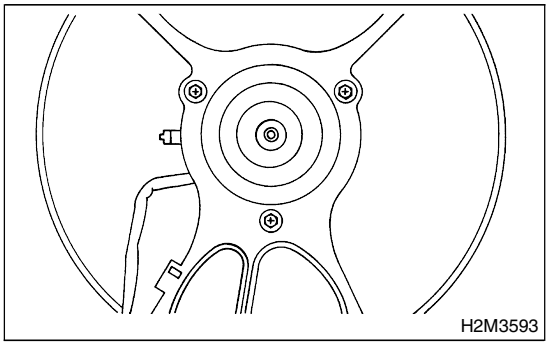
3) Remove bolts which install fan motor onto shroud.



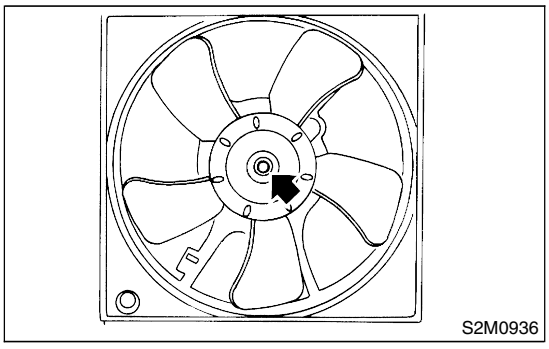
D: ASSEMBLY S176059A02

Assemble in the reverse order of disassembly.

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



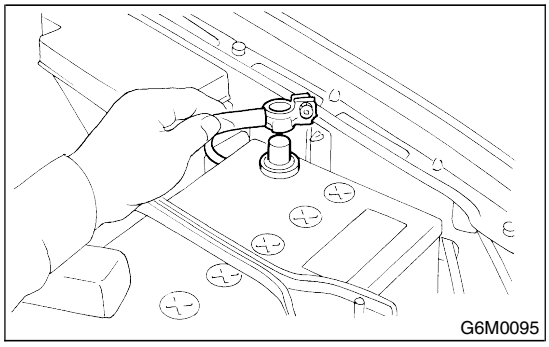
Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)



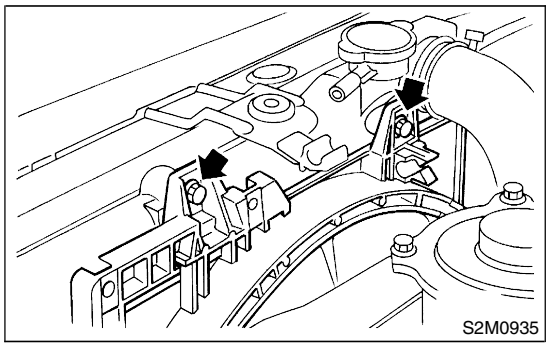
10. Radiator Sub Fan and Fan Motor S176074

A: REMOVAL S176074A18

1) Disconnect battery ground cable.


G6M0095

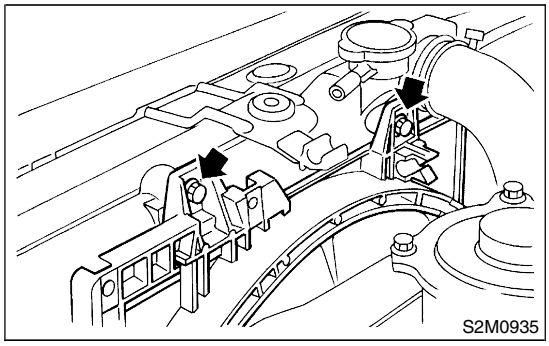
2) Lift-up the vehicle.
3) Remove under cover.
4) Disconnect connector of sub fan motor.
5) Lower the vehicle.
6) Remove bolts which hold sub fan shroud to radiator.
7) Remove radiator sub fan shroud through the under side of vehicle.


S2M0935

B: INSTALLATION S176074A11

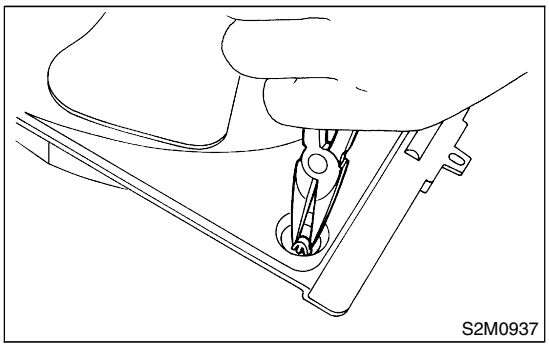
Install in the reverse order of removal.

Tightening torque:
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)

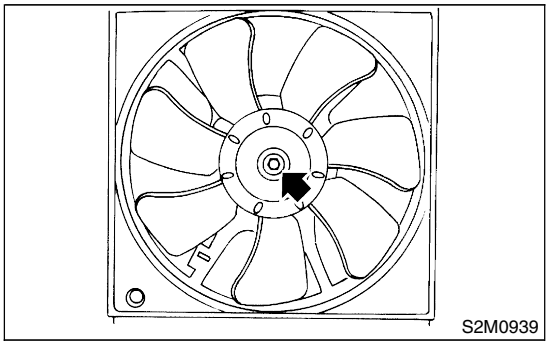

S2M0935

C: DISASSEMBLY S176074A06

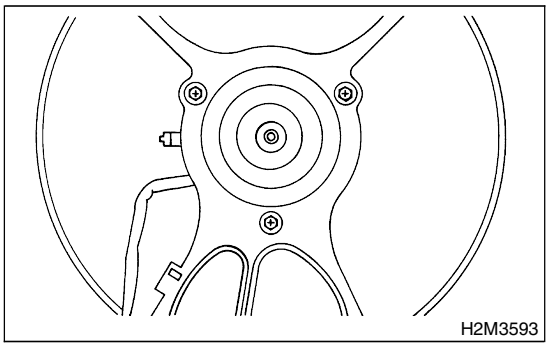
1) Remove clip which holds motor harness onto shroud.


S2M0937

2) Remove nut which holds fan itself onto fan motor and shroud assembly.


S2M0939

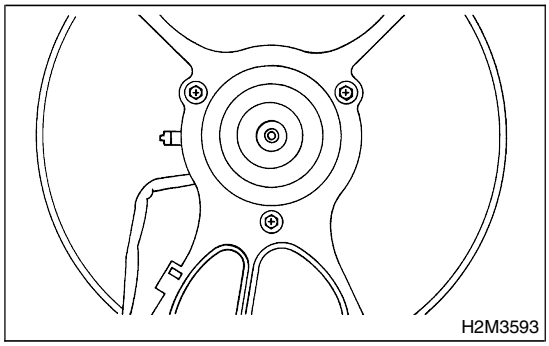
3) Remove bolts which install fan motor onto shroud.


H2M3593

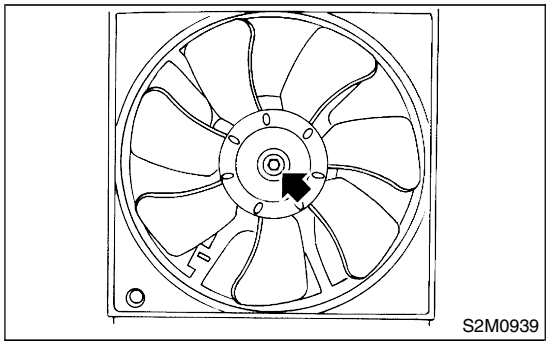
D: ASSEMBLY S176074A02

Assemble in the reverse order of disassembly.

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



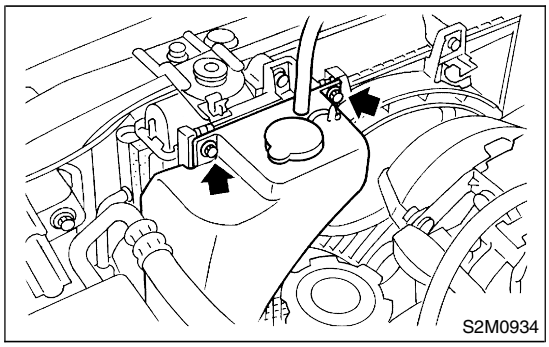
Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)



11. Reservoir Tank S176075

A: REMOVAL S176075A18

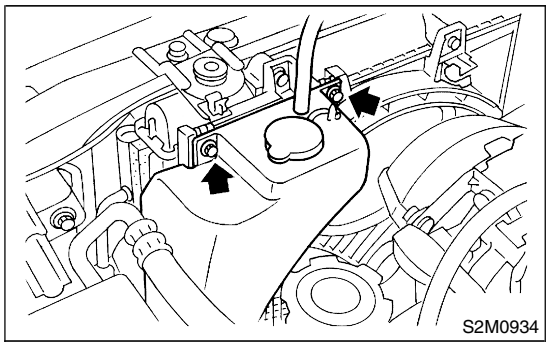
1) Disconnect over flow hose from radiator filler neck position.
2) Remove bolts which install reservoir tank onto radiator main fan shroud.
3) Remove reservoir tank.



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.

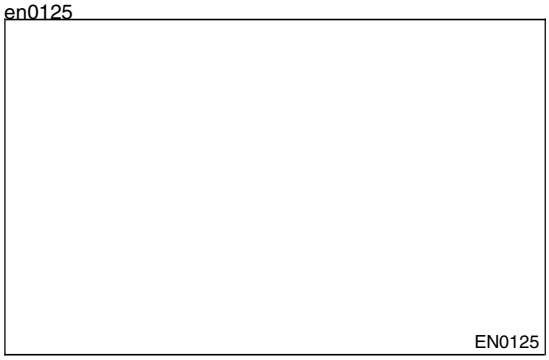
12. Coolant Filler Tank S176764

A: REMOVAL S176764A18

WARNING:
The radiator is pressurized. Wait until engine cools down before working on the radiator.

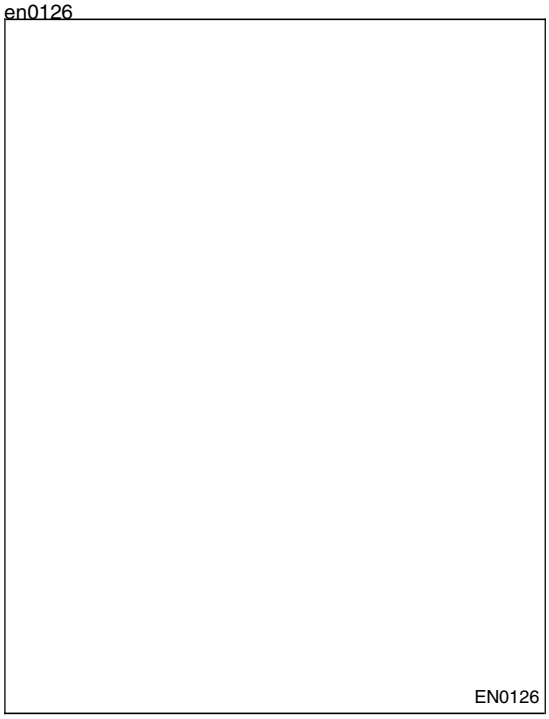
1) Drain coolant about 3.0 (3.2 US qt, 2.6 Imp qt). <Ref. to CO-14, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
2) Remove air cleaner upper cover and air intake boot. <Ref. to IN(DOHC TURBO)-7, REMOVAL, Air Cleaner.>
3) Remove air cleaner element.
4) Disconnect engine coolant hoses from coolant filler tank.

en0125



5) Remove bolts and nut which install coolant filler tank.
6) Disconnect engine coolant hose which connects the under side of coolant filler tank.
7) Remove coolant filler tank.

en0126

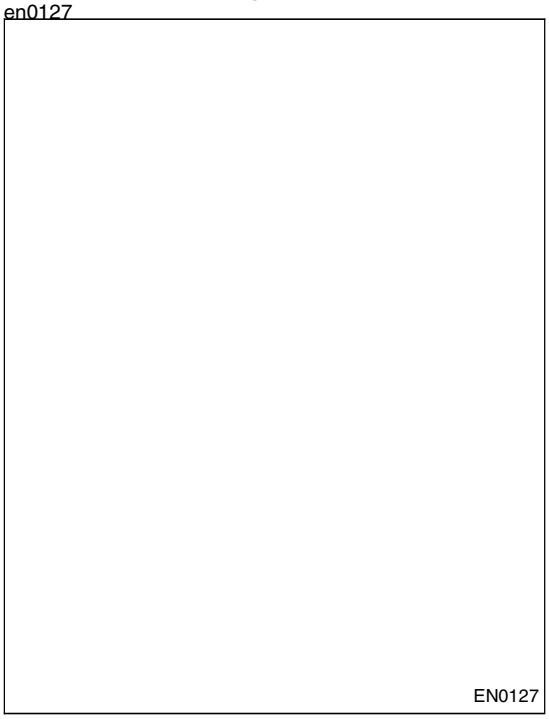


B: INSTALLATION S176764A11

1) Install in the reverse order of removal.

Tightening torque:
T1: 19 N·m (1.9 kgf-m, 13.7 ft-lb)
T2: 21 N·m (2.1 kgf-m, 15.2 ft-lb)

en0127



2) Fill engine coolant. <Ref. to CO-14, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

13. 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(SOHC)-2, Basic Diagnostic Procedure.> or <Ref. to EN(SOHCw/oOBD)-2, Basic Diagnostic Procedure.> or <Ref. to EN(DOHC TURBO)-2, PROCEDURE, 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(SOHC)-2, Basic Diagnostic Procedure.> or <Ref. to EN(SOHCw/oOBD)-2, Basic Diagnostic Procedure.> or <Ref. to EN(DOHC TURBO)-2, PROCEDURE, 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.

LUBRICATION

LU

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4. Oil Pump....12
5. Oil Pan and Strainer....16
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7. Engine Oil Cooler....22
8. Engine Oil Filter....24
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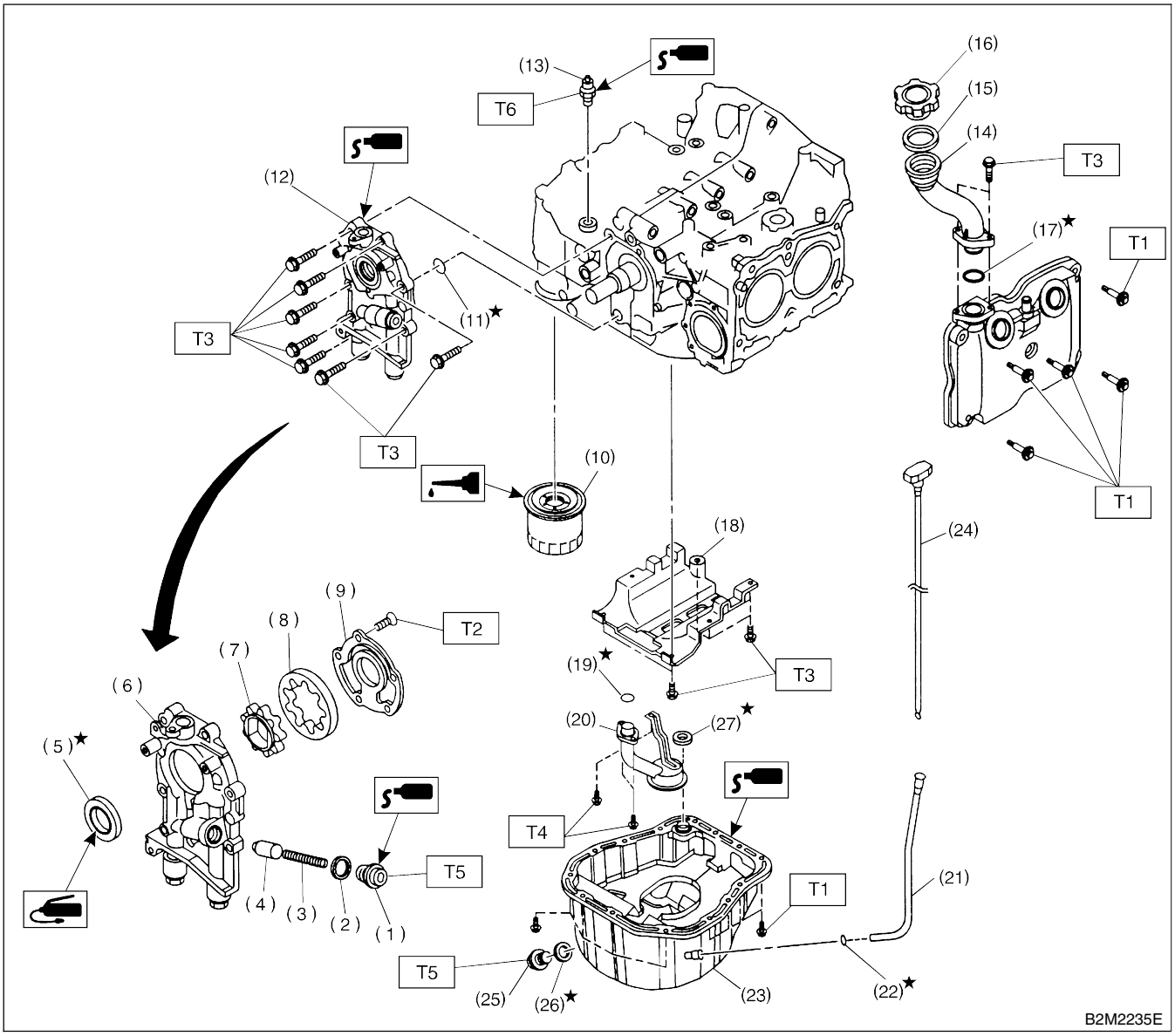
1. General Description S178001

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		Non-Turbo model	78 × 9 mm (3.07 × 0.35 in)
			Turbo-model	79 × 10 mm (3.11 × 0.39 in)
	Tip clearance between inner and outer rotor			STANDARD: 0.04 — 0.14 mm (0.0016 — 0.0055 in)
				LIMIT: 0.18 mm (0.0071 in)
	Side clearance between inner rotor and pump case			STANDARD: 0.02 — 0.07 mm (0.0008 — 0.0028 in)
				LIMIT: 0.12 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)	700 rpm	Discharge	- pressure: 98 kPa (1.0 kg/cm^2, 14 psi)
				- quantity: 4.2 ℓ (4.4 US qt, 3.7 Imp qt)/min.
		5,000 rpm	Discharge	- pressure: 294 kPa (3.0 kg/cm^2, 43 psi)
				- quantity: 42.0 ℓ (11.10 US gal, 9.24 Imp gal)/min.
	Relief valve operation pressure			490 kPa (5.0 kg/cm^2, 71 psi)
Oil filter	Type			Full-flow filter type
	Filtration area			1,000 cm^2 (155 sq in)
	By-pass valve opening pressure			157 kPa (1.6 kg/cm^2, 23 psi)
	Outer diameter × width			80 × 70 mm (3.15 × 2.76 in)
	Oil filter to engine thread size			M 20 × 1.5
Relief valve (on rocker shaft) operation pressure				69 kPa (0.7kg/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)			Non-Turbo model	4.0 ℓ (4.2 US qt, 3.5 Imp qt)
			Turbo model	4.5 ℓ (4.8 US qt, 4.0 Imp qt)

B: COMPONENT S178001A05

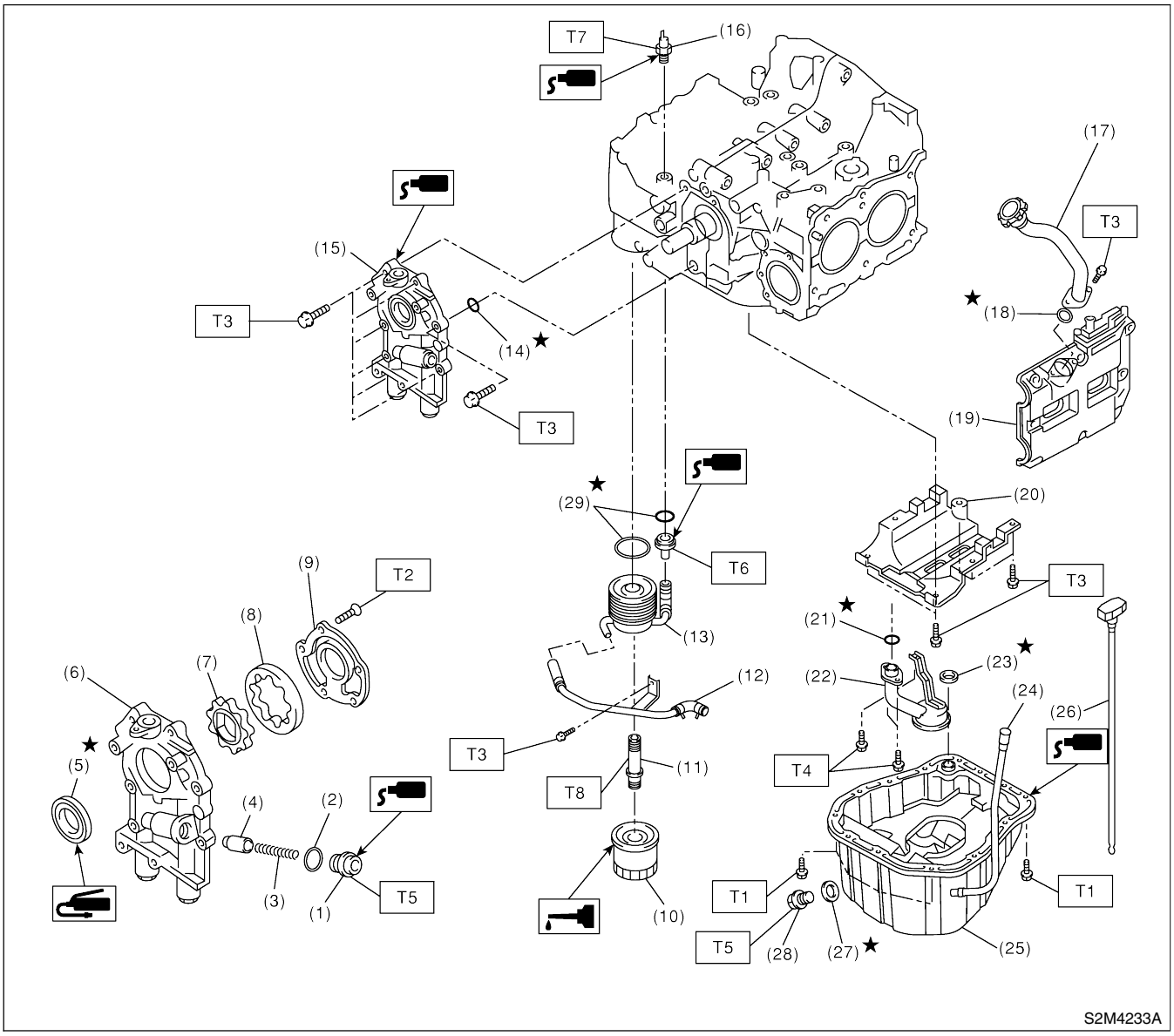
1. NON-TURBO MODEL S178001A0501



(1) Plug
(2) Washer
(3) Relief valve spring
(4) Relief valve
(5) Oil seal
(6) Oil pump case
(7) Inner rotor
(8) Outer rotor
(9) Oil pump cover
(10) Oil filter
(11) O-ring
(12) Oil pump ASSY
(13) Oil pressure switch
(14) Oil filler duct
(15) O-ring
(16) Oil filler cap
(17) O-ring
(18) Baffle plate
(19) O-ring
(20) Oil strainer
(21) Oil level gauge guide
(22) O-ring
(23) Oil pan
(24) Oil level gauge
(25) Drain plug
(26) Metal gasket
(27) Gasket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: 5 (0.5, 3.6)
T3: 6.4 (0.65, 4.7)
T4: 10 (1.0, 7.2)
T5: 44 (4.5, 33)
T6: 25 (2.5, 18.1)

2. TURBO MODEL S178001A0502



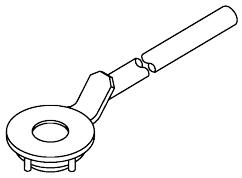
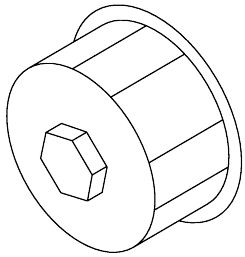
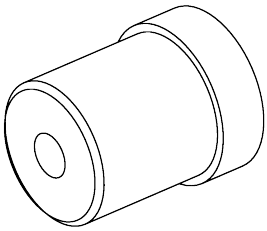
(1) Plug
(2) Washer
(3) Relief valve spring
(4) Relief valve
(5) Oil seal
(6) Oil pump case
(7) Inner rotor
(8) Outer rotor
(9) Oil pump cover
(10) Oil filter
(11) Connector
(12) Water by-pass pipe
(13) Oil cooler
(14) O-ring
(15) Oil pump ASSY
(16) Oil pressure switch
(17) Oil filler duct
(18) O-ring
(19) Cylinder head cover
(20) Baffle plate
(21) O-ring
(22) Oil strainer
(23) Gasket
(24) Oil level gauge guide
(25) Oil pan
(26) Oil level gauge
(27) Metal gasket
(28) Drain plug
(29) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: 5 (0.5, 3.6)
T3: 6.4 (0.65, 4.7)
T4: 10 (1.0, 7.0)
T5: 44 (4.5, 33)
T6: 69 (7.0, 50.6)
T7: 25 (2.5, 18.1)
T8: 54 (5.5, 40)

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 negative terminal from battery.

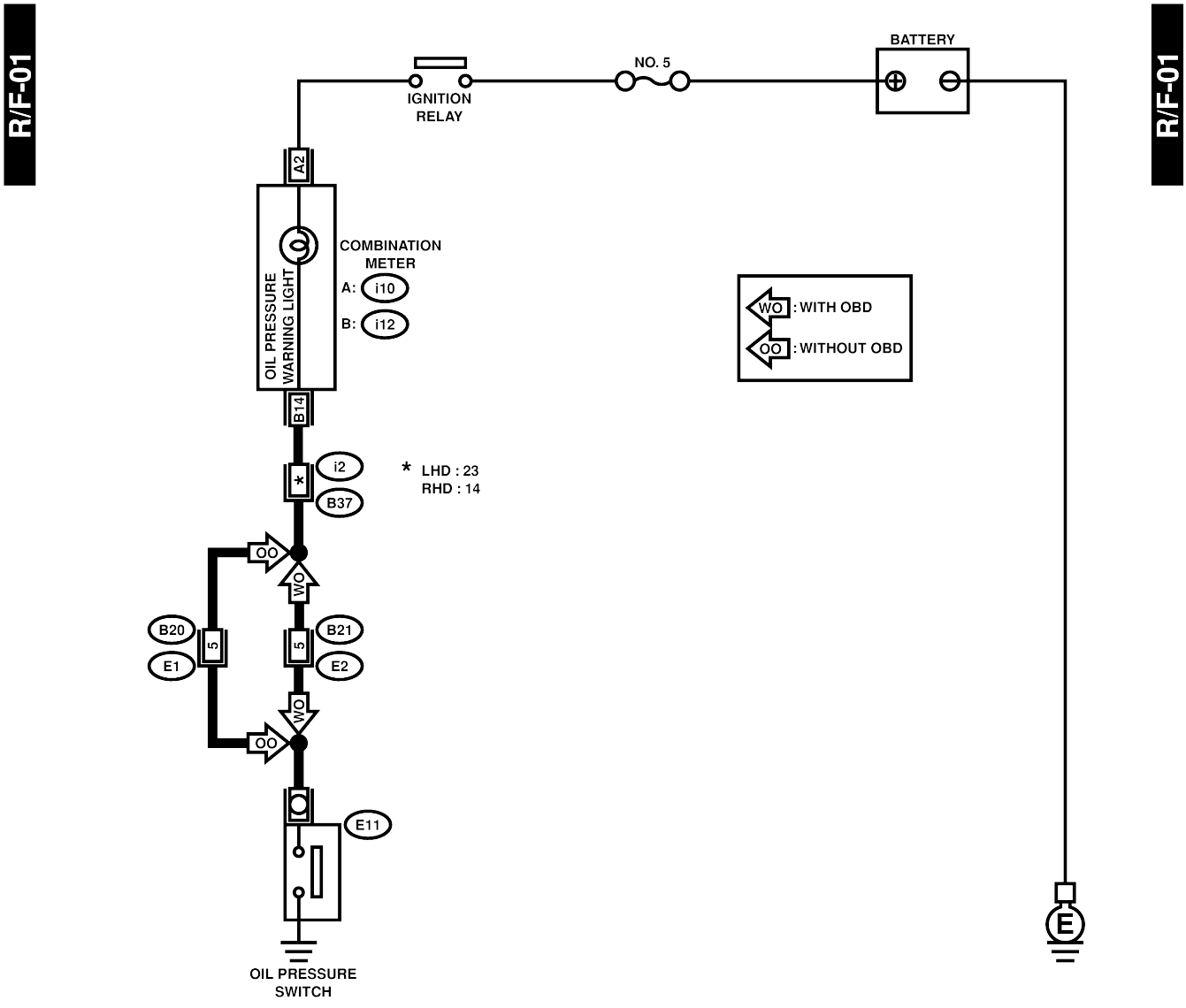
D: PREPARATION TOOL S178001A17

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

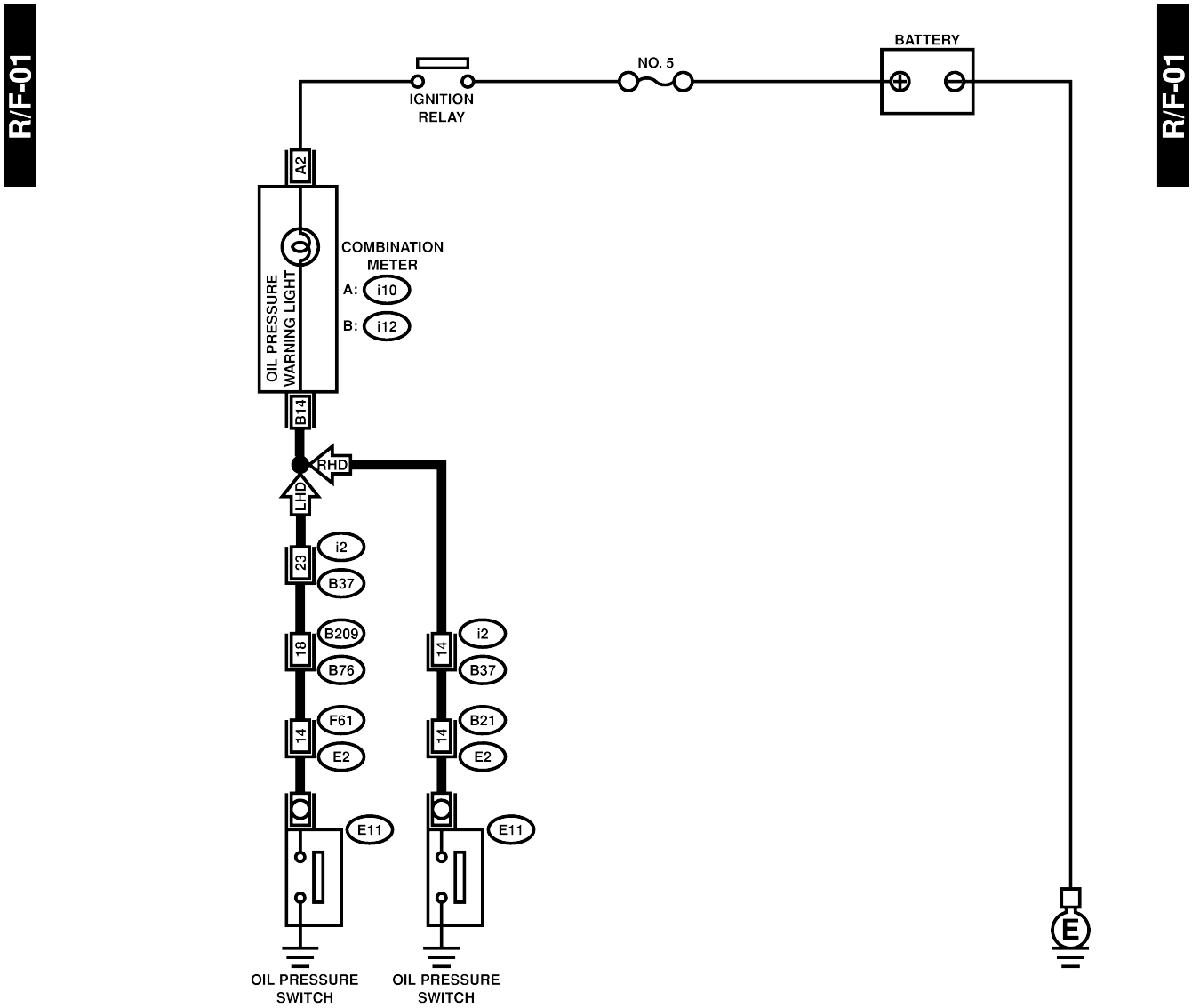
A: SCHEMATIC S178076A21

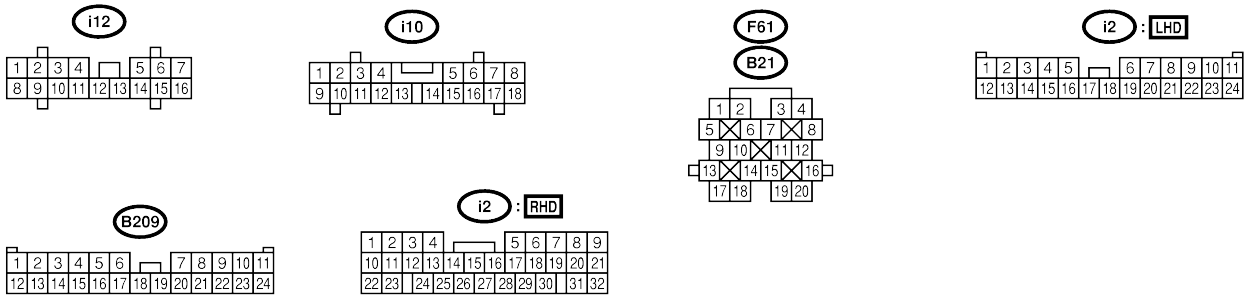
1. NON-TURBO MODEL S178076A2101



S2M2141

2. TURBO MODEL S178076A2102





S2M2142

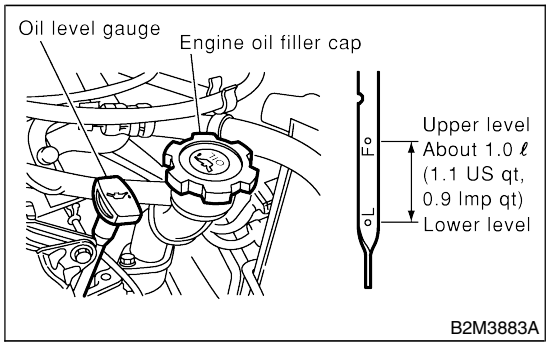
B: INSPECTION S178076A10

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-7, 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

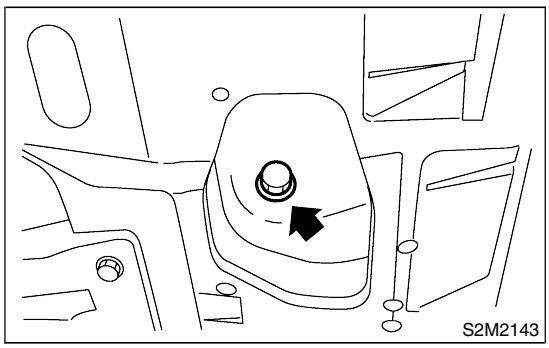
A: INSPECTION S178077A10

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.

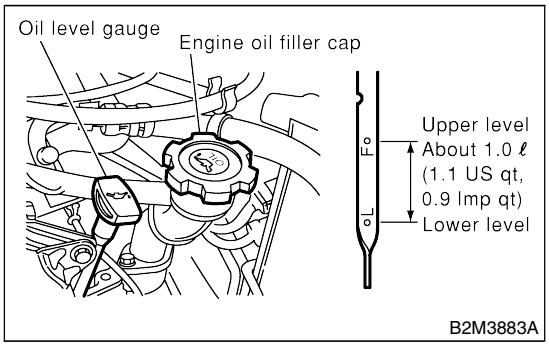


B: REPLACEMENT S178077A20

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

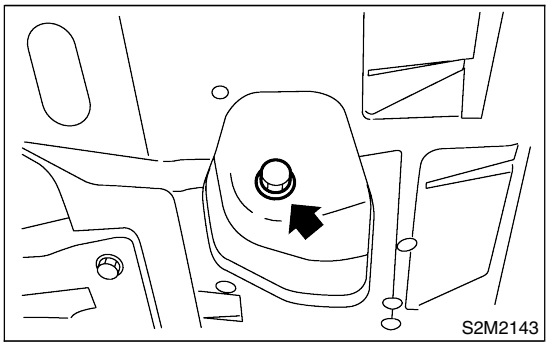


2) Open engine oil filler cap for quick draining of the engine oil.



3) Replace drain plug gasket.
4) Tighten engine oil drain plug after draining engine oil.

Tightening torque:
44 N·m (4.5 kgf-m, 33 ft-lb)

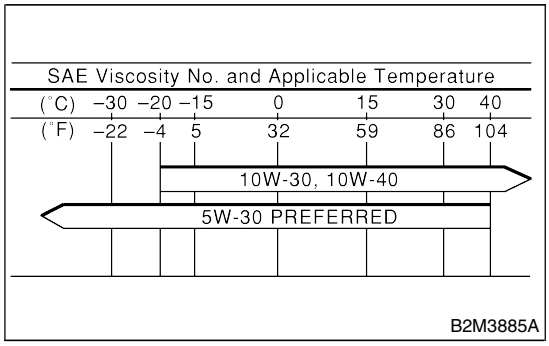


5) Fill engine oil through filler pipe up to upper point on level gauge. Make sure that vehicle is placed level when checking oil level. Use engine oil of proper quality and viscosity, selected in accordance with the table in figure.

Recommended oil
API classification
SJ or SH with the words “Energy Conserving or Energy conserving II”, CCMC specification G4 or G5, ACEA specification A1, A2 or A3, or New API mark displayed on the container (If it is impossible to get SJ or SH grade, you may use SG grade.)

Engine oil capacity: (Non-Turbo model)
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)

Engine oil capacity: (Turbo model)
Upper level
4.5 ℓ (4.8 US qt, 4.0 Imp qt)
Lower level
3.5 ℓ (3.7 US qt, 3.1 Imp qt)

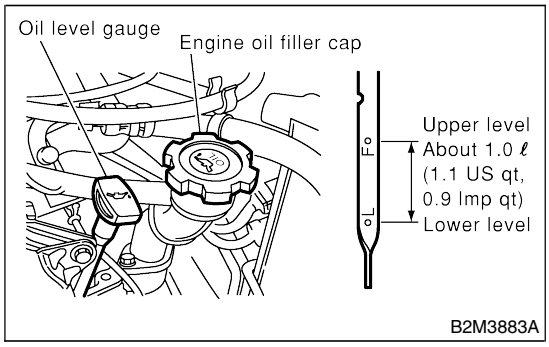


The proper viscosity helps vehicle get good cold and hot starting by reducing viscous friction and thus increasing cranking speed.

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.

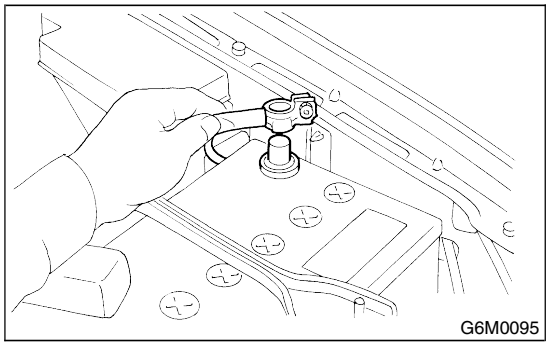
6) Close engine oil filler cap.
7) Start engine and warm it up for a time.
8) After engine stops, recheck the oil level. If necessary, add engine oil up to upper level on level gauge.



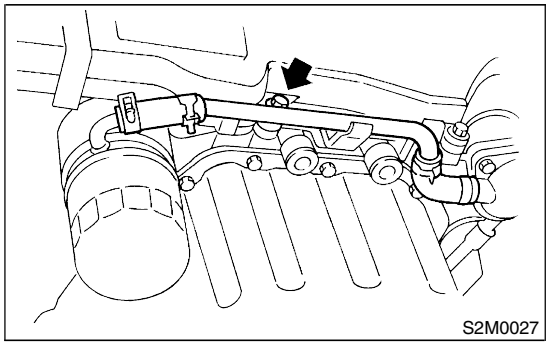
4. Oil Pump S178070

A: REMOVAL S178070A18

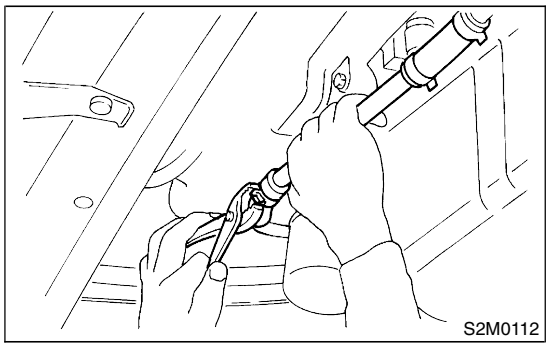
1) Disconnect battery ground cable.


G6M0095

2) Lift-up the vehicle.
3) Remove under cover.
4) Remove bolts which install water pipe of oil cooler to oil pump. (Turbo model)

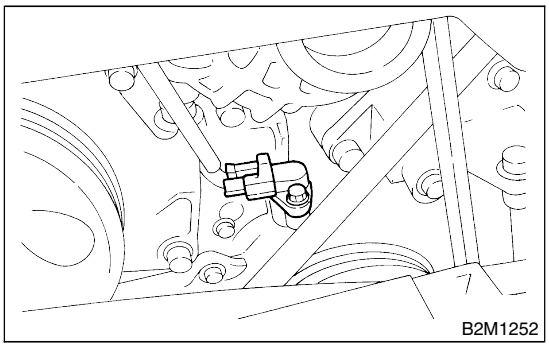

S2M0027

5) Remove water pipe and hoses between oil cooler and water pump. (Turbo model)

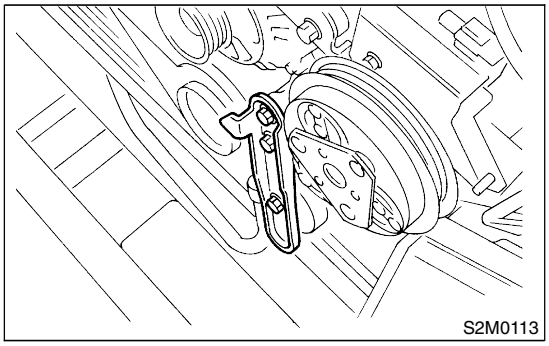

S2M0112

6) Remove radiator. <Ref. to CO-25, REMOVAL, Radiator.>

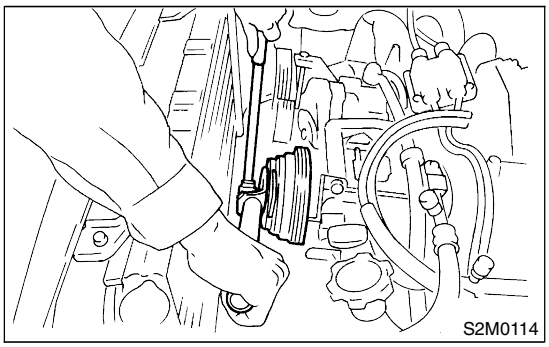
7) Remove crankshaft position sensor.


B2M1252

8) Remove V-belts. <Ref. to ME(SOHC)-42, REMOVAL, V-belt.> or <Ref. to ME(DOHC TURBO)-44, REMOVAL, V-belt.>
9) Remove rear side V-belt tensioner.

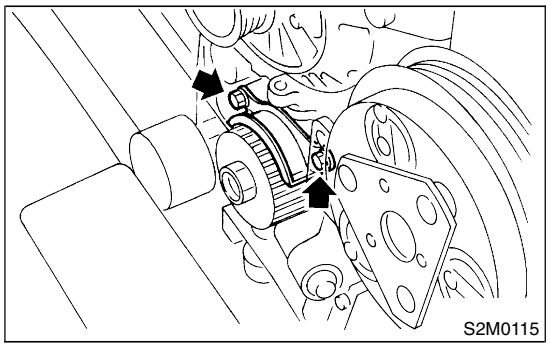

S2M0113

10) Remove crankshaft pulley by using ST.
ST 499977300 CRANKSHAFT PULLEY WRENCH

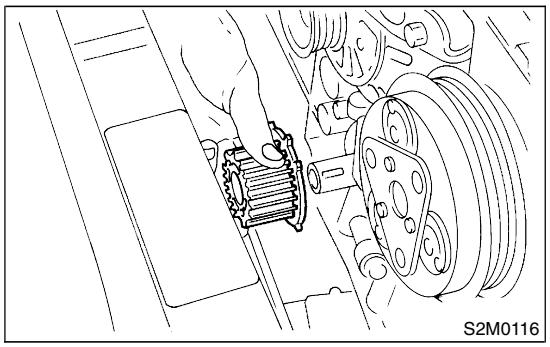

S2M0114

11) Remove water pump. <Ref. to CO-16, REMOVAL, Water Pump.>

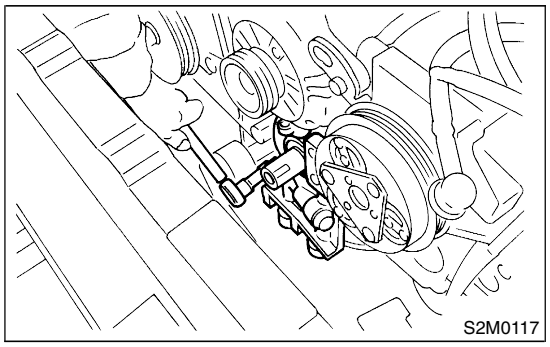
12) Remove timing belt guide. (MT vehicles only)



13) Remove crankshaft sprocket.

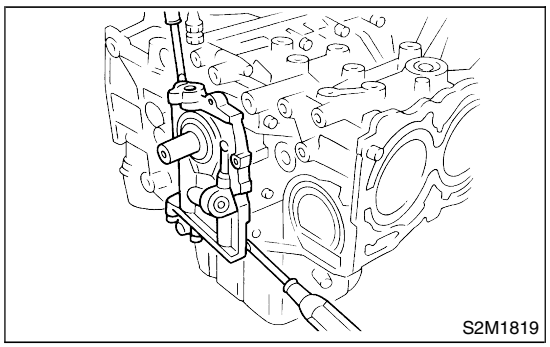


14) Remove bolts which install oil pump onto cylinder block.



15) Remove oil pump by using flat bladed screwdriver.

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

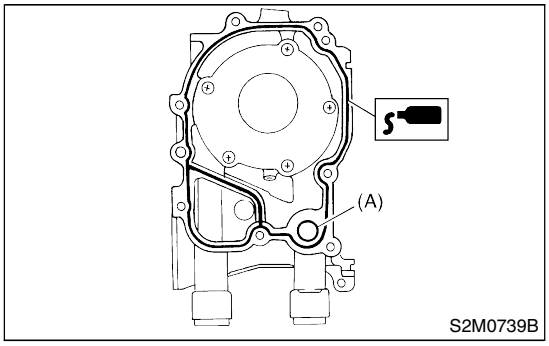


B: INSTALLATION S178070A11

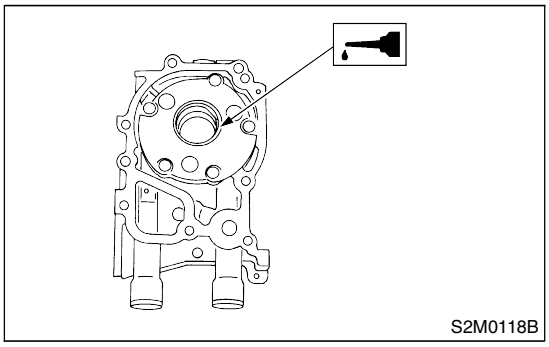
Install in the reverse order of removal.
Do the following:
1) Apply fluid packing to matching surfaces of oil pump.

Fluid packing:
THREE BOND 1215 or equivalent

2) Replace O-ring (A) with a new one.



3) Apply a coat of engine oil to the inside of the oil seal.

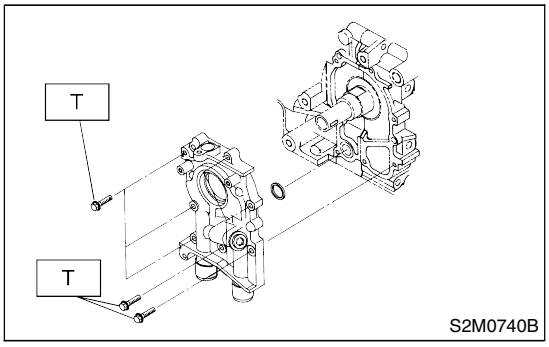


4) Be careful not to scratch oil seal when installing oil pump on cylinder block.
5) Position the oil pump, aligning the notched area with the crankshaft, and push the oil pump straight.

CAUTION:
Make sure the oil seal lip is not folded.

6) Install oil pump.

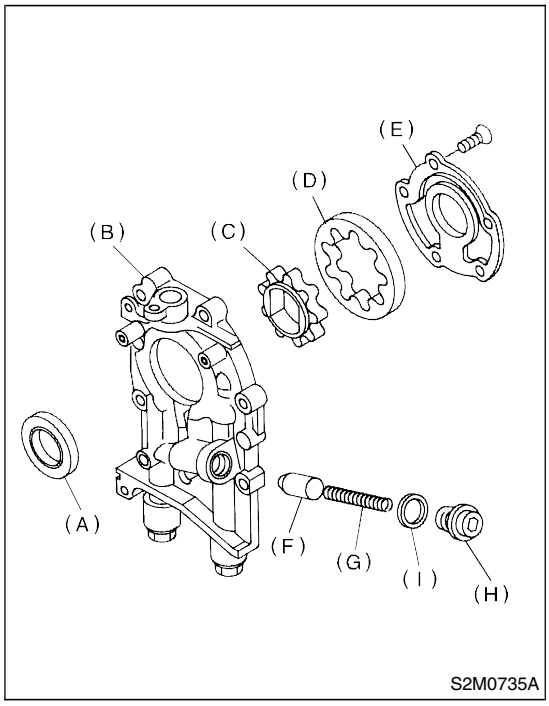
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



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.

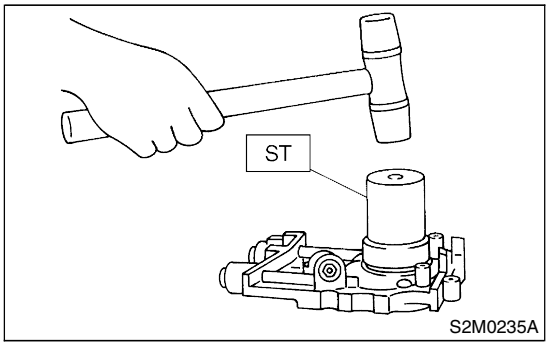


(A) Oil seal
(B) Pump case
(C) Inner rotor
(D) Outer rotor
(E) Pump cover
(F) Relief valve
(G) Relief valve spring
(H) Plug
(I) Washer

D: ASSEMBLY S178070A02

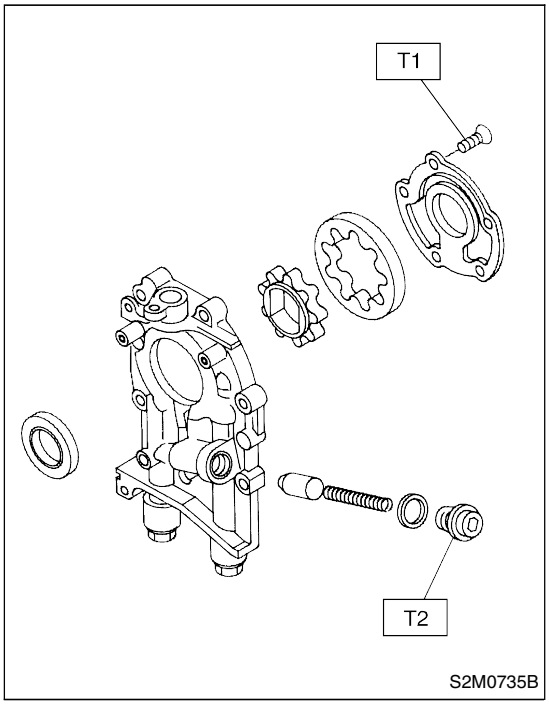
1) Install front oil seal by using ST.
ST 499587100 OIL SEAL INSTALLER

CAUTION:
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)

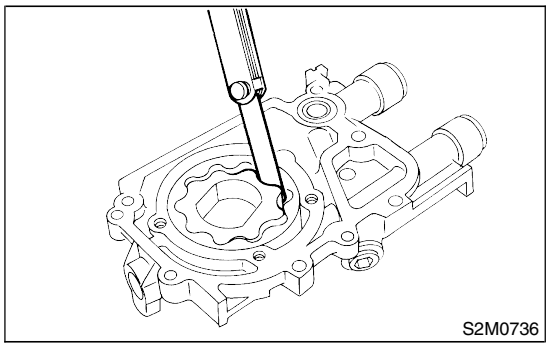


E: INSPECTION S178070A10

1. TIP CLEARANCE S178070A1001

Measure the tip clearance of rotors. If the clearance exceeds the limit, replace rotors as a matched set.

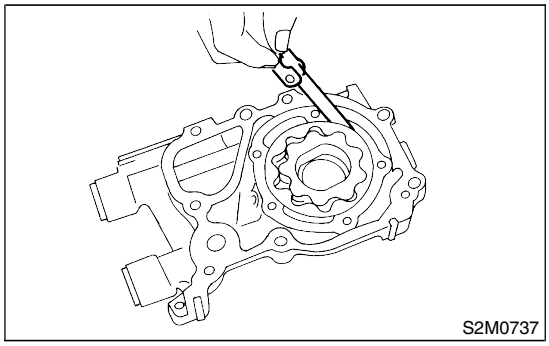
Tip clearance:
Standard
0.04 — 0.14 mm (0.0016 — 0.0055 in)
Limit
0.18 mm (0.0071 in)


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.

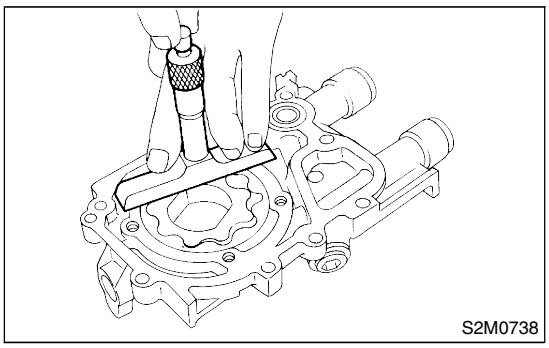
Case clearance:
Standard
0.10 — 0.175 mm (0.0039 — 0.0069 in)
Limit
0.20 mm (0.0079 in)


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.

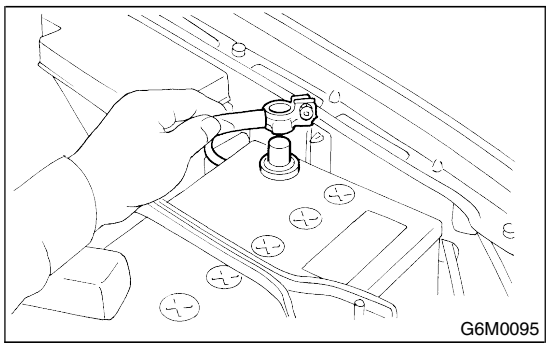
6. OIL SEAL S178070A1006

Check the oil seal lips for deformation, hardening, wear, etc. and replace if defective.

5. Oil Pan and Strainer S178071

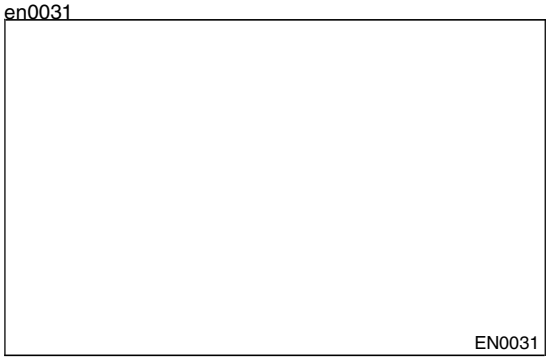
A: REMOVAL S178071A18

1) Set the vehicle on lift arms.
2) Remove front wheels.
3) Disconnect battery ground cable.



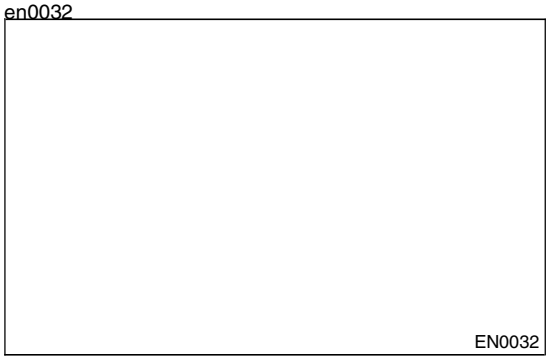
4) Remove air intake duct and air cleaner case. (Non-Turbo model)
<Ref. to IN(SOHC)-8, REMOVAL, Air Intake Duct.> and <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
5) Disconnect connector from mass air flow sensor. (Turbo model)

en0031

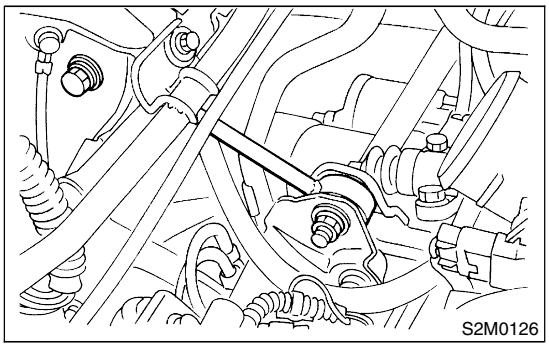


6) Remove air intake boot and air cleaner upper cover. (Turbo model)

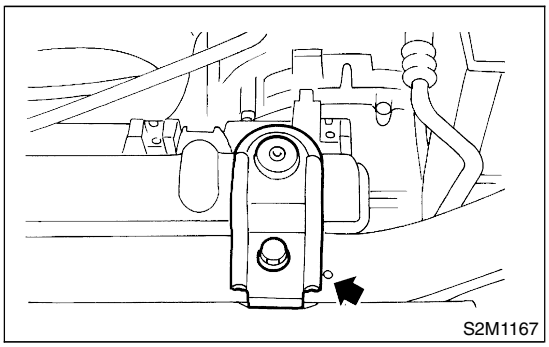
en0032



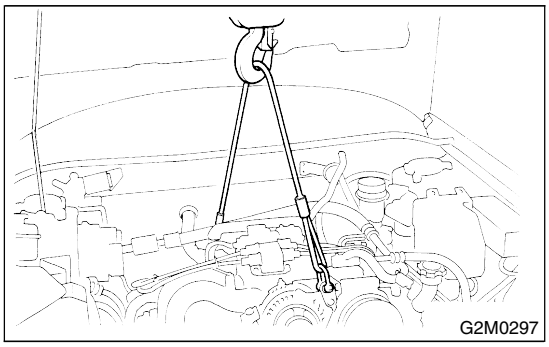
7) Remove intercooler (Turbo model) <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
8) Remove pitching stopper.



9) Remove radiator upper brackets.



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



11) Lift-up the vehicle.

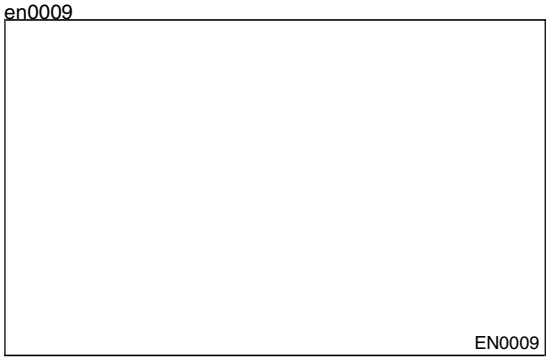
CAUTION:
At this time, raise up wire ropes.

12) Remove under cover.

13) Drain engine oil.
Set container under the vehicle, and remove drain plug from oil pan.

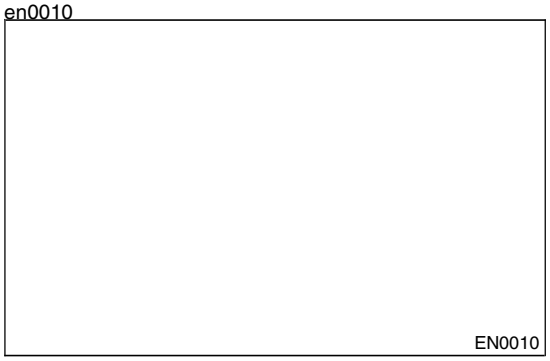
- Non-Turbo model

en0009



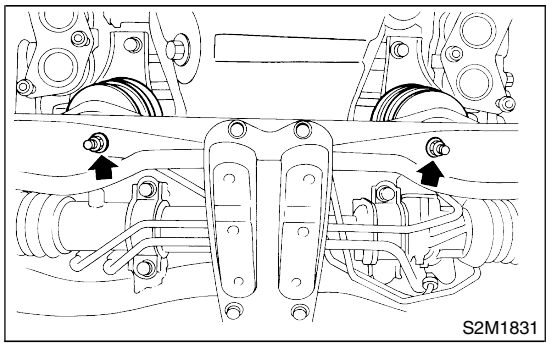
- Turbo model

en0010



(A) Gasket
(B) Drain plug

14) Remove front and center exhaust pipes. (Non-Turbo model) <Ref. to EX(SOHC)-5, REMOVAL, Front Exhaust Pipe.> or <Ref. to EX(SOHCw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>
15) Remove nuts which install front cushion rubber onto front crossmember.

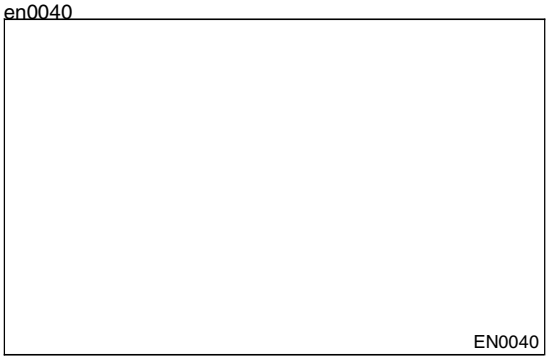


16) Remove bolts which install oil pan on cylinder block while raising up engine.
17) Insert oil pan cutter blade between cylinder block-to-oil pan clearance.

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

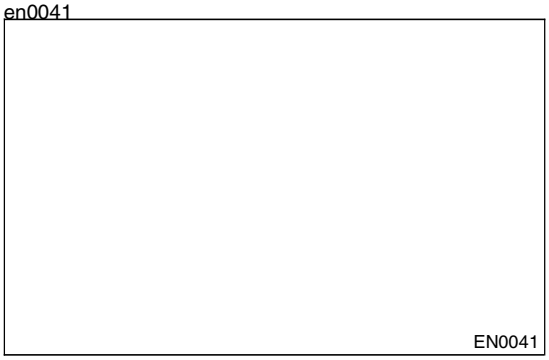
- Non-Turbo model

en0040

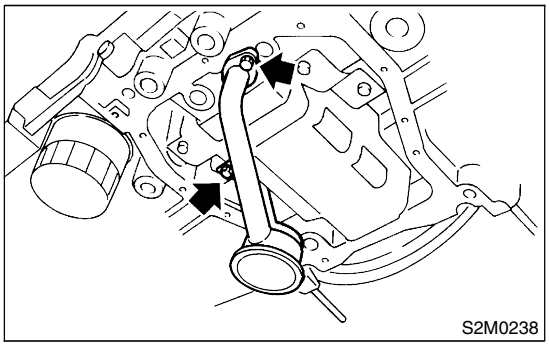


- Turbo model

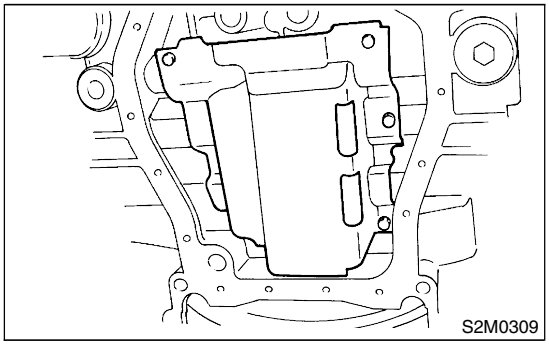
en0041



18) Remove oil strainer.



19) Remove baffle plate.

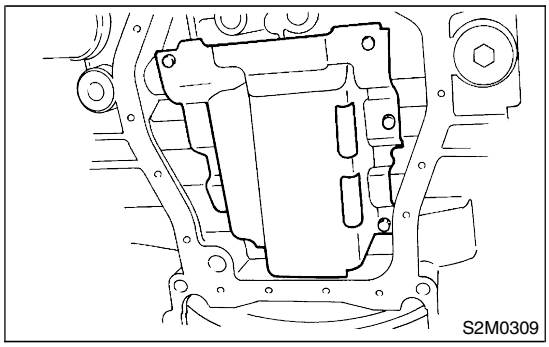


B: INSTALLATION S178071A11

CAUTION:
Before installing oil pan, clean sealant from oil pan and engine block.

1) Install baffle plate.

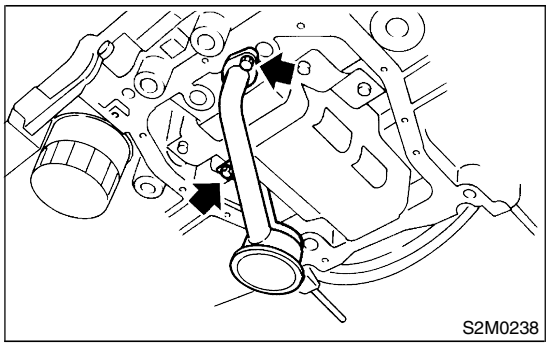
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)


S2M0309

2) Install oil strainer onto baffle plate.

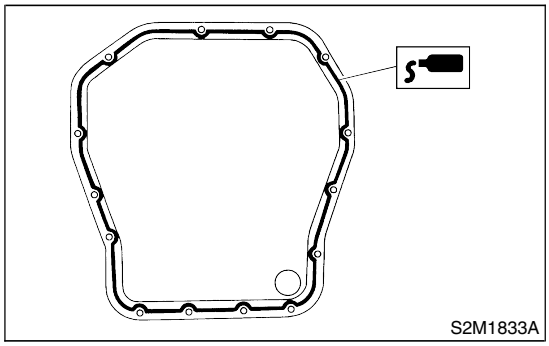
CAUTION:
Replace O-ring with a new one.

Tightening torque:
10 N·m (1.0 kgf-m, 7 ft-lb)


S2M0238

3) Apply fluid packing to mating surfaces and install oil pan.

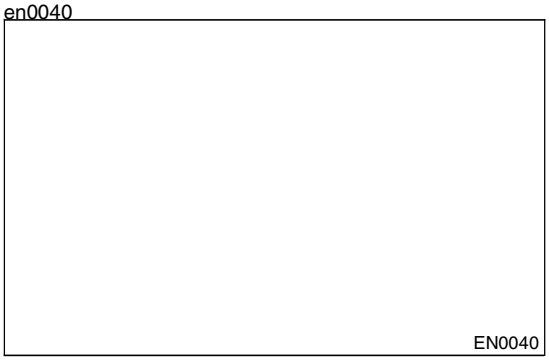
Fluid packing:
THREE BOND 1215 or equivalent


S2M1833A

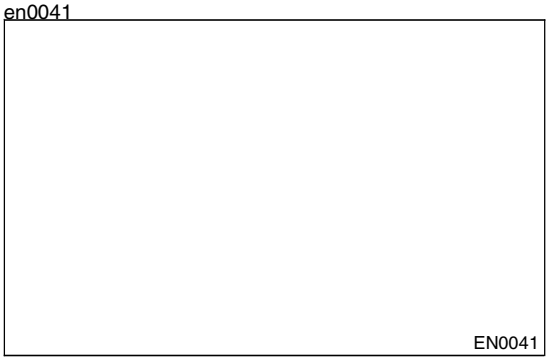
4) Tighten bolts which install oil pan onto engine block.

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

- Non-Turbo model

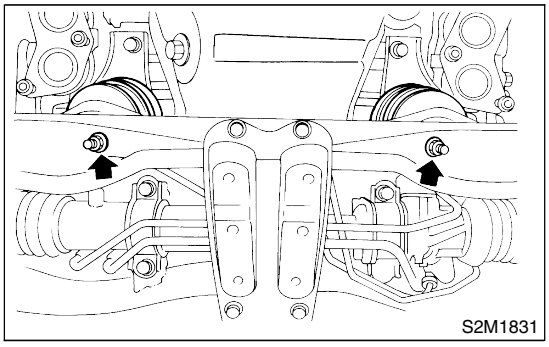
en0040

EN0040

- Turbo model

en0041

EN0041

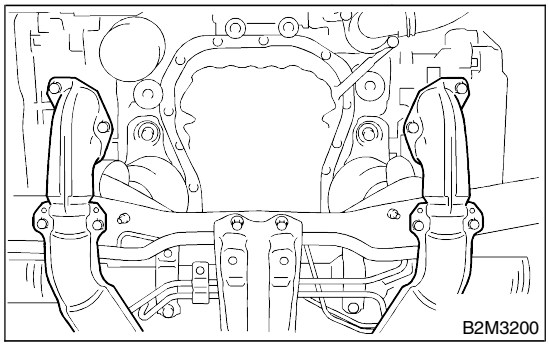
5) Lower engine onto front crossmember.
6) Tighten nuts which install front cushion rubber onto front crossmember.

Tightening torque:
69 N·m (7.0 kgf-m, 51 ft-lb)


S2M1831

7) Install front and center exhaust pipes. (Non-Turbo model)
<Ref. to EX(SOHC)-6, INSTALLATION, Front Exhaust Pipe.> or <Ref. to EX(SOHCw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>

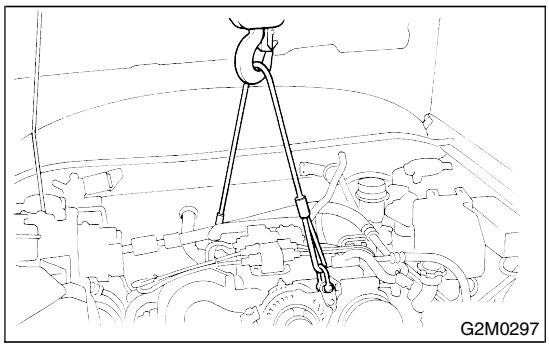
CAUTION:
Always use the new gaskets.


B2M3200

8) Install under cover.
9) Lower the vehicle.

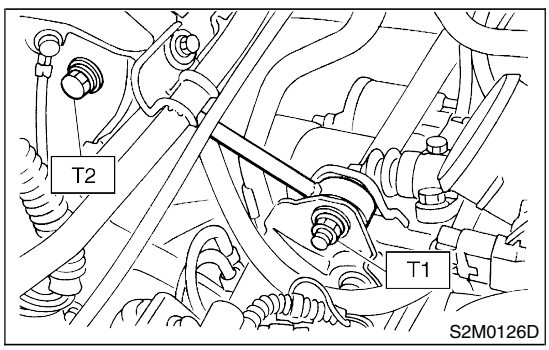
CAUTION:
At this time, lower lifting device and release steel cables.

10) Remove lifting device and steel cables.


G2M0297

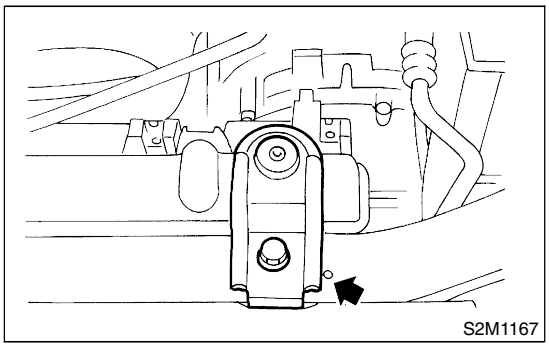
11) Install pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 37 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



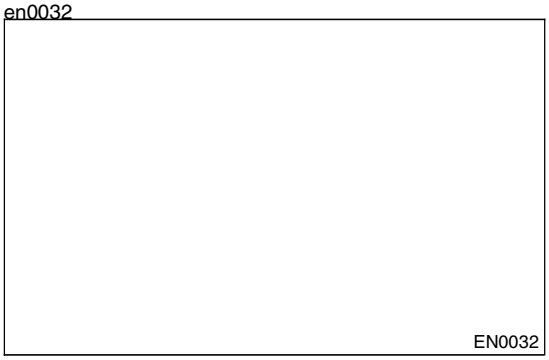
S2M0126D

12) Install radiator upper brackets.


S2M1167

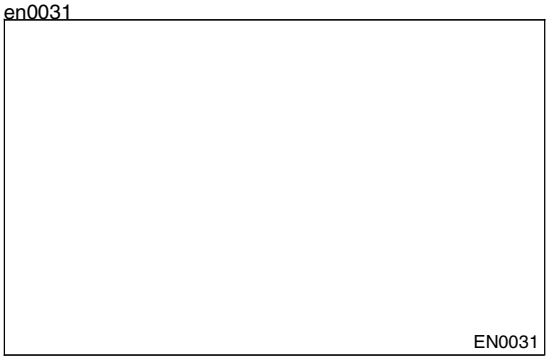
13) Install air intake duct and air cleaner case. (Non-Turbo model)
<Ref. to IN(SOHC)-7, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(SOHC)-8, INSTALLATION, Air Intake Duct.>
14) Install intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>
15) Install air intake boot and air cleaner upper cover. (Turbo model)

en0032


EN0032

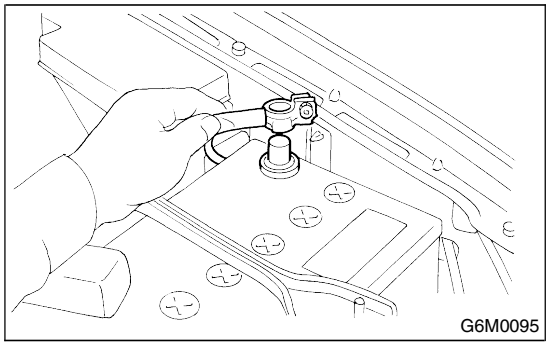
16) Connect connector to mass air flow sensor. (Turbo model)

en0031


EN0031

17) Install front wheels.

18) Connect battery ground cable.



19) Fill engine oil. <Ref. to LU-10, INSPECTION, Engine Oil.>

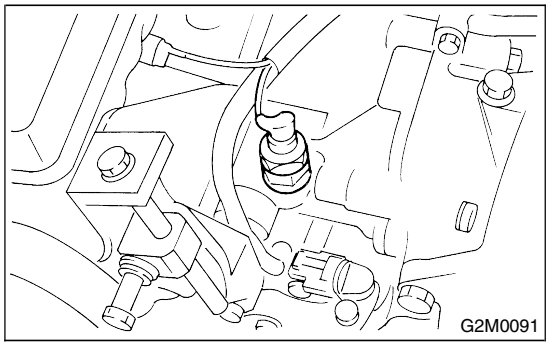
C: INSPECTION S178071A10

By visual check make sure oil pan, oil strainer, oil strainer stay and baffle plate are not damaged.

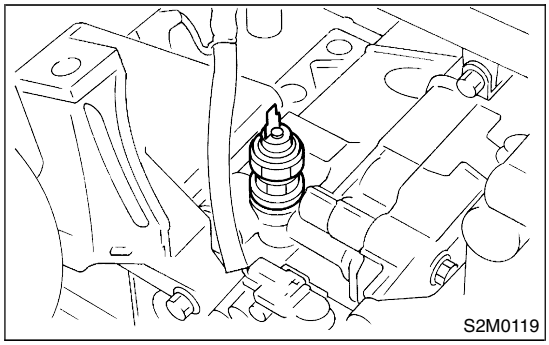
6. Oil Pressure Switch S178069

A: REMOVAL S178069A18

1) Remove generator from bracket. <Ref. to SC-12, REMOVAL, Generator.>
2) Disconnect terminal from oil pressure switch.



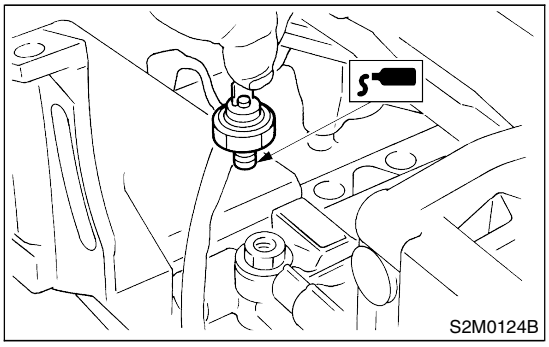
3) Remove oil pressure switch.



B: INSTALLATION S178069A11

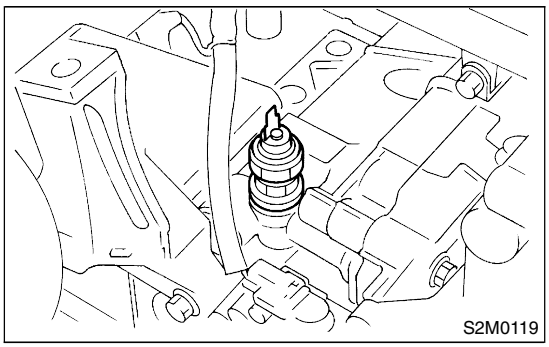
1) Apply fluid packing to oil pressure switch threads.

Fluid packing:
THREE BOND 1215 or equivalent

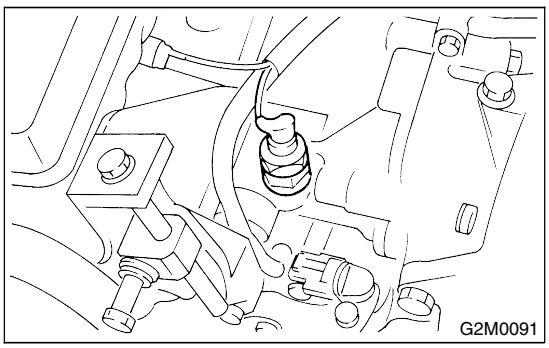


2) Install oil pressure switch onto engine block.

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



3) Connect terminal of oil pressure switch.



4) Install generator on bracket. <Ref. to SC-13, INSTALLATION, Generator.>

C: INSPECTION S178069A10

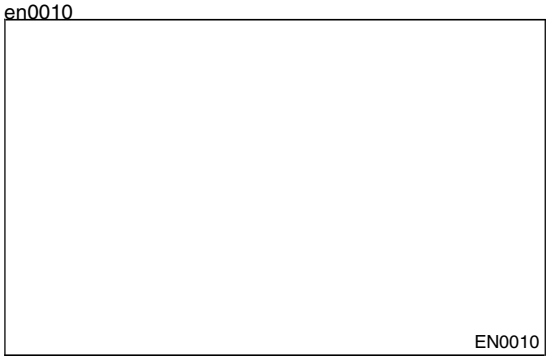
Make sure oil does not leak or seep from where the oil pressure switched is installed.

7. Engine Oil Cooler S178768

A: REMOVAL S178768A18

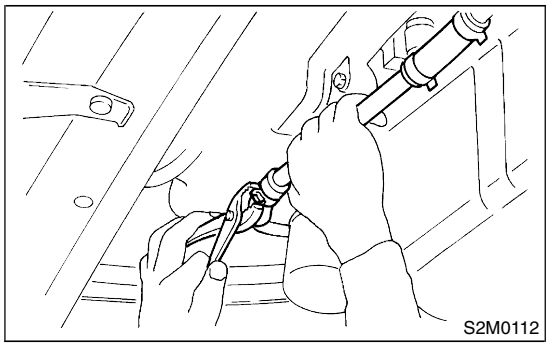
1) Lift-up the vehicle.
2) Remove under cover.
3) Drain engine oil. Set container under the vehicle, and remove drain plug from oil pan.

en0010



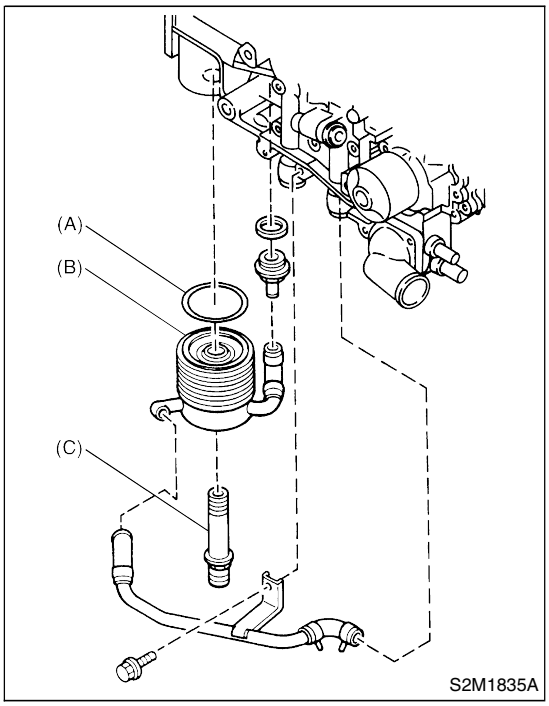
(A) Metal gasket
(B) Drain plug

4) Drain coolant.
5) Remove water by-pass pipe between oil cooler and water pump.



6) Remove engine oil filter. <Ref. to LU-24, REMOVAL, Engine Oil Filter.>

7) Remove connector and remove oil cooler.



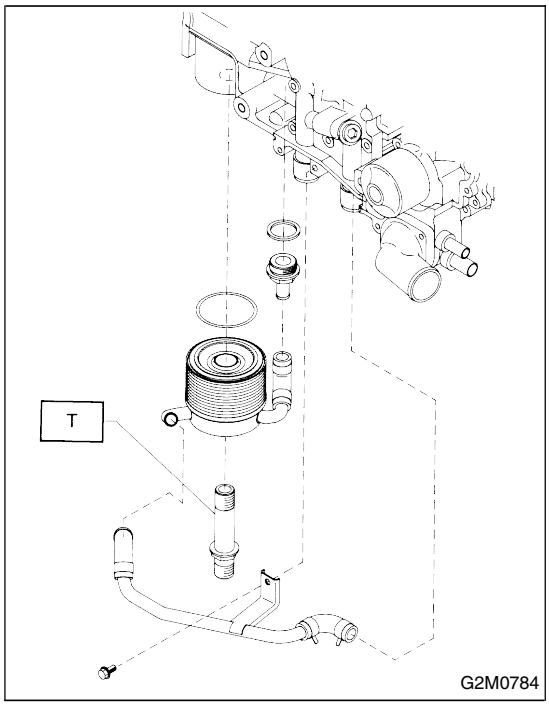
(A) O-ring
(B) Oil cooler
(C) Connector

B: INSTALLATION S178768A11

1) Install in the reverse order of removal.

Tightening torque:
T: 54 N·m (5.5 kgf-m, 39.8 ft-lb)

CAUTION:
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.

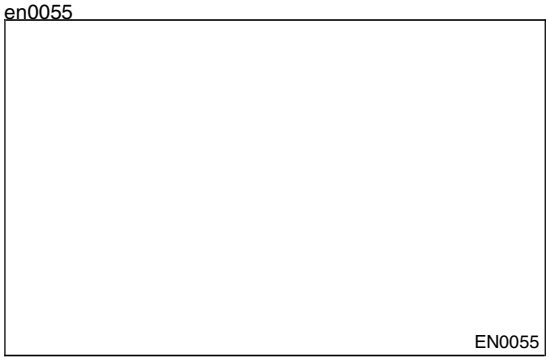
8. Engine Oil Filter S178585

A: REMOVAL S178585A18

1) Remove under cover.
2) Remove oil filter with ST.
ST 498547000 OIL FILTER WRENCH

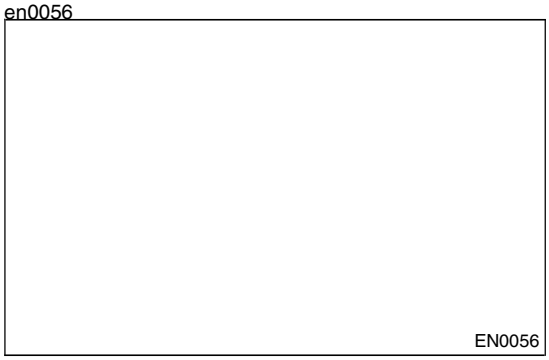
- Non-Turbo model

en0055



- Turbo model

en0056



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-10, 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).

MEMO:

SPEED CONTROL SYSTEMS

SP

Page

1. General Description....2
2. Accelerator Pedal....5
3. Accelerator Control Cable....12

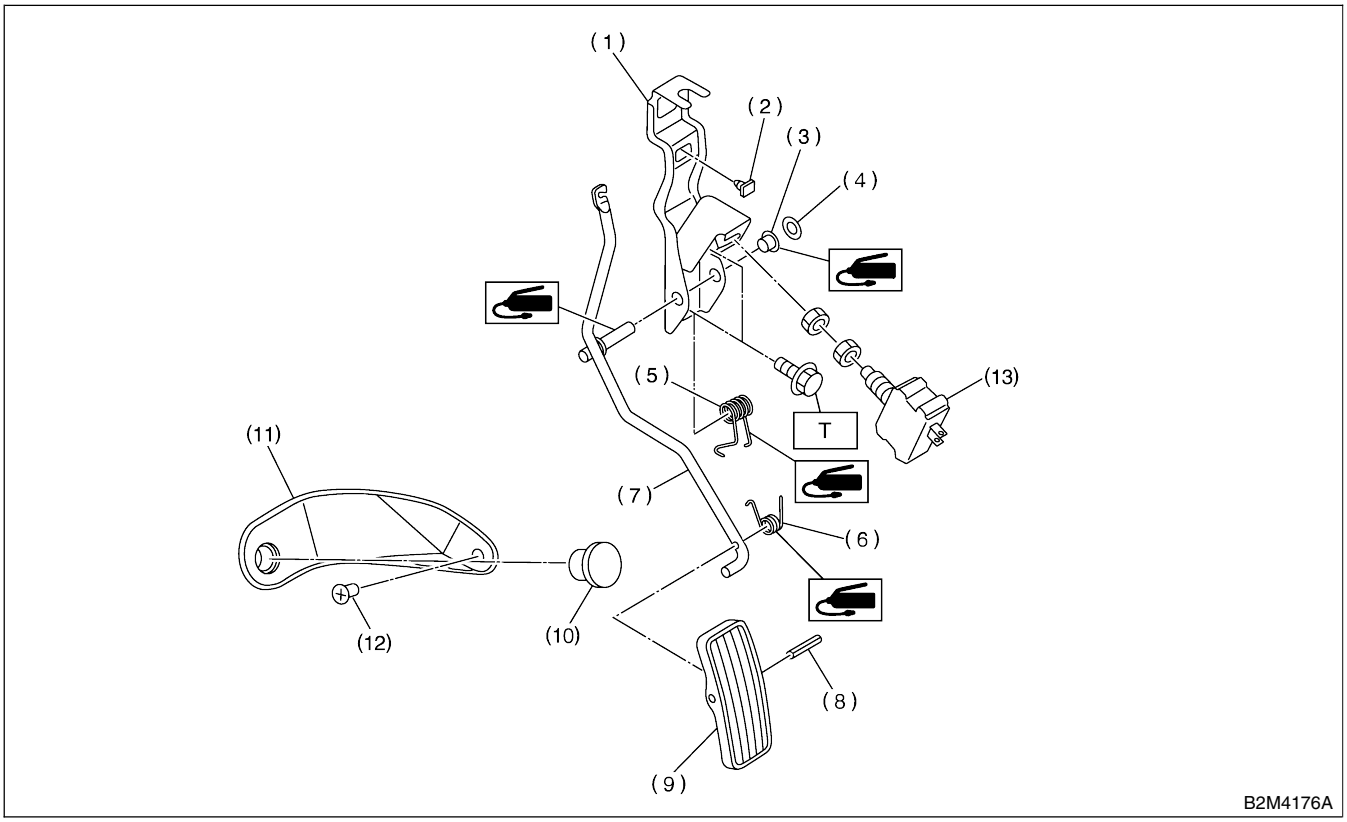
1. General Description S177001

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

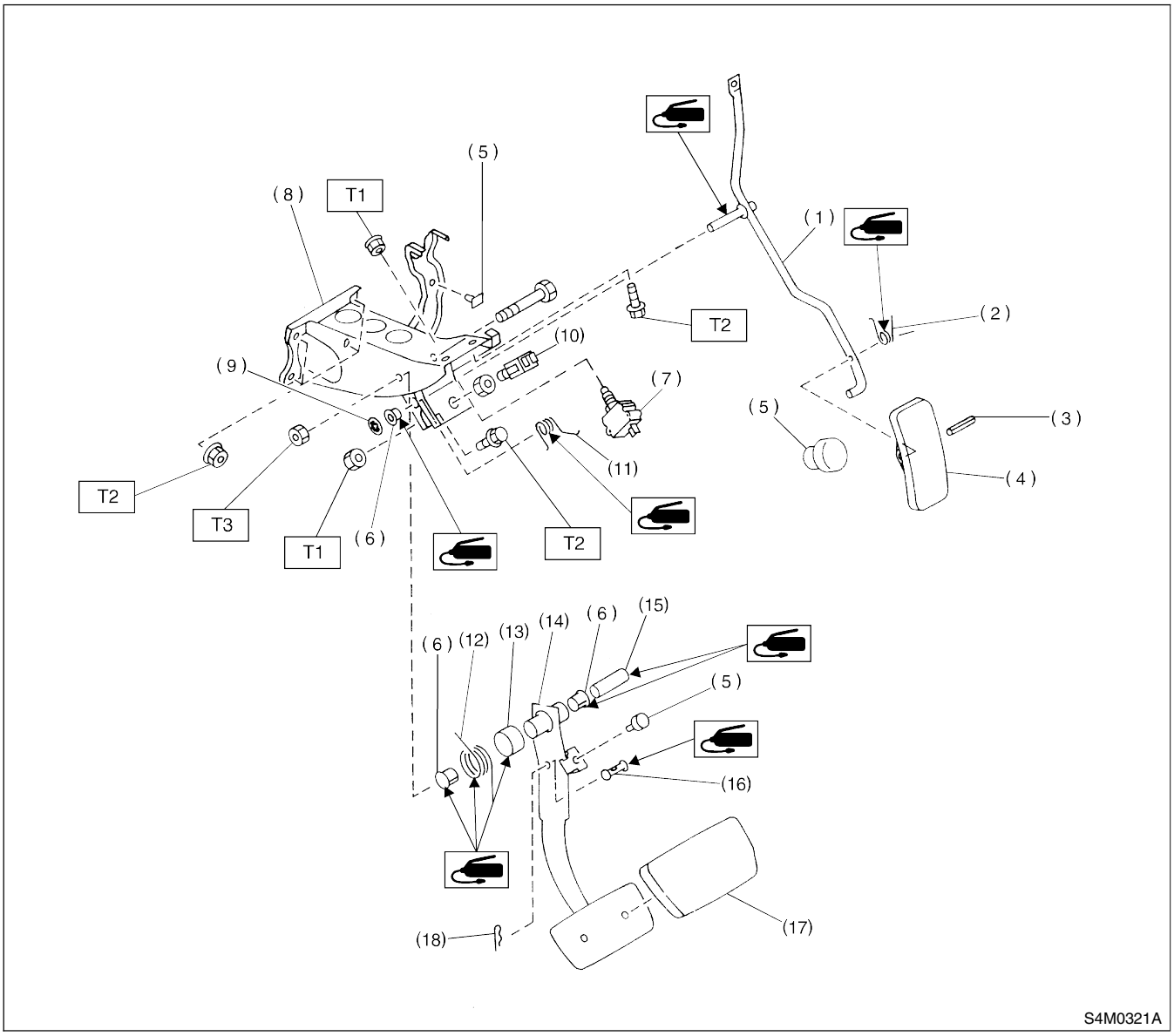
1. LHD MODEL S177001A0501



(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
(13) Kick-down switch (AT model)

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

2. RHD MODEL S177001A0502



(1) Accelerator pedal
(2) Accelerator pedal spring
(3) Spring pin
(4) Accelerator pedal pad
(5) Stopper
(6) Bushing
(7) Kick-down switch
(8) Pedal bracket
(9) Clip
(10) Stop light switch
(11) Accelerator spring
(12) Brake pedal spring
(13) Brake spacer
(14) Brake pedal
(15) Spacer
(16) Clevis pin
(17) Brake pedal pad
(18) Snap pin

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.0)
T3: 29 (3.0, 21.7)

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 negative terminal from battery.

2. Accelerator Pedal S177005

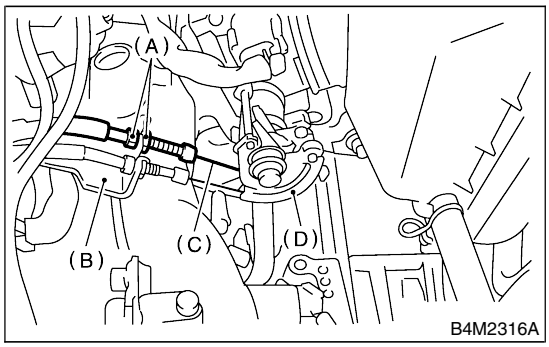
A: REMOVAL S177005A18

1. LHD MODEL S177005A1801

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.

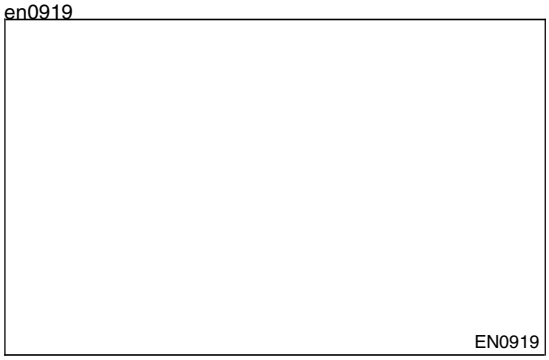
CAUTION:
Be careful not to kink accelerator cable.

- SOHC model



- DOHC TURBO model

en0919

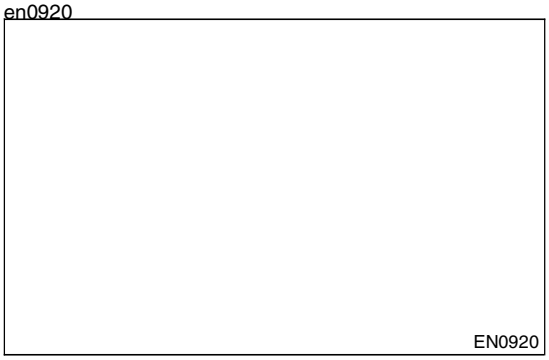


(A) Lock nut
(B) Accelerator cable bracket
(C) Accelerator cable
(D) Throttle cam

6) Remove clip inside engine compartment.

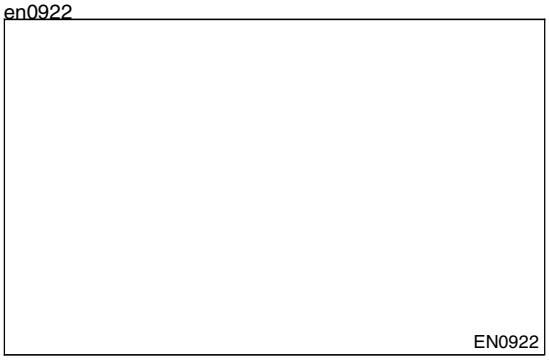
- SOHC model

en0920



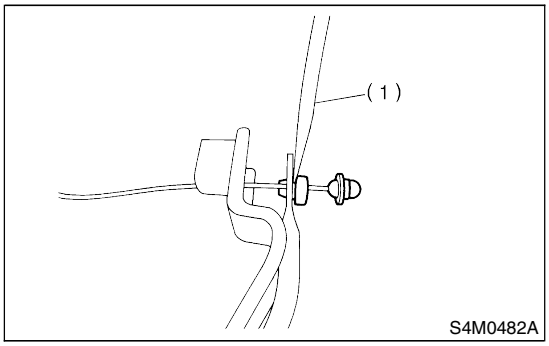
- DOHC TURBO model

en0922



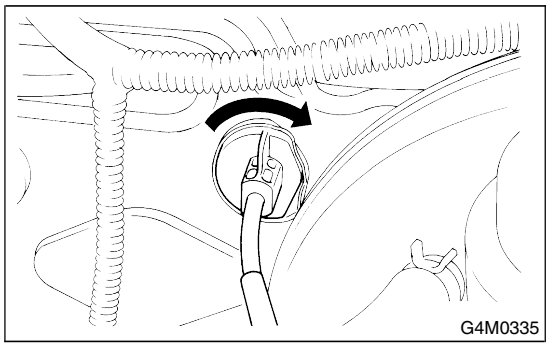
(A) Toe board
(B) Accelerator cable
(C) To accelerator pedal
(D) Brake booster
(E) Clip

7) Remove instrument panel lower cover from instrument panel, and connector.
8) Disconnect connector from kick-down switch. (AT model)
9) Remove brake and clutch pedal bracket. <Ref. to BR-54, REMOVAL, Brake Pedal.>
10) Disconnect accelerator cable from accelerator pedal lever.

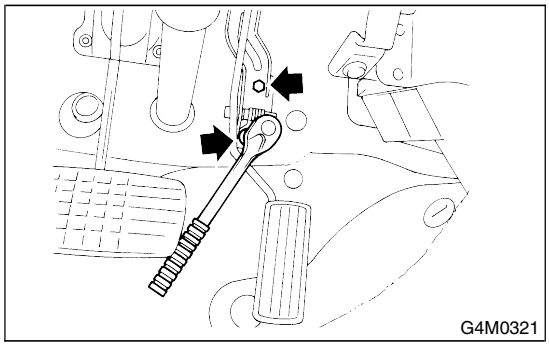


(1) Slot type screwdriver

11) Working inside engine compartment, remove casing cap out of the toe board by turning it clockwise.


G4M0335

12) Pull out the cable from the toe board hole.
13) Remove accelerator pedal connecting bolt from accelerator pedal bracket.

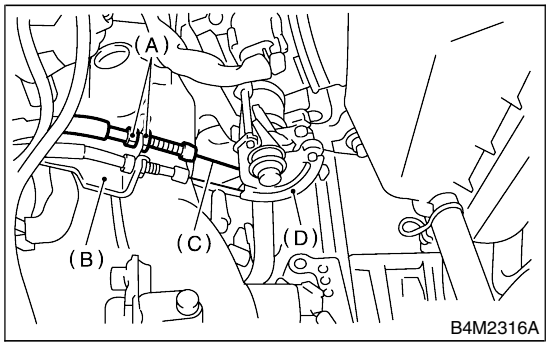

G4M0321

2. RHD MODEL S177005A1802

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.

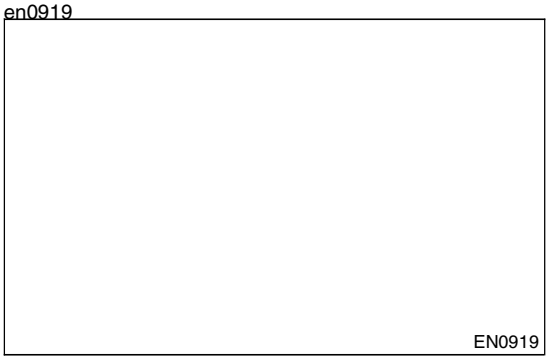
- SOHC model



B4M2316A

- DOHC TURBO model

en0919

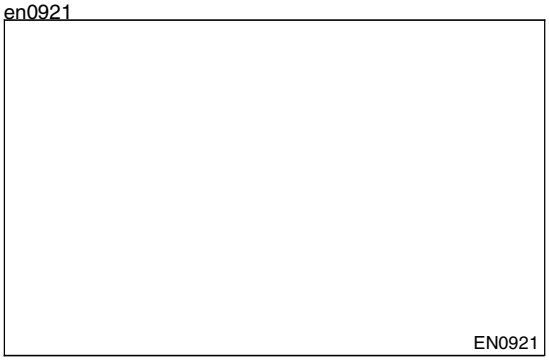

EN0919

(A) Lock nut
(B) Accelerator cable bracket
(C) Accelerator cable
(D) Throttle cam

6) Remove clip inside engine compartment.

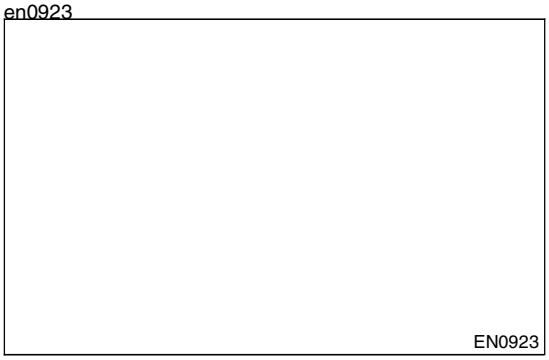
- SOHC model

en0921


EN0921

- DOHC TURBO model

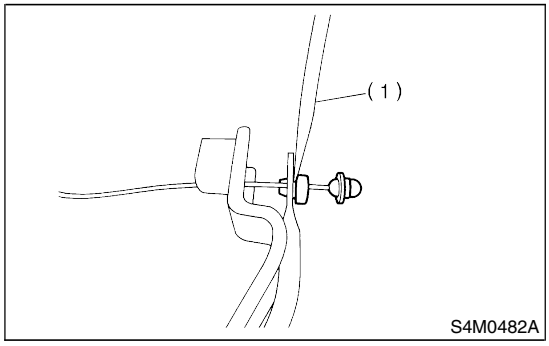
en0923


EN0923

(A) Toe board
(B) Accelerator cable
(C) To accelerator pedal
(D) Brake booster
(E) Clip

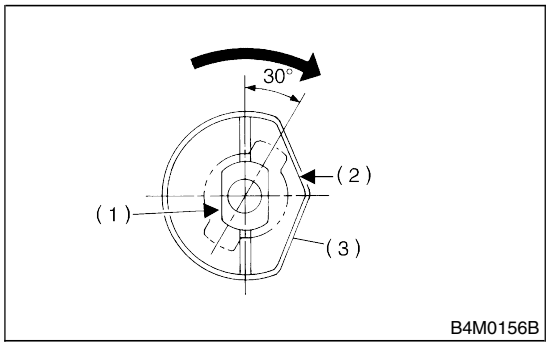
7) Remove instrument panel lower cover from instrument panel, and connector.
8) Disconnect connector from kick-down switch. (AT model)
9) Remove clevis pin which secures brake pedal to brake booster operating rod. Also disconnect electrical connectors (for stop light switch, etc.).

10) Disconnect accelerator cable from accelerator pedal lever.



(1) Slot type screwdriver

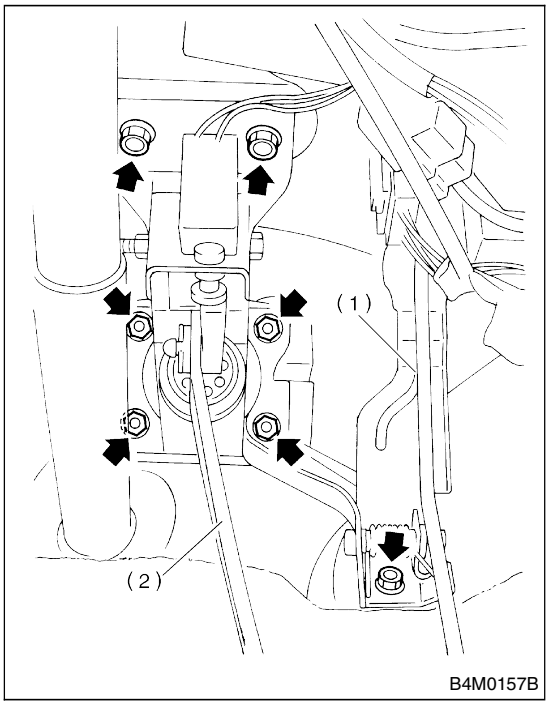
11) Remove the casing cap out of the toe board by turning it clockwise.



(1) Accelerator cable
(2) Toe board hole
(3) Casing cap

12) Pull out the cable from the toe board hole.

13) Remove nuts and bolts which secure pedal bracket.

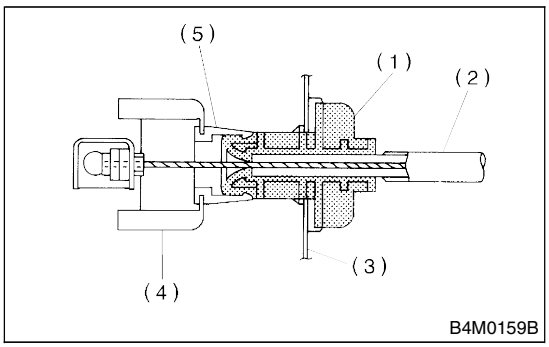


(1) Accelerator pedal
(2) Brake pedal

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.
• Always use new clevis pins. (RHD model only)
• Make sure that holder and casing cap are securely connected.



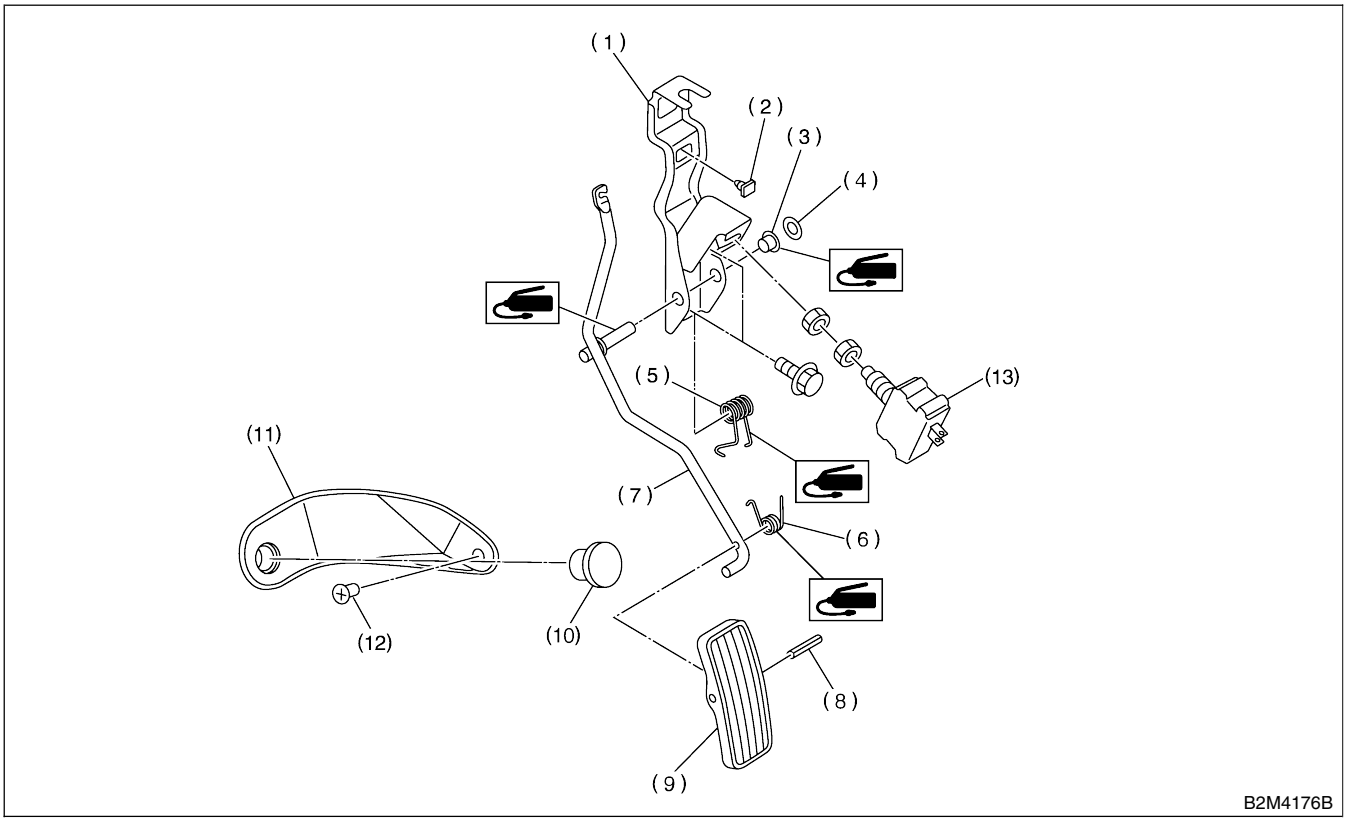
(1) Casing cap
(2) Accelerator cable
(3) Toe board
(4) Accelerator pedal bracket
(5) Holder

C: DISASSEMBLY S177005A06

1) Remove the clip, and then remove the accelerator pedal from the bracket.

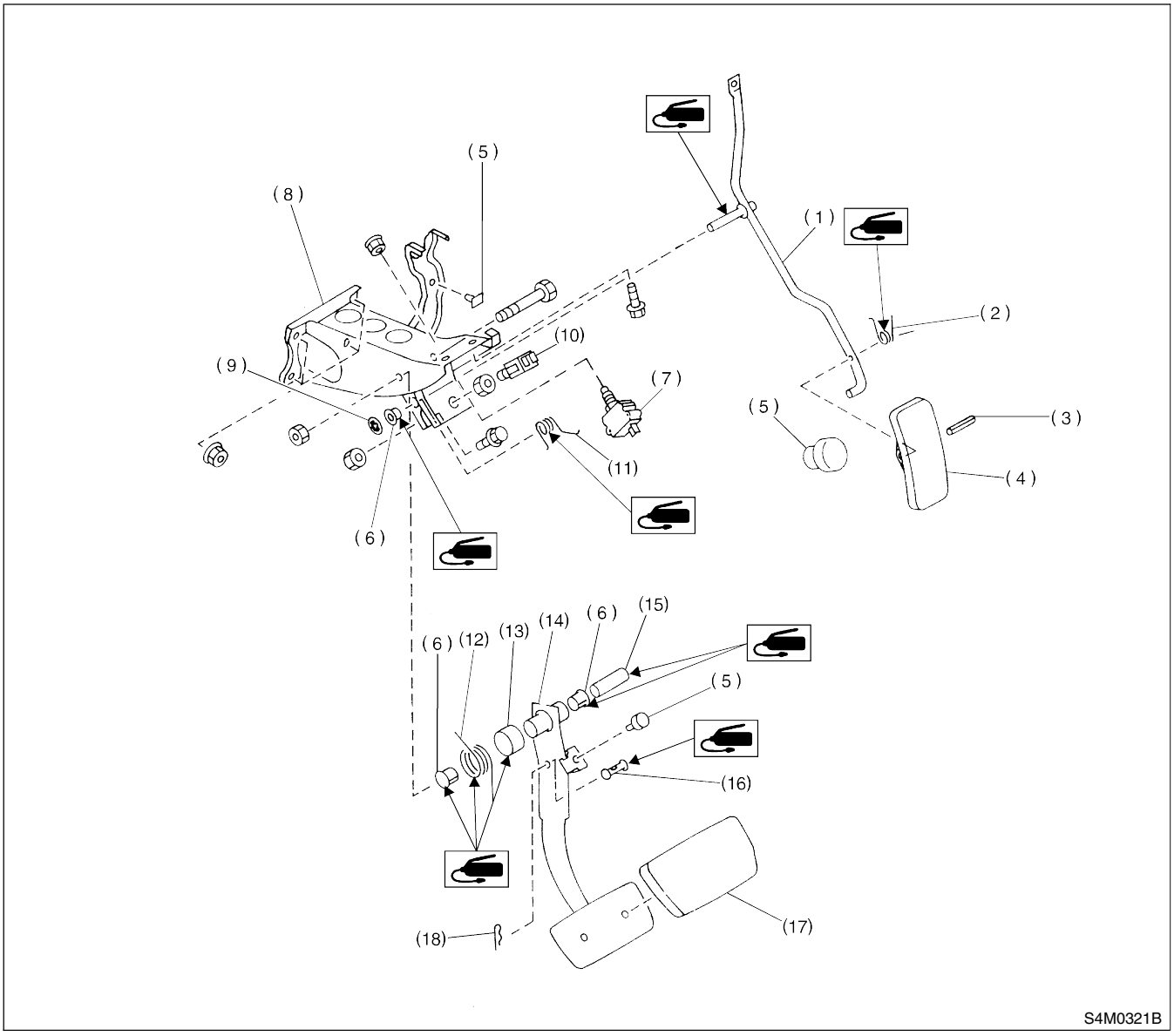
- LHD model

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
(13) Kick-down switch (AT model)

- RHD model



(1) Accelerator pedal
(2) Accelerator pedal spring
(3) Spring pin
(4) Accelerator pedal pad
(5) Stopper
(6) Bushing
(7) Kick-down switch
(8) Pedal bracket
(9) Clip
(10) Stop light switch
(11) Accelerator spring
(12) Brake pedal spring
(13) Brake spacer
(14) Brake pedal
(15) Spacer
(16) Clevis pin
(17) Brake pedal pad
(18) Snap pin

D: ASSEMBLY S177005A02

Assemble in the reverse order of disassembly.

CAUTION:
Clean and apply grease to spacer and inside bore of a accelerator pedal.

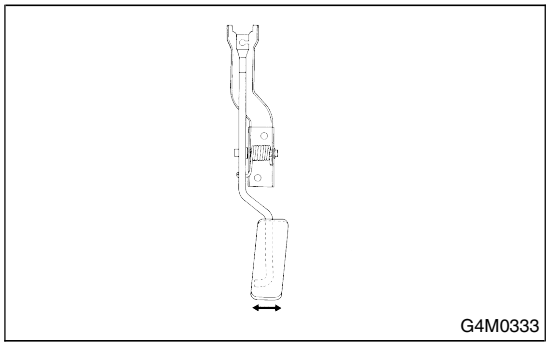
E: INSPECTION S177005A10

1. ACCELERATOR PEDAL S177005A1001

Lightly move pedal pad in lateral the direction to ensure pedal deflection is in specified range.

CAUTION:
If excessive deflection is noted, replace bushing and clip with new ones.

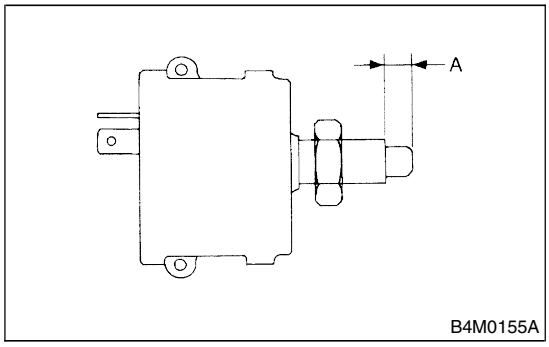
Deflection of accelerator pedal:
Service limit
5.0 mm (0.197 in) or less



2. KICK-DOWN SWITCH S177005A1002

If kick-down switch does not operate properly (or if it does not stop at the specified position), replace with a new one.

Specified position: A
$2^{+1.5}_{0}$ mm (0.079 $^{+0.059}_{0}$ in)

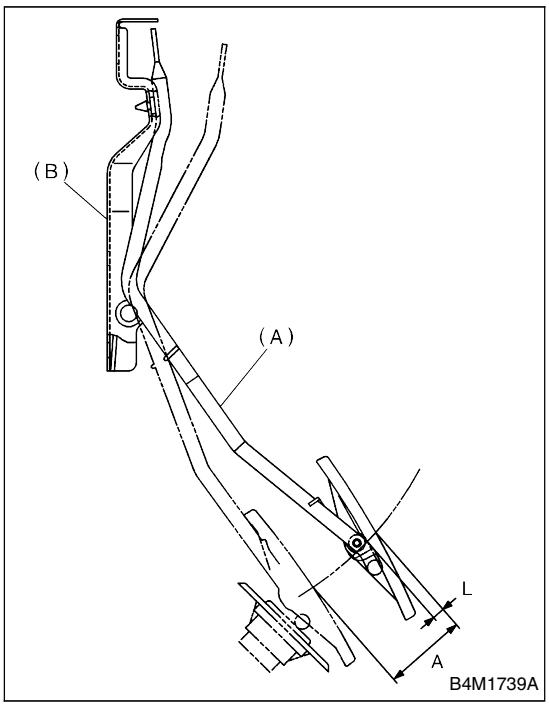


F: ADJUSTMENT S177005A01

1) Check pedal stroke and free play by operating accelerator pedal by hand.
If it is not within specified value, adjust it by turning nut connecting accelerator cable to throttle body.

Free play at pedal pad: L
1 — 4 mm (0.04 — 0.16 in)

Stroke at pedal pad: A
50 — 55 mm (1.97 — 2.17 in)



(A) Accelerator pedal
(B) Accelerator pedal bracket

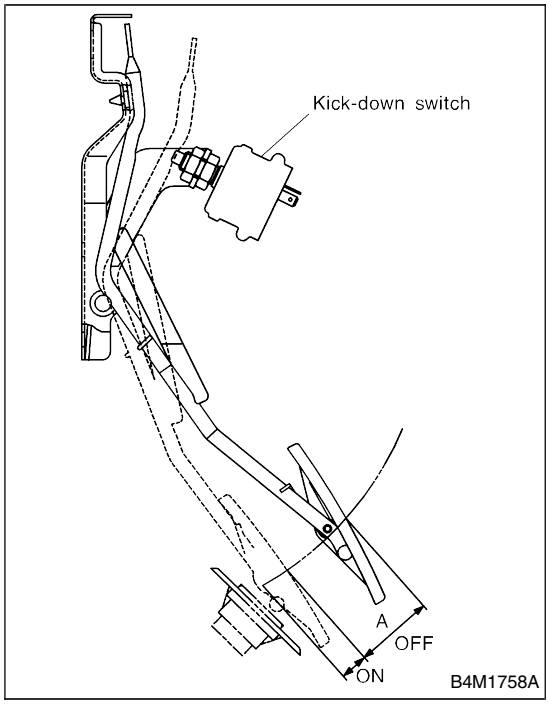
Accelerator cable lock nut tightening torque:
14 N·m (1.4 kgf-m, 10.1 ft-lb)

2) Check to ensure the kick-down switch operates at the specified value in relation to the stroke of the accelerator pedal.
If it is not in specified value, adjust it by adjusting position of kick-down switch.

CAUTION:
Be careful not to rotate kick-down switch.

Kick-down switch stroke: A
48±1 mm (1.89±0.04 in)

Kick-down switch tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



3. Accelerator Control Cable S177759

A: REMOVAL S177759A18

1) Remove accelerator pedal. <Ref. to SP-5, 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-7, 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.

IGNITION

IG(SOHC)

Page

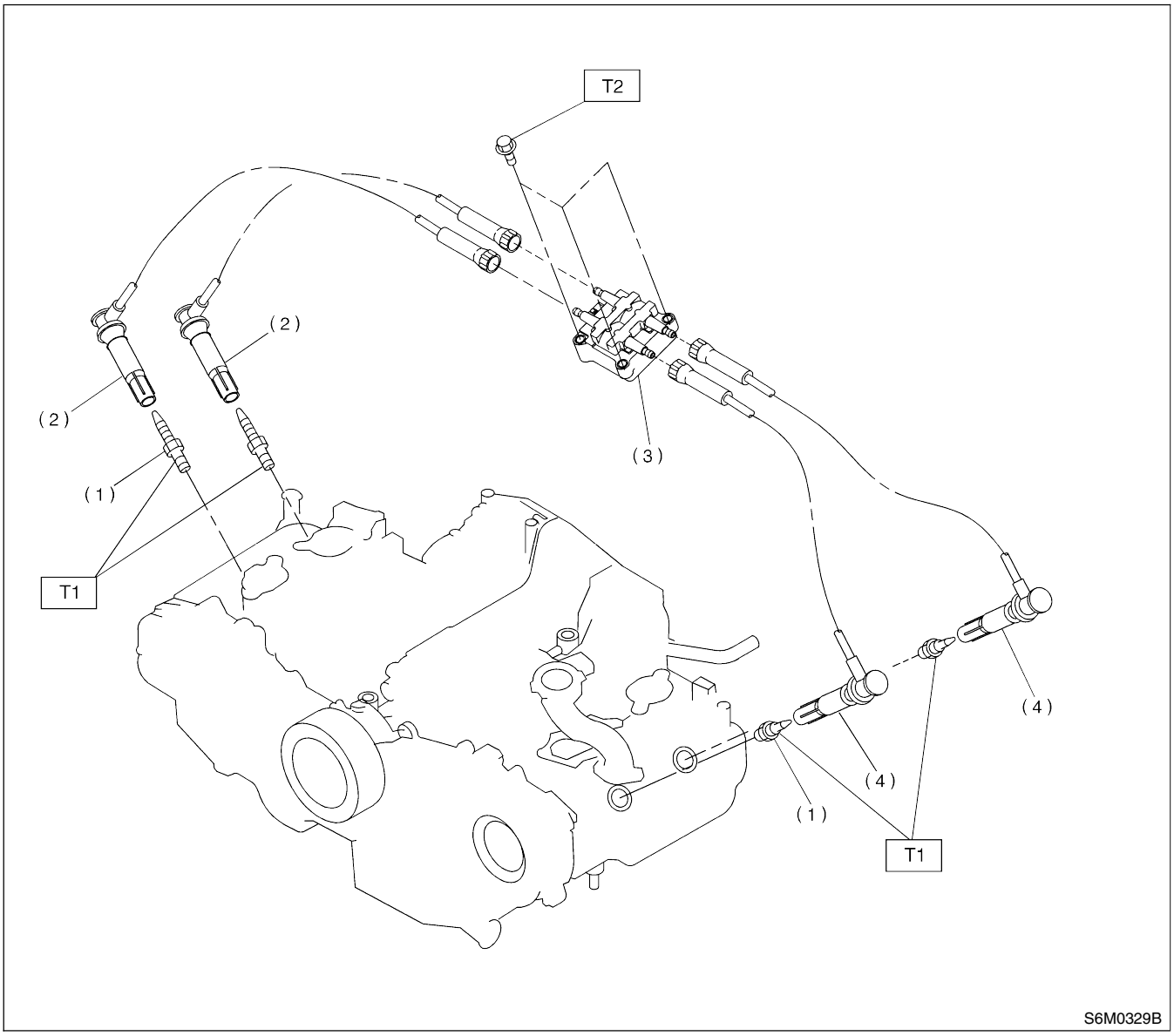
1. General Description....2
2. Spark Plug....4
3. Ignition Coil and Ignitor Assembly....8
4. Spark Plug Cord....10

1. General Description S151001

A: SPECIFICATIONS S151001E49

Item			Designation	
Ignition coil and ignitor assembly	Model		FH0137	
	Manufacturer		DIAMOND	
	Primary coil resistance		0.73 Ω±10%	
	Secondary coil resistance		12.8 kΩ±15%	
	Insulation resistance between primary terminal and case		More than 10 MΩ	
Spark plug	Type and manufacturer		RC10YC4 ..... CHAMPION	
			Alternate	BKR5E-11 ..... NGK
	Thread size	mm	14, P = 1.25	
	Spark gap	mm (in)	1.0 — 1.1 (0.039 — 0.043)	

B: COMPONENT S151001A05



(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 S151001A03

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

2. Spark Plug S151003

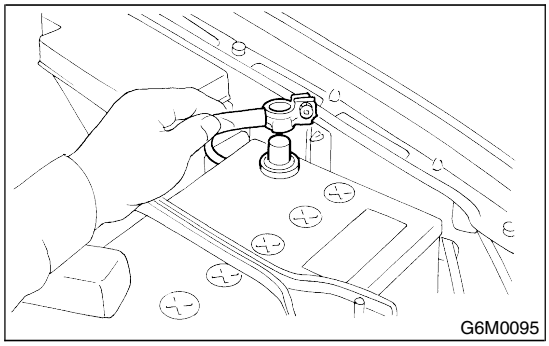
A: REMOVAL S151003A18

CAUTION:
All spark plugs installed on an engine, must be of the same heat range.

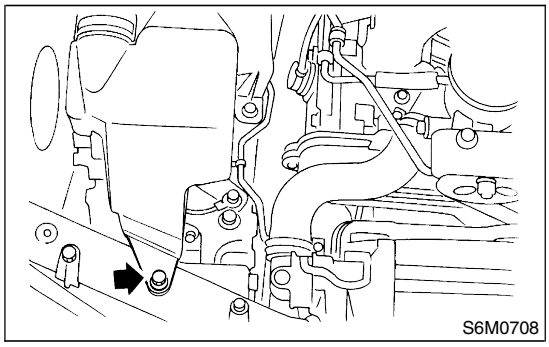
Spark plug:
CHAMPION: RC10YC4
(Alternate)
NGK: BKR5E-11

1. RH SIDE S151003A1805

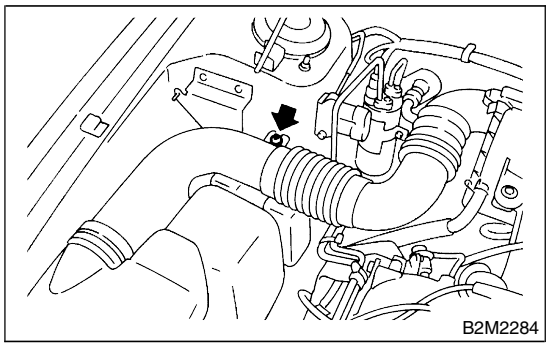
1) Disconnect battery ground cable.


G6M0095

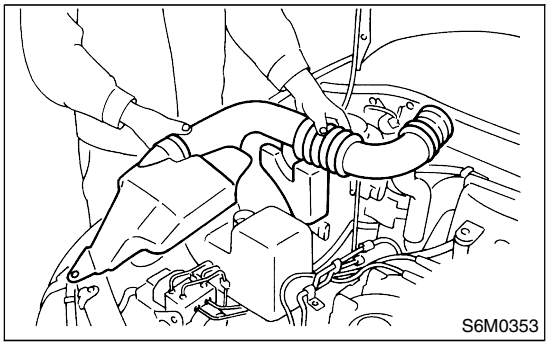
2) Remove air intake duct and resonator chamber.
(1) Remove bolt which installs air intake duct on the front side of body.


S6M0708

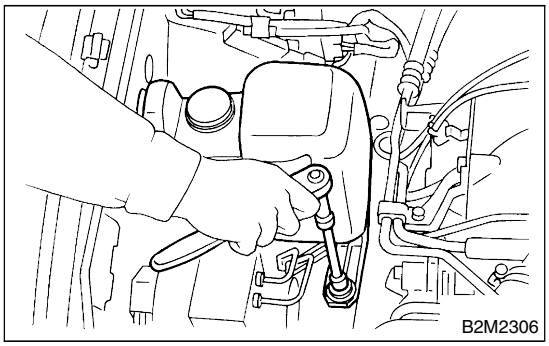
(2) Remove bolt which installs air intake duct on body.


B2M2284

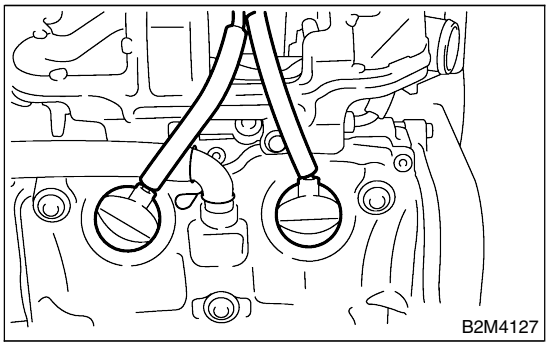
(3) Remove air intake duct as a unit.


S6M0353

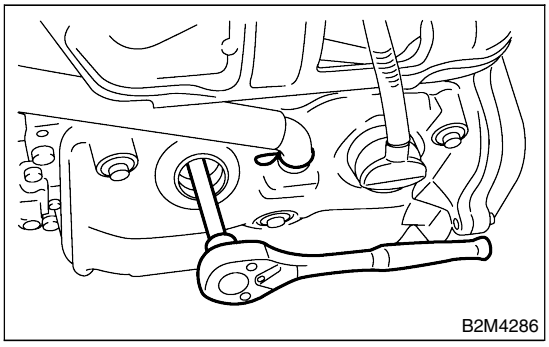
(4) Remove resonator chamber.


B2M2306

3) Remove spark plug cords by pulling boot, not cord itself.

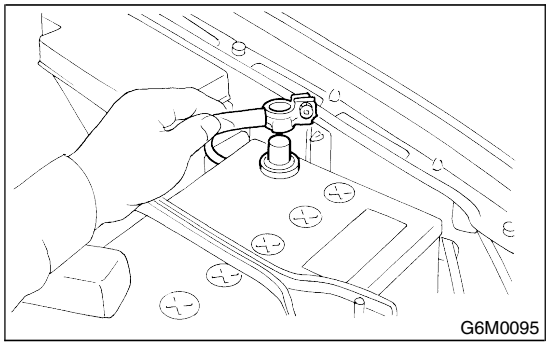

B2M4127

4) Remove spark plugs with the spark plug socket.

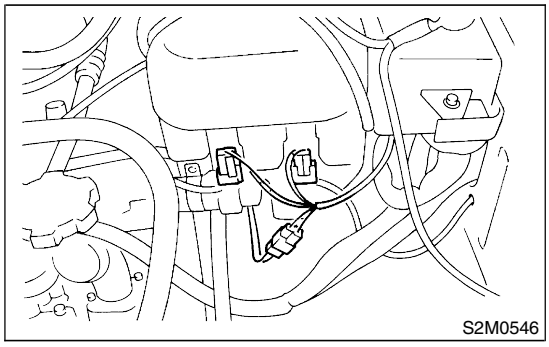

B2M4286

2. LH SIDE S151003A1806

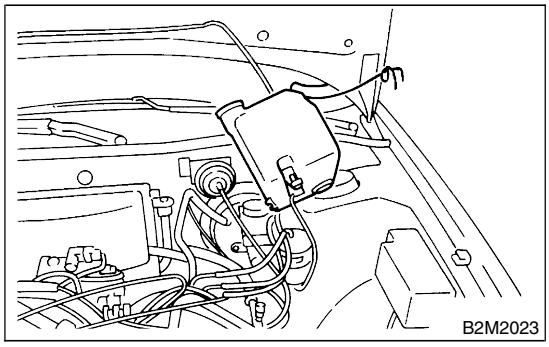
1) Disconnect battery ground cable.


G6M0095

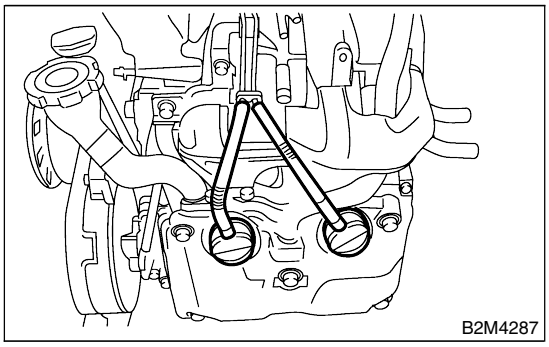
2) Disconnect washer motor connector.


S2M0546

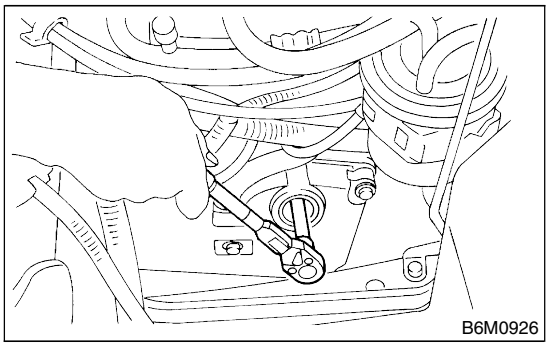
3) Disconnect rear window glass washer hose from washer motor, then plug connection with a suitable cap.
4) Remove the two bolts which hold the washer tank, then take the tank away from the working area.


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 S151003A11

1. RH SIDE S151003A1105

Install in the reverse order of removal.

Tightening torque (Spark plug):
20.6 N·m (2.10 kgf-m, 15.2 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):
32 N·m (3.3 kgf-m, 24 ft-lb)

2. LH SIDE S151003A1106

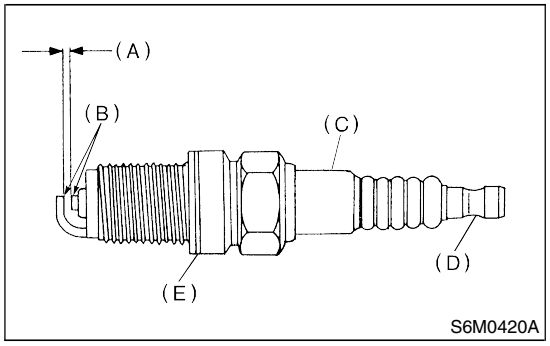
Install in the reverse order of removal.

Tightening torque (Spark plug):
20.6 N·m (2.10 kgf-m, 15.2 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.

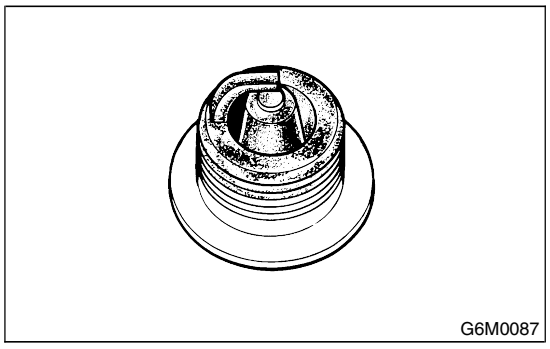
C: INSPECTION S151003A10

Check electrodes and inner and outer porcelain of plugs, noting the type of deposits and the degree of electrode erosion.

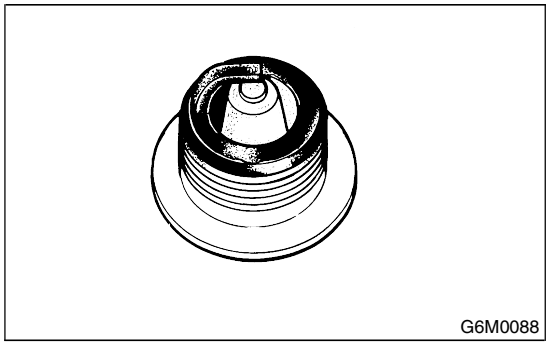


(A) Electrode gap
(B) Carbon accumulation or wear
(C) Cracks
(D) Damage
(E) Damaged gasket

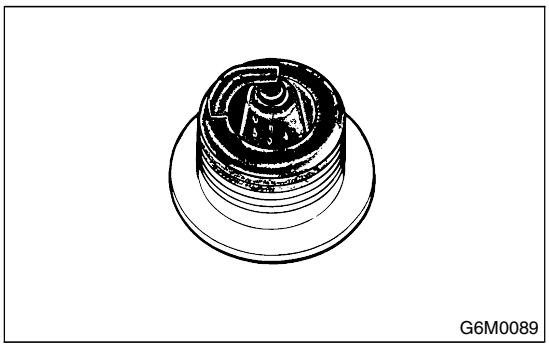
1) Normal
Brown to grayish-tan deposits and slight electrode wear indicate correct spark plug heat range.



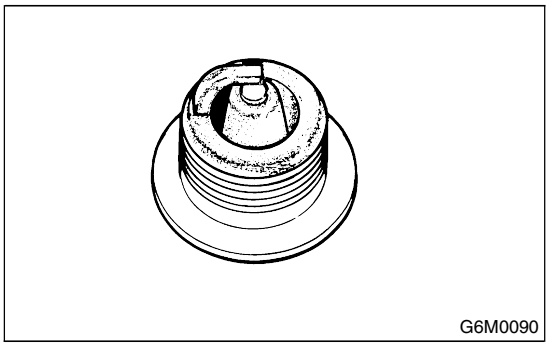
2) Carbon fouled
Dry fluffy carbon deposits on insulator and electrode are mostly caused by slow speed driving in city, weak ignition, too rich fuel mixture, dirty air cleaner, etc.
It is advisable to replace with plugs having hotter heat range.



3) Oil fouled
Wet black deposits show excessive oil entrance into combustion chamber through worn rings and pistons or excessive clearance between valve guides and stems. If same condition remains after repair, use a hotter plug.



4) Overheating
White or light gray insulator with black or gray brown spots and bluish burnt electrodes indicate engine overheating. Moreover, the appearance results from incorrect ignition timing, loose spark plugs, wrong selection of fuel, hotter range plug, etc. It is advisable to replace with plugs having colder heat range.



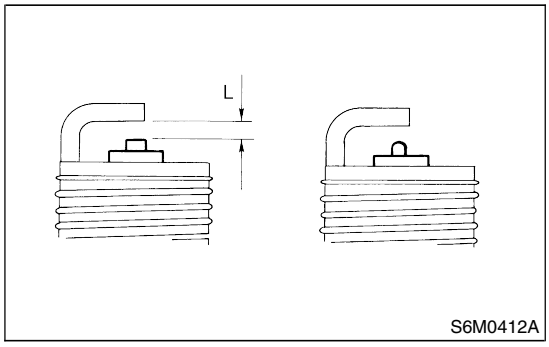
D: CLEANING S151003E56

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 S151003A01

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)

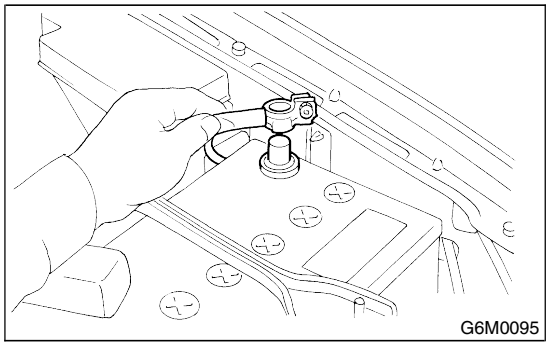


NOTE:
Replace with new spark plug if this area is worn to “ball” shape.

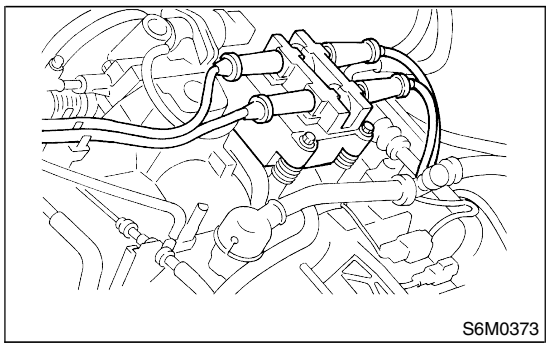
3. Ignition Coil and Ignitor Assembly S151015

A: REMOVAL S151015A18

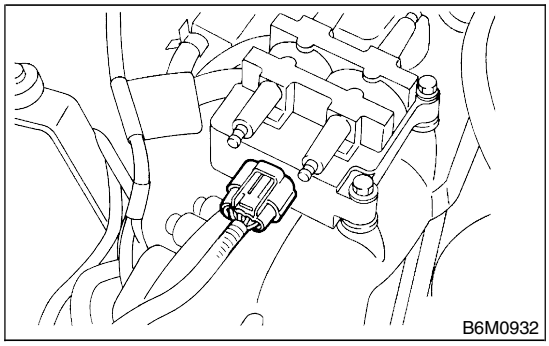
1) Disconnect battery ground cable.


G6M0095

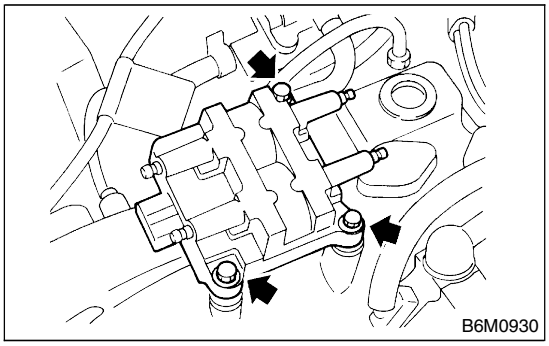
2) Disconnect spark plug cords from ignition coil and ignitor assembly.


S6M0373

3) Disconnect connector from ignition coil and ignitor assembly.


B6M0932

4) Remove ignition coil and ignitor assembly.

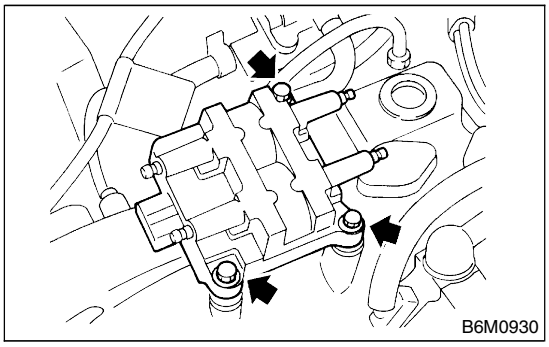

B6M0930

B: INSTALLATION S151015A11

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

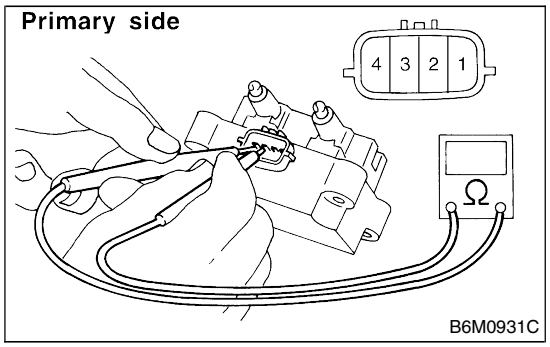
C: INSPECTION S151015A10

Using accurate tester, inspect the following items, and replace if defective.
1) Primary resistance
2) Secondary coil resistance

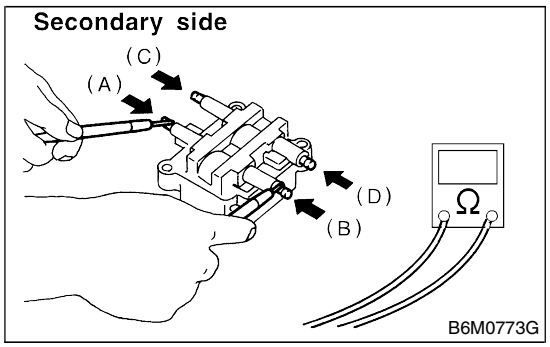
CAUTION:
If the resistance is extremely low, this indicates the presence of a short-circuit.

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%



[Secondary side]
Between (A) and (B)
12.8 kΩ±15%
Between (C) and (D)
12.8 kΩ±15%



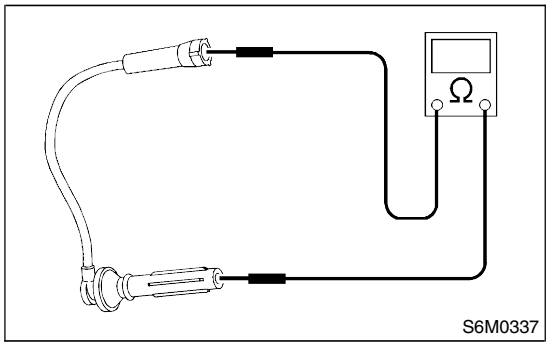
3) Insulation between primary terminal and case: 10 MΩ or more.

4. Spark Plug Cord S151014

A: INSPECTION S151014A10

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



SPARK PLUG CORD

MEMO:

SPARK PLUG CORD

STARTING/CHARGING SYSTEMS

SC

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1. General Description....2
2. Starter....5
3. Generator....12
4. Battery....18

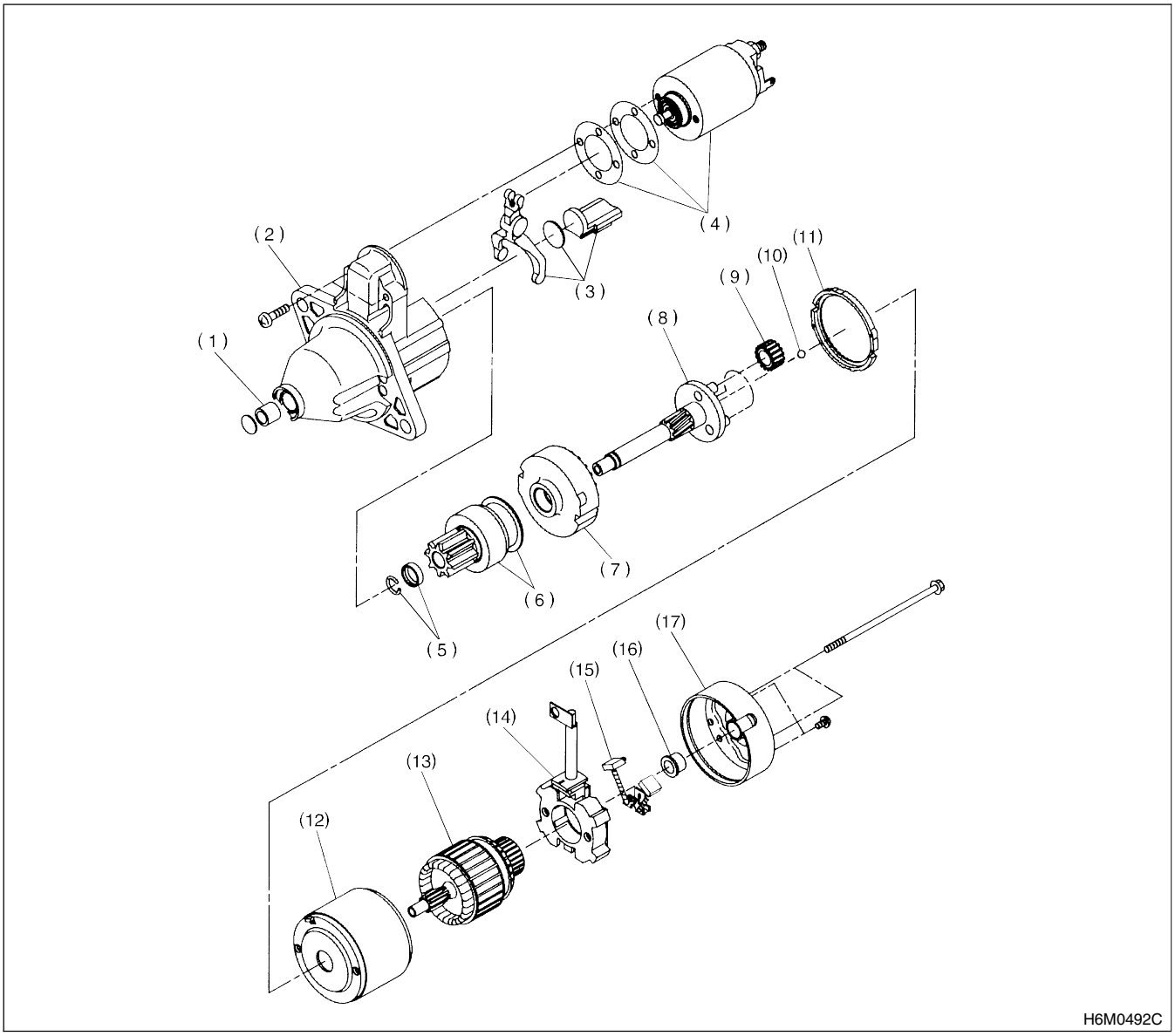
1. General Description S179001

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		A2TB6291	
	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	Type and capacity	For Europe	12 V — 48 AH	12 V — 52 AH
		For Australia	12 V — 40 AH	
		Others	12 V — 40 AH	

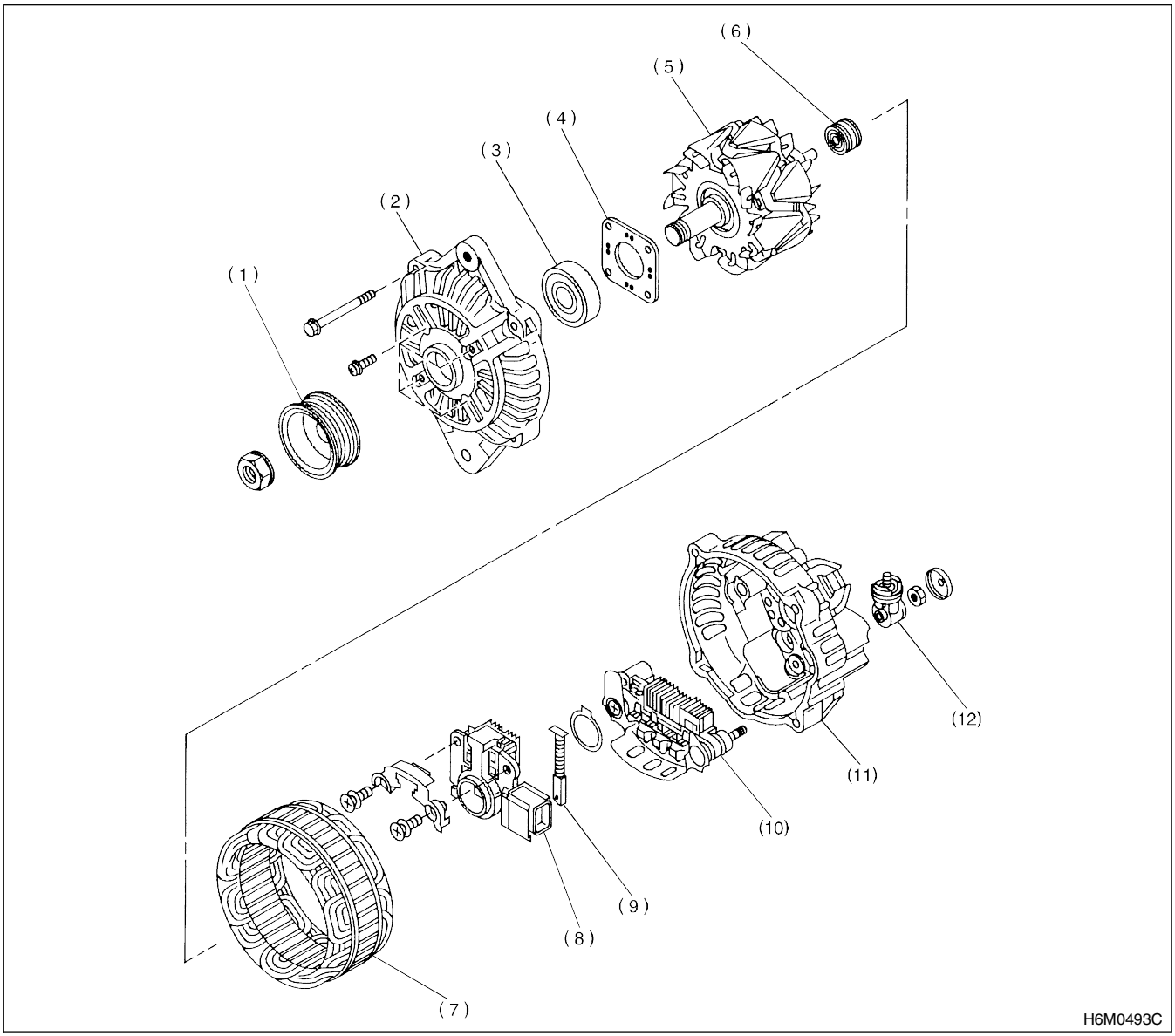
B: COMPONENT S179001A05

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
(2) Front cover
(3) Ball bearing
(4) Bearing retainer
(5) Rotor
(6) Bearing
(7) Stator coil
(8) IC regulator with brush
(9) Brush
(10) Rectifier
(11) Rear cover
(12) Terminal

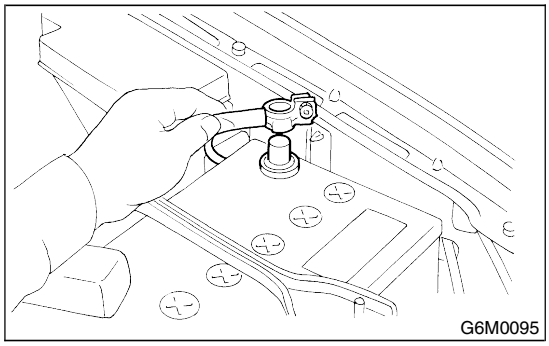
C: CAUTION S179001A03

- 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 negative terminal from battery.

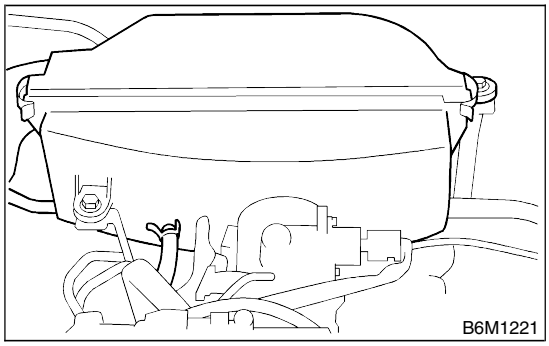
2. Starter S179012

A: REMOVAL S179012A18

1) Disconnect battery ground cable.


G6M0095

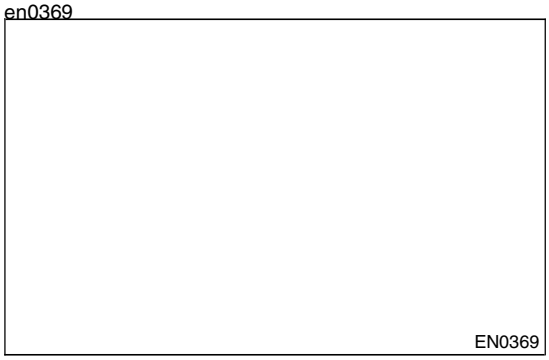
2) Remove air cleaner case. (Non-Turbo Model)


B6M1221

3) Remove intercooler. (Turbo Model) <Ref. to IN(DOHC TURBO) -10, REMOVAL, Intercooler.>
4) Remove air cleaner case stay. (Non-Turbo Model)

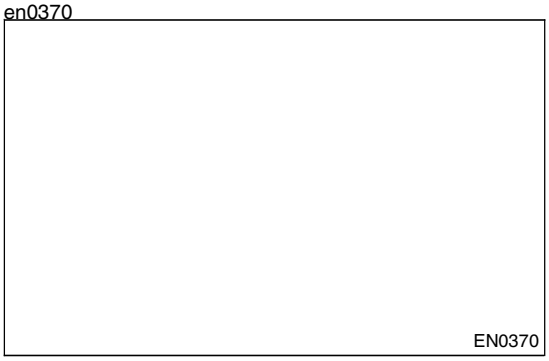
- MT vehicles

en0369

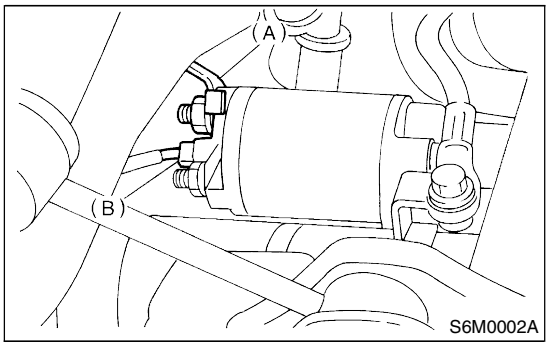

EN0369

- AT vehicles

en0370


EN0370

5) Disconnect connector and terminal from starter.

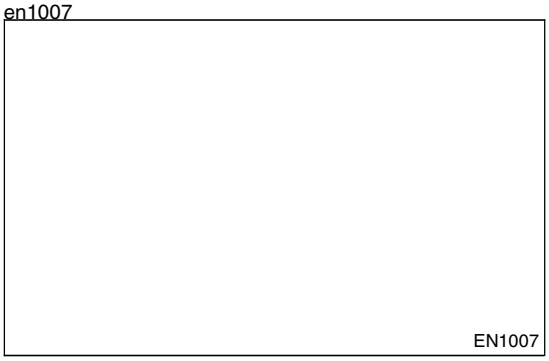


S6M0002A

(A) Terminal
(B) Connector

6) Remove starter from transmission.

en1007

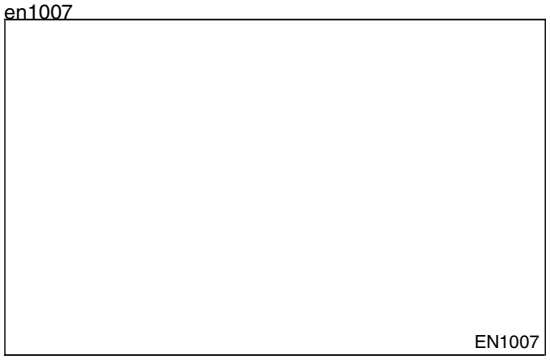

EN1007

B: INSTALLATION S179012A11

Install in the reverse order of removal.

Tightening torque:
50 N·m (5.1 kgf-m, 37 ft-lb)

en1007

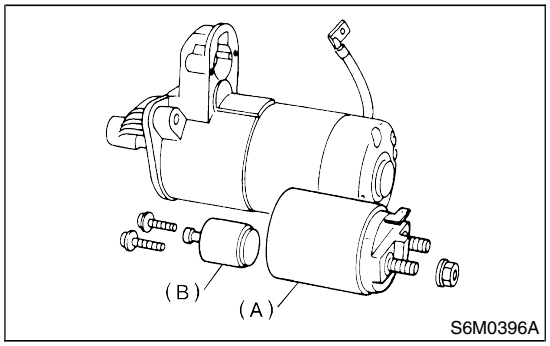


C: DISASSEMBLY S179012A06

1. STARTER ASSEMBLY S179012A0601

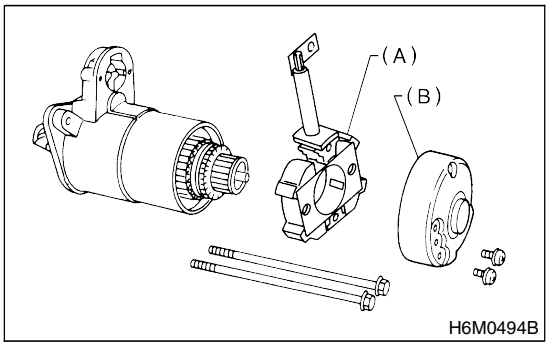
1) Loosen nut which holds terminal M of switch assembly, and disconnect connector.
2) Remove bolts which hold switch assembly, and remove switch assembly, plunger and plunger spring from starter as a unit.

CAUTION:
Be careful because pinion gap adjustment washer may sometimes be used on the mounting surface of switch assembly.



(A) Switch ASSY
(B) Plunger

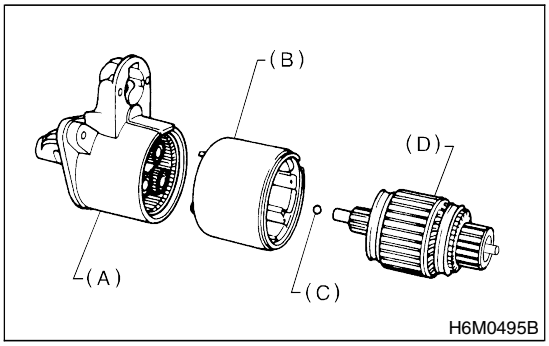
3) Remove both through-bolts and brush holder screws, and detach rear bracket and brush holder.



(A) Brush holder
(B) Rear bracket

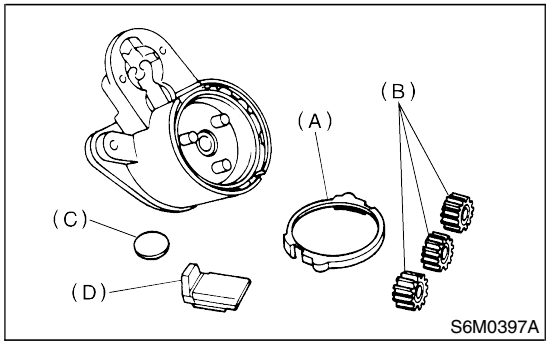
4) Remove armature and yoke. Ball used as a bearing will then be removed from the end of armature.

CAUTION:
Be sure to mark an alignment mark on yoke and front bracket before removing yoke.



(A) Front bracket
(B) Yoke
(C) Ball
(D) Awature

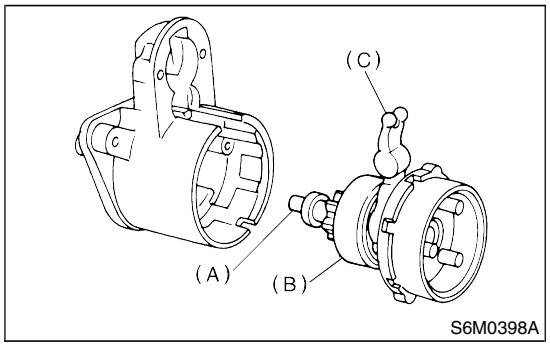
5) Remove packing A, three planetary gears, packing B and plate.



(A) Packing A
(B) Planetary gear
(C) Plate
(D) Packing B

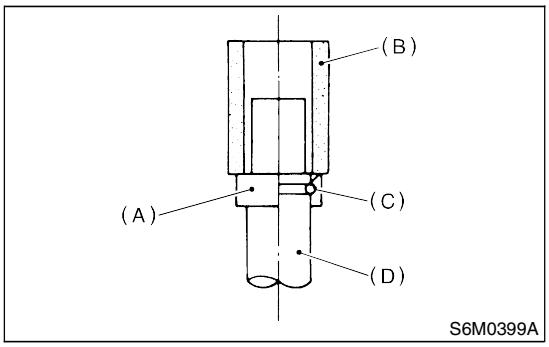
6) Remove shaft assembly and overrunning clutch as a unit.

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.

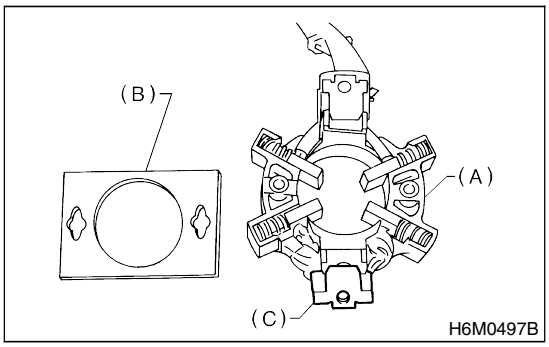


(A) Stopper
(B) Tool
(C) Ring
(D) Shaft

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

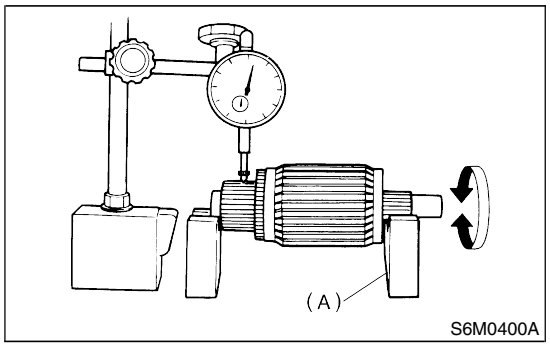
3) After assembling parts correctly, make sure starter operates properly.

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.

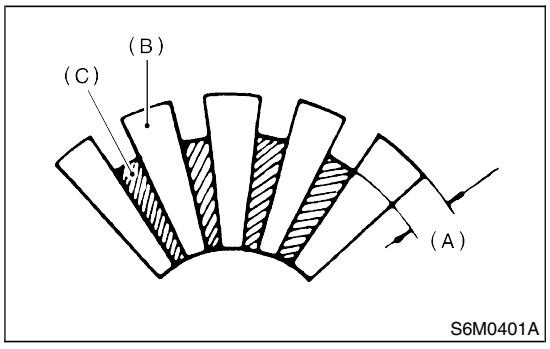
Commutator run-out:
Standard
0.05 mm (0.0020 in)
Service limit
Less than 0.10 mm (0.0039 in)



(A) V-block

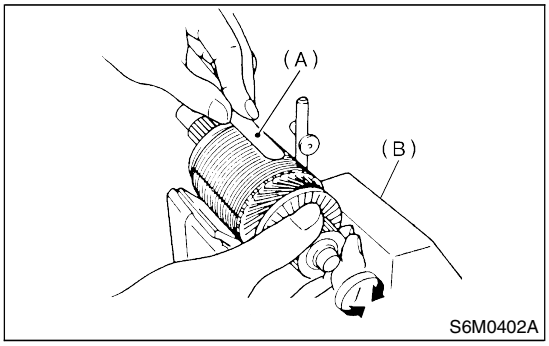
3) Depth of segment mold
Check the depth of segment mold.

Depth of segment mold:
0.5 mm (0.020 in)



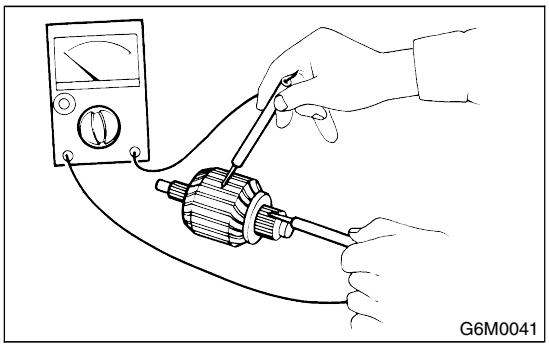
(A) Depth of mold
(B) Segment
(C) Mold

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

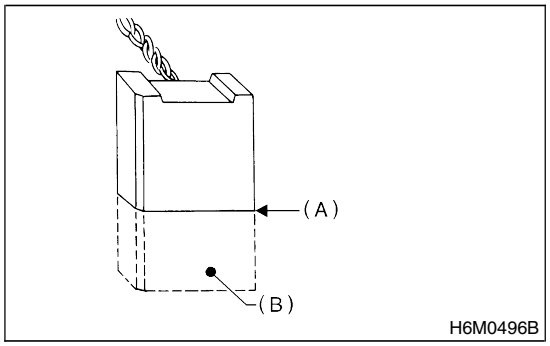
Inspect teeth of pinion for wear and damage. Replace if it is damaged. Rotate pinion in direction of rotation (counterclockwise). It should rotate smoothly. But in opposite direction, it should be locked.

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

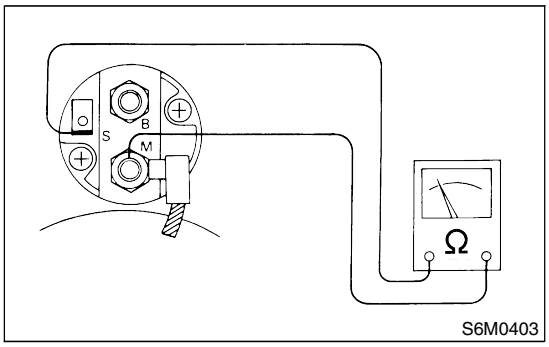
2) Brush movement
Be sure brush moves smoothly inside brush holder.
3) Brush spring force
Measure brush spring force with a spring scale. If it is less than the service limit, replace brush holder.

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 terminal M and B.

Terminal / Specified resistance:
S — M / Less than 1 Ω
S — Ground / Less than 1 Ω
M — B / More than 1 MΩ



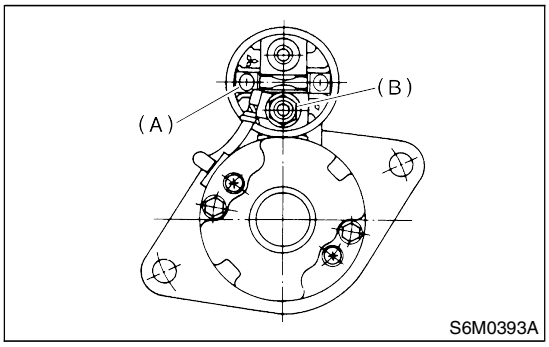
6. SWITCH ASSEMBLY OPERATION

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.

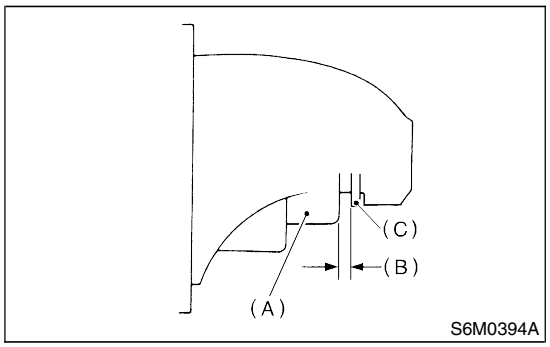


(A) Terminal S
(B) Terminal M

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)

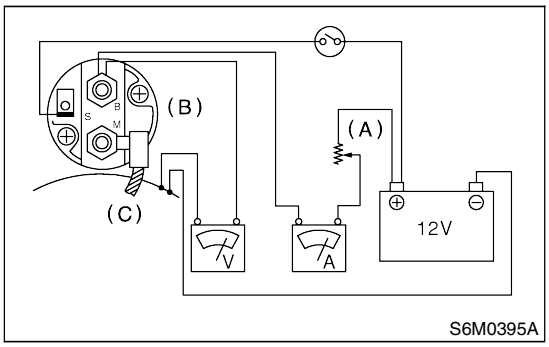


(A) Pinion
(B) Gap
(C) Stopper

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):

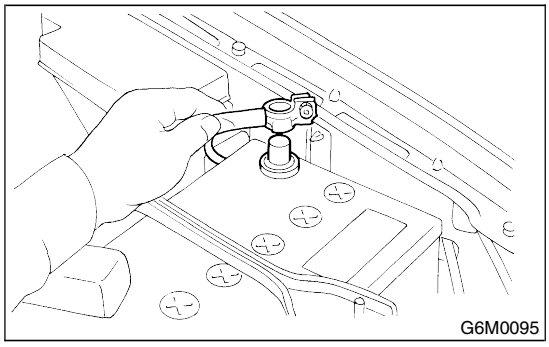
Voltage / Current
MT vehicles
4 V/650 A or less
AT vehicles
3.5 V/940 A or less

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

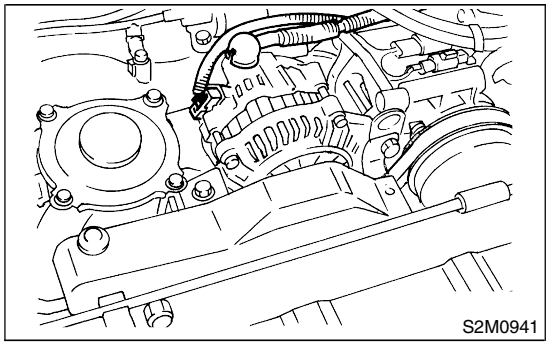
A: REMOVAL S179008A18

1) Disconnect battery ground cable.

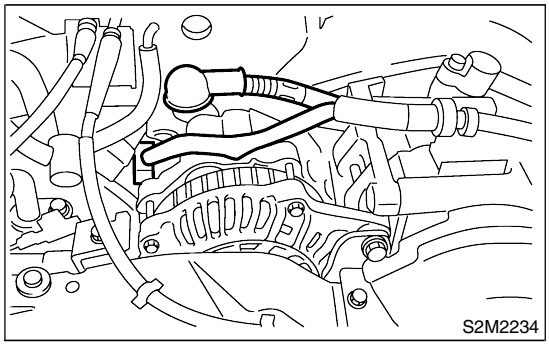

G6M0095

2) Disconnect connector and terminal from generator.

- Non-Turbo Model

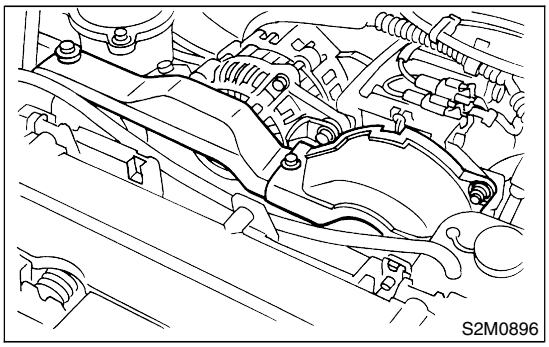

S2M0941

- Turbo Model

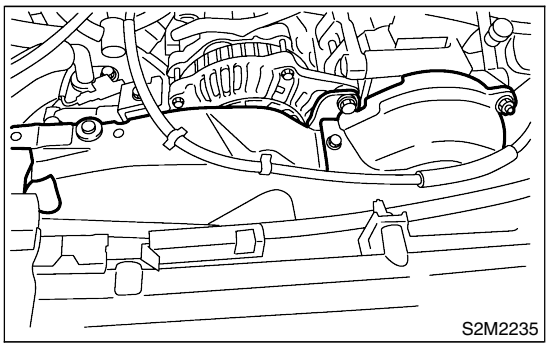

S2M2234

3) Remove V-belt cover.

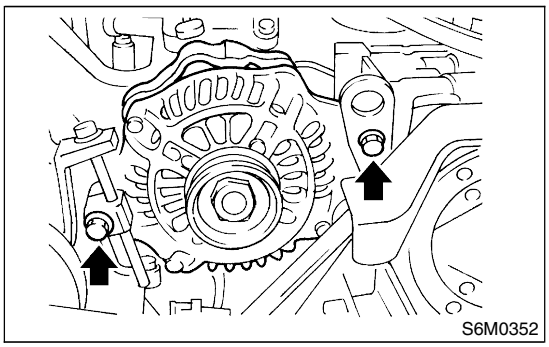
- Non-Turbo Model


S2M0896

- Turbo Model


S2M2235

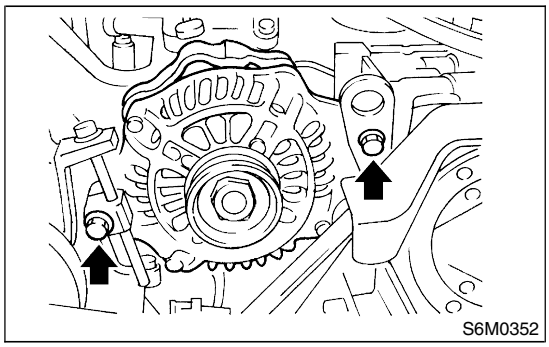
4) Remove front side V-belt.
<Ref. to ME(SOHC) -42, FRONT SIDE, REMOVAL, V-belt.> or <Ref. to ME(DOHC TURBO) -44, FRONT SIDE, REMOVAL, V-belt.>
5) Remove bolts which install generator onto bracket.


S6M0352

B: INSTALLATION S179008A11

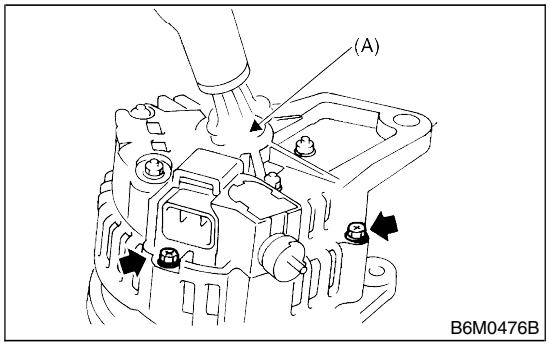
Install in the reverse order of removal.

CAUTION:
Check and adjust V-belt tension. <Ref. to ME(SOHC) -43, INSPECTION, V-belt.> and <Ref. to ME(DOHC TURBO) -45, INSPECTION, V-belt.>


S6M0352

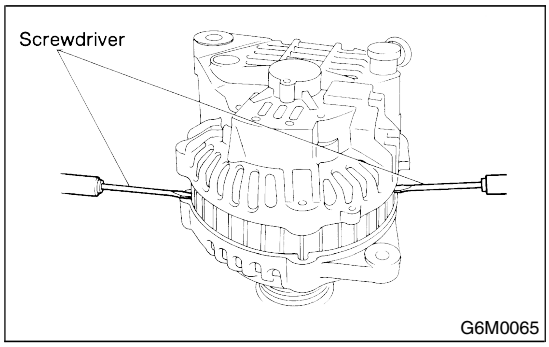
C: DISASSEMBLY S179008A06

1) Heat the portion (A) of rear cover to 50°C (122°F) with heater drier.



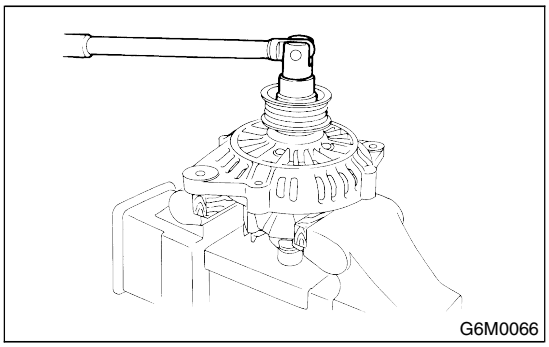
B6M0476B

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.

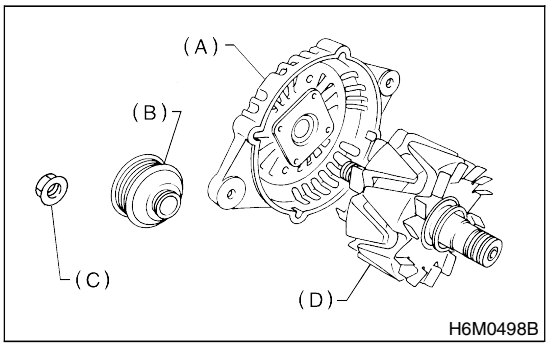


G6M0065

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.

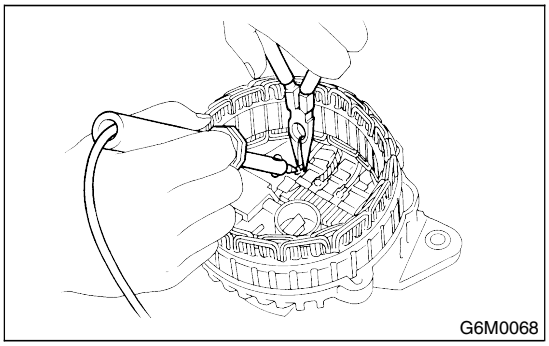


H6M0498B

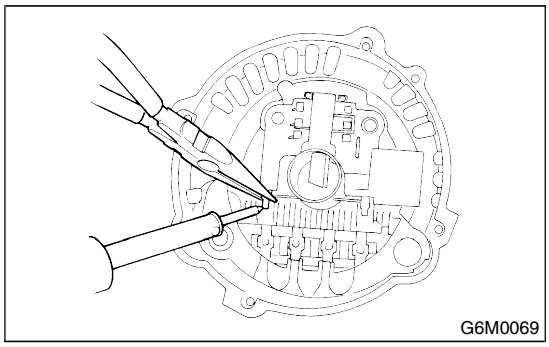
(A) Front bracket
(B) Pulley
(C) Nut
(D) Rotor

4) Unsolder connection between rectifier and stator coil to remove stator coil.

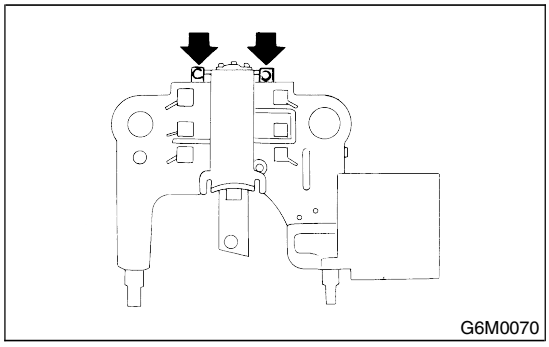
CAUTION:
Finish the work rapidly (less than three seconds) because the rectifier cannot withstand heat very well.


G6M0068

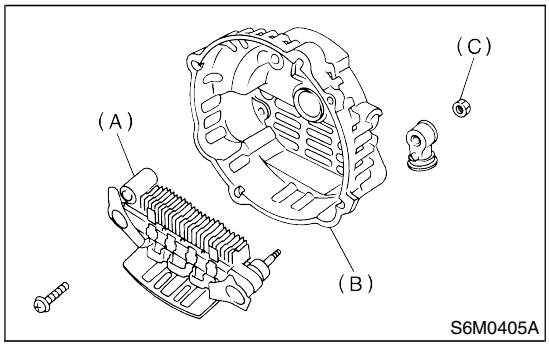
5) Remove screws which secure IC regulator to rear cover, and unsolder connection between IC regulator and rectifier to remove IC regulator.


G6M0069

6) Remove the brushes by unsoldering at the pigtails.


G6M0070

7) Remove the nut and insulating bushing at terminal B, and remove rectifier.



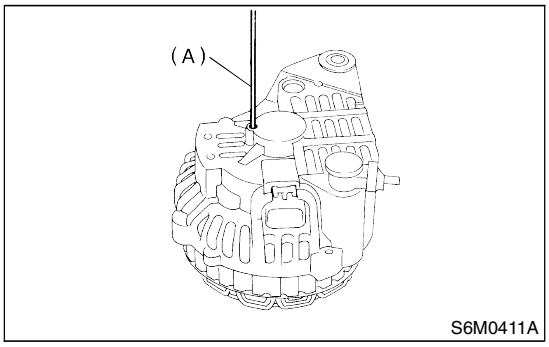
S6M0405A

(A) Ractifier
(B) Rear cover
(C) Nut

D: ASSEMBLY S179008A02

To assemble, 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.



S6M0411A

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.

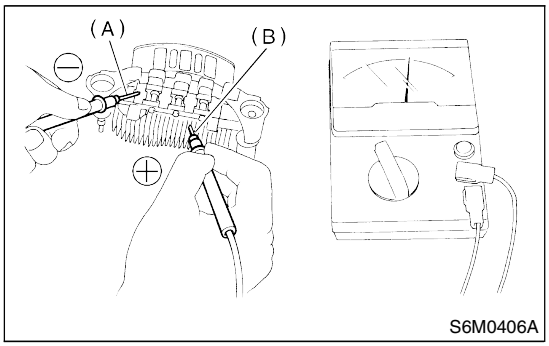
3) After reassembly, turn the pulley by hand to check that the rotor turns smoothly.

E: INSPECTION S179008A10

1. DIODE S179008A1001

CAUTION:
Never use a megger tester (measuring use for high voltage) or any other similar measure for this test; otherwise, the diodes may be damaged.

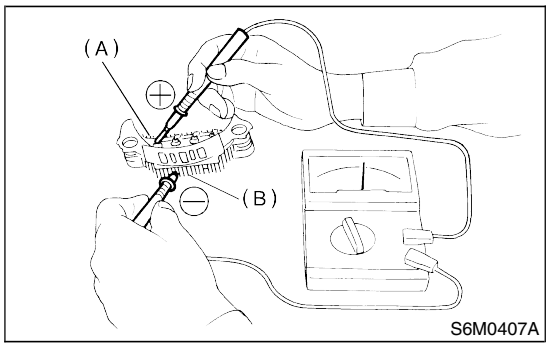
1) Checking positive diode
Check for continuity between the diode lead and the positive side heat sink. The positive diode is in good condition if continuity (1 Ω or less) exists only in the direction from the diode lead to the heat sink.



S6M0406A

(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)

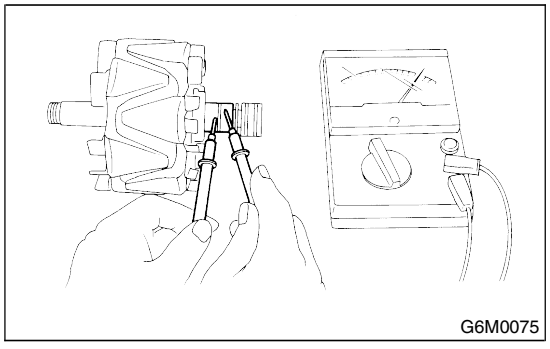
2. ROTOR S179008A1002

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.

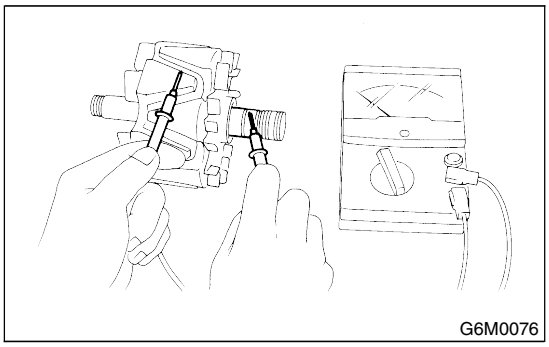
Slip ring outer diameter:
Standard
22.7 mm (0.894 in)
Limit
22.1 mm (0.870 in)

3) Continuity test
Check resistance between slip rings using circuit tester.
If the resistance is not within specification, replace rotor assembly.

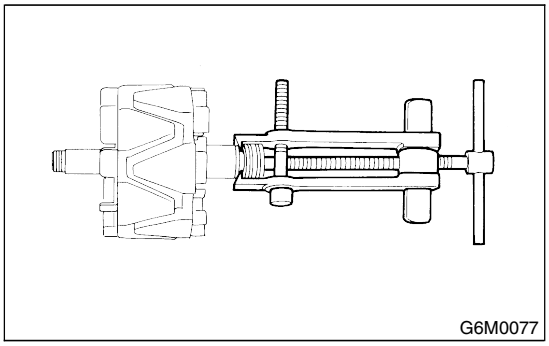
Specified resistance:
Approx. 2.7 — 3.2 Ω



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.

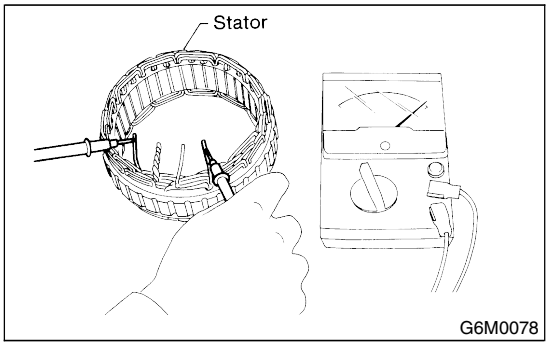


5) Ball bearing (rear side)
(1) Check rear ball bearing. Replace if it is noisy or if rotor does not turn smoothly.
(2) The rear bearing can be removed by using common bearing puller.

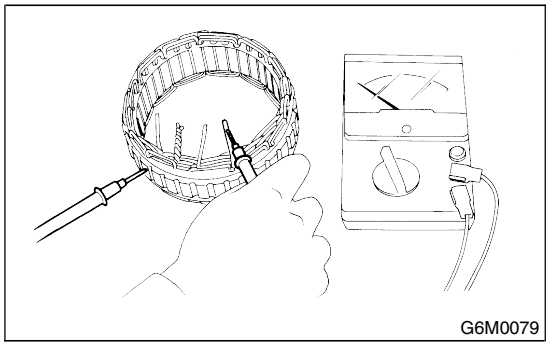


3. STATOR S179008A1003

1) Continuity test
Inspect stator coil for continuity between each end of the lead wires. If there is no continuity (1 Ω or more) between individual lead wires, the lead wire is broken, and so replace stator assembly.



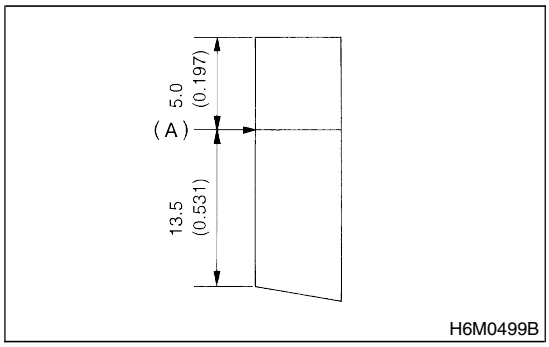
2) Insulation test
Inspect stator coil for continuity (1 Ω or less) between stator core and each end of the lead wire. If there is continuity, the stator coil is grounded, and so replace stator assembly.


G6M0079

4. BRUSH S179008A1004

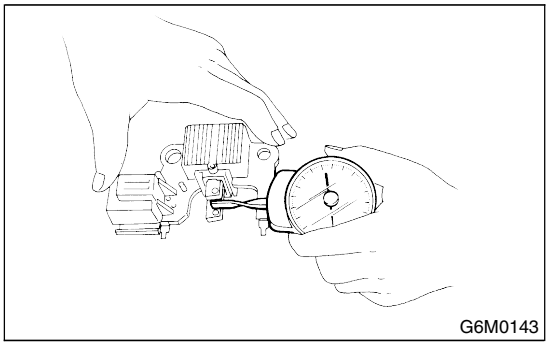
1) Measure the length of each brush. If wear exceeds the service limit, replace the brush. Each brush has the service limit mark (A) on it.

Brush length:
Standard
18.5 mm (0.728 in)
Service limit
5.0 mm (0.197 in)



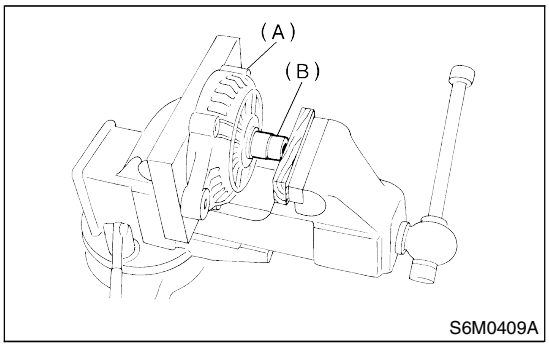
H6M0499B

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).


G6M0143

5. BEARING (FRONT SIDE) S179008A1005

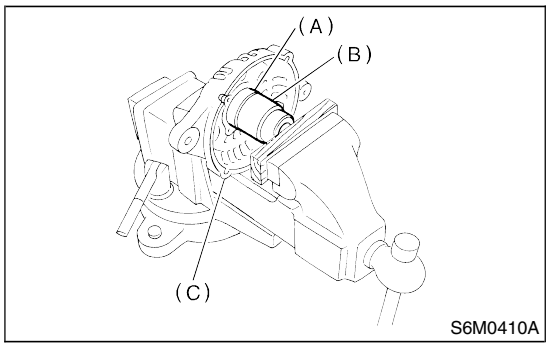
1) Check front ball bearing. If resistance is felt while rotating, or if abnormal noise is heard, replace the ball bearing.
2) Replacing front bearing
(1) Remove front bearing retainer.
(2) Closely install a fit tool on the bearing inner race. Press the bearing down out of front bracket with a hand press or vise. A socket wrench can serve as the tool.



S6M0409A

(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.

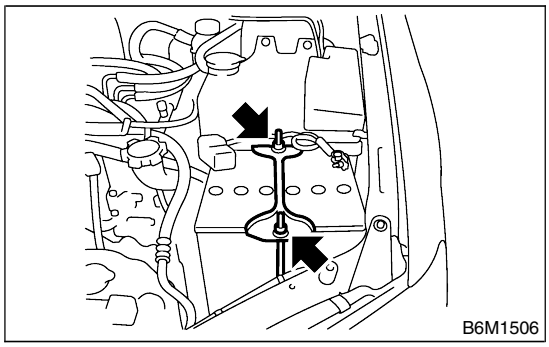


(A) Bearing
(B) Socket wrench
(C) Front bracket

4. Battery S179011

A: REMOVAL S179011A18

1) Disconnect the positive (+) terminal after disconnecting the negative (–) terminal of battery.
2) Remove flange nuts from battery rods and take off battery holder.



3) Remove battery.

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.

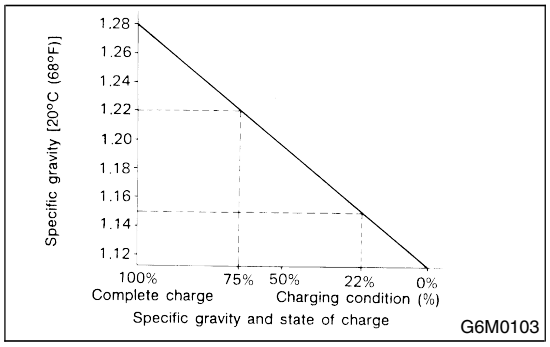
2. ELECTROLYTE LEVEL: S179011A1002

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)]



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.

MEMO:

ENGINE (DIAGNOSTICS)

EN(SOHC)

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1. Basic Diagnostic Procedure

S058501

A: PROCEDURE S058501E45

1. ENGINE S058501E4501

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(SOHC)-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(SOHC)-59, 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(SOHC)-294, 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(SOHC)-80, OPERATION, 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(SOHC)-48, Engine Malfunction Indicator Lamp (MIL).>
4	**PERFORM THE DIAGNOSIS.** 1) Perform the clear memory mode. <Ref. to EN(SOHC)-45, Clear Memory Mode.> 2) Perform the inspection mode. <Ref. to EN(SOHC)-42, 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(SOHC)-86, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Complete the diagnosis.

2. AUTOMATIC TRANSMISSION S058501E4502

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 S058502

A: CHECK S058502A04

1. CHECK LIST NO. 1 S058502A0401

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 S058502A0402

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 S058001

A: CAUTION S058001A03

1) Airbag system wiring harness is routed near the engine control module (ECM), main relay and fuel pump relay.

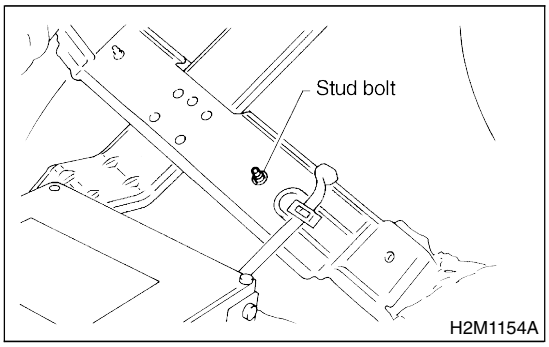
CAUTION:
• All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
• Be careful not to damage Airbag system wiring harness when servicing the engine control module (ECM), transmission control module (TCM), main relay and fuel pump relay.

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.

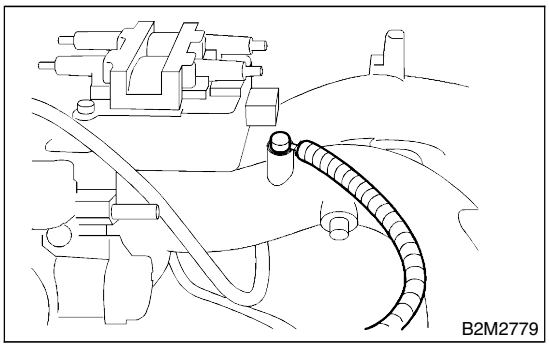
CAUTION:
When replacing ECM, be careful not to use the wrong spec. ECM to avoid any damage on fuel injection system.

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.

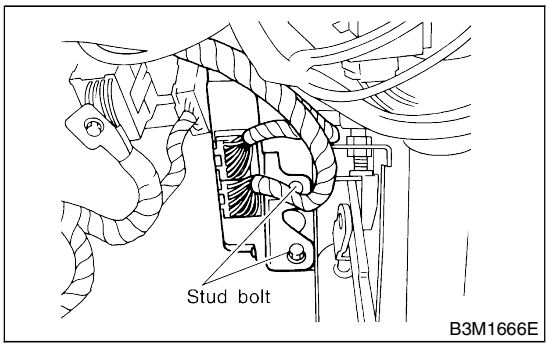
8) Use ECM mounting stud bolts at the body head grounding point when measuring voltage and resistance inside the passenger compartment.



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 S058001A10

Before performing diagnostics, check the following items which might affect engine problems:

1. BATTERY S058001A1001

1) Measure battery voltage and specific gravity of electrolyte.

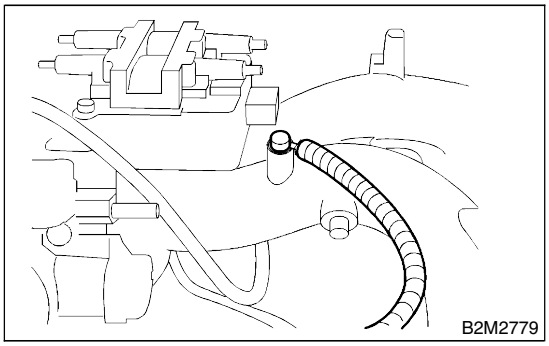
Standard voltage: 12 V

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 S058001A1002

Make sure the engine grounding terminal is properly connected to the engine.



C: NOTE S058001A15

1. DESCRIPTION S058001A1501

• 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 S058001A1502

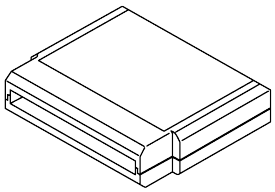
● The Multipoint Fuel Injection (MFI) system is a system that supplies the optimum air-fuel mixture to the engine for all the various operating conditions through the use of the latest electronic technology.
With this system fuel, which is pressurized at a constant pressure, is injected into the intake 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 S058001A1503

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 S058001A17

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)

MEMO:

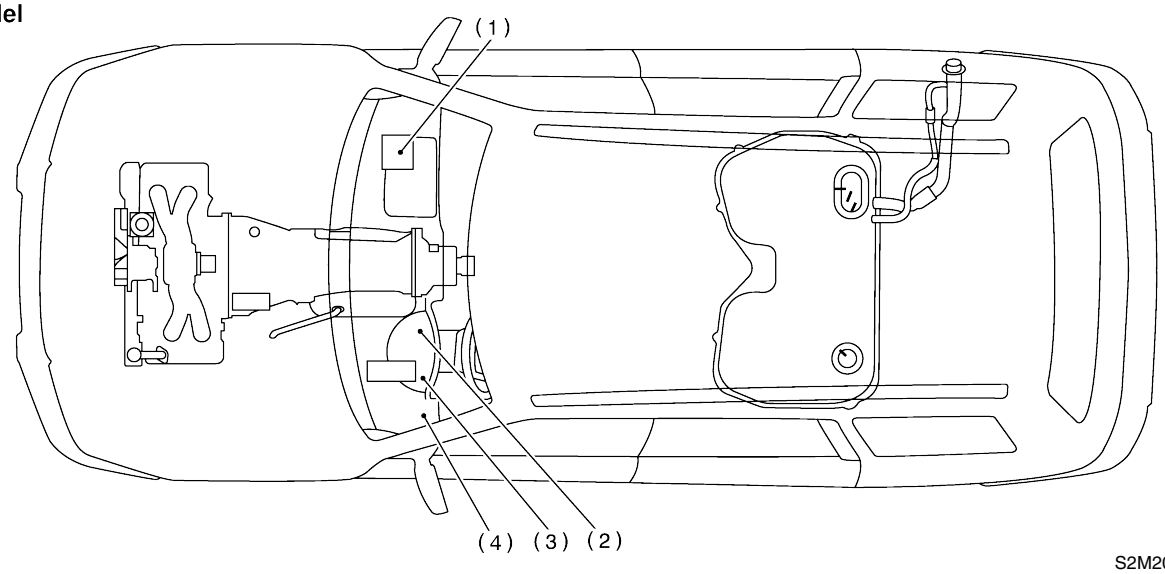
4. Electrical Components Location S058507

A: LOCATION S058507A13

1. ENGINE S058507A1301

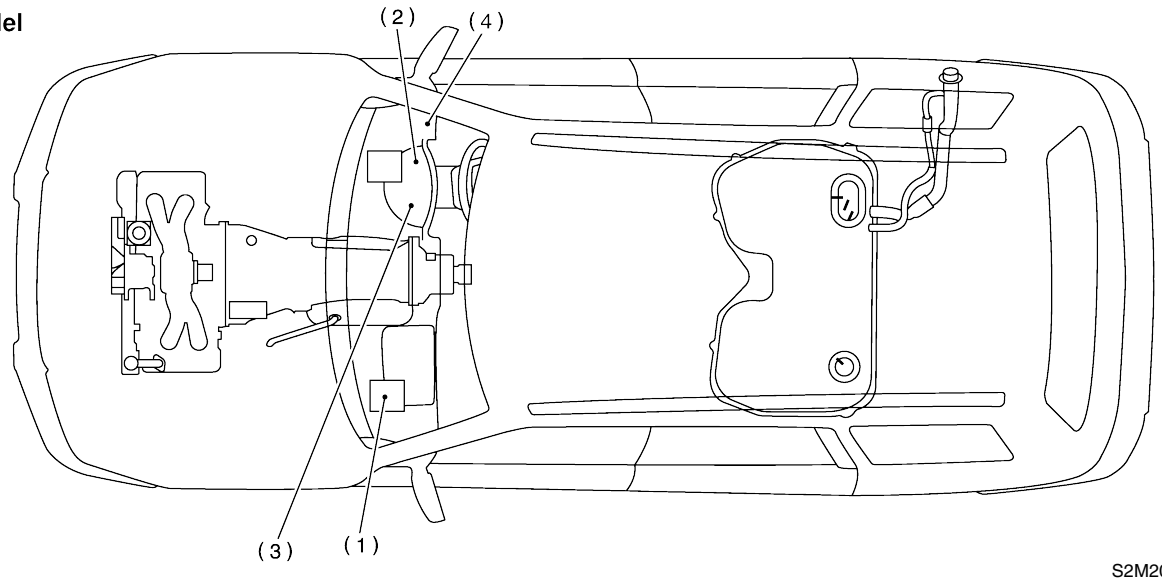
- **MODULE**

LHD model



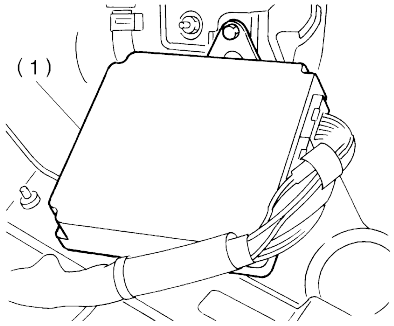
S2M2069A

RHD model

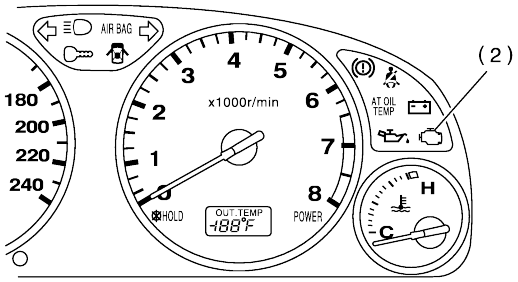


S2M2070A

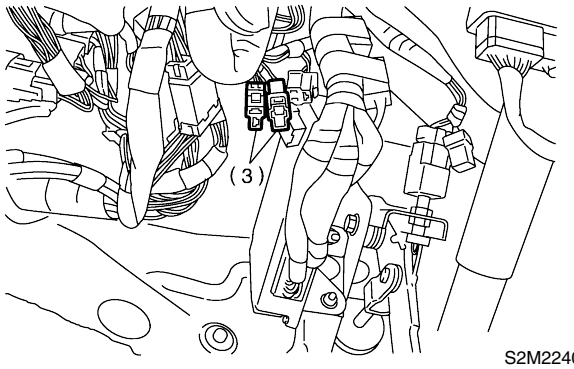
(1) Engine control module (ECM)
(2) CHECK ENGINE malfunction indicator lamp (MIL)
(3) Test mode connector
(4) Data link connector (for Subaru Select Monitor and OBD-II general scan tool)



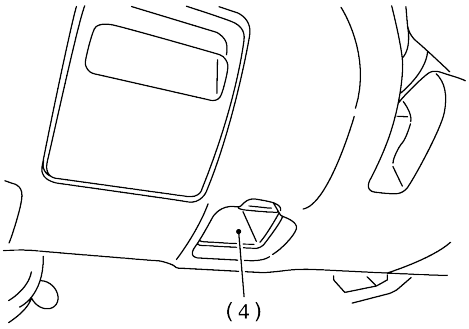
B3M1575A



S2M2104C



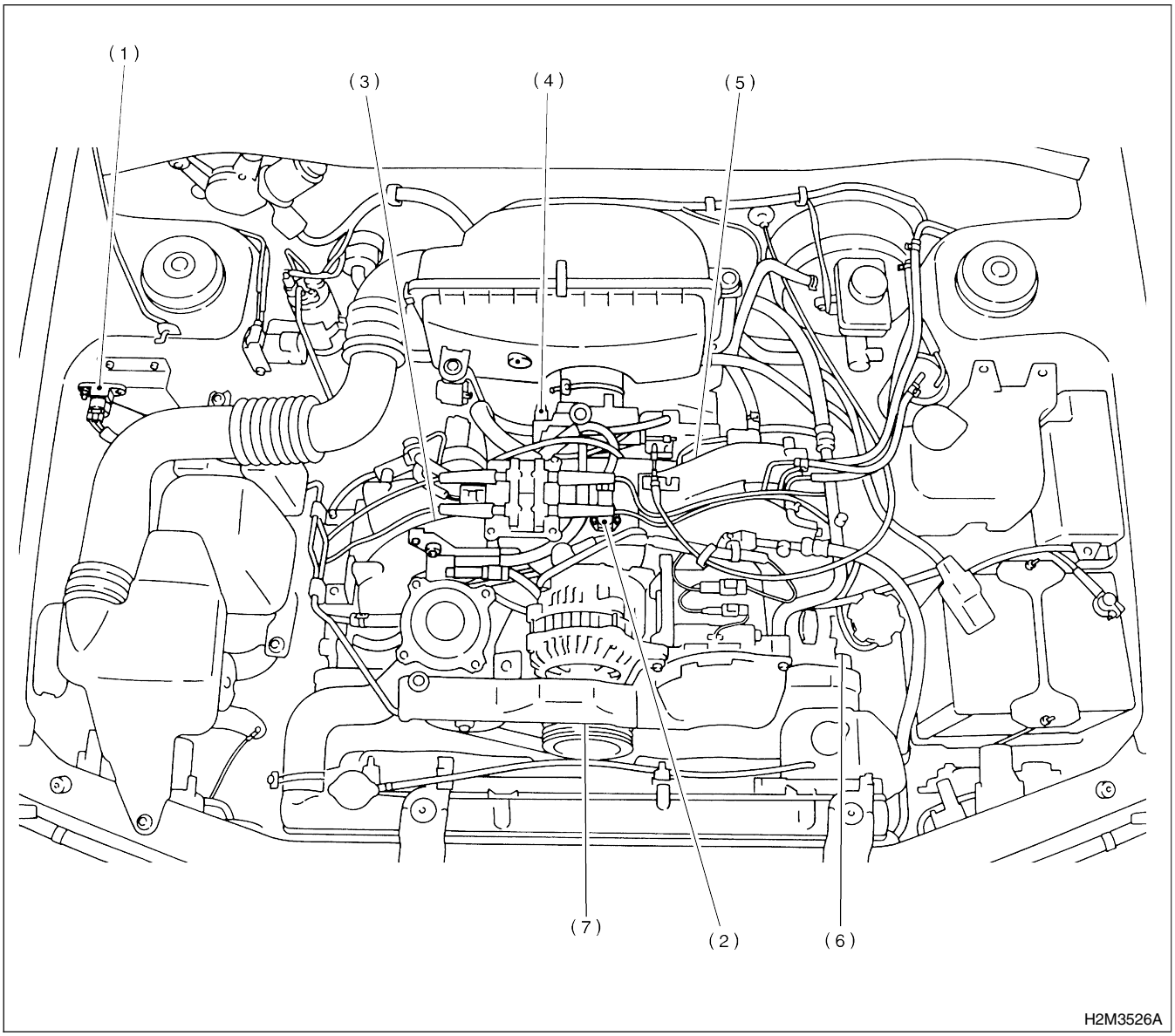
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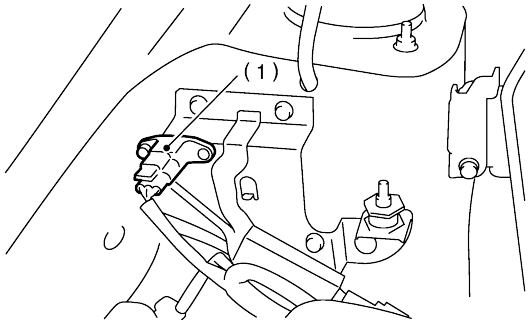
S2M2157D

ELECTRICAL COMPONENTS LOCATION

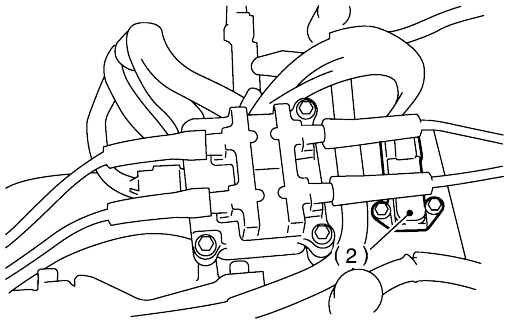
● SENSOR



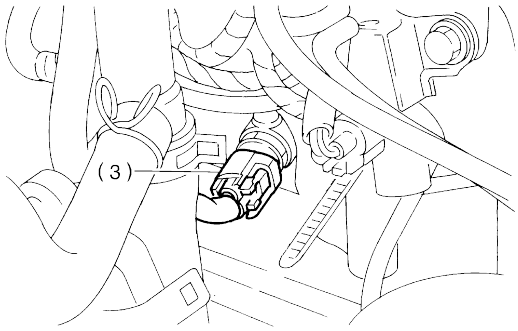
(1) Atmospheric pressure sensor
(2) Intake air temperature and pressure sensor
(3) Engine coolant temperature sensor
(4) Throttle position sensor
(5) Knock sensor
(6) Camshaft position sensor
(7) Crankshaft position sensor



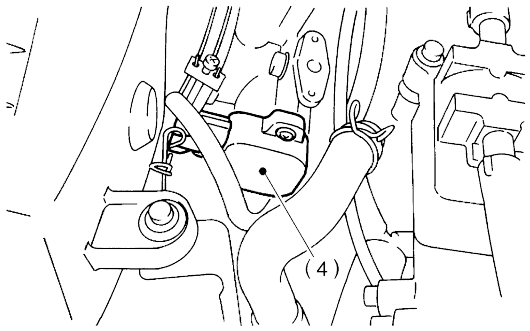
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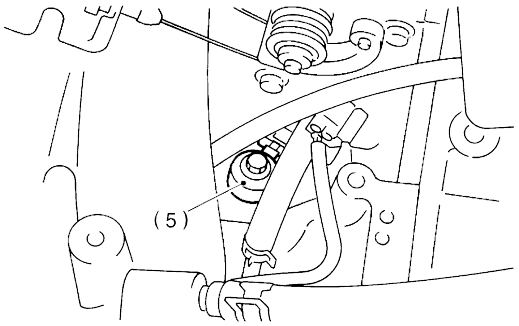
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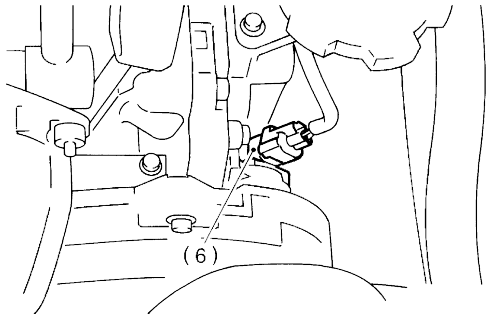
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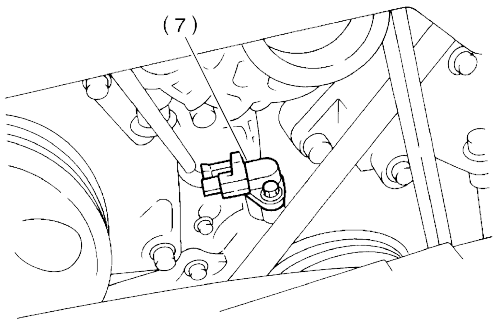
B2M2240A



B2M2241A

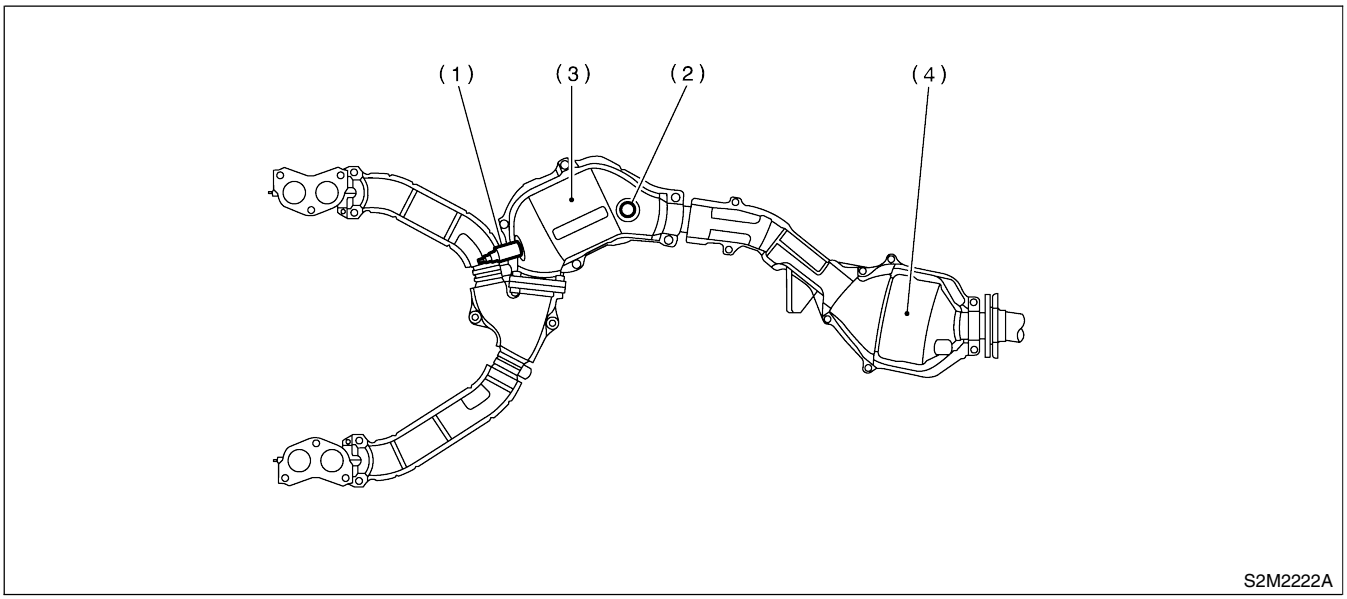


B2M2242A

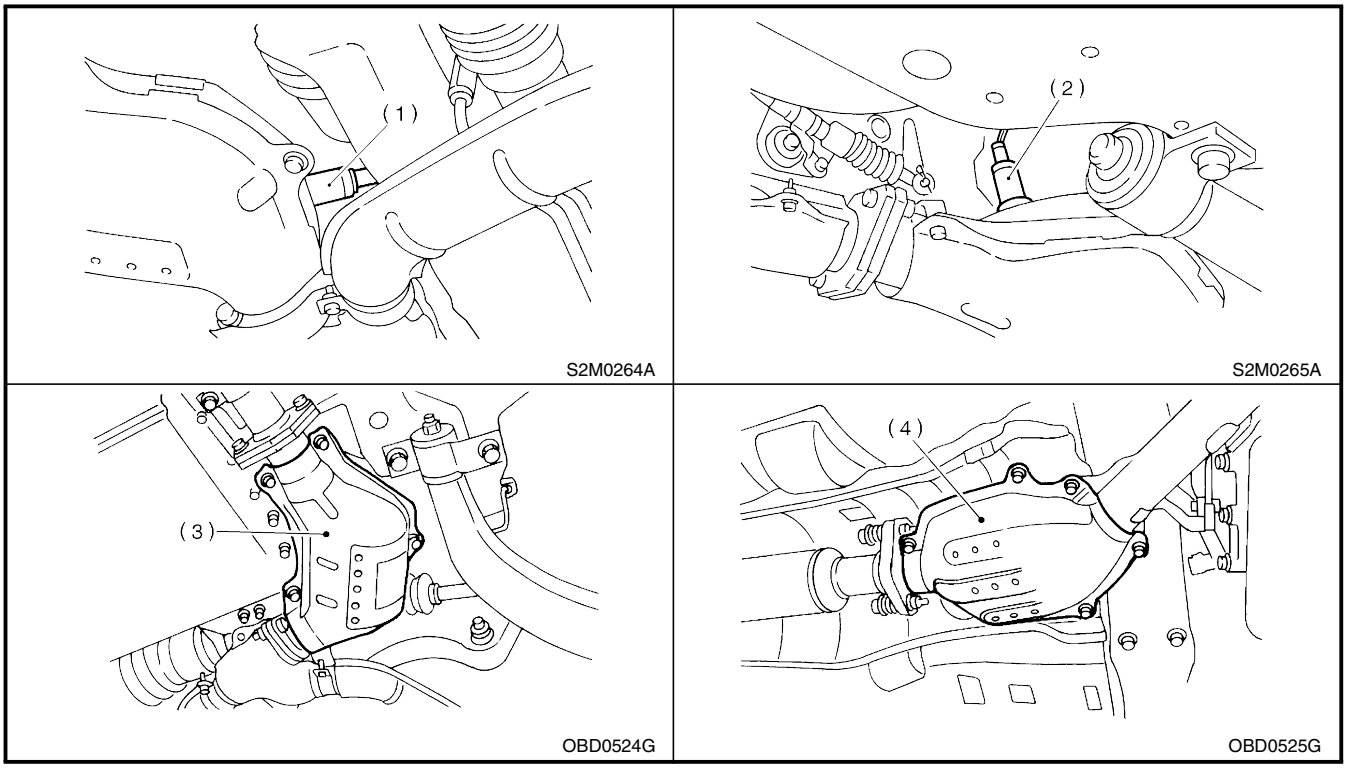


B2M0213J

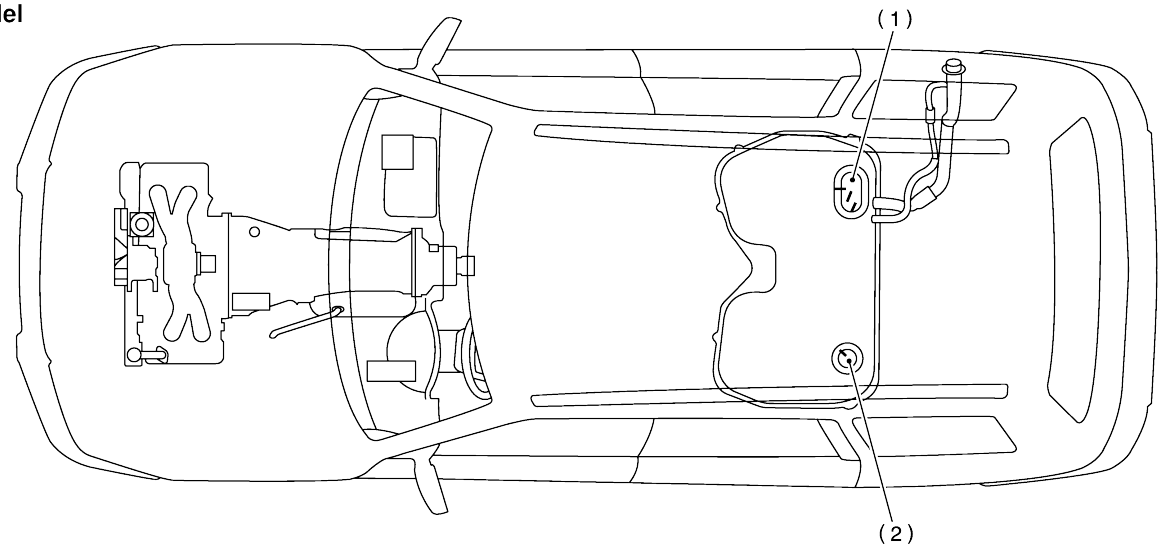
ELECTRICAL COMPONENTS LOCATION



(1) Front oxygen (A/F) sensor
(2) Rear oxygen sensor
(3) Front catalytic converter
(4) Rear catalytic converter

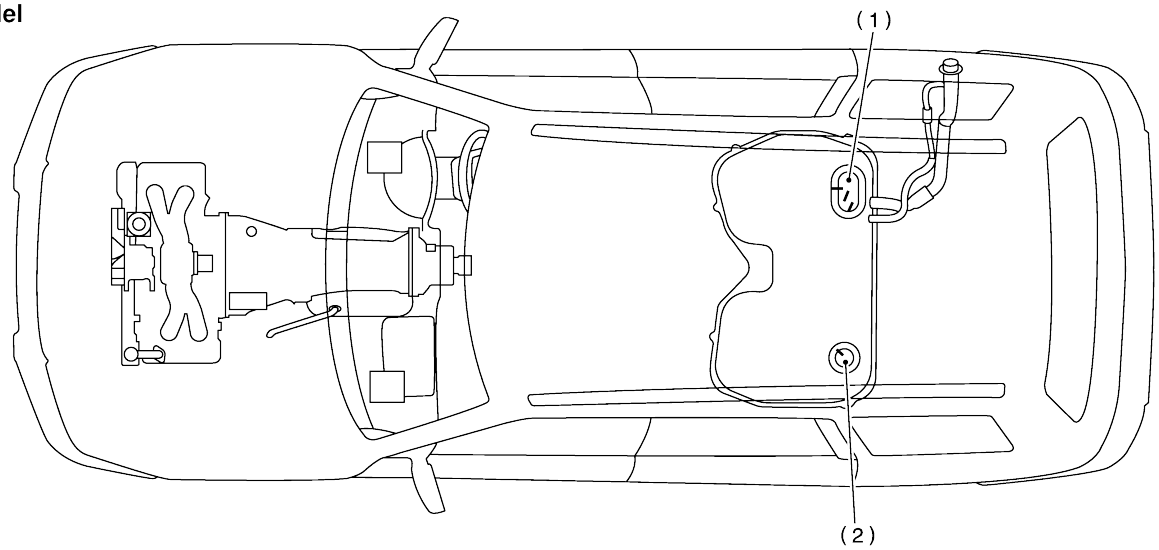


LHD model



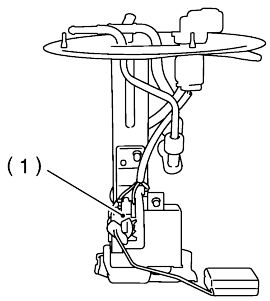
S2M2069B

RHD model

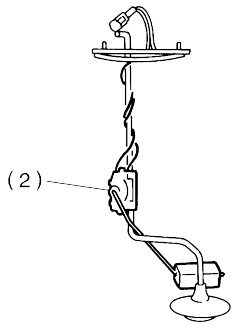


S2M2070B

(1) Fuel level sensor (2) Fuel sub level sensor

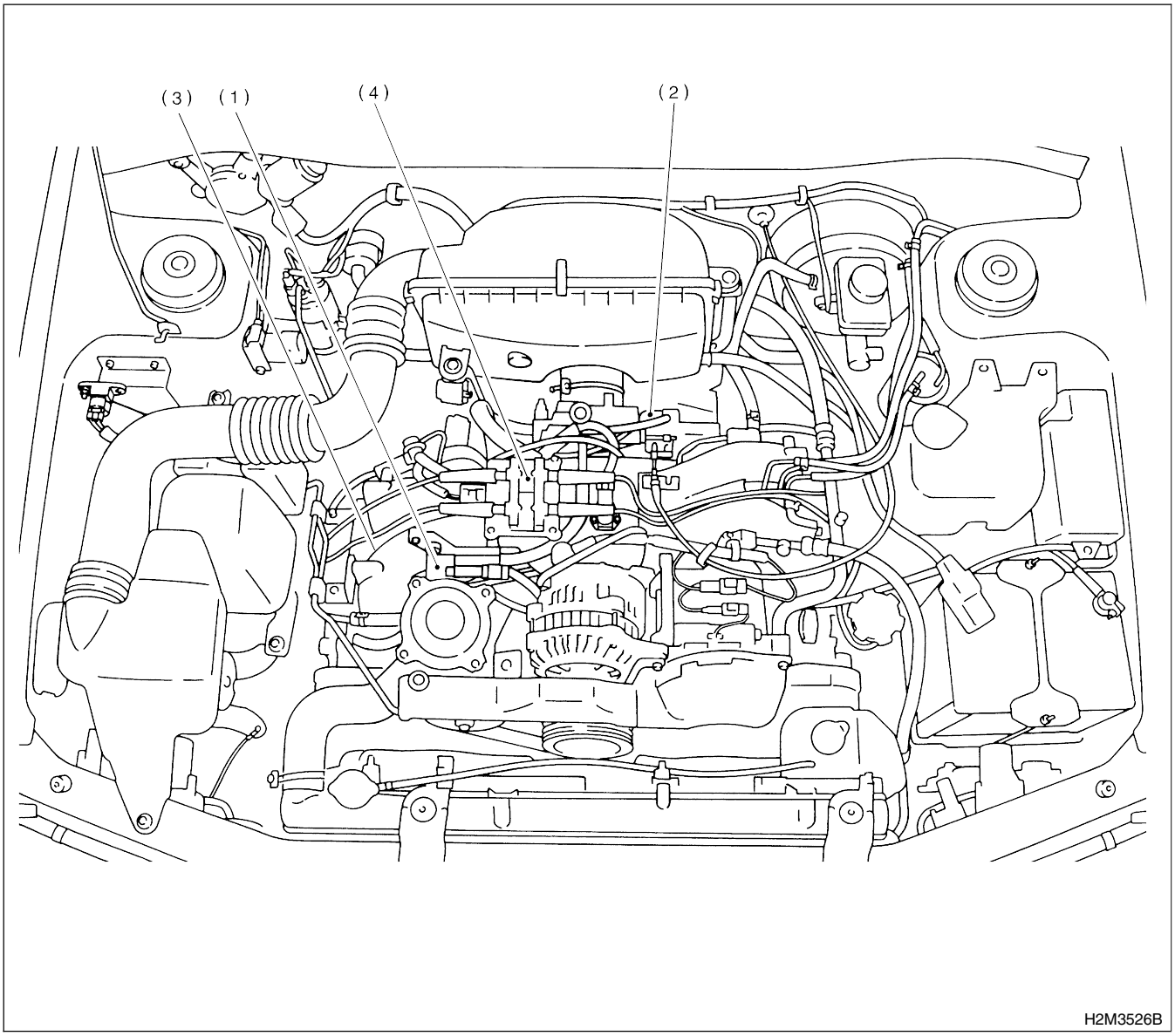


S2M2080A

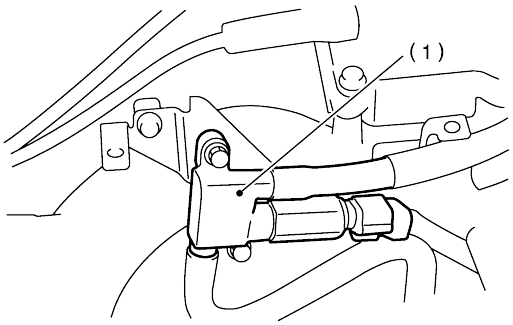


S2M0270B

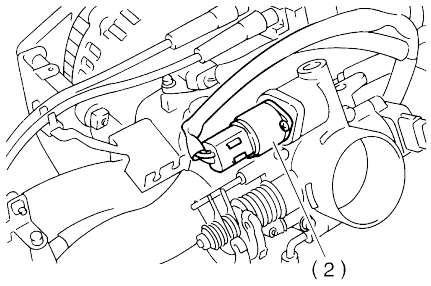
● SOLENOID VALVE, EMISSION CONTROL SYSTEM PARTS AND IGNITION SYSTEM PARTS



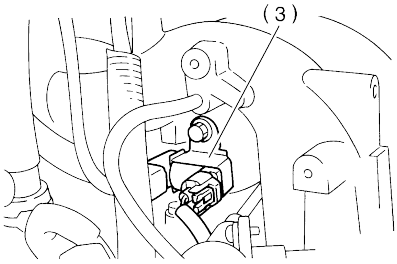
(1) Air assist injector solenoid valve
(2) Idle air control solenoid valve
(3) Purge control solenoid valve
(4) Ignition coil & ignitor ASSY



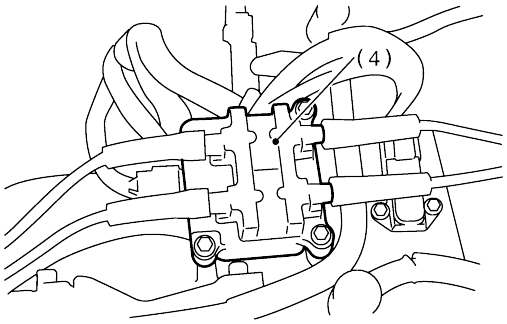
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H2M3259A



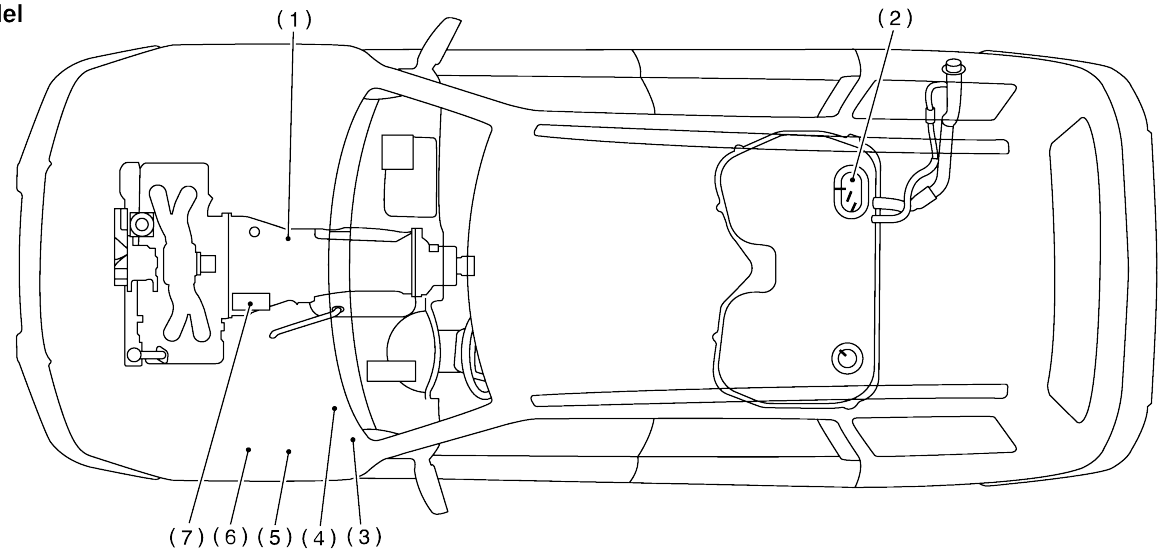
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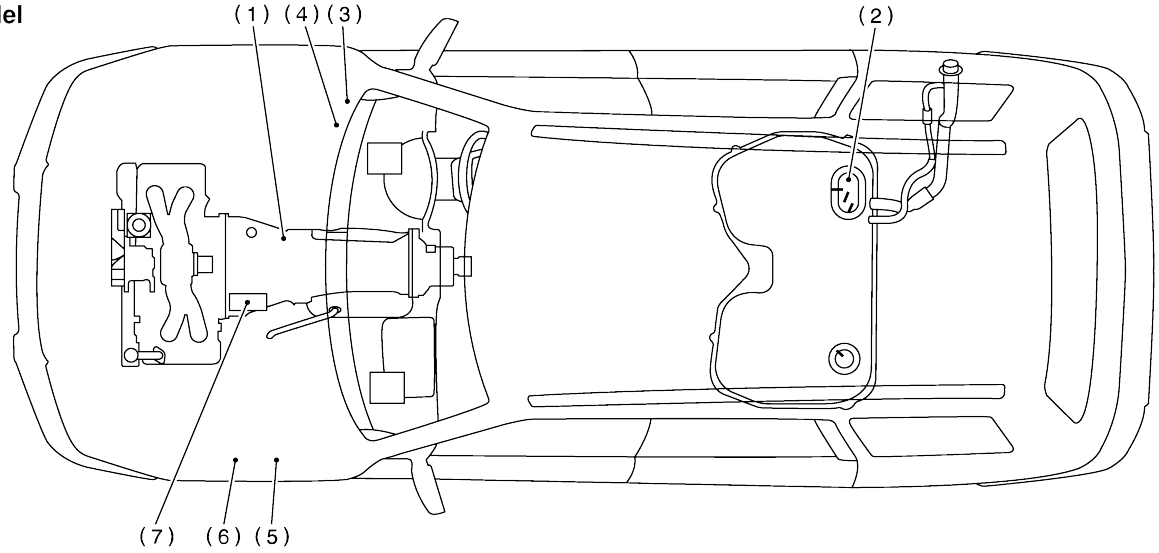
ELECTRICAL COMPONENTS LOCATION

LHD model



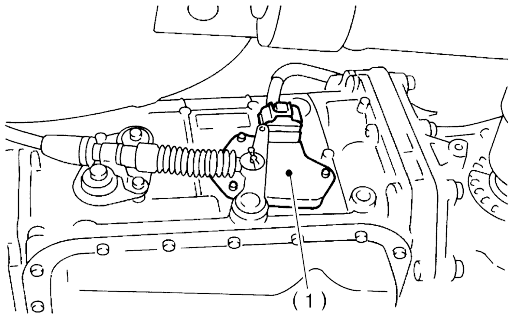
S2M2069C

RHD model

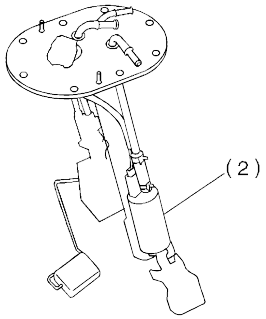


S2M2070C

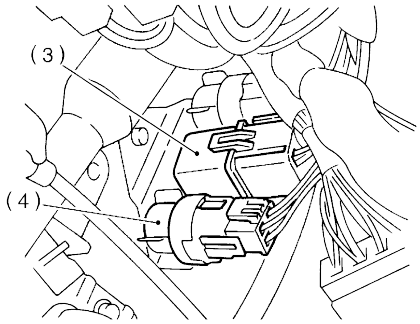
(1) Inhibitor switch
(2) Fuel pump
(3) Main relay
(4) Fuel pump relay
(5) Radiator main fan relay
(6) Radiator sub fan relay
(7) Starter



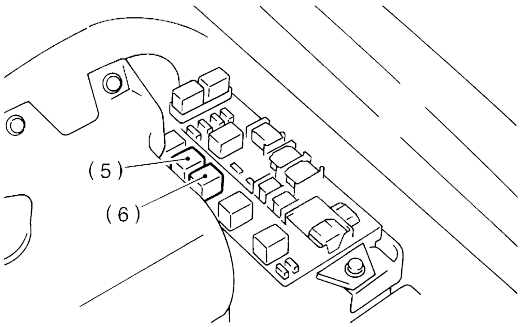
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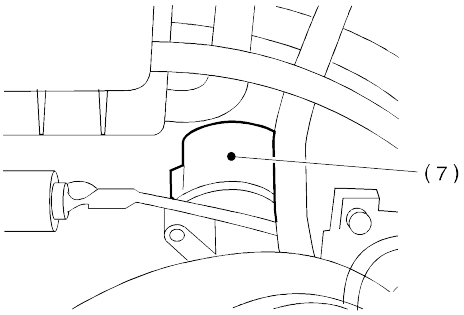
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S2M0278A



S2M0279A

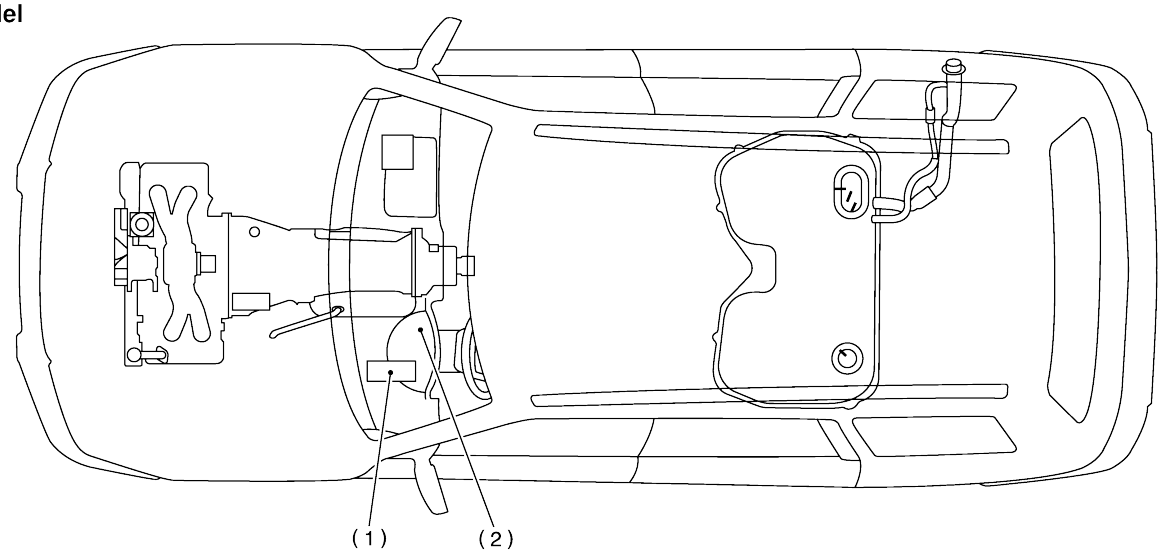


B2M2247E

2. TRANSMISSION S058507A1302

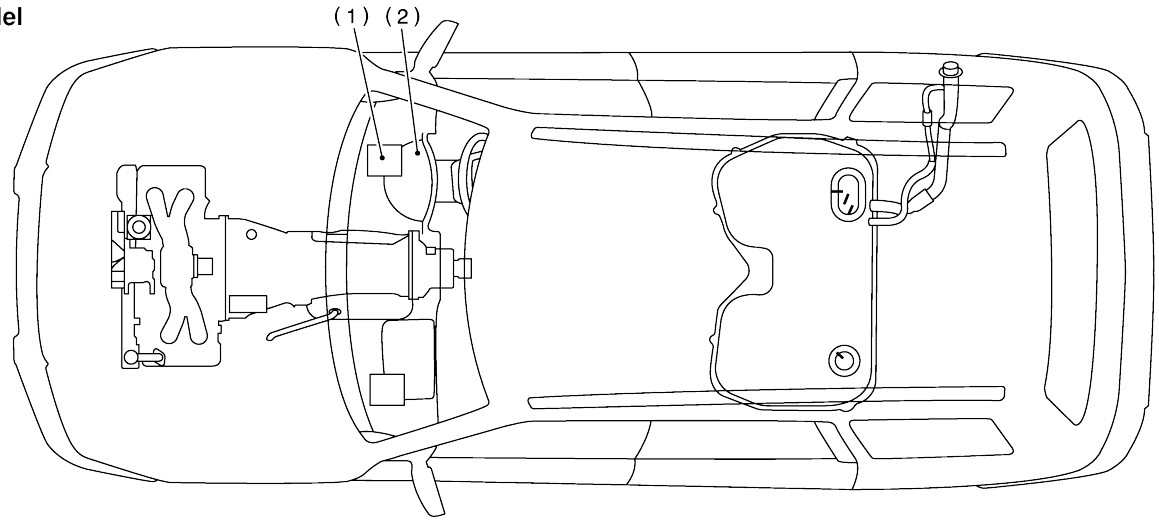
● MODULE

LHD model



S2M2069D

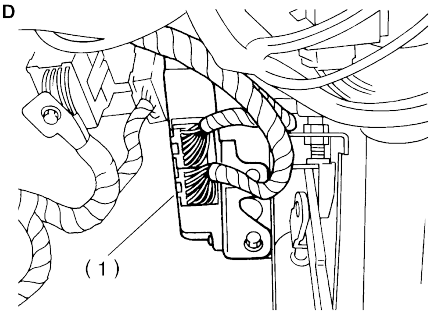
RHD model



S2M2070D

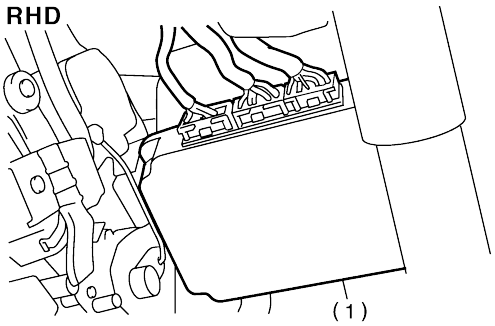
(1) Transmission Control Module (TCM) (for AT vehicles)
(2) AT diagnostic indicator light (for AT vehicles)

LHD

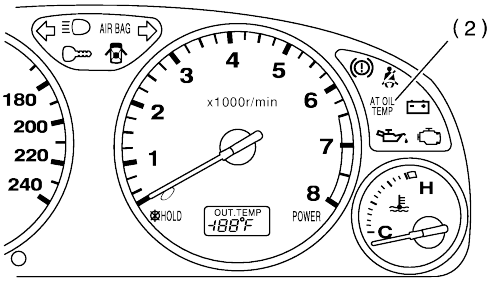


B3M1666G

RHD

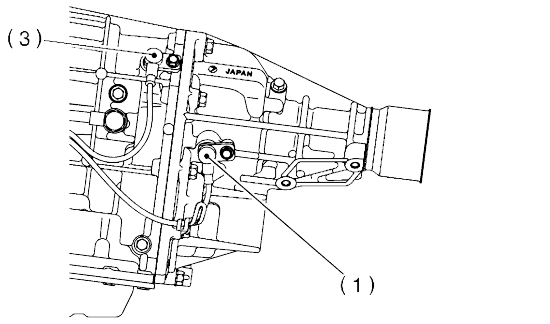


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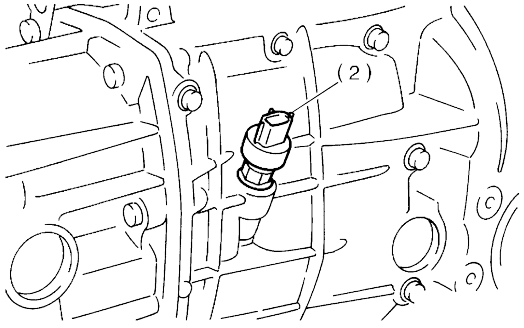


S2M2104B

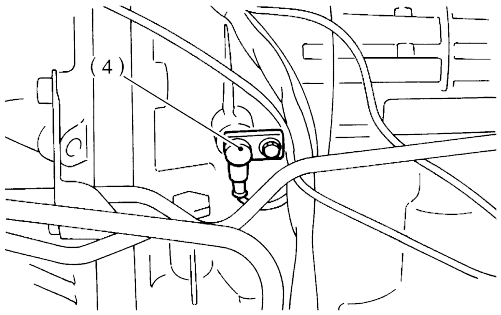
● SENSOR



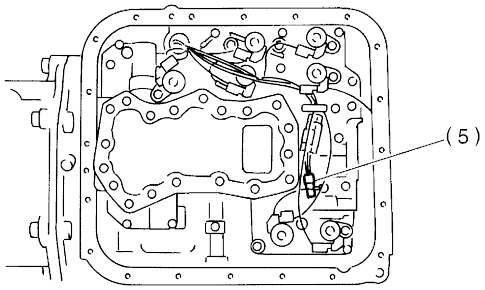
B2M2258A



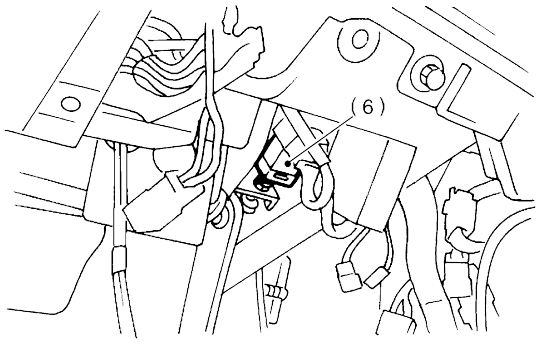
B2M2259A



B2M2260A



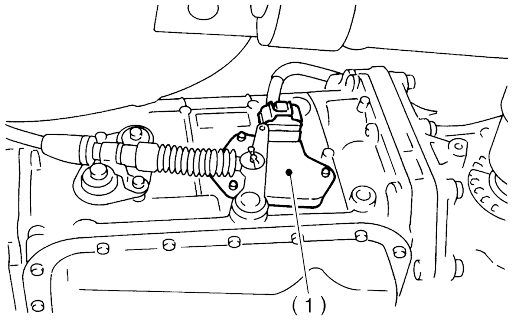
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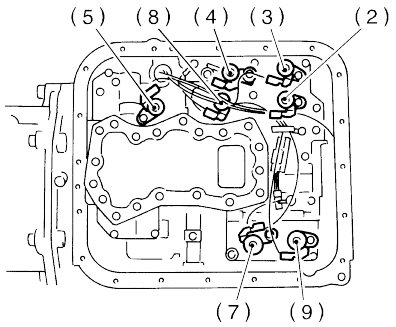
OBD0653B

(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

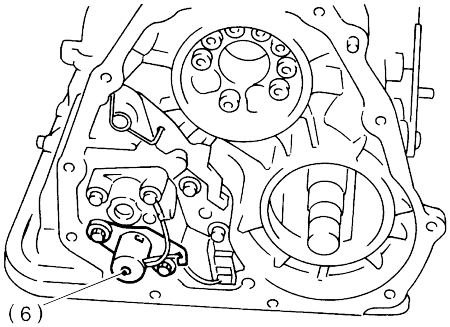
● SOLENOID VALVE AND SWITCH (AT VEHICLES)



B2M2246F



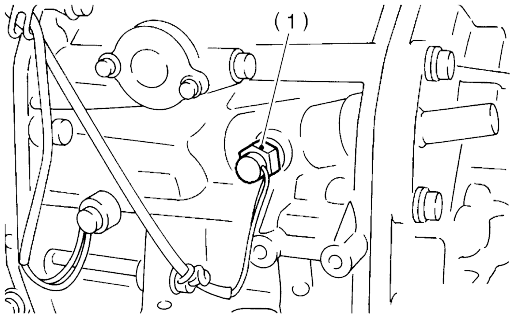
B2M2263K



B2M2264F

(1) Inhibitor switch
(2) Shift solenoid valve 1
(3) Shift solenoid valve 2
(4) Line pressure duty solenoid
(5) Lock-up duty solenoid
(6) Transfer duty solenoid
(7) 2-4 brake duty solenoid
(8) Low clutch timing solenoid valve
(9) 2-4 brake timing solenoid valve

● SOLENOID VALVE AND SWITCH (MT VEHICLES)

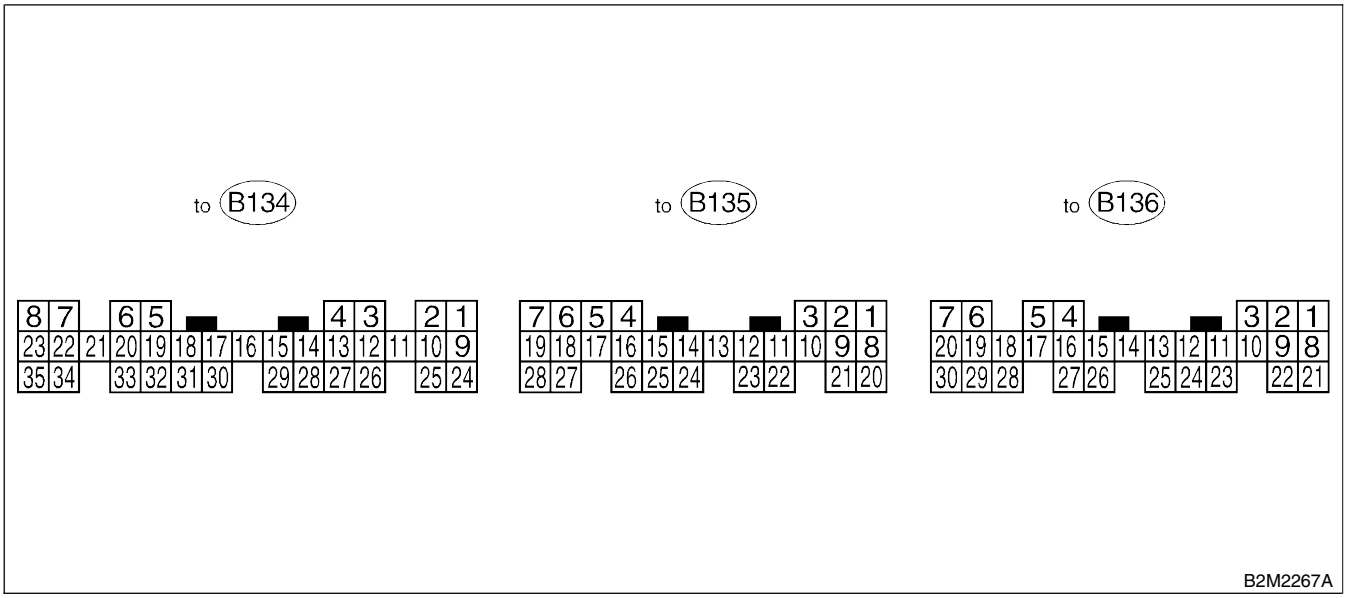


B2M2265A

(1) Neutral position switch

5. Engine Control Module (ECM) I/O Signal S058526

A: ELECTRICAL SPECIFICATION S058526A08



Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Crankshaft position sensor	Signal (+)	B135	2	0	–7 — +7	Sensor output waveform
	Signal (–)	B135	9	0	0	—
	Shield	B135	10	0	0	—
Camshaft position sensor	Signal (+)	B135	1	0	–7 — +7	Sensor output waveform
	Signal (–)	B135	8	0	0	—
	Shield	B135	10	0	0	—
Throttle position sensor	Signal	B136	17	Fully closed: 0.2 — 1.0 Fully opened: 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	29	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	
Fuel level sensor		B136	27	0.12 — 4.75	0.12 — 4.75	—

ENGINE CONTROL MODULE (ECM) I/O SIGNAL

Content	Connector No.	Terminal No.	Signal (V)		Note
			Ignition SW ON (Engine OFF)	Engine ON (Idling)	
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 S058530

A: ELECTRICAL SPECIFICATION

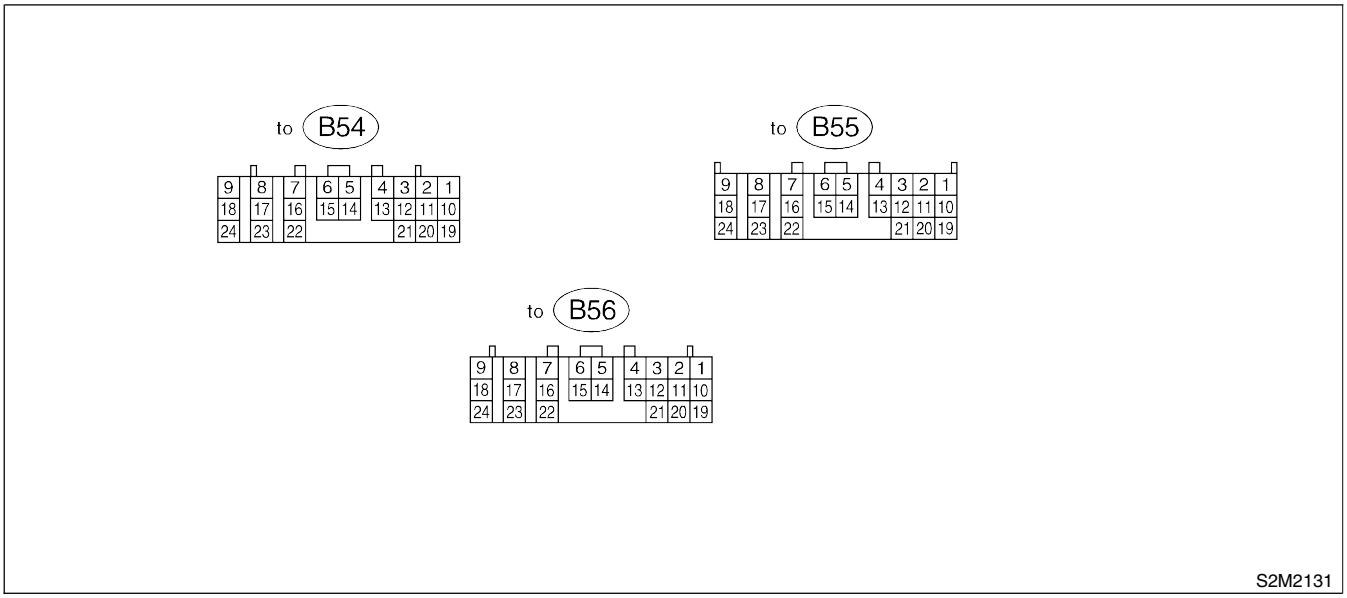
S058530A08

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 S058506

A: ELECTRICAL SPECIFICATION S058506A08



S2M2131

Check with ignition switch ON.						
Content		Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Back-up power supply		B56	1	Ignition switch OFF	10 — 16	—
Ignition power supply		B54	23	Ignition switch ON (with engine OFF)	10 — 16	—
		B54	24			
Inhibitor switch	“P” range switch	B55	1	Select lever in “P” range	Less than 1	—
				Select lever in any other than “P” range (except “N” range)	More than 8	
	“N” range switch	B55	14	Select lever in “N” range	Less than 1	—
				Select lever in any other than “N” range (except “P” range)	More than 8	
	“R” range switch	B55	3	Select lever in “R” range	Less than 1	—
				Select lever in any other than “R” range	More than 9.5	
	“D” range switch	B55	4	Select lever in “D” range	Less than 1	—
				Select lever in any other than “D” range	More than 9.5	
	“3” range switch	B55	5	Select lever in “3” range	Less than 1	—
				Select lever in any other than “3” range	More than 9.5	
	“2” range switch	B55	6	Select lever in “2” range	Less than 1	—
				Select lever in any other than “2” range	More than 9.5	
	“1” range switch	B55	7	Select lever in “1” range	Less than 1	—
				Select lever in any other than “1” range	More than 9.5	
Brake switch		B55	12	Brake pedal depressed.	More than 10.5	—
				Brake pedal released.	Less than 1	
ABS signal		B55	21	ABS switch ON	Less than 1	—
				ABS switch OFF	6.5 — 15	

Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Hold switch	B55	16	Hold switch ON	Less than 1	—
			Hold switch OFF	More than 8	
Power switch	B55	23	Power switch ON	Less than 1	—
			Power switch OFF	More than 10	
Kick-down switch	B55	11	Throttle fully opened.	Less than 1	—
			Throttle fully closed.	More than 6.5	
POWER indicator light	B56	11	Light ON	Less than 1	—
			Light OFF	More than 9	
AT OIL TEMP indicator light	B56	10	Light ON	Less than 1	—
			Light OFF	More than 9	
Throttle position sensor	B54	3	Throttle fully closed.	0.3 — 0.7	—
			Throttle fully open.	4.0 — 4.6	
Throttle position sensor power supply	B54	2	Ignition switch ON (With engine OFF)	4.8 — 5.3	—
ATF temperature sensor	B54	11	ATF temperature 20°C (68°F)	1.6 — 2.0	2.1 — 2.9 k
			ATF temperature 80°C (176°F)	0.4 — 0.9	275 — 375
Rear vehicle speed sensor	B55	24	Vehicle stopped.	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Front vehicle speed sensor	B55	18	Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	450 — 650
Torque converter turbine speed sensor	B55	8	Engine idling after warm-up. (D range)	0	450 — 650
			Engine idling after warm-up. (N range)	More than 1 (AC range)	
Vehicle speed output signal	B56	17	Vehicle speed at most 10 km/h (6 MPH)	Less than 1← →More than 4	—
Engine speed signal	B55	17	Ignition switch ON (with engine OFF)	More than 10.5	—
			Ignition switch ON (with engine ON)	8 — 11	
Cruise set signal	B55	22	When cruise control is set (SET lamp ON)	Less than 1	—
			When cruise control is not set (SET lamp OFF)	More than 6.5	
Torque control signal 1	B56	5	Ignition switch ON (with engine ON)	4	—
Torque control signal 2	B56	14	Ignition switch ON (with engine ON)	4	—
Torque control cut signal	B55	10	Ignition switch ON	8	—
Intake manifold pressure signal	B54	1	Engine idling after warm-up.	1.2 — 1.8	—
Shift solenoid 1	B54	22	1st or 4th gear	More than 9	10 — 16
			2nd or 3rd gear	Less than 1	
Shift solenoid 2	B54	5	1st or 2nd gear	More than 9	10 — 16
			3rd or 4th gear	Less than 1	

TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

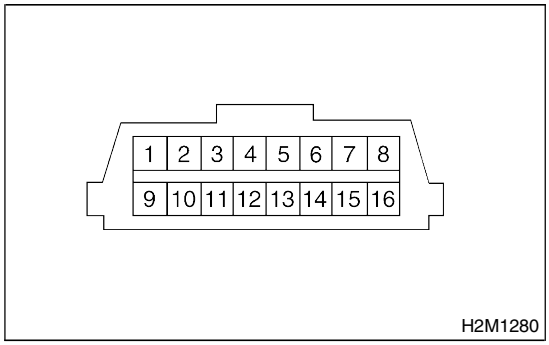
Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Line pressure duty solenoid	B54	9	Ignition switch ON (with engine OFF) Throttle fully closed after warm-up.	1.5 — 4.0	2.0 — 4.5
			Ignition switch ON (with engine OFF) Throttle fully open after warm-up.	Less than 0.5	
Lock-up duty solenoid	B54	7	When lock up occurs.	More than 8.5	10 — 17
			When lock up is released.	Less than 0.5	
Transfer duty solenoid	B54	6	Fuse on FWD switch	More than 8.5	10 — 17
			Fuse removed from FWD switch (with throttle fully open and with select lever in 1st gear).	Less than 0.5	
2-4 brake duty solenoid	B54	18	Ignition switch ON (with engine OFF) Throttle fully closed after warm-up.	1.5 — 4.0	2.0 — 4.5
			Ignition switch ON (with engine OFF) Throttle fully open after warm-up.	Less than 0.5	
2-4 brake timing solenoid	B54	16	1st gear	Less than 1	10 — 16
			3rd gear	More than 9	
Low clutch timing solenoid	B54	15	2nd gear	Less than 1	10 — 16
			4th gear	More than 9	
Sensor ground line 1	B54	20	—	0	Less than 1
Sensor ground line 2	B55	9	—	0	Less than 1
Sensor ground line 3	B54	10	—	0	Less than 1
Sensor ground line 4	B54	19	—	0	Less than 1
System ground line	B56	19	—	0	Less than 1
	B54	20			
FWD switch	B55	20	Fuse removed.	6 — 9.1	—
			Fuse installed.	Less than 1	
FWD indicator light	B56	2	Fuse ON FWD switch	Less than 1	—
			Fuse removed from FWD switch	More than 9	
Data link signal (Subaru Select Monitor)	B56	15	—	—	—
		6	—	—	

8. Data Link Connector S058505

A: NOTE S058505A15

1) This connector is used both for OBD-II general scan tools and the Subaru Select Monitor.
2) Terminal No. 4 to No. 6 of the data link connector is used for the Subaru Select Monitor signal.

CAUTION:
Do not connect any scan tools other than the OBD-II general scan tools and the Subaru Select Monitor, because the circuit for the Subaru Select Monitor may be damaged.



Terminal No.	Contents	Terminal No.	Contents
1	Power supply	9	Blank
2	Blank	10	K line of ISO 9141 CARB
3	Blank	11	Blank
4	Subaru Select Monitor signal (ECM to Subaru Select Monitor)*	12	Ground
5	Subaru Select Monitor signal (Subaru Select Monitor to ECM)*	13	Ground
6	Line end check signal 1	14	Blank
7	Blank	15	Blank
8	Blank	16	Blank

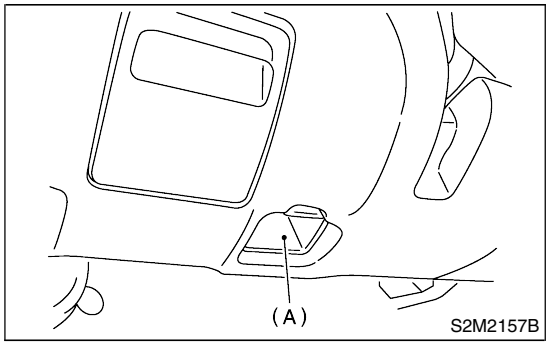
*: Circuit only for Subaru Select Monitor

9. OBD-II General Scan Tool S058527

A: OPERATION S058527A16

1. HOW TO USE OBD-II GENERAL SCAN TOOL S058527A1601

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(SOHC)-80, List of Diagnostic Trouble Code (DTC).>

2. MODE $01 (CURRENT POWERTRAIN DIAGNOSTIC DATA) S058527A1602

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) S058527A1603

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) S058527A1604

Refer to Read Diagnostic Trouble Code for information about data denoting emission-related powertrain diagnostic trouble codes. <Ref. to EN(SOHC)-41, Read Diagnostic Trouble Code.>

5. MODE $04 (CLEAR/RESET EMISSION-RELATED DIAGNOSTIC INFORMATION) S058527A1605

Refers to the mode used to clear or reset emission-related diagnostic information (OBD-II trouble diagnostic information).

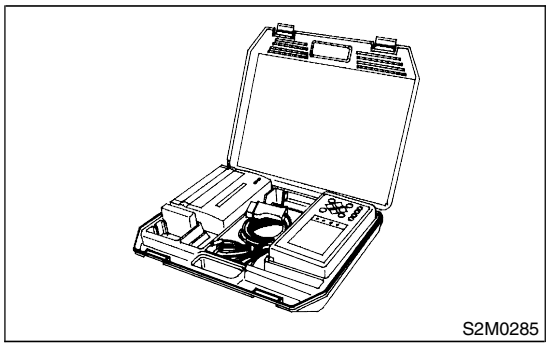
NOTE:
Refer to OBD-II general scan tool manufacturer's instruction manual to clear or reset emission-related diagnostic information (MODE $04).

10. Subaru Select Monitor S058503

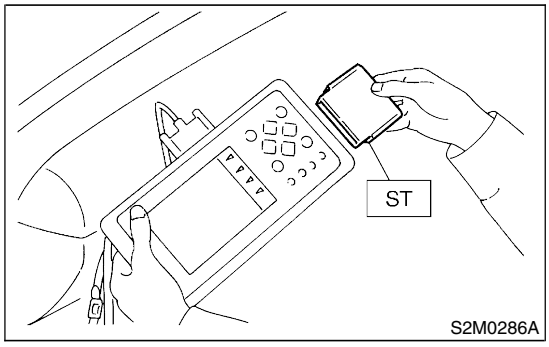
A: OPERATION S058503A16

1. HOW TO USE SUBARU SELECT MONITOR S058503A1601

1) Prepare Subaru Select Monitor kit. <Ref. to EN(SOHC)-8, PREPARATION TOOL, General Description.>

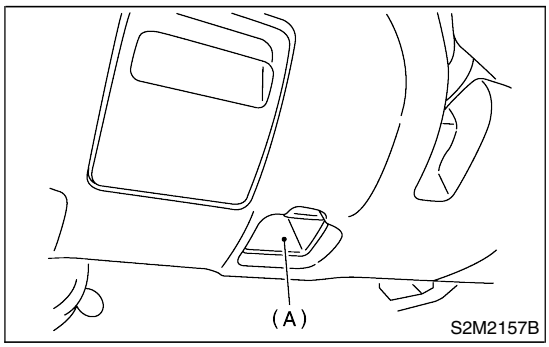

S2M0285

2) Connect diagnosis cable to Subaru Select Monitor.
3) Insert cartridge into Subaru Select Monitor. <Ref. to EN(SOHC)-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).

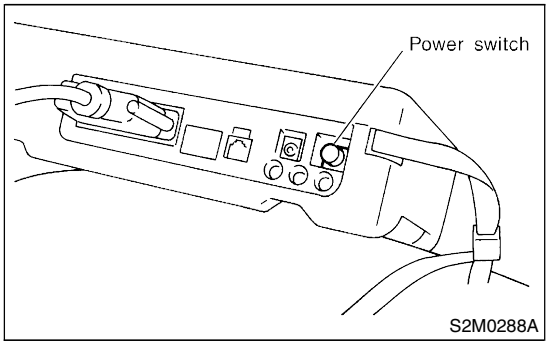


S2M2157B

(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)

S058503A1602

Refer to Read Diagnostic Trouble Code for information about how to indicate DTC. <Ref. to EN(SOHC)-41, Read Diagnostic Trouble Code.>

3. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE. (OBD MODE) S058503A1603

Refer to Read Diagnostic Trouble Code for information about how to indicate DTC. <Ref. to EN(SOHC)-41, Read Diagnostic Trouble Code.>

4. READ CURRENT DATA FOR ENGINE. (NORMAL MODE) S058503A1604

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 psi
Intake manifold relative pressure signal	Mani. Relative Pressure	mmHg or kPa or inHg or psi
Intake manifold absolute pressure signal	Mani. Absolute Pressure	mmHg or kPa or inHg or psi
A/F correction (short term fuel trim) by rear oxygen sensor	A/F Correction #3	%
Long term whole fuel trim	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
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 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
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

Contents	Display	Unit of measure
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.

5. READ CURRENT DATA FOR ENGINE. (OBD MODE) S058503A1605

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)	Complete or incomplete
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	No support
Test of heated catalyst	Heated catalyst	No support
Test of evaporative emission purge control system	Evaporative purge system	No support
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) S058503A1606

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) S058503A1607

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 S058503A1608

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.
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. S058503A1609

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
Kick down switch signal	Kick Down Switch	ON or OFF
Stop lamp switch signal	Stop Lamp Switch	ON or OFF
Anti lock brake system signal	ABS Signal	ON or OFF
Cruise control system signal	Cruise Control Signal	ON or OFF
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 S058508

A: OPERATION S058508A16

1. SUBARU SELECT MONITOR (NORMAL MODE) S058508A1601

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(SOHC)-80, List of Diagnostic Trouble Code (DTC).>

2. SUBARU SELECT MONITOR (OBD MODE) S058508A1602

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(SOHC)-80, List of Diagnostic Trouble Code (DTC).>

3. OBD-II GENERAL SCAN TOOL S058508A1603

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(SOHC)-80, 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).

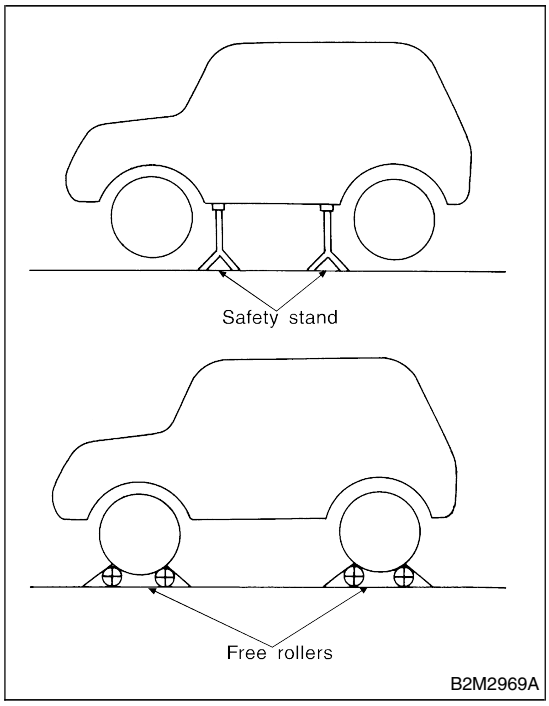
12. Inspection Mode S058510

A: OPERATION S058510A16

1. PREPARATION FOR THE INSPECTION MODE S058510A1601

Raise the vehicle using a garage jack and place on safety stands or drive the vehicle onto free rollers.

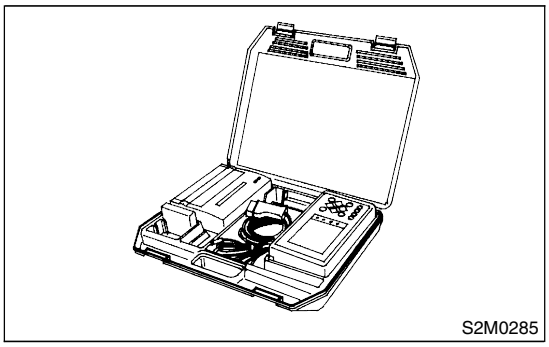
WARNING:
• Before raising the vehicle, ensure parking brakes are applied.
• Do not use a pantograph jack in place of a safety stand.
• Secure a rope or wire to the front and rear towing or tie-down hooks to prevent the lateral runout of front wheels.
• Do not abruptly depress/release clutch pedal or accelerator pedal during works even when engine is operating at low speeds since this may cause vehicle to jump off free rollers.
• In order to prevent the vehicle from slipping due to vibration, do not place any wooden blocks or similar items between the safety stands and the vehicle.
• Since the rear wheels will also rotate, do not place anything near them. Also, make sure that nobody goes in front of the vehicle.



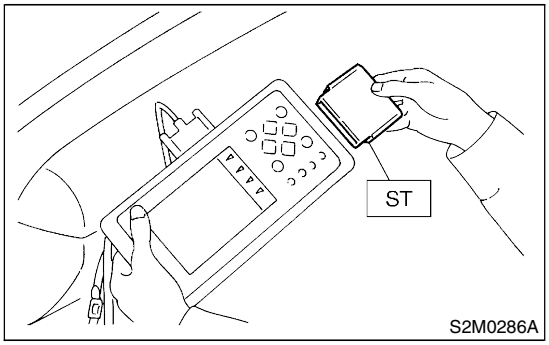
2. SUBARU SELECT MONITOR S058510A1602

After performing diagnostics and clearing the memory, check for any remaining unresolved trouble data.

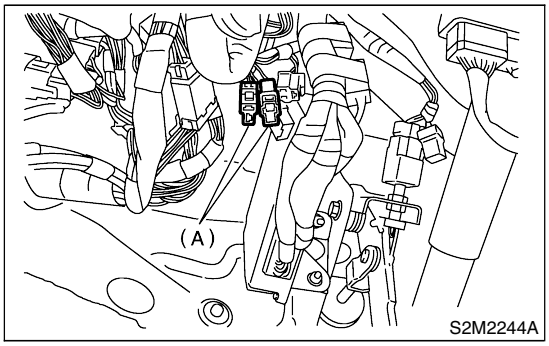
1) Prepare Subaru Select Monitor kit. <Ref. to EN(SOHC)-8, PREPARATION TOOL, General Description.>



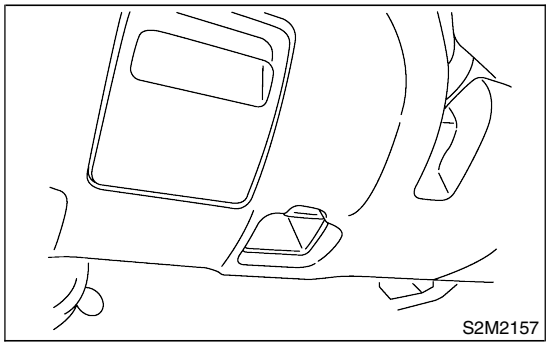
2) Connect diagnosis cable to Subaru Select Monitor.
3) Insert cartridge into Subaru Select Monitor. <Ref. to EN(SOHC)-8, PREPARATION TOOL, General Description.>



4) Connect test mode connector (A) at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



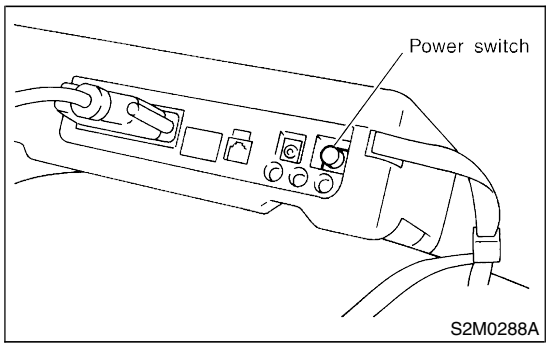
5) Connect Subaru Select Monitor to data link connector.
(1) Connect Subaru Select Monitor to data link connector located in the lower portion of the instrument panel (on the driver's side).


S2M2157

(2) Connect diagnosis cable to data link connector.

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.



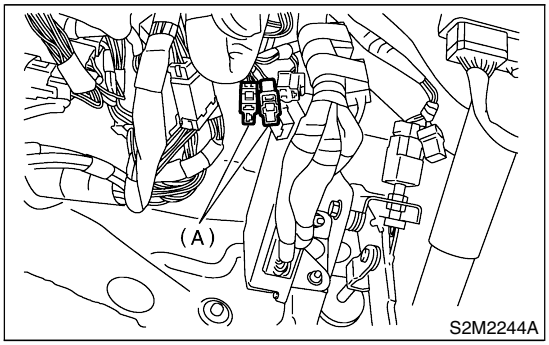
S2M0288A

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 {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(SOHC)-80, 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 *S058510A1603*

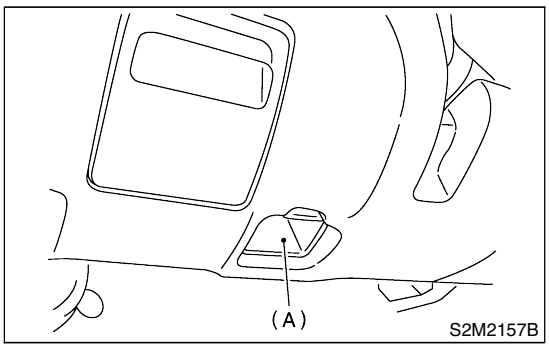
After performing diagnostics and clearing the memory, check for any remaining unresolved trouble data:
1) Connect test mode connector (A) at the lower side of the instrument panel (on the driver's side), to the side of the center console box.



S2M2244A

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.



S2M2157B

3) Start the engine.

NOTE:
● Ensure the selector lever is placed in the “P” position before starting. (AT vehicles)
● Depress clutch pedal when starting the engine. (MT vehicles)

4) Using the selector lever or shift lever, turn the “P” position switch and the “N” position switch to ON.
5) Depress the brake pedal to turn the brake switch ON. (AT vehicles)
6) Keep engine speed in the 2,500 — 3,000 rpm range for 40 seconds.

NOTE:
On models without tachometer, use the tachometer (Secondary pickup type).

7) Place the selector lever or shift lever in the “D” position (AT vehicles) or “1st” gear (MT vehicles) and drive the vehicle at 5 to 10 km/h (3 to 6 MPH).

NOTE:
● On AWD vehicles, release the parking brake.
● The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunctions. When engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system.

8) Using the OBD-II general scan tool, check for diagnostic trouble code(s) and record the result(s).

NOTE:
● For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.
● For detailed concerning diagnostic trouble codes, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(SOHC)-80, List of Diagnostic Trouble Code (DTC).>

13. Clear Memory Mode S058513

A: OPERATION S058513A16

1. SUBARU SELECT MONITOR (NORMAL MODE) S058513A1601

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) S058513A1602

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.

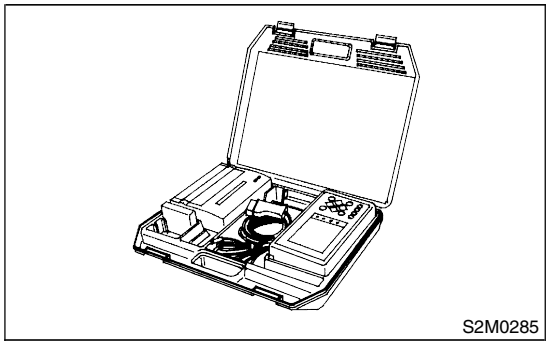
3. OBD-II GENERAL SCAN TOOL S058513A1603

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.

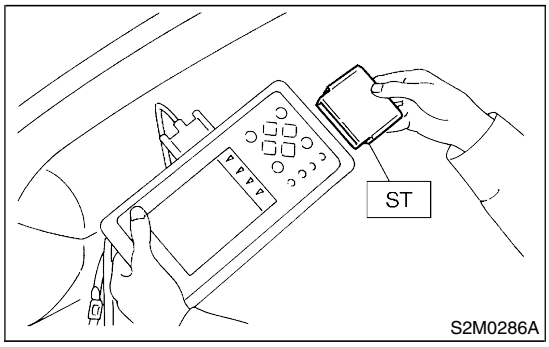
14. Compulsory Valve Operation Check Mode S058528

A: OPERATION S058528A16

1) Prepare Subaru Select Monitor kit. <Ref. to EN(SOHC)-8, PREPARATION TOOL, General Description.>

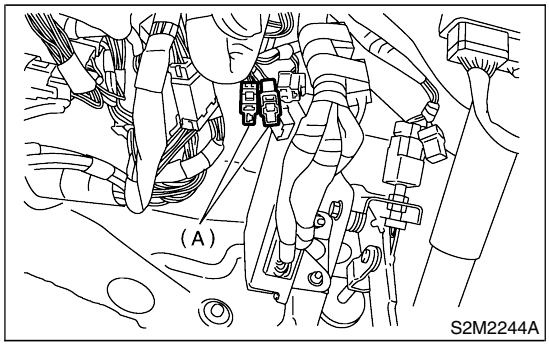

S2M0285

2) Connect diagnosis cable to Subaru Select Monitor.
3) Insert cartridge into Subaru Select Monitor. <Ref. to EN(SOHC)-8, PREPARATION TOOL, General Description.>



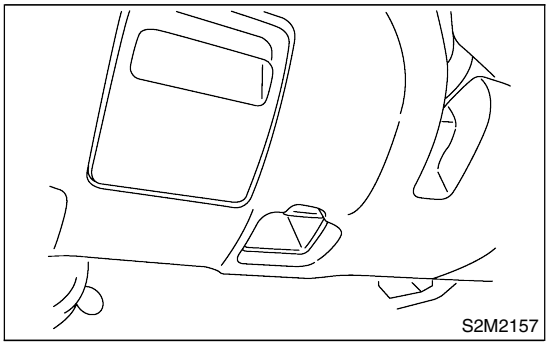
S2M0286A

4) Connect test mode connector (A) at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



S2M2244A

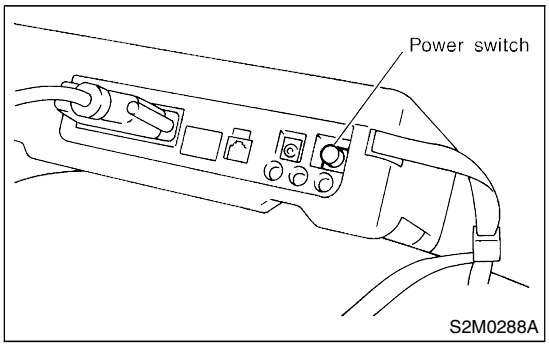
5) Connect Subaru Select Monitor to data link connector.
(1) Connect Subaru Select Monitor to data link connector located in the lower portion of the instrument panel (on the driver's side).


S2M2157

(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

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
PCV Solenoid Valve
Vent Control Solenoid Valve
FICD Solenoid
Pressure Switching Sol. 1
Pressure Switching Sol. 2
Fuel Tank Sensor Control Valve

- For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

15. Engine Malfunction Indicator Lamp (MIL) S058653

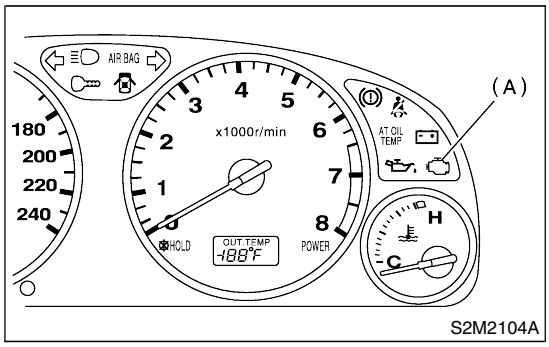
A: PROCEDURE S058653E45

1. Activation of check engine malfunction indicator lamp (MIL). <Ref. to EN(SOHC)-49, 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(SOHC)-50, 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(SOHC)-53, 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(SOHC)-54, 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(SOHC)-56, 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) S058653E89

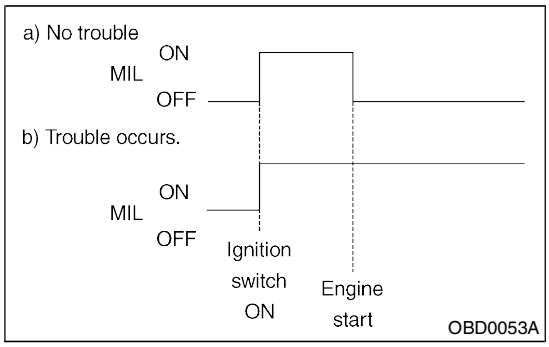
1) When ignition switch is turned to ON (engine off), the CHECK ENGINE malfunction indicator lamp (MIL) in the combination meter illuminates.

NOTE:
If the MIL does not illuminate, perform diagnostics of the CHECK ENGINE light circuit or the combination meter circuit. <Ref. to EN(SOHC)-50, CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT COME ON., Engine Malfunction Indicator Lamp (MIL).>

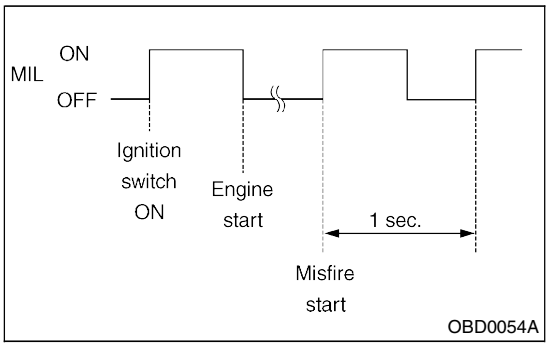


(A) Malfunction indicator lamp (MIL)

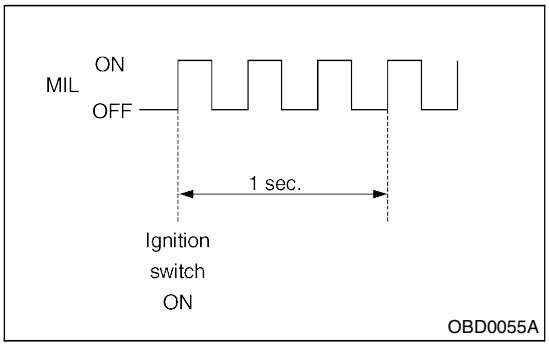
2) After starting the engine, the MIL goes out. If it does not, either the engine or the emission control system is malfunctioning.



3) If the diagnosis system senses a misfire which could damage the catalyzer, the MIL will blink at a cycle of 1 Hz.

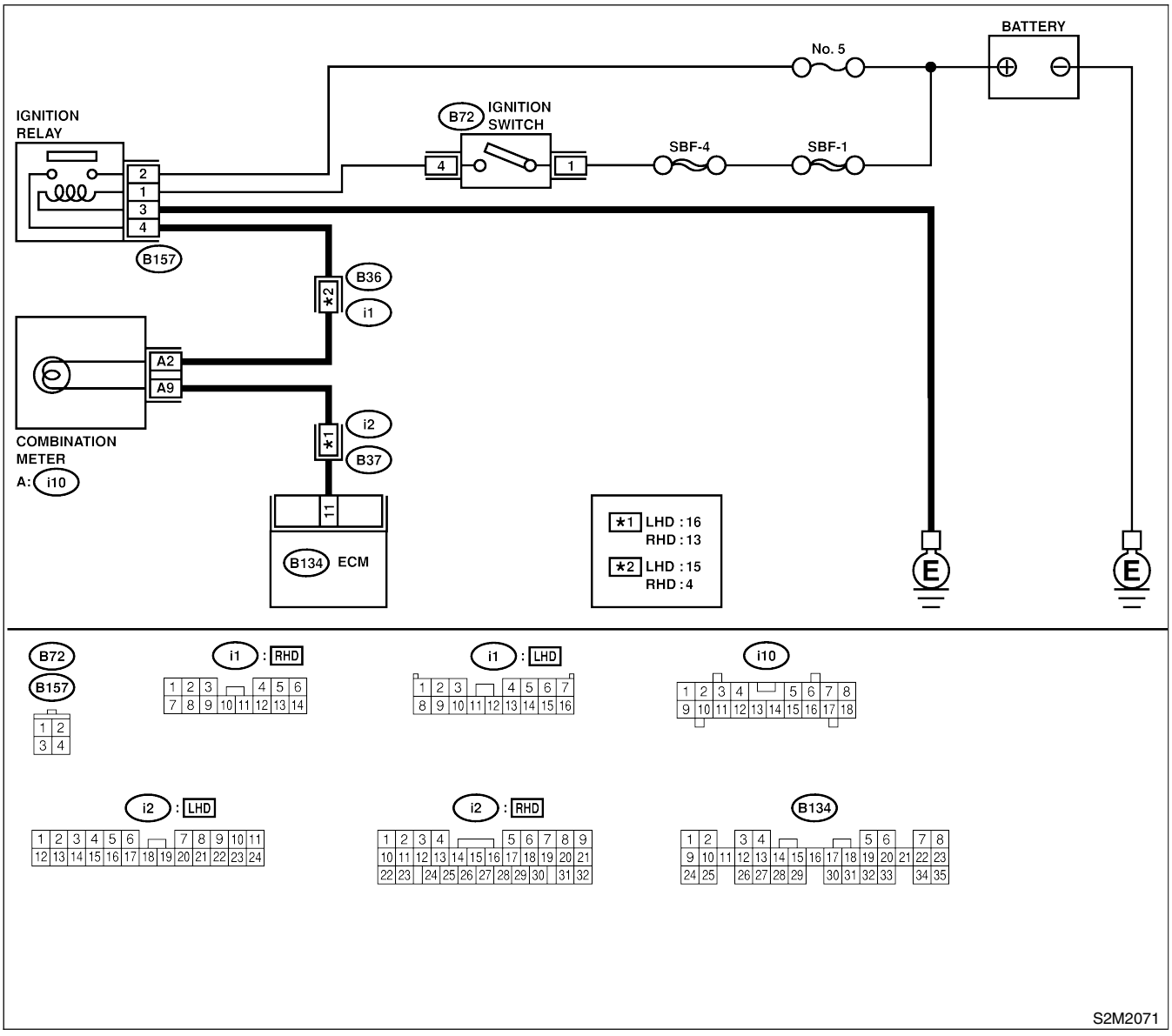


4) When ignition switch is turned to ON (engine off) or to “START” with the test mode connector connected, the MIL blinks at a cycle of 3 Hz.



C: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT COME ON. S058653E90

- **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:**



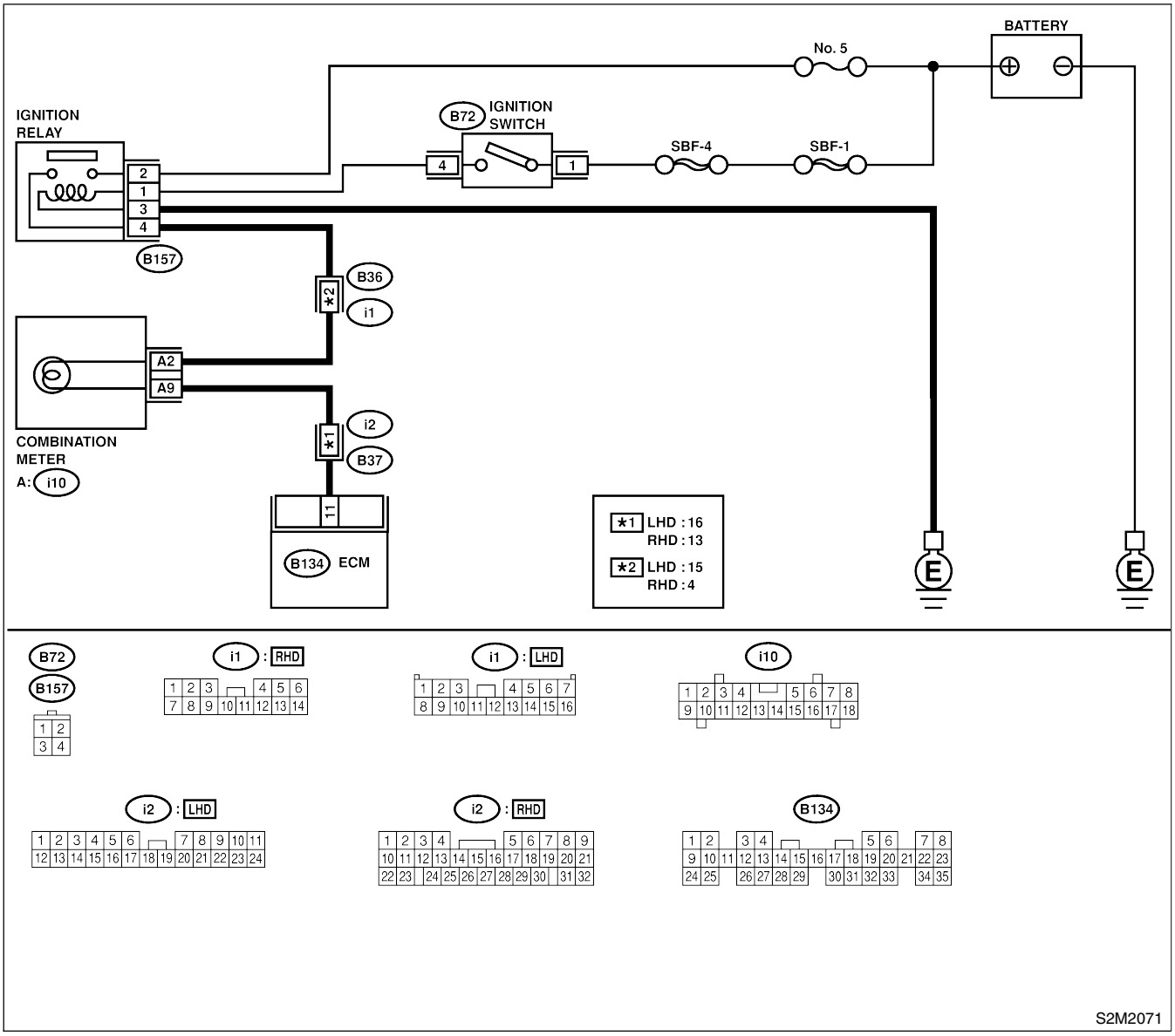
No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 11 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **4**.	Go to step **2**.

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(SOHC)-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-15, 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 (i2)
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. S058653E91

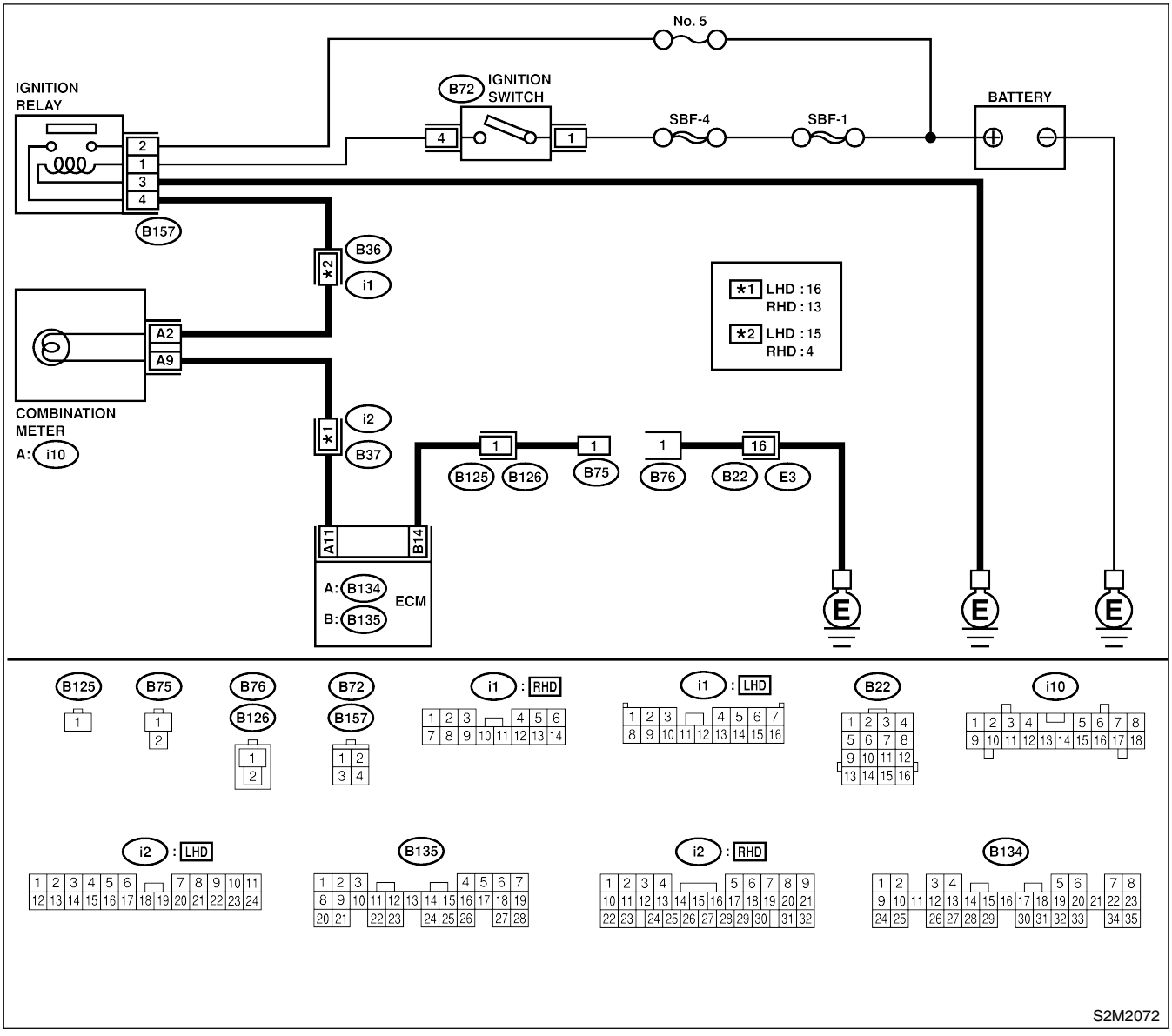
- **DIAGNOSIS:**
  - The CHECK ENGINE malfunction indicator lamp (MIL) circuit is shorted.
- **TROUBLE SYMPTOM:**
  - Although MIL comes on when engine runs, trouble code is not shown on Subaru select monitor or OBD-II general scan tool display.
- **WIRING DIAGRAM:**



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(SOHC)-49, Engine Control Module.>

E: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT BLINK AT A CYCLE OF 3 Hz. S058653E92

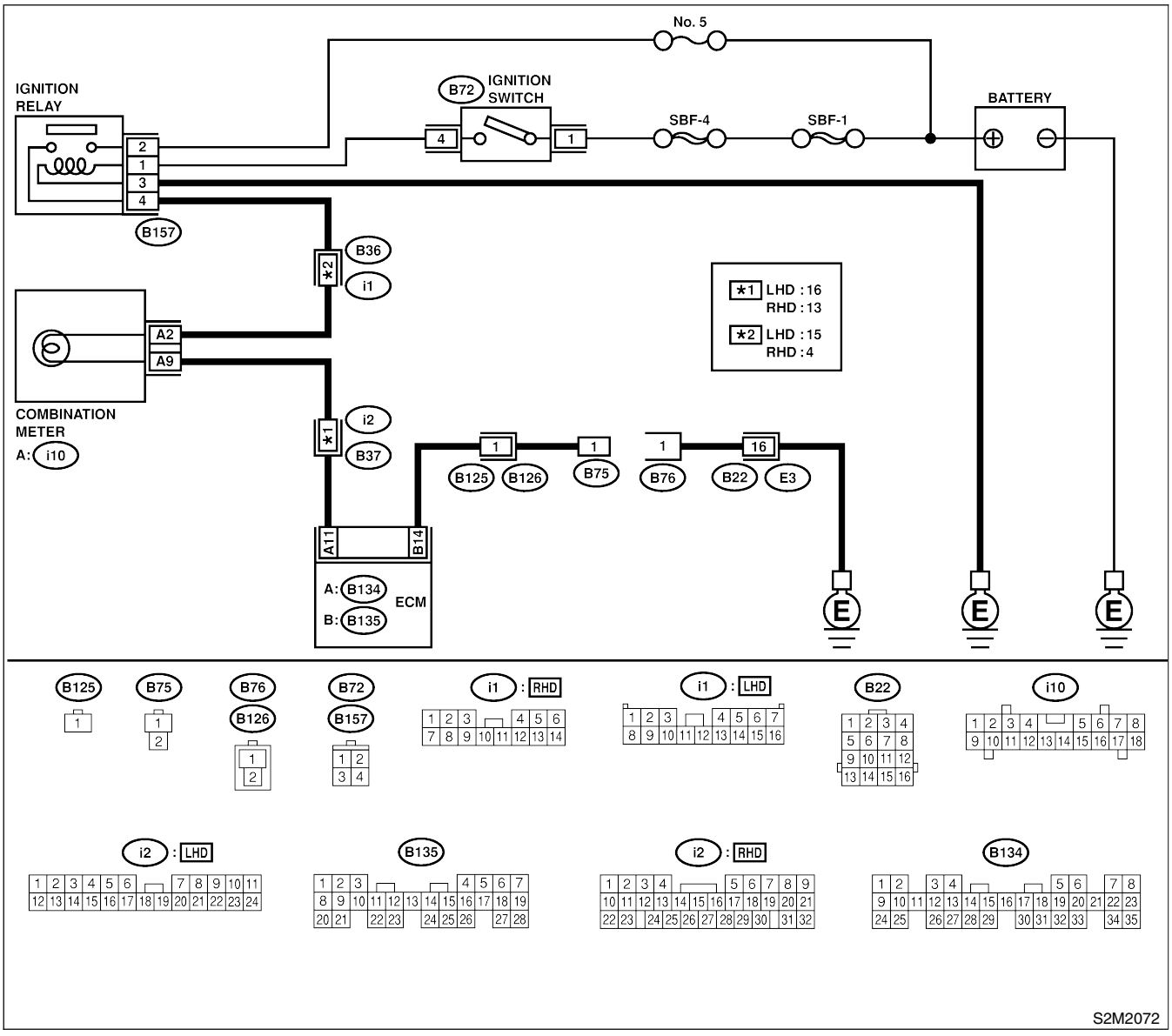
- **DIAGNOSIS:**
  - The CHECK ENGINE malfunction indicator lamp (MIL) circuit is open or shorted.
  - Test mode connector circuit is in open.
- **TROUBLE SYMPTOM:**
  - When inspection mode, MIL does not blink at a cycle of 3 Hz.
- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK STATUS OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL).** 1) Turn ignition switch to OFF. 2) Disconnect test mode connector. 3) Turn ignition switch to ON. (engine OFF)	Does the MIL come on?	Go to step **2**.	Repair the MIL circuit. <Ref. to EN(SOHC)-50, CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT COME ON., Engine Malfunction Indicator Lamp (MIL).>
2	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Turn ignition switch to ON.	Does the MIL come on?	Repair ground short circuit in harness between combination meter and ECM connector.	Go to step **3**.
3	**CHECK HARNESS BETWEEN TEST MODE CONNECTOR AND CHASSIS GROUND.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between test mode connector and chassis ground. ***Connector & terminal*** ***(B76) No. 1 — Chassis ground:***	Is resistance less than 1 Ω?	Go to step **4**.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between test mode connector and chassis ground
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Go to step **5**.
5	**CHECK HARNESS BETWEEN ECM AND TEST MODE CONNECTOR.** 1) Connect test mode connector. 2) Measure resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 14 — Chassis ground:***	Is resistance less than 1 Ω?	Go to step **6**.	Repair open circuit in harness between ECM and test mode connector.
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(SOHC)-49, Engine Control Module.>

F: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) REMAINS BLINKING AT A CYCLE OF 3 Hz. S058653E93

- **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(SOHC)-49, Engine Control Module.>

MEMO:

16. Diagnostics for Engine Starting Failure S058533

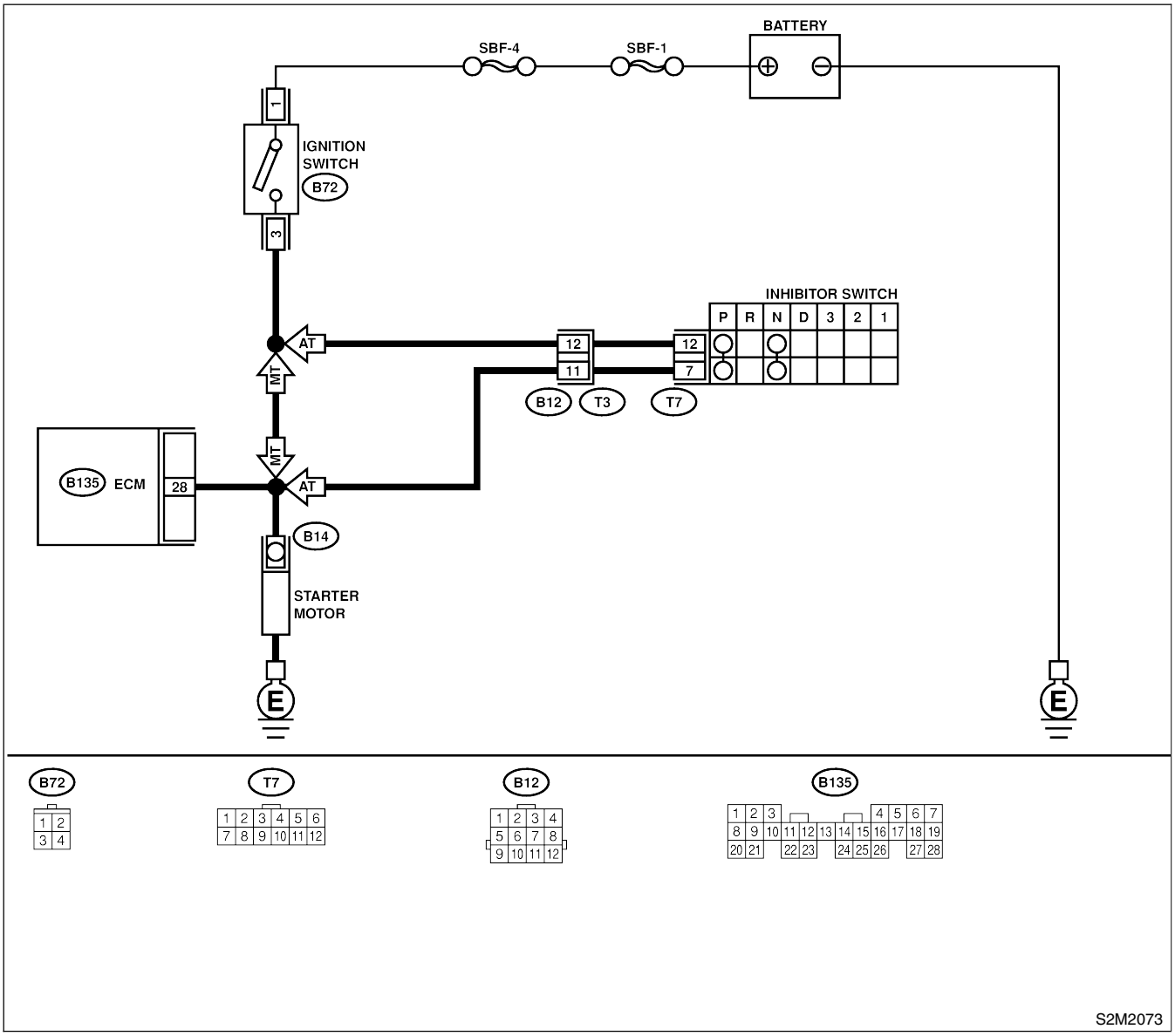
A: PROCEDURE S058533E45

1. Inspection of starter motor circuit. <Ref. to EN(SOHC)-60, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
2. Inspection of ECM power supply and ground line. <Ref. to EN(SOHC)-64, CONTROL MODULE POWER SUPPLY AND GROUND LINE, Diagnostics for Engine Starting Failure.>
↓
3. Inspection of ignition control system. <Ref. to EN(SOHC)-68, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>
↓
4. Inspection of fuel pump circuit. <Ref. to EN(SOHC)-72, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
5. Inspection of fuel injector circuit. <Ref. to EN(SOHC)-76, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

B: STARTER MOTOR CIRCUIT S058533E94

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(SOHC)-45, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(SOHC)-42, Inspection Mode.>.

- **WIRING DIAGRAM:**



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(SOHC)-41, OPERATION, Read Diagnostic Trouble Code.>	Is the trouble code stored in memory? <Ref. to EN(SOHC)-80, LIST, List of Diagnostic Trouble Code (DTC).>	Record DTC. Repair the trouble case. <Ref. to EN(SOHC)-86, 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-5, 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.

DIAGNOSTICS FOR ENGINE STARTING FAILURE

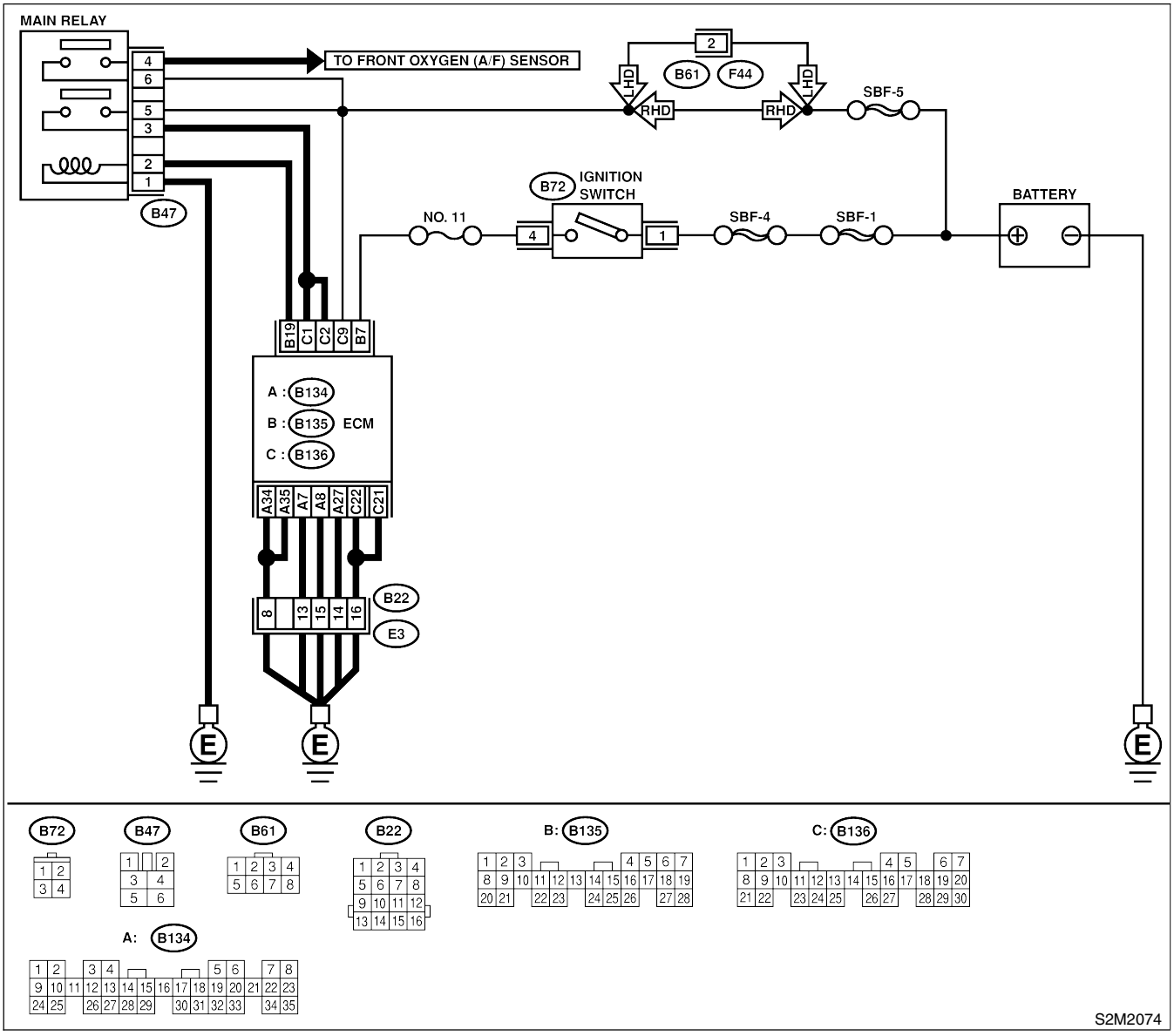
No.	Step	Check	Yes	No
9	**CHECK TRANSMISSION TYPE.**	Is the vehicle AT?	Go to step **10**.	Repair open circuit between ignition switch and starter motor circuit.
10	**CHECK INHIBITOR SWITCH CIRCUIT.** 1) Turn ignition switch to OFF. 2) Place the selector lever in the “P” or “N” position. 3) Separate 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 S058533E37

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(SOHC)-45, Clear Memory Mode.> and INSPECTION MODE. <Ref. to EN(SOHC)-42, 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.

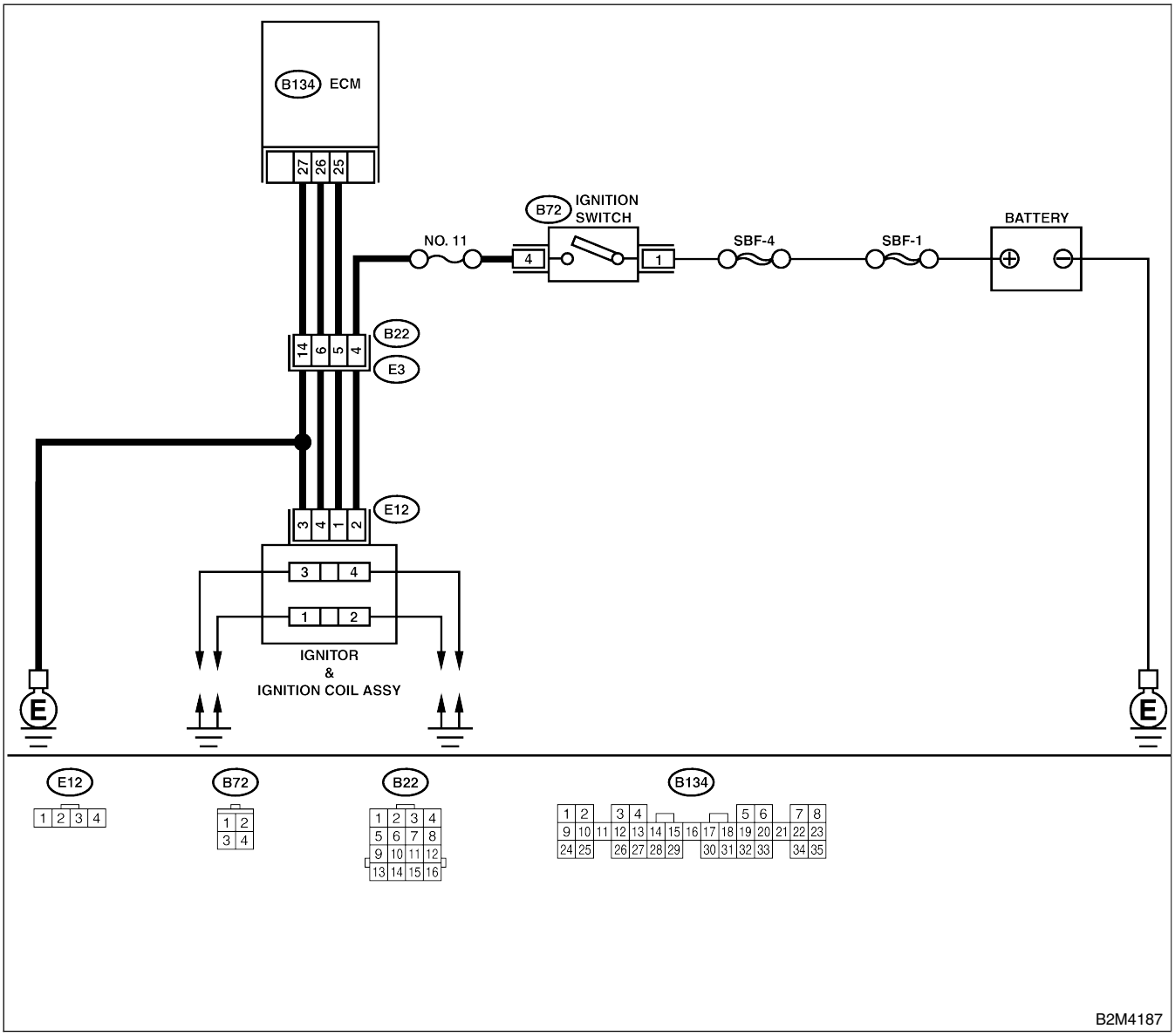
No.	Step	Check	Yes	No
10	**CHECK INPUT VOLTAGE OF ECM.** 1) Connect main relay connector. 2) Turn ignition switch to ON. 3) Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 1 (+) — Chassis ground (–):*** ***(B136) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Check ignition control system. <Ref. to EN(SOHC)-68, 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 S058533E95

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(SOHC)-45, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(SOHC)-42, 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(SOHC)-72, 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 (B22)
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(SOHC)-8, 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(SOHC)-8, Ignition Coil and Ignitor Assembly.>

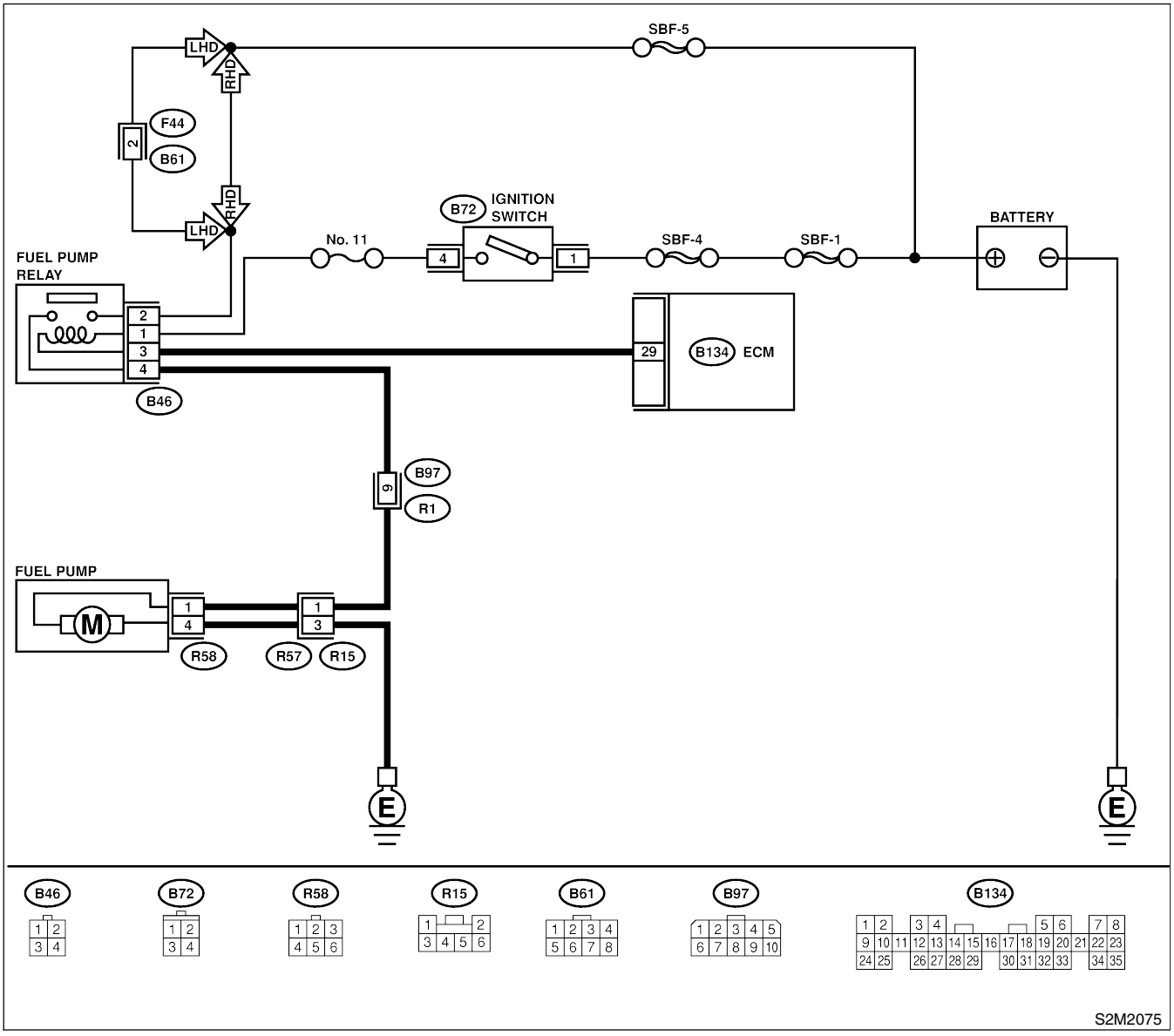
No.	Step	Check	Yes	No
6	**CHECK INPUT SIGNAL FOR IGNITION COIL & IGNITOR ASSEMBLY.** 1) Connect connector to ignition coil & ignitor assembly. 2) Check if voltage varies synchronously with engine speed when cranking, while monitoring voltage between ignition coil & ignitor assembly connector and engine 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(SOHC)-8, 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(SOHC)-8, 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 (B22)
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 (B22)
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(SOHC)-72, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>

E: FUEL PUMP CIRCUIT S058533E96

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(SOHC)-45, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(SOHC)-42, Inspection Mode.>.

- **WIRING DIAGRAM:**



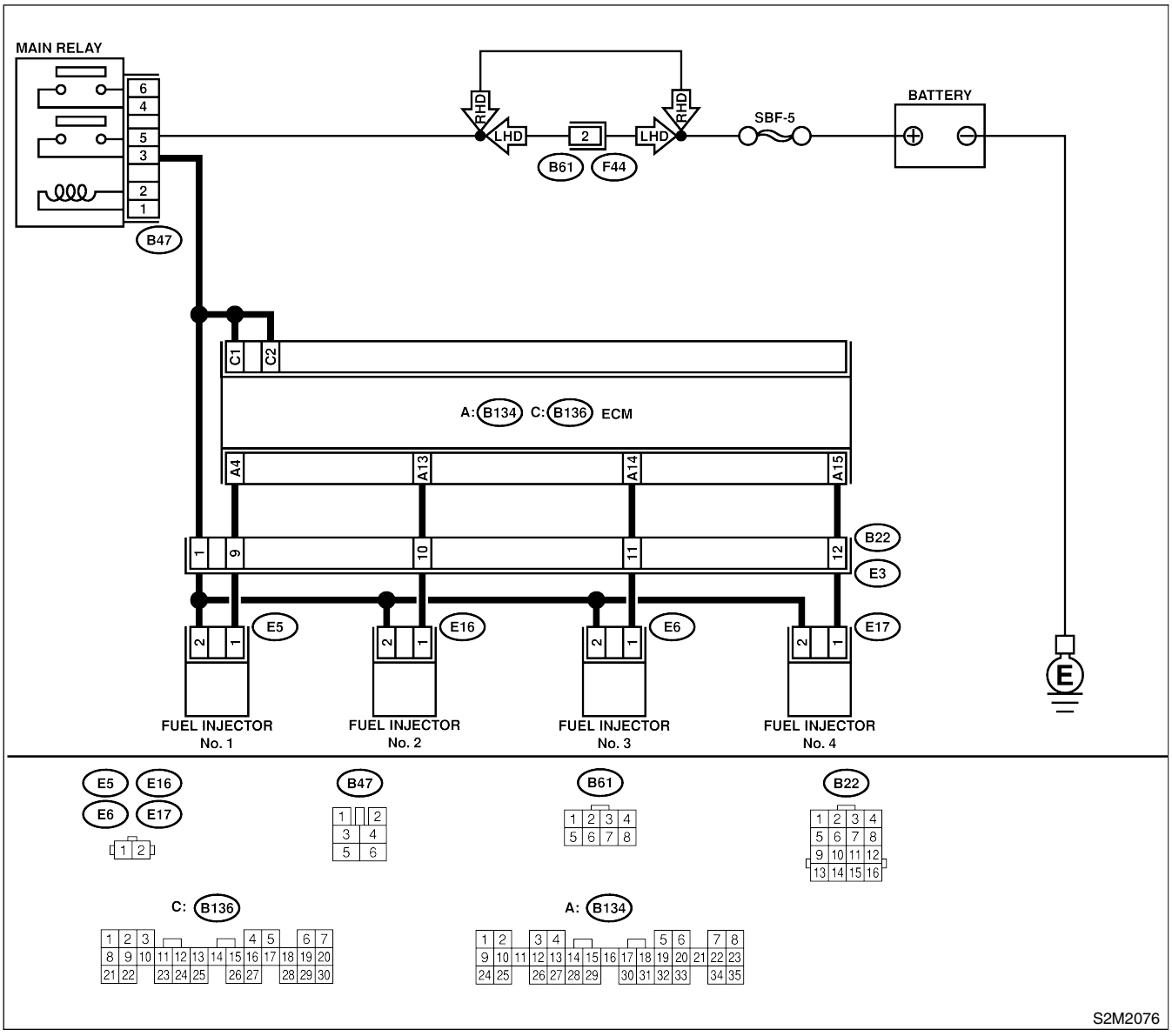
No.	Step	Check	Yes	No
1	**CHECK OPERATING SOUND OF FUEL PUMP.** Make sure that fuel pump is in operation for two seconds when turning ignition switch to ON. NOTE: Fuel pump operation can also be executed using Subaru Select Monitor (Function mode: FD01). For the procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(SOHC)-46, Compulsory Valve Operation Check Mode.>	Does fuel pump produce operating sound?	Check fuel injector circuit. <Ref. to EN(SOHC)-76, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **2**.
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 (R15)
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(SOHC)-62, 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 R15 and B97
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.

No.	Step	Check	Yes	No
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(SOHC)-51, Fuel Pump Relay.>
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. 29 — (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(SOHC)-76, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

MEMO:

F: FUEL INJECTOR CIRCUIT S058533E97

CAUTION:
- **Check or repair only faulty parts.**
- **After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(SOHC)-45, Clear Memory Mode.> and INSPECTION MODE. <Ref. to EN(SOHC)-42, 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(SOHC)-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 #1 cylinder fuel injector. 3) Turn ignition switch to ON. 4) Measure power supply voltage between the fuel injector terminal and engine ground. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (–):*** ***#2 (E16) No. 2 (+) — Engine ground (–):*** ***#3 (E6) No. 2 (+) — Engine ground (–):*** ***#4 (E17) No. 2 (+) — Engine ground (–):***	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 (B22) • Poor contact in fuel injector connector
3	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Disconnect connector from ECM. 2) Measure resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(B134) No. 4 — (B136) No. 2:***	Is the resistance between 5 and 20 Ω?	Go to step **4**.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fuel injector connector • Poor contact in coupling connector (B22)
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:***	Is the resistance less than 1 Ω?	Repair ground short circuit in harness between ECM and fuel injector connector.	Go to step **5**.
5	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(B134) No. 13 — (B136) No. 2:***	Is the resistance between 5 and 20 Ω?	Go to step **6**.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fuel injector connector • Poor contact in coupling connector (B22)
6	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(B134) No. 13 — Chassis ground:***	Is the resistance less than 1 Ω?	Repair ground short circuit in harness between ECM and fuel injector connector.	Go to step **7**.

No.	Step	Check	Yes	No
7	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(B134) No. 14 — (B136) No. 2:***	Is the resistance between 5 and 20 Ω?	Go to step **8**.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fuel injector connector • Poor contact in coupling connector (B22)
8	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(B134) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Repair ground short circuit in harness between ECM and fuel injector connector.	Go to step **9**.
9	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(B134) No. 15 — (B136) No. 2:***	Is the resistance between 5 and 20 Ω?	Go to step **10**.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fuel injector connector • Poor contact in coupling connector (B22)
10	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(B134) No. 15 — Chassis ground:***	Is the resistance less than 1 Ω?	Repair ground short circuit in harness between ECM and fuel injector connector.	Go to step **11**.
11	**CHECK 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 **12**.	Replace faulty fuel injector.
12	**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(SOHC)-294, INSPECTION, Genera Diagnostic Table.>

MEMO:

17. List of Diagnostic Trouble Code (DTC) S058525

A: LIST S058525A12

DTC No.	Item	Index
P0031	Front oxygen (A/F) sensor heater circuit low input	<Ref. to EN(SOHC)-86, 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(SOHC)-90, 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(SOHC)-92, 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(SOHC)-96, DTC P0038 — REAR OXYGEN SENSOR HEATER CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0066	Air assist injector solenoid valve circuit low input	<Ref. to EN(SOHC)-98, 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(SOHC)-100, 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(SOHC)-102, 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(SOHC)-106, DTC P0107 — PRESSURE SENSOR CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0108	Pressure sensor circuit high input	<Ref. to EN(SOHC)-110, 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(SOHC)-114, 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(SOHC)-116, 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(SOHC)-118, 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(SOHC)-122, 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(SOHC)-124, 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(SOHC)-128, 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(SOHC)-130, DTC P0122 — THROTTLE POSITION SENSOR CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0123	Throttle position sensor circuit high input	<Ref. to EN(SOHC)-134, DTC P0123 — THROTTLE POSITION SENSOR CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC No.	Item	Index
P0125	Insufficient coolant temperature for closed loop fuel control	<Ref. to EN(SOHC)-136, DTC P0125 — INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0130	Front oxygen (A/F) sensor circuit range/performance problem (Lean)	<Ref. to EN(SOHC)-138, 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(SOHC)-142, 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(SOHC)-144, 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(SOHC)-146, 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(SOHC)-148, DTC P0136 — REAR OXYGEN SENSOR CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0139	Rear oxygen sensor circuit slow response	<Ref. to EN(SOHC)-152, DTC P0139 — REAR OXYGEN SENSOR CIRCUIT SLOW RESPONSE —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0170	Fuel trim malfunction	<Ref. to EN(SOHC)-154, DTC P0170 — FUEL TRIM MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0301	Cylinder 1 misfire detected	<Ref. to EN(SOHC)-156, DTC P0301 — CYLINDER 1 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0302	Cylinder 2 misfire detected	<Ref. to EN(SOHC)-156, DTC P0302 — CYLINDER 2 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0303	Cylinder 3 misfire detected	<Ref. to EN(SOHC)-156, DTC P0303 — CYLINDER 3 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0304	Cylinder 4 misfire detected	<Ref. to EN(SOHC)-158, DTC P0304 — CYLINDER 4 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0327	Knock sensor circuit low input	<Ref. to EN(SOHC)-166, DTC P0327 — KNOCK SENSOR CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0328	Knock sensor circuit high input	<Ref. to EN(SOHC)-168, DTC P0328 — KNOCK SENSOR CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0335	Crankshaft position sensor circuit malfunction	<Ref. to EN(SOHC)-170, 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(SOHC)-172, DTC P0336 — CRANKSHAFT POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0340	Camshaft position sensor circuit malfunction	<Ref. to EN(SOHC)-174, 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(SOHC)-176, 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(SOHC)-180, DTC P0420 — CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

LIST OF DIAGNOSTIC TROUBLE CODE (DTC)

DTC No.	Item	Index
P0444	Evaporative emission control system purge control valve circuit low input	<Ref. to EN(SOHC)-182, 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(SOHC)-186, DTC P0445 — EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0461	Fuel level sensor circuit range/ performance problem	<Ref. to EN(SOHC)-188, 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(SOHC)-190, 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(SOHC)-194, DTC P0463 — FUEL LEVEL SENSOR CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0464	Fuel level sensor intermittent input	<Ref. to EN(SOHC)-198, 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(SOHC)-200, DTC P0480 — COOLING FAN RELAY 1 CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0483	Cooling fan function problem	<Ref. to EN(SOHC)-204, DTC P0483 — COOLING FAN FUNCTION PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0500	Vehicle speed sensor malfunction	<Ref. to EN(SOHC)-208, DTC P0500 — VEHICLE SPEED SENSOR MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0506	Idle control system RPM lower than expected	<Ref. to EN(SOHC)-210, DTC P0506 — IDLE CONTROL SYSTEM RPM LOWER THAN EXPECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0507	Idle control system RPM higher than expected	<Ref. to EN(SOHC)-212, 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(SOHC)-214, DTC P0512 — STARTER SWITCH CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0513	Incorrect immobilizer key	<Ref. to IM-34, DTC P0153 — INCORRECT IMMOBILIZER KEY (USE OF UNREGISTERED KEY) —, Diagnostics Chart with Trouble Code.>
P0562	Charge system cricuit low input	<Ref. to EN(SOHC)-216, DTC P0562 — CHARGE SYSTEM CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0563	Charge system cricuit high input	<Ref. to EN(SOHC)-218, DTC P0563 — CHARGE SYSTEM CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0604	Internal control module memory check sum error	<Ref. to EN(SOHC)-220, DTC P0604 — INTERNAL CONTROL MODULE MEMORY CHECK SUM ERROR —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0703	Brake switch input malfunction	<Ref. to EN(SOHC)-222, DTC P0703 — BRAKE SWITCH INPUT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0705	Transmission range sensor circuit malfunction	<Ref. to AT-122, CHECK INHIBITOR SWITCH., Diagnostic Procedure for No-trouble Code.>
P0710	Transmission fluid temperature sensor circuit malfunction	<Ref. to AT-46, TROUBLE CODE 27 — ATF TEMPERATURE SENSOR —, Diagnostic Procedure with Trouble Code.>
P0715	Torque converter turbine speed sensor circuit malfunction	<Ref. to AT-64, TROUBLE CODE 36 — TORQUE CONVERTER TURBINE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>

DTC No.	Item	Index
P0720	Output speed sensor (Front vehicle speed sensor) circuit malfunction	<Ref. to AT-58, TROUBLE CODE 33 — FRONT VEHICLE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>
P0725	Engine speed input circuit malfunction	<Ref. to AT-42, TROUBLE CODE 11 — ENGINE SPEED SIGNAL —, Diagnostic Procedure with Trouble Code.>
P0731	Gear 1 incorrect ratio	<Ref. to EN(SOHC)-224, DTC P0731 — GEAR 1 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0732	Gear 2 incorrect ratio	<Ref. to EN(SOHC)-224, DTC P0732 — GEAR 2 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0733	Gear 3 incorrect ratio	<Ref. to EN(SOHC)-224, DTC P0733 — GEAR 3 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0734	Gear 4 incorrect ratio	<Ref. to EN(SOHC)-225, DTC P0734 — GEAR 4 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0741	Torque converter clutch system malfunction	<Ref. to EN(SOHC)-226, 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-96, TROUBLE CODE 77 — LOCK-UP DUTY SOLENOID —, Diagnostic Procedure with Trouble Code.>
P0748	Pressure control solenoid (Line pressure duty solenoid) electrical	<Ref. to AT-88, TROUBLE CODE 75 — LINE PRESSURE DUTY SOLENOID —, Diagnostic Procedure with Trouble Code.>
P0753	Shift solenoid A (Shift solenoid 1) electrical	<Ref. to AT-72, TROUBLE CODE 71 — SHIFT SOLENOID 1 —, Diagnostic Procedure with Trouble Code.>
P0758	Shift solenoid B (Shift solenoid 2) electrical	<Ref. to AT-76, TROUBLE CODE 72 — SHIFT SOLENOID 2 —, Diagnostic Procedure with Trouble Code.>
P0778	2-4 brake pressure control solenoid valve circuit malfunction	<Ref. to AT-92, TROUBLE CODE 76 — 2-4 BRAKE DUTY SOLENOID —, Diagnostic Procedure with Trouble Code.>
P0785	2-4 brake timing control solenoid valve circuit malfunction	<Ref. to AT-84, TROUBLE CODE 74 — 2-4 BRAKE TIMING SOLENOID —, Diagnostic Procedure with Trouble Code.>
P1110	Atmospheric pressure sensor low input	<Ref. to EN(SOHC)-228, DTC P1110 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1111	Atmospheric pressure sensor high input	<Ref. to EN(SOHC)-232, 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(SOHC)-236, 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(SOHC)-238, DTC P1137 — FRONT OXYGEN (A/F) SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1142	Throttle position sensor circuit range/performance problem (low input)	<Ref. to EN(SOHC)-242, 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(SOHC)-244, DTC P1146 — PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC) for.>
P1442	Fuel level sensor circuit range/performance problem 2	<Ref. to EN(SOHC)-248, DTC P1442 — FUEL LEVEL SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM 2 —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1480	Cooling fan relay 1 circuit high input	<Ref. to EN(SOHC)-250, DTC P1480 — COOLING FAN RELAY 1 CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1507	Idle control system malfunction (failsafe)	<Ref. to EN(SOHC)-254, DTC P1507 — IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

LIST OF DIAGNOSTIC TROUBLE CODE (DTC)

DTC No.	Item	Index
P1510	Idle air control solenoid valve signal 1 circuit low input	<Ref. to EN(SOHC)-256, 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(SOHC)-256, 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(SOHC)-256, 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(SOHC)-256, 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(SOHC)-256, 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(SOHC)-256, 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(SOHC)-258, 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(SOHC)-262, 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(SOHC)-264, DTC P1518 — STARTER SWITCH CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1540	Vehicle speed sensor malfunction 2	<Ref. to EN(SOHC)-266, DTC P1540 — VEHICLE SPEED SENSOR MALFUNCTION 2 —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1560	Back-up voltage circuit malfunction	<Ref. to EN(SOHC)-268, DTC P1560 — BACK-UP VOLTAGE CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1570	Antennna	<Ref. to IM-35, DTC P1570 — ANTENNA —, Diagnostics Chart with Trouble Code.>
P1571	Reference code incompatibility	<Ref. to IM-26, DTC P1571 — REFERENCE CODE INCOMPATIBILITY —, Diagnostics Chart with Trouble Code.>
P1572	IMM circuit failure except antenna circuit	<Ref. to IM-27, DTC P1572 — IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT) —, Diagnostics Chart with Trouble Code.>
P1574	Key communication failure	<Ref. to IM-33, DTC P1574 — KEY COMMUNICATION FAILURE —, Diagnostics Chart with Trouble Code.>
P1576	EGI control module EEPROM	<Ref. to IM-34, DTC P1576 — EGI CONTROL MODULE EEPROM —, Diagnostics Chart with Trouble Code.>
P1577	IMM control module EEPROM	<Ref. to IM-34, DTC P1577 — IMM CONTROL MODULE EEPROM —, Diagnostics Chart with Trouble Code.>
P1590	Neutral position switch circuit high input (AT model)	<Ref. to EN(SOHC)-270, DTC P1590 — NEUTRAL POSITION SWITCH CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1591	Neutral position switch circuit low input (AT model)	<Ref. to EN(SOHC)-274, DTC P1591 — NEUTRAL POSITION SWITCH CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1592	Neutral position switch circuit (MT model)	<Ref. to EN(SOHC)-276, DTC P1592 — NEUTRAL POSITION SWITCH CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC No.	Item	Index
P1594	Automatic transmission diagnosis input signal circuit malfunction	<Ref. to EN(SOHC)-278, 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(SOHC)-280, 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(SOHC)-282, 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(SOHC)-284, 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(SOHC)-286, 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-50, TROUBLE CODE 31 — THROTTLE POSITION SENSOR —, Diagnostic Procedure with Trouble Code.>
P1701	Cruise control set signal circuit malfunction for automatic transmission	<Ref. to EN(SOHC)-288, 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-80, TROUBLE CODE 73 — LOW CLUTCH TIMING SOLENOID —, Diagnostic Procedure with Trouble Code.>
P1711	Engine torque control signal 1 circuit malfunction	<Ref. to EN(SOHC)-290, 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(SOHC)-292, DTC P1712 — ENGINE TORQUE CONTROL SIGNAL 2 CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

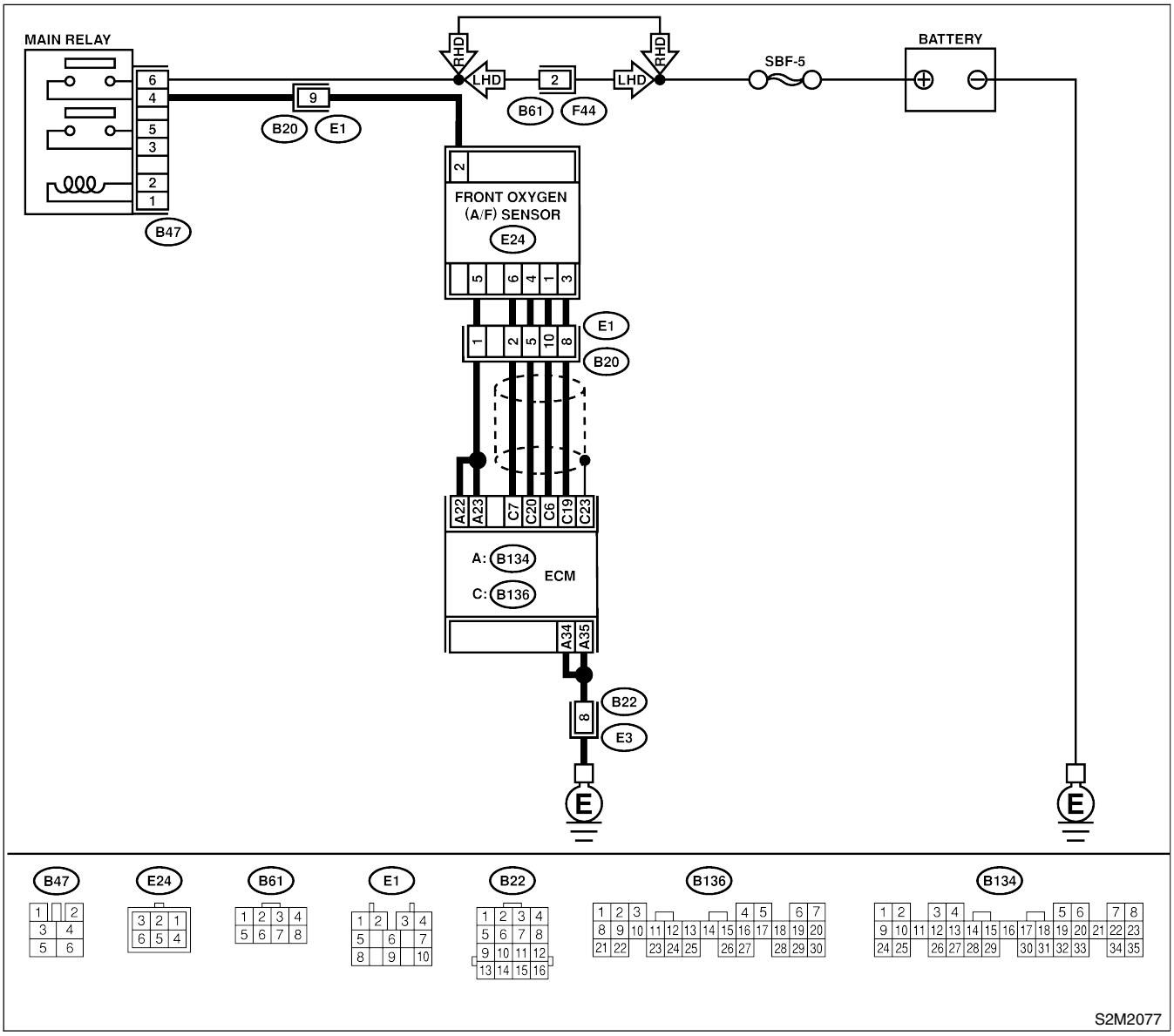
18. Diagnostic Procedure with Diagnostic Trouble Code (DTC) S058521

A: DTC P0031 — FRONT OXYGEN (A/F) SENSOR HEATER CIRCUIT LOW INPUT — S058521F83

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, 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 ignition switch to OFF. 2) Disconnect connector from front oxygen (A/F) sensor. 3) Turn ignition switch to ON. 4) Measure voltage between front oxygen (A/F) sensor connector and engine ground. ***Connector & terminal*** ***(E24) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **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 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 (B22)
4	**CHECK CURRENT DATA.** 1) Start engine 2) Read data of front oxygen (A/F) sensor heater current using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(SOHC)-34, 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 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 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 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 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 ignition switch to OFF. 2) Measure 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 front oxygen (A/F) sensor. <Ref. to FU(SOHC)-45, Front Oxygen (A/F) Sensor.>

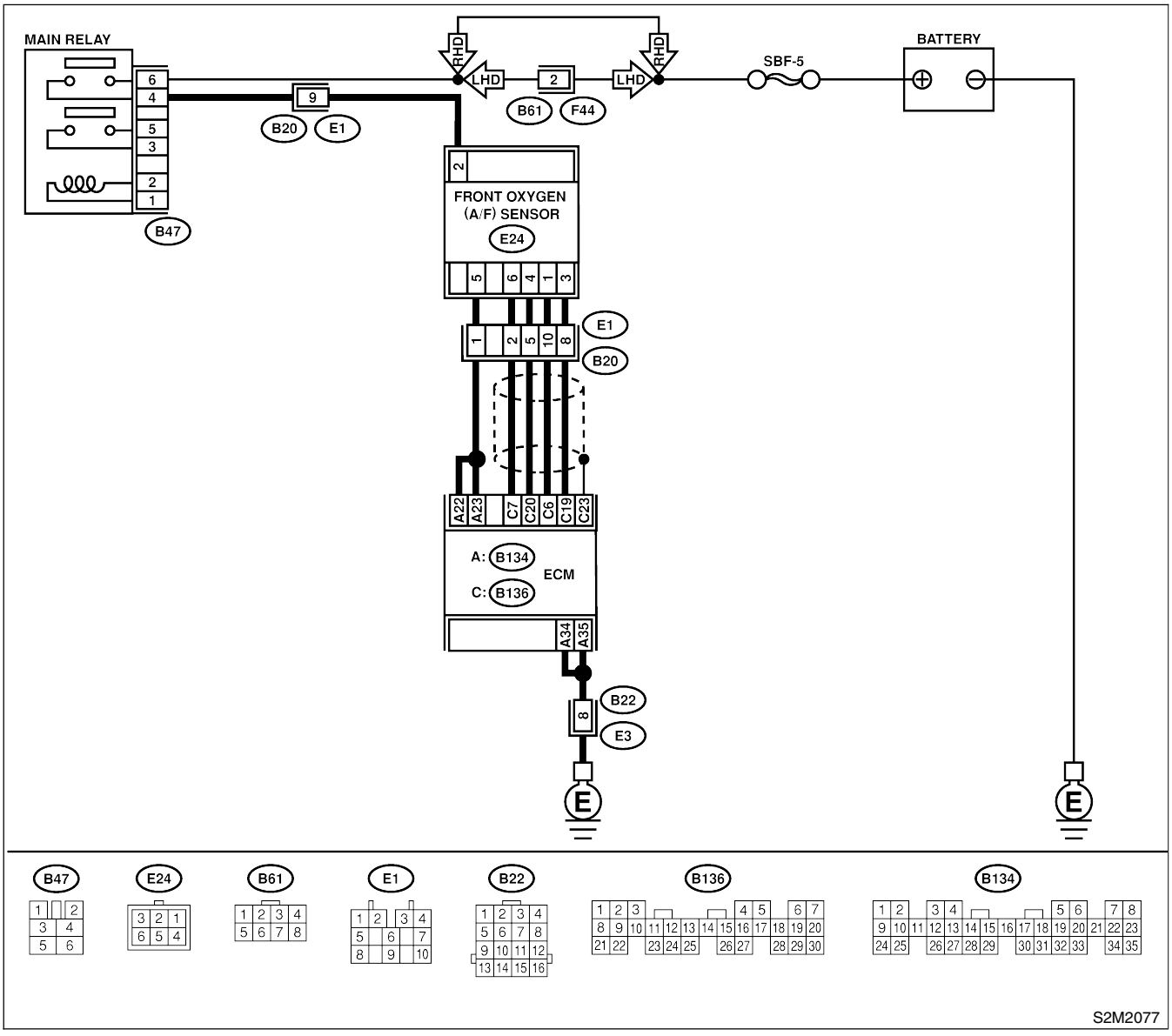
MEMO:

B: DTC P0032 — FRONT OXYGEN (A/F) SENSOR HEATER CIRCUIT HIGH INPUT — S058521F84

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **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. 23 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **3**.	Go to step **2**.
2	**CHECK OUTPUT SIGNAL FROM ECM.** Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(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 ignition switch to OFF. 2) Repair battery short circuit in harness between ECM and front oxygen (A/F) sensor connector. 3) Turn ignition switch to ON. 4) Read data of front oxygen (A/F) sensor heater current using Subaru Select Monitor or the OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(SOHC)-34, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value more than 2.3 A?	Replace ECM. <Ref. to FU(SOHC)-49, Engine Control Module.>	END
4	**CHECK OUTPUT SIGNAL FROM ECM.** Measure 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 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

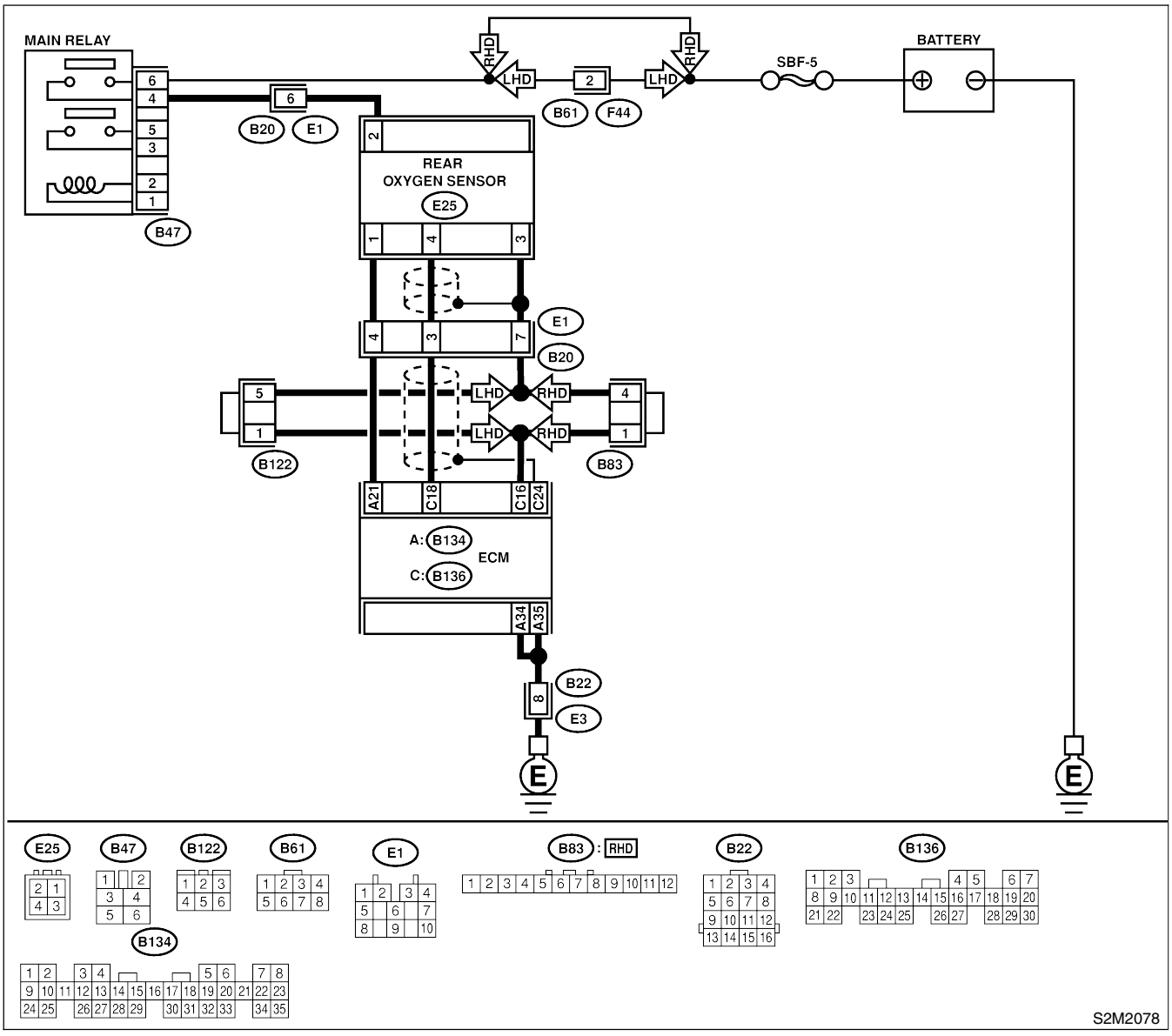
C: DTC P0037 — REAR OXYGEN SENSOR HEATER CIRCUIT MALFUNCTION

S058521F85

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK GROUND CIRCUIT OF ECM.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 35 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3**.	Go to step **2**.
2	**CHECK GROUND CIRCUIT OF ECM.** 1) Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine ground terminal • Poor contact in ECM connector • Poor contact in coupling connector (B22) 2) Measure resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(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 (B22)
3	**CHECK CURRENT DATA.** 1) Start engine. 2) Read data of rear oxygen sensor heater current using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(SOHC)-34, Subaru Select Monitor.> • OBD-II scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value more than 0.2 A?	Repair connector. NOTE: In this case, repair the following: • Poor contact in rear oxygen sensor connector • Poor contact in rear oxygen sensor connecting harness connector • Poor contact in ECM connector	Go to step **4**.
4	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Start and idle the engine. 2) Measure 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 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 connector from rear oxygen sensor. 2) Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 21 (+) — Chassis ground (–):***	Is the voltage less than 1.0 V?	Replace ECM. <Ref. to FU(SOHC)-49, Engine Control Module.>	Repair battery short circuit in harness between ECM and rear oxygen sensor connector. After repair, replace ECM. <Ref. to FU(SOHC)-49, Engine Control Module.>

No.	Step	Check	Yes	No
7	**CHECK POWER SUPPLY TO REAR OXYGEN SENSOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from rear oxygen sensor. 3) Turn ignition switch to ON. 4) Measure voltage between rear oxygen sensor connector and engine ground or chassis ground. ***Connector & terminal*** ***(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 (E1)
8	**CHECK REAR OXYGEN SENSOR.** 1) Turn ignition switch to OFF. 2) Measure resistance between rear oxygen sensor connector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 30 Ω?	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector • Poor contact in coupling connector (E1)	Replace rear oxygen sensor. <Ref. to FU(SOHC)-47, Rear Oxygen Sensor.>

MEMO:

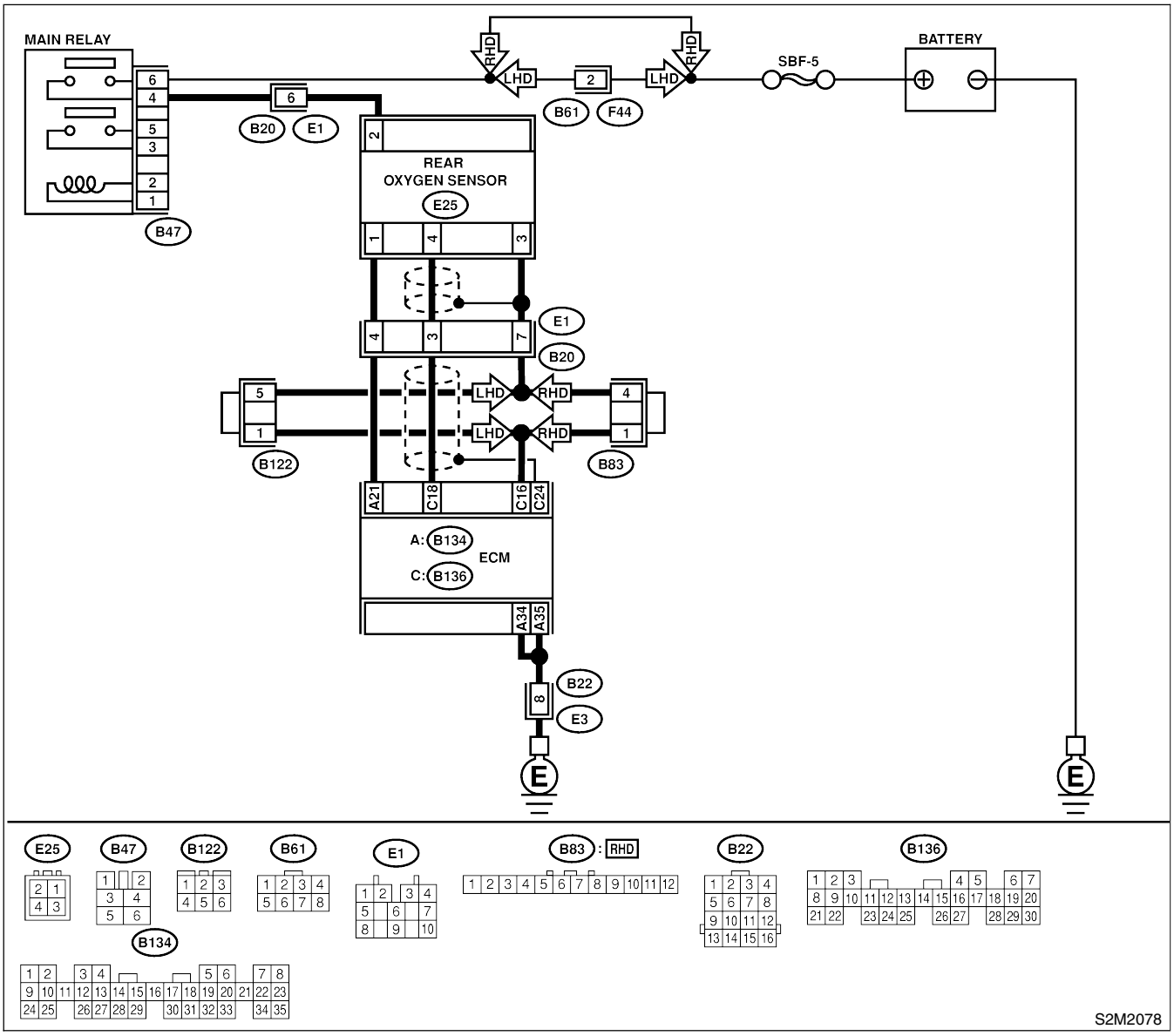
D: DTC P0038 — REAR OXYGEN SENSOR HEATER CIRCUIT HIGH INPUT —

S058521F86

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** Measure 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**.

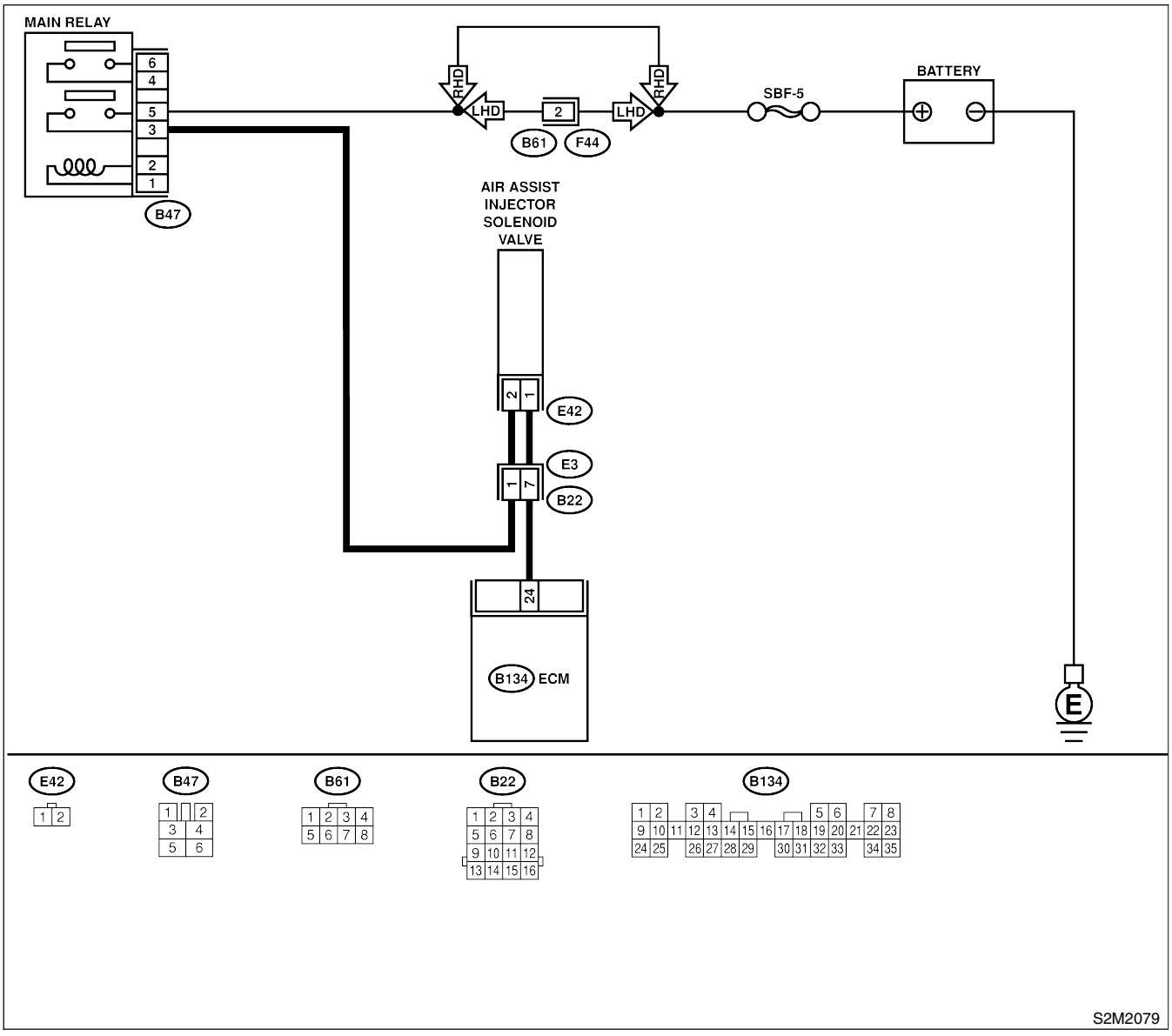
No.	Step	Check	Yes	No
2	**CHECK CURRENT DATA.** 1) Turn ignition switch to OFF. 2) Repair battery short circuit in harness between ECM and rear oxygen sensor connector. 3) Turn ignition switch to ON. 4) Read data of rear oxygen sensor heater current using Subaru Select Monitor or the OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(SOHC)-34, Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value more than 7 A?	Replace ECM. <Ref. to FU(SOHC)-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 P0066 — AIR ASSIST INJECTOR SOLENOID VALVE CIRCUIT LOW INPUT — S058521F88

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



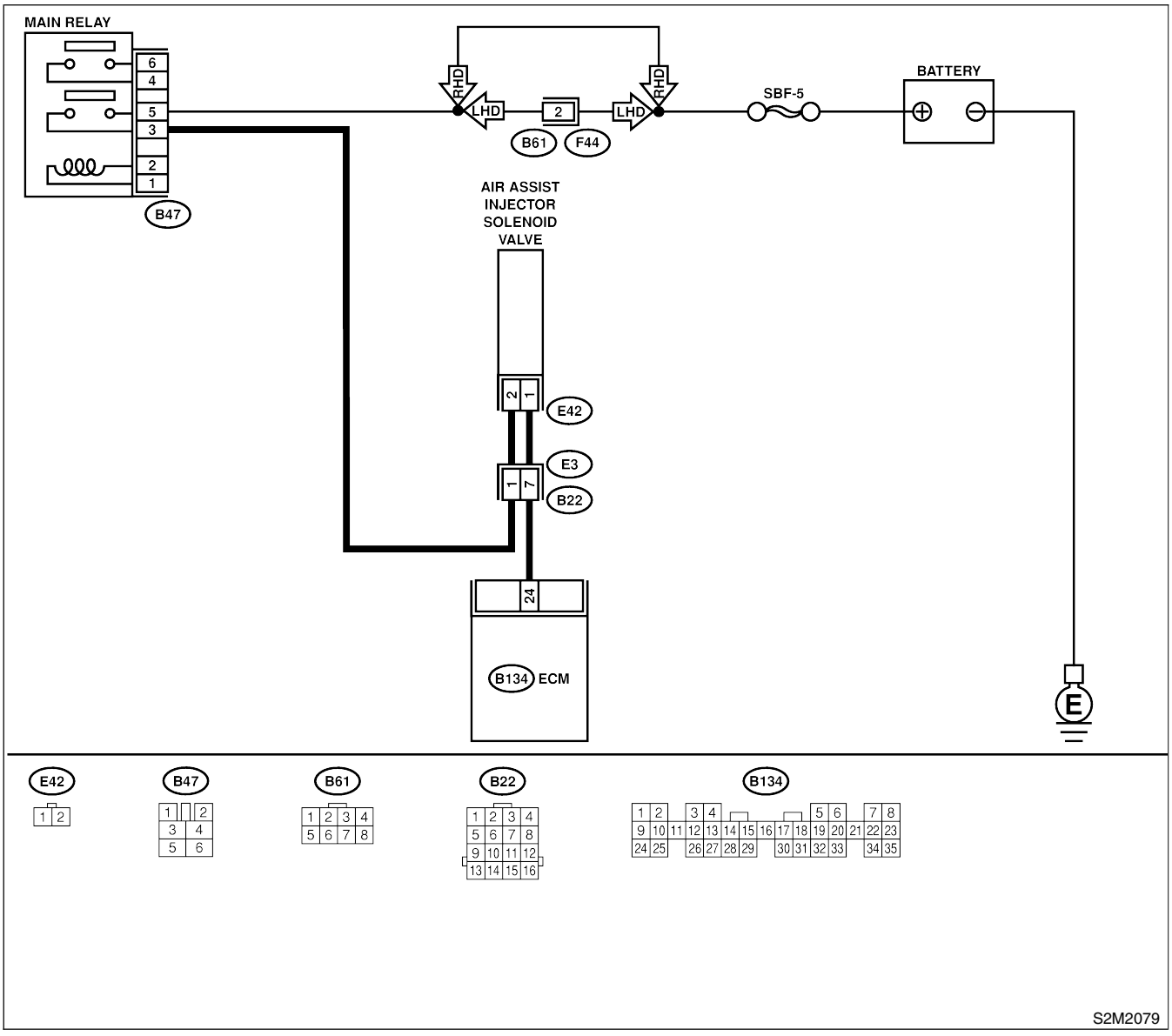
No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 24 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair poor contact in ECM connector.	Go to step **2**.
2	**CHECK POWER SUPPLY TO AIR ASSIST INJECTOR SOLENOID VALVE.** 1) Turn ignition switch to OFF. 2) Disconnect connector from air assist injector solenoid valve. 3) Turn ignition switch to ON. 4) Measure 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 (B22)
3	**CHECK HARNESS BETWEEN ECM AND AIR ASSIST INJECTOR SOLENOID VALVE CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure 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 (B22)
4	**CHECK HARNESS BETWEEN ECM AND AIR ASSIST INJECTOR SOLENOID VALVE CONNECTOR.** Measure 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 air assist injector solenoid valve. <Ref. to FU(SOHC)-39, Air Assist Injector Solenoid Valve.>

F: DTC P0067 — AIR ASSIST INJECTOR SOLENOID VALVE CIRCUIT HIGH INPUT — S058521G72

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



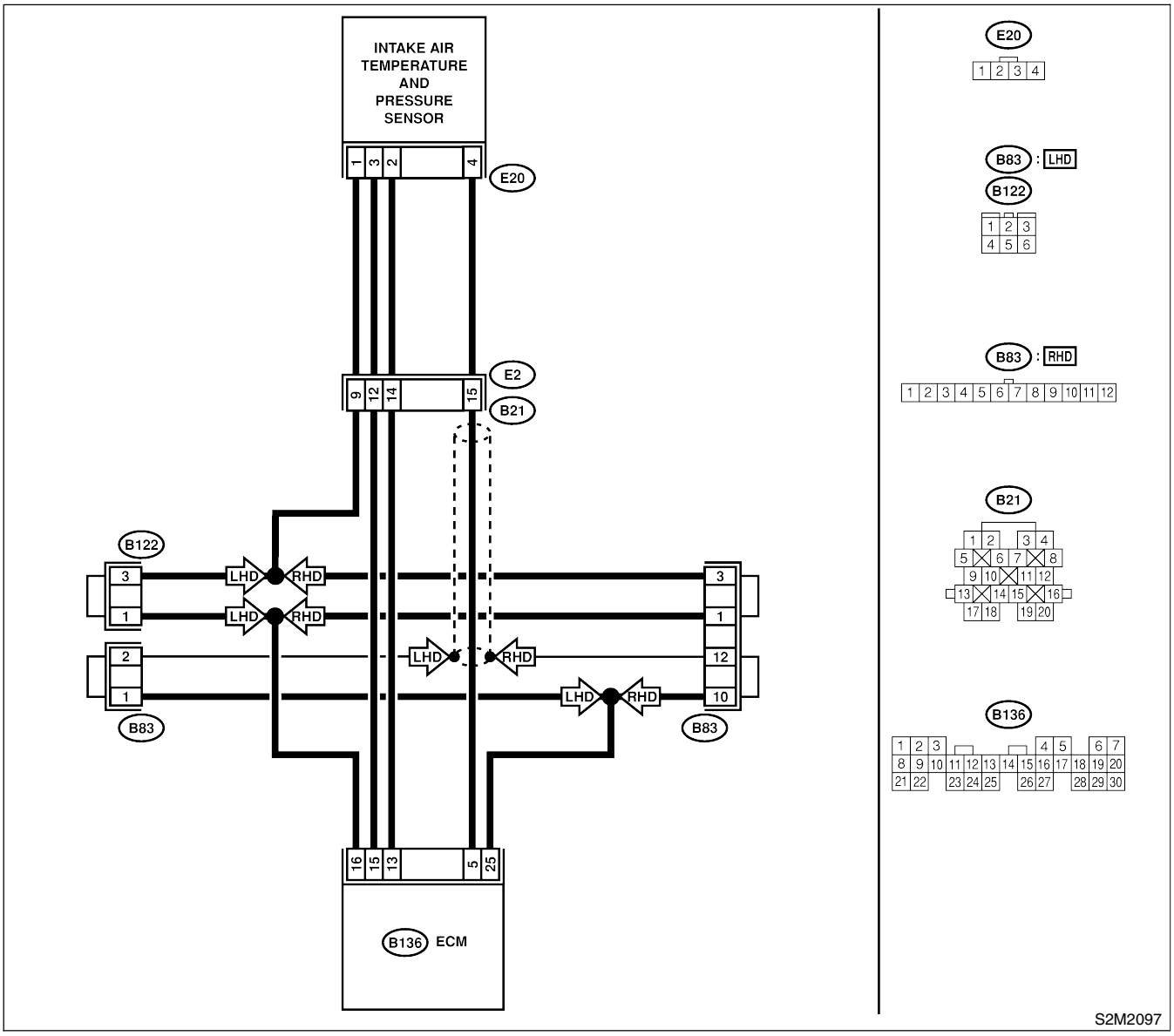
No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 24 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Go to step **3**.
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn ignition switch to OFF. 2) Disconnect connector from air assist injector solenoid valve. 3) Turn ignition switch to ON. 4) Measure 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 ECM. <Ref. to FU(SOHC)-49, Engine Control Module.>	Replace air assist injector solenoid valve <Ref. to FU(SOHC)-39, Air Assist Injector Solenoid Valve.> and ECM <Ref. to FU(SOHC)-49, Engine Control Module.>
3	**CHECK OUTPUT SIGNAL FROM ECM.** Measure 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 ECM. <Ref. to FU(SOHC)-49, Engine Control Module.>	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

G: DTC P0106 — PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LOW INPUT) — S058521F90

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, 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.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0107, P0108 or P1112?	Inspect DTC P0107, P0108 or P1112 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(SOHC)-80, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK AIR INTAKE SYSTEM.**	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair air intake system.	Go to step **3**.
3	**CHECK PRESSURE SENSOR.** 1) Start the engine and warm-up engine until coolant temperature is greater than 60°C (140°F). 2) Place the shift lever in the selector lever in "N" or "P" position. 3) Turn A/C switch to OFF. 4) Turn all accessory switches to OFF. 5) Read data of intake manifold pressure sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(SOHC)-34, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual. Specification: • Intake manifold absolute pressure ***Ignition ON*** ***73.3 — 106.6 kPa (550 — 800 mmHg, 21.65 — 31.50 inHg)*** ***Idling*** ***20.0 — 46.7 kPa (150 — 350 mmHg, 5.91 — 13.78 inHg)***	Is the value within the specifications?	Go to step **4**.	Replace intake air temperature sensor and pressure sensor. <Ref. to FU(SOHC)-36, Intake Air Temperature and Pressure Sensor.>
4	**CHECK THROTTLE POSITION.** Read data of throttle position signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(SOHC)-34, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.	Is throttle positioning ratio equal to or less than 5% when throttle is fully closed?	Go to step **5**.	Adjust or replace throttle position sensor. <Ref. to FU(SOHC)-33 Throttle Position Sensor.>

No.	Step	Check	Yes	No
5	**CHECK THROTTLE POSITION.**	Is throttle positioning ratio equal to or more than 85% when throttle is fully open?	Replace intake air temperature and pressure sensor. <Ref. to FU(SOHC)-36, Intake Air Temperature and Pressure Sensor.>	Replace throttle position sensor. <Ref. to FU(SOHC)-33, Throttle Position Sensor.>

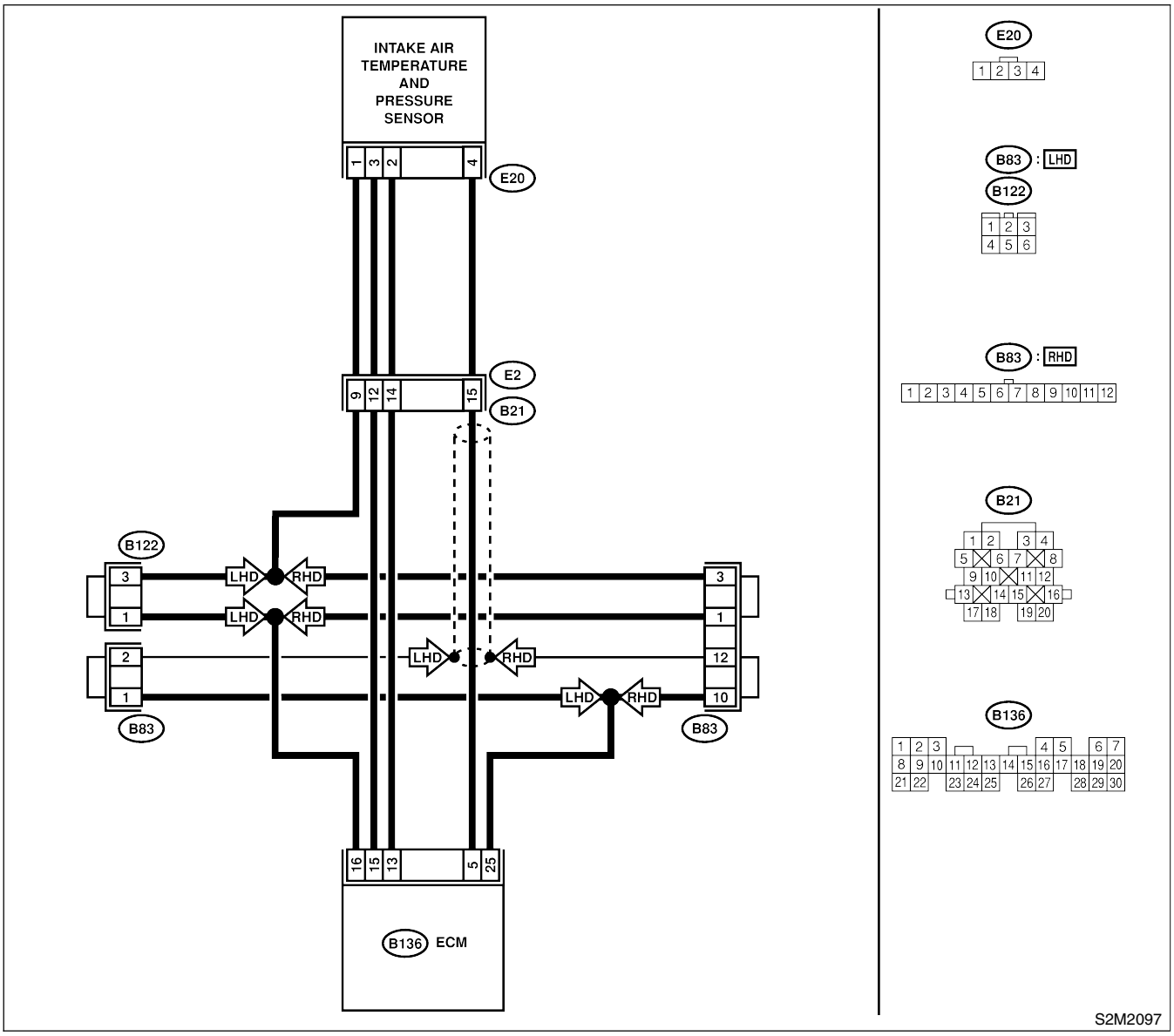
MEMO:

H: DTC P0107 — PRESSURE SENSOR CIRCUIT LOW INPUT — S058521B12

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start engine. 2) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(SOHC)-34, 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 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 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 your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
5	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(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 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(SOHC)-34, 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**.

No.	Step	Check	Yes	No
7	**CHECK HARNESS BETWEEN ECM AND INTAKE AIR TEMPERATURE AND PRESSURE SENSOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from intake air temperature and pressure sensor. 3) Turn ignition switch to ON. 4) Measure 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.
8	**CHECK HARNESS BETWEEN ECM AND INTAKE AIR TEMPERATURE AND PRESSURE SENSOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure 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 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 intake air temperature and pressure sensor. <Ref. to FU(SOHC)-36, Intake Air Temperature and Pressure Sensor.>

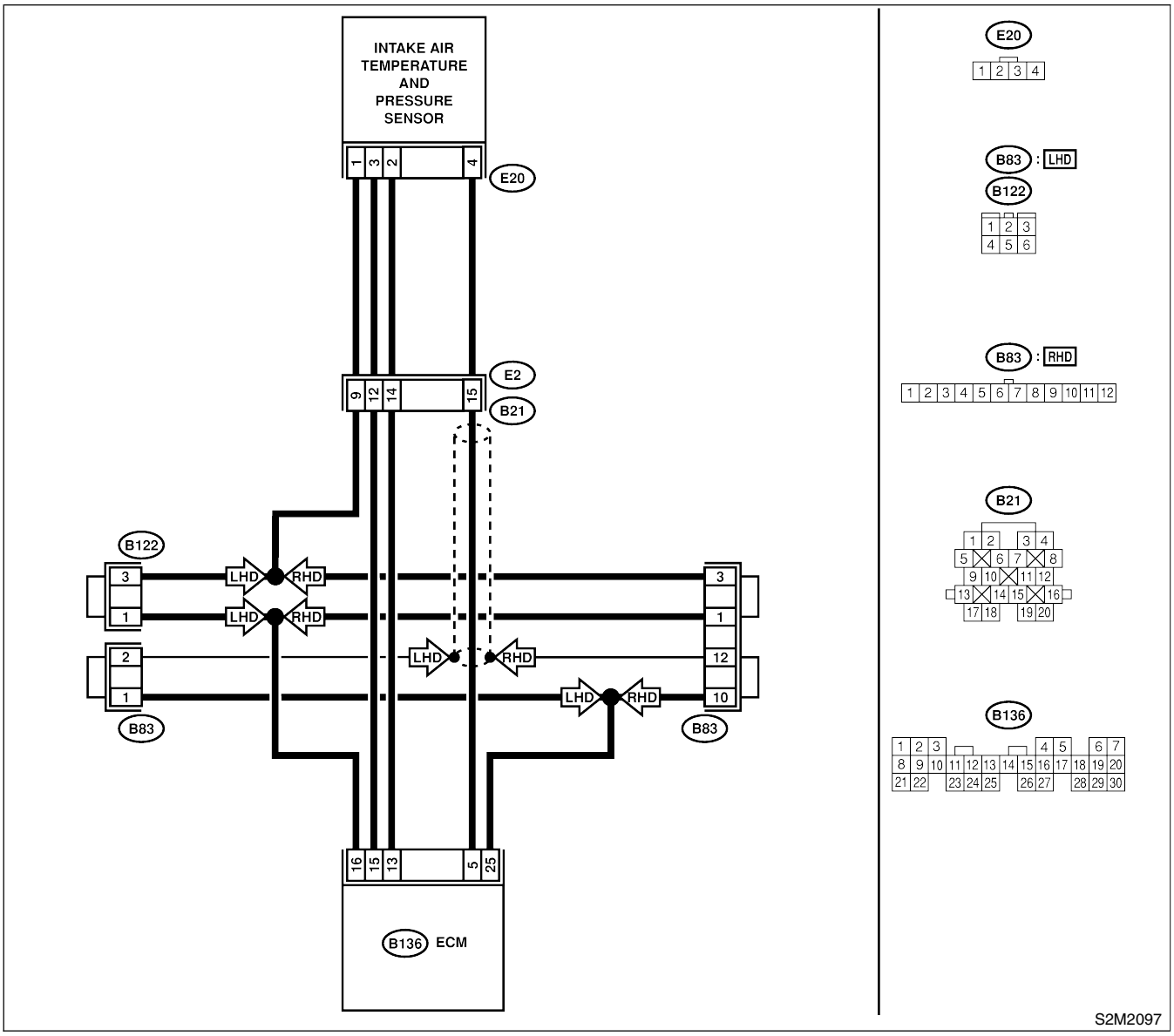
MEMO:

I: DTC P0108 — PRESSURE SENSOR CIRCUIT HIGH INPUT — S058521B13

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start engine. 2) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(SOHC)-34, 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 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 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 your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
4	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM 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 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(SOHC)-34, 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 ignition switch to OFF. 2) Disconnect connector from intake air temperature and pressure sensor. 3) Turn ignition switch to ON. 4) Measure 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 ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure 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 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 intake air temperature and pressure sensor. <Ref. to FU(SOHC)-36, Intake Air Temperature and Pressure Sensor.>
10	**CHECK HARNESS BETWEEN ECM AND INTAKE AIR TEMPERATURE AND PRESSURE SENSOR CONNECTOR.** 1) Turn ignition switch to OFF and Subaru Select Monitor or the OBD-II general scan tool switch to OFF. 2) Disconnect connector from intake air temperature and pressure sensor. 3) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON. 4) Read data of intake manifold absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(SOHC)-34, 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 intake air temperature and pressure sensor. <Ref. to FU(SOHC)-36, Intake Air Temperature and Pressure Sensor.>

MEMO:

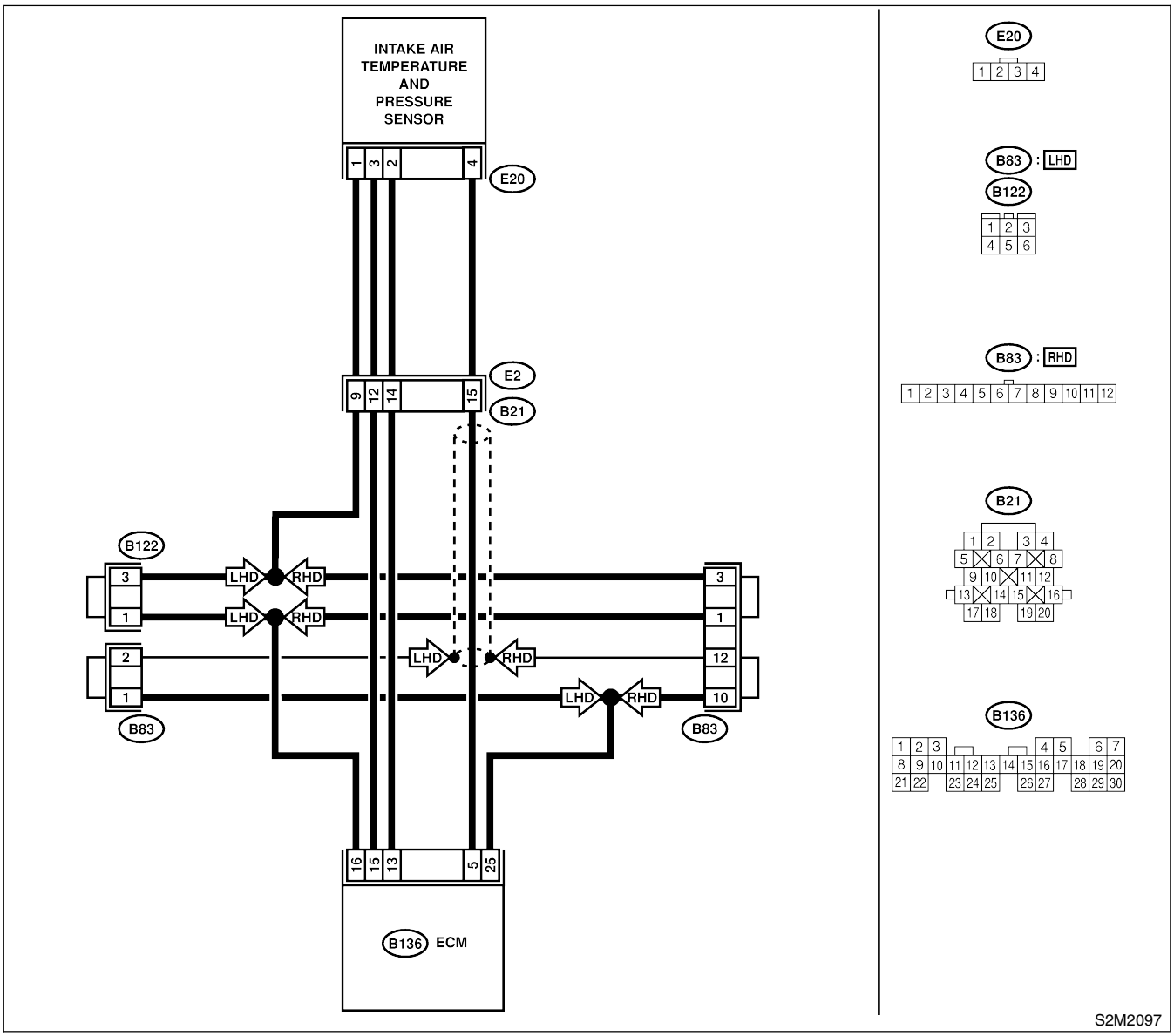
J: DTC P0111 — INTAKE AIR TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM — S058521B14

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, 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 P0112, P0113, P0117, P0118 or P0125?	Inspect DTC P0112, P0113, P0117, P0118 or P0125 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(SOHC)-80, 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 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(SOHC)-34, 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 intake air temperature and pressure sensor. <Ref. to FU(SOHC)-36, Intake Air Temperature and Pressure Sensor.>	Inspect DTC P0125 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(SOHC)-80, List of Diagnostic Trouble Code (DTC).>

K: DTC P0112 — INTAKE AIR TEMPERATURE SENSOR CIRCUIT LOW INPUT

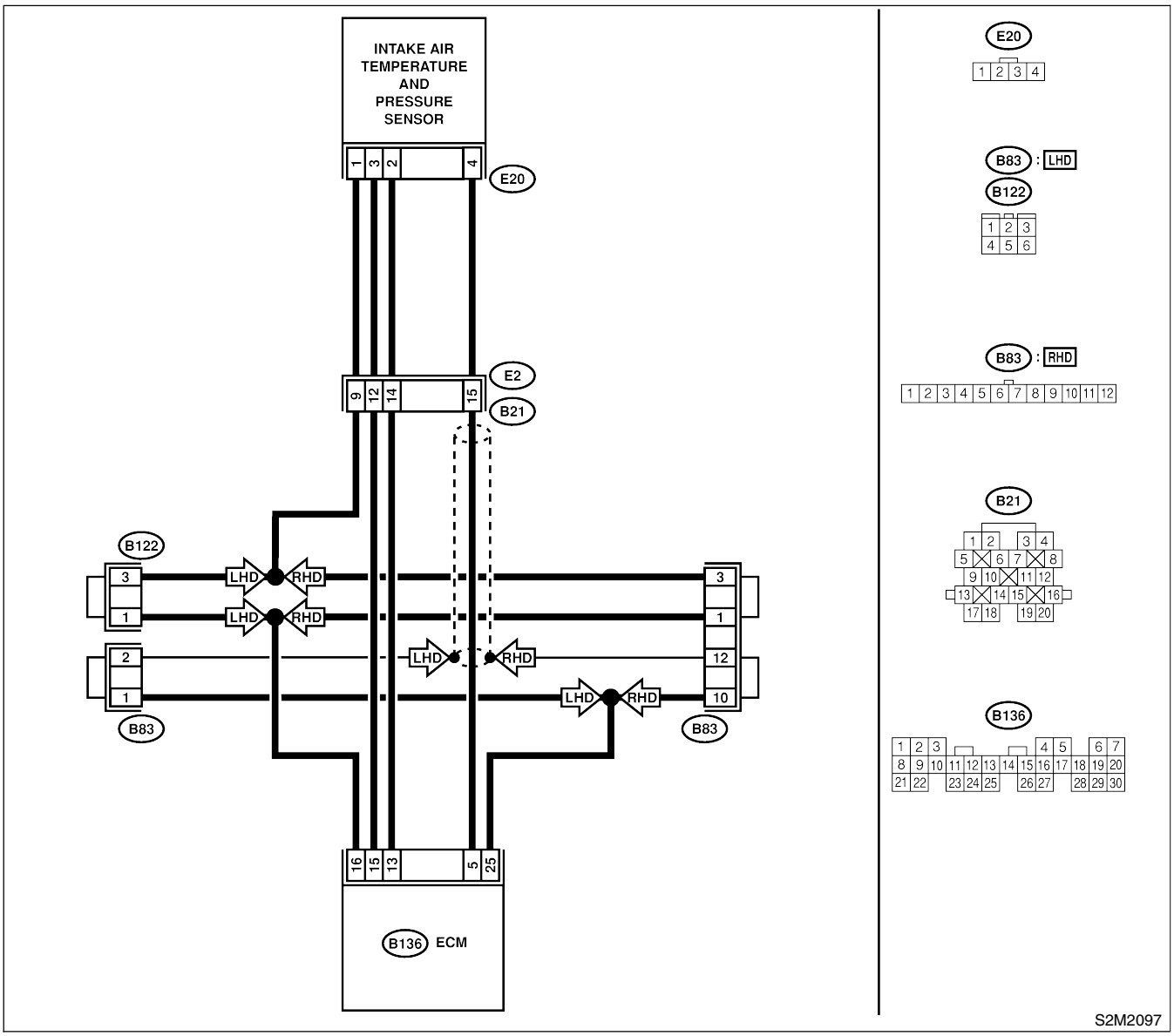
S058521B15

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start engine. 2) Read data of intake air temperature sensor signal using Subaru Select Monitor or the OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(SOHC)-34, 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 (B21) ● Poor contact in joint connector (B83, B122)
2	**CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE AND PRESSURE SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from intake air temperature and pressure sensor. 3) Turn ignition switch to ON. 4) Read data of intake air temperature sensor signal using Subaru Select Monitor or the OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(SOHC)-34, Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value less than –40°C (–40°F)?	Replace intake air temperature and pressure sensor. <Ref. to FU(SOHC)-36, Intake Air Temperature and Pressure Sensor.>	Repair ground short circuit in harness between intake air temperature sensor and ECM connector.

L: DTC P0113 — INTAKE AIR TEMPERATURE SENSOR CIRCUIT HIGH INPUT

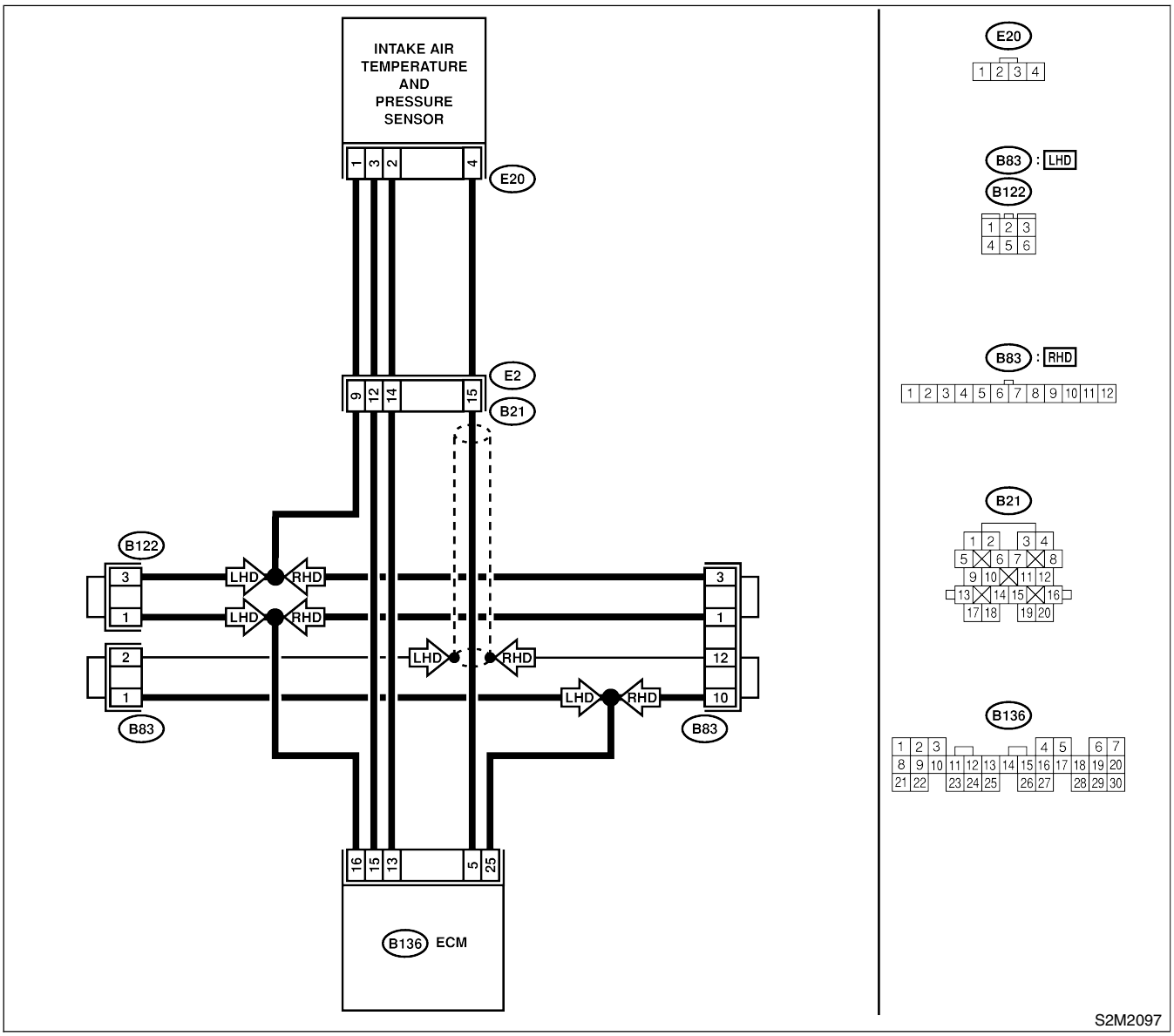
S058521B16

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start engine. 2) Read data of intake air temperature sensor signal using Subaru Select Monitor or the OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(SOHC)-34, 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 (B21) ● Poor contact in joint connector (B83, B122)
2	**CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE AND PRESSURE SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from intake air temperature and pressure sensor. 3) Measure 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 ignition switch to ON. 2) Measure 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 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 (B21) ● Poor contact in joint connector (B83, B122)
5	**CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE AND PRESSURE SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Measure 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 intake air temperature and pressure sensor. <Ref. to FU(SOHC)-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 (B21) ● Poor contact in joint connector (B83, B122)

MEMO:

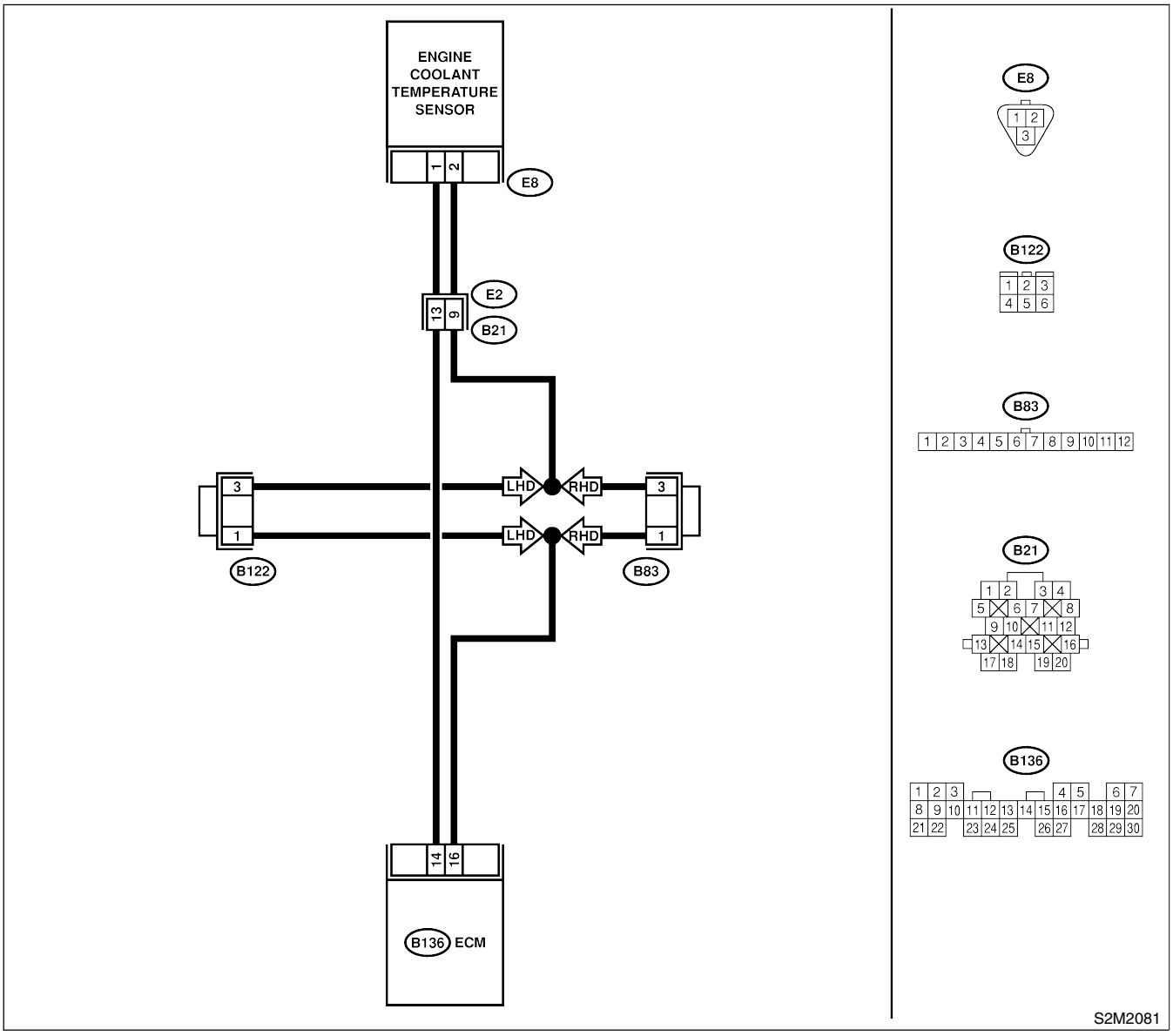
M: DTC P0117 — ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT LOW INPUT — S058521F91

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



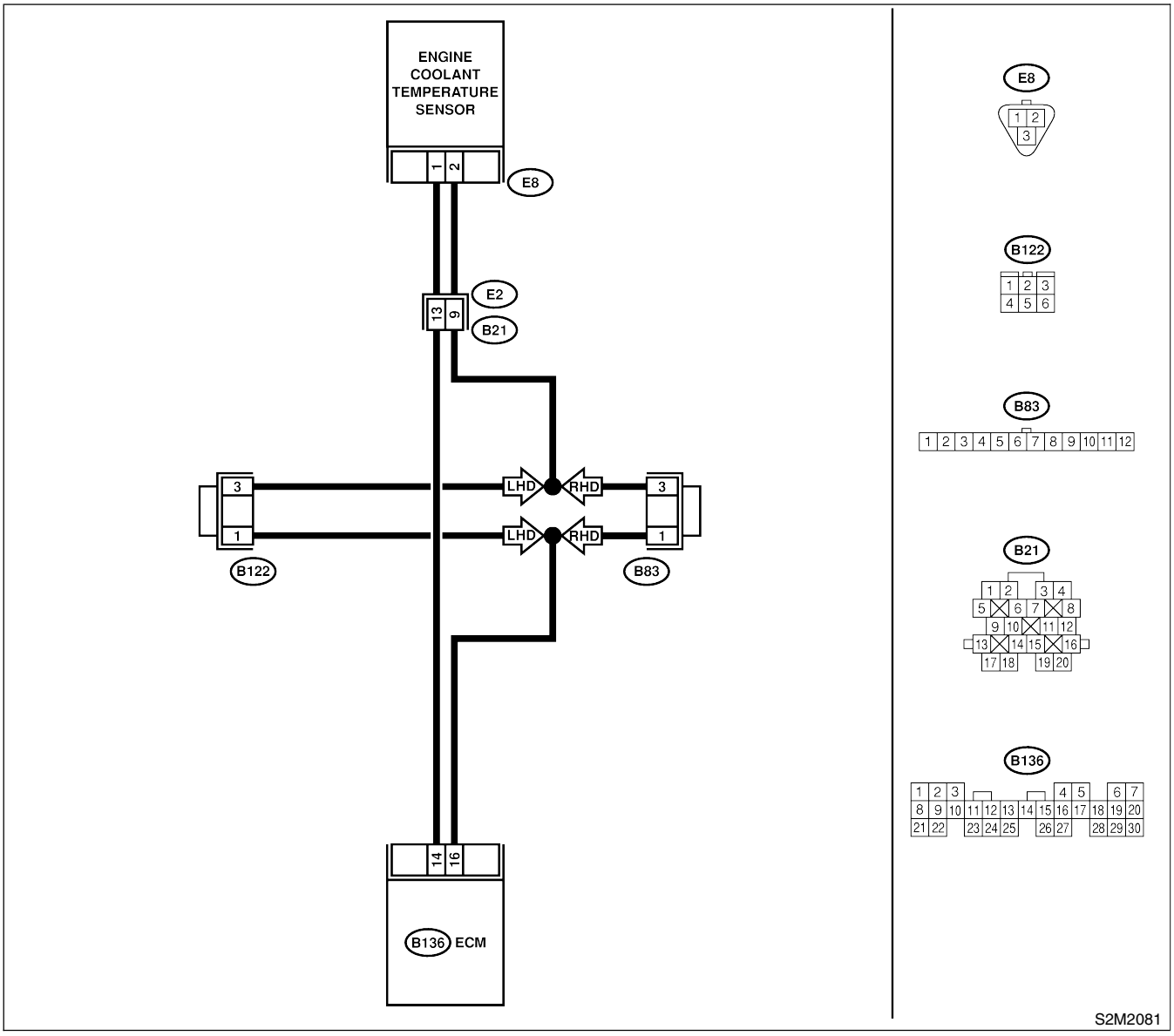
No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start engine. 2) Read data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(SOHC)-34, 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 (B21) ● Poor contact in joint connector LHD: B122 RHD: B83
2	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from engine coolant temperature sensor. 3) Turn ignition switch to ON. 4) Read data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(SOHC)-34, Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value less than –40°C (–40°F)?	Replace engine coolant temperature sensor. <Ref. to FU(SOHC)-28, Engine Coolant Temperature Sensor.>	Repair ground short circuit in harness between engine coolant temperature sensor and ECM connector.

N: DTC P0118 — ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT HIGH INPUT — S058521F92

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start engine. 2) Read data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(SOHC)-34, 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 (B21) ● Poor contact in joint connector LHD: B122 RHD: B83
2	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from engine coolant temperature sensor. 3) Measure voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and engine coolant temperature sensor connector.	Go to step **3**.
3	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to ON. 2) Measure voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and engine coolant temperature sensor connector.	Go to step **4**.

No.	Step	Check	Yes	No
4	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 1 (+) — Engine ground (–):***	Is the voltage more than 4 V?	Go to step **5**.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine coolant temperature sensor connector • Poor contact in engine coolant temperature sensor connector • Poor contact in ECM connector • Poor contact in coupling connector (B21) • Poor contact in joint connector LHD: B122 RHD: B83
5	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Measure resistance of harness between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Replace engine coolant temperature sensor. <Ref. to FU(SOHC)-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 (B21) • Poor contact in joint connector LHD: B122 RHD: B83

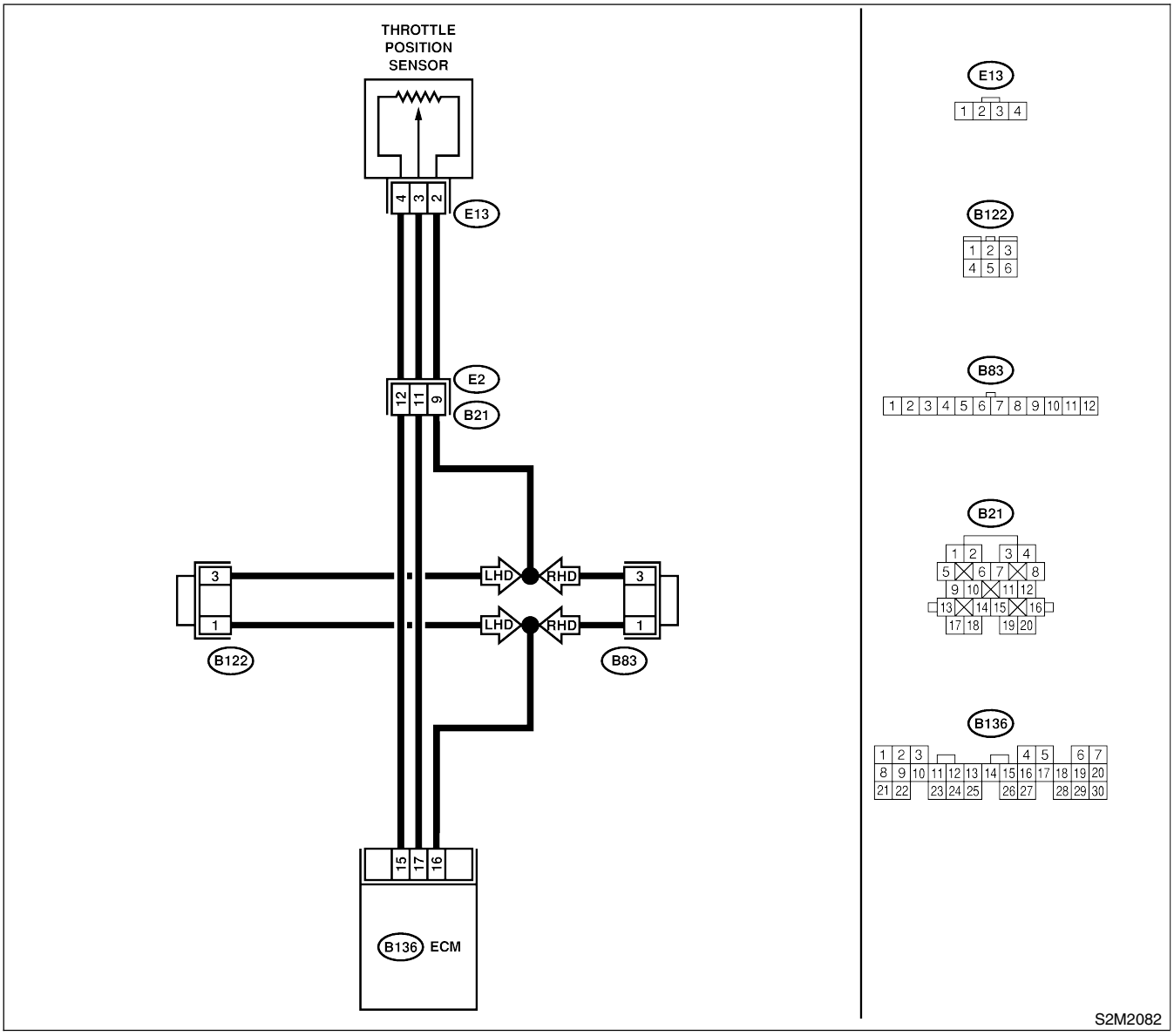
MEMO:

O: DTC P0121 — THROTTLE POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) — S058521B19

- **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(SOHC)-45 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42 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 “17. List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(SOHC)-80, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0121.	Replace throttle position sensor. <Ref. to FU(SOHC)-33, Throttle Position Sensor.>

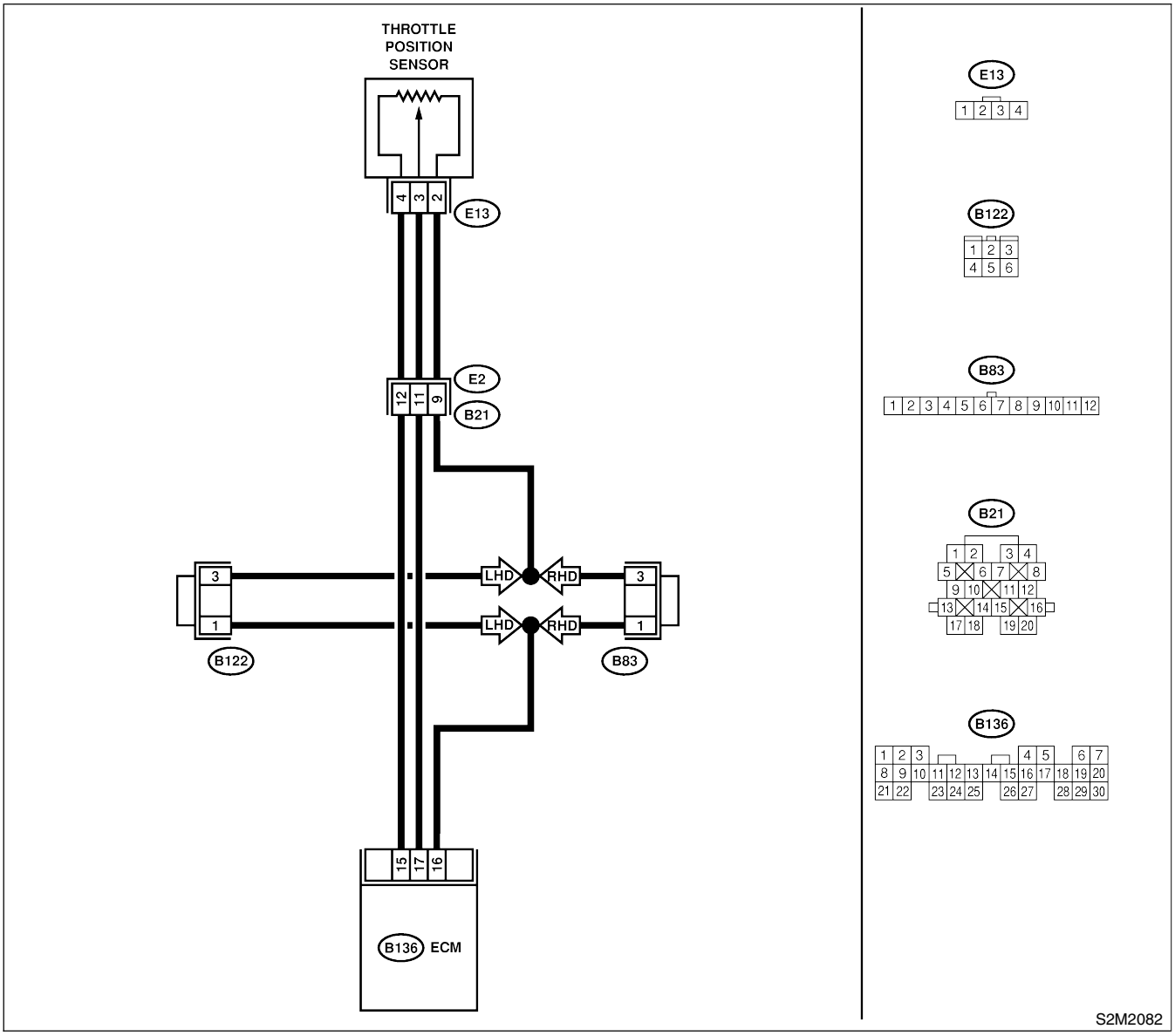
P: DTC P0122 — THROTTLE POSITION SENSOR CIRCUIT LOW INPUT — S058521B20

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start engine. 2) Read data of throttle position sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(SOHC)-34, 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 (B21)
2	**CHECK INPUT SIGNAL FOR ECM.** Measure 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 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 your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
4	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM 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 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 ignition switch to OFF. 2) Disconnect connectors from throttle position sensor. 3) Turn ignition switch to ON. 4) Measure voltage between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E13) No. 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 (B21) • Poor contact in joint connector LHD: B122 RHD: B83
7	**CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Measure resistance of harness between ECM connector and throttle position sensor connector. ***Connector & terminal*** ***(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 (B21)
8	**CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.** Measure resistance of harness between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E13) No. 3 — Engine ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between throttle position sensor and ECM connector.	Go to step **9**.
9	**CHECK POOR CONTACT.** Check poor contact in throttle position sensor connector.	Is there poor contact in throttle position sensor connector?	Repair poor contact in throttle position sensor connector.	Replace throttle position sensor. <Ref. to FU(SOHC)-33, Throttle Position Sensor.>

MEMO:

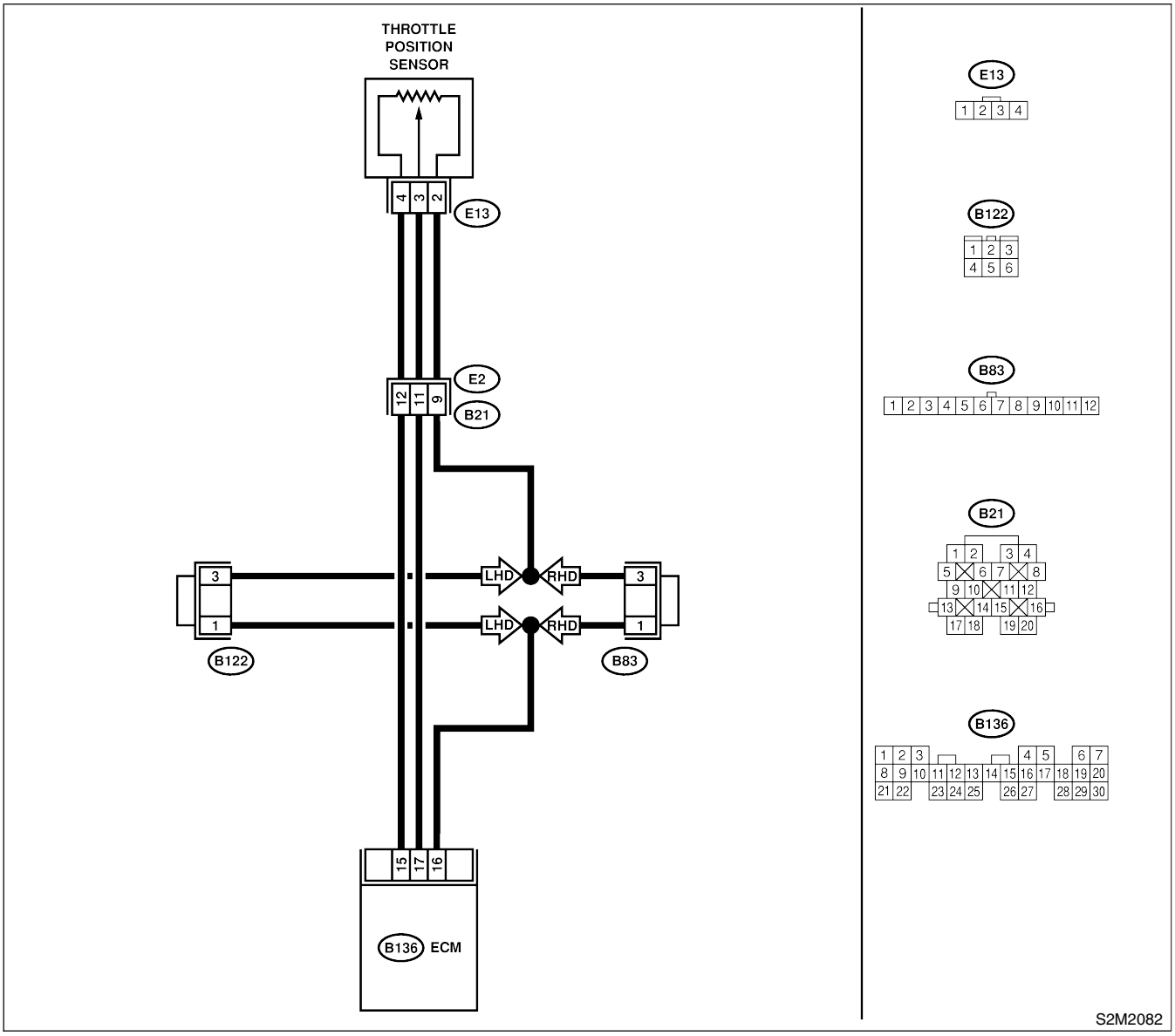
Q: DTC P0123 — THROTTLE POSITION SENSOR CIRCUIT HIGH INPUT — S058521B21

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



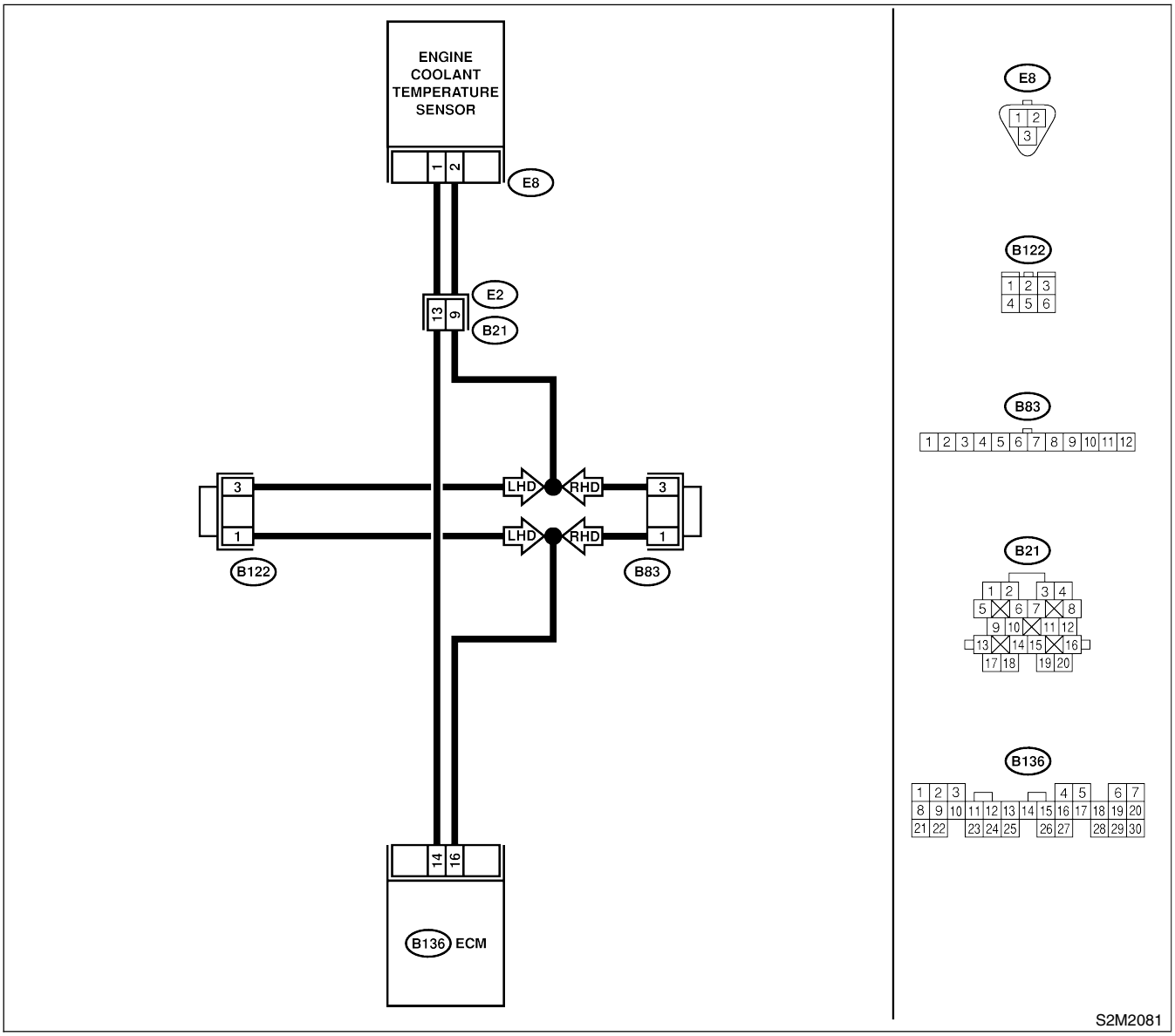
No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start engine. 2) Read data of throttle position sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(SOHC)-34, 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 (B21)
2	**CHECK HARNESS BETWEEN THROTTLE POSITION SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from throttle position sensor. 3) Measure resistance of harness between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E13) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **3**.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between throttle position sensor and ECM connector ● Poor contact in coupling connector (B21) ● Poor contact in joint connector LHD: B122 RHD: B83
3	**CHECK HARNESS BETWEEN THROTTLE POSITION SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to ON. 2) Measure voltage between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E13) No. 3 (+) — Engine ground (–):***	Is the voltage more than 4.9 V?	Repair battery short circuit in harness between throttle position sensor and ECM connector. After repair, replace ECM. <Ref. to FU(SOHC)-49, Engine Control Module.>	Replace throttle position sensor. <Ref. to FU(SOHC)-33 Throttle Position Sensor.>

R: DTC P0125 — INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL — S058521B22

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



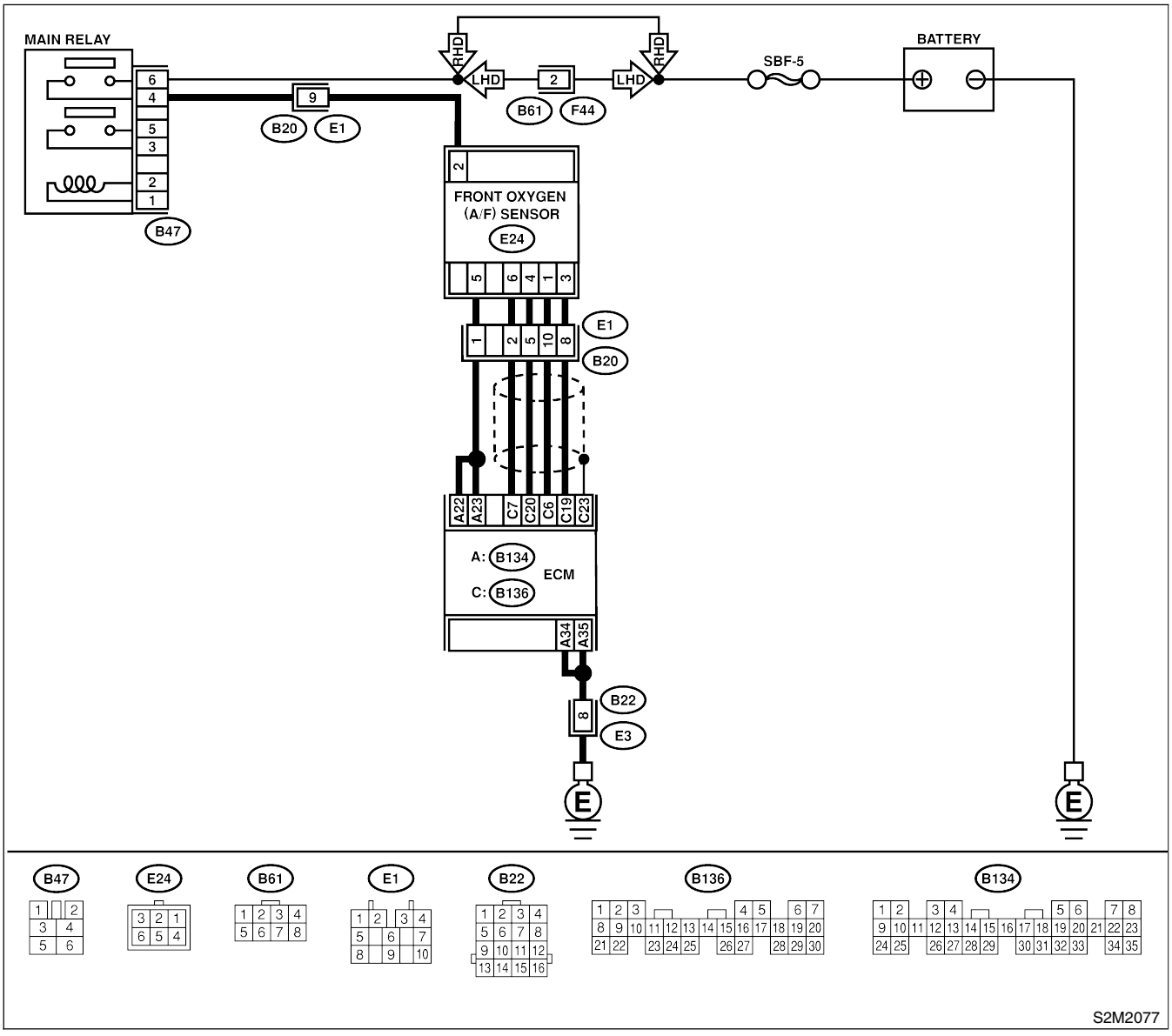
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0117 or P0118?	Inspect DTC P0117 or P0118 using “17. List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(SOHC)-80, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0125.	Go to step **2**.
2	**CHECK THERMOSTAT.**	Does thermostat remain opened?	Replace thermostat. <Ref. to CO-23, Thermostat.>	Replace engine coolant temperature sensor. <Ref. to FU(SOHC)-28, Engine Coolant Temperature Sensor.>

S: DTC P0130 — FRONT OXYGEN (A/F) SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LEAN) — S058521G44

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, 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, P0132, P0031 or P0032?	Inspect DTC P0131, P0132, P0031 or P0032 using “17. List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(SOHC)-80, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK FRONT OXYGEN (A/F) SENSOR DATA.** 1) Start engine. 2) While observing the Subaru Select Monitor or OBD-II general scan tool screen, warm-up the engine until coolant temperature is above 70°C (160°F). If the engine is already warmed-up, operate at idle speed for at least 1 minute. 3) Read data of front oxygen (A/F) sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(SOHC)-34, 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 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 ignition switch to OFF. 2) Disconnect connector from ECM and front oxygen (A/F) sensor connector. 3) Measure resistance between ECM and front oxygen (A/F) sensor. ***Connector & terminals*** ***(B136) No. 6 — (E24) No. 1:*** ***(B136) No. 7 — (E24) No. 6:*** ***(B136) No. 19 — (E24) No. 3:*** ***(B136) No. 20 — (E24) No. 4:***	Is the resistance less than 5 Ω?	Go to step **5**.	Repair open circuit between ECM and front oxygen (A/F) sensor.

No.	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR.** Measure 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.
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 front oxygen (A/F) sensor. <Ref. to FU(SOHC)-45, Front Oxygen (A/F) Sensor.>

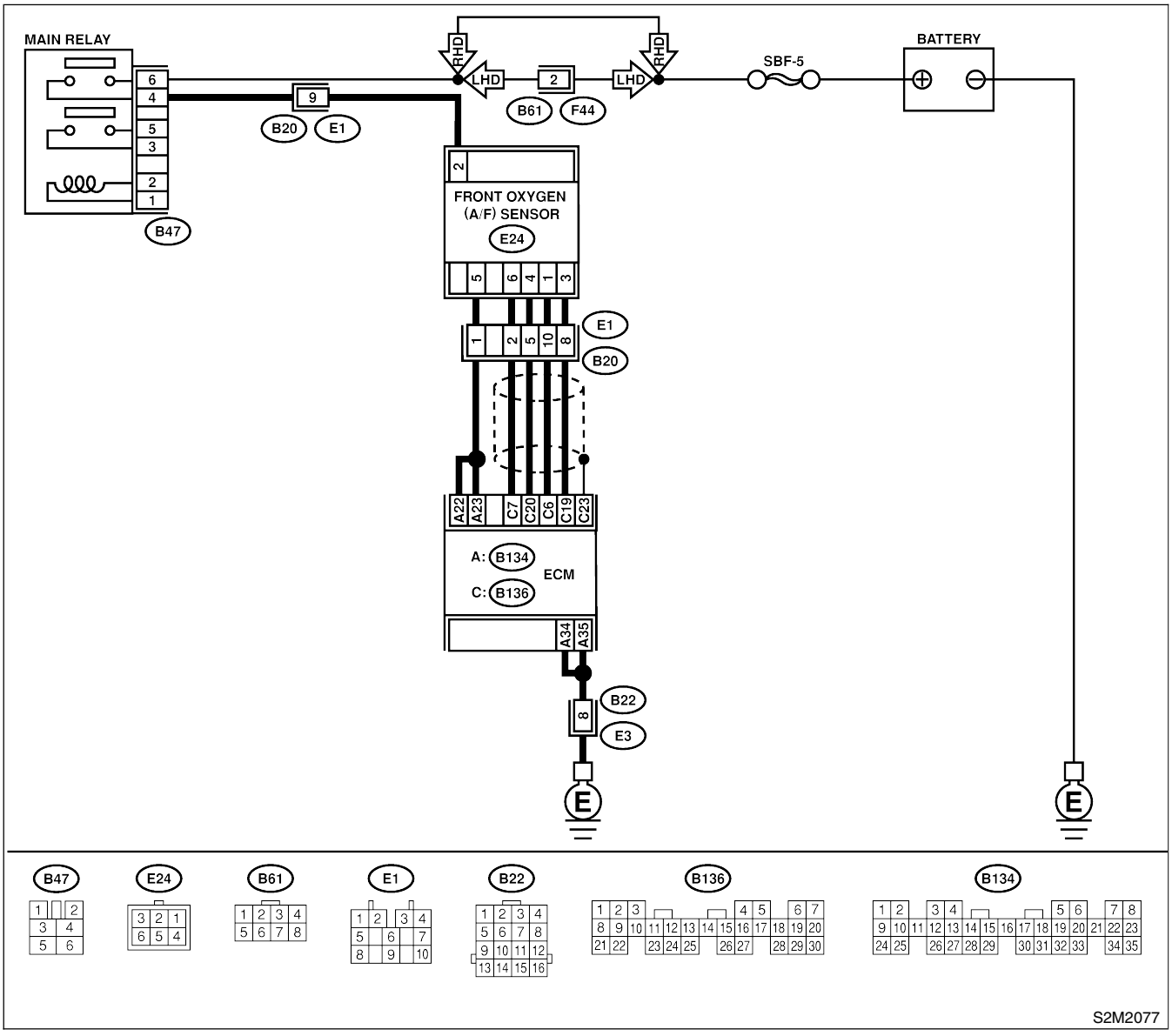
MEMO:

T: DTC P0131 — FRONT OXYGEN (A/F) SENSOR CIRCUIT MALFUNCTION (OPEN CIRCUIT) — S058521G45

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



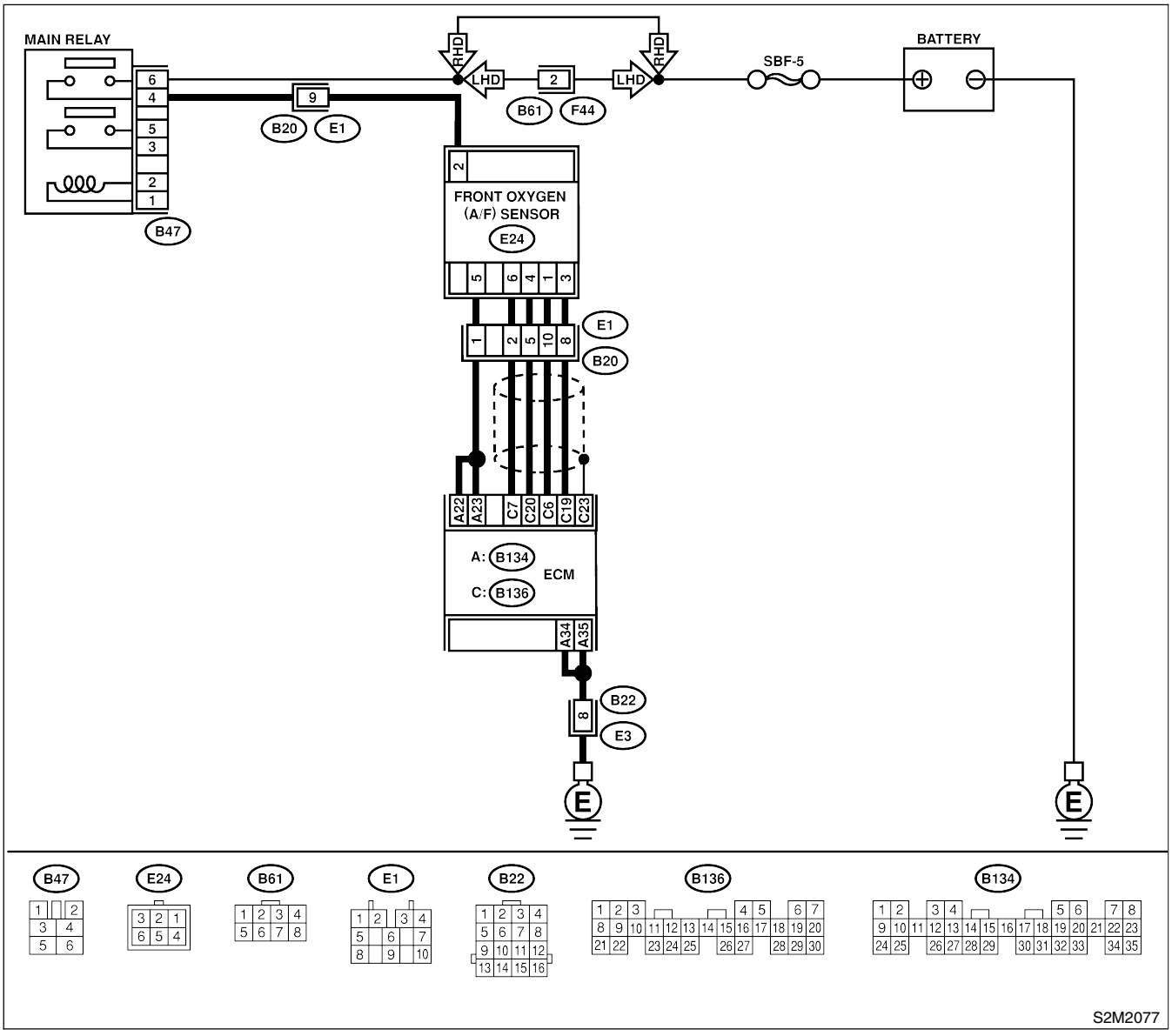
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from ECM and front oxygen (A/F) sensor connector. 3) Measure resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B136) No. 6 — (E24) No. 1:*** ***(B136) No. 7 — (E24) No. 6:*** ***(B136) No. 19 — (E24) No. 3:*** ***(B136) No. 20 — (E24) No. 4:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector
2	**CHECK POOR CONTACT.** Check poor contact in front oxygen (A/F) sensor connector.	Is there poor contact in front oxygen (A/F) sensor connector?	Repair poor contact in front oxygen (A/F) sensor connector.	Replace front oxygen (A/F) sensor. <Ref. to FU(SOHC)-45, Front Oxygen (A/F) Sensor.>

U: DTC P0132 — FRONT OXYGEN (A/F) SENSOR CIRCUIT MALFUNCTION (SHORT CIRCUIT) — S058521G46

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



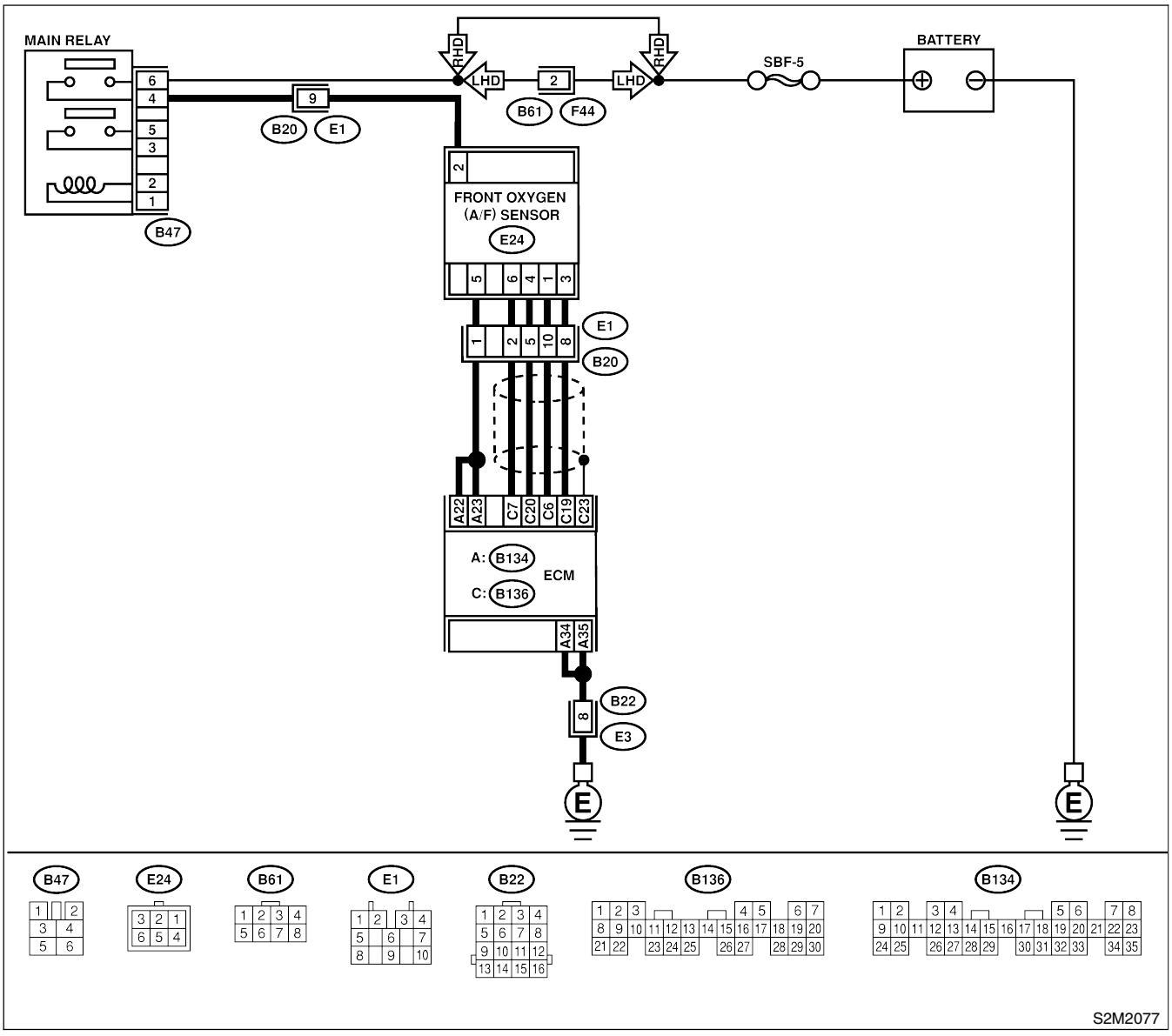
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 6 — Chassis ground:*** ***(B136) No. 7 — Chassis ground:*** ***(B136) No. 19 — Chassis ground:*** ***(B136) No. 20 — Chassis ground:***	Is the resistance more than 10 Ω?	Replace front oxygen (A/F) sensor. <Ref. to FU(SOHC)-45, Front Oxygen (A/F) Sensor.>	Repair ground short circuit in harness between ECM and front oxygen (A/F) sensor connector.

V: DTC P0133 — FRONT OXYGEN (A/F) SENSOR CIRCUIT SLOW RESPONSE — S058521B26

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



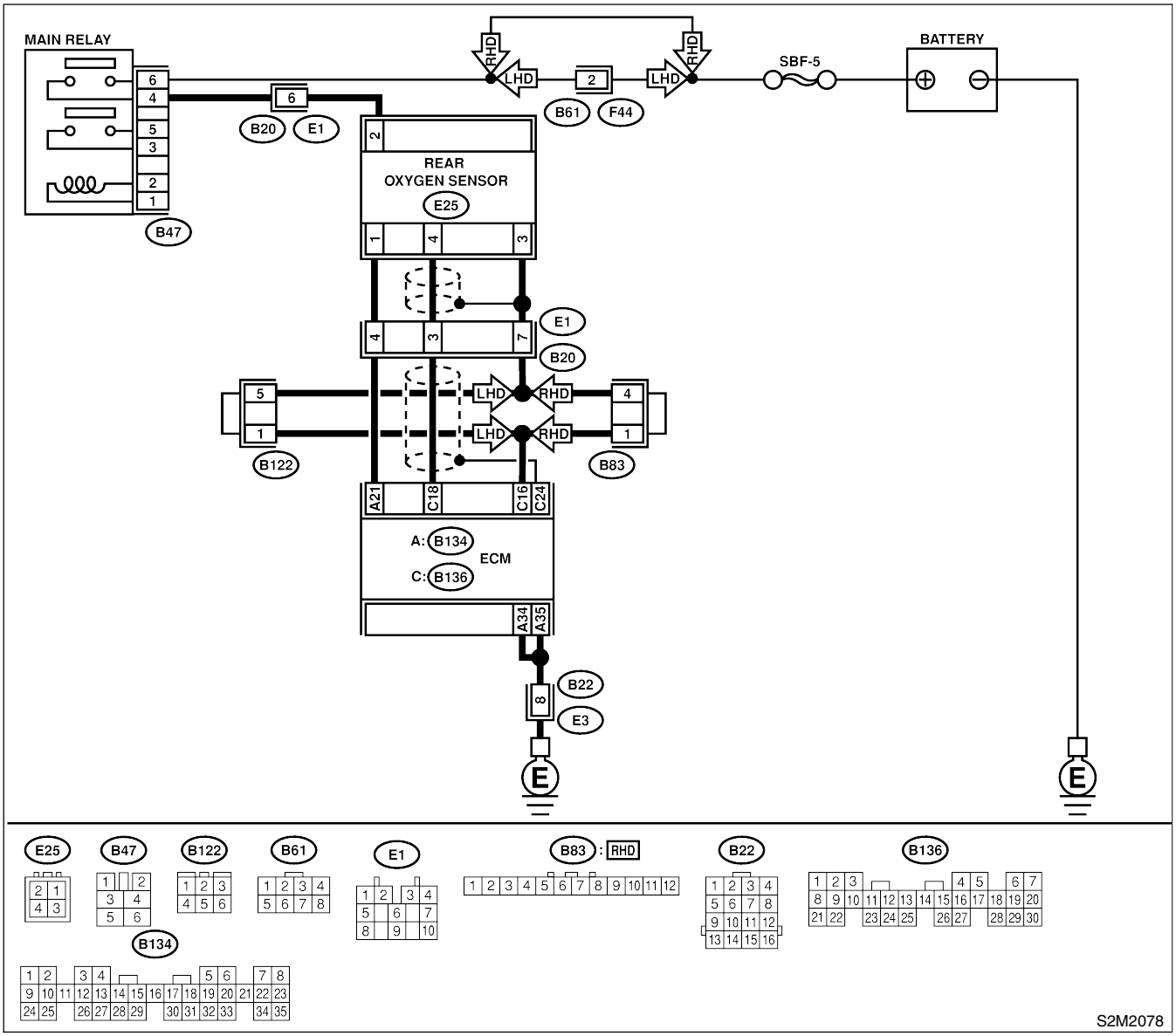
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0131, P0132, P0031 or P0032?	Inspect DTC P0131, P0132, P0031 or P0032 using “17. List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(SOHC)-80, List of Diagnostic Trouble 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 front oxygen (A/F) sensor. <Ref. to FU(SOHC)-45, Front Oxygen (A/F) Sensor.>

W: DTC P0136 — REAR OXYGEN SENSOR CIRCUIT MALFUNCTION — S058521B28

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, 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 "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(SOHC)-80, 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 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(SOHC)-34, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Does the value fluctuate?	Go to step **7**.	Go to step **4**.
4	**CHECK REAR OXYGEN SENSOR DATA.** Read data of rear oxygen sensor signal using Subaru Select Monitor or OBD-II General Scan Tool.	Is the value fixed between 0.2 and 0.4 V?	Go to step **5**.	Replace rear oxygen sensor. <Ref. to FU(SOHC)-47, Rear Oxygen Sensor.>
5	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from ECM and rear oxygen sensor. 3) Measure resistance of harness between ECM and rear oxygen sensor connector. ***Connector & terminal*** ***(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 REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from rear oxygen sensor. 3) Turn ignition switch to ON. 4) Measure voltage between rear oxygen sensor harness connector and engine ground or chassis ground. ***Connector & terminal*** ***(E25) No. 4 (+) — Engine ground (–):***	Is the voltage more than 0.2 V?	Replace rear oxygen sensor. <Ref. to FU(SOHC)-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

No.	Step	Check	Yes	No
7	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. ● Loose installation of portions ● Damage (crack, hole etc.) of parts ● Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there a fault in exhaust system?	Repair or replace faulty parts.	Replace rear oxygen sensor. <Ref. to FU(SOHC)-47, Rear Oxygen Sensor.>

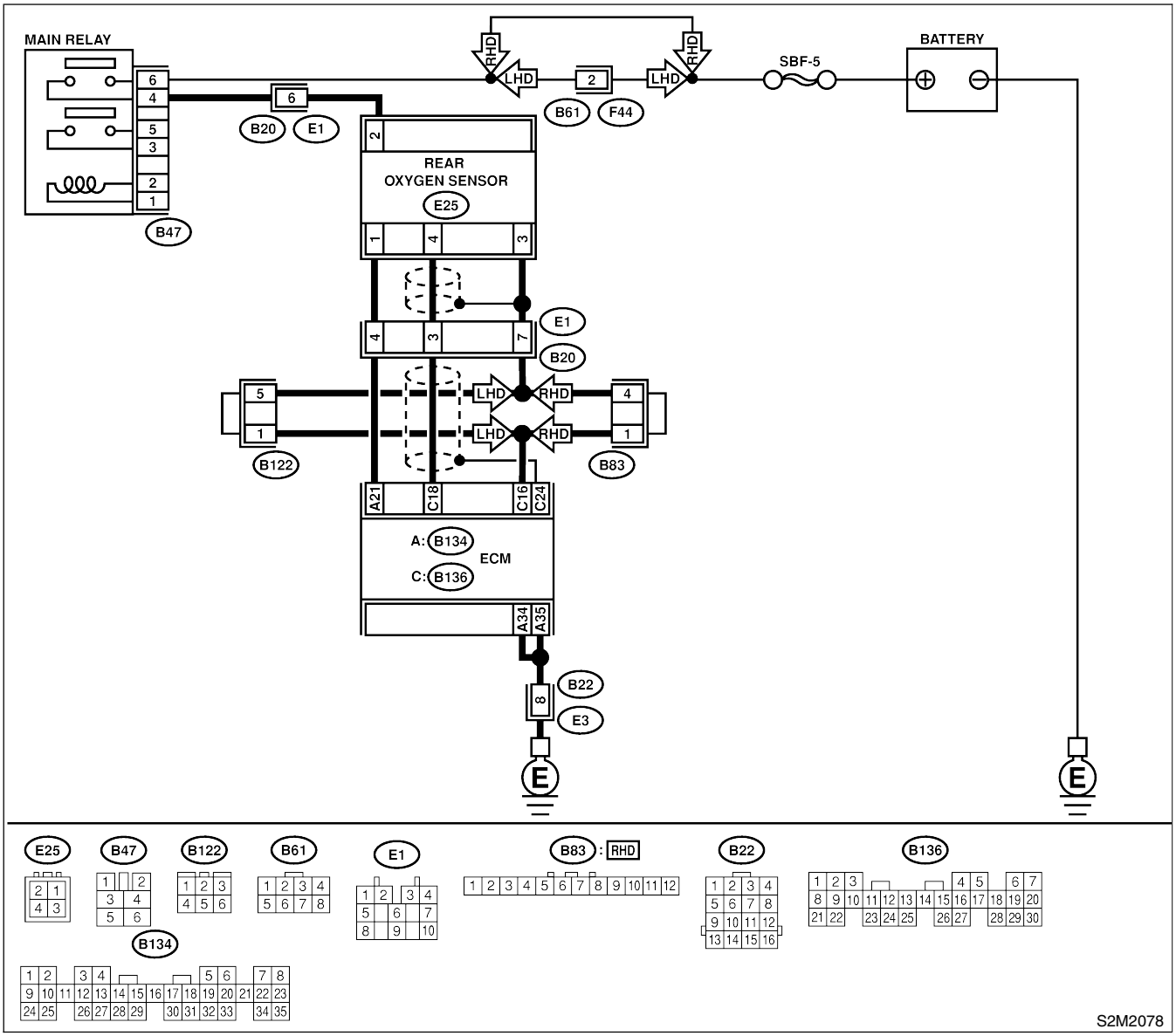
MEMO:

X: DTC P0139 — REAR OXYGEN SENSOR CIRCUIT SLOW RESPONSE — S058521B29

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, 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 “17. List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(SOHC)-80, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0139.	Replace rear oxygen sensor. <Ref. to FU(SOHC)-47, Rear Oxygen Sensor.>

Y: DTC P0170 — FUEL TRIM MALFUNCTION — S058521B31

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

No.	Step	Check	Yes	No
1	**CHECK EXHAUST SYSTEM.**	Are there holes or loose bolts on exhaust system?	Repair exhaust system.	Go to step **2**.
2	**CHECK AIR INTAKE SYSTEM.**	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair air intake system.	Go to step **3**.
3	**CHECK FUEL PRESSURE.** **WARNING:** • **Place "NO FIRE" signs near the working area.** • **Be careful not to spill fuel on the floor.** 1) Release fuel pressure. (1) Disconnect connector from fuel pump relay. (2) Start the engine and run it until it stalls. (3) After the engine stalls, crank it for five more seconds. (4) Turn ignition switch to OFF. 2) Connect connector to fuel pump relay. 3) Disconnect fuel delivery hose from fuel filter, and connect fuel pressure gauge. 4) Install fuel filler cap. 5) Start the engine and idle while gear position is neutral. 6) Measure fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold. **WARNING:** **Before removing fuel pressure gauge, release fuel pressure.** NOTE: If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again.	Is fuel pressure between 284 and 314 kPa (2.9 — 3.2 kg/cm^2, 41 — 46 psi)?	Go to step **4**.	Repair the following items. **Fuel pressure too high** • Clogged fuel return line or bent hose **Fuel pressure too low** • Improper fuel pump discharge • Clogged fuel supply line

No.	Step	Check	Yes	No
4	**CHECK FUEL PRESSURE.** After connecting pressure regulator vacuum hose, measure fuel pressure. **WARNING:** **Before removing fuel pressure gauge, release fuel pressure.** NOTE: ● If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again. ● If out of specification as measured at this step, check or replace pressure regulator and pressure regulator vacuum hose.	Is fuel pressure between 206 and 235 kPa (2.1 — 2.4 kg/cm^2, 30 — 34 psi)?	Go to step **5**.	Repair the following items. **Fuel pressure too high** ● Faulty pressure regulator ● Clogged fuel return line or bent hose **Fuel pressure too low** ● Faulty pressure regulator ● Improper fuel pump discharge ● Clogged fuel supply line
5	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** 1) Start the engine and warm-up completely. 2) Read data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(SOHC)-34, 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 engine coolant temperature sensor. <Ref. to FU(SOHC)-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 A/C switch to OFF. 4) Turn all accessory switches to OFF. 5) Read data of intake manifold pressure sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(SOHC)-34, 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 your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.	Replace intake air temperature and pressure sensor. <Ref. to FU(SOHC)-36, Intake Air Temperature and Pressure Sensor.>

Z: DTC P0301 — CYLINDER 1 MISFIRE DETECTED — S058521B37

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(SOHC)-158, DTC P0304 — CYLINDER 4 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AA: DTC P0302 — CYLINDER 2 MISFIRE DETECTED — S058521B38

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(SOHC)-158, DTC P0304 — CYLINDER 4 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AB: DTC P0303 — CYLINDER 3 MISFIRE DETECTED — S058521B39

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(SOHC)-158, DTC P0304 — CYLINDER 4 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

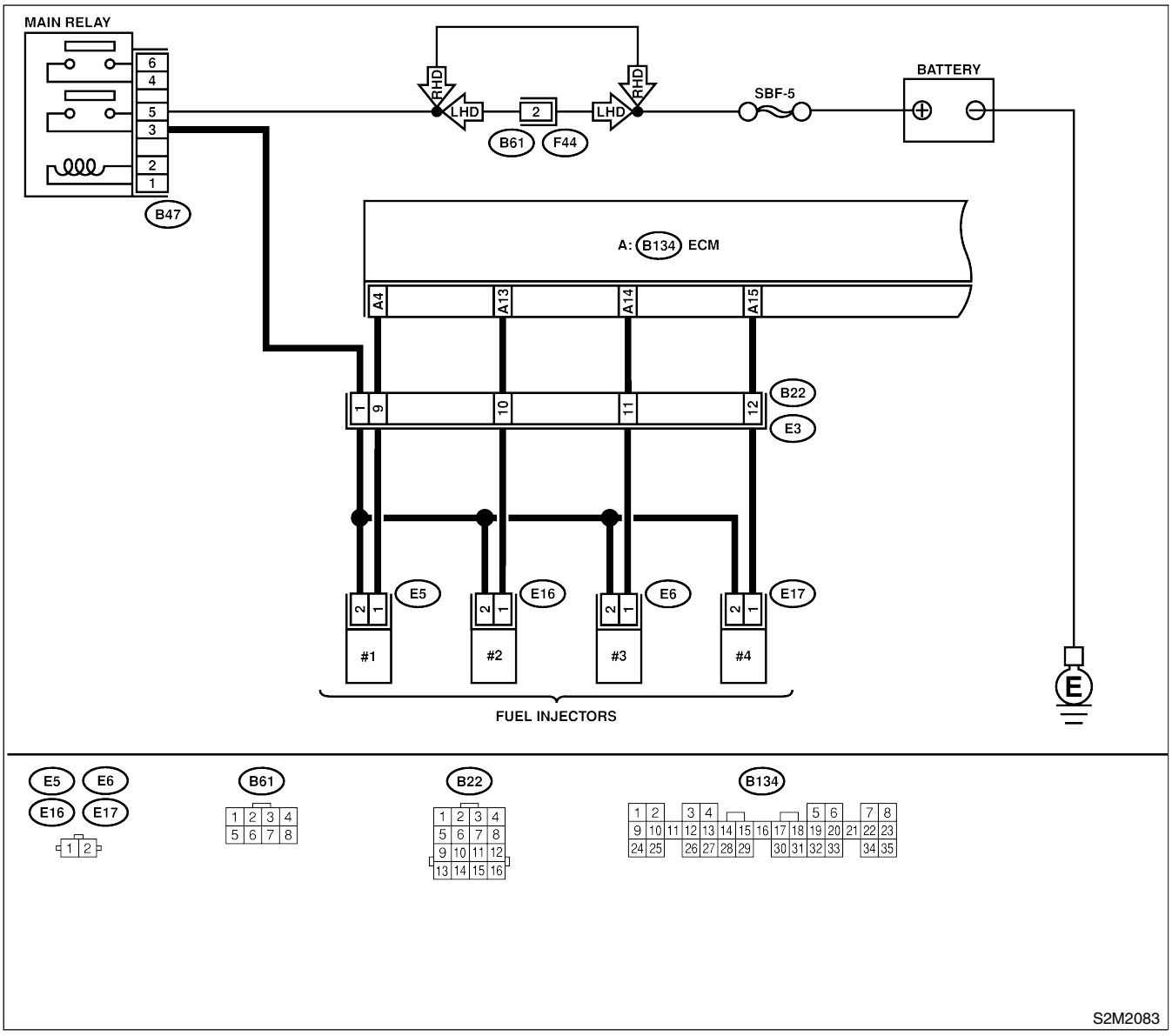
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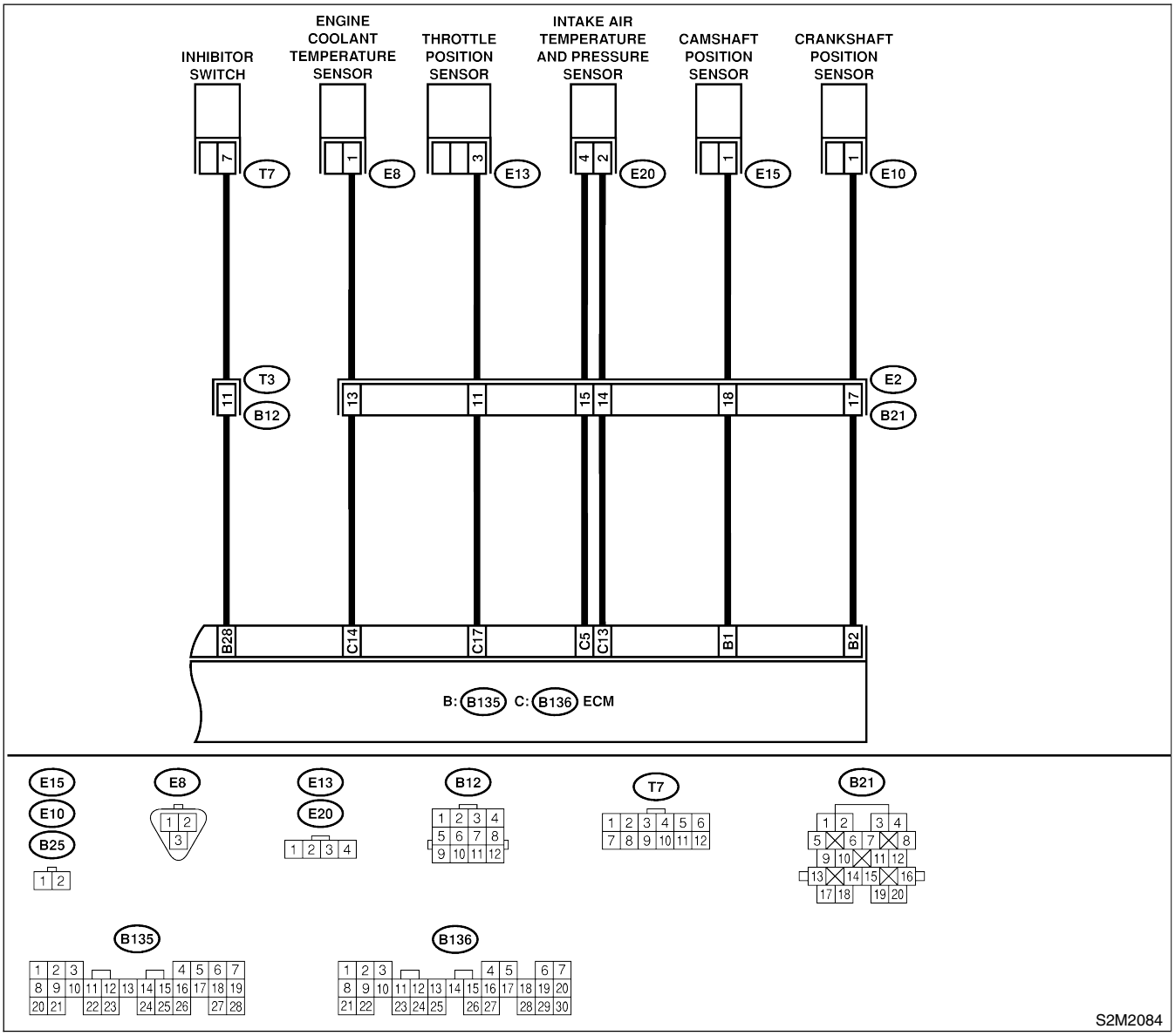
AC: DTC P0304 — CYLINDER 4 MISFIRE DETECTED — S058521B40

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, 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 P0106, P0107, P0108, P0117, P0118 or P0125?	Inspect DTC P0106, P0107, P0108, P0117, P0118 or P0125 using “17. List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(SOHC)-80, 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**.

No.	Step	Check	Yes	No
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM connector and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (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 ignition switch to OFF. 2) Disconnect connector from fuel injector on faulty cylinders. 3) Measure voltage between ECM connector and engine ground on faulty cylinders. ***Connector & terminal*** ***#1 (E5) No. 1 — Engine ground:*** ***#2 (E16) No. 1 — Engine ground:*** ***#3 (E6) No. 1 — Engine ground:*** ***#4 (E17) No. 1 — Engine ground:***	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 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 (B22)
5	**CHECK FUEL INJECTOR.** Measure resistance between fuel injector terminals on faulty cylinder. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 5 and 20 Ω?	Go to step **6**.	Replace faulty fuel injector. <Ref. to FU(SOHC)-40, Fuel Injector.>

No.	Step	Check	Yes	No
6	**CHECK POWER SUPPLY LINE.** 1) Turn ignition switch to ON. 2) Measure voltage between fuel injector and engine ground on faulty cylinders. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (–):*** ***#2 (E16) No. 2 (+) — Engine ground (–):*** ***#3 (E6) No. 2 (+) — Engine ground (–):*** ***#4 (E17) No. 2 (+) — Engine ground (–):***	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 ignition switch to OFF. 2) Disconnect connector from fuel injector on faulty cylinder. 3) Turn ignition switch to ON. 4) Measure voltage between ECM connector and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (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 ECM. <Ref. to FU(SOHC)-49, Engine Control Module.>	Go to step **8**.
8	**CHECK FUEL INJECTOR.** 1) Turn ignition switch to OFF. 2) Measure resistance between fuel injector terminals on faulty cylinder. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Replace faulty fuel injector <Ref. to FU(SOHC)-40, Fuel Injector .> and ECM <Ref. to FU(SOHC)-49, Engine Control Module.>.	Go to step **9**.
9	**CHECK INSTALLATION OF CAMSHAFT POSITION SENSOR/CRANKSHAFT POSITION SENSOR.**	Is camshaft position sensor or crankshaft position sensor loosely installed?	Tighten camshaft position sensor or crankshaft position sensor.	Go to step **10**.
10	**CHECK CRANKSHAFT SPROCKET.** Remove timing belt cover.	Is crankshaft sprocket rusted or does it have broken teeth?	Replace crankshaft sprocket. <Ref. to ME(SOHC)-53, Crankshaft Sprocket.>	Go to step **11**.

No.	Step	Check	Yes	No
11	**CHECK INSTALLATION CONDITION OF TIMING BELT.** Turn crankshaft using ST, and align alignment mark on crankshaft sprocket with alignment mark on cylinder block. ST 499987500 CRANKSHAFT SOCKET	Is timing belt dislocated from its proper position?	Repair installation condition of timing belt. <Ref. to ME(SOHC)-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 memory using Subaru Select Monitor. <Ref. to EN(SOHC)-45, Clear Memory Mode.> 2) Start engine, and drive the vehicle more than 10 minutes.	Is the MIL coming on or blinking?	Go to step **15**.	Go to step **14**.
14	**CHECK CAUSE OF MISFIRE DIAGNOSED.**	Was the cause of misfire diagnosed when the engine is running?	Finish diagnostics operation, if the engine has no abnormality. NOTE: Ex. Remove spark plug cord, etc.	Repair poor contact. NOTE: In this case, repair the following: • Poor contact in ignitor connector • Poor contact in ignition coil connector • Poor contact in fuel injector connector on faulty cylinders • Poor contact in ECM connector • Poor contact in coupling connector
15	**CHECK AIR INTAKE SYSTEM.**	Is there a fault in air intake system?	Repair air intake system. NOTE: Check the following items: • Are there air leaks or air suction caused by loose or dislocated nuts and bolts? • Are there cracks or any disconnection of hoses?	Go to step **16**.

No.	Step	Check	Yes	No
16	**CHECK MISFIRE SYMPTOM.** 1) Turn ignition switch to ON. 2) Read diagnostic trouble code (DTC). ● Subaru Select Monitor <Ref. to EN(SOHC)-34, 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 P0170. <Ref. to EN(SOHC)-154, DTC P0170 — FUEL TRIM MALFUNCTION —, 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(SOHC)-68, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Go to DTC P0170. <Ref. to EN(SOHC)-154, DTC P0170 — FUEL TRIM MALFUNCTION —, 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(SOHC)-68, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Go to DTC P0170. <Ref. to EN(SOHC)-154, DTC P0170 — FUEL TRIM MALFUNCTION —, 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 P0170. <Ref. to EN(SOHC)-154, DTC P0170 — FUEL TRIM MALFUNCTION —, 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 P0170. <Ref. to EN(SOHC)-154, DTC P0170 — FUEL TRIM MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
26	**CYLINDER AT RANDOM**	Is the engine idle rough?	Go to DTC P0170. <Ref. to EN(SOHC)-154, DTC P0170 — FUEL TRIM MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Repair or replace faulty parts. NOTE: Check the following items. • Spark plugs • Fuel injectors • Compression ratio

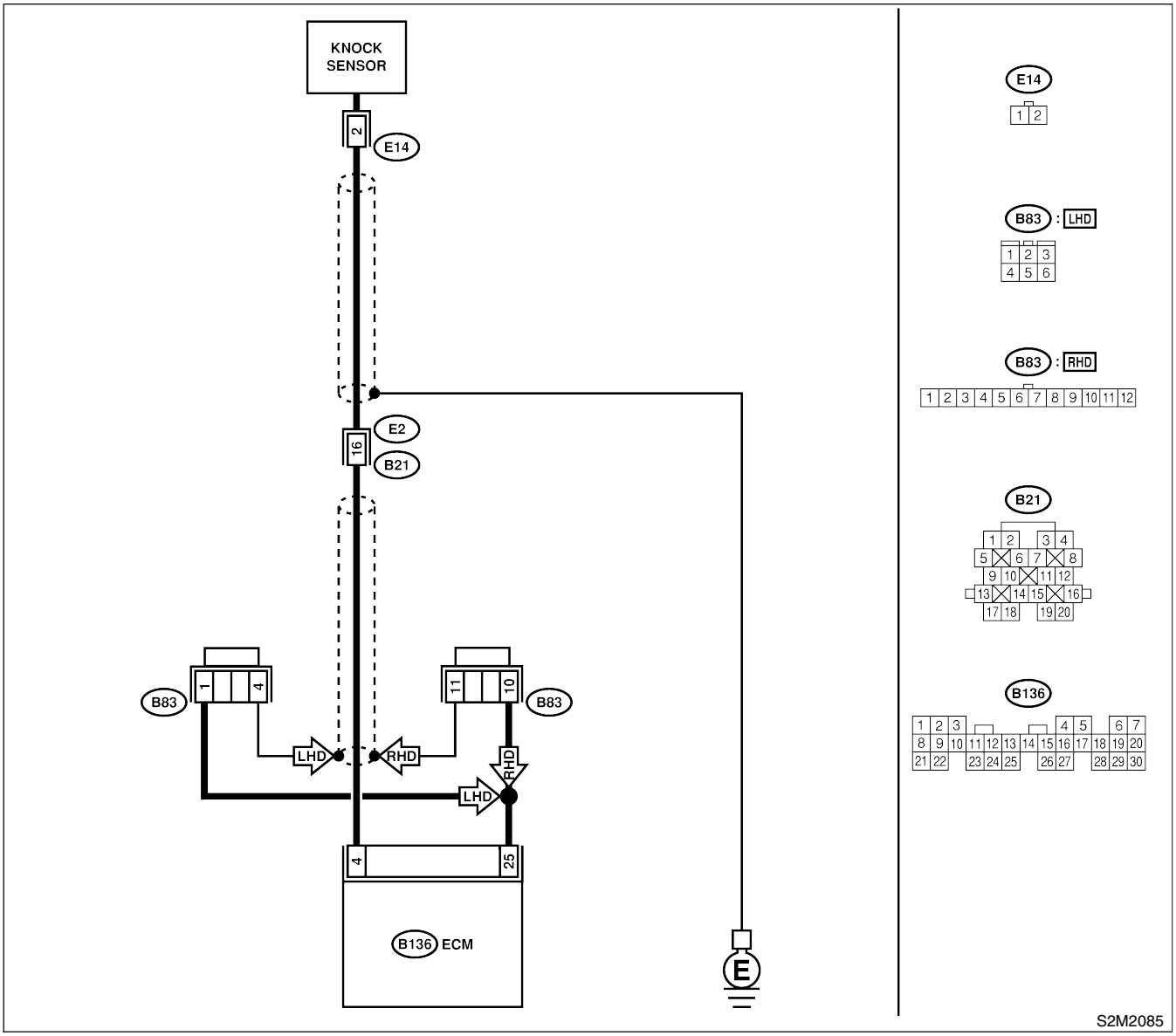
MEMO:

AD: DTC P0327 — KNOCK SENSOR CIRCUIT LOW INPUT — S058521F94

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



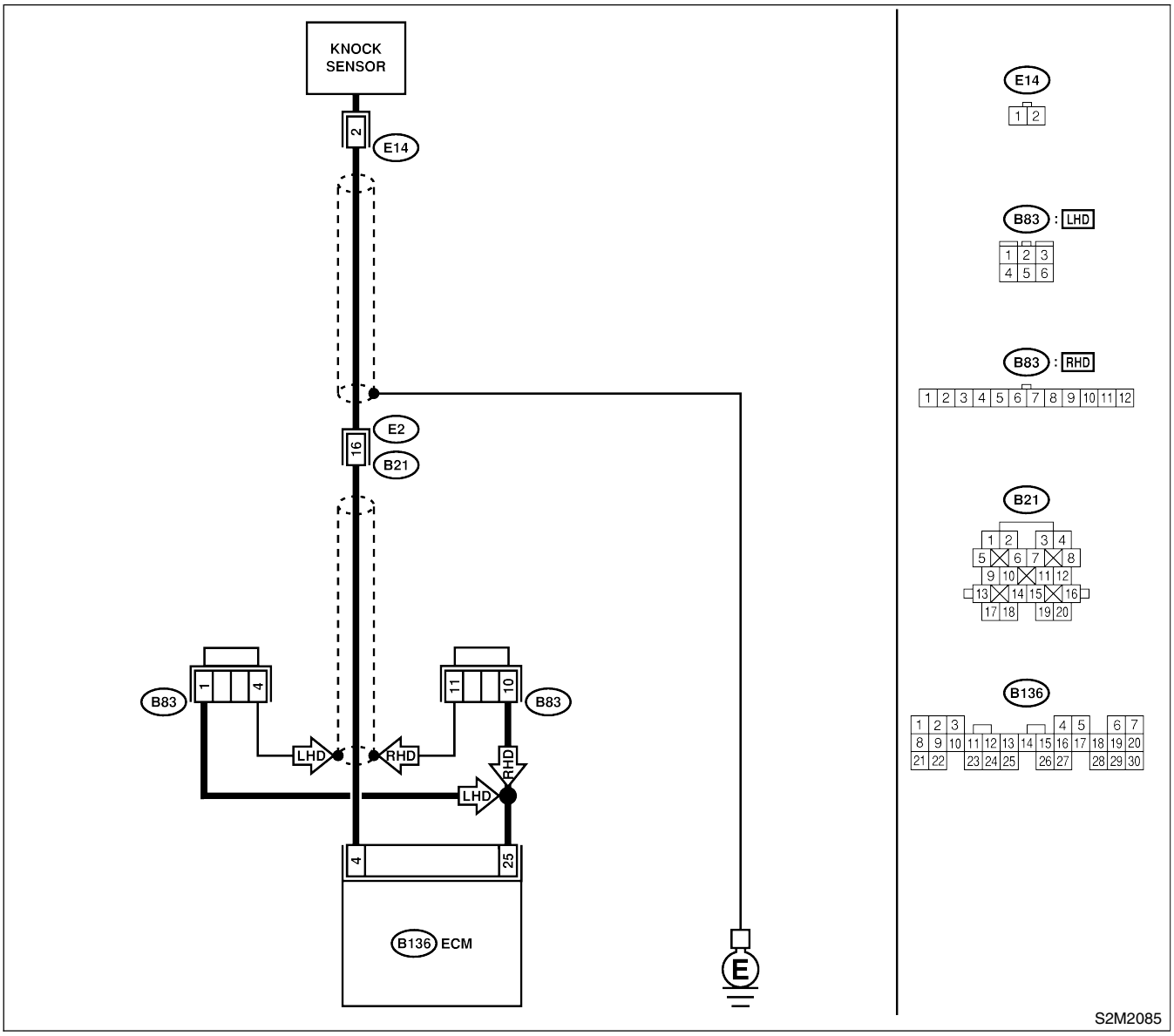
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance between ECM harness connector and chassis ground. ***Connector & terminal*** ***(B136) No. 4 — Chassis ground:***	Is the resistance 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 (B21)
2	**CHECK KNOCK SENSOR.** 1) Disconnect connector from knock sensor. 2) Measure resistance between knock sensor connector terminal and engine ground. ***Terminal*** ***No. 2 — Engine ground:***	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 (B21)
3	**CHECK CONDITION OF KNOCK SENSOR INSTALLATION.**	Is the knock sensor installation bolt tightened securely?	Replace knock sensor. <Ref. to FU(SOHC)-31, Knock Sensor.>	Tighten knock sensor installation bolt securely.

AE: DTC P0328 — KNOCK SENSOR CIRCUIT HIGH INPUT — S058521F95

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



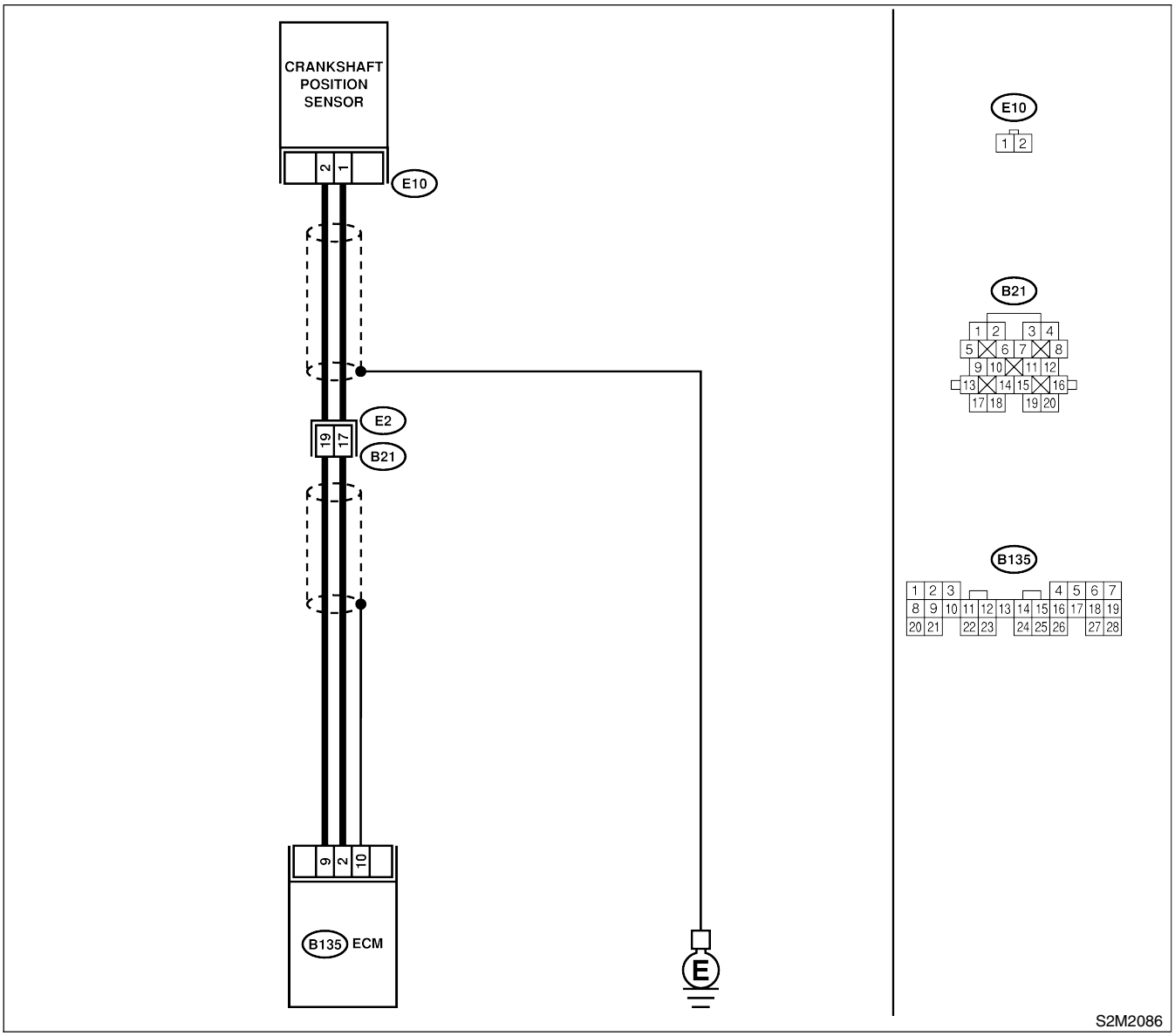
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** Measure resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 4 — Chassis ground:***	Is the resistance less than 400 kΩ?	Go to step **2**.	Go to step **3**.
2	**CHECK KNOCK SENSOR.** 1) Disconnect connector from knock sensor. 2) Measure resistance between knock sensor connector terminal and engine ground. ***Terminal*** ***No. 2 — Engine ground:***	Is the resistance less than 400 kΩ?	Replace knock sensor. <Ref. to FU(SOHC)-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 connectors to ECM and knock sensor. 2) Turn ignition switch to ON. 3) Measure 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 (B21)	Repair poor contact in ECM connector.

AF: DTC P0335 — CRANKSHAFT POSITION SENSOR CIRCUIT MALFUNCTION — S058521B42

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



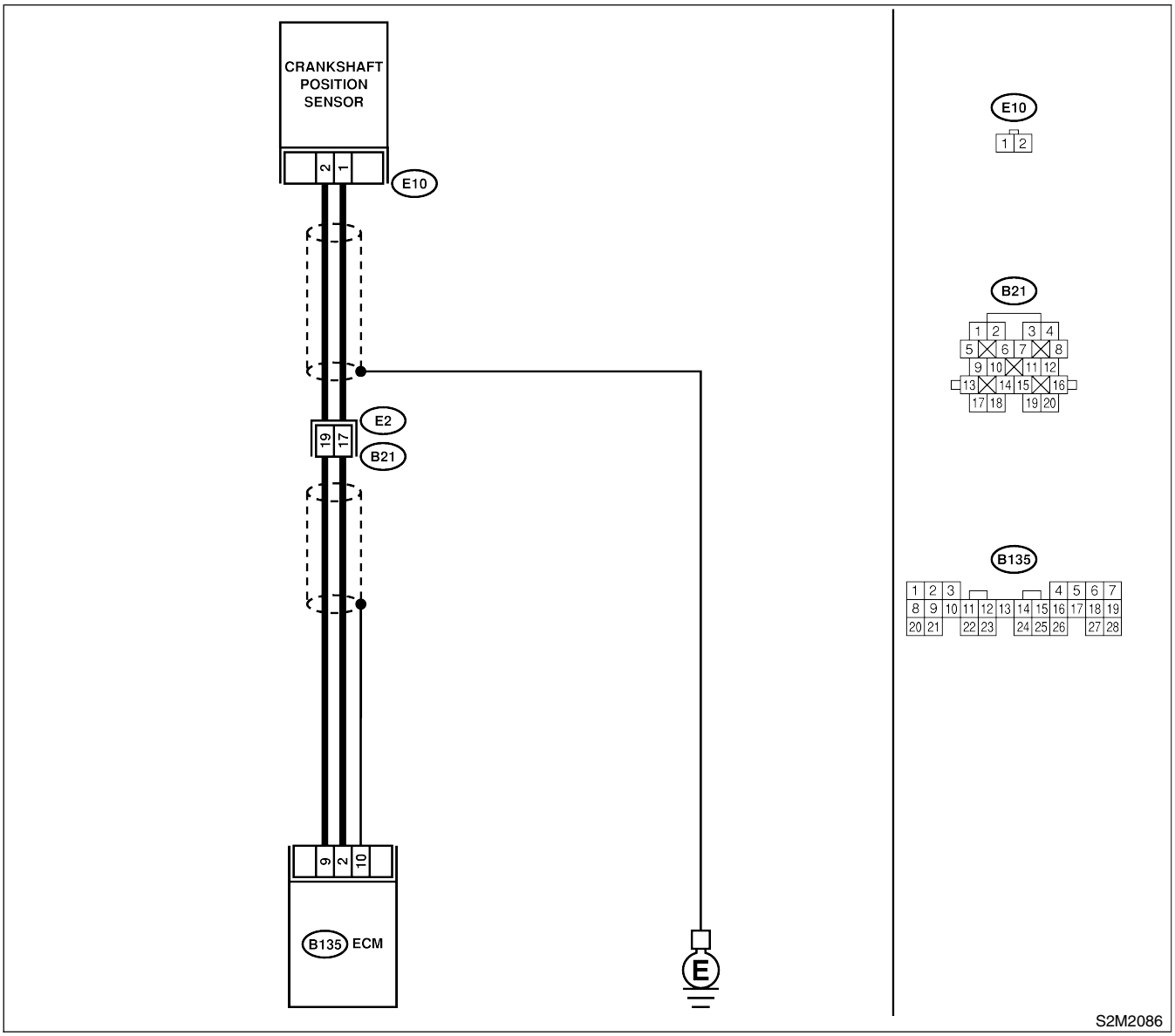
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from crankshaft position sensor. 3) Measure resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:***	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 (B21)	Go to step **2**.
2	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:***	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 CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 2 — Engine ground:***	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 (B21)
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 crankshaft position sensor. 2) Measure 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 crankshaft position sensor. <Ref. to FU(SOHC)-29, Crankshaft Position Sensor.>

AG: DTC P0336 — CRANKSHAFT POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM — S058521B43

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, 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 "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(SOHC)-80, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.** Turn ignition switch to OFF.	Is the crankshaft position sensor installation bolt tightened securely?	Go to step **3**.	Tighten crankshaft position sensor installation bolt securely.
3	**CHECK CRANKSHAFT SPROCKET.** Remove front belt cover.	Are crankshaft sprocket teeth cracked or damaged?	Replace crankshaft sprocket. <Ref. to ME(SOHC)-46, Crankshaft Sprocket.>	Go to step **4**.
4	**CHECK INSTALLATION CONDITION OF TIMING BELT.** Turn crankshaft using ST, and align alignment mark on crankshaft sprocket with alignment mark on cylinder block. ST 499987500 CRANKSHAFT SOCKET	Is timing belt dislocated from its proper position?	Repair installation condition of timing belt. <Ref. to ME(SOHC)-46, Timing Belt Assembly.>	Replace crankshaft position sensor. <Ref. to FU(SOHC)-29, Crankshaft Position Sensor.>

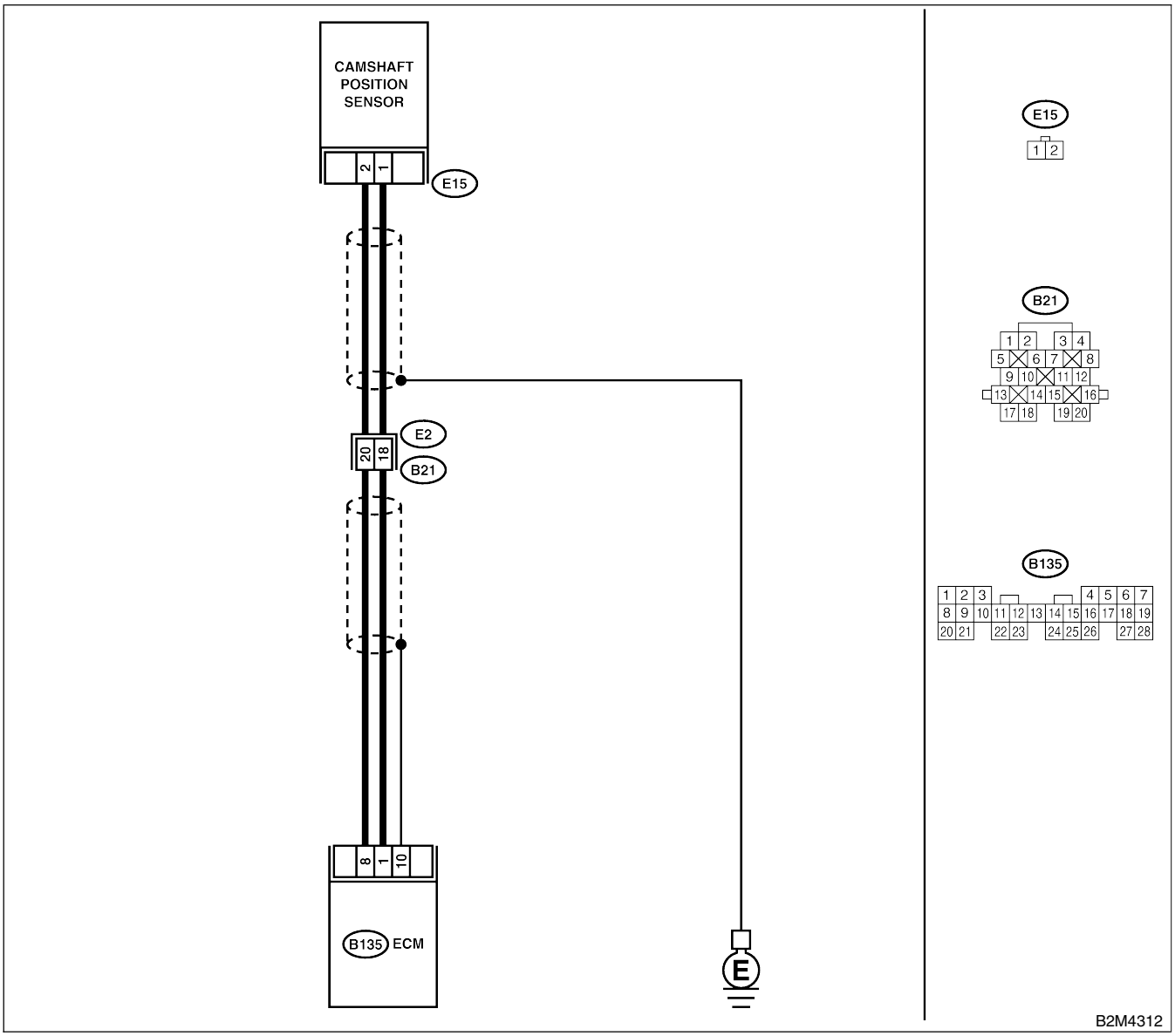
AH: DTC P0340 — CAMSHAFT POSITION SENSOR CIRCUIT MALFUNCTION

S058521B44

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



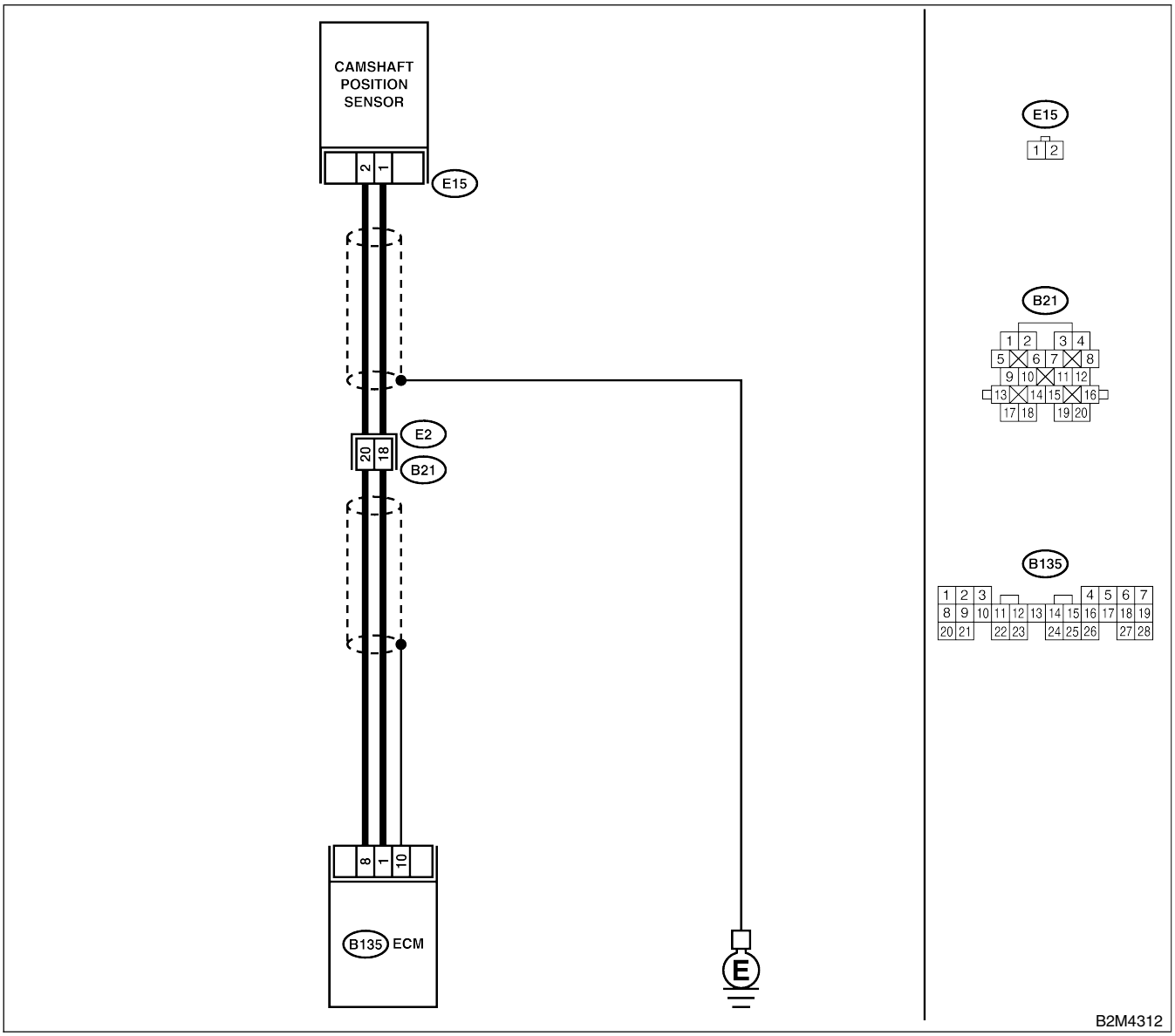
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from camshaft position sensor. 3) Measure resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	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 (B21)	Go to step **2**.
2	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	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 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 (B21)
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 camshaft position sensor. 2) Measure 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 camshaft position sensor. <Ref. to FU(SOHC)-30, Camshaft Position Sensor.>

AI: DTC P0341 — CAMSHAFT POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM — S058521B45

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, 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 "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(SOHC)-80, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from camshaft position sensor. 3) Measure resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	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 (B21)	Go to step **3**.
3	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	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 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 (B21)
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 camshaft position sensor. 2) Measure 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 camshaft position sensor. <Ref. to FU(SOHC)-30, Camshaft Position Sensor.>
7	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.** Turn 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 front belt cover. <Ref. to ME(SOHC)-45, Belt Cover.>	Are camshaft sprocket teeth cracked or damaged?	Replace camshaft sprocket. <Ref. to ME(SOHC)-51, Camshaft Sprocket.>	Go to step **9**.
9	**CHECK INSTALLATION CONDITION OF TIMING BELT.** Turn camshaft using ST, and align alignment mark on camshaft sprocket with alignment mark on timing belt cover LH. ST 499207100 CAMSHAFT SPROCKET WRENCH	Is timing belt dislocated from its proper position?	Repair installation condition of timing belt. <Ref. to ME(SOHC)-46, Timing Belt Assembly.>	Replace camshaft position sensor. <Ref. to FU(SOHC)-30, Camshaft Position Sensor.>

MEMO:

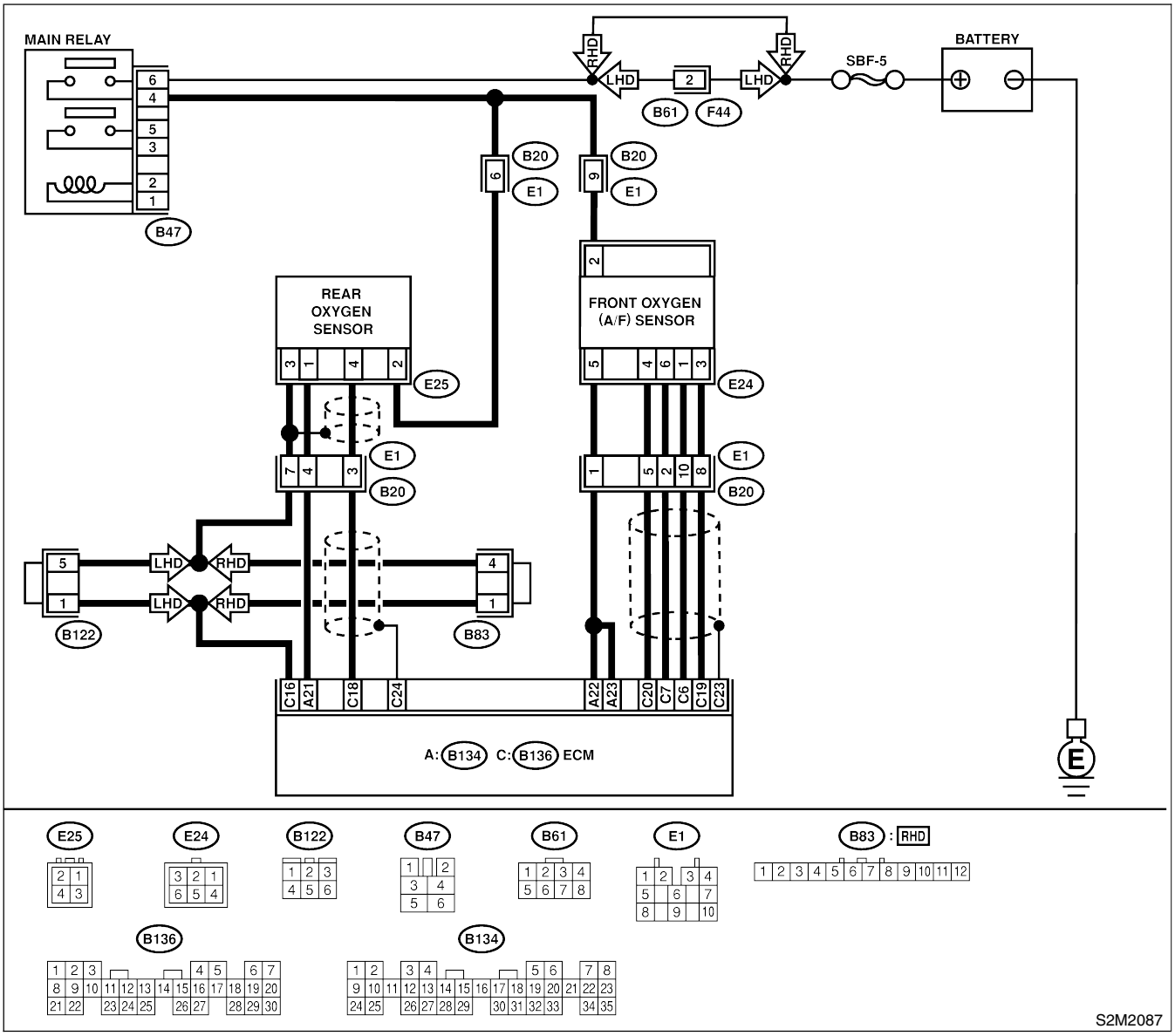
AJ: DTC P0420 — CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD —

S058521B46

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



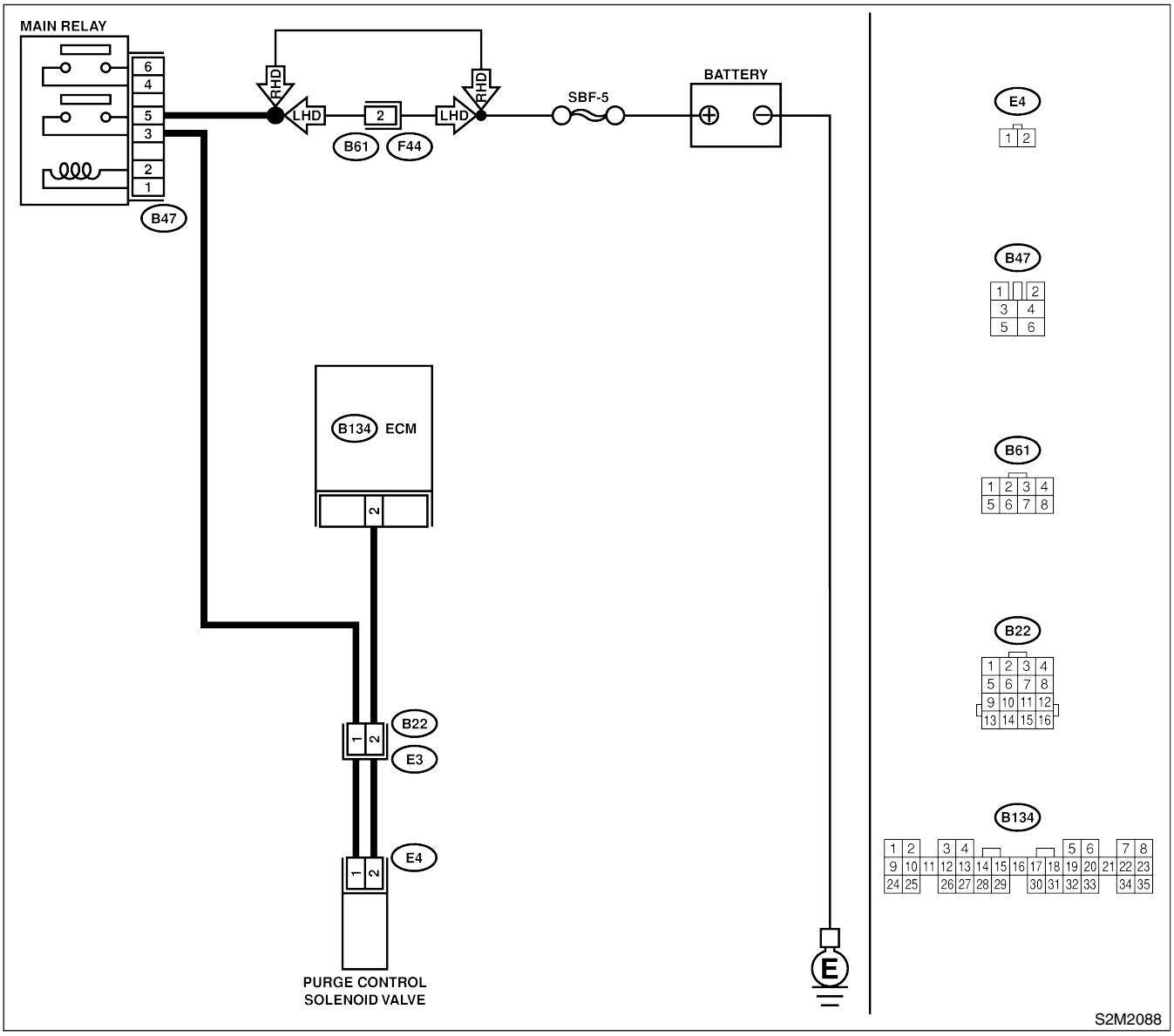
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0130, P0133, P0136, P0139, P0037, P0301, P0302, P0303, P0304, P1130, P1131, P0031, P0032 and P0038?	Inspect the relevant DTC using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(SOHC)-80, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0420.	Go to step **2**.
2	**CHECK EXHAUST SYSTEM.** Check for gas leaks or air suction caused by loose or dislocated nuts and bolts, and open hole at exhaust pipes. NOTE: Check the following positions. • Between cylinder head and front exhaust pipe • Between front exhaust pipe and front catalytic converter • Between front catalytic converter and rear catalytic converter	Is there a fault in exhaust system?	Repair or replace exhaust system. <Ref. to EX(SOHC)-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 front catalytic converter <Ref. to EC(SOHC)-3. Front Catalytic Converter.> and rear catalytic converter <Ref. to EC(SOHC)-6, Rear Catalytic Converter.>.	Go to step **4**.
4	**CHECK FRONT CATALYTIC CONVERTER.** Remove front catalytic converter.	Is there damage at rear face or front face of front catalyst?	Replace front catalytic converter. <Ref. to EC(SOHC)-3, Front Catalytic Converter.>	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

AK: DTC P0444 — EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT LOW INPUT — S058521G47

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(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 your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.	Go to step **2**.
2	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from purge control solenoid valve and ECM. 3) Measure resistance of harness between purge control solenoid valve connector and engine ground. ***Connector & terminal*** ***(E4) No. 2 — Engine ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between ECM and purge control solenoid valve connector.	Go to step **3**.
3	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** Measure resistance of harness between ECM and purge control solenoid valve of harness connector. ***Connector & terminal*** ***(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 (B22)
4	**CHECK PURGE CONTROL SOLENOID VALVE.** 1) Remove purge control solenoid valve. 2) Measure resistance between purge control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 10 and 100 Ω?	Go to step **5**.	Replace purge control solenoid valve. <Ref. to EC(SOHC)-8, Purge Control Solenoid Valve.>
5	**CHECK POWER SUPPLY TO PURGE CONTROL SOLENOID VALVE.** 1) Turn ignition switch to ON. 2) Measure voltage between purge control solenoid valve and engine ground. ***Connector & terminal*** ***(E4) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **6**.	Repair open circuit in harness between main relay and purge control solenoid valve connector.

No.	Step	Check	Yes	No
6	**CHECK POOR CONTACT.** Check poor contact in purge control solenoid valve connector.	Is there poor contact in purge control solenoid valve connector?	Repair poor contact in purge control solenoid valve connector.	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

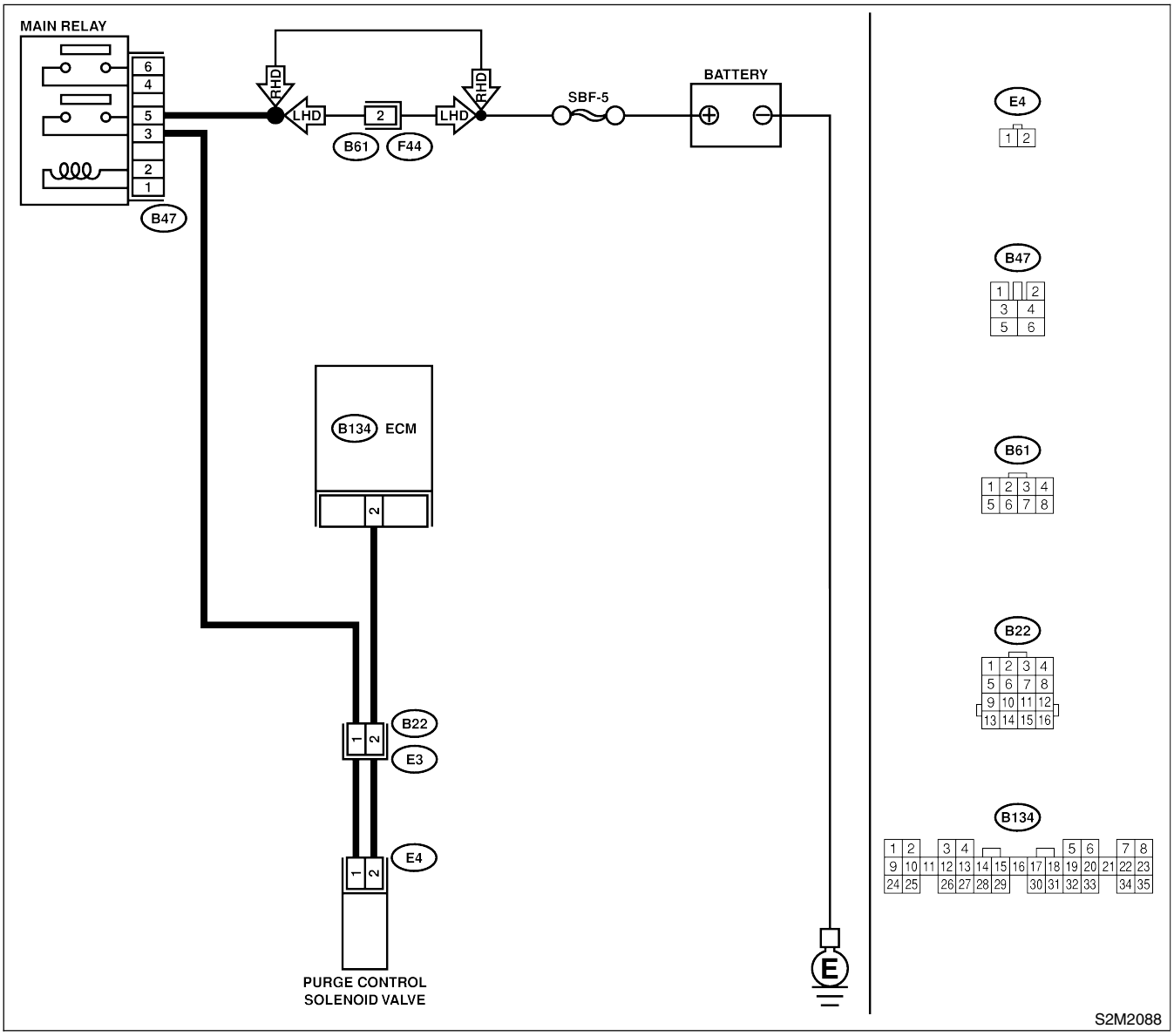
MEMO:

AL: DTC P0445 — EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH INPUT — S058521G48

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



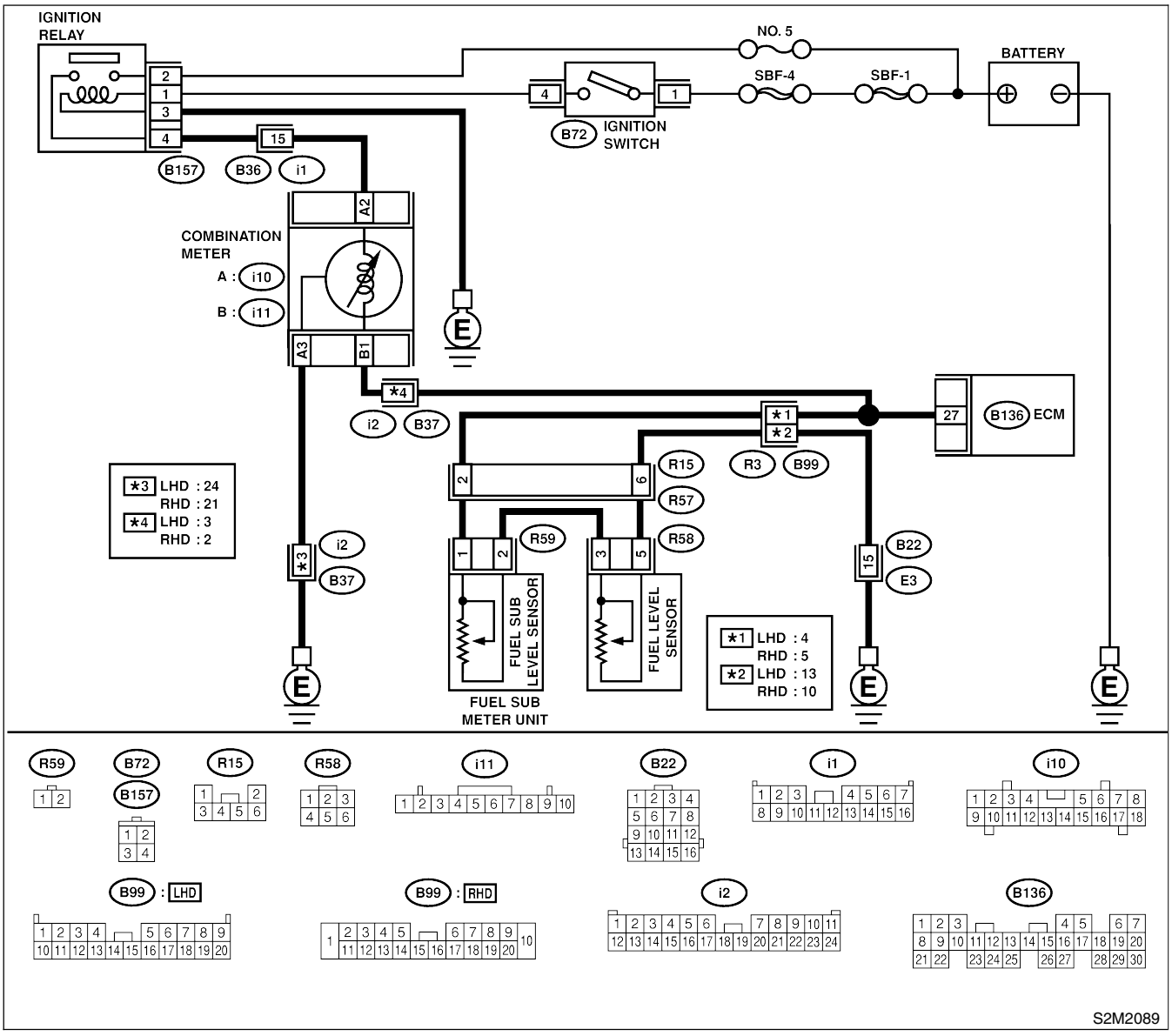
No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn ignition switch to OFF. 2) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box. 3) Turn ignition switch to ON. 4) While operating purge control solenoid valve, measure voltage between ECM and chassis ground. NOTE: Purge control solenoid valve operation can be executed using Subaru Select Monitor. For procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(SOHC)-46, Compulsory Valve Operation Check Mode.> ***Connector & terminal*** ***(B134) No. 2 (+) — Chassis ground (–):***	Does 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 ignition switch to ON. 2) Measure 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 ECM. <Ref. to FU(SOHC)-49, Engine Control Module.>
4	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from purge control solenoid valve. 3) Turn ignition switch to ON. 4) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(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 ECM. <Ref. to FU(SOHC)-49, Engine Control Module.>	Go to step **5**.
5	**CHECK PURGE CONTROL SOLENOID VALVE.** 1) Turn ignition switch to OFF. 2) Measure resistance between purge control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Replace purge control solenoid valve <Ref. to EC(SOHC)-8, Purge Control Solenoid Valve.> and ECM <Ref. to FU(SOHC)-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 ECM. <Ref. to FU(SOHC)-49, Engine Control Module.>

AM: DTC P0461 — FUEL LEVEL SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM — S058521B54

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



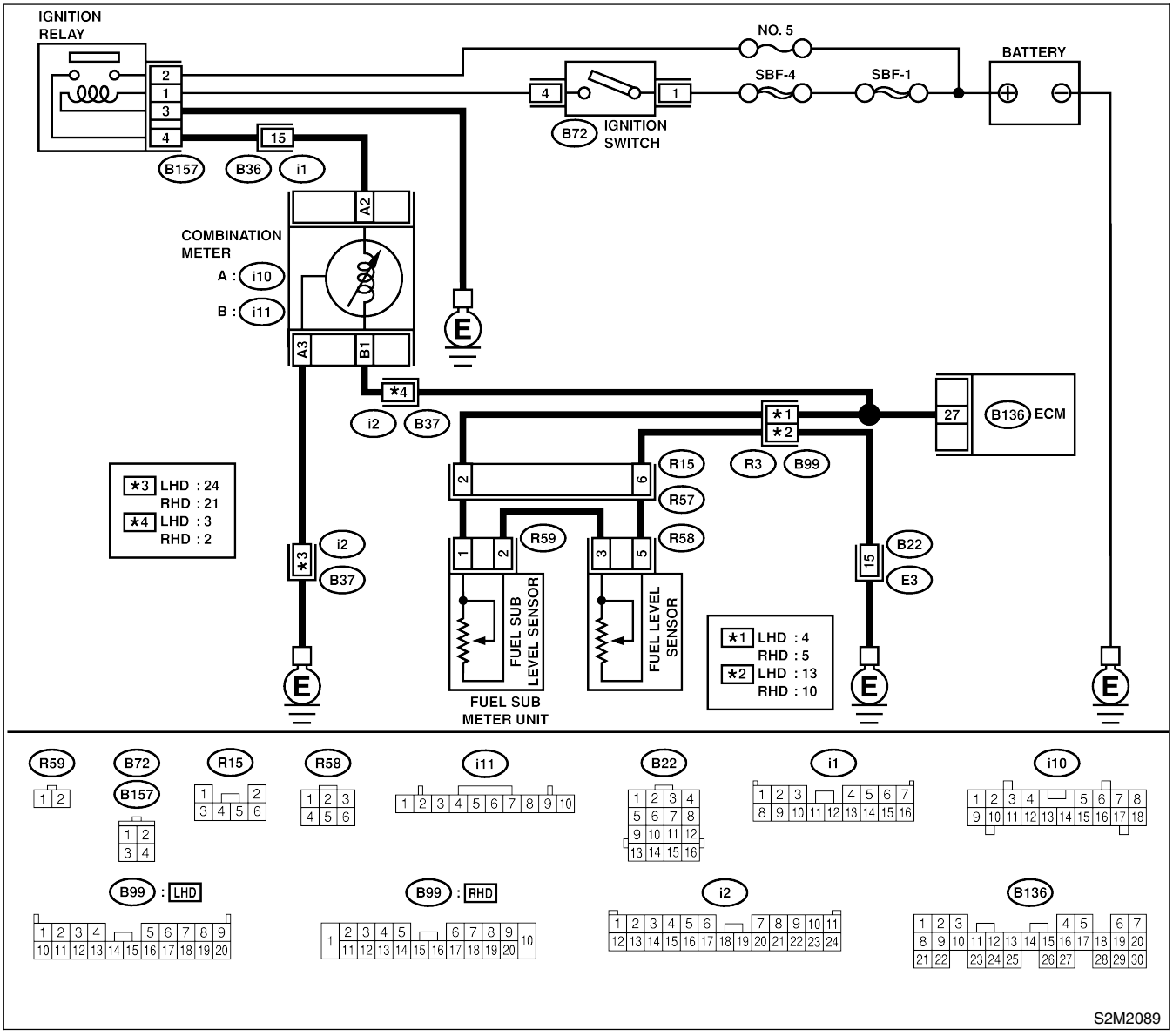
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0462 or P0463?	Inspect DTC P0462 or P0463 using “17. List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(SOHC)-80, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect this trouble.	Replace fuel level sensor <Ref. to FU(SOHC)-64, Fuel Level Sensor.> and fuel sub level sensor <Ref. to FU(SOHC)-65, Fuel Sub Level Sensor.>.

AN: DTC P0462 — FUEL LEVEL SENSOR CIRCUIT LOW INPUT — S058521B55

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK SPEEDOMETER AND TACHOMETER OPERATION IN COMBINATION METER.**	Does speedometer and tachometer operate normally?	Go to step **2**.	Repair or replace combination meter. <Ref. to IDI-4, Combination Meter System.>

No.	Step	Check	Yes	No
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn ignition switch to ON. (Engine OFF) 2) Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(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 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(SOHC)-34, 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
4	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn ignition switch to OFF. 2) Separate fuel tank cord connector (R57) and rear wiring harness connector (R15). 3) Turn ignition switch to ON. 4) Measure voltage of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(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 ignition switch to OFF. 2) Disconnect connector from connector (i11) and ECM connector. 3) Measure 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 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 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 (i2)

No.	Step	Check	Yes	No
7	**CHECK FUEL TANK CORD.** 1) Turn ignition switch to OFF. 2) Disconnect connector from fuel sub level sensor. 3) Measure resistance between fuel sub level sensor and chassis ground. ***Connector & terminal*** ***(R59) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8**.	Repair ground short circuit in fuel tank cord.
8	**CHECK FUEL TANK CORD.** 1) Disconnect connector from fuel pump assembly. 2) Measure resistance between fuel pump assembly and chassis ground. ***Connector & terminal*** ***(R59) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **9**.	Repair ground short circuit in fuel tank cord.
9	**CHECK FUEL LEVEL SENSOR.** **WARNING:** **During work procedures, if fuel tank is more than 3/4 full, be careful because fuel may spill.** 1) Remove fuel pump assembly. <Ref. to FU(SOHC)-62 Fuel Pump.> 2) Measure resistance between fuel level sensor and terminals with its float set to the full position. ***Terminals*** ***No. 3 — No. 5:***	Is the resistance between 0.5 and 2.5 Ω?	Go to step **10**.	Replace fuel level sensor.
10	**CHECK FUEL SUB LEVEL SENSOR.** **WARNING:** **During work procedures, if fuel tank is more than 3/4 full, be careful because fuel may spill.** 1) Remove fuel sub level sensor. <Ref. to FU(SOHC)-65, Fuel Sub Level Sensor.> 2) Measure resistance between fuel sub level sensor and terminals with its float set to the full position. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 0.5 and 2.5 Ω?	Repair poor contact in harness between ECM and combination meter connector.	Replace fuel sub level sensor.

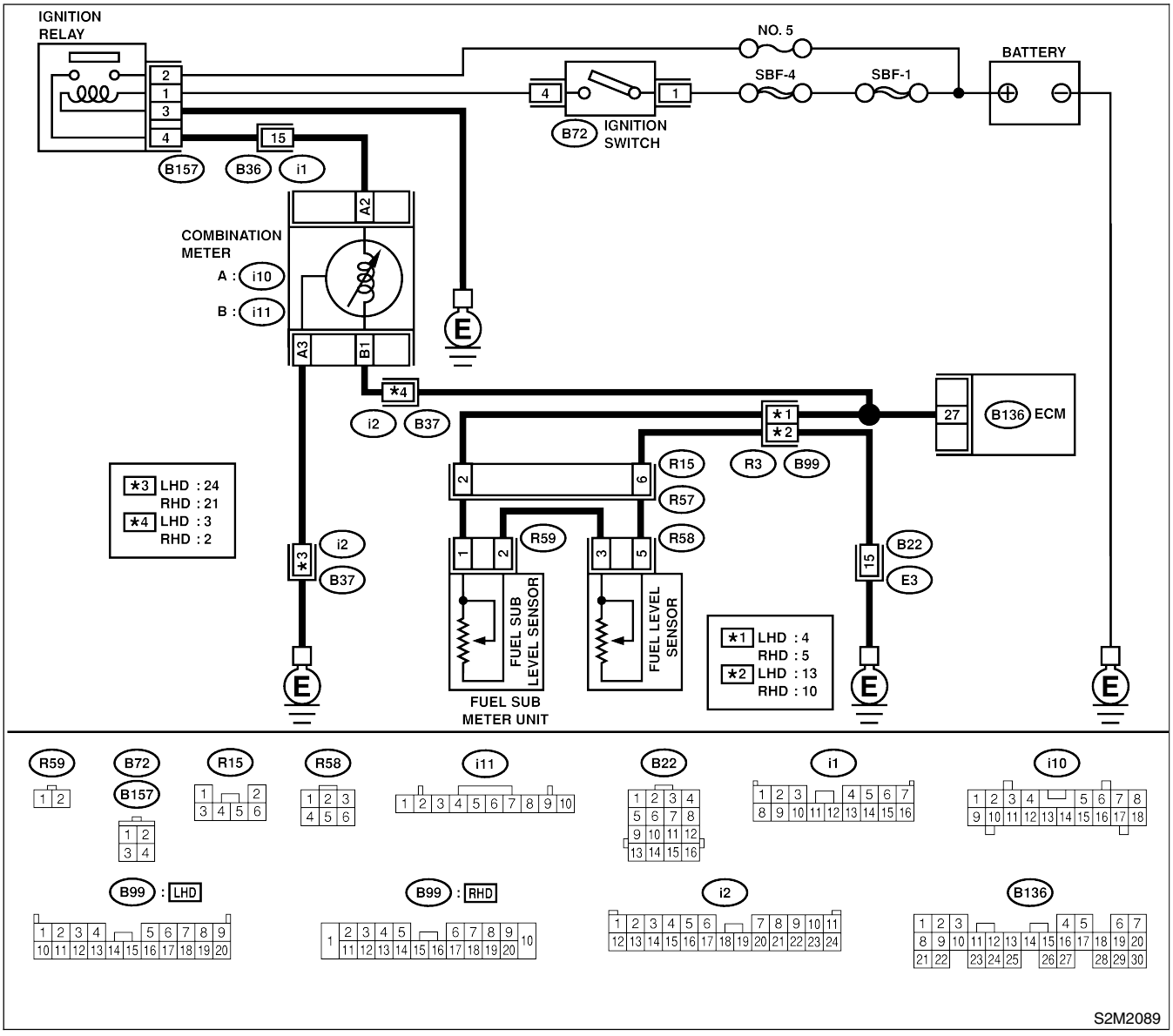
MEMO:

AO: DTC P0463 — FUEL LEVEL SENSOR CIRCUIT HIGH INPUT — S058521B56

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK SPEEDOMETER AND TACHOMETER OPERATION IN COMBINATION METER.**	Does speedometer and tachometer operate normally?	Go to step **2**.	Repair or replace combination meter. <Ref. to IDI-4, Combination Meter System.>

No.	Step	Check	Yes	No
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn ignition switch to ON. (Engine OFF) 2) Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(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 (B22, B37 and R57)
3	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn ignition switch to OFF. 2) Disconnect combination meter connector (i11) and ECM connector. 3) Turn ignition switch to ON. 4) Measure 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 ignition switch to OFF. 2) Separate fuel tank cord connector (R57) and rear wiring harness connector (R15). 3) Measure resistance between ECM and fuel tank cord. ***Connector & terminal*** ***(B136) No. 27 — (R15) No. 2:***	Is the resistance less than 5 Ω?	Go to step **5**.	Repair open circuit between ECM and fuel tank cord.
5	**CHECK HARNESS BETWEEN FUEL TANK CORD AND CHASSIS GROUND.** Measure resistance between fuel tank cord and chassis ground. ***Connector & terminal*** ***(R15) No. 6 — 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 (B22 and B99)
6	**CHECK FUEL TANK CORD.** 1) Disconnect connector from fuel level sensor. 2) Measure resistance between fuel level sensor and coupling connector. ***Connector & terminal*** ***(R57) No. 6 — (R58) No. 5:***	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 connector from fuel sub level sensor. 2) Measure 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 resistance between fuel sub level sensor and coupling connector. ***Connector & terminal*** ***(R57) No. 2 — (R59) No. 1:***	Is the resistance less than 10 Ω?	Go to step **9**.	Repair open circuit between coupling connector and fuel sub level sensor.
9	**CHECK FUEL LEVEL SENSOR.** **WARNING:** **During work procedures, if fuel tank is more than 3/4 full, be careful because fuel may spill.** 1) Remove fuel pump assembly. <Ref. to FU(SOHC)-62, Fuel Pump.> 2) While moving fuel level sensor float up and down, measure resistance between fuel level sensor terminals. ***Terminals*** ***No. 3 — No. 5:***	Is the resistance more than 54.5 Ω?	Replace fuel level sensor. <Ref. to FU(SOHC)-64, Fuel Level Sensor.>	Go to step **10**.
10	**CHECK FUEL SUB LEVEL SENSOR.** **WARNING:** **During work procedures, if fuel tank is more than 3/4 full, be careful because fuel may spill.** 1) Remove fuel sub level sensor. <Ref. to FU(SOHC)-65, Fuel Sub Level Sensor.> 2) While moving fuel sub level sensor float up and down, measure resistance between fuel sub level sensor terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance more than 41.5 Ω?	Replace fuel sub level sensor. <Ref. to FU(SOHC)-65, Fuel Sub Level Sensor.>	Replace combination meter. <Ref. to IDI-15, Combination Meter Assembly.>

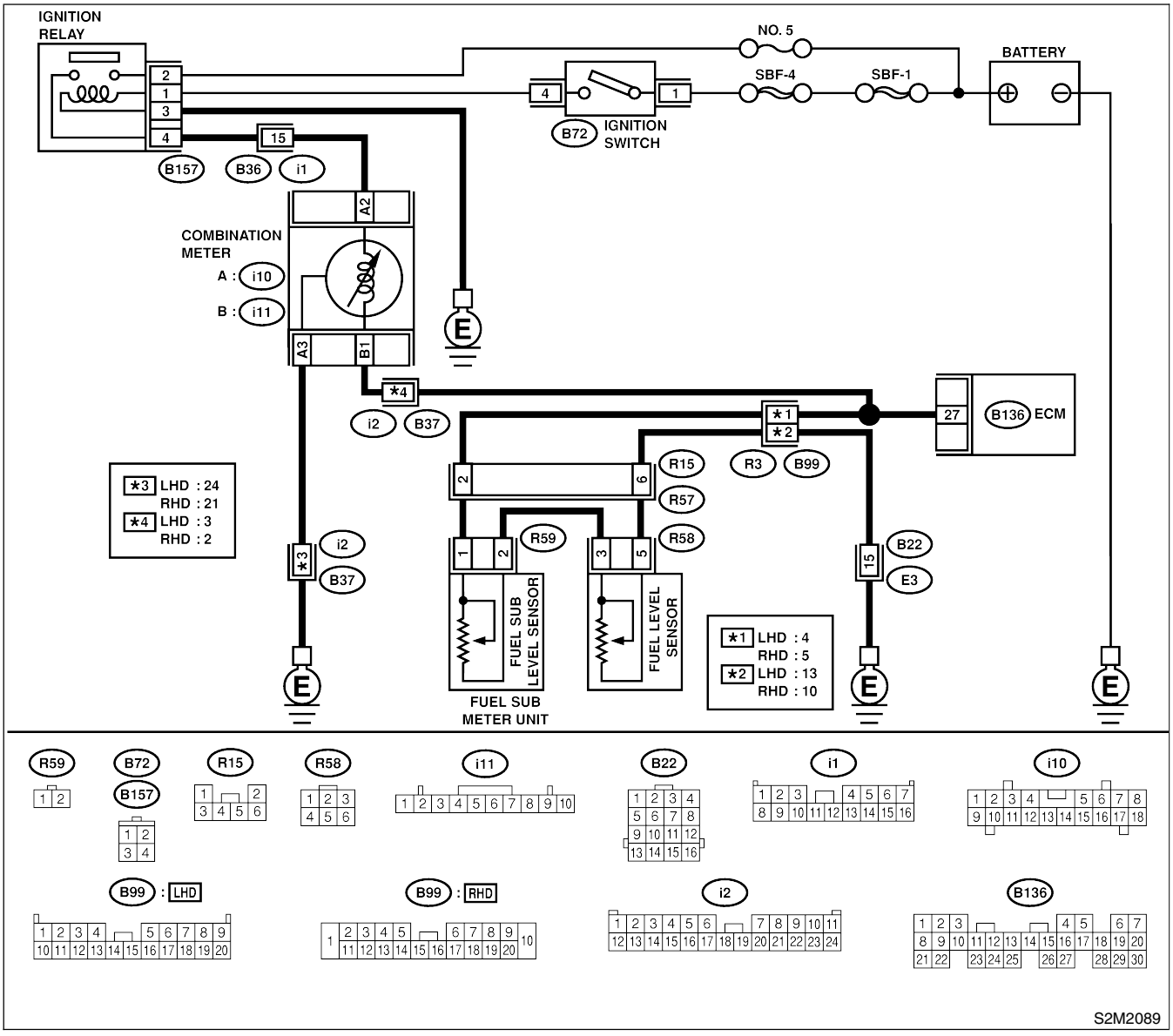
MEMO:

AP: DTC P0464 — FUEL LEVEL SENSOR INTERMITTENT INPUT— S058521G01

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



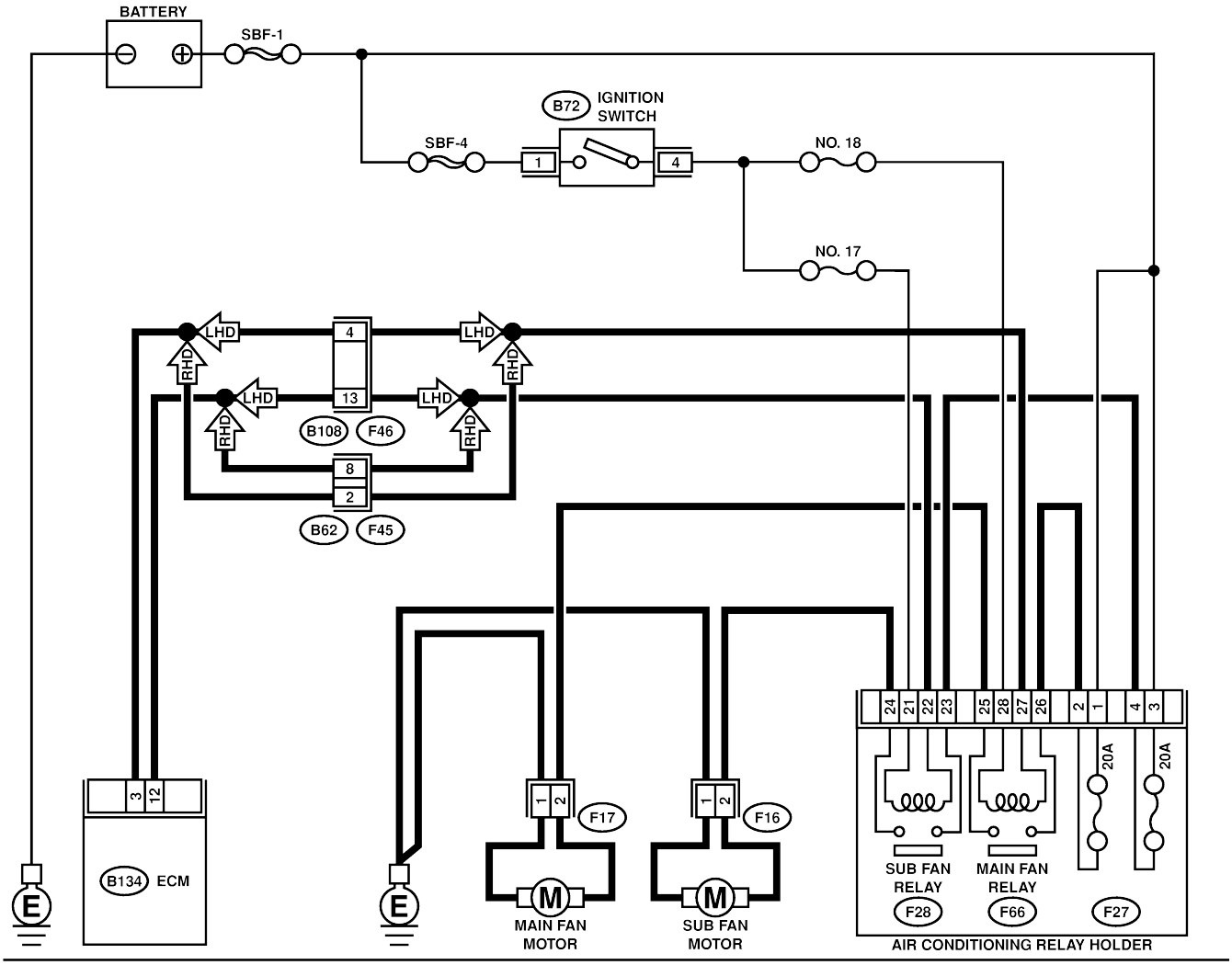
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0462 or P0463?	Inspect DTC P0462 or P0463 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(SOHC)-80, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK FUEL LEVEL SENSOR.** **WARNING:** **During work procedures, if fuel tank is more than 3/4 full, be careful because fuel may spill.** 1) Remove fuel pump assembly. <Ref. to FU(SOHC)-62, Fuel Pump.> 2) While moving fuel level sensor float up and down, make sure that the resistance between fuel level sensor terminals changes smoothly. ***Terminals*** ***No. 3 — No. 5:***	Does the resistance change smoothly?	Go to step **3**.	Replace fuel level sensor. <Ref. to FU(SOHC)-64, Fuel Level Sensor.>
3	**CHECK FUEL SUB LEVEL SENSOR.** **WARNING:** **During work procedures, if fuel tank is more than 3/4 full, be careful because fuel may spill.** 1) Remove fuel sub level sensor. <Ref. to FU(SOHC)-65, Fuel Sub Level Sensor.> 2) While moving fuel sub level sensor float up and down, make sure that the resistance between fuel level sensor terminals changes smoothly. ***Terminals*** ***No. 1 — No. 2:***	Does the resistance change smoothly?	Repair poor contact in ECM, combination meter and coupling connectors.	Replace fuel sub level sensor. <Ref. to FU(SOHC)-65, Fuel Sub Level Sensor.>

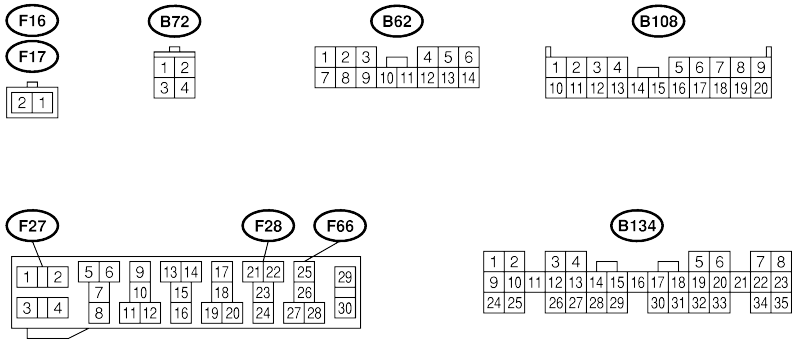
AQ: DTC P0480 — COOLING FAN RELAY 1 CIRCUIT LOW INPUT — S058521B57

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**





S2M2090

No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn ignition switch to OFF. 2) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box. 3) Turn ignition switch to ON. 4) While operating radiator fan relay, measure voltage between ECM terminal and ground. NOTE: Radiator fan relay operation can be executed using Subaru Select Monitor. For procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(SOHC)-34, Subaru Select Monitor.> ***Connector & terminal*** ***(B134) No. 3 (+) — Chassis ground (–):***	Does voltage change between 0 and 10 V?	Repair poor contact in ECM connector.	Go to step **2**.
2	**CHECK GROUND SHORT CIRCUIT IN RADIATOR MAIN FAN RELAY CONTROL CIRCUIT.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from ECM. 3) Measure resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(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 main fan relay from A/C relay holder. 2) Turn ignition switch to ON. 3) Measure voltage between fuse and relay box (F/B) connector and chassis ground. ***Connector & terminal*** ***(F66) No. 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 ignition switch to OFF. 2) Measure resistance between main fan relay terminals. ***Terminal*** ***No. 28 — No. 27:***	Is the resistance between 87 and 107 Ω?	Go to step **5**.	Replace main fan relay.
5	**CHECK OPEN CIRCUIT IN MAIN FAN RELAY CONTROL CIRCUIT.** Measure resistance of harness between ECM and main fan relay connector. ***Connector & terminal*** ***(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 (F45, F46)
6	**CHECK POOR CONTACT.** Check poor contact in ECM or main fan relay connector.	Is there poor contact in ECM or main fan relay connector?	Repair poor contact in ECM or main fan relay connector.	Contact your Subaru distributor.

MEMO:

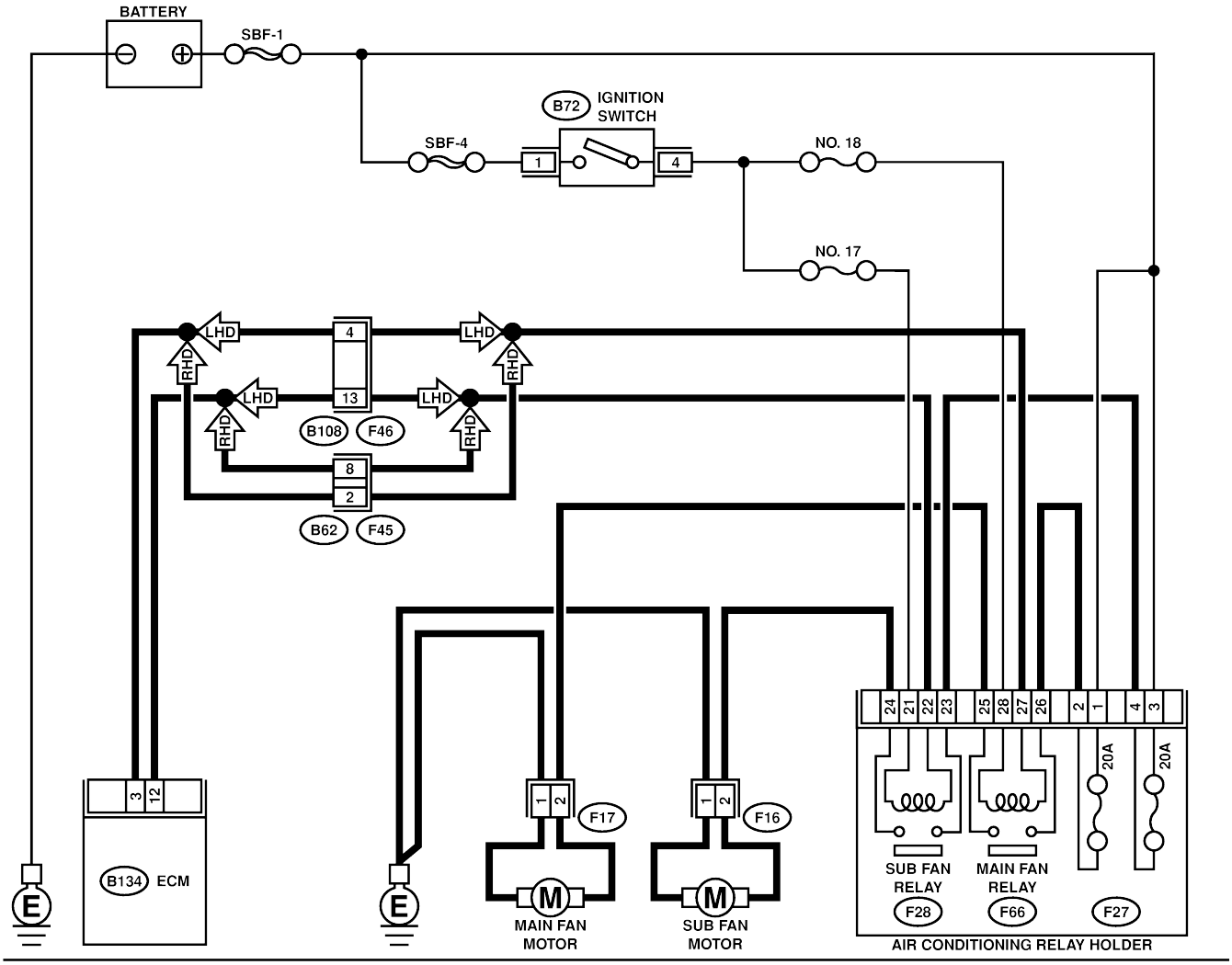
AR: DTC P0483 — COOLING FAN FUNCTION PROBLEM — S058521B58

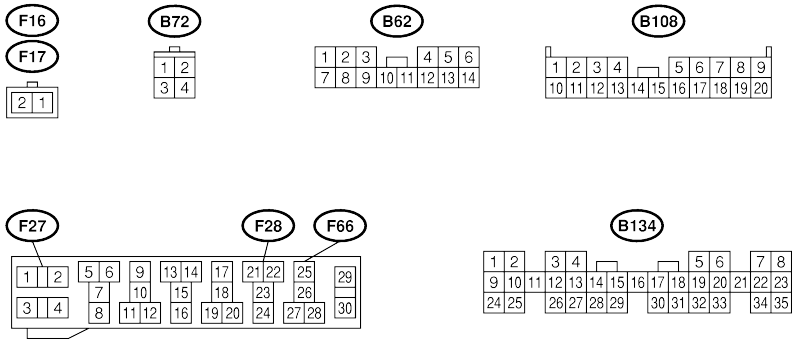
- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Occurrence of noise
  - Overheating

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, 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:**





S2M2090

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is there any other DTC on display?	Inspect the relevant DTC using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(SOHC)-80, List of Diagnostic Trouble Code (DTC).>	Check radiator fan and fan motor. <Ref. to CO-8, Radiator Main Fan System.> and <Ref. to CO-11, Radiator Sub Fan System.>

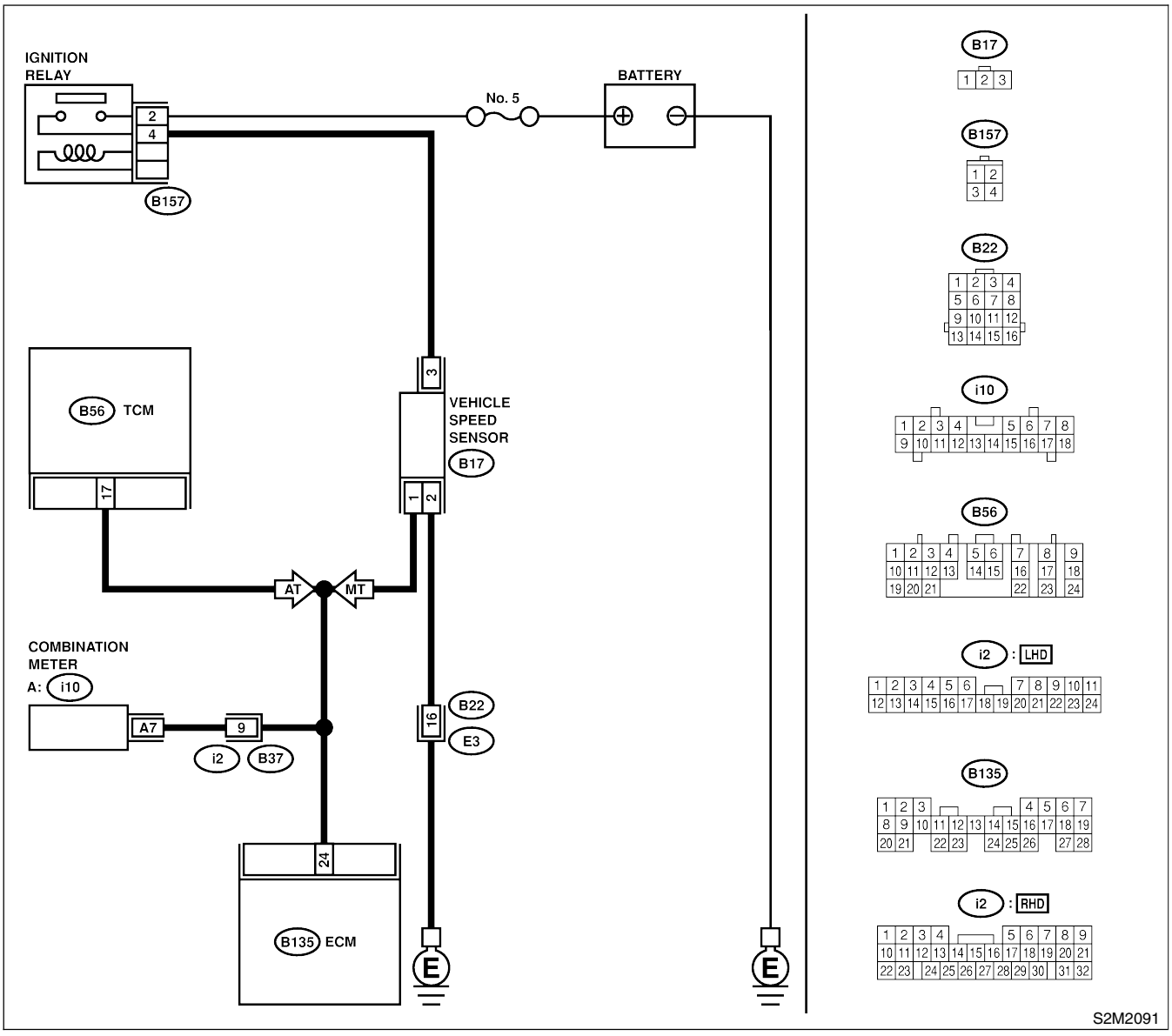
MEMO:

AS: DTC P0500 — VEHICLE SPEED SENSOR MALFUNCTION — S058521B59

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, 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-58, TROUBLE CODE 33 — FRONT VEHICLE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>	Go to step **3**.
3	**CHECK SPEEDOMETER OPERATION IN COMBINATION METER.**	Does speedometer operate normally?	Go to step **4**.	Check speedometer and vehicle speed sensor. <Ref. to IDI-17, Speedometer.> and <Ref. to AT-32, Front Vehicle Speed Sensor.> and <Ref. to AT-36, Rear Vehicle Speed Sensor.> and <Ref. to AT-37, Torque Converter Turbine Speed Sensor.>
4	**CHECK HARNESS BETWEEN ECM AND COMBINATION METER CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from combination meter. 3) Measure resistance between ECM and combination meter. ***Connector & terminal*** ***(B135) No. 24 — (i10) No. 7:***	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 (i2)

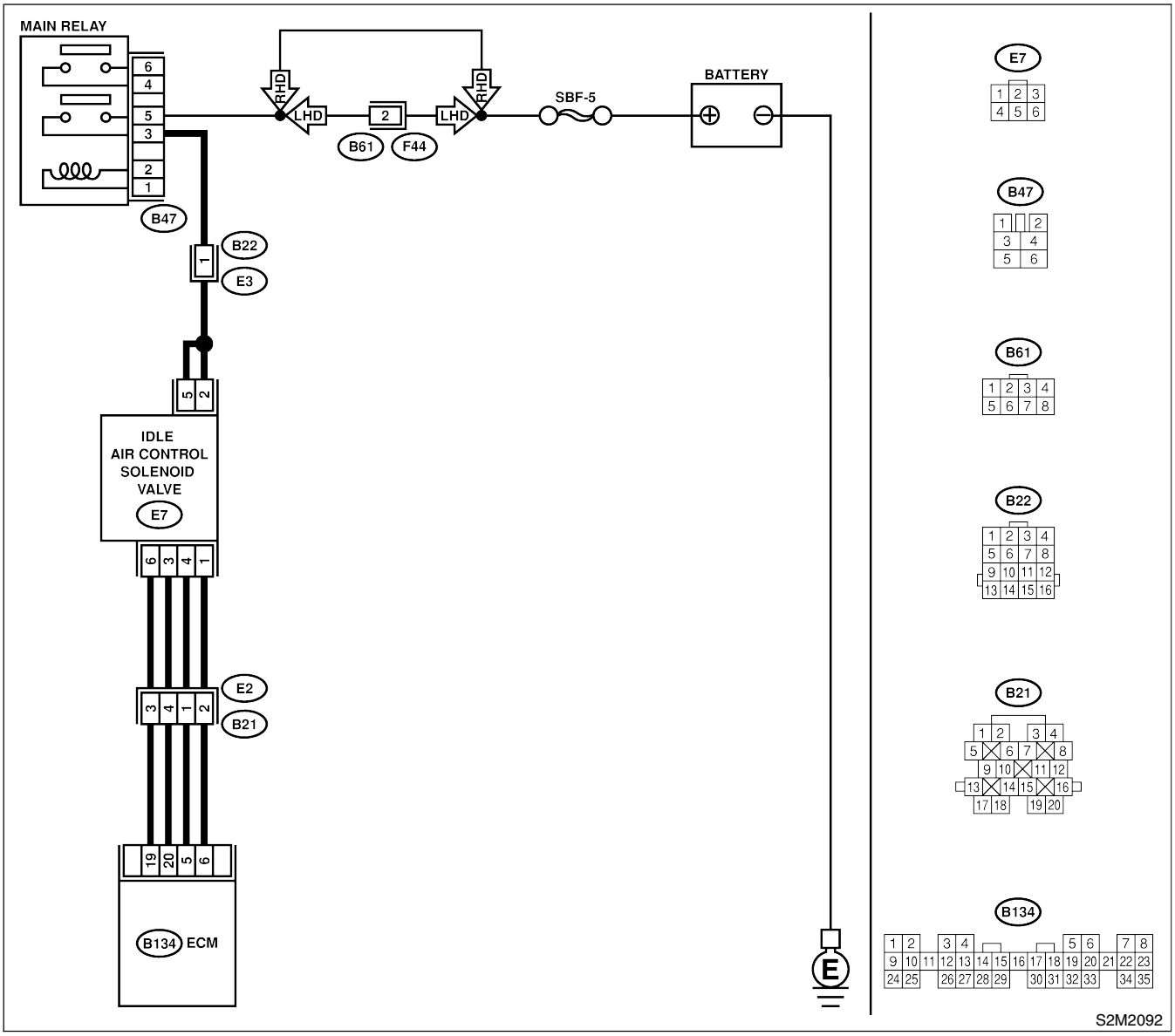
AT: DTC P0506 — IDLE CONTROL SYSTEM RPM LOWER THAN EXPECTED

S058521B61

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, 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 P1510, P1511, P1512, P1513, P1514, P1515, P1516 or P1517?	Inspect DTC P1510, P1511, P1512, P1513, P1514, P1515, P1516 or P1517 using “17. List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(SOHC)-80, 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 ignition switch to OFF. 2) Remove idle air control solenoid valve from throttle body. <Ref. to FU(SOHC)-38, REMOVAL, Idle Air Control Solenoid Valve.> 3) Remove throttle body from intake manifold. <Ref. to FU(SOHC)-14, REMOVAL, Throttle Body.> 4) Using an air gun, force air into idle air control solenoid valve installation area. Confirm that forced air subsequently escapes from throttle body interior.	Does air flow out?	Replace idle air control solenoid valve. <Ref. to FU(SOHC)-38, INSTALLATION, Idle Air Control Solenoid Valve.>	Replace throttle body. <Ref. to FU(SOHC)-14, INSTALLATION, Throttle Body.>

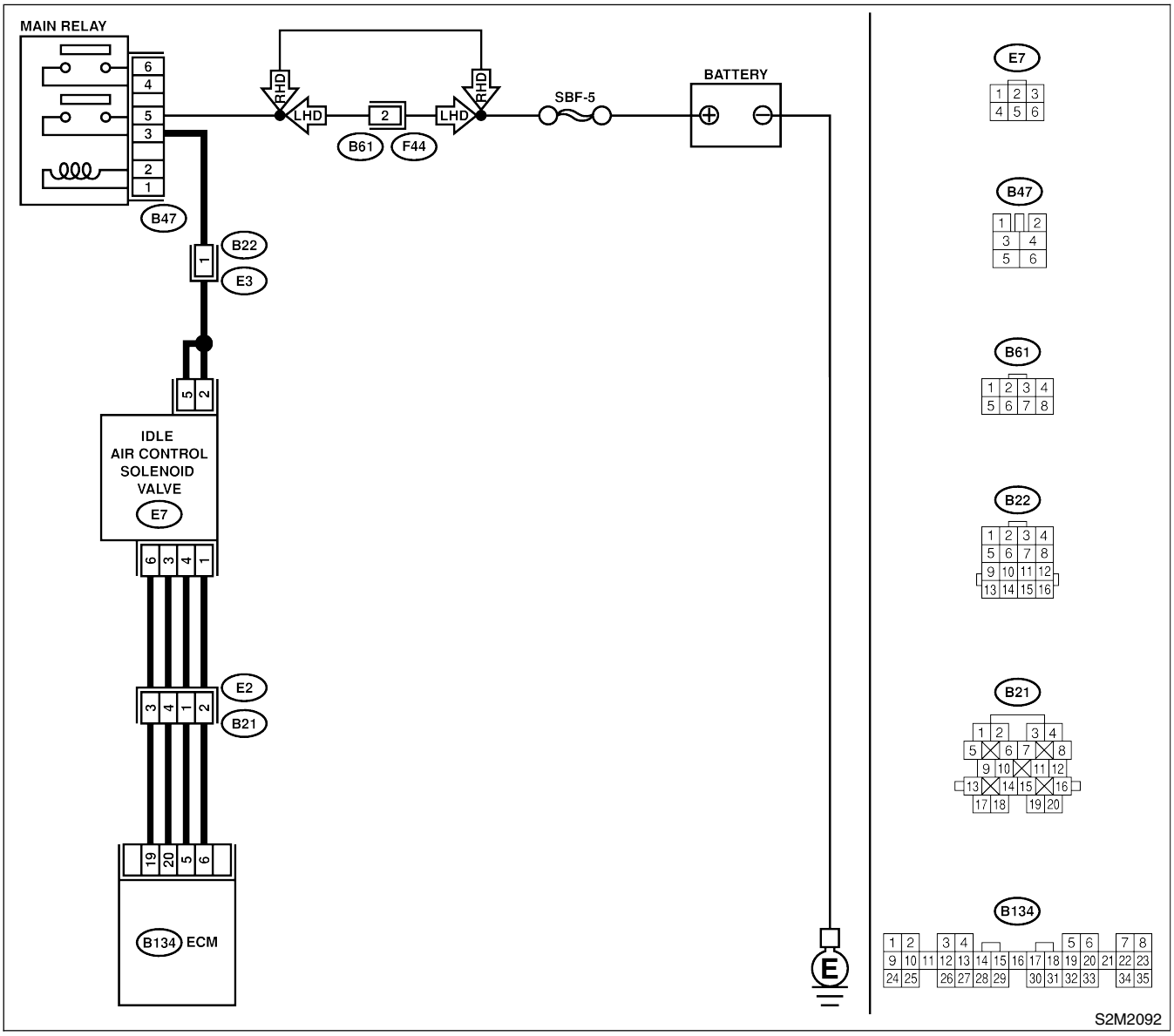
AU: DTC P0507 — IDLE CONTROL SYSTEM RPM HIGHER THAN EXPECTED

S058521B62

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



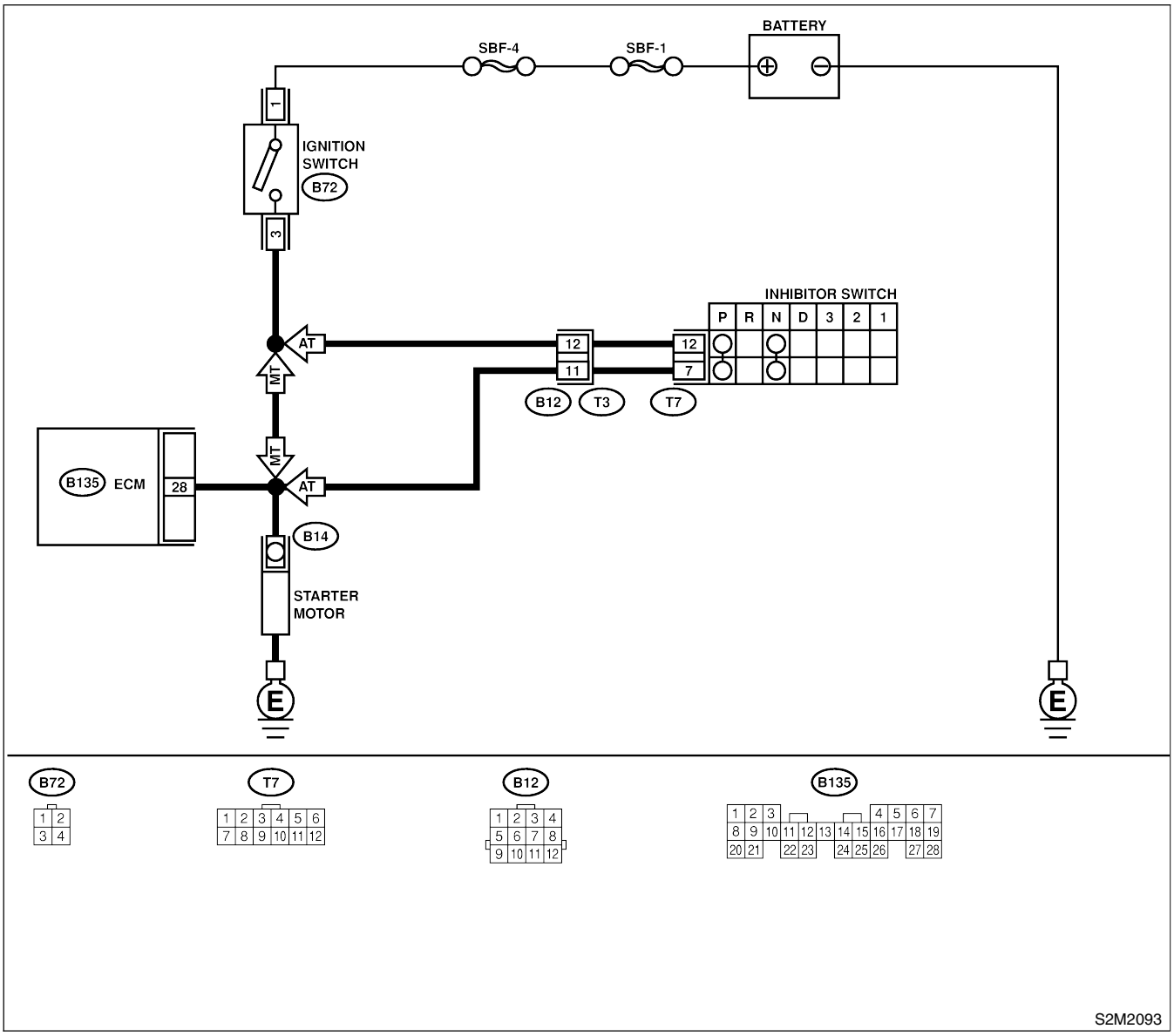
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1510, P1511, P1512, P1513, P1514, P1515, P1516 or P1517?	Inspect DTC P1510, P1511, P1512, P1513, P1514, P1515, P1516 or P1517 using “17. List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(SOHC)-80, 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 ignition switch to ON. 2) Start engine, and idle it. 3) Check the following items. ● Loose installation of intake manifold, idle air control solenoid valve and throttle body ● Cracks of intake manifold gasket, idle air control solenoid valve gasket and throttle body gasket ● Disconnections of vacuum hoses	Is there a fault in air intake system?	Repair air suction and leaks.	Go to step **3**.
3	**CHECK THROTTLE CABLE.**	Does throttle cable have play for adjustment?	Go to step **4**.	Adjust throttle cable. <Ref. to SP-12, INSTALLATION, Accelerator Control Cable.>
4	**CHECK AIR BY-PASS LINE.** 1) Turn ignition switch to OFF. 2) Remove idle air control solenoid valve from throttle body. <Ref. to FU(SOHC)-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 idle air control solenoid valve. <Ref. to FU(SOHC)-38, INSTALLATION, Idle Air Control Solenoid Valve.>

AV: DTC P0512 — STARTER SWITCH CIRCUIT HIGH INPUT — S058521G02

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



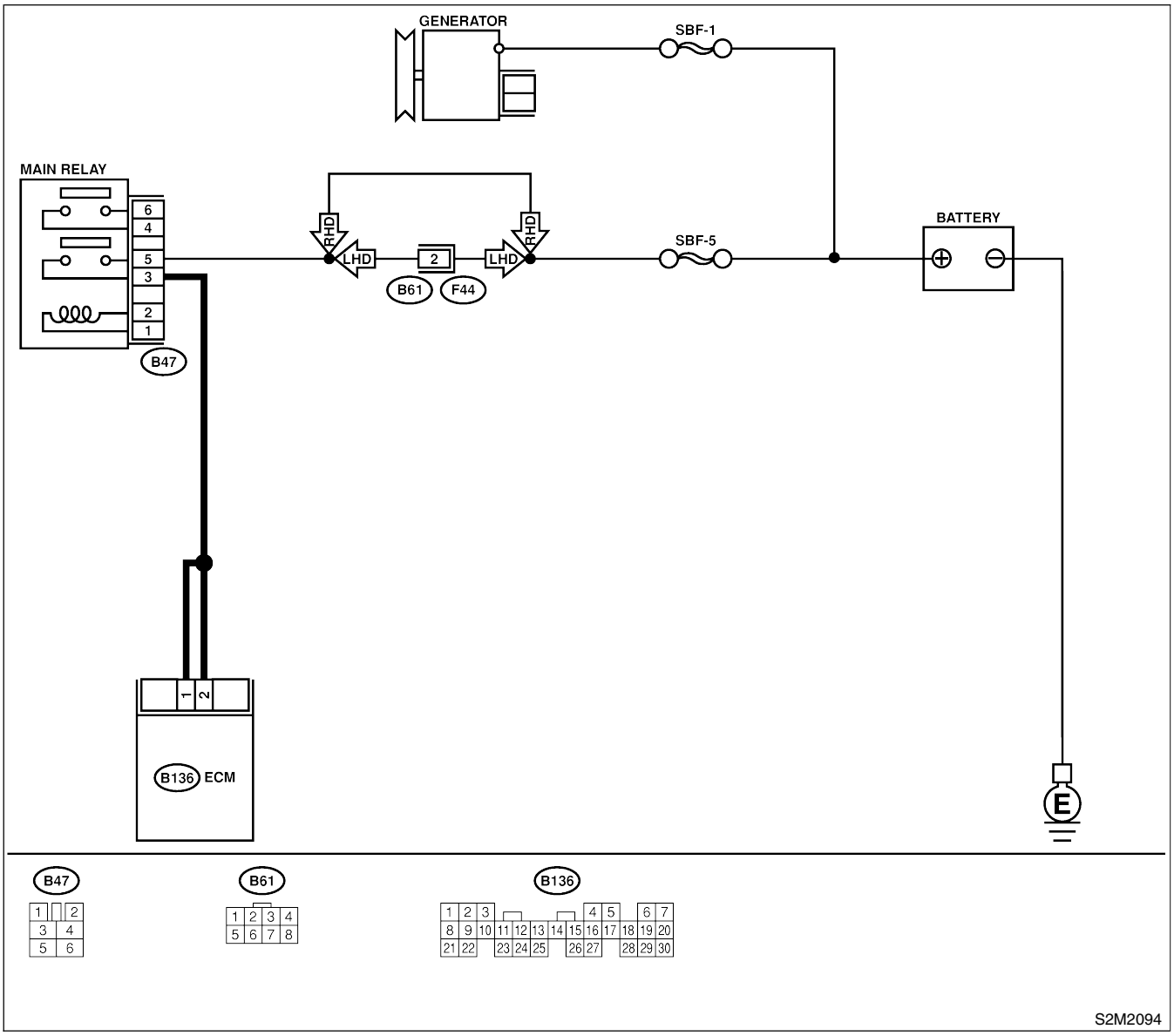
No.	Step	Check	Yes	No
1	**CHECK OPERATION OF STARTER MOTOR.** NOTE: Place the inhibitor switch in each position.	Does starter motor operate when ignition switch to "ON"?	Repair battery short circuit in starter motor circuit. After repair, replace ECM. <Ref. to FU(SOHC)-49, Engine Control Module.>	Check starter motor circuit. <Ref. to EN(SOHC)-60, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

AW: DTC P0562 — CHARGE SYSTEM CIRCUIT LOW INPUT — S058521G81

- **DTC DETECTING CONDITION:**
  - Power source voltage of the ECM is low.
- **TROUBLE SYMPTOM:**
  - Charge warning light comes on.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



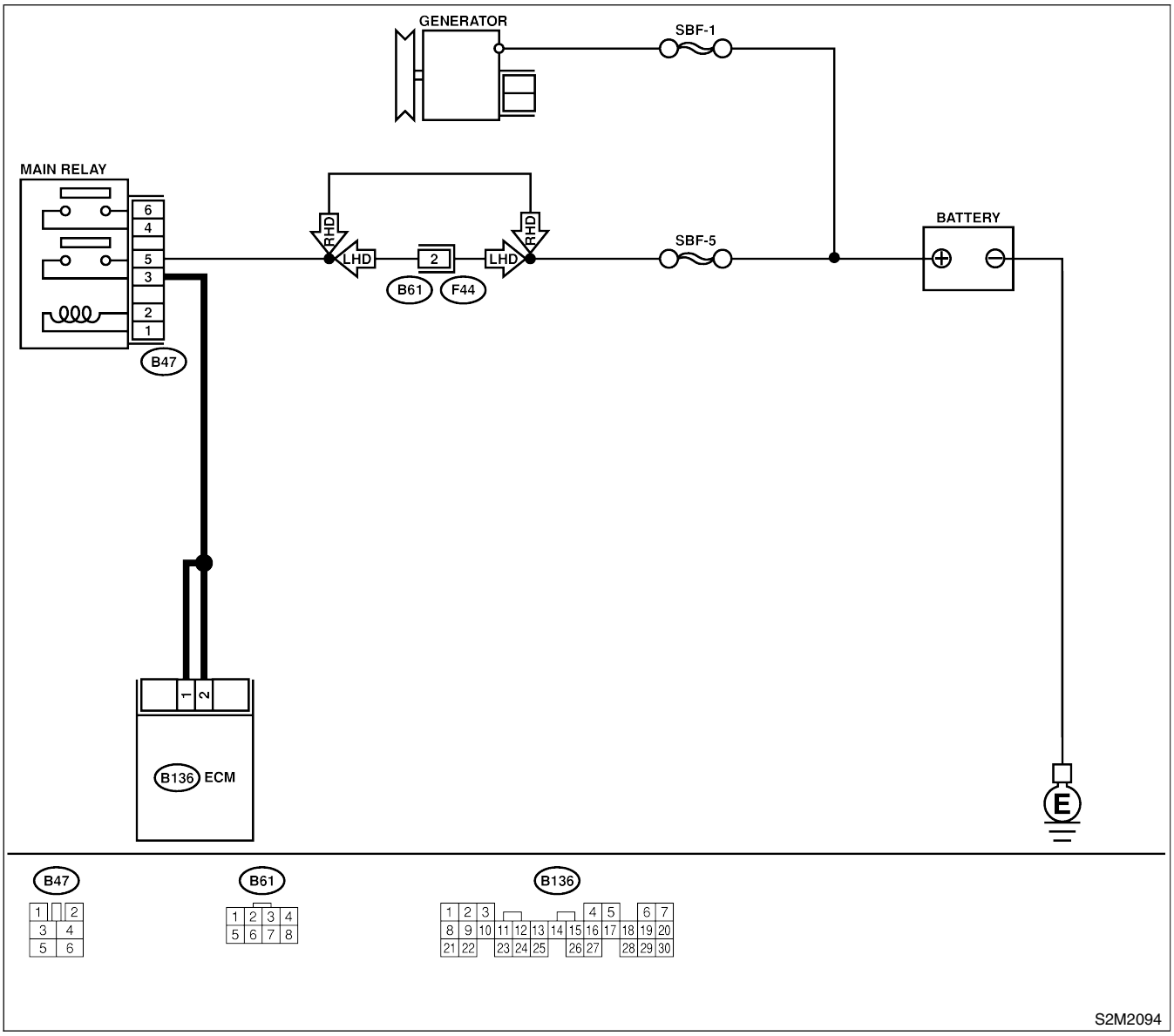
No.	Step	Check	Yes	No
1	**CHECK GENERATOR.** 1) Start engine. 2) Idling after warm-up. 3) Measure voltage between generator B terminal and chassis ground. ***Terminal*** ***Generator B terminal (+) — Chassis ground (–):***	Is the voltage less than 10.8 V?	Go to step **2**.	Repair generator. <Ref. to SC-12, Generator.>
2	**CHECK GENERATOR.** 1) Run engine at 5,000 rpm. 2) Measure voltage between generator B terminal and chassis ground. ***Terminal*** ***Generator B terminal (+) — Chassis ground (–):***	Is the voltage less than 10.8 V?	Go to step **3**.	Repair generator. <Ref. to SC-12, Generator.>
3	**CHECK BATTERY TERMINAL.** Turn ignition switch to OFF.	Are the positive and negative battery terminals tightly clamped?	Go to step **4**.	Tighten the clamp of terminal.
4	**CHECK INPUT VOLTAGE OF ECM.** 1) Run the engine at idle. 2) Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 1 (+) — Chassis ground (–):*** ***(B136) No. 2 (+) — Chassis ground (–):***	Is the voltage less than 10.8 V?	Go to step **5**.	Repair harness connector between battery, main relay and ECM.
5	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ECM?	Repair connector.	Go to step **6**.
6	**CHECK ECM.** 1) Connect all connectors. 2) Erase the memory. <Ref. to EN(SOHC)-45, Clean Memory Mode.> 3) Perform inspection mode. <Ref. to EN(SOHC)-42, Inspection Mode.> 4) Read out the trouble code. <Ref. to EN(SOHC)-41, Read Diagnostic Trouble Code.>	Is the same trouble code as in the current diagnosis still being output?	Replace generator.	Go to step **7**.
7	**CHECK ANY OTHER TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

AX: DTC P0563 — CHARGE SYSTEM CIRCUIT HIGH INPUT — S058521G82

- **DTC DETECTING CONDITION:**
  - Power source voltage of the ECM is high.
- **TROUBLE SYMPTOM:**
  - Charge warning light comes on.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



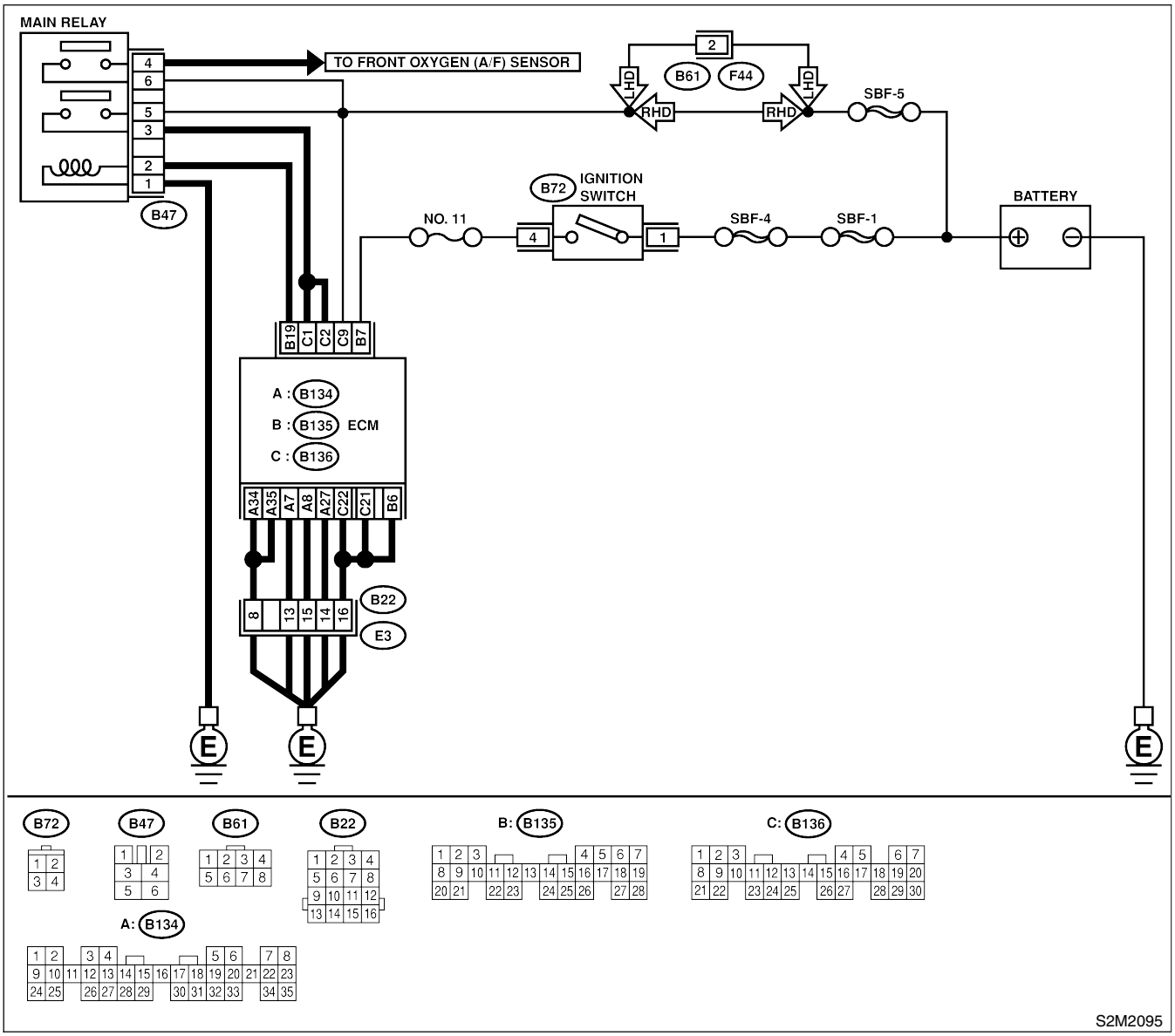
No.	Step	Check	Yes	No
1	**CHECK GENERATOR.** 1) Start engine. 2) Idling after warm-up. 3) Measure voltage between generator B terminal and chassis ground. ***Terminal*** ***Generator B terminal (+) — Chassis ground (–):***	Is the voltage more than 16.2 V?	Go to step **2**.	Repair generator. <Ref. to SC-12, Generator.>
2	**CHECK GENERATOR.** 1) Run engine at 5,000 rpm. 2) Measure voltage between generator B terminal and chassis ground. ***Terminal*** ***Generator B terminal (+) — Chassis ground (–):***	Is the voltage more than 16.2 V?	Go to step **3**.	Repair generator. <Ref. to SC-12, Generator.>
3	**CHECK BATTERY TERMINAL.** Turn ignition switch to OFF.	Are the positive and negative battery terminals tightly clamped?	Go to step **4**.	Tighten the clamp of terminal.
4	**CHECK INPUT VOLTAGE OF ECM.** 1) Run the engine at idle. 2) 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 16.2 V?	Go to step **5**.	Repair harness connector between battery, main relay and ECM.
5	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ECM?	Repair connector.	Go to step **6**.
6	**CHECK ECM.** 1) Connect all connectors. 2) Erase the memory. <Ref. to EN(SOHC)-45, Clear Memory Mode.> 3) Perform inspection mode. <Ref. to EN(SOHC)-42, Inspection Mode.> 4) Read out the trouble code. <Ref. to EN(SOHC)-41, Read Diagnostic Trouble Code.>	Is the same trouble code as in the current diagnosis still being output?	Replace generator.	Go to step **7**.
7	**CHECK ANY OTHER TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

AY: DTC P0604 — INTERNAL CONTROL MODULE MEMORY CHECK SUM ERROR — S058521G03

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Engine does not start.
  - Engine stalls.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



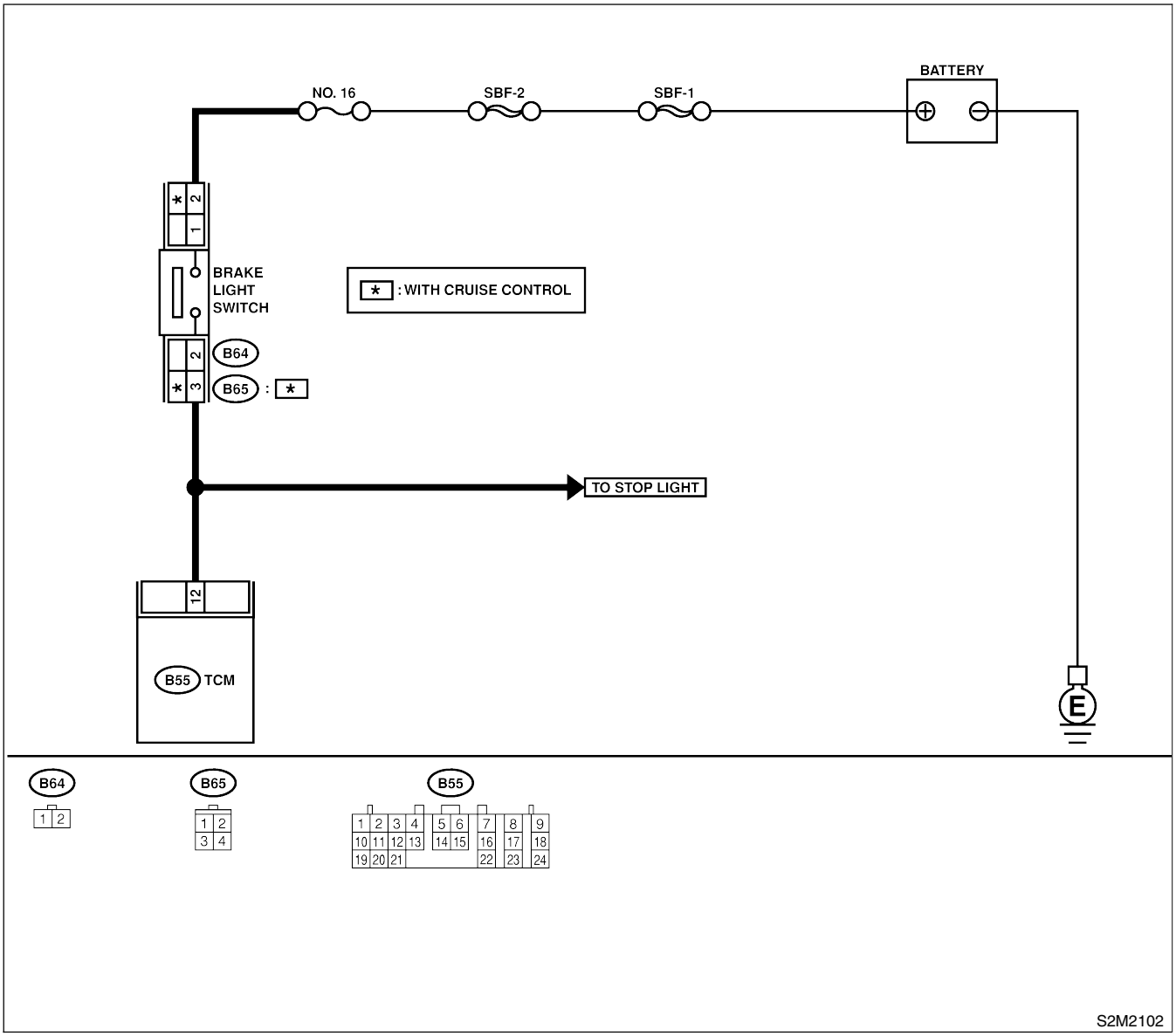
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0601?	Replace ECM. <Ref. to FU(SOHC)-49, Engine Control Module.>	It is not necessary to inspect DTC P0601.

AZ: DTC P0703 — BRAKE SWITCH INPUT MALFUNCTION — S058521B64

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK OPERATION OF BRAKE LIGHT.**	Does brake light come on when depressing the brake pedal?	Go to step **2**.	Repair or replace brake light circuit.

No.	Step	Check	Yes	No
2	**CHECK HARNESS BETWEEN TCM AND BRAKE LIGHT SWITCH CONNECTOR.** 1) Disconnect connectors from TCM and brake light switch. 2) Measure resistance of harness between TCM and brake light switch connector. ***Connector & terminal*** ***(B55) No. 12 — (B64) No. 2:*** ***(B55) No. 12 — (B65) No. 3 (With cruise control):***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair or replace harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between TCM and brake light switch connector • Poor contact in TCM connector • Poor contact in brake light switch connector
3	**CHECK HARNESS BETWEEN TCM AND BRAKE LIGHT SWITCH CONNECTOR.** Measure resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 12 — Chassis ground:***	Is the resistance more than 1 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 connectors to TCM and brake light switch. 2) Measure voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 12 (+) — Chassis ground (–):***	Is the voltage less than 1 V when releasing the brake pedal?	Go to step **5**.	Adjust or replace brake light switch. <Ref. to LI-31, STOP LIGHT SWITCH, INSPECTION, Stop Light System.>
5	**CHECK INPUT SIGNAL FOR TCM.** Measure voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 12 (+) — Chassis ground (–):***	Is the voltage more than 10 V when depressing the brake pedal?	Go to step **6**.	Adjust or replace brake light switch. <Ref. to LI-31, STOP LIGHT SWITCH, INSPECTION, Stop Light System.>
6	**CHECK POOR CONTACT.** Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair poor contact in TCM connector.	Replace TCM. <Ref. to AT-48, Transmission Control Module.>

BA: DTC P0731 — GEAR 1 INCORRECT RATIO — S058521B70

NOTE:
For the diagnostic procedure, refer to DTC P0734. <Ref. to EN(SOHC)-225, DTC P0734 — GEAR 4 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BB: DTC P0732 — GEAR 2 INCORRECT RATIO — S058521B71

NOTE:
For the diagnostic procedure, refer to DTC P0734. <Ref. to EN(SOHC)-225, DTC P0734 — GEAR 4 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BC: DTC P0733 — GEAR 3 INCORRECT RATIO — S058521B72

NOTE:
For the diagnostic procedure, refer to DTC P0734. <Ref. to EN(SOHC)-225, DTC P0734 — GEAR 4 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BD: DTC P0734 — GEAR 4 INCORRECT RATIO — S058521B73

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**

No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is there any other DTC on display?	Inspect relevant DTC using “17. List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(SOHC)-80, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK THROTTLE POSITION SENSOR CIRCUIT.** Check throttle position sensor circuit. <Ref. to AT-50, TROUBLE CODE 31 — THROTTLE POSITION SENSOR —, Diagnostic Procedure with Trouble Code.>	Is there any trouble in throttle position sensor circuit?	Repair or replace throttle position sensor circuit.	Go to step **3**.
3	**CHECK FRONT VEHICLE SPEED SENSOR CIRCUIT.** Check front vehicle speed sensor circuit. <Ref. to AT-58, TROUBLE CODE 33 — FRONT VEHICLE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>	Is there any trouble in vehicle speed sensor 2 circuit?	Repair or replace vehicle speed sensor 2 circuit.	Go to step **4**.
4	**CHECK TORQUE CONVERTER TURBINE SPEED SENSOR CIRCUIT.** Check torque converter turbine speed sensor circuit. <Ref. to AT-64, TROUBLE CODE 36 — TORQUE CONVERTER TURBINE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>	Is there any trouble in torque converter turbine speed sensor circuit?	Repair or replace torque converter turbine speed sensor circuit.	Go to step **5**.
5	**CHECK POOR CONTACT.** Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair poor contact in TCM connector.	Go to step **6**.
6	**CHECK MECHANICAL TROUBLE.** Check mechanical trouble in automatic transmission.	Is there any mechanical trouble in automatic transmission?	Repair or replace automatic transmission. <Ref. to AT-12, INSPECTION, Road Test.>	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

BE: DTC P0741 — TORQUE CONVERTER CLUTCH SYSTEM MALFUNCTION

— S058521G04

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, 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 “17. List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(SOHC)-80, 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-96, TROUBLE CODE 77 — LOCK-UP DUTY SOLENOID —, Diagnostic Procedure with Trouble Code.>	Is there any trouble in lock-up duty solenoid circuit?	Repair or replace lock-up duty solenoid circuit.	Go to step **3**.
3	**CHECK THROTTLE POSITION SENSOR CIRCUIT.** Check throttle position sensor circuit. <Ref. to AT-50, TROUBLE CODE 31 — THROTTLE POSITION SENSOR —, Diagnostic Procedure with Trouble Code.>	Is there any trouble in throttle position sensor circuit?	Repair or replace throttle position sensor circuit.	Go to step **4**.
4	**CHECK TORQUE CONVERTER TURBINE SPEED SENSOR CIRCUIT.** Check torque converter turbine speed sensor circuit. <Ref. to AT-64, TROUBLE CODE 36 — TORQUE CONVERTER TURBINE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>	Is there any trouble in torque converter turbine speed sensor circuit?	Repair or replace torque converter turbine speed sensor circuit.	Go to step **5**.
5	**CHECK ENGINE SPEED INPUT CIRCUIT.** Check engine speed input circuit. <Ref. to AT-42, TROUBLE CODE 11 — ENGINE SPEED SIGNAL —, Diagnostic Procedure with Trouble Code.>	Is there any trouble in engine speed input circuit?	Repair or replace engine speed input circuit.	Go to step **6**.
6	**CHECK INHIBITOR SWITCH CIRCUIT.** Check inhibitor switch circuit. <Ref. to AT-122, CHECK INHIBITOR SWITCH, Diagnostic Procedure for No-trouble Code.>	Is there any trouble in inhibitor switch circuit?	Repair or replace inhibitor switch circuit.	Go to step **7**.
7	**CHECK BRAKE LIGHT SWITCH CIRCUIT.** Check brake light switch circuit. <Ref. to AT-111, CHECK BRAKE SWITCH, Diagnostic Procedure for No-trouble Code.>	Is there any trouble in brake light switch circuit?	Repair or replace brake light switch circuit.	Go to step **8**.

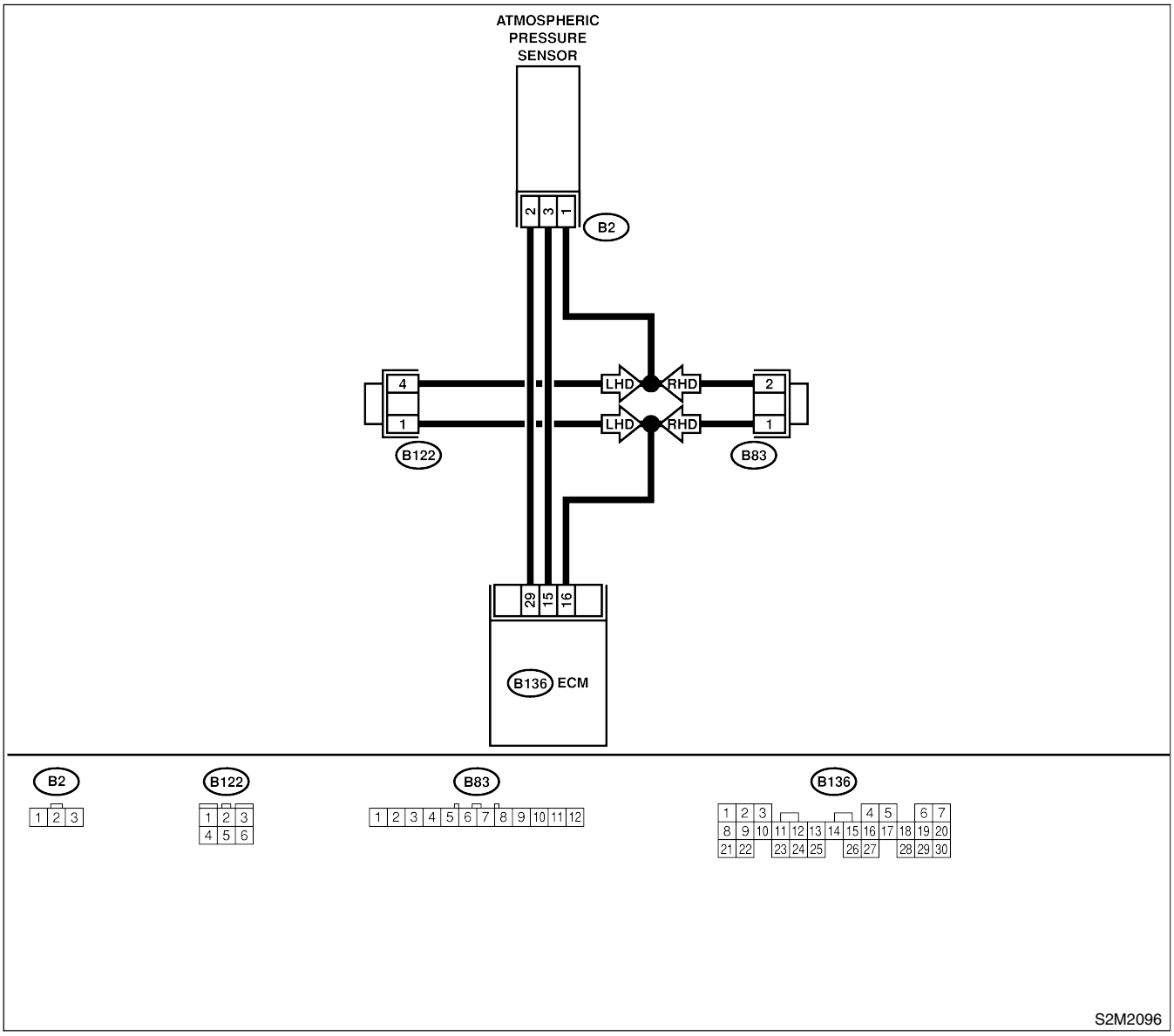
No.	Step	Check	Yes	No
8	**CHECK ATF TEMPERATURE SENSOR CIRCUIT.** Check ATF temperature sensor circuit. <Ref. to AT-46, TROUBLE CODE 27 — ATF TEMPERATURE SENSOR —, Diagnostic Procedure with Trouble Code.>	Is there any trouble in ATF temperature sensor circuit?	Repair or replace ATF temperature sensor circuit.	Go to step **9**.
9	**CHECK POOR CONTACT.** Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair poor contact in TCM connector.	Go to step **10**.
10	**CHECK MECHANICAL TROUBLE.** Check mechanical trouble in automatic transmission.	Is there any mechanical trouble in automatic transmission?	Repair or replace automatic transmission. <Ref. to AT-12, INSPECTION, Road Test.>	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

BF: DTC P1110 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT LOW INPUT — S058521B84

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start engine. 2) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(SOHC)-34, 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 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 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 your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
5	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(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 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(SOHC)-34, 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 ignition switch to OFF. 2) Disconnect connector from atmospheric pressure sensor. 3) Turn ignition switch to ON. 4) Measure 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 LHD: (B122) RHD: (B83)
8	**CHECK HARNESS BETWEEN ECM AND ATMOSPHERIC PRESSURE SENSOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between ECM and pressure sensor connector. ***Connector & terminal*** ***(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 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 atmospheric pressure sensor. <Ref. to FU(SOHC)-37, Atmospheric Pressure Sensor .>

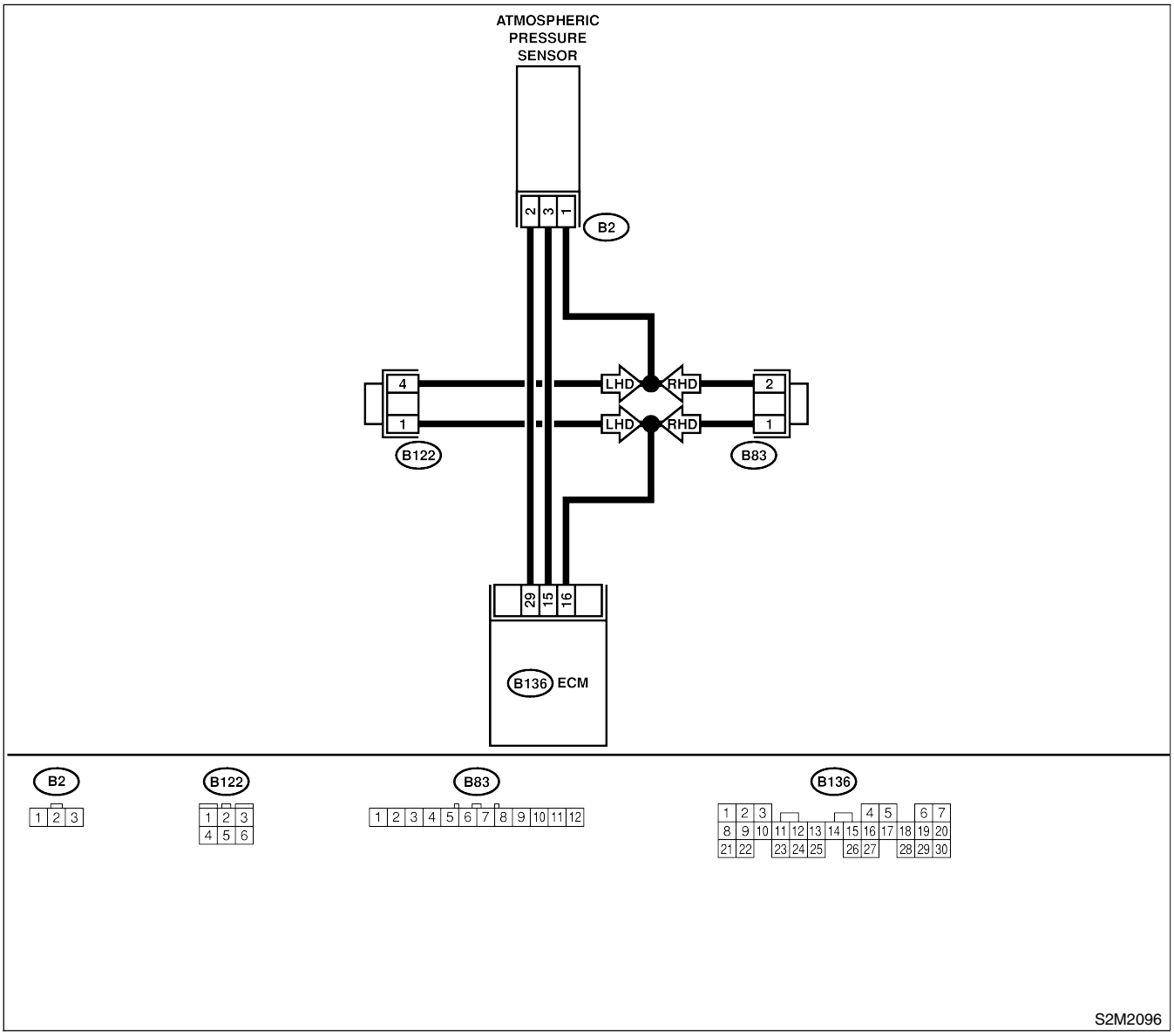
MEMO:

BG: DTC P1111 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT HIGH INPUT — S058521B85

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start engine. 2) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(SOHC)-34, 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 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 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 your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
4	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM 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 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(SOHC)-34, 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 ignition switch to OFF. 2) Disconnect connector from atmospheric pressure sensor. 3) Turn ignition switch to ON. 4) Measure 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 LHD: B122 RHD: B83

No.	Step	Check	Yes	No
7	**CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between ECM and pressure sensor connector. ***Connector & terminal*** ***(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 • Poor contact in joint connector LHD: B122 RHD: B83
8	**CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.** Measure 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 LHD: B122 RHD: B83
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 atmospheric pressure sensor. <Ref. to FU(SOHC)-37, Atmospheric Pressure Sensor .>
10	**CHECK CURRENT DATA.** 1) Turn ignition switch to OFF. 2) Disconnect connector from atmospheric pressure sensor. 3) Turn ignition switch to ON. 4) Read data of intake manifold absolute pressure signal using Subaru select monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(SOHC)-34, 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 atmospheric pressure sensor. <Ref. to FU(SOHC)-37, Atmospheric Pressure Sensor.>

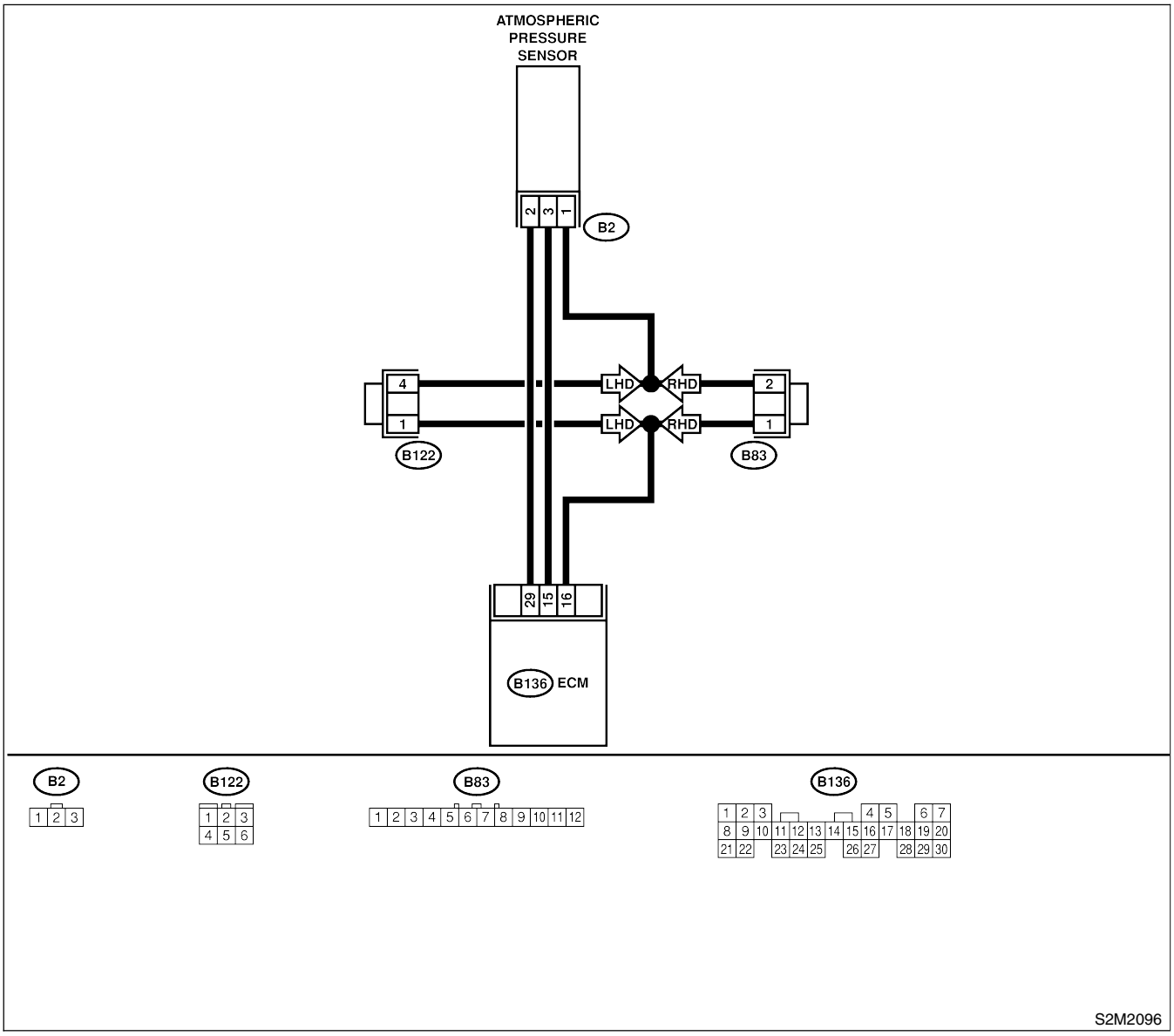
MEMO:

BH: DTC P1112 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT RANGE/ PERFORMANCE PROBLEM — S058521B86

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



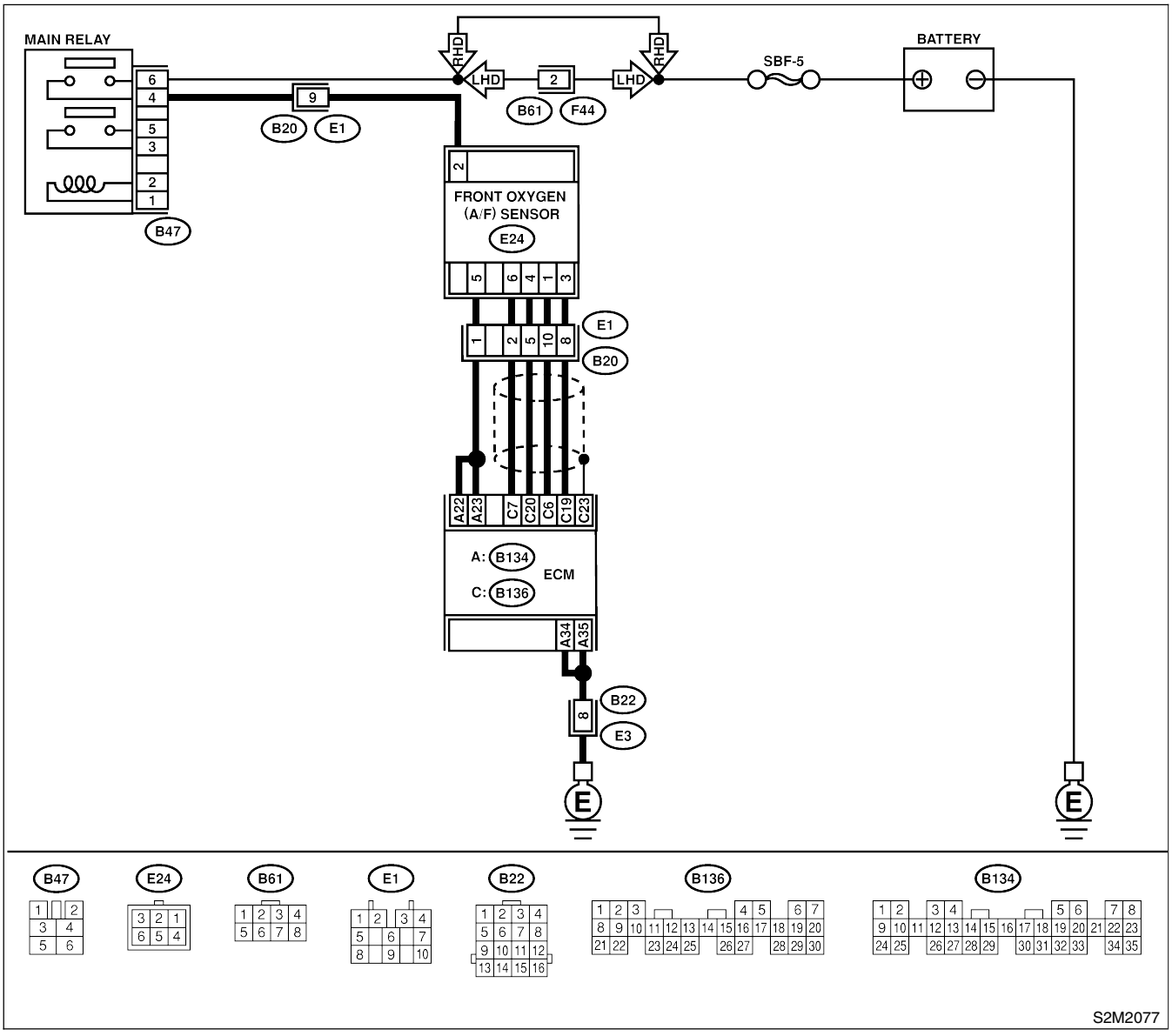
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.** NOTE: In this case, it is not necessary to inspect DTC P0106.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0106, P0107, P0108, P1110 or P1111?	Inspect DTC P0106, P0107, P0108, P1110 or P1111 using “17. List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(SOHC)-80, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK ATMOSPHERIC PRESSURE SENSOR FILTER.** 1) Turn ignition switch to OFF. 2) Disconnect connector from atmospheric pressure sensor. 3) Remove atmospheric pressure sensor. 4) Check atmospheric pressure sensor filter.	Is atmospheric pressure sensor filter non-functional? (Check for contamination, damage, water leakage, etc.)	Replace atmospheric pressure sensor filter.	Go to step **3**.
3	**CHECK CURRENT DATA.** 1) Turn ignition switch to ON. 2) Read data of intake manifold absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(SOHC)-34, 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 atmospheric pressure sensor. <Ref. to FU(SOHC)-37, Atmospheric Pressure Sensor .>	Replace intake air temperature and pressure sensor. <Ref. to FU(SOHC)-36, Intake Air Temperature and Pressure Sensor.>

BI: DTC P1137 — FRONT OXYGEN (A/F) SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM — S058521G49

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, 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, P0132, P0031 or P0032?	Inspect DTC P0131, P0132, P0031 or P0032 using “17. List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(SOHC)-80, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK FRONT OXYGEN (A/F) SENSOR DATA.** 1) Start engine. 2) While observing the Subaru Select Monitor or OBD-II general scan tool screen, warm-up the engine until coolant temperature is above 70°C (160°F). If the engine is already warmed-up, operate at idle speed for at least 1 minute. 3) Read data of front oxygen (A/F) sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(SOHC)-34, 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 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 ignition switch to OFF. 2) Disconnect connector from ECM and front oxygen (A/F) sensor connector. 3) Measure resistance between ECM and front oxygen (A/F) sensor. ***Connector & terminals*** ***(B136) No. 6 — (E24) No. 1:*** ***(B136) No. 7 — (E24) No. 6:*** ***(B136) No. 19 — (E24) No. 3:*** ***(B136) No. 20 — (E24) No. 4:***	Is the resistance less than 5 Ω?	Go to step **5**.	Repair open circuit between ECM and front oxygen (A/F) sensor.

No.	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR.** Measure 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.
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 front oxygen (A/F) sensor. <Ref. to FU(SOHC)-45, Front Oxygen (A/F) Sensor.>

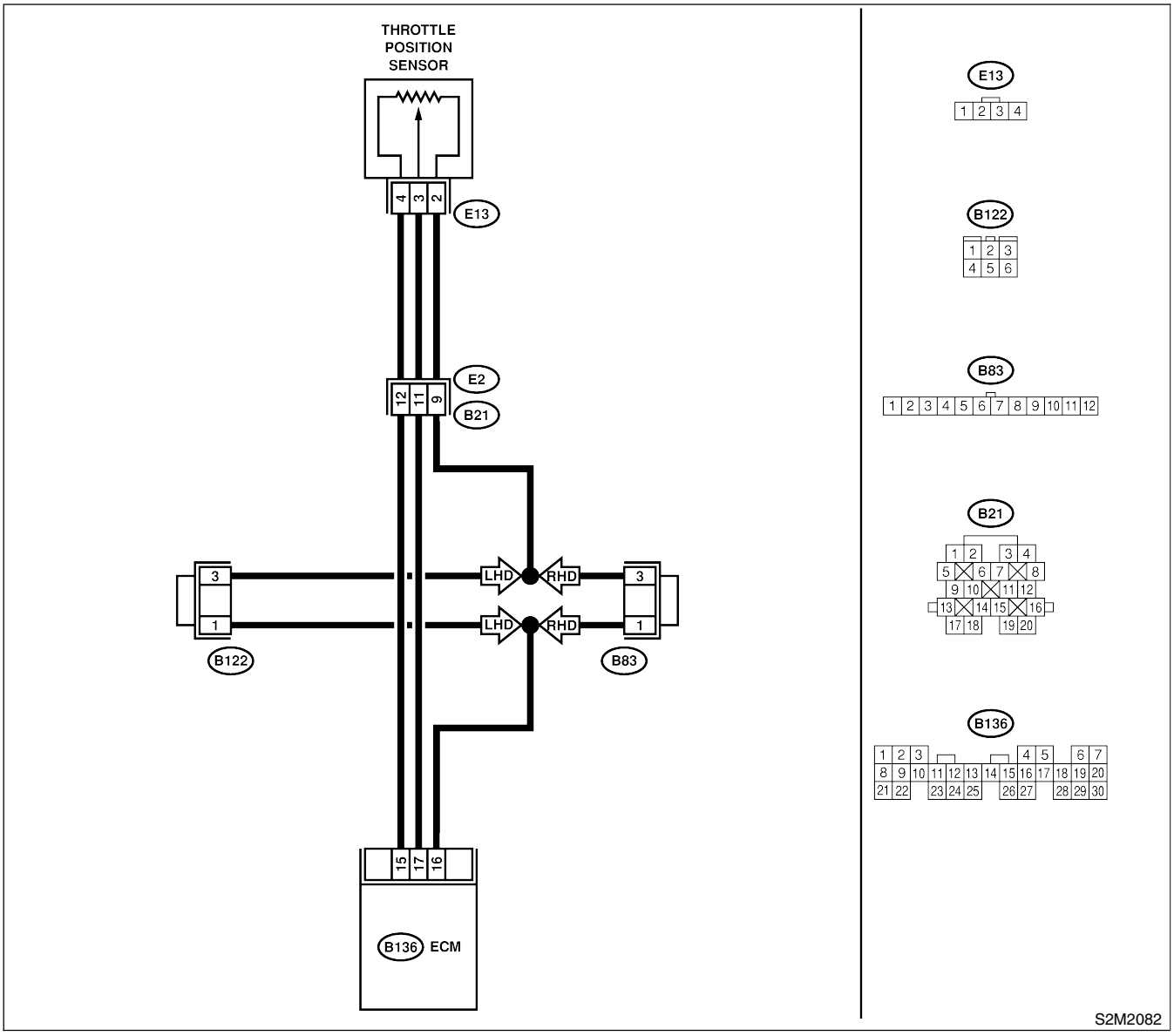
MEMO:

BJ: DTC P1142 — THROTTLE POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LOW INPUT) — S058521B99

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



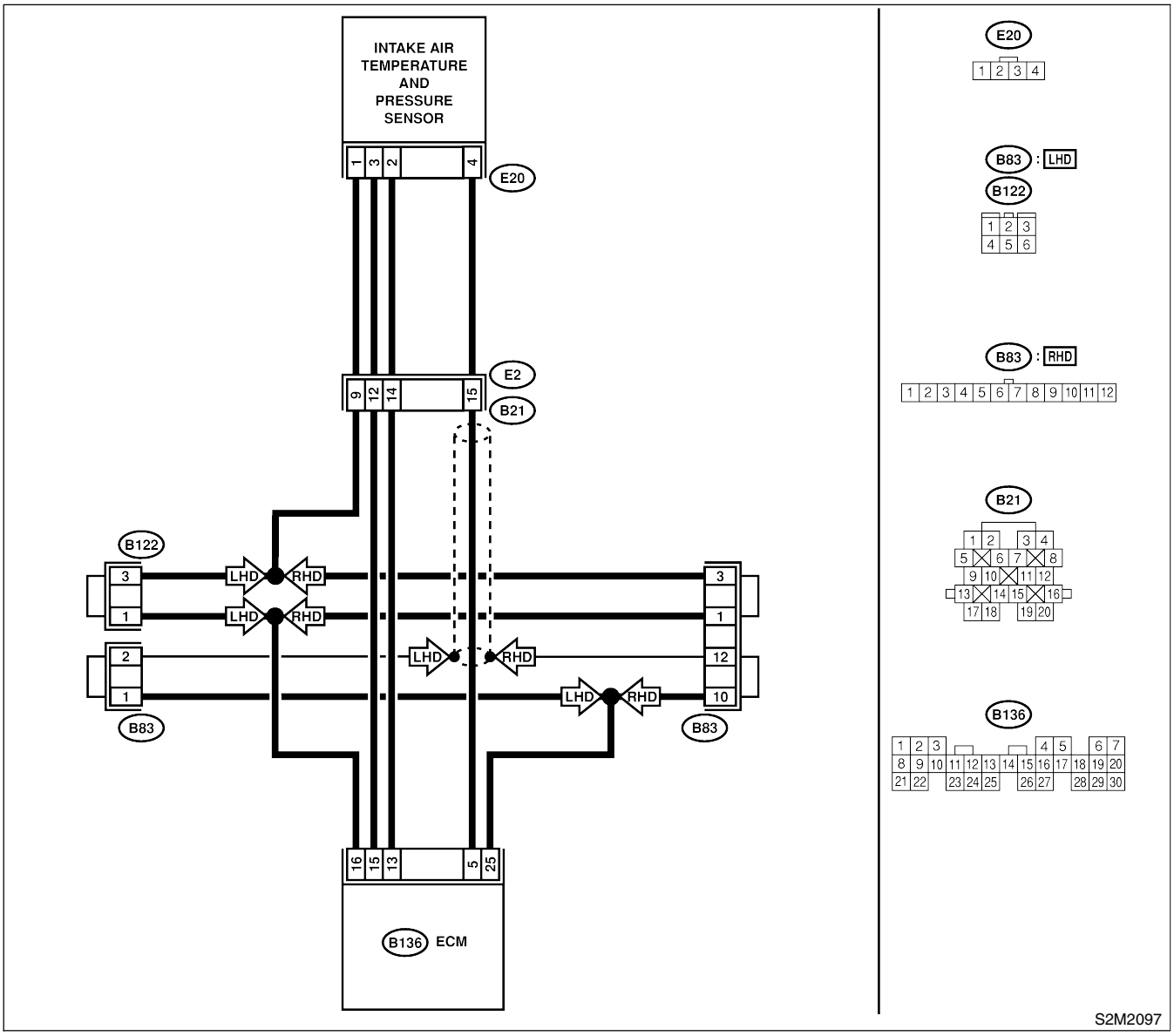
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0122 or P0123?	Inspect DTC P0122 or P0123 using “17. List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(SOHC)-80, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P1142.	Replace throttle position sensor. <Ref. to FU(SOHC)-33 Throttle Position Sensor.>

BK: DTC P1146 — PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) — S058521G07

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, 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.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0107, P0108 or P1112?	Inspect DTC P0107, P0108 or P1112 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(SOHC)-80, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK AIR INTAKE SYSTEM.**	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair air intake system.	Go to step **3**.
3	**CHECK PRESSURE SENSOR.** 1) Start the engine and warm-up engine until coolant temperature is greater than 60°C (140°F). 2) Place the shift lever in the selector lever in "N" or "P" position. 3) Turn A/C switch to OFF. 4) Turn all accessory switches to OFF. 5) Read data of intake manifold pressure sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(SOHC)-34, Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual. Specification: ● Intake manifold absolute pressure ***Ignition ON*** ***73.3 — 106.6 kPa (550 — 800 mmHg, 21.65 — 31.50 inHg)*** ***Idling*** ***20.0 — 46.7 kPa (150 — 350 mmHg, 5.91 — 13.78 inHg)***	Is the value within the specifications?	Go to step **4**.	Replace intake air temperature sensor and pressure sensor. <Ref. to FU(SOHC)-36, Intake Air Temperature and Pressure Sensor.>
4	**CHECK THROTTLE POSITION.** Read data of throttle position signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(SOHC)-34, Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.	Is throttle positioning ratio equal to or less than 5% when throttle is fully closed?	Go to step **5**.	Adjust or replace throttle position sensor. <Ref. to FU(SOHC)-33, Throttle Position Sensor.>

No.	Step	Check	Yes	No
5	**CHECK THROTTLE POSITION.**	Is throttle positioning ratio equal to or more than 85% when throttle is fully open?	Replace intake air temperature and pressure sensor. <Ref. to FU(SOHC)-36, Intake Air Temperature and Pressure Sensor.>	Replace throttle position sensor. <Ref. to FU(SOHC)-33, Throttle Position Sensor.>

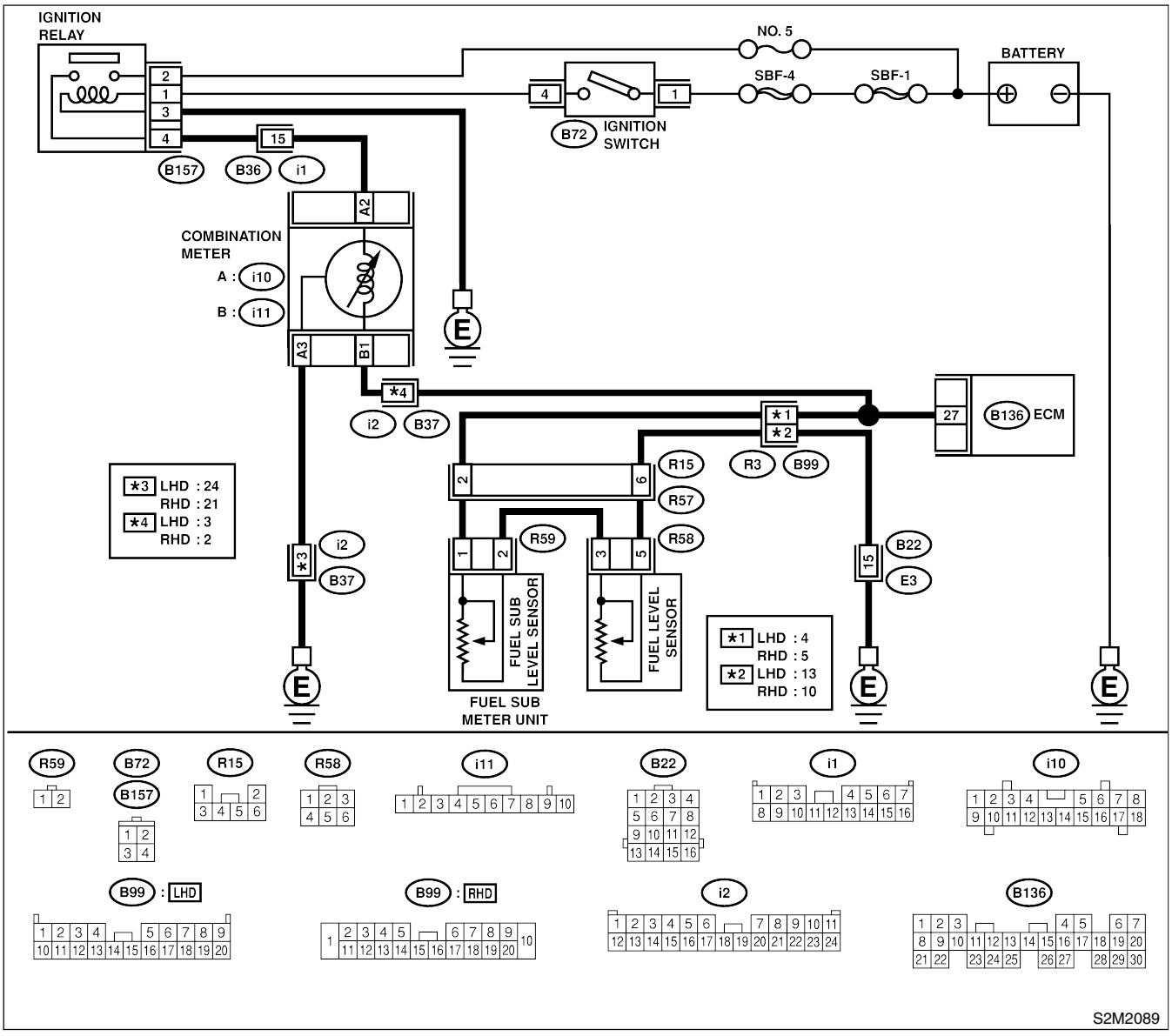
MEMO:

BL: DTC P1442 — FUEL LEVEL SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM 2 — S058521C11

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



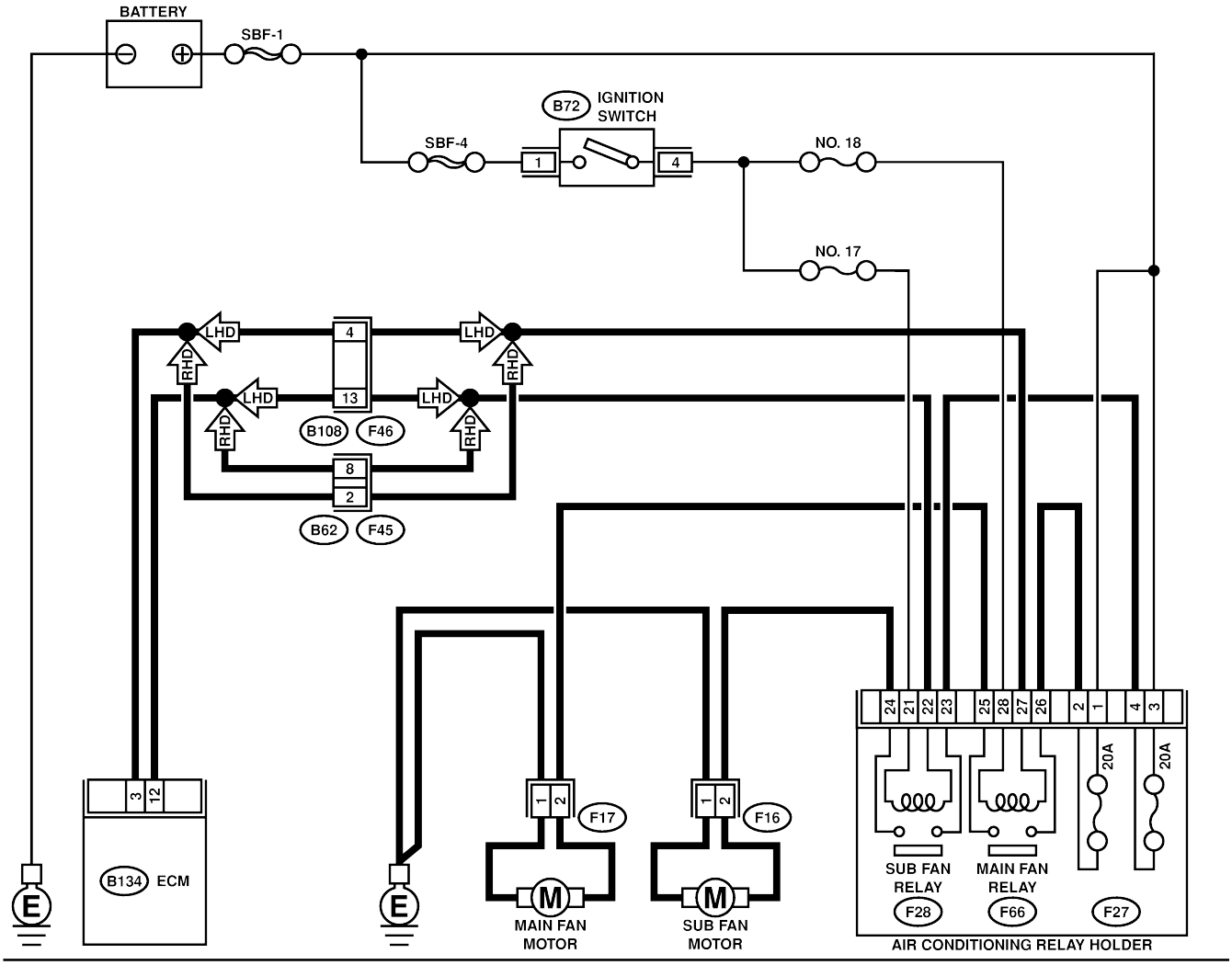
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0461, P0462 or P0463?	Inspect DTC P0461, P0462 or P0463 using “17. List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(SOHC)-80, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect this trouble.	Replace fuel level sensor <Ref. to FU(SOHC)-64, Fuel Level Sensor.> and fuel sub level sensor. <Ref. to FU(SOHC)-65, Fuel Sub Level Sensor.>

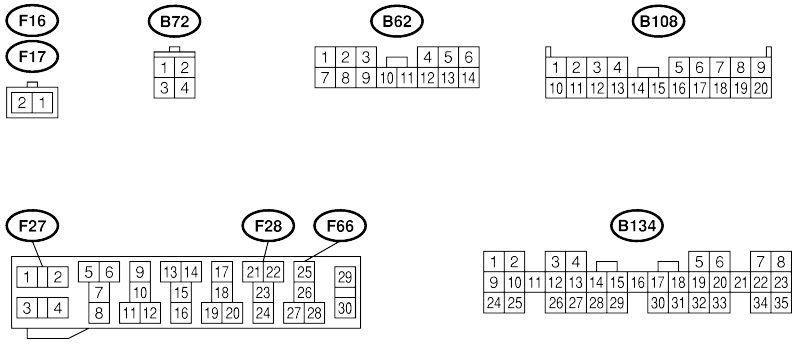
BM: DTC P1480 — COOLING FAN RELAY 1 CIRCUIT HIGH INPUT — S058521G08

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**





S2M2090

No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn ignition switch to OFF. 2) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box. 3) Turn ignition switch to ON. 4) While operating radiator fan relay, measure voltage between ECM and chassis ground. NOTE: Radiator fan relay operation can be executed using Subaru Select Monitor. For procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(SOHC)-46, Compulsory Valve Operation Check Mode.> ***Connector & terminal*** ***(B134) No. 3 (+) — Chassis ground (–):***	Does voltage change between 0 and 10 V?	Even if MIL lights up, the circuit has returned to a normal condition at this time. In this case, repair poor contact in ECM connector.	Go to step **2**.
2	**CHECK SHORT CIRCUIT IN RADIATOR FAN RELAY CONTROL CIRCUIT.** 1) Turn ignition switch to OFF. 2) Remove main fan relay and sub fan relay. (with A/C models) 3) Disconnect test mode connector. 4) Turn ignition switch to ON. 5) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(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 ECM. <Ref. to FU(SOHC)-49,, Engine Control Module.>	Go to step **3**.
3	**CHECK MAIN FAN RELAY.** 1) Turn ignition switch to OFF. 2) Remove main fan relay. 3) Measure resistance between main fan relay terminals. ***Terminal*** ***No. 25 — No. 26:***	Is the resistance less than 1 Ω?	Replace main fan relay and ECM. <Ref. to FU(SOHC)-49, Engine Control Module.>	Go to step **4**.
4	**CHECK SUB FAN RELAY.** 1) Remove sub fan relay. 2) Measure resistance between sub fan relay terminals. ***Terminal*** ***No. 23 — No. 24***	Is the resistance less than 1 Ω?	Replace sub fan relay and ECM. <Ref. to FU(SOHC)-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 ECM. <Ref. to FU(SOHC)-49, Engine Control Module.>

MEMO:

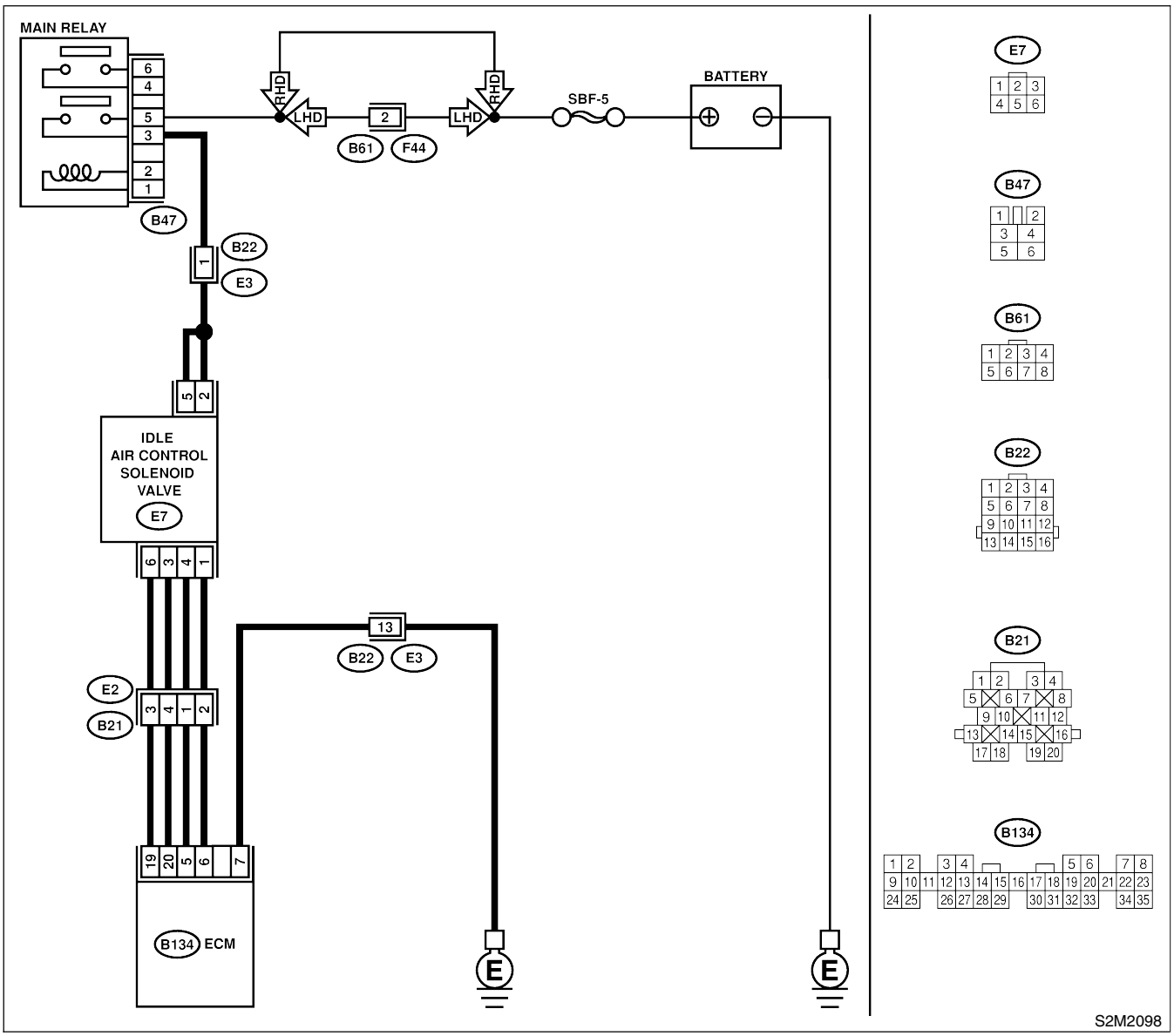
BN: DTC P1507 — IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE) —

S058521C16

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, 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 P1510, P1511, P1512, P1513, P1514, P1515, P1516 or P1517?	Inspect DTC P1510, P1511, P1512, P1513, P1514, P1515, P1516 or P1517 using “17. List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(SOHC)-80, 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 ignition switch to ON. 2) Start engine, and idle it. 3) Check the following items. ● Loose installation of intake manifold, idle air control solenoid valve and throttle body ● Cracks of intake manifold gasket, idle air control solenoid valve gasket and throttle body gasket ● Disconnections of vacuum hoses	Is there a fault in air intake system?	Repair air suction and leaks.	Go to step **3**.
3	**CHECK THROTTLE CABLE.**	Does throttle cable have play for adjustment?	Go to step **4**.	Adjust throttle cable. <Ref. to SP-12, INSTALLATION, Accelerator Control Cable.>
4	**CHECK AIR BY-PASS LINE.** 1) Turn ignition switch to OFF. 2) Remove idle air control solenoid valve from throttle body. <Ref. to FU(SOHC)-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 idle air control solenoid valve. <Ref. to FU(SOHC)-38, Idle Air Control Solenoid Valve.>

BO: DTC P1510 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 1 CIRCUIT LOW INPUT — S058521C17

NOTE:
For the diagnostic procedure, refer to DTC P1516. <Ref. to EN(SOHC)-258, DTC 1516 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 4 CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BP: DTC P1511 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 1 CIRCUIT HIGH INPUT — S058521C18

NOTE:
For the diagnostic procedure, refer to DTC P1517. <Ref. to EN(SOHC)-262, DTC 1517 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 4 CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BQ: DTC P1512 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 2 CIRCUIT LOW INPUT — S058521C19

NOTE:
For the diagnostic procedure, refer to DTC P1516. <Ref. to EN(SOHC)-258, DTC 1516 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 4 CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BR: DTC P1513 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 2 CIRCUIT HIGH INPUT — S058521C20

NOTE:
For the diagnostic procedure, refer to DTC P1517. <Ref. to EN(SOHC)-262, DTC 1517 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 4 CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BS: DTC P1514 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 3 CIRCUIT LOW INPUT — S058521C21

NOTE:
For the diagnostic procedure, refer to DTC P1516. <Ref. to EN(SOHC)-258, DTC 1516 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 4 CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BT: DTC P1515 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 3 CIRCUIT HIGH INPUT — S058521C22

NOTE:
For the diagnostic procedure, refer to DTC P1517. <Ref. to EN(SOHC)-262, DTC 1517 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 4 CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

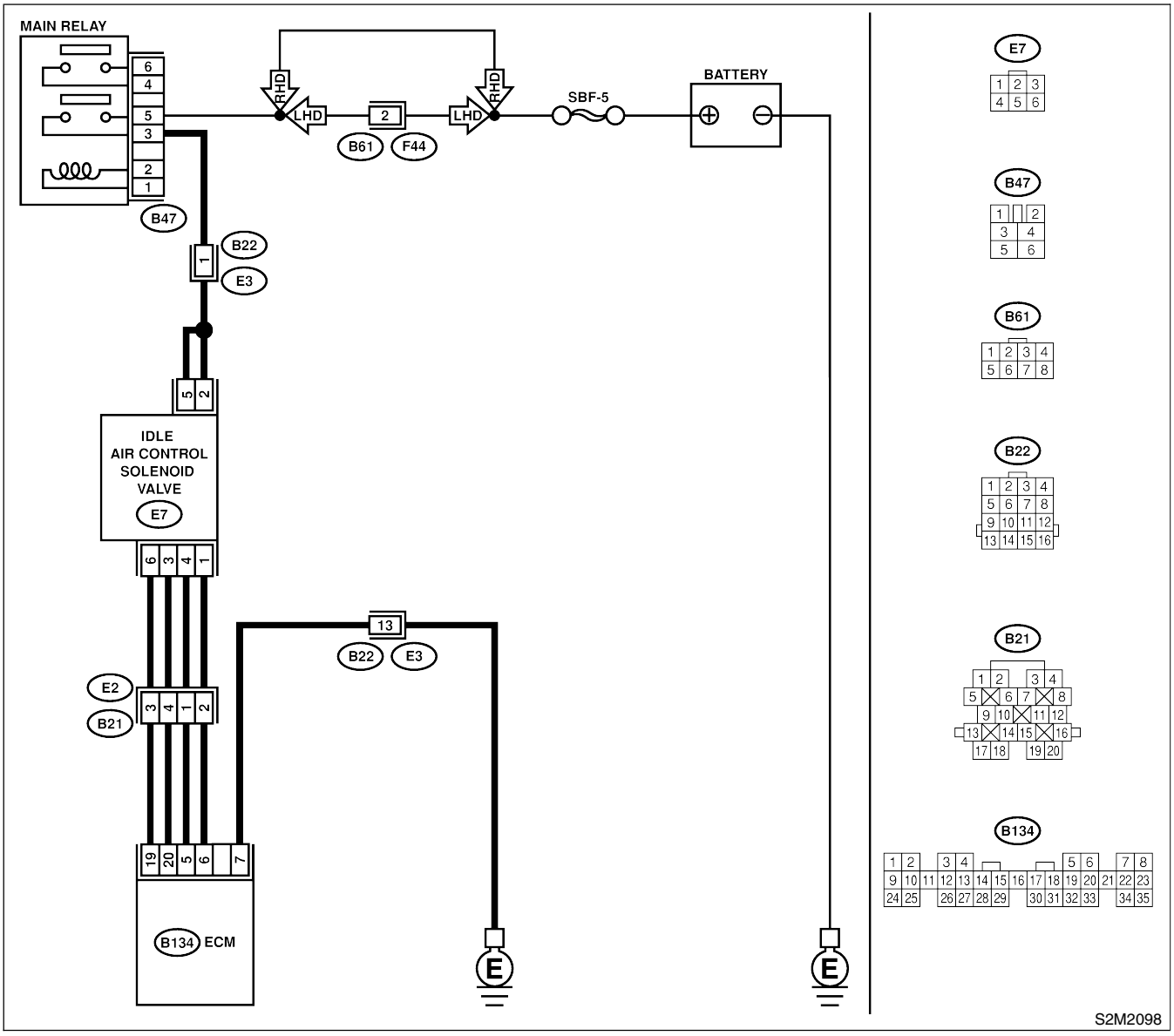
MEMO:

BU: DTC P1516 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 4 CIRCUIT LOW INPUT — S058521C23

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO IDLE AIR CONTROL SOLENOID VALVE.** 1) Turn ignition switch to OFF. 2) Disconnect connector from idle air control solenoid valve. 3) Turn ignition switch to ON. 4) Measure voltage between idle air control solenoid valve 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 (B22)
2	**CHECK POWER SUPPLY TO IDLE AIR CONTROL SOLENOID VALVE.** Measure 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 (B22)
3	**CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.** 1) Turn ignition switch to OFF. 2) Measure 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 (B21)
4	**CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.** 1) Disconnect connector from ECM. 2) Measure 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 idle air control solenoid valve. <Ref. to FU(SOHC)-38, Idle Air Control Solenoid Valve.>

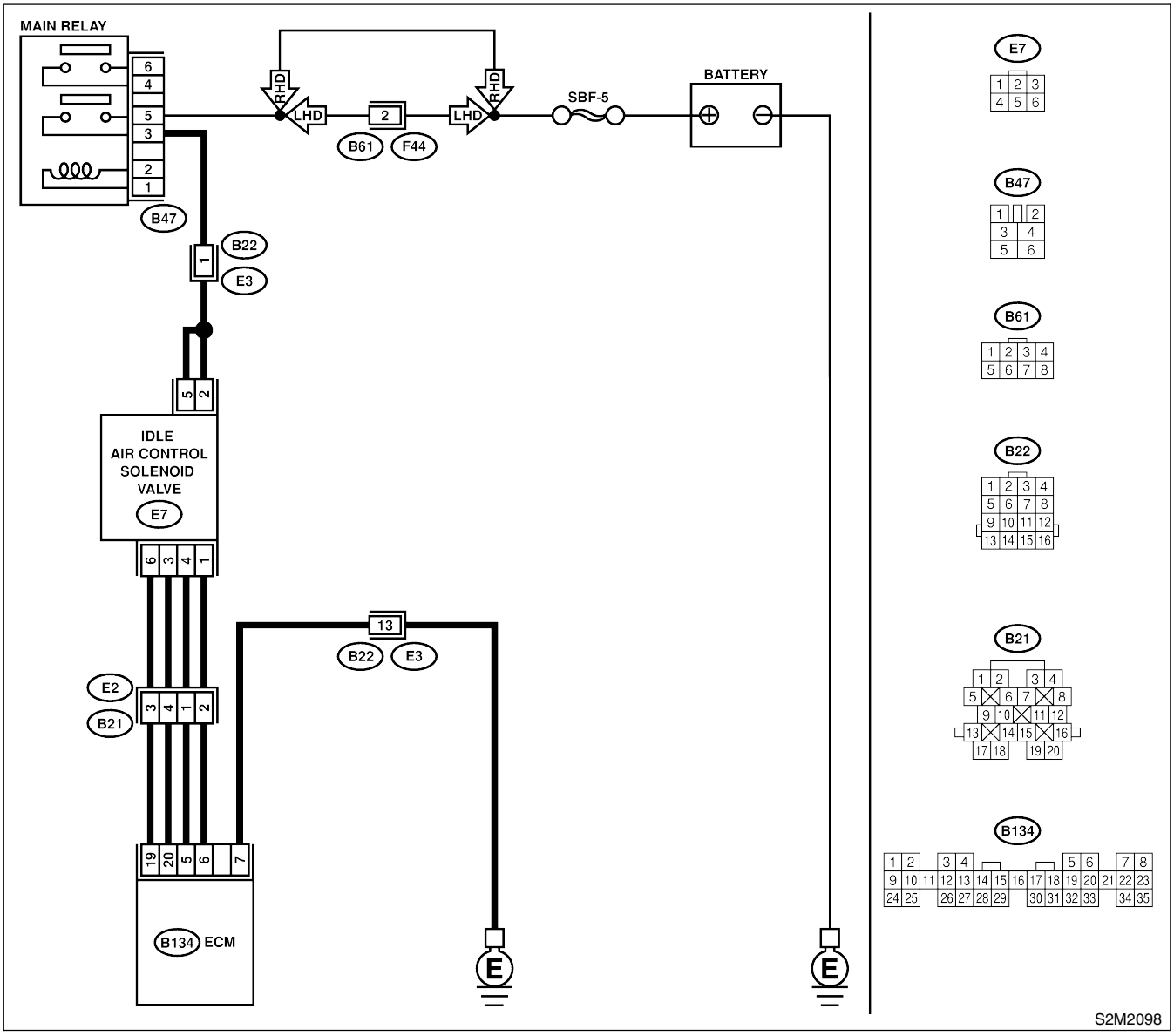
MEMO:

BV: DTC P1517 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 4 CIRCUIT HIGH INPUT — S058521C24

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



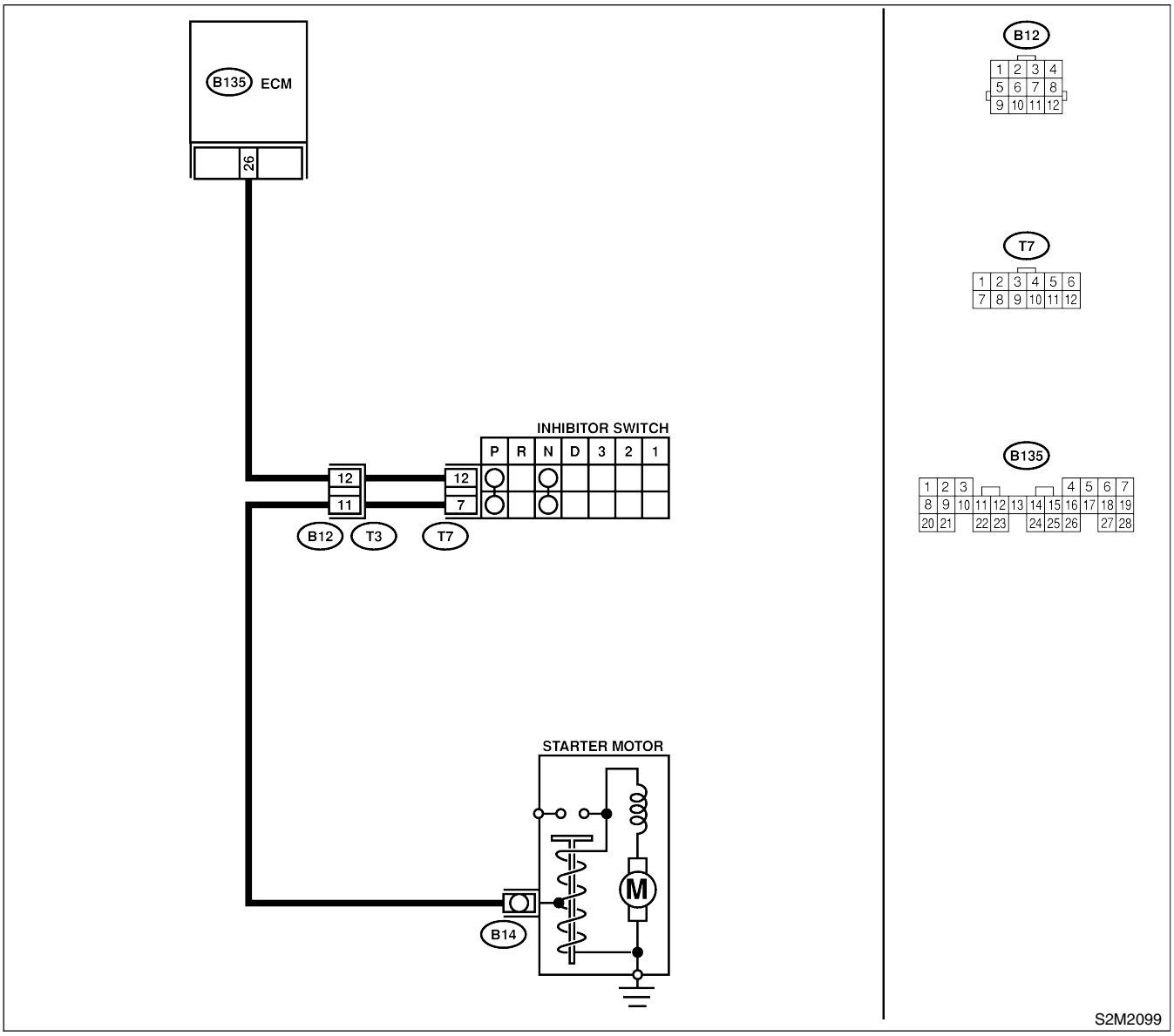
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1511, P1513, P1515 and P1517 at same time?	Go to step **2**.	Go to step **3**.
2	**CHECK GROUND CIRCUIT FOR ECM.** 1) Turn ignition switch to OFF. 2) Measure resistance 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 (B22)
3	**CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from idle air control solenoid valve. 3) Turn ignition switch to ON. 4) Measure voltage between ECM 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 ECM. <Ref. to FU(SOHC)-49, Engine Control Module.>	Replace ECM. <Ref. to FU(SOHC)-49, Engine Control Module.>

BW: DTC P1518 — STARTER SWITCH CIRCUIT LOW INPUT — S058521G09

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



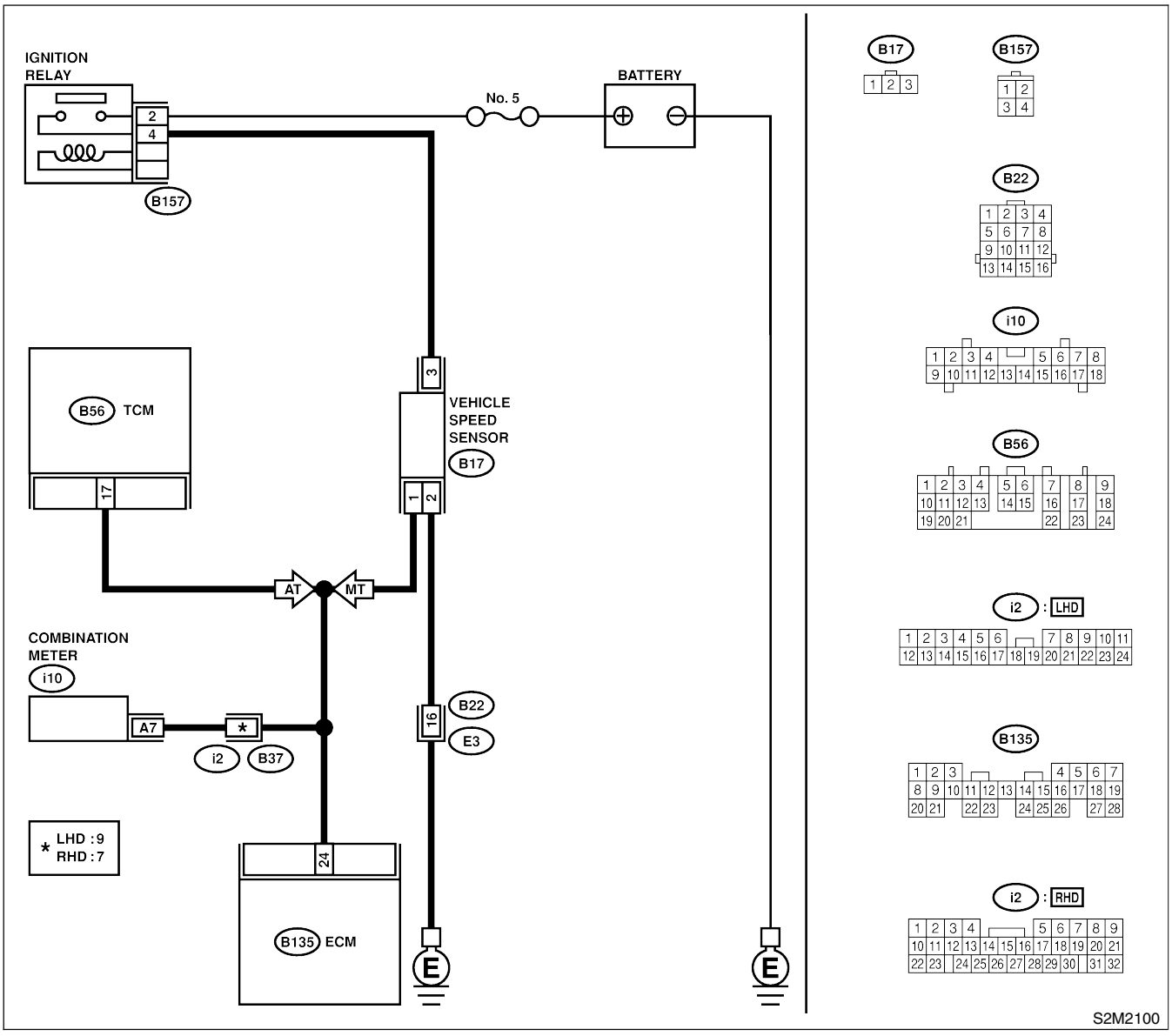
No.	Step	Check	Yes	No
1	**CHECK OPERATION OF STARTER MOTOR.** NOTE: Place the inhibitor switch in the “P” or “N” position.	Does starter motor operate when ignition switch to “ST”?	Repair harness and connector. NOTE: In this case, repair the following: ● Open or ground short circuit in harness between ECM and starter motor connector. ● Poor contact in ECM connector.	Check starter motor circuit. <Ref. to EN(SOHC)-60, STARTER MOTOR CIRCUIT, Diagnostic for Engine Starting Failure.>

BX: DTC P1540 — VEHICLE SPEED SENSOR MALFUNCTION 2 — S058521C26

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



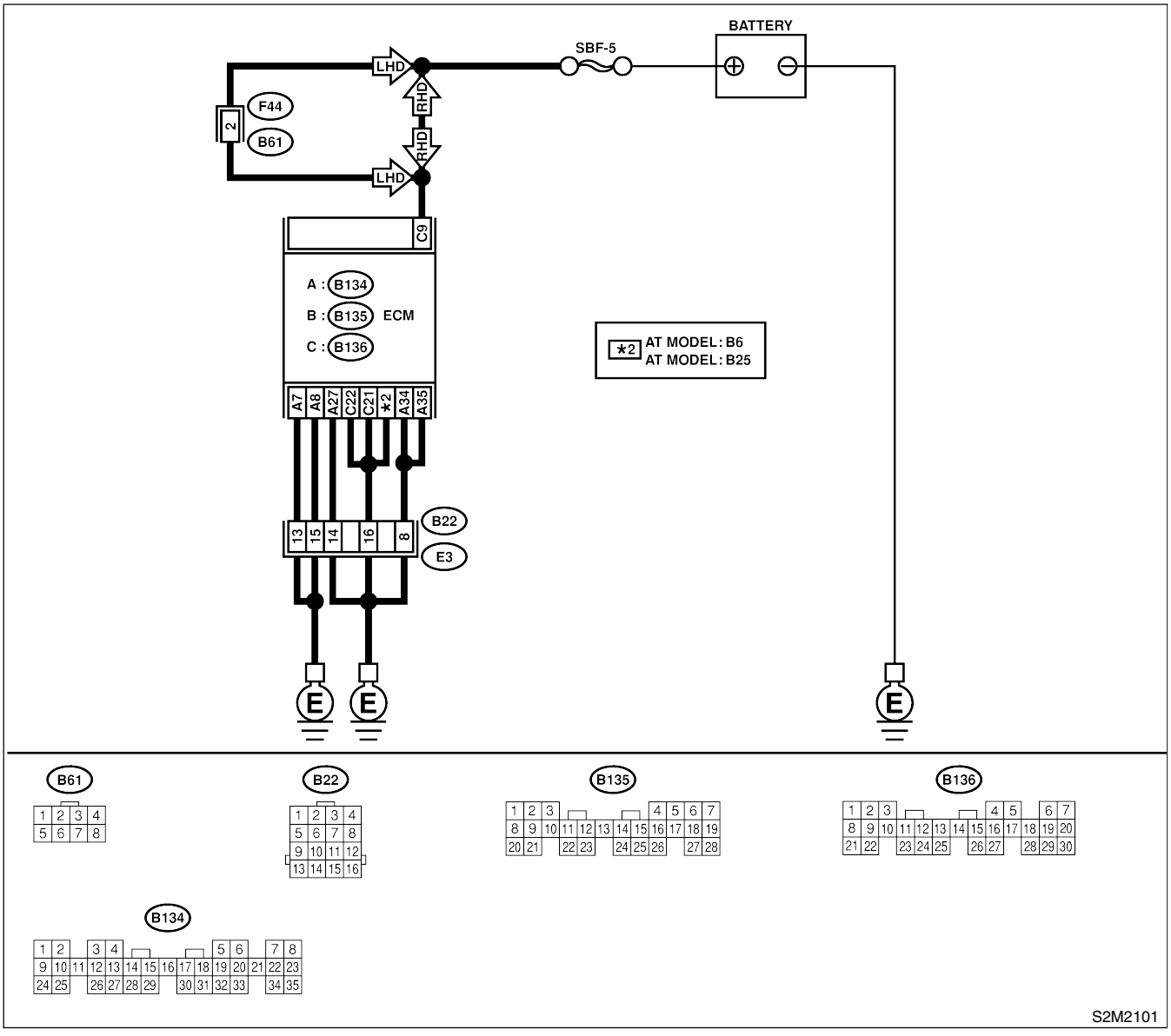
No.	Step	Check	Yes	No
1	**CHECK DTC P0720 ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0720?	Check front vehicle speed sensor signal circuit. <Ref. to AT-58, TROUBLE CODE 33 — FRONT VEHICLE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>	Go to step **2**.
2	**CHECK SPEEDOMETER OPERATION IN COMBINATION METER.**	Does speedometer operate normally?	Go to step **3**.	Check speedometer and vehicle speed sensor. <Ref. to IDI-17, Speedometer.>
3	**CHECK HARNESS BETWEEN ECM AND COMBINATION METER CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from combination meter. 3) Measure resistance between ECM and combination meter. ***Connector & terminal*** ***(B135) No. 24 — (i10) No. 7:***	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 (i2)

BY: DTC P1560 — BACK-UP VOLTAGE CIRCUIT MALFUNCTION — S058521C27

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn ignition switch to OFF. 2) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 9 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair poor contact in ECM connector.	Go to step **2**.

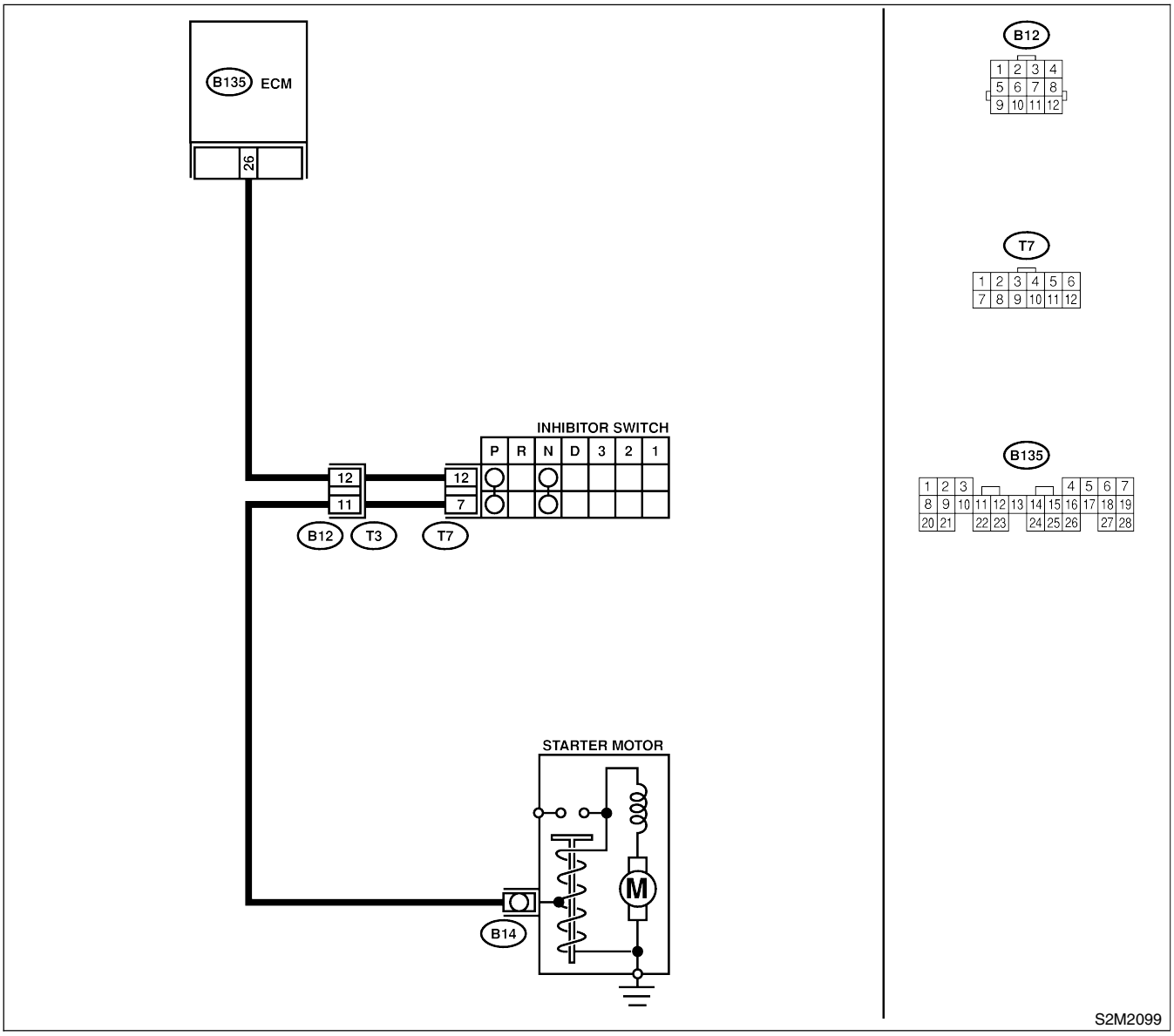
No.	Step	Check	Yes	No
2	**CHECK HARNESS BETWEEN ECM AND MAIN FUSE BOX CONNECTOR.** 1) Disconnect connector from ECM. 2) Measure resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 9 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between ECM connector and battery terminal.	Go to step **3**.
3	**CHECK FUSE SBF-5.**	Is fuse blown?	Replace 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

BZ: DTC P1590 — NEUTRAL POSITION SWITCH CIRCUIT HIGH INPUT (AT MODEL) — S058521G83

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, 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 "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(SOHC)-80, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground in selector lever "N" and "P" positions. ***Connector & terminal*** ***(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 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 your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
5	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(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 ignition switch to OFF. 2) Disconnect connectors from ECM and inhibitor switch. 3) Measure resistance of harness between ECM and inhibitor switch connector. ***Connector & terminal*** ***(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 (B12) • Poor contact in inhibitor switch connector • Poor contact in ECM connector

No.	Step	Check	Yes	No
7	**CHECK INHIBITOR SWITCH GROUND LINE.** Measure resistance of harness between inhibitor switch connector and engine ground. ***Connector & terminal*** ***(T7) No. 7 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **8**.	Repair open circuit in harness between inhibitor switch connector and starter motor ground line. NOTE: In this case, repair the following: • Open circuit in harness between inhibitor switch connector and starter motor ground line • Poor contact in starter motor connector • Poor contact in starter motor ground • Starter motor
8	**CHECK INHIBITOR SWITCH.** Measure resistance between inhibitor switch connector receptacle's terminals in selector lever "N" and "P" positions. ***Terminals*** ***No. 7 — No. 12:***	Is the resistance less than 1 Ω?	Go to step **9**.	Replace inhibitor switch. <Ref. to AT-28, Inhibitor Switch.>
9	**CHECK SELECTOR CABLE CONNECTION.**	Is there any fault in selector cable connection to inhibitor switch?	Repair selector cable connection. <Ref. to CS-11, INSPECTION, Select Cable.>	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

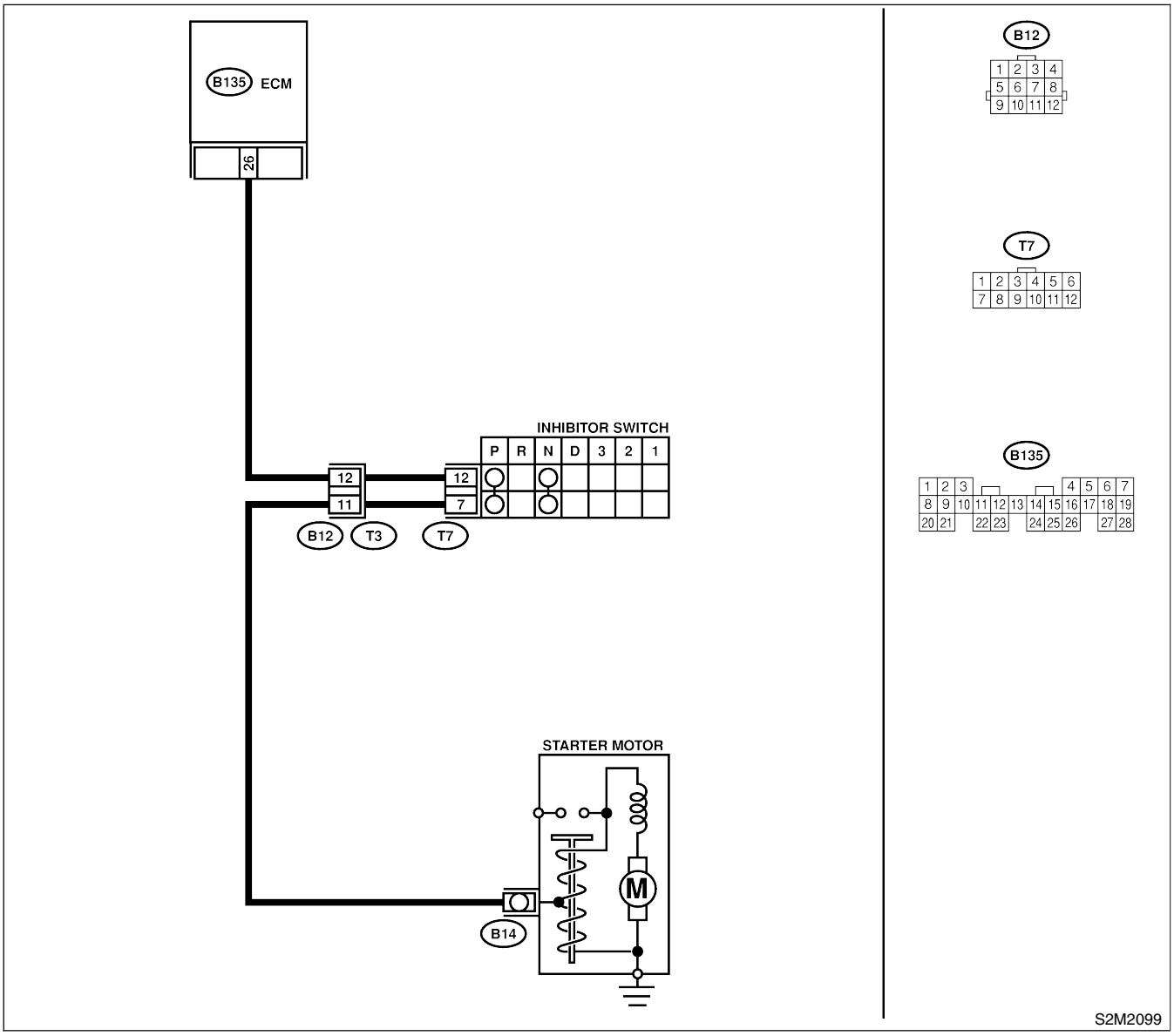
MEMO:

CA: DTC P1591 — NEUTRAL POSITION SWITCH CIRCUIT LOW INPUT (AT MODEL) — S058521G84

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



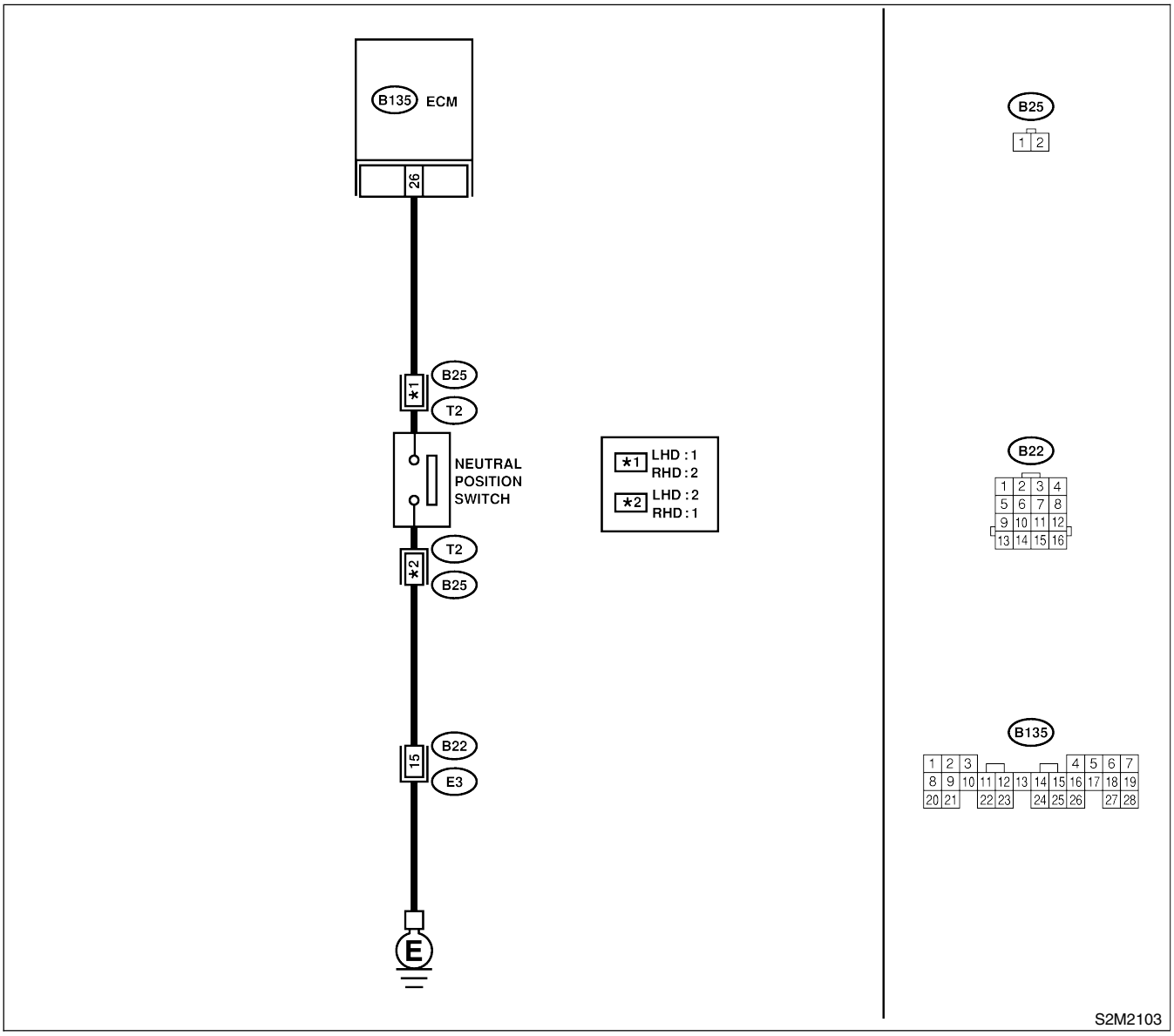
No.	Step	Check	Yes	No
1	**CHECK DTC P0705 ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0705?	Inspect DTC P0705 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(SOHC)-80, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(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 ignition switch to OFF. 2) Disconnect connectors from ECM and transmission harness connector (T3). 3) Measure resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(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 connector from inhibitor switch. 2) Measure resistance of harness between transmission harness connector and engine ground. ***Connector & terminal*** ***(T3) No. 12 — Engine ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between transmission harness and inhibitor switch connector.	Go to step **5**.
5	**CHECK INHIBITOR SWITCH.** Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "N" position. ***Terminals*** ***No. 7 — No. 12:***	Is the resistance more than 1 MΩ at except "N" and "P" positions?	Go to step **6**.	Replace inhibitor switch. <Ref. to AT-28, Inhibitor Switch.>
6	**CHECK SELECTOR CABLE CONNECTION.**	Is there any fault in selector cable connection to inhibitor switch?	Repair selector cable connection. <Ref. to CS-11, INSPECTION, Select Cable.>	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

CB: DTC P1592 — NEUTRAL POSITION SWITCH CIRCUIT LOW INPUT (MT MODEL) — S058521G85

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



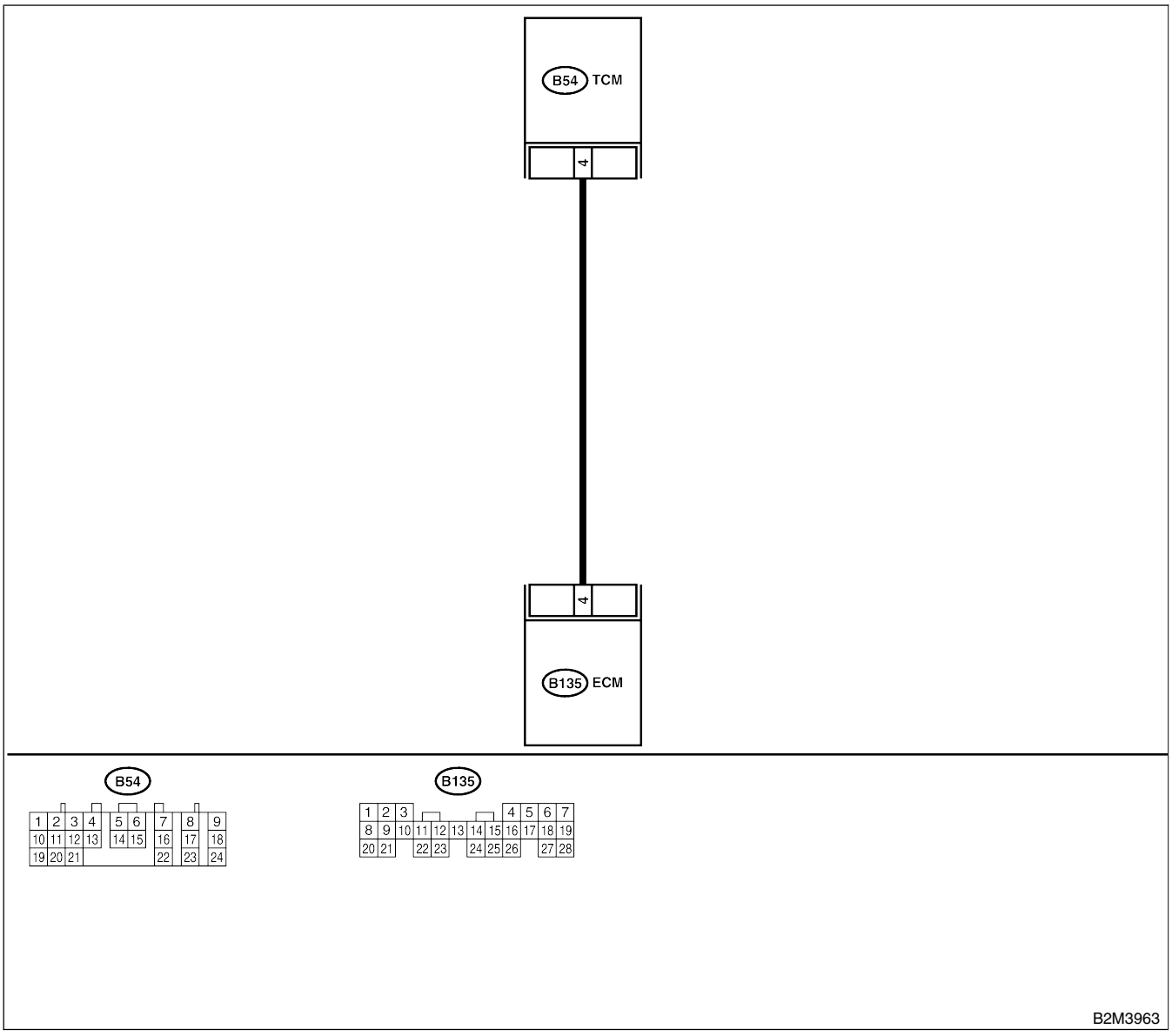
No.	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 26 (+) — Chassis ground (–):***	Is the voltage more than 10V in neutral position?	Go to step **2**.	Go to step **4**.
2	**CHECK INPUT SIGNAL FOR ECM.** Measure 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 your distributor.
4	**CHECK NEUTRAL POSITION SWITCH.** 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission harness. 3) Measure resistance between transmission harness and connector terminals. ***Connector & terminal*** ***(T2) No. 1 — No. 2:***	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 resistance between transmission harness connector terminals.	Is the resistance less than 1Ω in other positions?	Go to step **6**.	Repair short circuit in transmission harness or replace neutral position switch.
6	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** Measure 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 connector from ECM. 2) Measure resistance of harness between ECM and transmission harness connector. ***Connector & terminal*** ***LHD: (B135) No. 26 — (B25) No. 1:*** ***RHD: (B135) No. 26 — (B25) No. 2:***	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 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 your distributor.

CC: DTC P1594 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT MALFUNCTION — S058521G12

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, 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 AT shift control functioning properly?	Go to step **2**.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

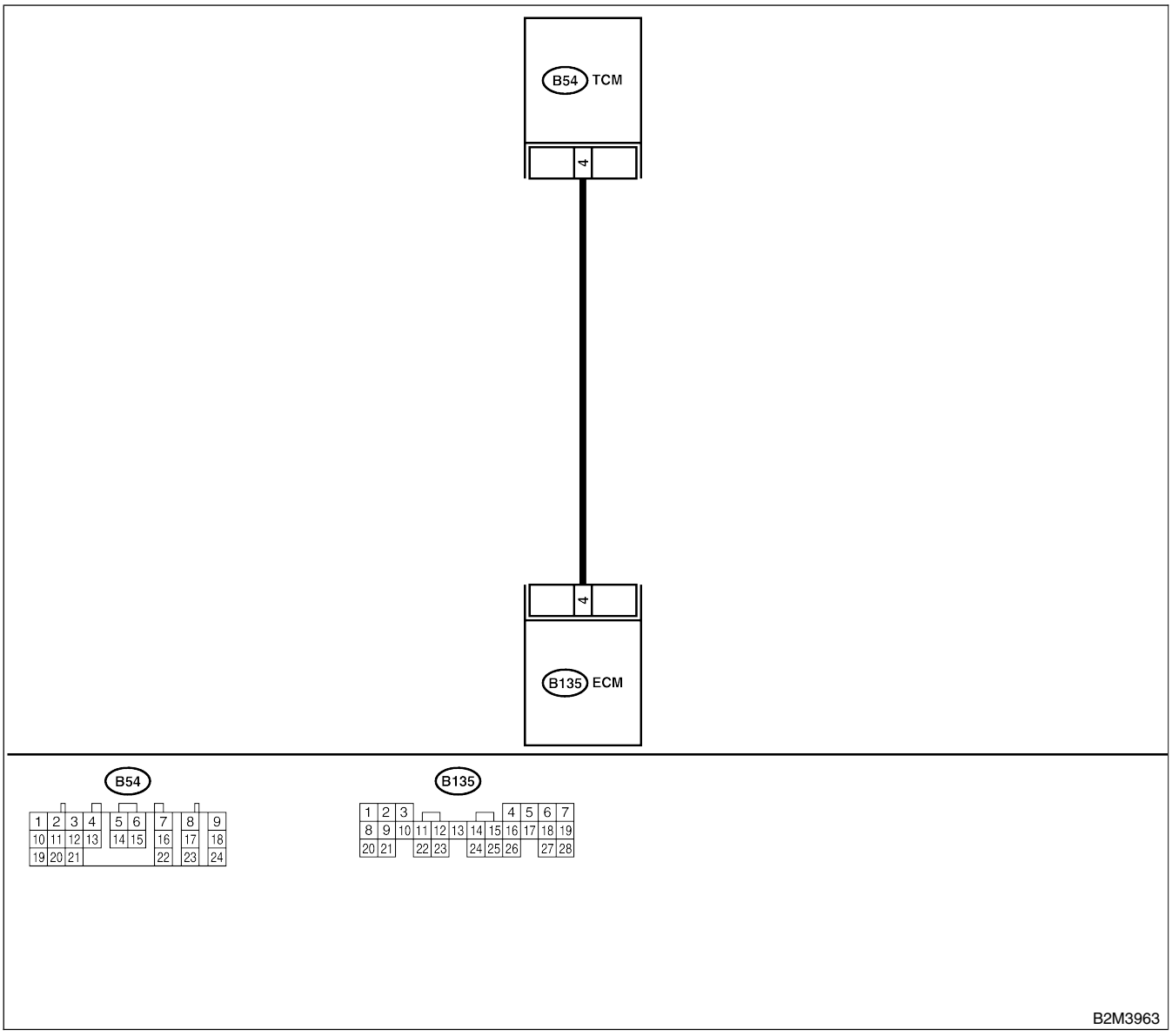
No.	Step	Check	Yes	No
2	**CHECK ACCESSORY.**	Are car phone and/or CB installed on vehicle?	Repair grounding line of car phone or CB system.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

CD: DTC P1595 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT LOW INPUT — S058521G13

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



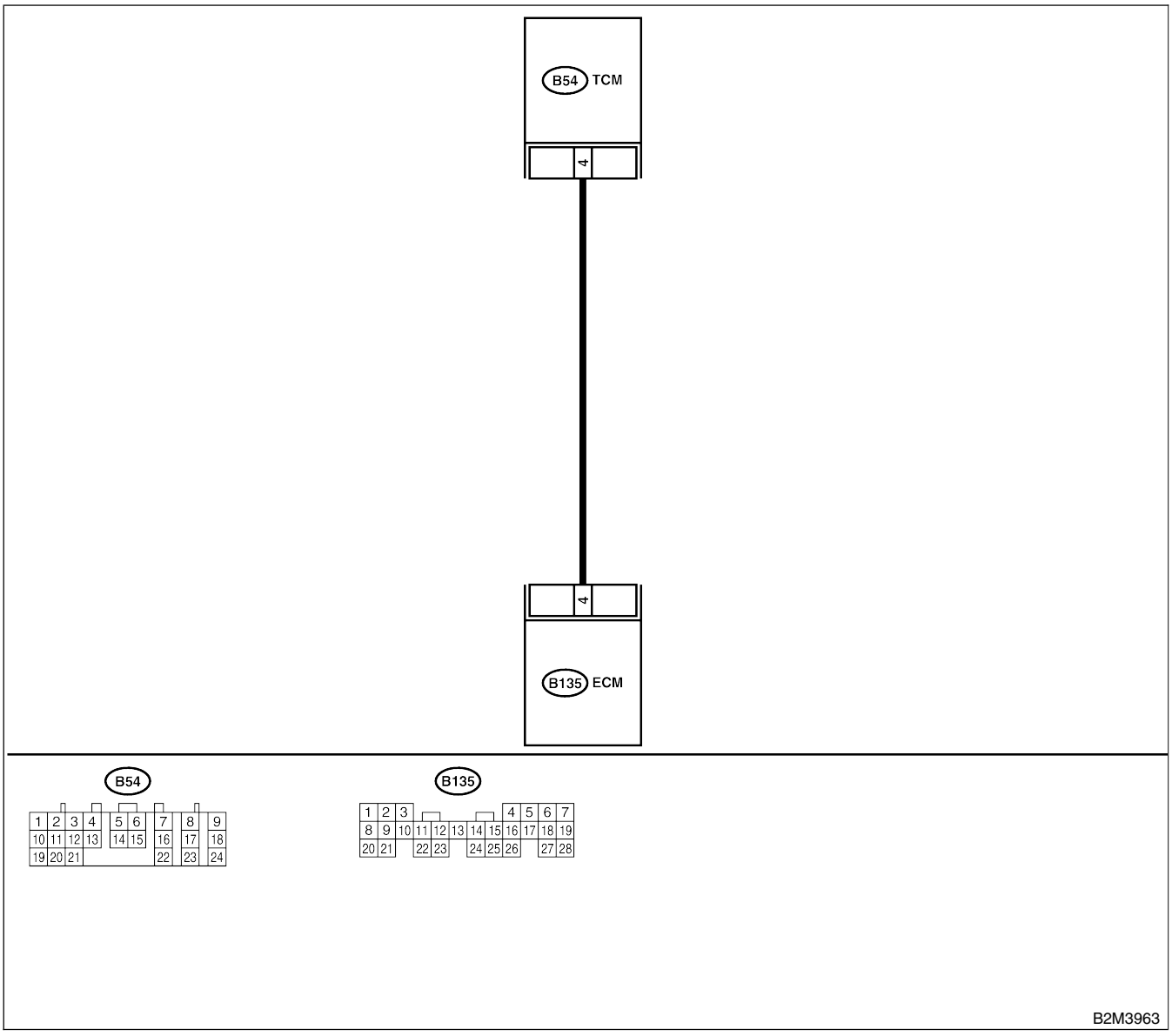
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 4 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **2**.	Even if MIL lights up, the 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 ignition switch to OFF. 2) Disconnect connector from ECM and TCM. 3) Measure resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 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 connector to ECM. 2) Turn ignition switch to ON. 3) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 5 V?	Go to step **4**.	Repair poor contact in ECM connector.
4	**CHECK TROUBLE CODE FOR AUTOMATIC TRANSMISSION.** Read trouble code for automatic transmission. <Ref. to AT-22, Read Diagnostic Trouble Code.>	Does trouble code appear for automatic transmission?	Inspect trouble code for automatic transmission. <Ref. to AT-42, Diagnostic Procedure with Trouble Code.>	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

CE: DTC P1596 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT HIGH INPUT — S058521G14

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



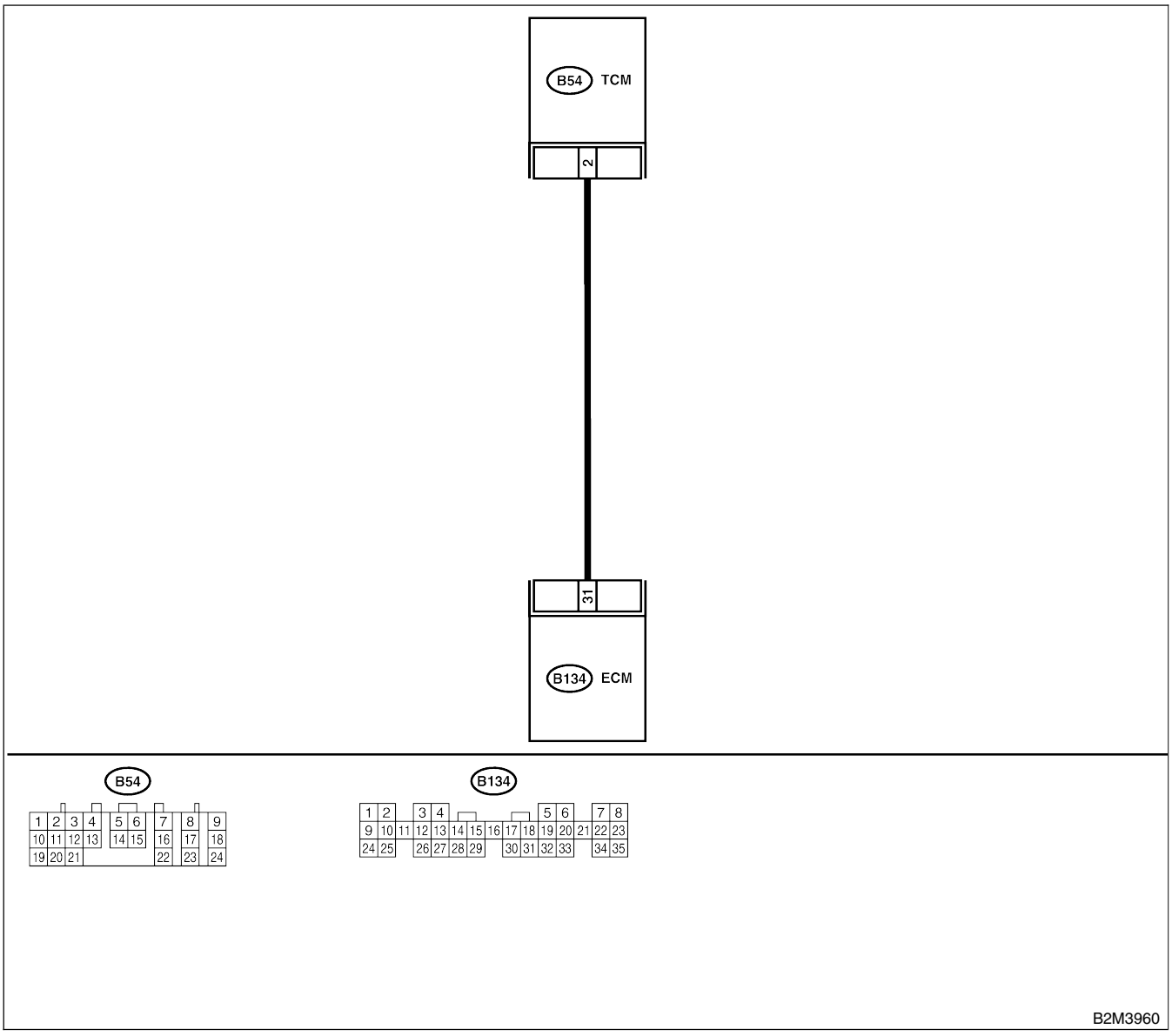
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and TCM connector. After repair, replace ECM. <Ref. to FU(SOHC)-49, Engine Control Module.>	Go to step **2**.
2	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 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 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 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 your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
5	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** Measure voltage between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 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.

CF: DTC P1698 — ENGINE TORQUE CONTROL CUT SIGNAL CIRCUIT LOW INPUT — S058521G15

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



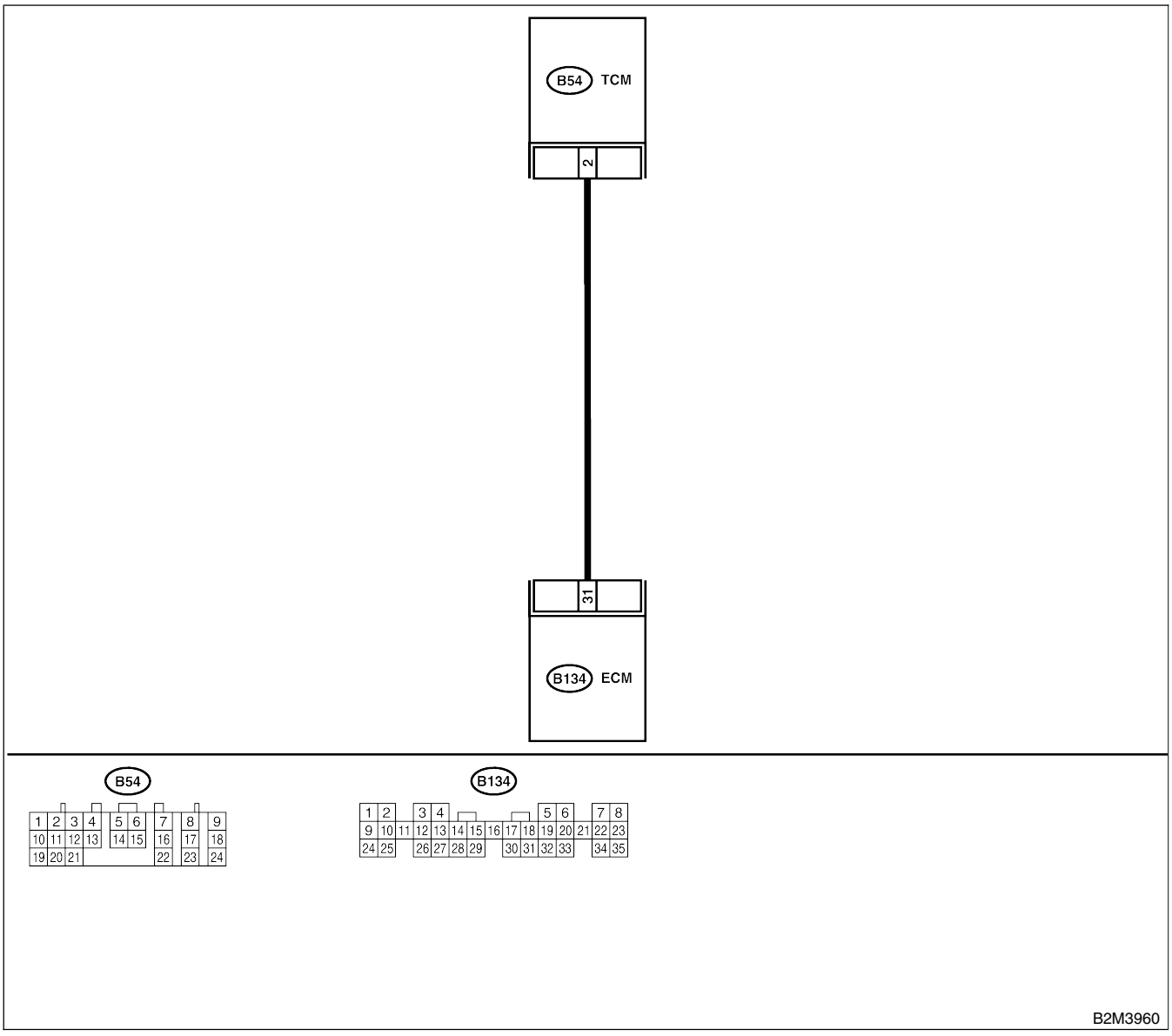
No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Start engine, and warm-up the engine. 2) Turn ignition switch to OFF. 3) Turn ignition switch to ON. 4) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 31 (+) — Chassis ground (–):***	Is the voltage more than 3 V?	Repair poor contact in ECM connector.	Go to step **2**.
2	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from ECM and TCM. 3) Measure 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 resistance of harness between 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.

CG: DTC P1699 — ENGINE TORQUE CONTROL CUT SIGNAL CIRCUIT HIGH INPUT — S058521G16

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



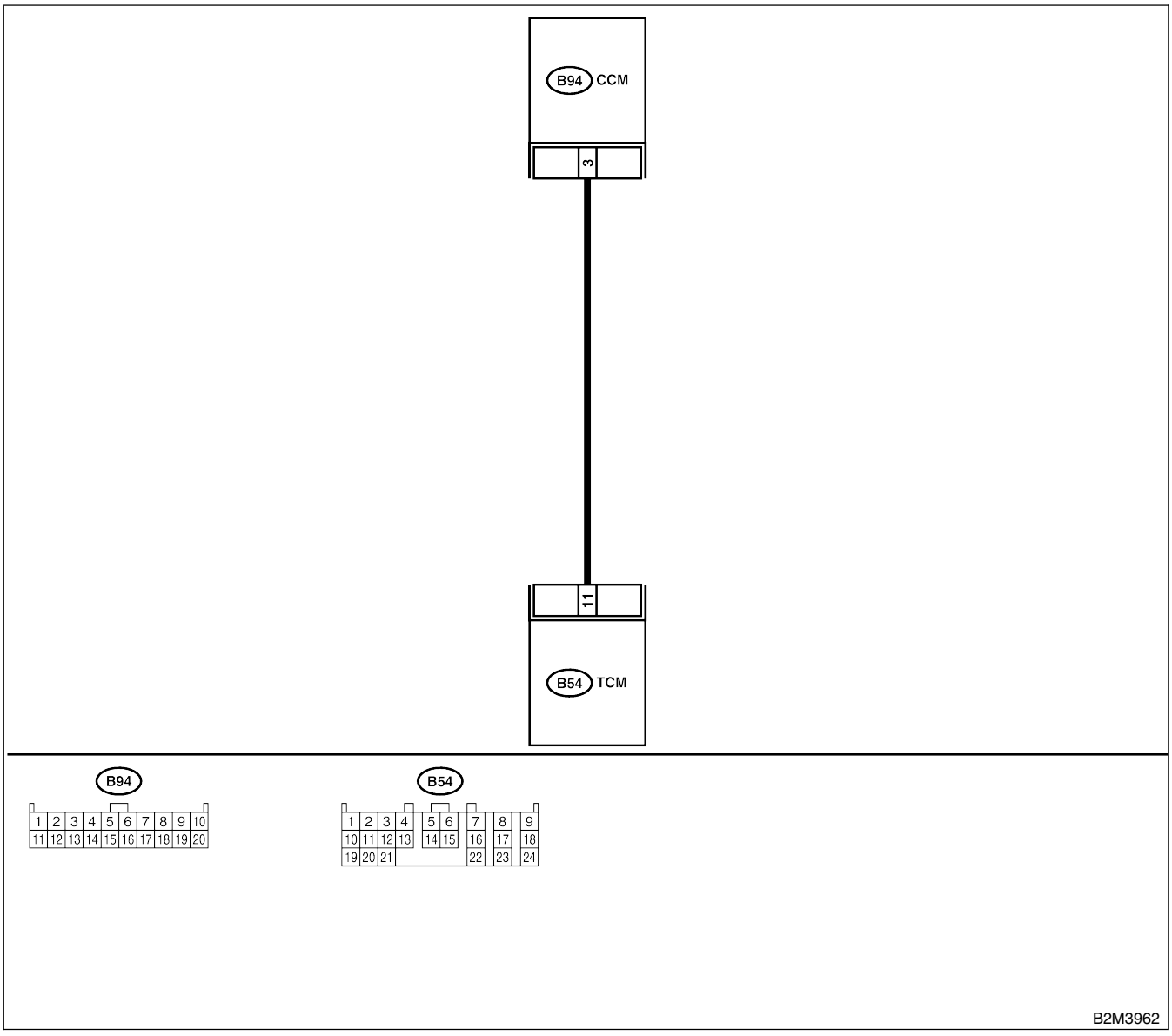
No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Start engine, and warm-up the engine. 2) Turn ignition switch to OFF. 3) Disconnect connector from TCM. 4) Turn ignition switch to ON. 5) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 31 (+) — Chassis 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 ECM. <Ref. to FU(SOHC)-49, Engine Control Module.>
2	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(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 ECM. <Ref. to FU(SOHC)-49, Engine Control Module.>	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

CH: DTC P1701 — CRUISE CONTROL SET SIGNAL CIRCUIT MALFUNCTION FOR AUTOMATIC TRANSMISSION — S058521C29

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



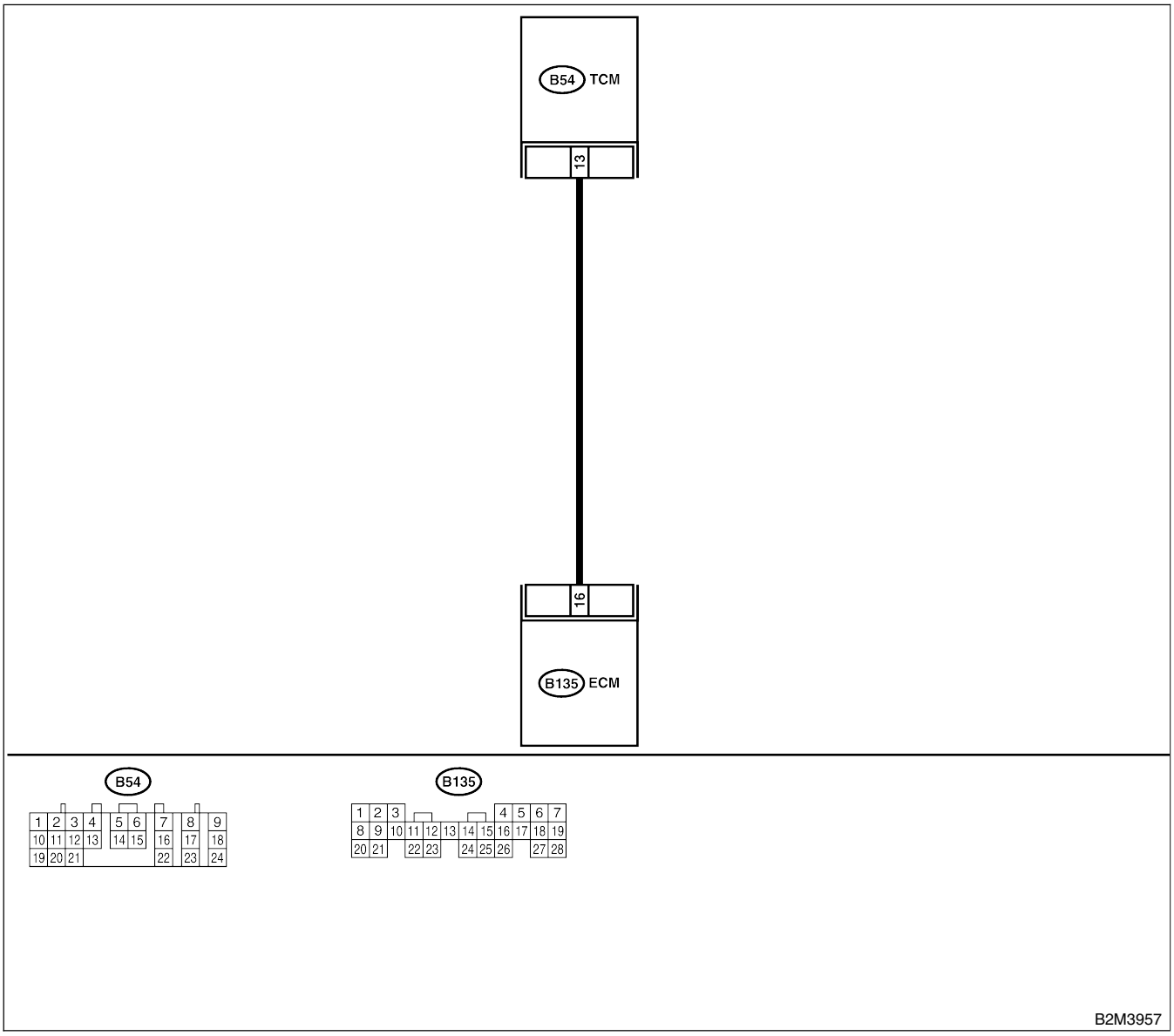
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN TCM AND CCM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and CCM. 3) Measure resistance of harness between TCM and CCM connector. ***Connector & terminal*** ***(B54) No. 11 — (B94) No. 3:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair open circuit in harness between TCM and CCM connector.
2	**CHECK HARNESS BETWEEN TCM AND CCM CONNECTOR.** Measure resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(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 connector to TCM and CCM. 2) Lift-up the vehicle or set the vehicle on free rollers. **CAUTION:** **On AWD models, raise all wheels off ground.** 3) Start the engine. 4) Cruise control main switch to ON. 5) Move selector lever to “D” and slowly increase vehicle speed to 50 km/h (31 MPH). 6) Cruise control command switch to ON. 7) Measure voltage between TCM and chassis ground. ***Connector & terminal*** ***(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-10, INSPECTION, Cruise Control Command Switch.>
4	**CHECK POOR CONTACT.** Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair poor contact in TCM connector.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

CI: DTC P1711 — ENGINE TORQUE CONTROL SIGNAL 1 CIRCUIT MALFUNCTION — S058521G17

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



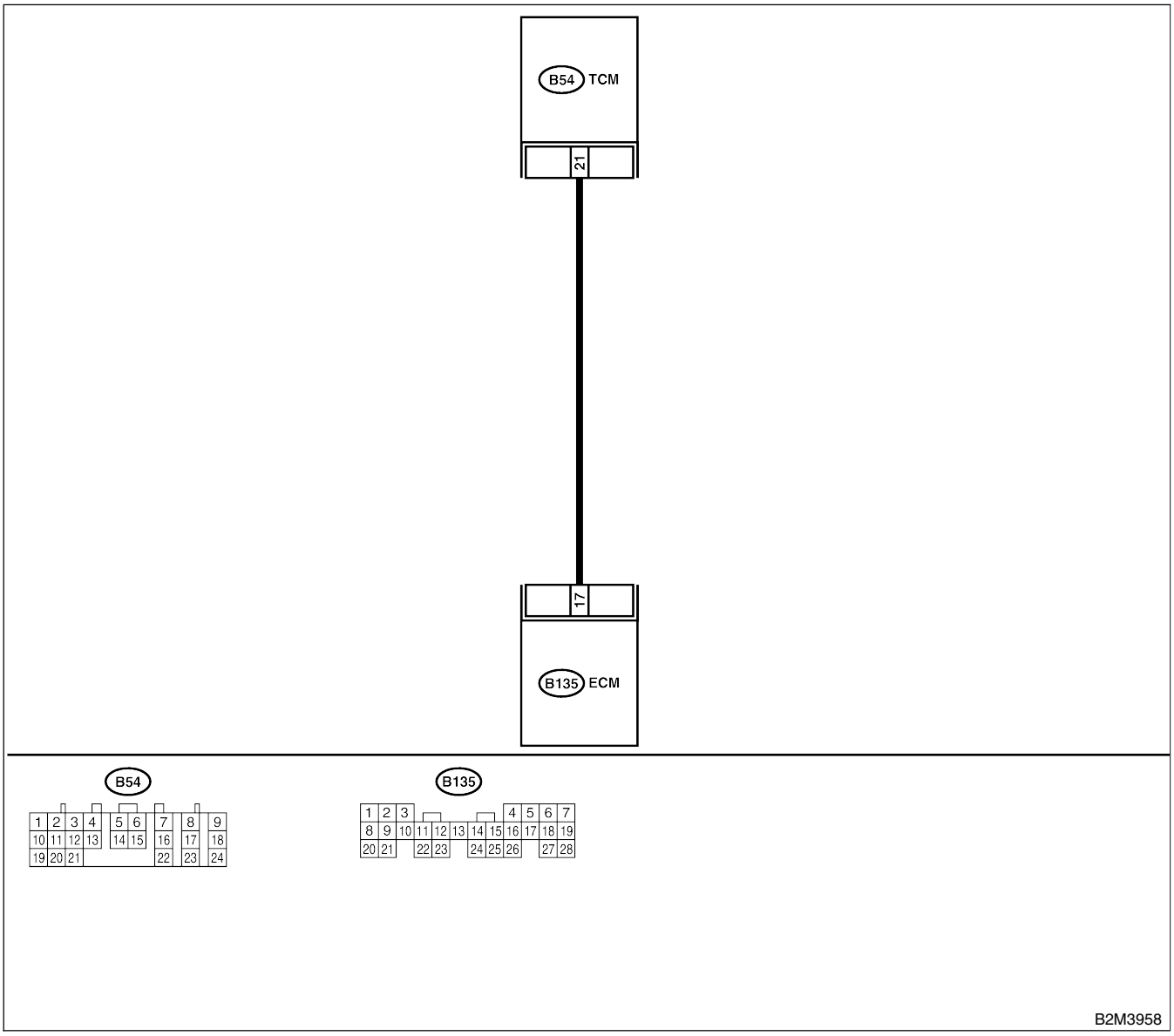
No.	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 16 (+) — Chassis ground (–):***	Is the voltage more than 4.5 V?	Go to step **2**.	Go to step **4**.
2	**CHECK INPUT SIGNAL FOR ECM.** Measure 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 ECM. <Ref. to FU(SOHC)-49, Engine Control Module.>
4	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from ECM and TCM. 3) Measure resistance of harness between ECM and TCM connector. ***Connector & terminal*** ***(B135) No. 16 — (B54) No. 13:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair open circuit in harness between ECM and TCM connector.
5	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** Measure resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 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 TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

CJ: DTC P1712 — ENGINE TORQUE CONTROL SIGNAL 2 CIRCUIT MALFUNCTION — S058521G18

- **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(SOHC)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-42, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 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 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 ECM. <Ref. to FU(SOHC)-49, Engine Control Module.>
4	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from ECM and TCM. 3) Measure resistance of harness between ECM and TCM connector. ***Connector & terminal*** ***(B135) No. 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 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 TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

19. General Diagnostic Table

S058257

A: INSPECTION S058257A10

1. ENGINE S058257A1001

NOTE:
Malfunction of parts other than those listed is also possible. <Ref. to ME(SOHC)-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

Symptom	Problem parts
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
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 S058257A1002

NOTE:
Check general diagnostics table with non-conformity symptom for automatic transmission. <Ref. to AT-2, Basic Diagnostic Procedure.>

GENERAL DIAGNOSTIC TABLE

MEMO:

FUEL INJECTION (FUEL SYSTEMS)

FU(SOHCw/oOBD)

		Page
1.	General Description	2
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3.	Intake Manifold	12
4.	Engine Coolant Temperature Sensor	23
5.	Crankshaft Position Sensor	24
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7.	Throttle Position Sensor	26
8.	Pressure Sensor	29
9.	Intake Air Temperature Sensor	30
10.	Idle Air Control Solenoid Valve	31
11.	Fuel Injector	32
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15.	Fuel Pump Relay	40
16.	Fuel	41
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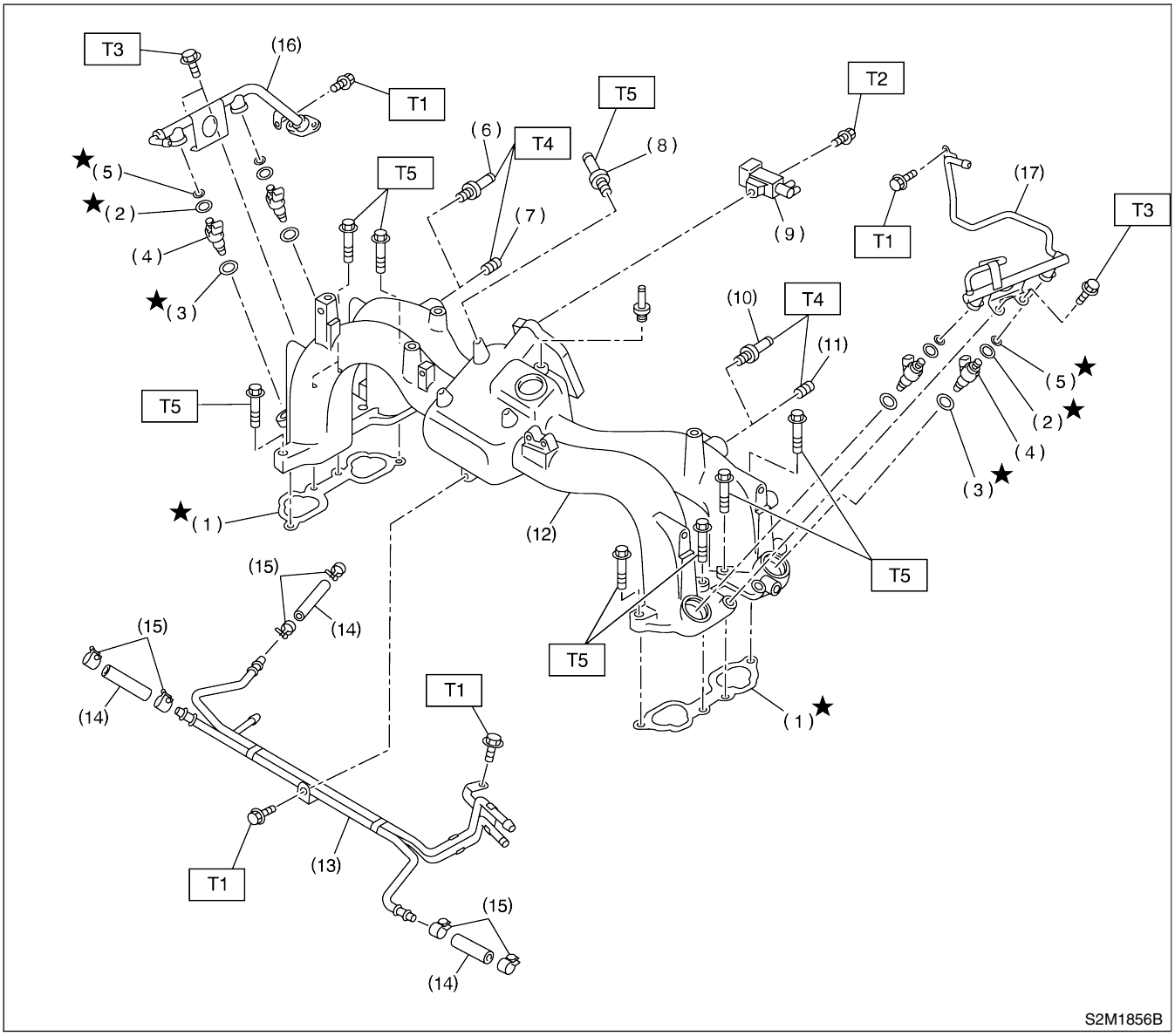
1. General Description S165001

A: SPECIFICATIONS S165001E49

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

B: COMPONENT S165001A05

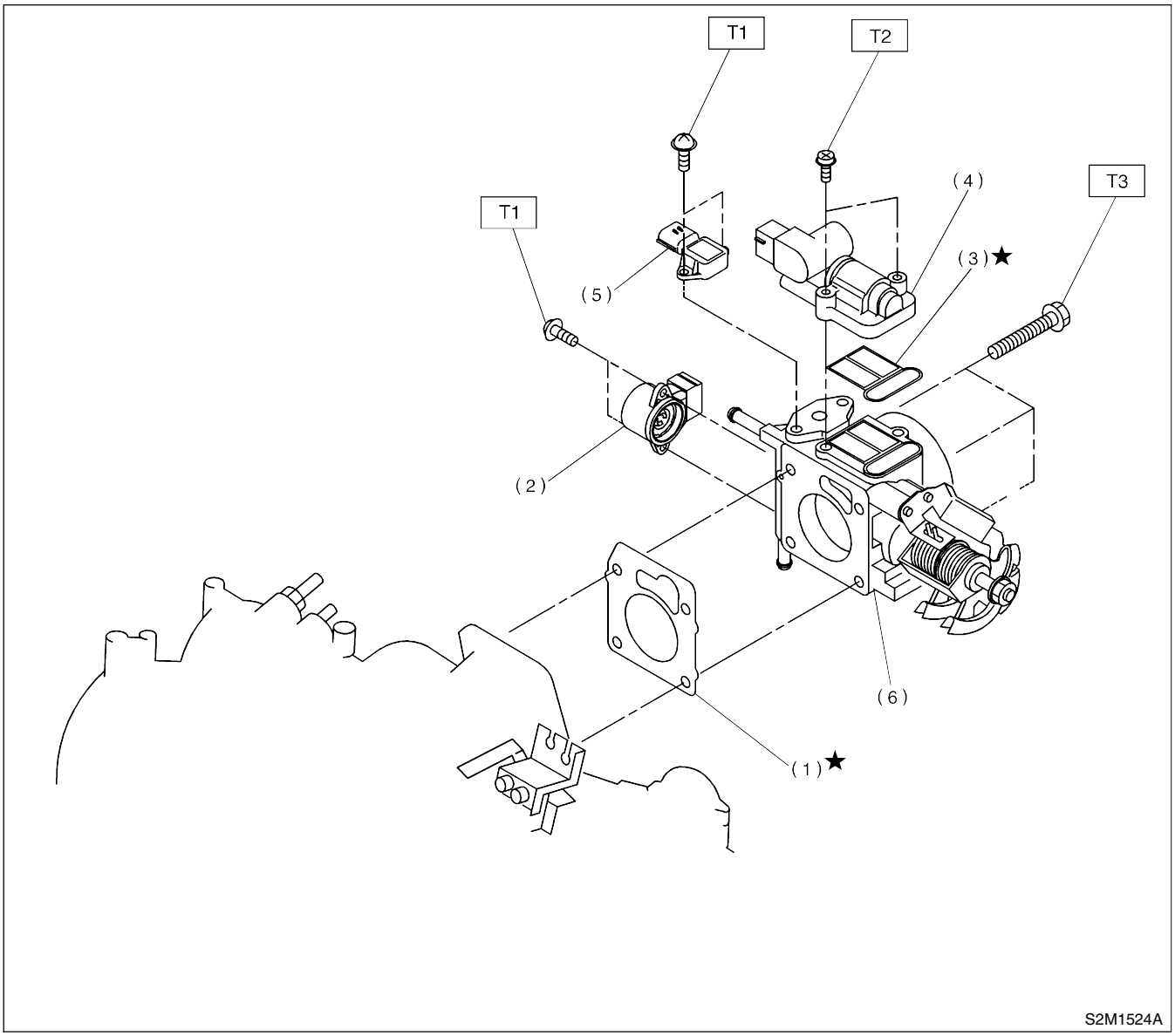
1. INTAKE MANIFOLD S165001A0501



(1) Intake manifold gasket
(2) Insulator A
(3) Insulator B
(4) Fuel injector
(5) O-ring
(6) Nipple (RHD models)
(7) Plug (LHD models)
(8) PCV valve
(9) Purge control solenoid valve
(10) Nipple (LHD models)
(11) Plug (RHD models)
(12) Intake manifold
(13) Fuel pipe ASSY
(14) Fuel hose
(15) Clip
(16) Fuel injector pipe RH
(17) Fuel injector pipe LH

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.9 (0.5, 3.6)
T2: 15.7 (1.6, 11.6)
T3: 19 (1.9, 13.7)
T4: 17 (1.7, 12)
T5: 25 (2.5, 18.1)

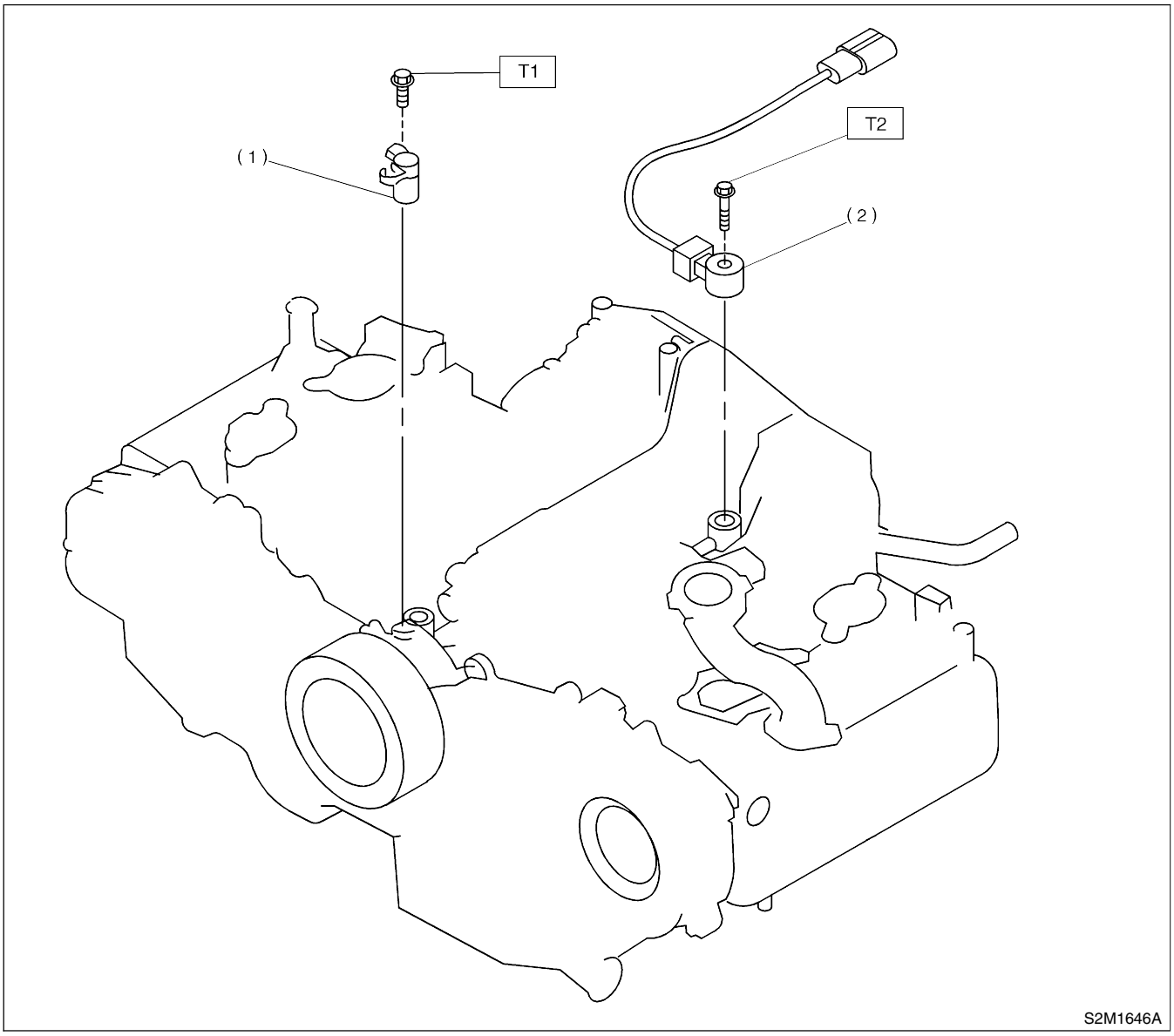
2. AIR INTAKE SYSTEM S165001A0502



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

Tightening torque: N·m (kgf-m, ft-lb)
T1: 2.0 (0.2, 1.4)
T2: 3.4 (0.35, 2.5)
T3: 22 (2.2, 15.9)

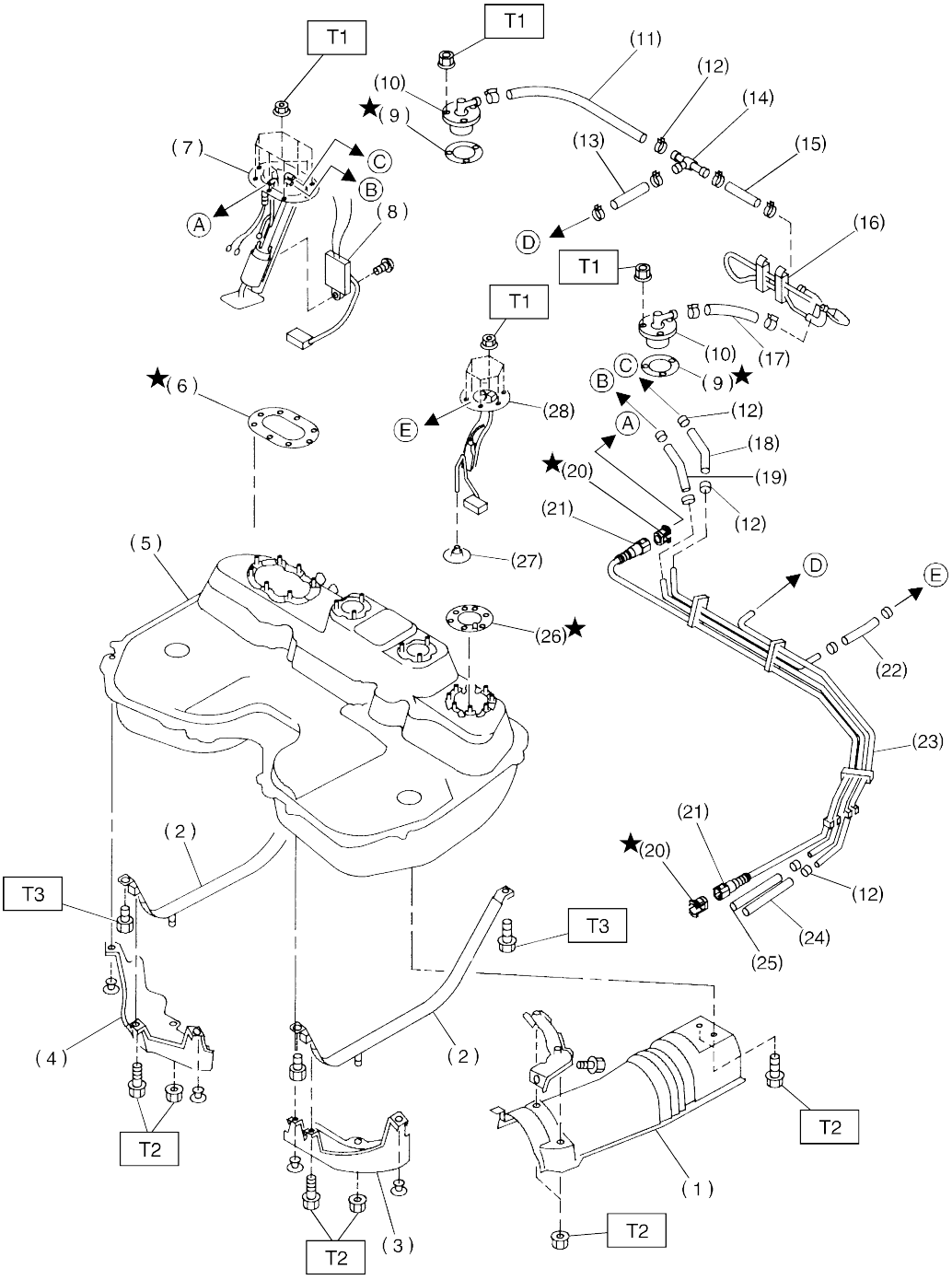
3. CRANKSHAFT POSITION, CAMSHAFT POSITION AND KNOCK SENSORS S165001A0503



(1) Crankshaft position sensor
(2) Knock sensor

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 24 (2.4, 17)

4. FUEL TANK S165001A0504

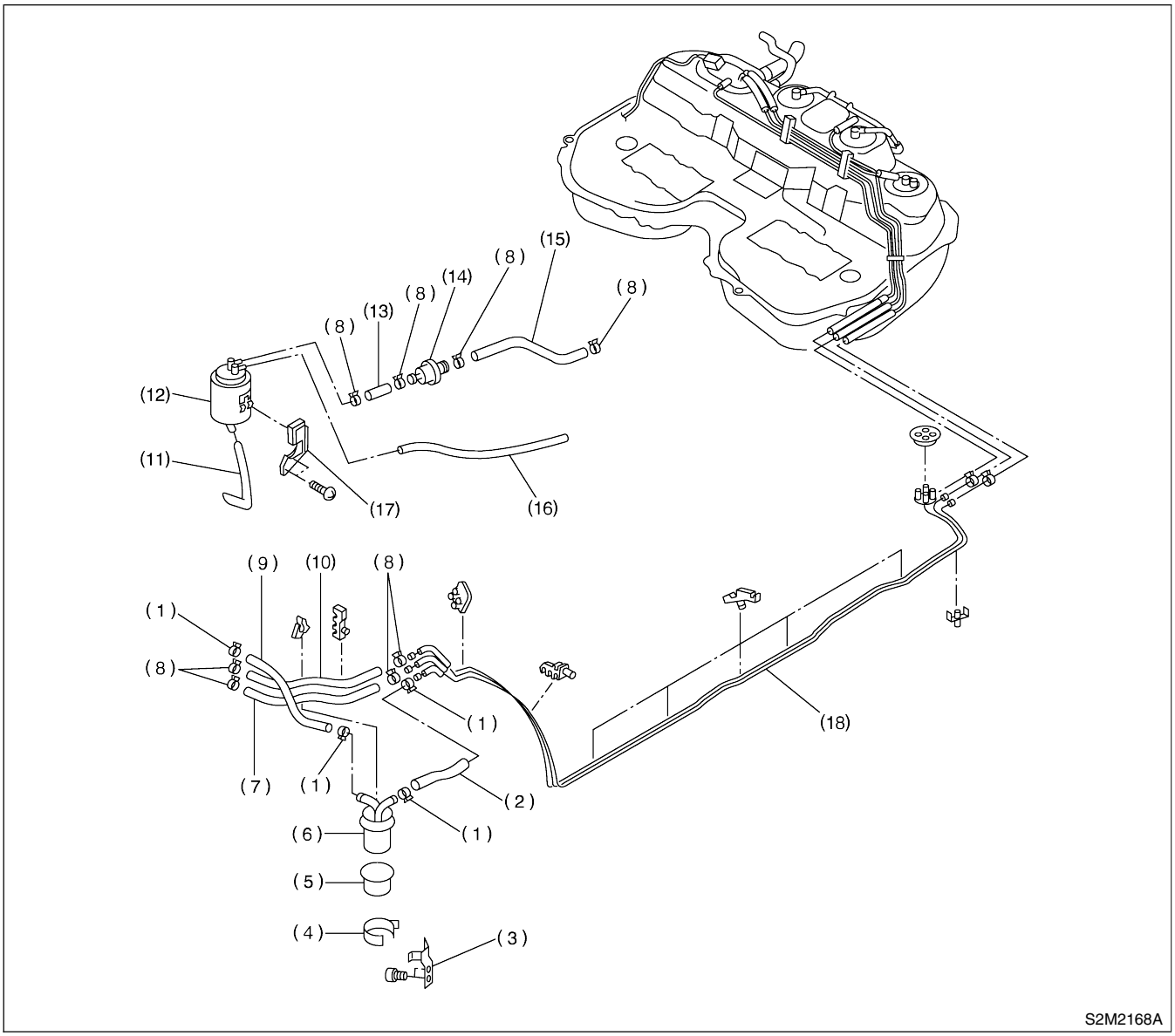


S2M0634A

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

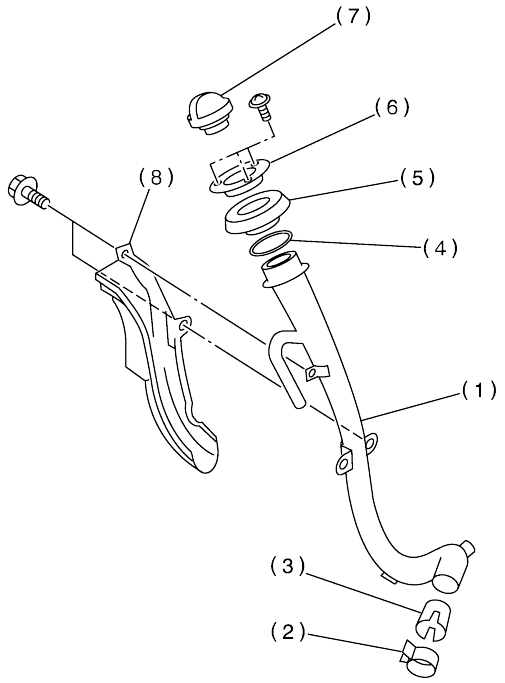
Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.3)
T2: 7.4 (0.75, 5.4)
T3: 33 (3.4, 25)

5. FUEL LINE S165001A0505



(1) Clamp
(2) Fuel delivery hose A
(3) Fuel filter bracket
(4) Fuel filter holder
(5) Fuel filter cup
(6) Fuel filter
(7) Evaporation hose
(8) Clip
(9) Fuel delivery hose B
(10) Fuel return hose
(11) Air vent hose
(12) Canister
(13) Canister hose A
(14) Two-way valve
(15) Canister hose B
(16) Canister hose C
(17) Canister bracket
(18) Fuel pipe ASSY

6. FUEL FILLER PIPE S165001A0506



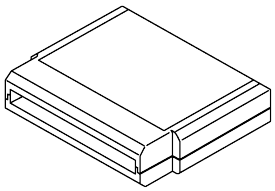
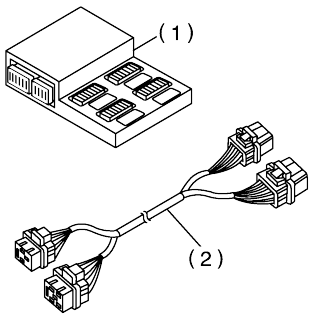
S2M2169A

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

C: CAUTION S165001A03

- 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.

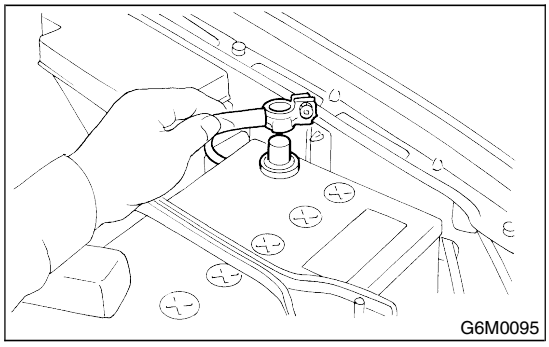
D: PREPARATION TOOL S165001A17

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)
 S2M2170A	498307600	CHECK BOARD KIT	Troubleshooting for engine electrical system. (1) CHECK BOARD: 498307610 (2) CHECK BOARD ADAPTER: 498307620

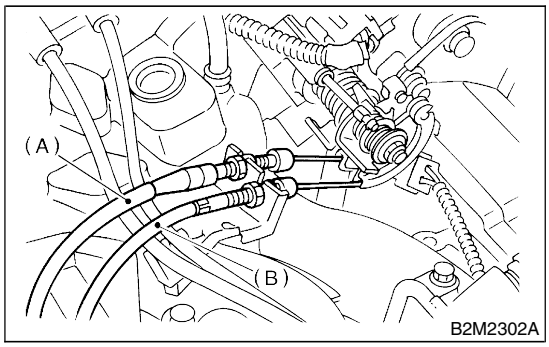
2. Throttle Body S165010

A: REMOVAL S165010A18

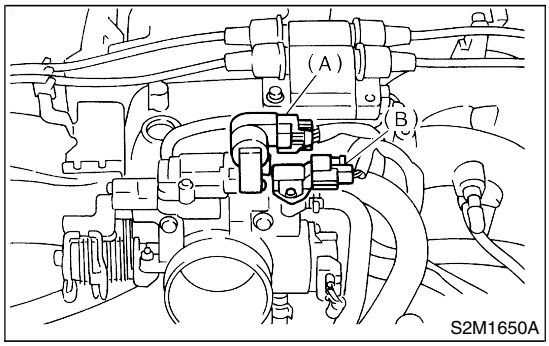
1) Disconnect battery ground cable.



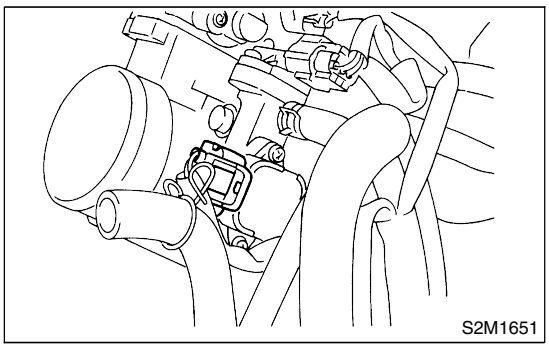
2) Remove air cleaner case. <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
3) Disconnect accelerator cable (A).
4) Disconnect cruise control cable (B). (With cruise control model)



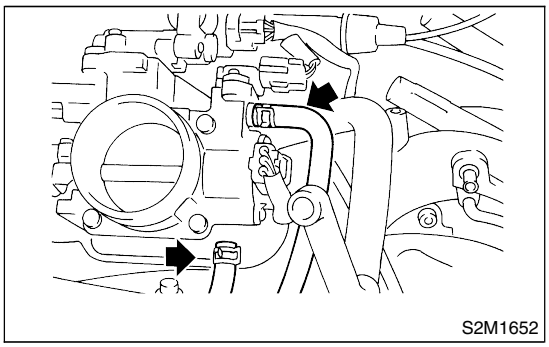
5) Disconnect connectors from idle air control solenoid valve (A) and intake manifold pressure sensor (B).



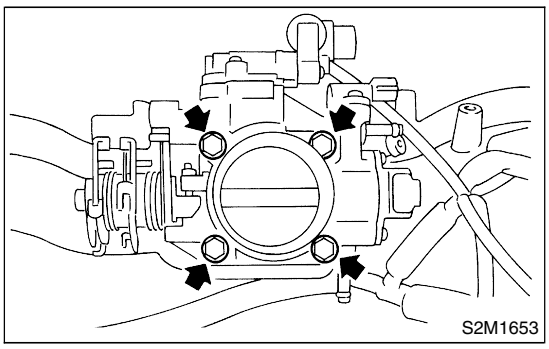
6) Disconnect connector from throttle position sensor.



7) Disconnect engine coolant hoses from throttle body.



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



B: INSTALLATION S165010A11

Install in the reverse order of removal.

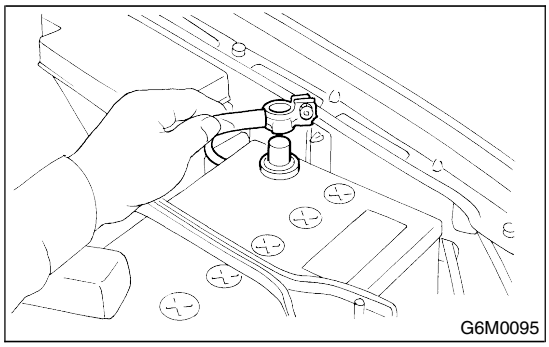
NOTE:
Always use a new gasket.

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)

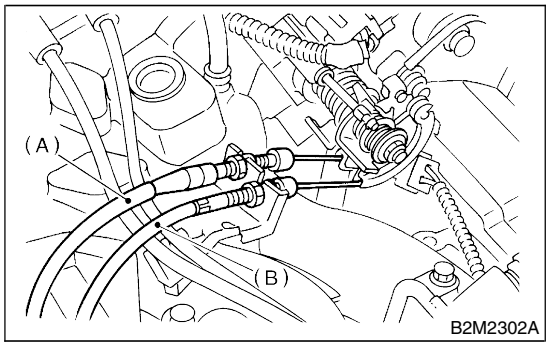
3. Intake Manifold S165034

A: REMOVAL S165034A18

1) Release fuel pressure. <Ref. to FU(SOHCw/oOBD)-41, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open fuel flap lid, and remove fuel filler cap.
3) Disconnect battery ground cable.

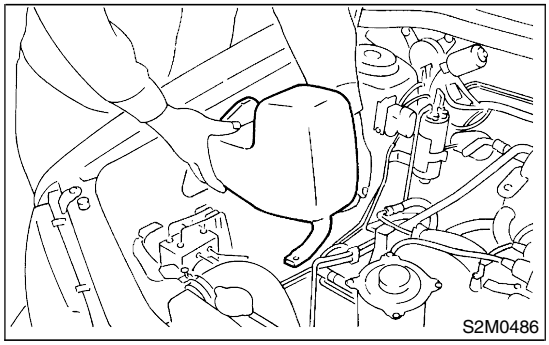

G6M0095

4) Remove air cleaner case and air intake duct. <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.> and <Ref. to IN(SOHC)-8, REMOVAL, Air Intake Duct.>
5) Disconnect accelerator cable (A).
6) Disconnect cruise control cable (B). (With cruise control model)



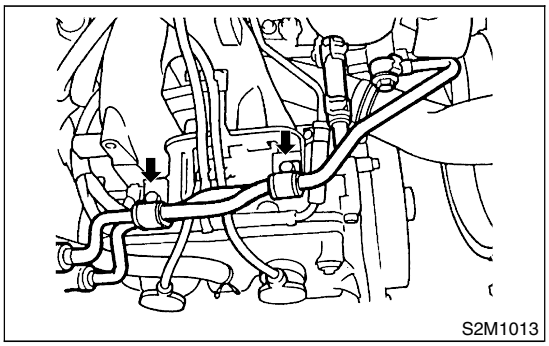
B2M2302A

7) Remove power steering pump from bracket.
(1) Remove resonator chamber.

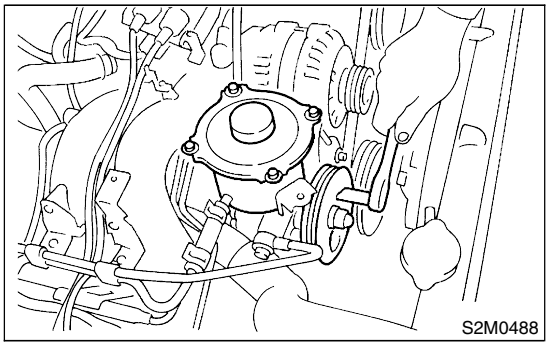

S2M0486

(2) Remove V-belts.
<Ref. to ME(SOHC)-42, REMOVAL, V-belt.>
(3) Remove bolts which secure power steering pipe brackets to intake manifold.

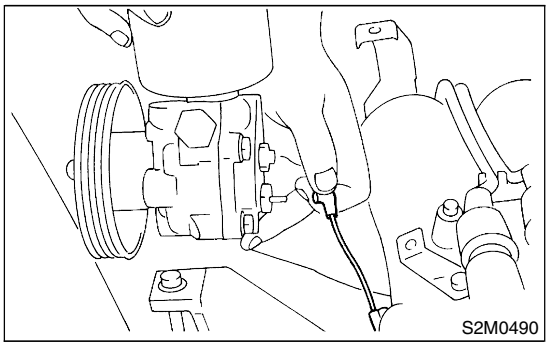
CAUTION:
Do not disconnect power steering hose.


S2M1013

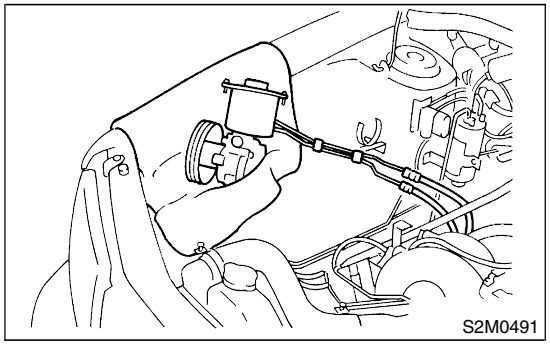
(4) Remove bolts which install power steering pump to bracket.


S2M0488

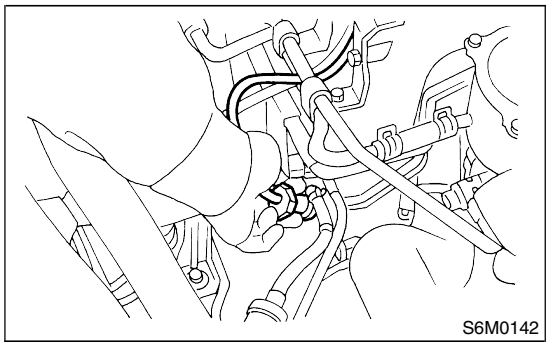
(5) Disconnect terminal from power steering pump switch.


S2M0490

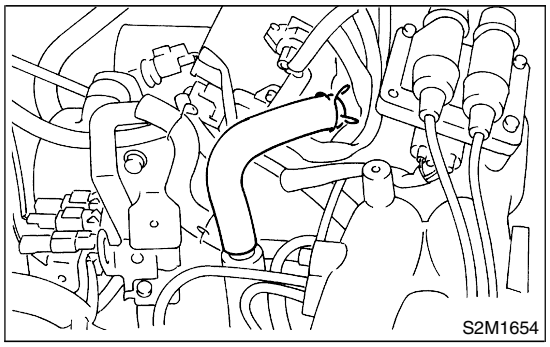
(6) Place power steering pump on the right side wheel apron.


S2M0491

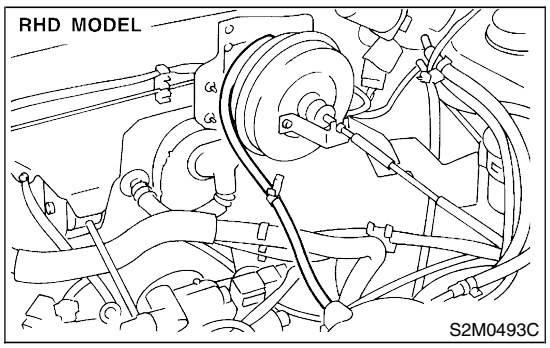
8) Disconnect spark plug cords from spark plugs.


S6M0142

9) Disconnect PCV hose from intake manifold.

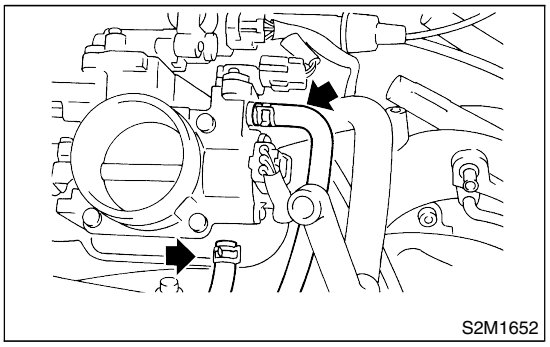

S2M1654

10) Disconnect vacuum hose to cruise control diaphragm. (With cruise control models)

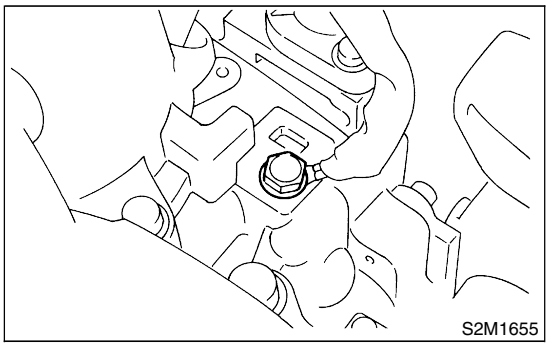


S2M0493C

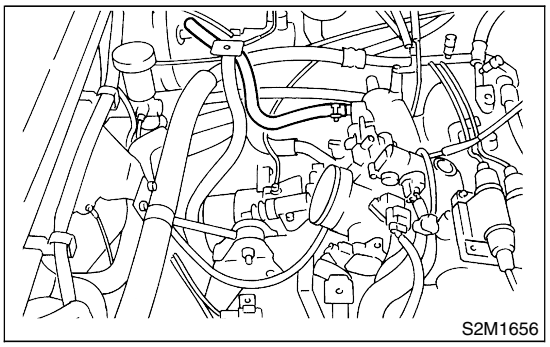
11) Disconnect engine coolant hose from throttle body.


S2M1652

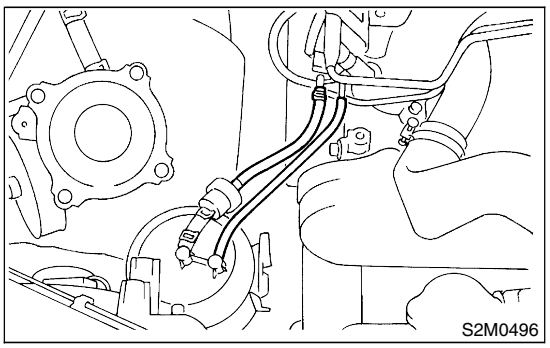
12) Remove bolt which installs ground terminal onto cylinder head.


S2M1655

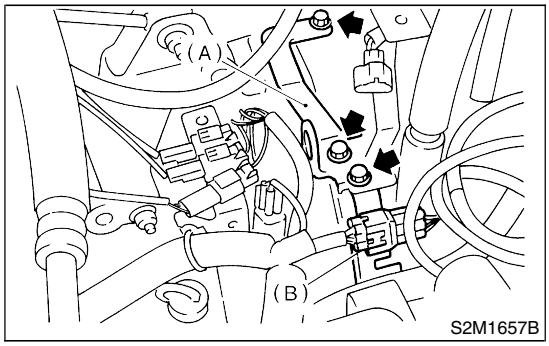
13) Disconnect brake booster hose.


S2M1656

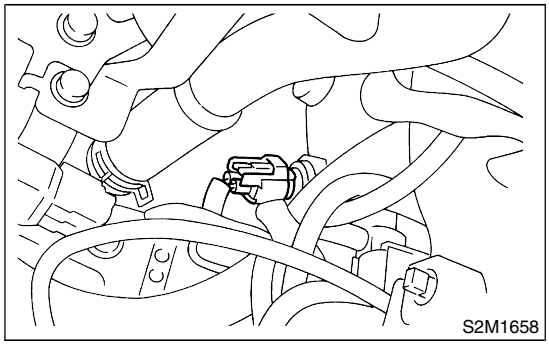
14) Disconnect canister hoses from pipes.


S2M0496

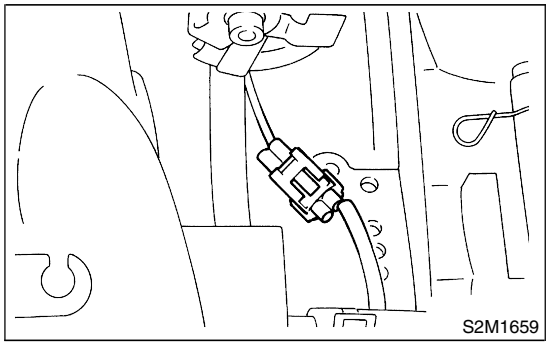
15) Remove air cleaner case stay RH and engine harness bracket (A), and disconnect engine harness connectors (B) from bulkhead harness connectors.
16) Pull out engine harness connector from bracket.



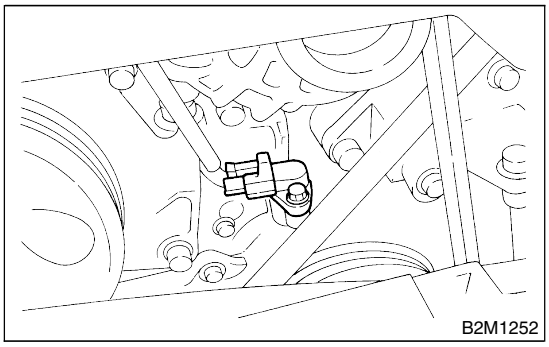
17) Disconnect connector from engine coolant temperature sensor.



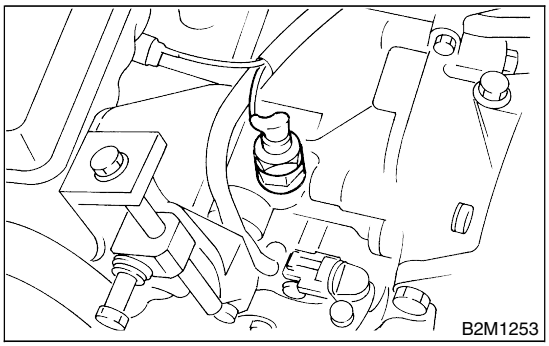
18) Disconnect knock sensor connector.



19) Disconnect connector from crankshaft position sensor.

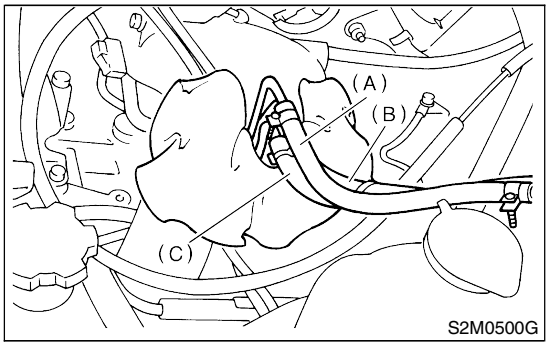


20) Disconnect connector from oil pressure switch.



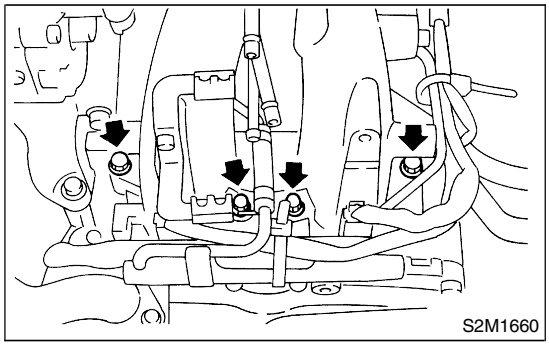
21) Disconnect fuel hoses from fuel pipes.

WARNING:
Catch fuel from hoses in a container.

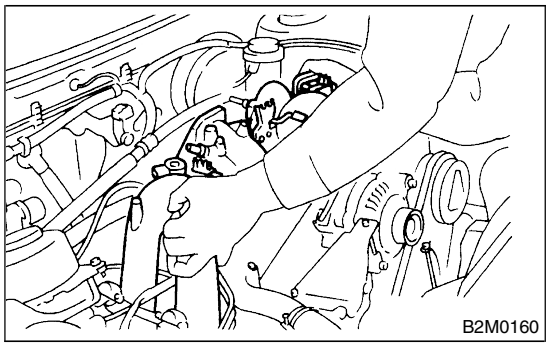


(A) Fuel delivery hose
(B) Return hose
(C) Evaporation hose

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


S2M1660

23) Remove intake manifold.

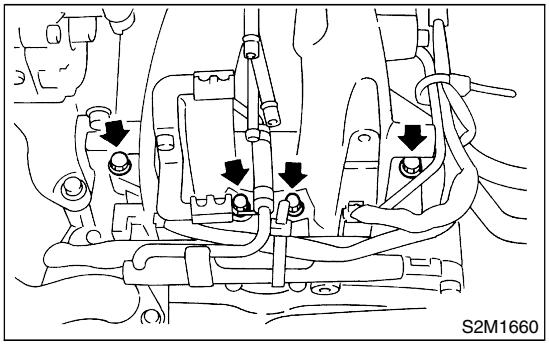

B2M0160

B: INSTALLATION S165034A11

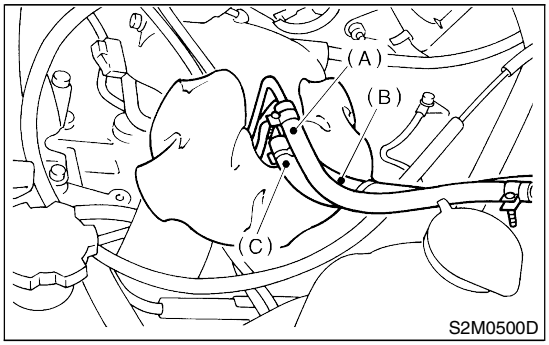
1) Install intake manifold onto cylinder heads.

NOTE:
Always use new gaskets.

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


S2M1660

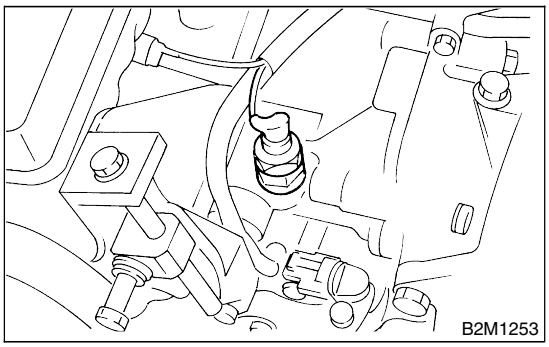
2) Connect fuel hoses.



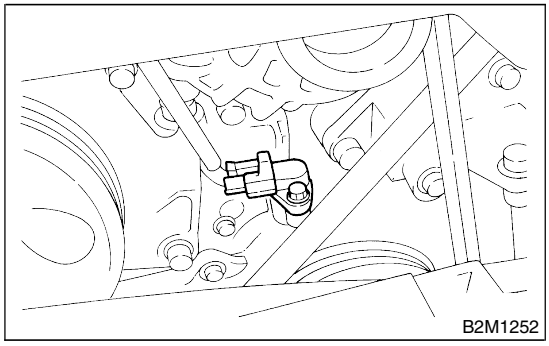
S2M0500D

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

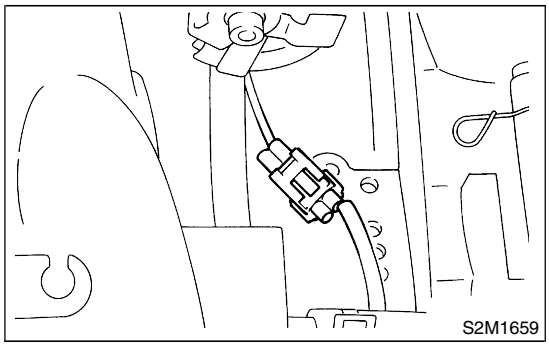
3) Connect connector to oil pressure switch.


B2M1253

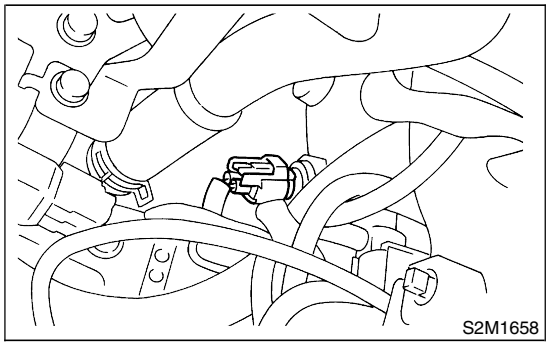
4) Connect connector to crankshaft position sensor.


B2M1252

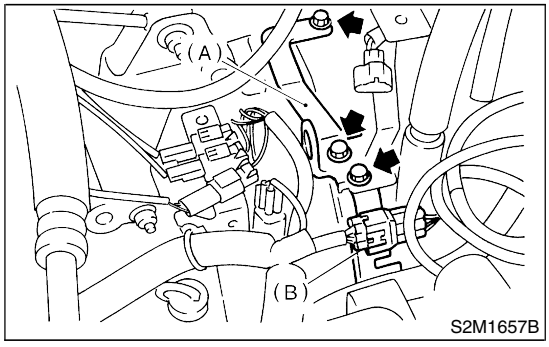
5) Connect knock sensor connector.


S2M1659

6) Connect connectors to engine coolant temperature sensor.

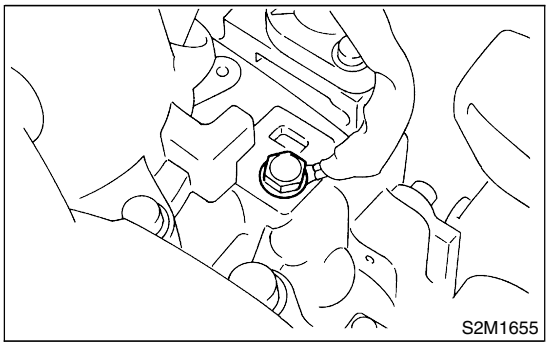

S2M1658

7) Hold engine harness connector onto bracket.
8) Install air cleaner case stay RH and engine harness bracket (A), and connect engine harness connectors (B) to bulkhead connectors.

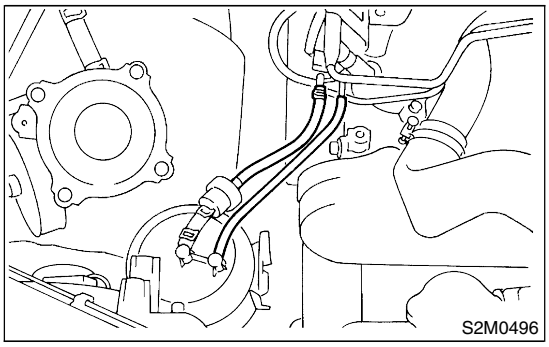


S2M1657B

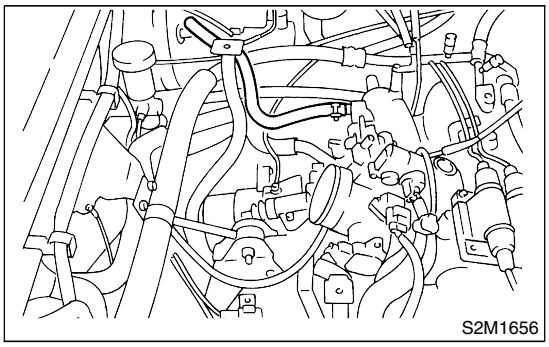
9) Tighten bolt which installs engine harness ground terminal.


S2M1655

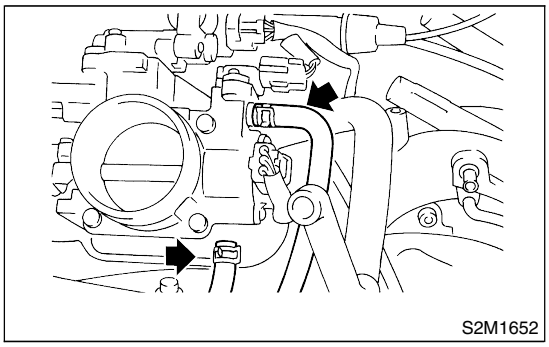
10) Connect canister hoses to pipes.


S2M0496

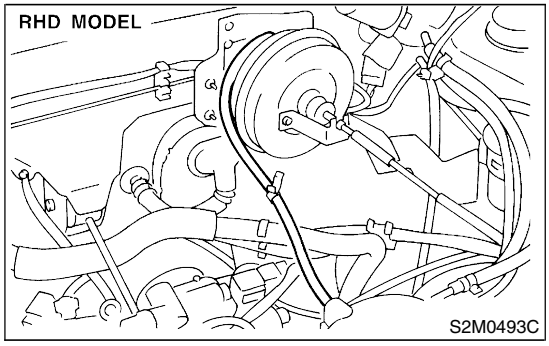
11) Connect brake booster hose.


S2M1656

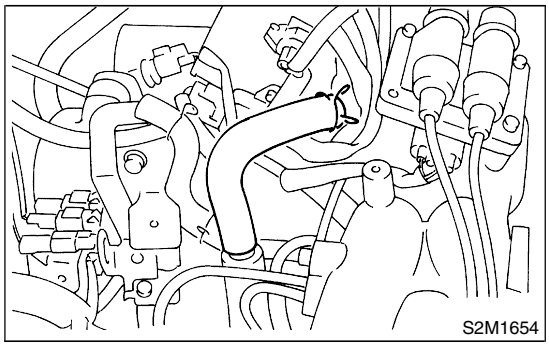
12) Connect engine coolant hose to throttle body.


S2M1652

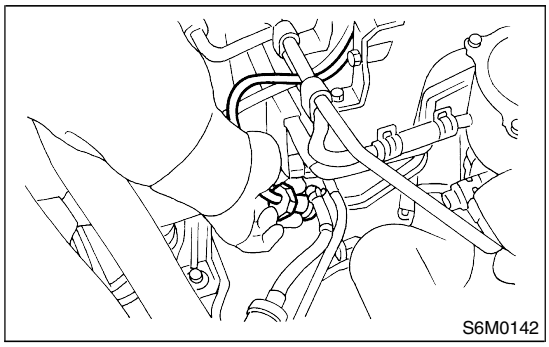
13) Connect vacuum hose to cruise control diaphragm. (With cruise control models)



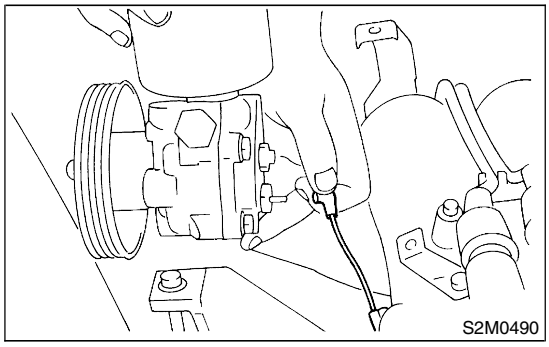
14) Connect PCV hose to intake manifold.



15) Connect spark plug cords to spark plugs.

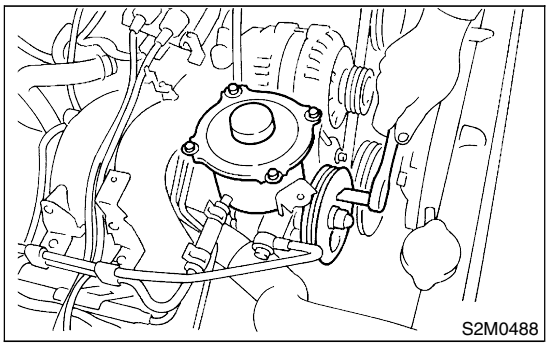


16) Install power steering pump on bracket.
(1) Connect terminal to power steering pump switch.

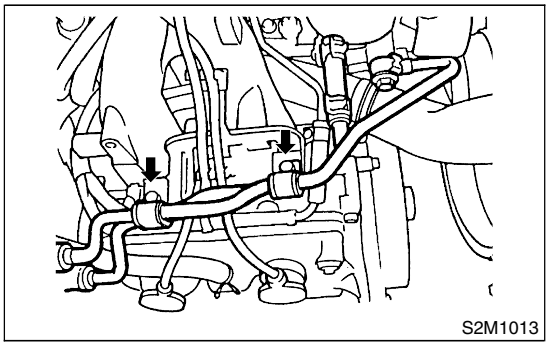


(2) Tighten bolts which install power steering pump on bracket.

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

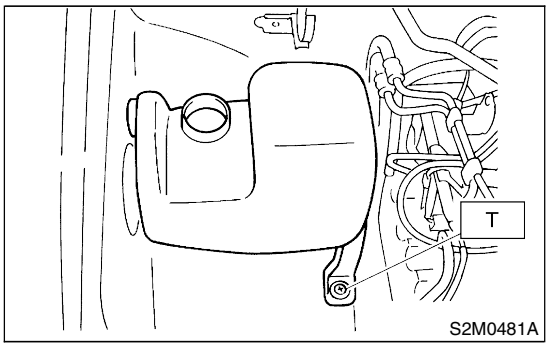


(3) Install power steering pipe brackets on right side intake manifold.

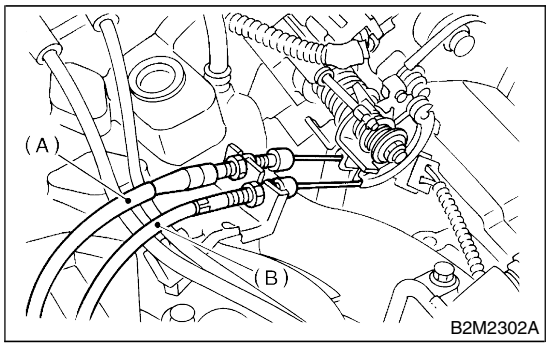


(4) Install power steering pump drive V-belt. <Ref. to ME(SOHC)-42, INSTALLATION, V-belt.>
(5) Install resonator chamber.

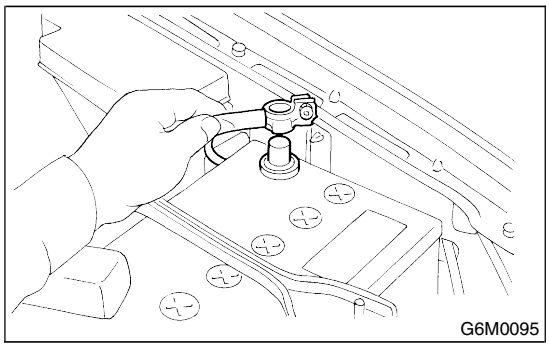
Tightening torque:
T: 33 N·m (3.4 kgf-m, 25 ft-lb)



17) Connect accelerator cable (A).
18) Connect cruise control cable (B). (With cruise control models)

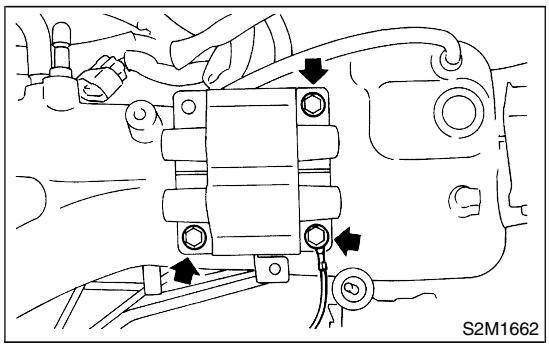


19) Install air cleaner case and air intake duct. <Ref. to IN(SOHC)-7, INSTALLATION, Air Cleaner Case.> and <Ref. to N(SOHC)-8, INSTALLATION, Air Intake Duct.>
20) Connect connector to fuel pump relay. <Ref. to FU(SOHCw/oOBD)-40, INSTALLATION, Fuel Pump Relay.>
21) Connect battery ground cable.

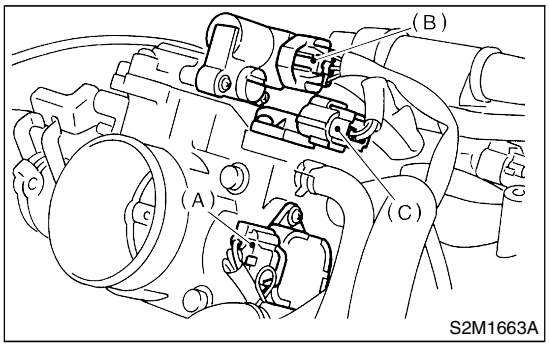


C: DISASSEMBLY S165034A06

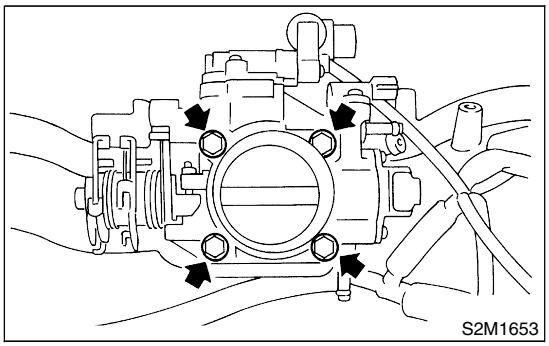
1) Disconnect connector from ignition coil and ignitor assembly.
2) Remove ignition coil and ignitor assembly.



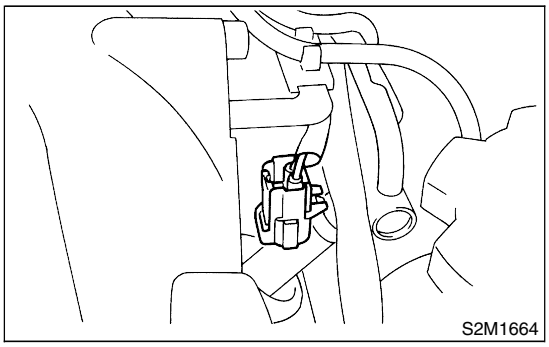
3) Disconnect connectors from throttle position sensor (A), idle air control solenoid valve (B) and pressure sensor (C).



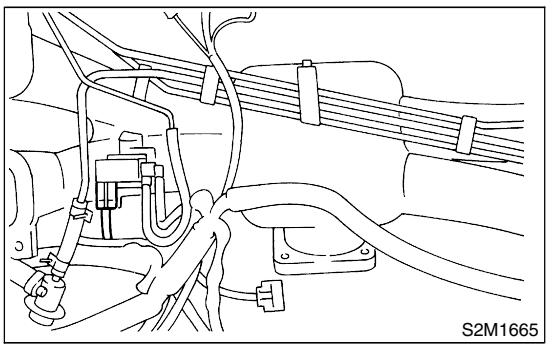
4) Remove throttle body.



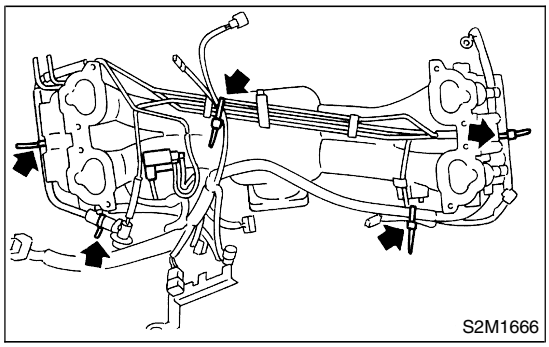
5) Disconnect connectors from fuel injectors.



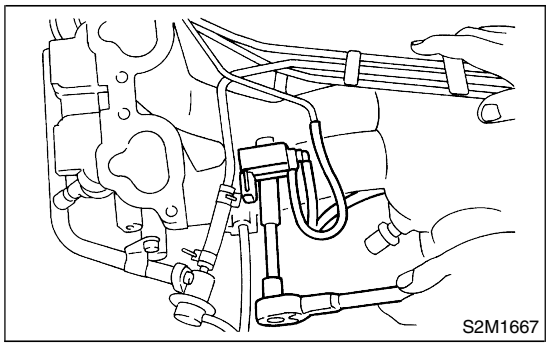
6) Disconnect connector from purge control solenoid valve.



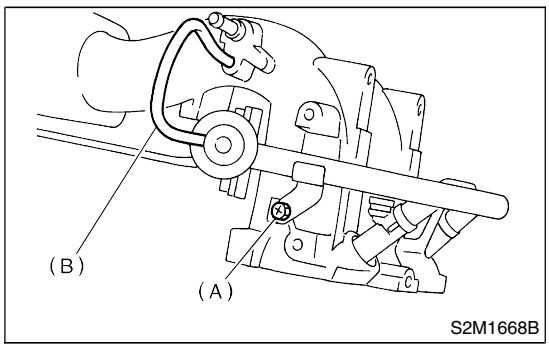
7) Remove harness bands which hold engine harness onto intake manifold.


S2M1666

8) Remove engine harness from intake manifold.
9) Remove purge control solenoid valve.

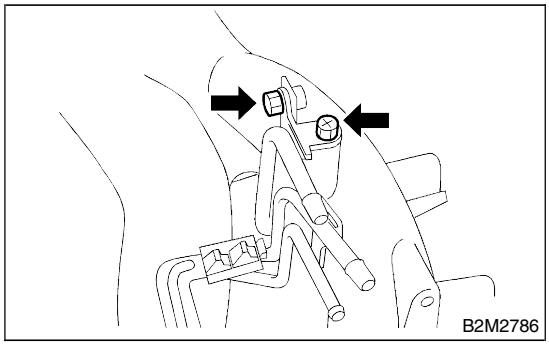

S2M1667

10) Disconnect pressure regulator vacuum hose (B) from intake manifold.
11) Remove bolt (A) which installs injector pipe on intake manifold.

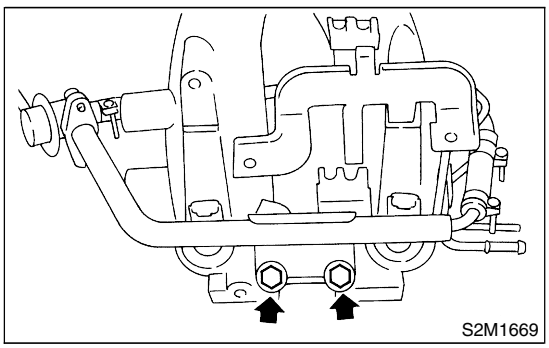


S2M1668B

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

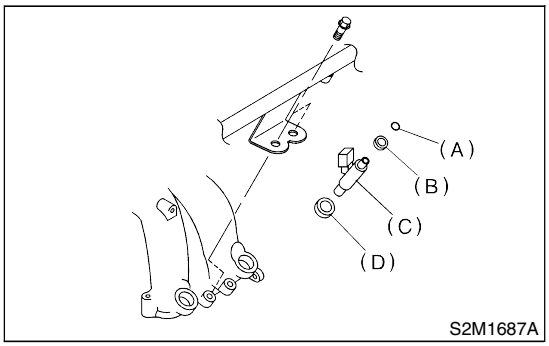

B2M2786

13) Remove the four bolts which install injector pipe on intake manifold.


S2M1669

14) Remove fuel injectors.

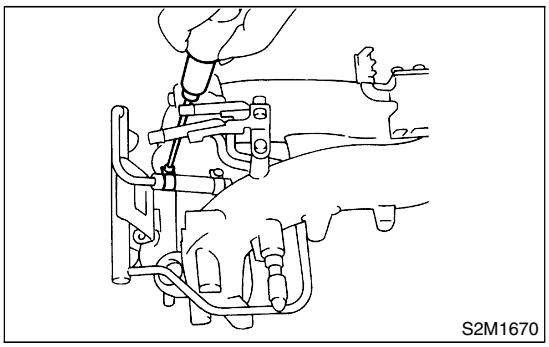
CAUTION:
Replace O-rings and insulators with new ones.



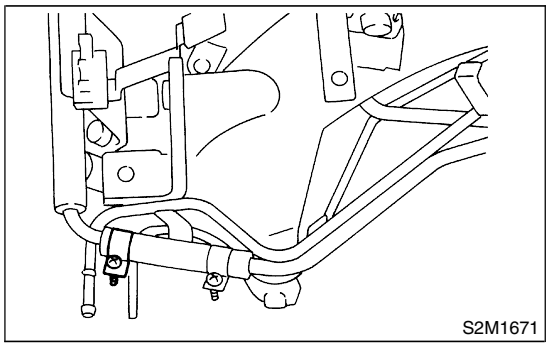
S2M1687A

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

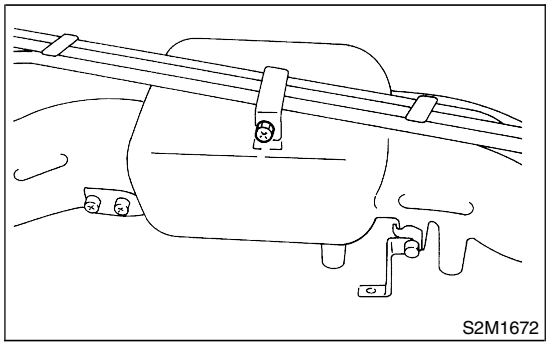
15) Loosen clamp which holds front left side fuel hose to injector pipe and remove the pipe from clamp.


S2M1670

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


S2M1671

17) Remove the bolt which installs fuel pipes on intake manifold.

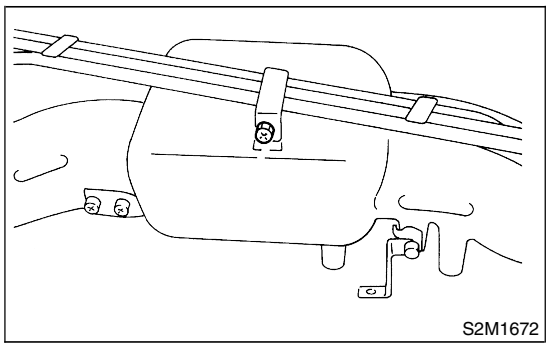

S2M1672

18) Remove fuel injector pipe.
19) Remove fuel pipe assembly, pressure regulator, etc. from intake manifold.

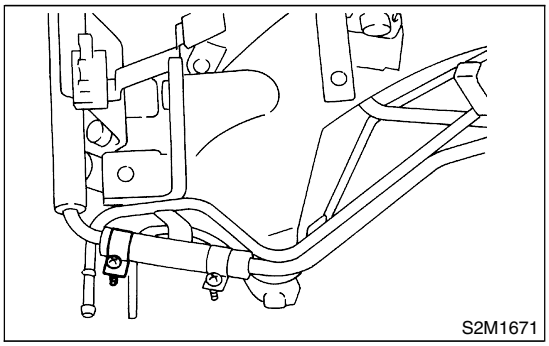
D: ASSEMBLY *S165034A02*

1) Install fuel pipe assembly, pressure regulator, etc. to intake manifold.
2) Install fuel injector pipe.
3) Tighten the bolt which installs fuel pipes on intake manifold.

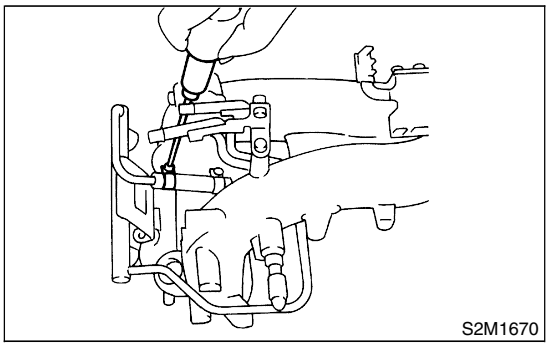
Tightening torque:
4.9 N·m (0.5 kgf-m, 3.6 ft-lb)


S2M1672

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

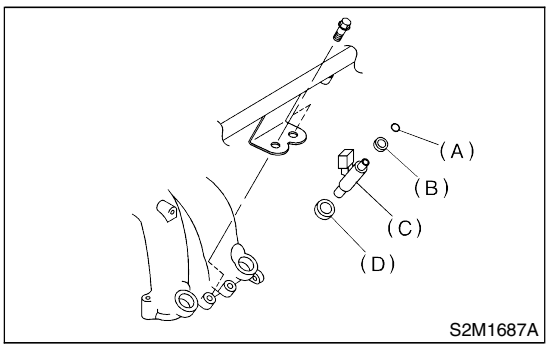

S2M1671

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


S2M1670

6) Install fuel injectors.

NOTE:
Always use new O-rings and insulators.

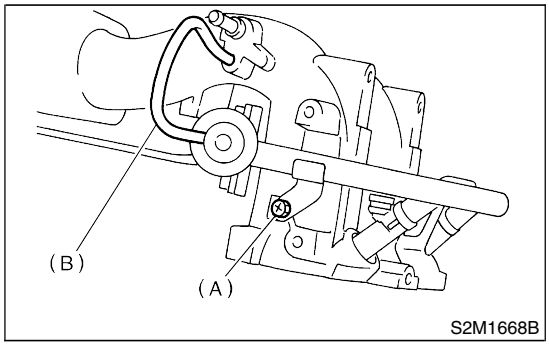


S2M1687A

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

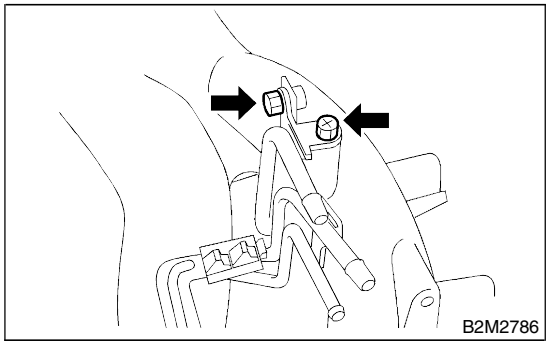
7) Tighten bolt (A) which installs injector pipe on intake manifold and connect pressure regulator vacuum hose (B).

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



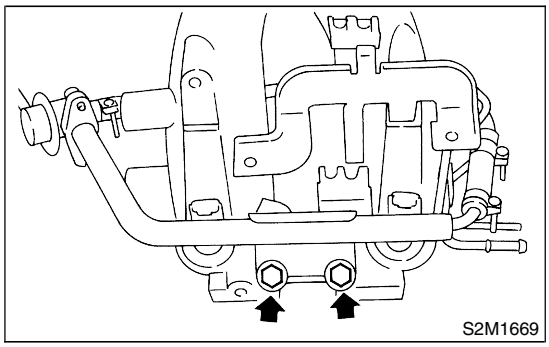
8) Tighten the two bolts which install fuel pipes on the left side of intake manifold.

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

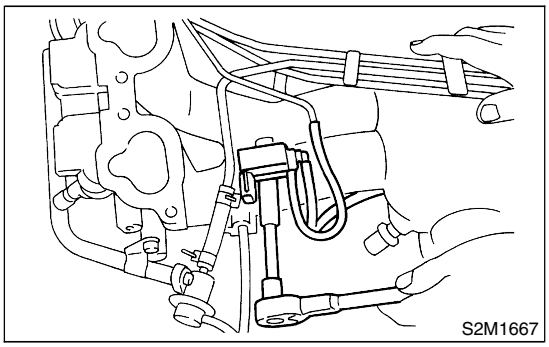


9) Tighten the four bolts which install injector pipe on intake manifold.

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

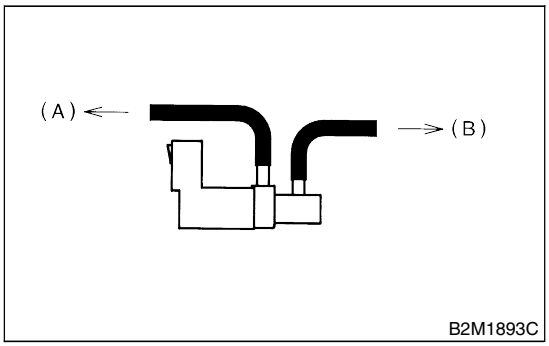


10) Install purge control solenoid valve.



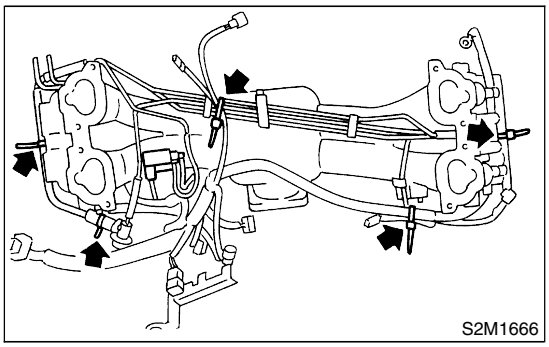
11) Connect hoses to purge control solenoid valve.

CAUTION:
Carefully connect the evaporation hoses.



(A) To fuel pipe
(B) To intake manifold

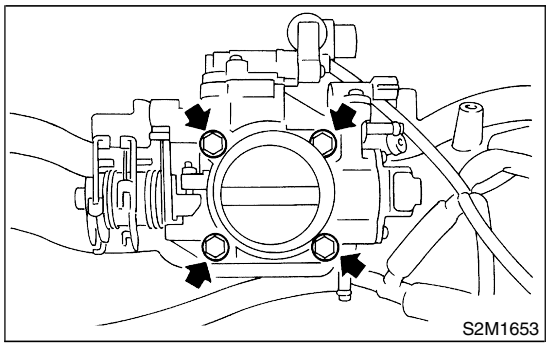
12) Install engine harness onto intake manifold.
13) Connect connectors and pipes to fuel injectors and purge control solenoid valve.
14) Hold engine harness by harness bands.



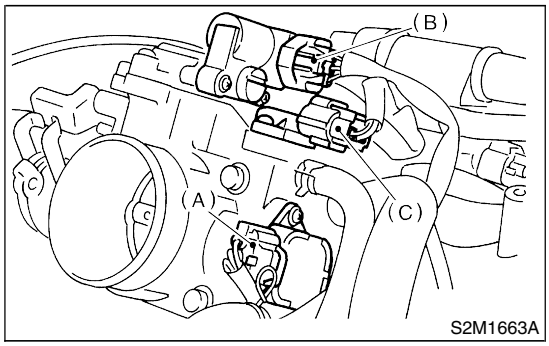
15) Assemble throttle body to intake manifold.

NOTE:
Replace gasket with a new one.

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



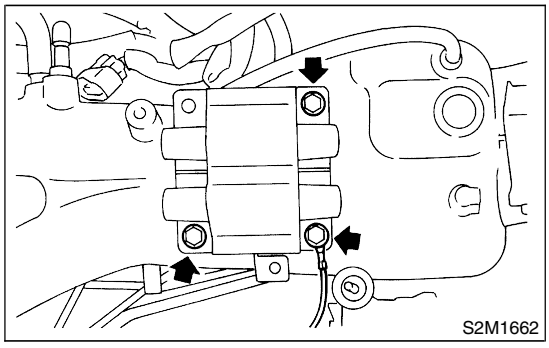
16) Connect connectors to throttle position sensor (A), idle air control solenoid valve (B) and pressure sensor (C).



17) Install ignition coil and ignitor assembly.

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

NOTE:
Do not forget to installs ground terminal on ignition coil and ignitor assembly.



18) Connect connector to ignition coil and ignitor assembly.

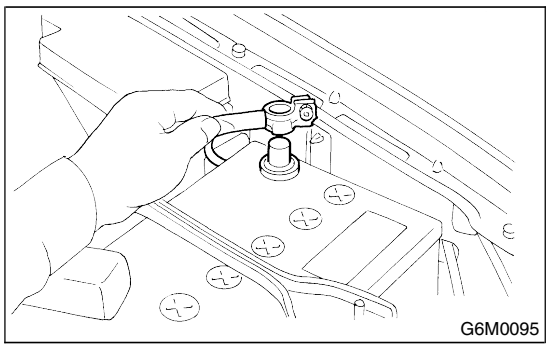
E: INSPECTION S165034A10

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

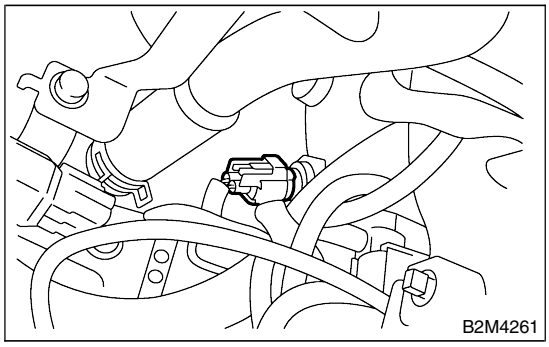
4. Engine Coolant Temperature Sensor S165047

A: REMOVAL S165047A18

1) Disconnect battery ground cable.


G6M0095

2) Remove air intake duct and air cleaner case. <Ref. to IN(SOHC)-8, REMOVAL, Air Intake Duct.> and <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
3) Disconnect connector from engine coolant temperature sensor.

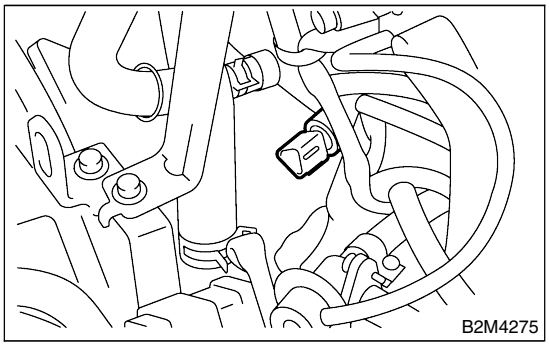

B2M4261

4) Remove engine coolant temperature sensor.

B: INSTALLATION S165047A11

Install in the reverse order of removal.

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

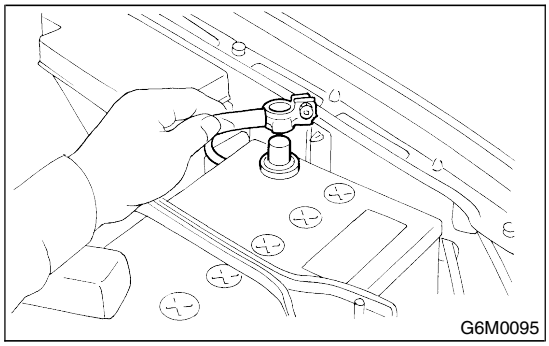

B2M4275

5. Crankshaft Position Sensor

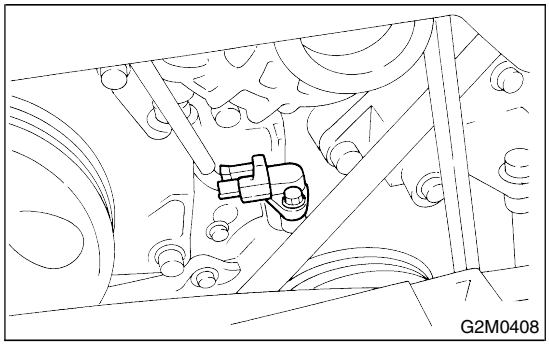
S165043

A: REMOVAL S165043A18

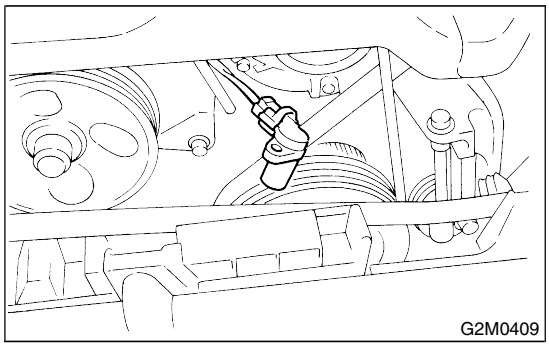
1) Disconnect battery ground cable.


G6M0095

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


G2M0408

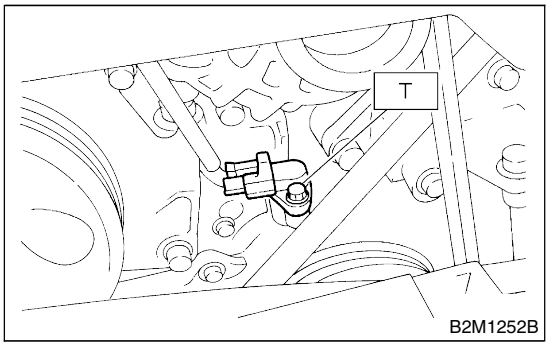
3) Remove crankshaft position sensor, and disconnect connector from it.


G2M0409

B: INSTALLATION S165043A11

Install in the reverse order of removal.

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

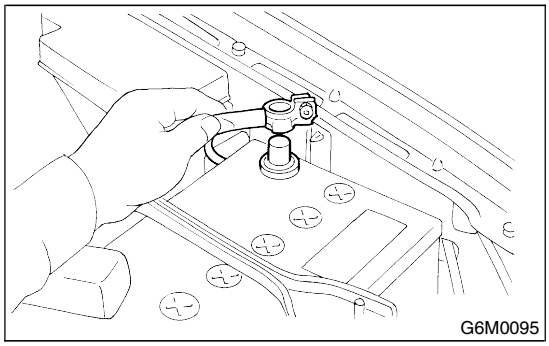


B2M1252B

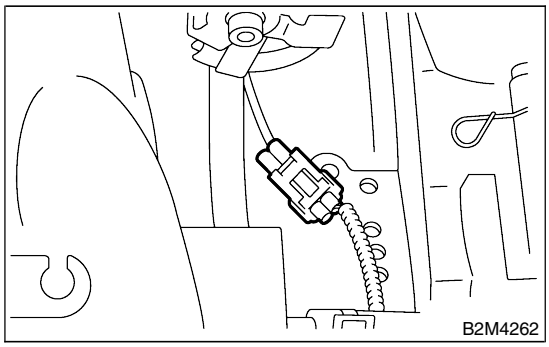
6. Knock Sensor S165042

A: REMOVAL S165042A18

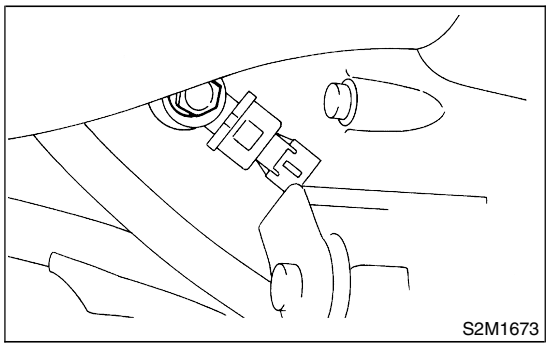
1) Disconnect battery ground cable from battery ground terminal.



2) Remove air cleaner case.
<Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
3) Disconnect knock sensor connector.



4) Remove knock sensor from cylinder block.

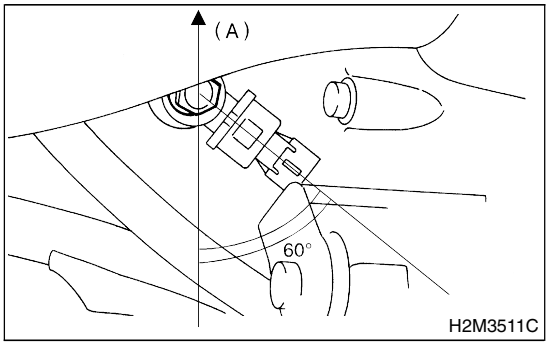


B: INSTALLATION S165042A11

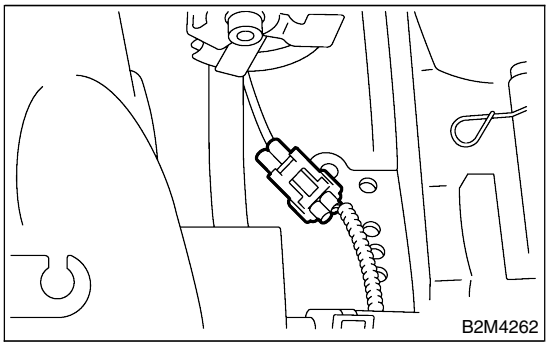
1) Install knock sensor to cylinder block.

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

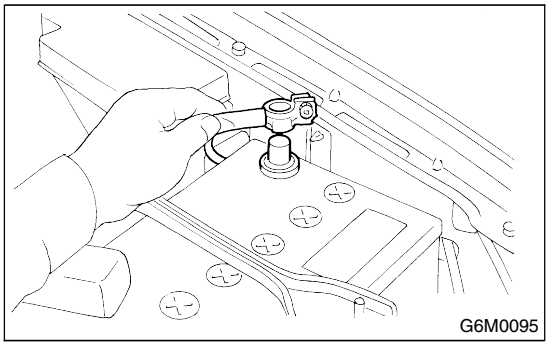
NOTE:
The extraction area of the knock sensor cord must be positioned at a 60° angle relative to the engine rear.



2) Connect knock sensor connector.



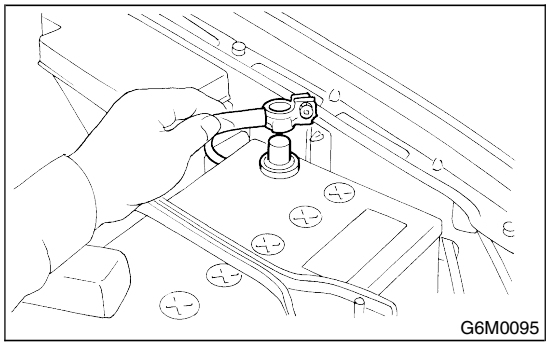
3) Install air cleaner case.
<Ref. to IN(SOHC)-7, INSTALLATION, Air Cleaner Case.>
4) Connect battery ground cable.



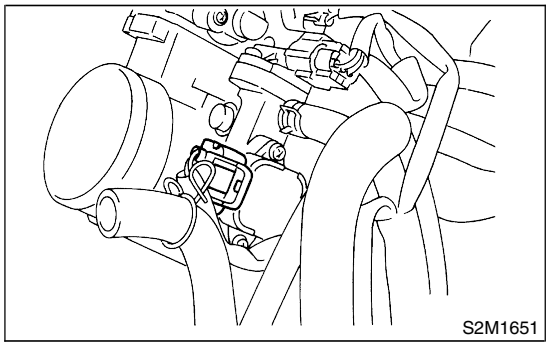
7. Throttle Position Sensor S165039

A: REMOVAL S165039A18

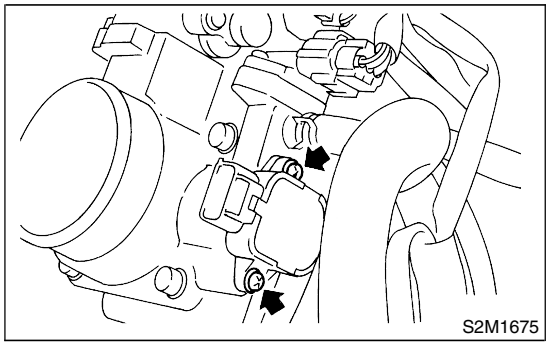
1) Disconnect battery ground cable.


G6M0095

2) Disconnect connector from throttle position sensor.


S2M1651

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

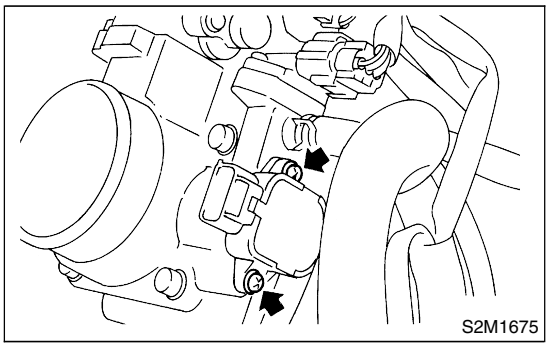

S2M1675

B: INSTALLATION S165039A11

Install in the reverse order of removal.

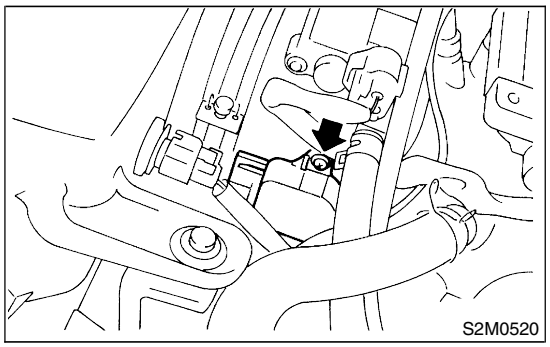
Tightening torque:
1.6 N·m (0.16 kgf-m, 1.2 ft-lb)

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

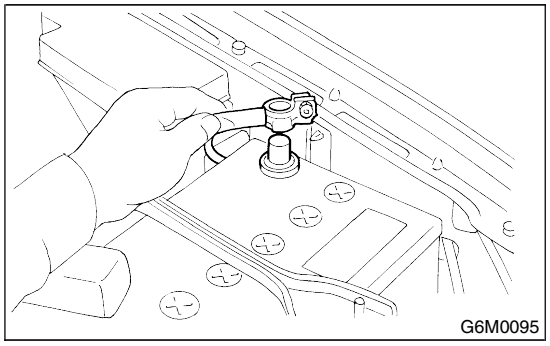

S2M1675

C: ADJUSTMENT S165039A01

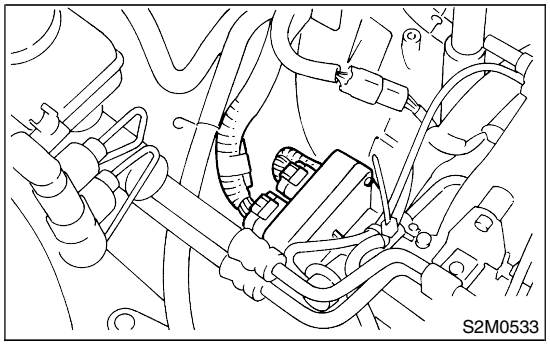
1) Turn ignition switch to OFF.
2) Loosen throttle position sensor holding screws.


S2M0520

3) When using voltage meter;
   (1) Disconnect battery ground cable.


G6M0095

   (2) Disconnect connectors from ECM.

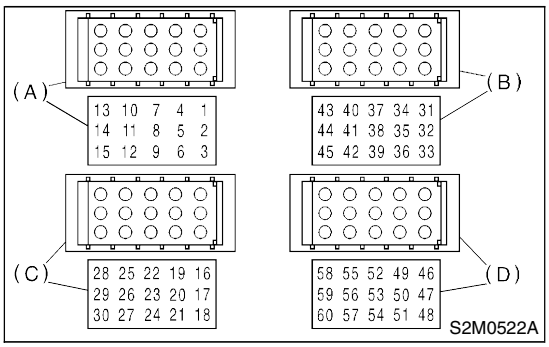

S2M0533

   (3) Set ST to ECM.

ST 498307600 CHECK BOARD KIT

   (4) Connect battery ground cable.
   (5) Turn ignition switch to ON.
   (6) Adjust throttle position sensor so that signal voltage on CHECK BOARD may be in specification.

Terminal / Specified voltage
(C) No. 23 — (C) No. 24 / 0.45 — 0.55 V
[Fully closed.]

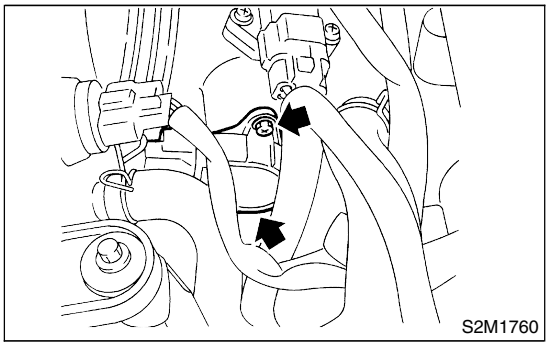


S2M0522A

   (7) Tighten throttle position sensor holding screws.

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

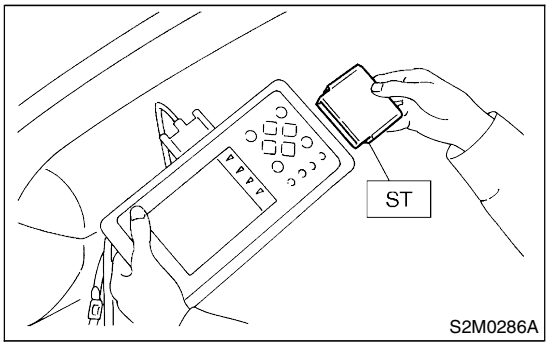
CAUTION:
When removing ST from ECM, disconnect battery ground cable.


S2M1760

4) When using Subaru Select Monitor;

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

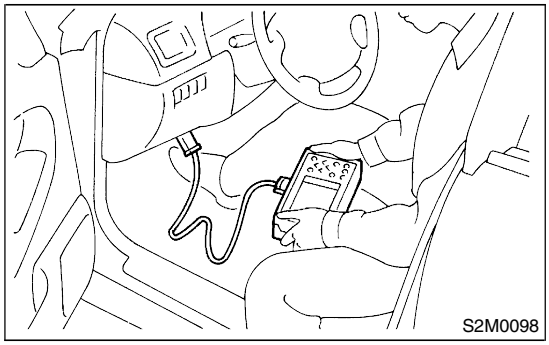
   (1) Insert the cartridge to Subaru Select Monitor. <Ref. to FU(SOHCw/oOBD)-10, PREPARATION, General Description.>



S2M0286A

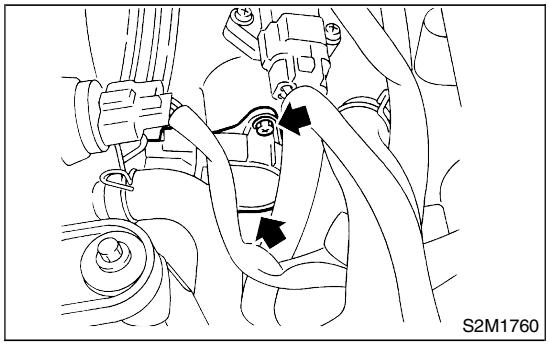
(2) Connect Subaru Select Monitor to the data link connector.
(3) Turn ignition switch to ON, and Subaru Select Monitor switch to ON.
(4) Select {2. Each System Check} in Main Menu.
(5) Select {Engine Control System} in Selection Menu.
(6) Select {1. Current Data Display & Save} in Engine Diagnosis.
(7) Select {1.12 Data Display} in Data Display Menu.
(8) 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


S2M0098

(9) Tighten throttle position sensor holding screws.

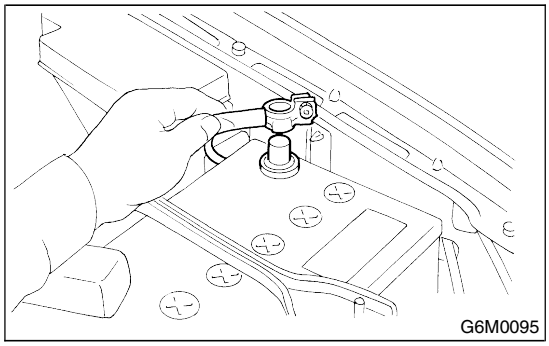
Tightening torque:
1.6 N·m (0.16 kgf-m, 1.2 ft-lb)


S2M1760

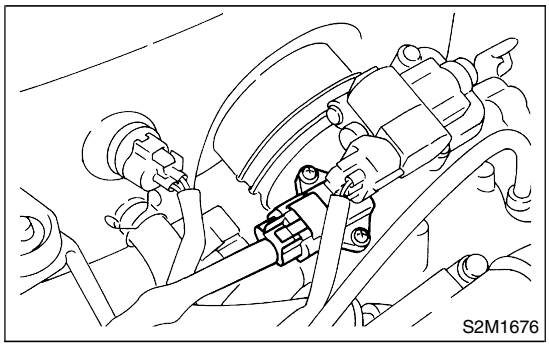
8. Pressure Sensor S165765

A: REMOVAL S165765A18

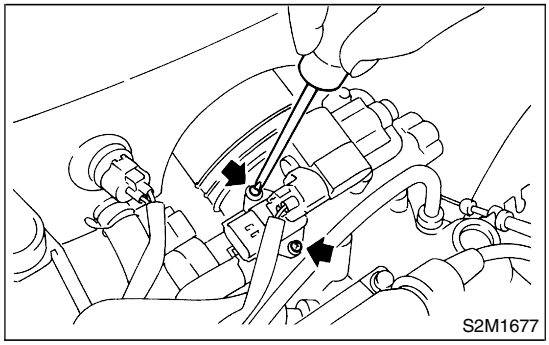
1) Disconnect battery ground cable.


G6M0095

2) Disconnect connector from pressure sensor.


S2M1676

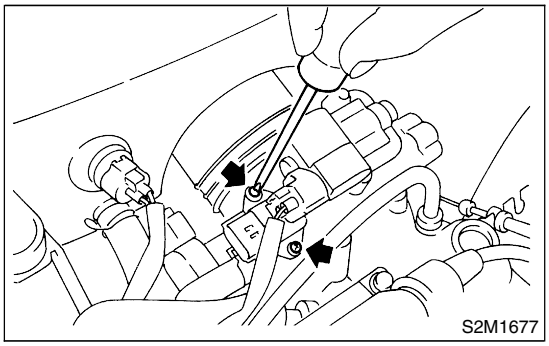
3) Remove pressure sensor from throttle body.


S2M1677

B: INSTALLATION S165765A11

Install in the reverse order of removal.

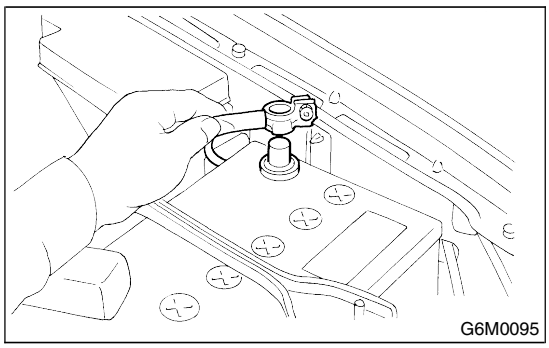
Tightening torque:
2.0 N·m (0.2 kgf-m, 1.4 ft-lb)


S2M1677

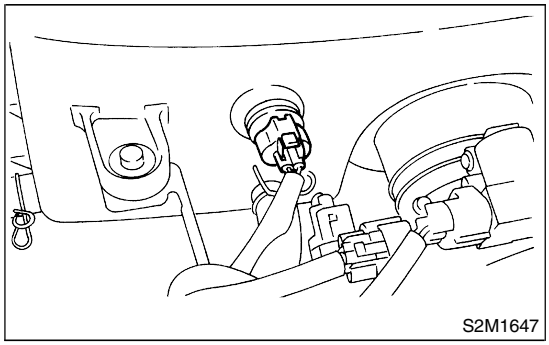
9. Intake Air Temperature Sensor S165569

A: REMOVAL S165569A18

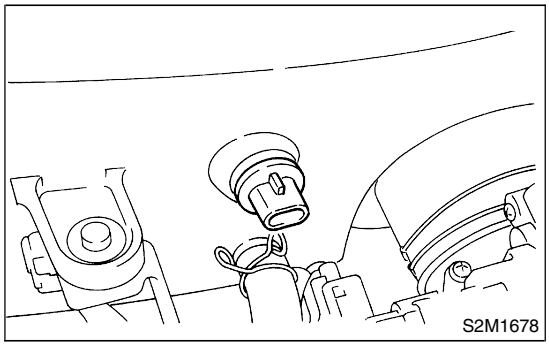
1) Disconnect battery ground cable.



2) Disconnect connector from intake air temperature sensor.

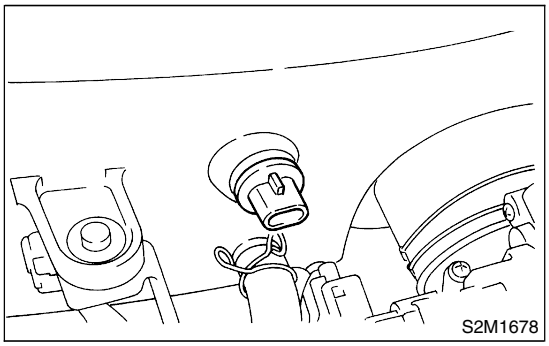


3) Remove intake air temperature sensor from air cleaner case.



B: INSTALLATION S165569A11

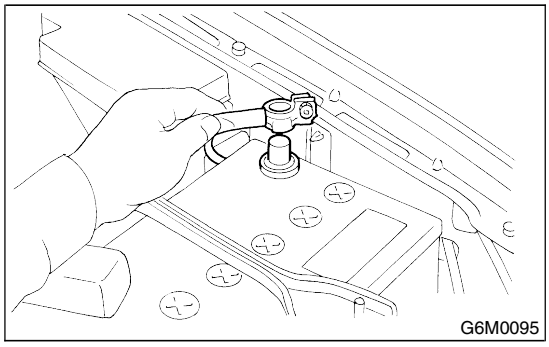
Install in the reverse order of removal.



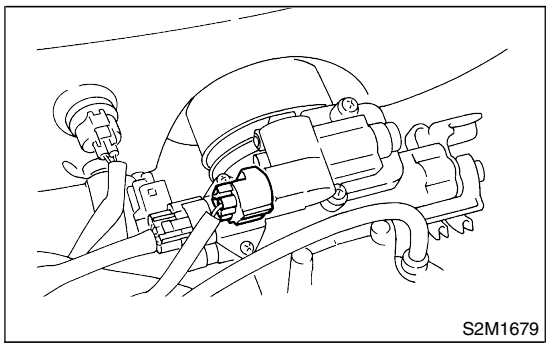
10. Idle Air Control Solenoid Valve S165056

A: REMOVAL S165056A18

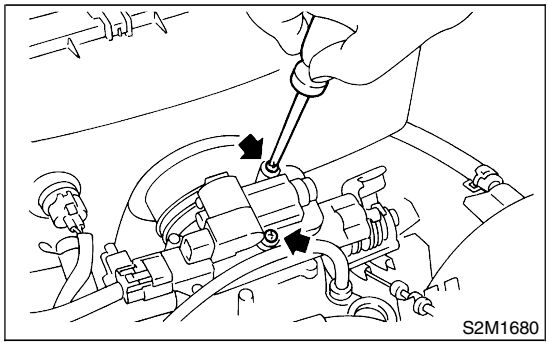
1) Disconnect battery ground cable.



2) Disconnect connector from idle air control solenoid valve.



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

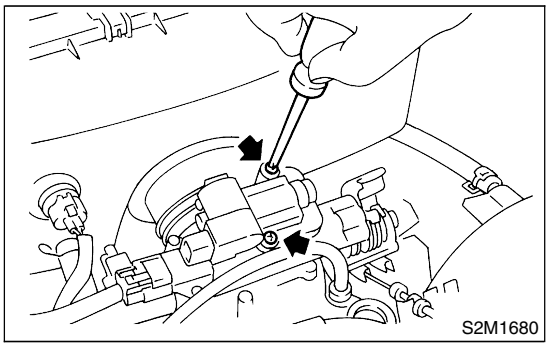


B: INSTALLATION S165056A11

Install in the reverse order of removal.

NOTE:
Always use new gasket.

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

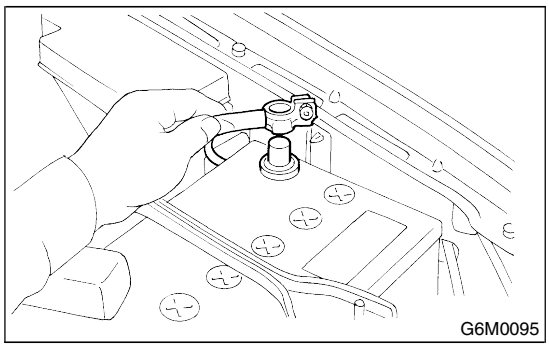


11. Fuel Injector S165051

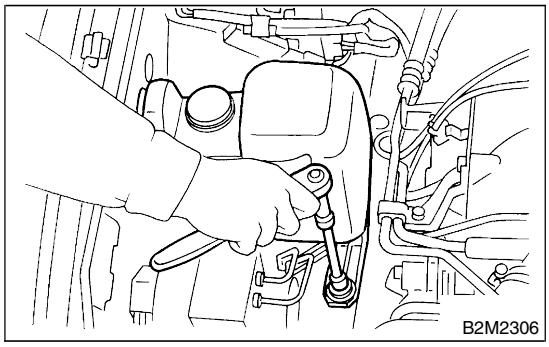
A: REMOVAL S165051A18

1. RH SIDE S165051A1801

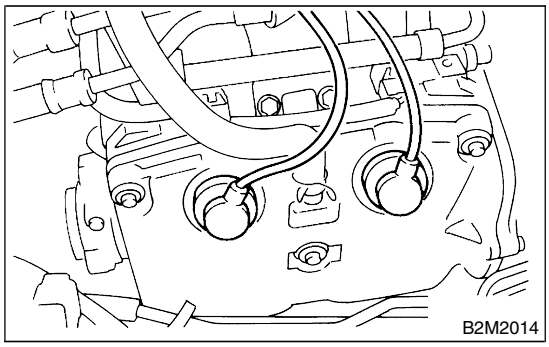
1) Release fuel pressure.
<Ref. to FU(SOHCw/oOBD)-41, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open fuel flap lid, and remove fuel filler cap.
3) Disconnect battery ground cable.


G6M0095

4) Remove air intake duct and air cleaner case. <Ref. to IN(SOHC)-8, REMOVAL, Air Intake Duct.> and <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
5) Remove resonator chamber.

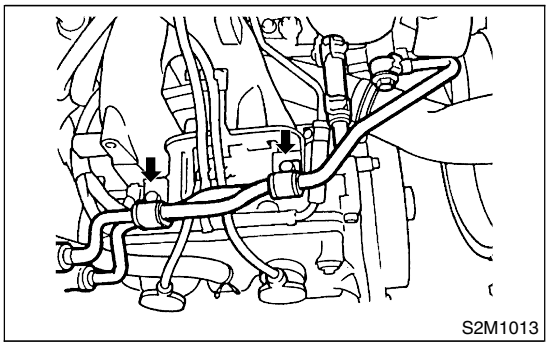

B2M2306

6) Remove spark plug cords from spark plugs (#1 and #3 cylinders).

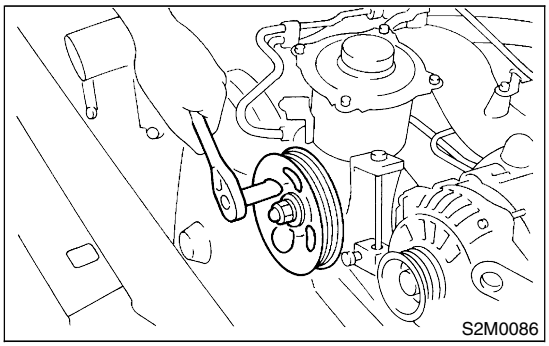

B2M2014

7) Remove power steering pump and tank from brackets.
(1) Remove V-belt.
<Ref. to ME(SOHC)-42, REMOVAL, V-belt.>

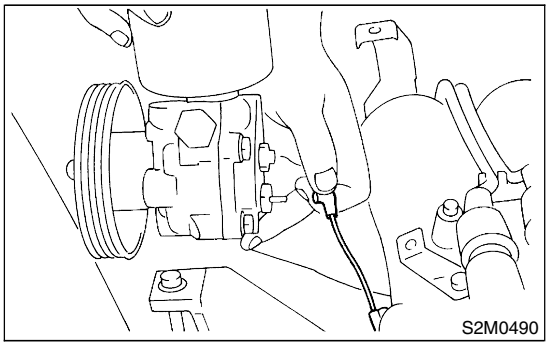
(2) Remove bolts which hold power steering pipe brackets to intake manifold.


S2M1013

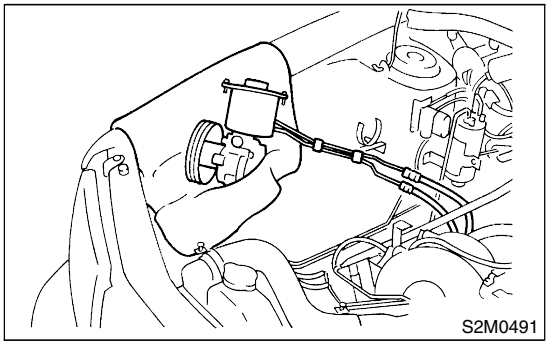
(3) Remove bolts which secure power steering pump to bracket.


S2M0086

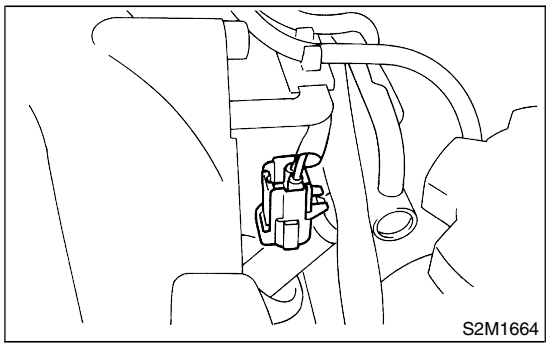
(4) Disconnect connector from power steering pump switch.


S2M0490

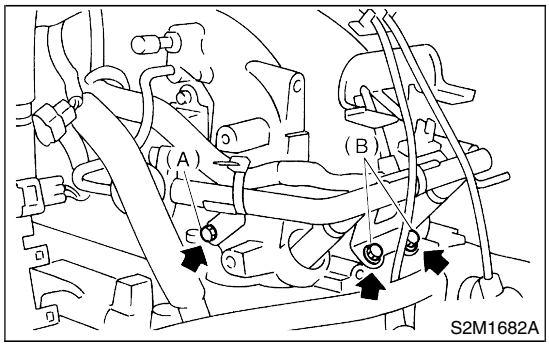
(5) Place power steering pump and tank on the right side wheel apron.


S2M0491

8) Disconnect connector from fuel injector.

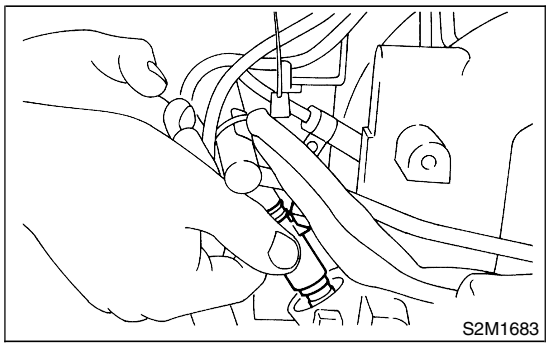

S2M1664

9) Remove bolts (A) and (B) which install injector pipe to intake manifold.



S2M1682A

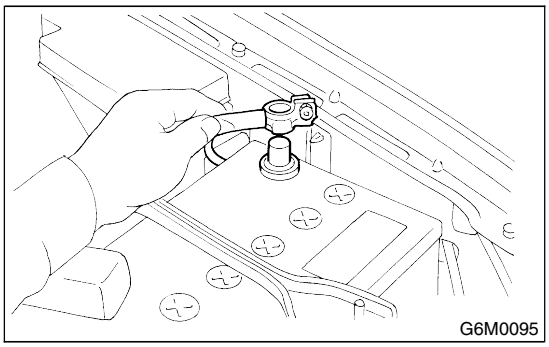
10) Pull up injector pipe, and remove fuel injectors from intake manifold.


S2M1683

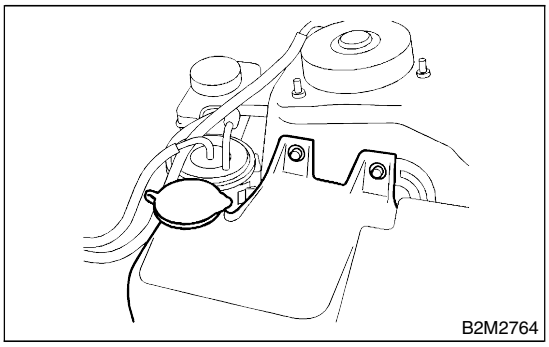
2. LH SIDE *S165051A1802*

1) Release fuel pressure. <Ref. to FU(SOHCw/oOBD)-41, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open fuel flap lid, and remove fuel filler cap.

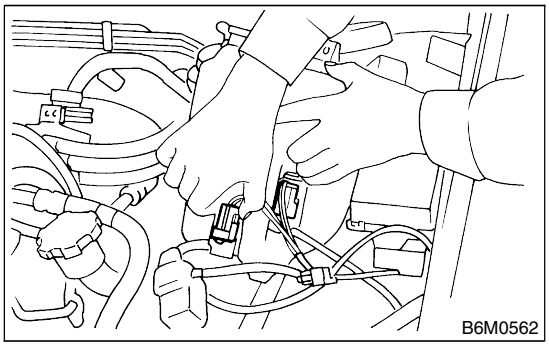
3) Disconnect battery ground cable.


G6M0095

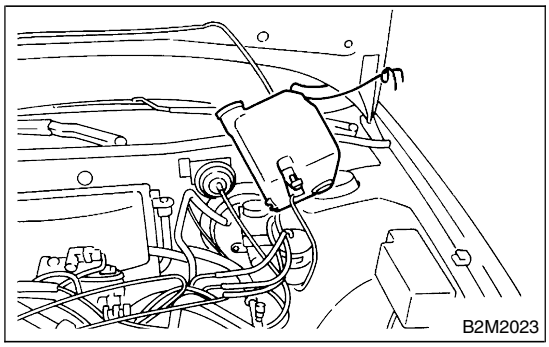
4) Remove two bolts which install washer tank on body.


B2M2764

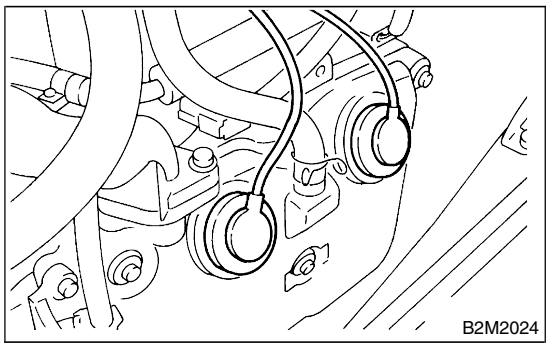
5) Disconnect connector from front window washer motor.
6) Disconnect connector from rear gate glass washer motor.


B6M0562

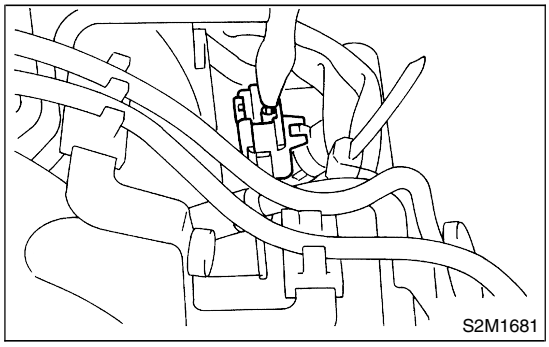
7) Disconnect rear window glass washer hose from washer motor, then plug connection with a suitable cap.
8) Move washer tank, and secure it away from working area.


B2M2023

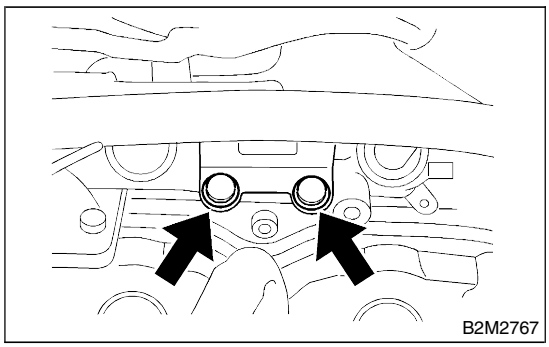
9) Remove spark plug cords from spark plugs (#2 and #4 cylinders).


B2M2024

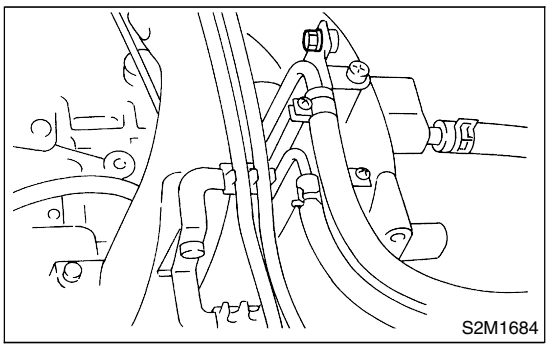
10) Disconnect connector from fuel injector.


S2M1681

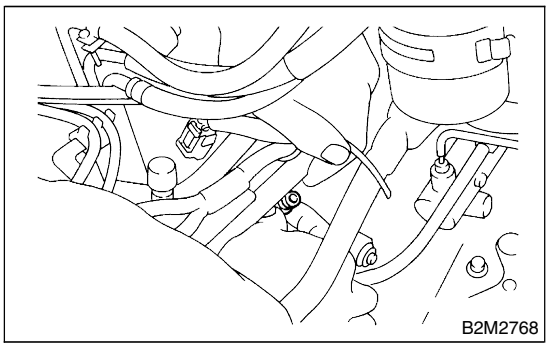
11) Remove bolt which installs injector pipe to intake manifold.


B2M2767

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


S2M1684

13) Pull up injector pipe, and remove fuel injectors from intake manifold.

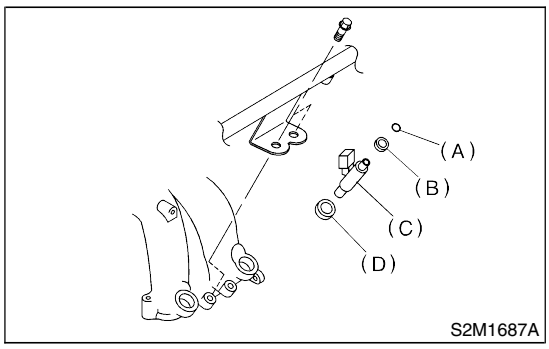

B2M2768

B: INSTALLATION S165051A11

1. RH SIDE S165051A1101

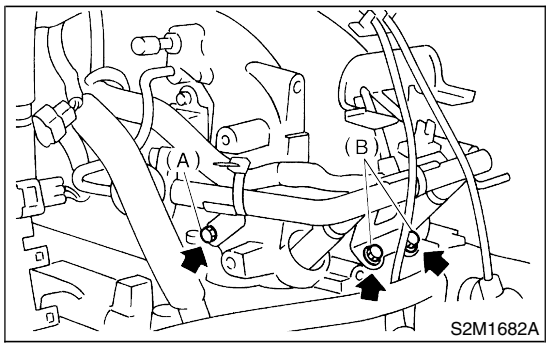
Install in the reverse order of removal.

NOTE:
Replace O-rings with new ones.

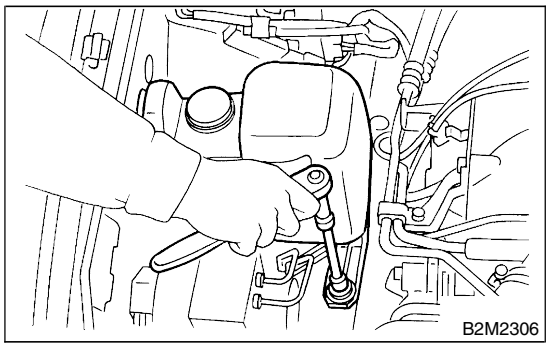


(A) O-ring
(B) Insulator A
(C) Fuel injector
(D) Insulator B

Tightening torque:
Bolt (A) 4.9 N·m (0.50 kgf-m, 3.6 ft-lb)
Bolt (B) 19 N·m (1.9 kgf-m, 13.7 ft-lb)



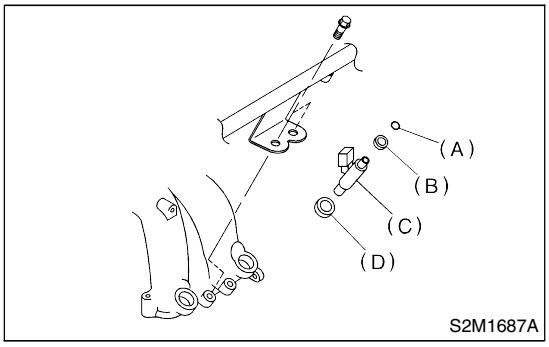
Tightening torque:
32 N·m (3.3 kgf-m, 23.9 ft-lb)



2. LH SIDE S165051A1102

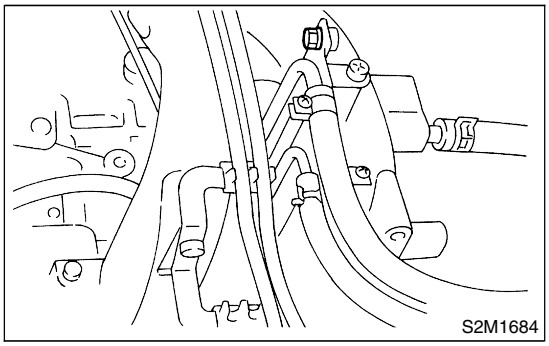
Install in the reverse order of removal.

NOTE:
Replace O-rings with new ones.

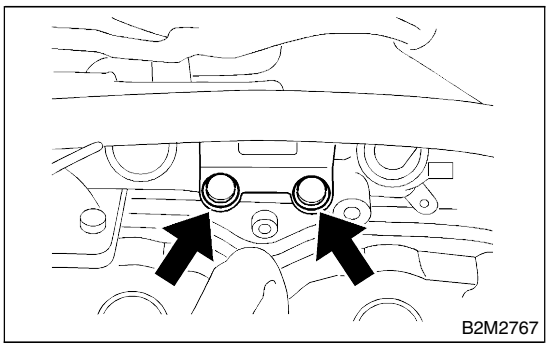


(A) O-ring
(B) Insulator A
(C) Fuel injector
(D) Insulator B

Tightening torque:
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)



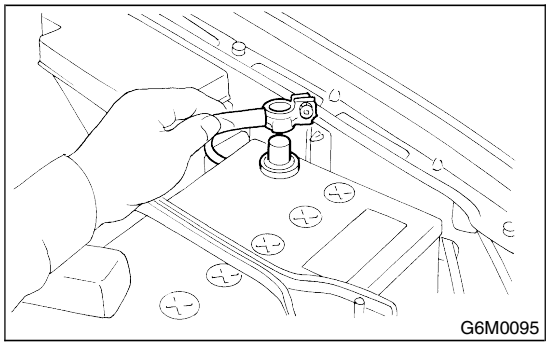
Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)



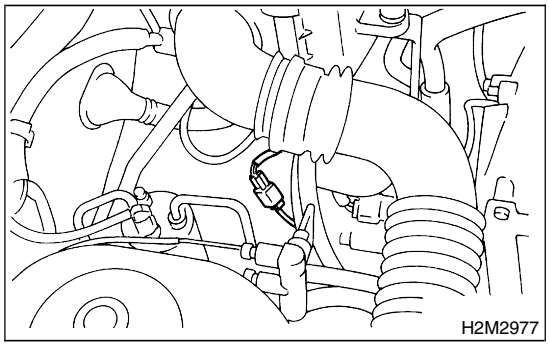
12. Oxygen Sensor S165712

A: REMOVAL S165712A18

1) Disconnect battery ground cable.



2) Disconnect connector from oxygen sensor.

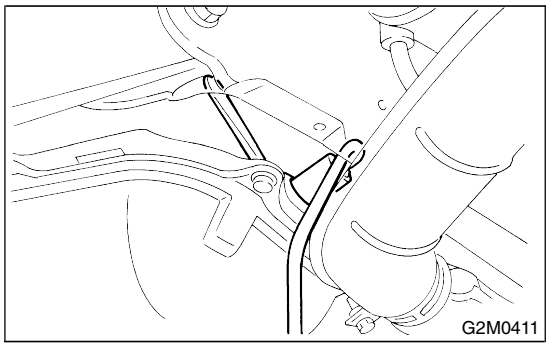


3) Lift-up the vehicle.
4) Apply SUBARU CRC or its equivalent to threaded portion of oxygen sensor, and leave it for one minute or more.

SUBARU CRC (Part No. 004301003)

5) Remove oxygen sensor.

CAUTION:
When removing the oxygen sensor, wait until exhaust pipe cools, otherwise it will damage exhaust pipe.

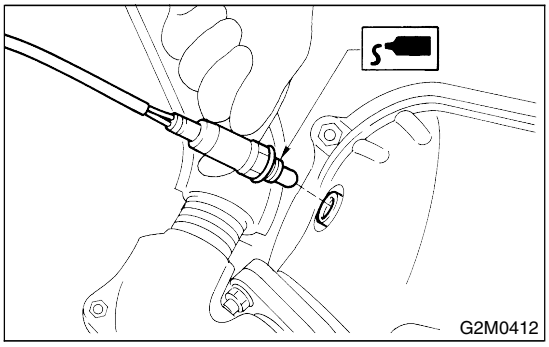


B: INSTALLATION S165712A11

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

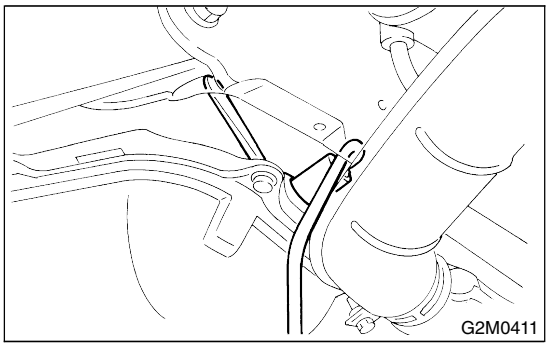
Anti-seize compound:
SS-30 by JET LUBE

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

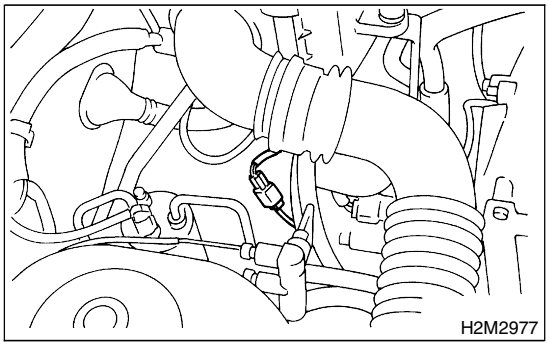


2) Install oxygen sensor.

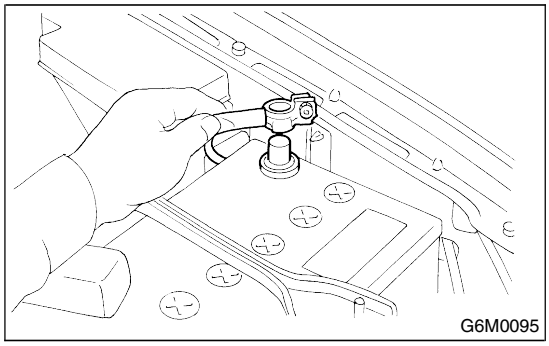
Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)



3) Lower the vehicle.
4) Connect connector of oxygen sensor.



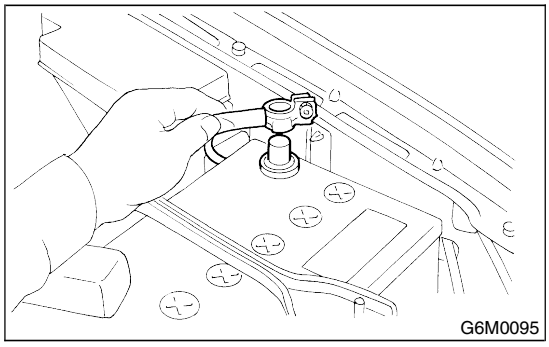
5) Connect battery ground cable.



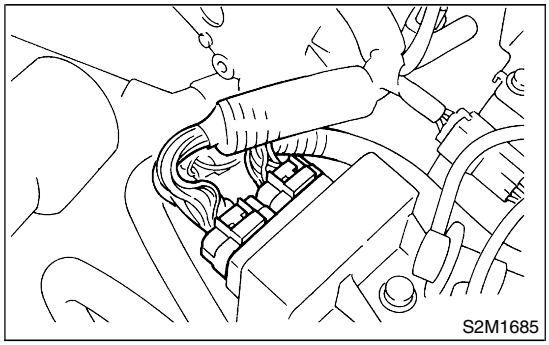
13. Engine Control Module S165049

A: REMOVAL S165049A18

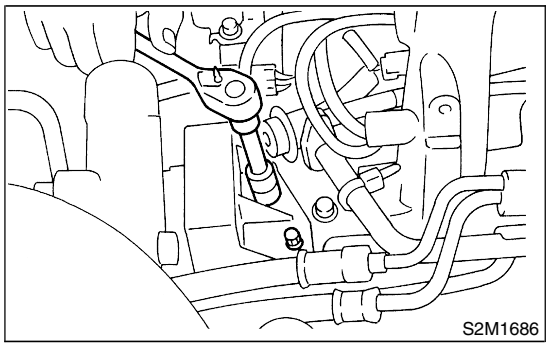
1) Disconnect battery ground cable.


G6M0095

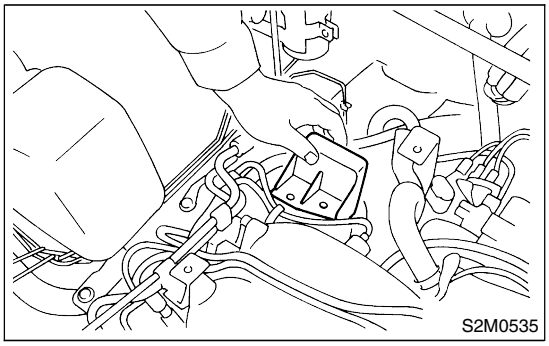
2) Remove air intake duct.
<Ref. to IN(SOHC)-8, REMOVAL, Air Intake Duct.>
3) Disconnect the two connectors from ECM.


S2M1685

4) Remove bolts which install ECM on right side cylinder head.


S2M1686

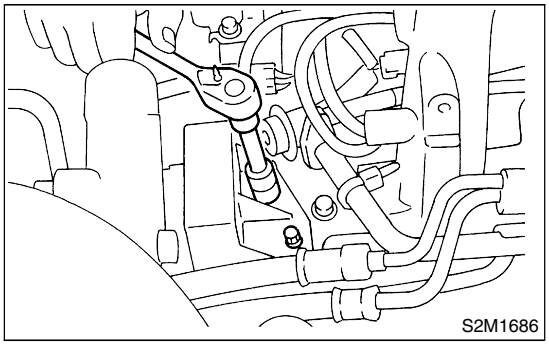
5) Take off ECM from engine compartment.


S2M0535

B: INSTALLATION S165049A11

Install in the reverse order of removal.

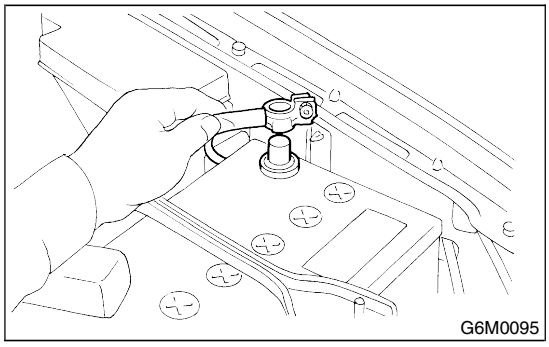
Tightening torque:
23 N·m (2.3 kgf-m, 16.6 ft-lb)


S2M1686

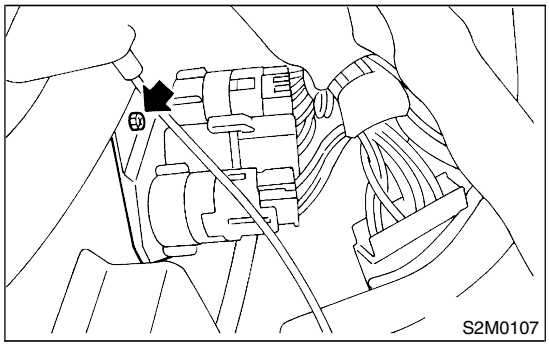
14. Main Relay S165050

A: REMOVAL S165050A18

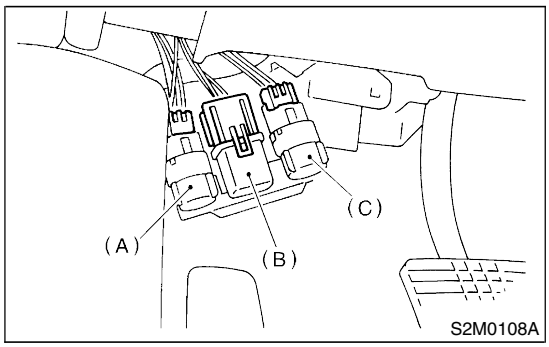
1) Disconnect battery ground cable.


G6M0095

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


S2M0107

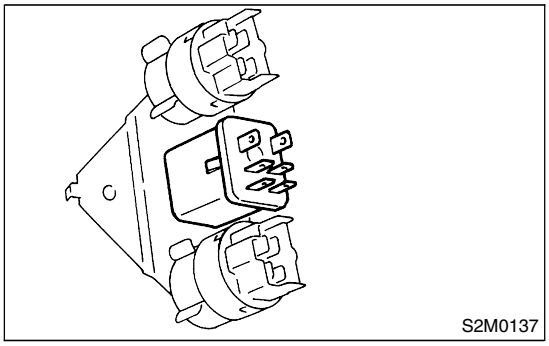
3) Disconnect connectors from relays.



S2M0108A

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

4) Remove main relay from mounting bracket.


S2M0137

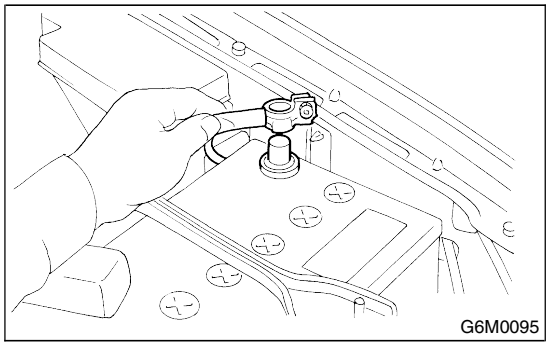
B: INSTALLATION S165050A11

Install in the reverse order of removal.

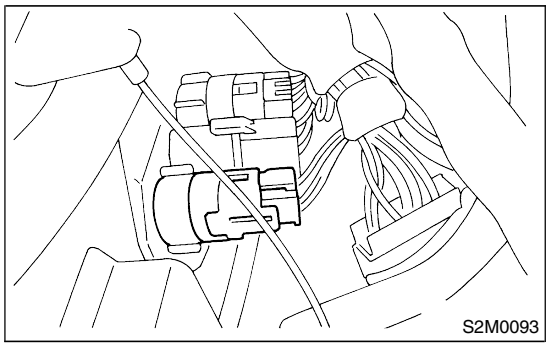
15. Fuel Pump Relay S165048

A: REMOVAL S165048A18

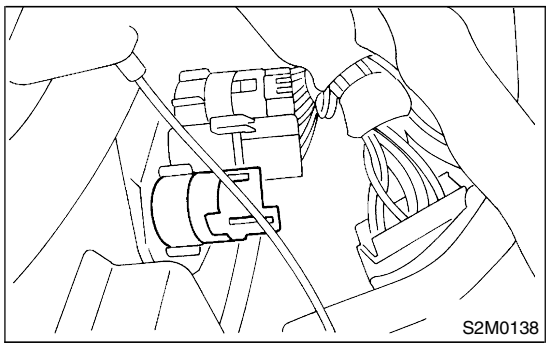
1) Disconnect battery ground cable.



2) Disconnect connector from fuel pump relay.



3) Remove fuel pump relay from mounting bracket.



B: INSTALLATION S165048A11

Install in the reverse order of removal.

16. Fuel S165052

A: OPERATION S165052A16

1. RELEASING OF FUEL PRESSURE

S165052A1601

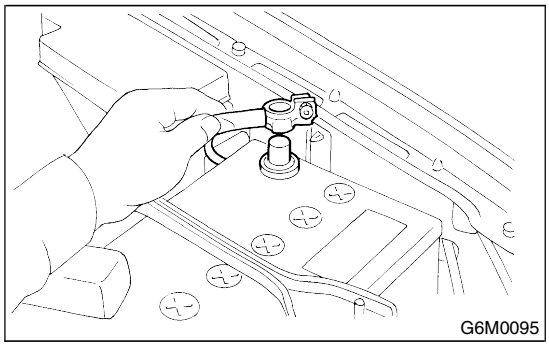
WARNING:
- **Place "No fire" signs near the working area.**
- **Disconnect ground terminal from battery.**

1) Disconnect connector from fuel pump relay. <Ref. to FU(SOHCw/oOBD)-40, REMOVAL, Fuel Pump Relay.>
2) Start the engine, and run it until it stalls.
3) After the engine stalls, crank it for five more seconds.
4) Turn ignition switch OFF.

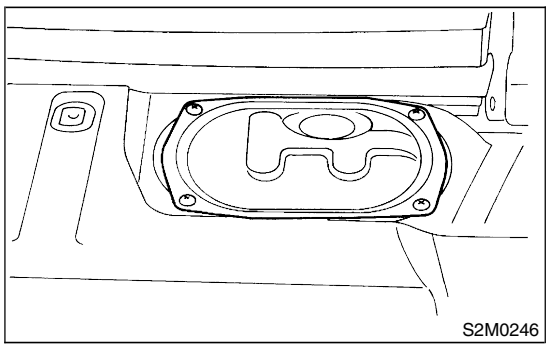
2. DRAINING OF FUEL S165052A1602

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

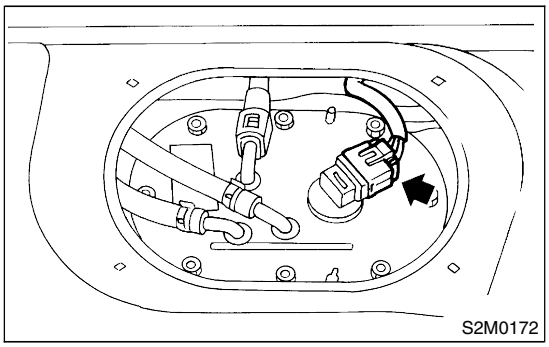
1) Release fuel pressure. <Ref. to FU(SOHCw/oOBD)-41, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open fuel flap lid, and remove fuel filler cap.
3) Disconnect battery ground cable.


G6M0095

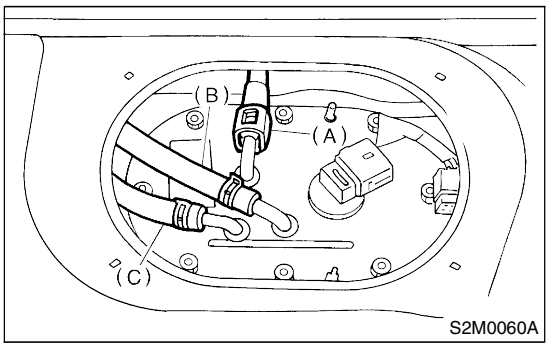
4) Remove the floor box located just behind the rear seats.
5) Remove access hole lid.


S2M0246

6) Disconnect connector from fuel pump.

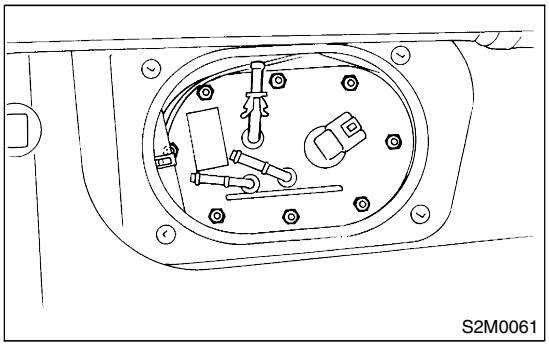

S2M0172

7) Disconnect quick connector, and then disconnect fuel delivery hose (A). <Ref. to FU(SOHCw/oOBD)-56, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>
8) Move clips, and then disconnect fuel return hose (B) and jet pump hose (C).

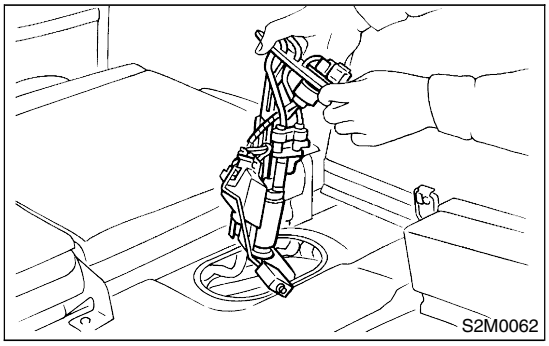


S2M0060A

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

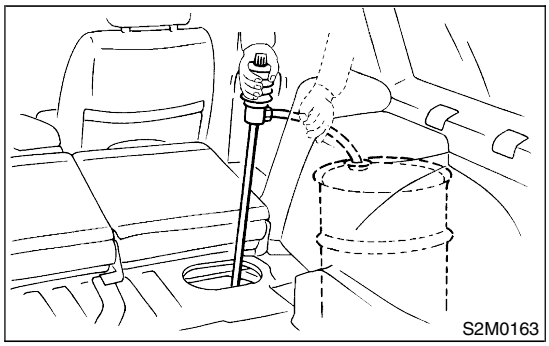

S2M0061

10) Take off fuel pump from fuel tank.

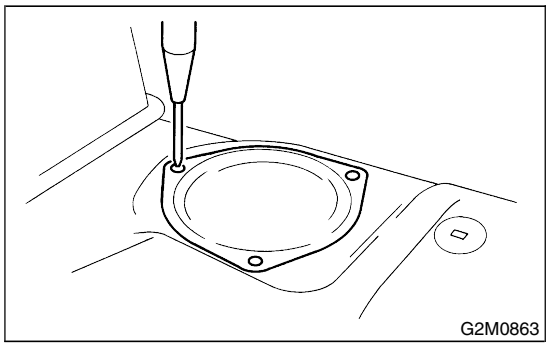

S2M0062

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

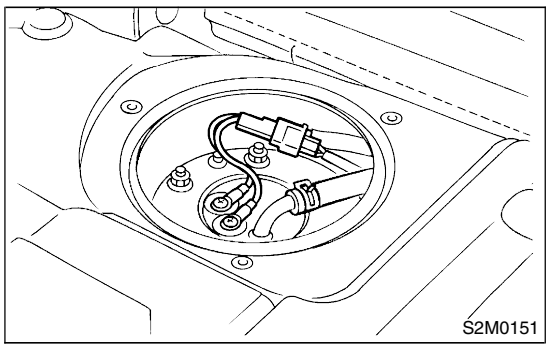
WARNING:
Do not use a motor pump when draining fuel.


S2M0163

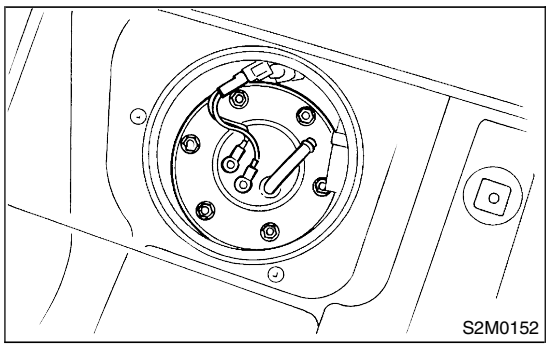
12) Remove service hole cover.


G2M0863

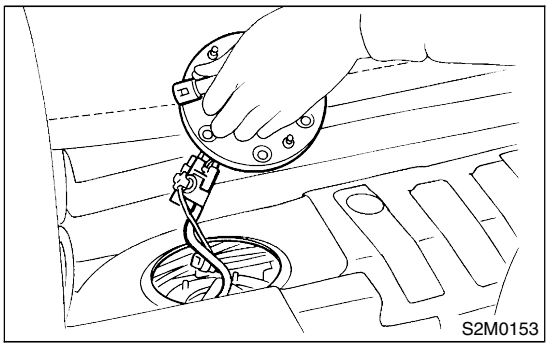
13) Disconnect connector from fuel sub meter.
14) Disconnect fuel jet pump hose.


S2M0151

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

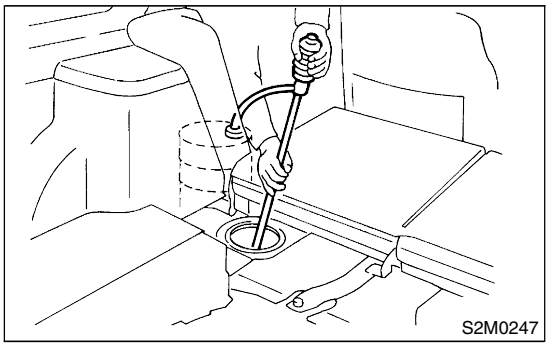

S2M0152

16) Remove fuel sub meter unit.


S2M0153

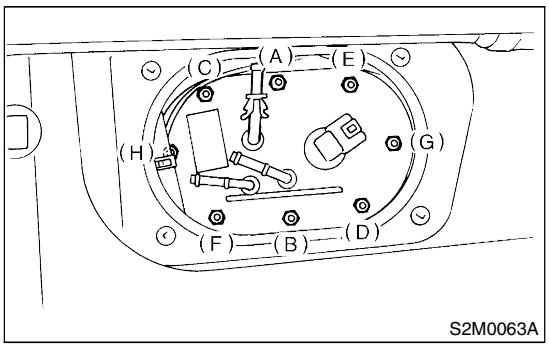
17) Drain fuel from there.

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


S2M0247

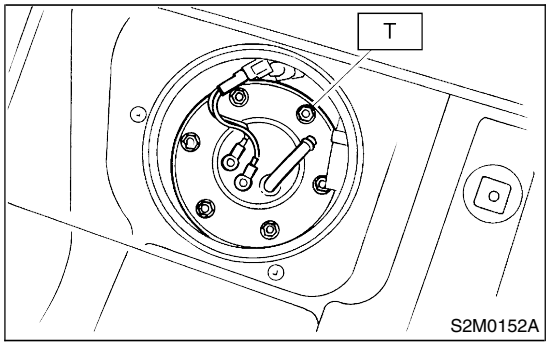
18) After draining fuel, reinstall fuel pump and fuel sub meter unit.
Tighten nuts of fuel pump in alphabetical sequence shown in figure to specified torque.

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



S2M0063A

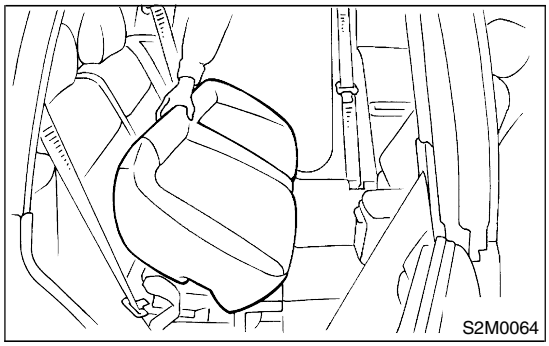
Tightening torque:
T: 4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



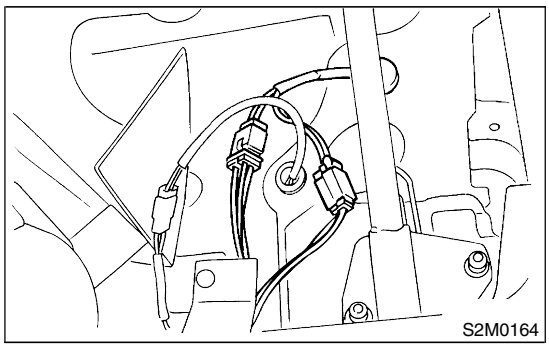
17. Fuel Tank S165053

A: REMOVAL S165053A18

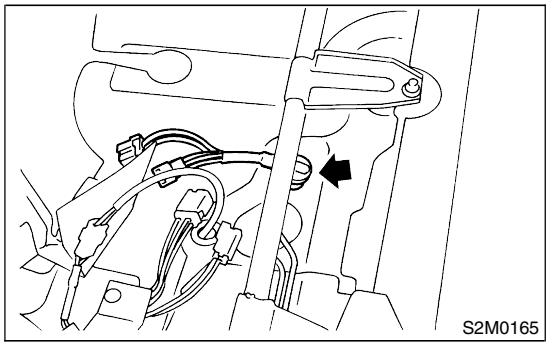
1) Set vehicle on the lift.
2) Release fuel pressure. <Ref. to FU(SOHCw/oOBD)-41, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
3) Drain fuel from fuel tank. <Ref. to FU(SOHCw/oOBD)-41, DRAINING OF FUEL, OPERATION, Fuel.>
4) Remove rear seat cushion, and turn up cover.


S2M0064

5) Disconnect connector of fuel tank cord from rear harness.


S2M0164

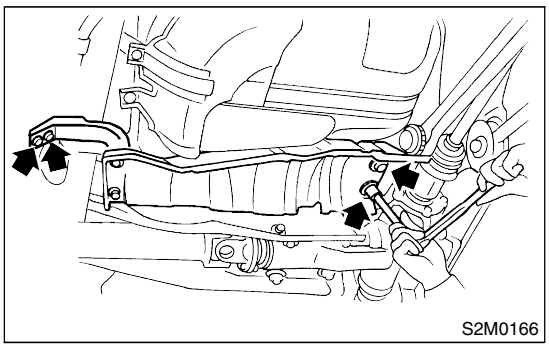
6) Push grommet which holds fuel tank cord on floor panel into under the body.


S2M0165

7) Lift-up the vehicle.
8) Remove rear exhaust pipe. <Ref. to EX(SOHCw/oOBD)-10, REMOVAL Rear Exhaust Pipe.>

NOTE:
To facilitate the removal of parts, apply a coat of SUBARU CRC to matching area of rubber cushions in advance.
SUBARU CRC (Part No. 004301003)

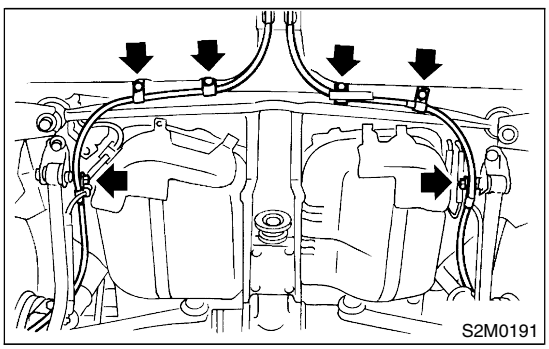
9) Remove heat sealed cover.


S2M0166

10) Remove muffler assembly.
<Ref. to EX(SOHCw/oOBD)-12, REMOVAL Muffler.>

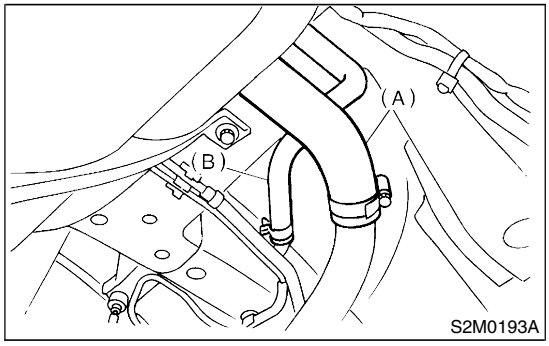
NOTE:
To facilitate the removal of parts, apply a coat of SUBARU CRC to matching area of rubber cushions in advance.
SUBARU CRC (Part No. 004301003)

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

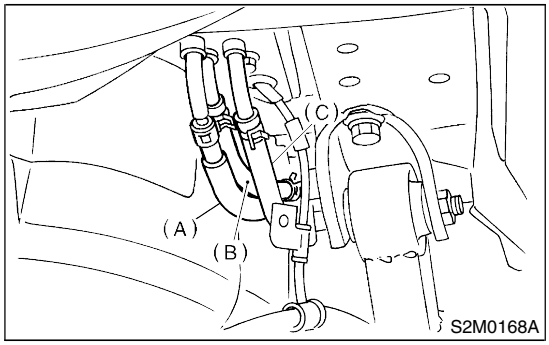

S2M0191

12) Remove rear differential assembly. <Ref. to DI-25, REMOVAL, Rear Differential for T-type.> and <Ref. to DI-42, REMOVAL, Rear Differential for VA-type.>
13) Remove rear crossmember. <Ref. to RS-20, REMOVAL, Rear Crossmember.>

14) Loosen clamp, and disconnect fuel filler hose (A) and air vent hose (B) from fuel filler pipe.

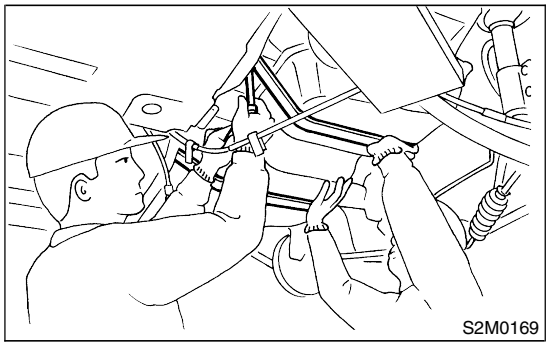


15) Move clips, and disconnect fuel return hose (B) and evaporation hose (C).
16) Disconnect quick connector, and then disconnect fuel delivery hose (A). <Ref. to FU(SOHCw/oOBD)-56, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>



17) While holding fuel tank, remove bolts from bands and dismount fuel tank.

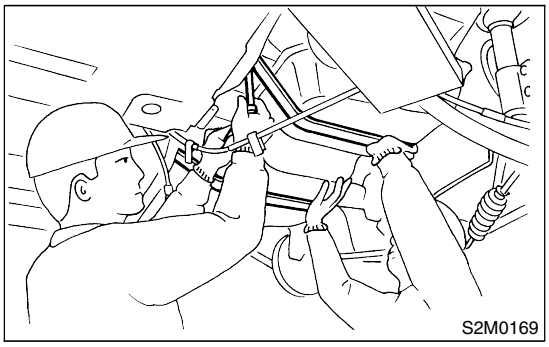
WARNING:
A helper is required to perform this work.



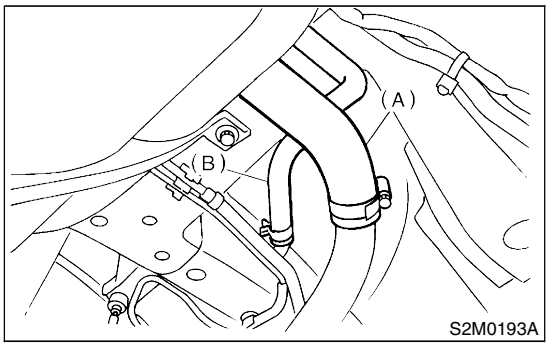
B: INSTALLATION S165053A11

1) While a helper holds fuel tank, push fuel tank harness into access hole with grommet.

2) Set fuel tank, and temporary tighten bolts for installing fuel tank bands.

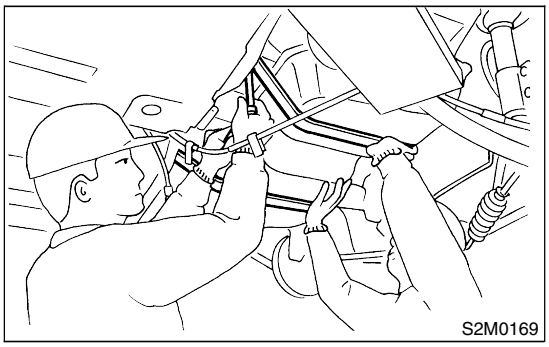


3) Connect fuel filler hose (A) and air vent hose (B).



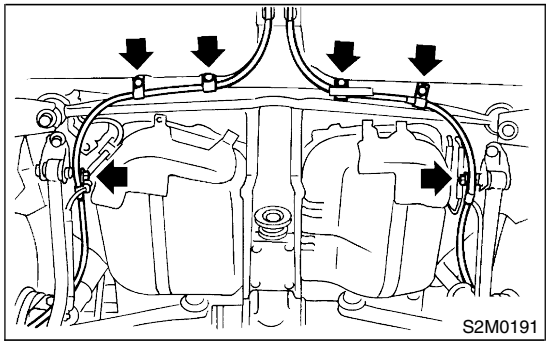
4) Connect fuel hoses, and hold them with clips and quick connector. <Ref. to FU(SOHCw/oOBD)-57, INSTALLATION, Fuel Delivery, Return and Evaporation Lines.>
5) Tighten band mounting bolts.

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

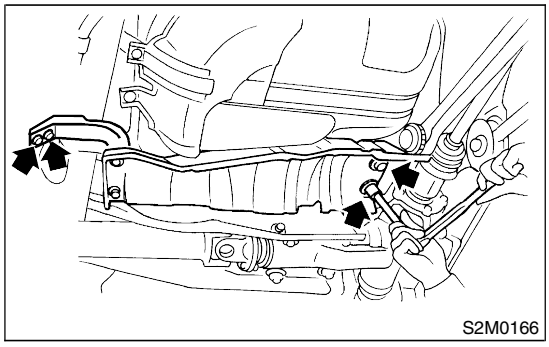


6) Install rear crossmember. <Ref. to RS-20, INSTALLATION, Rear Crossmember.>
7) Install rear differential assembly. <Ref. to DI-27, INSTALLATION, Rear Differential for T-type.> and <Ref. to DI-43, INSTALLATION Rear Differential for VA-type.>

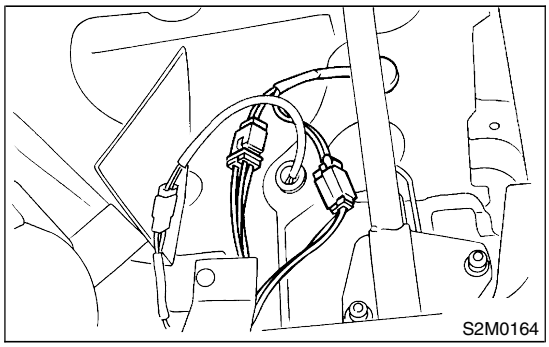
8) Install bolts which hold parking brake holding bracket.


S2M0191

9) Install muffler assembly. <Ref. to EX(SOHCw/oOBD)-12, INSTALLATION, Muffler.>
10) Install heat sealed cover.

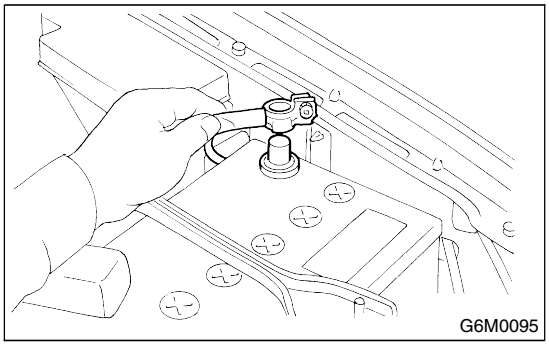

S2M0166

11) Install rear exhaust pipe. <Ref. to EX(SOHCw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.>
12) Lower the vehicle.
13) Connect connectors to fuel tank harness, and plug access hole with grommet.


S2M0164

14) Install rear seat cushion.
15) Install fuel filler cap.
16) Connect connector to fuel pump relay. <Ref. to FU(SOHCw/oOBD)-40, INSTALLATION, Fuel Pump Relay.>

17) Connect battery ground cable.


G6M0095

C: INSPECTION *S165053A10*

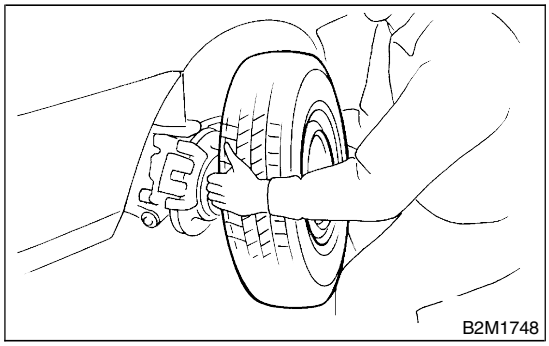
1) Make sure there are no cracks, holes, or other damage on the fuel tank.
2) Make sure that the fuel hoses and fuel pipes are not cracked and that connections are tight.

18. Fuel Filler Pipe S165022

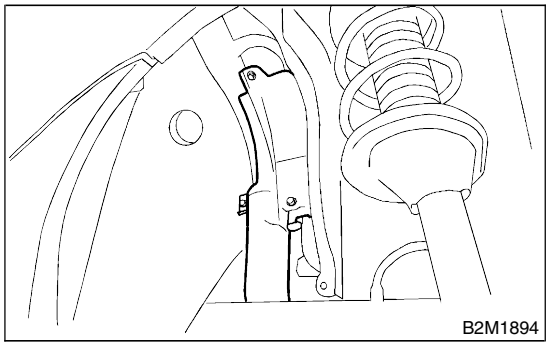
A: REMOVAL S165022A18

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

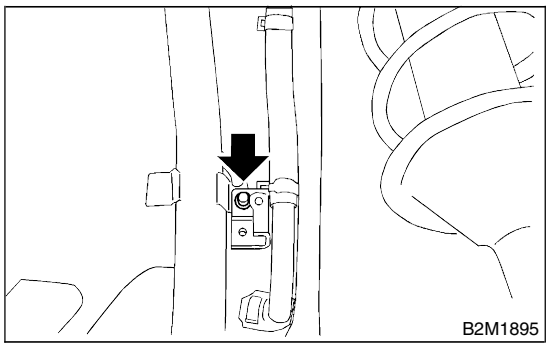
1) Set the vehicle on the lift.
2) Drain fuel from fuel tank. <Ref. to FU(SOHCw/oOBD)-41, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
3) Remove screws holding packing in place.
4) Remove wheel nuts of rear right side.
5) Lift-up the vehicle.
6) Remove rear right side wheel.


B2M1748

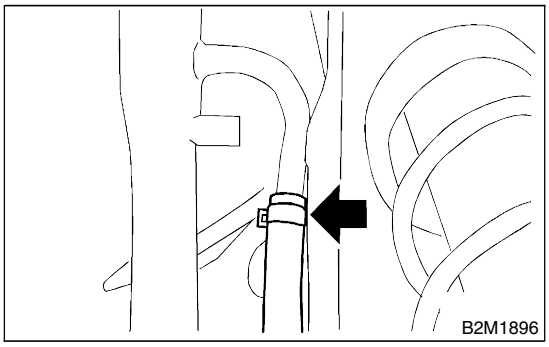
7) Remove fuel filler pipe protector.


B2M1894

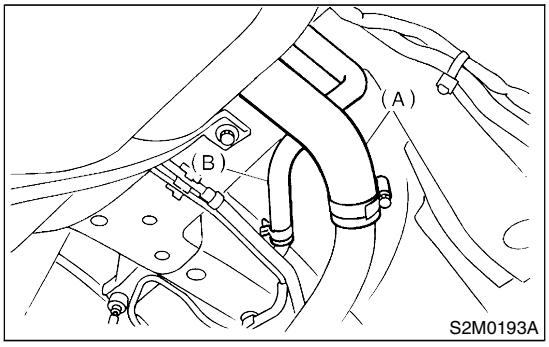
8) Remove bolts which hold fuel filler pipe bracket on body.


B2M1895

9) Move clip, and disconnect air vent hose from air vent pipe.

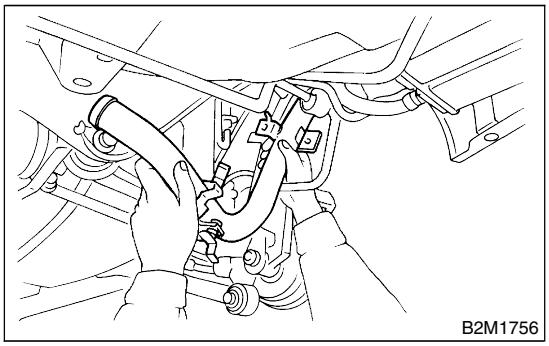

B2M1896

10) Loosen clamp, and separate fuel filler hose (A) from fuel filler pipe.
11) Move clip, and separate air vent hose (B).



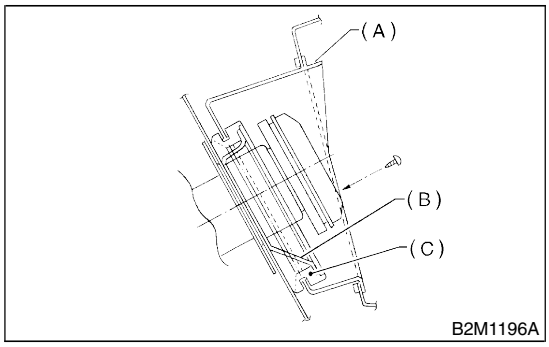
S2M0193A

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


B2M1756

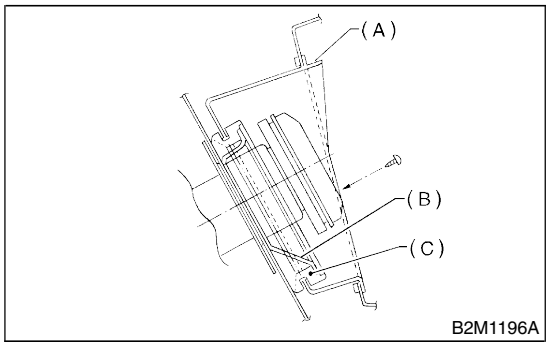
B: INSTALLATION S165022A11

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



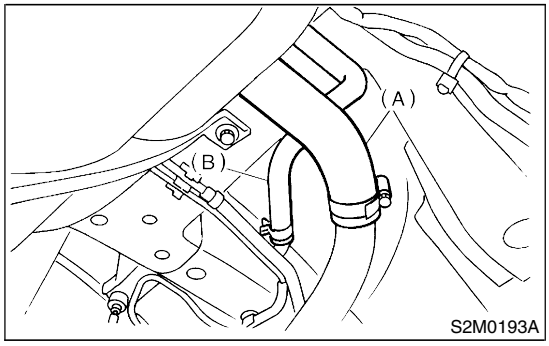
3) Align holes in fuel filler pipe neck and set cup (B), and tighten screws.

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



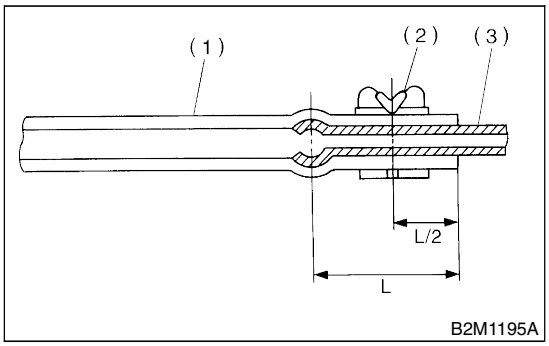
4) Insert fuel filler hose (A) approximately 25 to 30 mm (0.98 to 1.18 in) over the lower end of fuel filler pipe and tighten clamp.

CAUTION:
Do not allow clips to touch air vent hose (B) and rear suspension crossmember.



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

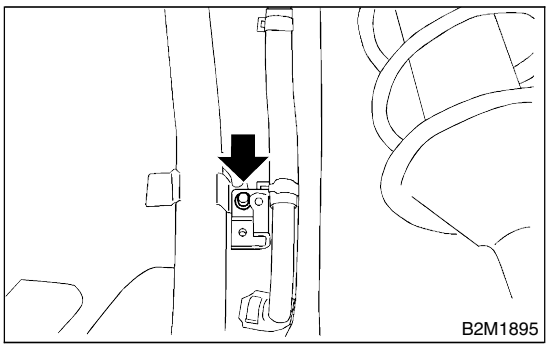
L = 27.5±2.5 mm (1.083±0.098 in)



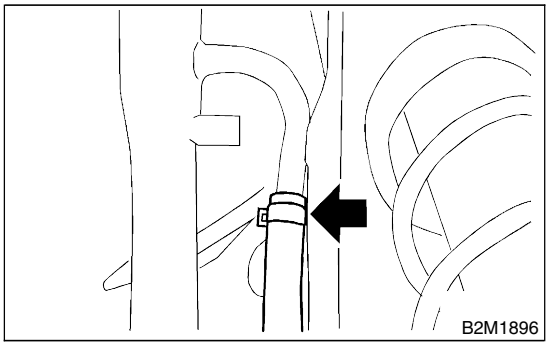
(1) Hose
(2) Clip
(3) Pipe

6) Tighten bolt which holds fuel filler pipe bracket on body.

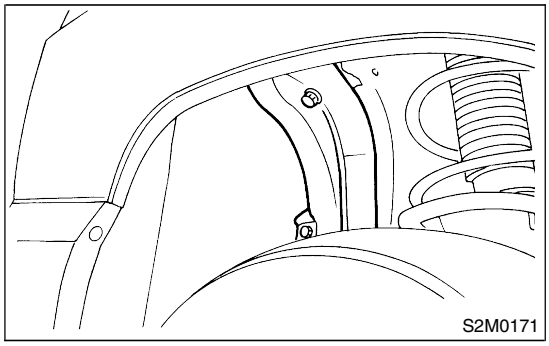
Tightening torque:
22.6 N·m (2.3 kgf-m, 16.6 ft-lb)



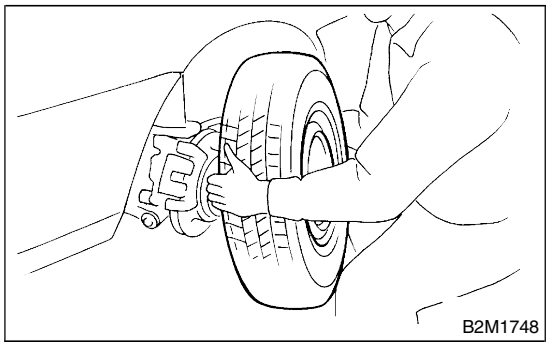
7) Connect air vent hose to air vent pipe.



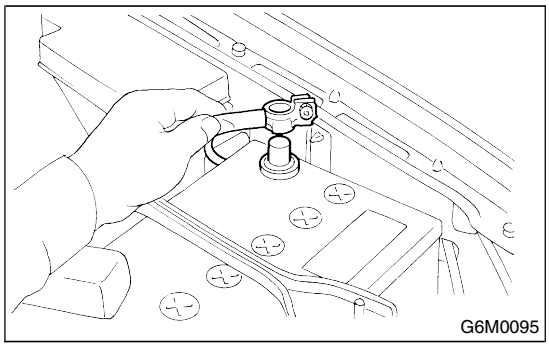
8) Install fuel filler pipe protector.



9) Install rear right wheel.



10) Lower the vehicle.
11) Tighten wheel nuts.
12) Connect connector to fuel pump relay.
<Ref. to FU(SOHCw/oOBD)-40, INSTALLATION, Fuel Pump Relay.>
13) Connect battery ground terminal.

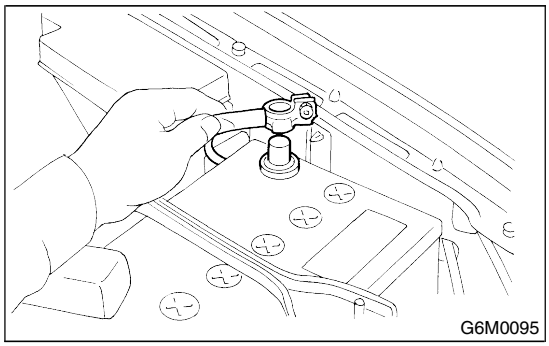


19. Fuel Pump S165025

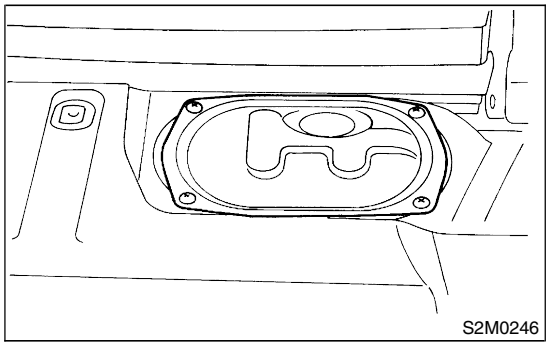
A: REMOVAL S165025A18

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

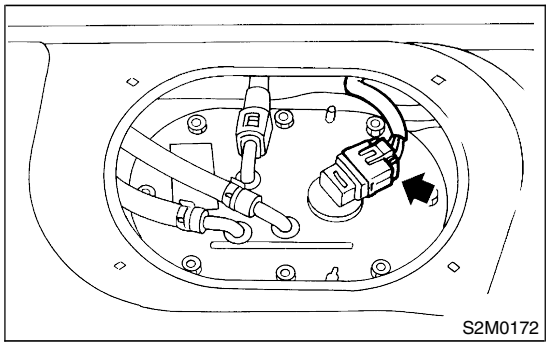
1) Release fuel pressure. <Ref. to FU(SOHCw/oOBD)-41, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open fuel filler flap lid, and remove fuel filler cap.
3) Disconnect battery ground cable.


G6M0095

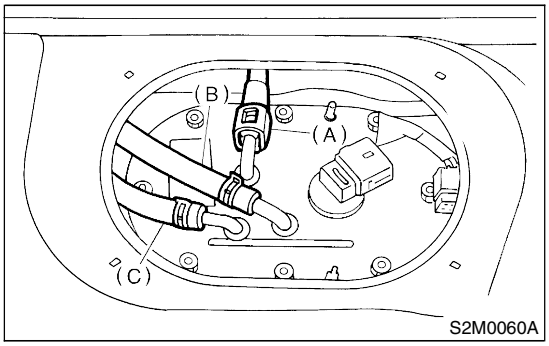
4) Remove the floor box located just behind the rear seats.
5) Remove access hole lid.


S2M0246

6) Disconnect connector from fuel pump.

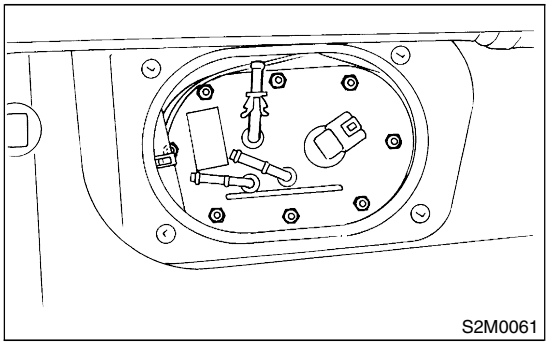

S2M0172

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(SOHCw/oOBD)-56, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>

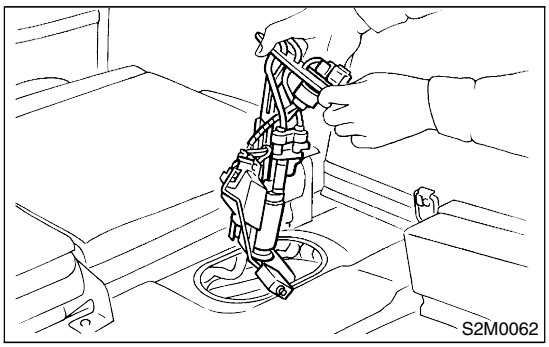


S2M0060A

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


S2M0061

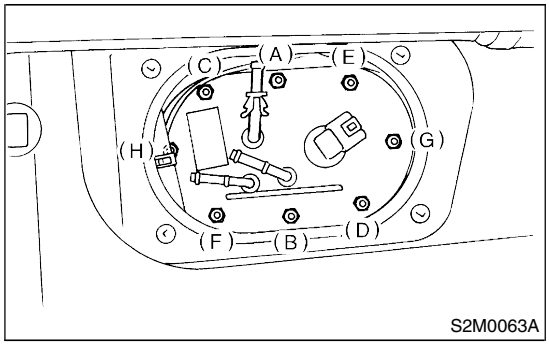
10) Take off fuel pump from fuel tank.


S2M0062

B: INSTALLATION S165025A11

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

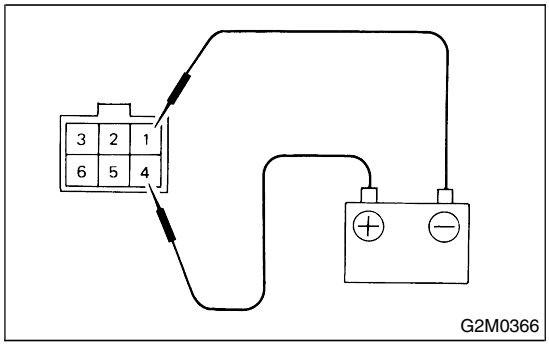
Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



C: INSPECTION S165025A10

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.



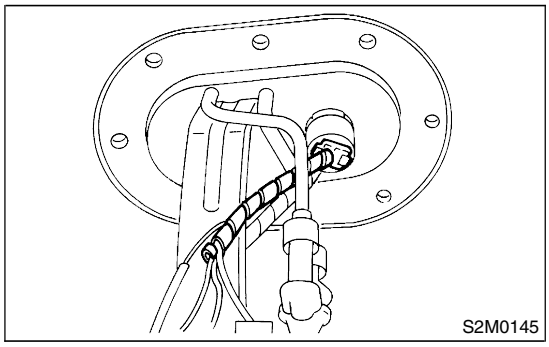
20. Fuel Level Sensor S165026

A: REMOVAL S165026A18

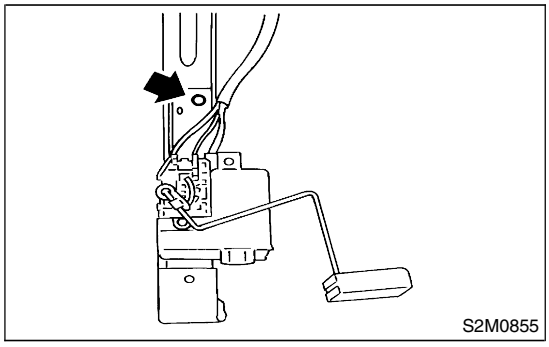
WARNING:
• Place “NO FIRE” signs near the working area.
• Be careful not to spill fuel on the floor.

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

1) Remove fuel pump assembly. <Ref. to FU(SOHCw/oOBD)-50, REMOVAL, Fuel Pump.>
2) Disconnect connector from fuel pump bracket.


S2M0145

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


S2M0855

B: INSTALLATION S165026A11

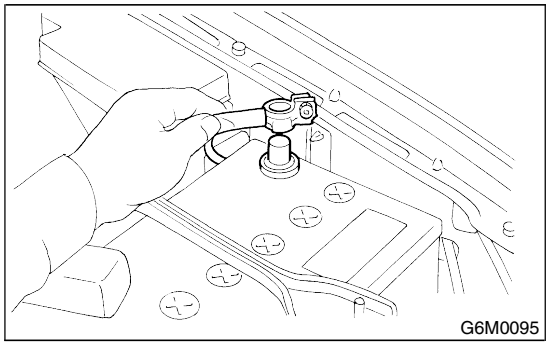
Install in the reverse order of removal.

21. Fuel Sub Level Sensor S165023

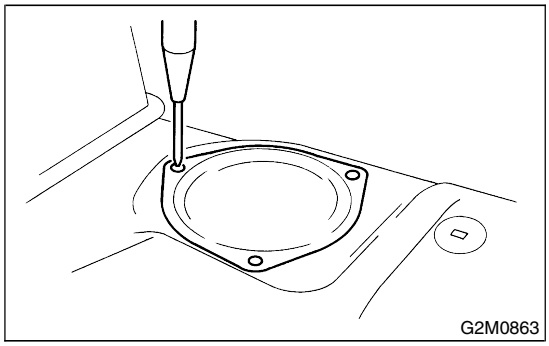
A: REMOVAL S165023A18

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

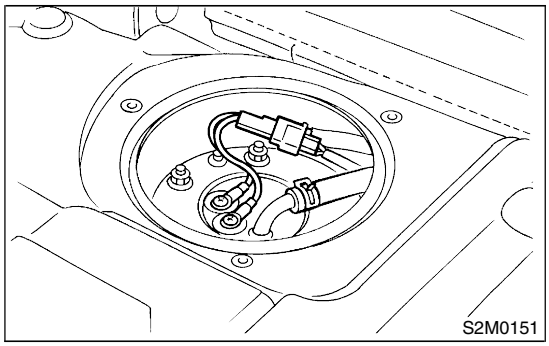
1) Disconnect battery ground cable.


G6M0095

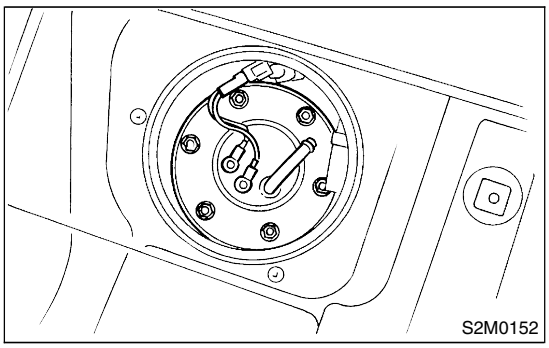
2) Remove the floor box located just behind the rear seats.
3) Remove service hole cover.


G2M0863

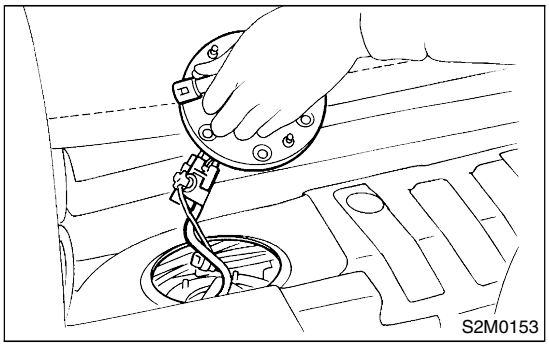
4) Disconnect connector from fuel sub meter.
5) Disconnect fuel jet pump hose.


S2M0151

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


S2M0152

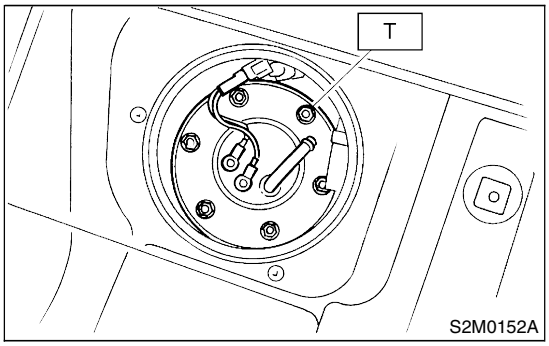
7) Remove fuel sub meter unit.


S2M0153

B: INSTALLATION S165023A11

Install in the reverse order of removal.

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



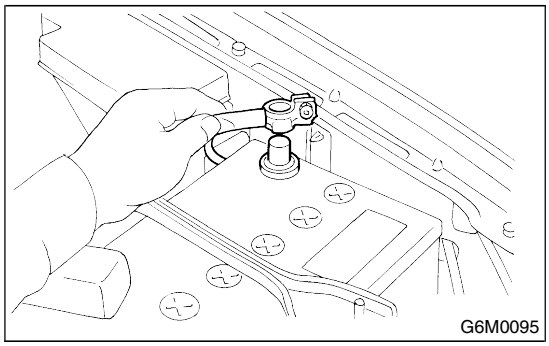
S2M0152A

22. Fuel Filter S165027

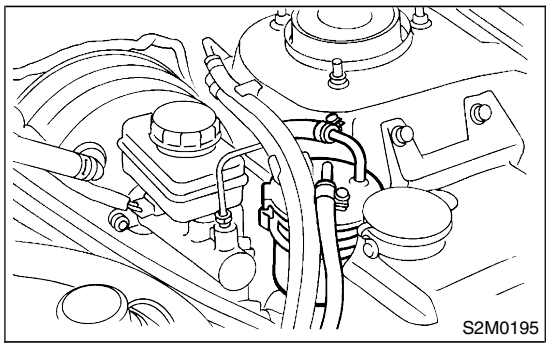
A: REMOVAL S165027A18

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(SOHCw/oOBD)-41, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open fuel flap lid, and remove fuel filler cap.
3) Disconnect battery ground cable.


G6M0095

4) Disconnect fuel hoses from fuel filter.


S2M0195

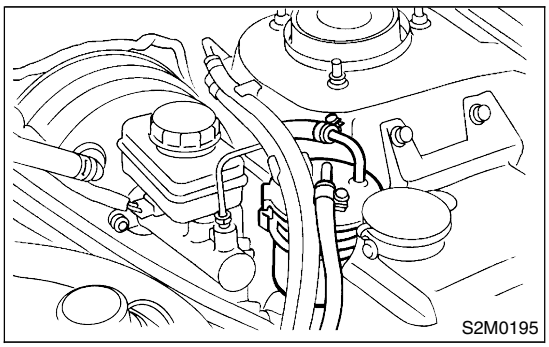
5) Remove filter from holder.

B: INSTALLATION S165027A11

CAUTION:
- **If fuel hoses are damaged at the connecting portion, replace it with a new one.**
- **If clamps are badly damaged, replace with new ones.**

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

Tightening torque:
1 N·m (0.1 kgf-m, 0.7 ft-lb)


S2M0195

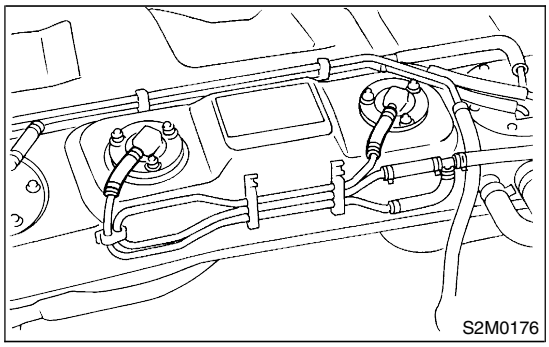
C: INSPECTION S165027A10

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.

23. Fuel Cut Valve S165021

A: REMOVAL S165021A18

1) Remove fuel tank. <Ref. to FU(SOHCw/oOBD)-44, REMOVAL, Fuel Tank.>
2) Move clip and disconnect evaporation hose from fuel cut valve.

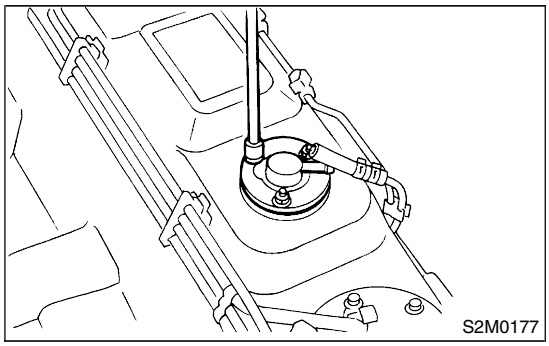


3) Remove bolts which install fuel cut valve.

B: INSTALLATION S165021A11

Install in the reverse order of removal.

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

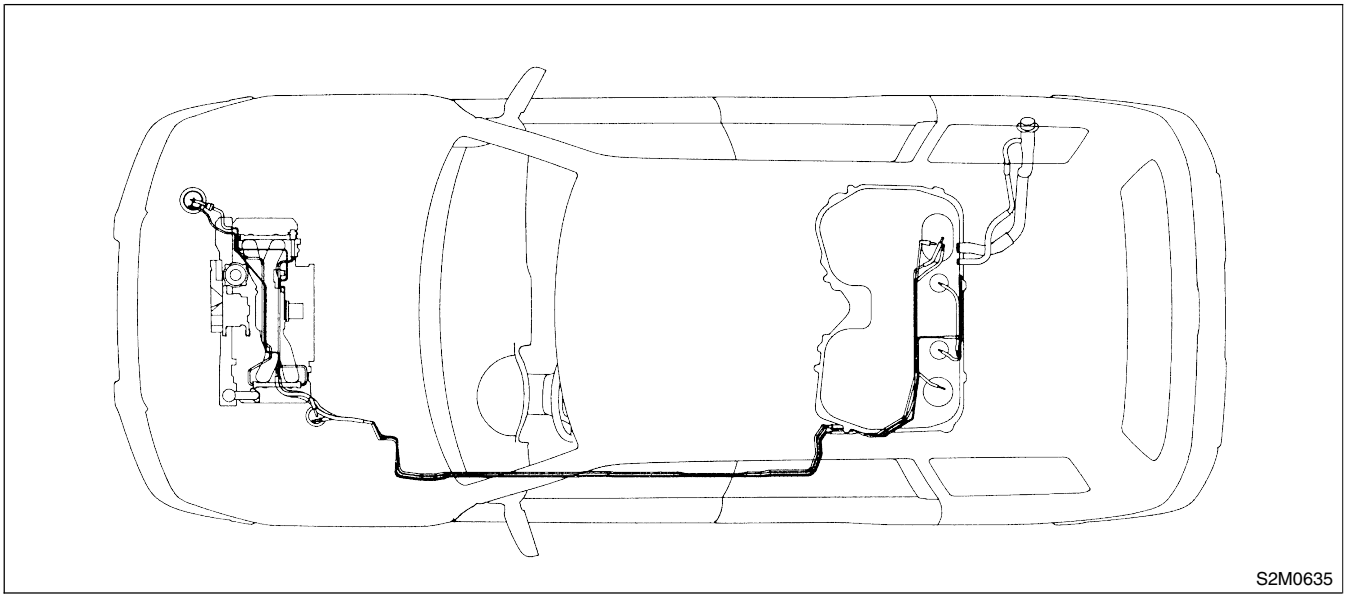


24. Fuel Delivery, Return and Evaporation Lines S165019

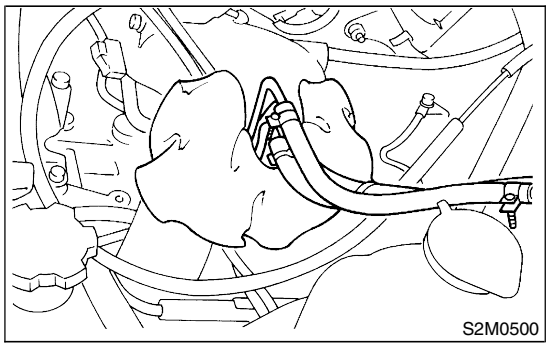
A: REMOVAL S165019A18

1) Release fuel pressure. <Ref. to FU(SOHCw/oOBD)-41, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>

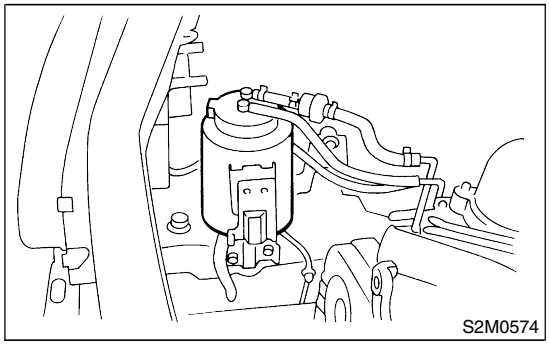
2) Open fuel filler flap lid and remove fuel filler cap.
3) Remove inner trim, insulator and rear seat.
4) Remove fuel delivery pipes and hoses, fuel return pipes and hoses, evaporation pipes and hoses.


S2M0635

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

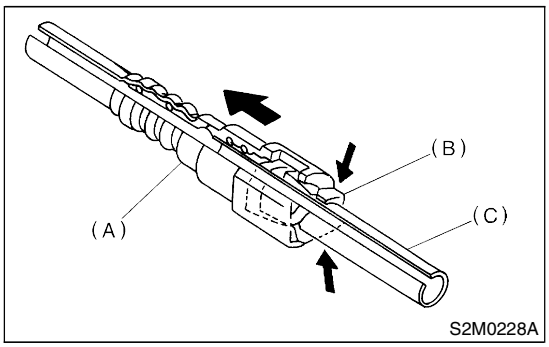

S2M0500

6) In the engine compartment, detach canister hose from canister.


S2M0574

7) 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 retainer with new ones.



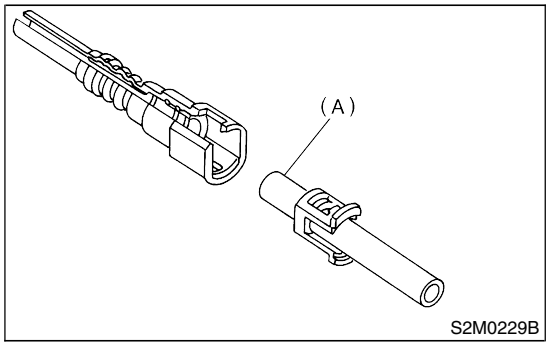
S2M0228A

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

B: INSTALLATION S165019A11

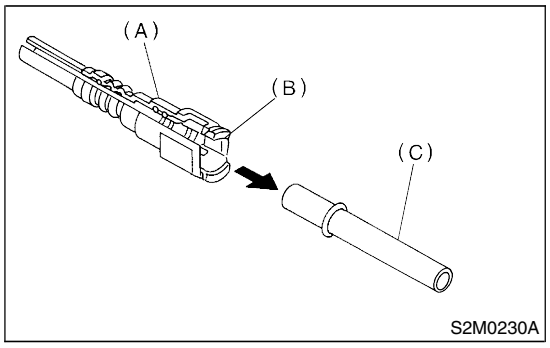
1) Connect quick connector on fuel delivery and return line.

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



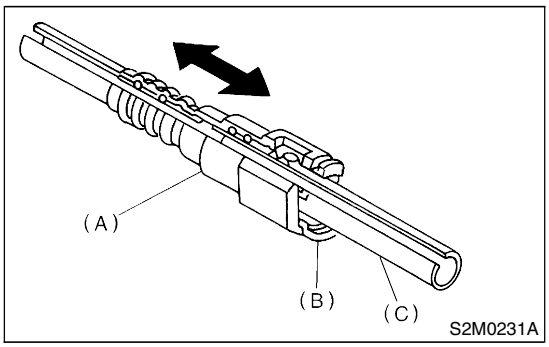
(1) Set new retainer (B) to connector (A).
(2) Push pipe into connector completely.

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



(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.**

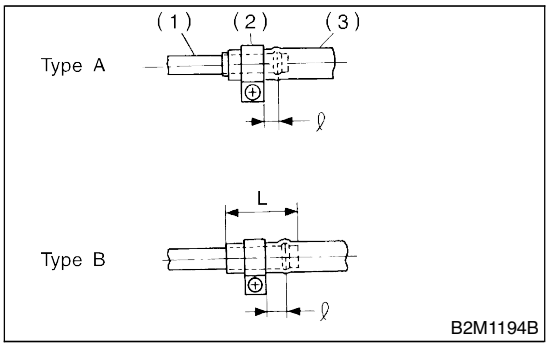


(A) Connector
(B) Retainer
(C) Pipe

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)

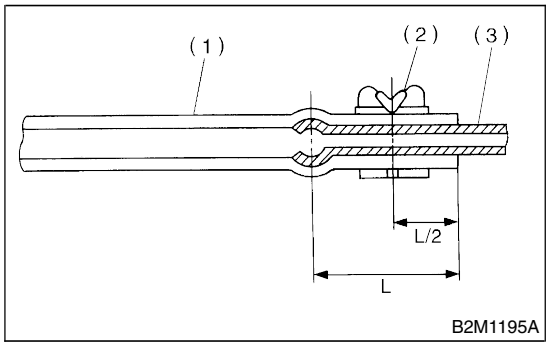


(1) Fitting
(2) Clamp
(3) Hose

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 S165019A10

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.

25. Fuel System Trouble in General S165571

A: INSPECTION S165571A10

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

MEMO:

EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)

EC(SOHCw/oOBD)

Page

1. General Description....2
2. Front Catalytic Converter....3
3. Canister....6
4. Purge Control Solenoid Valve....7
5. Two-way Valve....8

1. General Description S160001

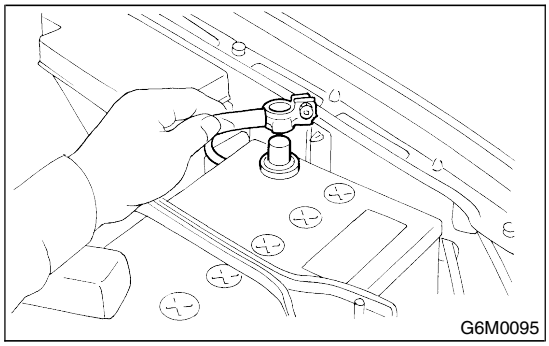
A: CAUTION S160001A03

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

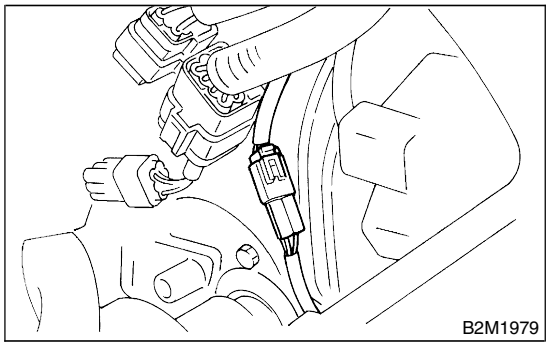
2. Front Catalytic Converter S160017

A: REMOVAL S160017A18

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

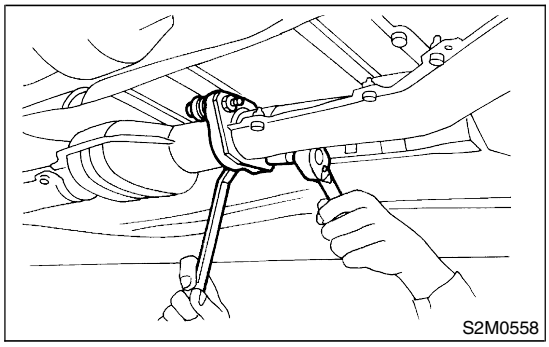

G6M0095

3) Disconnect front oxygen sensor connector.

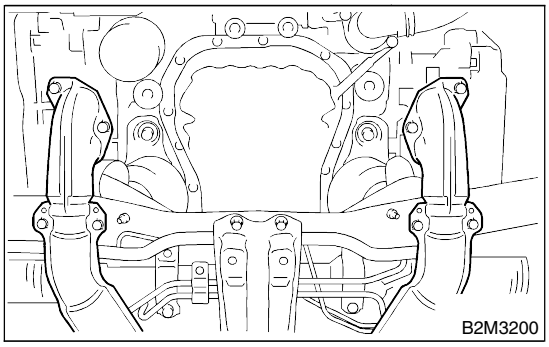

B2M1979

4) Lift-up the vehicle.
5) Remove under cover.
6) Separate center exhaust pipe from rear exhaust pipe.

CAUTION:
Be careful, exhaust pipe is hot.

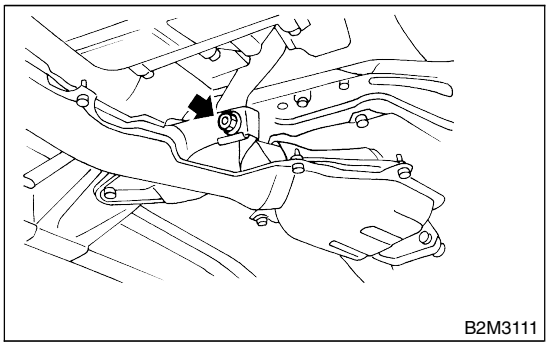

S2M0558

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

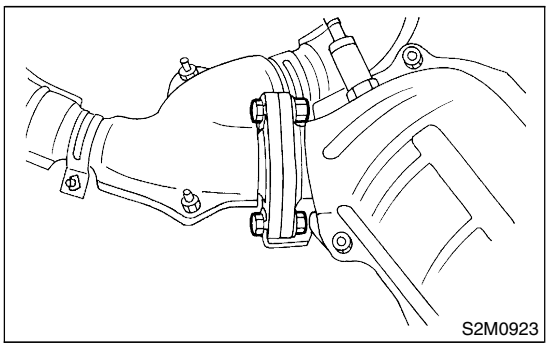

B2M3200

8) Remove front exhaust pipe and center exhaust pipe from hanger bracket.

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


B2M3111

9) Separate front catalytic converter from front exhaust pipe.

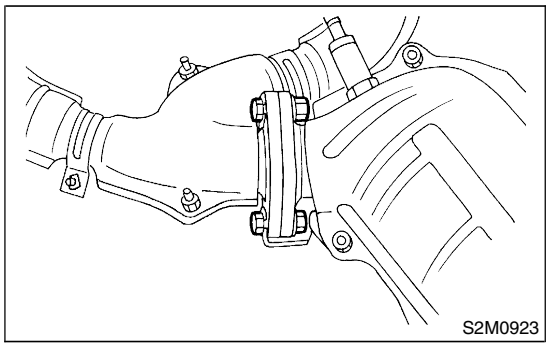

S2M0923

B: INSTALLATION S160017A11

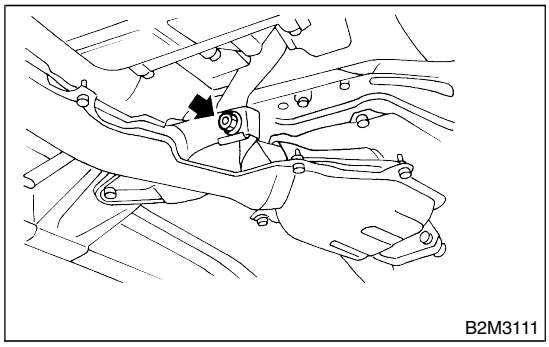
CAUTION:
Replace gaskets with new ones.

1) Install front catalytic converter to front exhaust pipe.

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

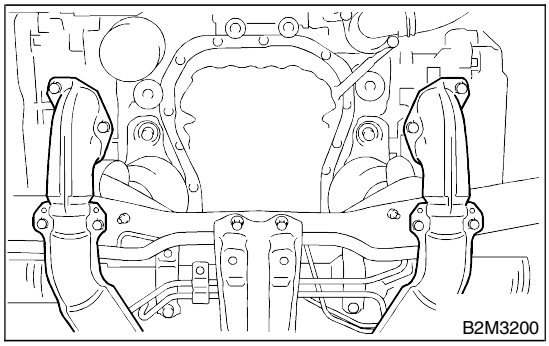

S2M0923

2) Install front exhaust pipe and center exhaust pipe. And temporarily tighten bolt which installs center exhaust pipe to hanger bracket.


B2M3111

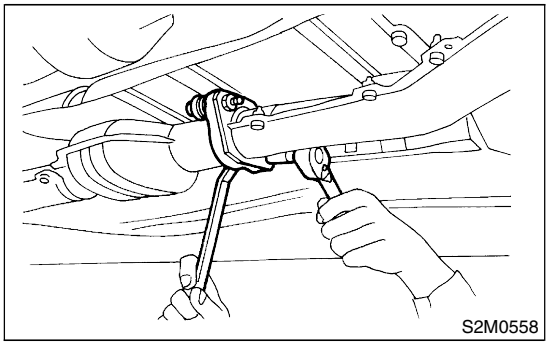
3) Tighten bolts which hold front exhaust pipe onto cylinder heads.

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


B2M3200

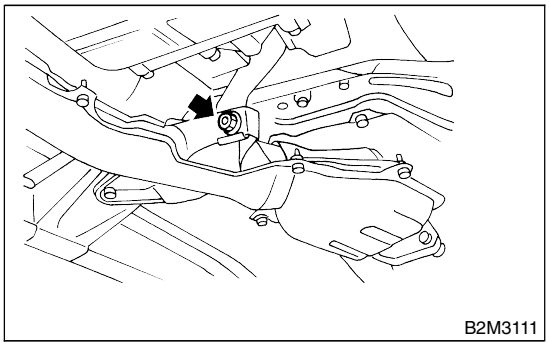
4) Install center exhaust pipe to rear exhaust pipe.

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

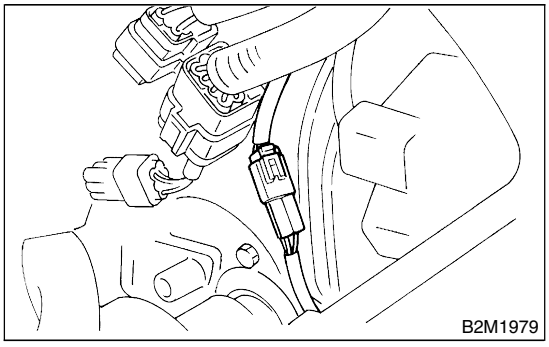

S2M0558

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

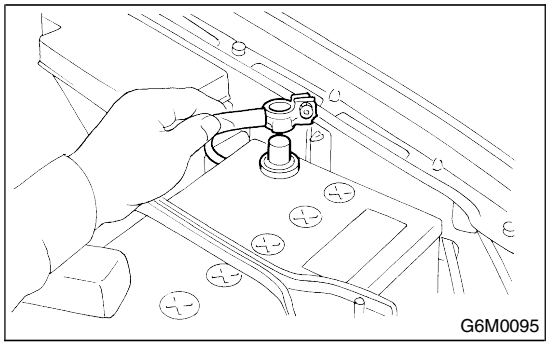
Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)


B2M3111

6) Install under cover.
7) Lower the vehicle.
8) Connect front oxygen sensor connector.


B2M1979

9) Connect battery ground cable.



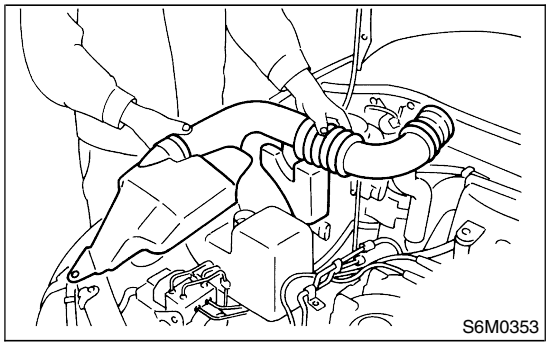
C: INSPECTION *S160017A10*

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

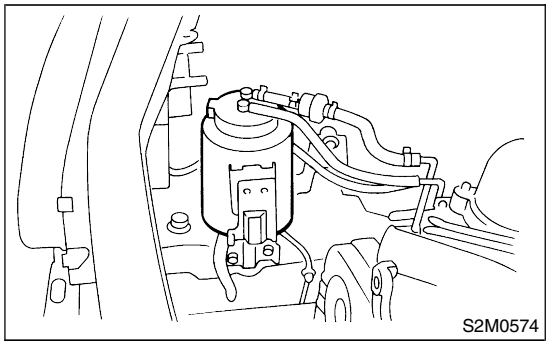
3. Canister S160037

A: REMOVAL S160037A18

1) Remove air intake duct as a unit.



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



B: INSTALLATION S160037A11

Install in the reverse order of removal.

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

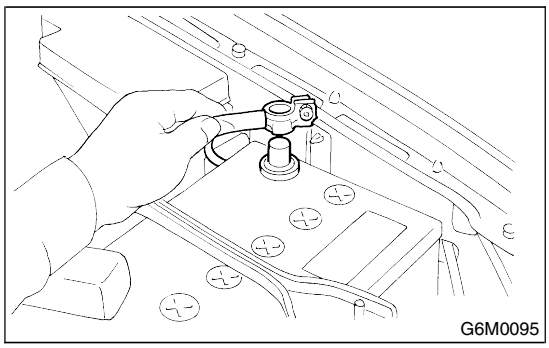
C: INSPECTION S160037A10

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

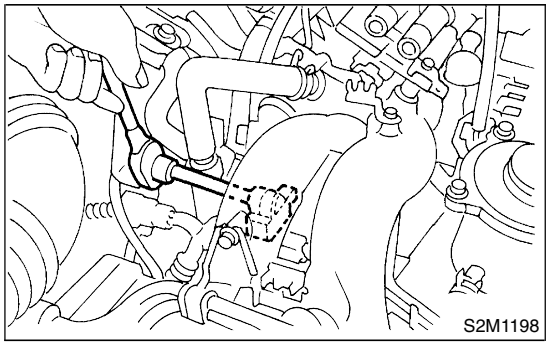
4. Purge Control Solenoid Valve S160035

A: REMOVAL S160035A18

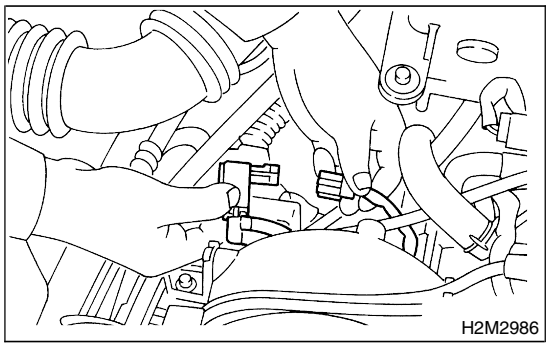
1) Disconnect battery ground cable.



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



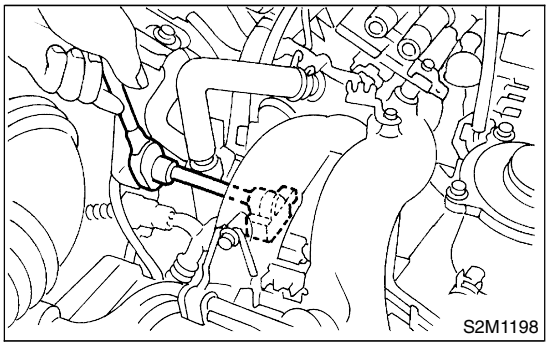
3) Take out purge control solenoid valve through the bottom of the intake manifold.
4) Disconnect connector and hoses from purge control solenoid valve.



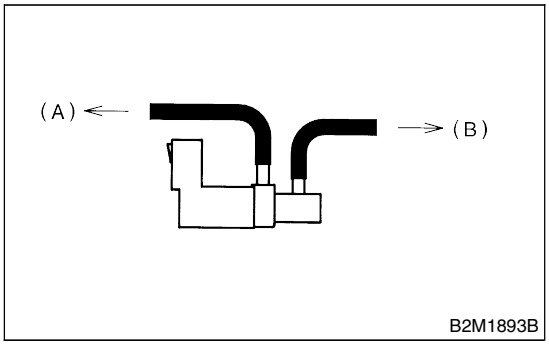
B: INSTALLATION S160035A11

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.



(A) To fuel pipe
(B) To intake manifold

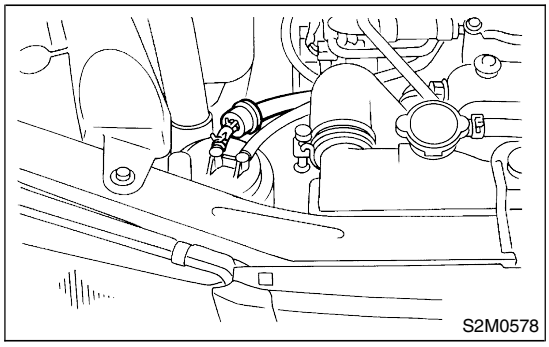
C: INSPECTION S160035A10

Make sure hoses are not cracked or loose.

5. Two-way Valve S160707

A: REMOVAL S160707A18

Disconnect hoses from two-way valve, and remove it.



B: INSTALLATION S160707A11

Install in the reverse order of removal.

C: INSPECTION S160707A10

Make sure that hoses are not cracked or loose.

EXHAUST

EX(SOHCw/oOBD)

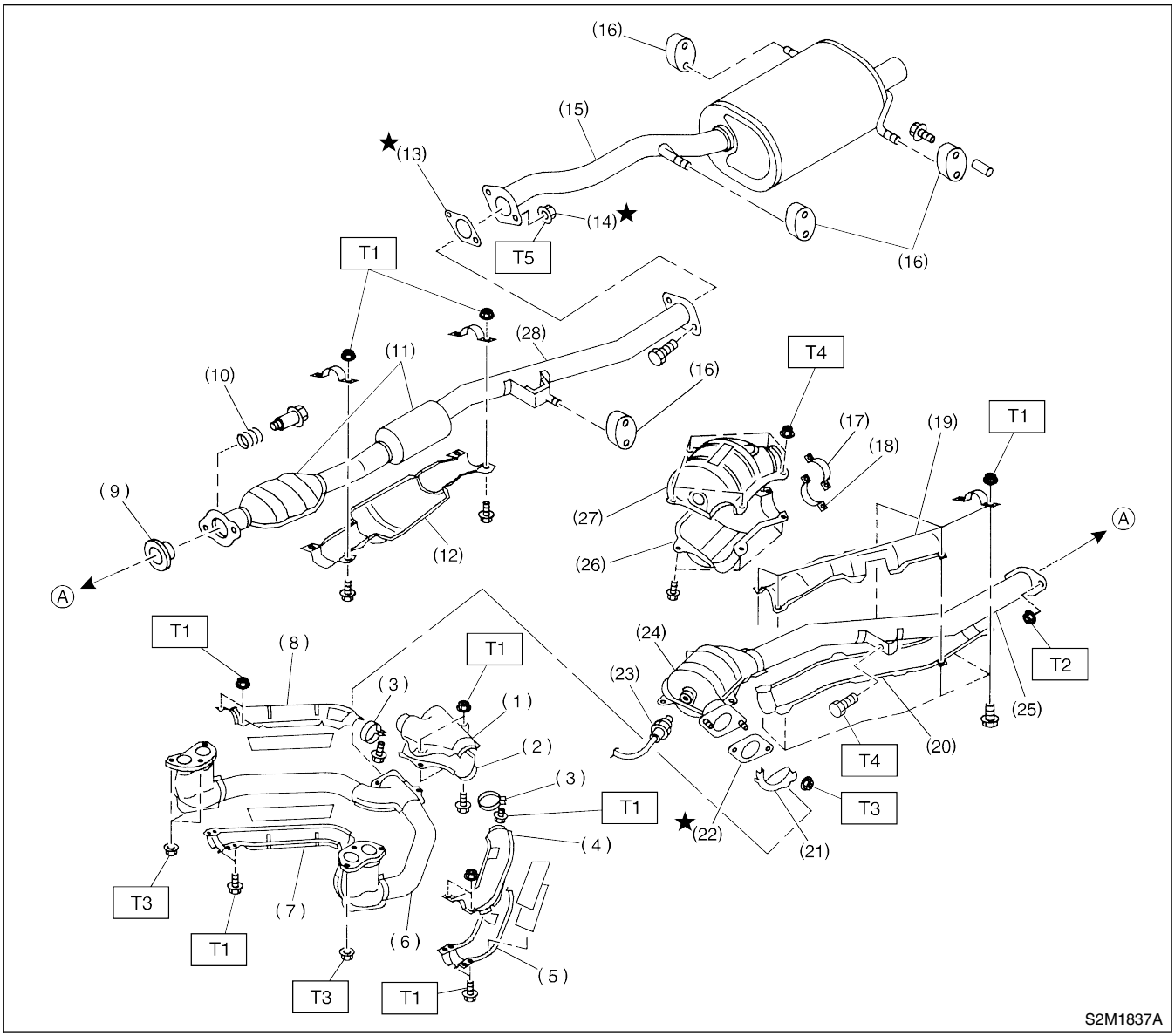
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2. Front Exhaust Pipe....6
3. Center Exhaust Pipe....9
4. Rear Exhaust Pipe....10
5. Muffler....12

1. General Description S162001

A: COMPONENT S162001A05

1. WITH CATALYTIC CONVERTER S162001A0504

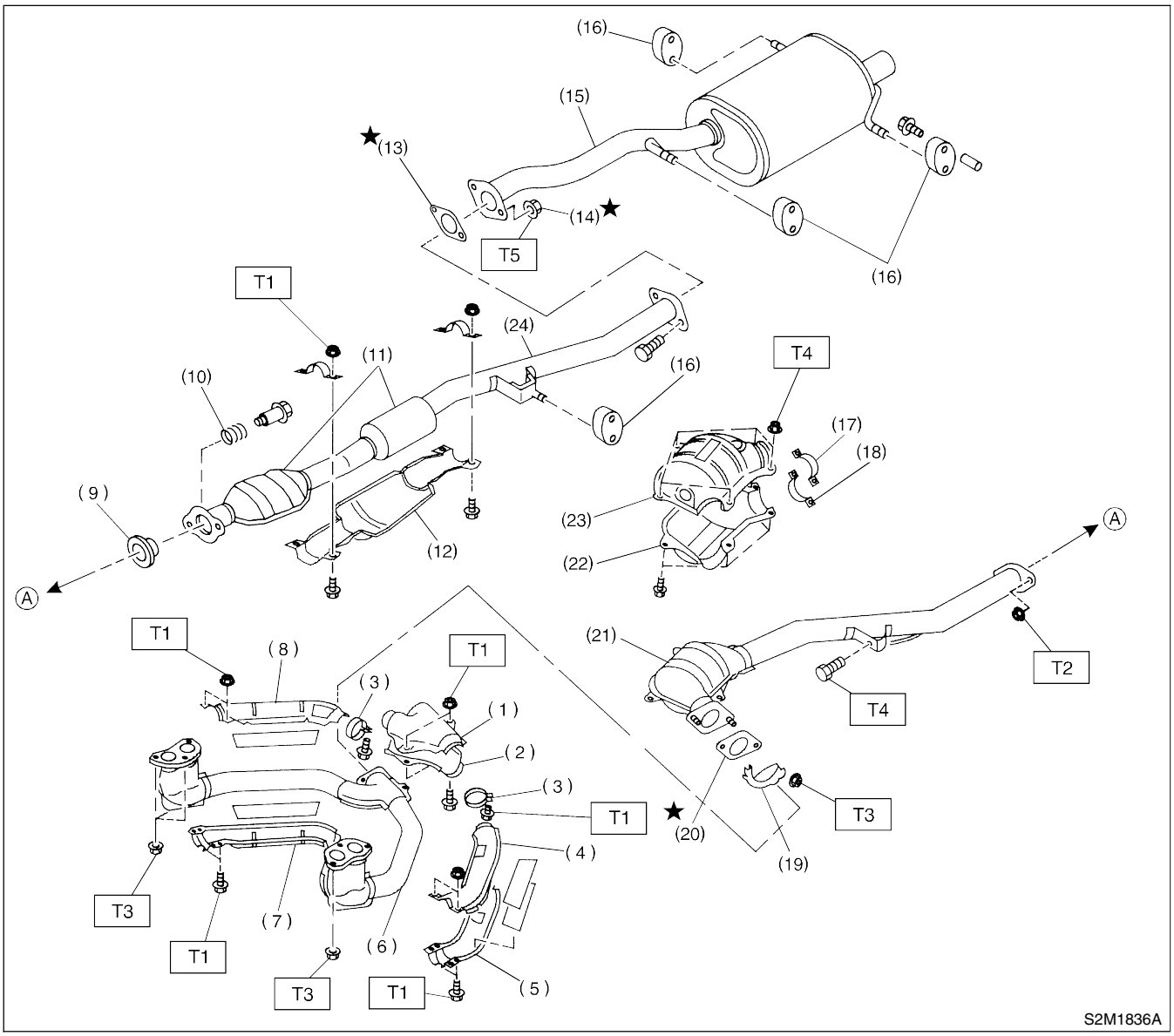


(1) Upper front exhaust pipe cover CTR
(2) Lower front exhaust pipe cover CTR
(3) Clamp
(4) Upper front exhaust pipe cover LH
(5) Lower front exhaust pipe cover LH
(6) Front exhaust pipe
(7) Lower front exhaust pipe cover RH
(8) Upper front exhaust pipe cover RH
(9) Gasket
(10) Spring
(11) Chamber
(12) Rear exhaust pipe cover
(13) Gasket
(14) Self-locking nut
(15) Muffler
(16) Cushion rubber
(17) Upper clamp
(18) Lower clamp
(19) Upper center exhaust pipe cover
(20) Lower center exhaust pipe cover
(21) Protector
(22) Gasket
(23) Oxygen sensor
(24) Front catalytic converter
(25) Center exhaust pipe
(26) Lower front catalytic converter cover
(27) Upper front catalytic converter cover
(28) Rear exhaust pipe

Tightening torque: N·m (kgf-m, ft-lb)
T1: 13 (1.3, 9.4)
T2: 18 (1.8, 13.0)
T3: 30 (3.1, 22.4)
T4: 35 (3.6, 26.0)
T5: 48 (4.9, 35.4)

2. WITHOUT CATALYTIC CONVERTER

S162001A0503



(1) Upper front exhaust pipe cover CTR
(2) Lower front exhaust pipe cover CTR
(3) Clamp
(4) Upper front exhaust pipe cover LH
(5) Lower front exhaust pipe cover LH
(6) Front exhaust pipe
(7) Lower front exhaust pipe cover RH
(8) Upper front exhaust pipe cover RH
(9) Gasket
(10) Spring
(11) Chamber
(12) Rear exhaust pipe cover
(13) Gasket
(14) Self-locking nut
(15) Muffler
(16) Cushion rubber
(17) Upper clamp
(18) Lower clamp
(19) Protector
(20) Gasket
(21) Center exhaust pipe
(22) Lower front catalytic converter cover
(23) Upper front catalytic converter cover
(24) Rear exhaust pipe

Tightening torque: N·m (kgf-m, ft-lb)
T1: 13 (1.3, 9.4)
T2: 18 (1.8, 13.0)
T3: 30 (3.1, 22.4)
T4: 35 (3.6, 26.0)
T5: 48 (4.9.5, 35.4.6)

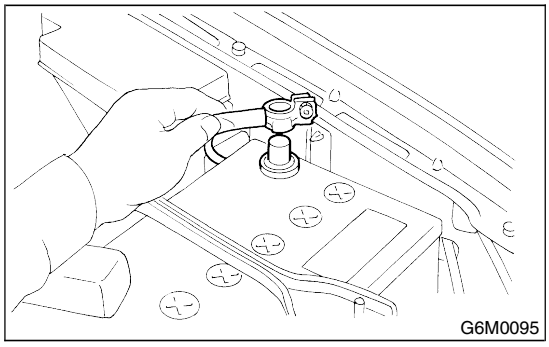
B: CAUTION S162001A03

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

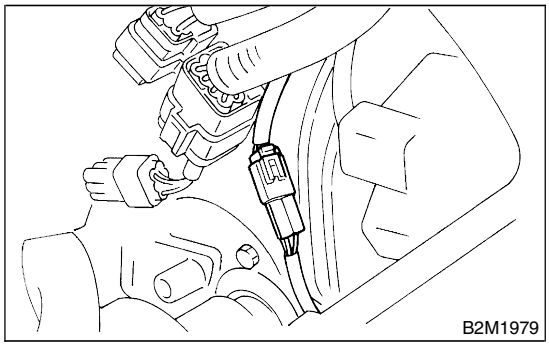
2. Front Exhaust Pipe S162065

A: REMOVAL S162065A18

1) Disconnect battery ground cable.

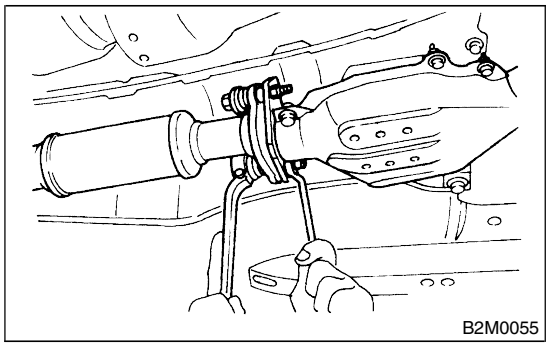

G6M0095

2) Disconnect front oxygen sensor connector. (With catalytic converter)


B2M1979

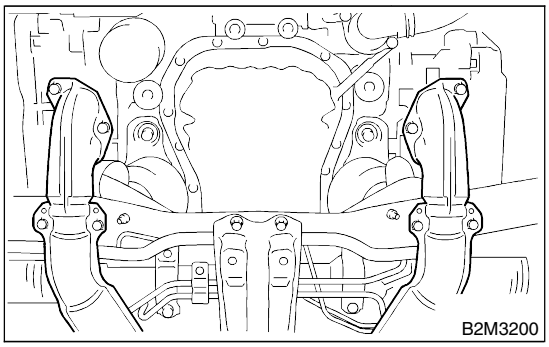
3) Lift-up the vehicle.
4) Remove under cover. <Ref. to EI-11, REMOVAL, Front Under Cover.>
5) Separate front and center exhaust pipe assembly from rear exhaust pipe.

WARNING:
Be careful, exhaust pipe is hot.

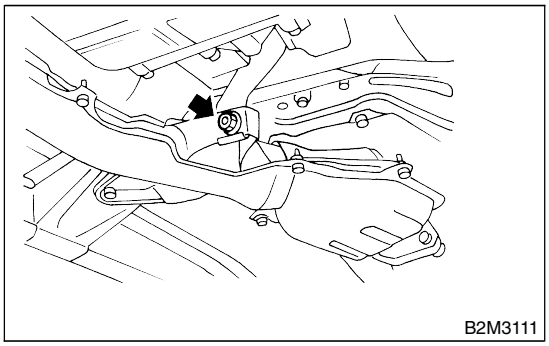

B2M0055

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

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


B2M3200

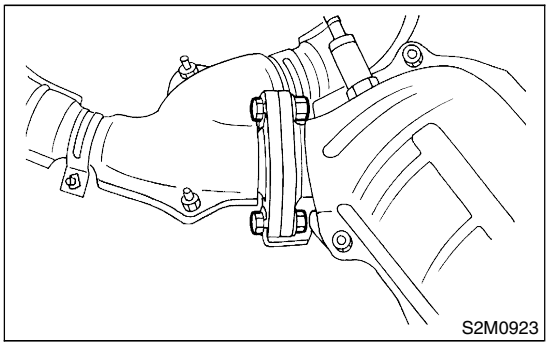
7) Remove bolt which installs front and center exhaust pipe assembly to hanger bracket.


B2M3111

8) 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.**

9) Separate front exhaust pipe from center exhaust pipe.

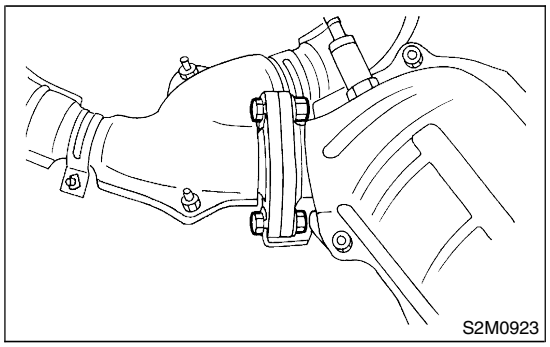

S2M0923

B: INSTALLATION S162065A11

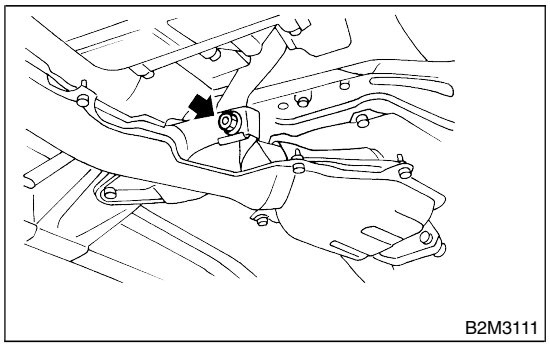
1) Install front exhaust pipe to center exhaust pipe.

CAUTION:
Replace gaskets with new ones.

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

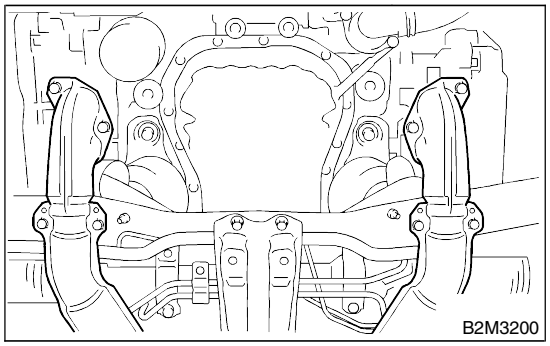

S2M0923

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

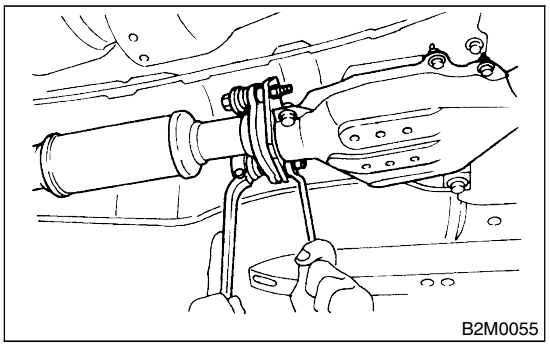
4) Tighten bolts which hold front exhaust pipe onto cylinder heads.

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


B2M3200

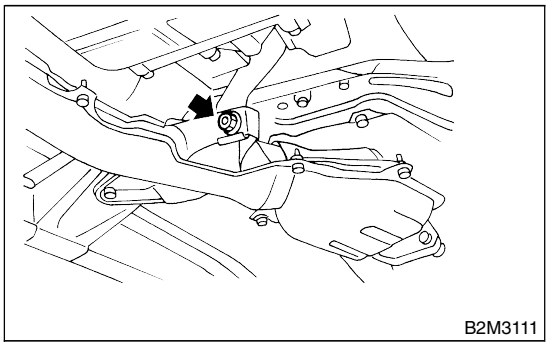
5) Tighten bolts which install front and center exhaust pipe assembly to rear exhaust pipe.

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

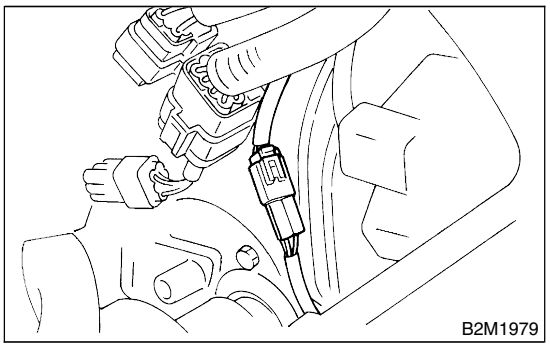

B2M0055

6) Tighten bolt which holds front and center exhaust pipe assembly to hanger bracket.

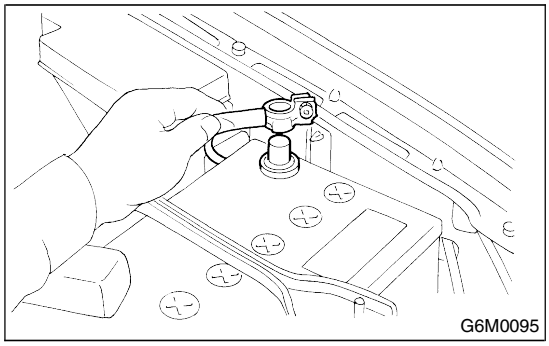
Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)


B2M3111

7) Install under cover. <Ref. to EI-11, INSTALLATION, Front Under Cover.>
8) Lower the vehicle.
9) Connect front oxygen sensor connector. (With catalytic converter)


B2M1979

10) Connect battery ground cable.



C: INSPECTION *S162065A10*

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 S162067

A: REMOVAL S162067A18

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(SOHCw/oOBD)-6 REMOVAL, Front Exhaust Pipe.>

B: INSTALLATION S162067A11

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(SOHCw/oOBD)-7 INSTALLATION, Front Exhaust Pipe.>

C: INSPECTION S162067A10

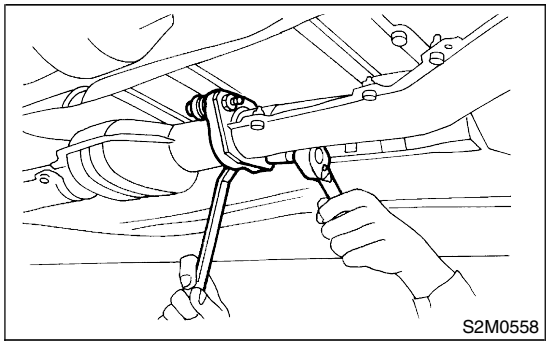
1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

4. Rear Exhaust Pipe S162068

A: REMOVAL S162068A18

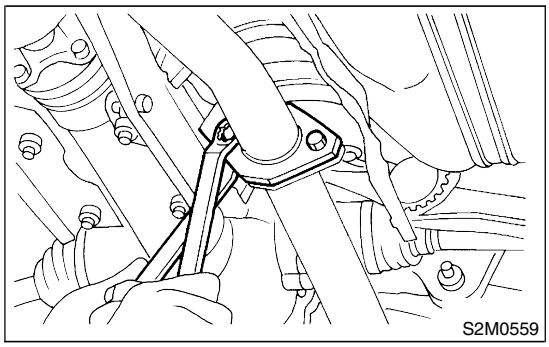
1) Separate rear exhaust pipe from center exhaust pipe.

CAUTION:
Be careful, exhaust pipe is hot.



2) Separate rear exhaust pipe from muffler.

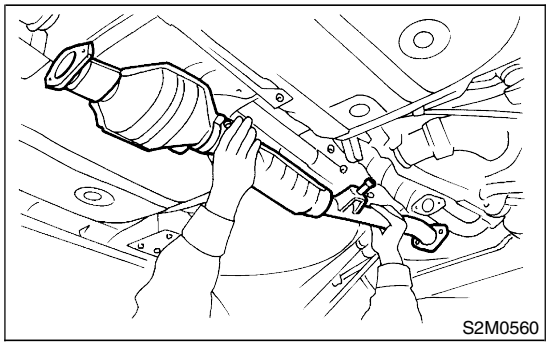
CAUTION:
Be careful not to pull down rear exhaust pipe.



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)



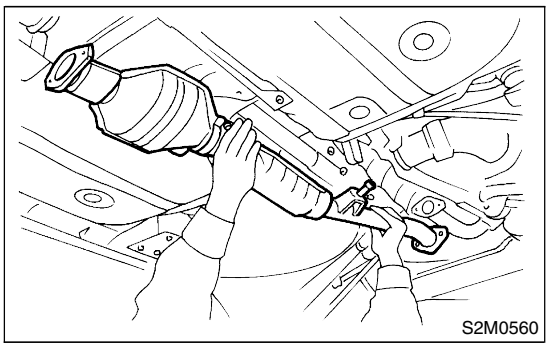
B: INSTALLATION S162068A11

CAUTION:
Replace gaskets with new ones.

1) Install rear exhaust pipe bracket to rubber cushion.

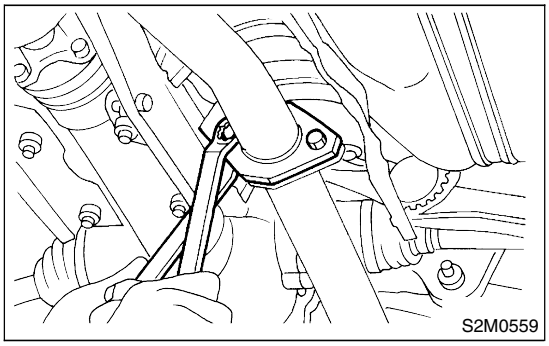
NOTE:
To facilitate removal, apply a coat of SUBARU CRC to mating area of rubber cushion in advance.

SUBARU CRC (Part No. 004301003)



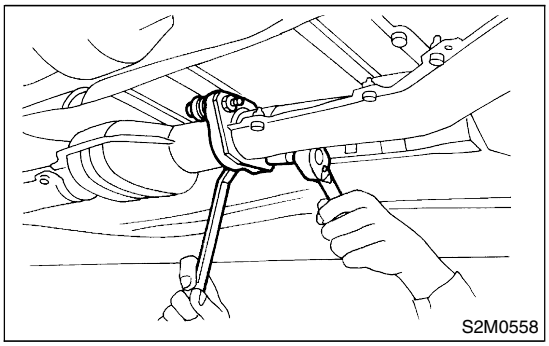
2) Install rear exhaust pipe to muffler.

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 S162068A10

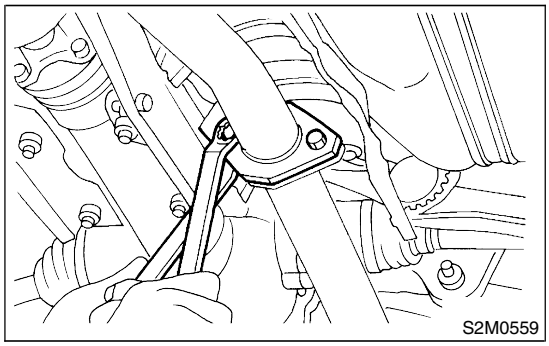
1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.
3) Make sure the cushion rubber is not worn or cracked.

5. Muffler S162066

A: REMOVAL S162066A18

1) Separate muffler from rear exhaust pipe.

CAUTION:
Be careful, exhaust pipe is hot.

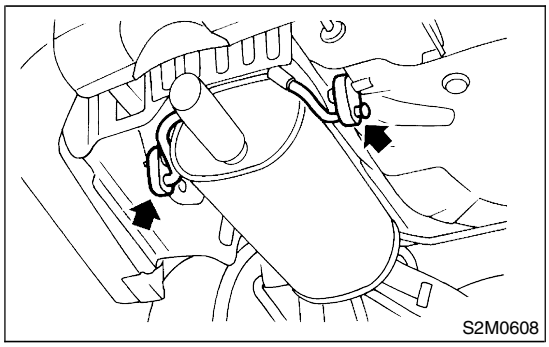

S2M0559

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.

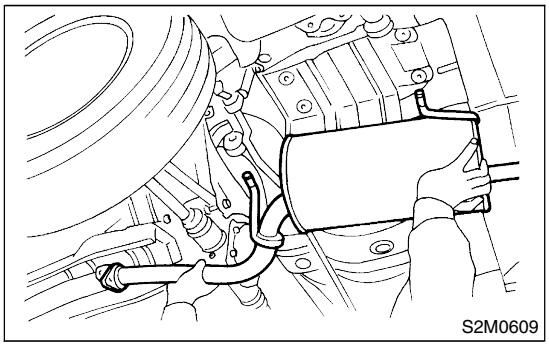
SUBARU CRC (Part No. 004301003)


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)

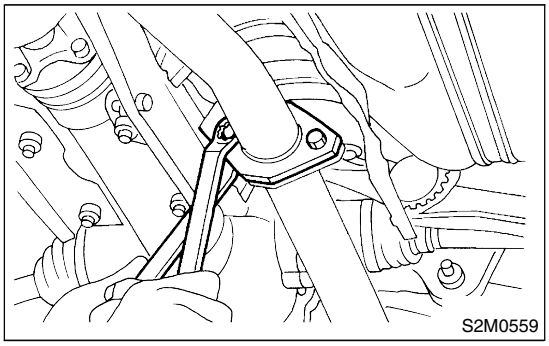

S2M0609

B: INSTALLATION S162066A11

Install in the reverse order of removal.

CAUTION:
Replace gasket with a new one.

Tightening torque:
48 N·m (4.9 kgf-m, 35.4 ft-lb)


S2M0559

C: INSPECTION S162066A10

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.

IGNITION

IG(SOHCw/oOBD)

Page

1. General Description....2
2. Spark Plug....5
3. Ignition Coil and Ignitor Assembly....9
4. Spark Plug Cord....11

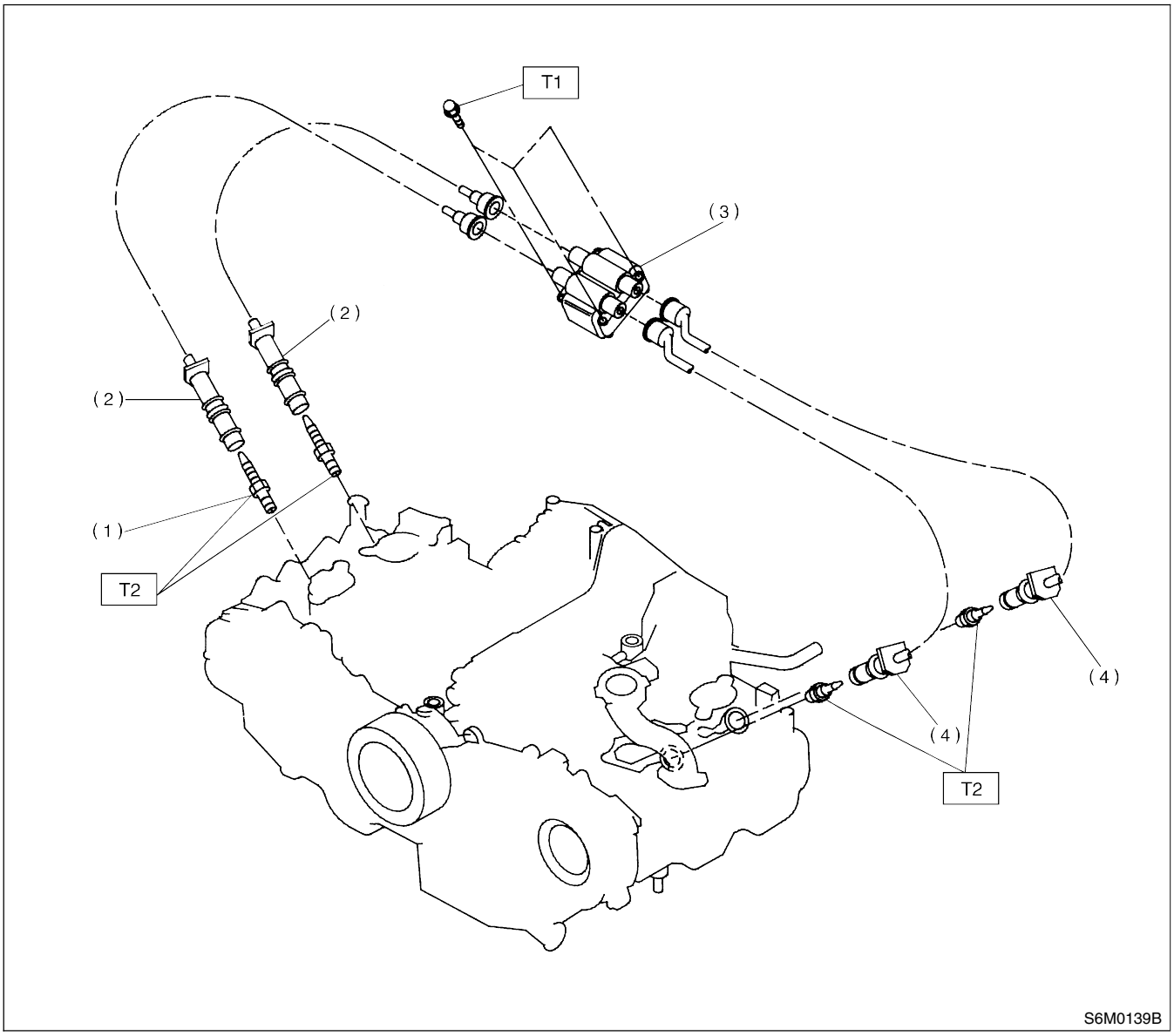
1. General Description S161001

A: SPECIFICATIONS S161001E49

Item		Designation
Ignition coil and ignitor assembly	Model	CM12–100B
	Manufacturer	HITACHI
	Primary coil resistance	0.7 Ω±10%
	Secondary coil resistance	13.0 kΩ±20%
	Insulation resistance between primary terminal and case	More than 10 MΩ
Spark plug	Type and manufacturer	BKR6E* ..... NGK RC10YC4** ..... CHAMPION BKR5E-11** ..... NGK (Alternate)
	Thread size mm	14, P = 1.25
	Spark gap mm (in)	0.7 — 0.8 mm (0.028 — 0.031 in)* 1.0 — 1.1 mm (0.039 — 0.043 in)**

*: Without catalytic converter
**: With catalytic converter

B: COMPONENT S161001A05



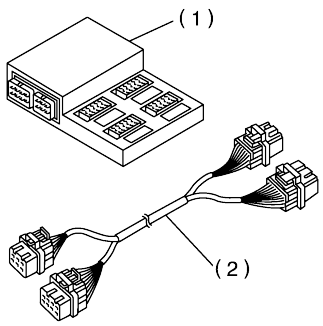
(1) Spark plug
(2) Spark plug cord (#1, #3)
(3) Ignition coil and ignitor ASSY
(4) Spark plug cord (#2, #4)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 21 (2.1, 15)

C: CAUTION S161001A03

- 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.

D: PREPARATION TOOL S161001A17

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 S2M2137A	498307600	CHECK BOARD KIT	Troubleshooting for engine electrical systems (1) CHECK BOARD: 498307610 (2) CHECK BOARD ADAPTER: 498307620

2. Spark Plug S161003

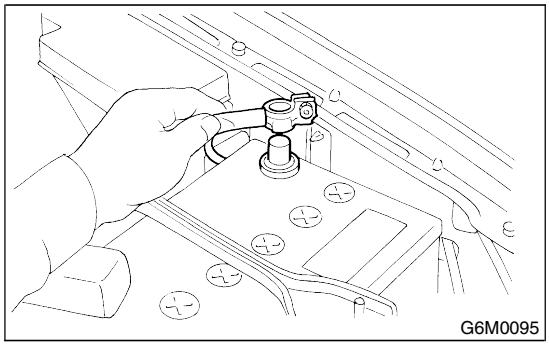
A: REMOVAL S161003A18

CAUTION:
All spark plugs installed on an engine, must be of the same heat range.

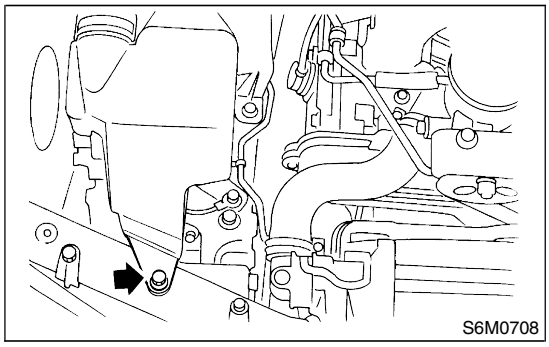
Spark plug:
With catalyst model: CHAMPION RC10YC4
Without catalyst model: NGK BKR6E

1. RH SIDE S161003A1805

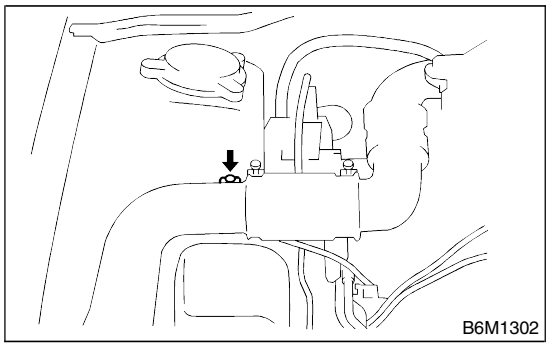
1) Disconnect battery ground cable.


G6M0095

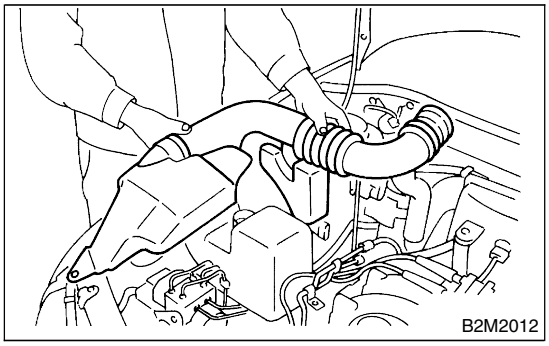
2) Remove air intake duct and resonator chamber.
(1) Remove bolt which installs air intake duct on the front side of body.


S6M0708

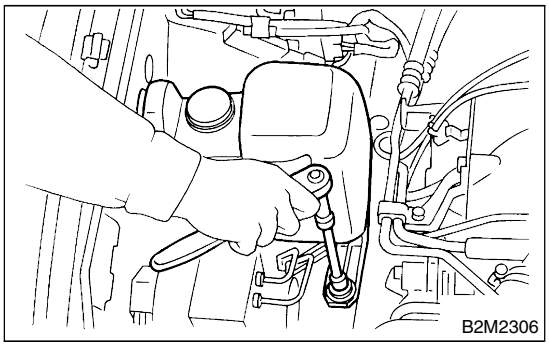
(2) Remove bolt which installs air intake duct on body.


B6M1302

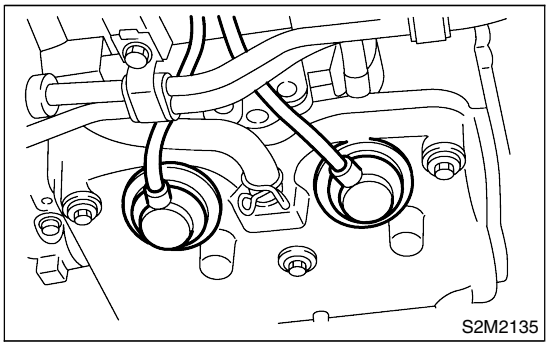
(3) Remove air intake duct as a unit.


B2M2012

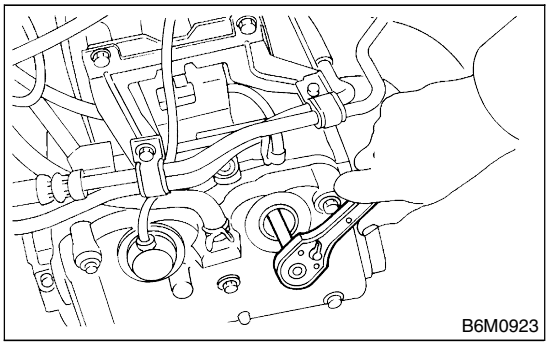
(4) Remove resonator chamber.


B2M2306

3) Remove spark plug cords by pulling boot, not cord itself.

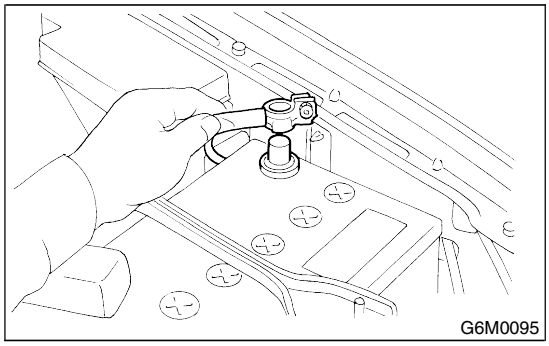

S2M2135

4) Remove spark plugs with the spark plug socket.

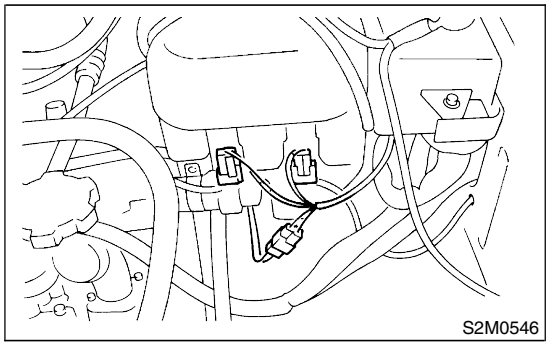

B6M0923

2. LH SIDE S161003A1806

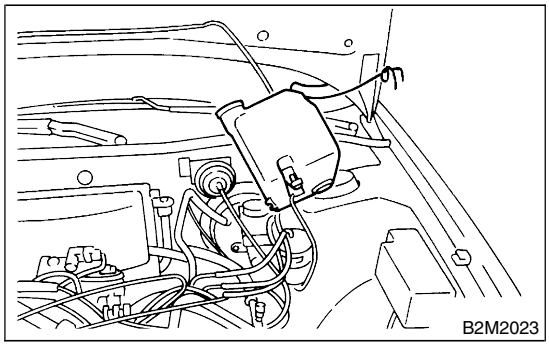
1) Disconnect battery ground cable.


G6M0095

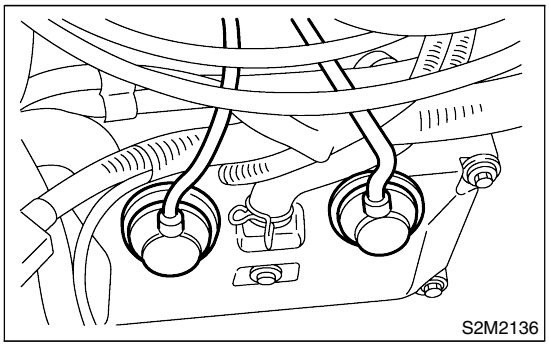
2) Disconnect washer motor connector.


S2M0546

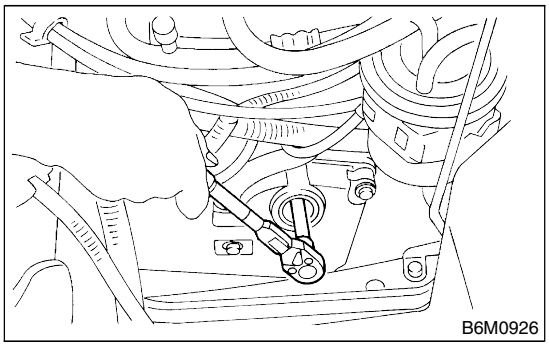
3) Disconnect rear window glass washer hose from washer motor, then plug connection with a suitable cap.
4) Remove the two bolts which hold the washer tank, then take the tank away from the working area.


B2M2023

5) Remove spark plugs cord by pulling boot, not cord itself.


S2M2136

6) Remove spark plug with the spark plug socket.


B6M0926

B: INSTALLATION S161003A11

1. RH SIDE S161003A1105

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):
32 N·m (3.3 kgf-m, 24 ft-lb)

2. LH SIDE S161003A1106

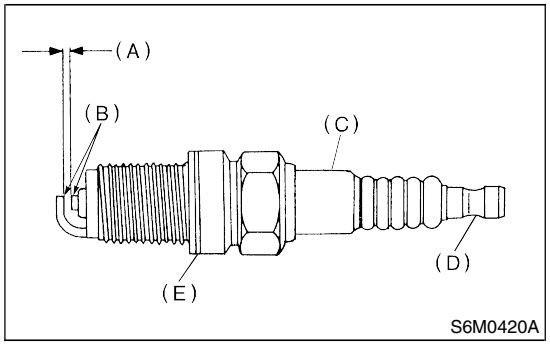
Install in the reverse order of removal.

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.

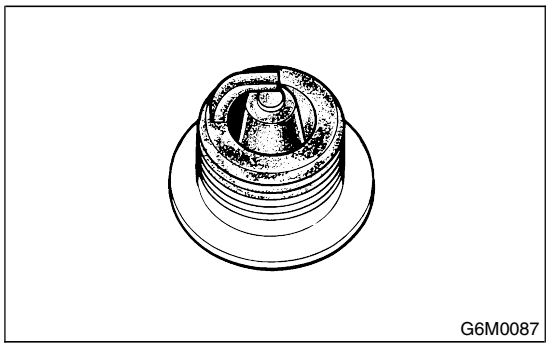
C: INSPECTION S161003A10

Check electrodes and inner and outer porcelain of plugs, noting the type of deposits and the degree of electrode erosion.

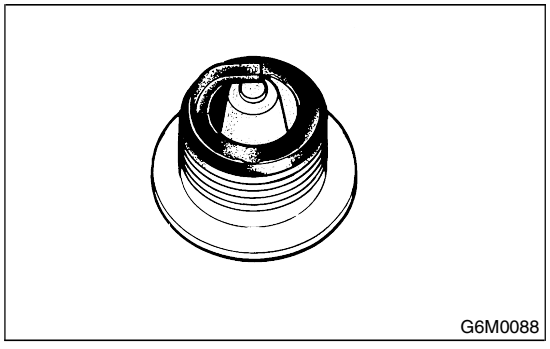


(A) Electrode gap
(B) Carbon accumulation or wear
(C) Cracks
(D) Damage
(E) Damaged gasket

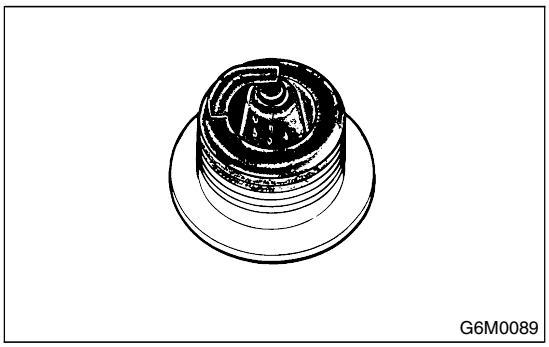
1) Normal
Brown to grayish-tan deposits and slight electrode wear indicate correct spark plug heat range.



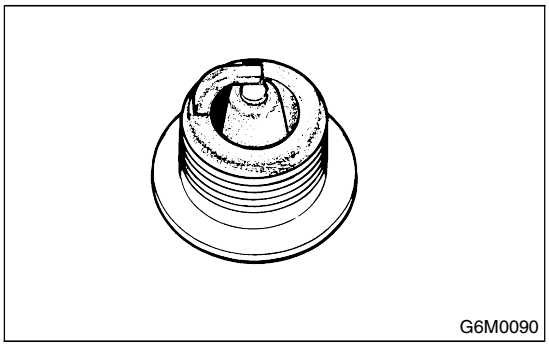
2) Carbon fouled
Dry fluffy carbon deposits on insulator and electrode are mostly caused by slow speed driving in city, weak ignition, too rich fuel mixture, dirty air cleaner, etc.
It is advisable to replace with plugs having hotter heat range.



3) Oil fouled
Wet black deposits show excessive oil entrance into combustion chamber through worn rings and pistons or excessive clearance between valve guides and stems. If same condition remains after repair, use a hotter plug.



4) Overheating
White or light gray insulator with black or gray brown spots and bluish burnt electrodes indicate engine overheating. Moreover, the appearance results from incorrect ignition timing, loose spark plugs, wrong selection of fuel, hotter range plug, etc. It is advisable to replace with plugs having colder heat range.



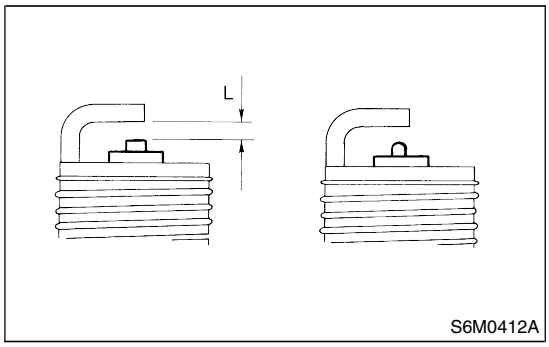
D: CLEANING S161003E56

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 S161003A01

Correct it if the spark plug gap is measured with a gap gauge, and it is necessary.

Spark plug gap: L
With catalyst:
1.0 — 1.1 mm (0.039 — 0.043 in)
Without catalyst:
0.7 — 0.8 mm (0.028 — 0.031 in)

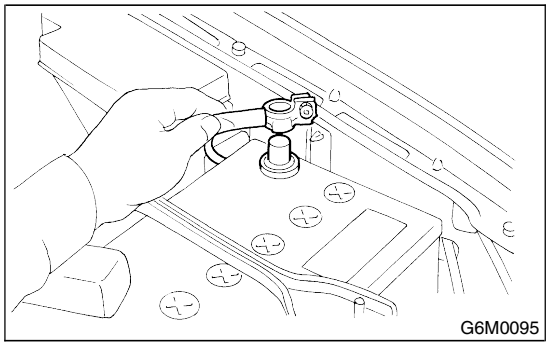


NOTE:
Replace with new spark plug if this area is worn to "ball" shape.

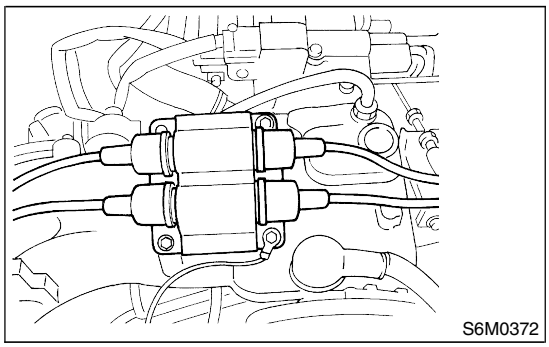
3. Ignition Coil and Ignitor Assembly S161015

A: REMOVAL S161015A18

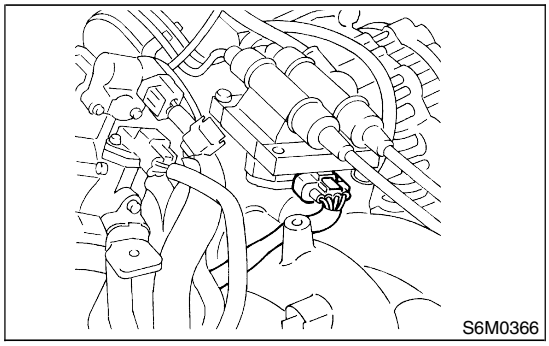
1) Disconnect battery ground cable.


G6M0095

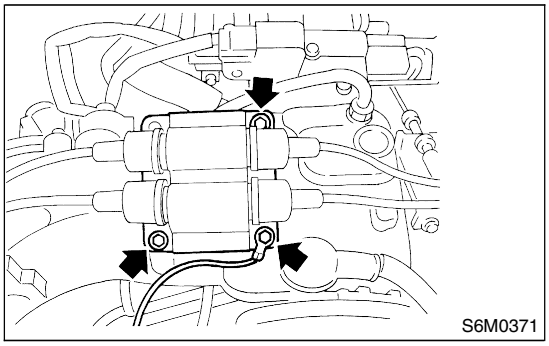
2) Disconnect spark plug cords from ignition coil and ignitor assembly.


S6M0372

3) Disconnect connector from ignition coil and ignitor assembly.


S6M0366

4) Remove ignition coil and ignitor assembly.

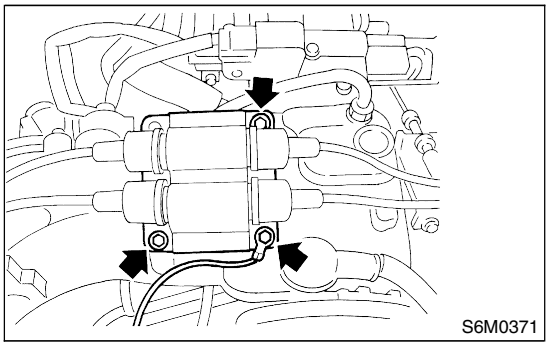

S6M0371

B: INSTALLATION S161015A11

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.

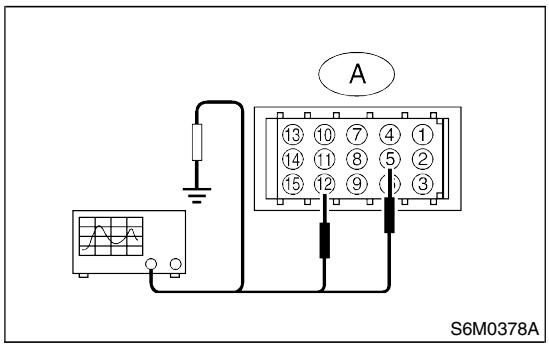

S6M0371

C: INSPECTION S161015A10

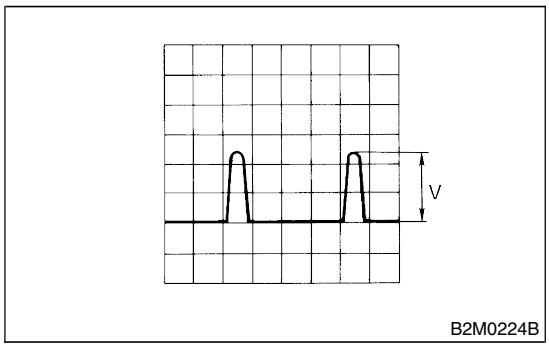
Using oscilloscope and accurate tester, inspect the following items, and replace if defective.
- Ignitor input signal
- Secondary coil resistance
- Poor contact in ignition coil and ignitor assembly connector

1) Turn ignition switch to OFF.
2) Disconnect connector from ECM, then connect ST. <Ref. to EN(SOHCw/oOBD)-23, HOW TO CHECK I/O SIGNAL FOR ECM, Engine Control Module (ECM) I/O Signal.>
ST 498307600 CHECK BOARD KIT
3) Turn ignition switch to ON.
4) Measure voltage between ignition coil and ignition assembly and body.

Connector & terminal:
(A) No. 5 — Engine ground
(A) No. 12 — Engine ground



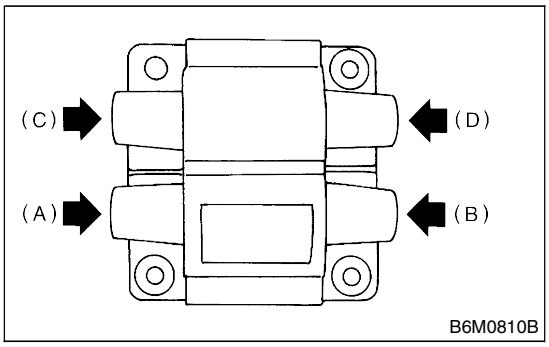
Specified voltage: 3 — 4 V



5) Turn ignition switch to OFF.
6) Disconnect connector from ignition coil and ignitor assembly.
7) Remove spark plug cords.
8) Measure resistance between spark plug cord contact portions to check secondary coil.

Terminals / Specified resistance:
(A) — (B) / 13.0 ±2.6 kΩ
(C) — (D) / 13.0 ±2.6 kΩ

CAUTION:
If the resistance is extremely low, this indicates the presence of a ground short circuit.



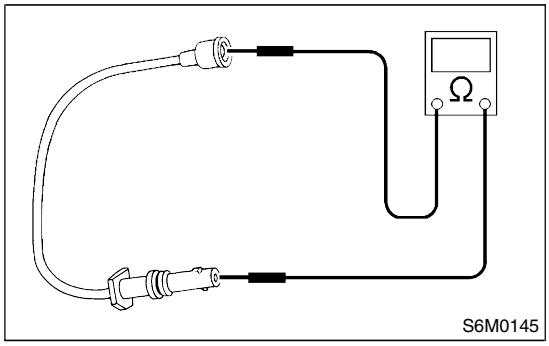
9) Check poor contact in ignition coil and ignitor assembly connector.

4. Spark Plug Cord S161014

A: INSPECTION S161014A10

Check for:
1) Damage to cords, deformation, burning or rust formation of terminals
2) Resistance values of cords

Resistance value:
5.24 — 12.23 kΩ



SPARK PLUG CORD

SPARK PLUG CORD

MEMO:

SPARK PLUG CORD

ENGINE (DIAGNOSTICS)

EN(SOHCw/oOBD)

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1. Basic Diagnostic Procedure

S068501

A: PROCEDURE S068501E45

1. WITH SUBARU SELECT MONITOR S068501E4501

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(SOHCw/oOBD)-4 CHECK, Check List for Interview.> 2) Start the engine.	Does the engine start?	Go to step **2**.	Inspection using “Diagnostics for Engine Starting Failure”. <Ref. to EN(SOHCw/oOBD)-47 Diagnostics for Engine Starting Failure.>
2	**CHECK ILLUMINATION OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL).** <Ref. to EN(SOHCw/oOBD)-33 ACTIVATION OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL), Engine Malfunction Indicator Lamp (MIL).>	Does MIL illuminate?	Go to step **3**.	Inspection using “General Diagnostic Table”. <Ref. to EN(SOHCw/oOBD)-113 INSPECTION, General Diagnostic Table.>
3	**CHECK INDICATION OF DTC ON DISPLAY.** 1) Turn ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn ignition switch to ON and the Subaru Select Monitor switch to ON. 4) Read DTC on the Subaru Select Monitor. <Ref. to EN(SOHCw/oOBD)-27 WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code.>	Does the Subaru Select Monitor indicate DTC? <Ref. to EN(SOHCw/oOBD)-65 LIST, List of Diagnostic Trouble Code (DTC).>	Record diagnostic trouble code. Repair the trouble cause. <Ref. to EN(SOHCw/oOBD)-68 Diagnostic Procedure with 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(SOHCw/oOBD)-33 Engine Malfunction Indicator Lamp (MIL).>
4	**PERFORM THE DIAGNOSIS.** 1) Perform the clear memory mode. <Ref. to EN(SOHCw/oOBD)-31 OPERATION, Clear Memory Mode.> 2) Perform the inspection mode. <Ref. to EN(SOHCw/oOBD)-29 OPERATION, Inspection Mode.>	Does the Subaru Select Monitor indicate DTC? <Ref. to EN(SOHCw/oOBD)-65 LIST, List of Diagnostic Trouble Code (DTC).>	Record diagnostic trouble code. Repair the trouble cause. <Ref. to EN(SOHCw/oOBD)-68 Diagnostic Procedure with Diagnostic Trouble Code (DTC).> Go to step **4**.	Complete the diagnosis.

2. WITHOUT SUBARU SELECT MONITOR

S068501E4502

CAUTION:
• Check the connector while it is connected unless specified otherwise.
• Be sure to check again from the beginning in order to prevent secondary trouble caused by repair work.

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(SOHCw/oOBD)-4 CHECK, Check List for Interview.> 2) Start the engine.	Does the engine start?	Go to step **2**.	Inspection using "Diagnostics for Engine Starting Failure". <Ref. to EN(SOHCw/oOBD)-47 Diagnostics for Engine Starting Failure.>
2	**CHECK ILLUMINATION OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL).** <Ref. to EN(SOHCw/oOBD)-33 ACTIVATION OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL), Engine Malfunction Indicator Lamp (MIL).>	Does MIL illuminate?	Go to step **3**.	Inspection using "9. General Diagnostic Table". <Ref. to EN(SOHCw/oOBD)-113 INSPECTION, General Diagnostic Table.>
3	**CHECK INDICATION OF DTC ON MIL.** 1) Perform the read diagnostic trouble code (read memory mode). <Ref. to EN(SOHCw/oOBD)-27 WITHOUT SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code.> 2) Read DTC on MIL.	Does the MIL indicate DTC? <Ref. to EN(SOHCw/oOBD)-65 LIST, List of Diagnostic Trouble Code (DTC).>	Repair the trouble cause. Go to step **4**.	Repair the related parts. NOTE: If DTC is not shown on MIL although the MIL illuminates, perform diagnostics of MIL (CHECK ENGINE malfunction indicator lamp) circuit or combination meter. <Ref. to EN(SOHCw/oOBD)-33 Engine Malfunction Indicator Lamp (MIL).>
4	**PERFORM THE DIAGNOSIS.** 1) Perform the clear memory mode. <Ref. to EN(SOHCw/oOBD)-31 OPERATION, Clear Memory Mode.> 2) Perform the inspection mode. <Ref. to EN(SOHCw/oOBD)-29 OPERATION, Inspection Mode.>	Does the MIL indicate DTC? <Ref. to EN(SOHCw/oOBD)-65 LIST, List of Diagnostic Trouble Code (DTC).>	Repair the trouble cause. Go to step **4**.	Complete the diagnosis.

2. Check List for Interview S068502

A: CHECK S068502A04

1. CHECK LIST NO. 1 S068502A0401

Check the following items when problem has occurred.

NOTE:
Use copies of this page for interviewing customers.

Customer's name		Engine no.	
Date of sale		Fuel brand	
Date of repair		Odometer reading	km
Vin no.			miles
Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others:		
Outdoor temperature	°F (°C)		
	☐ Hot ☐ Warm ☐ Cool ☐ Cold		
Place	☐ Highway ☐ Suburbs ☐ Inner city ☐ Uphill ☐ Downhill ☐ Rough road ☐ Others:		
Engine temperature	☐ Cold ☐ Warming-up ☐ After warming-up ☐ Any temperature ☐ Others:		
Engine speed	rpm		
Vehicle speed	MPH		
Driving conditions	☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH)		
Headlight	☐ ON/☐ OFF	Rear defogger	☐ ON/☐ OFF
Blower	☐ ON/☐ OFF	Radio	☐ ON/☐ OFF
A/C compressor	☐ ON/☐ OFF	CD/Cassette	☐ ON/☐ OFF
Cooling fan	☐ ON/☐ OFF	Car phone	☐ ON/☐ OFF
Front wiper	☐ ON/☐ OFF	CB	☐ ON/☐ OFF
Rear wiper	☐ ON/☐ OFF		

2. CHECK LIST NO. 2 S068502A0402

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 ☐ 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 S068001

A: CAUTION S068001A03

1) Airbag system wiring harness is routed near the engine control module (ECM), main relay and fuel pump relay.

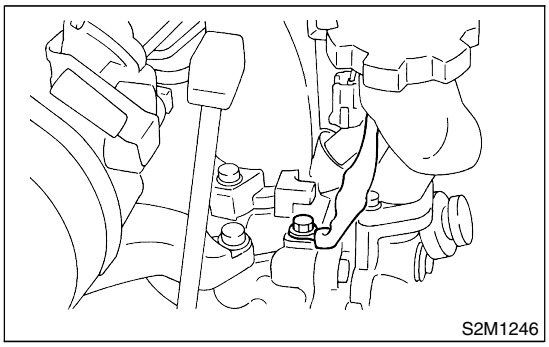
CAUTION:
• All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
• Be careful not to damage Airbag system wiring harness when servicing the engine control module (ECM), transmission control module (TCM), main relay and fuel pump relay.

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.

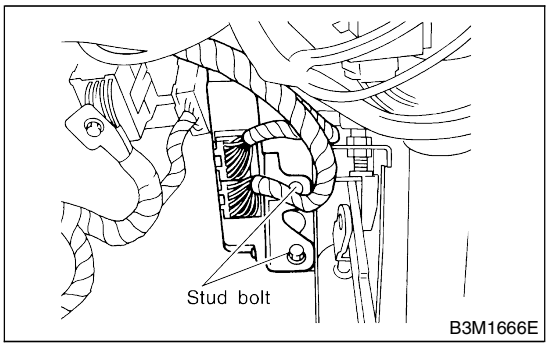
CAUTION:
When replacing ECM, be careful not to use the wrong spec. ECM to avoid any damage on fuel injection system.

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 engine grounding terminal or engine proper as the grounding point to the body when measuring voltage and resistance in the engine compartment.


S2M1246

9) Use TCM mounting stud bolts at the body head grounding point when measuring voltage and resistance inside the passenger compartment.



B3M1666E

10) Every MFI-related part is a precision part. Do not drop them.
11) 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 in the engine compartment.)
• 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.

12) 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.
13) 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.
14) 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.
15) 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).
16) 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 S068001A10

Before performing diagnostics, check the following items which might affect engine problems:

1. BATTERY S068001A1001

1) Measure battery voltage and specific gravity of electrolyte.

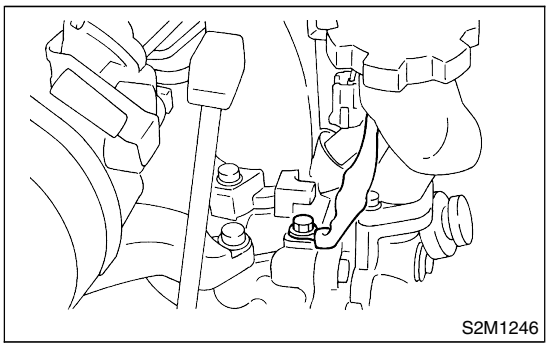
Standard voltage: 12 V

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 S068001A1002

Make sure the engine grounding terminal is properly connected to the engine.

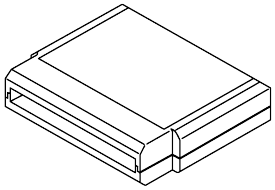

S2M1246

C: NOTE S068001A15

1. ENGINE AND EMISSION CONTROL SYSTEM S068001A1501

● 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.

D: PREPARATION TOOL S068001A17

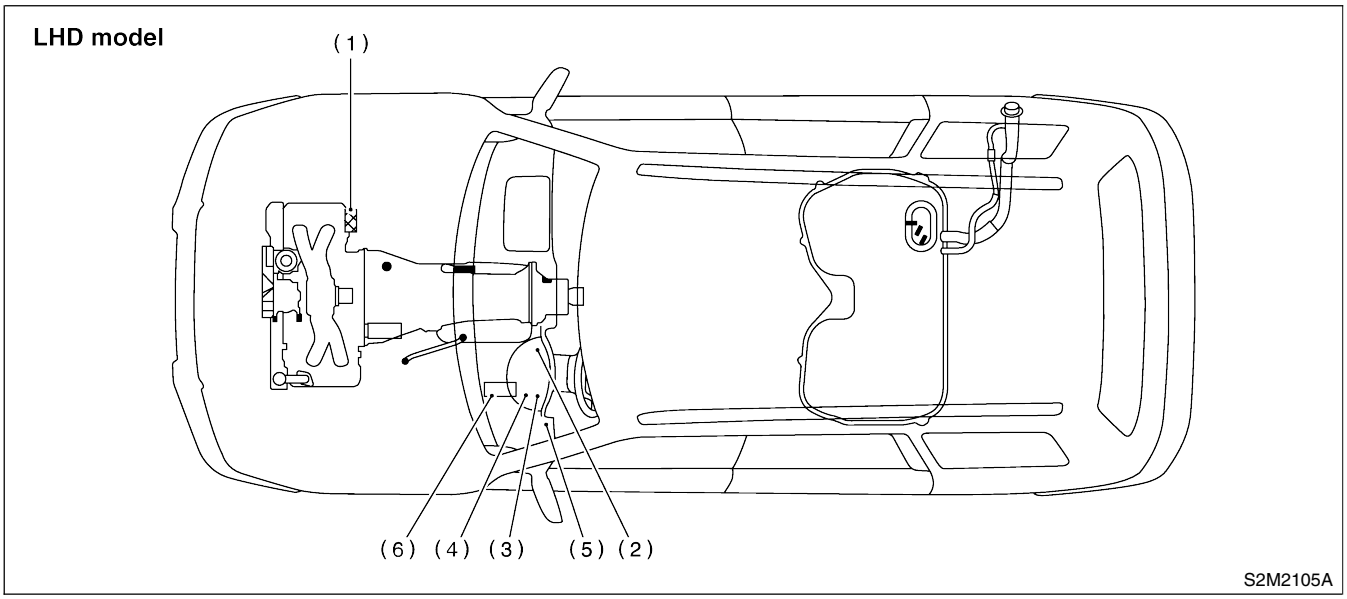
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
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 B2M3877	22771AA030	SELECT MONITOR KIT	Troubleshooting for electrical systems. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

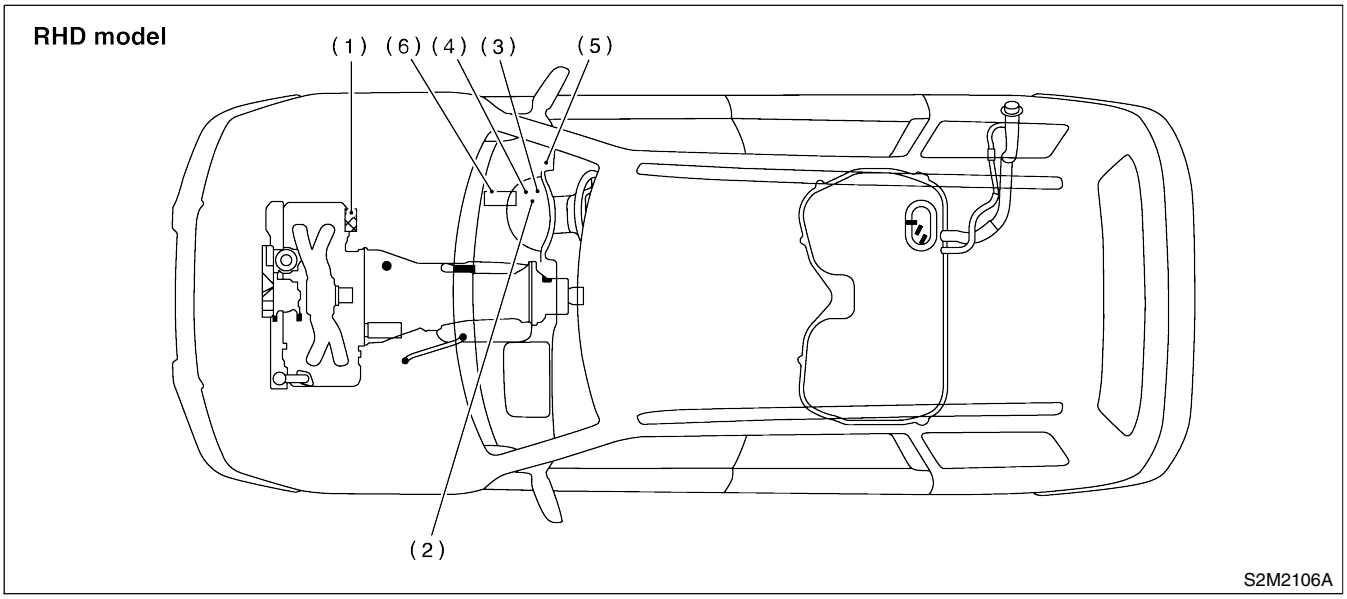
MEMO:

4. Electrical Components Location S068507

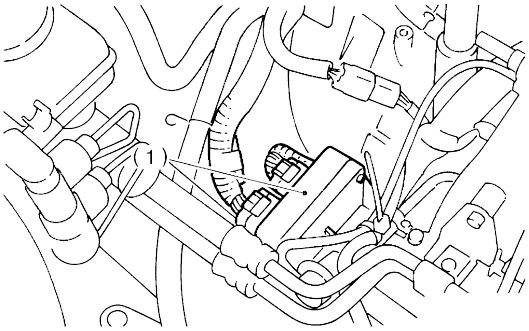
A: LOCATION S068507A13

1. MODULE S068507A1301

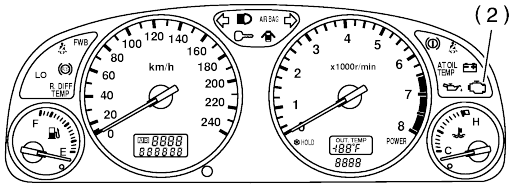




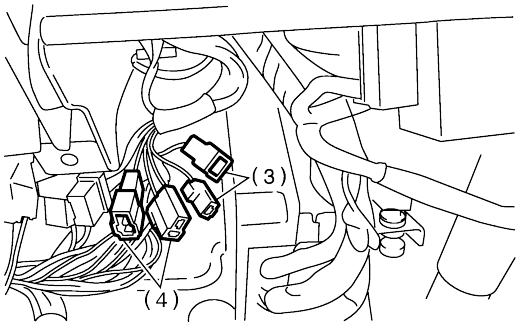
(1) Engine control module (ECM)
(2) CHECK ENGINE malfunction indicator lamp (MIL)
(3) Read memory connector
(4) Test mode connector
(5) Data link connector
(6) Transmission control module (TCM)



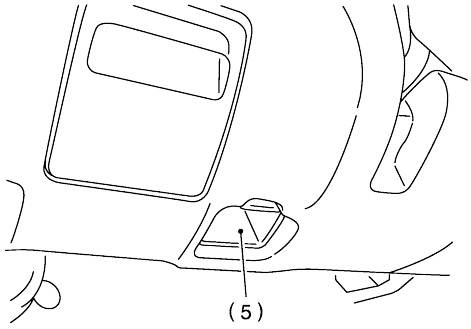
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S2M2107A

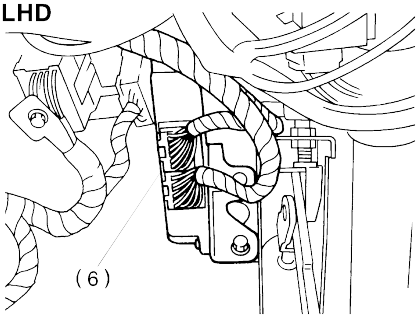


S2M2108A



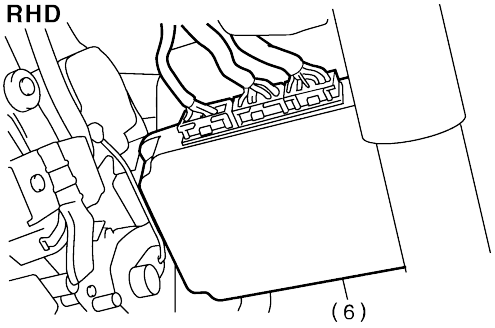
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LHD



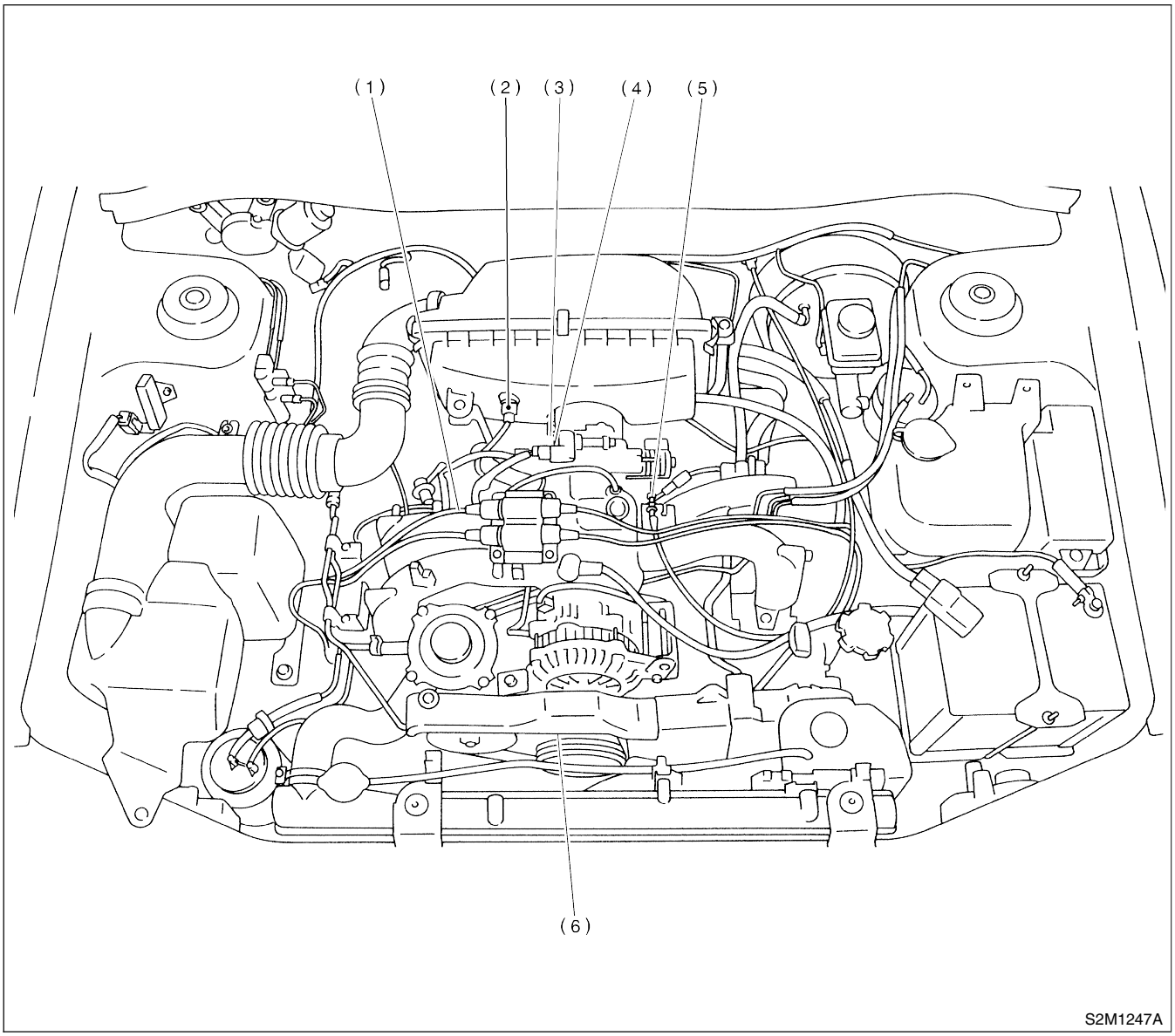
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RHD

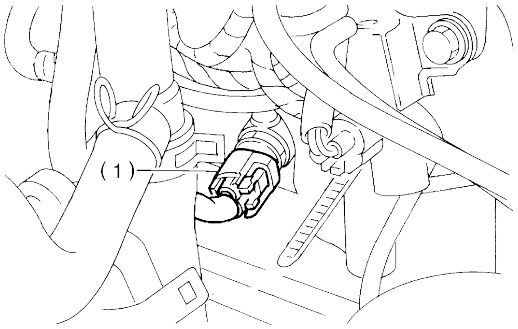


B3M1652C

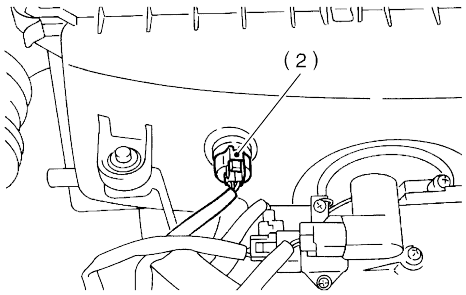
2. SENSOR S068507A1302



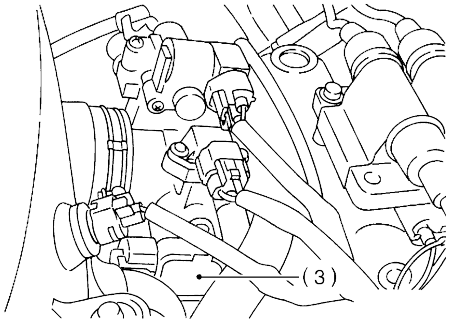
(1) Engine coolant temperature sensor
(2) Intake air temperature sensor
(3) Throttle position sensor
(4) Pressure sensor
(5) Knock sensor
(6) Crankshaft position sensor



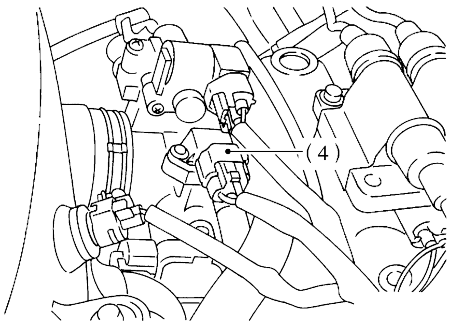
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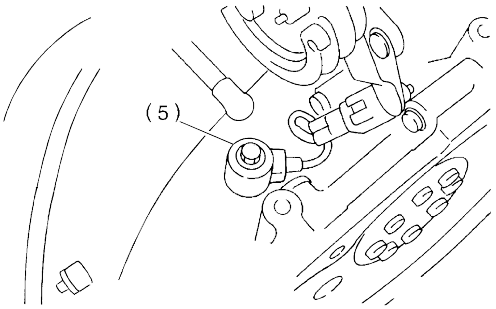
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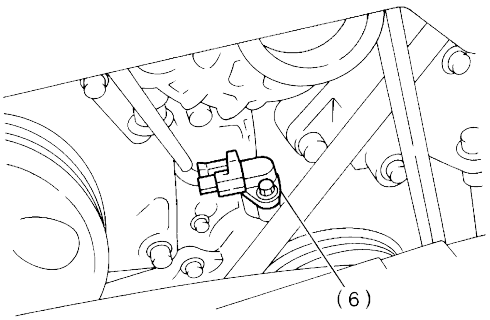
S2M1250A



S2M1250B



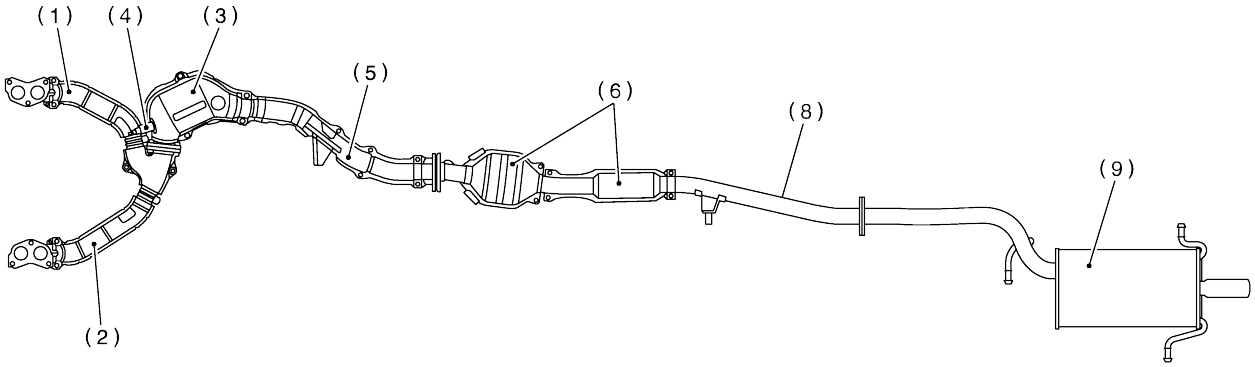
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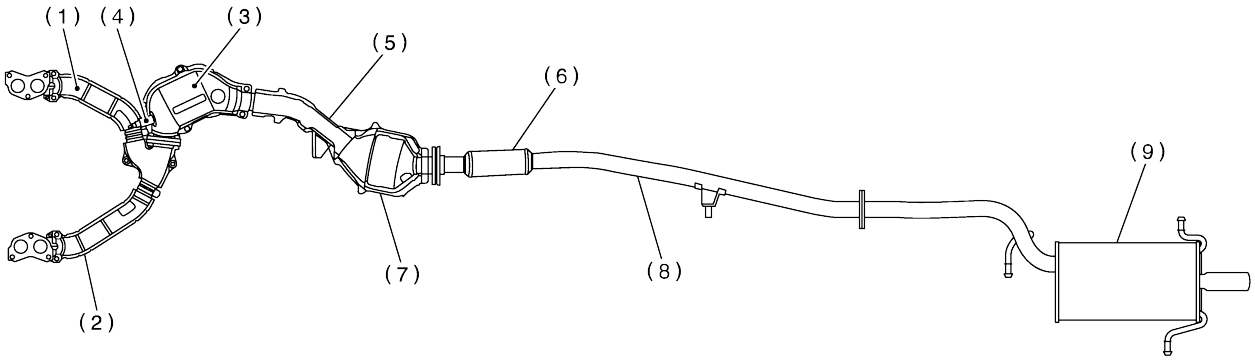
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ELECTRICAL COMPONENTS LOCATION

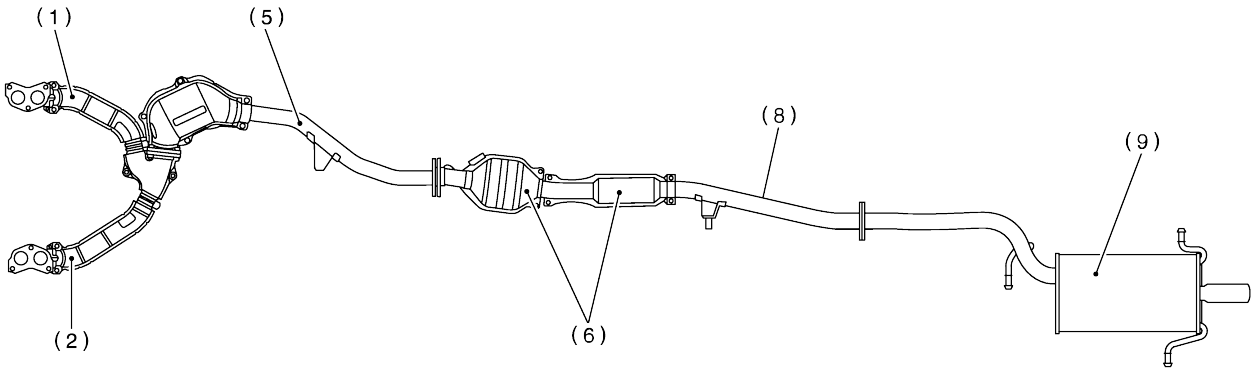
AUSTRALIA SPEC. VEHICLES



WITH CATALYTIC CONVERTER
(EXCEPT AUSTRALIA SPEC. VEHICLES)

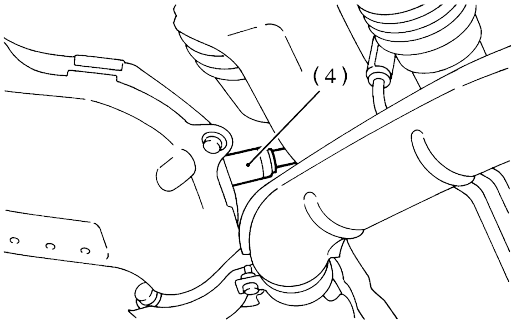


WITHOUT CATALYTIC CONVERTER

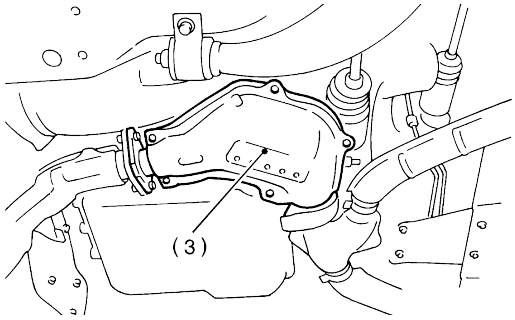


S2M2257A

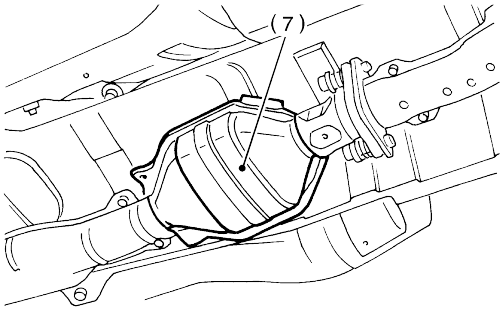
(1) Front exhaust pipe RH
(2) Front exhaust pipe LH
(3) Front catalytic converter
(4) Oxygen sensor
(5) Center exhaust pipe
(6) Resonance chamber
(7) Rear catalytic converter
(8) Rear exhaust pipe
(9) Muffler



S2M0264C

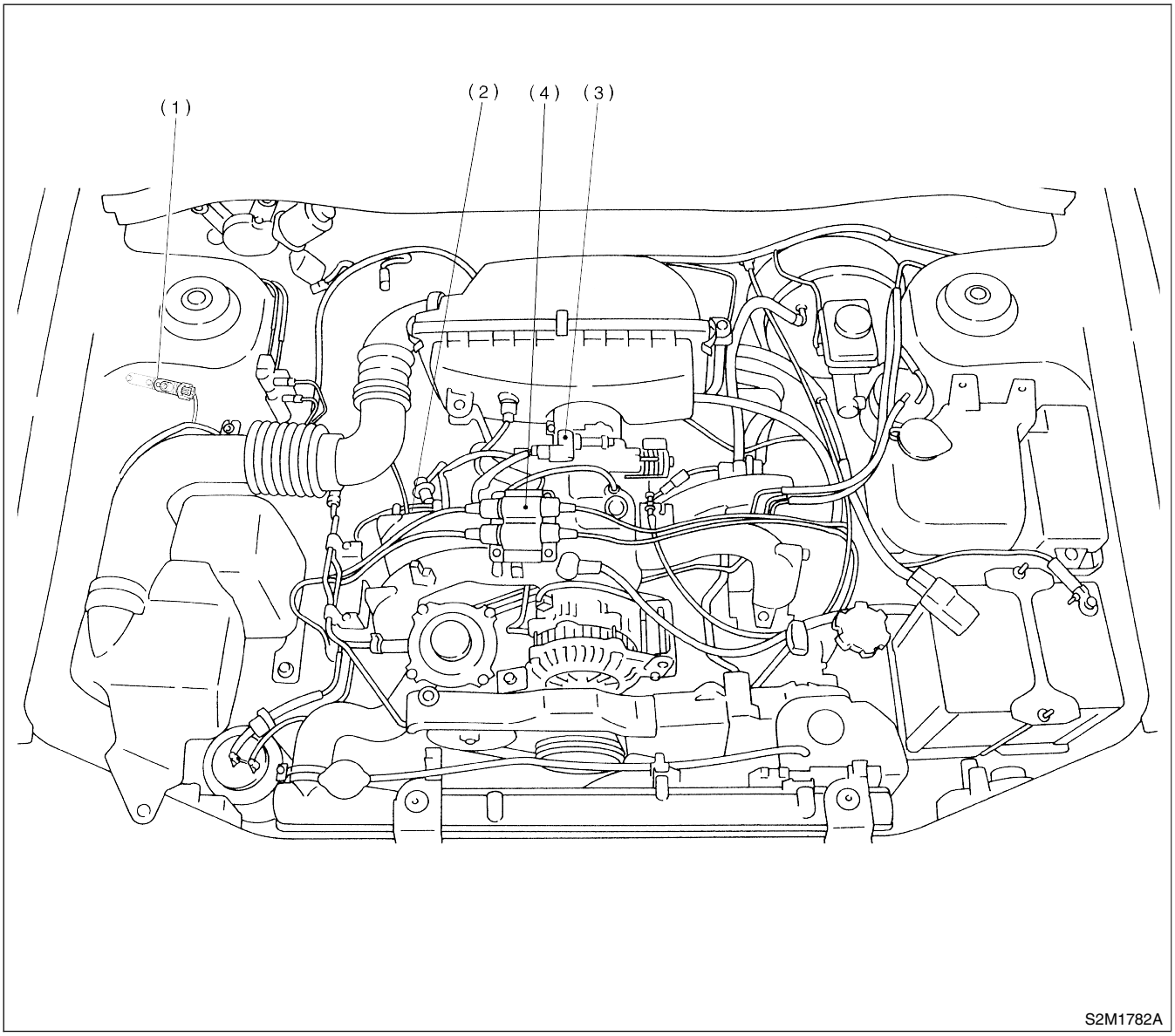


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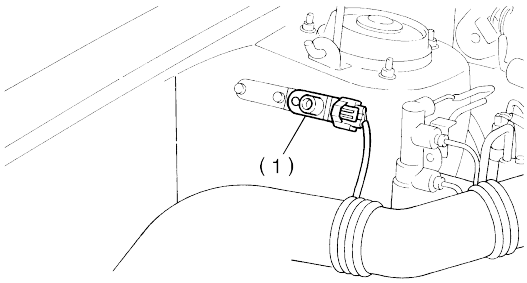


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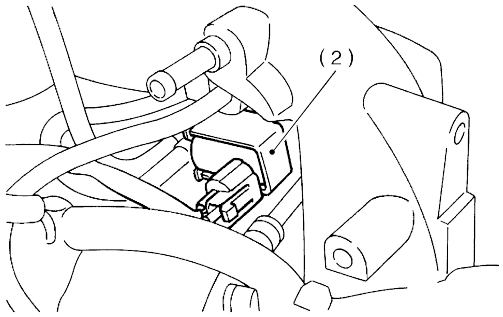
3. SOLENOID VALVE, EMISSION CONTROL SYSTEM PARTS AND IGNITION SYSTEM PARTS *S068507A1303*



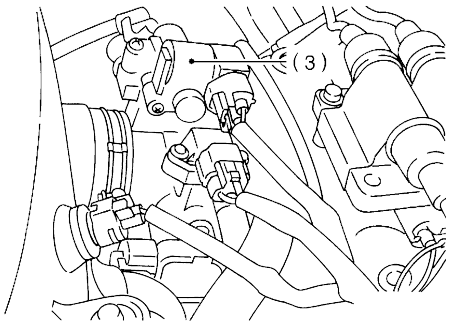
(1) CO resistor (General spec. vehicles)
(2) Purge control solenoid valve
(3) Idle air control solenoid valve
(4) Ignition coil and ignitor ASSY



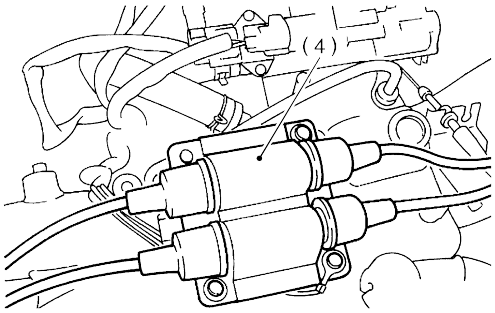
S2M1764A



S2M1252A



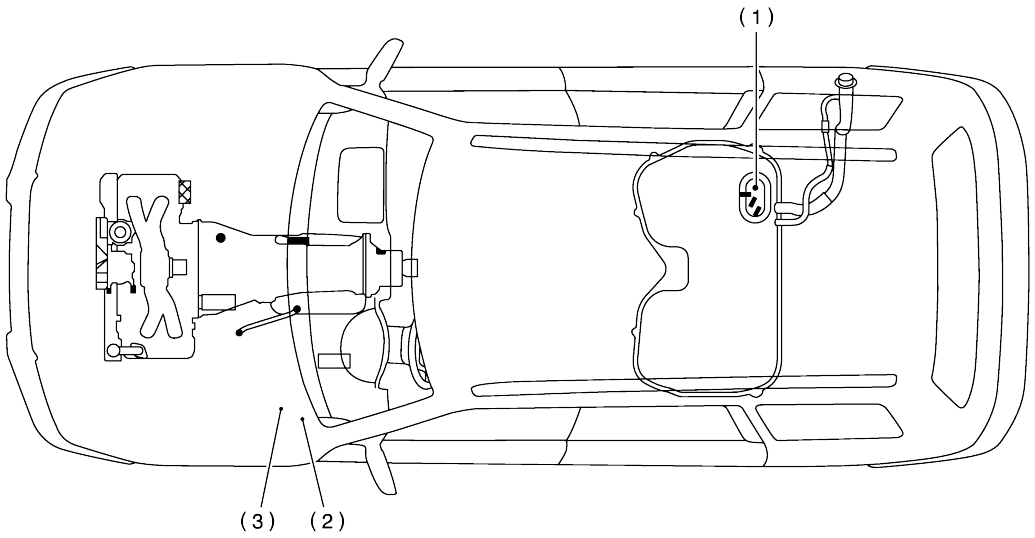
S2M1250C



S2M1253A

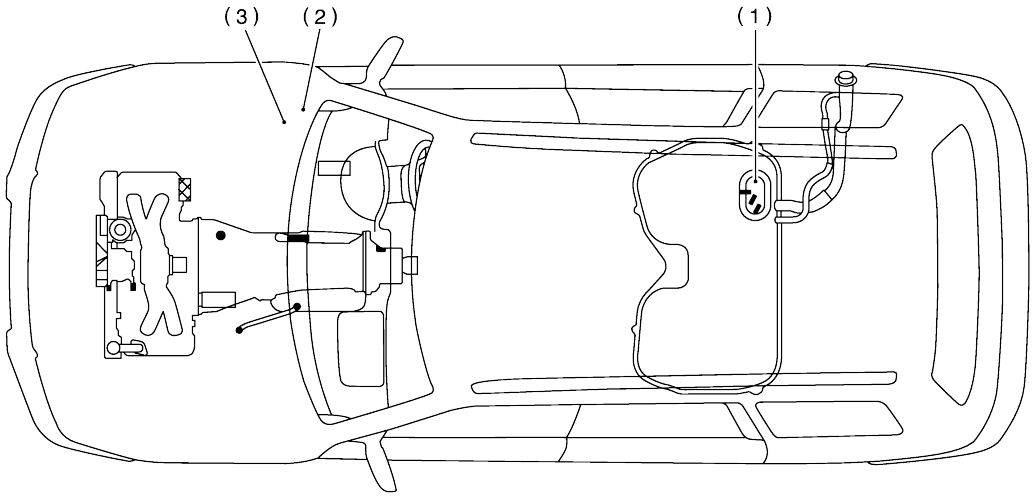
ELECTRICAL COMPONENTS LOCATION

LHD model



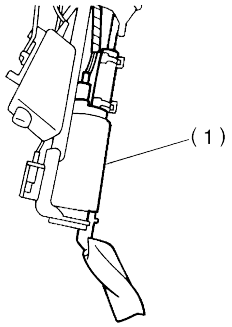
S2M2105B

RHD model

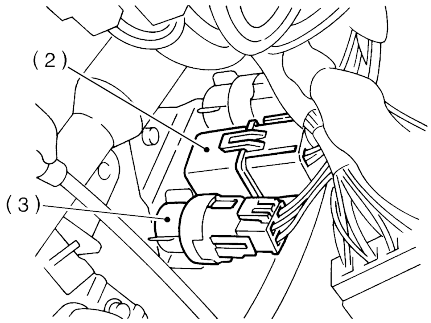


S2M2106B

(1) Fuel pump
(2) Main relay
(3) Fuel pump relay



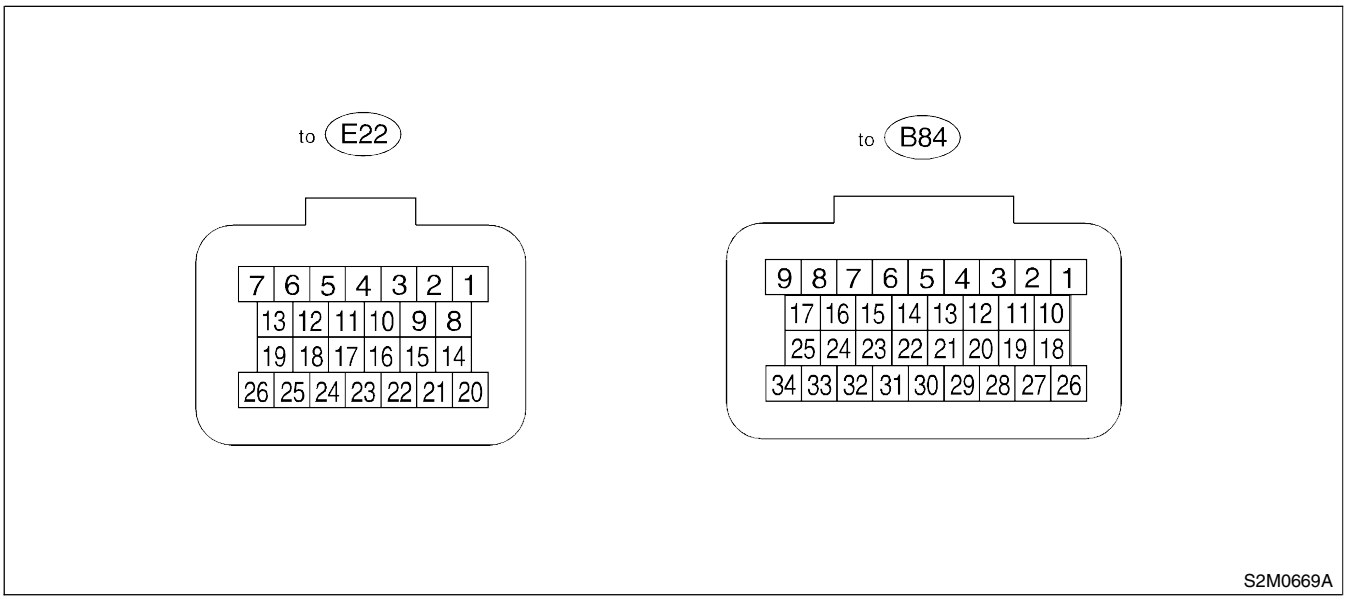
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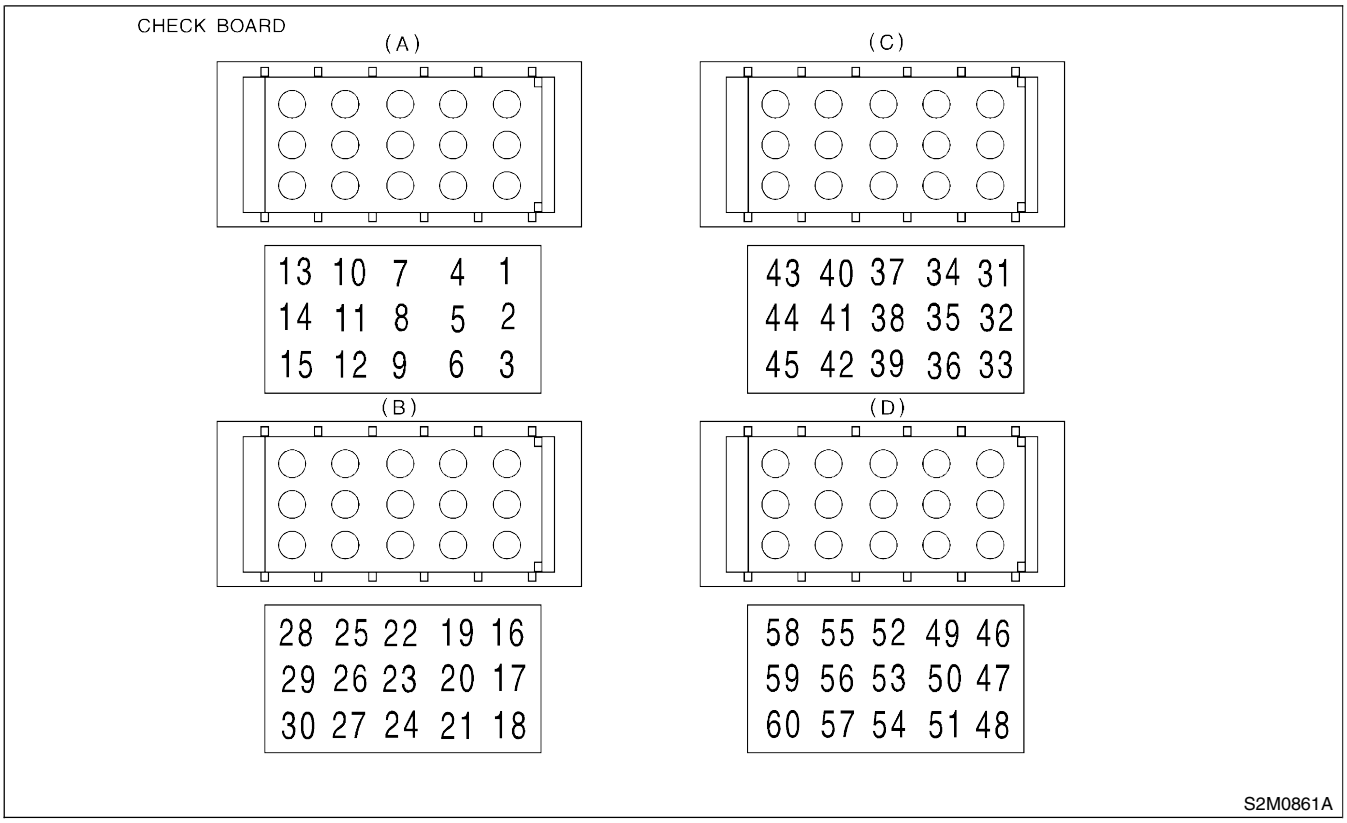


S2M0278C

5. Engine Control Module (ECM) I/O Signal S068526

A: ELECTRICAL SPECIFICATION S068526A08





ENGINE CONTROL MODULE (ECM) I/O SIGNAL

Content		ECM		CHECK BOARD		Signal (V)		Note
		Connector No.	Terminal No.	Connector No.	Terminal No.	Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Crankshaft position sensor	Signal (+)	E22	20	B	26	0	−7 to +7	Sensor output waveform
	Signal (−)	E22	14	B	19	0	0	—
	Shield	E22	21	B	25	0	0	—
Pressure sensor	Signal	E22	18	A	15	3.4 — 3.6	1.2 — 1.8	—
	Power supply	E22	25	B	21	5	5	—
	GND	E22	22	B	24	0	0	—
Throttle position sensor	Signal	E22	23	B	23	Fully closed: 0.2 — 1.0 Fully open: 4.2 — 4.7		—
	Power supply	E22	25	B	21	5	5	—
	GND	E22	22	B	24	0	0	—
Oxygen sensor	Signal	B84	22	D	47	0.6, or less	0 — 0.9	—
	Shield	B84	15	C	38	0	0	—
Engine coolant temperature sensor		E22	24	B	22	0.4 — 2.4	0.4 — 2.4	After warm-up
Vehicle speed sensor		B84	33	D	53	0 or 5	0 or 5	“5” and “0” are repeatedly displayed when vehicle is driven.
Intake air temperature sensor		E22	17	B	16	2.3 — 2.5	1.4 — 1.6	After warm-up
A/C switch		B84	27	D	59	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
Ignition switch		B84	28* 19	D	58* 50	10 — 13	13 — 14	—
Neutral position switch (MT)		B84	26	D	60	ON: 10 — 13 OFF: 0		• On MT vehicles; switch is ON when gear is in neutral position.
Neutral position switch (AT)						ST: 10 — 13 ON: 0 OFF: 13 — 14		• On AT vehicles; switch is ON when shift is in “N” or “P” position
Knock sensor	Signal	E22	16	B	17	2.5	2.5	—
	Shield	E22	21	B	25	0	0	
Test mode connector		B84	19* 28	D	50* 58	10 — 13	13 — 14	When connected: 0
Read memory connector		B84	20	D	49	10 — 13	13 — 14	When connected: 0
Back-up power supply		B84	34	D	52	10 — 13	13 — 14	Ignition switch “OFF”: 10 — 13
Control unit power supply		B84	9	B	27	10 — 13	13 — 14	—
			17	C	36			
Ignition control	# 1, # 2	E22	3	A	5	0	1 — 3.4	—
	# 3, # 4	E22	9	A	12	0	1 — 3.4	—
Fuel injector	# 1, # 2	E22	7	A	1	10 — 13	1 — 14	Waveform
	# 3, # 4	E22	6	A	2	10 — 13	1 — 14	Waveform

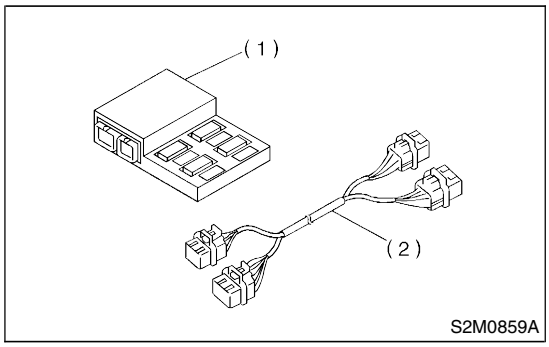
ENGINE CONTROL MODULE (ECM) I/O SIGNAL

Content	ECM		CHECK BOARD		Signal (V)		Note
	Connector No.	Terminal No.	Connector No.	Terminal No.	Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Idle air control solenoid valve	E22	4	A	4	—	1 — 13	Waveform
Fuel pump relay control	B84	3	C	33	ON: 0.5, or less OFF: 10 — 13	0.5, or less	—
A/C relay control	B84	11	C	42	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	—
Radiator fan relay 1	B84	2	C	34	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	—
Radiator fan relay 2	B84	10	C	43	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	With A/C vehicles only
Self-shutoff control	B84	5	C	31	10 — 13	13 — 14	—
Malfunction indicator lamp	B84	13	C	40	—	—	Light “ON”: 1, or less Light “OFF”: 10 — 14
Engine speed output	B84	6	B	30	—	0 — 13, or more	Waveform
Torque control signal	B84	18	D	51	8	8 — 9	—
VCC signal	B84	1	C	35	5	5	AT and without catalyst vehicles only
AT load signal	B84	29	D	57	3.4 — 3.6	1.2 — 1.8	—
Purge control solenoid valve	E22	5	A	3	ON: 1, or less OFF: 10 — 13	13 — 14	• Waveform • When connecting test mode connector
Power steering pressure switch	E22	26	B	20	10 — 13	ON: 0 OFF: 13 — 14	—
MT/AT identification	B84	16	C	37	MT: 0 AT: 5	MT: 0 AT: 5	—
Select monitor signal	B84	24	C	45	—	—	—
		32	D	54			
GND (ignition system)	E22	10	A	11	0	0	—
GND (power supply)	E22	11	A	10	0	0	—
		12		9			
GND (control systems)	E22	21	B	25	0	0	—
Immobilizer serial line	B84	23	D	46	—	—	—
		31		55			

*: RHD

B: HOW TO CHECK I/O SIGNAL FOR ECM S068526H57

● When checking I/O signal, connect ST between ECM and ECM connector.
1) Prepare the ST.
ST 498307600 CHECK BOARD KIT



(1) CHECK BOARD
(2) CHECK BOARD ADAPTER

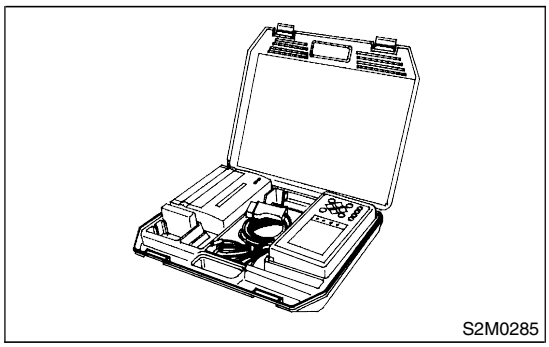
2) Turn ignition switch to OFF.
3) Disconnect connectors from ECM.
4) Connect connectors of CHECK BOARD ADAPTER to ECM and CHECK BOARD.
5) Connect engine harness and bulkhead harness connectors to CHECK BOARD.

6. Subaru Select Monitor S068503

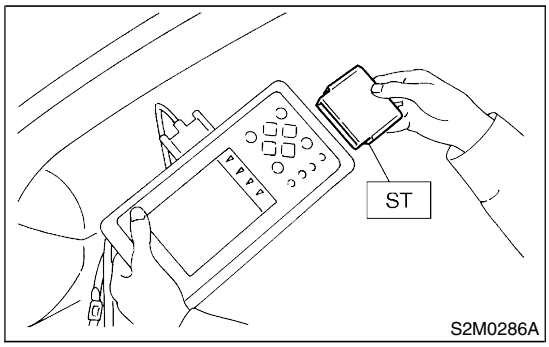
A: OPERATION S068503A16

1. HOW TO USE SUBARU SELECT MONITOR S068503A1601

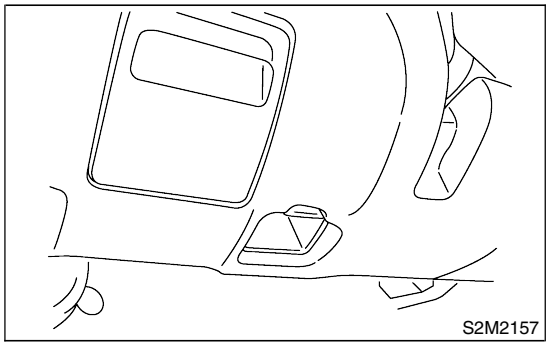
1) Prepare Subaru Select Monitor kit.



2) Connect diagnosis cable to Subaru Select Monitor.
3) Insert cartridge into Subaru Select Monitor.



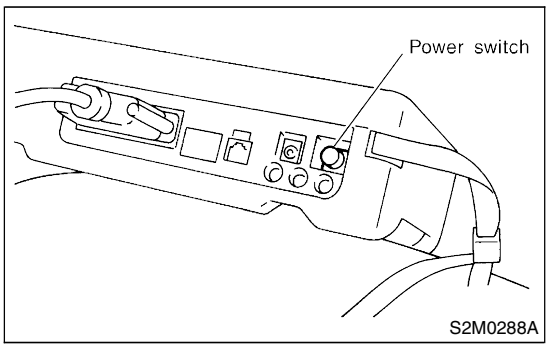
4) Connect Subaru Select Monitor to data link connector.
   (1) Data link connector located in the lower portion of the instrument panel (on the driver's side).



   (2) Connect diagnosis cable to data link connector.

CAUTION:
Do not connect scan tools except for Subaru Select Monitor.

5) Turn ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.



6) Using Subaru Select Monitor, call up diagnostic trouble code(s) and various data, then record them.

2. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE. S068503A1602

Refer to Read Diagnostic Trouble Code for information about how to indicate DTC. <Ref. to EN(SOHCw/oOBD)-27 Read Diagnostic Trouble Code.>

3. READ CURRENT DATA SHOWN ON DISPLAY. S068503A1603

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 {1. Current Data Display & Save} and press the [YES] key.
5) On the ≪Data Display Menu≫ display screen, select the {1. 12 Data Display} and press the [YES] key.
6) Using the scroll key, move the display screen up or down until the desired data is shown.

- A list of the support data is shown in the following table.

Contents	Unit of measure
Battery voltage	V
Vehicle speed signal	km/h or MPH
Engine speed signal	rpm
Engine coolant temperature signal	°C or °F
Ignition timing signal	deg
Throttle position signal	%
Throttle position signal	V
Injection pulse width	ms
Idle air control signal	%
Engine load data	%
Front oxygen sensor output signal	V
A/F correction coefficient	%
Knock sensor signal	deg
CO resistor	V
Intake manifold absolute/relative pressure signal	mmHg or kPa or inHg
Intake air temperature signal	°C or °F
Canister purge control solenoid valve duty ratio	%
Idle air control solenoid valve current	mA
Ignition switch signal	ON or OFF
Test mode connector signal	ON or OFF
Neutral position switch signal	ON or OFF
Air conditioning switch signal	ON or OFF
Air conditioning relay signal	ON or OFF
Radiator main fan relay signal	ON or OFF
Fuel pump relay signal	ON or OFF
Knocking signal	ON or OFF
Radiator sub fan relay signal	ON or OFF
Engine torque control signal	ON or OFF
Front oxygen sensor rich signal	ON or OFF
Crankshaft position sensor signal	ON or OFF
Electrical load signal	ON or OFF
Read memory connector signal	ON or OFF
Power steering pressure signal	ON or OFF
AT vehicle ID signal	ON or OFF
Idle switch	ON or OFF
Canister purge control solenoid valve	ON or OFF
Torque permission signal	ON or OFF

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

4. LED OPERATION MODE FOR ENGINE S068503A1604

Contents	Message	LED “ON” requirements
Ignition switch signal	ON or OFF	When ignition switch is turned ON.
Test mode connector signal	ON or OFF	When test mode connector is connected.
Neutral position switch signal	ON or OFF	When neutral position signal is entered.
Air conditioning switch signal	ON or OFF	When air conditioning switch is turned ON.
Air conditioning relay signal	ON or OFF	When air conditioning relay is in function.
Radiator main fan relay signal	ON or OFF	When radiator main fan relay is in function.
Fuel pump relay signal	ON or OFF	When fuel pump relay is in function.
Knocking signal	ON or OFF	When knocking signal is entered.
Radiator sub fan relay signal	ON or OFF	When radiator sub fan relay is in function.
Engine torque control signal	ON or OFF	When engine torque control signal is entered.
Front oxygen sensor rich signal	ON or OFF	When front oxygen sensor mixture ratio is rich.
Crankshaft position sensor signal	ON or OFF	When crankshaft position sensor signal is entered.
Electrical load signal	ON or OFF	When the lighting switch, blower fan switch or rear defogger switch is turned ON.
Read memory connector signal	ON or OFF	When read memory connector is connected.
Power steering pressure signal	ON or OFF	When steering wheel is turned.
AT vehicle ID signal	ON or OFF	When AT identification signal is entered.
Idle switch	ON or OFF	When throttle sensor sends signal that throttle opening angle is in idle position.
Canister purge control solenoid valve	ON or OFF	When canister purge control solenoid valve is in function.
Torque permission signal	ON or OFF	When torque permission signal is entered.

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

7. Read Diagnostic Trouble Code S068508

A: OPERATION S068508A16

1. WITH SUBARU SELECT MONITOR S068508A1601

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(SOHCw/oOBD)-65 LIST, LIST of Diagnostic Trouble Code (DTC).>

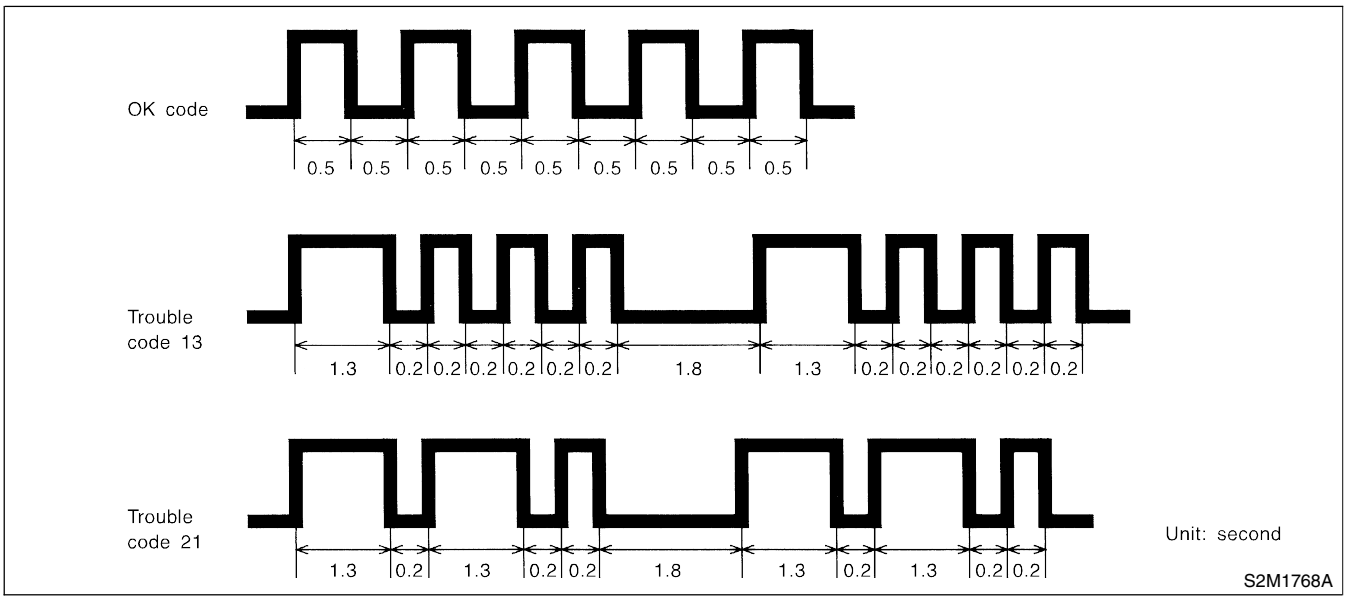
2. WITHOUT SUBARU SELECT MONITOR S068508A1602

No.	Step	Check	Yes	No
1	**CHECK STATUS OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL).** 1) Turn ignition switch to OFF. 2) Connect read memory connector. <Ref. to EN(SOHCw/oOBD)-10 LOCATION, Electrical Components Location.> 3) Turn ignition switch to ON.	Does the MIL come on?	Go to step **2**.	Check the following and repair if necessary. NOTE: ● Open or short circuit in engine control module power supply or ground line ● Open or short circuit in CHECK ENGINE malfunction indicator lamp
2	**CHECK DIAGNOSTIC TROUBLE CODE (DTC).**	Does the MIL indicate diagnostic trouble code (DTC)?	Record diagnostic trouble code (DTC). Then turn ignition switch to OFF, disconnect read memory connector.	Complete read diagnostic trouble code. Turn ignition switch to OFF and disconnect read memory connector.

READ DIAGNOSTIC TROUBLE CODE

The CHECK ENGINE malfunction indicator lamp (MIL) flashes the code corresponding to the faulty parts. The long segment (1.3 seconds ON) indicates a “ten”, and the short segment (0.2 seconds ON) signifies “one”. And middle segment (0.5 seconds ON) means OK code.

NOTE:
● For detailed concerning diagnostic trouble codes, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(SOHCw/oOBD)-65 LIST, LIST of Diagnostic Trouble Code (DTC).>



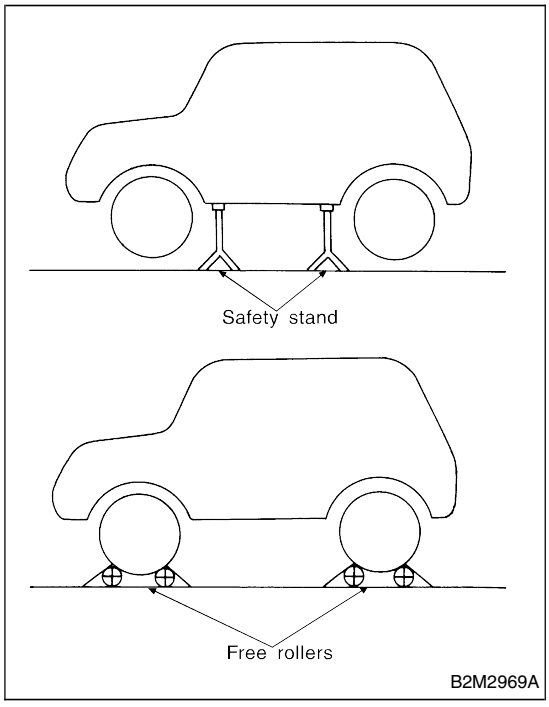
8. Inspection Mode S068510

A: OPERATION S068510A16

1. PREPARATIONS FOR THE INSPECTION MODE S068510A1601

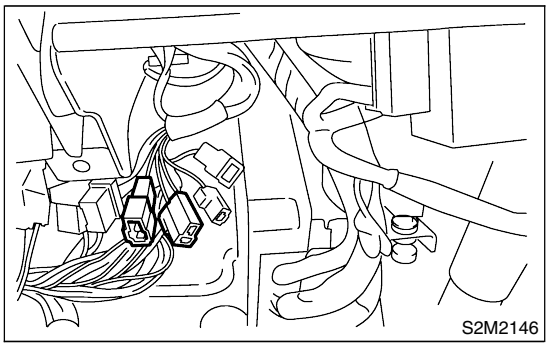
Raise the vehicle using a garage jack and place on safety stands or drive the vehicle onto free rollers.

WARNING:
• Before raising the vehicle, ensure parking brakes are applied.
• Do not use a pantograph jack in place of a safety stand.
• Secure a rope or wire to the front and rear towing or tie-down hooks to prevent the lateral runout of front wheels.
• Do not abruptly depress/release clutch pedal or accelerator pedal during works even when engine is operating at low speeds since this may cause vehicle to jump off free rollers.
• In order to prevent the vehicle from slipping due to vibration, do not place any wooden blocks or similar items between the safety stands and the vehicle.
• Since the rear wheels will also rotate, do not place anything near them. Also, make sure that nobody goes in front of the vehicle.

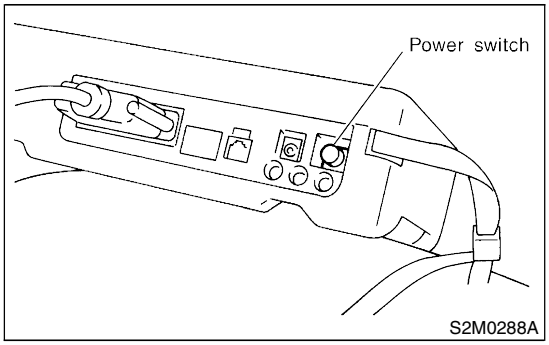


2. WITH SUBARU SELECT MONITOR S068510A1602

After performing diagnostics and clearing the memory, check for any remaining unresolved trouble data.
1) Connect test mode connector (green).



2) Connect Subaru select monitor to data link connector. <Ref. to EN(SOHCw/oOBD)-10 LOCATION, Electrical Components Location.>
3) Turn ignition switch to ON (engine OFF) and Subaru select monitor switch to ON.



4) On the ≪Main Menu≫ display screen, select the {2. Each System Check} and press the [YES] key.
5) On the ≪System Selection Menu≫ display screen, select the {Engine Control System} and press the [YES] key.
6) Press the [YES] key after displayed the information of engine type.
7) On the ≪Engine Diagnosis≫ display screen, select the {6. Dealer Check Mode Procedure} and press the [YES] key.
8) When the “Perform Inspection (Dealer Check) Mode?” is shown on the display screen, press the [YES] key.
9) Perform subsequent procedures as instructed on the display screen.
• If trouble still remains in the memory, the corresponding diagnostic trouble code (DTC) appears on the display screen.

NOTE:
● For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
● For detailed concerning diagnostic trouble codes, refer to the DIAGNOSTIC TROUBLE CODE (DTC) LIST. <Ref. to EN(SOHCw/oOBD)-65 LIST, List of Diagnostic Trouble Code (DTC).>
● On AWD vehicles, release the parking brake.
● The speed difference between front and rear wheels may light either the ABS warning light, but this indicates no malfunctions. When engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system.

3. WITHOUT SUBARU SELECT MONITOR S068510A1603

No.	Step	Check	Yes	No
1	**CHECK STATUS OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL).** 1) Start and warm-up the engine. 2) Turn ignition switch to OFF. 3) Set shift lever to neutral position (MT vehicles), or set selector lever to “P” position (AT vehicles). 4) Connect test mode connector (green). 5) Turn ignition switch to ON.	Does the MIL come on?	Go to step **2**.	Check the following and repair if necessary. NOTE: ● Open or short circuit in engine control module power supply or ground line ● Open or short circuit in CHECK ENGINE malfunction indicator lamp
2	**CHECK DIAGNOSTIC TROUBLE CODE (DTC).** 1) Set selector lever to “N” position, and then set selector lever to “P” position again (AT vehicles only). 2) Start the engine.	Does the MIL indicate diagnostic trouble code (DTC)?	Record diagnostic trouble code (DTC) and inspect using DTC. <Ref. to EN(SOHCw/oOBD)-68 Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Go to step **3**.
3	**CHECK DIAGNOSTIC TROUBLE CODE (DTC).** 1) Drive vehicle at speed greater than 11 km/h (7 MPH) for at least one minute. 2) Warm-up engine above 2,000 rpm.	Does the MIL indicate diagnostic trouble code (DTC)?	Record diagnostic trouble code (DTC) and inspect using DTC. <Ref. to EN(SOHCw/oOBD)-68 Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Turn ignition switch to OFF. Disconnect test mode connector. Complete inspection mode. NOTE: When on-board diagnosis system indicates no trouble, the trouble is in a different symptom.

9. Clear Memory Mode S068513

A: OPERATION S068513A16

1. WITH SUBARU SELECT MONITOR S068513A1601

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 ISC 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.

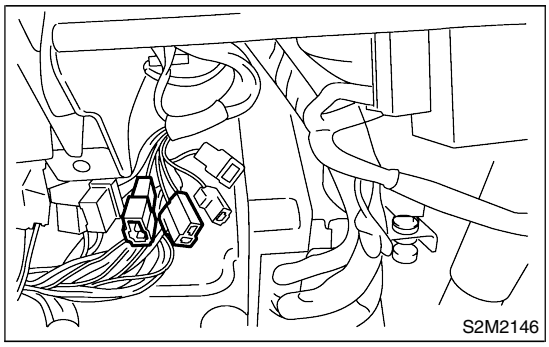
2. WITHOUT SUBARU SELECT MONITOR S068513A1602

No.	Step	Check	Yes	No
1	**CHECK STATUS OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL).** 1) Turn ignition switch to OFF. 2) Set shift lever to neutral position (MT vehicles), or set selector lever to "P" position (AT vehicles). 3) Connect test mode connector and read memory connector. 4) Turn ignition switch to ON.	Does the MIL come on?	Go to step **2**.	Check the following and repair if necessary. NOTE: ● Open or short circuit in engine control module power supply or ground line ● Open or short circuit in CHECK ENGINE malfunction indicator lamp
2	**CHECK DIAGNOSTIC TROUBLE CODE (DTC).** 1) Set selector lever to "N" position, and then set selector lever to "P" position again (AT vehicles only). 2) Start the engine. 3) Drive vehicle at speed greater than 11 km/h (7 MPH) for at least one minute. 4) Warm-up engine above 2,000 rpm.	Does the MIL indicate diagnostic trouble code (DTC)? <Ref. to EN(SOHCw/oOBD)-65 LIST, List of Diagnostic Trouble Code (DTC).>	Record diagnostic trouble code. Repair the trouble cause. <Ref. to EN(SOHCw/oOBD)-68 Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Turn ignition switch to OFF. Disconnect read memory connector and test mode connector. Complete clear memory mode.

10. Compulsory Valve Operation Check Mode S068528

A: OPERATION S068528A16

1) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



2) Each valve functions when ignition switch is turned to ON (engine OFF).
● A list of the support portion is shown in the following table.

Contents
Compulsory fuel pump relay operation check
Compulsory purge control solenoid valve operation check
Compulsory radiator fan relay operation check
Compulsory air conditioning relay operation check

11. Engine Malfunction Indicator Lamp (MIL) S068653

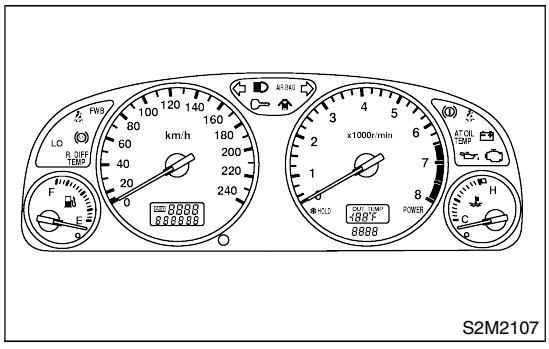
A: PROCEDURE S068653E45

1. Activation of check engine malfunction indicator lamp (MIL). <Ref. to EN(SOHCw/oOBD)-33 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(SOHCw/oOBD)-34 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(SOHCw/oOBD)-38 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(SOHCw/oOBD)-40 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(SOHCw/oOBD)-44 CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) REMAINS BLINKING AT A CYCLE OF 3 HZ., Engine Malfunction Indicator Lamp (MIL).>

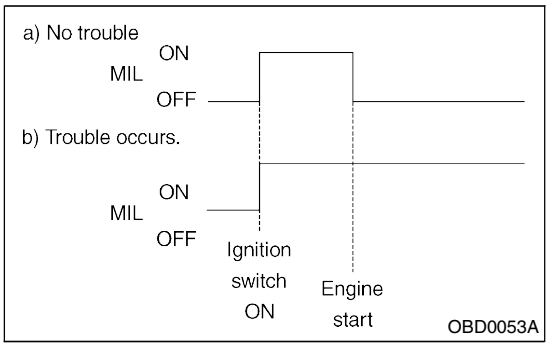
B: ACTIVATION OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) S068653E89

1) When ignition switch is turned to ON (engine off), the CHECK ENGINE malfunction indicator lamp (MIL) in the combination meter illuminates.

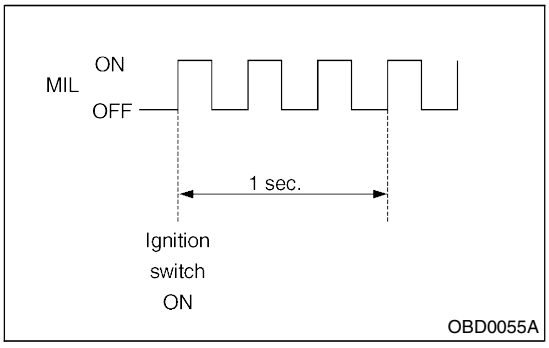
NOTE:
If the MIL does not illuminate, perform diagnostics of the CHECK ENGINE light circuit or the combination meter circuit. <Ref. to IDI-15 Combination Meter Assembly.>



2) After starting the engine, the MIL goes out. If it does not, either the engine or the emission control system is malfunctioning. <Ref. to EN(SOHCw/oOBD)-2 PROCEDURE, Basic Diagnostic Procedure.>

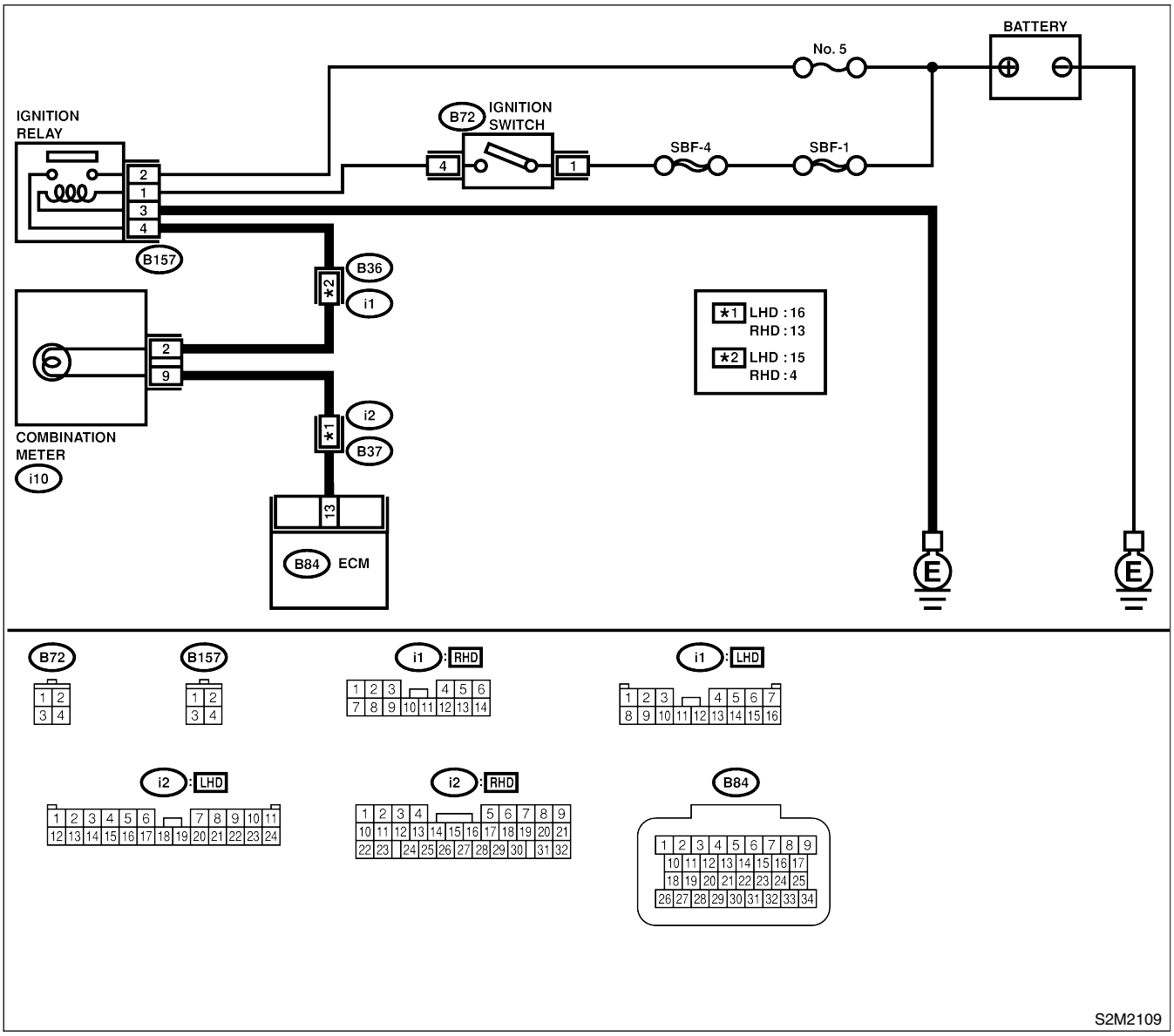


3) When ignition switch is turned to ON (engine off) or to “START” with the test mode connector connected, the MIL blinks at a cycle of 3 Hz.



C: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT COME ON. S068653E90

- **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:**



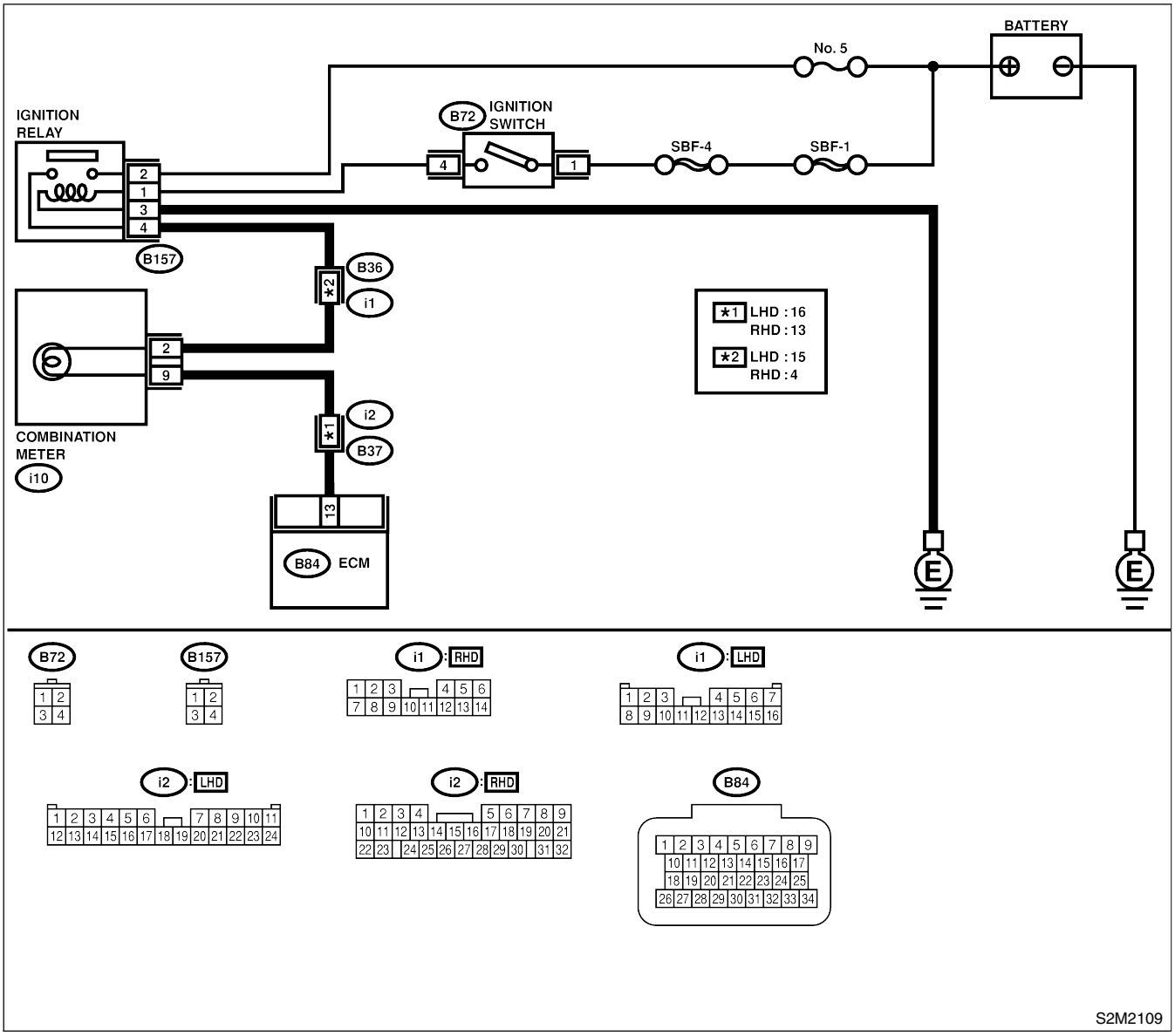
No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Disconnect connector from ECM, then connect check board. <Ref. to EN(SOHCw/oOBD)-23, HOW TO CHECK I/O SIGNAL FOR ECM, Engine Control Module (ECM) I/O Signal.> 2) Turn ignition switch to ON. 3) Measure voltage between ECM connector and engine ground. ***Connector & terminal*** ***(C) No. 40 (+) — Engine ground (–):***	Is the voltage less than 1 V?	Go to step **4**.	Go to step **2**.
2	**CHECK POOR CONTACT.**	Does the MIL come on when shaking or pulling ECM connector and harness?	Repair poor contact in ECM connector.	Go to step **3**.
3	**CHECK ECM CONNECTOR.**	Is ECM connector correctly connected?	Replace ECM. <Ref. to FU(SOHCw/oOBD)-38, 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-15, Combination Meter Assembly.> 3) Disconnect connector from ECM and combination meter. 4) Measure resistance of harness between ECM and combination meter connector. ***Connector & terminal*** ***(B84) No. 13 — (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 (i2)
5	**CHECK POOR CONTACT.** Check poor contact in combination meter connector. <Ref. to IDI-15, Combination Meter Assembly.>	Is there poor contact in combination meter connector?	Repair poor contact in combination meter connector.	Go to step **6**.

No.	Step	Check	Yes	No
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 coupling connector (i1) • Poor contact in ignition relay connector • Poor contact in ignition switch connector
7	**CHECK POOR CONTACT.** Check poor contact in combination meter connector. <Ref. to IDI-15, Combination Meter Assembly.>	Is there poor contact in combination meter connector?	Repair poor contact in combination meter connector.	Replace bulb or combination meter.

MEMO:

D: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT GO OFF. S068653E91

- **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:**



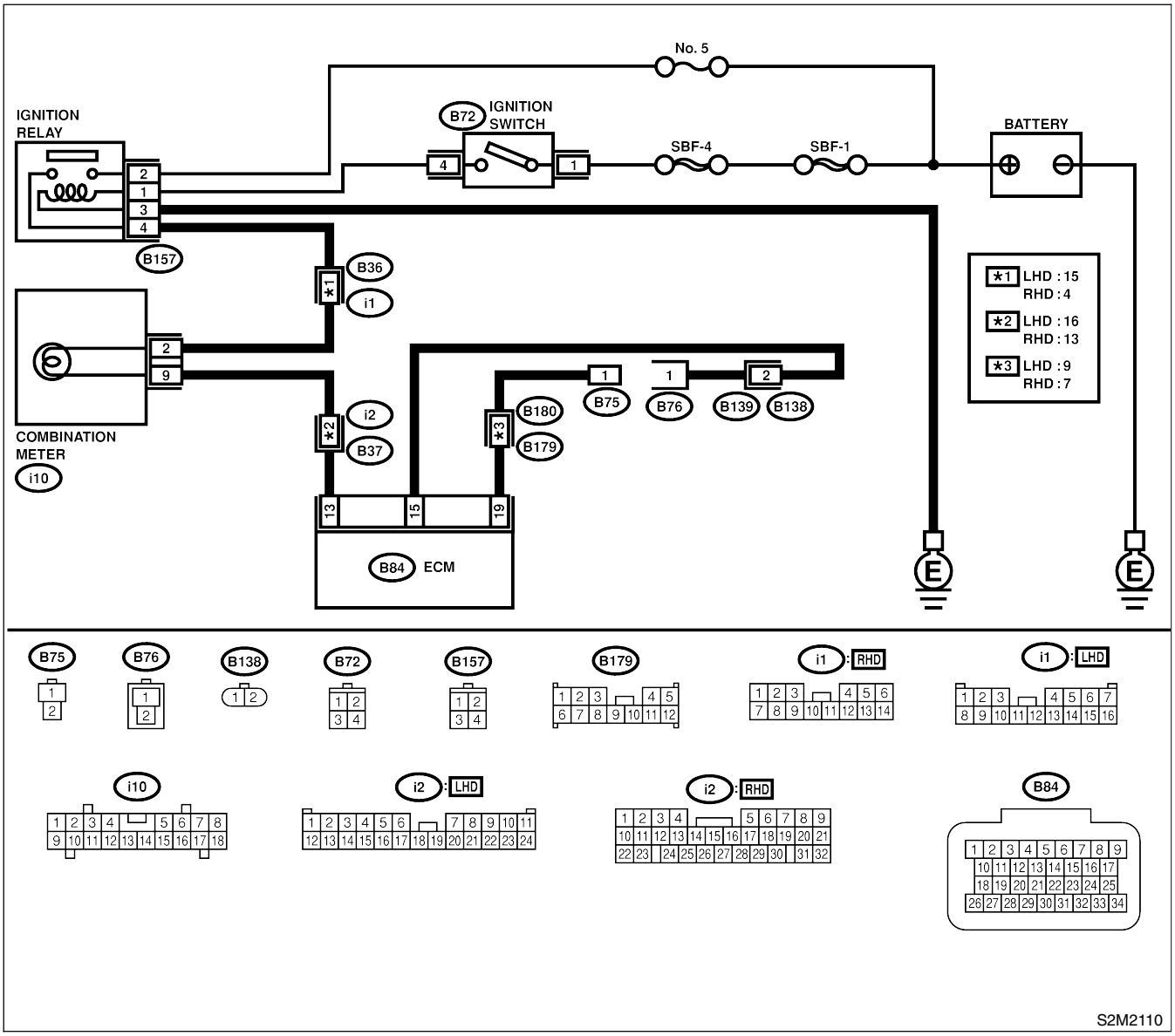
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Turn ignition switch to ON.	Does the MIL come on?	Repair short circuit in harness between combination meter and ECM connector.	Replace ECM. <Ref. to FU(SOHCw/oOBD)-38, Engine Control Module.>

MEMO:

E: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT BLINK AT A CYCLE OF 3 Hz. S068653E92

- **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:**



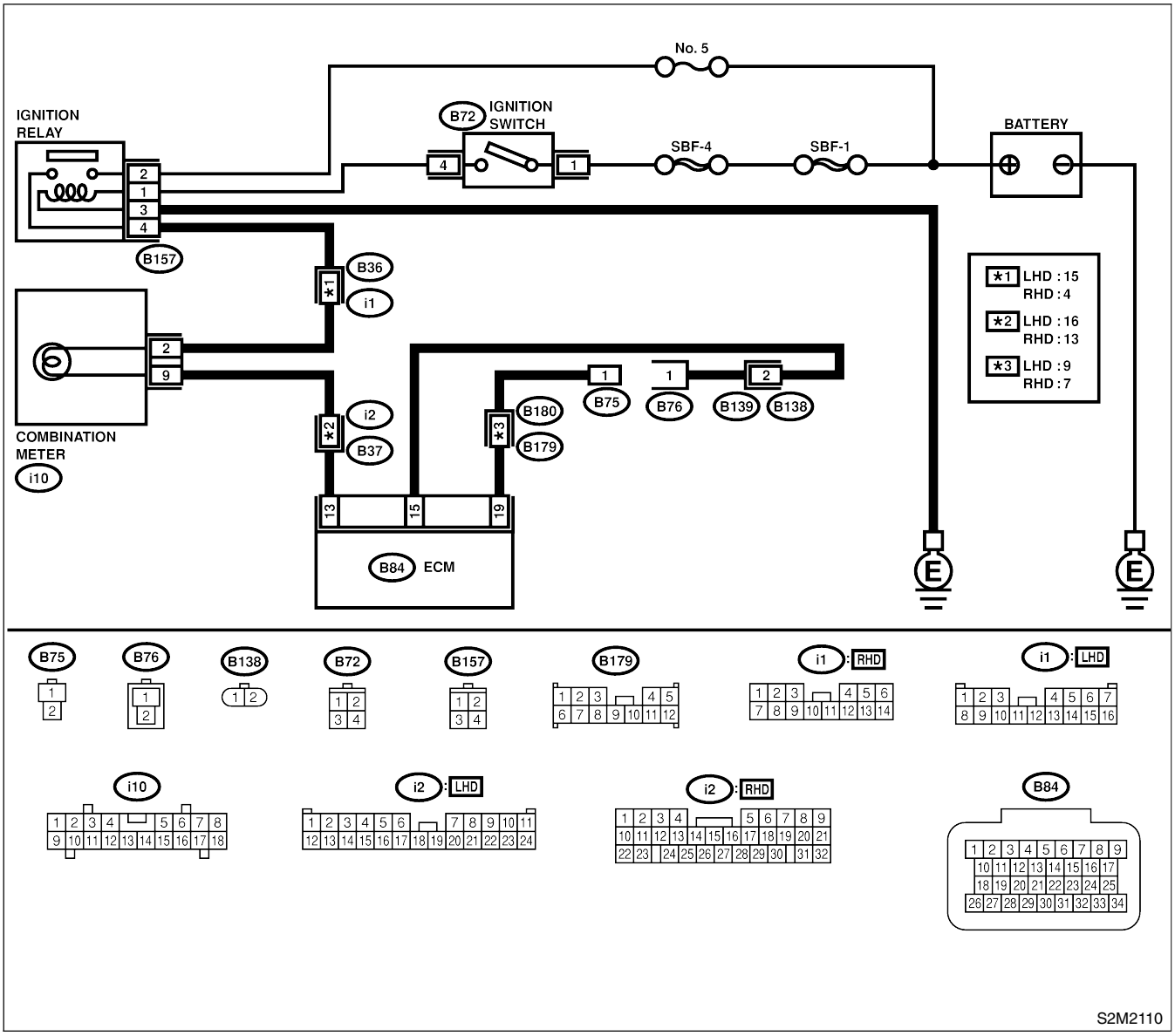
No.	Step	Check	Yes	No
1	**CHECK STATUS OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL).** 1) Turn ignition switch to OFF. 2) Disconnect test mode connector. 3) Turn ignition switch to ON.	Does the MIL come on?	Go to step **2**.	Repair the MIL circuit. <Ref. to EN(SOHCw/oOBD)-34, CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT COME ON., Engine Malfunction Indicator Lamp (MIL).>

No.	Step	Check	Yes	No
2	**CHECK OUTPUT SIGNAL FROM ECM.** Measure voltage between test mode connector and chassis ground. ***Connector & terminal*** ***(B75) No. 1 (+) — Chassis ground (–):***	Is voltage less than 1 V?	Go to step **3**.	Go to step **5**.
3	**CHECK HARNESS BETWEEN ECM AND TEST MODE CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between ECM and test mode connector. ***Connector & terminal*** ***(B84) No. 19 — (B75) No. 1:***	Is resistance less than 1 Ω?	Go to step **4**.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and test mode connector • Poor contact in coupling connector (B180)
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(SOHCw/oOBD)-38, Engine Control Module.>
5	**CHECK HARNESS BETWEEN ECM AND TEST MODE CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between ECM and test mode connector. ***Connector & terminal*** ***(B84) No. 15 — (B76) No. 1:***	Is 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 test mode connector • Poor contact in coupling connector (B138)
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(SOHCw/oOBD)-38, Engine Control Module.>

MEMO:

F: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) REMAINS BLINKING AT A CYCLE OF 3 Hz. S068653E93

- **DIAGNOSIS:**
  - Test mode connector circuit is shorted.
- **TROUBLE SYMPTOM:**
  - Even though test mode connector is disconnected, MIL blinks at a cycle of 3 Hz when ignition switch is turned to ON.
- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**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 engine ground. ***Connector & terminal*** ***(B84) No. 19 — Engine ground:***	Is resistance less than 5 Ω?	Repair short circuit in harness between ECM and test mode connector.	Replace ECM. <Ref. to FU(SOHCw/oOBD)-38, Engine Control Module.>

ENGINE MALFUNCTION INDICATOR LAMP (MIL)

MEMO:

12. Diagnostics for Engine Starting Failure S068533

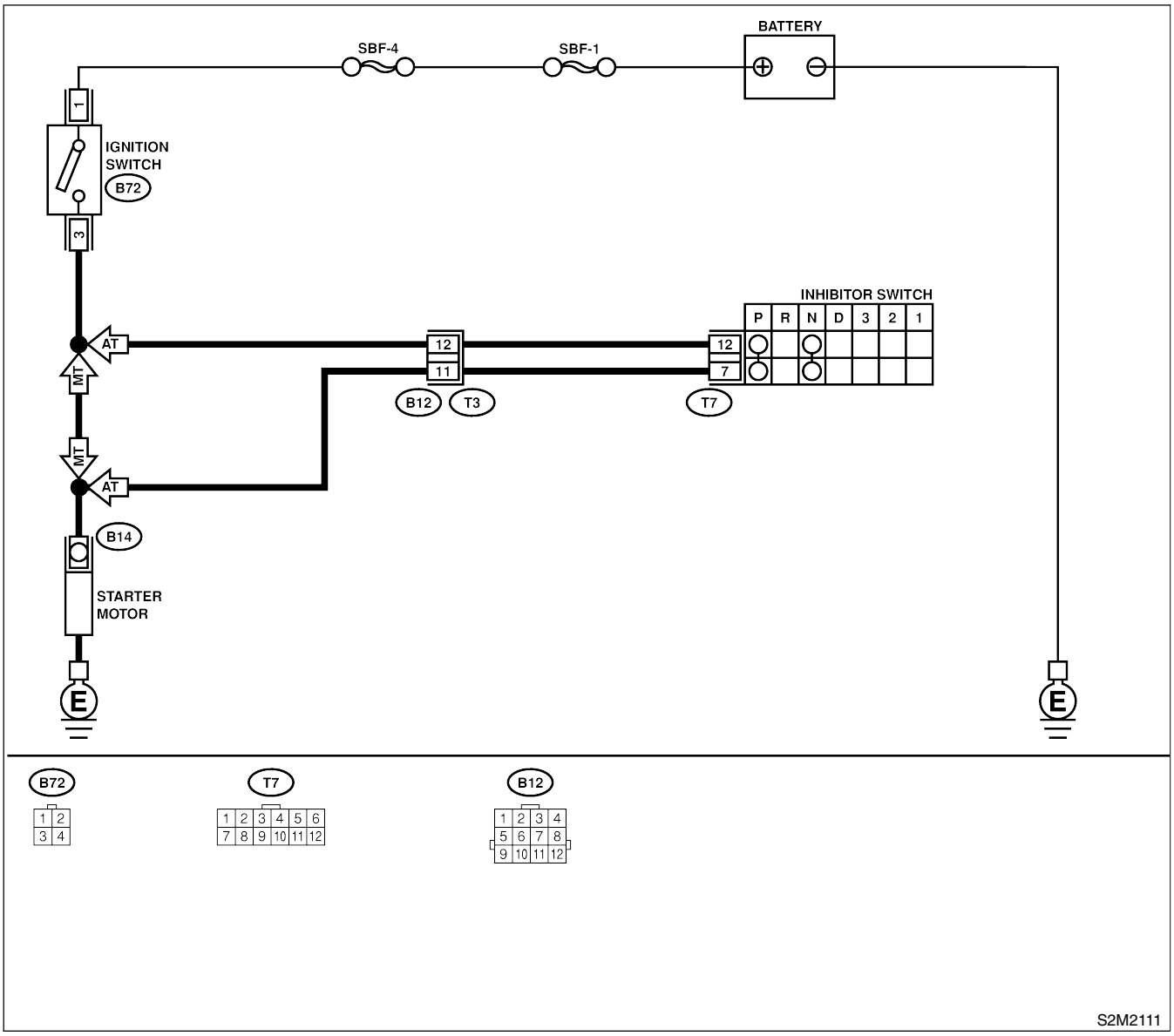
A: PROCEDURE S068533E45

1. Inspection of starter motor circuit. <Ref. to EN(SOHCw/oOBD)-48 STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
2. Inspection of ECM power supply and ground line. <Ref. to EN(SOHCw/oOBD)-52 CONTROL MODULE POWER SUPPLY AND GROUND LINE, Diagnostics for Engine Starting Failure.>
↓
3. Inspection of ignition control system. <Ref. to EN(SOHCw/oOBD)-54 IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>
↓
4. Inspection of fuel pump circuit. <Ref. to EN(SOHCw/oOBD)-58 FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
5. Inspection of fuel injector circuit. <Ref. to EN(SOHCw/oOBD)-62 FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

B: STARTER MOTOR CIRCUIT S068533E94

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to EN(SOHCw/oOBD)-31 OPERATION, Clear Memory Mode.> and <Ref. to EN(SOHCw/oOBD)-29 OPERATION, Inspection Mode.>

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**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 select lever in the "P" or "N" position.	Is the voltage more than 10 V?	Go to step **2**.	Go to step **3**.
2	**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.
3	**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 **4**.
4	**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 **5**.	NOTE: Check the following and repair if necessary. • Blown out fuse (SBF-1, SBF-4) • If replaced fuse (SBF-1, SBF-4) blows easily, check the harness for short circuit of harness between fuse and ignition switch connector. • Open circuit in harness between ignition switch and battery
5	**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 **6**.	Replace ignition switch.
6	**CHECK TRANSMISSION TYPE.**	Is the vehicle AT?	Go to step **7**.	Repair open circuit between ignition switch and starter motor circuit.

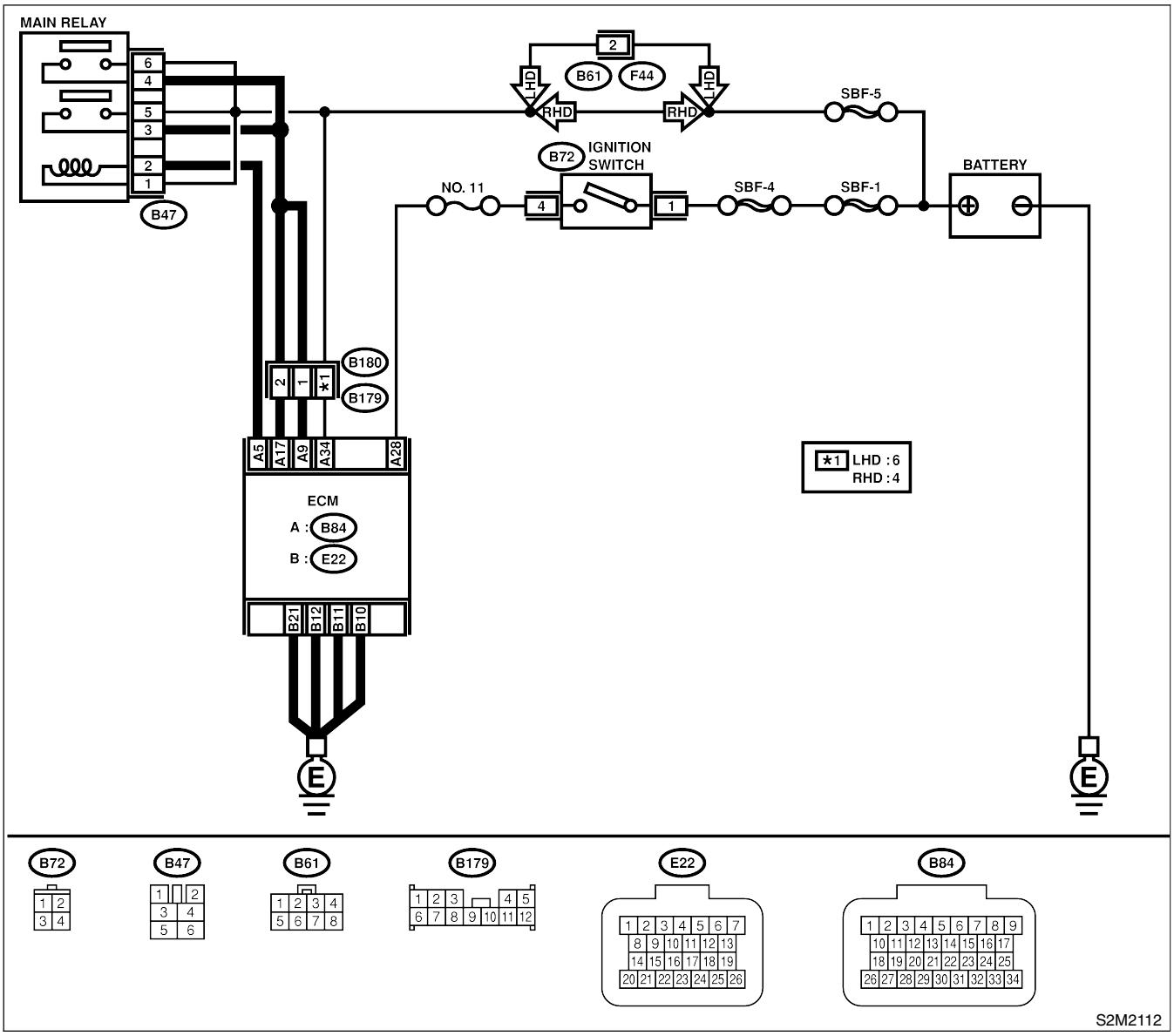
No.	Step	Check	Yes	No
7	**CHECK INHIBITOR SWITCH CIRCUIT.** 1) Turn ignition switch to OFF. 2) Place the select lever in the “P” or “N” position. 3) Separate transmission harness connector. 4) Measure resistance between transmission harness connector receptacle’s terminals. ***Connector & terminal*** ***(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 **8**.
8	**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:*** ***(T3) No. 12 — (T7) No. 12:***	Is the resistance less than 1 Ω?	Go to step **9**.	Repair open circuit in harness between transmission harness and inhibitor switch connector.
9	**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 S068533E37

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to EN(SOHCw/oOBD)-31 OPERATION, Clear Memory Mode.> and <Ref. to EN(SOHCw/oOBD)-29 OPERATION, Inspection Mode.>

- **WIRING DIAGRAM:**



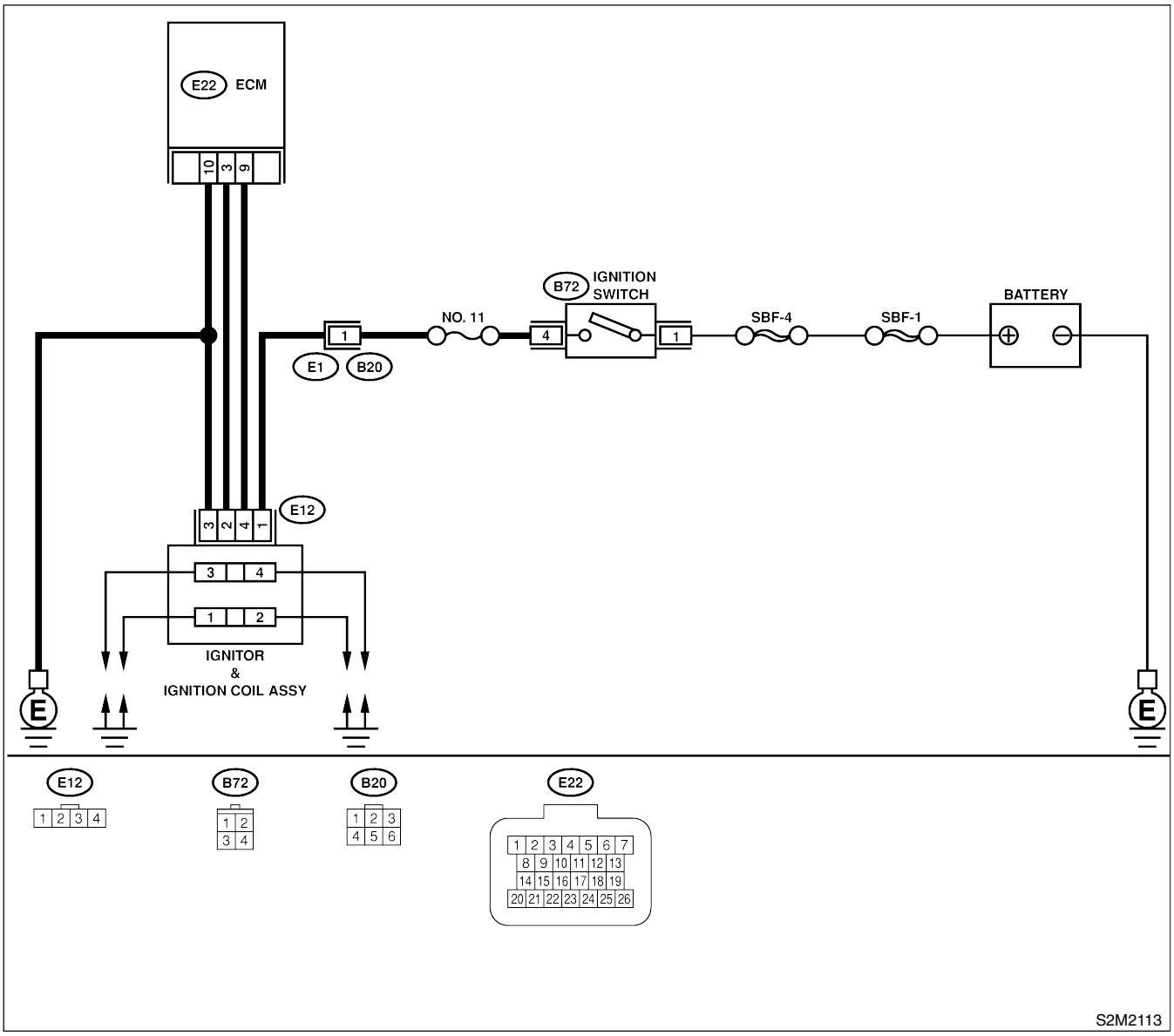
No.	Step	Check	Yes	No
1	**CHECK MAIN RELAY.** 1) Turn ignition switch to OFF. 2) Remove main relay. 3) Connect battery to main relay terminals No. 1 and No. 2. 4) Measure resistance between main relay terminals. ***Terminals*** ***No. 3 — No. 5:***	Is the resistance less than 10 Ω?	Go to step **2**.	Replace main relay.

No.	Step	Check	Yes	No
2	**CHECK MAIN RELAY.** Measure resistance between main relay terminals. ***Terminals*** ***No. 4 — No. 6:***	Is the resistance less than 10 Ω?	Go to step **3**.	Replace main relay.
3	**CHECK GROUND CIRCUIT OF ECM.** 1) Disconnect connectors from ECM. 2) Measure resistance of harness between ECM and engine ground. ***Connector & terminal*** ***(E22) No. 10 — Engine ground:*** ***(E22) No. 11 — Engine ground:*** ***(E22) No. 12 — Engine ground:*** ***(E22) No. 21 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **4**.	Repair open circuit in harness between ECM connector and engine grounding terminal.
4	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM connector and engine ground. ***Connector & terminal*** ***(B84) No. 28 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **5**.	Repair open or ground short circuit of power supply circuit.
5	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Measure voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 1 (+) — Chassis ground (–):*** ***(B47) No. 5 (+) — Chassis ground (–):*** ***(B47) No. 6 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **6**.	Repair open or ground short circuit of power supply circuit.
6	**CHECK INPUT VOLTAGE OF ECM.** Measure voltage between ECM connector and engine ground. ***Connector & terminal*** ***(B84) No. 34 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **7**.	Repair open or ground short circuit of power supply circuit.
7	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn ignition switch to OFF. 2) Connect main relay connector. 3) Measure voltage between ECM connector and engine ground. ***Connector & terminal*** ***(B84) No. 5 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **8**.	Repair open or ground short circuit between ECM connector and main relay connector.
8	**CHECK INPUT VOLTAGE OF ECM.** 1) Connect ST. <Ref. to EN(SOHCw/oOBD)-23, HOW TO CHECK I/O SIGNAL FOR ECM, Engine Control Module (ECM) I/O Signal.> ST 498307600 CHECK BOARD KIT 2) Measure voltage between ECM connector and engine ground. ***Connector & terminal*** ***(B) No. 27 (+) — Engine ground (–):*** ***(C) No. 36 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Check ignition control system. <Ref. to EN(SOHCw/oOBD)-54, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Repair open or ground short circuit between ECM connector and main relay connector.

D: IGNITION CONTROL SYSTEM S068533E95

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to EN(SOHCw/oOBD)-31 OPERATION, Clear Memory Mode.> and <Ref. to EN(SOHCw/oOBD)-29 OPERATION, 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(SOHCw/oOBD)-58, 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. 1 (+) — 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 connector (B20)
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:*** ***No. 3 — No. 4:***	Is the resistance between 10 and 15 Ω?	Go to step **5**.	Replace ignition coil & ignitor assembly. <Ref. to IG(SOHCw/oOBD)-9, Ignition Coil and Ignitor Assembly.>
5	**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. 2 (+) — Engine ground (–):*** ***(E12) No. 4 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **6**.	Replace ignition coil & ignitor assembly.

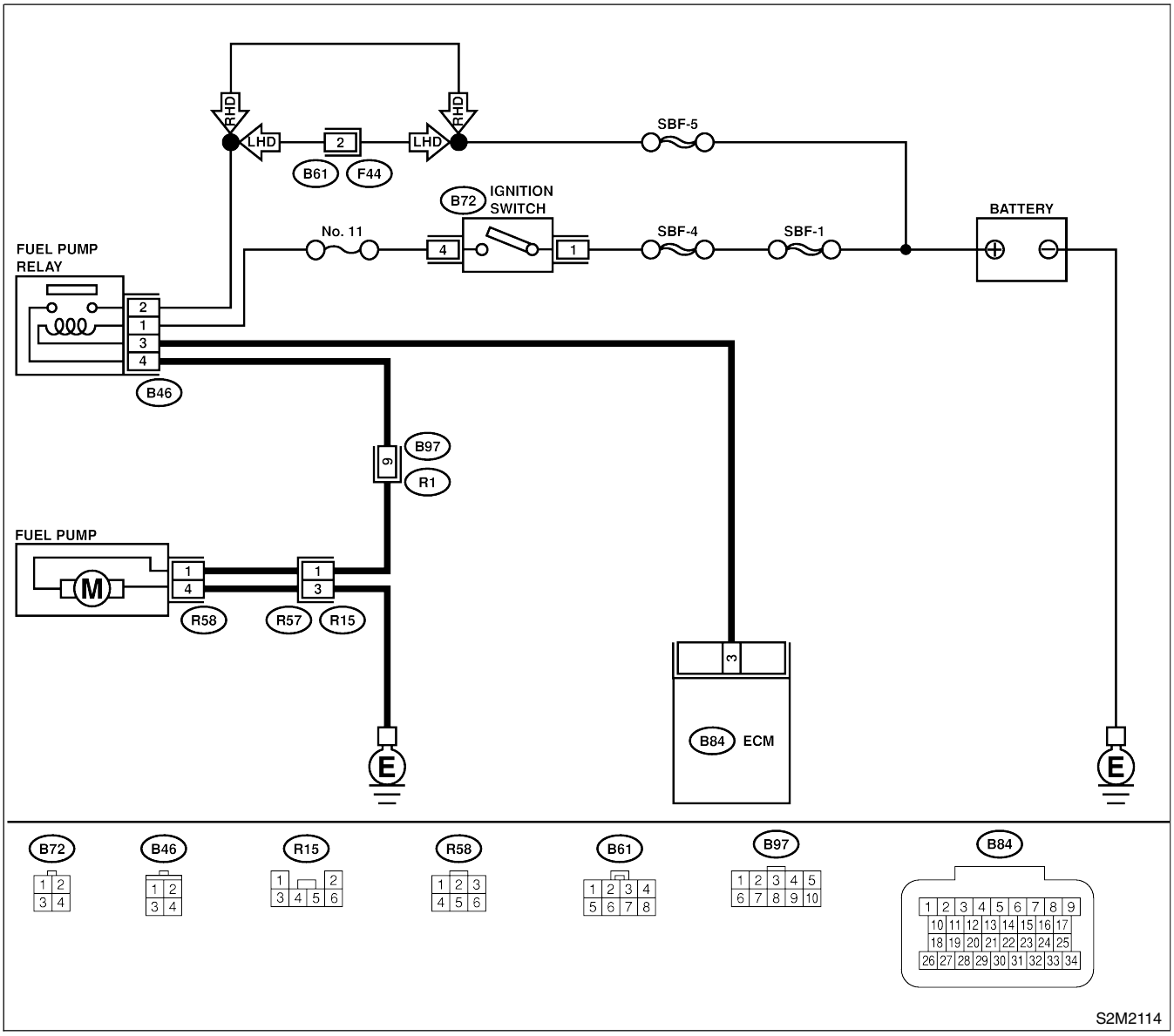
No.	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSEMBLY CONNECTOR.** 1) Disconnect connector from ECM. 2) Measure resistance of harness between ECM and ignition coil & ignitor assembly connector. ***Connector & terminal*** ***(E22) No. 9 — (E12) No. 4:*** ***(E22) No. 3 — (E12) No. 2:*** ***(E22) No. 10 — (E12) No. 3:***	Is the resistance less than 1 Ω?	Go to step **7**.	Repair open circuit in harness between ECM and ignition coil & ignitor assembly connector.
7	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSEMBLY CONNECTOR.** Measure resistance of harness between ECM and engine ground. ***Connector & terminal:*** ***(E22) No. 3 — Engine ground:*** ***(E22) No. 9 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **8**.	Repair ground short circuit in harness between ECM and ignition coil & ignitor assembly 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 pump circuit. <Ref. to EN(SOHCw/oOBD)-58, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>

MEMO:

E: FUEL PUMP CIRCUIT S068533E96

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to EN(SOHCw/oOBD)-31 OPERATION, Clear Memory Mode.> and <Ref. to EN(SOHCw/oOBD)-29 OPERATION, Inspection Mode.>

- **WIRING DIAGRAM:**



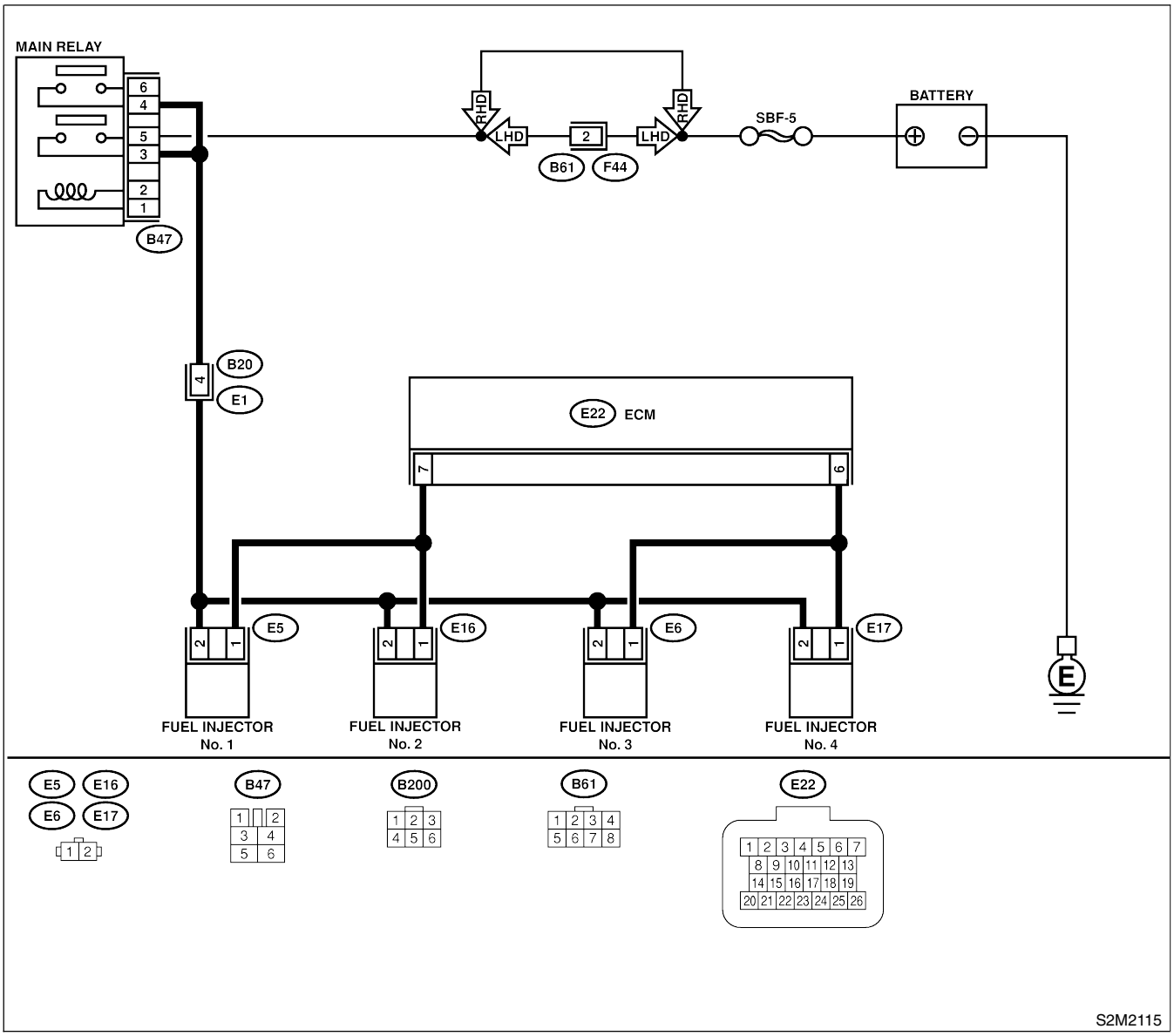
No.	Step	Check	Yes	No
1	**CHECK OPERATING SOUND OF FUEL PUMP.** 1) Connect test mode connector. 2) Turn ignition switch to ON. 3) Make sure that fuel pump is in operation. NOTE: For the procedure, refer to the "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to EN(SOHCw/oOBD)-32, Compulsory Valve Operation Check Mode.>	Does fuel pump produce operating sound?	Check fuel injector circuit. <Ref. to EN(SOHCw/oOBD)-62, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **2**.
2	**CHECK GROUND CIRCUIT OF FUEL PUMP.** 1) Turn ignition switch to OFF. 2) Remove fuel pump access hole lid located on the luggage compartment floor. 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 (R15)
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(SOHCw/oOBD)-50, 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 between fuel pump and fuel pump relay connector. ***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 and fuel pump relay connector • Poor contact in coupling connectors (R15) and (B97)
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 ground short circuit in harness between fuel pump and fuel pump relay connector.

No.	Step	Check	Yes	No
6	**CHECK FUEL PUMP RELAY.** 1) Disconnect connector from fuel pump relay. 2) Remove fuel pump relay from 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(SOHCw/oOBD)-40, Fuel Pump Relay.>
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*** ***(B84) No. 3 — (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(SOHCw/oOBD)-62, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

MEMO:

F: FUEL INJECTOR CIRCUIT S068533E97

CAUTION:
- **Check or repair only faulty parts.**
- **After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to EN(SOHCw/oOBD)-31 OPERATION, Clear Memory Mode.> and <Ref. to EN(SOHCw/oOBD)-29 OPERATION, 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(SOHC)-28, 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 (B20) • Poor contact in fuel injector connector
3	**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 11 and 12 Ω?	Go to step **4**.	Replace faulty fuel injector. <Ref. to FU(SOHCw/oOBD)-32, Fuel Injector.>
4	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Disconnect connector from ECM. 2) Measure resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(E22) No. 7 — #1 (E5) No. 1:*** ***(E22) No. 7 — #2 (E16) No. 1:*** ***(E22) No. 6 — #3 (E6) No. 1:*** ***(E22) No. 6 — #4 (E17) No. 1:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair open circuit in harness between ECM and fuel injector connector.
5	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(E22) No. 6 — Engine ground:*** ***(E22) No. 7 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Repair ground short in harness between ECM and fuel injector connector.
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Check crankshaft position sensor circuit. <Ref. to EN(SOHCw/oOBD)-64, CRANKSHAFT POSITION SENSOR CIRCUIT, Diagnostics for Engine Starting Failure.>

G: CRANKSHAFT POSITION SENSOR CIRCUIT S068533E98

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to EN(SOHCw/oOBD)-31, Clear Memory Mode.>, <Ref. to EN(SOHCw/oOBD)-29, Inspection Mode.>

NOTE:
Check crankshaft position sensor circuit. <Ref. to EN(SOHCw/oOBD)-68, DTC 11 CRANKSHAFT POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

13. List of Diagnostic Trouble Code (DTC) S068525

A: LIST S068525A12

DTC No.	Item	Contents of diagnosis	Index
11	Crankshaft position sensor	• No signal entered from crankshaft position sensor when ignition switch is ON. • The harness connector between ECM and crankshaft position sensor is in short or open.	<Ref. to EN(SOHCw/oOBD)-68, DTC 11 CRANKSHAFT POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
21	Engine coolant temperature sensor	• The engine coolant temperature sensor signal is abnormal. • The harness connector between ECM and engine coolant temperature sensor is in short or open.	<Ref. to EN(SOHCw/oOBD)-70, DTC 21 ENGINE COOLANT TEMPERATURE SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
22	Knock sensor	• The knock sensor signal is abnormal. • The harness connector between ECM and knock sensor is in short or open.	<Ref. to EN(SOHCw/oOBD)-74, DTC 22 KNOCK SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
45	Pressure sensor	• The pressure sensor signal is abnormal. • The harness connector between ECM and pressure sensor is in short or open.	<Ref. to EN(SOHCw/oOBD)-78, DTC 45 PRESSURE SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
24	Idle air control solenoid valve	• The idle air control solenoid valve is not in function. • The harness connector between ECM and idle air control solenoid valve is in short or open.	<Ref. to EN(SOHCw/oOBD)-80, DTC 24 IDLE AIR CONTROL SOLENOID VALVE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
26	Intake air temperature sensor	• The intake air temperature sensor signal is abnormal. • The harness connector between ECM and intake air temperature sensor is in short or open.	<Ref. to EN(SOHCw/oOBD)-84, DTC 26 INTAKE AIR TEMPERATURE SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
31	Throttle position sensor	• The throttle position sensor signal is abnormal. • The throttle position sensor is installed abnormally. • The harness connector between ECM and throttle position sensor is in short or open.	<Ref. to EN(SOHCw/oOBD)-86, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
32	Oxygen sensor (With catalyst vehicles)	• The oxygen sensor is not in function. • The harness connector between ECM and oxygen sensor is in short or open.	<Ref. to EN(SOHCw/oOBD)-90, DTC 32 OXYGEN SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

LIST OF DIAGNOSTIC TROUBLE CODE (DTC)

DTC No.	Item	Contents of diagnosis	Index
33	Vehicle speed signal	• The vehicle speed signal is abnormal. • The harness connector between ECM and combination meter is in short or open.	<Ref. to EN(SOHCw/oOBD)-94, DTC 33 VEHICLE SPEED SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
35	Purge control solenoid valve	• The purge control solenoid valve is not in function. • The harness connector between ECM and purge control solenoid valve is in short or open.	<Ref. to EN(SOHCw/oOBD)-96, DTC 35 PURGE CONTROL SOLENOID VALVE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
38	Torque control signal	• Abnormal signal entered from TCM. • The harness connector between ECM and TCM is in short.	<Ref. to EN(SOHCw/oOBD)-100, DTC 38 TORQUE CONTROL SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
46	CO resistor (General spec. vehicles)	• The CO resistor signal is abnormal. • The harness connector between ECM and CO resistor is in short or open. • The CO value is not adjusted to specifications.	<Ref. to EN(SOHCw/oOBD)-102, DTC 46 CO RESISTOR (GENERAL SPEC. VEHICLES), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
51	Neutral position switch	• The neutral position switch signal is abnormal. • The harness connector between ECM and neutral position switch is in short or open.	<Ref. to EN(SOHCw/oOBD)-104, DTC 51 NEUTRAL POSITION SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
53	Immobiliser system	Faulty immobiliser system.	<Ref. to IM-2, Basic Diagnostic Procedure.>
54	Air intake system	Because the ducts and hoses on air intake line are loosened or damaged, the pressure sensor signal is abnormal.	<Ref. to EN(SOHCw/oOBD)-108, DTC 54 — AIR INTAKE SYSTEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
85	Charge system	Charge system is abnormal.	<Ref. to EN(SOHCw/oOBD)-111, DTC 85 CHARGE SYSTEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

MEMO:

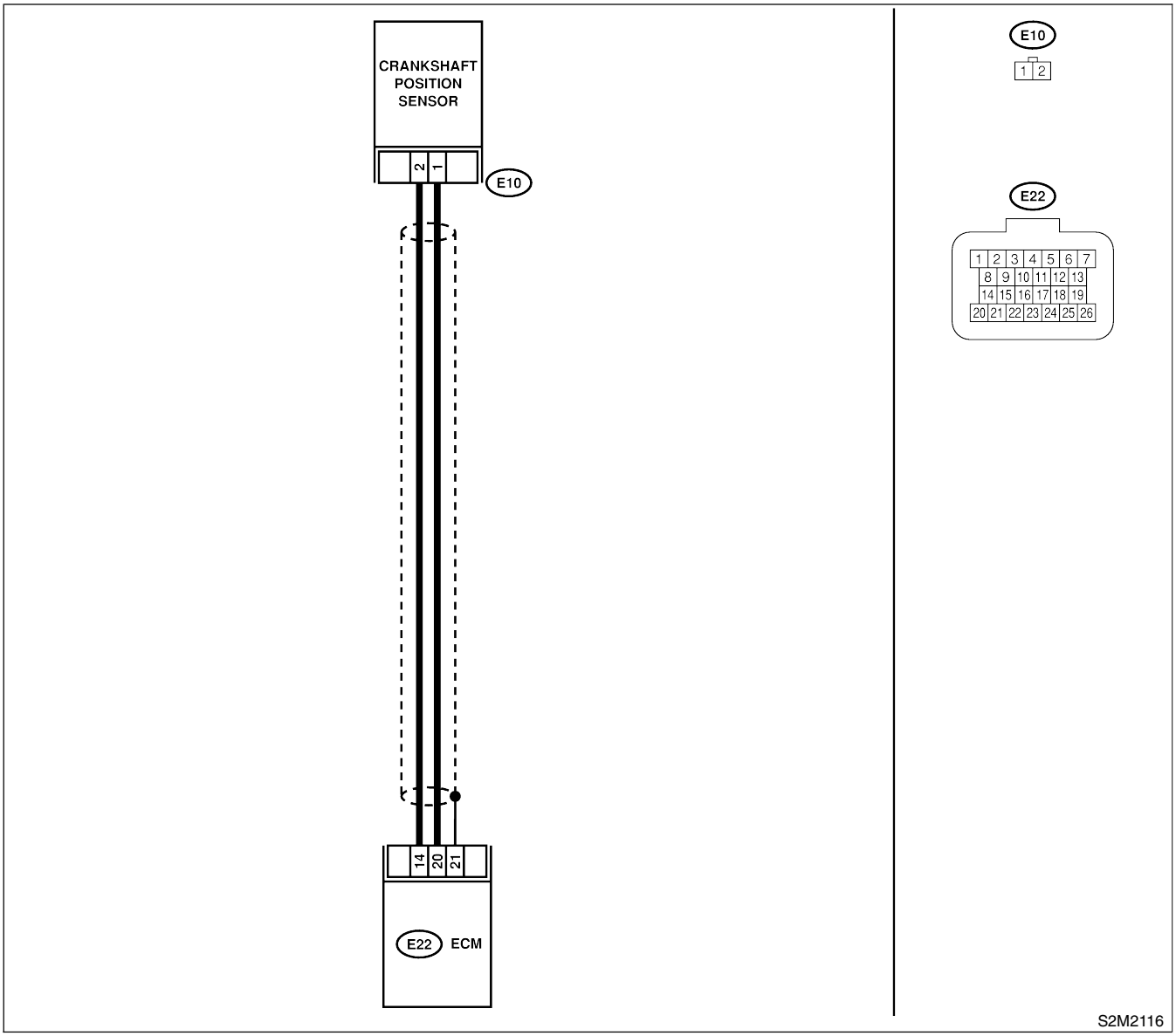
14. Diagnostic Procedure with Diagnostic Trouble Code (DTC) S068521

A: DTC 11 CRANKSHAFT POSITION SENSOR S068521G55

- **DIAGNOSIS:**
  - No signal entered from crankshaft position sensor when ignition switch is ON.
  - The harness connector between ECM and crankshaft position sensor is in short or open.
- **TROUBLE SYMPTOM:**
  - Engine stalls.
  - Restarting impossible

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to EN(SOHCw/oOBD)-31 OPERATION, Clear Memory Mode.> and <Ref. to EN(SOHCw/oOBD)-29 OPERATION, Inspection Mode.>

- **WIRING DIAGRAM:**



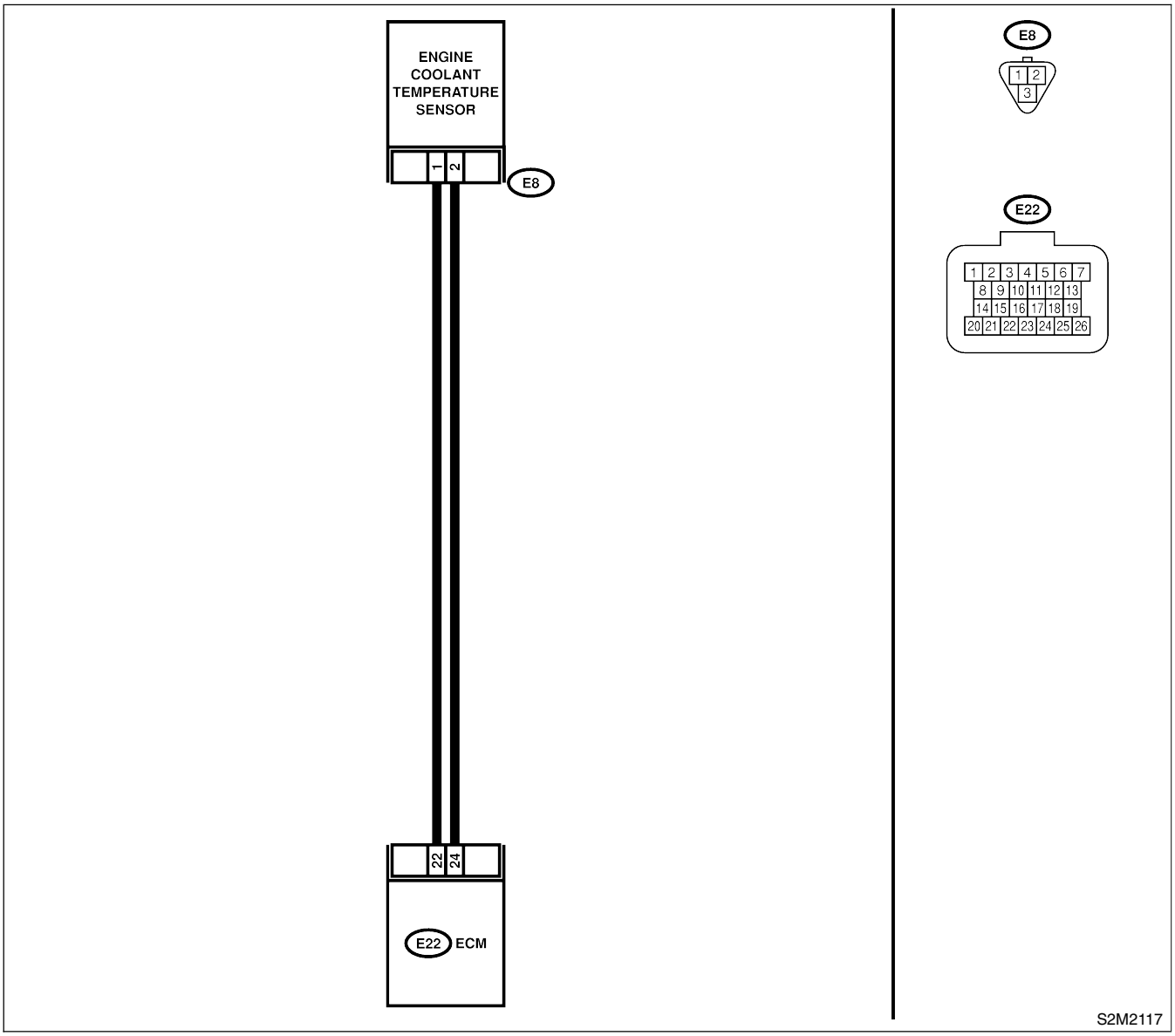
No.	Step	Check	Yes	No
1	**CHECK CONDITION OF CRANKSHAFT POSITION SENSOR INSTALLATION.**	Are the crankshaft position sensor installing bolts tightened securely?	Go to step **2**.	Tighten crankshaft position sensor installing bolts securely.
2	**CHECK CRANKSHAFT POSITION SENSOR.** 1) Remove crankshaft position sensor. 2) Measure resistance between connector terminals of crankshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 1 and 4 kΩ?	Go to step **3**.	Replace crankshaft position sensor.
3	**CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR.** 1) Connect connector to crankshaft position sensor. 2) Disconnect connector from ECM. 3) Measure resistance of harness between crankshaft position sensor connector and ECM. ***Connector & terminal*** ***(E22) No. 14 — (E22) No. 20:***	Is the resistance between 1 and 5 kΩ?	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
4	**CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR.** Measure resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(E22) No. 20 — Engine ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between crankshaft position sensor and ECM connector.	Go to step **5**.
5	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM, then connect ST. <Ref. to EN(SOHCw/oOBD)-23, HOW TO CHECK I/O SIGNAL FOR ECM, Engine Control Module (ECM) I/O Signal.> ST 498307600 CHECK BOARD KIT 3) Set the positive (+) probe and ground lead of oscilloscope at ECM connector terminals. 4) Measure voltage indicated on oscilloscope while cranking the engine. ***Connector & terminal*** ***(B) No. 26 (+) — (B) No. 19 (–):***	Is the voltage more than 400 mV?	Go to step **6**.	Replace crankshaft position sensor.
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Go to step **7**.
7	**CHECK ECM.** 1) Connect all connectors. 2) Erase the memory. <Ref. to EN(SOHCw/oOBD)-31, Clear Memory Mode.> 3) Perform inspection mode. <Ref. to EN(SOHCw/oOBD)-29, Inspection Mode.> 4) Read out the trouble code. <Ref. to EN(SOHCw/oOBD)-27, Read Diagnostic Trouble Code.>	Is the same trouble code as in the current diagnosis still being output?	Replace generator.	Go to step **8**.
8	**CHECK ANY OTHER TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

B: DTC 21 ENGINE COOLANT TEMPERATURE SENSOR S068521G58

- **DIAGNOSIS:**
  - The engine coolant temperature sensor signal is abnormal.
  - The harness connector between ECM and engine coolant temperature sensor is in short or open.
- **TROUBLE SYMPTOM:**
  - Hard to start
  - Erroneous idling
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to EN(SOHCw/oOBD)-31 OPERATION, Clear Memory Mode.> and <Ref. to EN(SOHCw/oOBD)-29 OPERATION, Inspection Mode.>

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Remove air intake duct and air cleaner assembly. 3) Disconnect connector from engine coolant temperature sensor. 4) Measure voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — 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 **2**.
2	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to ON. 2) Measure voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — 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.** Measure voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (–):***	Is the voltage more than 4 V?	Go to step **4**.	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
4	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Measure resistance of harness between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 1 — 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 ECM and engine coolant temperature sensor connector • Poor contact in engine coolant temperature sensor connector • Poor contact in ECM connector

No.	Step	Check	Yes	No
5	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** Measure resistance between engine coolant temperature sensor terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 2 and 3 kΩ at 20°C (68°F)?	Go to step **6**.	Replace engine coolant temperature sensor. <Ref. to FU(SOHCw/oOBD)-23, Engine Coolant Temperature Sensor.>
6	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** Measure resistance between engine coolant temperature sensor terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 0.35 and 0.4 kΩ at 80°C (176°F)?	Go to step **7**.	Replace engine coolant temperature sensor. <Ref. to FU(SOHCw/oOBD)-23, Engine Coolant Temperature Sensor.>
7	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** Measure resistance between engine coolant temperature sensor terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 0.2 and 0.3 kΩ at 90°C (194°F)?	Replace ECM. <Ref. to FU(SOHCw/oOBD)-38, Engine Control Module.>	Replace engine coolant temperature sensor. <Ref. to FU(SOHCw/oOBD)-23, Engine Coolant Temperature Sensor.>

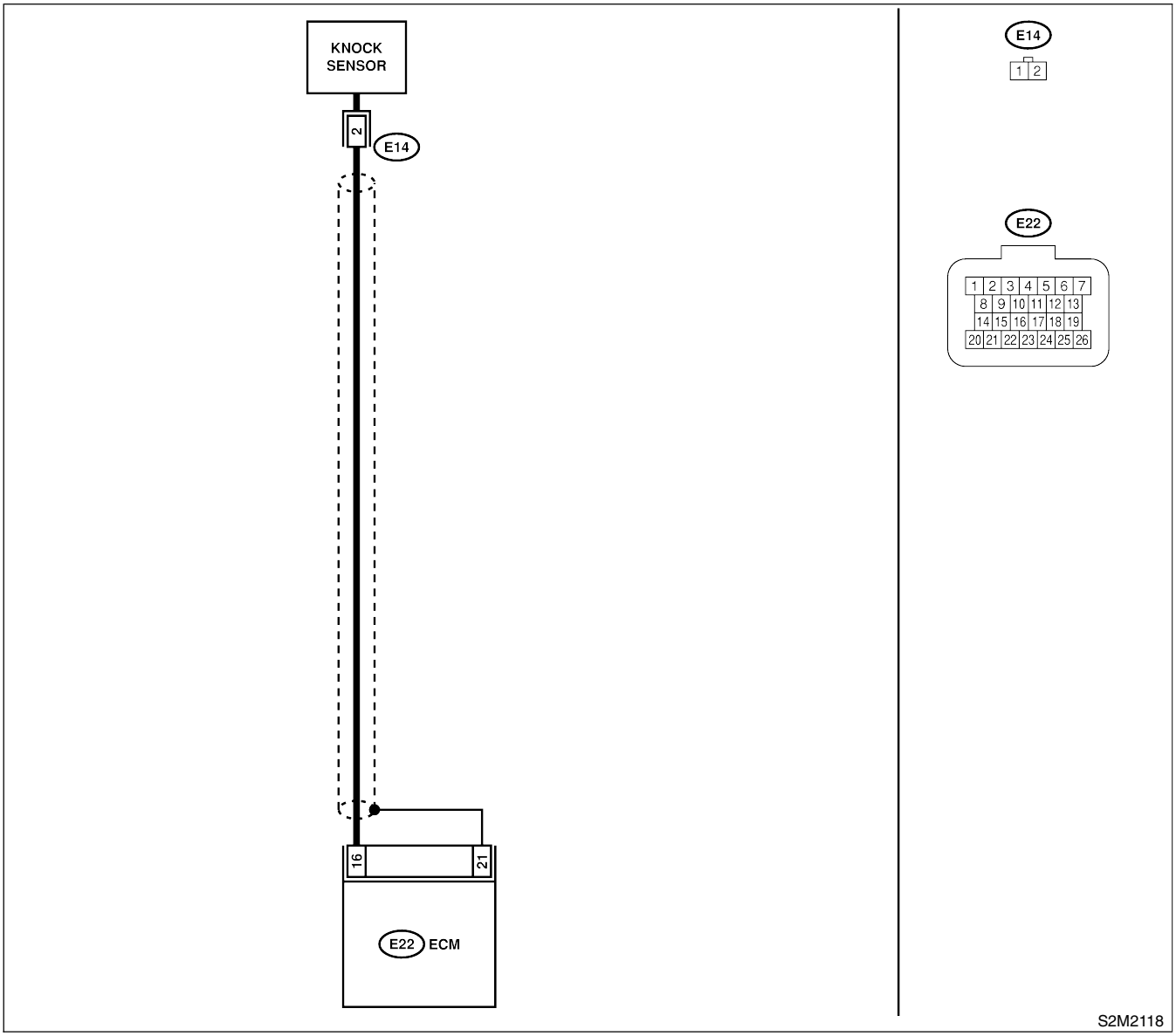
MEMO:

C: DTC 22 KNOCK SENSOR S068521G59

- **DIAGNOSIS:**
  - The knock sensor signal is abnormal.
  - The harness connector between ECM and knock sensor is in short or open.
- **TROUBLE SYMPTOM:**
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to EN(SOHCw/oOBD)-31 OPERATION, Clear Memory Mode.> and <Ref. to EN(SOHCw/oOBD)-29 OPERATION, Inspection Mode.>

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between ECM connector and engine ground. ***Connector & terminal*** ***(E22) No. 16 — Engine ground:***	Is the resistance more than 700 kΩ?	Go to step **3**.	Go to step **2**.
2	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** Measure resistance of harness between ECM connector and engine ground. ***Connector & terminal*** ***(E22) No. 16 — Engine ground:***	Is the resistance less than 400 kΩ?	Go to step **5**.	Go to step **6**.
3	**CHECK KNOCK SENSOR.** 1) Disconnect connector from knock sensor. 2) Measure resistance between knock sensor connector terminal and engine ground. ***Terminal*** ***No. 2 — Engine ground:***	Is the resistance more than 700 kΩ?	Go to step **4**.	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
4	**CHECK CONDITION OF KNOCK SENSOR INSTALLATION.**	Is the knock sensor installation bolt tightened securely?	Replace knock sensor. <Ref. to FU(SOHCw/oOBD)-25, Knock Sensor.>	Tighten knock sensor installation bolt securely.
5	**CHECK KNOCK SENSOR.** 1) Disconnect connector from knock sensor. 2) Measure resistance between knock sensor connector terminal and engine ground. ***Terminal*** ***No. 2 — Engine ground:***	Is the resistance less than 400 kΩ?	Replace 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.

No.	Step	Check	Yes	No
6	**CHECK INPUT SIGNAL FOR ECM.** 1) Connect ST. <Ref. to EN(SOHCw/oOBD)-23, HOW TO CHECK I/O SIGNAL FOR ECM, Engine Control Module (ECM) I/O Signal.> ST 498307600 CHECK BOARD KIT 2) Turn ignition switch to ON. 3) Measure voltage between ECM and engine ground. ***Connector & terminal*** ***(B) No. 17 (+) — Engine 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	Repair poor contact in ECM connector.

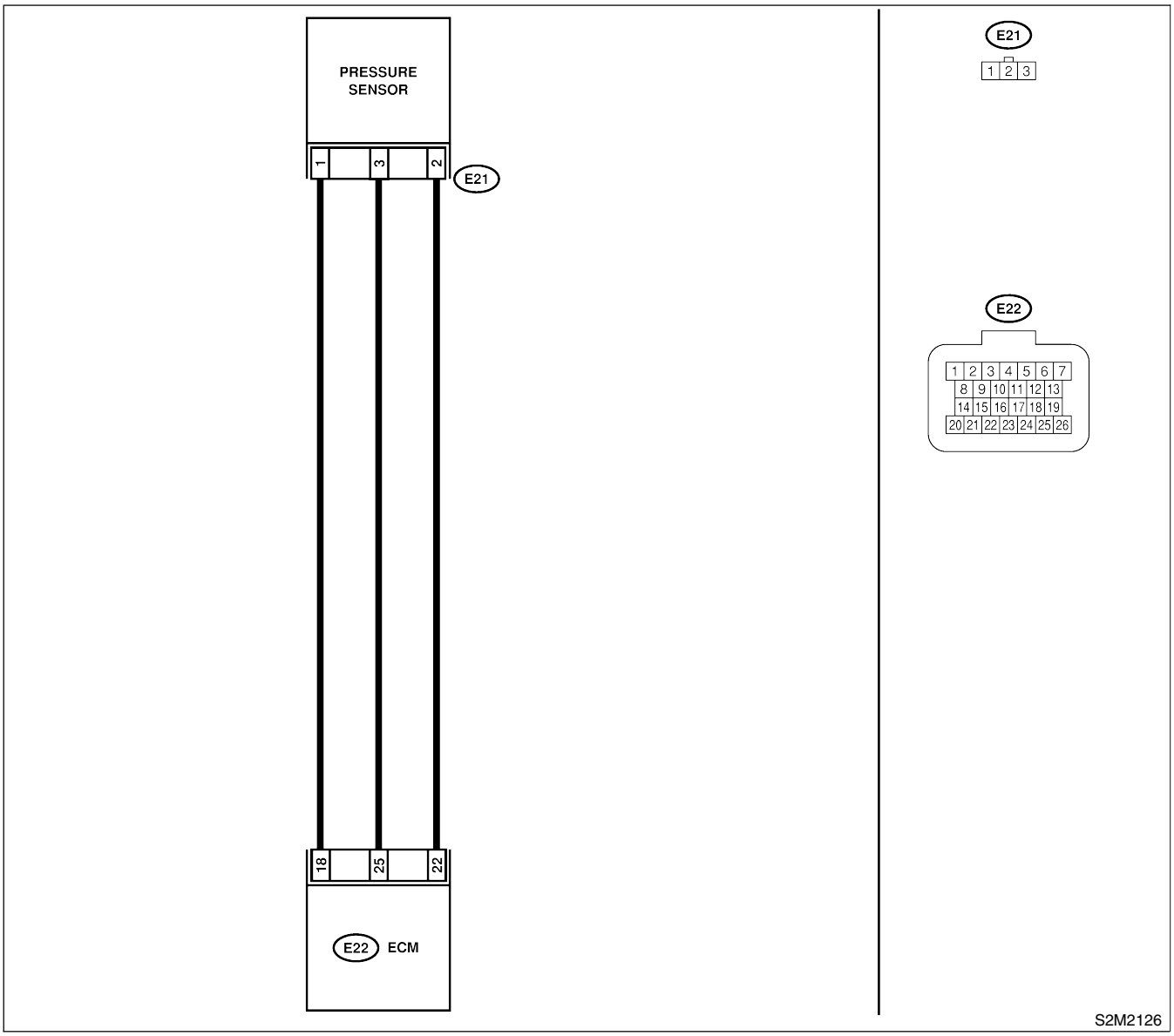
MEMO:

D: DTC 45 PRESSURE SENSOR S068521G67

- **DIAGNOSIS:**
  - The pressure sensor signal is abnormal.
  - The harness connector between ECM and pressure sensor is in short or open.
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to EN(SOHCw/oOBD)-31 OPERATION, Clear Memory Mode.> and <Ref. to EN(SOHCw/oOBD)-29 OPERATION, Inspection Mode.>

- **WIRING DIAGRAM:**



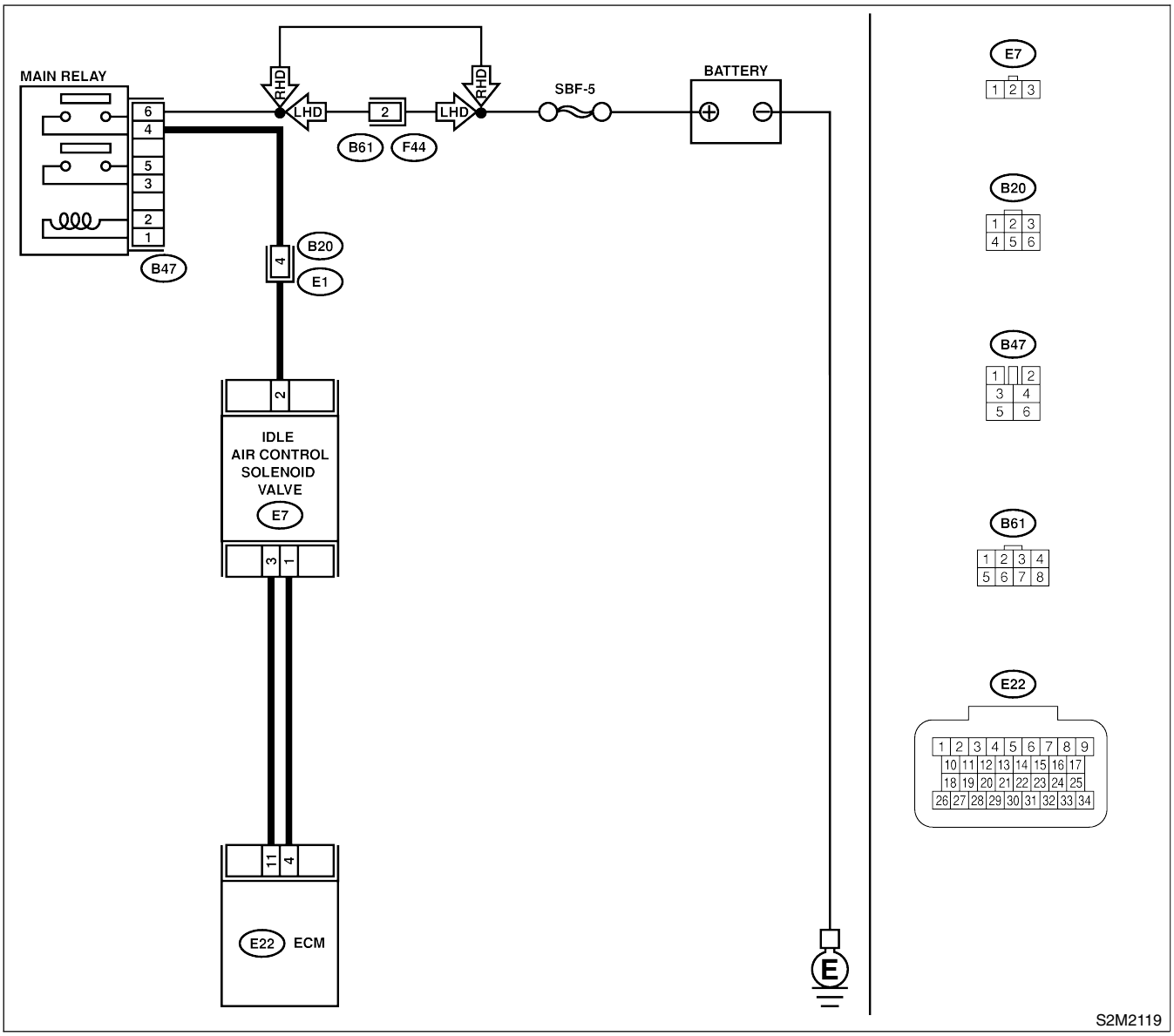
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.** 1) Disconnect connector from pressure sensor. 2) Turn ignition switch to ON. 3) Measure voltage between pressure sensor connector and engine ground. ***Connector & terminal*** ***(E21) No. 3 (+) — Engine ground (–):***	Is the voltage between 4.5 V and 5.5 V?	Go to step **2**.	Repair open circuit in harness between ECM and pressure sensor.
2	**CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.** 1) Disconnect connector from ECM. 2) Measure resistance of harness between ECM and pressure sensor connector. ***Connector & terminal*** ***(E22) No. 22 — (E21) No. 2:*** ***(E22) No. 25 — (E21) No. 3:*** ***(E22) No. 18 — (E21) No. 1:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair open circuit in harness between ECM and pressure sensor connector.
3	**CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.** Measure resistance of harness between ECM connector and engine ground. ***Connector & terminal*** ***(E22) No. 25 — Engine ground:*** ***(E22) No. 18 — Engine ground:*** ***(E22) No. 22 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Repair ground short circuit in harness between ECM and pressure sensor connector.
4	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM, then connect ST. <Ref. to EN(SOHCw/oOBD)-23, HOW TO CHECK I/O SIGNAL FOR ECM, Engine Control Module (ECM) I/O Signal.> ST 498307600 CHECK BOARD KIT 3) Turn ignition switch to ON. 4) Measure voltage between ECM and engine ground. ***Connector & terminal*** ***(A) No. 15 (+) — Engine ground (–):***	Is the voltage between 2.3 V and 2.5 V?	Go to step **5**.	Replace pressure sensor. <Ref. to FU(SOHCw/oOBD)-29, Pressure Sensor.>
5	**CHECK INPUT SIGNAL FOR ECM.** 1) Start engine, and idle it. 2) Measure voltage between ECM and engine ground. ***Connector & terminal*** ***(A) No. 15 (+) — Engine ground (–):***	Is the voltage between 1.2 V and 1.8 V?	Go to step **6**.	Replace pressure sensor. <Ref. to FU(SOHCw/oOBD)-29, Pressure Sensor.>
6	**CHECK POOR CONTACT.** Check poor contact in pressure sensor connector.	Is there poor contact in pressure sensor connector?	Repair poor contact in pressure sensor connector.	Replace pressure sensor. <Ref. to FU(SOHCw/oOBD)-29, Pressure Sensor.>

E: DTC 24 IDLE AIR CONTROL SOLENOID VALVE S068521G60

- **DIAGNOSIS:**
  - The idle air control solenoid valve is not in function.
  - The harness connector between ECM and idle air control solenoid valve is in short or open.
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Hard to start
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to EN(SOHCw/oOBD)-31 OPERATION, Clear Memory Mode.> and <Ref. to EN(SOHCw/oOBD)-29 OPERATION, Inspection Mode.>

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK AIR INTAKE SYSTEM.** 1) Turn ignition switch to ON. 2) Start engine and idle it. 3) Check the following item. • Loose installation of intake manifold, idle air control solenoid valve and throttle body • Cracks of intake manifold gasket, idle air control solenoid valve gasket and throttle body gasket • Loose control connection and cracks of idle air control solenoid valve by-pass hose • Disconnection of vacuum hoses	Is there a fault in air intake system?	Repair or replace air intake system.	Go to step **2**.
2	**CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM and idle air control solenoid valve. 3) Measure resistance of harness between ECM and idle air control solenoid valve connector. ***Connector & terminal*** ***(E22) No. 4 — (E7) No. 1:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair open circuit in harness between ECM and idle air control solenoid valve connector.
3	**CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.** Measure resistance of harness between ECM and idle air control solenoid valve connector. ***Connector & terminal*** ***(E22) No. 11 — (E7) No. 3:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair open circuit in harness between ECM and idle air control solenoid valve connector.
4	**CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.** Measure resistance of harness between ECM connector and engine ground. ***Connector & terminal*** ***(E22) No. 11 — Engine ground:***	Is the resistance more than 1 MΩ?	Repair ground short in harness between ECM and idle air control solenoid valve.	Go to step **5**.
5	**CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.** Measure resistance of harness between ECM connector and engine ground. ***Connector & terminal*** ***(E22) No. 4 — Engine ground:***	Is the resistance more than 1 MΩ?	Repair ground short circuit in harness between ECM and idle air control solenoid valve connector.	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.	Go to step **7**.
7	**CHECK MAIN RELAY.** 1) Turn 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. 4 — No. 6:***	Is the resistance less than 10 Ω?	Go to step **8**.	Replace main relay.

No.	Step	Check	Yes	No
8	**CHECK POWER SUPPLY TO IDLE AIR CONTROL SOLENOID VALVE.** 1) Disconnect connector from idle air control solenoid valve. 2) Turn ignition switch to ON. 3) Measure 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 **9**.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between idle air control solenoid valve and battery • Poor contact in coupling connector (B20)
9	**CHECK POOR CONTACT.** Check poor contact in idle air control solenoid valve connector.	Is there poor contact in idle air control solenoid valve connector?	Repair poor contact in idle air control solenoid valve connector.	Contact your Subaru distributor. NOTE: Inspection by your Subaru distributor is required, because probable cause is deterioration of multiple parts.

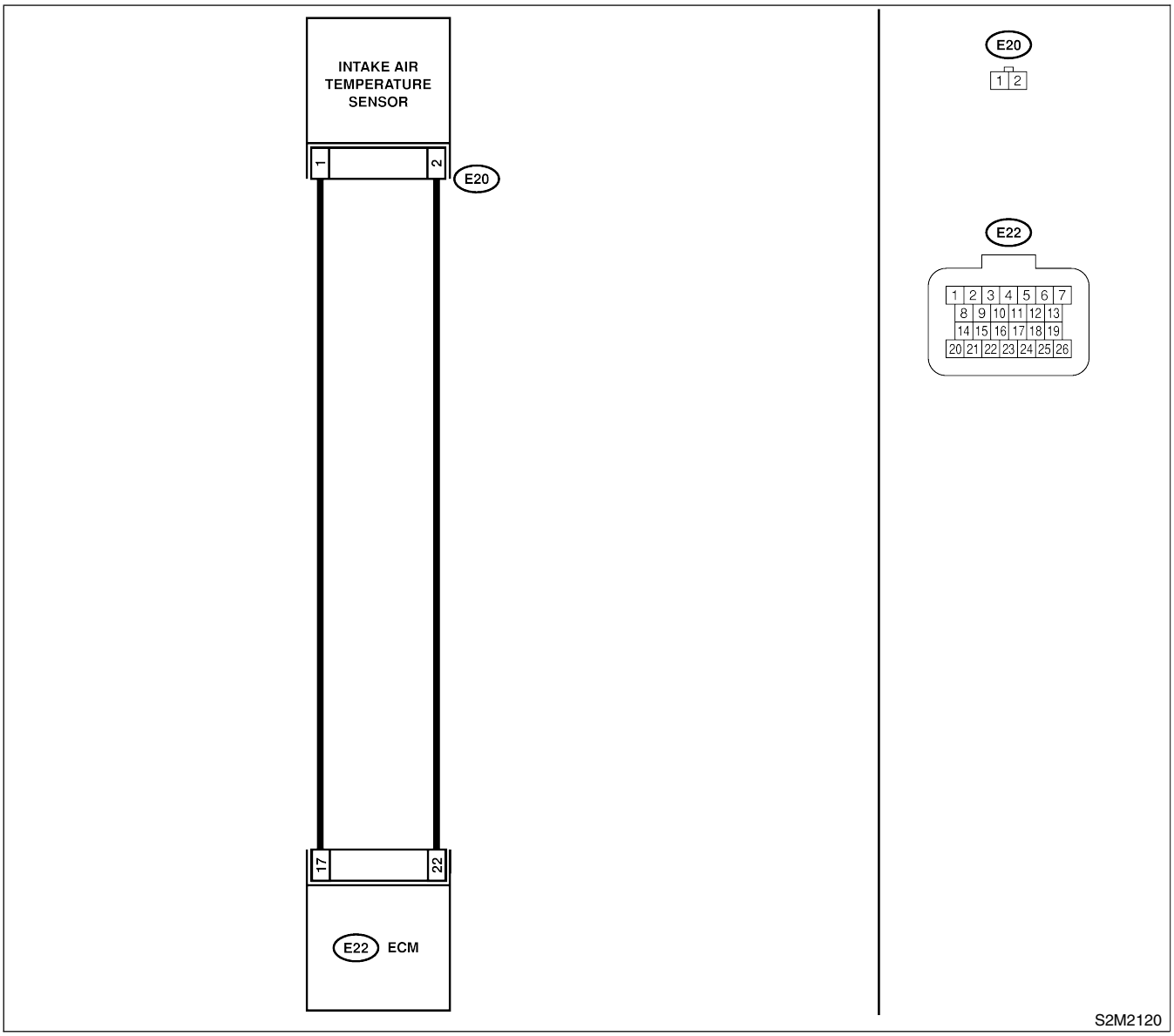
MEMO:

F: DTC 26 INTAKE AIR TEMPERATURE SENSOR S068521G61

- **DIAGNOSIS:**
  - The intake air temperature sensor signal is abnormal.
  - The harness connector between ECM and intake air temperature sensor is in short or open.
- **TROUBLE SYMPTOM:**
  - Hard to start
  - Erroneous idling
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to EN(SOHCw/oOBD)-31 OPERATION, Clear Memory Mode.> and <Ref. to EN(SOHCw/oOBD)-29 OPERATION, Inspection Mode.>

- **WIRING DIAGRAM:**



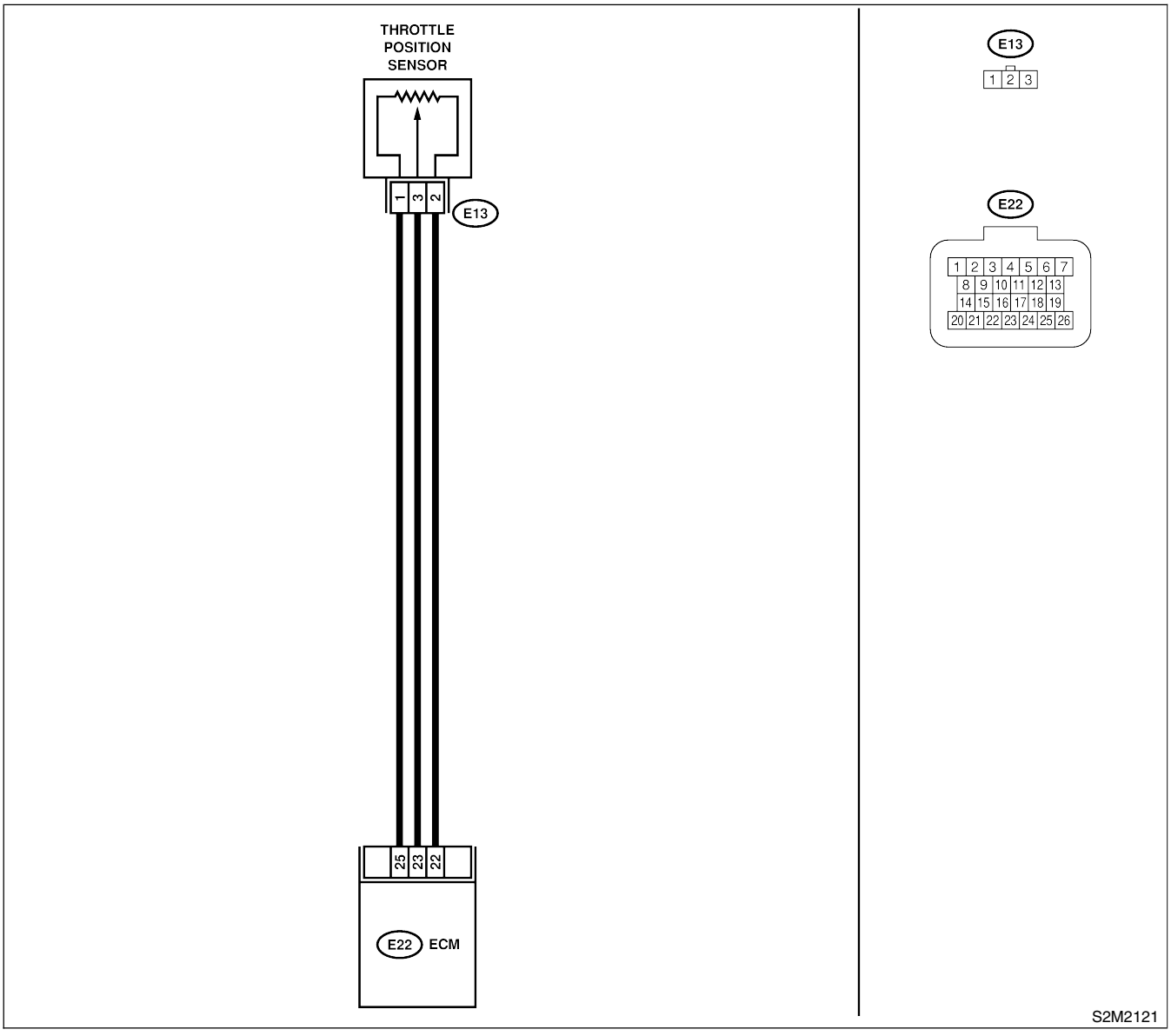
No.	Step	Check	Yes	No
1	**CHECK INTAKE AIR TEMPERATURE SENSOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from intake air temperature sensor. 3) Measure resistance between intake air temperature sensor terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 2 and 3 kΩ at 20°C (68°F)?	Go to step **2**.	Replace intake air temperature sensor. <Ref. to FU(SOHCw/oOBD)-30, Intake Air Temperature Sensor.>
2	**CHECK INTAKE AIR TEMPERATURE SENSOR.** Measure resistance between intake air temperature sensor terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 2 and 3 kΩ at 50°C (122°F)?	Go to step **3**.	Replace intake air temperature sensor. <Ref. to FU(SOHCw/oOBD)-30, Intake Air Temperature Sensor.>
3	**CHECK HARNESS BETWEEN ECM AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.** 1) Disconnect connector from ECM. 2) Measure resistance of harness connector between ECM and intake air temperature sensor connector. ***Connector & terminal*** ***(E22) No. 17 — (E20) No. 1:*** ***(E22) No. 22 — (E20) No. 2:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair open circuit in harness between ECM and intake air temperature sensor connector.
4	**CHECK HARNESS BETWEEN ECM AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.** Measure resistance of harness between ECM connector and engine ground. ***Connector & terminal*** ***(E22) No. 17 — Engine ground:*** ***(E22) No. 22 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Repair ground short circuit in harness between ECM and idle air control solenoid valve connector.
5	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Contact your Subaru distributor. NOTE: Inspection by your Subaru distributor is required, because probable cause is deterioration of multiple parts.

G: DTC 31 THROTTLE POSITION SENSOR S068521G62

- **DIAGNOSIS:**
  - The throttle position sensor signal is abnormal.
  - The throttle position sensor is installed abnormally.
  - The harness connector between ECM and throttle position sensor is in short or open.
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to EN(SOHCw/oOBD)-31 OPERATION, Clear Memory Mode.> and <Ref. to EN(SOHCw/oOBD)-29 OPERATION, Inspection Mode.>

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM, then connect ST. <Ref. to EN(SOHCw/oOBD)-23, HOW TO CHECK I/O SIGNAL FOR ECM, Engine Control Module (ECM) I/O Signal.> ST 498307600 CHECK BOARD KIT 3) Turn ignition switch to ON. 4) Measure voltage between ECM and engine ground while throttle valve is fully closed. ***Connector & terminal*** ***(B) No. 23 (+) — Engine ground (–):***	Is the voltage more than 4.5 V?	Go to step **3**.	Go to step **2**.
2	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM and engine ground. ***Connector & terminal*** ***(B) No. 23 (+) — Engine ground (–):***	Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair poor contact in ECM connector.	Contact your Subaru distributor. NOTE: Inspection by your Subaru distributor is required, because probable cause is deterioration of multiple parts.
3	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM connector and engine ground. ***Connector & terminal*** ***(B) No. 24 (+) — Engine ground (–):***	Is the voltage less than 0.1 V?	Go to step **4**.	Repair poor contact in ECM connector.
4	**CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from throttle position sensor. 3) Turn ignition switch to ON. 4) Measure voltage between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E13) No. 3 (+) — Engine ground (–):***	Is the voltage more than 4.5 V?	Go to step **5**.	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
5	**CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect ECM connector from CHECK BOARD. 3) Measure resistance of harness between ECM and throttle position sensor connector. ***Connector & terminal*** ***(E22) No. 22 — (E13) No. 2:***	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 throttle position sensor and ECM connector • Poor contact in ECM connector • Poor contact in throttle position sensor connector

No.	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.** Measure resistance of harness between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E13) No. 2 — Engine ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between throttle position sensor and ECM connector.	Go to step **7**.
7	**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.	Go to step **8**.
8	**CHECK CONDITION OF THROTTLE POSITION SENSOR INSTALLATION.**	Are the throttle position sensor installing screws tightened securely?	Replace throttle position sensor.	Adjust throttle position sensor and tighten throttle position sensor installing screws securely.

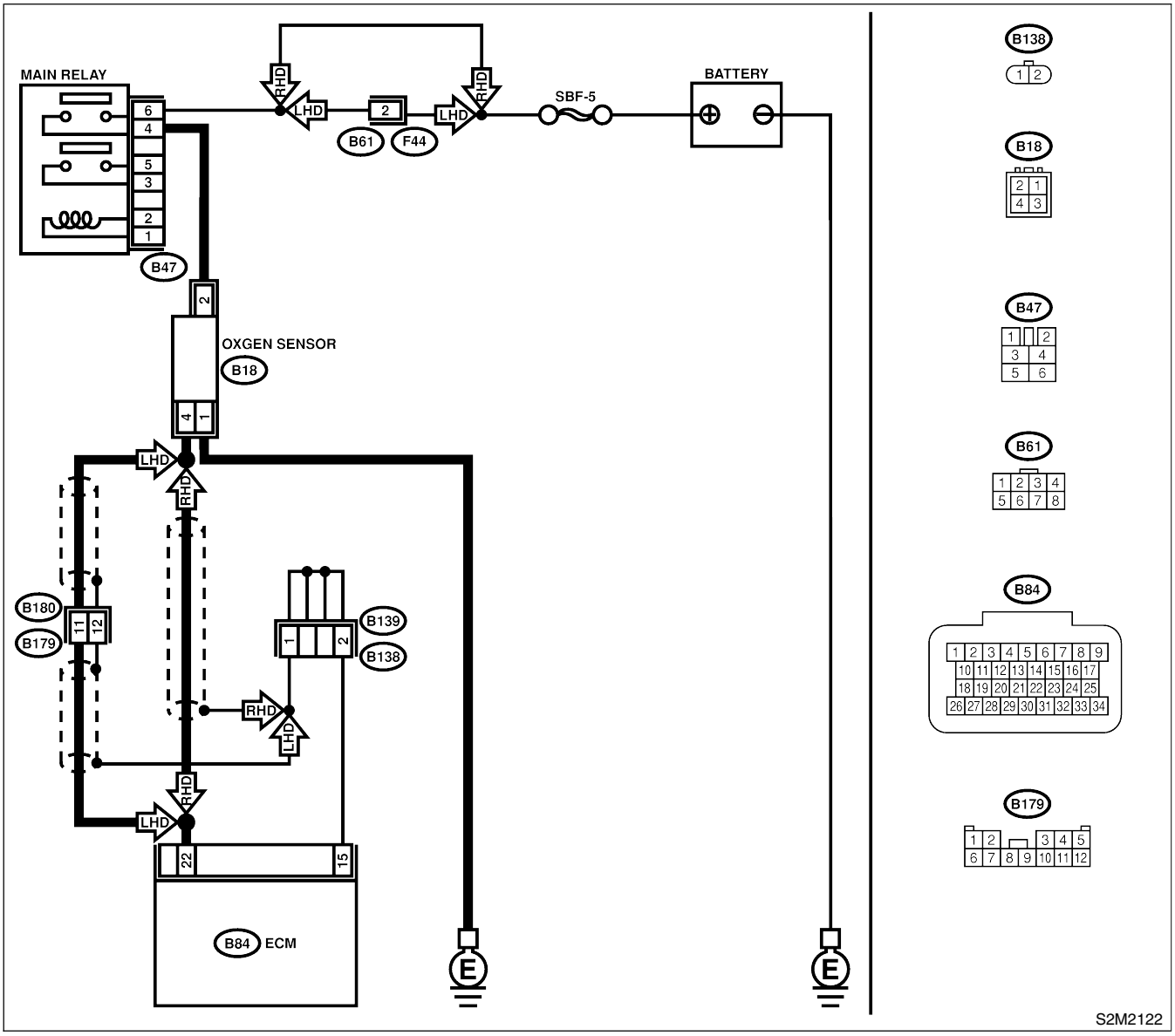
MEMO:

H: DTC 32 OXYGEN SENSOR S068521G63

- **DIAGNOSIS:**
  - The oxygen sensor is not in function.
  - The harness connector between ECM and oxygen sensor is in short or open.
- **TROUBLE SYMPTOM:**
  - Failure of engine to start
  - Erroneous idling
  - Poor driving performance
  - Engine stalls.
  - Idle mixture is out of specifications.

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to EN(SOHCw/oOBD)-31 OPERATION, Clear Memory Mode.> and <Ref. to EN(SOHCw/oOBD)-29 OPERATION, Inspection Mode.>

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK FOR OTHER CAUSES AFFECTING EXHAUST GAS.** NOTE: • Check for use of improper fuel. • Check if engine oil or coolant level is extremely low.	Is CO% more than 2% after engine warm-up?	Check fuel system.	Go to step **2**.
2	**CHECK EXHAUST SYSTEM.**	Is there a fault in exhaust system?	Repair exhaust system. NOTE: • 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 hole	Go to step **3**.
3	**CHECK HARNESS BETWEEN OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from oxygen sensor. 3) Turn ignition switch to ON. 4) Measure voltage between front oxygen sensor harness connector and engine ground. ***Connector & terminal*** ***(B18) No. 4 (+) — Engine ground (–):***	Is the voltage more than 0.2 V?	Go to step **4**.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and oxygen sensor connector • Poor contact in the ECM connector
4	**CHECK POOR CONTACT.** Check poor contact in oxygen sensor connector.	Is there poor contact in oxygen sensor connector?	Repair poor contact in oxygen sensor connector.	Go to step **5**.
5	**CHECK MAIN RELAY.** 1) Turn 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. 4 — No. 6:***	Is the resistance less than 10 Ω?	Go to step **6**.	Replace main relay.

No.	Step	Check	Yes	No
6	**CHECK POWER SUPPLY TO OXYGEN SENSOR.** 1) Turn ignition switch to ON. 2) Measure voltage between oxygen sensor connector. ***Connector & terminal*** ***(B18) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **7**.	Repair power supply line. NOTE: In this case, repair the following: • Open circuit in harness between battery and oxygen sensor connector • Poor contact in oxygen sensor connector • Poor contact in main relay connector
7	**CHECK OXYGEN SENSOR.** 1) Turn ignition switch to OFF. 2) Measure resistance between oxygen sensor terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 30 Ω?	Repair poor contact. NOTE: In this case, repair the following: • Poor contact in ECM connector • Poor contact in oxygen sensor connector	Replace oxygen sensor. <Ref. to FU(SOHCw/oOBD)-36, Oxygen Sensor.>

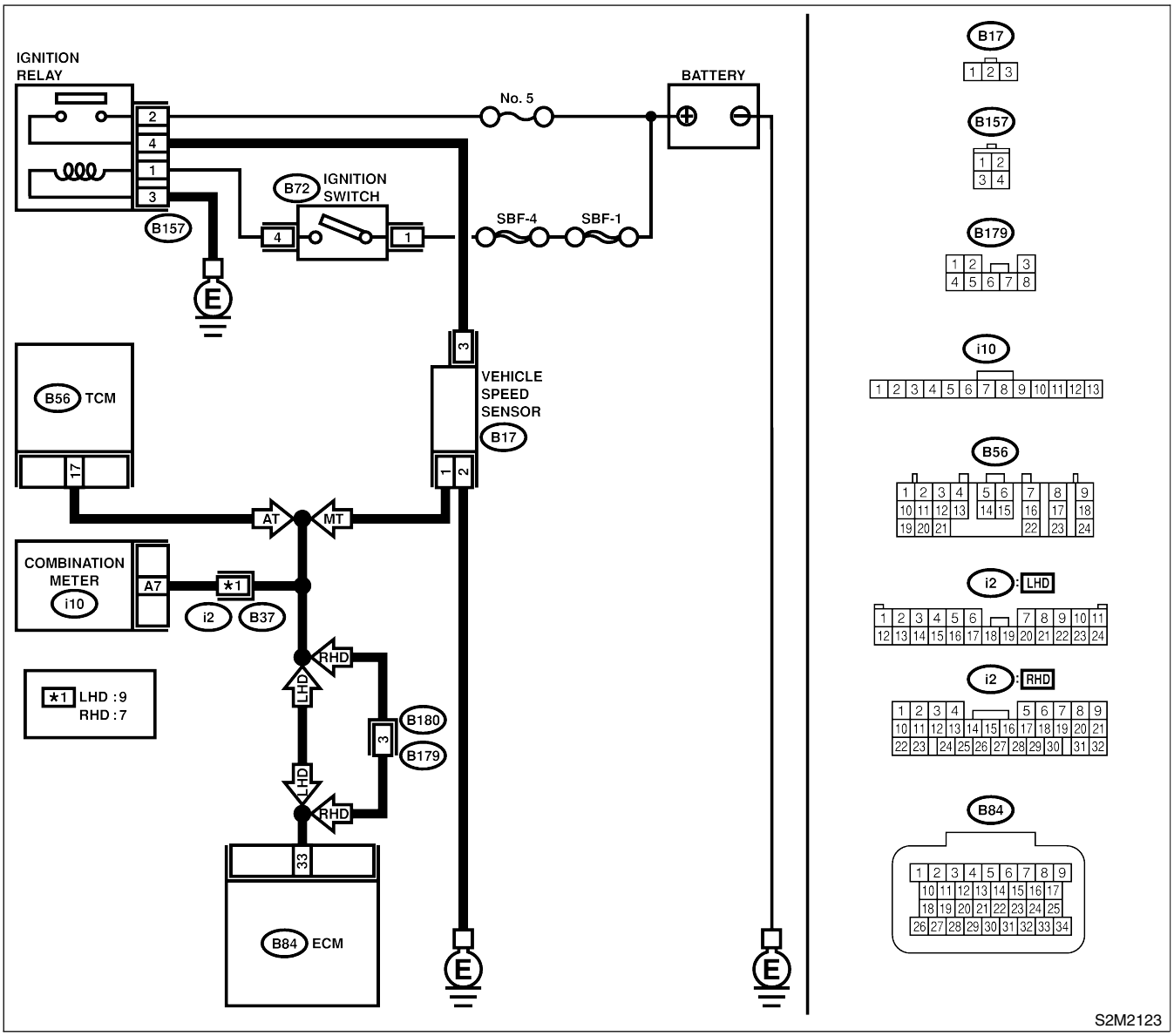
MEMO:

I: DTC 33 VEHICLE SPEED SIGNAL S068521G64

- **DIAGNOSIS:**
  - The vehicle speed signal is abnormal.
  - The harness connector between ECM and vehicle speed sensor is in short or open.
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to EN(SOHCw/oOBD)-31 OPERATION, Clear Memory Mode.> and <Ref. to EN(SOHCw/oOBD)-29 OPERATION, Inspection Mode.>

- **WIRING DIAGRAM:**



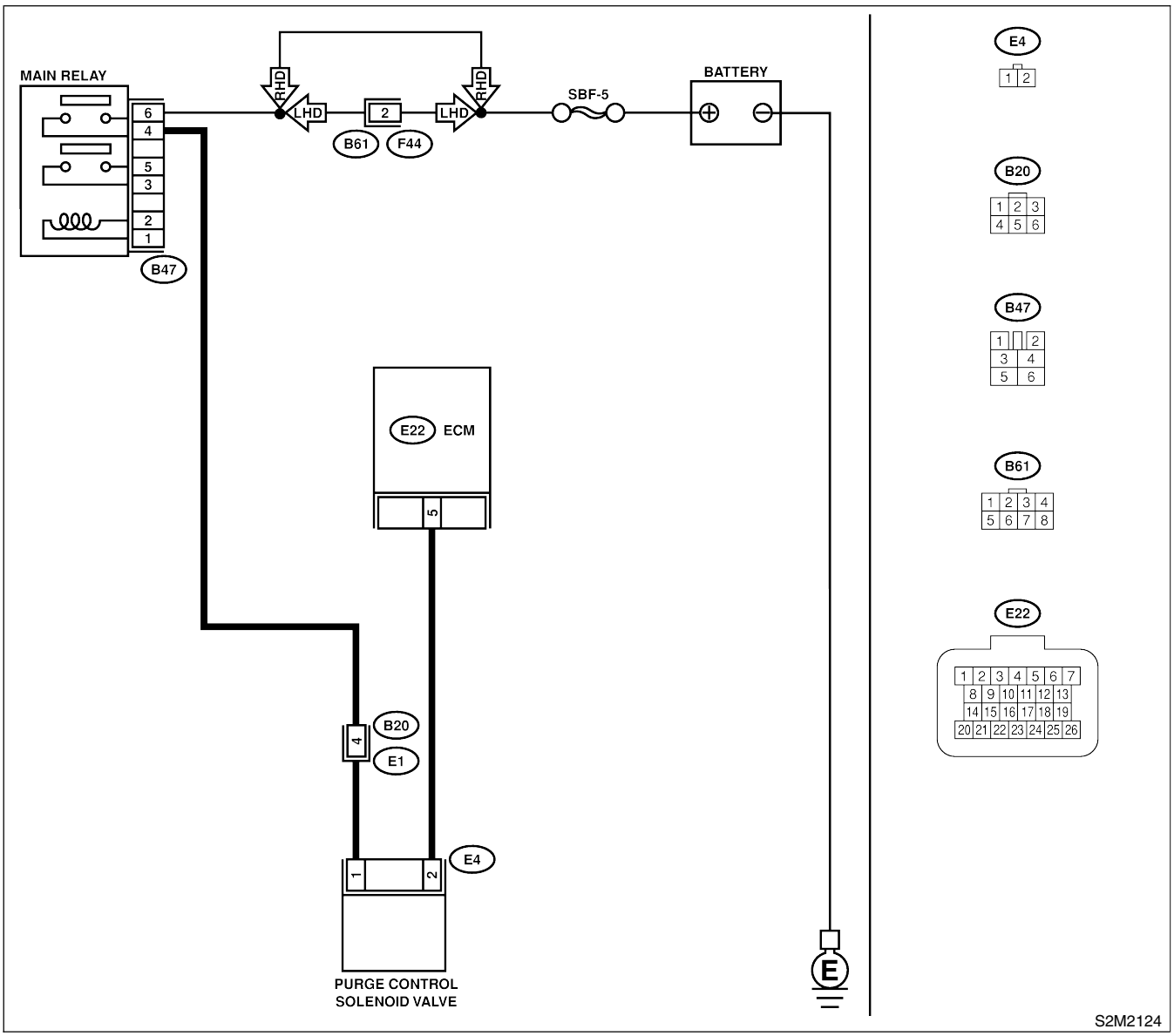
No.	Step	Check	Yes	No
1	**CHECK SPEEDOMETER OPERATION IN COMBINATION METER.**	Does speedometer operate normally?	Go to step **2**.	Check speedometer and vehicle speed sensor. <Ref. to IDI-7, INSPECTION, Combination Meter System.>
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Disconnect connector from ECM, then connect ST. <Ref. to EN(SOHCw/oOBD)-23, HOW TO CHECK I/O SIGNAL FOR ECM, Engine Control Module (ECM) I/O Signal.> ST 498307600 CHECK BOARD KIT 2) Lift-up the vehicle. 3) Set the positive (+) terminal and earth lead of the oscilloscope at ECM connector terminals. ***Connector & terminal*** ***(D) No. 53 — Engine ground:*** 4) Start the engine. 5) Shift the gear position, and travel at a constant speed. 6) Measure the signal voltage indicated on the oscilloscope.	Is the voltage more than 3 V?	Go to step **3**.	Go to step **4**.
3	**CHECK POOR CONTACT.** Check for poor contact at ECM connector.	Is there poor contact at the ECM connector?	Repair poor contact at ECM.	Replace ECM. <Ref. to FU(SOHCw/oOBD)-38, Engine Control Module.>
4	**CHECK HARNESS BETWEEN ECM AND COMBINATION METER CONNECTOR.** Measure voltage between ECM and engine ground. ***Connector & terminal*** ***(D) No. 53 (+) — Engine ground (–):***	Is the voltage more than 2 V?	Repair harness and connector. NOTE: In this case, repair the following: • Battery short circuit in harness between ECM and combination meter connector	Go to step **5**.
5	**CHECK HARNESS BETWEEN ECM AND COMBINATION METER CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect check board. 3) Measure resistance of harness between ECM connector and engine ground. ***Connector & terminal*** ***(B84) No. 33 — Engine ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between ECM and combination meter connector.	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.	Replace ECM. <Ref. to FU(SOHCw/oOBD)-38, Engine Control Module.>

J: DTC 35 PURGE CONTROL SOLENOID VALVE S068521G65

- **DIAGNOSIS:**
  - The purge control solenoid valve is not in function.
  - The harness connector between ECM and purge control solenoid valve is in short or open.
- **TROUBLE SYMPTOM:**
  - Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to EN(SOHCw/oOBD)-31 OPERATION, Clear Memory Mode.> and <Ref. to EN(SOHCw/oOBD)-29 OPERATION, Inspection Mode.>

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK OPERATION SOUND OF PURGE CONTROL SOLENOID VALVE.** 1) Turn ignition switch to OFF. 2) Connect test mode connector. 3) Turn ignition switch to ON. 4) Make sure that the ON/OFF operating sound of purge control solenoid valve occurs at about 10 Hz.	Does purge control solenoid valve produce operating sound?	Go to step **2**.	Go to step **3**.
2	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM.	Replace ECM. <Ref. to FU(SOHCw/oOBD)-38, Engine Control Module.>
3	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect test mode connector. 3) Disconnect connector from ECM, then connect ST. <Ref. to EN(SOHCw/oOBD)-23, HOW TO CHECK I/O SIGNAL FOR ECM, Engine Control Module (ECM) I/O Signal.> ST 498307600 CHECK BOARD KIT 4) Disconnect connector from purge control solenoid valve. 5) Turn ignition switch to ON. 6) Measure voltage between ECM and engine ground. ***Connector & terminal*** ***(A) No. 3 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and purge control solenoid valve connector. After repair, replace ECM.	Go to step **4**.
4	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect ECM connector from CHECK BOARD. 3) Measure resistance of harness between ECM and purge control solenoid valve of harness connector. ***Connector & terminal*** ***(E22) No. 5 — (E4) No. 2:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair open circuit in harness between ECM and purge control solenoid valve connector.
5	**CHECK PURGE CONTROL SOLENOID VALVE.** 1) Remove purge control solenoid valve. 2) Measure resistance between purge control solenoid valve terminals. ***Terminal*** ***No. 1 — No. 2:***	Is the resistance between 23 and 27 Ω?	Go to step **6**.	Replace purge control solenoid valve. <Ref. to EC(SOHCw/oOBD)-7, Purge Control Solenoid Valve.>
6	**CHECK MAIN RELAY.** 1) Turn 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. 4 — No. 6:***	Is the resistance less than 10 Ω?	Go to step **7**.	Replace main relay.

No.	Step	Check	Yes	No
7	**CHECK POWER SUPPLY TO PURGE CONTROL SOLENOID VALVE.** 1) Turn ignition switch to ON. 2) Measure voltage between purge control solenoid valve and engine ground. ***Connector & terminal*** ***(E4) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **8**.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between battery and purge control solenoid valve connector • Poor contact in main relay connector • Poor contact in coupling connector (B20)
8	**CHECK POOR CONTACT.** Check poor contact in purge control solenoid valve connector.	Is there poor contact in purge control solenoid valve connector?	Repair poor contact in purge control solenoid valve connector.	Contact your Subaru distributor. NOTE: Inspection by your Subaru distributor is required, because probable cause is deterioration of multiple parts.

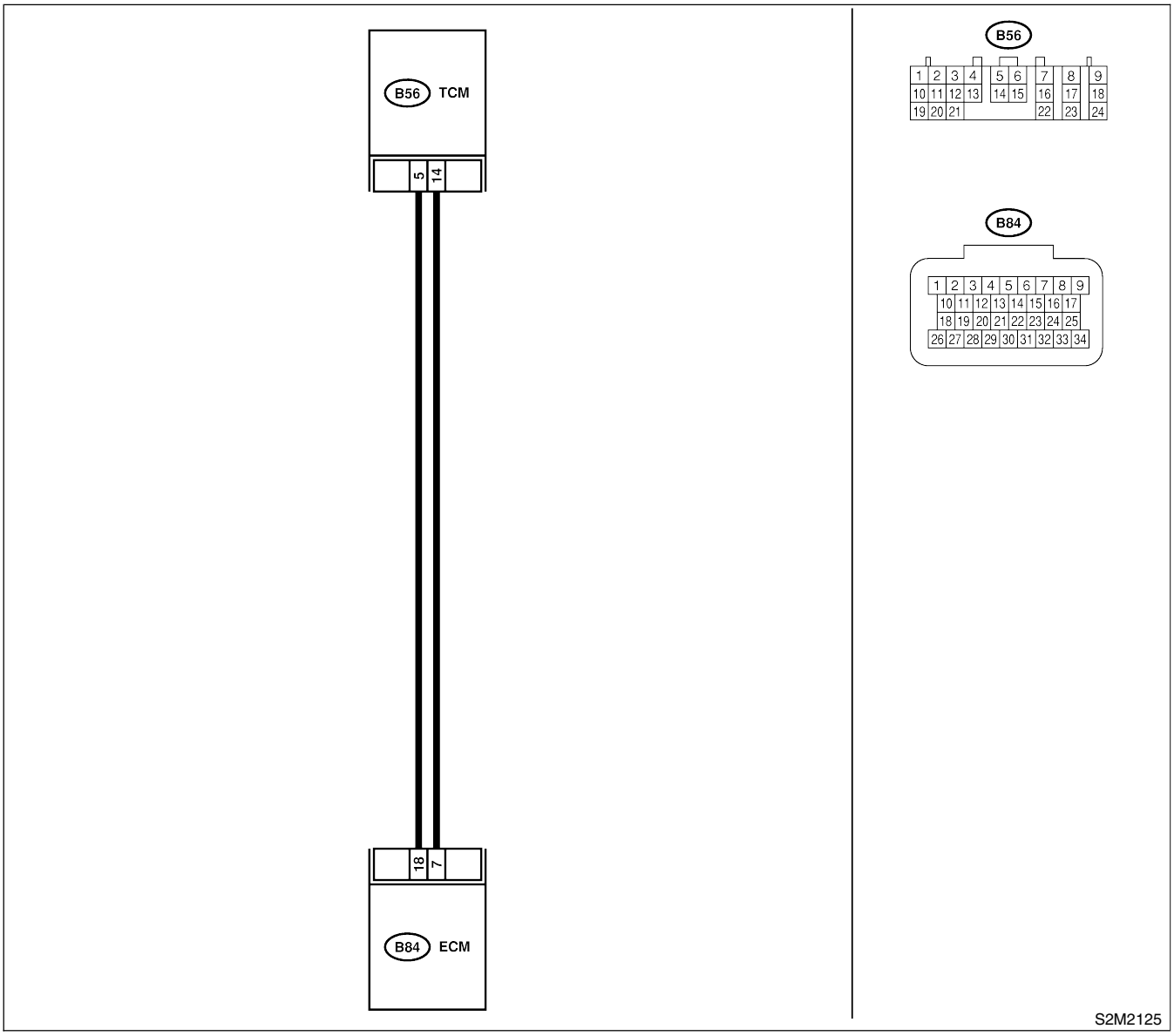
MEMO:

K: DTC 38 TORQUE CONTROL SIGNAL S068521G66

- **DIAGNOSIS:**
  - Abnormal signal entered from TCM
  - The harness connector between ECM and TCM is in short.

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to EN(SOHCw/oOBD)-31 OPERATION, Clear Memory Mode.> and <Ref. to EN(SOHCw/oOBD)-29 OPERATION, Inspection Mode.>

- **WIRING DIAGRAM:**



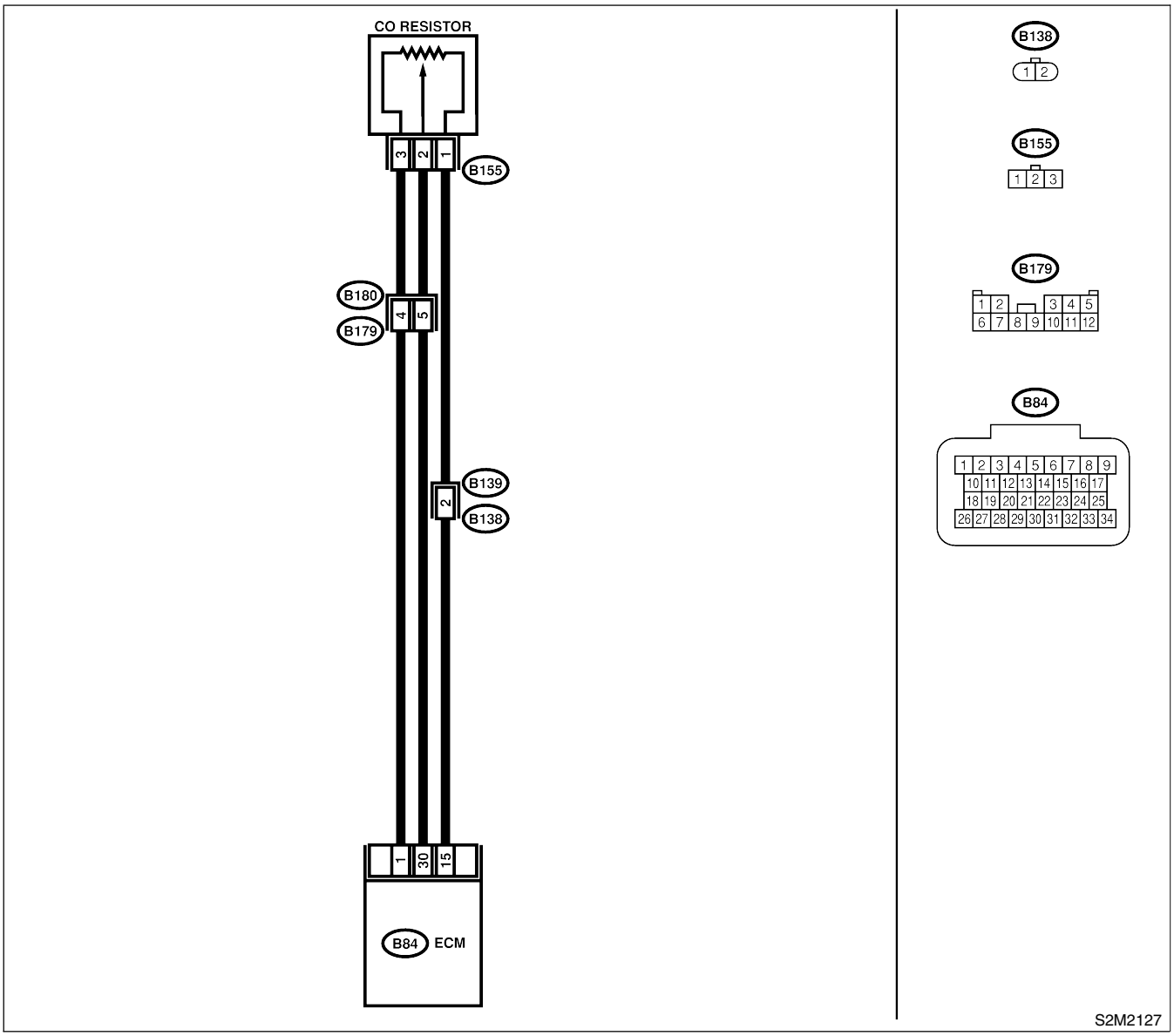
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Disconnect connectors from ECM and TCM. 2) Measure resistance of harness between ECM and engine ground. ***Connector & terminal*** ***(B84) No. 7 — Engine ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between ECM and TCM connector.	Go to step **2**.
2	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** Measure resistance of harness between ECM and engine ground. ***Connector & terminal*** ***(B84) No. 18 — Engine ground:***	Is there resistance less than 10 Ω?	Repair ground short circuit in harness between ECM and TCM connector.	Replace TCM. <Ref. to AT-48 Transmission Control Module (TCM).>

L: DTC 46 CO RESISTOR (GENERAL SPEC. VEHICLES) S068521G68

- **DIAGNOSIS:**
  - The CO resistor signal is abnormal.
  - The harness connector between ECM and CO resistor is in short or open.
  - The CO value is not adjusted to specifications.
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Mixture ratio is too rich or too lean.

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to EN(SOHCw/oOBD)-31 OPERATION, Clear Memory Mode.> and <Ref. to EN(SOHCw/oOBD)-29 OPERATION, Inspection Mode.>

- **WIRING DIAGRAM:**



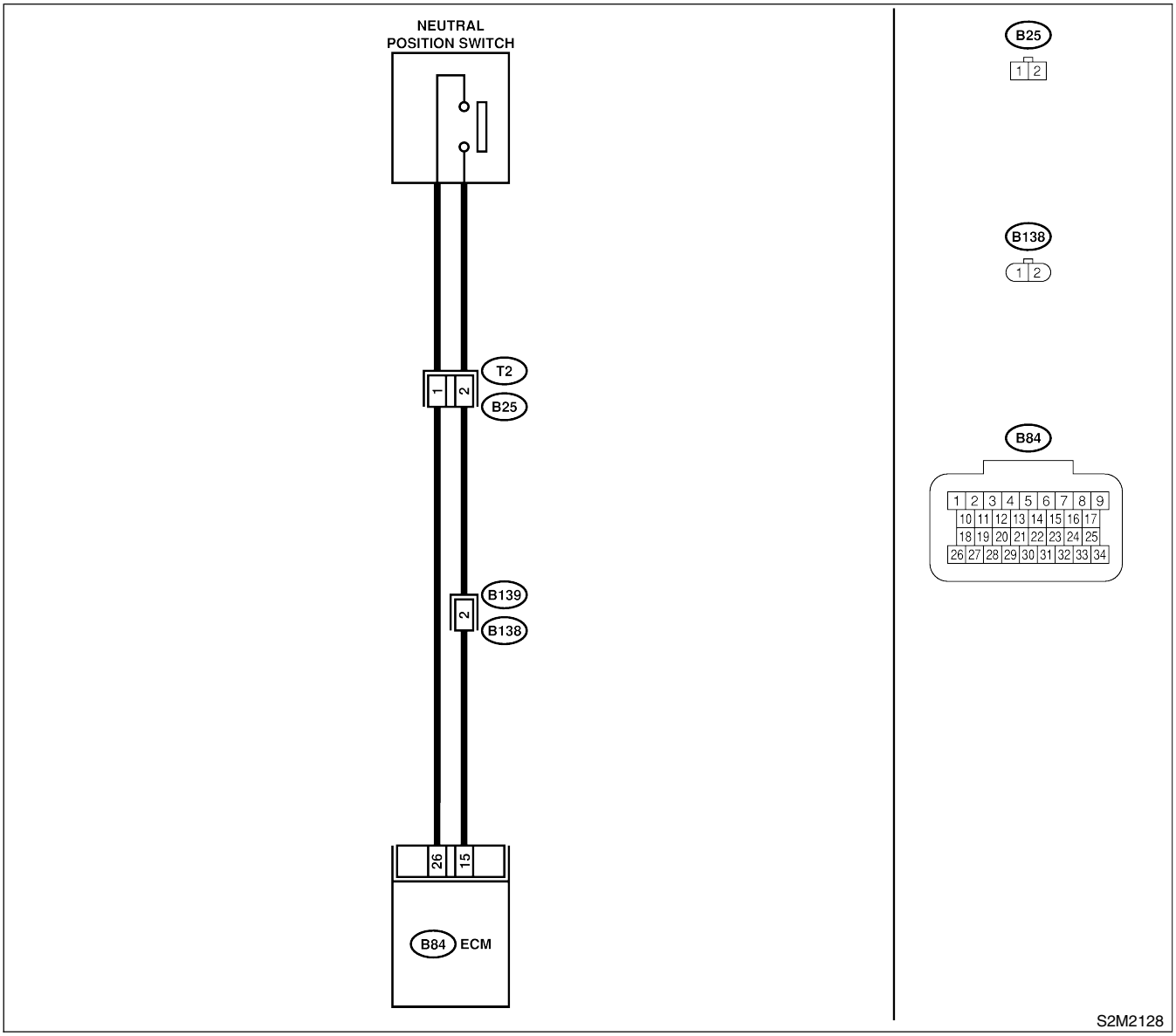
No.	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM, then connect ST. <Ref. to EN(SOHCw/oOBD)-23, HOW TO CHECK I/O SIGNAL FOR ECM, Engine Control Module (ECM) I/O Signal.> ST 498307600 CHECK BOARD KIT 3) Turn ignition switch to ON. 4) Measure voltage between ECM and engine ground. ***Connector & terminal*** ***(D) No. 56 (+) — Engine ground (–):***	Is the voltage between 0.5 V and 4.5 V?	Go to step **3**.	Go to step **2**.
2	**CHECK POOR CONTACT.**	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(SOHCw/oOBD)-38, Engine Control Module.>
3	**CHECK HARNESS BETWEEN CO RESISTOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM and CO resistor. 3) Measure resistance of harness between ECM and CO resistor connector. ***Connector & terminal*** ***(B84) No. 1 — (B155) No. 3:*** ***(B84) No. 30 — (B155) No. 2:*** ***(B84) No. 15 — (B155) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair open circuit in harness between ECM and CO resistor connector.
4	**CHECK HARNESS BETWEEN CO RESISTOR AND ECM CONNECTOR.** Measure resistance of harness between ECM connector and engine ground. ***Connector & terminal*** ***(B84) No. 1 — Engine ground:*** ***(B84) No. 30 — Engine ground:*** ***(B84) No. 15 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Repair short circuit in harness between ECM and CO resistor connector.
5	**CHECK CO RESISTOR.** Measure resistance between CO resistor terminals. ***Terminals*** ***No. 1 — No. 3:***	Is the resistance between 4 and 6 kΩ?	Go to step **6**.	Replace CO resistor.
6	**CHECK CO RESISTOR.** Measure variable resistance between CO resistor terminals while rotating the screw of CO resistor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 0 and 6 kΩ?	Replace ECM.	Replace CO resistor. NOTE: Ensure resistance varies in response to screw rotation.

M: DTC 51 NEUTRAL POSITION SWITCH S068521H58

- **DIAGNOSIS:**
  - The neutral position switch signal is abnormal.
  - The harness connector between ECM and neutral position switch is in short or open.
- **TROUBLE SYMPTOM:**
  - Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to EN(SOHCw/oOBD)-31 OPERATION, Clear Memory Mode.> and <Ref. to EN(SOHCw/oOBD)-29 OPERATION, Inspection Mode.>

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM, then connect ST. <Ref. to EN(SOHCw/oOBD)-23, HOW TO CHECK I/O SIGNAL FOR ECM, Engine Control Module (ECM) I/O Signal.> ST 498307600 CHECK BOARD KIT 3) Turn ignition switch to ON. 4) Measure voltage between ECM and engine ground. ***Connector & terminal*** ***(D) No. 60 (+) — Engine ground (–):***	Is the voltage between 4.5 and 5.5 V in neutral position?	Go to step **2**.	Go to step **4**.
2	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM and engine ground. ***Connector & terminal*** ***(D) No. 60 (+) — Engine ground (–):***	Is the voltage less than 1 V in other positions?	Go to step **3**.	Go to step **4**.
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Contact your Subaru distributor.
4	**CHECK NEUTRAL POSITION SWITCH.** 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission harness. 3) Measure resistance between transmission harness and connector terminals. ***Connector & terminal*** ***(T2) No. 1 — No. 2:***	Is the resistance more than 1 MΩ in neutral position?	Go to step **5**.	Repair short circuit in transmission harness or replace neutral position switch.
5	**CHECK NEUTRAL POSITION SWITCH.** Measure resistance between transmission harness connector terminals. ***Connector & terminal*** ***(T2) No. 1 — No. 2:***	Is the resistance less than 1 Ω in other positions?	Go to step **6**.	Repair open circuit in transmission harness or replace neutral position switch.
6	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** 1) Disconnect ECM connector from CHECK BOARD. 2) Measure resistance of harness between ECM and transmission harness connector. ***Connector & terminal*** ***(B84) No. 26 — (B25) No. 1:***	Is the resistance less than 1 Ω?	Go to step **7**.	Repair open circuit in harness between ECM and transmission harness connector.
7	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** Measure resistance between ECM connector and engine ground. ***Connector & terminal*** ***(B84) No. 26 — Engine ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between ECM and transmission harness connector.	Go to step **8**.

No.	Step	Check	Yes	No
8	**CHECK NEUTRAL POSITION SWITCH GROUND CIRCUIT.** Measure 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 harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between transmission harness connector and engine grounding terminal • Poor contact in coupling connector (B138)
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 your Subaru distributor. NOTE: Inspection by your Subaru distributor is required, because probable cause is deterioration of multiple parts.

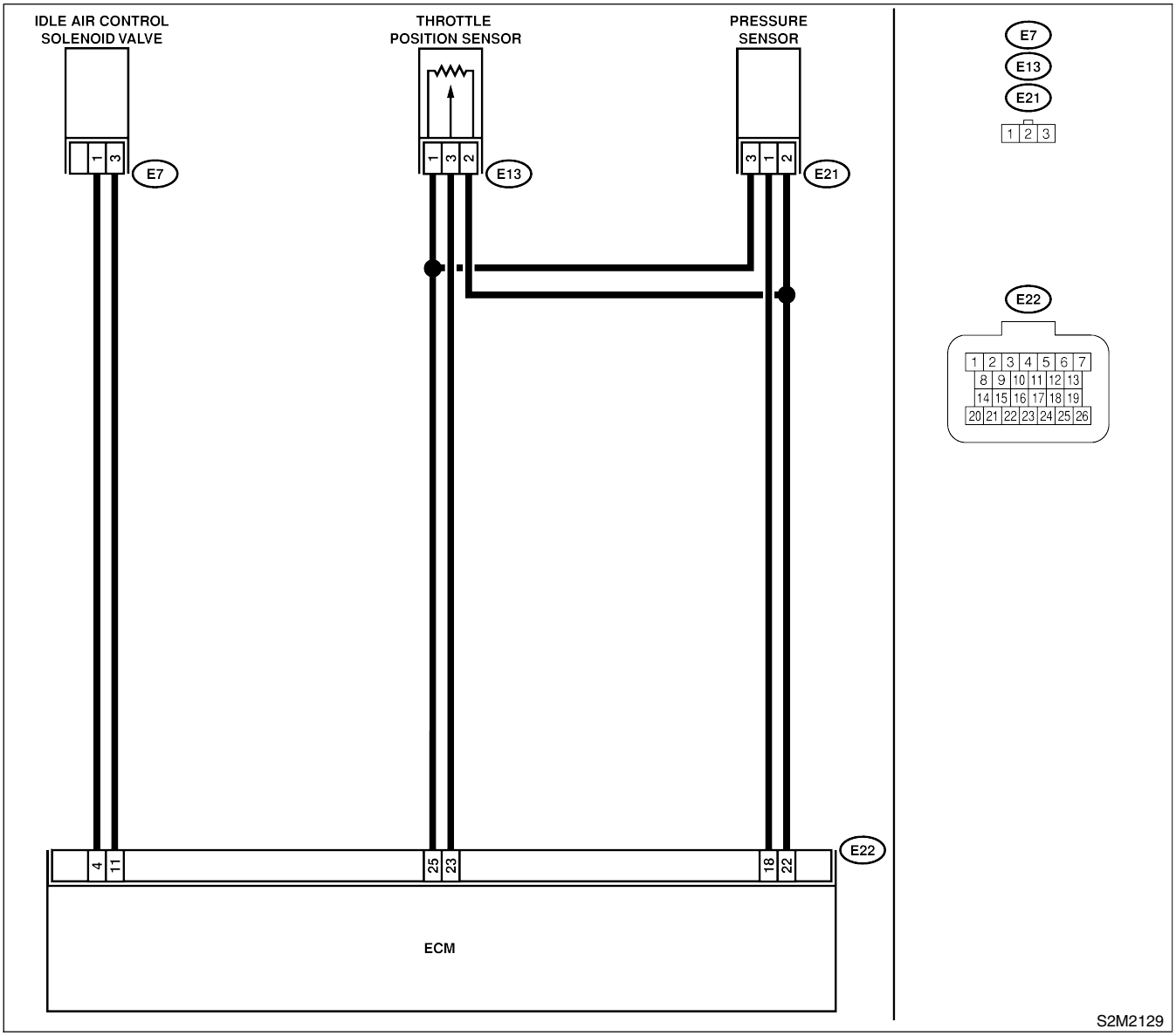
MEMO:

N: DTC 54 — AIR INTAKE SYSTEM — S068521H59

- **DIAGNOSIS:**
  - Intake duct, hose, nipple, etc., looseness, displacement, detachment
- **TROUBLE SYMPTOM:**
  - High idling revs
  - Poor engine pick up

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to EN(SOHCw/oOBD)-31, Clear Memory Mode.>, <Ref. to EN(SOHCw/oOBD)-29, Inspection Mode.>

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK AIR INTAKE SYSTEM.** 1) Turn ignition switch to ON. 2) Start engine, and idle it. 3) Check the following items: ● Cracks of air intake duct ● Disconnections of air intake duct ● Check for looseness, displacement of the intake manifold. ● Check that the intake manifold is connected in the instructed manner. (Gasket detachment, insufficient fastening torque of nuts and bolts) ● Check for looseness, detachment of hose, nipple etc.	Is there a fault in the air intake system?	Repair or replace air intake system.	Go to step **2**.
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn ignition to OFF. 2) Disconnect connector from ECM, then connect ST. <Ref. to EN(SOHCw/oOBD)-23, HOW TO CHECK I/O SIGNAL FOR ECM, Engine Control Module (ECM) I/O Signal.> ST 498307600 CHECK BOARD KIT 3) Turn ignition switch to ON. 4) Measure voltage between ECM and engine ground. ***Connector & terminal*** ***(D) No. 51 (+) — Engine ground (–):***	Is the voltage between 3.4 V and 3.6 V?	Go to step **3**.	Replace pressure sensor.
3	**CHECK INPUT SIGNAL FOR ECM.** 1) Start engine, and idle it. 2) Measure voltage between ECM and engine ground. ***Connector & terminal*** ***(D) No. 51 (+) — Engine ground (–):***	Is the voltage between 1.2 V and 1.8 V?	Go to step **4**.	Replace pressure sensor. <Ref. to FU(SOHCw/oOBD)-29, Pressure Sensor.>
4	**CHECK INPUT SIGNAL FOR ECM.** 1) Stop engine, and turn ignition switch to ON. 2) Measure voltage between ECM terminals while throttle valve is fully closed. ***Terminal*** ***No. 23 (+) — No. 21 (–):***	Is the voltage between 0.2 V and 1.0 V?	Go to step **5**.	Replace throttle position sensor. <Ref. to FU(SOHCw/oOBD)-26, Throttle Position Sensor.>
5	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM terminals while throttle valve is fully opened. ***Terminal*** ***No. 23 (+) — No. 21 (–):***	Is the voltage between 4.2 V and 4.7 V?	Go to step **6**.	Replace throttle position sensor. <Ref. to FU(SOHCw/oOBD)-26, Throttle Position Sensor.>
6	**CHECK IDLE AIR CONTROL SOLENOID VALVE.** 1) Start engine, and idle it. 2) Disconnect connector from idle air control solenoid valve.	Does engine revolution change?	Go to step **7**.	Replace idle air control solenoid valve. <Ref. to FU(SOHCw/oOBD)-31, Idle Air Control Solenoid Valve.>

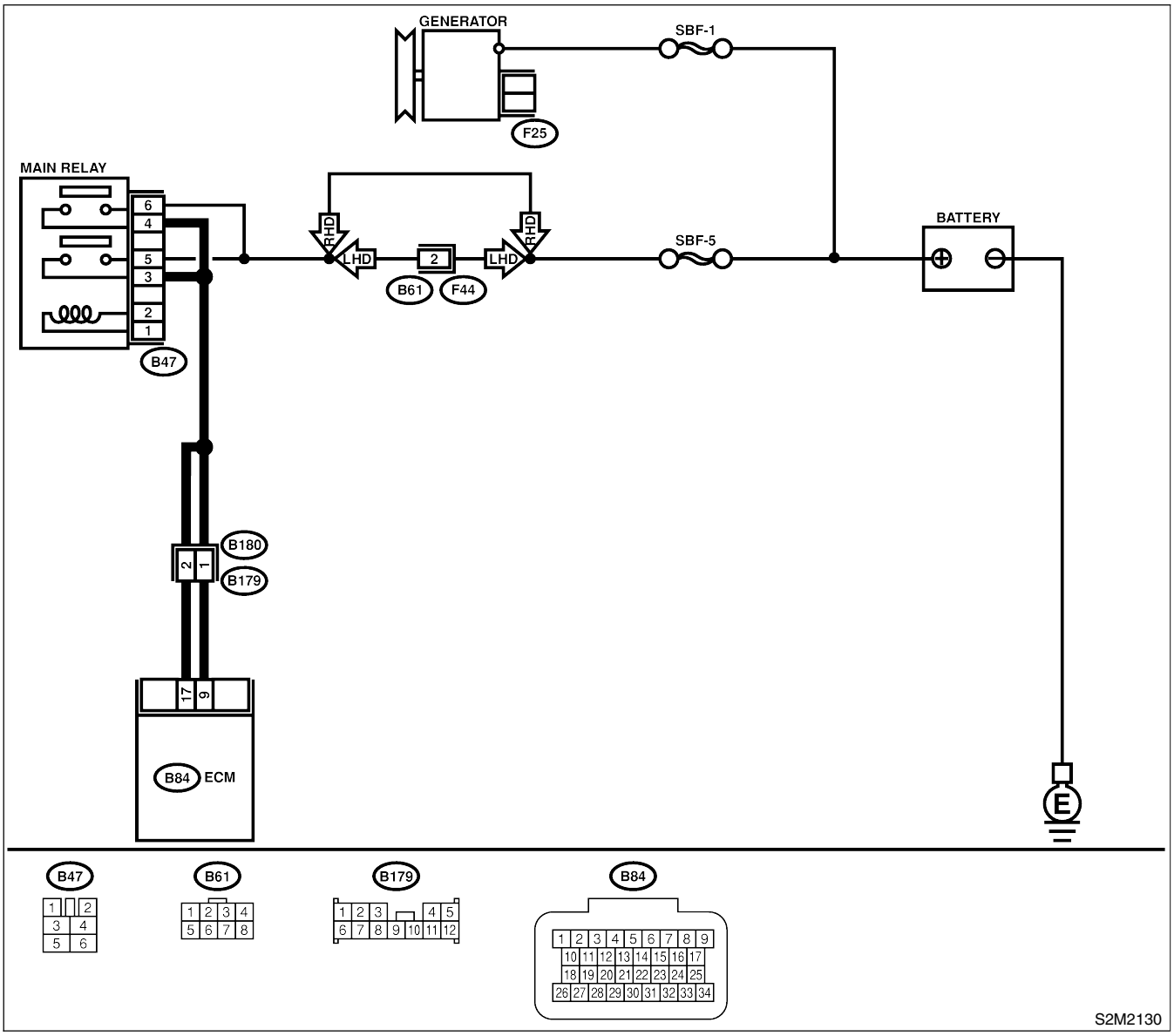
No.	Step	Check	Yes	No
7	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Contact your Subaru distributor. NOTE: Inspection by your Subaru distributor is required, because probable cause is deterioration of multiple parts.

O: DTC 85 CHARGE SYSTEM S068521G71

- **DIAGNOSIS:**
  - Power source voltage of the ECM is low or high.
- **TROUBLE SYMPTOM:**
  - Charge warning light comes on.

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to EN(SOHCw/oOBD)-31 OPERATION, Clear Memory Mode.> and <Ref. to EN(SOHCw/oOBD)-29 OPERATION, Inspection Mode.>

- **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

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 10.8 V and 16.2 V?	Go to step **2**.	Repair generator. <Ref. to SC-12, Generator.>
2	**CHECK GENERATOR.** 1) Run the engine at 5,000 rpm. 2) Measure voltage between generator B terminal and chassis ground. ***Terminal*** ***Generator B terminal (+) — Chassis ground (–):***	Is the voltage between 10.8 V and 16.2 V?	Go to step **3**.	Repair generator. <Ref. to SC-12, Generator.>
3	**CHECK BATTERY TERMINAL.** Turn ignition switch to OFF.	Are the positive and negative battery terminals tightly clamped?	Go to step **4**.	Tighten the clamp of terminal.
4	**CHECK INPUT VOLTAGE OF ECM.** 1) Disconnect connector from ECM, then connect ST. <Ref. to EN(SOHCw/oOBD)-23, HOW TO CHECK I/O SIGNAL FOR ECM, Engine Control Module (ECM) I/O Signal.> ST 4983907600 CHECK BOARD KIT 2) Run the engine at idle. 3) Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B) No. 27 (+) — Chassis ground (–):*** ***(C) No. 36 (+) — Chassis ground (–):***	Is the voltage between 10.8 V and 16.2 V?	Go to step **5**.	Repair harness connector between battery, main relay and ECM.
5	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ECM?	Repair connector.	Go to step **6**.
6	**CHECK ECM.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the trouble code.	Is the same trouble code as in the current diagnosis still being output?	Replace generator.	Go to step **7**.
7	**CHECK ANY OTHER TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

15. General Diagnostic Table S068257

A: INSPECTION S068257A10

NOTE:
- Malfunction of parts other than those listed is also possible.
- The right-hand priority column indicates the inspection priority of probable causes of the symptom. Carry out the check starting from A.

Symptom	Problem parts	Priority
1. Engine does not start. (internal combustion does not occur.)	1) ECM power supply	A
	2) Engine ground terminal	A
	3) Crankshaft position sensor	B
	4) Fuel pump	B
	5) Pressure regulator	B
	6) Engine coolant temperature sensor	C
	7) Ignition coil & ignitor	C
	8) Spark plug	C
	9) Fuel injector	C
	10) Idle air control solenoid valve	C
2. Engine does not start. (internal combustion occurs.)	1) ECM power supply	A
	2) Spark plug	A
	3) Engine coolant temperature sensor	B
	4) Pressure regulator	B
	5) Pressure sensor	C
	6) Fuel pump	C
	7) Fuel injector	C
	8) Idle air control solenoid valve	C
3. Engine does not start. (engine stalls after internal combustion.)	1) ECM power supply	A
	2) Pressure sensor	A
	3) Engine coolant temperature sensor	B
	4) Spark plug	B
	5) Ignition coil	C
	6) Fuel pump	C
	7) Pressure regulator	C
	8) Fuel injector	C
	9) Idle air control solenoid valve	C
4. Engine stalls.	1) Pressure sensor	B
	2) Spark plug	B
	3) Accelerator cable is out of adjustment	B
	4) ECM power supply	C
	5) Throttle position sensor	C
	6) Crankshaft position sensor	C
	7) Vehicle speed sensor	C
	8) Ignition coil	C
	9) Fuel pump	C
	10) Idle air control solenoid valve	C
5. Rough idling	1) Spark plug	A
	2) Pressure sensor	B
	3) Engine coolant temperature sensor	B
	4) Pressure regulator	B
	5) Idle air control solenoid valve	B
	6) Air leak in air intake system	B
	7) ECM power supply	C
	8) Throttle position sensor	C
	9) Intake air temperature sensor	C
	10) Oxygen sensor	C
	11) Fuel pump	C
	12) Fuel injector	C
	13) Test mode or read memory connectors are connected.	C

GENERAL DIAGNOSTIC TABLE

Symptom	Problem parts	Priority
6. Hard to drive at constant speed	1) Pressure regulator	A
	2) Fuel injector	B
	3) Pressure sensor	C
	4) Engine coolant temperature sensor	C
	5) Throttle position sensor	C
	6) Fuel pump	C
7. Poor acceleration/deceleration	1) Spark plug	A
	2) Throttle position sensor	B
	3) Ignition coil	B
	4) Fuel pump	B
	5) Pressure regulator	B
	6) Fuel injector	B
	7) Pressure sensor	C
	8) Engine coolant temperature sensor	C
	9) Idle air control solenoid valve	C
	10) Knock sensor	C
8. Poor return to idling	1) Accelerator cable is out of adjustment	A
	2) Throttle position sensor	B
	3) Idle air control solenoid valve	B
	4) Pressure sensor	C
	5) Engine coolant temperature sensor	C
9. Back fire	1) Spark plug	A
	2) Fuel injector	B
	3) Ignition coil and ignitor	C
	4) Fuel pump	C
	5) Pressure regulator	C
10. Knocking	1) Fuel pump	B
	2) Pressure regulator	B
	3) Engine coolant temperature sensor	C
	4) Knock sensor	C
11. Excessive fuel consumption	1) Engine coolant temperature sensor	A
	2) Pressure sensor	B
	3) Intake air temperature sensor	B
	4) Pressure regulator	B
12. Shocks while driving	1) Pressure regulator	A
	2) ECM power supply	B
	3) Throttle position sensor	B
13. Poor engine revving	1) Pressure regulator	A
	2) Pressure sensor	B
	3) Engine coolant temperature sensor	B
	4) Throttle sensor	B
	5) Intake air temperature sensor	B
	6) Fuel pump	B
14. Remarks	1) ECM power supply	A*
	2) Pressure sensor	B*
	3) Pressure regulator	B*
	4) Idle air control solenoid valve	B*
	5) Air leak in air intake system	B*

A*: Including ECM ground circuit
B*: Check hoses.

FUEL INJECTION (FUEL SYSTEMS)

FU(DOHC TURBO)

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1. General Description S185001

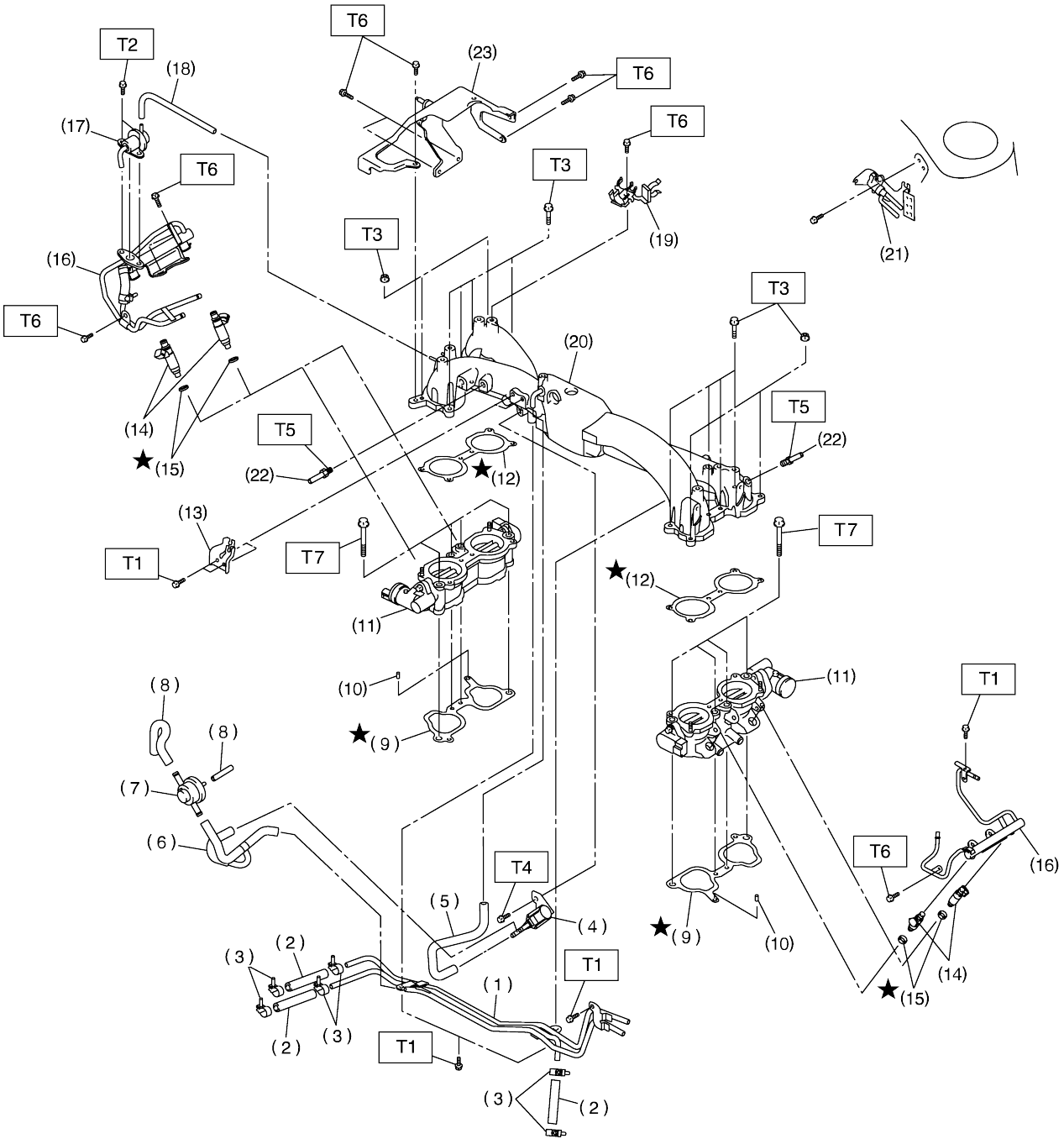
A: SPECIFICATIONS S185001E49

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	450 — 677 kPa (4.59 — 6.9 kg/cm^2, 65.27 — 98.2 psi)
	Discharge flow	More than 130 ℓ (34.3 US gal, 28.6 Imp gal)/h [12 V at 300 kPa (3.06 kg/cm^2, 43.5 psi)]
Fuel filter		Cartridge type

MEMO:

B: COMPONENT S185001A05

1. INTAKE MANIFOLD S185001A0501



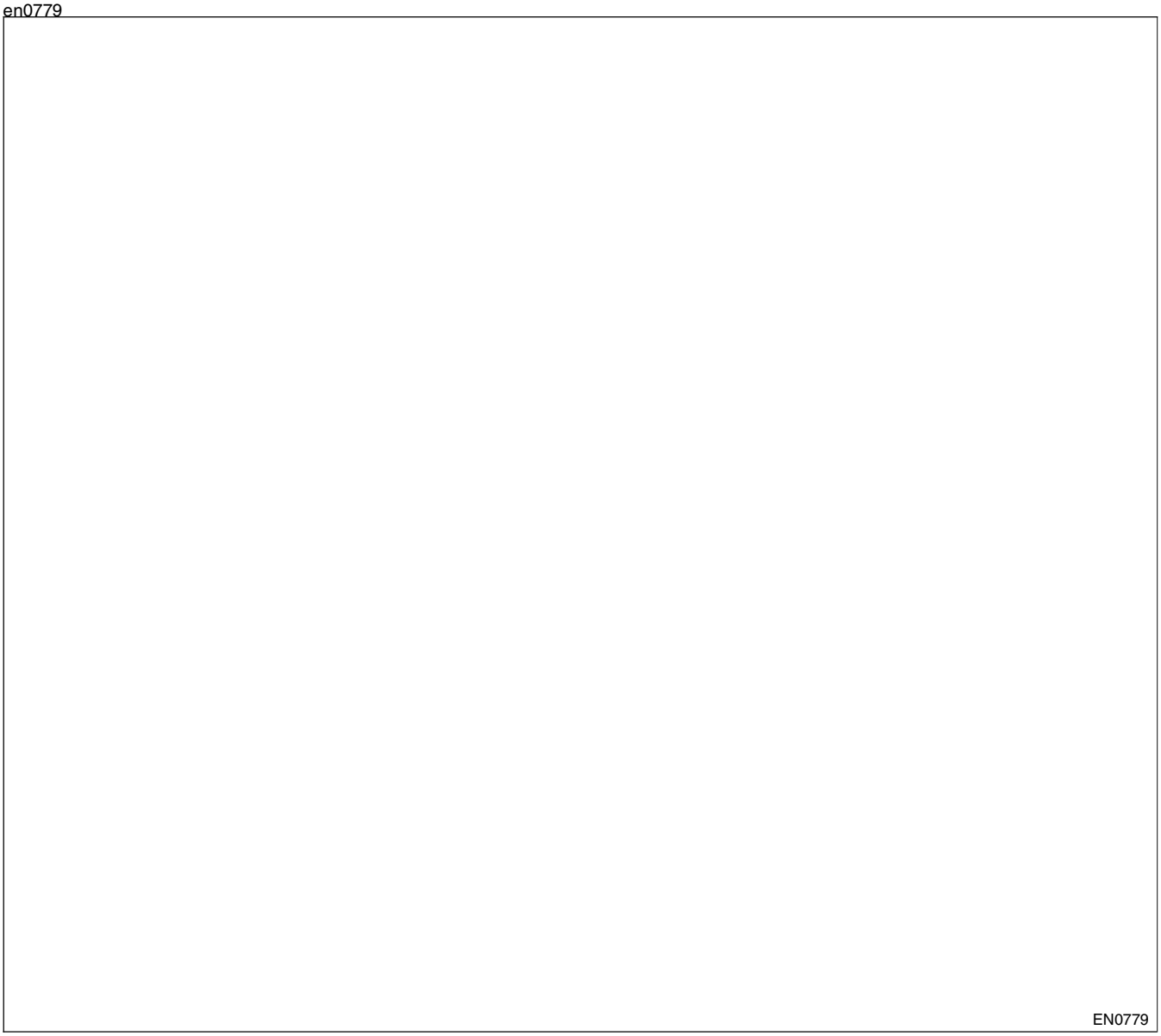
S2M2173A

(1) Fuel pipe ASSY
(2) Fuel hose
(3) Clip
(4) Purge control solenoid valve
(5) Vacuum hose
(6) Vacuum control hose
(7) Purge valve
(8) Purge hose
(9) Intake manifold gasket
(10) Guide pin
(11) Tumble generator valve ASSY
(12) Tumble generator valve gasket
(13) Accelerator cable bracket
(14) Fuel injector
(15) Insulator
(16) Fuel injector pipe
(17) Pressure regulator
(18) Pressure regulator hose
(19) Blow-by hose stay
(20) Intake manifold
(21) Wastegate control solenoid valve ASSY
(22) Nipple
(23) Fuel pipe protector

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5 (0.50, 3.7)
T2: 6.4 (0.65, 4.7)
T3: 8.25 (0.84, 6.1)
T4: 16 (1.63, 11.8)
T5: 17 (1.73, 12.5)
T6: 19 (1.94, 14.0)
T7: 25 (2.55, 18.4)

2. AIR INTAKE SYSTEM S185001A0502

en0779

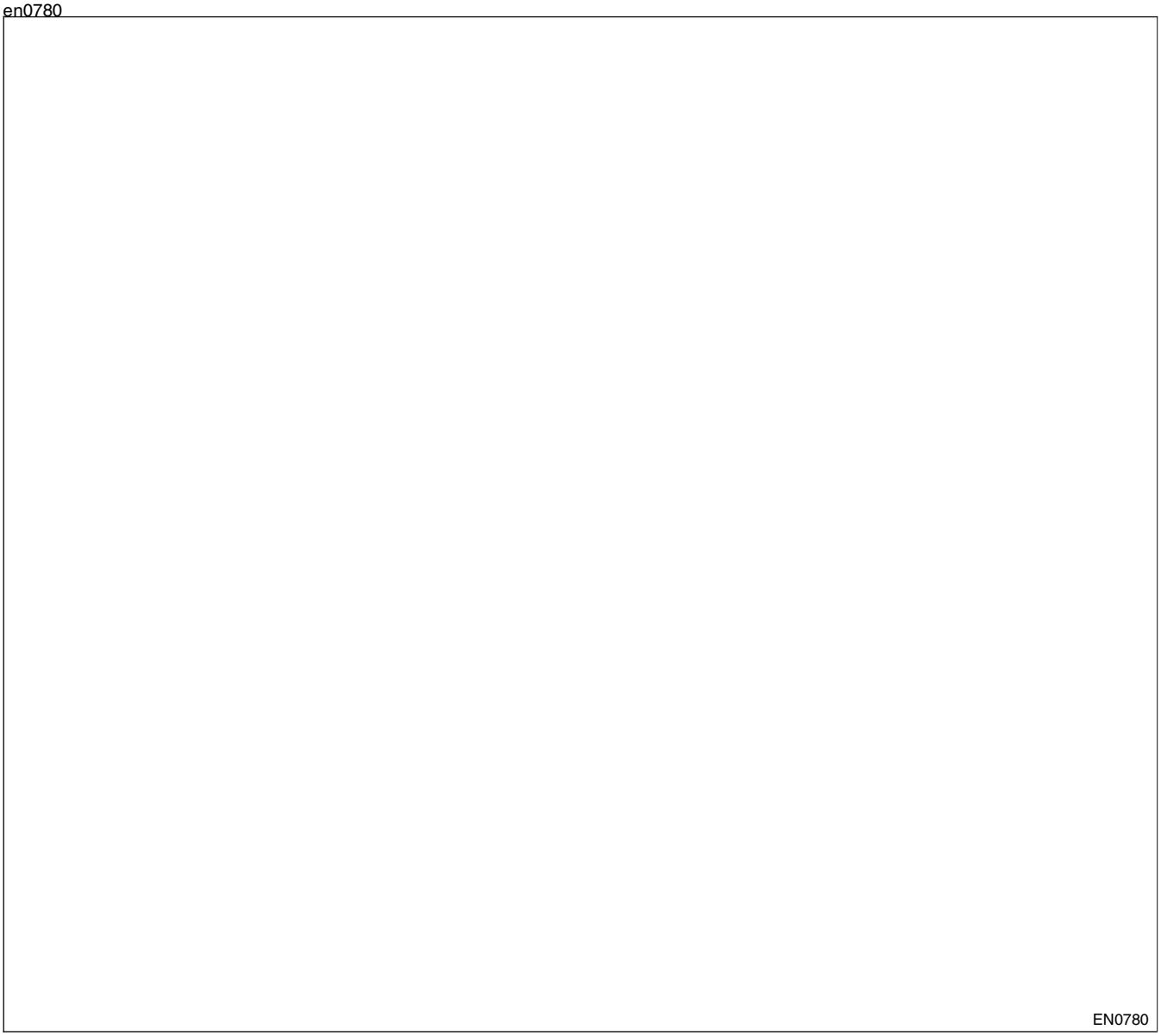


(1) Gasket
(2) Throttle position sensor
(3) Idle air control solenoid valve
(4) Throttle body
(5) Pressure sensor

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.6 (0.16, 1.2)
T2: 2.8 (0.29, 2.1)
T3: 22 (2.2, 16)

3. CRANKSHAFT POSITION, CAMSHAFT POSITION AND KNOCK SENSORS S185001A0503

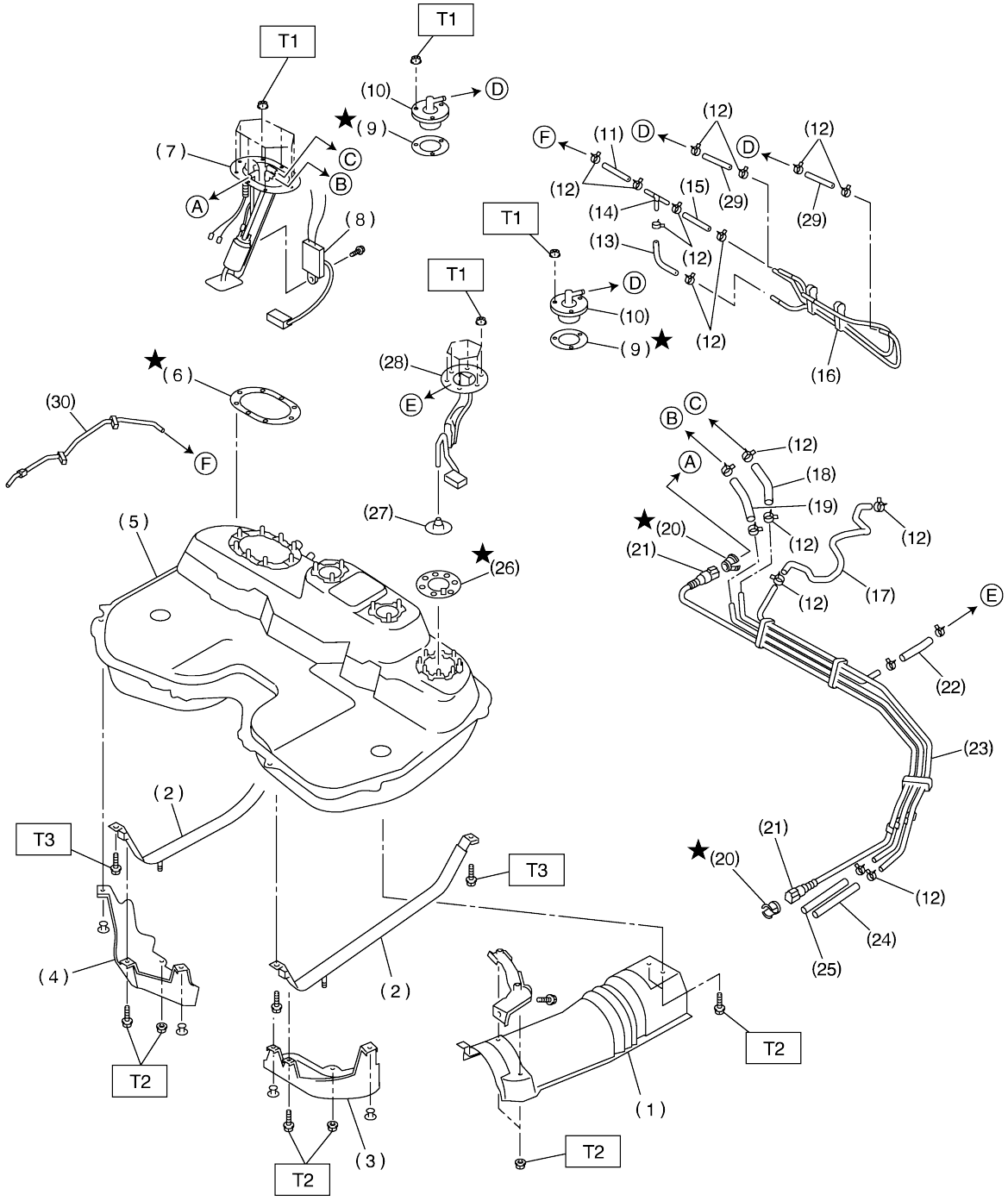
en0780



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

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

4. FUEL TANK S185001A0504

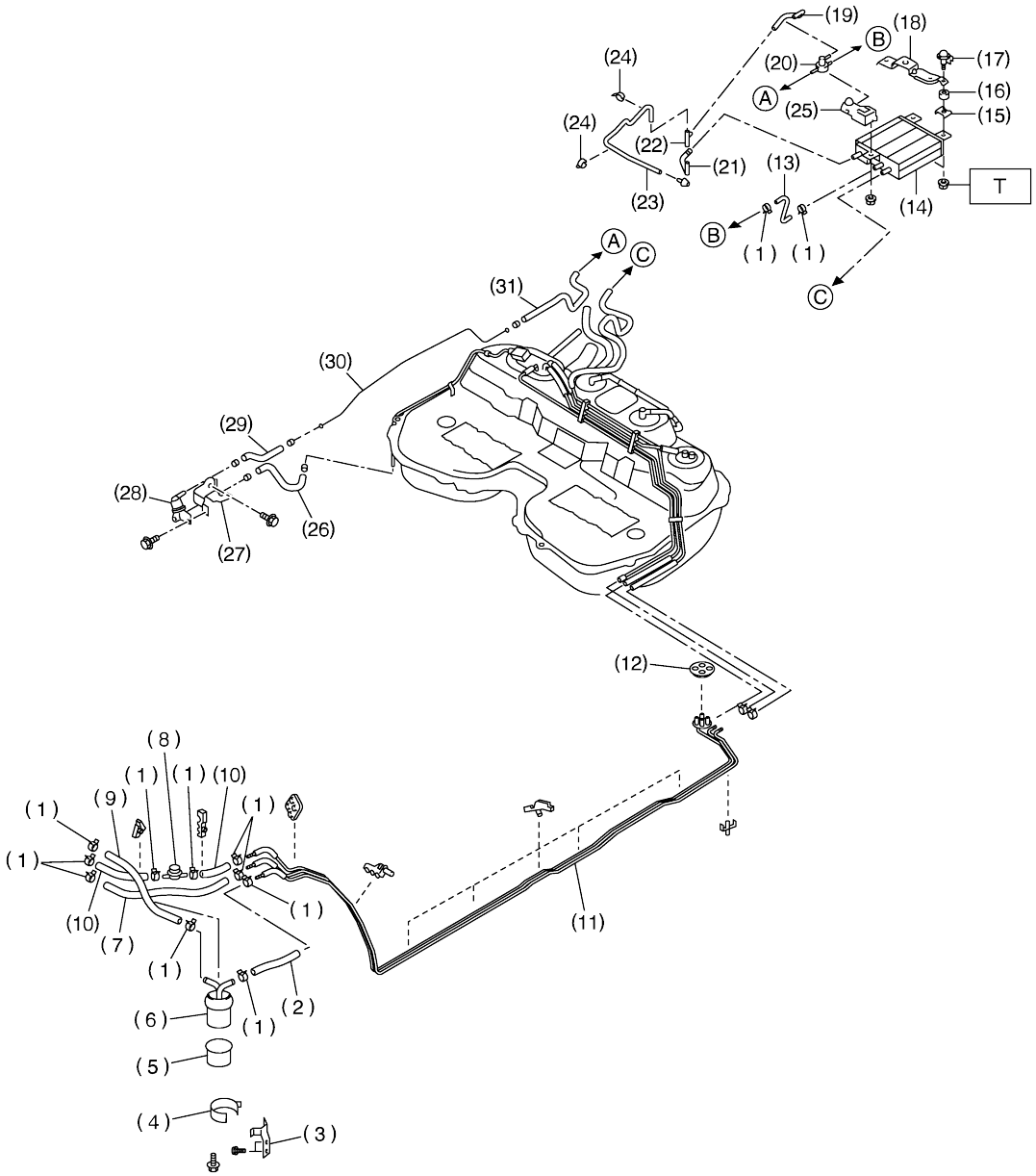


S2M2152A

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

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 S185001A0505

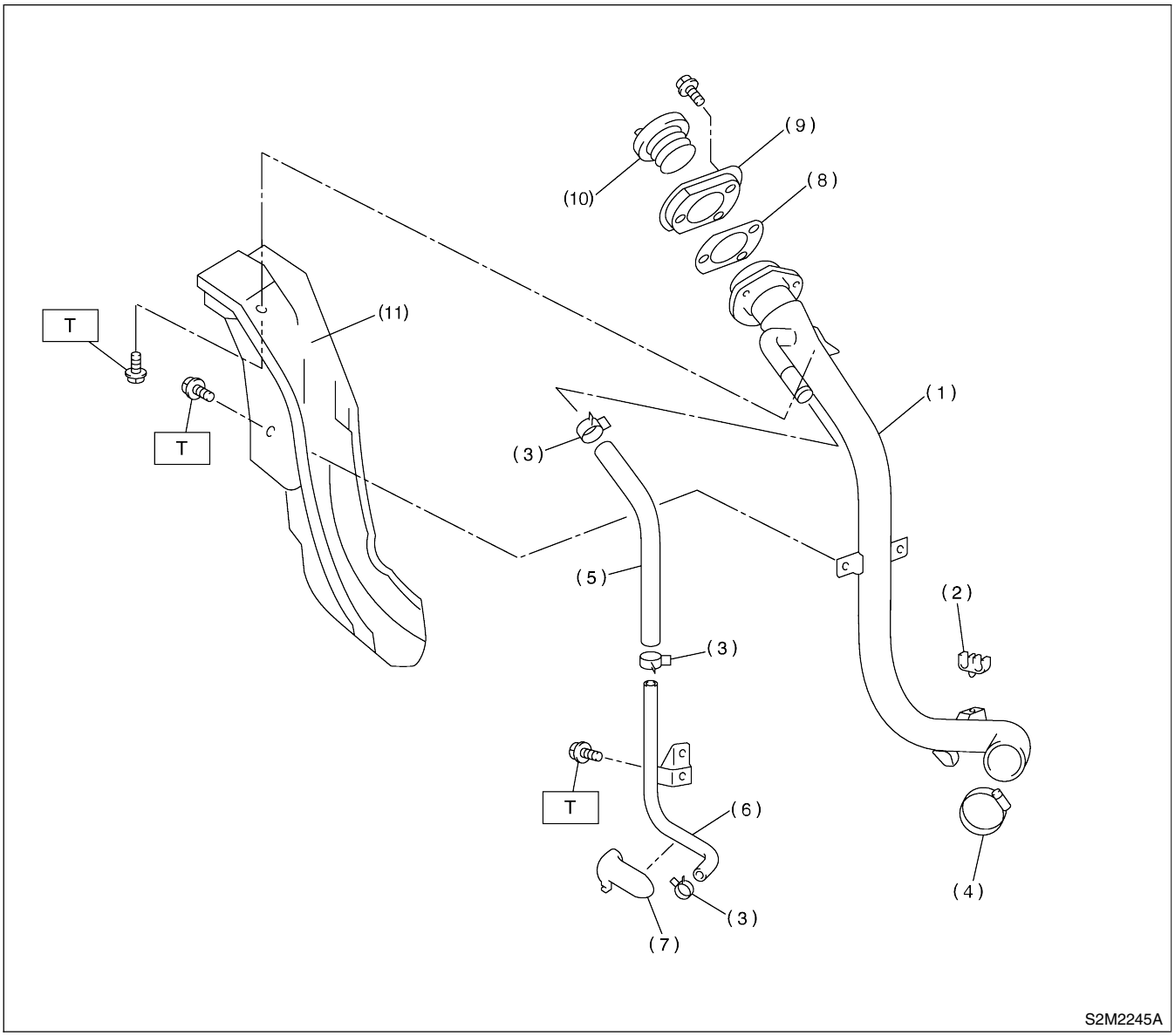


S2M2153A

(1) Clip
(2) Fuel delivery hose A
(3) Fuel filter bracket
(4) Fuel filter holder
(5) Fuel filter cup
(6) Fuel filter
(7) Evaporation hose A
(8) Fuel damper
(9) Fuel delivery hose B
(10) Fuel return hose
(11) Fuel pipe ASSY
(12) Grommet
(13) Canister hose A
(14) Canister
(15) Canister bracket plate
(16) Cushion
(17) Canister bracket spacer
(18) Rear canister bracket
(19) Two-way valve return hose
(20) Two-way valve
(21) Two-way valve drain hose A
(22) Connector
(23) Two-way valve drain hose B
(24) Clamp
(25) Front canister bracket
(26) Evaporation hose B
(27) Roll over valve bracket
(28) Roll over valve
(29) Evaporation hose C
(30) Evaporation pipe
(31) Canister hose B

Tightening torque: N·m (kgf-m, ft-lb)
T1: 23 (2.34, 17.0)

6. FUEL FILLER PIPE S185001A0506



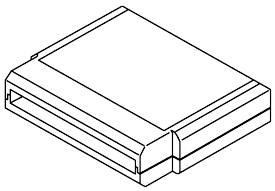
(1) Fuel filter pipe ASSY
(2) Evaporation hose holder
(3) Clamp
(4) Clamp
(5) Air vent hose
(6) Air vent pipe
(7) Air vent pipe holder
(8) Filler pipe packing
(9) Filler ring
(10) Filler cap
(11) Fuel pipe protector

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.5 (0.76, 5.5)

C: CAUTION S185001A03

- 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.

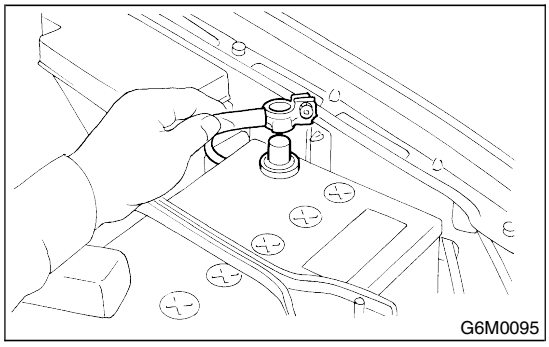
D: PREPARATION TOOL S185001A17

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 S185010

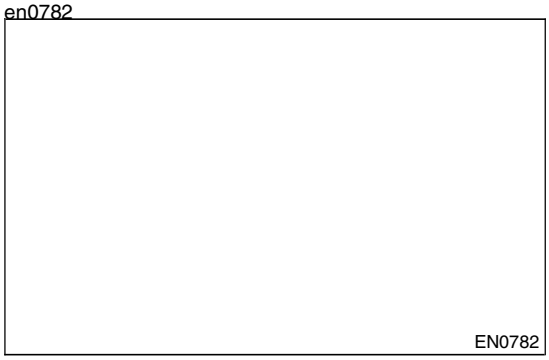
A: REMOVAL S185010A18

1) Disconnect battery ground cable.

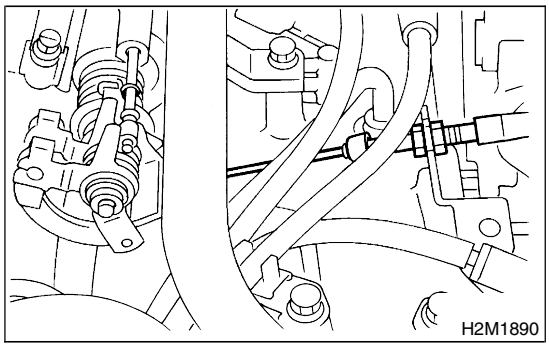

G6M0095

2) Remove intercooler. <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
3) Disconnect connector from throttle position sensor (A) and idle air control solenoid valve (B) and pressure sensor (C).

en0782

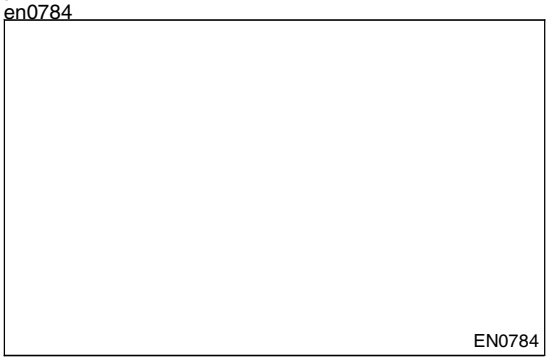

EN0782

4) Disconnect accelerator cable.


H2M1890

5) Disconnect engine coolant hoses from throttle body.

en0784


EN0784

6) Remove bolts which secure throttle body to intake manifold.

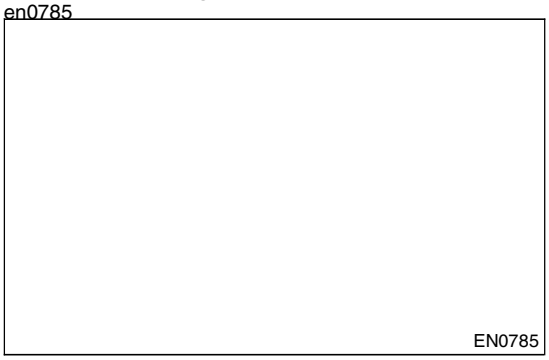
B: INSTALLATION S185010A11

Install in the reverse order of removal.

NOTE:
Always use new gaskets.

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

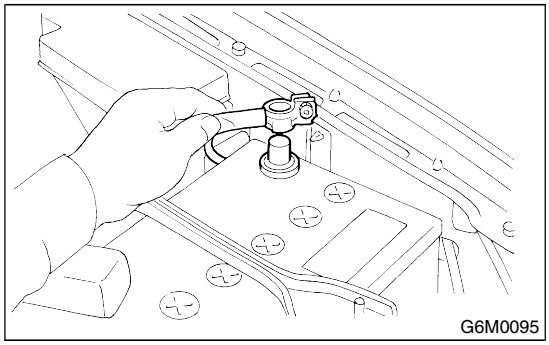
en0785


EN0785

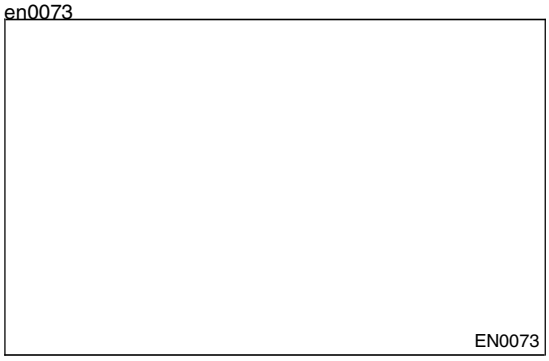
3. Intake Manifold S185034

A: REMOVAL S185034A18

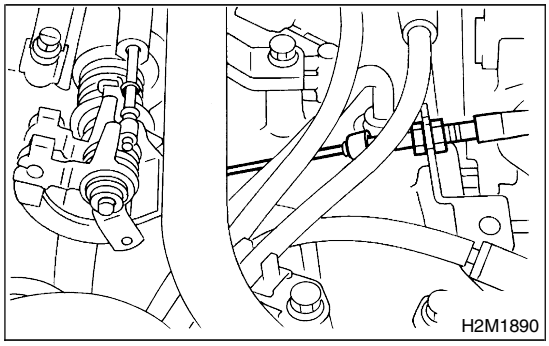
1) Release fuel pressure. <Ref. to FU(DOHC TURBO)-50, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Disconnect battery ground cable.


G6M0095

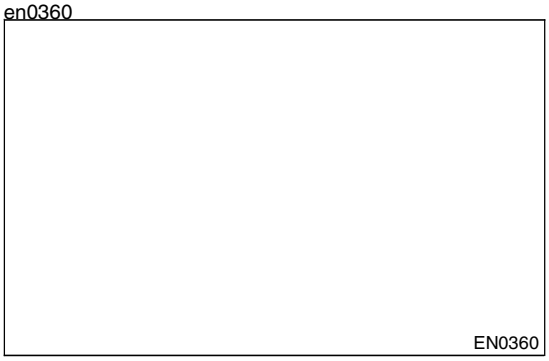
3) Lift up vehicle.
4) Remove under cover.
5) Drain coolant about 3.0 ℓ (3.2 US qt, 2.6 Imp qt).

en0073

EN0073

6) Remove air cleaner upper cover and air intake boot. <Ref. to IN(DOHC TURBO)-7, REMOVAL, Air Cleaner.>
7) Remove air cleaner element.
8) Remove intercooler. <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
9) Disconnect accelerator cable.

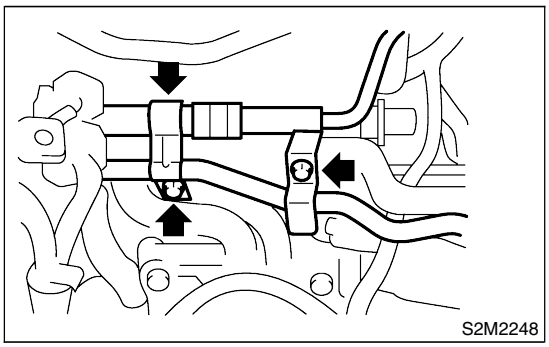

H2M1890

10) Remove coolant filler tank. <Ref. to CO-37, REMOVAL, Coolant Filler Tank.>
11) Remove power steering pump from bracket.
(1) Remove front side V-belt. <Ref. to ME(DOHC TURBO)-44, REMOVAL, V-belt.>
(2) Disconnect the power steering switch connector.

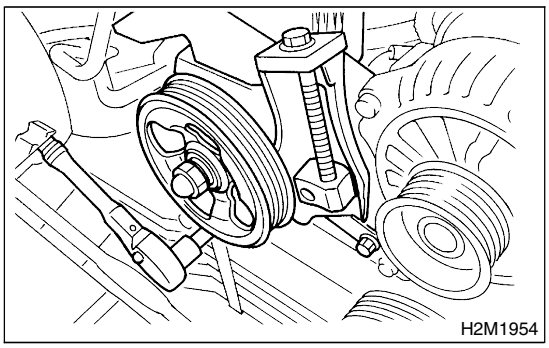
en0360

EN0360

(3) Remove bolts which secure power steering pipe brackets to intake manifold.

NOTE:
Do not disconnect power steering hose.

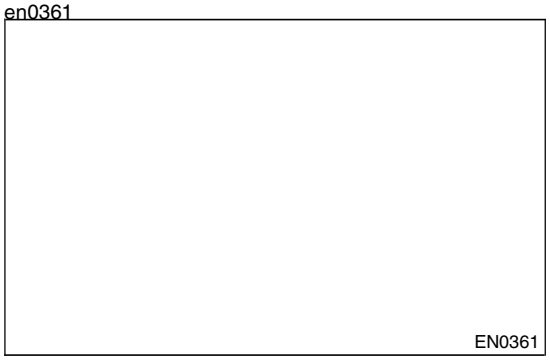

S2M2248

(4) Remove bolts which secure power steering pump.


H2M1954

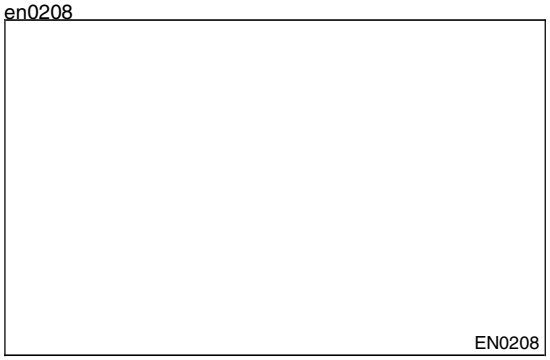
(5) Remove power steering tank from the bracket by pulling it upward.

en0361



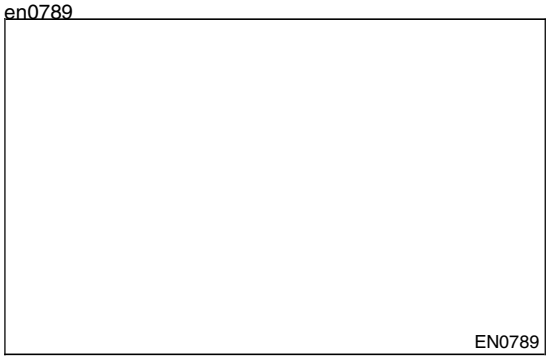
(6) Place power steering pump on the right side wheel apron.

en0208



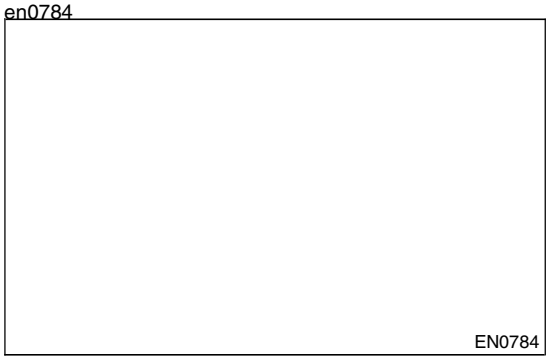
12) Disconnect emission hose from PCV valve.

en0789



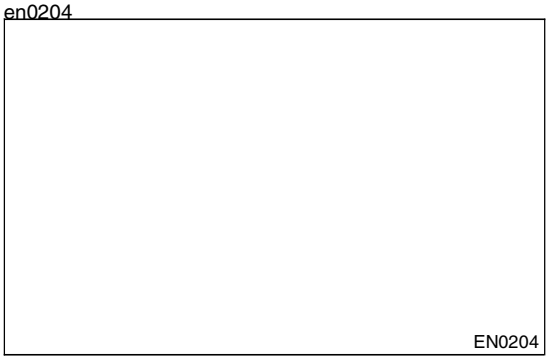
13) Disconnect engine coolant hoses from throttle body.

en0784



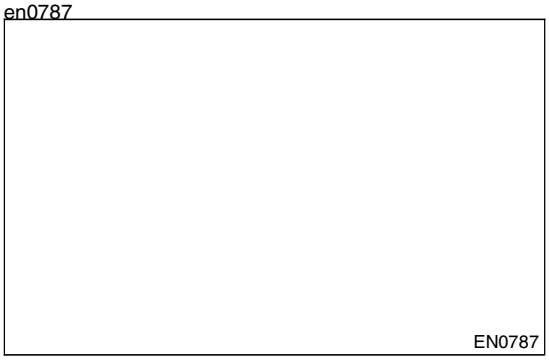
14) Disconnect brake booster hose.

en0204



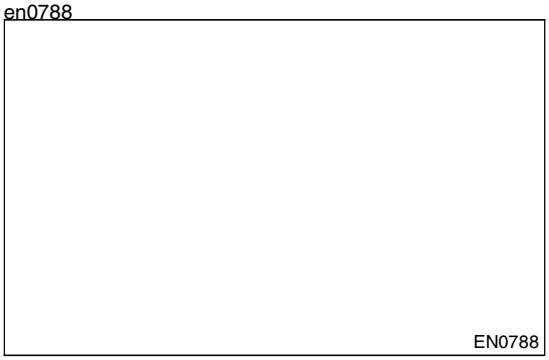
15) Disconnect Pressure hose from intake duct.

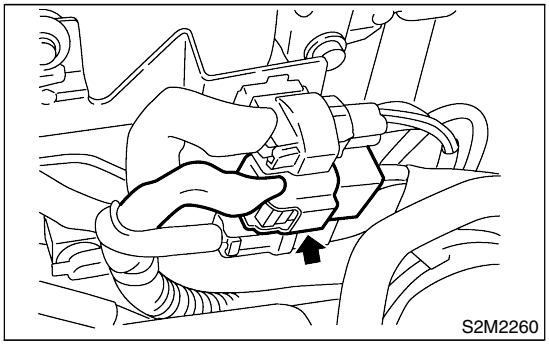
en0787



16) Disconnect engine harness connectors from bulkhead harness connectors.

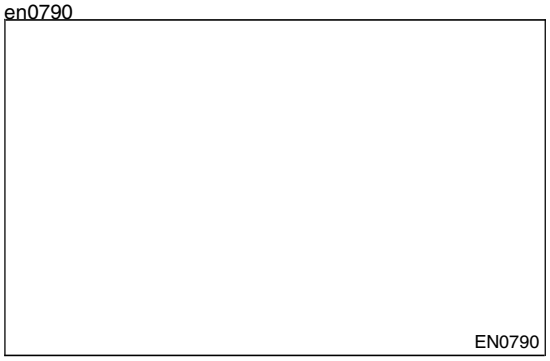
en0788



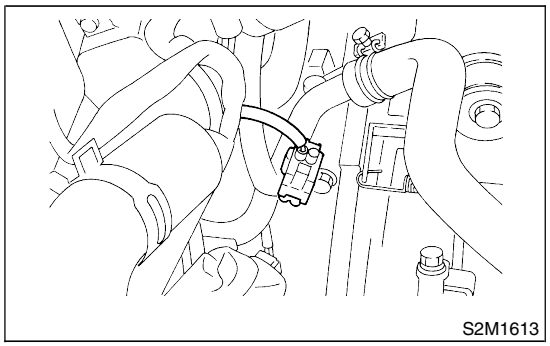


17) Disconnect connectors from engine coolant temperature sensor (A), oil pressure switch (B) and crankshaft position sensor (C).

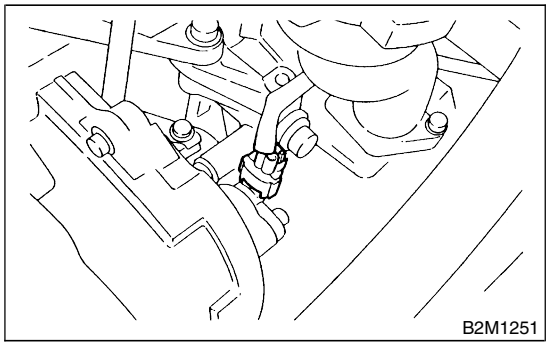
en0790



18) Disconnect knock sensor connector.

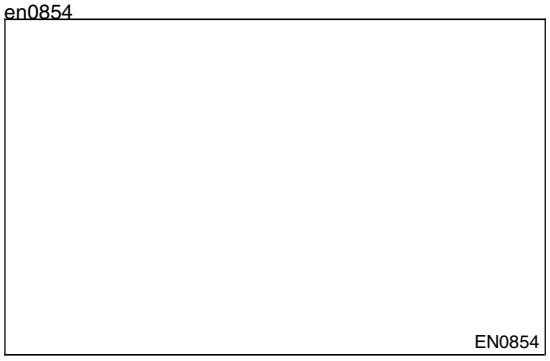


19) Disconnect connector from camshaft position sensor.

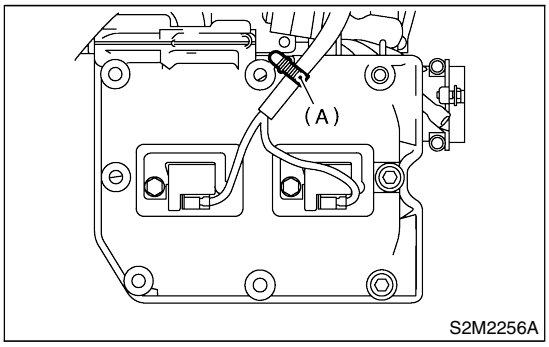


20) Disconnect connector from ignition coil.

en0854



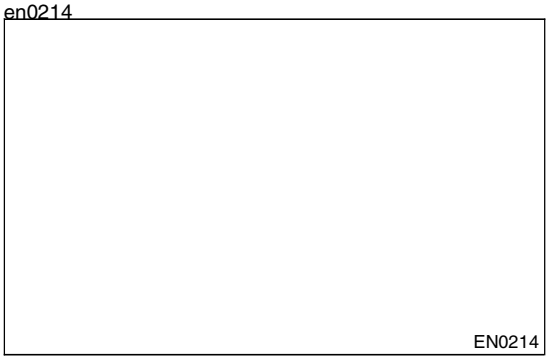
21) Remove harness secured by clip (A) from the bracket.



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

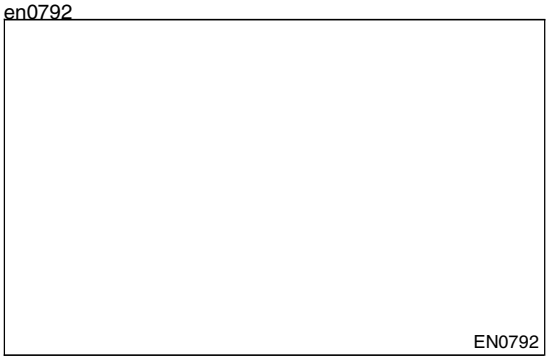
WARNING:
Catch fuel from hoses in a container.

en0214



23) Remove bolts which secure intake manifold to cylinder heads.

en0792



24) Remove intake manifold.

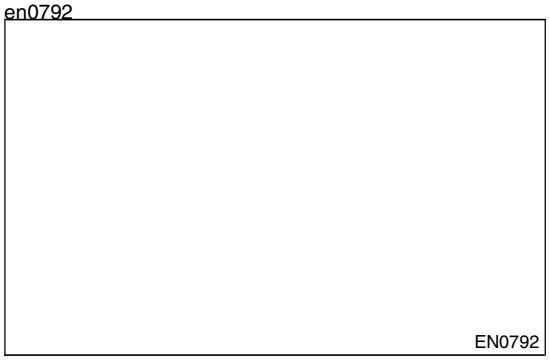
B: INSTALLATION *S185034A11*

1) Install intake manifold onto cylinder heads.

NOTE:
Always use new gaskets.

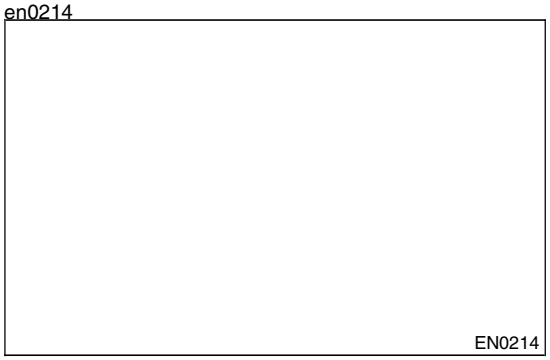
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

en0792



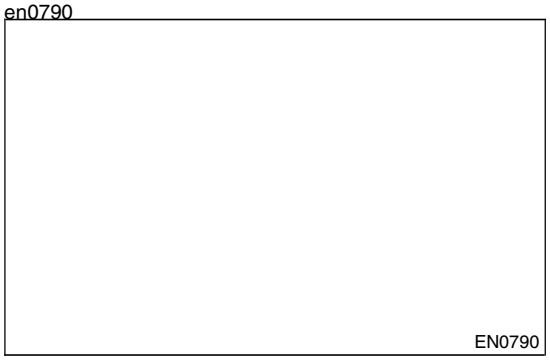
2) Connect fuel delivery hose, return hose, and evaporation hose.

en0214

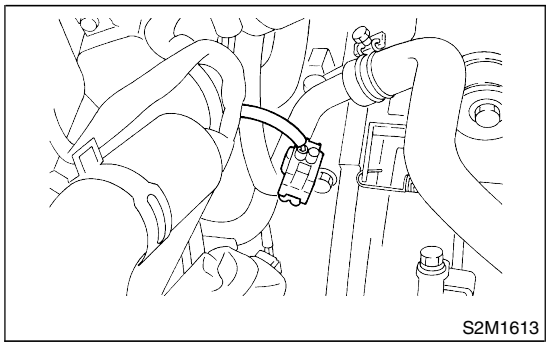


3) Connect connector to oil pressure switch (B), crankshaft position sensor (C) and engine coolant temperature sensor (A).

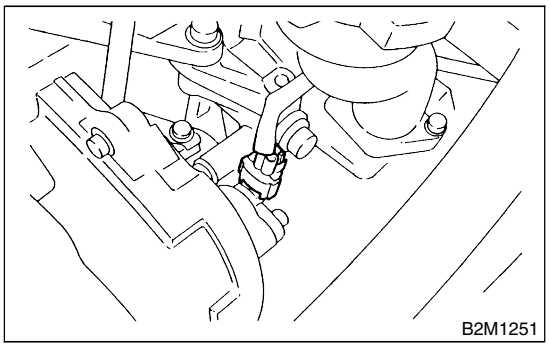
en0790



4) Connect connector to knock sensor.

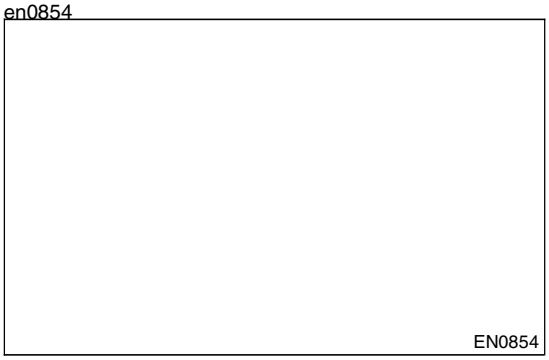


5) Connect connector to camshaft position sensor.

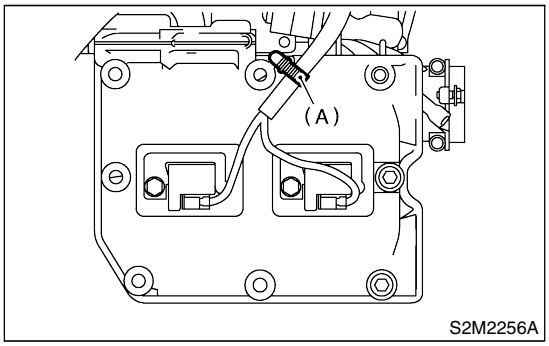


6) Connect connector to ignition coil.

en0854

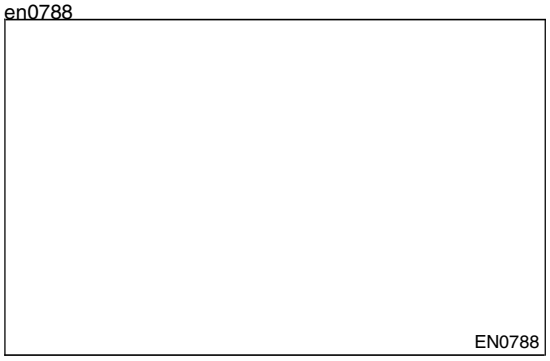


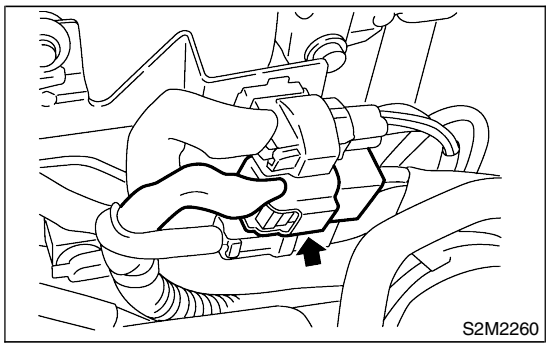
7) Secure harness to the bracket with clip (A).



8) Connect engine harness connector to bulkhead harness connectors.

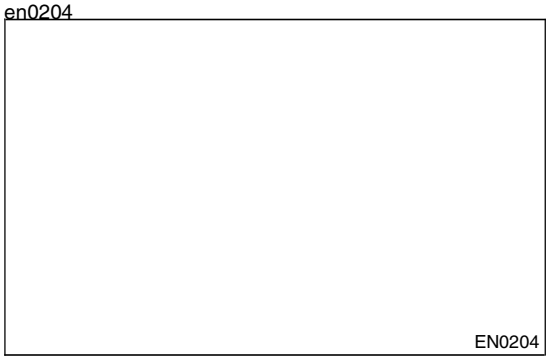
en0788





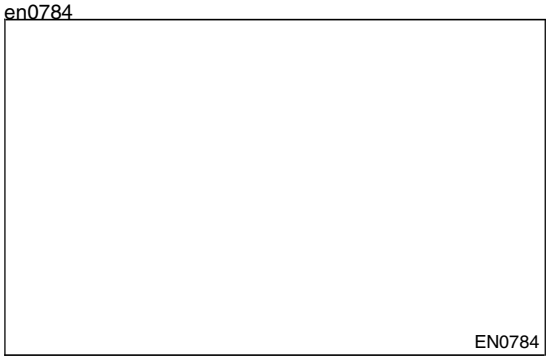
9) Connect brake booster vacuum hose.

en0204



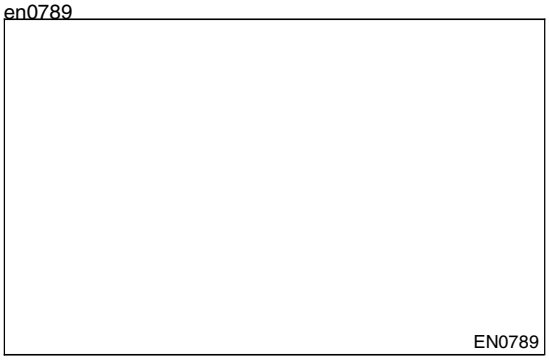
10) Connect engine coolant hoses to throttle body.

en0784



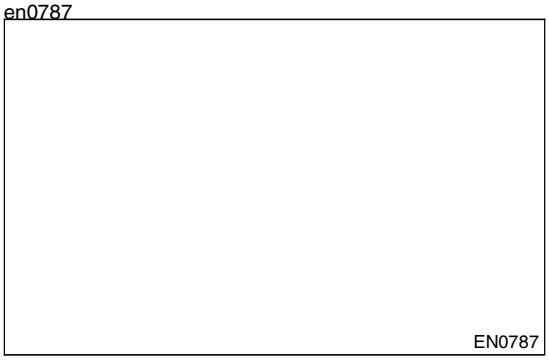
11) Connect emission hose to PCV valve.

en0789



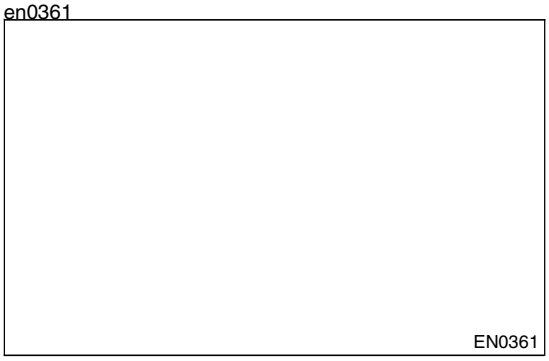
12) Connect pressure hose to intake duct.

en0787



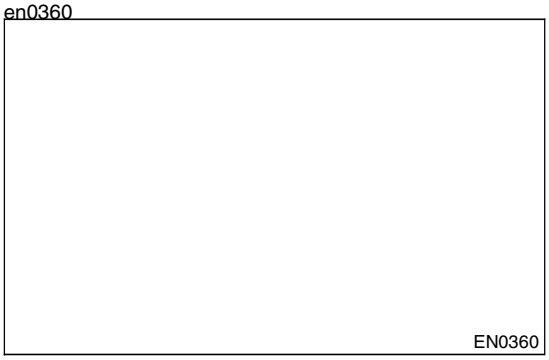
13) Install power steering pump on bracket.
(1) Install power steering tank on bracket.

en0361



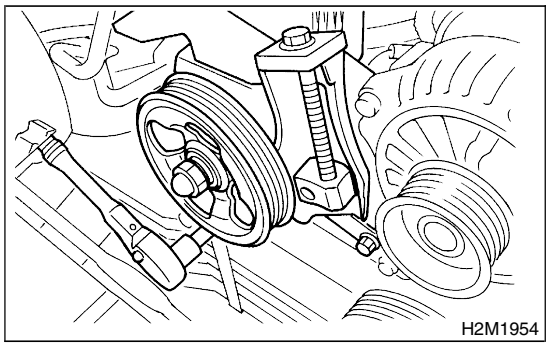
(2) Connect connector to power steering pump switch.

en0360

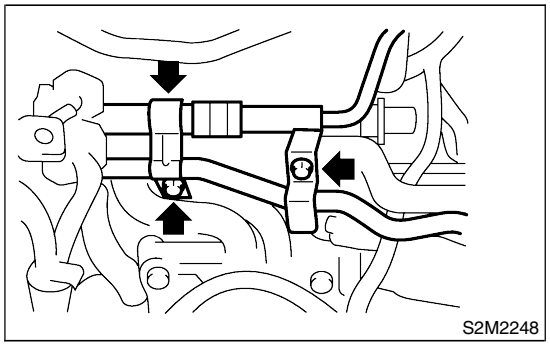


(3) Install power steering pump, and tighten bolts.

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

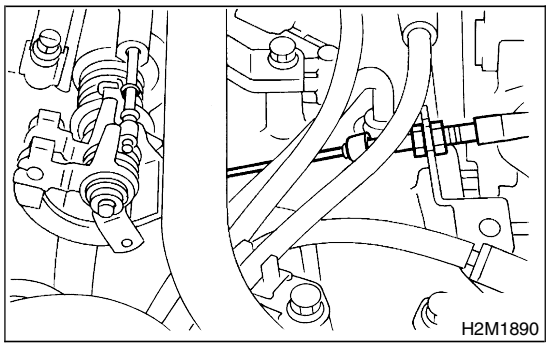

H2M1954

(4) Install power steering pipe brackets on right side intake manifold.

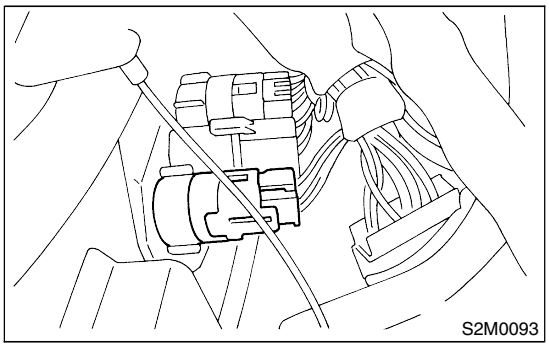

S2M2248

(5) Install front side V-belt. <Ref. to ME(DOHC TURBO)-44, REMOVAL, V-belt.>

14) Install coolant filler tank. <Ref. to CO-37, INSTALLATION, Coolant Filler Tank.>
15) Connect accelerator cable.


H2M1890

16) Install intercooler. <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>
17) Install air cleaner element.
18) Install air cleaner upper cover and air intake duct as a unit. <Ref. to IN(DOHC TURBO)-7, INSTALLATION, Air Cleaner.>
19) Connect connector to fuel pump relay.

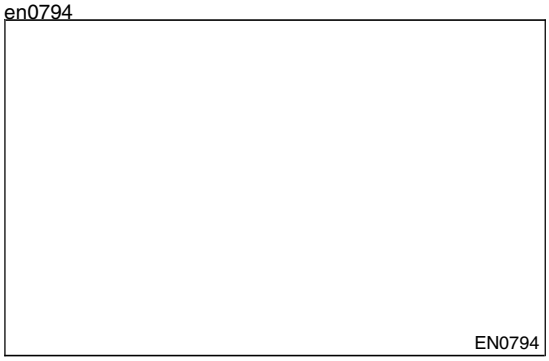

S2M0093

20) Connect battery ground cable.
21) Lift up vehicle.
22) Install under cover.
23) Fill coolant. <Ref. to CO-14, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

C: DISASSEMBLY S185034A06

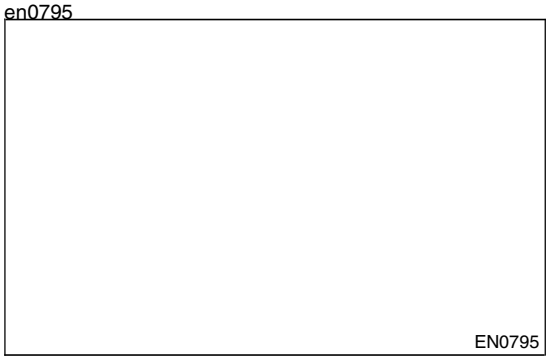
1) Remove fuel pipe protector.

en0794

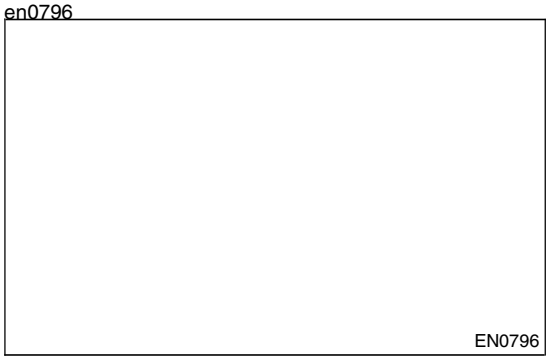


2) Remove engine ground terminal from intake manifold.

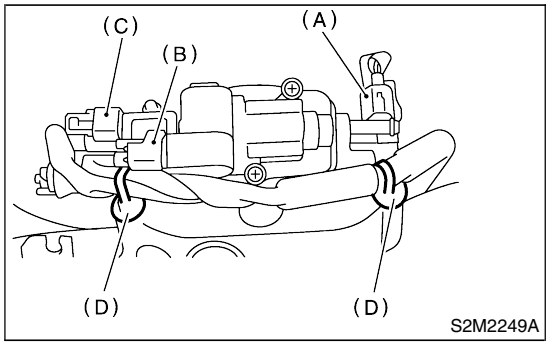
en0795



en0796

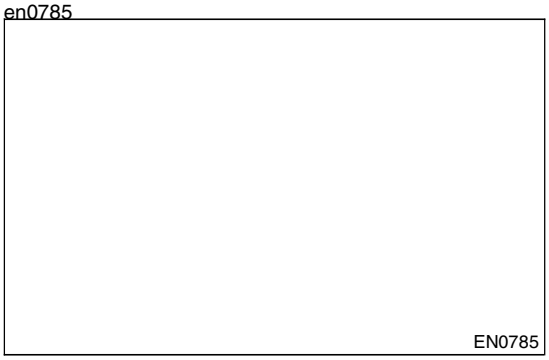


3) Disconnect connector from throttle position sensor (A), idle air control solenoid valve (B) and pressure sensor (C).
4) Separate engine harness secured to the intake manifold by clip (D).



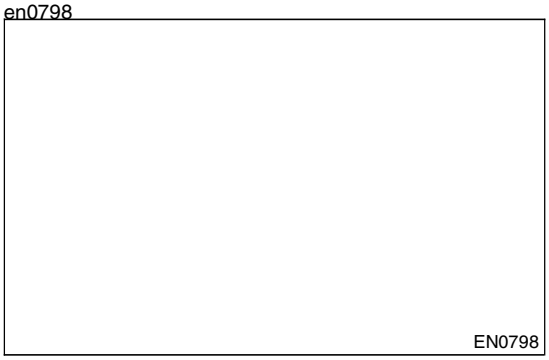
5) Remove throttle body from intake manifold.

en0785



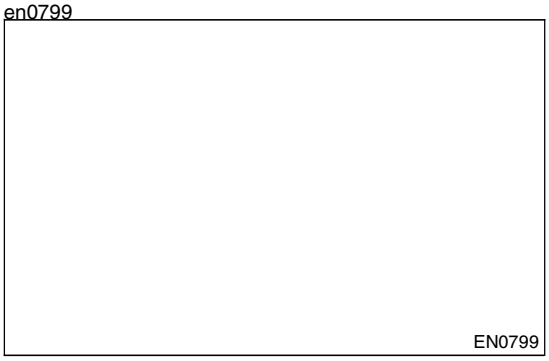
6) Disconnect connector from fuel injector.

en0798



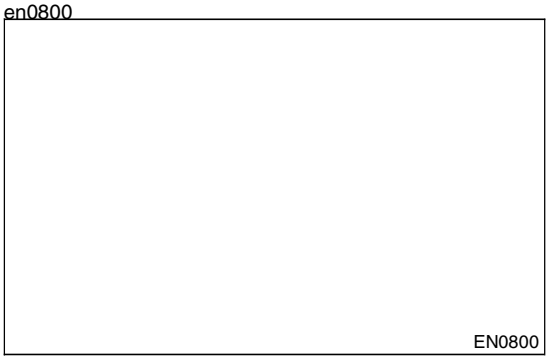
7) Disconnect connector from tumble generator valve actuator.

en0799



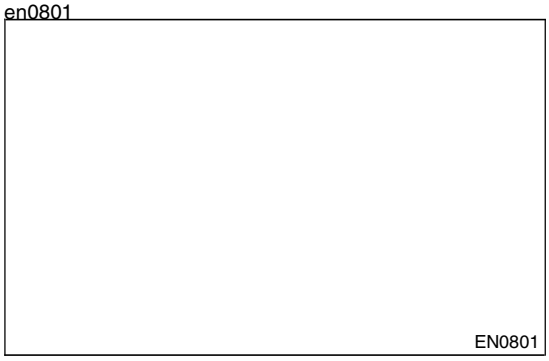
8) Disconnect connector from tumble generator valve sensor.

en0800



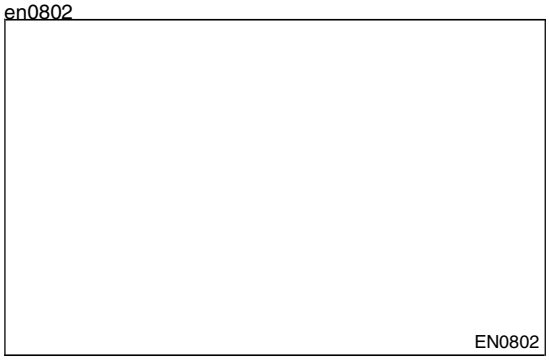
9) Disconnect connector from purge control solenoid valve.

en0801



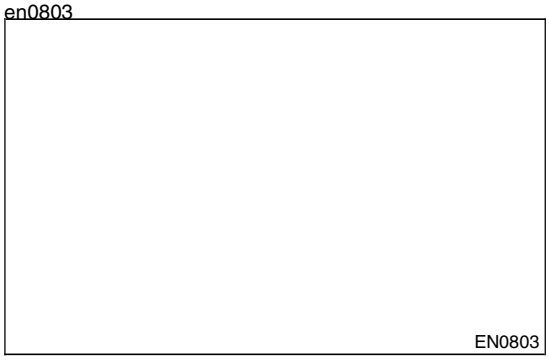
10) Remove purge control solenoid valve.

en0802



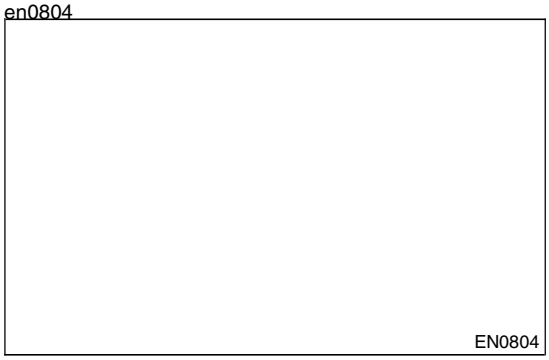
11) Disconnect evaporation hose from intake manifold.

en0803



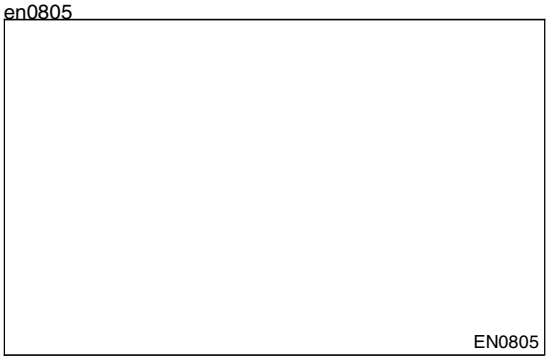
12) Disconnect evaporation hoses from purge valve.

en0804



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

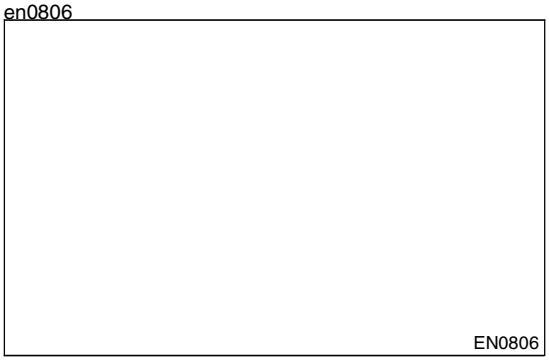
en0805



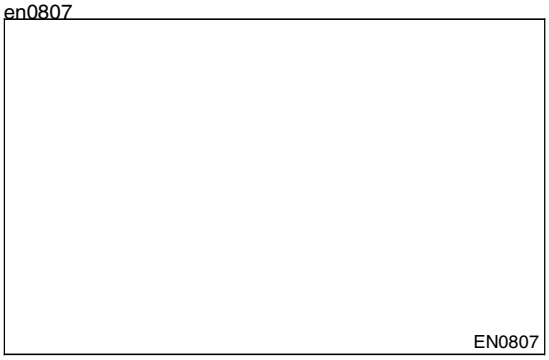
14) Remove bolt which hold fuel injector pipe onto intake manifold.

- LH SIDE

en0806

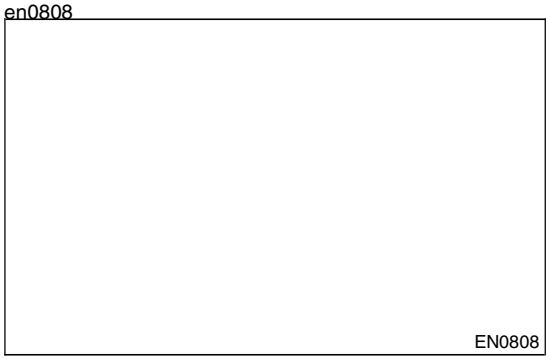


en0807

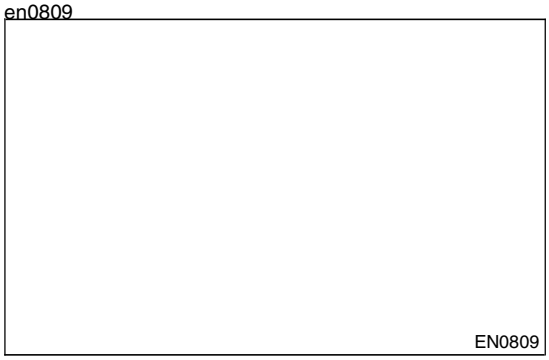


● RH SIDE

en0808

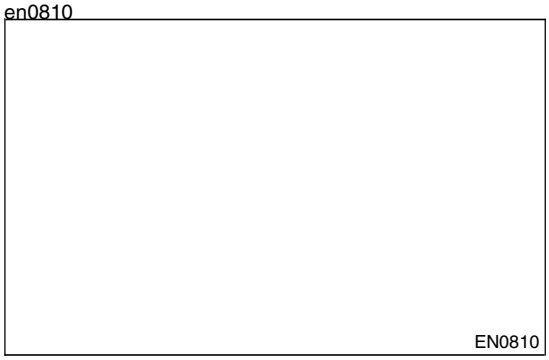


en0809



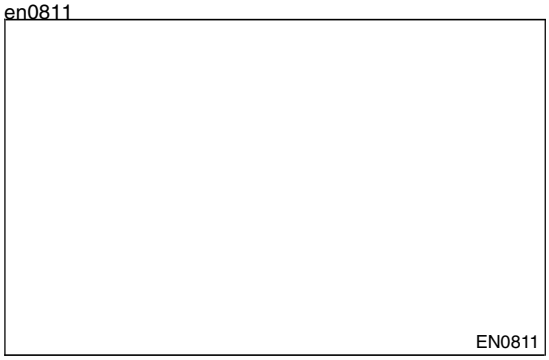
15) Remove fuel injector.

en0810



16) Remove harness bracket which hold engine harness onto intake manifold.

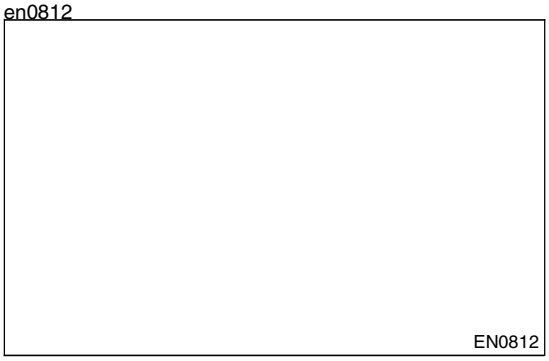
en0811



17) Remove engine harness from intake manifold.

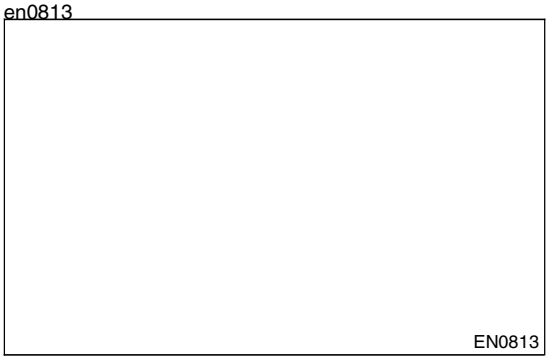
18) Loosen clamp which holds front left side fuel hose to injector pipe and remove the pipe from clamp.

en0812



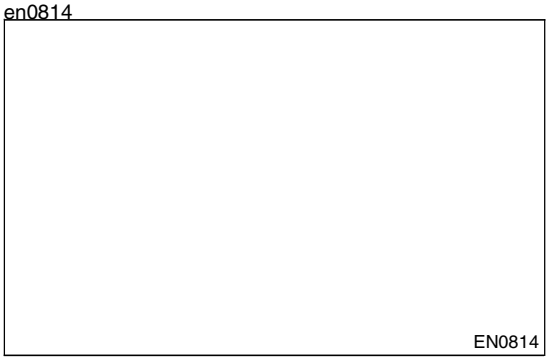
19) Remove fuel injector pipe LH.
20) Remove bolts which installs fuel pipe on intake manifold.

en0813



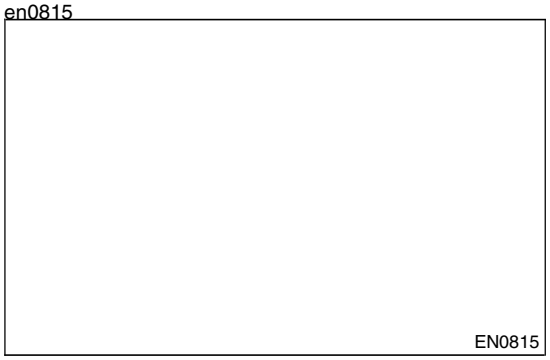
21) Remove fuel pipe assembly and pressure regulator, from intake manifold.
22) Remove intake duct from intake manifold.

en0814



23) Remove tumble generator valve assembly from intake manifold.

en0815



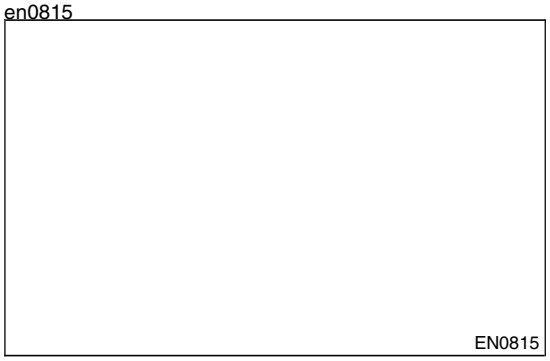
D: ASSEMBLY S185034A02

NOTE:
Replace gasket with a new one.

1) Install tumble generator valve assembly to intake manifold.

Tightening torque:
8.25 N·m (0.84 kgf-m, 6.08 ft-lb)

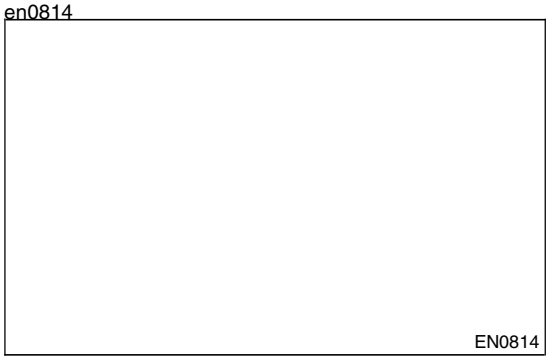
en0815



2) Install air intake duct to intake manifold.

Tightening torque:
19 N·m (1.94 kgf-m, 14.0 ft-lb)

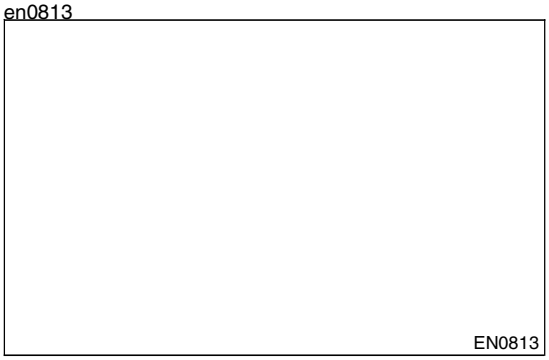
en0814



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

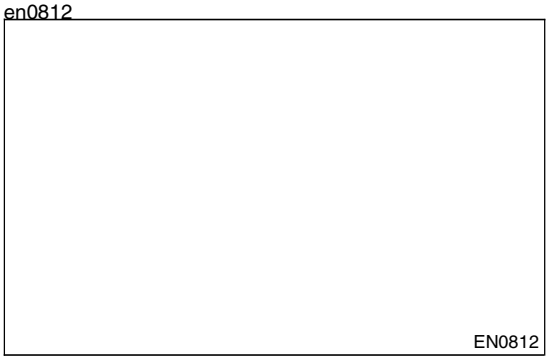
Tightening torque:
5 N·m (0.51 kgf-m, 3.69 ft-lb)

en0813



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

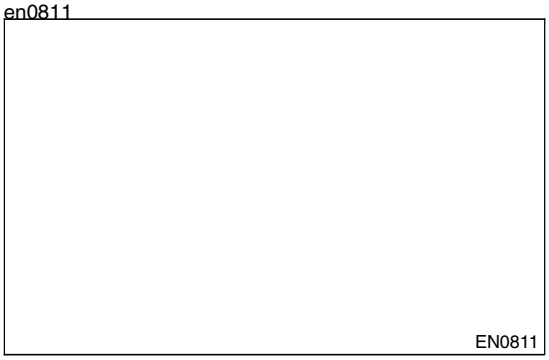
en0812



6) Install engine harness to intake manifold.
7) Install harness bracket which hold engine harness onto intake manifold.

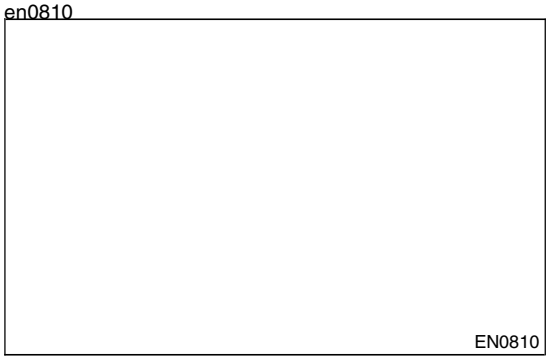
Tightening torque:
19 N·m (1.94 kgf-m, 14.0 ft-lb)

en0811



8) Install fuel injector.

en0810

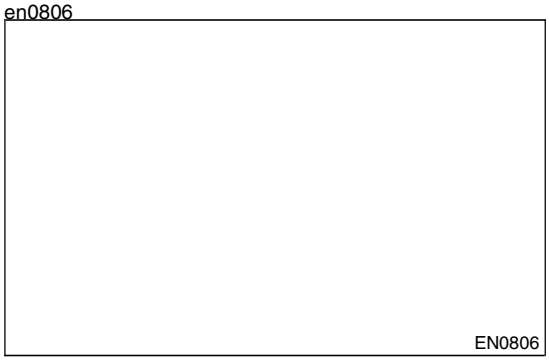


9) Tighten bolt which install fuel injector pipe onto intake manifold.

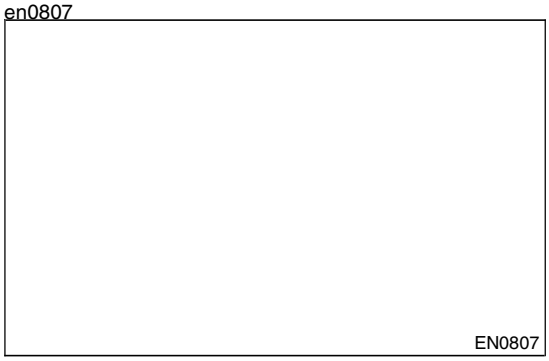
Tightening torque:
19 N·m (1.94 kgf-m, 14.0 ft-lb)

- LH SIDE

en0806

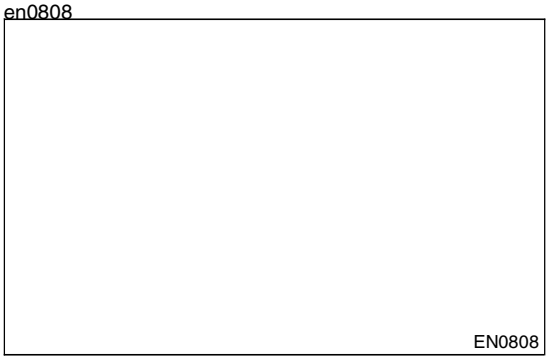


en0807

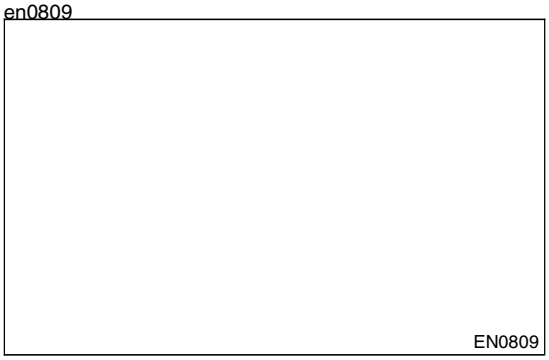


- RH SIDE

en0808



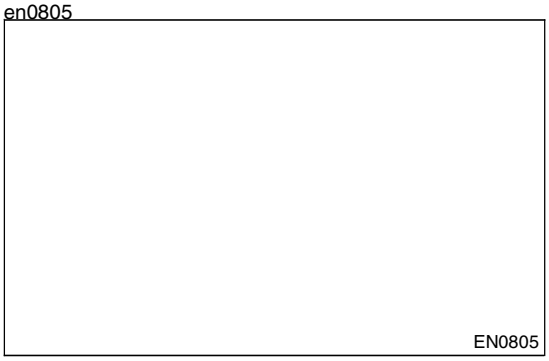
en0809



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

Tightening torque:
5 N·m (0.51 kgf-m, 3.69 ft-lb)

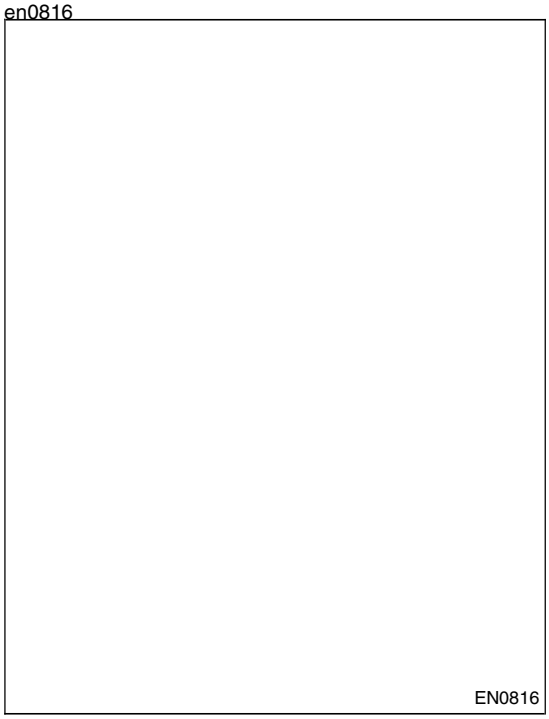
en0805



11) Connect evaporation hoses to purge valve.

CAUTION:
Carefully connect the evaporation hoses.

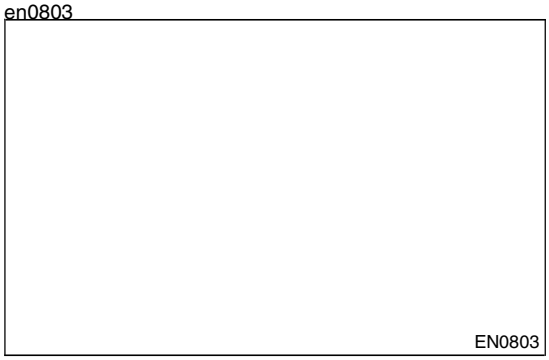
en0816



(A) To fuel pipe ASSY
(B) To intake duct
(C) To purge control solenoid valve
(D) To intake manifold

12) Connect evaporation hose to intake manifold.

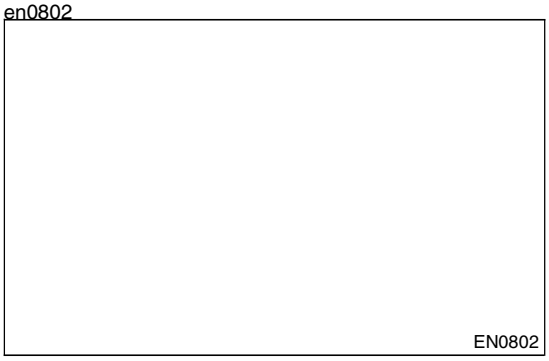
en0803



13) Install purge control solenoid valve.

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

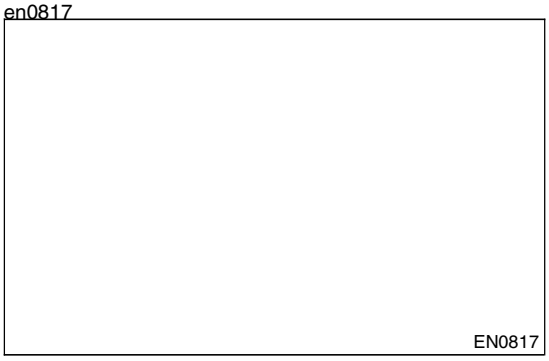
en0802



14) Connect hoses to purge control solenoid valve.

CAUTION:
Carefully connect the evaporation hoses.

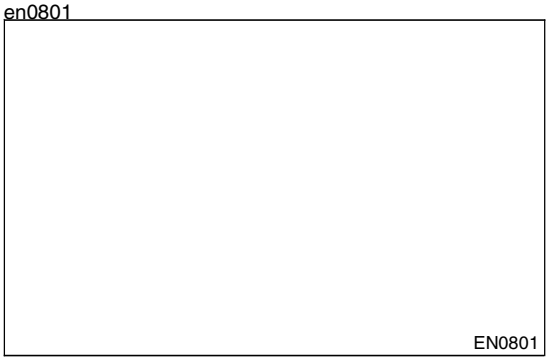
en0817



(A) To intake manifold
(B) To purge valve

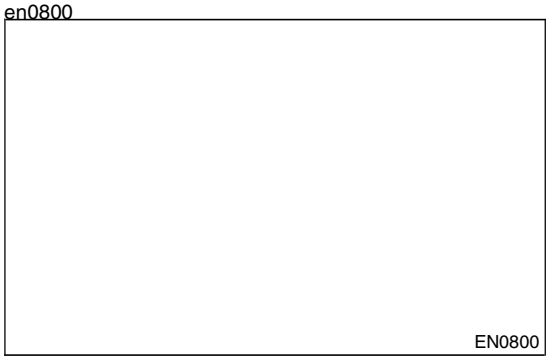
15) Connect connector to purge control solenoid valve.

en0801



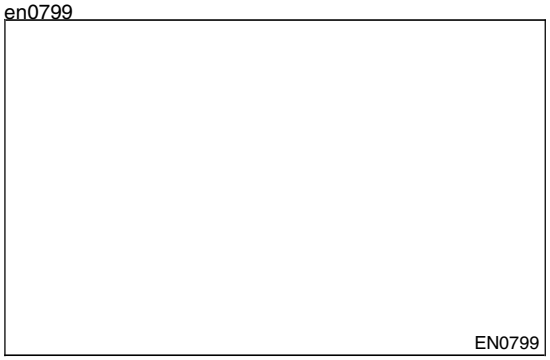
16) Connect connector to tumble generator valve sensor.

en0800



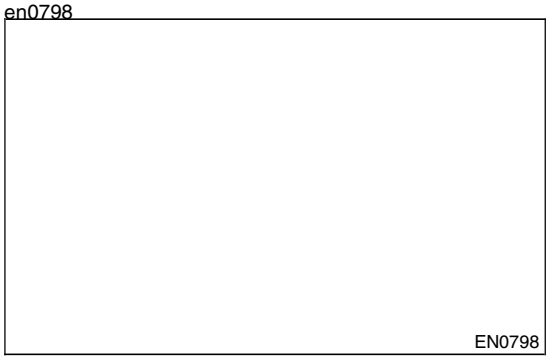
17) Connect connector to tumble generator valve actuator.

en0799



18) Connect connector to fuel injector.

en0798

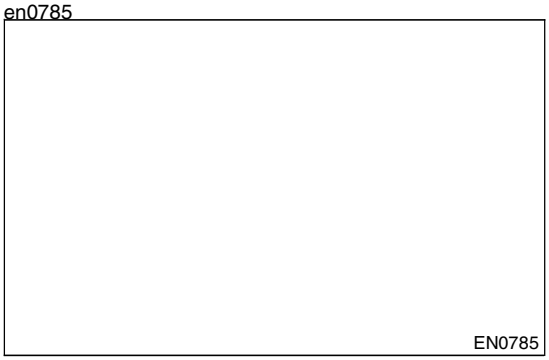


19) Install throttle body to intake manifold.

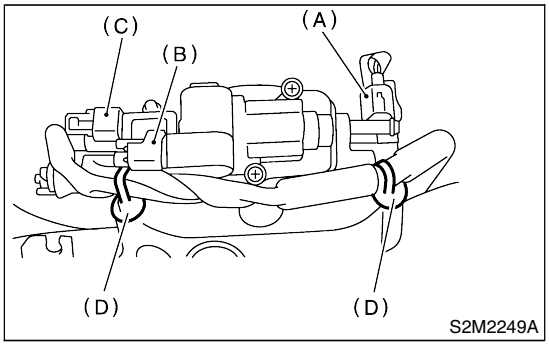
NOTE:
Replace gasket with a new one.

Tightening torque:
22 N·m (2.2 kgf-m, 16 ft-lb)

en0785



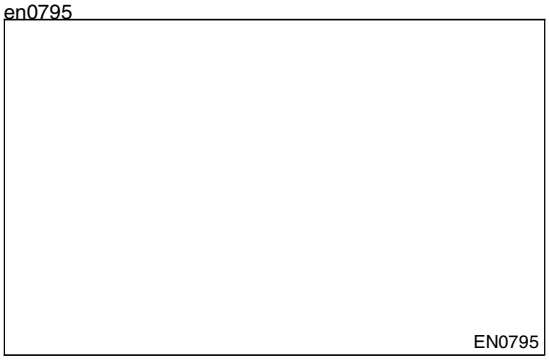
20) Connect connector to throttle position sensor (A), idle air control solenoid valve (B) and pressure sensor (C).
21) Secure engine harness to the intake manifold with clip (D).



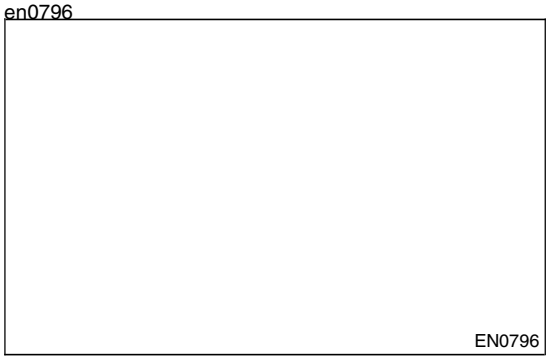
22) Install engine ground terminal to intake manifold.

Tightening torque:
19 N·m (1.94 kgf-m, 14.0 ft-lb)

en0795



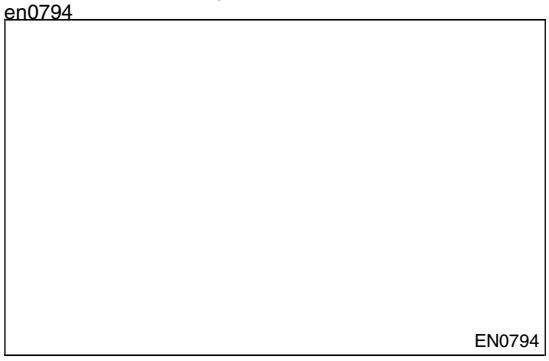
en0796



23) Install fuel pipe protector.

Tightening torque:
19 N·m (1.94 kgf-m, 14.0 ft-lb)

en0794



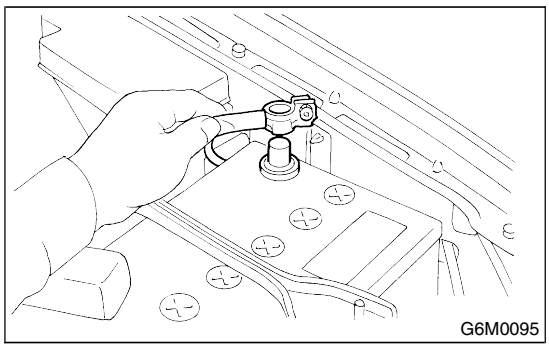
E: INSPECTION *S185034A10*

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

4. Engine Coolant Temperature Sensor S185047

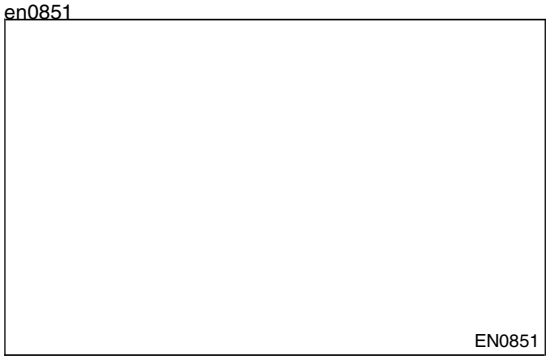
A: REMOVAL S185047A18

1) Disconnect battery ground cable.



2) Remove the generator <Ref. to SC-12, REMOVAL, Generator.>
3) Disconnect connector from engine coolant temperature sensor.

en0851



4) Remove engine coolant temperature sensor.

B: INSTALLATION S185047A11

Install in the reverse order of removal.

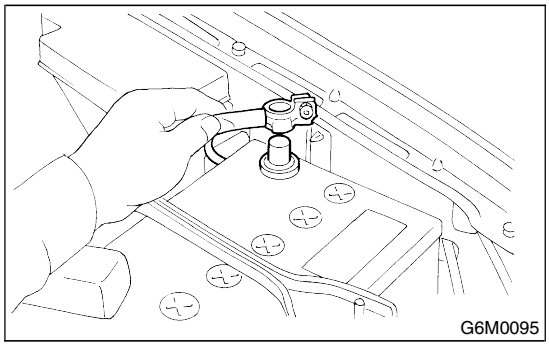
Tightening torque:
18 N·m (1.8 kgf-m, 13 ft-lb)

5. Crankshaft Position Sensor

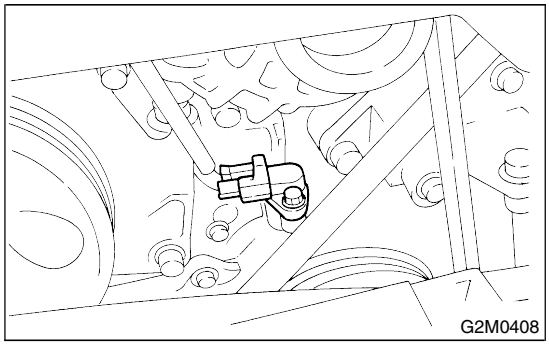
S185043

A: REMOVAL S185043A18

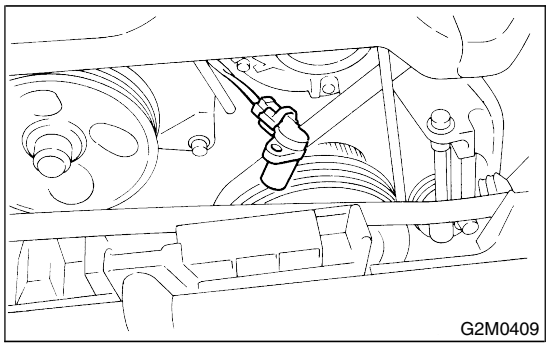
1) Disconnect battery ground cable.


G6M0095

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


G2M0408

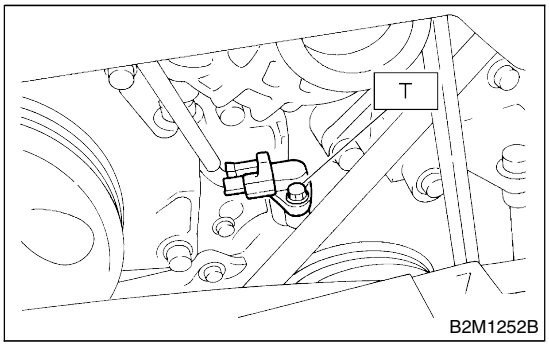
3) Remove crankshaft position sensor, and disconnect connector from it.


G2M0409

B: INSTALLATION S185043A11

Install in the reverse order of removal.

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



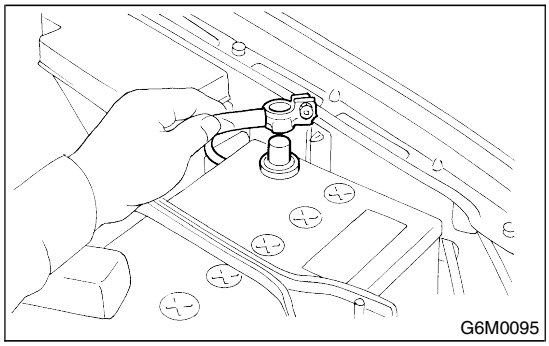
B2M1252B

6. Camshaft Position Sensor

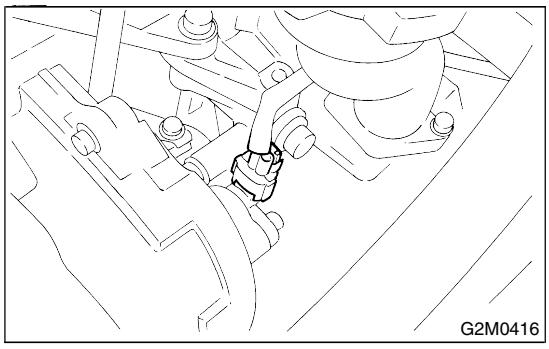
S185041

A: REMOVAL S185041A18

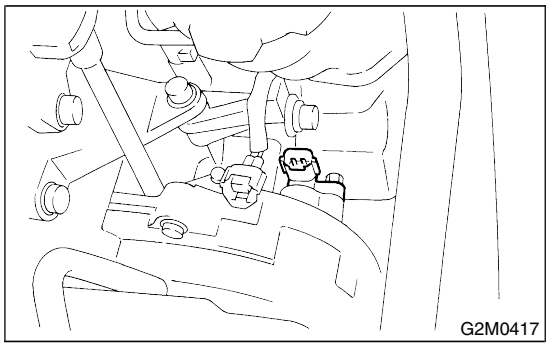
1) Disconnect battery ground cable.


G6M0095

2) Disconnect connector from camshaft position sensor.


G2M0416

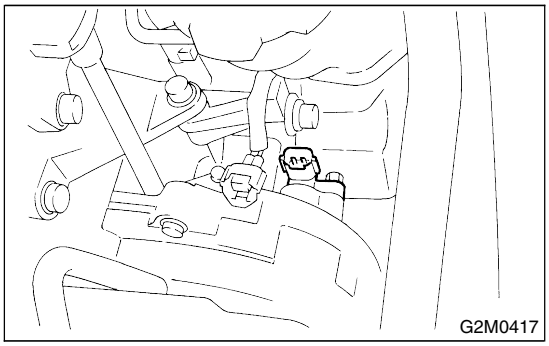
3) Remove camshaft position sensor from camshaft support LH.


G2M0417

B: INSTALLATION S185041A11

Install in the reverse order of removal.

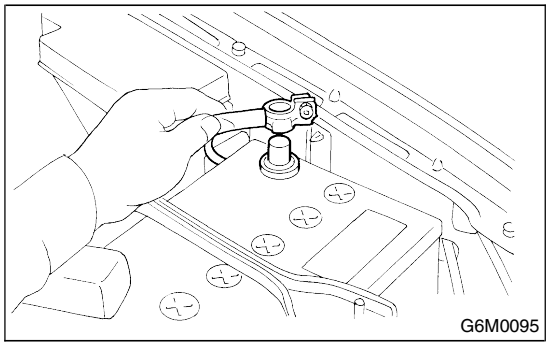
Tightening torque:
T: 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)


G2M0417

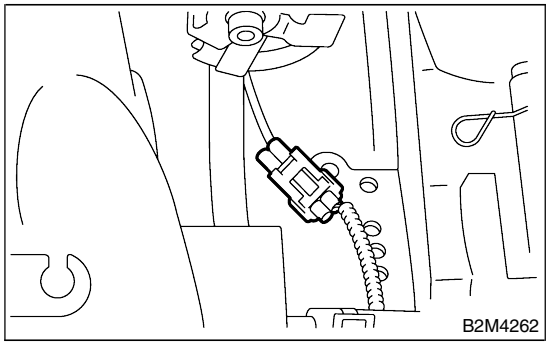
7. Knock Sensor S185042

A: REMOVAL S185042A18

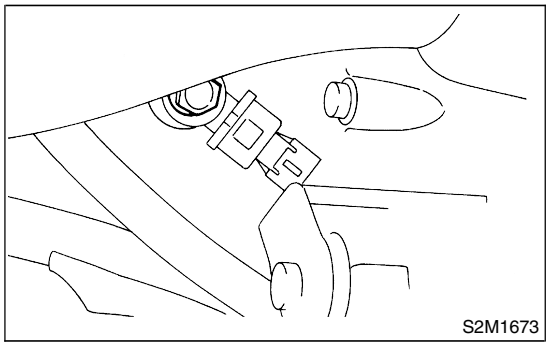
1) Disconnect battery ground cable from battery ground terminal.



2) Remove intercooler. <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
3) Disconnect knock sensor connector.



4) Remove knock sensor from cylinder block.

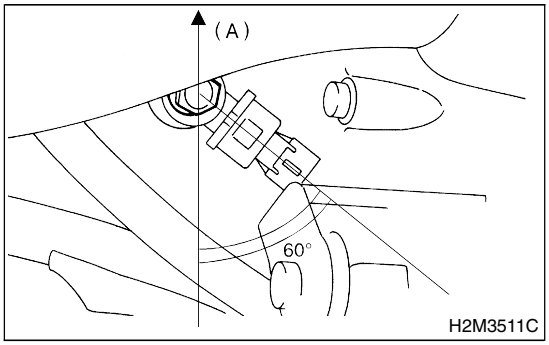


B: INSTALLATION S185042A11

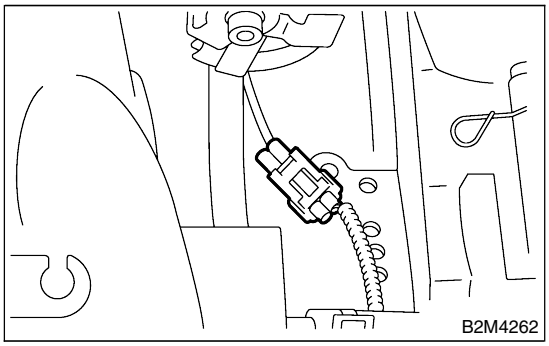
1) Install knock sensor to cylinder block.

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

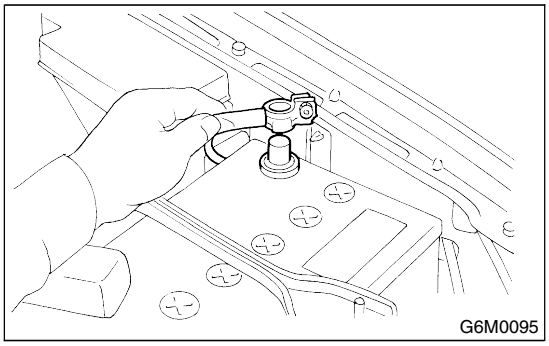
NOTE:
The extraction area of the knock sensor cord must be positioned at a 60° angle relative to the engine rear.



2) Connect knock sensor connector.



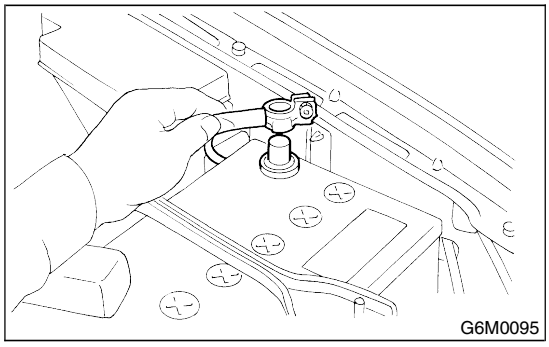
3) Install intercooler. <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>
4) Connect battery ground cable.



8. Throttle Position Sensor S185039

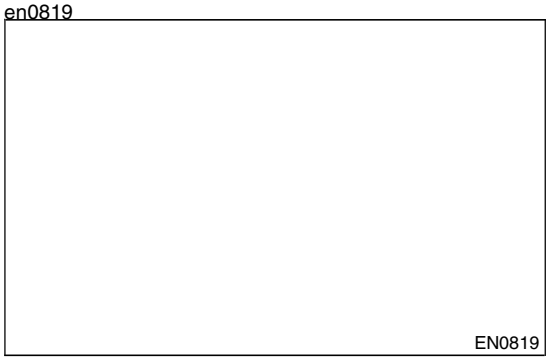
A: REMOVAL S185039A18

1) Disconnect battery ground cable.


G6M0095

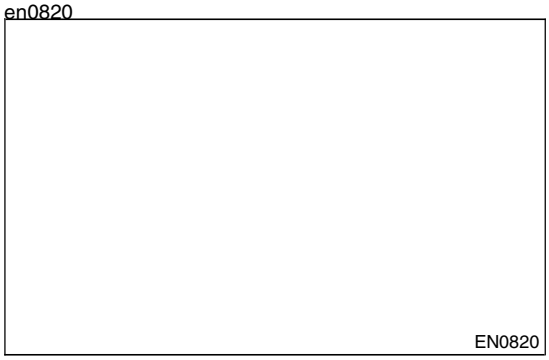
2) Remove inter cooler. <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
3) Disconnect connector from throttle position sensor.

en0819


EN0819

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

en0820

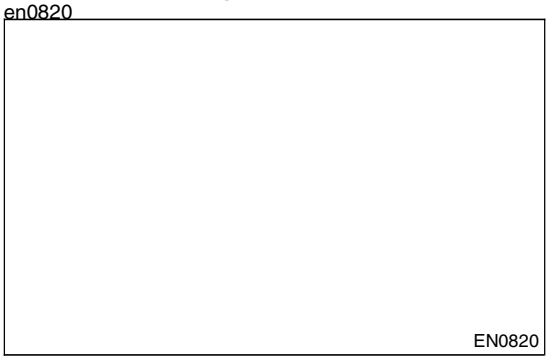

EN0820

B: INSTALLATION S185039A11

Install in the reverse order of removal.

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

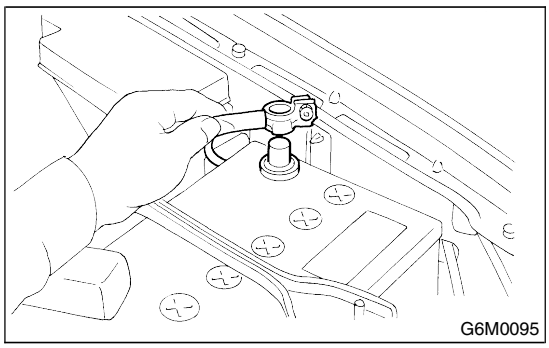
en0820


EN0820

9. Mass Air Flow and Intake Air Temperature Sensor S185770

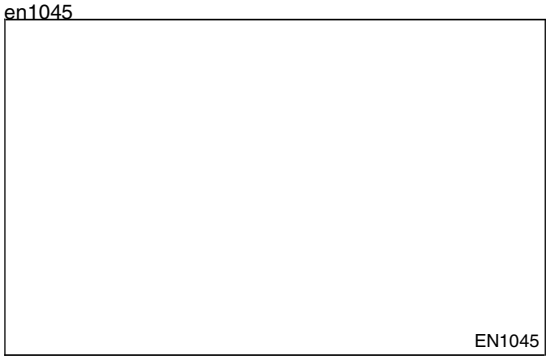
A: REMOVAL S185770A18

1) Disconnect battery ground cable.


G6M0095

2) Disconnect connector mass air flow and intake air temperature sensor.
3) Remove mass air flow and intake air temperature sensor.

en1045


EN1045

B: INSTALLATION S185770A11

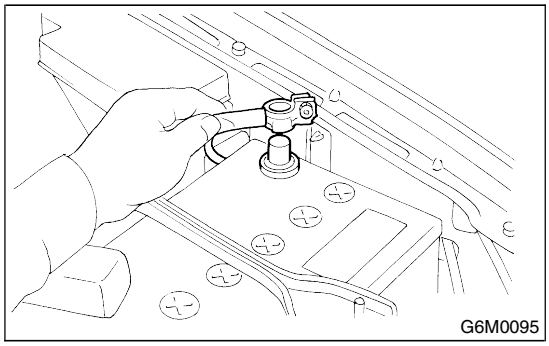
Install in the reverse order of removal.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

10. Pressure Sensor S185765

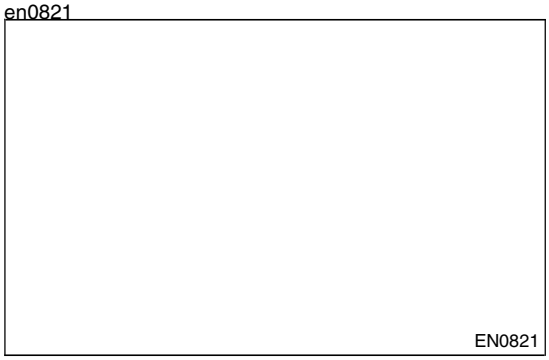
A: REMOVAL S185765A18

1) Disconnect battery ground cable.



2) Remove idle air control solenoid valve. <Ref. to FU(SOHC)-38, REMOVAL, Idle Air Control Solenoid Valve.>
3) Disconnect connectors from pressure sensor.

en0821



4) Remove pressure sensor from throttle body.

B: INSTALLATION S185765A11

Install in the reverse order of removal.

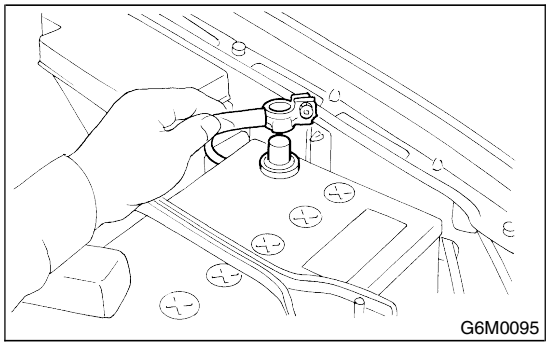
NOTE:
Replace gaskets for idle air control solenoid valve with new ones.

Tightening torque:
Pressure sensor
1.6 N·m (0.16 kgf-m, 1.2 ft-lb)
Idler air control solenoid valve
2.8 N·m (0.29 kgf-m, 2.1 ft-lb)

11. Idle Air Control Solenoid Valve S185056

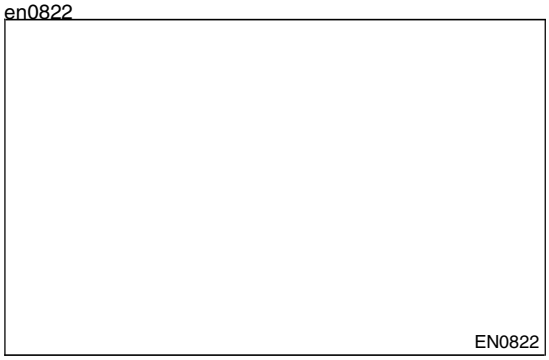
A: REMOVAL S185056A18

1) Disconnect battery ground cable.


G6M0095

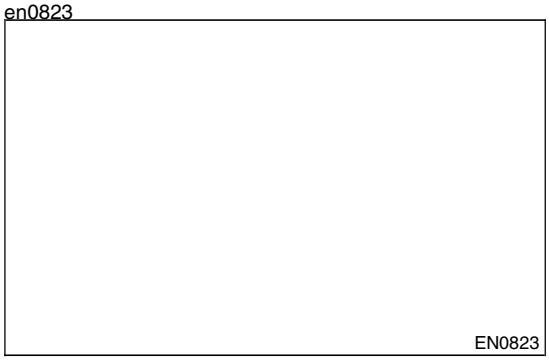
2) Disconnect connector from idle air control solenoid valve.

en0822


EN0822

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

en0823


EN0823

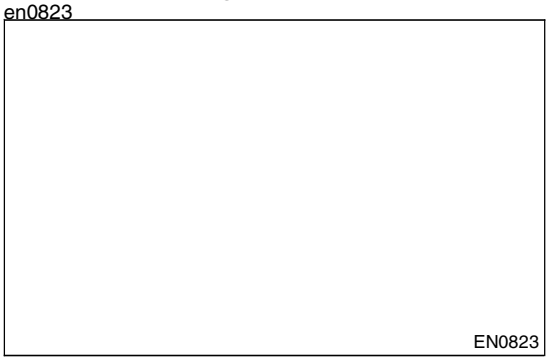
B: INSTALLATION S185056A11

Install in the reverse order of removal.

NOTE:
Always use new gasket.

Tightening torque:
2.8 N·m (0.29 kgf-m, 2.1 ft-lb)

en0823


EN0823

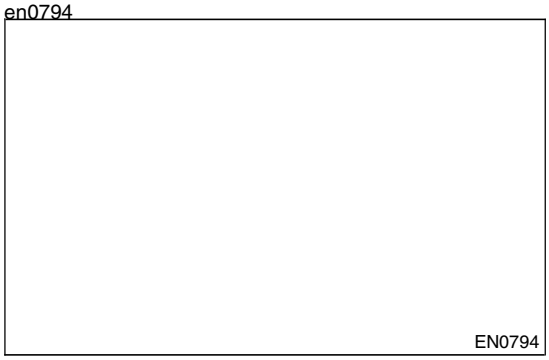
12. Fuel Injector S185051

A: REMOVAL S185051A18

1. RH SIDE S185051A1801

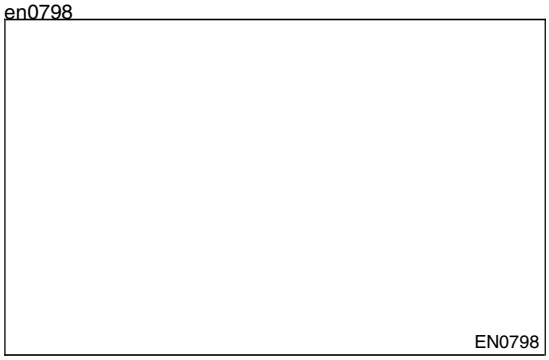
1) Remove intake manifold. <Ref. to FU(DOHC TURBO)-15, REMOVAL, Intake Manifold.>
2) Remove fuel pipe protector.

en0794



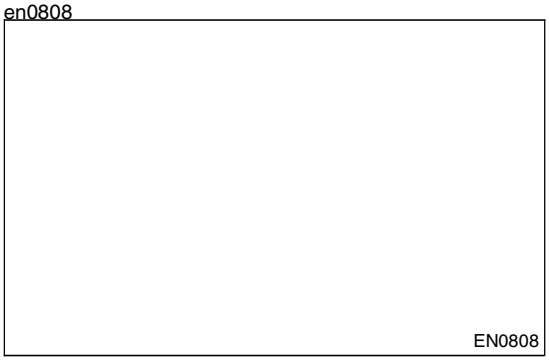
3) Disconnect connector from fuel injector.

en0798

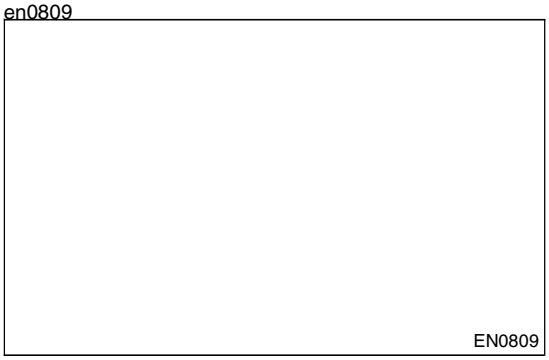


4) Remove bolts which hold injector pipe to intake manifold.

en0808

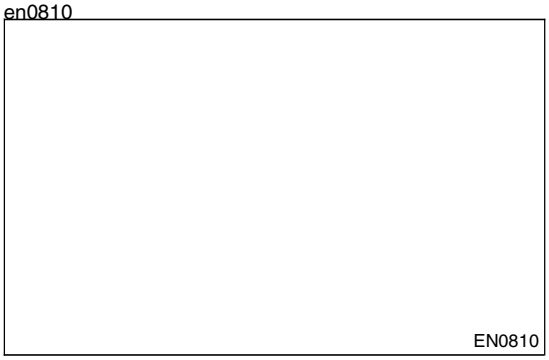


en0809



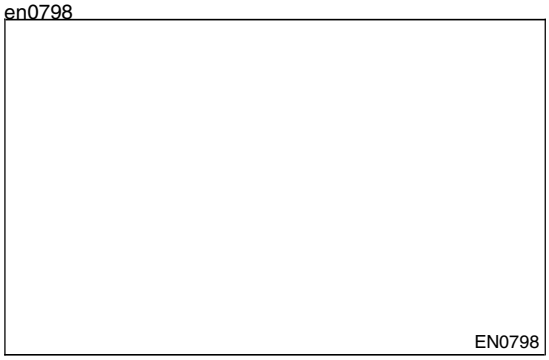
5) Remove fuel injector while lifting up fuel injector pipe.

en0810

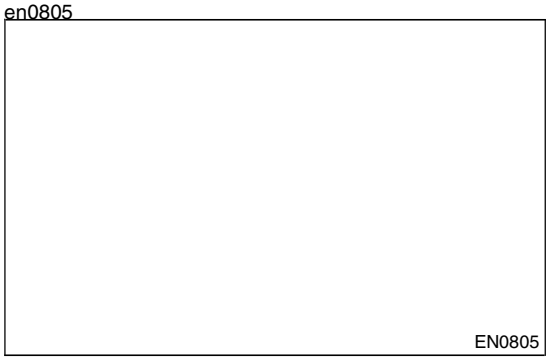


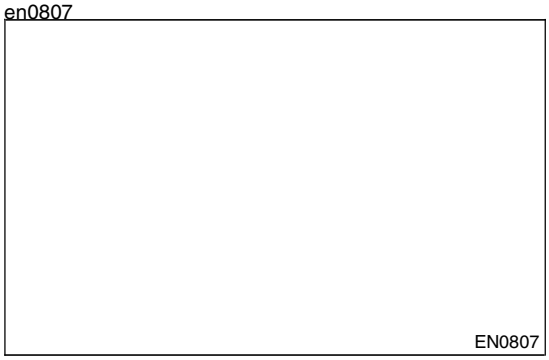
2. LH SIDE S185051A1802

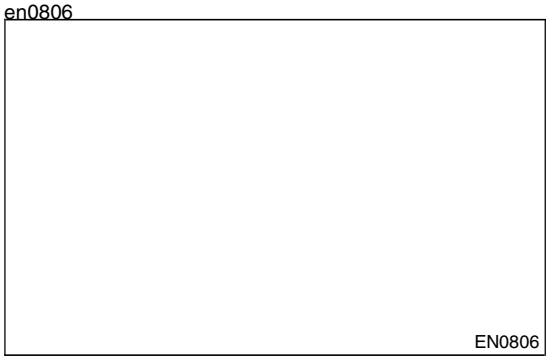
1) Remove intake manifold. <Ref. to FU(DOHC TURBO)-15, REMOVAL, Intake Manifold.>
2) Disconnect connector from fuel injector.

en0798

EN0798

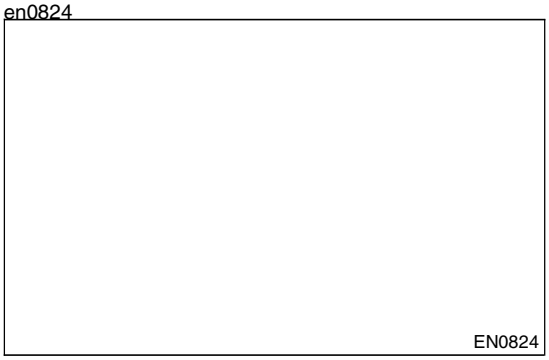
3) Remove bolts which hold injector pipe to intake manifold.

en0805

EN0805

en0807

EN0807

en0806

EN0806

4) Remove fuel injector while lifting up fuel injector pipe.

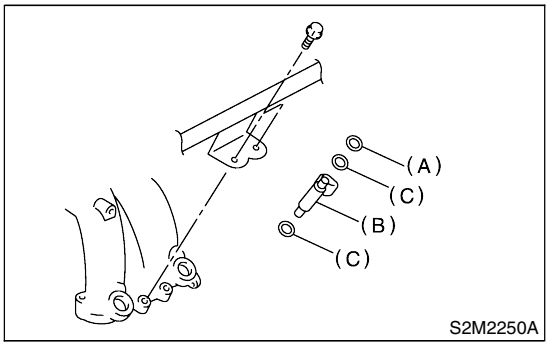
en0824

EN0824

B: INSTALLATION S185051A11

1. RH SIDE S185051A1101

Install in the reverse order of removal.

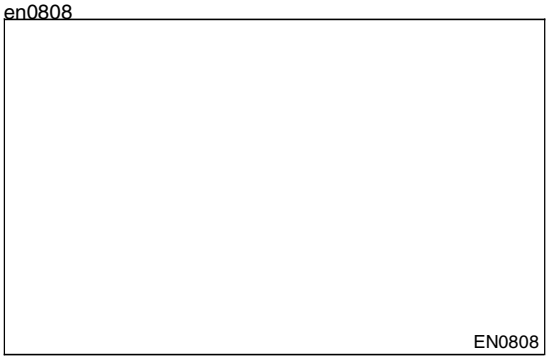
NOTE:
Replace O-ring and insulators with new ones.



S2M2250A

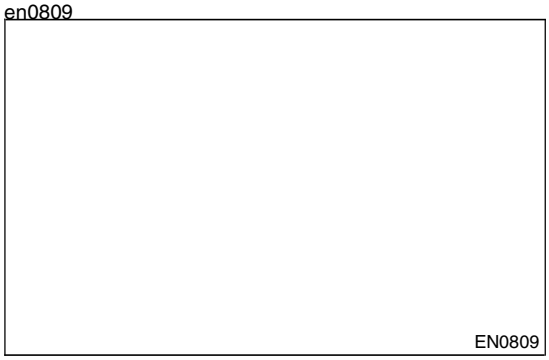
(A) O-ring
(B) Fuel injector
(C) Insulator

Tightening torque:
19 N·m (1.94 kgf-m, 14.0 ft-lb)

en0808

EN0808

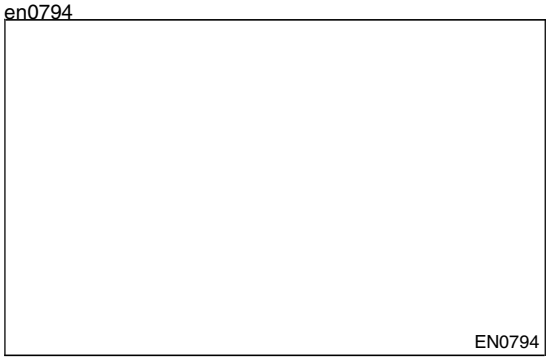
Tightening torque:
19 N·m (1.94 kgf-m, 14.0 ft-lb)

en0809



Tightening torque:
19 N·m (1.94 kgf-m, 14.0 ft-lb)

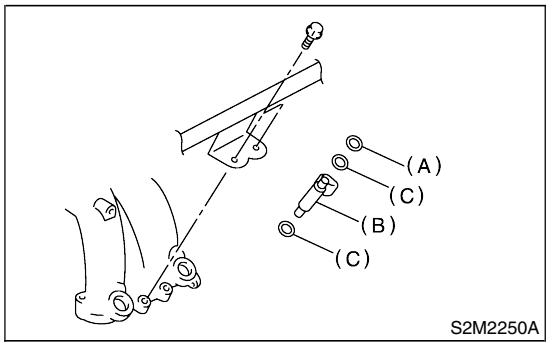
en0794



2. LH SIDE *S185051A1102*

Install in the reverse order of removal.

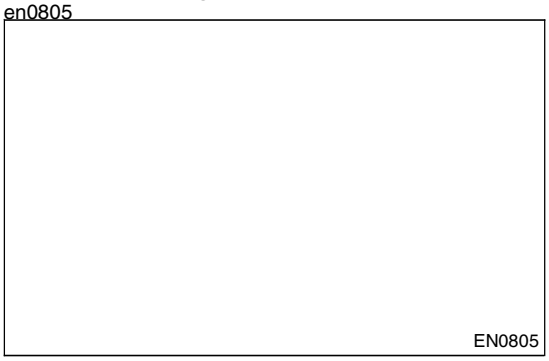
NOTE:
Replace O-ring and insulators with new ones.



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

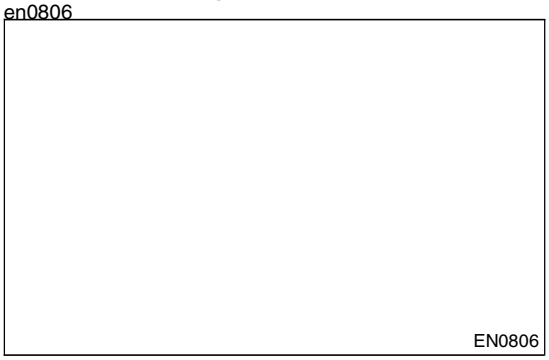
Tightening torque:
5 N·m (0.51 kgf-m, 3.69 ft-lb)

en0805



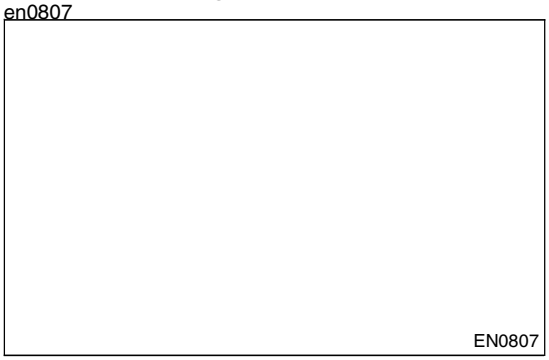
Tightening torque:
19 N·m (1.94 kgf-m, 14.0 ft-lb)

en0806



Tightening torque:
19 N·m (1.94 kgf-m, 14.0 ft-lb)

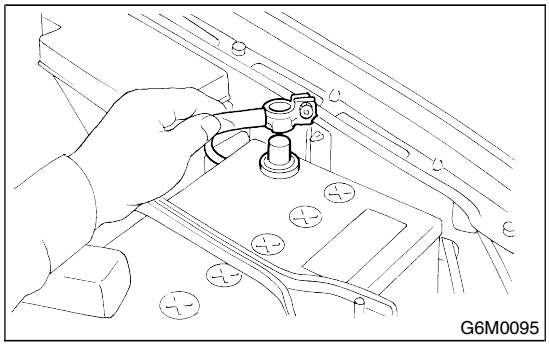
en0807



13. Tumble Generator Valve Assembly S185766

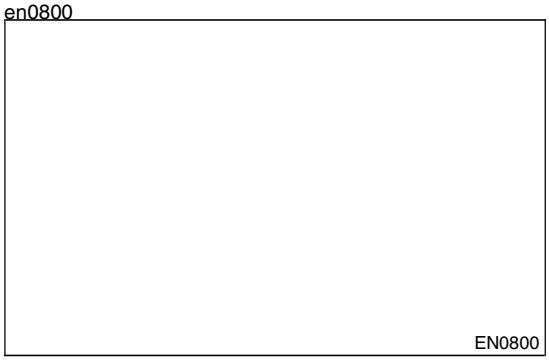
A: REMOVAL S185766A18

1) Disconnect battery ground cable.



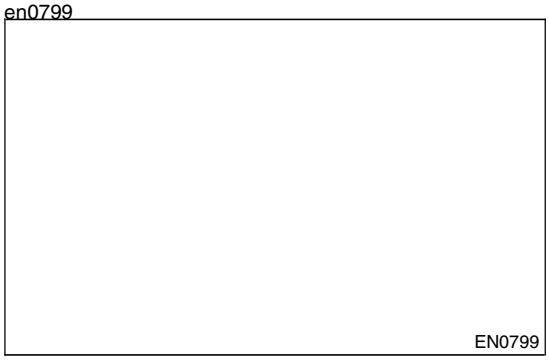
2) Remove intake manifold. <Ref. to FU(DOHC TURBO)-15, REMOVAL, Intake Manifold.>
3) Disconnect connector from tumble generator valve sensor.

en0800



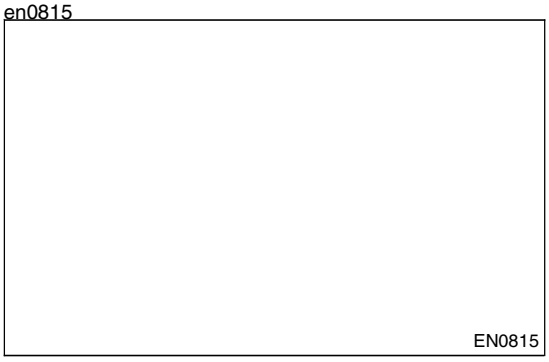
4) Disconnect connector from tumble generator valve actuator.

en0799



5) Remove fuel injector. <Ref. to FU(DOHC TURBO)-37, REMOVAL, Fuel Injector.>
6) Remove tumble generator valve body from intake manifold.

en0815



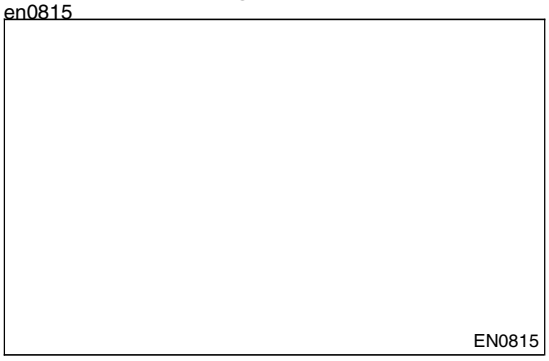
B: INSTALLATION S185766A11

Install in the reverse order of removal.

NOTE:
Always use new gaskets.

Tightening torque:
8.25 N·m (0.84 kgf-m, 6.1 ft-lb)

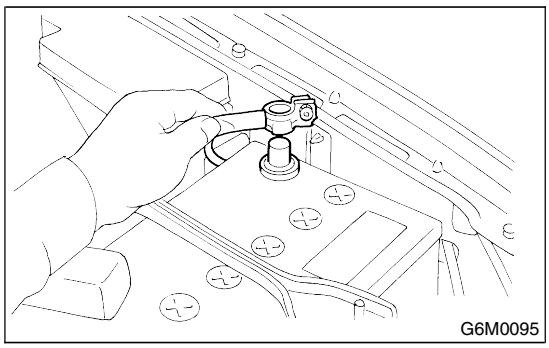
en0815



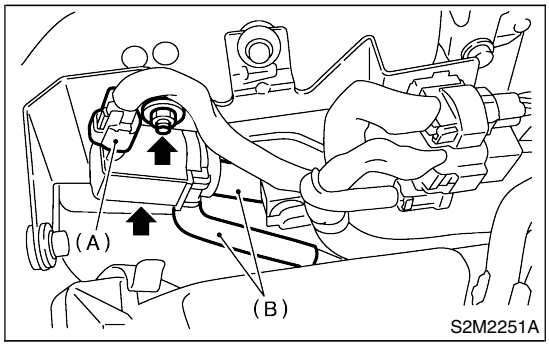
14. Wastegate Control Solenoid Valve S185057

A: REMOVAL S185057A18

1) Disconnect battery ground cable.



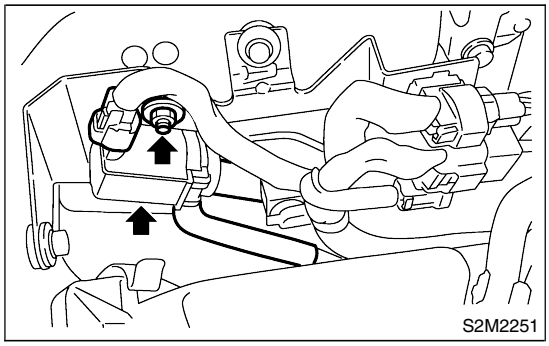
2) Disconnect connector (A) from wastegate control solenoid valve.
3) Disconnect pressure hoses (B) from wastegate control solenoid valve.
4) Remove wastegate control solenoid valve from bracket



B: INSTALLATION S185057A11

Install in the reverse order of removal.

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

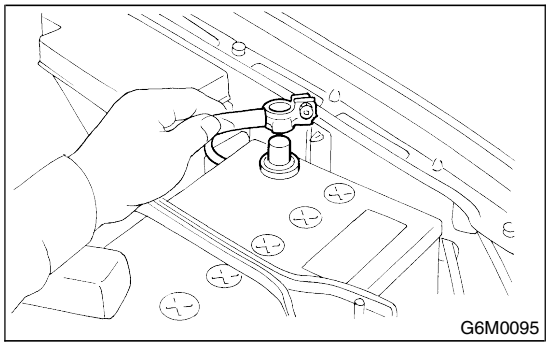


15. Front Oxygen (A/F) Sensor

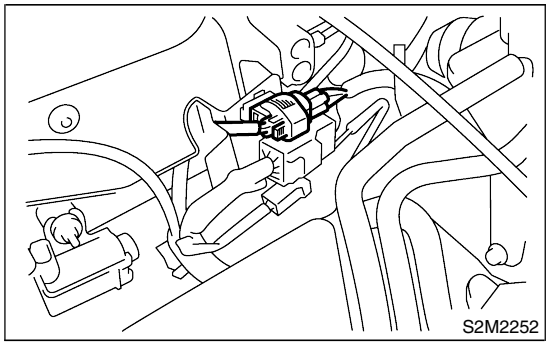
S185642

A: REMOVAL S185642A18

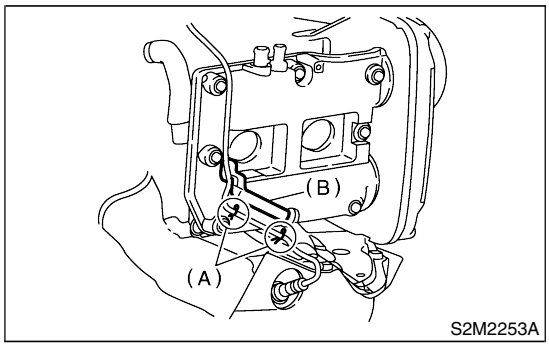
1) Disconnect battery ground cable.



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

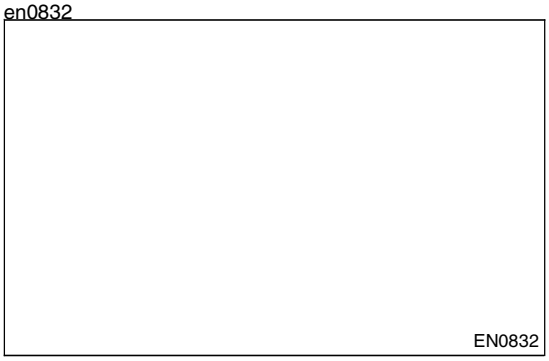


3) Remove harness secured by clip (A) from the bracket (B).



4) Remove front right side wheel.
5) Lift-up the vehicle.
6) Remove service hole cover.

en0832



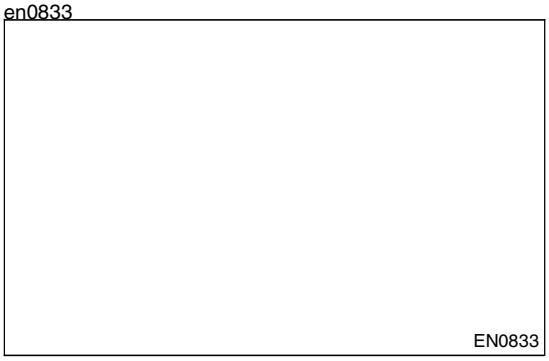
7) Apply SUBARU CRC or its equivalent to threaded portion of front oxygen (A/F) sensor, and leave it for one minute or more.

SUBARU CRC (Part No. 004301003)

8) 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.

en0833



B: INSTALLATION S185642A11

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

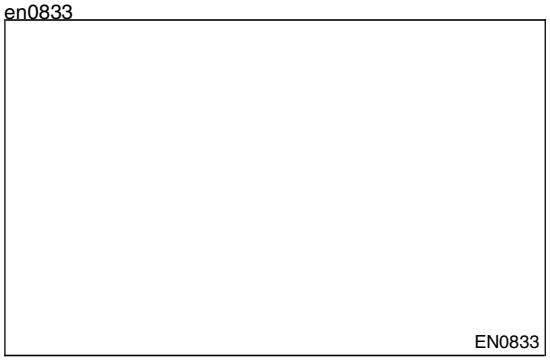
Anti-seize compound:
SS-30 by JET LUBE

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

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

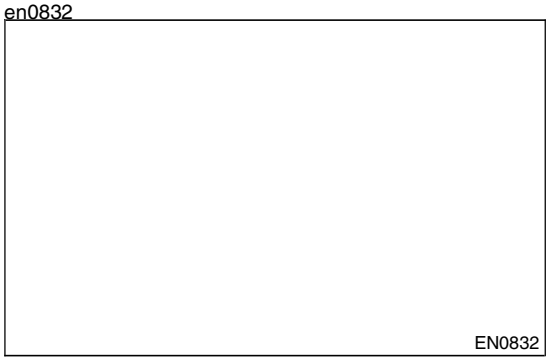
Tightening torque:
30N·m (3.1 kgf-m, 22 ft-lb)

en0833

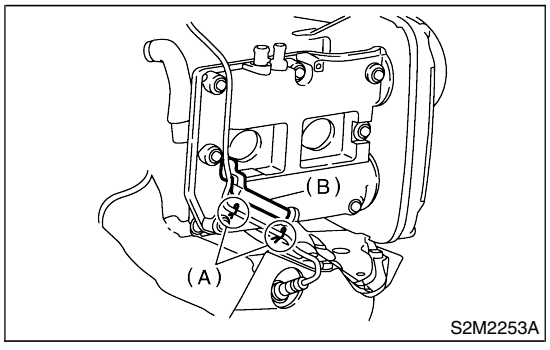


3) Install service hole cover.

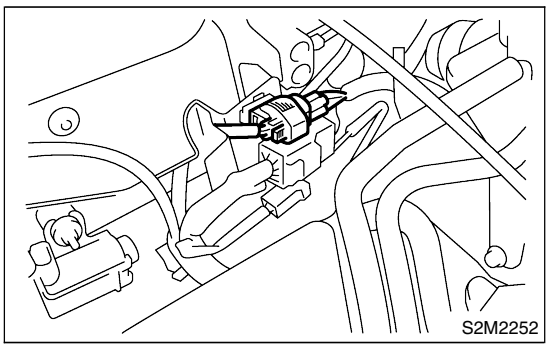
en0832



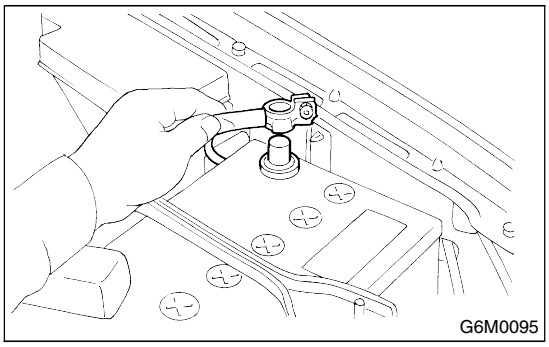
4) Lower the vehicle.
5) Install front right side wheel.
6) Secure a harness to bracket (B) by clip (A).



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



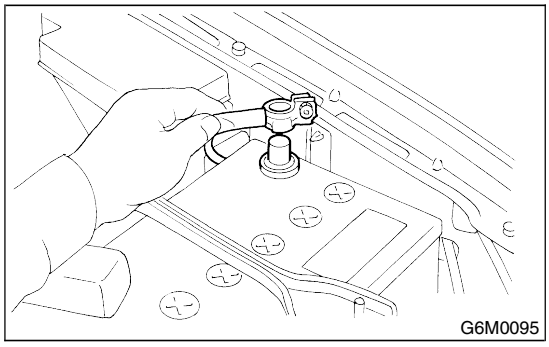
8) Connect battery ground cable.



16. Rear Oxygen Sensor S185657

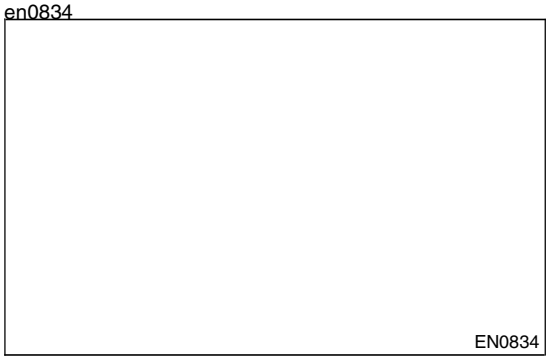
A: REMOVAL S185657A18

1) Disconnect battery ground cable.

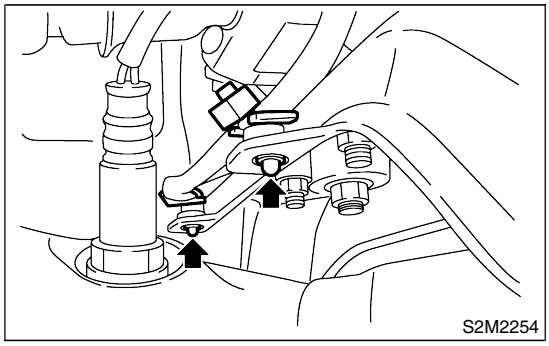

G6M0095

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

en0834


EN0834

4) Vertically draw out clip (A) from crossmember (B).


S2M2254

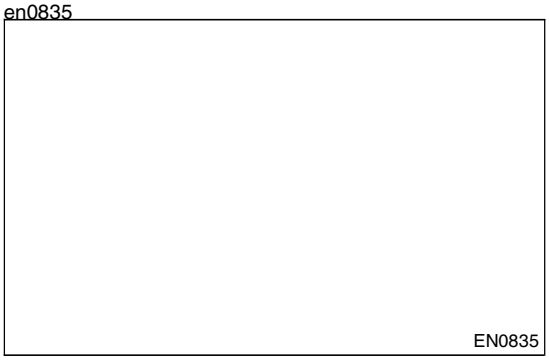
5) Apply SUBARU CRC or its equivalent to threaded portion of rear oxygen sensor, and leave it for one minute or more.

SUBARU CRC (Part No. 004301003)

6) Remove rear oxygen sensor.

CAUTION:
When removing the oxygen sensor, wait until exhaust pipe cools, otherwise it will damage exhaust pipe.

en0835


EN0835

B: INSTALLATION S185657A11

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

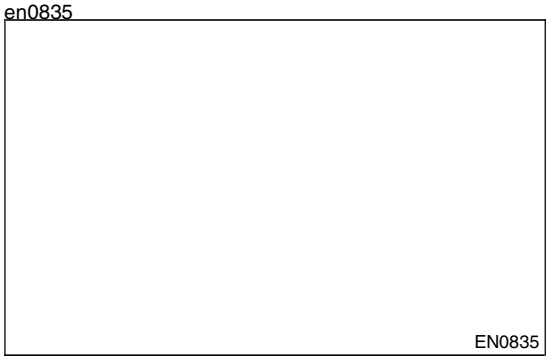
CAUTION:
Never apply anti-seize compound to protector of rear oxygen sensor.

Anti-seize compound:
SS-30 by JET LUBE

2) Install rear oxygen sensor.

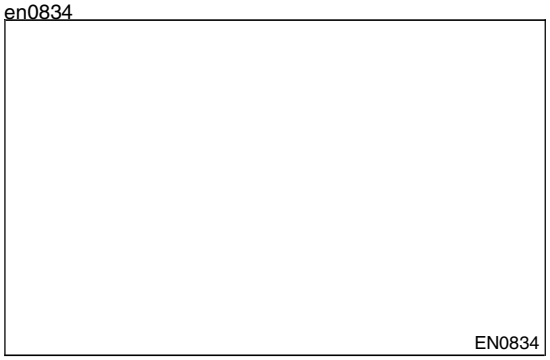
Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)

en0835

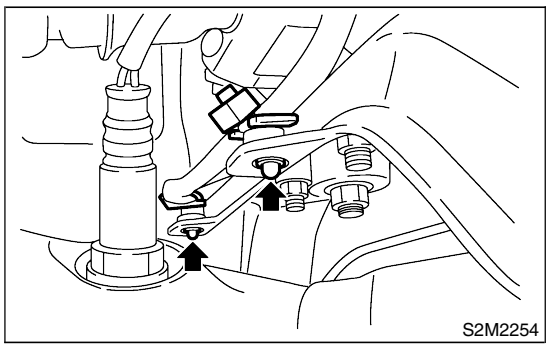


3) Connect connector to rear oxygen sensor.

en0834

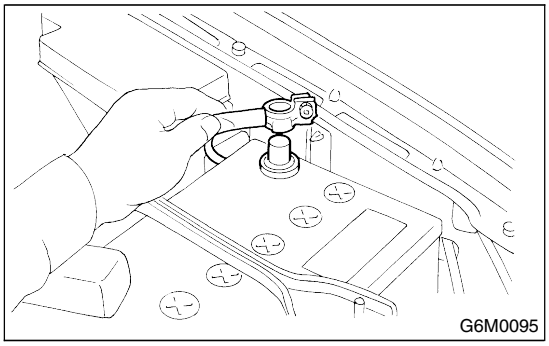


4) Secure clip (A) on the crossmember.



5) Lower the vehicle.

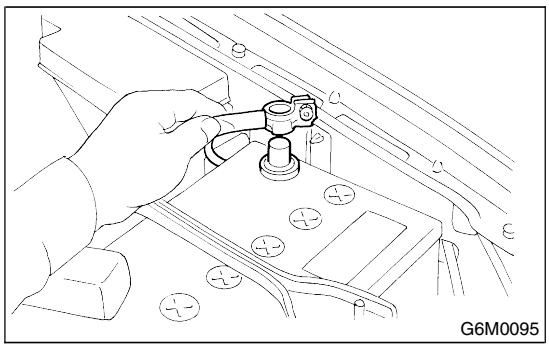
6) Connect battery ground cable.



17. Exhaust Temperature Sensor S185763

A: REMOVAL S185763A18

1) Disconnect battery ground cable.



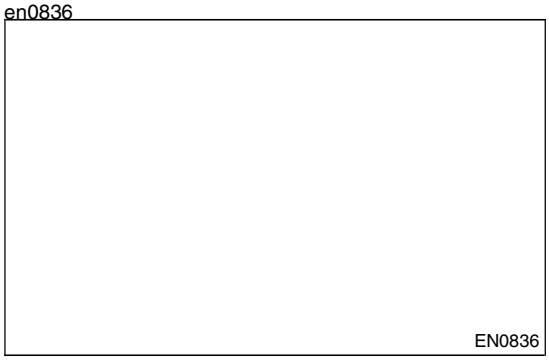
2) Remove joint pipe. <Ref. to EX(DOHC TURBO)-13, REMOVAL, Joint Pipe.>
3) Apply SUBARU CRC or its equivalent to threaded portion of exhaust temperature sensor, and leave it for one minute or more.

SUBARU CRC (Part No. 004301003)

4) Remove exhaust temperature sensor.

CAUTION:
When removing the oxygen sensor, wait until exhaust pipe cools, otherwise it will damage exhaust pipe.

en0836



B: INSTALLATION S185763A11

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

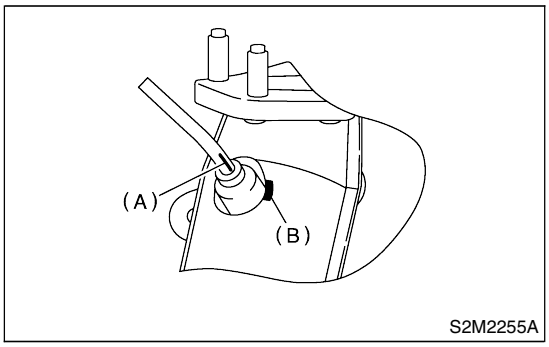
CAUTION:
Never apply anti-seize compound to protector of exhaust temperature sensor.

Anti-seize compound:
SS-30 by JET LUBE

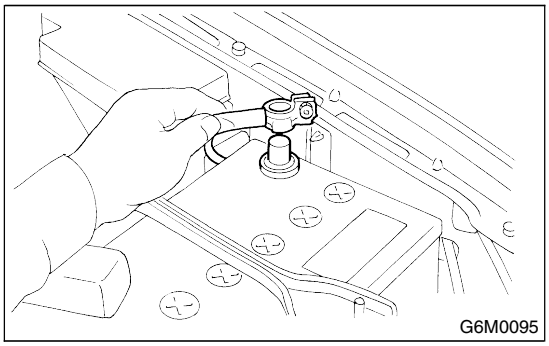
2) Install exhaust temperature sensor.

NOTE:
Align mark (A) on the exhaust temperature sensor side with the joint pipe side mark (B) and tighten.

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



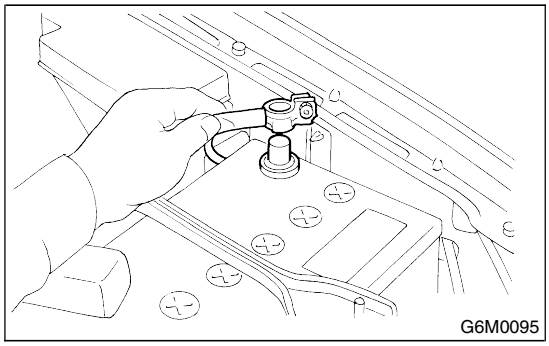
3) Install joint pipe <Ref. to EX(DOHC TURBO)-13, INSTALLATION, Joint Pipe.>.
4) Connect battery ground cable.



18. Engine Control Module S185049

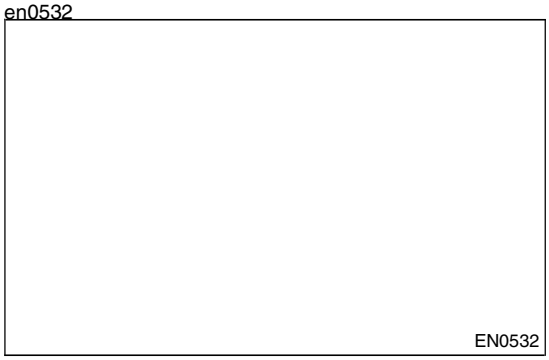
A: REMOVAL S185049A18

1) Disconnect battery ground cable.


G6M0095

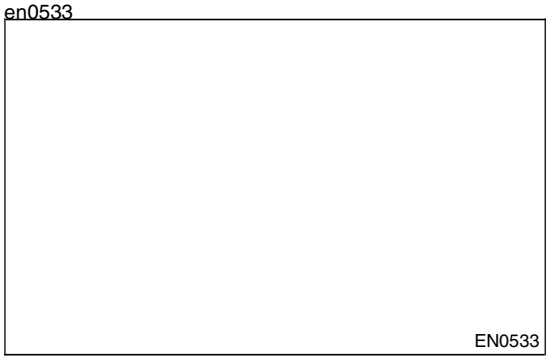
2) Remove lower inner trim of passenger side. <Ref. to EI-38, REMOVAL, Lower Inner Trim.>
3) Detach floor mat of front passenger seat.
4) Remove protect cover.

en0532


EN0532

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

en0533


EN0533

7) Disconnect ECM connectors and take out ECM.

B: INSTALLATION S185049A11

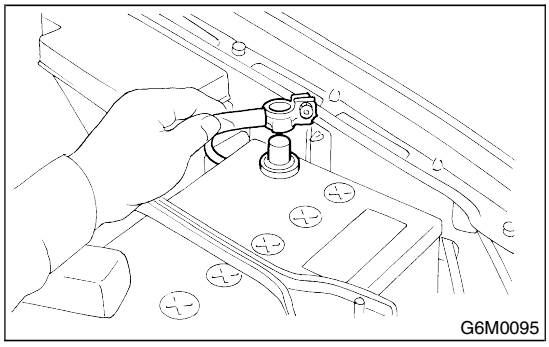
Install in the reverse order of removal.

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

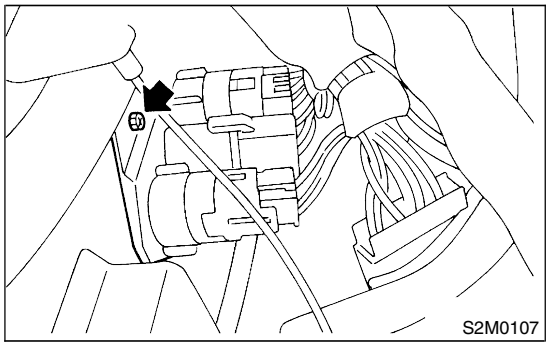
19. Main Relay S185050

A: REMOVAL S185050A18

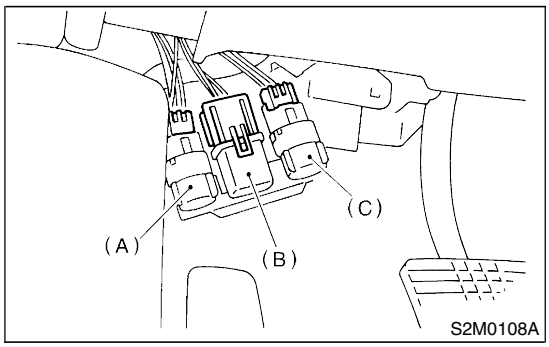
1) Disconnect battery ground cable.



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

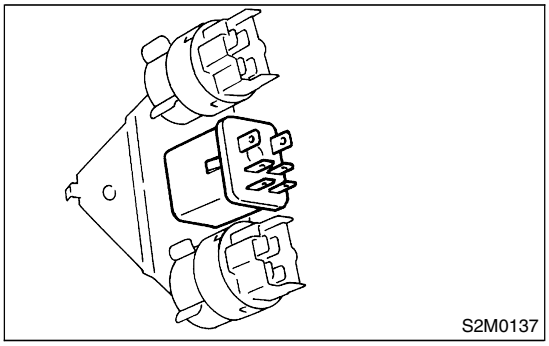


3) Disconnect connectors from relays.



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

4) Remove main relay from mounting bracket.



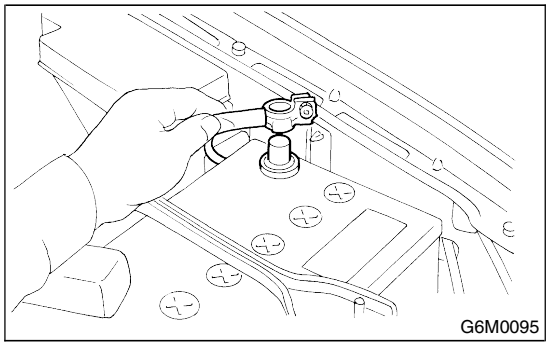
B: INSTALLATION S185050A11

Install in the reverse order of removal.

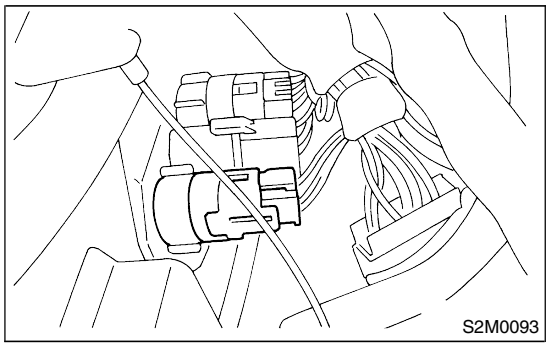
20. Fuel Pump Relay S185048

A: REMOVAL S185048A18

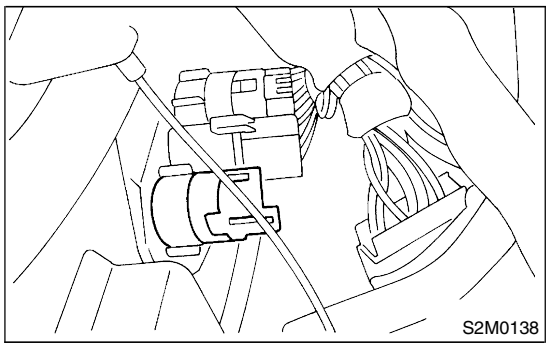
1) Disconnect battery ground cable.


G6M0095

2) Disconnect connector from fuel pump relay.


S2M0093

3) Remove fuel pump relay from mounting bracket.


S2M0138

B: INSTALLATION S185048A11

Install in the reverse order of removal.

21. Fuel S185052

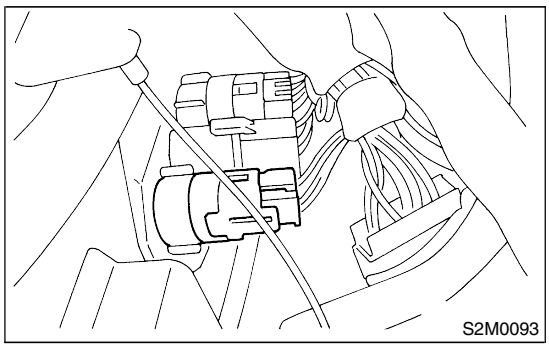
A: OPERATION S185052A16

1. RELEASING OF FUEL PRESSURE

S185052A1601

WARNING:
• Place "NO FIRE" signs near the working area.
• Disconnect ground terminal from battery.

1) Disconnect connector from fuel pump relay.

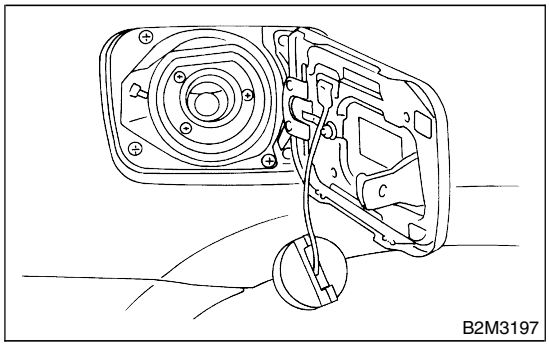

S2M0093

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 to OFF.

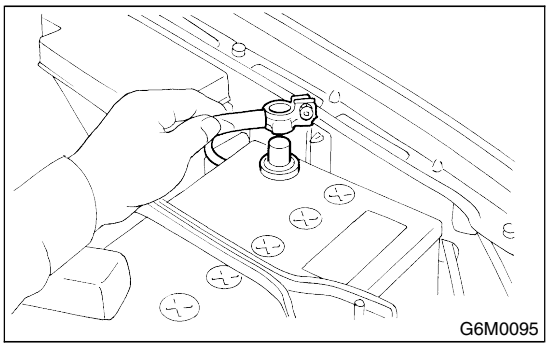
2. DRAINING OF FUEL S185052A1603

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

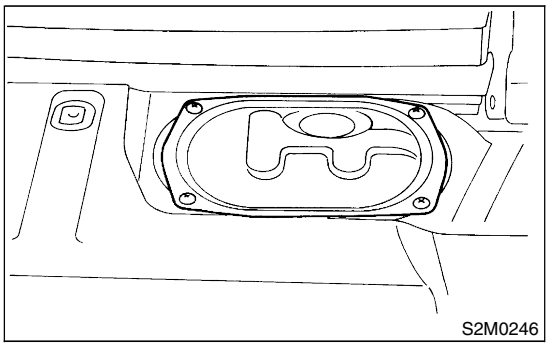
1) Release fuel pressure. <Ref. to FU(DOHC TURBO)-50, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open fuel flap lid, and remove fuel filler cap.


B2M3197

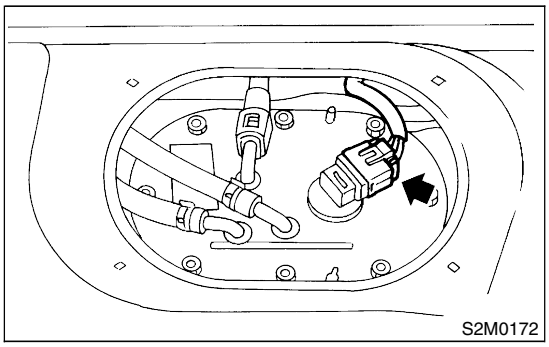
3) Disconnect battery ground cable.


G6M0095

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

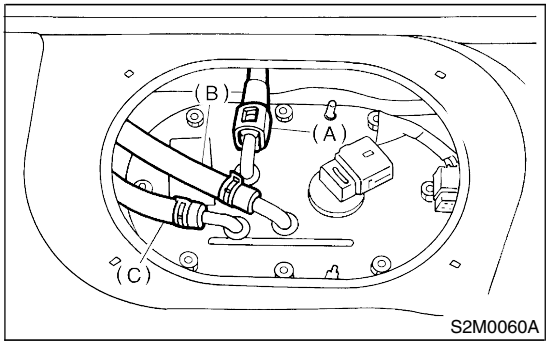

S2M0246

6) Disconnect connector from fuel pump.

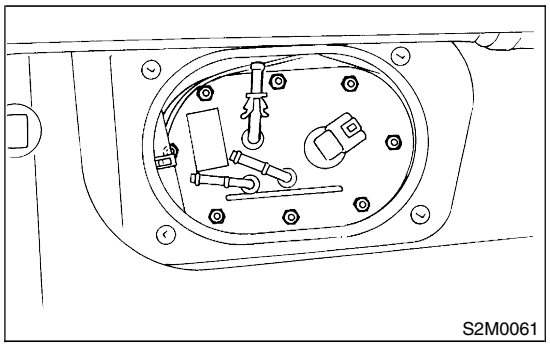

S2M0172

7) Disconnect quick connector, and then disconnect fuel delivery hose (A). <Ref. to FU(DOHC TURBO)-67, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>

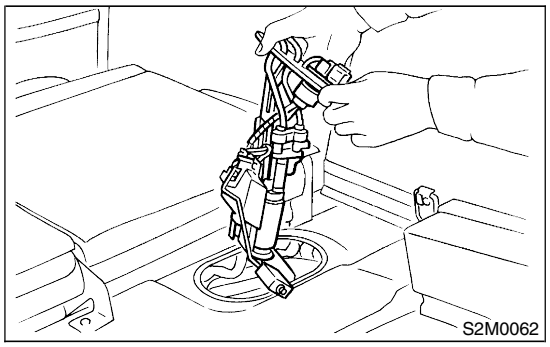
8) Move clips, and then disconnect fuel return hose (B) and jet pump hose (C).



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

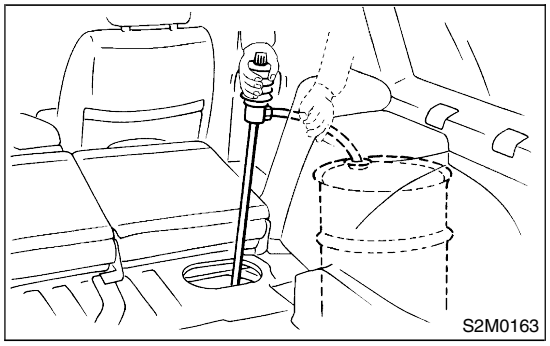


10) Take off fuel pump from fuel tank.

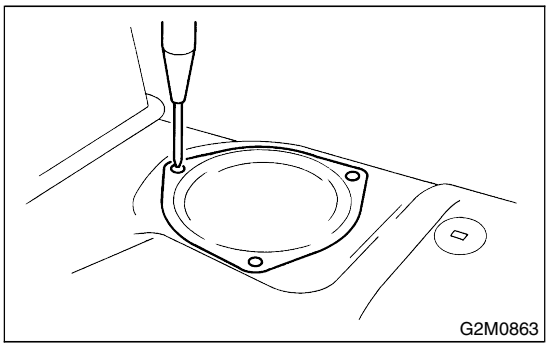


11) Drain fuel from fuel tank by using a hand pump.

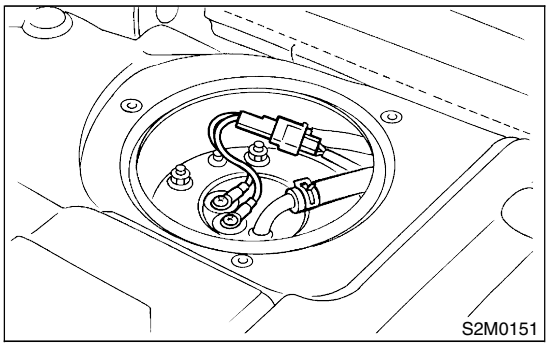
WARNING:
Do not use a motor pump when draining fuel.



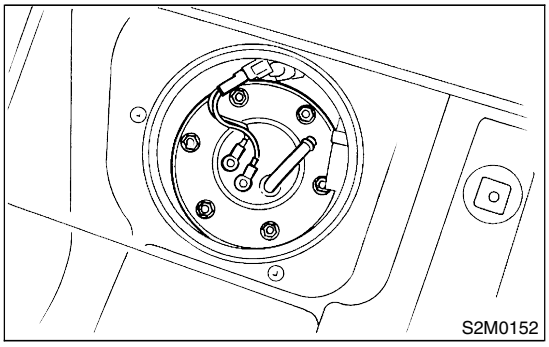
12) Remove service hole cover.



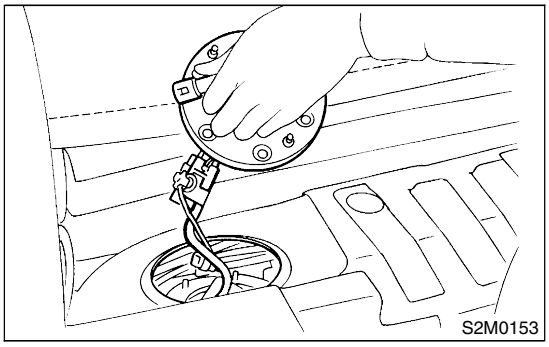
13) Disconnect connector from fuel sub level sensor.
14) Disconnect fuel jet pump hose.



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

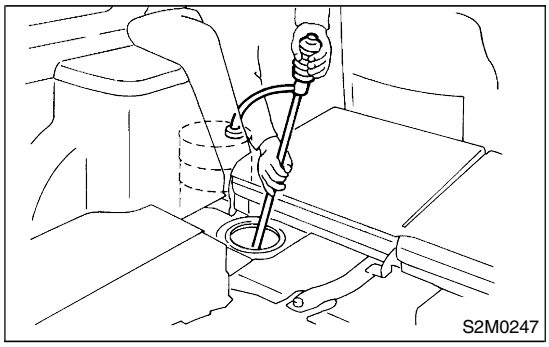


16) Remove fuel sub level sensor.



17) Drain fuel from there.

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

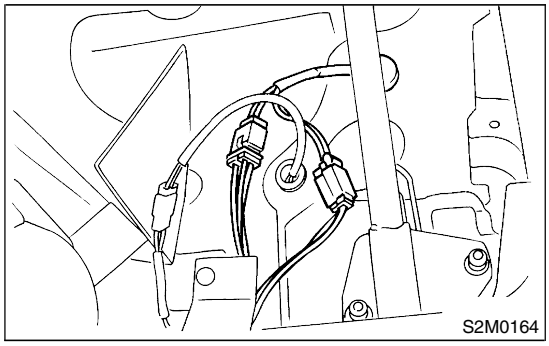


22. Fuel Tank S185053

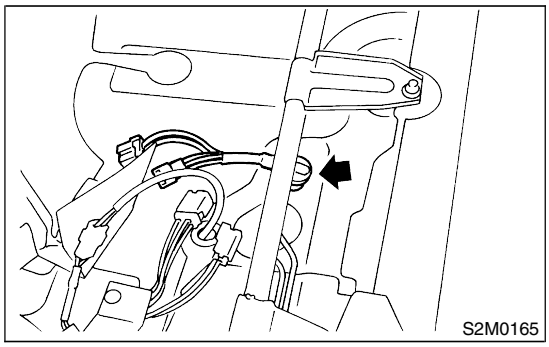
A: REMOVAL S185053A18

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

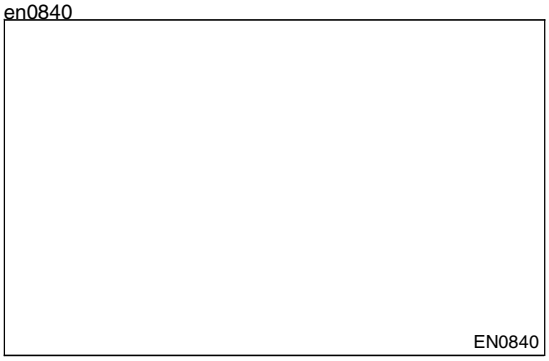
1) Set vehicle on the lift.
2) Release fuel pressure. <Ref. to FU(DOHC TURBO)-52, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
3) Drain fuel from fuel tank. <Ref. to FU(DOHC TURBO)-50, DRAINING FUEL, OPERATION, Fuel.>
4) Remove rear seat.
5) Disconnect connector of fuel tank cord to rear harness.


S2M0164

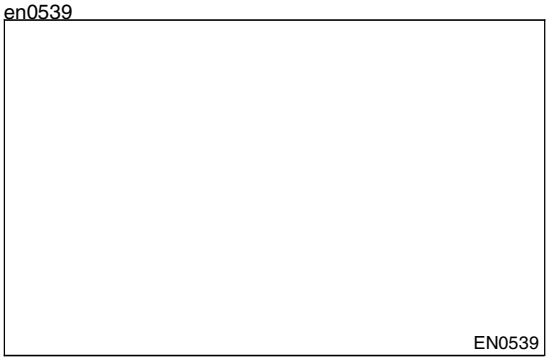
6) Push grommet which holds fuel tank cord on floor panel into under the body.


S2M0165

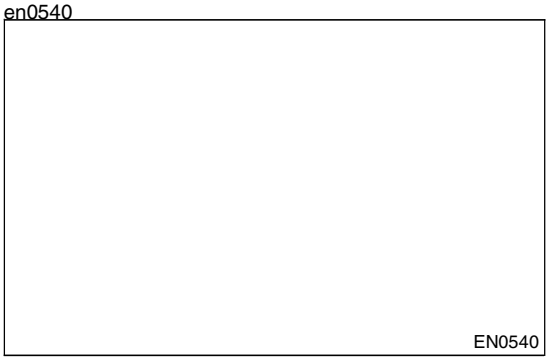
7) Remove rear crossmember. <Ref. to RS-20, REMOVAL, Rear Crossmember.>
8) Disconnect two-way valve hose (A) from two-way valve and disconnect canister hose (B) from canister.

en0840

EN0840

9) Loosen clamp and disconnect fuel filler hose (A) and air vent hose (B) from fuel filler pipe.

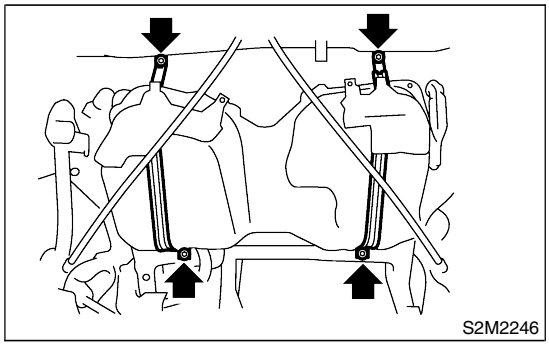
en0539

EN0539

10) Move clips, and disconnect quick connector. <Ref. to FU(DOHC TURBO)-67, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>
11) Disconnect fuel hoses.

en0540

EN0540

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

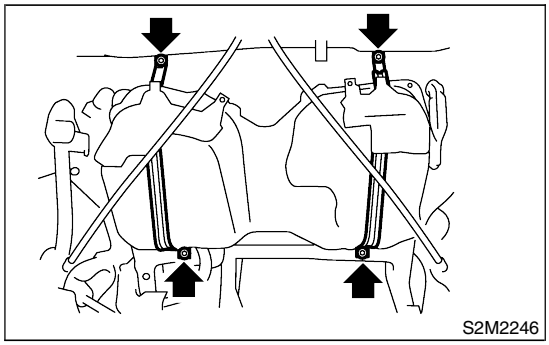
WARNING:
A helper is required to perform this work.



B: INSTALLATION *S185053A11*

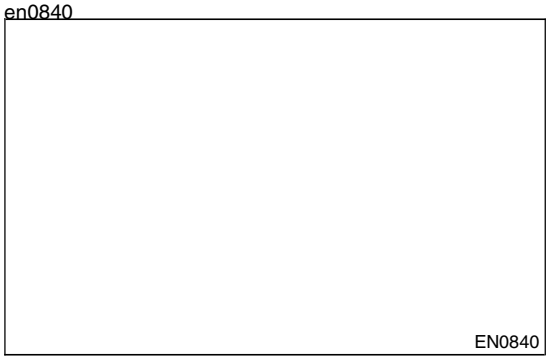
1) Support fuel tank with transmission jack and push fuel tank harness into access hole with grommet.
2) Set fuel tank and temporarily tighten bolts of fuel tank bands.

WARNING:
A helper is required to perform this work.



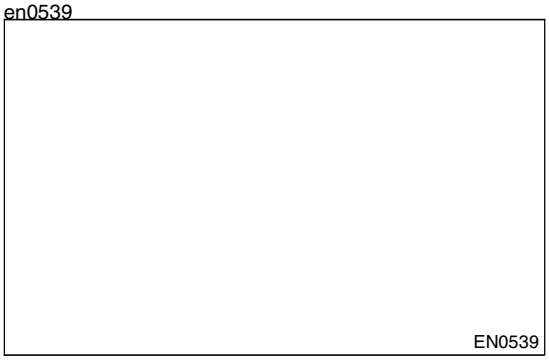
3) Connect two-way valve hose (A) to two-way valve and connect canister hose (B) to canister.

en0840



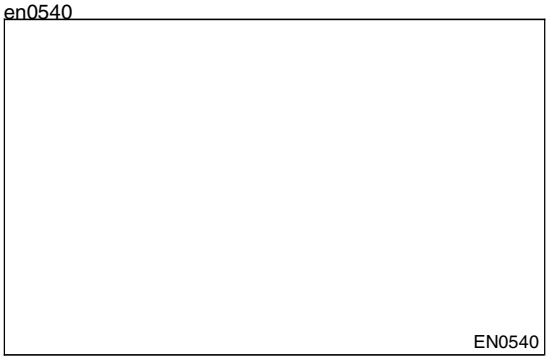
4) Connect fuel filler hose (A) and air vent hose (B).

en0539



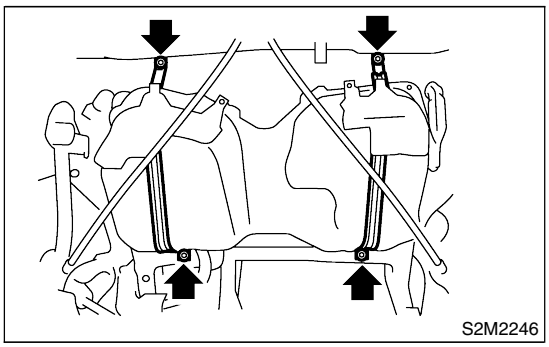
5) Connect fuel hoses, and hold then with clips and quick connector. <Ref. to FU(DOHC TURBO)-67, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>

en0540



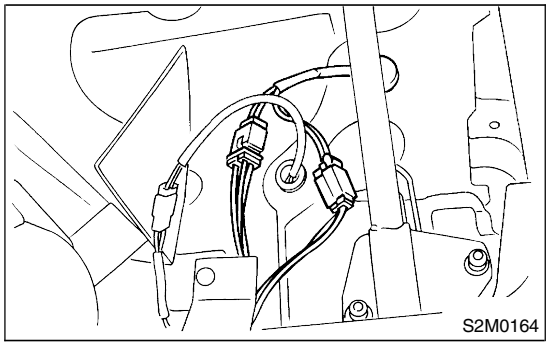
6) Tighten band mounting bolts.

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

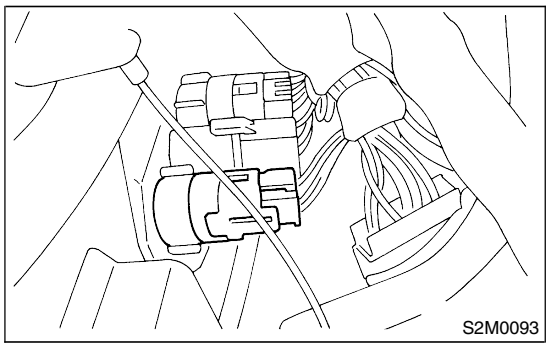


7) Install rear crossmember. <Ref. to RS-20, INSTALLATION, Rear Crossmember.>

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



9) Set rear seat and floor mat.
10) Connect connector to fuel pump relay.



C: INSPECTION S185053A10

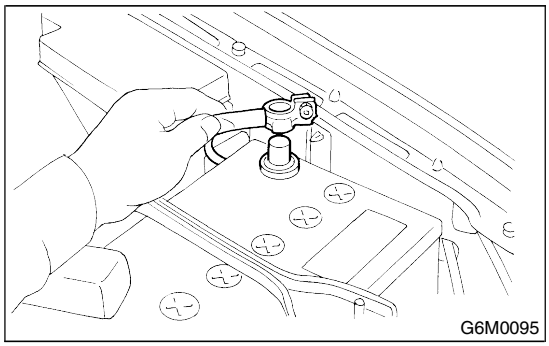
1) Make sure there are no cracks, holes, or other damage on the fuel tank.
2) Make sure that the fuel hoses and fuel pipes are not cracked and that connections are tight.

23. Fuel Filler Pipe S185022

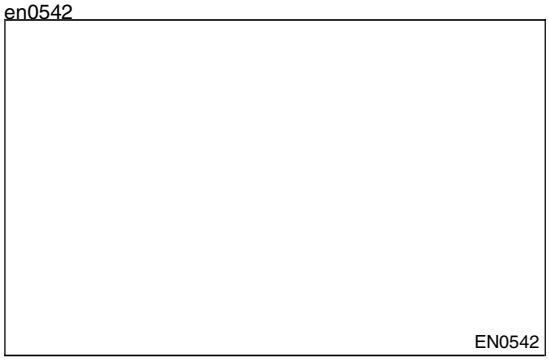
A: REMOVAL S185022A18

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

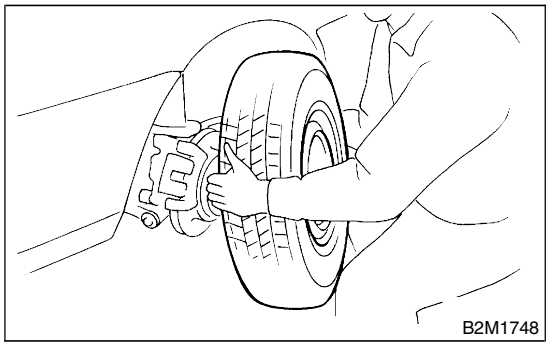
1) Release fuel pressure. <Ref. to FU(DOHC TURBO)-50, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open fuel filler flap lid and remove filler cap.
3) Disconnect battery ground cable.


G6M0095

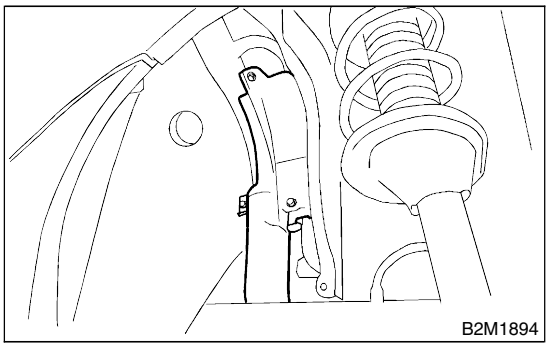
4) Remove screws holding packing in place.

en0542

EN0542

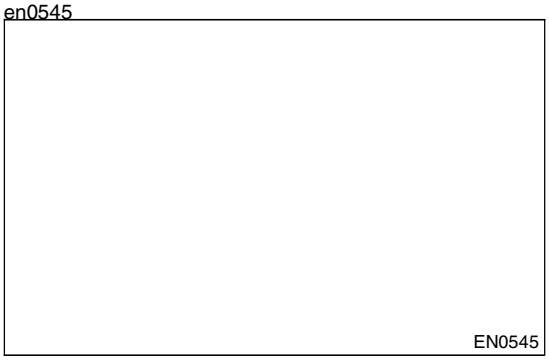
5) Lift-up the vehicle.
6) Remove rear right side wheel nuts.
7) Remove rear right side wheel.


B2M1748

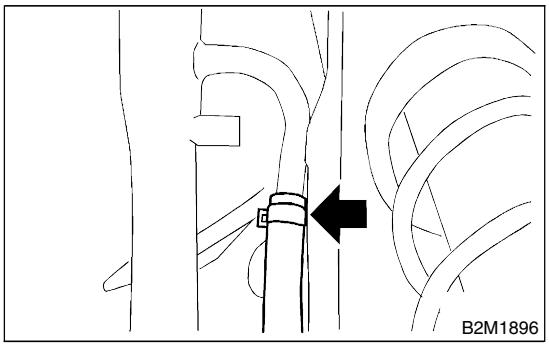
8) Remove fuel filler pipe protector.


B2M1894

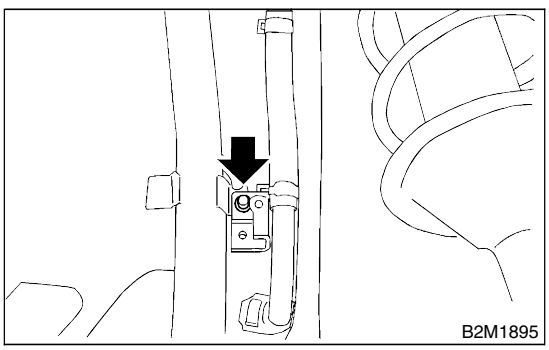
9) Separate evaporation hoses from clip of fuel filler pipe.

en0545

EN0545

10) Disconnect air vent hose from fuel filler pipe.

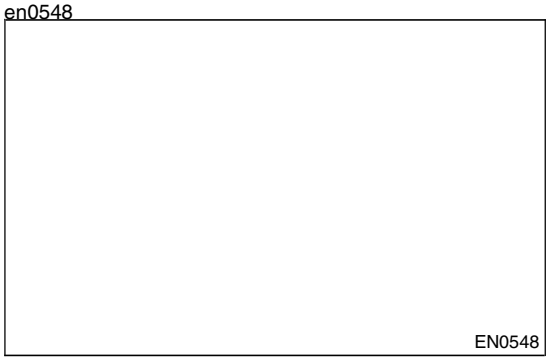

B2M1896

11) Remove bolts which hold fuel filler pipe bracket on body.


B2M1895

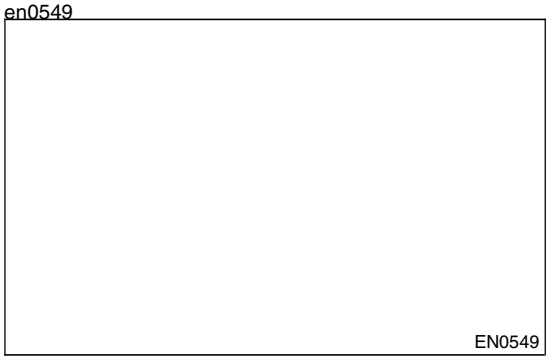
12) Loosen clamp and separate fuel filler hose (A) from fuel filler pipe.
13) Move clip and separate air vent hose (B).

en0548



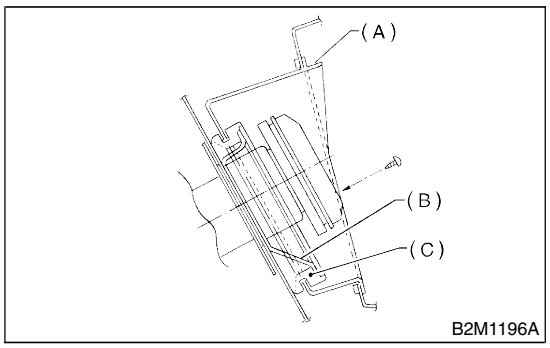
14) Remove fuel filler pipe to under side of the vehicle.
15) Remove air vent pipe together with clip from body.

en0549



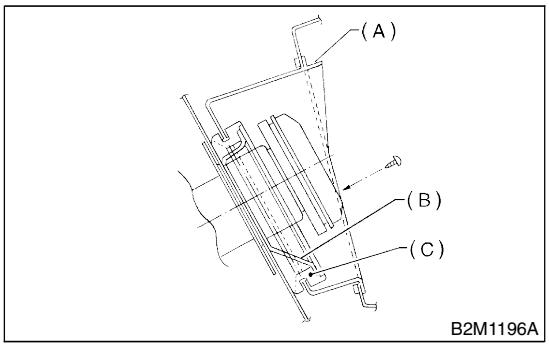
B: INSTALLATION S185022A11

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



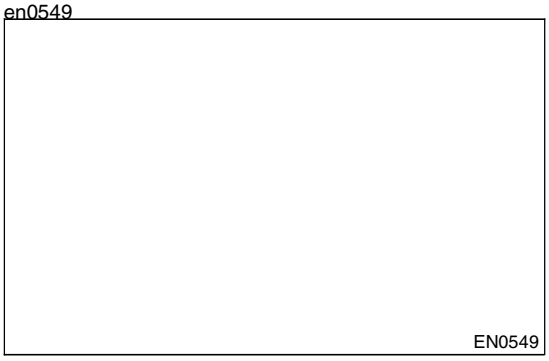
3) Align holes in fuel filler pipe neck and set cup (B), and tighten screws.

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

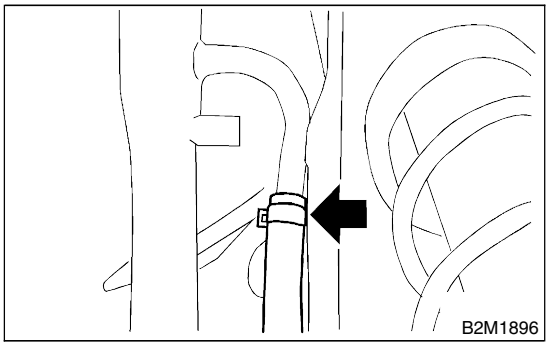


4) Install air vent pipe.

en0549



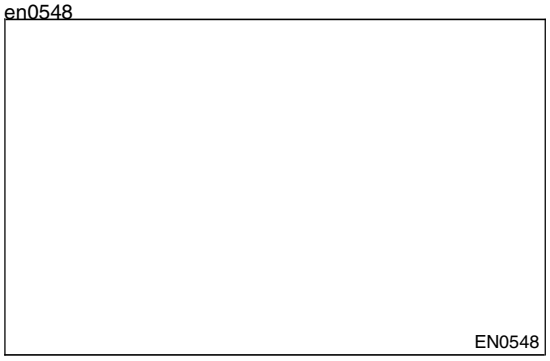
5) Connect air vent hose to fuel filler pipe.



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

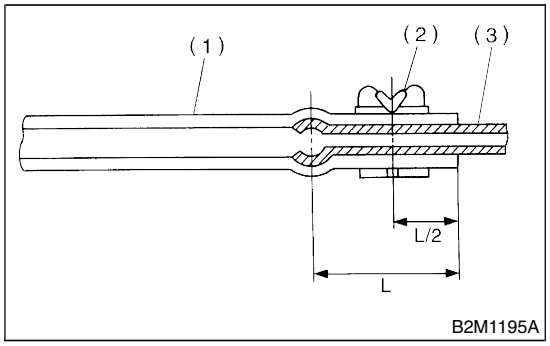
CAUTION:
Do not allow clips to touch air vent hose (B) and rear suspension crossmember.

en0548



7) Insert air vent hose approximately 25 to 30 mm (0.98 to 1.18 in) into the lower end of air vent pipe and hold clip.

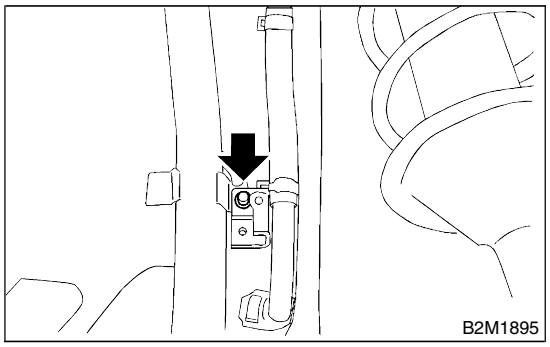
L = 27.5±2.5 mm (1.083±0.098 in)



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

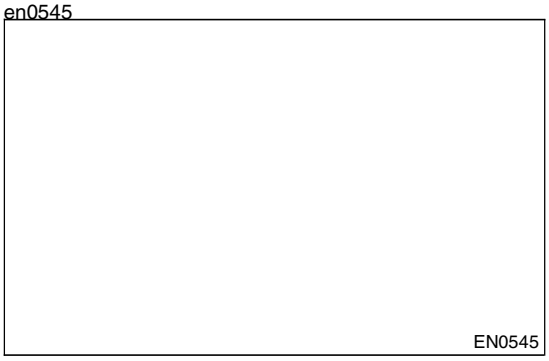
8) Tighten bolt which holds fuel filler pipe bracket on body.

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

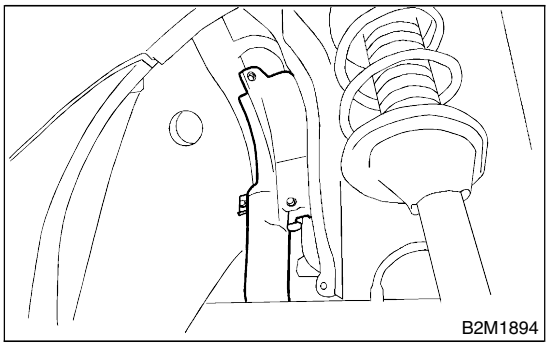


9) Tighten bolts which hold evaporation hoses onto clip of fuel filler pipe.

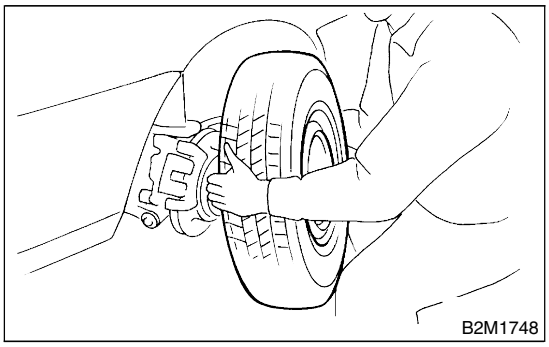
en0545



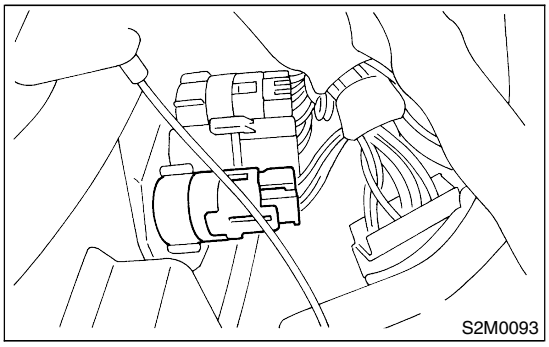
10) Install fuel filler pipe protector.



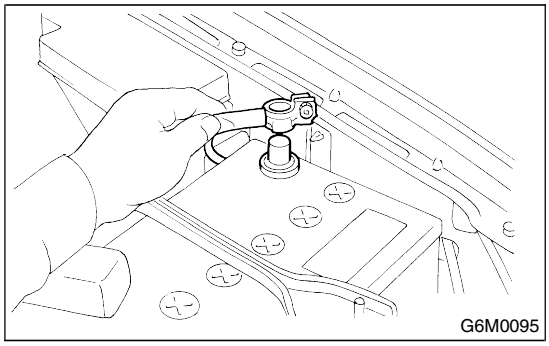
11) Install rear right wheel.



12) Lower the vehicle.
13) Tighten wheel nuts.
14) Connect connector to fuel pump relay.



15) Connect battery ground terminal.

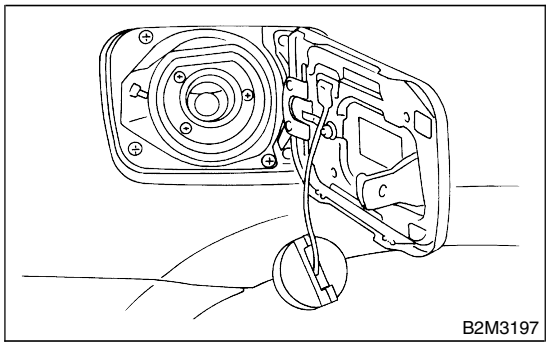


24. Fuel Pump S185025

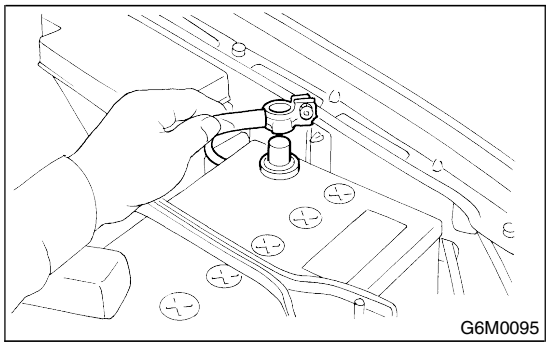
A: REMOVAL S185025A18

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

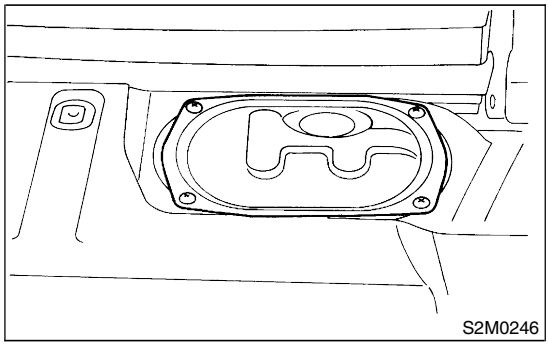
1) Release fuel pressure. <Ref. to FU(DOHC TURBO)-50, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open fuel filler flap lid, and remove fuel filler cap.


B2M3197

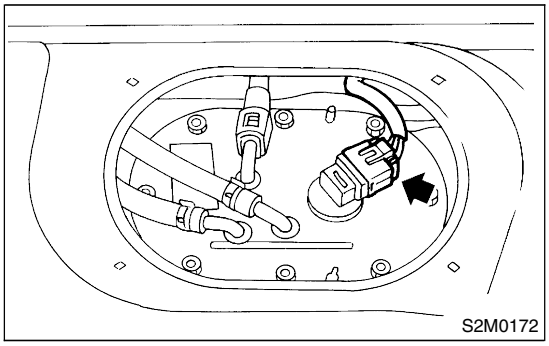
3) Disconnect battery ground cable.


G6M0095

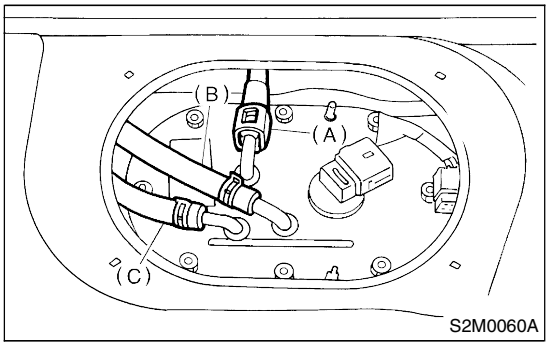
4) Remove the floor box located just behind the rear seats.
5) Remove access hole lid.


S2M0246

6) Disconnect connector from fuel pump.

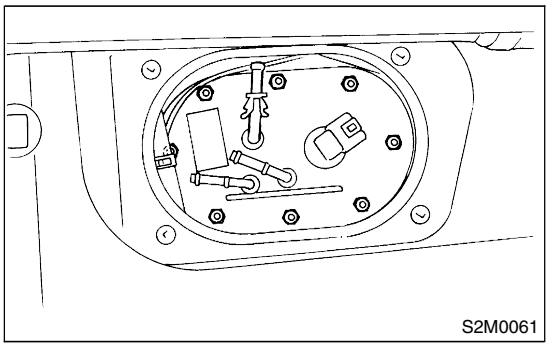

S2M0172

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(DOHC TURBO)-67, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>

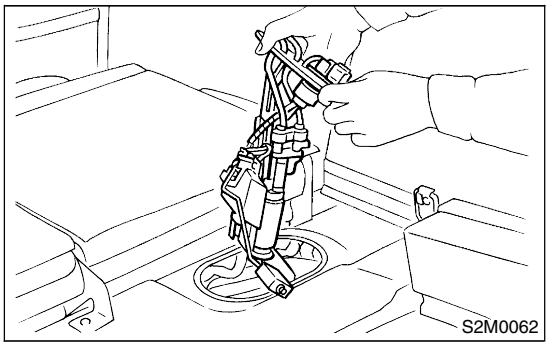


S2M0060A

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


S2M0061

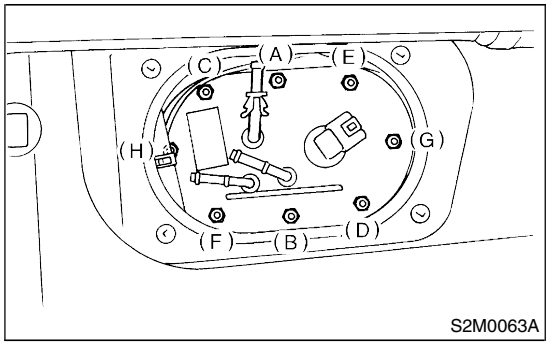
10) Take off fuel pump from fuel tank.


S2M0062

B: INSTALLATION S185025A11

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.

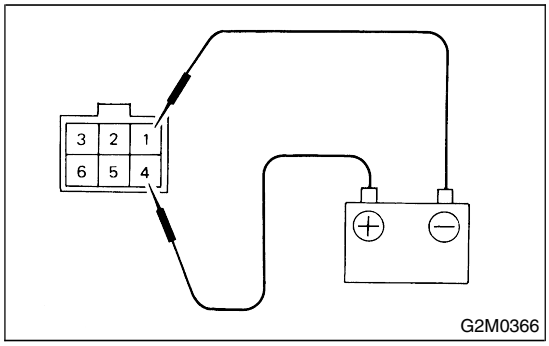
Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



C: INSPECTION S185025A10

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.



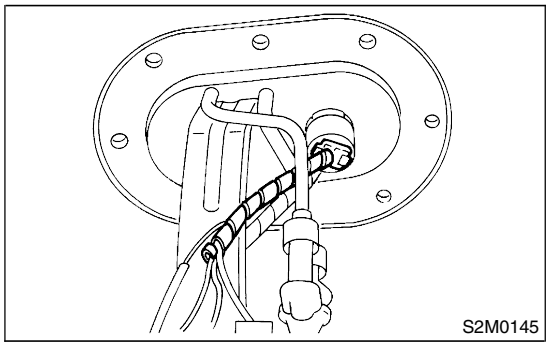
25. Fuel Level Sensor S185026

A: REMOVAL S185026A18

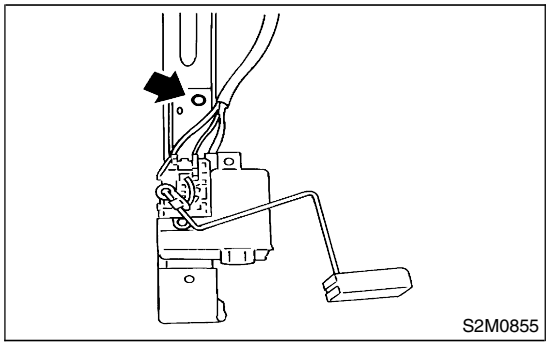
WARNING:
• Place “NO FIRE” signs near the working area.
• Be careful not to spill fuel on the floor.

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

1) Remove fuel pump assembly. <Ref. to FU(DOHC TURBO)-60, REMOVAL , Fuel Pump.>
2) Disconnect connector from fuel pump bracket.



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



B: INSTALLATION S185026A11

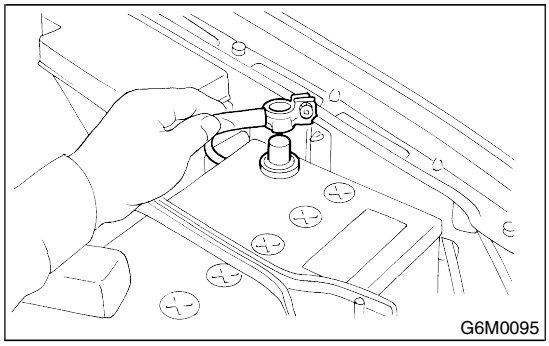
Install in the reverse order of removal.

26. Fuel Sub Level Sensor S185023

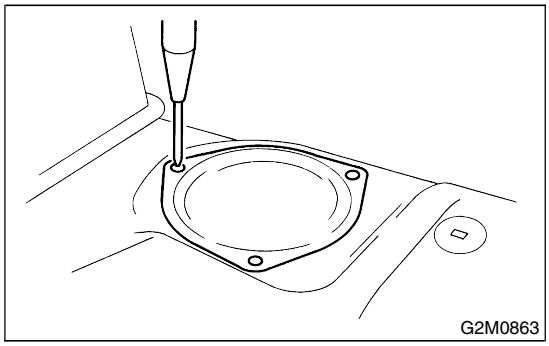
A: REMOVAL S185023A18

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

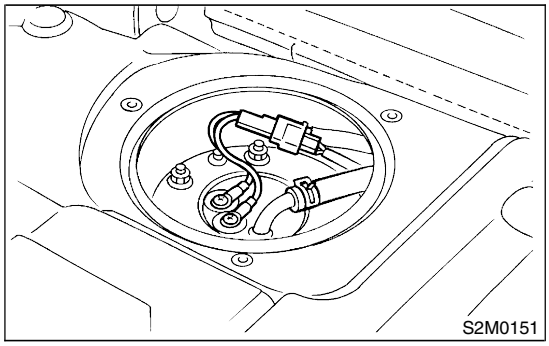
1) Disconnect battery ground cable.


G6M0095

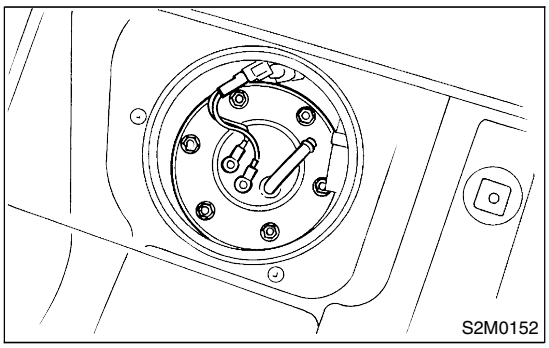
2) Remove the floor box located just behind the rear seats.
3) Remove service hole cover.


G2M0863

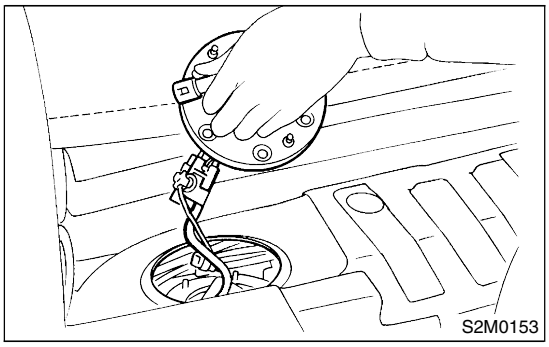
4) Disconnect connector from fuel sub level sensor.
5) Disconnect fuel jet pump hose.


S2M0151

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


S2M0152

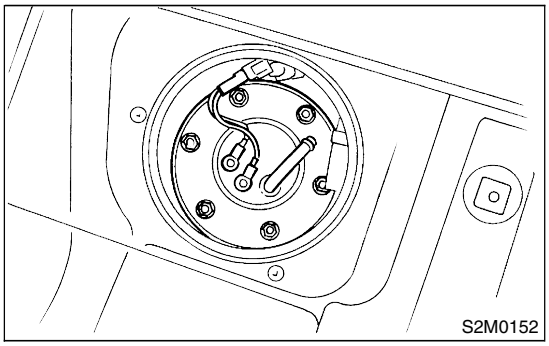
7) Remove fuel sub level sensor.


S2M0153

B: INSTALLATION S185023A11

Install in the reverse order of removal.

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

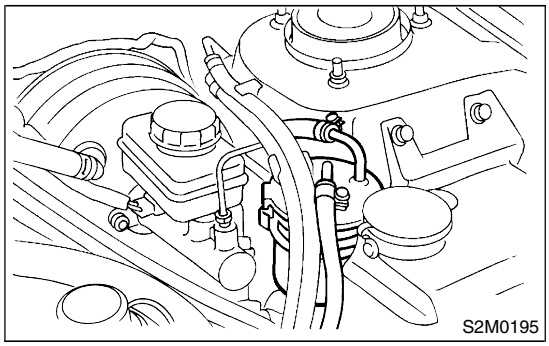

S2M0152

27. Fuel Filter S185027

A: REMOVAL S185027A18

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(DOHC TURBO)-50, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Disconnect fuel delivery hoses from fuel filter.



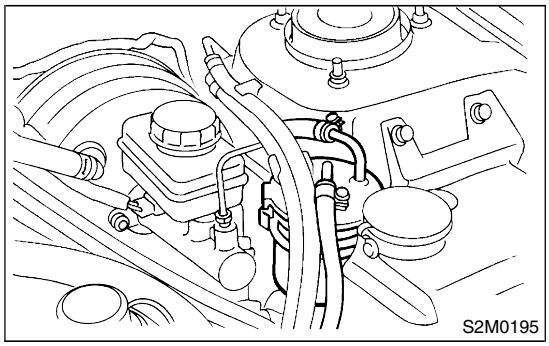
3) Remove filter from holder.

B: INSTALLATION S185027A11

CAUTION:
• If fuel hoses are damaged at the connecting portion, replace it with a new one.
• If clamps are badly damaged, replace with new ones.

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

Tightening torque:
12.5 N·m (1.27 kgf-m, 9.22 ft-lb)



C: INSPECTION S185027A10

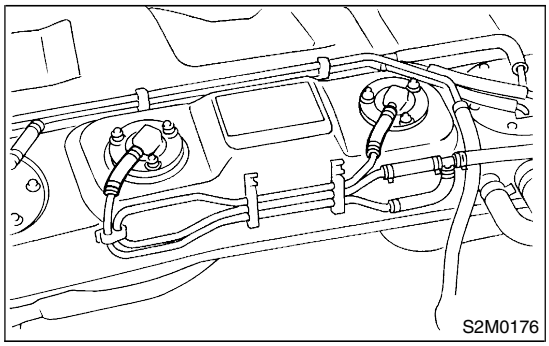
1) Check the inside of fuel filter for dirt and water sediment.
2) If it is clogged, or if replacement interval has been reached, replace it.
3) If water is found in it, shake and expel the water from inlet port.

28. Fuel Cut Valve S185021

A: REMOVAL S185021A18

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(DOHC TURBO)-53, REMOVAL, Fuel Tank.>
2) Move clip and disconnect evaporation hose from fuel cut valve.

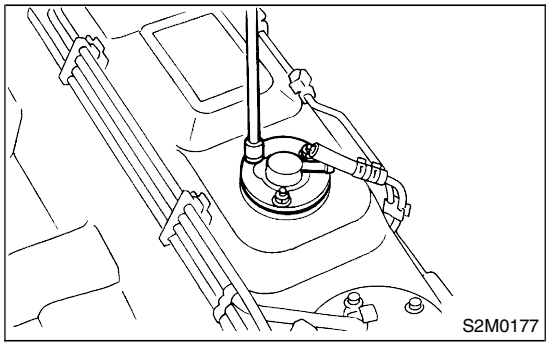

S2M0176

3) Remove bolts which install fuel cut valve.

B: INSTALLATION S185021A11

Install in the reverse order of removal.

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

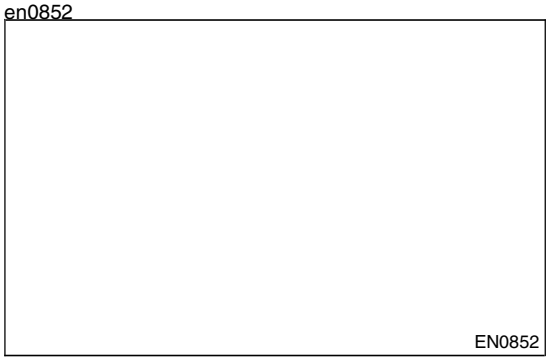

S2M0177

29. Fuel Damper Valve S185708

A: REMOVAL S185708A18

1) Release fuel pressure. <Ref. to FU(DOHC TURBO)-50, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Remove fuel damper valve from fuel return line.

en0852



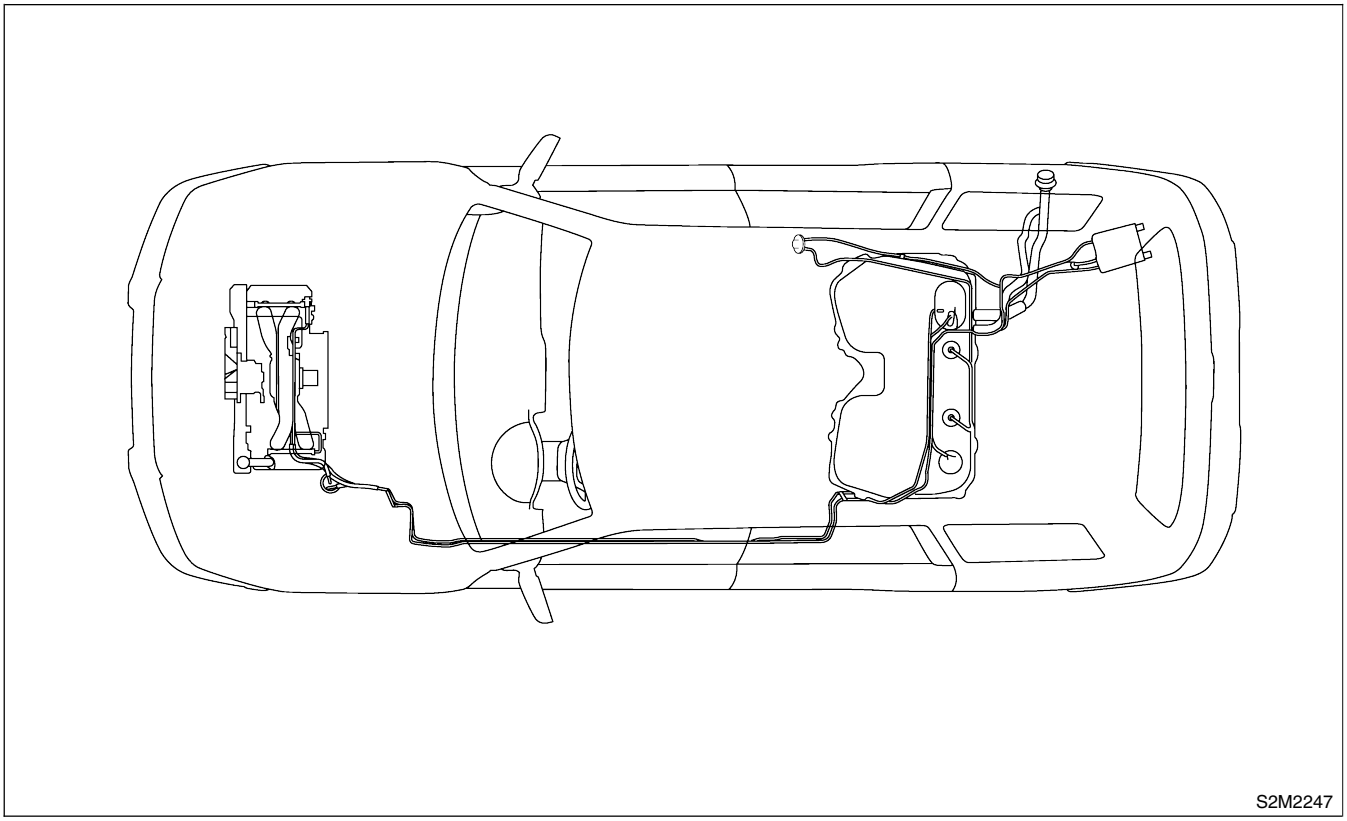
B: INSTALLATION S185708A11

Install in the reverse order of removal.

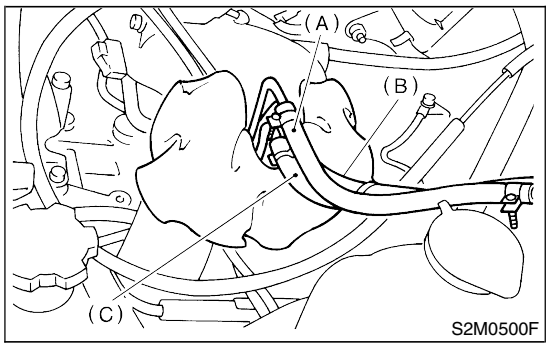
30. Fuel Delivery, Return and Evaporation Lines S185019

A: REMOVAL S185019A18

1) Set vehicle on the lift.
2) Release fuel pressure. <Ref. to FU(DOHC TURBO)-50, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
3) Open fuel filler flap lid and remove fuel filler cap.
4) Remove floor mat. <Ref. to EI-43, REMOVAL, Floor Mat.>
5) Remove fuel delivery pipes and hoses, fuel return pipes and hoses, evaporation pipes and hoses.


S2M2247

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



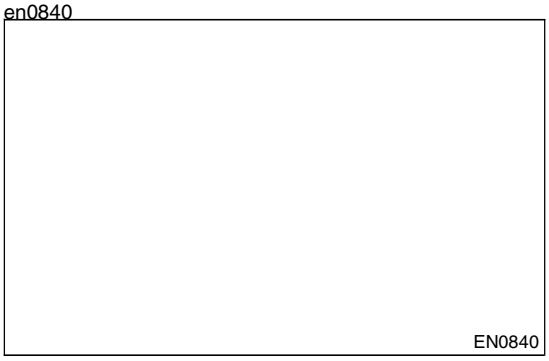
S2M0500F

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

7) Lift-up the vehicle.

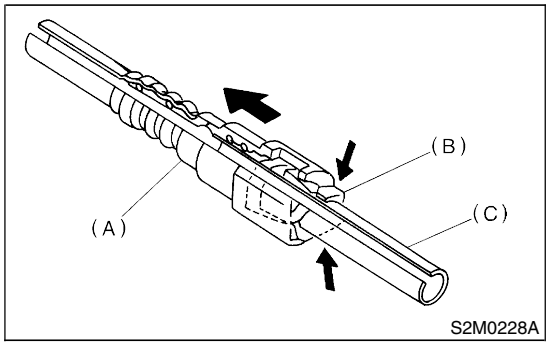
8) Disconnect two-way valve hose (A) from two-way valve and disconnect canister hose (B) from canister.

en0840


EN0840

9) 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.

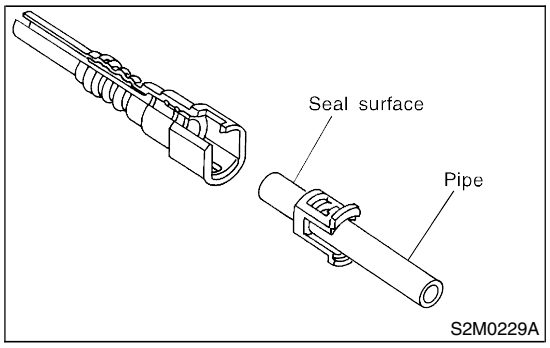


(A) Connector
(B) Retainer
(C) Pipe

B: INSTALLATION S185019A11

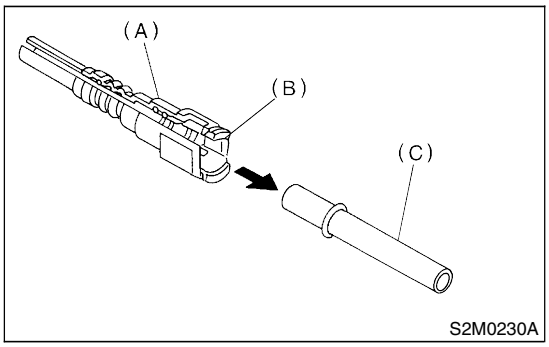
1) Connect quick connector on fuel delivery line.

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.



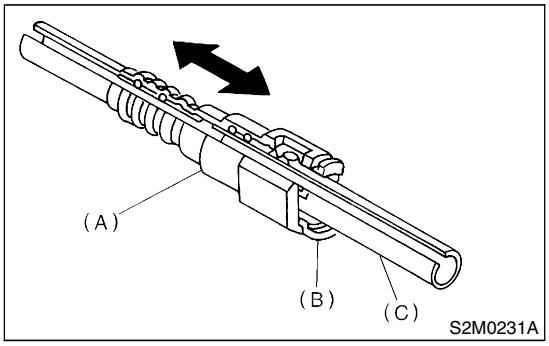
(1) Set new retainer (B) to connector (A).
(2) Push pipe into connector completely.

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



(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.

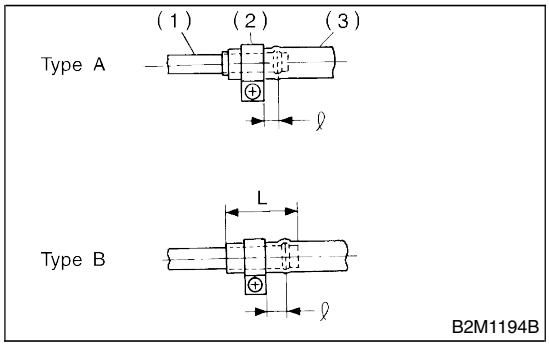


(A) Connector
(B) Retainer
(C) Pipe

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)

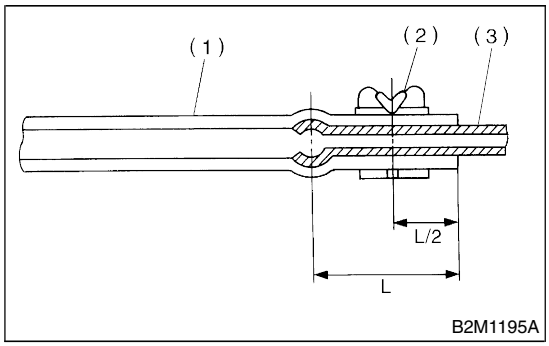


(1) Fitting
(2) Clamp
(3) Hose

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 *S185019A10*

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.

31. Fuel System Trouble in General S185571

A: INSPECTION S185571A10

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

EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)

EC(DOHC TURBO)

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4. Precatalytic Converter....5
5. Canister....6
6. Purge Control Solenoid Valve....7
7. Two-way Valve....8

1. General Description S180001

A: CAUTION S180001A03

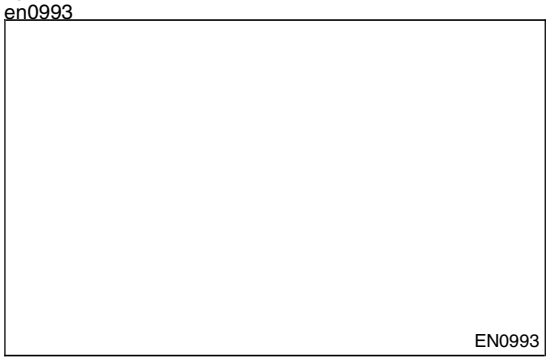
- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation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

2. Front Catalytic Converter S180017

A: REMOVAL S180017A18

1) Remove center exhaust pipe. <Ref. to EX(DOHC TURBO)-9, REMOVAL, Center Exhaust Pipe.>
2) Separate front catalytic converter (A) from rear catalytic converter (B).

en0993



B: INSTALLATION S180017A11

NOTE:
Replace gaskets with new ones.
Install in the reverse order of removal.

C: INSPECTION S180017A10

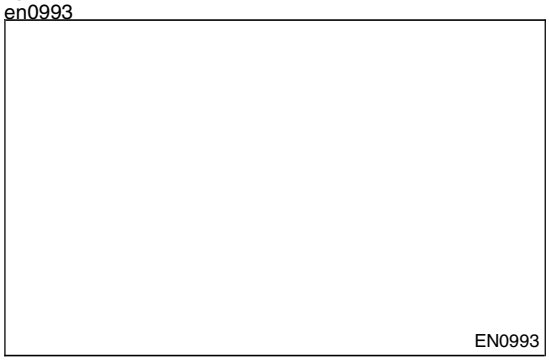
1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

3. Rear Catalytic Converter S180036

A: REMOVAL S180036A18

1) Remove center exhaust pipe. <Ref. to EX(DOHC TURBO)-9, REMOVAL, Center Exhaust Pipe.>
2) Separate rear catalytic converter (B) from front catalytic converter (A).

en0993



B: INSTALLATION S180036A11

NOTE:
Replace gaskets with new ones.
Install in the reverse order of removal.

C: INSPECTION S180036A10

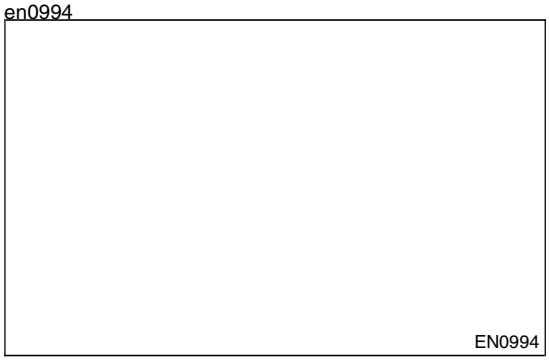
1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

4. Precatalytic Converter S180767

A: REMOVAL S180767A18

Precatalytic converter (A) is built in joint pipe. Refer to removal of joint pipe for removal procedure. <Ref. to EX(DOHC TURBO)-13, REMOVAL, Joint Pipe.>

en0994



B: INSTALLATION S180767A11

Precatalytic converter is built in joint pipe. Refer to installation of joint pipe for installation procedure. <Ref. to EX(DOHC TURBO)-13, INSTALLATION, Joint Pipe.>

C: INSPECTION S180767A10

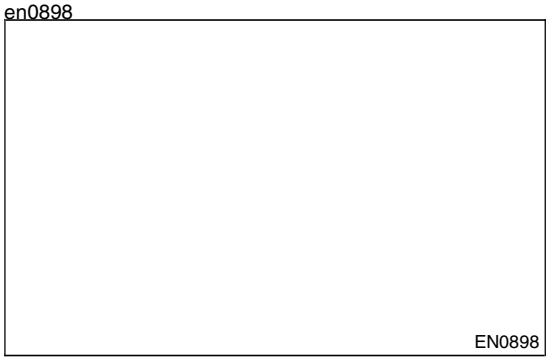
1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

5. Canister S180037

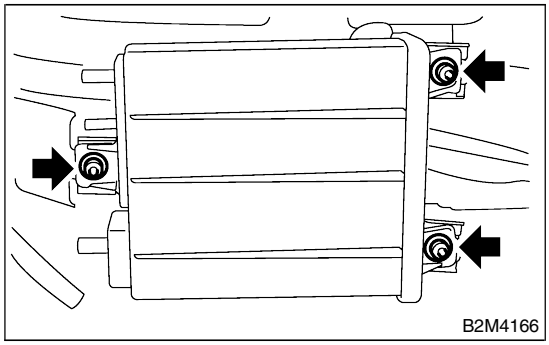
A: REMOVAL S180037A18

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

en0898



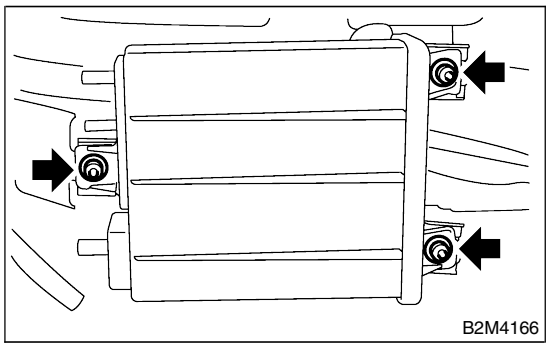
3) Remove canister from body.



B: INSTALLATION S180037A11

1) Install in the reverse order of removal.

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



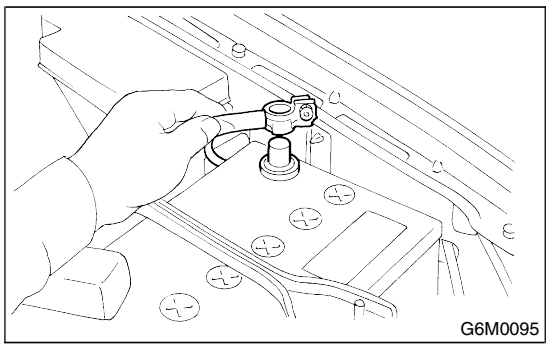
C: INSPECTION S180037A10

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

6. Purge Control Solenoid Valve S180035

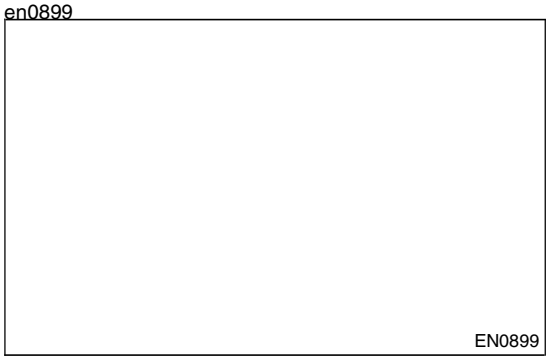
A: REMOVAL S180035A18

1) Disconnect battery ground cable.


G6M0095

2) Disconnect connector and hoses from purge control solenoid valve.
3) Remove bolt which installs purge control solenoid valve onto intake manifold.

en0899

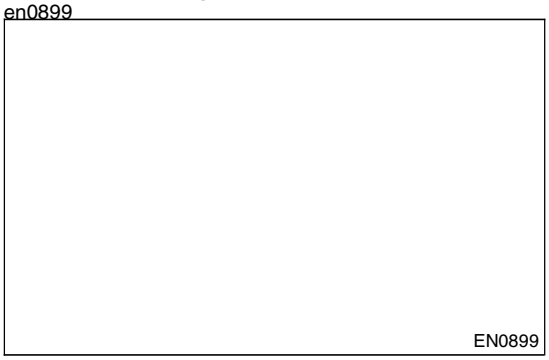

EN0899

B: INSTALLATION S180035A11

Install in the reverse order of removal.

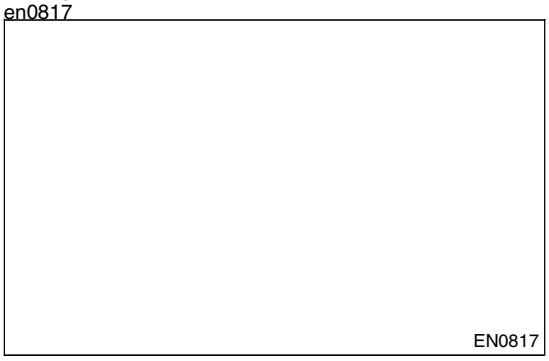
Tightening torque:
16 N·m (1.6 kgf-m, 11.6 ft-lb)

en0899


EN0899

CAUTION:
Carefully connect the evaporation hoses.

en0817


EN0817

(A) To intake manifold
(B) To purge value

C: INSPECTION S180035A10

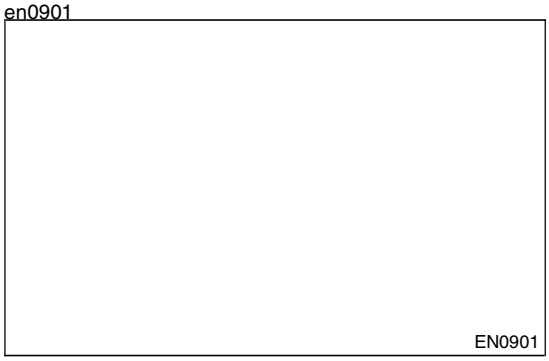
Make sure hoses are not cracked or loose.

7. Two-way Valve S180707

A: REMOVAL S180707A18

1) Lift-up the vehicle.
2) Remove canister from body. <Ref. to EC(DOHC TURBO)-6, REMOVAL, Canister.>
3) Remove two-way valve with bracket as a single unit from body.

en0901



4) Remove two-way valve from bracket.

B: INSTALLATION S180707A11

Install in the reverse order of removal.

C: INSPECTION S180707A10

Make sure that hoses are not cracked or loose.

INTAKE (INDUCTION)

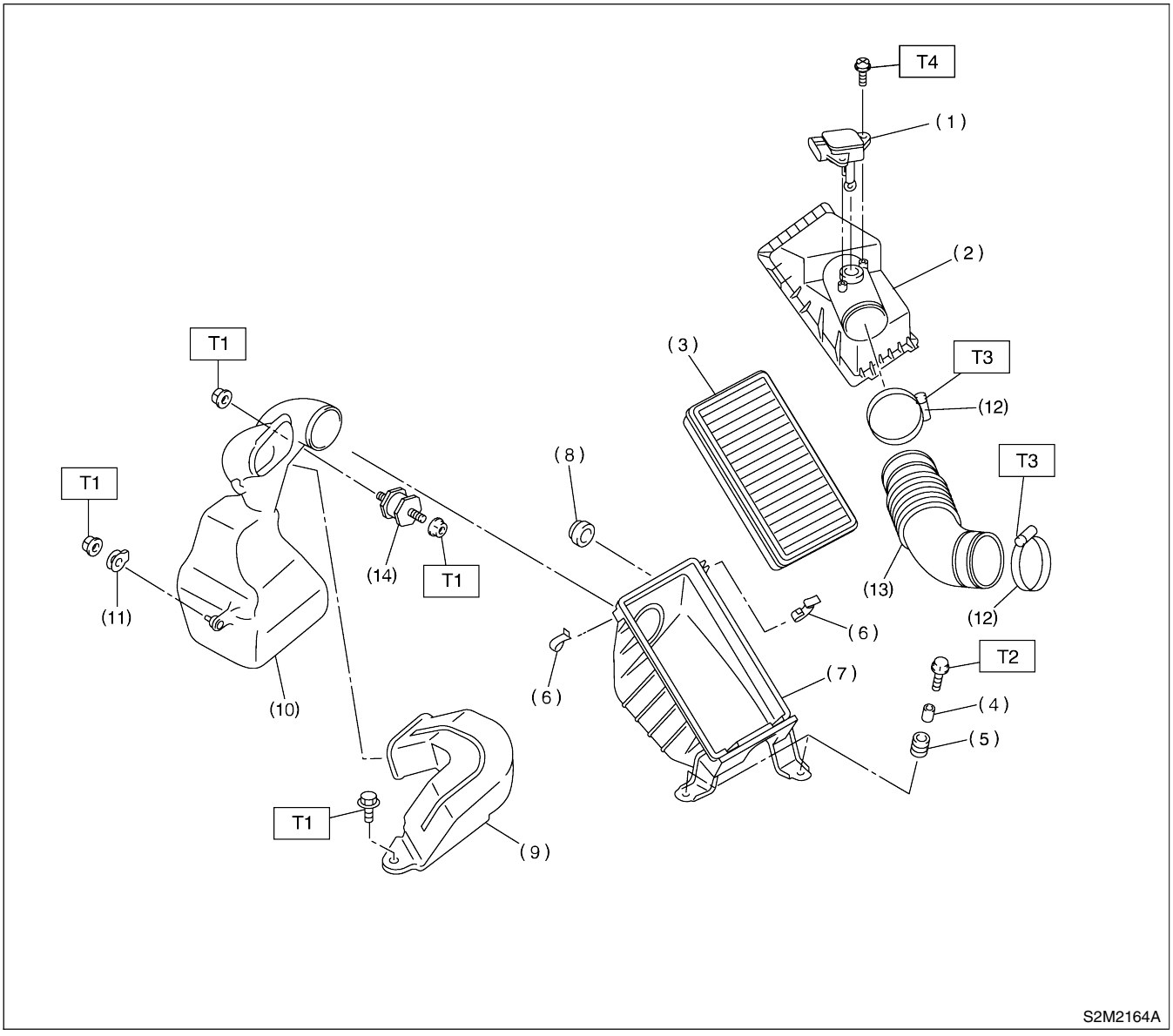
IN(DOHC TURBO)

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1.	General Description	2
2.	Air Cleaner	7
3.	Air Intake Duct	8
4.	Intake Duct	9
5.	Intercooler	10
6.	Turbocharger	12
7.	Air By-pass Valve	14

1. General Description S184001

A: COMPONENT S184001A05

1. AIR CLEANER S184001A0501

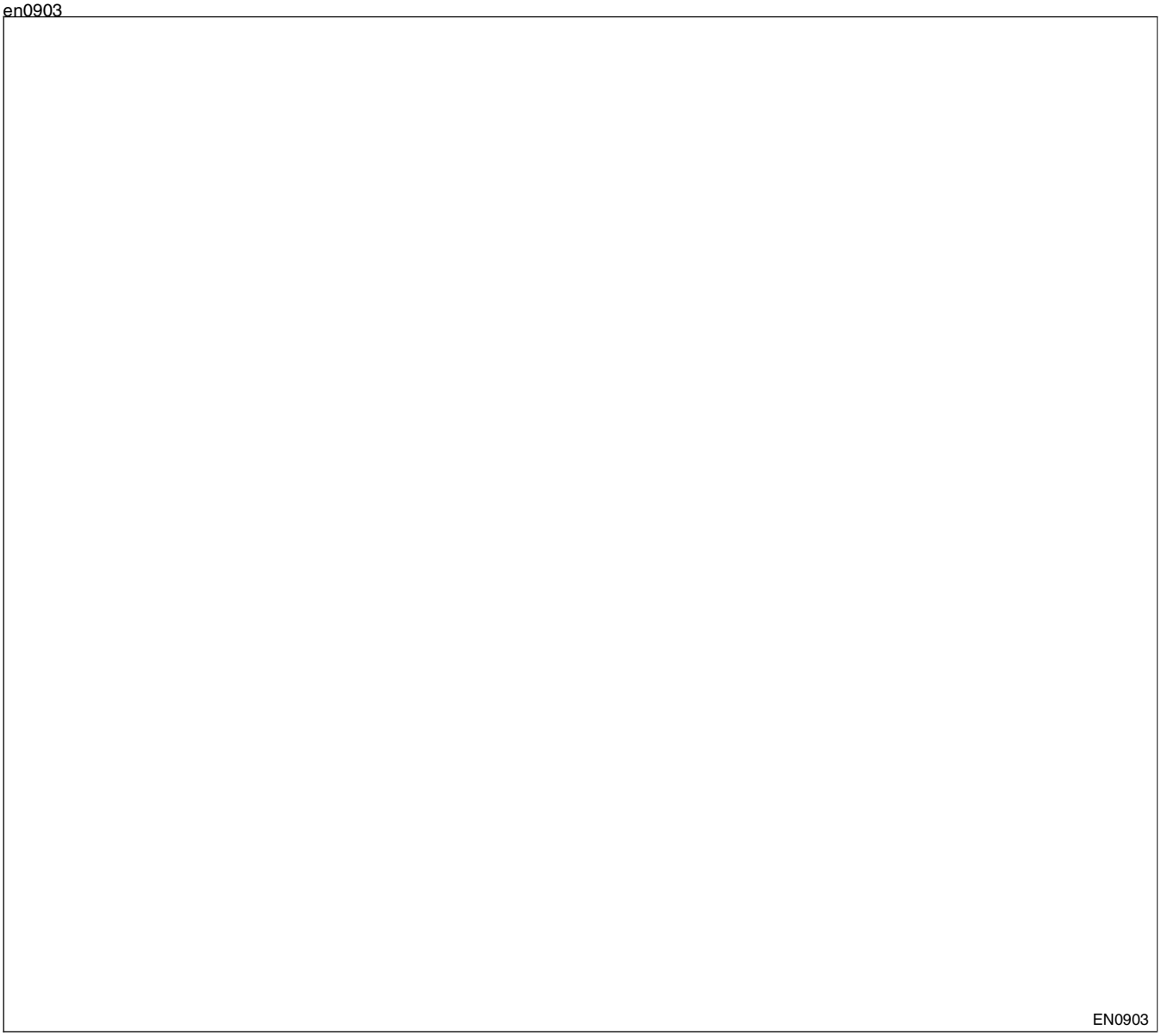


(1) Mass air flow sensor
(2) Air cleaner upper cover
(3) Air cleaner element
(4) Spacer
(5) Bushing
(6) Clip
(7) Air cleaner lower case
(8) Cushion rubber
(9) Air intake duct
(10) Resonator chamber ASSY
(11) Cushion rubber
(12) Clamp
(13) Air intake boot
(14) Cushion

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 33 (3.4, 25)
T3: 2.5 (0.25, 1.8)
T4: 1.7 (0.17, 1.2)

2. INTAKE DUCT S184001A0502

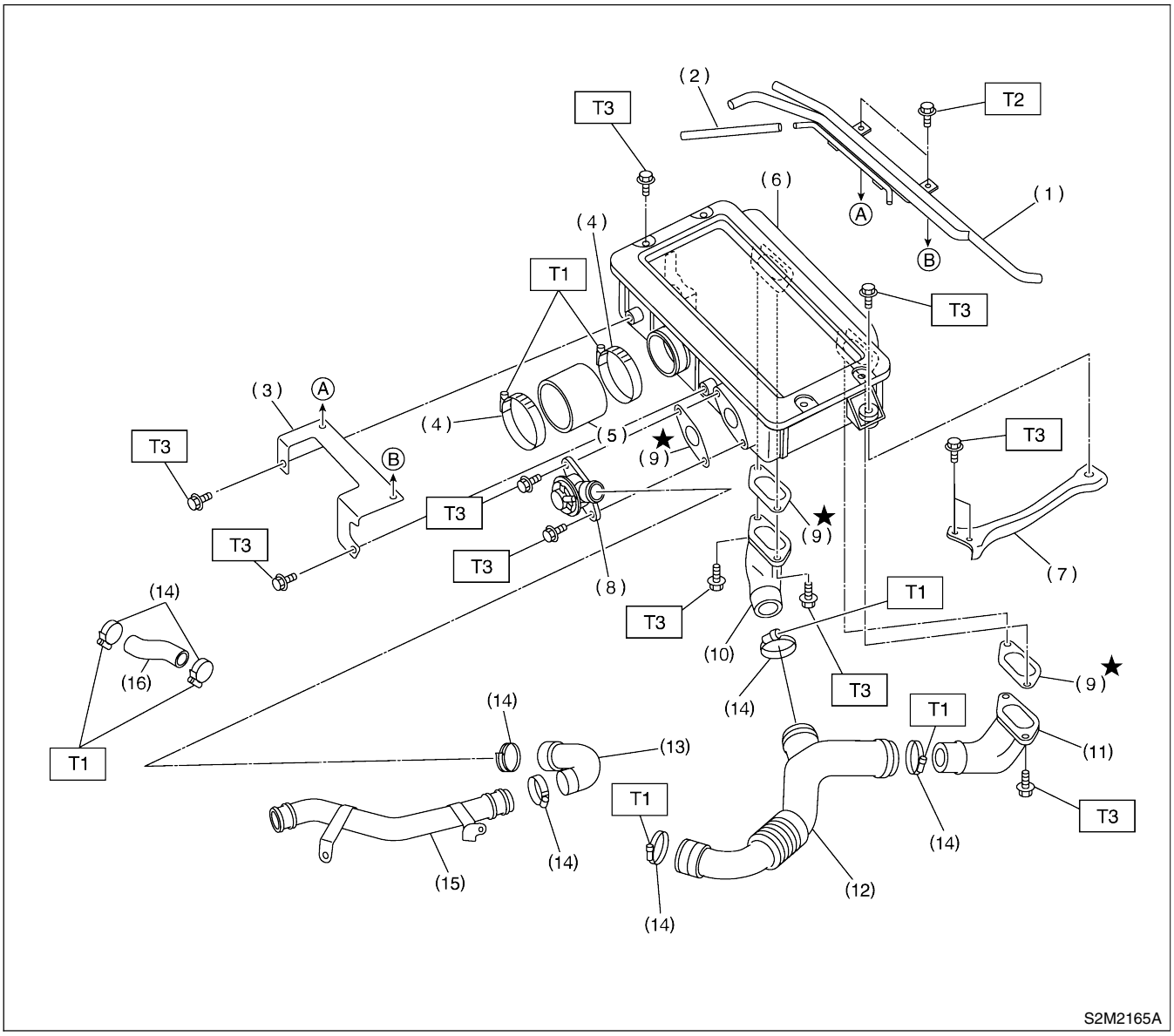
en0903



(1) Clamp
(2) Air by-pass hose A
(3) Air by-pass hose B
(4) Air by-pass hose C
(5) Air by-pass hose D
(6) Intake duct

Tightening torque: N·m (kgf-m, ft-lb)
T1: 15.7 (1.6, 11.6)

3. INTER COOLER S184001A0503

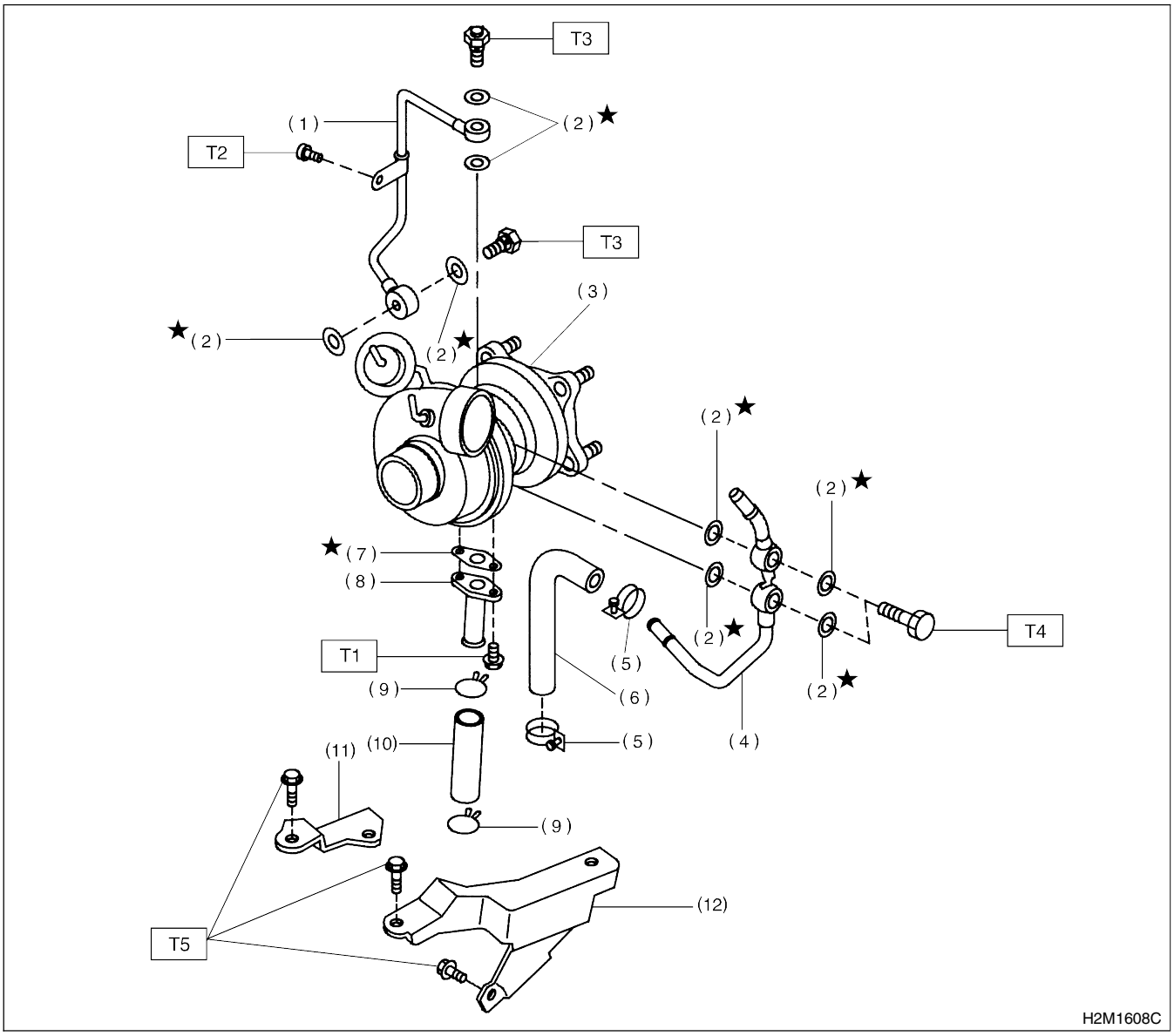


S2M2165A

(1) PVC pipe
(2) Air by-pass hose C
(3) Stay
(4) Clamp
(5) Air intake hose
(6) Intercooler
(7) Intercooler bracket
(8) Air by-pass valve
(9) Gasket
(10) Intercooler duct A
(11) Intercooler duct B
(12) Intercooler duct C
(13) Air by-pass hose A
(14) Clamp
(15) Air by-pass pipe
(16) Air by-pass hose B

Tightening torque: N·m (kgf-m, ft-lb)
T1: 3 (0.22, 1.6)
T2: 6.4 (0.65, 4.7)
T3: 16 (1.6, 11.7)

4. TURBOCHARGER S184001A0504



(1) Oil inlet pipe
(2) Metal gasket
(3) Turbocharger
(4) Water pipe
(5) Clamp
(6) Engine coolant hose
(7) Gasket
(8) Oil outlet pipe
(9) Clip
(10) Oil outlet hose
(11) Turbocharger bracket RH
(12) Turbocharger bracket LH

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.3)
T2: 4.9 (0.50, 3.6)
T3: 29 (3.0, 21.7)
T4: 30 (3.1, 22.4)
T5: 33 (3.4, 24.6)

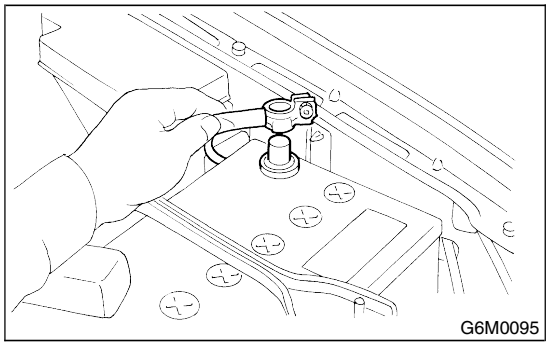
B: CAUTION S184001A03

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

2. Air Cleaner S184087

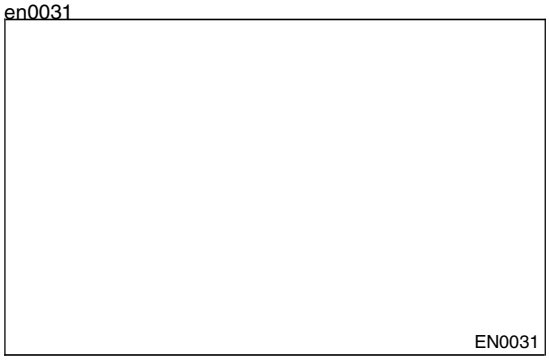
A: REMOVAL S184087A18

1) Disconnect connector battery ground cable.


G6M0095

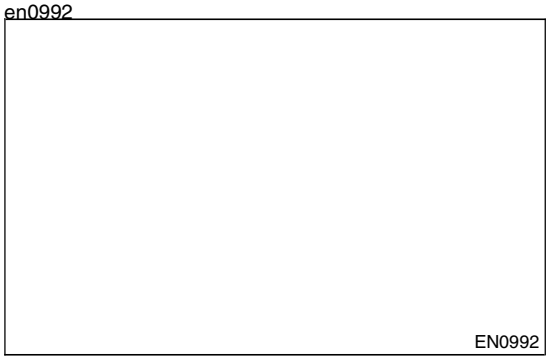
2) Disconnect connector from mass air flow sensor.

en0031


EN0031

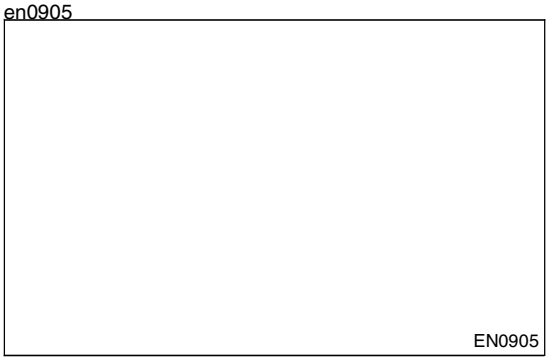
3) Loosen clamp (A) which connects air intake boot to intake duct.
4) Remove the two clips (B) from air cleaner upper cover.

en0992


EN0992

5) Remove air cleaner upper cover.
6) Remove air cleaner element.
7) Remove air cleaner lower case.

en0905

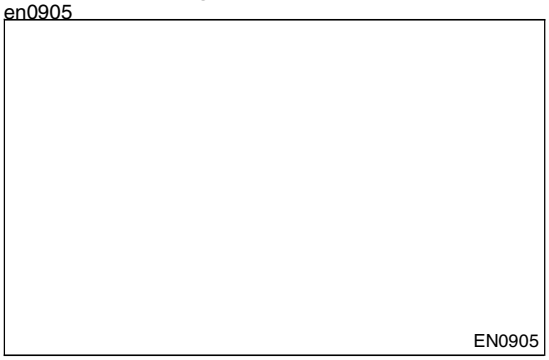

EN0905

B: INSTALLATION S184087A11

Install in the reverse order of removal.

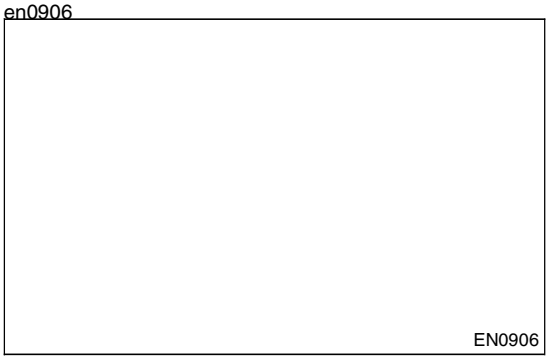
Tightening torque:
33 N·m (3.4 kgf-m, 25 ft-lb)

en0905


EN0905

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

en0906


EN0906

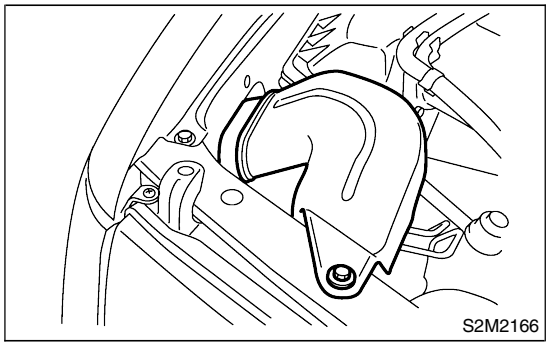
C: INSPECTION S184087A10

Replace if excessively damaged or dirty.

3. Air Intake Duct S184566

A: REMOVAL S184566A18

Remove bolts which install air intake duct on the front side of body.



B: INSTALLATION S184566A11

Install in the reverse order of removal.

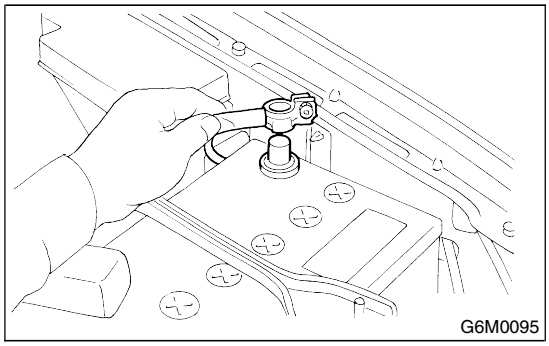
C: INSPECTION S184566A10

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

4. Intake Duct S184760

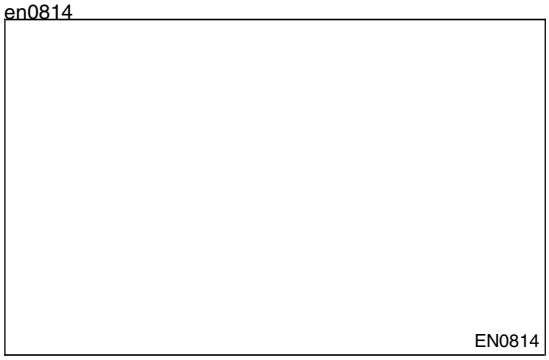
A: REMOVAL S184760A18

1) Disconnect battery ground cable.


G6M0095

2) Remove intake manifold. <Ref. to FU(DOHC TURBO)-15, REMOVAL, Intake Manifold.>
3) Remove sensor, engine harness, and fuel pipe attached to the intake manifold. <Ref. to FU(DOHC TURBO)-21, DISASSEMBLY, Intake Manifold.>
4) Remove intake duct from intake manifold.

en0814


EN0814

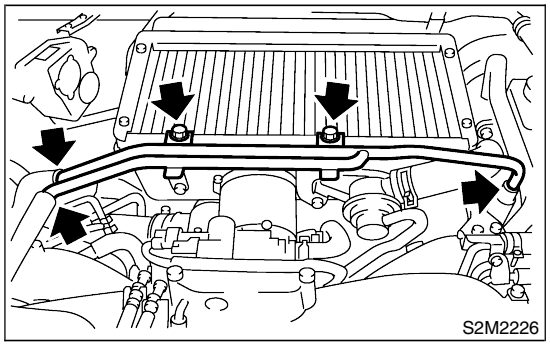
B: INSTALLATION S184760A11

Install in the reverse order of removal.

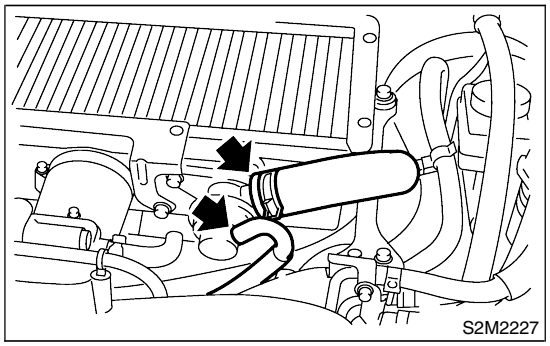
5. Intercooler S184761

A: REMOVAL S184761A18

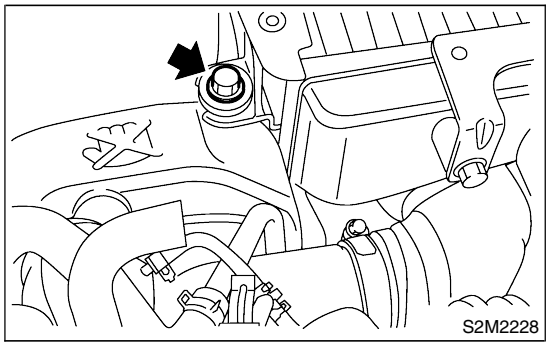
1) Remove air by-pass hoses from intercooler.

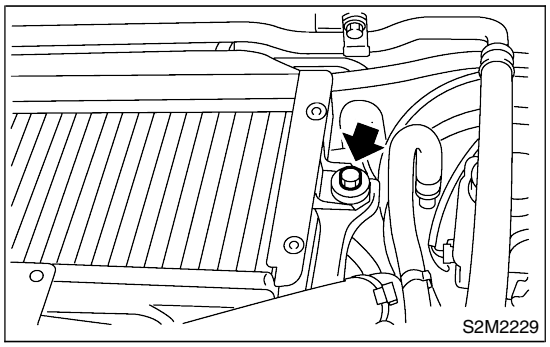

S2M2226

2) Loosen clamp, and remove hoses from air by-pass valve.


S2M2227

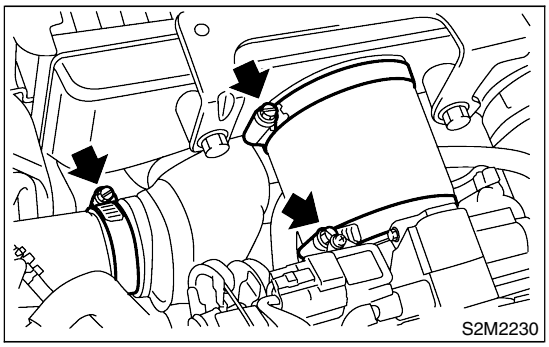
3) Remove bolts which secure intercooler to bracket.


S2M2228


S2M2229

4) Separate intercooler air duct from turbocharger.

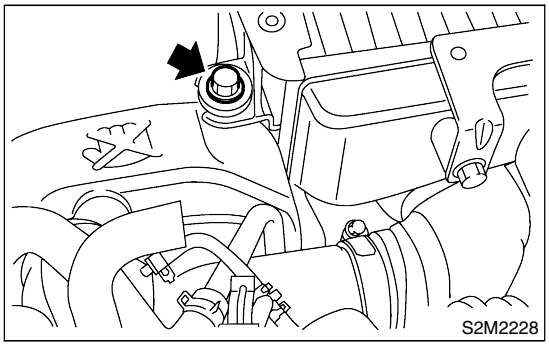
5) Separate intercooler from throttle body.

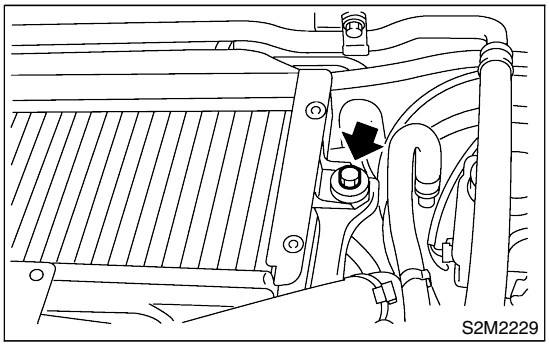

S2M2230

B: INSTALLATION S184761A11

Install in the reverse order of removal.

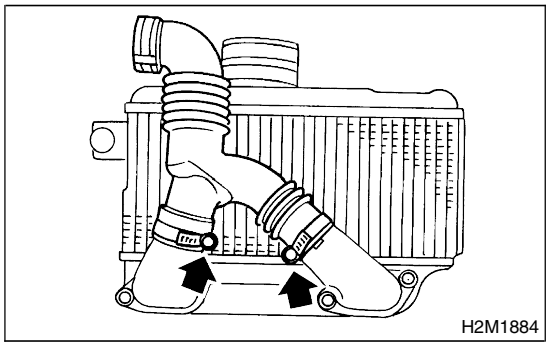
Tightening torque:
16 N·m (1.6 kgf-m, 11.7 ft-lb)


S2M2228

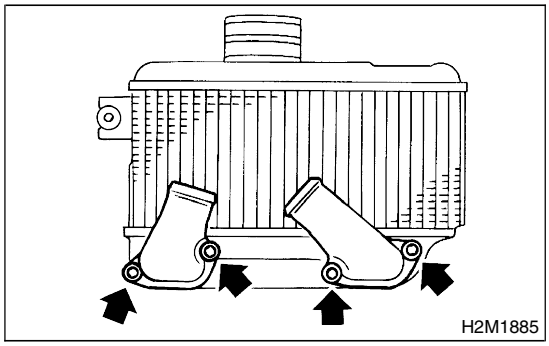

S2M2229

C: DISASSEMBLY S184761A06

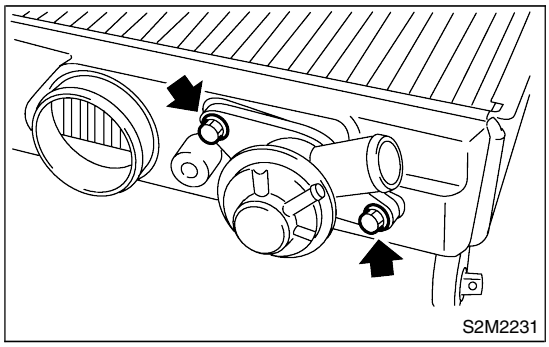
1) Loosen clamps, then remove intercooler duct.


H2M1884

2) Remove intercooler ducts from intercooler.


H2M1885

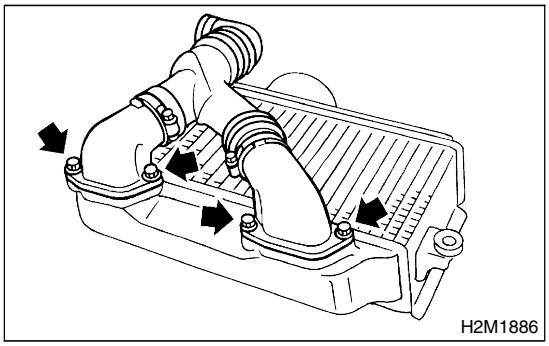
3) Remove air by-pass valve.

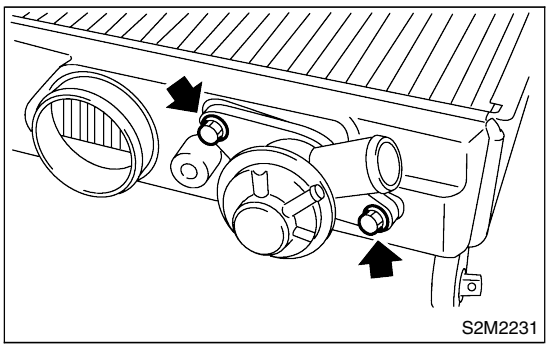

S2M2231

D: ASSEMBLY S184761A02

Assemble in the reverse order of disassembly.

Tightening torque:
16 N·m (1.6 kgf-m, 11.7 ft-lb)

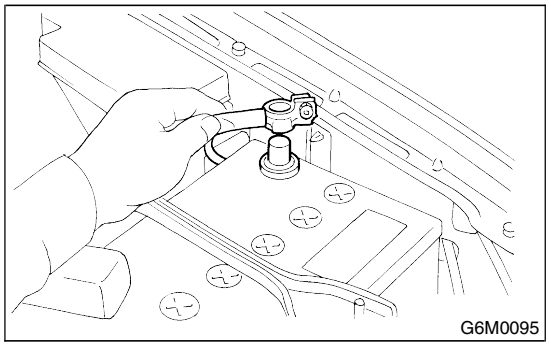

H2M1886


S2M2231

6. Turbocharger S184762

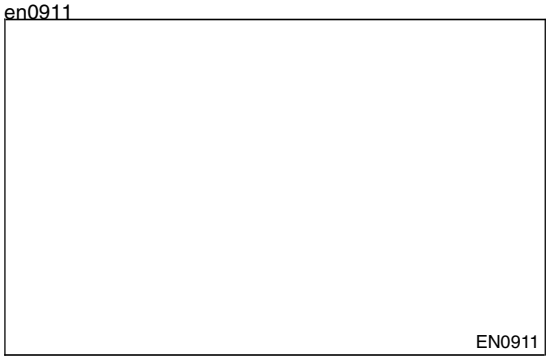
A: REMOVAL S184762A18

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


G6M0095

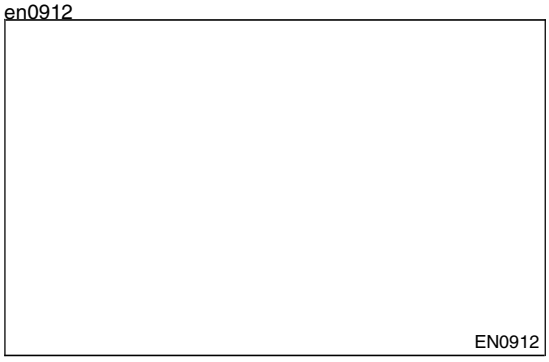
3) Remove center exhaust pipe. <Ref. to EX(DOHC TURBO)-9, REMOVAL, Center Exhaust Pipe.>
4) Lower the vehicle.
5) Separate turbocharger joint pipe from turbocharger.

en0911

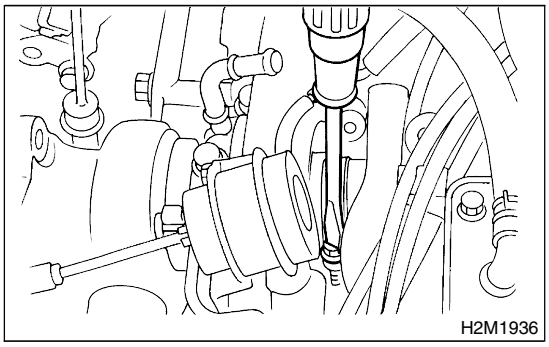

EN0911

6) Disconnect engine coolant hose which is connected to coolant filler tank.

en0912

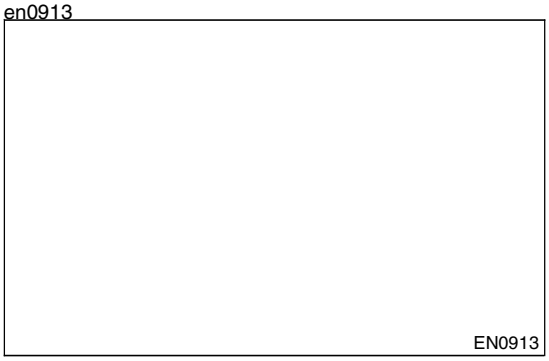

EN0912

7) Loosen clamp which secures turbocharger to air inlet duct.

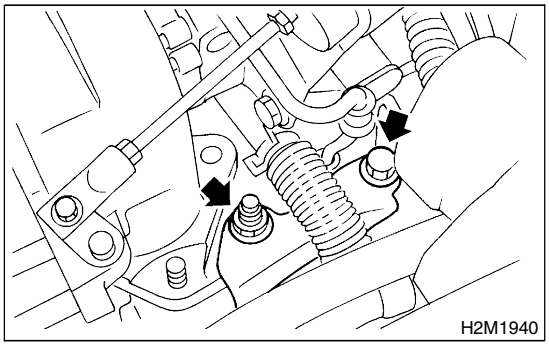

H2M1936

8) Remove bolt which secures bracket of oil pipe to turbocharger.
9) Remove oil pipe from turbocharger.

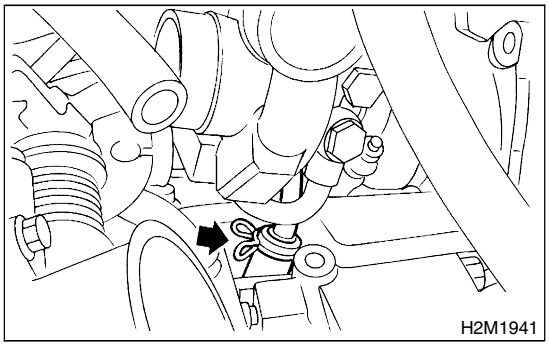
en0913


EN0913

10) Remove turbocharger bracket.


H2M1940

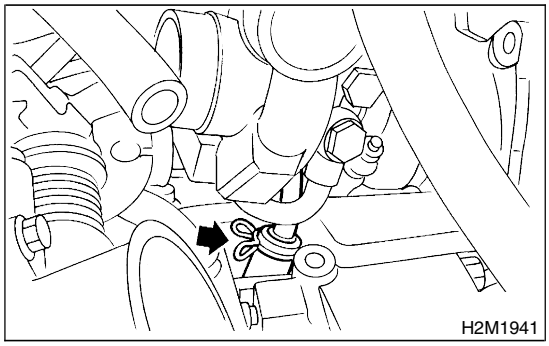
11) Disconnect oil outlet hose from pipe.


H2M1941

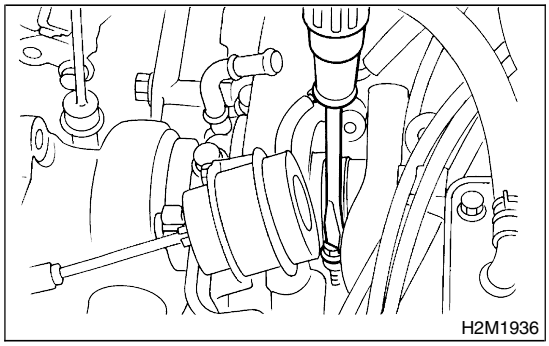
12) Take out turbocharger from engine compartment.

B: INSTALLATION S184762A11

1) Connect oil outlet hose to outlet pipe.

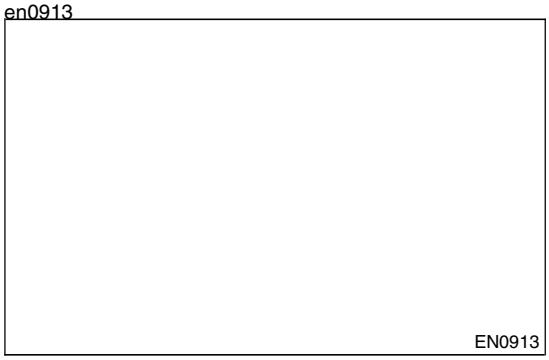


2) Install turbocharger to air intake duct.



3) Install oil pipe to turbocharger.

en0913

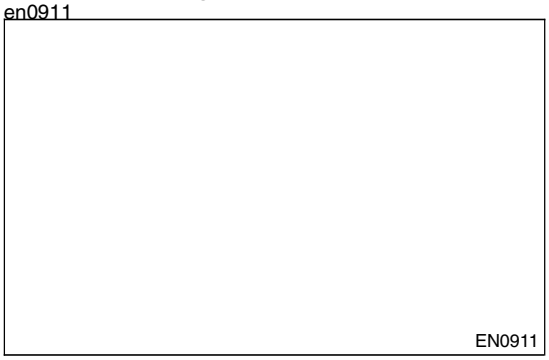


4) Install joint pipe to turbocharger.

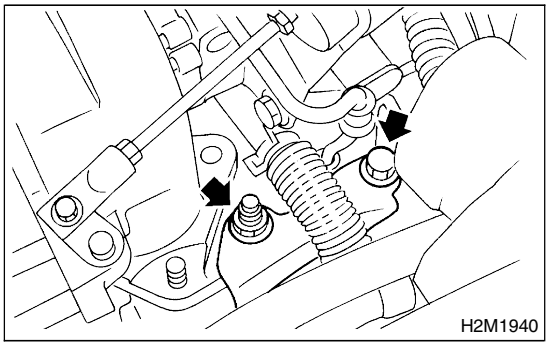
CAUTION:
Replace gasket with a new one.

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

en0911

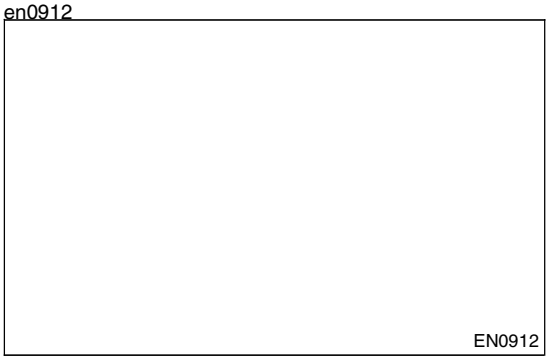


5) Install turbocharger bracket.



6) Connect engine coolant hose which is connected to coolant filler tank.

en0912

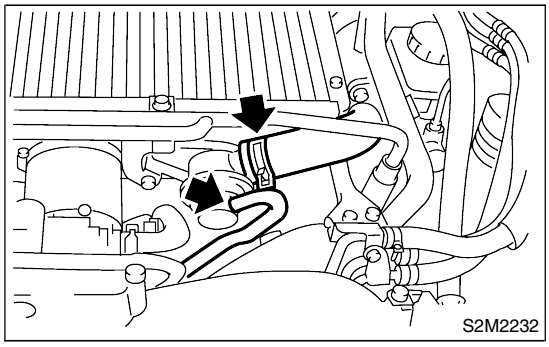


7) Lift-up the vehicle.
8) Install center exhaust pipe. <Ref. to EX(DOHC TURBO)-10, INSTALLATION, Center Exhaust Pipe.>

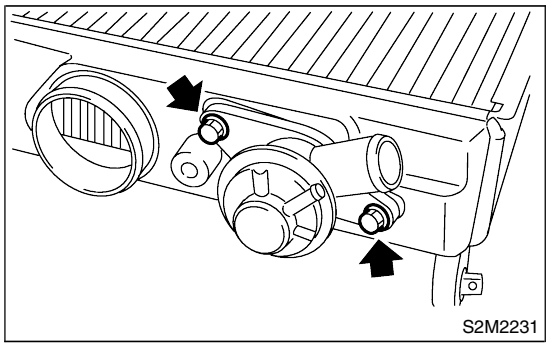
7. Air By-pass Valve S184016

A: REMOVAL S184016A18

1) Disconnect air by-pass hoses from air by-pass valve.



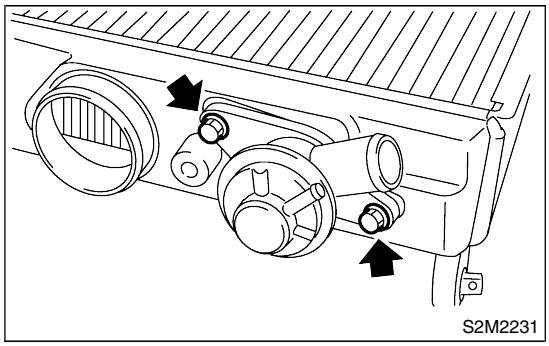
2) Remove air by-pass valve from intercooler.



B: INSTALLATION S184016A11

Install in the reverse order of removal.

Tightening torque:
16 N·m (1.6 kgf-m, 11.7 ft-lb)



MECHANICAL

ME(DOHC TURBO)

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1. General Description S183001

A: SPECIFICATIONS S183001E49

Engine	Type			Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine
	Valve arrangement			Belt driven, double overhead camshaft, 4-valve/cylinder
	Bore x Stroke		mm (in)	92 x 75 (3.62 x 2.95)
	Piston displacement		cm^3 (cu in)	1,994 (121.67)
	Compression ratio			8.0
	Compression pressure (at 200 — 300 rpm)		kPa (kg/cm^2, psi)	981 — 1,177 (10 — 12, 142 — 171)
	Number of piston rings			Pressure ring: 2, Oil ring: 1
	Intake valve timing	Opening		3° BTDC
		Closing		33° ABDC
	Exhaust valve timing	Opening		33° BBDC
		Closing		3° 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; “P” or “N” position on AT]		rpm	700±100 (No load) 800±150 (A/C switch ON)
	Firing order			1 → 3 → 2 → 4
	Ignition timing		BTDC/rpm	12°±10°/700 rpm

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

Belt tension 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 bush I.D.			18.0 — 18.08 mm (0.7087 — 0.7118 in)
	Clearance between spacer and bush		STD	0.025 — 0.125 mm (0.0010 — 0.0049 in)
			Limit	0.175 mm (0.0069 in)
	Side clearance of spacer		STD	0.2 — 0.55 mm (0.0079 — 0.0217 in)
			Limit	0.81 mm (0.0319 in)
Camshaft	Bend limit			0.020 mm (0.0079 in)
	Thrust clearance		STD	0.015 — 0.070 mm (0.0006 — 0.0028 in)
			Limit	0.10 mm (0.0039 in)
	Cam lobe height	Intake	STD	44.75 — 44.85 mm (1.7618 — 1.7657 in)
			Limit	44.65 mm (1.759 in)
		Exhaust	STD	44.60 — 44.70 mm (1.7559 — 1.7598 in)
			Limit	44.50 mm (1.7520 in)
	Jounal O.D.	STD	Front	37.946 — 37.963 mm (1.4939 — 1.4946 in)
			Center rear	29.946 — 29.963 mm (1.1790 — 1.1796 in)
	Oil clearance		STD	0.037 — 0.072 mm (0.0015 — 0.0028 in)
			Limit	0.10 mm (0.0039 in)
Cylinder head	Surface warpage limit			0.05 mm (0.0020 in)
	Surface grinding limit			0.3 mm (0.012 in)
	Standard height			127.5 mm (5.02 in)
Valve seat	Refacing angle			90°
	Contacting width	Intake	STD	1.0 mm (0.039 in)
			Limit	1.7 mm (0.067 in)
		Exhaust	STD	1.5 mm (0.059 in)
			Limit	2.2 mm (0.087 in)
Valve guide	Inner diameter			6.000 — 6.015 mm (0.2362 — 0.2368 in)
	Protrusion above head			12.0 — 12.4 mm (0.472 — 0.488 in)
Valve	Head edge thickness	Intake	STD	1.2 mm (0.047 in)
			Limit	0.8 mm (0.031 in)
		Exhaust	STD	1.5 mm (0.059 in)
			Limit	0.8 mm (0.031 in)
	Stem diameter		Intake	5.950 — 5.965 mm (0.2343 — 0.2348 in)
			Exhaust	5.950 — 5.965 mm(0.2343 — 0.2348 in)
	Stem oil clearance	STD	Intake	0.035 — 0.062 mm (0.0014 — 0.0024 in)
			Exhaust	0.040 — 0.067 mm (0.0016 — 0.0026 in)
		Limit	—	0.15 mm (0.0059 in)
	Overall length		Intake	104.4 mm (4.110 in)
			Exhaust	104.7 mm (4.122 in)
Valve spring	Free length			44.67 mm (1.7587 in)
	Squareness			2.5°, 2.0 mm (0.079 in)
	Tension/spring height			220.7±15.7 N (22.5±1.6 kgf, 49.6±3.5 lb)/36.0 mm (1.417 in) 510.9±25.5 N (52.1±2.6 kgf, 114.9±5.7 lb)/26.6 mm (1.0.47 in)

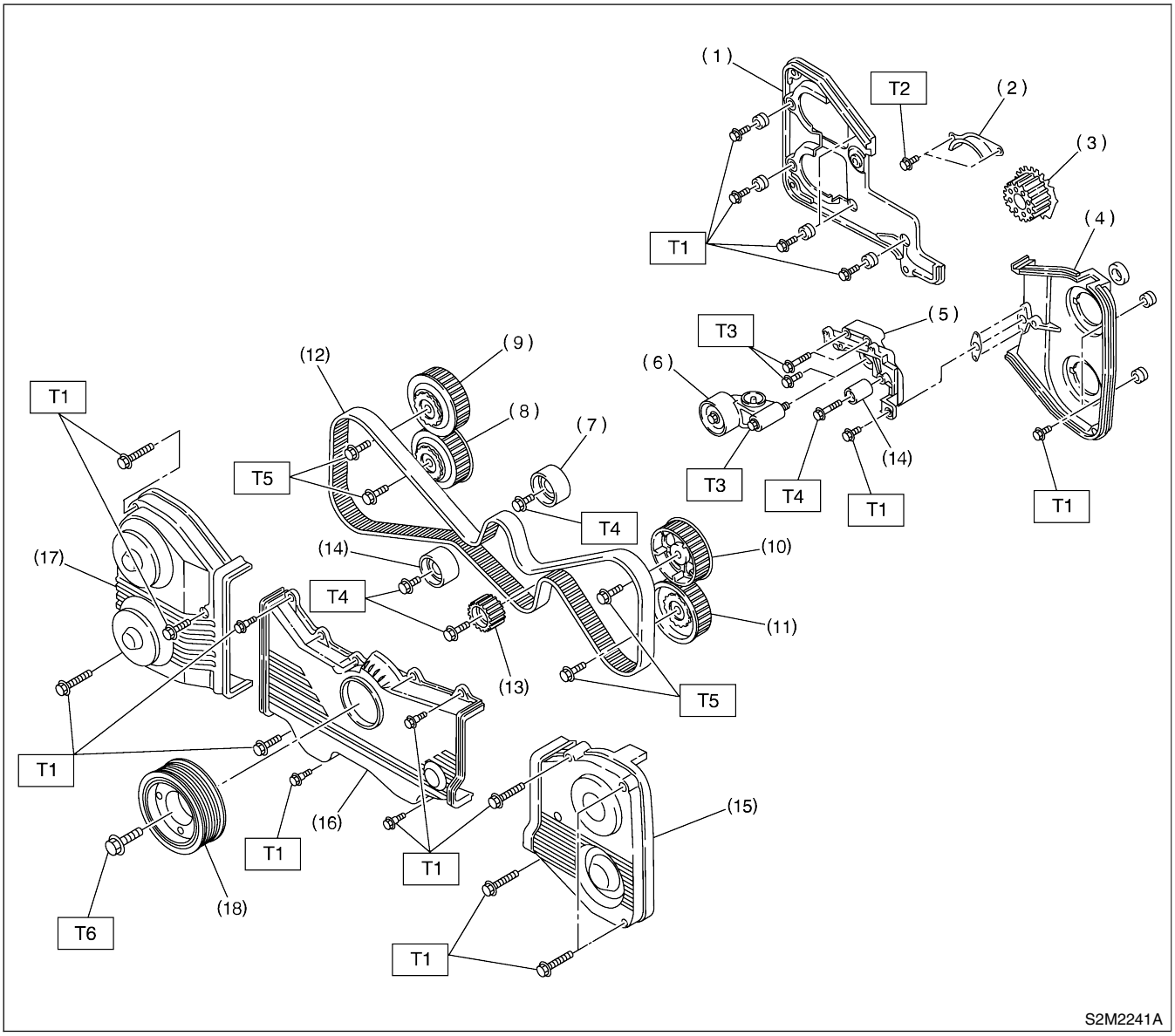
Cylinder block	Surface warpage limit (mating with cylinder head)			0.05 mm (0.0020 in)
	Surface grinding limit			0.1 mm (0.004 in)
	Cylinder bore	STD	A	92.005 — 92.015 mm (3.6222 — 3.6226 in)
			B	91.995 — 92.005 mm (3.6218 — 3.6222 in)
	Taper		STD	0.015 mm (0.0006 in)
			Limit	0.050 mm (0.0020 in)
	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	91.985 — 91.995 mm (3.6214 — 3.6218 in)
			B	91.975 — 91.985 mm (3.6211 — 3.6214 in)
		0.25 mm (0.0098 in) OS		92.225 — 92.235 mm (3.6309 — 3.6313 in)
		0.50 mm (0.0197 in) OS		92.475 — 92.485 mm (3.6407 — 3.6411 in)
Piston pin	Standard clearance between piston pin and hole in piston		STD	0.004 — 0.008 mm (0.0002 — 0.0003 in)
			Limit	0.020 mm (0.0008 in)
	Degree of fit			Piston pin must be fitted into position with thumb at 20°C (68°F).
Piston ring	Piston ring gap	Top ring	STD	0.20 — 0.26 mm (0.0079 — 0.0102 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	1.492 — 1.501 mm (0.0587 — 0.0591 in)
			0.03 mm (0.0012 in) US	1.510 — 1.513 mm (0.0594 — 0.0596 in)
			0.05 mm (0.0020 in) US	1.520 — 1.523 mm (0.0598 — 0.0600 in)
			0.25 mm (0.0098 in) US	1.620 — 1.623 mm (0.0638 — 0.0639 in)
Connecting rod bushing	Clearance between piston pin and bushing		STD	0 — 0.022 mm (0 — 0.0009 in)
			Limit	0.030 mm (0.0012 in)

Crankshaft	Bend limit			0.035 mm (0.0014 in)
	Crank pin and crank journal	Out-of-roundness		0.020 mm (0.0008 in) or less
		Grinding limit		0.25 mm (0.0098 in)
	Crank pin outer diameter		STD	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 (2.0466 — 2.0453 in)
			0.25 mm (0.0098 in) US	51.734 — 51.750 mm (2.0368 — 2.0374 in)
	Crank journal outer diameter	#1, #3, #5	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)

MEMO:

B: COMPONENT S183001A05

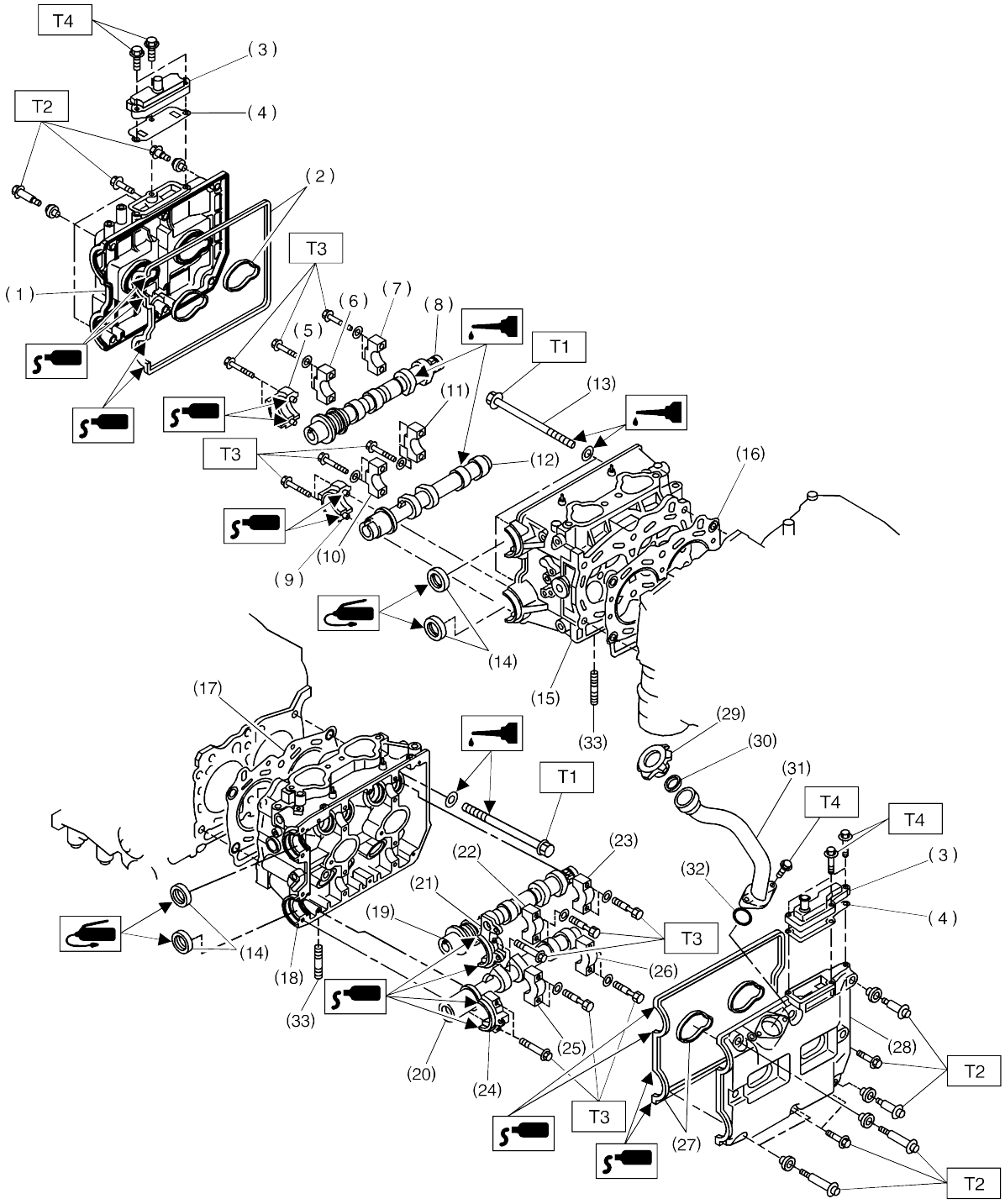
1. TIMING BELT S183001A0501



(1) Right-hand belt cover No. 2
(2) Timing belt guide (MT vehicles only)
(3) Crankshaft sprocket
(4) Left-hand belt cover No. 2
(5) Tensioner bracket
(6) Automatic belt tension adjuster ASSY
(7) Belt idler
(8) Right-hand exhaust camshaft sprocket
(9) Right-hand intake camshaft sprocket
(10) Left-hand intake camshaft sprocket
(11) Left-hand exhaust camshaft sprocket
(12) Timing belt
(13) Belt idler No. 2
(14) Belt idler
(15) Left-hand belt cover
(16) Front belt cover
(17) Right-hand belt cover
(18) Crankshaft pulley

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: 10 (1.0, 7)
T3: 25 (2.5, 18.1)
T4: 39 (4.0, 28.9)
T5: 98 (10, 72.4)
T6: 127 (13, 94.0)

2. CYLINDER HEAD AND CAMSHAFT S183001A0502

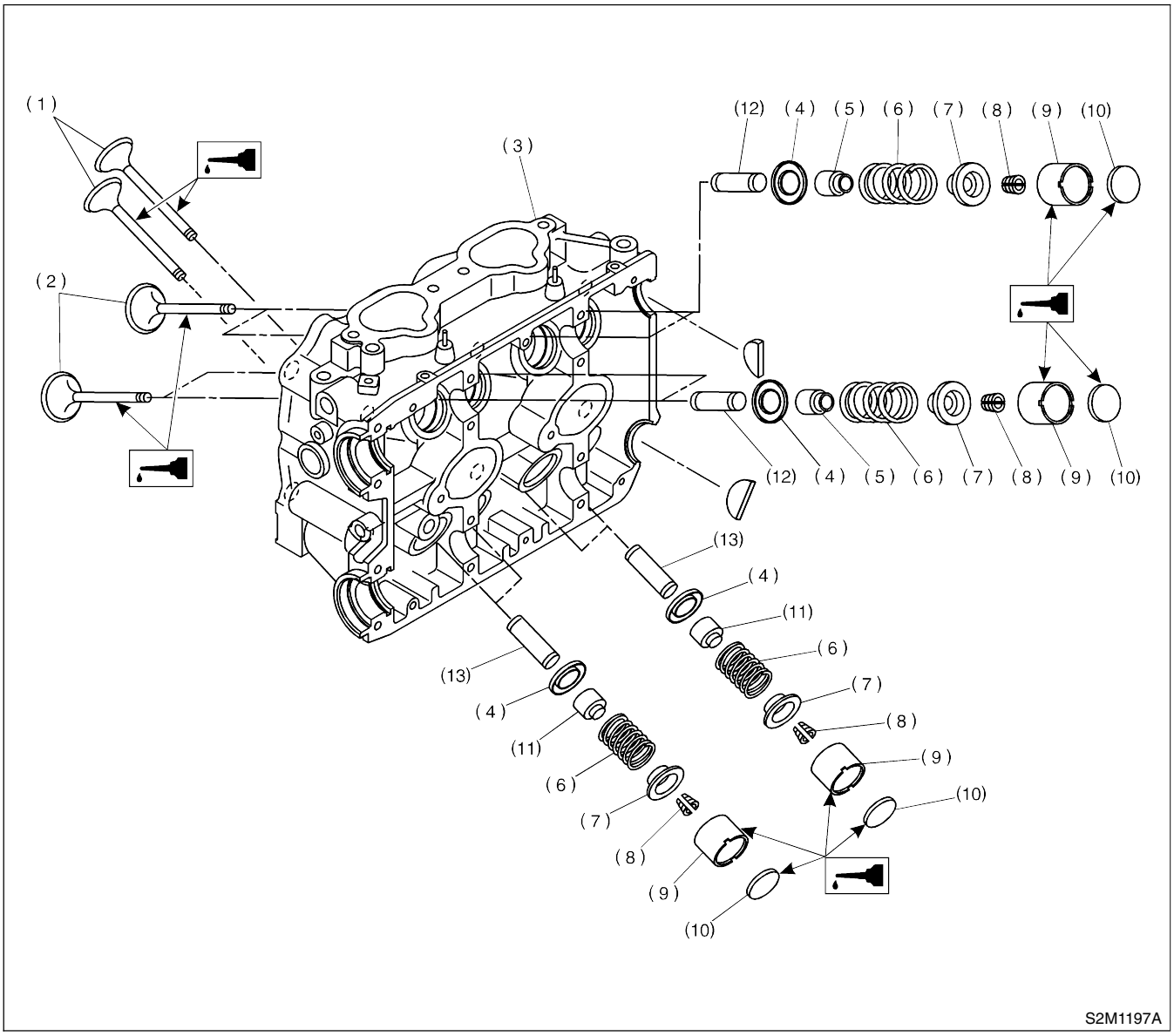


S2M1188A

(1) Rocker cover (RH)
(2) Rocker cover gasket (RH)
(3) Oil separator cover
(4) Gasket
(5) Intake camshaft cap (Front RH)
(6) Intake camshaft cap (Center RH)
(7) Intake camshaft cap (Rear RH)
(8) Intake camshaft (RH)
(9) Exhaust camshaft cap (Front RH)
(10) Exhaust camshaft cap (Center RH)
(11) Exhaust camshaft cap (Rear RH)
(12) Exhaust camshaft (RH)
(13) Cylinder head bolt
(14) Oil seal
(15) Cylinder head (RH)
(16) Cylinder head gasket (RH)
(17) Cylinder head gasket (LH)
(18) Cylinder head (LH)
(19) Intake camshaft (LH)
(20) Exhaust camshaft (LH)
(21) Intake camshaft cap (Front LH)
(22) Intake camshaft cap (Center LH)
(23) Intake camshaft cap (Rear LH)
(24) Exhaust camshaft (Front LH)
(25) Exhaust camshaft cap (Center LH)
(26) Exhaust camshaft cap (Rear LH)
(27) Rocker cover gasket (LH)
(28) Rocker cover (LH)
(29) Oil filler cap
(30) Gasket
(31) Oil filler duct
(32) O-ring
(33) Stud bolt

Tightening torque: N·m (kgf-m, ft-lb)
T1: <Ref. to ME(DOHC TURBO)-63, INSTALLATION, Cylinder Head Assembly.>
T2: 5 (0.5, 3.6)
T3: 10 (1.0, 7)
T4: 6.4 (0.65, 4.7)

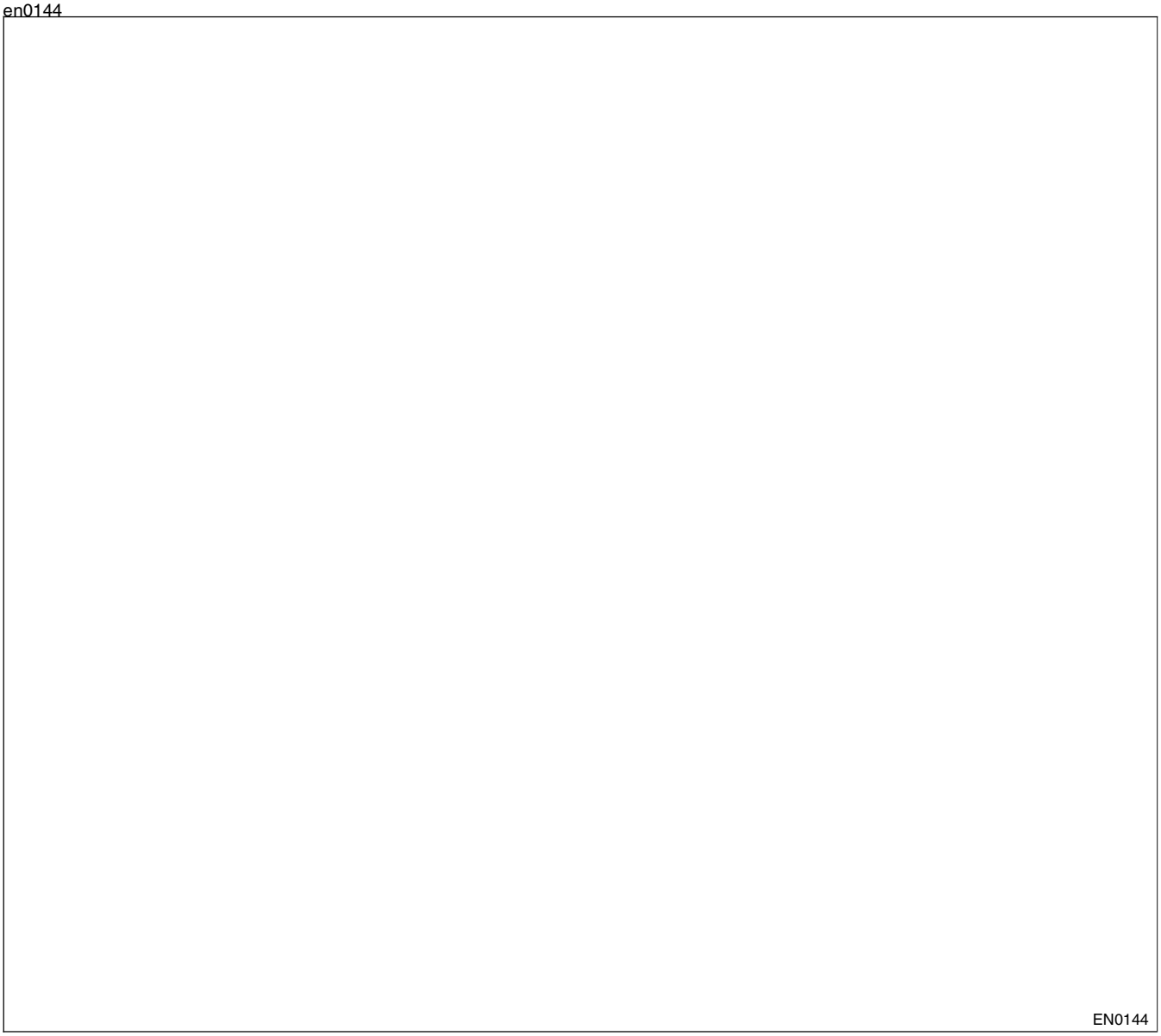
3. CYLINDER HEAD AND VALVE ASSEMBLY S183001A0503



(1) Exhaust valve
(2) Intake valve
(3) Cylinder head
(4) Valve spring seat
(5) Intake valve oil seal
(6) Valve spring
(7) Retainer
(8) Retainer key
(9) Valve lifter
(10) Shim
(11) Exhaust valve oil seal
(12) Intake valve guide
(13) Exhaust valve guide

4. CYLINDER BLOCK S183001A0504

en0144

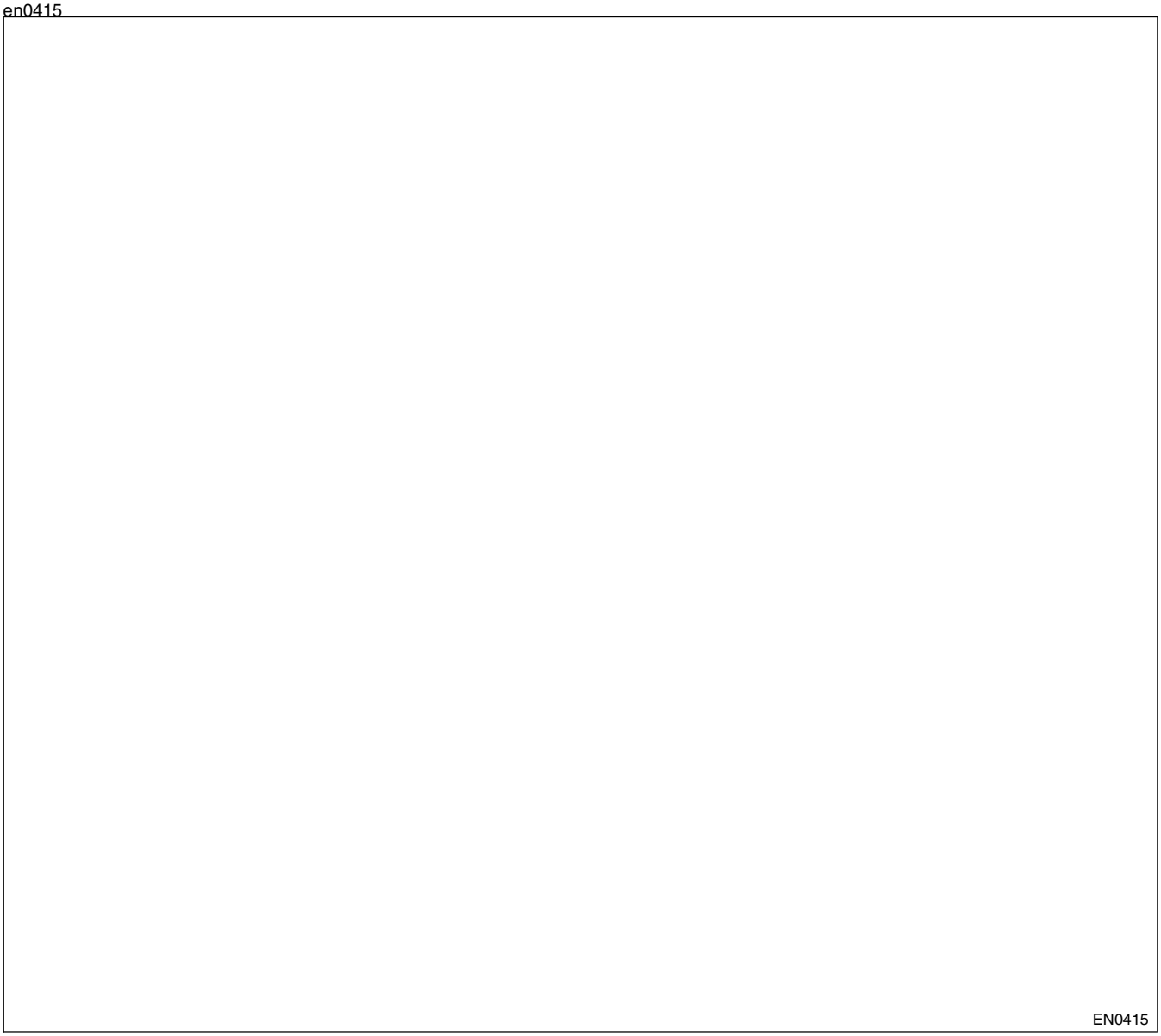


(1) Oil pressure switch
(2) Cylinder block (RH)
(3) Service hole plug
(4) Gasket
(5) Oil separator cover
(6) Water by-pass pipe
(7) Oil pump
(8) Front oil seal
(9) Rear oil seal
(10) O-ring
(11) Service hole cover
(12) Cylinder block (LH)
(13) Water pump
(14) Baffle plate
(15) Oil cooler
(16) Waster by-pass pipe
(17) Connector
(18) Oil strainer
(19) Gasket
(20) Oil pan
(21) Drain plug
(22) Metal gasket
(23) Oil level gauge guide
(24) Oil filter
(25) Gasket
(26) Water pump hose
(27) 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)
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 (5.5, 40)

5. CRANKSHAFT AND PISTON S183001A0505

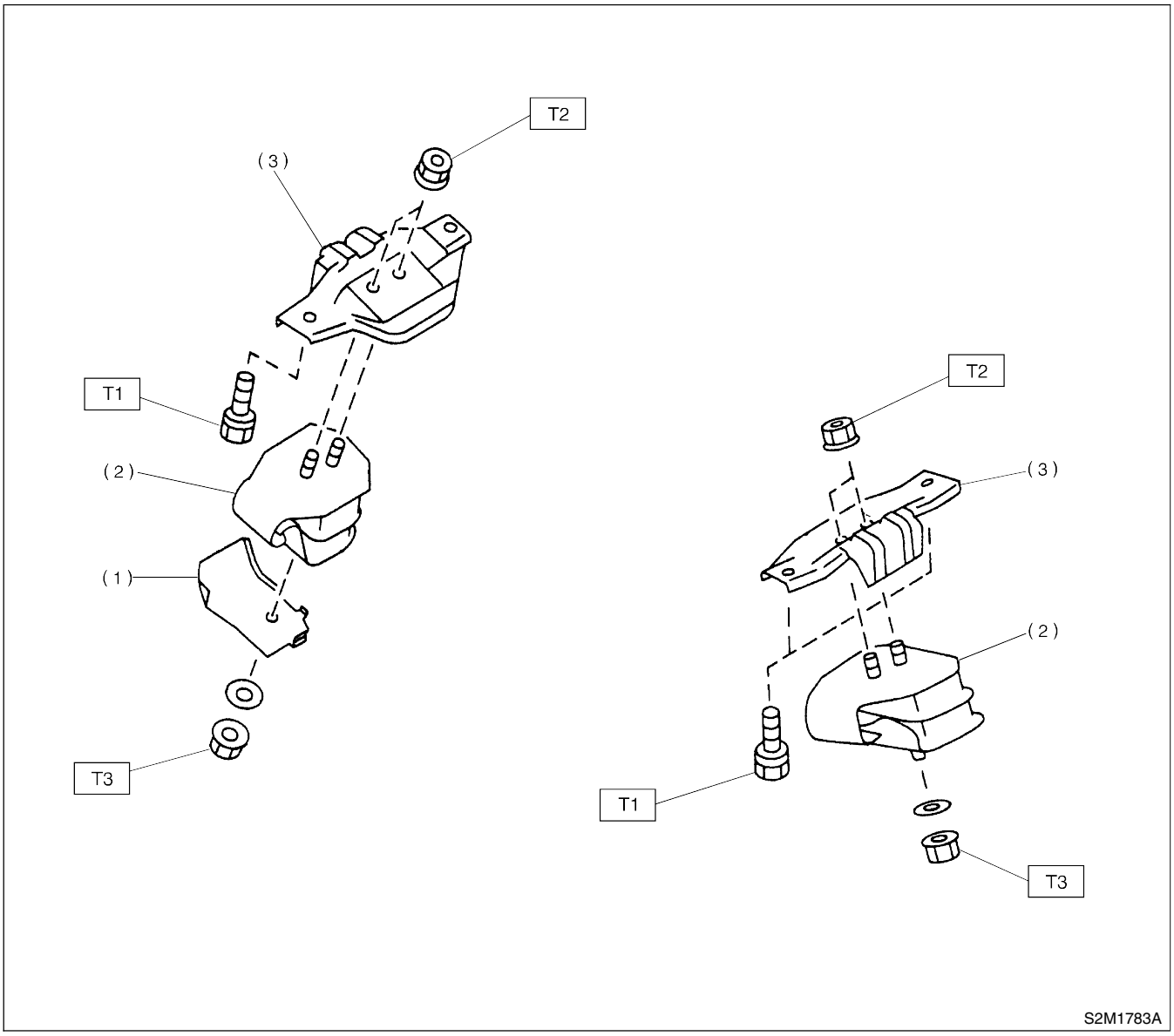
en0415



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

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

6. ENGINE MOUNTING S183001A0506



(1) Hear shield cover
(2) Front cushion rubber
(3) Front engine mounting bracket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 35 (3.6, 25.8)
T2: 42 (4.3, 30.9)
T3: 85 (8.7, 62.7)

C: CAUTION S183001A03

- 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 S183001A17

1. SPECIAL TOOLS S183001A1701

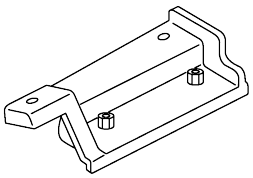
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
en0147 EN0147	498267600	CYLINDER HEAD TABLE	• Used for replacing valve guides. • Used for removing and installing valve springs.
 B2M3851	498457000	ENGINE STAND ADAPTER RH	Used with ENGINE STAND (499817000).

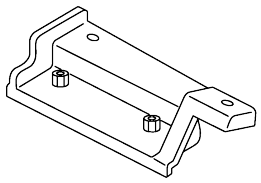
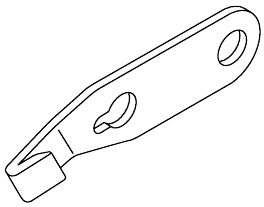
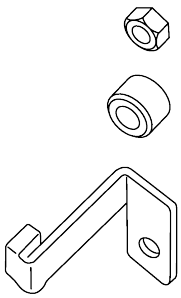
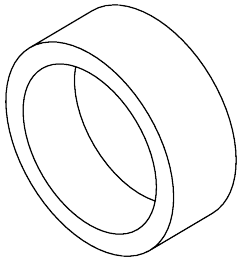
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3852	498457100	ENGINE STAND ADAPTER LH	Used with ENGINE STAND (499817000).
 B2M3853	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel when loosening and tightening crankshaft pulley bolt, etc.
 B3M2043	498277200	STOPPER SET	Used for removing and installing automatic transmission assembly to engine
 B2M3854	398744300	PISTON GUIDE	Used for installing piston in cylinder.

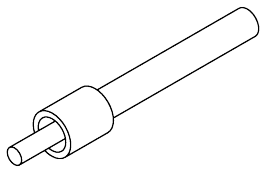
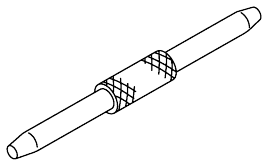
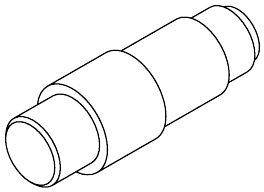
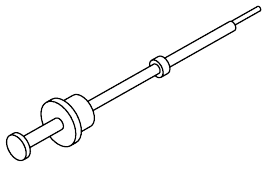
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3855	498857100	VALVE OIL SEAL GUIDE	Used for press-fitting of intake and exhaust valve guide oil seals.
 B2M3856	499017100	PISTON PIN GUIDE	Used for installing piston pin, piston and connecting rod.
 B2M3857	499037100	CONNECTING ROD BUSHING REMOVER & INSTALLER	Used for removing and installing connecting rod bushing.
 B2M3858	499097700	PISTON PIN REMOVER ASSY	Used for removing piston pin.

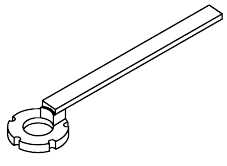
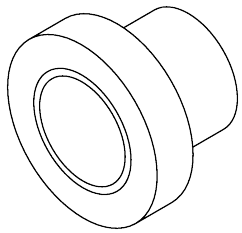
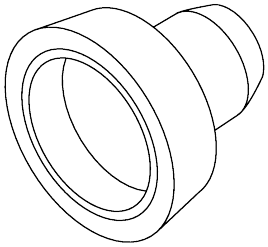
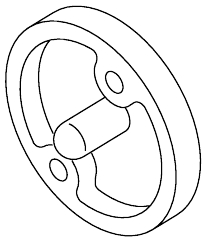
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M4158	499207400	CAMSHAFT SPROCKET WRENCH	Used for removing and installing camshaft sprocket.
 B2M3860	499587700	CAMSHAFT OIL SEAL INSTALLER	Used for installing cylinder head plug.
 B2M3861	499587200	CRANKSHAFT OIL SEAL INSTALLER	• Used for installing crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL GUIDE (499597100).
 B2M3863	499597100	CRANKSHAFT OIL SEAL GUIDE	• Used for installing crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL INSTALLER (499587200).

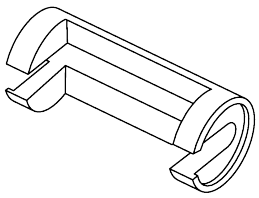
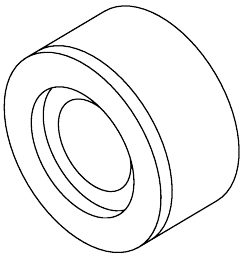
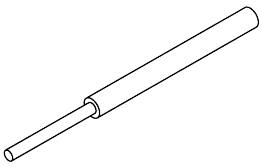
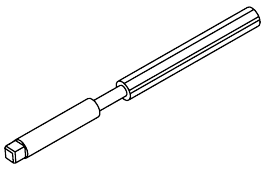
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3864	499718000	VALVE SPRING REMOVER	Used for removing and installing valve spring.
 B2M3865	498267700	VALVE GUIDE ADJUSTER	Used for installing intake and exhaust valve guides.
 B2M3867	499767200	VALVE GUIDE REMOVER	Used for removing valve guides.
 B2M3868	499767400	VALVE GUIDE REAMER	Used for reaming valve guides.

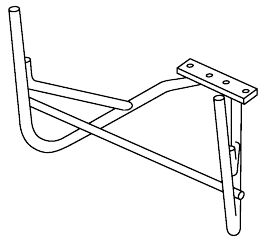
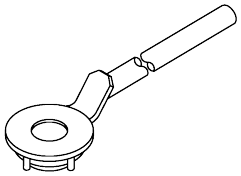
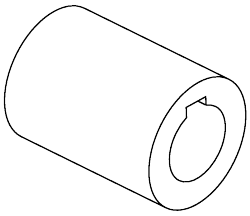
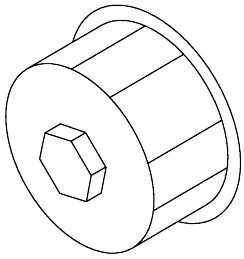
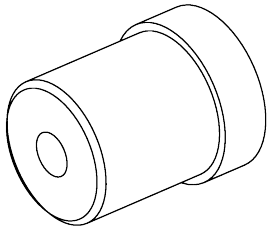
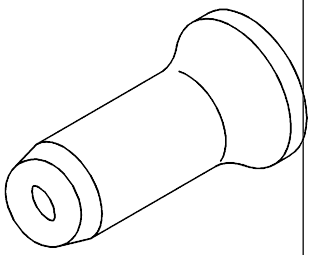
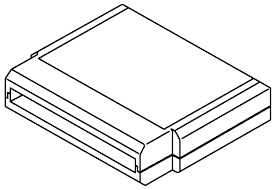
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3869	499817000	ENGINE STAND	• Stand used for engine disassembly and assembly. • Used with ENGINE STAND ADAPTER RH (498457000) & LH (498457100).
 B2M4157	499977300	CRANK PULLEY WRENCH	Used for stopping rotation of crankshaft pulley when loosening and tightening crankshaft pulley bolts.
 B2M3871	499987500	CRANKSHAFT SOCKET	Used for rotating crankshaft.
 B2M3872	498547000	OIL FILTER WRENCH	Used for removing and installing oil filter.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3875	499587100	OIL SEAL INSTALLER	Used for installing oil pump oil seal.
 S1H0136	499587600	OIL SEAL GUIDE	Used for installing camshaft oil seal.
~~en0168~~ EN0168	499597200	OIL SEAL GUIDE	Used for installing camshaft oil seal. Used with OIL SEAL GUIDE (499587600).
~~en0169~~ EN0169	49818200	SHIM REPLACER	Used for correct valve clearance.
 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 *S183001A1702*

TOOL NAME	REMARKS
Compression Gauge	Used for measuring compression.
Timing Light	Used for measuring ignition timing.

E: PROCEDURE S183001E45

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
- Camshaft
- Cylinder Head

2. Compression S183081

A: INSPECTION S183081A10

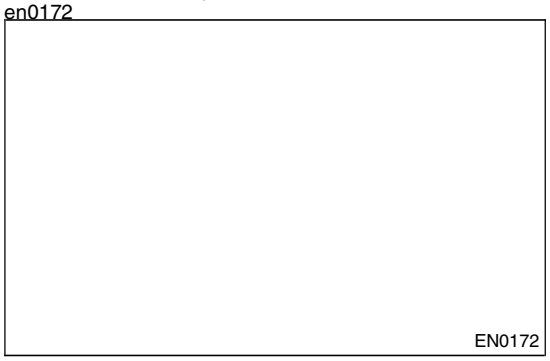
CAUTION:
After warming-up, engine becomes very hot. Be careful not to burn yourself during measurement.

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(DOHC TURBO)-50, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
4) Remove all the spark plugs. <Ref. to IG(DOHC TURBO)-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.

en0172



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

Compression (350 rpm and fully open throttle):
Standard;
981 — 1,177 kPa (10.0 — 12.0 kg/cm^2, 142 — 171 psi)
Limit;
981 kPa (10.0 kg/cm^2, 142 psi)
Difference between cylinders;
49 kPa (0.5 kg/cm^2, 7 psi)

3. Idle Speed S183082

A: INSPECTION S183082A10

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) Insert the cartridge to SUBARU SELECT MONITOR.
5) Connect SUBARU SELECT MONITOR to the data link connector.
6) Turn ignition switch to ON, and SUBARU SELECT MONITOR switch to ON.
7) Select {2. Each System Check} in Main Menu.
8) Select {Engine Control System} in Selection Menu.
9) Select {1. Current Data Display & Save} in Engine Control System Diagnosis.
10) Select {1.12 Data Display} in Data Display Menu.
11) Start the engine, and read engine idle speed.
12) 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 position (AT)]:
700±100 rpm

13) 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]:
800±150 rpm

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

4. Ignition Timing S183086

A: INSPECTION S183086A10

1) Before checking ignition timing speed, check the following:
   (1) Ensure that air cleaner element is free from clogging, spark plugs are in good condition, and that hoses are connected properly.
   (2) Ensure that malfunction indicator light (CHECK ENGINE light) does not illuminate.
2) Warm-up the engine.
3) Stop the engine, and turn ignition switch to OFF.
4) Insert the cartridge to SUBARU SELECT MONITOR.
5) Connect SUBARU SELECT MONITOR to the data link connector.
6) Turn ignition switch to ON, and SUBARU SELECT MONITOR switch to ON.
7) Select {2. Each System Check} in Main Menu.
8) Select {Engine Control System} in Selection Menu.
9) Select {1. Current Data Display & Save} in Engine Control System Diagnosis.
10) Select {1.12 Data Display} in Data Display Menu.
11) Start the engine, at idle speed and check the ignition timing.

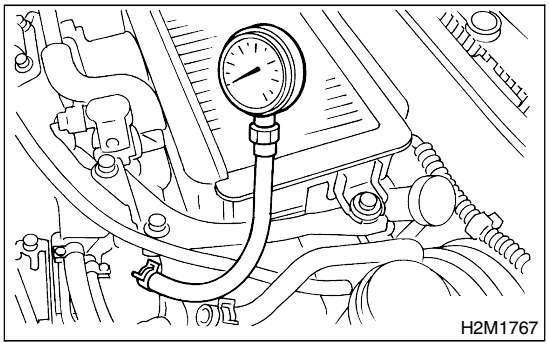
Ignition timing [BTDC/rpm]:
12°±10°/700

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

5. Intake Manifold Vacuum S183654

A: INSPECTION S183654A10

1) Warm-up the engine.
2) Disconnect the brake vacuum hose and install the vacuum gauge to the hose fitting on the manifold.
3) Keep the engine at the idle speed and read the vacuum gauge indication.
By observing the gauge needle movement, the internal condition of the engine can be diagnosed as described below.



Vacuum pressure (at idling, A/C "OFF"):
Less than –60.0 kPa (–450 mmHg, –17.72 inHg)

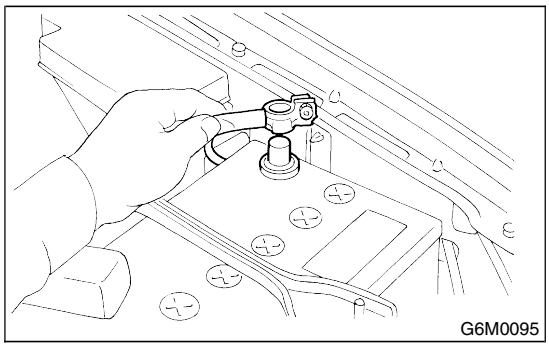
Diagnosis of engine condition by measurement of manifold vacuum	
Vacuum gauge indication	Possible engine condition
1. Needle is steady but lower than normal position. This tendency becomes more evident as engine temperature rises.	Leakage around intake manifold gasket or disconnection or damaged vacuum hose
2. When engine speed is reduced slowly from higher speed, needle stops temporarily when it is lowering or becomes steady above normal position.	Back pressure too high, or exhaust system clogged
3. Needle intermittently drops to position lower than normal position.	Leakage around cylinder
4. Needle drops suddenly and intermittently from normal position.	Sticky valves
5. When engine speed is gradually increased, needle begins to vibrate rapidly at certain speed, and then vibration increases as engine speed increases.	Weak or broken valve springs
6. Needle vibrates above and below normal position in narrow range.	Defective ignition system or throttle chamber idle adjustment

4) After measuring intake manifold vacuum, install brake vacuum hose.

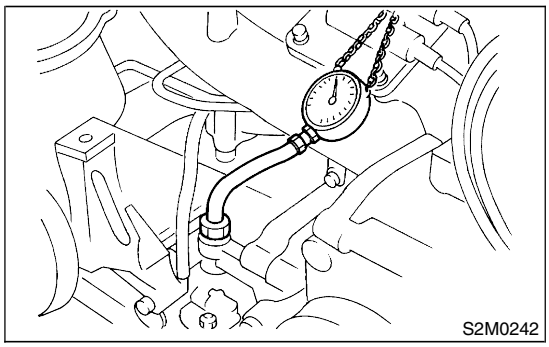
6. Engine Oil Pressure S183655

A: INSPECTION S183655A10

1) Remove oil pressure switch from engine cylinder block. <Ref. to LU-21, REMOVAL, Oil Pressure Switch.>
2) Connect oil pressure gauge hose to cylinder block.
3) Connect battery ground cable.


G6M0095

4) 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-25, 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-25, INSPECTION, Engine Lubrication System Trouble in General.>

NOTE:
The specified data is based on an engine oil temperature of 80°C (176°F).

5) After measuring oil pressure, install oil pressure switch. <Ref. to LU-21, INSTALLATION, Oil Pressure Switch.>

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

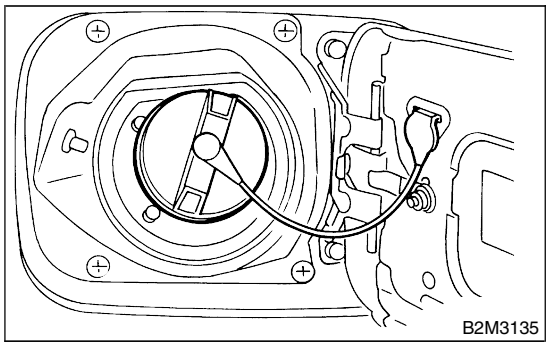
7. Fuel Pressure S183656

A: INSPECTION S183656A10

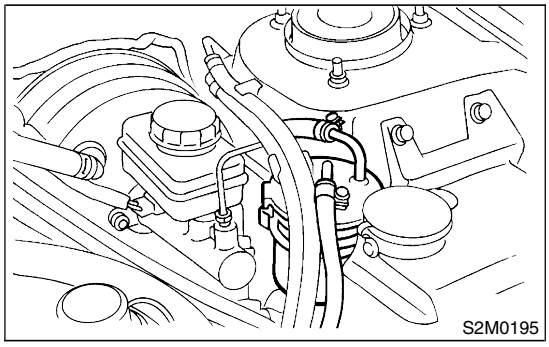
WARNING:
Before removing fuel pressure gauge, release fuel pressure.

NOTE:
If out of specification, check or replace pressure regulator and pressure regulator vacuum hose.

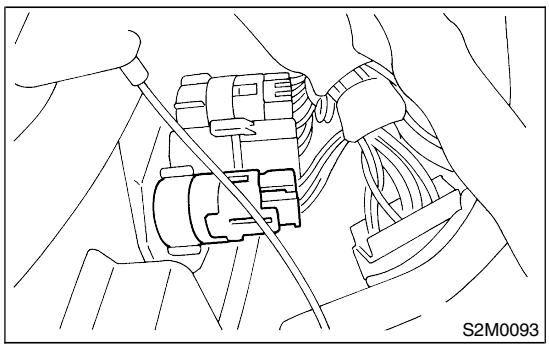
1) Release fuel pressure. <Ref. to FU(DOHC TURBO)-50, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open fuel flap lid, and remove fuel filler cap.


B2M3135

3) Disconnect fuel delivery hoses from fuel filter, and connect fuel pressure gauge.

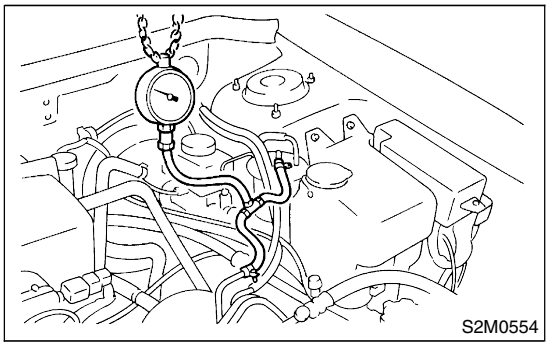

S2M0195

4) Connect connector of fuel pump relay.


S2M0093

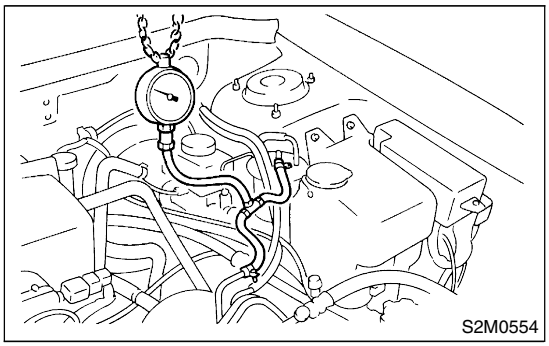
5) Start the engine.
6) Measure fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold.

Fuel pressure:
Standard; 284 — 314 kPa (2.9 — 3.2 kg/cm^2, 41 — 46 psi)


S2M0554

7) After connecting pressure regulator vacuum hose, measure fuel pressure.

Fuel pressure:
Standard; 230 — 260 kPa (2.35 — 2.65 kg/cm^2, 33 — 38 psi)


S2M0554

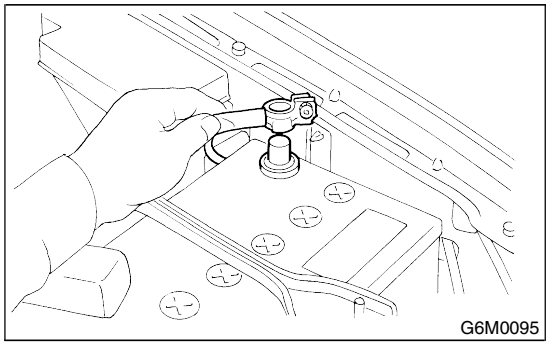
NOTE:
The fuel pressure gauge registers 10 to 20 kPa (0.1 to 0.2 kg/cm^2, 1 to 3 psi) higher than standard values during high-altitude operations.

8. Valve Clearance S183083

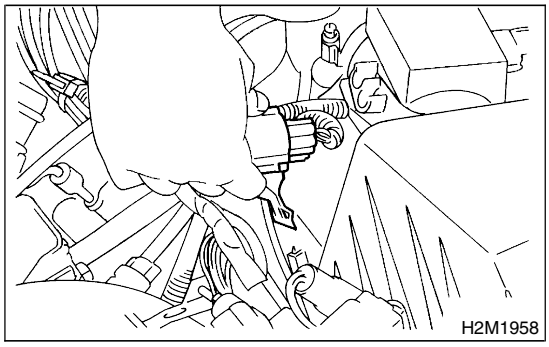
A: INSPECTION S183083A10

CAUTION:
Inspection and adjustment of valve clearance should be performed while engine is cold.

1) Set the vehicle onto the lift.
2) Disconnect battery ground cable.

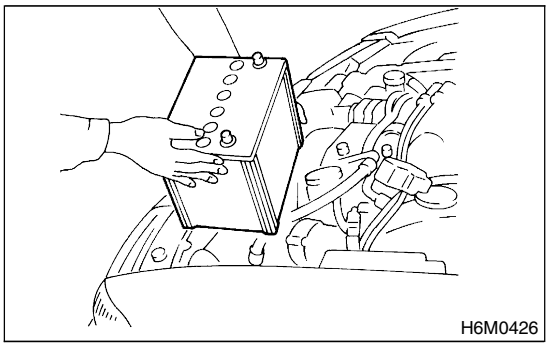

G6M0095

3) Remove air intake duct. <Ref. to IN(DOHC TURBO)-8, REMOVAL , Air Intake Duct.>
4) Remove one bolt which secures timing belt cover (RH).
5) Lift-up the vehicle.
6) Remove under cover.
7) Loosen remaining bolts which secure timing belt cover (RH), then remove belt cover.
8) Lower the vehicle.
9) When inspecting #1 and #3 cylinders:
(1) Pull out engine harness connector with bracket from air cleaner upper cover.

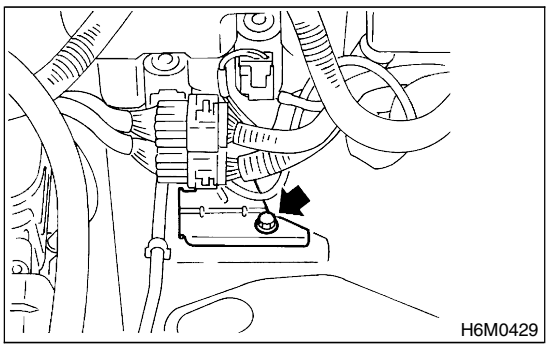

H2M1958

(2) Remove air cleaner case. <Ref. to IN(DOHC TURBO)-7, REMOVAL, Air Cleaner.>
(3) Disconnect spark plug cords from spark plugs (#1 and #3 cylinders).
(4) Place suitable container under the vehicle.
(5) Disconnect PCV hose from rocker cover (RH).
(6) Remove bolts, then remove rocker cover (RH).

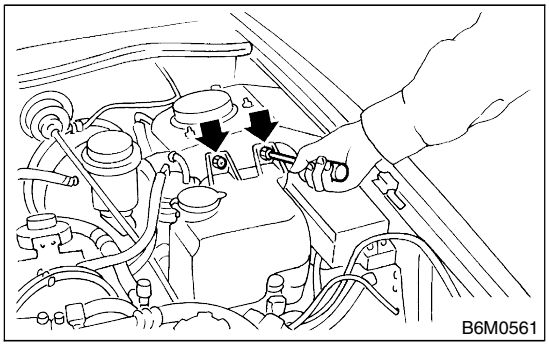
10) When inspecting #2 and #4 cylinders;
(1) Disconnect battery cables, and then remove battery and battery carrier.


H6M0426

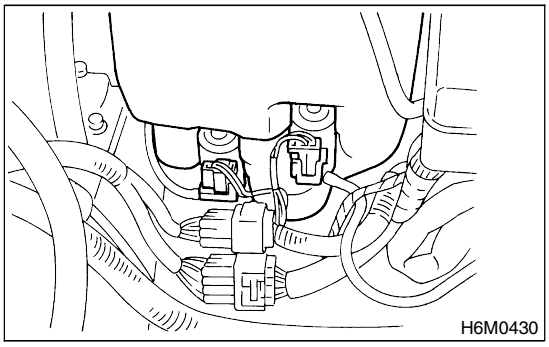
(2) Remove bolt which secures engine harness bracket onto body.


H6M0429

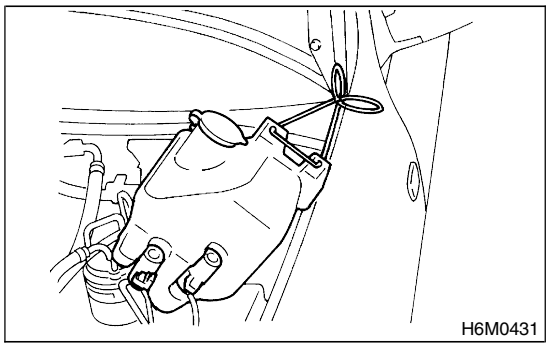
(3) Remove washer tank mounting bolts.


B6M0561

(4) Disconnect washer motor connectors.


H6M0430

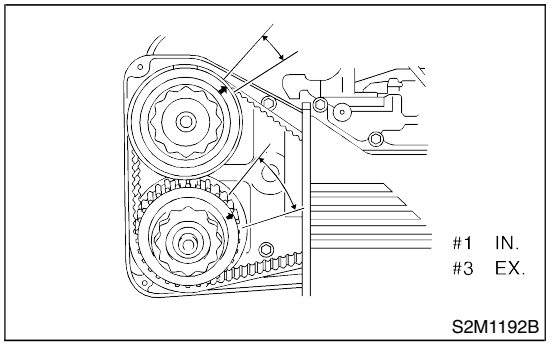
(5) Move washer tank upward.


H6M0431

(6) Disconnect spark plug cords from spark plugs (#2 and #4 cylinders).
(7) Place suitable container under the vehicle.
(8) Disconnect PCV hose from rocker cover (LH).
(9) Remove bolts, then remove rocker cover (LH).

11) Turn crankshaft pulley clockwise until arrow mark on camshaft sprocket is set to position shown in figure.

NOTE:
Turn crankshaft using ST.
ST 499987500 CRANKSHAFT SOCKET



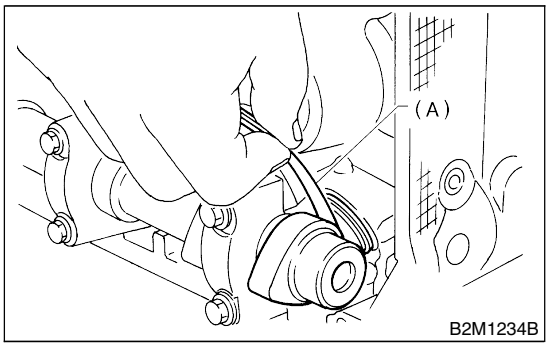
S2M1192B

12) Measure #1 cylinder intake valve and #3 cylinder exhaust valve clearance by using thickness gauge (A).

CAUTION:
● Insert the thickness gauge in as horizontal a direction as possible with respect to the shim.
● Measure exhaust valve clearances while lifting-up the vehicle.

Valve clearance:
Intake: 0.20±0.02 mm (0.0079±0.0008 in)
Exhaust: 0.25±0.02 mm (0.0098±0.0008 in)

NOTE:
If the measured value is not within specification, take notes of the value in order to adjust the valve clearance later on.

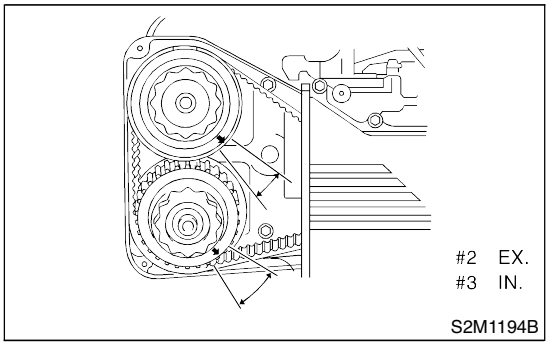


B2M1234B

13) If necessary, adjust the valve clearance. <Ref. to ME(DOHC TURBO)-30, ADJUSTMENT, Valve Clearance.>

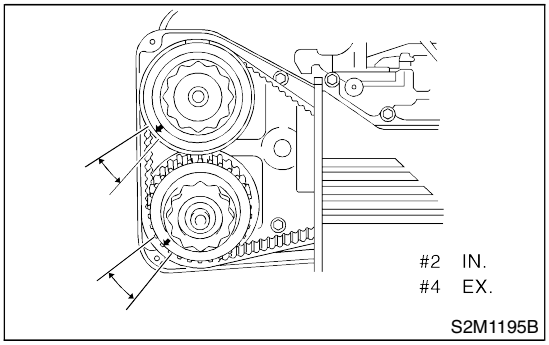
14) Further turn crankshaft pulley clockwise. Using the same procedures described previously, then measure valve clearances again.

(1) Set arrow mark on camshaft sprocket to position shown in figure, and measure #2 cylinder exhaust valve and #3 cylinder intake valve clearances.



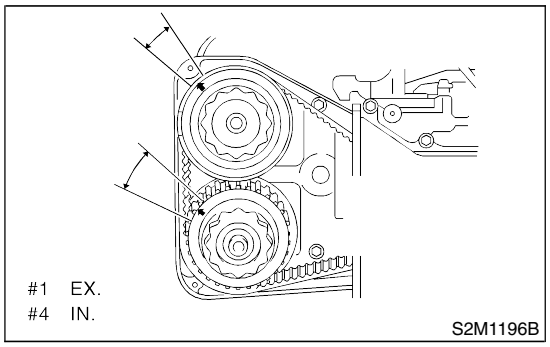
S2M1194B

(2) Set arrow mark on camshaft sprocket to position shown in figure, and measure #2 cylinder intake valve and #4 cylinder exhaust valve clearances.



S2M1195B

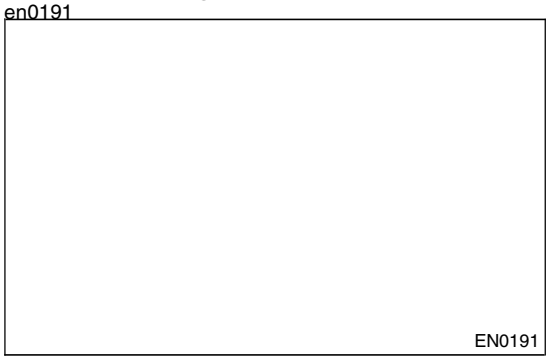
(3) Set arrow mark on camshaft sprocket to position shown in figure, and measure #1 cylinder exhaust valve and #4 cylinder intake valve clearances.



15) After inspection, install the related parts in the reverse order of removal.

Tightening torque:
32 N·m (3.3 kgf-m, 24 ft-lb)

en0191

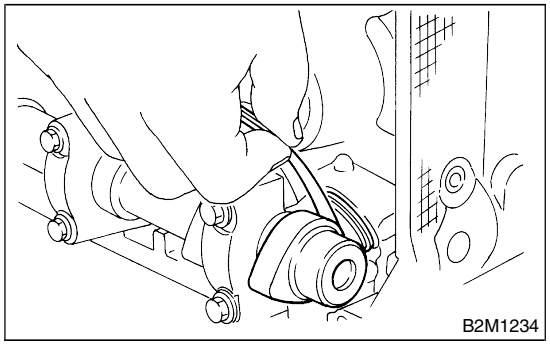


B: ADJUSTMENT *S183083A01*

CAUTION:
Adjustment of valve clearance should be performed while engine is cold.

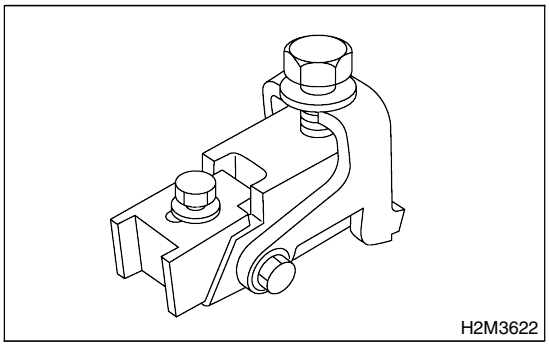
1) Measure all valve clearances. <Ref. to ME(DOHC TURBO)-28, INSPECTION, Valve Clearance.>

NOTE:
Record each valve clearance after it has been measured.

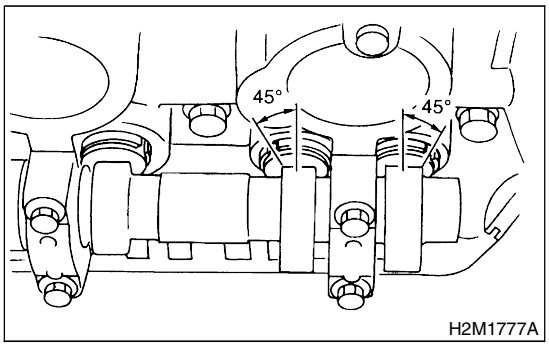


2) Remove shim from valve lifter.

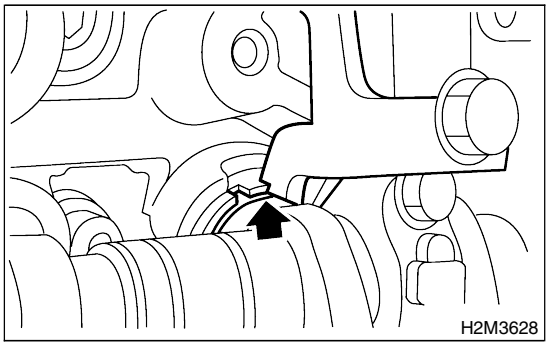
(1) Prepare the ST.
ST 498187200 SHIM REPLACER



(2) Rotate the notch of the valve lifter outward by 45.



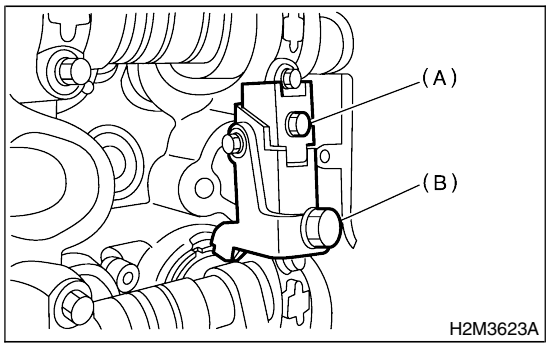
(3) Adjust SHIM REPLACER notch to valve lifter and set it.



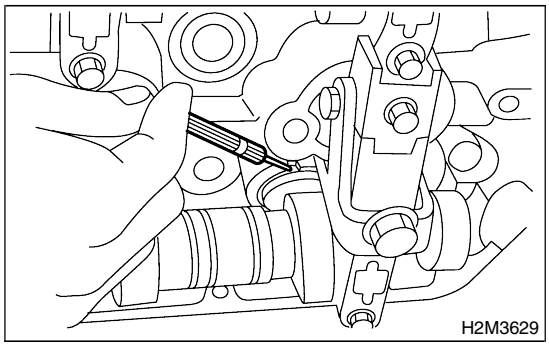
NOTE:
When setting, be careful SHIM REPLACER edge does not touch shim.

(4) Tighten bolt (A) and install it to the cylinder head.

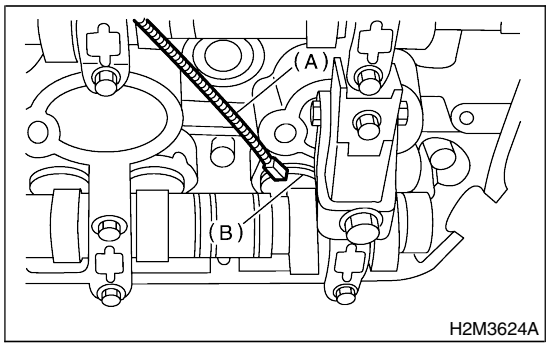
(5) Tighten bolt (B) and insert the valve lifter.



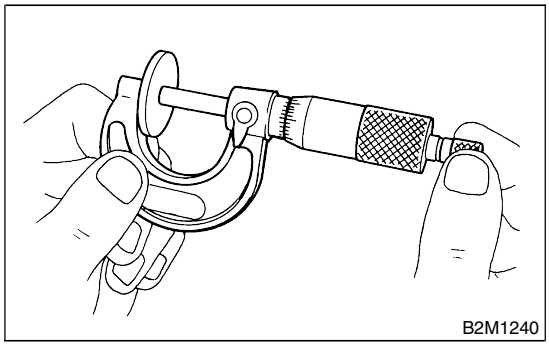
(6) Insert tweezers into the notch of the valve lifter, and take the shim out.



NOTE:
By using a magnet (A), the shim (B) can be taken out without dropping it.



3) Measure thickness of shim with micrometer.



4) Select a shim of suitable thickness using measured valve clearance and shim thickness, by referring to the following table.
5) Set suitable shim selected in step 4) to valve lifter.

Unit: mm
Intake valve:S =(V + T) - 0.20 Exhaust valve:S =(V + T) - 0.25
S: Shim thickness to be used V: Measured valve clearance T: Shim thickness required

Part No.	Thickness mm (in)
13218 AK010	2.00 (0.0787)
13218 AK020	2.02 (0.0795)
13218 AK030	2.04 (0.0803)
13218 AK040	2.06 (0.0811)
13218 AK050	2.08 (0.0819)
13218 AK060	2.10 (0.0827)
13218 AK070	2.12 (0.0835)
13218 AK080	2.14 (0.0843)
13218 AK090	2.16 (0.0850)
13218 AK100	2.18 (0.0858)
13218 AK110	2.20 (0.0866)
13218 AE710	2.22 (0.0874)
13218 AE730	2.24 (0.0882)
13218 AE750	2.26 (0.0890)
13218 AE770	2.28 (0.0898)
13218 AE790	2.30 (0.0906)
13218 AE810	2.32 (0.0913)
13218 AE830	2.34 (0.0921)
13218 AE850	2.36 (0.0929)
13218 AE870	2.38 (0.0937)
13218 AE890	2.40 (0.0945)
13218 AE910	2.42 (0.0953)
13218 AE920	2.43 (0.0957)
13218 AE930	2.44 (0.0961)
13218 AE940	2.45 (0.0965)
13218 AE950	2.46 (0.0969)
13218 AE960	2.47 (0.0972)
13218 AE970	2.48 (0.0976)
13218 AE980	2.49 (0.0980)
13218 AE990	2.50 (0.0984)
13218 AF000	2.51 (0.0988)
13218 AF010	2.52 (0.0992)
13218 AF020	2.53 (0.0996)
13218 AF030	2.54 (0.1000)
13218 AF040	2.55 (0.1004)
13218 AF050	2.56 (0.1008)
13218 AF060	2.57 (0.1012)
13218 AF070	2.58 (0.1016)
13218 AF090	2.60 (0.1024)
13218 AF110	2.62 (0.1031)

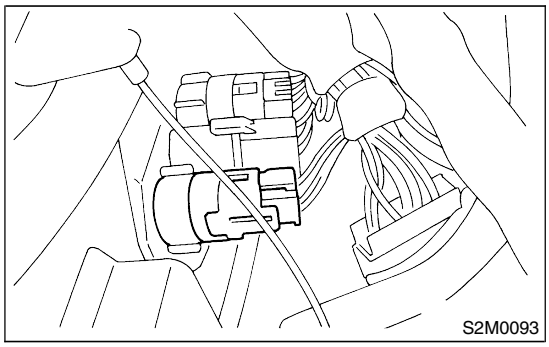
13218 AF130	2.64 (0.1039)
13218 AF150	2.66 (0.1047)
13218 AF170	2.68 (0.1055)
13218 AF190	2.70 (0.1063)

6) Inspect all valves for clearance again at this stage. If the valve clearance is not correct, repeat the procedure over again from the first step.
7) After inspection, install the related parts in the reverse order of removal.

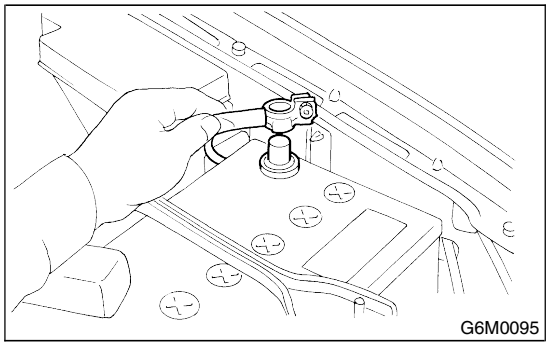
9. Engine Assembly S183079

A: REMOVAL S183079A18

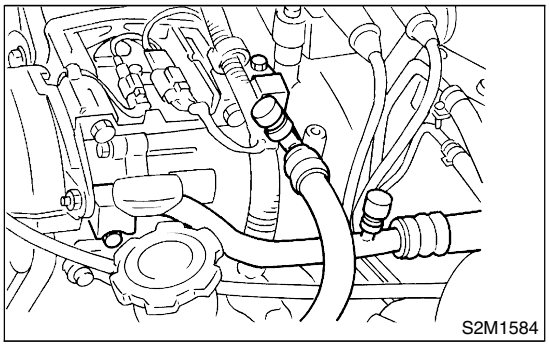
1) Set the vehicle on lift arms.
2) Open front hood fully and support with stay.
3) Raise rear seat, and turn floor mat up.
4) Release fuel pressure.
   (1) Disconnect fuel pump relay connector.


S2M0093

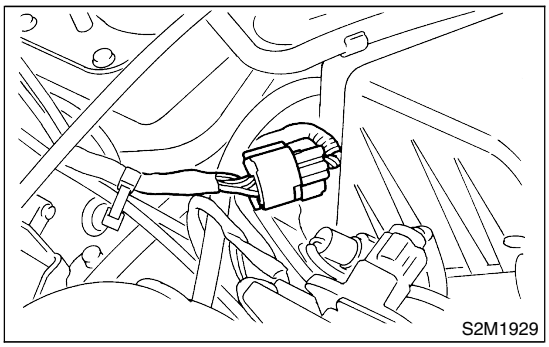
   (2) Start the engine, and run until stalls.
   (3) After the engine stalls, crank it for five seconds more.
   (4) Turn ignition switch to “OFF”.
5) Remove filler cap.
6) Disconnect battery ground terminal.


G6M0095

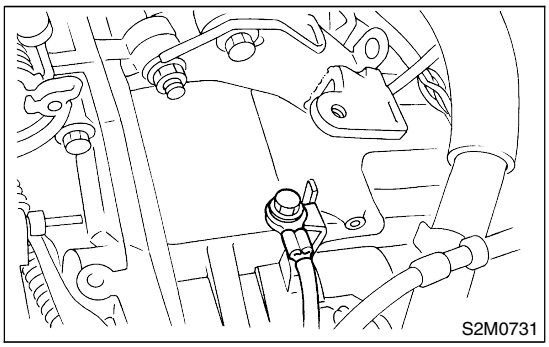
7) Remove radiator from vehicle. <Ref. to CO-25, REMOVAL, Radiator.>
8) Remove coolant filler tank. <Ref. to CO-37, REMOVAL, Coolant Filler Tank.>
9) Collect refrigerant, and remove pressure hoses.
   (1) Place and connect the attachment hose to the refrigerant recycle system.
   (2) Collect refrigerant from A/C system.
   (3) Disconnect A/C pressure hoses from A/C compressor.


S2M1584

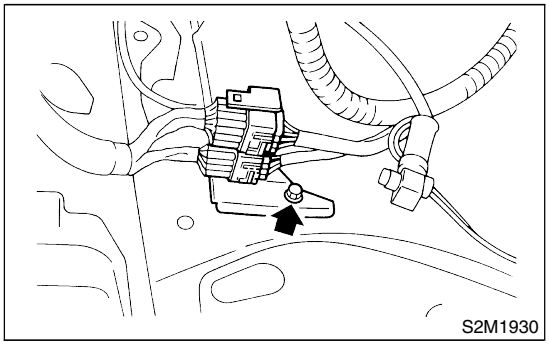
10) Remove intercooler. <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
11) Disconnect the following connectors and cable.
   (1) Engine harness connector


S2M1929

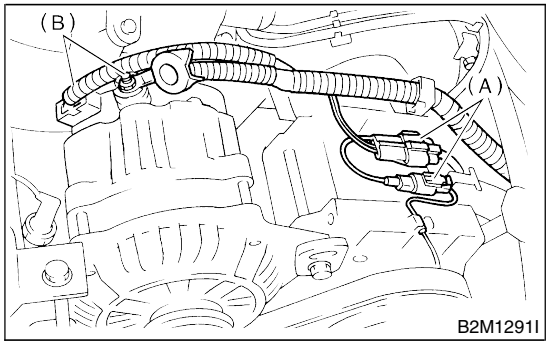
   (2) Engine ground terminal


S2M0731

   (3) Engine harness connector

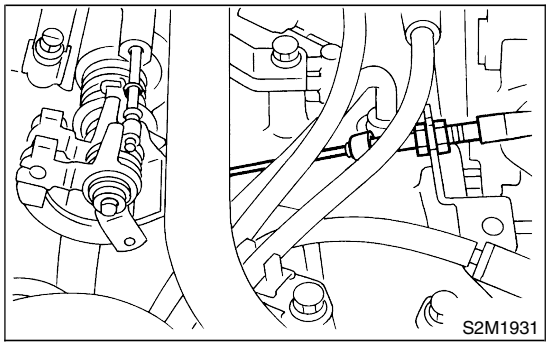

S2M1930

(4) Generator connector, terminal and A/C compressor connectors

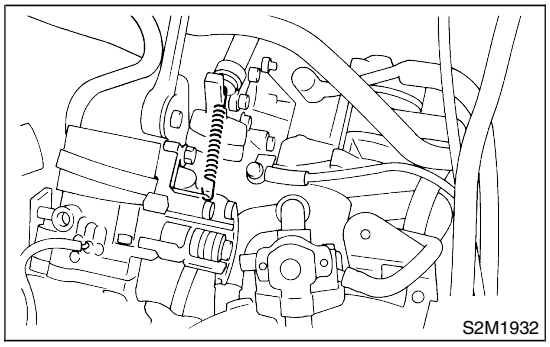


(A) A/C compressor connector
(B) Generator connector and terminal

(5) Accelerator cable

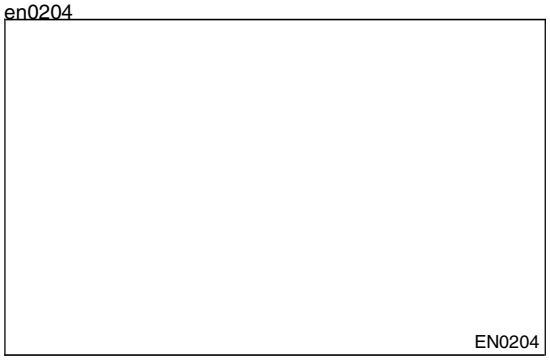


(6) Clutch release spring



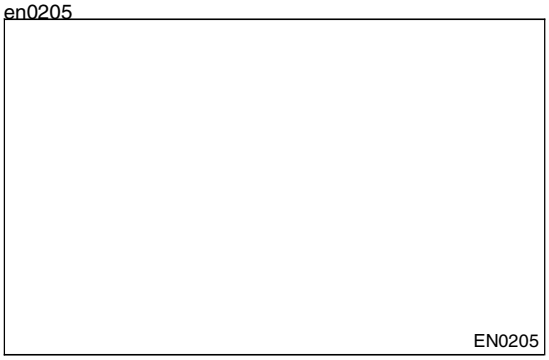
12) Disconnect the following hoses
(1) Brake booster vacuum hose

en0204



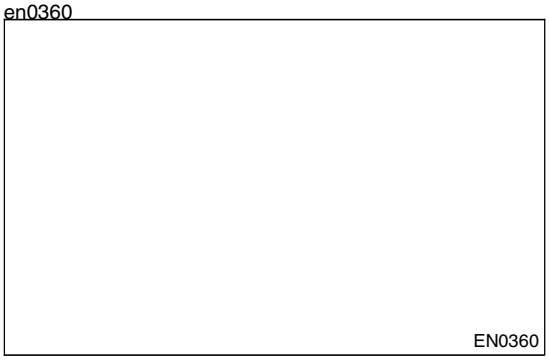
(2) Heater inlet outlet hose

en0205

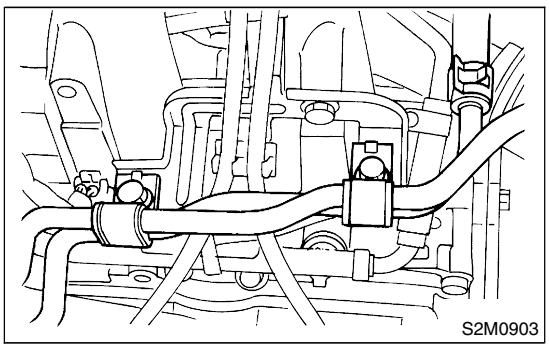


13) Remove power steering pump from bracket.
(1) Loosen lock bolt and slider bolt, and remove front side V-belt. <Ref. to ME(DOHC TURBO)-44, FRONT SIDE BELT, REMOVAL, V-belt.>
(2) Disconnect the power steering switch connector.

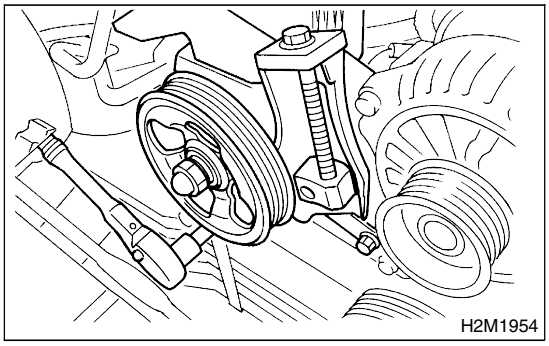
en0360



(3) Remove pipe with bracket from intake manifold.

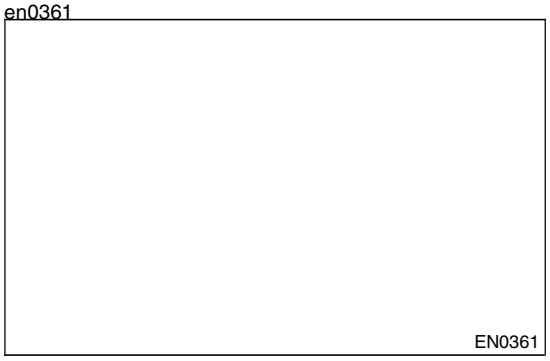


(4) Remove power steering pump from engine.



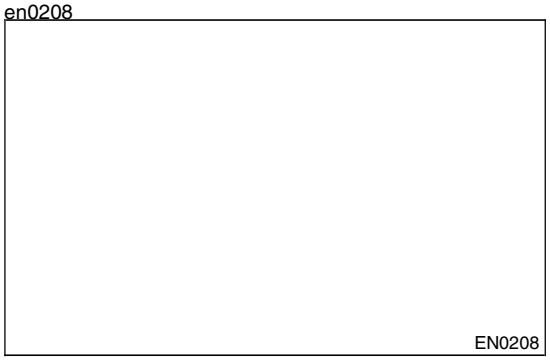
(5) Remove power steering tank from the bracket by pulling it upward.

en0361



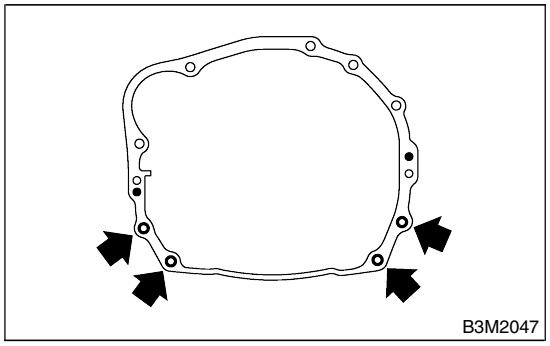
(6) Place power steering pump on the right side wheel apron.

en0208

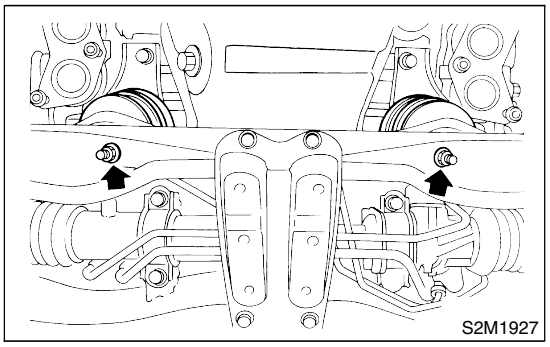


14) Remove center exhaust pipe. <Ref. to EX(DOHC TURBO)-9, REMOVAL, Center Exhaust Pipe.>

15) Remove nuts which hold lower side of transmission to engine.



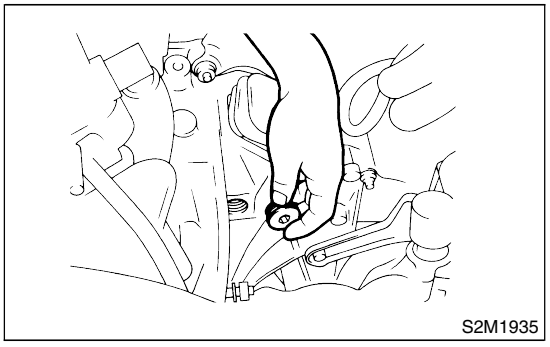
16) Remove nuts which install front cushion rubber onto front crossmember.



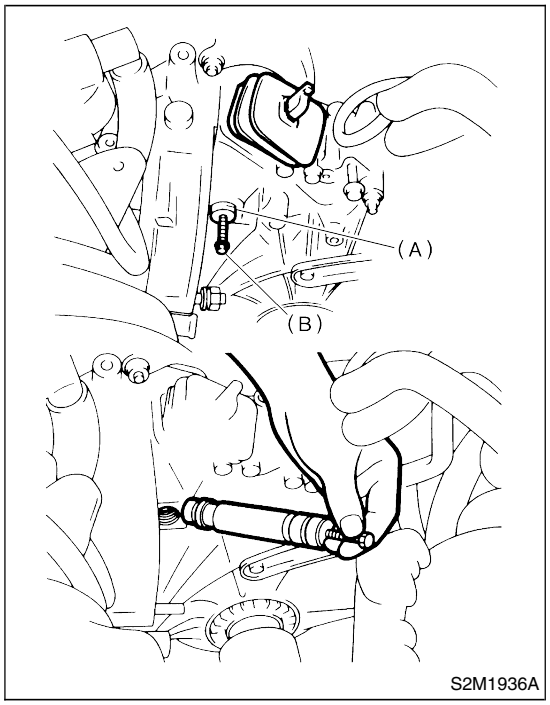
17) Separate clutch release fork from release bearing. (MT vehicles)

(1) Remove clutch operating cylinder from transmission.

(2) Remove plug using 10 mm hexagon wrench.



(3) Screw 6 mm dia. bolt into release fork shaft, and remove it.



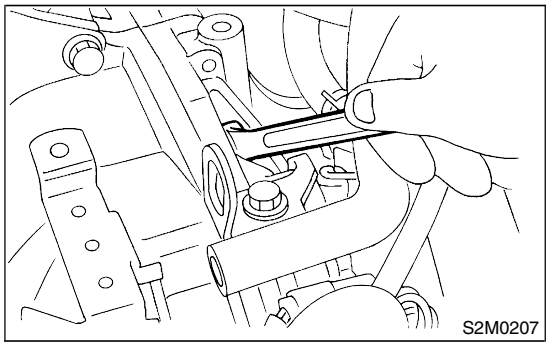
(A) Shaft
(B) Bolt

(4) Raise release fork and unfasten release bearing tabs to free release fork.

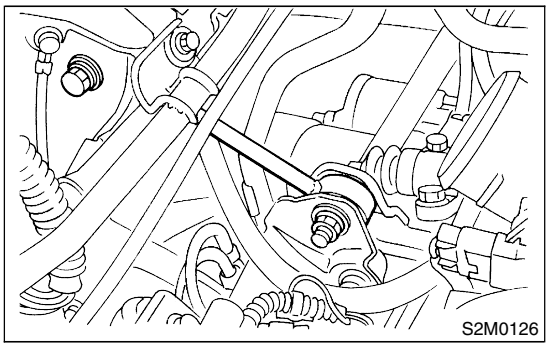
CAUTION:
Step (4) is required to prevent interference with engine when removing engine from transmission.

18) Select torque converter clutch from drive plate. (AT vehicles)
(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 tha engine using ST.

ST 499977300 CRANK PULLEY WRENCH



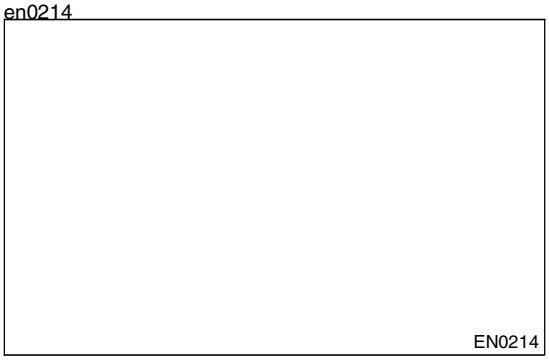
19) Remove pitching stopper.



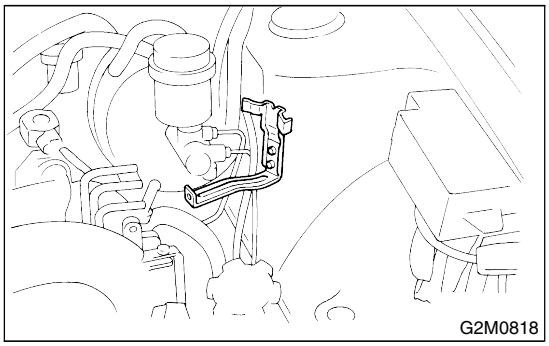
20) Disconnect fuel delivery hose, return hose and evaporation hose.

CAUTION:
- **Catch fuel from hose into container.**
- **Disconnect hose with its end wrapped with cloth to prevent fuel from splashing.**

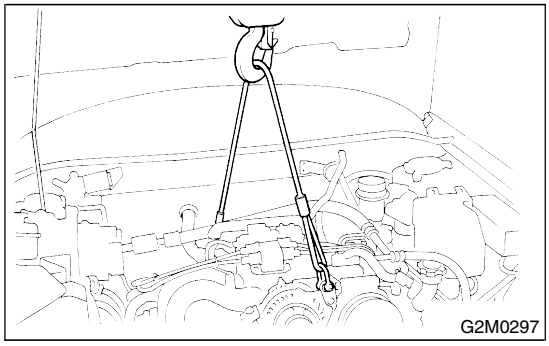
en0214



21) Remove fuel filter and bracket.

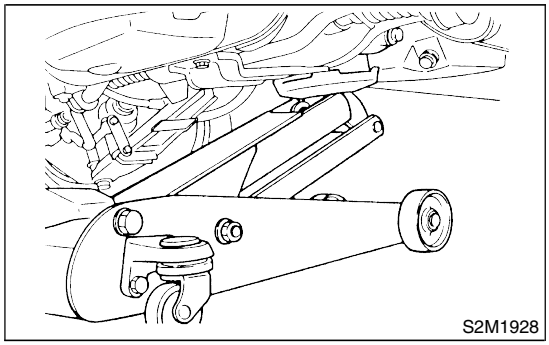


22) Support engine with a lifting device and wire ropes.



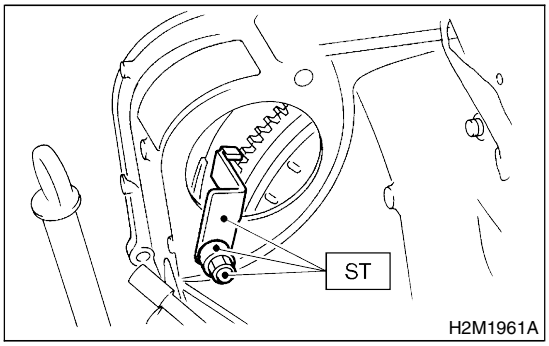
23) Support transmission with a garage jack.

CAUTION:
Before moving engine away from transmission, check to be sure no work has been overlooked. Doing this is very important in order to facilitate re-installation and because transmission lowers under its own weight.

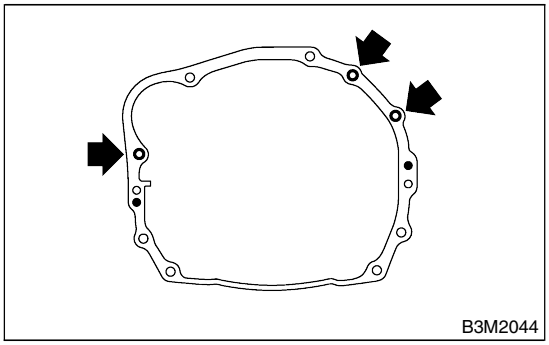


24) Separation of engine and transmission.
(1) Remove starter. <Ref. to SC-5, REMOVAL, Starter.>
(2) Install ST to torque converter clutch case. (AT vehicles)

ST 498277200 STOPPER SET



(3) Remove bolt which holds right upper side of transmission to engine.



25) Remove engine from vehicle.
(1) Slightly raise engine.
(2) Raise transmission with garage jack.
(3) Move engine horizontally until mainshaft is withdrawn from clutch cover.
(4) Slowly move engine away from engine compartment.

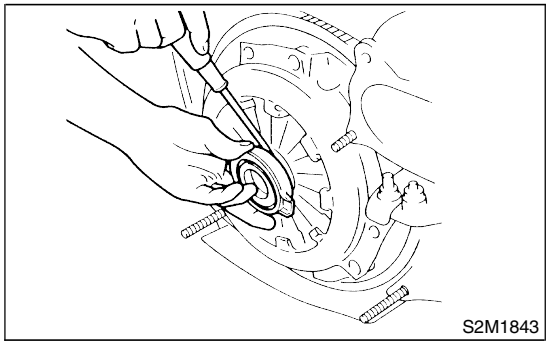
CAUTION:
Be careful not to damage adjacent parts or body panels with crank pulley, oil pressure gauge, etc.

26) Remove front cushion rubbers.

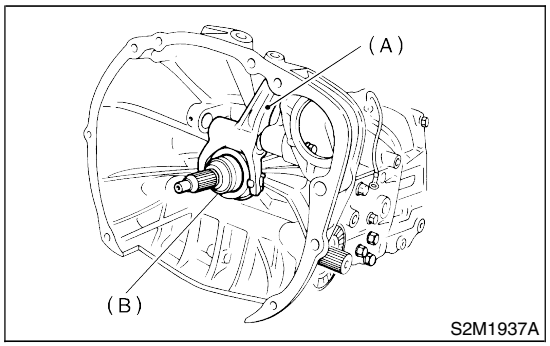
B: INSTALLATION S183079A11

1) Install clutch release fork and bearing onto transmission. (MT vehicles)

(1) Remove release bearing from clutch cover with flat type screw driver.

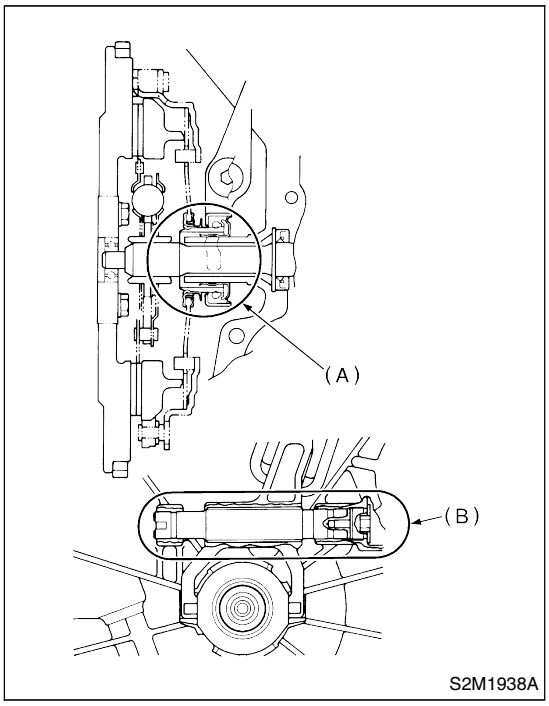


(2) Install release bearing on transmission.
(3) Install release fork into release bearing tab.



(A) Release fork
(B) Release bearing

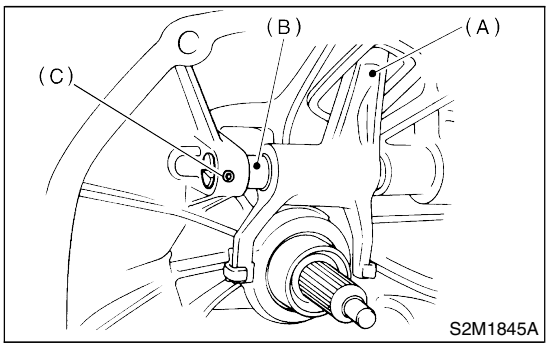
(4) Apply grease to specified points.
- Spline FX2200
- Shaft SUNLIGHT 2



(A) Spline (FX2200)
(B) Shaft (SUNLIGHT 2)

(5) Insert release fork shaft into release fork.

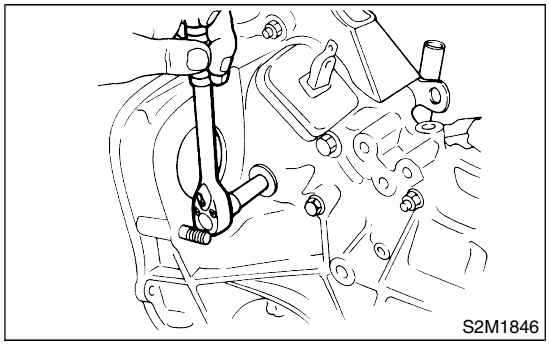
CAUTION:
Make sure the cutout portion of release fork shaft contacts spring pin.



(A) Release fork
(B) Release shaft
(C) Spring pin

(6) Tighten plug.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)


S2M1846

2) Install front cushion rubbers to engine.

Tightening torque:
34 N·m (3.5 kgf-m, 25.3 ft-lb)

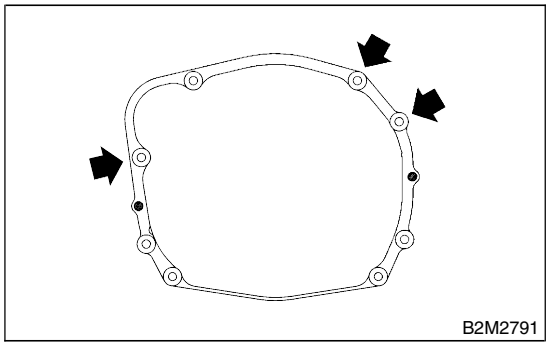
3) Install engine onto transmission.
(1) Position engine in engine compartment and align it with transmission.

CAUTION:
Be careful not to damage adjacent parts or body panels with crank pulley, oil pressure gauge, etc.

(2) Apply a small amount of grease to splines of mainshaft. (MT vehicles)

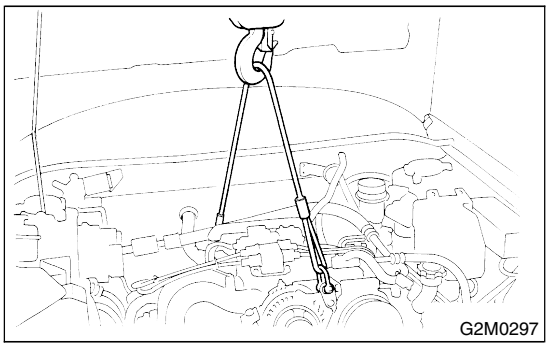
4) Tighten bolt which hold right upper side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)


B2M2791

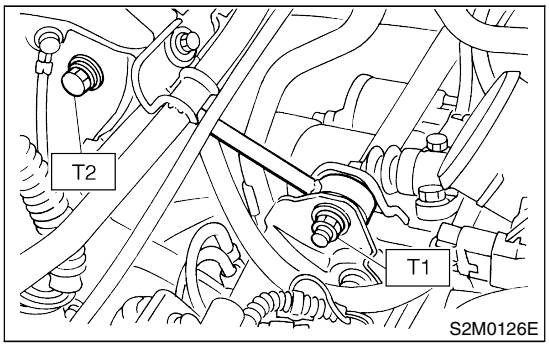
5) Remove lifting device and wire ropes.

6) Remove garage jack.


G2M0297

7) Install pitching stopper.

Tightening torque:
T1: 49 N·m (5.0 kgf-m, 36.2 ft-lb)
T2: 57 N·m (5.8 kgf-m, 42 ft-lb)



S2M0126E

8) Remove ST from torque converter clutch case. (AT vehicles)

NOTE:
Be careful not to drop the ST into the torque converter clutch case when removing ST.

ST 498277200 STOPPER SET

9) Install starter. <Ref. to SC-6, INSTALLATION, Starter.>

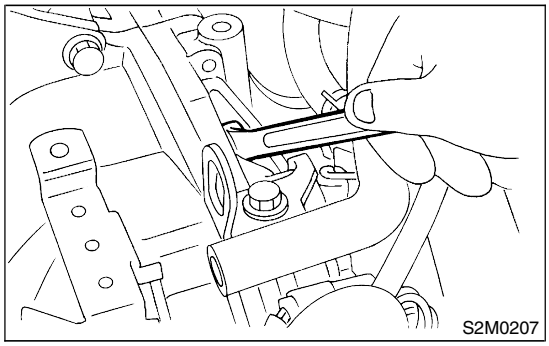
10) Install torque converter clutch onto drive plate. (AT vehicles)
(1) Tighten bolts which hold torque converter clutch to drive plate.

(2) Tighten other bolts while rotating the engine by using ST.

CAUTION:
Be careful not to drop bolts into torque converter clutch housing.

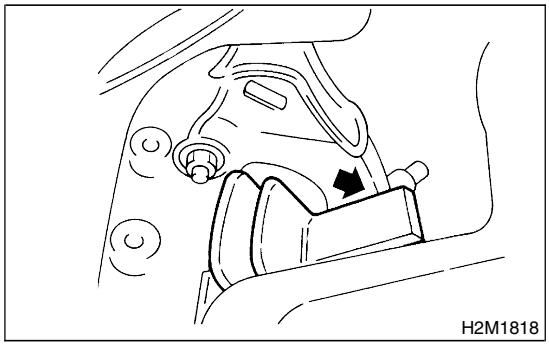
ST 499977300 CRANK PULLEY WRENCH

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

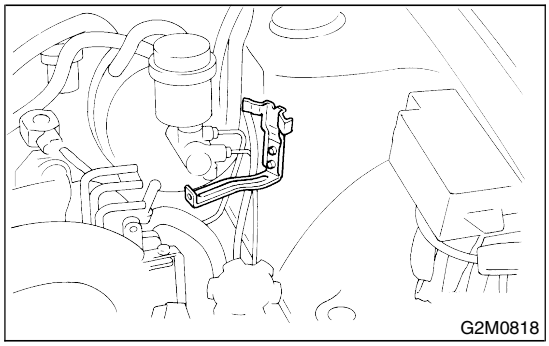

S2M0207

(3) Clog plug onto service hole.

11) Push clutch release lever to fit bearing into clutch cover.


H2M1818

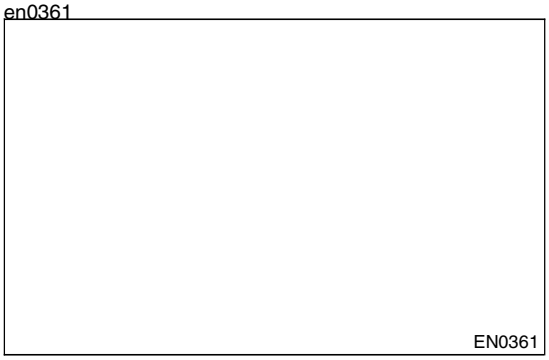
12) Install fuel filter and bracket.


G2M0818

13) Install power steering pump on bracket.

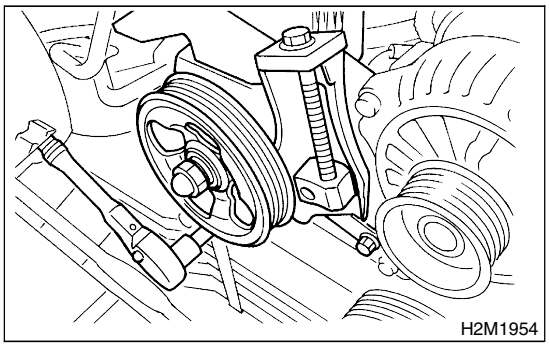
(1) Install the power steering tank on bracket.

en0361

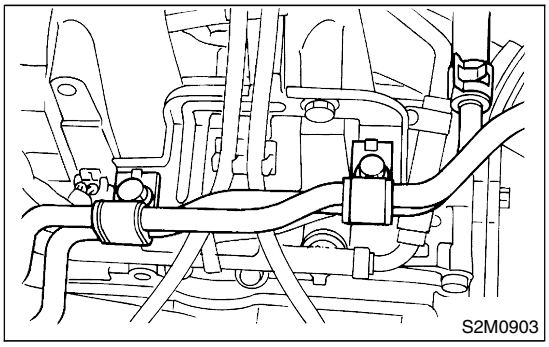

EN0361

(2) Install power steering pump on bracket, and tighten bolts.

Tightening torque:
20.1 N·m (2.05 kgf-m, 14.8 ft-lb)

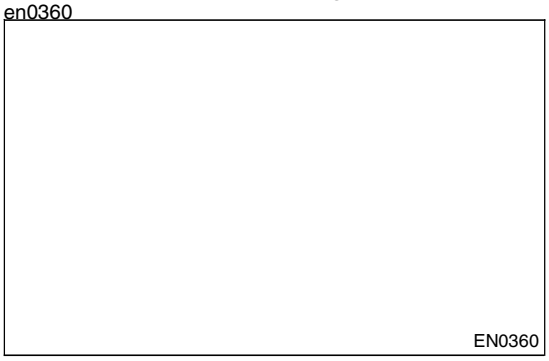

H2M1954

(3) Install power steering pipe bracket on right side intake manifold, and install spark plug codes.


S2M0903

(4) Connect power steering switch connector.

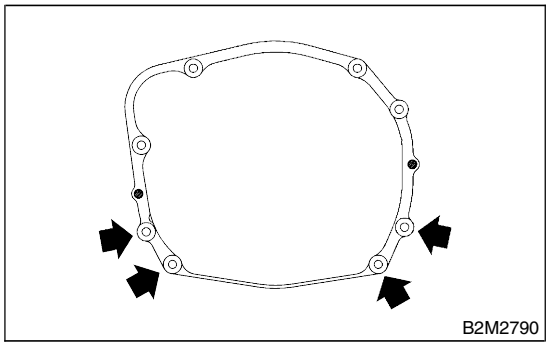
en0360


EN0360

(5) Install front side V-belt, and adjust it. <Ref. to ME(SOHC)-42, FRONT SIDE BELT, INSTALLATION, V-belt.>

14) Tighten nuts which hold lower side of transmission to engine.

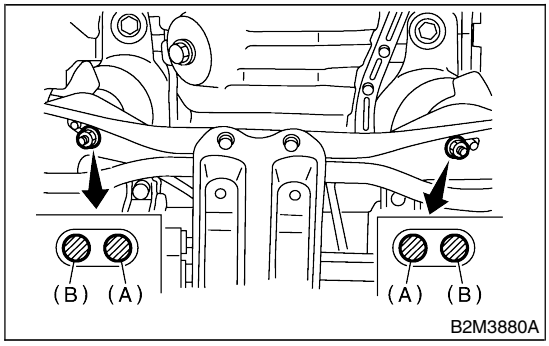
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



15) Tighten nuts which install front cushion rubber onto crossmember.

Tightening torque:
83 N·m (8.5 kgf-m, 61 ft-lb)

CAUTION:
Make sure the front cushion rubber mounting bolts (A) and locator (B) are securely installed.



16) Install center exhaust pipe.
<Ref. to EX(DOHC TURBO)-7, INSTALLATION, Front Exhaust Pipe.>

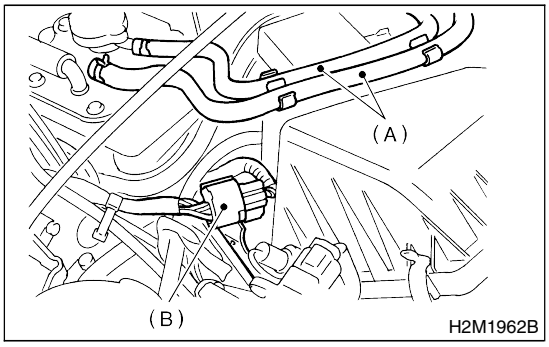
17) Connect the following hoses.
(1) Fuel delivery hose, return hose and evaporation hose
(2) Heater inlet and outlet hoses
(3) Brake booster vacuum hose

18) Connect the following connectors and terminals.
(1) Engine ground terminal
(2) Engine harness connectors
(3) Generator connector and terminal
(4) A/C compressor connectors (With A/C)

19) Connect the following cables.
(1) Accelerator cable
(2) Clutch release spring

CAUTION:
After connecting each cable, adjust them.

20) Install air intake system.
(1) Install intercooler. <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>
(2) Install air cleaner element and air cleaner upper cover.
(3) Install engine harness connector bracket.
(4) Install filler hose to air cleaner case.

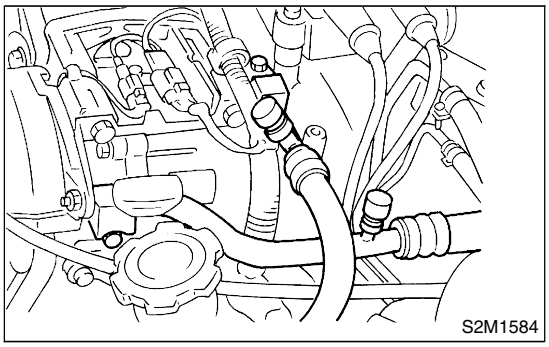


(A) Filler hose
(B) Connector bracket

21) Install A/C pressure hoses. (With A/C)

CAUTION:
Use new O-rings.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



22) Install radiator. <Ref. to CO-27, INSTALLATION, Radiator.>
23) Install coolant filler tank. <Ref. to CO-27, INSTALLATION, Radiator.>
24) Install window washer tank.
25) Install battery in the vehicle, and connect cables.
26) Fill coolant.
<Ref. to CO-27, INSTALLATION, Radiator.>
27) Charge A/C system with refrigerant.
<Ref. to AC-20, OPERATION, Refrigerant Charging Procedure.>
28) Remove front hood stay, and close front hood.
29) Take off the vehicle from lift arms.

10. Engine Mounting S183085

A: REMOVAL S183085A18

1) Remove engine assembly. <Ref. to ME(DOHC TURBO)-33, REMOVAL, Engine Assembly.>
2) Remove engine mounting from engine assembly.

B: INSTALLATION S183085A11

Install in the reverse order of removal.

Tightening torque:
Engine mounting;
35 N·m (3.6 kgf-m, 25.8 ft-lb)

C: INSPECTION S183085A10

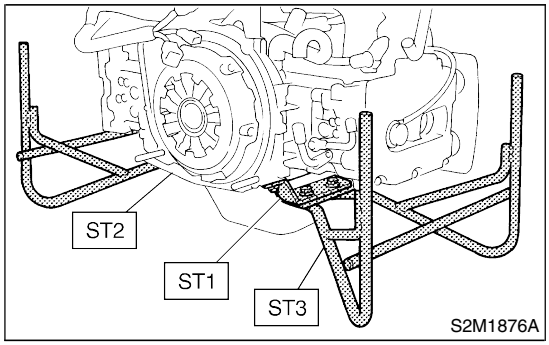
Make sure there are no cracks or other damage.

11. Preparation for Overhaul S183091

A: PROCEDURE S183091E45

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	499817000	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.

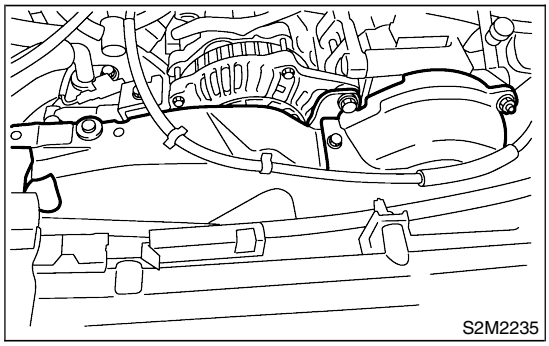
12. V-belt S183080

A: REMOVAL S183080A18

1. FRONT SIDE BELT S183080A1801

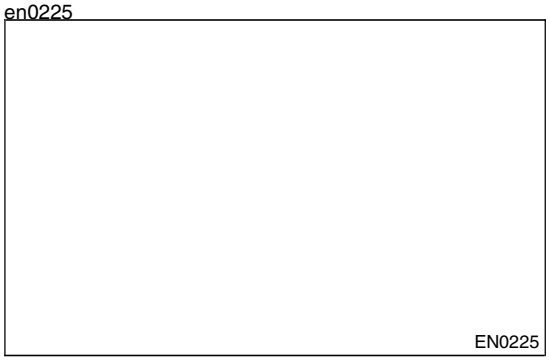
NOTE:
Perform the following procedures 1) to 4) with the engine installed to the body.

1) Remove V-belt cover.


S2M2235

2) Loosen the lock bolt (A).
3) Loosen the slider bolt (B).
4) Remove the front side belt (C).

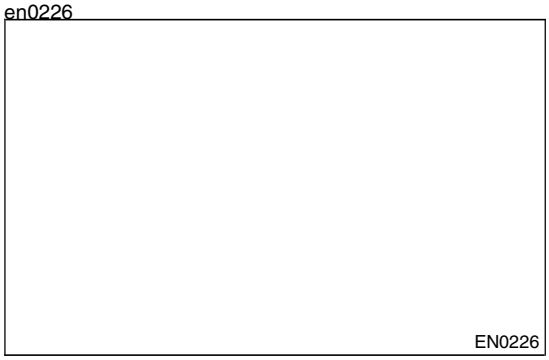
en0225


EN0225

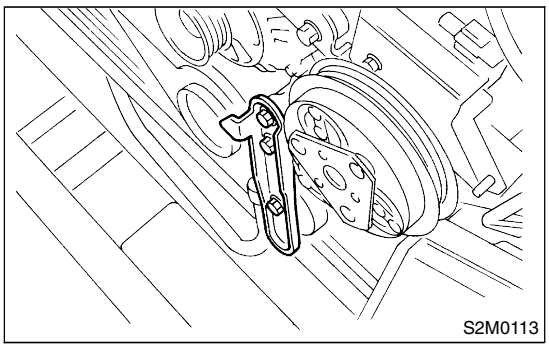
2. REAR SIDE BELT S183080A1802

1) Loosen the lock nut (A).
2) Loosen the slider bolt (B).

en0226


EN0226

3) Remove the A/C belt.
4) Remove the A/C belt tensioner.


S2M0113

B: INSTALLATION S183080A11

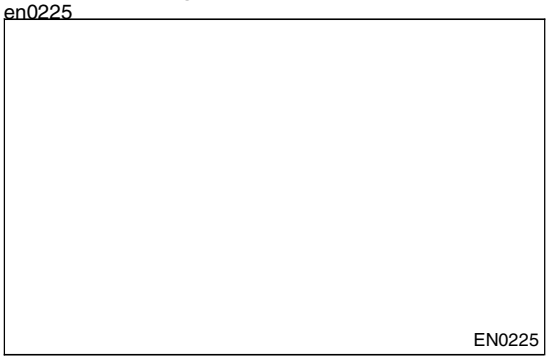
1. FRONT SIDE BELT S183080A1101

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(DOHC TURBO)-45, 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, 5.5 ft-lb)

en0225

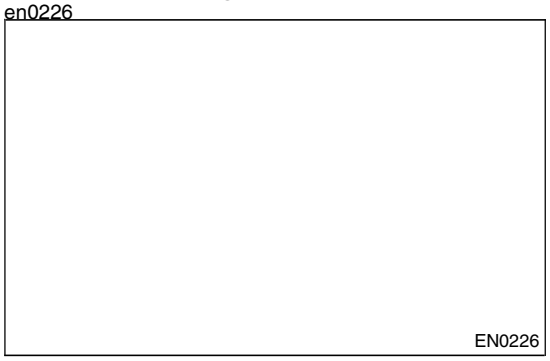

EN0225

2. REAR SIDE BELT S183080A1102

1) Install a belt, and tighten the slider bolt (B) so as to obtain the specified belt tension. <Ref. to ME(DOHC TURBO)-45, 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)

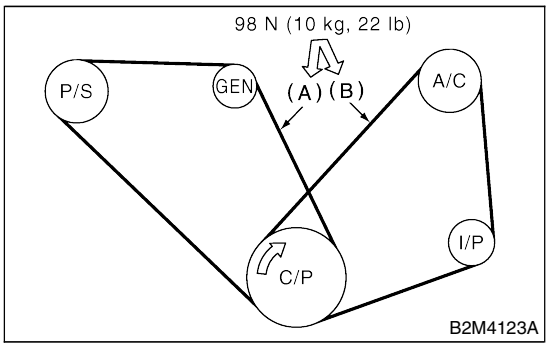
en0226



C: INSPECTION S183080A10

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)
****: With Air conditioner***

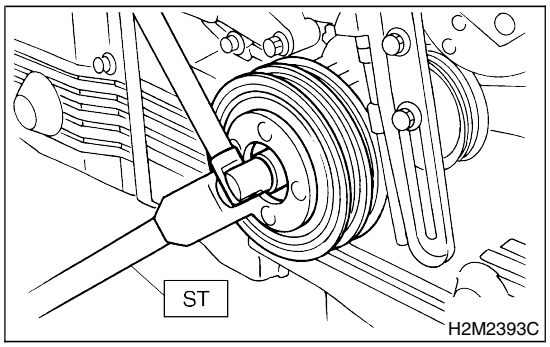


C/P Crankshaft pulley
GEN Generator
P/S Power steering oil pump pulley
A/C Air conditioning compressor pulley
I/P Idler pulley

13. Crankshaft Pulley S183098

A: REMOVAL S183098A18

1) Remove V-belt. <Ref. to ME(DOHC TURBO)-44, REMOVAL, V-belt.>
2) Remove crankshaft pulley bolt. To lock crankshaft, use ST.
ST 499977300
CRANKSHAFT PULLEY WRENCH

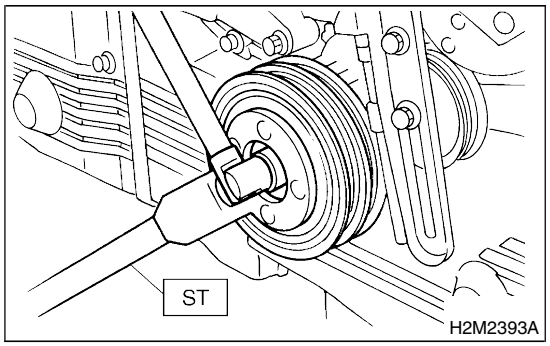


3) Remove crankshaft pulley.

B: INSTALLATION S183098A11

1) Install crankshaft pulley.
2) Install pulley bolt.
To lock crankshaft, use ST.
ST 499977300 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:
127 N·m (13.0 kgf-m, 94.0 ft-lb)



3) Confirm that the tightening angle of the crankshaft pulley bolt is 45 degrees or more. If not, conduct the following procedures (1) through (4).

CAUTION:
If the tightening angle of crankshaft pulley bolt is less than 45 degrees, the bolt should be damaged. In this case, the bolt must be replaced.

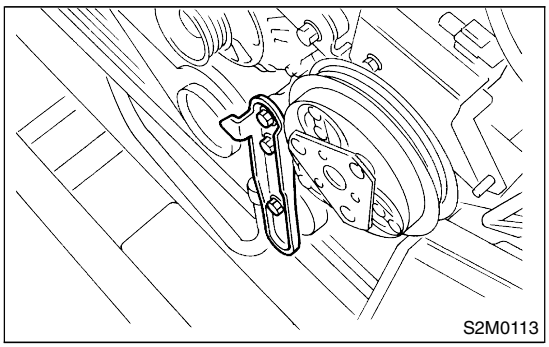
(1) Replace the crankshaft pulley bolts and clean them.

Crankshaft pulley bolt:
12369AA011

(2) Clean the crankshaft thread using an air gun.
(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 keeping them in an angle between 65 degrees and 75 degrees.

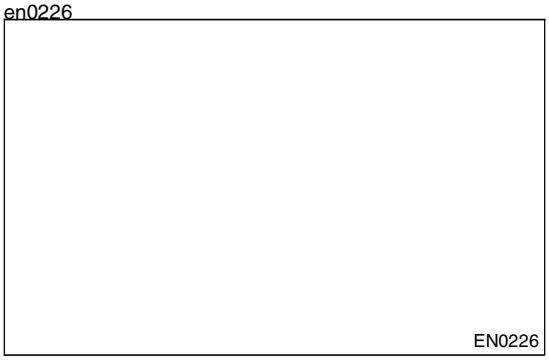
CAUTION:
Conduct the tightening procedures by confirming the turning angle of the crankshaft pulley bolt referring to the gauge indicated on the belt cover.

4) Install A/C belt tensioner.



5) Install A/C belt.

en0226



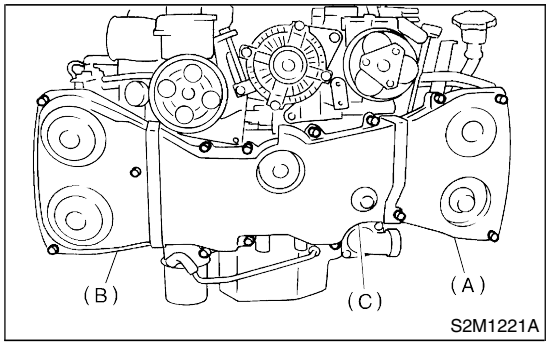
C: INSPECTION S183098A10

1) Make sure the V-belt is not worn or otherwise damaged.
2) Check the tension of the belt. <Ref. to ME(DOHC TURBO)-45, INSPECTION, V-belt.>

14. Belt Cover S183582

A: REMOVAL S183582A18

1) Remove V-belt. <Ref. to ME(DOHC TURBO)-44, REMOVAL, V-belt.>
2) Remove crankshaft pulley. <Ref. to ME(DOHC TURBO)-46, REMOVAL, Crankshaft Pulley.>
3) Remove left-hand belt cover (A).
4) Remove right-hand belt cover (B).
5) Remove front belt cover (C).



B: INSTALLATION S183582A11

1) Install front belt cover (C).

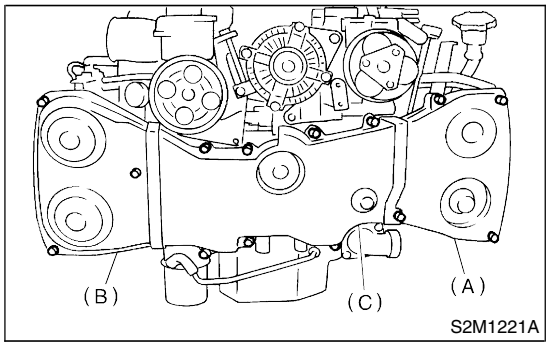
Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

2) Install right-hand belt cover (B).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

3) Install left-hand belt cover (A).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



4) Install crankshaft pulley. <Ref. to ME(DOHC TURBO)-46, INSTALLATION, Crankshaft Pulley.>
5) Install V-belt. <Ref. to ME(DOHC TURBO)-44, INSTALLATION, V-belt.>

C: INSPECTION S183582A10

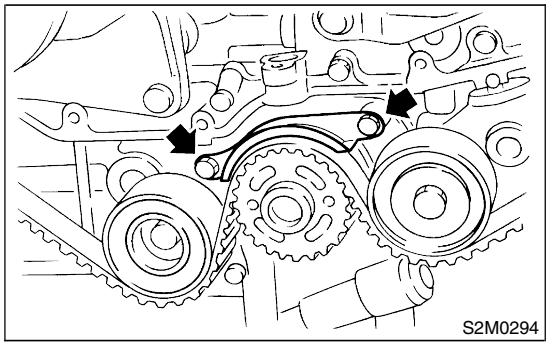
Make sure the cover is not damaged.

15. Timing Belt Assembly S183099

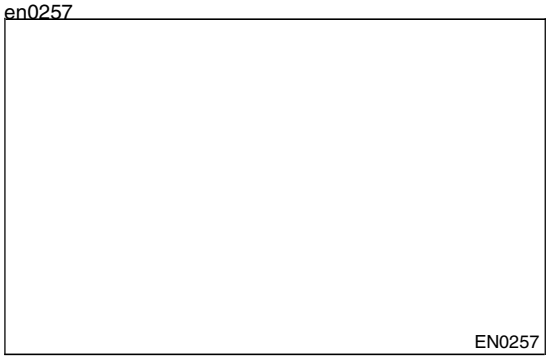
A: REMOVAL S183099A18

1. TIMING BELT S183099A1801

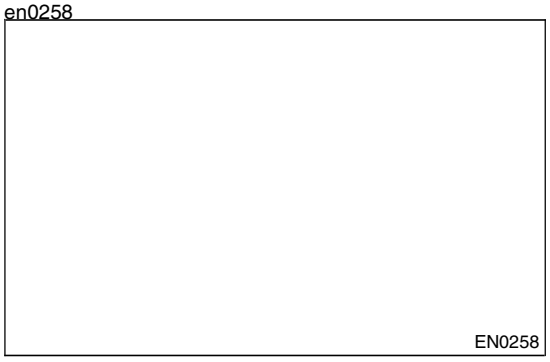
1) Remove V-belt. <Ref. to ME(DOHC TURBO)-44, REMOVAL, V-belt.>
2) Remove crankshaft pulley. <Ref. to ME(DOHC TURBO)-46, REMOVAL, Crankshaft Pulley.>
3) Remove belt cover. <Ref. to ME(DOHC TURBO)-47, REMOVAL, Belt Cover.>
4) Remove timing belt guides. (MT vehicle only)


S2M0294

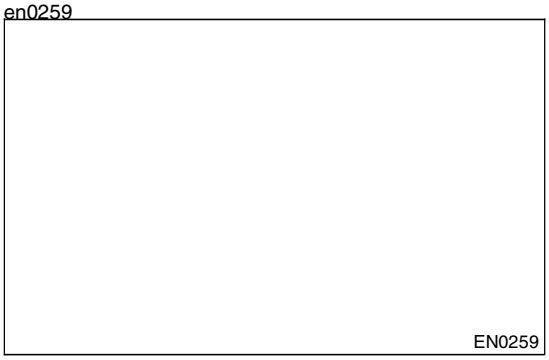
en0257


EN0257

en0258

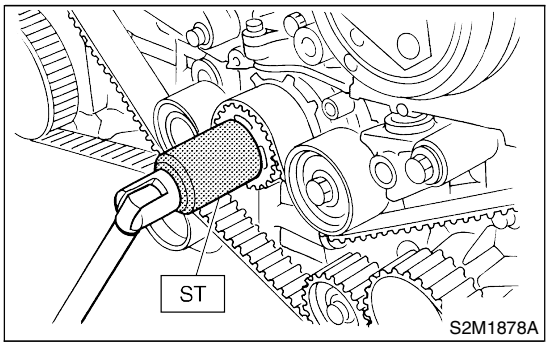

EN0258

en0259


EN0259

5) If alignment mark and/or arrow mark (which indicates rotation direction) on timing belt fade away, put new marks before removing timing belt as follows:
(1) Turn crankshaft using ST, and align alignment marks on crankshaft sprocket, left-hand intake camshaft sprocket, left-hand exhaust camshaft sprocket, right-hand intake camshaft sprocket and right hand exhaust camshaft sprocket with notches of belt cover and cylinder block.

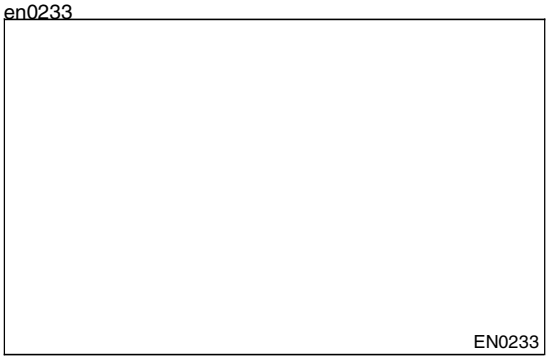
ST 499987500 CRANKSHAFT SOCKET

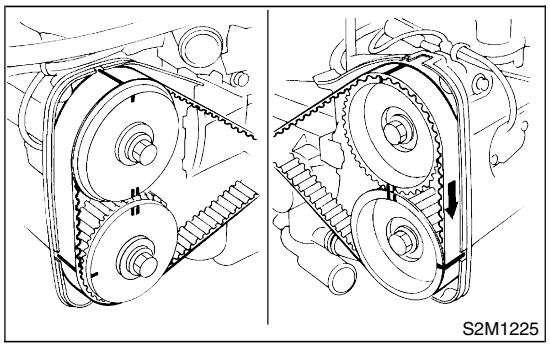


S2M1878A

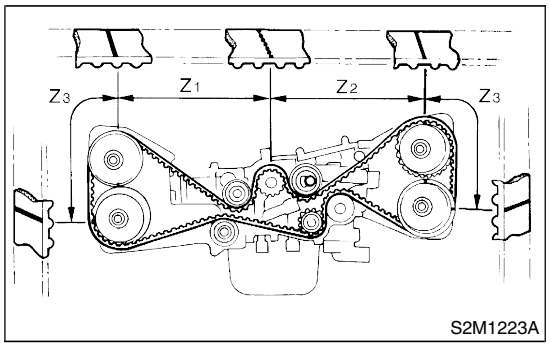
(2) Using white paint, put alignment and/or arrow marks on timing belts in relation to the sprockets.

en0233

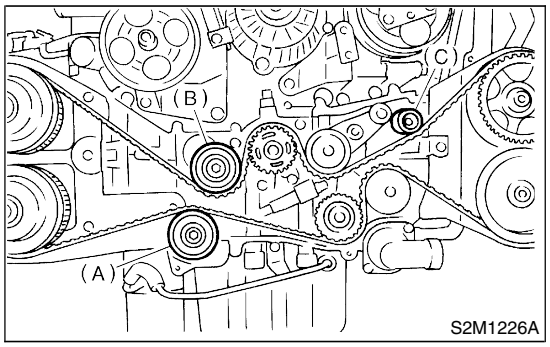

EN0233



Z_1: 54.5 tooth length
Z_2: 51 tooth length
Z_3: 28 tooth length



6) Remove belt idler (A).

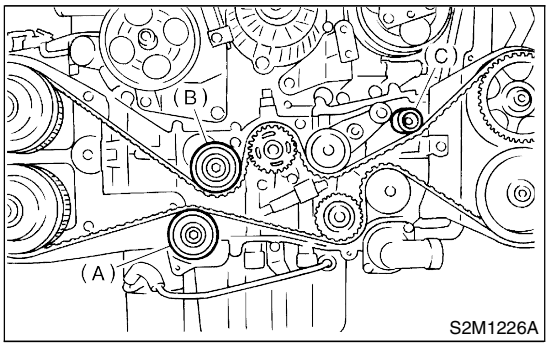


7) Remove timing belt.

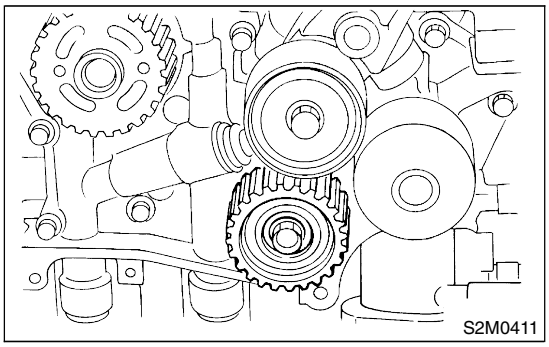
CAUTION:
After timing belt has been removed, never rotate intake and exhaust, camshaft sprocket. If camshaft sprocket is rotated, the intake and exhaust valve heads strike together and valve stems are bent.

2. BELT IDLER AND AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY *S183099A1802*

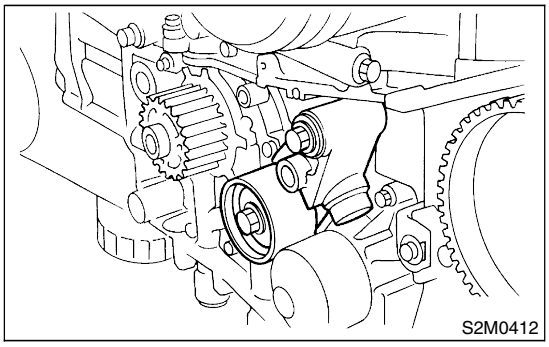
1) Remove belt idler (B) and (C).



2) Remove belt idler No. 2.



3) Remove automatic belt tension adjuster assembly.



B: INSTALLATION *S183099A11*

1. AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER

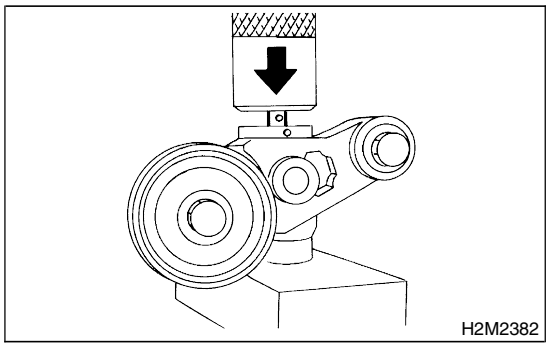
S183099A1101

1) Preparation for installation of automatic belt tension adjuster assembly:

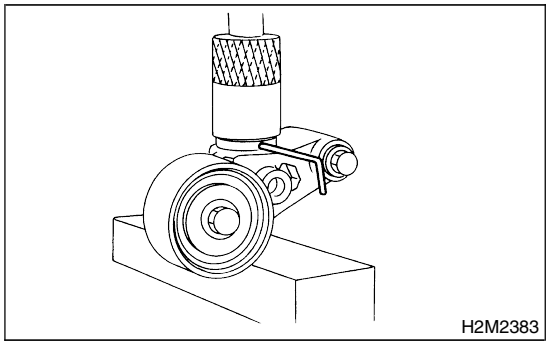
CAUTION:
- **Always use a vertical type pressing tool to move the adjuster rod down.**
- **Do not use a lateral type vise.**
- **Push adjuster rod vertically.**

● 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.

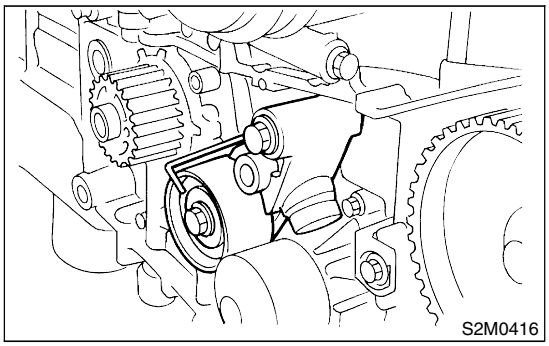

H2M2382

(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.


H2M2383

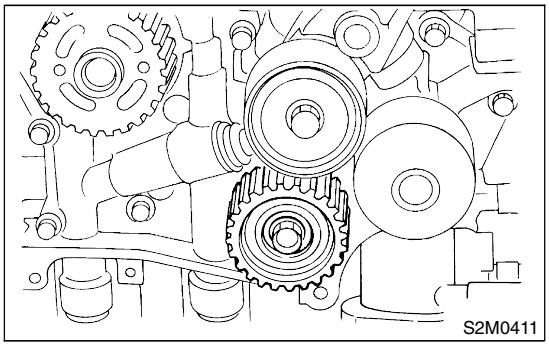
2) Install automatic belt tension adjuster assembly.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)


S2M0416

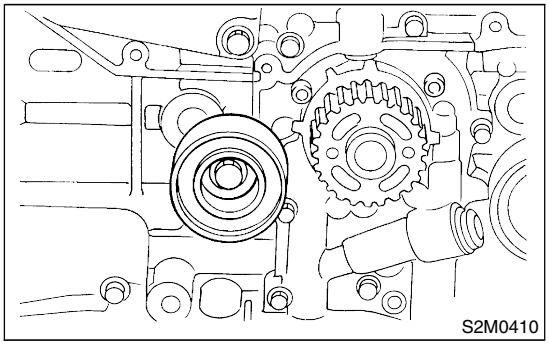
3) Install belt idler No. 2.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)


S2M0411

4) Install belt idler.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

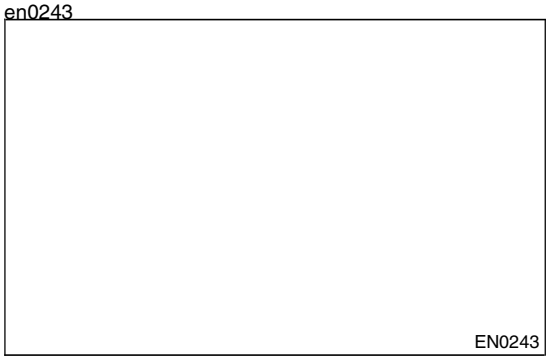

S2M0410

2. TIMING BELT *S183099A1102*

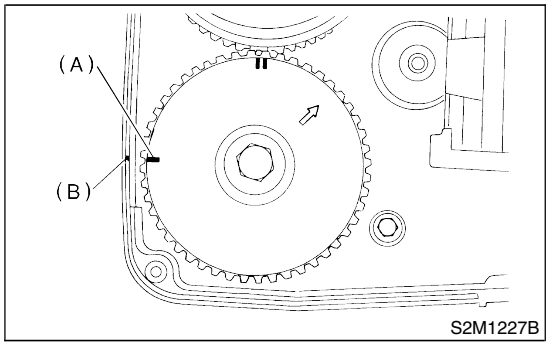
1) Preparation for installation of automatic belt tension adjuster assembly. <Ref. to ME(DOHC TURBO)-49, AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER, INSTALLATION, Timing Belt Assembly.>
2) Crankshaft and camshaft sprocket alignment.

(1) Align mark (A) on crankshaft sprocket with mark on the oil pump cover at cylinder block.

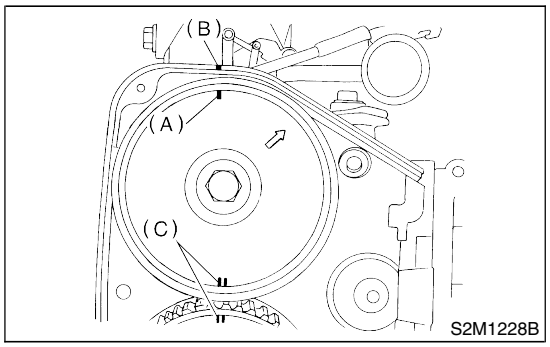
en0243



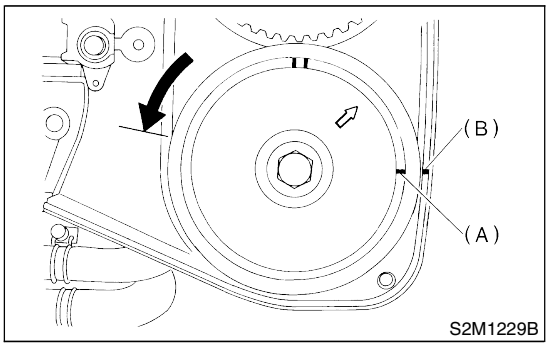
(2) Align single line mark (A) on right-hand exhaust camshaft sprocket with notch (B) on belt cover.



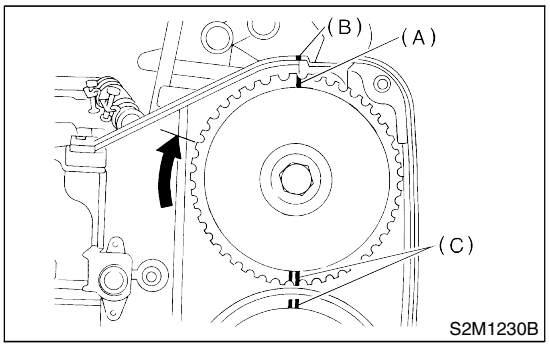
(3) Align single line mark (A) on right-hand intake camshaft sprocket with notch (B) on belt cover.
(Make sure double lines (C) on intake camshaft and exhaust camshaft sprockets are aligned.)



(4) Align single line mark (A) on left-hand exhaust camshaft sprocket with notch (B) on belt cover by turning sprocket counterclockwise (as viewed from front of engine).

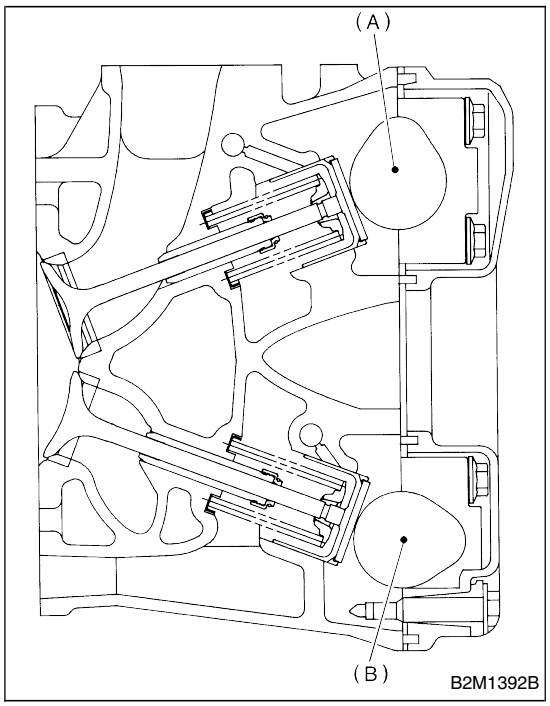


(5) Align single line mark (A) on left-hand intake camshaft sprocket with notch (B) on belt cover by turning sprocket clockwise (as viewed from front of engine).
Ensure double lines (C) on intake and exhaust camshaft sprockets are aligned.



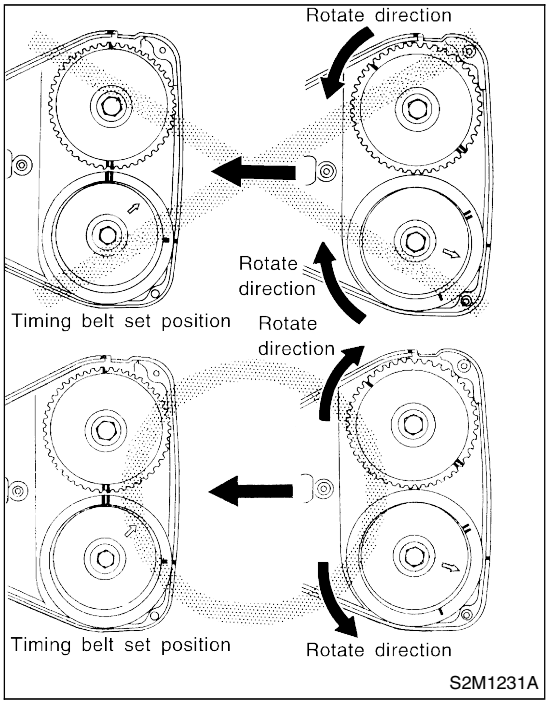
(6) Ensure camshaft and crankshaft sprockets are positioned properly.

CAUTION:
• Intake and exhaust camshafts for this DOHC engine can be independently rotated with timing belts removed. As can be seen from the figure, if intake and exhaust valves are lifted simultaneously, their heads will interfere with each other, resulting in bent valves.

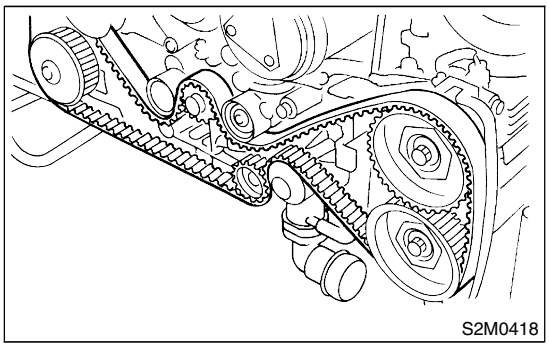


(A) Intake camshaft
(B) Exhaust camshaft

• When timing belts are not installed, four camshafts are held at the "zero-lift" position, where all cams on camshafts do not push intake and exhaust valves down. (Under this condition, all valves remain unlifted.)
• When camshafts are rotated to install timing belts, #2 intake and #4 exhaust cam of left-hand camshafts are held to push their corresponding valves down. (Under this condition, these valves are held lifted.) Right-side camshafts are held so that their cams do not push valves down.
• Left-hand camshafts must be rotated from the "zero-lift" position to the position where timing belt is to be installed at as small an angle as possible, in order to prevent mutual interference of intake and exhaust valve heads.
• Do not allow camshafts to rotate in the direction shown in the figure as this causes both intake and exhaust valves to lift simultaneously, resulting in interference with their heads.

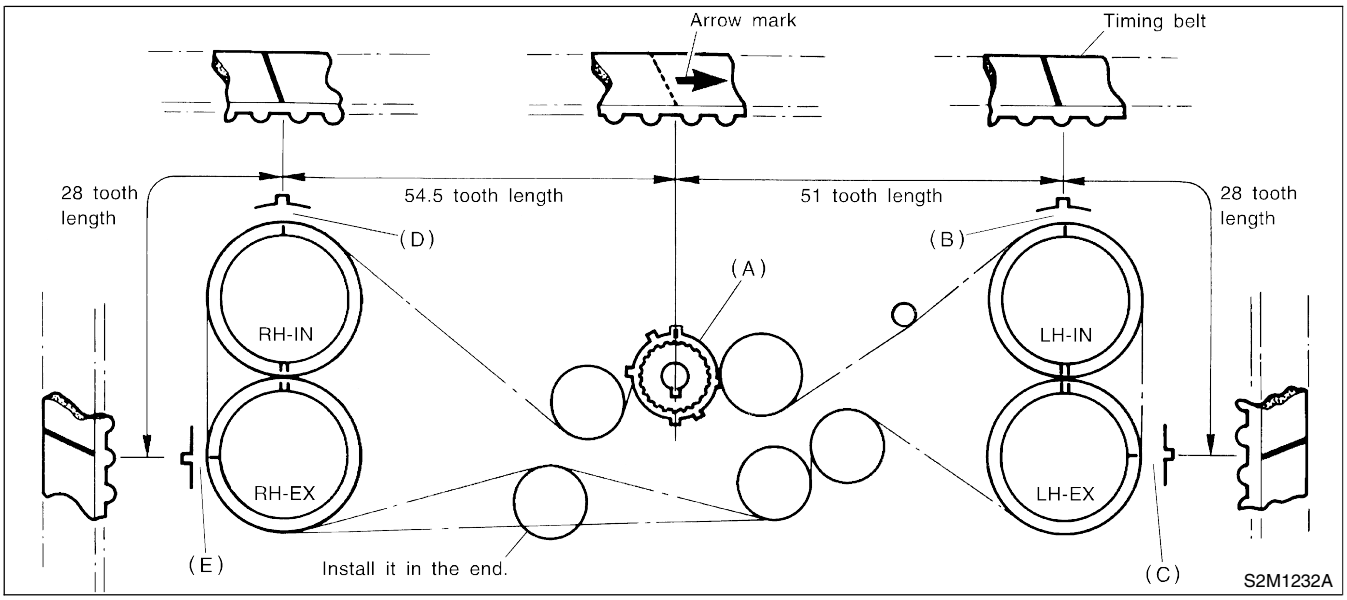


3) Installation of timing belt



Align alignment mark on timing belt with marks on sprockets in the alphabetical order shown in figure. While aligning marks, position timing belt properly.

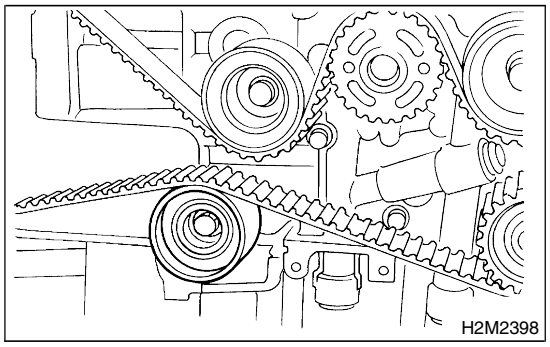
CAUTION:
• Disengagement of more than three timing belt teeth may result in interference between the valve and piston.
• Ensure belt's rotating direction is correct.



4) Install belt idlers.

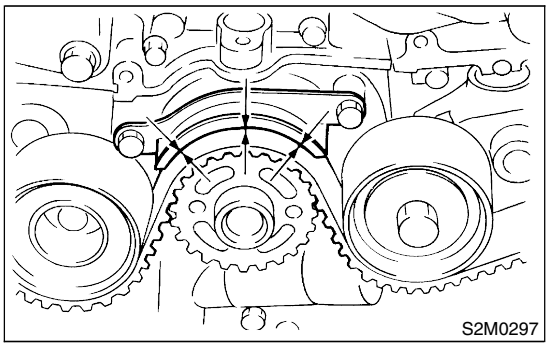
Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

CAUTION:
Make sure that the marks on timing belt and sprockets are aligned.

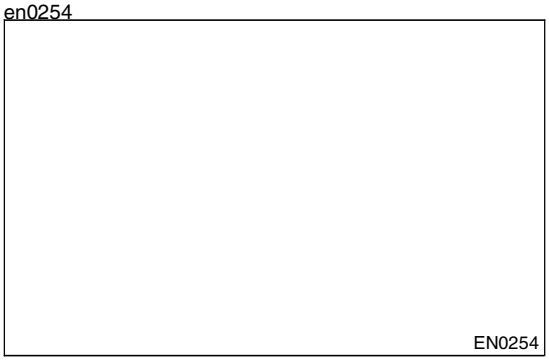


5) After ensuring that the marks on timing belt and sprockets are aligned, remove stopper pin from tensioner adjuster.
6) Install timing belt guide. (MT vehicle only)
(1) Temporarily tighten remaining bolts.
(2) Check and adjust clearance between timing belt and timing belt guide.

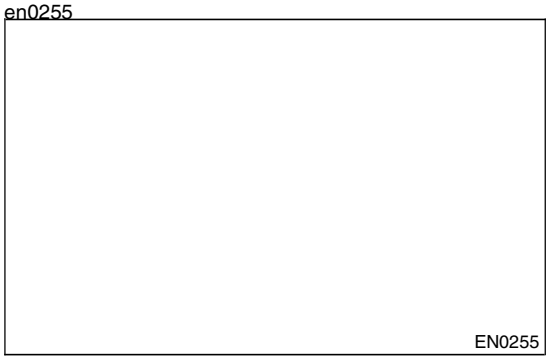
Clearance:
1.0±0.5 mm (0.039±0.020 in)



en0254

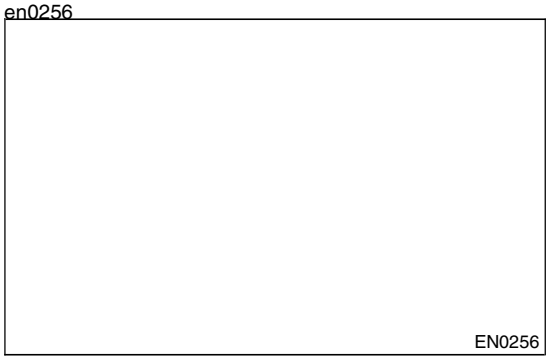


en0255



EN0255

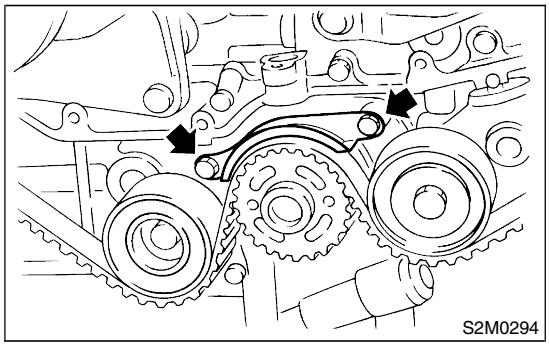
en0256



EN0256

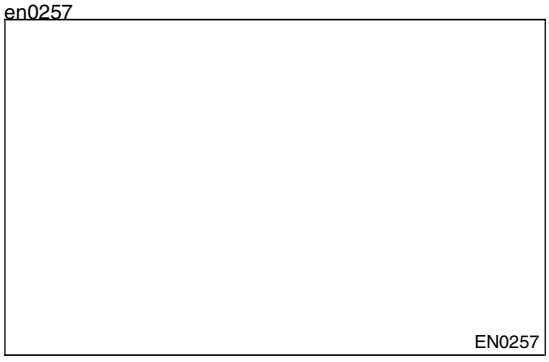
(3) Tighten remaining bolts.

Tightening torque:
9.8 N·m (1.0 kgf-m, 7.2 ft-lb)



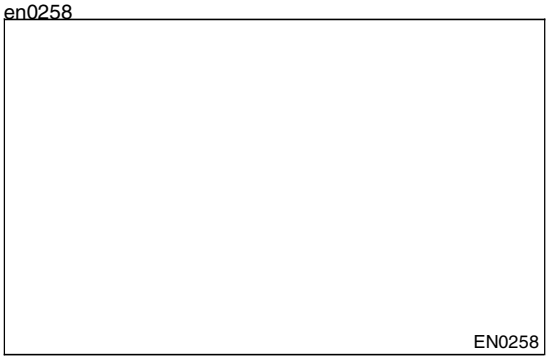
S2M0294

en0257



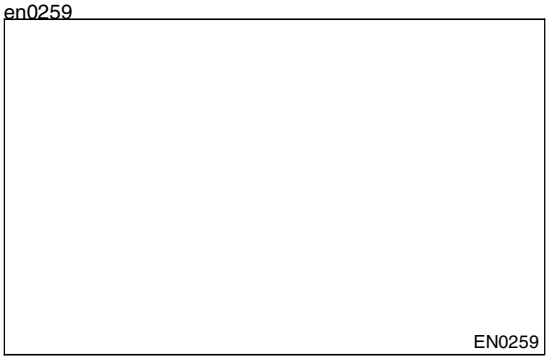
EN0257

en0258



EN0258

en0259



EN0259

7) Install belt cover. <Ref. to ME(DOHC TURBO)-47, INSTALLATION, Belt Cover.>
8) Install crankshaft pulley. <Ref. to ME(DOHC TURBO)-46, REMOVAL, Crankshaft Pulley.>
9) Install V-belt. <Ref. to ME(DOHC TURBO)-44, INSTALLATION, V-belt.>

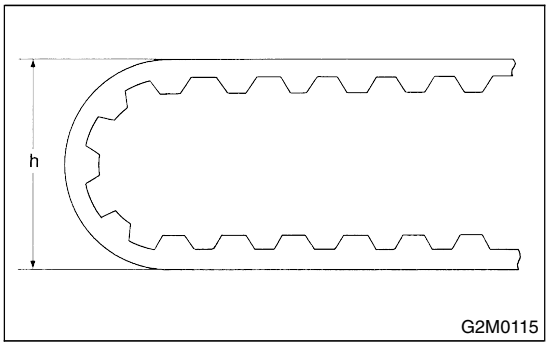
C: INSPECTION S183099A10

1. TIMING BELT S183099A1001

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 S183099A1002

1) Visually check oil seals for leaks, and rod ends for abnormal wear or scratches. If necessary, replace automatic belt tension adjuster assembly.

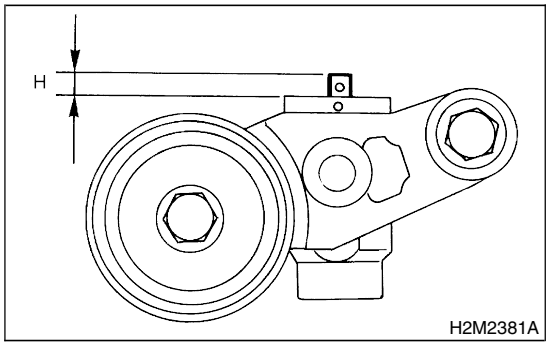
CAUTION:
Slight traces of oil at rod's oil seal does not indicate a problem.

2) Check that the adjuster rod does not move when a pressure of 294 N (30 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)



3. BELT TENSION PULLEY S183099A1003

1) Check mating surfaces of timing belt and contact point of adjuster rod for abnormal wear or scratches. Replace belt tension pulley if faulty.
2) Check belt tension pulley for smooth rotation. Replace if noise or excessive play is noted.
3) Check belt tension pulley for grease leakage.

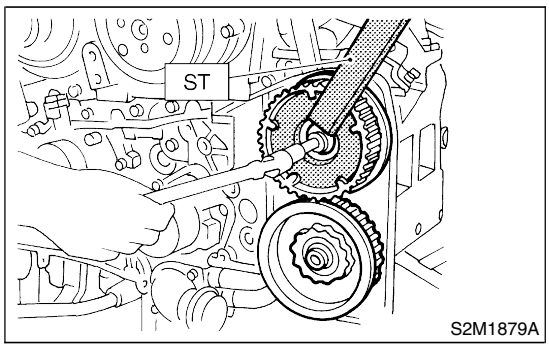
4. BELT IDLER S183099A1004

1) Check idler for smooth rotation. Replace if noise or excessive play is noted.
2) Check outer contacting surfaces of idler pulley for abnormal wear and scratches.
3) Check idler for grease leakage.

16. Camshaft Sprocket S183097

A: REMOVAL S183097A18

1) Remove V-belt. <Ref. to ME(DOHC TURBO)-44, REMOVAL, V-belt.>
2) Remove crankshaft pulley. <Ref. to ME(DOHC TURBO)-46, REMOVAL, Crankshaft Pulley.>
3) Remove belt cover. <Ref. to ME(DOHC TURBO)-47, REMOVAL, Belt Cover.>
4) Remove timing belt assembly. <Ref. to ME(DOHC TURBO)-48, REMOVAL, Timing Belt Assembly.>
5) Remove camshaft position sensor. <Ref. to FU(DOHC TURBO)-31, REMOVAL, Camshaft Position Sensor.>
6) Remove camshaft sprockets. To lock camshaft, use ST.
ST 499207400 CAMSHAFT SPROCKET WRENCH

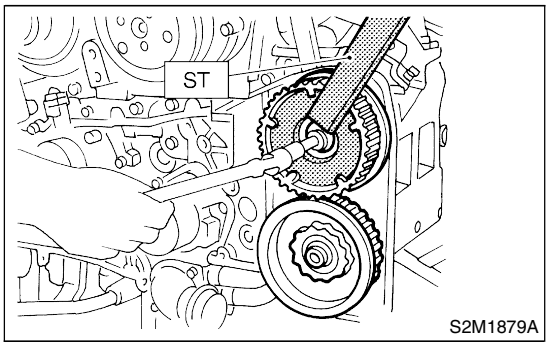


B: INSTALLATION S183097A11

1) Install camshaft sprocket No. 1. and No. 2. To lock camshaft, use ST.
ST 499207100 CAMSHAFT SPROCKET WRENCH

Tightening torque:
98 N·m (10 kgf-m, 72.4 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 position sensor. <Ref. to FU(DOHC TURBO)-31, INSTALLATION, Camshaft Position Sensor.>
3) Install timing belt assembly. <Ref. to ME(DOHC TURBO)-49, INSTALLATION, Timing Belt Assembly.>
4) Install belt cover. <Ref. to ME(DOHC TURBO)-47, INSTALLATION, Belt Cover.>
5) Install crankshaft pulley. <Ref. to ME(DOHC TURBO)-46, INSTALLATION, Crankshaft Pulley.>
6) Install V-belt. <Ref. to ME(DOHC TURBO)-44, INSTALLATION, V-belt.>

C: INSPECTION S183097A10

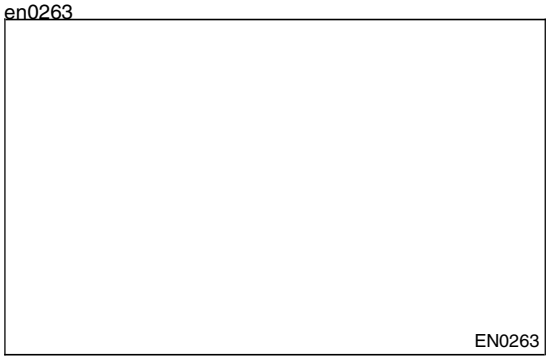
1) Check sprocket teeth for abnormal wear and scratches.
2) Make sure there is no free play between sprocket and key.
3) Check crankshaft sprocket notch for sensor for damage and contamination of foreign matter.

17. Crankshaft Sprocket S183101

A: REMOVAL S183101A18

1) Remove V-belt. <Ref. to ME(DOHC TURBO)-44, REMOVAL, V-belt.>
2) Remove crankshaft pulley. <Ref. to ME(DOHC TURBO)-46, REMOVAL, Crankshaft Pulley.>
3) Remove belt cover. <Ref. to ME(DOHC TURBO)-47, REMOVAL, Belt Cover.>
4) Remove timing belt assembly. <Ref. to ME(DOHC TURBO)-48, REMOVAL, Timing Belt Assembly.>
5) Remove camshaft sprocket. <Ref. to ME(DOHC TURBO)-56, REMOVAL, Camshaft Sprocket.>
6) Remove crankshaft sprocket.

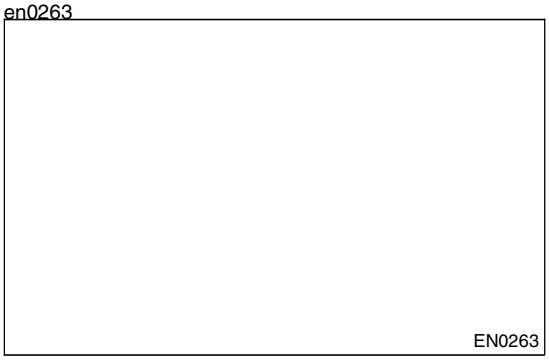
en0263



B: INSTALLATION S183101A11

1) Install crankshaft sprocket.

en0263



2) Install camshaft sprocket. <Ref. to ME(DOHC TURBO)-56, INSTALLATION, Camshaft Sprocket.>
3) Install timing belt assembly. <Ref. to ME(DOHC TURBO)-49, INSTALLATION, Timing Belt Assembly.>
4) Install belt cover. <Ref. to ME(DOHC TURBO)-47, INSTALLATION, Belt Cover.>
5) Install crankshaft pulley. <Ref. to ME(DOHC TURBO)-46, INSTALLATION, Crankshaft Pulley.>
6) Install V-belt. <Ref. to ME(DOHC TURBO)-44, INSTALLATION, V-belt.>

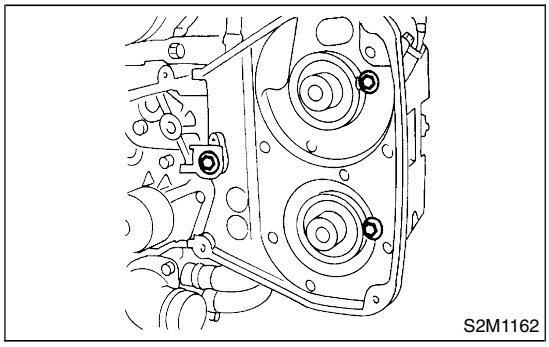
C: INSPECTION S183101A10

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.

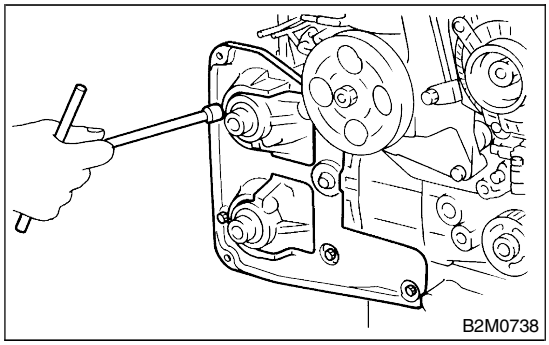
18. Camshaft S183092

A: REMOVAL S183092A18

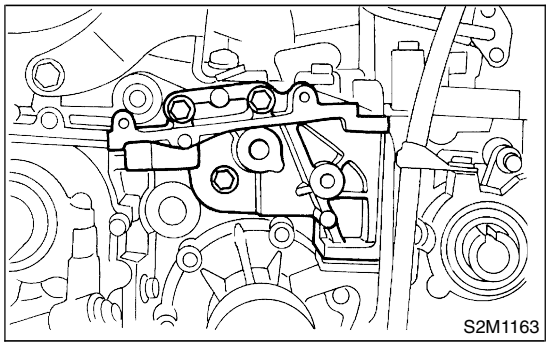
1) Remove V-belt. <Ref. to ME(DOHC TURBO)-44, INSTALLATION, V-belt.>
2) Remove crankshaft pulley. <Ref. to ME(DOHC TURBO)-46, REMOVAL, Crankshaft Pulley.>
3) Remove belt cover. <Ref. to ME(DOHC TURBO)-47, REMOVAL, Belt Cover.>
4) Remove timing belt assembly. <Ref. to ME(DOHC TURBO)-48, REMOVAL, Timing Belt Assembly.>
5) Remove camshaft sprocket. <Ref. to ME(DOHC TURBO)-56, REMOVAL, Camshaft Sprocket.>
6) Remove crankshaft sprocket. <Ref. to ME(DOHC TURBO)-57, REMOVAL, Crankshaft Sprocket.>
7) Remove left-hand belt cover No. 2.


S2M1162

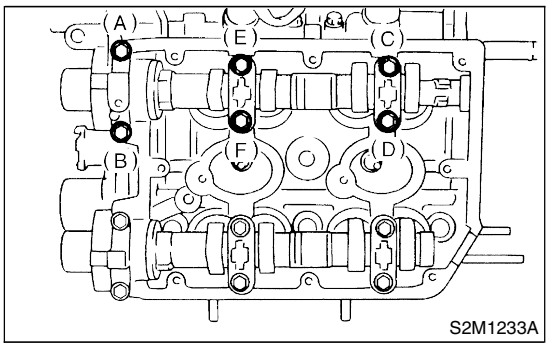
8) Remove right-hand belt cover No.2.


B2M0738

9) Remove tensioner bracket.

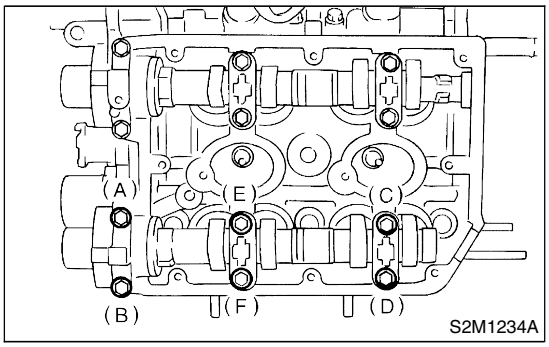

S2M1163

10) Remove oil level gauge guide. (LH side only)
11) Remove spark plug cord.
12) Remove rocker cover and gasket.
13) Loosen intake camshaft cap bolts equally, a little at a time in alphabetical sequence shown in figure.



S2M1233A

14) Remove camshaft caps and intake camshaft.
15) Loosen exhaust camshaft cap bolts equally, a little at a time in alphabetical sequence shown in figure.



S2M1234A

16) Remove camshaft caps and exhaust camshaft.

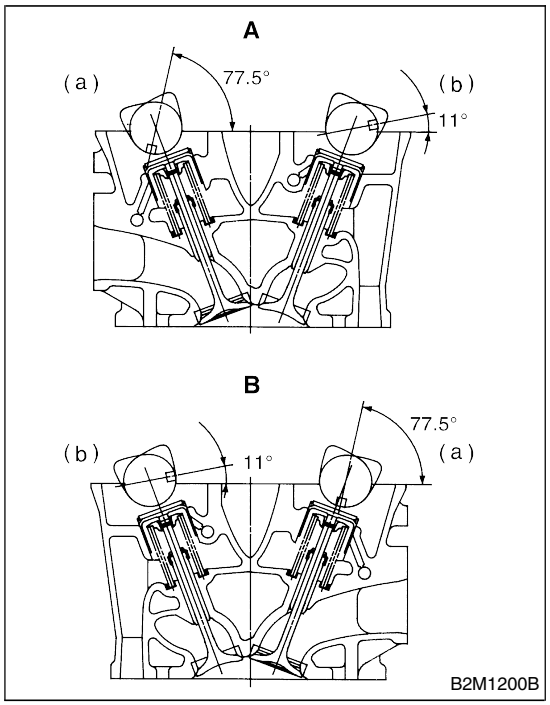
CAUTION:
Arrange camshaft caps in order so that they can be installed in their original positions.

17) Similarly, remove right-hand camshafts and related parts.

B: INSTALLATION S183092A11

1) Camshaft installation Apply engine oil to cylinder head at camshaft bear-ing location before installing camshaft. Install cam-shaft so that each valves is close to or in contact with “base circle” of cam lobe.

CAUTION:
• When camshafts are positioned as shown in figure, camshafts need to be rotated at a minimum to align with timing belt during installation.
• Right-hand camshaft need not be rotated when set at position shown in figure. Left-hand intake camshaft: Rotate 80° clock-wise.
Left-hand exhaust camshaft: Rotate 45° counterclockwise.

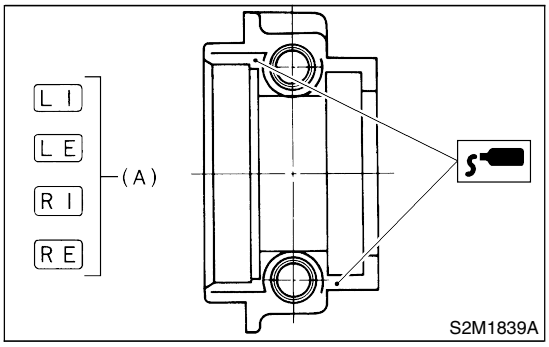


A Left side cylinder head
B Right side cylinder head
(a) Intake camshaft
(b) Exhaust camshaft

2) Camshaft cap installation
(1) Apply fluid packing sparingly to cap mating surface.

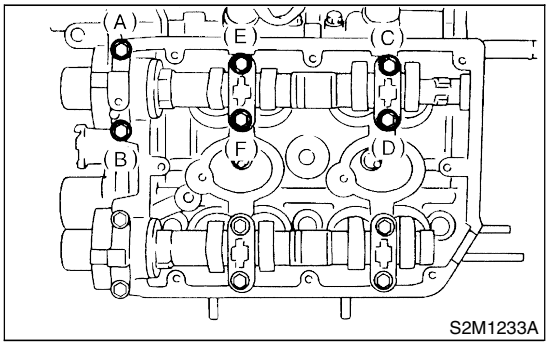
CAUTION:
Do not apply fluid packing excessively. Failure to do so may cause excess packing to come out and flow toward oil seal, resulting in oil leaks.

Fluid packing:
THREE BOND 1215 or equivalent



(2) Apply engine oil to cap bearing surface and install cap on camshaft as shown by identification mark (A).
(3) Gradually tighten cap in at least two stages in alphabetical sequence shown in figure, and then tighten to specified torque.

Tightening torque:
20 N·m (2.0 kgf-m, 14.5 ft-lb)



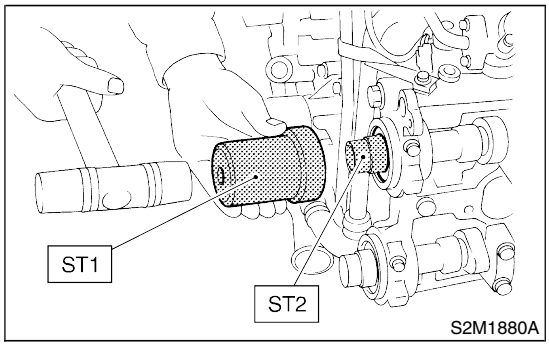
(4) Similarly, tighten cap on exhaust side. After tightening cap, ensure camshaft rotates only slightly while holding it at “base” circle.

Tightening torque:
20 N·m (2.0 kgf-m, 14.5 ft-lb)

3) Camshaft oil seal installation Apply grease to new oil seal lips and press onto front end of camshaft by using ST1 and ST2.

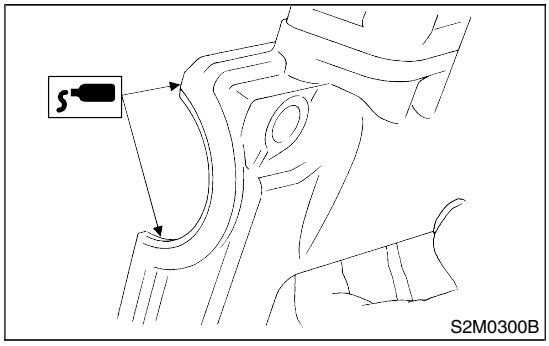
CAUTION:
Use a new oil seal.

ST1 499587600 OIL SEAL INSTALLER
ST2 499597200 OIL SEAL GUIDE



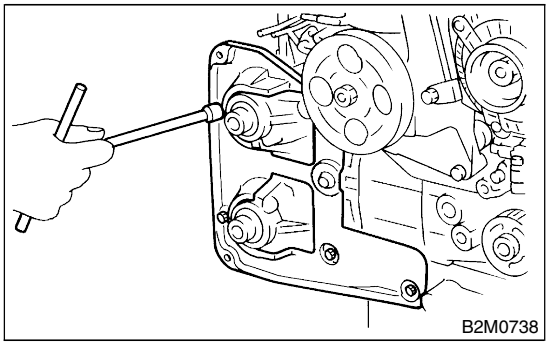
4) Rocker cover installation
(1) Install gasket on rocker cover. Install peripheral gasket and ignition coil gasket.
(2) Apply fluid packing to four front open edges of peripheral gasket.

Fluid packing:
THREE BOND 1215 or equivalent



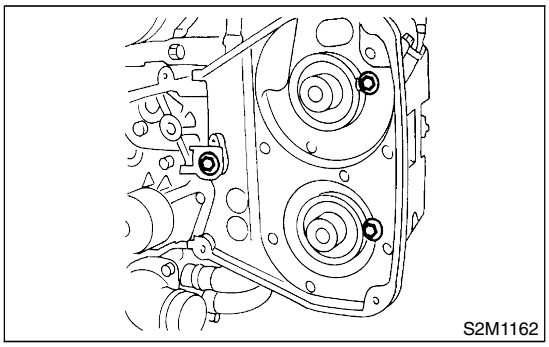
(3) Install rocker cover on cylinder head. Ensure gasket is properly positioned during installation.
5) Install spark plug cord.
6) Similarly, install parts on right-hand side.
7) Install right-hand belt cover No. 2.

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



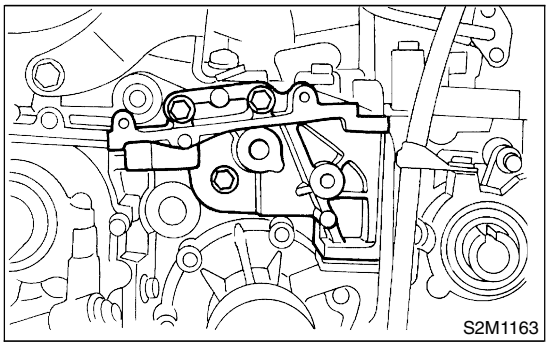
8) Install left-hand belt cover No. 2.

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



9) Install tensioner bracket.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



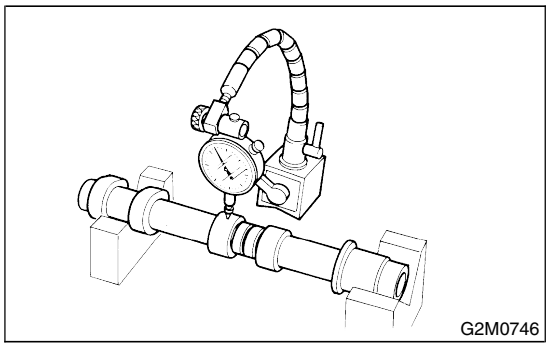
10) Install crankshaft sprocket. <Ref. to ME(DOHC TURBO)-56, INSTALLATION, Camshaft Sprocket.>
11) Install camshaft sprockets. <Ref. to ME(DOHC TURBO)-56, INSTALLATION, Camshaft Sprocket.>
12) Install timing belt assembly. <Ref. to ME(DOHC TURBO)-49, INSTALLATION, Timing Belt Assembly.>
13) Install belt cover. <Ref. to ME(DOHC TURBO)-47, INSTALLATION, Belt Cover.>

14) Install crankshaft pulley. <Ref. to ME(DOHC TURBO)-46, INSTALLATION, Crankshaft Pulley.>
15) Install V-belt. <Ref. to ME(DOHC TURBO)-44, INSTALLATION, V-belt.>

C: INSPECTION S183092A10

1) Measure the bend, and repair or replace if necessary.

Limit:
0.020 mm (0.0008 in)

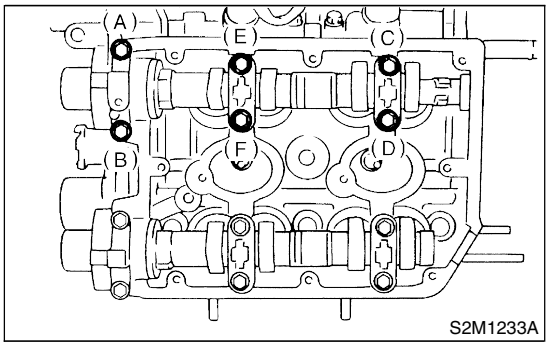


2) Check journal for damage and wear. Replace if faulty.
3) Measure outside diameter of camshaft journal. If the journal diameter is not as specified, check the oil clearance.

	Camshaft journal	
	Front	Center, rear
Standard	37.946 — 37.963 (1.4939 — 1.4946 in)	29.946 — 29.963 (1.1790 — 1.1796 in)

4) Measurement of the camshaft journal oil clearance
(1) Clean the bearing caps and camshaft journals.
(2) Place the camshafts on the cylinder head. (Without installing valve rocker.)
(3) Place plastigauge across each of the camshaft journals.
(4) Gradually tighten cap in at least two stages in alphabetical sequence shown in figure, and then tighten to specified torque.

Tightening torque:
20 N·m (2.0 kgf-m, 14.5 ft-lb)

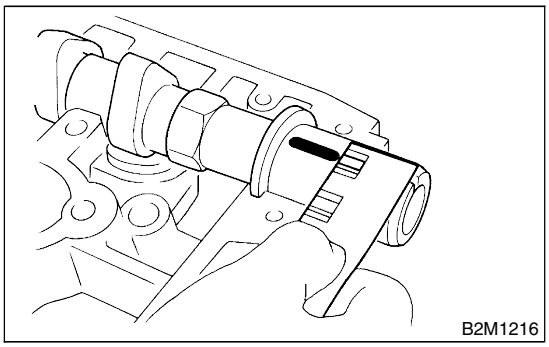


CAUTION:
Do not turn the camshaft.

(5) Remove the bearing caps.
(6) Measure the widest point of the plastigauge on each journal. If the oil clearance exceeds the limit, replace the camshaft. If necessary, replace the camshaft caps and cylinder head as a set.

Standard:
0.037 — 0.072 mm (0.0015 — 0.0028 in)

Limit:
0.10 mm (0.0039 in)

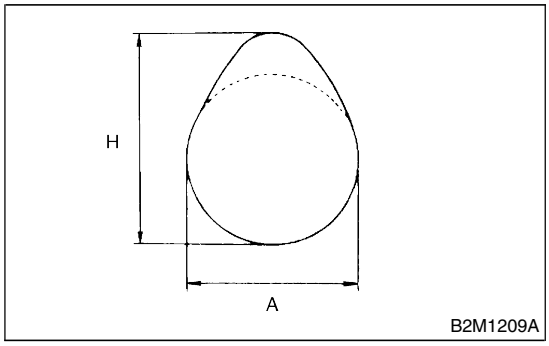


(7) Completely remove the plastigauge.
5) Check cam face condition; remove minor faults by grinding with oil stone. Measure the cam height H; replace if the limit has been exceeded.

Cam height: H Standard:
Intake:
44.75 — 44.85 mm (1.7618 — 1.7657 in)
Exhaust:
44.60 — 44.70 mm (1.7559 — 1.7598 in)

Limit:
Intake:
44.65 mm (1.7579 in)
Exhaust:
44.50 mm (1.7520 in)

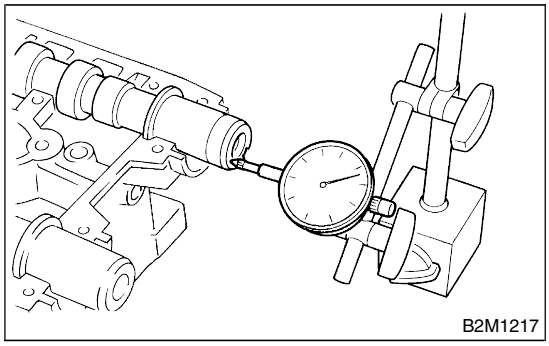
Cam base circle diameter A:
37.0 mm (1.457 in)



6) Measure the thrust clearance of camshaft with dial gauge. If the clearance exceeds the limit, replace caps and cylinder head as a set. If necessary replace camshaft.

Standard:
0.015 — 0.070 mm (0.0006 — 0.0028 in)

Limit:
0.1 mm (0.004 in)

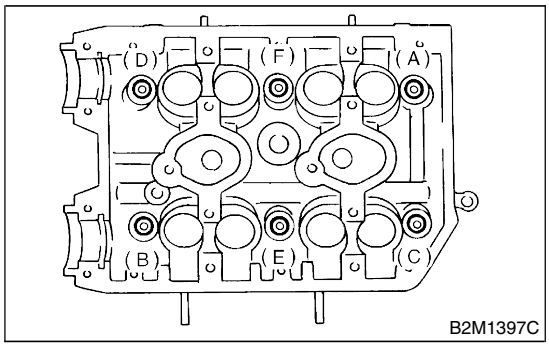


19. Cylinder Head Assembly S183093

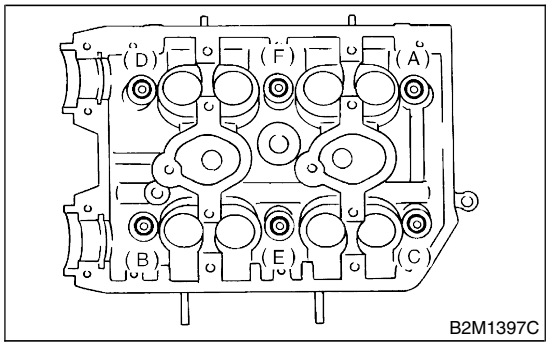
A: REMOVAL S183093A18

1) Remove V-belt. <Ref. to ME(DOHC TURBO)-44, REMOVAL, V-belt.>
2) Remove crankshaft pulley. <Ref. to ME(DOHC TURBO)-46, REMOVAL, Crankshaft Pulley.>
3) Remove belt cover. <Ref. to ME(DOHC TURBO)-47, REMOVAL, Belt Cover.>
4) Remove timing belt assembly. <Ref. to ME(DOHC TURBO)-48, REMOVAL, Timing Belt Assembly.>
5) Remove camshaft sprocket. <Ref. to ME(DOHC TURBO)-56, REMOVAL, Camshaft Sprocket.>
6) Remove intake manifold. <Ref. to FU(DOHC TURBO)-15, REMOVAL, Intake Manifold.>
7) Remove bolt which installs A/C compressor bracket on cylinder head.
8) Remove camshaft. <Ref. to ME(DOHC TURBO)-58, REMOVAL, Camshaft.>
9) Remove cylinder head bolts in alphabetical sequence shown in figure.

CAUTION:
Leave bolts (A) and (D) engaged by three or four threads to prevent cylinder head from falling.



10) While tapping cylinder head with a plastic hammer, separate it from cylinder block. Remove bolts (A) and (D) to remove cylinder head.



11) Remove cylinder head gasket.

CAUTION:
Do not scratch the mating surface of cylinder head and cylinder block.

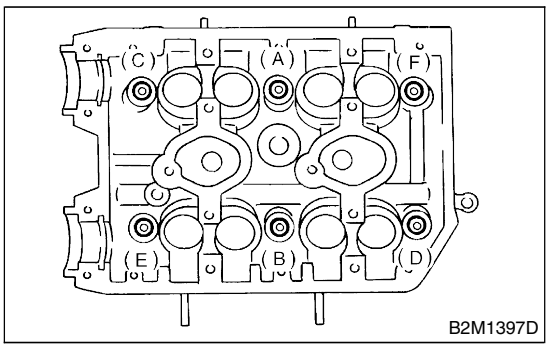
12) Similarly, remove right side cylinder head.

B: INSTALLATION S183093A11

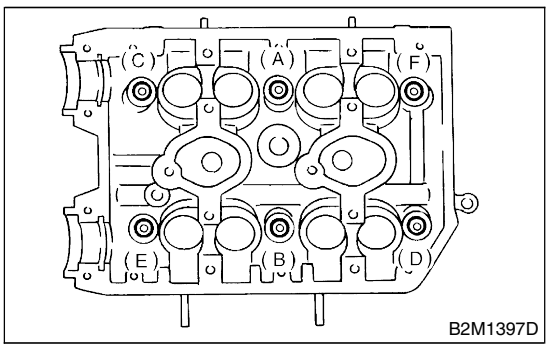
1) Install cylinder head and gaskets on cylinder block.

CAUTION:
- **Use new cylinder head gaskets.**
- **Be careful not to scratch the mating surface of cylinder head and cylinder block.**

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.

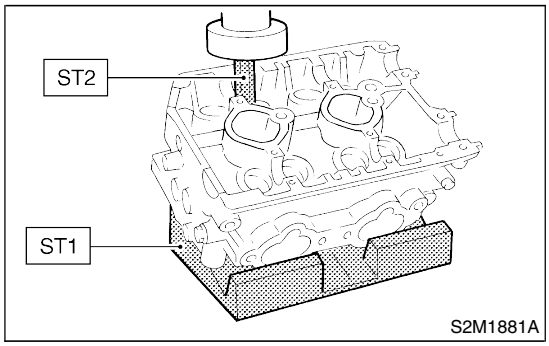
CAUTION:
Ensure that the total "re-tightening angle" [in the two previous steps] do not exceed 180°.

3) Install camshaft. <Ref. to ME(DOHC TURBO)-59, INSTALLATION, Camshaft.>
4) Install A/C compressor bracket on cylinder head.
5) Install intake manifold. <Ref. to ME(DOHC TURBO)-59, INSTALLATION, Camshaft.>
6) Install camshaft sprocket. <Ref. to ME(DOHC TURBO)-56, INSTALLATION, Camshaft Sprocket.>
7) Install timing belt assembly. <Ref. to ME(DOHC TURBO)-49, INSTALLATION, Timing Belt Assembly.>
8) Install belt cover. <Ref. to ME(DOHC TURBO)-47, INSTALLATION, Belt Cover.>
9) Install crankshaft pulley. <Ref. to ME(DOHC TURBO)-46, INSTALLATION, Crankshaft Pulley.>
10) Install V-belt. <Ref. to ME(DOHC TURBO)-44, INSTALLATION, V-belt.>

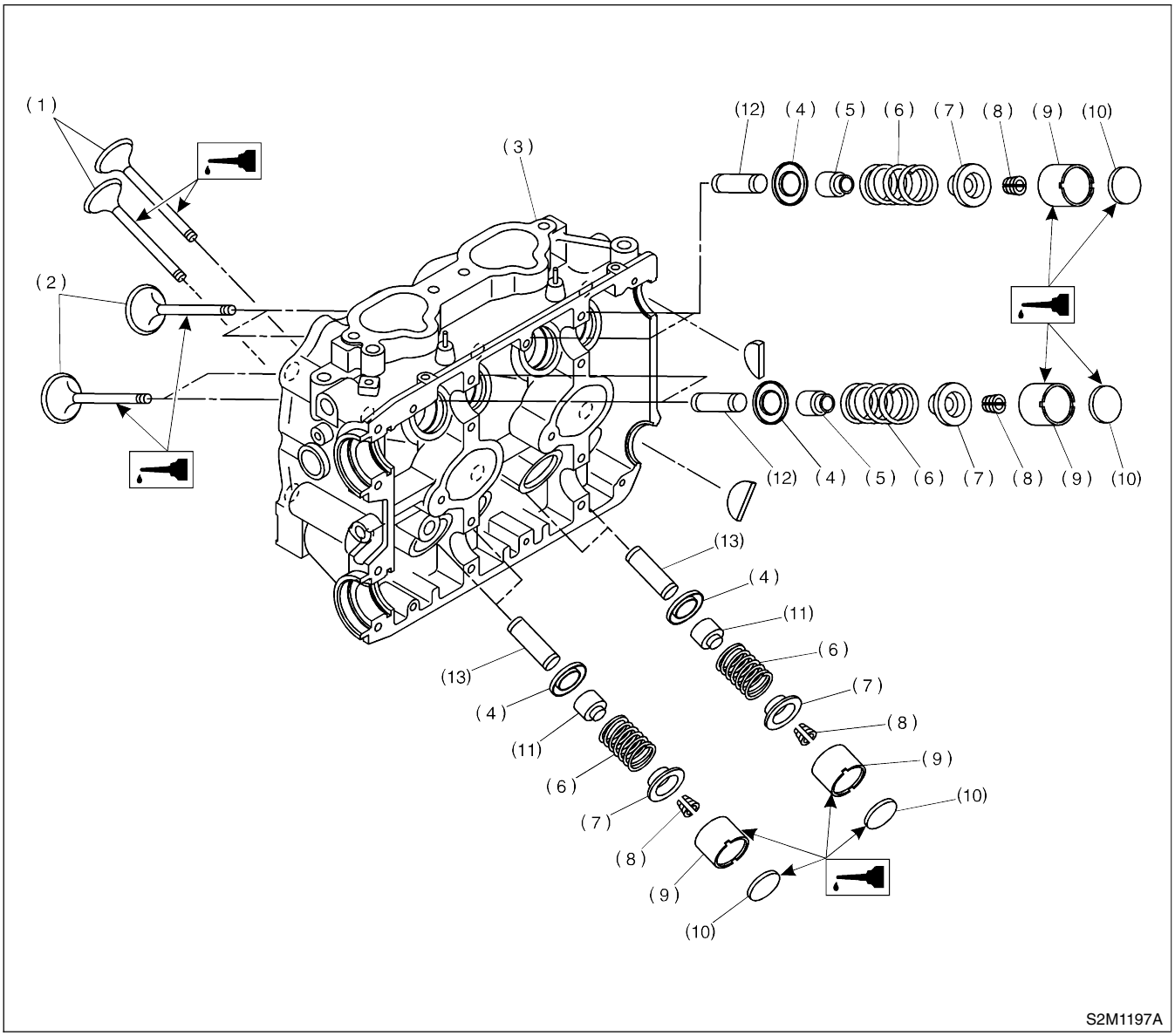
C: DISASSEMBLY S183093A06

1) Remove valve shims and valve lifters.
2) Compress the valve spring and remove the valve spring retainer key. Remove each valve and valve spring.
ST 498267600 CYLINDER HEAD TABLE
ST 499718000 VALVE SPRING REMOVER

CAUTION:
- **Keep removed parts in order for re-installing in their original positions.**
- **Mark each valve to prevent confusion.**
- **Use extreme care not to damage the lips of the intake valve oil seals and exhaust valve oil seals.**



D: ASSEMBLY S183093A02



(1) Exhaust valve
(2) Intake valve
(3) Cylinder head
(4) Valve spring seat
(5) Intake valve oil seal
(6) Valve spring
(7) Retainer
(8) Retainer key
(9) Valve lifter
(10) Shim
(11) Exhaust valve oil seal
(12) Intake valve guide
(13) Exhaust valve guide

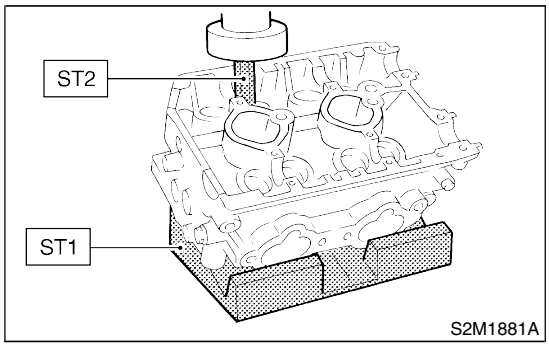
1) Installation of valve spring and valve
   (1) Coat stem of each valve with engine oil and insert valve into valve guide.

CAUTION:
When inserting valve into valve guide, use special care not to damage the oil seal lip.

   (2) Set cylinder head on ST1.
   (3) Install valve spring and retainer using ST2.

ST 498267600 CYLINDER HEAD TABLE
ST 499718000 VALVE SPRING REMOVER

CAUTION:
Be sure to install the valve springs with their close-coiled end facing the seat on the cylinder head.



(4) Compress valve spring and fit valve spring retainer key.
(5) After installing, tap valve spring retainers lightly with wooden hammer for better seating.
2) Apply oil to the surface of the valve lifter and valve shim.
3) Install valve lifter and valve shim.

E: INSPECTION S183093A10

1. CYLINDER HEAD S183093A1001

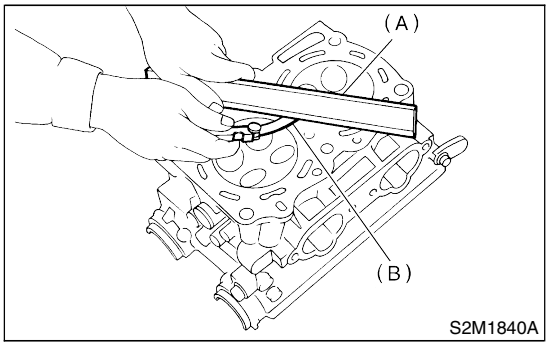
1) Make sure that no crack or other damage exists. In addition to visual inspection, inspect important areas by means of red check.
2) Measure the warping of the cylinder head surface that mates with crankcase by using a straight edge (A) and thickness gauge (B).
If the warping exceeds 0.05 mm (0.0020 in), regrind the surface with a surface grinder.

Warping limit:
0.05 mm (0.0020 in)

Grinding limit:
0.3 mm (0.012 in)

Standard height of cylinder head:
127.5 mm (5.02 in)

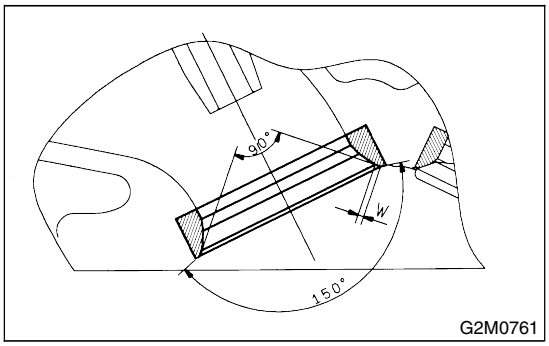
CAUTION:
Uneven torque for the cylinder head nuts can cause warping. When reassembling, pay special attention to the torque so as to tighten evenly.



2. VALVE SEAT S183093A1002

Inspect intake and exhaust valve seats, and correct the contact surfaces with valve seat cutter if they are defective or when valve guides are replaced.

Valve seat width: W
Intake
Standard 1.0 mm (0.039 in)
Limit 1.7 mm (0.067 in)
Exhaust
Standard 1.5 mm (0.059 in)
Limit 2.2 mm (0.087 in)



3. VALVE GUIDE S183093A1003

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)

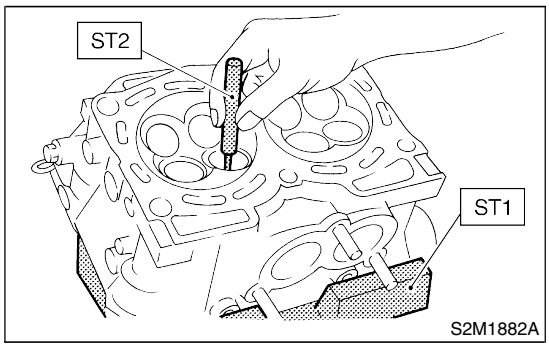
2) If the clearance between valve guide and stem exceeds the limit, replace valve guide or valve itself whichever shows greater amount of wear. See following procedure for valve guide replacement.

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)

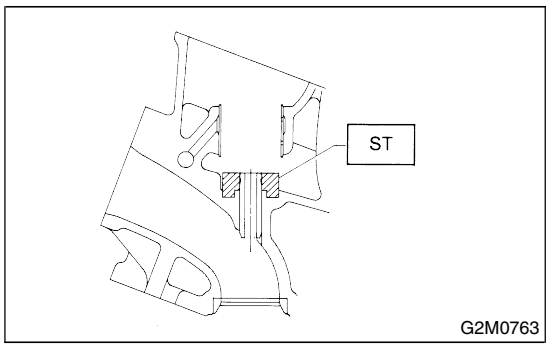
(1) Place cylinder head on ST1 with the combustion chamber upward so that valve guides enter the holes in ST1.
(2) Insert ST2 into valve guide and press it down to remove valve guide.

ST1 498267600 CYLINDER HEAD TABLE
ST2 499767200 VALVE GUIDE REMOVER



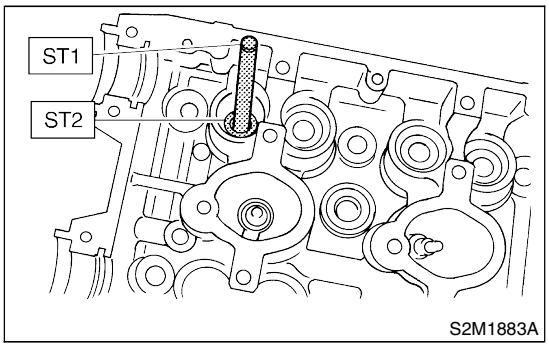
(3) Turn cylinder head upside down and place ST as shown in the figure.

ST 498767700 VALVE GUIDE ADJUSTER



(4) Before installing new valve guide, make sure that neither scratches nor damages exist on the inside surface of the valve guide holes in cylinder head.
(5) Put new valve guide, coated with sufficient oil, in cylinder, and insert ST1 into valve guide. Press in until the valve guide upper end is flush with the upper surface of ST2.

ST1 499767200 VALVE GUIDE REMOVER
ST2 498267700 VALVE GUIDE ADJUSTER



(6) Check the valve guide protrusion.

Valve guide protrusion: L
12.0 — 12.4 mm (0.472 — 0.488 in)

(7) Ream the inside of valve guide with ST. Gently rotate the reamer clockwise while pressing it lightly into valve guide, and return it also rotating clockwise. After reaming, clean valve guide to remove chips.

ST 499767400 VALVE GUIDE REAMER

CAUTION:
• Apply engine oil to the reamer when reaming.
• If the inner surface of the valve guide is torn, the edge of the reamer should be slightly ground with an oil stone.
• If the inner surface of the valve guide becomes lustrous and the reamer does not chips, use a new reamer or remedy the reamer.

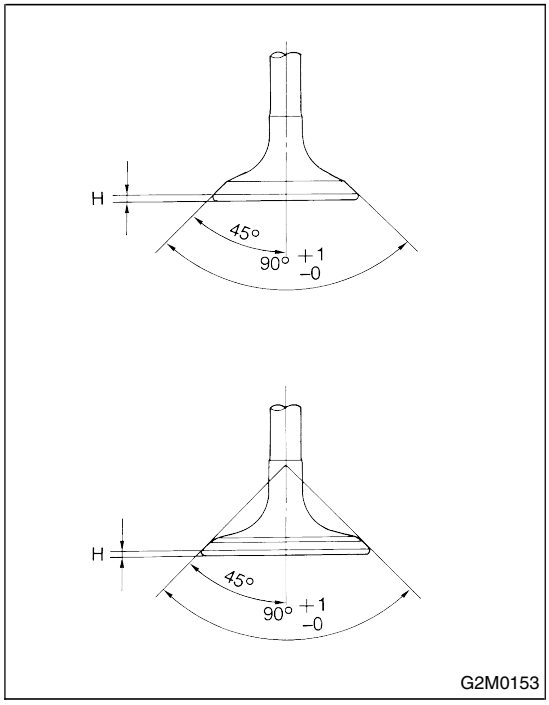
(8) Recheck the contact condition between valve and valve seat after replacing valve guide.

4. INTAKE AND EXHAUST VALVE S183093A1004

1) Inspect the flange and stem of valve, and replace if damaged, worn, or deformed, or if "H" is less than the specified limit.

H:
Intake
Standard 1.2 mm (0.047 in)
Limit 0.8 mm (0.031 in)
Exhaust
Standard 1.5 mm (0.059 in)
Limit 0.8 mm (0.031 in)

Valve overall length:
Intake
104.4 mm (4.110 in)
Exhaust
104.7 mm (4.122 in)

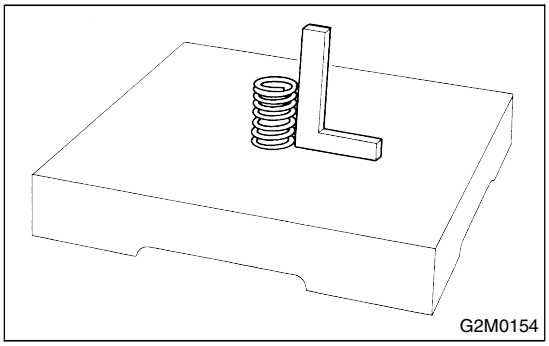


2) Put a small amount of grinding compound on the seat surface and lap the valve and seat surface. Install a new intake valve oil seal after lapping.

5. VALVE SPRINGS S183093A1005

1) Check valve springs for damage, free length, and tension. Replace valve spring if it is not to the specifications presented in the table.
2) To measure the squareness of the valve spring, stand the spring on a surface plate and measure its deflection at the top using a try square.

	Valve spring
Free length	44.67 mm (1.7587 in)
Tension/spring height	220.7±15.7 N (22.5±1.6 kgf, 49.6±3.5 lb)/36.0 mm (1.417 in)
	510.9±25.5 N (52.1±2.6 kgf, 114.9±5.7 lb)/26.6 mm (1.047 in)
Squareness	2.5°, 2.0 mm (0.079 in)



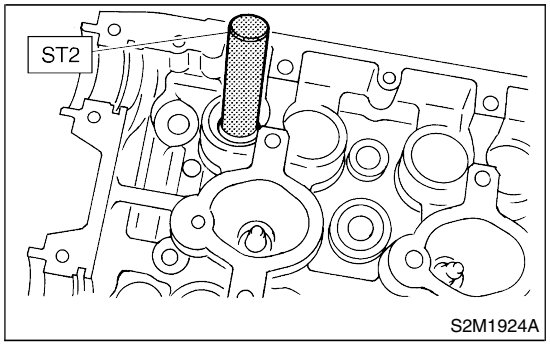
6. INTAKE AND EXHAUST VALVE OIL SEAL S183093A1006

Replace oil seal with new one, if lip is damaged or spring out of place, or when the surfaces of intake valve and valve seat are reconditioned or intake valve guide is replaced.
1) Place cylinder head on ST1.
2) Press in oil seal to the specified dimension indicated in the figure by using ST2.
ST1 498267600 CYLINDER HEAD TABLE
ST2 498857100 VALVE GUIDE REMOVER

CAUTION:
• Apply engine oil to oil seal before force-fitting.
• Differentiate between intake valve oil seal and exhaust valve oil seal by noting their difference in color.

Color of rubber part:
Intake [Black]
Exhaust [Brown]

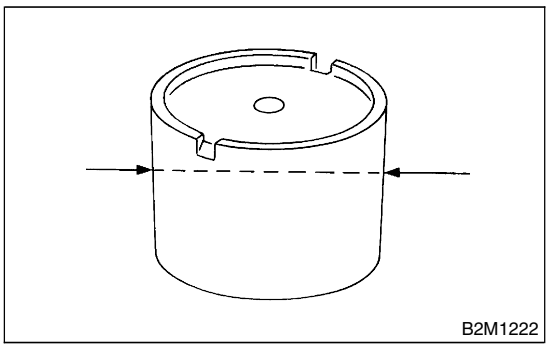
Color of spring part:
Intake [Silver]
Exhaust [Silver]



7. VALVE LIFTER S183093A1007

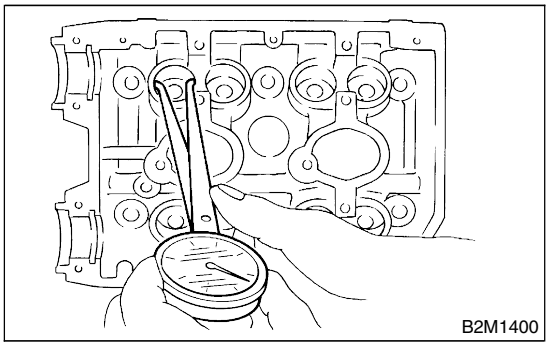
1) Check valve lifter visually.
2) Measure outer diameter of valve lifter.

Outer diameter:
34.959 — 34.975 mm (1.3763 — 1.3770 in)



3) Measure inner diameter of valve lifter mating part on cylinder head.

Inner diameter:
34.994 — 35.016 mm (1.3777 — 1.3786 in)



CAUTION:
If difference between outer diameter of valve lifter and inner diameter of valve lifter mating part is over the limit, replace cylinder head.

Standard:
0.019 — 0.057 mm (0.0007 — 0.0022 in)

Limit:
0.100 mm (0.0039 in)

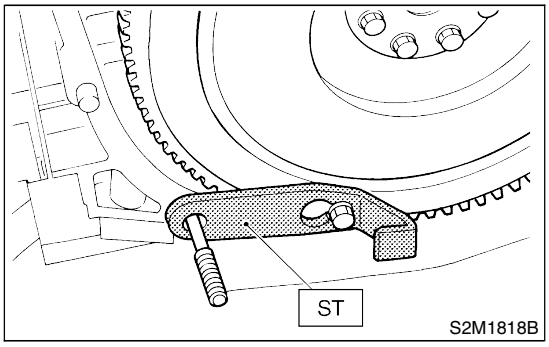
20. Cylinder Block S183090

A: REMOVAL S183090A18

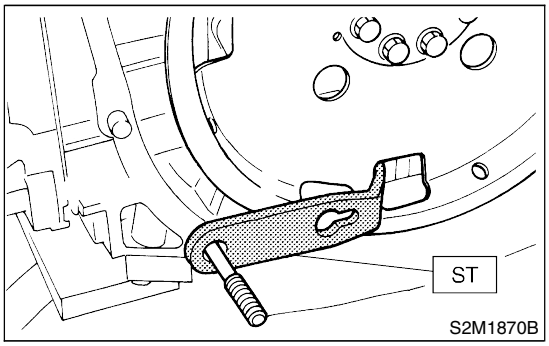
NOTE:
Before conducting this procedure, drain engine oil completely if applicable.

1) Remove intake manifold. <Ref. to FU(DOHC TURBO)-15, REMOVAL, Intake Manifold.>
2) Remove V-belt. <Ref. to ME(DOHC TURBO)-44, REMOVAL, V-belt.>
3) Remove crankshaft pulley. <Ref. to ME(DOHC TURBO)-46, REMOVAL, Crankshaft Pulley.>
4) Remove belt cover. <Ref. to ME(DOHC TURBO)-47, REMOVAL, Belt Cover.>
5) Remove timing belt assembly. <Ref. to ME(DOHC TURBO)-48, REMOVAL, Timing Belt Assembly.>
6) Remove camshaft sprocket. <Ref. to ME(DOHC TURBO)-56, REMOVAL, Camshaft Sprocket.>
7) Remove crankshaft sprocket. <Ref. to ME(DOHC TURBO)-57, REMOVAL, Crankshaft Sprocket.>
8) Remove generator and A/C compressor with their brackets.
9) Remove cylinder head assembly. <Ref. to ME(DOHC TURBO)-63, REMOVAL, Cylinder Head Assembly.>
10) Remove clutch housing cover. (MT vehicles only)
11) Remove flywheel (MT vehicle) or drive plate (AT vehicle).
Using ST, lock crankshaft.
ST 498497100 CRANKSHAFT STOPPER

- MT VEHICLES

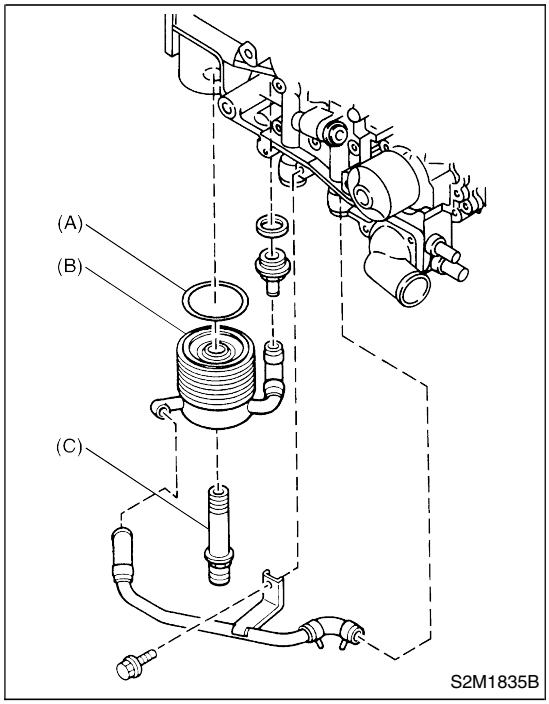


- AT VEHICLES



12) Remove oil separator cover.
13) Remove water by-pass pipe for heater.
14) Remove oil filter.

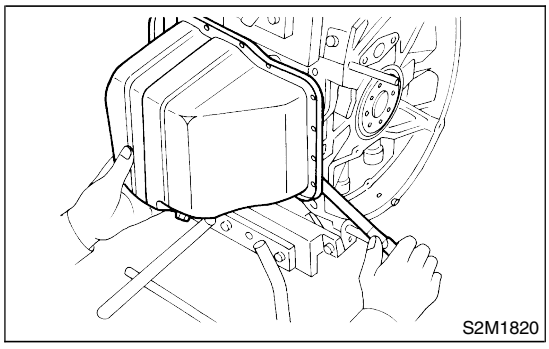
15) Remove oil cooler.



(A) Gasket
(B) Oil cooler
(C) Connector

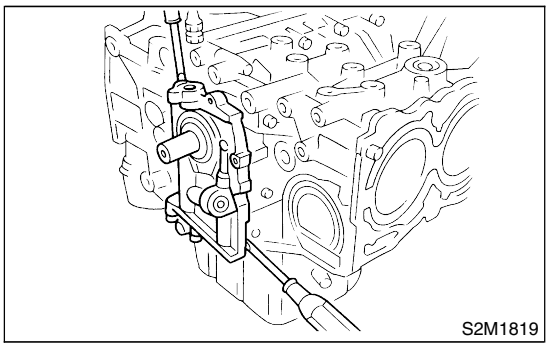
16) Removal of oil pan
(1) Turn cylinder block with #2 and #4 piston sides facing upward.
(2) Remove bolts which secure oil pan to cylinder block.
(3) Insert a oil pan cutter blade between cylinder block-to-oil pan clearance and remove oil pan.

CAUTION:
Do not use a screwdriver or similar tool in place of oil pan cutter.



17) Remove oil strainer stay.
18) Remove oil strainer.
19) Remove baffle plate.
20) Remove water pips.
21) Remove water pump.
22) 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.

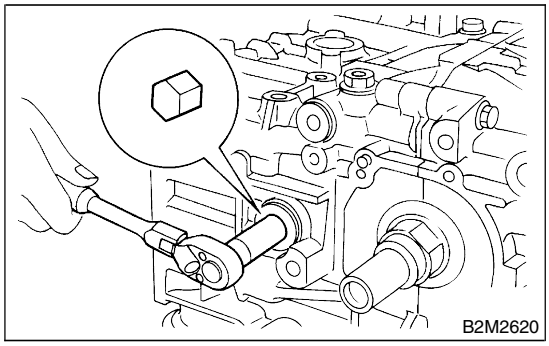


en0294

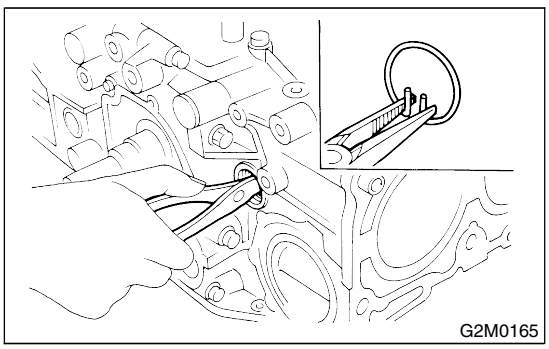
EN0294

(1) Service hole plug
(2) Gasket
(3) Circlip
(4) Piston pin
(5) Service hole cover
(6) O-ring

23) Remove service hole cover and service hole plugs using hexagon wrench [14 mm (0.55 in)].

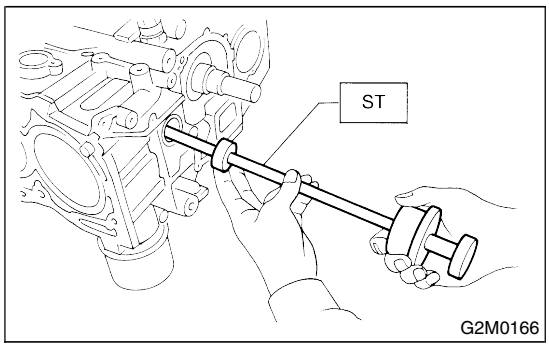

B2M2620

24) 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.


G2M0165

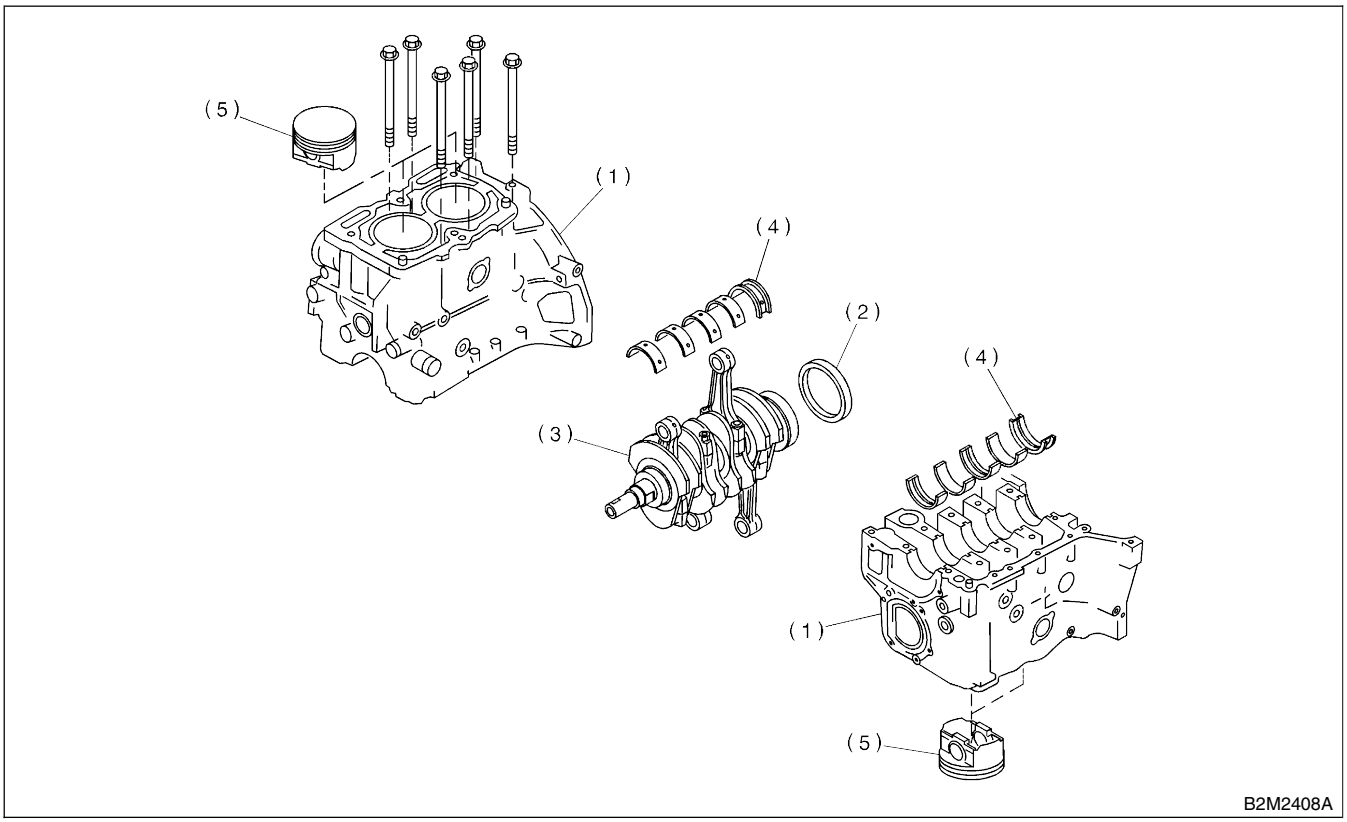
25) Draw out piston pin from #1 and #2 pistons using ST.
ST 499097700 PISTON PIN REMOVER

CAUTION:
Be careful not to confuse original combination of piston, piston pin and cylinder.



26) Similarly remove piston pins from #3 and #4 pistons.
27) Remove bolts which connect cylinder block on the side of #2 and #4 cylinders.
28) Back off bolts which connect cylinder block on the side of #1 and #3 cylinders two or three turns.
29) Set up cylinder block so that #1 and #3 cylinders are on the upper side, then remove cylinder block connecting bolts.
30) 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.



(1) Cylinder block
(2) Rear oil seal
(3) Crankshaft
(4) Crankshaft bearing
(5) Piston

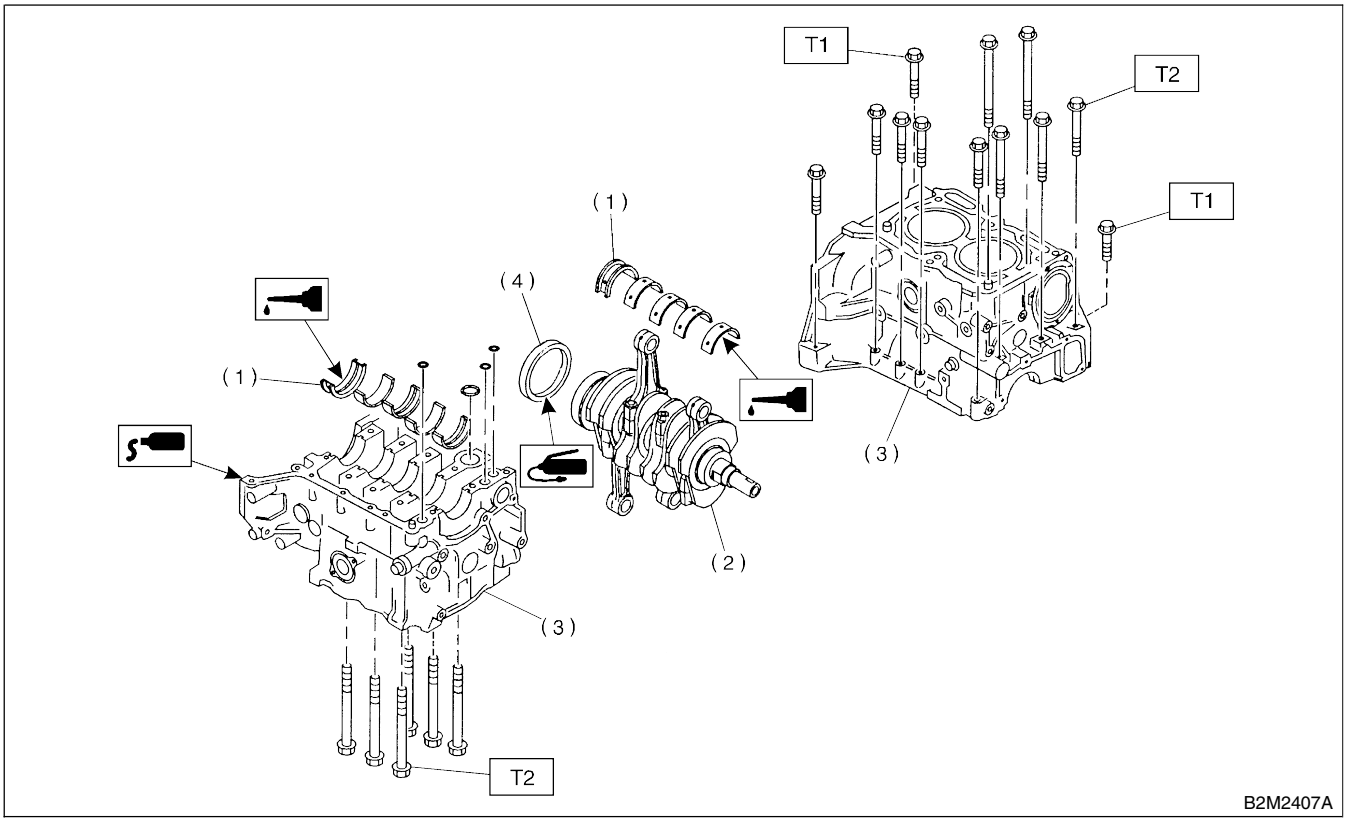
31) Remove rear oil seal.
32) Remove crankshaft together with connecting rod.
33) Remove crankshaft bearings from cylinder block using hammer handle.

CAUTION:
Do not confuse combination of crankshaft bearings. Press bearing at the end opposite to locking lip.

34) Draw out each piston from cylinder block using wooden bar or hammer handle.

CAUTION:
Do not confuse combination of piston and cylinder.

B: INSTALLATION S183090A11



(1) Crankshaft bearing
(2) Crankshaft
(3) Cylinder block
(4) Rear oil seal

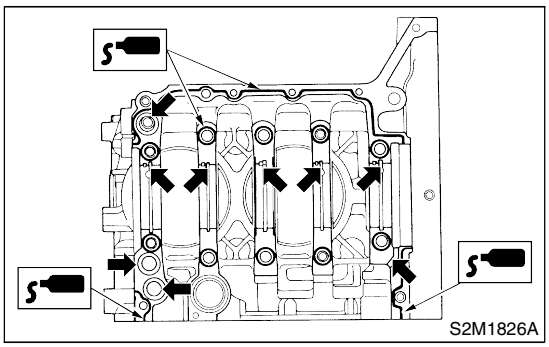
Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.1)
T2: 47 (4.8, 34.7)

CAUTION:
Remove oil in the mating surface of bearing and cylinder block before installation. Also apply a coat of engine oil to crankshaft pins.

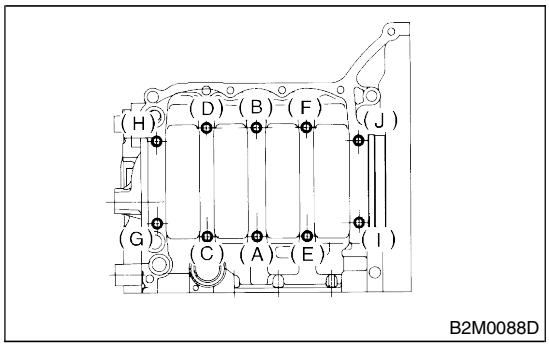
1) Position crankshaft on the #2 and #4 cylinder block.
2) Apply fluid packing to the mating surface of #1 and #3 cylinder block, and position it on #2 and #4 cylinder block.

Fluid packing:
THREE BOND 1215 or equivalent

CAUTION:
Do not allow fluid packing to jut into O-ring grooves, oil passages, bearing grooves, etc.



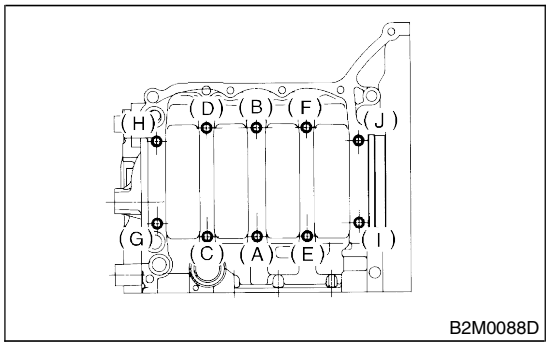
3) Temporarily tighten 10 mm cylinder block connecting bolts in alphabetical sequence shown in figure.



B2M0088D

4) Tighten 10 mm cylinder block connecting bolts in alphabetical sequence.

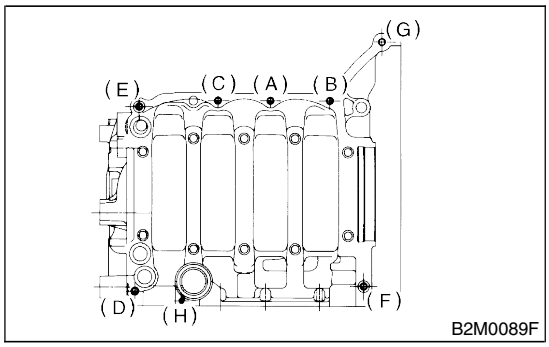
Tightening torque:
47 N·m (4.8 kgf-m, 34.7 ft-lb)



B2M0088D

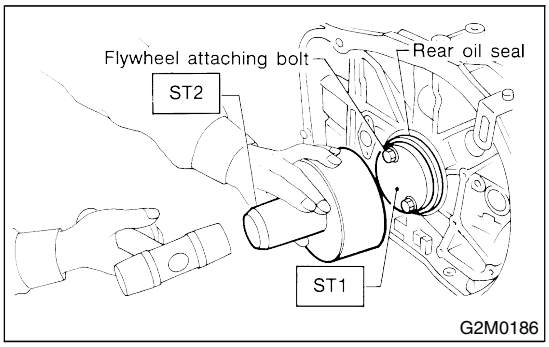
5) Tighten 8 mm and 6 mm cylinder block connecting bolts in alphabetical sequence shown in figure.

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

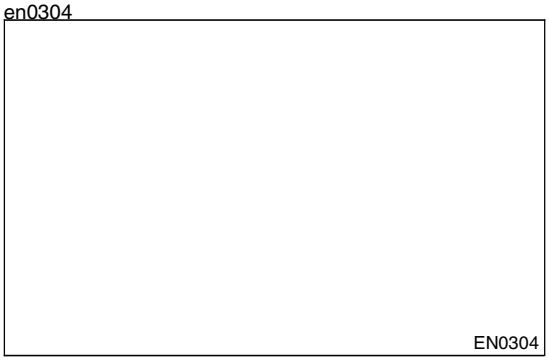
6) Install rear oil seal using ST1 and ST2.
ST1 499597100 OIL SEAL GUIDE
ST2 499587200 OIL SEAL INSTALLER



G2M0186

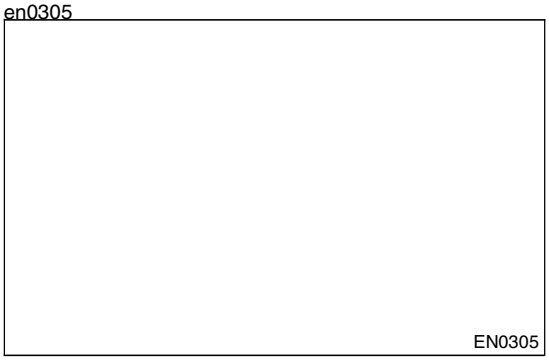
7) Position the top ring gap at (A) or (B) in the figure.

en0304


EN0304

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.

en0305

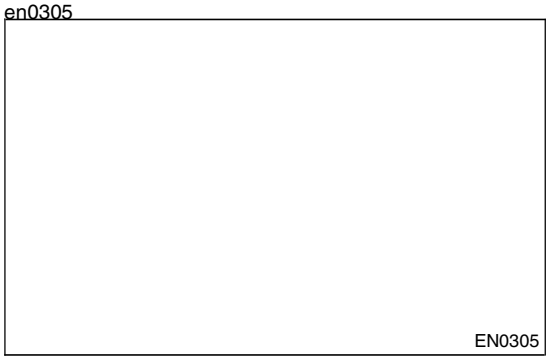

EN0305

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.

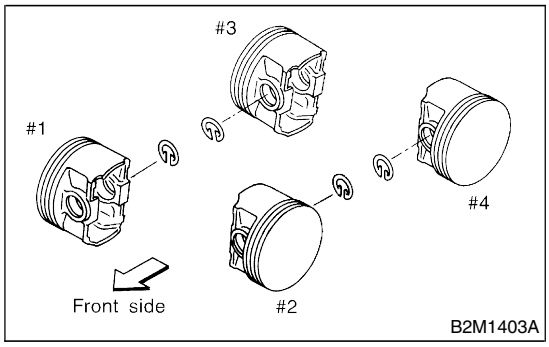
CAUTION:
• Ensure ring gaps do not face the same direction.
• Ensure ring gaps are not within the piston skirt area.

en0305



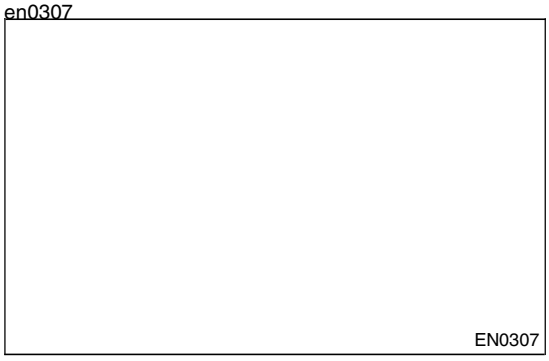
12) Install circlip.
Install circlips in piston holes located opposite service holes in cylinder block, when positioning all pistons in the corresponding cylinders.

CAUTION:
Use new circlips.

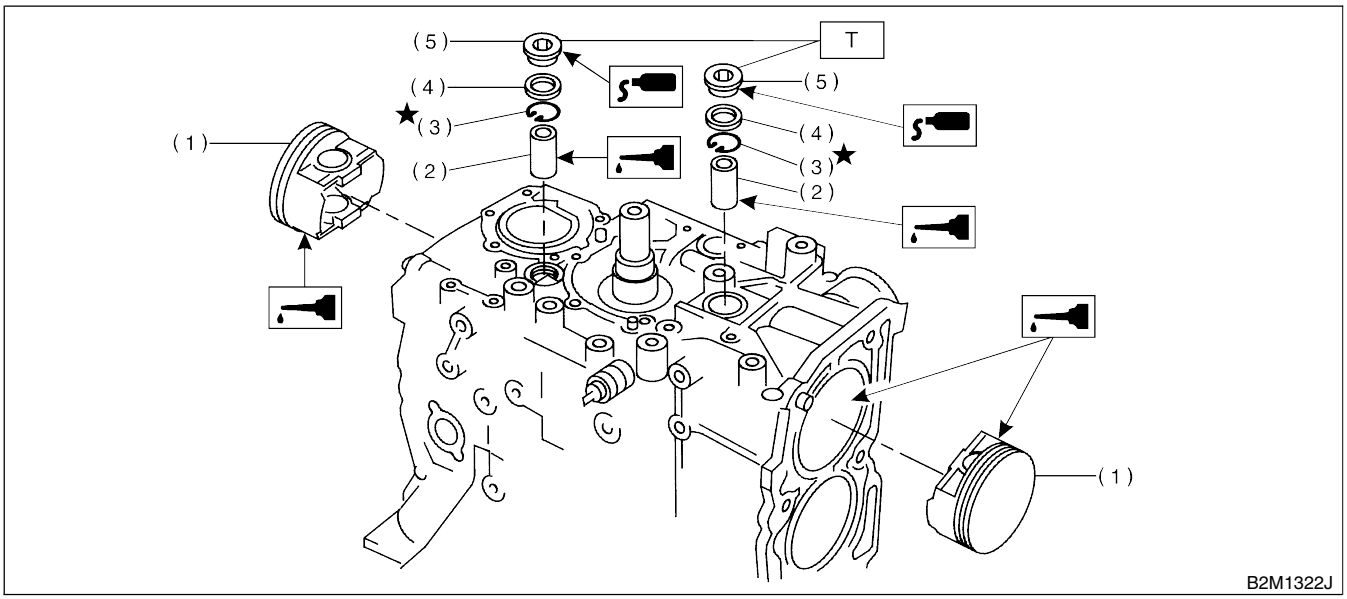


CAUTION:
Piston front mark faces towards the front of the engine.

en0307



(A) Front mark



(1) Piston
(2) Piston pin
(3) Circlip
(4) Gasket
(5) Service hole plug

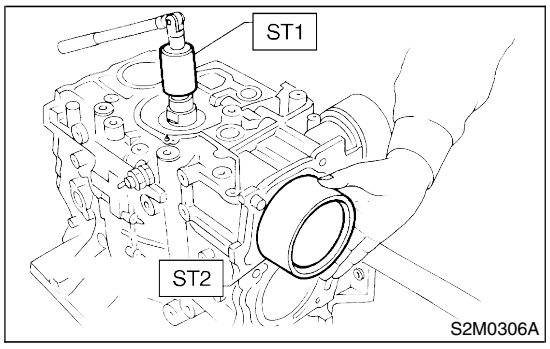
Tightening torque: N·m (kgf-m, ft-lb)
T: 69 (7.0, 50.6)

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.

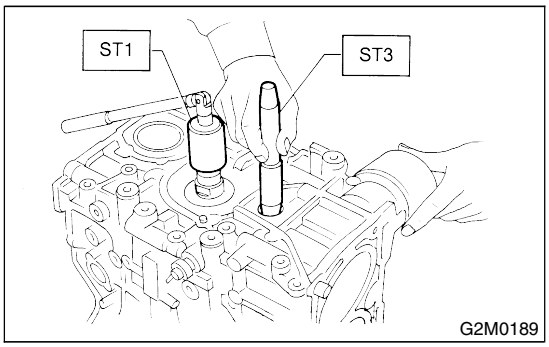
ST2 498744300 PISTON GUIDE



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.

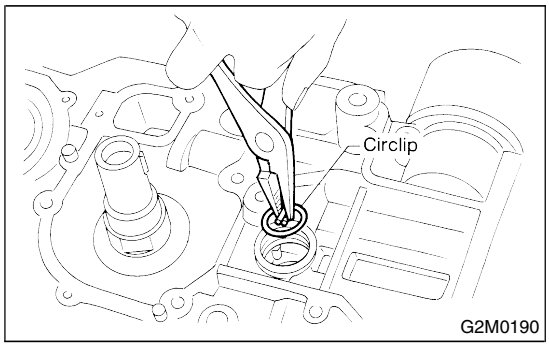
ST3 499017100 PISTON PIN GUIDE



(2) Apply a coat of engine oil to piston pin and insert piston pin into piston and connecting rod through service hole.

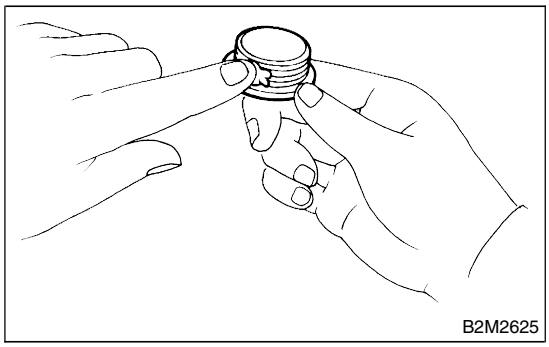
(3) Install circlip.

CAUTION:
Use new circlips.



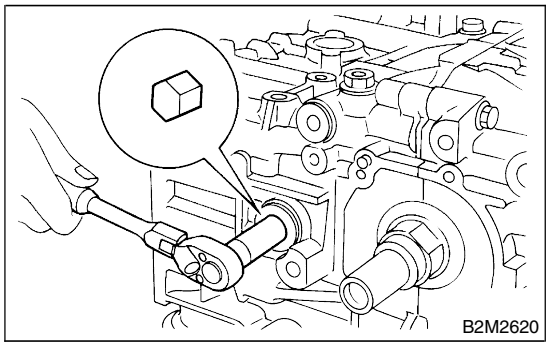
(4) Apply fluid packing around the service hole plug.

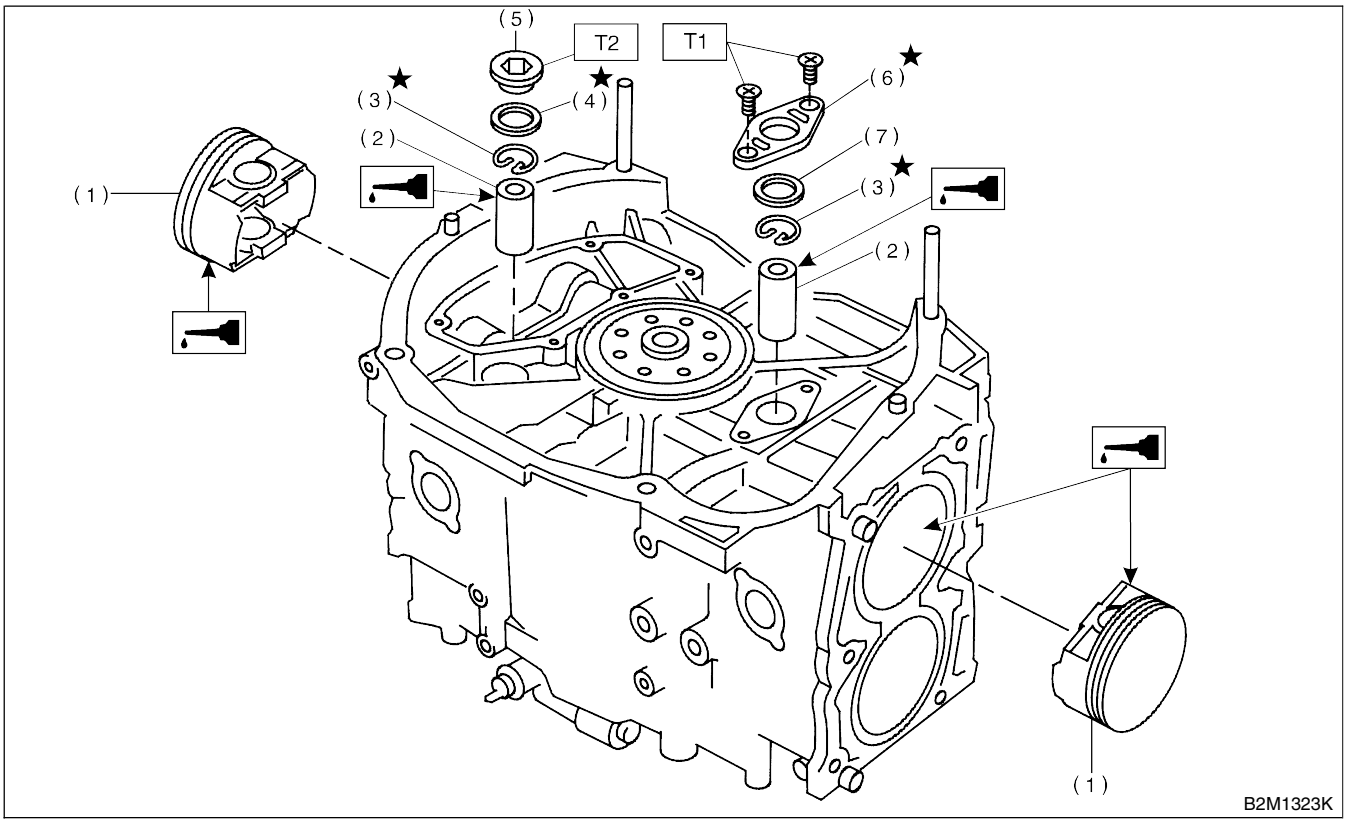
Fluid packing:
THREE BOND 1215 or equivalent



(5) Install service hole plug and gasket.

CAUTION:
Use a new gasket.





(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.
16) Install baffle plate.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

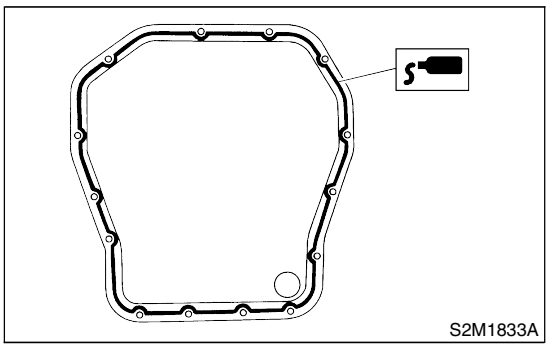
17) Install oil strainer and O-ring

Tightening torque:
10 N·m (1.0 kgf-m, 7 ft-lb)

18) Install oil strainer stay.

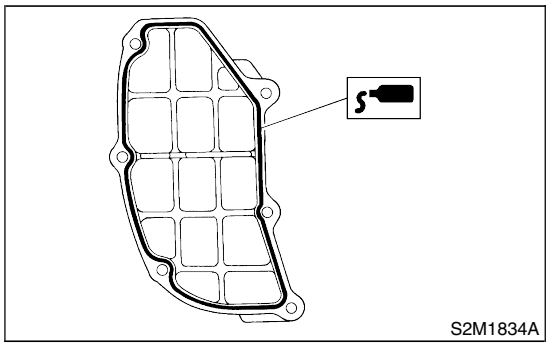
19) Apply fluid packing to matching surfaces and install oil pan.

Fluid packing:
THREE BOND 1215 or equivalent



20) Apply fluid packing to matching surfaces and install oil separator cover.

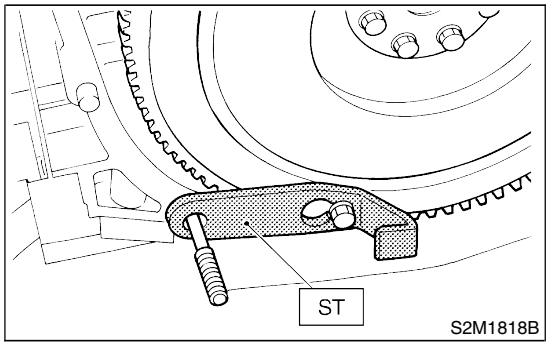
Fluid packing:
THREE BOND 1215 or equivalent



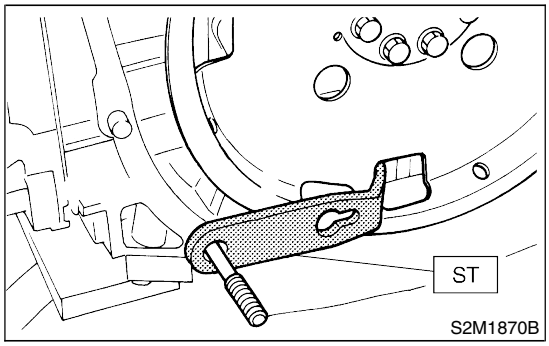
21) Install flywheel (MT vehicles) or drive plate (AT vehicles).
To lock crankshaft, use ST.
ST 498497100 CRANKSHAFT STOPPER

Tightening torque:
72 N·m (7.3 kgf-m, 52.8 ft-lb)

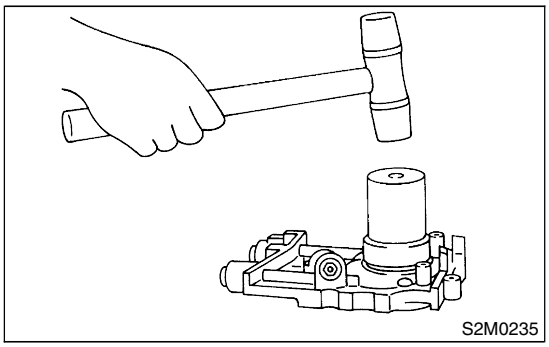
- MT VEHICLES



- AT VEHICLES

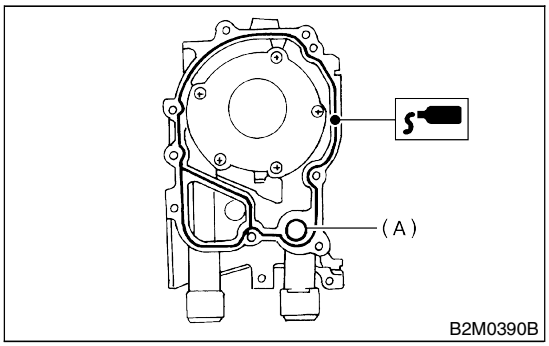


22) Install clutch housing cover.
23) Installation of oil pump
(1) Discard front oil seal after removal. Replace with a new one using ST.
ST 499587100 OIL SEAL INSTALLER



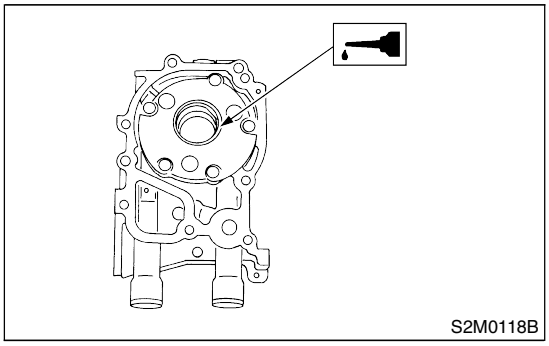
(2) Apply fluid packing to matching surface of oil pump.

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.

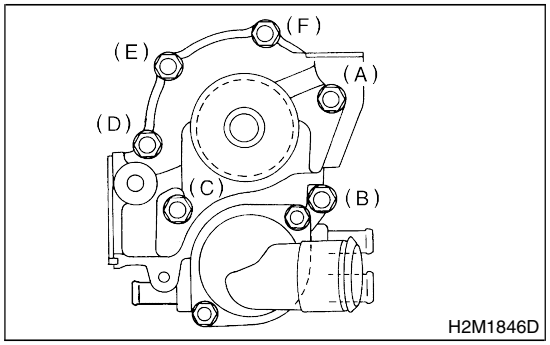
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

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.

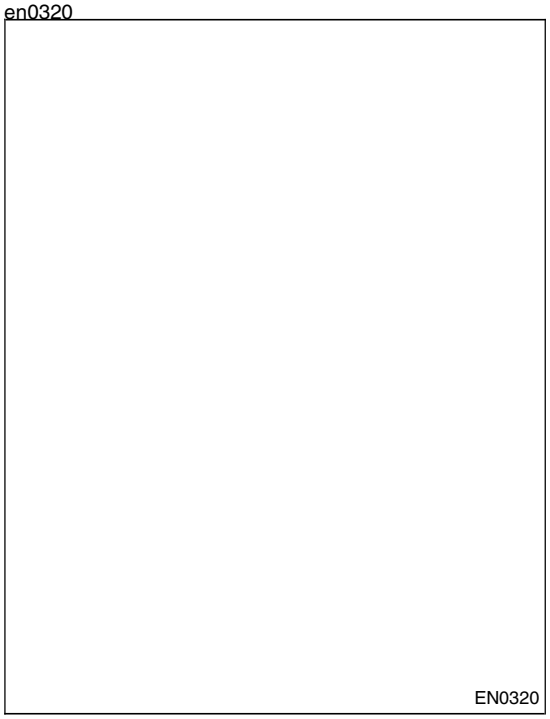


H2M1846D

25) Install water by-pass pipe for heater.
26) Install oil cooler.

Tightening torque:
T1: 55 N·m (5.5 kgf-m, 40 ft-lb)
T2: 69 N·m (7.0 kgf-m, 50.6 ft-lb)

en0320

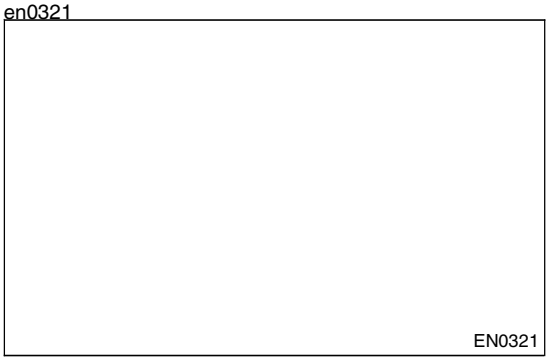

EN0320

(A) O-ring
(B) Oil cooler
(C) Connector

27) Install oil filter using ST.
ST 498547000 OIL FILTER WRENCH

28) Install water by-pass pipe between oil cooler and water pump.

en0321

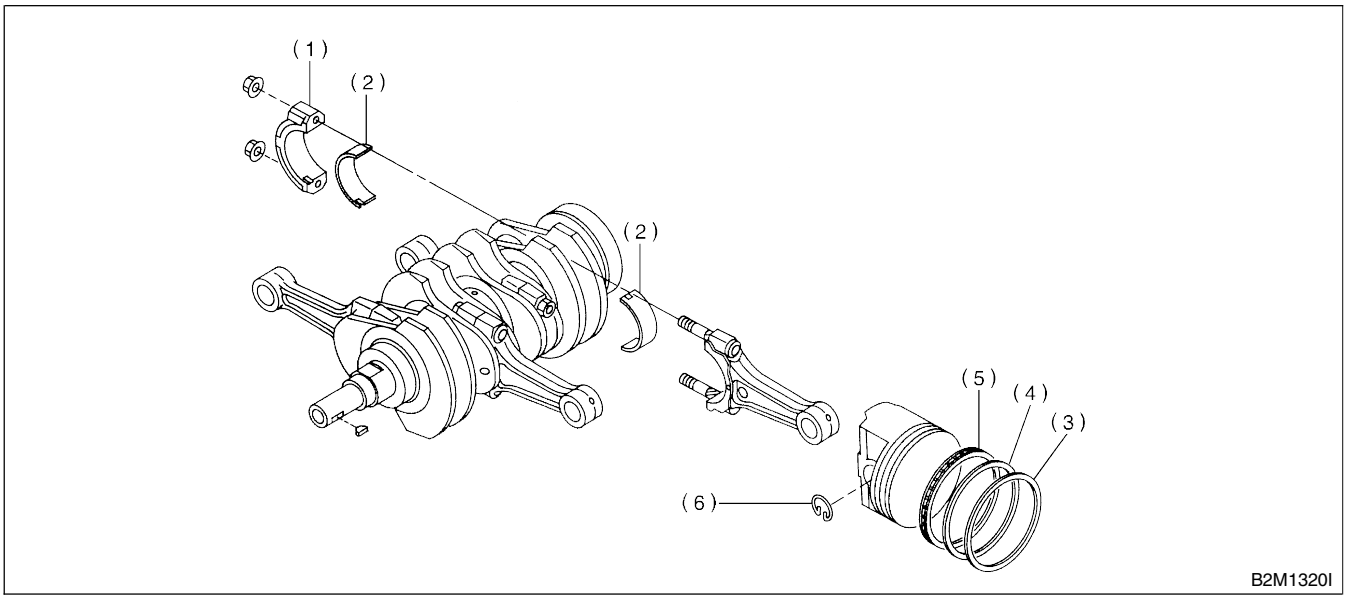

EN0321

29) Install water pipe.

CAUTION:
Always use a new O-ring.

30) Install cylinder head assembly. <Ref. to ME(DOHC TURBO)-63, INSTALLATION, Cylinder Head Assembly.>
31) Install oil level gauge guide and tighten attaching bolt (left side only).
32) Install rocker cover.
33) Install crankshaft sprocket. <Ref. to ME(DOHC TURBO)-57, INSTALLATION, Crankshaft Sprocket.>
34) Install camshaft sprocket. <Ref. to ME(DOHC TURBO)-56, INSTALLATION, Camshaft Sprocket.>
35) Install timing belt assembly. <Ref. to ME(DOHC TURBO)-49, INSTALLATION, Timing Belt Assembly.>
36) Install belt cover. <Ref. to ME(DOHC TURBO)-47, INSTALLATION, Belt Cover.>
37) Install crankshaft pulley. <Ref. to ME(DOHC TURBO)-46, INSTALLATION, Crankshaft Pulley.>
38) Install generator and A/C compressor brackets on cylinder head.
39) Install V-belt. <Ref. to ME(DOHC TURBO)-44, INSTALLATION, V-belt.>
40) Install intake manifold. <Ref. to FU(DOHC TURBO)-15, REMOVAL, Intake Manifold.>

C: DISASSEMBLY S183090A06



(1) Connecting rod cap
(2) Connecting rod bearing
(3) Top ring
(4) Second ring
(5) Oil ring
(6) Circlip

1) Remove connecting rod cap.
2) Remove connecting rod bearing.

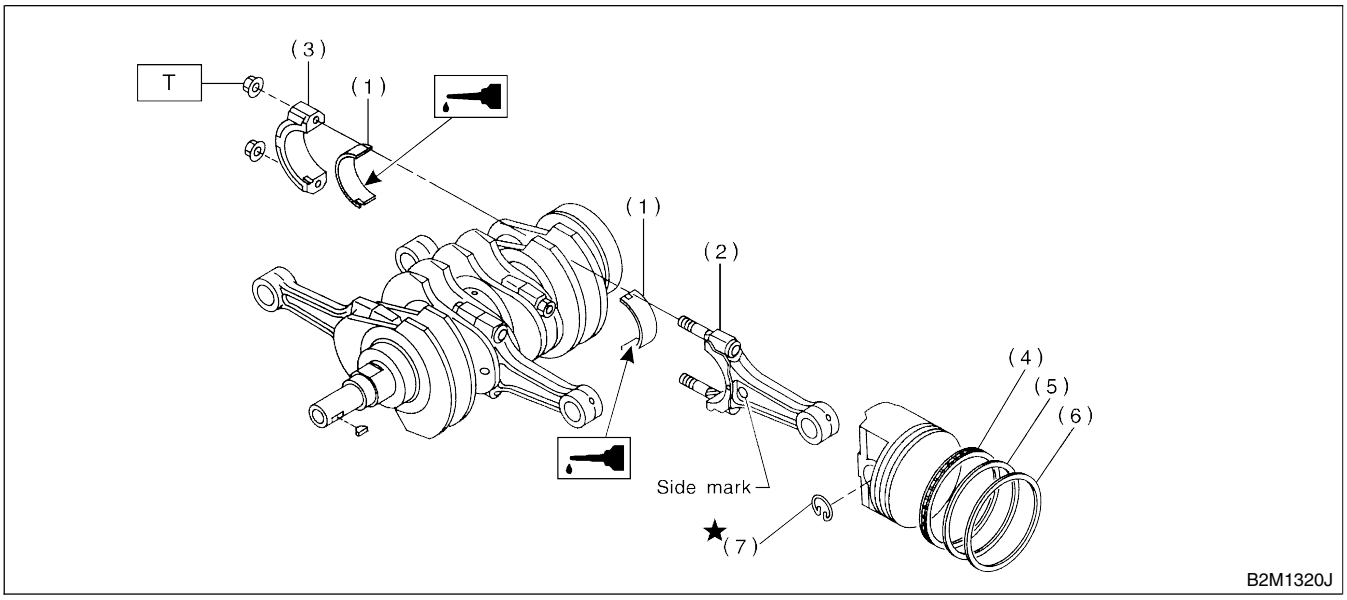
CAUTION:
Arrange removed connecting rod, connecting rod cap and bearing in order to prevent confusion.

3) Remove piston rings using the piston ring expander.
4) Remove the oil ring by hand.

CAUTION:
Arrange the removed piston rings in good order to prevent confusion.

5) Remove circlip.

D: ASSEMBLY S183090A02



(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 S183090A10

1. CYLINDER BLOCK S183090A1001

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)

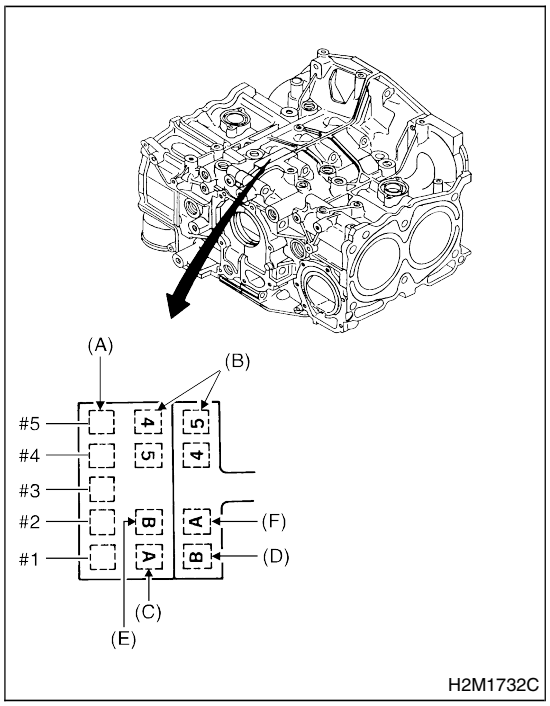
2. CYLINDER AND PISTON S183090A1002

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: 92.005 — 92.015 mm (3.6222 — 3.6226 in)
B: 91.995 — 92.005 mm (3.6218 — 3.6222 in)



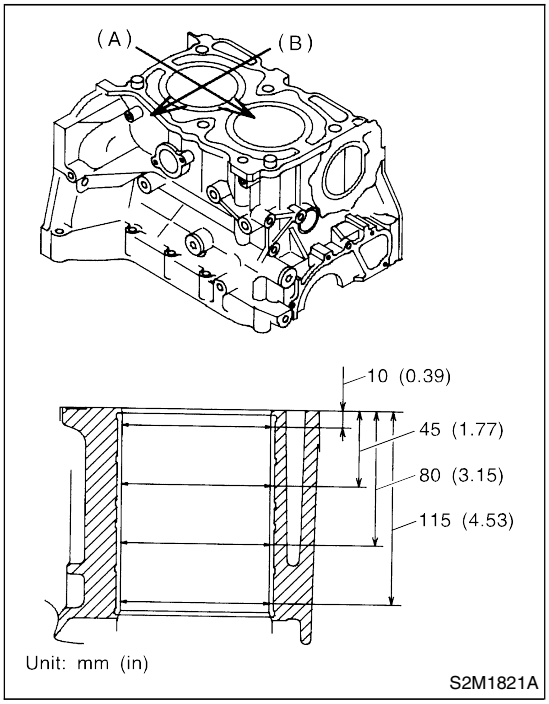
(A) Main jourual size mark
(B) Cylinder block RH-LH combination mark
(C) #1 cylinder bore size mark
(D) #2 cylinder bore size mark
(E) #3 cylinder bore size mark
(F) #4 cylinder bore size mark

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)



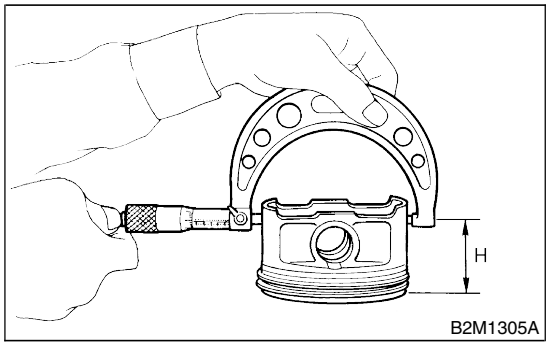
(A) Piston pin direction
(B) Thrust direction

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: 91.985 — 91.995 mm
(3.6214 — 3.6218 in)
B: 91.975 — 91.985 mm
(3.6211 — 3.6214 in)
0.25 mm (0.0098 in) oversize
92.225 — 92.235 mm
(3.6309 — 3.6313 in)
0.50 mm (0.0197 in) oversize
92.475 — 92.485 mm
(3.6407 — 3.6411 in)



5) Calculate the clearance between cylinder and piston.

CAUTION:
Measurement should be performed at a temperature of 20°C (68°F).

Cylinder to piston clearance at 20°C (68°F):
Standard
0.010 — 0.030 mm (0.0004 — 0.0012 in)
Limit
0.050 mm (0.0020 in)

6) Boring and honing
(1) If the value of taper, out-of-roundness, or cylinder-to-piston clearance measured exceeds the specified limit or if there is any damage on the cylinder wall, rebore it to use an oversize piston.

CAUTION:
When any of the cylinders needs reboring, all other cylinders must be bored at the same time, and use oversize pistons. Do not perform boring on one cylinder only, nor use an oversize piston for one cylinder only.

(2) If the cylinder inner diameter exceeds the limit after boring and honing, replace the crankcase.

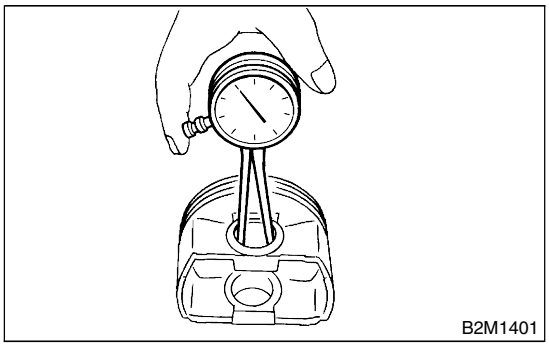
CAUTION:
Immediately after reboring, the cylinder diameter may differ from its real diameter due to temperature rise. Thus, pay attention to this when measuring the cylinder diameter.

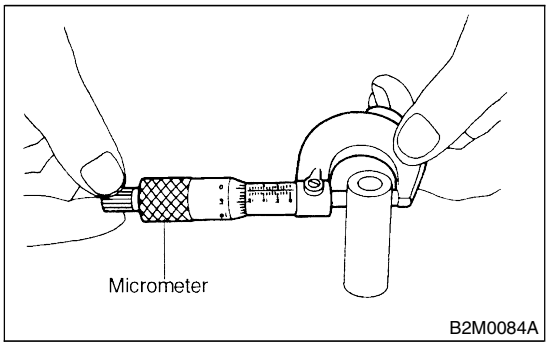
Limit of cylinder enlarging (boring):
0.5 mm (0.020 in)

3. PISTON AND PISTON PIN *S183090A1003*

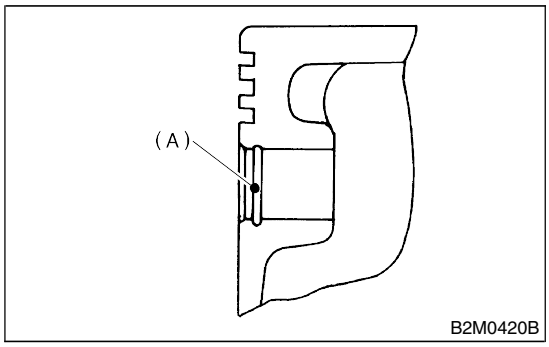
1) Check pistons and piston pins for damage, cracks, and wear and the piston ring grooves for wear and damage. Replace if defective.
2) Measure the piston-to-cylinder clearance at each cylinder. <Ref. to ME(DOHC TURBO)-84, CYLINDER AND PISTON, INSPECTION, Cylinder Block.> If any of the clearances is 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)





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.



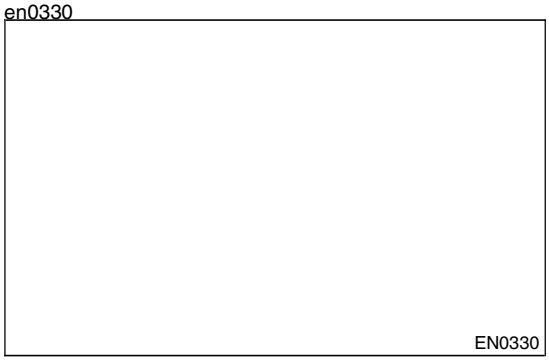
5) Check piston pin circlip for distortion, cracks and wear.

4. PISTON RING S183090A1004

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.

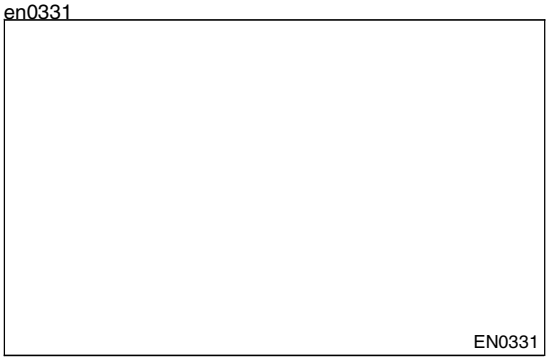
CAUTION:
• "N" is marked on the end of the top and second rings. When installing the rings to the piston, face this mark upward.

en0330



• The oil ring is a combined ring consisting of two rails and a spacer in between. When installing, be careful to assemble correctly.

en0331

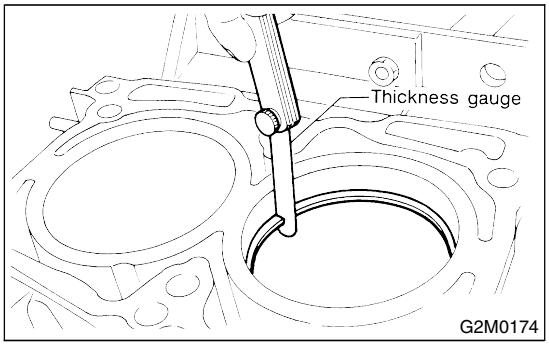


(A) Top ring
(B) Second ring
(C) Oil ring
(a) Upper rail
(b) Spacer
(c) Lower rail

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)

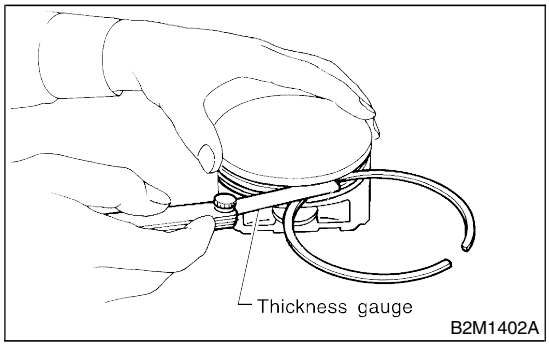


3) Measure the clearance between piston ring and piston ring groove with a thickness gauge.

CAUTION:
Before measuring the clearance, clean the piston ring groove and piston ring.

Unit: mm (in)

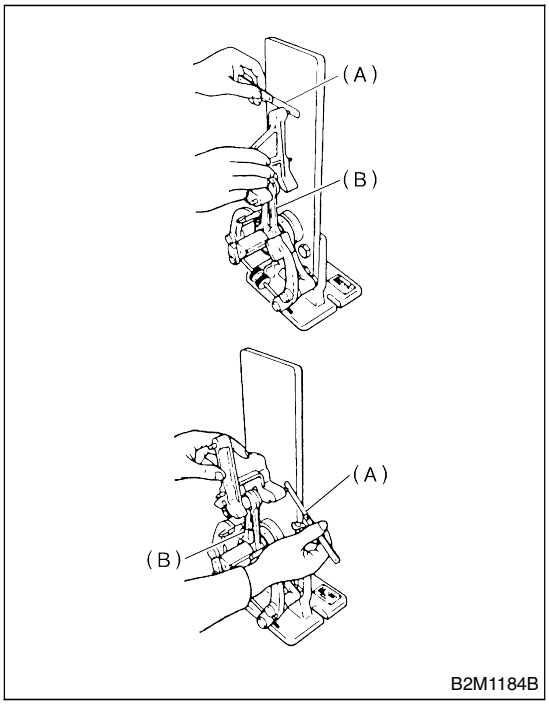
		Standard	Limit
Clearance between piston ring and piston ring groove	Top ring	0.040 — 0.080 (0.0016 — 0.0031)	0.15 (0.0059)
	Second ring	0.030 — 0.070 (0.0012 — 0.0028)	0.15 (0.0059)



5. CONNECTING ROD S183090A1005

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)

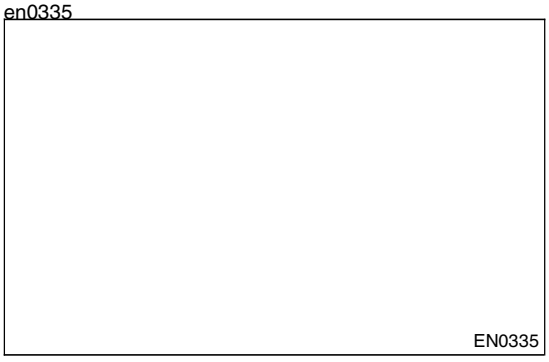


(A) Thickness gauge
(B) Connecting rod

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)

en0335



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.)

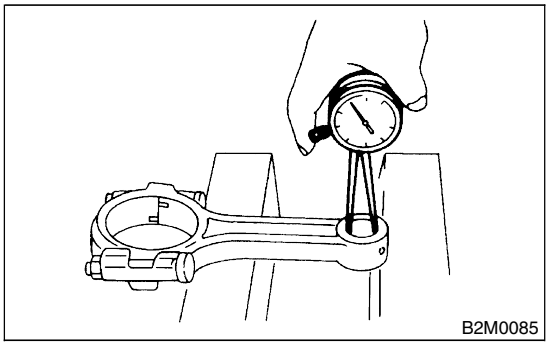
Connecting rod oil clearance:
Standard
0.020 — 0.046 mm (0.0008 — 0.0018 in)
Limit
0.05 mm (0.0020 in)

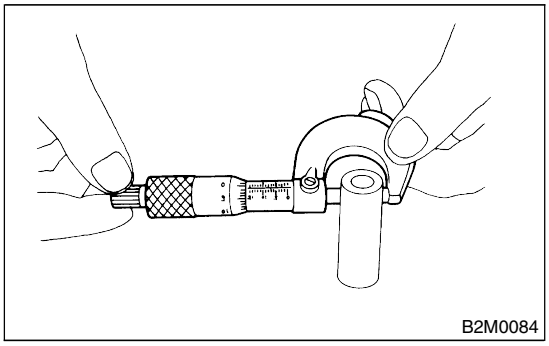
Unit: mm (in)

Bearing	Bearing size (Thickness at center)	Outer diameter of crank pin
Standard	1.492 — 1.501 (0.0587 — 0.0591)	51.984 — 52.000 (2.0466 — 2.0472)
0.03 (0.0012) undersize	1.510 — 1.513 (0.0594 — 0.0596)	51.954 — 51.970 (2.0454 — 2.0461)
0.05 (0.0020) undersize	1.520 — 1.523 (0.0598 — 0.0600)	51.934 — 51.950 (2.0446 — 2.0453)
0.25 (0.0098) undersize	1.620 — 1.623 (0.0638 — 0.0639)	51.734 — 51.750 (2.0368 — 2.0374)

6) Inspect bushing at connecting rod small end, and replace if worn or damaged. Also measure the piston pin clearance at the connecting rod small end.

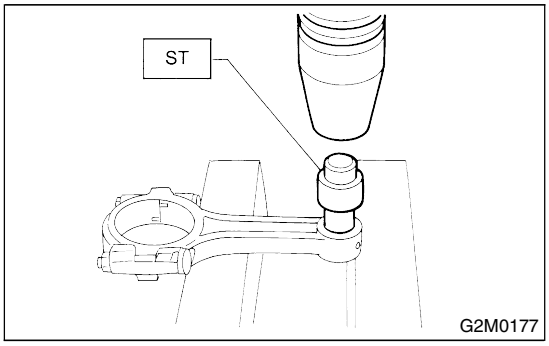
Clearance between piston pin and bushing:
Standard
0 — 0.022 mm (0 — 0.0009 in)
Limit
0.030 mm (0.0012 in)


B2M0085


B2M0084

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.

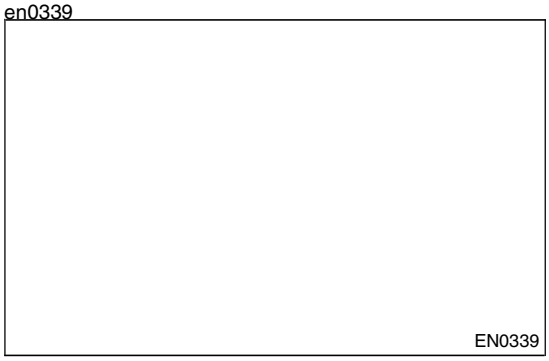
6. CRANKSHAFT AND CRANKSHAFT BEARING S183090A1006

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.

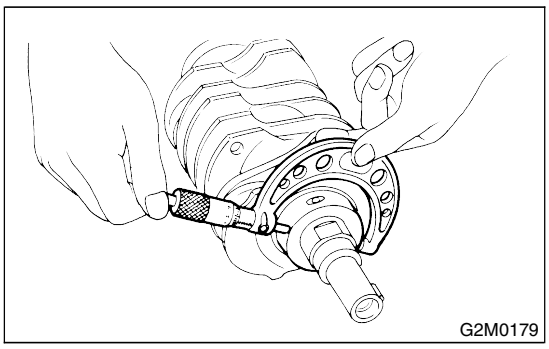
Crankshaft bend limit:
0.035 mm (0.0014 in)

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)



Unit: mm (in)

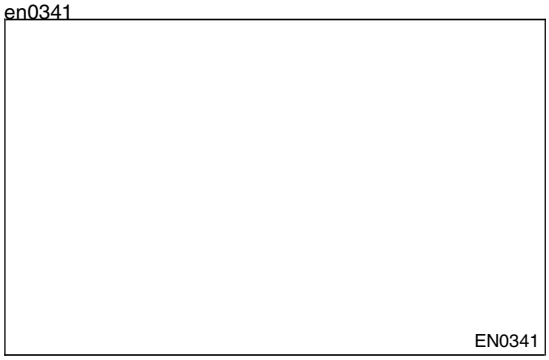
		Crank journal diameter		Crank pin diameter
		#1, #3, #5	#2, #4	
Standard	Journal O.D.	59.992 — 60.008 (2.3619 — 2.3625)	59.992 — 60.008 (2.3619 — 2.3625)	51.984 — 52.000 (2.0466 — 2.0472)
	Bearing size (Thickness at center)	1.998 — 2.011 (0.0787 — 0.0792)	2.000 — 2.013 (0.0787 — 0.0793)	1.492 — 1.510 (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 (20368 — 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)

21. Engine Trouble in General S183095

A: INSPECTION S183095A10

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(DOHC TURBO)-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(DOHC TURBO)-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(DOHC TURBO)-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(DOHC TURBO)-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(DOHC TURBO)-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(DOHC TURBO)-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(DOHC TURBO)-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(DOHC TURBO)-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(DOHC TURBO)-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(DOHC TURBO)-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 filter seal	B
		• Defective crankshaft oil seal	B
		• Defective rocker cover gasket	B
		• Loosened oil drain plug or defective gasket	B
		• Loosened oil pan fitting bolts or defective oil pan	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
10. Excessive fuel consumption	• Engine control system <Ref. to EN(DOHC TURBO)-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

22. Engine Noise S183096

A: INSPECTION S183096A10

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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(DOHC TURBO)-44, OPERATION, Inspection Mode.> after connecting fuel injector connector.

MEMO:

EXHAUST

EX(DOHC TURBO)

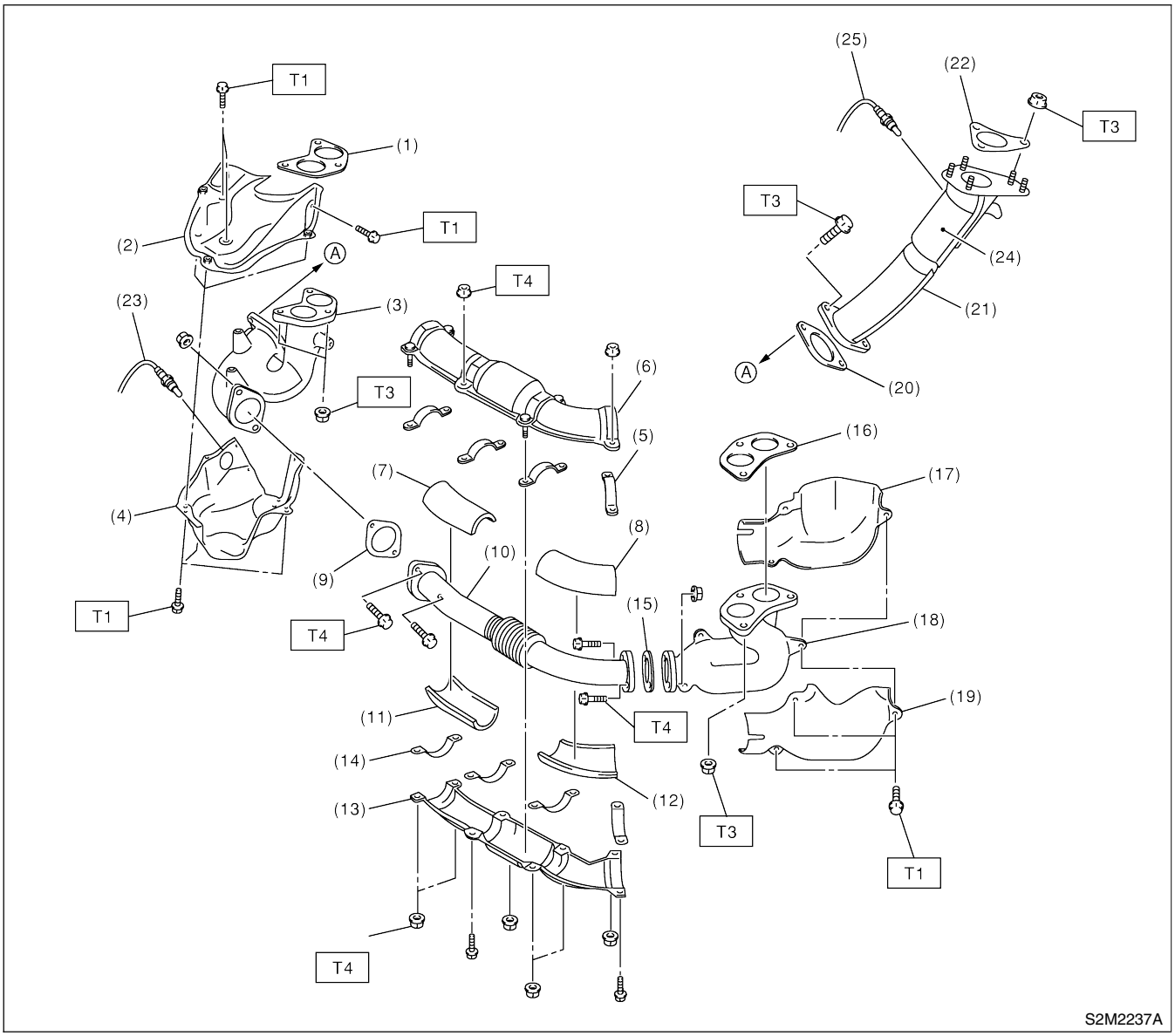
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1. General Description....2
2. Front Exhaust Pipe....7
3. Center Exhaust Pipe....9
4. Joint Pipe....13
5. Rear Exhaust Pipe....14
6. Muffler....15

1. General Description S182001

A: COMPONENT S182001A05

1. FRONT EXHAUST PIPE S182001A0501

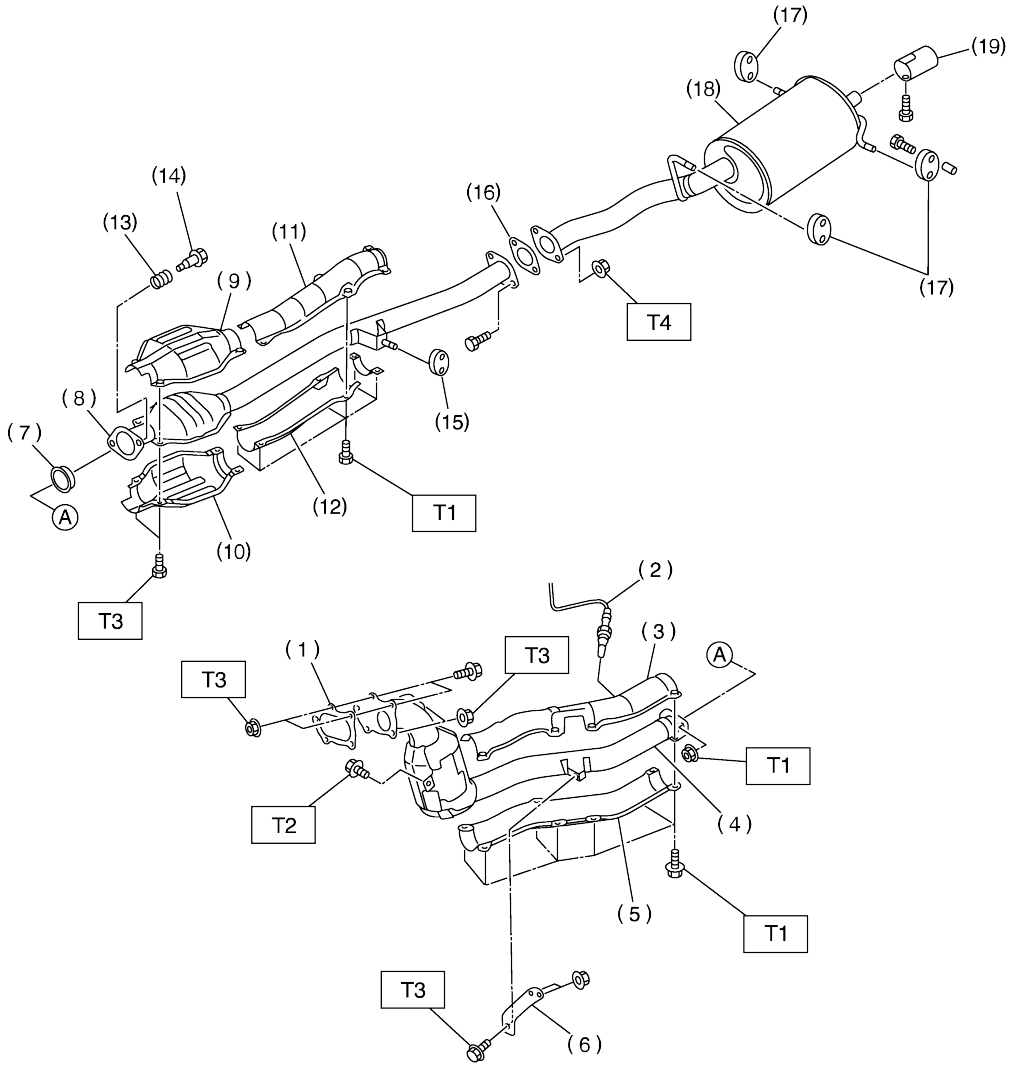


(1) Gasket
(2) Upper exhaust manifold cover (RH)
(3) Exhaust manifold (RH)
(4) Lower exhaust manifold cover (RH)
(5) Front exhaust pipe upper clamp
(6) Front exhaust pipe upper cover
(7) Front exhaust pipe upper insulator (RH)
(8) Front exhaust pipe upper insulator (LH)
(9) Gasket
(10) Front exhaust pipe
(11) Front exhaust pipe lower insulator (RH)
(12) Front exhaust pipe lower insulator (LH)
(13) Front exhaust pipe lower cover
(14) Front exhaust pipe lower clamp
(15) Gasket
(16) Gasket
(17) Upper exhaust manifold cover (LH)
(18) Exhaust manifold (LH)
(19) Lower exhaust manifold cover (LH)
(20) Gasket
(21) Turbocharger joint pipe
(22) Gasket
(23) Front oxygen (A/F) sensor
(24) Precatalytic converter
(25) Exhaust temperature sensor

Tightening torque: N·m (kgf-m, ft-lb)
T1: 18.6 (1.9, 13.7)
T2: 25 (2.5, 18.1)
T3: 35 (3.6, 26.0)
T4: 39 (4, 28.9)

2. CENTER AND REAR EXHAUST PIPE, AND MUFFLER S182001A0502

● AUSTRALIA SPEC. VEHICLES

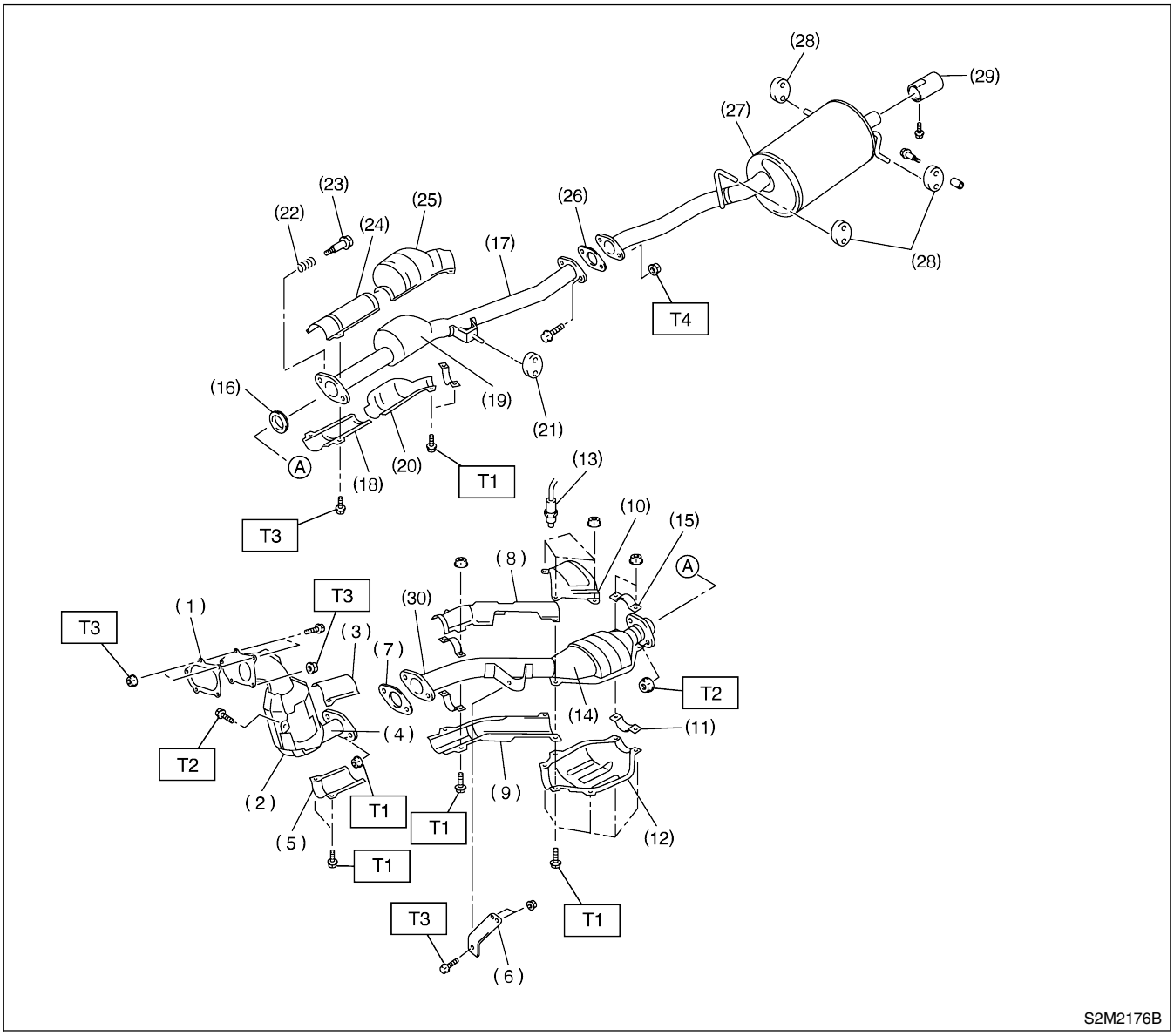


S2M2239A

(1) Gasket
(2) Rear oxygen converter
(3) Upper center pipe cover
(4) Center exhaust pipe
(5) Lower center pipe cover
(6) Bracket (MT)
(7) Gasket
(8) Rear exhaust pipe
(9) Upper cover
(10) Lower cover
(11) Upper cover A
(12) Lower cover A
(13) Spring
(14) Bolt
(15) Cushion
(16) Gasket
(17) Cushion
(18) Muffler
(19) Muffler cutter

Tightening torque: N·m (kgf-m, ft-lb)
T1: 18 (1.8, 13.0)
T2: 30 (3.1, 22.4)
T3: 35 (3.6, 26.0)
T4: 48 (4.9, 35.4)

• EXCEPT AUSTRALIA SPEC. VEHICLES



(1) Gasket
(2) Front catalytic converter
(3) Upper center pipe cover (Front)
(4) Center exhaust pipe (Front)
(5) Lower center pipe cover (Front)
(6) Bracket
(7) Gasket
(8) Upper center pipe cover (Rear)
(9) Lower center pipe cover (Rear)
(10) Upper rear catalytic converter cover
(11) Lower clamp
(12) Lower rear catalytic converter cover
(13) Rear oxygen sensor
(14) Rear catalytic converter
(15) Upper clamp
(16) Gasket
(17) Rear exhaust pipe
(18) Lower rear exhaust pipe cover (Front)
(19) Chamber
(20) Lower rear exhaust pipe cover (Rear)
(21) Cushion
(22) Spring
(23) Bolt
(24) Upper rear exhaust pipe cover (Front)
(25) Upper rear exhaust pipe cover (Rear)
(26) Gasket
(27) Muffler
(28) Cushion
(29) Muffler cutter
(30) Center exhaust pipe (Rear)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 18 (1.8, 13.0)
T2: 30 (3.1, 22.4)
T3: 35 (3.6, 26.0)
T4: 48 (4.9, 35.4)

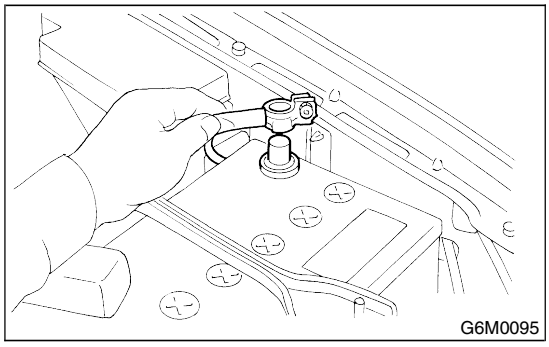
B: CAUTION S182001A03

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Before disconnecting electrical connectors of sensors or units, be sure to disconnect negative terminal from battery.

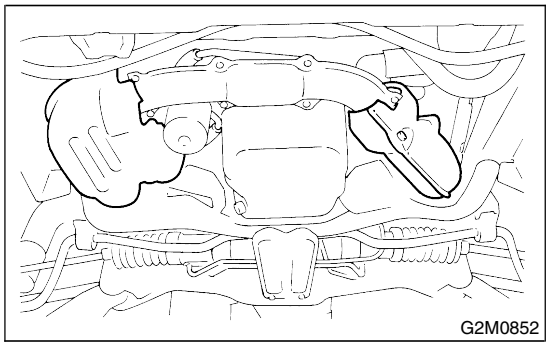
2. Front Exhaust Pipe S182065

A: REMOVAL S182065A18

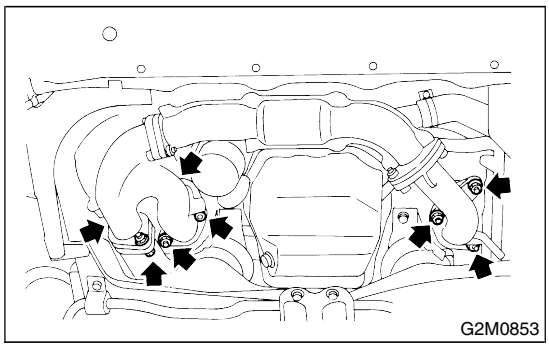
1) Disconnect battery ground cable.


G6M0095

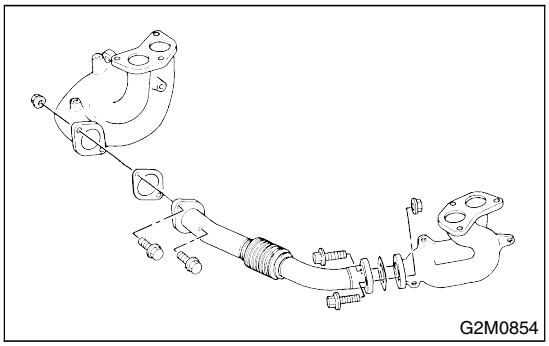
2) Remove front oxygen (A/F) sensor. <Ref. to FU(DOHC TURBO)-42, REMOVAL, Front Oxygen (A/F) Sensor.>
3) Remove under cover.
4) Remove lower exhaust manifold cover (RH).
5) Remove lower and upper exhaust manifold covers (LH).


G2M0852

6) Remove bolts and nuts which hold front exhaust pipe assembly to turbocharger joint pipe.
7) While holding front exhaust pipe assembly with one hand, remove nuts which hold front exhaust pipe assembly to cylinder head exhaust port.


G2M0853

8) Remove front exhaust pipe assembly.
9) Remove covers from exhaust manifold and front exhaust pipe.
10) Separate front exhaust pipe from exhaust mani-folds.

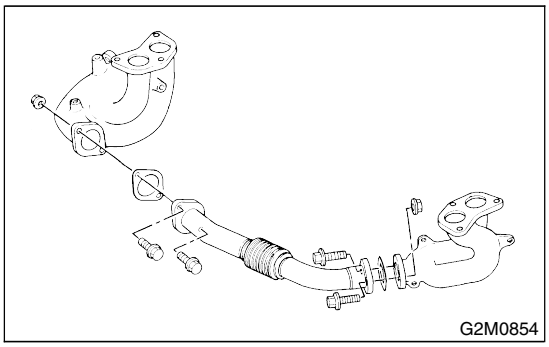

G2M0854

B: INSTALLATION S182065A11

CAUTION:
Replace gaskets with new ones.

1) Assemble front exhaust pipe and exhaust mani-folds.

Tightening torque:
39 N·m (4 kgf-m, 28.9 ft-lb)


G2M0854

2) Install front exhaust pipe covers.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

3) Install upper exhaust manifold cover (RH).

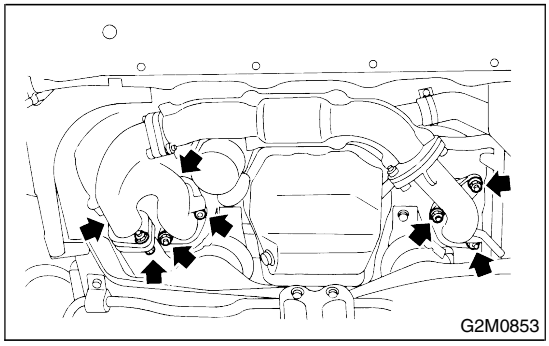
Tightening torque:
18.6 N·m (1.9 kgf-m, 13.7 ft-lb)

4) Install front exhaust pipe assembly.

Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)

5) Connect exhaust manifold (RH) to turbocharger joint pipe.

Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)

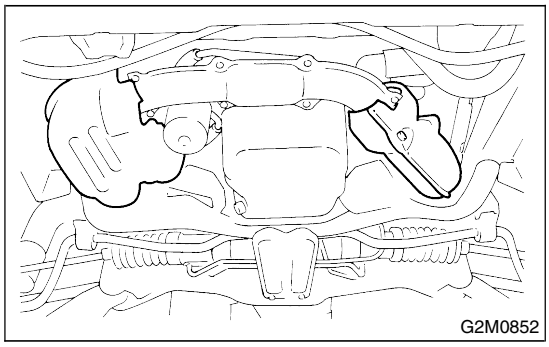

G2M0853

6) Install upper and lower exhaust manifold covers (LH).

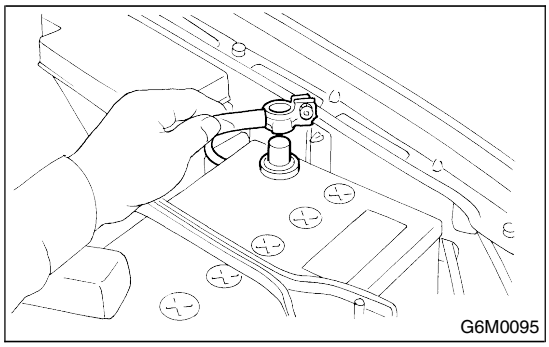
Tightening torque:
18.6 N·m (1.9 kgf-m, 13.7 ft-lb)

7) Install lower exhaust manifold cover (RH).

Tightening torque:
18.6 N·m (1.9 kgf-m, 13.7 ft-lb)


G2M0852

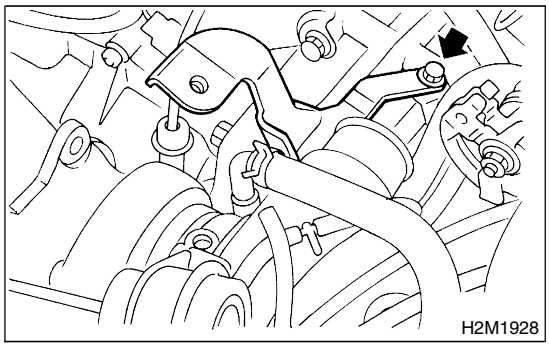
8) Install front oxygen (A/F) sensor. <Ref. to FU(DOHC TURBO)-43, INSTALLATION, Front Oxygen (A/F) Sensor.>
9) Install under cover.
10) Connect battery ground cable.


G6M0095

3. Center Exhaust Pipe S182067

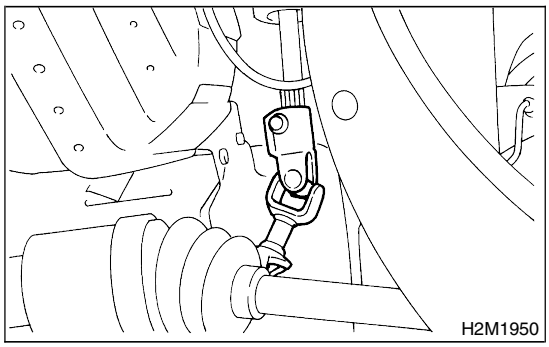
A: REMOVAL S182067A18

1) Set the vehicle on the lift.
2) Disconnect battery ground cable.
3) Remove intercooler. <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
4) Remove intercooler bracket.


H2M1928

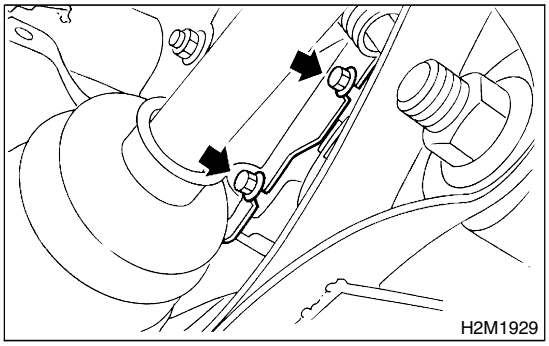
5) Lift-up the vehicle.
6) Remove under cover.
7) Remove universal joint bolts and then remove universal joint (RHD model only).

CAUTION:
Scribe alignment marks on universal joint so that it can be reassembled at the original serration.

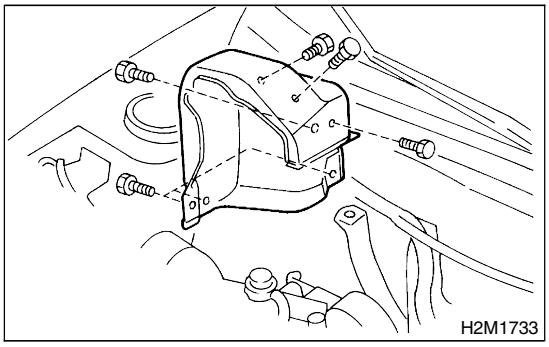

H2M1950

8) Remove bolts which install the lower side of turbocharger upper cover.

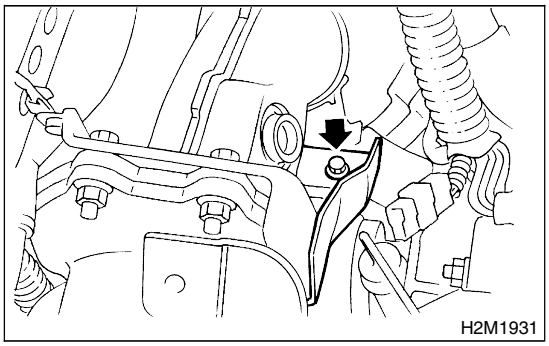
CAUTION:
Be careful, turbocharger and exhaust pipe are hot.


H2M1929

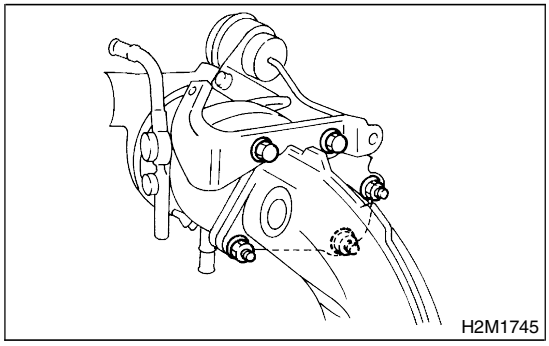
9) Lower the vehicle.
10) Remove turbocharger upper cover.


H2M1733

11) Remove bolts which install the upper side of turbocharger lower cover, and remove it.

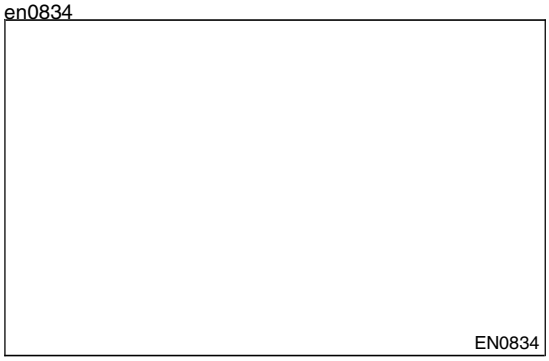

H2M1931

12) Separate center exhaust pipe from turbocharger.

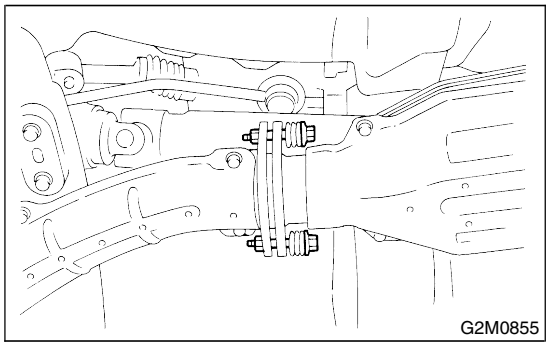

H2M1745

13) Lift-up the vehicle.
14) Disconnect connector from rear oxygen sensor.

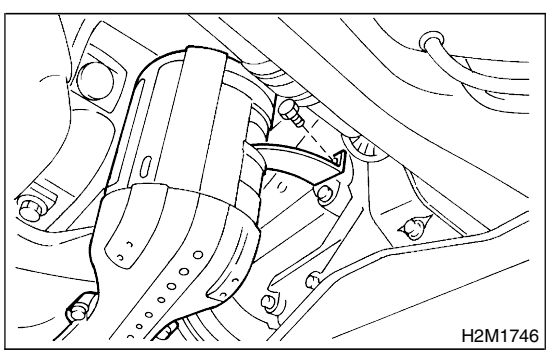
en0834


EN0834

15) Separate center exhaust pipe from rear exhaust pipe.

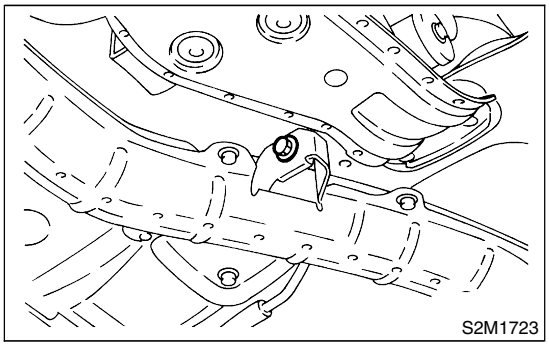

G2M0855

16) Remove bolt which holds center exhaust pipe bracket to transmission.

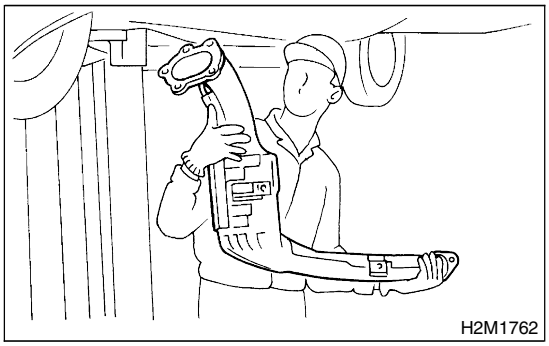

H2M1746

17) Remove intercooler bracket.
18) Remove bolt which holds center exhaust pipe to hanger bracket.

CAUTION:
Be careful not to pull down center exhaust pipe.


S2M1723

19) Remove center exhaust pipe.

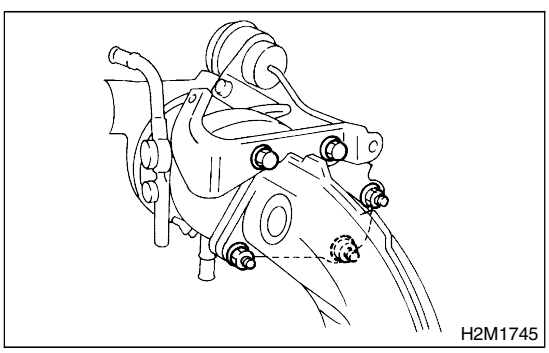

H2M1762

B: INSTALLATION S182067A11

CAUTION:
Replace gaskets with new ones.

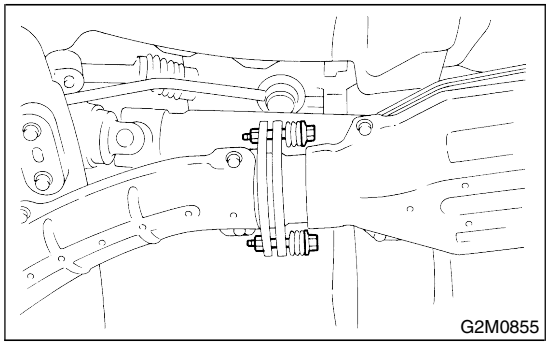
1) Install center exhaust pipe and temporarily tighten bolt which holds center exhaust pipe to hanger bracket.
2) Temporarily tighten bolt which holds center pipe to transmission.
3) Connect center exhaust pipe to turbocharger.

Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)


H2M1745

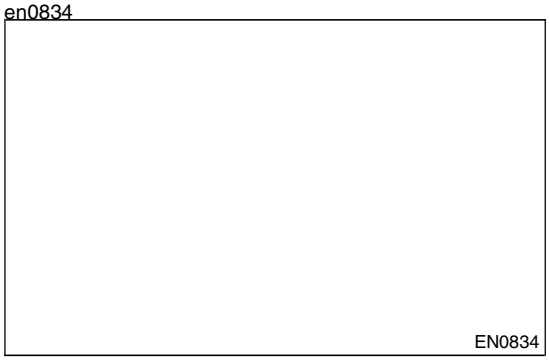
4) Install center exhaust pipe to rear exhaust pipe.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)


G2M0855

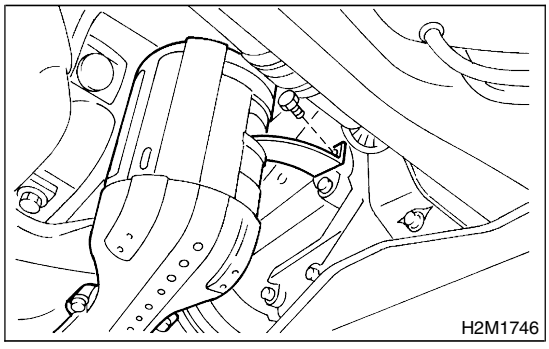
5) Connect connector to rear oxygen sensor.

en0834


EN0834

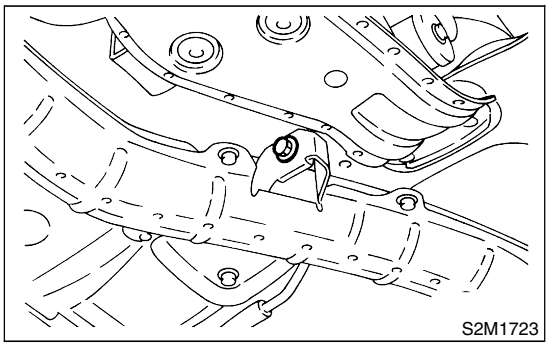
6) Tighten bolt which holds center exhaust pipe bracket to transmission.

Tightening torque:
30 N·m (3.1 kgf-m, 22.4 ft-lb)


H2M1746

7) Tighten bolt which holds center exhaust pipe to hanger bracket.

Tightening torque:
35 N·m (3.6 kgf-m, 26 ft-lb)


S2M1723

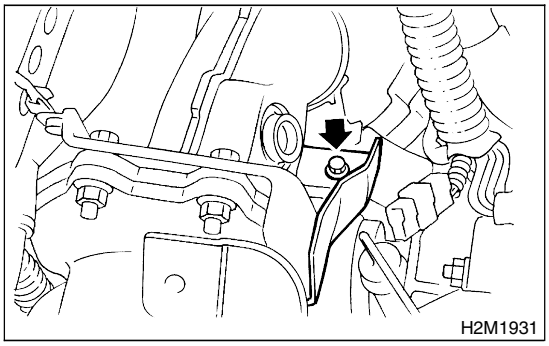
8) Tighten bolts which hold intercooler bracket.

Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)

9) Lower the vehicle.

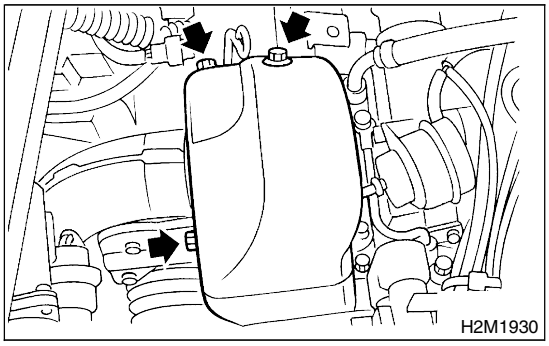
10) Place turbocharger lower cover, and tighten bolts which install the upper side of lower cover.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)


H2M1931

11) Place turbocharger upper cover, and tighten bolts which install the upper side of upper cover.

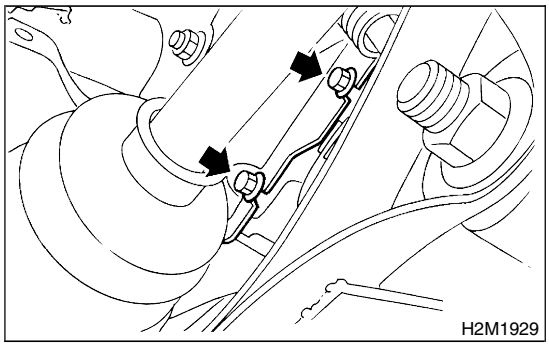
Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)


H2M1930

12) Lift-up the vehicle.

13) Tighten bolts which install the under side of turbocharger upper cover.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)

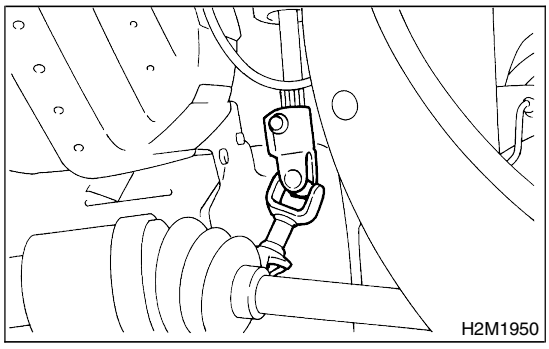


14) Install universal joint (RHD model only).
(1) Align bolt hole on the long yoke side of universal joint with the cutout at the serrated section of shaft end, and insert universal joint.
(2) Align bolt hole on the short yoke side of universal joint with the cutout at the serrated section of gearbox assembly. Lower universal joint completely.
(3) Temporarily tighten bolt on the short yoke side. Raise universal joint to make sure the bolt is properly passing through the cutout at the serrated section.
(4) Tighten bolt on the long yoke side, then that on the short yoke side.

Tightening torque:
24 N·m (2.4 kgf-m, 17.4 ft-lb)

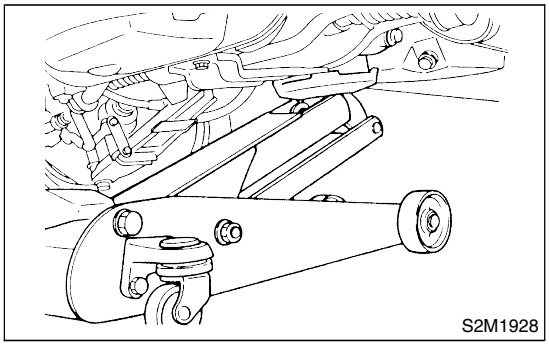
CAUTION:
• Make sure that universal joint bolts are tightened through notches in shaft serration.
• Excessively large tightening torque of universal joint bolts may lead to heavy steering wheel operation.

Standard clearance between gearbox to DOJ:
Over 15 mm (0.59 in)



15) Install under cover.
16) Lower the vehicle.

17) Install intercooler bracket.

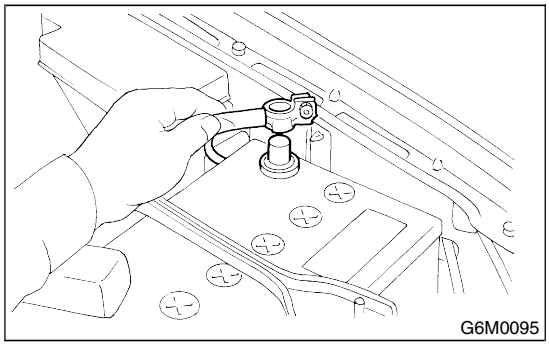


18) Install intercooler. <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>
19) Align center of roll connector. (With airbag model) <Ref. to AB-11, ROLL CONNECTOR, INSPECTION, Inspection Locations After a Collision.>

4. Joint Pipe S182771

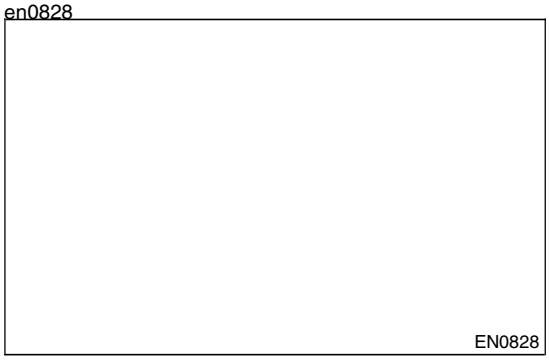
A: REMOVAL S182771A18

1) Disconnect battery ground cable.


G6M0095

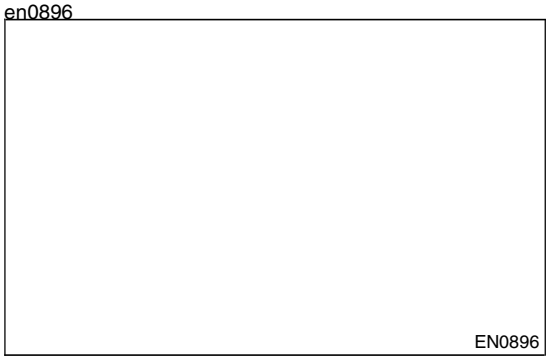
2) Remove solenoid valve cover.

en0828

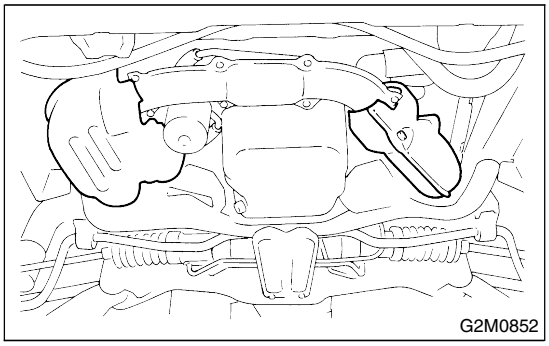

EN0828

3) Disconnect from exhaust temperature sensor connector.

en0896

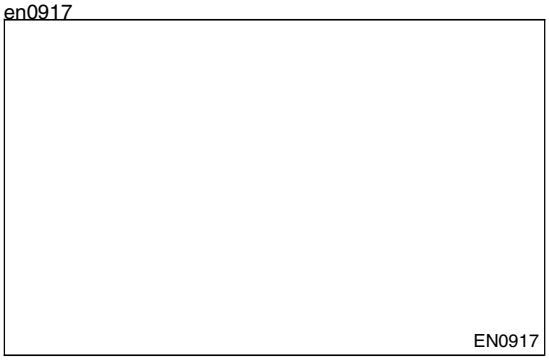

EN0896

4) Remove front oxygen (A/F) sensor. <Ref. to FU(DOHC TURBO)-42, REMOVAL, Front Oxygen (A/F) Sensor.>
5) Remove under cover.
6) Remove lower exhaust manifold cover (RH).


G2M0852

7) Remove nuts. Which hold front exhaust manifold to joint pipe.

en0917

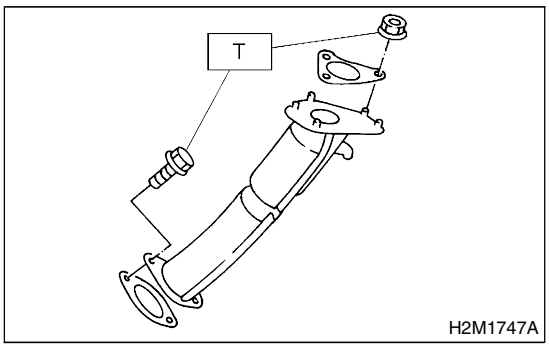

EN0917

8) Remove center exhaust pipe. <Ref. to EX(DOHC TURBO)-9, REMOVAL, Center Exhaust Pipe.>
9) Remove turbocharger. <Ref. to IN(DOHC TURBO)-12, REMOVAL, Turbocharger.>
10) Take off joint pipe in the upward direction.

B: INSTALLATION S182771A11

Install in the reverse order of removal.

Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)

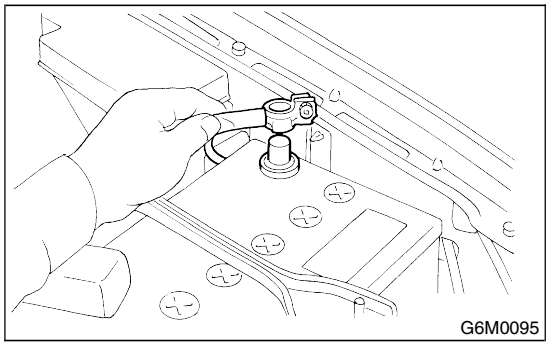


H2M1747A

5. Rear Exhaust Pipe S182068

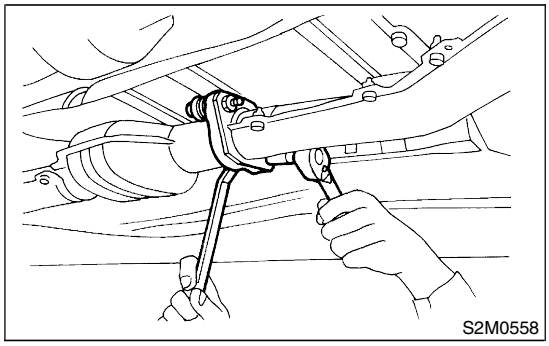
A: REMOVAL S182068A18

1) Disconnect battery ground cable.



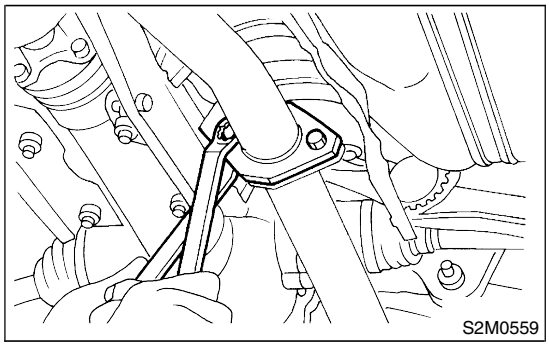
2) Lift up the vehicle.
3) Separate rear exhaust pipe from center exhaust pipe.

CAUTION:
Be careful, exhaust pipe is hot.



4) Separate rear exhaust pipe from muffler.

CAUTION:
Be careful not to pull down rear exhaust pipe.



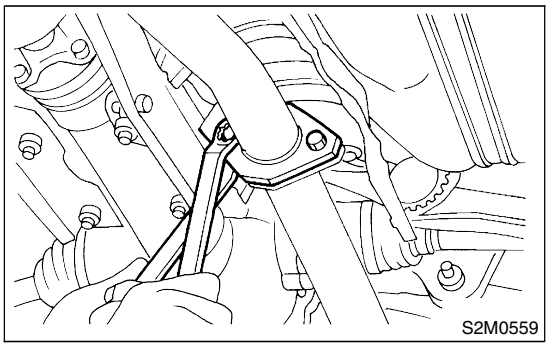
5) Remove rear exhaust pipe.

B: INSTALLATION S182068A11

CAUTION:
Replace gaskets with new ones.

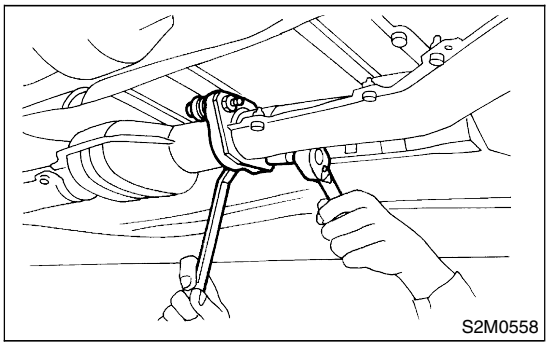
1) Install rear exhaust pipe to muffler.

Tightening torque:
48 N·m (4.9 kgf-m, 35.4 ft-lb)

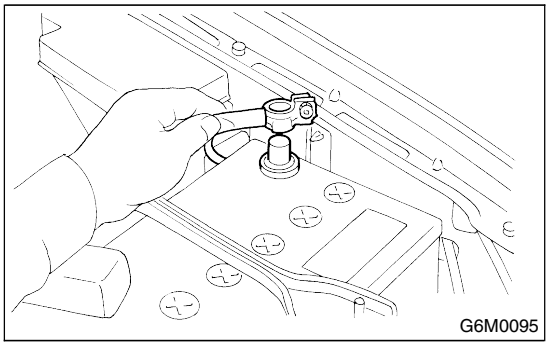


2) Install rear exhaust pipe to center exhaust pipe.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



3) Lower the vehicle.
4) Connect battery ground cable.



C: INSPECTION S182068A10

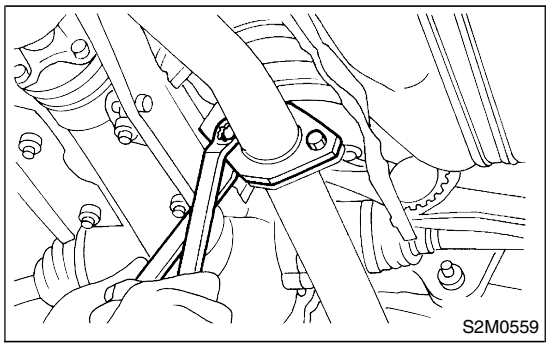
1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.
3) Make sure the cushion rubber is not worn or cracked.

6. Muffler S182066

A: REMOVAL S182066A18

1) Separate muffler from rear exhaust pipe.

CAUTION:
Be careful, exhaust pipe is hot.

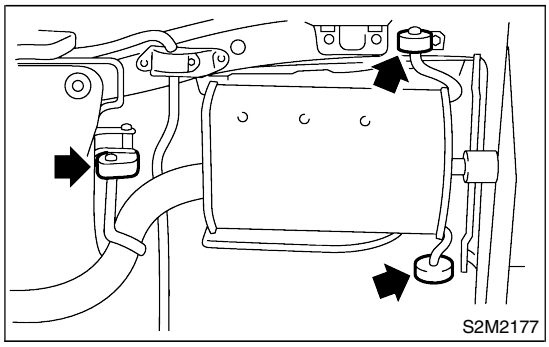


2) Remove rubber cushions, and detach muffler.

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)

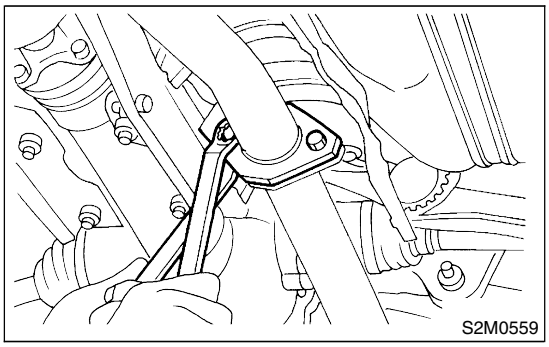


B: INSTALLATION S182066A11

Install in the reverse order of removal.

CAUTION:
Replace gasket with a new one.

Tightening torque:
48 N·m (4.9 kgf-m, 35.4 ft-lb)



C: INSPECTION S182066A10

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.
3) Make sure the cushion rubber is not worn or cracked.

MUFFLER

MEMO:

IGNITION

IG(DOHC TURBO)

Page

1. General Description....2
2. Spark Plug....4
3. Ignition Coil and Ignitor Assembly....8

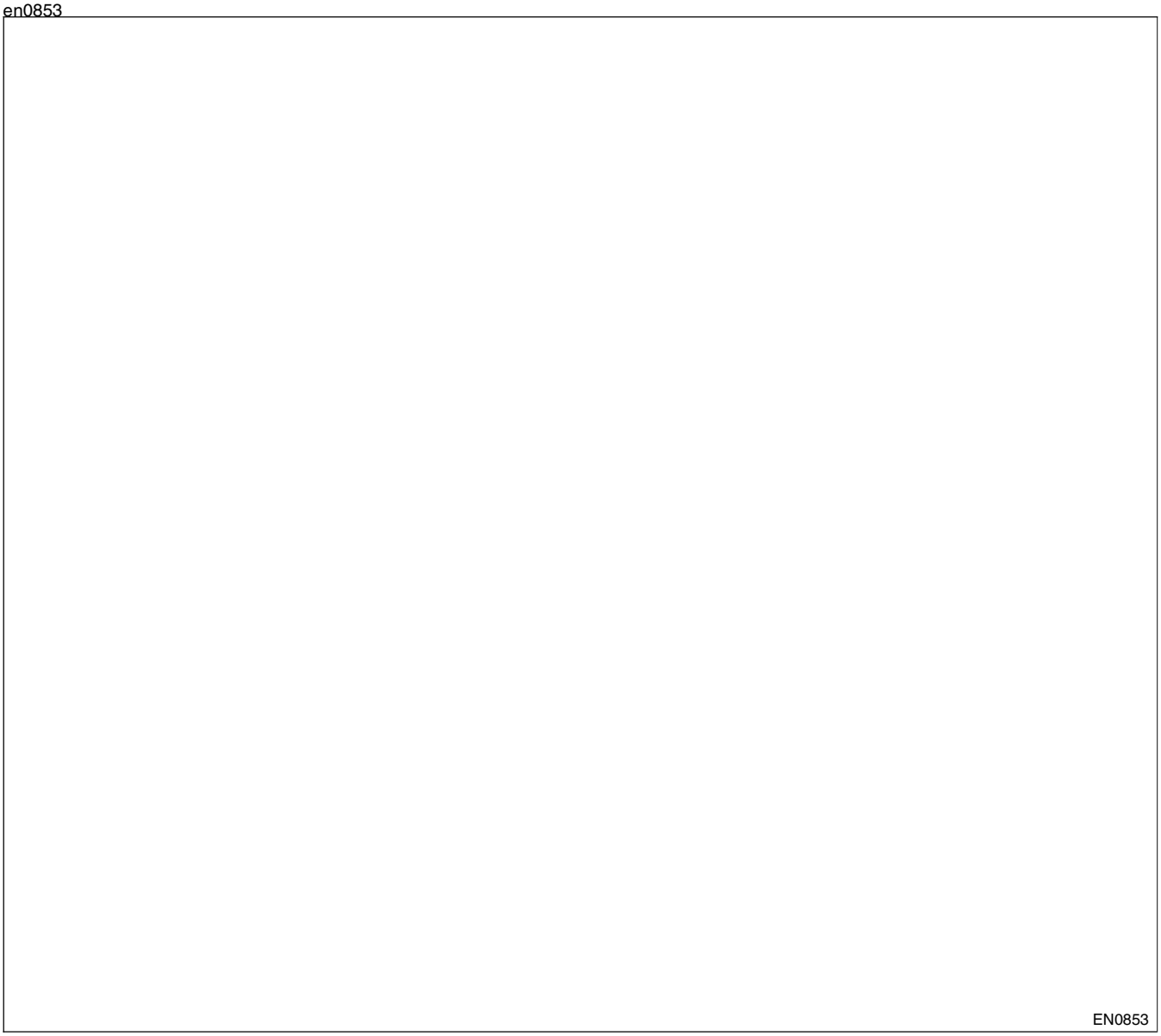
1. General Description S181001

A: SPECIFICATIONS S181001E49

Item		Designation
Ignition coil and ignitor assembly	Model	FK0140
	Manufacturer	DIAMOND
Spark plug	Type and manufacturer	PFR6G ..... NGK
	Thread size mm	14, P = 1.25
	Spark gap mm (in)	0.7 — 0.8 (0.028 — 0.031)

B: COMPONENT S181001A05

en0853



(1) Spark plug
(2) Ignition coil and ignitor ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 21 (2.1, 15)
T2: 16 (1.6, 11.7)

C: CAUTION S181001A03

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Before disconnecting electrical connectors of sensors or units, be sure to disconnect negative terminal from battery.

2. Spark Plug S181003

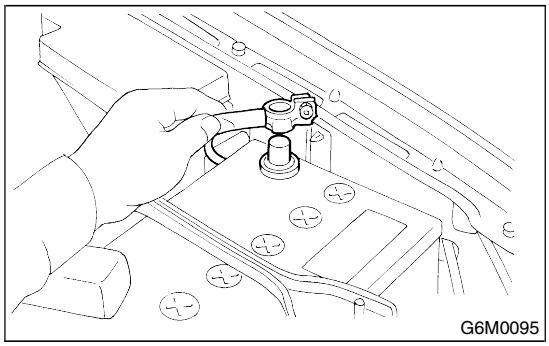
A: REMOVAL S181003A18

CAUTION:
All spark plugs installed on an engine, must be of the same heat range.

Spark plug:
NGK: PFR6G

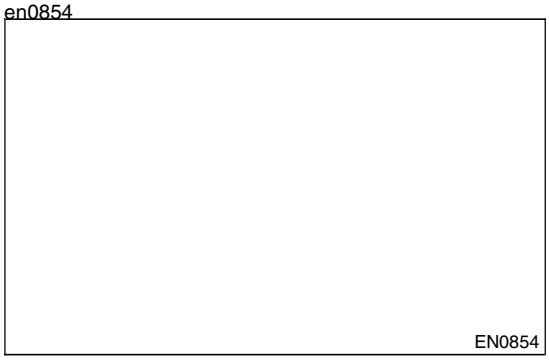
1. RH SIDE S181003A1801

1) Disconnect battery ground cable.


G6M0095

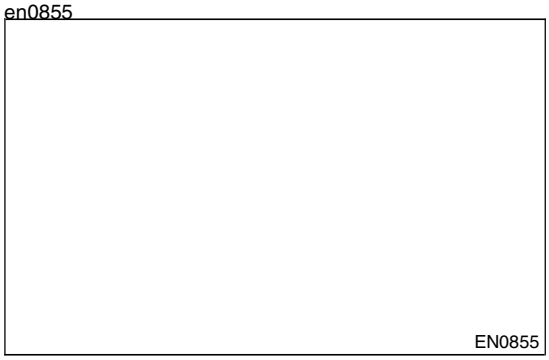
2) Remove air cleaner lower case. <Ref. to IN(DOHC TURBO)-7, REMOVAL, Air Cleaner.>
3) Disconnect connector from ignition coil.

en0854


EN0854

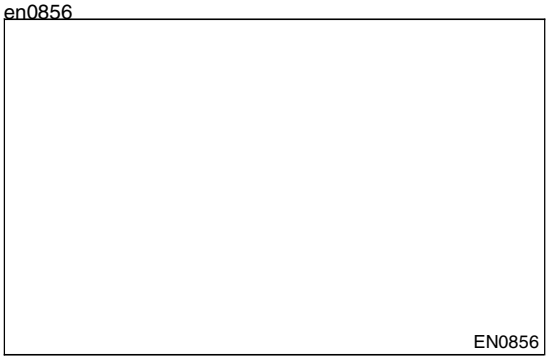
4) Remove ignition coil.

en0855


EN0855

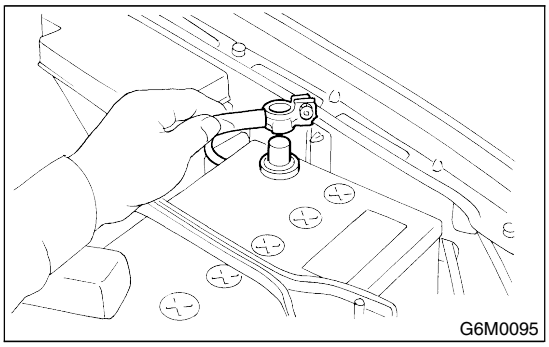
5) Remove spark plugs with the spark plug socket.

en0856

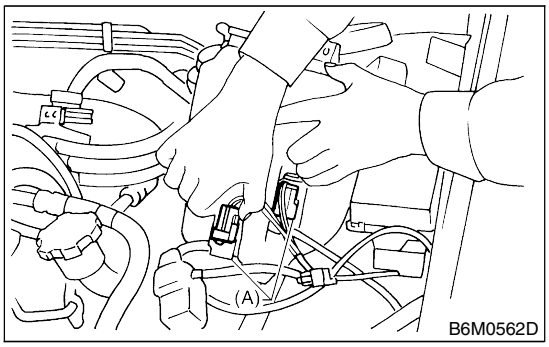

EN0856

2. LH SIDE S181003A1802

1) Disconnect battery cables, and then remove battery and battery carrier.


G6M0095

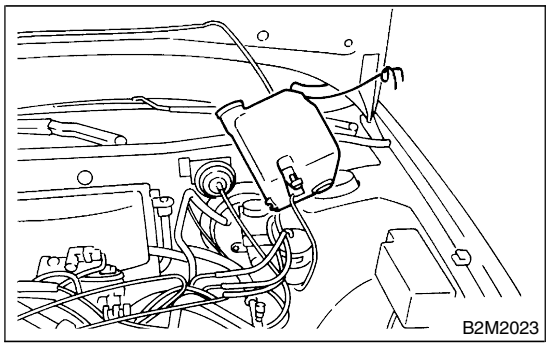
2) Disconnect washer motor connector (A).



B6M0562D

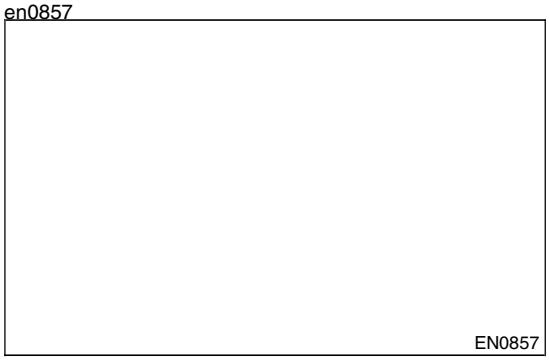
3) Disconnect rear window glass washer hose from washer motor, then plug connection with a suitable cap.

4) Remove the two bolts which hold the washer tank, then take the tank away from the working area.


B2M2023

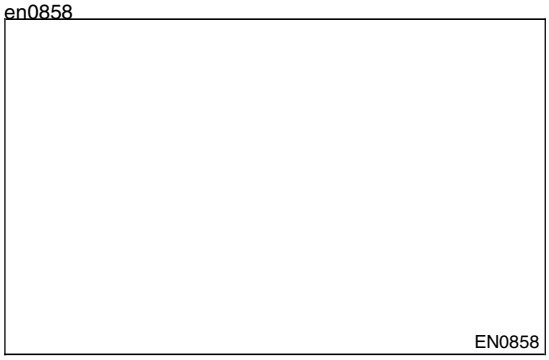
5) Disconnect connector from ignition coil.

en0857


EN0857

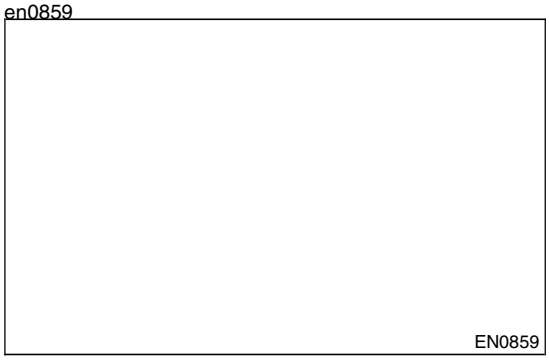
6) Remove ignition coil.

en0858


EN0858

7) Remove spark plug with the spark plugs socket.

en0859


EN0859

B: INSTALLATION S181003A11

1. RH SIDE S181003A1101

1) Install in the reverse order of removal.

Tightening torque (Spark plug):
21 N·m (2.1 kgf-m, 15 ft-lb)

Tightening torque (Ignition coil):
16 N·m (1.63 kgf-m, 11.8 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.

2. LH SIDE S181003A1102

1) Install in the reverse order of removal.

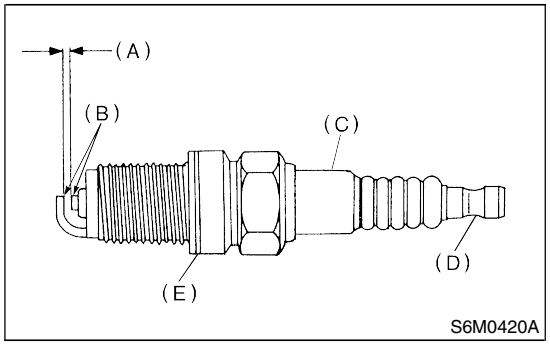
Tightening torque (Spark plug):
21 N·m (2.1 kgf-m, 15 ft-lb)

Tightening torque (Ignition coil):
16 N·m (1.63 kgf-m, 11.8 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.

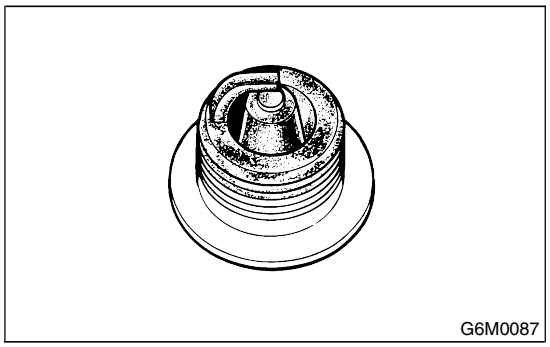
C: INSPECTION S181003A10

Check electrodes and inner and outer porcelain of plugs, noting the type of deposits and the degree of electrode erosion.

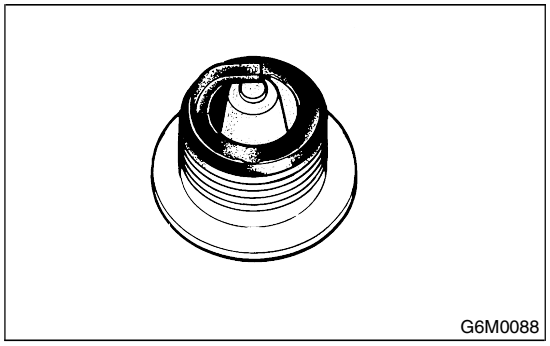


(A) Electrode gap
(B) Carbon accumulation or wear
(C) Cracks
(D) Damage
(E) Damaged gasket

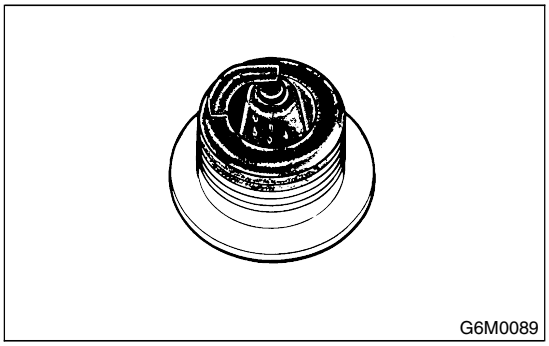
1) Normal
Brown to grayish-tan deposits and slight electrode wear indicate correct spark plug heat range.



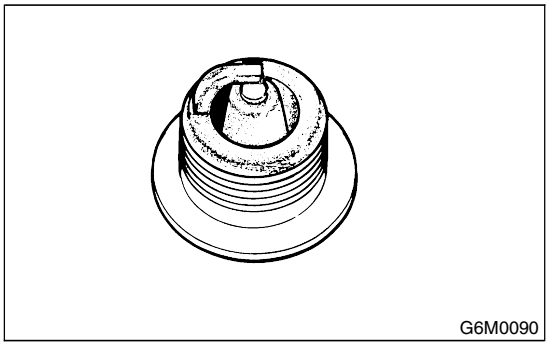
2) Carbon fouled
Dry fluffy carbon deposits on insulator and electrode are mostly caused by slow speed driving in city, weak ignition, too rich fuel mixture, dirty air cleaner, etc.
It is advisable to replace with plugs having hotter heat range.



3) Oil fouled
Wet black deposits show excessive oil entrance into combustion chamber through worn rings and pistons or excessive clearance between valve guides and stems. If same condition remains after repair, use a hotter plug.



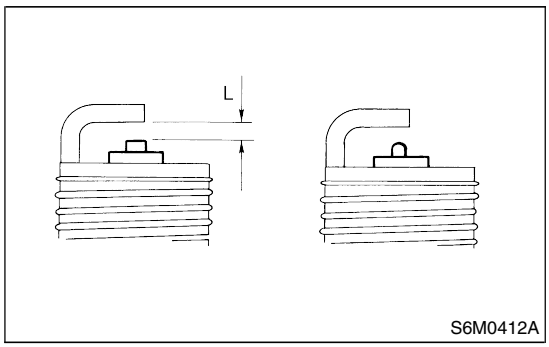
4) Overheating
White or light gray insulator with black or gray brown spots and bluish burnt electrodes indicate engine overheating. Moreover, the appearance results from incorrect ignition timing, loose spark plugs, wrong selection of fuel, hotter range plug, etc. It is advisable to replace with plugs having colder heat range.



D: ADJUSTMENT S181003A01

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.
After cleaning spark plugs, recondition firing surface of electrodes with file. Then correct the spark plug gap using a gap gauge.

Spark plug gap: L
0.7 — 0.8 mm (0.028 — 0.031 in)



NOTE:
Replace with new spark plug if this area is worn to “ball” shape.

3. Ignition Coil and Ignitor Assembly S181015

A: REMOVAL S181015A18

Direct ignition type has been adopted. Refer to the “Spark Plug Removal” for removal procedure. <Ref. to IG(DOHC TURBO)-4, REMOVAL, Spark Plug.>

B: INSTALLATION S181015A11

Install in the reverse order of removal.

Tightening torque:
16 N·m (1.63 kgf-m, 11.8 ft-lb)

C: INSPECTION S181015A10

Because ignition coil is a direct ignition type, the resistance cannot be measured in a single unit. For inspection procedure of ignition system, refer to the following. <Ref. to EN(DOHC TURBO)-72, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>

ENGINE (DIAGNOSTICS)

EN(DOHC TURBO)

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1. Basic Diagnostic Procedure

S088501

A: PROCEDURE S088501E45

1. ENGINE S088501E4501

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(DOHC TURBO)-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(DOHC TURBO)-63, 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(DOHC TURBO)-344, 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(DOHC TURBO)-82, 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(DOHC TURBO)-50, Engine Malfunction Indicator Lamp (MIL).>
4	**PERFORM THE DIAGNOSIS.** 1) Perform the clear memory mode. <Ref. to EN(DOHC TURBO)-47, Clear Memory Mode.> 2) Perform the inspection mode. <Ref. to EN(DOHC TURBO)-44, 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(DOHC TURBO)-90, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Complete the diagnosis.

2. AUTOMATIC TRANSMISSION S088501E4502

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-11, Differential Gear Oil.>
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 S088502

A: CHECK S088502A04

1. CHECK LIST NO. 1 S088502A0401

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 S088502A0402

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 ☐ 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 S088001

A: CAUTION S088001A03

1) Airbag system wiring harness is routed near the engine control module (ECM), main relay and fuel pump relay.

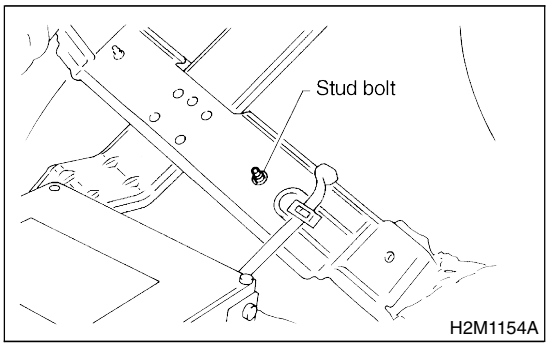
CAUTION:
• All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
• Be careful not to damage Airbag system wiring harness when servicing the engine control module (ECM), transmission control module (TCM), main relay and fuel pump relay.

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.

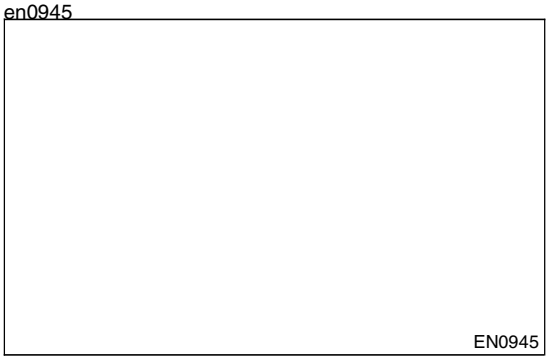
7) The connectors to each sensor in the engine compartment and the harness connectors on the engine side and body side are all designed to be waterproof. However, it is still necessary to take care not to allow water to get into the connectors when washing the vehicle, or when servicing the vehicle on a rainy day.

8) Use ECM mounting stud bolts at the body head grounding point when measuring voltage and resistance inside the passenger compartment.

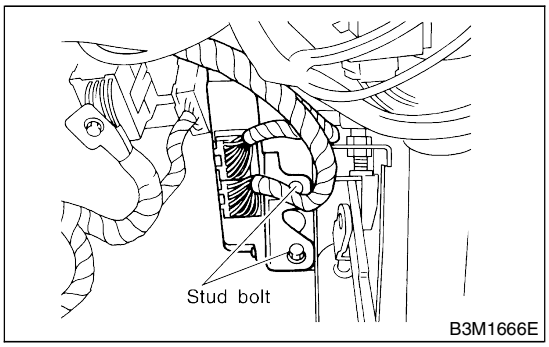


9) Use engine grounding terminal or engine proper as the grounding point to the body when measuring voltage and resistance in the engine compartment.

en0945



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) 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 S088001A10

Before performing diagnostics, check the following items which might affect engine problems:

1. BATTERY S088001A1001

1) Measure battery voltage and specific gravity of electrolyte.

Standard voltage: 12 V

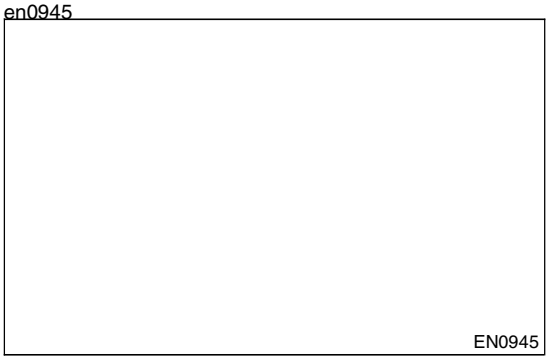
Specific gravity: Above 1.260

2) Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.

2. ENGINE GROUNDING S088001A1002

Make sure the engine grounding terminal is properly connected to the engine.

en0945



C: NOTE S088001A15

1. DESCRIPTION S088001A1501

• 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 S088001A1502

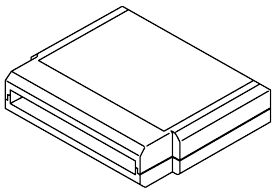
● The Multipoint Fuel Injection (MFI) system is a system that supplies the optimum air-fuel mixture to the engine for all the various operating conditions through the use of the latest electronic technology.
With this system fuel, which is pressurized at a constant pressure, is injected into the intake 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 S088001A1503

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 S088001A17

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3876	24082AA150 (New 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)

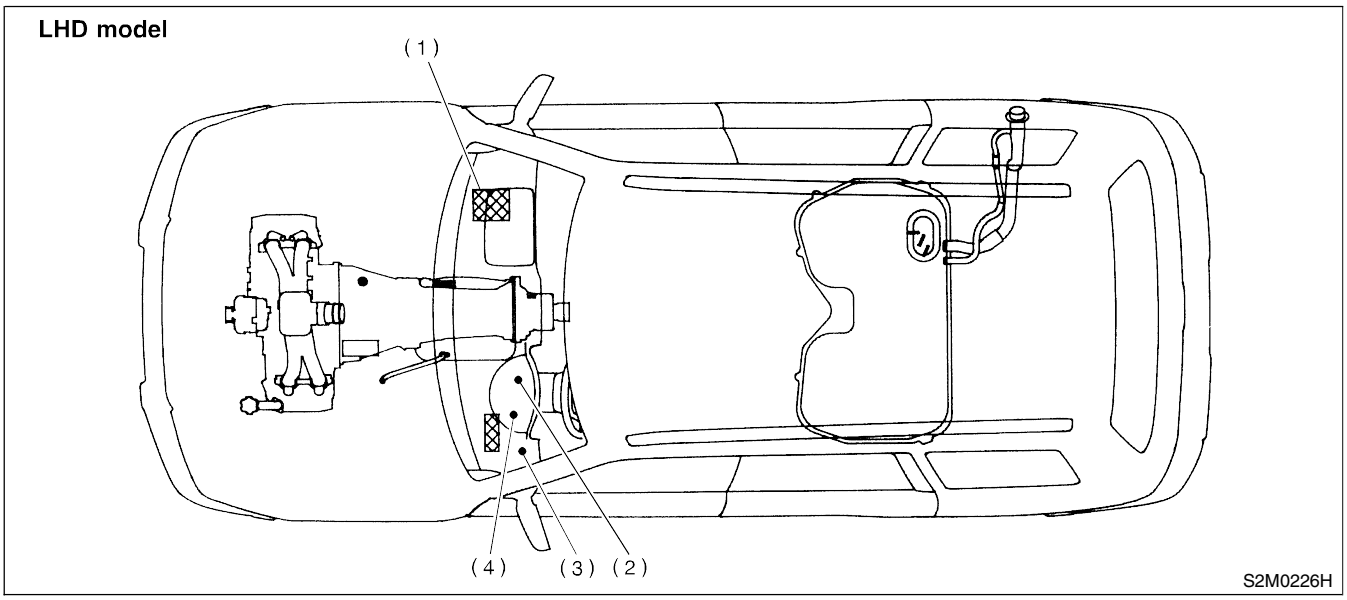
MEMO:

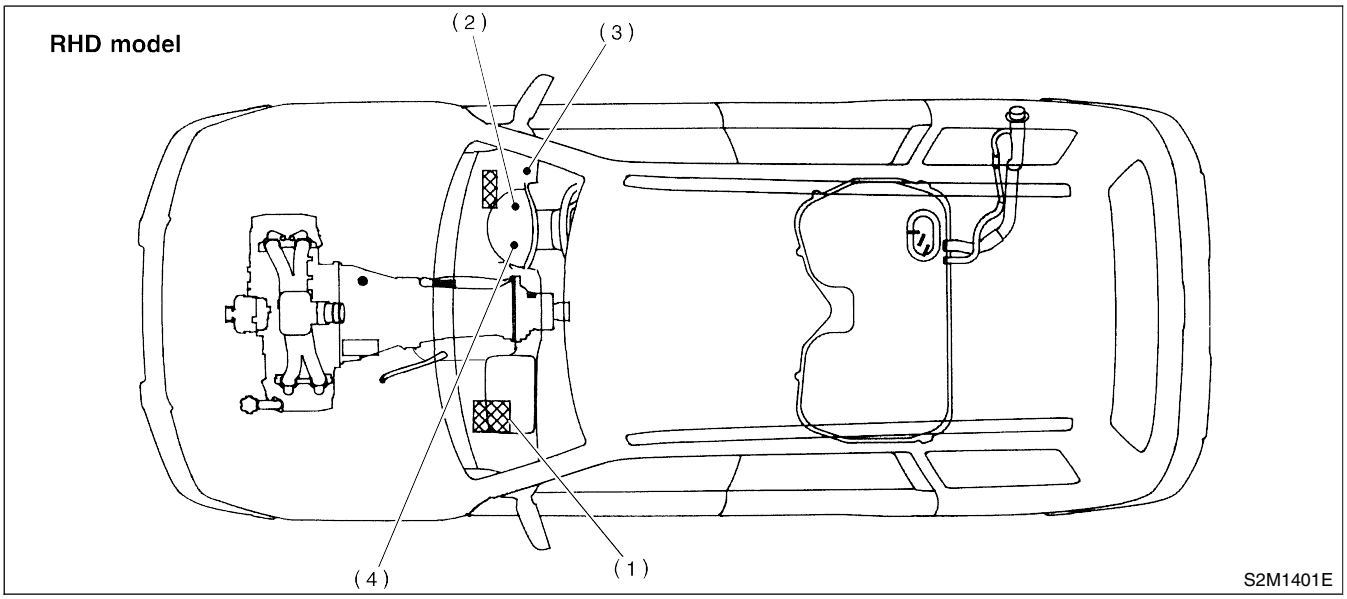
4. Electrical Components Location S088507

A: LOCATION S088507A13

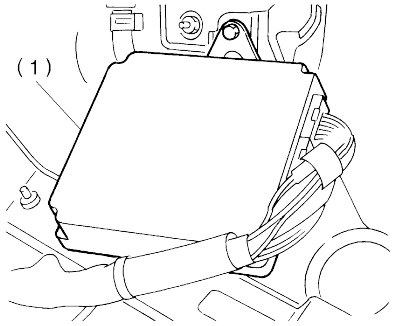
1. ENGINE S088507A1301

- **MODULE**

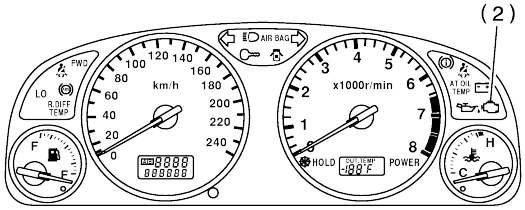




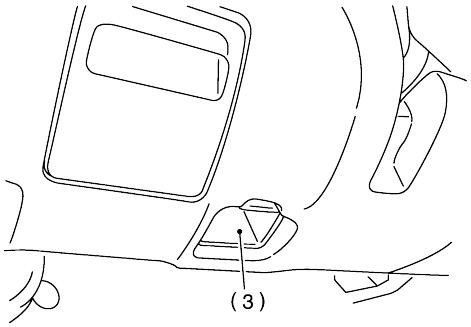
(1) Engine control module (ECM)
(2) CHECK ENGINE malfunction indicator lamp (MIL)
(3) Data link connector
(4) Test mode connector



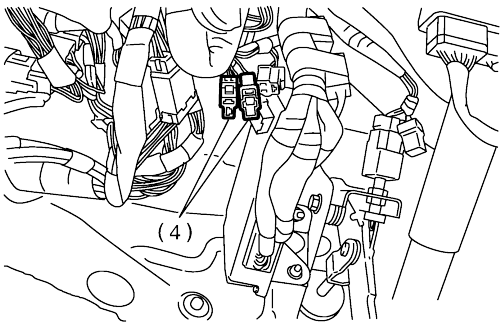
B3M1575A



S2M2215A

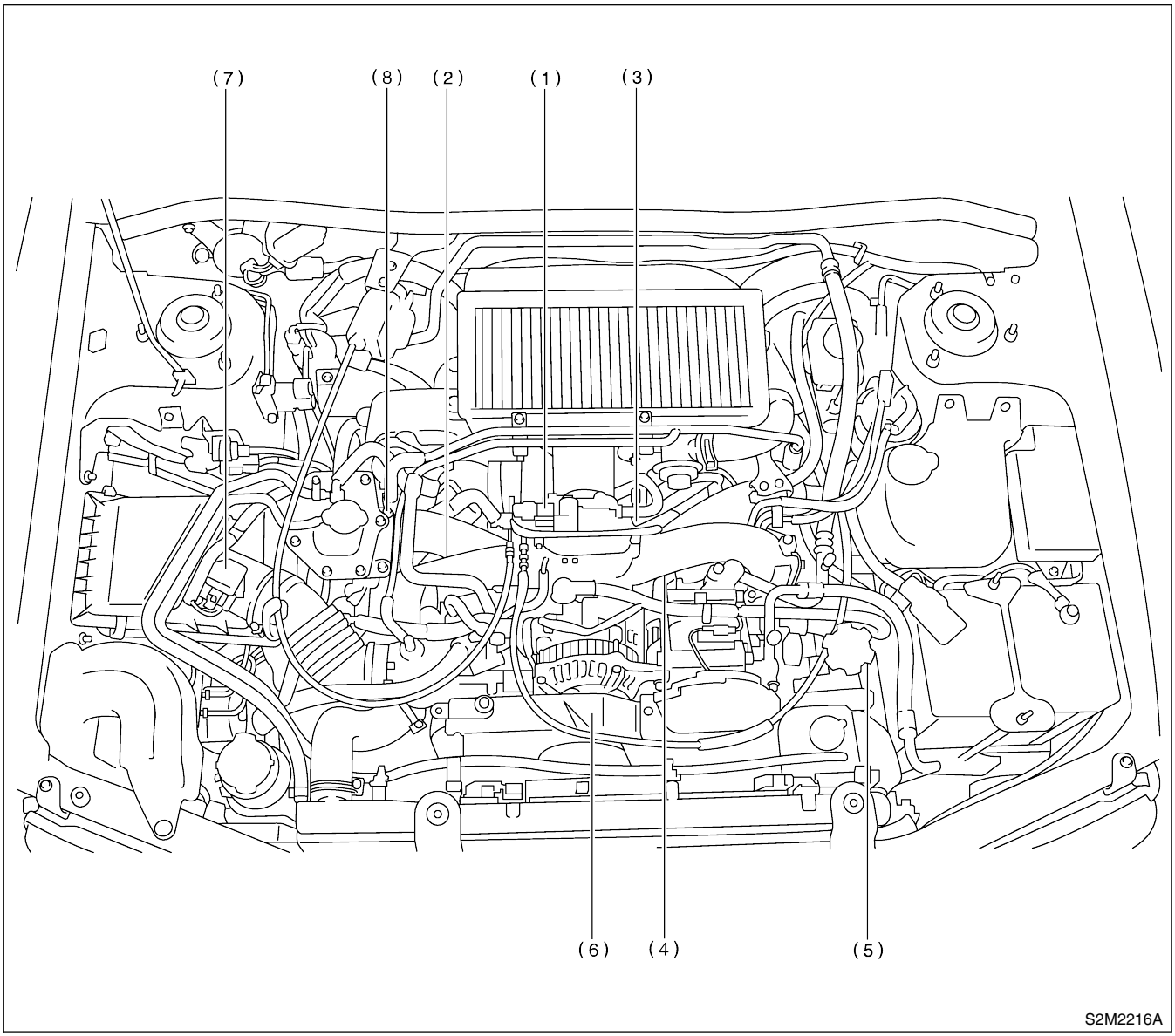


S2M2157A



S2M2244B

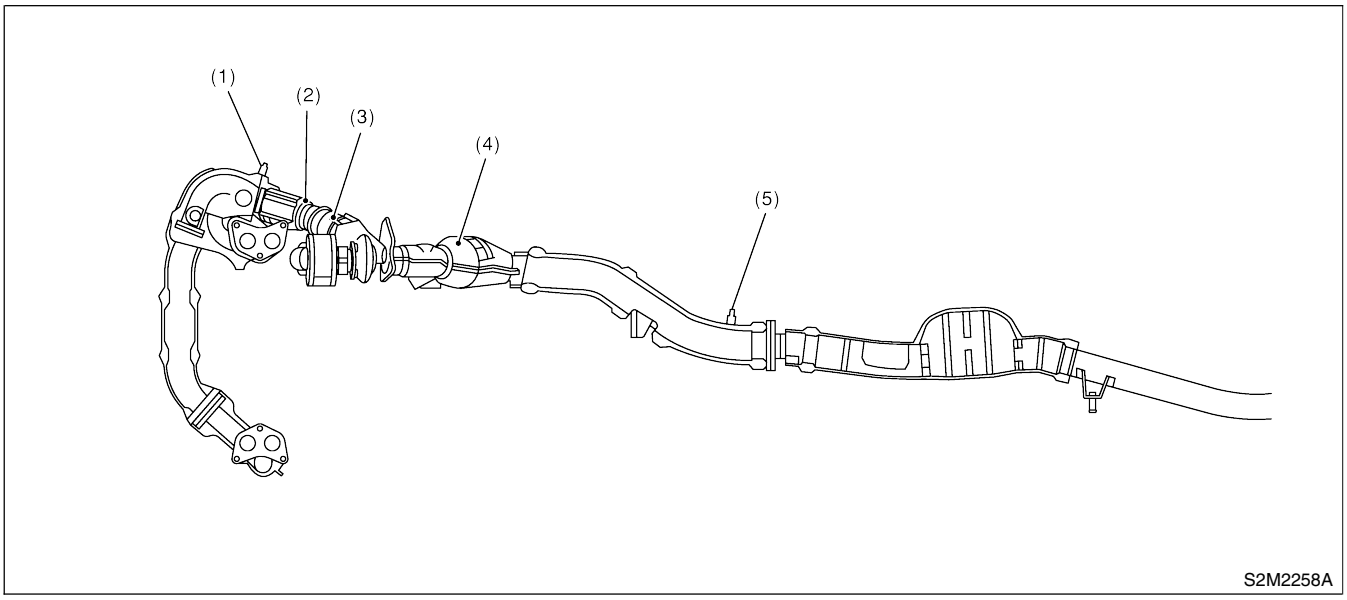
● SENSOR



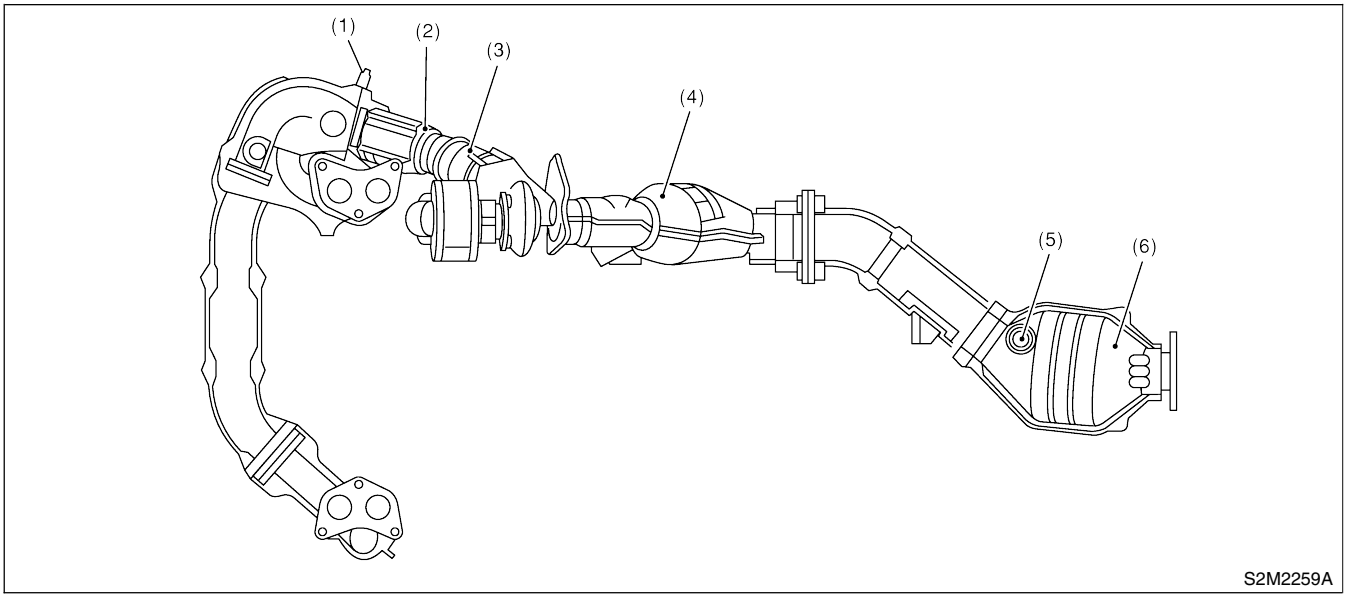
(1) Pressure sensor
(2) Engine coolant temperature sensor
(3) Throttle position sensor
(4) Knock sensor
(5) Camshaft position sensor
(6) Crankshaft position sensor
(7) Mass air flow and intake air temperature sensor
(8) Tumble generator valve position sensor

en1008 EN1008	en1009 EN1009
en1010 EN1010	en1011 EN1011
en1012 EN1012	en1013 EN1013
en1014 EN1014	en1015 EN1015

● Australia Model



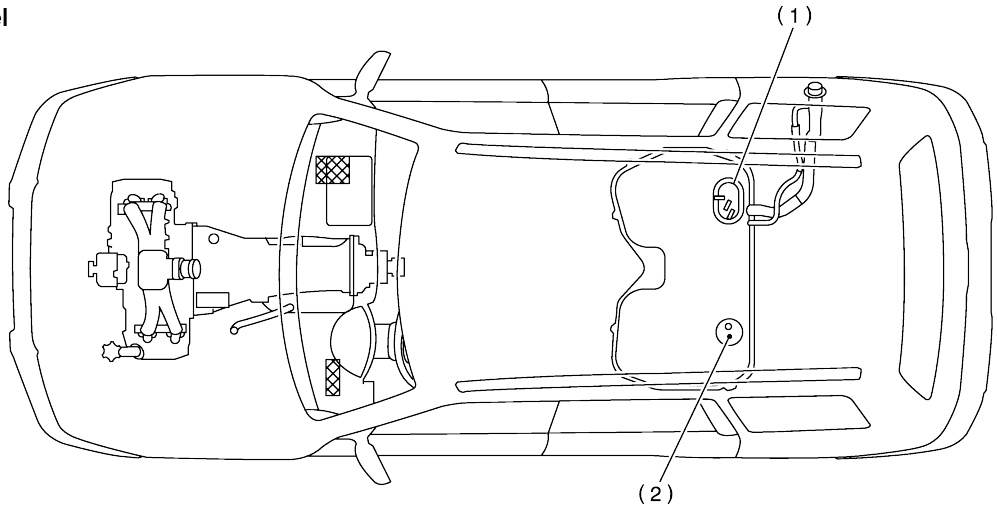
● Except Australia Model



(1) Front oxygen (A/F) sensor
(2) Precatalytic converter
(3) Exhaust temperature sensor
(4) Front catalytic converter
(5) Rear oxygen sensor
(6) Rear catalytic converter (Except Australia model)

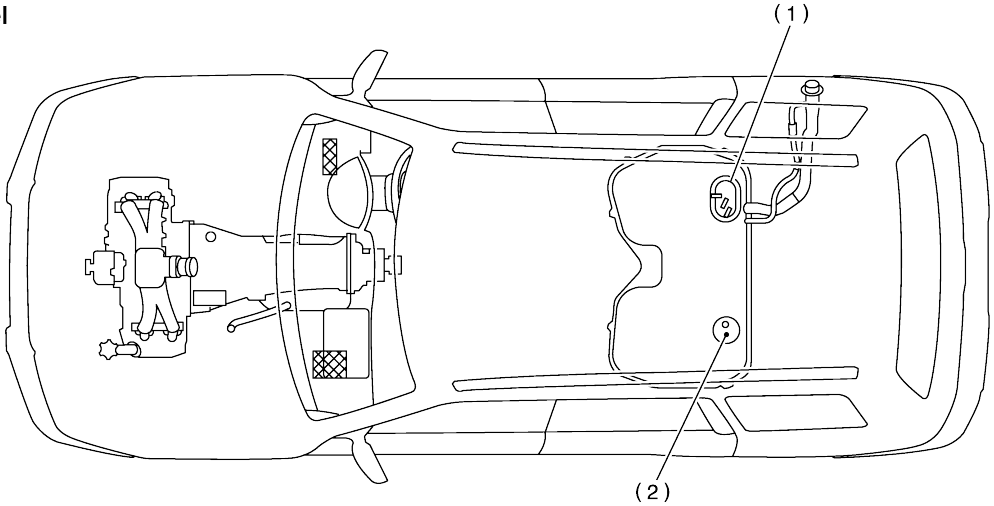
en1016 EN1016	en1017 EN1017
en0949 EN0949	en1018 EN1018
en0950 EN0950	SUBARU.

LHD model



S2M2217A

RHD model



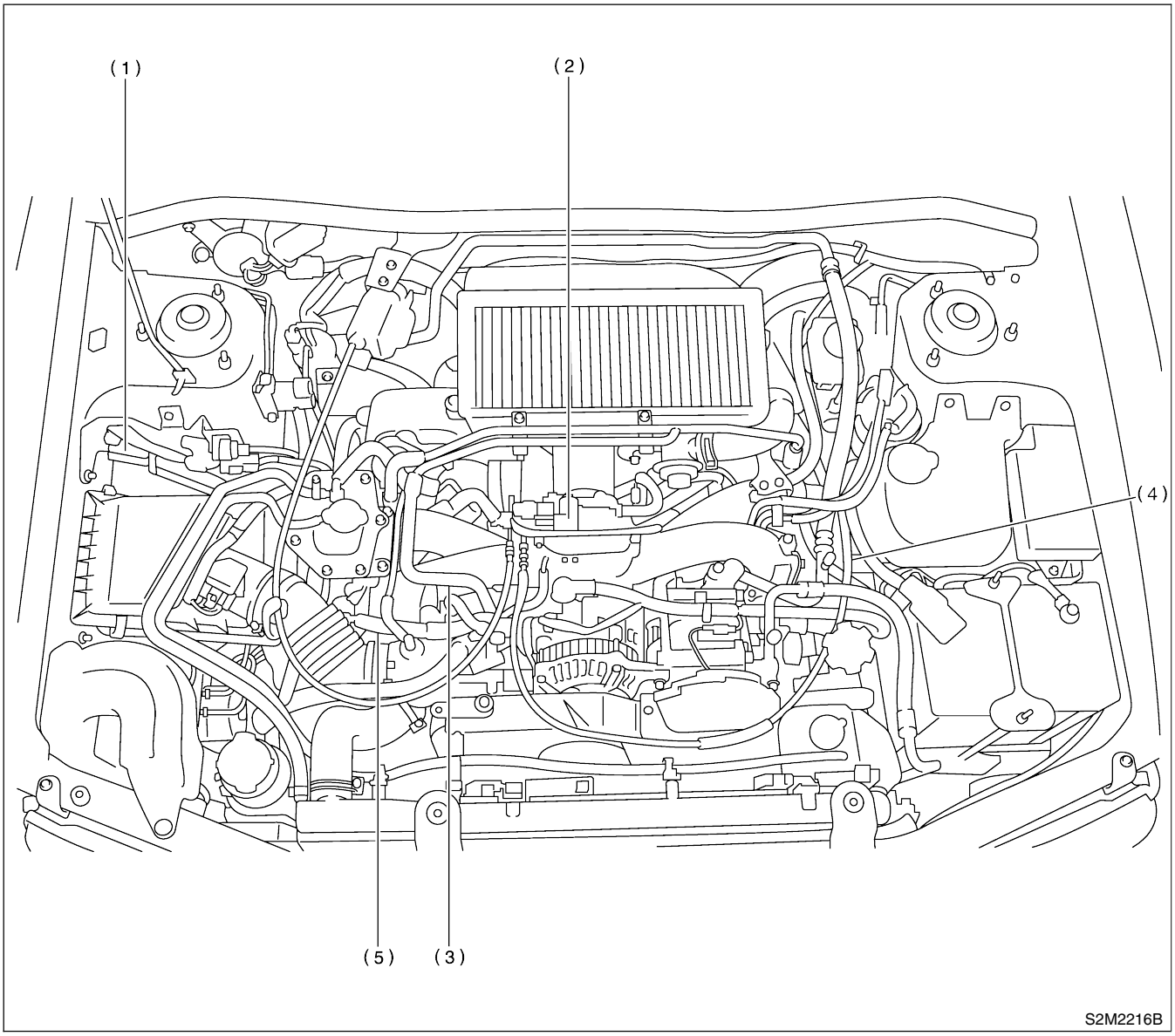
S2M2218A

(1) Fuel level sensor (2) Fuel sub level sensor

en1036	en1037
EN1036	EN1037

MEMO:

● SOLENOID VALVE, ACTUATOR, EMISSION CONTROL SYSTEM PARTS AND IGNITION SYSTEM PARTS

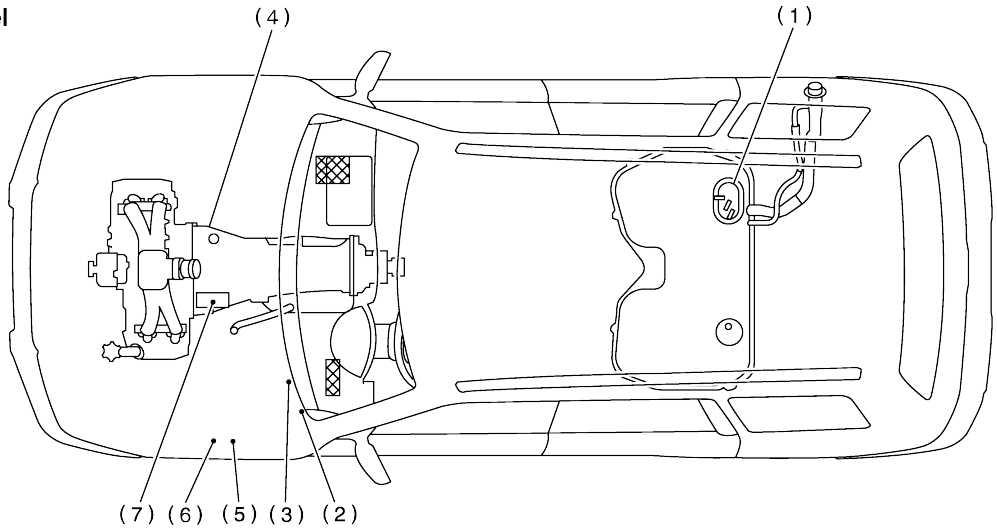


(1) Wastegate control solenoid valve
(2) Idle air control solenoid valve
(3) Purge control solenoid valve
(4) Ignition coil
(5) Tumble generator valve actuator

en1021 EN1021	en1022 EN1022
en1023 EN1023	en1024 EN1024
en0952 EN0952	SUBARU

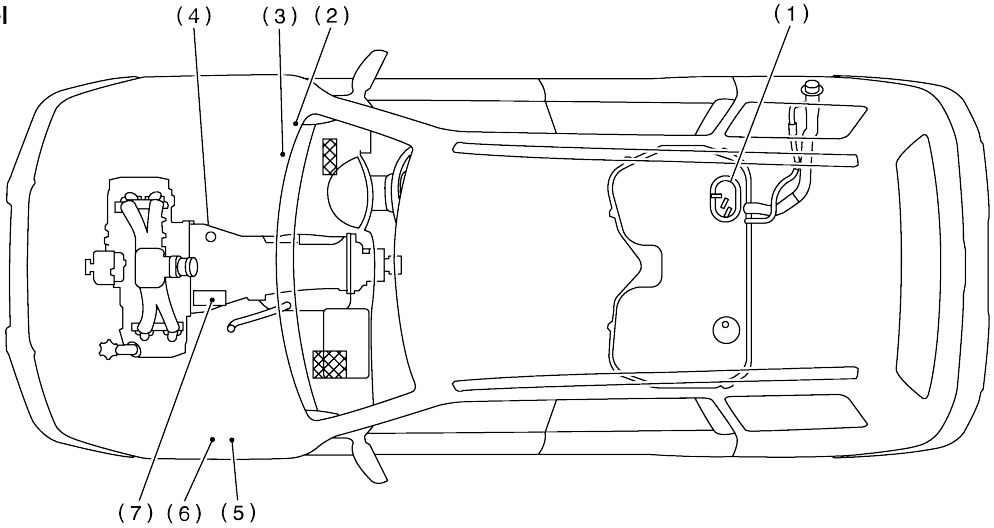
ELECTRICAL COMPONENTS LOCATION

LHD model



S2M2217B

RHD model



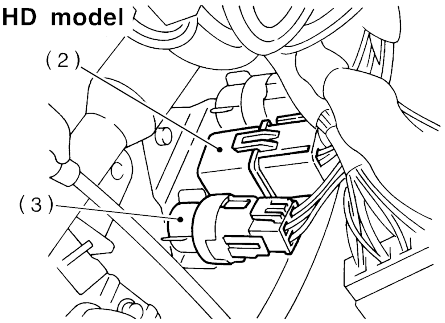
S2M2218B

(1) Fuel pump
(2) Main relay
(3) Fuel pump relay
(4) Inhibitor switch
(5) Radiator main fan relay
(6) Radiator sub fan relay
(7) Starter

en0953

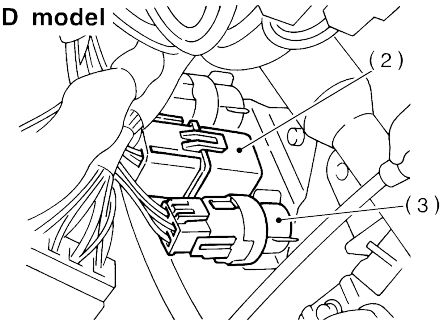
EN0953

LHD model



S2M0278B

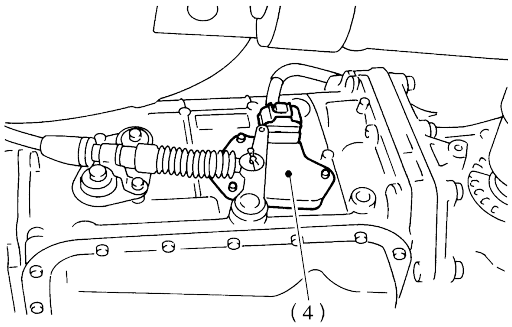
RHD model



S2M0663A

en0746

EN0746



B2M2246G

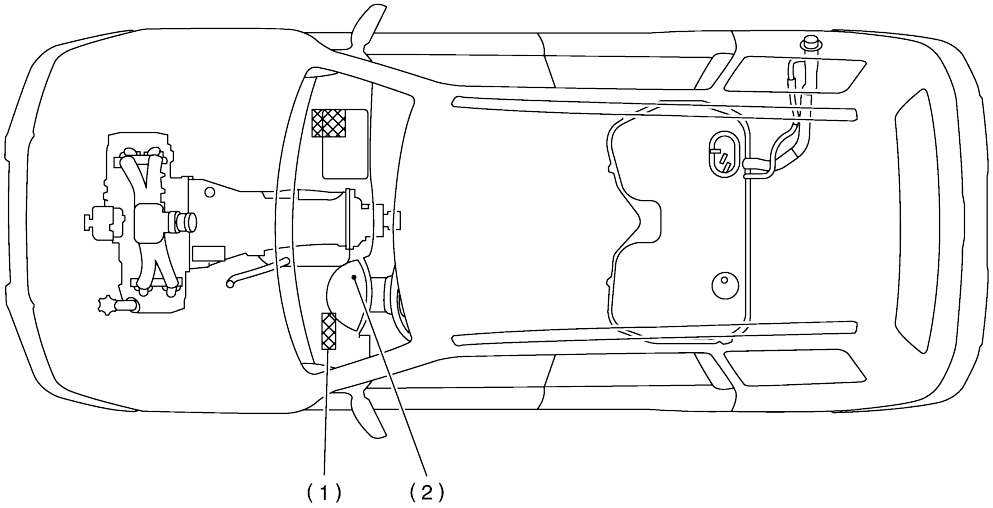
en1030

EN1030

2. TRANSMISSION S088507A1302

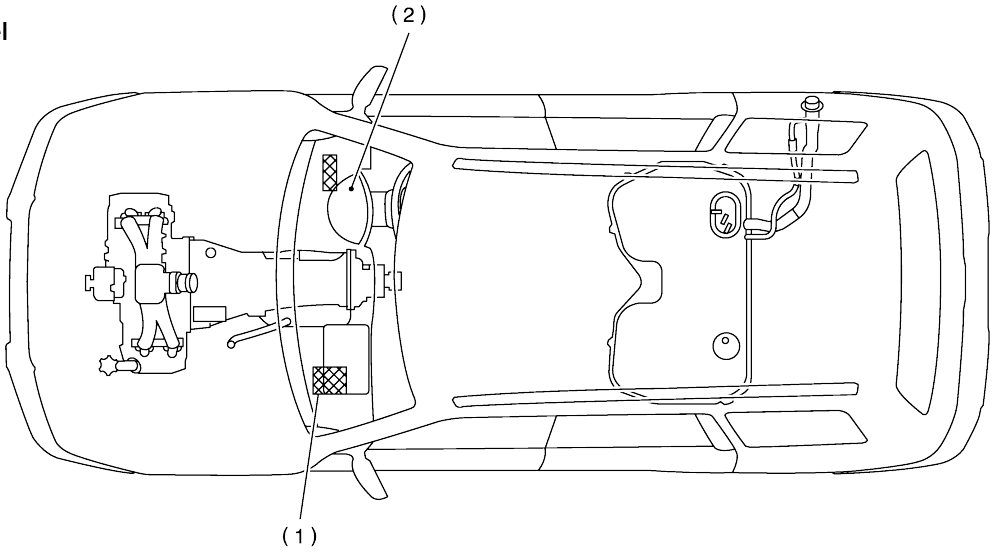
● MODULE

LHD model



S2M2217C

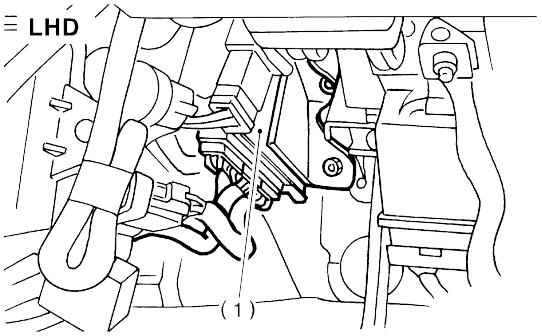
RHD model



S2M2218C

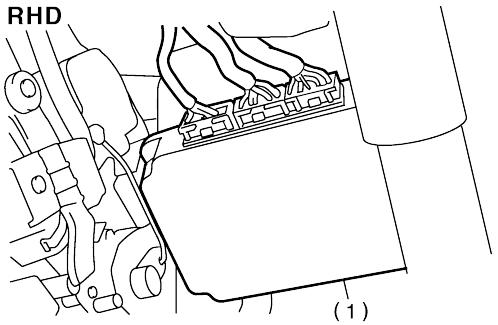
(1) Transmission Control Module (TCM) (for AT vehicles)
(2) AT diagnostic indicator light (for AT vehicles)

LHD

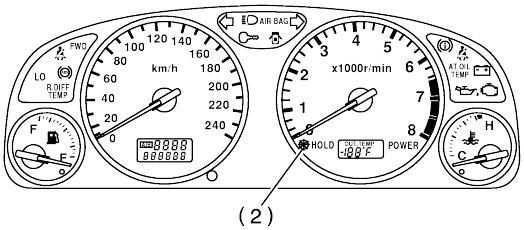


B3M1592D

RHD

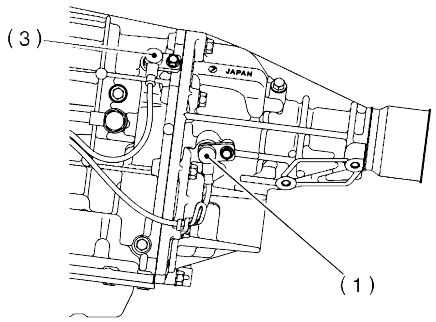


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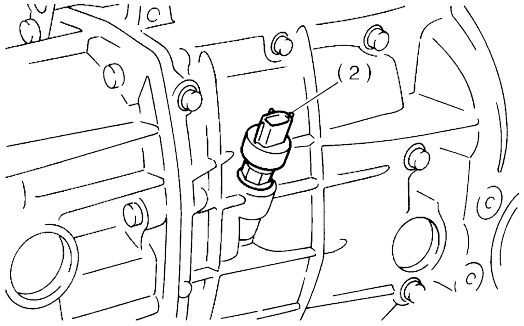


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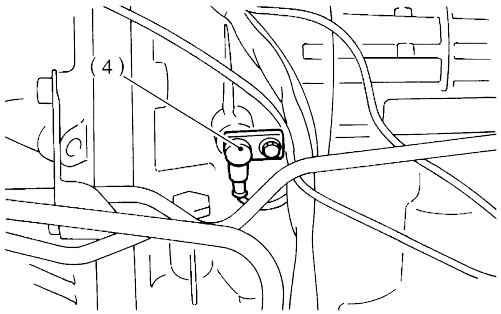
● SENSOR



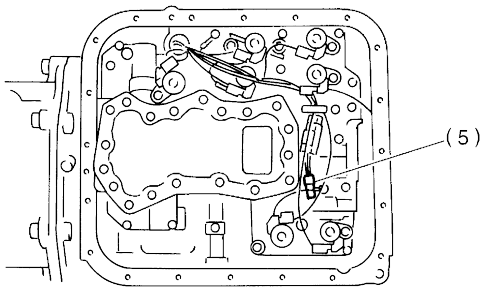
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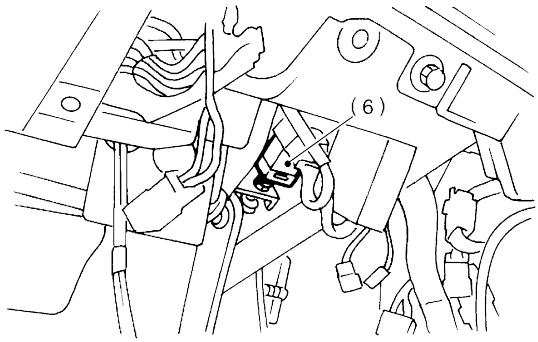
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B2M2260A



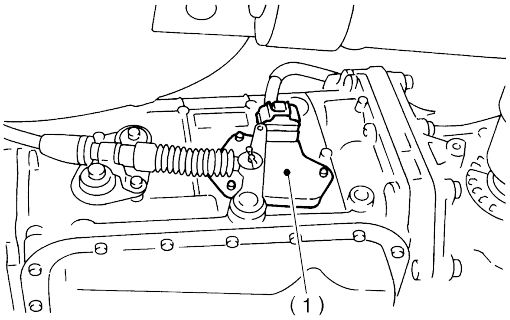
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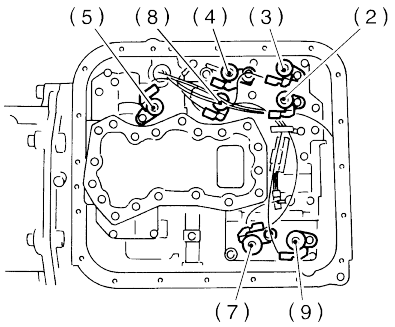
OBD0653B

(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

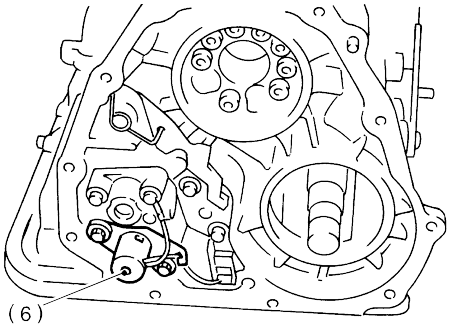
• SOLENOID VALVE AND SWITCH (AT VEHICLES)



B2M2246F



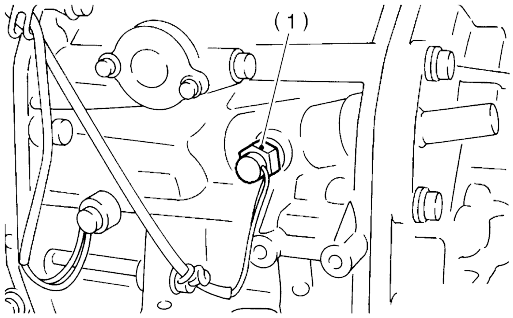
B2M2263K



B2M2264F

(1) Inhibitor switch
(2) Shift solenoid valve 1
(3) Shift solenoid valve 2
(4) Line pressure duty solenoid
(5) Lock-up duty solenoid
(6) Transfer duty solenoid
(7) 2-4 brake duty solenoid
(8) Low clutch timing solenoid valve
(9) 2-4 brake timing solenoid valve

• SOLENOID VALVE AND SWITCH (MT VEHICLES)



B2M2265A

(1) Neutral position switch

5. Engine Control Module (ECM) I/O Signal S088526

A: ELECTRICAL SPECIFICATION S088526A08

en0955



Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Crankshaft position sensor	Signal (+)	B135	2	0	–7 — +7	Sensor output waveform
	Signal (–)	B135	11	0	0	—
	Shield	B135	21	0	0	—
Camshaft position sensor	Signal (+)	B135	1	0	–7 — +7	Sensor output waveform
	Signal (–)	B135	10	0	0	—
	Shield	B135	21	0	0	—
Throttle position sensor	Signal	B135	7	Fully closed: 0.2 — 1.0 Fully opened: 4.2 — 4.7		—
	Power supply	B135	9	5	5	—
	GND (sensor)	B135	19	0	0	—
Rear oxygen sensor	Signal	B135	17	0	0 — 0.9	—
	Shield	B135	26	0	0	—
	GND (sensor)	B135	19	0	0	—
Front oxygen (A/F) sensor heater	Signal 1	B137	4	0 — 1.0	0 — 1.0	—
	Signal 2	B137	5	0 — 1.0	0 — 1.0	—
Rear oxygen sensor heater signal		B136	13	0 — 1.0	0 — 1.0	—
Engine coolant temperature sensor	Signal	B135	18	1.0 — 1.4	1.0 — 1.4	After warm-up the engine.
	GND (sensor)	B135	19	0	0	After warm-up the engine.
Vehicle speed signal		B134	1	0 or 5	0 or 5	“5” and “0” are repeatedly displayed when vehicle is driven.

Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Mass air flow sensor	Signal	B84	13	—	0.3 — 4.5	—
	Shield	B84	8	0	0	—
	GND	B84	7	0	0	—
Intake air temperature sensor signal		B135	27	—	—	—
Exhaust gas temperature sensor	Signal	B135	16	—	—	—
	GND (sensor)	B135	19	0	0	—
Tumble generator valve position sensor RH	Signal	B84	23	Fully closed: 0.2 — 1.0 Fully opened: 4.2 — 4.7		—
	Power supply	B135	9	5	5	—
	GND (sensor)	B135	19	0	0	—
Tumble generator valve position sensor LH	Signal	B84	13	Fully closed: 0.2 — 1.0 Fully opened: 4.2 — 4.7		—
	Power supply	B135	9	5	5	—
	GND (sensor)	B135	19	0	0	—
Tumble generator valve RH (open)		B84	4	0 or 5	0 or 5	—
Tumble generator valve RH (close)		B84	5	0 or 5	0 or 5	—
Tumble generator valve LH (open)		B84	11	0 or 5	0 or 5	—
Tumble generator valve LH (close)		B84	10	0 or 5	0 or 5	—
Wastegate control solenoid valve		B137	24	10 — 13	13 — 14	—
Starter switch		B134	16	0	0	Cranking: 8 — 14
A/C switch		B134	6	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
Ignition switch		B134	14	10 — 13	13 — 14	—
Neutral position switch	MT	B135	8	ON: 12±0.5 OFF: 0		Switch is ON when gear is in neutral position.
	AT	B135	8	ON: 0 OFF: 12±0.5		Switch is ON when shift is in “N” or “P” position.
Test mode connector		B134	5	5	5	When connected: 0
Knock sensor	Signal	B135	4	2.8	2.8	—
	Shield	B135	22	0	0	—
Back-up power supply		B137	10	10 — 13	13 — 14	Ignition switch “OFF”: 10 — 13
Control unit power supply		B137	2	10 — 13	13 — 14	—
		B137	3	10 — 13	13 — 14	—
Sensor power supply		B135	9	5	5	—
Line end check 1		B134	10	0	0	—
Ignition control	#1	B136	24	0	13 — 14	Waveform
	#2	B136	23	0	13 — 14	Waveform
	#3	B136	22	0	13 — 14	Waveform
	#4	B136	21	0	13 — 14	Waveform

ENGINE CONTROL MODULE (ECM) I/O SIGNAL

Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Fuel injector	#1	B137	1	10 — 13	1 — 14	Waveform
	#2	B136	6	10 — 13	1 — 14	Waveform
	#3	B136	5	10 — 13	1 — 14	Waveform
	#4	B136	4	10 — 13	1 — 14	Waveform
Idle air control solenoid valve	Signal	B136	10	0 or 13 — 14	0 or 13 — 14	Waveform
A/C relay control		B137	27	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	—
Radiator fan relay 1 control		B137	17	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	—
Radiator fan relay 2 control		B137	28	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	With A/C vehicles only
Malfunction indicator lamp		B137	15	—	—	Light “ON”: 1, or less Light “OFF”: 10 — 14
Engine speed output		B136	9	—	0 — 13, or more	Waveform
Purge control solenoid valve		B137	16	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	—
Pressure sensor	Signal	B135	8	1.7 — 2.4	1.1 — 1.6	—
	Power supply	B135	9	5	5	
	GND (sensor)	B135	19	0	0	
Fuel level sensor		B135	25	0.12 — 4.75	0.12 — 4.75	—
Small light switch		B134	17	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Blower fan switch		B134	9	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Rear defogger switch		B134	3	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Power steering oil pressure switch		B135	24	10 — 13	ON: 0 OFF: 13 — 14	—
Front oxygen (A/F) sensor signal (+)		B137	19	2.8 — 3.2	2.8 — 3.2	—
Front oxygen (A/F) sensor signal (–)		B137	29	2.4 — 2.7	2.4 — 2.7	—
Front oxygen (A/F) sensor shield		B136	7	0	0	—
SSM/GST communication line		B134	21	Less than 1 ←→ More than 4	Less than 1 ←→ More than 4	—
GND (sensors)		B135	19	0	0	—
GND (injectors)		B136	8	0	0	—
GND (ignition system)		B136	18	0	0	—
GND (power supply)		B136	17	0	0	—
		B134	22	0	0	—
GND (control systems)		B134	7	0	0	—
		B134	15	0	0	—
GND (oxygen sensor heater 1)		B137	9	0	0	—
GND (oxygen sensor heater 2)		B137	8	0	0	—

6. Engine Condition Data S088530

A: ELECTRICAL SPECIFICATION

S088530A08

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 neutral position.
- A/C is turned OFF.
- All accessory switches are turned OFF.

7. Engine Condition Data S088506

A: ELECTRICAL SPECIFICATION S088506A08

tr0532



Check with ignition switch ON.						
Content		Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Back-up power supply		B56	1	Ignition switch OFF	10 — 16	—
Ignition power supply		B54	23	Ignition switch ON (with engine OFF)	10 — 16	—
		B54	24			
Inhibitor switch	“P” range switch	B55	1	Select lever in “P” range	Less than 1	—
				Select lever in any other than “P” range (except “N” range)	More than 8	
	“N” range switch	B55	14	Select lever in “N” range	Less than 1	—
				Select lever in any other than “N” range (except “P” range)	More than 8	
	“R” range switch	B55	3	Select lever in “R” range	Less than 1	—
				Select lever in any other than “R” range	More than 8	
	“D” range switch	B55	4	Select lever in “D” range	Less than 1	—
				Select lever in any other than “D” range	More than 8	
	“3” range switch	B55	5	Select lever in “3” range	Less than 1	—
				Select lever in any other than “3” range	More than 8	
	“2” range switch	B55	6	Select lever in “2” range	Less than 1	—
				Select lever in any other than “2” range	More than 8	
	“1” range switch	B55	7	Select lever in “1” range	Less than 1	—
				Select lever in any other than “1” range	More than 8	
Brake switch		B55	12	Brake pedal depressed.	More than 10.5	—
				Brake pedal released.	Less than 1	

Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
ABS signal	B55	21	ABS switch ON	Less than 1	—
			ABS switch OFF	6.5 — 15	
Hold switch	B55	16	Hold switch ON	Less than 1	—
			Hold switch OFF	More than 8	
Power switch	B55	23	Power switch ON	Less than 1	—
			Power switch OFF	More than 10	
Kick-down switch	B55	11	Throttle fully opened.	Less than 1	—
			Throttle fully closed.	More than 6.5	
POWER indicator light	B56	11	Light ON	Less than 1	—
			Light OFF	More than 9	
AT OIL TEMP indicator light	B56	10	Light ON	Less than 1	—
			Light OFF	More than 9	
Throttle position sensor	B54	3	Throttle fully closed.	0.3 — 0.7	—
			Throttle fully open.	4.0 — 4.6	
Throttle position sensor power supply	B54	2	Ignition switch ON (With engine OFF)	4.8 — 5.3	—
ATF temperature sensor	B54	11	ATF temperature 20°C (68°F)	1.6 — 2.0	2.1 — 2.9 k
			ATF temperature 80°C (176°F)	0.4 — 0.9	275 — 375
Rear vehicle speed sensor	B55	24	Vehicle stopped.	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Front vehicle speed sensor	B55	18	Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	450 — 650
Torque converter turbine speed sensor	B55	8	Engine idling after warm-up. (D range)	0	450 — 650
			Engine idling after warm-up. (N range)	More than 1 (AC range)	
Vehicle speed output signal	B56	17	Vehicle speed at most 10 km/h (6 MPH)	Less than 1← →More than 4	—
Engine speed signal	B55	17	Ignition switch ON (with engine OFF)	More than 10.5	—
			Ignition switch ON (with engine ON)	8 — 11	
Cruise set signal	B55	22	When cruise control is set (SET lamp ON)	Less than 1	—
			When cruise control is not set (SET lamp OFF)	More than 6.5	
Torque control signal 1	B56	5	Ignition switch ON (with engine ON)	4	—
Torque control signal 2	B56	14	Ignition switch ON (with engine ON)	4	—
Torque control cut signal	B55	10	Ignition switch ON	8	—
Mass air flow signal	B54	1	Engine idling after warm-up.	0.5 — 1.2	—
Shift solenoid 1	B54	22	1st or 4th gear	More than 9	10 — 16
			2nd or 3rd gear	Less than 1	
Shift solenoid 2	B54	5	1st or 2nd gear	More than 9	10 — 16
			3rd or 4th gear	Less than 1	

ENGINE CONDITION DATA

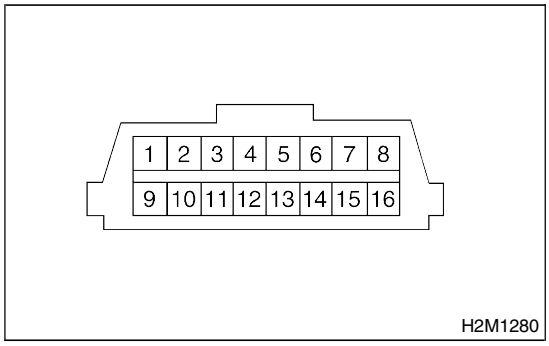
Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Line pressure duty solenoid	B54	9	Ignition switch ON (with engine OFF) Throttle fully closed after warm-up.	1.5 — 4.0	2.0 — 4.5
			Ignition switch ON (with engine OFF) Throttle fully open after warm-up.	Less than 0.5	
Lock-up duty solenoid	B54	7	When lock up occurs.	More than 8.5	10 — 17
			When lock up is released.	Less than 0.5	
Transfer duty solenoid	B54	6	Fuse on FWD switch	More than 8.5	10 — 17
			Fuse removed from FWD switch (with throttle fully open and with select lever in 1st gear).	Less than 0.5	
2-4 brake duty solenoid	B54	18	Ignition switch ON (with engine OFF) Throttle fully closed after warm-up.	1.5 — 4.0	2.0 — 4.5
			Ignition switch ON (with engine OFF) Throttle fully open after warm-up.	Less than 0.5	
2-4 brake timing solenoid	B54	16	1st gear	Less than 1	10 — 16
			3rd gear	More than 9	
Low clutch timing solenoid	B54	15	2nd gear	Less than 1	10 — 16
			4th gear	More than 9	
Sensor ground line 1	B54	20	—	0	Less than 1
Sensor ground line 2	B55	9	—	0	Less than 1
Sensor ground line 3	B54	10	—	0	Less than 1
Sensor ground line 4	B54	19	—	0	Less than 1
System ground line	B56	19	—	0	Less than 1
	B54	21			
FWD switch	B55	20	Fuse removed.	6 — 9.1	—
			Fuse installed.	Less than 1	
FWD indicator light	B56	2	Fuse ONFWD switch	Less than 1	—
			Fuse removed from FWD switch	More than 9	
Data link signal (Subaru Select Monitor)	B56	15	—	—	—
		6	—	—	

8. Data Link Connector S088505

A: NOTE S088505A15

This connector is used both for OBD-II general scan tools and the Subaru Select Monitor.

CAUTION:
Do not connect any scan tools other than the OBD-II general scan tools and the Subaru Select Monitor, because the circuit for the Subaru Select Monitor may be damaged.



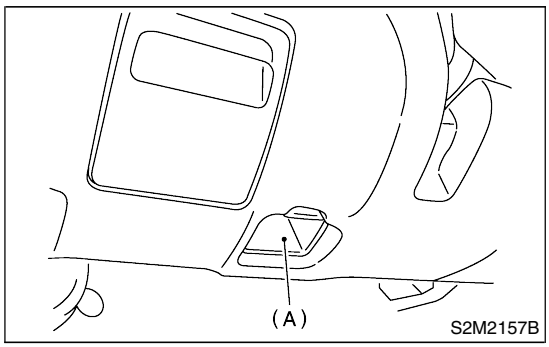
Terminal No.	Contents	Terminal No.	Contents
1	Power supply	9	Blank
2	Blank	10	K line of ISO 9141 CARB
3	Blank	11	Blank
4	Blank	12	Ground
5	Blank	13	Ground
6	Line end check signal 1	14	Blank
7	Blank	15	Blank
8	Line end check signal 2	16	Blank

9. OBD-II General Scan Tool S088527

A: OPERATION S088527A16

1. HOW TO USE OBD-II GENERAL SCAN TOOL S088527A1601

1) Prepare a general scan tool (OBD-II general scan tool) required by SAE J1978.
2) Open the cover and connect the OBD-II general scan tool to the data link connector (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(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).>

2. MODE $01 (CURRENT POWERTRAIN DIAGNOSTIC DATA) S088527A1602

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) S088527A1603

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) S088527A1604

Refer to Read Diagnostic Trouble Code for information about data denoting emission-related powertrain diagnostic trouble codes. <Ref. to EN(DOHC TURBO)-43, Read Diagnostic Trouble Code.>

5. MODE $04 (CLEAR/RESET EMISSION-RELATED DIAGNOSTIC INFORMATION) S088527A1605

Refers to the mode used to clear or reset emission-related diagnostic information (OBD-II trouble diagnostic information).

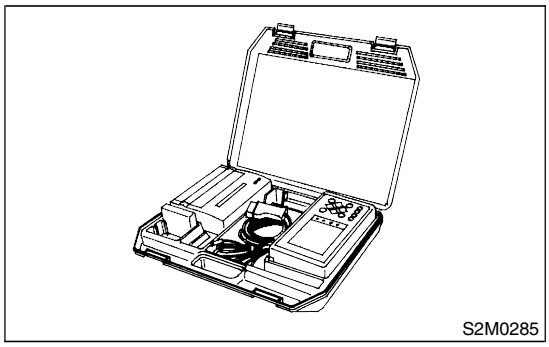
NOTE:
Refer to OBD-II general scan tool manufacturer's instruction manual to clear or reset emission-related diagnostic information (MODE $04).

10. Subaru Select Monitor S088503

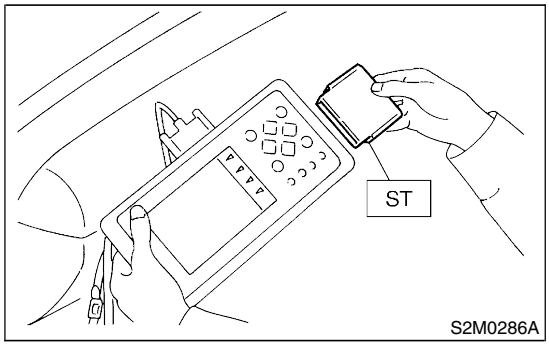
A: OPERATION S088503A16

1. HOW TO USE SUBARU SELECT MONITOR S088503A1601

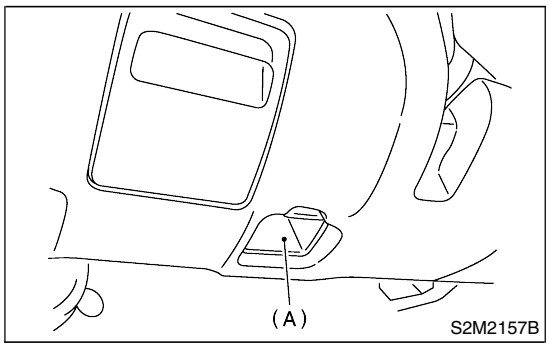
1) Prepare Subaru Select Monitor kit. <Ref. to EN(DOHC TURBO)-8, PREPARATION TOOL, General Description.>



2) Connect diagnosis cable to Subaru Select Monitor.
3) Insert cartridge into Subaru Select Monitor. <Ref. to EN(DOHC TURBO)-8, PREPARATION TOOL, General Description.>



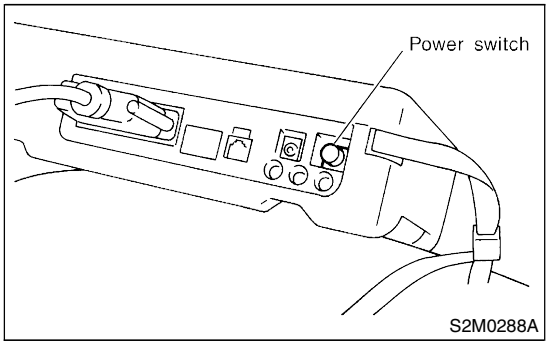
4) Connect Subaru Select Monitor to data link connector.
(1) Data link connector located (A) in the lower portion of the instrument panel (on the driver's side).



(2) Connect diagnosis cable to data link connector.

CAUTION:
Do not connect scan tools except for Subaru Select Monitor and OBD-II general scan tool.

5) Turn ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.



6) Using Subaru Select Monitor, call up diagnostic trouble code(s) and various data, then record them.

2. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE. (NORMAL MODE)

S088503A1602

Refer to Read Diagnostic Trouble Code for information about how to indicate DTC. <Ref. to EN(DOHC TURBO)-43, Read Diagnostic Trouble Code.>

3. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE. (OBD MODE) S088503A1603

Refer to Read Diagnostic Trouble Code for information about how to indicate DTC. <Ref. to EN(DOHC TURBO)-43, Read Diagnostic Trouble Code.>

4. READ CURRENT DATA FOR ENGINE. (NORMAL MODE) S088503A1604

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 Duty Ratio	%
Alternator duty control signal	ALT Duty	%
Fuel pump duty control signal	Fuel Pump Duty	%
A/F sensor current	A/F Sensor #1 Current	mA
A/F sensor resistance	A/F Sensor #1 Resistance	Ω
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 psi
Intake manifold relative pressure signal	Mani. Relative Pressure	mmHg or kPa or inHg or psi
Intake manifold absolute pressure signal	Mani. Absolute Pressure	mmHg or kPa or inHg or psi
A/F correction (short term fuel trim) by rear oxygen sensor	A/F Correction #3	%
Long term whole fuel trim	A/F Learning #1	%
Front oxygen (A/F) sensor heater current	A/F Heater Current 1	A
Rear oxygen sensor heater voltage	Rear O2 Heater Voltage	V
Canister purge control solenoid valve duty ratio	CPC Valve Duty Ratio	%
Primary supercharged pressure control signal	Primary Control	%
Tumble generator valve position sensor signal (right side)	TGV Position Sensor R	V
Tumble generator valve position sensor signal (left side)	TGV Position Sensor L	V
Tumble generator valve drive signal	TGV Drive	OPEN or CLOSE
Fuel level signal	Fuel Level	V
Intake air temperature signal	Intake Air Temp.	°C or °F
Learned ignition timing	Learned Ignition Timing	deg
Mass air flow sensor signal	Mass Air Flow	g/s
Mass air flow sensor signal	Air Flow Sensor Voltage	V
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 signal	A/C Compressor Signal	ON or OFF

Contents	Display	Unit of measure
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
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
Starter switch signal	Starter Switch	ON or OFF
Idle switch signal	Idle Switch	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 SW	ON or OFF
Blower fan switch signal	Blower Fan SW	ON or OFF
Small light switch signal	Light Switch	ON or OFF
Tumble generator valve output signal	TGV Output	ON or OFF

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

5. READ CURRENT DATA FOR ENGINE. (OBD MODE) S088503A1605

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)	Complete or incomplete
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	No support
Test of heated catalyst	Heated catalyst	No support
Test of evaporative emission purge control system	Evaporative purge system	No support
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) S088503A1606

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) S088503A1607

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 S088503A1608

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 SW	ON or OFF	When neutral position signal is entered.
Air conditioning switch signal	A/C SW	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.
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.
Rear oxygen sensor rich signal	Rear O2 Rich Signal	ON or OFF	When rear oxygen sensor mixture ratio is rich.
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.
Power steering switch signal	P/S SW	ON or OFF	When power steering switch is entered.
Rear defogger switch signal	Rear Defogger SW	ON or OFF	When rear defogger switch is turned ON.
Blower fan switch signal	Blower Fan SW	ON or OFF	When blower fan switch is turned ON.
Light switch signal	Light SW	ON or OFF	When small light switch is turned ON.
Tumble generator valve actuator signal	TGV Signal	ON or OFF	When TGV actuator signal is entered.
Tumble generator valve drive signal	TGV Drive	ON or OFF	When TGV moves and valve opens.

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

9. READ CURRENT DATA FOR AT. S088503A1609

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
Kick down switch signal	Kick Down Switch	ON or OFF
Stop lamp switch signal	Stop Lamp Switch	ON or OFF
Anti lock brake system signal	ABS Signal	ON or OFF
Cruise control system signal	Cruise Control Signal	ON or OFF
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 S088508

A: OPERATION S088508A16

1. SUBARU SELECT MONITOR (NORMAL MODE) S088508A1601

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(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).>

2. SUBARU SELECT MONITOR (OBD MODE) S088508A1602

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(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).>

3. OBD-II GENERAL SCAN TOOL S088508A1603

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(DOHC TURBO)-82, 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).

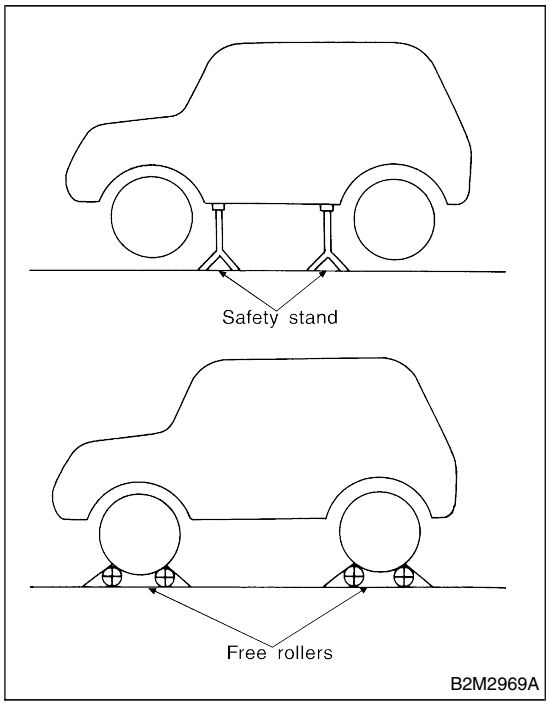
12. Inspection Mode S088510

A: OPERATION S088510A16

1. PREPARATION FOR THE INSPECTION MODE S088510A1601

Raise the vehicle using a garage jack and place on safety stands or drive the vehicle onto free rollers.

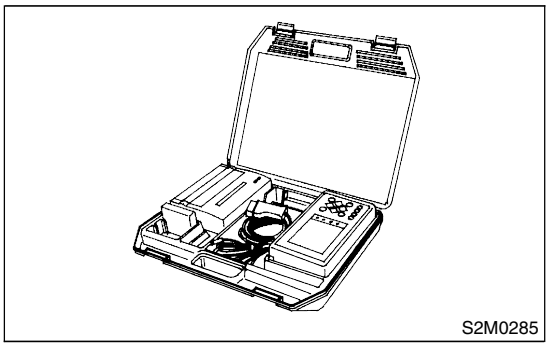
WARNING:
• Before raising the vehicle, ensure parking brakes are applied.
• Do not use a pantograph jack in place of a safety stand.
• Secure a rope or wire to the front and rear towing or tie-down hooks to prevent the lateral runout of front wheels.
• Do not abruptly depress/release clutch pedal or accelerator pedal during works even when engine is operating at low speeds since this may cause vehicle to jump off free rollers.
• In order to prevent the vehicle from slipping due to vibration, do not place any wooden blocks or similar items between the safety stands and the vehicle.
• Since the rear wheels will also rotate, do not place anything near them. Also, make sure that nobody goes in front of the vehicle.



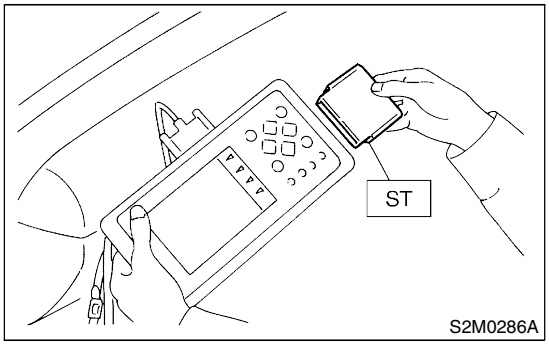
2. SUBARU SELECT MONITOR S088510A1602

After performing diagnostics and clearing the memory, check for any remaining unresolved trouble data.

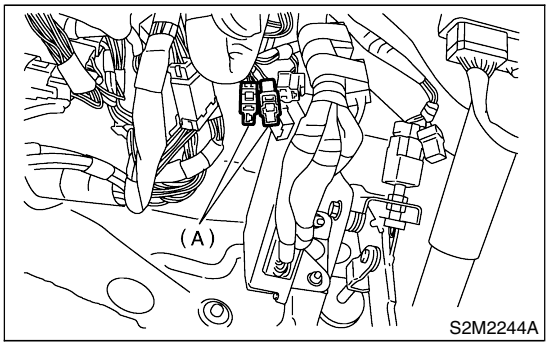
1) Prepare Subaru Select Monitor kit. <Ref. to EN(DOHC TURBO)-8, PREPARATION TOOL, General Description.>



2) Connect diagnosis cable to Subaru Select Monitor.
3) Insert cartridge into Subaru Select Monitor. <Ref. to EN(DOHC TURBO)-8, PREPARATION TOOL, General Description.>

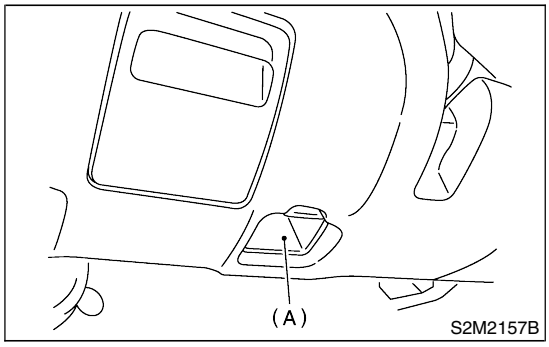


4) Connect test mode connector (A) at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



5) Connect Subaru Select Monitor to data link connector.

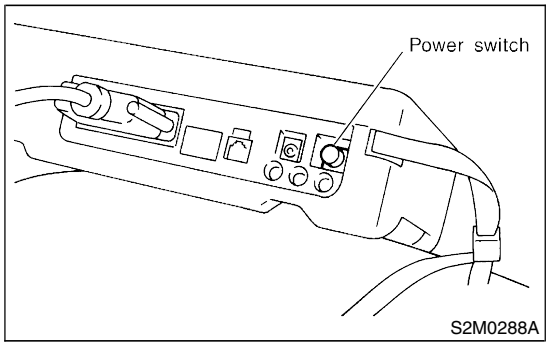
(1) Connect Subaru Select Monitor to data link connector (A) located in the lower portion of the instrument panel (on the driver's side).



(2) Connect diagnosis cable to data link connector.

CAUTION:
Do not connect scan tools except for Subaru Select Monitor and OBD-II general scan tool.

6) Turn ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.

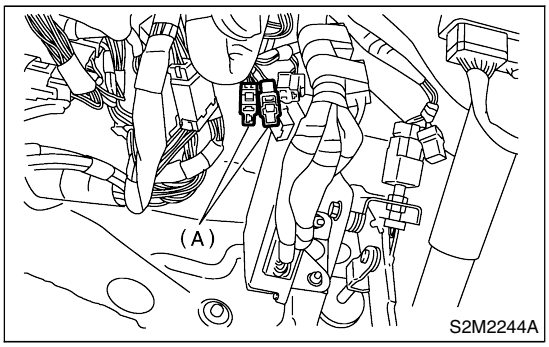


7) On the ≪Main Menu≫ display screen, select the {2. Each System Check} and press the [YES] key.
8) On the ≪System Selection Menu≫ display screen, select the {Engine Control System} and press the [YES] key.
9) Press the [YES] key after displayed the information of engine type.
10) On the ≪Engine Diagnosis≫ display screen, select the {Dealer Check Mode Procedure} and press the [YES] key.
11) When the "Perform Inspection (Dealer Check) Mode?" is shown on the display screen, press the [YES] key.
12) Perform subsequent procedures as instructed on the display screen.
● If trouble still remains in the memory, the corresponding diagnostic trouble code (DTC) appears on the display screen.

NOTE:
● For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
● For detailed concerning diagnostic trouble codes, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(DOHC TURBO)-82, 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.

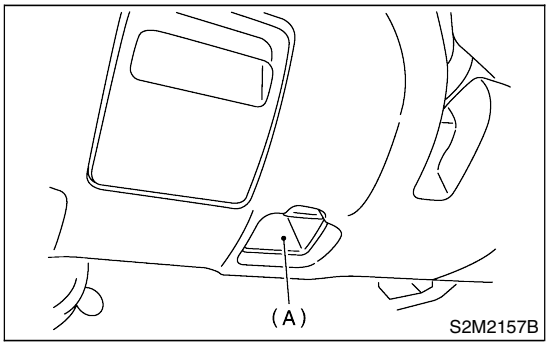
3. OBD-II GENERAL SCAN TOOL *S088510A1603*

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.

NOTE:
On models without tachometer, use the tachometer (Secondary pickup type).

7) Place the selector lever or shift lever in the “D” position (AT vehicles) or “1st” gear (MT vehicles) and drive the vehicle at 5 to 10 km/h (3 to 6 MPH).

NOTE:
● On AWD vehicles, release the parking brake.
● The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunctions. When engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system.

8) Using the OBD-II general scan tool, check for diagnostic trouble code(s) and record the result(s).

NOTE:
● For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.
● For detailed concerning diagnostic trouble codes, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).>

13. Clear Memory Mode S088513

A: OPERATION S088513A16

1. SUBARU SELECT MONITOR (NORMAL MODE) S088513A1601

1) On the ≪Main Menu≫ display screen, select the {2. Each System Check} and press the [YES] key.
2) On the ≪System Selection Menu≫ display screen, select the {Engine Control System} and press the [YES] key.
3) Press the [YES] key after displayed the information of engine type.
4) On the ≪Engine Diagnosis≫ display screen, select the {Clear Memory} and press the [YES] key.
5) When the 'Done' and 'Turn Ignition Switch OFF' are shown on the display screen, turn the Subaru Select Monitor and ignition switch to OFF.

NOTE:
● For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

2. SUBARU SELECT MONITOR (OBD MODE) S088513A1602

1) On the ≪Main Menu≫ display screen, select the {2. Each System Check} and press the [YES] key.
2) On the ≪System Selection Menu≫ display screen, select the {Engine Control System} and press the [YES] key.
3) Press the [YES] key after displayed the information of engine type.
4) On the ≪Engine Diagnosis≫ display screen, select the {OBD System} and press the [YES] key.
5) On the ≪OBD Menu≫ display screen, select the {4. Diagnosis Code(s) Cleared} and press the [YES] key.
6) When the 'Clear Diagnostic Code?' is shown on the display screen, press the [YES] key.
7) Turn Subaru Select Monitor and ignition switch to OFF.

NOTE:
● For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

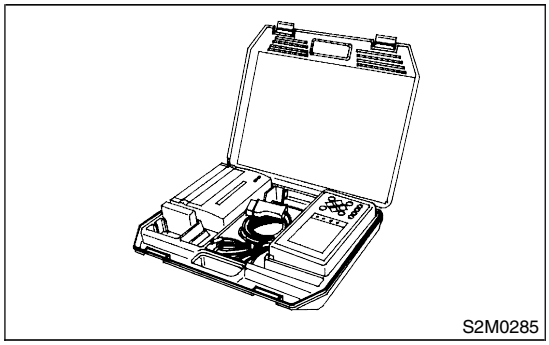
3. OBD-II GENERAL SCAN TOOL S088513A1603

For clear memory procedures using the OBD-II general scan tool, refer to the OBD-II General Scan Tool Instruction Manual.

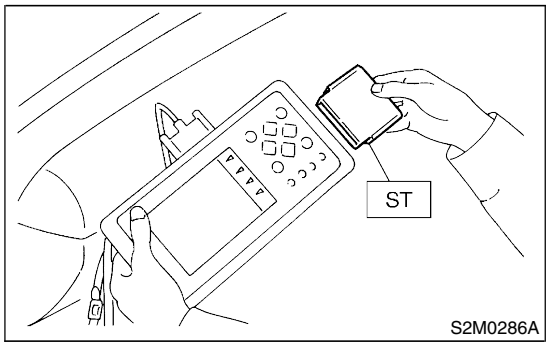
14. Compulsory Valve Operation Check Mode S088528

A: OPERATION S088528A16

1) Prepare Subaru Select Monitor kit. <Ref. to EN(DOHC TURBO)-8, PREPARATION TOOL, General Description.>

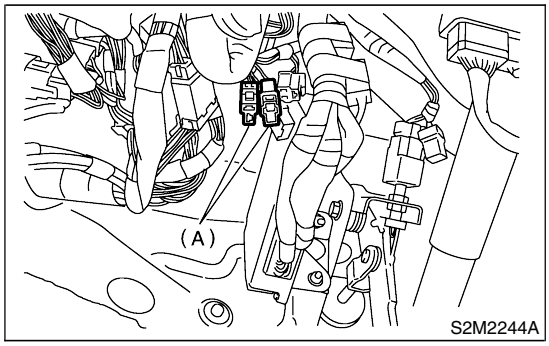

S2M0285

2) Connect diagnosis cable to Subaru Select Monitor.
3) Insert cartridge into Subaru Select Monitor. <Ref. to EN(DOHC TURBO)-8, PREPARATION TOOL, General Description.>



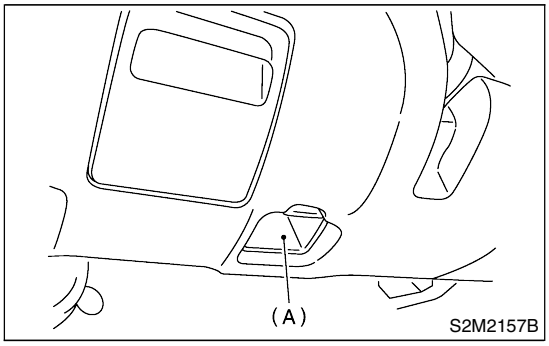
S2M0286A

4) Connect test mode connector (A) at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



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).

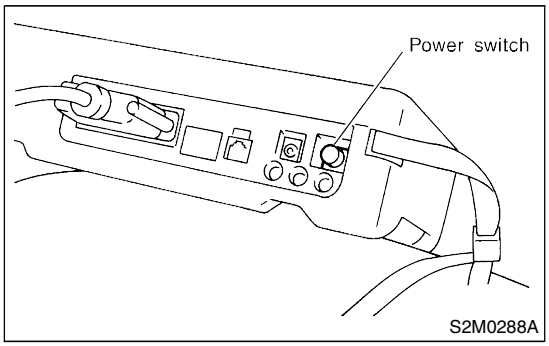


S2M2157B

(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

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
PCV Solenoid Valve
Vent Control Solenoid Valve
FICD Solenoid
Pressure Switching Sol. 1
Pressure Switching Sol. 2
AAI Solenoid Valve
Fuel Tank Sensor Control Valve

- For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

15. Engine Malfunction Indicator Lamp (MIL) S088653

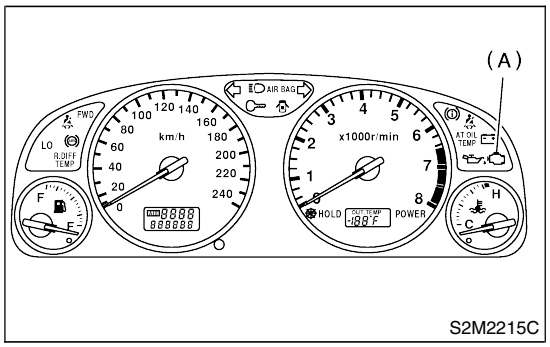
A: PROCEDURE S088653E45

1. Activation of check engine malfunction indicator lamp (MIL). <Ref. to EN(DOHC TURBO)-51, 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(DOHC TURBO)-52, 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(DOHC TURBO)-55, 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(DOHC TURBO)-56, 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(DOHC TURBO)-60, CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) REMAINS BLINKING AT A CYCLE OF 3 HZ., Engine Malfunction Indicator Lamp (MIL).>

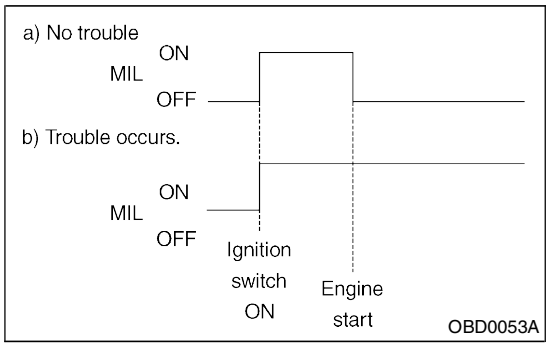
B: ACTIVATION OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) S088653E89

1) When ignition switch is turned to ON (engine off), the CHECK ENGINE malfunction indicator lamp (MIL) (A) in the combination meter illuminates.

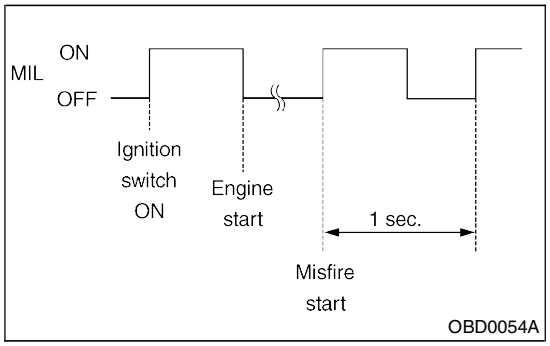
NOTE:
If the MIL does not illuminate, perform diagnostics of the CHECK ENGINE light circuit or the combination meter circuit. <Ref. to EN(DOHC TURBO)-52, CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT COME ON., Engine Malfunction Indicator Lamp (MIL).>



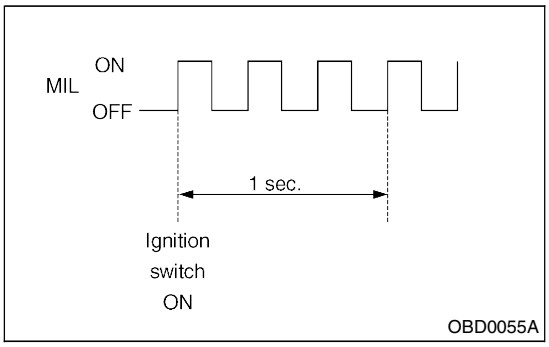
2) After starting the engine, the MIL goes out. If it does not, either the engine or the emission control system is malfunctioning.



3) If the diagnosis system senses a misfire which could damage the catalyzer, the MIL will blink at a cycle of 1 Hz.

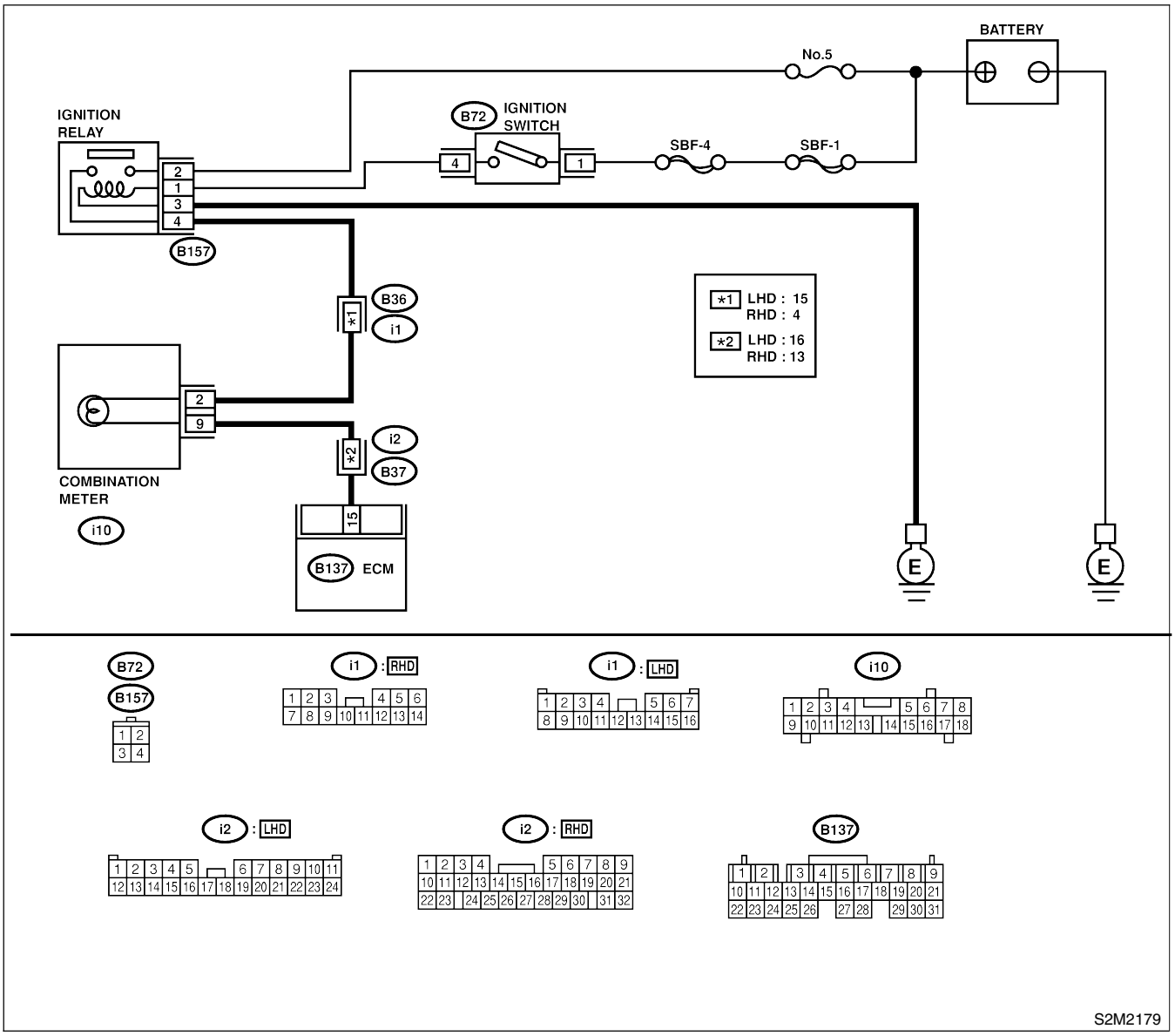


4) When ignition switch is turned to ON (engine off) or to “START” with the test mode connector connected, the MIL blinks at a cycle of 3 Hz.



C: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT COME ON. S088653E90

- **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:**

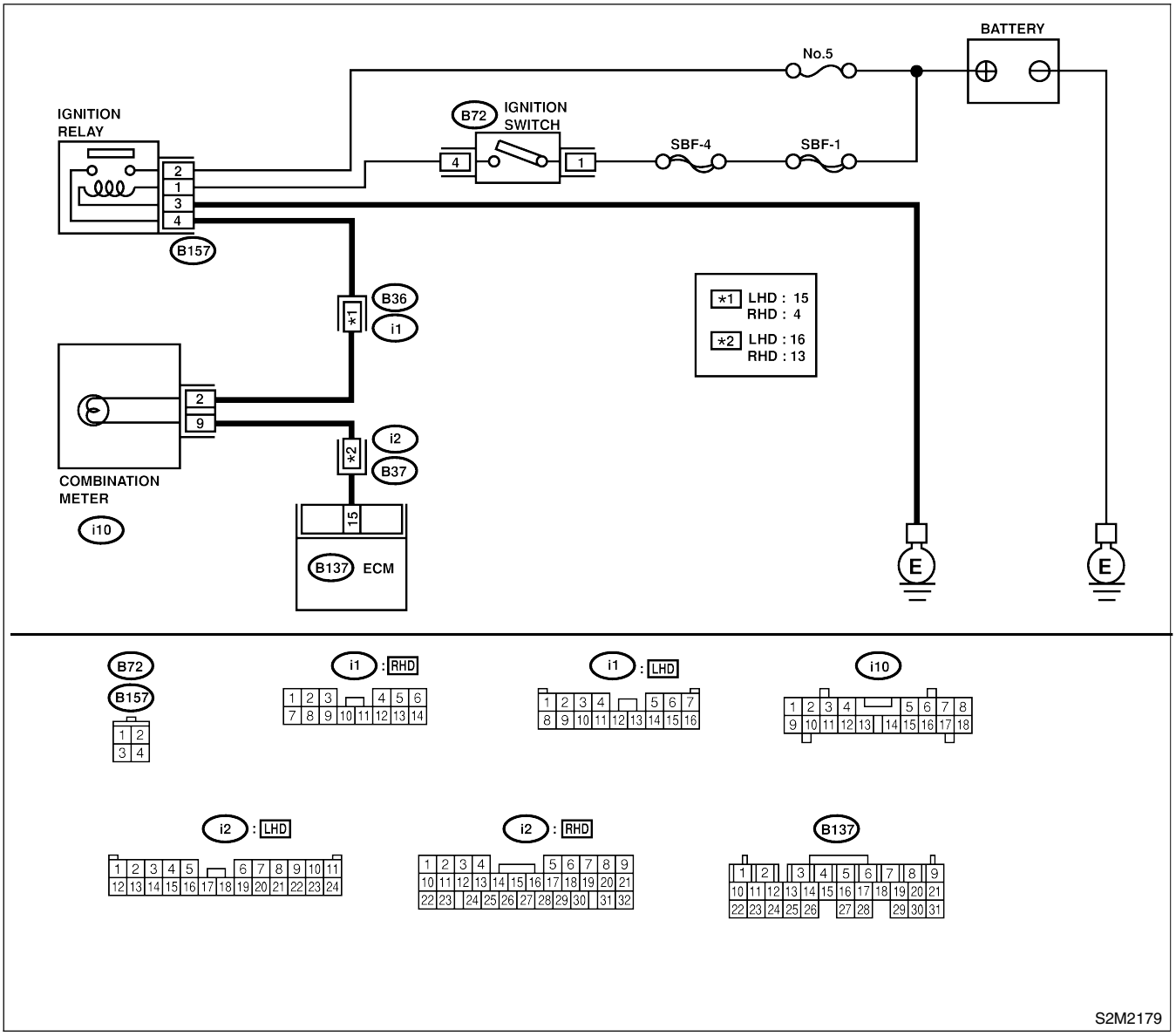


No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 15 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **4**.	Go to step **2**.
2	**CHECK POOR CONTACT.**	Does the MIL come on when shaking or pulling ECM connector and harness?	Repair poor contact in ECM connector.	Go to step **3**.
3	**CHECK ECM CONNECTOR.**	Is ECM connector correctly connected?	Replace ECM. <Ref. to FU(DOHC TURBO)-47, 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-15, Combination Meter Assembly.> 3) Disconnect connector from ECM and combination meter. 4) Measure resistance of harness between ECM and combination meter connector. ***Connector & terminal*** ***(B137) No. 15 — (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**.

No.	Step	Check	Yes	No
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
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. S088653E91

- **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:**

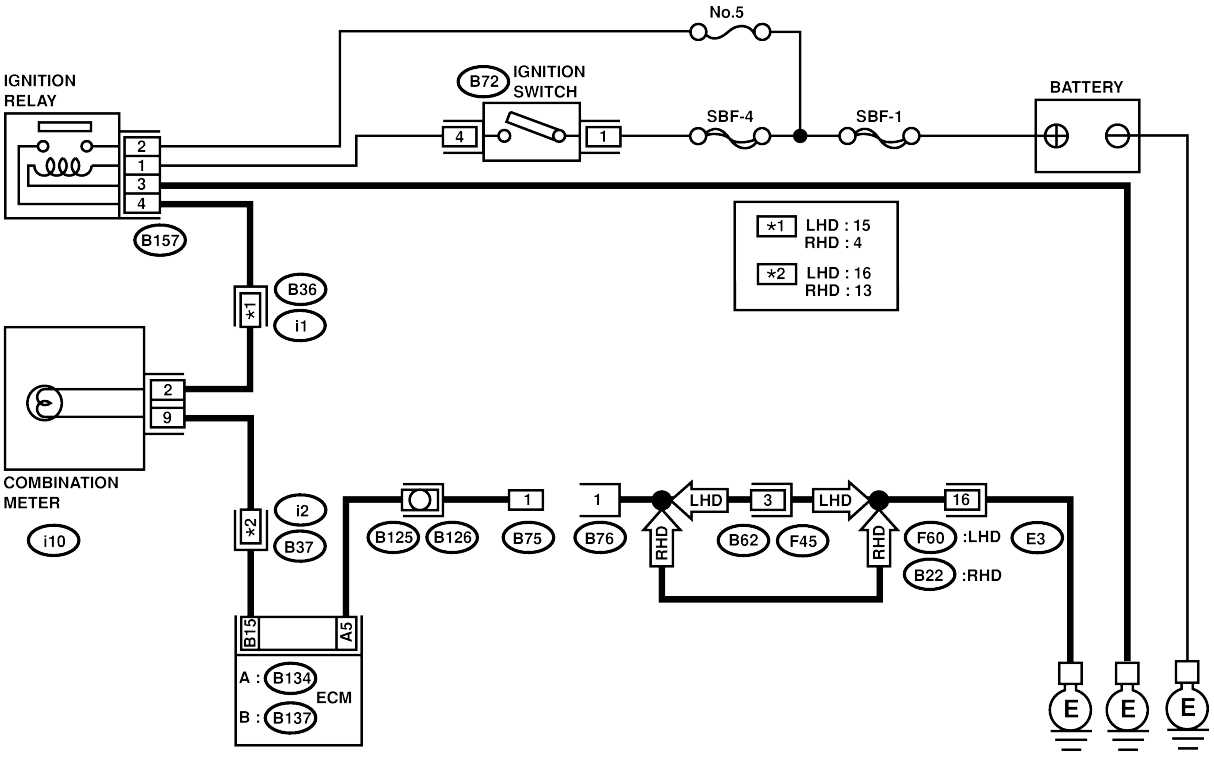


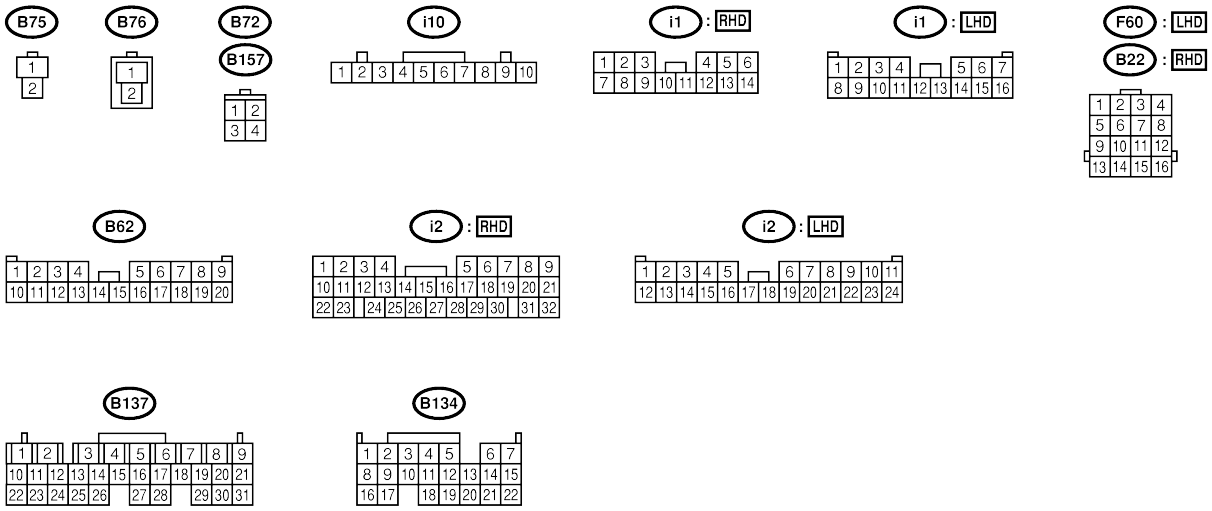
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Turn ignition switch to ON.	Does the MIL come on?	Repair short circuit in harness between combination meter and ECM connector.	Replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>

E: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT BLINK AT A CYCLE OF 3 Hz. S088653E92

- **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:**





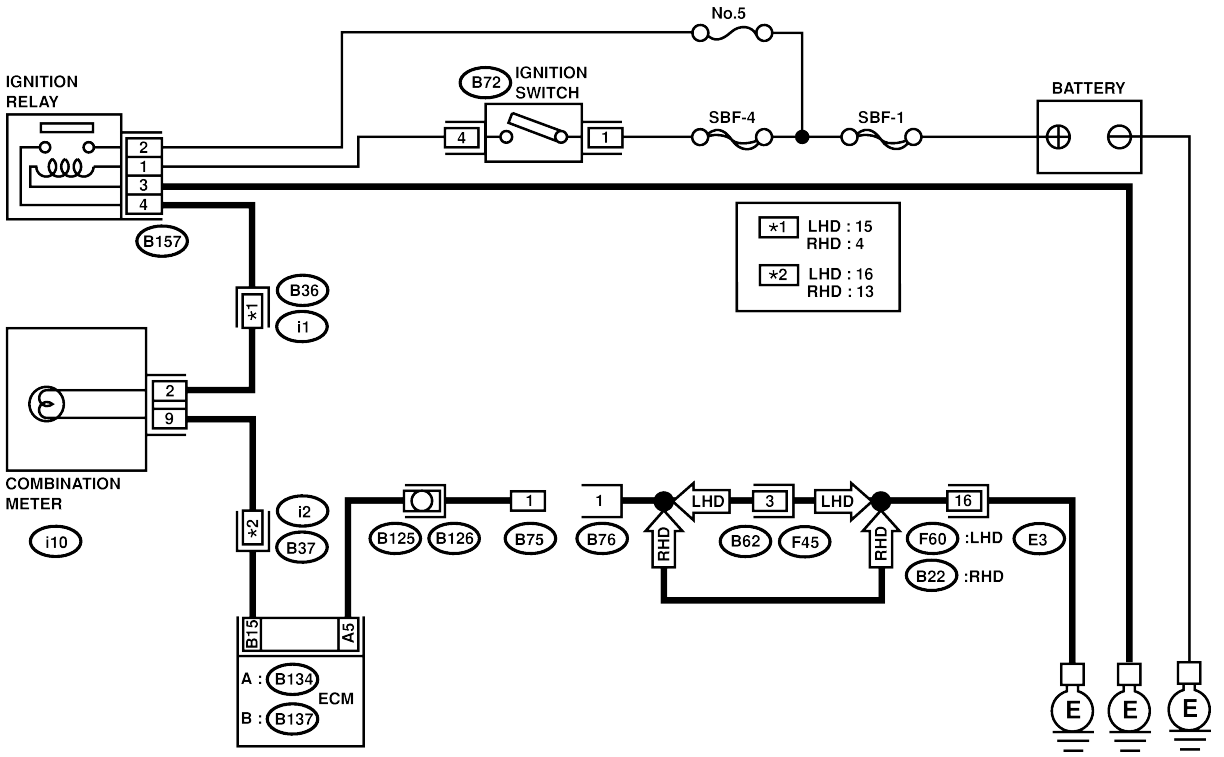
S2M2180

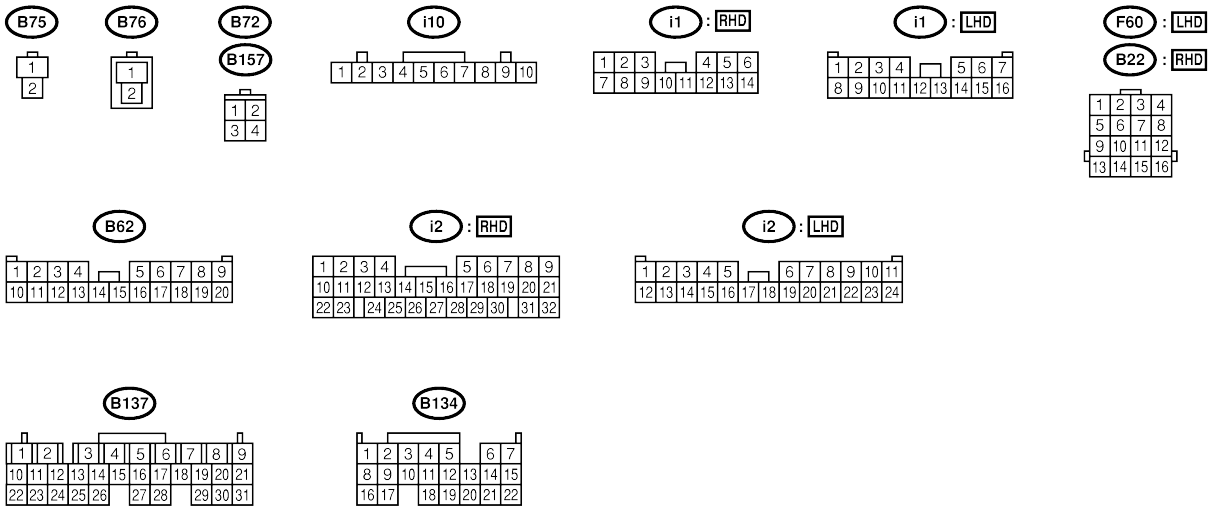
No.	Step	Check	Yes	No
1	**CHECK STATUS OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL).** 1) Turn ignition switch to OFF. 2) Disconnect test mode connector. 3) Turn ignition switch to ON. (engine OFF)	Does the MIL come on?	Go to step **2**.	Repair the MIL circuit. <Ref. to EN(DOHC TURBO)-52, CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT COME ON., Engine Malfunction Indicator Lamp (MIL).>
2	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Turn ignition switch to ON.	Does the MIL come on?	Repair ground short circuit in harness between combination meter and ECM connector.	Go to step **3**.
3	**CHECK HARNESS BETWEEN TEST MODE CONNECTOR AND CHASSIS GROUND.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between test mode connector and chassis ground. ***Connector & terminal*** ***(B76) No. 1 — Chassis ground:***	Is resistance less than 1 Ω?	Go to step **4**.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between test mode connector and chassis ground
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Go to step **5**.
5	**CHECK HARNESS BETWEEN ECM AND TEST MODE CONNECTOR.** 1) Connect test mode connector. 2) Measure resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 5 — Chassis ground:***	Is resistance less than 1 Ω?	Go to step **6**.	Repair open circuit in harness between ECM and test mode connector.
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>

MEMO:

F: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) REMAINS BLINKING AT A CYCLE OF 3 Hz. S088653E93

- **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:**





S2M2180

No.	Step	Check	Yes	No
1	**CHECK TEST MODE CONNECTOR.** 1) Disconnect test mode connector. 2) Turn ignition switch to ON.	Does MIL flash on and off?	Go to step **2**.	System is in good order. NOTE: MIL blinks at a cycle of 3 Hz when test mode connector is connected.
2	**CHECK HARNESS BETWEEN ECM CONNECTOR AND ENGINE GROUNDING TERMINAL.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 5 — Chassis ground:***	Is resistance less than 5 Ω?	Repair short circuit in harness between ECM and test mode connector.	Replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>

MEMO:

16. Diagnostics for Engine Starting Failure S088533

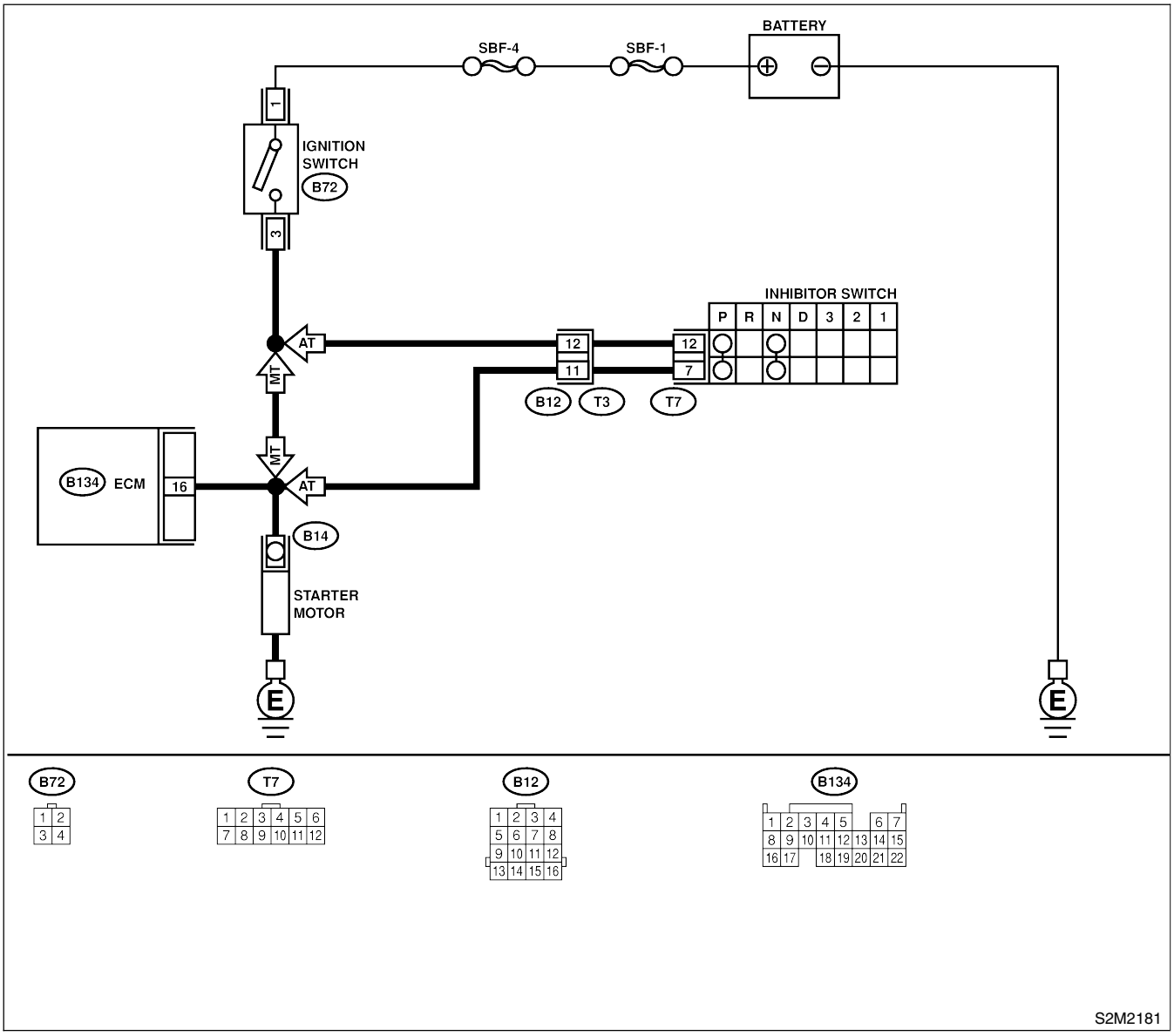
A: PROCEDURE S088533E45

1. Inspection of starter motor circuit. <Ref. to EN(DOHC TURBO)-64, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
2. Inspection of ECM power supply and ground line. <Ref. to EN(DOHC TURBO)-68, CONTROL MODULE POWER SUPPLY AND GROUND LINE, Diagnostics for Engine Starting Failure.>
↓
3. Inspection of ignition control system. <Ref. to EN(DOHC TURBO)-72, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>
↓
4. Inspection of fuel pump circuit. <Ref. to EN(DOHC TURBO)-76, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
5. Inspection of fuel injector circuit. <Ref. to EN(DOHC TURBO)-78, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

B: STARTER MOTOR CIRCUIT S088533E94

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(DOHC TURBO)-47, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



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(DOHC TURBO)-43, OPERATION, Read Diagnostic Trouble Code.>	Is the trouble code stored in memory? <Ref. to EN(DOHC TURBO)-82, LIST, List of Diagnostic Trouble Code (DTC).>	Record DTC. Repair the trouble case. <Ref. to EN(DOHC TURBO)-90, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	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-5, 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.

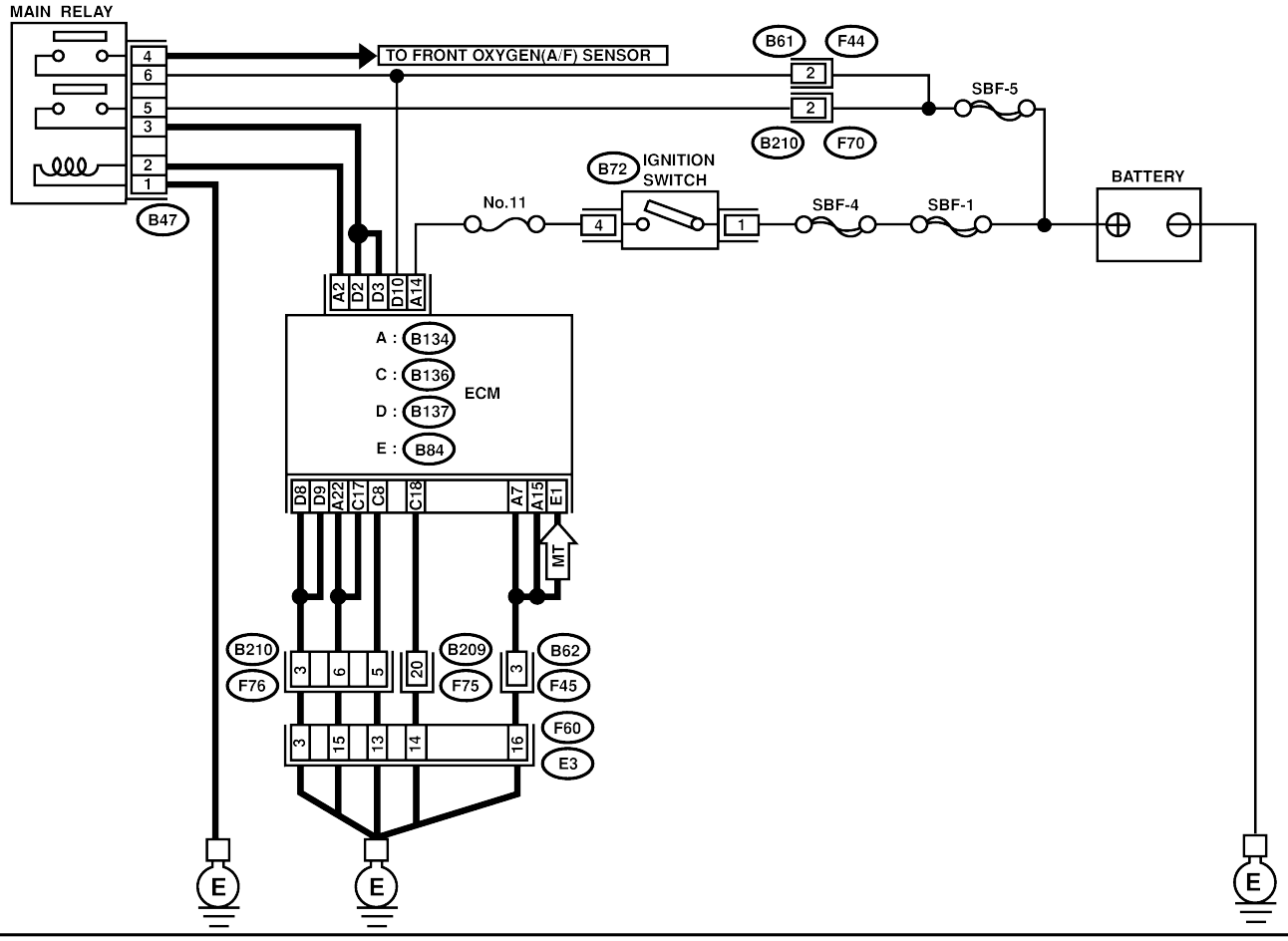
No.	Step	Check	Yes	No
9	**CHECK TRANSMISSION TYPE.**	Is the vehicle AT?	Go to step **10**.	Repair open circuit between ignition switch and starter motor circuit.
10	**CHECK INHIBITOR SWITCH CIRCUIT.** 1) Turn ignition switch to OFF. 2) Place the selector lever in the "P" or "N" position. 3) Separate 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. 1:***	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.

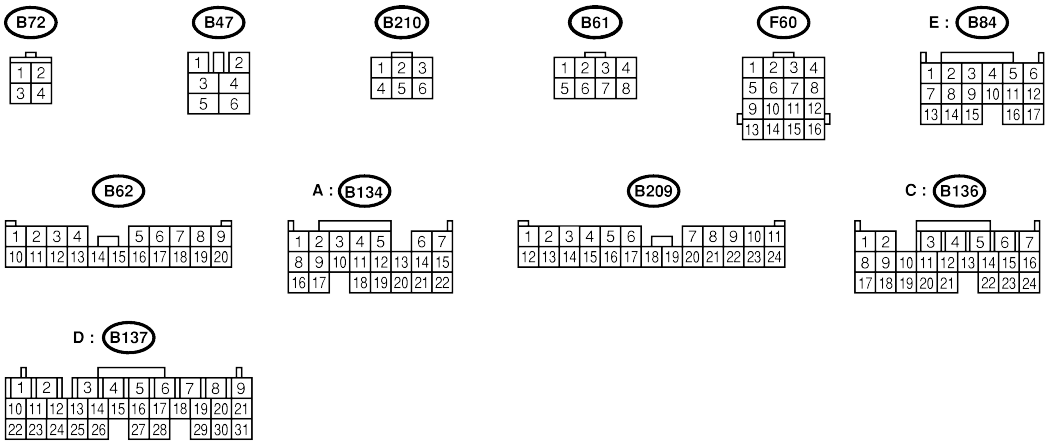
MEMO:

C: CONTROL MODULE POWER SUPPLY AND GROUND LINE S088533E37

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(DOHC TURBO)-47, Clear Memory Mode.> and INSPECTION MODE. <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>

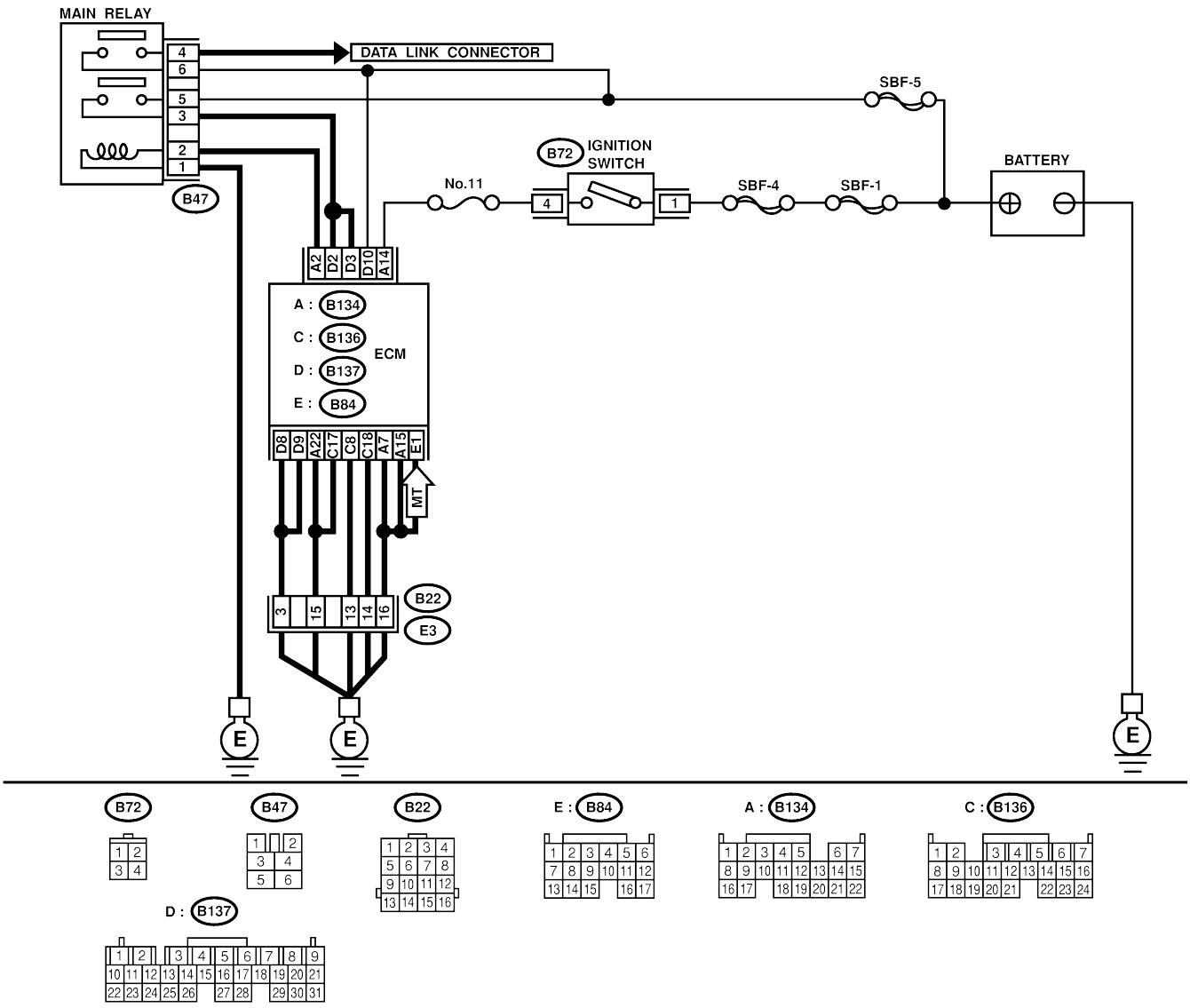
- **WIRING DIAGRAM:**
- **LHD MODEL**





S2M2182

- **RHD MODEL**



S2M2183

DIAGNOSTICS FOR ENGINE STARTING FAILURE

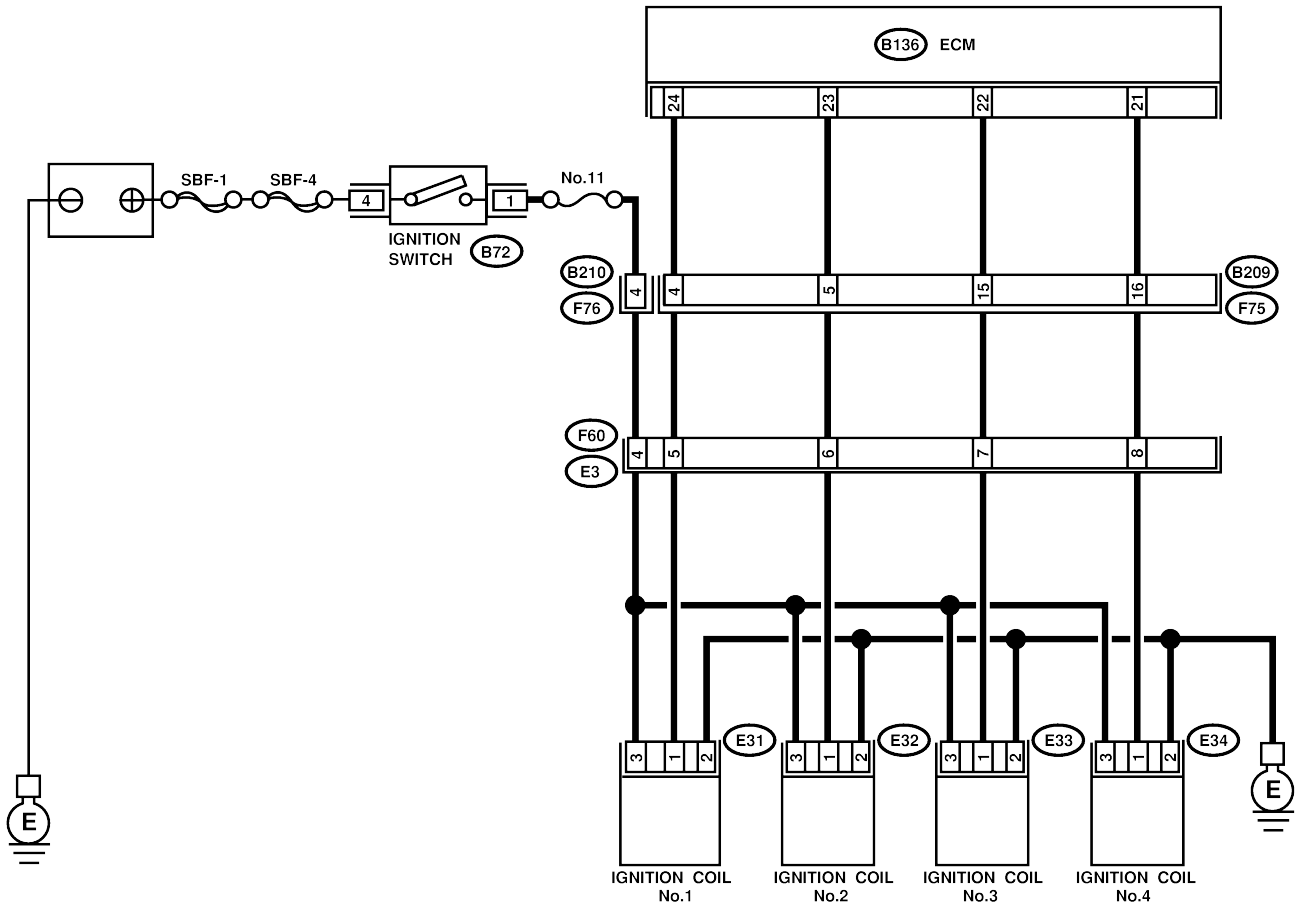
No.	Step	Check	Yes	No
1	**CHECK MAIN RELAY.** 1) Turn the ignition switch to OFF. 2) Remove main relay. 3) Connect battery to main relay terminals No. 1 and No. 2. 4) Measure resistance between main relay terminals. ***Terminals*** ***No. 3 — No. 5:*** ***No. 4 — No. 6:***	Is the resistance less than 10 Ω?	Go to step **2**.	Replace main relay.
2	**CHECK GROUND CIRCUIT OF ECM.** 1) Disconnect connector from ECM. 2) Measure resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 7 — Chassis ground:*** ***(B134) No. 15 — Chassis ground:*** ***(B134) No. 22 — Chassis ground:*** ***(B136) No. 8 — Chassis ground:*** ***(B136) No. 17 — Chassis ground:*** ***(B136) No. 18 — Chassis ground:*** ***(B137) No. 8 — Chassis ground:*** ***(B137) No. 9 — Chassis ground:*** ***(B84) No. 1 — Chassis ground: (MT model)***	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*** ***(B137) No. 10 (+) — Chassis ground (–):*** ***(B134) No. 14 (+) — 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 HARNESS BETWEEN ECM AND MAIN RELAY CONNECTOR.** 1) Turn ignition switch to OFF. 2) Measure resistance between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Repair ground short circuit in harness between ECM connector and main relay connector, then replace ECM.
5	**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*** ***(B134) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **6**.	Replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>
6	**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 **7**.	Repair open circuit in harness between ECM connector and main relay connector.
7	**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 **8**.	Repair open circuit between main relay and chassis ground.

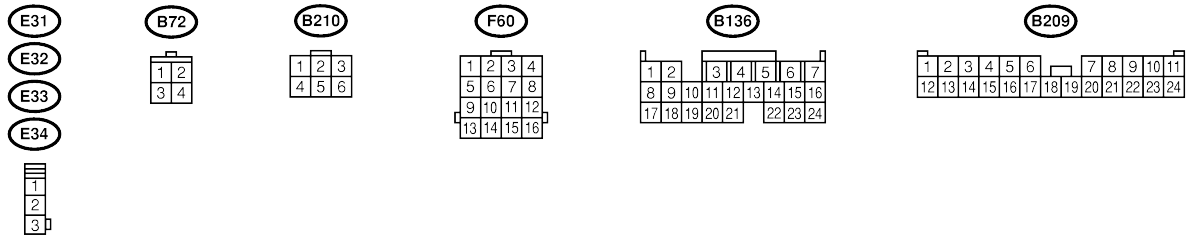
No.	Step	Check	Yes	No
8	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Measure voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 5 (+) — Chassis ground (–):*** ***(B47) No. 6 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **9**.	Repair open or ground short circuit in harness of power supply circuit.
9	**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*** ***(B137) No. 2 (+) — Chassis ground (–):*** ***(B137) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Check ignition control system. <Ref. to EN(DOHC TURBO)-72, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Repair open or ground short circuit in harness between ECM connector and main relay connector.

D: IGNITION CONTROL SYSTEM S088533E95

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(DOHC TURBO)-47, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**
- **LHD MODEL**

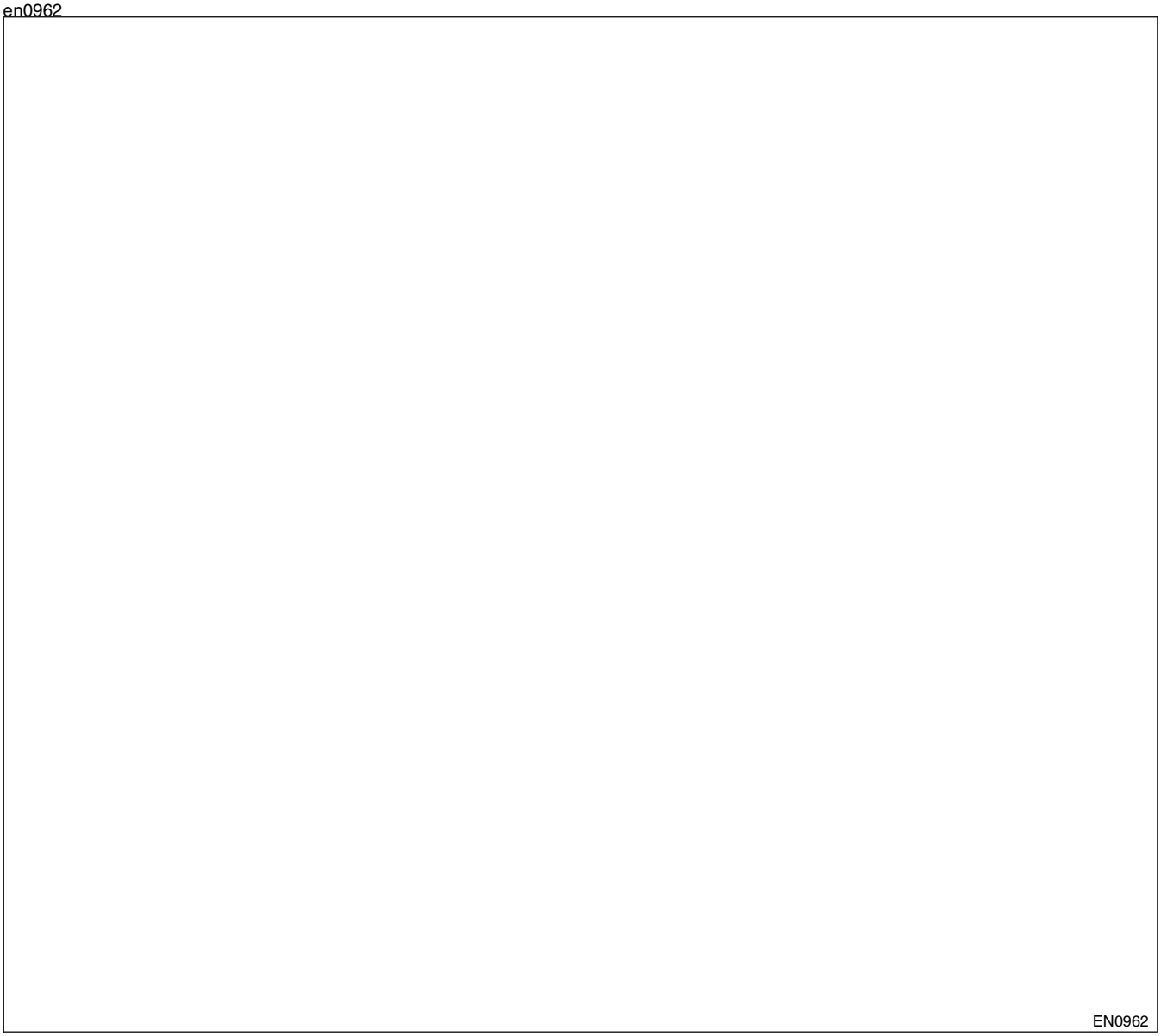




S2M2184

● **RHD MODEL**

en0962



No.	Step	Check	Yes	No
1	**CHECK SPARK PLUG CONDITION.** 1) Remove spark plug. <Ref. to IG(DOHC TURBO)-4, Spark Plug.> 2) Check spark plug condition. <Ref. to IG(DOHC TURBO)-4, Spark Plug.>	Is spark plug's status OK?	Go to step **2**.	Replace spark plug
2	**CHECK IGNITION SYSTEM FOR SPARKS.** 1) Connect spark plug to ignition coil. 2) Release fuel pressure. <Ref. to FU(DOHC TURBO)-50, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.> 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(DOHC TURBO)-76, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **3**.

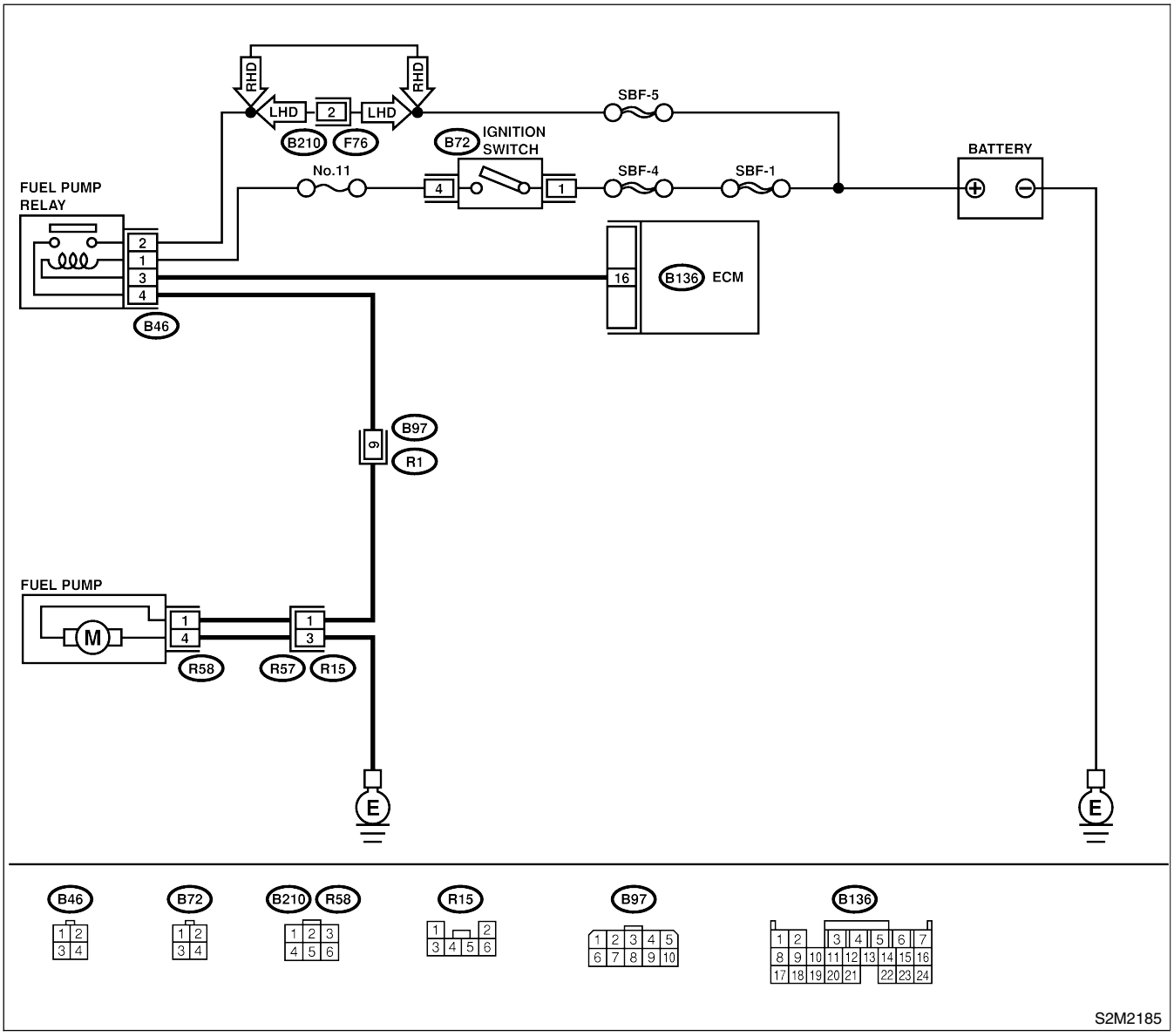
No.	Step	Check	Yes	No
3	**CHECK POWER SUPPLY CIRCUIT FOR IGNITION COIL & IGNITOR ASSEMBLY.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ignition coil & ignitor assembly. 3) Turn ignition switch to ON. 4) Measure power supply voltage between ignition coil & ignitor assembly connector and engine ground. ***Connector & terminal*** ***(E31) No. 3 (+) — Engine ground (–):*** ***(E32) No. 3 (+) — Engine ground (–):*** ***(E33) No. 3 (+) — Engine ground (–):*** ***(E34) No. 3 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **4**.	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
4	**CHECK HARNESS OF IGNITION COIL & IGNITOR ASSEMBLY GROUND CIRCUIT.** 1) Turn ignition switch to OFF. 2) Measure resistance between ignition coil & ignitor assembly connector and engine ground. ***Connector & terminal*** ***(E31) No. 2 — Engine ground:*** ***(E32) No. 2 — Engine ground:*** ***(E33) No. 2 — Engine ground:*** ***(E34) No. 2 — Engine ground:***	Is the resistance between less than 5 Ω?	Go to step **5**.	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
5	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSEMBLY CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Disconnect connector from ignition coil & ignitor assembly. 4) Measure resistance of harness between ECM and ignition coil & ignitor assembly connector. ***Connector & terminal*** ***(B136) No. 21 — (E34) No. 1:*** ***(B136) No. 22 — (E33) No. 1:*** ***(B136) No. 23 — (E32) No. 1:*** ***(B136) No. 24 — (E31) No. 1:***	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 ignition coil & ignitor assembly connector • Poor contact in coupling connector
6	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSEMBLY CONNECTOR.** Measure resistance of harness between ECM and engine ground. ***Connector & terminal:*** ***(B136) No. 21 — Engine ground:*** ***(B136) No. 22 — Engine ground:*** ***(B136) No. 23 — Engine ground:*** ***(B136) No. 24 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **7**.	Repair ground short circuit in harness between ECM and ignition coil & ignitor assembly connector.
7	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ignition coil and ignitor assembly.

MEMO:

E: FUEL PUMP CIRCUIT S088533E96

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(DOHC TURBO)-47, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**

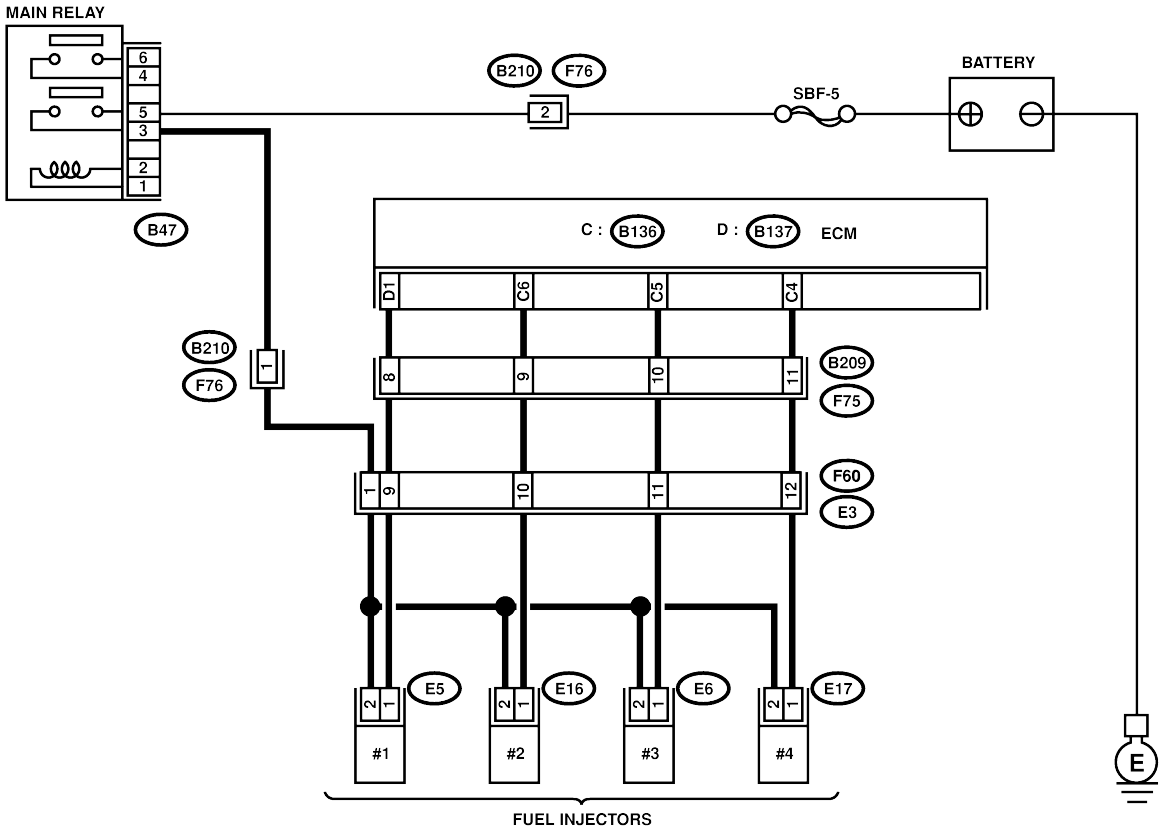


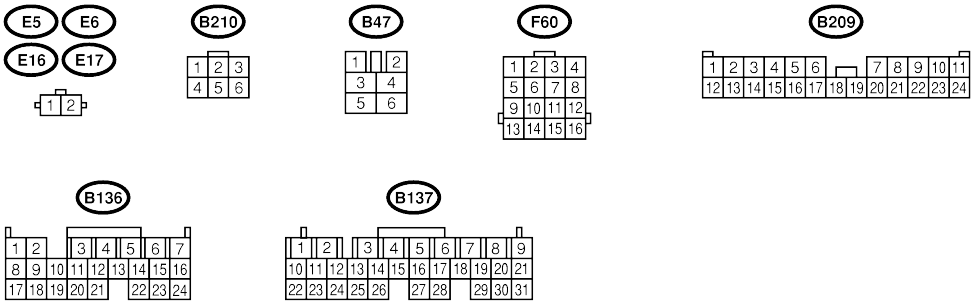
No.	Step	Check	Yes	No
1	**CHECK OPERATING SOUND OF FUEL PUMP.** Make sure that fuel pump is in operation for two seconds when turning ignition switch to ON. NOTE: Fuel pump operation can also be executed using Subaru Select Monitor (Function mode: FD01). For the procedure, refer to “Compulsory Valve Operation Check Mode”. <Ref. to EN(DOHC TURBO)-48, Compulsory Valve Operation Check Mode.>	Does fuel pump produce operating sound?	Check fuel injector circuit. <Ref. to EN(DOHC TURBO)-78, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>	Record DTC. Repair the trouble case. <Ref. to EN(DOHC TURBO)-90, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

F: FUEL INJECTOR CIRCUIT S088533E97

CAUTION:
• Check or repair only faulty parts.
• After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(DOHC TURBO)-47, Clear Memory Mode.> and INSPECTION MODE. <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>

- **WIRING DIAGRAM:**
- **LHD MODEL**

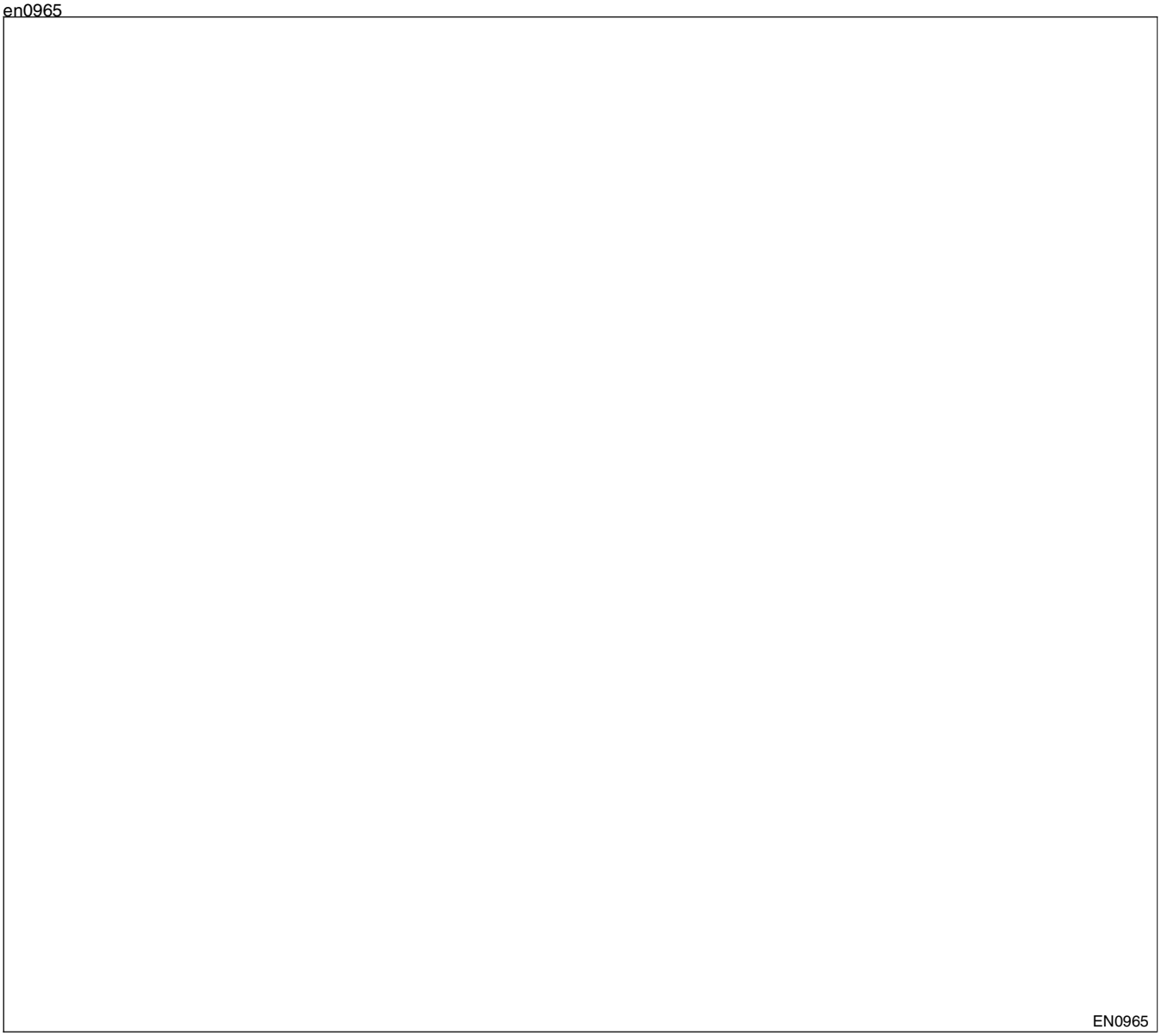




S2M2186

● **RHD MODEL**

en0965



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(DOHC TURBO)-27, 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 #1 cylinder fuel injector. 3) Turn ignition switch to ON. 4) Measure power supply voltage between the fuel injector terminal and engine ground. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (–):*** ***#2 (E16) No. 2 (+) — Engine ground (–):*** ***#3 (E6) No. 2 (+) — Engine ground (–):*** ***#4 (E17) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between main relay and fuel injector connector • Poor contact in main relay connector • Poor contact in coupling connector • Poor contact in fuel injector connector
3	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Disconnect connector from ECM. 2) Measure resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(B137) No. 1 — (E5) No. 1:*** ***(B136) No. 6 — (E16) No. 1:*** ***(B136) No. 5 — (E6) No. 1:*** ***(B136) No. 4 — (E6) 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*** ***(B137) No. 1 — Chassis ground:*** ***(B136) No. 6 — Chassis ground:*** ***(B136) No. 5 — Chassis ground:*** ***(B136) No. 4 — Chassis ground:***	Is the resistance less than 1 Ω?	Repair ground short circuit in harness between ECM and fuel injector connector.	Go to step **5**.
5	**CHECK 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(DOHC TURBO)-344, INSPECTION, General Diagnostic Table.>

17. List of Diagnostic Trouble Code (DTC) S088525

A: LIST S088525A12

DTC No.	Item	Index
P0031	Front oxygen (A/F) sensor heater circuit low input	<Ref. to EN(DOHC TURBO)-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(DOHC TURBO)-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(DOHC TURBO)-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(DOHC TURBO)-100, DTC P0038 — REAR OXYGEN SENSOR HEATER CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0101	Mass air flow sensor circuit range/performance problem (high input)	<Ref. to EN(DOHC TURBO)-102, DTC P0101 — MASS AIR FLOW SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0102	Mass air flow sensor circuit low input	<Ref. to EN(DOHC TURBO)-104, DTC P0102 — MASS AIR FLOW SENSOR CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0103	Mass air flow sensor circuit high input	<Ref. to EN(DOHC TURBO)-108, DTC P0103 — MASS AIR FLOW SENSOR CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0106	Pressure sensor circuit range/performance problem (low input)	<Ref. to EN(DOHC TURBO)-110, 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(DOHC TURBO)-114, DTC P0107 — PRESSURE SENSOR CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0108	Pressure sensor circuit high input	<Ref. to EN(DOHC TURBO)-118, 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(DOHC TURBO)-122, 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(DOHC TURBO)-124, 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(DOHC TURBO)-126, 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(DOHC TURBO)-130, 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(DOHC TURBO)-132, 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(DOHC TURBO)-136, 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(DOHC TURBO)-138, 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(DOHC TURBO)-142, 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(DOHC TURBO)-146, DTC P0125 — INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0131	Front oxygen (A/F) sensor circuit range/performance problem (low input)	<Ref. to EN(DOHC TURBO)-148, DTC P0131 — FRONT OXYGEN (A/F) SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LOW INPUT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0132	Front oxygen (A/F) sensor circuit range/performance problem (high input)	<Ref. to EN(DOHC TURBO)-150, DTC P0132 — FRONT OXYGEN (A/F) SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0133	Front oxygen (A/F) sensor circuit slow response	<Ref. to EN(DOHC TURBO)-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(DOHC TURBO)-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(DOHC TURBO)-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(DOHC TURBO)-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(DOHC TURBO)-161, DTC P0172 — FUEL TRIM MALFUNCTION (A/F TOO RICH) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0244	Wastegate control solenoid valve malfunction (high input)	<Ref. to EN(DOHC TURBO)-164, DTC P0244 — WASTEGATE CONTROL SOLENOID VALVE MALFUNCTION (HIGH INPUT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0245	Wastegate control solenoid valve circuit low input	<Ref. to EN(DOHC TURBO)-166, DTC P0245 — WASTEGATE CONTROL SOLENOID VALVE CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0246	Wastegate control solenoid valve circuit high input	<Ref. to EN(DOHC TURBO)-170, DTC P0246 — WASTEGATE CONTROL SOLENOID VALVE CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0301	Cylinder 1 misfire detected	<Ref. to EN(DOHC TURBO)-172, DTC P0301 — CYLINDER 1 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0302	Cylinder 2 misfire detected	<Ref. to EN(DOHC TURBO)-172, DTC P0302 — CYLINDER 2 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0303	Cylinder 3 misfire detected	<Ref. to EN(DOHC TURBO)-172, DTC P0303 — CYLINDER 3 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0304	Cylinder 4 misfire detected	<Ref. to EN(DOHC TURBO)-172, DTC P0304 — CYLINDER 4 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0327	Knock sensor circuit low input	<Ref. to EN(DOHC TURBO)-182, DTC P0327 — KNOCK SENSOR CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0328	Knock sensor circuit high input	<Ref. to EN(DOHC TURBO)-184, DTC P0328 — KNOCK SENSOR CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0335	Crankshaft position sensor circuit malfunction	<Ref. to EN(DOHC TURBO)-186, DTC P0335 — CRANKSHAFT POSITION SENSOR CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

LIST OF DIAGNOSTIC TROUBLE CODE (DTC)

DTC No.	Item	Index
P0336	Crankshaft position sensor circuit range/performance problem	<Ref. to EN(DOHC TURBO)-188, DTC P0336 — CRANKSHAFT POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0340	Camshaft position sensor circuit malfunction	<Ref. to EN(DOHC TURBO)-190, 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(DOHC TURBO)-192, 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(DOHC TURBO)-196, DTC P0420 — CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0444	Evaporative emission control system purge control valve circuit low input	<Ref. to EN(DOHC TURBO)-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(DOHC TURBO)-202, DTC P0445 — EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0461	Fuel level sensor circuit range/ performance problem	<Ref. to EN(DOHC TURBO)-206, 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(DOHC TURBO)-210, 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(DOHC TURBO)-214, DTC P0463 — FUEL LEVEL SENSOR CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0464	Fuel level sensor intermittent input	<Ref. to EN(DOHC TURBO)-218, 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(DOHC TURBO)-222, DTC P0480 — COOLING FAN RELAY 1 CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0483	Cooling fan function problem	<Ref. to EN(DOHC TURBO)-226, DTC P0483 — COOLING FAN FUNCTION PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0500	Vehicle speed sensor malfunction	<Ref. to EN(DOHC TURBO)-230, DTC P0500 — VEHICLE SPEED SENSOR MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0506	Idle control system RPM lower than expected	<Ref. to EN(DOHC TURBO)-232, DTC P0506 — IDLE CONTROL SYSTEM RPM LOWER THAN EXPECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0507	Idle control system RPM higher than expected	<Ref. to EN(DOHC TURBO)-234, DTC P0507 — IDLE CONTROL SYSTEM RPM HIGHER THAN EXPECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0508	Idle control system circuit low input	<Ref. to EN(DOHC TURBO)-236, DTC P0508 — IDLE CONTROL SYSTEM CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0509	Idle control system circuit high input	<Ref. to EN(DOHC TURBO)-238, DTC P0509 — IDLE CONTROL SYSTEM CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0512	Starter switch circuit high input	<Ref. to EN(DOHC TURBO)-240, DTC P0512 — STARTER SWITCH CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0513	Incorrect immobilizer key	<Ref. to IM-34, DTC P0153 — INCORRECT IMMOBILIZER KEY (USE OF UNREGISTERED KEY) —, Diagnostics Chart with Trouble Code.>

DTC No.	Item	Index
P0545	Exhaust gas temperature sensor circuit low input	<Ref. to EN(DOHC TURBO)-242, DTC P0545 — EXHAUST GAS TEMPERATURE SENSOR CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0546	Exhaust gas temperature sensor circuit high input	<Ref. to EN(DOHC TURBO)-244, DTC P0546 — EXHAUST GAS TEMPERATURE SENSOR CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0604	Internal control module memory check sum error	<Ref. to EN(DOHC TURBO)-248, DTC P0604 — INTERNAL CONTROL MODULE MEMORY CHECK SUM ERROR —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0703	Brake switch input malfunction	<Ref. to EN(DOHC TURBO)-252, DTC P0703 — BRAKE SWITCH INPUT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0705	Transmission range sensor circuit malfunction	<Ref. to AT-122, CHECK INHIBITOR SWITCH., Diagnostic Procedure for No-trouble Code.>
P0710	Transmission fluid temperature sensor circuit malfunction	<Ref. to AT-46, TROUBLE CODE 27 — ATF TEMPERATURE SENSOR —, Diagnostic Procedure with Trouble Code.>
P0715	Torque converter turbine speed sensor circuit malfunction	<Ref. to AT-64, TROUBLE CODE 36 — TORQUE CONVERTER TURBINE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>
P0720	Output speed sensor (vehicle speed sensor 2) circuit malfunction	<Ref. to AT-58, TROUBLE CODE 33 — FRONT VEHICLE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>
P0725	Engine speed input circuit malfunction	<Ref. to AT-42, TROUBLE CODE 11 — ENGINE SPEED SIGNAL —, Diagnostic Procedure with Trouble Code.>
P0731	Gear 1 incorrect ratio	<Ref. to EN(DOHC TURBO)-254, DTC P0731 — GEAR 1 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0732	Gear 2 incorrect ratio	<Ref. to EN(DOHC TURBO)-254, DTC P0732 — GEAR 2 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0733	Gear 3 incorrect ratio	<Ref. to EN(DOHC TURBO)-254, DTC P0733 — GEAR 3 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0734	Gear 4 incorrect ratio	<Ref. to EN(DOHC TURBO)-255, DTC P0734 — GEAR 4 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0741	Torque converter clutch system malfunction	<Ref. to EN(DOHC TURBO)-256, 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-96, TROUBLE CODE 77 — LOCK-UP DUTY SOLENOID —, Diagnostic Procedure with Trouble Code.>
P0748	Pressure control solenoid (Line pressure duty solenoid) electrical	<Ref. to AT-88, TROUBLE CODE 75 — LINE PRESSURE DUTY SOLENOID —, Diagnostic Procedure with Trouble Code.>
P0753	Shift solenoid A (Shift solenoid 1) electrical	<Ref. to AT-72, TROUBLE CODE 71 — SHIFT SOLENOID 1 —, Diagnostic Procedure with Trouble Code.>
P0758	Shift solenoid B (Shift solenoid 2) electrical	<Ref. to AT-76, TROUBLE CODE 72 — SHIFT SOLENOID 2 —, Diagnostic Procedure with Trouble Code.>
P0778	2-4 brake pressure control solenoid valve circuit malfunction	<Ref. to AT-92, TROUBLE CODE 76 — 2- BRAKE DUTY SOLENOID —, Diagnostic Procedure with Trouble Code.>
P0785	2-4 brake timing control solenoid valve circuit malfunction	<Ref. to AT-84, TROUBLE CODE 74 — 2-4 BRAKE TIMING SOLENOID —, Diagnostic Procedure with Trouble Code.>
P1086	Tumble generator valve #2 (LH) position sensor circuit low input	<Ref. to EN(DOHC TURBO)-258, DTC P1086 — TUMBLE GENERATOR VALVE #2 (LH) POSITION SENSOR CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1087	Tumble generator valve #2 (LH) position sensor circuit high input	<Ref. to EN(DOHC TURBO)-262, DTC P1087 — TUMBLE GENERATOR VALVE #2 (LH) POSITION SENSOR CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1088	Tumble generator valve #1 (RH) position sensor circuit low input	<Ref. to EN(DOHC TURBO)-266, DTC P1088 — TUMBLE GENERATOR VALVE #1 (RH) POSITION SENSOR CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

LIST OF DIAGNOSTIC TROUBLE CODE (DTC)

DTC No.	Item	Index
P1089	Tumble generator valve #1 (RH) position sensor circuit high input	<Ref. to EN(DOHC TURBO)-270, DTC P1089 — TUMBLE GENERATOR VALVE #1 (RH) POSITION SENSOR CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1090	Tumble generator valve #1(RH) malfunction (stuck open)	<Ref. to EN(DOHC TURBO)-273, DTC P1090 — TUMBLE GENERATOR VALVE SYSTEM #1 (RH) MALFUNCTION (STUCK OPEN) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1091	Tumble generator valve #1(RH) malfunction (stuck close)	<Ref. to EN(DOHC TURBO)-274, DTC P1091 — TUMBLE GENERATOR VALVE SYSTEM #1 (RH) MALFUNCTION (STUCK CLOSE) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1092	Tumble generator valve #2(LH) malfunction (stuck open)	<Ref. to EN(DOHC TURBO)-275, DTC P1092 — TUMBLE GENERATOR VALVE SYSTEM #2 (LH) MALFUNCTION (STUCK OPEN) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1093	Tumble generator valve #2(LH) malfunction (stuck close)	<Ref. to EN(DOHC TURBO)-276, DTC P1093 — TUMBLE GENERATOR VALVE SYSTEM #2 (LH) MALFUNCTION (STUCK CLOSE) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1094	Tumble generator valve circuit #1 (opencircuit)	<Ref. to EN(DOHC TURBO)-278, DTC P1094 — TUMBLE GENERATOR VALVE CIRCUIT #1 (OPEN CIRCUIT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1095	Tumble generator valve circuit #1 (overcurrent)	<Ref. to EN(DOHC TURBO)-280, DTC P1095 — TUMBLE GENERATOR VALVE CIRCUIT #1 (OVERCURRENT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1096	Tumble generator valve circuit #2 (opencircuit)	<Ref. to EN(DOHC TURBO)-282, DTC P1096 — TUMBLE GENERATOR VALVE CIRCUIT #2 (OPEN CIRCUIT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1097	Tumble generator valve circuit #2 (overcurrent)	<Ref. to EN(DOHC TURBO)-284, DTC P1097 — TUMBLE GENERATOR VALVE CIRCUIT #2 (OVERCURRENT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1110	Atmospheric pressure sensor low input	<Ref. to EN(DOHC TURBO)-286, DTC P1110 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1111	Atmospheric pressure sensor high input	<Ref. to EN(DOHC TURBO)-286, 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(DOHC TURBO)-287, DTC P1112 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1130	Front oxygen sensor circuit malfunction (open circuit)	<Ref. to EN(DOHC TURBO)-288, DTC P1130 — FRONT OXYGEN (A/F) SENSOR CIRCUIT MALFUNCTION (OPEN CIRCUIT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1131	Front oxygen sensor circuit malfunction (short circuit)	<Ref. to EN(DOHC TURBO)-290, DTC P1131 — FRONT OXYGEN (A/F) SENSOR CIRCUIT MALFUNCTION (SHORT CIRCUIT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1134	Front oxygen (A/F) sensor micro-computer problem	<Ref. to EN(DOHC TURBO)-292, DTC P1134 — FRONT OXYGEN (A/F) SENSOR MICRO-COMPUTER PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1139	Front oxygen (A/F) sensor #1 heater circuit perfomance/range problem	<Ref. to EN(DOHC TURBO)-294, DTC P1139 — FRONT OXYGEN (A/F) SENSOR #1 HEATER CIRCUIT RANGE/PERFORMANCE PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1141	Mass air flow sensor circuit range/perfomance problem (low input)	<Ref. to EN(DOHC TURBO)-296, DTC P1141 — MASS AIR FLOW SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LOW INPUT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1142	Throttle position sensor circuit range/performance problem (low input)	<Ref. to EN(DOHC TURBO)-298, 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(DOHC TURBO)-300, DTC P1146 — PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC No.	Item	Index
P1230	Fuel pump control unit maifunction	<Ref. to EN(DOHC TURBO)-xx, DTC P1230 — FUEL PUMP CONTROLLER MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1244	Wastegate control solenoid valve malfunction (low input)	<Ref. to EN(DOHC TURBO)-304, DTC P1244 — WASTEGATE CONTROL SOLENOID VALVE RANGE/PERFORMANCE PROBLEM (LOW INPUT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1245	Wastegate control solenoid valve malfunction (fail-safe)	<Ref. to EN(DOHC TURBO)-306, DTC P1245 — WASTEGATE CONTROL SOLENOID VALVE MALFUNCTION (FAIL-SAFE) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1301	Fire due to increased exhaust temperature	<Ref. to EN(DOHC TURBO)-308, DTC P1301 — FIRE DUE TO INCREASED EXHAUST TEMPERATURE —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1312	Exhaust temperature sensor malfunction	<Ref. to EN(DOHC TURBO)-310, DTC P1312 — EXHAUST GAS TEMPERATURE CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1480	Cooling fan relay 1 circuit high input	<Ref. to EN(DOHC TURBO)-312, 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(DOHC TURBO)-316, DTC P1507 — IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1518	Starter switch circuit low input	<Ref. to EN(DOHC TURBO)-318, DTC P1518 — STARTER SWITCH CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1544	High exhaust temperature detected	<Ref. to EN(DOHC TURBO)-320, DTC P1544 — HIGH EXHAUST TEMPERATURE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1560	Back-up voltage circuit malfunction	<Ref. to EN(DOHC TURBO)-322, DTC P1560 — BACK-UP VOLTAGE CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1570	Antennna	<Ref. to IM-35, DTC P1570 — ANTENNA —, Diagnostics Chart with Trouble Code.>
P1571	Reference code incompatibility	<Ref. to IM-26, DTC P1571 — REFERENCE CODE INCOMPATIBILITY —, Diagnostics Chart with Trouble Code.>
P1572	IMM circuit failure except antenna circuit	<Ref. to IM-27, DTC P1572 — IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT) —, Diagnostics Chart with Trouble Code.>
P1574	Key communication failure	<Ref. to IM-33, DTC P1574 — KEY COMMUNICATION FAILURE —, Diagnostics Chart with Trouble Code.>
P1576	EGI control module EEPROM	<Ref. to IM-34, DTC P1576 — EGI CONTROL MODULE EEPROM —, Diagnostics Chart with Trouble Code.>
P1577	IMM control module EEPROM	<Ref. to IM-34, DTC P1577 — IMM CONTROL MODULE EEPROM —, Diagnostics Chart with Trouble Code.>
P1590	Neutral position switch circuit high input (AT model)	<Ref. to EN(DOHC TURBO)-326, DTC P1590 — NEUTRAL POSITION SWITCH CIRCUIT HIGH INPUT (AT MODEL) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1591	Neutral position switch circuit low input (AT model)	<Ref. to EN(DOHC TURBO)-330, DTC P1591 — NEUTRAL POSITION SWITCH CIRCUIT LOW INPUT (AT MODEL) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1594	Automatic transmission diagnosis input signal circuit malfunction	<Ref. to EN(DOHC TURBO)-332, 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(DOHC TURBO)-334, DTC P1595 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

LIST OF DIAGNOSTIC TROUBLE CODE (DTC)

DTC No.	Item	Index
P1596	Automatic transmission diagnosis input signal circuit high input	<Ref. to EN(DOHC TURBO)-336, DTC P1596 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1700	Throttle position sensor circuit malfunction for automatic transmission	<Ref. to AT-50, TROUBLE CODE 31 — THROTTLE POSITION SENSOR —, Diagnostic Procedure with Trouble Code.>
P1701	Cruise control set signal circuit malfunction for automatic transmission	<Ref. to EN(DOHC TURBO)-338, 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-80, TROUBLE CODE 73 — LOW CLUTCH TIMING SOLENOID —, Diagnostic Procedure with Trouble Code.>
P1711	Engine torque control signal 1 circuit malfunction	<Ref. to EN(DOHC TURBO)-340, 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(DOHC TURBO)-342, DTC P1712 — ENGINE TORQUE CONTROL SIGNAL 2 CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

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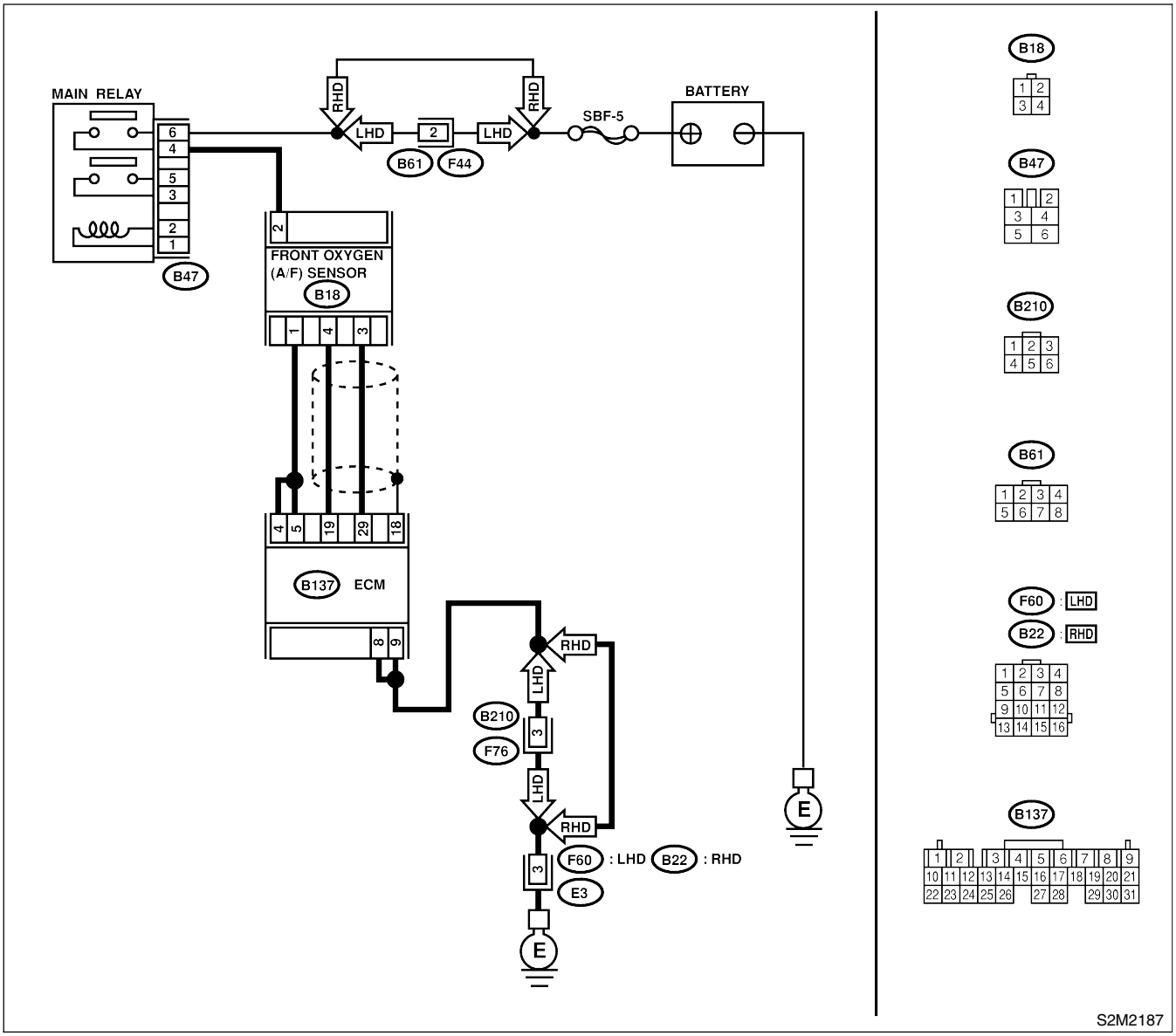
18. Diagnostic Procedure with Diagnostic Trouble Code (DTC) S088521

A: DTC P0031 — FRONT OXYGEN (A/F) SENSOR HEATER CIRCUIT LOW INPUT — S088521F83

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, 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 ignition switch to OFF. 2) Disconnect connector from front oxygen (A/F) sensor. 3) Turn ignition switch to ON. 4) Measure voltage between front oxygen (A/F) sensor connector and engine ground. ***Connector & terminal*** ***(B18) 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 resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 8 — Chassis ground:*** ***(B137) No. 9 — 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 engine 2) Read data of front oxygen (A/F) sensor heater current using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(DOHC TURBO)-36, 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 voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 4 (+) — Chassis ground (–):*** ***(B137) No. 5 (+) — 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 voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 4 (+) — Chassis ground (–):*** ***(B137) No. 5 (+) — Chassis ground (–):***	Does the voltage change less than 1.0 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair poor contact in ECM connector.	Go to step **7**.
7	**CHECK FRONT OXYGEN (A/F) SENSOR.** 1) Turn ignition switch to OFF. 2) Measure resistance between front oxygen (A/F) sensor connector terminals. ***Terminals*** ***No. 2 — No. 1:***	Is the resistance less than 10 Ω?	Repair harness and connector. NOTE: In this case, repair the following: • Open or ground short circuit in harness between front oxygen (A/F) sensor and ECM connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector	Replace front oxygen (A/F) sensor. <Ref. to FU(DOHC TURBO)-42, Front Oxygen (A/F) Sensor.>

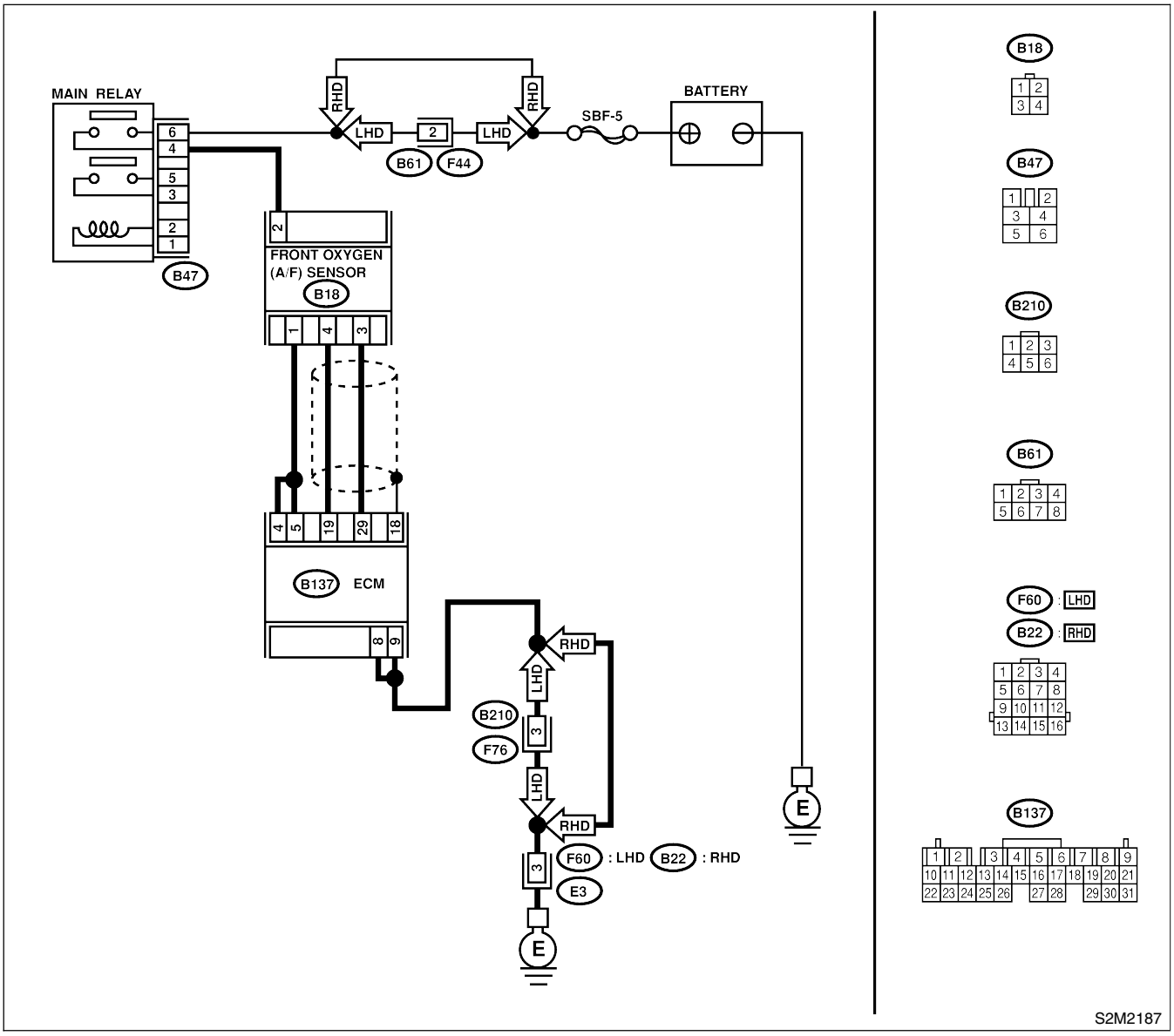
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B: DTC P0032 — FRONT OXYGEN (A/F) SENSOR HEATER CIRCUIT HIGH INPUT — S088521F84

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **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*** ***(B137) No. 4 (+) — Chassis ground (–):*** ***(B137) No. 5 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **3**.	Go to step **2**.
2	**CHECK FRONT OXYGEN (A/F) SENSOR HEATER CURRENT.** 1) Turn ignition switch to OFF. 2) Repair battery short circuit in harness between ECM and front oxygen (A/F) sensor connector. 3) Turn ignition switch to ON. 4) Read data of front oxygen (A/F) sensor heater current using Subaru Select Monitor or the OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(DOHC TURBO)-36, Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value more than 2.3 A?	Replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>	END
3	**CHECK OUTPUT SIGNAL FROM ECM.** Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 4 (+) — Chassis ground (–):*** ***(B137) No. 5 (+) — Chassis ground (–):***	Does the voltage change more than 8 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair battery short circuit in harness between ECM and front oxygen (A/F) sensor connector.	END

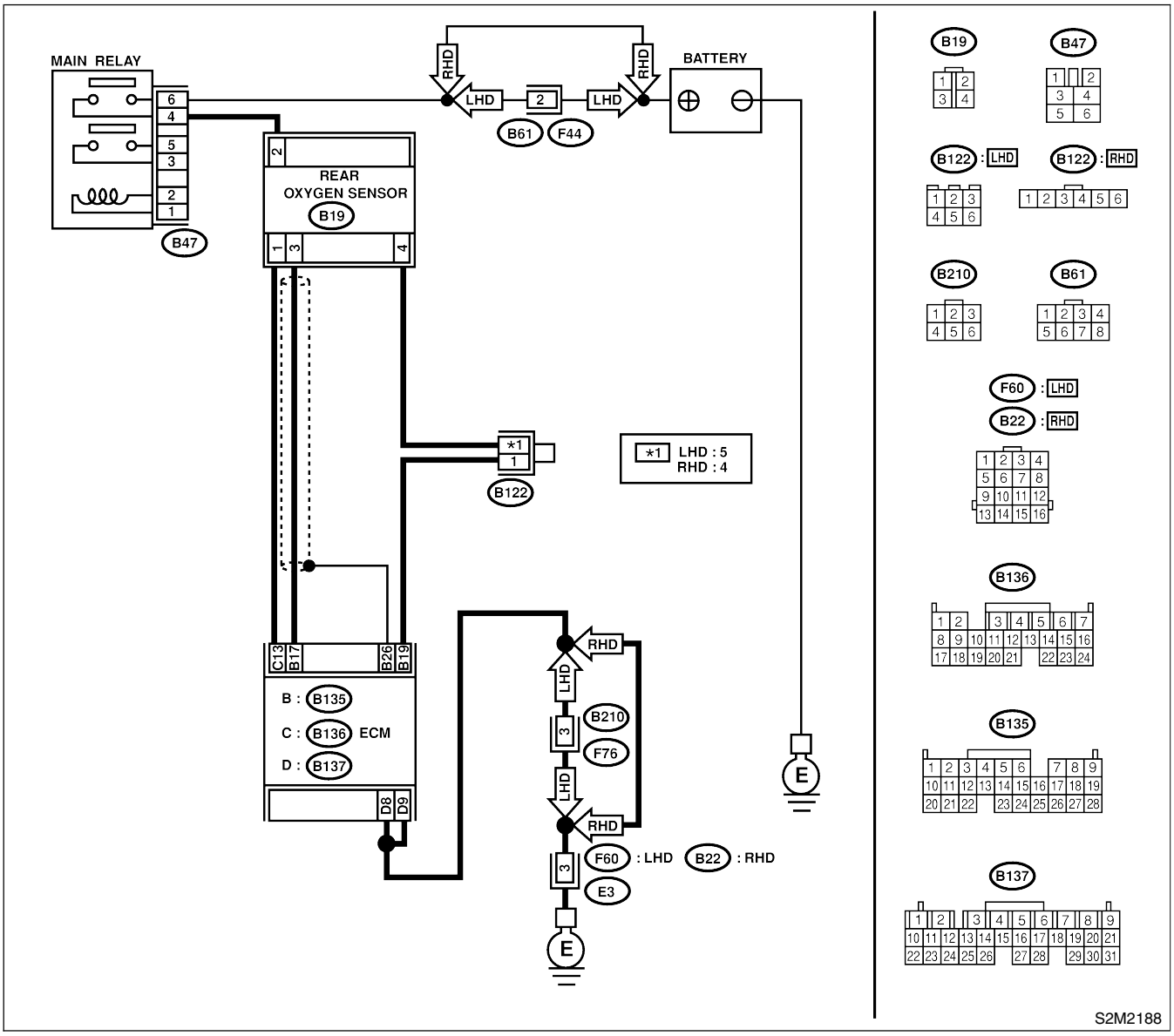
C: DTC P0037 — REAR OXYGEN SENSOR HEATER CIRCUIT MALFUNCTION

S088521F85

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK GROUND CIRCUIT OF ECM.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 8 — Chassis ground:*** ***(B137) No. 9 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **2**.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine ground terminal • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK CURRENT DATA.** 1) Start engine. 2) Read data of rear oxygen sensor heater current using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(DOHC TURBO)-36, Subaru Select Monitor.> • OBD-II scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value more than 0.2 A?	Repair connector. NOTE: In this case, repair the following: • Poor contact in rear oxygen sensor connector • Poor contact in rear oxygen sensor connecting harness connector • Poor contact in ECM connector	Go to step **3**.
3	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Start and idle the engine. 2) Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 13 (+) — Chassis ground (–):***	Is the voltage less than 1.0 V?	Go to step **6**.	Go to step **4**.
4	**CHECK OUTPUT SIGNAL FROM ECM.** Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 13 (+) — Chassis ground (–):***	Does the voltage change less than 1.0 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair poor contact in ECM connector.	Go to step **5**.
5	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Disconnect connector from rear oxygen sensor. 2) Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 13 (+) — Chassis ground (–):***	Is the voltage less than 1.0 V?	Replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>	Repair battery short circuit in harness between ECM and rear oxygen sensor connector. After repair, replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>

No.	Step	Check	Yes	No
6	**CHECK POWER SUPPLY TO REAR OXYGEN SENSOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from rear oxygen sensor. 3) Turn ignition switch to ON. 4) Measure voltage between rear oxygen sensor connector and engine ground or chassis ground. ***Connector & terminal*** ***(B19) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **7**.	Repair power supply line. NOTE: In this case, repair the following: • Open circuit in harness between main relay and rear oxygen sensor connector • Poor contact in rear oxygen sensor connector • Poor contact in coupling connector
7	**CHECK REAR OXYGEN SENSOR.** 1) Turn ignition switch to OFF. 2) Measure resistance between rear oxygen sensor connector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 30 Ω?	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector • Poor contact in coupling connector	Replace rear oxygen sensor. <Ref. to FU(DOHC TURBO)-44, Rear Oxygen Sensor.>

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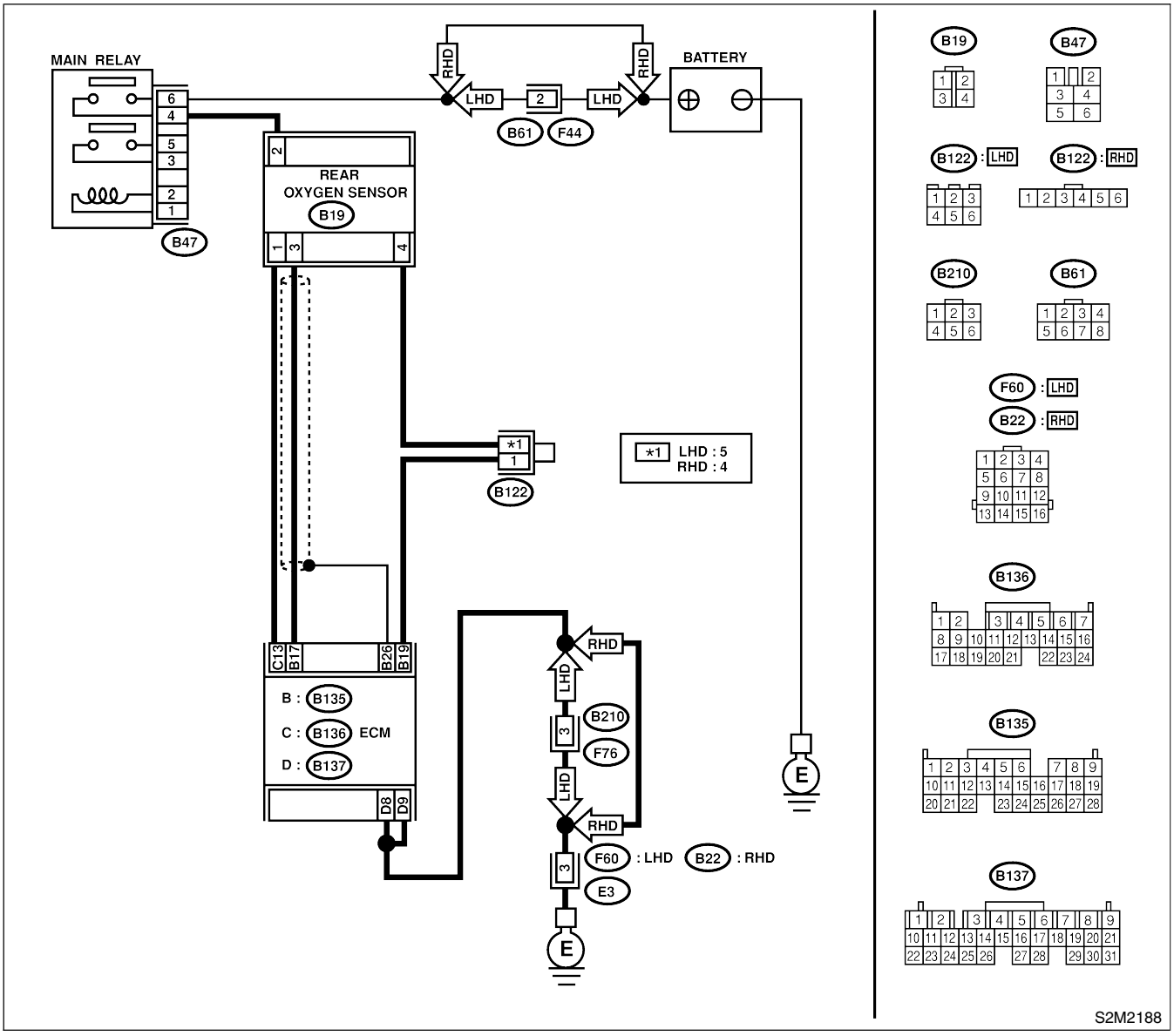
D: DTC P0038 — REAR OXYGEN SENSOR HEATER CIRCUIT HIGH INPUT —

S088521F86

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 13 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **2**.	Go to step **3**.
2	**CHECK CURRENT DATA.** 1) Turn ignition switch to OFF. 2) Repair battery short circuit in harness between ECM and rear oxygen sensor connector. 3) Turn ignition switch to ON. 4) Read data of rear oxygen sensor heater current using Subaru Select Monitor or the OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(DOHC TURBO)-36, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value more than 7 A?	Replace ECM. <Ref. to FU(DOHC TURBO)-47, 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

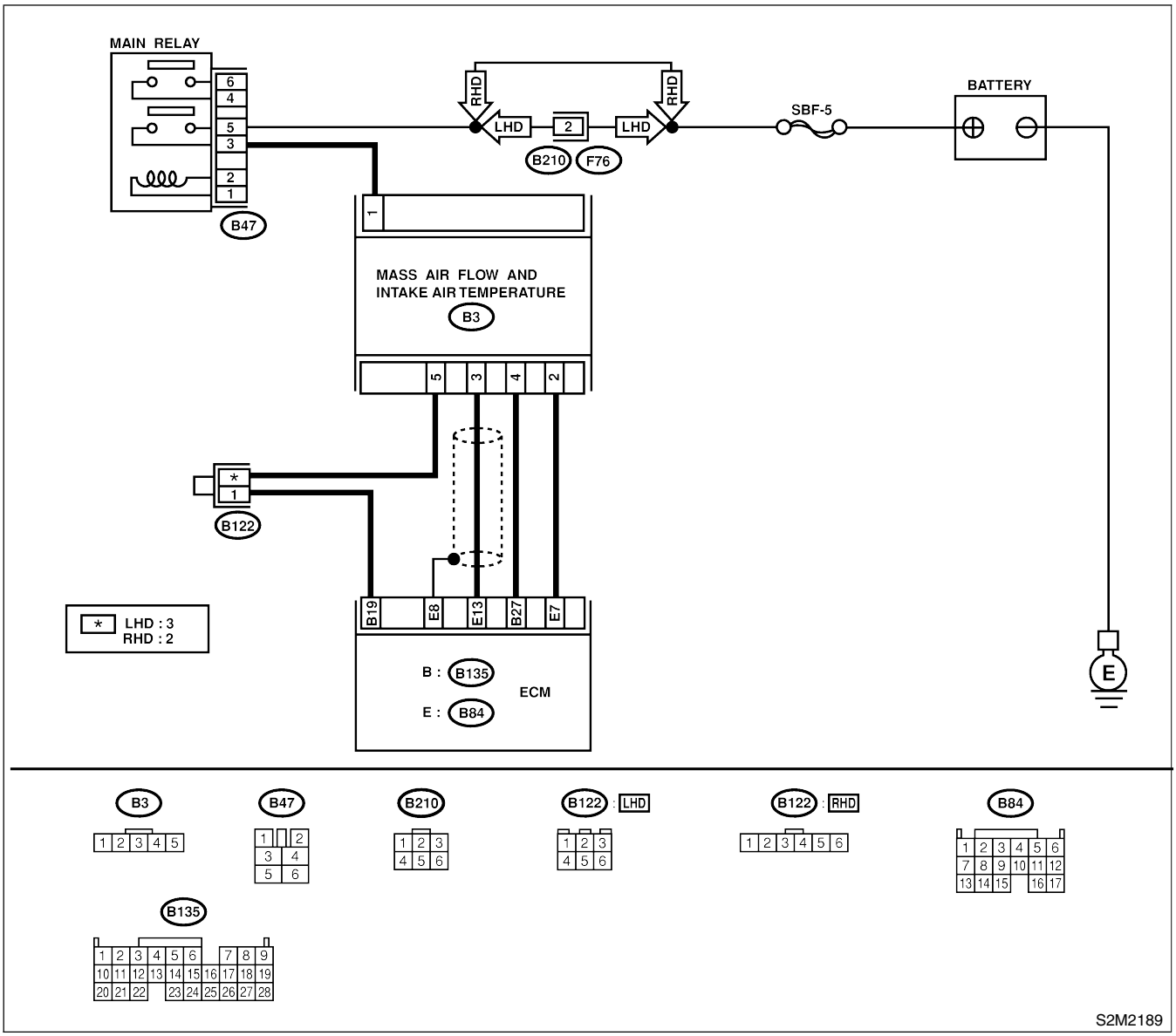
E: DTC P0101 — MASS AIR FLOW SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) — S088521B08

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



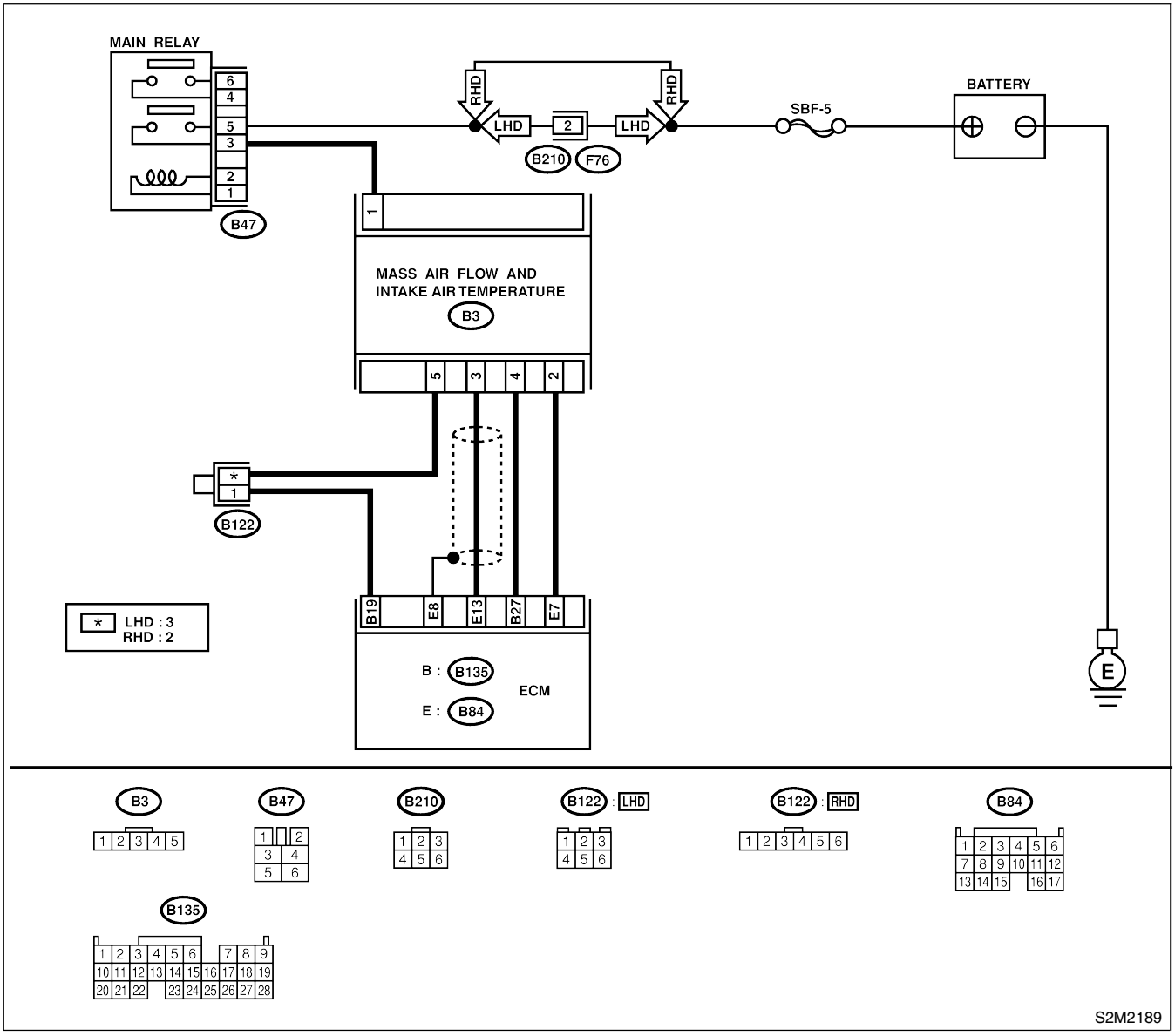
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0102 or P0113?	Inspect DTC P0102 or P0103 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0101.	Replace mass air flow and intake air temperature sensor. <Ref. to FU(DOHC TURBO)-34, Mass Air Flow and Intake Air Temperature Sensor.>

F: DTC P0102 — MASS AIR FLOW SENSOR CIRCUIT LOW INPUT — S088521B09

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.
  - Poor driving performance

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.** 1) Turn ignition switch to OFF. 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector. 3) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON. 4) Start engine. 5) Read data of mass air flow sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(DOHC TURBO)-36, 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 1.3 g/sec (0.172 lb/min) or 0.3 V and equal to or less than 240 g/sec (32 lb/min) or 4.58 V?	Even if MIL lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the mass air flow sensor. NOTE: In this case, repair the following: • Open or ground short circuit in harness between mass air flow sensor and ECM connector • Poor contact in mass air flow sensor or ECM connector	Go to step **2**.
2	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM connector and chassis ground while engine is idling. ***Connector & terminal*** ***(B84) No. 13 (+) — Chassis ground (–):***	Is the voltage less than 0.2 V?	Go to step **4**.	Go to step **3**.
3	**CHECK INPUT SIGNAL FOR ECM (USING SUBARU SELECT MONITOR).** Measure voltage between ECM connector and chassis ground while engine is idling.	Does the voltage change more than 0.2 V by shaking harness and connector of ECM while monitoring the value with Subaru select monitor?	Repair poor contact in ECM connector.	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
4	**CHECK POWER SUPPLY TO MASS AIR FLOW SENSOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from mass air flow sensor. 3) Turn ignition switch to ON. 4) Measure voltage between mass air flow sensor connector and chassis ground. ***Connector & terminal*** ***(B3) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10V?	Go to step **5**.	Repair open circuit between mass air flow sensor and main relay

No.	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between ECM and mass air flow sensor connector. ***Connector & terminal*** ***(B84) No. 13 — (B3) No. 3:*** ***(B135) No. 27 — (B3) No. 4:*** ***(B135) No. 19 — (B3) No. 5:***	Is the resistance less than 1Ω?	Go to step **6**.	Repair open circuit between ECM and mass air flow sensor connector.
6	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR** Measure resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B84) No. 13 — Chassis ground:*** ***(B135) No. 27 — Chassis ground:*** ***(B135) No. 19 — Chassis ground:***	Is the resistance more than 1MΩ?	Go to step **7**.	Repair ground short circuit between ECM and mass air flow sensor connector.
7	**CHECK POOR CONTACT** Check poor contact in mass air flow sensor connector.	Is there poor contact in mass air flow sensor connector?	Repair poor contact in mass air flow sensor connector.	Replace mass air flow and intake air temperature sensor. <Ref. to FU(DOHC TURBO)-34, Mass Air Flow and Intake Air Temperature Sensor.>

MEMO:

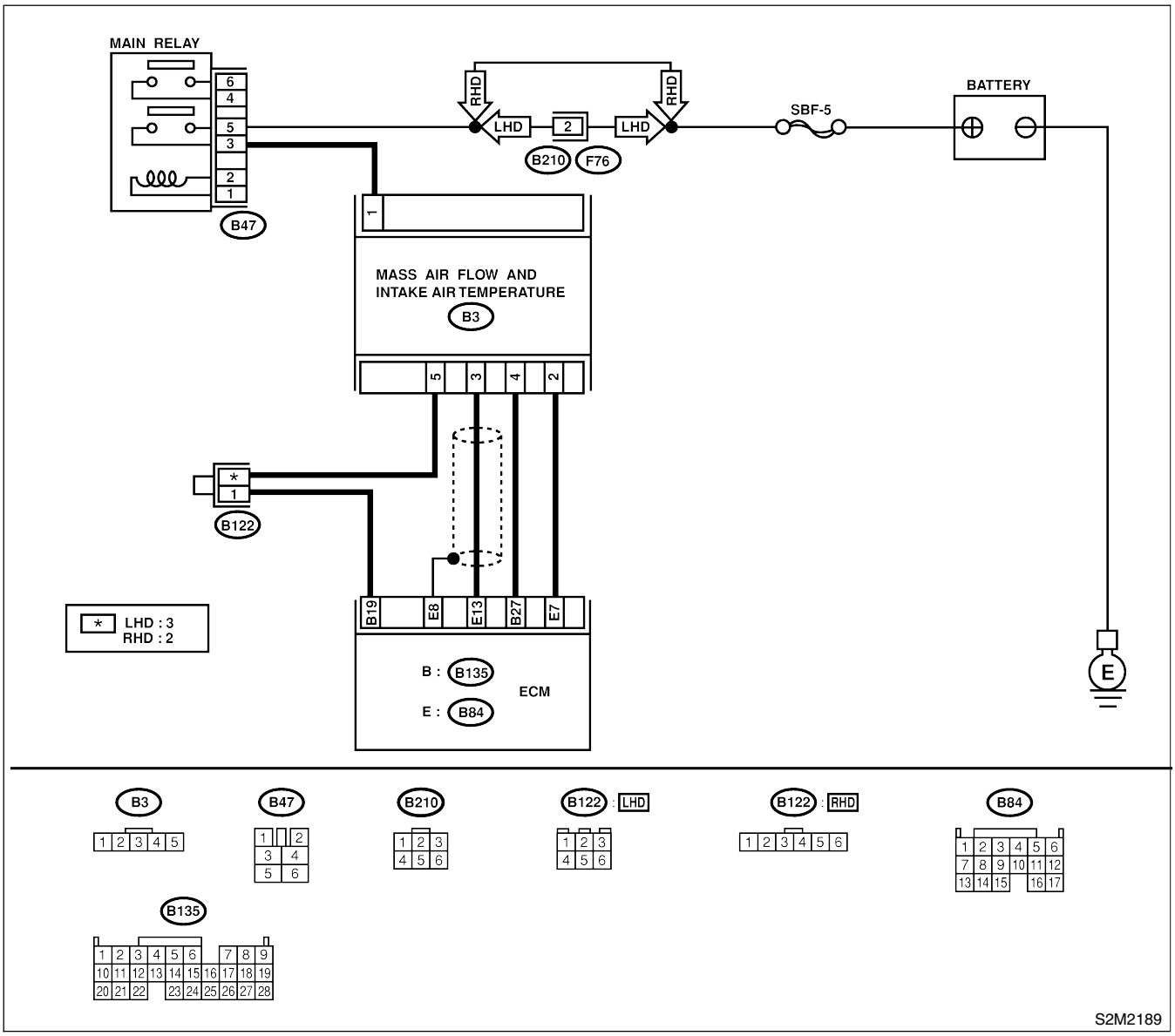
G: DTC P0103 — MASS AIR FLOW SENSOR CIRCUIT HIGH INPUT — S088521B10

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



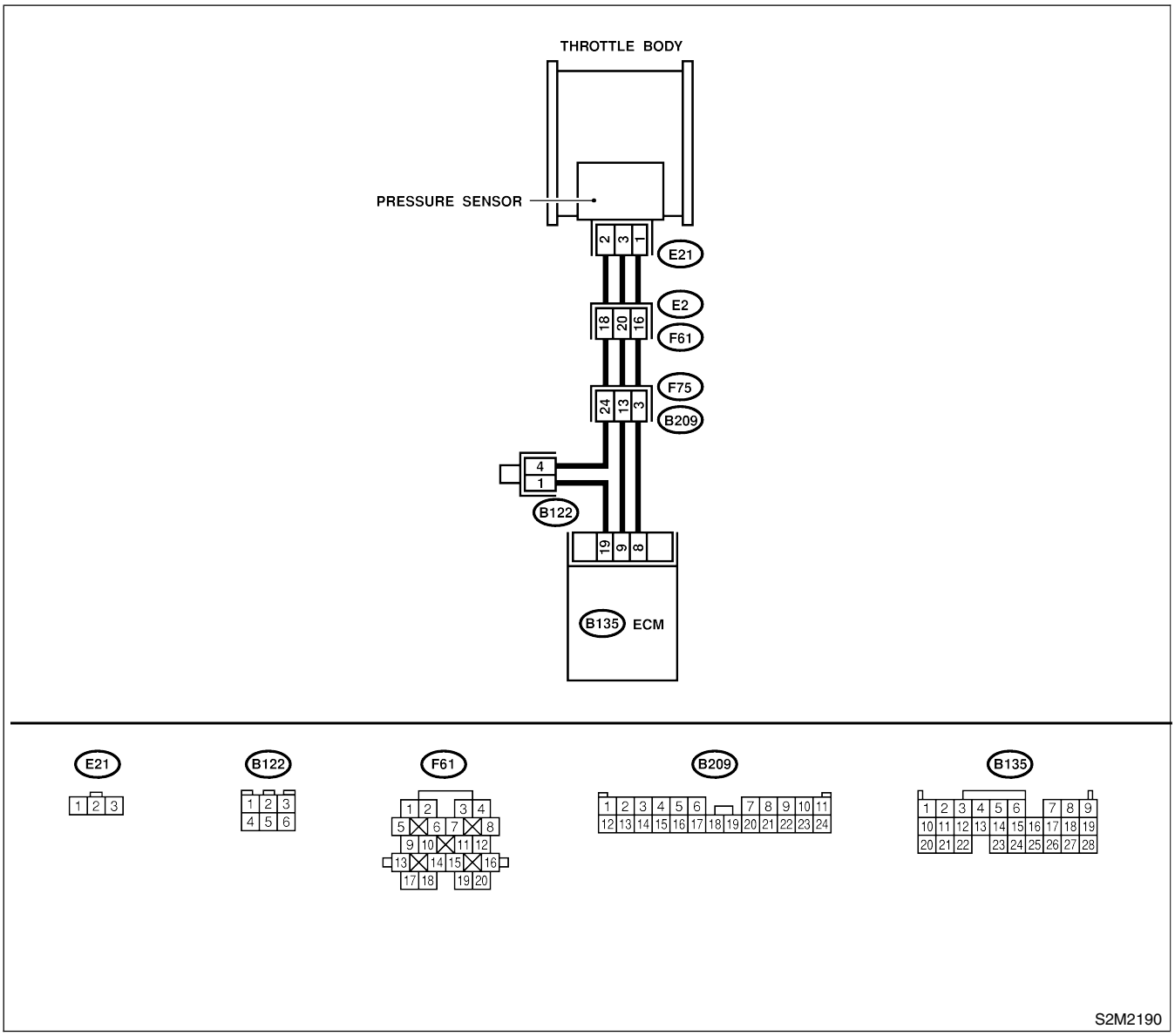
No.	Step	Check	Yes	No
1	**CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.** 1) Turn ignition switch to OFF. 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector. 3) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON. 4) Start engine. 5) Read data of mass air flow sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(DOHC TURBO)-36, 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 1.3 g/sec (0.172 lb/min) or 0.3 V and equal to or less than 240 g/sec (32 lb/min) or 4.58 V?	Even if MIL lights up, the circuit has returned to a normal condition at this time.	Go to step **2**.
2	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** 1) Turn ignition switch to OFF and Subaru Select Monitor or the OBD-II general scan tool switch to OFF. 2) Disconnect connector from mass air flow sensor. 3) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON. 4) Read data of mass air flow sensor signal using Subaru select monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(DOHC TURBO)-36, 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 240 g/sec (32 lb/min) or 4.58 V in function mode F06?	Repair battery short circuit in harness between mass air flow sensor and ECM connector. After repair, replace ECM.	Replace mass air flow sensor.

H: DTC P0106 — PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LOW INPUT) — S088521F90

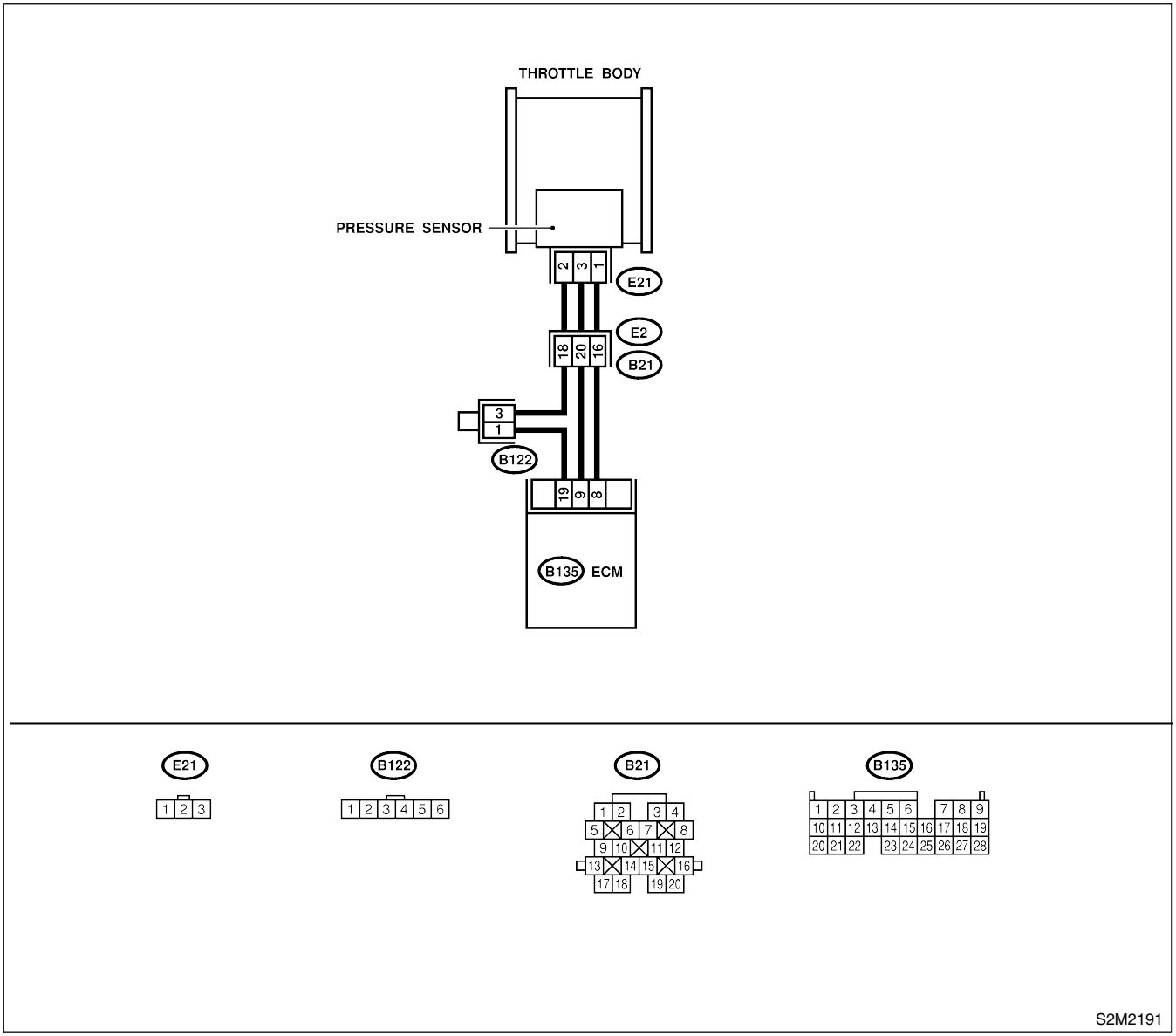
- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- TROUBLE SYMPTOM**:**
  - Failure of engine to start

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **LHD MODEL:**



- **RHD MODEL:**


THROTTLE BODY
PRESSURE SENSOR
2
3
1
E21
E2
18
20
16
B21
3
1
B122
19
9
8
B135
ECM
E21
1 2 3
B122
1 2 3 4 5 6
B21
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
B135
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28
S2M2191

No.	Step	Check	Yes	No
1	**CHECK IDLE SWITCH SIGNAL.** 1) Turn ignition switch to ON. 2) Operate the LED operation mode for engine using Subaru Select Monitor. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "LED OPERATION MODE FOR ENGINE". <Ref. to EN(DOHC TURBO)-36, Subaru Select Monitor.>	Does the LED of {Idle Switch Signal} come on?	Go to step **2**.	Check throttle position sensor circuit. <Ref. to EN(DOHC TURBO)-136, DTC P0121 - THROTTLE POSITION SENSOR CIRCUIT RANGE/ PERFORMANCE PROBLEM (HIGH INPUT) -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0106.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0107 or P0108?	Inspect DTC P0107 or P0108 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0106.	Go to step **3**.
3	**CHECK CONDITION OF INTAKE MANIFOLD PRESSURE SENSOR.**	Is the pressure sensor installation bolt tightened securely?	Go to step **4**.	Tighten pressure sensor installation bolt securely.
4	**CHECK CONDITION OF THROTTLE BODY.**	Is the throttle body installation bolt tightened securely?	Replace pressure sensor. <Ref. to FU(DOHC TURBO)-35, Pressure Sensor.>	Tighten throttle body installation bolt securely.

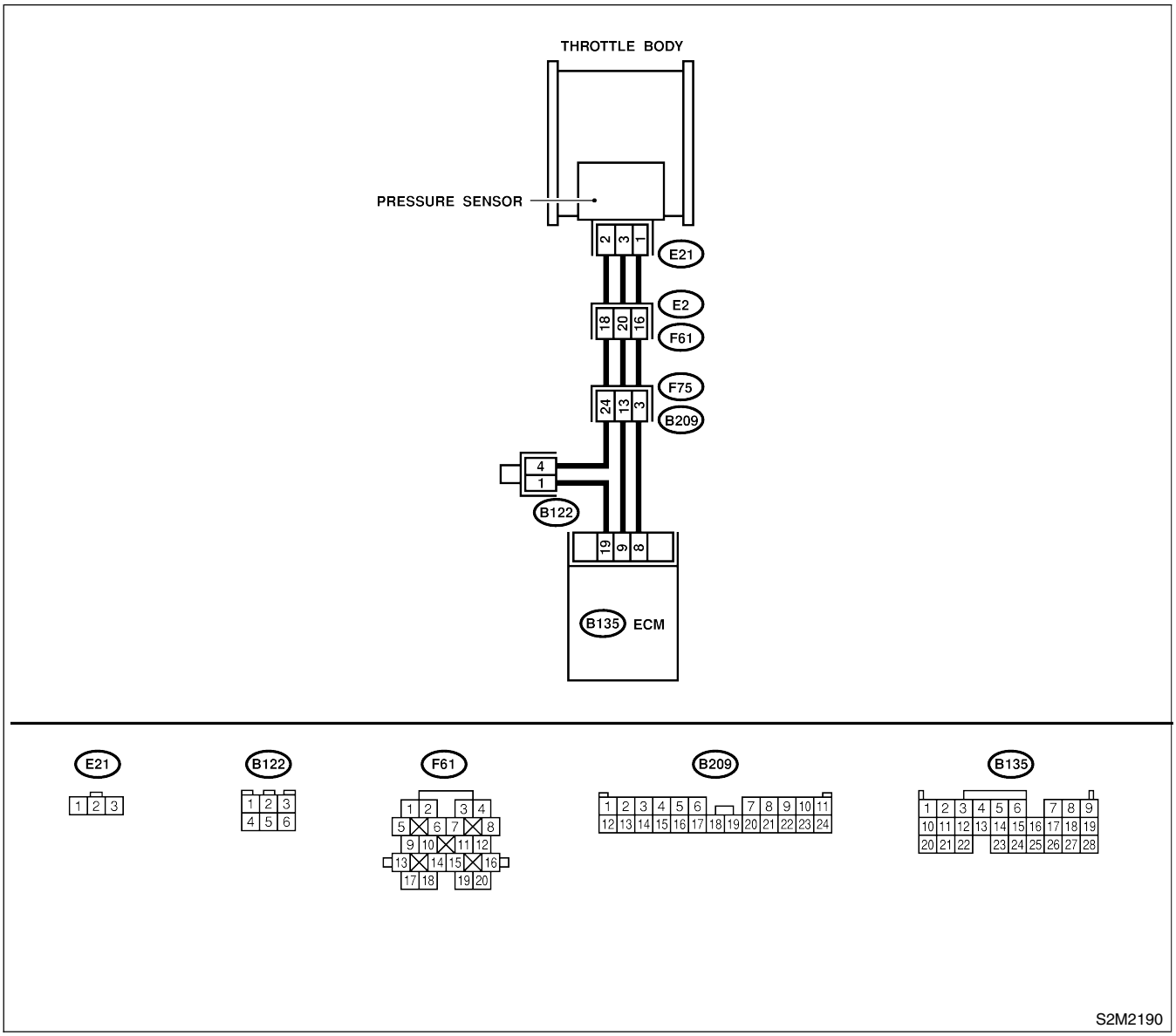
MEMO:

I: DTC P0107 — PRESSURE SENSOR CIRCUIT LOW INPUT — S088521B12

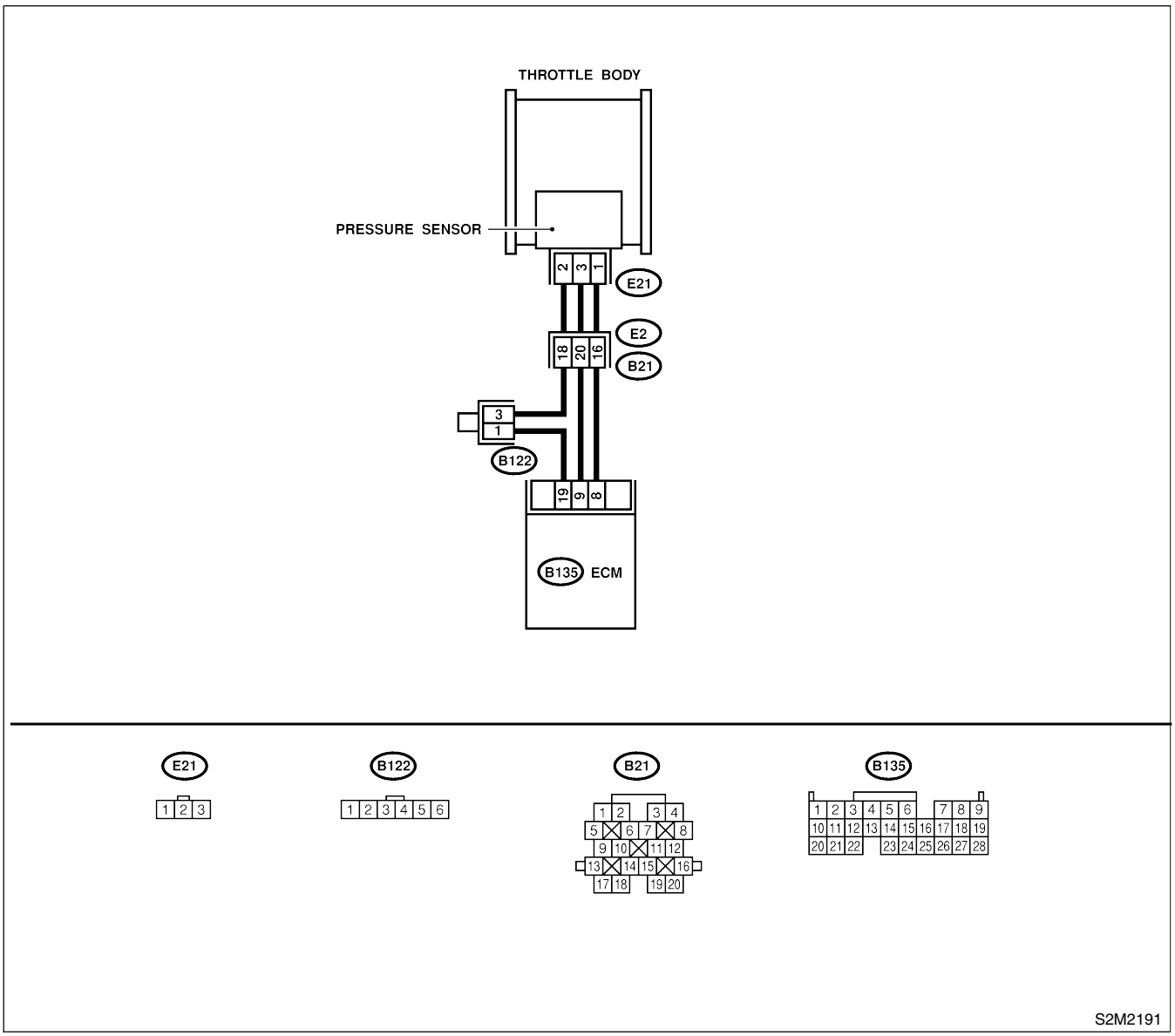
- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**
- **LHD MODEL**



- **RHD MODEL**


THROTTLE BODY
PRESSURE SENSOR
2
3
1
E21
E2
18
20
16
B21
3
1
B122
19
9
8
B135
ECM
E21
1 2 3
B122
1 2 3 4 5 6
B21
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
B135
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28
S2M2191

No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start engine. 2) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(DOHC TURBO)-36, 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 –7.2 kPa (–54 mmHg, –2.1 inHg)?	Go to step **3**.	Go to step **2**.
2	**CHECK POOR CONTACT.** Check poor contact in ECM and pressure sensor connector.	Is there poor contact in ECM or pressure sensor connector?	Repair poor contact in ECM or pressure sensor connector.	Even if MIL lights up, the circuit has returned to a normal condition at this time.
3	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (–):***	Is the voltage more than 4.5 V?	Go to step **5**.	Go to step **4**.
4	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (–):***	Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair poor contact in ECM connector.	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
5	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 8 (+) — Chassis ground (–):***	Is the voltage less than 0.7 V?	Go to step **6**.	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
6	**CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from pressure sensor. 3) Turn ignition switch to ON. 4) Measure voltage between pressure sensor connector and engine ground. ***Connector & terminal*** ***(E21) No. 3 (+) — Engine ground (–):***	Is the voltage more than 4.5 V?	Go to step **7**.	Repair open circuit in harness between ECM and intake manifold pressure sensor connector.

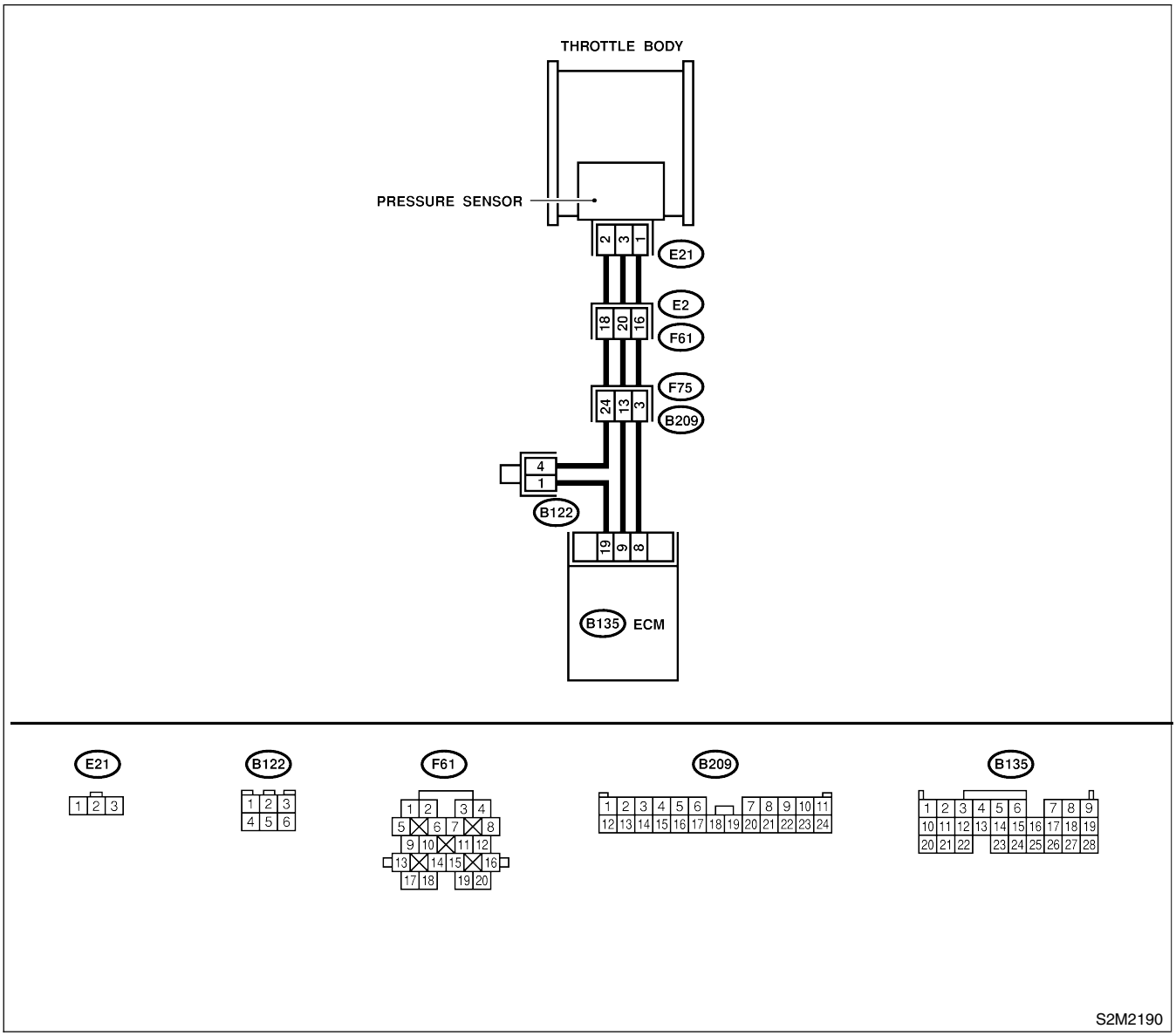
No.	Step	Check	Yes	No
7	**CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between ECM and intake manifold pressure sensor connector. ***Connector & terminal*** ***(B135) No. 19 — (E21) No. 2:***	Is the resistance less than 1 Ω?	Go to step **8**.	Repair open circuit in harness between ECM and intake manifold pressure sensor connector.
8	**CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.** Measure resistance of harness between intake manifold pressure sensor connector and engine ground. ***Connector & terminal*** ***(E21) No. 1 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **9**.	Repair ground short circuit in harness between ECM and intake manifold pressure sensor connector.
9	**CHECK POOR CONTACT.** Check poor contact in pressure sensor connector.	Is there poor contact in pressure sensor connector?	Repair poor contact in pressure sensor connector.	Replace pressure sensor. <Ref. to FU(DOHC TURBO)-35, Pressure Sensor.>

J: DTC P0108 — PRESSURE SENSOR CIRCUIT HIGH INPUT — S088521B13

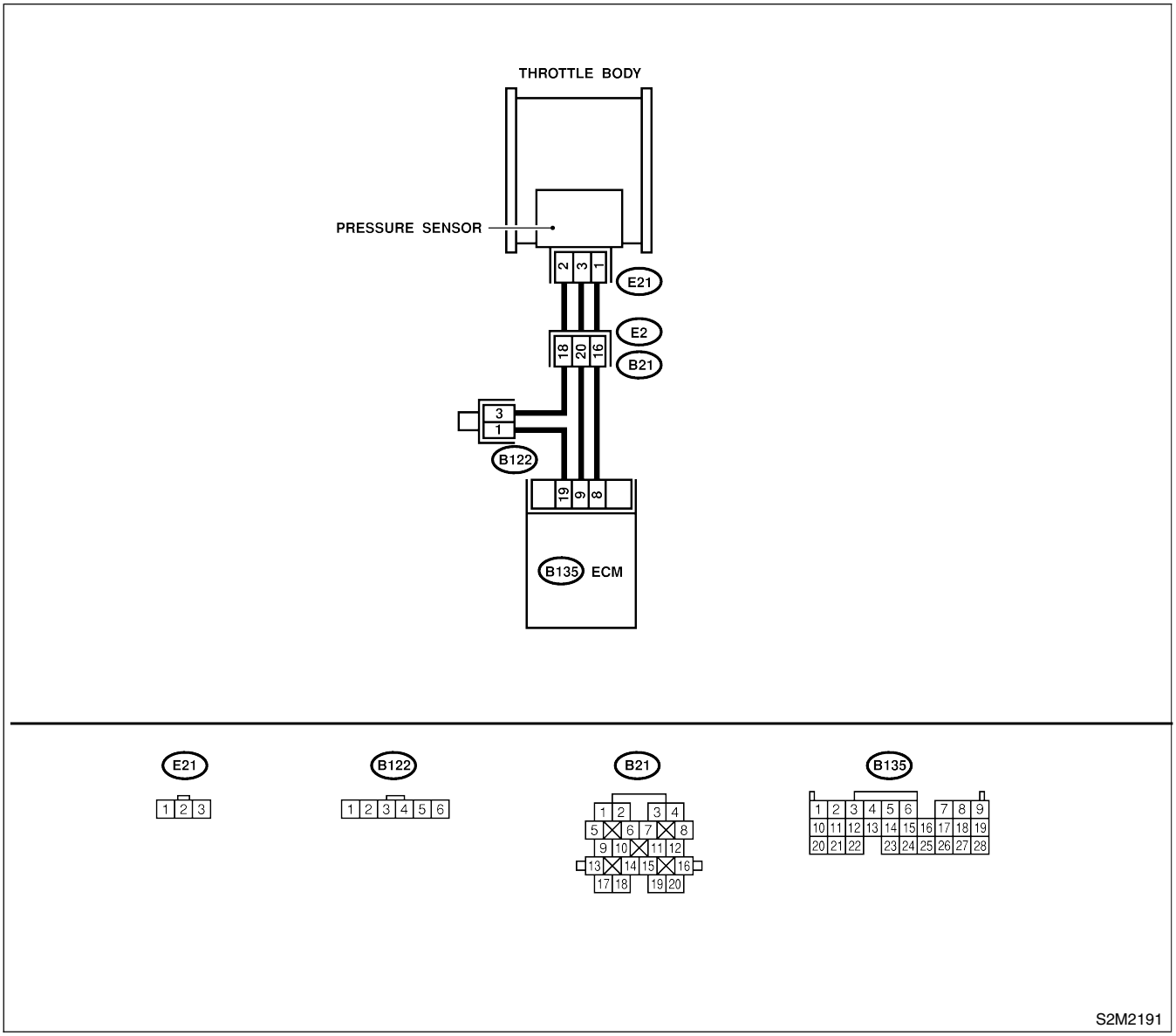
- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**
- **LHD MODEL**



- **RHD MODEL**


THROTTLE BODY
PRESSURE SENSOR
2
3
1
E21
E2
18
20
16
B21
3
1
B122
19
9
8
B135
ECM
E21
1 2 3
B122
1 2 3 4 5 6
B21
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
B135
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28
S2M2191

No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start engine. 2) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(DOHC TURBO)-36, 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 282 kPa (2,121 mmHg, 83.50 inHg)?	Go to step **9**.	Go to step **2**.
2	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (–):***	Is the voltage more than 4.5 V?	Go to step **4**.	Go to step **3**.
3	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (–):***	Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair poor contact in ECM connector.	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
4	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 8 (+) — Chassis ground (–):***	Is the voltage less than 0.7 V?	Go to step **5**.	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
5	**CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from pressure sensor. 3) Turn ignition switch to ON. 4) Measure voltage between pressure sensor connector and engine ground. ***Connector & terminal*** ***(E21) No. 3 (+) — Engine ground (–):***	Is the voltage more than 4.5 V?	Go to step **6**.	Repair open circuit in harness between ECM and pressure sensor connector.
6	**CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between ECM and pressure sensor connector. ***Connector & terminal*** ***(B135) No. 8 — (E21) No. 1:***	Is the resistance less than 1 Ω?	Go to step **7**.	Repair open circuit in harness between ECM and pressure sensor connector.

No.	Step	Check	Yes	No
7	**CHECK HARNESS BETWEEN ECM AND INTAKE MANIFOLD PRESSURE SENSOR CONNECTOR.** Measure resistance of harness between ECM and pressure sensor connector. ***Connector & terminal*** ***(B135) No. 19 — (E21) No. 2:***	Is the resistance less than 1 Ω?	Go to step **8**.	Repair open circuit in harness between ECM and pressure sensor connector.
8	**CHECK POOR CONTACT.** Check poor contact in pressure sensor connector.	Is there poor contact in pressure sensor connector?	Repair poor contact in pressure sensor connector.	Replace intake manifold pressure sensor. <Ref. to FU(DOHC TURBO)-35, Pressure Sensor.>
9	**CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.** 1) Turn ignition switch to OFF and Subaru Select Monitor or the OBD-II general scan tool switch to OFF. 2) Disconnect connector from pressure sensor. 3) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON. 4) Read data of intake manifold absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(DOHC TURBO)-36, 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 282 kPa (2,121 mmHg, 83.50 inHg)?	Repair battery short circuit in harness between ECM and pressure sensor connector.	Replace pressure sensor. <Ref. to FU(DOHC TURBO)-35, Pressure Sensor.>

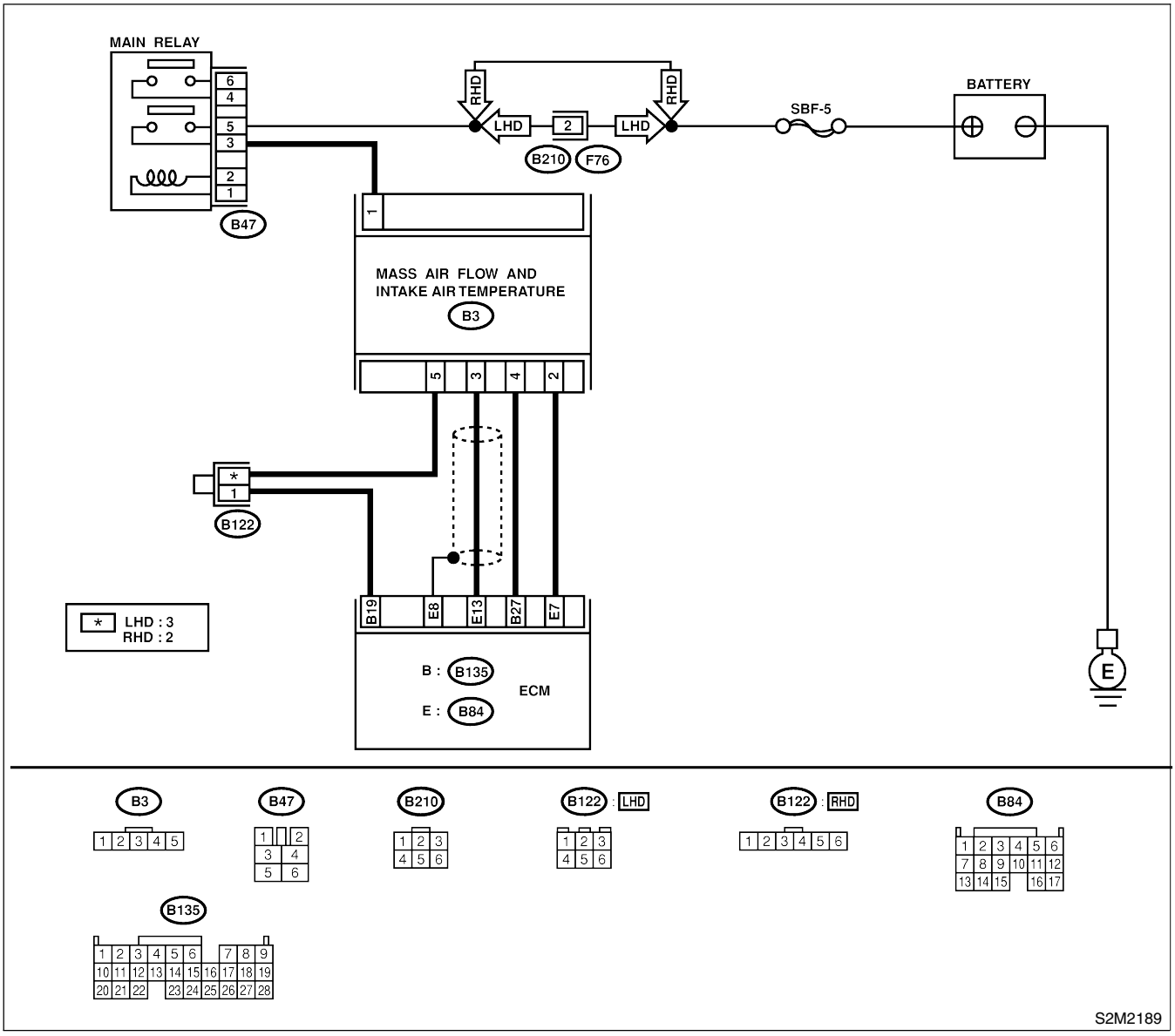
K: DTC P0111 — INTAKE AIR TEMPERATURE SENSOR CIRCUIT RANGE/ PERFORMANCE PROBLEM — S088521B14

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, 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 P0112, P0113, P0117, P0118 or P0125?	Inspect DTC P0112, P0113, P0117, P0118 or P0125 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(DOHC TURBO)-82, 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 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(DOHC TURBO)-36, 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 mass air flow and intake air temperature sensor. <Ref. to FU(DOHC TURBO)-34, Mass Air Flow and Intake Air Temperature Sensor.>	Inspect DTC P0125 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).>

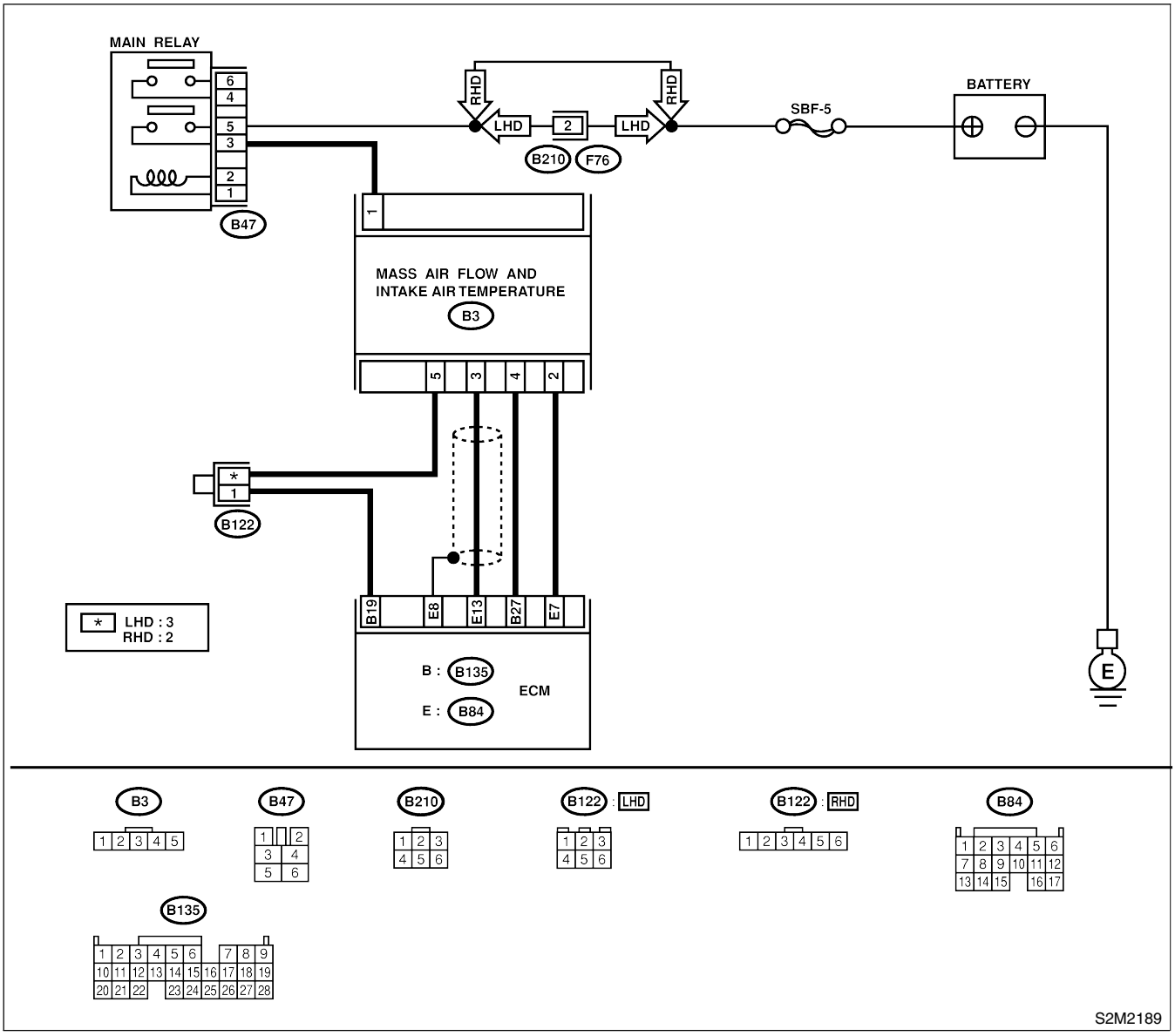
L: DTC P0112 — INTAKE AIR TEMPERATURE SENSOR CIRCUIT LOW INPUT

S088521B15

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start engine. 2) Read data of intake air temperature sensor signal using Subaru Select Monitor or the OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(DOHC TURBO)-36, 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 55°C (131°F)?	Go to step **2**.	Repair poor contact. NOTE: In this case, repair the following: ● Poor contact mass air flow and intake air temperature sensor ● Poor contact in ECM ● Poor contact in joint connector
2	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from mass air flow and intake air temperature sensor. 3) Turn ignition switch to ON. 4) Read data of intake air temperature sensor signal using Subaru Select Monitor or the OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(DOHC TURBO)-36, 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 –36°C (–33°F)?	Replace mass air flow and intake air temperature sensor. <Ref. to FU(DOHC TURBO)-34, Mass Air Flow and Intake Air Temperature Sensor.>	Repair ground short circuit in harness between mass air flow and intake air temperature sensor and ECM connector.

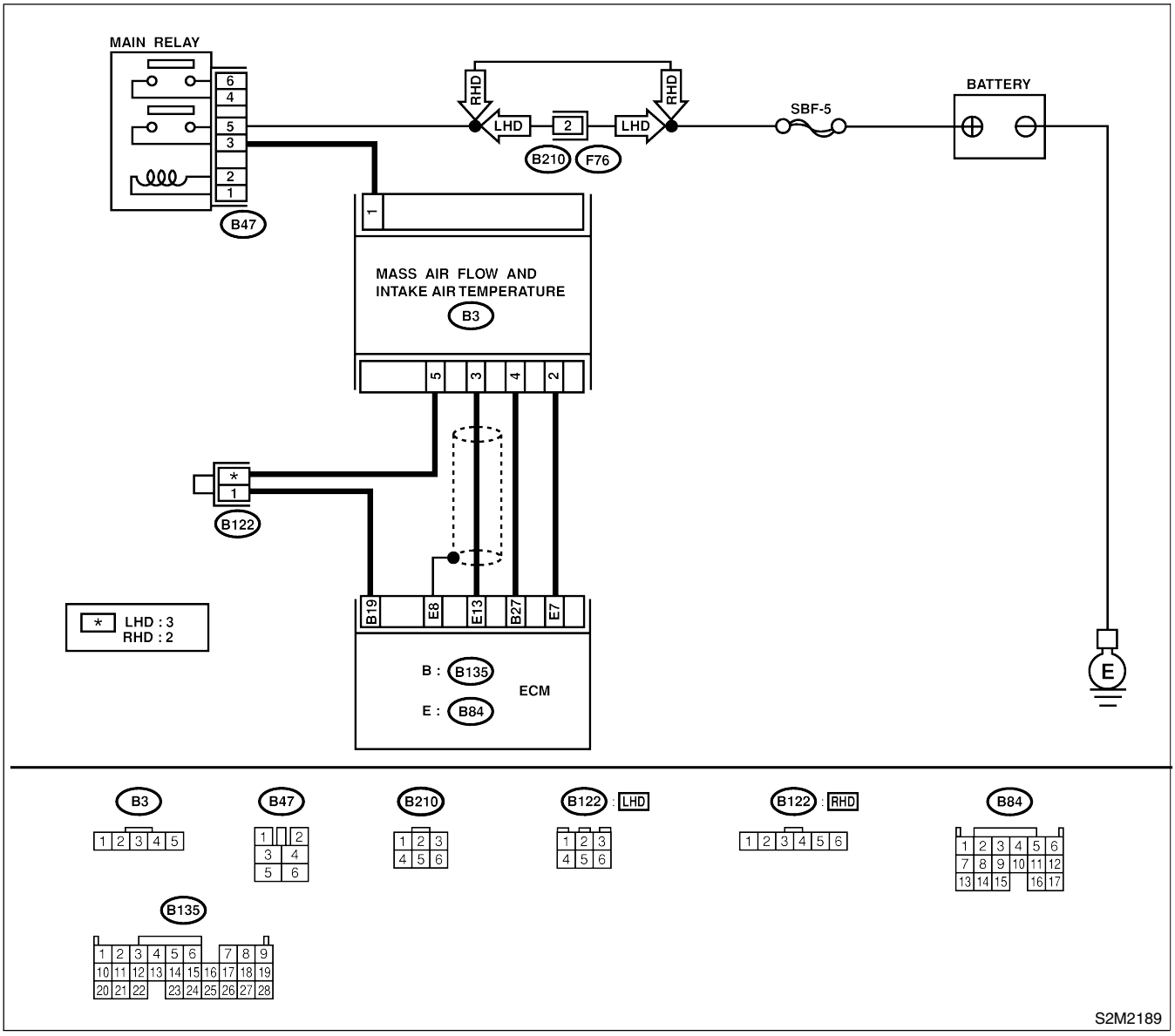
M: DTC P0113 — INTAKE AIR TEMPERATURE SENSOR CIRCUIT HIGH INPUT — S088521B16

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start engine. 2) Read data of intake air temperature sensor signal using Subaru Select Monitor or the OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(DOHC TURBO)-36, 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 –36°C (–33°F)?	Go to step **2**.	Repair poor contact. NOTE: In this case, repair the following: ● Poor contact in mass air flow and intake air temperature sensor ● Poor contact in ECM ● Poor contact in joint connector
2	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from mass air flow and intake air temperature sensor. 3) Measure voltage between mass air flow and intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between mass air flow and intake air temperature sensor and ECM connector.	Go to step **3**.
3	**CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE AND PRESSURE SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to ON. 2) Measure voltage between mass air flow and intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between mass air flow and intake air temperature sensor and ECM connector.	Go to step **4**.
4	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure voltage between mass air flow and intake air temperature sensor and pressure sensor connector and engine ground. ***Connector & terminal*** ***(B3) 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 mass air flow and intake air temperature sensor and ECM connector ● Poor contact in mass air flow and intake air temperature sensor ● Poor contact in ECM ● Poor contact in joint connector

No.	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Measure resistance of harness between mass air flow and intake air temperature sensor and engine ground. ***Connector & terminal*** ***(B3) No. 5 — Engine ground:***	Is the resistance less than 5 Ω?	Replace mass air flow and intake air temperature sensor. <Ref. to FU(DOHC TURBO)-34, Mass Air Flow and Intake Air Temperature Sensor.>	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between mass air flow and intake air temperature sensor and ECM connector ● Poor contact in mass air flow and intake air temperature sensor ● Poor contact in ECM ● Poor contact in joint connector

MEMO:

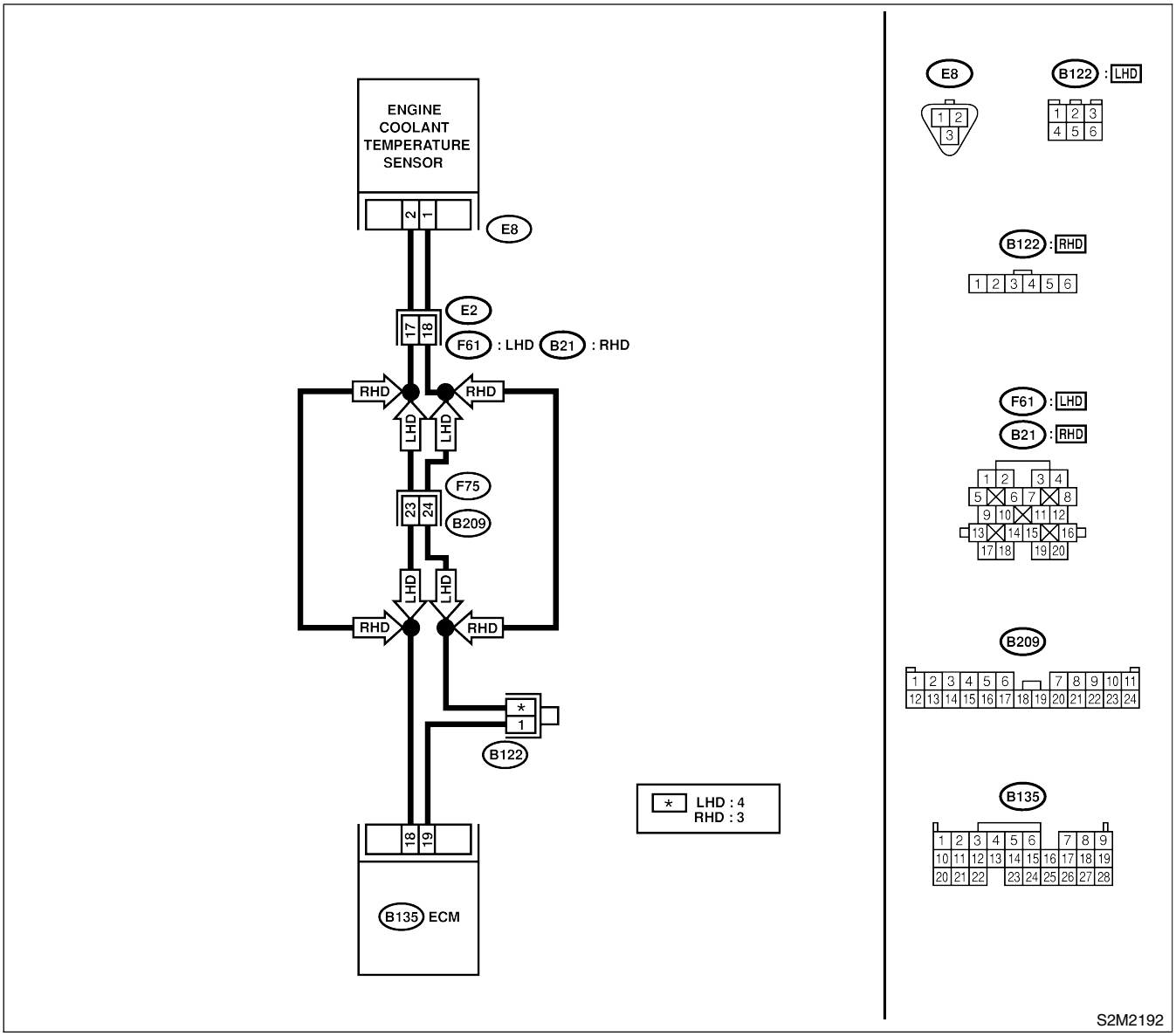
N: DTC P0117 — ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT LOW INPUT — S088521F91

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



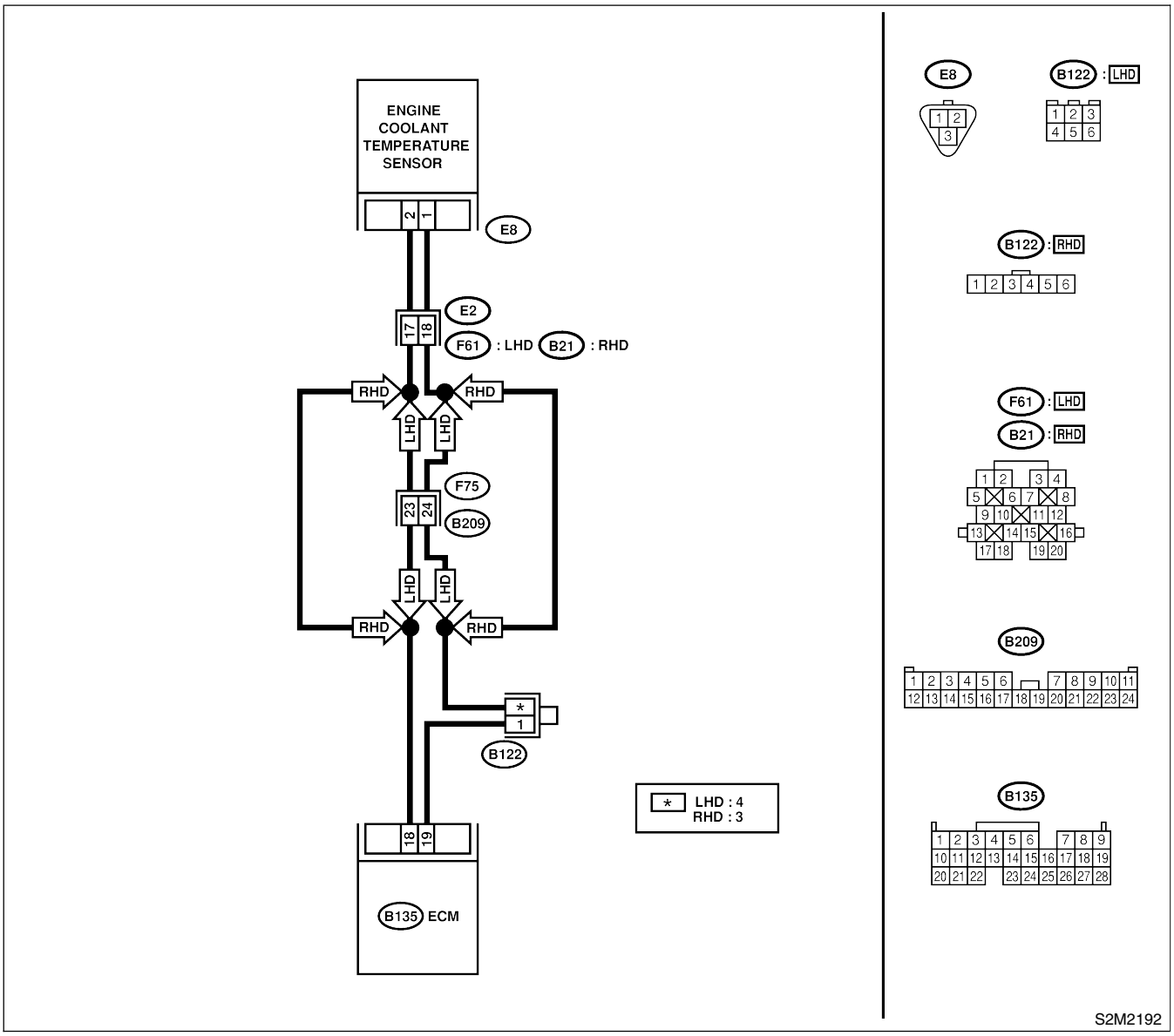
No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start engine. 2) Read data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(DOHC TURBO)-36, Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value greater than 150°C (302°F)?	Go to step **2**.	Repair poor contact. NOTE: In this case, repair the following: ● Poor contact in engine coolant temperature sensor ● Poor contact in ECM ● Poor contact in coupling connector ● Poor contact in joint connector
2	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from engine coolant temperature sensor. 3) Turn ignition switch to ON. 4) Read data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(DOHC TURBO)-36, Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value less than –40°C (–40°F)?	Replace engine coolant temperature sensor. <Ref. to FU(DOHC TURBO)-29, 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 — S088521F92

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start engine. 2) Read data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(DOHC TURBO)-36, Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value less than –40°C (–40°F)?	Go to step **2**.	Repair poor contact. NOTE: In this case, repair the following: ● Poor contact in engine coolant temperature sensor ● Poor contact in ECM ● Poor contact in coupling connector ● Poor contact in joint connector
2	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from engine coolant temperature sensor. 3) Measure voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and engine coolant temperature sensor connector.	Go to step **3**.
3	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to ON. 2) Measure voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and engine coolant temperature sensor connector.	Go to step **4**.
4	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — 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 ignition switch to OFF. 2) Measure resistance of harness between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 1 — Engine ground:***	Is the resistance less than 5 Ω?	Replace engine coolant temperature sensor. <Ref. to FU(DOHC TURBO)-29, Engine Coolant Temperature Sensor.>	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine coolant temperature sensor connector • Poor contact in engine coolant temperature sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector

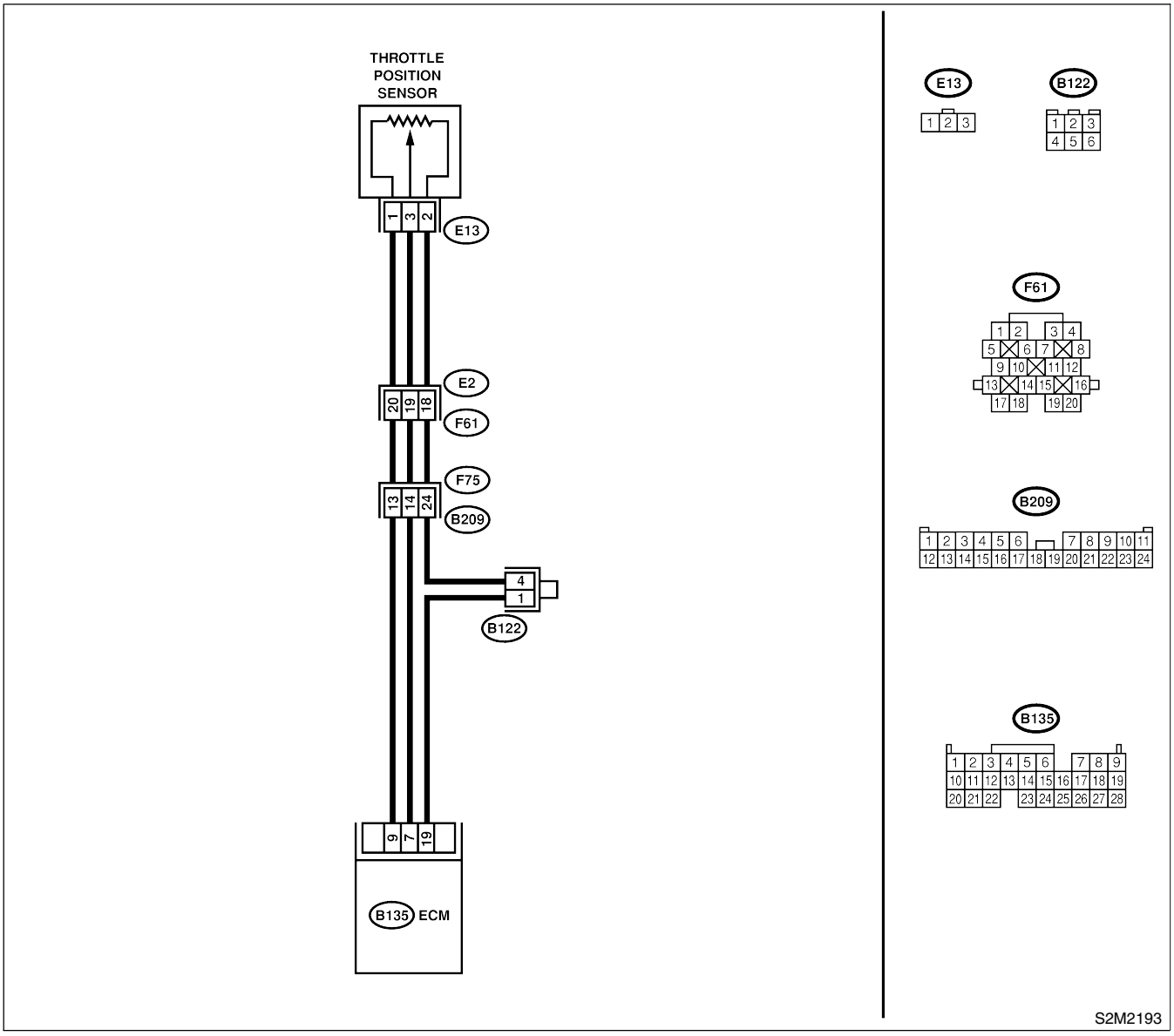
MEMO:

P: DTC P0121 — THROTTLE POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) — S088521B19

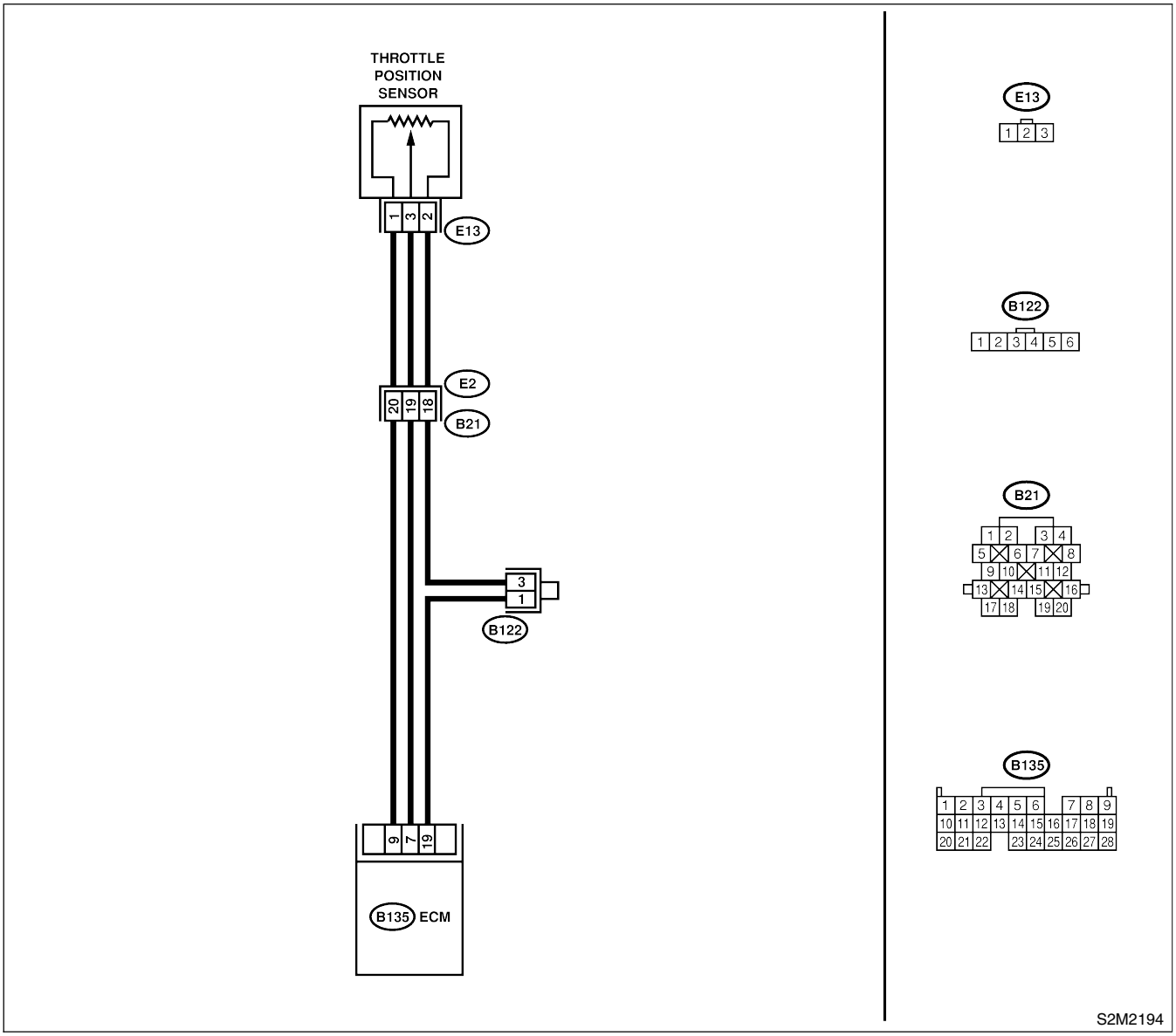
- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.
  - Poor driving performance
  - Fuel is cut.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode < Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**
- **LHD MODEL**



- **RHD MODEL**



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, P0123 or P1507?	Inspect DTC P0122, P0123 or P1507 using " List of Diagnostic Trouble Code (DTC)". <Ref. to EN(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0121.	Replace throttle position sensor. <Ref. to FU(DOHC TURBO)-33, Throttle Position Sensor.>

Q: DTC P0122 — THROTTLE POSITION SENSOR CIRCUIT LOW INPUT —

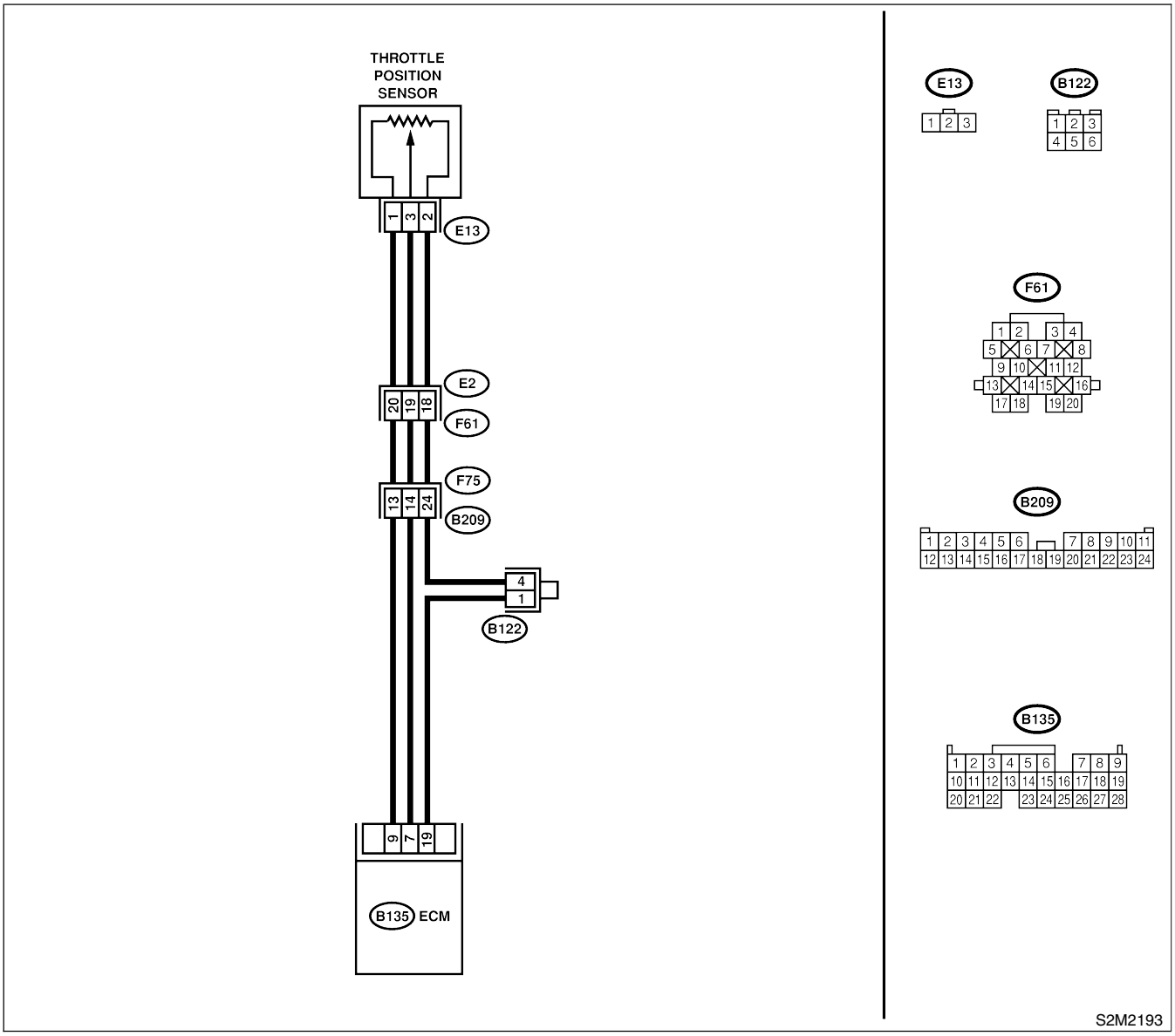
S088521B20

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

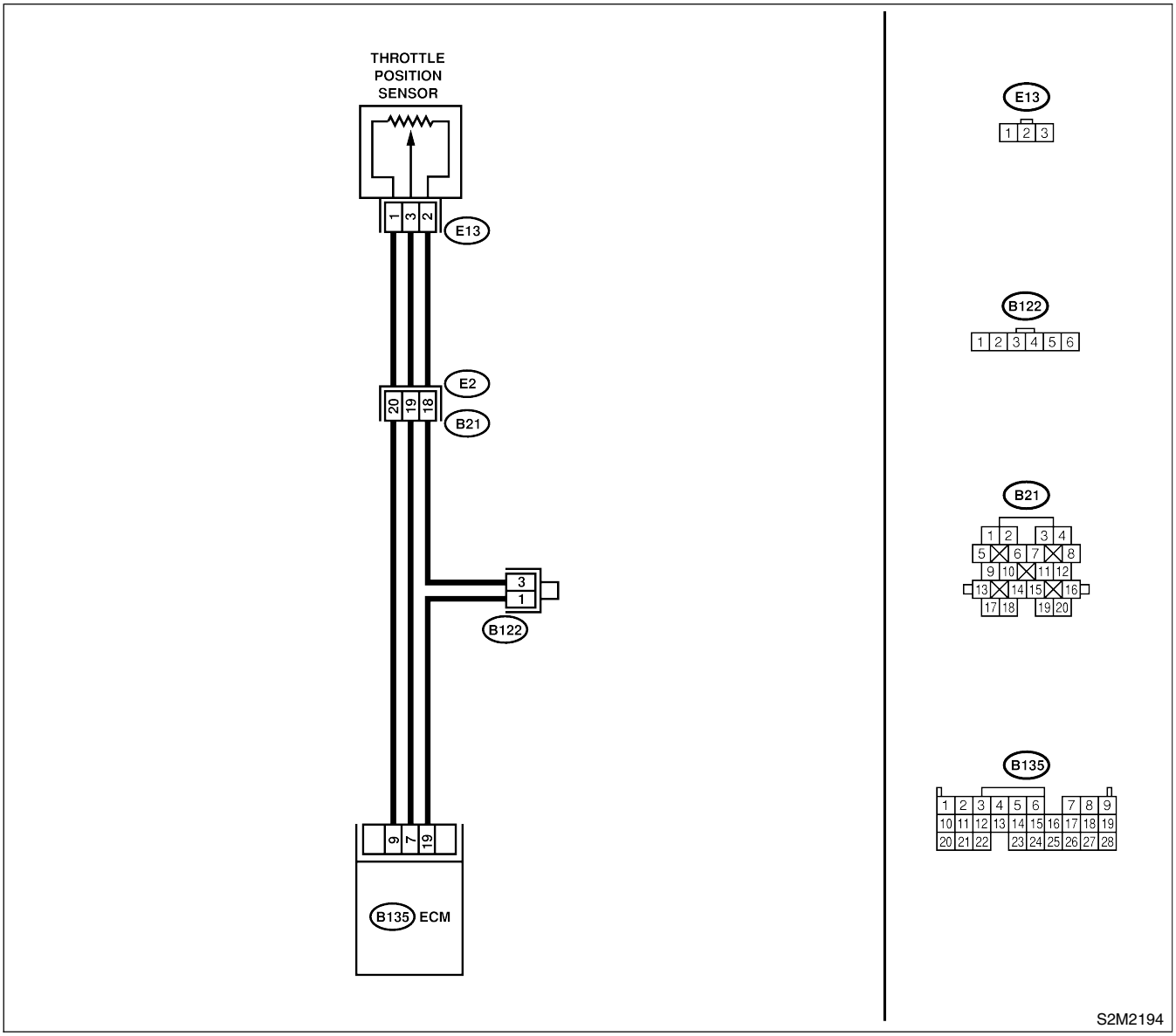
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**
- **LHD MODEL**



- **RHD MODEL**


THROTTLE
POSITION
SENSOR
1
3
2
E13
E2
20
19
18
B21
3
1
B122
9
7
19
B135
ECM
E13
1 2 3
B122
1 2 3 4 5 6
B21
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
B135
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28
S2M2194

No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start engine. 2) Read data of throttle position sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(DOHC TURBO)-36, Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value less than 0.1 V?	Go to step **2**.	Even if MIL lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: ● Poor contact in throttle position sensor connector ● Poor contact in ECM connector ● Poor contact in coupling connector
2	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM connector and chassis ground while throttle valve is fully closed. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (–):***	Is the voltage more than 4.5 V?	Go to step **4**.	Go to step **3**.
3	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (–):***	Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair poor contact in ECM connector.	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
4	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 7 (+) — Chassis ground (–):***	Is the voltage less than 0.1 V?	Go to step **6**.	Go to step **5**.
5	**CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)** Measure voltage between ECM connector and chassis ground.	Does the voltage change more than 0.1 V by shaking harness and connector of ECM while monitoring the value with Subaru Select Monitor?	Repair poor contact in ECM connector.	Go to step **6**.

No.	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from throttle position sensor. 3) Turn ignition switch to ON. 4) Measure voltage between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E13) No. 1 (+) — Engine ground (–):***	Is the voltage more than 4.5 V?	Go to step **7**.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between throttle position sensor and ECM connector • Poor contact in throttle position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector
7	**CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Measure resistance of harness between ECM connector and throttle position sensor connector. ***Connector & terminal*** ***(B135) No. 7 — (E13) No. 3:***	Is the resistance less than 1 Ω?	Go to step **8**.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between throttle position sensor and ECM connector • Poor contact in ECM connector • Poor contact in throttle position sensor connector • Poor contact in coupling connector
8	**CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.** Measure resistance of harness between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E13) No. 3 — Engine ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between throttle position sensor and ECM connector.	Go to step **9**.
9	**CHECK POOR CONTACT.** Check poor contact in throttle position sensor connector.	Is there poor contact in throttle position sensor connector?	Repair poor contact in throttle position sensor connector.	Replace throttle position sensor. <Ref. to FU(DOHC TURBO)-33, Throttle Position Sensor.>

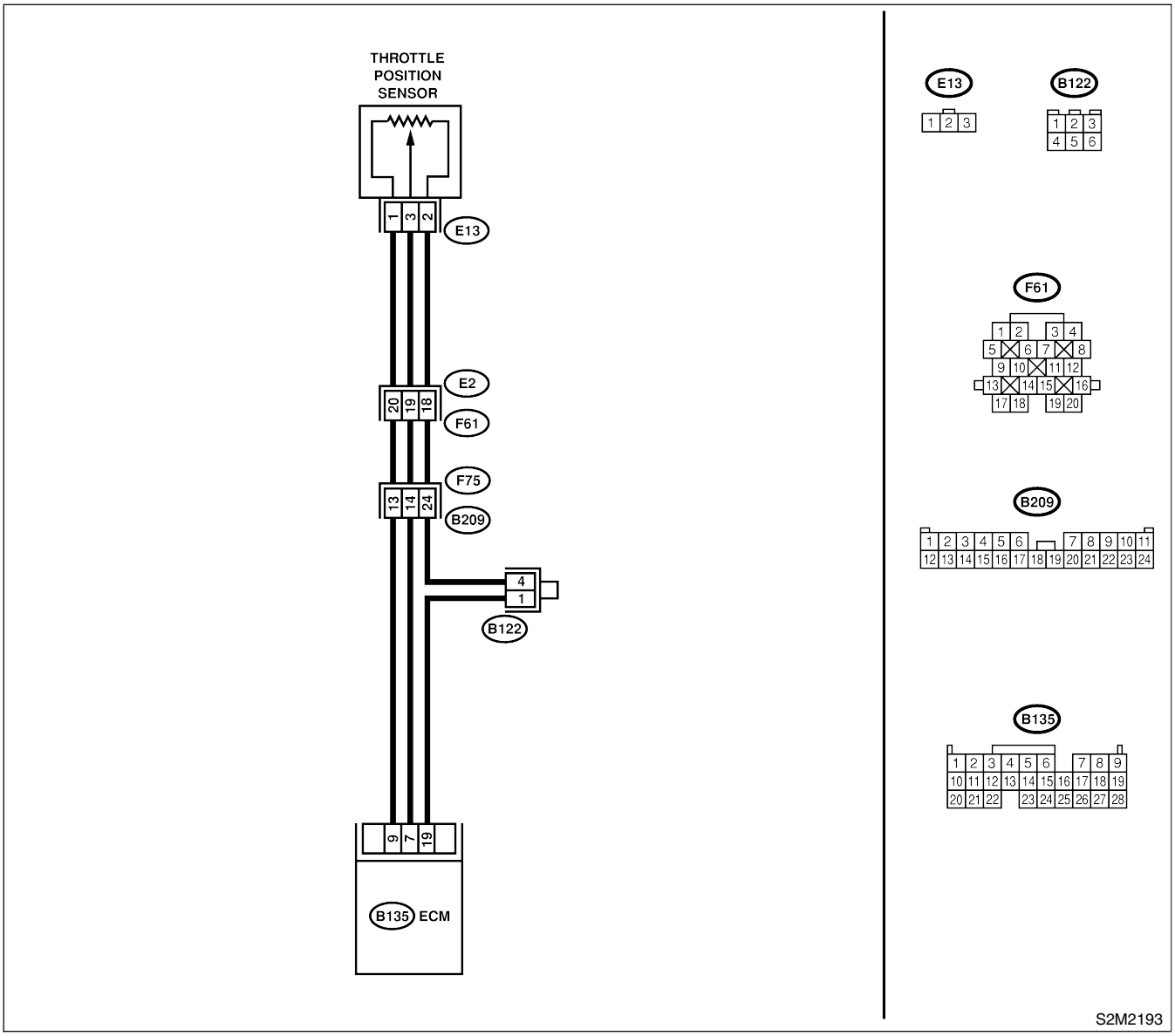
R: DTC P0123 — THROTTLE POSITION SENSOR CIRCUIT HIGH INPUT — S088521B21

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

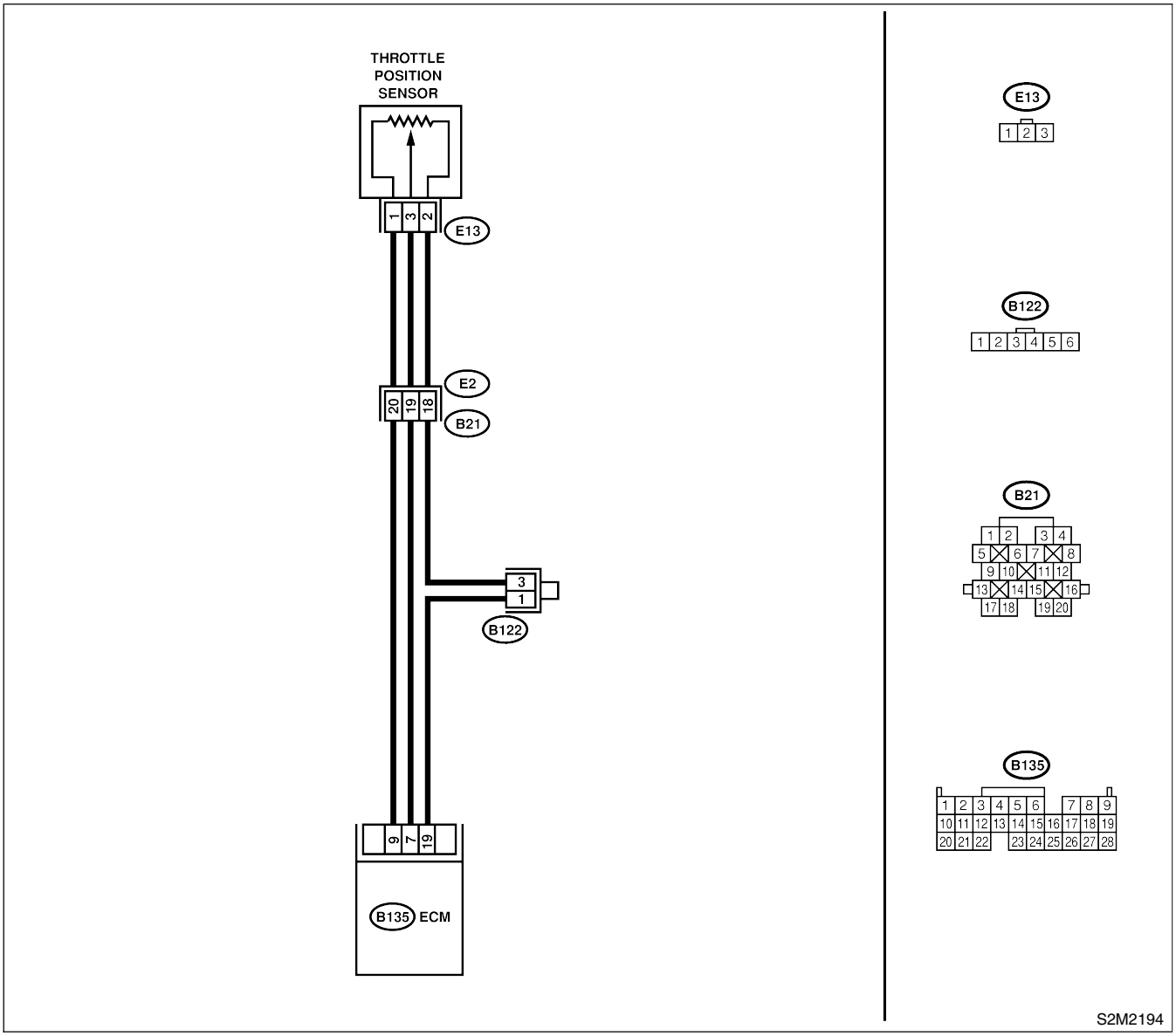
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**
- **LHD MODEL**



- **RHD MODEL**


THROTTLE
POSITION
SENSOR
1
3
2
E13
E2
20
19
18
B21
3
1
B122
9
7
19
B135
ECM
E13
1 2 3
B122
1 2 3 4 5 6
B21
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
B135
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28
S2M2194

No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start engine. 2) Read data of throttle position sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(DOHC TURBO)-36, 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 ignition switch to OFF. 2) Disconnect connector from throttle position sensor. 3) Measure resistance of harness between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E13) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **3**.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between throttle position sensor and ECM connector ● Poor contact in coupling connector ● Poor contact in joint connector
3	**CHECK HARNESS BETWEEN THROTTLE POSITION SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to ON. 2) Measure voltage between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E13) No. 3 (+) — Engine ground (–):***	Is the voltage more than 4.9 V?	Repair battery short circuit in harness between throttle position sensor and ECM connector. After repair, replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>	Replace throttle position sensor. <Ref. to FU(DOHC TURBO)-33, Throttle Position Sensor.>

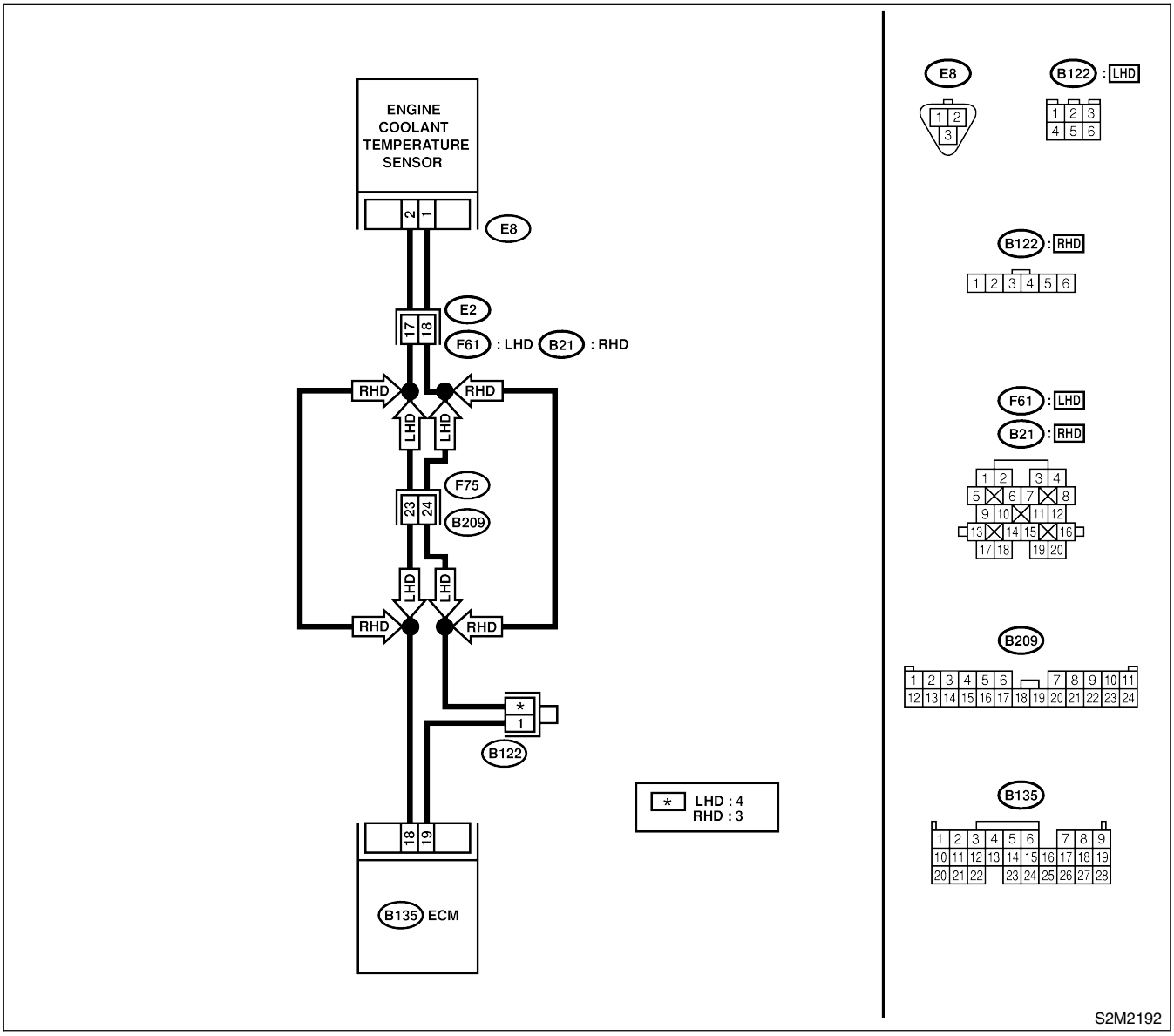
MEMO:

S: DTC P0125 — INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL — S088521B22

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, 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 P0117 or P0118?	Inspect DTC P0117 or P0118 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0125.	Go to step **2**.
2	**CHECK ENGINE COOLING SYSTEM.** NOTE: Check the following items. ● Thermostat open stuck ● Coolant level ● Coolant freeze ● Tire diameter	Is there a fault in engine cooling system?	Replace thermostat. <Ref. to CO-23, Thermostat.>	Replace engine coolant temperature sensor. <Ref. to FU(DOHC TURBO)-29, Engine Coolant Temperature Sensor.>

T: DTC P0131 — FRONT OXYGEN (A/F) SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LOW INPUT) — S088521B24

NOTE:
For the diagnostic procedure, refer to DTC P0132. <Ref. to EN(DOHC TURBO)-150, DTC P0132 — FRONT OXYGEN (A/F) SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

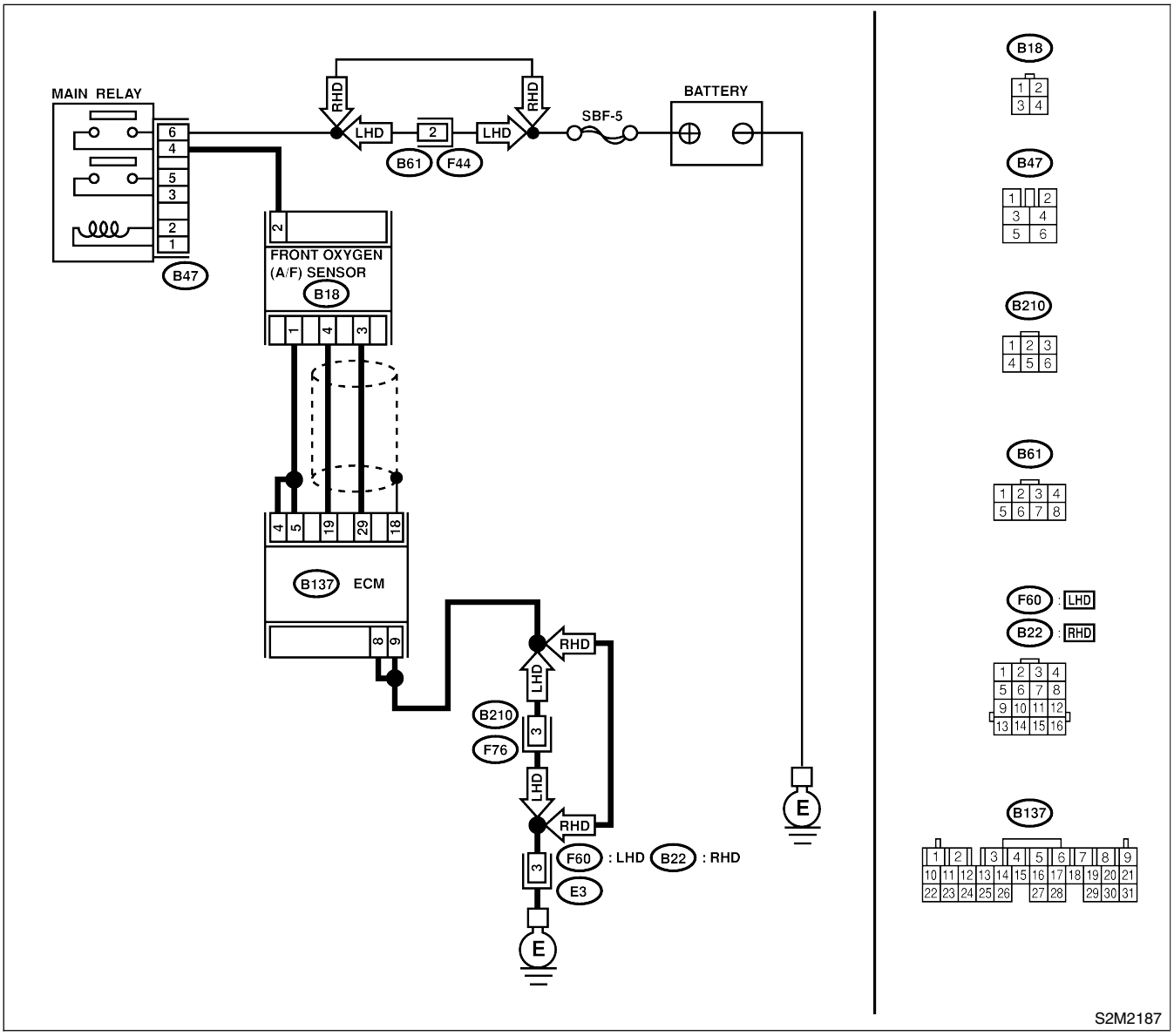
MEMO:

U: DTC P0132 — FRONT OXYGEN (A/F) SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) — S088521B25

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



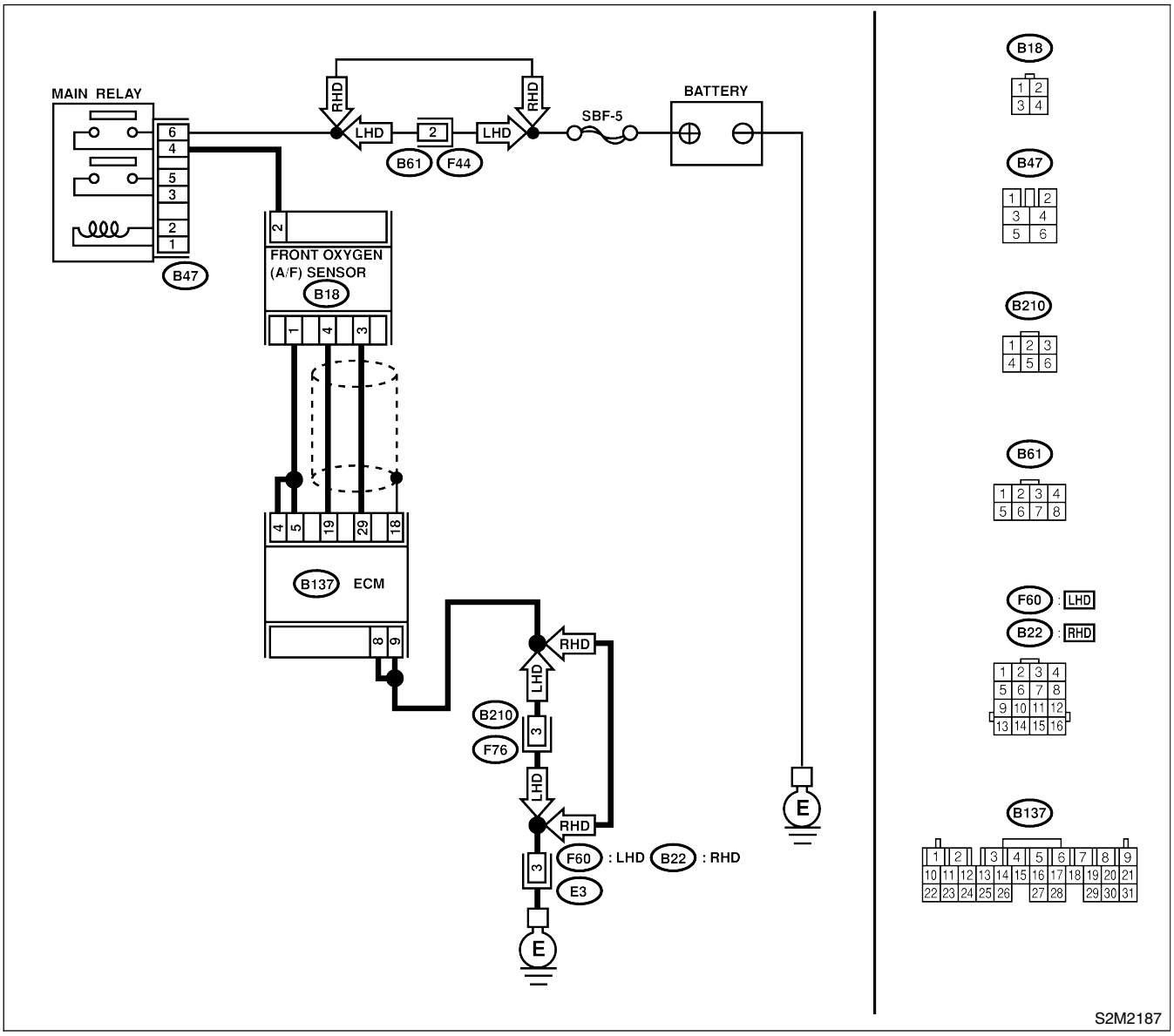
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0031, P0032, P1131, P1134 or P1139?	Inspect DTC P0031, P0032, P1131, P1134 or P1139 using "List of Diagnostic Trouble Code (DTC)".<Ref. to EN(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK FRONT (A/F) OXYGEN SENSOR DATA.** 1) Start engine. 2) While observing the Subaru Select Monitor or OBD-II general scan tool screen, warm-up the engine until coolant temperature is above 70°C (158°F). If the engine is already warmed-up, operate at idle speed for at least 1 minute. 3) Read data of front oxygen (A/F) sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(DOHC TURBO)-36, Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value equal to or more than 0.85 and equal to less than 1.15 in idling?	Go to step **3**.	Go to step **4**.
3	**CHECK REAR OXYGEN SENSOR SIGNAL.** 1) Race engine at speeds from idling to 5,000 rpm for a total of 5 cycles. NOTE: To increase engine speed to 5,000 rpm, slowly depress accelerator pedal, taking approximately 5 seconds, and quickly release accelerator pedal to decrease engine speed. 2) Operate the LED operation mode for engine. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "LED OPERATION MODE FOR ENGINE". <Ref. to EN(DOHC TURBO)-36, Subaru Select Monitor.>	Does the LED of {Rear O2 Rich Signal} blink?	Repair poor contact in front oxygen (A/F) sensor and rear oxygen sensor connector.	Check rear oxygen sensor circuit. <Ref. to FU(DOHC TURBO)-44, Rear Oxygen Sensor.>
4	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. ● Loose installation of portions ● Damage (crack, hole etc.) of parts ● Looseness of front oxygen (A/F) sensor ● Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there a fault in exhaust system?	Repair or replace faulty parts.	Replace front oxygen (A/F) sensor. <Ref. to FU(DOHC TURBO)-42, Front Oxygen (A/F) Sensor.>

V: DTC P0133 — FRONT OXYGEN (A/F) SENSOR CIRCUIT SLOW RESPONSE — S088521B26

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



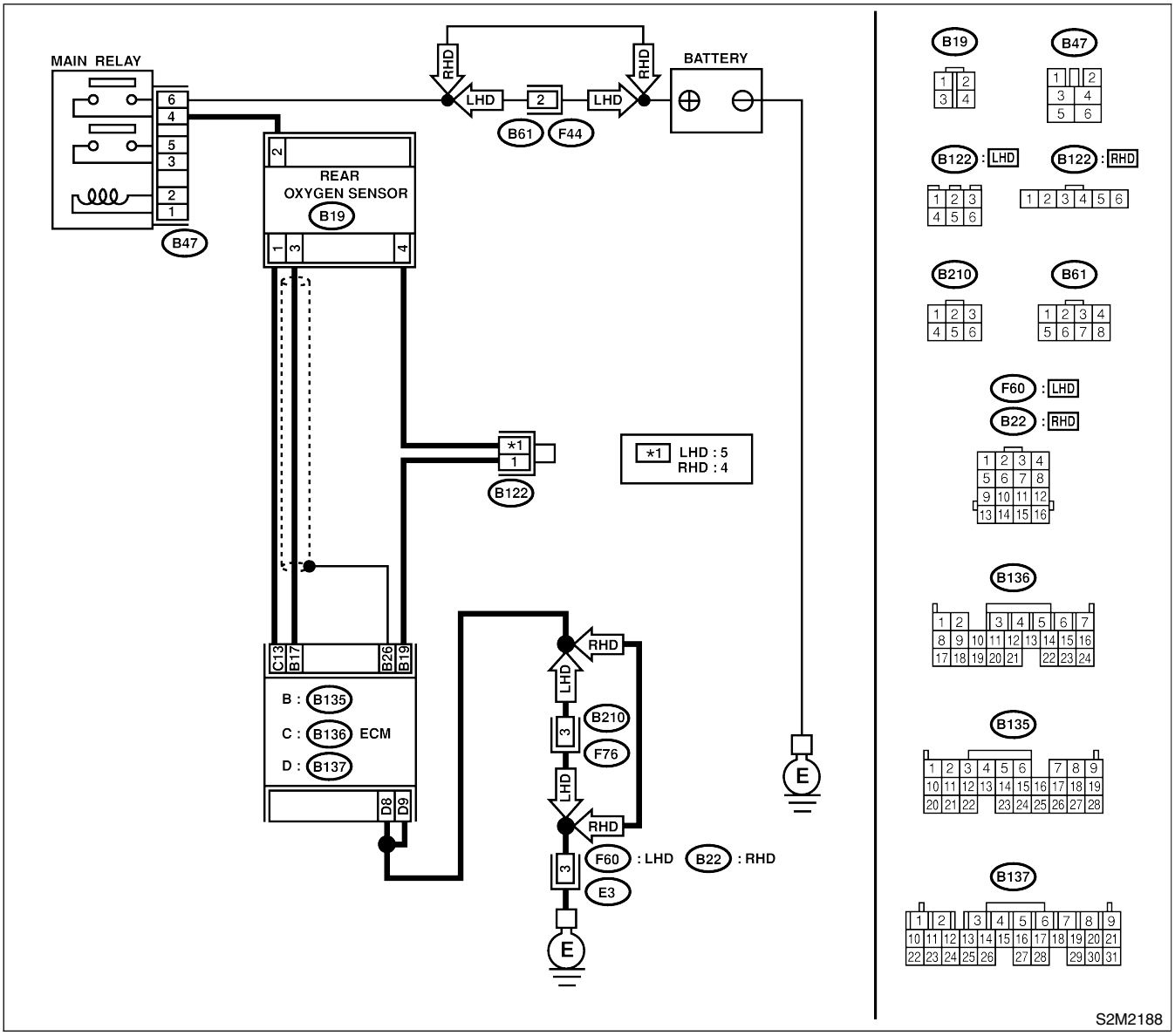
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0031, P0032, P0131, P0132, P1130, P1131, P1134 or P1139?	Inspect DTC P0031, P0032, P0131, P0132, P1130, P1131, P1134 or P1139 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(DOHC TURBO)-82, 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 front oxygen (A/F) sensor. <Ref. to FU(DOHC TURBO)-42, Front Oxygen (A/F) Sensor.>

W: DTC P0136 — REAR OXYGEN SENSOR CIRCUIT MALFUNCTION — S088521B28

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, 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**.
2	**CHECK FAILURE CAUSE OF P0131 or P0132.** Inspect DTC P0131 or P0132 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(DOHC TURBO)-82, 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 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(DOHC TURBO)-36, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Does the value fluctuate?	Go to step **7**.	Go to step **4**.
4	**CHECK REAR OXYGEN SENSOR DATA.** Read data of rear oxygen sensor signal using Subaru Select Monitor or OBD-II General Scan Tool.	Is the value fixed between 0.2 and 0.4 V?	Go to step **5**.	Replace rear oxygen sensor. <Ref. to FU(DOHC TURBO)-44, Rear Oxygen Sensor.>
5	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from ECM and rear oxygen sensor. 3) Measure resistance of harness between ECM and rear oxygen sensor connector. ***Connector & terminal*** ***(B135) No. 26 — (B19) No. 4:***	Is the resistance more than 3 Ω?	Repair open circuit in harness between ECM and rear oxygen sensor connector.	Go to step **6**.
6	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from rear oxygen sensor. 3) Turn ignition switch to ON. 4) Measure voltage between rear oxygen sensor harness connector and engine ground or chassis ground. ***Connector & terminal*** ***(B19) No. 3 (+) — Engine ground (–):***	Is the voltage more than 0.2 V?	Replace rear oxygen sensor. <Ref. to FU(DOHC TURBO)-44, 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

No.	Step	Check	Yes	No
7	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. ● Loose installation of portions ● Damage (crack, hole etc.) of parts ● Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there a fault in exhaust system?	Repair or replace faulty parts.	Replace rear oxygen sensor. <Ref. to FU(DOHC TURBO)-44, Rear Oxygen Sensor.>

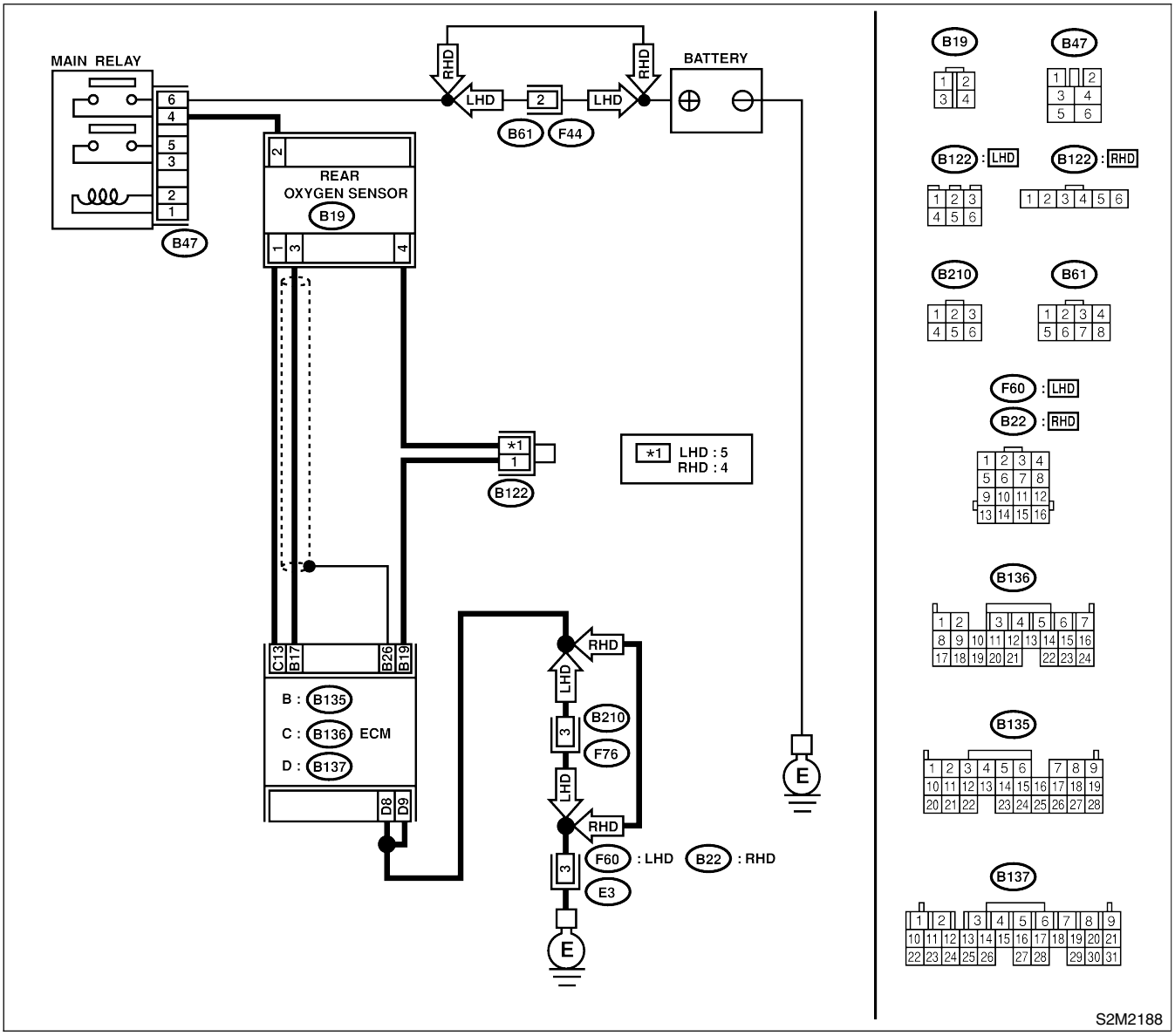
MEMO:

X: DTC P0139 — REAR OXYGEN SENSOR CIRCUIT SLOW RESPONSE — S088521B29

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, 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(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0139.	Replace rear oxygen sensor. <Ref. to FU(DOHC TURBO)-44, Rear Oxygen Sensor.>

Y: DTC P0171 — FUEL TRIM MALFUNCTION (A/F TOO LEAN) — S088521B33

NOTE:
For the diagnostic procedure, refer to DTC P0172. <Ref. to EN(DOHC TURBO)-161, DTC P0172 — FUEL TRIM MALFUNCTION (A/F TOO RICH) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Z: DTC P0172 — FUEL TRIM MALFUNCTION (A/F TOO RICH) — S088521B32

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

No.	Step	Check	Yes	No
1	**CHECK EXHAUST SYSTEM.**	Are there holes or loose bolts on exhaust system?	Repair exhaust system.	Go to step **2**.
2	**CHECK AIR INTAKE SYSTEM.**	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair air intake system.	Go to step **3**.
3	**CHECK FUEL PRESSURE.** **WARNING:** **• Place "NO FIRE" signs near the working area.** **• Be careful not to spill fuel on the floor.** 1) Release fuel pressure. (1) Disconnect connector from fuel pump relay. (2) Start the engine and run it until it stalls. (3) After the engine stalls, crank it for five more seconds. (4) Turn ignition switch to OFF. 2) Connect connector to fuel pump relay. 3) Disconnect fuel delivery hose from fuel filter, and connect fuel pressure gauge. 4) Install fuel filler cap. 5) Start the engine and idle while gear position is neutral. 6) Measure fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold. **WARNING:** **Before removing fuel pressure gauge, release fuel pressure.** NOTE: If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again.	Is fuel pressure between 284 and 314 kPa (2.9 — 3.2 kg/cm^2, 41 — 46 psi)?	Go to step **4**.	Repair the following items. **Fuel pressure too high** • Clogged fuel return line or bent hose **Fuel pressure too low** • Improper fuel pump discharge • Clogged fuel supply line

No.	Step	Check	Yes	No
4	**CHECK FUEL PRESSURE.** After connecting pressure regulator vacuum hose, measure fuel pressure. **WARNING:** **Before removing fuel pressure gauge, release fuel pressure.** NOTE: ● If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again. ● If out of specification as measured at this step, check or replace pressure regulator and pressure regulator vacuum hose.	Is fuel pressure between 206 and 235 kPa (2.1 — 2.4 kg/cm^2, 30 — 34 psi)?	Go to step **5**.	Repair the following items. **Fuel pressure too high** ● Faulty pressure regulator ● Clogged fuel return line or bent hose **Fuel pressure too low** ● Faulty pressure regulator ● Improper fuel pump discharge ● Clogged fuel supply line
5	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** 1) Start the engine and warm-up completely. 2) Read data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(DOHC TURBO)-36, Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is temperature greater than 60°C (140°F)?	Go to step **6**.	Replace engine coolant temperature sensor. <Ref. to FU(DOHC TURBO)-29, Engine Coolant Temperature Sensor.>
6	**CHECK INTAKE MANIFOLD 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 neutral position. 3) Turn A/C switch to OFF. 4) Turn all accessory switches to OFF. 5) Read data of intake manifold pressure sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(DOHC TURBO)-36, 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*** ***24.0 — 41.3 kPa (180 — 310 mmHg, 7.09 — 12.20 inHg)***	Is the value within the specifications?	Go to step **7**.	Replace mass air flow and intake manifold pressure sensor. <Ref. to FU(DOHC TURBO)-34, Mass Air Flow and Intake Air Temperature Sensor.>

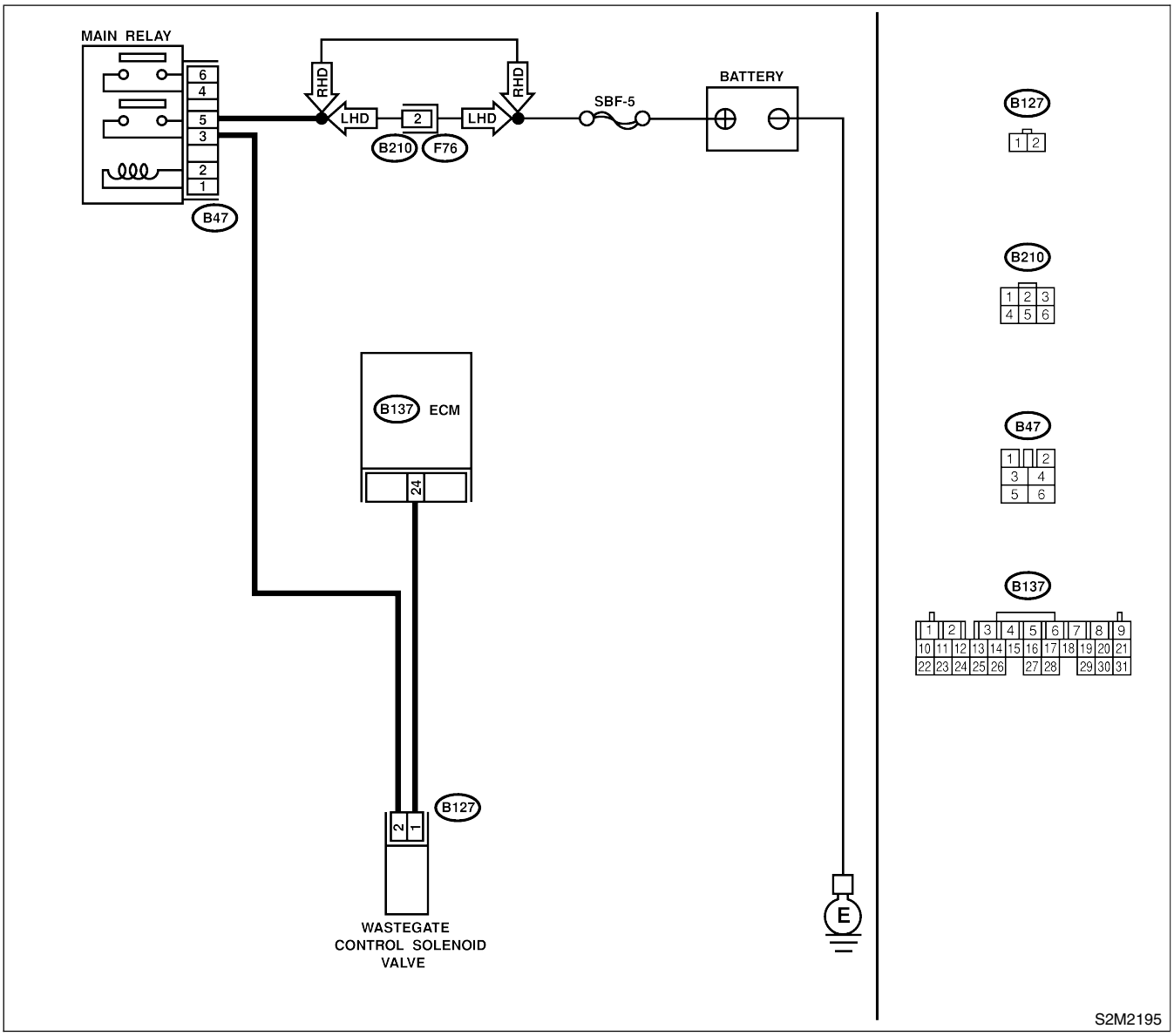
No.	Step	Check	Yes	No
7	**CHECK INTAKE AIR TEMPERATURE SENSOR.** 1) Start the engine and warm-up engine until coolant temperature is greater than 60°C (140°F). 2) Place the shift lever in neutral position. 3) Turn A/C switch to OFF. 4) Turn all accessory switches to OFF. 5) Open front hood. 6) Measure ambient temperature. 7) Read data of intake manifold pressure sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(DOHC TURBO)-36, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.	Is value obtained when ambient temperature is subtracted from intake air temperature greater than –10°C (14°F) and less than 50°C (122°F)?	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.	Check mass air flow and intake air temperature sensor. <Ref. to FU(DOHC TURBO)-34, Mass Air Flow and Intake Air Temperature Sensor.>

AA: DTC P0244 — WASTEGATE CONTROL SOLENOID VALVE MALFUNCTION (HIGH INPUT) — S088521H65

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



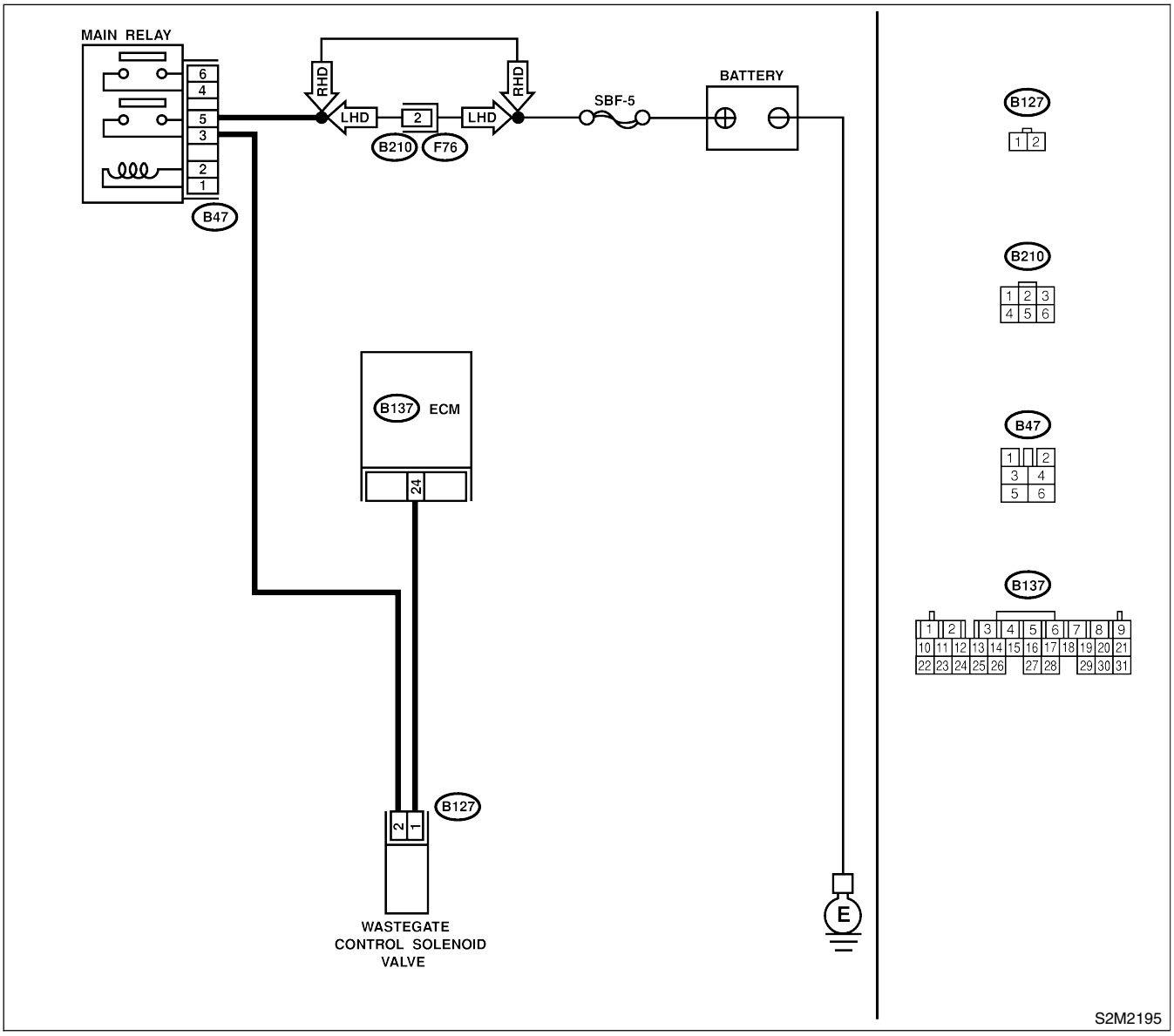
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0245 or P0246?	Inspect DTC P0245 or P0246 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0121.	Replace waste-gate control sole-noid valve. <Ref. to FU(DOHC TURBO)-41, Wastegate Control Solenoid Valve.>

AB: DTC P0245 — WASTEGATE CONTROL SOLENOID VALVE CIRCUIT LOW INPUT — S088521H66

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 24 (+) — 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 your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.	Go to step **2**.
2	**CHECK HARNESS BETWEEN WASTEGATE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from wastegate control solenoid valve and ECM. 3) Measure resistance of harness between wastegate control solenoid valve connector and engine ground. ***Connector & terminal*** ***(B127) No. 1 — Engine ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between ECM and wastegate control solenoid valve connector.	Go to step **3**.
3	**CHECK HARNESS BETWEEN WASTEGATE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** Measure resistance of harness between ECM and wastegate control solenoid valve of harness connector. ***Connector & terminal*** ***(B137) No. 24 — (B127) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair open circuit in harness between ECM and wastegate control solenoid valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and wastegate control solenoid valve connector
4	**CHECK WASTEGATE CONTROL SOLENOID VALVE.** 1) Remove wastegate control solenoid valve. 2) Measure resistance between purge control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 30 and 34 Ω?	Go to step **5**.	Replace wastegate control solenoid valve. <Ref. to FU(DOHC TURBO)-41, Wastegate Control Solenoid Valve.>
5	**CHECK POWER SUPPLY TO WASTEGATE CONTROL SOLENOID VALVE.** 1) Turn ignition switch to ON. 2) Measure voltage between wastegate control solenoid valve and engine ground. ***Connector & terminal*** ***(B127) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **6**.	Repair open circuit in harness between main relay and wastegate control solenoid valve connector.

No.	Step	Check	Yes	No
6	**CHECK POOR CONTACT.** Check poor contact in wastegate control solenoid valve connector.	Is there poor contact in wastegate control solenoid valve connector?	Repair poor contact in wastegate control solenoid valve connector.	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

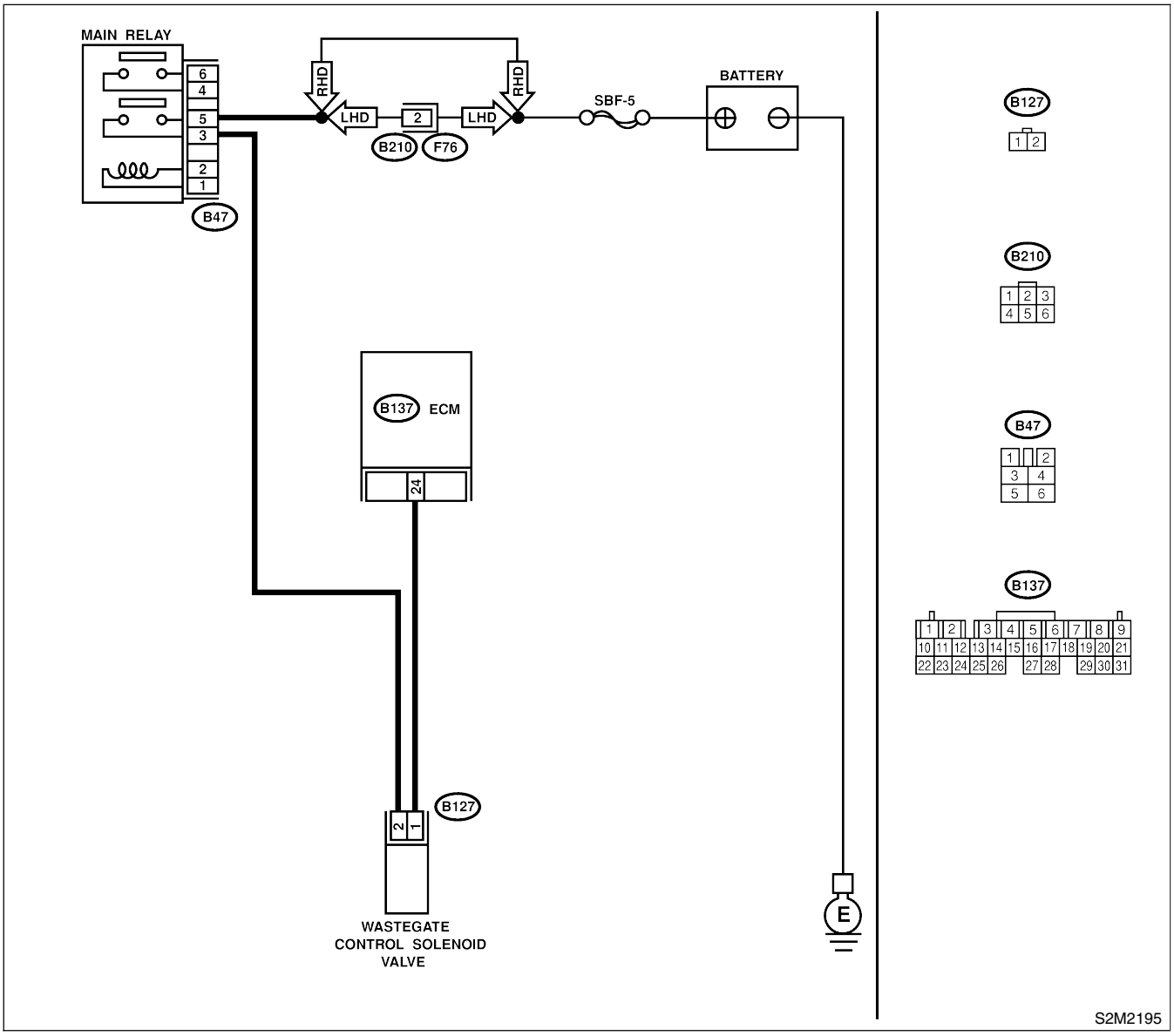
MEMO:

AC: DTC P0246 — WASTEGATE CONTROL SOLENOID VALVE CIRCUIT HIGH INPUT — S088521H67

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 24 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	Go to step **2**.
2	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>
3	**CHECK HARNESS BETWEEN WASTEGATE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from wastegate control solenoid valve. 3) Turn ignition switch to ON. 4) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 24 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and wastegate control solenoid valve connector. After repair, replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>	Go to step **4**.
4	**CHECK WASTEGATE CONTROL SOLENOID VALVE.** 1) Turn ignition switch to OFF. 2) Measure resistance between wastegate control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Replace wastegate control solenoid valve <Ref. to FU(DOHC TURBO)-41, Wastegate Control Solenoid Valve.> and ECM <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>	Go to step **5**.
5	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>

AD: DTC P0301 — CYLINDER 1 MISFIRE DETECTED — S088521B37

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(DOHC TURBO)-172, DTC P0304 — CYLINDER 4 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AE: DTC P0302 — CYLINDER 2 MISFIRE DETECTED — S088521B38

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(DOHC TURBO)-172, DTC P0304 — CYLINDER 4 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AF: DTC P0303 — CYLINDER 3 MISFIRE DETECTED — S088521B39

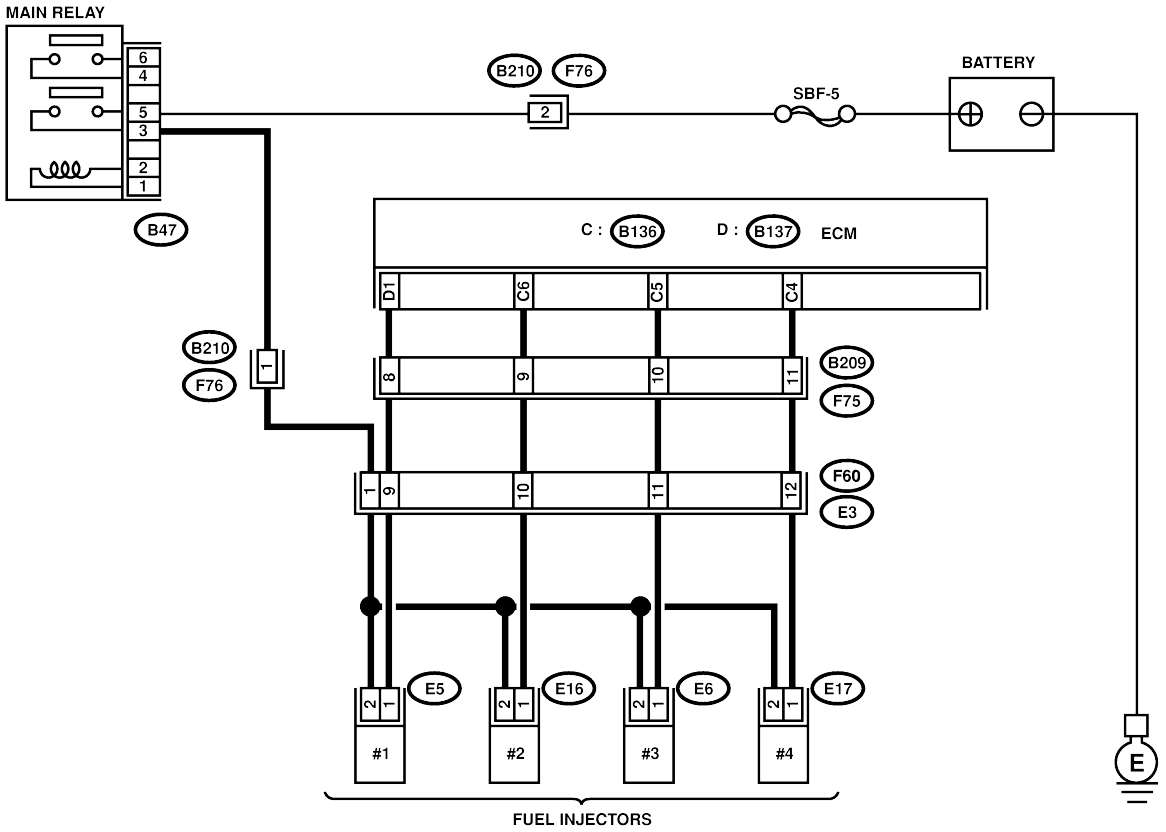
NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(DOHC TURBO)-172, DTC P0304 — CYLINDER 4 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

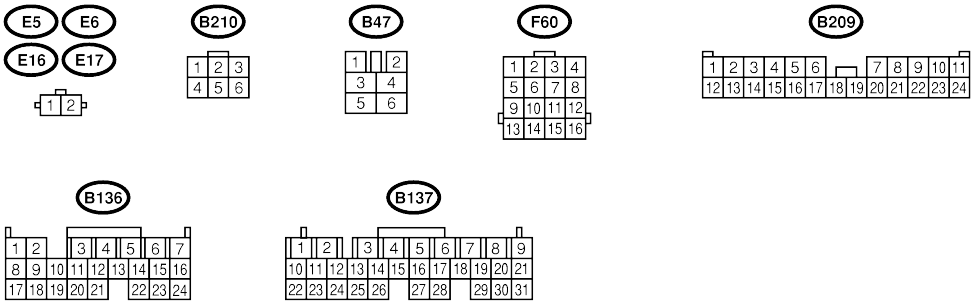
AG: DTC P0304 — CYLINDER 4 MISFIRE DETECTED — S088521B40

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**
- **LHD MODEL**

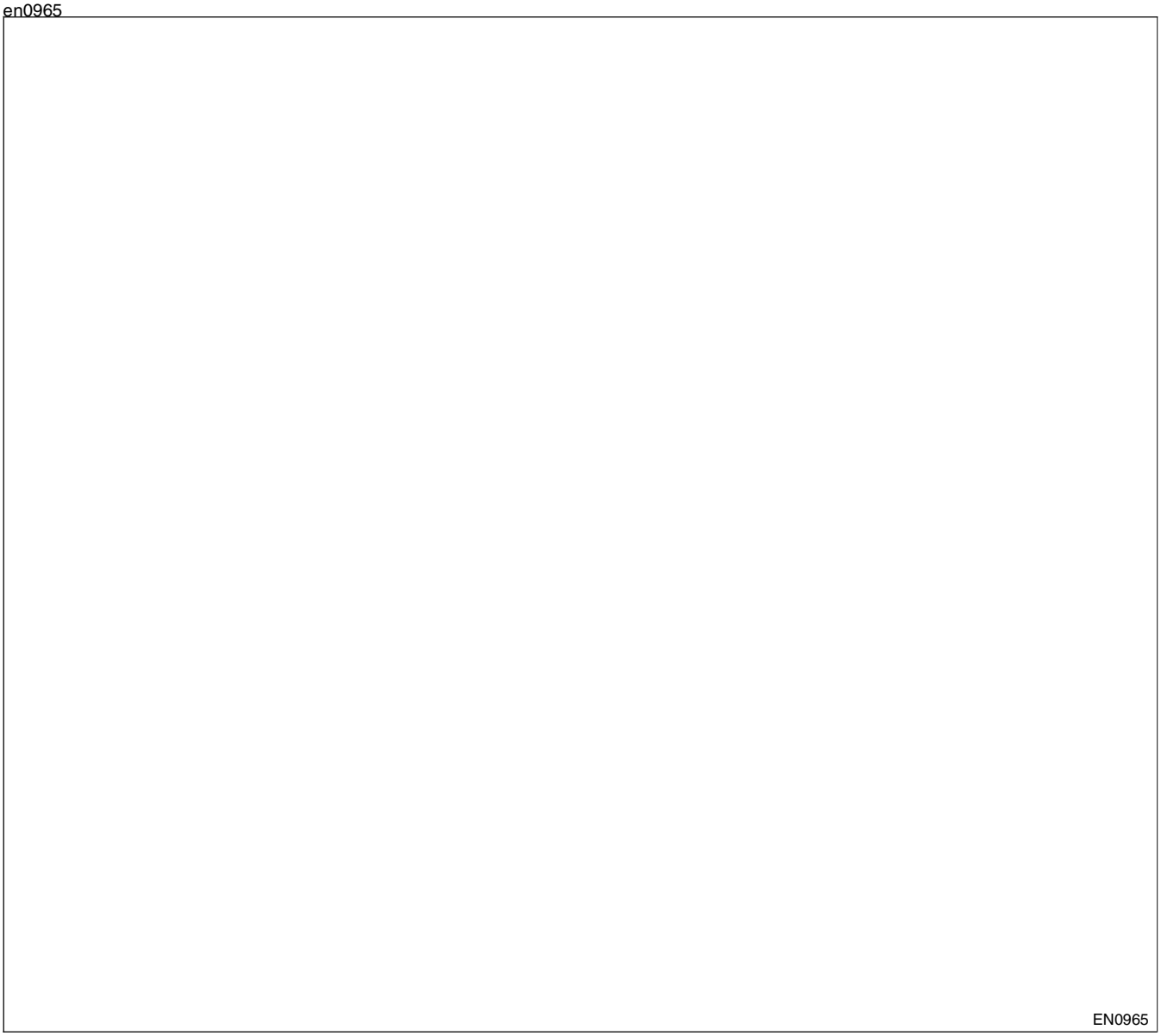




S2M2186

- **RHD MODEL**

en0965



No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0106, P0107, P0108, P0117, P0118 or P0125?	Inspect DTC P0106, P0107, P0108, P0117, P0118 or P0125 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(DOHC TURBO)-82, 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 ignition switch to ON. 2) Measure voltage between ECM connector and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B137) No. 1 (+) — Chassis ground (–):*** ***#2 (B136) No. 6 (+) — Chassis ground (–):*** ***#3 (B136) No. 5 (+) — Chassis ground (–):*** ***#4 (B136) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **7**.	Go to step **3**.
3	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from fuel injector on faulty cylinders. 3) Disconnect connector from ECM. 4) Measure voltage between ECM connector and engine ground on faulty cylinders. ***Connector & terminal*** ***#1 (E5) No. 1 — Engine ground:*** ***#2 (E16) No. 1 — Engine ground:*** ***#3 (E6) No. 1 — Engine ground:*** ***#4 (E17) No. 1 — Engine ground:***	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 resistance of harness connector between ECM connector and fuel injector on faulty cylinders. ***Connector & terminal*** ***#1 (B137) No. 1 — (E5) No. 1:*** ***#2 (B136) No. 6 — (E16) No. 1:*** ***#3 (B136) No. 5 — (E6) No. 1:*** ***#4 (B136) No. 4 — (E17) No. 1:***	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

No.	Step	Check	Yes	No
5	**CHECK FUEL INJECTOR.** Measure resistance between fuel injector terminals on faulty cylinder. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 5 and 20 Ω?	Go to step **6**.	Replace faulty fuel injector. <Ref. to FU(DOHC TURBO)-37, Fuel Injector.>
6	**CHECK POWER SUPPLY LINE.** 1) Turn ignition switch to ON. 2) Measure voltage between fuel injector and engine ground on faulty cylinders. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (–):*** ***#2 (E16) No. 2 (+) — Engine ground (–):*** ***#3 (E6) No. 2 (+) — Engine ground (–):*** ***#4 (E17) No. 2 (+) — Engine ground (–):***	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 ignition switch to OFF. 2) Disconnect connector from fuel injector on faulty cylinder. 3) Turn ignition switch to ON. 4) Measure voltage between ECM connector and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B137) No. 1 (+) — Chassis ground (–):*** ***#2 (B136) No. 6 (+) — Chassis ground (–):*** ***#3 (B136) No. 5 (+) — Chassis ground (–):*** ***#4 (B136) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and fuel injector. After repair, replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>	Go to step **8**.
8	**CHECK FUEL INJECTOR.** 1) Turn ignition switch to OFF. 2) Measure resistance between fuel injector terminals on faulty cylinder. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Replace faulty fuel injector <Ref. to FU(DOHC TURBO)-37, Fuel Injector.> and ECM <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>	Go to step **9**.
9	**CHECK INSTALLATION OF CAMSHAFT POSITION SENSOR/CRANKSHAFT POSITION SENSOR.**	Is camshaft position sensor or crankshaft position sensor loosely installed?	Tighten camshaft position sensor or crankshaft position sensor.	Go to step **10**.

No.	Step	Check	Yes	No
10	**CHECK CRANKSHAFT SPROCKET.** Remove timing belt cover.	Is crankshaft sprocket rusted or does it have broken teeth?	Replace crankshaft sprocket. <Ref. to ME(DOHC TURBO)-57, Crankshaft Sprocket.>	Go to step **11**.
11	**CHECK INSTALLATION CONDITION OF TIMING BELT.** Turn crankshaft using ST, and align alignment mark on crankshaft sprocket with alignment mark on cylinder block. ST 499987500 CRANKSHAFT SOCKET	Is timing belt dislocated from its proper position?	Repair installation condition of timing belt. <Ref. to ME(DOHC TURBO)-48, 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 memory using Subaru Select Monitor. <Ref. to EN(DOHC TURBO)-47, Clear Memory Mode.> 2) Start engine, and drive the vehicle more than 10 minutes.	Is the MIL coming on or blinking?	Go to step **15**.	Go to step **14**.
14	**CHECK CAUSE OF MISFIRE DIAGNOSED.**	Was the cause of misfire diagnosed when the engine is running?	Finish diagnostics operation, if the engine has no abnormality. NOTE: Ex. Remove spark plug cord, etc.	Repair poor contact. NOTE: In this case, repair the following: • Poor contact in ignitor connector • Poor contact in ignition coil connector • Poor contact in fuel injector connector on faulty cylinders • Poor contact in ECM connector • Poor contact in coupling connector

No.	Step	Check	Yes	No
15	**CHECK AIR INTAKE SYSTEM.**	Is there a fault in air intake system?	Repair air intake system. NOTE: Check the following items: ● Are there air leaks or air suction caused by loose or dislocated nuts and bolts? ● Are there cracks or any disconnection of hoses?	Go to step **16**.
16	**CHECK MISFIRE SYMPTOM.** 1) Turn ignition switch to ON. 2) Read diagnostic trouble code (DTC). ● Subaru Select Monitor <Ref. to EN(DOHC TURBO)-36, 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 ● Fuel injector ● Compression ratio	Go to DTC P0171 and P0172. <Ref. to EN(DOHC TURBO)-160, DTC P0171 - FUEL TRIM MALFUNCTION (A/F TOO LEAN) -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

No.	Step	Check	Yes	No
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(DOHC TURBO)-72, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Go to DTC P0171 and P0172. <Ref. to EN(DOHC TURBO)-160, DTC P0171 - FUEL TRIM MALFUNCTION (A/F TOO LEAN) -, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
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(DOHC TURBO)-72, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Go to DTC P0171 and P0172. <Ref. to EN(DOHC TURBO)-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 and P0172. <Ref. to EN(DOHC TURBO)-160, DTC P0171 — FUEL TRIM MALFUNCTION (A/F TOO LEAN) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

No.	Step	Check	Yes	No
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 and P0172. <Ref. to EN(DOHC TURBO)-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 and P0172. <Ref. to EN(DOHC TURBO)-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

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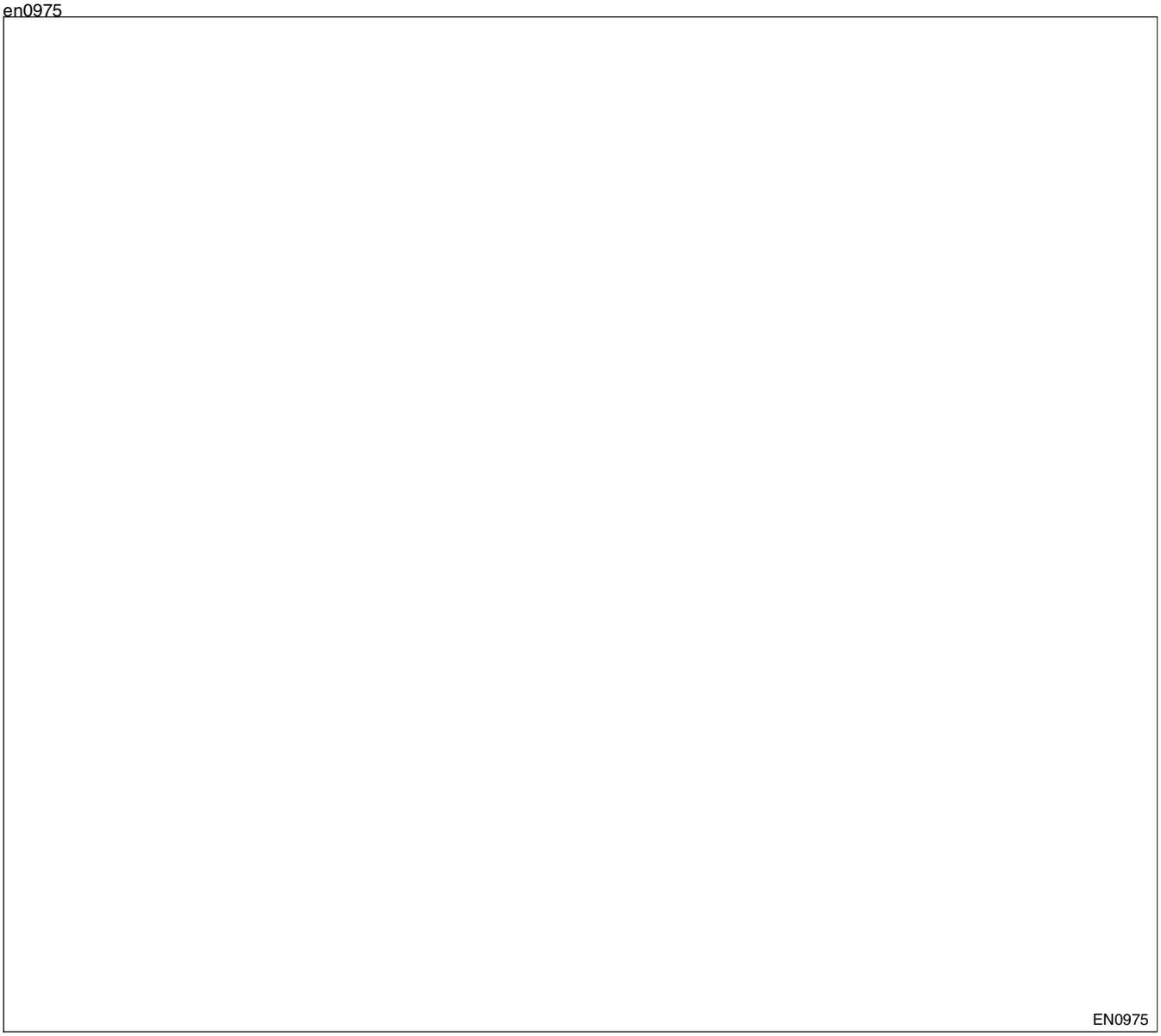
AH: DTC P0327 — KNOCK SENSOR CIRCUIT LOW INPUT — S088521F94

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**

en0975



No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance between ECM harness connector and chassis ground. ***Connector & terminal*** ***(B135) 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 connector from knock sensor. 2) Measure 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 knock sensor. <Ref. to FU(DOHC TURBO)-32, Knock Sensor.>	Tighten knock sensor installation bolt securely.

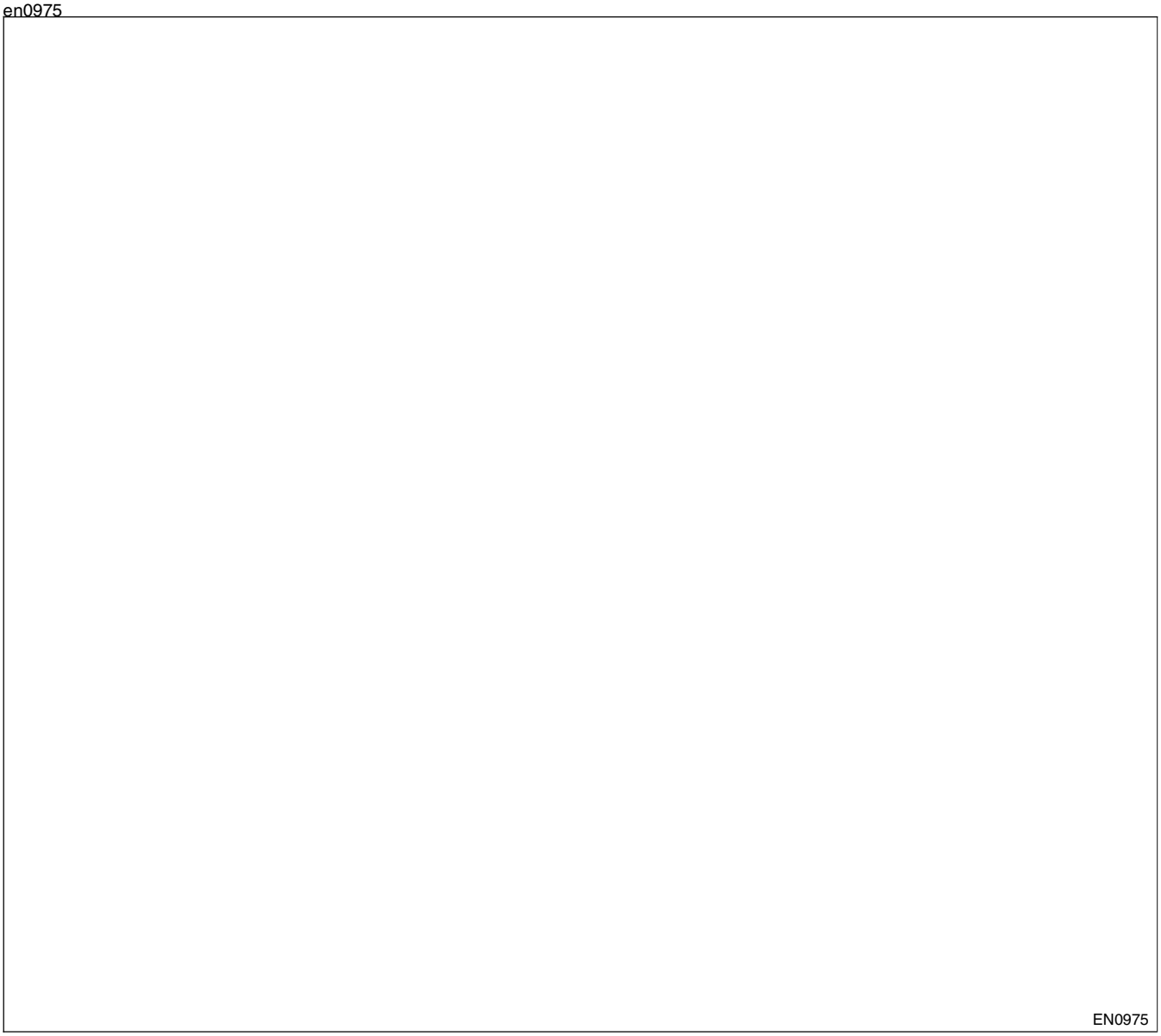
AI: DTC P0328 — KNOCK SENSOR CIRCUIT HIGH INPUT — S088521F95

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**

en0975



No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** Measure resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 4 — Chassis ground:***	Is the resistance less than 400 kΩ?	Go to step **2**.	Go to step **3**.
2	**CHECK KNOCK SENSOR.** 1) Disconnect connector from knock sensor. 2) Measure resistance between knock sensor connector terminal and engine ground. ***Terminal*** ***No. 2 — Engine ground:***	Is the resistance less than 400 kΩ?	Replace knock sensor. <Ref. to FU(DOHC TURBO)-32, 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 connectors to ECM and knock sensor. 2) Turn ignition switch to ON. 3) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 2 V?	Even if MIL lights up, the circuit has returned to a normal condition at this time. (However, the possibility of poor contact still remains.) NOTE: In this case, repair the following: • Poor contact in knock sensor connector • Poor contact in ECM connector • Poor contact in coupling connector	Repair poor contact in ECM connector.

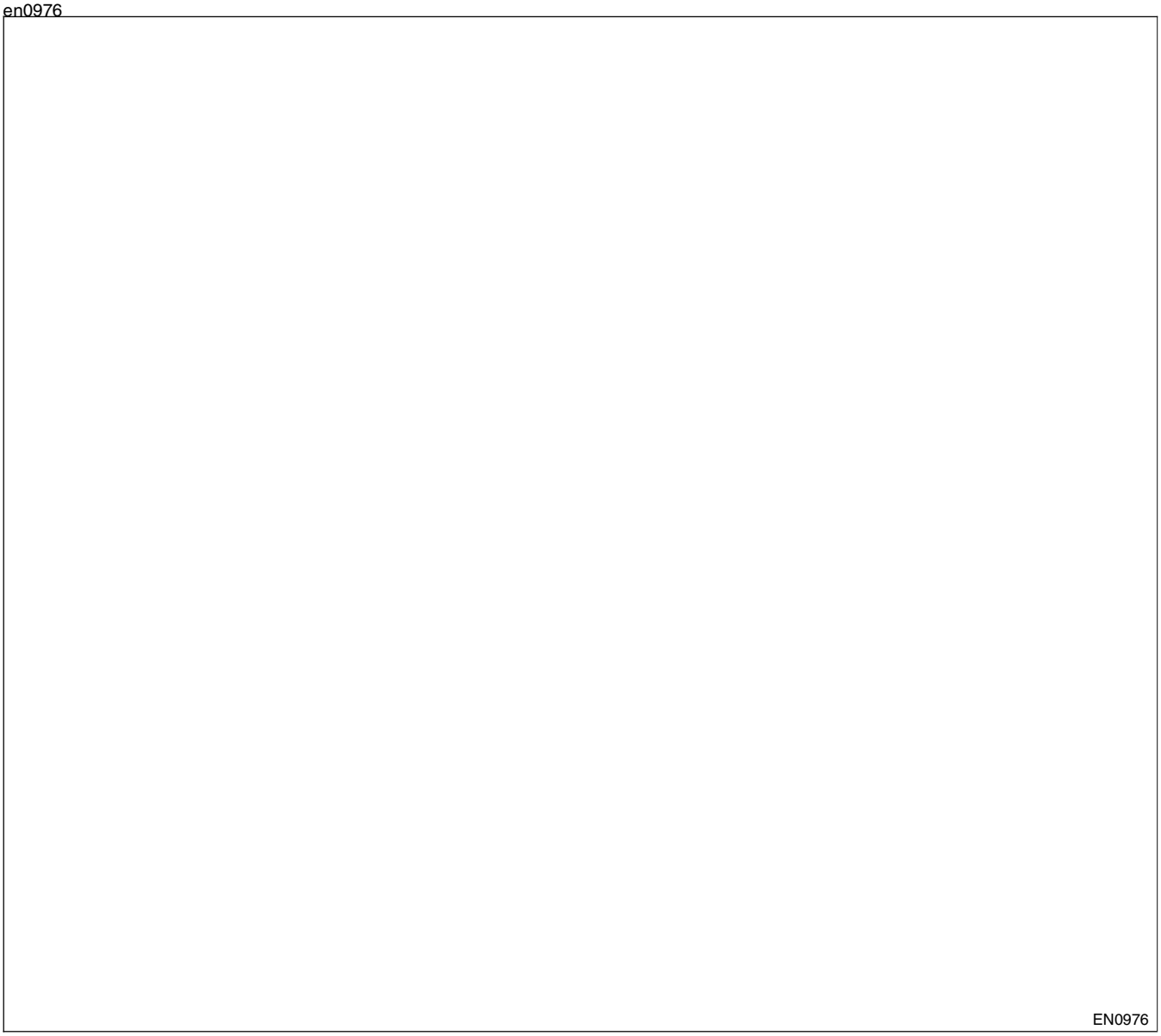
AJ: DTC P0335 — CRANKSHAFT POSITION SENSOR CIRCUIT MALFUNCTION — S088521B42

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**

en0976



No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from crankshaft position sensor. 3) Measure resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:***	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 CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:***	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 CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 2 — Engine ground:***	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 crankshaft position sensor. 2) Measure 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 crankshaft position sensor. <Ref. to FU(DOHC TURBO)-30, Crankshaft Position Sensor.>

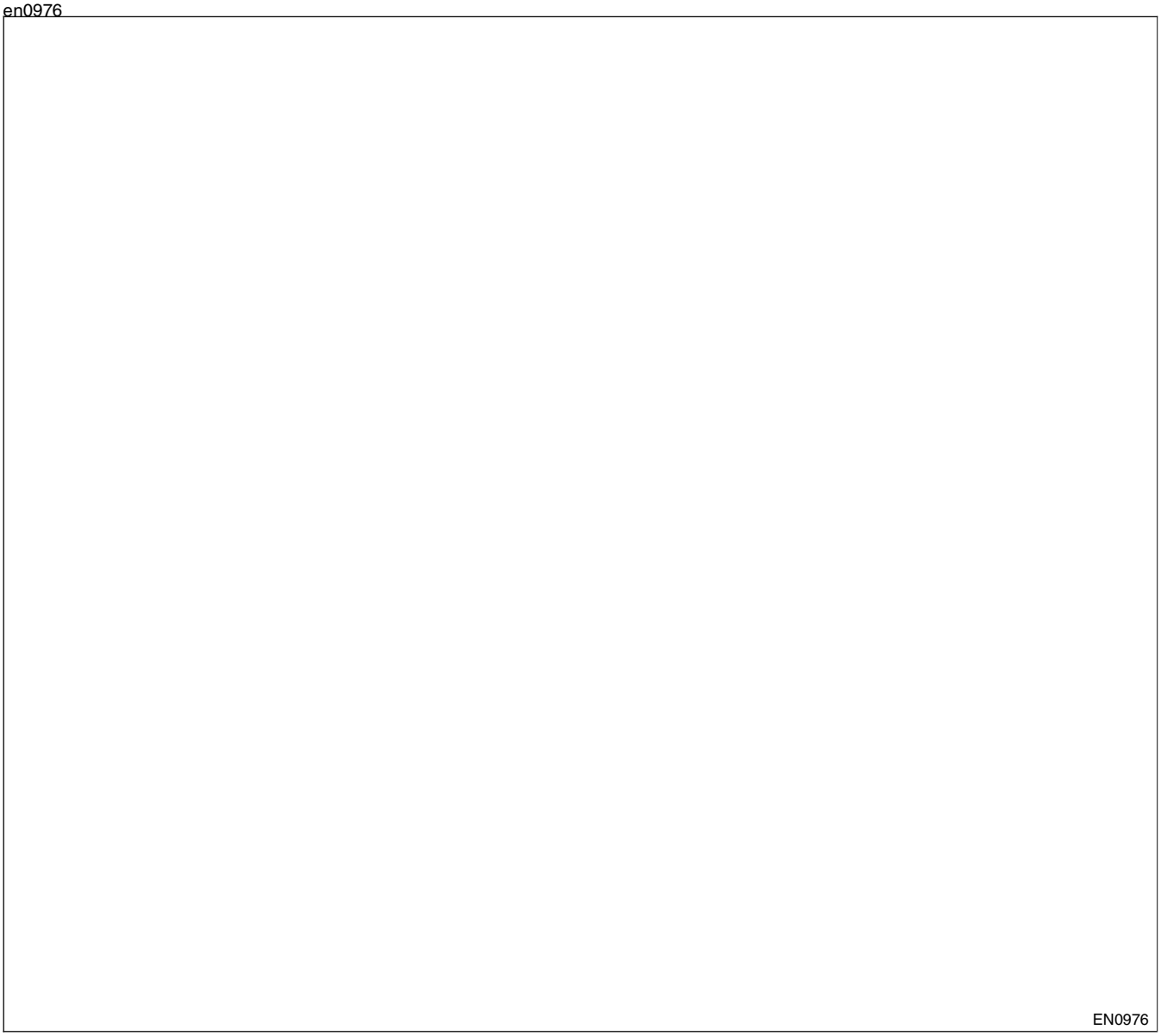
AK: DTC P0336 — CRANKSHAFT POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM — S088521B43

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**

en0976



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(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.** Turn ignition switch to OFF.	Is the crankshaft position sensor installation bolt tightened securely?	Go to step **3**.	Tighten crankshaft position sensor installation bolt securely.
3	**CHECK CRANKSHAFT SPROCKET.** Remove front belt cover.	Are crankshaft sprocket teeth cracked or damaged?	Replace crankshaft sprocket. <Ref. to FU(DOHC TURBO)-30, Crankshaft Position Sensor.>	Go to step **4**.
4	**CHECK INSTALLATION CONDITION OF TIMING BELT.** Turn crankshaft using ST, and align alignment mark on crankshaft sprocket with alignment mark on cylinder block. ST 499987500 CRANKSHAFT SOCKET	Is timing belt dislocated from its proper position?	Repair installation condition of timing belt. <Ref. to ME(DOHC TURBO)-48, Timing Belt Assembly.>	Replace crankshaft position sensor. <Ref. to FU(DOHC TURBO)-30, Crankshaft Position Sensor.>

AL: DTC P0340 — CAMSHAFT POSITION SENSOR CIRCUIT MALFUNCTION

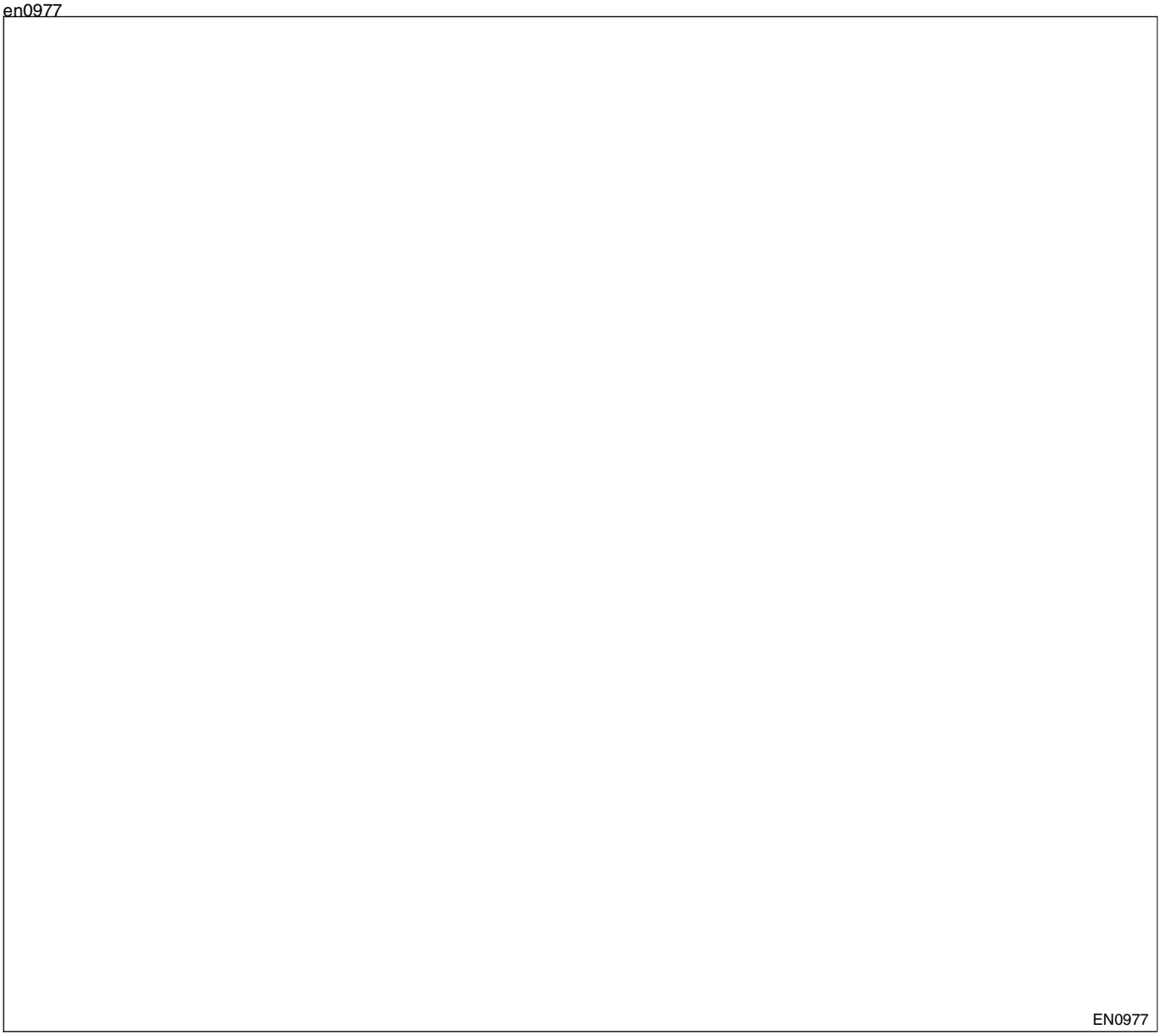
S088521B44

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**

en0977



No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from camshaft position sensor. 3) Measure resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	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 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 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 camshaft position sensor. 2) Measure 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 camshaft position sensor. <Ref. to FU(DOHC TURBO)-31, Camshaft Position Sensor.>

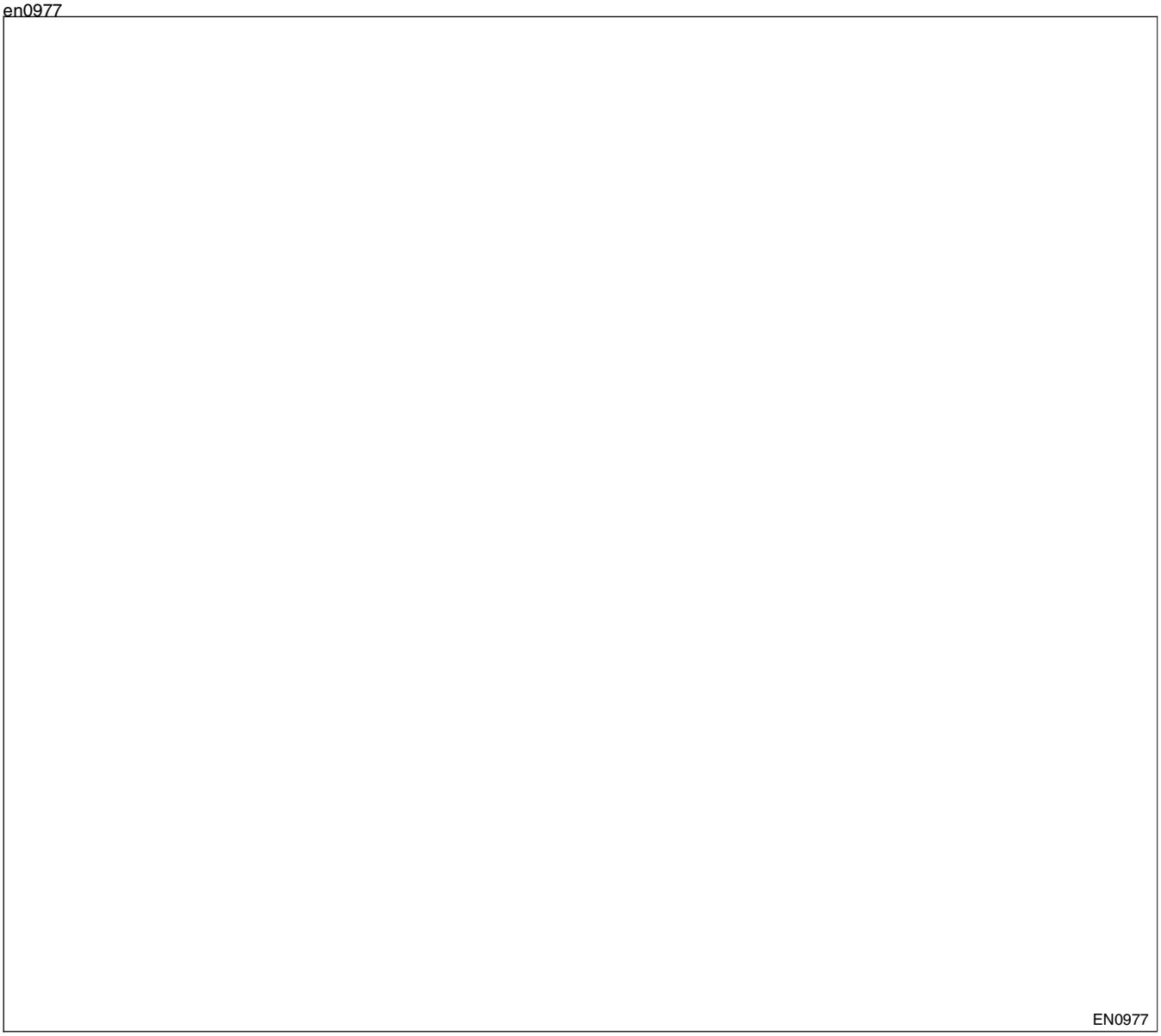
AM: DTC P0341 — CAMSHAFT POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM — S088521B45

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**

en0977



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(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from camshaft position sensor. 3) Measure resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	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 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 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

No.	Step	Check	Yes	No
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.
6	**CHECK CAMSHAFT POSITION SENSOR.** 1) Remove camshaft position sensor. 2) Measure 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 camshaft position sensor. <Ref. to FU(DOHC TURBO)-31, Camshaft Position Sensor.>
7	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.** Turn 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 front belt cover. <Ref. to ME(DOHC TURBO)-47, Belt Cover.>	Are camshaft sprocket teeth cracked or damaged?	Replace camshaft sprocket. <Ref. to ME(DOHC TURBO)-56, Camshaft Sprocket.>	Go to step **9**.
9	**CHECK INSTALLATION CONDITION OF TIMING BELT.** Turn camshaft using ST, and align alignment mark on camshaft sprocket with alignment mark on timing belt cover LH. ST 499207400 CAMSHAFT SPROCKET WRENCH	Is timing belt dislocated from its proper position?	Repair installation condition of timing belt. <Ref. to ME(DOHC TURBO)-48, Timing Belt Assembly.>	Replace camshaft position sensor. <Ref. to FU(DOHC TURBO)-31, Camshaft Position Sensor.>

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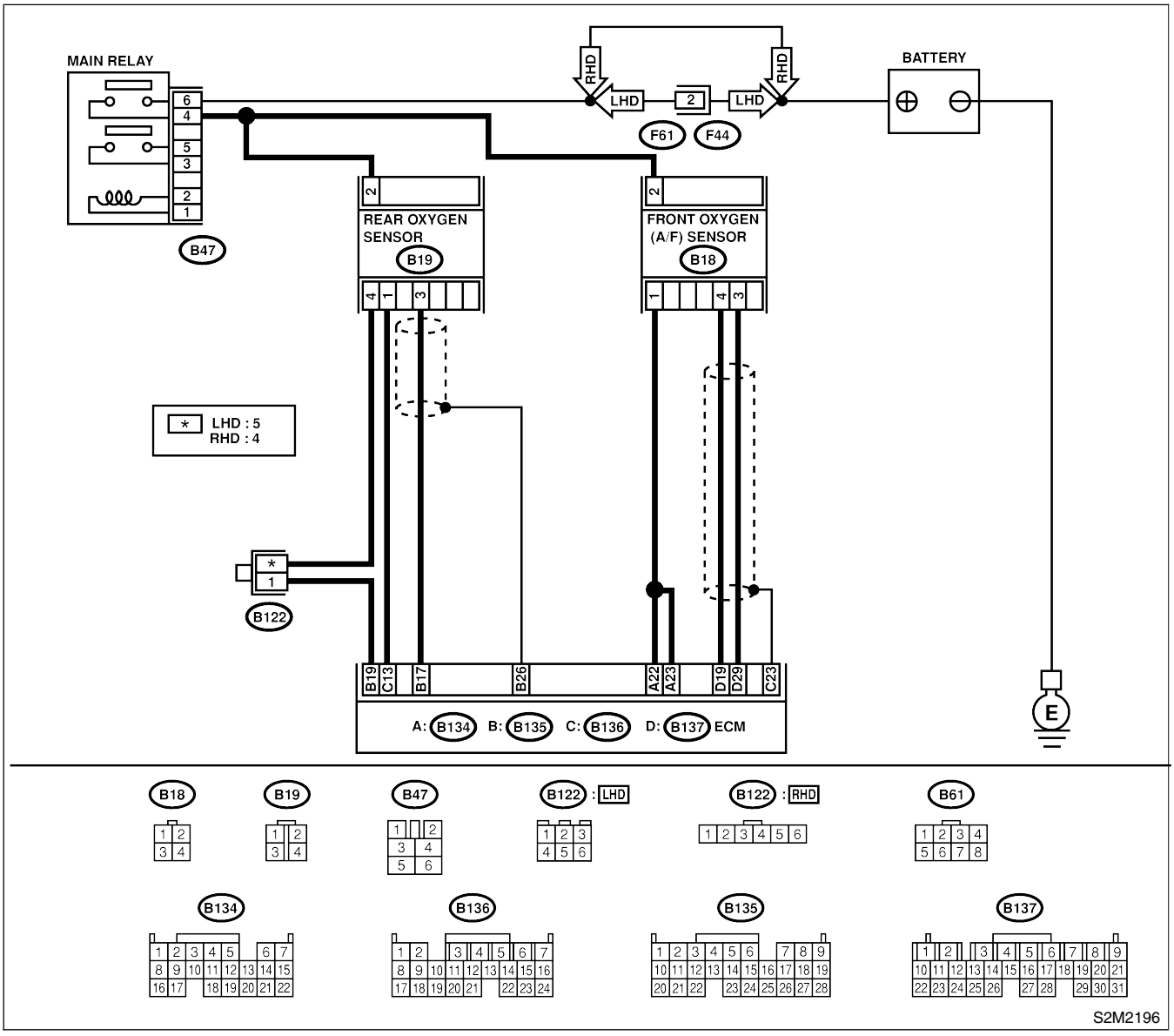
AN: DTC P0420 — CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD

S088521B46

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



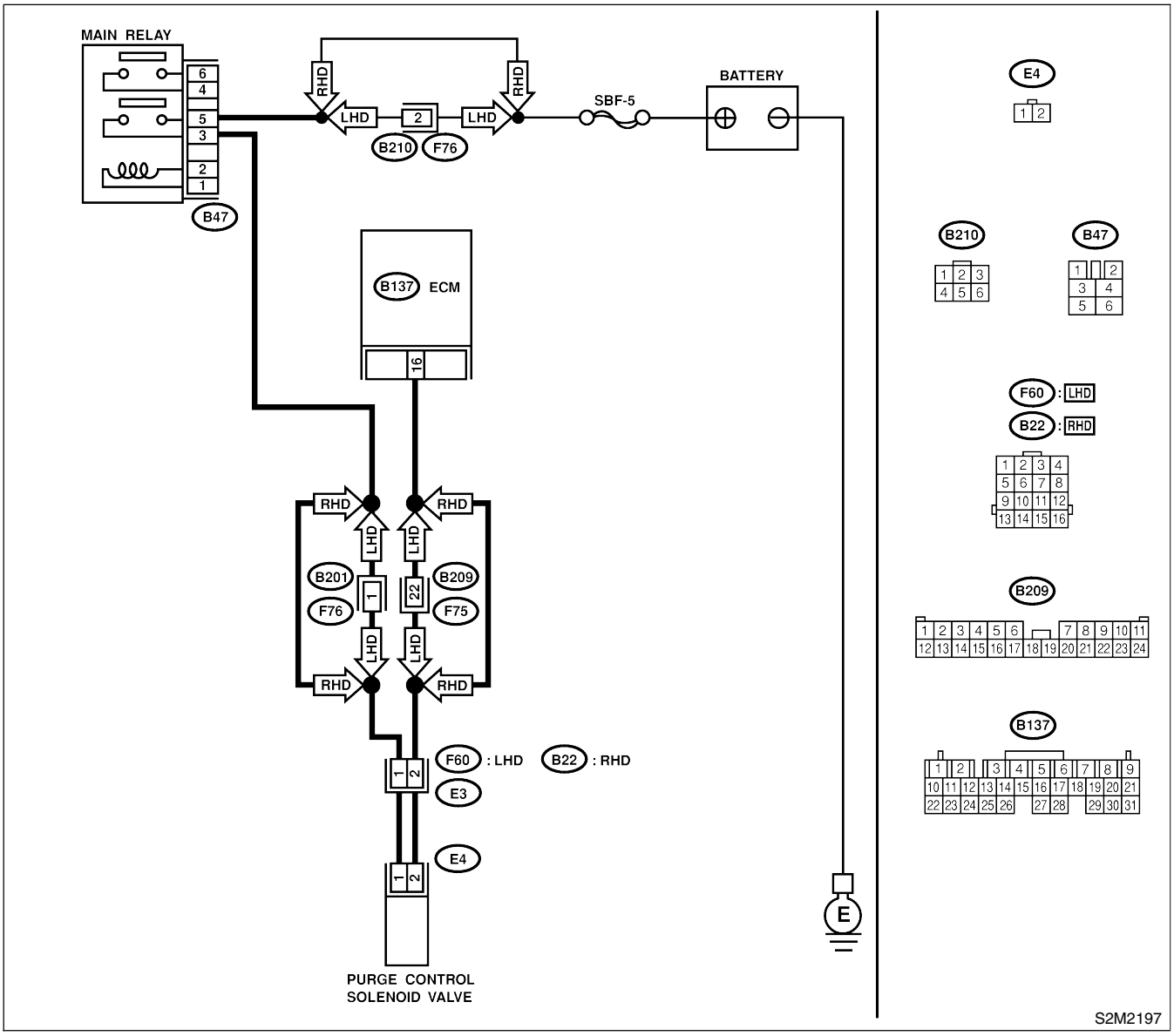
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0031, P0032, P0131, P0132, P0133, P1130, P1131, P1134, P1139, P0037, P0038, P0136 and P0139?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0420.	Go to step **2**.
2	**CHECK EXHAUST SYSTEM.** Check for gas leaks or air suction caused by loose or dislocated nuts and bolts, and open hole at exhaust pipes. NOTE: Check the following positions. ● Between cylinder head and front exhaust pipe ● Between front exhaust pipe and front catalytic converter ● Between front catalytic converter and rear catalytic converter	Is there a fault in exhaust system?	Repair or replace exhaust system. <Ref. to EX(DOHC TURBO)-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 front catalytic converter <Ref. to EC(DOHC TURBO)-3, Front Catalytic Converter.> and rear catalytic converter. <Ref. to EC(DOHC TURBO)-4, Rear Catalytic Converter.>	Go to step **4**.
4	**CHECK FRONT CATALYTIC CONVERTER.** Remove front catalytic converter.	Is there damage at rear face or front face of front catalyst?	Replace front catalytic converter. <Ref. to EC(DOHC TURBO)-3, Front Catalytic Converter.>	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

AO: DTC P0444 — EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT LOW INPUT — S088521G47

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 16 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Even if MIL lights up, the circuit has returned to a normal condition at this time. Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.	Go to step **2**.
2	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from purge control solenoid valve and ECM. 3) Measure resistance of harness between purge control solenoid valve connector and engine ground. ***Connector & terminal*** ***(E4) No. 2 — Engine ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between ECM and purge control solenoid valve connector.	Go to step **3**.
3	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** Measure resistance of harness between ECM and purge control solenoid valve of harness connector. ***Connector & terminal*** ***(B137) No. 16 — (E4) No. 2:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair open circuit in harness between ECM and purge control solenoid valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and purge control solenoid valve connector • Poor contact in coupling connector
4	**CHECK PURGE CONTROL SOLENOID VALVE.** 1) Remove purge control solenoid valve. 2) Measure resistance between purge control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 10 and 100 Ω?	Go to step **5**.	Replace purge control solenoid valve. <Ref. to EC(DOHC TURBO)-7, Purge Control Solenoid Valve.>
5	**CHECK POWER SUPPLY TO PURGE CONTROL SOLENOID VALVE.** 1) Turn ignition switch to ON. 2) Measure voltage between purge control solenoid valve and engine ground. ***Connector & terminal*** ***(E4) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **6**.	Repair open circuit in harness between main relay and purge control solenoid valve connector.

No.	Step	Check	Yes	No
6	**CHECK POOR CONTACT.** Check poor contact in purge control solenoid valve connector.	Is there poor contact in purge control solenoid valve connector?	Repair poor contact in purge control solenoid valve connector.	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

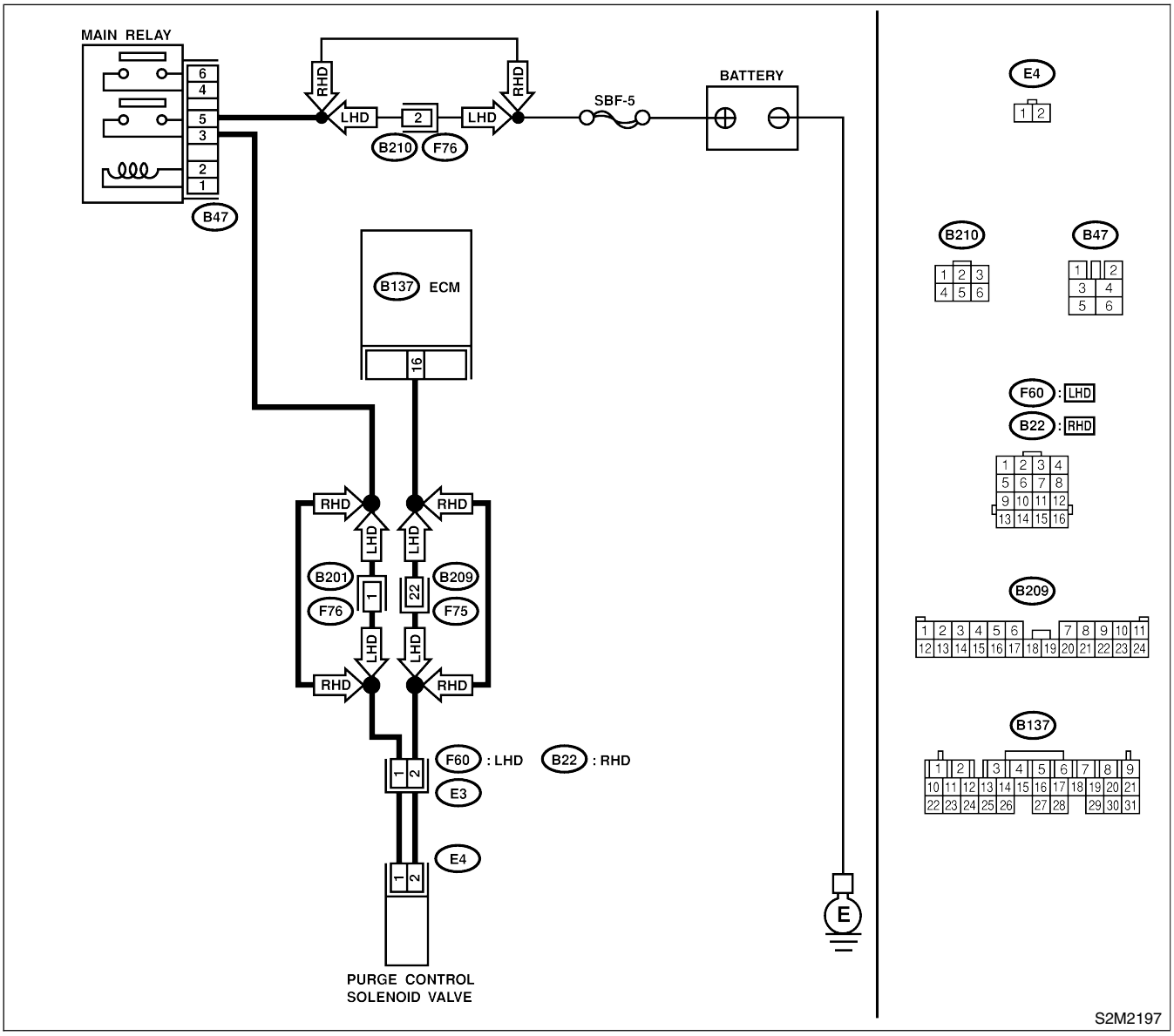
MEMO:

AP: DTC P0445 — EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH INPUT — S088521G48

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn ignition switch to OFF. 2) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box. 3) Turn ignition switch to ON. 4) While operating purge control solenoid valve, measure voltage between ECM and chassis ground. NOTE: Purge control solenoid valve operation can be executed using Subaru Select Monitor. For procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(DOHC TURBO)-48, Compulsory Valve Operation Check Mode.> ***Connector & terminal*** ***(B137) No. 16 (+) — Chassis ground (–):***	Does voltage change between 0 and 10 V?	Go to step **2**.	Even if MIL 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 ignition switch to ON. 2) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 16 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4**.	Go to step **3**.
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>
4	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from purge control solenoid valve. 3) Turn ignition switch to ON. 4) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 16 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and purge control solenoid valve connector. After repair, replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>	Go to step **5**.
5	**CHECK PURGE CONTROL SOLENOID VALVE.** 1) Turn ignition switch to OFF. 2) Measure resistance between purge control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Replace purge control solenoid valve <Ref. to EC(DOHC TURBO)-7, Purge Control Solenoid Valve.> and ECM <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>	Go to step **6**.

No.	Step	Check	Yes	No
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>

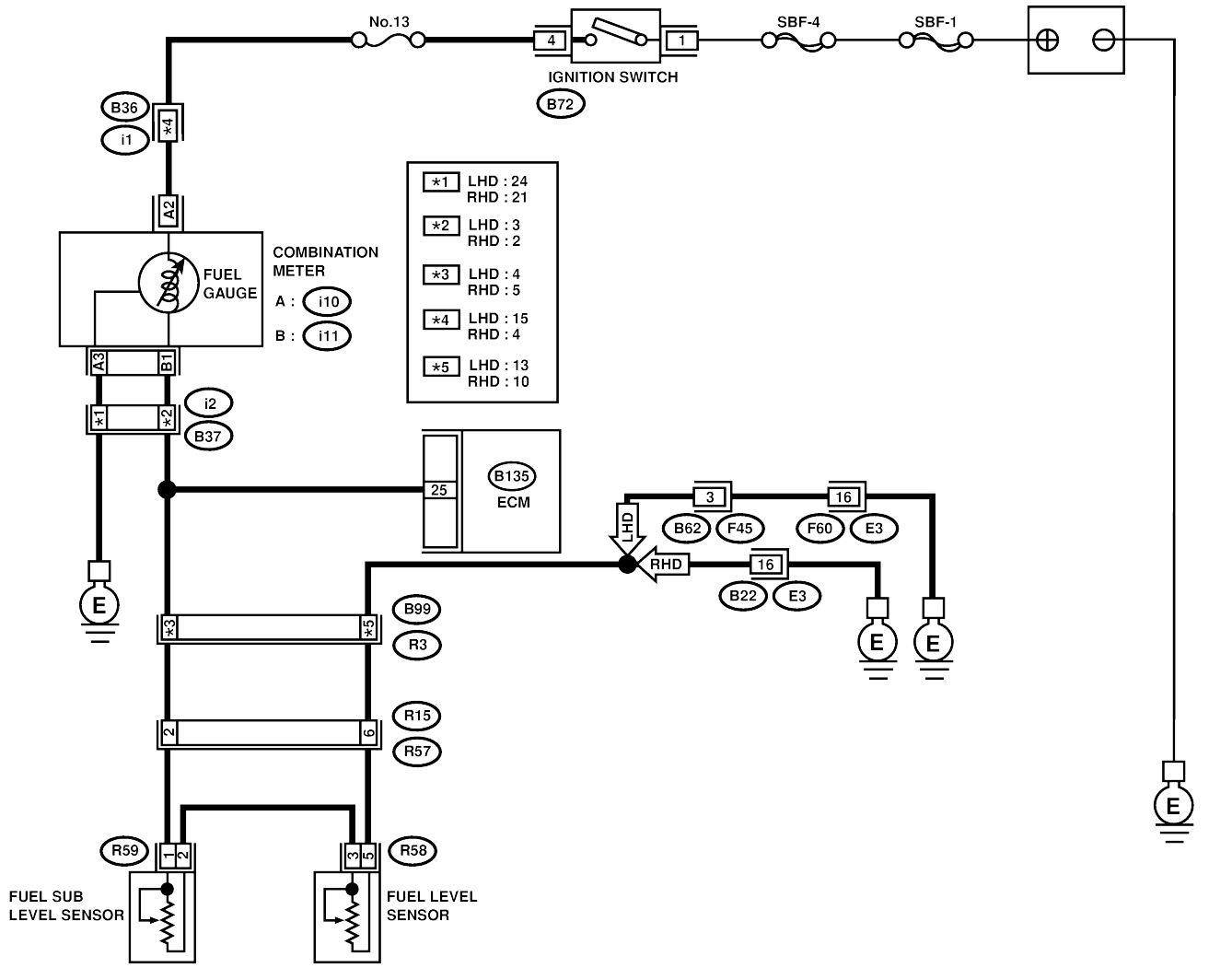
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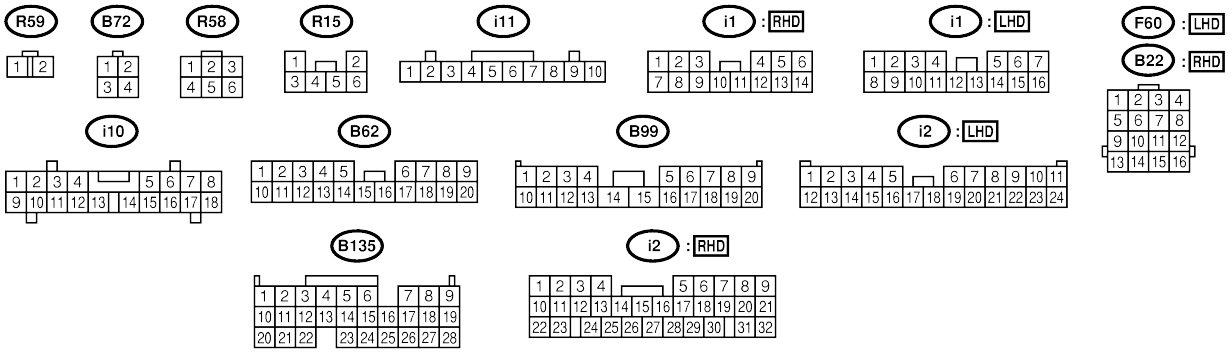
AQ: DTC P0461 — FUEL LEVEL SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM — S088521B54

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**





S2M2198

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(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect this trouble.	Replace fuel level sensor <Ref. to FU(DOHC TURBO)-62, Fuel Level Sensor.> and fuel sub level sensor <Ref. to FU(DOHC TURBO)-63, Fuel Sub Level Sensor.>

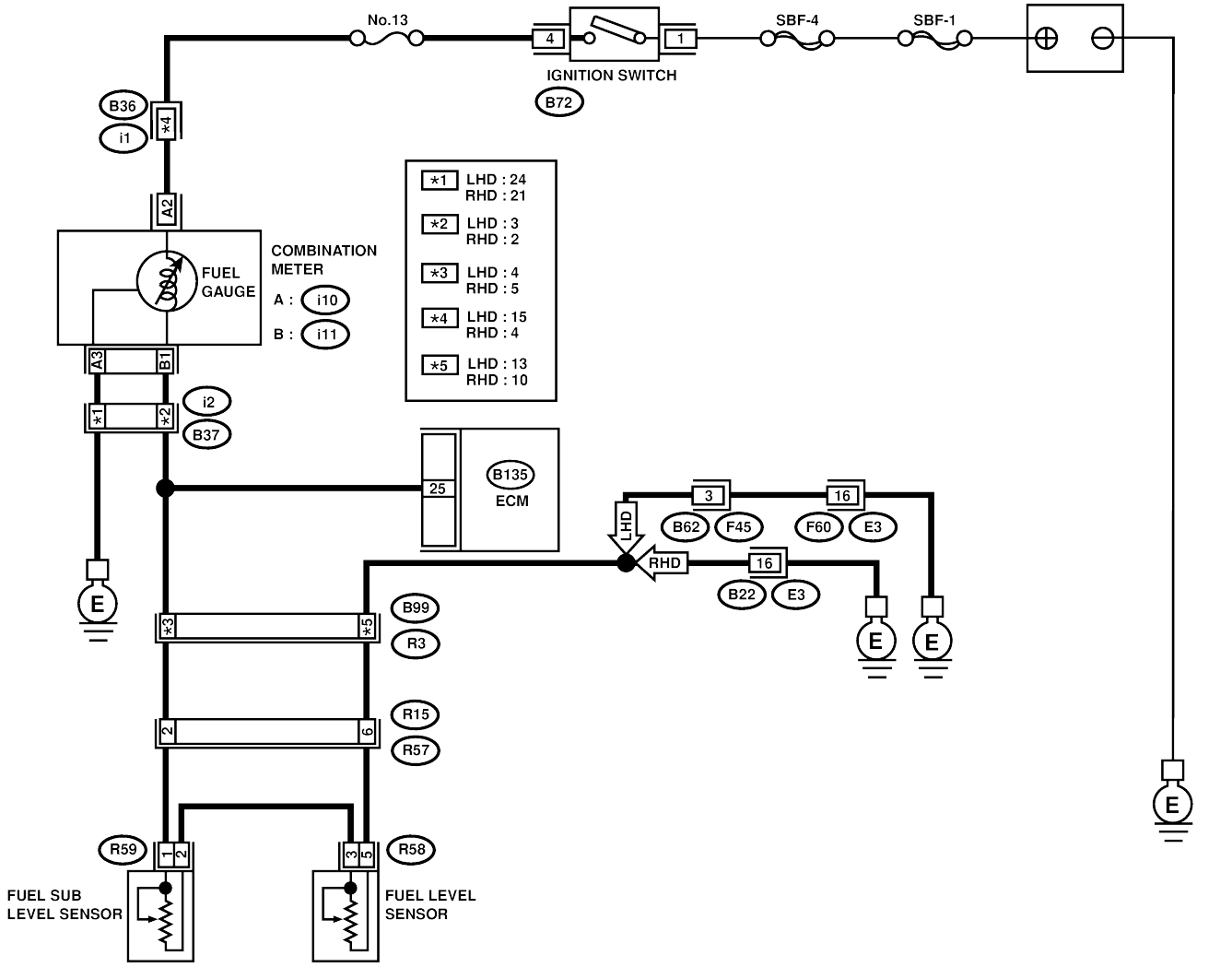
MEMO:

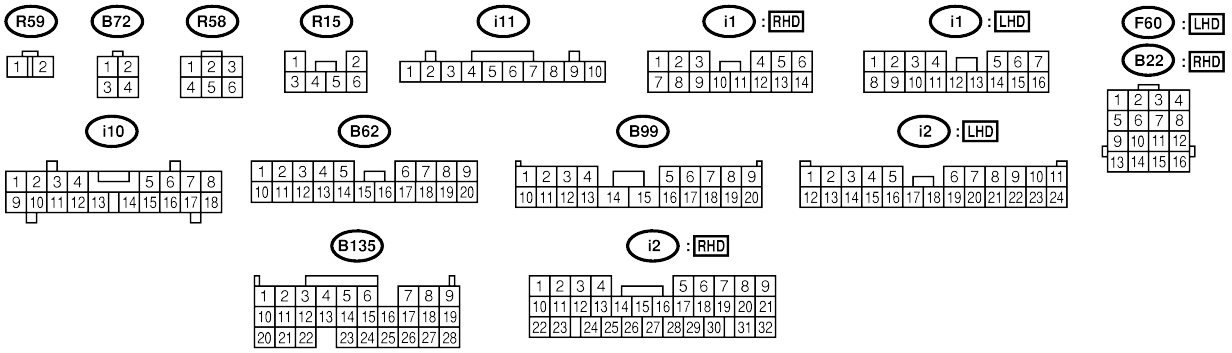
AR: DTC P0462 — FUEL LEVEL SENSOR CIRCUIT LOW INPUT — S088521B55

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**





S2M2198

No.	Step	Check	Yes	No
1	**CHECK SPEEDOMETER AND TACHOMETER OPERATION IN COMBINATION METER.**	Does speedometer and tachometer operate normally?	Go to step **2**.	Repair or replace combination meter. <Ref. to IDI-4, Combination Meter System.>
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn ignition switch to ON. (Engine OFF) 2) Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 25 (+) — Chassis ground (–):***	Is the voltage less than 0.12 V?	Go to step **6**.	Go to step **3**.
3	**CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)** Read data of fuel level sensor signal using Subaru Select Monitor. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(DOHC TURBO)-36, Subaru Select Monitor.>	Does the value change less than 0.12 V by shaking harness and connector of ECM while monitoring the value with Subaru Select Monitor?	Repair poor contact in ECM connector.	Even if MIL lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: ● Poor contact in combination meter connector ● Poor contact in ECM connector ● Poor contact in coupling connectors
4	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn ignition switch to OFF. 2) Separate fuel tank cord connector (R57) and rear wiring harness connector (R15). 3) Turn ignition switch to ON. 4) Measure voltage of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 25 (+) — Chassis ground (–):***	Is the voltage more than 0.12 V?	Go to step **4**.	Go to step **7**.
5	**CHECK HARNESS BETWEEN ECM AND COMBINATION METER.** 1) Turn ignition switch to OFF. 2) Disconnect connector from connector (i10), (i12) and ECM connector. 3) Measure resistance between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 25 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Repair ground short circuit in harness between ECM and combination meter connector.

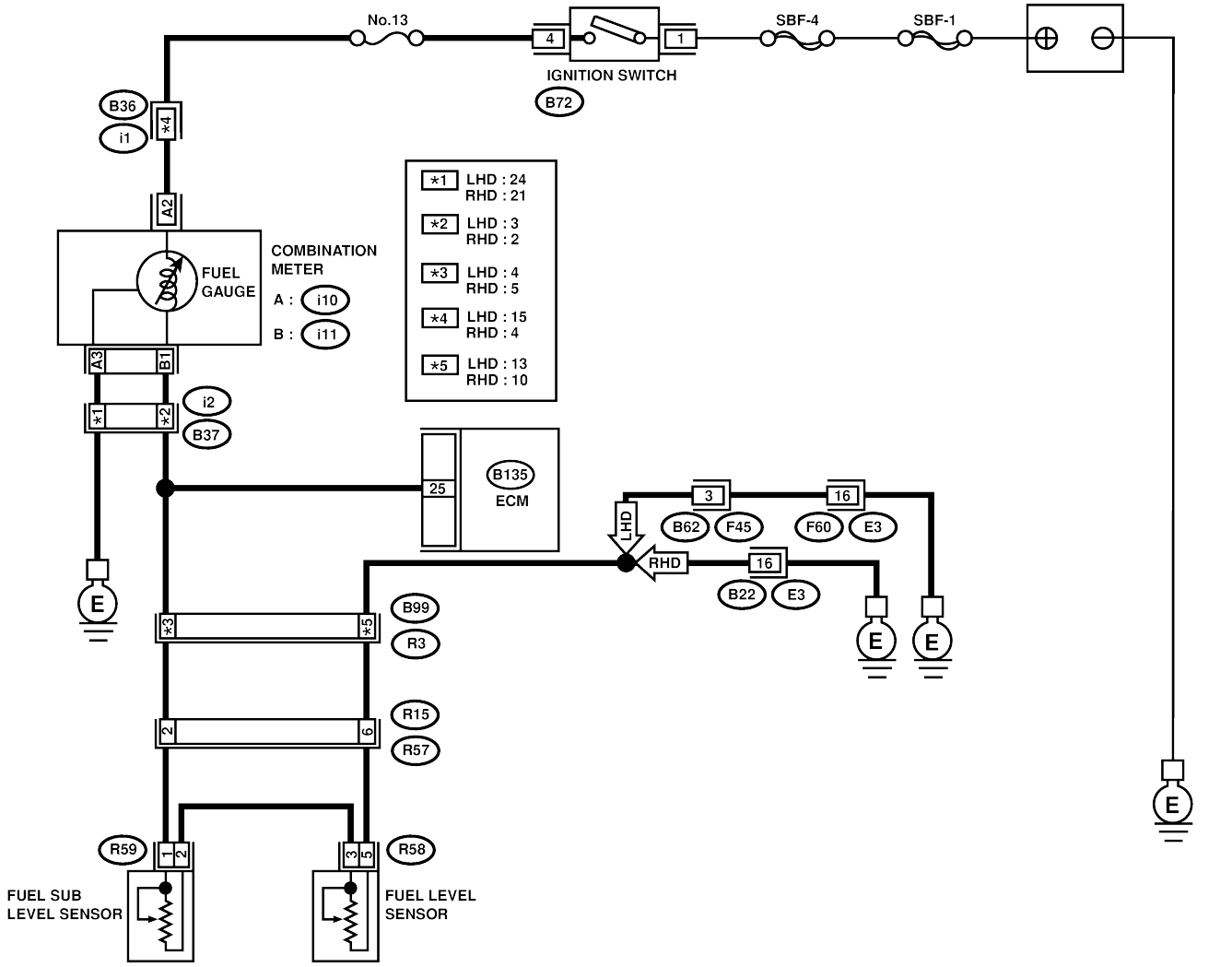
No.	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND COMBINATION METER.** Measure resistance between ECM and combination meter connector. ***Connector & terminal*** ***(B135) No. 25 — (i11) No. 1:***	Is the resistance less than 10 Ω?	Repair or replace combination meter. <Ref. to IDI-4, Combination Meter System.>	Repair open circuit between ECM and combination meter connector. NOTE: In this case, repair the following: Poor contact in coupling connector
7	**CHECK FUEL TANK CORD.** 1) Turn ignition switch to OFF. 2) Disconnect connector from fuel sub level sensor. 3) Measure resistance between fuel sub level sensor and chassis ground. ***Connector & terminal*** ***(R59) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8**.	Repair ground short circuit in fuel tank cord.
8	**CHECK FUEL TANK CORD.** 1) Disconnect connector from fuel pump assembly. 2) Measure resistance between fuel pump assembly and chassis ground. ***Connector & terminal*** ***(R59) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **9**.	Repair ground short circuit in fuel tank cord.
9	**CHECK FUEL LEVEL SENSOR.** 1) Remove fuel pump assembly. <Ref. to FU(DOHC TURBO)-60, Fuel Pump.> 2) Measure resistance between fuel level sensor and terminals with its float set to the full position. ***Terminals*** ***No. 3 — No. 5:***	Is the resistance between 0.5 and 2.5 Ω?	Go to step **10**.	Replace fuel level sensor.
10	**CHECK FUEL SUB LEVEL SENSOR.** 1) Remove fuel sub level sensor. <Ref. to FU(DOHC TURBO)-63, Fuel Sub Level Sensor.> 2) Measure resistance between fuel sub level sensor and terminals with its float set to the full position. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 0.5 and 2.5 Ω?	Repair poor contact in harness between ECM and combination meter connector.	Replace fuel sub level sensor.

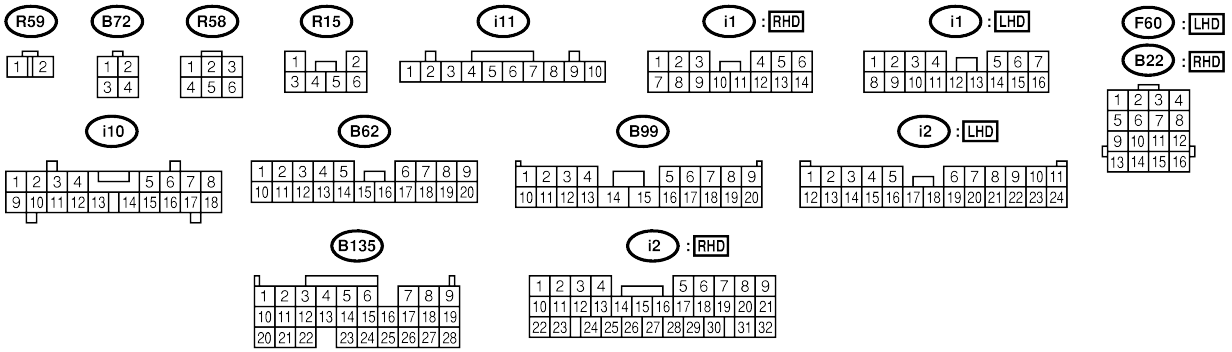
AS: DTC P0463 — FUEL LEVEL SENSOR CIRCUIT HIGH INPUT — S088521B56

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode<Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**





S2M2198

No.	Step	Check	Yes	No
1	**CHECK SPEEDOMETER AND TACHOMETER OPERATION IN COMBINATION METER.**	Does speedometer and tachometer operate normally?	Go to step **2**.	Repair or replace combination meter. <Ref. to IDI-4, Combination Meter System.>
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn ignition switch to ON. (Engine OFF) 2) Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 25 (+) — Chassis ground (–):***	Is the voltage more than 4.75 V?	Go to step **3**.	Even if MIL lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: ● Poor contact in fuel pump connector ● Poor contact in coupling connector
3	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn ignition switch to OFF. 2) Disconnect combination meter connector (i10) and ECM connector. 3) Turn ignition switch to ON. 4) Measure voltage of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 25 (+) — Chassis ground (–):***	Is the voltage more than 4.75 V?	Go to step **4**.	Repair battery short circuit between ECM and combination meter connector.
4	**CHECK HARNESS BETWEEN ECM AND FUEL TANK CORD.** 1) Turn ignition switch to OFF. 2) Separate fuel tank cord connector (R57) and rear wiring harness connector (R15). 3) Measure resistance between ECM and fuel tank cord. ***Connector & terminal*** ***(B135) No. 25 — (R15) No. 2:***	Is the resistance less than 5 Ω?	Go to step **5**.	Repair open circuit between ECM and fuel tank cord.
5	**CHECK HARNESS BETWEEN FUEL TANK CORD AND CHASSIS GROUND.** Measure resistance between fuel tank cord and chassis ground. ***Connector & terminal*** ***(R15) No. 6 — 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

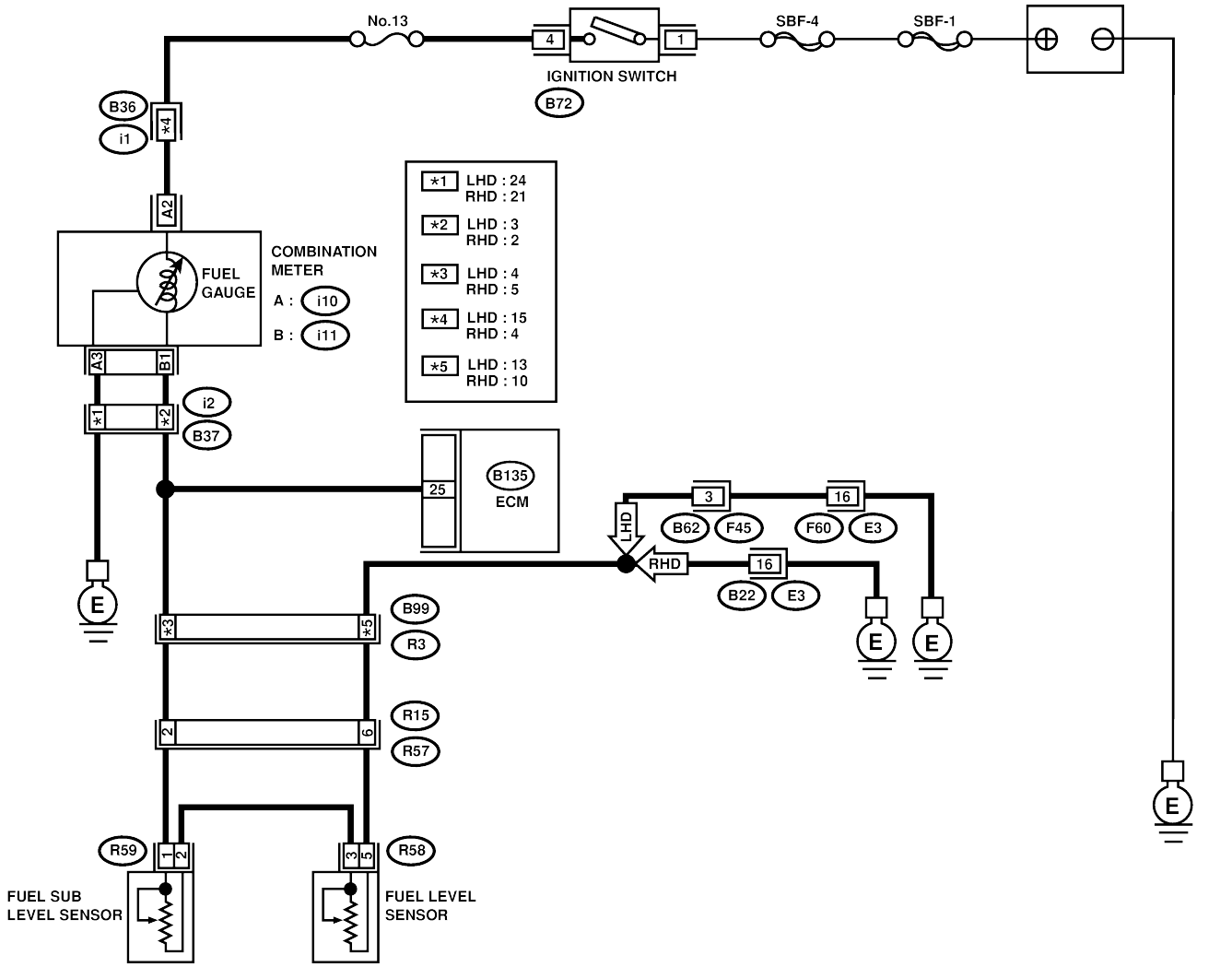
No.	Step	Check	Yes	No
6	**CHECK FUEL TANK CORD.** 1) Disconnect connector from fuel level sensor. 2) Measure resistance between fuel level sensor and coupling connector. ***Connector & terminal*** ***(R57) No. 6 — (R58) No. 5:***	Is the resistance less than 10 Ω?	Go to step **7**.	Repair open circuit between coupling connector and fuel level sensor.
7	**CHECK FUEL TANK CORD.** 1) Disconnect connector from fuel sub level sensor. 2) Measure resistance between fuel level sensor and fuel sub level sensor. ***Connector & terminal*** ***(R58) No. 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 resistance between fuel sub level sensor and coupling connector. ***Connector & terminal*** ***(R57) No. 2 — (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 fuel pump assembly. <Ref. to FU(DOHC TURBO)-60, Fuel Pump.> 2) While moving fuel level sensor float up and down, measure resistance between fuel level sensor terminals. ***Terminals*** ***No. 3 — No. 5:***	Is the resistance more than 53 Ω?	Replace fuel level sensor. <Ref. to FU(DOHC TURBO)-62, Fuel Level Sensor.>	Go to step **10**.
10	**CHECK FUEL SUB LEVEL SENSOR.** 1) Remove fuel sub level sensor. <Ref. to FU(DOHC TURBO)-63, Fuel Sub Level Sensor.> 2) While moving fuel sub level sensor float up and down, measure resistance between fuel sub level sensor terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance more than 45 Ω?	Replace fuel sub level sensor. <Ref. to FU(DOHC TURBO)-63, Fuel Sub Level Sensor.>	Replace combination meter. <Ref. to IDI-15, Combination Meter Assembly.>

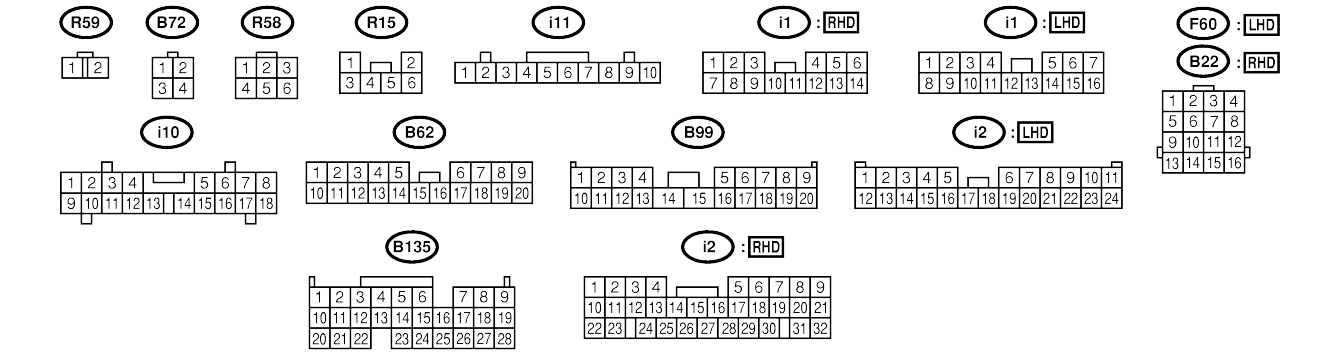
AT: DTC P0464 — FUEL LEVEL SENSOR INTERMITTENT INPUT— S088521G01

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode < Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**





S2M2198

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(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK FUEL LEVEL SENSOR.** 1) Remove fuel pump assembly. <Ref. to FU(DOHC TURBO)-60, Fuel Pump.> 2) While moving fuel level sensor float up and down, make sure that the resistance between fuel level sensor terminals changes smoothly. ***Terminals*** ***No. 3 — No. 5:***	Does the resistance change smoothly between approx. 0.5 Ω and approx. 52 Ω?	Go to step **3**.	Replace fuel level sensor. <Ref. to FU(DOHC TURBO)-62, Fuel Level Sensor.>
3	**CHECK FUEL SUB LEVEL SENSOR.** 1) Remove fuel sub level sensor. <Ref. to FU(DOHC TURBO)-63, Fuel Sub Level Sensor.> 2) While moving fuel sub level sensor float up and down, make sure that the resistance between fuel level sensor terminals changes smoothly. ***Terminals*** ***No. 1 — No. 2:***	Does the resistance change smoothly between approx. 0.5 Ω and approx. 44 Ω?	Repair poor contact in ECM, combination meter and coupling connectors.	Replace fuel sub level sensor. <Ref. to FU(DOHC TURBO)-63, Fuel Sub Level Sensor.>

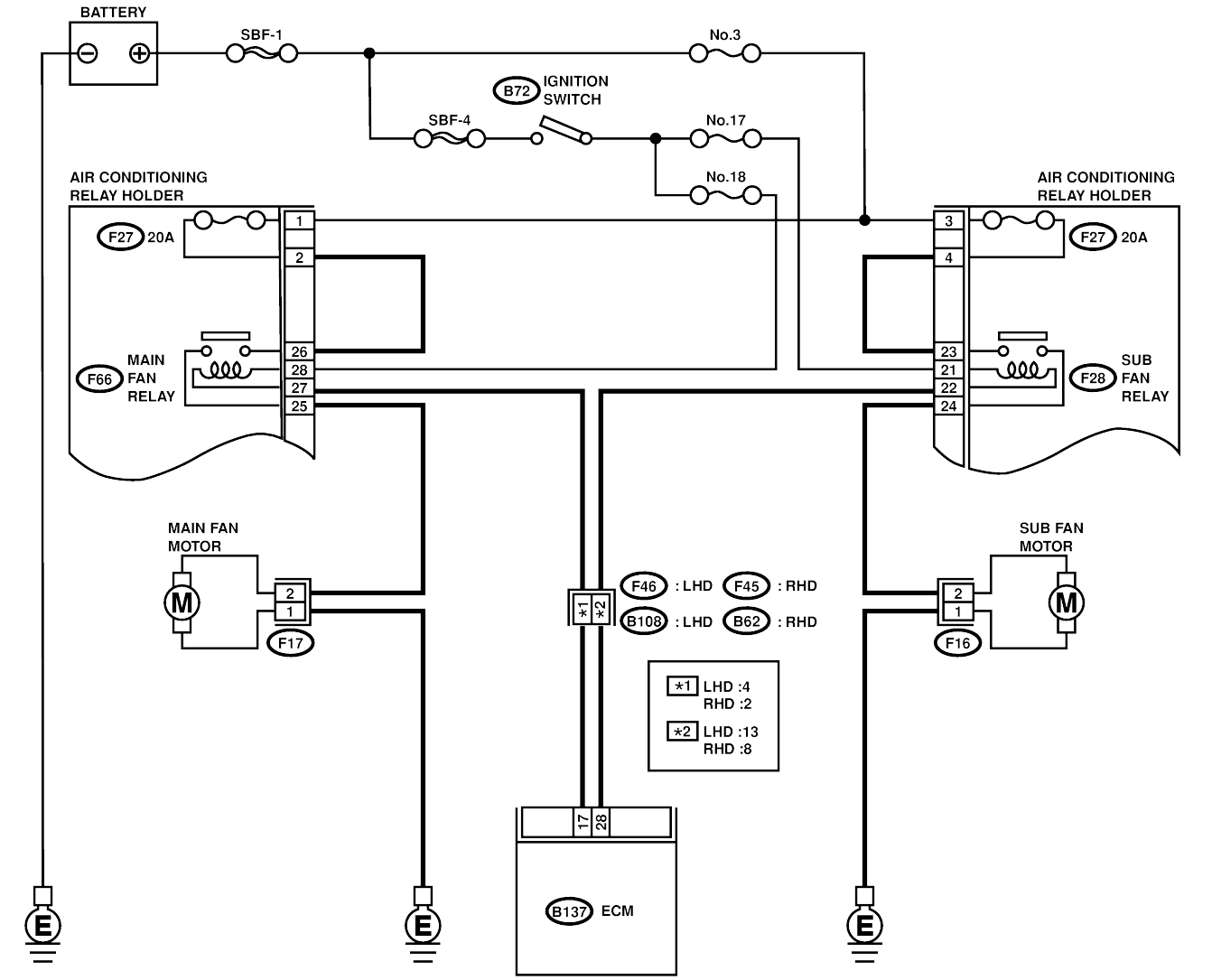
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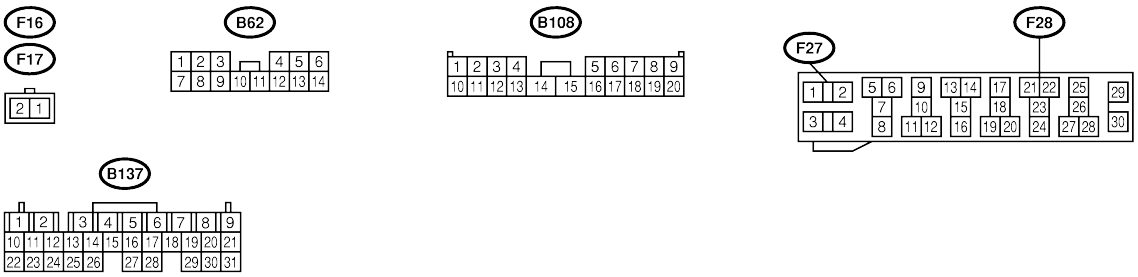
AU: DTC P0480 — COOLING FAN RELAY 1 CIRCUIT LOW INPUT — S088521B57

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

• WIRING DIAGRAM:





S2M2199

No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn ignition switch to OFF. 2) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box. 3) Turn ignition switch to ON. 4) While operating radiator fan relay, measure voltage between ECM terminal and ground. NOTE: Radiator fan relay operation can be executed using Subaru Select Monitor. For procedure, refer to "Compulsory Valve Operation Check Mode". < Ref. to EN(DOHC TURBO)-36, Subaru Select Monitor.> ***Connector & terminal*** ***(B137) No. 17 (+) — Chassis ground (–):***	Does voltage change between 0 and 10 V?	Repair poor contact in ECM connector.	Go to step **2**.
2	**CHECK GROUND SHORT CIRCUIT IN RADIATOR MAIN FAN RELAY CONTROL CIRCUIT.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from ECM. 3) Measure resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 17 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in radiator fan relay control circuit.	Go to step **3**.
3	**CHECK POWER SUPPLY FOR RELAY.** 1) Remove main fan relay from A/C relay holder. 2) Turn ignition switch to ON. 3) Measure voltage between fuse and relay box (F/B) connector and chassis ground. ***Connector & terminal*** ***(F66) No. 27 (+) — 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 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 **5**.	Replace main fan relay.
5	**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 **6**.	Replace main fan relay.
6	**CHECK OPEN CIRCUIT IN MAIN FAN RELAY CONTROL CIRCUIT.** Measure resistance of harness between ECM and main fan relay connector. ***Connector & terminal*** ***(B137) No. 17 — (F66) No. 27:***	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 main fan relay connector • Poor contact in coupling connector

No.	Step	Check	Yes	No
7	**CHECK POOR CONTACT.** Check poor contact in ECM or main fan relay connector.	Is there poor contact in ECM or main fan relay connector?	Repair poor contact in ECM or main fan relay connector.	Contact your Subaru distributor.

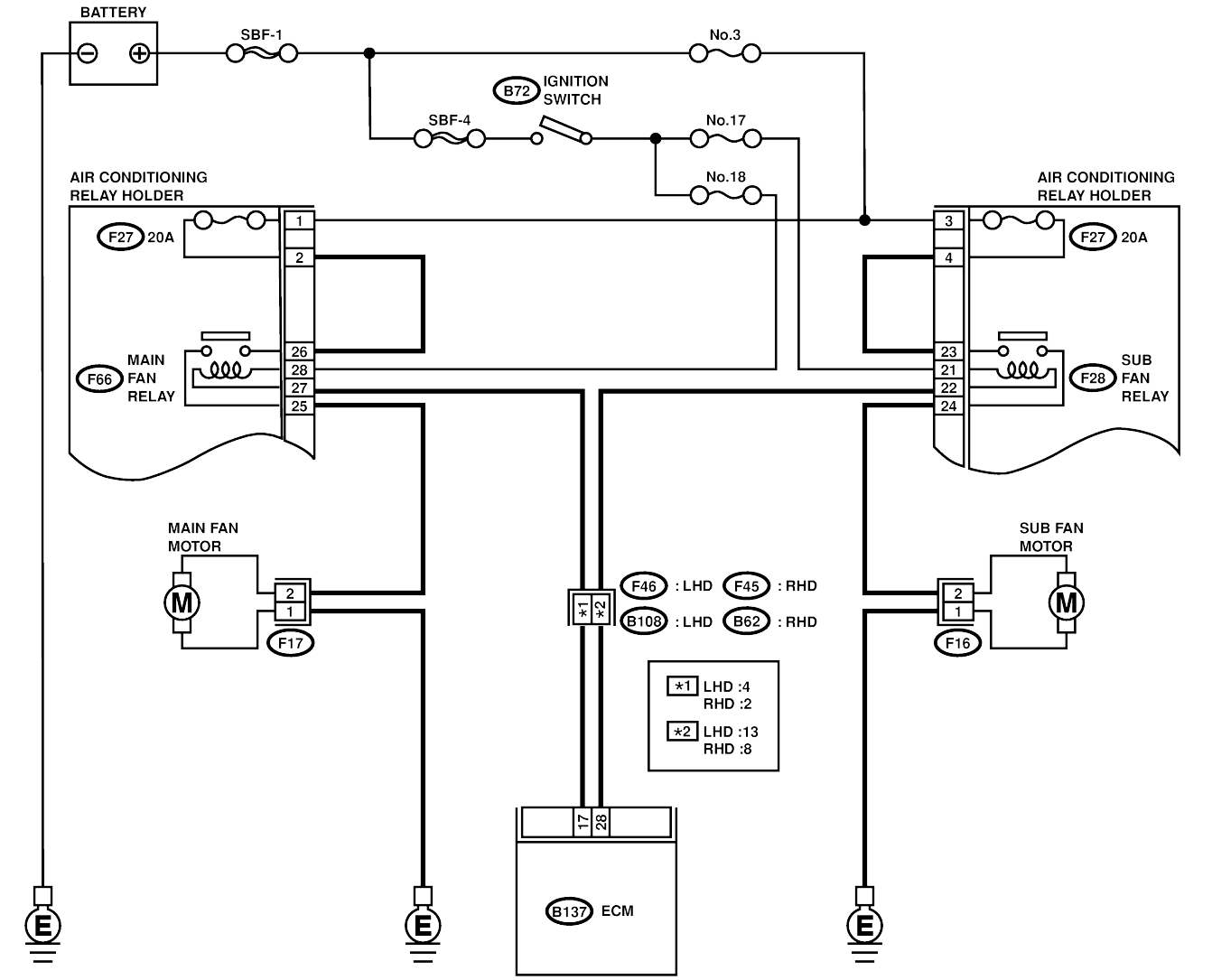
AV: DTC P0483 — COOLING FAN FUNCTION PROBLEM — S088521B58

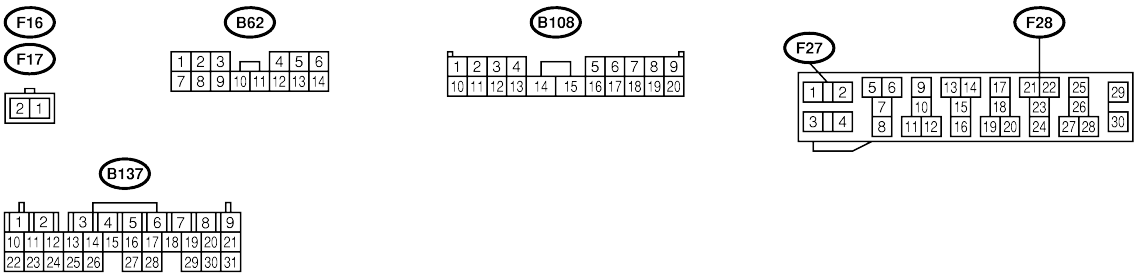
- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Occurrence of noise
  - Overheating

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode < Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, 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:





S2M2199

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(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).>	Check radiator fan, fan motor and thermostat. <Ref. to CO-8, Radiator Main Fan System.> and <Ref. to CO-11, Radiator Sub Fan System.> If thermostat is stuck, replace thermostat.

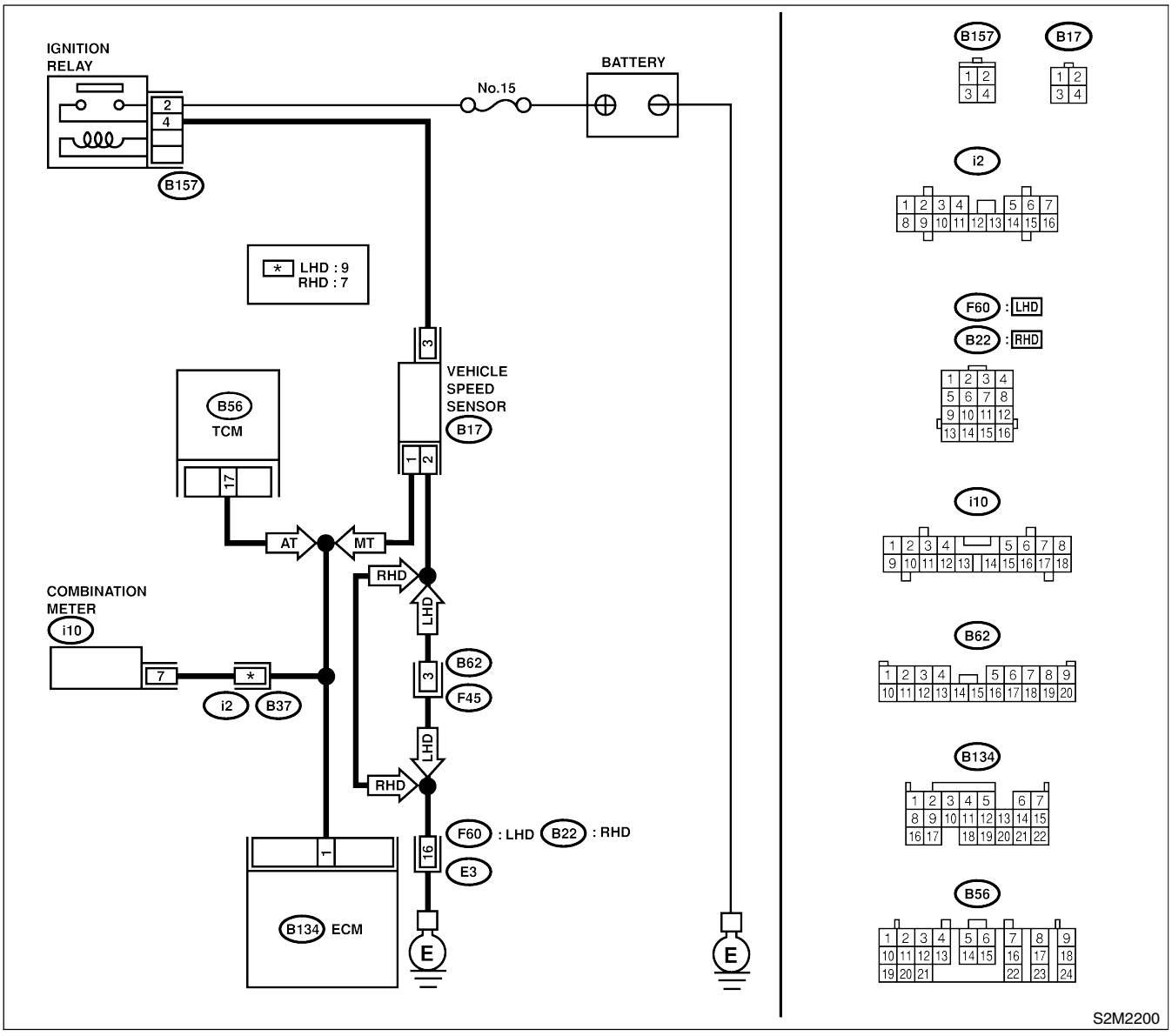
MEMO:

AW: DTC P0500 — VEHICLE SPEED SENSOR MALFUNCTION — S088521B59

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, 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-58, TROUBLE CODE 33 — FRONT VEHICLE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>	Go to step **3**.
3	**CHECK SPEEDOMETER OPERATION IN COMBINATION METER.**	Does speedometer operate normally?	Go to step **4**.	Check speedometer and vehicle speed sensor. <Ref. to IDI-17, Speedometer.> and <Ref. to AT-32, Front Vehicle Speed Sensor.> and <Ref. to AT-36, Rear Vehicle Speed Sensor.> and <Ref. to AT-37, Torque Converter Turbine Speed Sensor.>
4	**CHECK HARNESS BETWEEN ECM AND COMBINATION METER CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from combination meter. 3) Measure resistance between ECM and combination meter. ***Connector & terminal*** ***(B135) No. 24 — (i10) No. 7:***	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

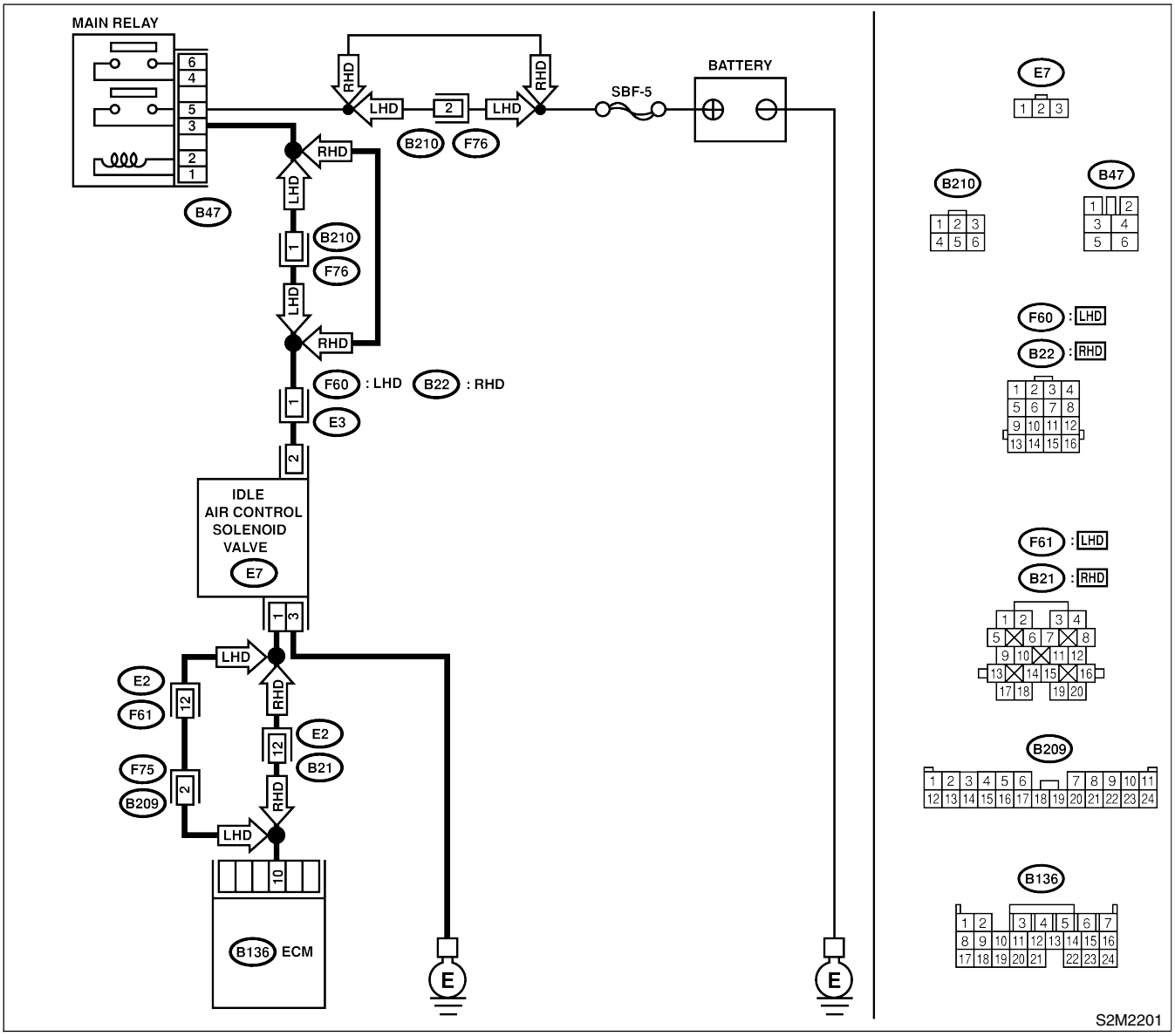
AX: DTC P0506 — IDLE CONTROL SYSTEM RPM LOWER THAN EXPECTED

S088521B61

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, 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 P0508 or P509?	Inspect DTC P0505 or P1505 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0506.	Go to step **2**.
2	**CHECK IDLE AIR CONTROL SOLENOID VALVE.** 1) Turn ignition switch to OFF. 2) Remove idle air control solenoid valve from throttle body. <Ref. to FU(DOHC TURBO)-36, REMOVAL, Idle Air Control Solenoid Valve.> 3) Using an air gun, force air into idle air control solenoid valve by-pass air inlet. Confirm that forced air subsequently escapes from both main air passage and assist air passage.	Does air flow out?	Go to step **4**.	Replace idle air control solenoid valve. <Ref. to FU(DOHC TURBO)-36, Idle Air Control Solenoid Valve.> After replace, Go to step **3**.
3	**CHECK IDLE AIR CONTROL SOLENOID VALVE DUTY RATIO.** 1) Turn ignition switch to ON. 2) Start engine, and warm-up the engine. 3) Turn all accessory switches to OFF. 4) Read data of idle air control solenoid valve duty ratio using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedures, refer to the “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(DOHC TURBO)-36, Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value more than 60%?	Go to step **4**.	END.
4	**CHECK BY-PASS AIR LINE.** 1) Turn ignition switch to OFF. 2) Remove idle air control solenoid valve from throttle body. <Ref. to FU(DOHC TURBO)-36, REMOVAL, Idle Air Control Solenoid Valve.> 3) Remove throttle body to intake manifold. <Ref. to FU(DOHC TURBO)-14, REMOVAL, Throttle Body.> 4) Using an air gun, force air into solenoid valve installation area and throttle valve interior. Confirm that forced air subsequently escapes from both these areas.	Does air flow out?	Replace idle air control solenoid valve. <Ref. to FU(DOHC TURBO)-36, Idle Air Control Solenoid Valve.>	Replace throttle body. <Ref. to FU(DOHC TURBO)-14, Throttle Body.>

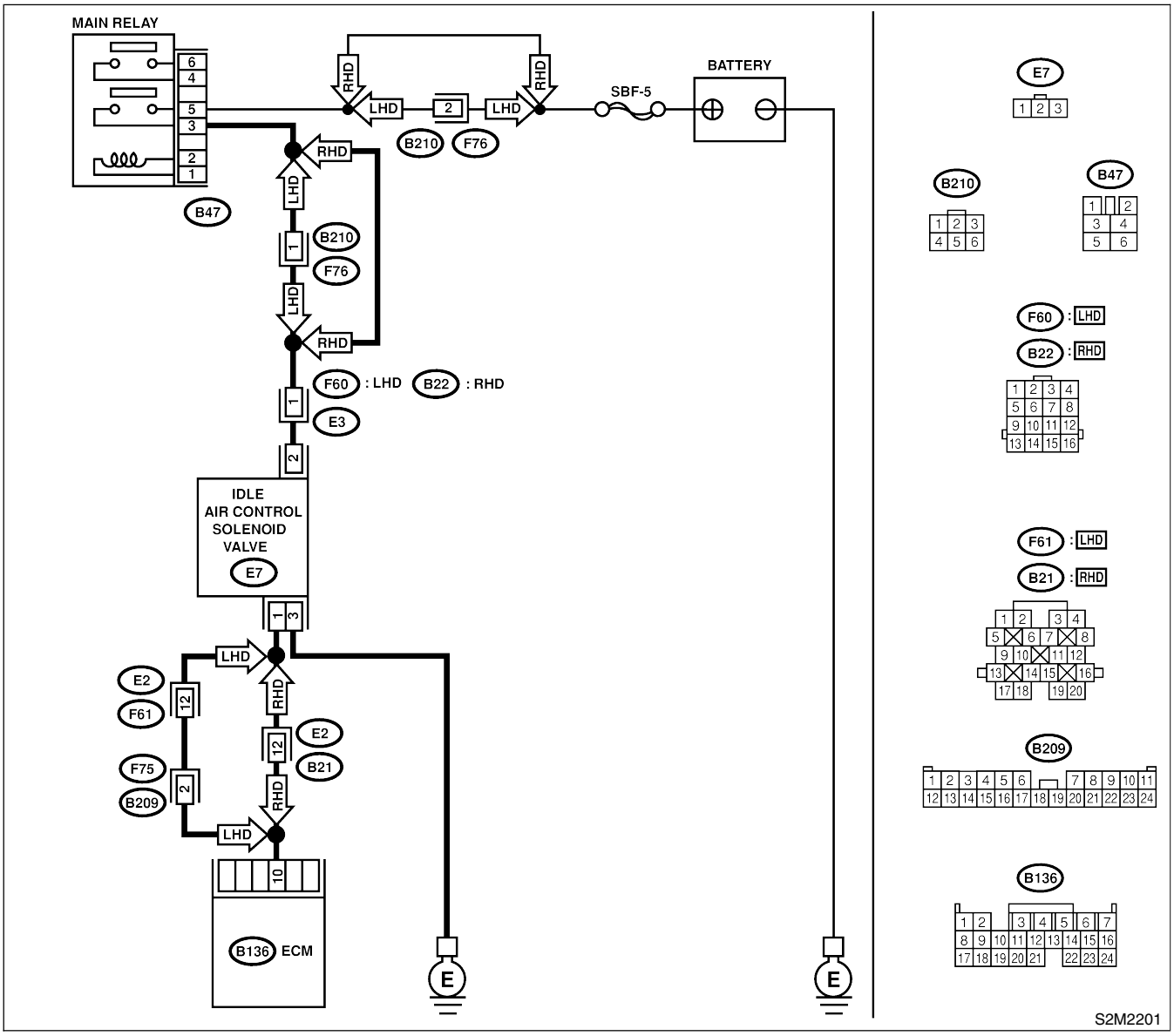
AY: DTC P0507 — IDLE CONTROL SYSTEM RPM HIGHER THAN EXPECTED

S088521B62

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



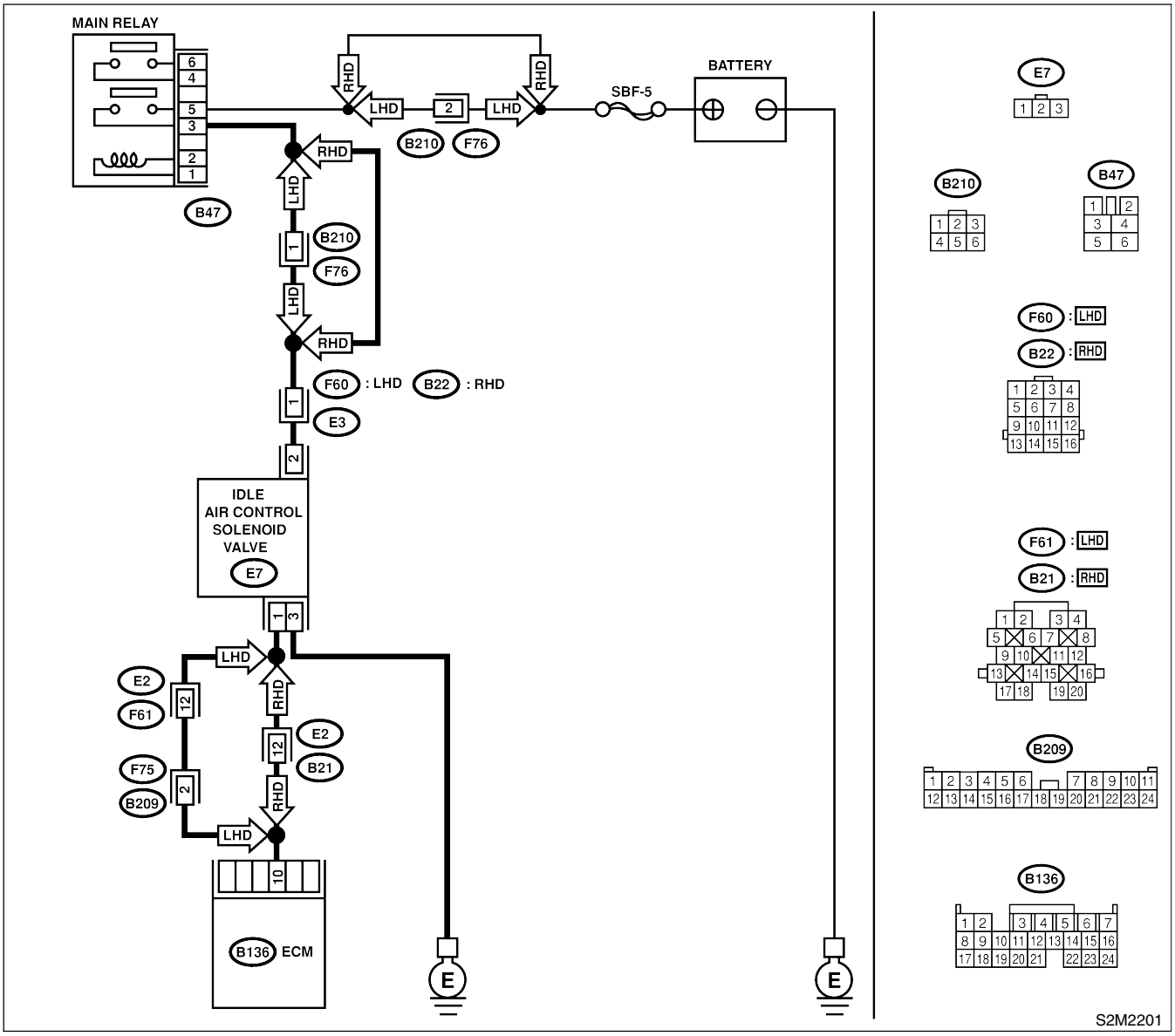
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0508 or P509?	Inspect DTC P0505 or P1505 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0507.	Go to step **2**.
2	**CHECK THROTTLE CABLE.**	Does throttle cable have play for adjustment?	Go to step **3**.	Adjust throttle cable. <Ref. to SP-12, INSTALLATION, Accelerator Control Cable.>
3	**CHECK AIR INTAKE SYSTEM.** 1) Turn ignition switch to ON. 2) Start engine, and idle it. 3) Check the following items. • Loose installation of intake manifold, idle air control solenoid valve and throttle body • Cracks of intake manifold gasket, idle air control solenoid valve gasket and throttle body gasket • Disconnections of vacuum hoses	Is there a fault in air intake system?	Repair air suction and leaks.	Replace idle air control solenoid valve. <Ref. to FU(DOHC TURBO)-36, Idle Air Control Solenoid Valve.>

AZ: DTC P0508 — IDLE CONTROL SYSTEM CIRCUIT LOW INPUT — S088521H68

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



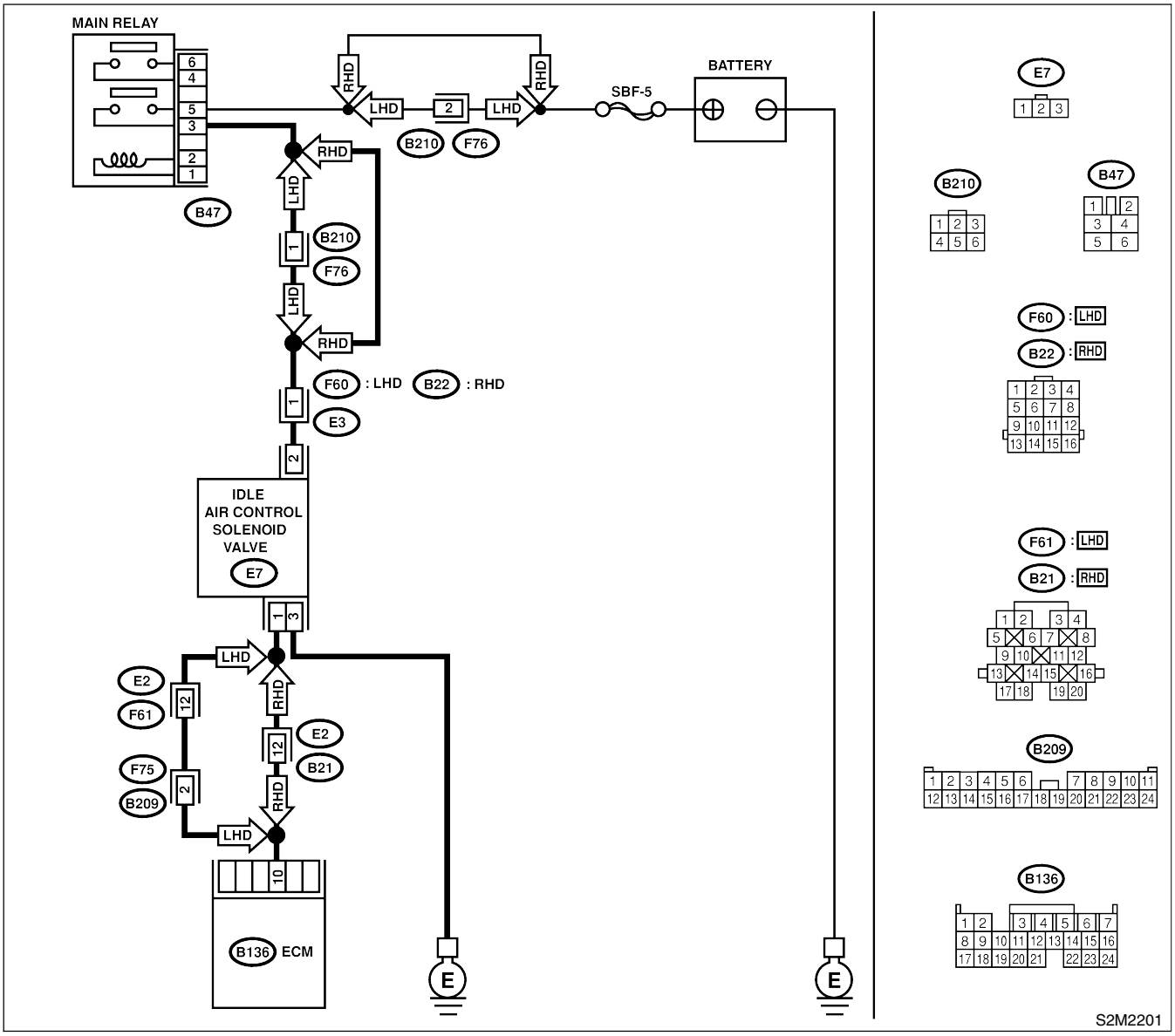
No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 10 (+) — Chassis ground (–):***	Is the voltage more than 3 V?	Repair poor contact in ECM connector.	Go to step **2**.
2	**CHECK POWER SUPPLY TO IDLE AIR CONTROL SOLENOID VALVE.** 1) Turn ignition switch to OFF. 2) Disconnect connector from idle air control solenoid valve. 3) Turn ignition switch to ON. 4) Measure voltage between idle air control solenoid valve and engine ground. ***Connector & terminal*** ***(E7) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between idle air control solenoid valve and main relay connector • Poor contact in coupling connector
3	**CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between ECM and idle air control solenoid valve connector. ***Connector & terminal*** ***(B136) No. 10 — (E7) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and idle air control solenoid valve connector • Poor contact in coupling connector
4	**CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.** Measure resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 10 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between ECM and idle air control solenoid valve connector.	Go to step **5**.
5	**CHECK GROUND CIRCUIT OF IDLE AIR CONTROL SOLENOID VALVE.** Measure resistance of harness between idle air control solenoid valve connector and engine ground. ***Connector & terminal*** ***(E7) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **6**.	Repair open circuit in harness between idle air control solenoid valve connector and engine ground terminal.
6	**CHECK POOR CONTACT.** Check poor contact in ECM and idle air control solenoid valve connectors.	Is there poor contact in ECM and idle air control solenoid valve connectors?	Repair poor contact in ECM and idle air control solenoid valve connectors.	Replace idle air control solenoid valve. <Ref. to FU(DOHC TURBO)-36, Idle Air Control Solenoid Valve.>

BA: DTC P0509 — IDLE CONTROL SYSTEM CIRCUIT HIGH INPUT — S088521H10

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



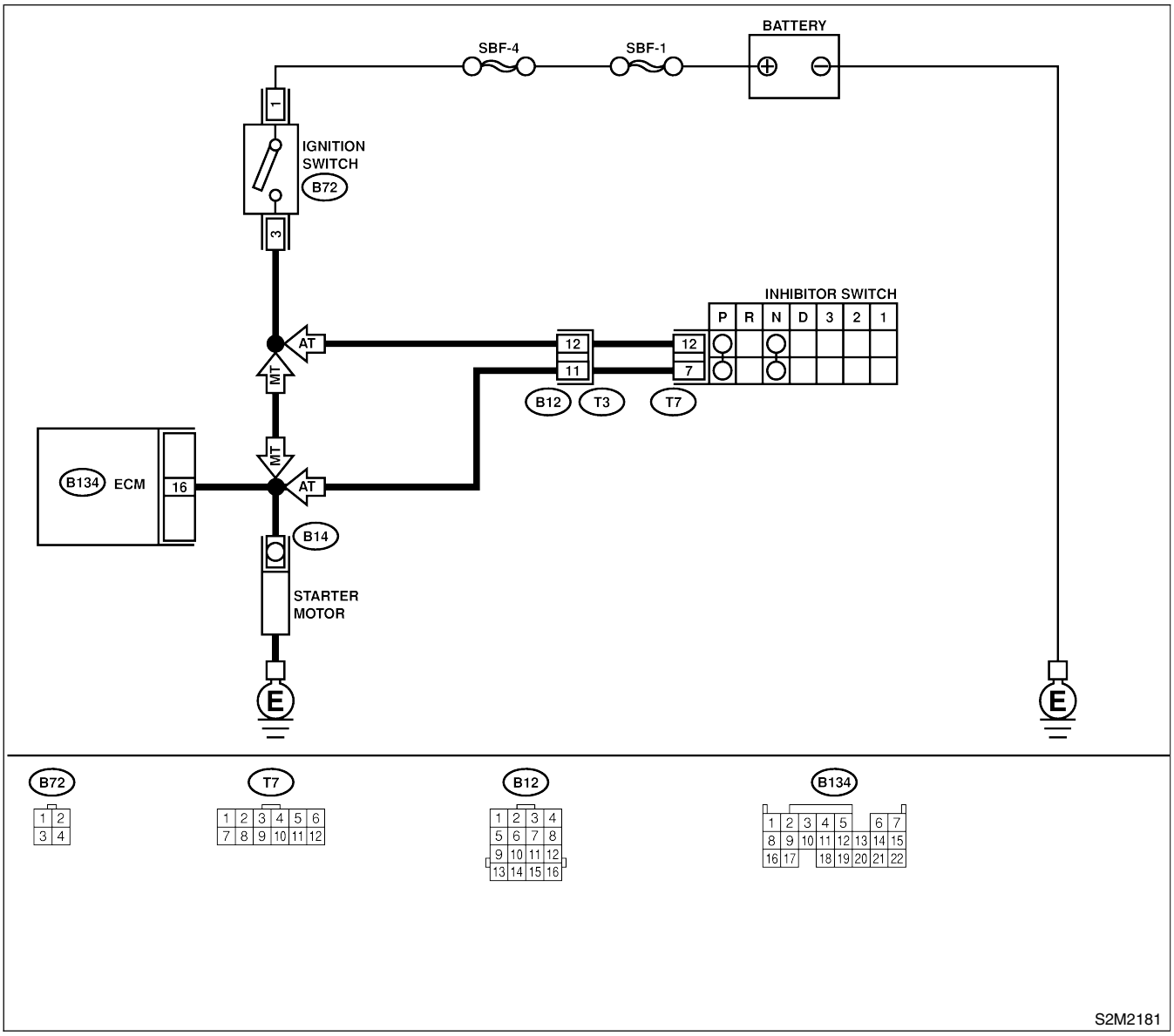
No.	Step	Check	Yes	No
1	**CHECK THROTTLE CABLE.**	Does throttle cable have play for adjustment?	Go to step **2**.	Adjust throttle cable. <Ref. to SP-12, INSTALLATION, Accelerator Control Cable.>
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 10 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	Go to step **4**.
3	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn ignition switch to OFF. 2) Disconnect connector from idle air control solenoid valve. 3) Turn ignition switch to ON. 4) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 10 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and idle air control solenoid valve connector. After repair, replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>	Replace idle air control solenoid valve <Ref. to FU(DOHC TURBO)-36, Idle Air Control Solenoid Valve.> and ECM <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>.
4	**CHECK OUTPUT SIGNAL FROM ECM.** Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 10 (+) — Chassis ground (–):***	Does the voltage change more than 10 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair battery short circuit in harness between ECM and idle air control solenoid valve connector. After repair, replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

BB: DTC P0512 — STARTER SWITCH CIRCUIT HIGH INPUT — S088521G02

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, 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)	Does starter motor operate when ignition switch to "ON"?	Repair battery short circuit in starter motor circuit.	Check starter motor circuit. <Ref. to EN(DOHC TURBO)-64, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

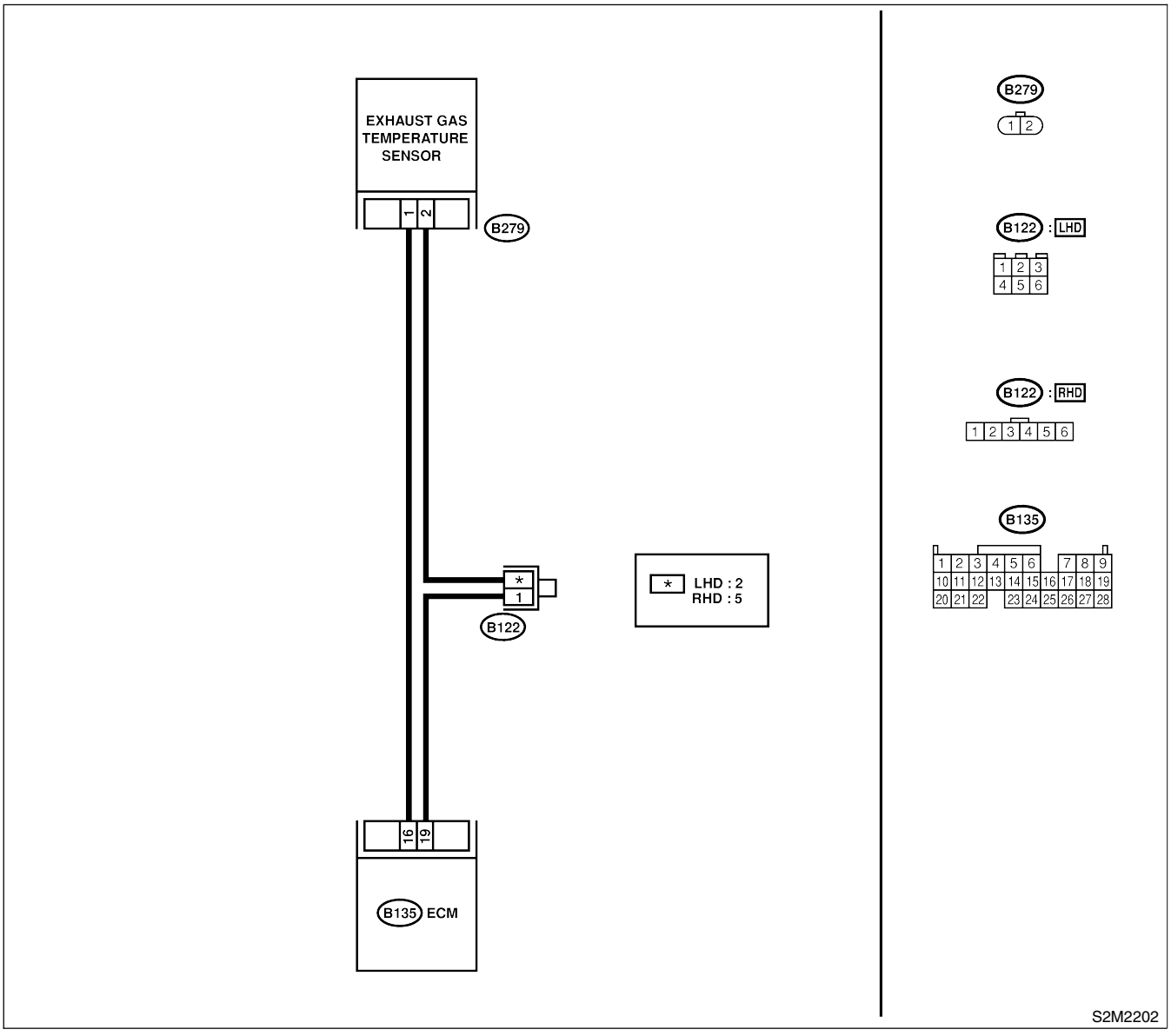
BC: DTC P0545 — EXHAUST GAS TEMPERATURE SENSOR CIRCUIT LOW INPUT — S088521H69

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



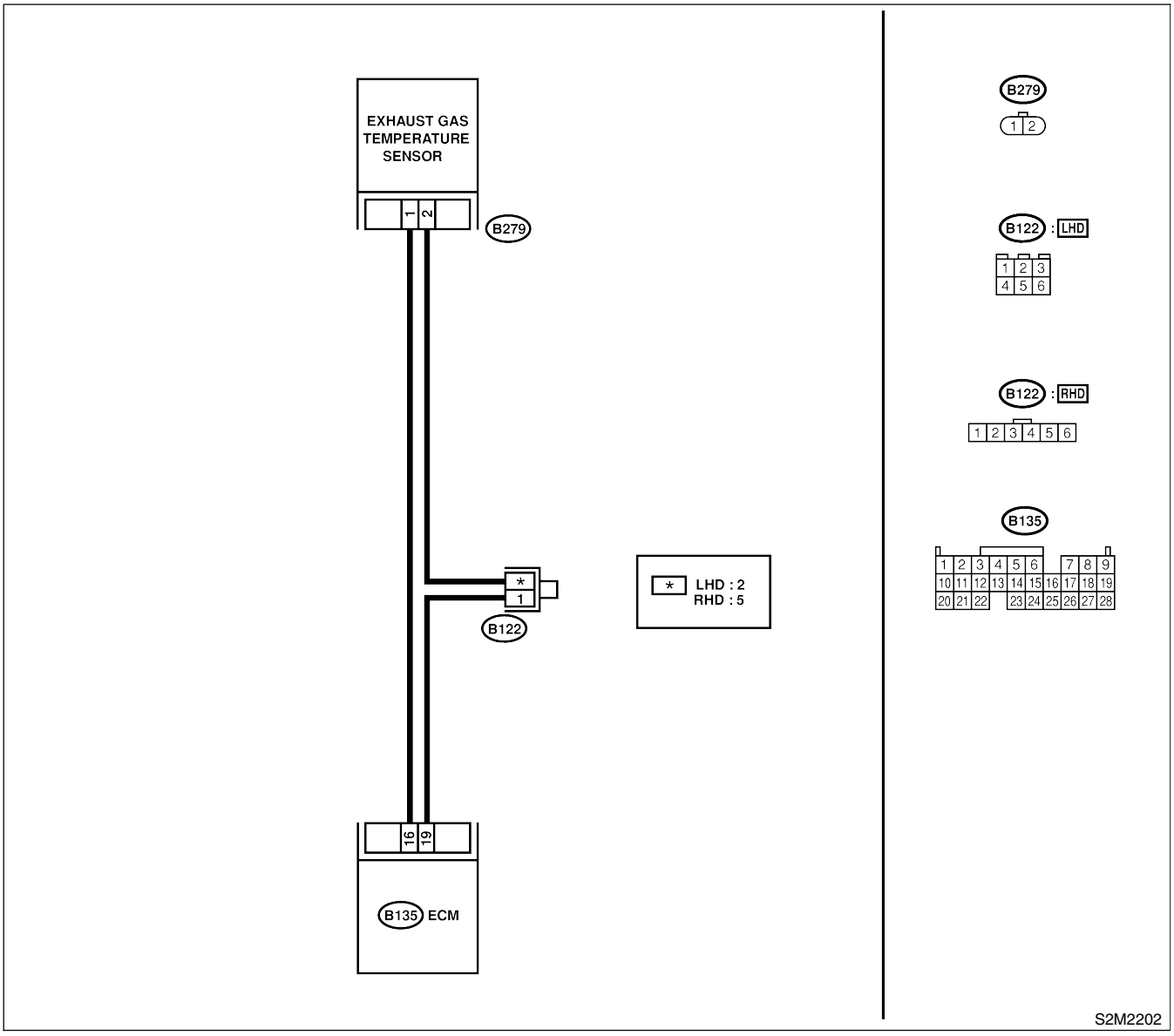
No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start engine. 2) Read data of exhaust gas temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(DOHC TURBO)-36, 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 1200°C (2192°F)?	Go to step **2**.	Repair poor contact. NOTE: In this case, repair the following: ● Poor contact in exhaust gas temperature sensor ● Poor contact in ECM ● Poor contact in joint connector
2	**CHECK HARNESS BETWEEN EXHAUST GAS TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from exhaust gas temperature sensor. 3) Turn ignition switch to ON. 4) Read data of exhaust gas 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(DOHC TURBO)-36, 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 372°C (702°F)?	Replace exhaust gas temperature sensor. <Ref. to FU(DOHC TURBO)-46, Exhaust Temperature Sensor.>	Repair ground short circuit in harness between exhaust gas temperature sensor and ECM connector.

BD: DTC P0546 — EXHAUST GAS TEMPERATURE SENSOR CIRCUIT HIGH INPUT — S088521H70

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start engine. 2) Read data of exhaust gas 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(DOHC TURBO)-36, 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 372°C (702°F)?	Go to step **2**.	Repair poor contact. NOTE: In this case, repair the following: ● Poor contact in exhaust gas temperature sensor ● Poor contact in ECM ● Poor contact in joint connector
2	**CHECK HARNESS BETWEEN EXHAUST GAS TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from exhaust gas temperature sensor. 3) Measure voltage between exhaust gas temperature sensor connector and engine ground. ***Connector & terminal*** ***(B279) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and exhaust gas temperature sensor connector.	Go to step **3**.
3	**CHECK HARNESS BETWEEN EXHAUST GAS TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to ON. 2) Measure voltage between exhaust gas temperature sensor connector and engine ground. ***Connector & terminal*** ***(B279) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and exhaust gas temperature sensor connector.	Go to step **4**.
4	**CHECK HARNESS BETWEEN EXHAUST GAS TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure voltage between exhaust gas temperature sensor connector and engine ground. ***Connector & terminal*** ***(B279) 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 exhaust gas temperature sensor connector ● Poor contact in exhaust gas temperature sensor connector ● Poor contact in ECM connector ● Poor contact in joint connector

No.	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN EXHAUST GAS TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Measure resistance of harness between exhaust gas temperature sensor connector and engine ground. ***Connector & terminal*** ***(B279) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Replace exhaust gas temperature sensor. <Ref. to FU(DOHC TURBO)-46, Exhaust Temperature Sensor.>	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between ECM and exhaust gas temperature sensor connector ● Poor contact in exhaust gas temperature sensor connector ● Poor contact in ECM connector ● Poor contact in joint connector

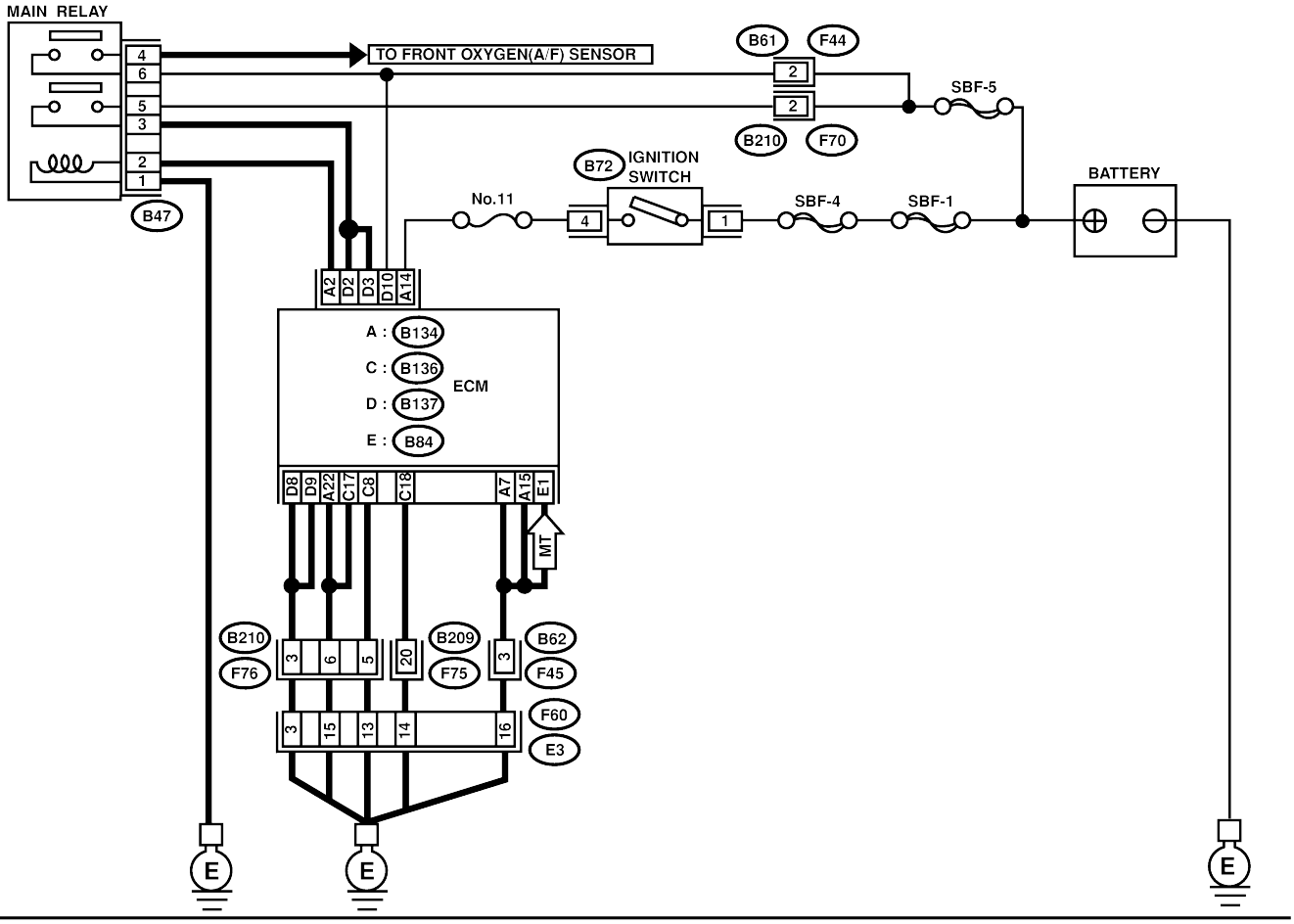
MEMO:

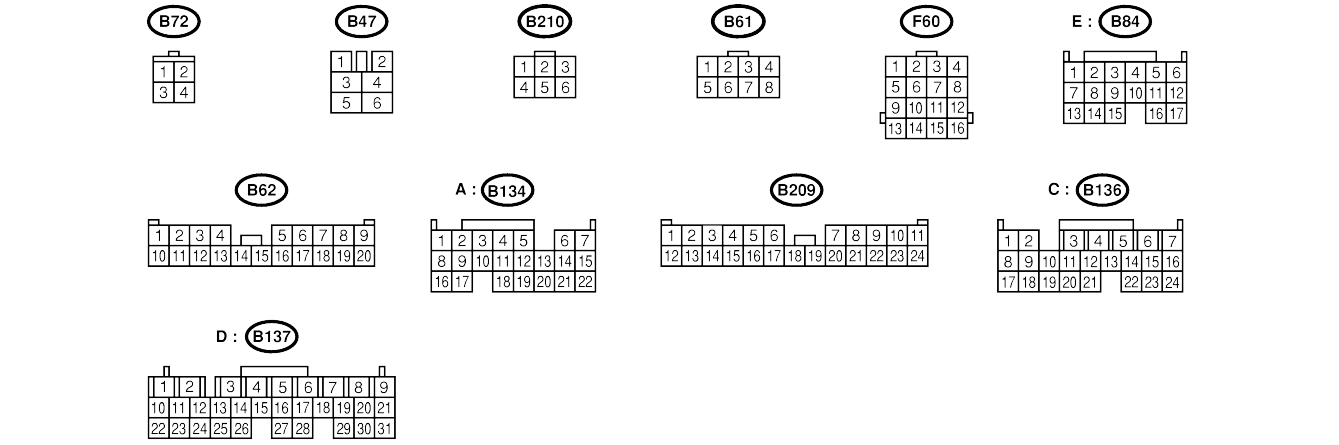
BE: DTC P0604 — INTERNAL CONTROL MODULE MEMORY CHECK SUM ERROR — S088521G03

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

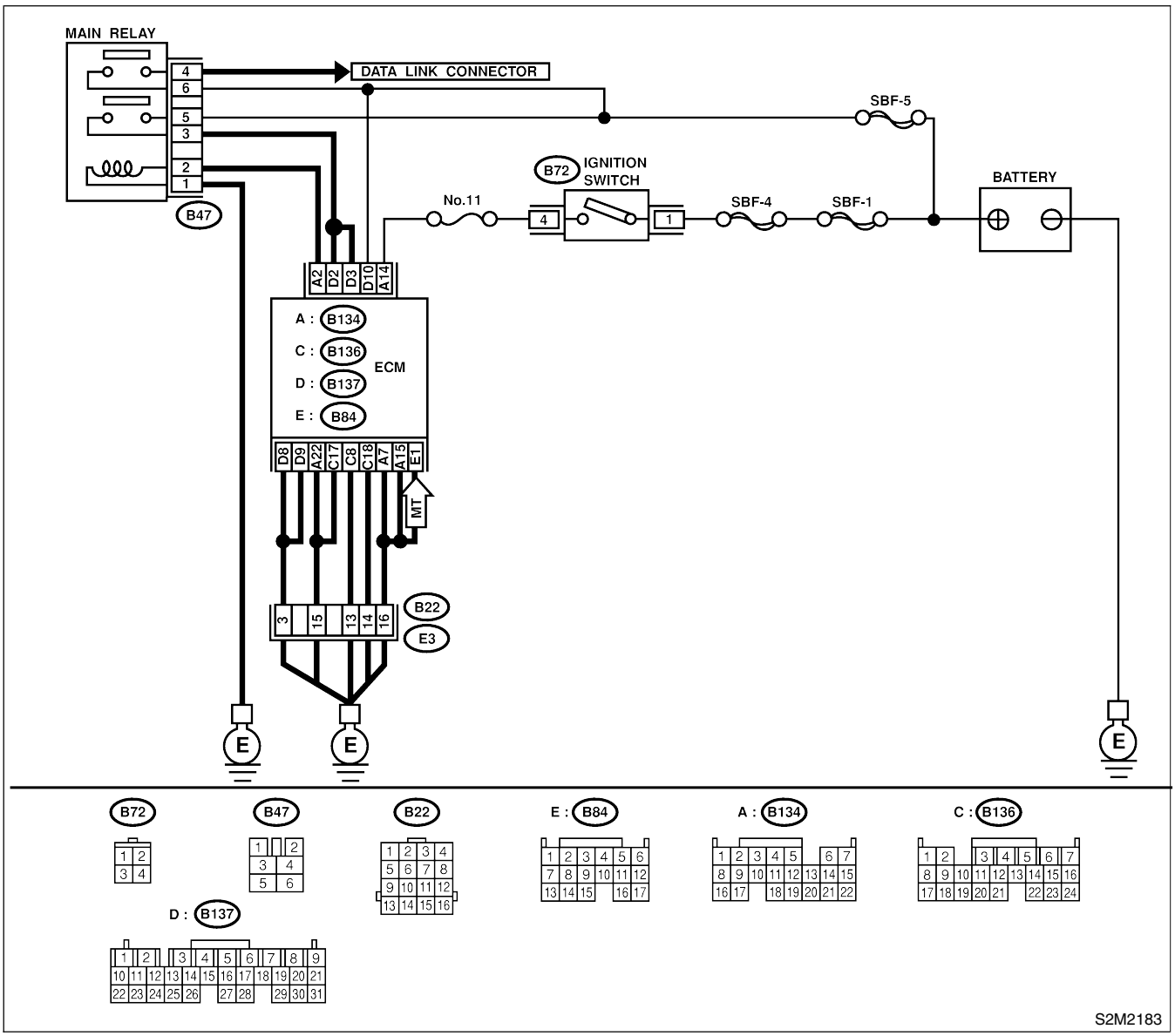
- **WIRING DIAGRAM:**
- **LHD MODEL**





S2M2182

• RHD MODEL



No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0604?	Replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>	It is not necessary to inspect DTC P0604.

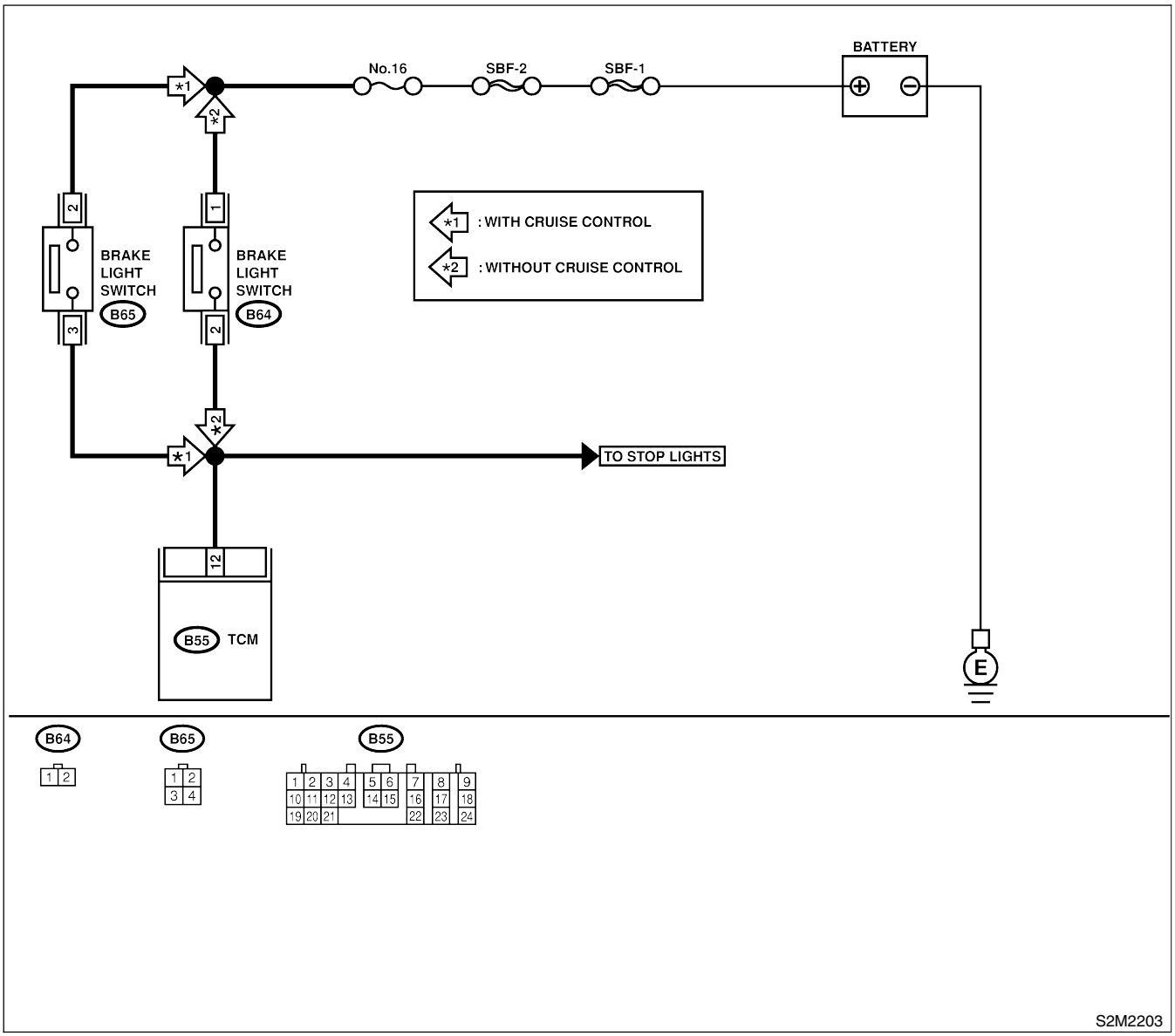
MEMO:

BF: DTC P0703 — BRAKE SWITCH INPUT MALFUNCTION — S088521B64

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK OPERATION OF BRAKE LIGHT.**	Does brake light come on when depressing the brake pedal?	Go to step **2**.	Repair or replace brake light circuit.

No.	Step	Check	Yes	No
2	**CHECK HARNESS BETWEEN TCM AND BRAKE LIGHT SWITCH CONNECTOR.** 1) Disconnect connectors from TCM and brake light switch. 2) Measure resistance of harness between TCM and brake light switch connector. ***Connector & terminal*** ***Without cruise control*** ***(B55) No. 12 — (B64) No. 2:*** ***With cruise control*** ***(B55) No. 12 — (B65) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair or replace harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between TCM and brake light switch connector • Poor contact in TCM connector • Poor contact in brake light switch connector
3	**CHECK HARNESS BETWEEN TCM AND BRAKE LIGHT SWITCH CONNECTOR.** Measure resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 12 — Chassis ground:***	Is the resistance more than 1 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 connectors to TCM and brake light switch. 2) Measure voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 12 (+) — Chassis ground (–):***	Is the voltage less than 1 V when releasing the brake pedal?	Go to step **5**.	Adjust or replace brake light switch. <Ref. to LI-31, STOP LIGHT SWITCH, INSPECTION, Stop Light System.>
5	**CHECK INPUT SIGNAL FOR TCM.** Measure voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 12 (+) — Chassis ground (–):***	Is the voltage more than 10 V when depressing the brake pedal?	Go to step **6**.	Adjust or replace brake light switch. <Ref. to LI-31, STOP LIGHT SWITCH, INSPECTION, Stop Light System.>
6	**CHECK POOR CONTACT.** Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair poor contact in TCM connector.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

BG: DTC P0731 — GEAR 1 INCORRECT RATIO — S088521B70

NOTE:
For the diagnostic procedure, refer to DTC P0734. <Ref. to EN(DOHC TURBO)-255, DTC P0734 — GEAR 4 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BH: DTC P0732 — GEAR 2 INCORRECT RATIO — S088521B71

NOTE:
For the diagnostic procedure, refer to DTC P0734. <Ref. to EN(DOHC TURBO)-255, DTC P0734 — GEAR 4 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BI: DTC P0733 — GEAR 3 INCORRECT RATIO — S088521B72

NOTE:
For the diagnostic procedure, refer to DTC P0734. <Ref. to EN(DOHC TURBO)-255, DTC P0734 — GEAR 4 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BJ: DTC P0734 — GEAR 4 INCORRECT RATIO — S088521B73

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, 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(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK THROTTLE POSITION SENSOR CIRCUIT.** Check throttle position sensor circuit. <Ref. to AT-50, TROUBLE CODE 31 — THROTTLE POSITION SENSOR —, Diagnostic Procedure with Trouble Code.>	Is there any trouble in throttle position sensor circuit?	Repair or replace throttle position sensor circuit.	Go to step **3**.
3	**CHECK FRONT VEHICLE SPEED SENSOR CIRCUIT.** Check front vehicle speed sensor circuit. <Ref. to AT-58, TROUBLE CODE 33 — FRONT VEHICLE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>	Is there any trouble in vehicle speed sensor 2 circuit?	Repair or replace vehicle speed sensor 2 circuit.	Go to step **4**.
4	**CHECK TORQUE CONVERTER TURBINE SPEED SENSOR CIRCUIT.** Check torque converter turbine speed sensor circuit. <Ref. to AT-64, TROUBLE CODE 36 — TORQUE CONVERTER TURBINE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>	Is there any trouble in torque converter turbine speed sensor circuit?	Repair or replace torque converter turbine speed sensor circuit.	Go to step **5**.
5	**CHECK POOR CONTACT.** Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair poor contact in TCM connector.	Go to step **6**.
6	**CHECK MECHANICAL TROUBLE.** Check mechanical trouble in automatic transmission.	Is there any mechanical trouble in automatic transmission?	Repair or replace automatic transmission. <Ref. to AT-12, INSPECTION, Road Test.>	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

BK: DTC P0741 — TORQUE CONVERTER CLUTCH SYSTEM MALFUNCTION

— S088521G04

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, 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(DOHC TURBO)-82, 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-96, TROUBLE CODE 77 — LOCK-UP DUTY SOLENOID —, Diagnostic Procedure with Trouble Code.>	Is there any trouble in lock-up duty solenoid circuit?	Repair or replace lock-up duty solenoid circuit.	Go to step **3**.
3	**CHECK THROTTLE POSITION SENSOR CIRCUIT.** Check throttle position sensor circuit. <Ref. to AT-50, TROUBLE CODE 31 — THROTTLE POSITION SENSOR —, Diagnostic Procedure with Trouble Code.>	Is there any trouble in throttle position sensor circuit?	Repair or replace throttle position sensor circuit.	Go to step **4**.
4	**CHECK TORQUE CONVERTER TURBINE SPEED SENSOR CIRCUIT.** Check torque converter turbine speed sensor circuit. <Ref. to AT-64, TROUBLE CODE 36 — TORQUE CONVERTER TURBINE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>	Is there any trouble in torque converter turbine speed sensor circuit?	Repair or replace torque converter turbine speed sensor circuit.	Go to step **5**.
5	**CHECK ENGINE SPEED INPUT CIRCUIT.** Check engine speed input circuit. <Ref. to AT-42, TROUBLE CODE 11 — ENGINE SPEED SIGNAL —, Diagnostic Procedure with Trouble Code.>	Is there any trouble in engine speed input circuit?	Repair or replace engine speed input circuit.	Go to step **6**.
6	**CHECK INHIBITOR SWITCH CIRCUIT.** Check inhibitor switch circuit. <Ref. to AT-122, CHECK INHIBITOR SWITCH., Diagnostic Procedure for No-trouble Code.>	Is there any trouble in inhibitor switch circuit?	Repair or replace inhibitor switch circuit.	Go to step **7**.
7	**CHECK BRAKE LIGHT SWITCH CIRCUIT.** Check brake light switch circuit. <Ref. to AT-111, CHECK BRAKE SWITCH., Diagnostic Procedure for No-trouble Code.>	Is there any trouble in brake light switch circuit?	Repair or replace brake light switch circuit.	Go to step **8**.

No.	Step	Check	Yes	No
8	**CHECK ATF TEMPERATURE SENSOR CIRCUIT.** Check ATF temperature sensor circuit. <Ref. to AT-46, TROUBLE CODE 27 - ATF TEMPERATURE SENSOR —, Diagnostic Procedure with Trouble Code.>	Is there any trouble in ATF temperature sensor circuit?	Repair or replace ATF temperature sensor circuit.	Go to step **9**.
9	**CHECK POOR CONTACT.** Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair poor contact in TCM connector.	Go to step **10**.
10	**CHECK MECHANICAL TROUBLE.** Check mechanical trouble in automatic transmission.	Is there any mechanical trouble in automatic transmission?	Repair or replace automatic transmission. <Ref. to AT-12, INSPECTION, Road Test.>	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

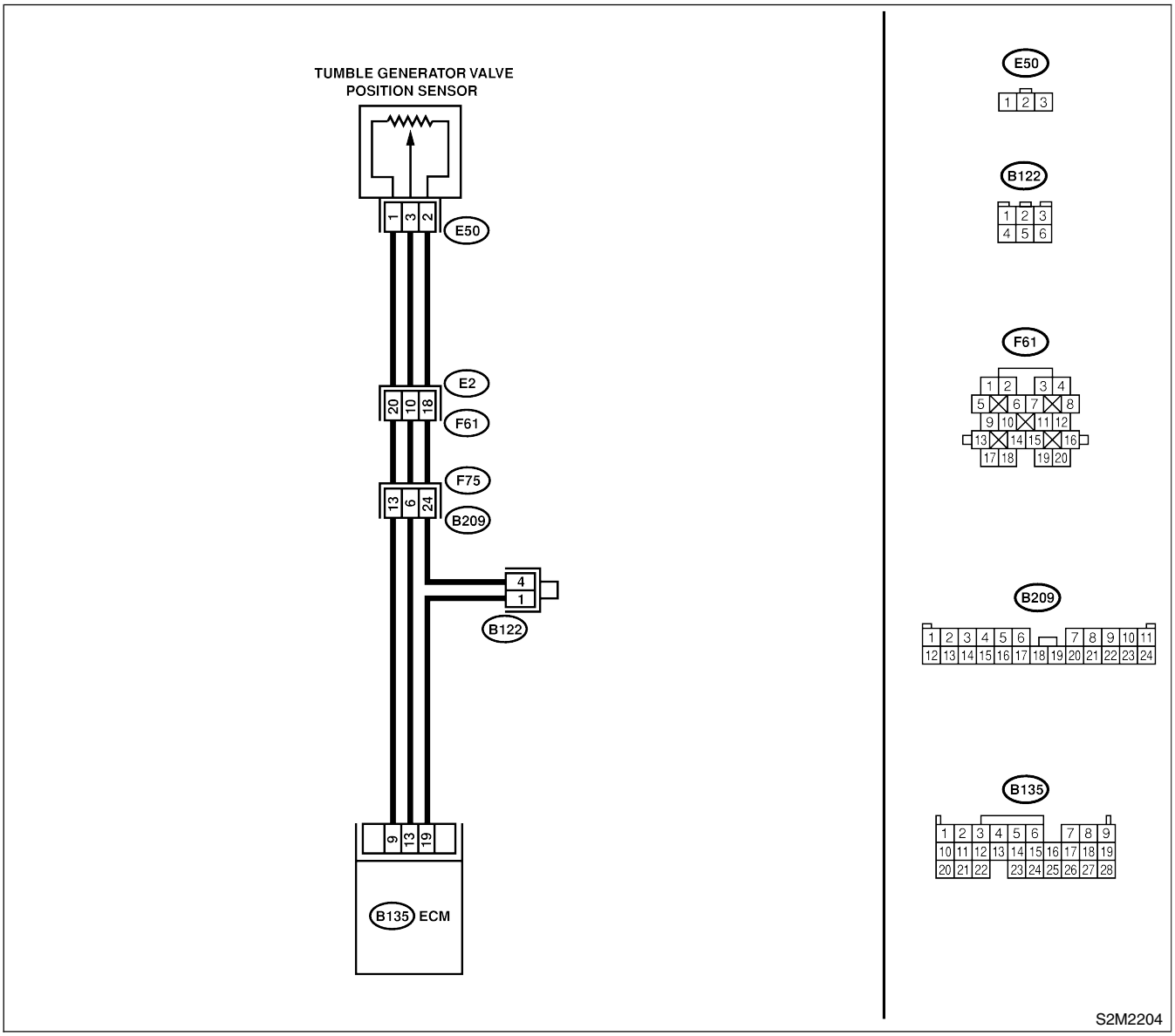
BL: DTC P1086 — TUMBLE GENERATOR VALVE #2 (LH) POSITION SENSOR CIRCUIT LOW INPUT — S088521H71

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

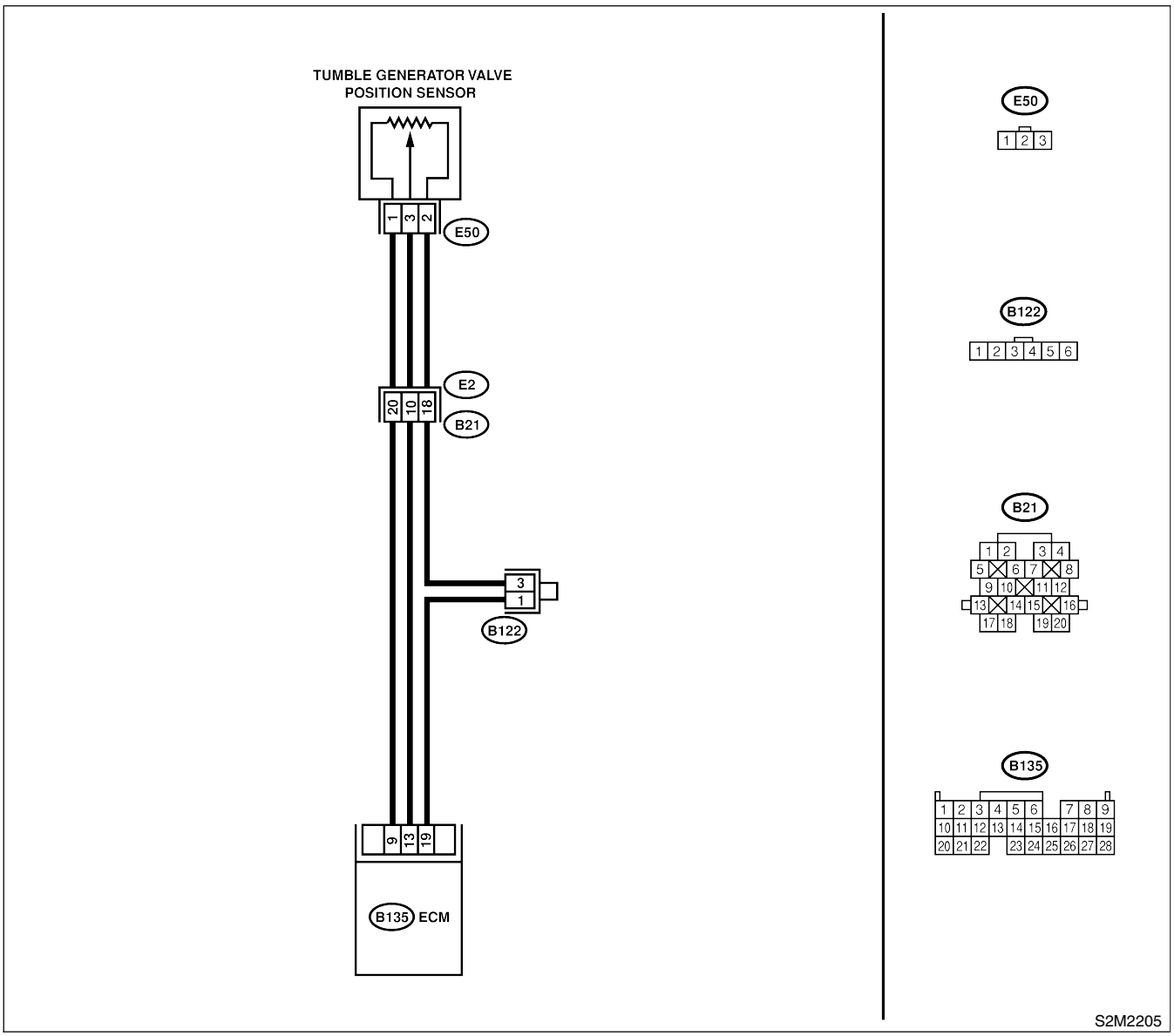
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**
- **LHD MODEL**



- **RHD MODEL**


TUMBLE GENERATOR VALVE
POSITION SENSOR
1
3
2
E50
E2
20
10
18
B21
3
1
B122
9
13
19
B135
ECM
E50
1 2 3
B122
1 2 3 4 5 6
B21
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
B135
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28
S2M2205

No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start engine. 2) Read data of tumble generator valve 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(DOHC TURBO)-36, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value less than 0.1 V?	Go to step **2**.	Even if MIL lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in throttle position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM connector and chassis ground while tumble generator valve is fully closed. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (–):***	Is the voltage more than 4.5 V?	Go to step **4**.	Go to step **3**.
3	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (–):***	Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair poor contact in ECM connector.	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
4	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 13 (+) — Chassis ground (–):***	Is the voltage less than 0.1 V?	Go to step **6**.	Go to step **5**.
5	**CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)** Measure voltage between ECM connector and chassis ground.	Does the voltage change more than 0.1 V by shaking harness and connector of ECM while monitoring the value with Subaru Select Monitor?	Repair poor contact in ECM connector.	Go to step **6**.

No.	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from tumble generator valve position sensor. 3) Turn ignition switch to ON. 4) Measure voltage between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E50) No. 1 (+) — Engine ground (–):***	Is the voltage more than 4.5 V?	Go to step **7**.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between tumble generator valve position sensor and ECM connector • Poor contact in tumble generator valve position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector
7	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Measure resistance of harness between ECM connector and tumble generator valve position sensor connector. ***Connector & terminal*** ***(B135) No. 13 — (E50) 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 tumble generator valve position sensor and ECM connector • Poor contact in ECM connector • Poor contact in tumble generator valve position sensor connector • Poor contact in coupling connector
8	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** Measure resistance of harness between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E50) No. 3 — Engine ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between tumble generator valve position sensor and ECM connector.	Go to step **9**.
9	**CHECK POOR CONTACT.** Check poor contact in tumble generator valve position sensor connector.	Is there poor contact in tumble generator valve position sensor connector?	Repair poor contact in tumble generator valve position sensor connector.	Replace tumble generator valve assembly. <Ref. to FU(DOHC TURBO)-40, Tumble Generator Valve Assembly.>

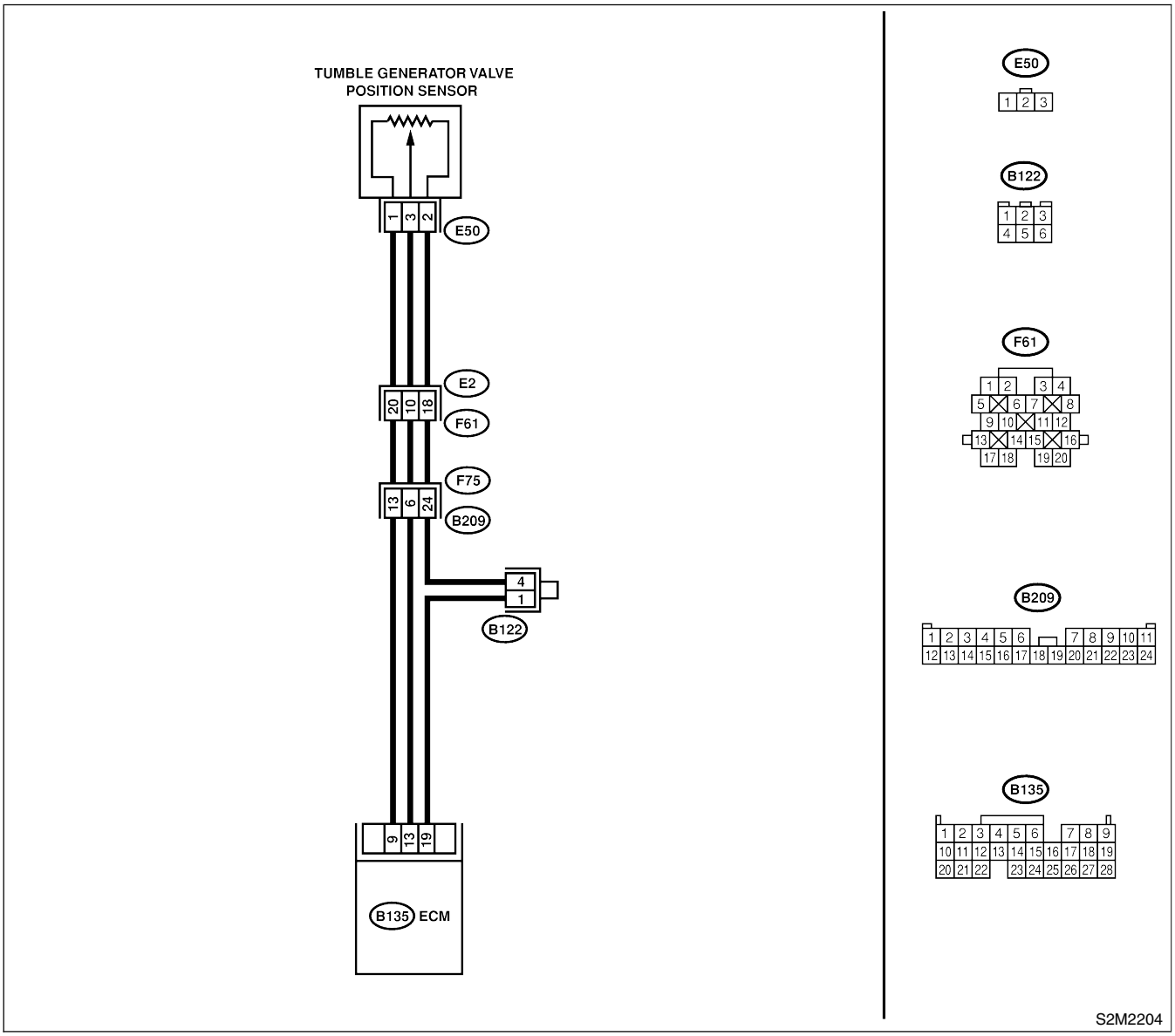
BM: DTC P1087 — TUMBLE GENERATOR VALVE #2 (LH) POSITION SENSOR CIRCUIT HIGH INPUT — S088521H72

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

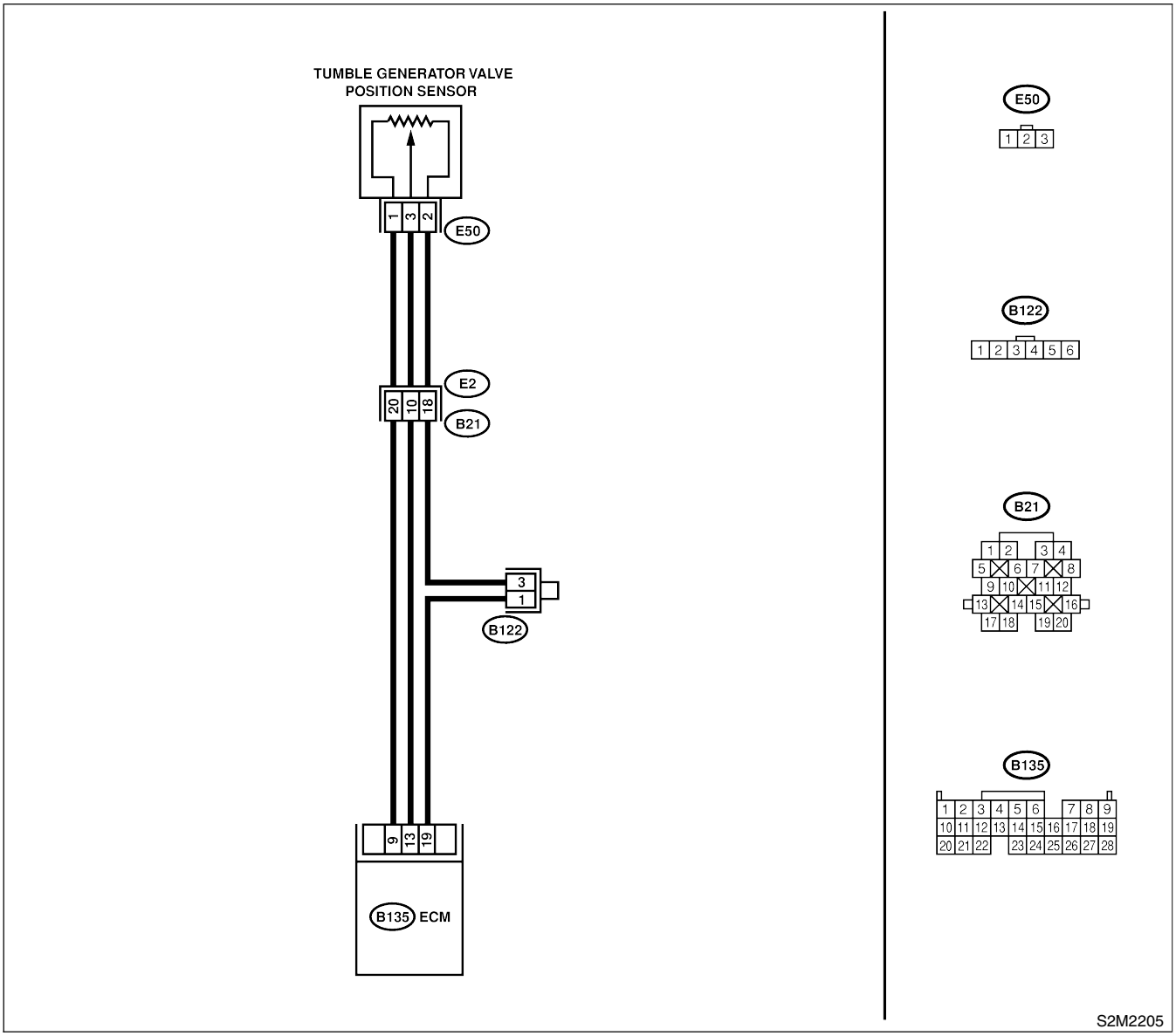
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**
- **LHD MODEL**



- **RHD MODEL**


TUMBLE GENERATOR VALVE
POSITION SENSOR
1
3
2
E50
E2
20
10
18
B21
3
1
B122
9
13
19
B135
ECM
E50
1 2 3
B122
1 2 3 4 5 6
B21
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
B135
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28
S2M2205

No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start engine. 2) Read data of tumble generator valve 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(DOHC TURBO)-36, 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 tumble generator valve position sensor connector ● Poor contact in ECM connector ● Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN TUMBLE GENERATOR VALVE POSITION SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from tumble generator valve position sensor. 3) Measure resistance of harness between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E50) 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 tumble generator valve position sensor and ECM connector ● Poor contact in coupling connector ● Poor contact in joint connector
3	**CHECK HARNESS BETWEEN TUMBLE GENERATOR VALVE POSITION SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to ON. 2) Measure voltage between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E50) No. 3 (+) — Engine ground (–):***	Is the voltage more than 4.9 V?	Repair battery short circuit in harness between tumble generator valve position sensor and ECM connector. After repair, replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>	Replace tumble generator valve assembly. <Ref. to FU(DOHC TURBO)-40, Tumble Generator Valve Assembly.>

MEMO:

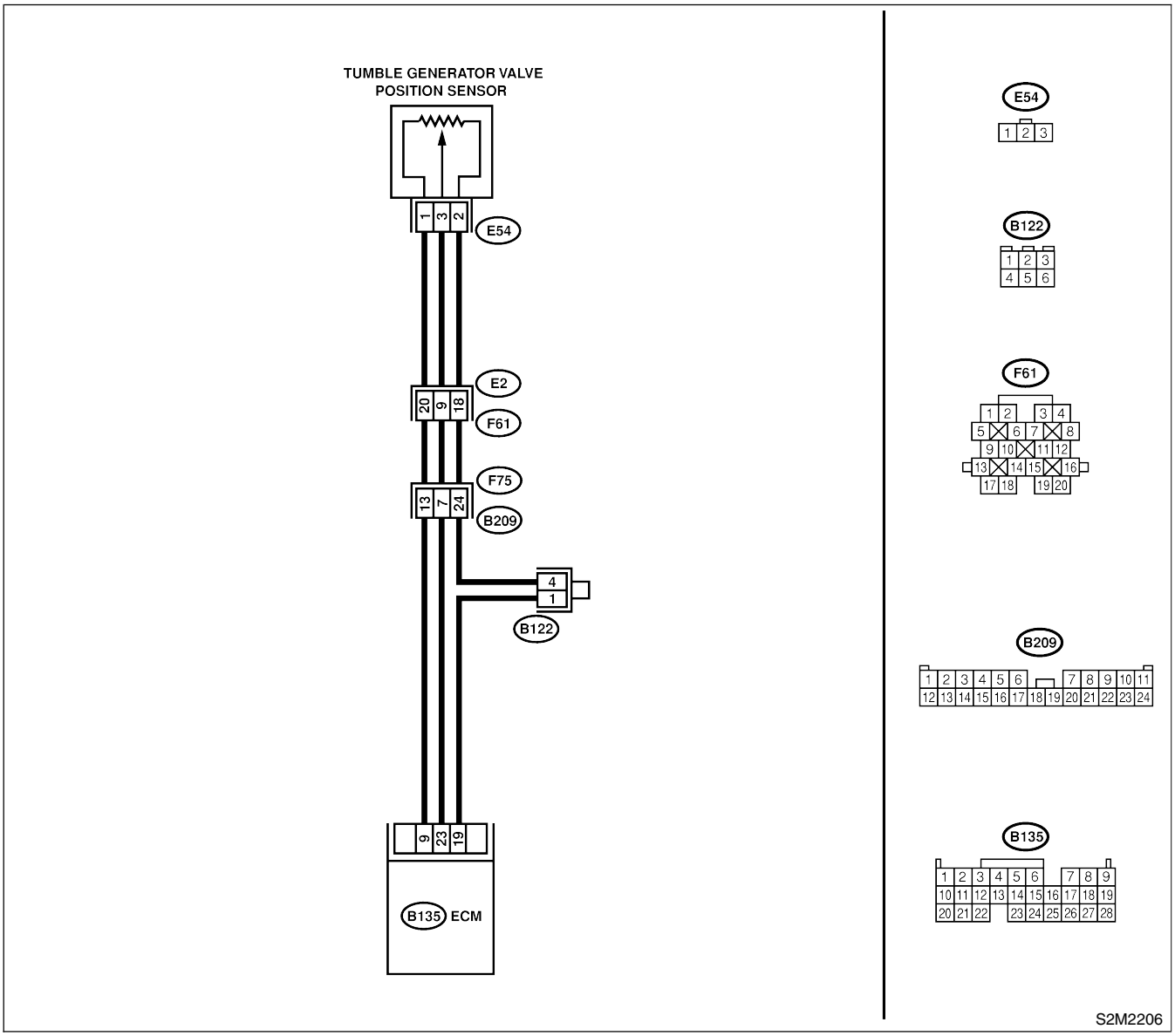
BN: DTC P1088 — TUMBLE GENERATOR VALVE #1 (RH) POSITION SENSOR CIRCUIT LOW INPUT — S088521H75

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

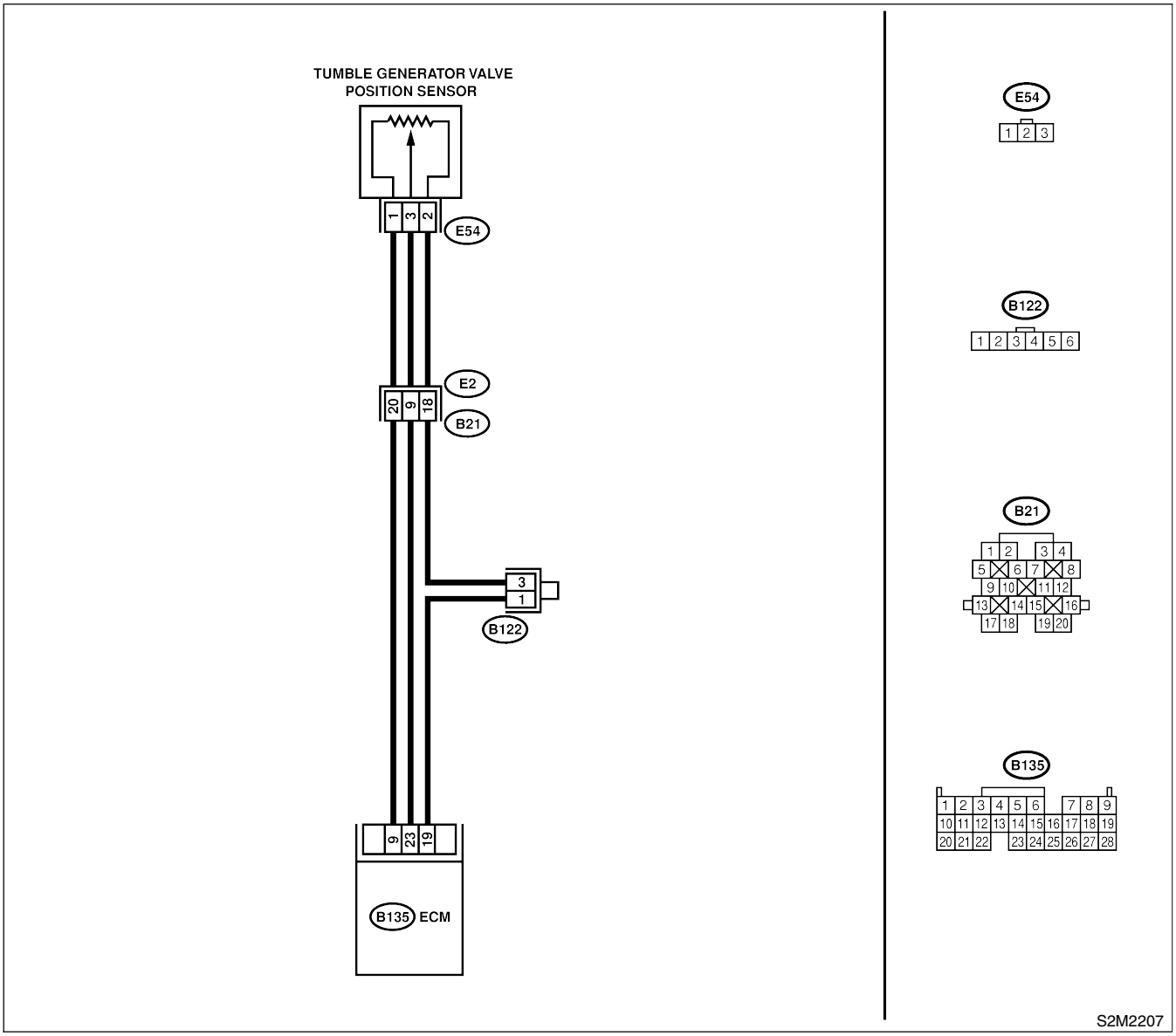
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**
- **LHD MODEL**



- **RHD MODEL**


TUMBLE GENERATOR VALVE
POSITION SENSOR
1
3
2
E54
E2
20
9
18
B21
3
1
B122
9
23
19
B135
ECM
E54
1 2 3
B122
1 2 3 4 5 6
B21
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
B135
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28
S2M2207

No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start engine. 2) Read data of tumble generator valve 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(DOHC TURBO)-36, 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 tumble generator valve position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM connector and chassis ground while throttle valve is fully closed. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (–):***	Is the voltage more than 4.5 V?	Go to step **4**.	Go to step **3**.
3	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (–):***	Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair poor contact in ECM connector.	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
4	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 23 (+) — Chassis ground (–):***	Is the voltage less than 0.1 V?	Go to step **6**.	Go to step **5**.
5	**CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)** Measure voltage between ECM connector and chassis ground.	Does the voltage change more than 0.1 V by shaking harness and connector of ECM while monitoring the value with Subaru Select Monitor?	Repair poor contact in ECM connector.	Go to step **6**.

No.	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from tumble generator valve position sensor. 3) Turn ignition switch to ON. 4) Measure voltage between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E54) No. 1 (+) — Engine ground (–):***	Is the voltage more than 4.5 V?	Go to step **7**.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between tumble generator valve 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 TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Measure resistance of harness between ECM connector and tumble generator valve position sensor connector. ***Connector & terminal*** ***(B135) No. 23 — (E54) 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 tumble generator valve position sensor and ECM connector • Poor contact in ECM connector • Poor contact in tumble generator valve position sensor connector • Poor contact in coupling connector
8	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** Measure resistance of harness between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E54) No. 3 — Engine ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between tumble generator valve position sensor and ECM connector.	Go to step **9**.
9	**CHECK POOR CONTACT.** Check poor contact in tumble generator valve position sensor connector.	Is there poor contact in tumble generator valve position sensor connector?	Repair poor contact in tumble generator valve position sensor connector.	Replace tumble generator valve assembly. <Ref. to FU(DOHC TURBO)-40, Tumble Generator Valve Assembly.>

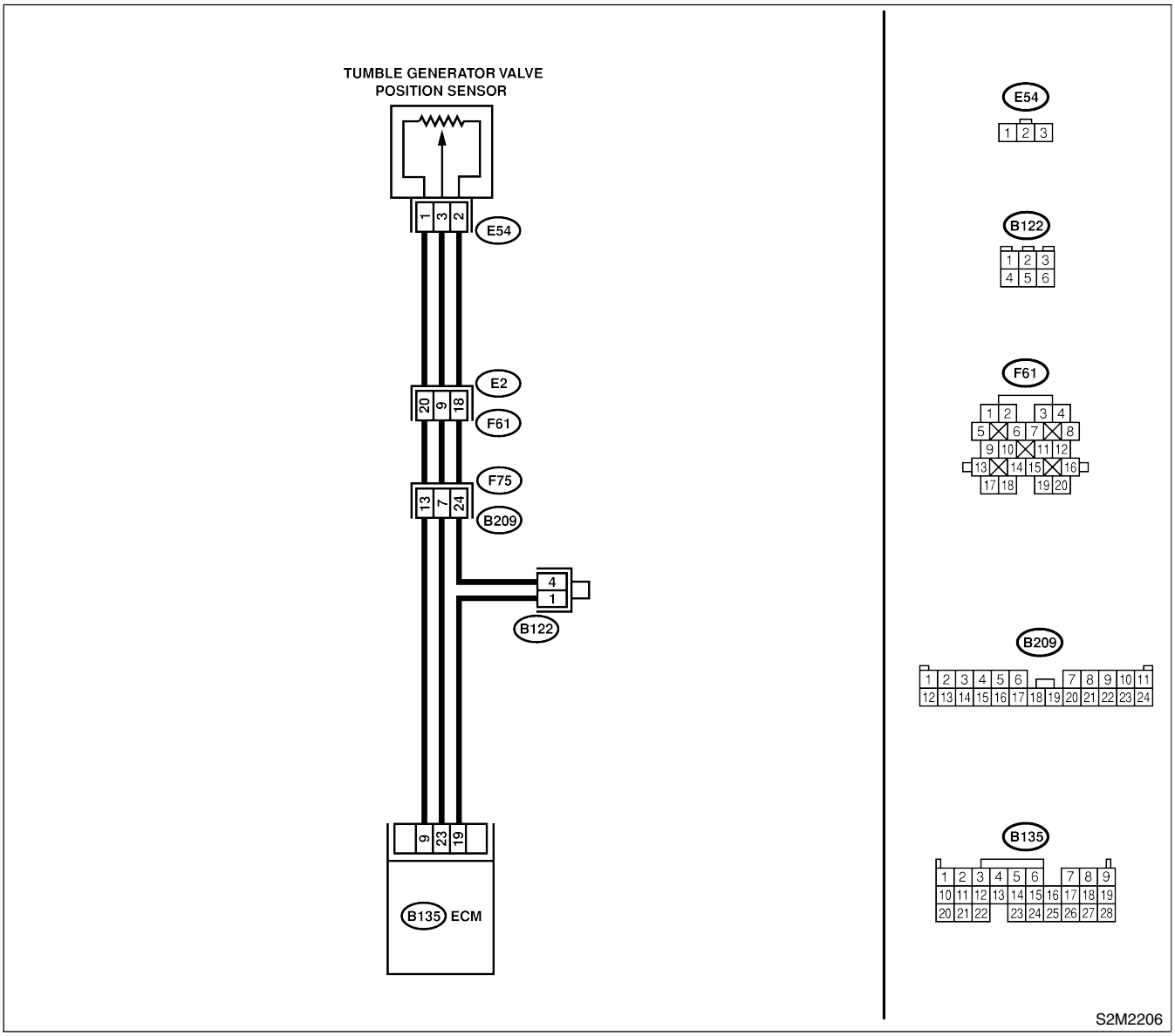
BO: DTC P1089 — TUMBLE GENERATOR VALVE #1 (RH) POSITION SENSOR CIRCUIT HIGH INPUT — S088521H76

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

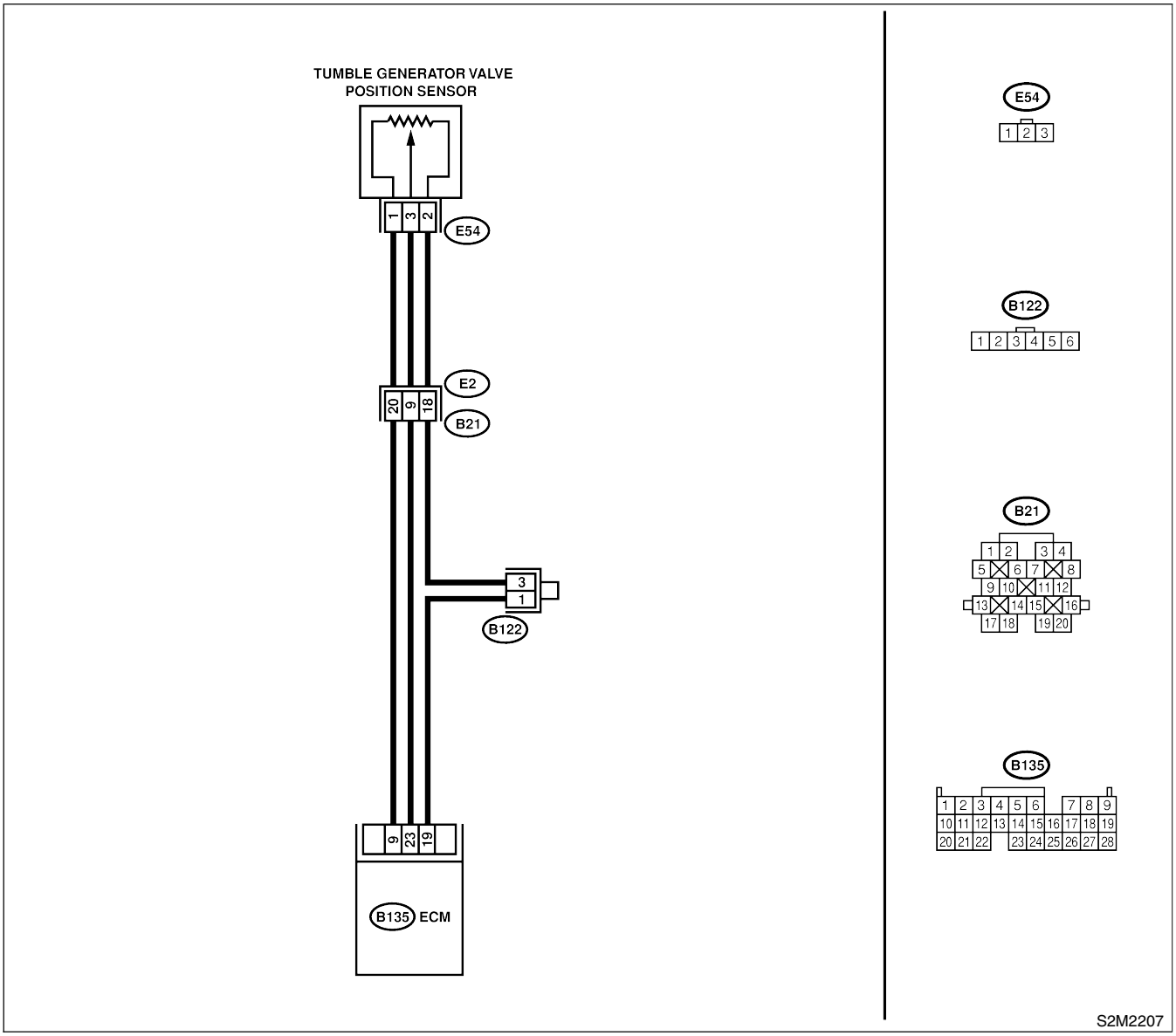
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**
- **LHD MODEL**



- **RHD MODEL**


TUMBLE GENERATOR VALVE
POSITION SENSOR
1
3
2
E54
E2
20
9
18
B21
3
1
B122
9
23
19
B135
ECM
E54
1 2 3
B122
1 2 3 4 5 6
B21
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
B135
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28
S2M2207

No.	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start engine. 2) Read data of tumble generator valve 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(DOHC TURBO)-36, 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 tumble generator valve position sensor connector ● Poor contact in ECM connector ● Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN TUMBLE GENERATOR VALVE POSITION SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from tumble generator valve position sensor. 3) Measure resistance of harness between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E54) 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 tumble generator valve position sensor and ECM connector ● Poor contact in coupling connector ● Poor contact in joint connector
3	**CHECK HARNESS BETWEEN TUMBLE GENERATOR VALVE POSITION SENSOR AND ECM CONNECTOR.** 1) Turn ignition switch to ON. 2) Measure voltage between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E54) No. 3 (+) — Engine ground (–):***	Is the voltage more than 4.9 V?	Repair battery short circuit in harness between tumble generator valve position sensor and ECM connector. After repair, replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>	Replace tumble generator valve assembly. <Ref. to FU(DOHC TURBO)-40, Tumble Generator Valve Assembly.>

BP: DTC P1090 — TUMBLE GENERATOR VALVE SYSTEM #1 (RH) MALFUNCTION (STUCK OPEN) — S088521H77

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate P1088, P1089, P1094 or P1095?	Inspect DTC P1088, P1089, P1094 or P1095 using List of Diagnostic Trouble Code (DTC) <Ref. to EN(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK TUMBLE GENERATOR VALVE RH** 1) Remove tumble generator valve assembly. 2) Check tumble generator valve body.	Does tumble generator valve move smoothly? (No dirt or foreign materials clogged)	Replace tumble generator valve assembly. <Ref. to FU(DOHC TURBO)-40, Tumble Generator Valve Assembly.>	Clean tumble generator valve.

BQ: DTC P1091 — TUMBLE GENERATOR VALVE SYSTEM #1 (RH) MALFUNCTION (STUCK CLOSE) — S088521H78

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate P1088, P1089, P1094 or P1095?	Inspect DTC P1088, P1089, P1094 or P1095 using List of Diagnostic Trouble Code (DTC) <Ref. to EN(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK TUMBLE GENERATOR VALVE RH** 1) Remove tumble generator valve assembly. 2) Check tumble generator valve body.	Does tumble generator valve move smoothly? (No dirt or foreign materials clogged)	Replace tumble generator valve assembly. <Ref. to FU(DOHC TURBO)-40, Tumble Generator Valve Assembly.>	Clean tumble generator valve.

BR: DTC P1092 — TUMBLE GENERATOR VALVE SYSTEM #2 (LH) MALFUNCTION (STUCK OPEN) — S088521H79

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate P1086, P1087, P1096 or P1097?	Inspect DTC P1086, P1087, P1096 or P1097 using List of Diagnostic Trouble Code (DTC) <Ref. to EN(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK TUMBLE GENERATOR VALVE RH** 1) Remove tumble generator valve assembly. 2) Check tumble generator valve body.	Does tumble generator valve move smoothly? (No dirt or foreign materials clogged)	Replace tumble generator valve assembly. <Ref. to FU(DOHC TURBO)-40, Tumble Generator Valve Assembly.>	Clean tumble generator valve.

BS: DTC P1093 — TUMBLE GENERATOR VALVE SYSTEM #2 (LH) MALFUNCTION (STUCK CLOSE) — S088521H80

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate P1086, P1087, P1096 or P1097?	Inspect DTC P1086, P1087, P1096 or P1097 using List of Diagnostic Trouble Code (DTC) <Ref. to EN(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK TUMBLE GENERATOR VALVE RH** 1) Remove tumble generator valve assembly. 2) Check tumble generator valve body.	Does tumble generator valve move smoothly? (No dirt or foreign materials clogged)	Replace tumble generator valve assembly. <Ref. to FU(DOHC TURBO)-40, Tumble Generator Valve Assembly.>	Clean tumble generator valve.

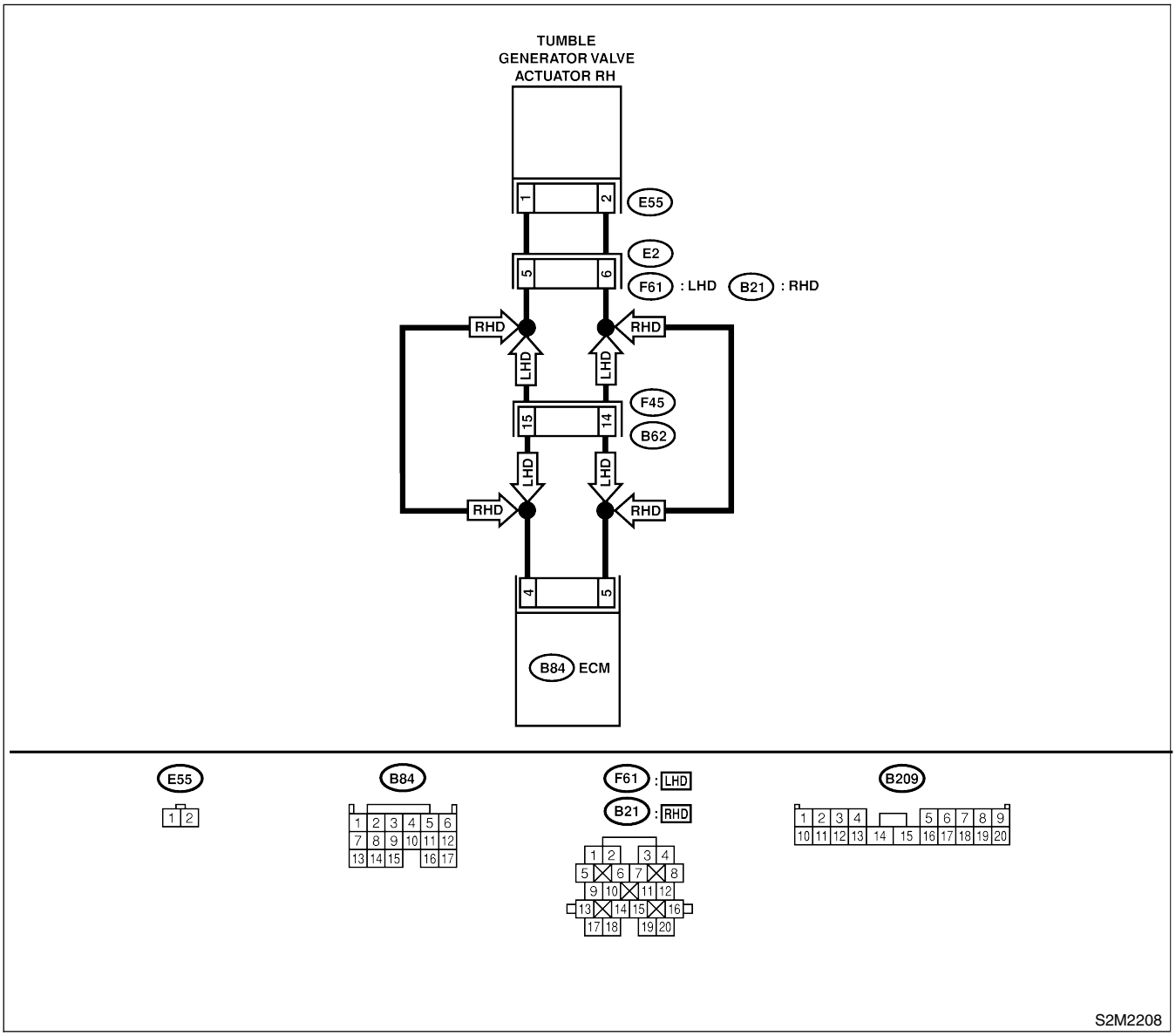
MEMO:

BT: DTC P1094 — TUMBLE GENERATOR VALVE CIRCUIT #1 (OPEN CIRCUIT) — S088521H81

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



S2M2208

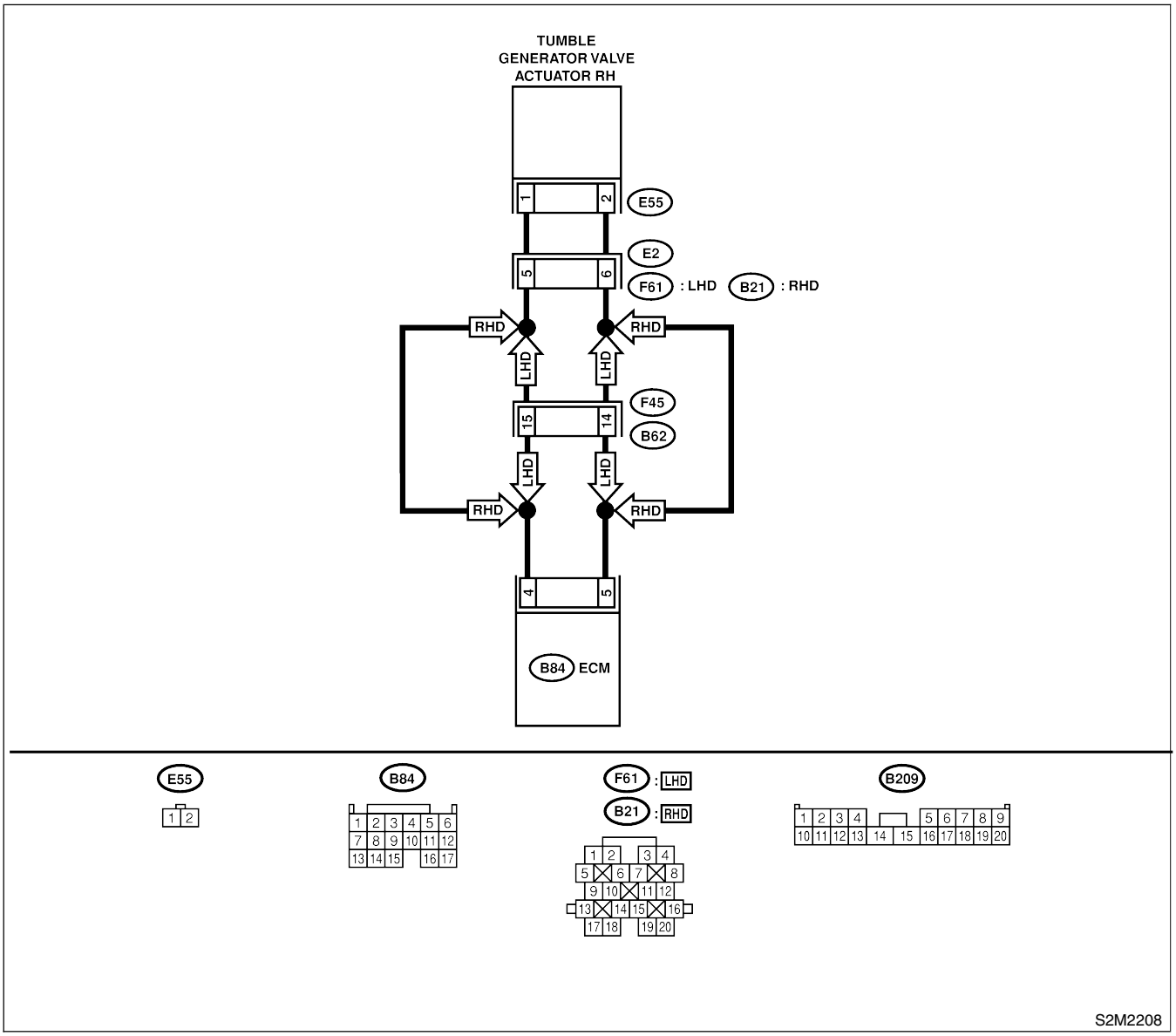
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from tumble generator valve actuator and ECM connector. 3) Measure resistance between tumble generator valve actuator and ECM connector. ***Connector & terminal*** ***(E55) No. 1 — (B84) No. 4:*** ***(E55) No. 2 — (B84) No. 5:***	Is the resistance less than 1Ω?	Go to step **2**.	Repair open circuit between ECM and tumble generator valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and tumble generator valve actuator connector. • Poor contact in coupling connector.
2	**CHECK POOR CONTACT.** Check poor contact in tumble generator valve actuator connector.	Is there poor contact in tumble generator valve actuator connector.	Repair poor contact in tumble generator valve actuator connector.	Replace tumble generator valve assembly. <Ref. to FU(DOHC TURBO)-40, Tumble Generator Valve Assembly.>

BU: DTC P1095 — TUMBLE GENERATOR VALVE CIRCUIT #1 (OVERCURRENT) — S088521H82

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



S2M2208

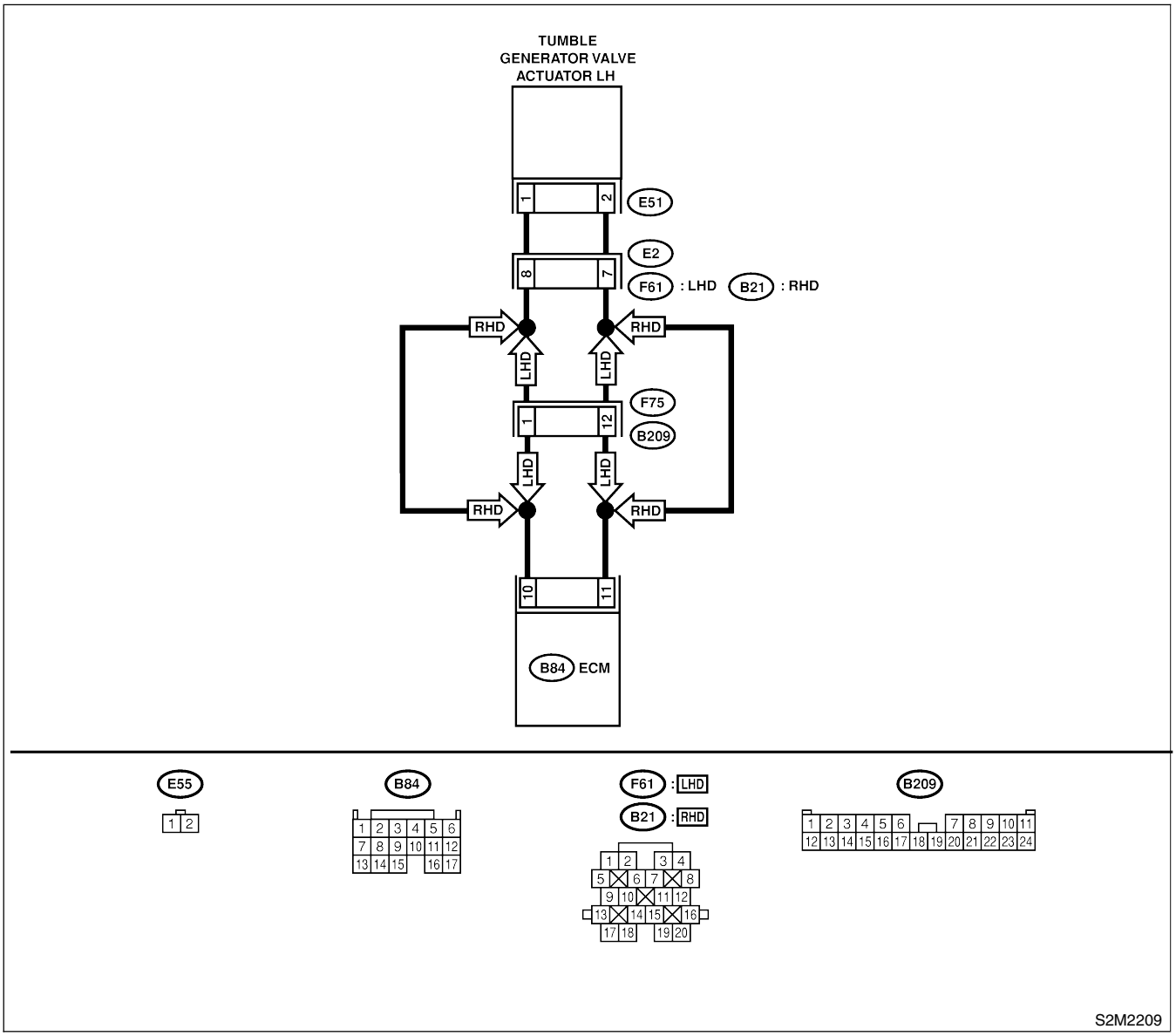
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from tumble generator valve connector. 3) Measure voltage between tumble generator valve actuator and chassis ground. ***Connector & terminal*** ***(E55) No. 1 (+) — Chassis ground (–):*** ***(E55) No. 2 (+) — Chassis ground (–):***	Is the voltage less than 5V?	Replace tumble generator valve assembly. <Ref. to FU(DOHC TURBO)-40, Tumble Generator Valve Assembly.>	Repair battery short circuit between ECM and tumble generator valve actuator.

BV: DTC P1096 — TUMBLE GENERATOR VALVE CIRCUIT #2 (OPEN CIRCUIT) — S088521H83

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



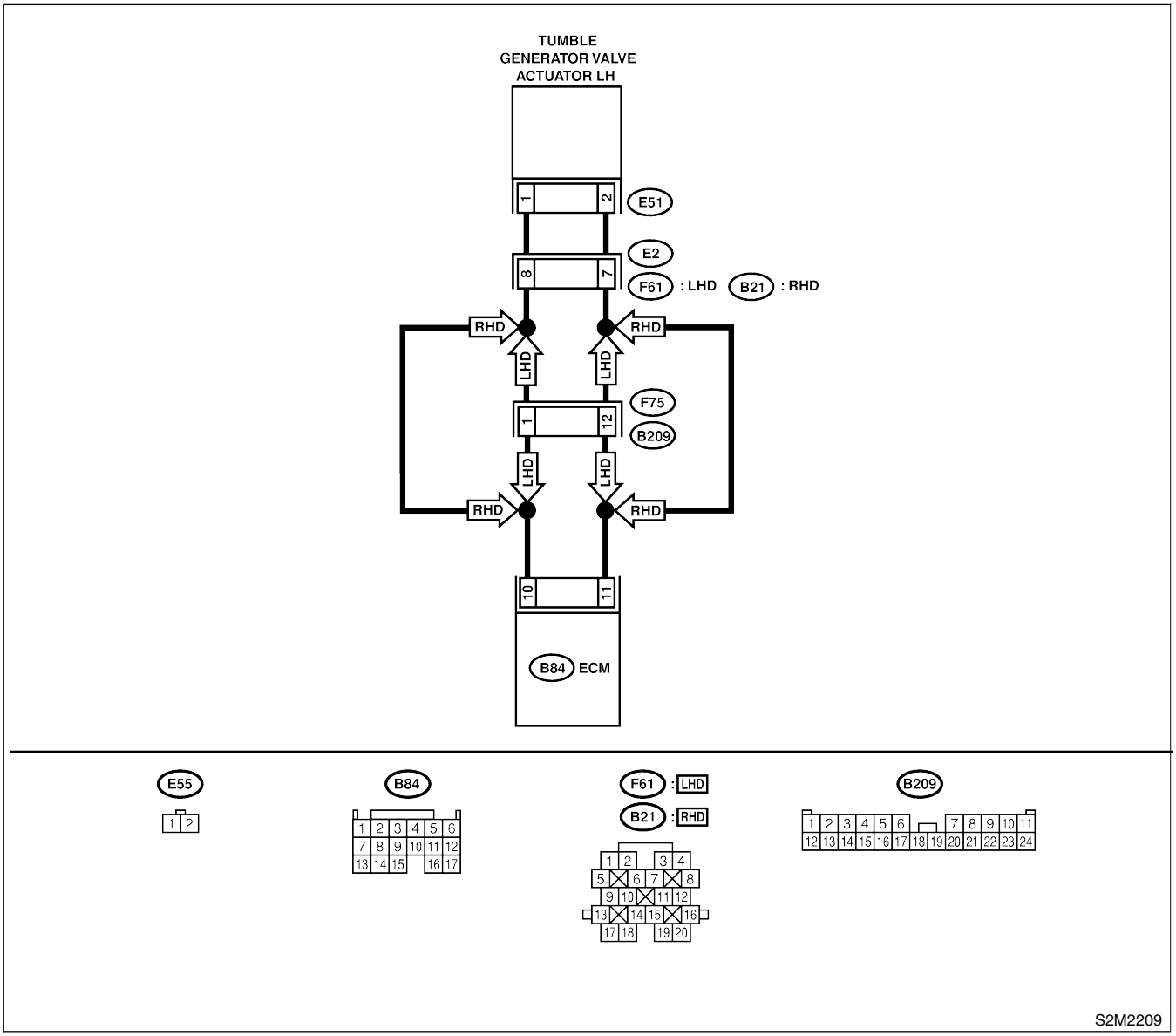
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from tumble generator valve and ECM connector. 3) Measure resistance between tumble generator valve actuator and ECM connector. ***Connector & terminal*** ***(E51) No. 1 — (B84) No. 10:*** ***(E51) No. 2 — (B84) No. 11:***	Is the resistance less than 1Ω?	Go to step **2**.	Repair open circuit between ECM and tumble generator valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and tumble generator valve actuator connector. • Poor contact in coupling connector.
2	**CHECK POOR CONTACT.** Check poor contact in tumble generator valve actuator connector.	Is there poor contact in tumble generator valve actuator connector.	Repair poor contact in tumble generator valve actuator connector.	Replace tumble generator valve assembly. <Ref. to FU(DOHC TURBO)-40, Tumble Generator Valve Assembly.>

BW: DTC P1097 — TUMBLE GENERATOR VALVE CIRCUIT #2 (OVERCURRENT) — S088521H84

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from tumble generator valve connector. 3) Measure voltage between tumble generator valve actuator and chassis ground. ***Connector & terminal*** ***(E51) No. 1 (+) — Chassis ground (–):*** ***(E51) No. 2 (+) — Chassis ground (–):***	Is the voltage less than 5V?	Replace tumble generator valve assembly. <Ref. to FU(DOHC TURBO)-40, Tumble Generator Valve Assembly.>	Repair battery short circuit between ECM and tumble generator valve actuator.

BX: DTC P1110 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT LOW INPUT — S088521B84

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1110?	Replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.> NOTE: Atmospheric pressure sensor is built into ECM.	It is not necessary to inspect DTC P1110.

BY: DTC P1111 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT HIGH INPUT — S088521B85

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1111?	Replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.> NOTE: Atmospheric pressure sensor is built into ECM.	It is not necessary to inspect DTC P1111.

BZ: DTC P1112 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT RANGE/ PERFORMANCE PROBLEM — S088521B86

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

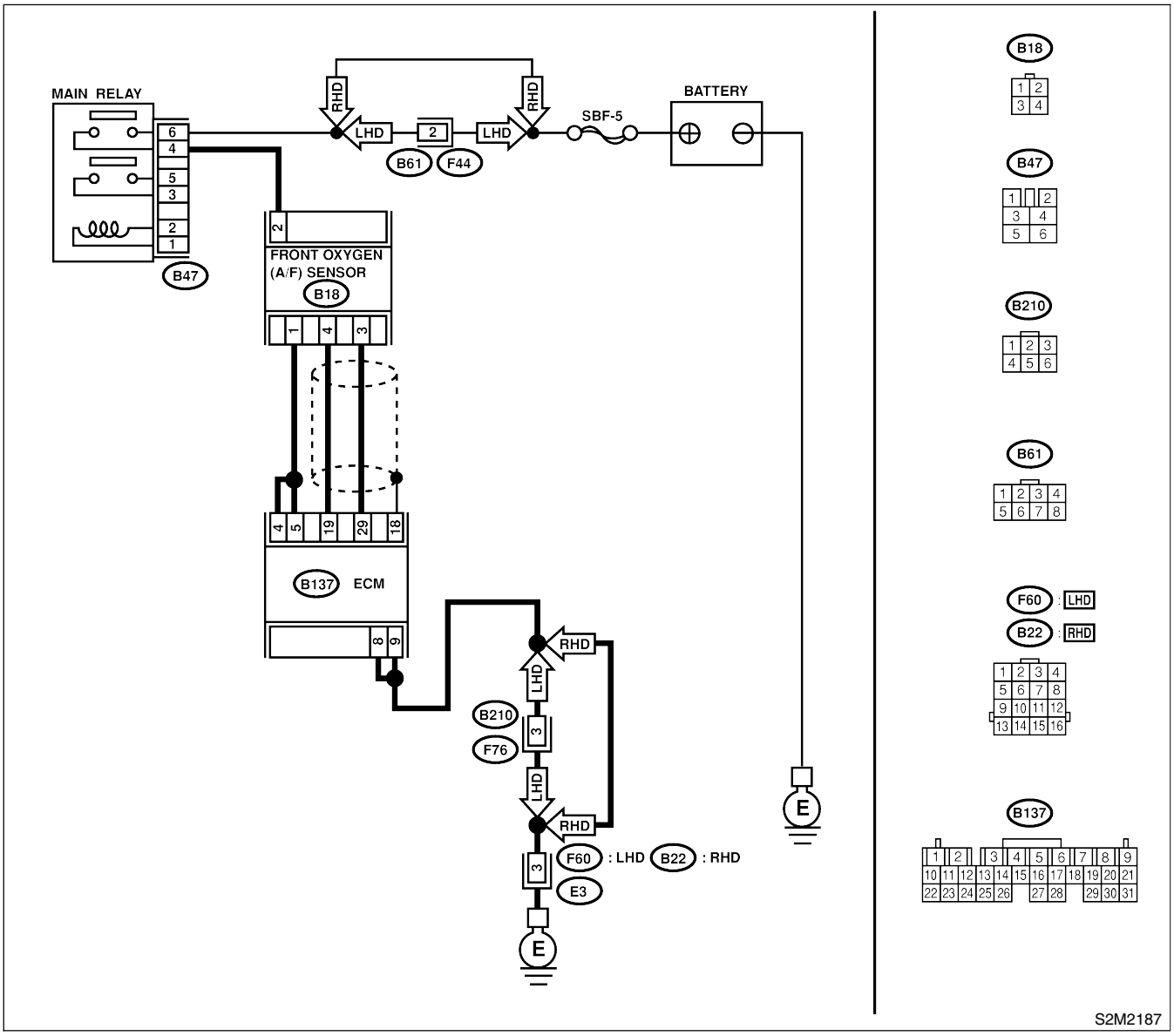
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0106, P0107, P0108, P1110 or P1111?	Inspect DTC P0106, P0107, P0108, P1110 or P1111 using “List of Diagnostic Trouble Code (DTC)”.<Ref. to EN(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).>	Replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.> NOTE: Atmospheric pressure sensor is built into ECM.

CA: DTC P1130 — FRONT OXYGEN (A/F) SENSOR CIRCUIT MALFUNCTION (OPEN CIRCUIT) — S088521B92

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



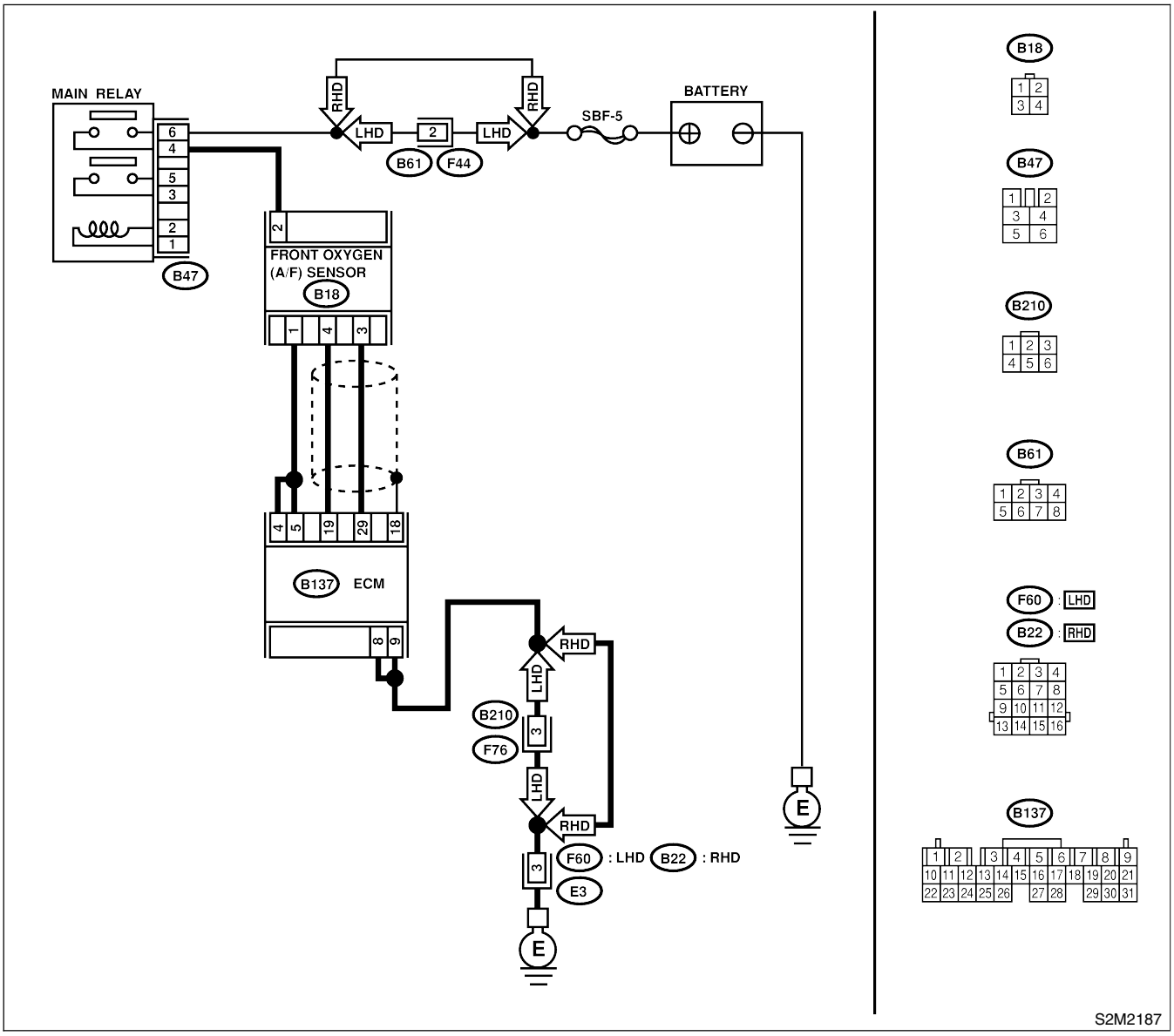
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from ECM and front oxygen (A/F) sensor connector. 3) Measure resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B137) No. 29 — (B18) No. 3:*** ***(B137) No. 19 — (B18) No. 4:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector
2	**CHECK POOR CONTACT.** Check poor contact in front oxygen (A/F) sensor connector.	Is there poor contact in front oxygen (A/F) sensor connector?	Repair poor contact in front oxygen (A/F) sensor connector.	Replace front oxygen (A/F) sensor. <Ref. to FU(DOHC TURBO)-42, Front Oxygen (A/F) Sensor.>

CB: DTC P1131 — FRONT OXYGEN (A/F) SENSOR CIRCUIT MALFUNCTION (SHORT CIRCUIT) — S088521B93

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



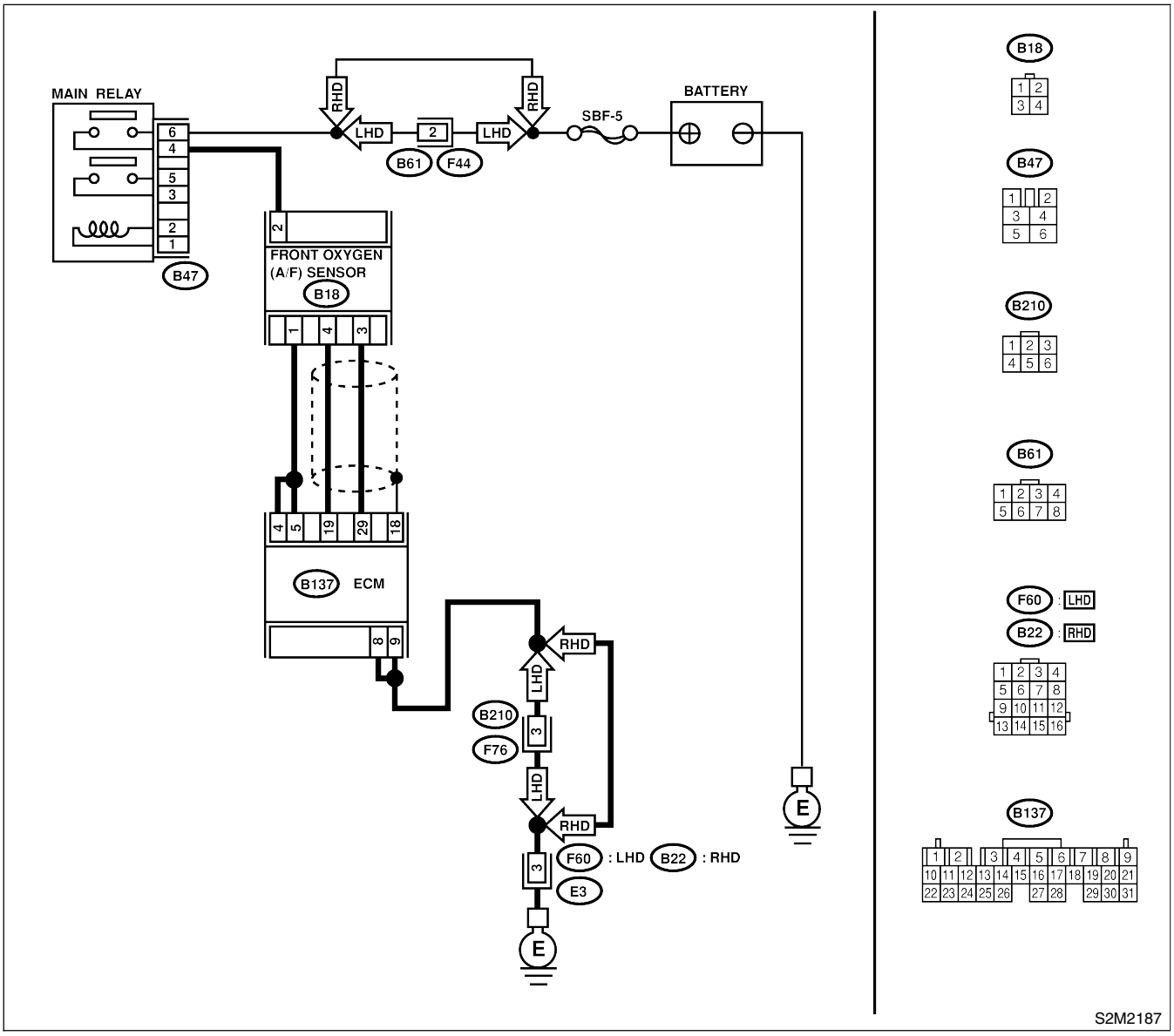
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 19 — Chassis ground:***	Is the resistance more than 10 Ω?	Go to step **2**.	Repair ground short circuit in harness between ECM and front oxygen (A/F) sensor connector.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 29 — Chassis ground:***	Is the resistance more than 10 Ω?	Go to step **3**.	Repair ground short circuit in harness between ECM and front oxygen (A/F) sensor connector.
3	**CHECK OUTPUT SIGNAL FOR ECM.** 1) Connect connector to ECM. 2) Turn ignition switch to ON. 3) Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 19 (+) — Chassis ground (–):***	Is the voltage more than 4.5 V?	Go to step **4**.	Go to step **5**.
4	**CHECK OUTPUT SIGNAL FOR ECM.** Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 19 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and front oxygen (A/F) sensor connector. After repair, replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>	Repair poor contact in ECM connector.
5	**CHECK OUTPUT SIGNAL FOR ECM.** Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 29 (+) — Chassis ground (–):***	Is the voltage more than 4.95 V?	Go to step **6**.	Replace front oxygen (A/F) sensor. <Ref. to FU(DOHC TURBO)-42, Front Oxygen (A/F) Sensor.>
6	**CHECK OUTPUT SIGNAL FOR ECM.** Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 29 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and front oxygen (A/F) sensor connector. After repair, replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>	Repair poor contact in ECM connector.

CC: DTC P1134 — FRONT OXYGEN (A/F) SENSOR MICRO-COMPUTER PROBLEM — S088521B96

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



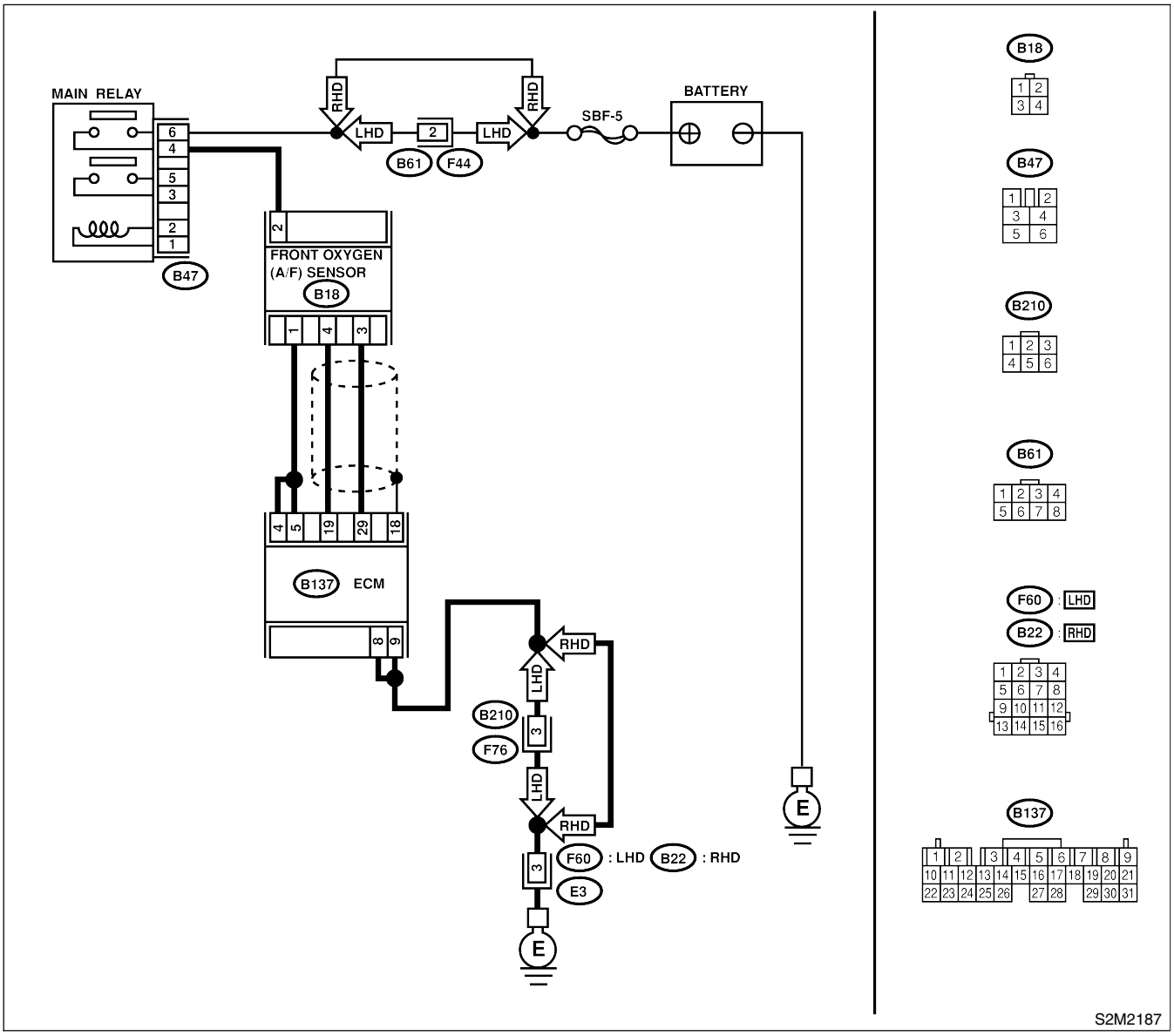
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1134?	Replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>	It is not necessary to inspect DTC P1134.

CD: DTC P1139 — FRONT OXYGEN (A/F) SENSOR #1 HEATER CIRCUIT RANGE/PERFORMANCE PROBLEM — S088521B97

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



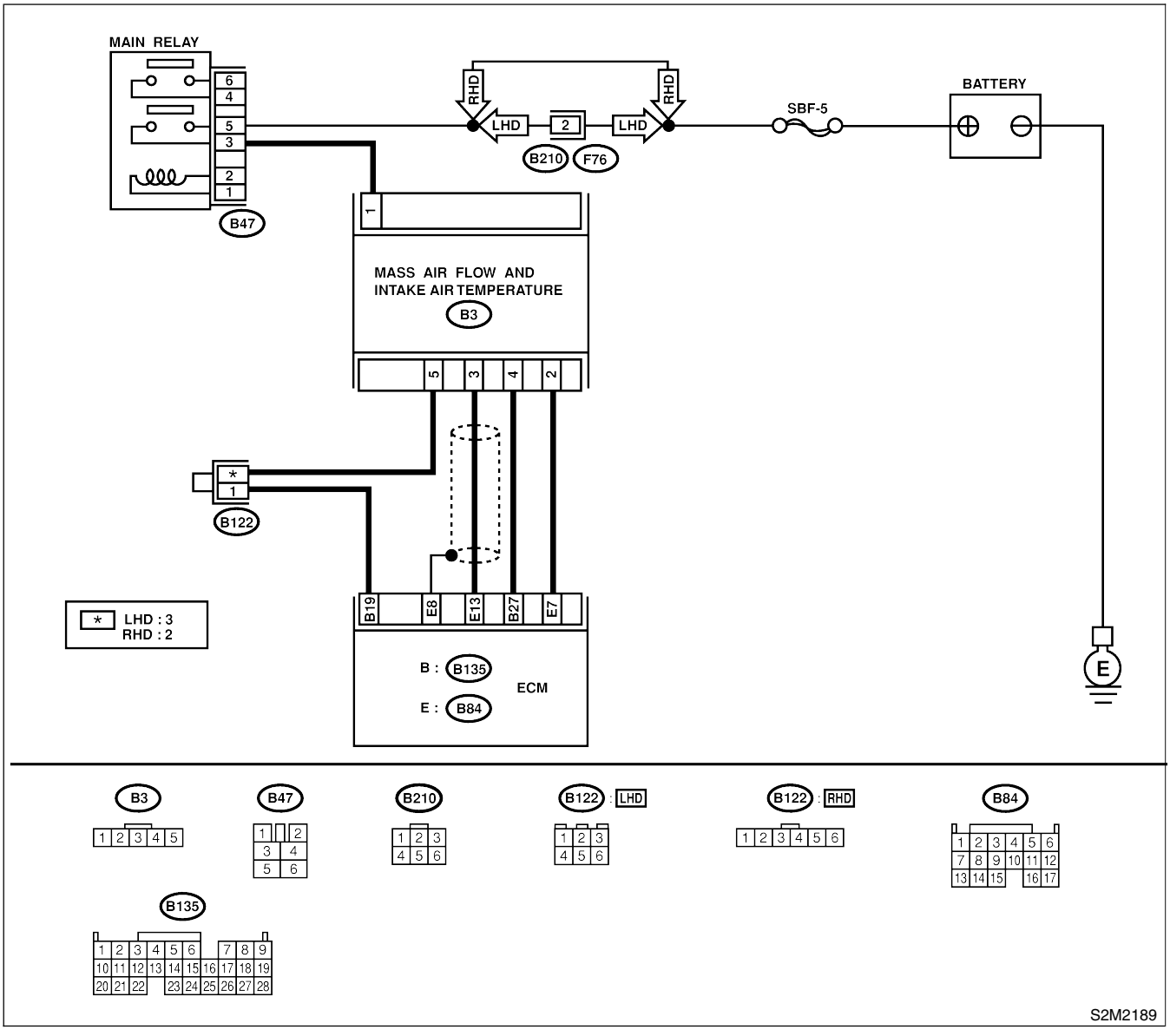
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Start engine, and warm-up the engine. 2) Turn ignition switch to OFF. 3) Disconnect connectors from ECM and front oxygen (A/F) sensor. 4) Measure resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B137) No. 5 — (B18) No. 1:*** ***(B137) No. 4 — (B18) No. 1:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair open circuit in harness between ECM and front oxygen (A/F) sensor connector.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B137) No. 19 — (B18) No. 4:*** ***(B137) No. 29 — (B18) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair open circuit in harness between ECM and front oxygen (A/F) sensor connector.
3	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure resistance of harness between main relay and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B47) No. 4 — (B18) No. 2:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair open circuit in harness between ECM and front oxygen (A/F) sensor connector.
4	**CHECK FRONT OXYGEN (A/F) SENSOR.** Measure resistance between front oxygen (A/F) sensor connector terminals. ***Terminals*** ***No. 2 — No. 1:***	Is the resistance less than 5 Ω?	Go to step **5**.	Replace front oxygen (A/F) sensor. <Ref. to FU(DOHC TURBO)-42, Front Oxygen (A/F) Sensor.>
5	**CHECK POOR CONTACT.** Check poor contact in ECM and front oxygen (A/F) sensor connector.	Is there poor contact in ECM or front oxygen (A/F) sensor connector?	Repair poor contact in ECM or front oxygen (A/F) sensor connector.	Replace front oxygen (A/F) sensor. <Ref. to FU(DOHC TURBO)-42, Front Oxygen (A/F) Sensor.>

CE: DTC P1141 — MASS AIR FLOW SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LOW INPUT) — S088521B98

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



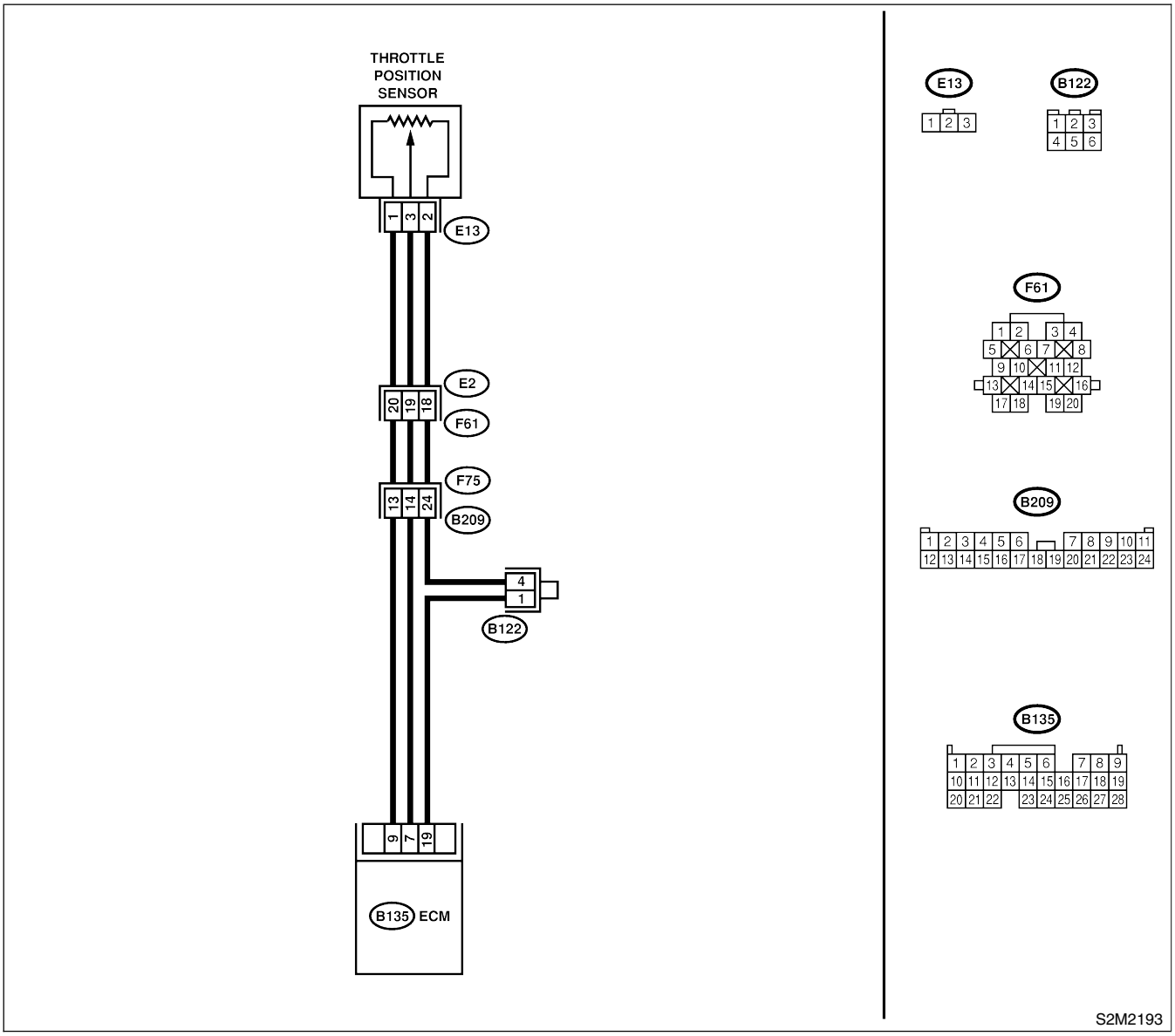
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does Subaru select monitor or OBD-II general scan tool indicate DTC P0102 or P0103?	Inspect DTC P0102 or P0103 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P1141.	Replace mass air flow and intake air temperature sensor.

CF: DTC P1142 — THROTTLE POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LOW INPUT) — S088521B99

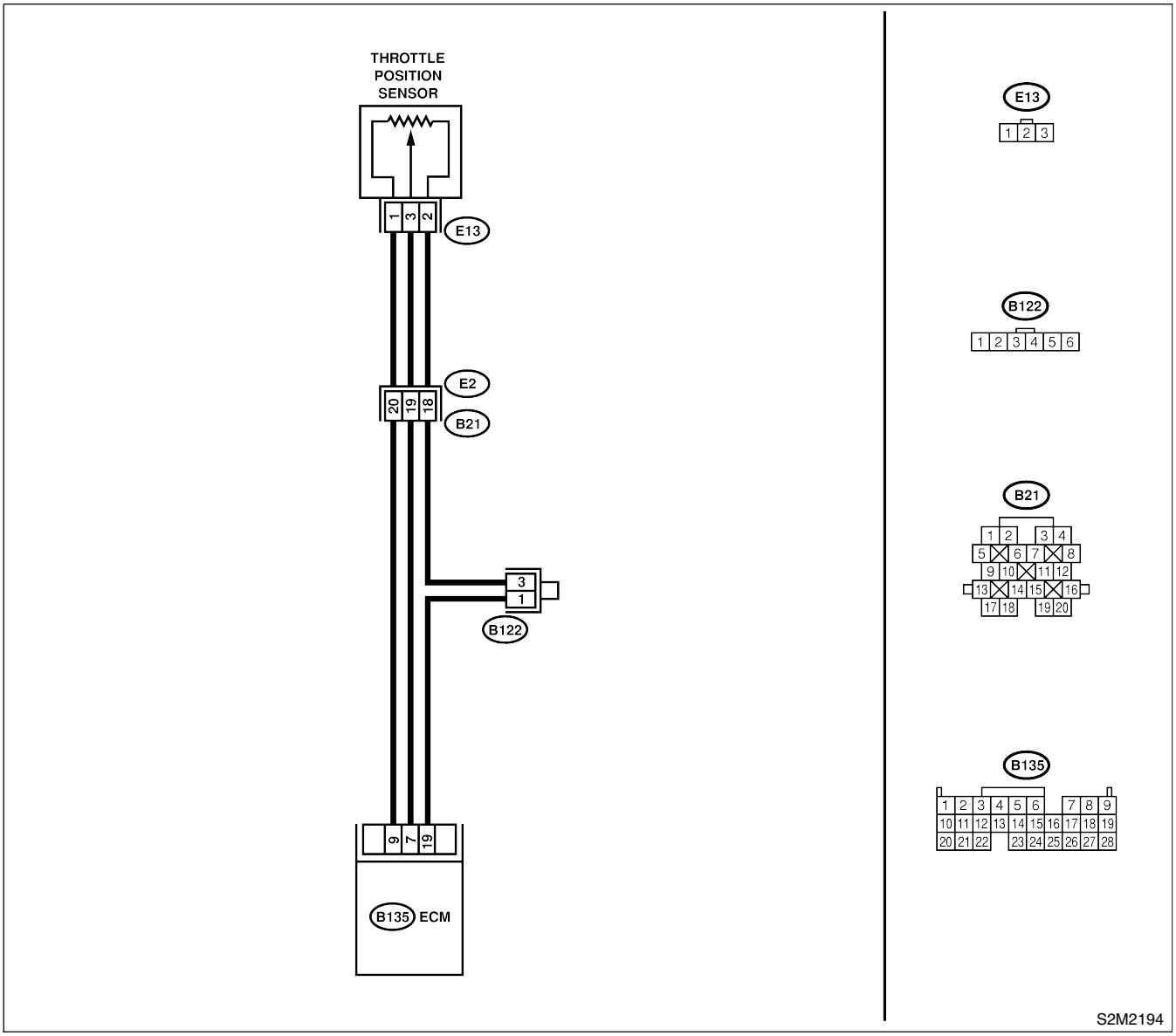
- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**
- **LHD MODEL**



- **RHD MODEL**



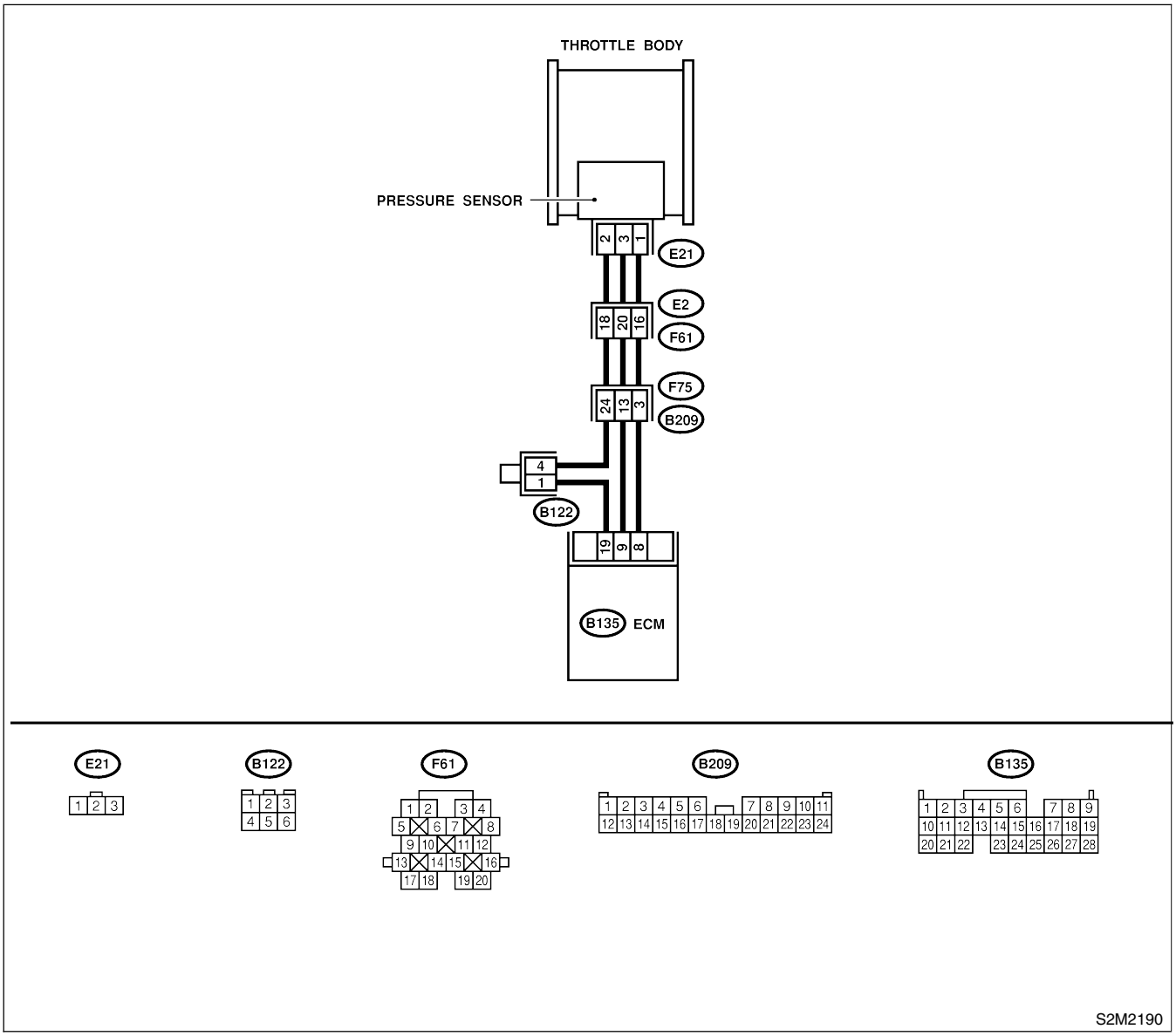
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0122 or P0123?	Inspect DTC P0122 or P0123 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P1142.	Replace throttle position sensor. <Ref. to FU(DOHC TURBO)-33, Throttle Position Sensor.>

CG: DTC P1146 — PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) — S088521G07

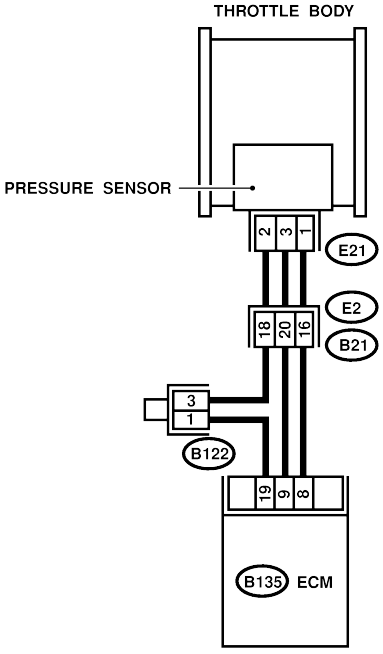
- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

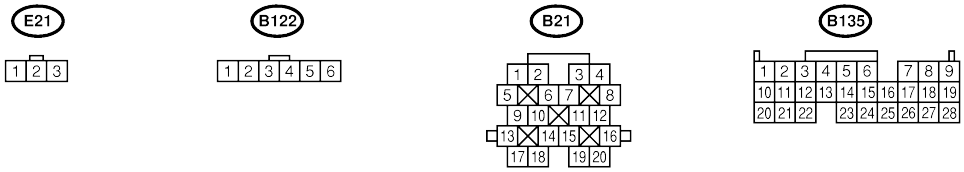
CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**
- **LHD MODEL**



- **RHD MODEL**





S2M2191

No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.** NOTE: In this case, it is not necessary to inspect DTC P0106.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0107, P0108 or P1112?	Inspect DTC P0107, P0108 or P1112 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(DOHC TURBO)-82, 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**.

No.	Step	Check	Yes	No
3	**CHECK PRESSURE SENSOR.** 1) Start the engine and warm-up engine until coolant temperature is greater than 60°C (140°F). 2) Place the shift lever in the selector lever in "N" or "P" position. 3) Turn A/C switch to OFF. 4) Turn all accessory switches to OFF. 5) Read data of intake manifold pressure sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(DOHC TURBO)-36, 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 pressure sensor. <Ref. to FU(DOHC TURBO)-35, Pressure Sensor.>
4	**CHECK THROTTLE POSITION.** Read data of throttle position signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(DOHC TURBO)-36, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.	Is throttle positioning ratio equal to or less than 5% when throttle is fully closed?	Go to step **5**.	Replace throttle position sensor. <Ref. to FU(DOHC TURBO)-33, Throttle Position Sensor.>
5	**CHECK THROTTLE POSITION.**	Is throttle positioning ratio equal to or more than 85% when throttle is fully open?	Replace pressure sensor. <Ref. to FU(DOHC TURBO)-35, Pressure Sensor.>	Replace throttle position sensor. <Ref. to FU(DOHC TURBO)-33, Throttle Position Sensor.>

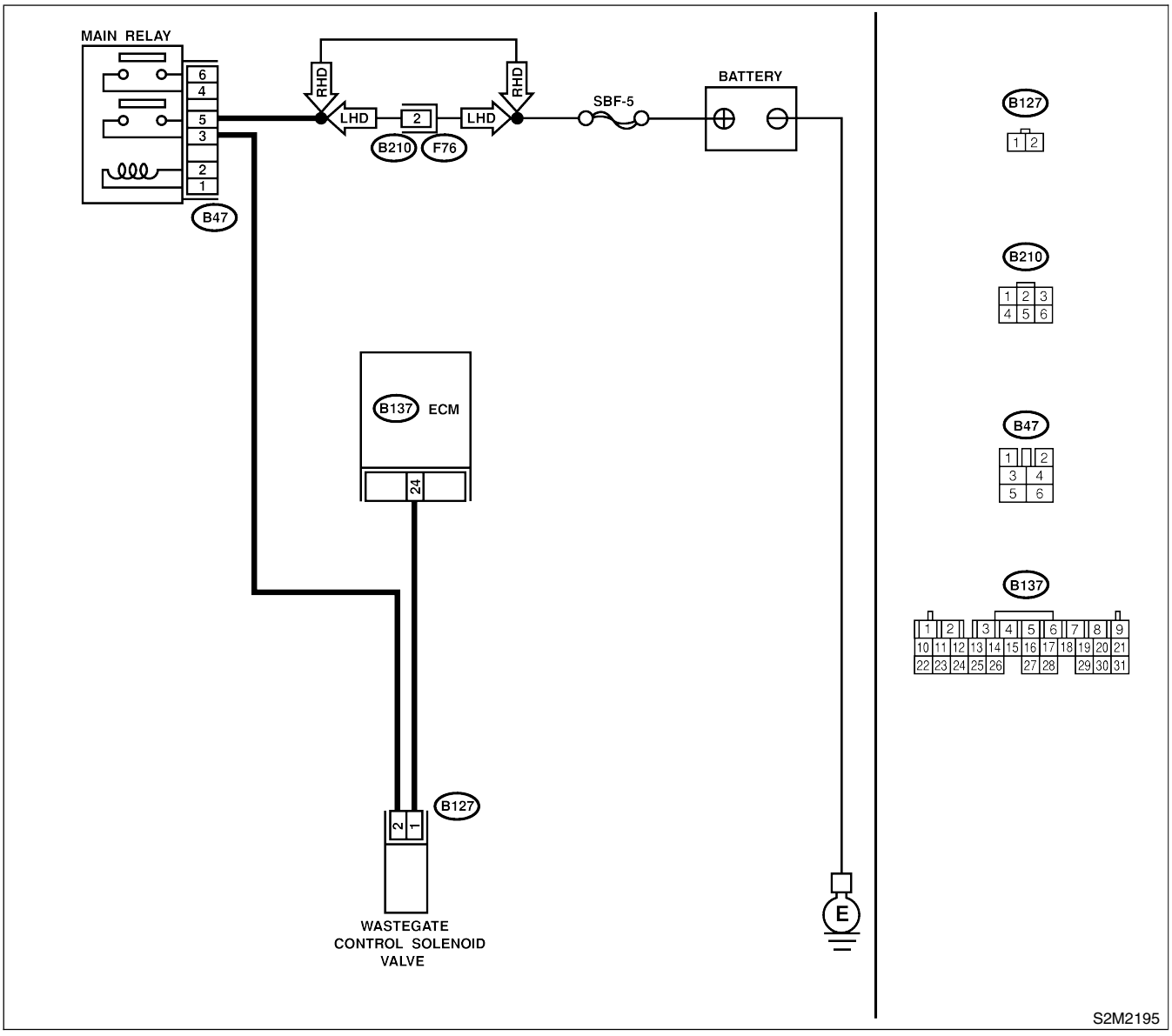
MEMO:

CH: DTC P1244 — WASTEGATE CONTROL SOLENOID VALVE RANGE/PERFORMANCE PROBLEM (LOW INPUT) — S088521H86

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



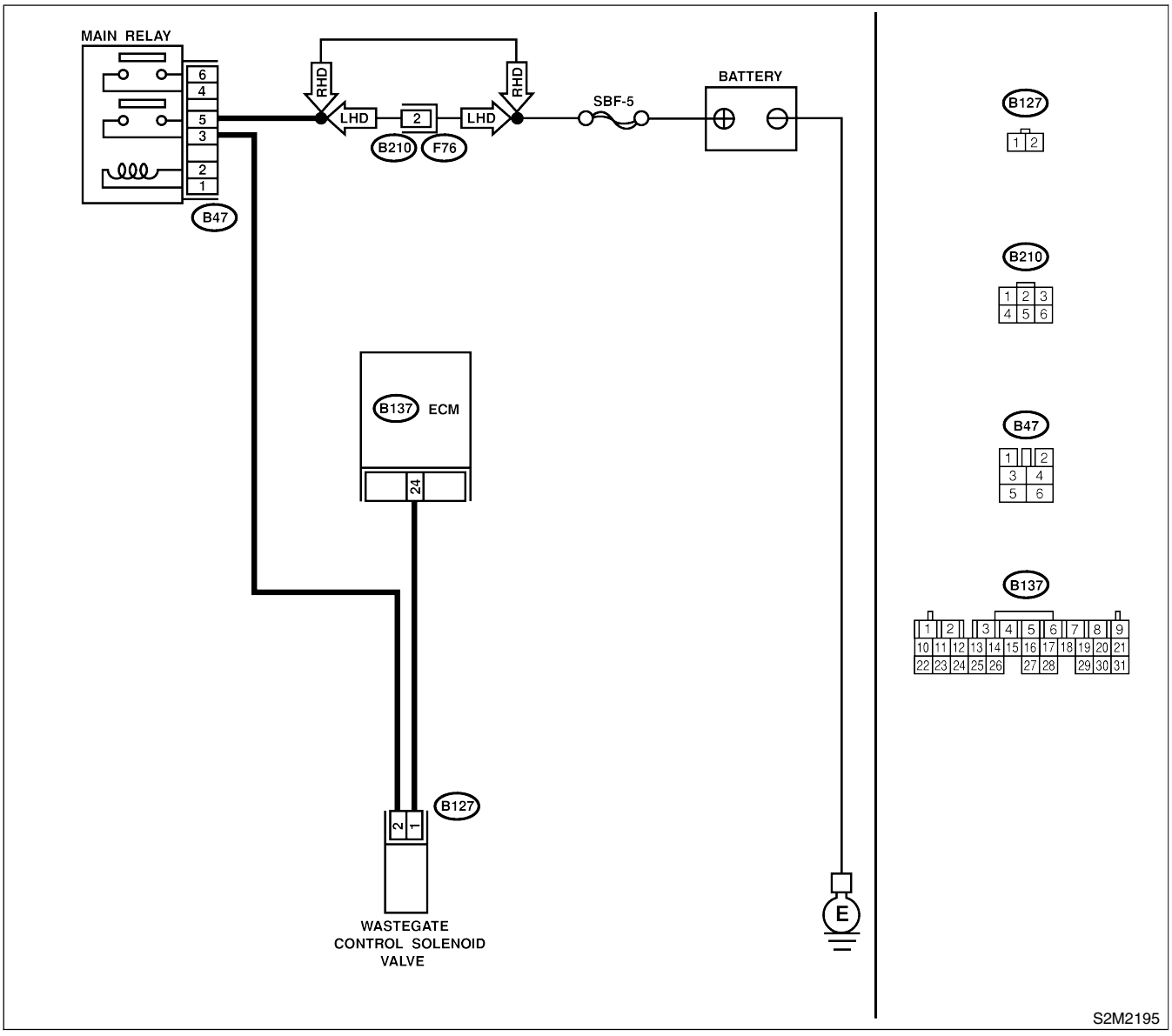
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0245 or P0246?	Inspect DTC P0245 or P0246 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P1142.	Replace waste-gate control sole-noid valve. <Ref. to FU(DOHC TURBO)-41, Wastegate Control Solenoid Valve.>

CI: DTC P1245 — WASTEGATE CONTROL SOLENOID VALVE MALFUNCTION (FAIL-SAFE) — S088521H87

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, 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 P0244, P0245, P0246 or P1244?	Inspect DTC P0244, P0245, P0246 or P1244 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0507.	Replace waste-gate control sole-noid valve. <Ref. to FU(DOHC TURBO)-41, Wastegate Control Solenoid Valve.>

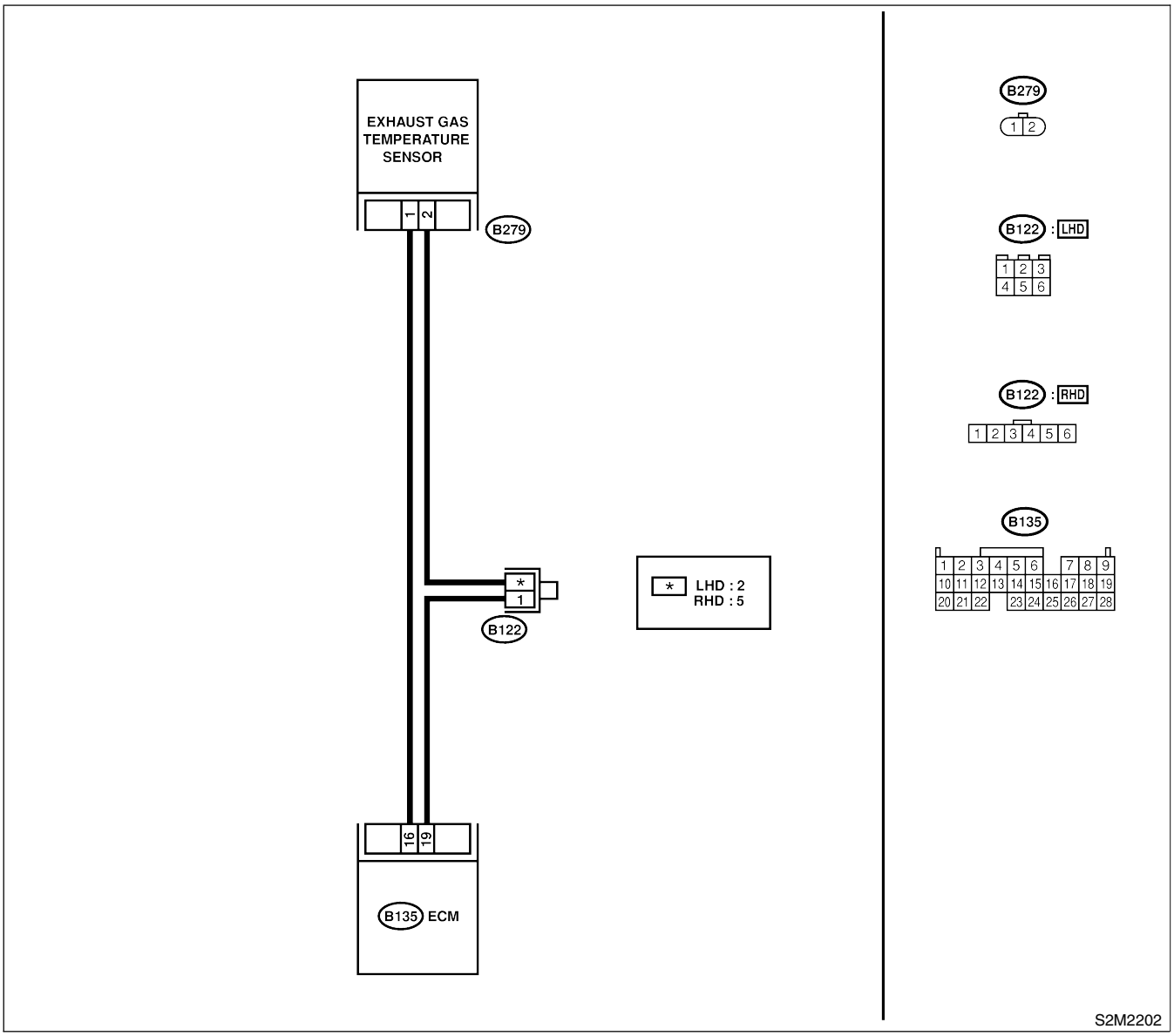
CJ: DTC P1301 — FIRE DUE TO INCREASED EXHAUST TEMPERATURE —

S088521H88

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC.** Conduct troubleshooting for all DTC P0301, P0302, P0303 and P0304. <Ref. to EN(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).>	Does failure for repair or replacement exist?	Repair or replace failure, then replace precatalytic converter.	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

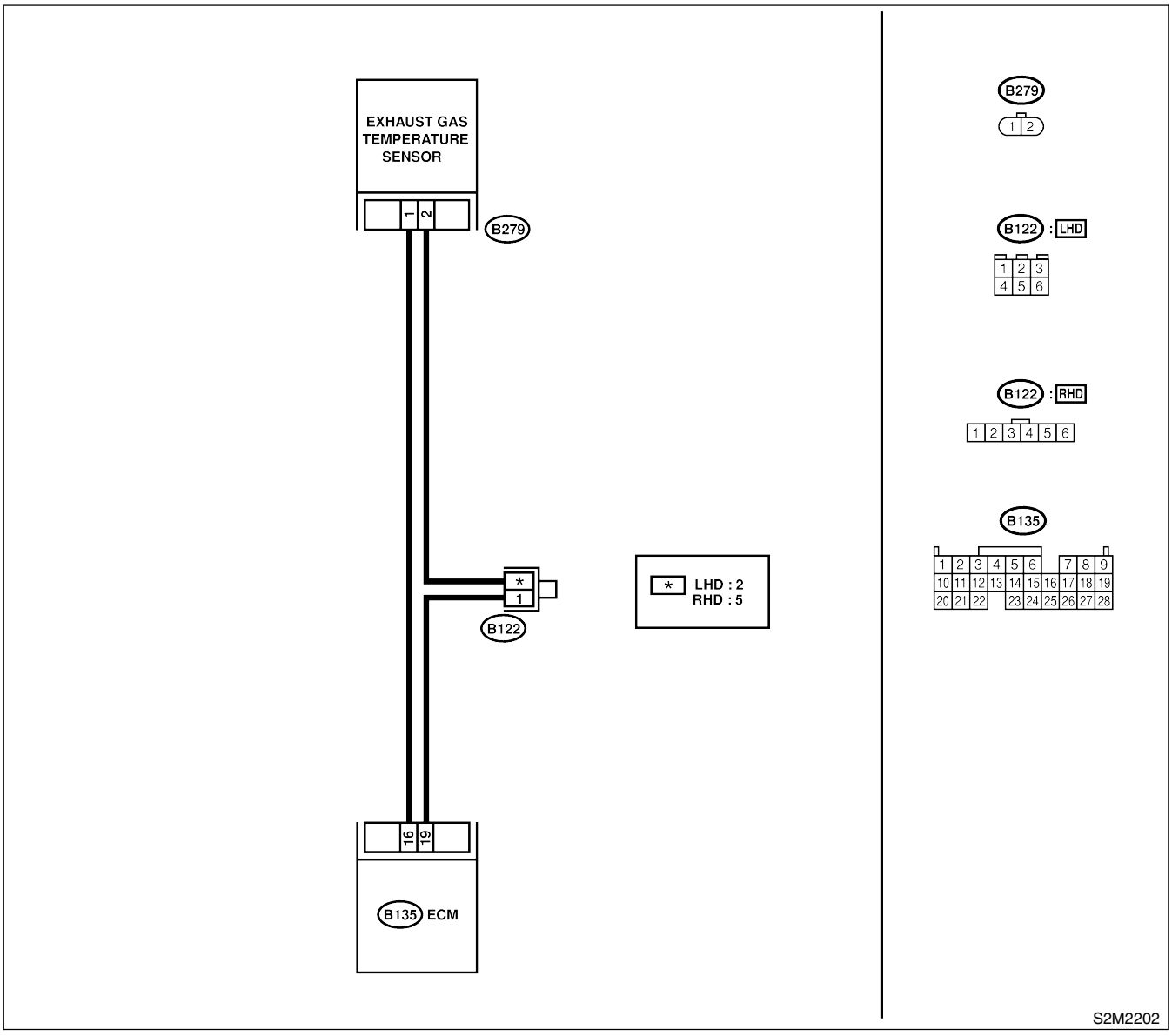
CK: DTC P1312 — EXHAUST GAS TEMPERATURE CIRCUIT MALFUNCTION

S088521H89

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



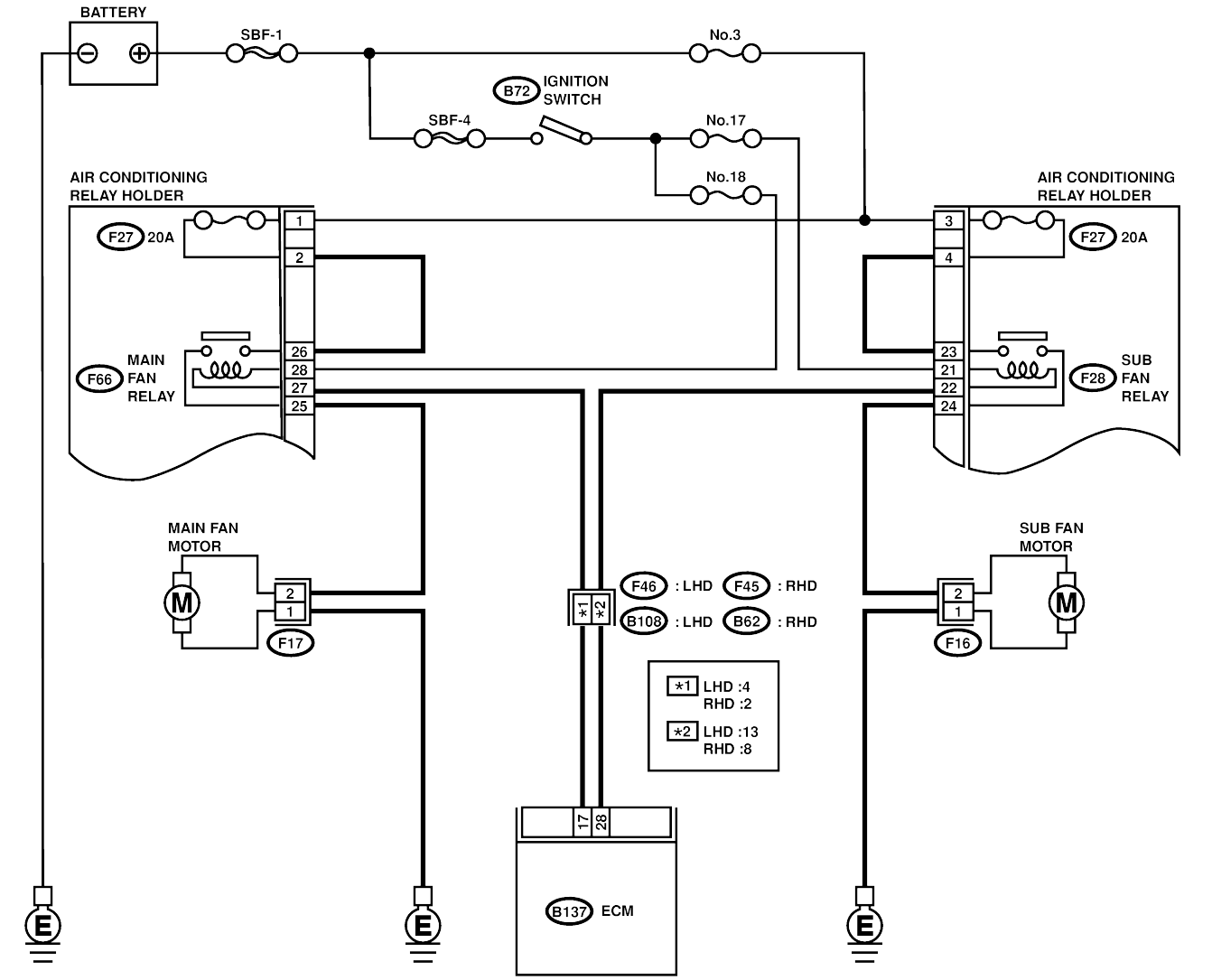
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0545, P0546 or P1544?	Inspect DTC P0545, P0546 or P1544 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P1312.	Replace exhaust gas temperature sensor. <Ref. to FU(DOHC TURBO)-46, Exhaust Temperature Sensor.>

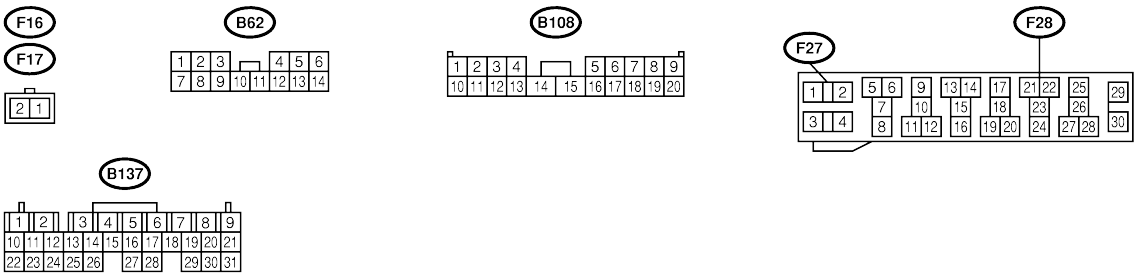
CL: DTC P1480 — COOLING FAN RELAY 1 CIRCUIT HIGH INPUT — S088521G08

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

• WIRING DIAGRAM:





S2M2199

No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn ignition switch to OFF. 2) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box. 3) Turn ignition switch to ON. 4) While operating radiator fan relay, measure voltage between ECM and chassis ground. NOTE: Radiator fan relay operation can be executed using Subaru Select Monitor. For procedure, refer to "Compulsory Valve Operation Check Mode".<Ref. to EN(DOHC TURBO)-48, Compulsory Valve Operation Check Mode.> ***Connector & terminal*** ***(B137) No. 17 (+) — Chassis ground (–):*** ***(B137) No. 28 (+) — Chassis ground (–):***	Does voltage change between 0 and 10 V?	Even if MIL lights up, the circuit has returned to a normal condition at this time. In this case, repair poor contact in ECM connector.	Go to step **2**.
2	**CHECK SHORT CIRCUIT IN RADIATOR FAN RELAY CONTROL CIRCUIT.** 1) Turn ignition switch to OFF. 2) Remove main fan relay and sub fan relay. (with A/C models) 3) Disconnect test mode connector. 4) Turn ignition switch to ON. 5) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 17 (+) — Chassis ground (–):*** ***(B137) No. 28 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair battery short circuit in radiator fan relay control circuit. After repair, replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>	Go to step **3**.
3	**CHECK MAIN FAN RELAY.** 1) Turn ignition switch to OFF. 2) Remove main fan relay. 3) Measure resistance of main fan relay. ***Terminal*** ***No. 26 — No. 25:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Replace main fan relay and ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>
4	**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 **5**.	Replace main fan relay and ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>
5	**CHECK SUB FAN RELAY.** 1) Turn ignition switch to OFF. 2) Measure resistance of main fan relay. ***Terminal*** ***No. 17 — No. 18:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Replace sub fan relay and ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>

No.	Step	Check	Yes	No
6	**CHECK SUB FAN RELAY.** 1) Connect battery to terminals No. 20 and No. 19 of sub fan relay. 2) Measure resistance of main fan relay. ***Terminal*** ***No. 17— No. 18:***	Is the resistance less than 1 Ω?	Go to step **7**.	Replace sub fan relay and ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>
7	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>

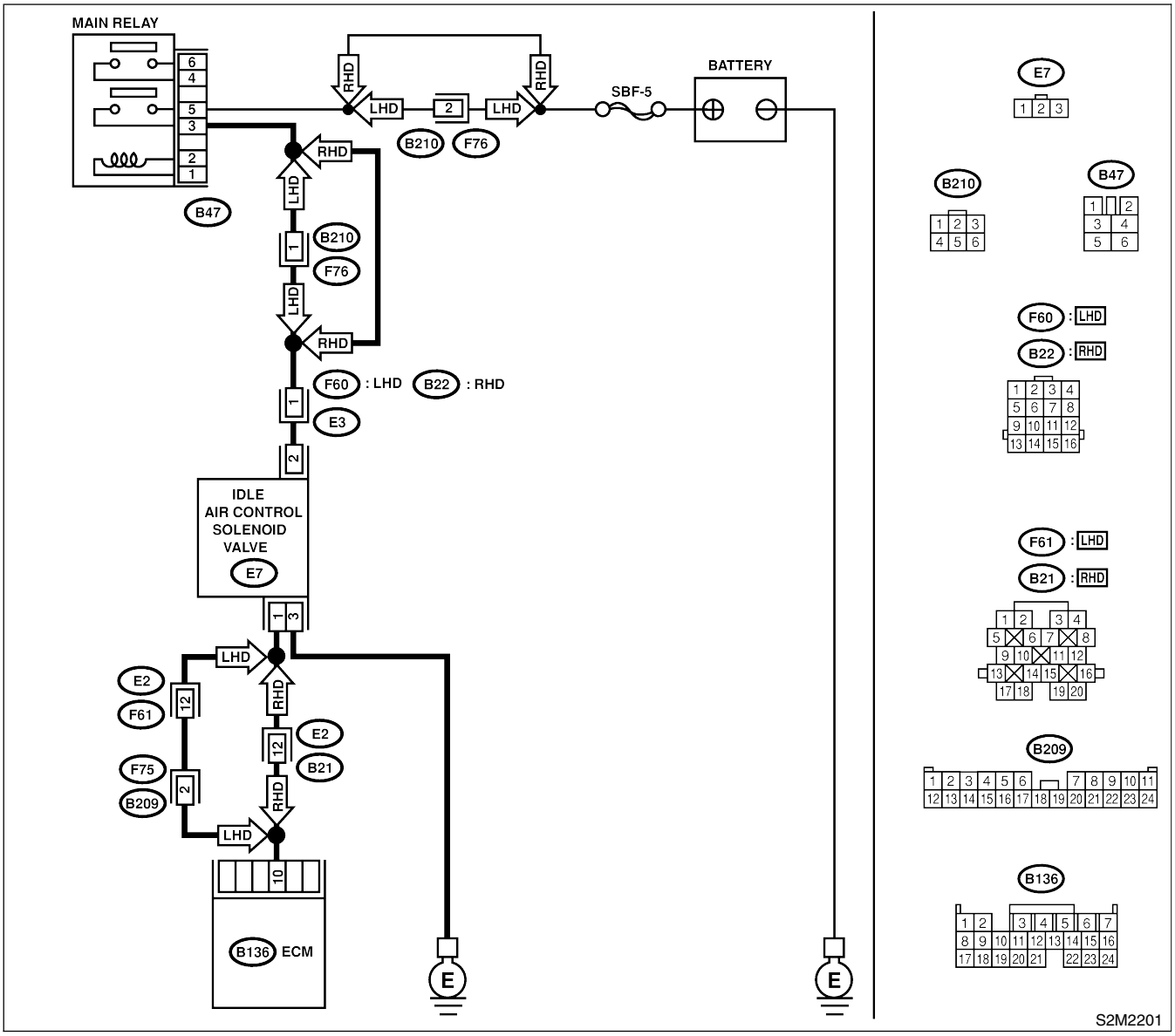
CM: DTC P1507 — IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE) —

S088521C16

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Engine keeps running at higher revolution than specified idling revolution.
  - Fuel is cut according to fail-safe function.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



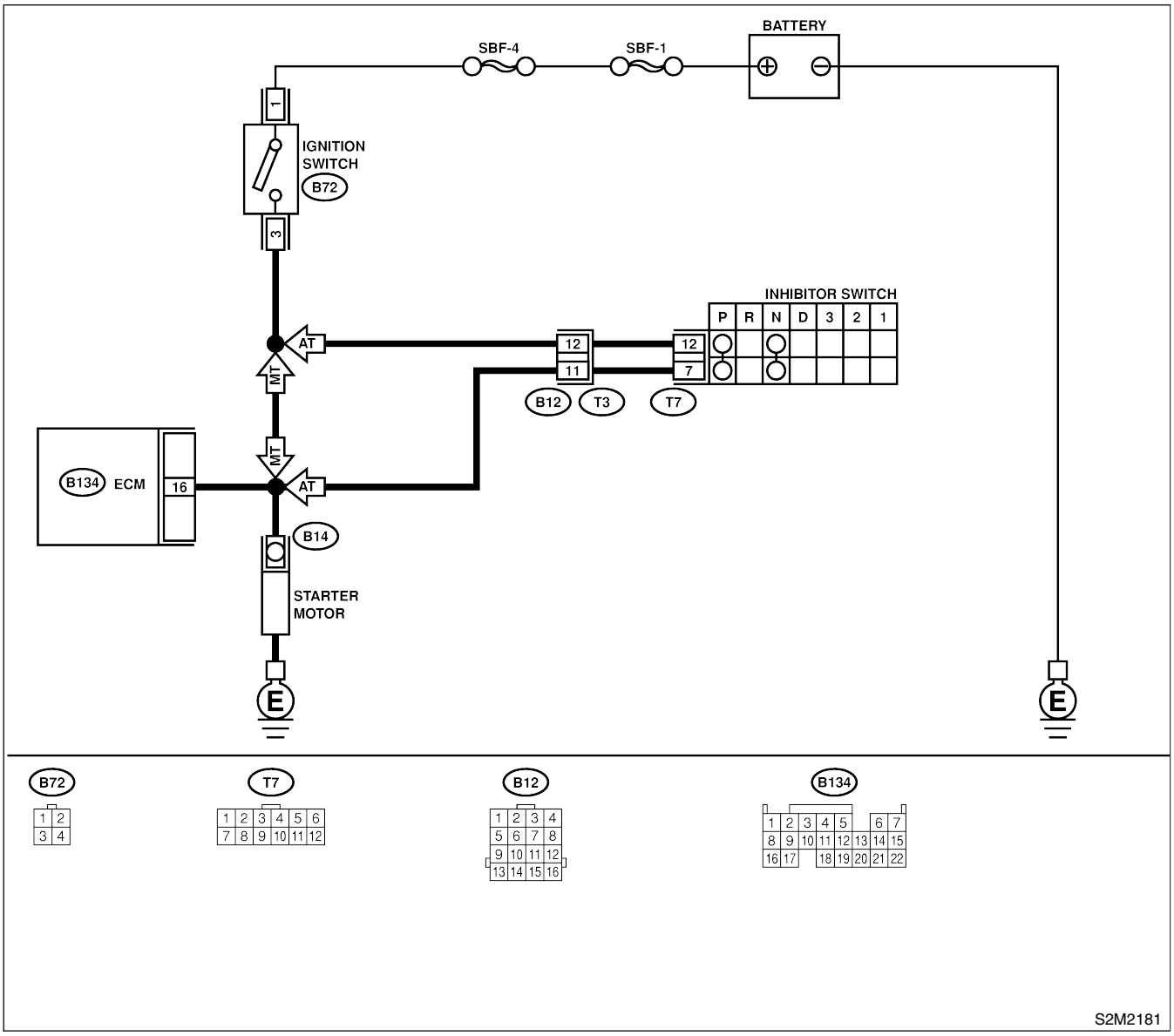
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0506, P0507, P0508, P0509 or P1142?	Inspect DTC P0506, P0507, P0508, P0509 or P1142 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(DOHC TURBO)-82, List of Diagnostic 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 ignition switch to ON. 2) Start engine, and idle it. 3) Check the following items. ● Loose installation of intake manifold, idle air control solenoid valve and throttle body ● Cracks of intake manifold gasket, idle air control solenoid valve gasket and throttle body gasket ● Disconnections of vacuum hoses	Is there a fault in air intake system?	Repair air suction and leaks.	Go to step **3**.
3	**CHECK THROTTLE CABLE.**	Does throttle cable have play for adjustment?	Go to step **4**.	Adjust throttle cable. <Ref. to SP-12, Accelerator Control Cable.>
4	**CHECK AIR BY-PASS LINE.** 1) Turn ignition switch to OFF. 2) Remove idle air control solenoid valve from throttle body. <Ref. to FU(DOHC TURBO)-36, 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 idle air control solenoid valve. <Ref. to FU(DOHC TURBO)-36, Idle Air Control Solenoid Valve.>

CN: DTC P1518 — STARTER SWITCH CIRCUIT LOW INPUT — S088521G09

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



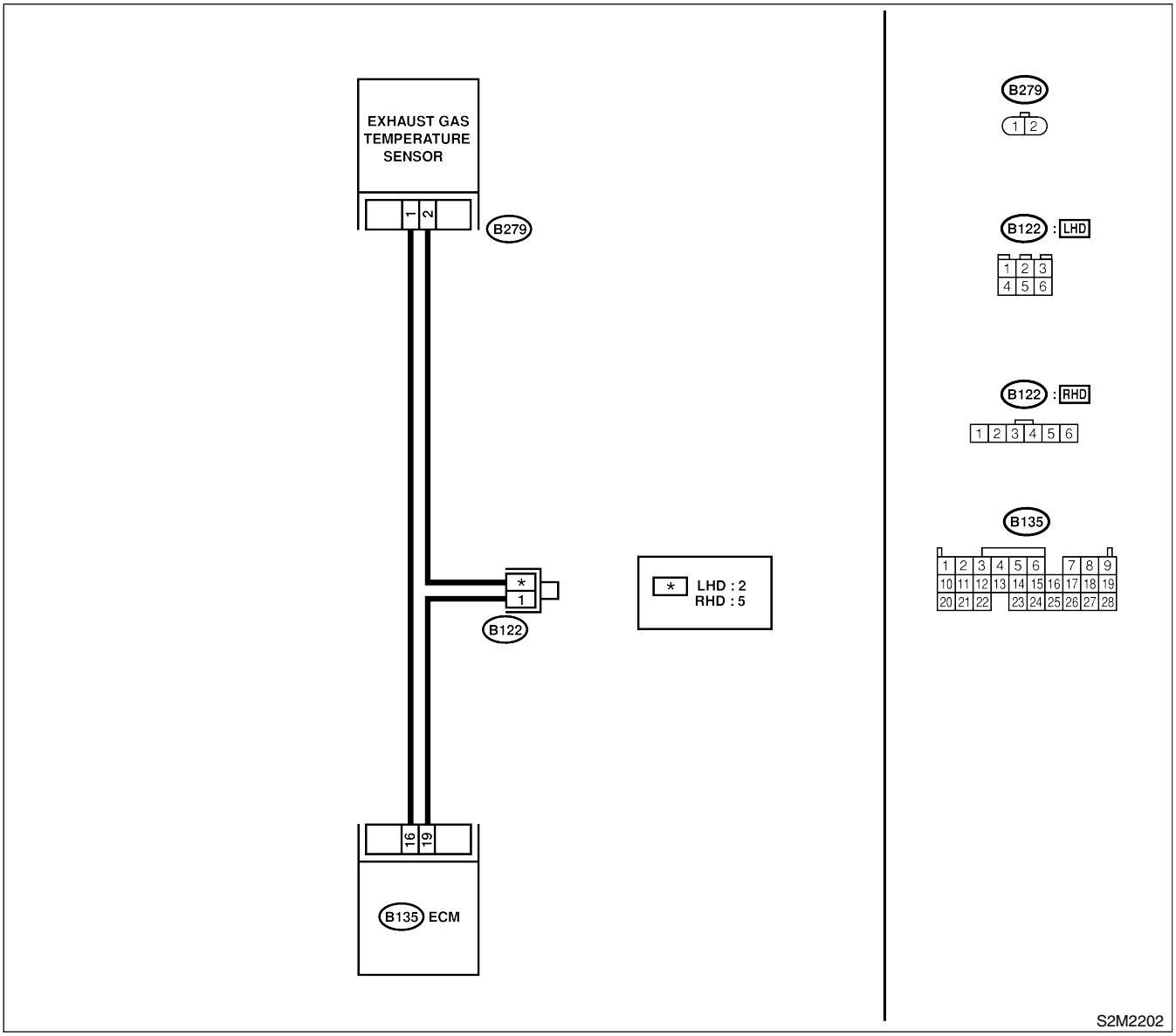
No.	Step	Check	Yes	No
1	**CHECK OPERATION OF STARTER MOTOR.** NOTE: Place the inhibitor switch in the “P” or “N” position (AT model).	Does starter motor operate when ignition switch to “ST”?	Repair harness and connector. NOTE: In this case, repair the following: ● Open or ground short circuit in harness between ECM and starter motor connector. ● Poor contact in ECM connector.	Check starter motor circuit. <Ref. to EN(DOHC TURBO)-64, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

CO: DTC P1544 — HIGH EXHAUST TEMPERATURE DETECTED — S088521H90

- **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(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**



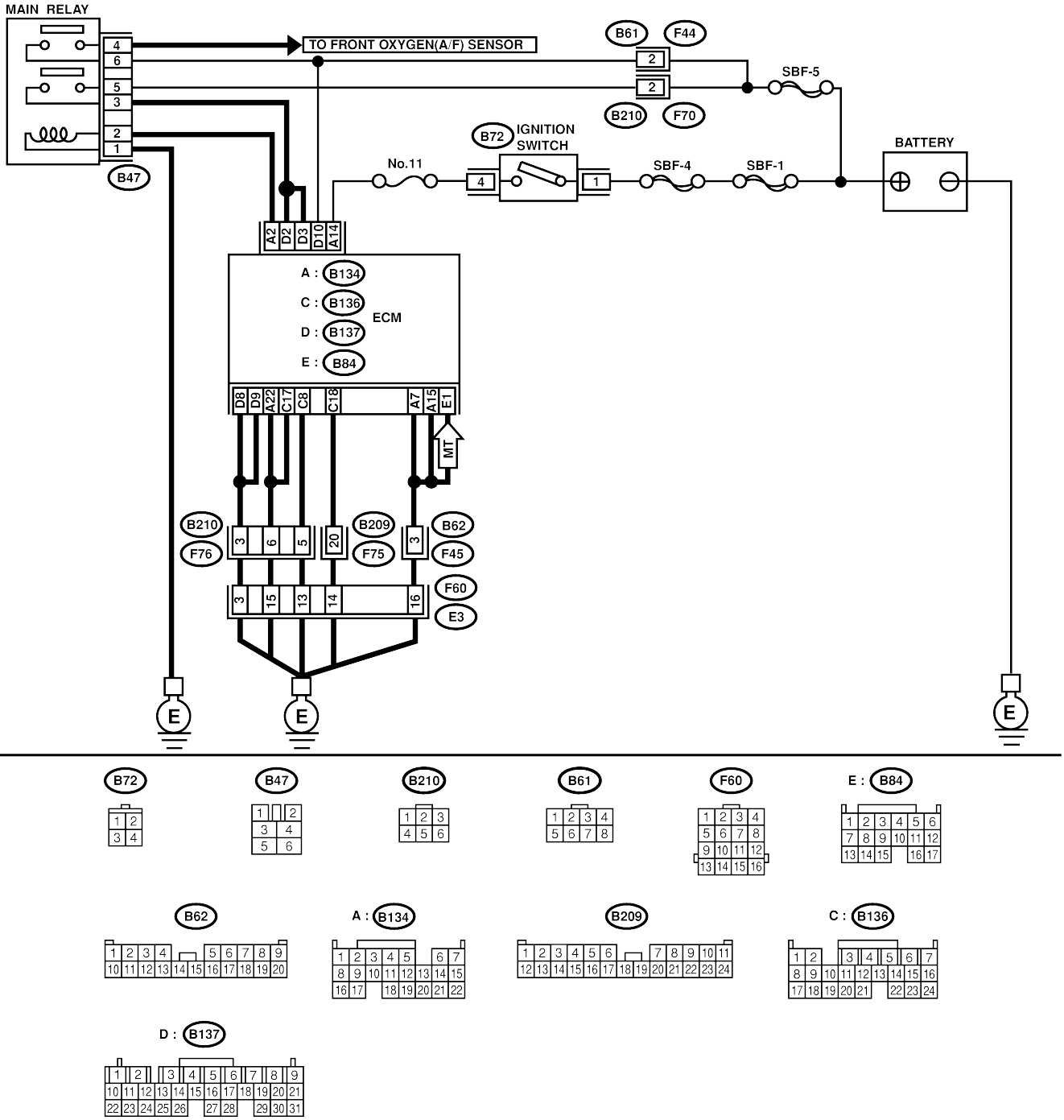
No.	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0335, P0336, P0340, P0341, P0545, P0546, P1312, P0102, P0103, P0101, P1141, P0301, P0302, P0303, P0304, P1301, P0171, P0133, P1134, P0131, P0132, P1130, P1131, P1139, P0031, P0032, P0139, P0136, P0039 or P0037?	Inspect DTC P0335, P0336, P0340, P0341, P0545, P0546, P1312, P0102, P0103, P0101, P1141, P0301, P0302, P0303, P0304, P1301, P0171, P0133, P1134, P0131, P0132, P1130, P1131, P1139, P0031, P0032, P0139, P0136, P0039 or P0037 using List of Diagnostic Trouble Code (DTC). <Ref. to EN(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P1544.	Go to step **2**.
2	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. • Loose installation of exhaust manifold • Cracks or hole of exhaust manifold • Loose installation of front oxygen (A/F) sensor	Is there a fault in exhaust system?	Repair or replace failure, then replace precatalytic converter.	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

CP: DTC P1560 — BACK-UP VOLTAGE CIRCUIT MALFUNCTION — S088521C27

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

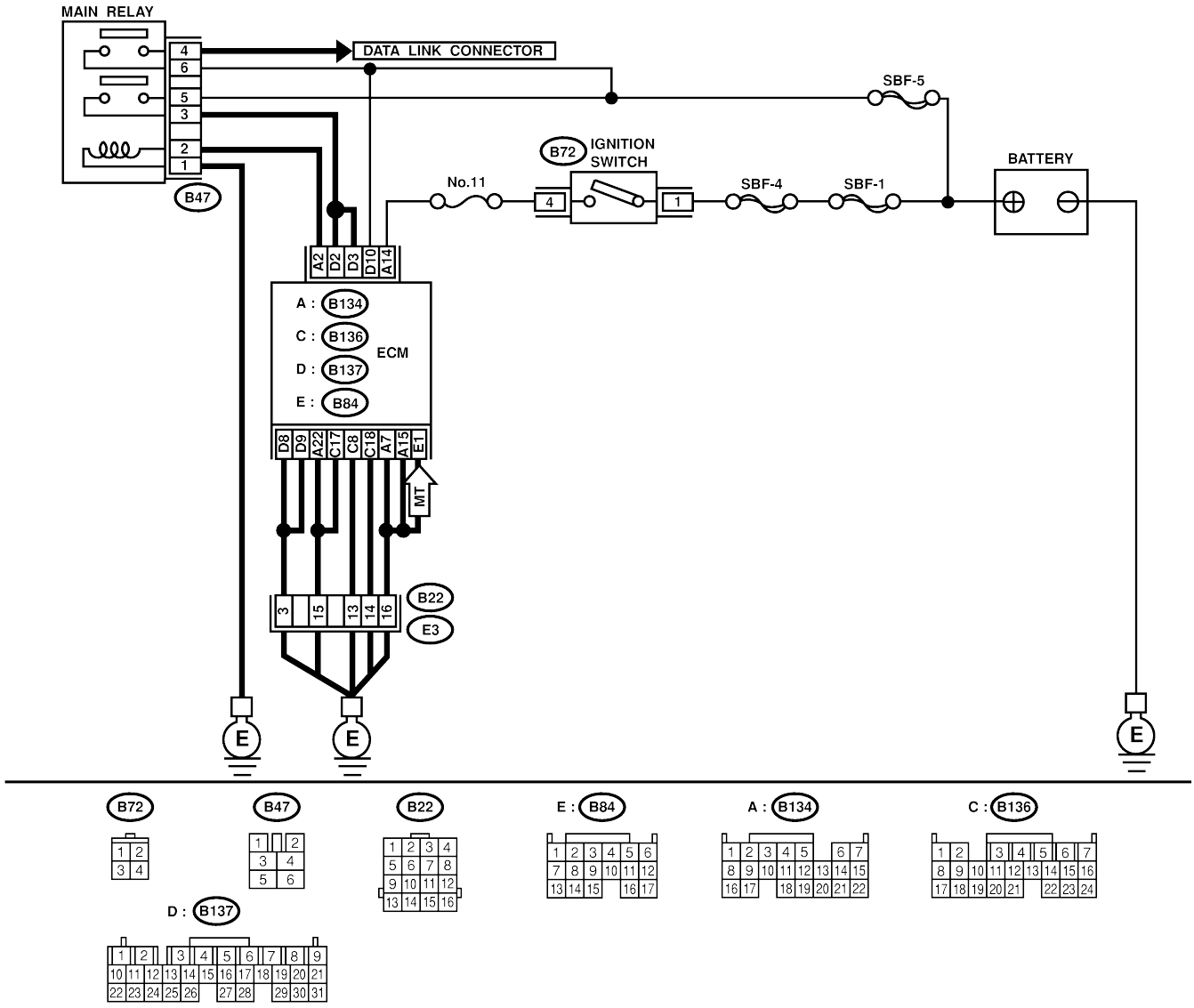
CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(DOHC TURBO)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(DOHC TURBO)-44, Inspection Mode.>.

- **WIRING DIAGRAM:**
- **LHD MODEL**



S2M2182

- **RHD MODEL**



S2M2183

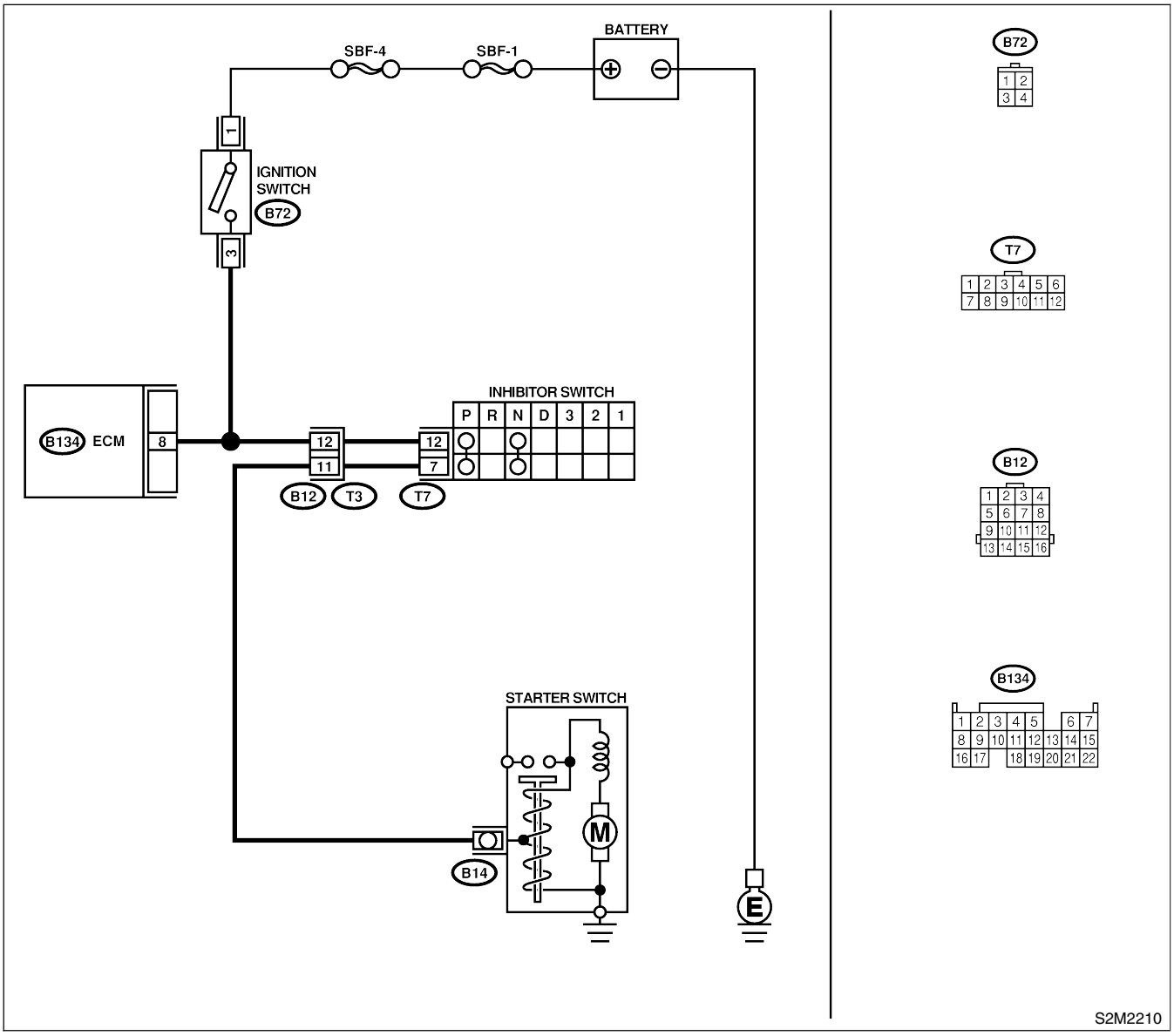
No.	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn ignition switch to OFF. 2) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 10 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair poor contact in ECM connector.	Go to step **2**.
2	**CHECK HARNESS BETWEEN ECM AND MAIN FUSE BOX CONNECTOR.** 1) Disconnect connector from ECM. 2) Measure resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 10 — 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 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

CQ: DTC P1590 — NEUTRAL POSITION SWITCH CIRCUIT HIGH INPUT (AT MODEL) — S088521G83

- **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(SOHC)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-44, 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(SOHC)-82, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground in selector lever "N" and "P" positions. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **3**.	Go to step **5**.
3	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM and chassis ground in selector lever except for "N" and "P" positions. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (–):***	Is the voltage between 4.5 and 5.5 V?	Go to step **4**.	Go to step **5**.
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
5	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and inhibitor switch connector.	Go to step **6**.
6	**CHECK HARNESS BETWEEN ECM AND INHIBITOR SWITCH CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from ECM and inhibitor switch. 3) Measure resistance of harness between ECM and inhibitor switch connector. ***Connector & terminal*** ***(B134) No. 8 — (T7) No. 12:***	Is the resistance less than 1 Ω?	Go to step **7**.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and inhibitor switch connector • Poor contact in coupling connector • Poor contact in inhibitor switch connector • Poor contact in ECM connector

No.	Step	Check	Yes	No
7	**CHECK INHIBITOR SWITCH GROUND LINE.** Measure resistance of harness between inhibitor switch connector and engine ground. ***Connector & terminal*** ***(T7) No. 7 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **8**.	Repair open circuit in harness between inhibitor switch connector and starter motor ground line. NOTE: In this case, repair the following: • Open circuit in harness between inhibitor switch connector and starter motor ground line • Poor contact in starter motor connector • Poor contact in starter motor ground • Starter motor
8	**CHECK INHIBITOR SWITCH.** Measure resistance between inhibitor switch connector receptacle's terminals in selector lever "N" and "P" positions. ***Terminals*** ***No. 7 — No. 12:***	Is the resistance less than 1 Ω?	Go to step **9**.	Replace inhibitor switch. <Ref. to AT-28, Inhibitor Switch.>
9	**CHECK SELECTOR CABLE CONNECTION.**	Is there any fault in selector cable connection to inhibitor switch?	Repair selector cable connection. <Ref. to CS-10, Select Cable.>	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

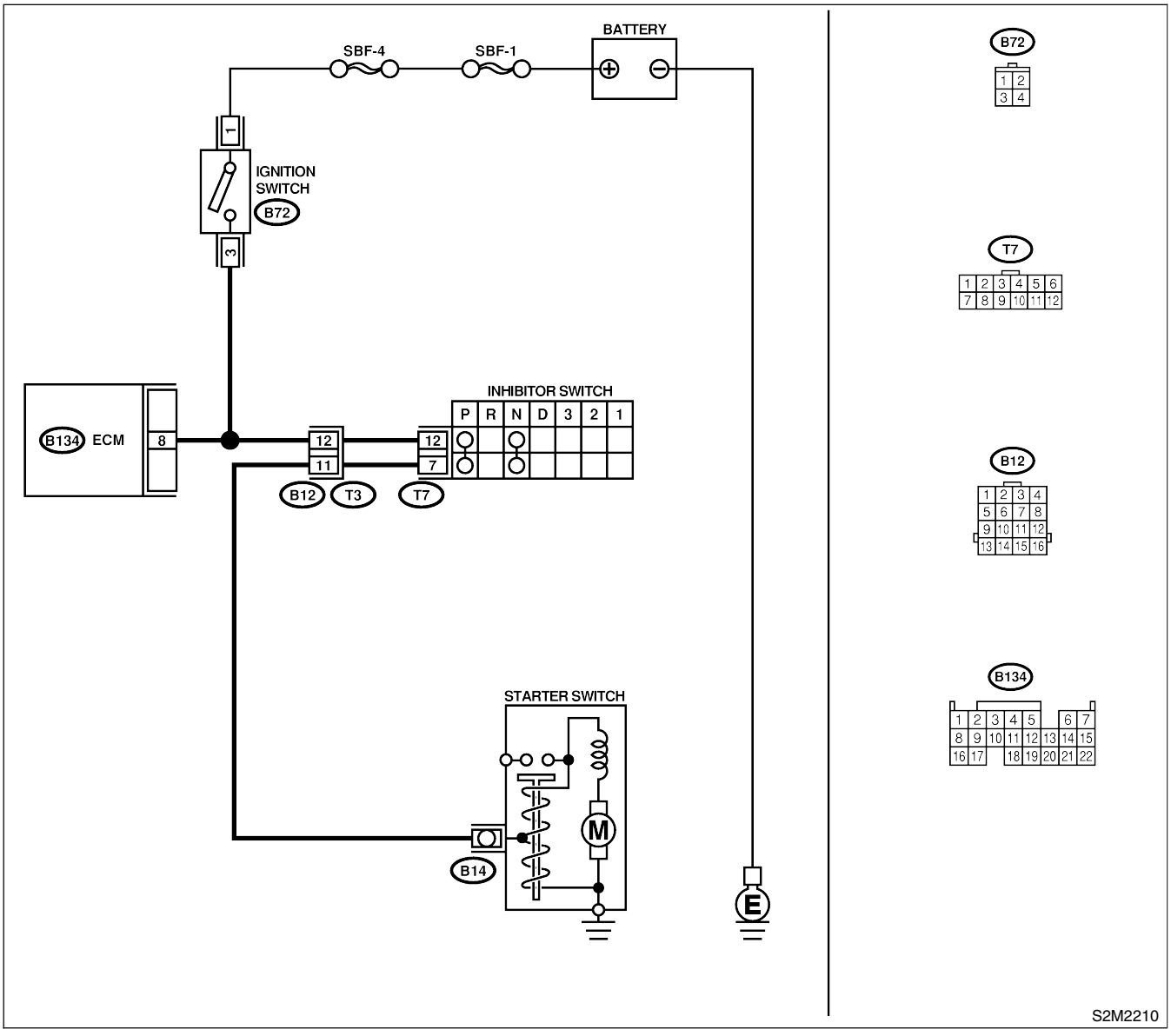
MEMO:

CR: DTC P1591 — NEUTRAL POSITION SWITCH CIRCUIT LOW INPUT (AT MODEL) — S088521G84

- **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(SOHC)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-44, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



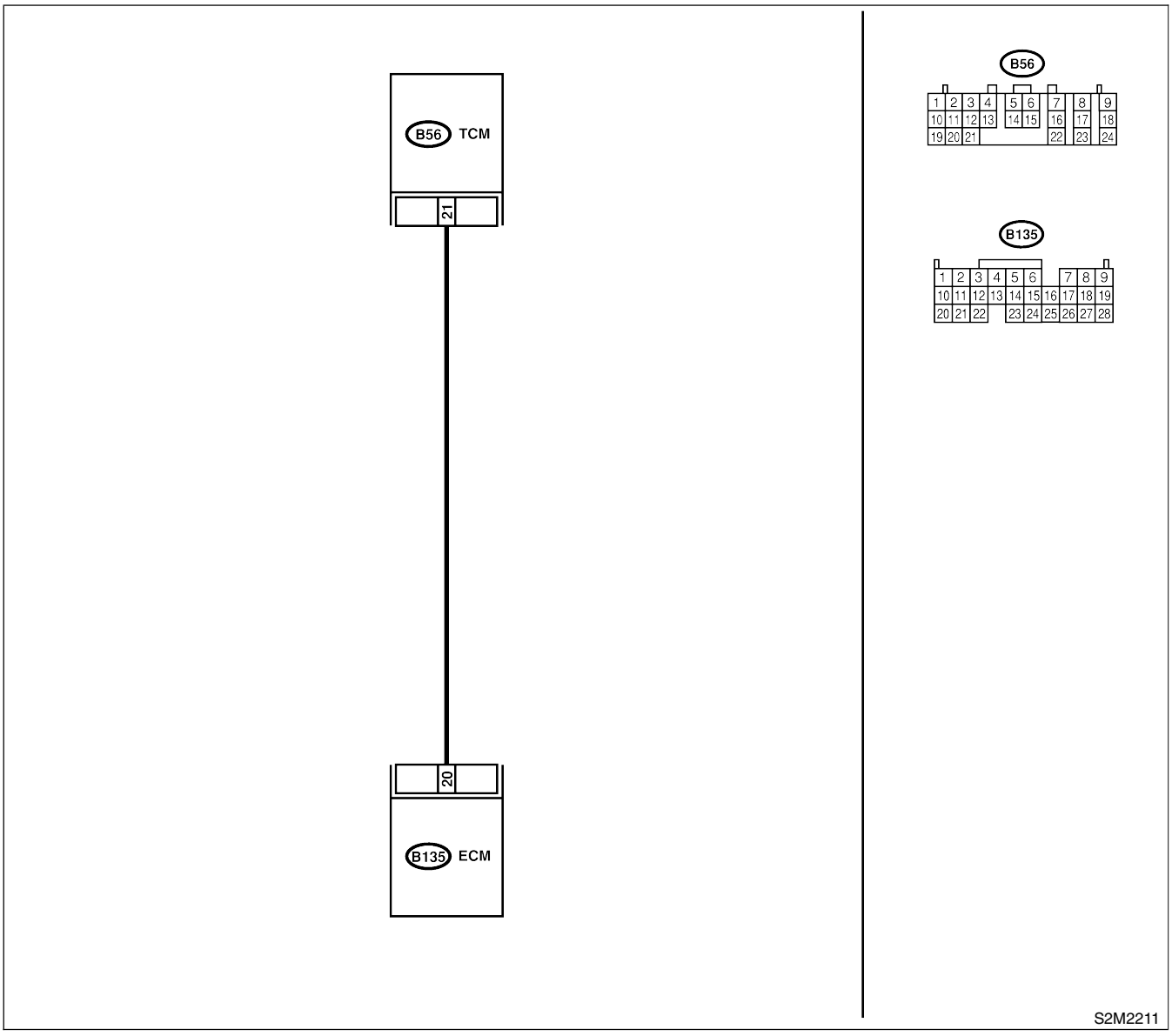
No.	Step	Check	Yes	No
1	**CHECK DTC P0705 ON DISPLAY.**	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0705?	Inspect DTC P0705 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(SOHC)-82, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (–):***	Is the voltage between 4.5 and 5.5 V at except "N" and "P" positions?	Even if MIL lights up, the circuit has returned to a normal condition at this time.	Go to step **3**.
3	**CHECK HARNESS BETWEEN ECM AND TRANSMISSION HARNESS CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from ECM and transmission harness connector (T3). 3) Measure resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 8 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between ECM and transmission harness connector.	Go to step **4**.
4	**CHECK TRANSMISSION HARNESS CONNECTOR.** 1) Disconnect connector from inhibitor switch. 2) Measure resistance of harness between transmission harness connector and engine ground. ***Connector & terminal*** ***(T3) No. 12 — Engine ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between transmission harness and inhibitor switch connector.	Go to step **5**.
5	**CHECK INHIBITOR SWITCH.** Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "N" position. ***Terminals*** ***No. 7 — No. 12:***	Is the resistance more than 1 MΩ at except "N" and "P" positions?	Go to step **6**.	Replace inhibitor switch. <Ref. to AT-28, Inhibitor Switch.>
6	**CHECK SELECTOR CABLE CONNECTION.**	Is there any fault in selector cable connection to inhibitor switch?	Repair selector cable connection. <Ref. to CS-10, Select Cable.>	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

CS: DTC P1594 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT MALFUNCTION — S088521G12

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-44, 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 AT shift control functioning properly?	Go to step **2**.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

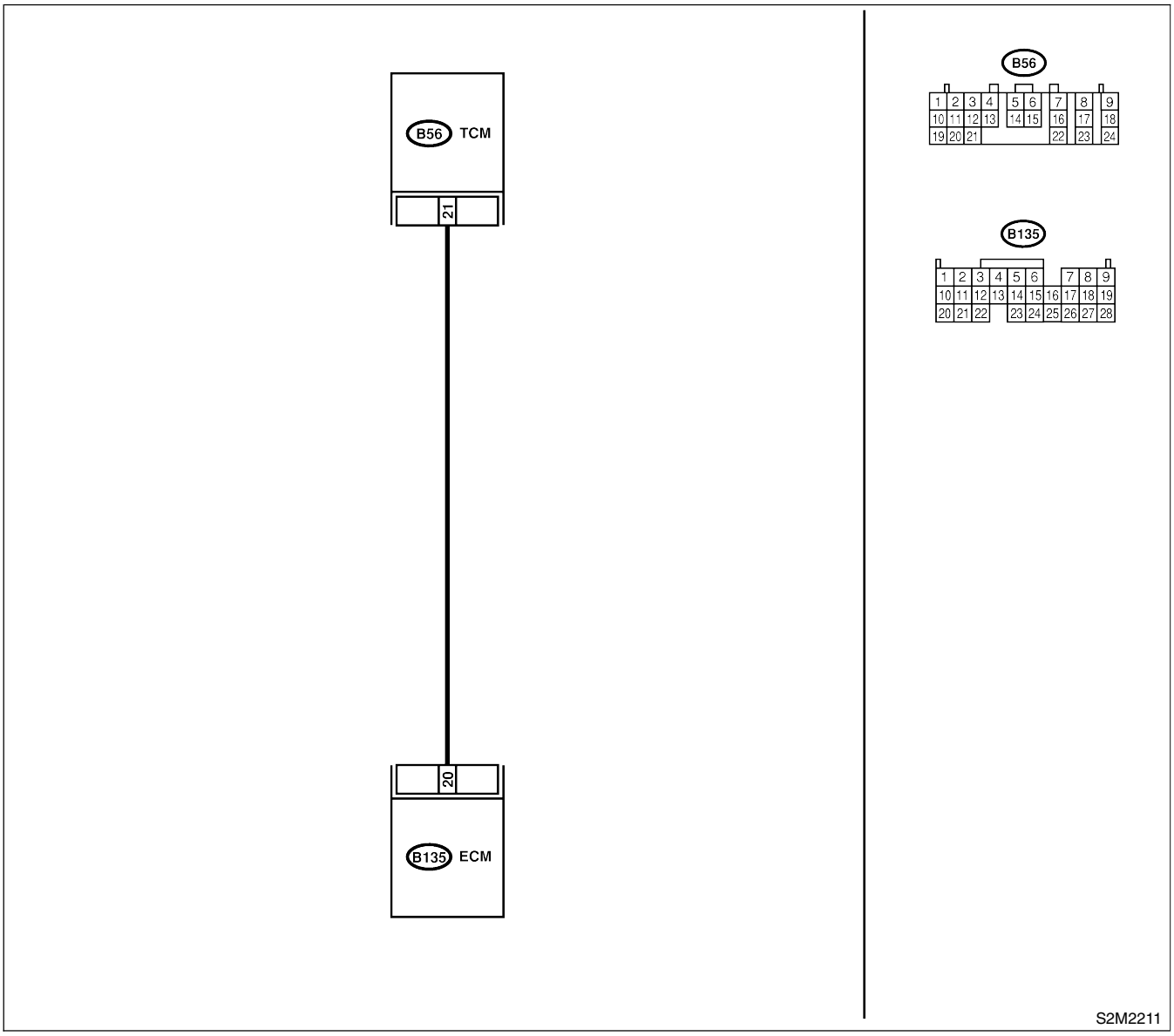
No.	Step	Check	Yes	No
2	**CHECK ACCESSORY.**	Are car phone and/or CB installed on vehicle?	Repair grounding line of car phone or CB system.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

CT: DTC P1595 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT LOW INPUT — S088521G13

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-44, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



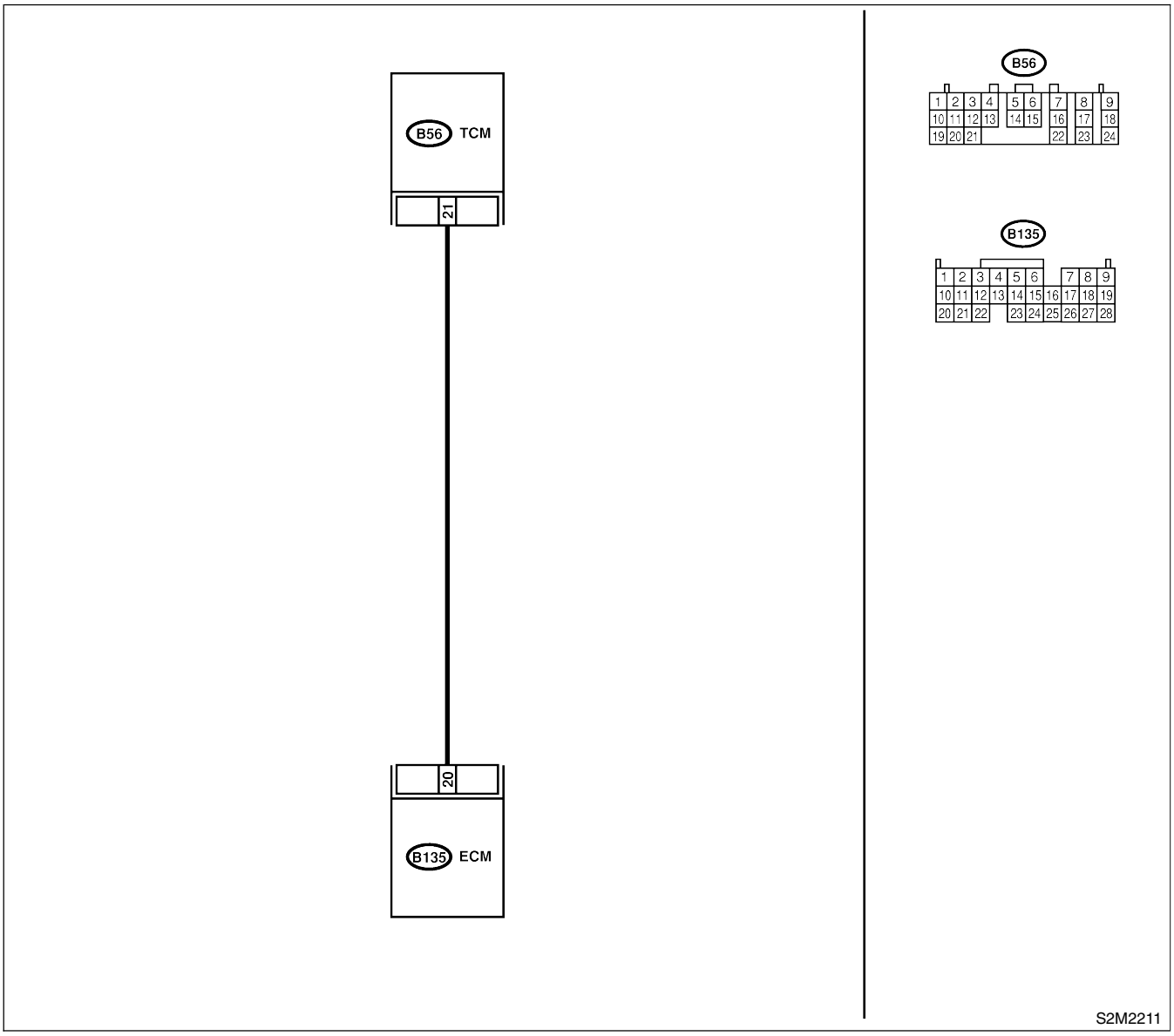
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 20 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **2**.	Even if MIL lights up, the circuit has returned to a normal condition at this time. NOTE: In this case, repair the following: • Poor contact in ECM connector • Poor contact in TCM connector
2	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM and TCM. 3) Measure resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 20 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between ECM and TCM connector.	Go to step **3**.
3	**CHECK OUTPUT SIGNAL FOR ECM.** 1) Connect connector to ECM. 2) Turn ignition switch to ON. 3) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 20 (+) — Chassis ground (–):***	Is the voltage more than 5 V?	Go to step **4**.	Repair poor contact in ECM connector.
4	**CHECK TROUBLE CODE FOR AUTOMATIC TRANSMISSION.** Read trouble code for automatic transmission. <Ref. to AT-22, Read Diagnostic Trouble Code.>	Does trouble code appear for automatic transmission?	Inspect trouble code for automatic transmission. <Ref. to AT-42, Diagnostic Procedure with Trouble Code.>	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

CU: DTC P1596 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT HIGH INPUT — S088521G14

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-44, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



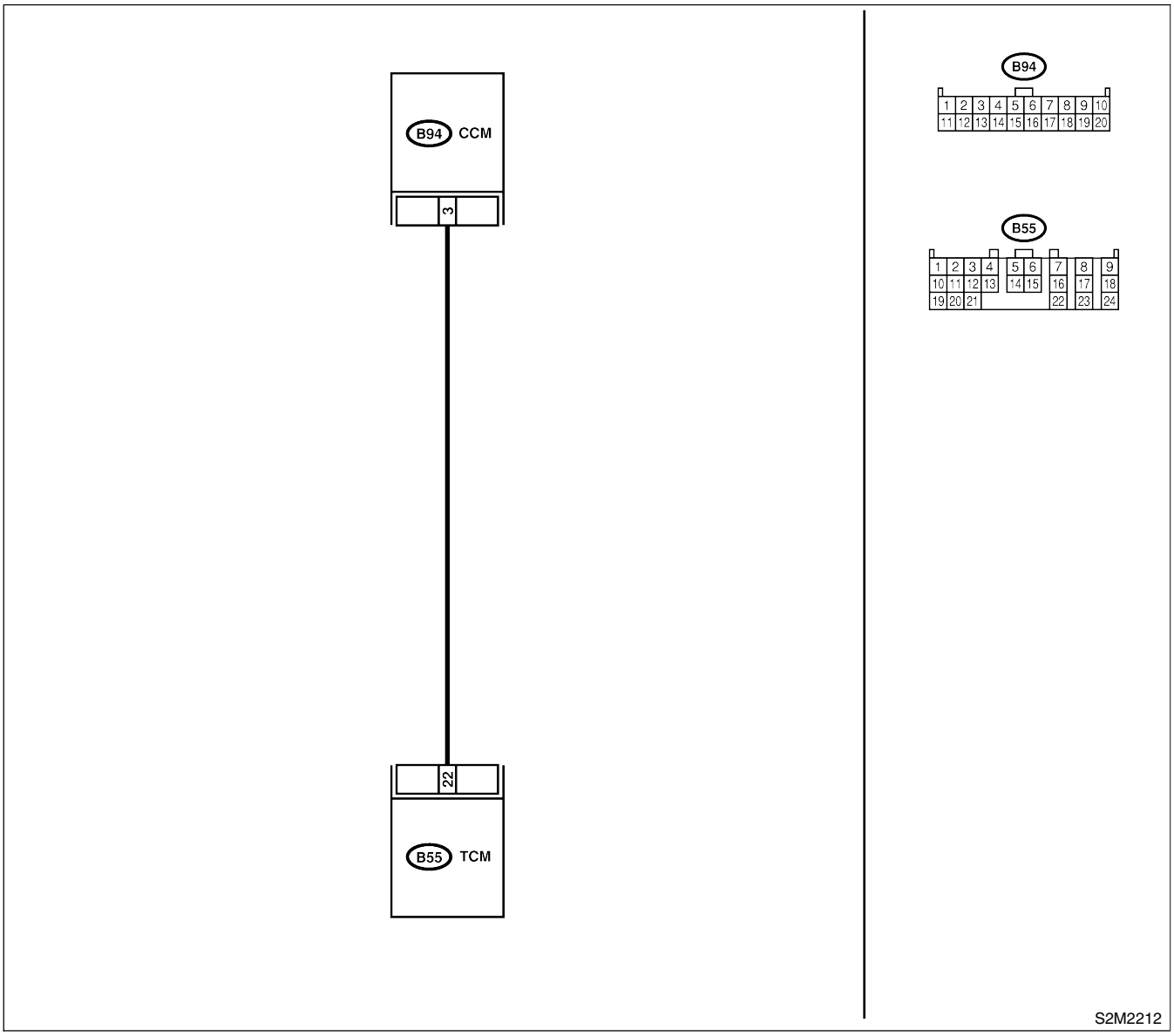
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 20 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and TCM connector.	Go to step **2**.
2	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 20 (+) — Chassis ground (–):***	Is the voltage more than 4 V?	Go to step **5**.	Go to step **3**.
3	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 20 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Repair poor contact in ECM connector.	Go to step **4**.
4	**CHECK OUTPUT SIGNAL FROM ECM.** Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 20 (+) — Chassis ground (–):***	Does the voltage change from 1 V to 4 V while monitoring the value with voltage meter?	Even if MIL lights up, the circuit has returned to a normal condition at this time. NOTE: In this case, repair the following: • Poor contact in ECM connector • Poor contact in TCM connector	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
5	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** Measure voltage between TCM and chassis ground. ***Connector & terminal*** ***(B56) No. 21 (+) — 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.

CV: DTC P1701 — CRUISE CONTROL SET SIGNAL CIRCUIT MALFUNCTION FOR AUTOMATIC TRANSMISSION — S088521C29

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(SOHC)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-44, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



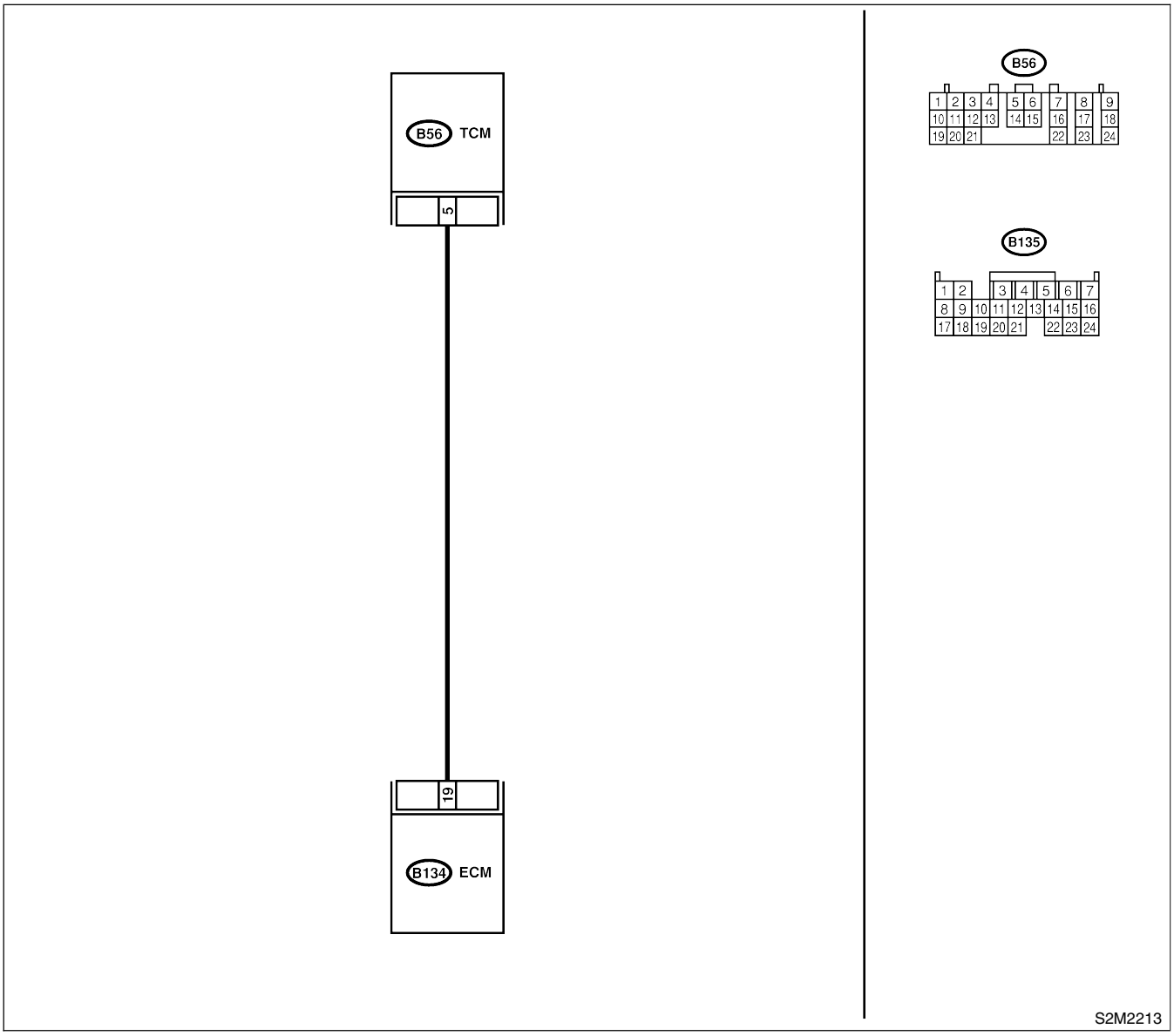
No.	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN TCM AND CCM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and CCM. 3) Measure resistance of harness between TCM and CCM connector. ***Connector & terminal*** ***(B55) No. 22 — (B94) No. 3:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair open circuit in harness between TCM and CCM connector.
2	**CHECK HARNESS BETWEEN TCM AND CCM CONNECTOR.** Measure resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 22 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair short circuit in harness between TCM and CCM connector.	Go to step **3**.
3	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect connector to TCM and CCM. 2) Lift-up the vehicle or set the vehicle on free rollers. **CAUTION:** **On AWD models, raise all wheels off ground.** 3) Start the engine. 4) Cruise control main switch to ON. 5) Move selector lever to “D” and slowly increase vehicle speed to 50 km/h (31 MPH). 6) Cruise control command switch to ON. 7) Measure voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 22 (+) — Chassis ground (–):***	Is the resistance less than 1 V?	Go to step **4**.	Check cruise control command switch circuit. <Ref. to CC-10, Cruise Control Command Switch.>
4	**CHECK POOR CONTACT.** Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair poor contact in TCM connector.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

CW: DTC P1711 — ENGINE TORQUE CONTROL SIGNAL 1 CIRCUIT MALFUNCTION — S088521G17

- **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(SOHC)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-44, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



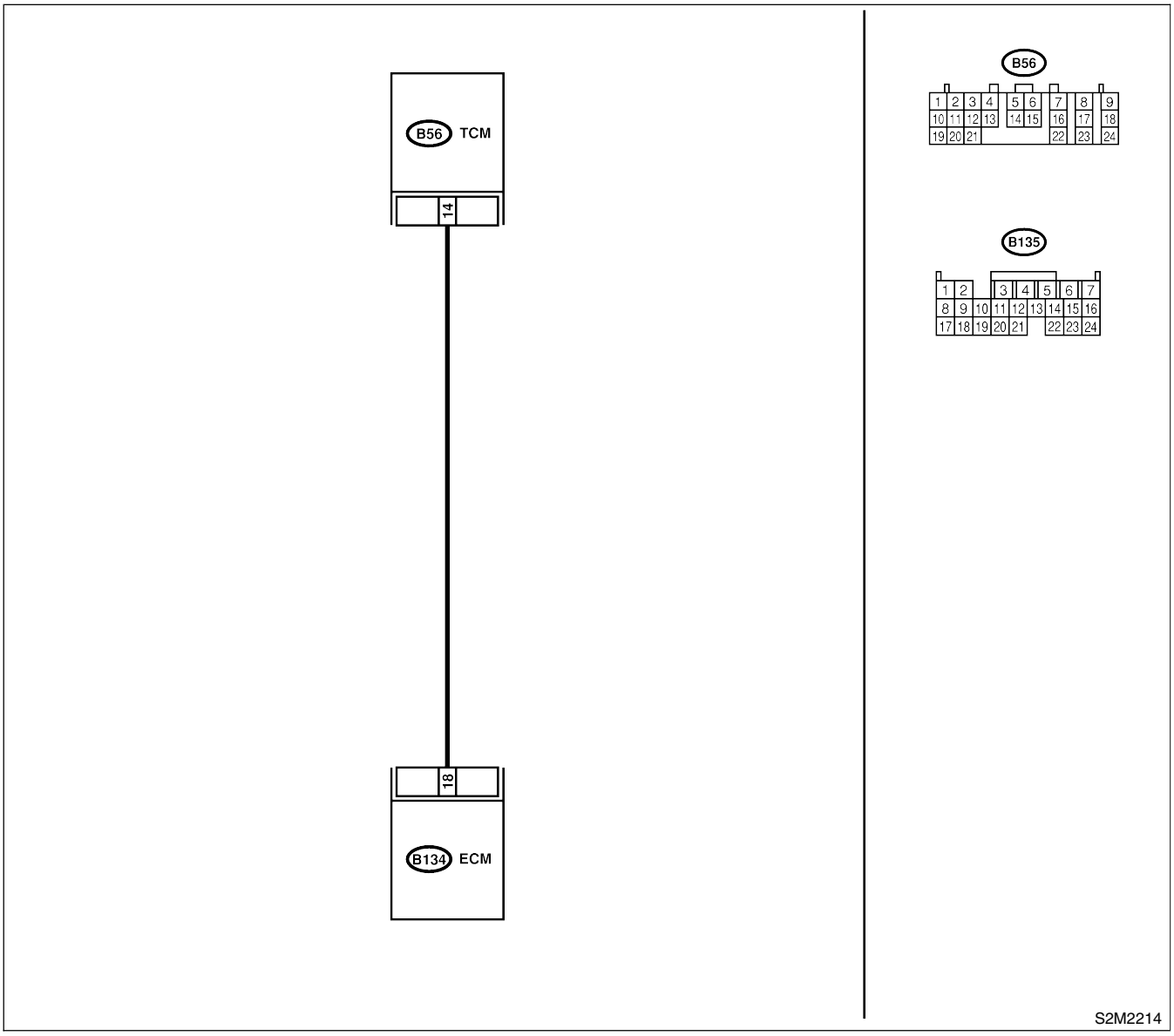
No.	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 19 (+) — Chassis ground (–):***	Is the voltage more than 4.5 V?	Go to step **2**.	Go to step **4**.
2	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 19 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and TCM connector.	Go to step **3**.
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(DOHC TURBO)-49, Engine Control Module.>
4	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from ECM and TCM. 3) Measure resistance of harness between ECM and TCM connector. ***Connector & terminal*** ***(B134) No. 19 — (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 resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 19 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between ECM and TCM connector.	Go to step **6**.
6	**CHECK POOR CONTACT.** Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair poor contact in TCM connector.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

CX: DTC P1712 — ENGINE TORQUE CONTROL SIGNAL 2 CIRCUIT MALFUNCTION — S088521G18

- **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(SOHC)-47, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(SOHC)-44, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 18 (+) — Chassis ground (–):***	Is the voltage more than 4.5 V?	Go to step **2**.	Go to step **4**.
2	**CHECK INPUT SIGNAL FOR ECM.** Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 18 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and TCM connector.	Go to step **3**.
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(DOHC TURBO)-49, Engine Control Module.>
4	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from ECM and TCM. 3) Measure resistance of harness between ECM and TCM connector. ***Connector & terminal*** ***(B134) No. 18 — (B56) No. 14:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair open circuit in harness between ECM and TCM connector.
5	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** Measure resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 18 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between ECM and TCM connector.	Go to step **6**.
6	**CHECK POOR CONTACT.** Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair poor contact in TCM connector.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

19. General Diagnostic Table S088257

A: INSPECTION S088257A10

1. ENGINE S088257A1001

NOTE:
Malfunction of parts other than those listed is also possible. <Ref. to ME(DOHC TURBO)-91, Engine Trouble in General.>

Symptom	Problem parts
1. Engine stalls during idling.	1) Idle air control solenoid valve 2) Pressure sensor 3) Mass air flow and intake temperature sensor 4) Ignition parts (*1) 5) Engine coolant temperature sensor (*2) 6) Crankshaft position sensor (*3) 7) Camshaft position sensor (*3) 8) Fuel injection parts (*4)
2. Rough idling	1) Idle air control solenoid valve 2) Pressure sensor 3) Mass air flow and intake temperature sensor 4) Engine coolant temperature sensor (*2) 5) Ignition parts (*1) 6) Air intake system (*5) 7) Fuel injection parts (*4) 8) Throttle position sensor 9) Crankshaft position sensor (*3) 10) Camshaft position sensor (*3) 11) Oxygen sensor 12) Fuel pump and fuel pump relay
3. Engine does not return to idle.	1) Idle air control solenoid valve 2) Engine coolant temperature sensor 3) Accelerator cable (*6) 4) Throttle position sensor 5) Pressure sensor 6) Mass air flow and intake air temperature sensor
4. Poor acceleration	1) Pressure sensor 2) Mass air flow and intake temperature sensor 3) Throttle position sensor 4) Fuel injection parts (*4) 5) Fuel pump and fuel pump relay 6) Engine coolant temperature sensor (*2) 7) Crankshaft position sensor (*3) 8) Camshaft position sensor (*3) 9) A/C switch and A/C cut relay 10) Engine torque control signal circuit 11) Ignition parts (*1)
5. Engine stalls or engine sags or hesitates at acceleration.	1) Pressure sensor 2) Mass air flow and intake temperature sensor 3) Engine coolant temperature sensor (*2) 4) Crankshaft position sensor (*3) 5) Camshaft position sensor (*3) 6) Purge control solenoid valve 7) Fuel injection parts (*4) 8) Throttle position sensor 9) Fuel pump and fuel pump relay

Symptom	Problem parts
6. Surge	1) Pressure sensor 2) Mass air flow and intake temperature sensor 3) Engine coolant temperature sensor (*2) 4) Crankshaft position sensor (*3) 5) Camshaft position sensor (*3) 6) Fuel injection parts (*4) 7) Throttle position sensor 8) Fuel pump and fuel pump relay
7. Spark knock	1) Pressure sensor 2) Mass air flow and intake temperature sensor 3) Engine coolant temperature sensor 4) Knock sensor 5) Fuel injection parts (*4) 6) Fuel pump and fuel pump relay
8. After burning in exhaust system	1) Pressure sensor 2) Mass air flow and intake temperature sensor 3) Engine coolant temperature sensor (*2) 4) Fuel injection parts (*4) 5) 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.

GENERAL DIAGNOSTIC TABLE

MEMO:

CONTROL SYSTEMS

CS

Page

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2. Select Lever 7
3. Select Cable 10
4. MT Gear Shift Lever....13
5. MT Drive Select Lever 19
6. Drive Select Cable 21
7. General Diagnostic Table 22

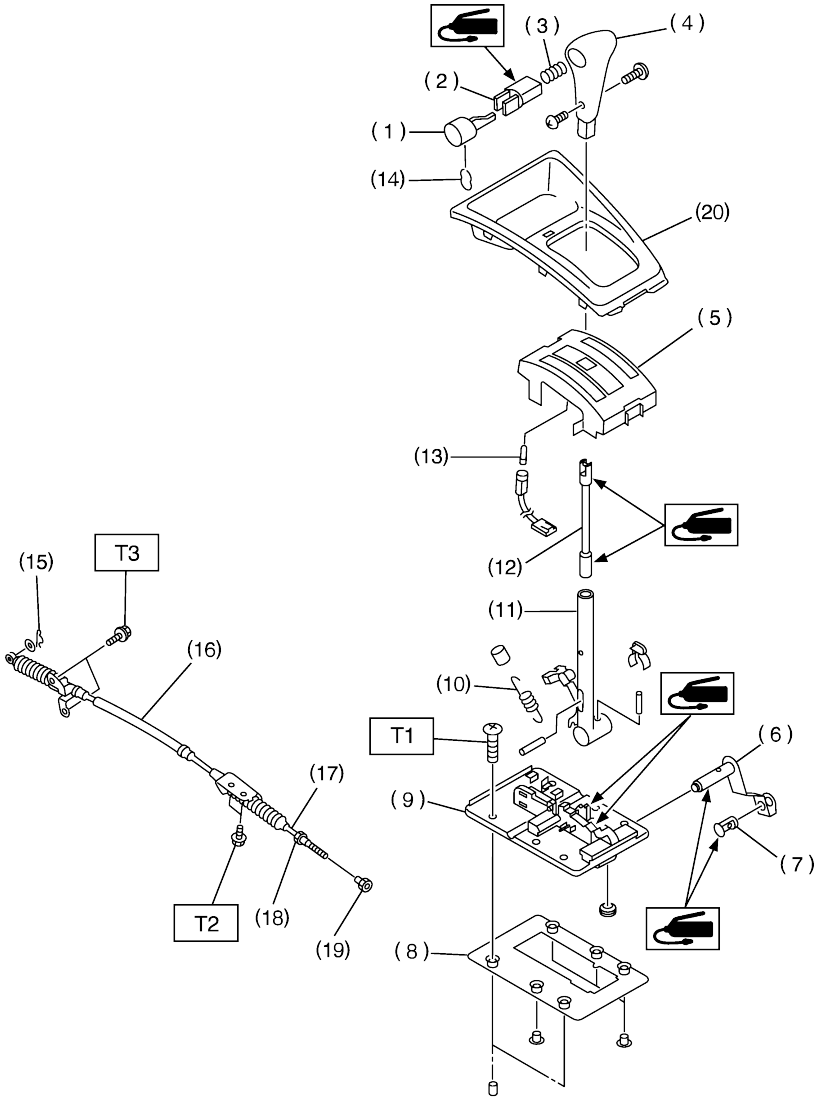
1. General Description S501001

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

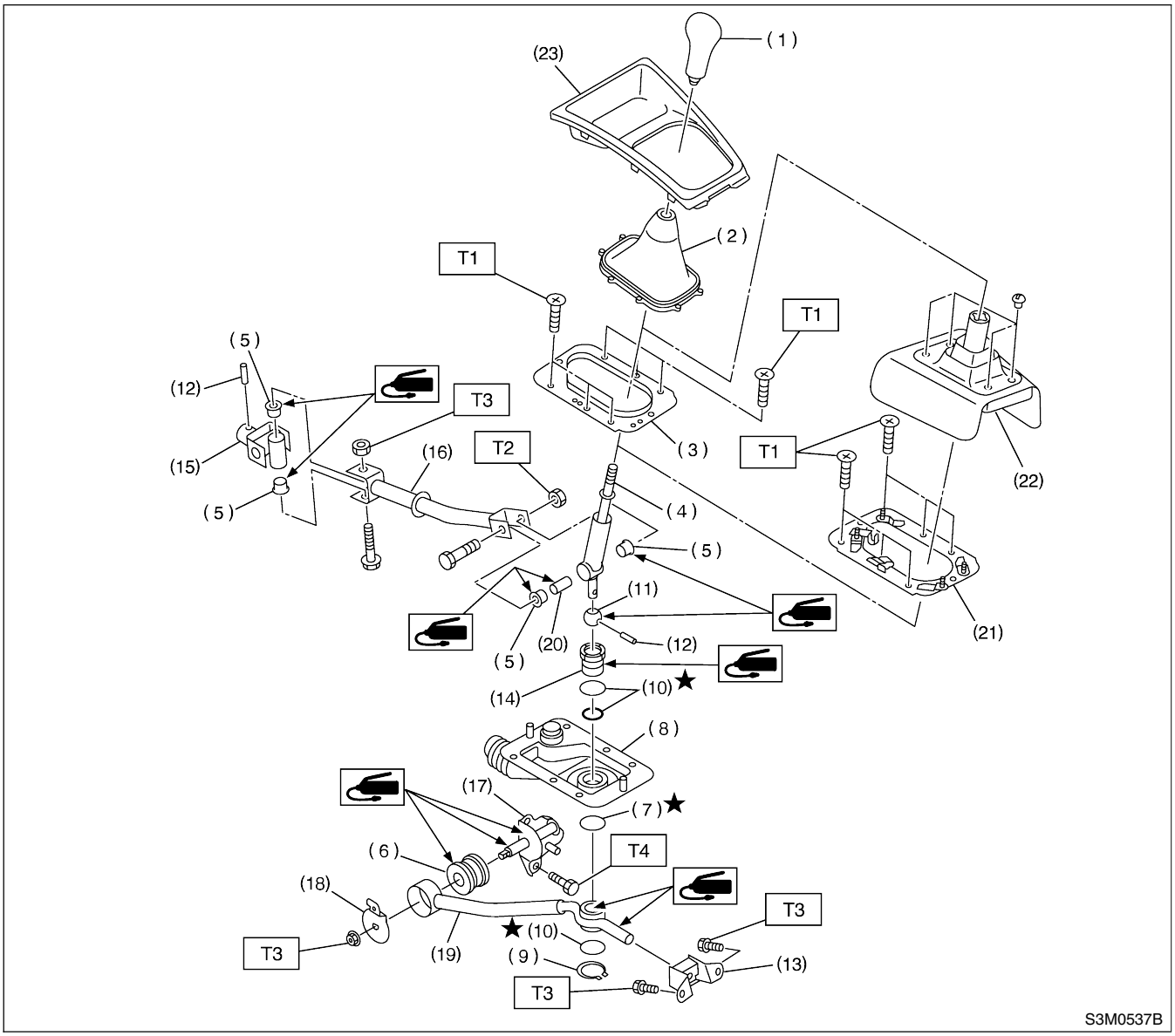


S3M0584A

(1) Button A
(2) Button B
(3) Spring (button)
(4) Grip
(5) Indicator cover
(6) Selector lever lower
(7) Pin
(8) Packing
(9) Plate
(10) Detent spring
(11) Selector lever upper
(12) Rod
(13) Indicator light bulb
(14) Clip
(15) Snap pin
(16) Outer cable
(17) Inner cable
(18) Nut (front)
(19) Nut (rear)
(20) Front cover

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5.9 (0.6, 4.3)
T2: 25 (2.5, 18.1)
T3: 32 (3.3, 24)

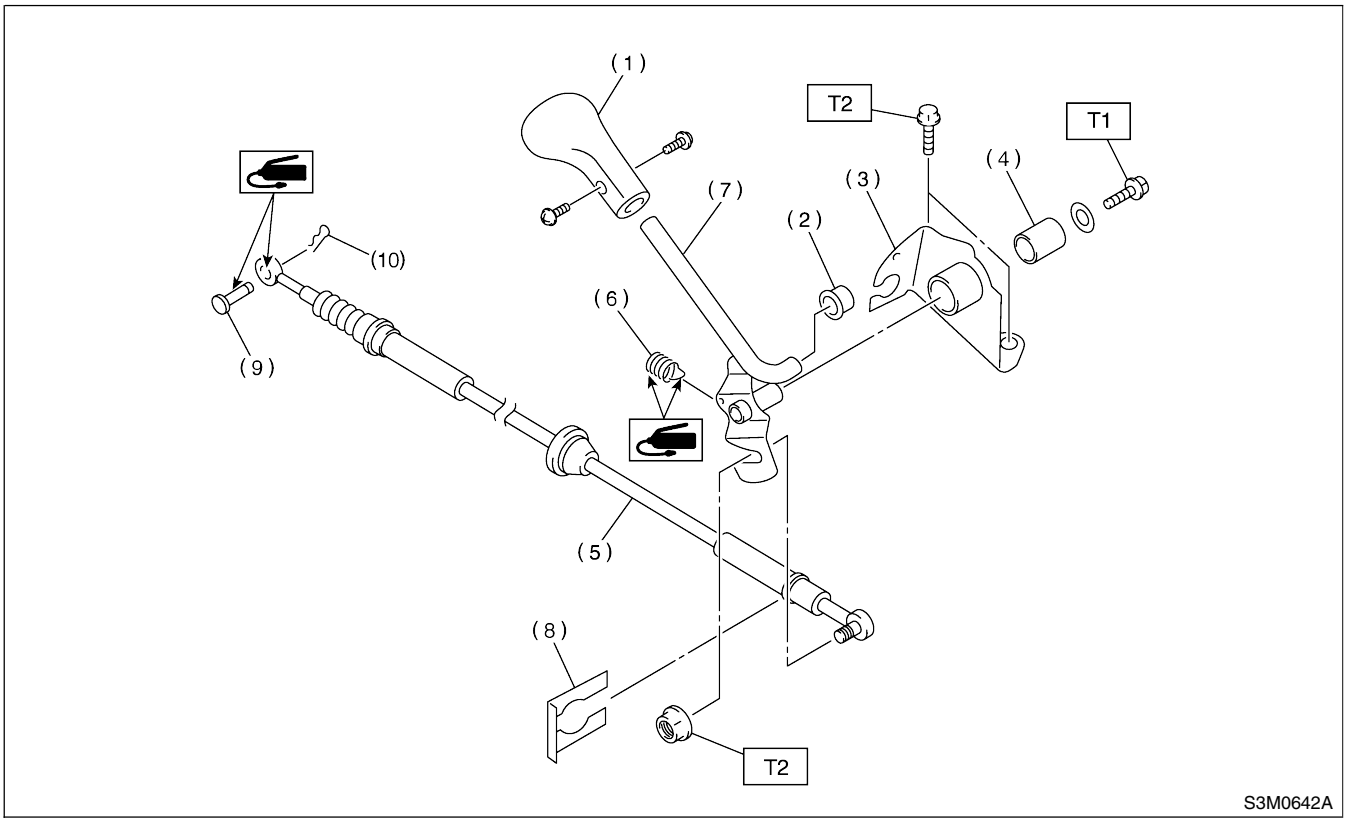
2. MT GEAR SHIFT LEVER S501001A0502



(1) Gear shift knob
(2) Console boot
(3) Boot plate (Non-Turbo model)
(4) Lever
(5) Bush A
(6) Bush B
(7) Locking wire
(8) Boot
(9) Snap ring
(10) O-ring
(11) Bush C
(12) Straight pin
(13) Cushion rubber
(14) Bush D
(15) Joint
(16) Rod
(17) Bracket
(18) Washer
(19) Stay
(20) Spacer
(21) Boot plate (Turbo model)
(22) Boot and insulator
(23) Front cover

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.5 (0.46, 3.3)
T2: 11.8 (1.20, 8.7)
T3: 18 (1.8, 13.0)
T4: 24.5 (2.5, 18.1)

3. DRIVE SELECT LEVER S501001A0503



(1) Knob
(2) Cap
(3) Plate
(4) Bushing
(5) Cable
(6) Spring
(7) Lever
(8) Clamp
(9) Clevis pin
(10) Snap ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.6 (0.16, 1.2)
T2: 18 (1.8, 13.0)

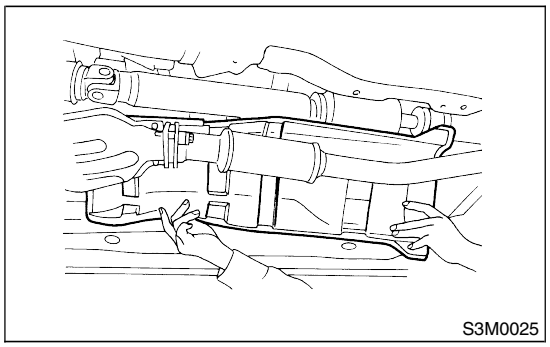
C: CAUTION S501001A03

- 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 negative terminal from battery.

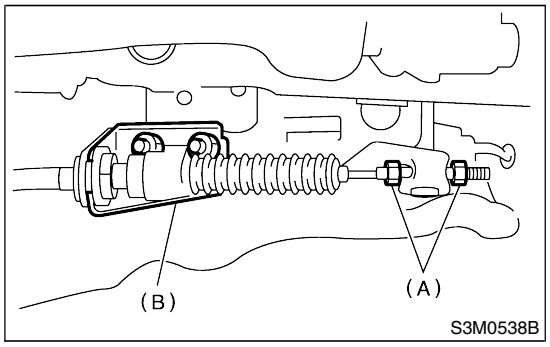
2. Select Lever S501548

A: REMOVAL S501548A18

1) Set vehicle on a lift.
2) Disconnect battery ground terminal from battery.
3) Move the select lever to the “N” position.
4) Lift-up the vehicle.
5) Remove heat shield cover. (Non-Turbo model)


S3M0025

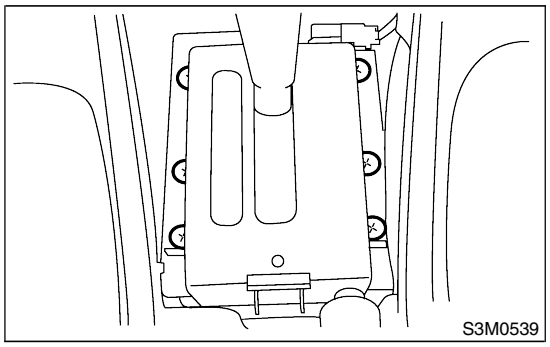
6) Disconnect cable from select lever and then remove cable bracket.



S3M0538B

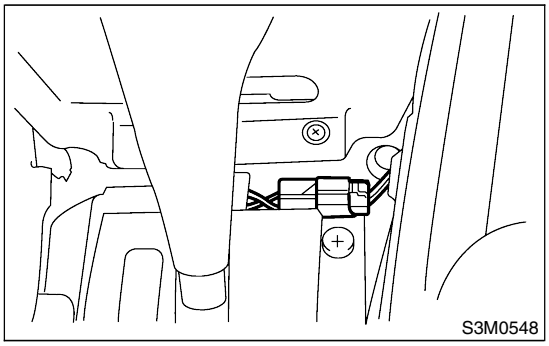
(A) Adjusting nuts
(B) Cable bracket

7) Remove front cover. <Ref. to EI-30, REMOVAL, Consol Box.>
8) Disconnect connectors, and remove the stay.
9) Remove the six bolts to take out the select lever assembly from body.


S3M0539

B: INSTALLATION S501548A11

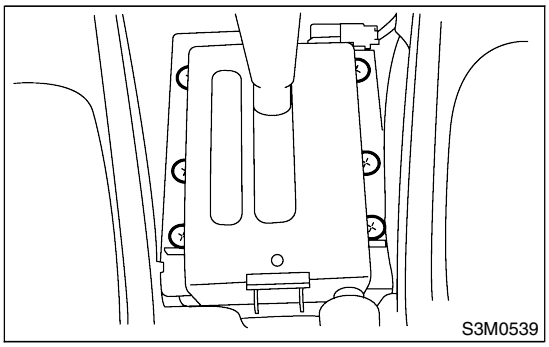
1) Install the select indicator light connector.


S3M0548

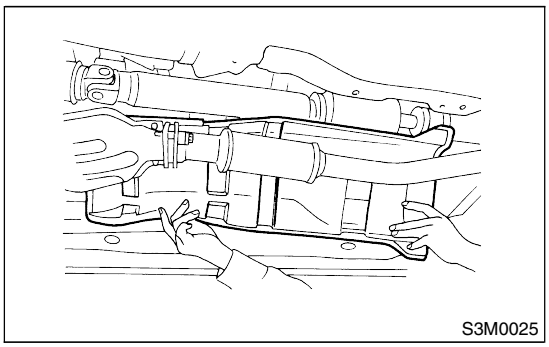
2) Install the select lever to vehicle.

NOTE:
Do not allow the select lever to catch on the wiring harnesses, etc. during installation.

Tightening torque:
5.9 N·m (0.6 kgf-m, 4.3 ft-lb)


S3M0539

3) Install the front cover. <Ref. to EI-30, INSTALLATION, Console Box.>
4) Lift-up the vehicle.
5) Move the select lever to the “N” position, then adjust the select cable position. <Ref. to CS-11, ADJUSTMENT, Select Cable.>
6) Install heat shield cover. (Non-Turbo model)

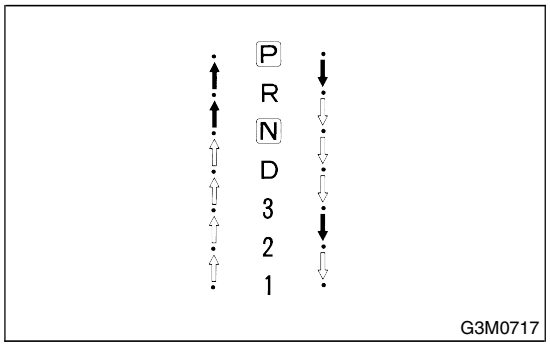

S3M0025

7) Inspect the following items. If the following inspection reveals problems, adjust the select cable and inhibitor switch. <Ref. to CS-11, ADJUSTMENT, Select Cable.> and <Ref. to AT-28, ADJUSTMENT, Inhibitor Switch.>

(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.

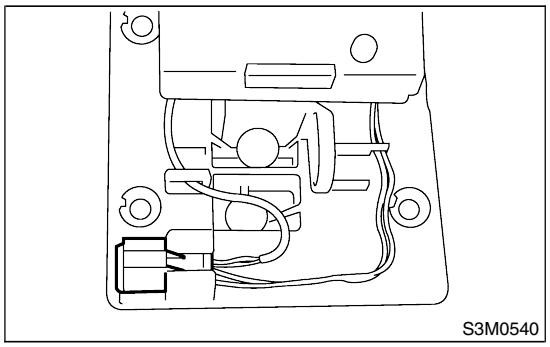
- Check that select lever does not move from “N” to “R” without pushing the button.
- Check that select lever does not move from “R” to “P” without pushing the button.
- Check that select lever does not move from “P” to “R” without pushing the button.
- Check that select lever does not move from “3” to “2” without pushing the button.



G3M0717

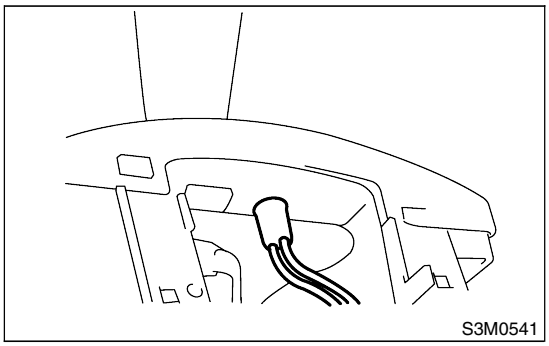
C: DISASSEMBLY S501548A06

1) Remove connector from plate.

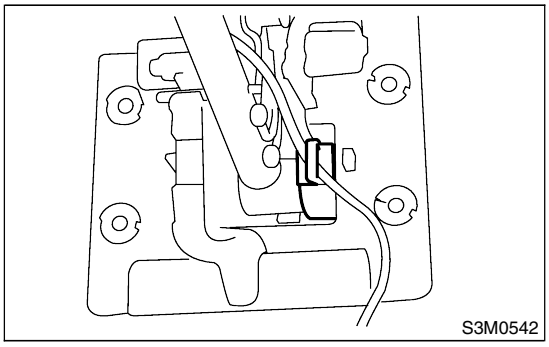

S3M0540

2) Remove indicator light.

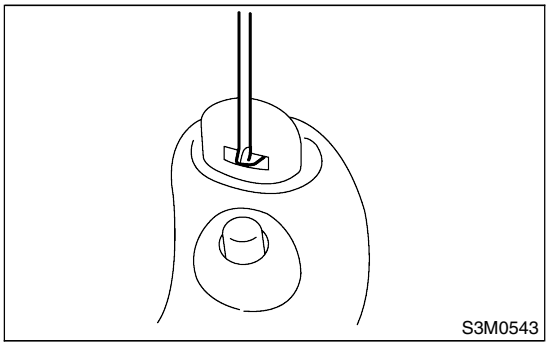
NOTE:
Be careful not to break the indicator light during removal.


S3M0541

3) Detach indicator cover from plate, and remove clip.


S3M0542

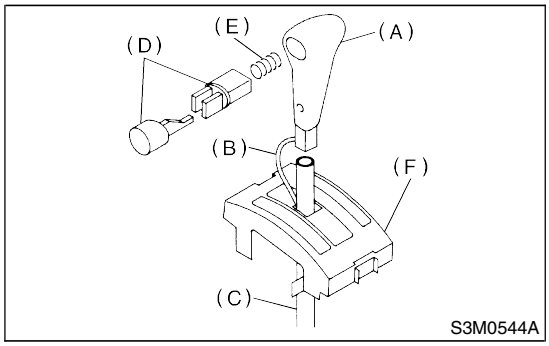
4) Remove clip.


S3M0543

5) Remove the two screws.

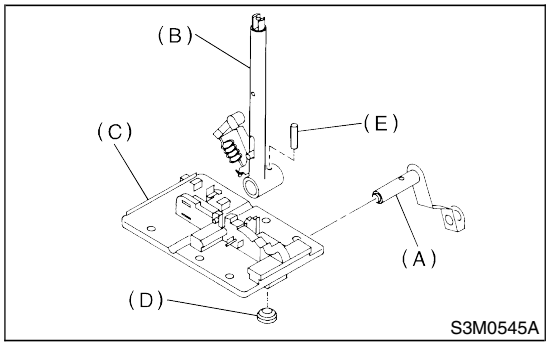
6) While pressing select lever button, remove select lever grip and indicator cover from upper select lever, and then remove the select lever button and spring.

CAUTION:
Position the select lever grip carefully so that the select lever button does not jump out.



(A) Select lever grip
(B) Harness
(C) Upper select lever
(D) Button
(E) Spring
(F) Indicator cover

7) Remove cap and then the straight pin.
8) Remove lower select lever, and then lift upper select lever from plate.

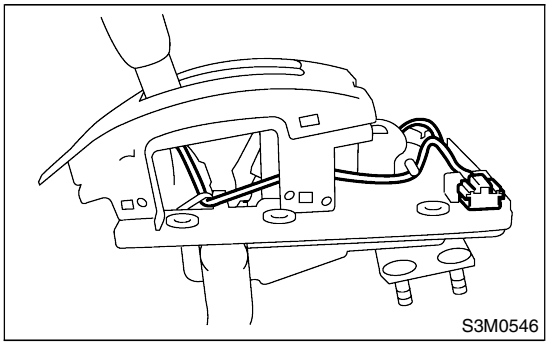


(A) Lower select lever
(B) Upper select lever
(C) Plate
(D) Cap
(E) Straight pin

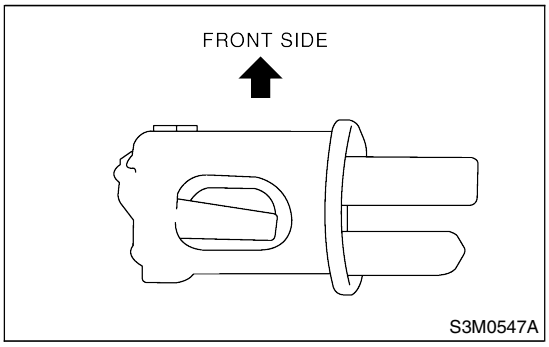
D: ASSEMBLY S501548A02

1) Clean all parts before assembly.
2) Apply grease [NIGTIGHT LYW No. 2 or equivalent] to each parts. <Ref. to CS-3 AT SELECT LEVER, COMPONENT, General Description.>
3) Assembly is in the reverse order of disassembly.

NOTE:
● Install indicator cover so that harness does not interfere with select lever operation.



● Be careful to install the spring and button into the select lever grip in the correct direction.



4) After completion of fitting, transfer select lever to range “P” — “1”, then check whether the indicator and select lever agree, whether the pointer and position mark agree and what the operating force is.

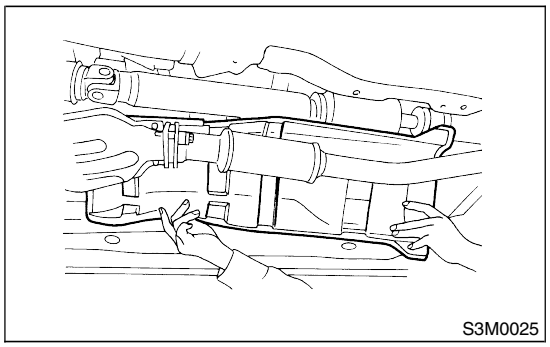
E: INSPECTION S501548A10

1) Inspect removed parts by comparing with new ones for deformation, damage and wear. Correct or replace if defective.
2) Make sure the following parts operate properly before assembly.
(1) Button in the grip: It should slide smoothly.
(2) Grip on the select lever: When pushing the grip on the select lever by hand, screw holes should be aligned.
(3) Select lever and rod: They should move smoothly.

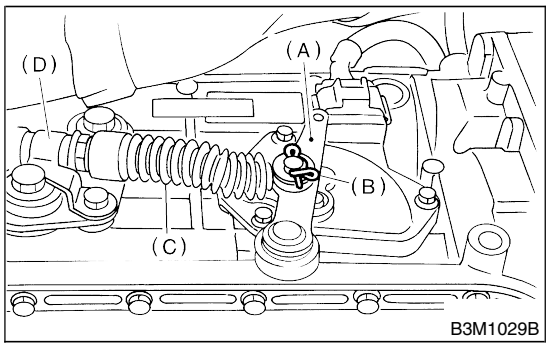
3. Select Cable S501549

A: REMOVAL S501549A18

1) Set vehicle on a lift.
2) Disconnect battery ground terminal from battery.
3) Prior to removal, set lever to “N” position.
4) Lift-up the vehicle.
5) Remove heat shield cover. (Non-turbo model)

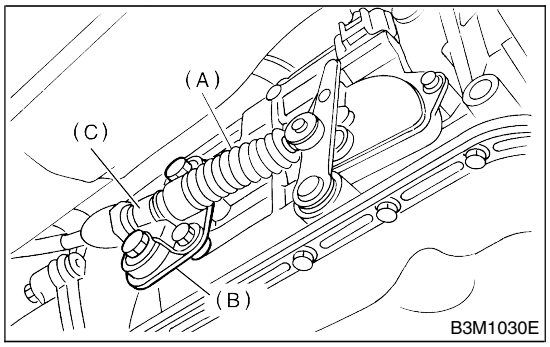


6) Remove snap pin from range select lever.



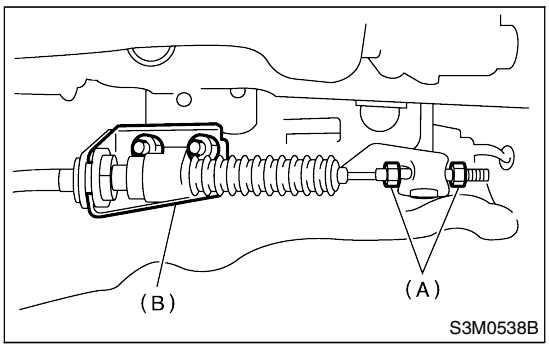
(A) Range select lever
(B) Snap pin
(C) Select cable
(D) Clamp

7) Remove plate assembly from transmission case.



(A) Select cable
(B) Plate ASSY
(C) Clamp

8) Disconnect cable from select lever and then remove cable bracket.



(A) Adjusting nuts
(B) Cable bracket

9) Remove select cable from plate assembly.

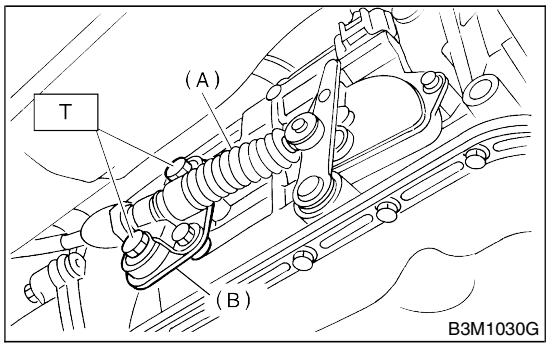
B: INSTALLATION S501549A11

1) Install select cable to plate assembly.

Tightening torque:
32 N·m (3.3 kgf-m, 24 ft-lb)

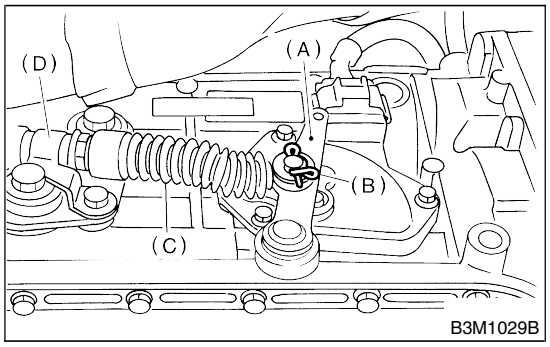
2) Install select cable to range select lever.
3) Install plate assembly to transmission.

Tightening torque:
T: 24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Select cable
(B) Plate ASSY

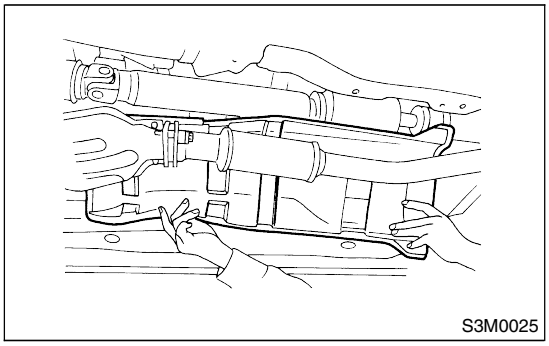
4) Install snap pin to range select lever.



(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-11 ADJUSTMENT, Select Cable.>

6) Install heat shield cover. (Non-turbo model)

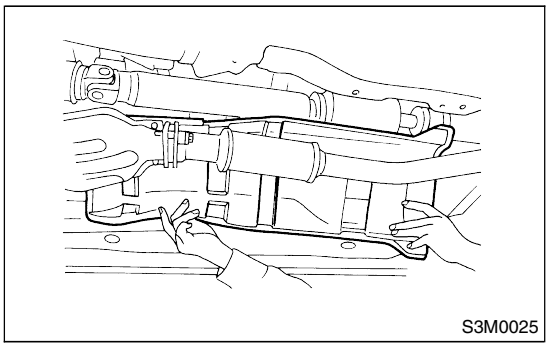


C: INSPECTION S501549A10

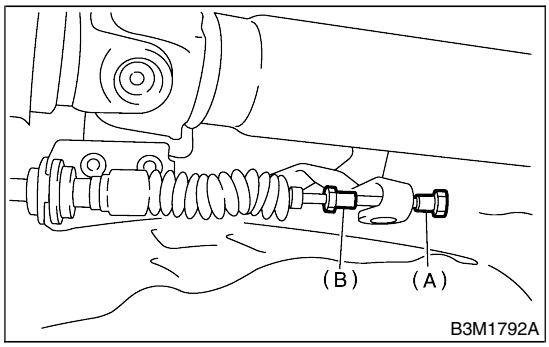
Check the removed cable and replace if damaged, rusty, or malfunctioning.
1) Check for smooth operation of the cable.
2) Check the inner cable for damage and rust.
3) Check the outer cable for damage, bends, and cracks.
4) Check the boot for damage, cracks, and deterioration.
5) Move select lever from “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) Set lever to “N” position.
2) Lift-up the vehicle.
3) Remove heat shield cover.

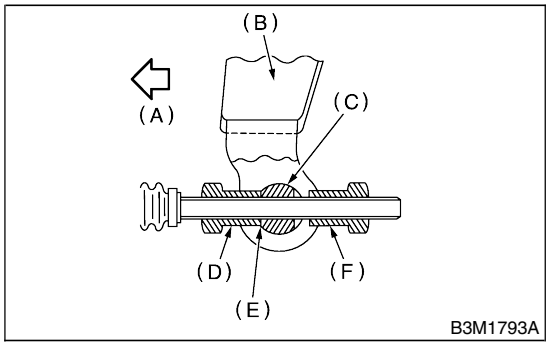


4) Loosen the adjusting nut on each side.



(A) Adjusting nut A
(B) Adjusting nut B

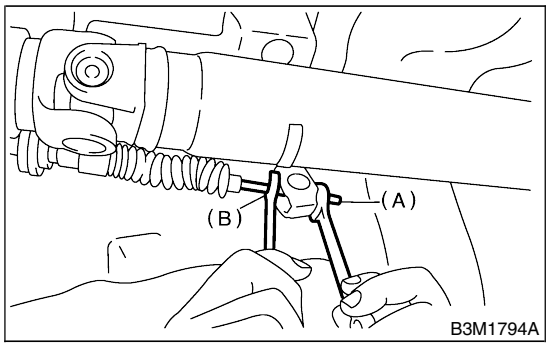
5) Turn adjusting nut B until it lightly touches the connector.



(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)



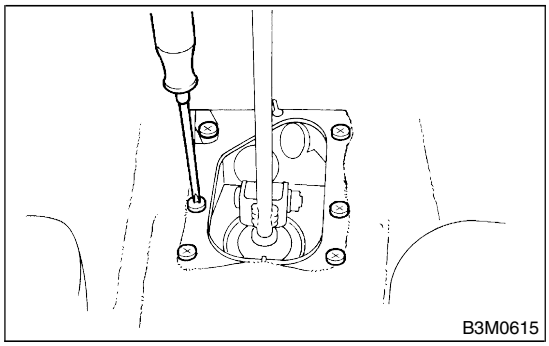
(A) Adjusting nut A
(B) Adjusting nut B

7) After completion of fitting, make sure that the select lever operates smoothly all across the operating range.
8) Install in the reverse order of removal.

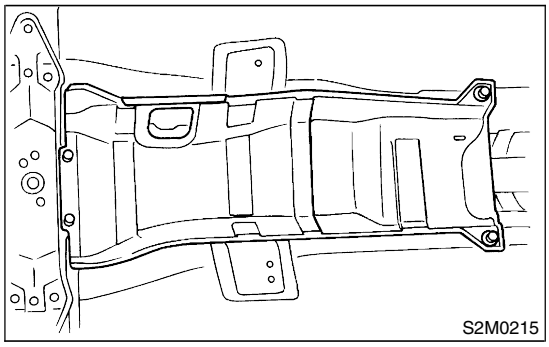
4. MT Gear Shift Lever S501236

A: REMOVAL S501236A18

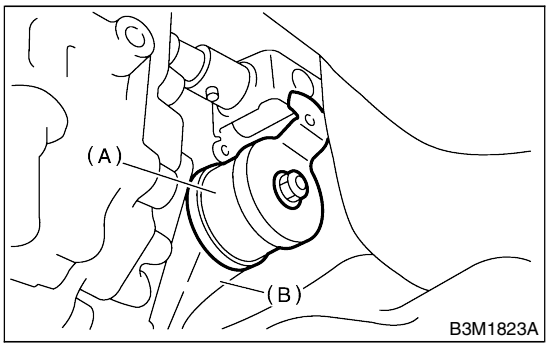
1) Set the vehicle on the lift.
2) Remove gear shift knob.
3) Remove front cover. <Ref. to EI-30, REMOVAL, Console Box.>
4) Remove the four screws to take out the boot and insulator assembly from boot plate. (Turbo model)
5) Remove boot plate from body.


B3M0615

6) Lift-up the vehicle.
7) Remove rear exhaust pipe and muffler.
Non-turbo model with OBD:
<Ref. to EX(SOHC)-9, REMOVAL, Rear Exhaust.> and <Ref. to EX(SOHC)-11, REMOVAL, Muffler.>
Non-turbo model without OBD:
<Ref. to EX(SOHCw/oOBD)-10, REMOVAL, Rear Exhaust.> and <Ref. to EX(SOHCw/oOBD)-12, REMOVAL, Muffler.>
Turbo model:
<Ref. to EX(DOHC TURBO)-14, REMOVAL, Rear Exhaust.> and <Ref. to EX(DOHC TURBO)-15, REMOVAL, Muffler.>
8) Remove heat shield cover. (Non-turbo model)


S2M0215

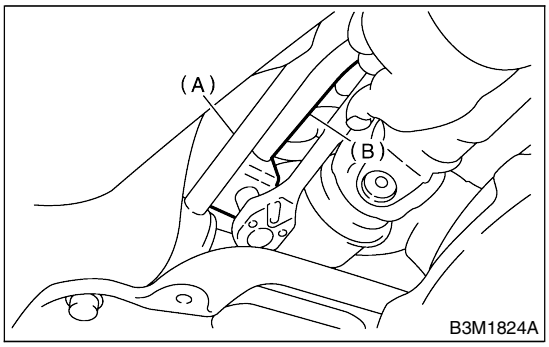
9) Remove stay from transmission bracket.



B3M1823A

(A) Stay
(B) Transmission bracket

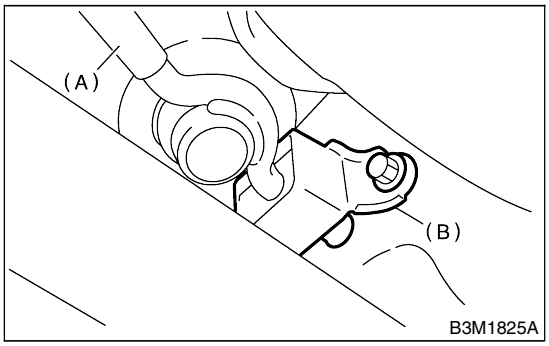
10) Remove rod from joint.



B3M1824A

(A) Stay
(B) Rod

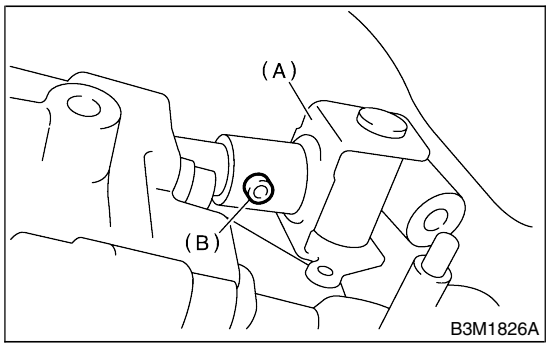
11) Remove cushion rubber from body.



B3M1825A

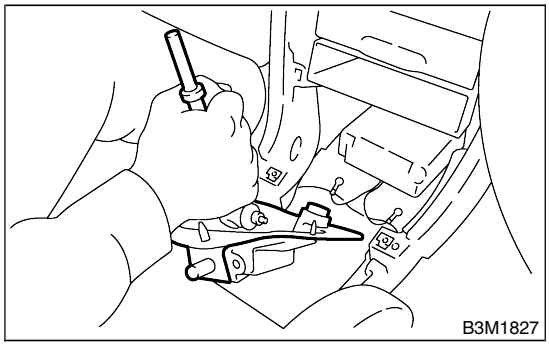
(A) Stay
(B) Cushion rubber

12) Remove joint and then extract straight pin.



(A) Joint
(B) Straight pin

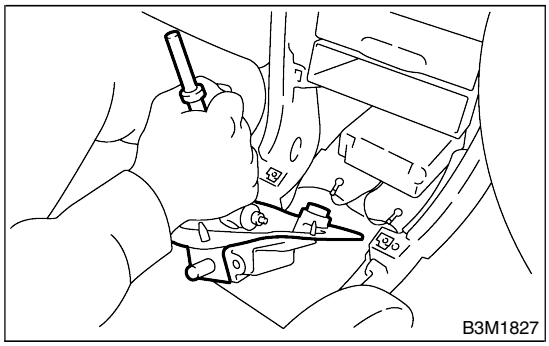
13) Lower the vehicle.
14) Remove gear shift lever.



B: INSTALLATION S501236A11

1) Install the joint to the transmission and secure with the straight pin.
2) Insert gear shift lever from room side.

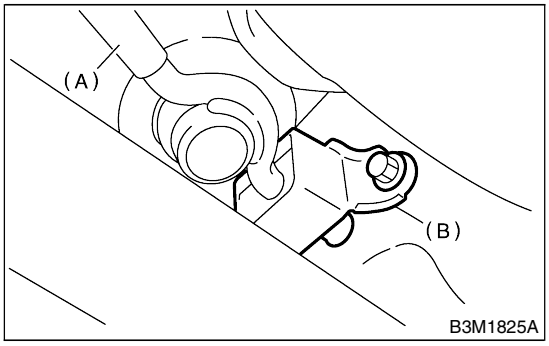
NOTE:
After inserting rod and stay, temporarily put them onto transmission mount.



3) Lift-up the vehicle.

4) Mount cushion rubber on the body.

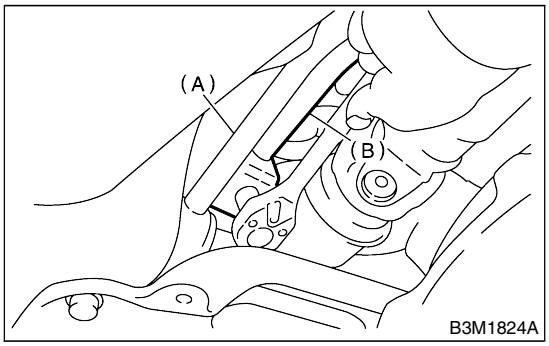
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



(A) Cushion rubber
(B) Stay

5) Connect rod to the joint.

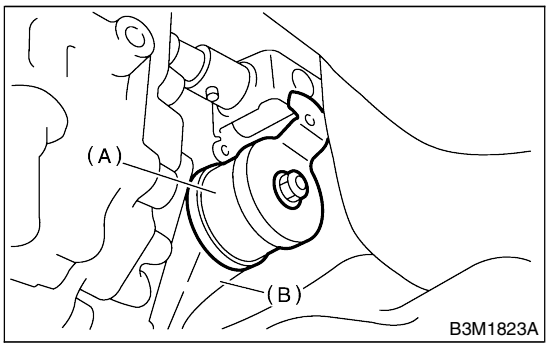
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



(A) Joint
(B) Rod

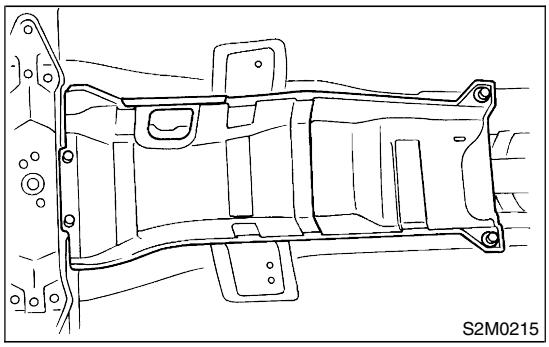
6) Connect stay to transmission bracket.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



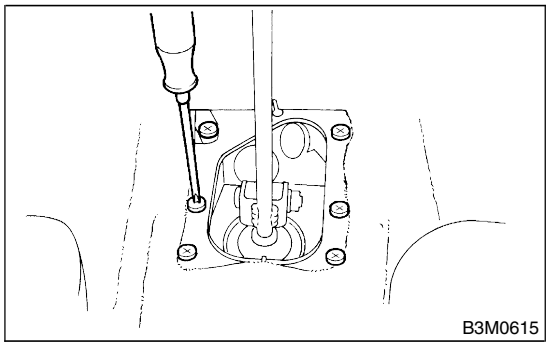
(A) Stay
(B) Transmission bracket

7) Install heat shield cover. (Non-turbo model)


S2M0215

8) Install rear exhaust pipe and muffler.
Non-turbo model with OBD:
<Ref. to EX(SOHC)-9, INSTALLATION, Rear Exhaust.> and <Ref. to EX(SOHC)-11, INSTALLATION, Muffler.>
Non-turbo model without OBD:
<Ref. to EX(SOHCw/oOBD)-10, INSTALLATION, Rear Exhaust.> and <Ref. to EX(SOHCw/oOBD)-12, INSTALLATION, Muffler.>
Turbo model:
<Ref. to EX(DOHC TURBO)-14, INSTALLATION, Rear Exhaust.> and <Ref. to EX(DOHC TURBO)-15, INSTALLATION, Muffler.>
9) Mount boot plate on body.

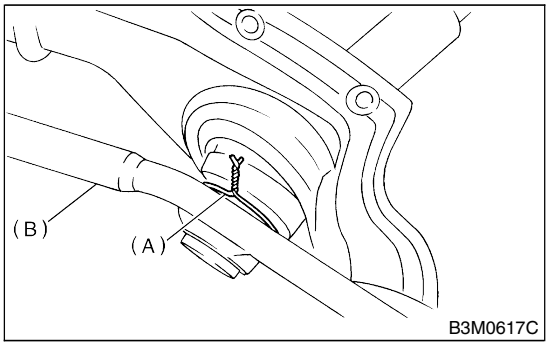
Tightening torque:
4.5 N·m (0.46 kgf-m, 3.3 ft-lb)


B3M0615

10) Install boot and insulator assembly on boot plate. (Turbo model)
11) Install front cover, gear shift knob. <Ref. to EI-30, INSTALLATION, Console Box.>

C: DISASSEMBLY S501236A06

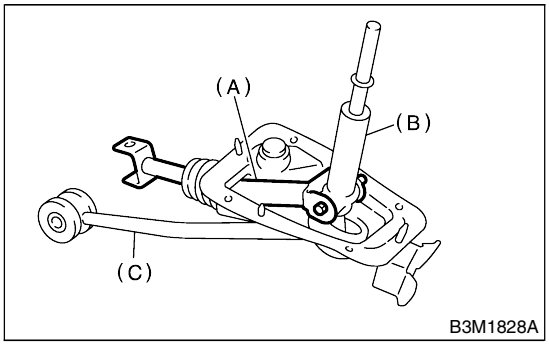
1) Disassemble locking wire.



B3M0617C

(A) Locking wire
(B) Stay

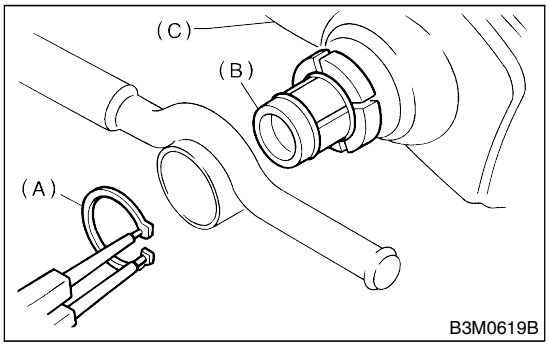
2) Remove rod from gear shift lever.



B3M1828A

(A) Rod
(B) Gear shift lever
(C) Stay

3) Remove snap ring from bushing D, then disconnect stay.

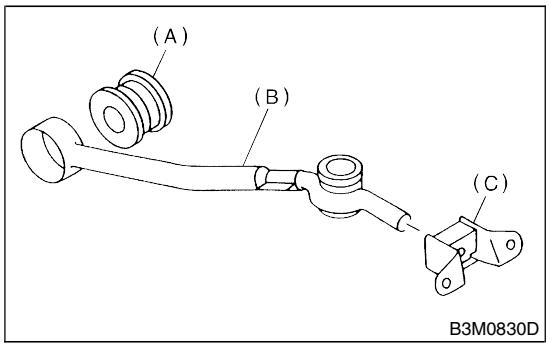


B3M0619B

(A) Snap ring
(B) Bushing D
(C) Boot

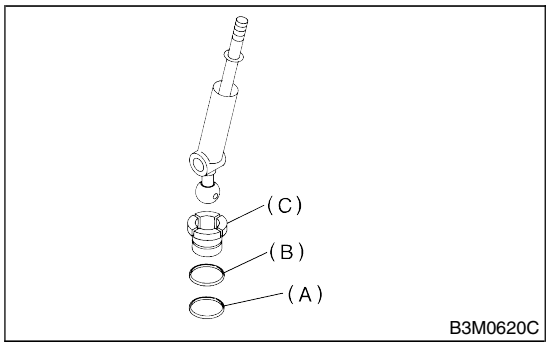
4) Remove boot from gear shift lever.

5) Remove bushing and cushion rubber from stay.



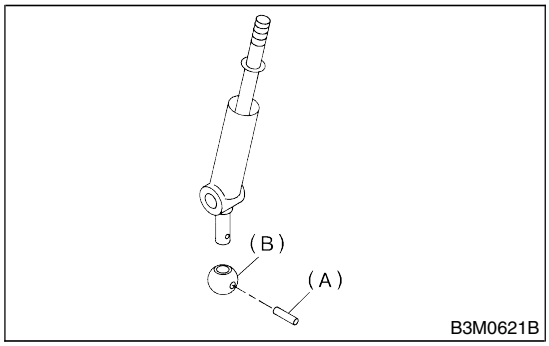
(A) Bushing
(B) Stay
(C) Cushion rubber

6) Remove O-ring, then disconnect bushing D.



(A) O-ring A
(B) O-ring B
(C) Bushing D

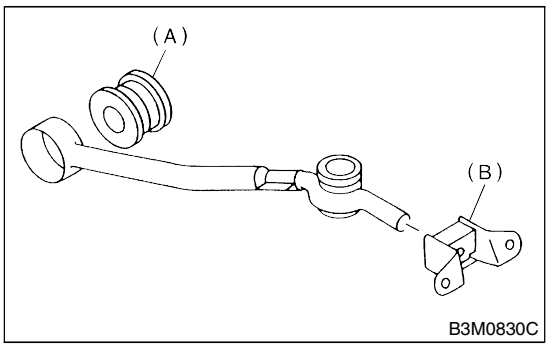
7) Draw out straight pin, then remove bushing C from gear shift lever.



(A) Straight pin
(B) Bushing C

D: ASSEMBLY S501236A02

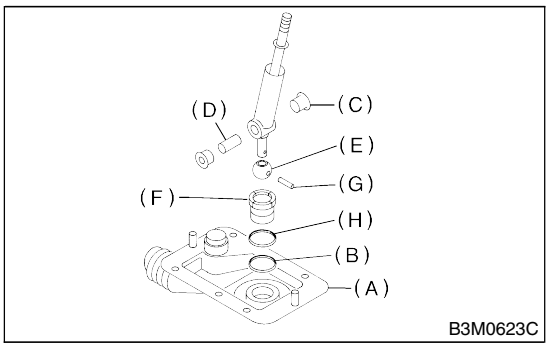
1) Clean all parts before assembly.
2) Mount the bushing B and cushion rubber on the stay.



(A) Bushing
(B) Cushion rubber

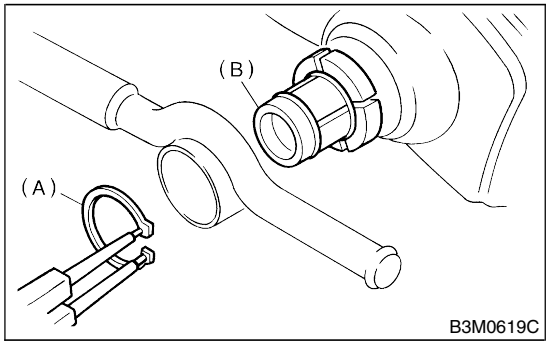
3) Mount each part; boot, O-ring, bushing A, spacer, bushing B, bushing D and straight pin on the gear shift lever.

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 B
(C) Bushing A
(D) Spacer
(E) Bushing C
(F) Bushing D
(G) Straight pin
(H) O-ring A

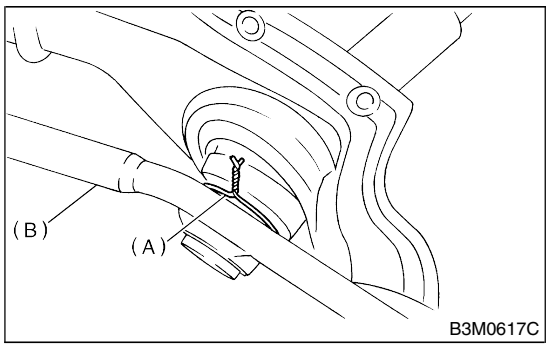
4) Insert the gear shift lever into the boot hole.
5) Install snap ring and stay to the bushing D.



(A) Snap ring
(B) Bushing D

6) Tighten with locking wire to the extent that the boot will not come off.

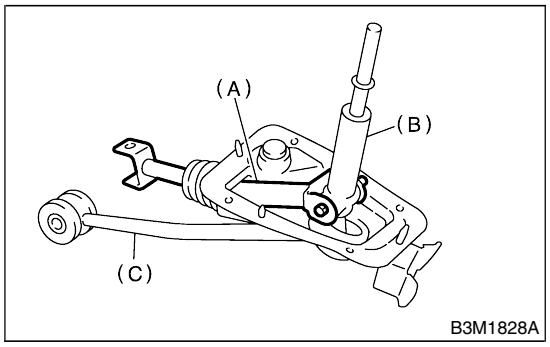
CAUTION:
Always use new locking wire.



(A) Locking wire
(B) Stay

7) Insert the rod into the boot hole.
8) Connect rod to gear shift lever.

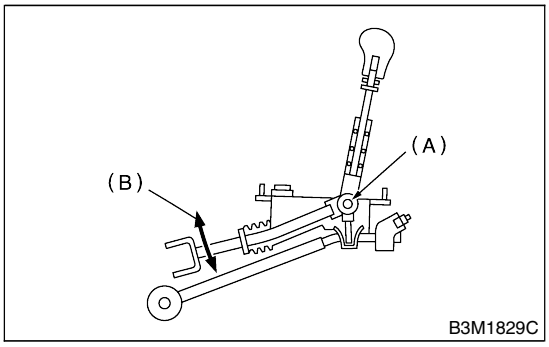
Tightening torque:
11.8 N·m (1.2 kgf-m, 8.7 ft-lb)



(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

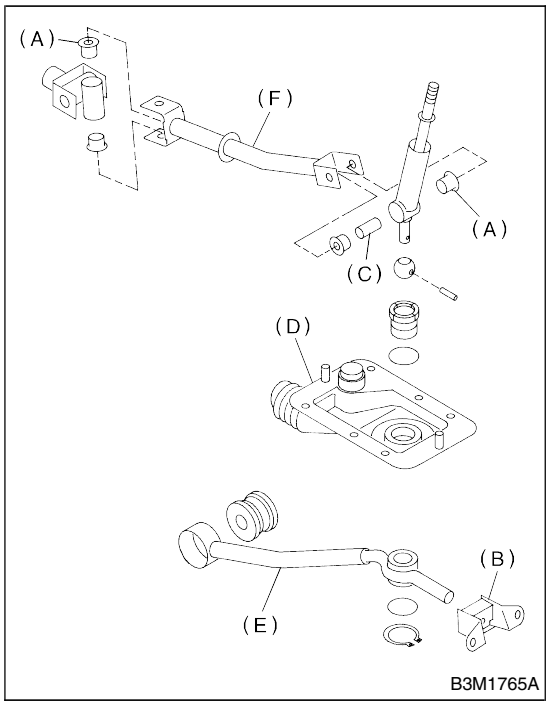


(A) Center of rotation
(B) Swing torque

10) Check that there is no excessive play and that parts move smoothly.

E: INSPECTION S501236A10

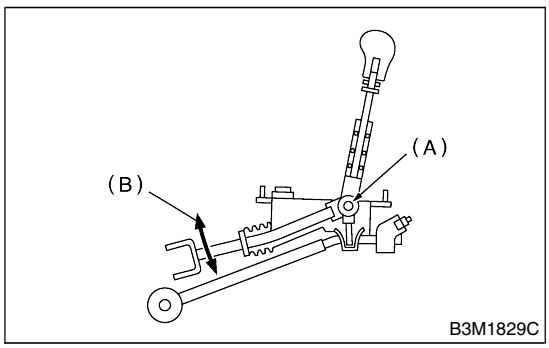
1) Check each part (bushing A, cushion rubber, spacer, boot, stay and rod, etc.) for deformation, damage and wear. Repair or replace any defective part. Determine defective parts by comparing with new parts.



(A) Bushing A
(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

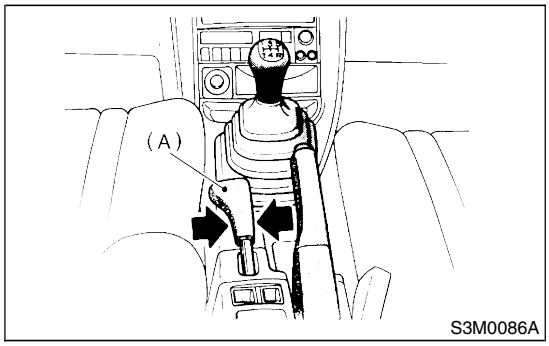


(A) Center of rotation
(B) Swing torque

5. MT Drive Select Lever S501235

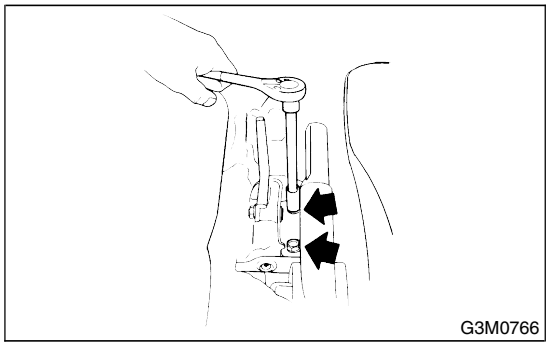
A: REMOVAL S501235A18

1) To immobilize vehicle, put the select lever in "1st" and block the tires.
2) Disconnect battery ground terminal from battery.
3) Set drive select lever to HI position.
4) Remove the drive select lever knob.

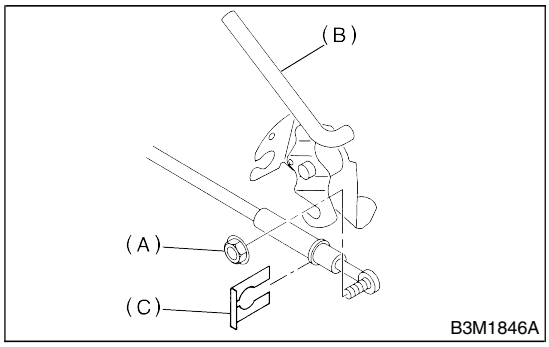


(A) Drive select lever knob

5) Remove console box. <Ref. to EI-30 Console Box.>
6) Remove the bolt installing drive select lever assembly on body.



7) Remove nut, clamp and then disconnect the cable from drive select lever assembly.



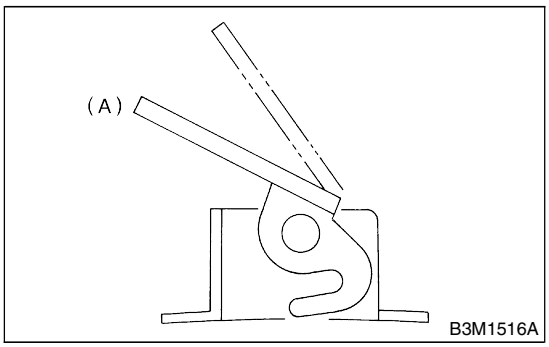
(A) Nut
(B) Drive select lever
(C) Clamp

B: INSTALLATION S501235A11

1) Install drive select lever.

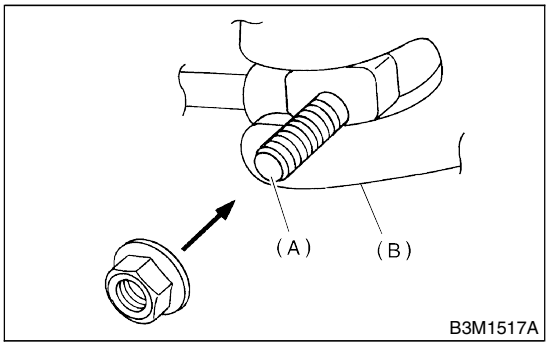
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

2) Set drive select lever to HI position.



(A) HI position

3) Be sure to insert cable end bolt into lever arm slit.



(A) Cable end bolt
(B) Lever arm

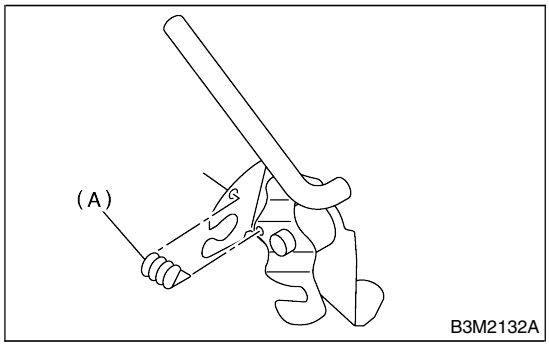
4) Tighten nut where cable end bolt comes to a stop.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

5) Install in the reverse order of removal.

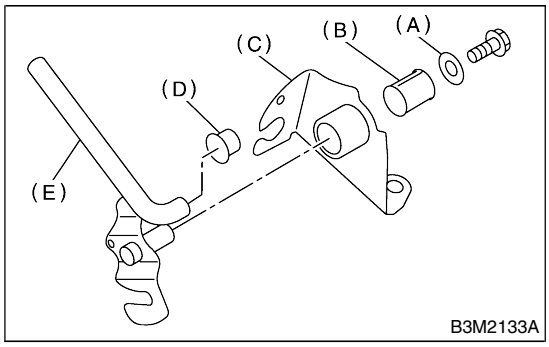
C: DISASSEMBLY S501235A06

1) Remove spring.



(A) Spring

2) Remove lever, cap and bushing.



(A) Washer
(B) Bushing
(C) Plate
(D) Cap
(E) Lever

D: ASSEMBLY S501235A02

1) Assemble in the reverse order of disassembly.

Tightening torque:
1.6 N·m (0.16 kgf-m, 1.2 ft-lb)

2) Make sure the select lever moves smoothly.

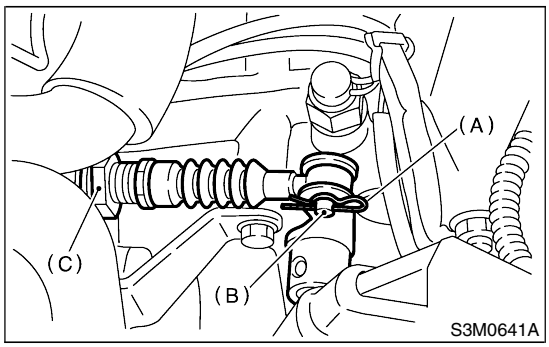
E: INSPECTION S501235A10

1) Make sure the select lever moves smoothly. If it does not move smoothly, repair or replace it.
2) Make sure the drive select lever is not damaged. If it is damaged, repair or replace it.

6. Drive Select Cable S501717

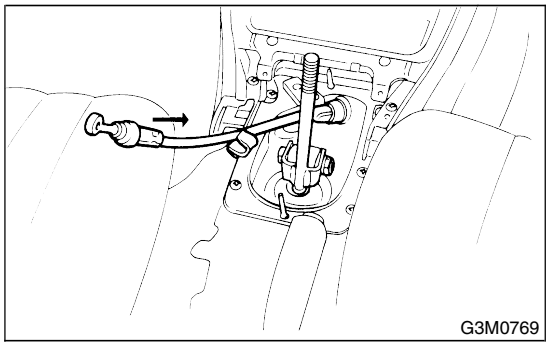
A: REMOVAL S501717A18

1) Remove the drive select lever. <Ref. to CS-19 REMOVAL, MT Drive Select Lever.>
2) Remove intake duct. <Ref. to IN(SOHC)-8, REMOVAL, Air Intake Duct.>
3) Remove air cleaner case. <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
4) Remove snap pin and clevis pin.
5) Loosen the nut and disconnect the cable from cable bracket.



(A) Snap pin
(B) Clevis pin
(C) Nut

6) Remove cable from the under side of vehicle.



B: INSTALLATION S501717A11

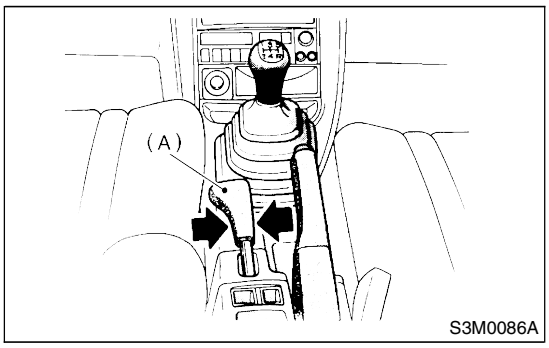
1) Install in the reverse order of removal.
2) Make sure the drive select lever operates properly.

C: INSPECTION S501717A10

1) Make sure to move transmission to HI or LO position by moving the drive select lever. If it doesn't, adjust the cable.<Ref. to CS-21 ADJUSTMENT, Drive Select Cable.>
2) Make sure cable operates smoothly. If it catches or fails to work properly, repair or replace it.
3) Check cable for damage.

D: ADJUSTMENT S501717A01

1) Set the drive select lever to HI position.
2) Remove the drive select lever knob.



3) Remove console box. <Ref. to EI-30, Console Box.>
4) Loosen the nut.
5) Make sure transmission is in HI position. If isn't, pull on cable to put transmission in HI position.
6) Tighten the nut in the location where the cable end bolt stops naturally.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

7) Make sure to move transmission to HI or LO position by moving the drive select lever. If it doesn't, readjust cable.

7. General Diagnostic Table S501257

A: INSPECTION S501257A10

Symptom	Possible cause	Remedy
1. AT select lever	(1) Starter does not run.	Adjust select cable and inhibitor switch, or inspect circuit.
	(2) Back-up light does not light up.	Adjust select cable and inhibitor switch, or inspect circuit.

AUTOMATIC TRANSMISSION

AT

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20.	ATF Cooler Pipe and Hose	49

1. General Description S502001

A: SPECIFICATIONS S502001E49

1. TORQUE CONVERTER CLUTCH S502001E4901

Model	Non-turbo model	Turbo model
Type	Symmetric, 3 element, single stage, 2 phase torque converter	
Stall torque ratio	2.0 — 2.2	1.9 — 2.1
Nominal diameter	236 mm (9.29 in)	246 mm (9.69 in)
Stall speed (at sea level)	2,100 — 2,600 rpm	2,150 — 2,950 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 sets

4. TRANSMISSION GEAR RATIO S502001E4904

	Gear ratio
1st	2.785
2nd	1.545
3rd	1.000
4th	0.694
Rev	2.272

5. PLANETARY GEAR AND PLATE S502001E4905

	Non-turbo model	Turbo model
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	42	
Tooth number of rear pinion	17	
Tooth number of rear internal gear	75	
Drive & driven plate number of high clutch	4	5
Drive & driven plate number of low clutch	4	7
Drive & driven plate number of reverse clutch	2	
Drive & driven plate number of 2-4 brake	3	4
Drive & driven plate number of low & reverse brake	4	7

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)	Automatic gear change 1st ← → 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	Non-turbo model	8.4 — 8.7 ℓ (8.9 — 9.2 US qt, 7.4 — 7.7 Imp qt)
	Turbo model	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)

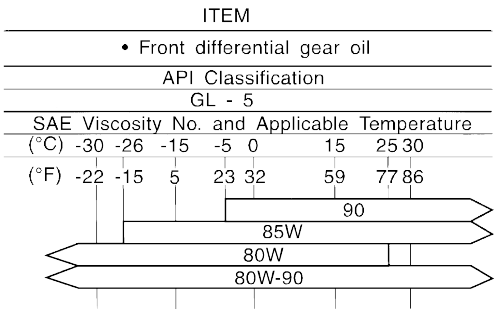
8. COOLING AND HARNESS S502001E4908

Cooling system	Liquid-cooled cooler incorporated in radiator
ATF cooling system (Radiation capacity)	4.630 kW (3,981 kcal/h, 15,797 BTU/h)
Inhibitor switch	12 poles
Transmission harness	20 poles

9. TRANSFER S502001E4909

Model	Non-turbo model	Turbo model
Transfer clutch	Hydraulic multi-plate clutch	
Drive & driven plate number of transfer clutch	4	6
Control method	Electronic, hydraulic type	
Lubricant	The same Automatic transmission fluid used in automatic transmission	
1st reduction gear ratio	1.000 (53/53)	

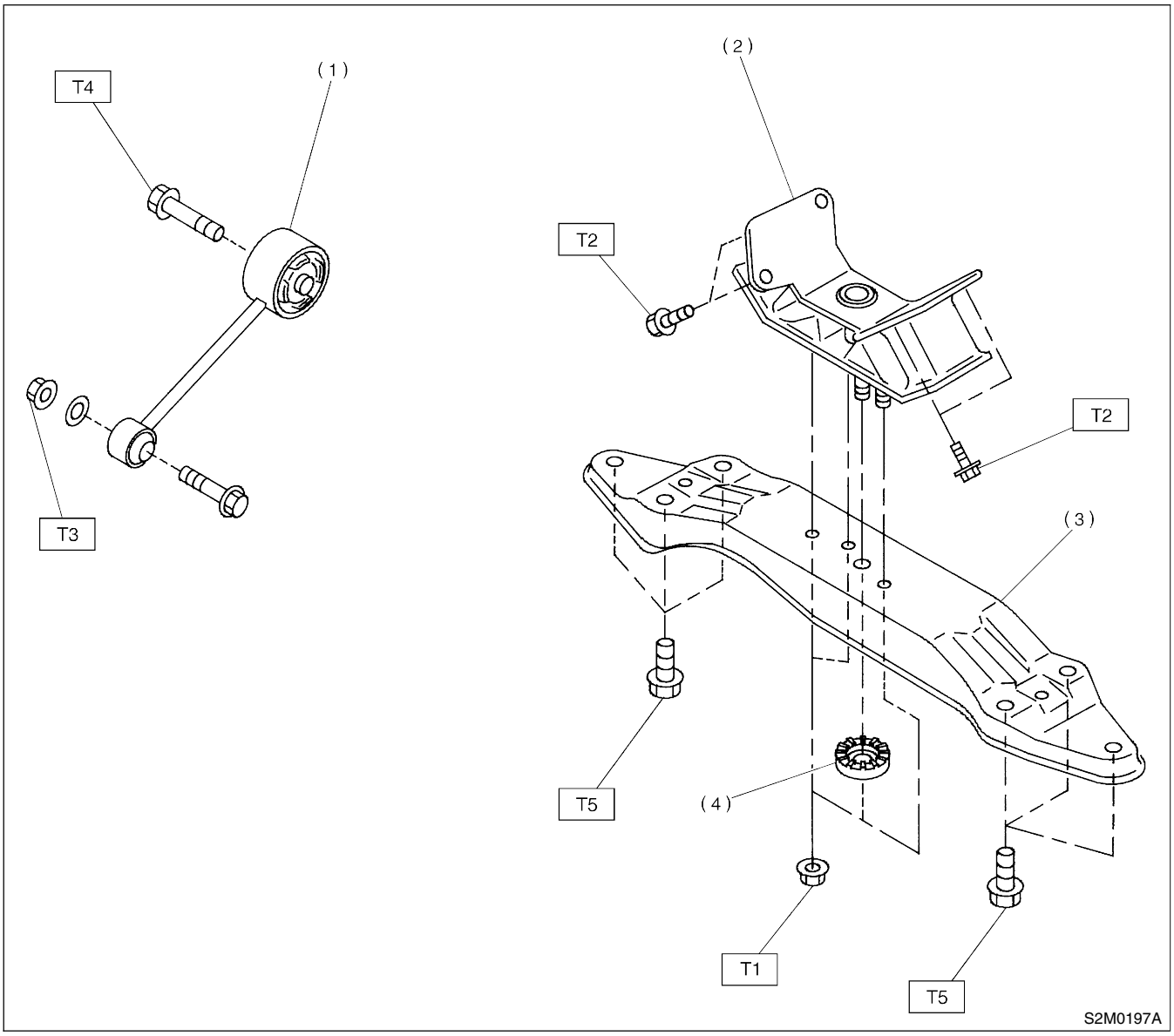
10. FINAL REDUCTION S502001E4910

Model	Turbo model	Non-turbo model
Front final gear ratio	4.111 (37/9)	4.444 (40/9)
Lubrication oil		
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

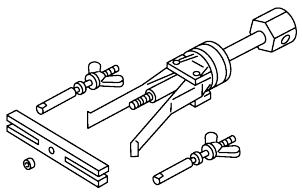
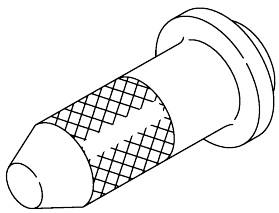
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1977	398527700	PULLER ASSY	Used for removing extension case oil seal.
 B3M1972	498057300	INSTALLER	Used for installing extension oil seal.

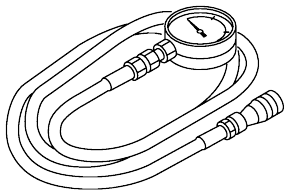
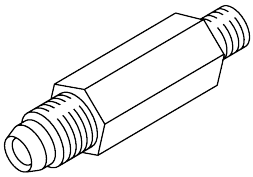
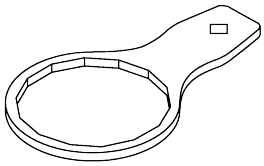
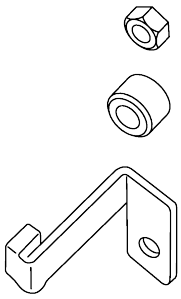
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M2040	498575400	OIL PRESSURE GAUGE ASSY	Used for measuring oil pressure.
 B3M2041	498897200	ADAPTER	Used oil pump housing when measuring reverse clutch pressure and line pressure.
 B3M2042	498545400	FILTER WRENCH	Used for removing and installing ATF filter.
 B3M2043	498277200	STOPPER SET	Used for removing and installing automatic transmission assembly to engine.

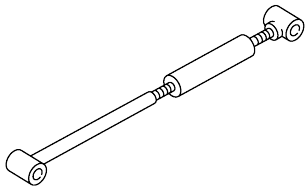
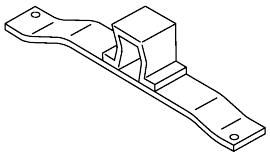
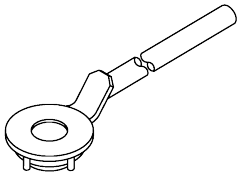
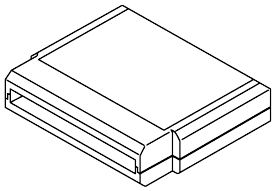
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1976	41099AA020	ENGINE SUPPORT	Used for supporting engine.
 B3M1975	41099AA010	ENGINE SUPPORT BRACKET	Used for supporting engine.
 B2M4157	499977300	CRANK PULLEY WRENCH	Used for removing and installing bolts which secure torque converter to the drive plate.
 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)

2. GENERAL PURPOSE TOOLS S502001A1702

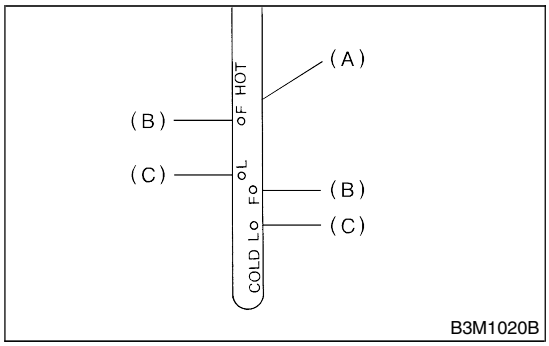
TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.

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.

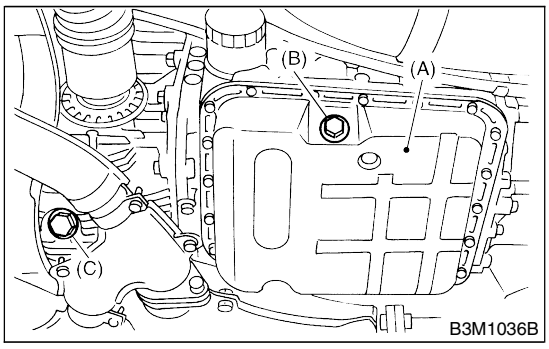
B: REPLACEMENT S502248A20

1) Lift 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.

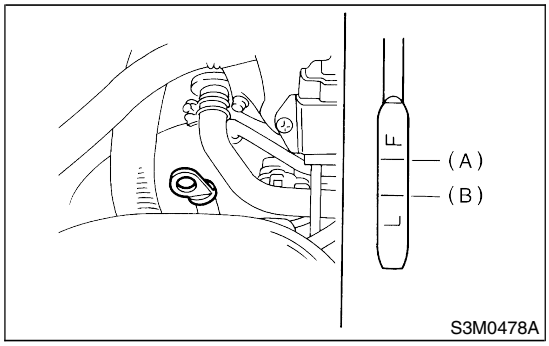
Capacity when transmission is overhauled:
Non-turbo model:
8.4 — 8.7 ℓ (8.9 — 9.2 US qt, 7.4 — 7.71 Imp qt)
Turbo model:
9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 8.2 — 8.4 Imp qt)

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

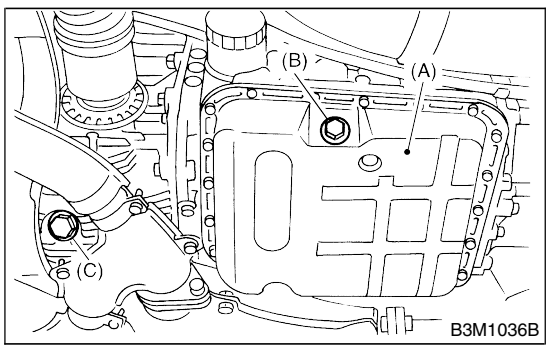
B: REPLACEMENT S502150A20

1) Lift 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

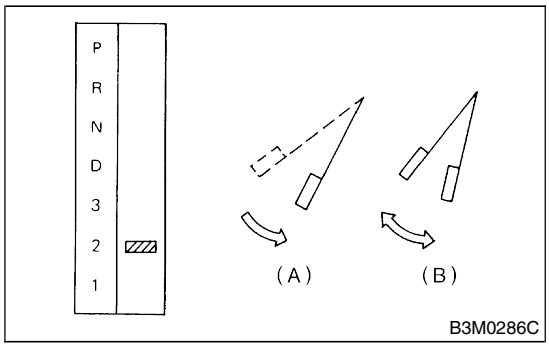
A: INSPECTION S502246A10

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 short a time as possible, in order to prevent the automatic transmission from sustaining damage.

Stall speed (at sea level):
Non-turbo model: 2,100 — 2,600 rpm
Turbo model: 2,150 — 2,950 rpm

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 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)

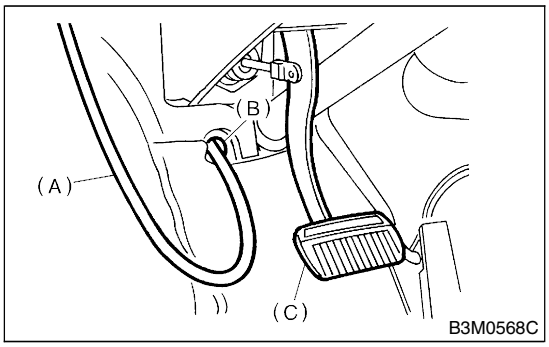
CAUTION:

- **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.

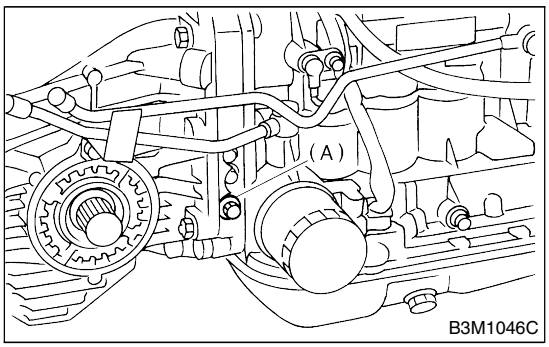
ST 498575400 OIL PRESSURE GAUGE ASSY



(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

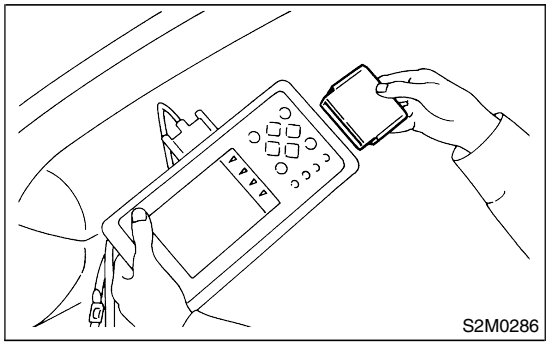


(A) Test plug

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.>



(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)

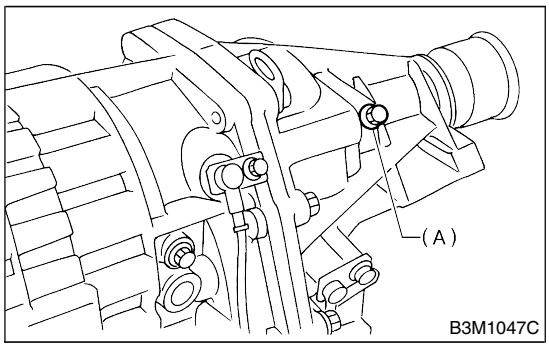
8. Transfer Clutch Pressure Test S502159

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 test. <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

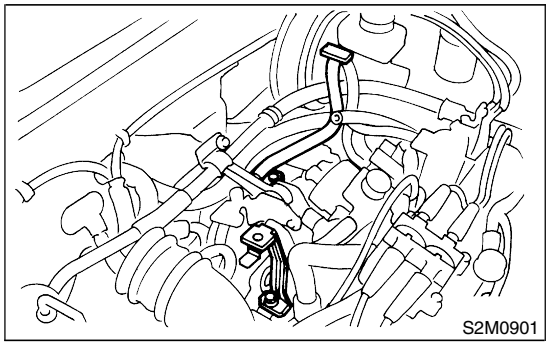
NOTE:
If oil pressure is not produced or if it does not change in the AWD mode, the transfer duty solenoid or transfer valve assembly may be malfunctioning. If oil pressure is produced in the FWD mode, the problem is similar to that in the AWD mode.

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)

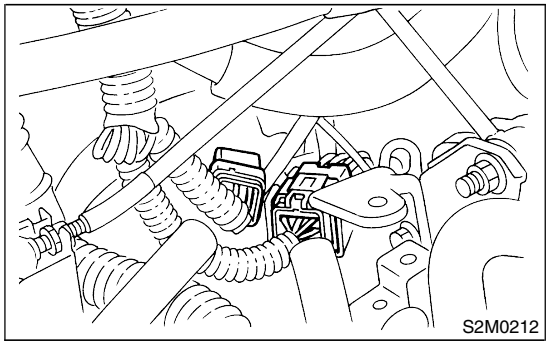
9. Automatic Transmission Assembly S502207

A: REMOVAL S502207A18

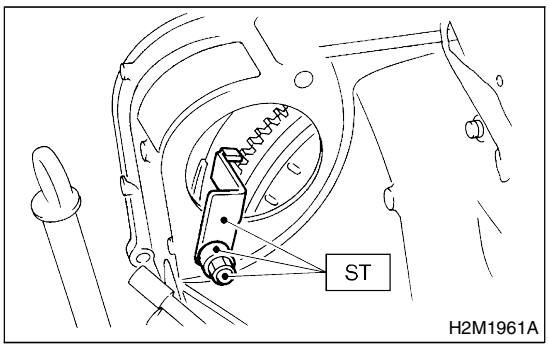
1) Set vehicle on a lift.
2) Open front hood fully, and support with stay.
3) Disconnect battery ground terminal.
4) Remove air intake duct and cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-8, REMOVAL, Air Intake Duct.> and <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
5) Remove air cleaner case stay. (Non-turbo model)


S2M0901

6) Remove intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
7) Disconnect the following connectors.
   (1) Transmission harness connector

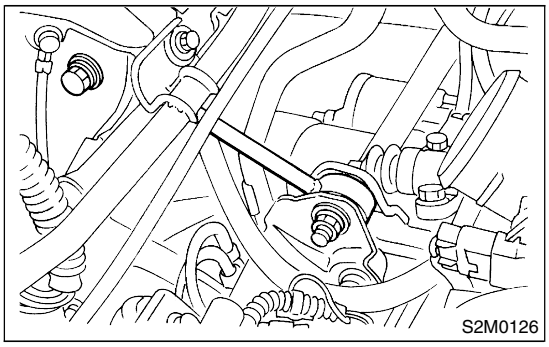

S2M0212

   (2) Transmission ground terminal
8) Remove starter. <Ref. to SC-5, REMOVAL, Starter.>
9) Install ST to torque converter clutch case.
ST 498277200 STOPPER SET



H2M1961A

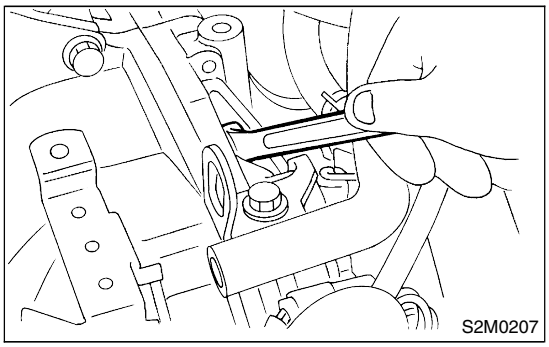
10) Remove pitching stopper.


S2M0126

11) 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.

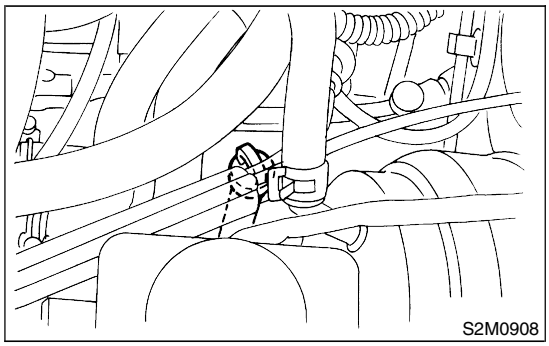
CAUTION:
Be careful not to drop bolts into torque converter clutch housing.

ST 499977300 CRANK PULLEY WRENCH


S2M0207

12) Remove ATF level gauge.

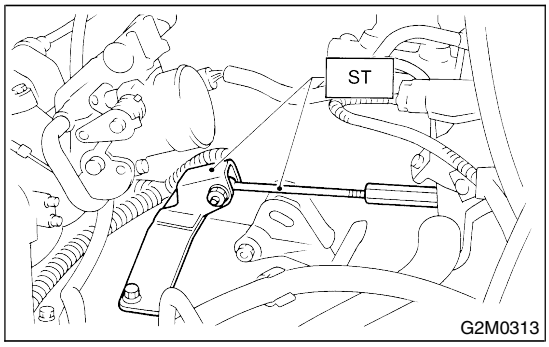
CAUTION:
Plug opening to prevent entry of foreign particles into transmission fluid.


S2M0908

13) Set ST.

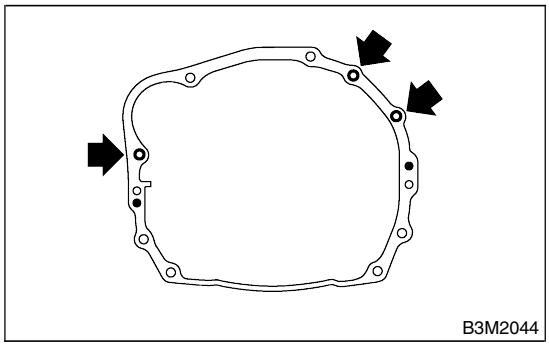
NOTE:
Also is available Part No. 41099AA010.

ST 41099AA020 ENGINE SUPPORT ASSY

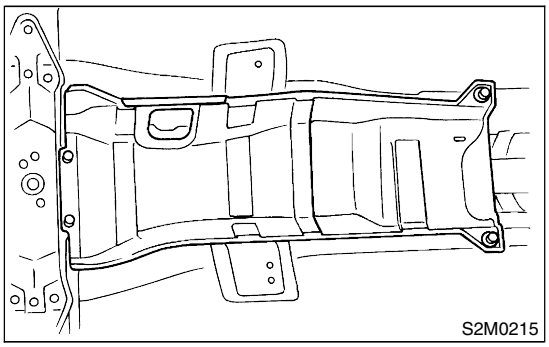


G2M0313

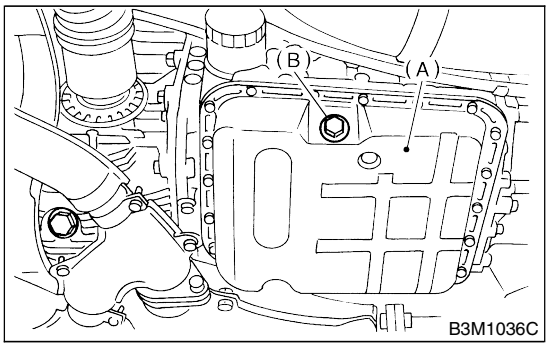
14) Remove bolt which holds right upper side of transmission to engine.


B3M2044

15) Remove front and center exhaust pipe. (Non-turbo model)
With OBD:
<Ref. to EX(SOHC)-5, REMOVAL, Front Exhaust Pipe.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>
16) Remove rear exhaust pipe and muffler. (Non-turbo model)
With OBD:
<Ref. to EX(SOHC)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11, REMOVAL, Muffler.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-12, REMOVAL, Muffler.>
17) Remove center, rear exhaust pipe and muffler. (Turbo model)
<Ref. to EX(DOHC TURBO)-9, REMOVAL, Center Exhaust Pipe.>, <Ref. to EX(DOHC TURBO)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, REMOVAL, Muffler.>
18) Remove heat shield cover. (If equipped)


S2M0215

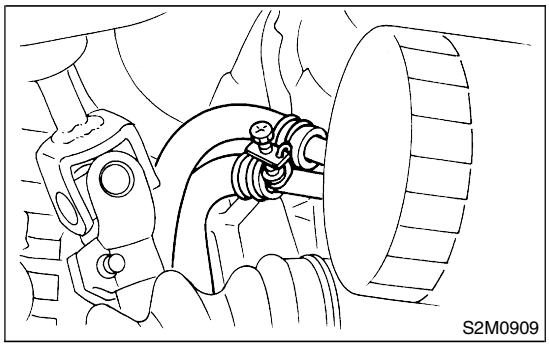
19) Remove hanger bracket from right side of transmission.
20) Remove under cover.
21) Drain ATF to remove ATF drain plug.



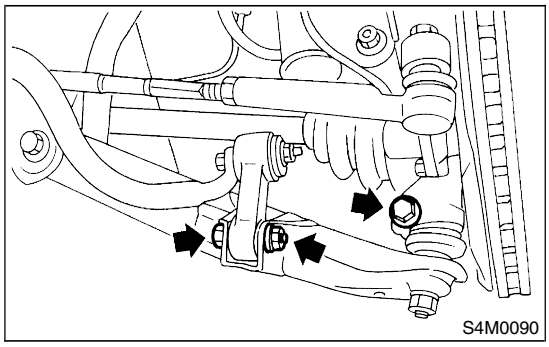
B3M1036C

(A) Oil pan
(B) Drain plug

22) Disconnect ATF cooler hoses from pipes of transmission side, and remove ATF level gauge guide.

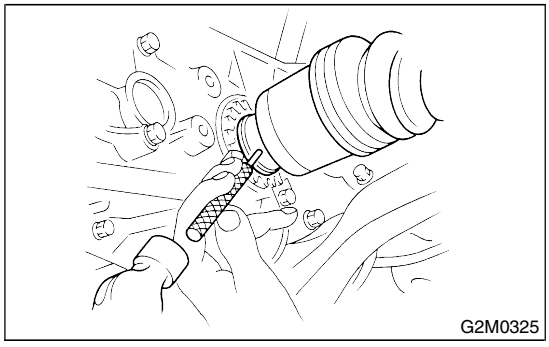

S2M0909

23) Remove propeller shaft.
<Ref. to DS-14 REMOVAL, Propeller Shaft.>
24) Remove shift select cable. <Ref. to CS-10 REMOVAL, Select Cable.>
25) Remove front drive shafts from transmission.
(1) Disconnect stabilizer link from transverse link.
(2) Remove bolt securing ball joint of transverse link to housing.

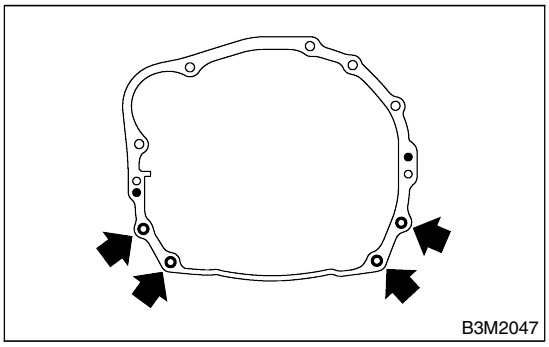

S4M0090

(3) Lower transverse link.
(4) 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

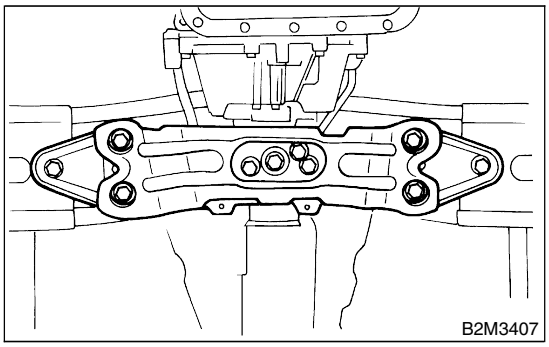
26) Remove nuts which hold lower side of transmission to engine.


B3M2047

27) Place transmission jack under transmission.

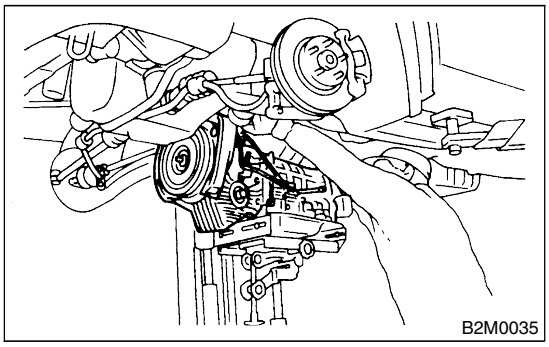
CAUTION:
• Always support transmission case with a transmission jack.
• On AT vehicles, make sure that the support plates of transmission jack don't touch the oil pan.

28) Remove transmission rear crossmember from vehicle.


B2M3407

29) Remove transmission.

CAUTION:
Move transmission and torque converter as a unit away from engine.


B2M0035

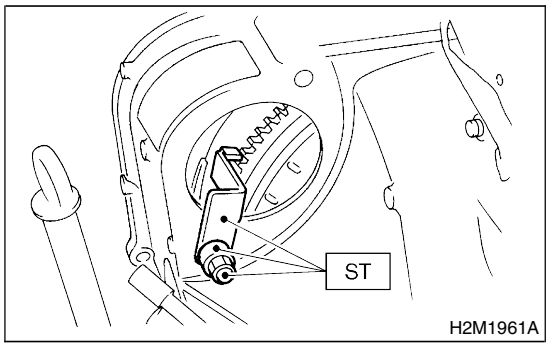
30) Separate transmission assembly and rear cushion rubber.

B: INSTALLATION S502207A11

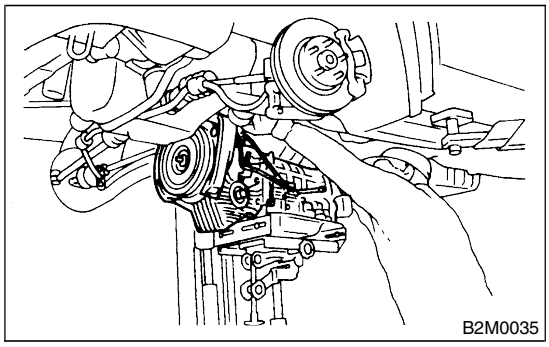
1) Install rear cushion rubber to transmission assembly.

Tightening torque:
38 N·m (3.9 kgf-m, 28 ft-lb)

2) Install ST to torque converter clutch case.
ST 498277200 STOPPER SET

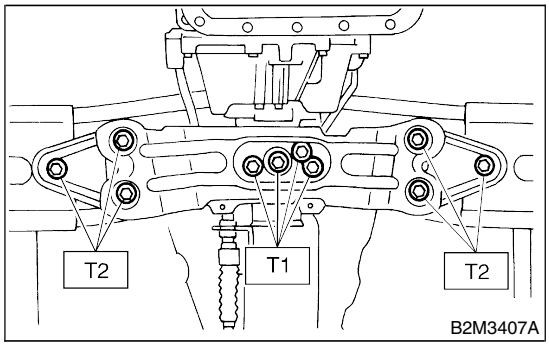


3) Install transmission onto engine.
(1) Gradually raise transmission with transmission jack.



(2) Engage them at splines.
4) Install transmission rear crossmember.

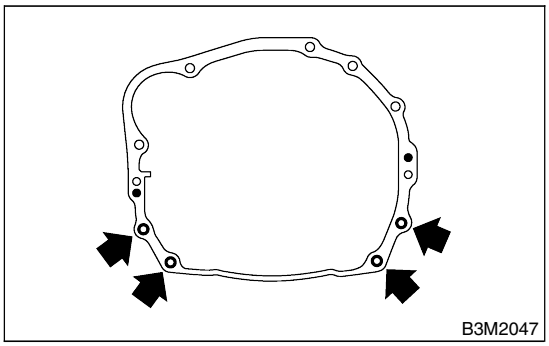
Tightening torque:
T1: 35 N·m (3.6 kgf-m, 26 ft-lb)
T2: 70 N·m (7.1 kgf-m, 51 ft-lb)



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)

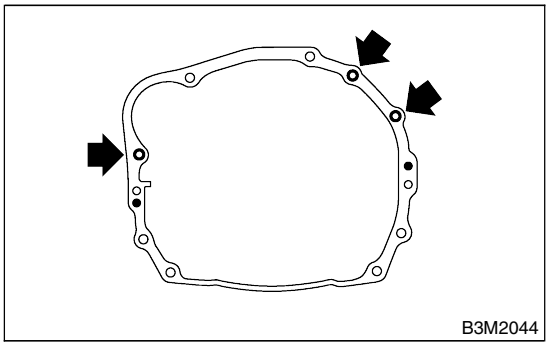


7) Lower the vehicle.
8) Connect engine and transmission.
(1) Remove ST from torque converter clutch case.

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)

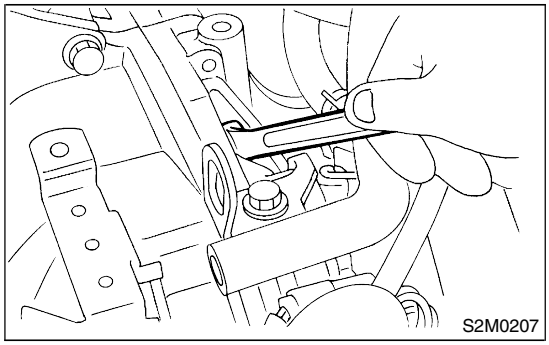


9) Install torque converter clutch to drive plate.
(1) Tighten bolts which hold torque converter clutch to drive plate.
(2) Tighten other bolts while rotating the engine by using ST.

CAUTION:
Be careful not to drop bolts into torque converter clutch housing.

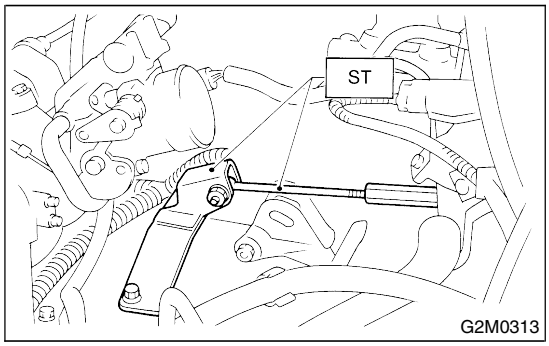
ST 499977300 CRANK PULLEY WRENCH

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)


S2M0207

(3) Clog plug onto service hole.

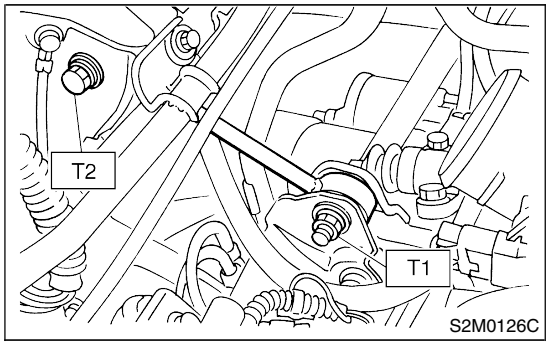
10) Remove ST.



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)

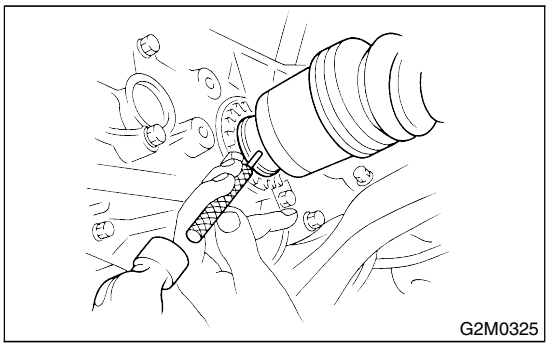


S2M0126C

12) Lift vehicle.

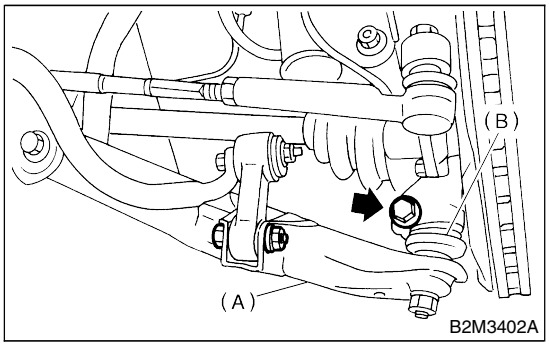
Install front drive shafts into transmission.
(1) Lift vehicle.
(2) Install front drive shaft into transmission.
(3) Drive spring pin into chamfered hole of drive shaft.

CAUTION:
Always use a new spring pin.


G2M0325

(4) 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)

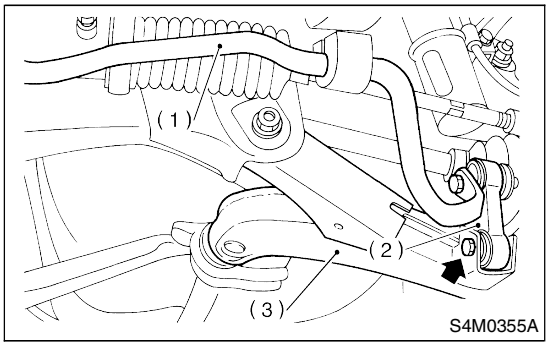


B2M3402A

(A) Transverse link
(B) Ball joint

13) Install stabilizer link to front transverse link.

Tightening torque:
30 N·m (3.1 kgf-m, 22 ft-lb)

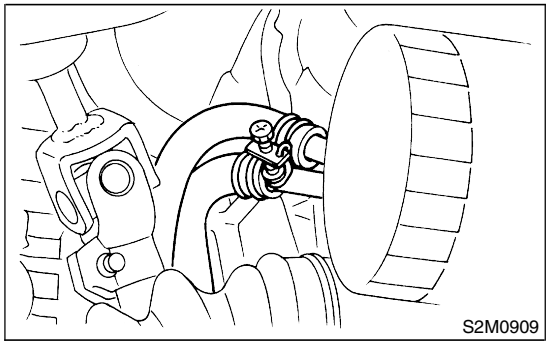


S4M0355A

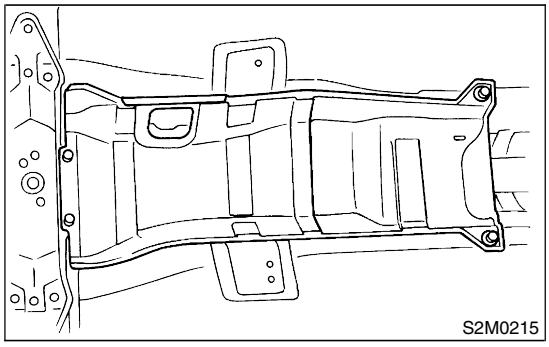
(A) Stabilizer
(B) Stabilizer link
(C) Transverse link

14) Install shift select cable onto select lever.
<Ref. to CS-11 INSTALLATION, Select Cable.>

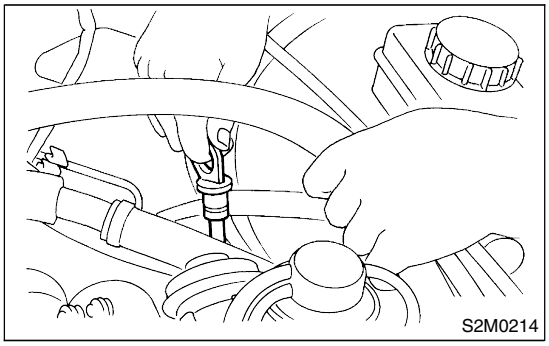
15) Install ATF level gauge guide, and connect ATF cooler hoses to pipe.


S2M0909

16) Install propeller shaft.
<Ref. to DS-15 INSTALLATION, Propeller Shaft.>
17) Install heat shield cover. (If equipped)


S2M0215

18) Install rear exhaust pipe and muffler assembly. (Non-turbo model)
With OBD:
<Ref. to EX(SOHC)-11, INSTALLATION, Muffler.> and <Ref. to EX(SOHC)-9, INSTALLATION, Rear Exhaust Pipe.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-12, INSTALLATION, Muffler.> and <Ref. to EX(SOHCw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.>
19) Install front and center exhaust pipe. (Non-turbo model)
With OBD:
<Ref. to EX(SOHC)-6, INSTALLATION, Front Exhaust Pipe.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>
20) Install center, rear exhaust pipe and muffler. (Turbo model) <Ref. to EX(DOHC TURBO)-10, INSTALLATION, Center Exhaust Pipe.>, <Ref. to EX(DOHC TURBO)-14, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, INSTALLATION, Muffler.>
21) Install under cover.
22) Lower the vehicle.
23) Install ATF level gauge.


S2M0214

24) Connect the following connectors.
(1) Transmission harness connectors
(2) Transmission ground terminal
25) Install air cleaner case stay.

Tightening torque:
16 N·m (1.6 kgf-m, 11.6 ft-lb)

26) Install air cleaner case and intake duct. (Non-turbo model) <Ref. to IN(SOHC)-7, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(SOHC)-8, INSTALLATION, Air Intake Duct.>
27) Install intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>
28) Connect battery ground terminal.
29) 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:
Non-turbo model
8.4 — 8.7 ℓ (8.9 — 9.2 US qt, 7.4 — 8.4 Imp qt)
Turbo model
9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 8.2 — 8.4 Imp qt)

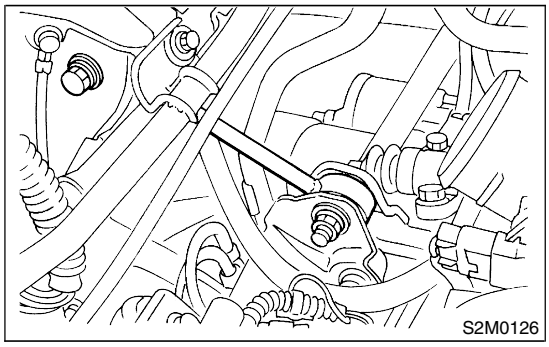
30) Take off vehicle from lift arms.
31) Check select lever operation.
<Ref. to AT-28, INSPECTION, Inhibitor Switch.>
32) Check the ATF level. <Ref. to AT-9, Automatic Transmission Fluid.>
33) Check the vehicle on the road tester.
<Ref. to AT-12, Road Test.>

10. Transmission Mounting System S502233

A: REMOVAL S502233A18

1. PITCHING STOPPER S502233A1801

1) Disconnect battery ground terminal.
2) Remove the air intake duct and cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-8, REMOVAL, Air Intake Duct.> and <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
3) Remove intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>
4) Remove the pitching stopper.

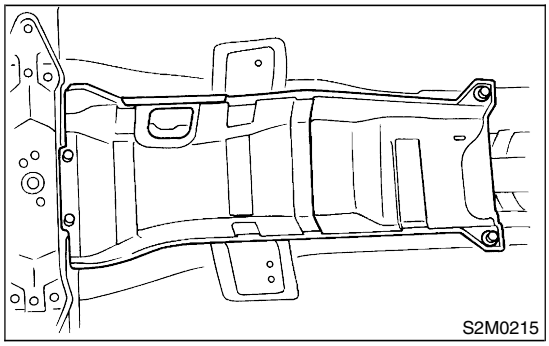

S2M0126

2. CROSSMEMBER AND CUSHION RUBBER S502233A1802

1) Set vehicle on a lift.
2) Disconnect battery ground terminal.
3) Lift vehicle and support it with sturdy racks.
4) Remove the front, center, rear exhaust pipes and muffler.

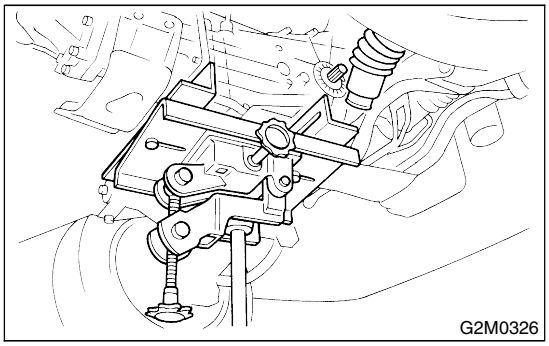
CAUTION:
When removing exhaust pipes, be careful each exhaust pipe does not drop out.

5) Remove the heat shield cover. (If equipped)

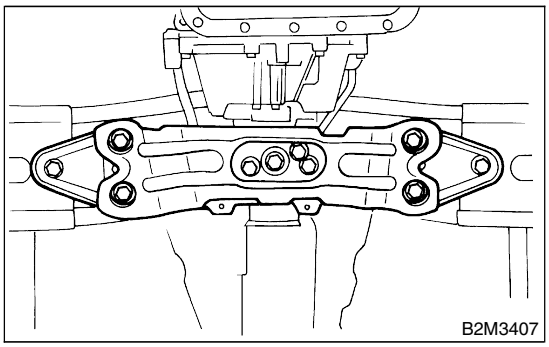

S2M0215

6) Set the transmission jack under the transmission.

CAUTION:
• Always support transmission case with a transmission jack.
• On AT vehicle, make sure that the support plates of transmission jack don't touch the oil pan.


G2M0326

7) Remove the crossmember.


B2M3407

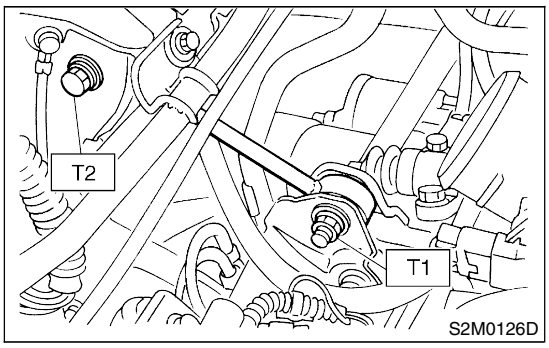
8) Remove the rear cushion rubber.

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)



S2M0126D

2) Install the air intake duct and cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-7, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(SOHC)-8, INSTALLATION, Air Intake Duct.>

3) Install intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>

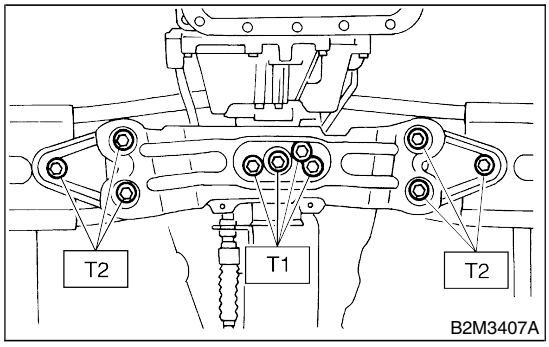
2. CROSSMEMBER AND CUSHION RUBBER S502233A1102

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 ft-lb)



3) Remove the transmission jack.
4) Install the heat shield cover. (If equipped)
5) Install the front, center, rear exhaust pipes and the muffler. (Non-turbo model)
With OBD:
<Ref. to EX(SOHC)-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(SOHC)-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11, INSTALLATION, Muffler.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(SOHCw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.>
6) Install center, rear exhaust pipes and muffler. (Turbo model) <Ref. to EX(DOHC TURBO)-10, INSTALLATION, Center Exhaust Pipe.>, <Ref. to EX(DOHC TURBO)-14, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, INSTALLATION, Muffler.>
7) Install under cover.

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

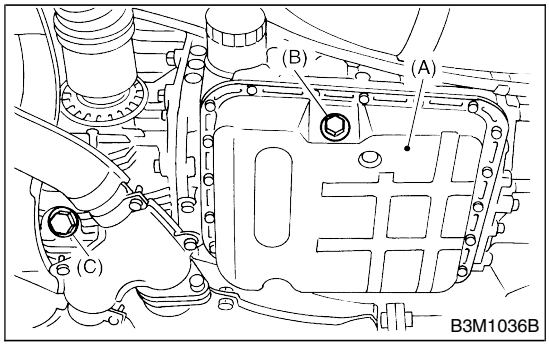
Make sure ATF does not leak from the joint of the transmission and propeller shaft. If so, replace oil seal. <Ref. to AT-27 REPLACEMENT, Extension Case Oil Seal.>

B: REPLACEMENT S502718A20

1) Set vehicle on a lift.
2) Lift vehicle.
3) Clean transmission exterior.
4) Drain ATF completely.

NOTE:
Tighten ATF drain plug after draining ATF.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



(G) Oil pan
(H) Drain plug
(I) Differential oil drain plug

5) Remove the rear exhaust pipe and muffler.

Non-turbo model:
With OBD
<Ref. to EX(SOHC)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11, REMOVAL, Muffler.>
Without OBD
<Ref. to EX(SOHCw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-12, REMOVAL, Muffler.>

Turbo model:
<Ref. to EX(DOHC TURBO)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, REMOVAL, Muffler.>

6) Remove the heat shield cover. (If equipped)
7) Remove the propeller shaft. <Ref. to DS-14 REMOVAL, Propeller Shaft.>
8) Using ST, remove the oil seal.
ST 398527700 PULLER ASSY
9) Using ST, install the oil seal.
ST 498057300 INSTALLER
10) Install the propeller shaft. <Ref. to DS-15 INSTALLATION, Propeller Shaft.>
11) Install the heat shield cover. (If equipped)
12) Install the rear exhaust pipe and muffler.

Non-turbo model:
With OBD
<Ref. to EX(SOHC)-11, INSTALLATION, Muffler.> and <Ref. to EX(SOHC)-9, INSTALLATION, Rear Exhaust Pipe.>
Without OBD
<Ref. to EX(SOHCw/oOBD)-12, INSTALLATION, Muffler.> and <Ref. to EX(SOHCw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.>

Turbo model:
<Ref. to EX(DOHC TURBO)-14, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, INSTALLATION, Muffler.>

13) Pour ATF and check the ATF level. <Ref. to AT-9 Automatic Transmission Fluid.>

12. Inhibitor Switch S502243

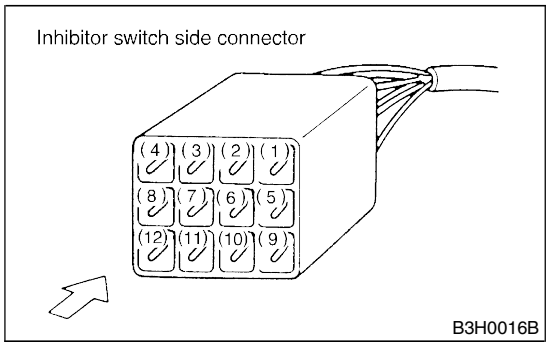
A: INSPECTION S502243A10

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.

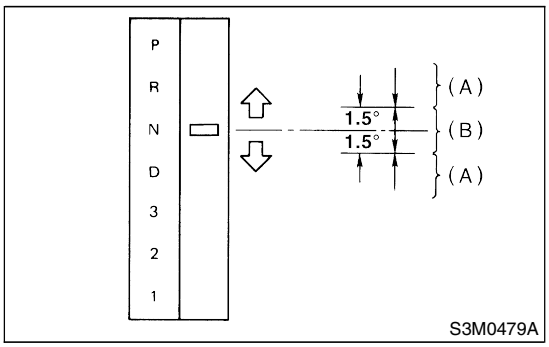
CAUTION:
Also check that continuity in ignition circuit does not exist when select lever is in R, D, 3, 2 and 1 ranges.

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
Ignition circuit	P/N	12 — 11
Back-up light circuit	R	10 — 9



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.>

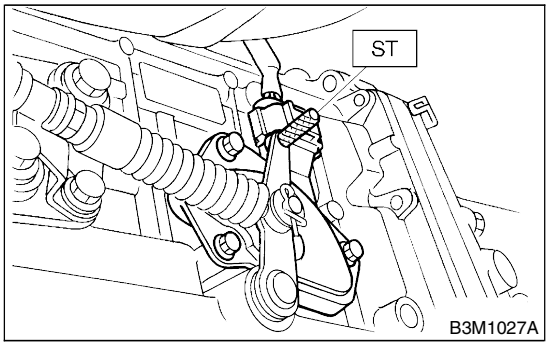


(A) Continuity does not exist.
(B) Continuity exists.

4) Repeat the above checks. If there are abnormalities, adjust the select cable. <Ref. to CS-11 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



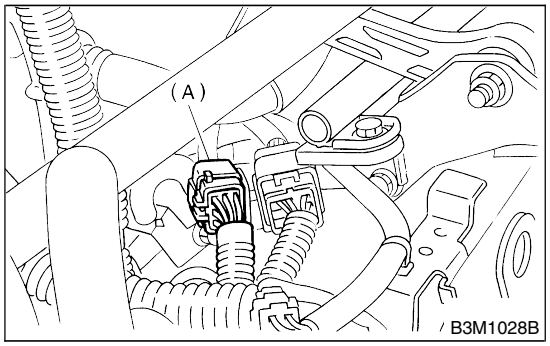
4) Tighten the three inhibitor switch bolts.

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.

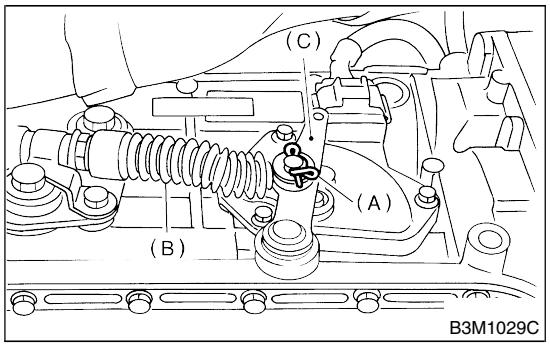
C: REMOVAL S502243A18

1) Set vehicle on a lift.
2) Move select lever to neutral position.
3) Remove air cleaner case. <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
4) Remove intercooler. <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
5) Disconnect inhibitor switch connector.



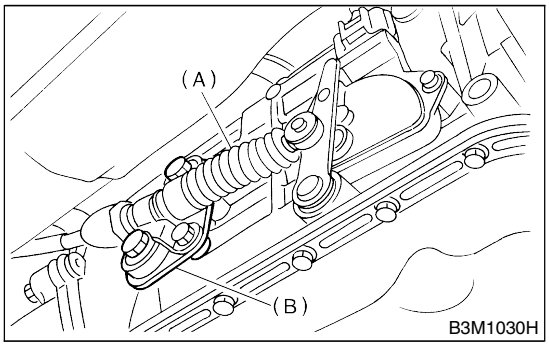
(A) Inhibitor switch

6) Remove inhibitor switch connector from stay.
7) Lift vehicle.
8) Remove under cover.
9) Remove snap pin from range select lever.



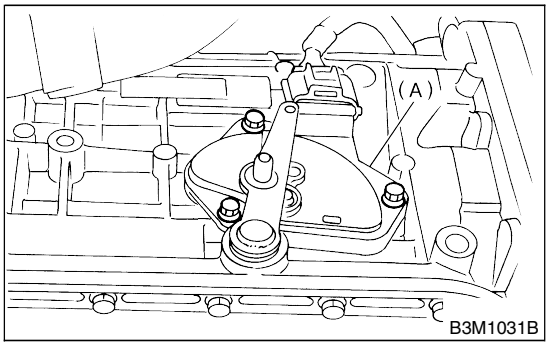
(A) Snap pin
(B) Select cable
(C) Range select lever

10) Remove plate assembly from transmission case.



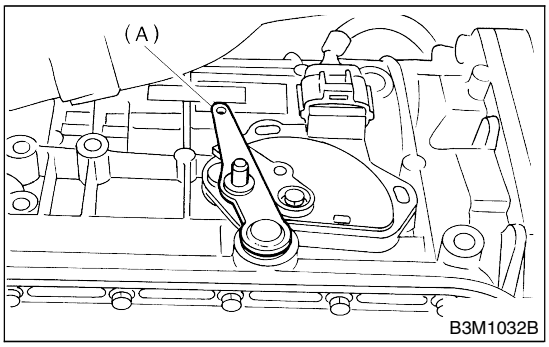
(A) Select cable
(B) Plate ASSY

11) Remove bolts.



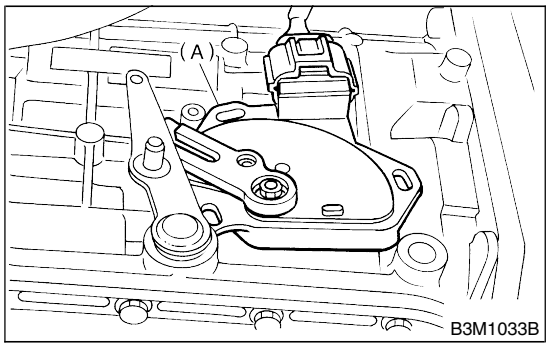
(A) Inhibitor switch

12) Move range select lever to parking position (left side).



(A) Range select lever

13) Remove inhibitor switch from transmission.

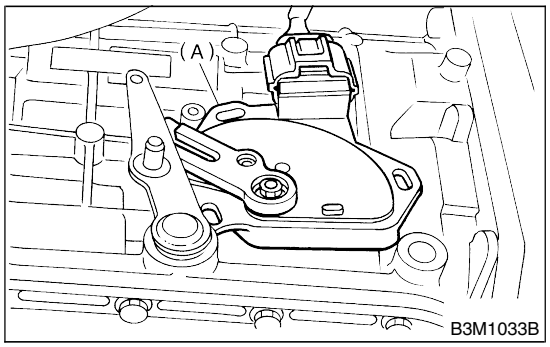


(A) Inhibitor switch

14) Remove inhibitor switch connector from inhibitor switch.

D: INSTALLATION S502243A11

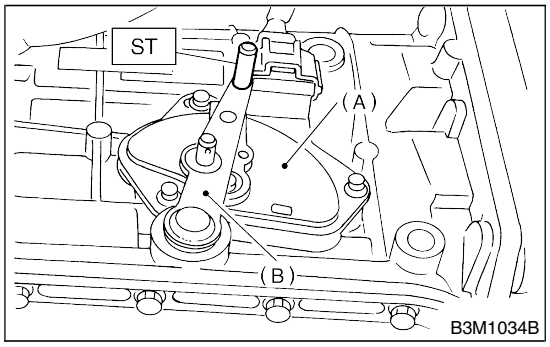
1) Connect inhibitor switch connector.
2) Install inhibitor switch to transmission case.



(A) Inhibitor switch

3) Move range select lever to neutral position.
4) Using ST, tighten bolts of inhibitor switch.
ST 499267300 STOPPER PIN

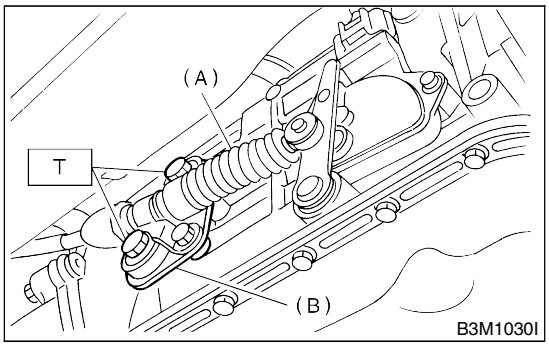
Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)



(A) Inhibitor switch
(B) Range select lever

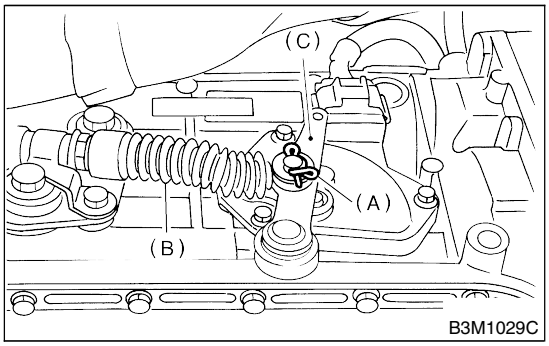
5) Install select cable to range select lever.
6) Install plate assembly to transmission.

Tightening torque:
T: 24.5 N·m (2.50 kgf-m, 18.1 ft-lb)



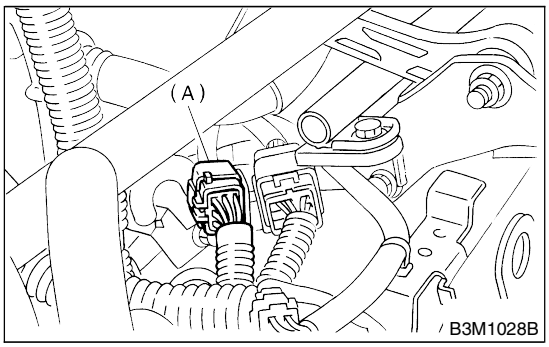
(A) Select cable
(B) Plate ASSY

7) Install snap pin to range select lever.



(A) Snap ring
(B) Select cable
(C) Range select lever

8) Install under cover.
9) Lower the vehicle.
10) Install inhibitor switch connector from stay.
11) Connect inhibitor switch connector.



(A) Inhibitor switch

12) Install air cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-7, INSTALLATION, Air Cleaner Case.>

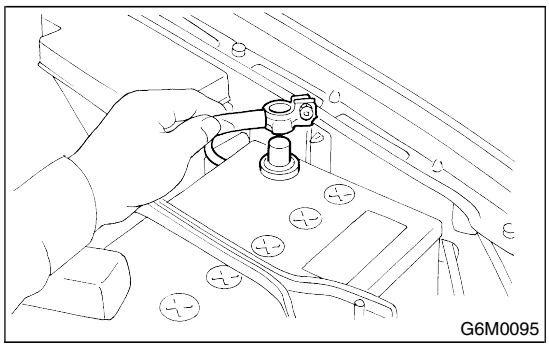
13) Install intercooler. <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>
14) Inspect inhibitor switch. <Ref. to AT-28 INSPECTION, Inhibitor Switch.>

13. Front Vehicle Speed Sensor

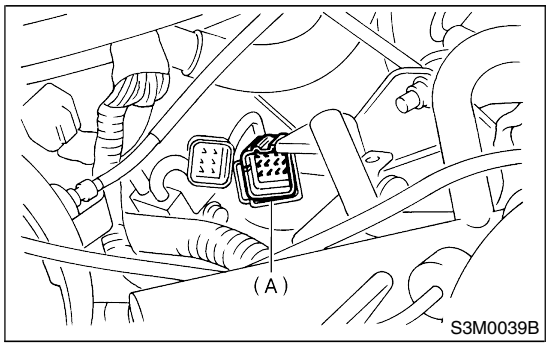
S502709

A: REMOVAL S502709A18

1) Set vehicle on a lift.
2) Disconnect battery ground terminal.



3) Remove air cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
4) Remove intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
5) Disconnect transmission connector.

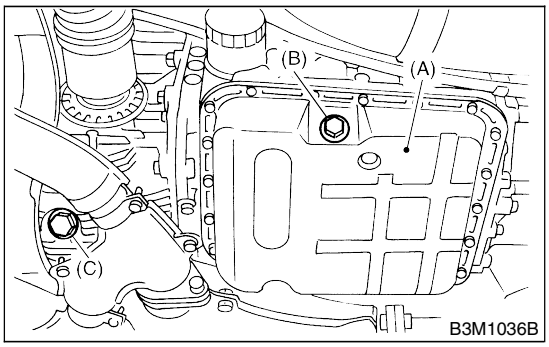


(A) Transmission connector

6) Remove the transmission connector from stay.
7) Lift vehicle.
8) Remove under cover.
9) Clean transmission exterior.
10) Drain ATF completely.

NOTE:
Tighten ATF drain plug after draining ATF.

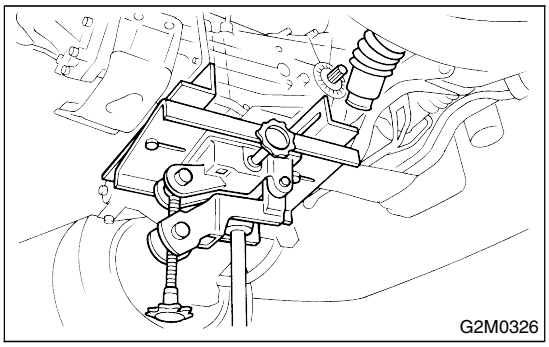
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



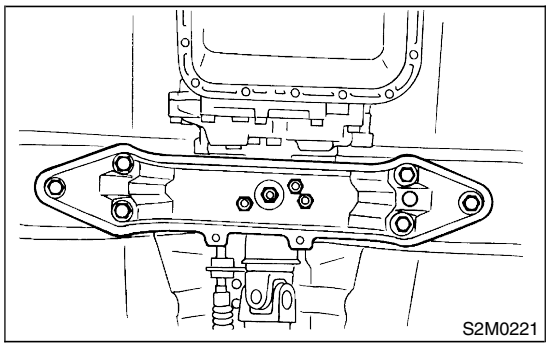
(A) Oil pan
(B) Drain plug
(C) Differential oil drain plug

11) Remove front, center, rear exhaust pipes and muffler. (Non-turbo model)
With OBD:
<Ref. to EX(SOHC)-5, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(SOHC)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11, REMOVAL, Muffler.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(SOHCw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-12, REMOVAL, Muffler.>
12) Remove center, rear exhaust pipe and muffler. (Turbo model)
<Ref. to EX(DOHC TURBO)-9, REMOVAL, Center Exhaust Pipe.>, <Ref. to EX(DOHC TURBO)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, REMOVAL, Muffler.>
13) Remove the shield cover. (If equipped)
14) Remove the propeller shaft. <Ref. to DS-14 REMOVAL, Propeller Shaft.>
15) Place transmission jack under transmission.

CAUTION:
• Always support transmission case with a transmission jack.
• On AT vehicle, make sure that the support plates of transmission jack don't touch the oil pan.



16) Remove the transmission rear crossmember bolts.



17) Lower the AT jack.

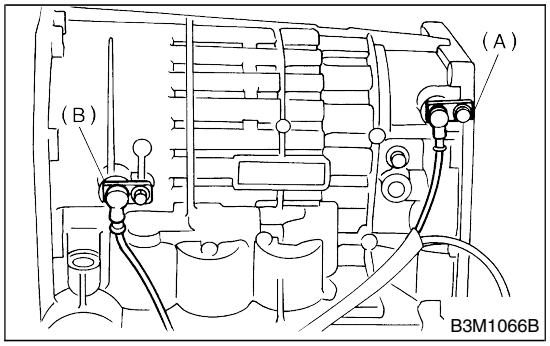
NOTE:
Do not separate the AT jack and transmission.

18) Remove the oil cooler outlet pipe.

CAUTION:
When removing outlet pipe, be careful not to lose balls and springs used with retaining screws.

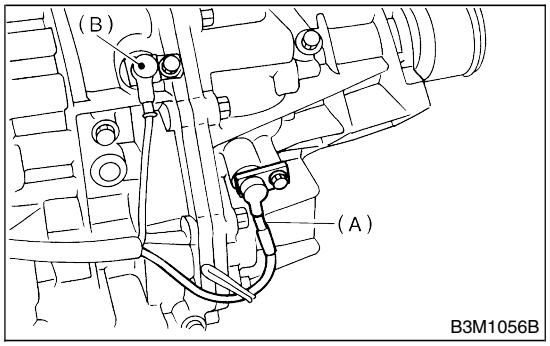
19) Remove front and rear vehicle speed sensor and torque converter turbine speed sensor.

● **Front vehicle speed sensor and torque converter turbine speed sensor**



(A) Front vehicle speed sensor
(B) Torque converter turbine speed sensor

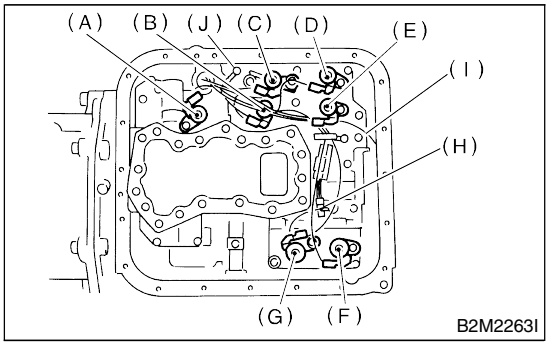
● **Rear vehicle speed sensor**



(A) Rear vehicle speed sensor
(B) Front vehicle speed sensor

20) Attach transmission rear crossmember bolt and tighten temporarily.

21) Remove the transmission jack.
22) Remove oil pan.
23) Disconnect duty solenoids and ATF temperature sensor connectors. Remove connectors from clip and disconnect connectors.

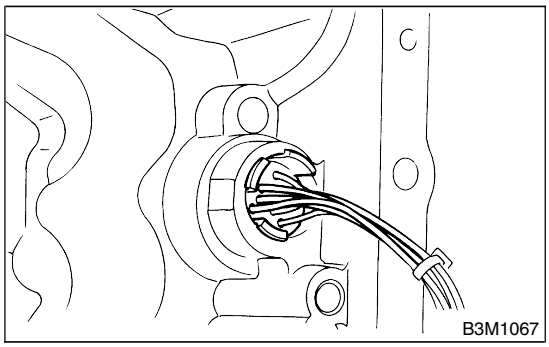


(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) ATF temperature sensor
(I) Transfer duty solenoid (Brown)
(J) Transmission ground

24) Remove harness assembly.

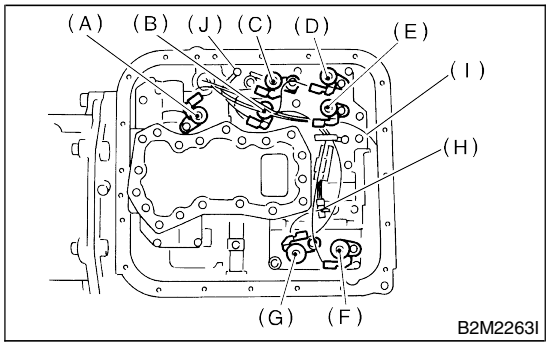
B: INSTALLATION S502709A11

1) Pass the harness assembly through the hole in the transmission case.



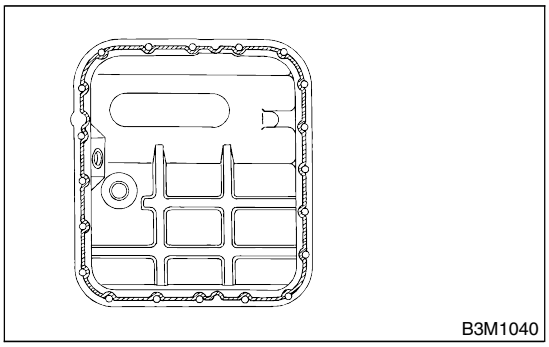
2) Connect harness connectors.
Connect connectors of same color, and secure connectors to valve body sing clips.

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

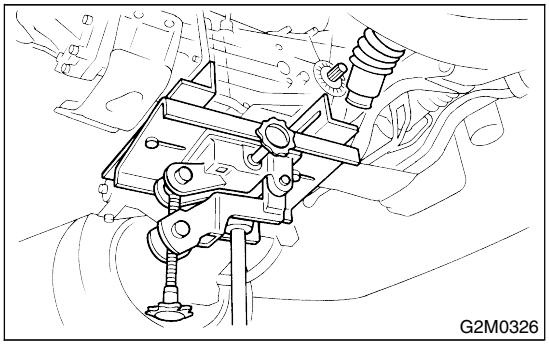


4) Install the oil pan.

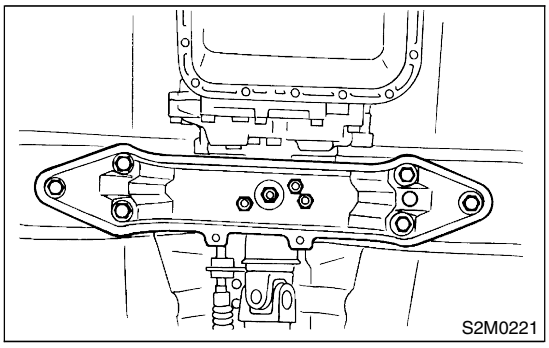
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

5) Place transmission jack under transmission.

CAUTION:
• Always support transmission case with a transmission jack.
• On AT vehicle, make sure that the support plates of transmission jack don't touch the oil pan.



6) Remove the transmission rear crossmember bolts.



7) Lower the AT jack.

NOTE:
Do not separate the AT jack and transmission.

8) Remove the oil cooler outlet pipe.

CAUTION:
When removing outlet pipe, be careful not to lose balls and springs used with retaining screws.

9) 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)

10) 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)

11) Install transmission rear crossmember bolts.

Tightening torque:
75 N·m (7.6 kgf-m, 55 ft-lb)

12) Install propeller shaft. <Ref. to DS-15 INSTALLATION, Propeller Shaft.>
13) Install shield cover. (If equipped)
14) Install front, center, rear exhaust pipes and muffler. (Non-turbo model)
With OBD:
<Ref. to EX(SOHC)-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(SOHC)-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11, REMOVAL, Muffler.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(SOHCw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-12, INSTALLATION, Muffler.>
15) Install center, rear exhaust pipe and muffler. (Turbo model) <Ref. to EX(DOHC TURBO)-10, INSTALLATION, Center Exhaust Pipe.>, <Ref. to EX(DOHC TURBO)-14, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, INSTALLATION, Muffler.>
16) Install under cover. (Turbo model)
17) Lower the vehicle.
18) Install the transmission connector to the stay.
19) Install air cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-7, INSTALLATION, Air Cleaner Case.>
20) Install intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>

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.>

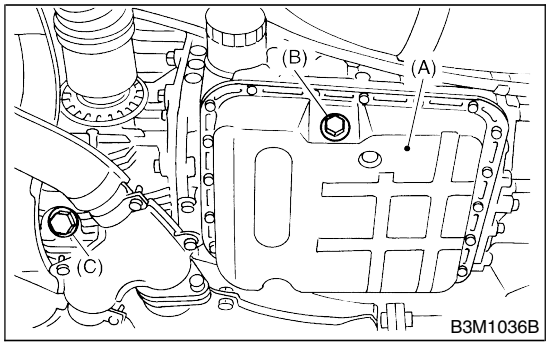
16. Control Valve Body S502564

A: REMOVAL S502564A18

1) Set vehicle on a lift.
2) Disconnect battery ground terminal from battery.
3) Lift vehicle.
4) Clean transmission exterior.
5) Remove under cover.
6) Drain ATF completely.

NOTE:
Tighten ATF drain plug after draining ATF.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

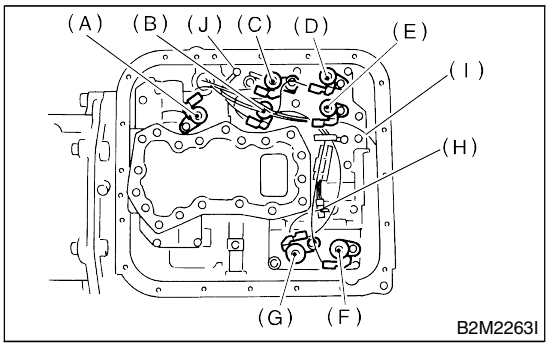


(A) Oil pan
(B) Drain plug
(C) Differential oil drain plug

7) Remove the oil pan.

NOTE:
- Remove and clean the magnet.
- Remove the old gasket on the oil pan and transmission case completely.

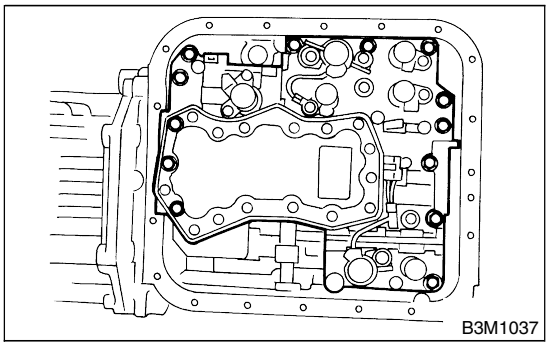
8) Disconnect duty solenoids and ATF temperature sensor connectors. Remove connectors from clip and disconnect connectors.



(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

9) Remove the control valve.

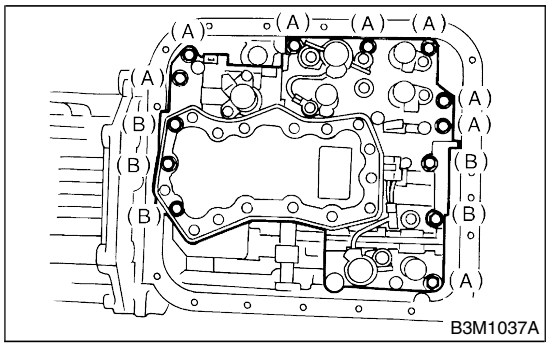
CAUTION:
When removing control valve body, be careful not to interfere with transfer duty solenoid wiring.



B: INSTALLATION S502564A11

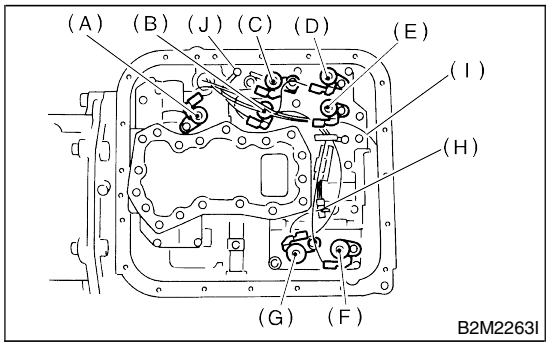
1) Set the range select lever in “N” position.
2) Install the control valve and ground earth terminal.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



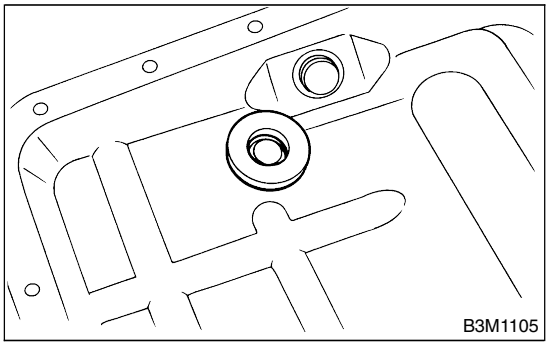
(A) Short bolts
(B) Long bolts

3) Connect all connector.

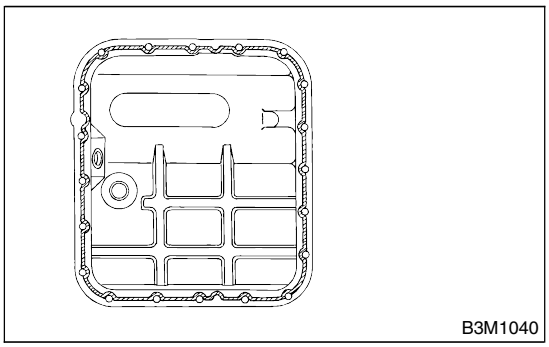


(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) ATF temperature sensor
(I) Transfer duty solenoid (Brown)
(J) Transmission ground

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) Install under cover. (Turbo model)
8) Pour ATF into the oil charge pipe.

Recommended fluid:
Dexron III type automatic transmission fluid

Fluid capacity:
Non-turbo model
8.4 — 8.7 ℓ (8.9 — 9.2 US qt, 7.4 — 7.7 Imp qt)
Turbo model
9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 8.2 — 8.4 Imp qt)

9) 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.

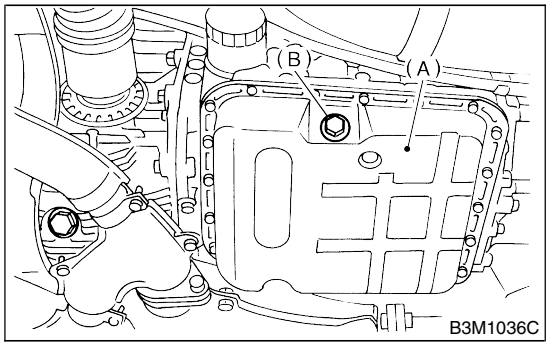
17. Shift Solenoids, Duty Solenoids and ATF Temperature Sensor S502227

A: REMOVAL S502227A18

1) Set vehicle on a lift.
2) Disconnect battery ground terminal from battery.
3) Lift vehicle.
4) Remove under cover.
5) Clean transmission exterior.
6) Drain ATF completely.

NOTE:
Tighten ATF drain plug after draining ATF.

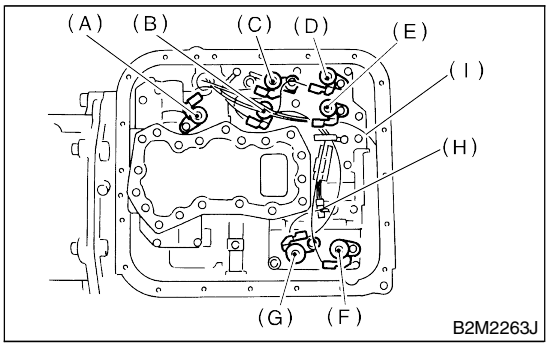
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Oil pan
(B) Drain plug

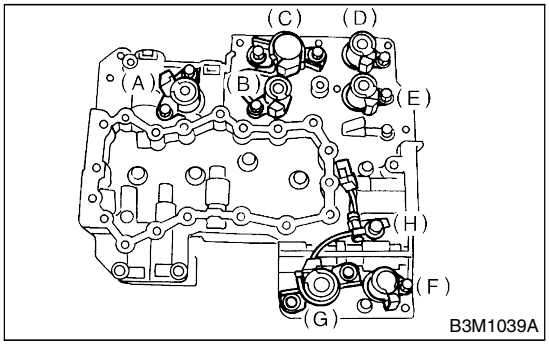
7) Remove oil pan.

8) 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)

9) Remove solenoids, duty solenoids and ATF temperature sensor.

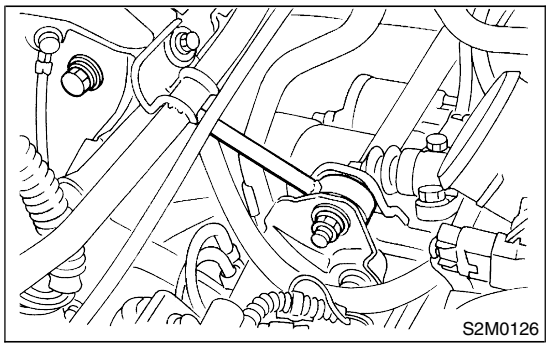


(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) ATF temperature sensor

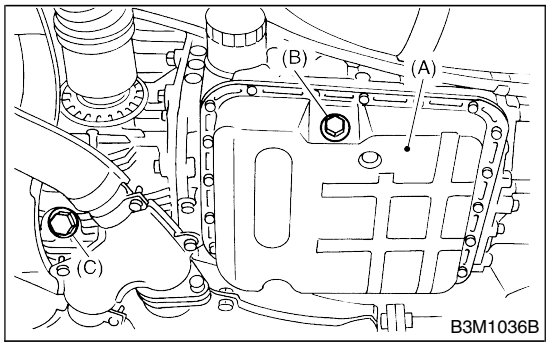
1. TRANSFER DUTY SOLENOID AND TRANSFER VALVE BODY S502227A1801

1) Set vehicle on a lift.
2) Disconnect battery ground terminal.
3) Remove air intake duct. <Ref. to IN(SOHC)-8, REMOVAL, Air Intake Duct.>
4) Remove air cleaner case. <Ref. to IN(SOHC)-7, REMOVAL , Air Cleaner Case.>
5) Remove intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10.>

6) Remove pitching stopper.


S2M0126

7) Remove front exhaust pipe with center exhaust pipe. (Non-turbo model)
With OBD:
<Ref. to EX(SOHC)-5, REMOVAL, Front Exhaust Pipe.> and <Ref. to XX.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>
8) Remove center exhaust pipe. (Turbo Model) <Ref. to EX(DOHC TURBO)-9, REMOVAL, Center Exhaust Pipe.>
9) Remove rear exhaust pipe and muffler. (Non-turbo model)
Non-turbo model with OBD:
<Ref. to EX(SOHC)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11, REMOVAL, Muffler.>
Non-turbo model without OBD:
<Ref. to EX(SOHCw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-12, REMOVAL, Muffler.>
Turbo model:
<Ref. to EX(DOHC TURBO)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, REMOVAL, Muffler.>
10) Raise vehicle and drain ATF.

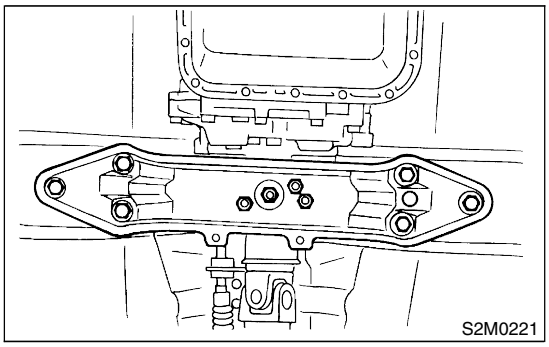


B3M1036B

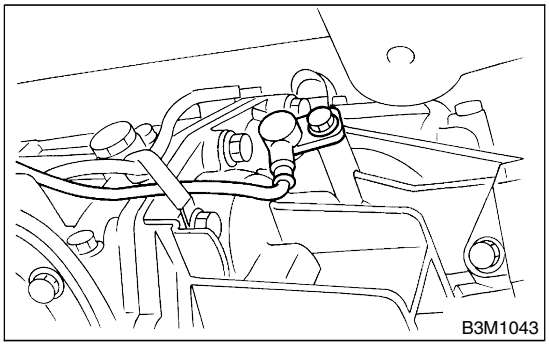
(A) Oil pan
(B) Drain plug
(C) Differential oil drain plug

11) Remove heat shield cover. (If equipped)
12) Remove propeller shaft. <Ref. to DS-14, REMOVAL, Propeller Shaft.>

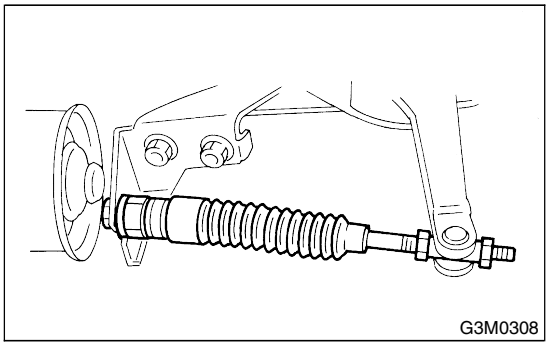
13) Remove rear crossmember.
(1) Support transmission using a transmission jack and raise slightly.
(2) Remove bolts and nuts as shown in Figure.


S2M0221

14) Remove rear vehicle speed sensor.


B3M1043

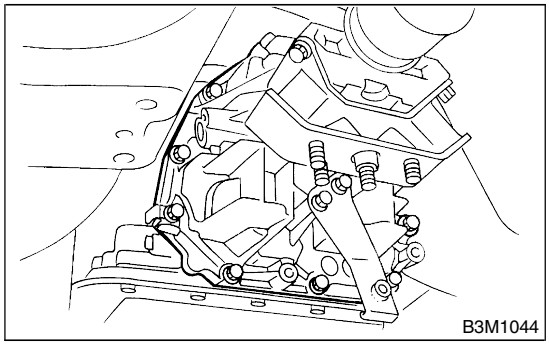
15) Remove select cable nut.


G3M0308

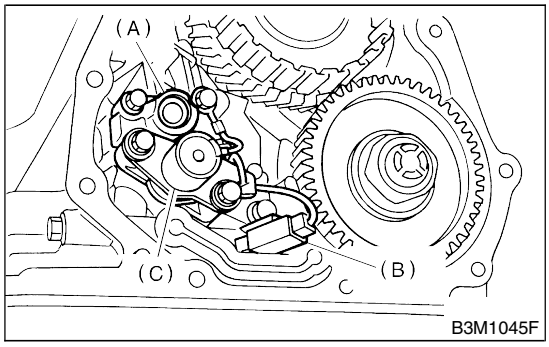
16) Move gear select cable so that extension bolts can be removed.
17) Remove bolts.

18) Remove extension case.

NOTE:
Use a container to catch oil flowing from extension.



19) Disconnect transfer duty solenoid connector.
20) Remove transfer duty solenoid and transfer valve body.

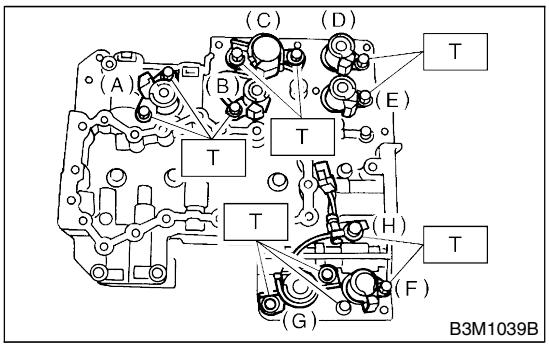


(A) Transfer valve body
(B) Transfer duty solenoid connector
(C) Transfer duty solenoid

B: INSTALLATION S502227A11

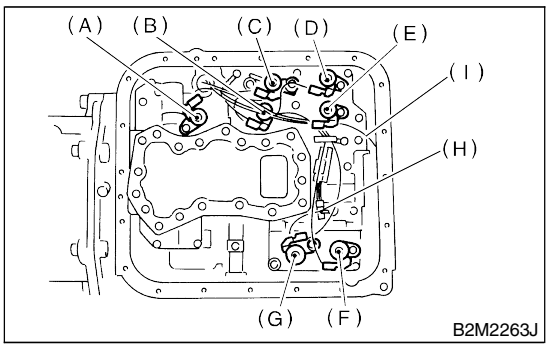
1) Install solenoids and ATF temperature sensor.

Tightening torque:
T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)



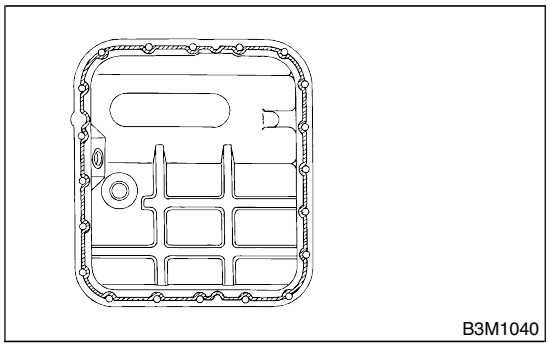
(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) ATF temperature sensor

2) Connect harness connectors.
Connect connectors of same color, and secure connectors to valve body using clips.



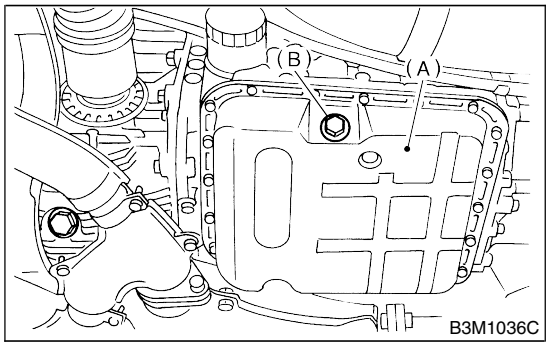
(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) ATF temperature sensor
(I) Transfer duty solenoid (Brown)

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.

Recommended fluid:
Dexron III type automatic transmission fluid

Fluid capacity:
Turbo model:
9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 8.2 — 8.4 Imp qt)
Non-turbo model:
8.4 — 8.7 ℓ (8.9 — 9.2 US qt, 7.4 — 7.7 Imp qt)

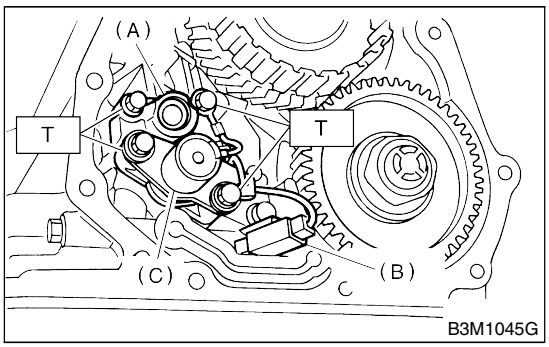
6) Check the ATF level. <Ref. to AT-9, Automatic Transmission Fluid.>

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 kgf-m, 5.8 ft-lb)

(2) Connect transfer duty solenoid connector.



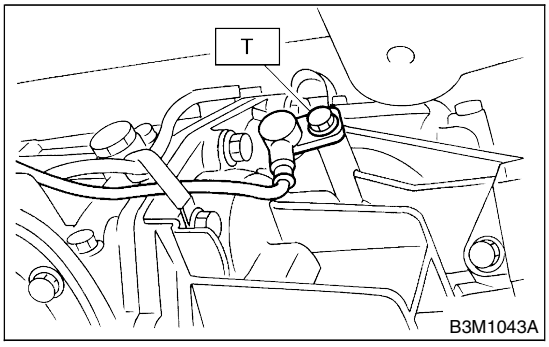
(A) Transfer valve body
(B) Transfer duty solenoid connector
(C) Transfer duty solenoid

2) Install extension case to transmission case.
(1) Tighten 11 bolts.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

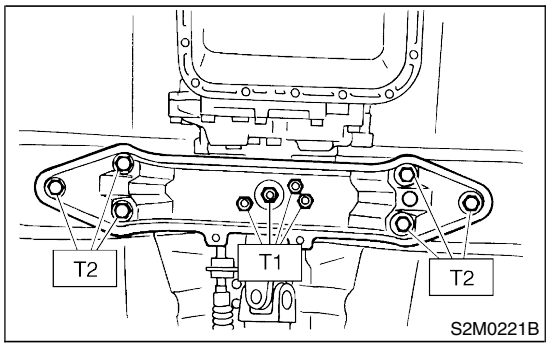
(2) Install select cable.
(3) Adjust the select cable. <Ref. to CS-11, ADJUSTMENT, Select Cable.>
3) Install rear vehicle speed sensor.

Tightening torque:
T: 7 N·m (0.7 kgf-m, 5.1 ft-lb)



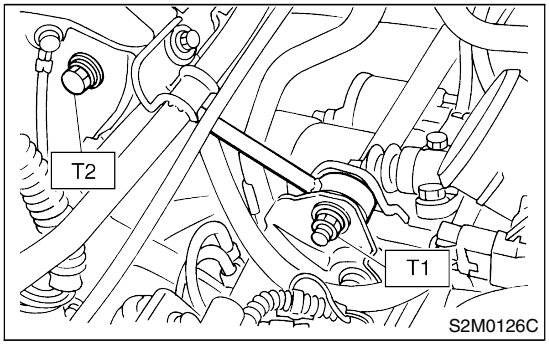
4) Install rear crossmember.
(1) Tighten bolts.

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)



(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. (Non-turbo model)
With OBD:
<Ref. to EX(SOHC)-6, INSTALLATION, Front Exhaust Pipe.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>
7) Install rear exhaust pipe and muffler. (Non-turbo model)
With OBD:
<Ref. to EX(SOHC)-11, INSTALLATION, Muffler.> and <Ref. to EX(SOHC)-9, INSTALLATION, Rear Exhaust Pipe.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-12, INSTALLATION, Muffler.> and <Ref. to EX(SOHCw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.>
8) Install center, rear exhaust pipe and muffler. (Turbo model) <Ref. to EX(DOHC TURBO)-10, INSTALLATION, Center Exhaust Pipe.>, <Ref. to EX(DOHC TURBO)-15, INSTALLATION, Muffler.> and <Ref. to EX(DOHC TURBO)-14, INSTALLATION, Rear Exhaust Pipe.>
9) Install under cover.
10) Install pitching stopper.

Tightening torque:
T1: 49 N·m (5.0 kgf-m, 36.2 ft-lb)
T2: 57 N·m (5.8 kgf-m, 42 ft-lb)



11) Install air cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-7, INSTALLATION, Air Cleaner Case.>
12) Install intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>
13) 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:
Non-turbo model; 8.4 - 8.7 L (8.9 - 9.2 US qt, 7.4 - 7.3 Imp qt)
Turbo model; 9.3 - 9.6 L (9.8 - 10.1 US qt, 8.2 - 8.4 Imp qt)

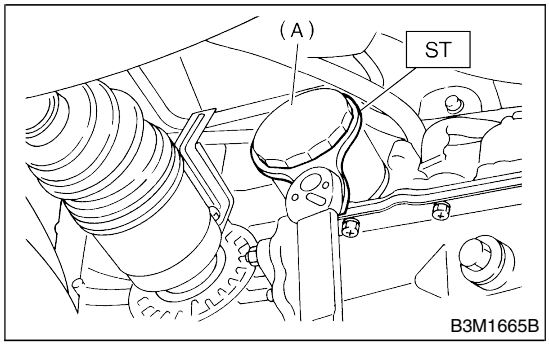
14) Check the ATF level. <Ref. to AT-9, Automatic Transmission Fluid.>

18. ATF Filter S502226

A: REMOVAL S502226A18

NOTE:
The ATF filter is maintenance free.

1) Lift 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) Install ATF filter. Turn it by hand, being careful not to damage oil seal.
2) Using ST, tighten ATF filter to transmission case.
Calculate ATF filter torque specifications using the following formula.
T2 = L1/(L1 + L2) × 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)	6 (0.6, 4.3)
150 (5.91)	5 (0.5, 3.6)
200 (7.87)	4 (0.4, 2.9)
250 (9.84)	3 (0.3, 2.2)

CAUTION:
Align ST with torque wrench while tightening ATF filter.

ST 498545400 OIL FILTER WRENCH
3) Add ATF.
4) Inspect level of ATF. <Ref. to AT-9 Automatic Transmission Fluid.>

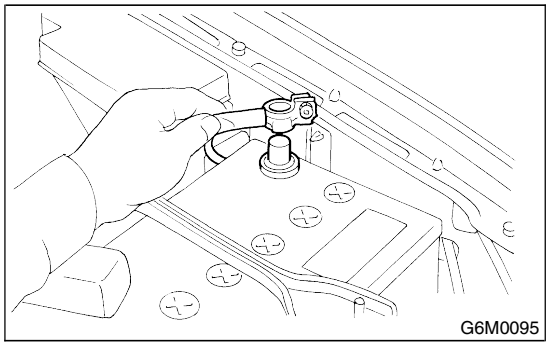
C: INSPECTION S502226A10

Replace the part if any defect is found from the inspection.
Check for rust, hole, ATF leaks, and other damage.

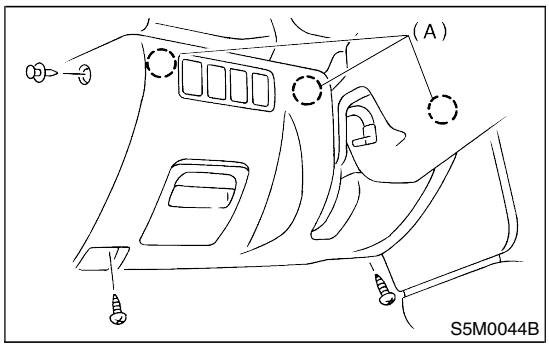
19. Transmission Control Module (TCM) S502225

A: REMOVAL S502225A18

1) Disconnect battery ground cable.



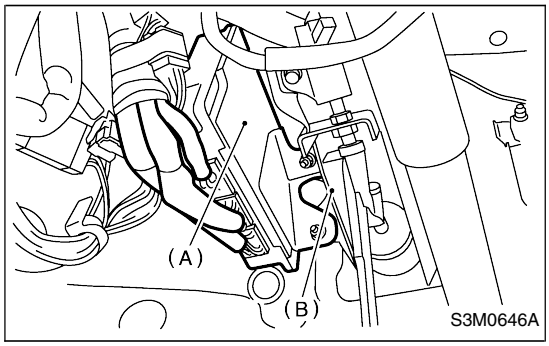
2) Remove lower cover and then disconnect connector.



(A) Clip

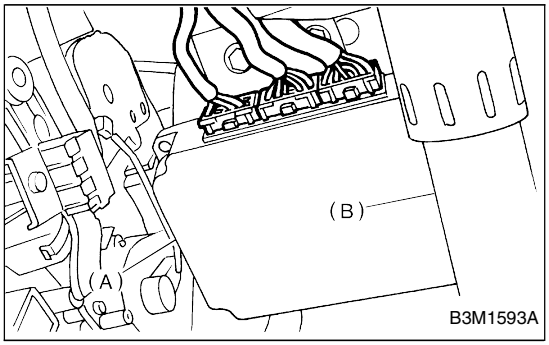
3) Disconnect connectors from transmission control module.

LHD model



(A) Transmission control module
(B) Brake pedal bracket

RHD model



(A) Transmission control module
(B) Column shaft

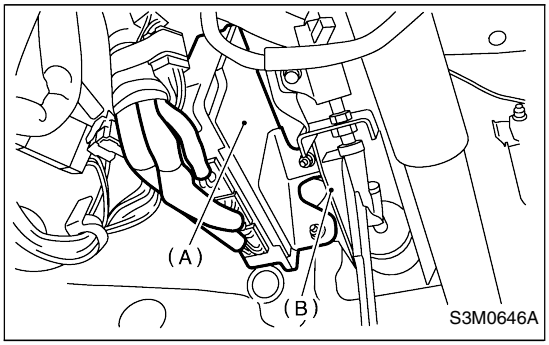
4) Remove transmission control module.

B: INSTALLATION S502225A11

1) Install transmission control module.

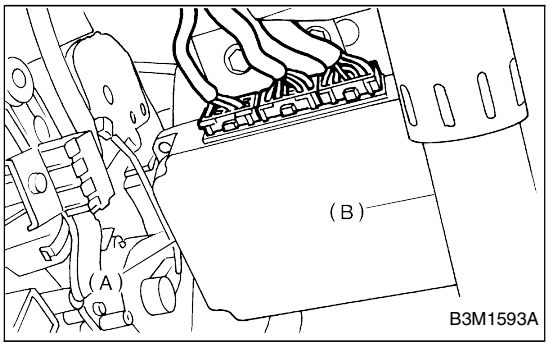
Tightening torque:
LHD model
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)
RHD model
25 N·m (2.5 kgf-m, 18.1 ft-lb)

LHD model



(A) Transmission control module
(B) Brake pedal bracket

RHD model



(A) Transmission control module
(B) Column shaft

2) Install in the reverse order of removal.

20. ATF Cooler Pipe and Hose

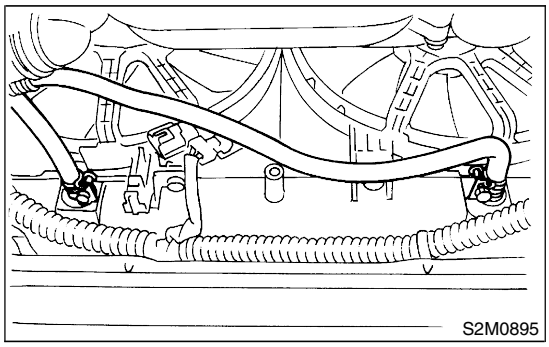
S502565

A: REMOVAL S502565A18

1. NON-TURBO MODEL S502565A1804

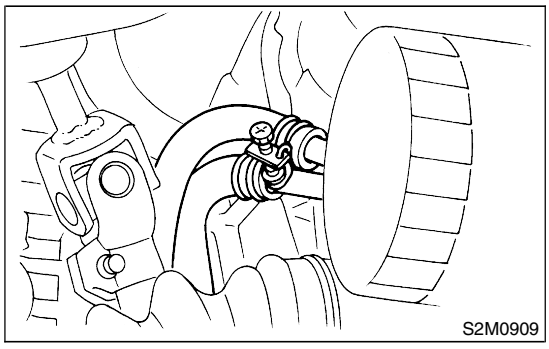
1) Set vehicle on a lift.
2) Remove battery and washer tank.
3) Lift vehicle.
4) Remove the under cover.
5) Disconnect ATF cooler hose from radiator.

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.

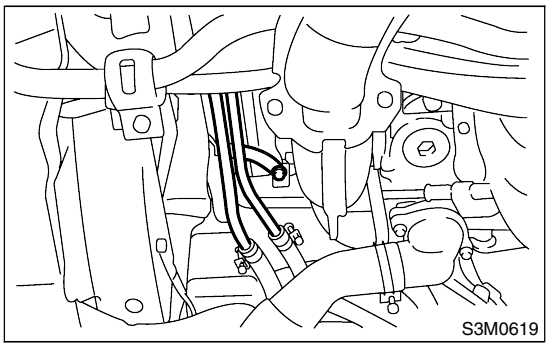

S2M0895

6) 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.

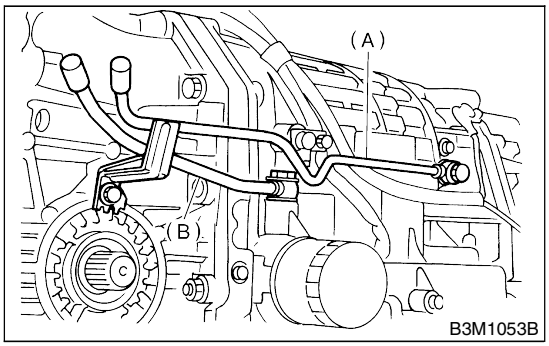

S2M0909

7) Remove ATF cooler pipe from cylinder head.


S3M0619

8) 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.



B3M1053B

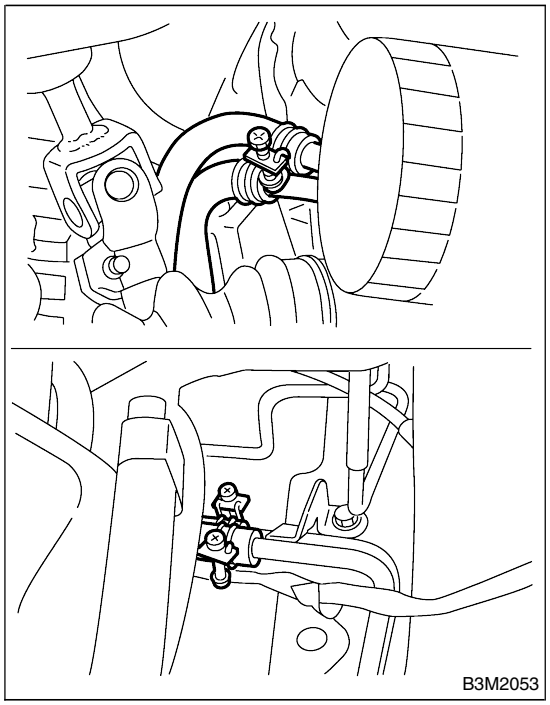
(A) Inlet pipe
(B) Outlet pipe

2. TURBO MODEL S502565A1805

1) Set vehicle on a lift.
2) Remove battery and washer tank.
3) Lift vehicle.
4) Remove the under cover.
5) Disconnect ATF cooler hose from radiator.
   (1) Remove radiator. <Ref. to CO-25, REMOVAL, Radiator.>
   (2) Remove radiator under cover.
   (3) Remove ATF cooler hose from radiator.

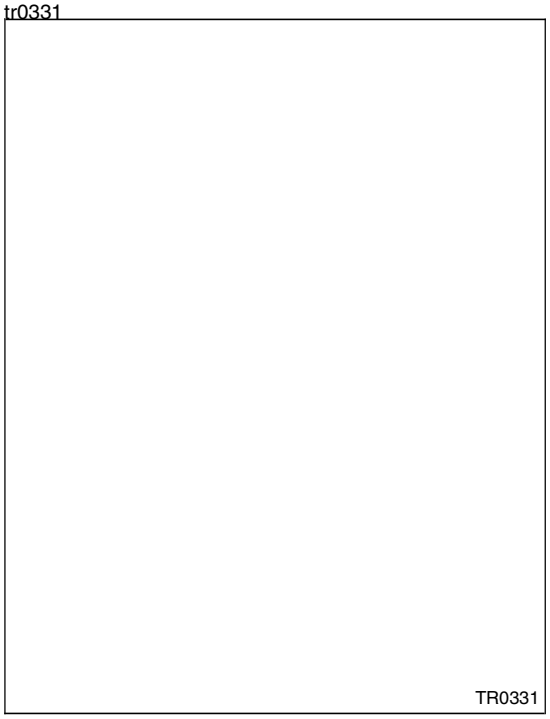
6) Disconnect ATF cooler hoses from pipes.

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.


B3M2053

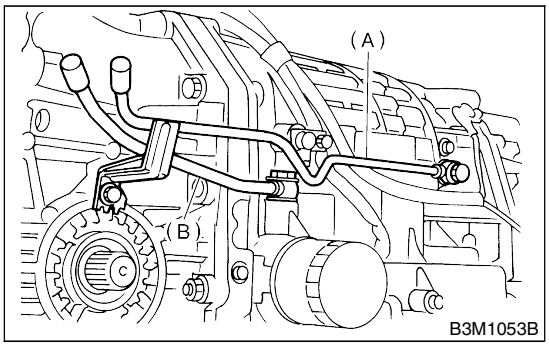
7) Remove ATF cooler pipe from frame.

tr0331


TR0331

8) 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.



B3M1053B

(A) Inlet pipe
(B) Outlet pipe

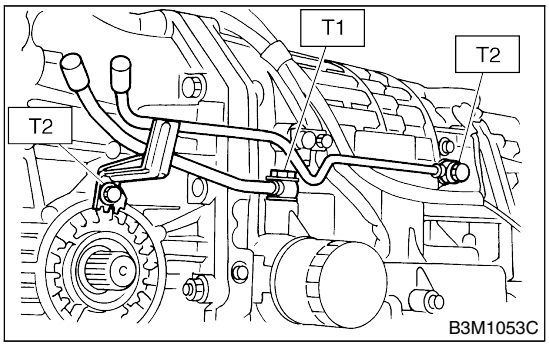
B: INSTALLATION S502565A11

1. NON-TURBO MODEL S502565A1104

1) Install the oil cooler outlet and inlet pipes.

CAUTION:
Be sure to use a new aluminum washer.

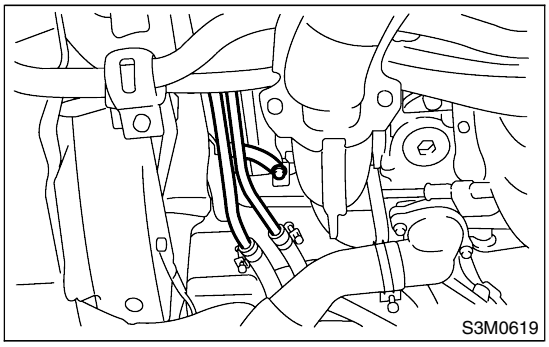
Tightening torque:
T1: 44 N·m (4.5 kgf-m, 32.5 ft-lb)
T2: 25 N·m (2.5 kgf-m, 18.1 ft-lb)



B3M1053C

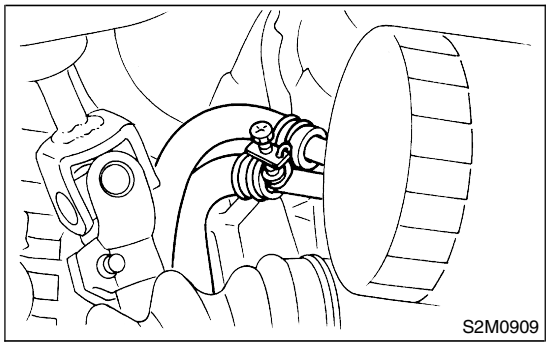
(A) Inlet pipe
(B) Outlet pipe

2) Install ATF cooler pipe to cylinder head.


S3M0619

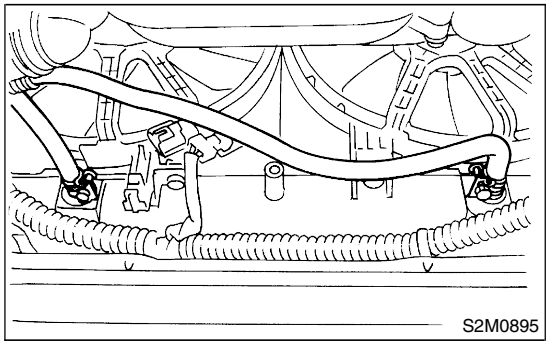
3) Connect ATF cooler hose to pipe transmission side.

NOTE:
● Install so that the hose is not folded over, excessively bent, or twisted.
● Be careful to insert the hose to the specified position.



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.



5) Install the under cover.
6) Install battery and washer tank.
7) Fill ATF. <Ref. to AT-9 Automatic Transmission Fluid.>

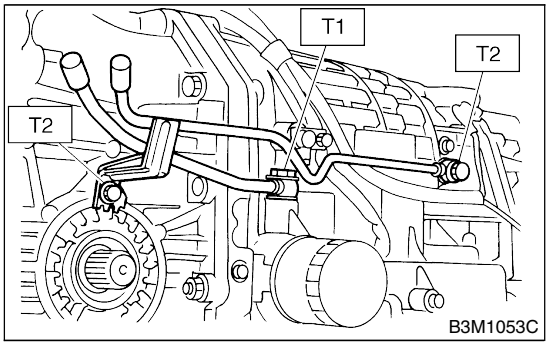
NOTE:
Make sure there are no ATF leaks in joints between the transmission, radiator, pipes, and hoses.

2. TURBO MODEL S502565A1105

1) Install the oil cooler outlet and inlet pipes.

CAUTION:
Be sure to use a new aluminum washer.

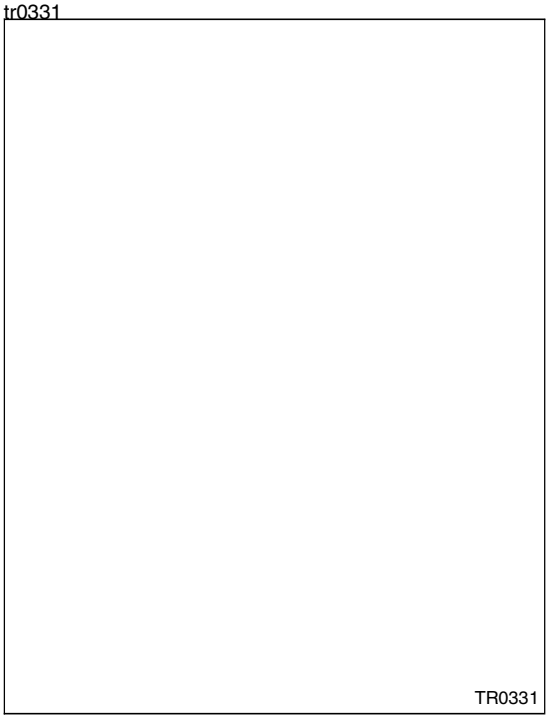
Tightening torque:
T1: 44 N·m (4.5 kgf-m, 32.5 ft-lb)
T2: 25 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Inlet pipe
(B) Outlet pipe

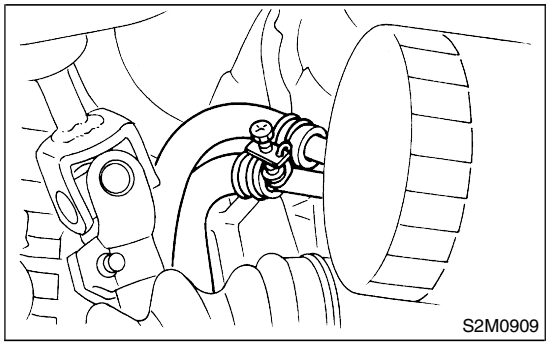
2) Install ATF cooler pipe to frame.

tr0331



3) Connect ATF cooler hose to pipe transmission 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.



4) Connect ATF cooler hose to pipe of radiator side.
   (1) Install ATF cooler hoses to radiator.
   (2) Install radiator under cover.
   (3) Install radiator. <Ref. to CO-27, INSTALLATION, Radiator.>
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

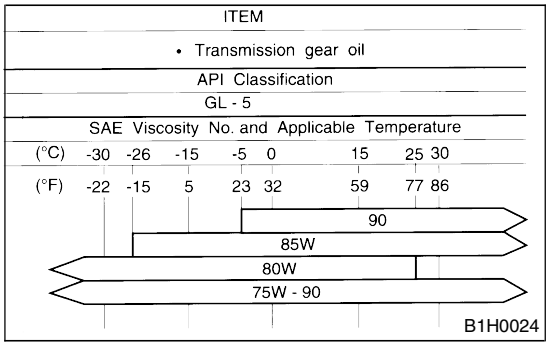
A: SPECIFICATIONS S503001E49

1. MANUAL TRANSMISSION AND DIFFERENTIAL S503001E4901

Model			Non-Turbo	Turbo	
				Without oil pump	With oil pump
			Dual-range	Single-range	
Type			5 × 2-forward speeds and 1 × 2-reverse	5-forward speeds and 1-reverse	
Transmission gear ratio		1st	3.454	3.454	
		2nd	2.062	1.947	
		3rd	1.448	1.366	
		4th	1.088	0.972	
		5th	0.871	0.738	
		Reverse	3.333		
Auxiliary transmission gear ratio		High	1.000	—	
		Low	1.447	—	
Front reduction gear	Final	Type of gear	Hypoid		
		Gear ratio	4.111	4.444	
Rear reduction gear	Transfer	Type of gear	Helical		
		Gear ratio	1.000		1.081
	Final	Type of gear	Hypoid		
		Gear ratio	4.111	4.444	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			4.0 ℓ (4.2 US qt, 3.5 Imp qt)	3.5 ℓ (3.7 US qt, 3.11 Imp qt)	4.4 ℓ (4.7 US qt, 3.9 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

Snap ring to counter washer clearance
0.05 — 0.35 mm (0.0020 — 0.0138 in)

Snap ring (Outer-19)	
Part No.	Thickness mm (in)
031319000	1.50 (0.0591)
805019010	1.72 (0.0677)

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. INPUT SHAFT ASSEMBLY S503001E4910

Snap ring (Outer-28) to ball bearing clearance
0 — 0.12 mm (0 — 0.0047 in)

Snap ring (Outer-28)	
Part No.	Thickness mm (in)
805028050	2.48 (0.0976)
805028060	2.56 (0.1008)
805028070	2.64 (0.1039)

Snap ring (Inner-68) to bearing clearance
0 — 0.12 mm (0 — 0.0047 in)

Snap ring (Inner-68)	
Part No.	Thickness mm (in)
805168020	1.84 (0.0724)
805168030	1.92 (0.0756)
805168040	2.00 (0.0787)

6. 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)

7. 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)	—	—

8. 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)

Non-Turbo model

5th shifter fork		
Part No.	Mark	Remarks
32812AA201	4	Approach to 5th gear by 0.2 mm (0.008 in)
32812AA211	5	Standard
32812AA221	6	Become distant from 5th gear by 0.2 mm (0.008 in)

Turbo model

5th shifter fork		
Part No.	Mark	Remarks
32812AA231	7	Approach to 5th gear by 0.2 mm (0.008 in)
32812AA241	No mark	Standard
32812AA251	9	Become distant from 5th gear by 0.2 mm (0.008 in)

9. 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.

10. 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)

11. FRONT DIFFERENTIAL S503001E4909

Bevel gear to pinion backlash
0.13 — 0.18 mm (0.0051 — 0.0071 in)

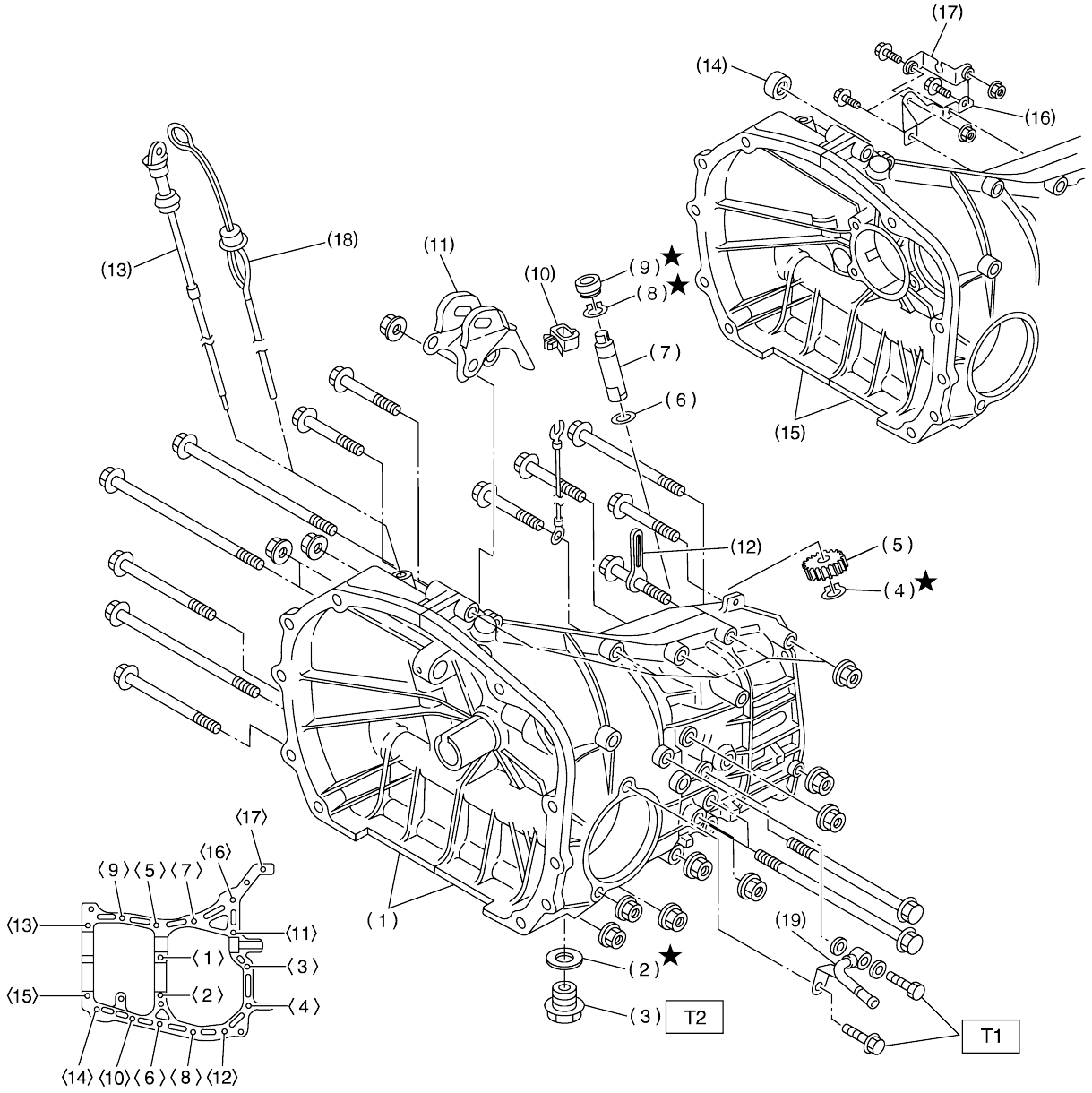
Washer (38.1 × 50 × t)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)	803038023	1.025 — 1.050 (0.0404 — 0.0413)
803038022	0.975 — 1.000 (0.0384 — 0.0394)	—	—

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)

B: COMPONENT S503001A05

1. TRANSMISSION CASE S503001A0501



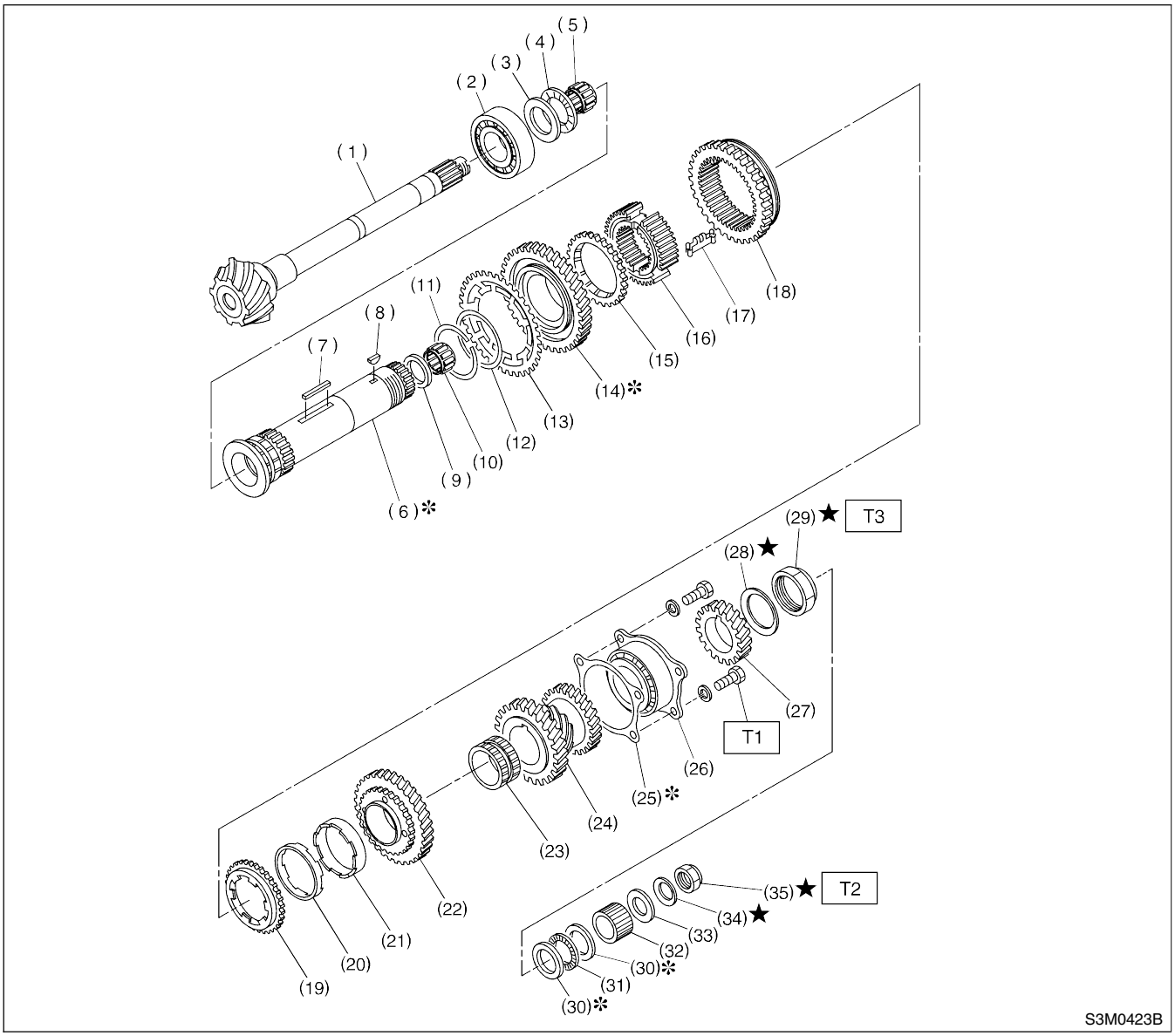
S3M0616A

(1) Transmission case ASSY (Turbo model)
(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) Clamp
(11) Pitching stopper bracket
(12) Clip
(13) Oil level gauge (Non-turbo model)
(14) Oil seal (Non-turbo model)
(15) Transmission case ASSY (Non-turbo model)
(16) High-low cable bracket A (Non-turbo model)
(17) High-low cable bracket B (Non-turbo model)
(18) Oil level gauge (Turbo model)
(19) Inlet pipe (with oil pump)

Tightening torque: N·m (kgf-m, ft-lb)
T: 44 (4.5, 32.5)

Size	All models	Tightening torque: N·m (kgf-m, ft-lb)
8 mm bolt	<5> — <15>	25 (2.5, 18.1)
10 mm bolt	<1> — <4> <16> — <17>	39 (4.0, 28.9)

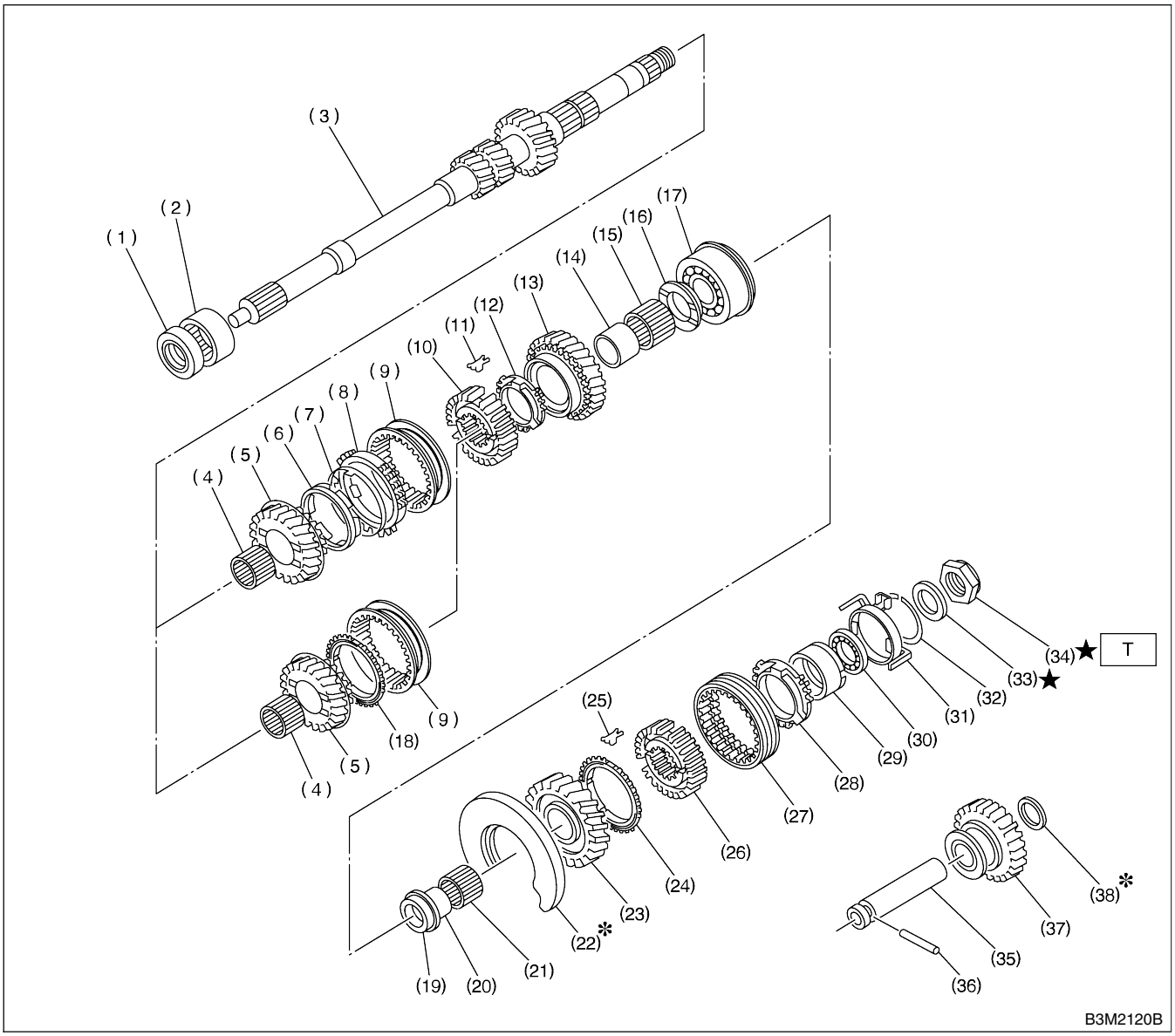
2. DRIVE PINION ASSEMBLY S503001A0502



(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 bush
(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)

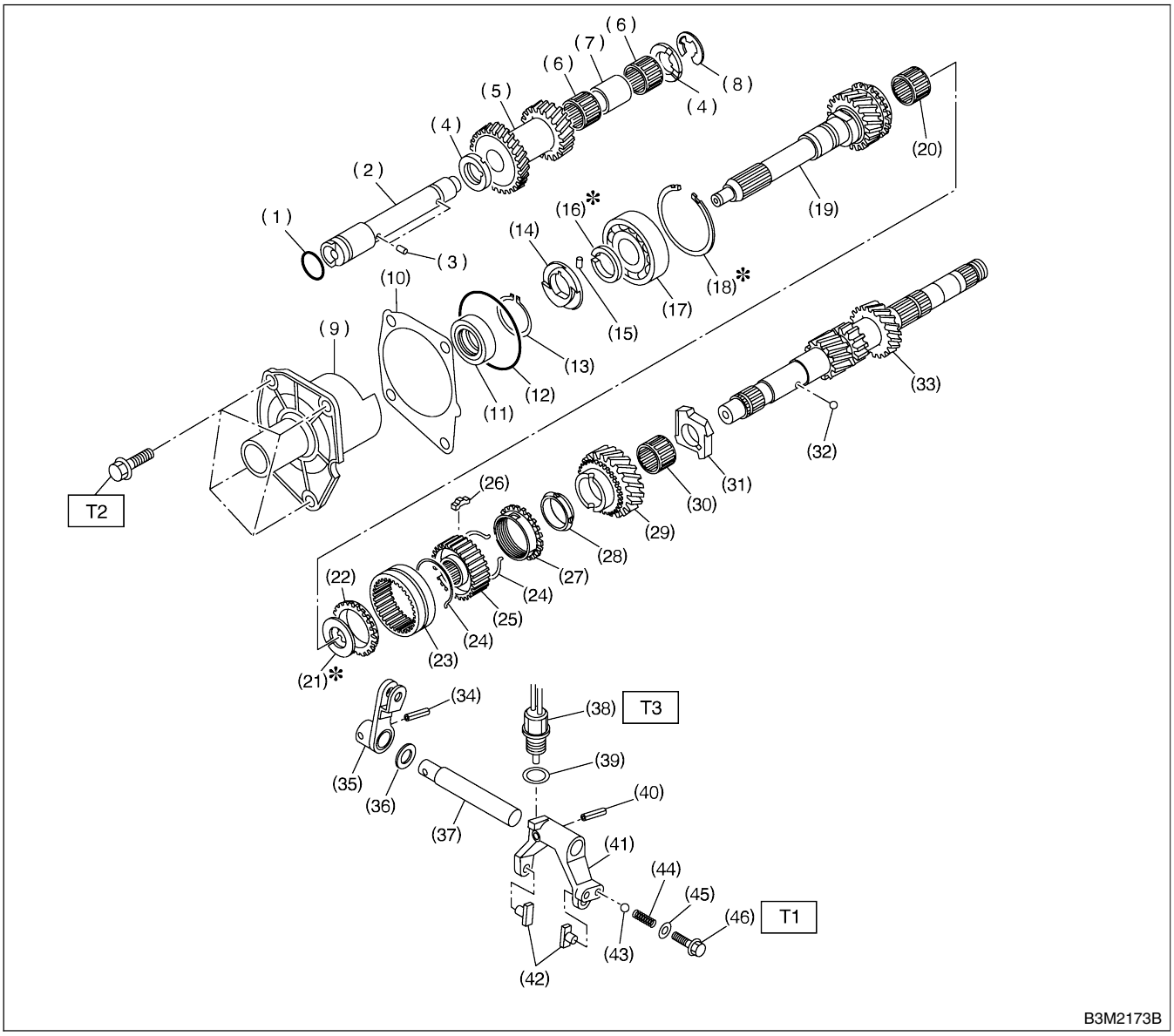
3. MAIN SHAFT ASSEMBLY S503001A0503



(1) Oil seal
(2) Needle bearing
(3) Transmission main shaft
(4) Needle bearing
(5) 3rd drive gear
(6) Inner baulk ring (Turbo model)
(7) 3rd synchro cone (Turbo model)
(8) Outer baulk ring (Turbo model)
(9) 3rd-4th coupling sleeve
(10) 3rd-4th synchronizer hub
(11) 3rd-4th shifting insert key
(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) Baulk ring (Non–turbo model)
(19) 5th gear thrust washer
(20) 5th needle bearing race
(21) Needle bearing
(22) Main shaft rear plate
(23) 5th drive gear
(24) 5th baulk ring
(25) 5th-Rev shifting insert key
(26) 5th-Rev synchronizer hub
(27) 5th-Rev coupling sleeve
(28) Rev baulk ring
(29) Rev synchro cone
(30) Ball bearing
(31) Synchro cone stopper
(32) Snap ring
(33) Lock washer
(34) Lock nut
(35) Reverse idler gear shaft
(36) Straight pin
(37) Reverse idler gear
(38) Washer

Tightening torque: N·m (kgf-m, ft-lb)
T: 118 (12.0, 86.8)

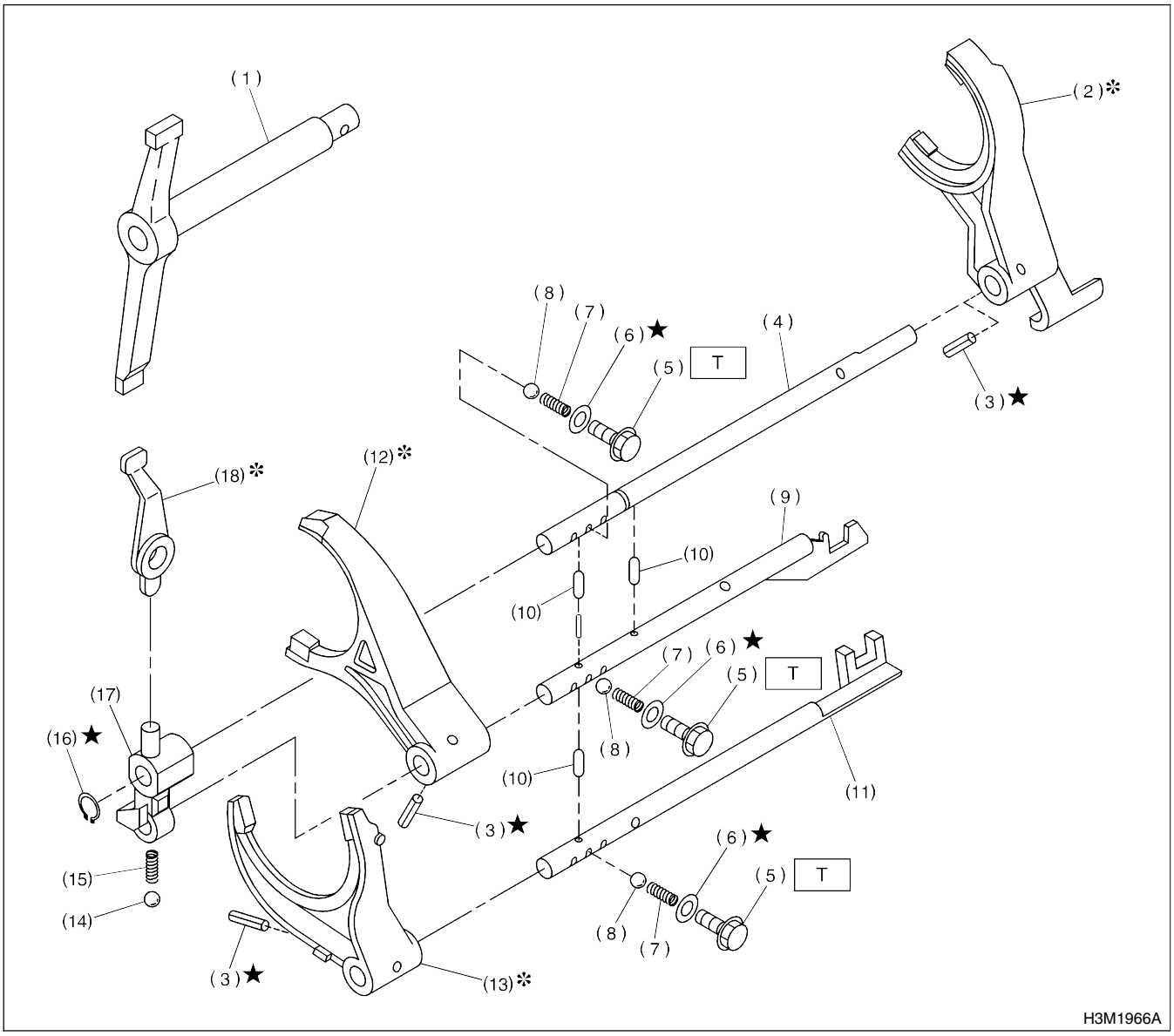
4. AUXILIARY TRANSMISSION GEARS S503001A0508



(1) O-ring
(2) High-low counter shaft
(3) Straight pin
(4) High-low counter washer
(5) Counter gear
(6) Needle bearing
(7) Counter gear collar
(8) Snap ring (Outer-19)
(9) Input shaft holder
(10) Input shaft shim
(11) Oil seal
(12) O-ring
(13) Snap ring (Outer-28)
(14) Oil squeeze
(15) Straight pin
(16) Snap ring (Outer-28)
(17) Ball bearing
(18) Snap ring (Inner-68)
(19) Input shaft
(20) Needle bearing
(21) Snap ring (Outer-25)
(22) High-low baulk ring
(23) High-low coupling sleeve
(24) High-low synchronizer spring
(25) High-low synchronizer hub
(26) Shifting insert
(27) High-low baulk ring
(28) Friction damper
(29) Input low gear
(30) Needle bearing
(31) Input low gear spacer
(32) Ball
(33) Main shaft
(34) Straight pin
(35) High-low shifter lever
(36) Washer
(37) High-low shifter shaft
(38) Low switch
(39) Gasket
(40) Straight pin
(41) High-low shifter fork
(42) High-low shifter piece
(43) Ball
(44) Spring
(45) Gasket
(46) Plug

Tightening torque: N·m (kgf-m, ft-lb)
T1: 15.7 (1.6, 11.6)
T2: 20 (2, 14.5)
T3: 25 (2.5, 18.1)

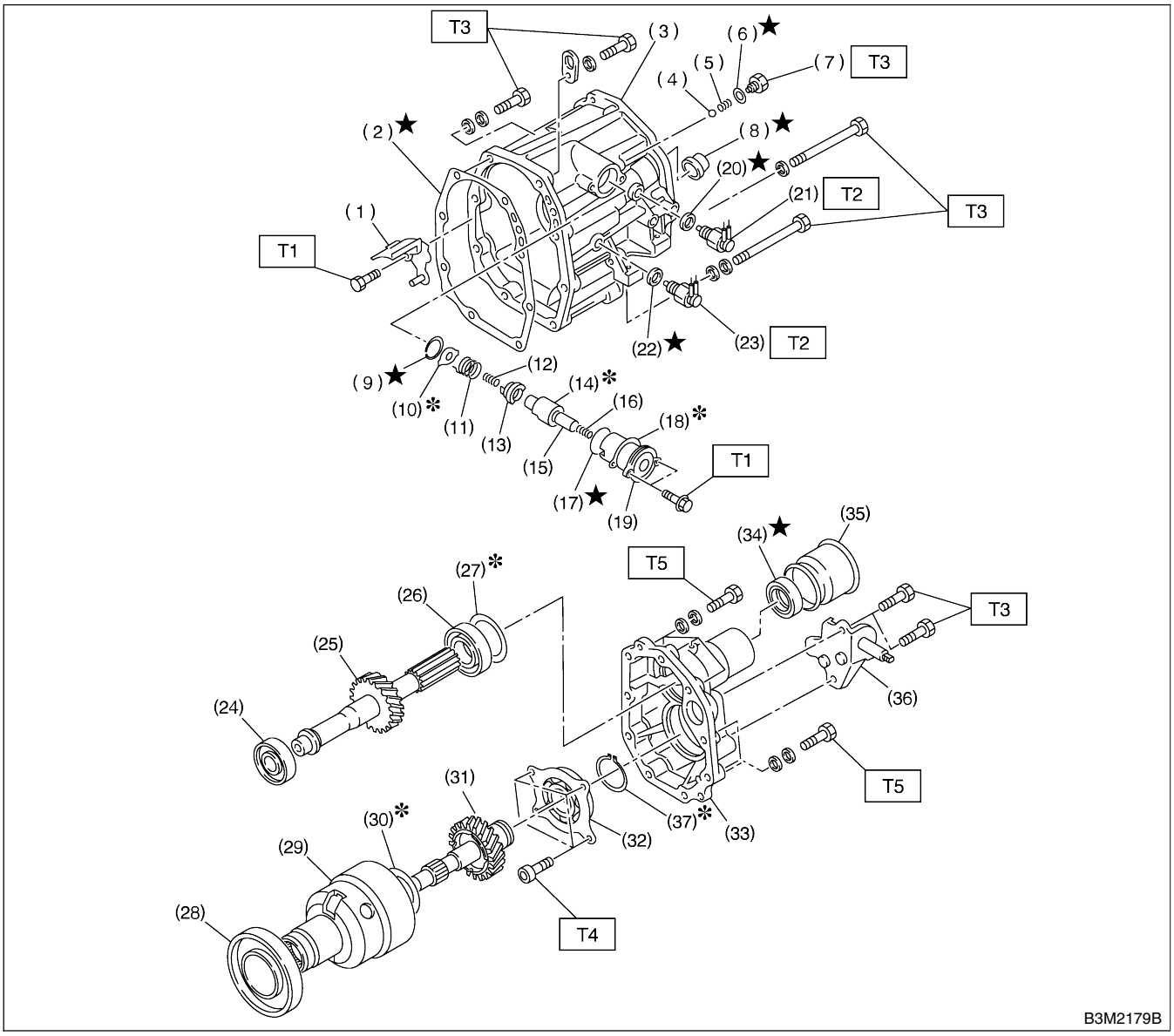
5. SHIFTER FORK AND SHIFTER ROD S503001A0504



(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)

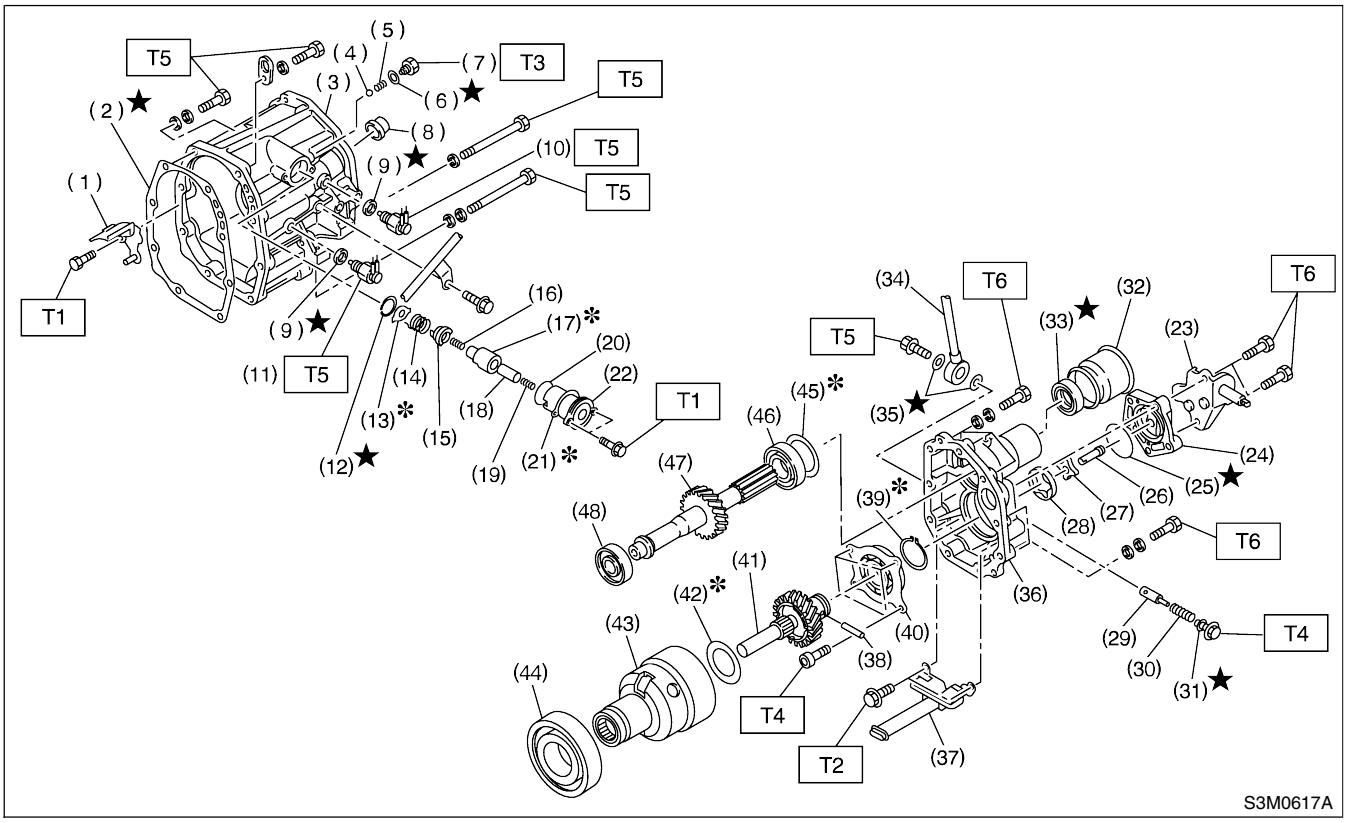
6. TRANSFER CASE AND EXTENSION CASE FOR MODEL WITHOUT OIL PUMP S503001A0509



(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 case
(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)

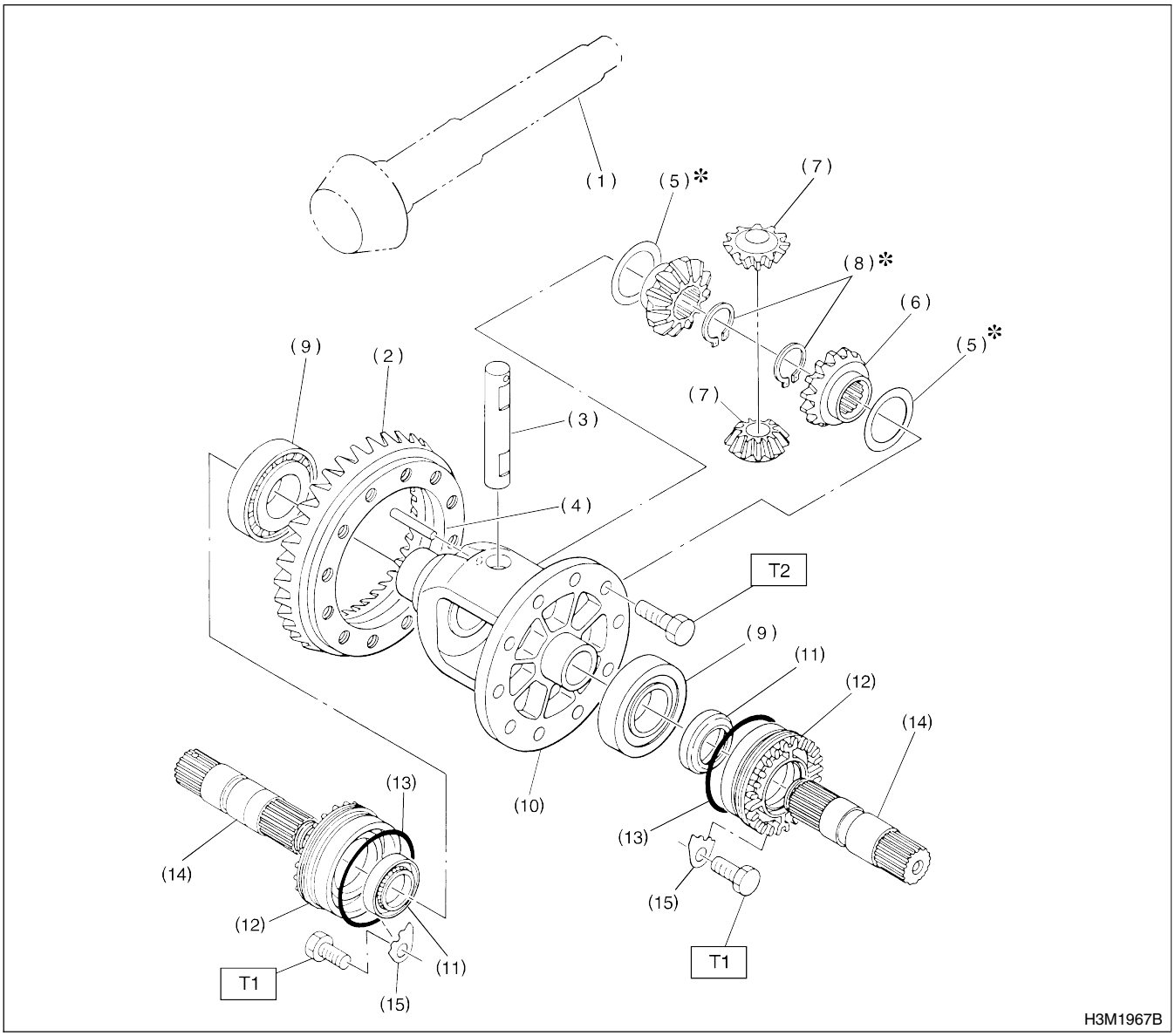
7. TRANSFER CASE AND EXTENSION CASE FOR MODEL WITH OIL PUMP S503001A0510



(1) Oil guide
(2) Gasket
(3) Transfer case
(4) Ball
(5) Reverse accent spring
(6) Gasket
(7) Plug
(8) Oil seal
(9) Gasket
(10) Neutral switch
(11) Back-up light switch
(12) Snap ring (Inner)
(13) Reverse check plate
(14) Reverse check spring
(15) Reverse check cam
(16) Return spring
(17) Reverse accent shaft
(18) Return spring cap
(19) Return spring
(20) O-ring
(21) Adjusting select shim
(22) Reverse check sleeve
(23) Shift bracket
(24) Oil pump cover
(25) O-ring
(26) Oil pump shaft
(27) Inner rotor
(28) Outer rotor
(29) Relief valve
(30) Return spring
(31) O-ring
(32) Dust cover
(33) Oil seal
(34) Outlet pipe
(35) Washer
(36) Extension case
(37) Oil strainer
(38) Straight pin
(39) Snap ring
(40) Ball bearing
(41) Transfer drive gear
(42) Washer
(43) Center differential
(44) Ball bearing
(45) Adjusting washer
(46) Roller bearing
(47) Transfer driven gear
(48) Roller bearing

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 10 (1.0, 7.2)
T3: 13 (1.3, 9.4)
T4: 26 (2.7, 20)
T5: 40 (4.1, 30)

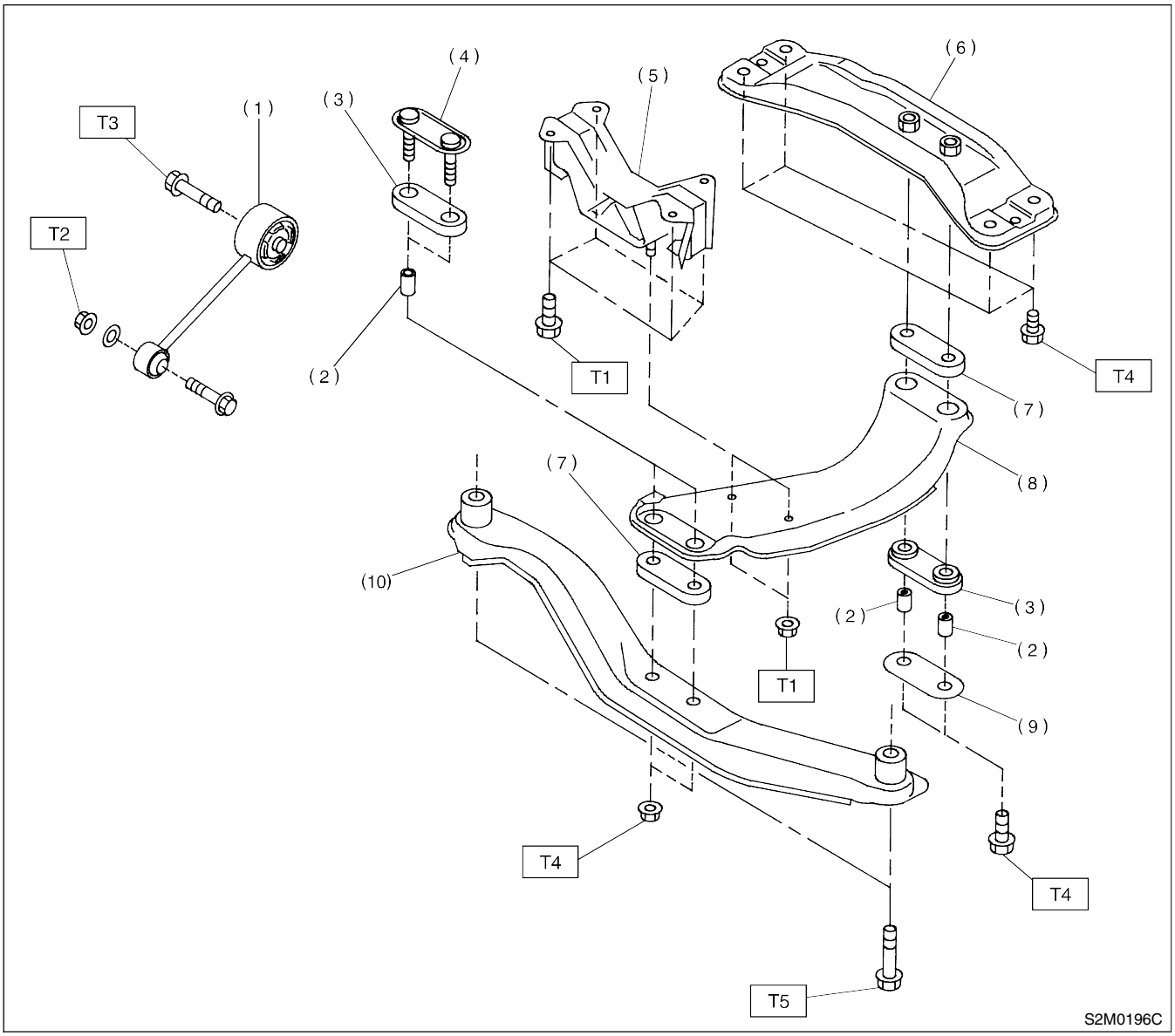
8. FRONT DIFFERENTIAL S503001A0506



(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)

9. 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

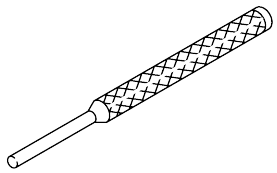
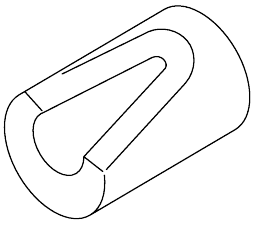
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1938	398791700	REMOVER II	Used for removing and installing spring pin (6 mm).
 B3M1939	399411700	ACCENT BALL INSTALLER	Used for installing reverse shifter rail arm.

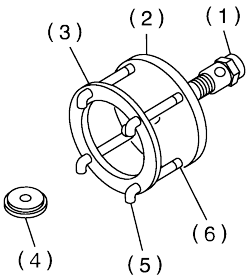
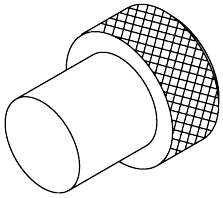
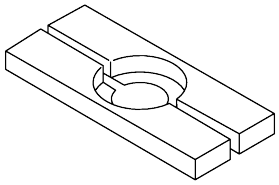
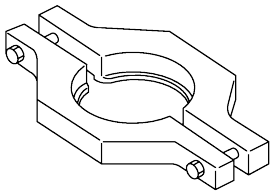
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1940A	399527700	PULLER SET	Used for removing and installing roller bearing (Differential). (1) BOLT (899521412) (2) PULLER (399527702) (3) HOLDER (399527703) (4) ADAPTER (398497701) (5) BOLT (899520107) (6) NUT (021008000)
 B3M1941	399780104	WEIGHT	Used for measuring preload on roller bearing.
 B3M1942	498077000	5TH DRIVEN GEAR REMOVER	Used for removing roller bearing of drive pinion shaft.
 B3M1943	498077300	CENTER DIFFERENTIAL BEARING REMOVER	Used for removing the center differential cover ball bearing.

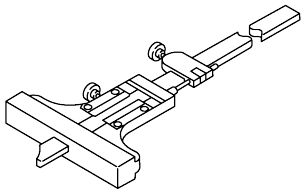
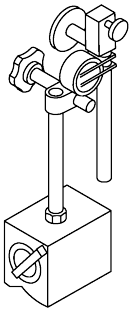
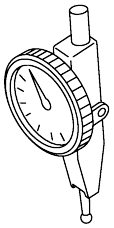
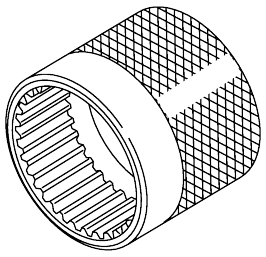
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1944	498147000	DEPTH GAUGE	Used for adjusting main shaft axial end play.
 B3M1945	498247001	MAGNET BASE	• Used for measuring backlash between side gear and pinion, and hypoid gear. • Used with DIAL GAUGE (498247100).
 B3M1946	498247100	DIAL GAUGE	• Used 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.

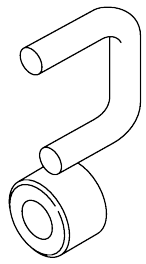
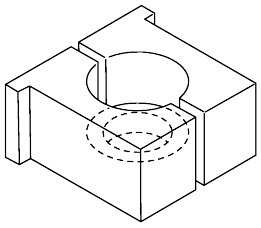
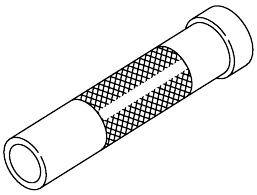
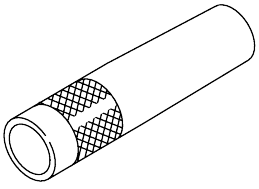
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1948	498787100	MAIN SHAFT STOPPER	Used for removing and installing transmission main shaft lock nut.
 B3M1949	498937000	HOLDER	Used for removing and installing transmission main shaft lock nut.
 B3M1950	499277100	BUSH 1-2 INSTALLER	• Used for installing 1st driven gear thrust plate and 1st-2nd driven gear bush. • 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.

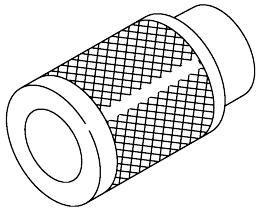
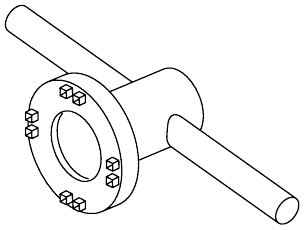
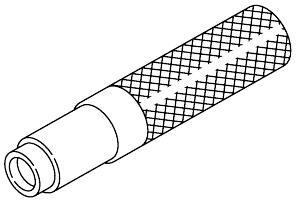
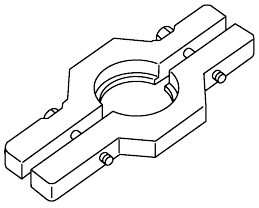
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1952	499757002	INSTALLER	• Used for installing snap ring (OUT 25), and ball bearing (25 x 26 x 17). • Used for installing bearing cone of transfer driven gear (extension core side).
 B3M1953	499787000	WRENCH ASSY	Used for removing and installing differential 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.

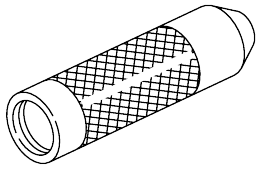
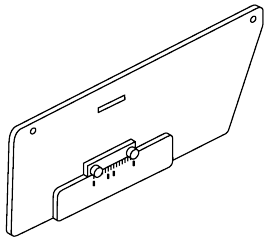
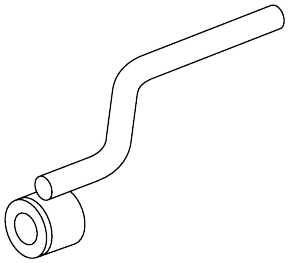
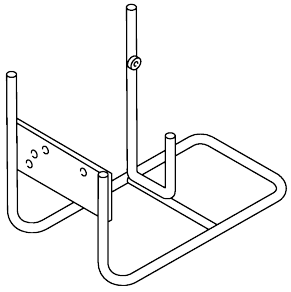
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1956	499877000	RACE 4-5 INSTALLER	• Used for installing 4th needle bearing race and ball bearing onto transmission main shaft. • Used with REMOVER (899714110).
 B3M1957	499917500	DRIVE PINION GAUGE ASSY	Used for adjusting drive pinion shim.
 B3M1958	499927100	HANDLE	Used for fitting transmission main shaft.
 B3M1959	499937100	TRANSMISSION STAND SET	Stand used for transmission disassembly and assembly.

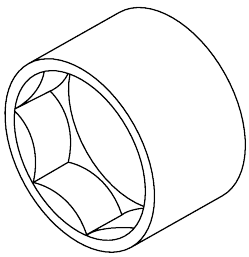
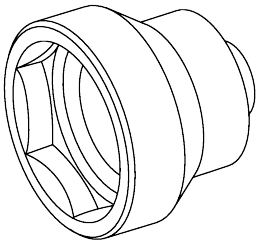
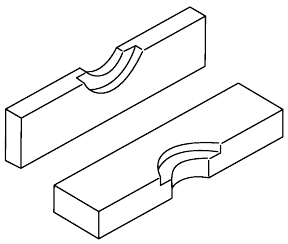
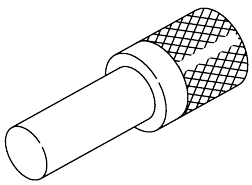
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1960	499987003	SOCKET WRENCH (35)	Used for removing and installing driven pinion lock nut and main shaft lock nut.
 B3M1961	499987300	SOCKET WRENCH (50)	Used for removing and installing driven gear assembly lock nut.
 B3M1962	899714110	REMOVER	Used for fixing transmission main shaft, drive pinion, rear drive shaft.
 B3M1963	899864100	REMOVER	Used for removing parts on transmission main shaft and drive pinion.

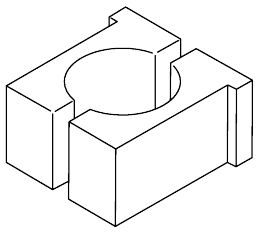
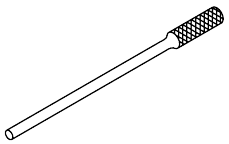
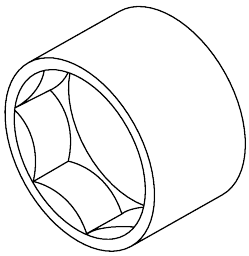
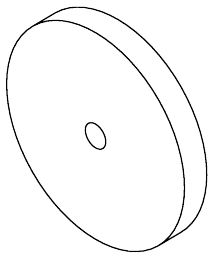
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1964	899884100	HOLDER	Used for tightening lock nut on sleeve.
 B3M1965	899904100	REMOVER	Used for removing and installing straight pin.
 B3M1966	899988608	SOCKET WRENCH (27)	Used for removing and installing drive pinion lock nut.
 B3M1967	398497701	ADAPTER	• Used for installing roller bearing onto differential case. • Used with INSTALLER (499277100).

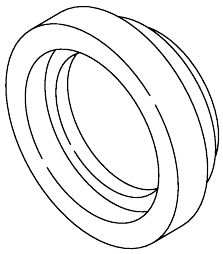
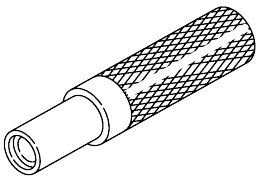
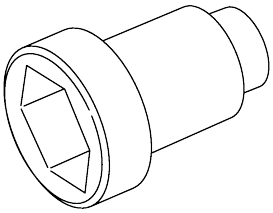
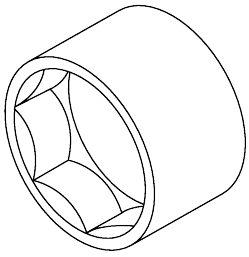
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1968	499587000	INSTALLER	Used for installing driven gears to driven shaft.
 B3M1969	899824100	PRESS	Used for installing speedometer shaft oil seal.
 B3M1970	499987100	SOCKET WRENCH (35)	Used for removing and installing drive pinion lock nut.
 B3M1971	899984103	SOCKET WRENCH (35)	Used for removing and installing drive pinion lock nut.

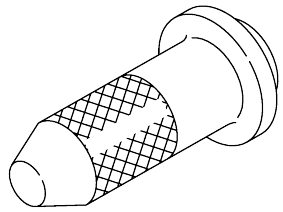
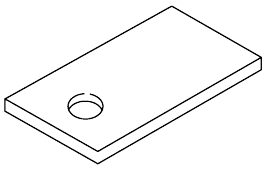
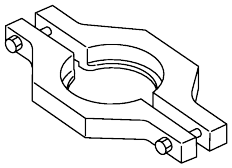
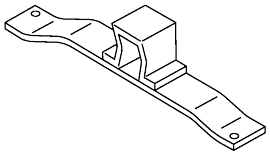
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1972	498057300	INSTALLER	Used for installing extension oil seal.
 B3M1973	498255400	PLATE	Used for measuring backlash.
 B3M1974	498077400	REMOVER	• Used for removing synchronizer cone of main shaft. • Used for removing 5th driven gear of drive pinion shaft.
 B3M1975	41099AA010	ENGINE SUPPORT BRACKET	Used for supporting engine.

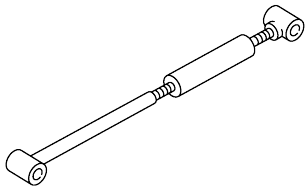
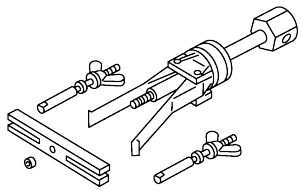
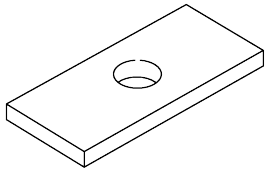
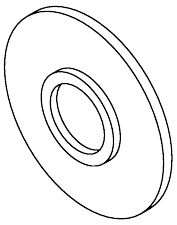
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1976	41099AA020	ENGINE SUPPORT	Used for supporting engine.
 B3M1977	398527700	PULLER ASSY	Used for removing and installing extension case roller bearing.
 B3M1978	398643600	GAUGE	Used for measuring total end play, extension end play and drive pinion height.
 B3M1905	38177700	INSTALLER	• Used for installing bearing cone of transfer driven gear (transfer case side). • Used for installing ball bearing of transfer drive gear.

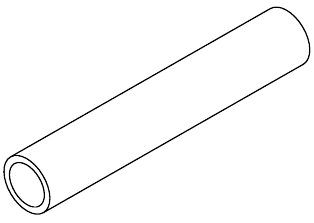
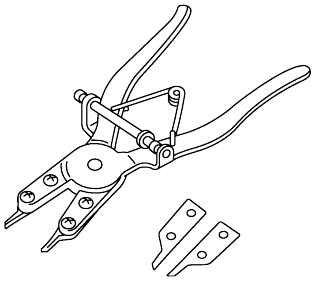
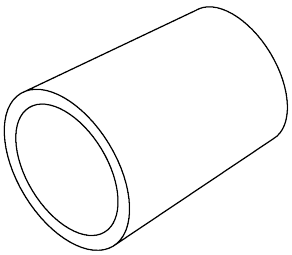
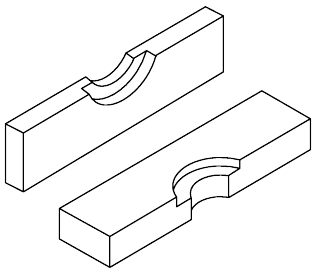
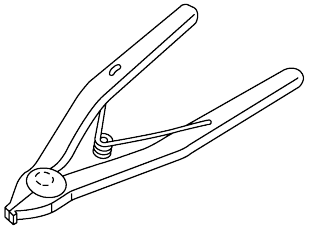
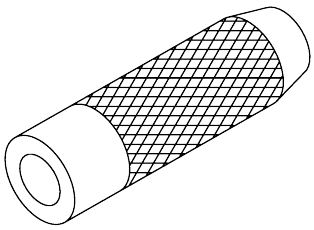
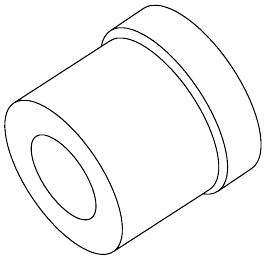
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M2122	398507703	DUMMY COLLAR	• Used for installing input shaft holder oil seal. • For dual-range model.
 B3M2123	398663600	PLIERS	• Used for removing and installing input shaft snap ring. • For dual-range model.
 B3M2124	499757001	SNAP RING GUIDE	• Used for installing snap ring (OUT 25). • For dual-range model.
 B3M2125	899858600	RETAINER	• Used for removing ball bearing. • For dual-range model.
 B3M2126	899474100	EXPANDER	• Used for removing and installing snap ring. • For dual-range model.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M2127	899580100	INSTALLER	• Used when pressing ball bearings into input shaft. • For dual-range model.
 B3M2129	399513600	INSTALLER	• Used when pressing ball bearings into input shaft. • For dual-range model.

2. GENERAL PURPOSE TOOLS S503001A1702

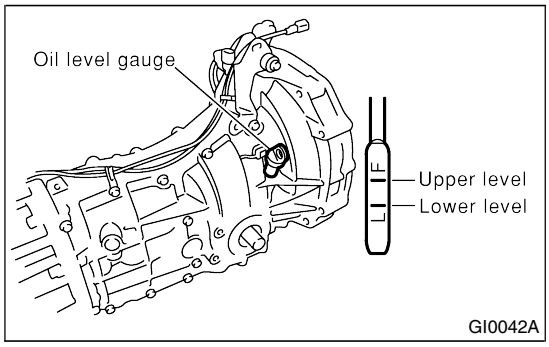
TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.

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.



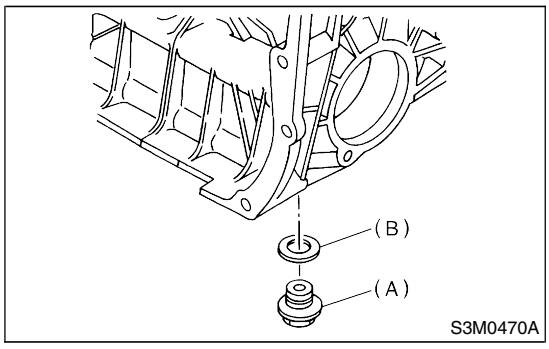
B: REPLACEMENT S503219A20

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:
Turbo model without oil pump;
3.5 ℓ (3.7 US qt, 3.1 Imp qt)
Turbo model with oil pump;
4.4 ℓ (4.7 US qt, 3.9 Imp qt)
Non-turbo model;
4.0 ℓ (4.2 US qt, 3.5 Imp qt)

6) Check the level of the transmission gear oil.

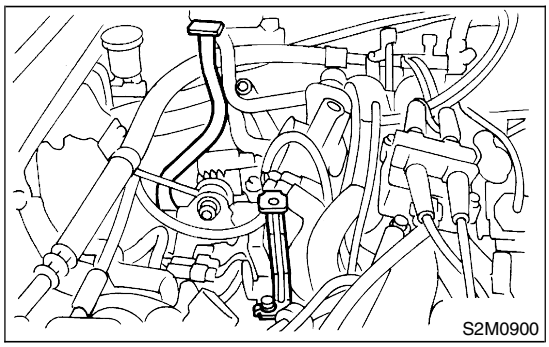
CAUTION:
When inserting the level gauge into transmission gear, align the protrusion on the side of the top part of the level gauge with the notch in the gauge hole.

NOTE:
The level should be within the specified range marked on the gauge.

3. Manual Transmission Assembly S503224

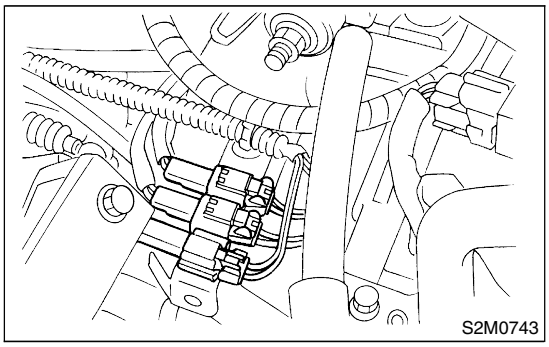
A: REMOVAL S503224A18

1) Set vehicle on a lift.
2) Open front hood fully, and support with stay.
3) Disconnect battery ground terminal.
4) Move gear shift lever to “N”, and release the parking brake.
5) Remove air intake duct and cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-8, REMOVAL, Air Intake Duct.> and <Ref. to IN(SOHC)-7, REMOVAL , Air Cleaner Case.>
6) Remove air cleaner case stay. (Non-turbo model)


S2M0900

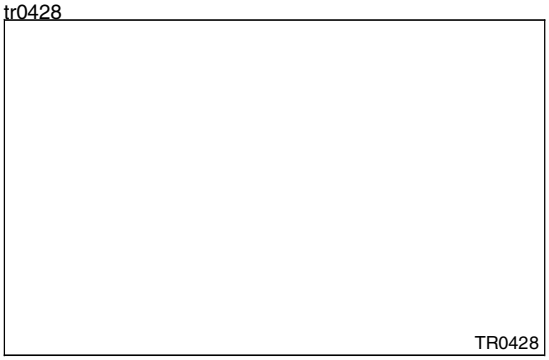
7) Remove intercooler (Turbo model) <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
8) Disconnect the following connectors.
   (1) Neutral position switch connector
   (2) Back-up light switch connector
   (3) High-low switch connector (Non-turbo model)

Non-turbo model

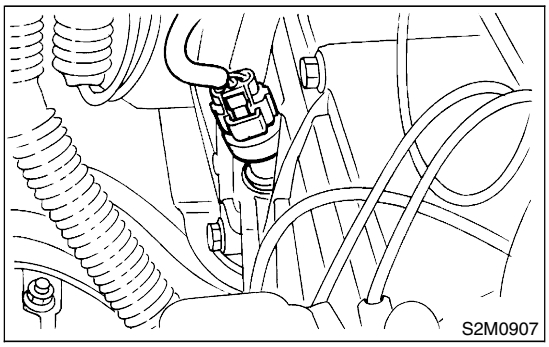

S2M0743

Turbo model

tr0428

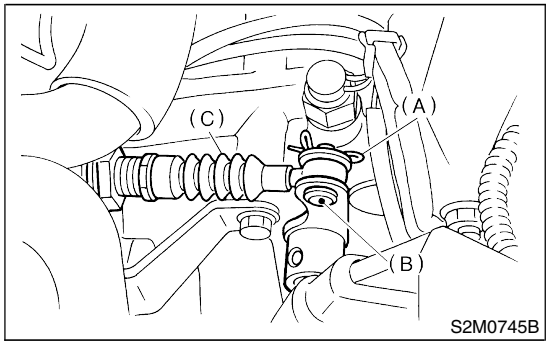

TR0428

   (4) Vehicle speed sensor


S2M0907

   (5) Transmission ground terminal.
9) Remove snap pin and pin from the drive select cable.

10) Remove the drive select cable on the transmission. (Non-turbo model)

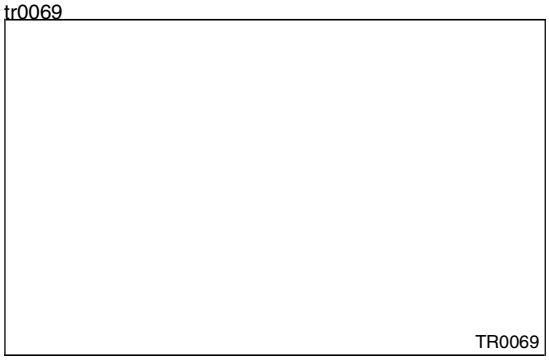


(A) Snap pin
(B) Pin
(C) Drive select cable

11) Remove starter. <Ref. to SC-5, REMOVAL, Starter.>
12) Remove operating cylinder from transmission.

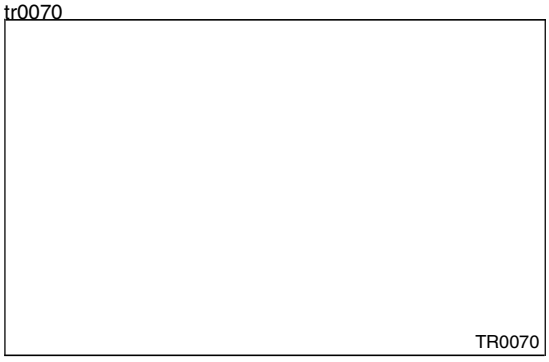
Non-turbo model

tr0069

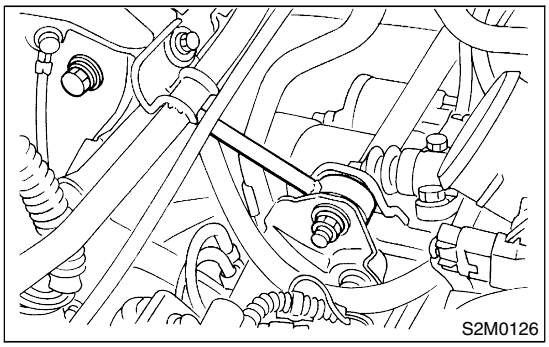


Turbo model

tr0070



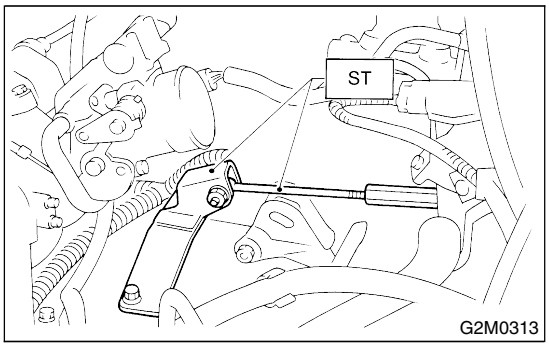
13) Remove pitching stopper.



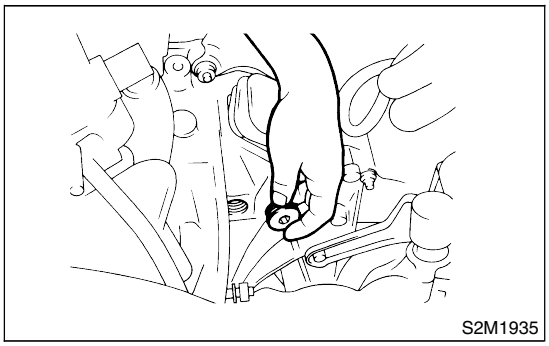
14) Set ST.

NOTE:
Also is available Part No. 41099AA010.

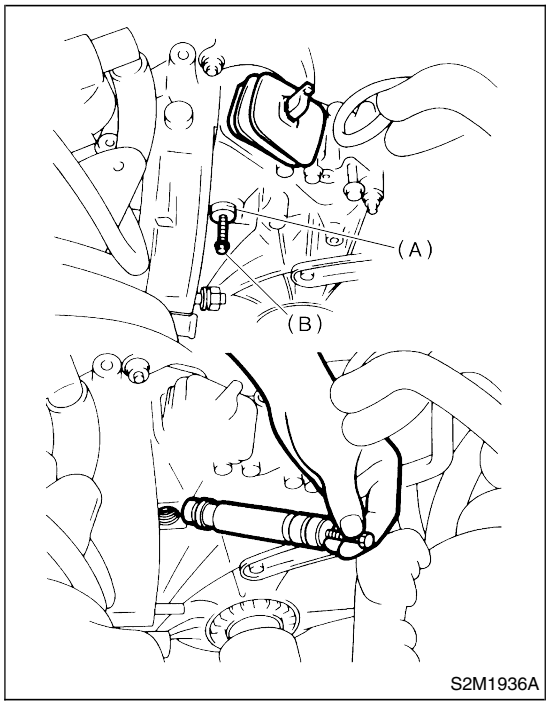
ST 41099AA020 ENGINE SUPPORT ASSY



15) Separate clutch release fork from release bearing. (Turbo model)
(1) Remove plug using 10 mm hexagon wrench.



(2) Screw 6 mm dia. bolt into release fork shaft, and remove it.

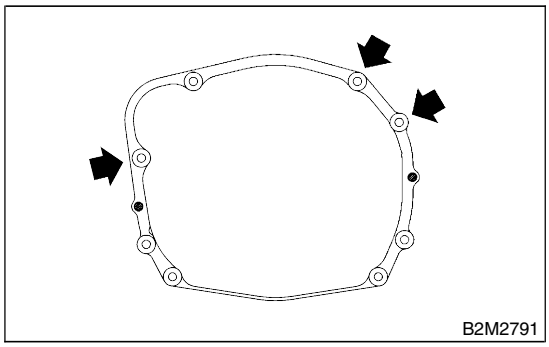


(A) Shaft
(B) Bolt

(3) Raise release fork and unfasten release bearing tabs to free release fork.

CAUTION:
Step (4) is required to prevent interference with engine when removing engine from transmission.

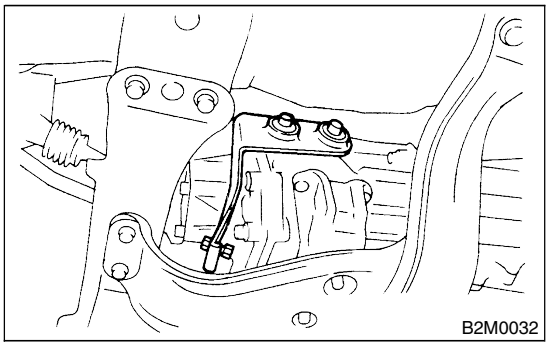
16) Remove bolt which holds right upper side of transmission to engine.



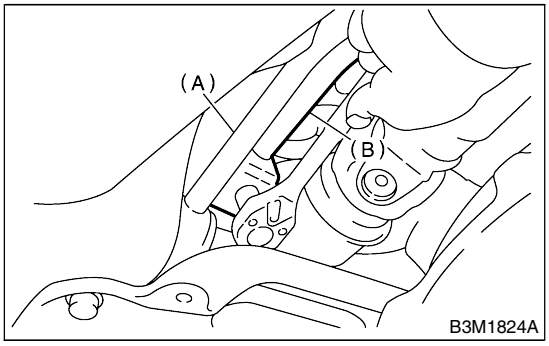
17) Remove front and center exhaust pipes. (Non-turbo model) with OBD <Ref. to EX(SOHC)-5, REMOVAL, Front Exhaust Pipe.> without OBD <Ref. to EX(SOHCw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>
18) Remove center exhaust pipe. (Turbo model). <Ref. to EX(DOHC TURBO)-9, REMOVAL, Center Exhaust Pipe.>
19) Remove rear exhaust pipe and muffler.

CAUTION:
When removing exhaust pipes, be careful each exhaust pipe does not drop out.

20) Remove heat shield cover. (If equipped)
21) Remove hanger bracket from right side of transmission.

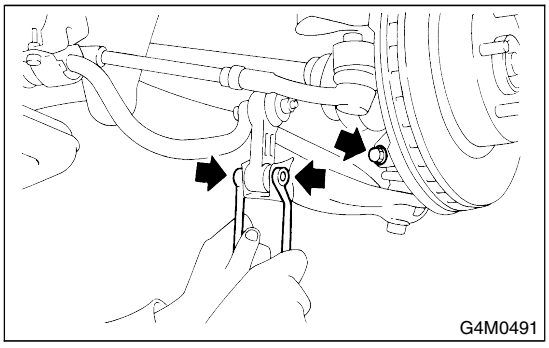


22) Remove propeller shaft. <Ref. to DS-14, REMOVAL, Propeller Shaft.>
23) Remove gear shift rod and stay from transmission.
(1) Disconnect stay from transmission.
(2) Disconnect rod from transmission.



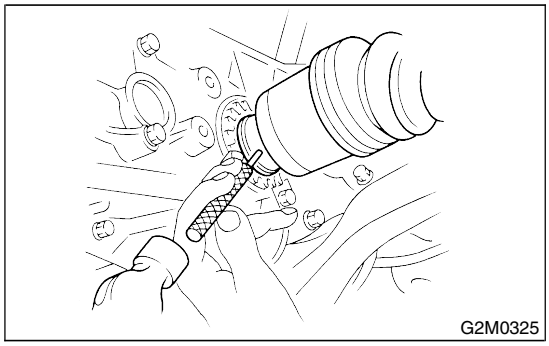
(A) Stay
(B) Rod

24) Disconnect stabilizer link from transverse link.
25) Remove bolt securing ball joint of transverse link to housing.

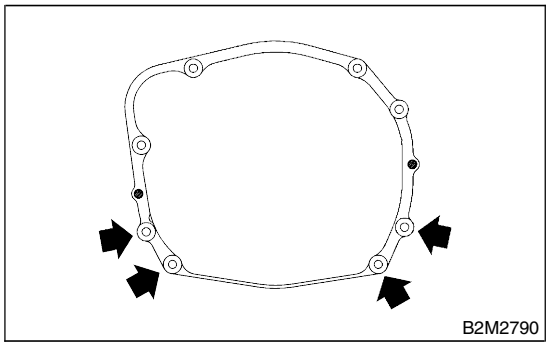


26) Remove spring pins and separate front drive shafts from each side of the transmission.

CAUTION:
Discard removing spring pin. Replace with a new one.

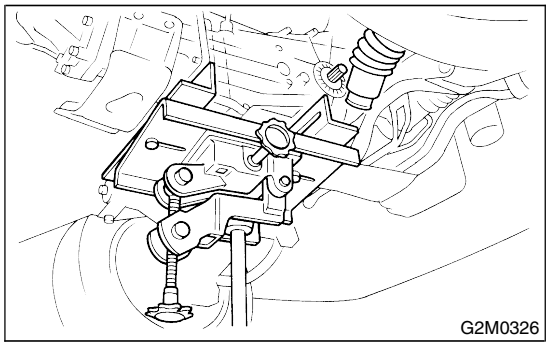

G2M0325

27) Remove nuts which hold lower side of transmission to engine.

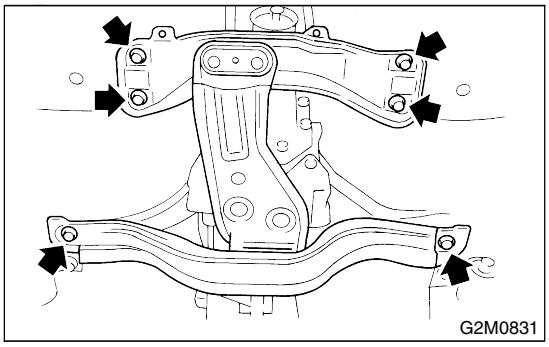

B2M2790

28) Disconnect oil cooler hoses to pipe. (Turbo model with oil pump)
29) Place transmission jack under transmission.

CAUTION:
Always support transmission case with a transmission jack.


G2M0326

30) Remove transmission rear crossmember from vehicle.


G2M0831

31) Remove transmission.

CAUTION:
Move transmission jack toward rear until main shaft is withdrawn from clutch cover.

32) Separate transmission assembly and rear cushion rubber.

B: INSTALLATION S503224A11

1) Install rear cushion rubber to transmission assembly.

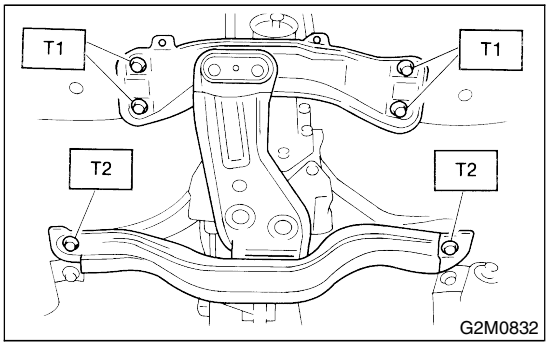
Tightening torque:
34 N·m (3.5 kgf-m, 25.3 ft-lb)

2) Install clutch release lever and bearing onto transmission. (Turbo model) <Ref. to CL-21, INSTALLATION, Release Bearing and Lever.>
3) 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.

4) Install transmission rear crossmember.

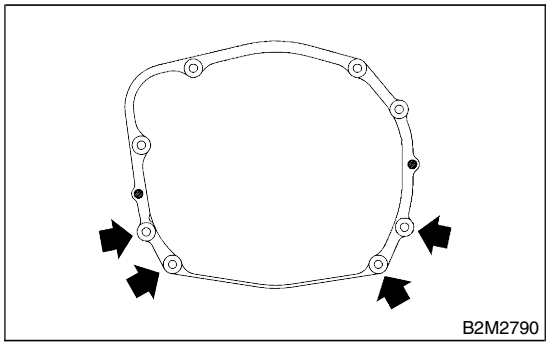
Tightening torque:
T1: 70 N·m (7.1 kgf-m, 51 ft-lb)
T2: 140 N·m (14.3 kgf-m, 103 ft-lb)



G2M0832

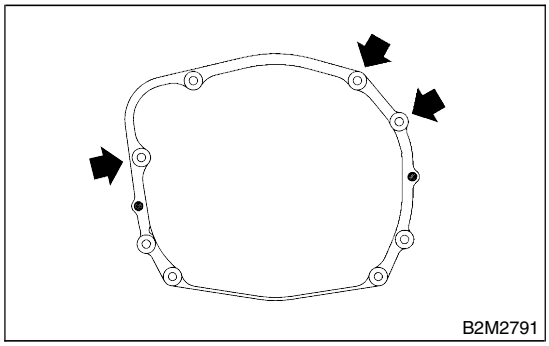
5) Take off transmission jack.
6) Tighten nuts which hold lower side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



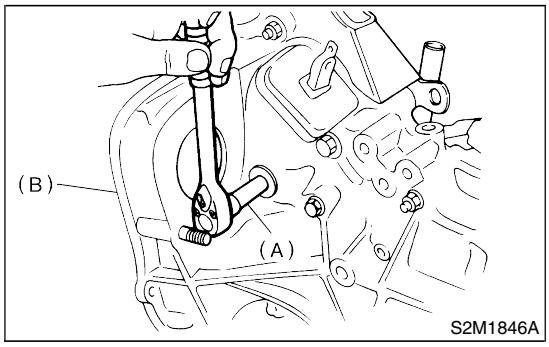
7) Connect engine and transmission.
(1) Install starter.
<Ref. to SC-6, INSTALLATION, Starter.>
(2) Tighten bolt which holds right upper side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



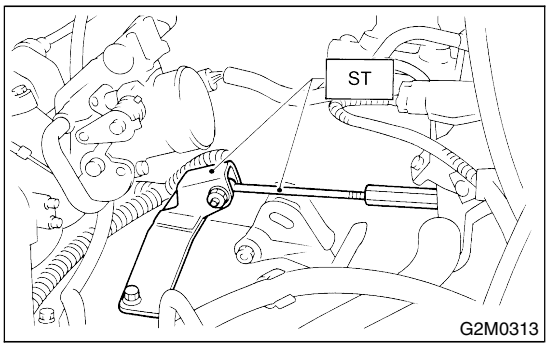
8) Install plug.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)

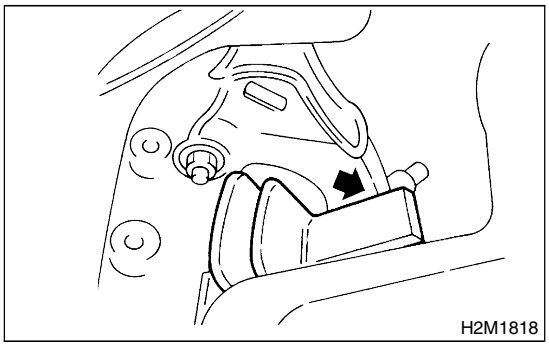


(A) Plug
(B) Transmission ASSY

9) Remove ST.

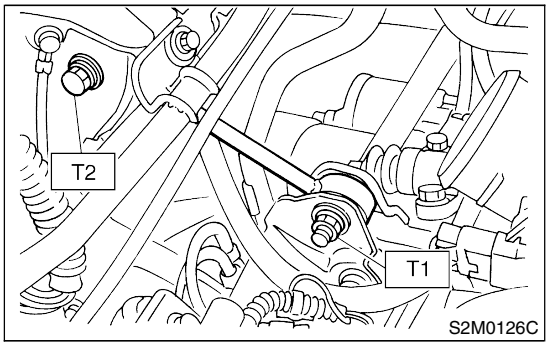


10) Push clutch release lever to fit bearing into clutch cover.



11) Install pitching stopper.

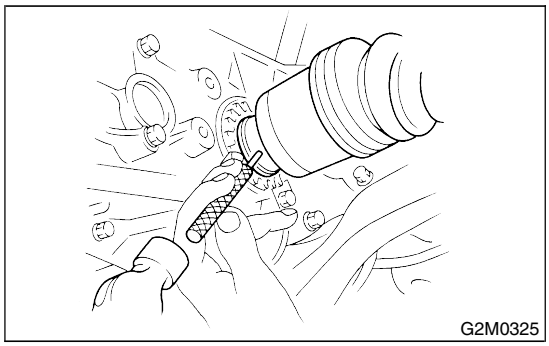
Tightening torque:
T1: 50 N·m (5.1 kgf-m, 37 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



12) Lift-up the vehicle.
13) Connect oil cooler hoses to pipe. (Turbo model with oil pump)
14) Install front drive shaft into transmission.

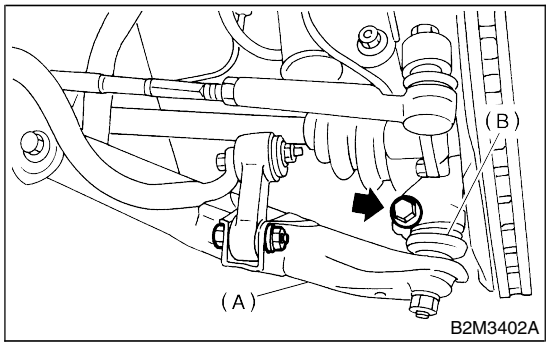
15) Drive spring pin into chamfered hole of drive shaft.

CAUTION:
Always use a new spring pin.


G2M0325

16) 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)



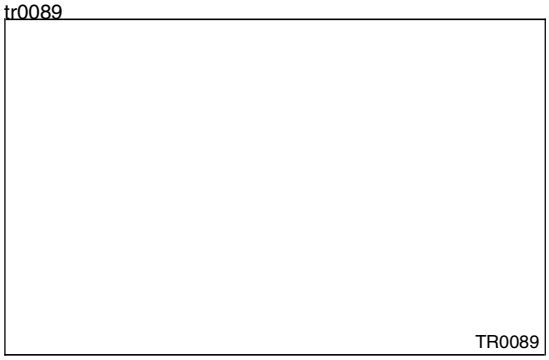
B2M3402A

(A) Transverse link
(B) Ball joint

17) Install stabilizer link from transverse link.

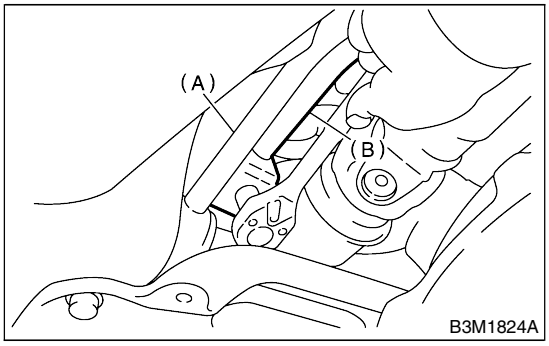
Tightening torque:
30 N·m (3.1 kgf-m, 22.1 ft-lb)

tr0089


TR0089

18) Connect rod to the joint.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

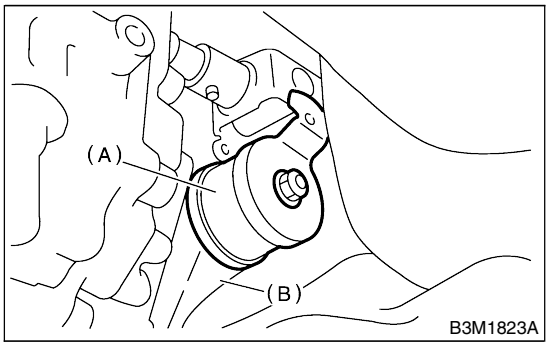


B3M1824A

(A) Joint
(B) Rod

19) Connect stay to transmission bracket.

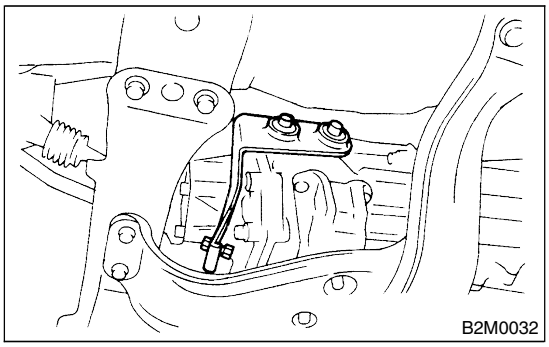
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



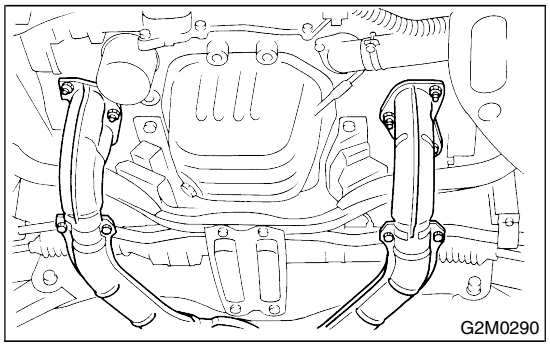
B3M1823A

(A) Stay
(B) Transmission bracket

20) Install propeller shaft. <Ref. to DS-15, INSTALLATION, Propeller Shaft.>
21) Install heat shield cover. (if equipped)
22) Install hanger bracket on right side of transmission.


B2M0032

23) Install rear exhaust pipe and muffler.
Non-turbo model with OBD:
<Ref. to EX(SOHC)-11, INSTALLATION, Muffler.> and <Ref. to EX(SOHC)-9, INSTALLATION, Rear Exhaust Pipe.>
Non-turbo model without OBD:
<Ref. to EX(SOHCw/oOBD)-12, INSTALLATION, Muffler.> and <Ref. to EX(SOHCw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.>
Turbo model:
<Ref. to EX(DOHC TURBO)-15, INSTALLATION, Muffler.> and <Ref. to EX(DOHC TURBO)-14, INSTALLATION, Rear Exhaust Pipe.>
24) Install front exhaust pipe and center exhaust pipe. (Non-turbo model)
Without OBD:
<Ref. to EX(SOHCw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>
With OBD:
<Ref. to EX(SOHC)-6, INSTALLATION, Front Exhaust Pipe.>

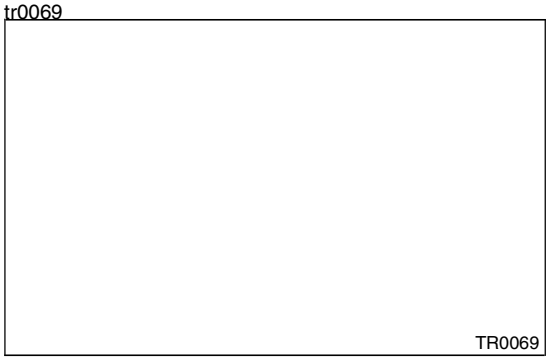

G2M0290

25) Install center exhaust pipe. (Turbo model) <Ref. to EX(DOHC TURBO)-10, INSTALLATION, Center Exhaust Pipe.>
26) Install under cover.
27) Install operating cylinder.

Tightening torque:
37 N·m (3.8 kgf-m, 27.5 ft-lb)

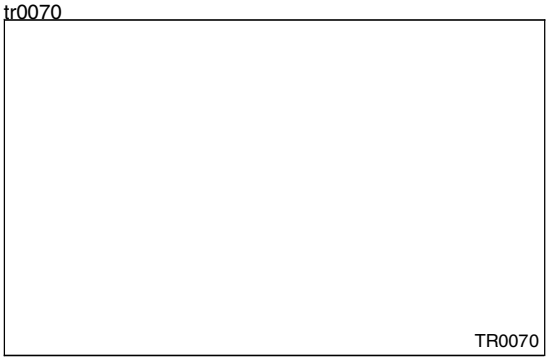
Non-turbo model

tr0069


TR0069

Turbo model

tr0070


TR0070

28) 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
(5) High-low switch connector (Non-turbo model)
29) Install air cleaner case stay.

Tightening torque:
16 N·m (1.6 kgf-m, 11.6 ft-lb)

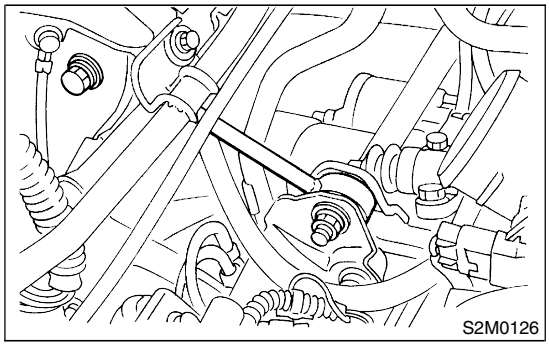
30) Install air cleaner case and intake duct. (Non-turbo model) <Ref. to IN(SOHC)-7, INSTALLATION, Air Cleaner Case.>, <Ref. to IN(SOHC)-8, INSTALLATION, Air Intake Duct.>
31) Install intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>
32) Connect battery ground terminal.
33) Pour gear oil and check the oil level. <Ref. to MT-31, Transmission Gear Oil.>
34) Take off vehicle from lift arms.

4. Transmission Mounting System S503233

A: REMOVAL S503233A18

1. PITCHING STOPPER S503233A1801

1) Disconnect battery ground terminal.
2) Remove the cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
3) Remove intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
4) Remove the pitching stopper.

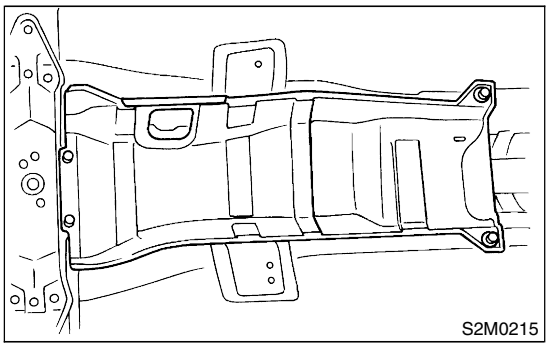

S2M0126

2. CROSSMEMBER AND CUSHION RUBBER S503233A1802

1) Disconnect battery ground terminal.
2) Jack-up vehicle and support it with sturdy racks.
3) Remove the front, center, rear exhaust pipes and muffler. (Non-turbo model)
With OBD:
<Ref. to EX(SOHC)-5, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(SOHC)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11, REMOVAL, Muffler.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(SOHCw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-12, REMOVAL, Muffler.>

CAUTION:
When removing exhaust pipes, be careful each exhaust pipe does not drop out.

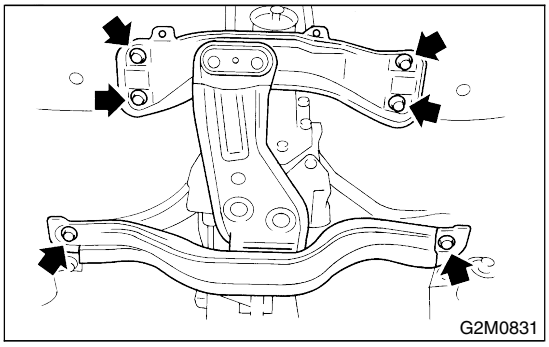
4) Remove center, rear exhaust pipes and muffler. <Ref. to EX(DOHC TURBO)-9, REMOVAL, Center Exhaust Pipe.>, <Ref. to EX(DOHC TURBO)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, REMOVAL, Muffler.>
5) Remove the heat shield cover. (If equipped)


S2M0215

6) Set the transmission jack under the transmission body.

CAUTION:
Always support transmission case with a transmission jack.

7) Remove the rear crossmember.


G2M0831

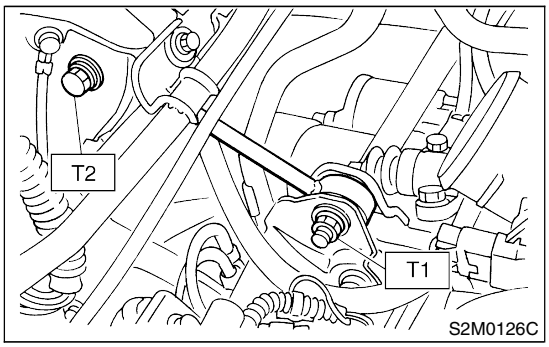
8) Remove the rear cushion rubber.

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. (Non-turbo model) <Ref. to IN(SOHC)-7, INSTALLATION, Air Cleaner Case.>

3) Install intercooler. <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>
4) Connect battery ground terminal.

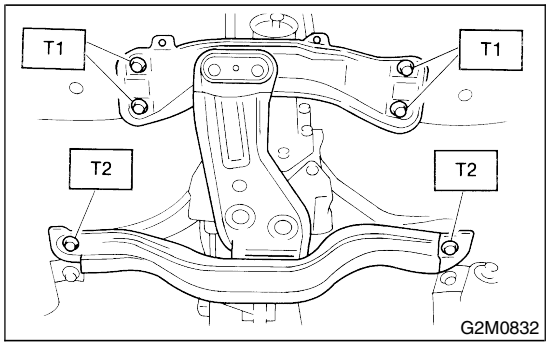
2. CROSSMEMBER AND CUSHION RUBBER S503233A1102

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)



3) Remove the transmission jack.
4) Install the heat shield cover. (If equipped)
5) Install the front, center, rear exhaust pipes and the muffler. (Non-turbo model)
With OBD:
<Ref. to EX(SOHC)-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(SOHC)-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11, INSTALLATION, Muffler.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(SOHCw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-12, INSTALLATION, Muffler.>
6) Install center, rear exhaust pipes and muffler. (Turbo model) <Ref. to EX(DOHC TURBO)-10, INSTALLATION, Center Exhaust Pipe.>, <Ref. to EX(DOHC TURBO)-14, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, 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.

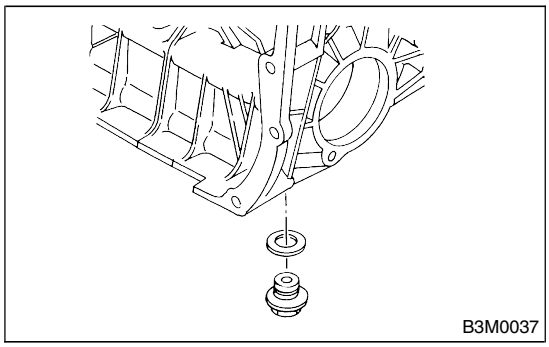
5. Oil Seal S503143

A: REPLACEMENT S503143A20

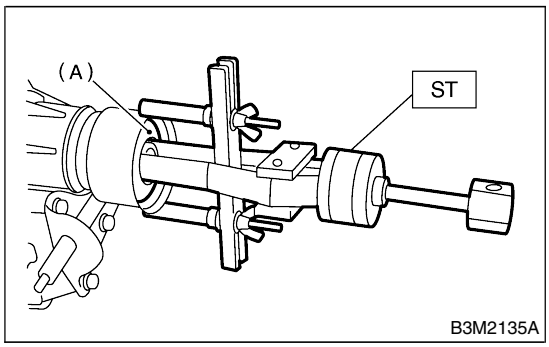
1) Clean transmission exterior.
2) Drain gear oil completely.

NOTE:
Tighten drain plug after draining gear oil.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)

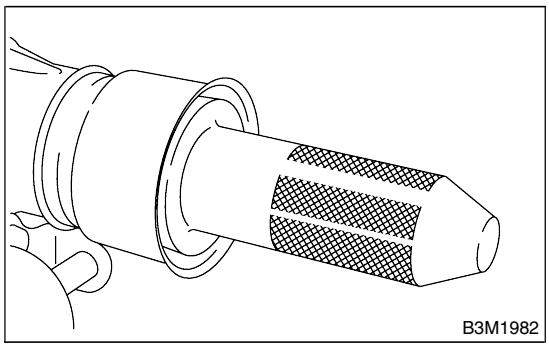


3) Remove rear exhaust pipe and muffler.
4) Remove heat shield cover. (If equipped)
5) Remove propeller shaft. <Ref. to DS-14, REMOVAL, Propeller Shaft.>
6) Using ST, remove the oil seal.
ST 398527700 PULLER ASSY



(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-31, Transmission Gear Oil.>

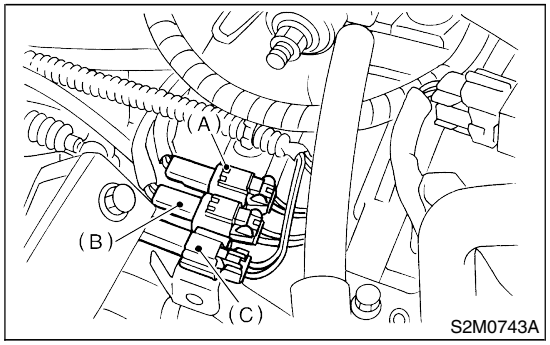
6. Switches and Harness S503232

A: REMOVAL S503232A18

1. BACK-UP LIGHT AND NEUTRAL POSITION SWITCH S503232A1801

1) Disconnect connector battery ground terminal.
2) Remove air intake duct and cleaner case. (Non-Turbo model) <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.> and <Ref. to IN(SOHC)-8, REMOVAL, Air Intake Duct.>
3) Remove intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
4) Disconnect connector back-up light switch and neutral position switch.

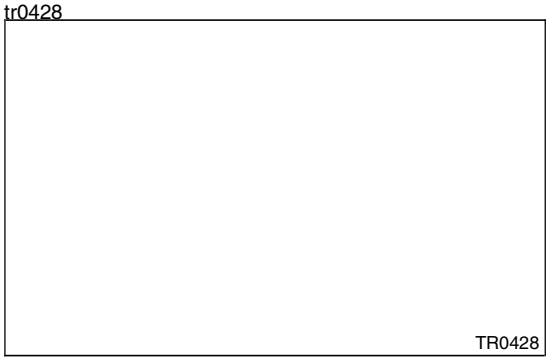
Non-turbo model



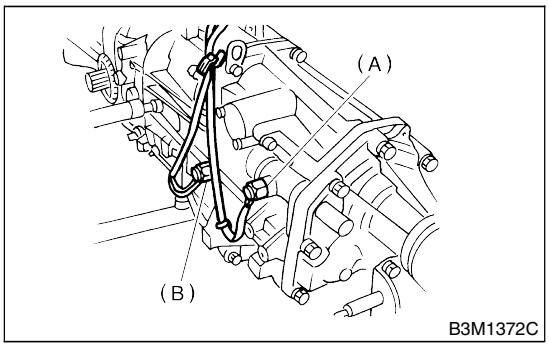
(A) Neutral switch (Brown)
(B) Back-up light switch (Gray)
(C) High-low switch (Black)

Turbo model

tr0428



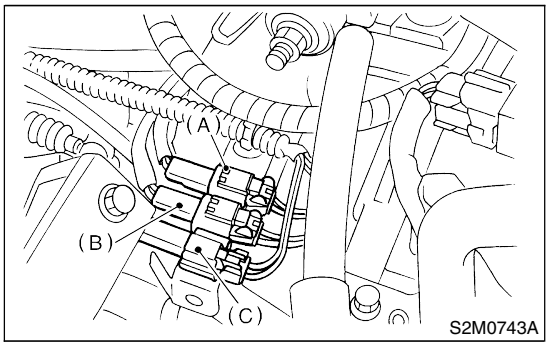
5) Lift-up the vehicle.
6) Remove back-up light switch and neutral position switch with harness.



(A) Neutral switch (Brown connector)
(B) Back-up light switch (Gray connector)

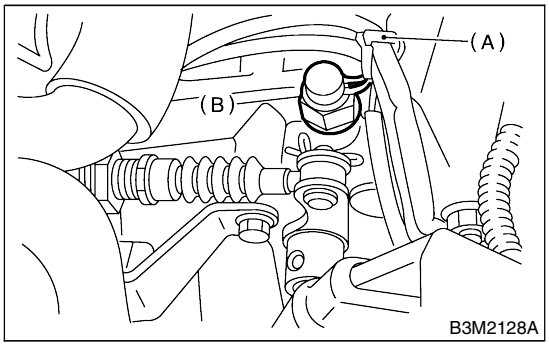
2. HIGH-LOW SWITCH S503232A1802

1) Disconnect connector battery ground terminal.
2) Remove air intake duct and cleaner case. <Ref. to IN (SOHC)-7, REMOVAL, Air Cleaner Case.> and <Ref. to IN (SOHC)-8, REMOVAL, Air Intake Duct.>
3) Disconnect connector high-low switch.



(A) Neutral switch (Brown)
(B) Back-up light switch (Gray)
(C) High-low switch (Black)

4) Remove HI-LO switch cable from clamp.
5) Remove HI-LO switch.



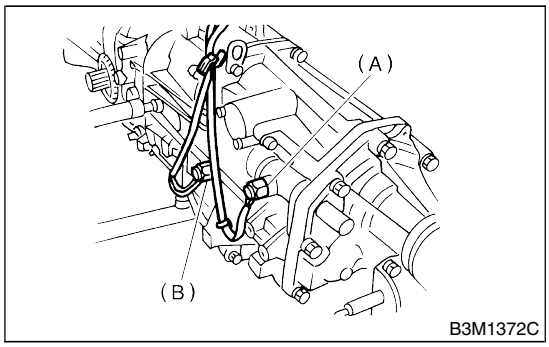
(A) Clamp
(B) High-low switch

B: INSTALLATION S503232A11

1. BACK-UP LIGHT SWITCH AND NEUTRAL POSITION SWITCH S503232A1101

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
(B) Back-up light switch

2) Connect connector of back-up light switch and neutral position switch.
3) Install air intake duct and cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-7, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(SOHC)-8, INSTALLATION, Air Intake Duct.>
4) Install intercooler (Turbo model) <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>
5) Connect battery ground terminal.

2. HIGH-LOW SWITCH S503232A1102

1) Install high-low switch.

Tightening torque:
24.5 N·m (2.5 kgf-m, 18.1 ft-lb)

2) Install HI-LO switch cable to the clamp.
3) Connect connector high-low switch.
4) Install air intake duct and cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-7, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(SOHC)-8, INSTALLATION, Air Intake Duct.>
5) Connect battery ground terminal.

C: INSPECTION S503232A10

1. BACK-UP LIGHT SWITCH S503232A1001

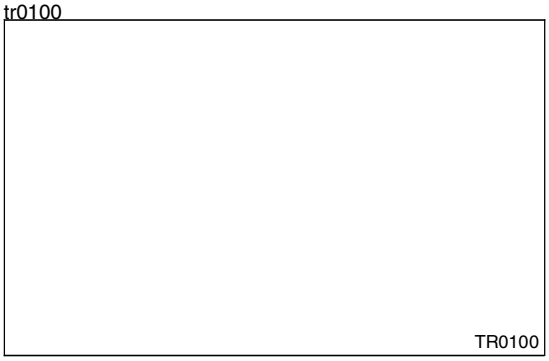
Inspect the back-up light switch. <Ref. to LI-29 INSPECTION, Back-up Light System.>

2. NEUTRAL POSITION SWITCH S503232A1002

1) Turn ignition switch to OFF.
2) Disconnect connector neutral position switch.
3) Using the circuit tester, verify the current in neutral position. Also verify that there is no current in positions other than neutral.

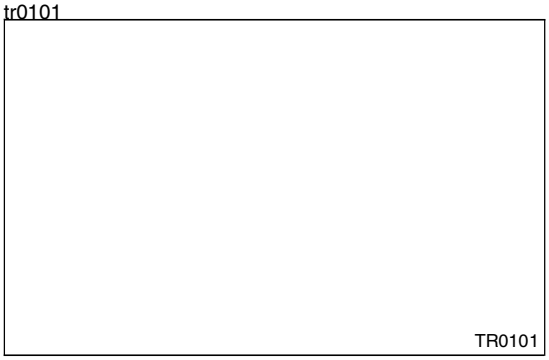
Non-turbo model

tr0100



Turbo model

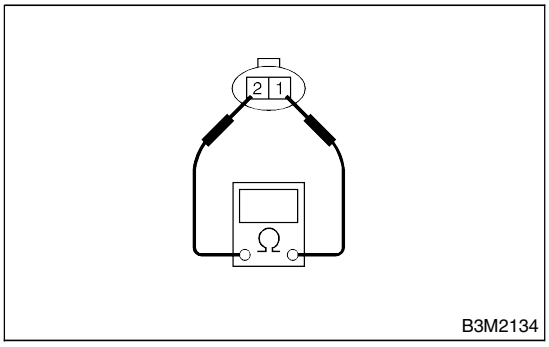
tr0101



4) Replace defective parts.

3. HIGH-LOW SWITCH S503232A1003

1) Turn ignition switch to OFF.
2) Disconnect connector high-low switch.
3) Set drive select lever in LO position, and make sure continuity exists using circuit tester.

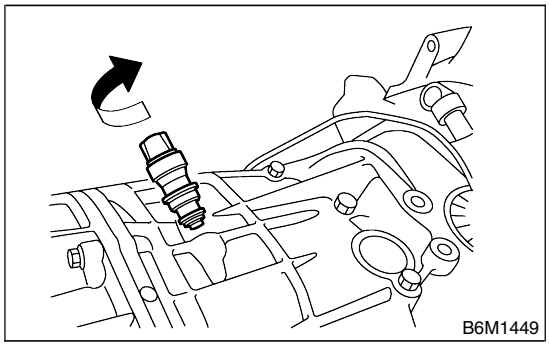


4) Replace defective parts.

7. Vehicle Speed Sensor S503231

A: REMOVAL S503231A18

1) Disconnect ground terminal from battery.
2) Lift-up the vehicle.
3) Remove front and center exhaust pipes. (Non-turbo model)
With OBD:
<Ref. to EX(SOHC)-5, REMOVAL, Front Exhaust Pipe.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>
4) Remove center exhaust pipe. (Turbo model)
<Ref. to EX(DOHC TURBO)-9, REMOVAL, Center Exhaust Pipe.>
5) Disconnect connector from vehicle speed sensor.
6) 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. (Non-turbo model)
With OBD:
<Ref. to EX(SOHC)-6, INSTALLATION, Front Exhaust Pipe.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>
5) Install center exhaust pipe. (Turbo model)
<Ref. to EX(DOHC TURBO)-10, INSTALLATION, Center Exhaust Pipe.>
6) Lower the vehicle.
7) Connect battery ground terminal.

C: INSPECTION S503231A10

Inspect the vehicle speed sensor.
Non-turbo model with OBD:
<Ref. to EN(SOHC)-208, DTC P0500-VEHICLE SPEED SENSOR MALFUNCTION-, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
Non-turbo model without OBD:
<Ref. to EN(SOHCw/oOBD)-94, DTC 33 VEHICLE SPEED SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
Turbo model:
<Ref. to EN(DOHC TURBO)-230, DTC P0500-VEHICLE SPEED SENSOR MALFUNCTION-, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

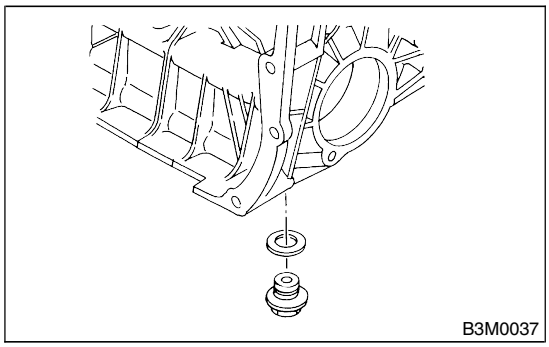
8. Preparation for Overhaul S503091

A: PROCEDURE S503091E45

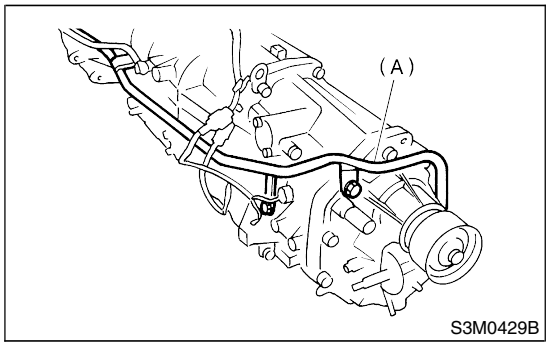
1) Clean oil, grease, dirt and dust from transmission.
2) Remove drain plug to drain oil. After draining, retighten it as before.

NOTE:
Replace gasket with a new one.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)



3) Remove outlet pipe. (With oil pump)

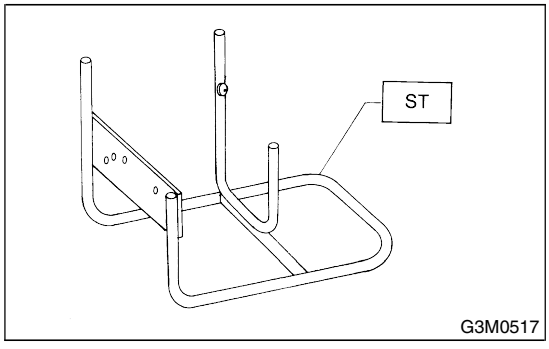


(A) Outlet pipe

4) Tighten union screw. (With oil pump)

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

5) Attach transmission to ST.
ST 499937100 TRANSMISSION STAND SET

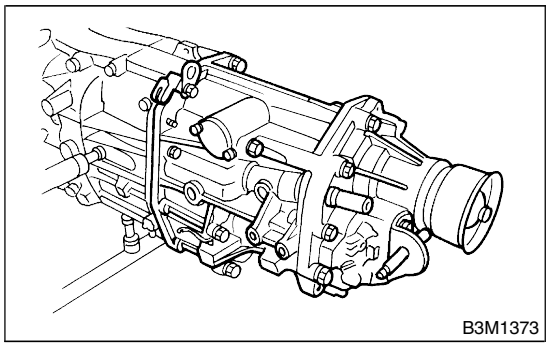


6) Rotating parts should be coated with oil prior to assembly.
7) All disassembled parts, if to be reused, should be reinstalled in the original positions and directions.
8) Gaskets, lock washers and lock nut must be replaced with new ones.
9) Liquid gasket should be used where specified to prevent leakage.

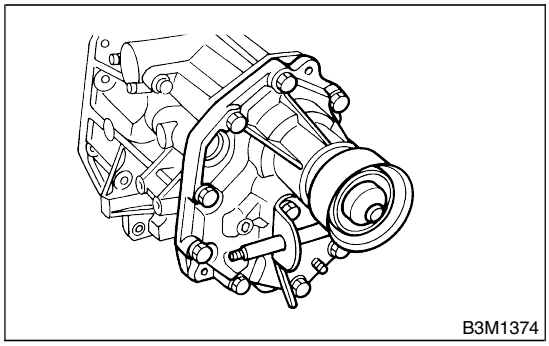
9. Transfer Case and Extension Case Assembly S503561

A: REMOVAL S503561A18

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
2) Remove back-up light switch and neutral position switch. <Ref. to MT-42 REMOVAL, Switches and Harness.>
3) Remove transfer case with extension case assembly.

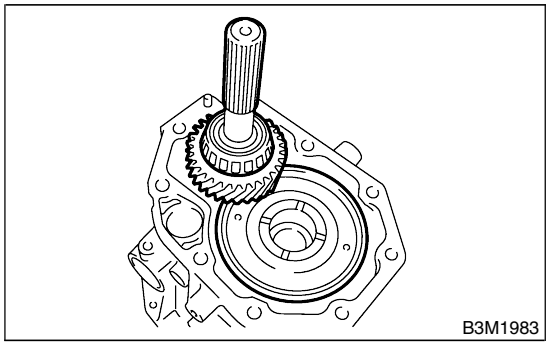

B3M1373

4) Remove shifter arm.
5) Remove extension case assembly.

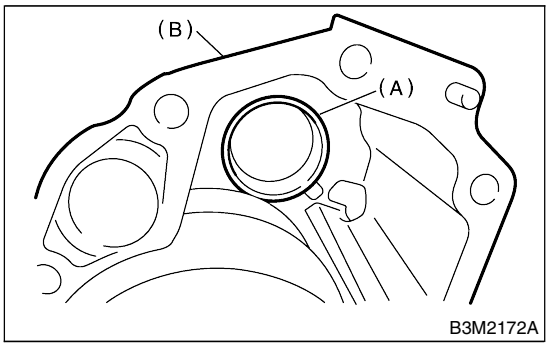

B3M1374

B: INSTALLATION S503561A11

1) Install center differential and transfer driven gear into transfer case.


B3M1983

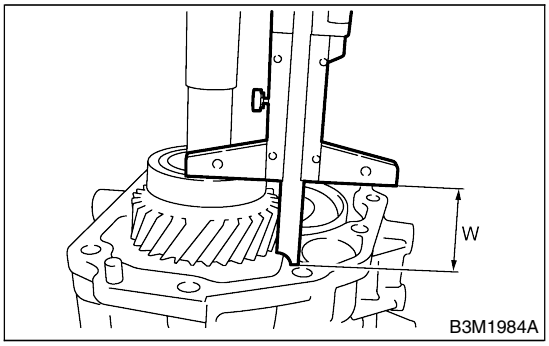
2) Remove bearing cone from the extension case assembly, and install to taper roller bearing of the transfer driven gear.



B3M2172A

(A) Bearing cone (Extension case)
(B) Extension case

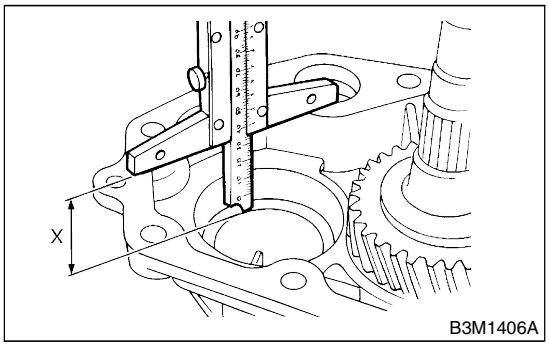
3) While pressing the bearing cone horizontally, turn the driven shaft ten rotations.
4) Measure height “W” between transfer case and taper roller bearing on the transfer driven gear.



B3M1984A

5) Measure depth “X”.

NOTE:
Measure with bearing cone and thrust washer removed.



B3M1406A

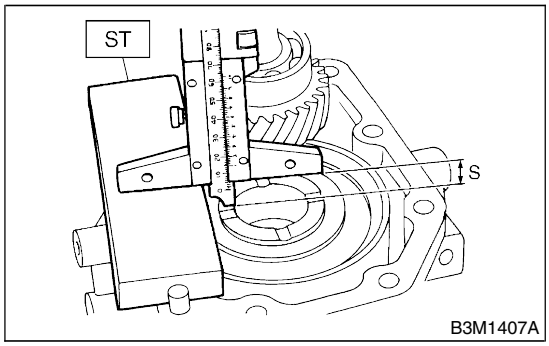
6) Calculate space “t” using the following equation: t = X – W + 0.2 to 0.3 mm (0.008 to 0.012 in)
7) Select nearest washer in the following table:

Standard clearance between thrust washer and taper roller bearing:
0.2 — 0.3 mm T (0.008 — 0.012 in T)

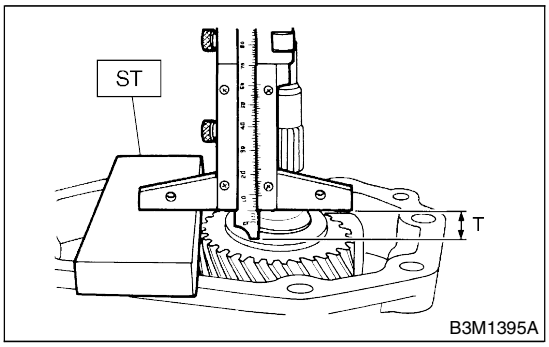
NOTE:
T: Tight

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 on transfer drive shaft.
9) Measure depth “S” between transfer case and center differential.
ST 398643600 GAUGE



10) Measure depth “T” between extension case and transfer drive gear.
ST 398643600 GAUGE



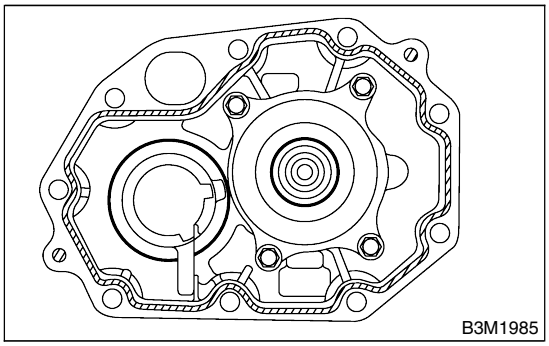
11) Calculate space “U” using the following equation: U = S – T
12) Select suitable washer in the following table:

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)

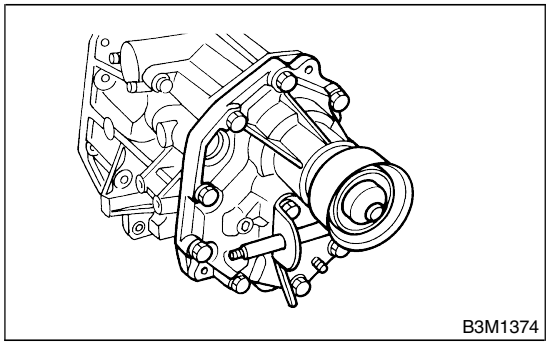
13) Fit thrust washer on center differential.
14) Install bearing cone into extension case.
15) Apply proper amount of liquid gasket to the transfer case mating surface.

Liquid gasket:
THREE BOND 1215B

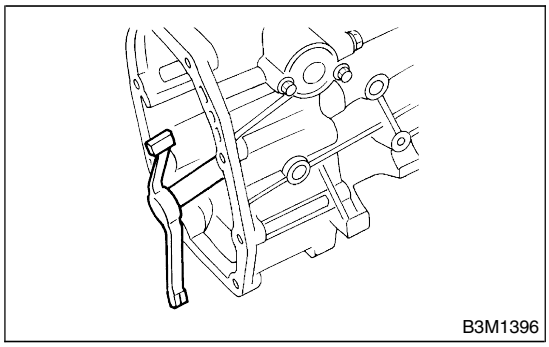


16) Install extension assembly into transfer case.

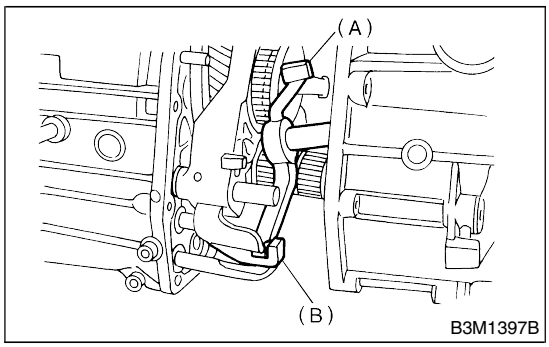
Tightening torque:
40N·m (4.1 kgf-m, 29.7 ft-lb)


B3M1374

17) Install shifter arm to transfer case.


B3M1396

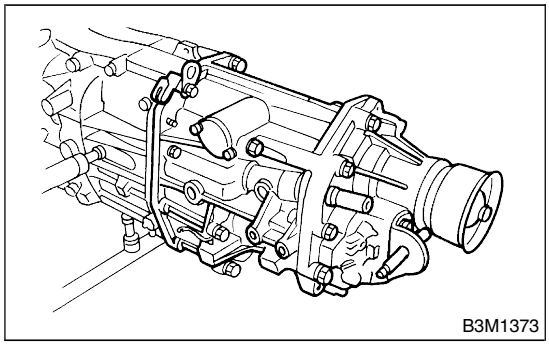
18) Hang the shifter arm on the 3rd-4th fork rod.



B3M1397B

19) Install transfer case with extension case assembly to transmission case.

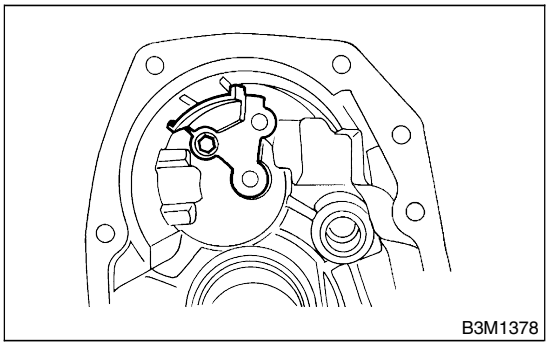
Tightening torque:
25N·m (2.5 kgf-m, 18.1 ft-lb)


B3M1373

C: DISASSEMBLY S503561A06

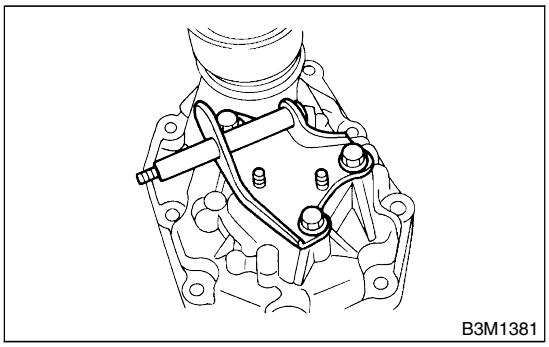
1. TRANSFER CASE S503561A0601

1) Remove reverse check assembly. <Ref. to MT-57 REMOVAL, Reverse Check Removal.>
2) Remove oil guide.


B3M1378

2. EXTENSION CASE S503561A0602

1) Remove transfer drive gear assembly. <Ref. to MT-52 REMOVAL, Transfer Drive Gear.>
2) Remove shift bracket.


B3M1381

3) Remove oil seal from extension case. <Ref. to MT-41 Oil Seal.>

D: ASSEMBLY S503561A02

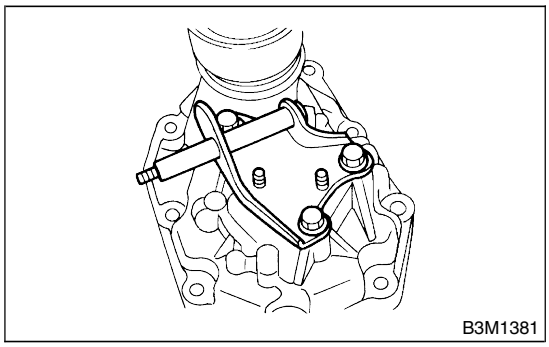
1. EXTENSION CASE S503561A0201

1) Using ST, install oil seal to extension case. <Ref. to MT-41, 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)

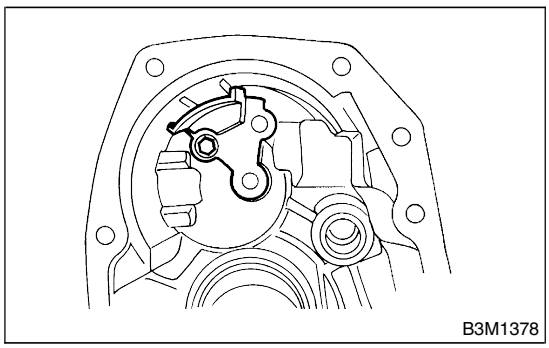

B3M1381

3) Install transfer drive gear to extension case. <Ref. to MT52 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-57 INSTALLATION, Reverse Check Sleeve.>

10. Oil Pump S503070

A: REMOVAL S503070A18

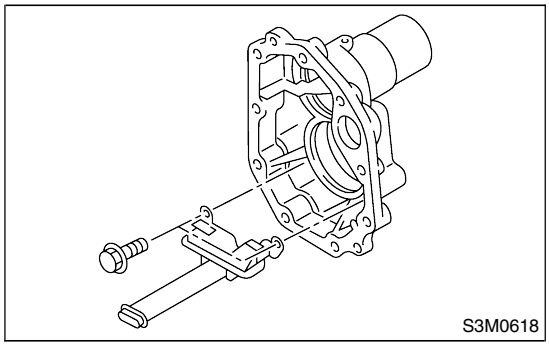
For extension case removal procedure, refer to “Transfer Case and Extension Case Assembly”. <Ref. to MT-46, REMOVAL, Transfer Case and Extension Case Assembly.>

B: INSTALLATION S503070A11

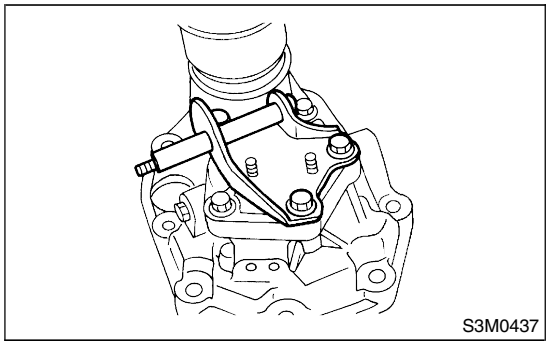
For extension case installation procedure, refer to “Transfer Case Pump and Extension Case Assembly”. <Ref. to MT-46, INSTALLATION, Transfer Case and Extension Case Assembly.>

C: DISASSEMBLY S503070A06

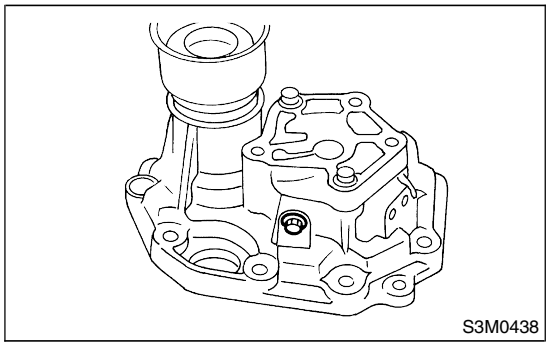
1) Remove transfer drive gear assembly. <Ref. to MT-52, REMOVAL, Transfer Drive Gear.>
2) Remove oil strainer from extension case.


S3M0618

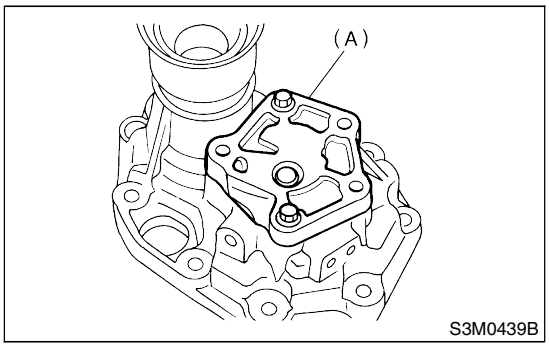
3) Remove shift bracket.


S3M0437

4) Remove relief valve from extension case.


S3M0438

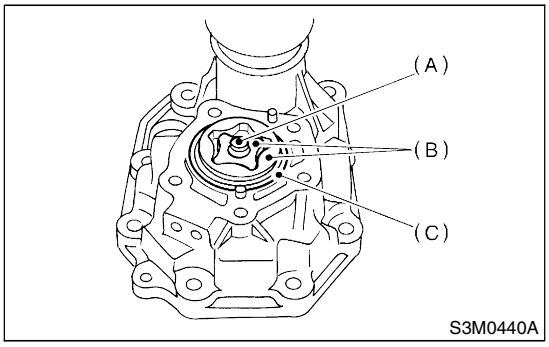
5) Remove oil pump cover from extension.



S3M0439B

(A) Oil pump cover

6) Remove rotor assembly, oil pump shaft and O-ring.



S3M0440A

(A) Oil pump shaft
(B) Rotor ASSY
(C) O-ring

D: ASSEMBLY S503070A02

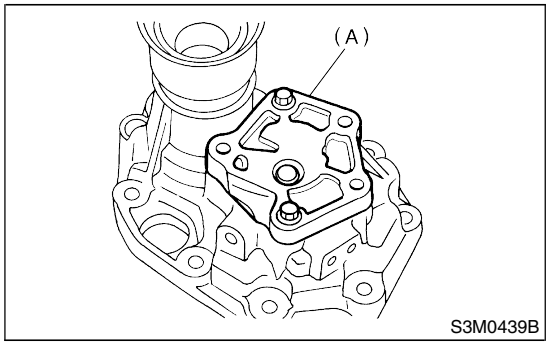
1) Install rotor assembly and oil pomp shaft to extension case.
2) Install O-ring to oil pump cover.

CAUTION:
Replace O-ring with a new one.

NOTE:
Apply a coat of gear oil to the O-ring.

3) Install oil pump cover to extension case.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

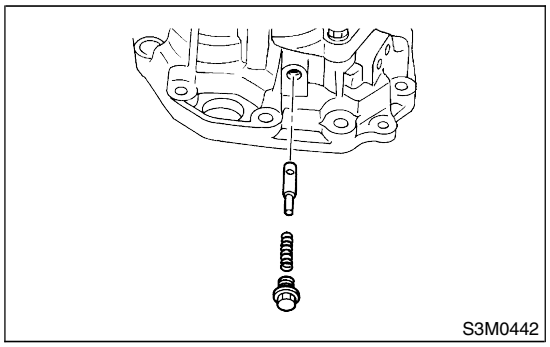


(A) Oil pump cover

4) Install relief valve and return spring to extension case.

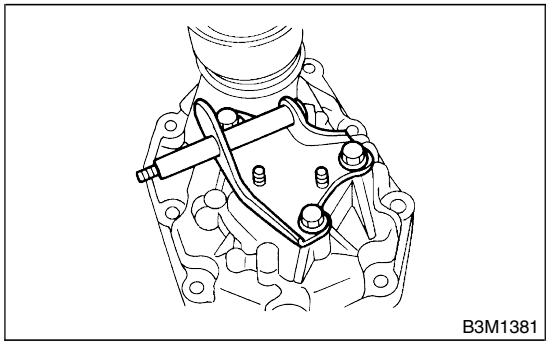
CAUTION:
Replace O-ring with a new one.

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)



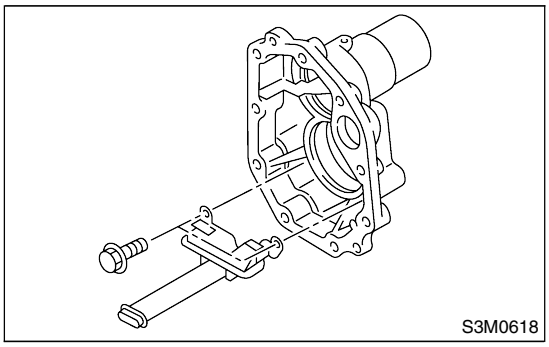
5) Install shift bracket to extension case.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



6) Install oil strainer to extension case.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

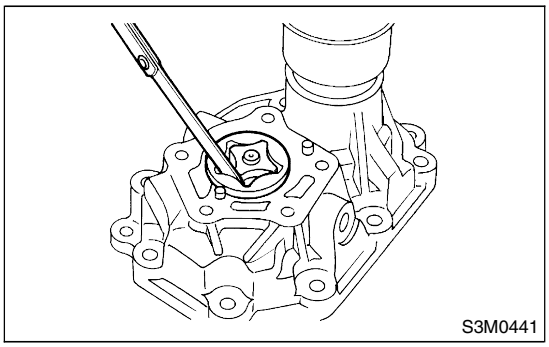


7) Install transfer drive gear. <Ref. to MT-52, INSTALLATION, Transfer Drive Gear.>

E: INSPECTION *S503070A10*

Use a thickness gauge to measure the chip clearance of the rotor assembly. If the value exceeds standard, replace the rotor as an assembly.

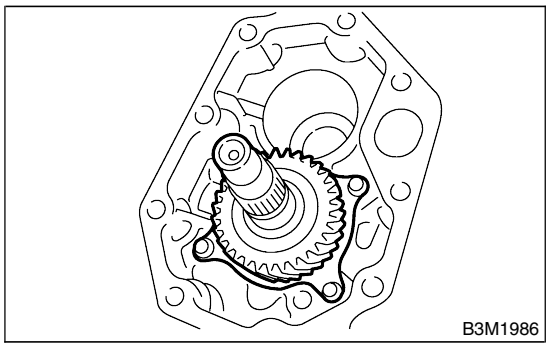
Chip clearance:
Less than 0.15 mm (0.0059 in)



11. Transfer Drive Gear S503229

A: REMOVAL S503229A18

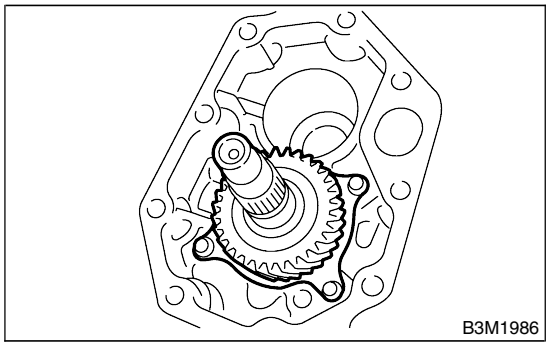
1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
2) Remove back-up light switch and neutral position switch. <Ref. to MT-42 REMOVAL, Switches and Harness.>
3) Remove transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove extension case assembly.
5) Remove transfer driven gear.
6) Remove transfer drive gear.



B: INSTALLATION S503229A11

1) Install transfer drive gear. (Without oil pump)

Tightening torque:
26 N·m (2.7 kgf-m, 20 ft-lb)

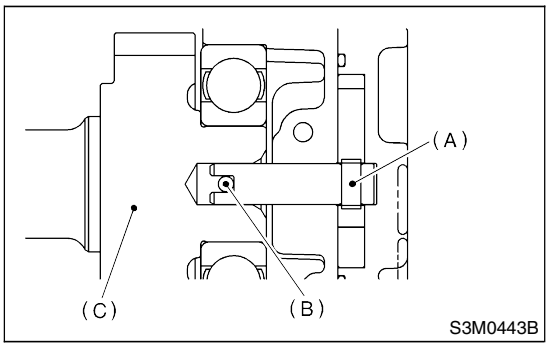


2) Install transfer drive gear to extension case. (With oil pump)

Tightening torque:
26 N·m (2.7 kgf-m, 20 ft-lb)

CAUTION:
Do not use a press machine. Always install the parts by hand.

NOTE:
Engage the transfer drive gear pin with the extension case pin.

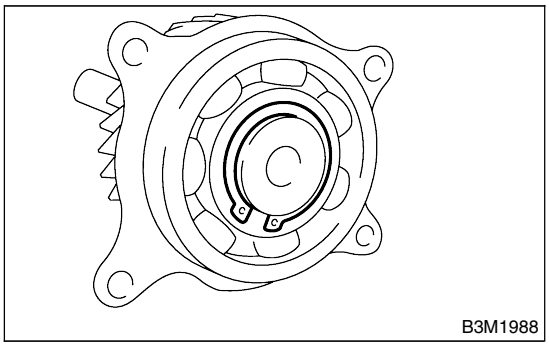


(A) Oil pump shaft
(B) Straight pin
(C) Transfer drive gear

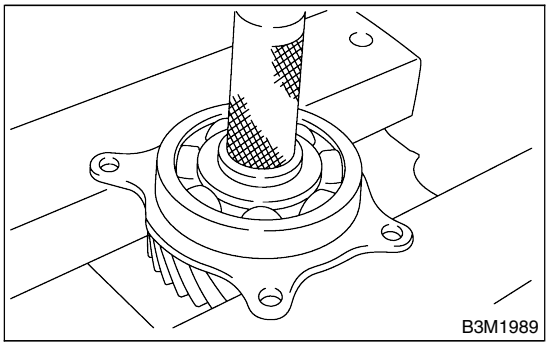
3) Install transfer driven gear.
4) Install the extension case assembly.
5) Install transfer case and extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>
6) Install back-up light switch and neutral position switch. <Ref. to MT-43 INSTALLATION, Switches and Harness.>
7) Install the manual transmission assembly from vehicle. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY S503229A06

1) Remove snap ring.



2) Remove ball bearing.



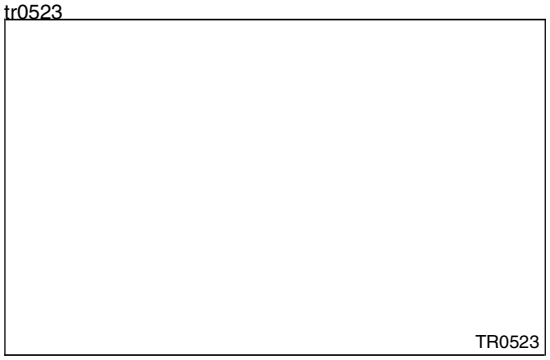
3) Remove straight pin from transfer drive gear. (With oil pump)

D: ASSEMBLY S503229A02

1) Install straight pin to transfer drive gear. (With pump)
2) Set the ST applying to inner race of bearing and instal to drive shaft.
ST 398177700 INSTALLER

CAUTION:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton)

tr0523



3) Install snap ring on transfer drive shaft.
4) Inspect clearance between snap ring and inner race of ball bearing. <Ref. MT-53, INSPECTION, Transfer Drive Gear.>

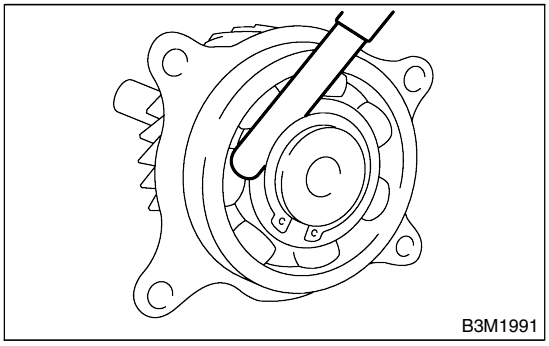
E: INSPECTION S503229A10

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)



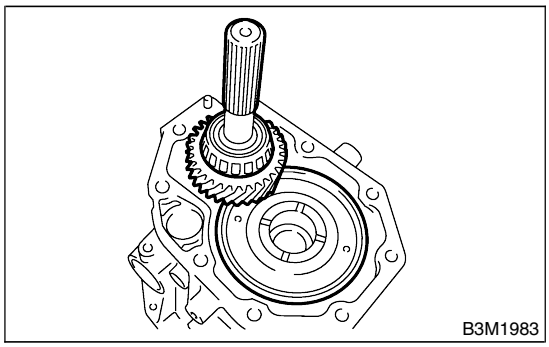
If the measurement is not within the specification, select suitable snap ring.

Snap ring	
Part No.	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.697)

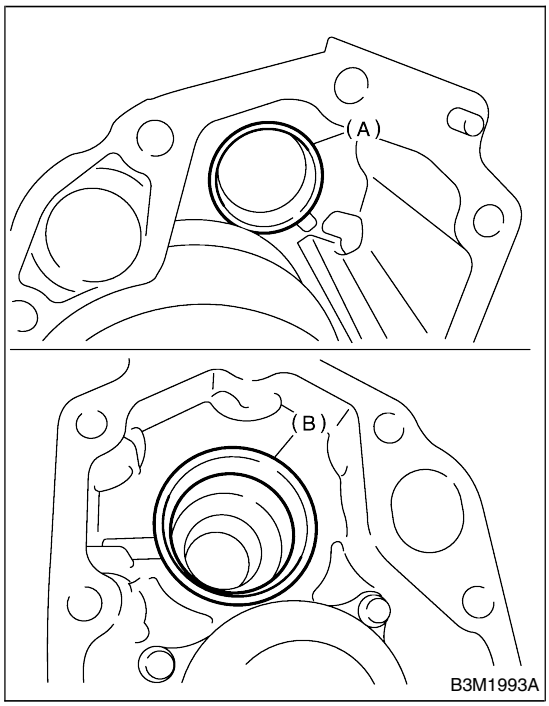
12. Transfer Driven Gear S503223

A: REMOVAL S503223A18

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32, REMOVAL, Manual Transmission Assembly.>
2) Remove back-up light switch and neutral position switch. <Ref. to MT-42, REMOVAL, Switches and Harness.>
3) Remove transfer case with extension case assembly. <Ref. to MT-46, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove extension case assembly.
5) Remove transfer driven gear.



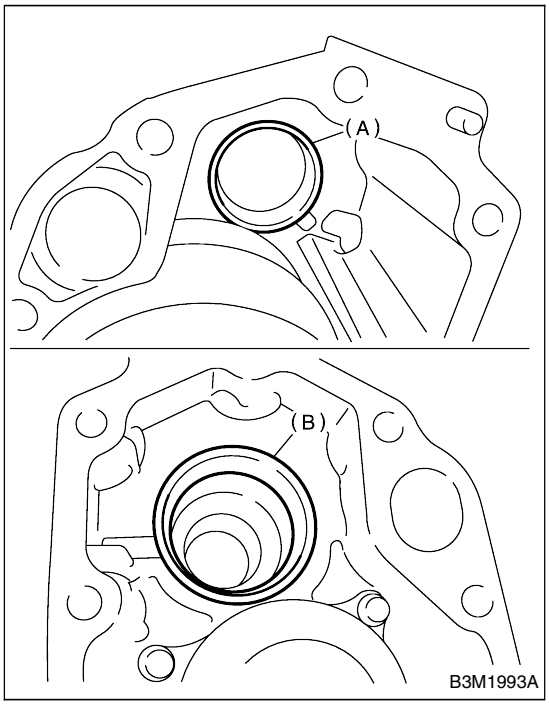
6) Remove bearing cup from extension case and transfer case.



(A) Bearing cup (transfer case)
(B) Bearing cup (extension case)

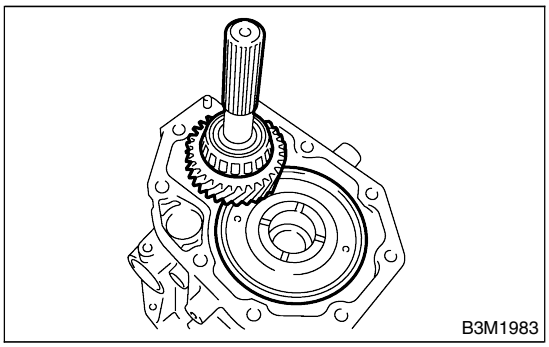
B: INSTALLATION S503223A11

1) Install bearing cup to extension case and transfer case.



(A) Bearing cup (transfer case)
(B) Bearing cup (extension case)

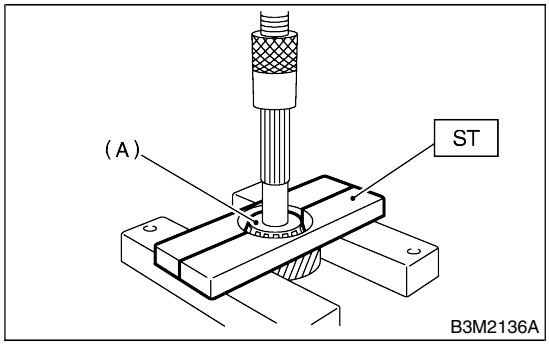
2) Install transfer driven gear.



3) Install transfer case and extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>
4) Install back-up light switch and neutral position switch. <Ref. to MT-43 INSTALLATION, Switches and Harness.>
5) Install the manual transmission assembly to vehicle. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

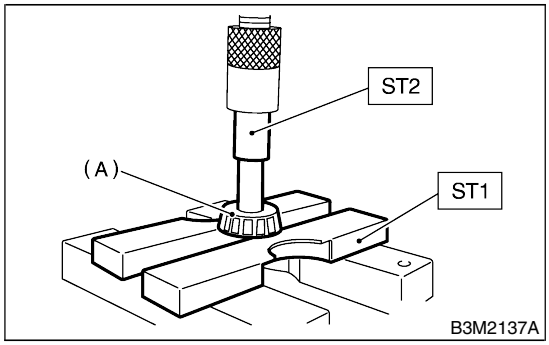
C: DISASSEMBLY S503223A06

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

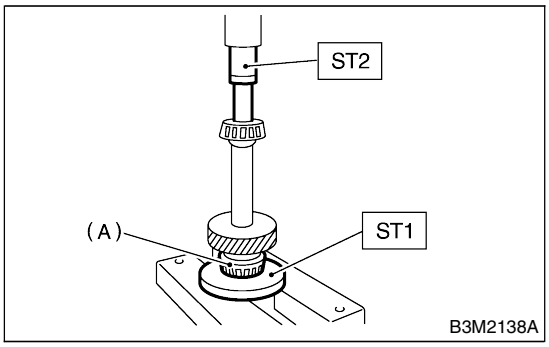


(A) Roller bearing

D: ASSEMBLY S503223A02

1) Using ST, install roller bearing (extension case side).
ST1 398177700 INSTALLER
ST2 899864100 REMOVER

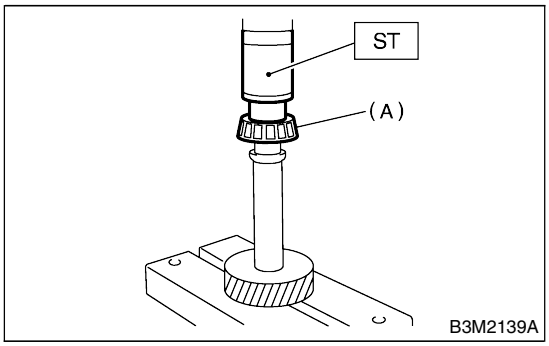
CAUTION:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton)



(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.

13. Center Differential S503158

A: REMOVAL S503158A18

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the transfer driven gear. <Ref. to MT-54 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-54 INSTALLATION, Transfer Driven Gear.>
3) Install the extension case assembly. <Ref. to MT-46 INSTALLATION, Extension Case Assembly.>
4) Install the transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
5) Install the back-up light switch and neutral position switch. <Ref. to MT-42 REMOVAL, Switches and Harness.>
6) Install the manual transmission assembly to vehicle. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

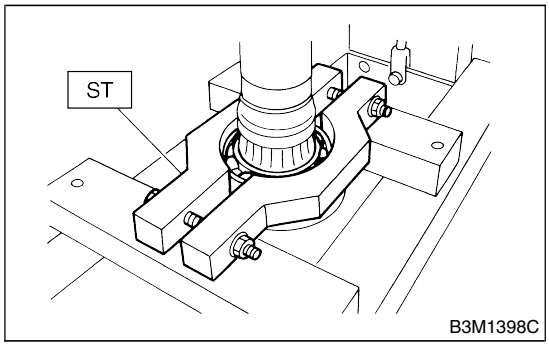
C: DISASSEMBLY S503158A06

NOTE:
Do not disassemble center differential because it is a non-disassemble part.

Remove ball bearing using ST.

CAUTION:
Do not reuse ball bearing.

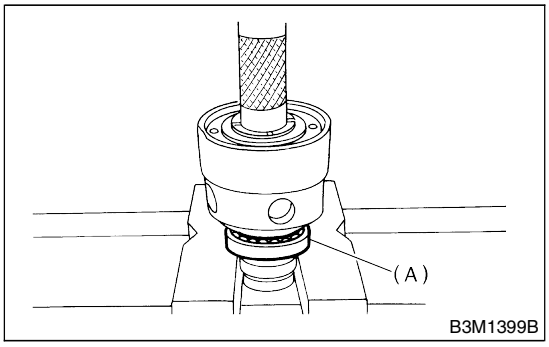
ST 498077300 CENTER DIFFERENTIAL BEARING REMOVER



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

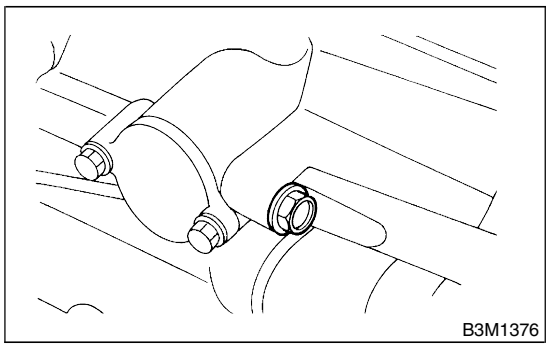
1) Bearings
Replace bearings in the following cases:
- Broken or rusty bearings
- Worn or damaged
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.
- Bearings having other defects

2) Center differential
Replace center differential assembly in the following case:
- Worn or damaged

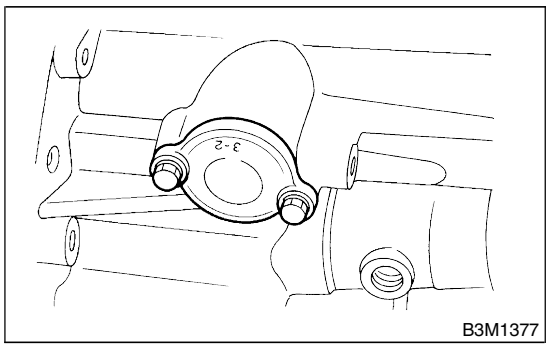
14. Reverse Check Sleeve S503267

A: REMOVAL S503267A18

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove shifter arm.
4) Remove plug, spring washer and reverse check ball.


B3M1376

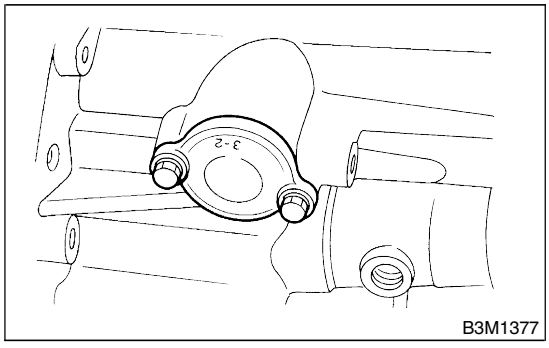
5) Remove the reverse check sleeve.


B3M1377

B: INSTALLATION S503267A11

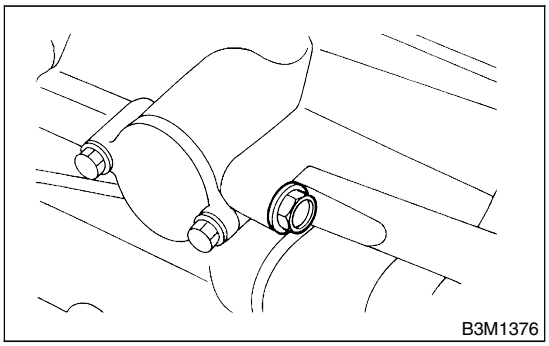
1) Install the reverse check sleeve.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)


B3M1377

2) Install ball, spring, washer and plug to transfer case.

Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)

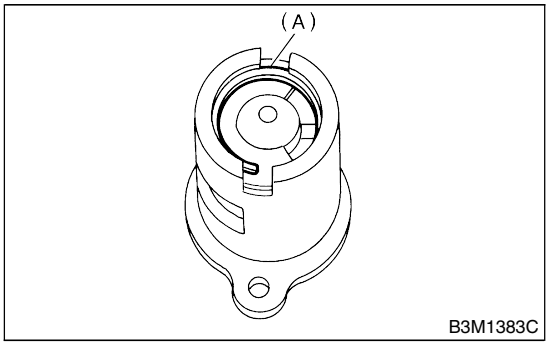

B3M1376

3) Install the shifter arm to transfer case assembly.
4) Install the transfer case with extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>
5) Install the manual transmission assembly to vehicle. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY S503267A06

1) Cover the reverse check sleeve with a rag, and remove snap ring using a screwdriver.

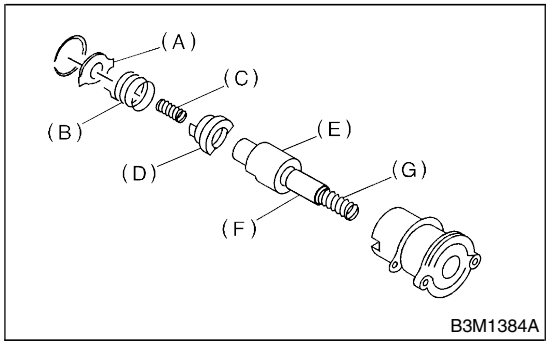
NOTE:
Replace snap ring with a new one if deformed or weakened.



B3M1383C

(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)

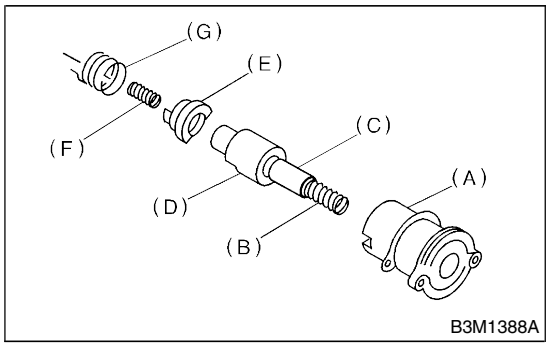
3) Remove O-ring.

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.

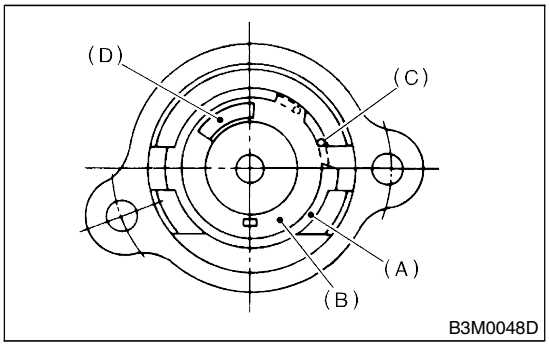


(A) Reverse check sleeve
(B) Return spring (1st-2nd)
(C) Return spring cap
(D) Reverse accent shaft
(E) Return spring (5th-Rev)
(F) Reverse check cam
(G) Reverse check spring

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-59 ADJUSTMENT, Reverse Check Sleeve.>

F: ADJUSTMENT S503267A01

1. NEUTRAL POSITION ADJUSTMENT

BB30109201

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.

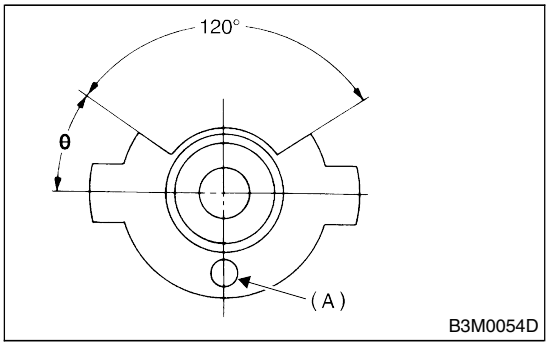
Adjustment shim	
Part No.	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

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.

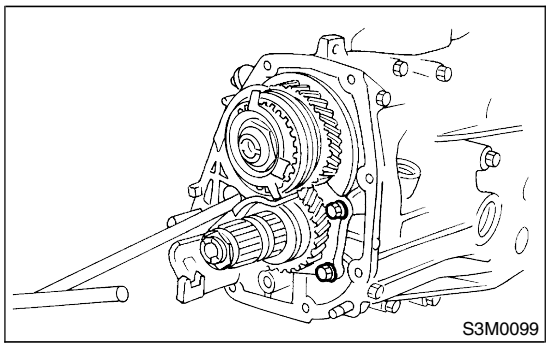


15. Transmission Case S503266

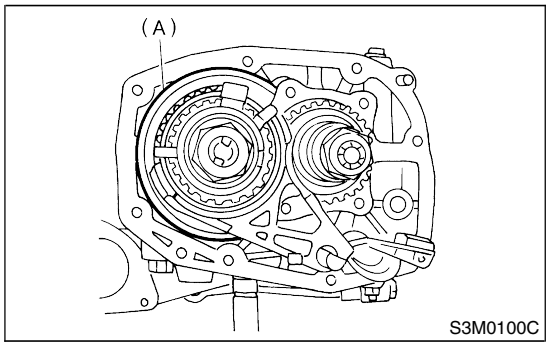
A: REMOVAL S503266A18

1. SINGLE-RANGE S503266A1801

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32, REMOVAL, Manual Transmission Assembly.>
2) Remove clutch release lever. <Ref. to CL-20, REMOVAL, Release Bearing and Lever.>
3) Remove transfer case with extension case assembly. <Ref. to MT-46, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove bearing mounting bolts.


S3M0099

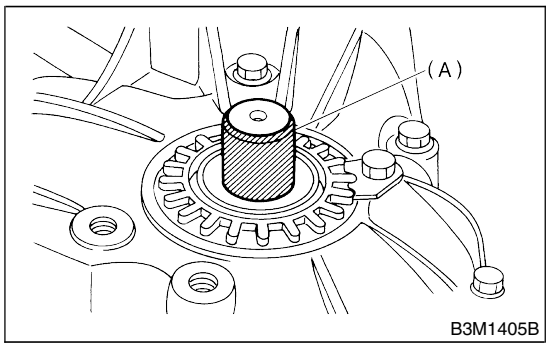
5) Remove main shaft rear plate.



S3M0100C

(A) Main shaft rear plate

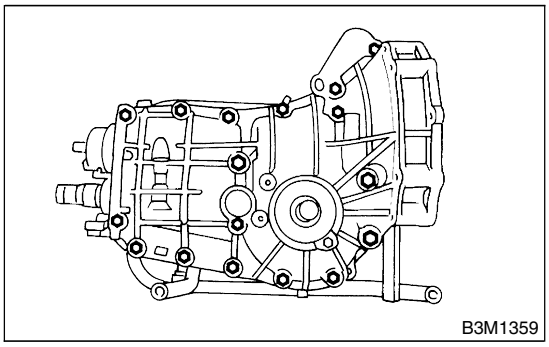
6) Put vinyl tape around splines of right and left axle drive shafts to prevent damage to oil seal.



B3M1405B

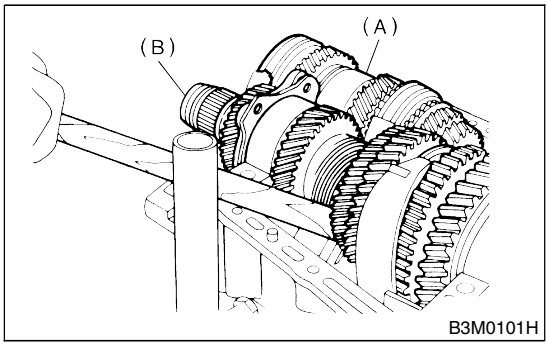
(A) Vinyl tape

7) Separate transmission case into right and left cases by loosening coupling bolts and nuts.


B3M1359

8) Remove drive pinion shaft assembly from left side transmission case.

NOTE:
Use a hammer handle, etc. to remove if too tight.

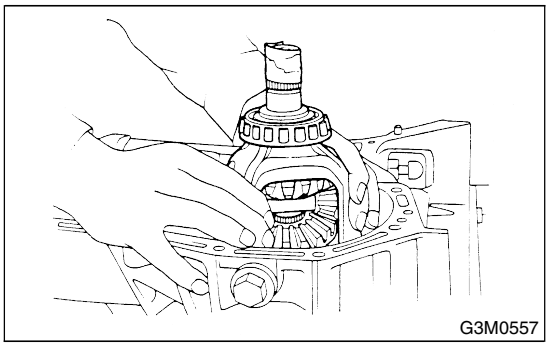


B3M0101H

(A) Main shaft assembly
(B) Drive pinion shaft assembly

9) Remove main shaft assembly.
10) Remove differential assembly.

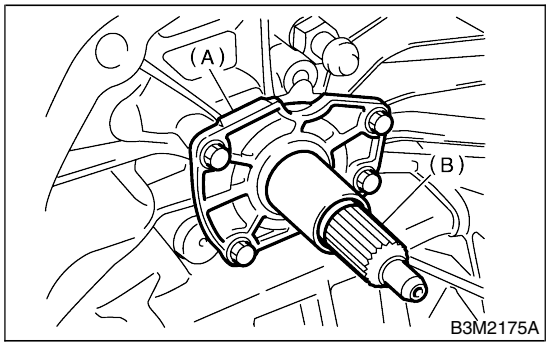
CAUTION:
- **Be careful not to confuse right and left roller bearing outer races.**
- **Be careful not to damage retainer oil seal.**


G3M0557

2. DUAL-RANGE S503266A1802

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32, REMOVAL, Manual Transmission Assembly.>

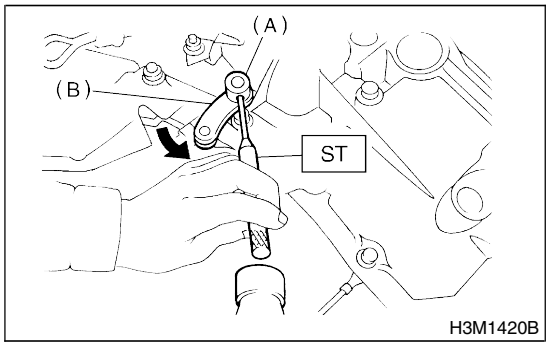
2) Remove clutch release lever. <Ref. to CL-20, REMOVAL, Release Bearing and Lever.>
3) Remove transfer case with extension case assembly. <Ref. to MT-46, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the input shaft holder.



(A) Input shaft holder
(B) Input shaft

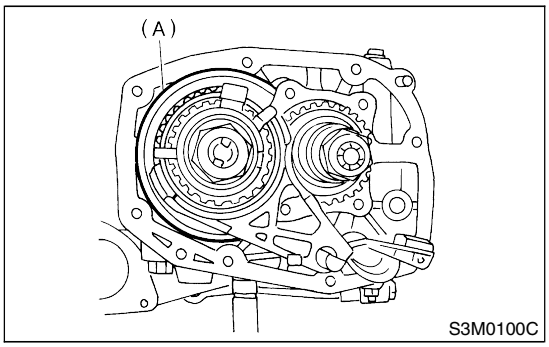
5) Remove the high-low switch. <Ref. to MT-42 REMOVAL, Switches and Harness.>
6) Using ST, drive out straight pin, and remove high-low shifter lever.
ST 398791700 REMOVER II

NOTE:
When driving out straight pin, remove it in the direction that it does not butt against transmission case.



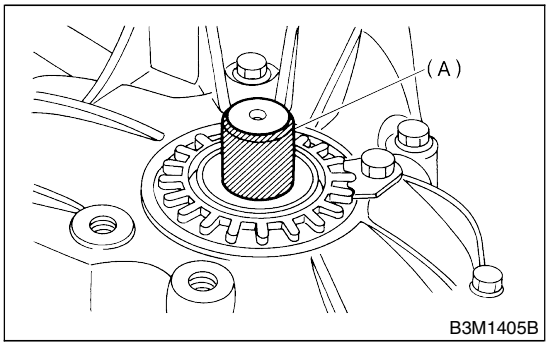
(A) Straight pin
(B) High-low shifter lever

7) Remove main shaft rear plate.



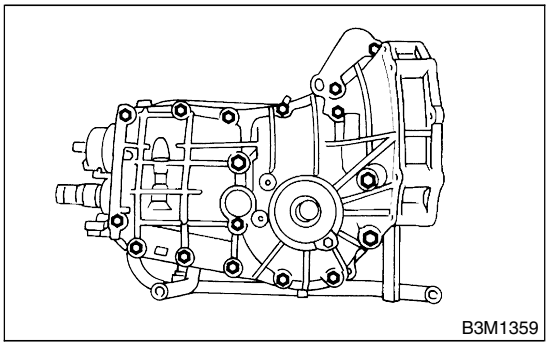
(A) Main shaft rear plate

8) Put vinyl tape around splines of right and left axle drive shafts to prevent damage to oil seals.



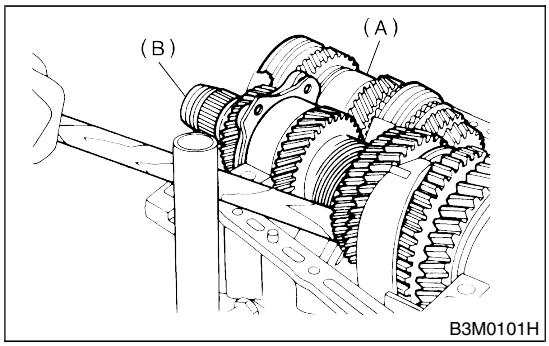
(A) Vinyl tape

9) Separate transmission case into right and left cases by loosening seventeen coupling bolts and nuts.



10) Remove drive pinion shaft assembly from left side transmission case.

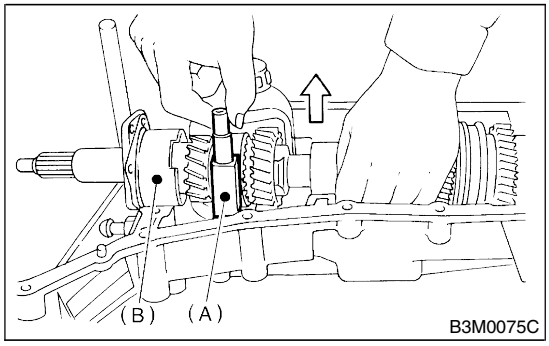
NOTE:
Use a hammer handle, etc. to remove if too tight.



(A) Main shaft assembly
(B) Drive pinion shaft assembly

11) Removing high-low shifter fork
Raise main shaft assembly slightly, and remove high-low shifter fork together with high-low shifter shaft and washer.

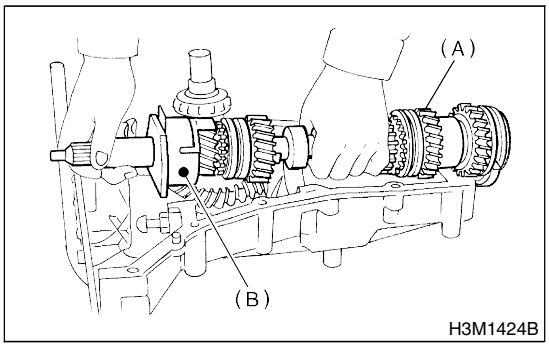
CAUTION:
Be careful not to drop the two high-low shifter pieces.



(A) High-low shifter fork
(B) Input shaft ASSY

12) Remove main shaft assembly and input shaft assembly.

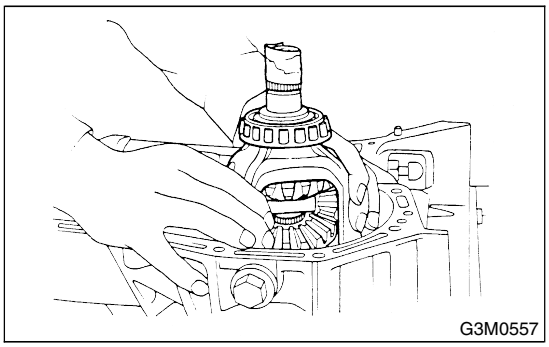
CAUTION:
Be careful not to drop input shaft and main shaft as they are separable.



(A) Main shaft ASSY
(B) Input shaft ASSY

13) 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. SINGLE-RANGE S503266A1101

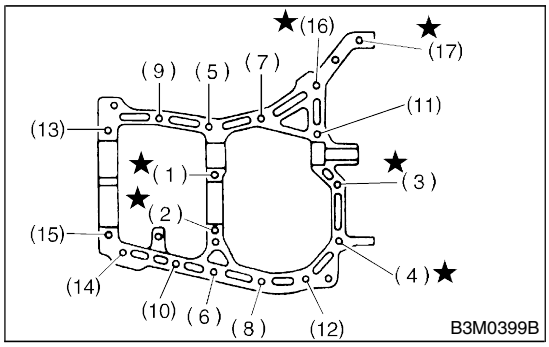
1) Wipe off grease, oil and dust on the mating surfaces of transmission cases with white gasoline.
2) Install the front differential assembly.
3) Install the main shaft assembly.
Install needle bearing knock pin hole into transmission case knock pin.
4) Install the drive pinion shaft assembly.
Install 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.

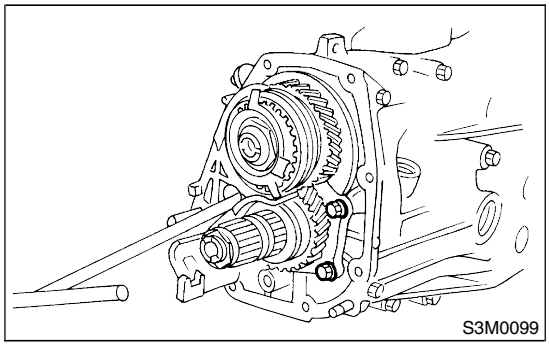
NOTE:
- Insert bolts from the bottom and tighten nuts at the top.
- Put cases together so that drive pinion shim and input shaft holder shim are not caught up in between.
- Confirm that speedometer gear is meshed.

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)



7) Tighten ball bearing attachment bolts.

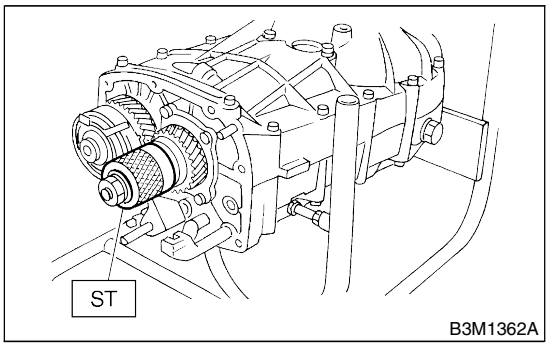
Tightening torque:
29 N·m (3.0 kgf-m, 21.7 ft-lb)



8) Backlash adjustment of hypoid gear and preload adjustment of roller bearing

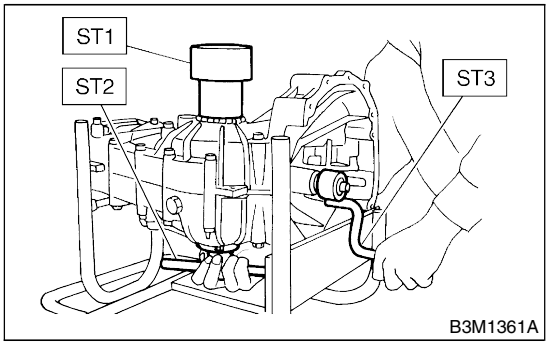
NOTE:
Support drive pinion assembly with ST.

ST 498427100 STOPPER



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.

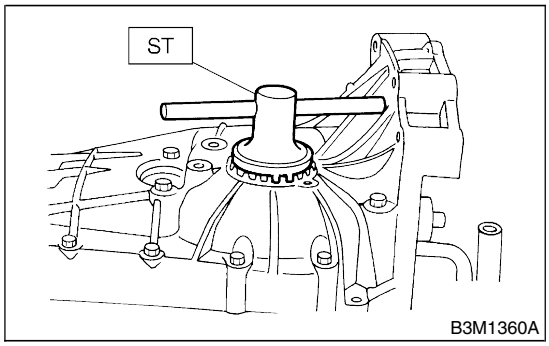
ST1 399780104 WEIGHT
ST2 499787000 WRENCH ASSY
ST3 499927100 HANDLE



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



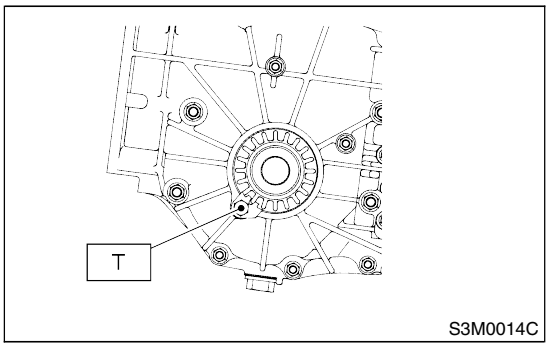
12) Fit lock plate. Loosen the retainer on the lower side by 1-1/2 notches of lock plate and turn in the retainer on the upper side by the same amount in order to obtain the backlash.

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-94 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-72 ADJUSTMENT, Main Shaft Assembly for Single-Range.>
19) Install clutch release lever and bearing. <Ref. to CL21 INSTALLATION, Release Bearing and Lever.>
20) Install transfer case with extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>
21) Install the manual transmission assembly into the vehicle.<Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

2. DUAL-RANGE *S503266A1102*

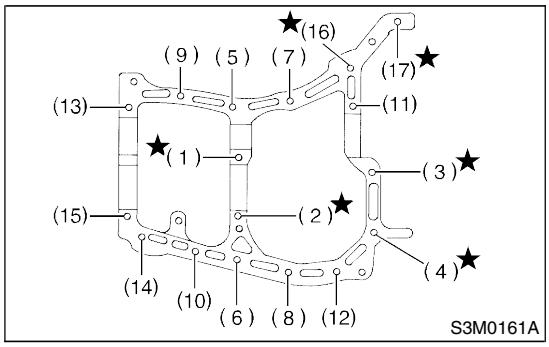
1) Wipe off grease, oil and dust on the mating surfaces of transmission cases with white gasoline.
2) Install the front differential assembly.
3) Install the main shaft assembly and input shaft assembly.
Connect main shaft assembly and input shaft assembly, and install needle bearing knock pin hole into 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.

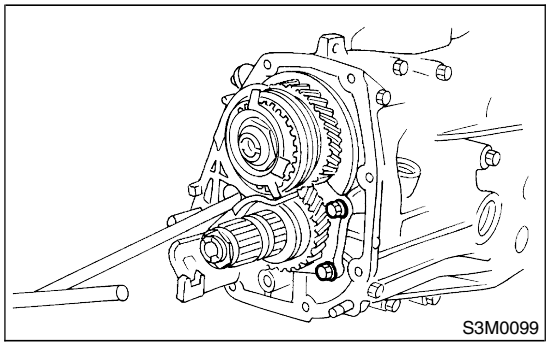
NOTE:
- Insert bolts from the bottom and tighten nuts at the top.
- Put cases together so that drive pinion shim and input shaft holder shim are not caught up in between.
- Confirm that speedometer gear is meshed.

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)



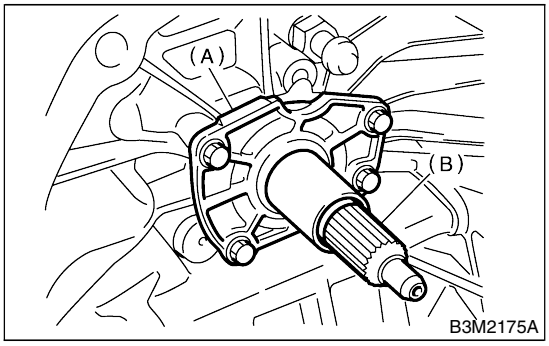
7) Tighten ball bearing attachment bolts.

Tightening torque:
29 N·m (3.0 kgf-m, 21.7 ft-lb)



8) Tighten input shaft holder attaching bolts.

Tightening torque:
20 N·m (2.0 kgf-m, 14.5 ft-lb)

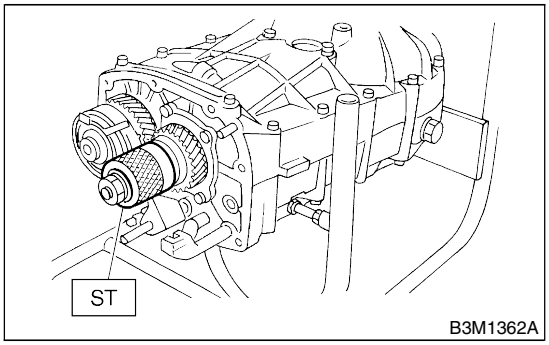


(A) Input shaft holder
(B) Input shaft

9) Backlash adjustment of hypoid gear and preload adjustment of roller bearing

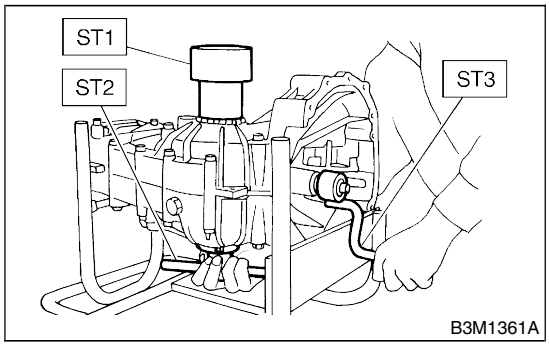
NOTE:
Support drive pinion assembly with ST.

ST 498427100 STOPPER



10) Place the transmission with case left side facing downward and put ST1 on bearing cup.

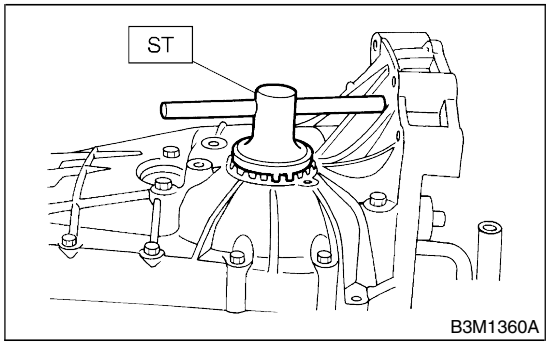
11) Screw retainer assembly into left case from the bottom with ST2. Fit ST3 on the transmission main shaft. Shift gear into 4th or 5th and turn the shaft several times. Screw in the retainer while turning ST3 until a slight resistance is felt on ST2. This is the contact point of hypoid gear and drive pinion shaft. Repeat the above sequence several times to ensure the contact point.
ST1 399780104 WEIGHT
ST2 499787000 WRENCH ASSY
ST3 499927100 HANDLE



12) 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



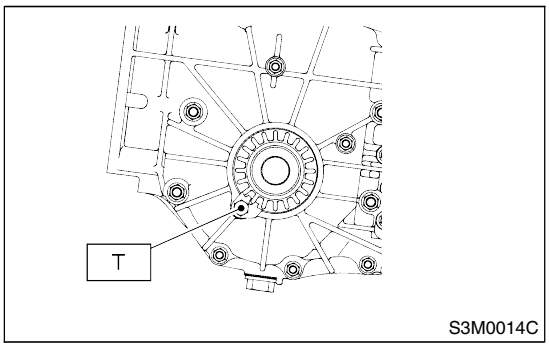
13) Fit lock plate. Loosen the retainer on the lower side by 1-1/2 notches of lock plate and turn in the retainer on the upper side by the same amount in order to obtain the backlash.

NOTE:
The notch on the lock plate moves by 1/2 notch if the plate is turned upside down.

14) Turn in the retainer on the upper side additionally by 1 notch in order to apply preload on taper roller bearing.
15) Tighten temporarily both the upper and lower lock plates and mark both holder and lock plate for later readjustment.
16) Turn transmission main shaft several times while tapping around retainer lightly with plastic hammer.
17) Inspect and adjust backlash and tooth contact of hypoid gear. <Ref. to MT-94 INSPECTION, Front Differential Assembly.>
18) 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)



19) Selection of main shaft rear plate <Ref. to MT-72 ADJUSTMENT, Main Shaft Assembly for Signal-Range.>
20) Install transfer case with extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>
21) Install clutch release lever and bearing. <Ref. to CL21 INSTALLATION, Release Bearing and Lever.>
22) Install the manual transmission assembly into the vehicle.<Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION S503266A10

Check the transmission case for cracks, damage, and oil leaks.

16. Main Shaft Assembly for Single-Range S503713

A: REMOVAL S503713A18

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
2) Remove transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove transmission case. <Ref. to MT-46 REMOVAL, Transmission Case.>
4) Removes drive pinion shaft assembly. <Ref. to MT-83 REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove main shaft assembly.

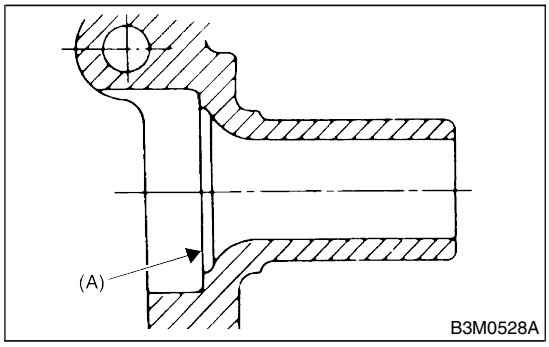
B: INSTALLATION S503713A11

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.



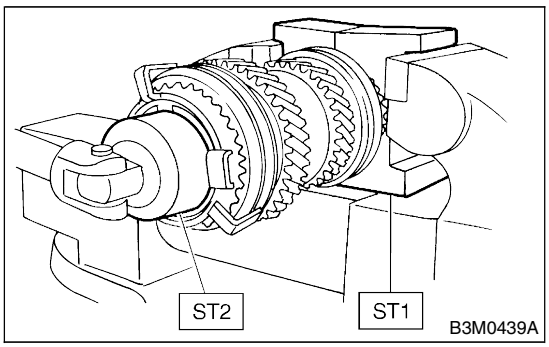
3) Install the drive pinion assembly. <Ref. to MT-83 INSTALLATION, Drive Pinion Shaft Assembly.>
4) Install transmission case. <Ref. to MT-62 INSTALLATION, Transmission Case.>
5) Install transfer case with extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>
6) Install the manual transmission assembly to vehicle. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY S503713A06

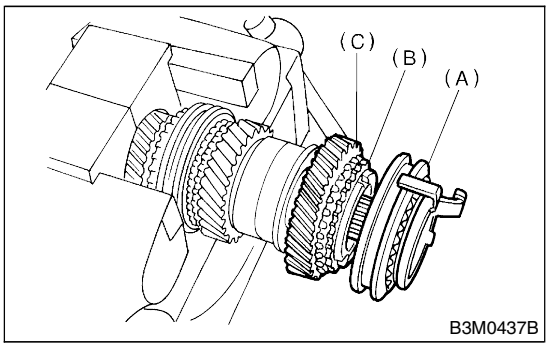
1) Put vinyl tape around main shaft splines to protect oil seal from damage. Then pull out oil seal and needle bearing by hand.
2) Remove lock nut from transmission main shaft assembly.

NOTE:
Remove caulking before taking off lock nut.

ST1 498937000 HOLDER
ST2 499987003 SOCKET WRENCH (35)

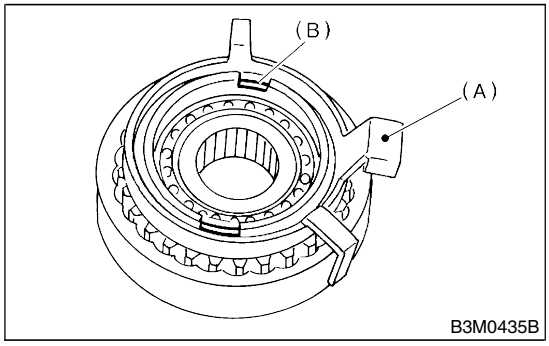


3) Remove 5th-Rev sleeve and hub assembly, baulk ring, 5th drive gear and needle bearing.



(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.

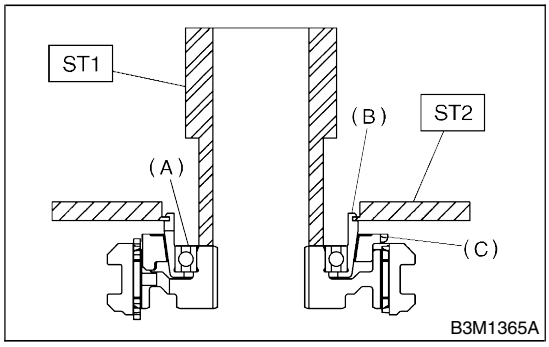


(A) Synchro cone stopper
(B) Snap ring

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

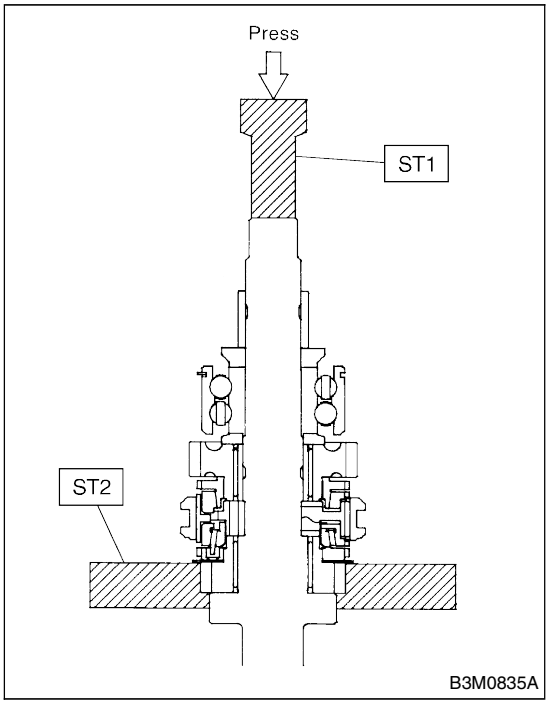


(A) Ball bearing
(B) Synchro cone
(C) Baulk ring

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.

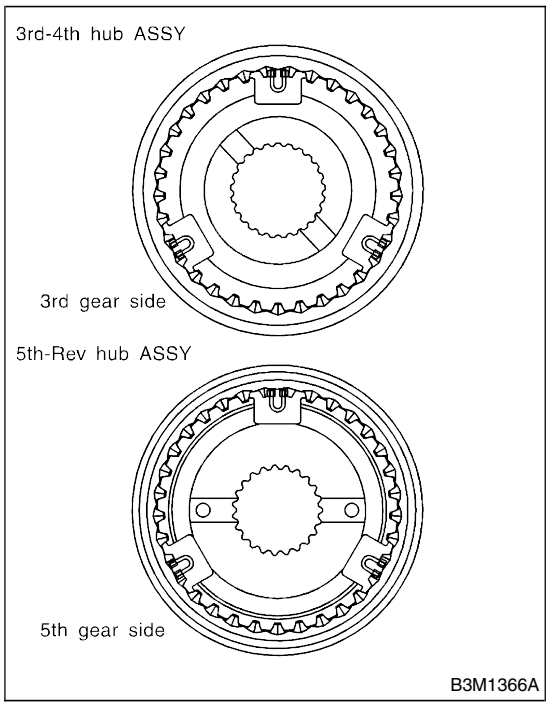
ST1 899864100 REMOVER
ST2 899714110 REMOVER



D: ASSEMBLY S503713A02

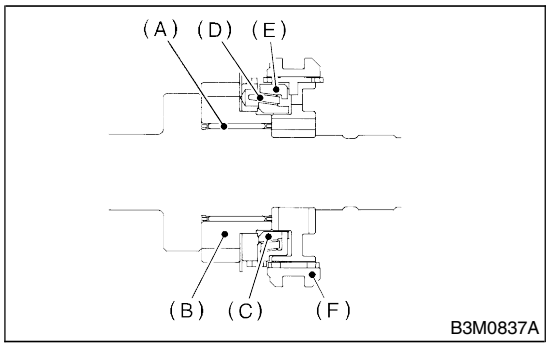
1) Assemble each sleeve and hub assembly.

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.

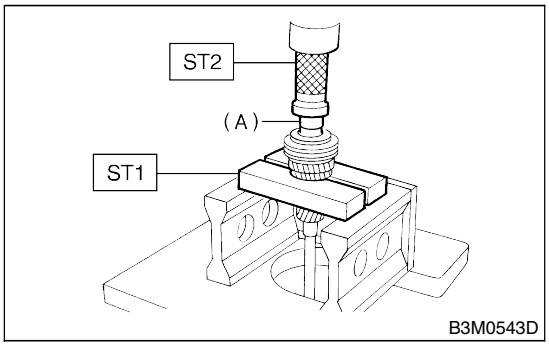


(A) 3rd needle bearing
(B) 3rd drive gear
(C) Inner baulk ring
(D) Synchro cone
(E) Outer baulk ring
(F) Sleeve and hub ASSY

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).

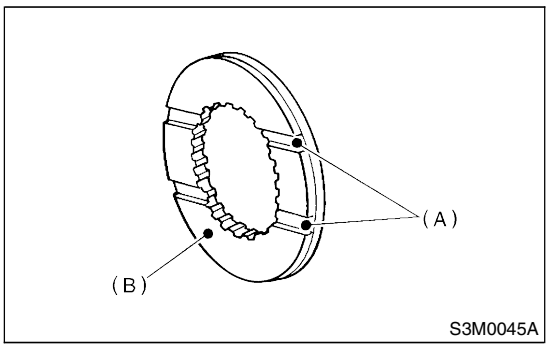
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



(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.

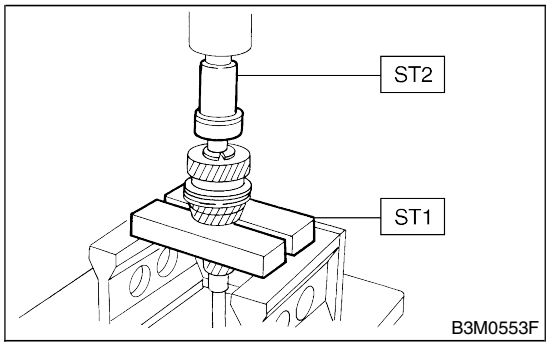


(A) Groove
(B) 4th gear side

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

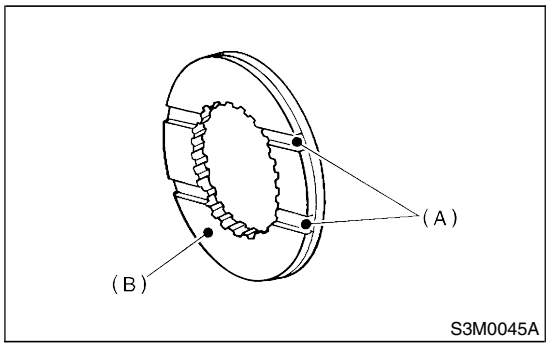


6) Using ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

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



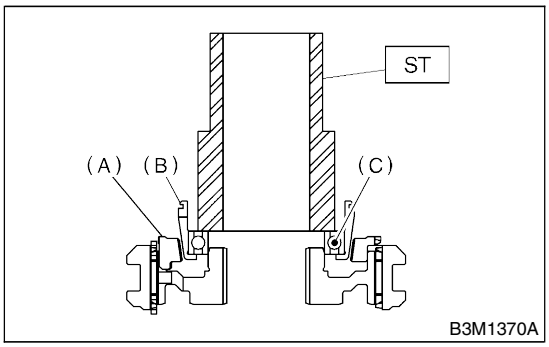
(A) Groove
(B) 4th gear thrust washer

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).

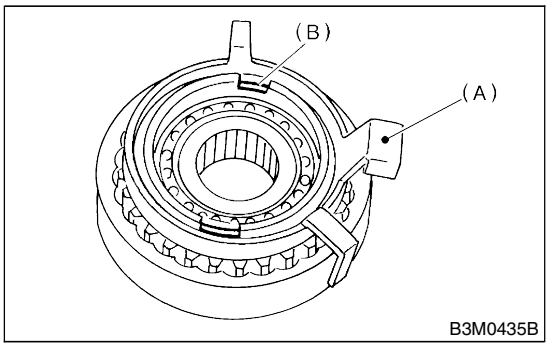
NOTE:
- Use new ball bearing.
- After press fitting, make sure synchro cone rotates freely.

ST 499757002 INSTALLER



(A) Baulk ring
(B) Synchro cone
(C) Ball bearing

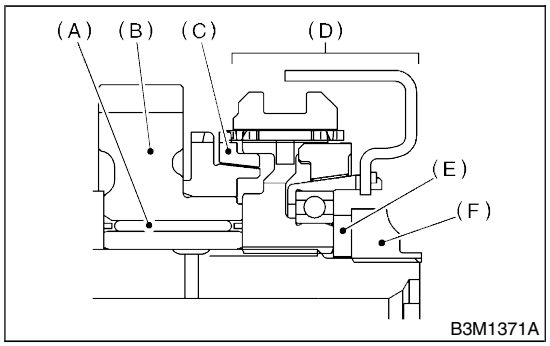
9) Install synchro cone stopper and snap ring to 5th-Rev sleeve and hub assembly.



(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.

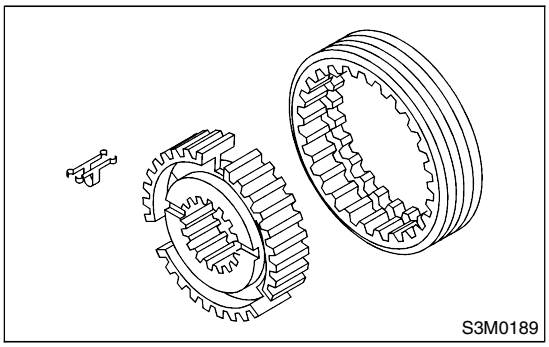
NOTE:
Secure lock nuts in two places after tightening.

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.

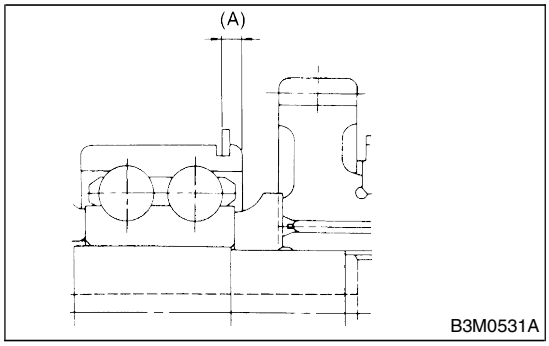
F: ADJUSTMENT S503713A01

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



17. Main Shaft Assembly for Dual-Range S503714

A: REMOVAL S503714A18

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
2) Remove transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove transmission case. <Ref. to MT-46 REMOVAL, Transmission Case.>
4) Removes drive pinion shaft assembly. <Ref. to MT-83 REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove main shaft assembly and input shaft assembly.

B: INSTALLATION S503714A11

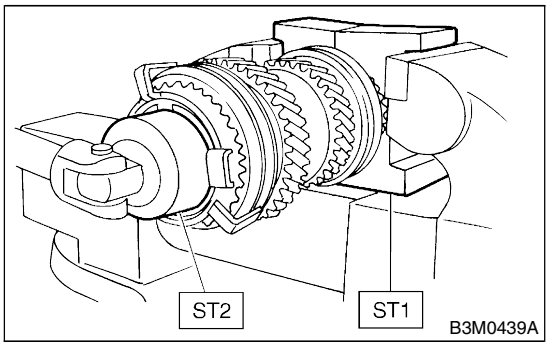
1) Install the needle bearing onto the front of transmission main shaft assembly.
2) Connect main shaft assembly and input shaft assembly.
3) Install needle bearing outer race knock pin hole into transmission case knock pin.
4) Install the drive pinion assembly. <Ref. to MT-83 INSTALLATION, Drive Pinion Shaft Assembly.>
5) Install transmission case. <Ref. to MT-62 INSTALLATION, Transmission Case.>
6) Install transfer case with extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>
7) Install the manual transmission assembly to vehicle. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY S503714A06

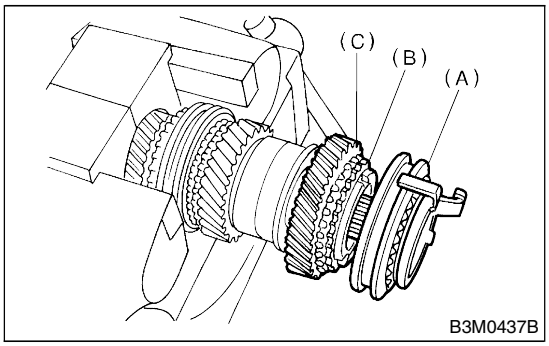
1) Put vinyl tape around main shaft splines to protect oil seal from damage. Then pull out oil seal and needle bearing by hand.
2) Remove lock nut from transmission main shaft assembly.

NOTE:
Remove caulking before taking off lock nut.

ST1 498937000 TRANSMISSION HOLDER
ST2 499987003 SOCKET WRENCH (35)

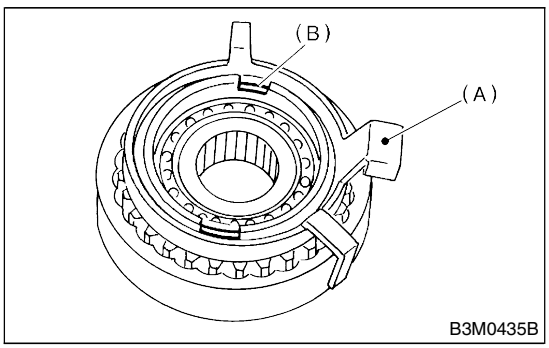


3) Remove 5th-Rev sleeve and hub assembly, baulk ring, 5th drive gear and needle bearing.



(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.

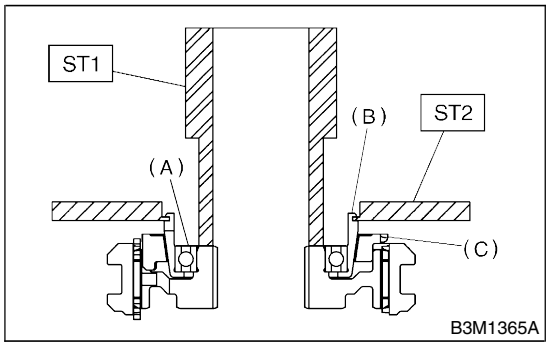


(A) Synchro cone stopper
(B) Snap ring

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

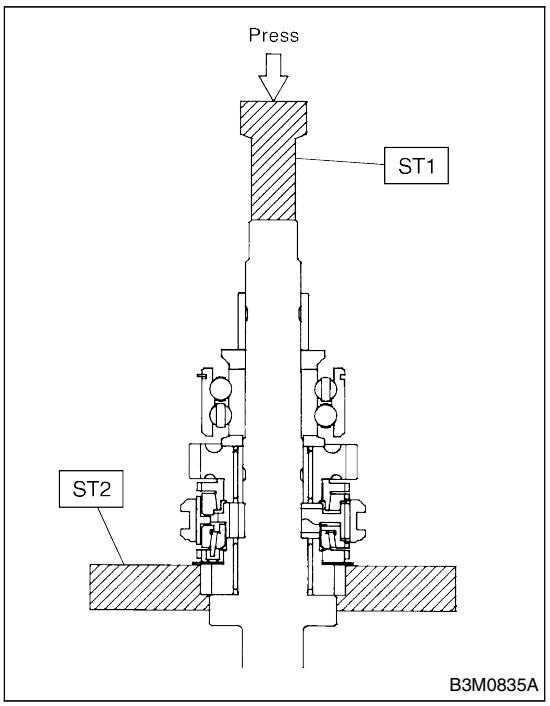


(A) Ball bearing
(B) Synchro cone
(C) Baulk ring

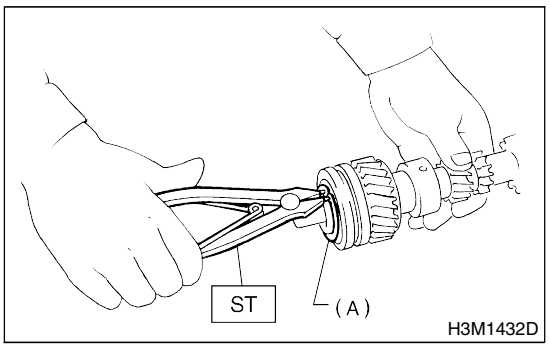
6) Using ST1 and ST2, remove the rest of parts.

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

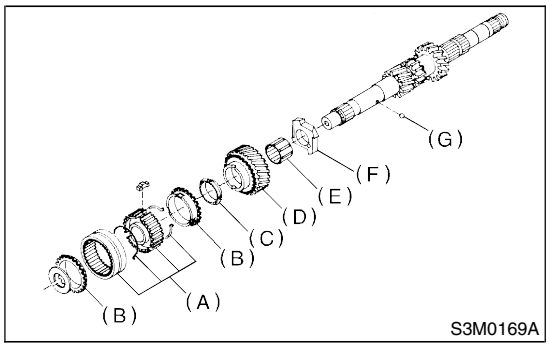


7) Remove snap ring from main shaft.
ST 899474100 EXPANDER



(A) Snap ring

8) Remove the rest of parts.

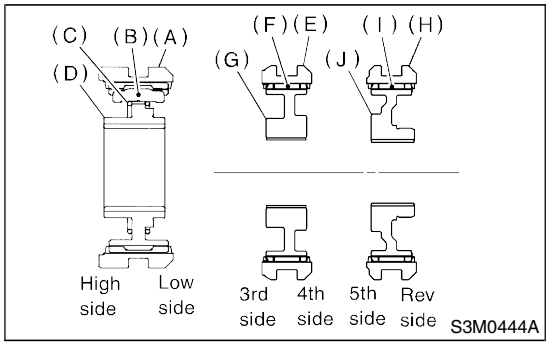


(A) Sleeve and hub ASSY
(B) High-low baulk ring
(C) Friction damper
(D) Low input gear
(E) Needle bearing
(F) Input low gear spacer
(G) Ball

D: ASSEMBLY S503714A02

1) Assemble when each sleeve and hub assembly are disassembled.

NOTE:
Position open ends of spring 120° apart.

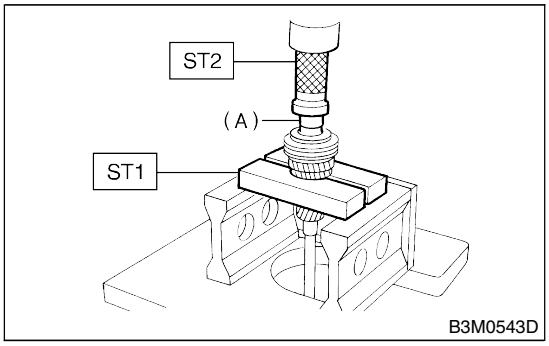


(A) High-low coupling sleeve
(B) Shifting insert
(C) High-low synchronizer spring
(D) High-low synchronizer hub
(E) Sleeve
(F) Insert key
(G) 3rd-4th synchronizer hub
(H) Sleeve
(I) Insert key
(J) 5th-Rev synchronizer hub

2) Install 3rd drive gear, baulk ring, sleeve and hub assembly for 3rd-4th needle bearing on transmission main shaft.

NOTE:
Align groove in baulk ring with shifting insert.

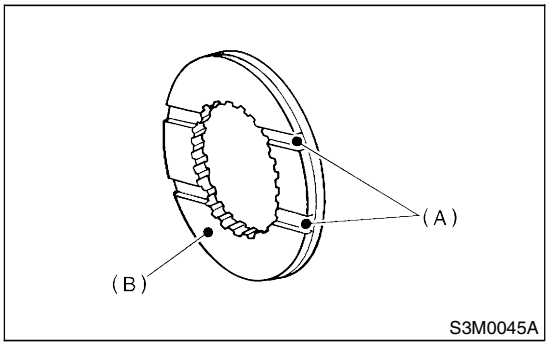
3) Install 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



(A) 4th needle bearing race

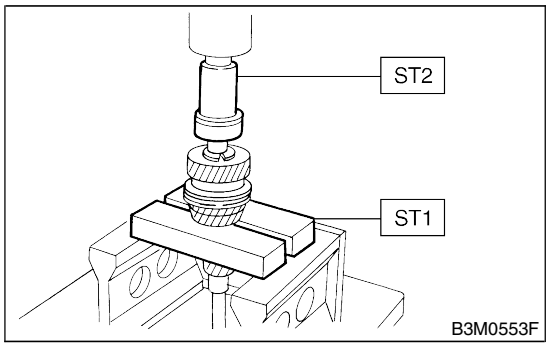
4) Install baulk ring, needle bearing, 4th drive gear and 4th gear thrust washer to transmission main shaft.

NOTE:
Face thrust washer in the correct direction.



(A) Groove
(B) 4th gear side

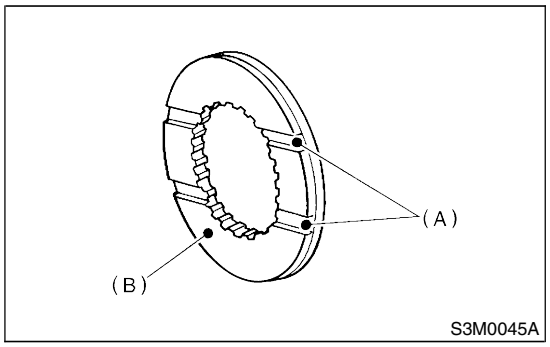
5) Drive ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



6) Using ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

NOTE:
Face thrust washer in the correct direction.

ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER

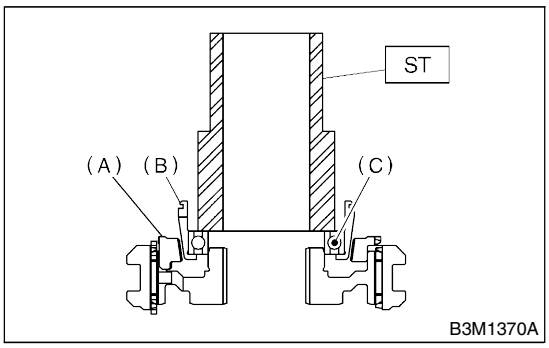


(A) Groove
(B) 4th gear thrust washer

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.

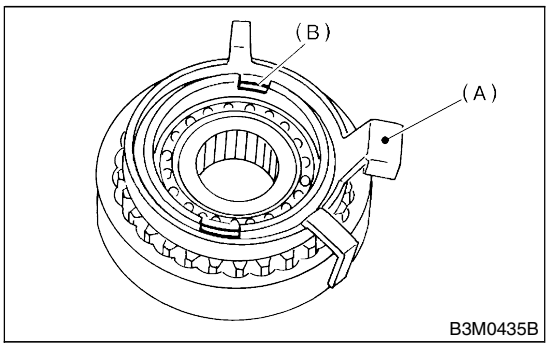
NOTE:
- Use new ball bearing.
- After press fitting, make sure synchro cone rotates freely.

ST 499757002 INSTALLER



(A) Baulk ring
(B) Synchro cone
(C) Ball bearing

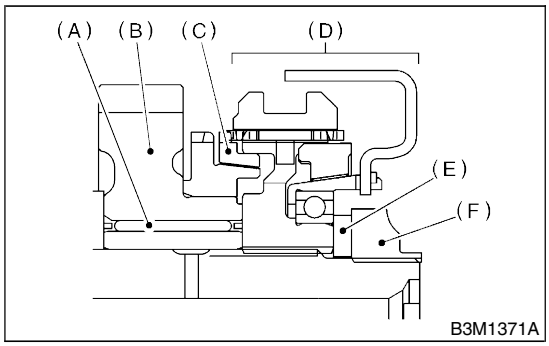
9) Install synchro cone stopper and snap ring to 5th-Rev sleeve and hub assembly.



(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 (35)
ST2 498937000 TRANSMISSION HOLDER

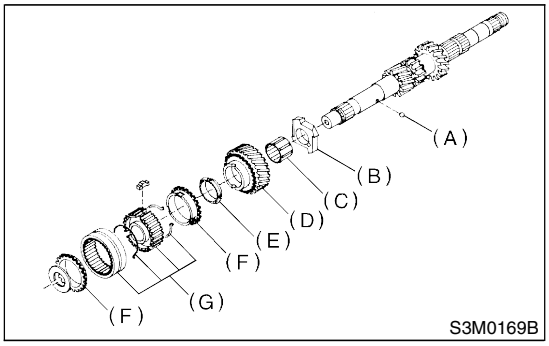
Tightening torque:
118 N·m (12.0 kgf-m, 86.8 ft-lb)

12) Install needle bearing on main shaft.

13) Install the parts to the front section of transmission main shaft.

CAUTION:
Be careful not to damage the graded section of transmission main shaft when installing needle bearing.

NOTE:
- Face the grooved side toward input gear.
- Align high-low baulk ring's groove with shifting insert.



(A) Ball
(B) Input low gear spacer
(C) Needle bearing
(D) Low input gear
(E) Friction damper
(F) High-low baulk ring
(G) Sleeve and hub ASSY

14) Install snap ring to the rod section of transmission main shaft using ST1 and ST2.

CAUTION:
Use only new snap ring.

NOTE:
Select a suitable outer snap ring so that axial clearance between snap ring and hub is held within 0.060 to 0.100 mm (0.0024 to 0.0039 in).

ST1 499757002 INSTALLER
ST2 499757001 SNAP RING GUIDE

Snap ring	
Part No.	Thickness mm (in)
805025051	2.42 (0.0953)
805025052	2.47 (0.0972)
805025053	2.52 (0.0992)
805025054	2.57 (0.1012)
805025055	2.62 (0.1031)
805025056	2.67 (0.1051)
805025057	2.72 (0.1071)
805025058	2.37 (0.0933)

E: INSPECTION S503714A10

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 S503714A01

Choose main shaft rear plate. <Ref. to MT-72 ADJUSTMENT, Main Shaft Assembly for Single-Range.>

18. Input Shaft Assembly S503715

A: REMOVAL S503715A18

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove transmission case. <Ref. to MT-60 REMOVAL, Transmission Case.>
4) Remove drive pinion shaft assembly. <Ref. to MT-83 REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove main shaft assembly and input shaft assembly.

B: INSTALLATION S503715A11

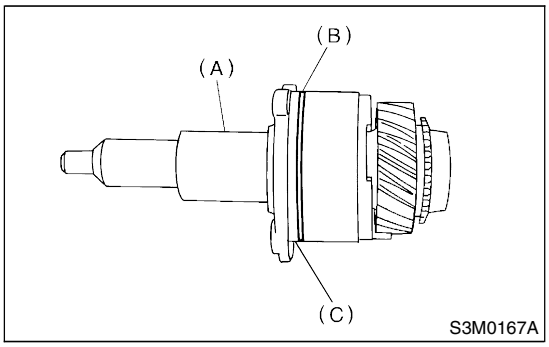
1) Install the needle bearing onto the front of the transmission main shaft assembly.
2) Connect main shaft assembly and input shaft assembly.
3) Install needle bearing outer race knock pin hole into transmission case knock pin.
4) Install the drive pinion assembly. <Ref. to MT-83 INSTALLATION, Drive Pinion Shaft.>
5) Install the transmission case. <Ref. to MT-62 INSTALLATION, Transmission Case.>
6) Install the transfer case with extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>
7) Install manual transmission assembly on vehicle. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY S503715A06

1) Remove O-ring from input shaft holder. Also, remove input shaft holder shim.

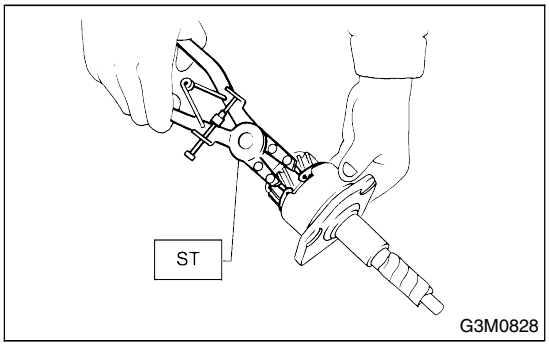
CAUTION:
Use new O-ring.

NOTE:
Number of shims used varies from none to two.

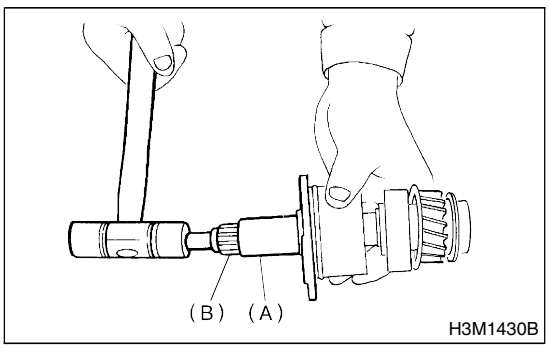


(A) Input shaft holder
(B) O-ring
(C) Input shaft holder shim

2) Put vinyl tape around input shaft splines to protect oil seal from damage.
3) Remove inner snap ring.
ST 398663600 PLIERS

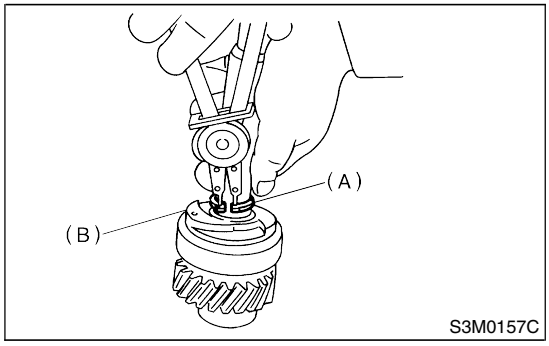


4) Hold input shaft holder stationary and remove input shaft by tapping its end with a plastic hammer.



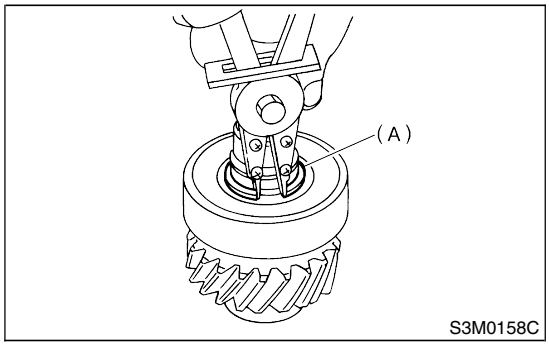
(A) Input shaft holder
(B) Input shaft

5) Remove outer snap ring. Then remove oil squeeze plate and straight pin.



(A) Snap ring
(B) Oil squeeze plate

6) Remove snap ring.

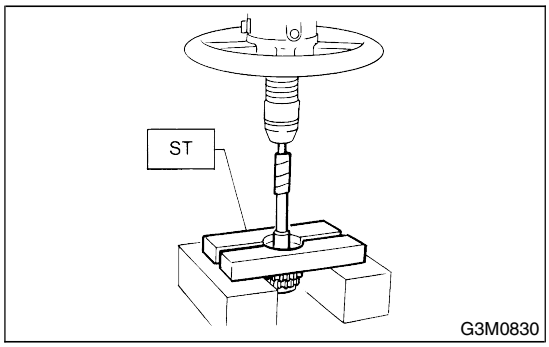


(A) Snap ring

7) Using a press and ST, remove ball bearing.

NOTE:
Remove inner snap ring before pressing.

ST 498077000 RETAINER



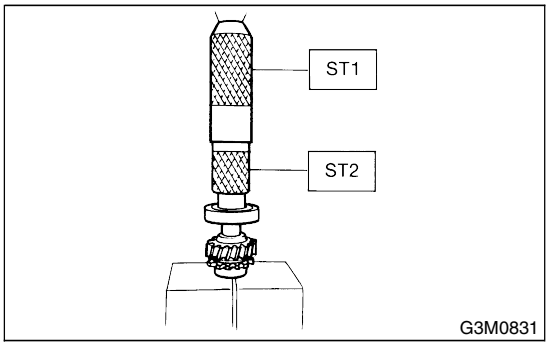
8) Remove oil seal from input shaft holder.

D: ASSEMBLY S503715A02

1) Install ball bearing onto input shaft.

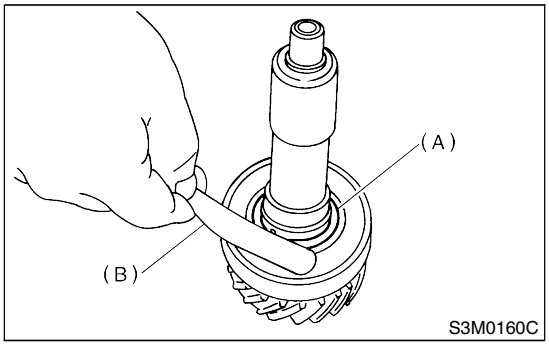
NOTE:
Place snap ring between input shaft gear and ball bearing beforehand. Use the table at 5) as a guide in selecting a suitable snap ring.

ST1 899580100 INSTALLER
ST2 399513600 INSTALLER



2) Install snap ring on input shaft.

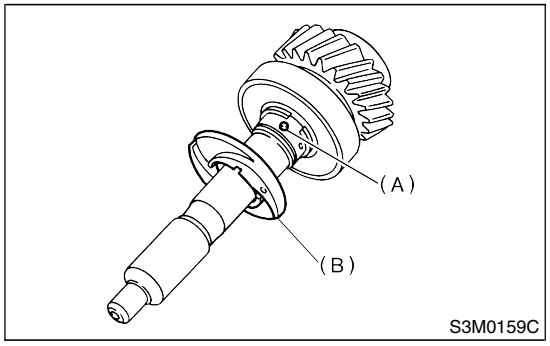
NOTE:
Select a suitable snap ring so that the axial play of ball bearing is held within 0 to 0.12 mm (0 to 0.0047 in).



(A) Snap ring
(B) Thickness gauge

Snap ring	
Part No.	Thickness mm (in)
805028050	2.48 (0.0976)
805028060	2.56 (0.1008)
805028070	2.64 (0.1039)

3) Install straight pin and oil squeeze plate to input shaft.

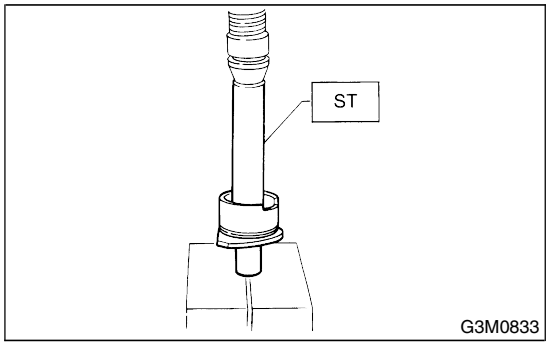


(A) Straight pin
(B) Oil squeeze plate

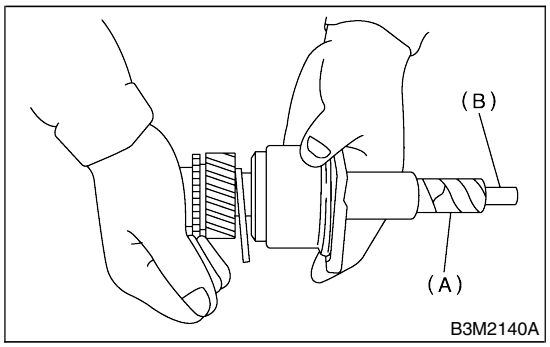
4) Install snap ring.
5) Drive oil seal into input shaft holder.

NOTE:
Apply a coat of grease to sealing lips before installing oil seal.

ST 398507703 DUMMY COLLAR



6) Wind vinyl tape around shaft splines and insert input shaft into holder by lightly tapping it by hand.

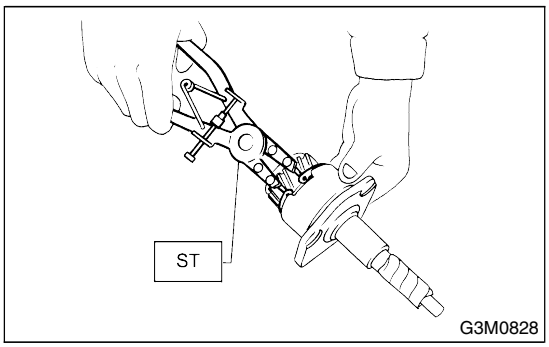


(A) Vinyl tape
(B) Input shaft

7) Install snap ring to input shaft holder.

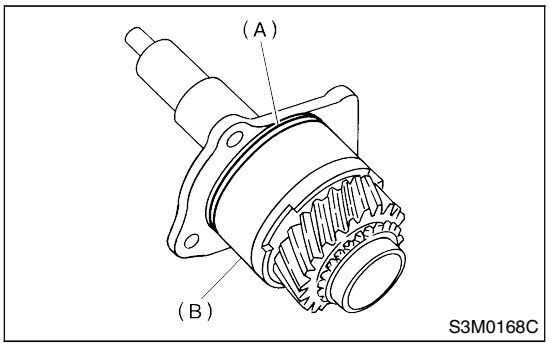
NOTE:
Select a suitable snap ring so that clearance between snap ring and bearing is held within 0 to 0.12 mm (0 to 0.0047 in).

ST 398663600 PLIERS



Snap ring	
Part No.	Thickness mm (in)
805168020	1.84 (0.0724)
805168030	1.92 (0.0756)
805168040	2.00 (0.0787)

8) Install O-ring on input shaft holder.



(A) O-ring
(B) Input shaft holder

E: INSPECTION S503715A10

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.

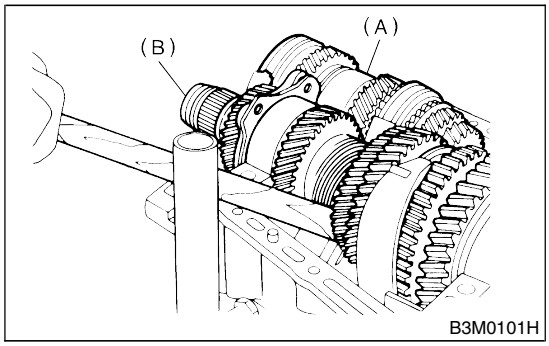
● When the inner wall is abnormally worn.
3) Gears
● Replace gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.
● Correct or replace if the cone that contacts the baulk ring is rough or damaged.
● Correct or replace if the inner surface or end face is damaged.
4) Baulk 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.

19. Drive Pinion Shaft Assembly S503269

A: REMOVAL S503269A18

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
2) Remove transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove transmission case. <Ref. to MT-60 REMOVAL, Transmission Case.>
4) Remove drive pinion shaft assembly.

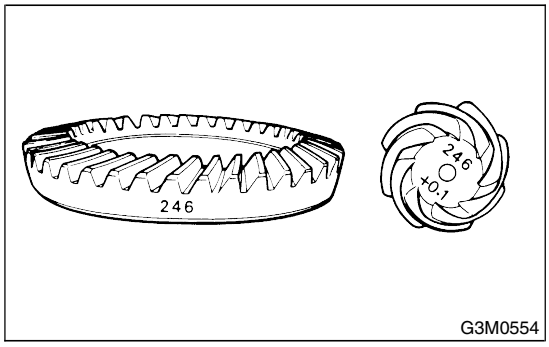
NOTE:
Use a hammer handle, etc. to remove if too tight.



(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.

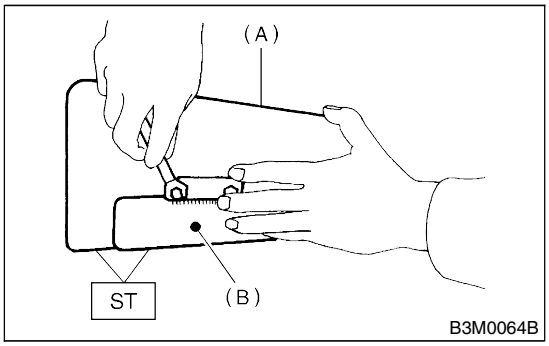


3) Place drive pinion shaft assembly on right hand transmission main case without shim and tighten bearing mounting bolts.

4) Inspection and adjustment of ST

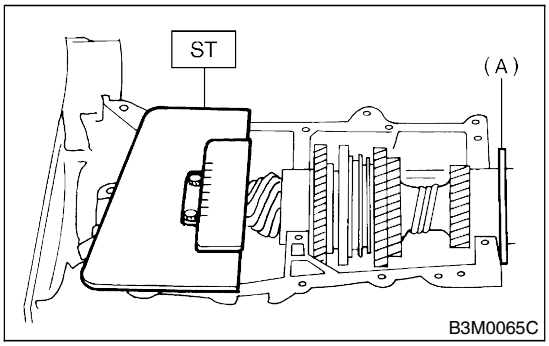
NOTE:
- Loosen the two bolts and adjust so that the scale indicates 0.5 correctly when the plate end and the scale end are on the same level.
- Tighten the two bolts.

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 finger tip and read the value at the point where it matches with the end face of drive pinion.
ST 499917500 DRIVE PINION GAUGE ASSY



(A) Adjust clearance to zero without shim.

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.

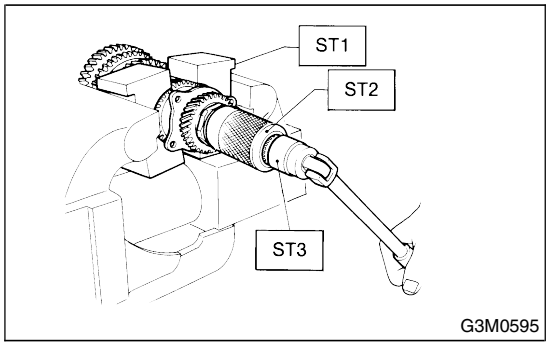
Drive pinion shim	
Part No.	Thickness mm (in)
32295AA031	0.150 (0.0059)
32295AA041	0.175 (0.0069)
32295AA051	0.200 (0.0079)
32295AA061	0.225 (0.0089)
32295AA071	0.250 (0.0098)
32295AA081	0.275 (0.0108)
32295AA091	0.300 (0.0118)
32295AA101	0.500 (0.0197)

9) Install differential assembly. <Ref. to MT-92 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-88 INSPECTION, Drive Shaft Assembly.>
11) Install transmission case. <Ref. to MT-62 INSTALLATION, Transmission Case.>
12) Install transfer case with extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>
13) Install the manual transmission assembly to vehicle. <Ref. to MT-32 INSTALLATION, Manual Transmission Assembly.>

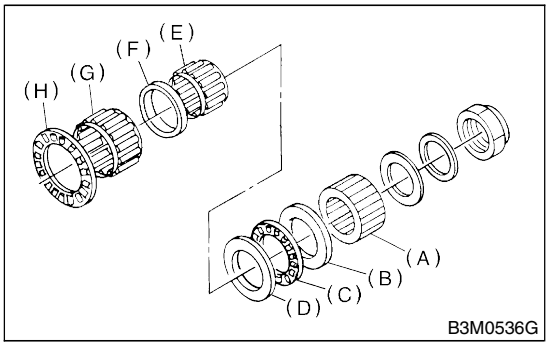
C: DISASSEMBLY S503269A06

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 (27)



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.

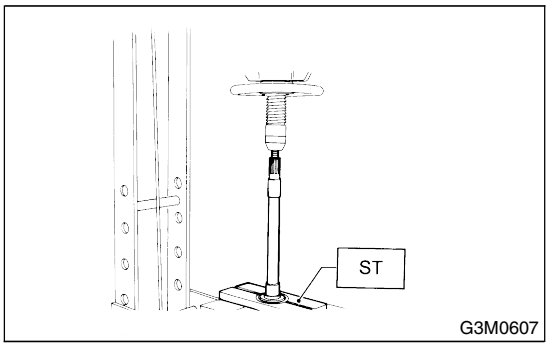


(A) Differential bevel gear sleeve
(B) Washer No. 1 (25 × 37.5 × t)
(C) Thrust bearing (25 × 37.5 × 3)
(D) Washer No. 2 (25 × 37.5 × 4)
(E) Needle bearing (25 × 30 × 20)
(F) Drive pinion collar
(G) Needle bearing (30 × 37 × 23)
(H) Thrust bearing (33 × 50 × 3)

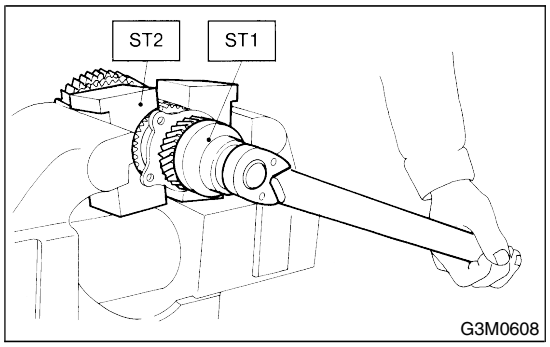
3) Remove roller bearing and washer using ST and press.

CAUTION:
Do not reuse roller bearing.

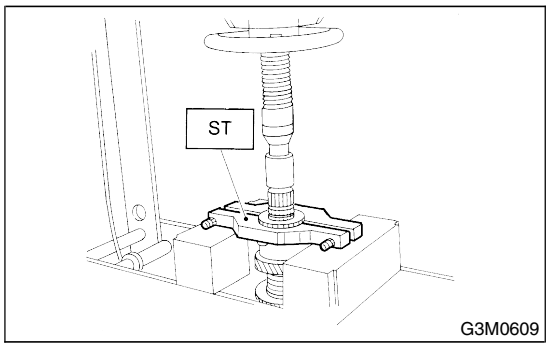
ST 498077000 REMOVER



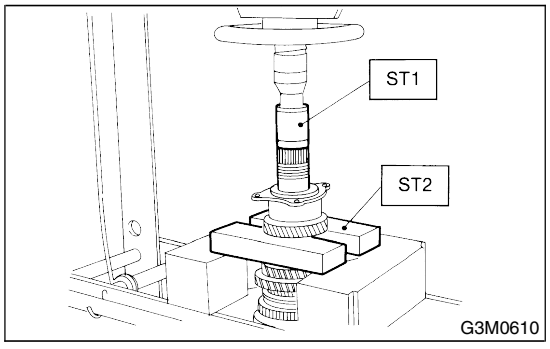
4) Straighten lock nut at staked portion. Remove the lock nut using ST1 and ST2.
ST1 499987300 SOCKET WRENCH (50)
ST2 899884100 HOLDER



5) Remove 5th driven gear using ST.
ST 499857000 5TH DRIVEN GEAR REMOVER

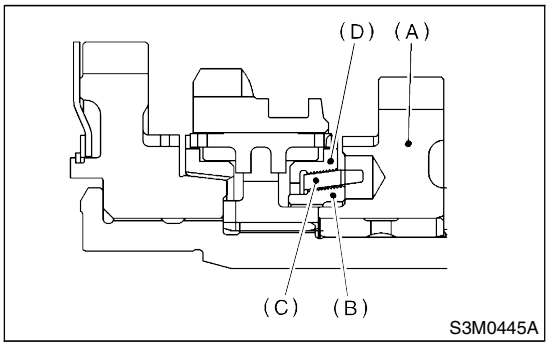


6) Remove woodruff key.
7) Remove roller bearing, 3rd-4th driven gear using ST1 and ST2.
ST1 499757002 INSTALLER
ST2 899714110 REMOVER



8) Remove the key.

9) Remove 2nd driven gear, inner baulk ring, synchro cone and outer baulk ring.

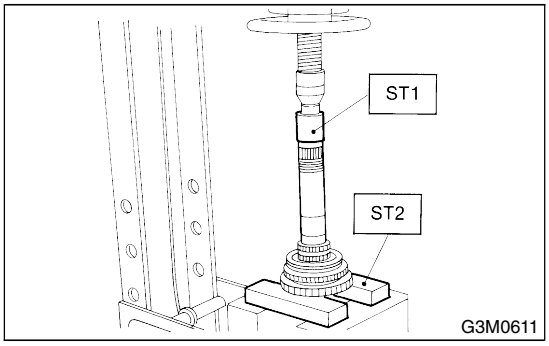


(A) 2nd driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring

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

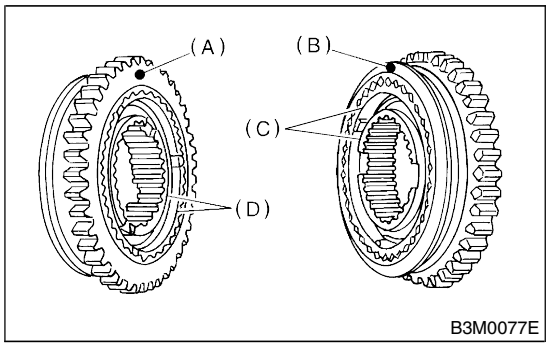


11) Remove sub gear for 1st driven gear.

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

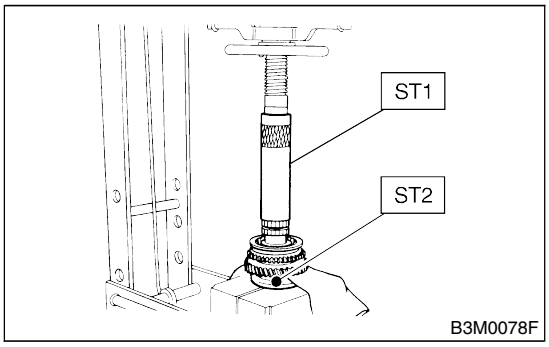
2) Install washer, snap ring and sub gear to 1st driven gear.
3) Install 1st driven gear, 1st baulk ring, gear and hub assembly onto driven shaft.

NOTE:
● Take care to install gear and hub assembly in proper direction.
● Align baulk ring and gear & hub assembly with key groove.

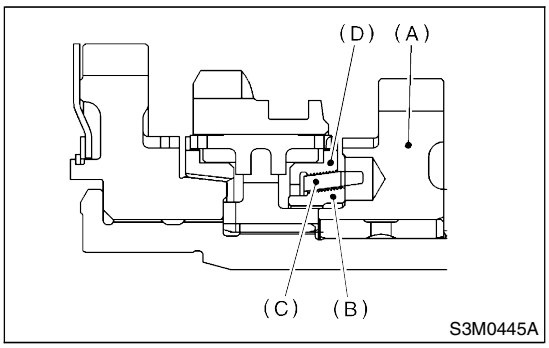
4) Install 2nd driven gear bushing onto driven shaft using ST1, ST2 and press.

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.



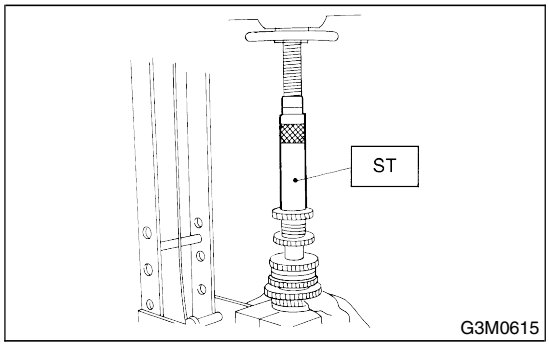
(A) 2nd driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring

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.

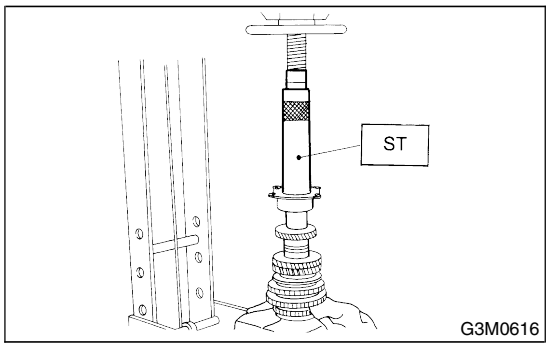
ST 499277200 INSTALLER



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).

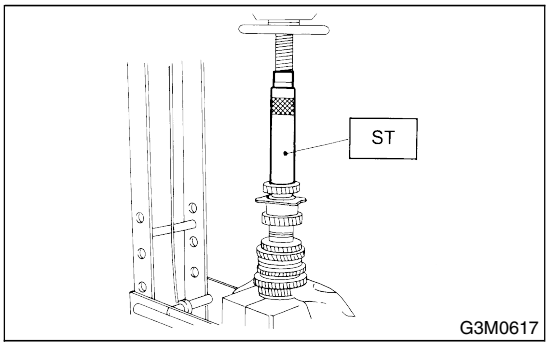
ST 499277200 INSTALLER



8) Position woodruff key in groove on the rear of driven shaft. Install 5th driven gear onto drive shaft using ST and press.

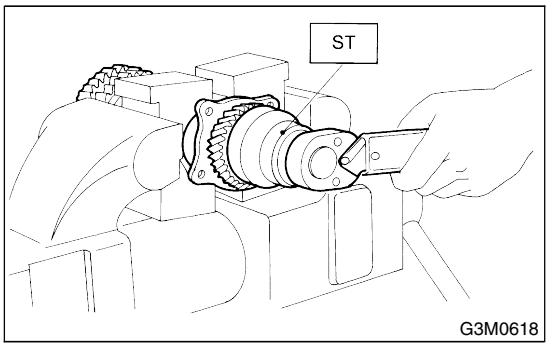
CAUTION:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST 499277200 INSTALLER

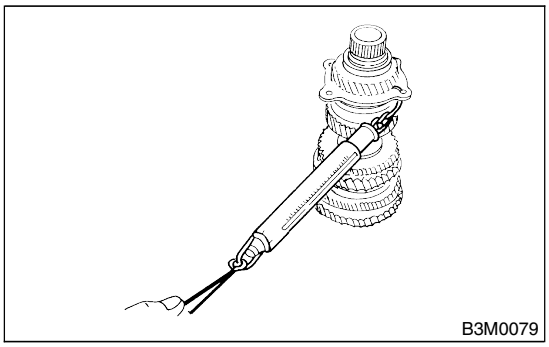


9) Install lock washer. Install lock nut and tighten to the specified torque using ST.
ST 499987300 SOCKET WRENCH (50)

Tightening torque:
265 N·m (27 kgf-m, 195 ft-lb)

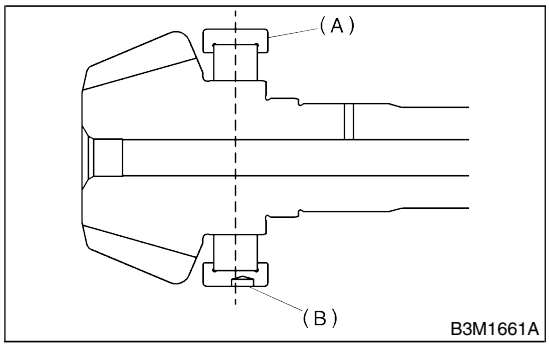


NOTE:
- Stake lock nut at two points.
- Using spring balancer, check that starting torque of roller bearing is 0.1 to 1.5 N (0.01 to 0.15 kgf, 0.02 to 0.33ft).



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.

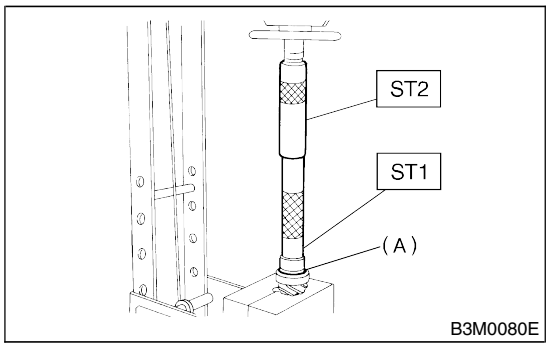


(A) Roller bearing
(B) Knock pin hole

11) Install washer using ST1, ST2 and press.

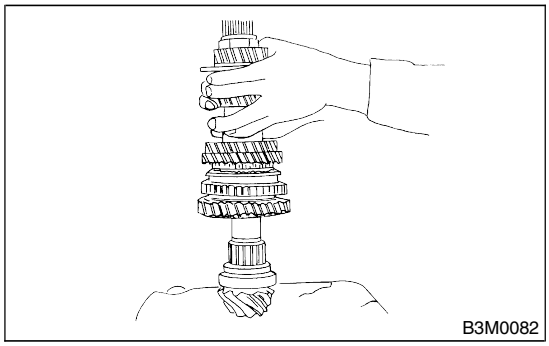
CAUTION:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST1 499277100 BUSH 1-2 INSTALLER
ST2 499277200 INSTALLER



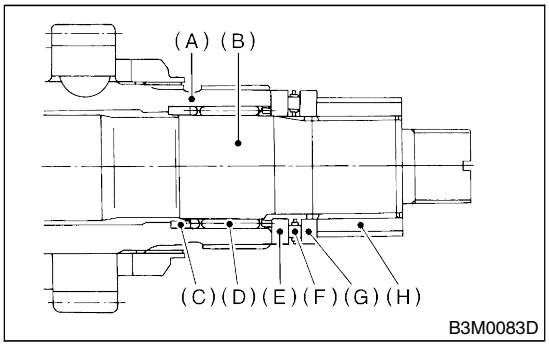
(A) Washer

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 because spacer must be installed in proper direction.

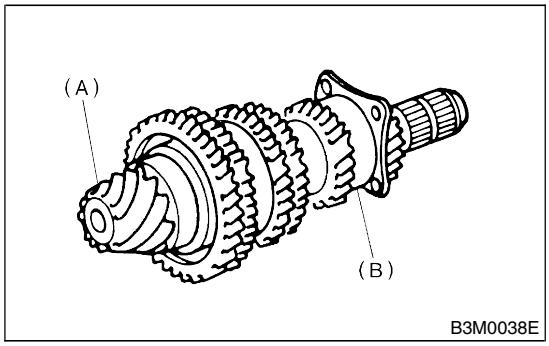


(A) Driven shaft
(B) Drive shaft
(C) Drive pinion collar
(D) Needle bearing (25 × 30 × 20)
(E) Washer No. 2 (25 × 36 × 4)
(F) Thrust bearing (25 × 37.5 × 3)
(G) Washer No. 1 (25 × 36 × t)
(H) Differential bevel gear sleeve

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

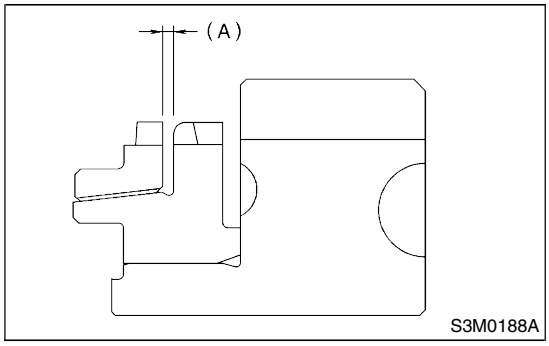
● Replace gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.
● Correct or replace if the cone that contacts the baulk ring is rough or damaged.
● Correct or replace if the inner surface or end face is damaged.

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.

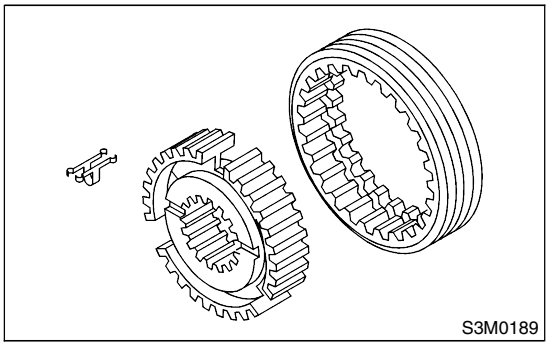
Clearance (A):
0.5 — 1.0 mm (0.020 — 0.040 in)



● 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.

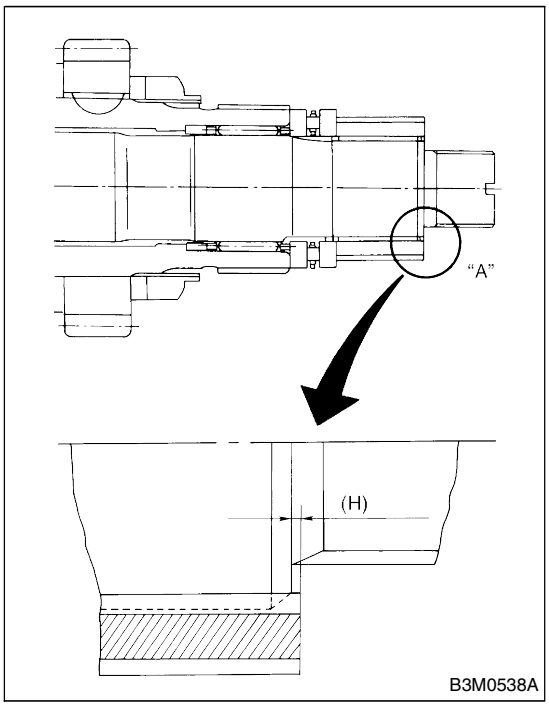
7) O-ring

Replace the O-ring if the sealing face is deformed, hardened, damaged, worn, or defective in any way.

F: ADJUSTMENT S503269A01

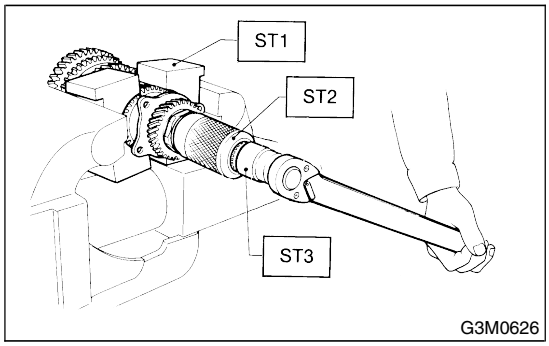
1. THRUST BEARING PRELOAD S503269A0101

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).



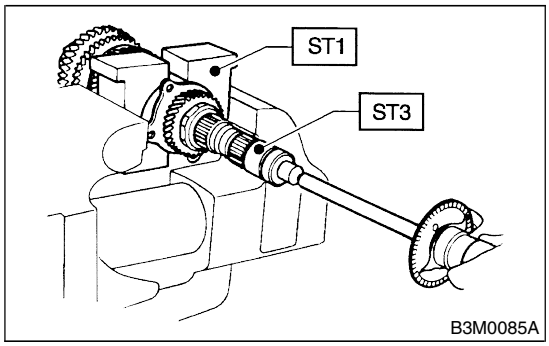
2) Using ST1, ST2 and ST3, tighten lock nut to the specified torque.
ST1 899884100 HOLDER
ST2 498427100 STOPPER
ST3 899988608 SOCKET WRENCH (27)

Tightening torque:
118 N·m (12 kgf-m, 86.8 ft-lb)

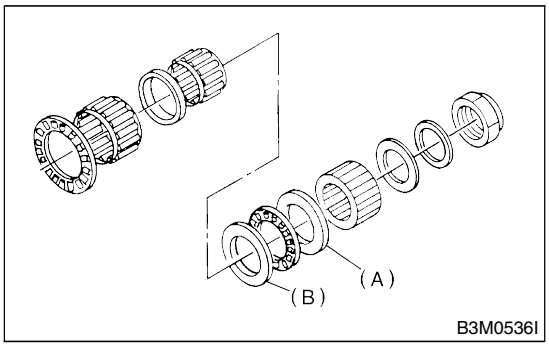


3) After removing ST2, measure starting torque using torque driver.
ST1 899884100 HOLDER
ST3 899988608 SOCKET WRENCH (27)

Starting torque:
0.3–0.8 N·m (0.03–0.08 kgf-m, 0.2–0.6 ft-lb)



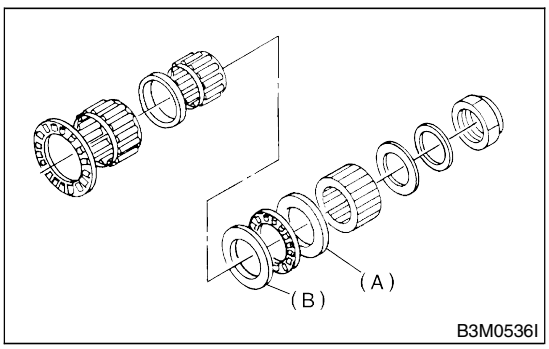
4) If starting torque is not within specified limit, select new adjusting washer No. 1 and recheck starting torque.



(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.



(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.

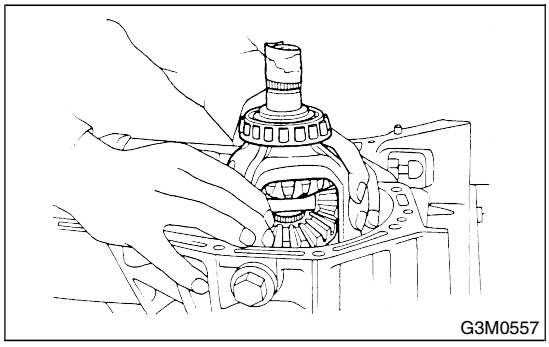
20. Front Differential Assembly

S503152

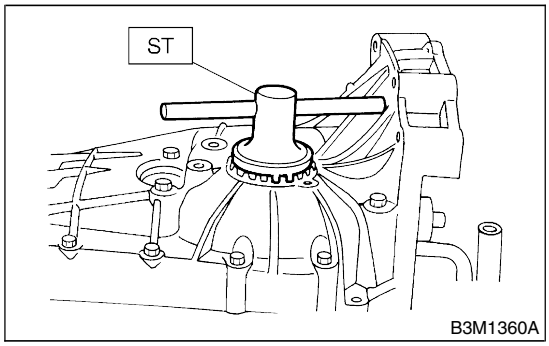
A: REMOVAL S503152A18

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
2) Remove transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove transmission case. <Ref. to MT-60 REMOVAL, Transmission Case.>
4) Removes drive pinion shaft assembly. Remove transfer case with extension case assembly. <Ref. to MT-83 REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove main shaft assembly.
Single-range model:
<Ref. to MT-67 REMOVAL, Main Shaft Assembly for Single-Range.>
Dual-range model:
<Ref. to MT-73 REMOVAL, Main Shaft Assembly for Dual-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



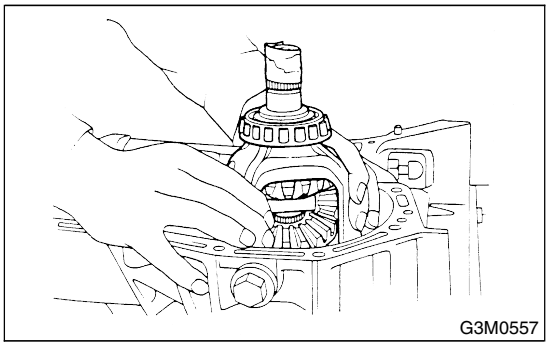
B3M1360A

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

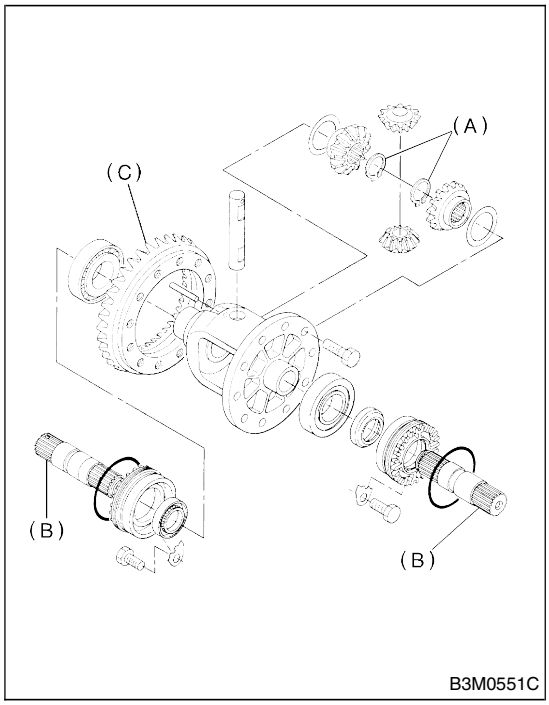
3) Install main shaft assembly.
Single-range model:
<Ref. to MT-67 INSTALLATION, Main Shaft Assembly for Single-Range.>
Dual-range:
<Ref. to MT-73 INSTALLATION, Main Shaft Assembly for Dual-Range.>
4) Install drive pinion assembly. <Ref. to MT-83 INSTALLATION, Drive Pinion Shaft Assembly.>
5) Install transmission case. <Ref. to MT-62 INSTALLATION, Transmission Case.>
6) Install transfer case with extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>
7) Install the manual transmission assembly to vehicle. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY S503152A06

1) Remove right and left snap rings from differential, and then remove two axle drive shafts.

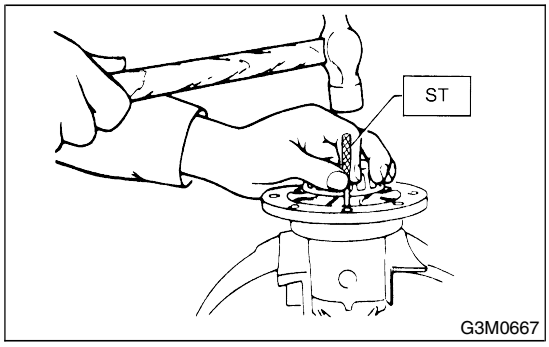
NOTE:
During reassembly, reinstall each axle drive shaft in the same place from which it was removed.

2) Loosen twelve bolts and remove hypoid driven gear.

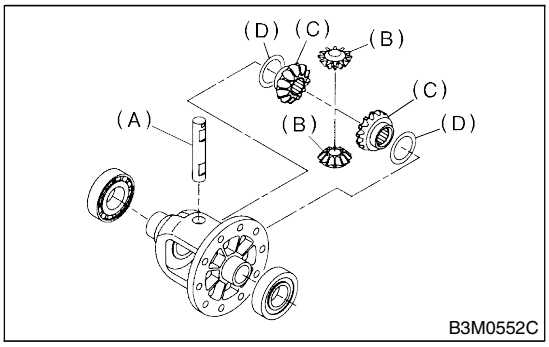


(A) Snap ring
(B) Axle drive shaft
(C) Hypoid driven gear

3) Drive out straight pin from differential assembly toward hypoid driven gear.
ST 899904100 REMOVER

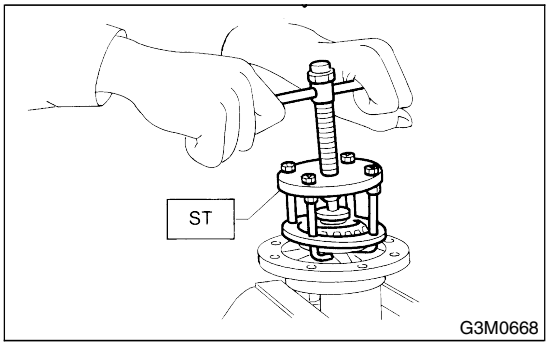


4) Pull out pinion shaft, and remove differential bevel pinion and gear and washer.



(A) Pinion shaft
(B) Bevel pinion
(C) Bevel gear
(D) Washer

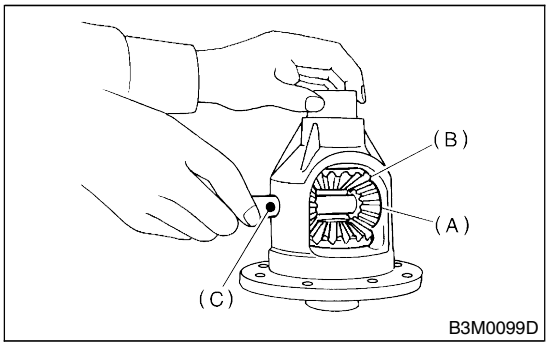
5) Remove roller bearing using ST.
ST 399527700 PULLER SET



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.



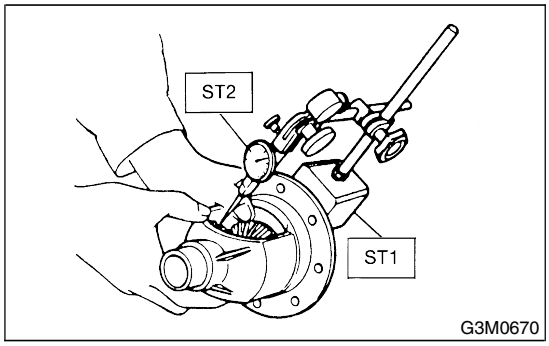
(A) Bevel pinion
(B) Bevel gear
(C) Pinion shaft

2) Measure backlash between bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust it. <Ref. to MT-96 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

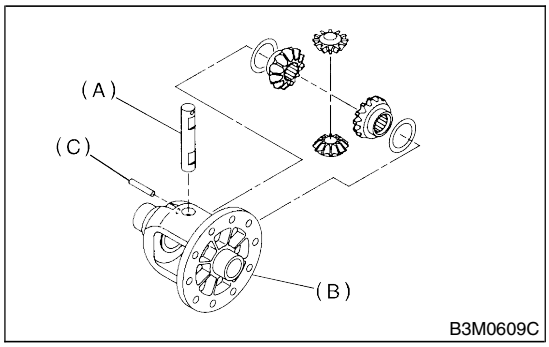
Standard backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



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



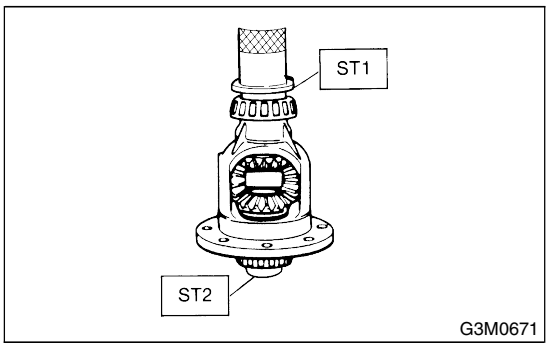
(A) Pinion shaft
(B) Differential case
(C) Straight pin

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).

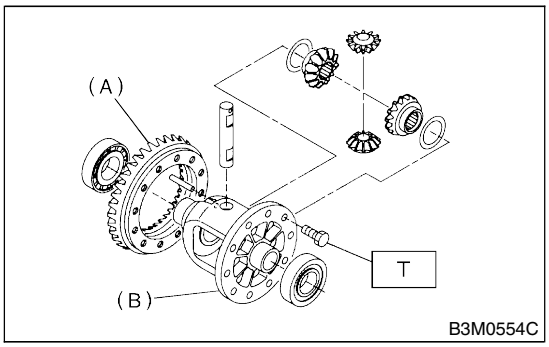
NOTE:
Be careful because roller bearing outer races are used as a set.

ST1 499277100 BUSH 1-2 INSTALLER
ST2 398497701 ADAPTER



5) Install hypoid driven gear to differential case using twelve bolts.

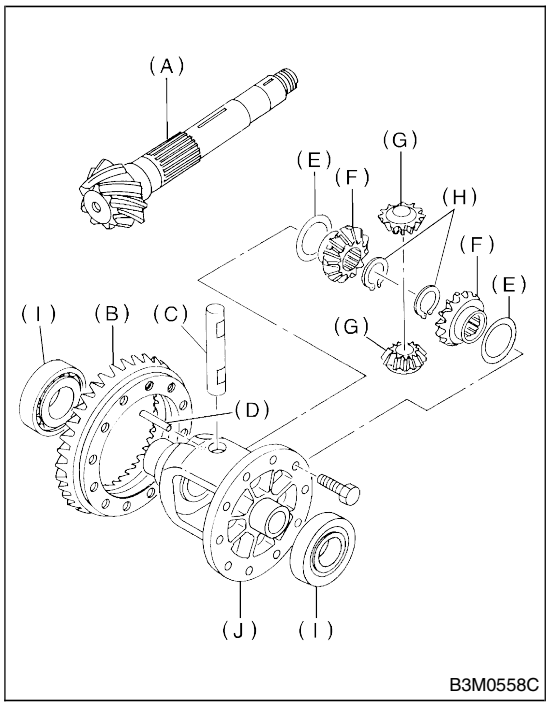
Tightening torque:
T: 62 N·m (6.3 kgf-m, 45.6 ft-lb)



(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

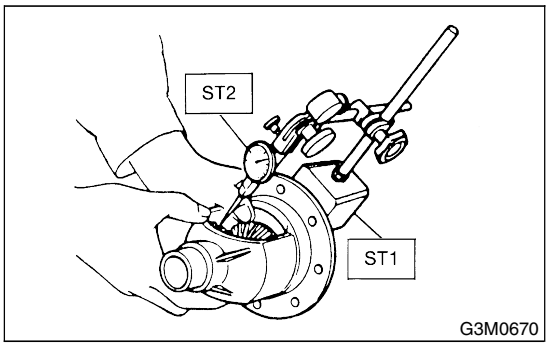
S503152A1001

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)

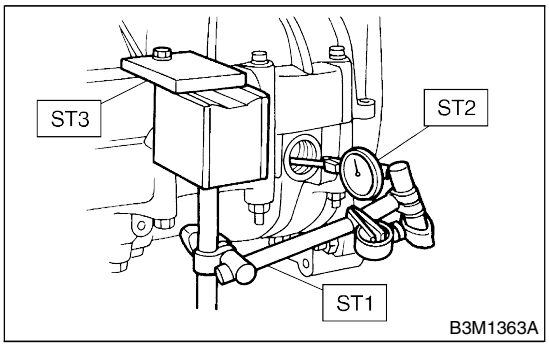


2. HYPOID GEAR BACKLASH

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)



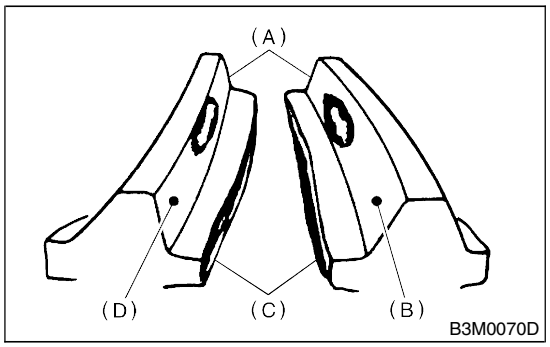
NOTE:
If backlash is outside specified range, adjust it by turning holder in right side case.

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-96 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-92 REMOVAL, Front Differential Assembly.>
2) Select a different washer from the table and install.

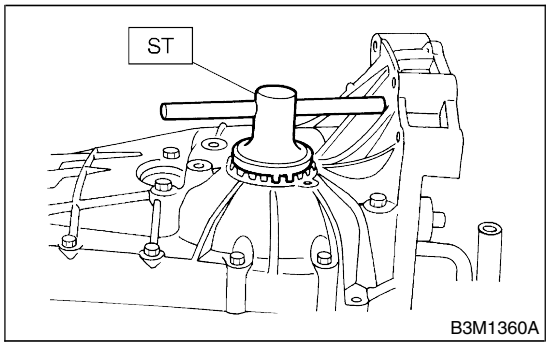
Washer	
Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)
803038022	0.975 — 1.000 (0.0384 — 0.0394)
803038023	1.025 — 1.050 (0.0404 — 0.0413)

3) Adjust until the specified value is obtained.

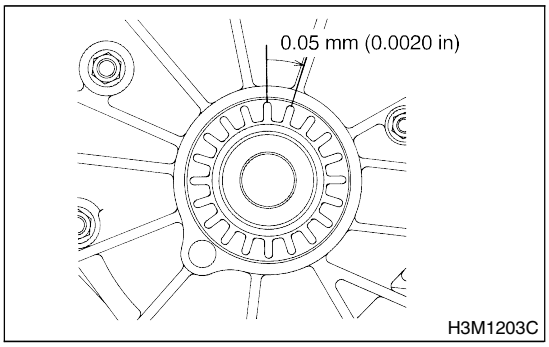
Standard backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)

2. HYPOID GEAR BACKLASH S503152A0102

Adjust backlash by turning holder in right side case.
ST 499787000 WRENCH ASSY



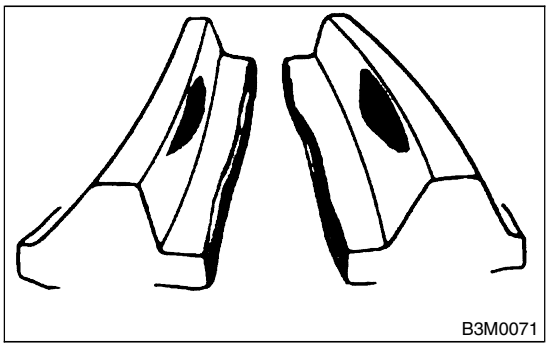
NOTE:
Each time holder rotates one tooth, backlash changes by 0.05 mm (0.020 in).



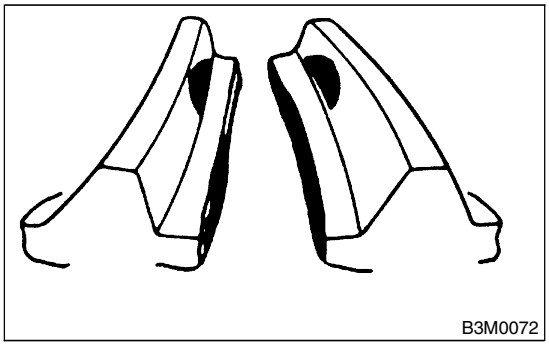
3. TOOTH CONTACT OF HYPOID GEAR

S503152A0103

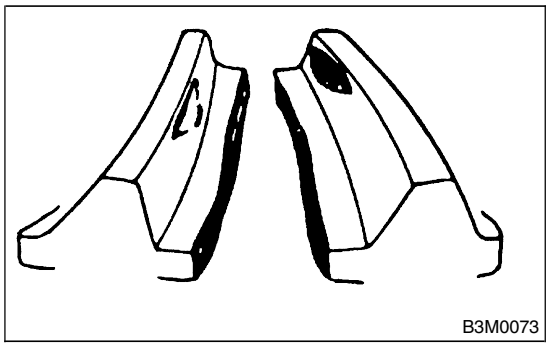
Adjust until the teeth contact is correct.
● Backlash is excessive.
To reduce backlash, loosen holder on the upper side (case right side) and turn in the holder on the lower side (case left side) by the same amount.



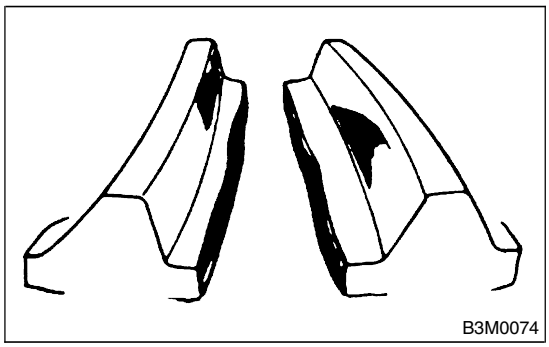
● Backlash is insufficient.
To increase backlash, loosen holder on the lower side (case left side) and turn in the holder on the upper side (case right side) by the same amount.



● The drive pinion shim selected before is too thick.
Reduce its thickness.



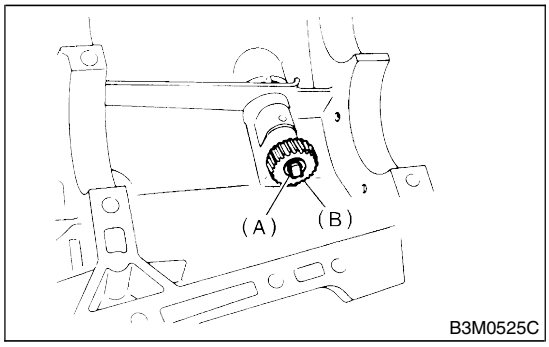
● The drive pinion shim selected before is too thin.
Increase its thickness.



21. Speedometer Gear S503268

A: REMOVAL S503268A18

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
2) Remove back-up light switch and neutral position switch. <Ref. to MT-42 REMOVAL, Switches and Harness.>
3) Remove transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove transmission case. <Ref. to MT-60 REMOVAL, Transmission Case.>
5) Remove vehicle speed sensor. <Ref. to MT-44 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

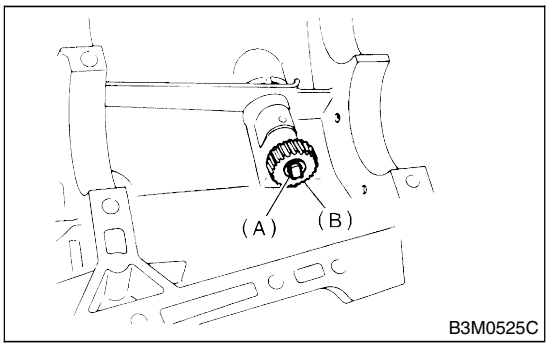
B: INSTALLATION S503268A11

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-44 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-62 INSTALLATION, Transmission Case.>
5) Install transfer case with extension case assembly.<Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>
6) Install back-up light switch and neutral position switch. <Ref. to MT-43 INSTALLATION, Switches and Harness.>
7) Install the manual transmission assembly to vehicle. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

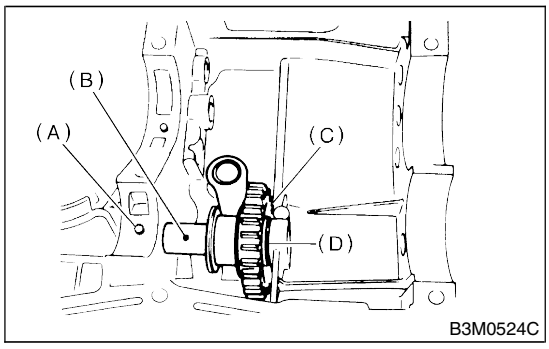
C: INSPECTION S503268A10

Check the speedometer gear, oil seal and speedometer shaft for damage. Replace if damaged.

22. Reverse Idler Gear S503263

A: REMOVAL S503263A18

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
2) Remove back-up light switch and neutral position switch. <Ref. to MT-42 REMOVAL, Switches and Harness.>
3) Remove transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove transmission case. <Ref. to MT-83 REMOVAL, Transmission Case.>
5) Remove drive pinion shaft assembly. <Ref. to MT-83 REMOVAL, Drive Pinion Shaft Assembly.>
6) Remove main shaft assembly.
Single-range model:
<Ref. to MT-67 REMOVAL, Main Shaft Assembly for Single-Range.>
Dual-range model:
<Ref. to MT-73 REMOVAL, Main Shaft Assembly for Dual-Range.>
7) Remove differential assembly. <Ref. to MT-92 REMOVAL, Front Differential Assembly.>
8) Remove shifter forks and rods. <Ref. to MT-101 REMOVAL, Shifter Fork and Rod.>
9) Pull out straight pin, and remove idler gear shaft, reverse idler gear and washer.



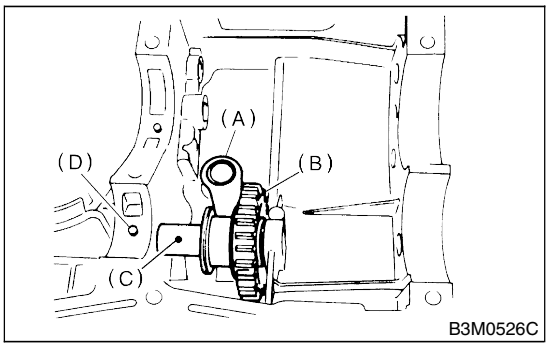
(A) Straight pin
(B) Idler gear shaft
(C) Idler gear
(D) Washer

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.



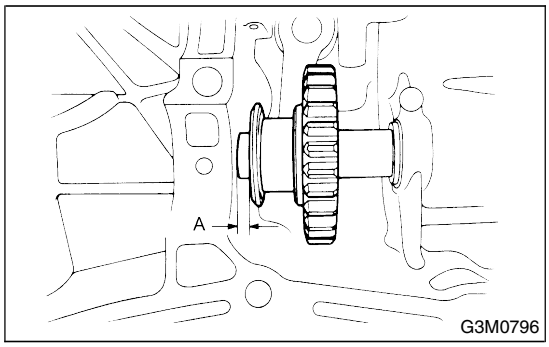
(A) Reverse shifter lever
(B) Reverse idler gear
(C) Reverse idler gear shaft
(D) Straight pin

2) Inspect and adjust clearance between reverse idler gear and transmission case wall. <Ref. to MT-99 INSTALLATION, Reverse Idler Gear.> and <Ref. to MT-100 ADJUSTMENT, Reverse Idler Gear.>
3) Install shifter forks and rods. <Ref. to MT-101 INSTALLATION, Shifter Fork and Rod.>
4) Install differential assembly. <Ref. to MT-92 INSTALLATION, Front Differential Assembly.>
5) Install main shaft assembly.
Single-range model:
<Ref. to MT-67 INSTALLATION, Main Shaft Assembly for Single-Range.>
Dual-range:
<Ref. to MT-73 INSTALLATION, Main Shaft Assembly for Dual-Range.>
6) Install drive pinion shaft assembly. <Ref. to MT-83 INSTALLATION, Drive Pinon Shaft Assembly.>
7) Install transmission case. <Ref. to MT-62 INSTALLATION, Transmission Case.>
8) Install transfer case with extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>
9) Install back-up light switch and neutral position switch. <Ref. to MT-43 INSTALLATION, Switches and Harness.>
10) Install the manual transmission assembly to vehicle. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION S503263A10

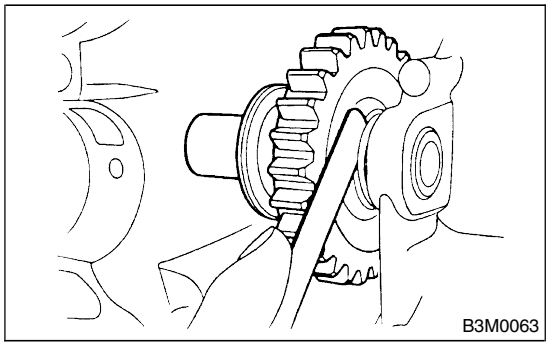
1) Move the reverse shifter rod toward the reverse side. Inspect clearance between reverse idler gear and transmission case wall.
If out of specification, select the appropriate reverse shifter lever and adjust.

Clearance A:
6.0 — 7.5 mm (0.236 — 0.295 in)



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)

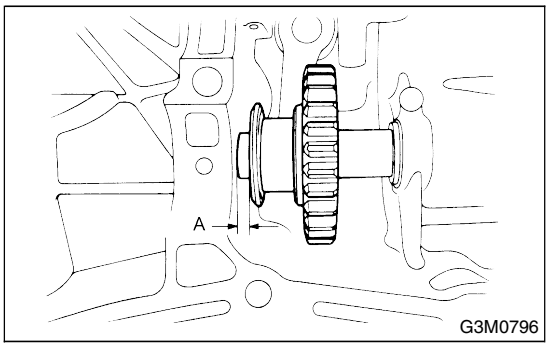


3) Check the reverse idler gear and shaft for damage. Replace if damaged.

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.

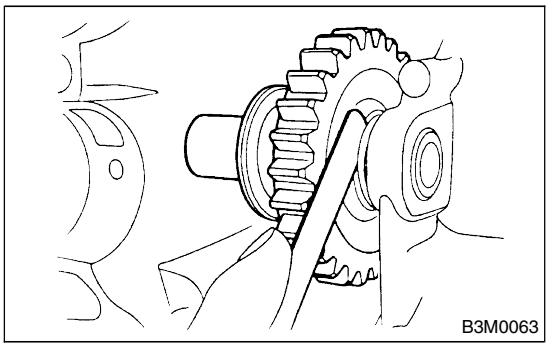
Clearance A:
6.0 — 7.5 mm (0.236 — 0.295 in)



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)

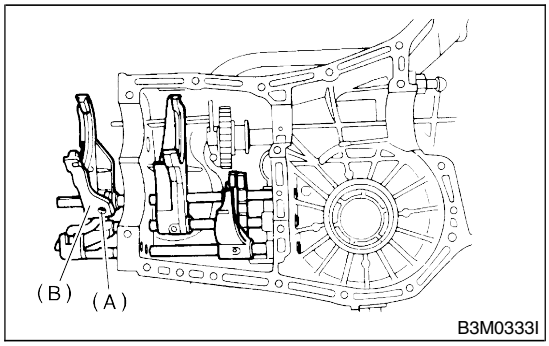


Washer	
Part No.	Thickness mm (in)
803020151	0.4 (0.016)
803020152	1.1 (0.043)
803020153	1.5 (0.059)
803020154	1.9 (0.075)
803020155	2.3 (0.091)

23. Shifter Fork and Rod S503255

A: REMOVAL S503255A18

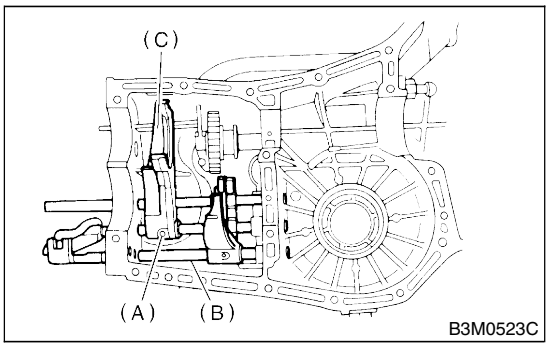
1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
2) Remove back-up light switch and neutral position switch. <Ref. to MT-42 REMOVAL, Switches and Harness.>
3) Remove transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove transmission case. <Ref. to MT-60 REMOVAL, Transmission Case.>
5) Removes drive pinion shaft assembly. <Ref. to MT-83 REMOVAL, Drive Pinon Shaft Assembly.>
6) Remove main shaft assembly.
Single-range model:
<Ref. to MT-67 REMOVAL, Main Shaft Assembly for Single-Range.>
Dual-range model:
<Ref. to MT-73 REMOVAL, Main Shaft Assembly for Dual-Range.>
7) Remove differential assembly. <Ref. to MT-92 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.

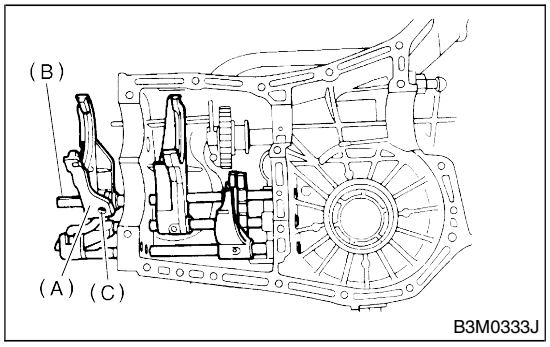
CAUTION:
Replace straight pin with a new one.

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.

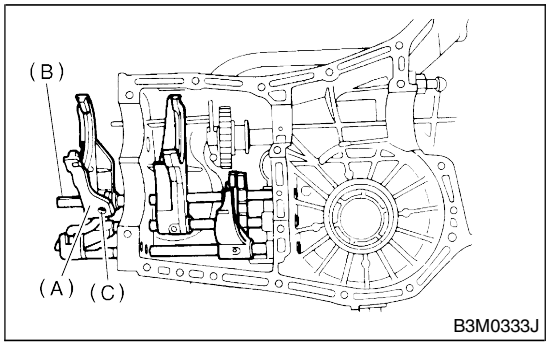
ST 398791700 STRAIGHT PIN REMOVER



(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.

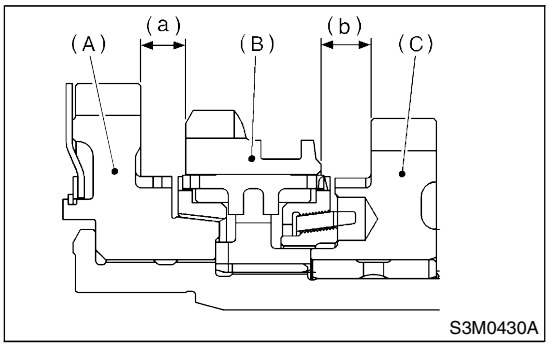


10) Install differential assembly. <Ref. to MT-92 INSTALLATION, Front Differential Assembly.>
11) Install main shaft assembly.
12) Install drive pinion shaft assembly. <Ref. to MT-83 INSTALLATION, Drive Pinon Shaft Assembly.>
13) Install transmission case. <Ref. to MT-62 INSTALLATION, Transmission Case.>
14) Install transfer case with extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>
15) Install back-up light switch and neutral position switch. <Ref. to MT-43 INSTALLATION, Switches and Harness.>
16) Install the manual transmission assembly to vehicle. <Ref. to MT-35 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)

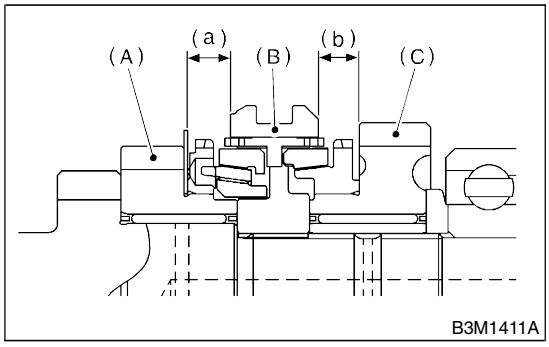


(A) 1st driven gear
(B) Reverse driven gear
(C) 2nd driven gear

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)

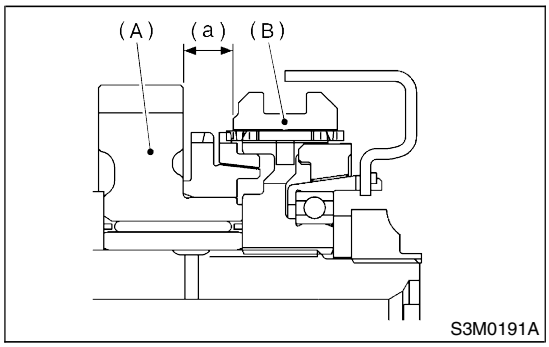


(A) 3rd drive gear
(B) Coupling sleeve
(C) 4th drive gear

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

Non-turbo model

5th shifter fork		
Part No.	Mark	Remarks
32812AA201	4	Approach to 5th gear by 0.2 mm (0.008 in).
32812AA211	5	Standard
32812AA221	6	Become distant from 5th gear by 0.2 mm (0.008 in).

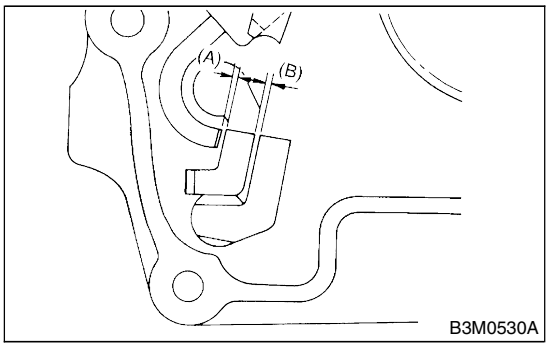
Turbo model

5th shifter fork		
Part No.	Mark	Remarks
32812AA231	7	Approach to 5th gear by 0.2 mm (0.008 in).
32812AA241	—	Standard
32812AA251	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)

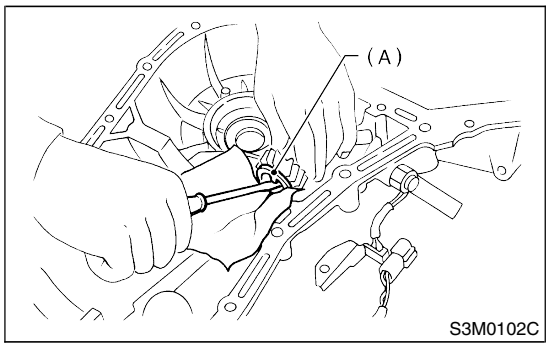
Clearance (B):
3rd — 4th to 5th:
0.5 — 1.3 mm(0.020 — 0.051 in)



24. Counter Gear S503716

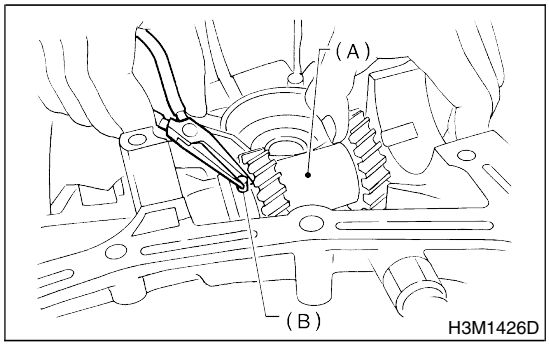
A: REMOVAL S503716A18

1) Remove the manual transmission assembly from the vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove transmission case. <Ref. to MT-60 REMOVAL, Transmission Case.>
4) Move counter gear shaft until it touches transmission case, and remove snap ring with a suitable tool.



(A) Snap ring

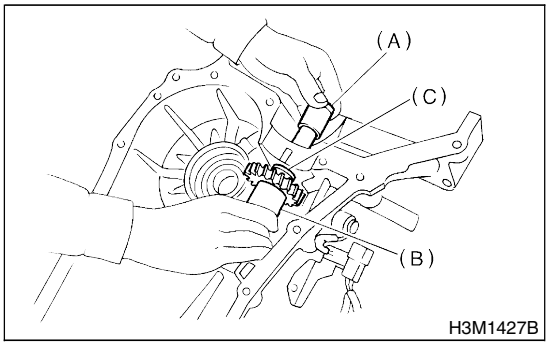
5) Slide washer at rear of high-low counter shaft, and remove straight pin from counter shaft.



(A) Counter gear
(B) Straight pin

6) Remove counter shaft from transmission case, taking care not to drop counter gear and the two washers.

CAUTION:
- **Be careful not to damage O-ring.**
- **Be careful not to drop straight pin on front side.**
- **Be careful not to drop two needle bearings and collar contained in counter gear.**



(A) Counter shaft
(B) Counter gear
(C) Washers

B: INSTALLATION S503716A11

1) Install O-ring and straight pin onto counter gear shaft.
2) Install the following parts in main case (Right-side), and push the shaft perfectly into case.
- Counter gear shaft
- Two counter gear washers
- Two needle bearings
- Counter gear collar
- Counter gear
- Straight pin
- Snap ring

3) Install the transmission case. <Ref. to MT-62 INSTALLATION, Transmission Case.>
4) Install the transfer case with extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>
5) Install the manual transmission assembly on vehicle. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

NOTE:
- Make sure that cut-out end surface of counter gear shaft does not protrude above the end surface of the case.
- Position the cut-out portion of counter gear shaft as shown in the figure.

C: INSPECTION S503716A10

1) After installing snap ring, measure clearance between snap ring and counter washer.

Clearance:
0.05 — 0.35 mm (0.0020 — 0.0138 in)

2) If the clearance is out of measured value, select a snap ring and install to put clearance within measured value. <Ref. to MT-104 ADJUSTMENT, Counter Gear.>

D: ADJUSTMENT S503716A01

Selection of snap ring
If the measurement is not with in the specification, select suitable snap ring.

Snap ring	
Part No.	Thickness mm (in)
031319000	1.50 (0.0591)
805019010	1.72 (0.0677)

25. 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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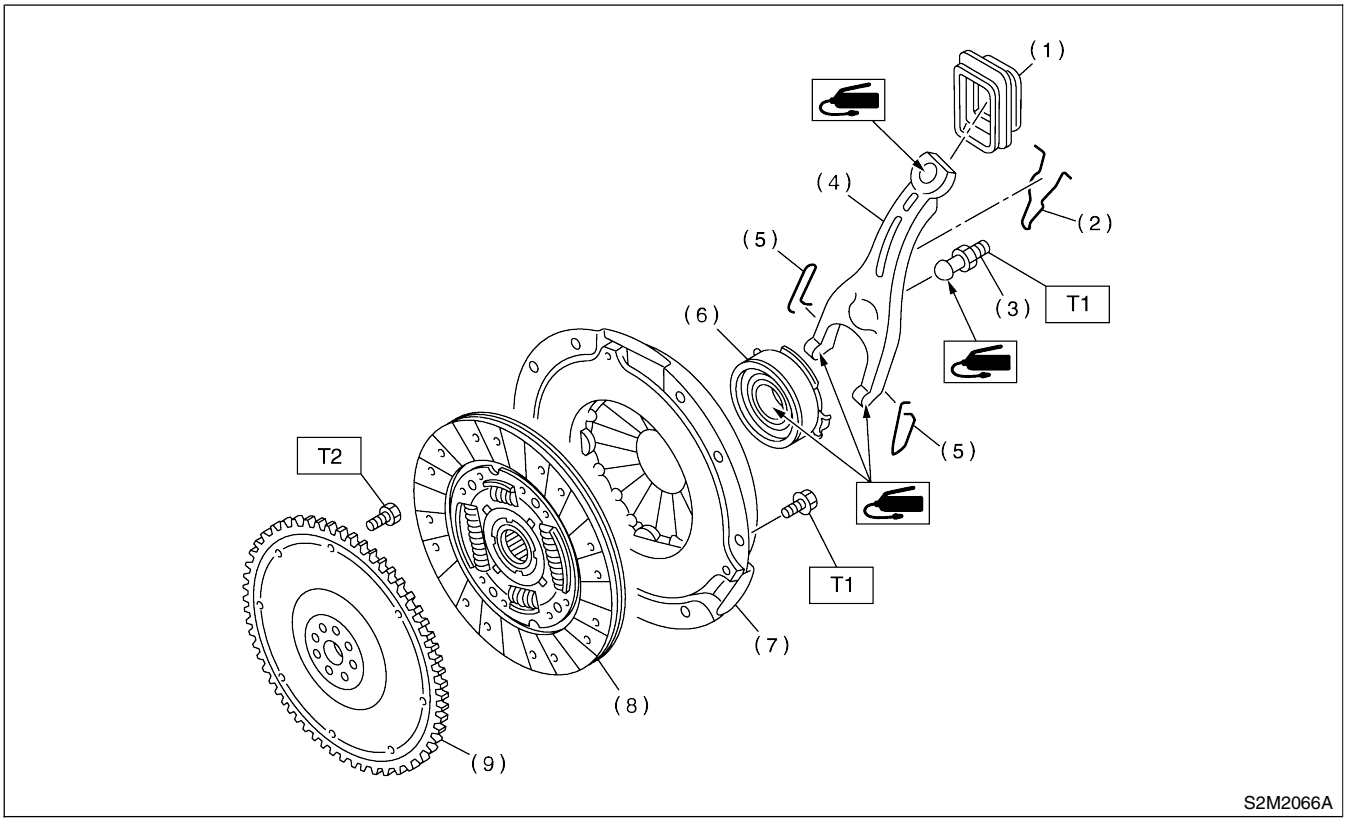
1. General Description S504001

A: SPECIFICATIONS S504001E49

Model				Non-turbo	Turbo
Clutch cover	Type			Push type	Pull type
	Diaphragm set load		kg (lb)	580 (1,279)	700 (1,544)
Clutch disc	Facing material			Woven (Non asbestos)	
	O.D. × I.D. × thickness		mm (in)	225 × 150 × 3.5 (8.86 × 5.91 × 0.138)	230 × 150 × 3.5 (9.06 × 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	1.7
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)	13.3 — 14.7 (0.524 — 0.579)

B: COMPONENT S504001A05

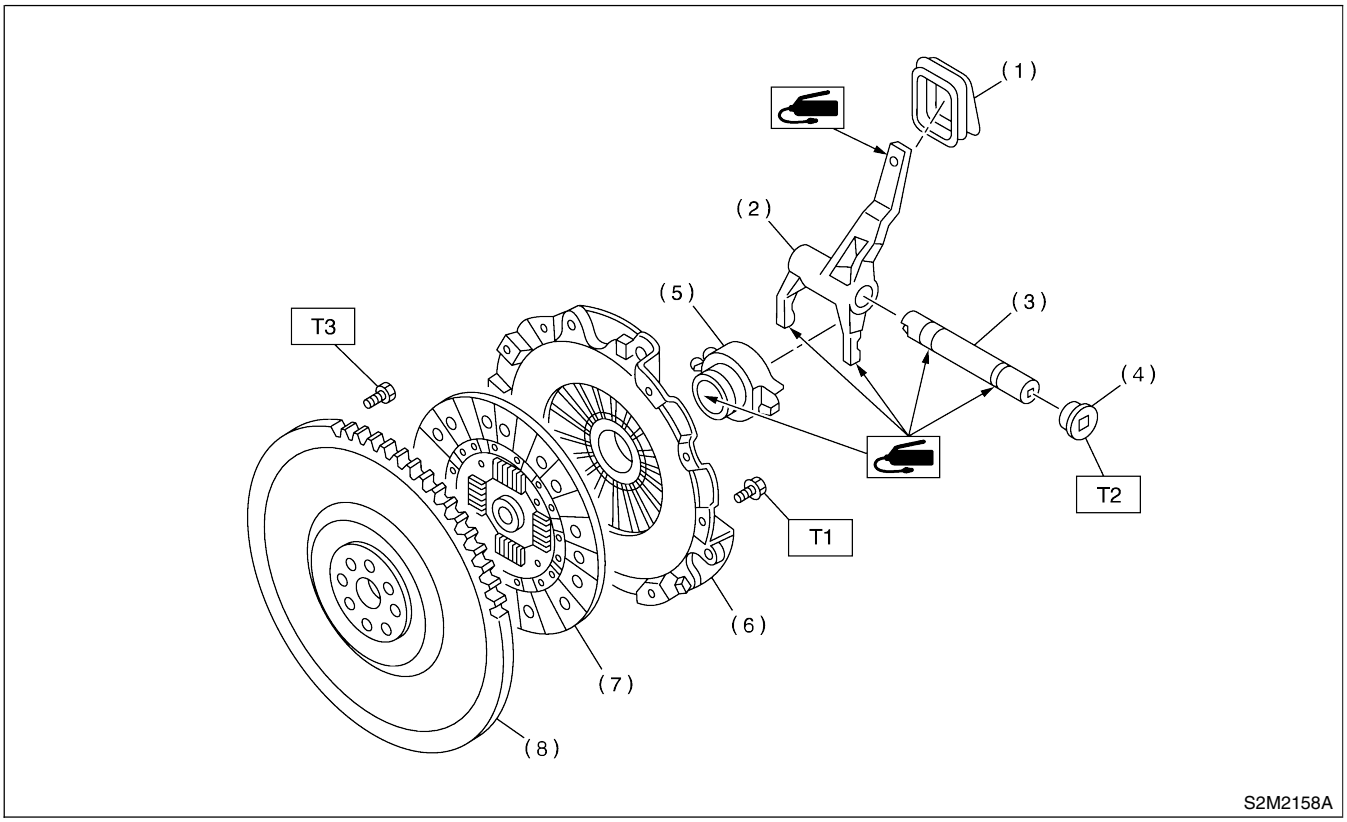
1. CLUTCH ASSEMBLY FOR NON-TURBO MODEL S504001A0504



(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 ASSEMBLY FOR TURBO MODEL S504001A0505

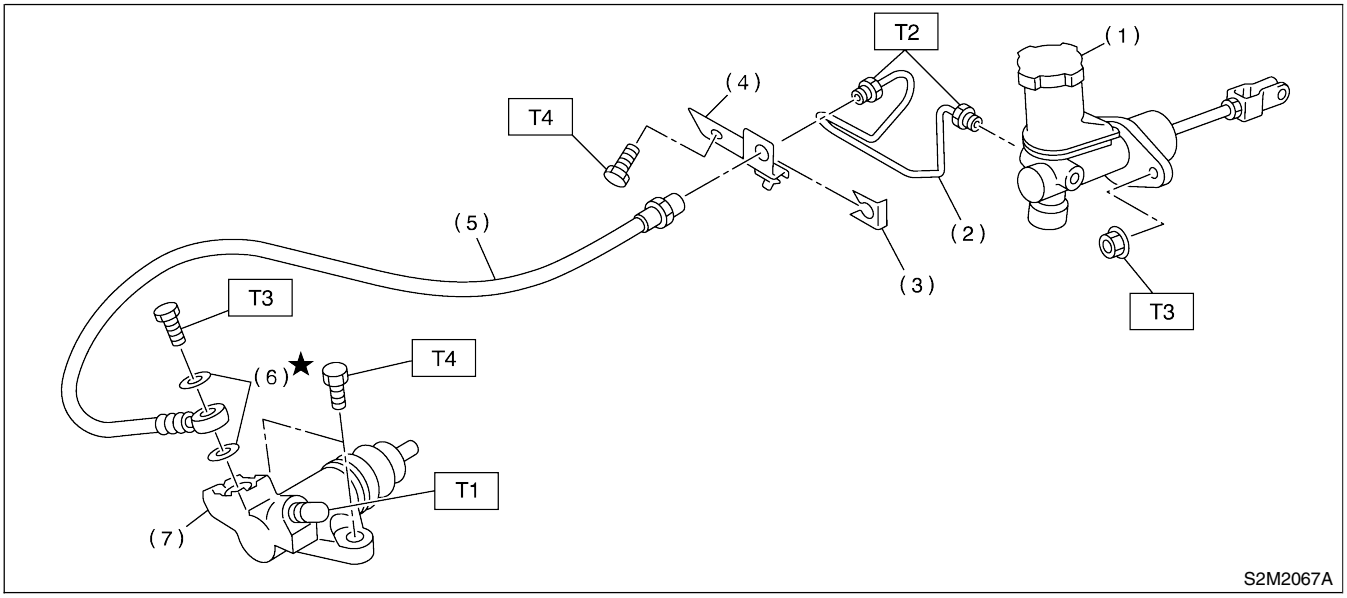


(1) Clutch release lever sealing
(2) Clutch release lever
(3) Clutch release lever shaft
(4) Plug
(5) Clutch release bearing
(6) Clutch cover
(7) Clutch disc
(8) Flywheel

Tightening torque: N·m (kgf-m, ft-lb)
T1: 15.7 (1.6, 11.6)
T2: 44 (4.5, 32.5)
T3: 72 (7.3, 52.8)

3. CLUTCH PIPE AND HOSE FOR NON-TURBO MODEL S504001A0506

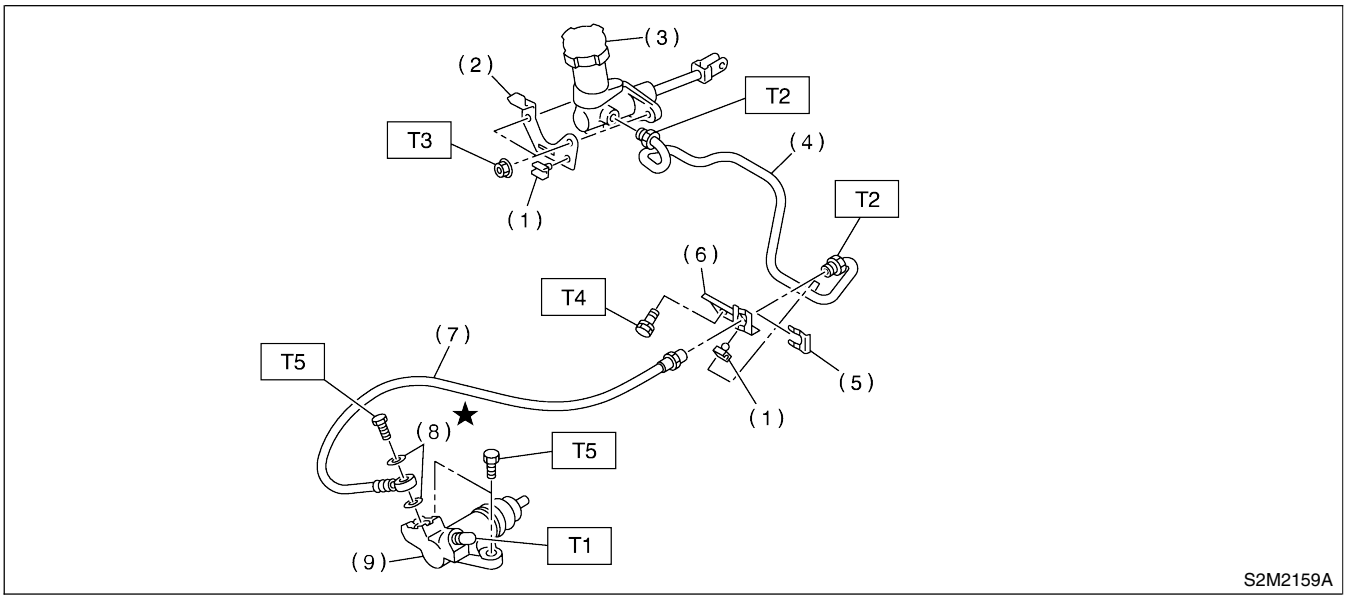
● LHD Model S504001A050601



(1) Operating cylinder
(2) Washer
(3) Clutch hose
(4) Bracket
(5) Clip
(6) Clutch pipe
(7) Master cylinder ASSY
(8) Clevis pin
(9) Snap pin
(10) Spacer

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)

● RHD Model S504001A050602

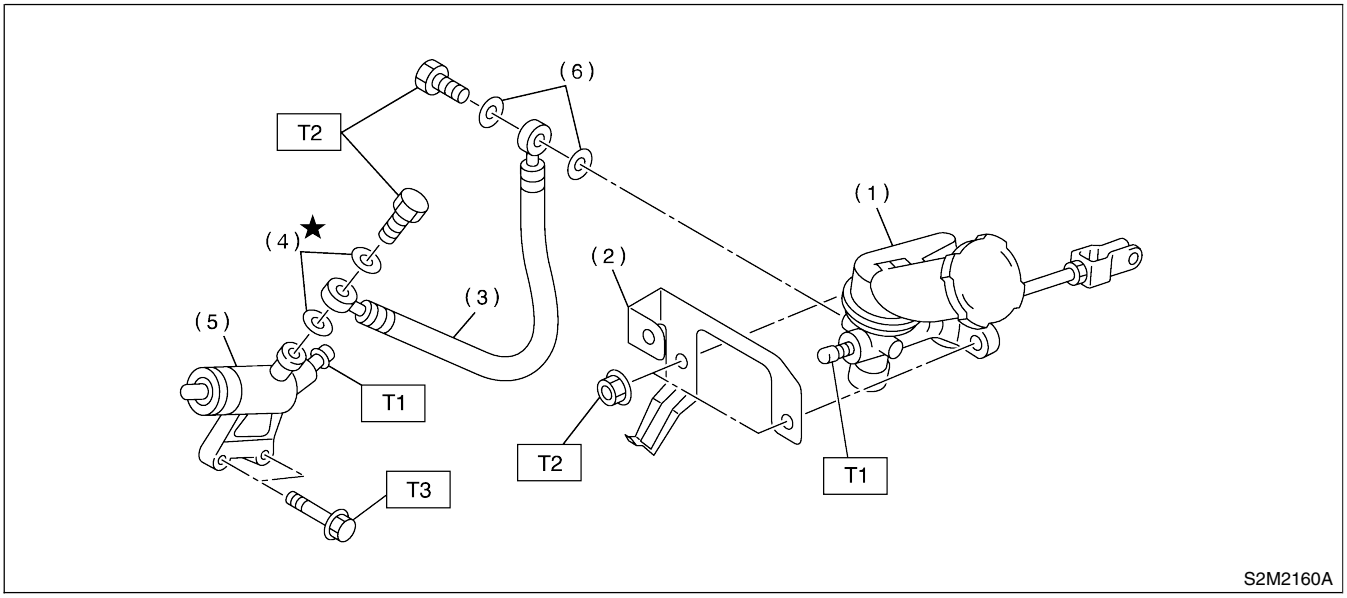


(1) Clamp A
(2) Bracket A
(3) Master cylinder ASSY
(4) Clutch pipe
(5) Clamp B
(6) Bracket B
(7) Clutch hose
(8) Washer
(9) Operating cylinder

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: 25 (2.5, 18.1)
T5: 37 (3.8, 27.5)

4. CLUTCH PIPE AND HOSE FOR TURBO MODEL S504001A0507

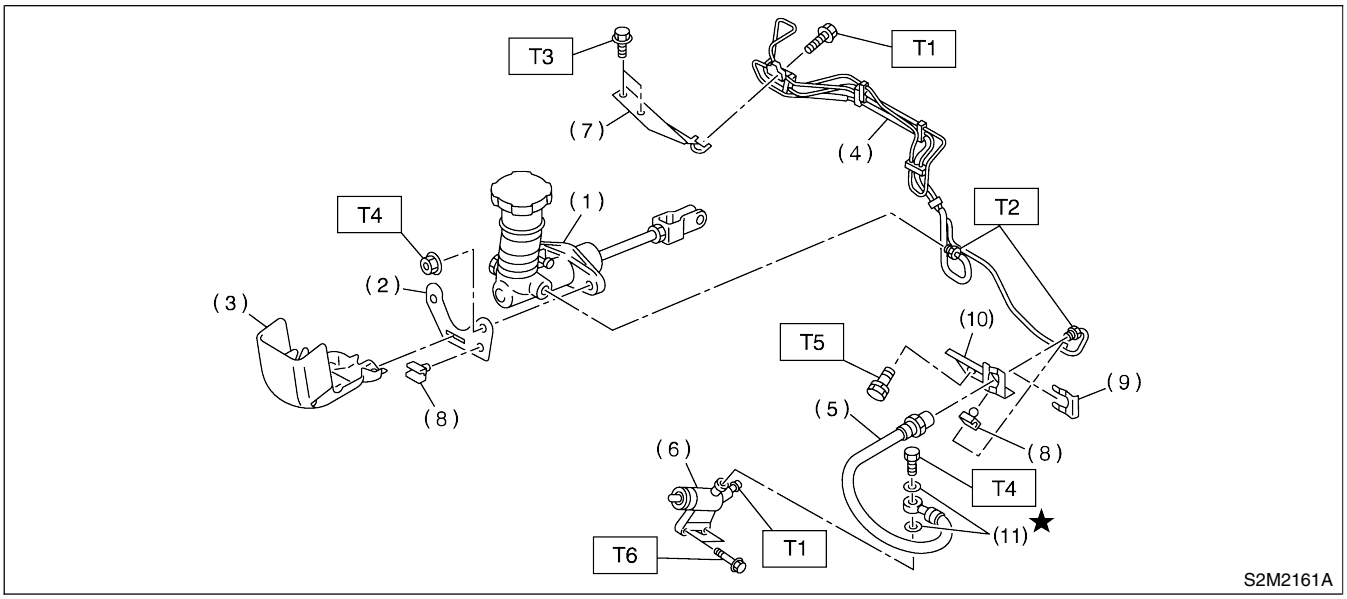
● LHD Model S504001A050701



(1) Master cylinder ASSY
(2) Bracket
(3) Clutch hose
(4) Washer
(5) Operating cylinder

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.0)
T3: 37 (3.8, 27.5)

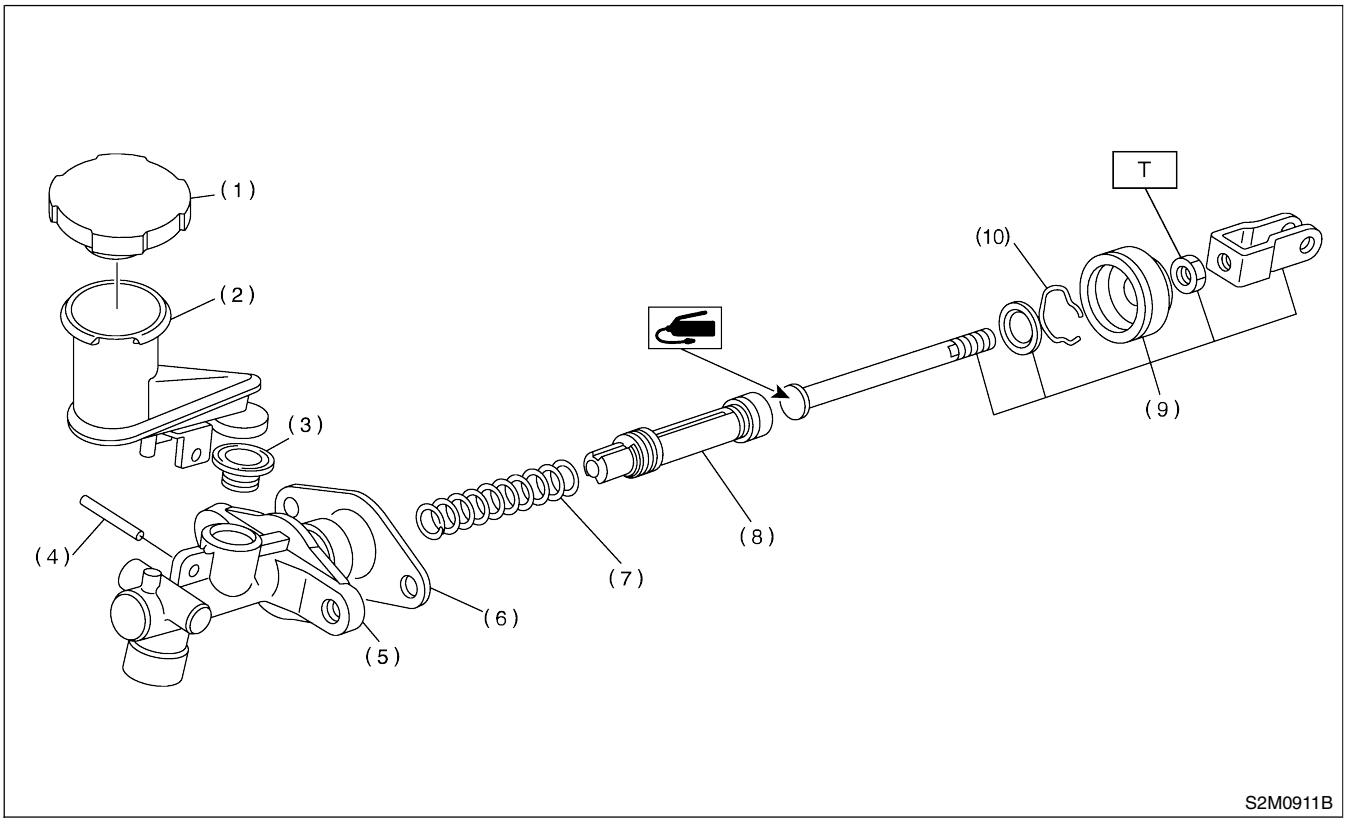
● RHD Model S504001A050702



(1) Master cylinder ASSY
(2) Bracket
(3) Sealed cover
(4) Clutch pipe and connector ASSY
(5) Clutch hose
(6) Operating cylinder
(7) Connector bracket
(8) Clip A
(9) Clip B
(10) Bracket
(11) Washer

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 15 (1.5, 10.8)
T3: 15.7 (1.6, 11.6)
T4: 18 (1.8, 13.0)
T5: 25 (2.5, 18.1)
T6: 37 (3.8, 27.5)

5. MASTER CYLINDER FOR NON-TURBO MODEL S504001A0508

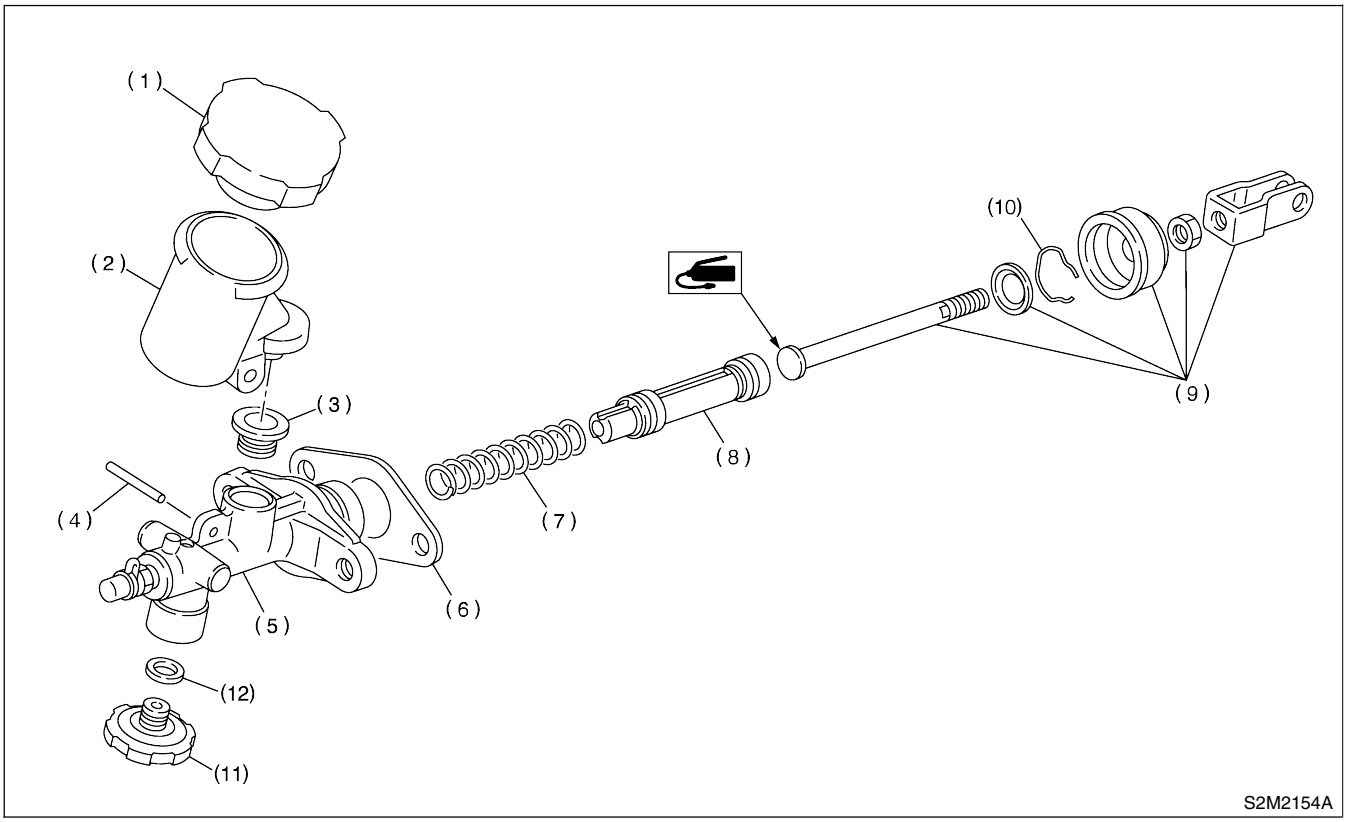


(1) Reservoir cap
(2) Reservoir tank
(3) Oil seal
(4) Straight pin
(5) Master cylinder
(6) Seat
(7) Return spring
(8) Piston
(9) Push rod
(10) Piston stop ring

Tightening torque: N·m (kgf-m, ft-lb)
T: 10 (1.0, 7)

6. MASTER CYLINDER FOR TURBO MODEL S504001A0509

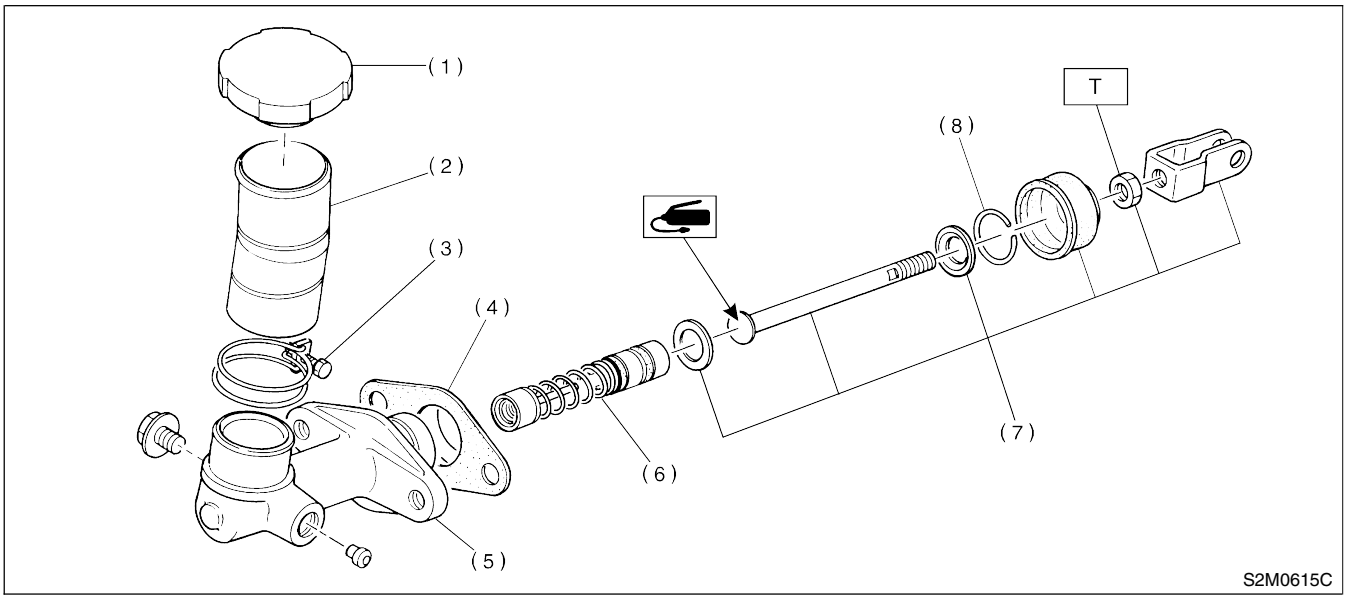
● LHD Model S504001A050901



(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
(11) Diaphragm spring
(12) Gasket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 10 (1.0, 7)
T2: 46.6 (4.75, 34.4)

● RHD Model S504001A050902

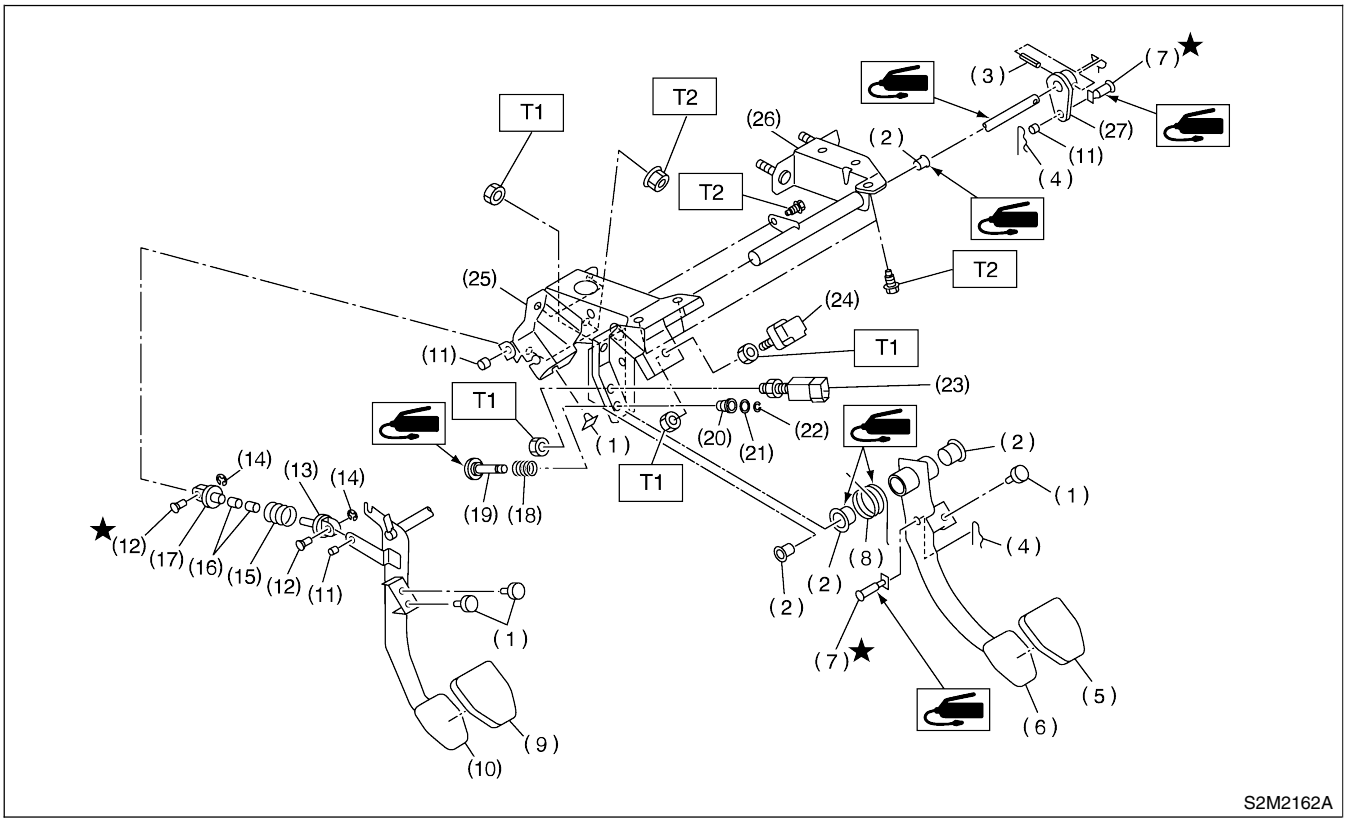


(1) Reservoir cap
(2) Reservoir tank
(3) Reservoir band
(4) Seat
(5) Master cylinder
(6) Piston
(7) Push rod
(8) Piston stop ring

Tightening torque: N·m (kgf-m, ft-lb)
T: 10 (1.0, 7)

7. CLUTCH PEDAL S504001A0503

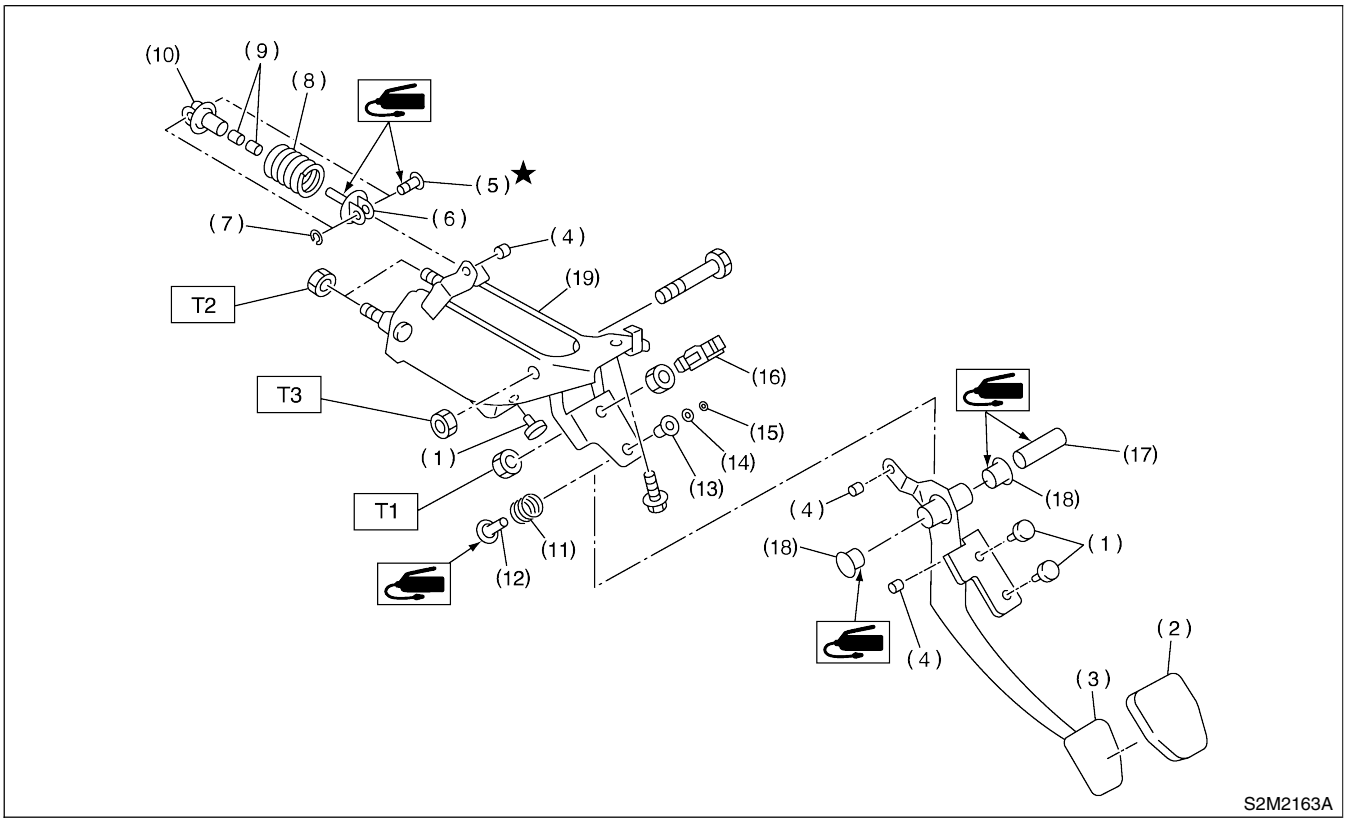
● LHD Model S504001A050301



(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)

● RHD Model S504001A050302



(1) Stopper
(2) Clutch pedal pad
(3) Clutch pedal
(4) Bushing C
(5) Clutch clevis pin
(6) Assist rod A
(7) Clip
(8) Assist spring
(9) Assist bushing
(10) Assist rod B
(11) Spring S
(12) Rod S
(13) Bushing S
(14) O-ring
(15) Clip
(16) Clutch switch (With cruise control)
(17) Spacer
(18) Bushing
(19) Clutch pedal bracket

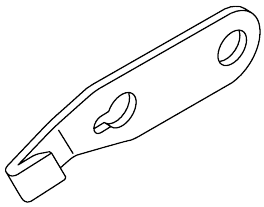
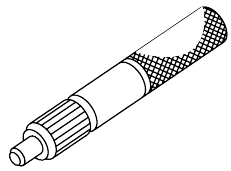
Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.0)
T3: 30 (3.1, 22.4)

C: CAUTION 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.

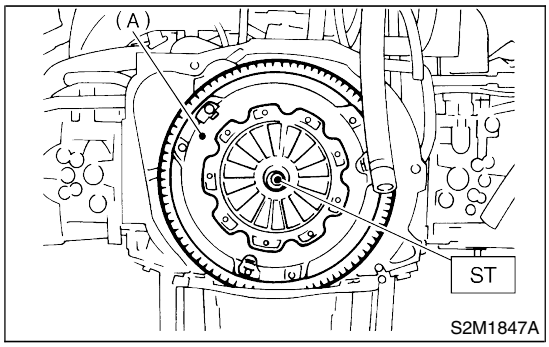
2. GENERAL PURPOSE TOOLS S504001A1702

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-32, REMOVAL, Manual Transmission Assembly.>
2) Install ST on flywheel.
ST 498497100 CRANKSHAFT STOPPER



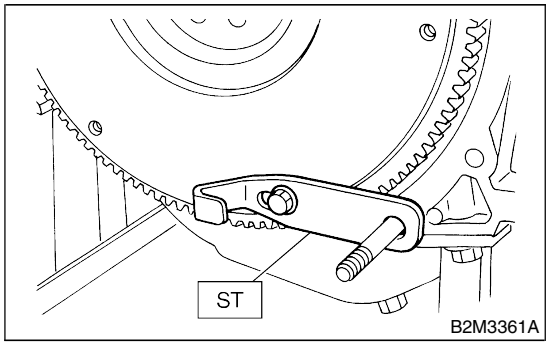
(A) Clutch cover

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.

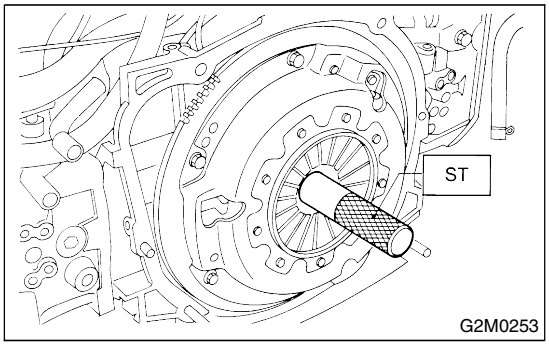
B: INSTALLATION S504252A11

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.

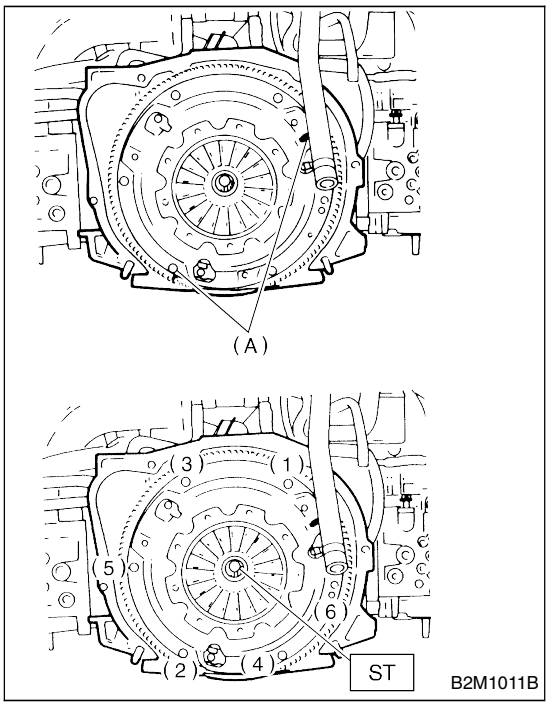
ST 499747100 CLUTCH DISC GUIDE



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-35, INSTALLATION, Manual Transmission.>

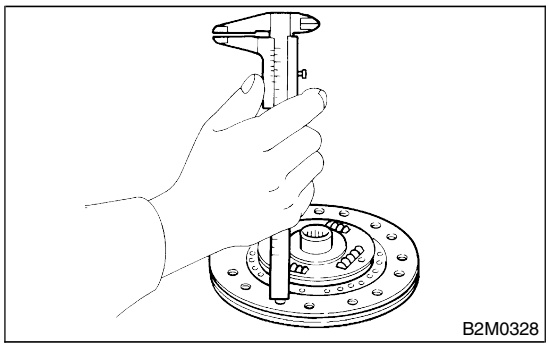
C: INSPECTION S504252A10

1. CLUTCH DISC S504252A1001

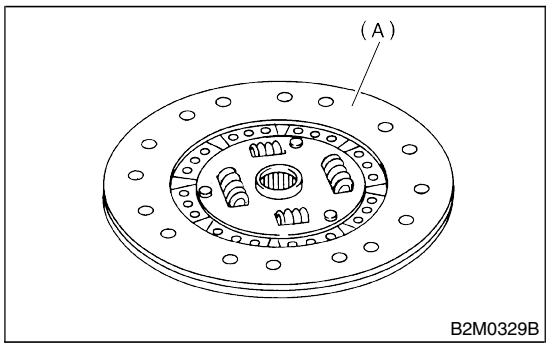
1) Facing wear
Measure the depth of rivet head from the surface of facing. Replace if facings are worn locally or worn down to less than the specified value.

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.

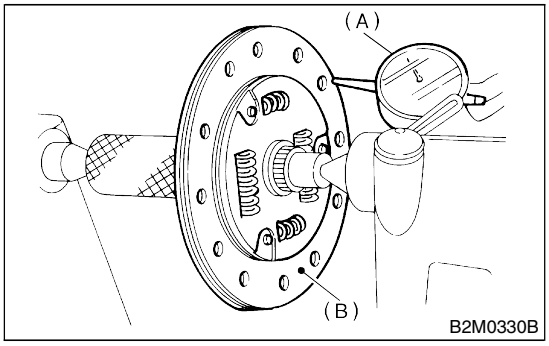


(A) Facing

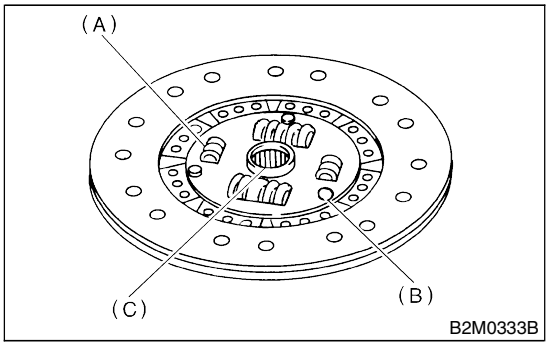
4) Deflection on facing
If deflection exceeds the specified value at the outer circumference of facing, repair or replace.

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.

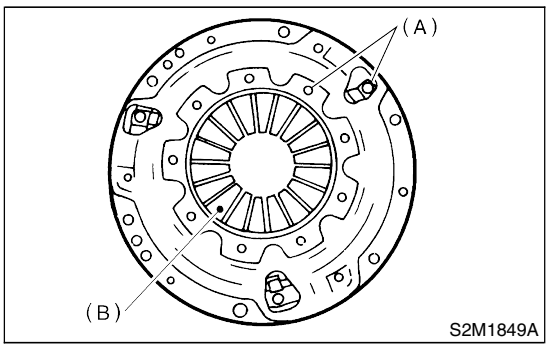


(A) Spline
(B) Rivet
(C) Torsion spring

2. CLUTCH COVER S504252A1002

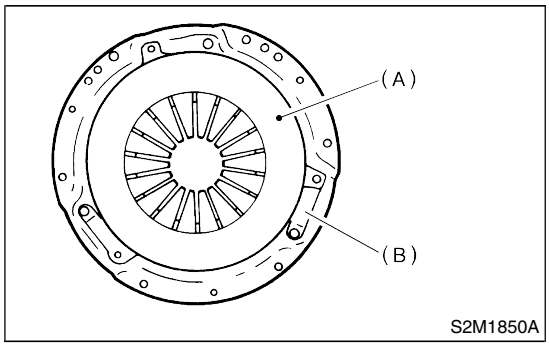
NOTE:
Visually check for the following items without disassembling, and replace or repair if defective.

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.

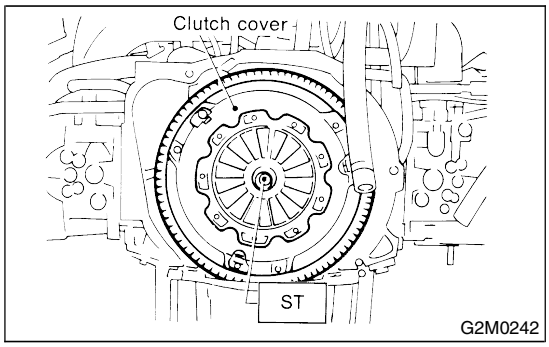


(A) Pressure plate
(B) Strap plate

3. Flywheel S504250

A: REMOVAL S504250A18

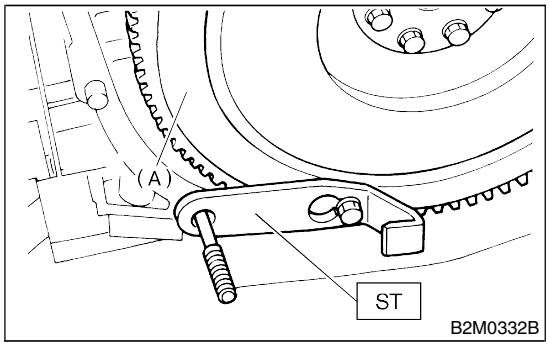
1) Remove transmission assembly. <Ref. to MT-32, REMOVAL, Manual Transmission Assembly.>
2) Install ST on flywheel.
ST 498497100 CRANKSHAFT STOPPER



3) Remove clutch cover and clutch disc. <Ref. to CL-15, 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.

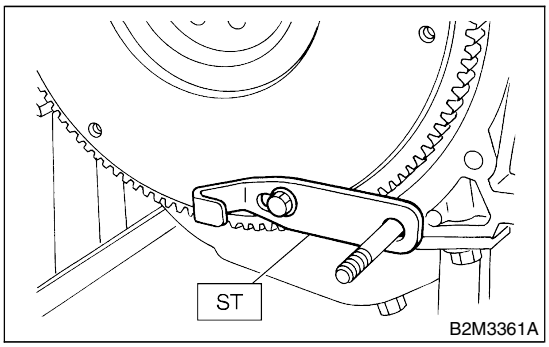
4) Using ST, remove flywheel.
ST 498497100 CRANKSHAFT STOPPER



(A) Flywheel

B: INSTALLATION S504250A11

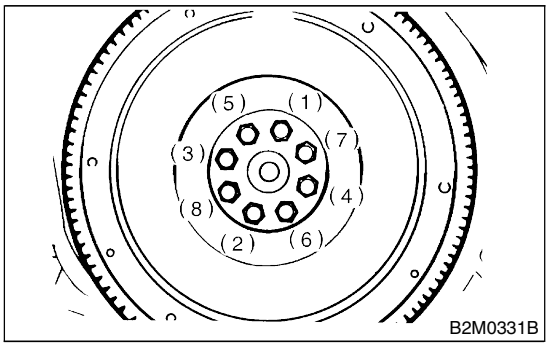
1) Install flywheel and ST.
ST 498497100 CRANKSHAFT STOPPER



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)

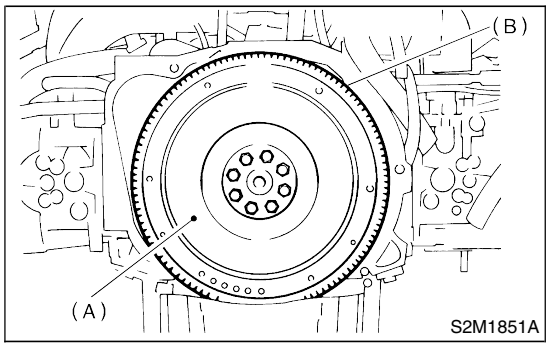


3) Install clutch disc and cover. <Ref. to CL-15, INSTALLATION, Clutch Disc and Cover.>
4) Install transmission assembly. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

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

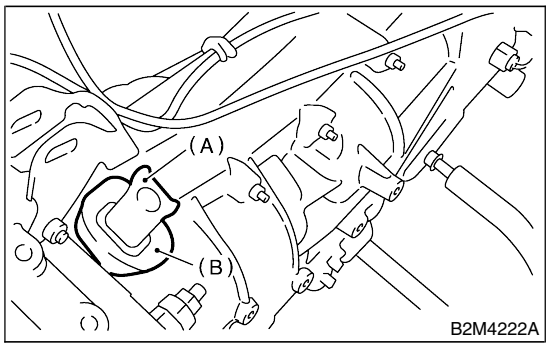
A: REMOVAL S504251A18

1. NON-TURBO MODEL S504251A1803

1) Remove transmission assembly from vehicle body.
<Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
2) Remove the two clips from clutch release lever and remove release bearing.

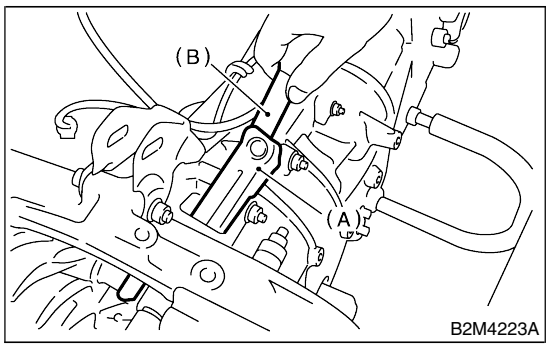
CAUTION:
Be careful not to deform clips.

3) Remove release lever seal.



(A) Clutch release lever
(B) Release lever seal

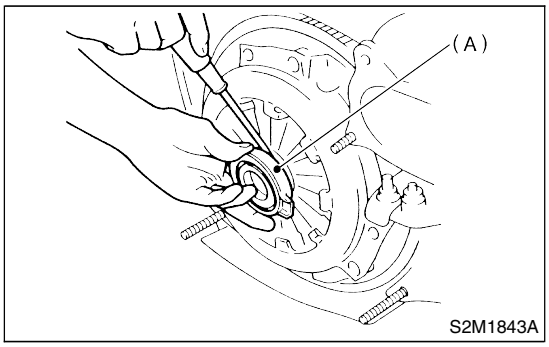
4) Remove release lever retainer spring from release lever pivot with a screwdriver by accessing it through clutch housing release lever hole. Then remove release lever.



(A) Clutch release lever
(B) Screwdriver

2. TURBO MODEL S504251A1804

1) Remove transmission assembly from vehicle body. <Ref. to MT-32, REMOVAL, Manual Transmission Assembly.>
2) Remove clutch release lever from transmission.
3) Put clutch release bearing in engine side.
4) Remove clutch release bearing from clutch cover using flat-type screwdriver.



(A) Clutch release bearing

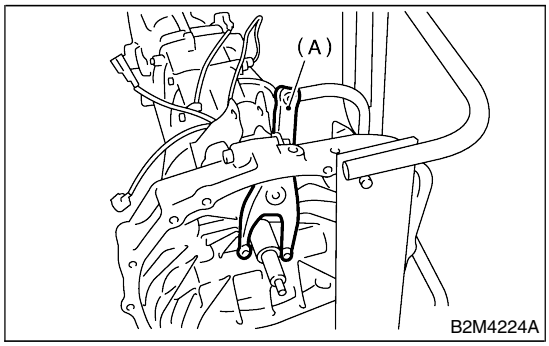
B: INSTALLATION S504251A11

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. NON-TURBO MODEL S504251A1103

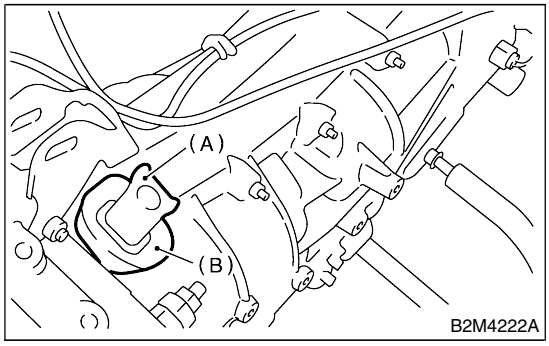
1) While pushing release lever to pivot and twisting it to both sides, fit retainer spring onto the constricted portion of pivot.

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-35, INSTALLATION, Manual Transmission Assembly.>

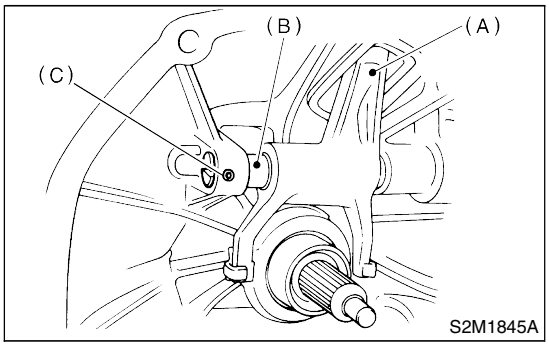
2. TURBO MODEL S504251A1104

1) Apply grease to each parts. <Ref. CL-3, COMPONENT, General Description.>

Grease:
SUNLIGHT2 (P/N 003602010)

2) Position both clutch release lever and bearing on transmission.
3) Install clutch release lever shaft.

CAUTION:
Be sure to fit groove on clutch release lever shaft into pin located at through-hole.



(A) Release fork
(B) Release shaft
(C) Spring pin

4) With clutch release lever held in that position, connect engine and transmission. <Ref. to MT-35, INSTALLATION, Manual Transmission Assembly.>

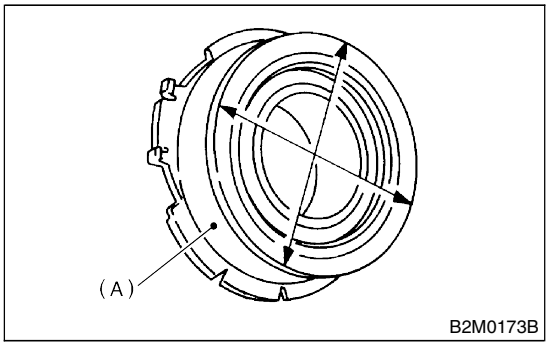
C: INSPECTION S504251A10

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.

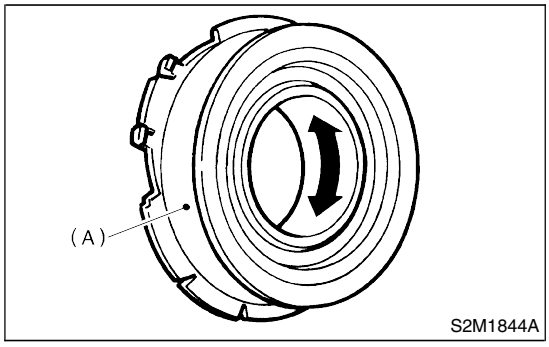
1) Check the bearing for smooth movement by applying force in the radial direction.

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.

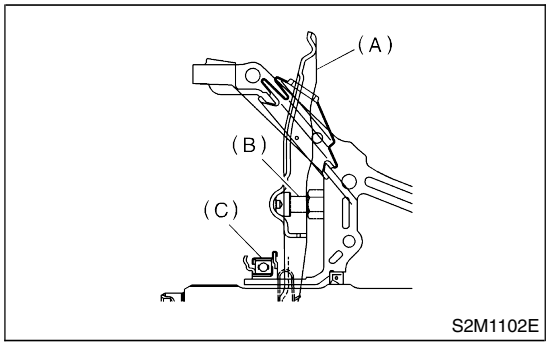


(A) Bearing case

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

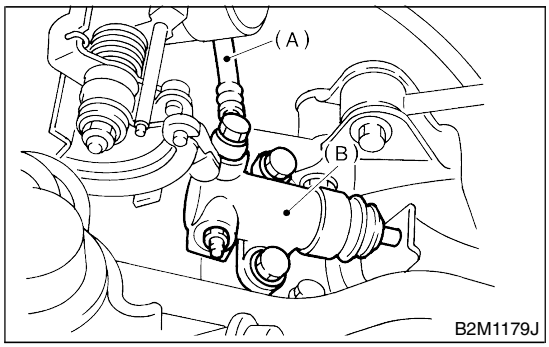
5. Operating Cylinder S504253

A: REMOVAL S504253A18

1. NON-TURBO MODEL S504253A1801

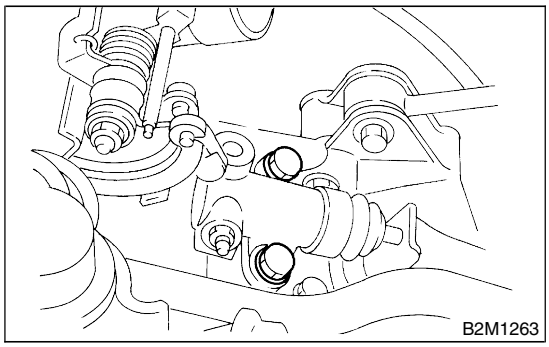
1) Remove air cleaner case. <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
2) Remove clutch hose from operating cylinder.

CAUTION:
Cover hose joint to prevent clutch fluid from flowing out.



(A) Clutch hose
(B) Operating cylinder

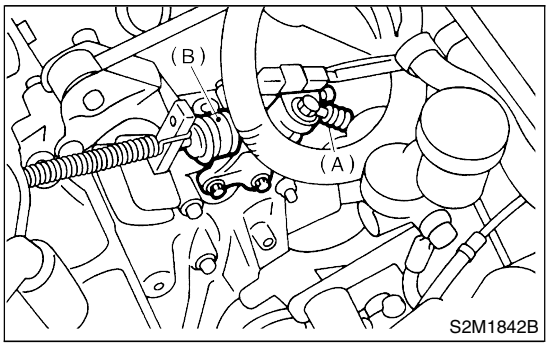
3) Remove operating cylinder from transmission.



2. TURBO MODEL S504253A1802

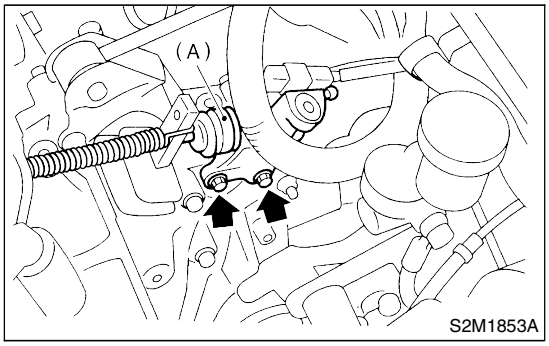
1) Remove intercooler. <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
2) Remove clutch hose from operating cylinder.

CAUTION:
Cover hose joint to prevent clutch fluid from flowing out.



(A) Clutch hose
(B) Operating cylinder

3) Remove operating cylinder from transmission.



(A) Operating cylinder

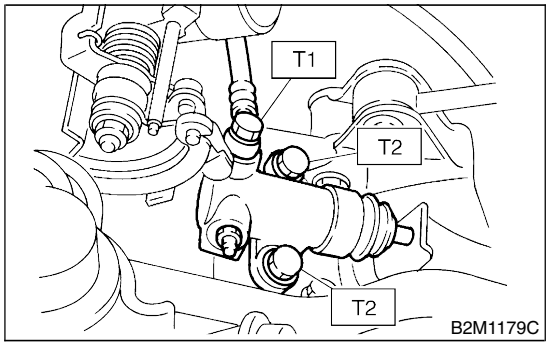
B: INSTALLATION S504253A11

1. NON-TURBO MODEL S504253A1101

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)

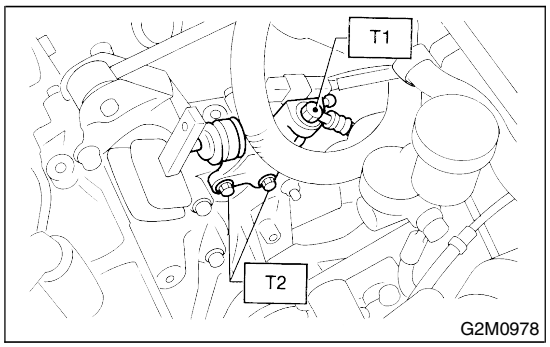


2) After bleeding air from operating cylinder, ensure that clutch operates properly.
<Ref. to CL-34 Clutch Fluid Air Bleeding.>

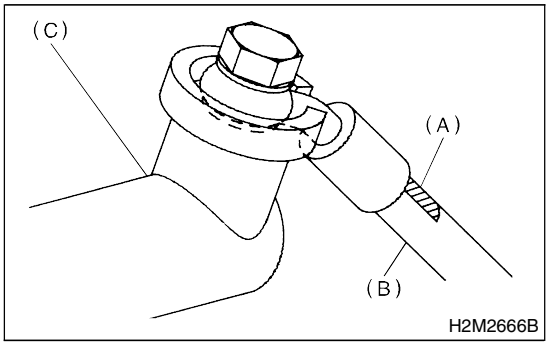
2. TURBO MODEL S504253A1102

1) Install in the reverse order of removal.

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)



NOTE:
- Be sure to install the clutch hose with the mark side facing upward.
- Be careful not to twist the clutch hose during installation.



(A) Marking
(B) Clutch hose
(C) Operating cylinder

2) After bleeding air from operating cylinder, ensure that clutch operates properly.
<Ref. to CL-34, Clutch Fluid Air Bleeding.>

C: INSPECTION S504253A10

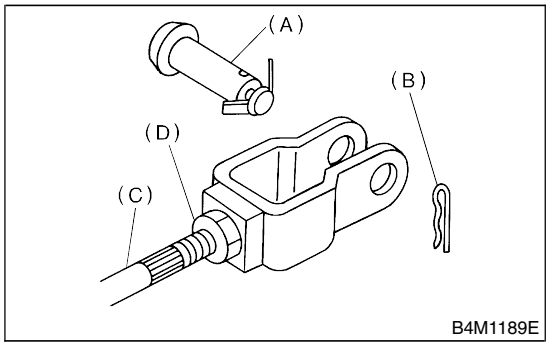
1) Check operating cylinder for damage. If operating cylinder is damaged, replace it.
2) Check operating cylinder for fluid leakage or damage on boot. If any leakage or damage is found, replace operating cylinder.

6. Master Cylinder S504168

A: REMOVAL S504168A18

1. NON-TURBO MODEL S504168A1801

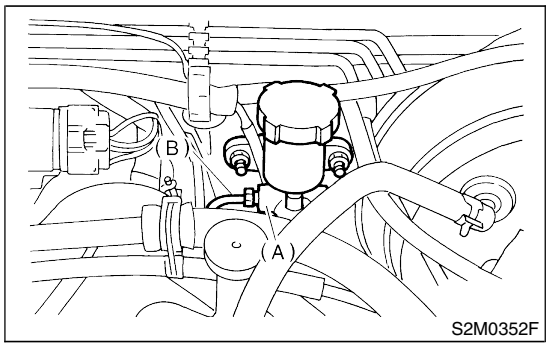
1) Thoroughly drain brake fluid from reservoir tank.
2) Remove snap pin, clevis pin and separate push rod of master cylinder from clutch pedal.



(A) Clevis pin
(B) Snap pin
(C) Push rod
(D) Lock nut

3) Remove air cleaner case and air intake duct.
4) Remove clutch pipe from master cylinder.
5) Remove master cylinder with reservoir tank.

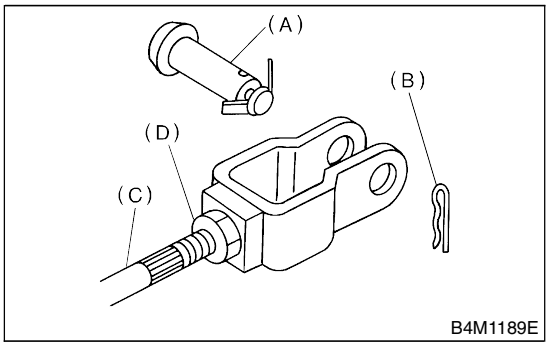
CAUTION:
Be extremely careful not to spill brake fluid. Brake fluid spilt on the vehicle body will harm the paint surface; wipe it off quickly if spilt.



(A) Master cylinder
(B) Clutch pipe

2. TURBO LHD MODEL S504168A1802

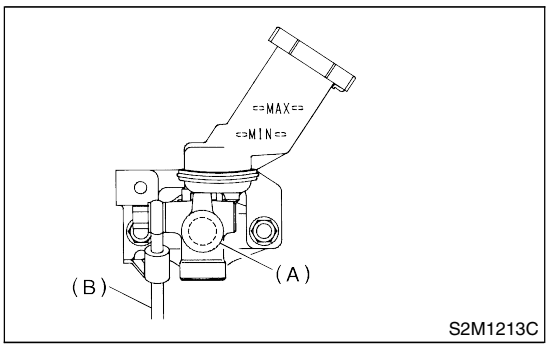
1) Thoroughly drain brake fluid from reservoir tank.
2) Remove snap pin, clevis pin and separate push rod of master cylinder from clutch pedal.



(A) Clevis pin
(B) Snap pin
(C) Push rod
(D) Lock nut

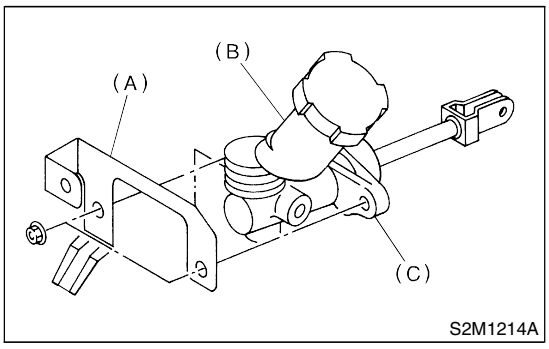
3) Remove intercooler. <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
4) Remove clutch hose from master cylinder.

CAUTION:
Plug up hose connection to prevent clutch fluid from spilling out.



(A) Master cylinder
(B) Clutch hose

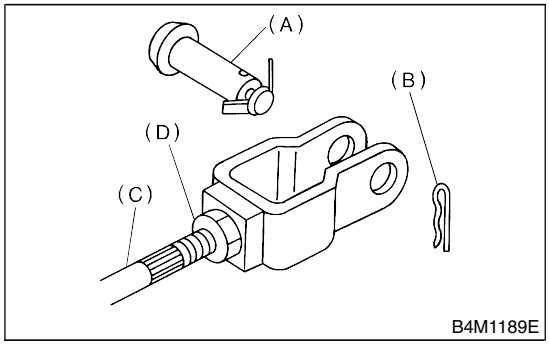
5) Remove master cylinder with reservoir tank.



(A) Bracket
(B) Reservoir tank
(C) Master cylinder

3. TURBO RHD MODEL S504168A1803

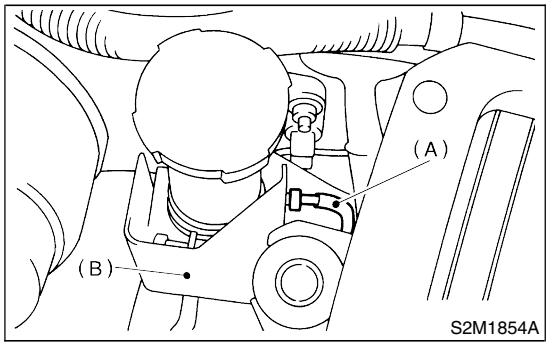
1) Thoroughly drain brake fluid from reservoir tank.
2) Remove snap pin, clevis pin and separate push rod of master cylinder from clutch pedal.



(A) Clevis pin
(B) Snap pin
(C) Push rod
(D) Lock nut

3) Remove intercooler. <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
4) Remove clutch pipe and sealed cover from master cylinder.

CAUTION:
Plug up pipe connection to prevent clutch fluid from spilling out.

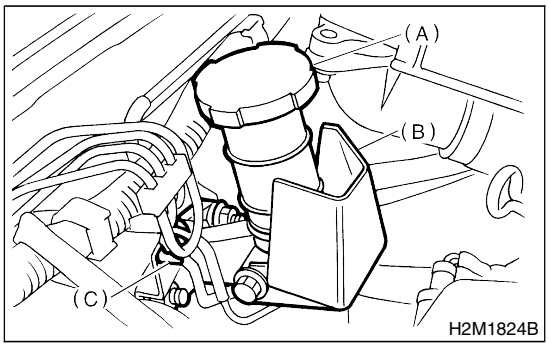


(A) Clutch pipe
(B) Sealed cover

5) Remove clutch pipe from master cylinder bracket clamp.

6) Slightly lift clutch pipe on master cylinder, then remove master cylinder and reservoir tank as a single unit.

CAUTION:
Be careful not to bend or twist clutch pipe.



(A) Reservoir tank
(B) Sealed cover
(C) Clamp

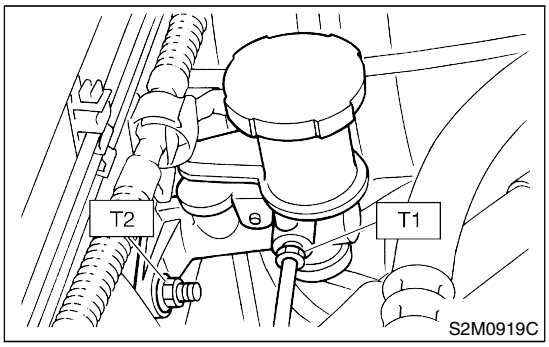
B: INSTALLATION S504168A11

1. NON-TURBO MODEL S504168A1101

1) Install master cylinder to body, and install clutch pipe to master cylinder.

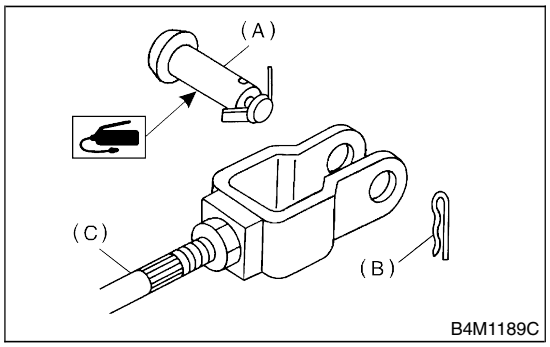
CAUTION:
Check that pipe is routed properly.

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

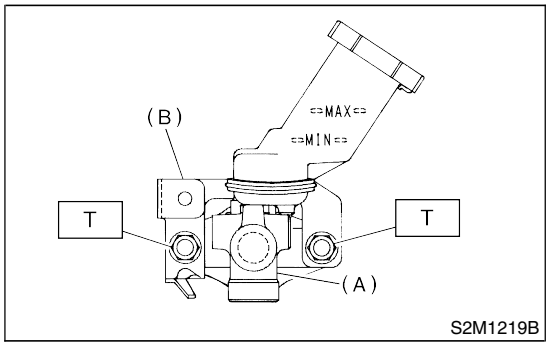
3) After bleeding air from system, ensure that clutch operates properly.
<Ref. to CL-34 Clutch Fluid Air Bleeding.>
4) Install air cleaner case and air intake duct.

2. TURBO LHD MODEL S504168A1102

1) Install master cylinder to body.

CAUTION:
Always use a new gasket.

Tightening torque:
T: 18 N·m (1.8 kgf-m, 13.0 ft-lb)

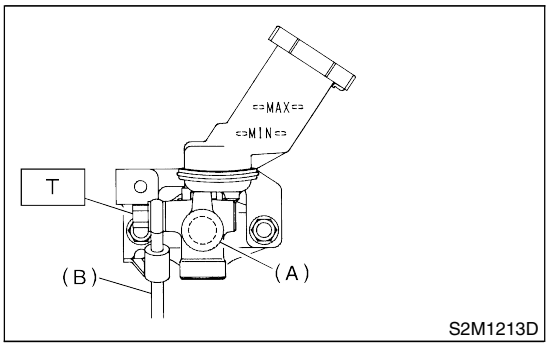


(A) Master cylinder
(B) Bracket

2) Install clutch hose to master cylinder.

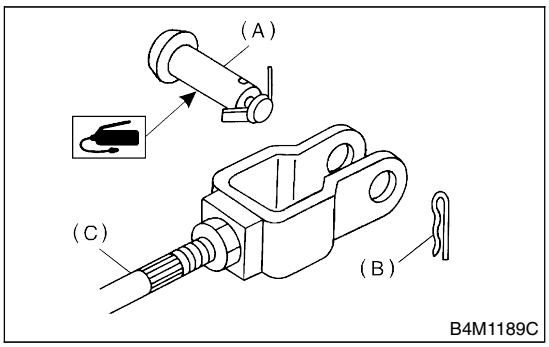
CAUTION:
Check that hose is routed properly.

Tightening torque:
T: 18 N·m (1.8 kgf-m, 13.0 ft-lb)



(A) Master cylinder
(B) Clutch hose

3) Connect push rod of master cylinder to clutch pedal, and install clevis pin and snap pin.



(A) Clevis pin
(B) Snap pin
(C) Push rod

4) After installing master cylinder assembly, bleeding air from clutch system. <Ref. to CL-34, Clutch Fluid Air Bleeding.>
5) After bleeding air from system, ensure that clutch operates properly.
6) Install inter coder. <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>

3. TURBO RHD MODEL S504168A1103

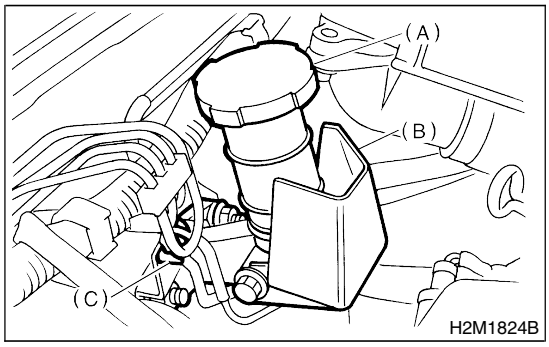
1) Slightly lift clutch pipe on master cylinder, then install master cylinder to body.

CAUTION:
Always use a new gasket.

NOTE:
Be careful not to bend clutch pipe when installing master cylinder.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

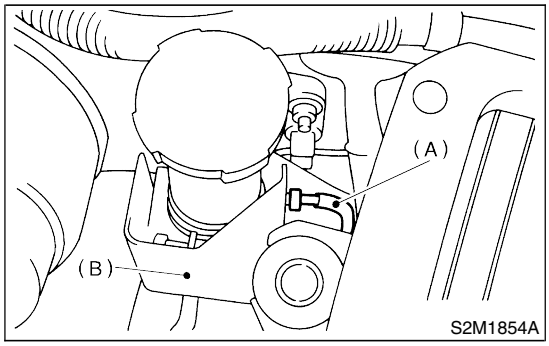
2) Insert clutch pipe into pipe bracket clamp.



(A) Reservoir tank
(B) Sealed cover
(C) Clamp

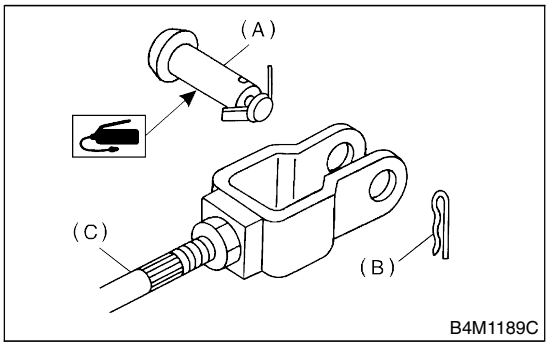
3) Install clutch pipe to master cylinder.

Tightening torque:
T1: 15N·m (1.5 kgf-m, 10.8 ft-lb)



(A) Clutch pipe
(B) Sealed cover

4) Connect push rod of master cylinder to clutch pedal, and install clevis pin and snap pin.



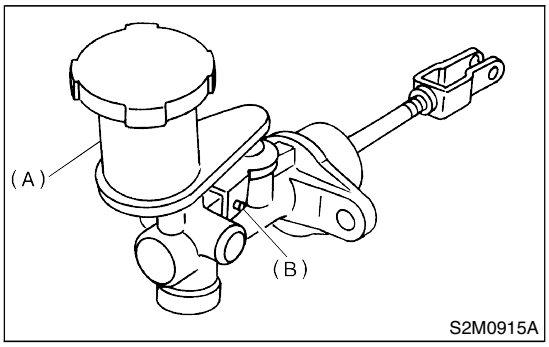
(A) Clevis pin
(B) Snap pin
(C) Push rod

5) After installing master cylinder assembly, bleeding air from clutch system. <Ref. to CL-34, Clutch Fluid Air Bleeding.>
6) After bleeding air from system, ensure that clutch operates properly.
7) Install intercooler. <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>

C: DISASSEMBLY S504168A06

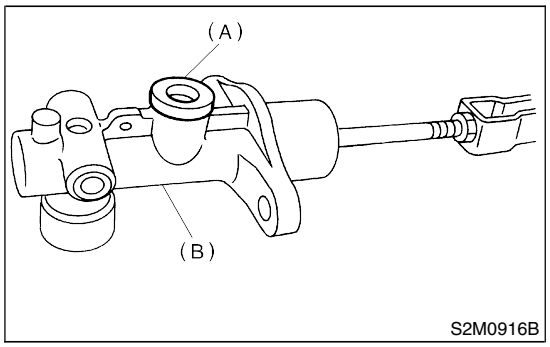
1. NON-TURBO MODEL S504168A0601

1) Remove straight pin and reservoir tank.



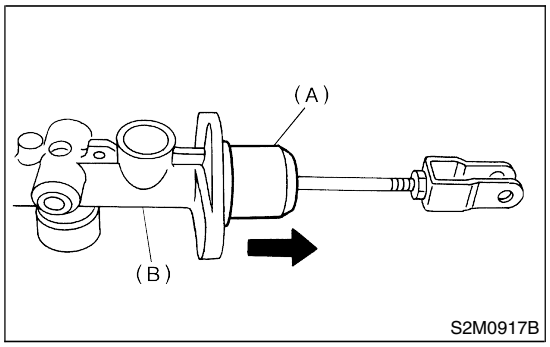
(A) Reservoir tank
(B) Straight pin

2) Remove oil seal.



(A) Oil seal
(B) Master cylinder

3) Move the cylinder boot backward.



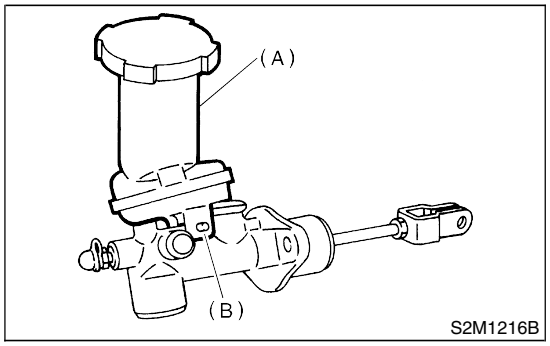
(A) Cylinder boot
(B) Master cylinder

4) Remove snap ring.

CAUTION:
Be careful when removing the snap ring to prevent the rod, washer, piston and return spring from flying out.

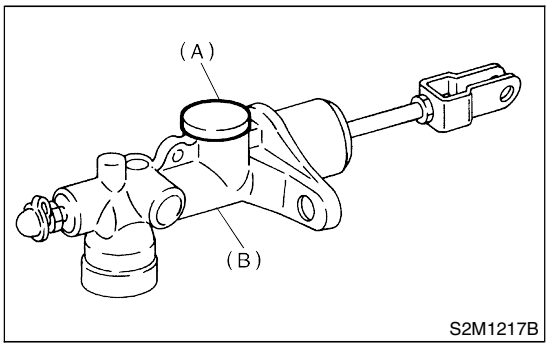
2. TURBO LHD MODEL *S504168A0602*

1) Remove diaphragm spring and gasket.
2) Remove straight pin and reservoir tank.



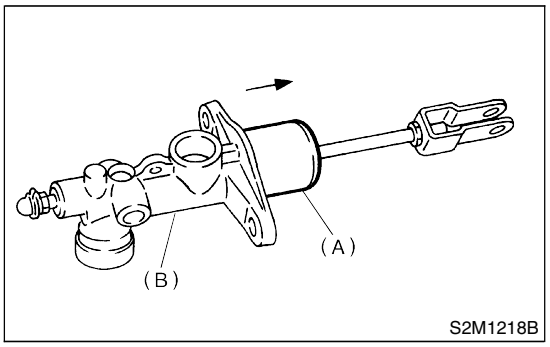
(A) Reservoir tank
(B) Straight pin

3) Remove oil seal.



(A) Oil seal
(B) Master cylinder

4) Move the cylinder boot backward.



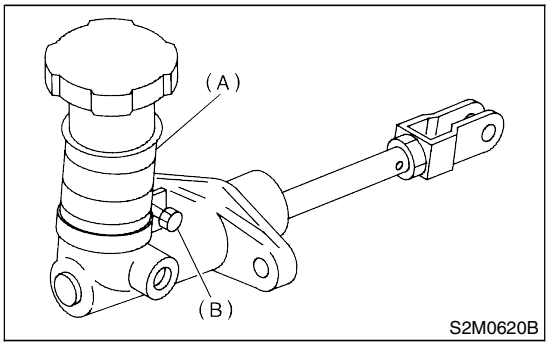
(A) Cylinder boot
(B) Master cylinder

5) Remove snap ring.

CAUTION:
Be careful when removing the snap ring to prevent the rod, washer, piston and return spring from flying out.

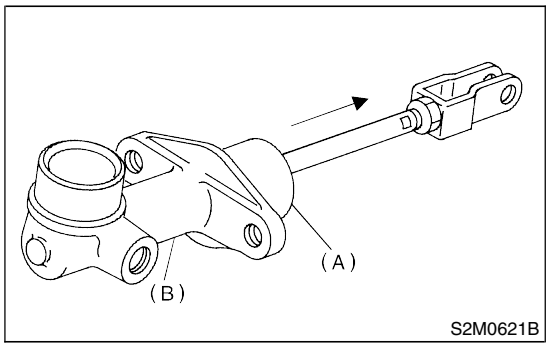
3. TURBO RHD MODEL *S504168A0603*

1) Loose reservoir band, and remove reservoir tank and band.



(A) Reservoir tank
(B) Reservoir band

2) Move the cylinder boot backward.



(A) Master cylinder boot
(B) Master cylinder

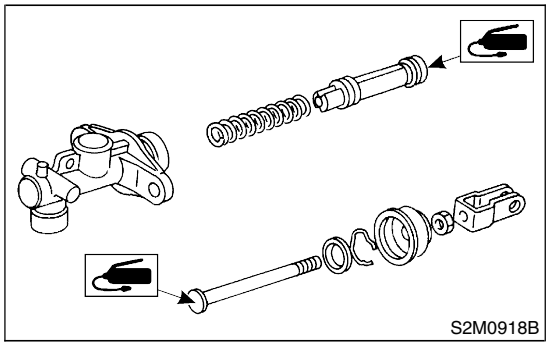
3) Remove snap ring.

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)



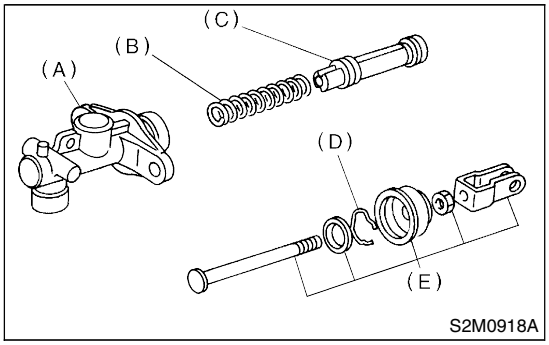
2) Assemble in the reverse order of disassembly.

E: INSPECTION S504168A10

1. LHD AND NON-TURBO RHD MODEL

S504168A1001

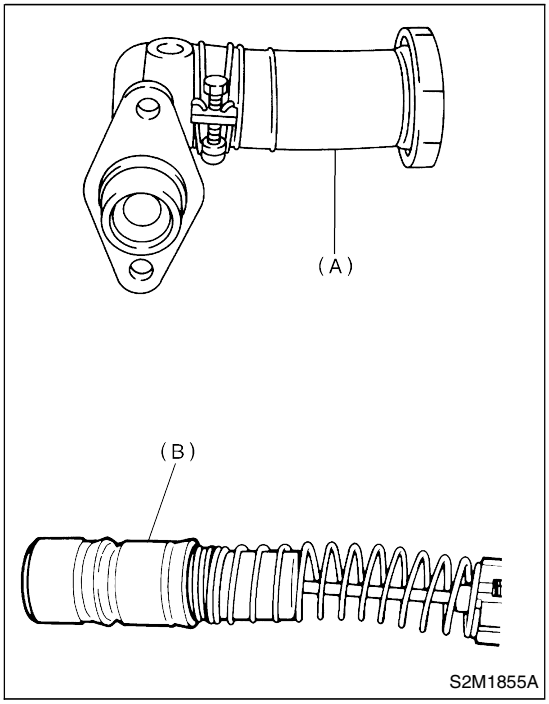
If any damage, deformation, wear, swelling, rust or other faults are found on the cylinder, piston, push rod, fluid reservoir, return spring and seat, replace the faulty part.



(A) Master cylinder body
(B) Return spring
(C) Piston
(D) Snap ring
(E) Rod ASSY

2. TURBO RHD MODEL S504168A1002

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.



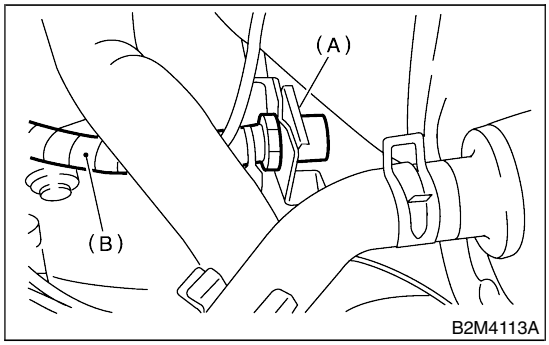
(A) Reservoir tank
(B) Piston

7. Clutch Pipe and Hose S504262

A: REMOVAL S504262A18

1. EXCEPT RHD TURBO MODEL S504262A1801

1) Remove air cleaner case or intercooler.
2) Drain clutch fluid. <Ref. to CL-33 Clutch Fluid.>
3) Remove clutch pipe from the clutch hose and master cylinder.
4) Pull out clamp, then remove clutch hose from bracket.

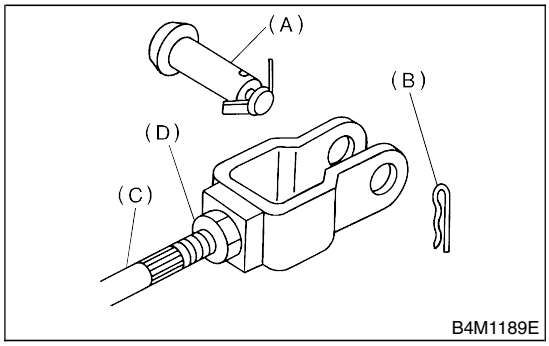


(A) Clamp
(B) Clutch hose

5) Remove hose from operating cylinder.

2. RHD TURBO MODEL S504262A1802

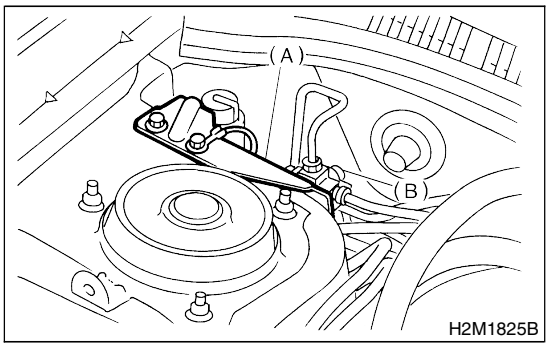
1) Remove snap pin, clevis pin and separate push rod of master cylinder from clutch pedal.



(A) Clevis pin
(B) Snap pin
(C) Push rod
(D) Lock nut

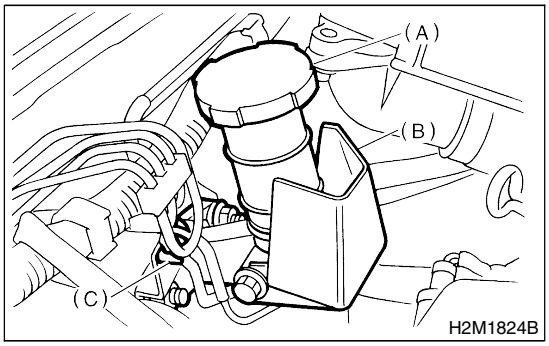
2) Remove intercooler. <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>

3) Remove connector bracket.



(A) Connector bracket
(B) Connector ASSY

4) Remove master cylinder. <Ref. to CL-28, TURBO RHD MODEL, INSTALLATION, Master Cylinder.>



(A) Reservoir tank
(B) Sealed cover
(C) Clamp

5) Remove clutch pipe bracket from body.
6) Remove clutch pipe from clutch pipe bracket.
7) Separate master cylinder and clutch pipe and connector assembly.

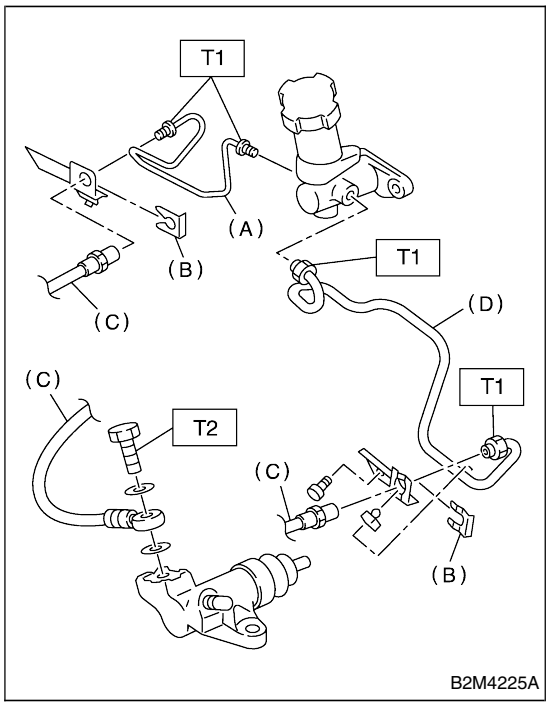
B: INSTALLATION S504262A11

1. EXCEPT RHD TURBO MODEL S504262A1101

Install in the reverse order of removal.

NOTE:
Bleed clutch fluid. <Ref. to CL-34 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 (LHD model)
(B) Clip
(C) Clutch hose
(D) Clutch pipe (RHD model)

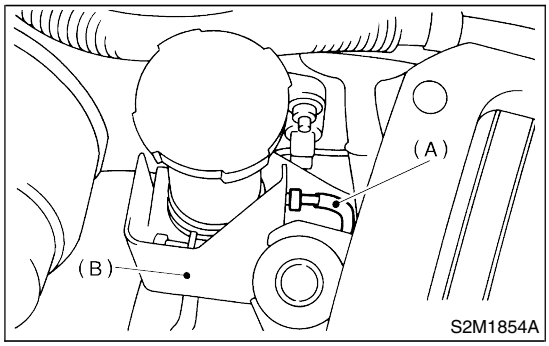
2. RHD TURBO MODEL S504262A1102

1) Install clutch pipe to clutch pipe bracket.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

2) Install clutch pipe to master cylinder.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)



(A) Clutch pipe
(B) Sealed cover

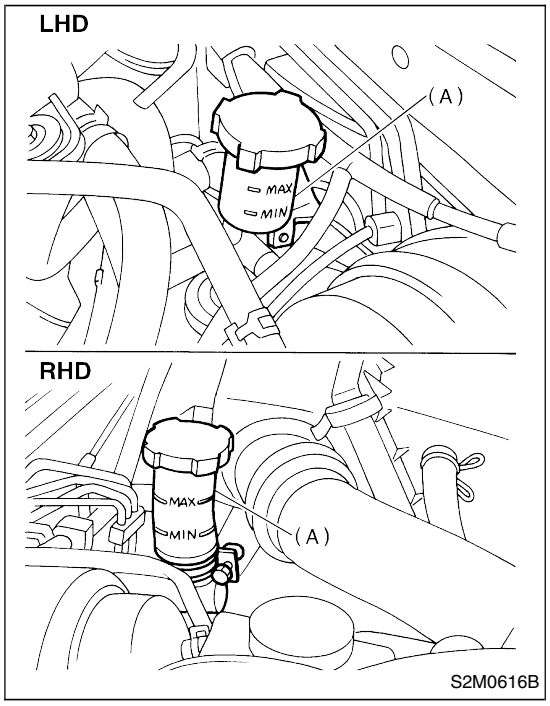
C: INSPECTION S504262A10

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 and air duct.
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

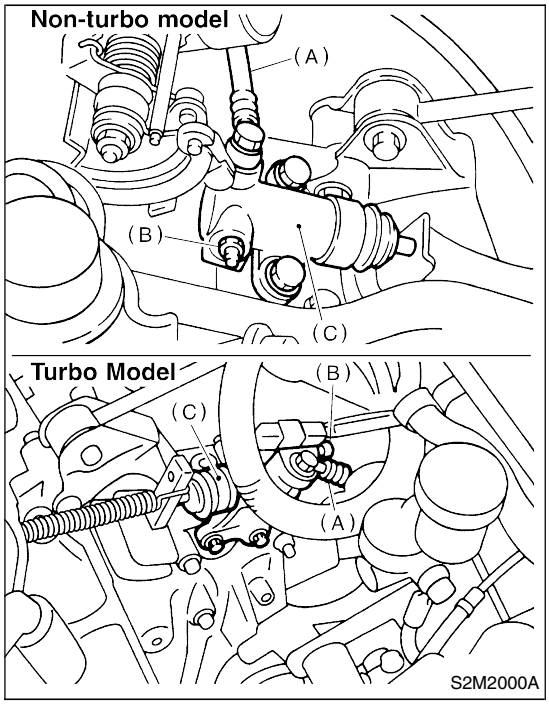
A: PROCEDURE S504260E45

1. LHD AND NON-TURBO RHD MODEL

S504260E4501

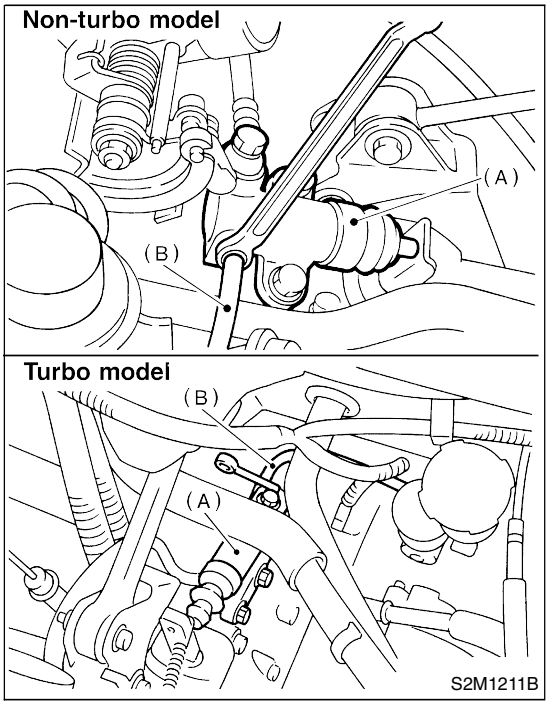
NOTE:
Bleed air from oil line with the help of a co-worker.

1) Remove air cleaner case or intercooler.
Non-turbo model:
<Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
Turbo model:
<Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
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.



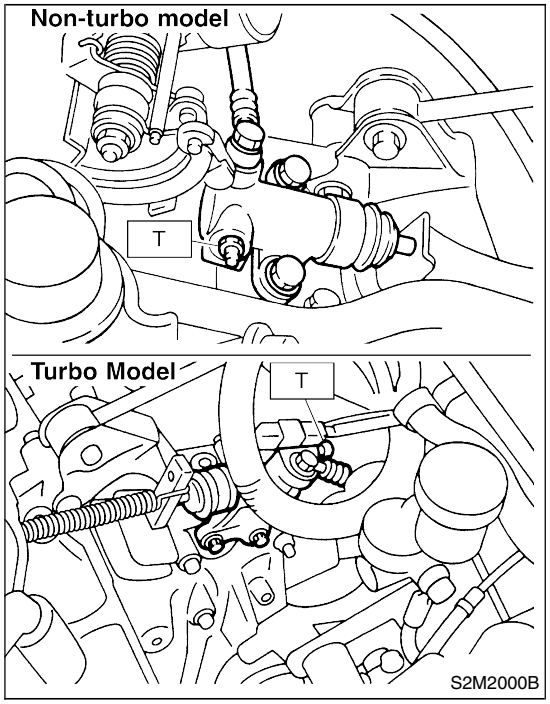
(A) Operating cylinder
(B) Vinyl tube

4) Repeat these steps until there are no more air bubbles in the vinyl tube.

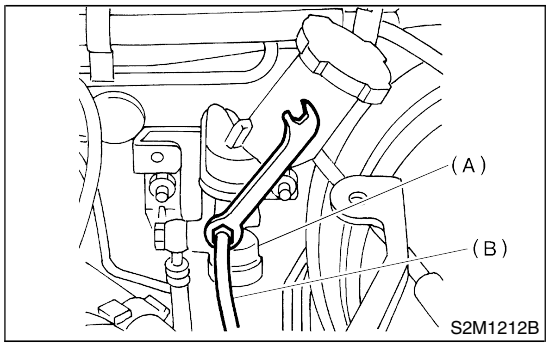
CAUTION:
Cover bleeder with waste cloth when loosening it, to prevent brake fluid from being splashed over surrounding parts.

5) Tighten air bleeder.

Tightening torque:
T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)



6) Repeat steps 2) through 4) using air bleeder on master cylinder. (Turbo LHD model)



(A) Master cylinder
(B) Vinyl tube

7) Tighten air bleeder. (Turbo LHD model)

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)

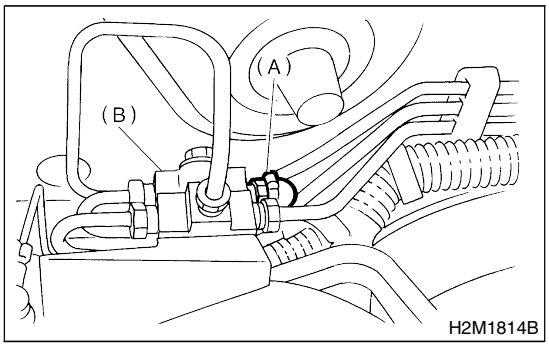
8) After depressing the clutch pedal, make sure that there are no evident leaks in the entire system.

2. TURBO RHD MODEL *S504260E4502*

NOTE:
Bleed air from oil line with the help of a co-worker.

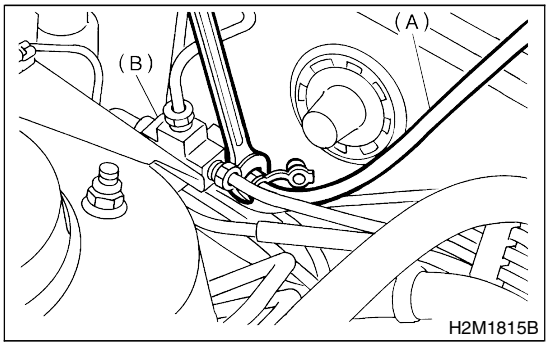
1) Remove intercooler. <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>

2) Fit one end of a vinyl tube into the air bleeder of clutch pipe and connector assembly and put the other end into a clutch fluid container.



(A) Air bleeder
(B) Connector ASSY

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.



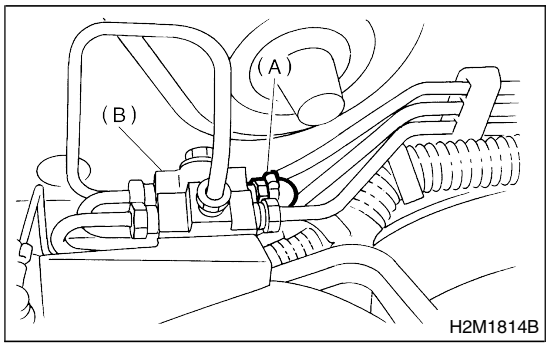
(A) Vinyl tube
(B) Connector ASSY

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.

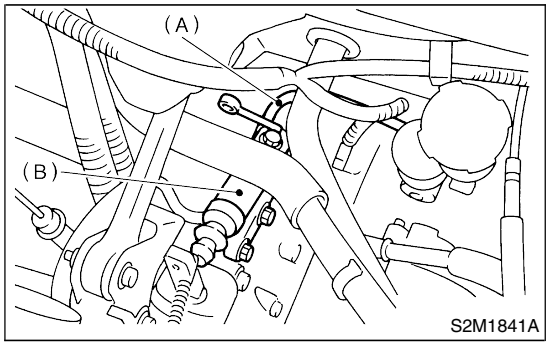
5) Tighten air bleeder.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



(A) Air bleeder
(B) Connector ASSY

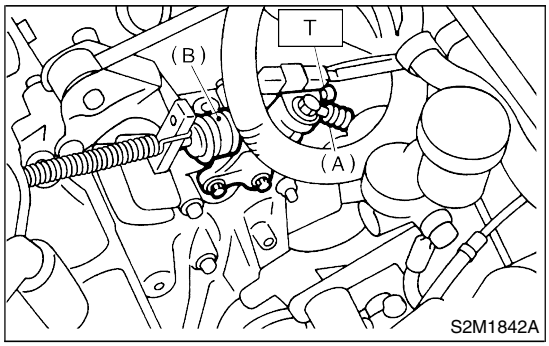
6) Repeat steps 2) through 4) using air bleeder on operating cylinder.



(A) Vinyl tube
(B) Operating cylinder

7) Tighten air bleeder.

Tightening torque:
T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)



(A) Clutch hose
(B) Operating cylinder

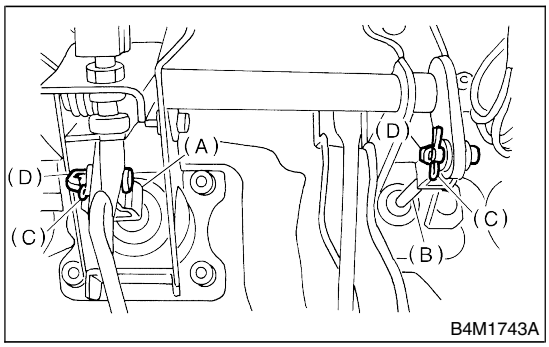
8) After depressing the clutch pedal, make sure that there are no leaks evident in the entire system.

10. Clutch Pedal S504256

A: REMOVAL S504256A18

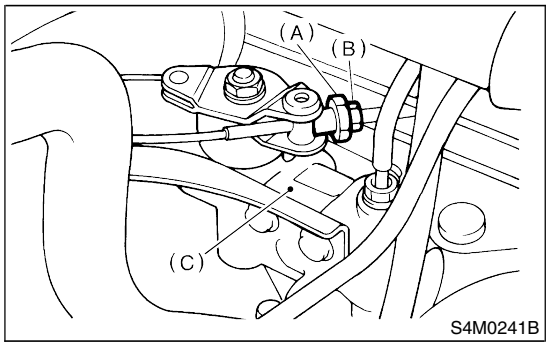
1. LHD MODEL S504256A1803

1) Remove steering column. <Ref. to PS-30 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

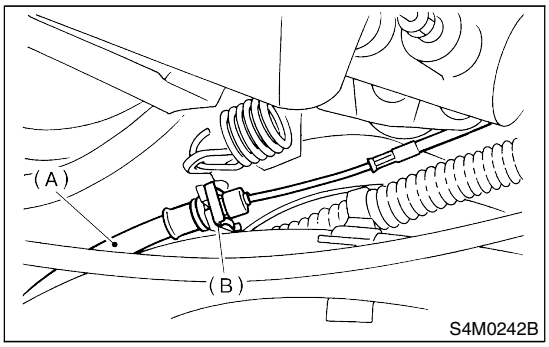
5) Remove PHV adjusting nut and lock nut.



(A) Adjusting nut
(B) Lock nut
(C) PHV

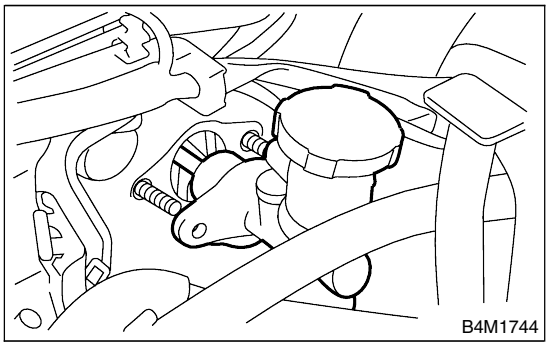
6) Remove cable clamp, and disconnect PHV cable from PHV.

CAUTION:
Carefully protect boot and inner cable from damage when disconnecting PHV cable.



(A) PHV cable
(B) Clamp

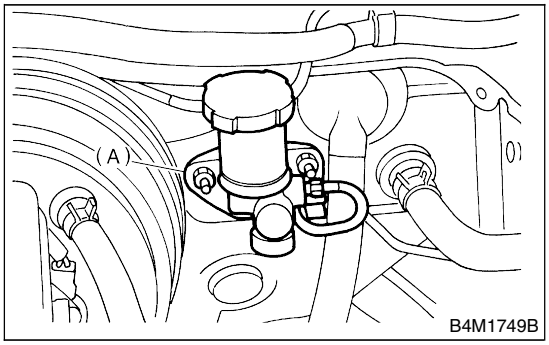
7) Remove nut which secures clutch master cylinder.



8) Remove bolts and nuts which secure brake and clutch pedals, and remove pedal assembly.

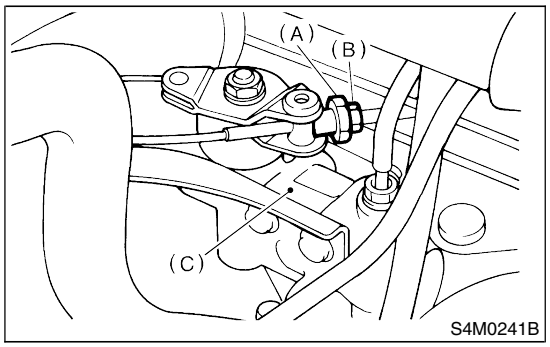
2. RHD MODEL S504256A1804

1) Disconnect ground cable from battery.
2) Disconnect connector from clutch. (With cruise control)
3) Remove snap pin and clevis pin that join push rod and clutch pedal.
4) Remove master cylinder mounting nuts.



(A) Master cylinder

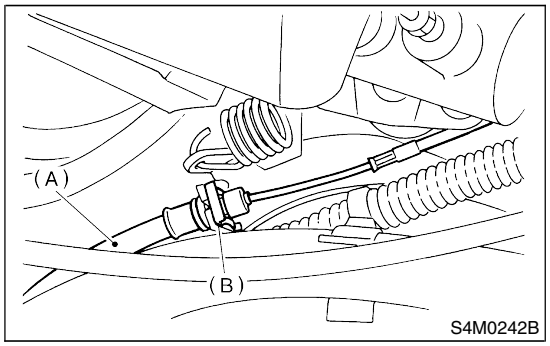
5) Remove PHV adjusting nut and lock nut.



(A) Adjusting nut
(B) Lock nut
(C) PHV

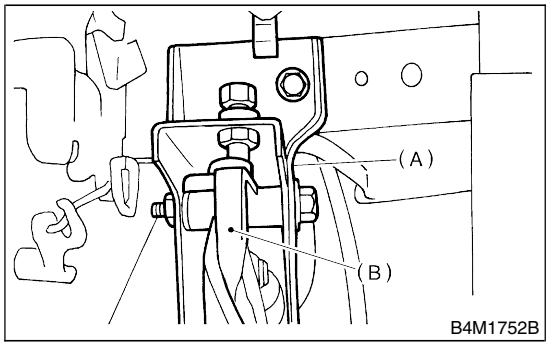
6) Remove cable clamp and disconnect PHV cable from PHV.

CAUTION:
Carefully protect boot and inner cable from damage when disconnecting PHV cable.



(A) PHV cable
(B) Clamp

7) Remove clutch pedal and bracket as a unit.



(A) Clutch pedal bracket
(B) Clutch pedal

B: INSTALLATION S504256A11

1) Install in the reverse order of removal.

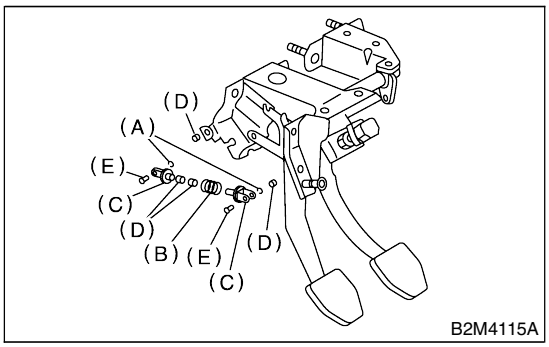
CAUTION:
- **If cable clamp is damaged, replace it with a new one.**
- **Never fail to cover outer cable end with boot.**
- **Be careful not to kink accelerator cable.**
- **Always use new clevis pins.**

2) Adjustment of clutch pedal and adjustment after pedal installation. <Ref. to CL-41 ADJUSTMENT, Clutch Pedal.>

C: DISASSEMBLY S504256A06

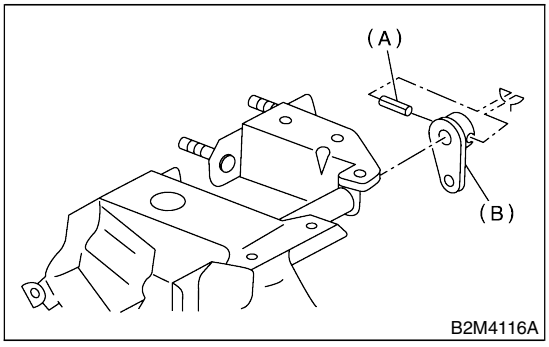
1. LHD MODEL S504256A0601

1) Remove clutch switches.
2) Remove clips, assist spring, rod and bushing.



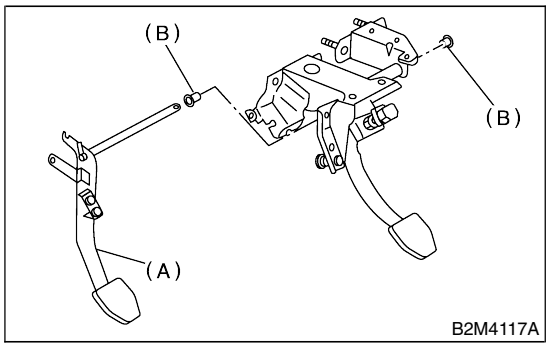
(A) Clip
(B) Assist spring
(C) Assist rod
(D) Bushing
(E) Clevis pin

3) Remove spring pin and lever.



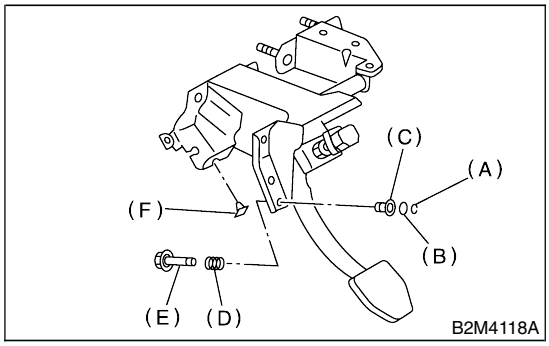
(A) Pin
(B) Lever

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.

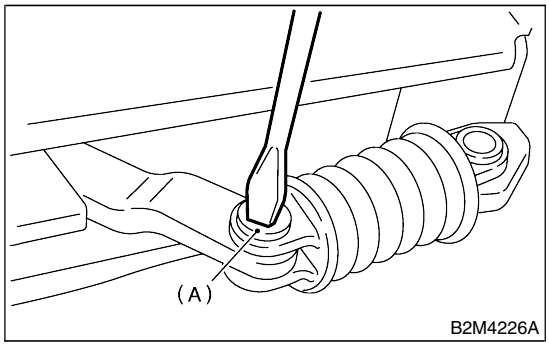


(A) Clip
(B) O-ring
(C) Bushing S
(D) Spring S
(E) Rod S
(F) Stopper

6) Remove stoppers from clutch pedal.
7) Remove clutch pedal pad.

2. RHD MODEL *S504256A0602*

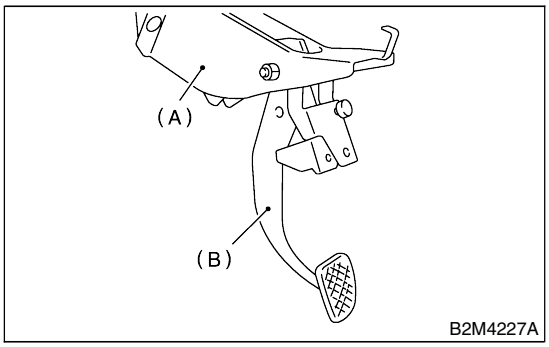
1) Remove clutch switch.
2) Remove clip, pull out clevis pin.



(A) Clevis pin

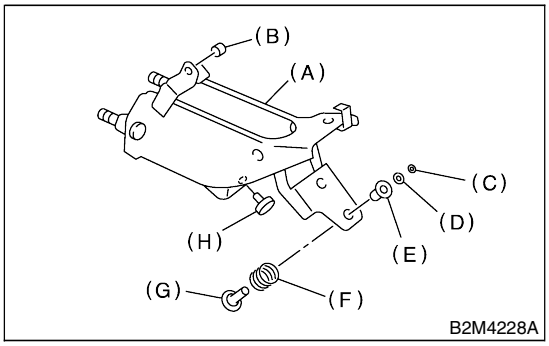
3) Remove assist rod, spring and bushing.

4) Remove clutch pedal from clutch pedal bracket.



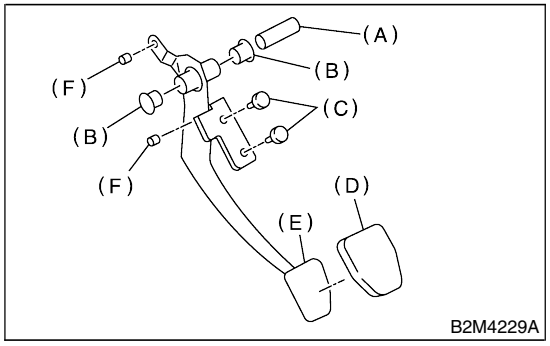
(A) Clutch pedal bracket
(B) Clutch pedal

5) Remove following parts (B to H) from clutch pedal bracket (A) as shown in figure.



(A) Clutch pedal bracket
(B) Bushing C
(C) Clip
(D) O-ring
(E) Bushing S
(F) Spring S
(G) Rod S
(H) Bushing

6) Remove spacer, bushing and pedal pad from clutch pedal.



(A) Spacer
(B) Bushing
(C) Bushing
(D) Pedal pad
(E) Clutch pedal
(F) Bushing C

D: ASSEMBLY S504256A02

1. LHD MODEL S504256A0201

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.

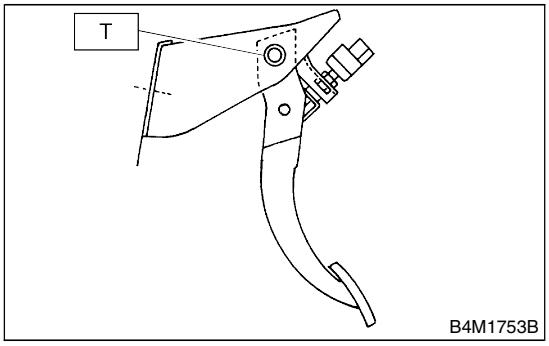
NOTE:
Clean up inside of bushings and apply grease before installing spacer.

4) Install hill holder cable to the clutch pedal. (Vehicle with hill holder)

2. RHD MODEL S504256A0202

1) Clean and apply grease to hole of sliding portion between clutch pedal and bushing.
2) Install pad, stopper, bushing C, spacer and bushing to clutch pedal.
3) Install rod S, spring S, bushing S, O-ring, clip, bushing, clutch switch and bushing C to clutch pedal bracket.
4) Install clutch pedal to pedal bracket.

Tightening torque:
T: 29 N·m (3.0 kgf-m, 21.7 ft-lb)



5) Install assist rod, bushing and assist spring to clutch pedal and pedal bracket.
6) Install PHV cable to clutch pedal. (Vehicle with hill holder).

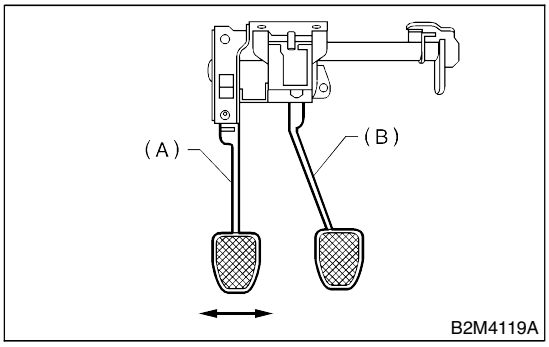
E: INSPECTION S504256A10

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

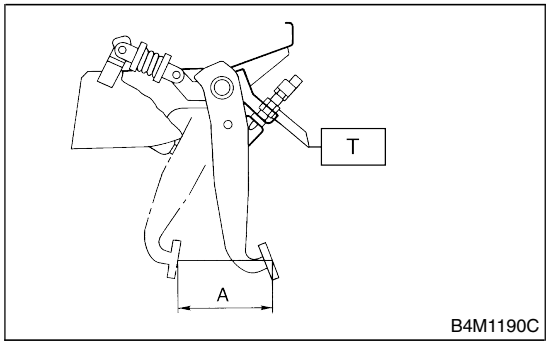
1) Turn clutch switch lock nuts until clutch pedal full stroke length is within specifications.

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.

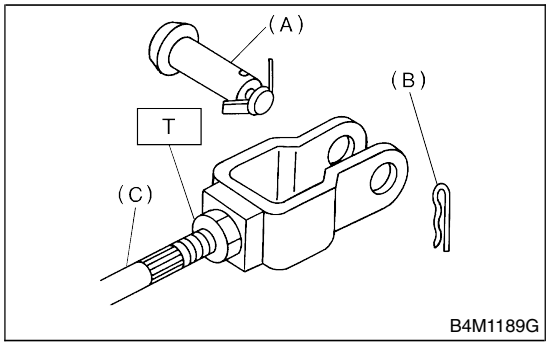
Specified clutch pedal full stroke: A
130 — 135 mm (5.12 — 5.31 in)

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)



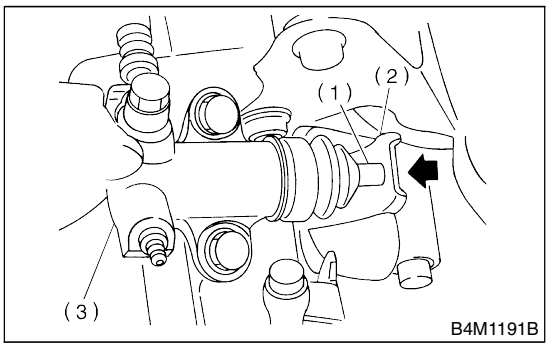
(A) Clevis pin
(B) Snap pin
(C) Push rod
(D) Lock nut

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-34 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.

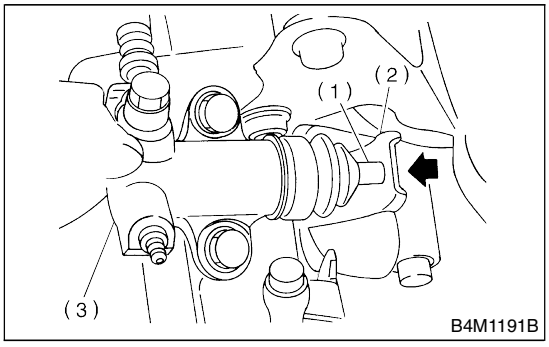
Specified clutch pedal full stroke:
130 — 135 mm (5.12 — 5.31 in)

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 new one. <Ref. to CL-25 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-33, Clutch Fluid.>

11. Clutch Switch S504258

A: REMOVAL S504258A18

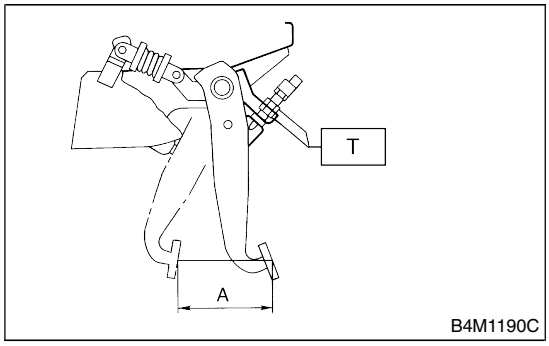
1) Remove battery ground terminal.
2) Disconnect connector from clutch switch.
3) Remove clutch switch.

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)

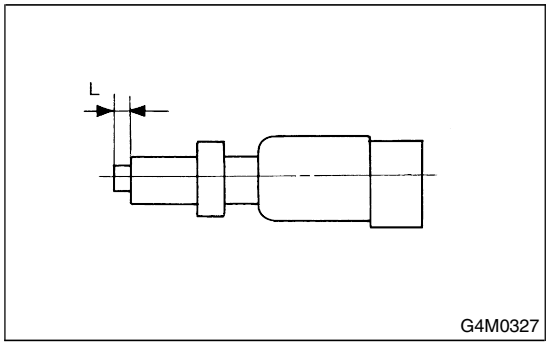


2) If clutch pedal stroke is out of specification, adjust the stroke. <Ref. to CL-41, ADJUSTMENT, Clutch Pedal.>
3) Connect clutch switch connector.

C: INSPECTION S504258A10

1) If clutch switch does not operate properly (or if it does not stop at the specified position), replace with new one.

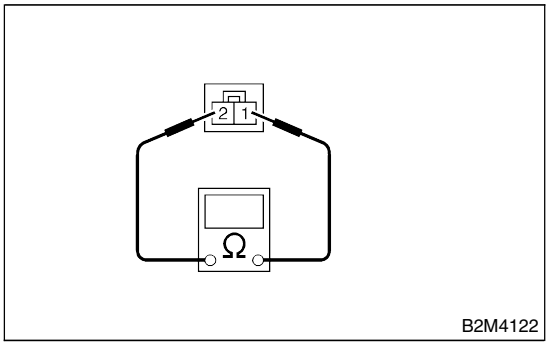
Specified position: L
$2^{+1.5}_{0}$mm ($0.079^{+0.059}_{0}$ in)



2) Check clutch switch continuity. If continuity is not as specified, replace the switch.

Switch position	Tester connection	Specified condition
Switch pin free	1 — 2	Continuity
Switch pin pushed in		No continuity

Clutch switch (With cruise control)



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-45 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.

MEMO:

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 POWER INDICATOR LIGHT.** Turn ignition switch to ON.	Does not the POWER indicator light light up?	Go to step **3**.	Go to step **4**.
3	**CHECK POWER INDICATOR LIGHT.** 1) Turn ignition switch to OFF. 2) Repair POWER indicator light circuit or power supply and ground line circuit. <Ref. to AT-28, Diagnostic Procedure for Power Indicator Light.> 3) Turn ignition switch to ON.	Is the POWER indicator 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-22, WITHOUT SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code.> With SUBARU SELECT MONITOR <Ref. to AT-23, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code.> NOTE: If the communication function of the select monitor cannot be executed normally, check the communication circuit. <Ref. to AT-36, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, Diagnostic Procedure for Select Monitor Communication.>	Is the trouble code displayed?	Go to step **6**. NOTE: Record all trouble codes.	Go to step **5**.

No.	Step	Check	Yes	No
5	**PERFORM THE GENERAL DIAGNOSTICS.** 1) Inspect using “Diagnostic Procedure for No-trouble Code”.<Ref. to AT-107, Diagnostic Procedure for No-trouble Code.> 2) Inspect using “Symptom Related Diagnostic”. <Ref. to AT-134, Symptom Related Diagnostic.> 3) Perform the clear memory mode. With SUBARU SELECT MONITOR <Ref. to AT-25, WITH SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> Without SUBARU SELECT MONITOR <Ref. to AT-25, WITHOUT SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> 4) Perform the inspection mode. <Ref. to AT-24, Inspection Mode.> Calling up the trouble code. Without SUBARU SELECT MONITOR <Ref. to AT-22, WITHOUT SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code.> With SUBARU SELECT MONITOR <Ref. to AT-23, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code.>	Is the trouble code displayed?	Go to step **6**.	Complete the diagnosis.
6	**PERFORM THE DIAGNOSIS.** 1) Inspect using “Diagnostics Chart with Trouble Code”.<Ref. to AT-42, Diagnostic Procedure with Trouble Code.> NOTE: For trouble code table, refer to “List of Diagnostic Trouble Code”.<Ref. to AT-27, List of Diagnostic Trouble Code.> 2) Repair trouble cause. 3) Perform the clear memory mode. With SUBARU SELECT MONITOR <Ref. to AT-25, WITH SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> Without SUBARU SELECT MONITOR <Ref. to AT-25, WITHOUT SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> 4) Perform the inspection mode. <Ref. to AT-24, Inspection Mode.> 5) Calling up the trouble code. Without SUBARU SELECT MONITOR <Ref. to AT-22, WITHOUT SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code.> With SUBARU SELECT MONITOR <Ref. to AT-23, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code.>	Is the trouble code displayed?	Inspect using “Diagnostics Chart with Diagnostic Connector”. <Ref. to AT-42, Diagnostic Procedure with Trouble Code.>	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
POWER switch	☐ ON ☐ OFF		
HOLD switch	☐ ON ☐ OFF		
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

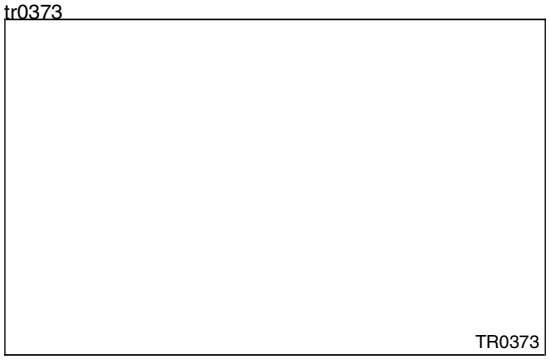
2. TRANSMISSION GROUND S004001A1002

Make sure that the ground terminal bolt is tightened securely.

- **Chassis side**

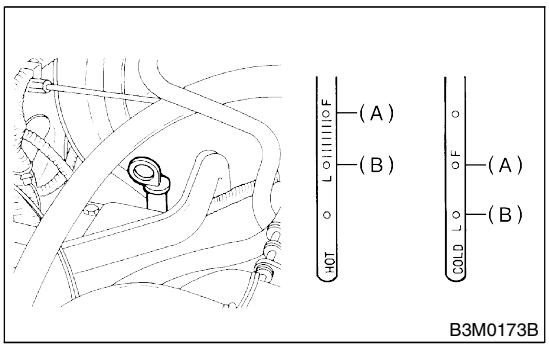
Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)

tr0373



3. ATF LEVEL S004001A1003

Make sure that ATF level is in the specification.

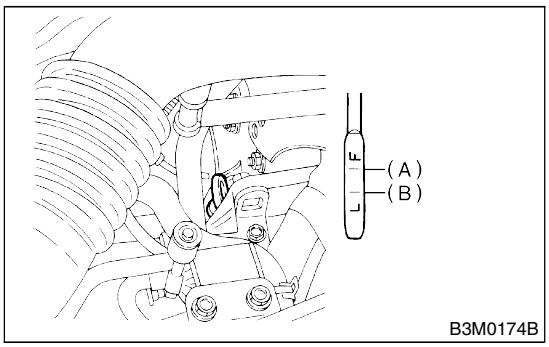


(A) Upper level
(B) Lower level

4. FRONT DIFFERENTIAL OIL LEVEL

S004001A1004

Make sure that front differential oil level is in the specification.



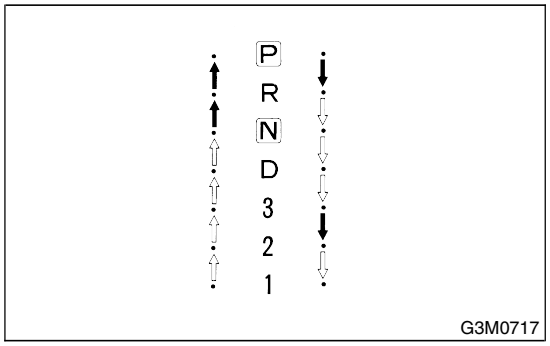
(A) Upper level
(B) Lower level

5. OPERATION OF SHIFT SELECT LEVER

S004001A1005

WARNING:
Stop the engine while checking operation of select lever.

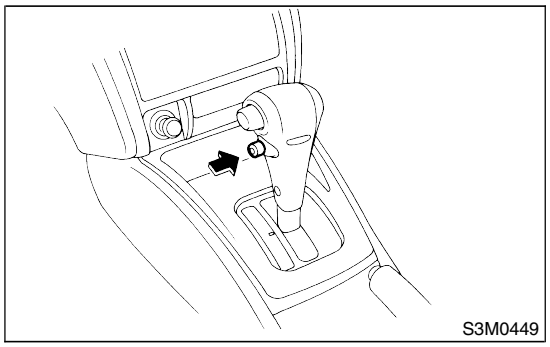
1) Check that select lever does not move from “N” to “R” without pushing the button.
2) Check that select lever does not move from “R” to “P” without pushing the button.
3) Check that select lever does not move from “P” to “R” without pushing the button.
4) Check that select lever does not move from “3” to “2” without pushing the button.



6. POWER SWITCH

S004001A1006

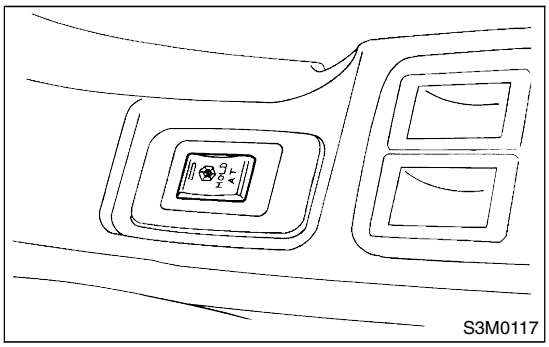
Make sure that POWER indicator light in combination meter comes ON, when turning power switch to ON.



7. HOLD SWITCH

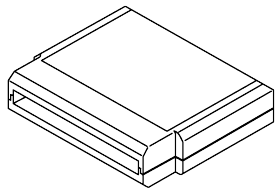
S004001A1007

Make sure that HOLD indicator light in combination meter comes ON, when turning hold switch to ON.



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

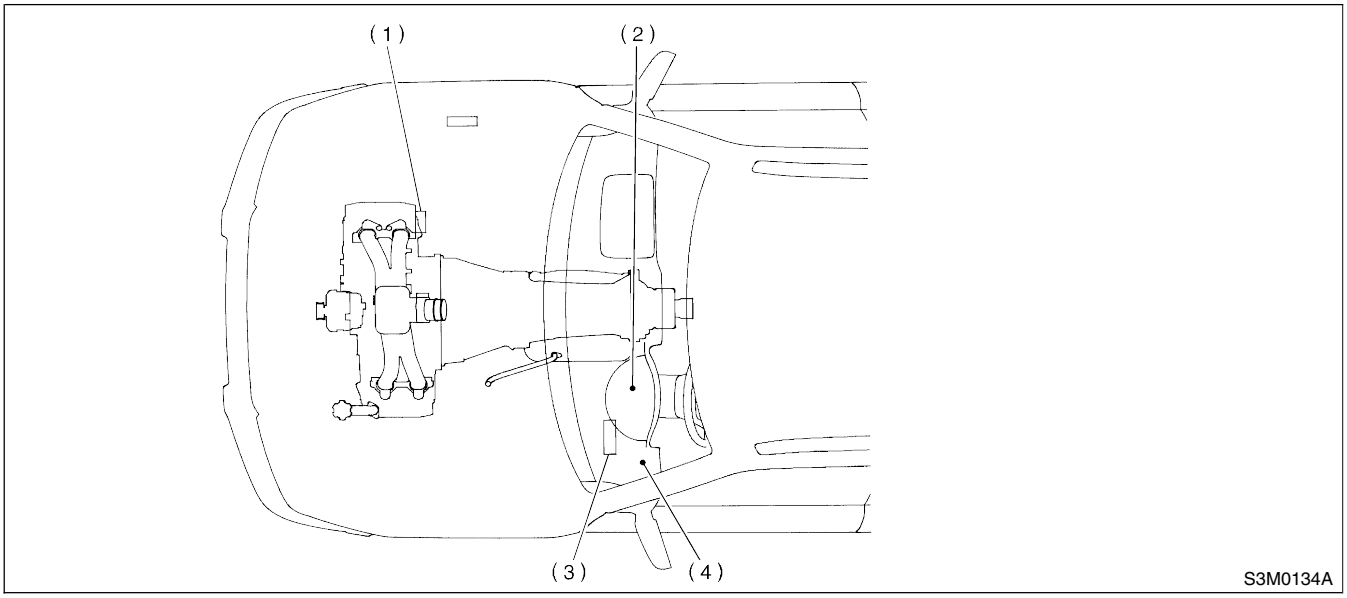
TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.
Oscilloscope	Used for measuring sensor.

4. Electrical Components Location S004507

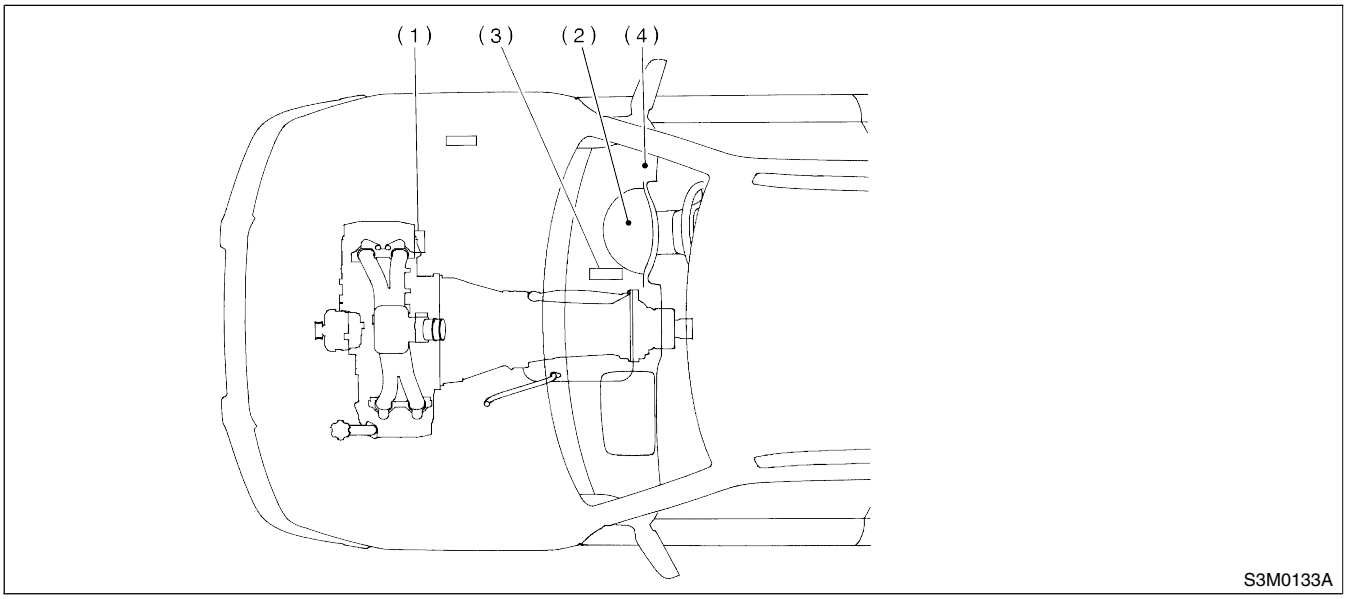
A: LOCATION S004507A13

1. CONTROL MODULE FOR MODEL WITHOUT OBD S004507A1304

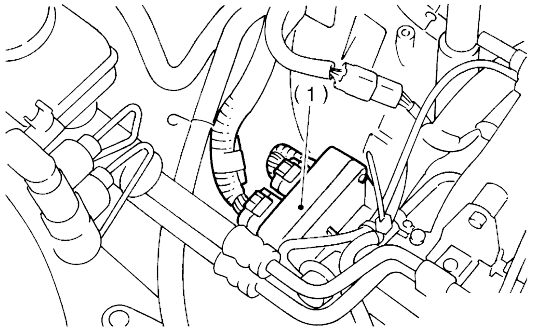
- LHD MODEL



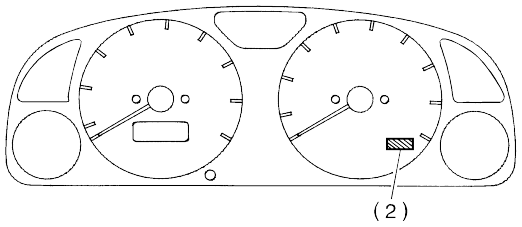
- RHD MODEL



(1) Engine control module (ECM)
(2) Power indicator light (AT diagnostic indicator light)
(3) Transmission control module (TCM)
(4) Data link connector

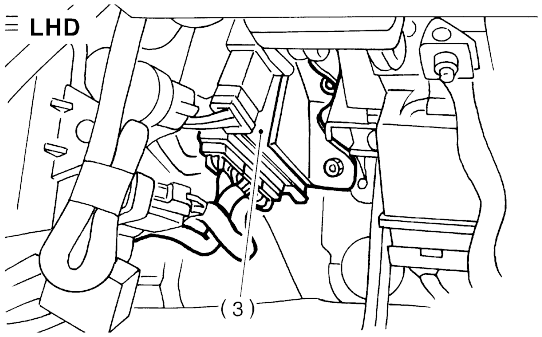


S2M0533C



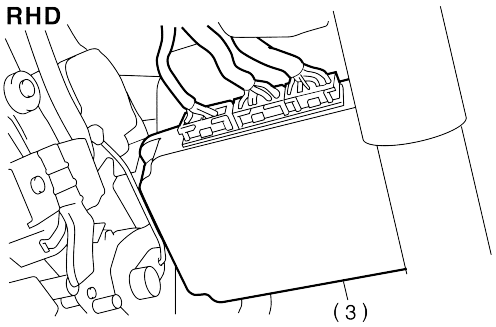
S3M0590A

LHD

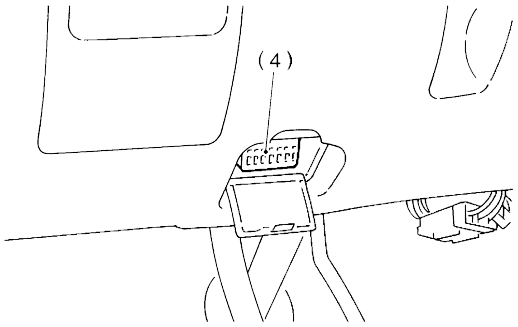


B3M1592B

RHD



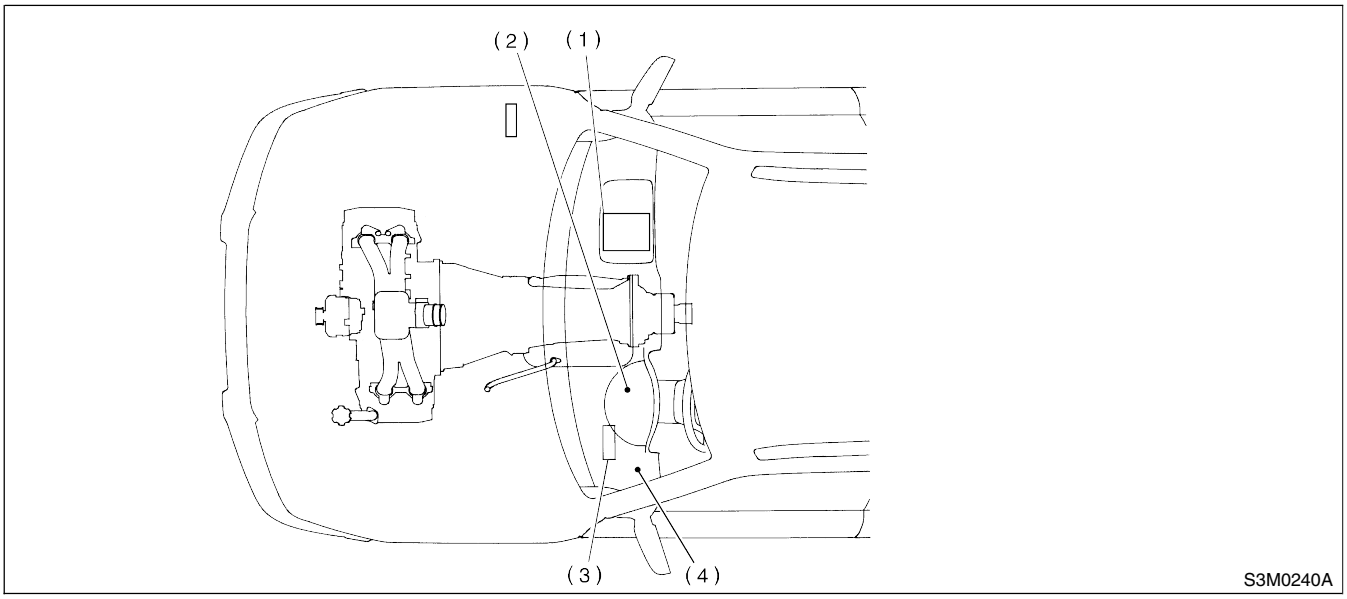
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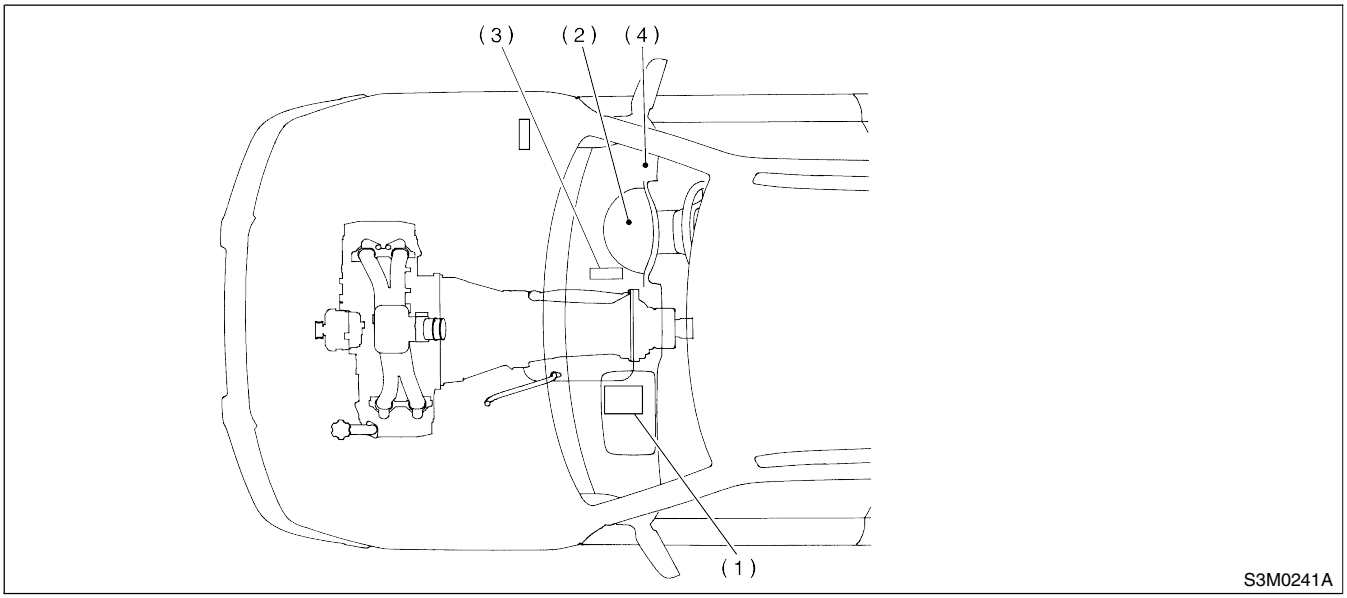
S2M0258C

2. CONTROL MODULE FOR MODEL WITH OBD S004507A1305

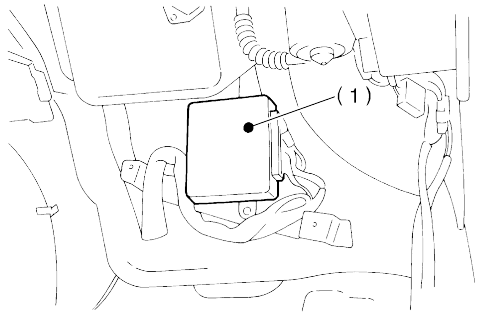
- LHD MODEL



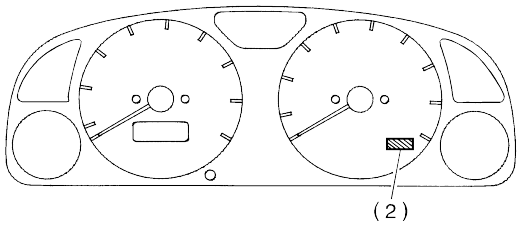
- RHD MODEL



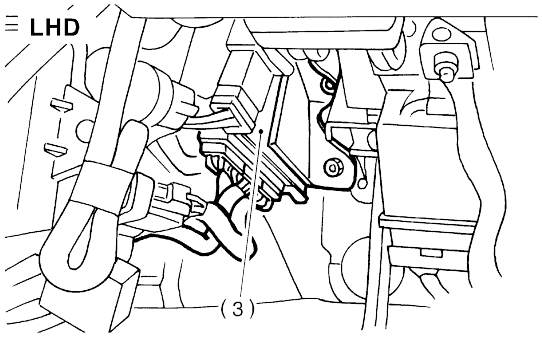
(1) Engine control module (ECM)
(2) Power indicator light (AT diagnostic indicator light)
(3) Transmission control module (TCM)
(4) Data link connector



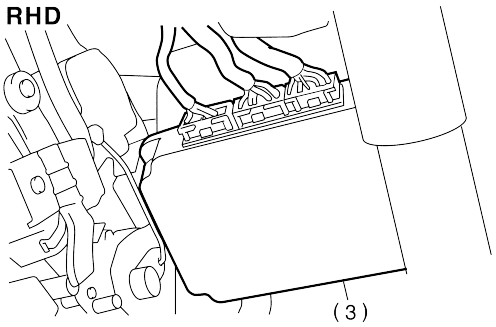
B3M0183E



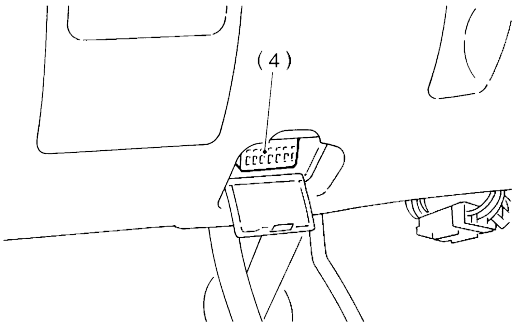
S3M0590A



B3M1592B



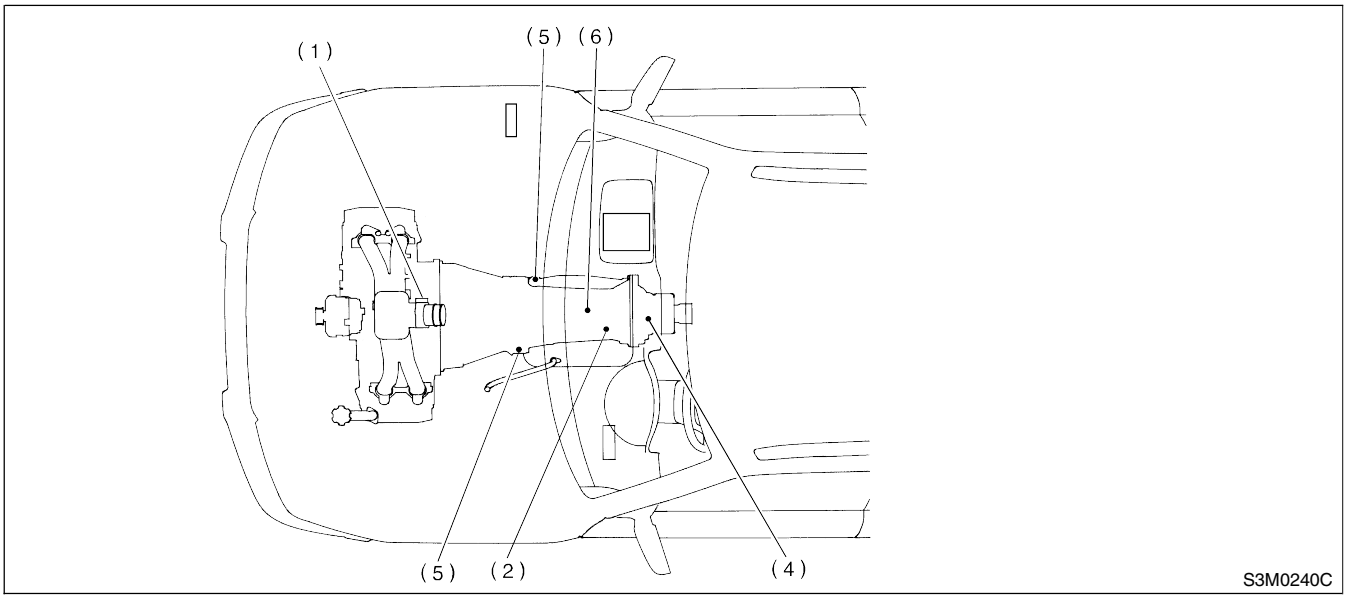
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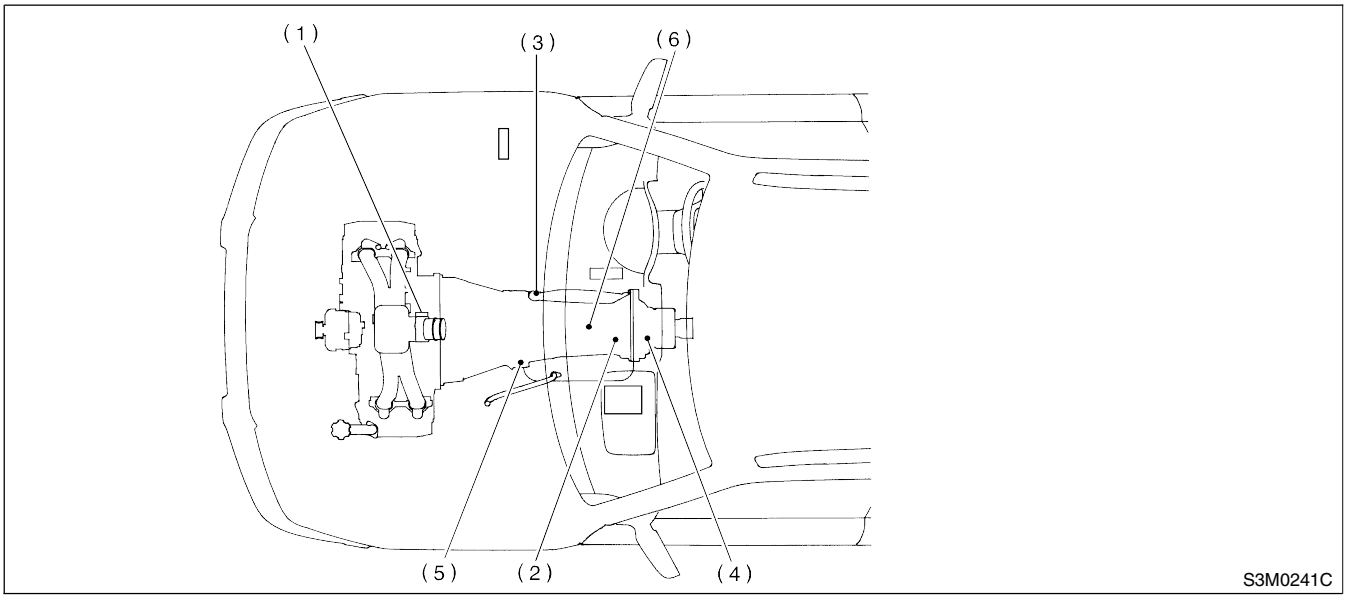
S2M0258C

3. SENSOR S004507A1302

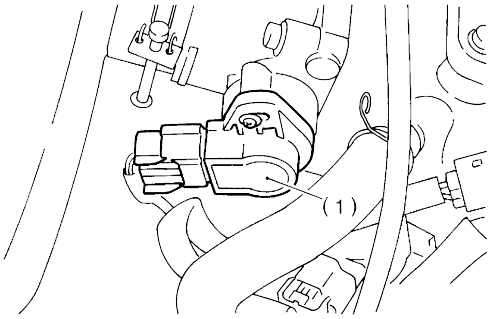
- LHD MODEL



- RHD MODEL



(1) Throttle position sensor
(2) Front vehicle speed sensor
(3) Inhibitor switch
(4) Rear vehicle speed sensor
(5) Torque converter torbine speed sensor
(6) ATF temperature sensor



S2M0262B

tr0387

TR0387

tr0388

TR0388

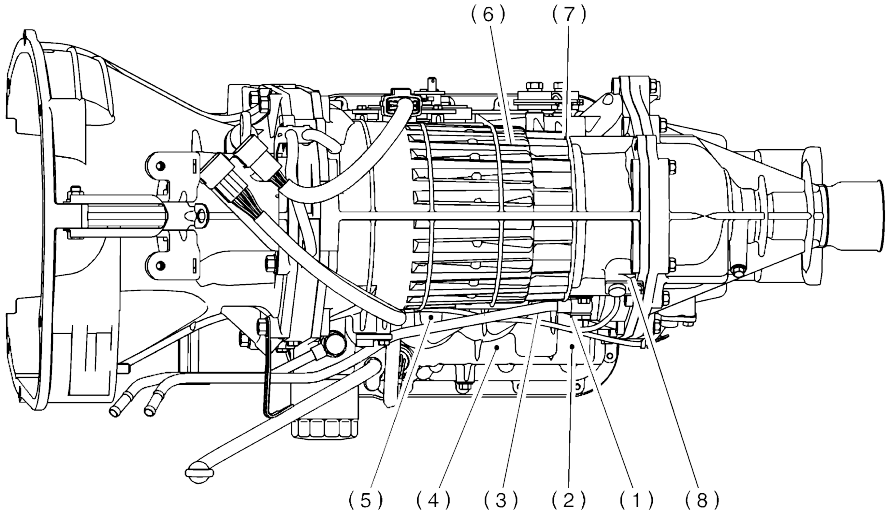
tr0389

TR0389

tr0390

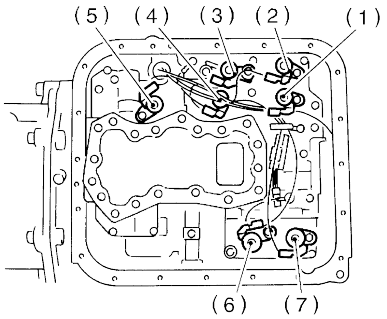
TR0390

4. SOLENOID S004507A1303

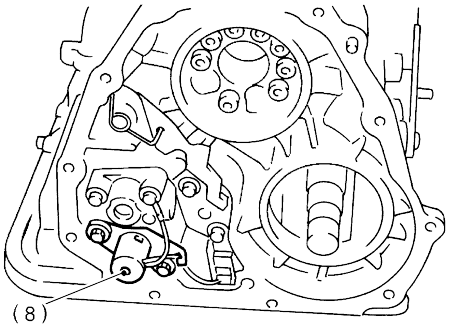


B3M1186A

(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



B2M2263D



B2M2264E

5. Transmission Control Module (TCM) I/O Signal S004506

A: ELECTRICAL SPECIFICATION S004506A08

tr0532

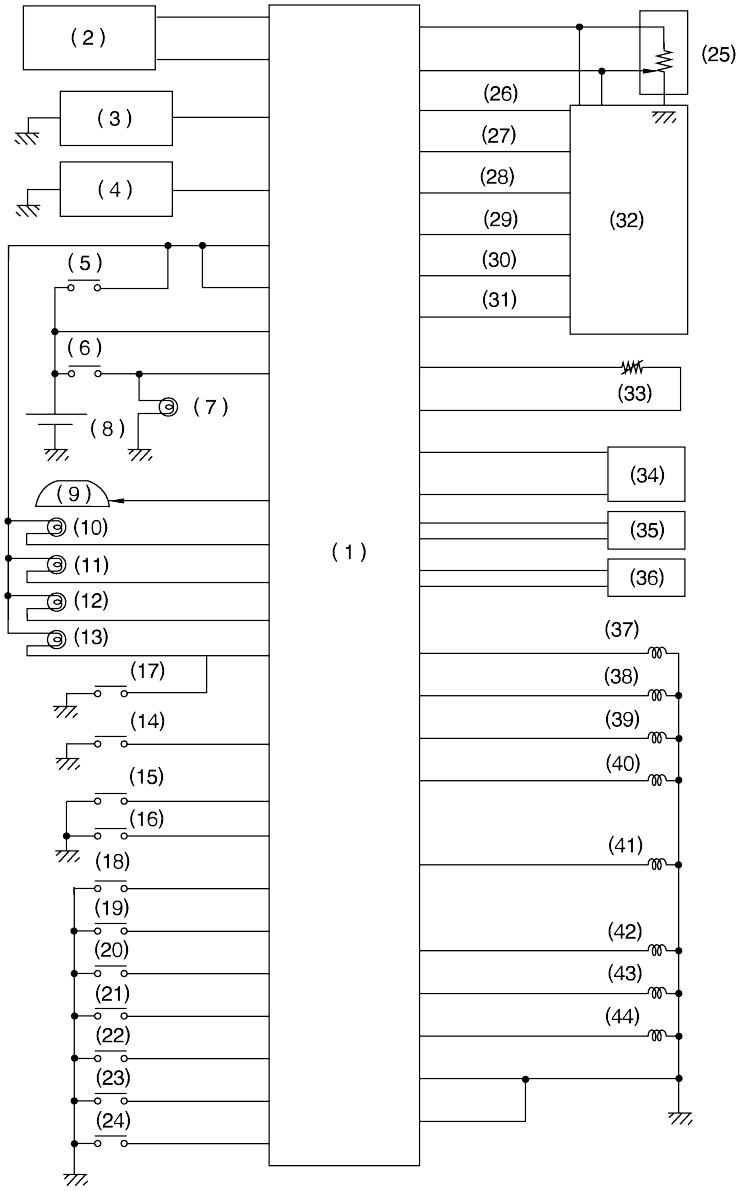


Check with ignition switch ON.						
Content		Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Back-up power supply		B56	1	Ignition switch OFF	10 — 16	—
Ignition power supply		B54	23	Ignition switch ON (with engine OFF)	10 — 16	—
		B54	24			
Inhibitor switch	"P" range switch	B55	1	Select lever in "P" range	Less than 1	—
				Select lever in any other than "P" range (except "N" range)	More than 8	
	"N" range switch	B55	14	Select lever in "N" range	Less than 1	—
				Select lever in any other than "N" range (except "P" range)	More than 8	
	"R" range switch	B55	3	Select lever in "R" range	Less than 1	—
				Select lever in any other than "R" range	More than 8	
	"D" range switch	B55	4	Select lever in "D" range	Less than 1	—
				Select lever in any other than "D" range	More than 8	
	"3" range switch	B55	5	Select lever in "3" range	Less than 1	—
				Select lever in any other than "3" range	More than 8	
	"2" range switch	B55	6	Select lever in "2" range	Less than 1	—
				Select lever in any other than "2" range	More than 8	
	"1" range switch	B55	7	Select lever in "1" range	Less than 1	—
				Select lever in any other than "1" range	More than 8	
Brake switch		B55	12	Brake pedal depressed.	More than 10.5	—
				Brake pedal released.	Less than 1	

Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Kick-down switch	B55	11	Throttle fully open.	Less than 1	—
			Throttle fully closed.	More than 6.5	
AT OIL TEMP warning light	B56	10	Light ON	Less than 1	—
			Light OFF	More than 9	
Throttle position sensor	B54	3	Throttle fully closed.	0.3 — 0.7	—
			Throttle fully open.	4.0 — 4.6	
Throttle position sensor power supply (with OBD model)	B54	2	Ignition switch ON (With engine OFF)	4.8 — 5.3	—
ATF temperature sensor	B54	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	24	Vehicle stopped.	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Front vehicle speed sensor	B55	18	Vehicle stopped.	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Torque converter turbine speed sensor	B55	8	Engine idling after warm-up. (D range)	0	450 — 650
			Engine idling after warm-up. (N range)	More than 1 (AC range)	
Vehicle speed output signal (Waveform)	B56	17	Vehicle speed at most 10 km/h (6 MPH)	Less than 1← →More than 4	—
Engine speed signal	B55	17	Ignition switch ON (with engine OFF)	More than 10.5	—
			Ignition switch ON (with engine ON)	8 — 11	
Cruise set signal	B55	22	When cruise control is set (SET lamp ON)	Less than 1	—
			When cruise control is not set (SET lamp OFF)	More than 6.5	
Torque control signal 1	B56	5	Ignition switch ON (with engine ON)	More than 4	—
Torque control signal 2	B56	14	Ignition switch ON (with engine ON)	More than 4	—
Torque control cut signal	B55	10	Ignition switch ON	8	—
Intake manifold pressure signal (Non-turbo model)	B54	1	Engine idling after warm-up.	1.2 — 1.8	—
Mass air flow signal (Turbo model)	B54	1	Engine idling after warm-up.	0.5 — 1.2	—
Shift solenoid 1	B54	22	1st or 4th gear	More than 9	10 — 16
			2nd or 3rd gear	Less than 1	
Shift solenoid 2	B54	5	1st or 2nd gear	More than 9	10 — 16
			3rd or 4th gear	Less than 1	

Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Line pressure duty solenoid	B54	9	Ignition switch ON (with engine OFF) Throttle fully closed after warm-up.	1.5 — 4.0	2.0 — 4.5
			Ignition switch ON (with engine OFF) Throttle fully open after warm-up.	Less than 0.5	
Lock-up duty solenoid	B54	7	When lock up occurs.	More than 8.5	10 — 17
			When lock up is released.	Less than 0.5	
Transfer duty solenoid	B54	6	Fuse on FWD switch	More than 8.5	10 — 17
			Fuse removed from FWD switch (with throttle fully open and with select lever in 1st gear).	Less than 0.5	
2-4 brake duty solenoid	B54	18	Throttle fully closed (with engine OFF) after warm-up.	1.5 — 4.0	2.0 — 4.5
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
2-4 brake timing solenoid	B54	16	1st gear	Less than 1	10 — 16
			3rd gear	More than 9	
Low clutch timing solenoid	B54	15	2nd gear	Less than 1	10 — 16
			4th gear	More than 9	
Hold switch	B55	16	Hold switch ON	Less than 1	—
			Hold switch OFF	More than 8	—
Power switch	B55	23	Power switch ON	Less than 1	—
			Power switch OFF	More than 10	—
Power indicator light	B56	11	Light ON	Less than 1	—
			Light OFF	More than 9	—
FWD switch	B55	20	Fuse removed	6 — 9.1	—
			Fuse installed	Less than 1	—
FWD indicator light	B56	2	Fused ON FWD switch	Less than 1	—
			Fuse removed from FWD switch	More than 9	—
ABS signal	B55	21	ABS switch ON	Less than 1	—
			ABS switch OFF	6.5 — 15	—
Sensor ground line 1	B54	20	—	0	Less than 1
Sensor ground line 2	B55	9	—	0	Less than 1
System ground line	B56	19	—	0	Less than 1
	B54	21			
Sensor ground line 3	B54	10	—	0	Less than 1
Sensor ground line 4	B54	19	—	0	Less than 1
AT diagnosis signal (Waveform)	B56	21	Ignition switch ON	Less than 1 ← → More than 4	—
Data link signal (Subaru Select Monitor)	B56	15	—	—	—
		6	—	—	

B: SCHEMATIC S004506A21



S3M0620

(1) Transmission control module
(2) Data link connector
(3) Cruise control module (Non-turbo model)
(4) ABS control module
(5) Ignition switch
(6) Brake switch
(7) Brake light
(8) Battery
(9) Combination meter (Speedometer circuit)
(10) ATF temperature warning light
(11) FWD indicator light
(12) POWER indicator light
(13) HOLD indicator light
(14) FWD switch
(15) Kick-down switch
(16) Power switch
(17) Hold switch
(18) "P" range switch
(19) "R" range switch
(20) "N" range switch
(21) "D" range switch
(22) "3" range switch
(23) "2" range switch
(24) "1" range switch
(25) Throttle position sensor
(26) Engine speed signal
(27) Torque control cut signal
(28) Torque control signal 2
(29) Torque control signal 1
(30) AT load signal
(31) AT diagnostic signal (with OBD)
(32) Engine control module
(33) ATF temperature sensor
(34) Torque converter turbine speed sensor
(35) Vehicle speed sensor 2 (Front)
(36) Vehicle speed sensor 1 (Rear)
(37) Shift solenoid 1
(38) Shift solenoid 2
(39) 2-4 brake timing solenoid
(40) Line pressure duty solenoid
(41) 2-4 brake duty solenoid
(42) Lock-up duty solenoid
(43) Low clutch timing solenoid
(44) Transfer duty solenoid

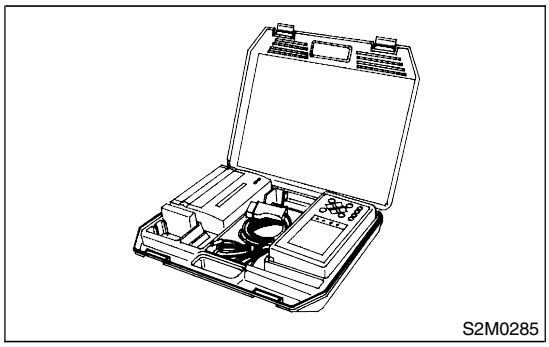
6. Subaru Select Monitor S004503

A: OPERATION S004503A16

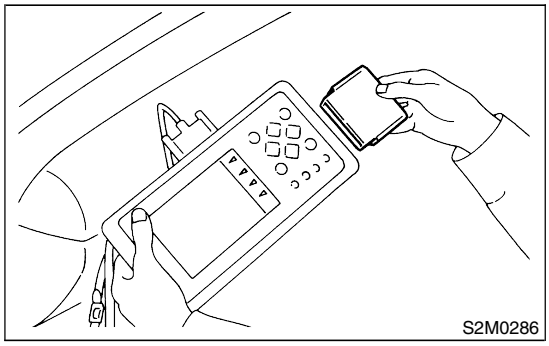
1. READ DIAGNOSTIC TROUBLE CODE

S004503A1601

1) Prepare Subaru Select Monitor kit.

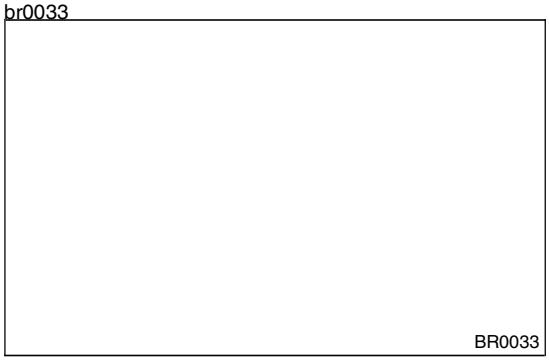

S2M0285

2) Connect diagnosis cable to Subaru Select Monitor.
3) Insert cartridge into Subaru Select Monitor. <Ref. to AT-7, PREPARATION TOOL, General Description.>


S2M0286

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).

br0033

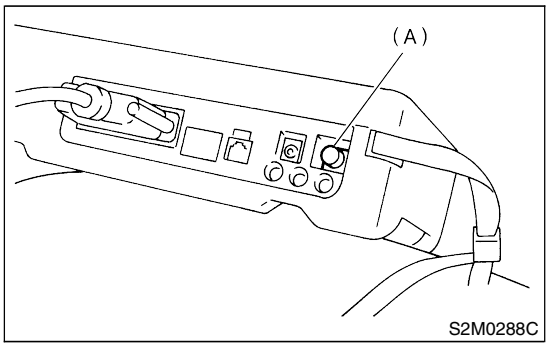

BR0033

(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.



S2M0288C

(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-27, List of Diagnostic Trouble Code.>

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
Power mode switch signal	Power Mode Switch	ON or OFF
Hold mode switch signal	Hold Mode Switch	ON or OFF
Kick down switch signal	Kick Down Switch	ON or OFF
Automatic transmission fluid temperature lamp	ATF Temperature 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.

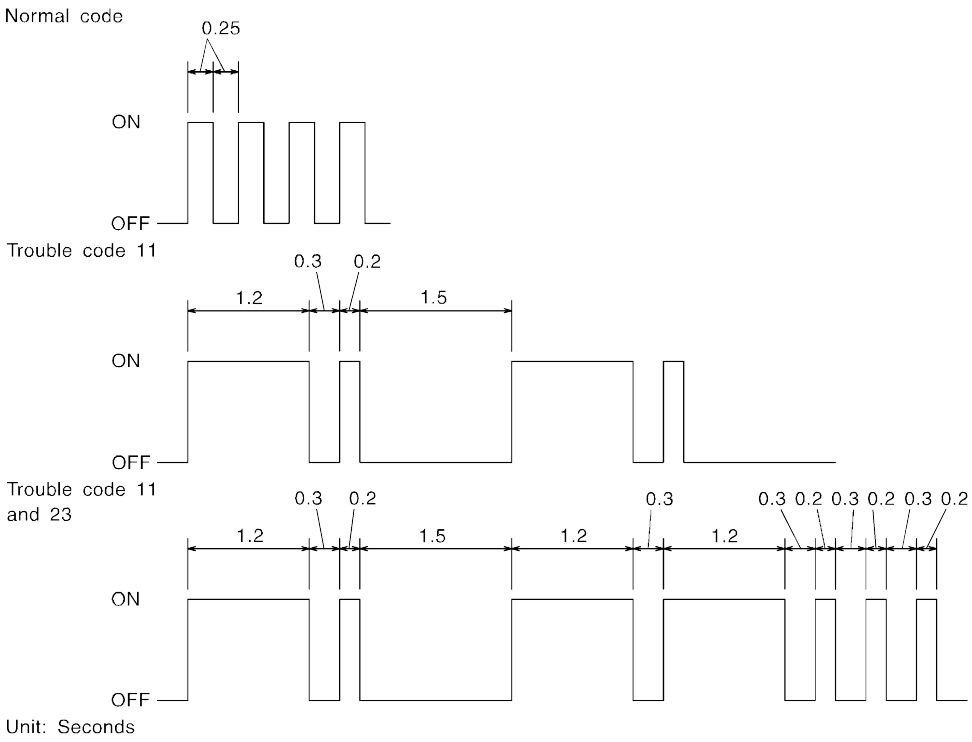
7. Read Diagnostic Trouble Code S004508

A: OPERATION S004508A16

1. WITHOUT SUBARU SELECT MONITOR S004508A1601

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-32, CHECK POWER SUPPLY AND GROUND LINE, Diagnostic Procedure for Power Indicator 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 trouble code. NOTE: Record all trouble codes.	Go to step **4**.
4	**CHECK INDICATOR LIGHT.**	Does indicator light remains illuminated?	Repair power indicator light circuit <Ref. to AT-28, Diagnostic Procedure for Power Indicator Light.>, or Inspect inhibitor switch, wiring, TCM, etc.	Calling up trouble code again.

The power indicator light flashes the code corresponding to the faulty part.
The long segment (1.2 sec on) indicates a “ten”, and the short segment (0.2 sec on) signifies a “one”.



2. WITH SUBARU SELECT MONITOR

S004508A1602

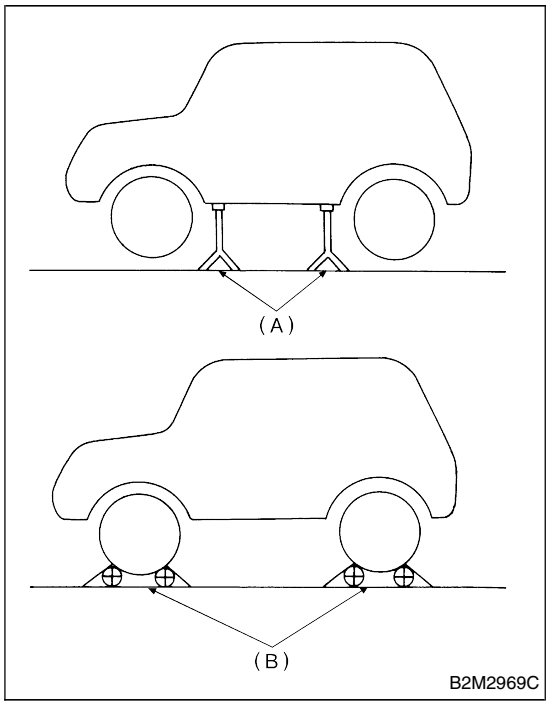
Refer to SUBARU SELECT MONITOR for information about how to obtain and understand trouble codes. <Ref. to AT-20, OPERATION, Subaru Select Monitor.>

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 light 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 trouble codes stored in the TCM memory.
- Be sure to remove the No. 4 fuse for at least the specified length of time. Otherwise, trouble codes may not be cleared.

2. WITH SUBARU SELECT MONITOR

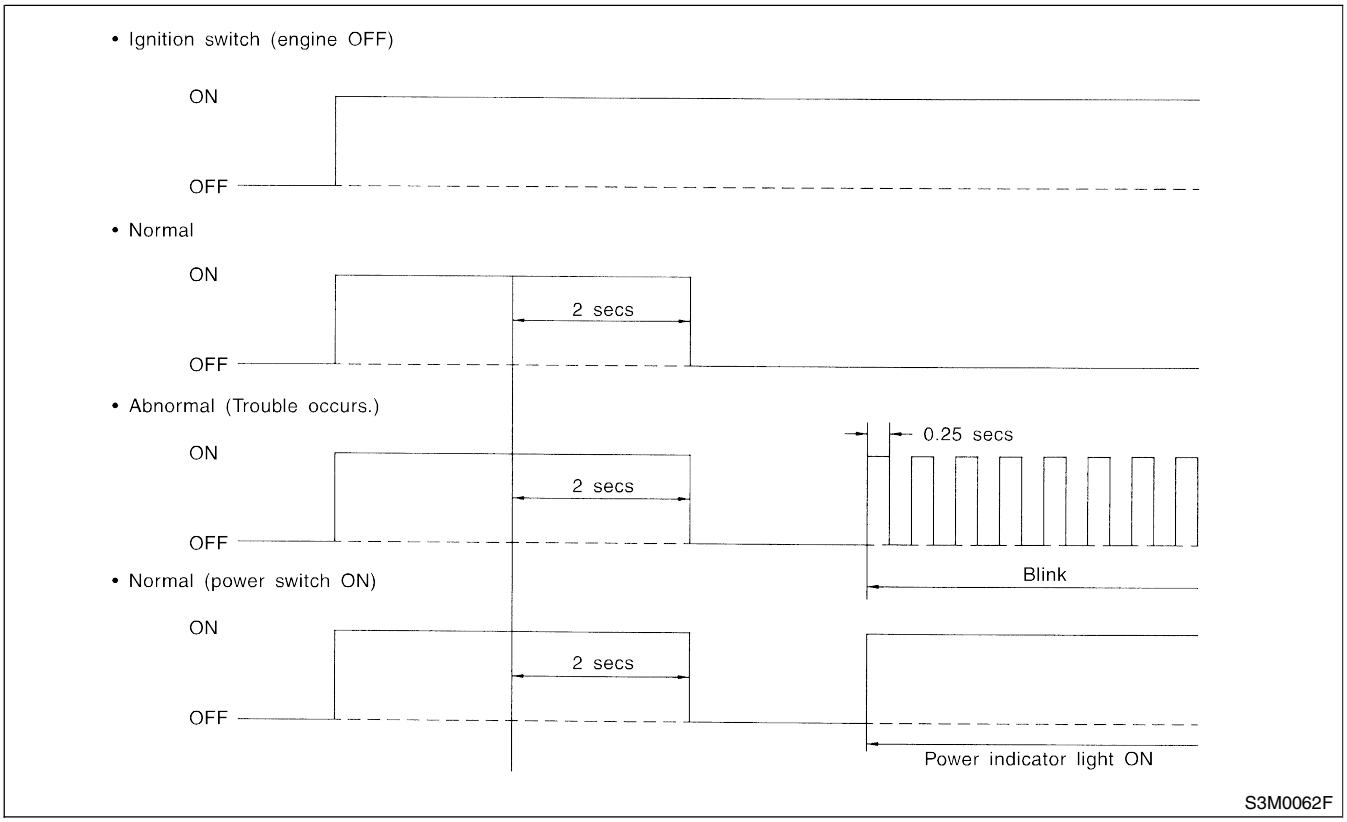
S004513A1601

Refer to SUBARU SELECT MONITOR for information about how to clear trouble codes.
<Ref. to AT-21, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

10. Power Indicator Light Display S004729

A: INSPECTION S004729A10

When any on-board diagnostics item is malfunctioning, the display on the power indicator 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 power indicator does not show a problem (although a problem is occurring), the problem can be determined by checking the performance characteristics of each sensor using the select monitor. Indicator signal is as shown in the figure.



11. List of Diagnostic Trouble Code S004511

A: LIST S004511A12

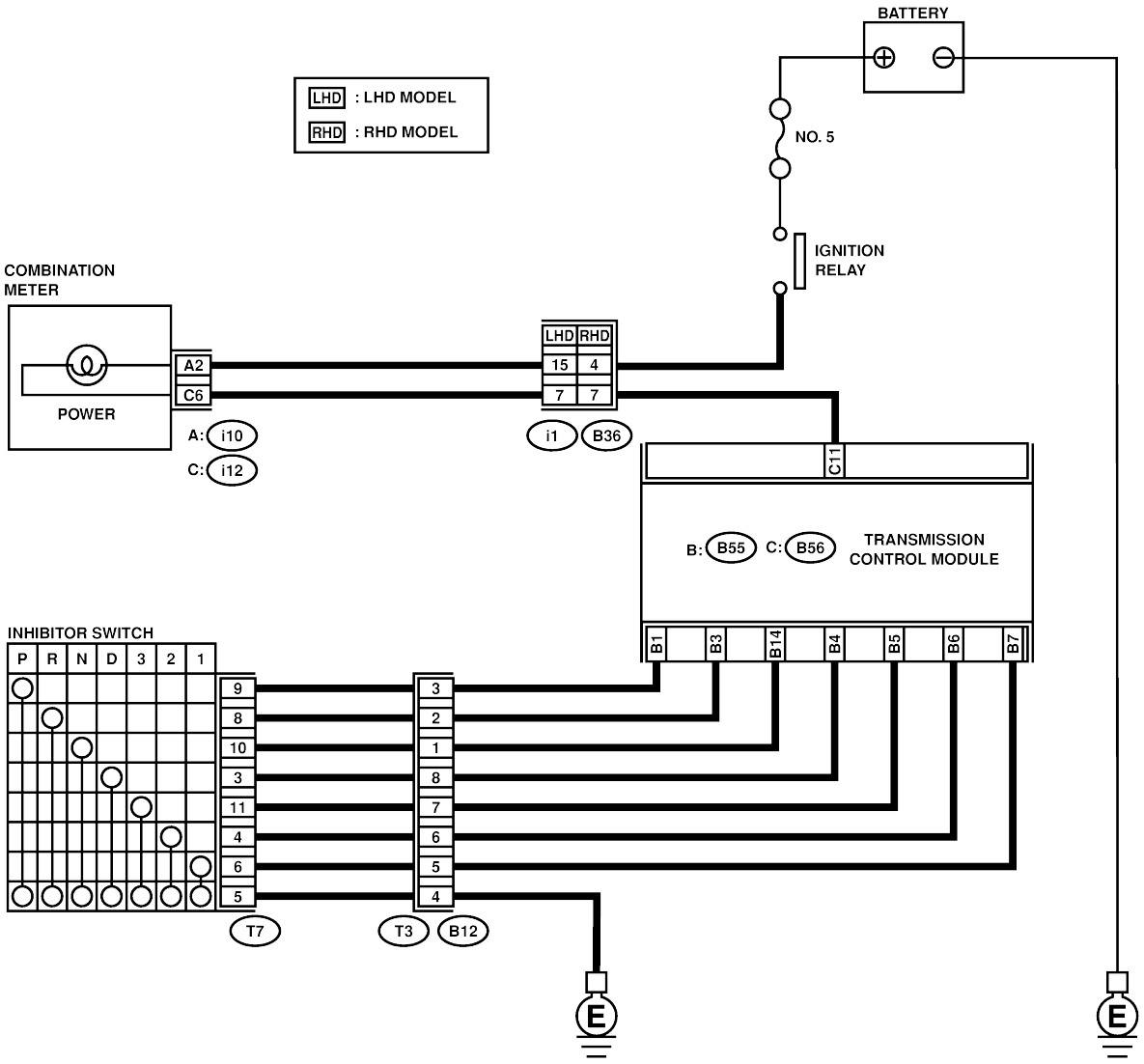
Trouble code	Item	Content of diagnosis	Index
11	Engine speed signal	Detects open or shorted input signal circuit.	<Ref. to AT-42, TROUBLE CODE 11 — ENGINE SPEED SIGNAL —, Diagnostic Procedure with Trouble Code.>
23	Mass air flow signal (Turbo model)	Detects open or shorted input signal circuit.	<Ref. to AT-44, TROUBLE CODE 23 — MASS AIR FLOW SIGNAL —, Diagnostic Procedure with Trouble Code.>
27	ATF temperature sensor	Detects open or shorted input signal circuit.	<Ref. to AT-46, TROUBLE CODE 27 — ATF TEMPERATURE SENSOR —, Diagnostic Procedure with Trouble Code.>
31	Throttle position sensor	Detects open or shorted input signal circuit.	<Ref. to AT-50, TROUBLE CODE 31 — THROTTLE POSITION SENSOR —, Diagnostic Procedure with Trouble Code.>
33	Front vehicle speed sensor	Detects open or shorted input signal circuit.	<Ref. to AT-58, TROUBLE CODE 33 — FRONT VEHICLE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>
36	Torque converter turbine speed sensor	Detects open or shorted input signal circuit.	<Ref. to AT-64, TROUBLE CODE 36 — TORQUE CONVERTER TURBINE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>
38	Torque control signal	Detects open or shorted input signal circuit.	<Ref. to AT-68, TROUBLE CODE 38 — TORQUE CONTROL SIGNAL —, Diagnostic Procedure with Trouble Code.>
45	Intake manifold pressure signal (Non-turbo model)	Detects open or shorted input signal circuit.	<Ref. to AT-70, TROUBLE CODE 45 — INTAKE MANIFOLD PRESSURE SIGNAL —, Diagnostic Procedure with Trouble Code.>
71	Shift solenoid 1	Detects open or shorted output signal circuit.	<Ref. to AT-72, TROUBLE CODE 71 — SHIFT SOLENOID 1 —, Diagnostic Procedure with Trouble Code.>
72	Shift solenoid 2	Detects open or shorted output signal circuit.	<Ref. to AT-76, TROUBLE CODE 72 — SHIFT SOLENOID 2 —, Diagnostic Procedure with Trouble Code.>
73	Low clutch timing solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-80, TROUBLE CODE 73 — LOW CLUTCH TIMING SOLENOID —, Diagnostic Procedure with Trouble Code.>
74	2-4 brake timing solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-84, TROUBLE CODE 74 — 2-4 BRAKE TIMING SOLENOID —, Diagnostic Procedure with Trouble Code.>
75	Line pressure duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-88, TROUBLE CODE 75 — LINE PRESSURE DUTY SOLENOID —, Diagnostic Procedure with Trouble Code.>
76	2-4 brake duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-92, TROUBLE CODE 76 — 2-4 BRAKE DUTY SOLENOID —, Diagnostic Procedure with Trouble Code.>
77	Lock-up duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-96, TROUBLE CODE 77 — LOCK-UP DUTY SOLENOID —, Diagnostic Procedure with Trouble Code.>
79	Transfer duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-100, TROUBLE CODE 79 — TRANSFER DUTY SOLENOID —, Diagnostic Procedure with Trouble Code.>
93	Rear vehicle speed sensor	Detects open or shorted input signal circuit.	<Ref. to AT-104, TROUBLE CODE 93 — REAR VEHICLE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>

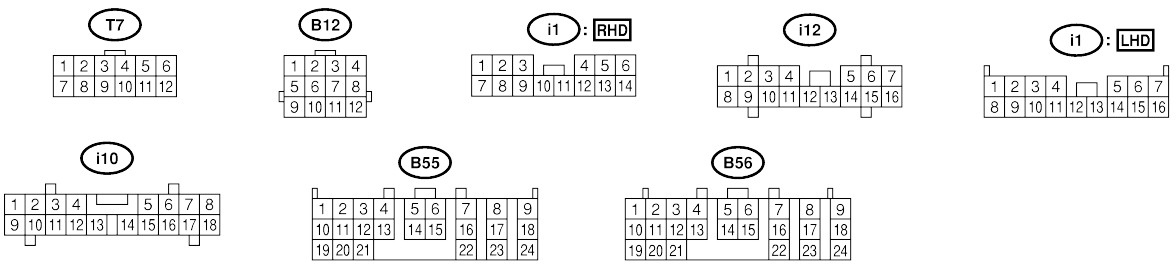
12. Diagnostic Procedure for Power Indicator Light S004730

A: POWER INDICATOR LIGHT DOES NOT COME ON OR GO OFF S004730G75

DIAGNOSIS:
The POWER Indicator light circuit is open or shorted.
TROUBLE SYMPTOM:
- When ignition switch is turned to ON (engine OFF), POWER indicator light does not illuminate.
- When on-board diagnostics is performed, POWER indicator light remains illuminated.

WIRING DIAGRAM:





S3M0621

No.	Step	Check	Yes	No
1	**CHECK POWER INDICATOR LIGHT.** Turn ignition switch to ON (engine OFF).	Does POWER indicator light illuminate?	Go to step **3**.	Go to step **2**.

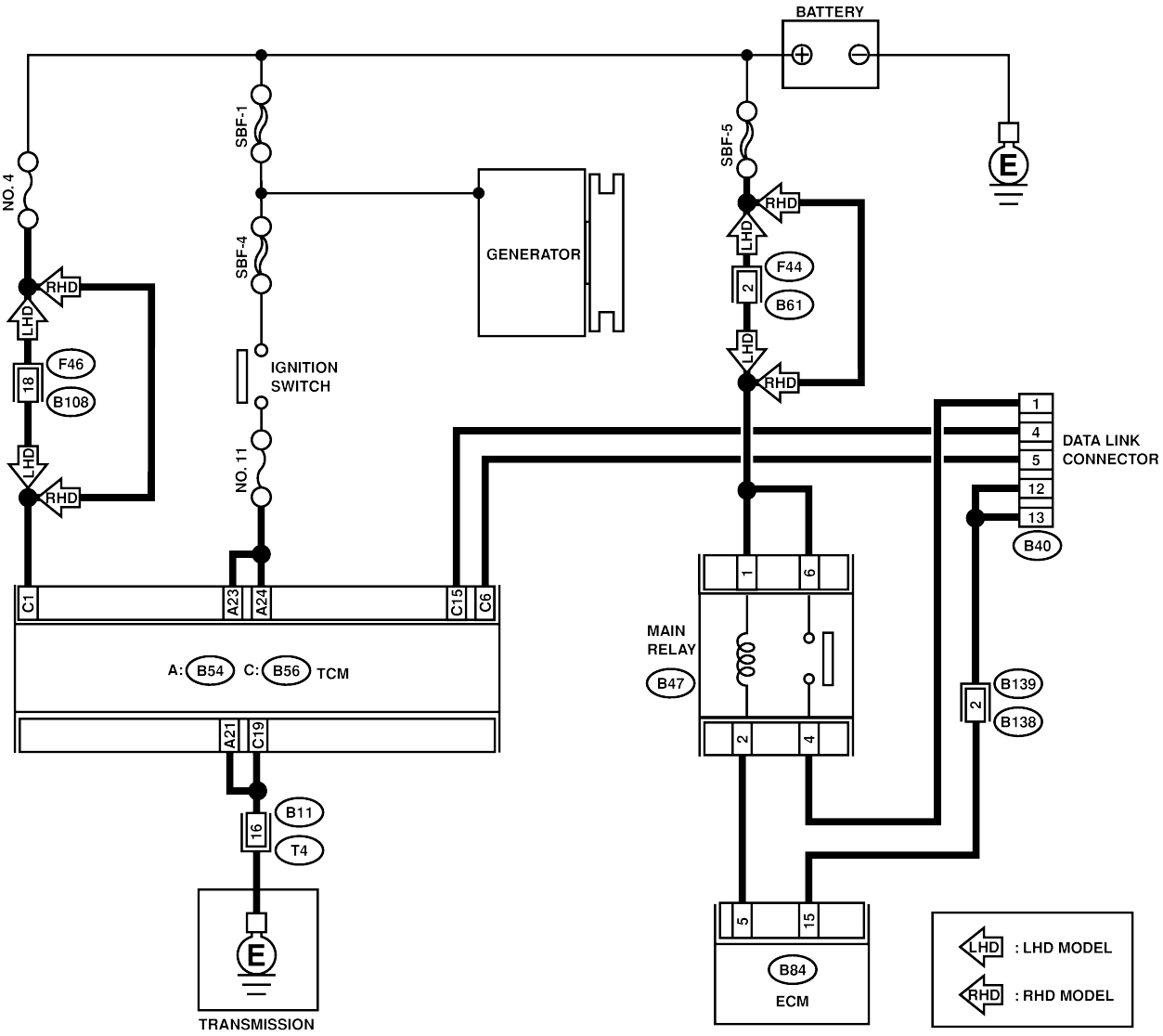
DIAGNOSTIC PROCEDURE FOR POWER INDICATOR LIGHT

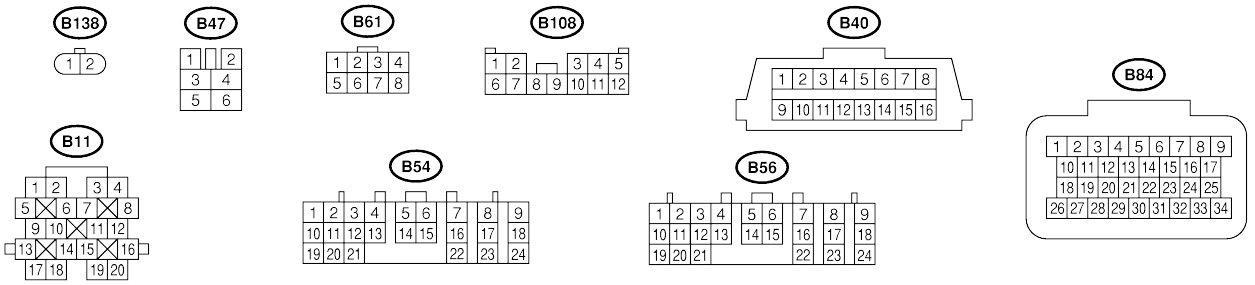
No.	Step	Check	Yes	No
2	**CHECK POWER INDICATOR LIGHT.** 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove POWER indicator light bulb from combination meter.	Is POWER indicator light bulb OK?	Go to step **4**.	Replace POWER indicator light bulb.
3	**CHECK POWER INDICATOR LIGHT.** Perform "Read Diagnostic Trouble Code". <Ref. to AT-22, WITHOUT SUBARU SELECT MONITOR OPERATION, Read Diagnostic Trouble Code.>	Does POWER indicator 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. 6 (+) — Chassis ground (–):***	Is voltage less than 1 V?	Go to step **7**.	Repair combination meter. <Ref. to IDI-15, 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*** ***(B56) No. 11 — (i12) No. 6:***	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*** ***(B56) No. 11 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Even if POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM.	Replace TCM. <Ref. to AT-48, 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-122, CHECK INHIBITOR SWITCH., Diagnostic Procedure for No-trouble Code.>
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 (B56) No. 11 (+) — Chassis ground (–):***	Is the resistance less than 1 MΩ?	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>	Repair short circuit in harness between combination meter connector and TCM connector.

B: CHECK POWER SUPPLY AND GROUND LINE S004730G86

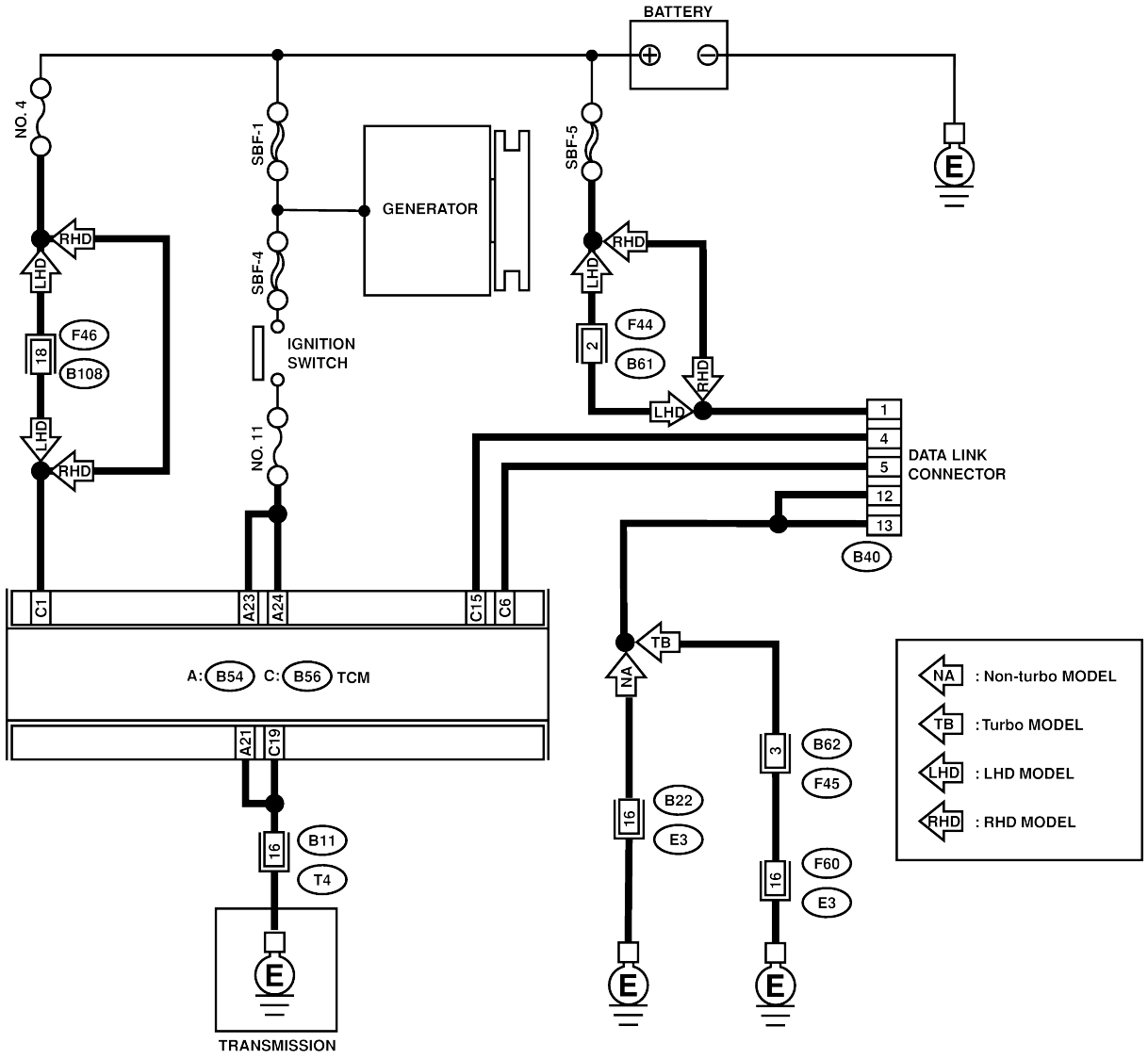
WIRING DIAGRAM:
WITHOUT OBD MODEL

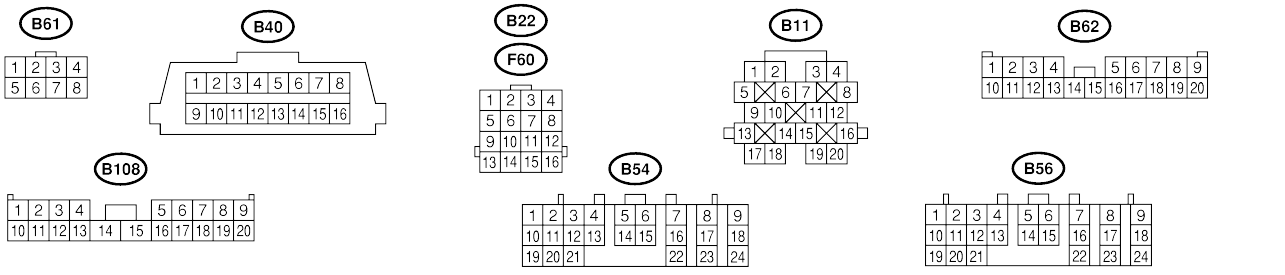




S3M0623

WITH OBD MODEL





S3M0622

DIAGNOSTIC PROCEDURE FOR POWER INDICATOR LIGHT

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*** ***(B56) No. 1 (+) — 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*** ***(B56) No. 19 — (B11) No. 16*** ***(B54) No. 21 — (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-48, Transmission Control Module (TCM).>

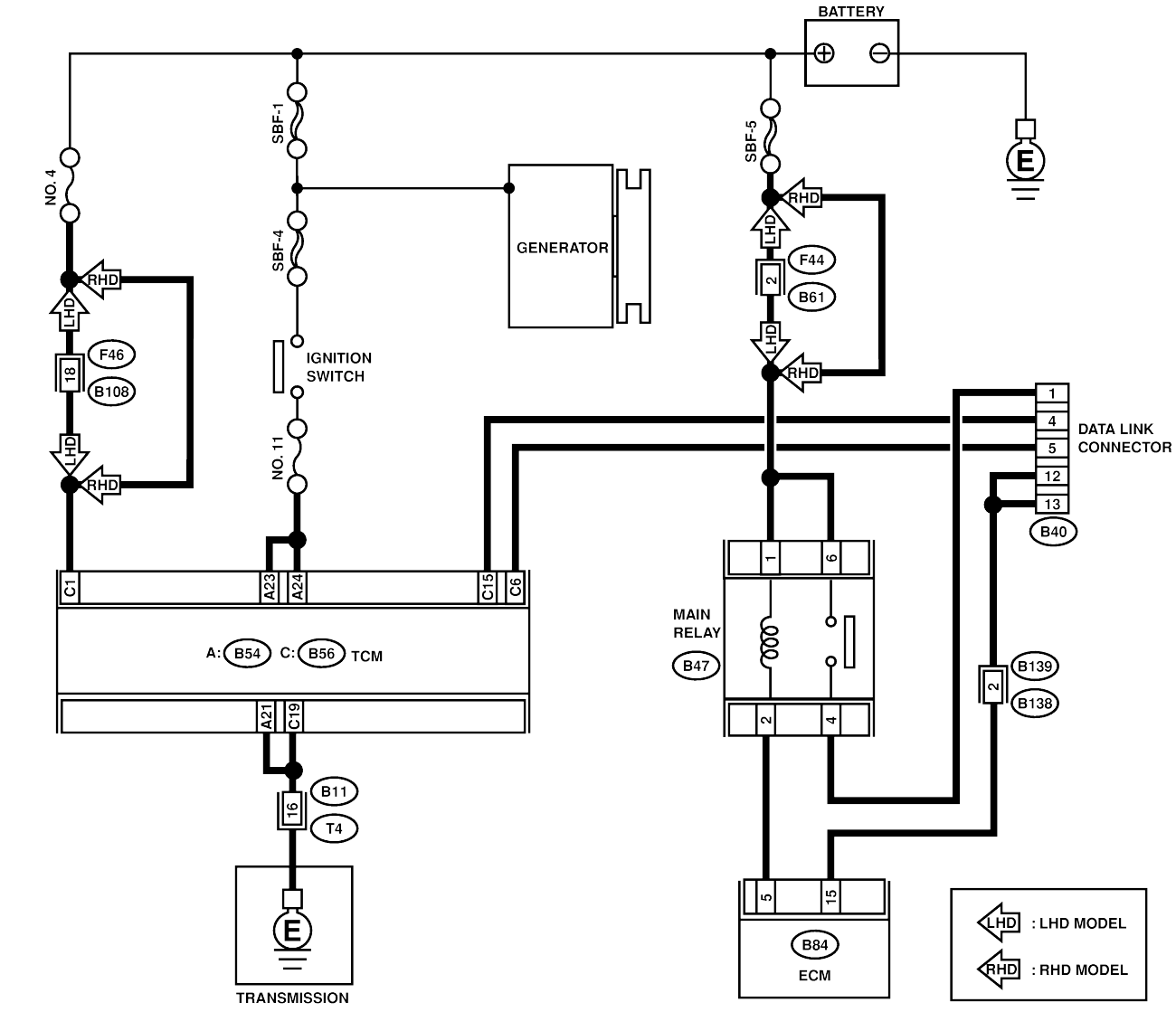
13. Diagnostic Procedure for Select Monitor Communication S004782

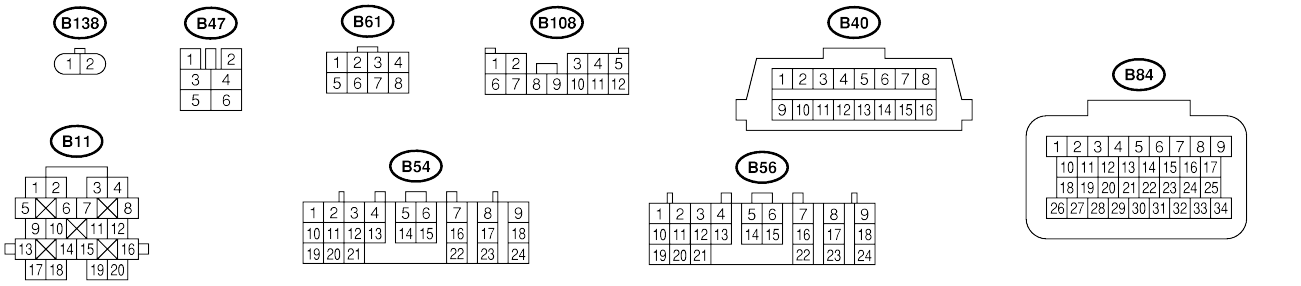
A: COMMUNICATION FOR INITIALIZING IMPOSSIBLE S004782E34

DIAGNOSIS:
- Faulty harness connector

TROUBLE SYMPTOM:
- Select monitor communication failure

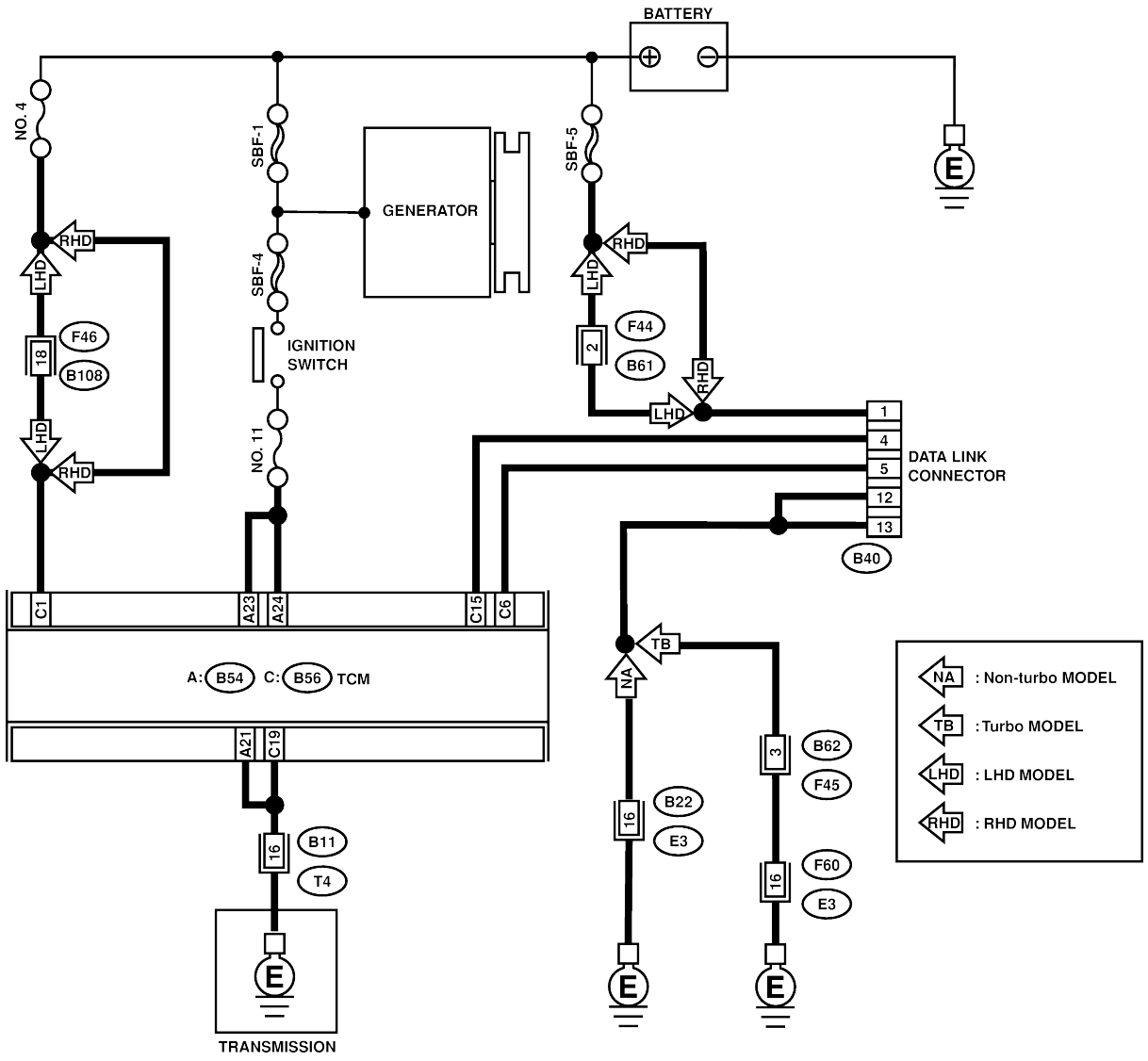
WIRING DIAGRAM:
WITHOUT OBD

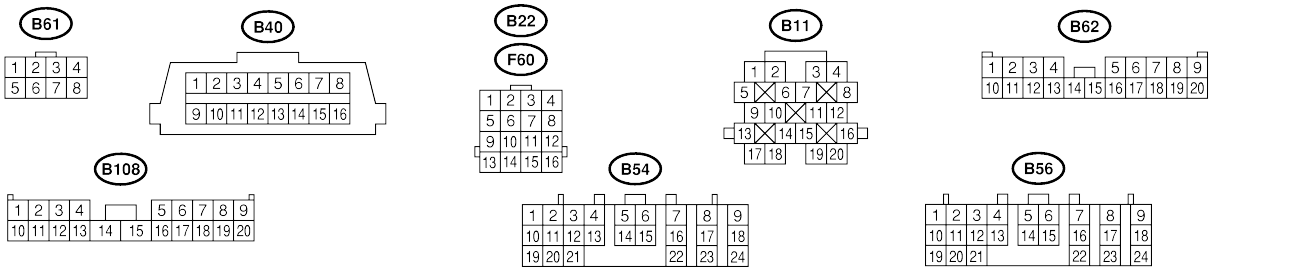




S3M0623

WITH OBD





S3M0622

No.	Step	Check	Yes	No
1	**CHECK THE VEHICLE.**	Is the target vehicle without OBD?	Go to step **2**.	Go to step **10**.
2	**CHECK MAIN RELAY.** 1) Turn ignition switch to OFF. 2) Remove main relay. 3) Connect battery to main relay terminals No. 2 (+) and No. 1 (–). 4) Measure resistance between main relay terminal. ***Terminal*** ***No. 4 — No. 6***	Is the resistance less than 10 Ω?	Go to step **3**.	Replace main relay.
3	**CHECK GROUND CIRCUIT OF ECM.** <Ref. to AT-50, TROUBLE CODE 31 — THROTTLE POSITION SENSOR —, Diagnostic Procedure with Trouble Code.>	Is there any trouble?	Repair ground terminal and/or ground circuit of ECM.	Go to step **4**.
4	**CHECK HARNESS BETWEEN ECM AND MAIN RELAY.** 1) Remove main relay connector. 2) Measure voltage between main relay and chassis ground. ***Connector & terminal*** ***(B47) No. 1 — Chassis ground:***	Is the voltage more than 10 V?	Go to step **5**.	Repair short circuit in harness between battery and main relay connector.
5	**CHECK INPUT VOLTAGE TO ECM.** 1) Install main relay. 2) Disconnect ECM connector. 3) Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B84) No. 5 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **6**.	Repair open or short circuit in harness between ECM and main relay connector, then replace ECM.
6	**CHECK INPUT VOLTAGE TO SUBARU SELECT MONITOR.** 1) Connect main relay connector. 2) Turn ignition switch to ON. 3) 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 **7**.	Repair harness and connector between data link connector and battery.
7	**CHECK SUBARU SELECT MONITOR GROUND CIRCUIT.** 1) Turn ignition switch to OFF. 2) Disconnect ECM connector. 3) Measure resistance between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 12 — Chassis ground:*** ***(B40) No. 13 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8**.	Repair harness and connector between data link connector and ECM connector.
8	**CHECK HARNESS BETWEEN BATTERY AND MAIN RELAY.** 1) Connect ECM connector. 2) 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 **9**.	Replace ECM.

No.	Step	Check	Yes	No
9	**CHECK SUBARU SELECT MONITOR GROUND CIRCUIT.** Measure resistance between data link connector and ECM connector. ***Connector & terminal*** ***(B40) No. 12 — (B84) No. 15:*** ***(B40) No. 13 — (B84) No. 15:***	Is the resistance less than 1 Ω?	Go to step **12**.	Repair harness and connector between data link connector and ECM connector, or replace ECM.
10	**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 **11**.	Repair harness and connector between battery and data link connector, and poor contact in coupling connector.
11	**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 **12**.	Repair open circuit in harness between data link connector and ground terminal, and poor contact in coupling connector.
12	**CHECK COMMUNICATION OF SELECT MONITOR.** 1) Connect ECM connector (Vehicle without OBD) 2) Turn ignition switch to ON. 3) 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 **17**.	Go to step **13**.
13	**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 **19**.	Go to step **14**.
14	**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 **15**.
15	**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 **16**.

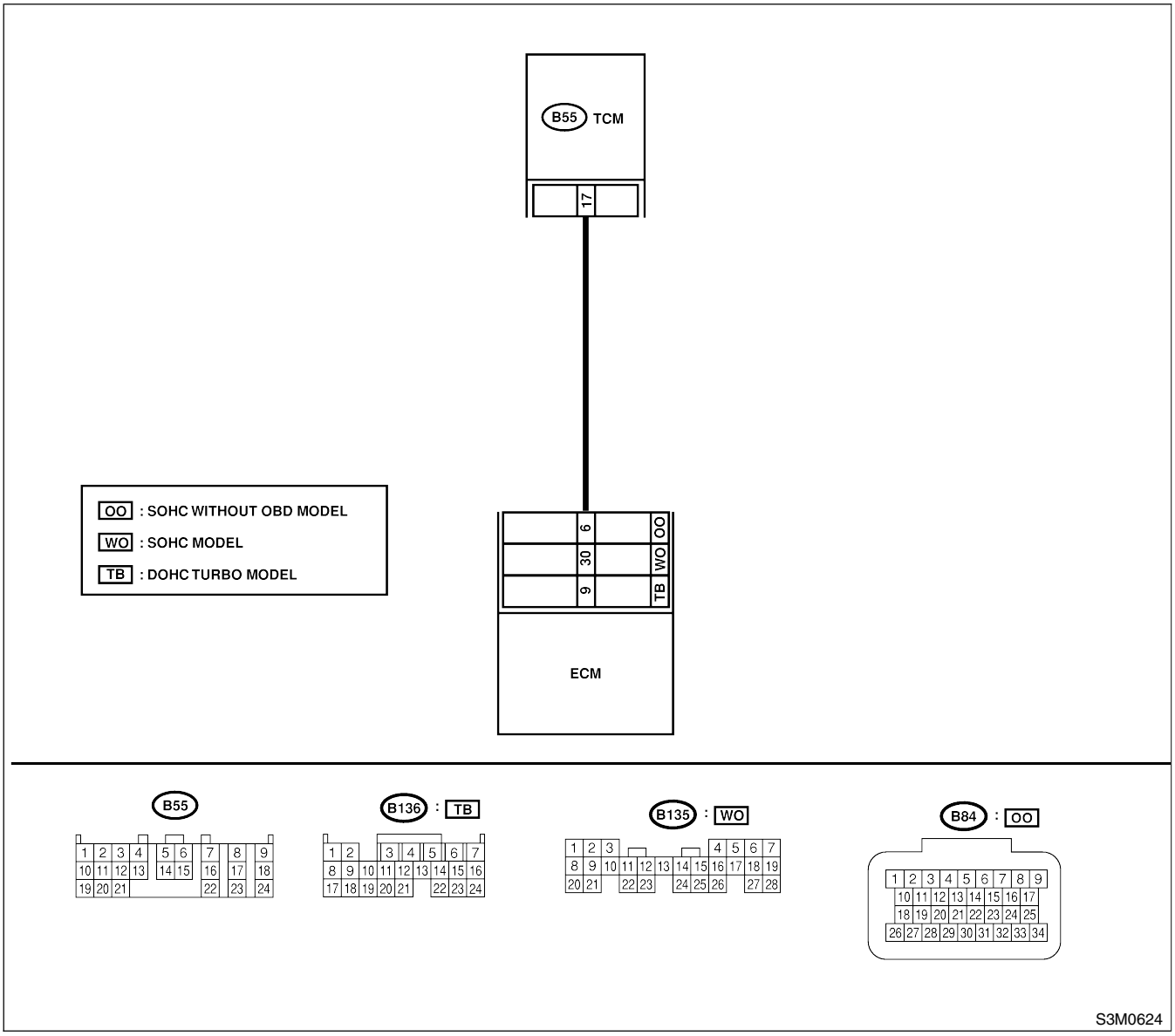
No.	Step	Check	Yes	No
16	**CHECK COMMUNICATION OF SELECT MONITOR.** 1) Turn ignition switch to OFF. 2) Connect ABSCM&H/U module connector. 3) Disconnect cruise control module connector. 4) Check whether communication to other systems (such as engine etc.) can be executed normally. NOTE: If the vehicle is not equipped with cruise control, Go to step **17**.	Are the name and year of the system displayed on the select monitor?	Inspect cruise control module.	Go to step **17**.
17	**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 **18**.	Repair harness and connector between each control module and data link connector.
18	**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.
19	**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 **20**.	Repair harness and connector between TCM and data link connector.
20	**CHECK INSTALLATION OF TCM CONNECTOR.** Turn ignition switch to OFF.	Is TCM connector inserted into TCM?	Go to step **21**.	Insert TCM connector into TCM.
21	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in control module and data link connector?	Repair poor contact.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

14. Diagnostic Procedure with Trouble Code S004509

A: TROUBLE CODE 11 — ENGINE SPEED SIGNAL — S004509C39

DIAGNOSIS:
Engine speed input signal circuit is open or shorted.
TROUBLE SYMPTOM:
- No lock-up (after engine warm-up).
- POWER indicator light remains on when vehicle speed is “0”.

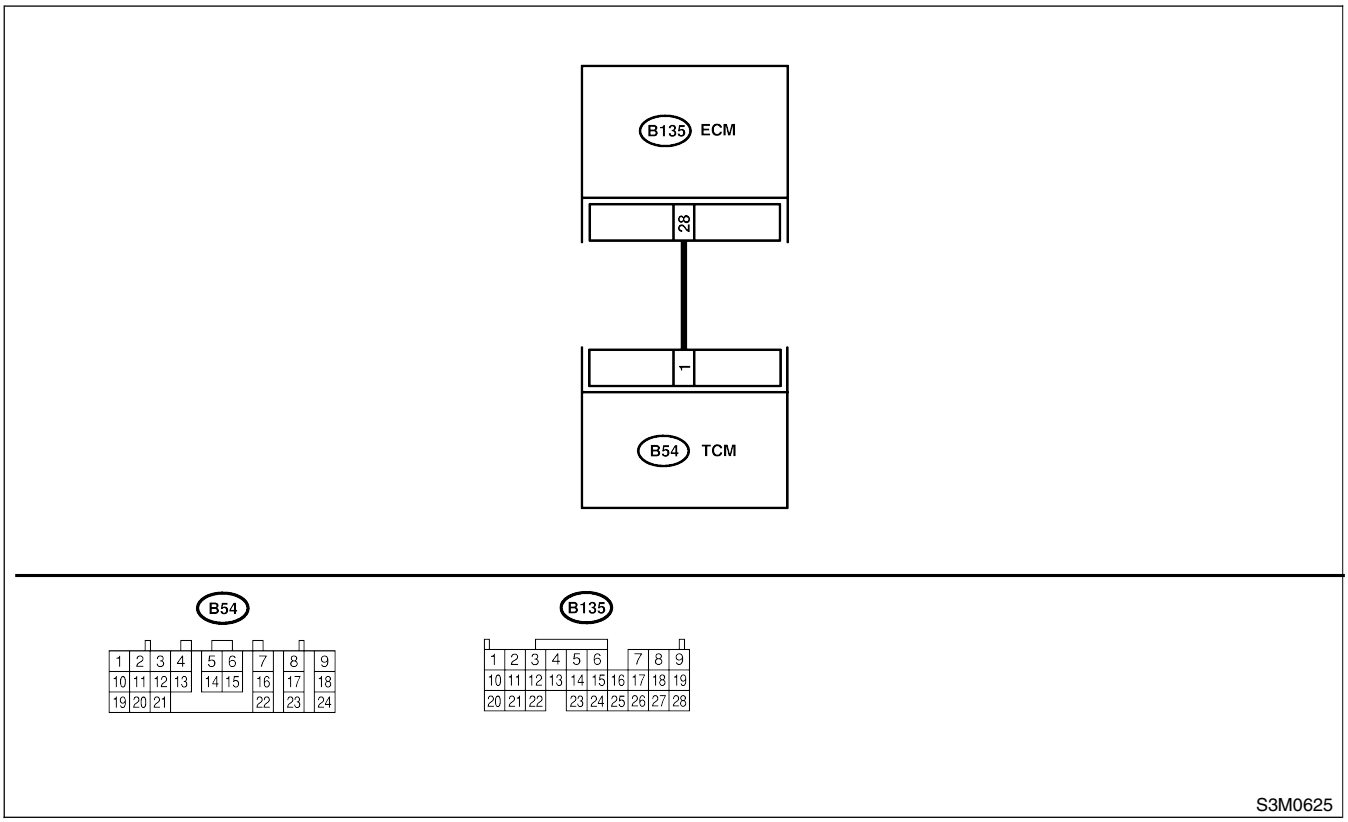
WIRING DIAGRAM:



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*** ***SOHC model:*** ***(B55) No. 17 — (B135) No. 30:*** ***SOHC without OBD:*** ***(B55) No. 17 — (B84) No. 6:*** ***DOHC TURBO:*** ***(B55) No. 17 — (B136) No. 9:***	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. 17 — 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. 17 (+) — Chassis ground (–):***	Is the voltage more than 10.5 V?	Even if “POWER” indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in 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 “POWER” indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in 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 TROUBLE CODE 11.**	Replace ECM with a new one. Does the trouble code appear again, after the memory has been cleared?	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>	Replace ECM.

B: TROUBLE CODE 23 — MASS AIR FLOW SIGNAL — S004509I01

DIAGNOSIS:
Input signal circuit of TCM from ECM is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:

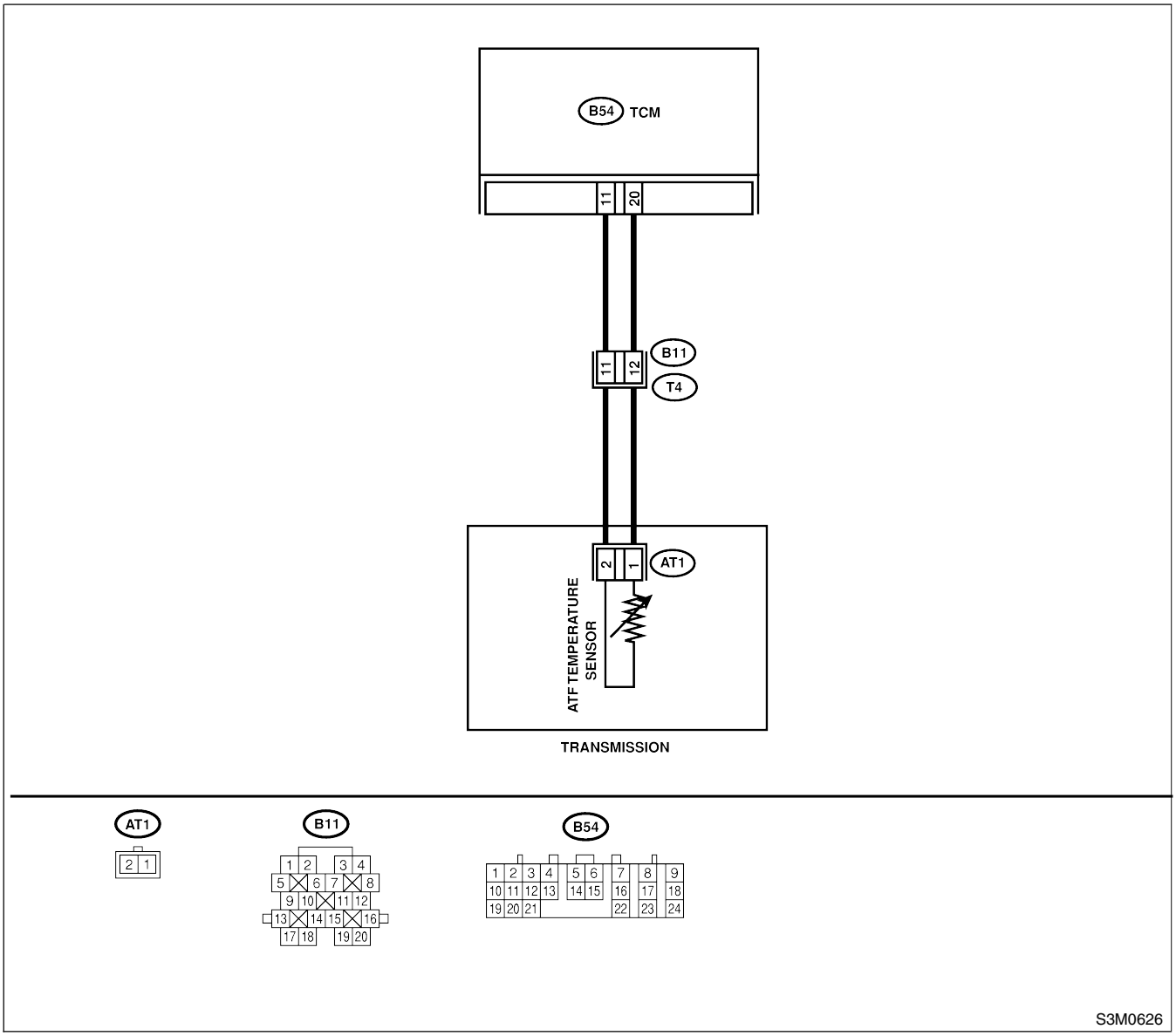


No.	Step	Check	Yes	No
1	**CHECK ENGINE GROUND TERMINALS AND GROUND CIRCUIT OF ECM** <Ref. to AT-50, TROUBLE CODE 31 - THROTTLE POSITION SENSOR -, Diagnostic Procedure with Trouble Code.>	Is there any trouble?	Repair ground terminal and/or ground circuit of ECM.	Go to step **2**.
2	**CHECK HARNESS CONNECTOR 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*** ***(B54) No. 1 — (B135) No. 28:***	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*** ***(B54) No. 1 — 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*** ***(B54) No. 1 (+) — Chassis ground (–):***	Is the voltage between 0.4 and 1.8 V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in 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 0.4 and 1.8 V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in 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-48, Transmission Control Module (TCM).>

C: TROUBLE CODE 27 — ATF TEMPERATURE SENSOR — S004509C76

DIAGNOSIS:
Input signal circuit of TCM to ATF temperature sensor is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



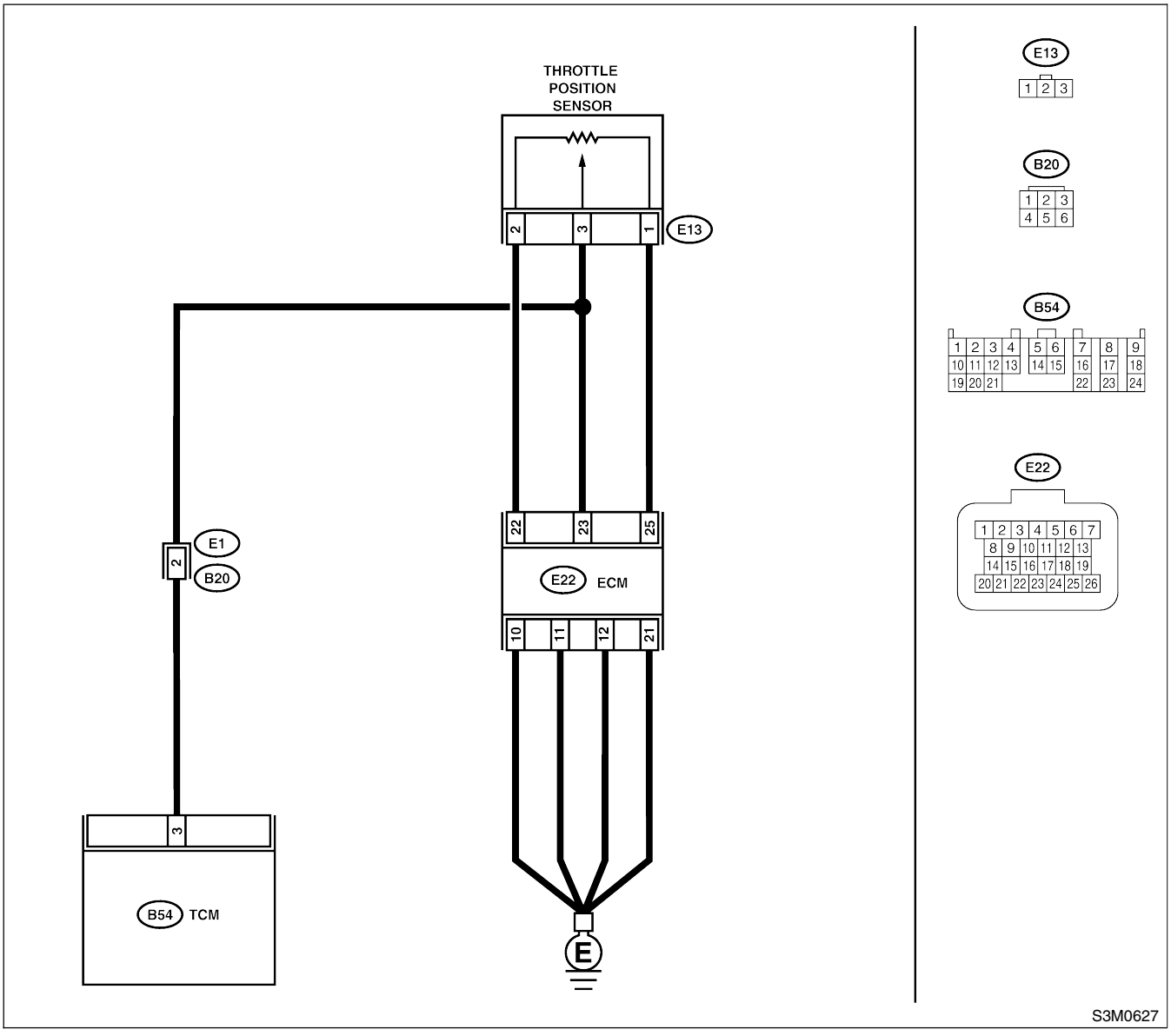
No.	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission and TCM. 3) Measure resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 20 — (B11) No. 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*** ***(B54) 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*** ***(B54) No. 20 — 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*** ***(B54) 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*** ***(B54) No. 11 (+) — No. 20 (–):***	Is the voltage between 0.4 and 0.9 V?	Even if "POWER" indicator 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 "POWER" indicator 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-48, 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.

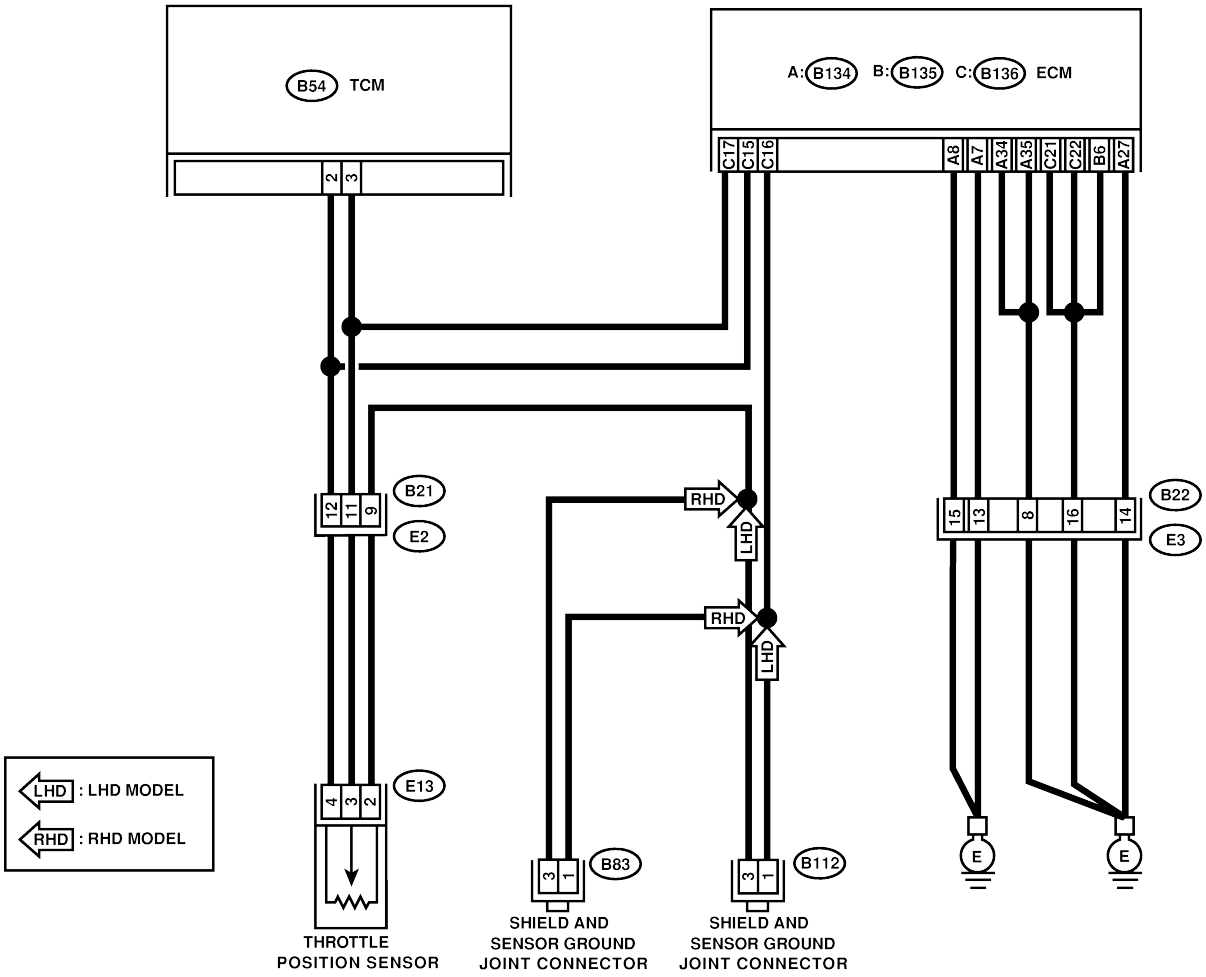
No.	Step	Check	Yes	No
12	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.** Measure resistance of harness between ATF temperature sensor and transmission connector. ***Connector & terminal*** ***(T4) No. 12 — (AT1) No. 1:***	Is the resistance less than 1 Ω?	Go to step **13**.	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-41, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>	Repair short circuit in harness between ATF temperature sensor and transmission connector.

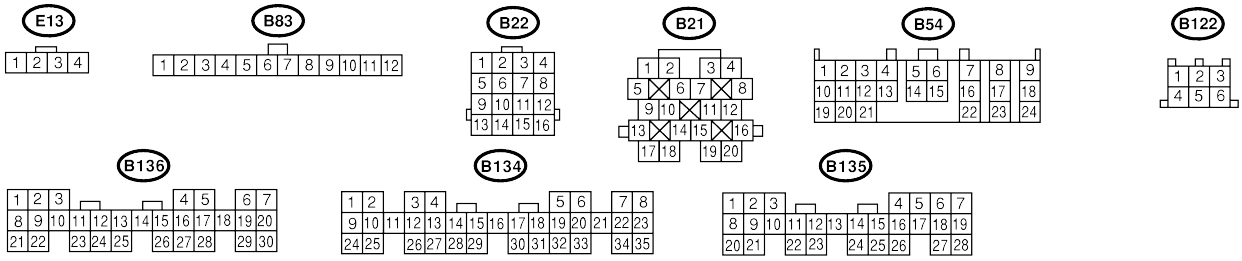
D: TROUBLE CODE 31 — THROTTLE POSITION SENSOR — S004509C94

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:
SOHC w/o OBD



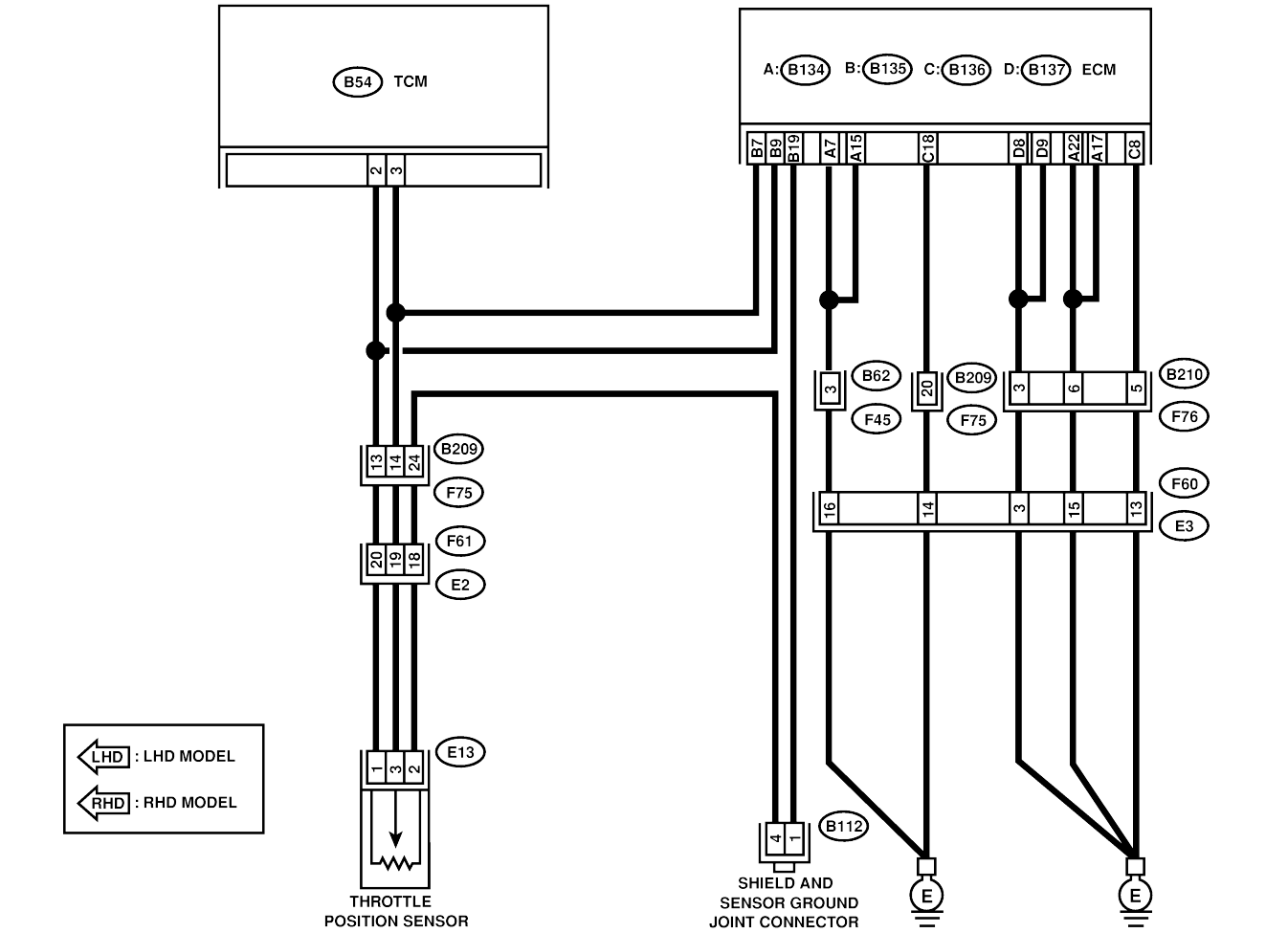
SOHC

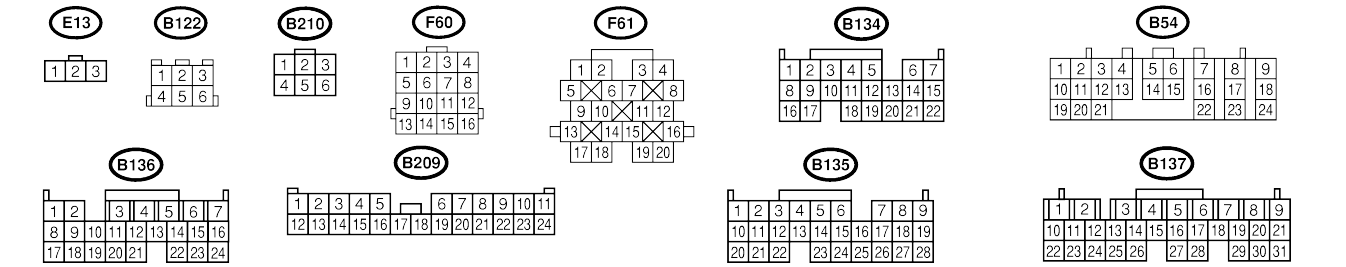




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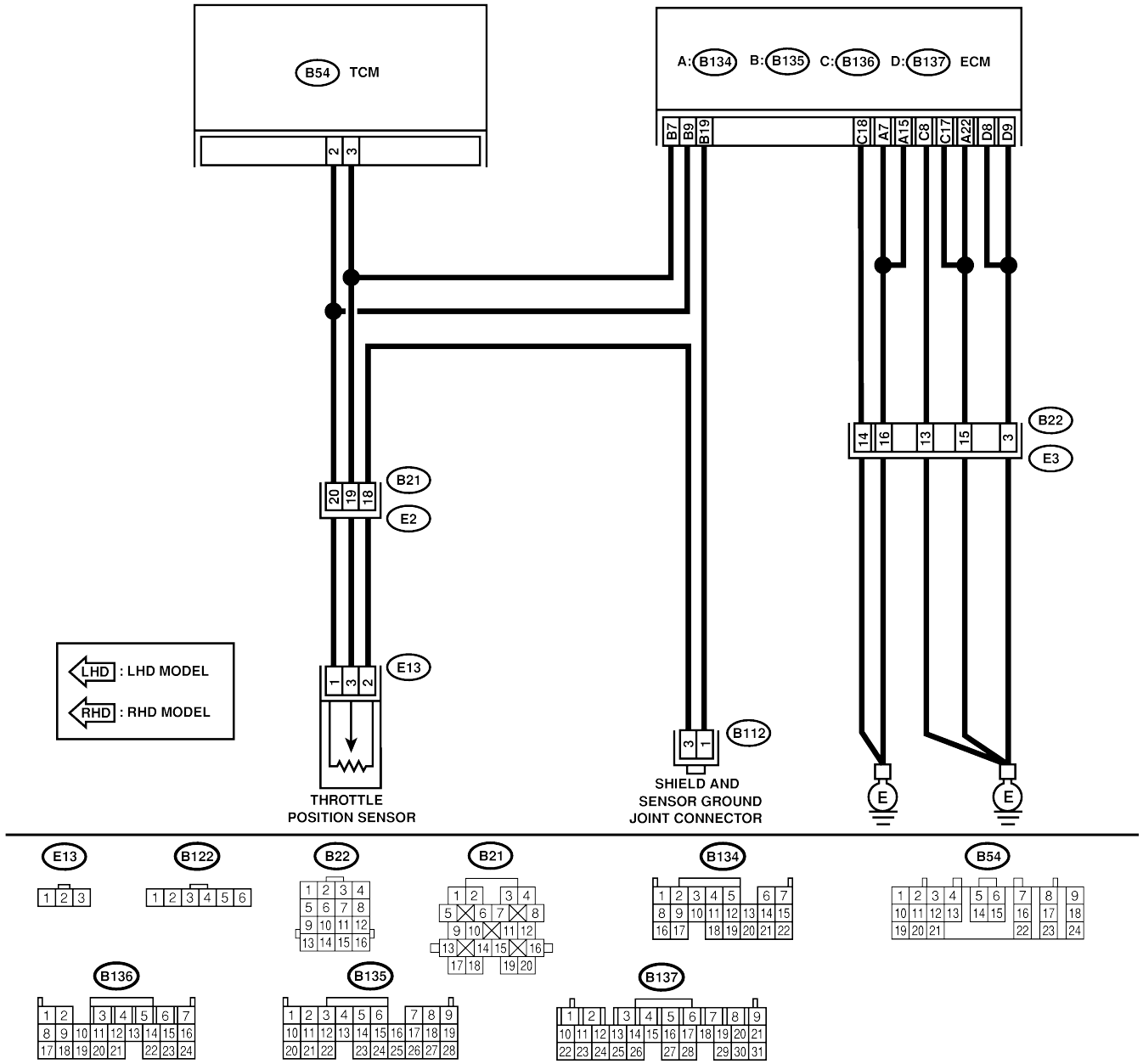
DOHC TURBO FOR LHD





S3M0647

DOHC TURBO FOR RHD



S3M0648

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*** ***SOHC MODEL:*** ***(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:*** ***(B135) No. 6 — Engine ground:*** ***SOHC w/o OBD MODEL*** ***(E22) No. 10 — Engine ground:*** ***(E22) No. 11— Engine ground:*** ***(E22) No. 12 — Engine ground:*** ***(E22) No. 21 — Engine ground:*** ***DOHC TURBO MODEL:*** ***(B134) No. 7 — Engine ground:*** ***(B134) No. 15 — Engine ground:*** ***(B134) No. 22 — Engine ground:*** ***(B136) No. 8 — Engine ground:*** ***(B136) No. 17 — Engine ground:*** ***(B136) No. 18 — Engine ground:*** ***(B137) No. 8 — Engine ground:*** ***(B137) No. 9 — 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*** ***SOHC MODEL:*** ***No. 4 — No. 2:*** ***EXCEPT SOHC MODEL:*** ***No. 1 — 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. 3 — (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.

No.	Step	Check	Yes	No
6	**CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.** Measure resistance of harness between TCM and throttle position sensor connector. ***Connector & terminal*** ***(B54) No. 2 — (E13) No. 4:*** NOTE: If SOHC w/o OBD model, Go to step **7**.	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*** ***(B54) No. 3 — 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*** ***(B54) No. 2 — 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.
9	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** Measure resistance of harness between TCM and ECM connector. ***Connector & terminal*** ***SOHC w/o OBD MODEL:*** ***(B54) No. 3 — (E22) No. 23:*** ***SOHC MODEL:*** ***(B54) No. 3 — (B136) No. 17:*** ***DOHC TURBO:*** ***(B54) No. 3 — (B135) No. 7:***	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*** ***(B54) No. 2 — (B136) No. 15:*** NOTE: If SOHC w/o OBD model, Go to step **11**.	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*** ***(B54) No. 3 (+) — Chassis ground (–):***	Is the voltage between 0.3 and 0.7 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*** ***(B54) No. 3 (+) — Chassis ground (–):***	Is the voltage between 4.0 and 4.6 V with throttle fully open?	Go to step **16**.	Go to step **18**.

No.	Step	Check	Yes	No
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 between 0.3 and 0.7 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 between 4.0 and 4.6 V?	Go to step **17**.	Go to step **18**.
16	**CHECK INPUT SIGNAL FOR TCM (THROTTLE POSITION SENSOR POWER SUPPLY).** Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 2 (+) — Chassis ground (–):***	Is the voltage between 4.8 and 5.3 V?	Even if “POWER” indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in 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 between 4.8 and 5.3 V?	Even if “POWER” indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in 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-48, Transmission Control Module (TCM).>

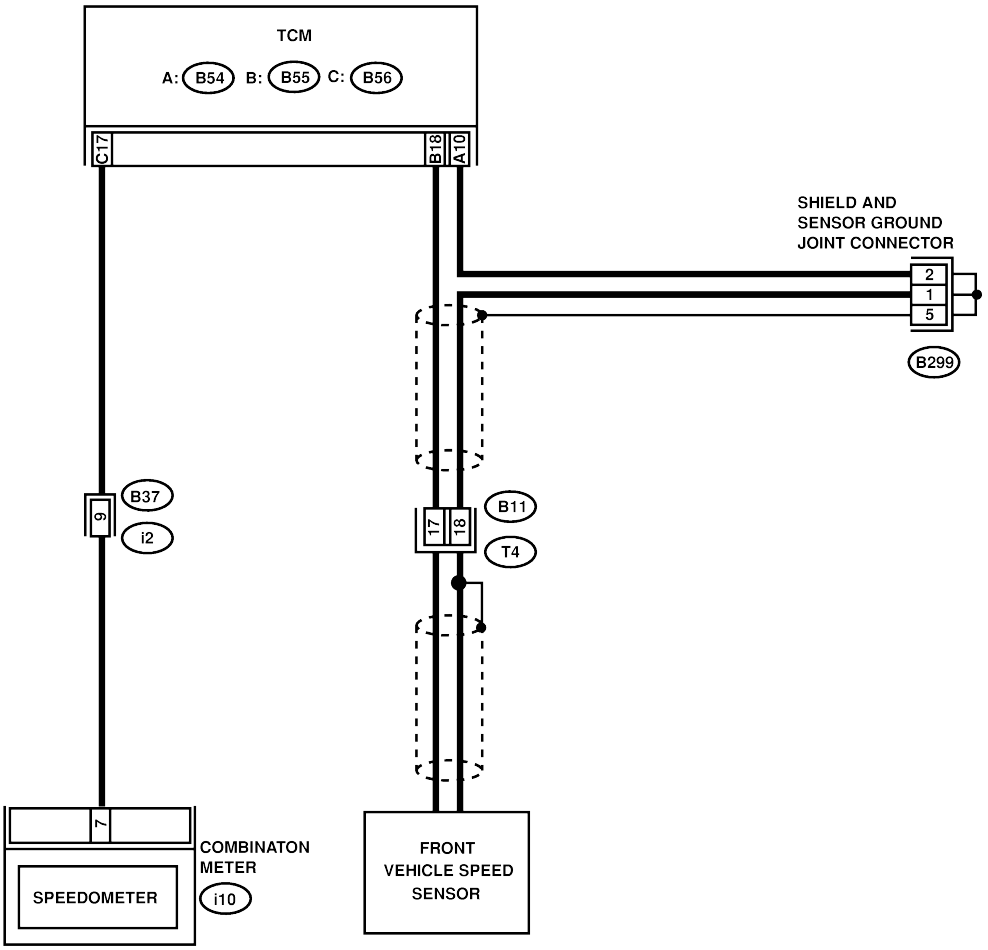
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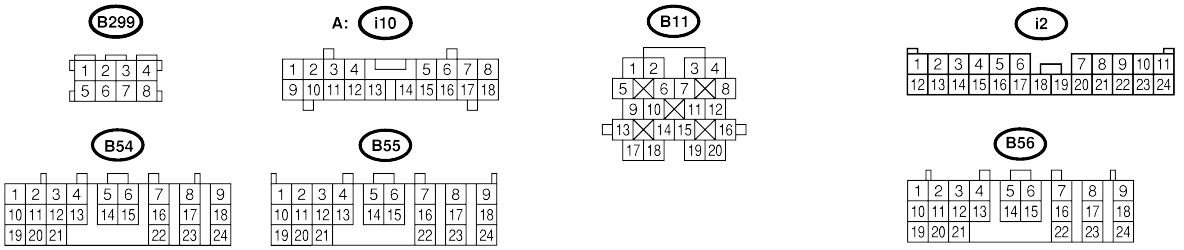
E: TROUBLE CODE 33 — FRONT VEHICLE SPEED SENSOR — S004509F60

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:





S3M0629

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. 18 — (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*** ***(B54) No. 10 — (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*** ***(B54) 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 TRANSMISSION.** Measure resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 18 — 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. 18 (+) — (B54) No. 10 (–):***	Is the voltage more than AC 1 V?	Even if “POWER” indicator 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. 18 Earth lead; (B54) No. 10 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 “POWER” indicator 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**.

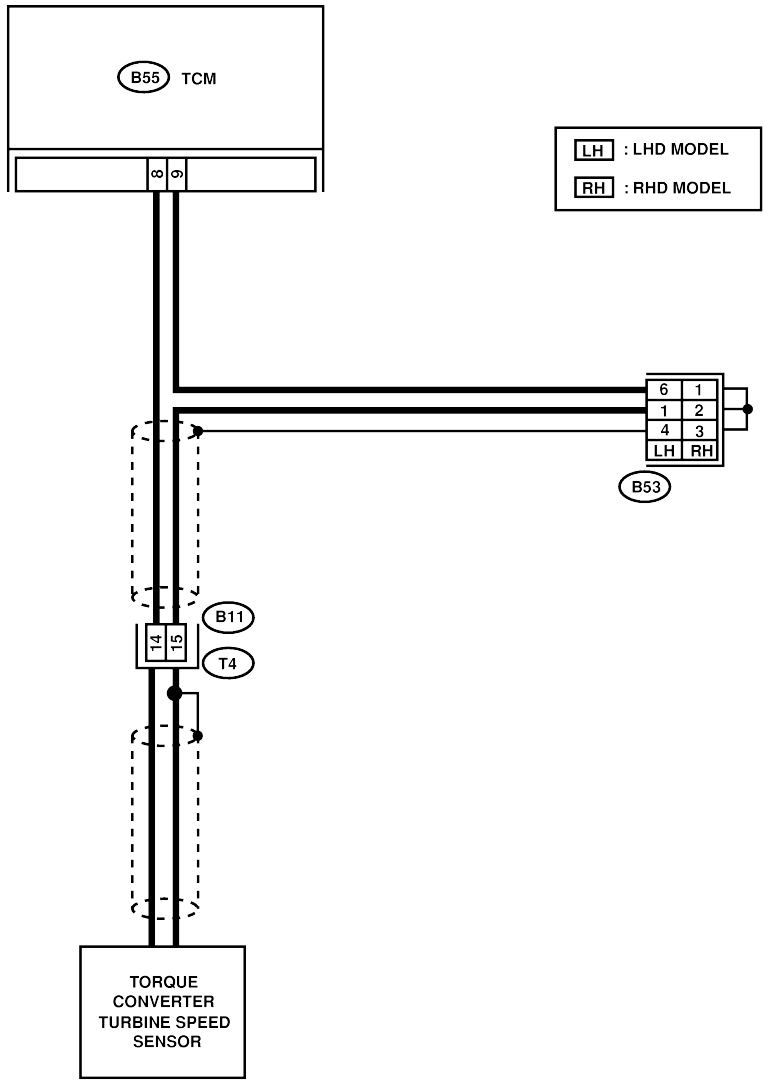
No.	Step	Check	Yes	No
10	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all connectors. 2) Connect Subaru Select Monitor to data link connector. 3) Lift-up or raise the vehicle and place safety stands. **CAUTION:** **On AWD models, raise all wheels off floor.** 4) Turn ignition 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 “POWER” indicator 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-48, Transmission Control Module (TCM).>

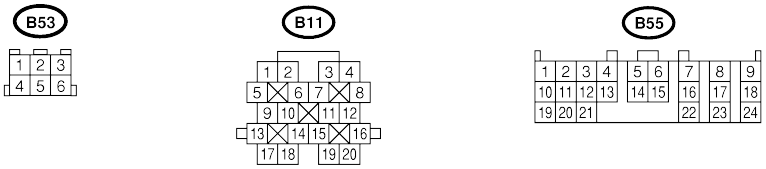
MEMO:

F: TROUBLE CODE 36 — TORQUE CONVERTER TURBINE SPEED SENSOR

S004509D17

DIAGNOSIS:
Input signal circuit of TCM is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:





S3M0630

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-37, 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. 8 — (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. 9 — (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. 9 — 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. 8 — 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. 8 (+) — No. 9 (–):***	Is the voltage more than AC 1 V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in 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 “POWER” indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in 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. 8 Earth lead; (B55) No. 9 3) Start the engine and move select lever to “P” or “N” range.	Is the signal voltage more than AC 1 V?	Even if “POWER” indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in 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-48, Transmission Control Module (TCM).>

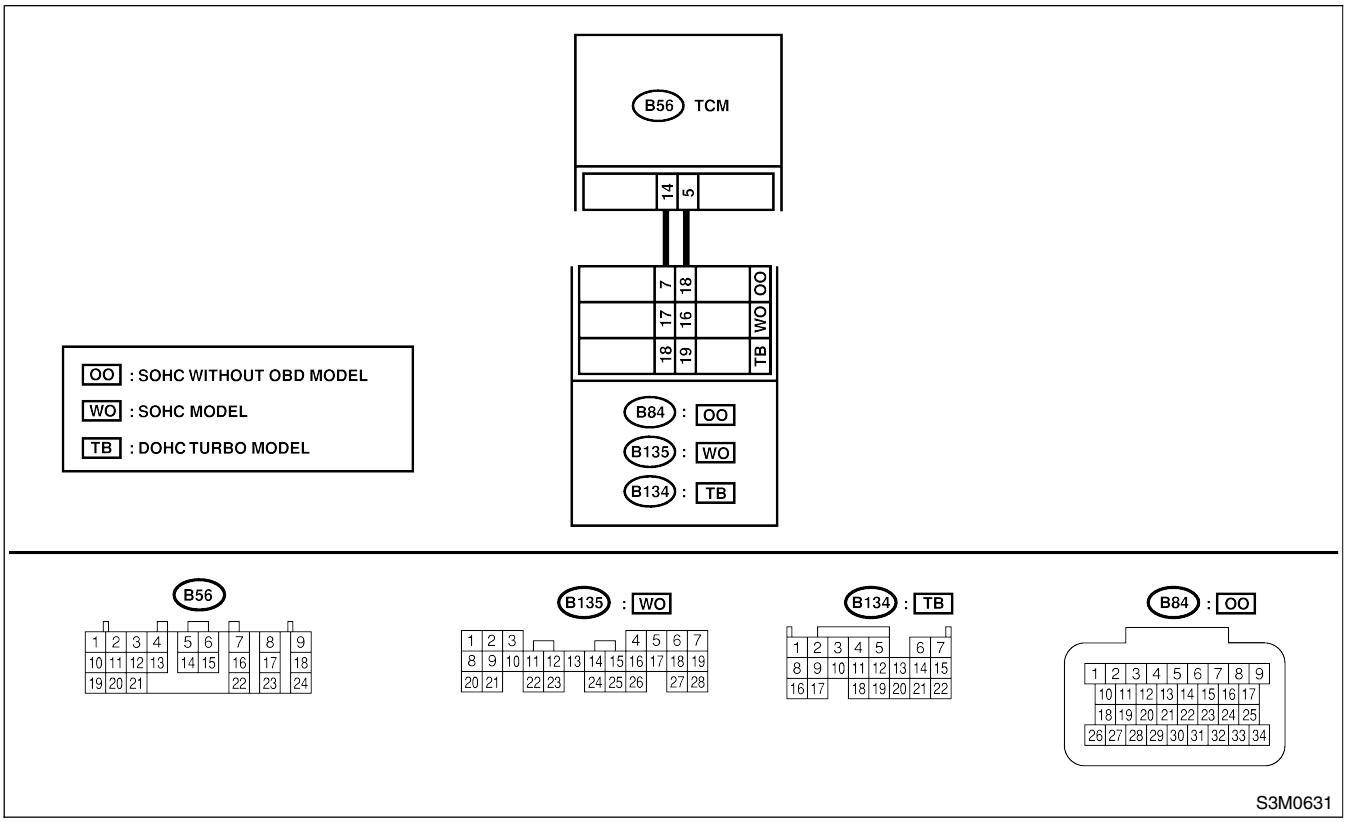
MEMO:

G: TROUBLE CODE 38 — TORQUE CONTROL SIGNAL — S004509D26

DIAGNOSIS:
- The signal circuit is open or shorted.

TROUBLE SYMPTOM:
Excessive shift shock.

WIRING DIAGRAM:

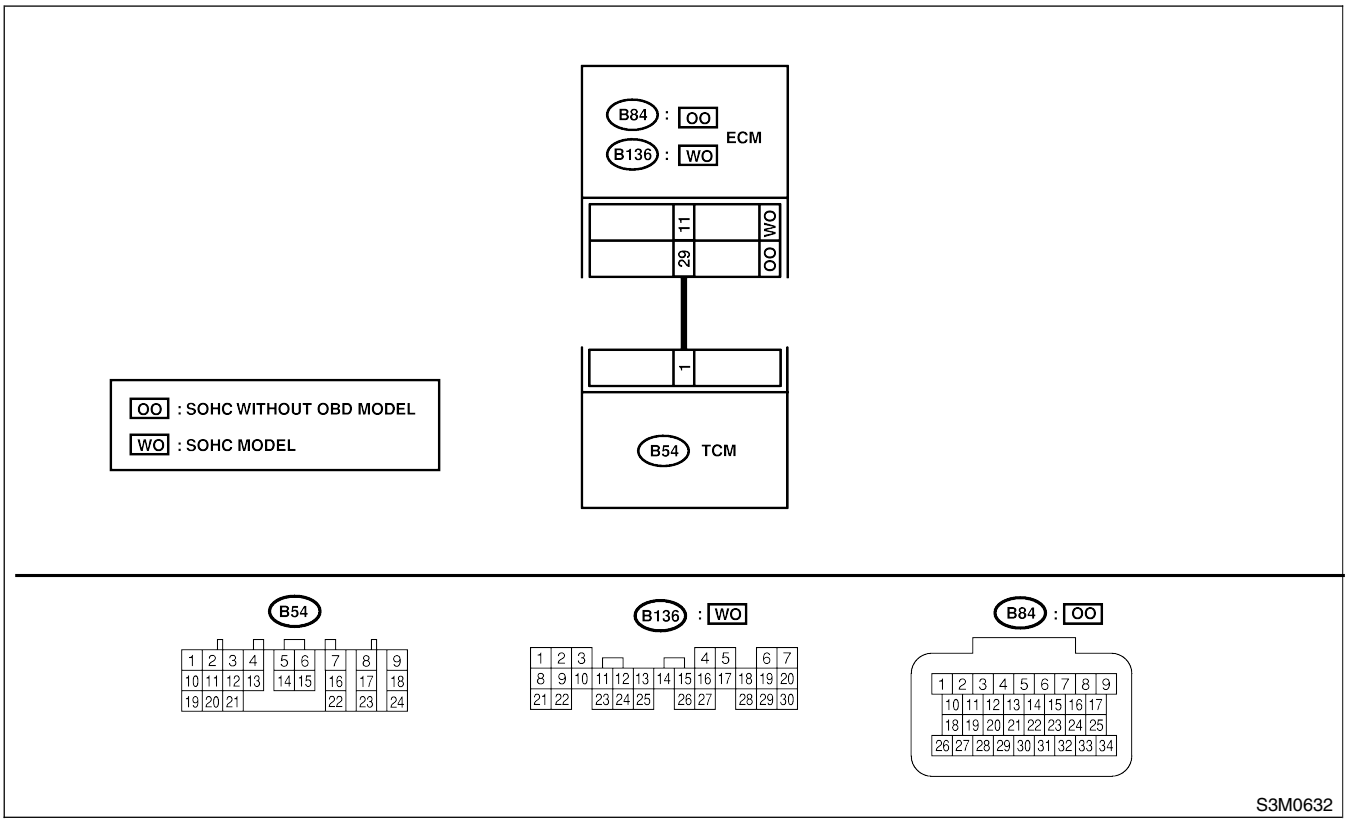


No.	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and ECM. 3) Measure resistance of harness between TCM and ECM connector. ***Connector & terminal*** ***SOHC without OBD:*** ***(B56) No. 14 — (B84) No. 7:*** ***(B56) No. 5 — (B84) No. 18:*** ***SOHC:*** ***(B56) No. 14 — (B135) No. 17:*** ***(B56) No. 5 — (B135) No. 16:*** ***DOHC TURBO:*** ***(B56) No. 14 — (B134) No. 18:*** ***(B56) No. 5 — (B134) No. 19:***	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*** ***(B56) No. 14 — Chassis ground:*** ***(B56) No. 5 — 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*** ***(B56) No. 14 (+) — Chassis ground (–):*** ***(B56) No. 5 (+) — Chassis ground (–):***	Is the voltage more than 4.8 V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in 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-50, TROUBLE CODE 31 - THROTTLE POSITION SENSOR -, Diagnostic Procedure with Trouble Code.>	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*** ***(B56) No. 14 (+) — Chassis ground (–):*** ***(B56) No. 5 (+) — Chassis ground (–):***	Is each voltage more than 4.8 V?	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>	Replace ECM.

H: TROUBLE CODE 45 — INTAKE MANIFOLD PRESSURE SIGNAL — S004509D48

DIAGNOSIS:
Input signal circuit of TCM from ECM is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:

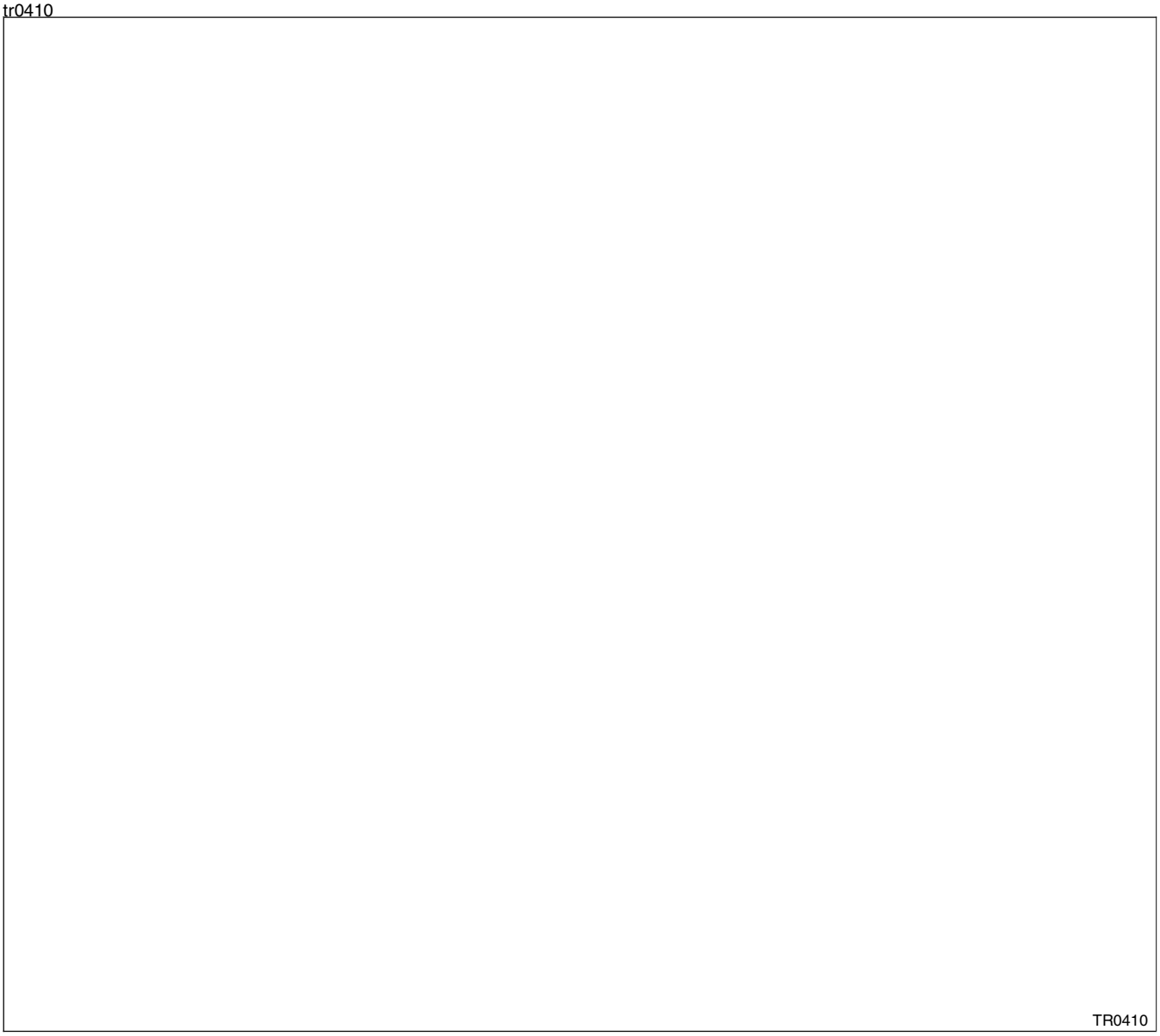


No.	Step	Check	Yes	No
1	**CHECK ENGINE GROUND TERMINALS AND GROUND CIRCUIT OF ECM** <Ref. to AT-50, TROUBLE CODE 31 - THROTTLE POSITION SENSOR -, Diagnostic Procedure with Trouble Code.>	Is there any trouble?	Repair ground terminal and/or ground circuit of ECM.	Go to step **2**.
2	**CHECK HARNESS CONNECTOR 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*** ***SOHC without OBD:*** ***(B54) No. 1 — (B84) No. 29:*** ***SOHC:*** ***(B54) No. 1 — (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*** ***(B54) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Repair short circuit in harness between TCM and ECM connector.

No.	Step	Check	Yes	No
4	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **6**.	Go to step **5**.
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*** ***(B54) No. 1 (+) — Chassis ground (–):***	Is the voltage between 0.4 and 1.8 V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in 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 0.4 and 1.8 V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in 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-48, Transmission Control Module (TCM).>

I: TROUBLE CODE 71 — SHIFT SOLENOID 1 — S004509D91

DIAGNOSIS:
Output signal circuit of shift solenoid 1 is open or shorted.
TROUBLE SYMPTOM:
Does not shift.
WIRING DIAGRAM:
tr0410



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. 22 — (B11) No. 1:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair open circuit in harness between TCM and transmission connector.

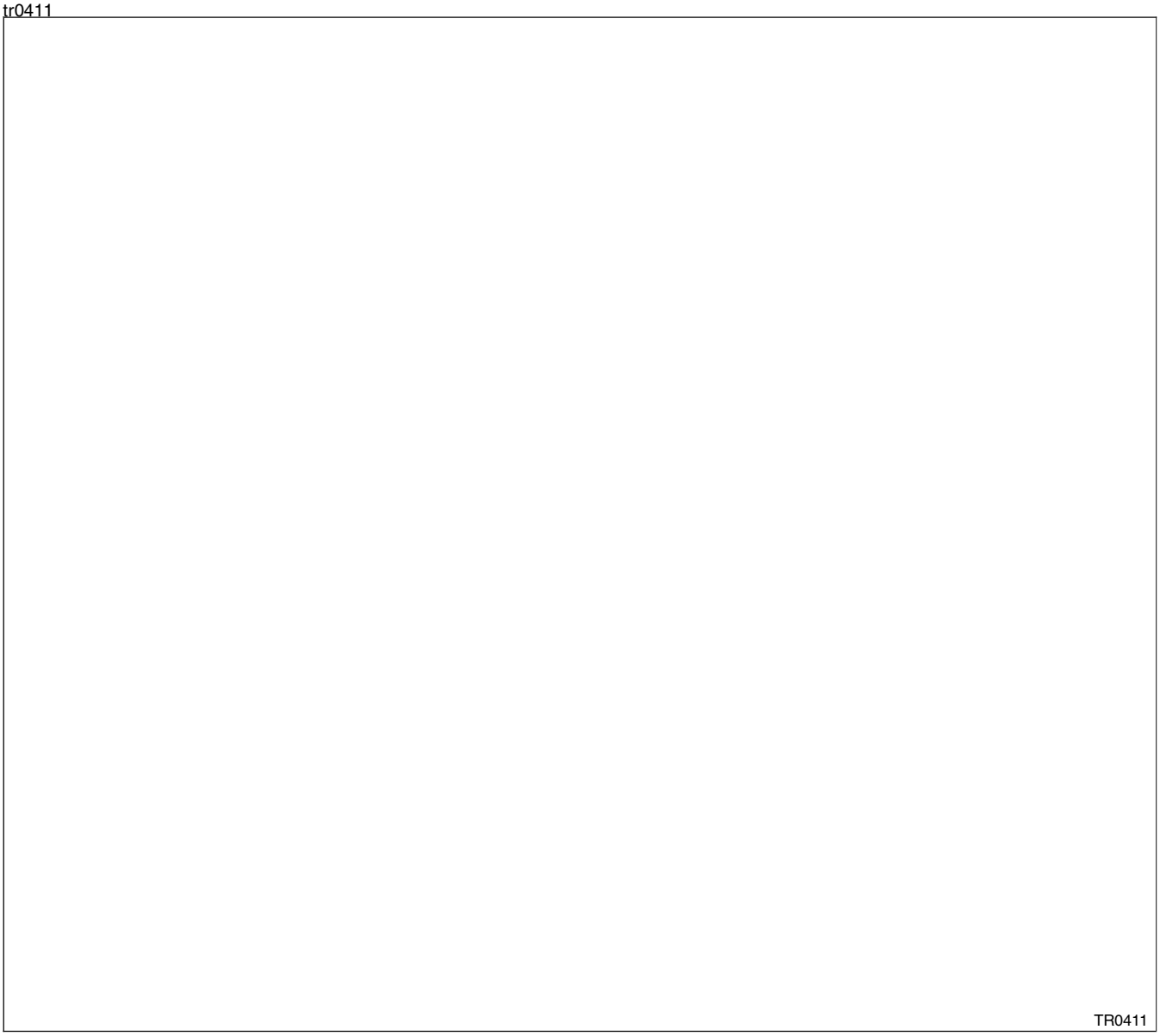
No.	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 22 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair short circuit in harness 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**.
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. 22 (+) — Chassis ground (–):***	Is the voltage more than 9V?	Go to step **5**.	Go to step **6**.
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Hold switch to ON. 2) Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 22 (+) — Chassis ground (–):***	Is the voltage less than 1V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or 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-48, 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-48, Transmission Control Module (TCM).>

No.	Step	Check	Yes	No
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.
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 “POWER” indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in shift solenoid 1 and transmission.	Repair short circuit harness between shift solenoid 1 and transmission connector.

MEMO:

J: TROUBLE CODE 72 — SHIFT SOLENOID 2 — S004509D98

DIAGNOSIS:
Output signal circuit of shift solenoid 2 is open or shorted.
TROUBLE SYMPTOM:
Does not shift.
WIRING DIAGRAM:
tr0411



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. 5 — (B11) No. 2:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair open circuit in harness between TCM and transmission connector.

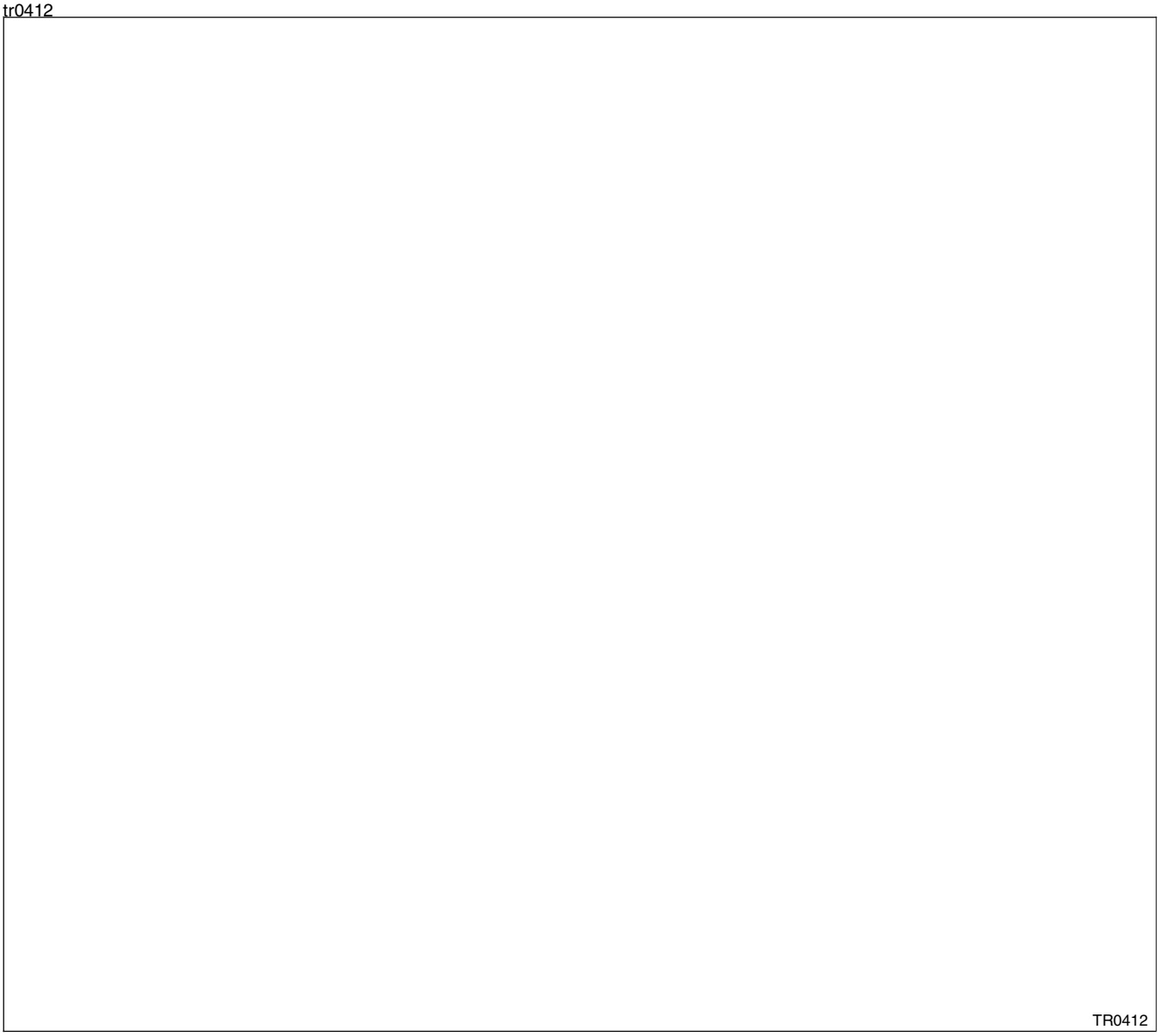
No.	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure resistance of harness between TCM connector and transmission ground. ***Connector & terminal*** ***(B54) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair short circuit in harness between TCM and transmission connector.
3	**CHECK 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**.
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. 22 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Even if “POWER” indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in 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-48, 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-41, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>

No.	Step	Check	Yes	No
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.
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 “POWER” indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in shift solenoid 2 and transmission.	Repair short circuit harness between shift solenoid 2 and transmission connector.

MEMO:

K: TROUBLE CODE 73 — LOW CLUTCH TIMING SOLENOID — S004509E05

DIAGNOSIS:
Output signal circuit of low clutch timing solenoid is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:
tr0412



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. 3:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair open circuit in harness between TCM and transmission connector.

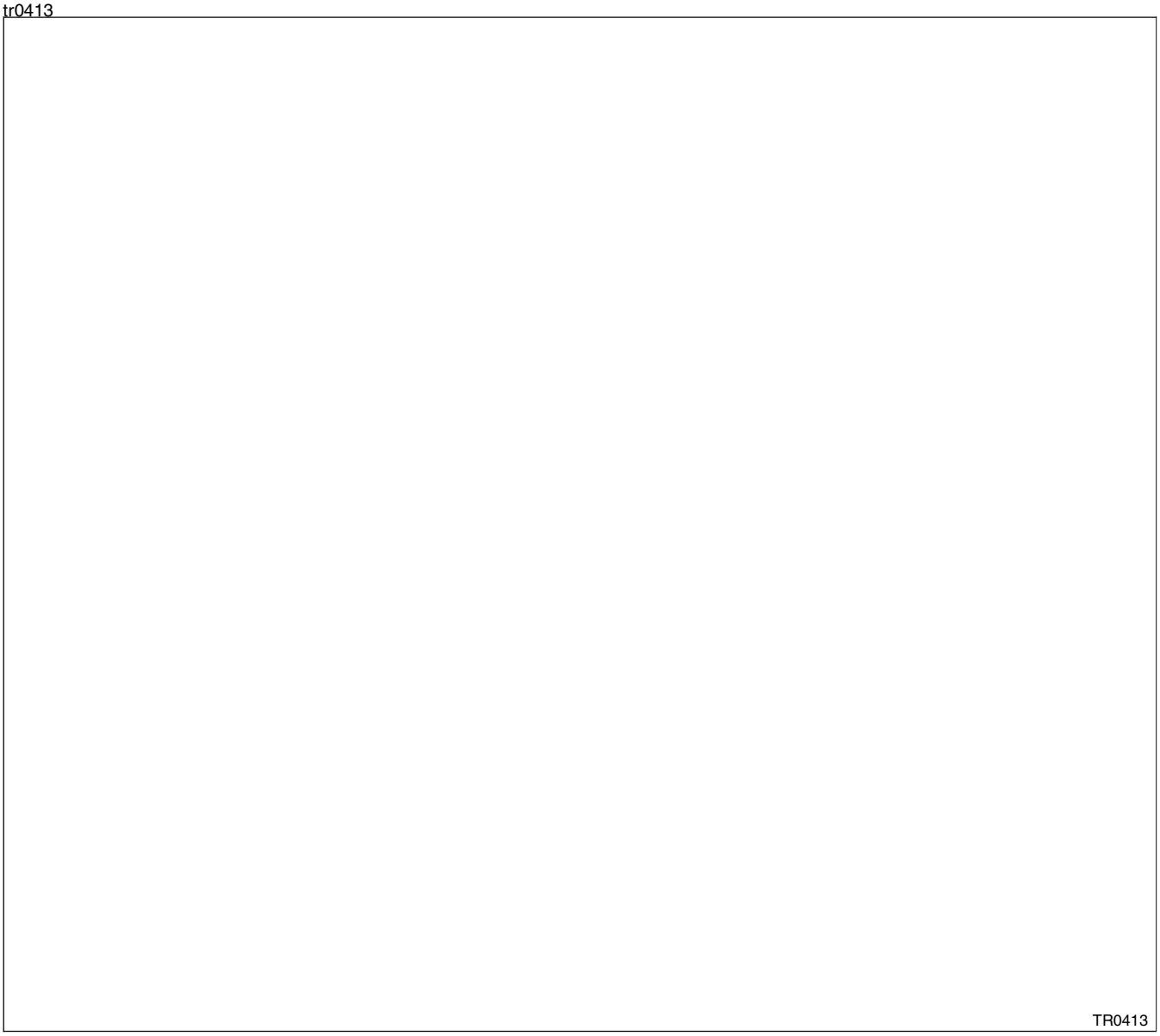
No.	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure resistance of harness between TCM connector and transmission ground. ***Connector & terminal*** ***(B54) No. 15 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair short circuit in harness between TCM and transmission connector.
3	**CHECK 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**.
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. 15 (+) — Chassis ground (–):***	Is the voltage more than 9V?	Go to step **5**.	Go to step **6**.
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Hold switch to ON. 2) Measure voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 15 (+) — Chassis ground (–):***	Is the voltage less than 1V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or 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-48, 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-41, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>

No.	Step	Check	Yes	No
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.
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 “POWER” indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in low clutch timing solenoid and transmission.	Repair short circuit harness between low clutch timing solenoid and transmission connector.

MEMO:

L: TROUBLE CODE 74 — 2-4 BRAKE TIMING SOLENOID — S004509E07

DIAGNOSIS:
Output signal circuit of 2-4 brake timing solenoid is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:
tr0413



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. 16 — (B11) No. 4:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair open circuit in harness between TCM and transmission connector.

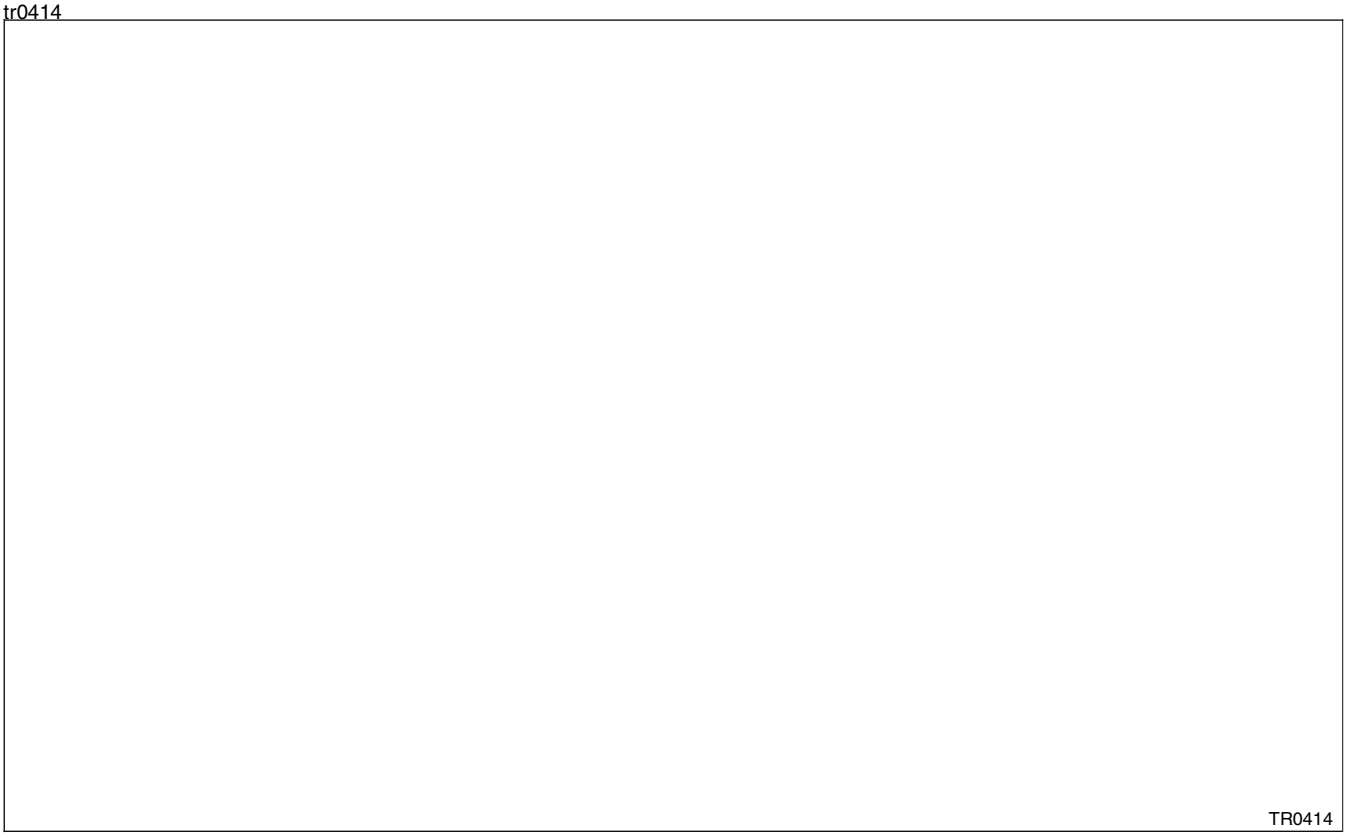
No.	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure resistance of harness between TCM connector and transmission ground. ***Connector & terminal*** ***(B54) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair short circuit in harness 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**.
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. 16 (+) — 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 “D”, 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. 16 (+) — Chassis ground (–):***	Is the voltage more than 9 V?	Even if “POWER” indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the transmission.	Go to step **6**.

No.	Step	Check	Yes	No
6	**CHECK POOR CONTACT.**	Is there poor contact in 2-4 brake timing solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
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-41, 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 “POWER” indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in 2-4 brake timing solenoid and transmission.	Repair short circuit harness between 2-4 brake timing solenoid and transmission connector.

MEMO:

M: TROUBLE CODE 75 — LINE PRESSURE DUTY SOLENOID — S004509E14

DIAGNOSIS:
Output signal circuit of line pressure duty solenoid is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:
tr0414



No.	Step	Check	Yes	No
1	**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 **2**.	Repair open circuit in harness between TCM and transmission connector.
2	**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 **3**.	Repair short circuit in harness between TCM and transmission connector.
3	**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 **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**.

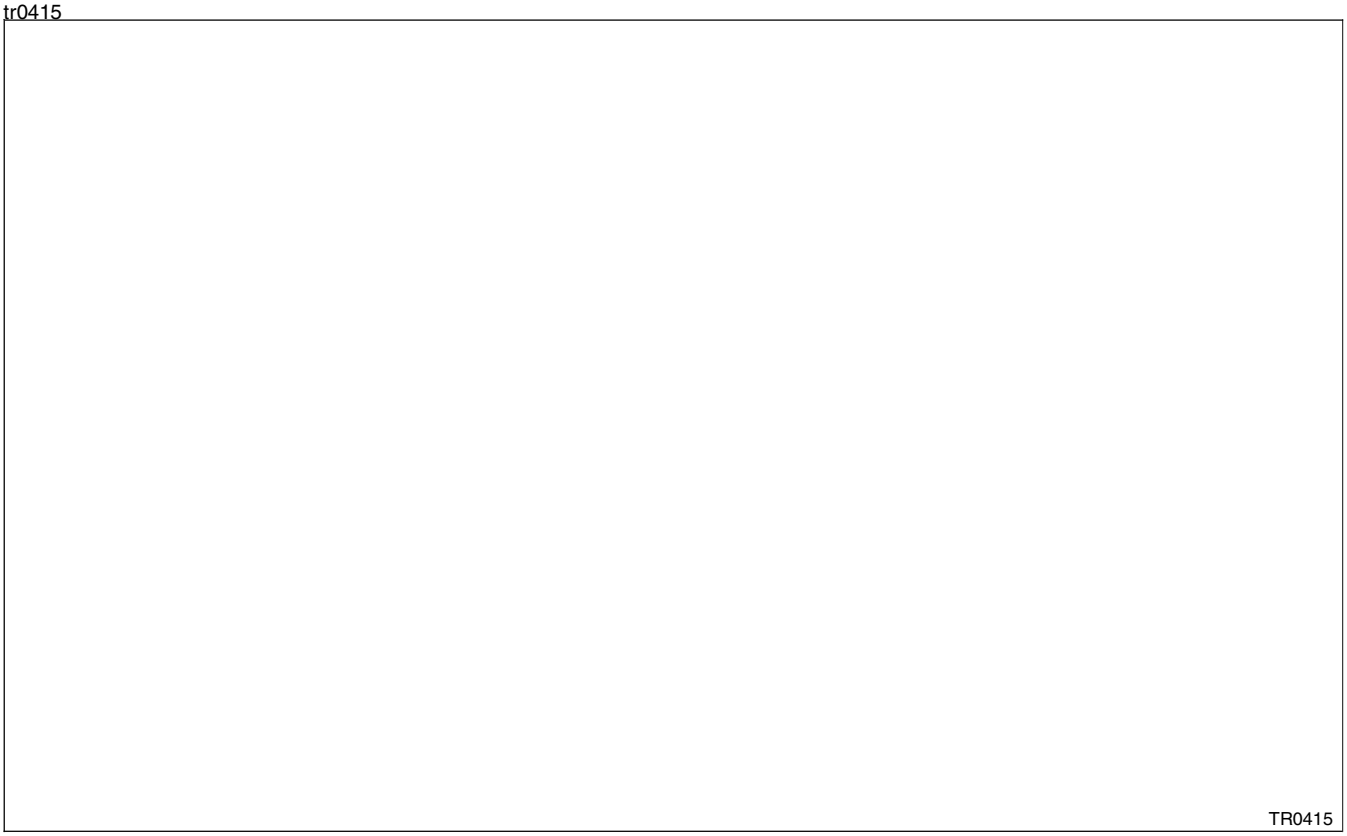
No.	Step	Check	Yes	No
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Connect all connectors. 2) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 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 **6**.	Go to step **9**.
6	**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 "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in 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) 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 **8**.	Go to step **9**.

No.	Step	Check	Yes	No
8	**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 "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in transmission.	Go to step **9**.
9	**CHECK POOR CONTACT.**	Is there poor contact in line pressure duty solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
10	**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 **11**.	Replace line pressure duty solenoid. <Ref. to AT-41, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
11	**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 **12**.	Repair open circuit in harness between line pressure duty solenoid and transmission connector.
12	**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 "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in line pressure duty solenoid and transmission.	Repair short circuit in harness between line pressure duty solenoid and transmission connector.

MEMO:

N: TROUBLE CODE 76 — 2–4 BRAKE DUTY SOLENOID — S004509E15

DIAGNOSIS:
Output signal circuit of 2-4 brake duty solenoid is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:
tr0415



No.	Step	Check	Yes	No
1	**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. 18 — (B11) No. 9:***	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 CHASSIS GROUND.** Measure resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 18 — 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 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 **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**.

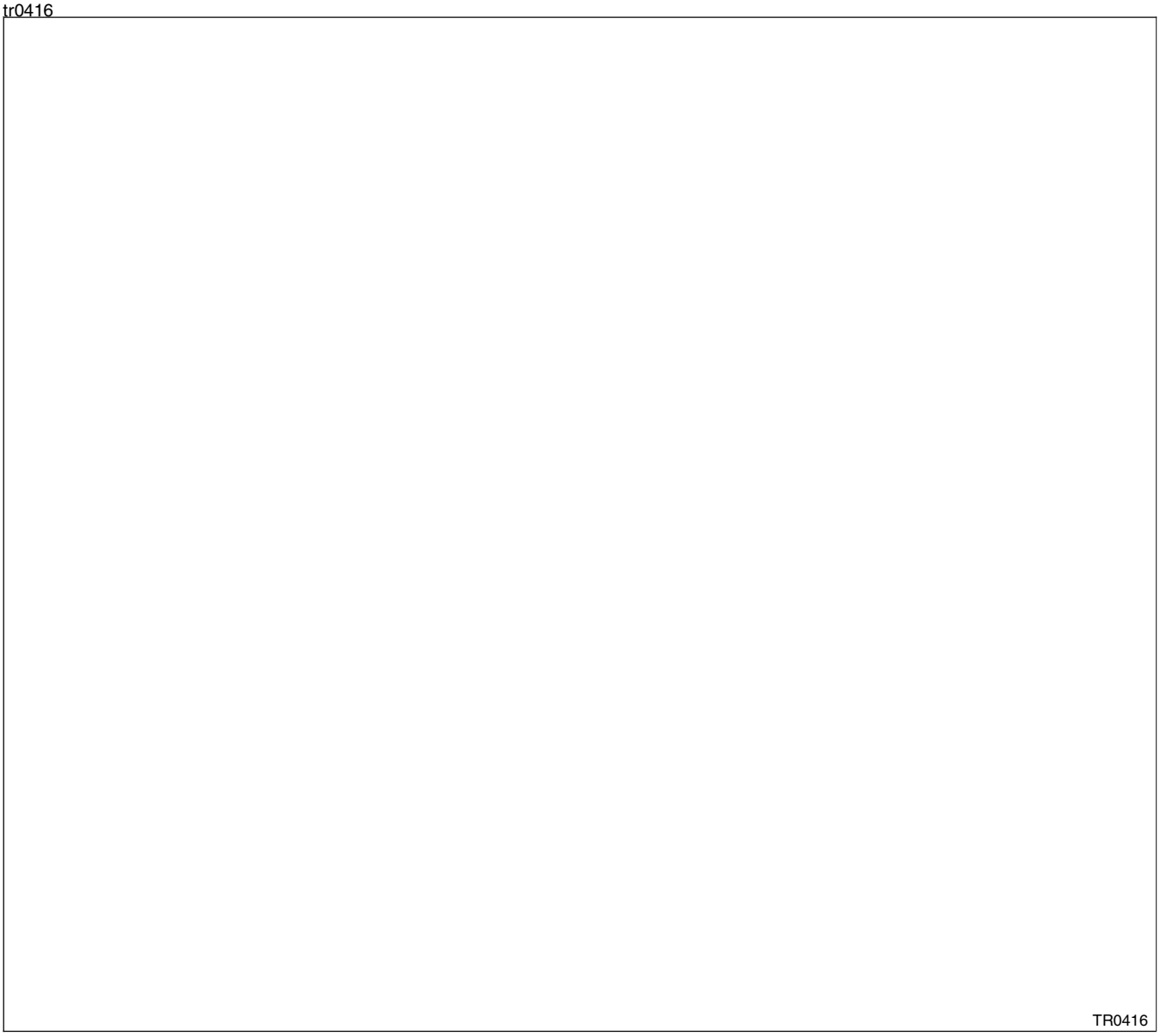
No.	Step	Check	Yes	No
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Connect all connectors. 2) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 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. 18 (+) — Chassis ground (–):***	Is the voltage between 1.5 and 5.0 V with throttle fully closed?	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. 18 (+) — Chassis ground (–):***	Is the voltage less than 1 V with throttle fully open?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM and transmission.	Go to step **9**.
7	**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 **8**.	Go to step **9**.

No.	Step	Check	Yes	No
8	**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 "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM and transmission.	Go to step **9**.
9	**CHECK POOR CONTACT.**	Is there poor contact in 2-4 brake duty solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
10	**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 **11**.	Replace 2-4 brake duty solenoid. <Ref. to AT-41, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
11	**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 **12**.	Repair open circuit in harness between 2-4 brake duty solenoid and transmission connector.
12	**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 "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in line pressure duty solenoid and transmission.	Repair short circuit in harness between 2-4 brake duty solenoid and transmission connector.

MEMO:

O: TROUBLE CODE 77 — LOCK-UP DUTY SOLENOID — S004509E16

DIAGNOSIS:
Output signal circuit of lock-up duty solenoid is open or shorted.
TROUBLE SYMPTOM:
No “lock-up” (after engine warm-up).
WIRING DIAGRAM:
tr0416



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**.

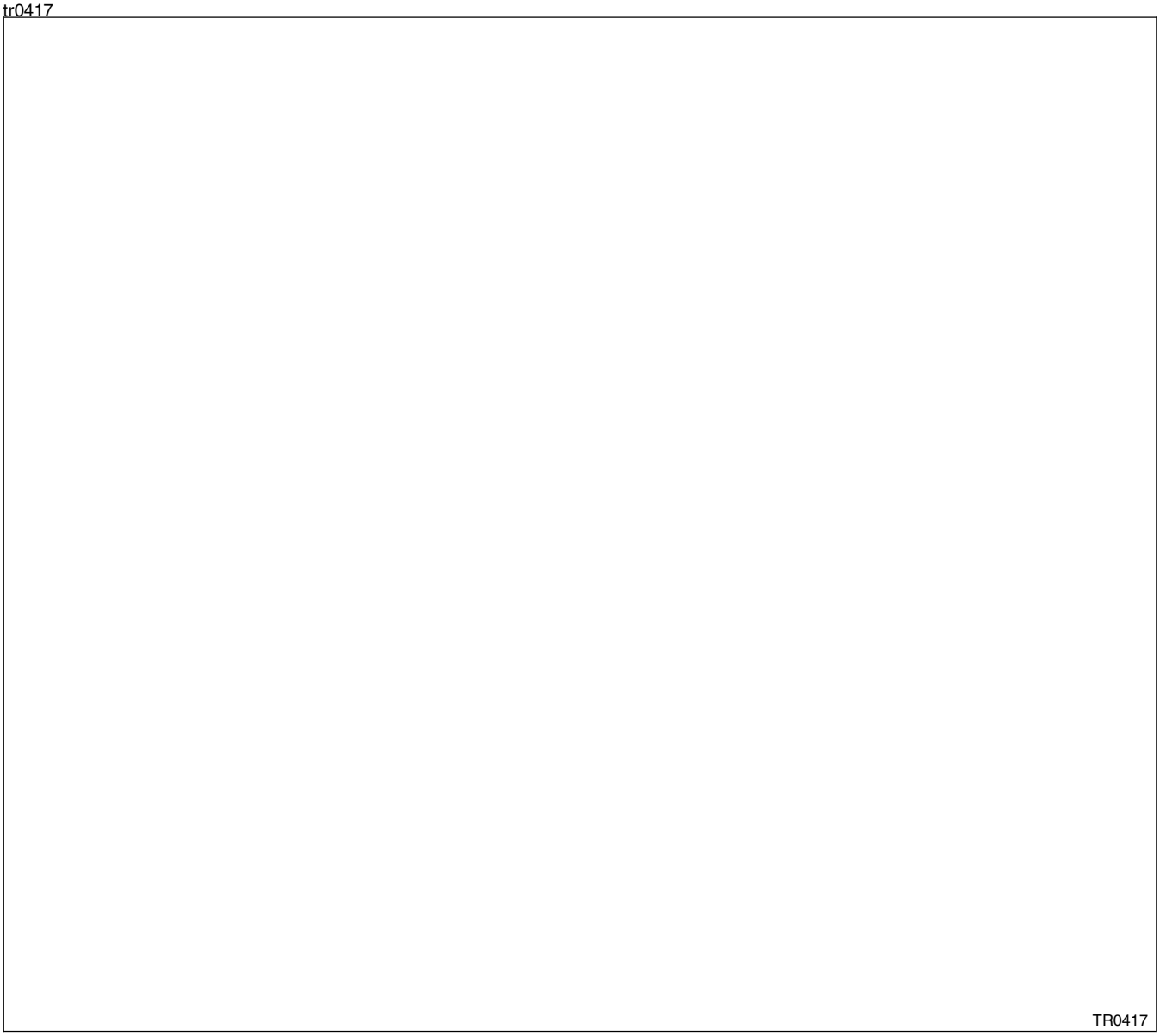
No.	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 7 — (B11) No. 13:***	Is the resistance 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. 7 — 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**.
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. 7 (+) — Chassis ground (–):***	Is the voltage more than 8.5 V?	Go to step **7**.	Go to step **10**.

No.	Step	Check	Yes	No
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. 7 (+) — Chassis ground (–):***	Is the voltage less than 0.5 V?	Even if “POWER” indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM and transmission.	Go to step **10**.
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 “POWER” indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM and transmission.	Go to step **10**.

No.	Step	Check	Yes	No
10	**CHECK POOR CONTACT.**	Is there poor contact in lock-up duty solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
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-41, 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 “POWER” indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in lock-up duty solenoid and transmission.	Repair short circuit in harness between lock-up duty solenoid and transmission connector.

P: TROUBLE CODE 79 — TRANSFER DUTY SOLENOID — S004509E17

DIAGNOSIS:
Output signal circuit of transfer duty solenoid is open or shorted.
TROUBLE SYMPTOM:
Excessive “braking” in tight corners.
WIRING DIAGRAM:
tr0417



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. 6 — (B11) No. 6:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair open circuit in harness between TCM and transmission connector.

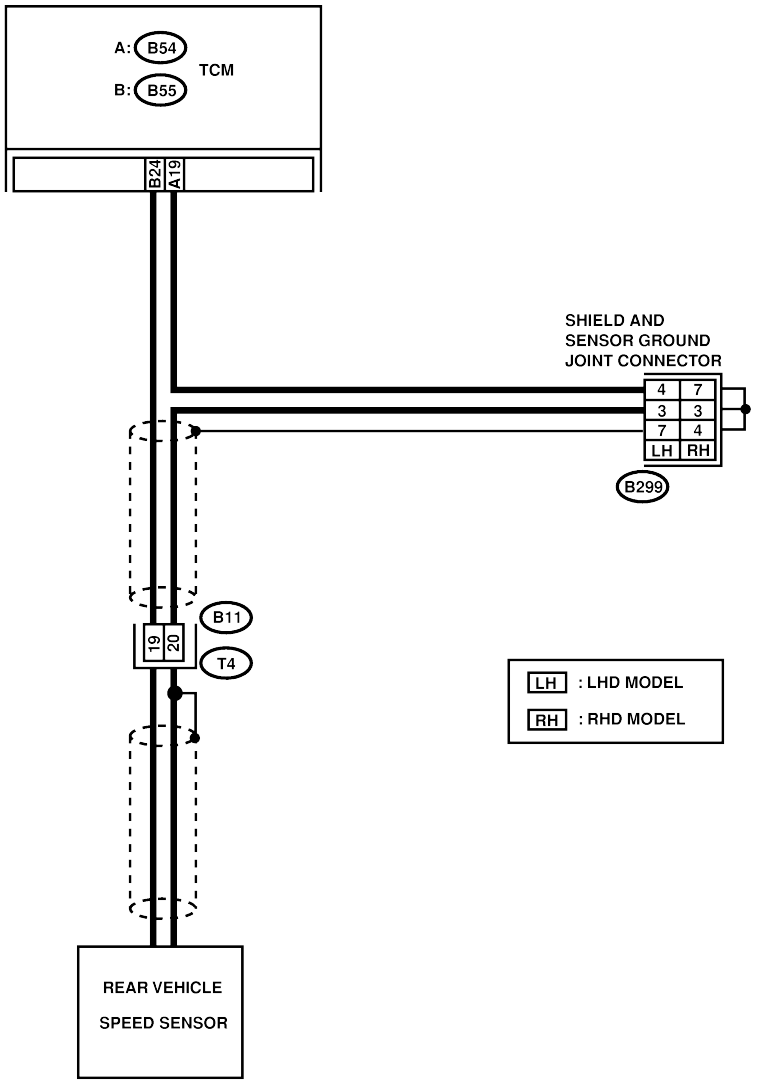
No.	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure resistance harness connector between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair short circuit in harness between 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**.
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. 6 (+) — 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. 6 (+) — Chassis ground (–):***	Is the voltage between 5 and 7 V in “D” range?	Even if “POWER” indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in 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**.

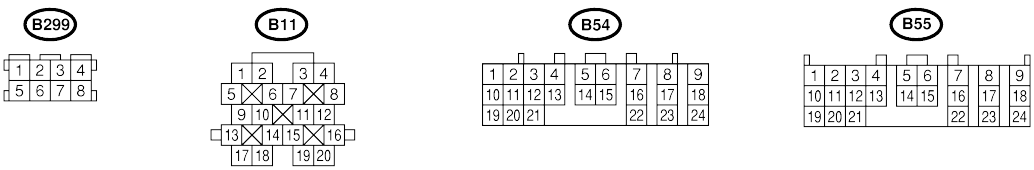
No.	Step	Check	Yes	No
8	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1) Move select lever to "N" with throttle fully closed (vehicle speed 0 km/h or 0 MPH). 2) Rear data of transfer duty solenoid using Subaru Select Monitor. ● Transfer duty solenoid is indicated in "%".	Is the value between approx. 60% and approx. 70%?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in 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-48, Transmission Control Module (TCM).>
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 "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the transfer duty solenoid and transmission.	Repair short circuit in harness between transfer duty solenoid and transmission connector.

MEMO:

Q: TROUBLE CODE 93 — REAR VEHICLE SPEED SENSOR — S004509F61

DIAGNOSIS:
Input signal circuit of TCM is open or shorted.
TROUBLE SYMPTOM:
No lock-up or excessive tight corner “braking”.
WIRING DIAGRAM:





S3M0633

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. 24 — (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*** ***(B54) No. 19 — (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. 24 — 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*** ***(B54) No. 19 — 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-36, 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. 24 (+) — (B54) No. 19 (–):***	Is the voltage more than AC 1 V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in 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 “POWER” indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in 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. 24 Earth lead; (B54) No. 19 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 “POWER” indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in 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-48, Transmission Control Module (TCM).>

15. Diagnostic Procedure for No-trouble Code S004618

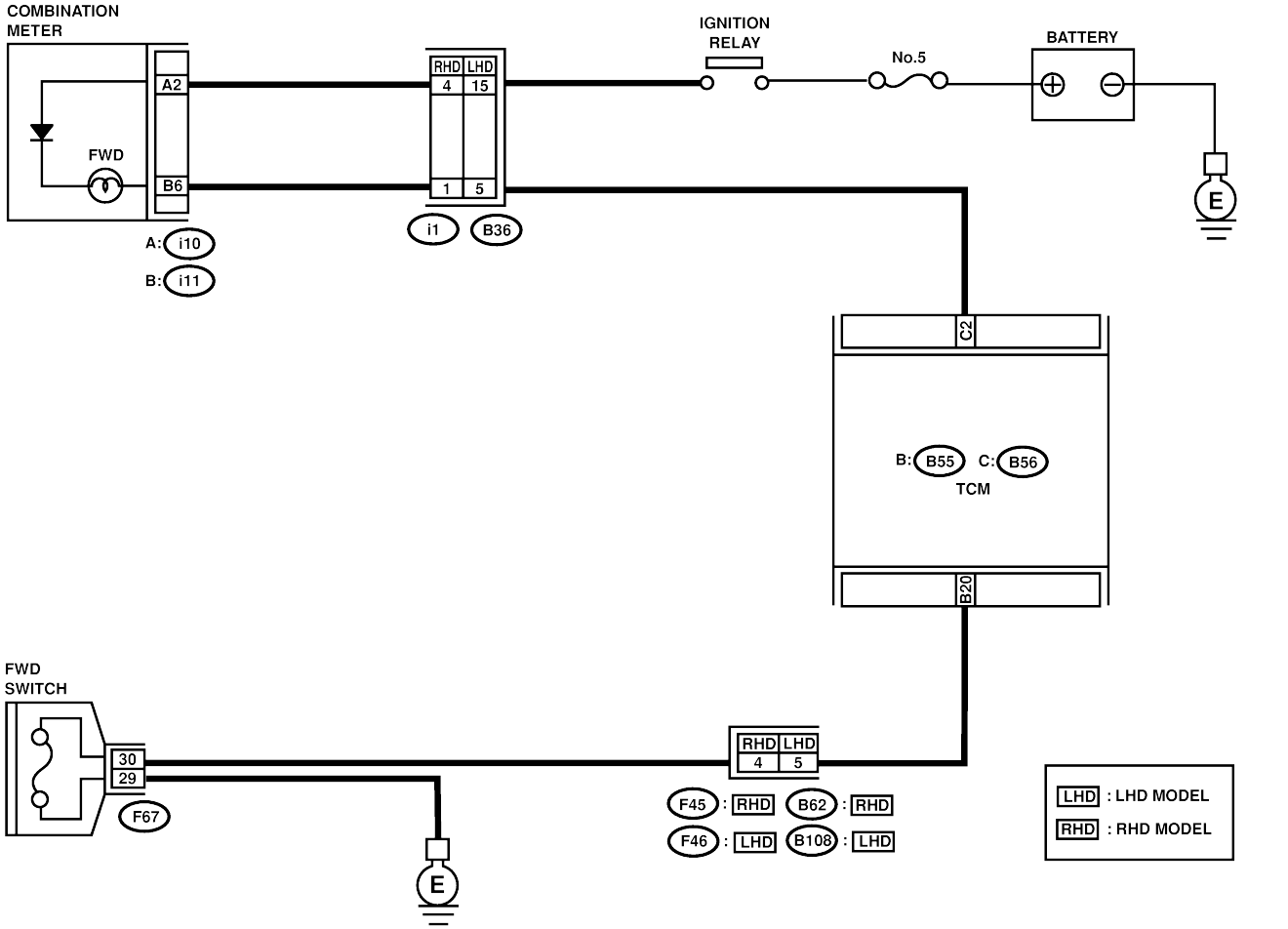
A: CHECK GEAR POSITION. S004618F15

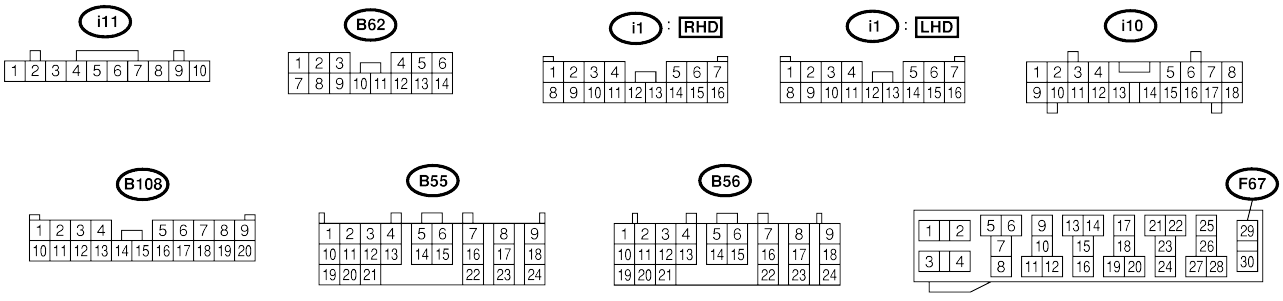
No.	Step	Check	Yes	No
1	**CHECK GEAR POSITION.** 1) Lift-up the vehicle and place safety stand. **CAUTION:** **On AWD models, raise all wheels off ground.** 2) Start the engine. 3) Move select lever to “D”, and drive vehicle. 4) Read data of gear position using Subaru Select Monitor. ● Gear position 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-108, CHECK FWD SWITCH., Diagnostic Procedure for No-trouble Code.>	Check shift solenoid 1 and shift solenoid 2 signal circuit. <Ref. to AT-72, TROUBLE CODE 71 - SHIFT SOLENOID 1 -, Diagnostic Procedure with Trouble Code.> and <Ref. to AT-76, TROUBLE CODE 72 - SHIFT SOLENOID 2 -, Diagnostic Procedure with Trouble Code.>

B: CHECK FWD SWITCH. S004618F16

DIAGNOSIS:
- LED does not come on even if FWD switch is ON.
- FWD switch circuit is open or short.

WIRING DIAGRAM:





S3M0634

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-111, CHECK BRAKE SWITCH., Diagnostic Procedure for No-trouble Code.>	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-15, 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. 20 — (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. 20 — 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. 20 (+) — 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. 20 (+) — Chassis ground (–):***	Is the voltage more than 6 V in FWD switch while removing?	Go to step **8**.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
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*** ***(B56) No. 2 — (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.

No.	Step	Check	Yes	No
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*** ***(B56) No. 2 — 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*** ***(B56) No. 2 — 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*** ***(B56) No. 2 — Chassis ground:***	Is the voltage more than 9 V in FWD switch while removing?	Go to step **12**.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
12	**CHECK POOR CONTACT.**	Is there poor contact in FWD switch circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

C: CHECK BRAKE SWITCH. S004618F17

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-112, CHECK ABS SWITCH, Diagnostic Procedure for No-trouble Code.>	Check brake switch circuit. <Ref. WI-58, A/T Control System.>

D: CHECK ABS SWITCH. S004618F18

No.	Step	Check	Yes	No
1	**CHECK ABS SWITCH.**	Does the LED of ABS switch light up?	Check ABS switch circuit. <Ref. to ABS-134, TROUBLE CODE 44 - ABS-AT CONTROL (NON CONTROLLED) -, Diagnostics Chart with Subaru Select Monitor.> and <Ref. to ABS-136, TROUBLE CODE 44 - ABS-AT CONTROL (CONTROLLED) -, Diagnostics Chart with Subaru Select Monitor.>	Go to step CHECK CRUISE CONTROL SWITCH. <Ref. to AT-112, CHECK CRUISE CONTROL SWITCH., Diagnostic Procedure for No-trouble Code.>

E: CHECK CRUISE CONTROL SWITCH. S004618F19

No.	Step	Check	Yes	No
1	**CHECK CRUISE CONTROL SWITCH.**	When cruise control is set, does LED light up?	Go to step CHECK KICK-DOWN SWITCH. <Ref. to AT-114, CHECK KICK-DOWN SWITCH., Diagnostic Procedure for No-trouble Code.>	Check cruise control. <Ref. to CC-37, Diagnostics Chart with Trouble Code (Turbo Model).>, <Ref. to CC-57, Diagnostics Chart with Trouble Code (Non-Turbo Model).>

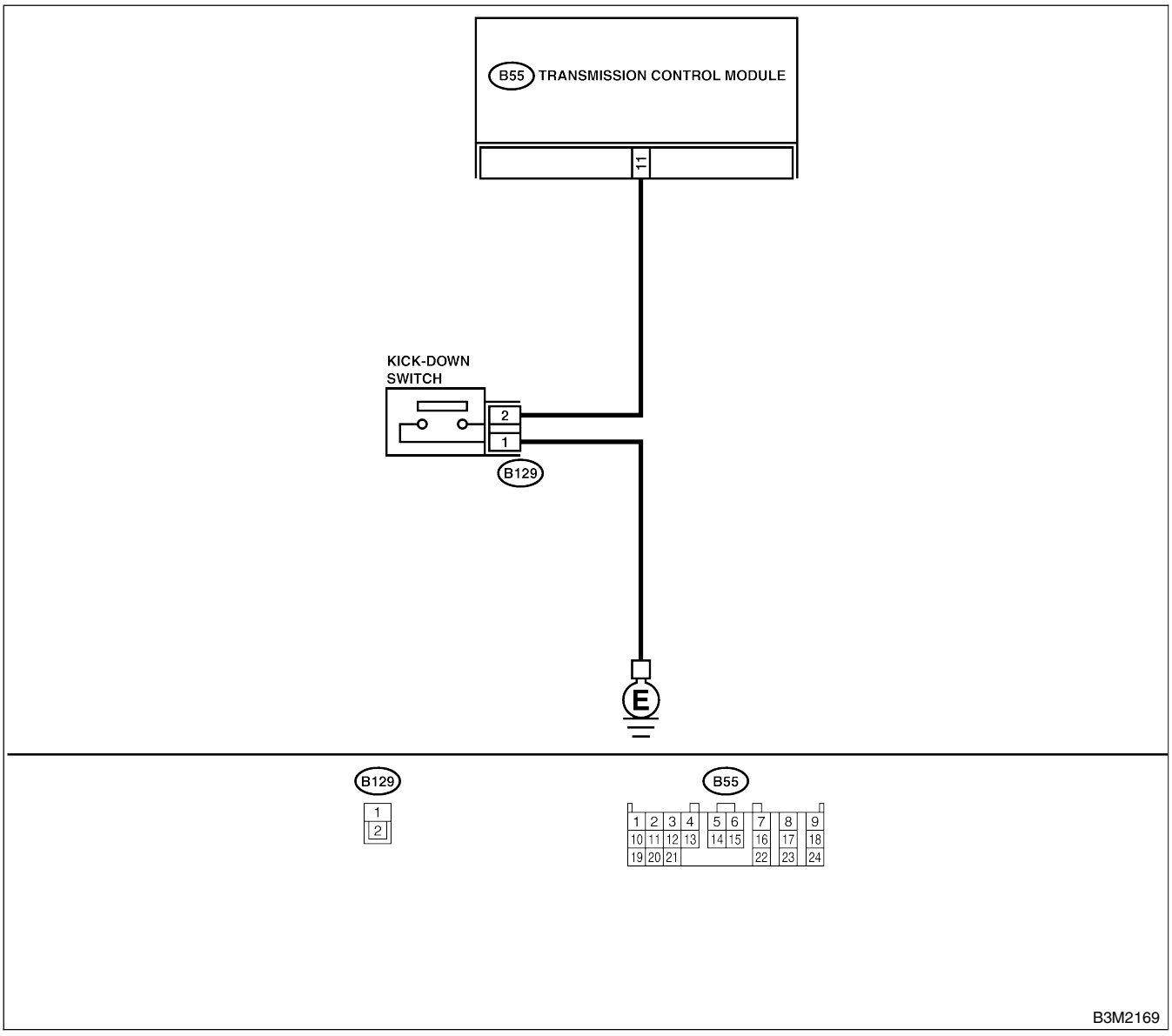
MEMO:

F: CHECK KICK–DOWN SWITCH. S004618G76

DIAGNOSIS:
- The kick-down switch is not ON when the throttle is fully open but is OFF when the throttle is partially open or fully closed.
- Kick-down switch circuit is open or short.

TROUBLE SYMPTOM:
No kick-down occurs (when the throttle is fully open).

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	**CHECK KICK-DOWN SWITCH OPERATION.**	When the accelerator pedal is depressed, does "ON" displayed?	Go to step CHECK POWER MODE SWITCH. <Ref. to AT-118, CHECK POWER MODE SWITCH, Diagnostic Procedure for No-trouble Code.>	Go to step **2**.
2	**CHECK KICK-DOWN SWITCH GROUND LINE.** 1) Disconnect connector from kick-down switch. 2) Measure resistance of harness connector between kick-down switch and chassis ground. ***Connector & terminal*** ***(B129) No. 1 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair open circuit in harness between kick-down switch and chassis ground.
3	**CHECK KICK-DOWN SWITCH.** Measure resistance for kick-down switch when depressing the accelerator pedal. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Go to step **4**.	Replace kick-down switch. <Ref. to SP-5, Accelerator Pedal.>
4	**CHECK KICK-DOWN SWITCH.** Measure resistance for kick-down switch when pressing the accelerator pedal. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Replace kick-down switch.
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND KICK-DOWN SWITCH.** 1) Turn ignition switch OFF. 2) Disconnect connectors from kick-down switch. 3) Measure resistance of harness connector between TCM and kick-down switch. ***Connector & terminal*** ***(B55) No. 11 — (B129) No. 2:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair open circuit in harness between TCM and kick-down switch.
6	**CHECK HARNESS CONNECTOR BETWEEN TCM AND KICK-DOWN SWITCH.** Measure resistance of harness connector between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7**.	Repair short circuit in harness between TCM and chassis ground.
7	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn ignition switch to OFF. 2) Connect connector to kick-down switch. 3) Turn ignition switch ON (with engine OFF). 4) Measure signal voltage for TCM when depressing the accelerator pedal. ***Connector & terminal*** ***(B55) No. 11 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **8**.	Go to step **9**.
8	**CHECK INPUT SIGNAL FOR TCM.** Measure signal voltage for TCM when pressing the accelerator pedal. ***Connector & terminal*** ***(B55) No. 11 (+) — Chassis ground (–):***	Is the voltage more than 6.5 V?	A temporary poor contact of the connector and harness may be the cause. Repair harness and connector in the TCM.	Go to step **9**.

No.	Step	Check	Yes	No
9	**CHECK POOR CONTACT.**	Is there poor contact?	Repair poor contact.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

MEMO:

G: CHECK POWER MODE SWITCH. S004618G77

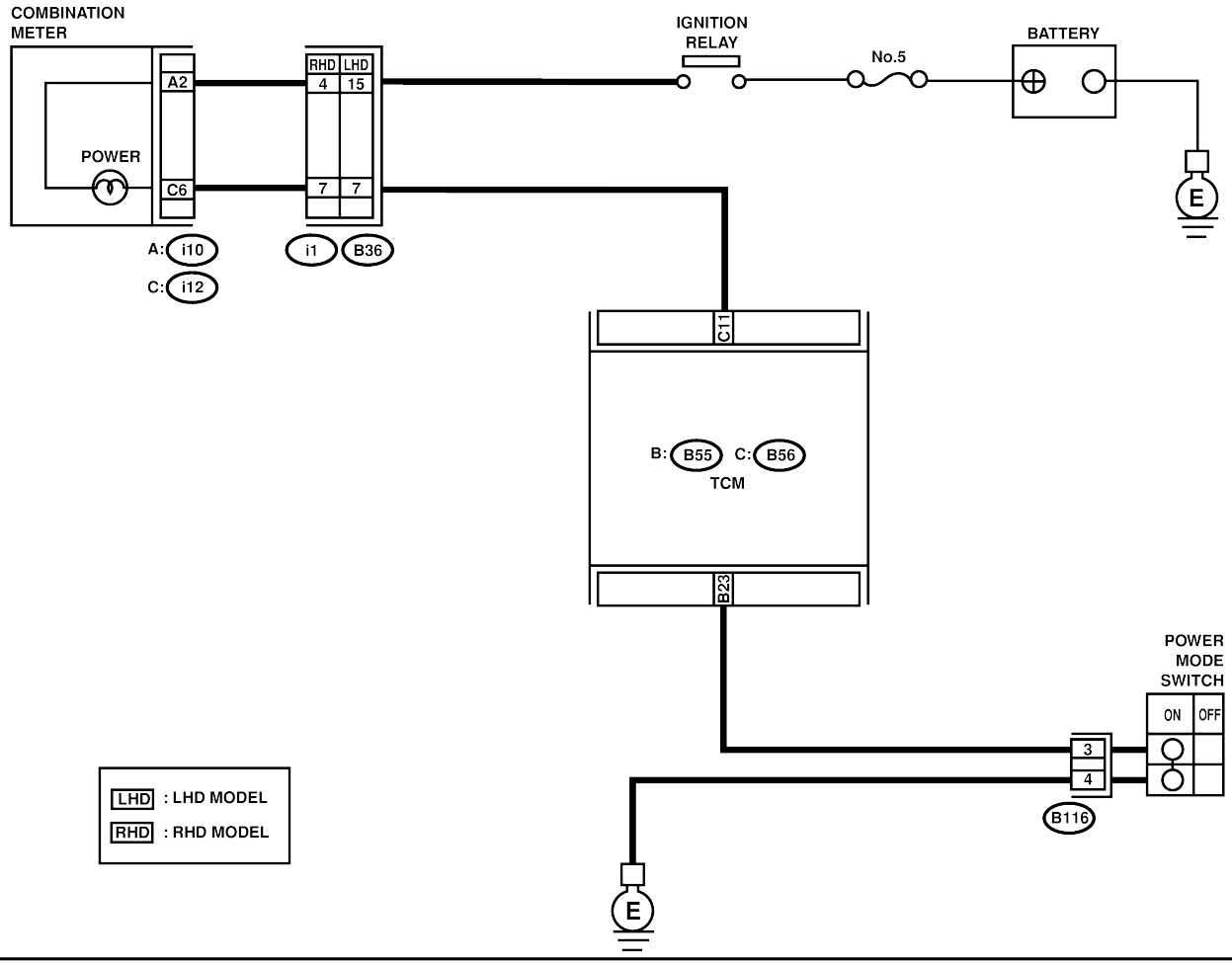
DIAGNOSIS:

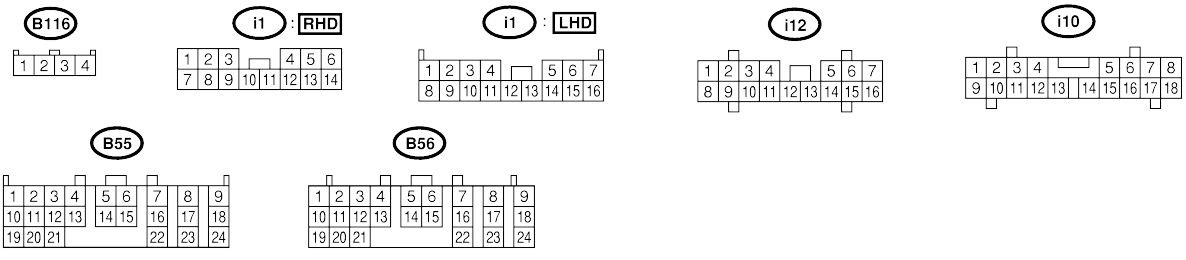
- LED does not come on when power switch is ON.
- Power switch circuit is open or shorted.

TROUBLE SYMPTOM:

No power mode occurs.

WIRING DIAGRAM:





S3M0635

No.	Step	Check	Yes	No
1	**CHECK POWER SWITCH OPERATION.**	When power switch is turned OFF, does LED light up?	Go to step **5**.	Go to step **2**.
2	**CHECK POWER SWITCH OPERATION.**	When power switch is turned ON, does LED light up?	Go to step CHECK INHIBITOR SWITCH. <Ref. to AT-122, CHECK INHIBITOR SWITCH., Diagnostic Procedure for No-trouble Code.>	Go to step **3**.
3	**CHECK POWER INDICATOR LIGHT.** 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove POWER indicator light bulb from combination meter.	Is POWER indicator light bulb OK?	Go to step **4**.	Replace POWER indicator light bulb. <Ref. to IDI-15, Combination Meter Assembly.>
4	**CHECK POWER SWITCH GROUND LINE.** 1) Turn ignition switch to OFF. 2) Disconnect connector from power switch. 3) Measure resistance of harness connector between power switch and chassis ground. ***Connector & terminal*** ***(B116) No. 4 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair open circuit in harness between power switch and chassis ground.
5	**CHECK POWER SWITCH.** 1) Power switch turned ON. 2) Measure resistance between terminals of power switch. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair power switch.
6	**CHECK POWER SWITCH.** 1) Power switch turned OFF. 2) Measure resistance between terminals of power switch. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance more than 1 MΩ?	Go to step **7**.	Repair power switch.
7	**CHECK HARNESS CONNECTOR BETWEEN TCM AND POWER SWITCH.** Measure resistance of harness connector between TCM and power switch. ***Connector & terminal*** ***(B55) No. 23 — (B116) No. 3:***	Is the resistance less than 1 Ω?	Go to step **8**.	Repair open circuit in harness between TCM and power switch connector.
8	**CHECK HARNESS CONNECTOR BETWEEN TCM AND POWER SWITCH.** Measure resistance of harness connector between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 23 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **9**.	Repair short circuit in harness between TCM and power switch connector.
9	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect connectors to TCM and power switch. 2) Turn ignition switch ON (with engine OFF). 3) Measure signal voltage for TCM while turning power switch OFF. ***Connector & terminal*** ***(B55) No. 23 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **10**.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

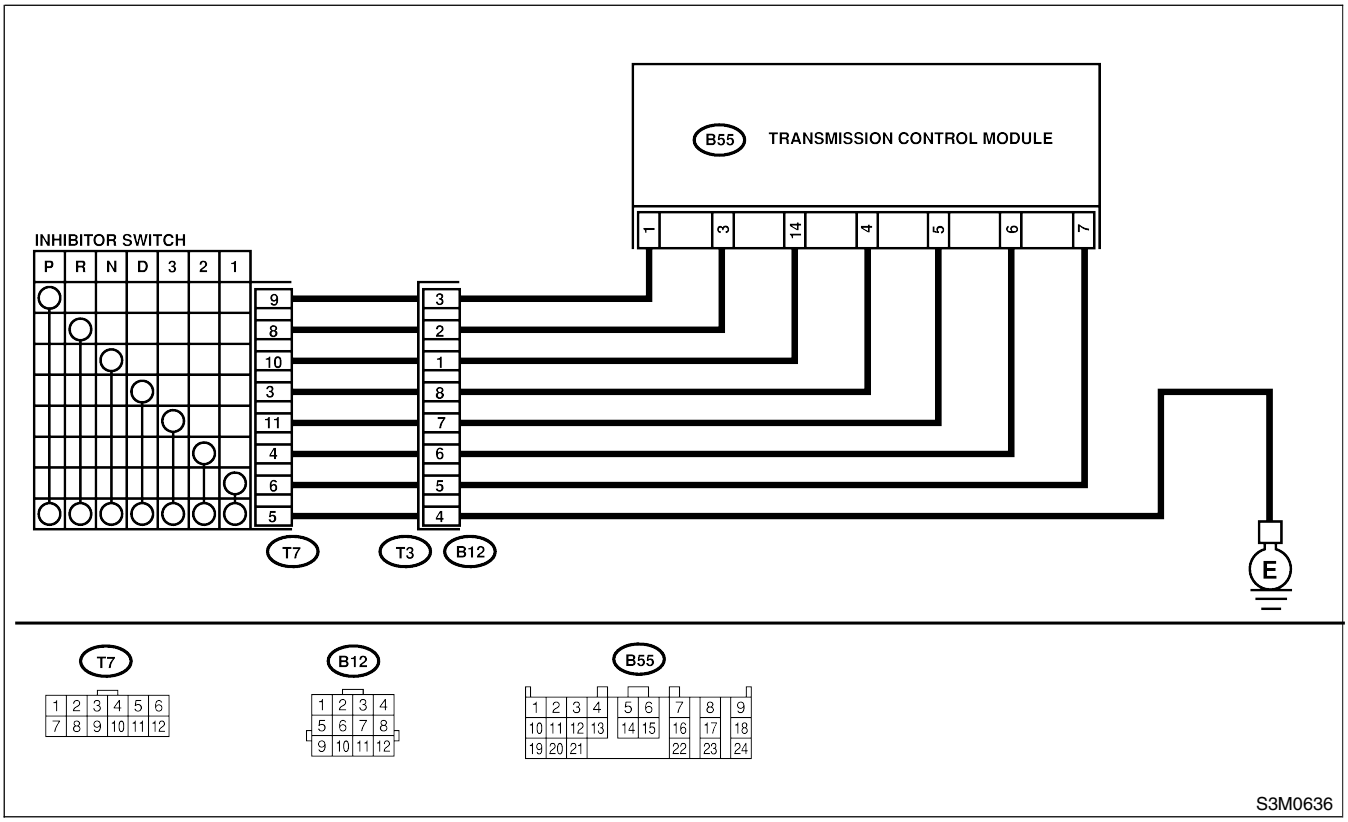
No.	Step	Check	Yes	No
10	**CHECK INPUT SIGNAL FOR TCM.** Measure signal voltage for TCM while turning power switch ON. ***Connector & terminal*** ***(B55) No. 23 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **11**.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
11	**CHECK POOR CONTACT.**	Is there poor contact?	Repair poor contact.	A temporary poor contact of the connector or harness in power switch circuit.

MEMO:

H: CHECK INHIBITOR SWITCH. S004618F20

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:



S3M0636

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 CHECK HOLD SWITCH. <Ref. to AT-130, CHECK HOLD SWITCH., Diagnostic Procedure for No-trouble Code.>
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. 1 — (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. 1 (+) — 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. 1 (+) — Chassis ground (–):***	Is the voltage more than 8 V in other ranges?	Go to step **44**.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

No.	Step	Check	Yes	No
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. 1 — Chassis ground:***	Is the resistance less than 1 MΩ?	Go to step **20**.	Repair ground short circuit in "P" range circuit.
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. 3 — (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. 3 (+) — 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. 3 (+) — Chassis ground (–):***	Is the voltage more than 8 V in other ranges?	Go to step **44**.	Replace TCM. <Ref. to AT-48, 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. 3 — 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. 14 — (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. 14 (+) — Chassis ground (–):***	Is the voltage less than 1 V in "N" range?	Go to step **26**.	Go to step **44**.

No.	Step	Check	Yes	No
26	**CHECK INPUT SIGNAL FOR TCM.** Measure voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 14 (+) — Chassis ground (–):***	Is the voltage more than 8 V in other ranges?	Go to step **44**.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
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. 14 — 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. 4 — (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. 4 (+) — 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. 4 (+) — Chassis ground (–):***	Is the voltage more than 8 V in other ranges?	Go to step **44**.	Replace TCM. <Ref. to AT-48, 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. 4 — 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. 5 — (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.

No.	Step	Check	Yes	No
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. 5 (+) — Chassis ground (–):***	Is the voltage less than 1 V in "3" range?	Go to step **34**.	Go to step **44**.
34	**CHECK INPUT SIGNAL FOR TCM.** Measure voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 5 (+) — Chassis ground (–):***	Is the voltage more than 8 V in other ranges?	Go to step **44**.	Replace TCM. <Ref. to AT-48, 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. 5 — 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*** ***(B55) No. 6 — (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*** ***(B55) No. 6 (+) — 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*** ***(B55) No. 6 (+) — Chassis ground (–):***	Is the voltage more than 8 V in other ranges?	Go to step **44**.	Replace TCM. <Ref. to AT-48, 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*** ***(B55) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **40**.	Repair ground short circuit in "2" range circuit.

No.	Step	Check	Yes	No
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*** ***(B55) No. 7 — (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.
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*** ***(B55) No. 7 (+) — 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*** ***(B55) No. 7 (+) — Chassis ground (–):***	Is the voltage more than 8 V in other ranges?	Go to step **44**.	Replace TCM. <Ref. to AT-48, 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*** ***(B55) No. 7 — 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-10, Select Cable.> <Ref. to AT-48, Transmission Control Module (TCM).>

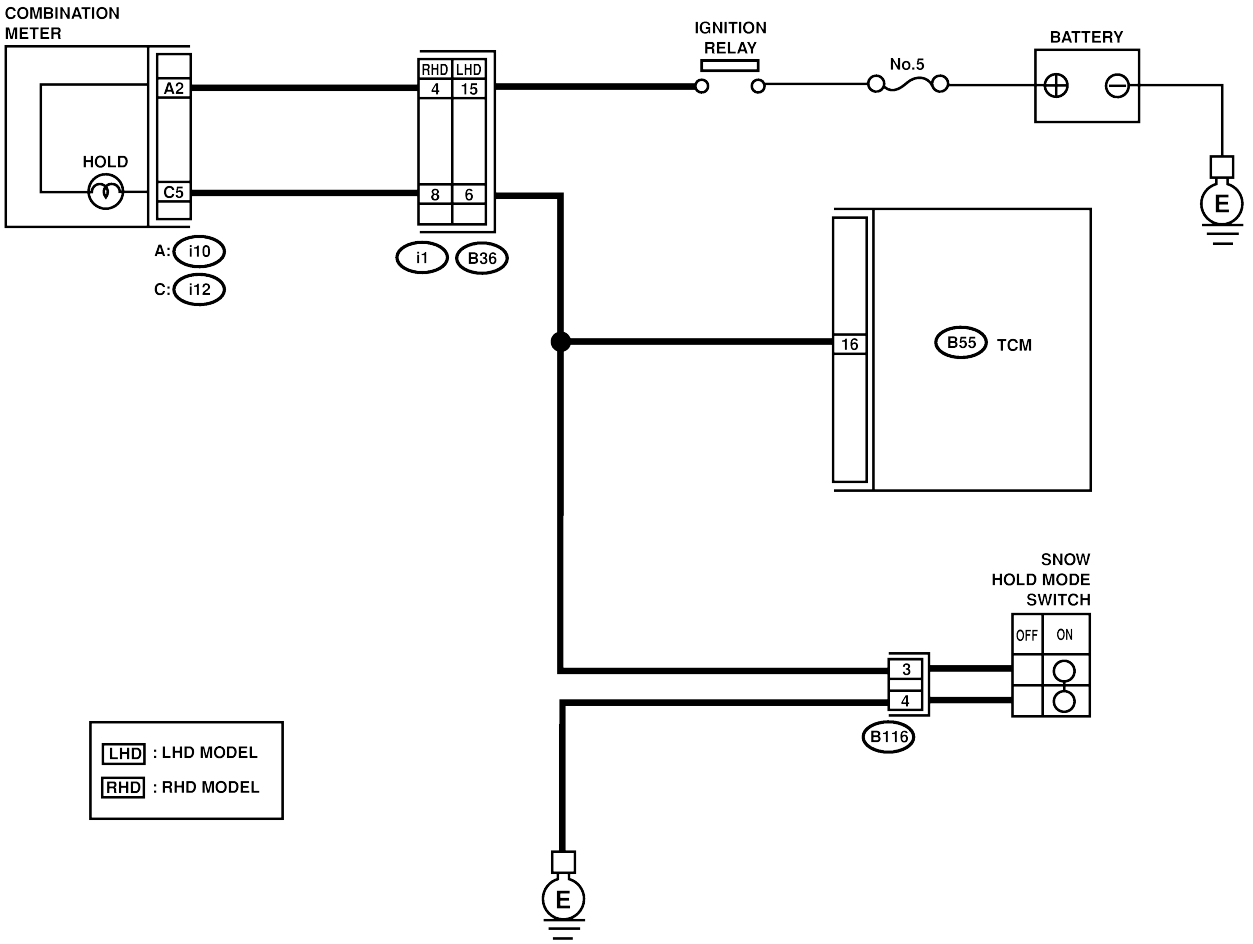
MEMO:

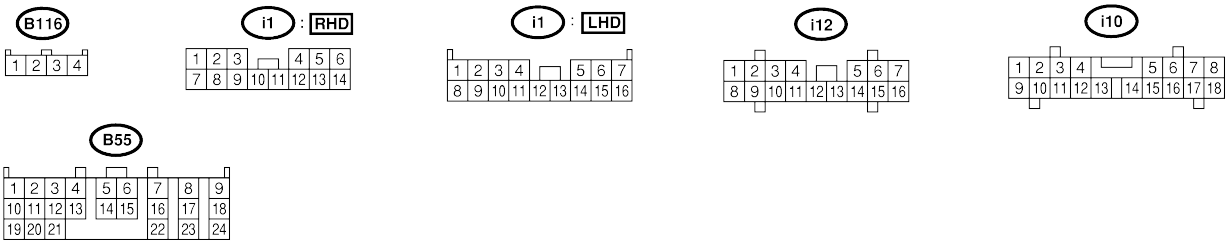
I: CHECK HOLD SWITCH. S004618G78

DIAGNOSIS:
- LED does not come on when hold switch is ON.
- Hold switch circuit is open or shorted.

TROUBLE SYMPTOM:
- 2nd gear is not held.
- Failure of vehicle to start in 2nd gear except 1st range.

WIRING DIAGRAM:





S3M0637

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

No.	Step	Check	Yes	No
1	**CHECK HOLD SWITCH OPERATION.**	When hold switch is turned OFF, does LED light up?	Go to step **5**.	Go to step **2**.
2	**CHECK HOLD SWITCH OPERATION.**	When hold switch is turned ON, does LED light up?	Go to step Symptom Related Diagnostic. <Ref. 134, Symptom Related Diagnostic.>	Go to step **3**.
3	**CHECK HOLD INDICATOR LIGHT.** 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove HOLD indicator light bulb from combination meter.	Is HOLD indicator light bulb OK?	Go to step **4**.	Replace HOLD indicator light bulb. <Ref. to IDI-15, Combination Meter Assembly.>
4	**CHECK HOLD SWITCH GROUND LINE.** 1) Turn ignition switch to OFF. 2) Disconnect connector from hold switch. 3) Measure resistance of harness connector between hold switch and chassis ground. ***Connector & terminal*** ***(B116) No. 4 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair open circuit in harness between hold switch and chassis ground.
5	**CHECK HOLD SWITCH.** 1) Hold switch turned ON. 2) Measure resistance between terminals of hold switch. ***Terminals*** ***No. 4 — No. 3:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair hold switch.
6	**CHECK HOLD SWITCH.** 1) Hold switch turned OFF. 2) Measure resistance between terminals of hold switch. ***Terminals*** ***No. 4 — No. 3:***	Is the resistance more than 1 MΩ?	Go to step **7**.	Repair hold switch.
7	**CHECK HARNESS CONNECTOR BETWEEN TCM AND HOLD SWITCH.** 1) Disconnect connector TCM and combination meter. 2) Measure resistance of harness connector between TCM and hold switch. ***Connector & terminal*** ***(B55) No. 16 — (B116) No. 3:***	Is the resistance less than 1 Ω?	Go to step **8**.	Repair open circuit in harness between TCM and hold switch connector and poor contact in coupling connector.
8	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** Measure resistance of harness connector TCM and combination meter. ***Connector & terminal*** ***(B55) No. 16 — (i12) No. 5:***	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 HOLD SWITCH.** Measure resistance of harness connector between TCM and chassis ground to make sure that circuit does not short. ***Connector & terminal*** ***(B55) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **10**.	Repair short circuit in harness between TCM, hold switch and combination meter connector.

No.	Step	Check	Yes	No
10	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect connectors to TCM and hold switch. 2) Turn ignition switch ON (with engine OFF). 3) Measure signal voltage for TCM while turning hold switch OFF. ***Connector & terminal*** ***(B55) No. 16 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **11**.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
11	**CHECK INPUT SIGNAL FOR TCM.** Measure signal voltage for TCM while turning hold switch ON. ***Connector & terminal*** ***(B55) No. 16 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **12**.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
12	**CHECK POOR CONTACT.**	Is there poor contact?	Repair poor contact.	A temporary poor contact of the connector or harness or connector in hold switch circuit.

16. Symptom Related Diagnostic S004519

A: INSPECTION S004519A10

Symptom	Problem parts
Starter does not rotate when select lever is in “P” or “N”; starter rotates when select lever is in “R”, “D”, “3” or “2”.	• Inhibitor switch • Select cable • Select lever • Starter motor and harness
Abnormal noise when select lever is in “P” or “N”.	• Strainer • Transfer duty solenoid • Oil pump • Drive plate • ATF level too high or too low
Hissing noise occurs during standing start.	• Strainer • ATF level too high or too low
Noise occurs while driving in “D1”.	• Final gear • Planetary gear • Reduction gear • Differential gear oil level too high or too low
Noise occurs while driving in “D2”.	
Noise occurs while driving in “D3”.	• Final gear • Low & reverse brake • Reduction gear • Differential gear oil level too high or too low
Noise occurs while driving in “D4”.	• Final gear • Low & reverse brake • Planetary gear • Reduction gear • Differential gear oil level too high or too low
Engine stalls while shifting from one range to another.	• Control valve • Lock-up damper • Engine performance • Input shaft
Vehicle moves when select lever is in “N”.	• TCM • Low clutch
Shock occurs when select lever is moved from “N” to “D”.	• TCM • Harness • Control valve • ATF deterioration
Excessive time lag occurs when select lever is moved from “N” to “D”.	• Control valve • Low clutch • Line pressure duty solenoid • Seal ring • Front gasket transmission case
Shock occurs when select lever is moved from “N” to “R”.	• TCM • Harness • Control valve • ATF deterioration
Excessive time lag occurs when select lever is moved from “N” to “R”.	• Control valve • Low & reverse clutch • Reverse clutch • Line pressure duty solenoid • Seal ring • Front gasket transmission case
Vehicle does not start in any shift range (engine stalls).	• Parking brake mechanism • Planetary gear

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 effected when select lever is in “3” range.	• Inhibitor switch • TCM • Throttle position sensor • Control valve
Engine brake is not effected when select lever is in “3” or “2” range.	• Control valve
Engine brake is not effected 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 effected.	• Select cable • Select lever • Parking mechanism
Shift lever cannot be moved or is hard to move from “P” range.	
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
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 • Hold switch
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 • Hold switch
Front wheel slippage occurs during standing starts.	• TCM • Front vehicle speed sensor • FWD switch • 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 • FWD switch • 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

Symptom	Problem parts
Select lever slips out of operation during acceleration or while driving on rough terrain.	• Select cable • Select lever • Detent spring • Manual plate

MEMO:

FRONT SUSPENSION

FS

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6. Front Stabilizer....22
7. Front Crossmember....23
8. General Diagnostic Table....24

1. General Description S202001

A: SPECIFICATIONS S202001E49

1. STABILIZER S202001E4901

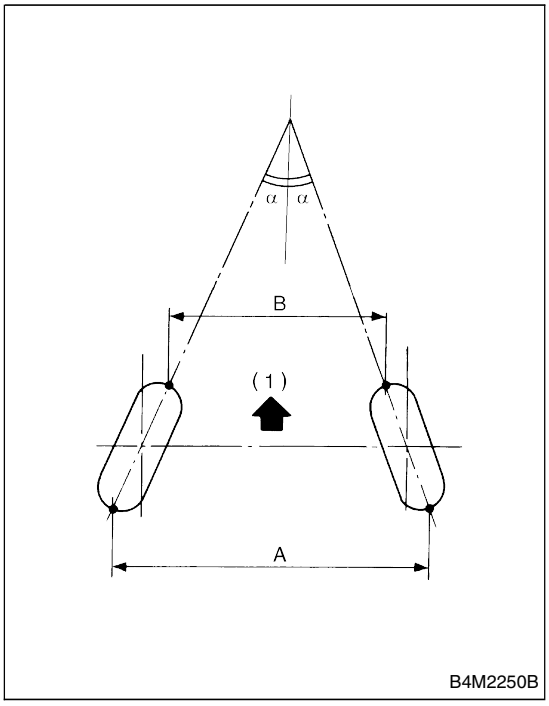
Model	Bar dia.	
	Front	Rear
NON-TURBO	19 mm (0.75 in)	13 mm (0.51 in)
TURBO	20 mm (0.79 in)	15 mm (0.59 in)

2. WHEEL ALIGNMENT S202001E4902

Model	NON-TURBO	TURBO
Camber (tolerance: ±0°30′)	–0°15′	–0°20′
Caster (common difference: ±0°45′)	–0°37′	–0°57′
Toe-in	0±3 mm (0±0.12 in)* Each toe angle: ±0°09′	
Kingpin angle	13°25′	13°40′
Wheel arch height [tolerance: $^{+12}/_{-24}$ mm ($^{+0.47}/_{-0.94}$ in)	432 mm (17.01 in)	422 mm (16.61 in)

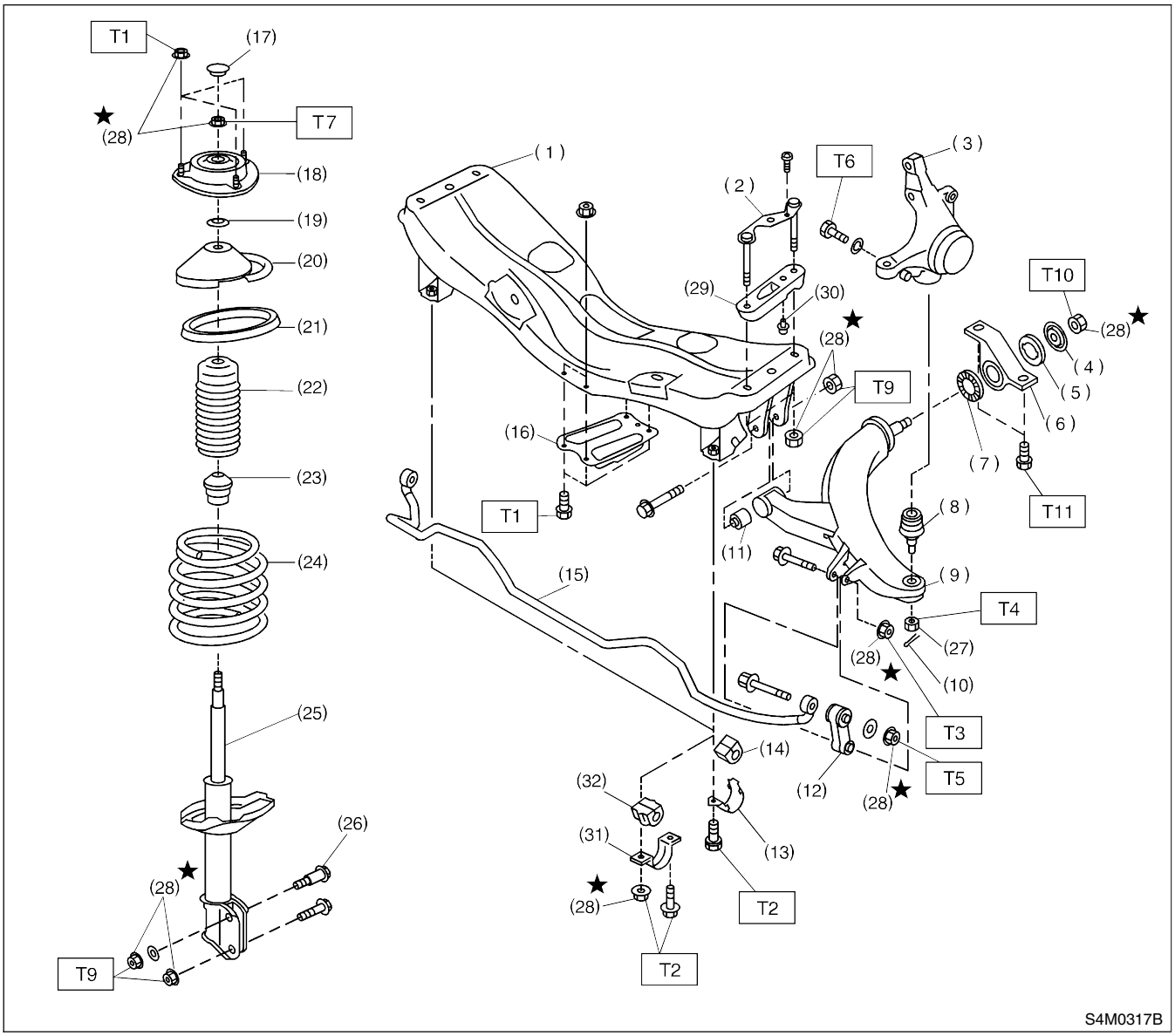
*: When performing toe-in adjustment, align as close to 0 mm (0 in) as possible.

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 (Non-Turbo model)
(14) Bushing (Non-Turbo model)
(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) Clamp (Turbo model)
(32) Bushing (Turbo model)

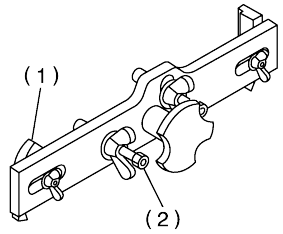
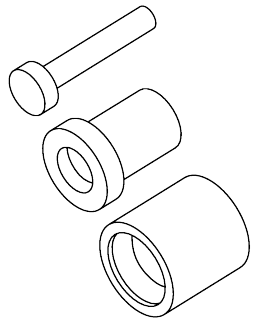
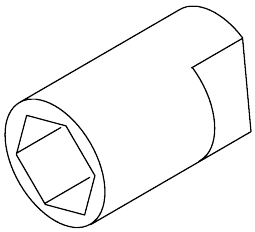
Tightening torque: N·m (kgf-m, ft-lb)
T1: 20 (2.0, 14.5)
T2: 25 (2.5, 18.1)
T3: 30 (3.1, 22)
T4: 40 (4.1, 30)
T5: 45 (4.6, 33)
T6: 50 (5.1, 37)
T7: 55 (5.6, 41)
T8: 100 (10.2, 74)
T9: 175 (17.8, 129)
T10: 190 (19.4, 140)
T11: 245 (25.0, 181)

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.

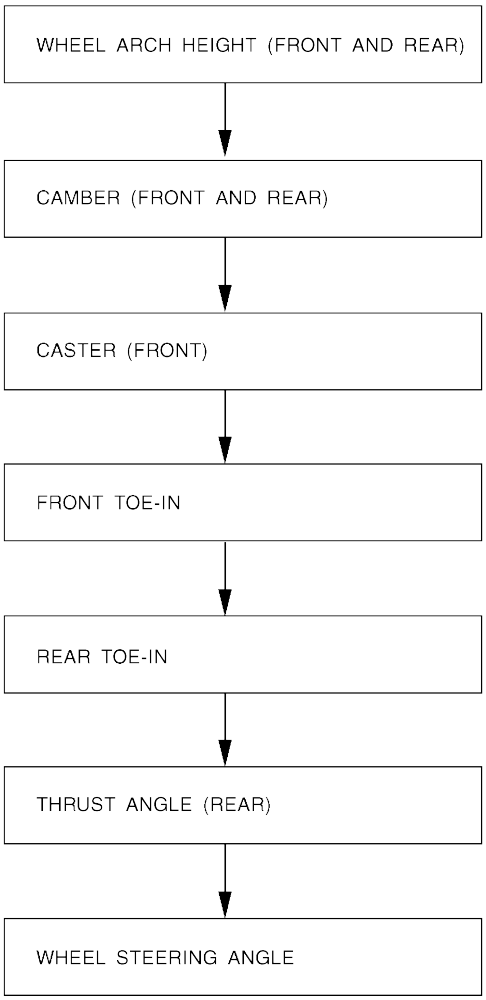
2. GENERAL PURPOSE TOOLS S202001A1702

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

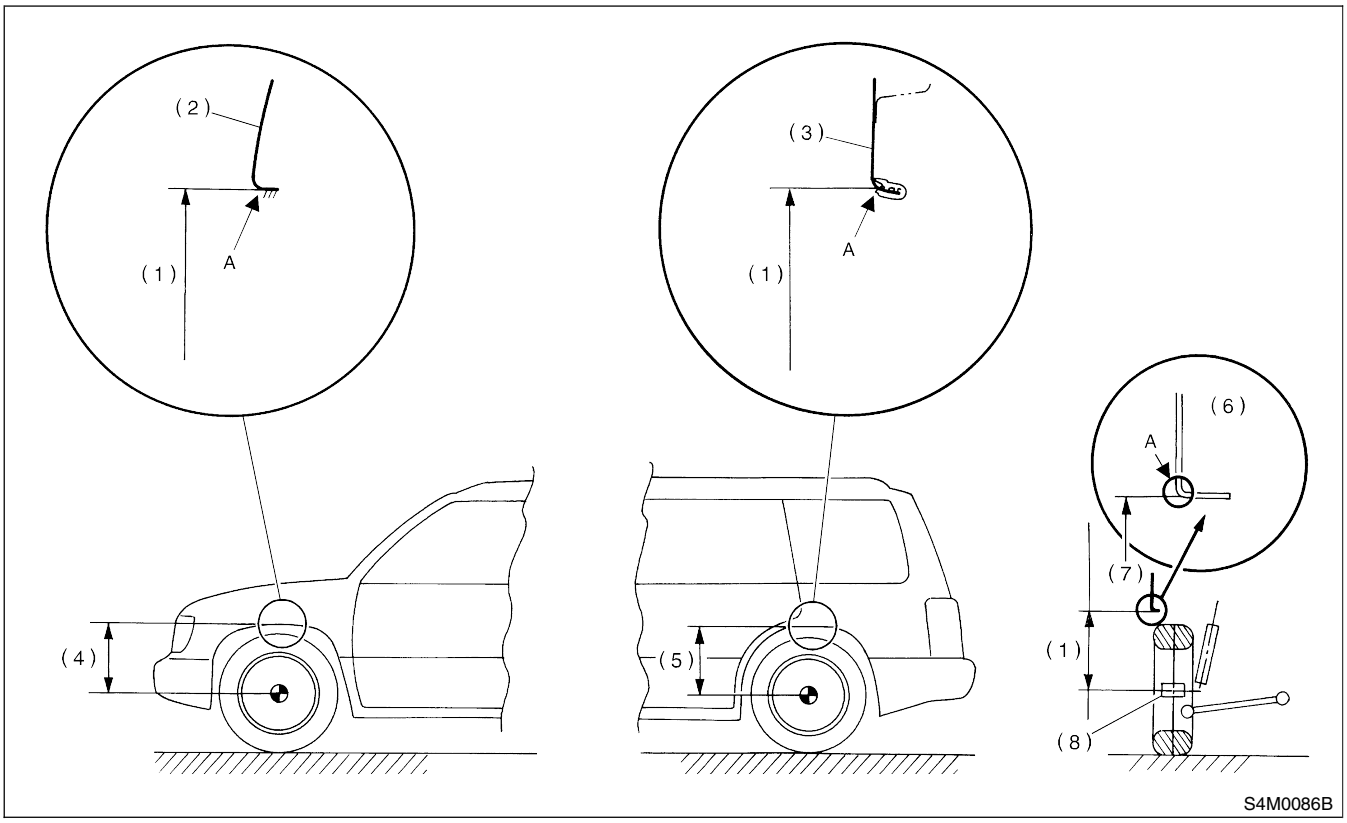
Check, adjust and/or measure wheel alignment in accordance with procedures indicated in figure:



B4M1088A

1. WHEEL ARCH HEIGHT S202116A1006

1) Adjust tire pressure to specifications.
2) Set vehicle under “curb weight” conditions. (Empty luggage compartment, install spare tire, jack, service tools, and top up fuel tank.)
3) Set steering wheel in a wheel-forward position.
4) Suspend thread from wheel arch (point “A” in figure below) to determine a point directly above center of spindle.
5) Measure distance between measuring point “A” and center of spindle.



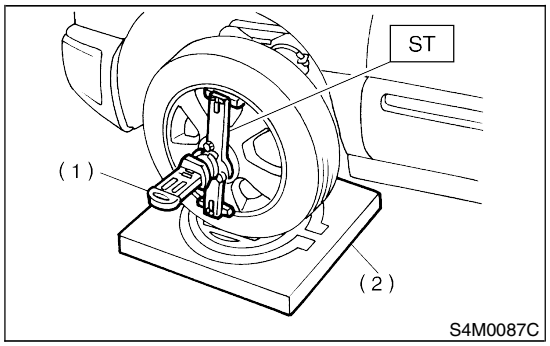
(1) Wheel arch height
(2) Front fender
(3) Outer rear quarter
(4) Front wheel arch height
(5) Rear wheel arch height
(6) Cross-section of arch
(7) Measuring point
(8) End of spindle

Model	Specified wheel arch height	
	Front	Rear
Non-Turbo	$432^{+12}/_{-24}$ mm ($17.01^{+0.47}/_{-0.94}$ in)	$435^{+12}/_{-24}$ mm ($17.13^{+0.47}/_{-0.94}$ in)
Turbo	$422^{+12}/_{-24}$ mm ($16.61^{+0.47}/_{-0.94}$ in)	$425^{+12}/_{-24}$ mm ($16.73^{+0.47}/_{-0.94}$ 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

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.>

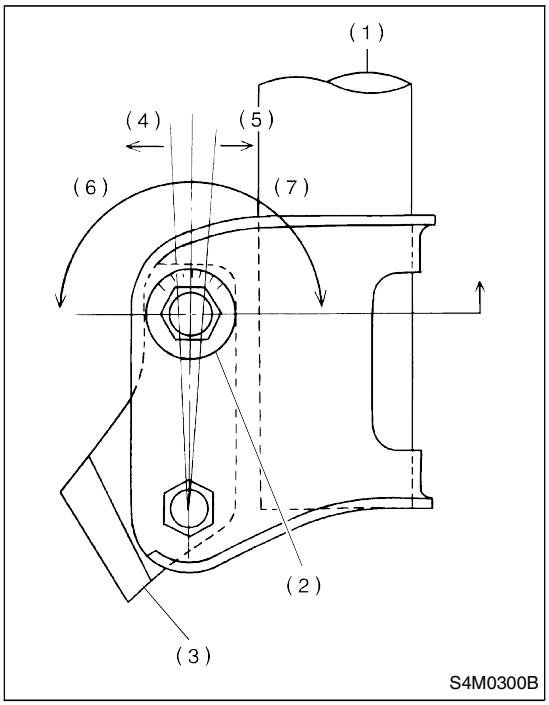
● Front Camber Adjustment

1) Loosen two self-locking nuts located at lower front portion of strut.

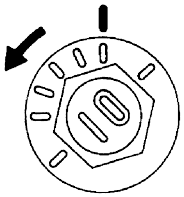
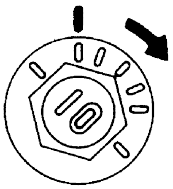
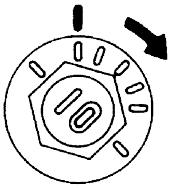
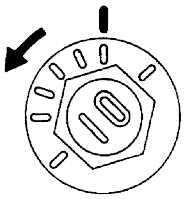
CAUTION:
● When adjusting bolt needs to be loosened or tightened, hold its head with a wrench and turn self-locking nut.
● Discard loosened self-locking nut and replace with a new one.
● When performing toe-in adjustment, align as close to 0 mm (0 in) as possible.

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.	 Rotate counterclockwise. B4M0190	 Rotate clockwise. B4M0350
Camber is decreased.	 Rotate clockwise. B4M0350	 Rotate counterclockwise. B4M0190

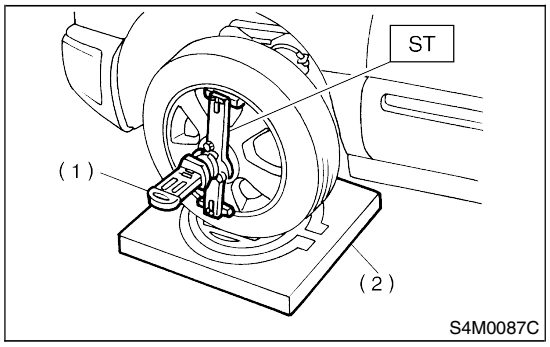
3) Tighten the two self-locking nuts.

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



(1) Alignment gauge
(2) Turning radius gauge

NOTE:
Refer to the “SPECIFICATIONS” for the caster values. <Ref. to FS-2 SPECIFICATIONS, General Description.>

4. FRONT WHEEL TOE-IN S202116A1004

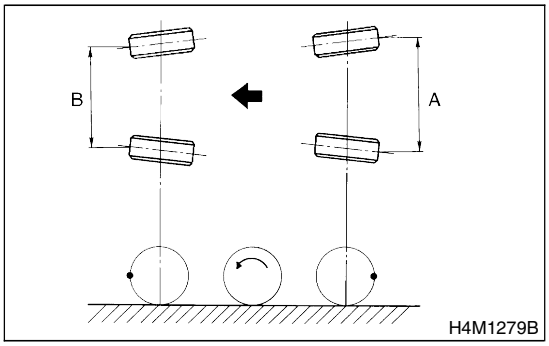
• Inspection

1) Using a toe gauge, measure front wheel toe-in.

Toe-in:
0±3 mm (0±0.12 in)

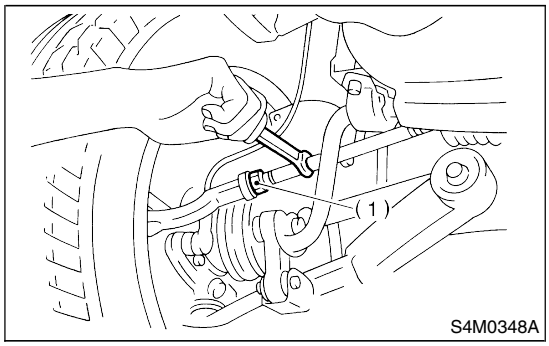
2) Mark rear sides of left and right tires at height corresponding to center of spindles and measure distance “A” between marks.
3) Move vehicle forward so that marks line up with front sides at height corresponding to center of spindles.
4) Measure distance “B” between left and right marks. Toe-in can 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.

5. REAR WHEEL TOE-IN *S202116A1007*

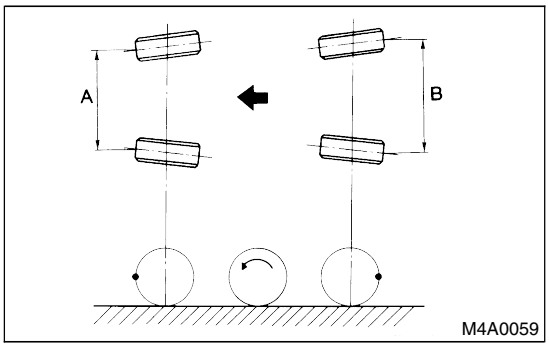
● Inspection

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 spindles and measure distance “B” between marks.
3) Move vehicle forward so that marks line up with front sides at height corresponding to center of spindles.
4) Measure distance “A” between left and right marks. Toe-in can then be obtained by the following equation:

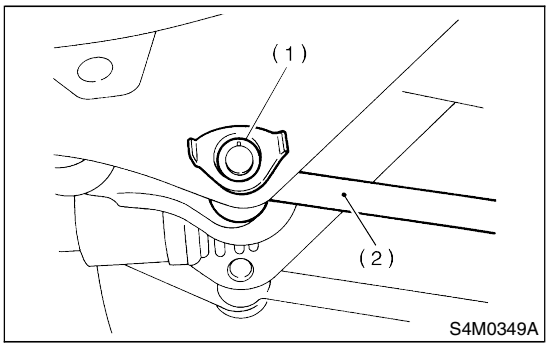
B – A = Toe-in



● Adjustment

1) Loosen self-locking nut on inner side of rear lateral link.

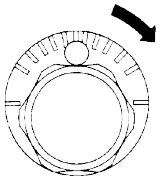
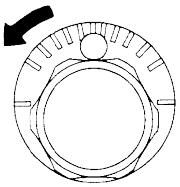
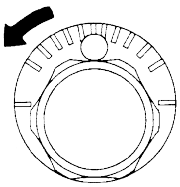
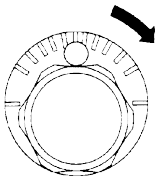
CAUTION:
● When loosening or tightening adjusting bolt, hold bolt head and turn self-locking nut.
● Discard loosened self-locking nut and replace with a new one.
● When performing toe-in adjustment, align as close to 0 mm (0 in) as possible.



(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.	 Rotate clockwise. B4M0192	 Rotate counter-clockwise. B4M0352
Toe-in is decreased.	 Rotate counter-clockwise. B4M0352	 Rotate clockwise. B4M0192

3) Tighten self-locking nut.

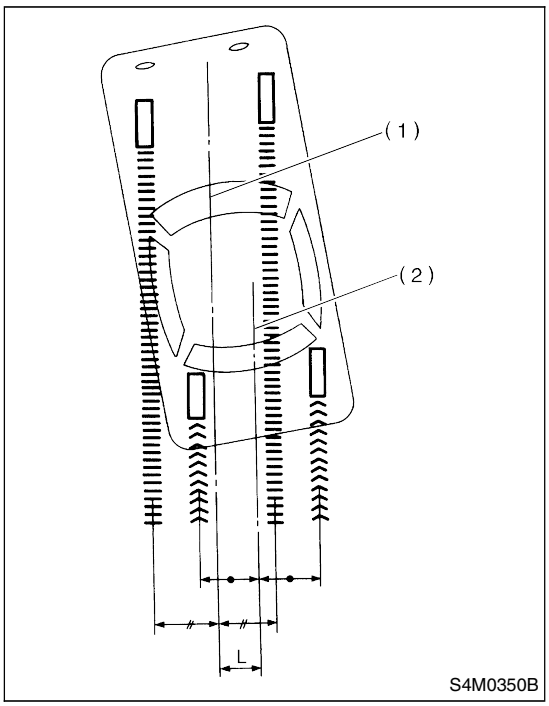
Tightening torque:
100 N·m (10.2 kgf-m, 74 ft-lb)

6. 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).

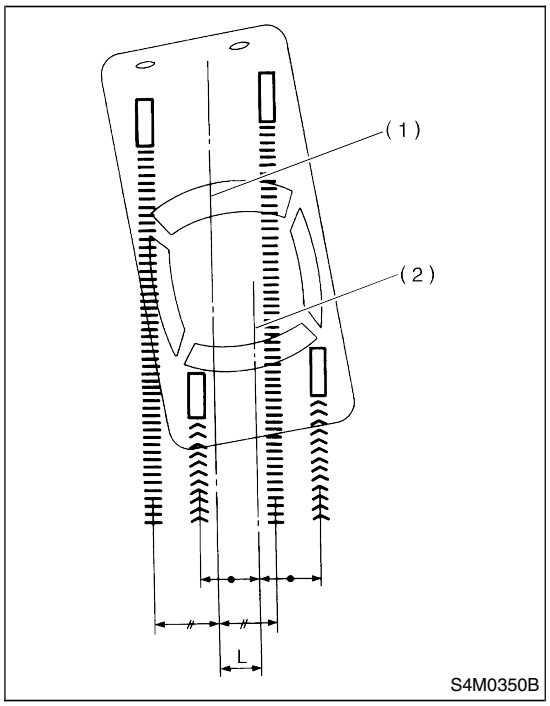


(1) Center line of loci (front axle)
(2) Center line of loci (rear axle)

● Adjustment

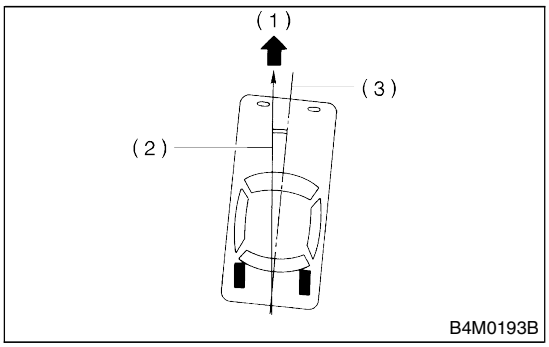
1) Make thrust angle adjustments by turning toe-in adjusting bolts of rear suspension equally in the same direction.
2) When one rear wheel is adjusted in a toe-in direction, adjust the other rear wheel equally in toe-out direction, in order to make thrust angle adjustment.
3) When left and right adjusting 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.

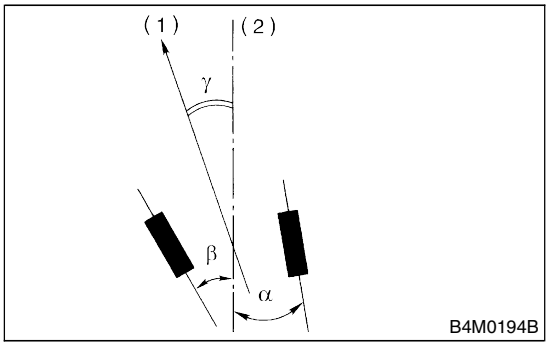


(1) Front
(2) Thrust angle
(3) Body center line

Thrust angle: r = (α – β)/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

7. STEERING ANGLE S202116A1005

● Inspection

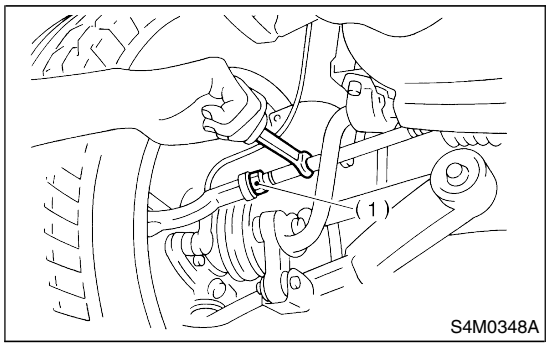
1) Place vehicle on a turning radius gauge.
2) While depressing brake pedal, turn steering wheel fully to the left and right. With steering wheel held at each fully turned position, measure both the inner and outer wheel steering angle.

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:
- **Check toe-in.**
- **Correct boot if it is twisted.**

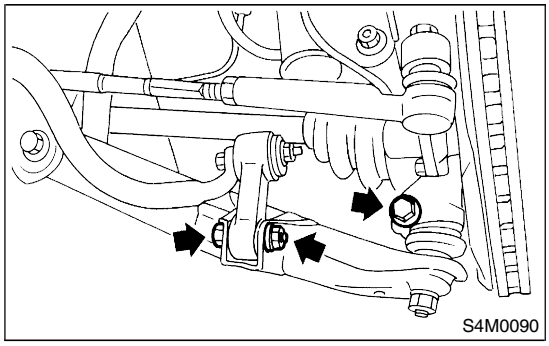


(1) Lock nut

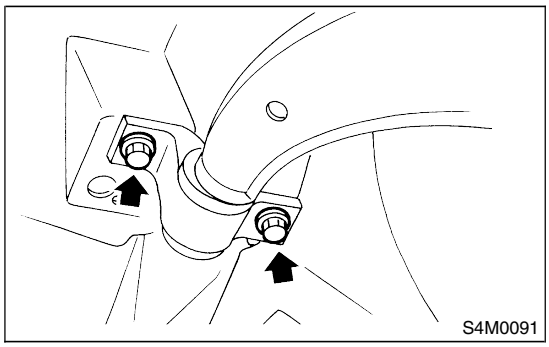
3. Front Transverse Link S202113

A: REMOVAL S202113A18

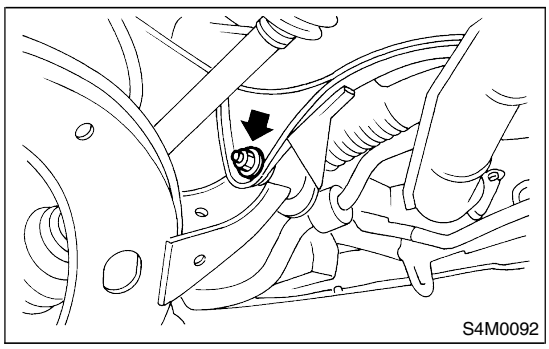
1) Set the vehicle on the lift.
2) Disconnect ground terminal from the battery.
3) Lift-up the vehicle and remove the wheel.
4) Disconnect stabilizer link from transverse link.
5) Remove bolt securing ball joint of transverse link to housing.


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.

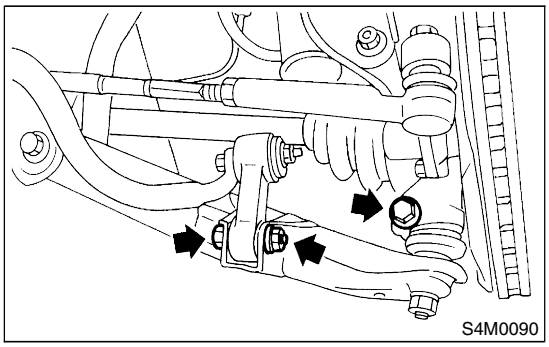
NOTE:
These bolts should be tightened to such an extent that they can still move back and forth in the oblong shaped hole in the bracket (which holds the bushing).

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)

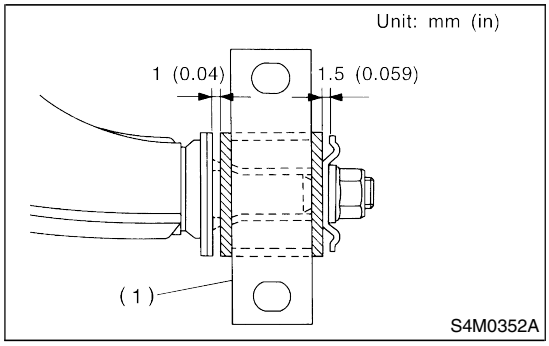
(2) Transverse link and crossmember

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.

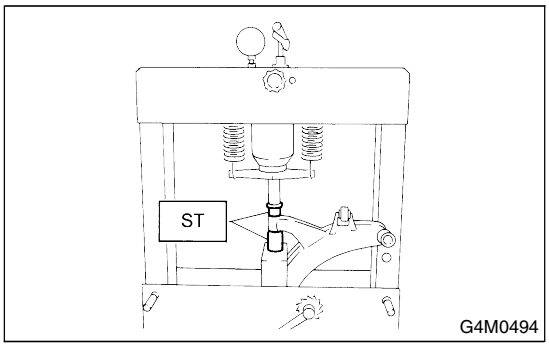


(1) Rear bushing

C: DISASSEMBLY S202113A06

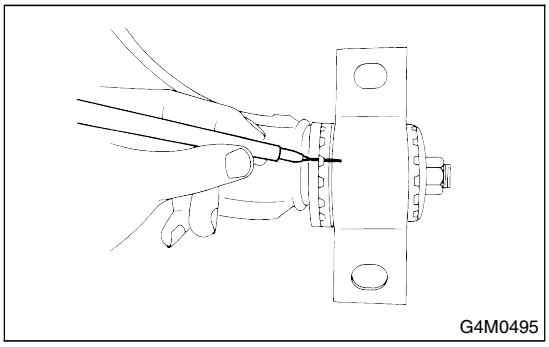
1. FRONT BUSHING S202113A0601

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.

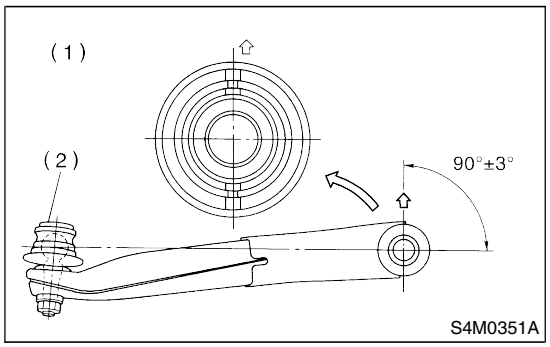


D: ASSEMBLY S202113A02

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)

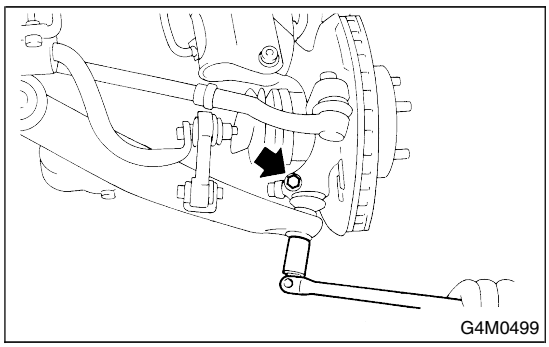
E: INSPECTION S202113A10

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 terminal from the 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.

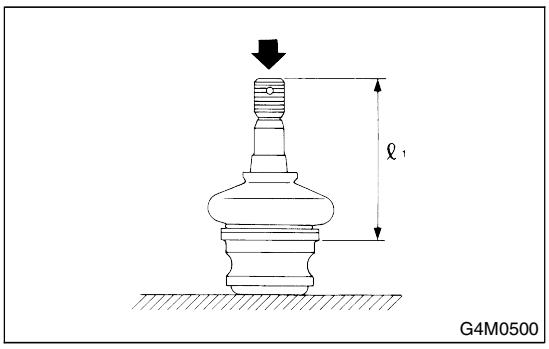
2) Connect ball joint to transverse link.

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.

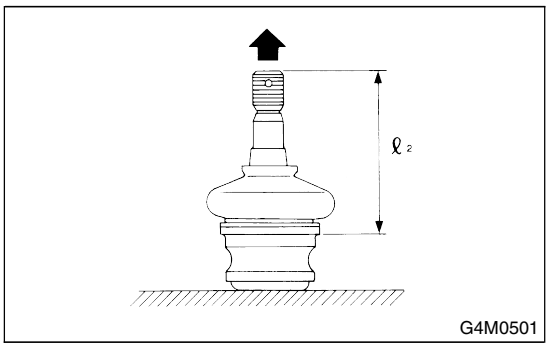
C: INSPECTION S202114A10

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)

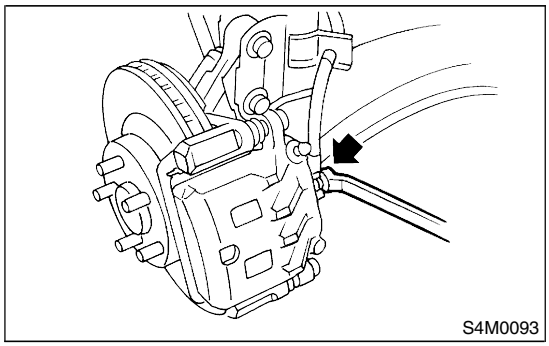
2) When play is smaller than the specified value, visually inspect the dust cover.
3) The ball joint and cover that have been removed must be checked for wear, damage or cracks, and any defective part must be replaced.
4) If the dust cover is damaged, replace with the new ball joint.

5. Front Strut S202115

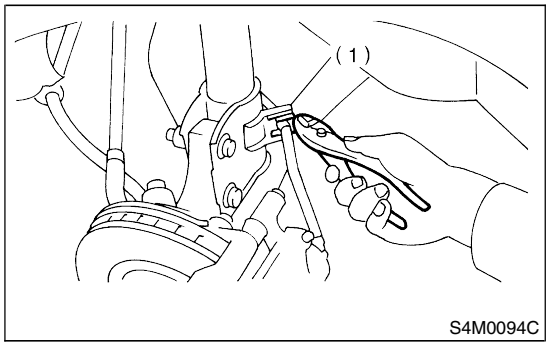
A: REMOVAL S202115A18

1) Set the vehicle on the lift.
2) Disconnect ground terminal from the 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

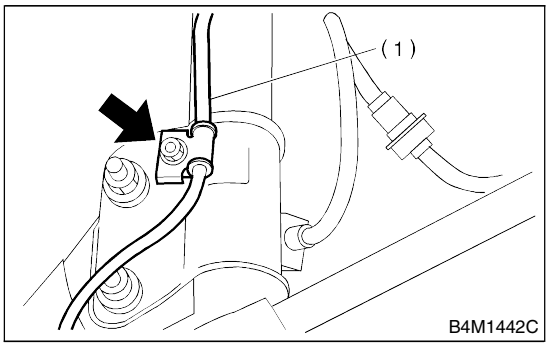
6) Remove brake hose clamp and disconnect brake hose from strut. Attach brake hose to body using gum tape.



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 on models equipped with ABS.



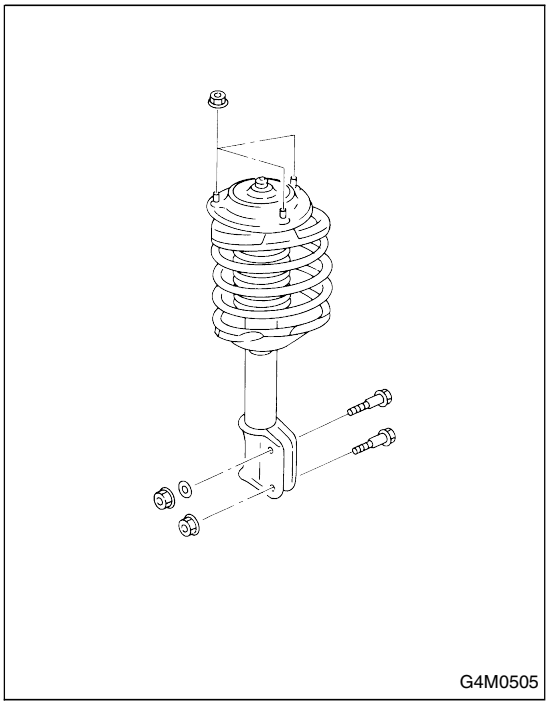
B4M1442C

(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. (ABS equipped models)

Tightening torque:
32 N·m (3.3 kgf-m, 24 ft-lb)

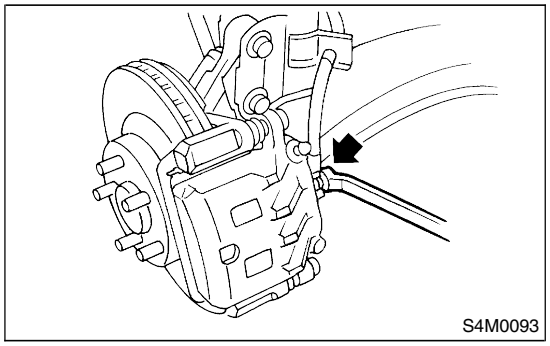
3) Position aligning mark on camber adjustment bolt with aligning mark on lower side of strut.

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)


S4M0093

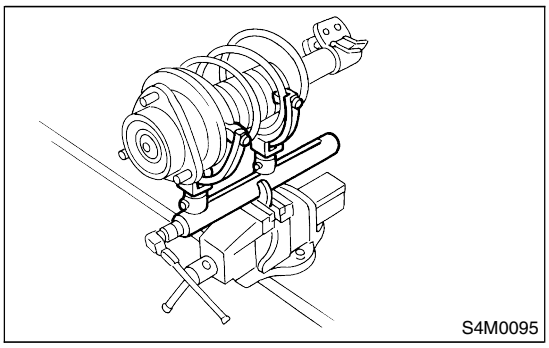
CAUTION:
Be sure to bleed air from brake system.

6) Install wheels.

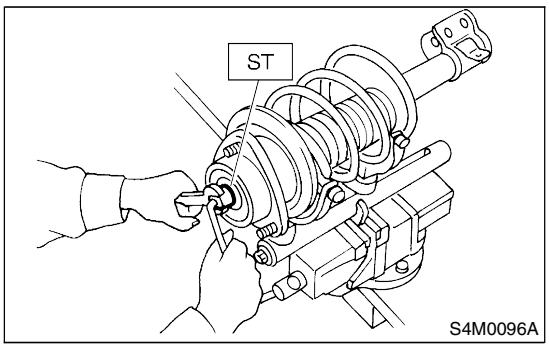
NOTE:
Check wheel alignment and adjust if necessary.

C: DISASSEMBLY S202115A06

1) Using a coil spring compressor, compress coil spring.


S4M0095

2) Using ST, remove self-locking nut.
ST 927760000 STRUT MOUNT SOCKET



S4M0096A

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.

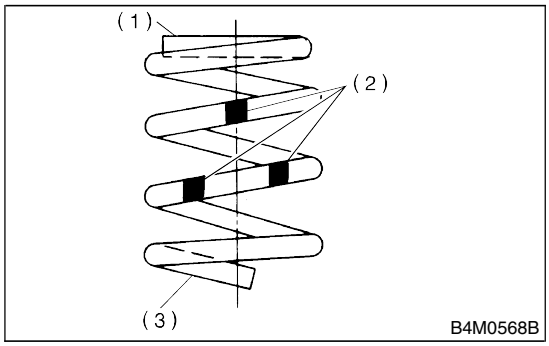
D: ASSEMBLY S202115A02

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”.

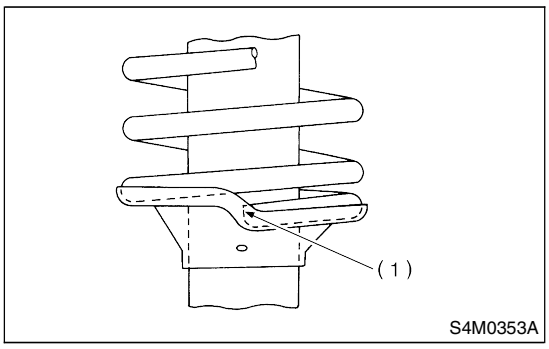
4) Using a coil spring compressor, compress the coil spring.

NOTE:
Make sure that the vertical installing direction of coil spring is as shown in figure.



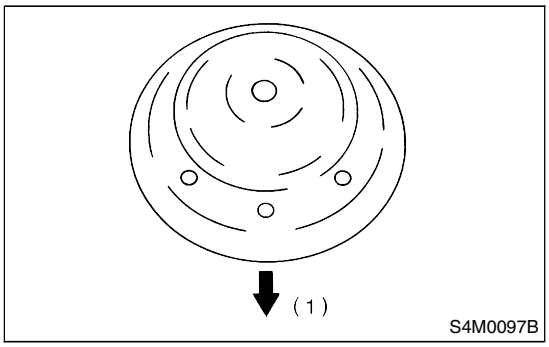
(1) Flat (top side)
(2) Identification paint
(3) Inclined (bottom side)

5) Set the coil spring correctly so that its end face fits well into the spring seat as shown.



6) Install helper and dust cover to the piston rod.
7) Pull the piston rod fully upward, and install rubber seat and spring seat.

NOTE:
Ensure that upper spring seat is positioned as shown in figure.



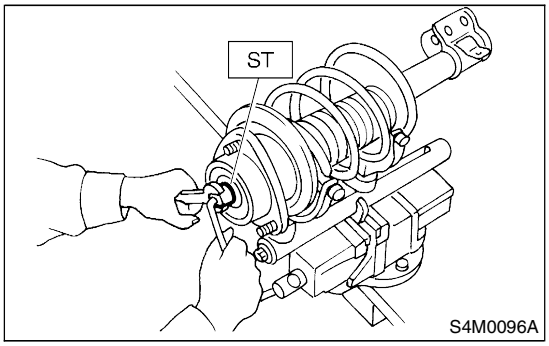
(1) Outside of body

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.

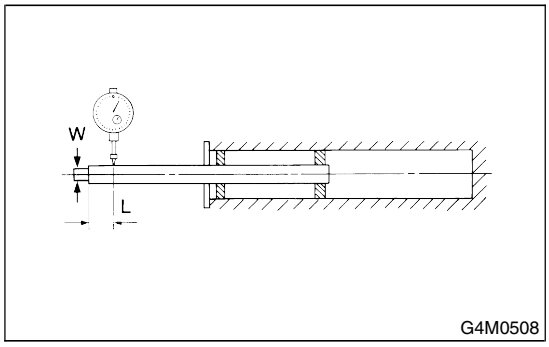
E: INSPECTION S202115A10

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.



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 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.

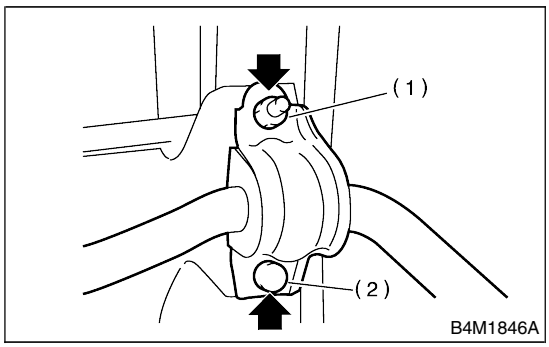
5. HELPER S202115A1005

Replace it with new one if cracked or damaged.

6. Front Stabilizer S202119

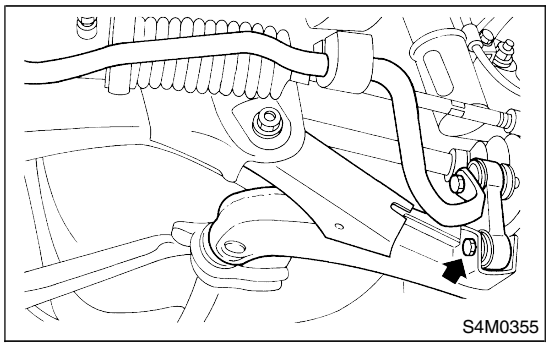
A: REMOVAL S202119A18

1) Set the vehicle on the lift.
2) Disconnect ground terminal from the battery.
3) Jack-up the front part of the vehicle and support it with safety stand (rigid racks).
4) Remove jack-up plate from lower part of crossmember.
5) Remove bolts which secure stabilizer to crossmember.



(1) Nut (Turbo model)
(2) Bolt

6) Remove bolts which secure stabilizer link to front transverse link.

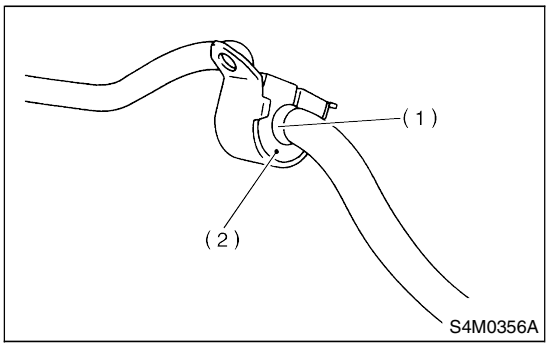


7) Remove front stabilizer.

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)

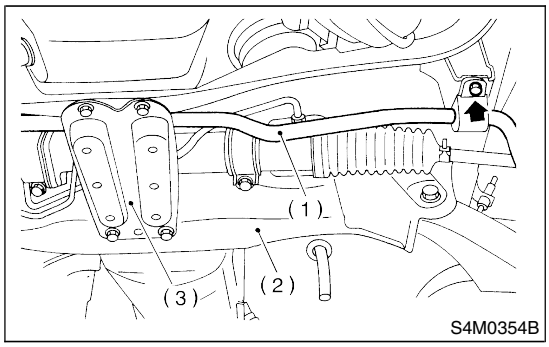
C: INSPECTION S202119A10

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

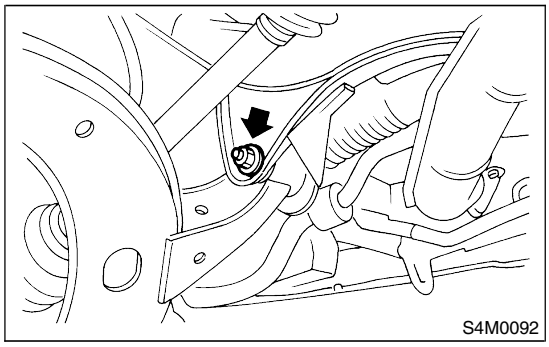
A: REMOVAL S202108A18

1) Set the vehicle on the lift.
2) Disconnect ground cable from the 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. (Non-turbo model)
With OBD
<Ref. to EX(SOHC)-5, REMOVAL, Front Exhaust Pipe.>
Without OBD
<Ref. to EX(SOHCw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>
7) Remove front transverse link from front crossmember and body.



8) Remove nuts attaching engine mount cushion rubber to crossmember.
9) Remove steering universal joint. <Ref. to PS-28, 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 gear-box.

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-102, 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.

REAR SUSPENSION

RS

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2. Wheel Alignment....7
3. Rear Stabilizer....8
4. Rear Trailing Link....9
5. Lateral link....12
6. Rear Strut....16
7. Rear Crossmember....20
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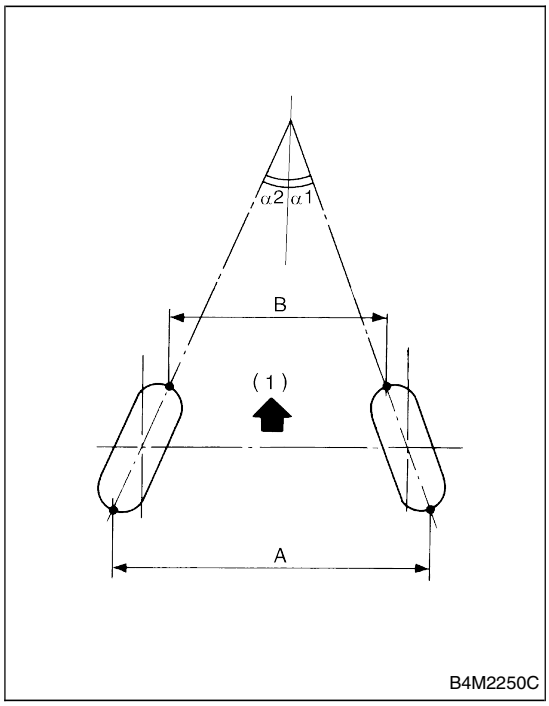
1. General Description S201001

A: SPECIFICATIONS S201001E49

Item	Non-turbo	Turbo
Camber (tolerance: ±0°45′)	–0°35′	–0°45′
Toe-in	2±3 mm (0.08±0.12 in)* Each toe-in angle: 0°06′±0°09′	
Wheel arch height [tolerance: $^{+12}/_{-24}$ mm ($^{+0.47}/_{-0.94}$ in)]	435 mm (17.13 in)	425 mm (16.73 in)
Thrust angle	0°±20′	
Diameter of stabilizer	13 mm (0.51 in)	15 mm (0.59 in)

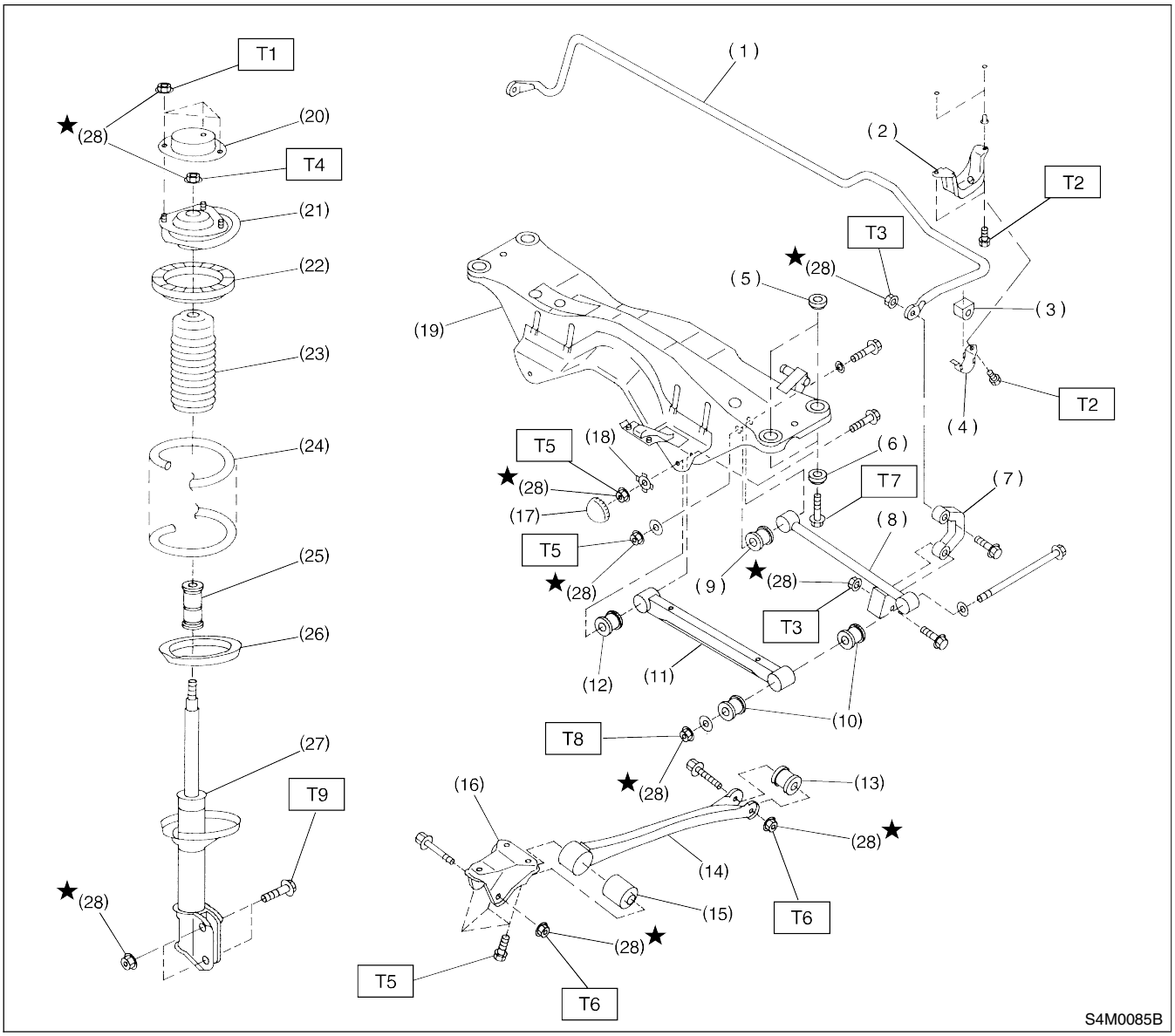
*: When performing toe-in adjustment, align as close to 2 mm (0.08 in) as possible.

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: 100 (10.2, 74)
T6: 115 (11.7, 85)
T7: 130 (13.3, 96)
T8: 140 (14.3, 103)
T9: 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

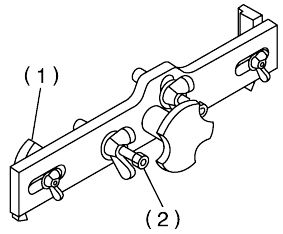
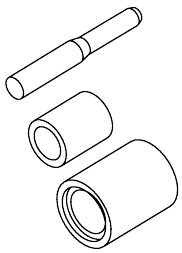
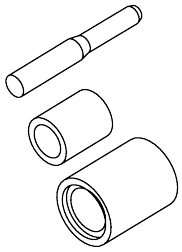
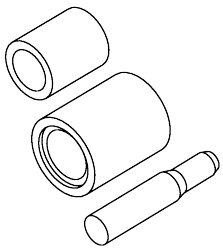
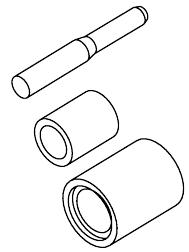
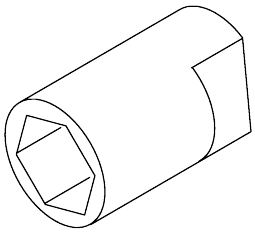
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2378A	927380002	ADAPTER	Used as an adapter for camber & caster gauge when measuring camber and caster. (1) 28199AC000 PLATE (2) 28199AC010 BOLT
 H5M0979	927690000	INSTALLER & REMOVER SET	Used for replacing lateral link bushing (12 dia.).
 H5M0979	927700000	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

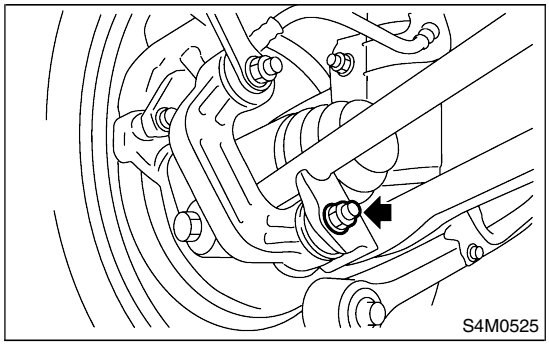
A: INSPECTION S201116A10

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.>

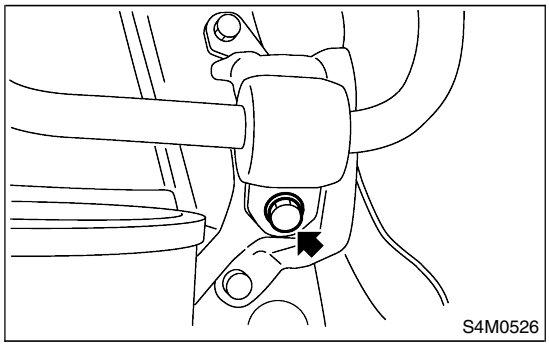
3. Rear Stabilizer S201118

A: REMOVAL S201118A18

1) Set vehicle on a lift.
2) Disconnect ground terminal from battery.
3) Jack-up the rear part of the vehicle, support it with safety stands (rigid racks).
4) Remove bolts which secure stabilizer link to rear lateral link.



5) Remove bolts which secure stabilizer to stabilizer bracket.

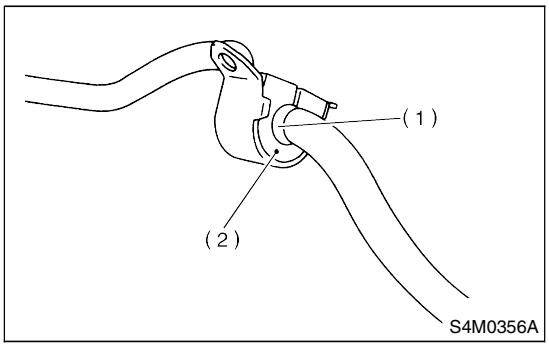


6) Separate rear stabilizer and stabilizer link.

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.



(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)

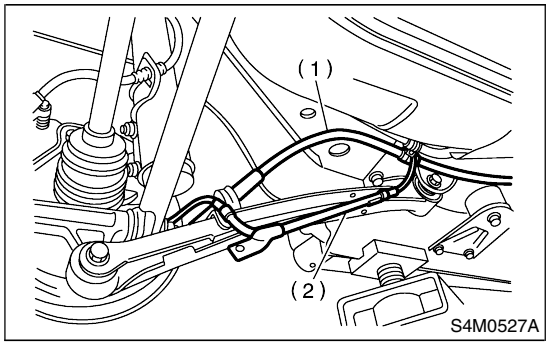
C: INSPECTION S201118A10

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

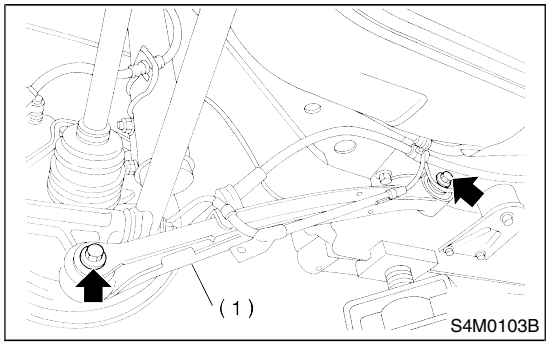
A: REMOVAL S201107A18

1) Set vehicle on a lift.
2) Disconnect ground terminal from battery.
3) Loosen rear wheel nuts.
4) Jack-up vehicle, and remove rear wheels.
5) Remove both rear parking brake clamp and ABS sensor harness. (Models equipped with ABS)



(1) Parking brake cable
(2) ABS sensor harness

6) Remove bolt which secure trailing link to trailing link bracket.



(1) Trailing link

7) Remove bolt which secure trailing link to rear housing.

B: INSTALLATION S201107A11

Install in the reverse order of removal.

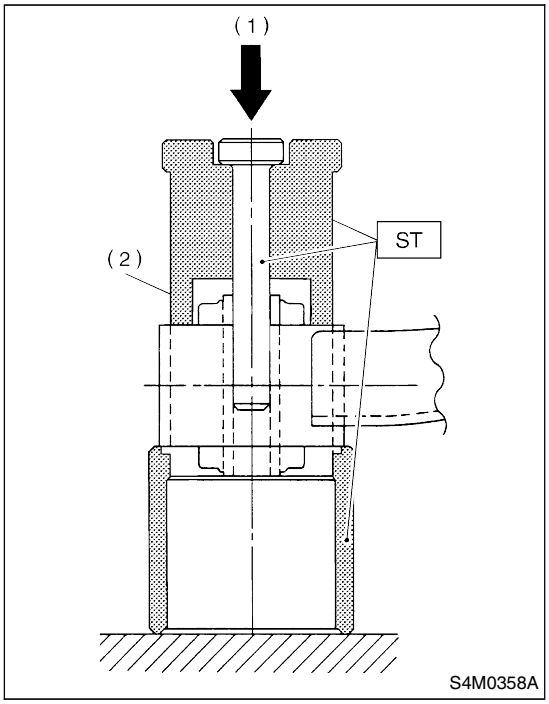
CAUTION:
Always tighten rubber bushing location when wheels are in full contact with the ground and vehicle is at curb weight condition.

NOTE:
Check wheel alignment and adjust if necessary.

C: DISASSEMBLY S201107A06

1. FRONT BUSHING S201107A0601

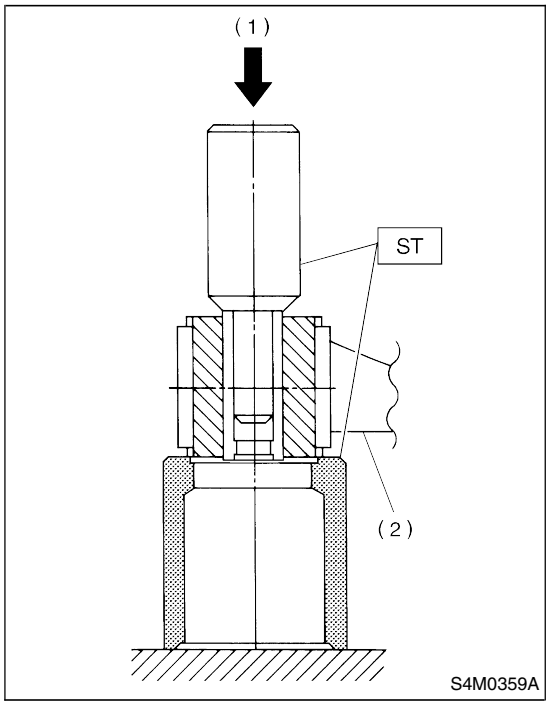
Using ST, press front bushing out of place.
ST 927720000 INSTALLER & REMOVER SET



(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

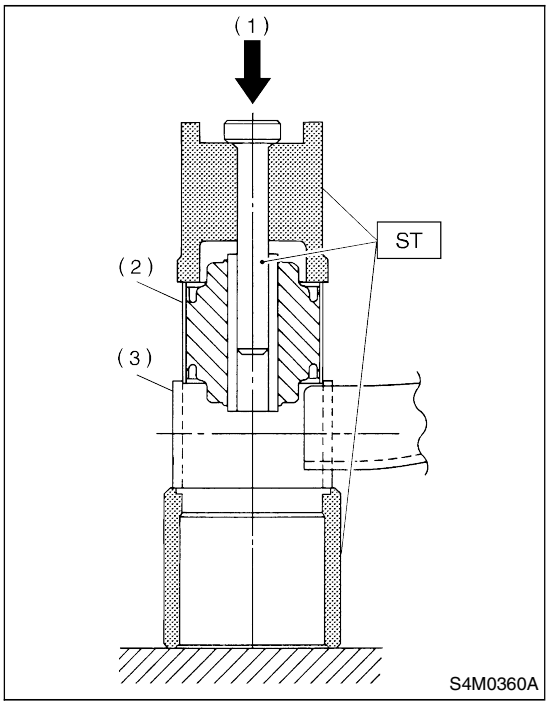
D: ASSEMBLY S201107A02

Assemble in the reverse order of disassembly.

1. FRONT BUSHING S201107A0201

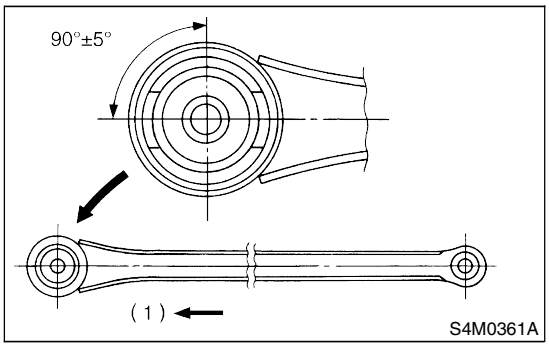
Using ST, press bushing into trailing link.
ST 927720000 INSTALLER & REMOVER SET

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.



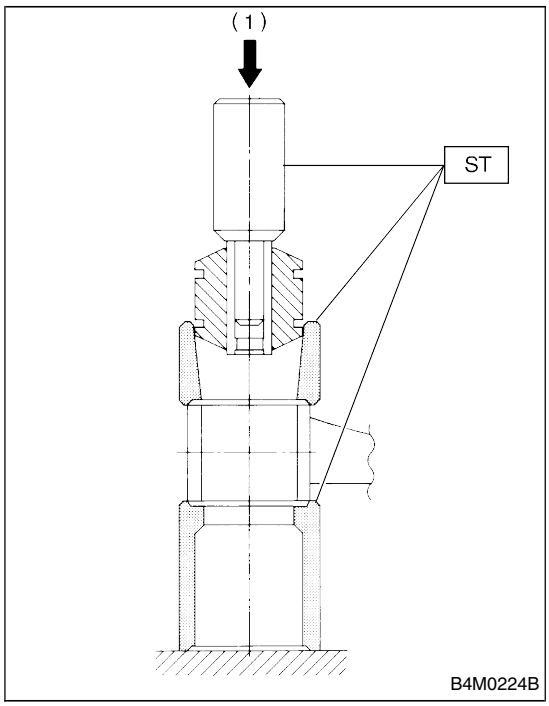
(1) Front

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.>

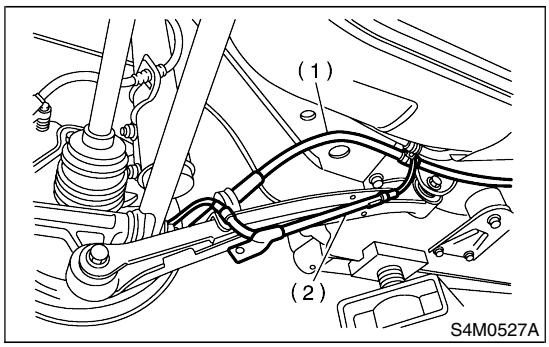
E: INSPECTION S201107A10

Check trailing links for bends, corrosion or damage.

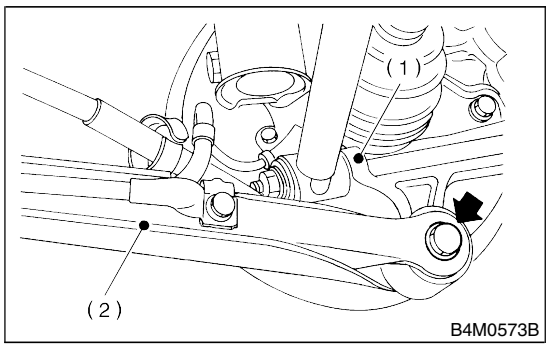
5. Lateral link S201576

A: REMOVAL S201576A18

1) Set vehicle on a lift.
2) Disconnect battery ground terminal 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. (Models equipped with ABS)



6) Remove bolt securing trailing link to housing.

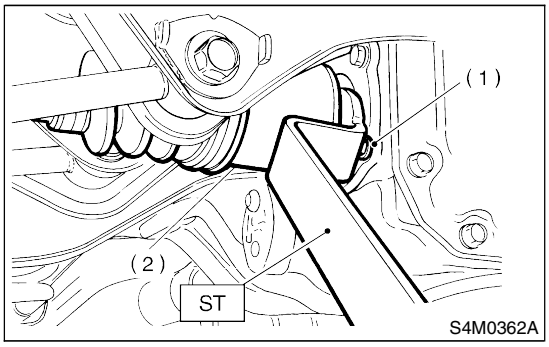


(1) Rear housing
(2) Trailing link

7) Remove bolts which secure lateral link assembly to rear housing.

8) Remove DOJ from rear differential using ST. (Except Non-TURBO AT model)
ST 28099PA100 DRIVE SHAFT REMOVER

NOTE:
The side spline shaft circlip comes out together with the shaft.

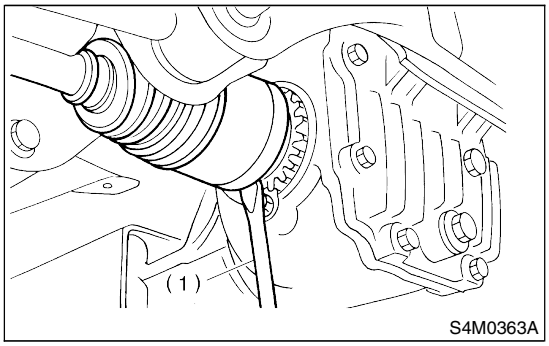


(1) Bolt
(2) DOJ

CAUTION:
Be careful not to damage side bearing retainer. Always use bolt as shown in figure, as supporting point for ST during removal.

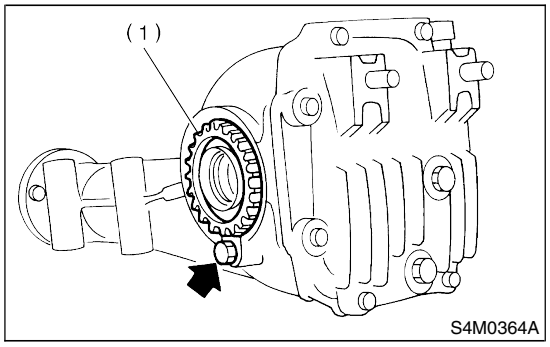
9) Remove DOJ from rear differential using tire lever. (Non-TURBO AT model)

NOTE:
The side spline shaft circlip comes out together with the shaft.



(1) Tire lever

CAUTION:
When removing the DOJ from the rear differential, fit tire lever to the bolt as shown in figure so as not to damage the axle shaft holder.



(1) Axle shaft holder

10) Scribe an alignment mark on rear lateral link adjusting bolt and crossmember.
11) 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.**

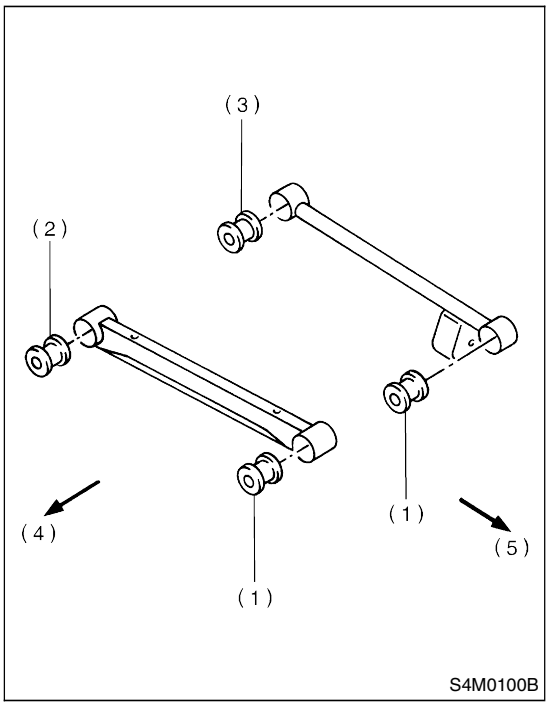
NOTE:
Check wheel alignment and adjust if necessary.

C: DISASSEMBLY S201576A06

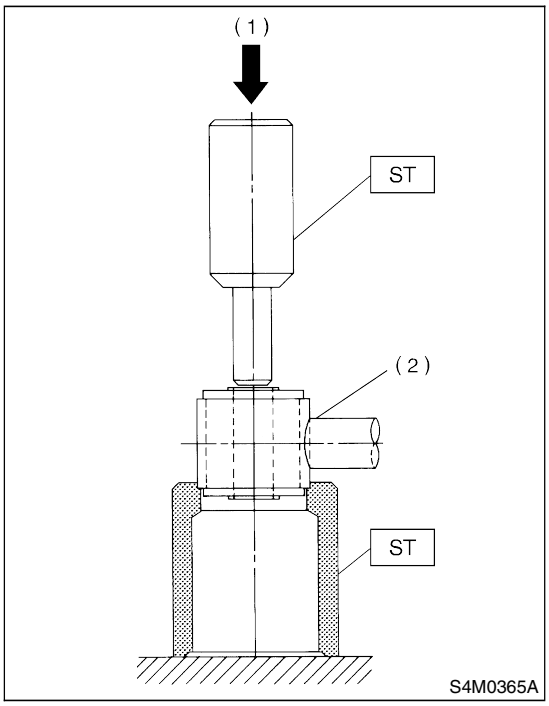
Using ST, press bushing out of place.

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

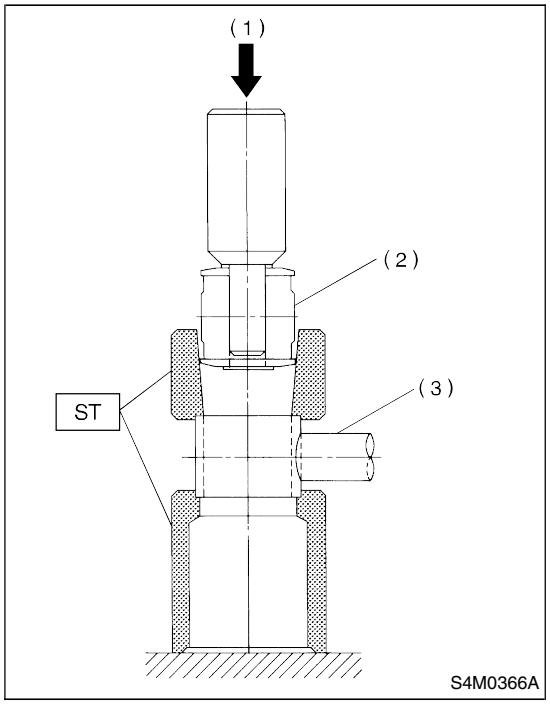
D: ASSEMBLY S201576A02

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.

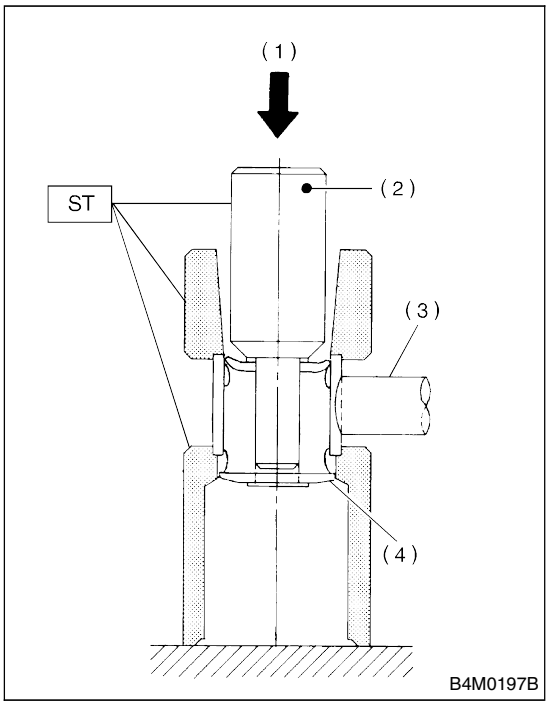
Specified lubricant:
TIRE LUBE : water = 1 : 3



(1) Press
(2) Bushing
(3) Lateral link

2) Press ST plunger until bushing flange protrudes beyond lateral link.

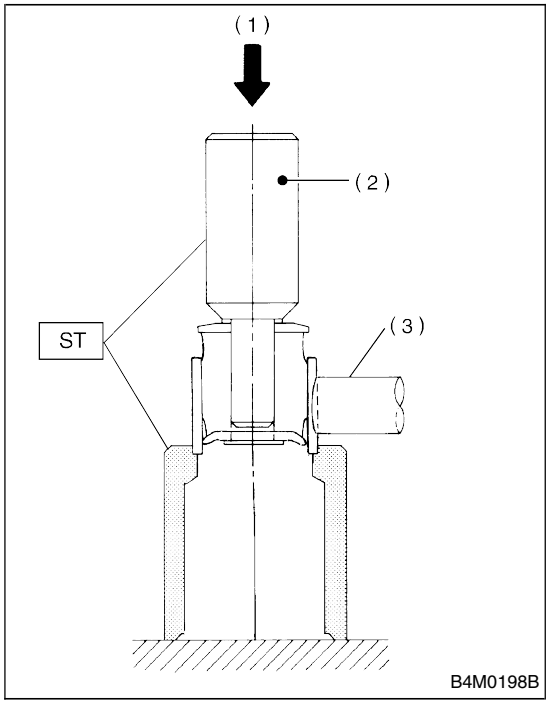
NOTE:
Use the same ST as that used during disassembly.



(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

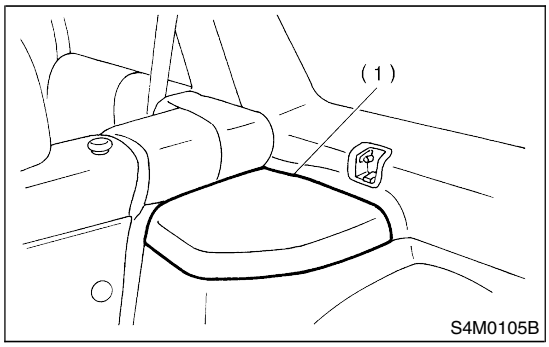
E: INSPECTION S201576A10

Visually check lateral links for damage or bends.

6. Rear Strut S201132

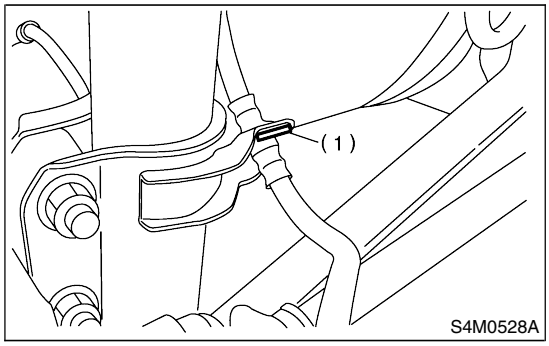
A: REMOVAL S201132A18

1) Set vehicle on a lift.
2) Disconnect ground terminal 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.



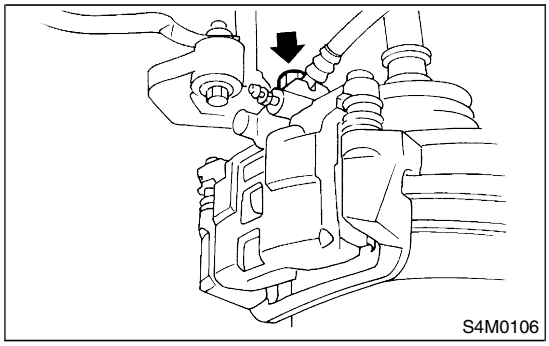
(1) Strut cap

5) Loosen rear wheel nuts.
6) Jack-up vehicle, and remove rear wheels.
7) Remove brake hose clip.



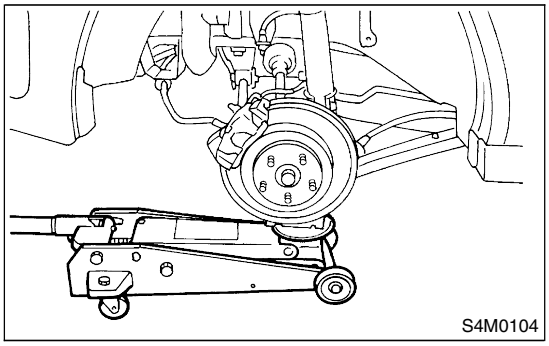
(1) Clip

8) Models equipped with rear disc brakes:
Remove union bolt from brake caliper.

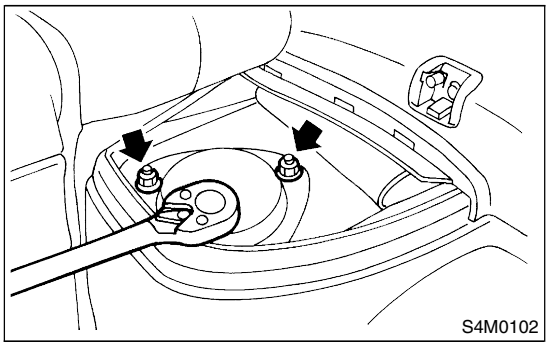


9) Models equipped with rear drum brakes:
Disconnect brake hose from brake pipe from strut, and disconnect brake pipe from drum brake.

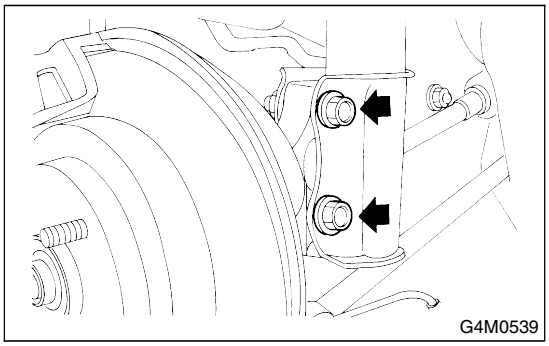
10) Use a garage jack to support the rear housing.



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.
• Models equipped with ABS:
Do not subject ABS sensor harness to excessive tension.

6) Be sure to bleed air from brake system.
7) Lower vehicle and tighten wheel nut.

Tightening torque:
88 N·m (9 kgf-m, 65 ft-lb)

8) Install strut cap of rear quarter trim.

NOTE:
Check wheel alignment and adjust if necessary.

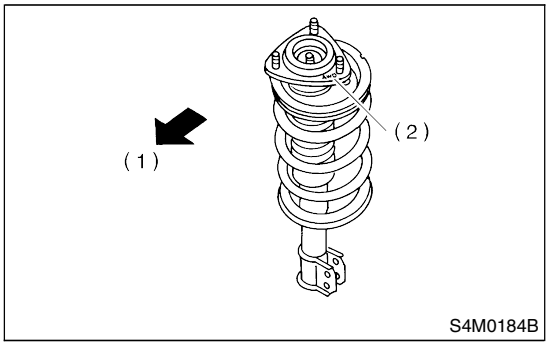
C: DISASSEMBLY S201132A06

For disassembly of rear strut, refer to procedures outlined under front strut as a guide. <Ref. to FS-19, DISASSEMBLY, Front Strut.>

D: ASSEMBLY S201132A02

Refer to Front Strut as a guide for assembly procedures. <Ref. to FS-20, 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

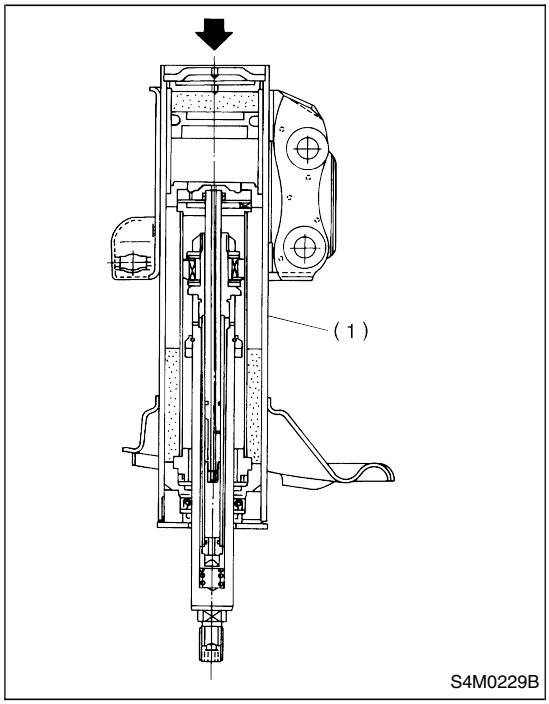
1) Refer to Front Strut as a guide for inspection procedures. <Ref. to FS-21, INSPECTION, Front Strut.>
2) For models equipped with self leveling struts: Inspect the following.

No.	Step	Check	Yes	No
1	**CHECK WHEEL ARCH HEIGHT.** 1) Remove all cargo from the vehicle. 2) Fill gasoline tank completely. 3) Drive vehicle (only the driver aboard) for at least 1 km (0.6 mile). 4) Measure the rear wheel arch height. This is value “A” in the equation. <Ref. to FS-6, Wheel Alignment.> 5) Put 4 people in the vehicle. NOTE: The total weight of the 4 people should be approximately 300 kg (662 lb). 6) Drive the vehicle for at least 5 km (3 miles). 7) Stop the vehicle. With the 4 people in the vehicle, measure the rear wheel arch height. This value is “B” in the equation. 8) A – B = C	Is C less than 30 mm (1.18 in)?	Go to step **2**.	Replace damper strut.
2	**CHECK WHEEL ARCH HEIGHT.** 1) Let the 4 people get off of the vehicle. 2) Drive the vehicle (only the driver aboard) for at least 1 km (0.6 mile). 3) Measure the rear wheel arch height. This is value “D” in the equation. 4) A – D = E	Is E less than ±10 mm (0.39 in)?	Go to step **3**.	Replace damper strut.
3	**CHECK VEHICLE.**	Is it a non-turbo vehicle?	Go to step **4**.	Go to step **5**.
4	**CHECK WHEEL ARCH HEIGHT.**	Is E less than $435^{+12}/_{-24}$ mm ($17.13^{+0.47}/_{-0.94}$ in)?	Correct.	Replace coil spring.
5	**CHECK WHEEL ARCH HEIGHT.**	Is E less than $425^{+12}/_{-24}$ mm ($16.73^{+0.47}/_{-0.94}$ in)?	Correct.	Replace coil spring.

F: DISPOSAL S201132A07

CAUTION:
• Completely discharge the gas from the green-painted struts on outer housings, before disposal. Follow the disposal procedure outlined below.
• Do not disassemble strut damper or place into a fire.
• Drill holes before disposing of self leveling struts.
• Before handling self leveling struts, be sure to wear goggles to protect eyes from gas, oil and/or filings.

1) Place self leveling strut upside-down (the opposite of its installation position on the vehicle) on a flat surface.
2) Using a 2 to 3 mm (0.08 to 0.12 in) dia. drill, drill 30 mm (1.18 in) deep holes in areas shown in the figure.



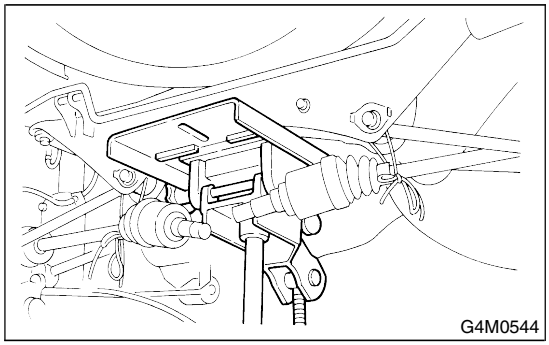
(1) Self leveling strut

7. Rear Crossmember S201133

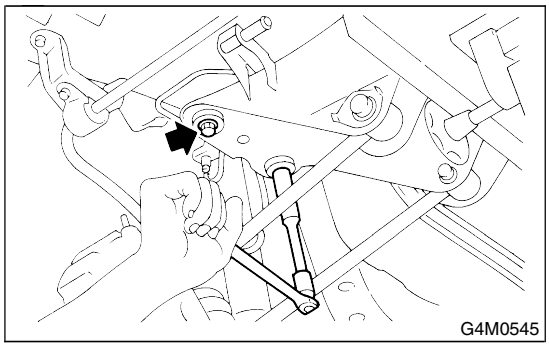
A: REMOVAL S201133A18

CAUTION:
Do not subject ABS sensor harness to excessive tension. (Models equipped with ABS)

1) Set vehicle on a lift.
2) Disconnect ground terminal from battery.
3) Loosen wheel nuts. Jack-up vehicle and remove wheels.
4) Separate front exhaust pipe and rear exhaust pipe. (Non-turbo model)
5) Separate center exhaust pipe (rear) and rear exhaust pipe. (Turbo model)
6) Remove rear exhaust pipe and muffler.
7) Remove rear differential.
T-Type: <Ref. to DI-25, Rear Differential for T-type.>
VA-Type: <Ref. to DI-42, Rear Differential for VA-type.>
8) Place transmission jack under rear crossmember.


G4M0544

9) Remove bolts securing crossmember to vehicle body, and remove crossmember.


G4M0545

10) Scribe an alignment mark on rear lateral link cam bolt and crossmember.
11) 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.

GENERAL DIAGNOSTIC TABLE

MEMO:

WHEEL AND TIRE SYSTEM

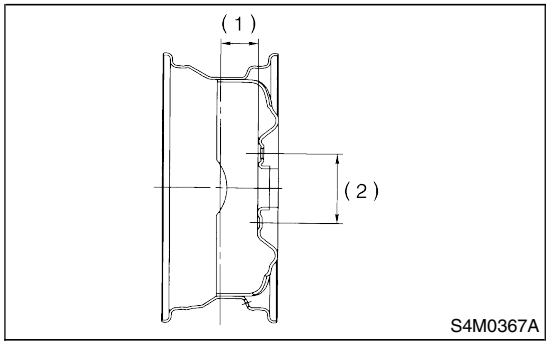
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1. General Description S204001

A: SPECIFICATIONS S204001E49



(1) Offset
(2) P.C.D.

	Model	Tire size	Rim size	Rim offset	P.C.D.
Front and Rear	Australia model	P205/70R15 95S	15 × 6J	48 mm (1.89 in)	100 mm (3.94 in) dia.
		P215/60R16 94H	16 × 6 1/2JJ		
	Except Australia model	205/70R15 95H	15 × 6J	48 mm (1.89 in)	
		215/60R16 95V	16 × 6 1/2JJ		

Model	Tire size	Tire inflation pressure	
		Light load	Full load
Australia model	P205/70R15 95S P215/60R16 94H	Ft: 200 kPa (2.0 kg/cm^2, 29 psi) Rr: 190 kPa (1.9 kg/cm^2, 28 psi)	Ft: 200 kPa (2.0 kg/cm^2, 29 psi) Rr: 250 kPa (2.5 kg/cm^2, 36 psi)
Except Australia model	205/70R15 95H 215/60R16 95V		

NOTE:
- Spare tires are the same for both front and rear.
- 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.

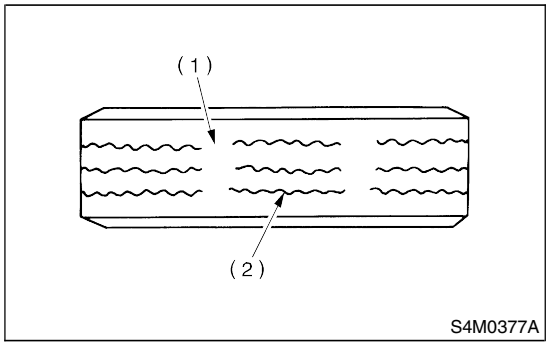
2. Tire S204125

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.

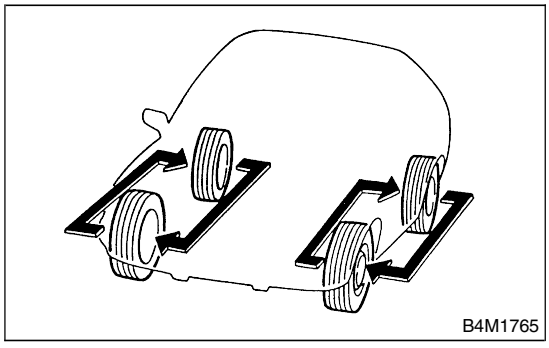


(1) Tread wear indicator
(2) Tire tread

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.

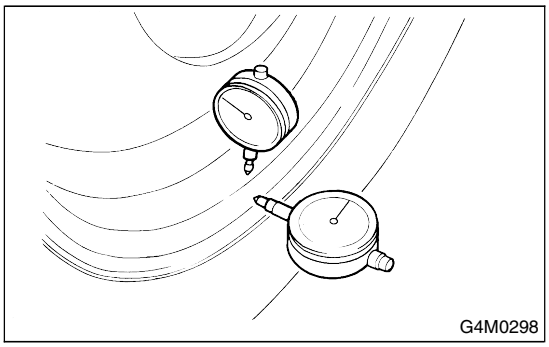
Wheel nut tightening torque:
88 N·m (9 kgf-m, 65 ft-lb)

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.

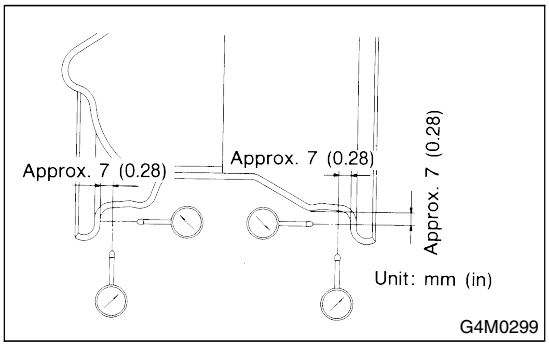
5) If a wheel is removed for replacement or for repair of a puncture, retighten the wheel nuts to the specified torque after running 1,000 km (600 miles).

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.



Axial runout limit	Radial runout limit
1.5 mm (0.059 in)	



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:

Axial runout limit	Radial runout limit
1.0 mm (0.039 in)	

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)

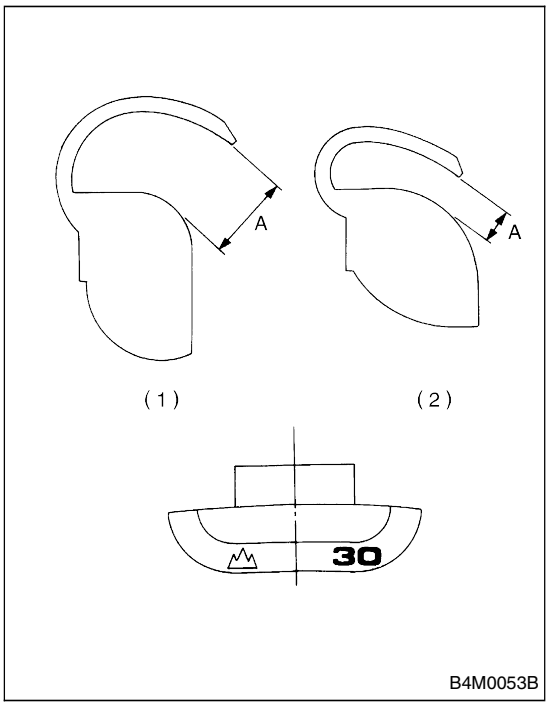
Balance weight part number (For aluminum wheel)	Weight
23141GA462	5 g (0.18 oz)
23141GA472	10 g (0.35 oz)
23141GA482	15 g (0.53 oz)
23141GA492	20 g (0.71 oz)
23141GA502	25 g (0.88 oz)
23141GA512	30 g (1.06 oz)
23141GA522	35 g (1.23 oz)
23141GA532	40 g (1.41 oz)
23141GA542	45 g (1.59 oz)
23141GA552	50 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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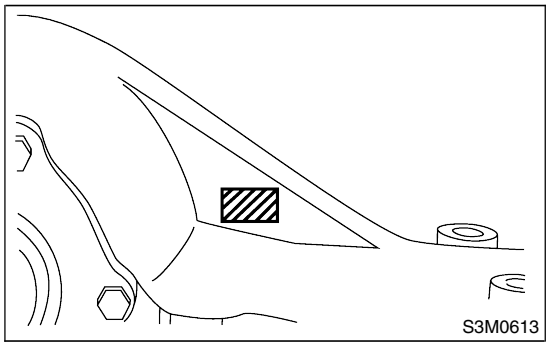
1. General Description S303001

A: SPECIFICATIONS S303001E49

Model	Non-Turbo		Turbo		
	MT	AT	Europe	Except Europe	
				MT	AT
	T type	VA type	T type (with LSD)		
Rear differential type	T2	XH	HP (with oil temperature sensor)	CF	JP
Gear	Hypoid gear				
Gear ratio	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				

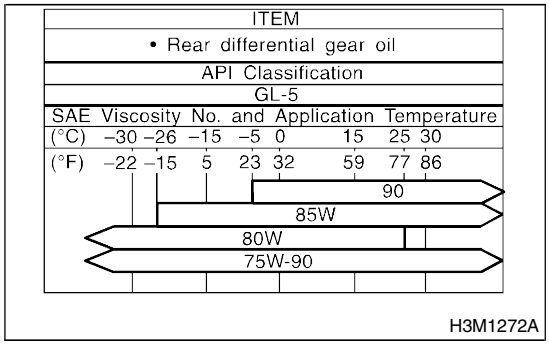
● **Identification**
When replacing a rear differential assembly, select the correct one according to the following table.

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.



1. SERVICE DATA *S303001E4901*

Front and rear bearing preload at companion flange bolt hole N (kgf, lb)	New bearing	T-type	19.6 — 28.4 (2.0 — 2.9, 4.4 — 6.4)
		VA-type	12.7 — 32.4 (1.3 — 3.3, 2.9 — 7.3)
	Used bearing	T-type	8.34 — 16.67 (0.85 — 1.7, 1.87 — 3.75)
Side gear backlash mm (in)		T-type	0.10 — 0.20 (0.0039 — 0.0079)
		VA-type	0.05 — 0.15 (0.0020 — 0.0059)
Side bearing standard width mm (in)			20.00 (0.7874)
Crown gear to drive pinion backlash mm (in)		T-type	0.10 — 0.20 (0.0039 — 0.0079)
		VA-type	0.10 — 0.15 (0.0039 — 0.0059)
Crown gear runout on its back surface mm (in)			Less than 0.05 (0.0020)

2. ADJUSTING PARTS S303001E4902

• VA-type

Item	Part No.	Length or thickness
Preload adjusting spacer	32288AA040	52.3 mm (2.059 in)
	32288AA050	52.5 mm (2.067 in)
	31454AA100	52.6 mm (2.071 in)
	32288AA060	52.7 mm (2.075 in)
	31454AA110	52.8 mm (2.079 in)
	32288AA070	52.9 mm (2.083 in)
	31454AA120	53.0 mm (2.087 in)
	32288AA080	53.1 mm (2.091 in)
	32288AA090	53.3 mm (2.098 in)
Preload adjusting washer	38336AA000	1.500 mm (0.0591 in)
	38336AA120	1.513 mm (0.0596 in)
	38336AA010	1.525 mm (0.0600 in)
	38336AA130	1.538 mm (0.0606 in)
	38336AA020	1.550 mm (0.0610 in)
	38336AA140	1.563 mm (0.0615 in)
	38336AA030	1.575 mm (0.0620 in)
	38336AA150	1.588 mm (0.0625 in)
	38336AA040	1.600 mm (0.0630 in)
	38336AA160	1.613 mm (0.0635 in)
	38336AA050	1.625 mm (0.0640 in)
	38336AA170	1.638 mm (0.0645 in)
	38336AA060	1.650 mm (0.0650 in)
	38336AA180	1.663 mm (0.0655 in)
	38336AA070	1.675 mm (0.0659 in)
	38336AA190	1.688 mm (0.0665 in)
	38336AA080	1.700 mm (0.0669 in)
	38336AA200	1.713 mm (0.0674 in)
	38336AA090	1.725 mm (0.0679 in)
	38336AA210	1.738 mm (0.0684 in)
	38336AA100	1.750 mm (0.0689 in)
	38336AA220	1.763 mm (0.0694 in)
	38336AA110	1.775 mm (0.0699 in)
Pinion height adjusting shim	32295AA200	0.150 mm (0.0059 in)
	32295AA210	0.175 mm (0.0069 in)
	32295AA220	0.200 mm (0.0079 in)
	32295AA230	0.225 mm (0.0089 in)
	32295AA240	0.250 mm (0.0098 in)
	32295AA250	0.275 mm (0.0108 in)
Side gear thrust washer	803135011	0.925 — 0.950 mm (0.0364 — 0.0374 in)
	803135012	0.950 — 0.975 mm (0.0374 — 0.0384 in)
	803135013	0.975 — 1.000 mm (0.0384 — 0.0394 in)
	803135014	1.000 — 1.025 mm (0.0394 — 0.0404 in)
	803135015	1.025 — 1.050 mm (0.0404 — 0.0413 in)

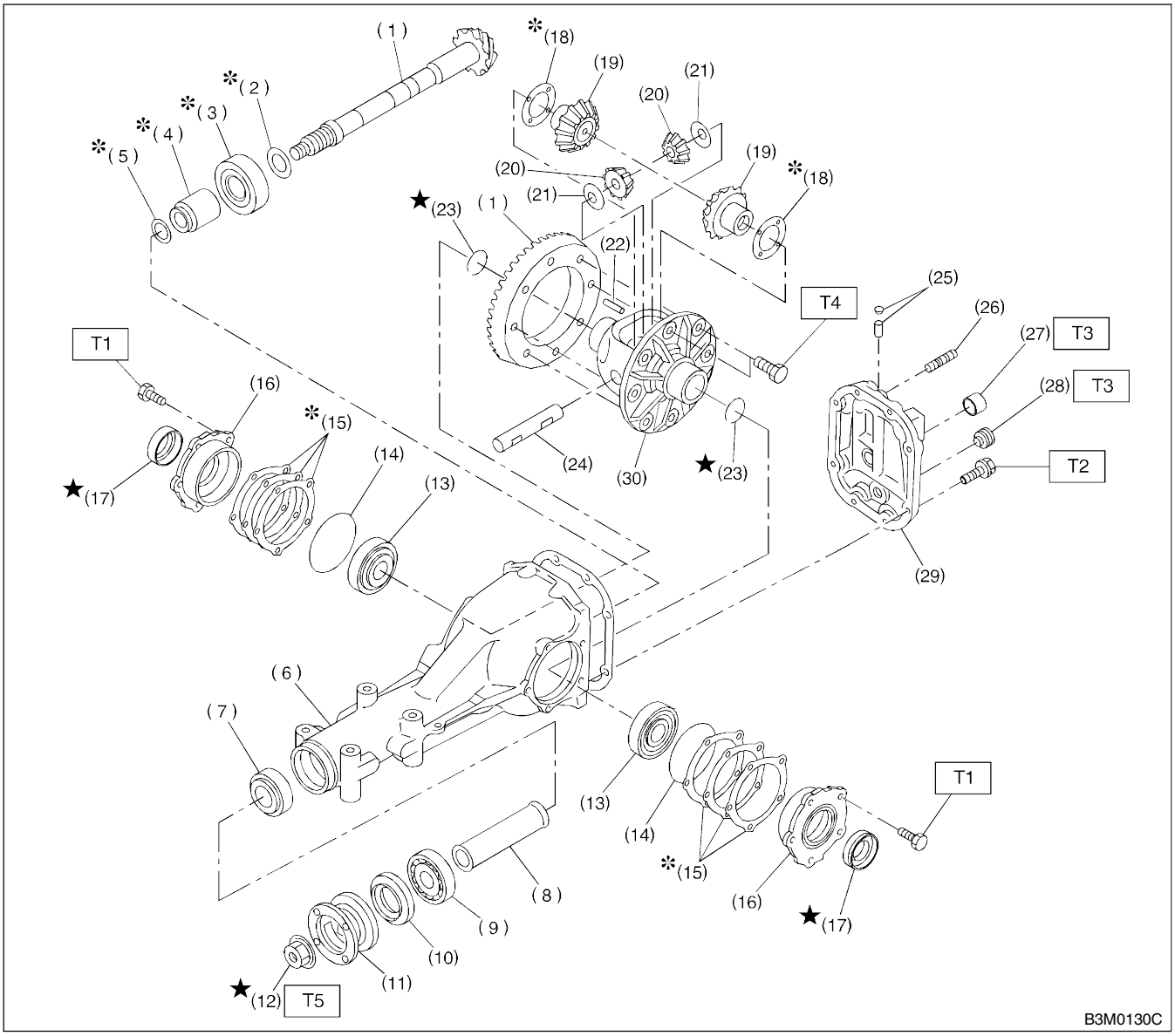
● **T-type**

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

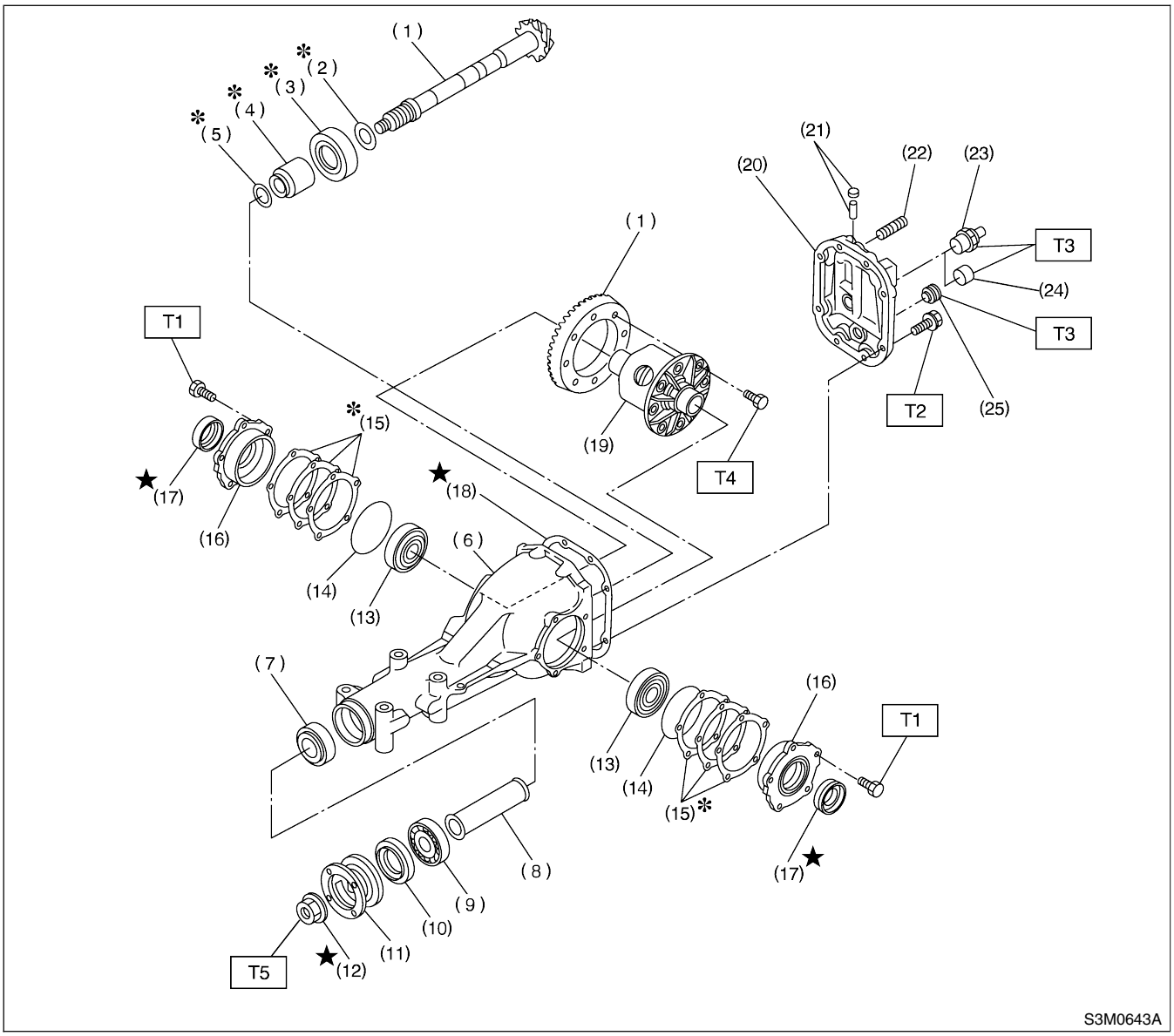
1. REAR DIFFERENTIAL FOR T-TYPE WITHOUT LSD S303001A0501



(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 FOR T-TYPE WITH LSD S303001A0502

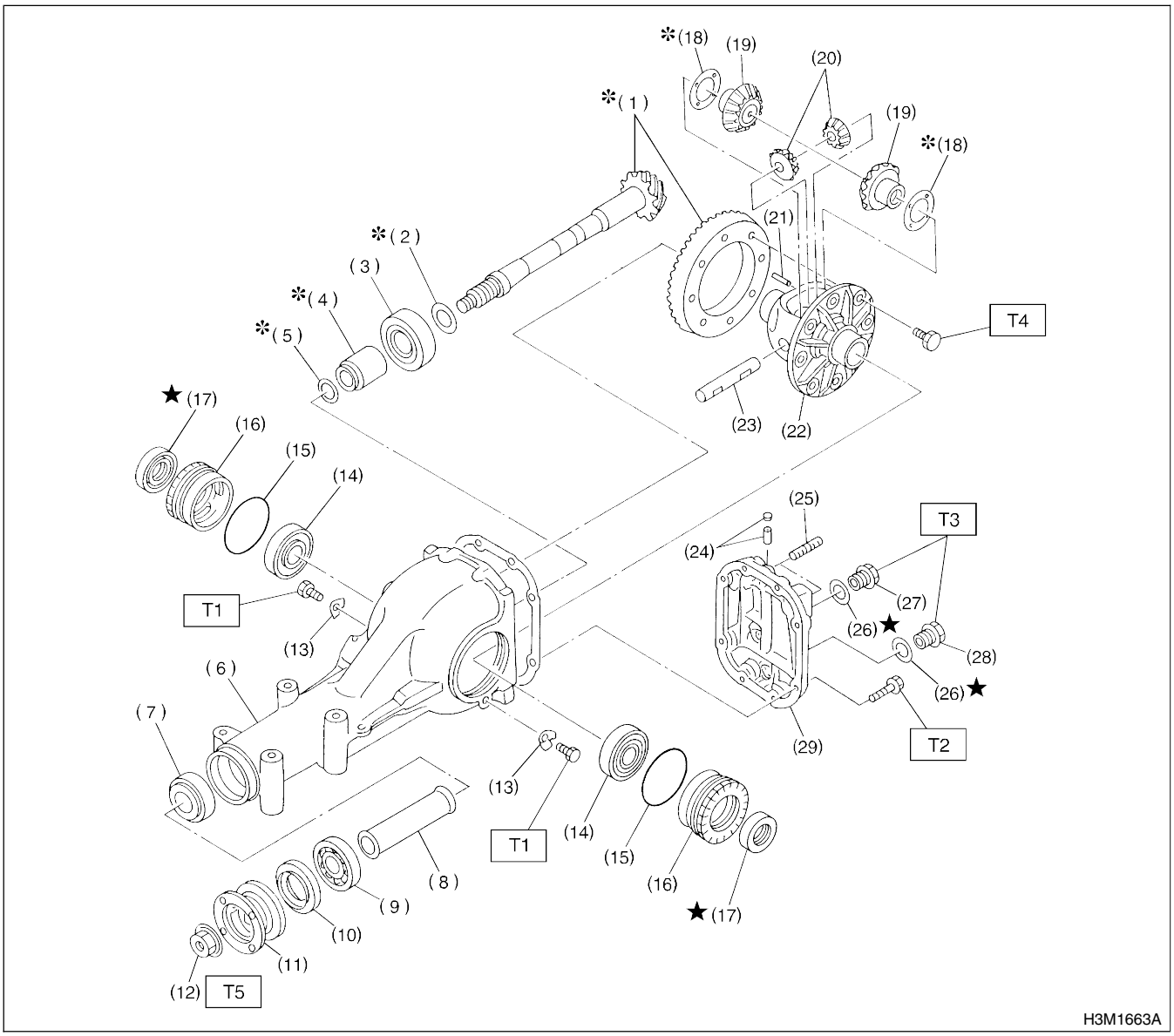


(1) Pinion crown gear set
(2) Pinion height adjusting shim
(3) Rear bearing
(4) Bearing preload adjusting spacer
(5) Bearing preload adjusting washer
(6) Differential carrier
(7) Front bearing
(8) Collar
(9) Pilot bearing
(10) Front oil seal
(11) Companion flange
(12) Self-locking nut
(13) Side bearing
(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 (With oil temperature sensor)
(24) Oil filler plug (Without oil temperature sensor)
(25) 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 FOR VA-TYPE

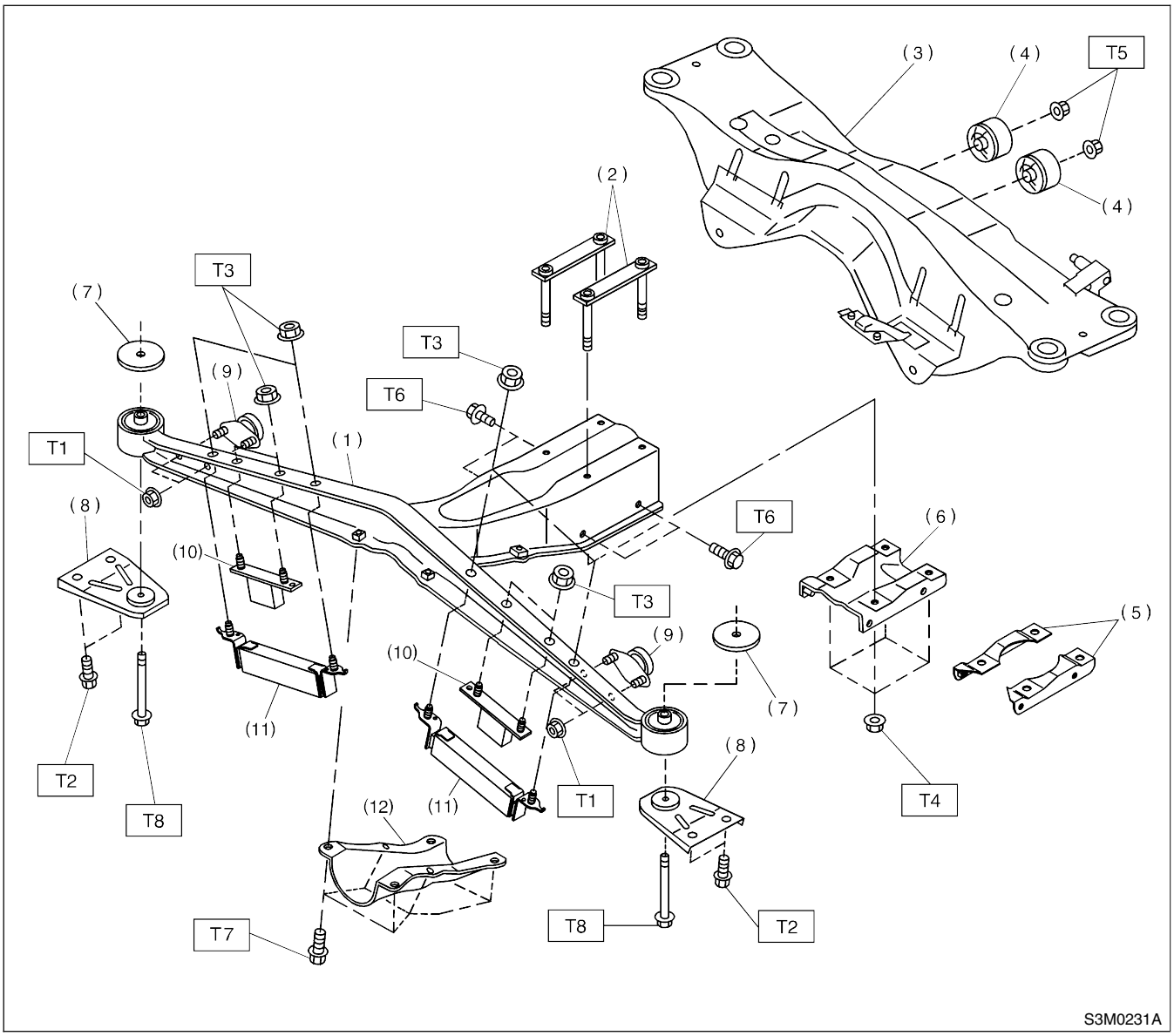
S303001A0503



(1) Pinion crown gear set
(2) Pinion height adjusting shim
(3) Rear bearing
(4) Bearing preload adjusting spacer
(5) Bearing preload adjusting washer
(6) Differential carrier
(7) Front bearing
(8) Collar
(9) Pilot bearing
(10) Front oil seal
(11) Companion flange
(12) Self-locking nut
(13) Lock plate
(14) Side bearing
(15) O-ring
(16) Axle shaft holder
(17) Side oil seal
(18) Side gear thrust washer
(19) Side gear
(20) Pinion mate gear
(21) Pinion shaft lock pin
(22) Differential case
(23) Pinion mate shaft
(24) Air breather cap
(25) Stud bolt
(26) Gasket
(27) Oil filler plug
(28) Oil drain plug
(29) Rear cover

Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.1)
T2: 25 (2.5, 18.1)
T3: 34 (3.5, 25.3)
T4: 62 (6.3, 45.6)
T5: 188 (19.2, 139)

4. REAR DIFFERENTIAL MOUNTING SYSTEM S303001A0504



(1) Differential front member
(2) Plate
(3) Crossmember
(4) Rear bushing
(5) Differential mount lower bracket (Non-Turbo model)
(6) Differential mount lower bracket (Turbo model)
(7) Stopper
(8) Differential mount bracket
(9) Dynamic damper A
(10) Mass damper (Turbo model)
(11) Dynamic damper B (Non-Turbo model)
(12) Differential mount front cover

Tightening torque: N·m (kgf-m, ft-lb)
T1: 20 (2.0, 14.5)
T2: 32 (3.3, 23.9)
T3: 40 (4.1, 30)
T4: 64 (6.5, 47.0)
T5: 69 (7.0, 50.6)
T6: 69 (7.0, 50.6)
T7: 88 (9.0, 65)
T8: 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

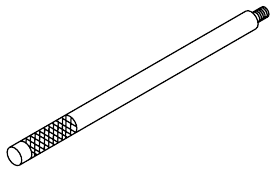
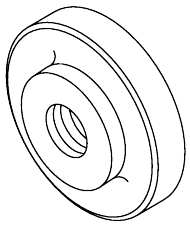
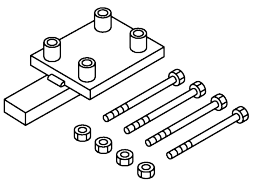
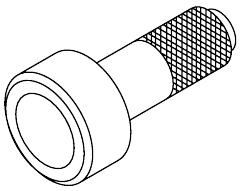
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1893	398477701	HANDLE	Used for installing front and rear bearing cone.
 B3M1894	398477702	DRIFT	Used press-fitting the bearing cone of differential carrier (rear).
 B3M1895	398217700	ATTACHEMENT SET	Stand for rear differential carrier disassembly and assembly.
 B3M1896	498447120	OIL SEAL INSTALLER	Used for installing front oil seal.

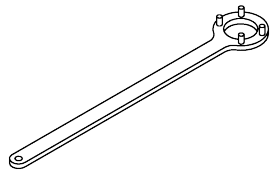
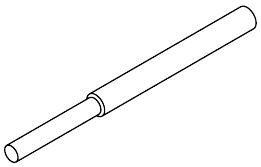
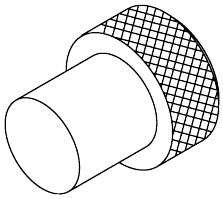
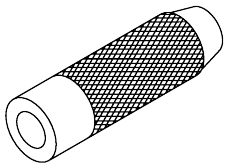
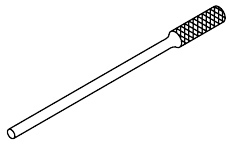
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1897	498427200	FLANGE WRENCH	Used for stopping rotaiotn of companion flange when loosening and tightening self-lock nut.
 B3M1898	398467700	DRIFT	Used for removing pinion, pilot bearing and front bearing cone.
 B3M1899	399780104	WEIGHT	Used for installing 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.

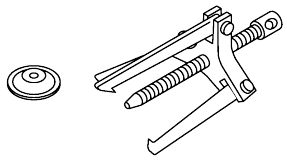
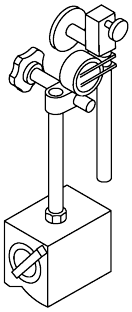
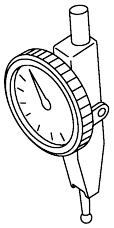
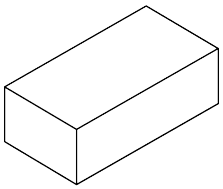
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1930	399703600	PULLEY ASSY	• Used for removing companion flange.
 B3M1902	498247001	MAGENT BASE	• Used for measuring backlash between side gear and pinion, and hypoid gear.. • Used with DIAL GAUGE (498247100).
 B3M1903	498247100	DAIL GAUGE	• Used measurng backlash between side gear and pinion, hypoid gear. • Used with MAGNET BASE (498247001).
 B3M1904	398507704	BLOCK	Used for adjusting pinion height and preload.

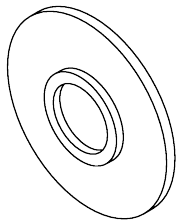
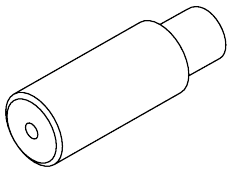
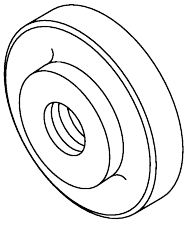
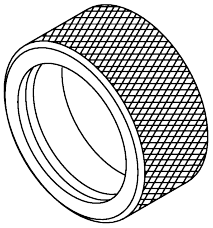
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1905	398177700	INSTALLER	• Used for installing rear bearing cone. • For T-type.
 B3M1906	398457700	ATTACHMENT	• Used for removing side bearing retainer. • For T-type.
 B3M1907	398477703	DRIFT2	• Used forpress-fitting the bearing race (rear) of differential carrier. • For T-type.
 B3M1908	398437700	DRIFT	• Used for installing said oil seal. • For T-type.

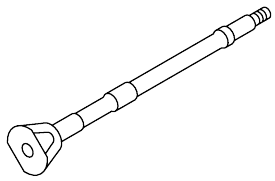
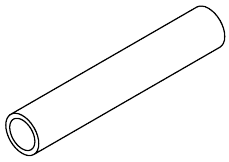
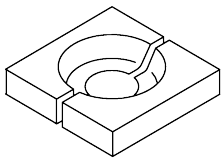
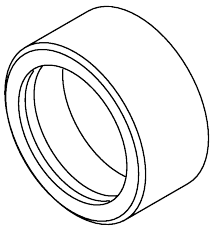
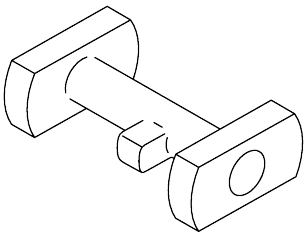
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1909	398507702	DUMMY SHAFT	• Used for adjusting pinion height and preload. • For T-type.
 B3M1910	398507703	DUMMY COLLAR	• Used for adjusting pinion height and preload. • For T-type.
 B3M1911	398517700	REPLACER	• Used for removing rear bearing cone. • For T-type.
 B3M1912	398487700	DRIFT	• Used for press-fitting the side bearing cone. • For T-type.
 B3M1913	398507701	GAUGE	• Used for adjusting pinion height. • For T-type.

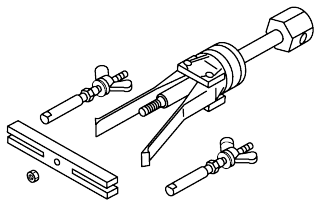
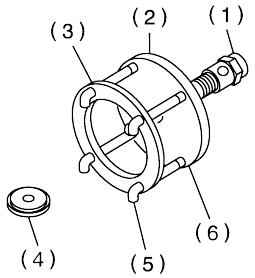
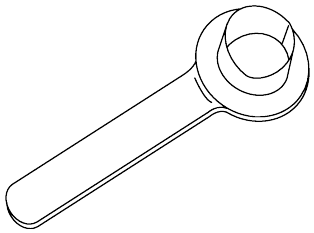
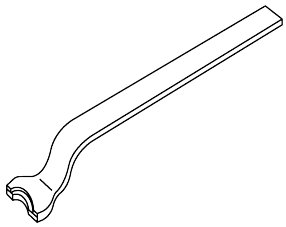
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1914	398527700	PULLEY ASSY	• Used for removing oil seal and side bearing cup. • For T-type.
 B3M1915A	398527700	PULLER SET	• Used for extracking side bearing cone. (1) BOLT (899521412) (2) PULLER (399527702) (3) HOLDER (399527703) (4) ADAPTER (398497701) (5) BOLT (899520107) (6) NUT (021008000) • For T-type.
 B3M1917	28099PA090	OIL SEAL PROTECTOR	• Used for installing rear drive shaft into rear differential. • For protecting oil seal. • For T-type.
 B3M1919	28099PA100	DRIVE SHAFT REMOVER	• Used for removing rear drive shaft from rear differential. • For T-type.

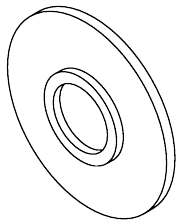
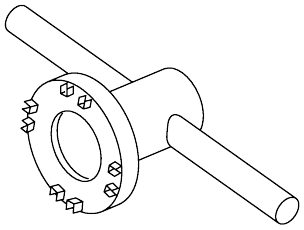
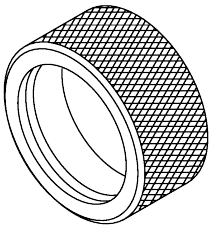
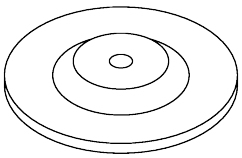
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1920	498175500	INSTALLER	• Used for installing rear bearing cone. • For VA-type.
 B3M1921	399780111	WRENCH ASSY	• Used for removing and installing side oil seal holder. • For VA-type.
 B3M1922	498447100	INSTALLER	• Used for installing oil seal. • For VA-type.
 B3M1923	399520105	SEAT	• Used for removing side bearing cone. • Used with PULLER SET (899524100). • For VA-type.

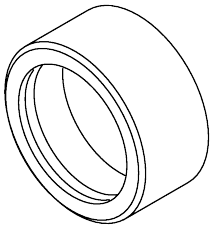
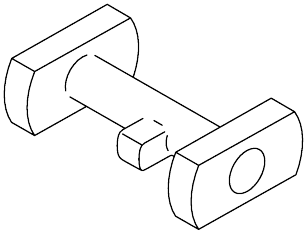
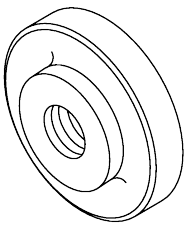
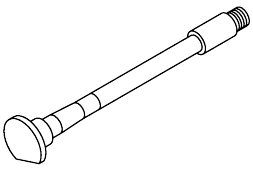
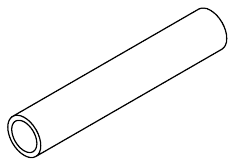
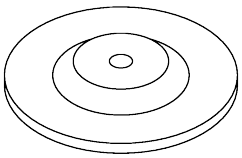
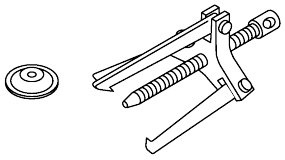
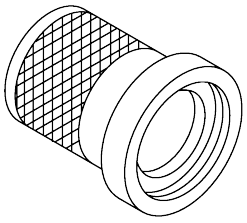
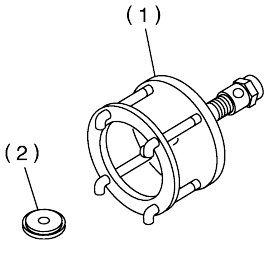
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1924	498485400	DRIFT	• UUsed for installing side bearing cone. • For VA-type.
 B3M1925	498505501	GAUGE	• Used for adjusting pinion height. • For VA-type.
 B3M1926	498447110	BEARING OUTER RACE DRIFT	• Used for press-fitting the bearing race (front) of differential carrier. • For VA-type.
 B3M1927	498447150	DUMMY SHAFT	• Used for adjusting pinion height and Pre-load. • For VA-type.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1928	32285AA000	DUMMY COLLAR	• Used for adjusting pinion height and Pre-load. • For VA-type.
 B3M1929	499705404	SEAT	• Used for removing side bearing race. • Used with PULLEY ASSY (499705401). • For VA-type.
 B3M1930	499705401	PULLEY ASSY	• Used for removing side bearing race. • Used with SEAT (499705404). • For VA-type.
 B3M1931	899874100	INSTALLER	• Used for installing companion flange. • For VA-type.
 B3M1932A	899524100	DIFFERENTIAL BEARING PULLER SET	• Used for removing side bearing cone of differential. • For VA-type. (1) Puller (2) Cap • Used with SEAT (399520105)

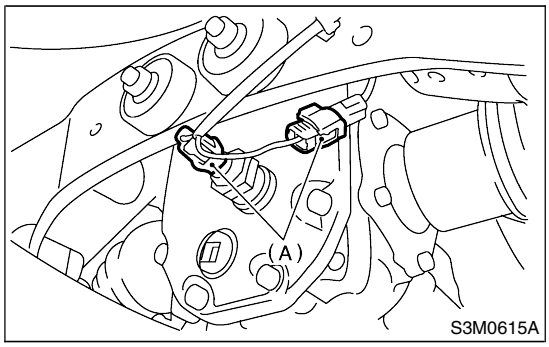
2. GENERAL PURPOSE TOOLS S301001A1702

TOOL NAME	REMERKS
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.
Tire Lever	Used for removal of rear drive shaft. (VA-type)

2. Differential Gear Oil S303150

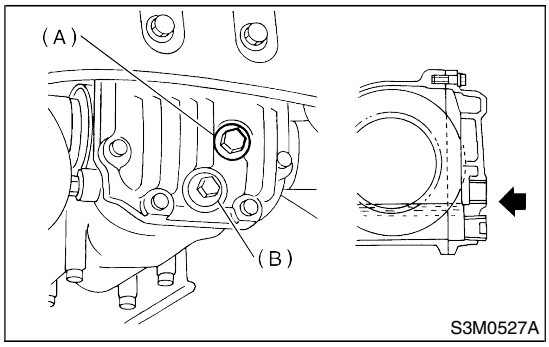
A: INSPECTION S303150A10

1) Set vehicle on a lift.
2) Disconnect ground terminal from battery.
3) Lift vehicle.
4) Disconnect oil temperature sensor connector (Turbo model for Europe).



(A) Connector

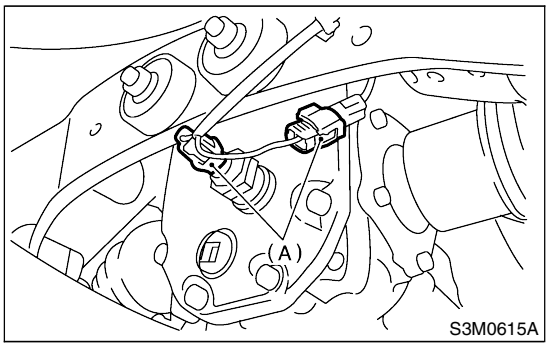
5) Take out filler plug, and replace gear oil if it is contaminated or deteriorated. <Ref. to DI-22 REPLACEMENT, Differential Gear Oil.>
6) Check gear oil level is up to the bottom part of filler bolt. If the level is low, refill up to the bottom of filler bolt.



(A) Filler plug
(B) Drain plug

B: REPLACEMENT S303150A20

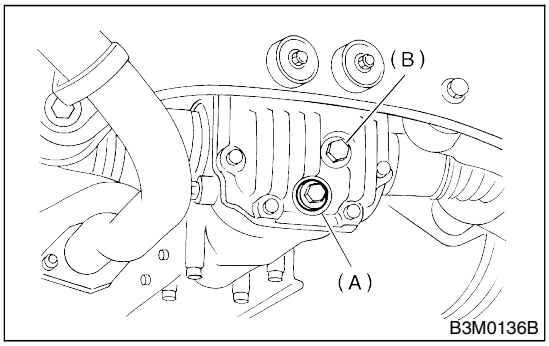
1) Disconnect ground terminal from battery.
2) Jack-up vehicle and support it with sturdy racks.
3) Disconnect oil temperature sensor connector (Turbo model for Europe).



(A) Connector

4) 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

5) Tighten oil drain plug.

CAUTION:
- **Apply fluid packing to drain plug in T-type.**
- **VA-type uses a new aluminum gasket.**

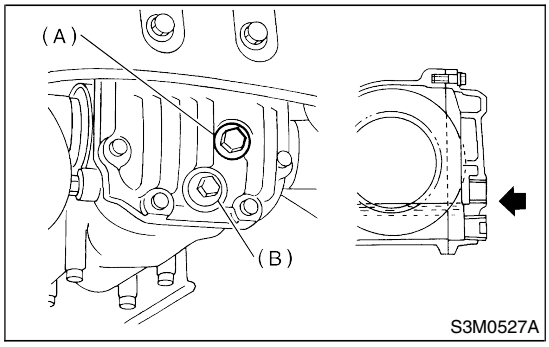
Fluid packing:
THREE BOND 1105 or equivalent

Tightening torque:
T-type;
49.0 N·m (5.0 kgf-m, 36.2 ft-lb)
VA-type;
34 N·m (3.5 kgf-m, 25.3 ft-lb)

6) 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

7) Install filler plug.

CAUTION:
- **Apply fluid packing to drain plug in T-type.**
- **VA-type uses a new aluminum gasket.**

Fluid packing:
THREE BOND 1105 or equivalent

Tightening torque:
T-type;
49.0 N·m (5.0 kgf-m, 36.2 ft-lb)
VA-type;
34 N·m (3.5 kgf-m, 25.3 ft-lb)

8) Connector oil temperature sensor connector.

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

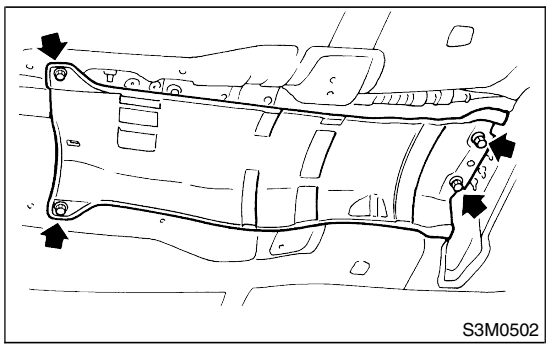
For front differential of manual transmission, refer to “MT” section. <Ref. to MT-92, Front Differential Assembly.>

4. Rear Differential for T-type

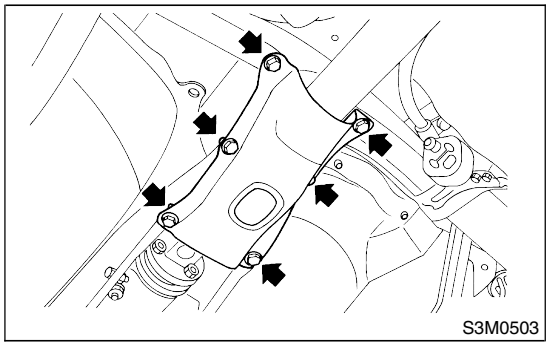
S303145

A: REMOVAL S303145A18

1) Set vehicle on a lift.
2) Disconnect ground terminal from battery.
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.
Non-turbo model with OBD:
<Ref. to EX(SOHC)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11, REMOVAL, Muffler.>
Non-turbo model without OBD:
<Ref. to EX(SOHCw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-12, REMOVAL, Muffler.>
Turbo model:
<Ref. to EX(DOHC TURBO)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, REMOVAL, Muffler.>
9) Remove front exhaust cover. (Non-Turbo model)

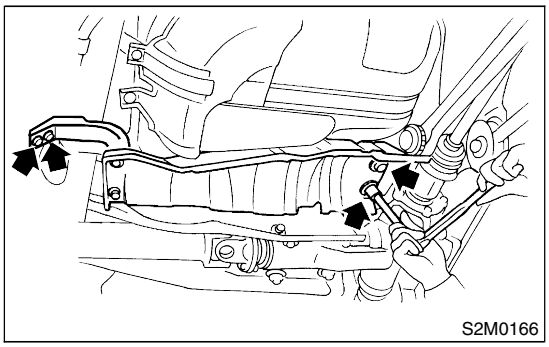

S3M0502

10) Remove front cover of rear differential mount.

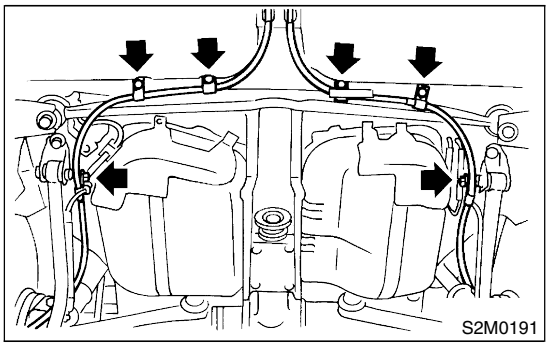

S3M0503

11) Remove propeller shaft.
<Ref. to DS-14, REMOVAL, Propeller Shaft.>

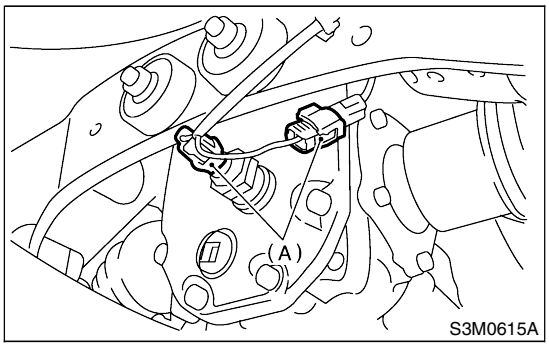
12) Remove heat sealed cover.


S2M0166

13) Remove clamps and bracket of parking brake cable.


S2M0191

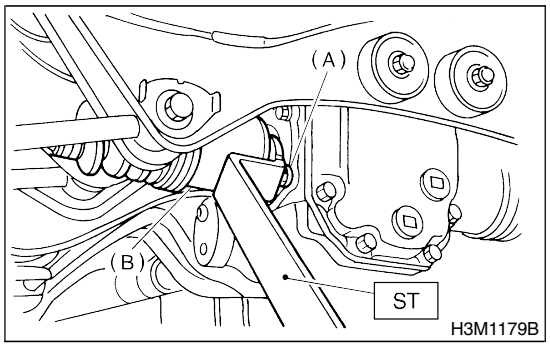
14) Disconnect connector from oil temperature sensor. (Turbo model for Europe)



S3M0615A

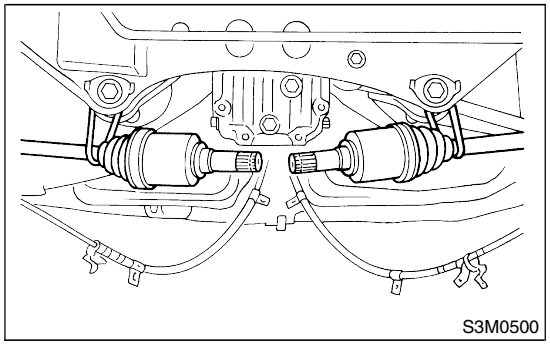
(A) Connector

15) Remove DOJ of rear drive shaft from rear differential using ST. <Ref. to DS-38, REMOVAL, Rear Drive Shaft.>
ST 28099PA100 DRIVE SHAFT REMOVER

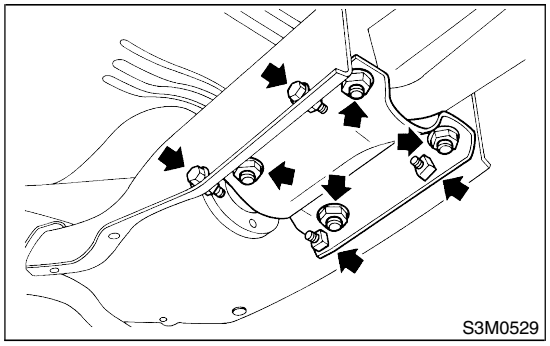


(A) Bolt
(B) DOJ

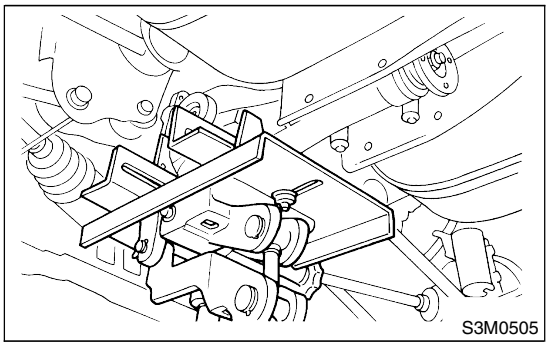
16) Secure rear drive shaft to rear crossmember using wire.



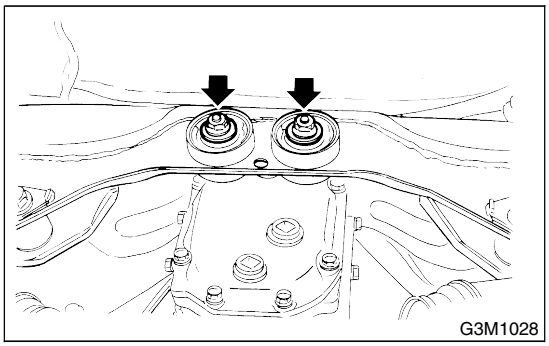
17) Remove lower differential bracket.



18) Support rear differential with transmission jack.

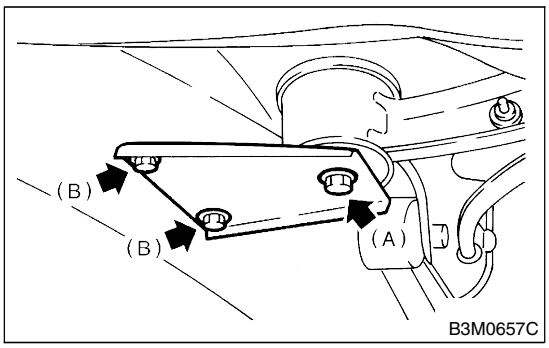


19) Remove self-locking nuts connecting rear differential to rear crossmember.



20) Remove bolts which secure rear differential front member to body.
(1) Loosen bolt A first, then remove bolts B.

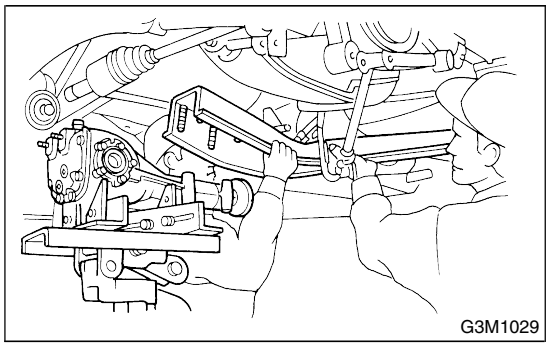
NOTE:
Support front member with a help of an assistant to prevent it from dropping.



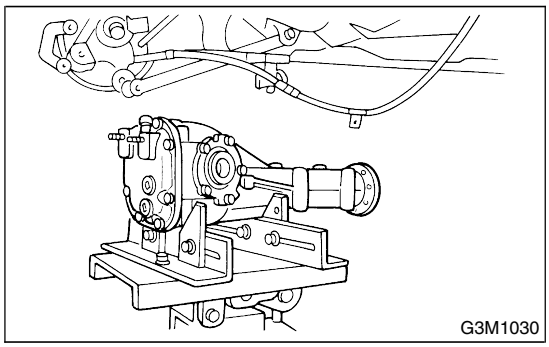
(A) Bolt A
(B) Bolt B

(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 S303145A11

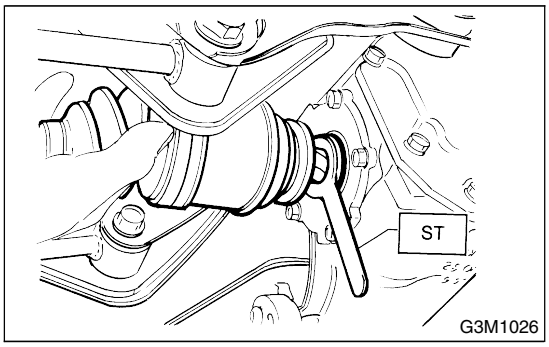
To install, reverse the removal sequence.
1) Install the air breather cap tapping with a plastic hammer.

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



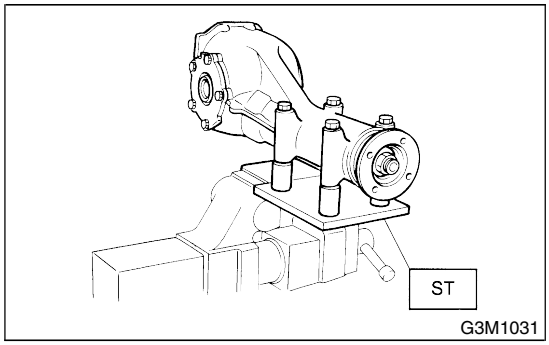
G3M1026

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-22, Differential Gear Oil.>
6) Connect connector to rear differential temperature sensor. (Turbo model for Europe)
7) If the results of the following inspections are not satisfactory, check rear differential temperature sensor and circuit. Then repair or replace if necessary.
(1) Check that rear differential temperature sensor warning light lights up when ignition switch is turned to on (engine stopped).
(2) Start engine, then check that the warning light goes off after a few seconds.

C: DISASSEMBLY S303145A06

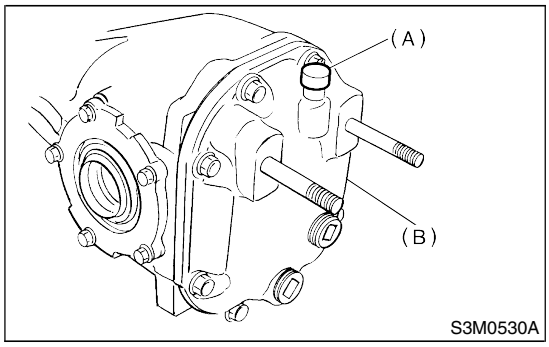
To detect real cause of trouble, inspect the following items before disassembling.
- Tooth contact of crown gear and pinion, and backlash
- Runout of crown gear at its back surface
- Turning resistance of drive pinion

1) Set ST on vise and install the differential assembly to ST.
ST 398217700 ATTACHMENT SET



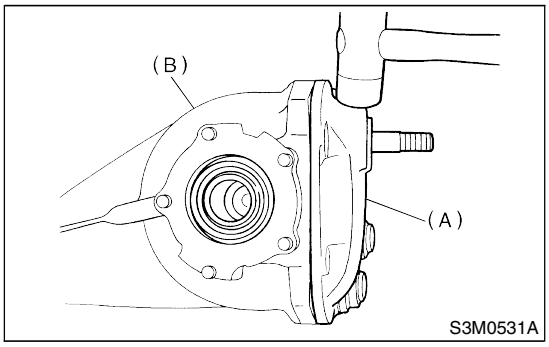
2) Drain gear oil by removing plug.
3) Remove the air breather cap.

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.

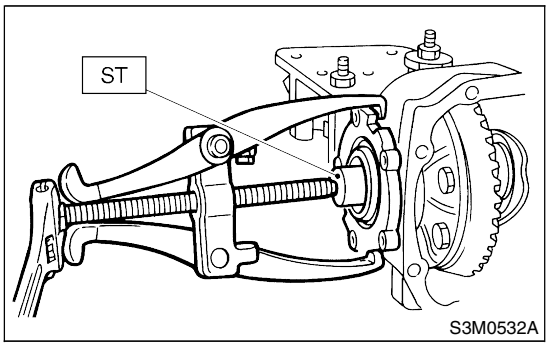


(A) Rear cover
(B) Differential carrier

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.

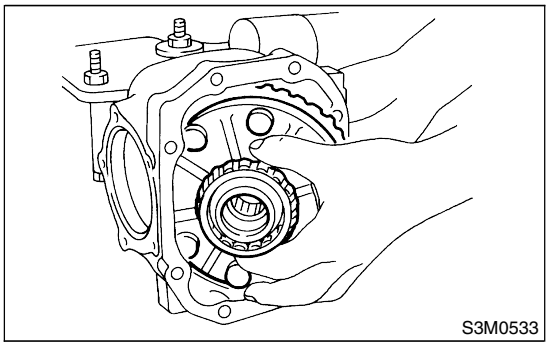
CAUTION:
Each shim, which is installed to adjust the side bearing preload, should be kept together with its mating retainer.

ST 398457700 ATTACHMENT

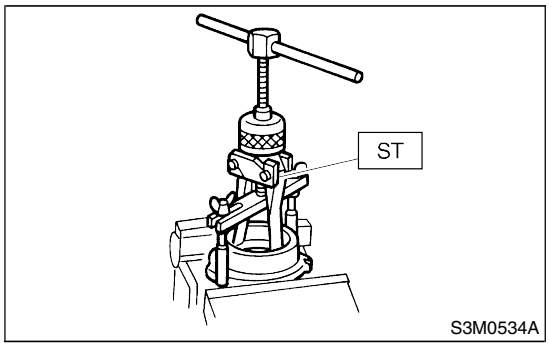


6) Pull out differential case assembly from differential carrier.

CAUTION:
Be careful not to hit the teeth against the case.



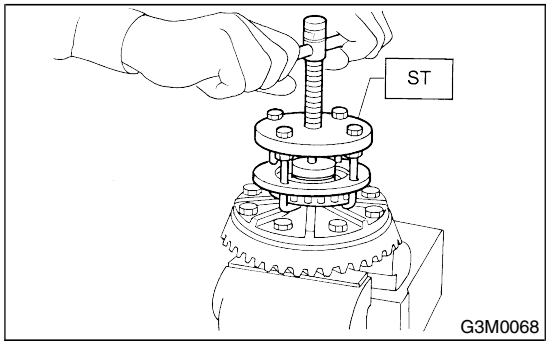
7) When replacing side bearing, pull bearing cup from side bearing retainer using ST.
ST 398527700 PULLER ASSY



8) Extract bearing cone with ST.

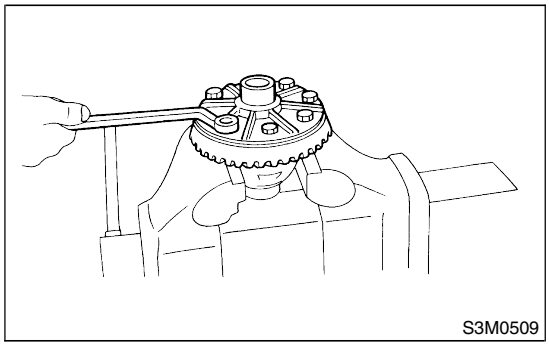
CAUTION:
Do not attempt to disassemble the parts unless necessary.

NOTE:
● Set puller so that its claws catch the edge of the bearing cone.
● Never mix up the right and left hand bearing races and cones.
ST 399527700 PULLER SET



9) Remove crown gear by loosening crown gear bolts.

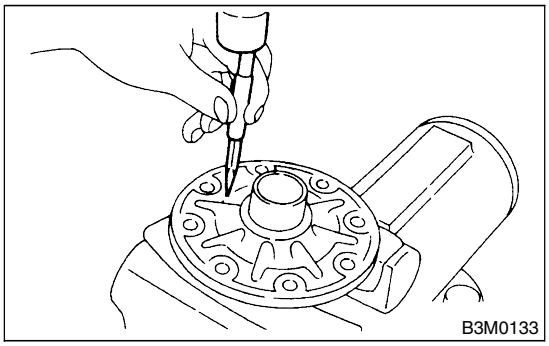
CAUTION:
Further disassembling is not allowed.



10) Drive out pinion shaft lock pin from crown gear side.

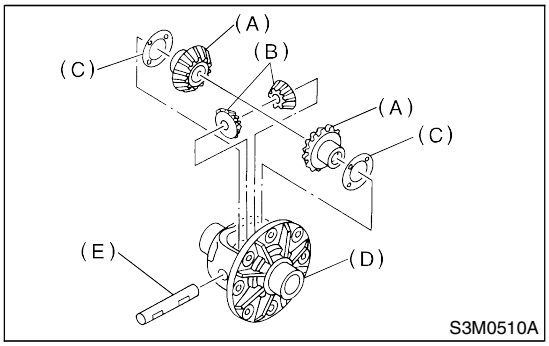
NOTE:
The lock pin is staked at the pin hole end on the differential carrier; do not drive it out forcibly before unstaking it.

ST 899904100 STRAIGHT PIN REMOVER



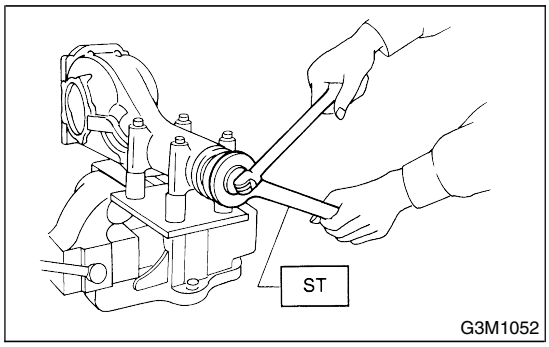
11) Draw out pinion mate shaft and remove pinion mate gears, side gears and thrust washers.

NOTE:
The gears as well as thrust washers should be marked or kept separated left and right, and front and rear.

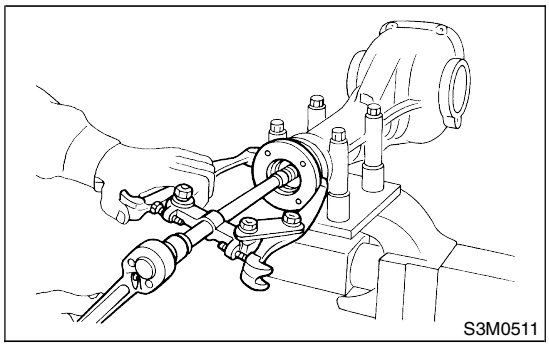


(A) Side gear
(B) Pinion mate gear
(C) Thrust washer
(D) Differential case
(E) Pinion mate shaft

12) Hold companion flange with ST and remove drive pinion nut.
ST 498427200 FLANGE WRENCH



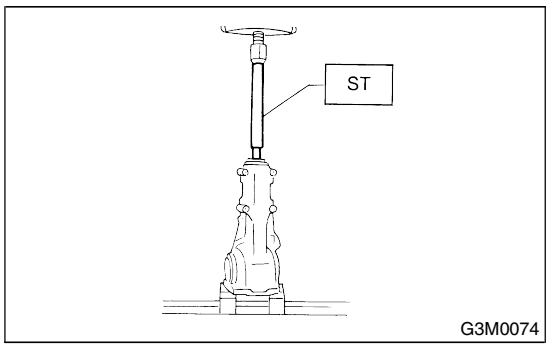
13) Extract the companion flange with a puller.



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.

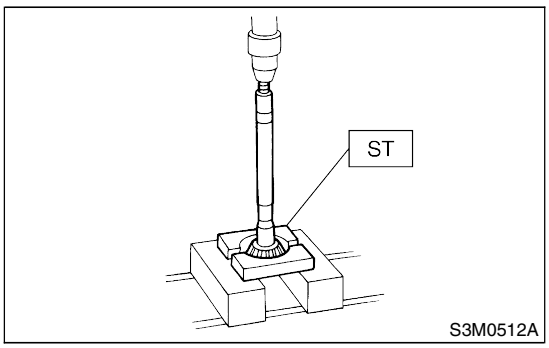
ST 398467700 DRIFT



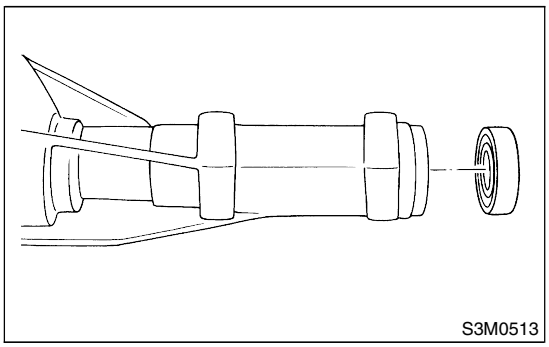
15) Remove rear bearing cone from drive pinion by supporting cone with ST.

NOTE:
Place the replacer so that its center-recessed side faces the pinion gear.

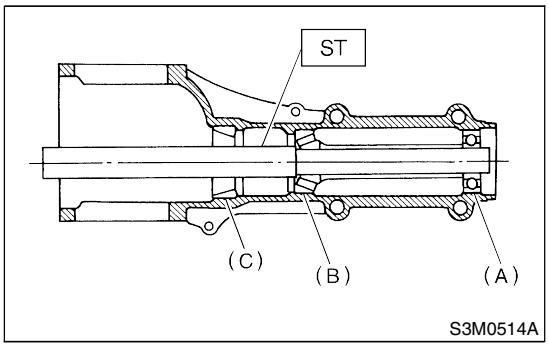
ST 398517700 REPLACER



16) Remove front oil seal from differential carrier using ST.
ST 398527700 PULLER ASSY

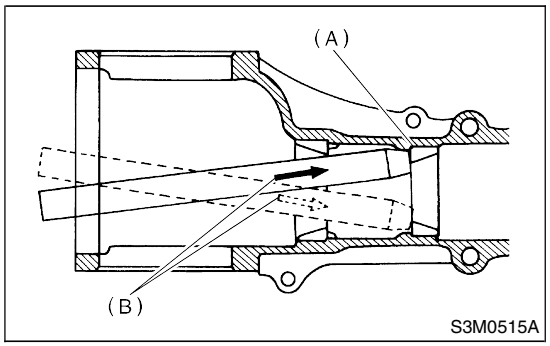


17) Remove pilot bearing together with front bearing cone using ST.
ST 398467700 DRIFT



(A) Pinion bearing
(B) Front bearing
(C) Rear bearing cup

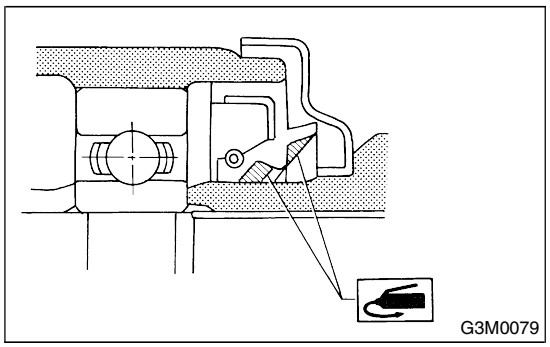
18) When replacing bearings, tap front bearing cup and rear bearing cup in this order out of case by using a brass bar.



(A) 2 cutouts along diagonal lines
(B) Tap alternately with brass bar.

D: ASSEMBLY S303145A02

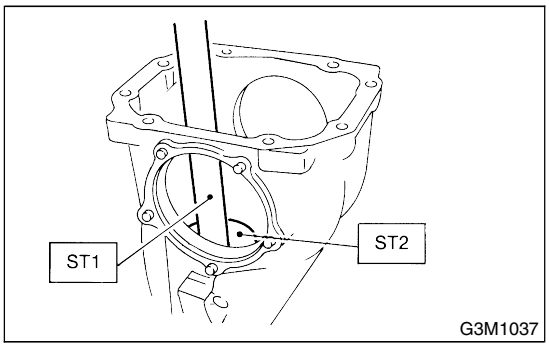
1) Precautions for assembling
- Assemble in the reverse order of disassembling.
- Check and adjust each part during assembly.
- For correct installation, keep the shims and washers in order.
- Thoroughly clean the surfaces on which the shims, washers and bearings are to be installed.
- Apply gear oil 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.



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

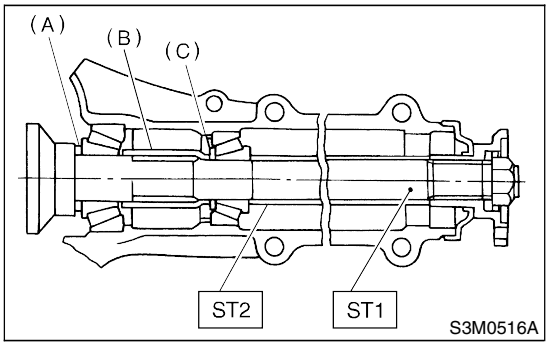


(2) Insert ST1 into carrier with pinion height adjusting washer and rear bearing cone fitted onto it.

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

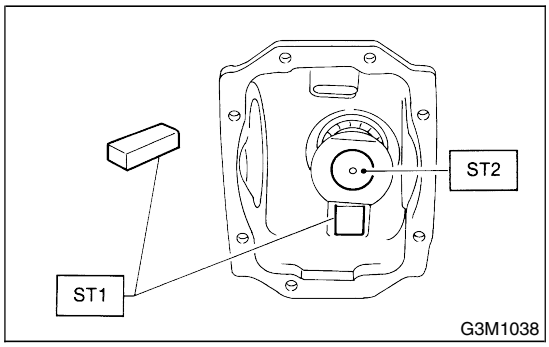
(4) Turn ST1 with hand to make it seated, and tighten drive pinion nut while measuring the preload with spring balance. Select preload adjusting washer and spacer so that the specified preload is obtained when nut is tightened to the specified torque.

CAUTION:
Use a new lock nut.

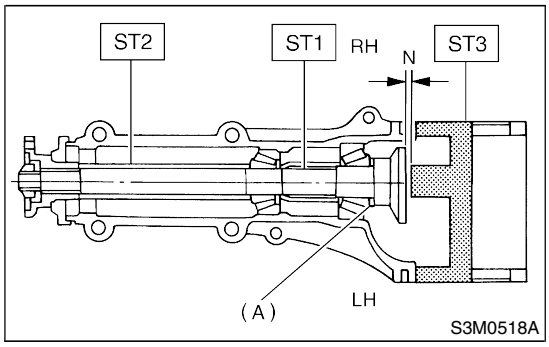
NOTE:
- Be careful not to give excessive preload.
- When tightening the drive pinion nut, lock ST1 with ST2 as shown in the figure.

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)
	Part No.	Length mm (in)
Preload adjusting spacer	383695201	56.2 (2.213)
	383695202	56.4 (2.220)
	383695203	56.6 (2.228)
	383695204	56.8 (2.236)
	383695205	57.0 (2.244)
	383695206	57.2 (2.252)

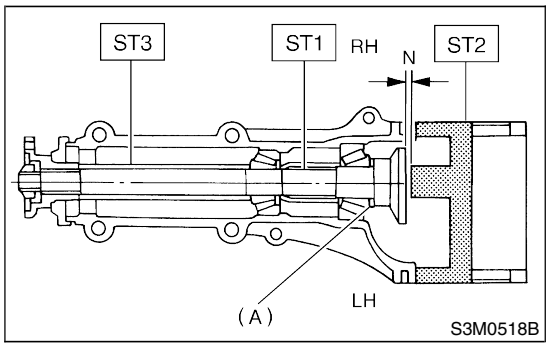
3) Adjusting drive pinion height
Adjust drive pinion height with shim installed between rear bearing cone and the back of pinion gear.

(1) Install ST1, ST2 and ST3, as shown in the figure, and apply the specified preload on the bearings.

Front and rear bearing preload
For new bearing: 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

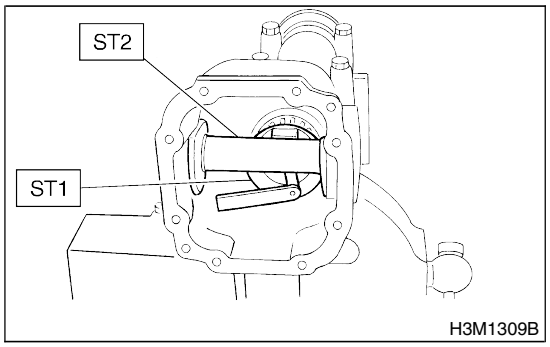


(A) Pinion height adjusting shim

(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)

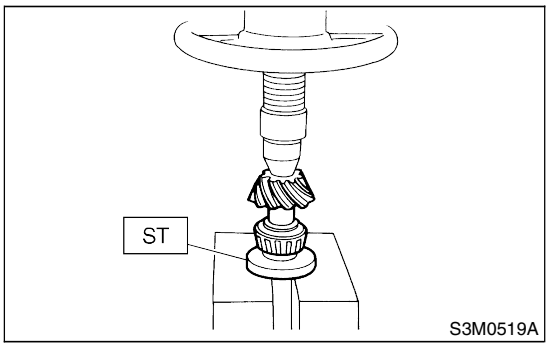
NOTE:
Use copies of this page.

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:		

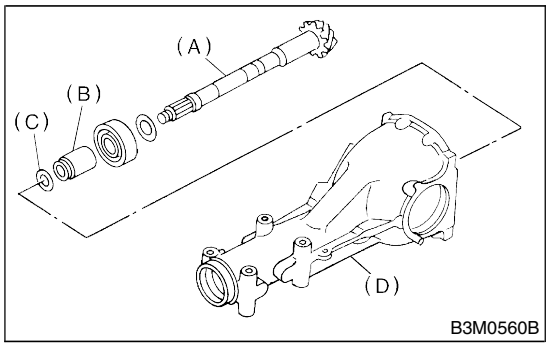
(Example of calculation)
To = 2.20 + 1.20 = 3.40 mm
N = 0.23 mm H = + 1,
T = 3.40 + 0.23 − 0.01 − 0.20 = 3.42
Result: Thickness = 3.42 mm
Therefore use the shim 383605200.

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

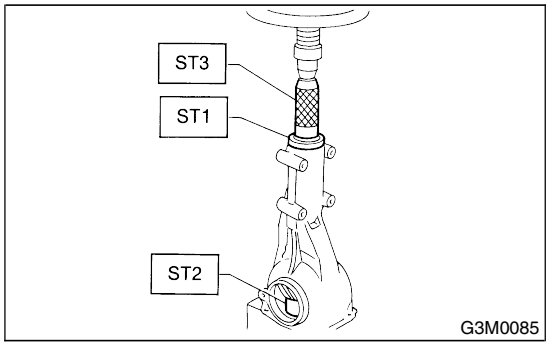


5) Insert drive pinion into differential carrier, install the previously selected bearing preload adjusting spacer and washer.

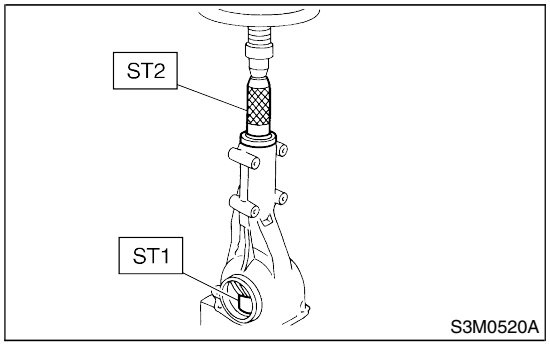


(A) Drive pinion
(B) Bearing adjusting spacer
(C) Washer
(D) Differential carrier

6) Press-fit front bearing cone into case with ST1, ST2 and ST3.
ST1 398507703 DUMMY COLLAR
ST2 399780104 WEIGHT
ST3 899580100 INSTALLER



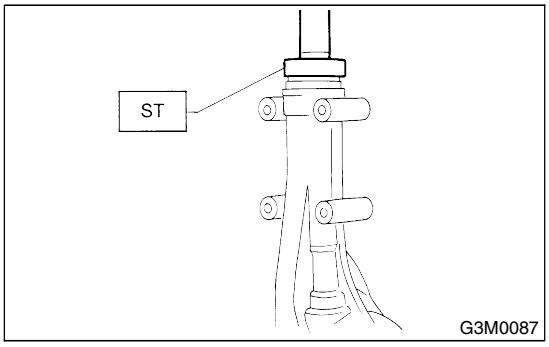
7) Insert spacer, then press-fit pilot bearing with ST1 and ST2.
ST1 399780104 WEIGHT
ST2 899580100 INSTALLER



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.

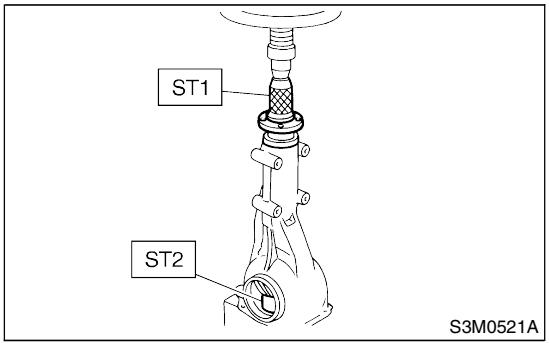
ST 498447120 INSTALLER



9) Press-fit companion flange with ST1 and ST2.

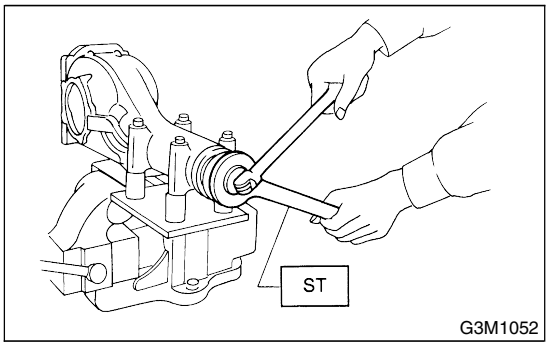
CAUTION:
Be careful not to damage bearing.

ST1 899874100 INSTALLER
ST2 399780104 WEIGHT



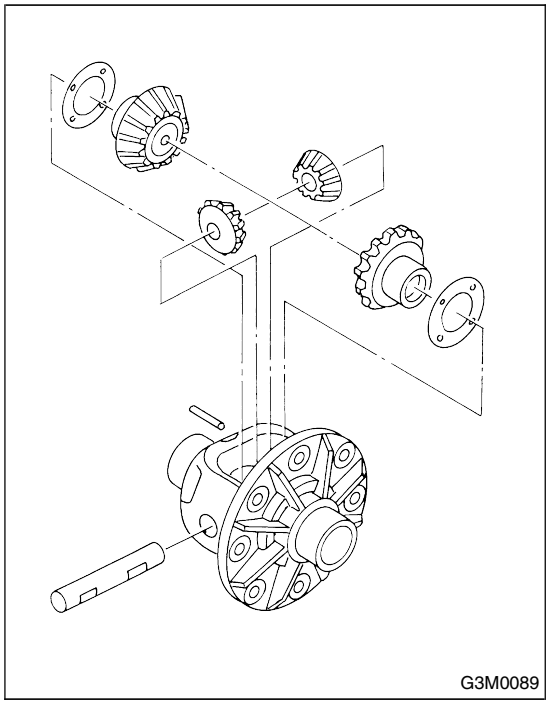
10) Install self-locking nut. Then tighten it with ST.
ST 498427200 FLANGE WRENCH

Tightening torque:
181 N·m (18.5 kgf-m, 134 ft-lb)



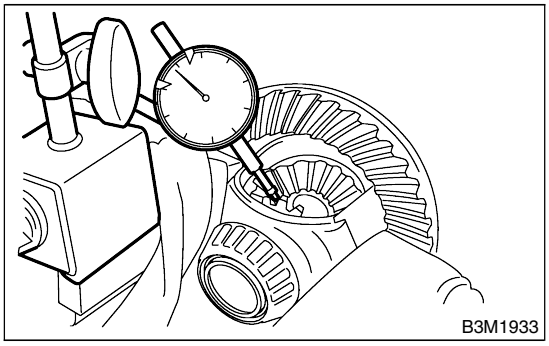
11) Assembling differential case
Install side gears and pinion mate gears, with their thrust washers and pinion mate shaft, into differential case.

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.

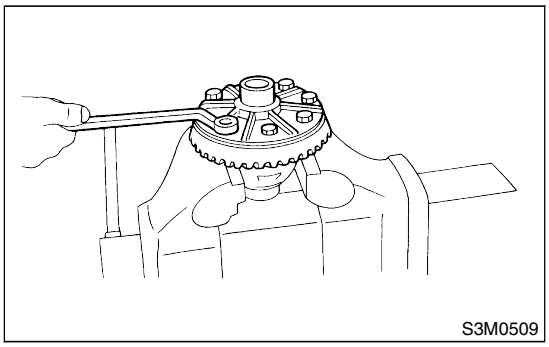
12) Install crown gear on differential case.

CAUTION:
Before installing bolts, apply Lock Tite to bolt threads.

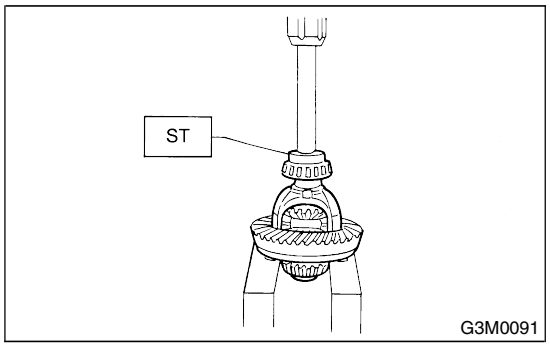
Lock Tite:
THREE BOND 1324 or equivalent

NOTE:
Tighten diagonally while tapping the bolt heads.

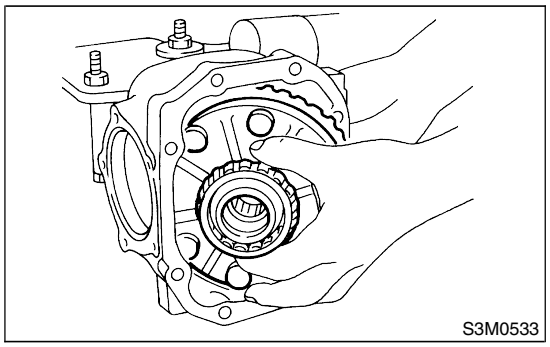
Tightening torque:
103 N·m (10.5 kgf-m, 76 ft-lb)


S3M0509

13) Press side bearing cone onto differential case with ST.
ST 398487700 DRIFT



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.



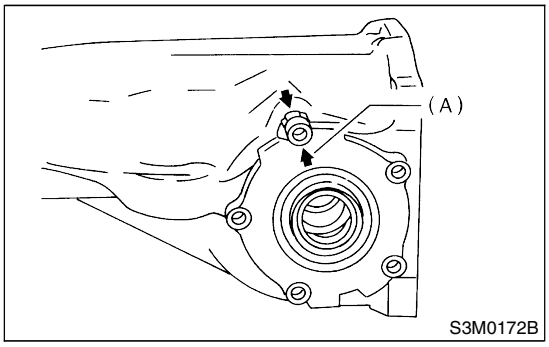
(3) Install side retainer shims and O-rings to the left and right retainers from which they were removed.

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.



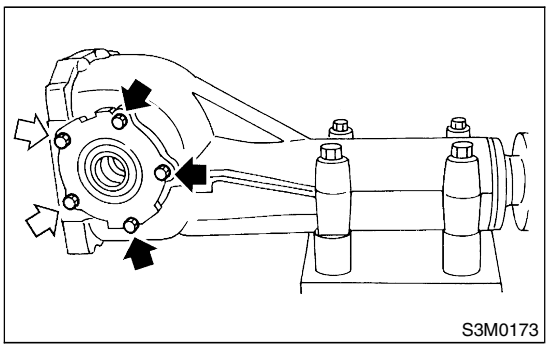
(A) Arrow mark

(5) Tighten side bearing retainer bolts.

CAUTION:
Before tightening the two side bearing retainer bolts, apply Lock Tite to bolt threads.

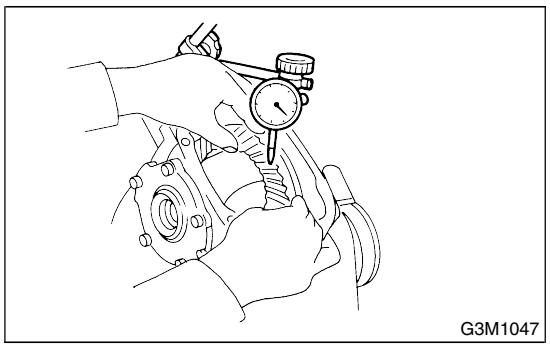
⇨ ***Lock Tite:***
THREE BOND 1105 or equivalent

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)

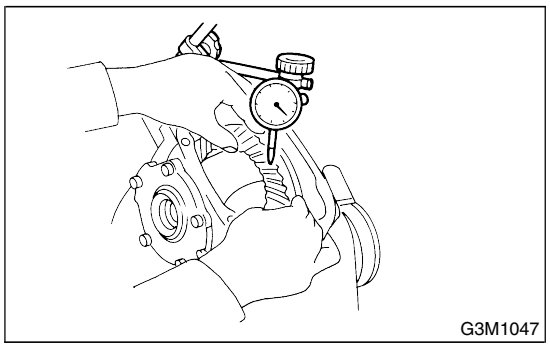

G3M1047

(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)

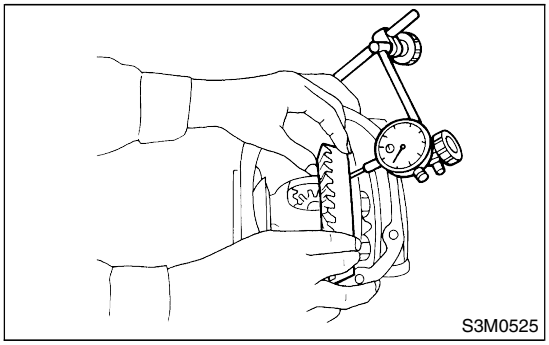
15) Re-check crown gear-to-pinion backlash.

Backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)


G3M1047

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.

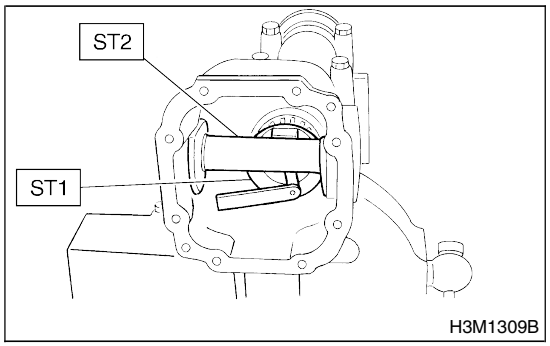
(2) When the contact pattern is incorrect, readjust according to the instructions given in “TOOTH CONTACT PATTERN”.

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



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)

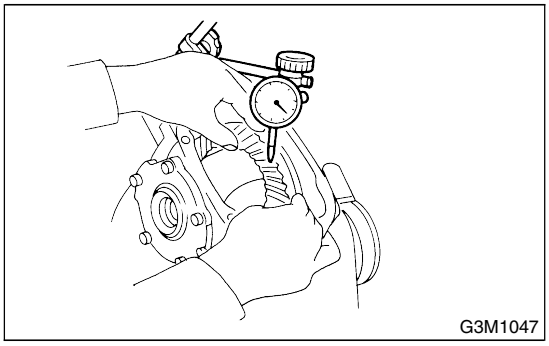
N = Reading of thickness gauge (mm)

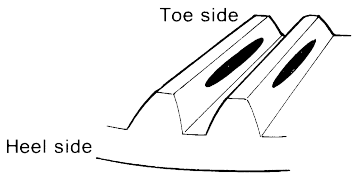
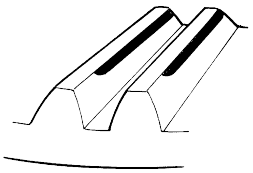
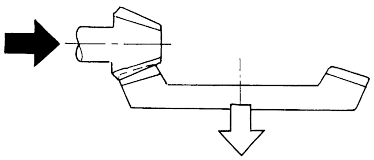
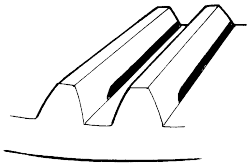
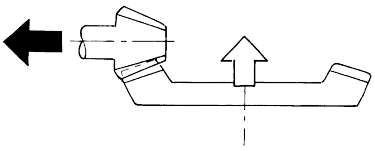
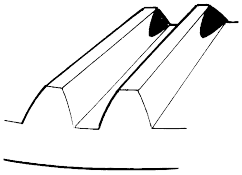
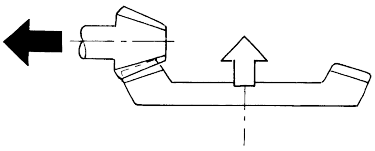
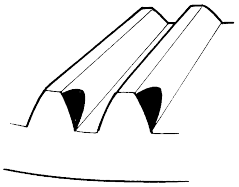
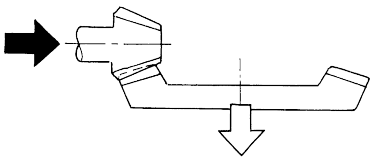
H = Figure marked on drive pinion head

(2) Hypoid gear backlash

Backlash:

0.10 — 0.20 mm (0.0039 — 0.0079 in)



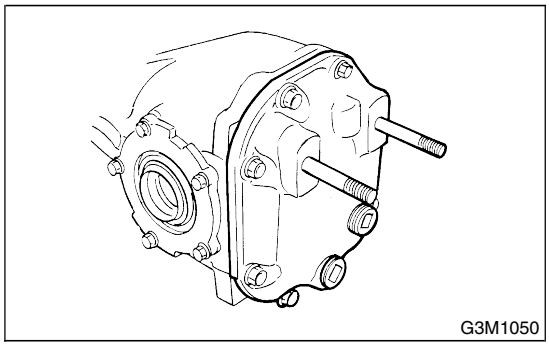
TOOTH CONTACT PATTERN		
Condition	Contact pattern	Adjustment
Correct tooth contact Tooth contact pattern slightly shifted towards toe under no load rotation. (When loaded, contact pattern moves toward heel.)	 G3M0098A	—
Face contact Backlash is too large.	This may cause noise and chipping at tooth ends.  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 S303145A10

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).

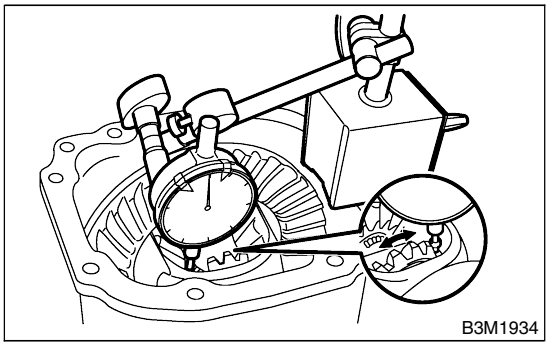
CAUTION:
The oil is hot, so be careful not to burn yourself when inspecting.

1. SIDE GEAR BACKLASH S303145A1001

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.

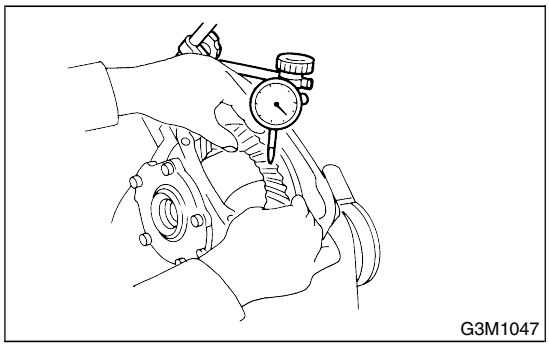

B3M1934

2. CROWN GEAR BACKLASH S303145A1002

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.

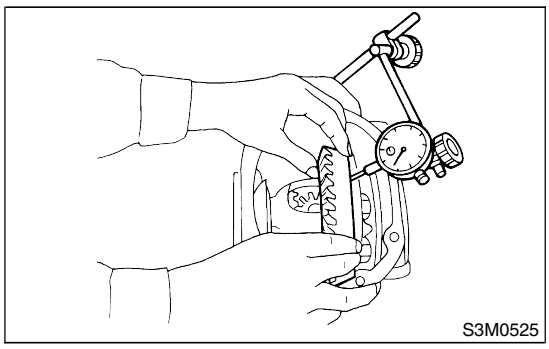

G3M1047

3. CROWN GEAR RUNOUT S303145A1003

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.


S3M0525

4. TOOTH CONTACT BETWEEN CROWN GEAR AND DRIVE PINION S303145A1004

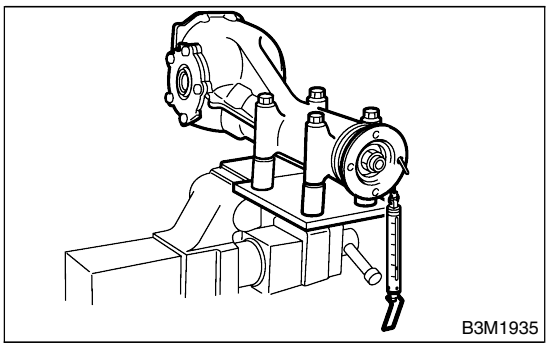
Inspect tooth contact between crown gear and driven pinion. <Ref. to DI-31 ASSEMBLY, Differential for T-type.>

5. TOTAL PRELOAD S303145A1005

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.


B3M1935

F: ADJUSTMENT S303145A01

1. SIDE GEAR BACKLASH A303145A0101

Adjust side gear backlash.
<Ref. to DI-31 ASSEMBLY, Differential for T-type.>

2. CROWN GEAR BACKLASH A303145A0102

Adjust crown gear backlash.
<Ref. to DI-31 ASSEMBLY, Differential for T-type.>

3. TOOTH CONTACT BETWEEN CROWN GEAR AND DRIVE PINION A303145A0103

Adjust the tooth contact between crown gear and drive pinion gear.
<Ref. to DI-31 ASSEMBLY, Differential for T-type.>

4. TOTAL PRELOAD A303145A0104

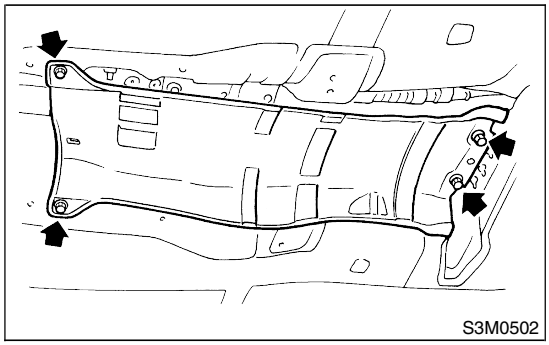
Adjust side bearing shim.
<Ref. to DI-31 ASSEMBLY, Differential for T-type.>

5. Rear Differential for VA-type

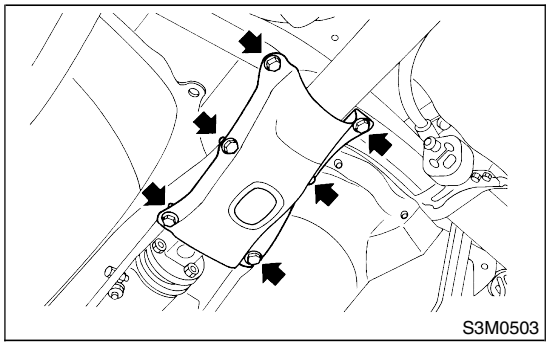
S303151

A: REMOVAL S303151A18

1) Set vehicle on a lift.
2) Disconnect ground terminal from battery.
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.
With OBD:
<Ref. to EX(SOHC)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11, REMOVAL, Muffler.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-12, REMOVAL, Muffler.>
9) Remove front exhaust cover.

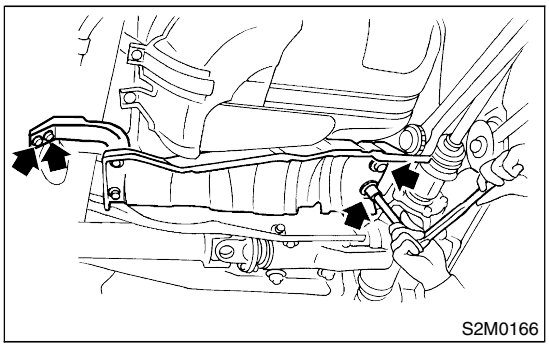

S3M0502

10) Remove front cover of rear differential mount.

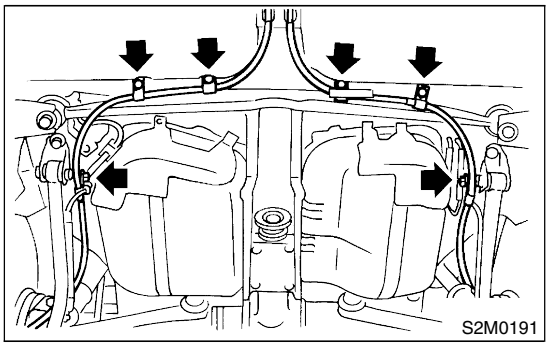

S3M0503

11) Remove propeller shaft. <Ref. to DS-14, REMOVAL, Propeller Shaft.>

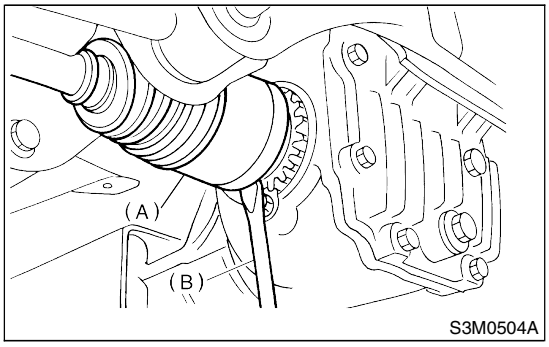
12) Remove heat sealed cover.


S2M0166

13) Remove clamps and bracket of parking brake cable.


S2M0191

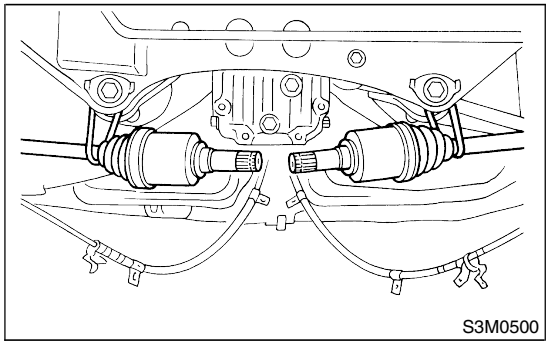
14) Remove DOJ of rear drive shaft from rear differential. <Ref. to DS-38, REMOVAL, Rear Drive Shaft.>



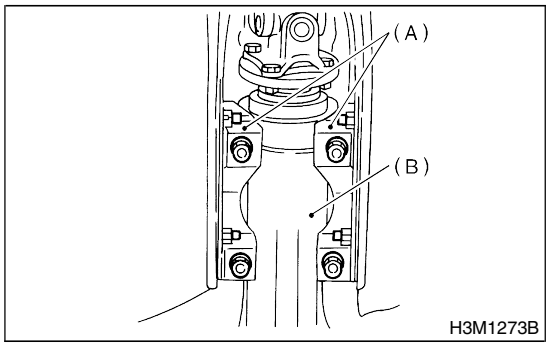
S3M0504A

(A) DOJ
(B) Tire lever

15) Secure rear drive shaft to rear crossmember using wire.


S3M0500

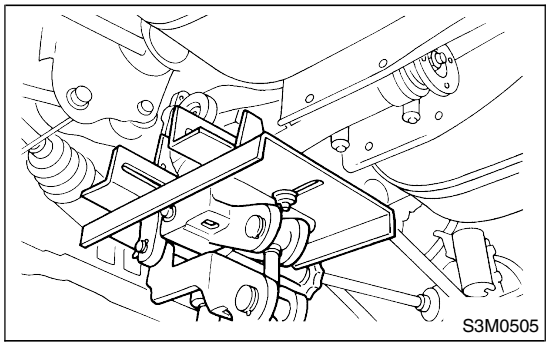
16) Remove lower differential bracket.



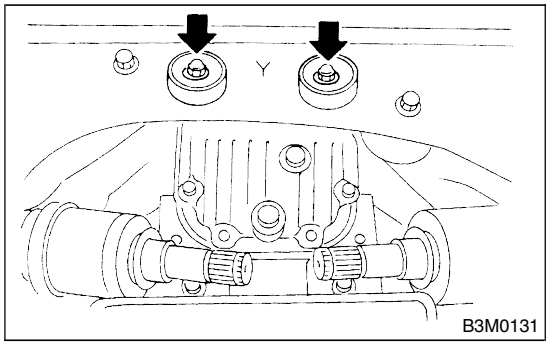
H3M1273B

(A) Lower differential bracket
(B) Rear differential

17) Support rear differential with transmission jack.

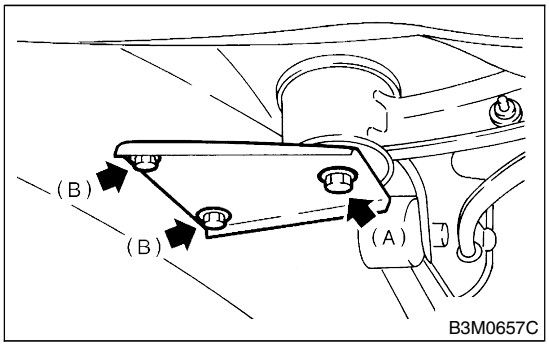

S3M0505

18) Remove self-locking nuts connecting rear differential to rear crossmember.


B3M0131

19) Remove bolts which secure rear differential front member to body.
(1) Loosen bolt A first, then remove bolts B.

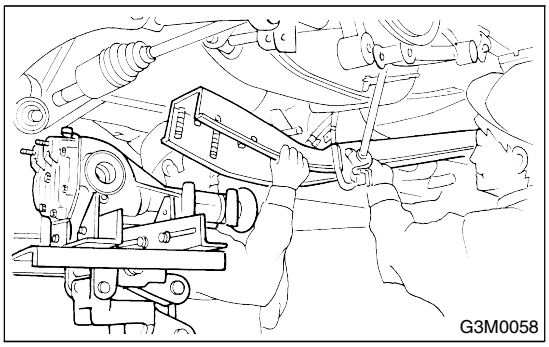
NOTE:
Support front member with a help of an assistant to prevent it from dropping.



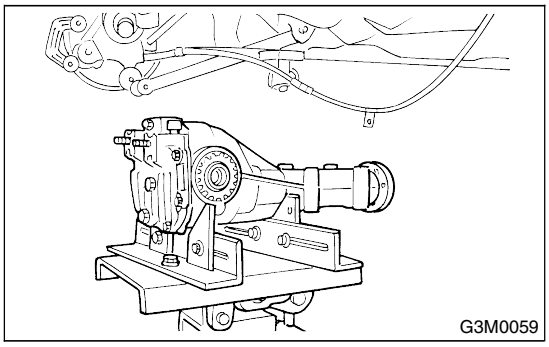
B3M0657C

(A) Bolt A
(B) Bolt B

(2) Remove bolt A.
20) While slowly lowering transmission jack, move rear differential forward and remove bolts from rear crossmember.
21) Remove front member from body.


G3M0058

22) Remove rear differential from body.

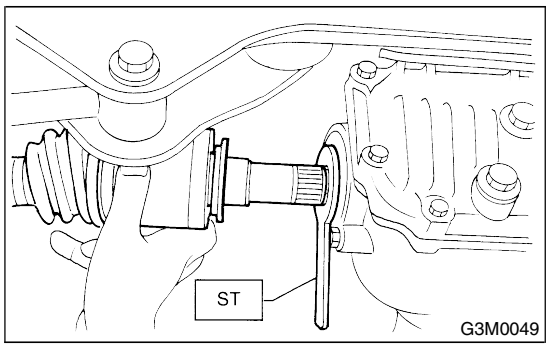

G3M0059

B: INSTALLATION S303151A11

To install, reverse the removal sequence.
1) Position front member on body by passing it under parking brake cable and securing to rear differential.

NOTE:
When installing rear differential front member, do not confuse the installation sequence of the upper and lower stoppers.

2) Install DOJ of rear drive shaft into rear differential.
ST 28099PA090 SIDE OIL SEAL PROTECTOR

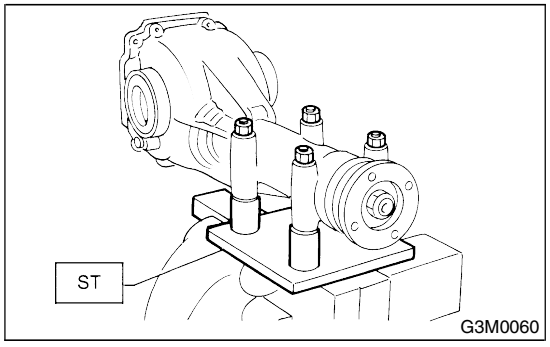


3) Install in the reverse order of removal.
4) After installation, fill differential carrier with gear oil. <Ref. to DI-22, Differential Gear Oil.>

C: DISASSEMBLY S303151A06

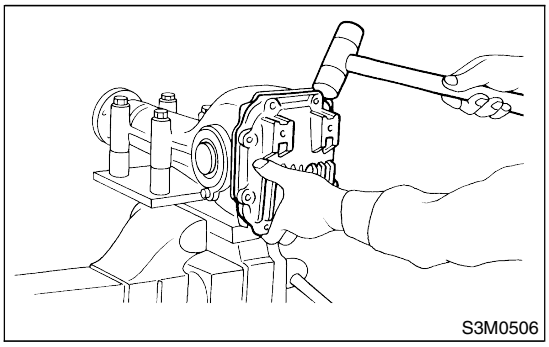
To detect real cause of trouble, inspect the following items before disassembling.
- Tooth contact of crown gear and pinion, and backlash
- Runout of crown gear at its back surface
- Turning resistance of drive pinion

1) Set ST on vise and install the differential assembly to ST.
ST 398217700 ATTACHMENT



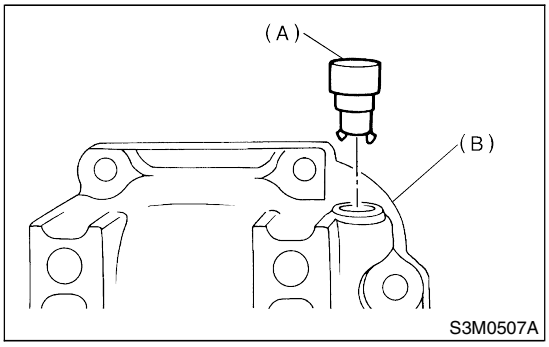
2) Drain gear oil by removing plug.

3) Remove rear cover by loosening retaining bolts.



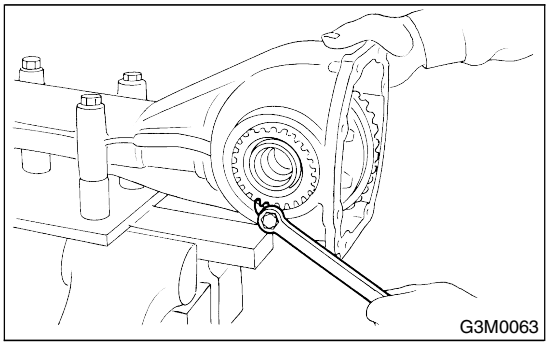
4) Replace air breather cap.

NOTE:
Do not attempt to replace the air breather cap unless necessary.

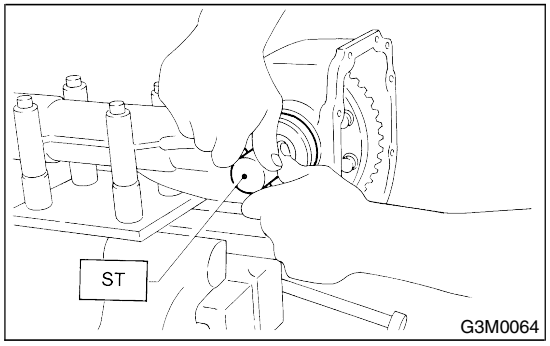


(A) Air breather cap
(B) Rear cover

5) Remove right and left lock plates.

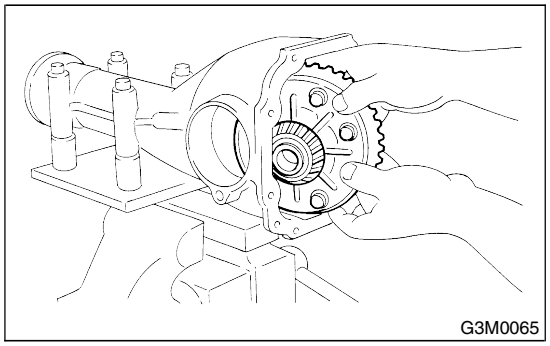


6) Remove right and left holders with ST.
ST 399780111 WRENCH

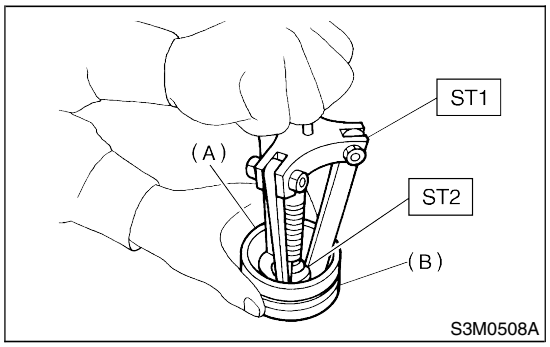


7) Pull out differential assembly from differential case.

CAUTION:
Be careful not to hit the teeth against the case.



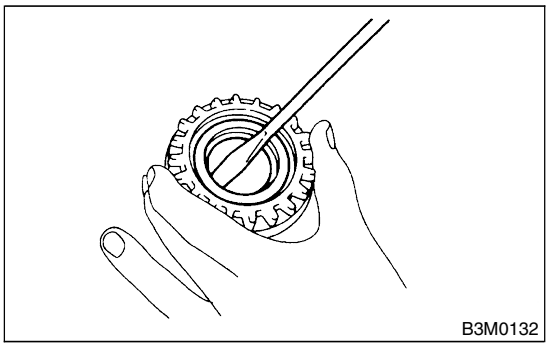
8) Remove bearing race from right and left holders with ST1 and ST2.
ST1 499705401 PULLER ASSY
ST2 499705404 OUTER RACE PULLER SEAT



(A) Bearing race
(B) Holder

9) Remove oil seal from right and left holders with screwdriver.

CAUTION:
Perform this operation only when changing oil seal.

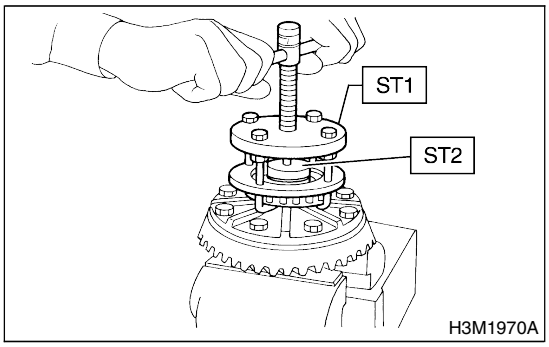


10) Extract bearing cone with ST1 and ST2.

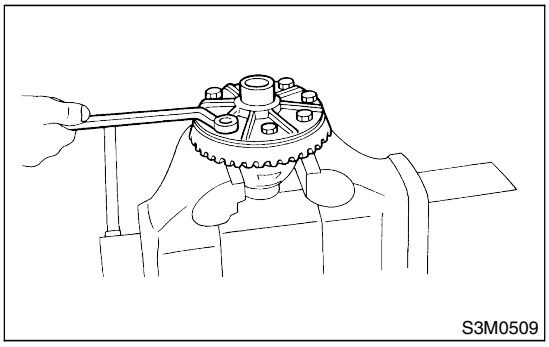
CAUTION:
Do not attempt to disassemble the parts unless necessary.

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.

ST1 899524100 PULLER SET
ST2 399520105 SEAT



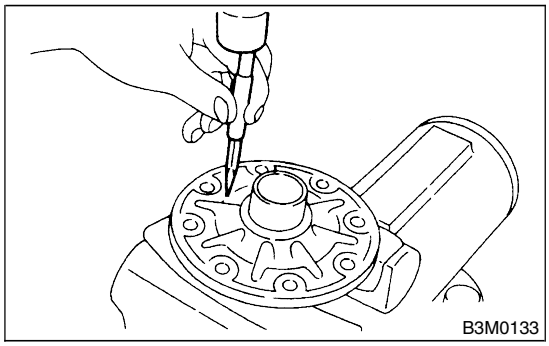
11) Remove crown gear by loosening crown gear bolts.



12) Drive out pinion shaft lock pin from crown gear side.

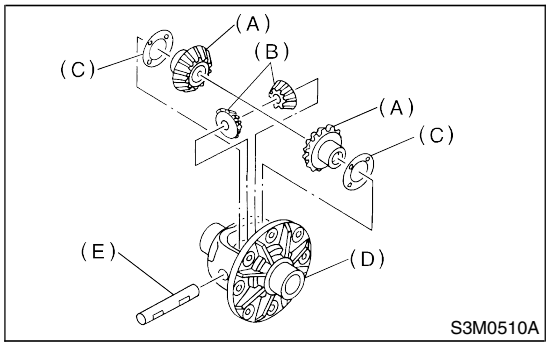
NOTE:
The lock pin is staked at the pin hole end on the differential case; do not drive it out forcibly before unstaking it.

ST 899904100 STRAIGHT PIN REMOVER



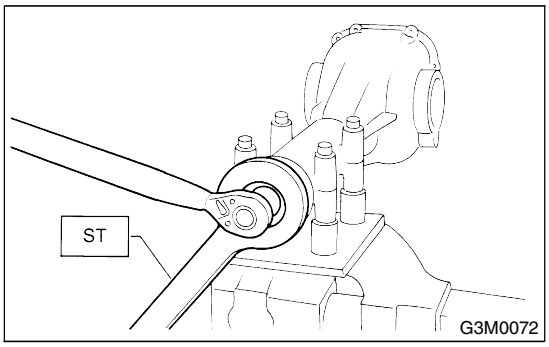
13) Draw out pinion mate shaft and remove pinion mate gears, side gears and thrust washers.

NOTE:
The gears as well as thrust washers should be marked or kept separated left and right, and front and rear.

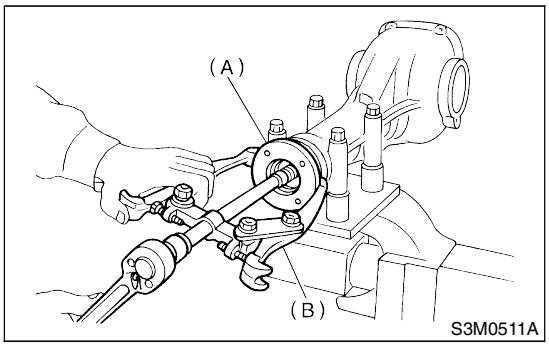


(A) Side gear
(B) Pinion mate gear
(C) Thrust washer
(D) Differential case
(E) Pinion mate shaft

14) Hold companion flange with ST and remove self-locking nut.
ST 498427200 FLANGE WRENCH



15) Extract the companion flange with a puller.

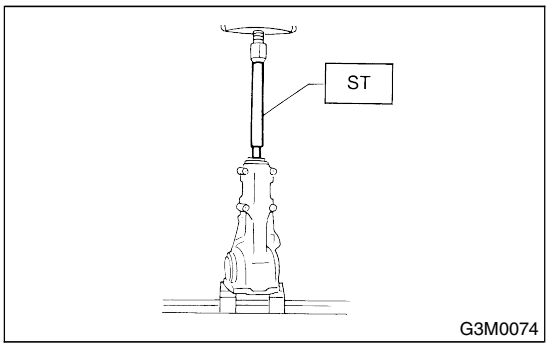


(A) Companion
(B) Puller

16) Press the end of drive pinion shaft and extract it together with rear bearing cone, preload adjusting spacer and washer.

NOTE:
Hold the drive pinion so as not to drop it.

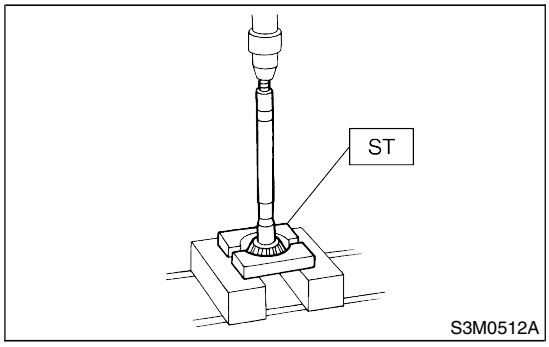
ST 398467700 DRIFT



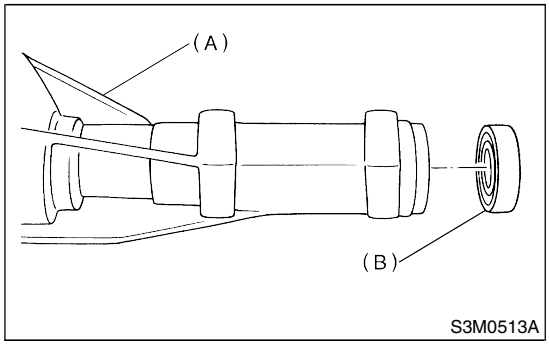
17) Remove rear bearing cone from drive pinion by supporting cone with ST.

NOTE:
Place the replacer so that its center-recessed side faces the pinion gear.

ST 498515500 REPLACER

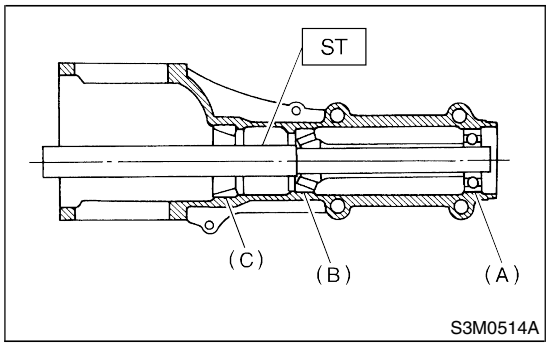


18) Remove front oil seal from differential carrier using ST.
ST 398527700 PULLER ASSY



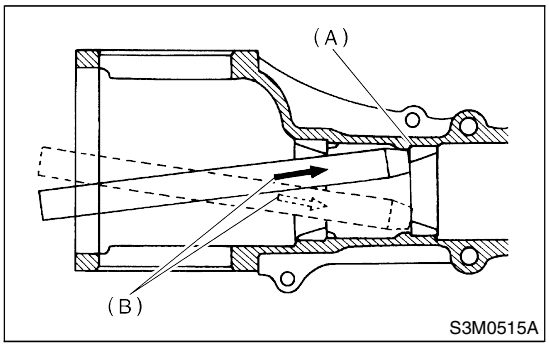
(A) Differential carrier
(B) Front oil seal

19) Remove pilot bearing together with front bearing cone using ST.
ST 398467700 DRIFT



(A) Pilot bearing
(B) Front bearing
(C) Rear bearing cup

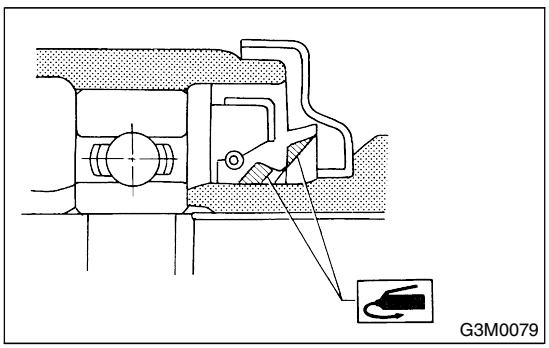
20) When replacing bearings, tap front bearing cup and rear bearing cup in this order out of case by using a brass bar.



(A) 2 cutouts along diagonal lines
(B) Tap alternately with brass bar.

D: ASSEMBLY S303151A02

1) Precautions for assembling
- Assemble in the reverse order of disassembling.
- Check and adjust each part during assembly.
- Keep the shims and washers in order, so that they are not misinstalled.
- Thoroughly clean the surfaces on which the shims, washers and bearings are to be installed.
- Apply gear oil when installing the bearings and thrust washers.
- Be careful not to mix up the right and left hand races of the bearings.
- Replace the oil seal with new one at every disassembly. Apply chassis grease between the lips when installing the oil seal.



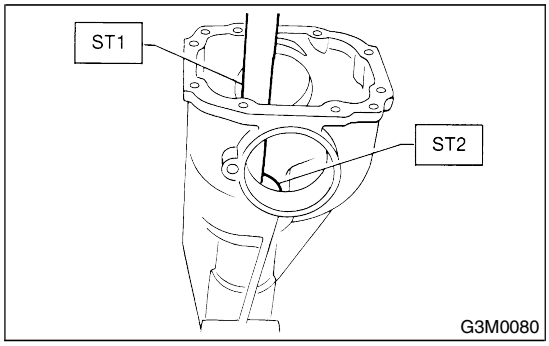
2) Adjust preload for front and rear bearings.
Adjust the bearing preload with spacer and washer between front and rear bearings. Pinion height adjusting washer are not affected by this adjustment. The adjustment must be carried out without oil seal inserted.

(1) Press rear bearing race into differential carrier with ST1 and ST2.

ST1 398477701 HANDLE
ST2 398477702 DRIFT

(2) Press front bearing race into differential carrier with ST1 and ST2.

ST1 398477701 HANDLE
ST2 498447110 DRIFT



(3) Insert front bearing cone.

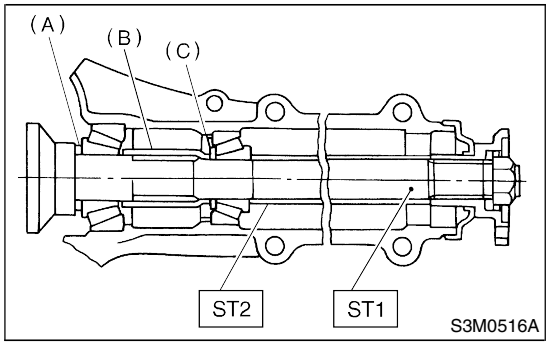
CAUTION:
Use a new front bearing cone.

(4) Insert ST1 into case with pinion height adjusting shim and rear bearing cone fitted onto it.

CAUTION:
- **Re-use the used washer if not deformed.**
- **Use a new rear bearing cone.**

(5) Then install preload adjusting spacer and washer, front bearing cone, ST2, companion flange, and washer and self-locking nut.

ST1 498447150 DUMMY SHAFT
ST2 32285AA000 DUMMY COLLAR



(A) Pinion height adjujusting shim
(B) Preload adjusting spacer
(C) Preload adjusting washer

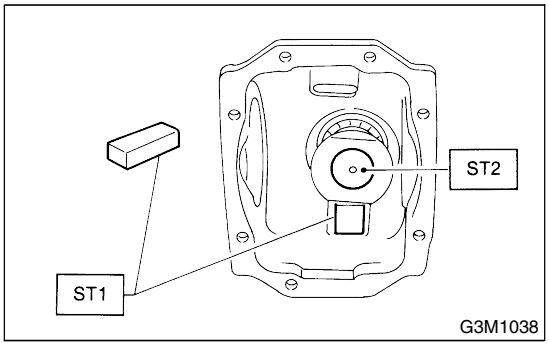
(6) Turn ST1 with hand to make it seated, and tighten drive pinion nut while measuring the preload with spring balance. Select preload adjusting washer and spacer so that the specified preload is obtained when nut is tightened to the specified torque.

CAUTION:
Use a new self-locking nut.

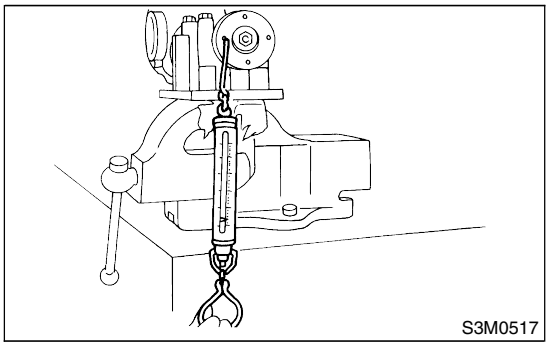
NOTE:
- Be careful not to give excessive preload.
- When tightening the drive pinion nut, lock ST1 with ST2 as shown in the figure.

ST1 398507704 BLOCK
ST2 498447150 DUMMY SHAFT

Tightening torque:
188 N·m (19.2 kgf-m, 139 ft-lb)



Front and rear bearing preload
For new bearing: 12.7 — 32.4 N (1.3 — 3.3 kgf, 2.9 — 7.3 lb) at companion flange bolt hole



	Part No.	Thickness mm (in)
Preload adjusting washer	38336AA000	1.500 (0.0591)
	38336AA120	1.513 (0.0596)
	38336AA010	1.525 (0.0600)
	38336AA130	1.538 (0.0606)
	38336AA020	1.550 (0.0610)
	38336AA140	1.563 (0.0615)
	38336AA030	1.575 (0.0620)
	38336AA150	1.588 (0.0625)
	38336AA040	1.600 (0.0630)
	38336AA160	1.613 (0.0635)
	38336AA050	1.625 (0.0640)
	38336AA170	1.638 (0.0645)
	38336AA060	1.650 (0.0650)
	38336AA180	1.663 (0.0655)
	38336AA070	1.675 (0.0659)
	38336AA190	1.688 (0.0665)
	38336AA080	1.700 (0.0669)
	38336AA200	1.713 (0.0674)
	38336AA090	1.725 (0.0679)
	38336AA210	1.738 (0.0684)
	38336AA100	1.750 (0.0689)
	38336AA220	1.763 (0.0694)
	38336AA110	1.775 (0.0699)
	Part No.	Length mm (in)
Preload adjusting spacer	32288AA040	52.3 (2.059)
	32288AA050	52.5 (2.067)
	31454AA100	52.6 (2.071)
	32288AA060	52.7 (2.075)
	31454AA110	52.8 (2.079)
	32288AA070	52.9 (2.083)
	31454AA120	53.0 (2.087)
	32288AA080	53.1 (2.091)
	32288AA090	53.3 (2.098)

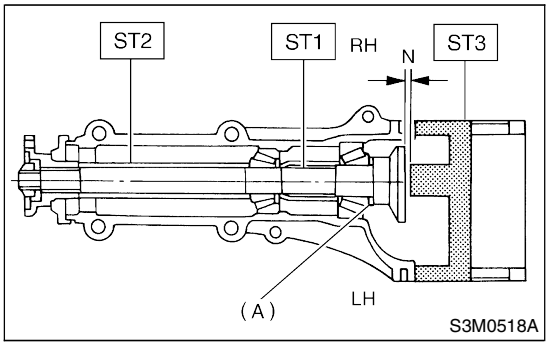
3) Adjusting drive pinion height
Adjust drive pinion height with shim installed between rear bearing cone and the back of pinion gear.

(1) Install ST1, ST2 and ST3, as shown in the figure, and apply the specified preload on the bearings

Front and rear bearing preload
For new bearing: 12.7 — 32.4 N (1.3 — 3.3 kgf, 2.9 — 7.3 lb) at companion flange bolt hole

Adjusting preload for front and rear bearings

NOTE:
At this time, install an original pinion height adjusting shim.
ST1 498447150 DUMMY SHAFT
ST2 32285AA000 DUMMY COLLAR
ST3 498505501 DIFFERENTIAL CARRIER GAUGE

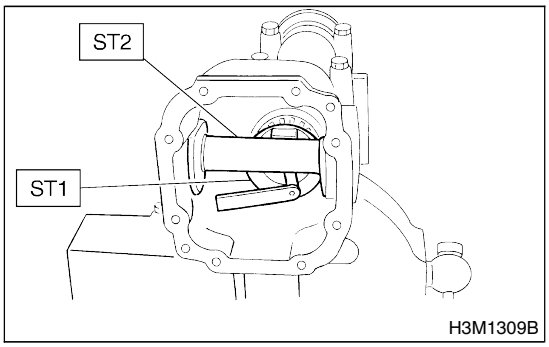


(A) Pinion height adjusting shim

(2) Measure the clearance N between the end of ST3 and the end surface of ST1 by using a thickness gauge.

NOTE:
Make sure there is no clearance between the case and ST3.

ST1 498447150 DUMMY SHAFT
ST2 498505501 DIFFERENTIAL CARRIER GAUGE



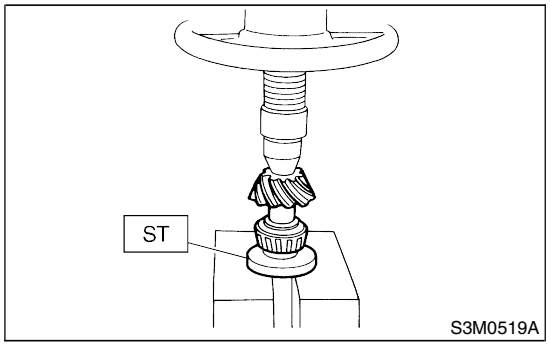
(3) Obtain the thickness of pinion height adjusting washer to be inserted from the following formula, and replace the temporarily installed shim with this one.

NOTE:
Use 1 to 3 shims as required for adjustment.

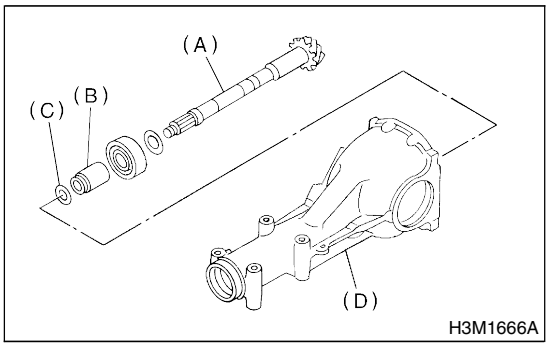
T = To + N – 0.05 (mm)
where
T = Thickness of pinion height adjusting shim (mm)
To = Thickness of shim originally installed (mm)
N = Reading of thickness gauge (mm)
H = Figure marked on drive pinion head
(Example of calculation)
To = 0.15 mm
N = 0.1 mm
T = 0.15 + 0.1 – 0.05 = 0.2 mm
Result: Thickness = 0.2 mm
Therefore use the 32295AA220.

Pinion height adjusting shim	
Part No.	Thickness mm (in)
32295AA200	0.150 (0.0059)
32295AA210	0.175 (0.0069)
32295AA220	0.200 (0.0079)
32295AA230	0.225 (0.0089)
32295AA240	0.250 (0.0098)
32295AA250	0.275 (0.0108)

4) Install the selected pinion height adjusting shim on drive pinion, and press the rear bearing cone into position with ST.
ST 498175500 INSTALLER

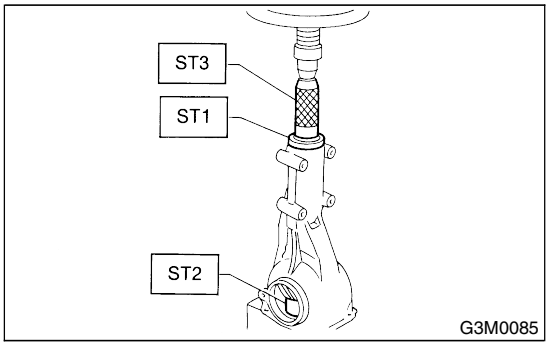


5) Insert drive pinion into differential carrier, install the previously selected bearing preload adjusting spacer and washer.

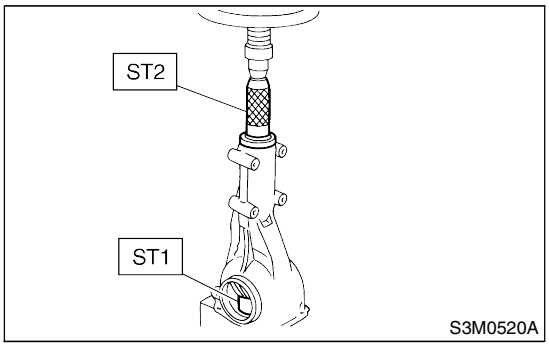


(A) Drive pinion
(B) Bearing preload adjusting spacer
(C) Bearing preload adjusting washer
(D) Differential carrier

6) Press-fit front bearing cone into carrier with ST1, ST2 and ST3.
ST1 32285AA000 DUMMY COLLAR
ST2 399780104 WEIGHT
ST3 899580100 INSTALLER



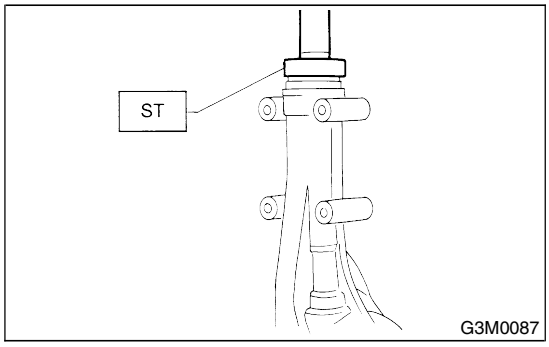
7) Insert spacer, then press-fit pilot bearing with ST1 and ST2.
ST1 399780104 WEIGHT
ST2 899580100 INSTALLER



8) Fit a new oil seal with ST.

NOTE:
● Press-fit until end of oil seal is 1 mm (0.04 in) inward from end of carrier.
● Apply grease between the oil seal lips.

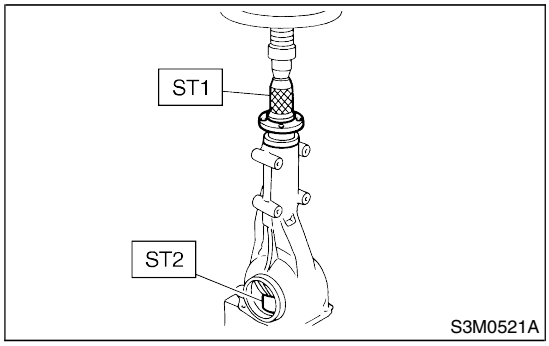
ST 498447120 OIL SEAL INSTALLER



9) Press-fit companion flange with ST1 and ST2.

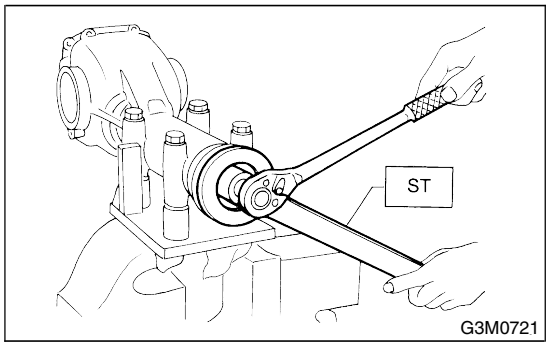
CAUTION:
Be careful not to damage bearing.

ST1 899874100 INSTALLER
ST2 399780104 WEIGHT



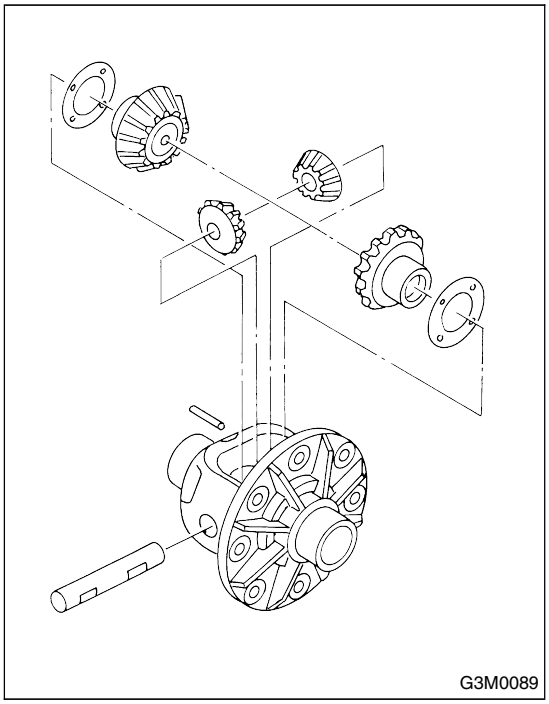
10) Install self-locking nut. Then tighten it with ST.
ST 398427200 FLANGE WRENCH

Tightening torque:
188 N·m (19.2 kgf-m, 139 ft-lb)



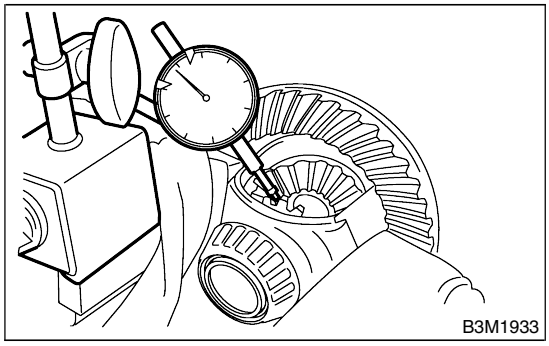
11) Assembling differential case
Install side gears and pinion mate gears, with their thrust washers and pinion mate shaft, into differential case.

NOTE:
● Apply gear oil on both sides of the washer and on the side gear shaft before installing.
● Insert the pinion mate shaft into the differential case by aligning the lock pin holes.



(1) Measure the side gear backlash.

Side gear back clearance:
0.05 — 0.15 mm (0.0020 — 0.0059 in)



(2) Adjust the side gear backlash as specified by selecting side gear thrust washer.

Side gear thrust washer	
Part No.	Thickness mm (in)
803135011	0.925 — 0.950 (0.0364 — 0.0374)
803135012	0.950 — 0.975 (0.0374 — 0.0384)
803135013	0.975 — 1.000 (0.0384 — 0.0394)
803135014	1.000 — 1.025 (0.0394 — 0.0404)
803135015	1.025 — 1.050 (0.0404 — 0.0413)

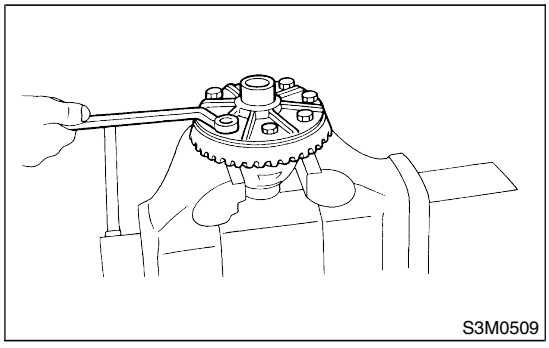
(3) Check the condition of rotation after applying oil to the gear tooth surfaces and thrust surfaces.
(4) After driving in pinion shaft lock pin, stake the both sides of the hole to prevent pin from falling off.
(5) Install crown gear on differential case.

CAUTION:
Before installing bolts, apply Lock Tite to bolt threads.

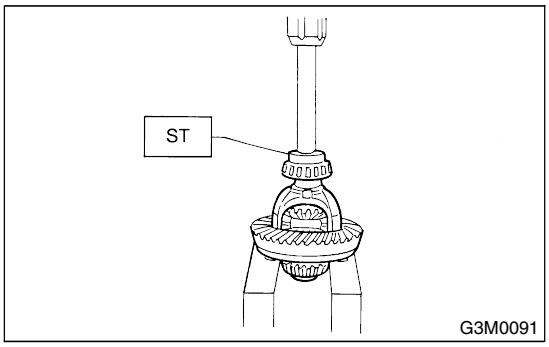
Lock Tite
THREE BOND 1324 or equivalent

NOTE:
Tighten diagonally while tapping the bolt heads.

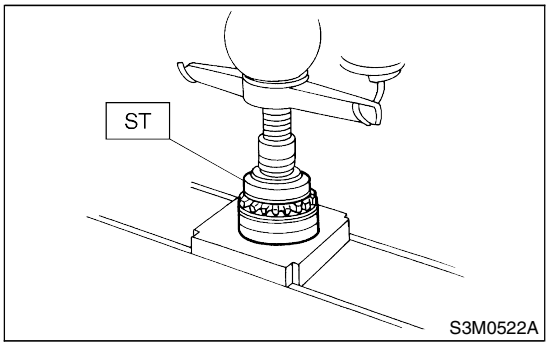
Tightening torque:
62 N·m (6.3 kgf-m, 45.6 ft-lb)



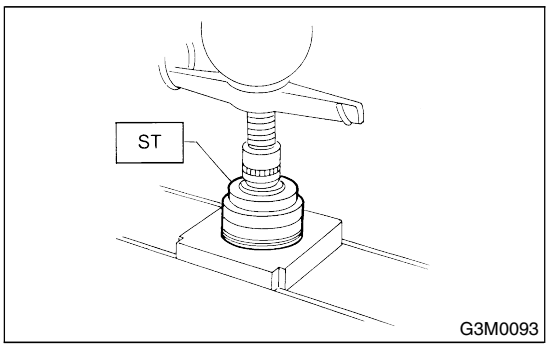
12) Press side bearing cone onto differential case with ST.
ST 498485400 DRIFT



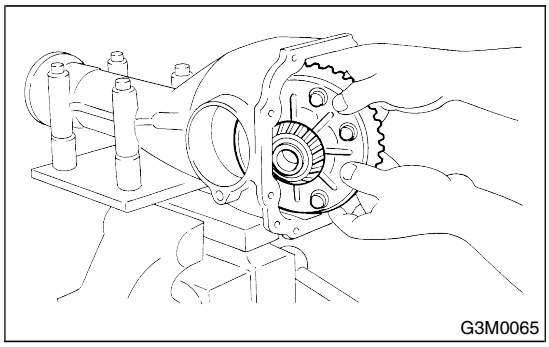
13) Assemble holders.
(1) Install oil seal into right and left holders.
ST 498447100 INSTALLER



(2) Install bearing race into right and left holders.
ST 398477702 DRIFT



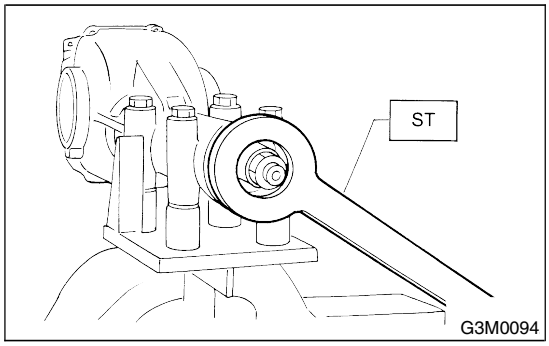
(3) Install the differential case assembly into differential carrier in the reverse order of disassembly.


G3M0065

14) Perform adjustment of backlash of pinion crown gear set and adjustment of preload of differential side bearing.

(1) Turn drive pinion with ST for better fitting of differential side bearing.

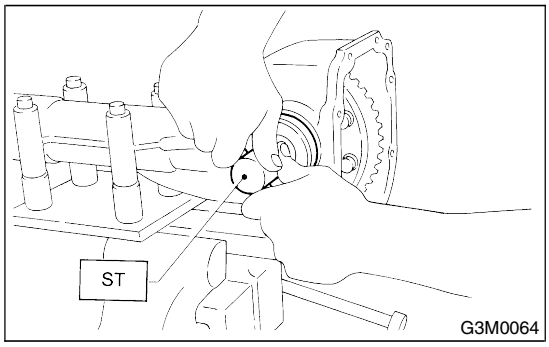
ST 498427200 FLANGE WRENCH



G3M0094

(2) Screw in side (left-side) holder until light contact is made with ST.

ST 399780111 WRENCH



G3M0064

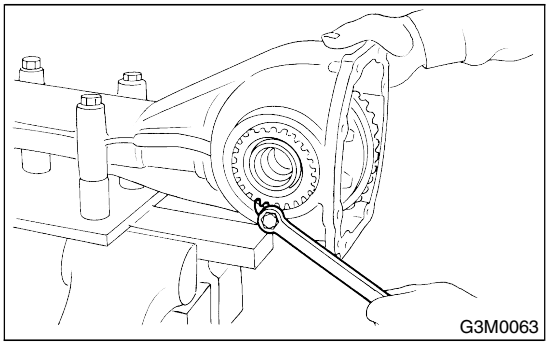
(3) Back off side (left-side) holder approximately 1 1/2 teeth of holder, and tighten left-side holder by approximately 2 teeth (approximately 1 1/2 + 1/2 teeth).

[Back off amount of side (left-side) holder + 1/2 tooth.]

This + 1/2 tooth gives preload.

(4) Temporarily tighten lock plate.

NOTE:
Turn over lock plate to displace holder 1/2 tooth.

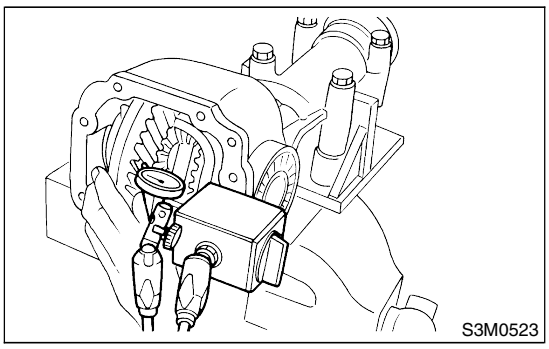

G3M0063

(5) Measure the crown gear-to-drive pinion backlash. Set magnet base on differential carrier. Align contact point of dial gauge with tooth face of crown gear, and move crown gear while holding drive pinion still. Read value indicated on dial gauge.

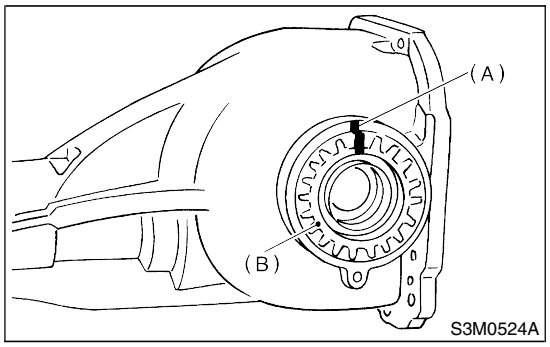
NOTE:
If measured backlash is not within specified range, repeat procedures for pinion crown gear set backlash adjustment and differential side bearing preload adjustment.

Backlash:

0.10 — 0.15 mm (0.0039 — 0.0059 in)


S3M0523

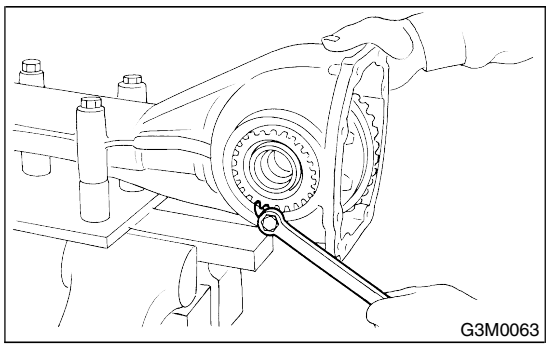
15) Draw a matching mark on both differential carrier and holder. Remove holder one side at a time. Replace in the original position after inserting an O-ring and applying grease to threaded portion.



(A) Matching mark
(B) Holder

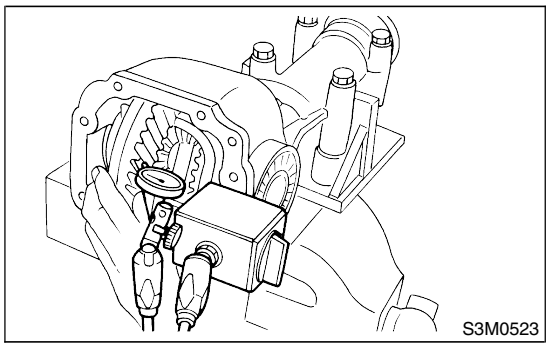
16) Tighten bolt of lock plate to specified torque.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



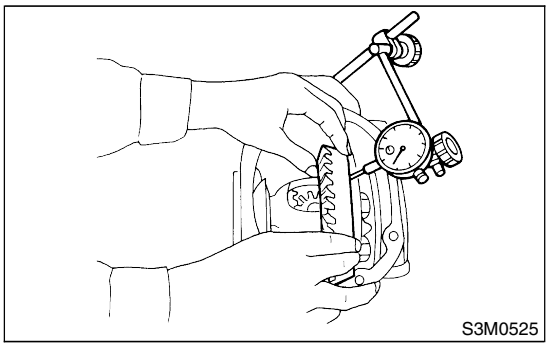
17) Re-check crown gear-to-pinion backlash.

Backlash:
0.10 — 0.15 mm (0.0039 — 0.0059 in)



18) Check the crown gear runout on its back surface, and make sure pinion and crown gear rotate smoothly.

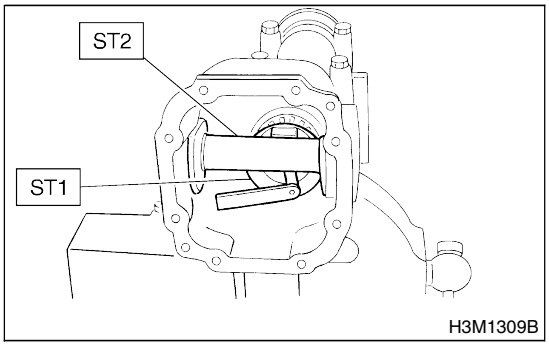
Limit of runout:
0.05 mm (0.0020 in)



19) Checking and adjusting tooth contact of crown gear.
(1) Apply an even coat of red lead on both sides of three or four teeth on the crown gear. Check the contact pattern after rotating crown gear several revolutions back and forth until a definite contact pattern appears on the crown gear.
(2) When the contact pattern is incorrect, readjust according to the instructions given in “TOOTH CONTACT PATTERN”.

NOTE:
Be sure to wipe off red lead completely after adjustment is completed.

20) If proper tooth contact is not obtained, once again adjust the drive pinion height and the differential side bearing preload (already mentioned) and the hypoid gear backlash.
(1) Drive pinion height
ST1 498447150 DUMMY SHAFT
ST2 498505501 DIFFERENTIAL GAUGE



T = To + N − 0.05 (mm)
where
T = Thickness of pinion height adjusting shim (mm)
To = Thickness of shim originally installed (mm)

N = Reading of thickness gauge (mm)

(2) Differential side bearing preload

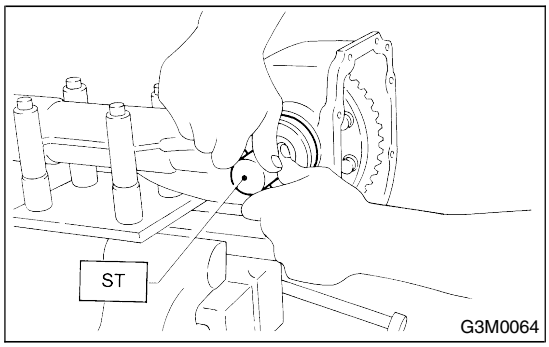
Screw in side (left-side) holder until light contact is made with ST.

Back off side (left-side) holder approximately 1 1/2 teeth of holder, and tighten left-side holder by approximately 2 teeth (approximately 1 1/2 + 1/2 teeth).

[Back off amount of side (left-side) holder + 1/2 tooth.]

This + 1/2 tooth gives preload.

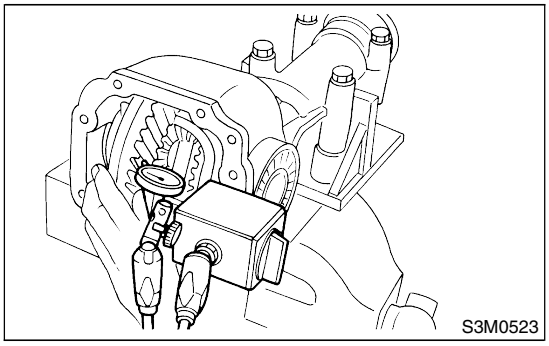
ST 399780111 WRENCH

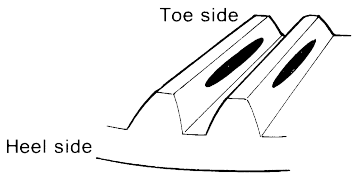
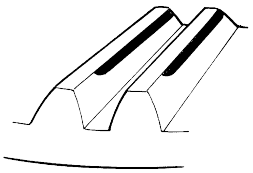
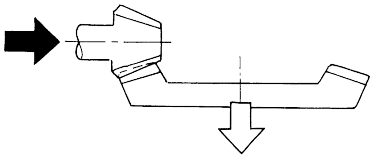
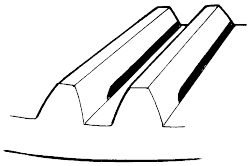
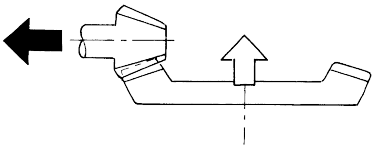
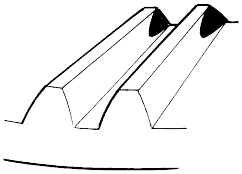
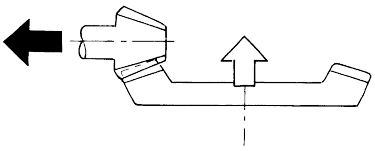
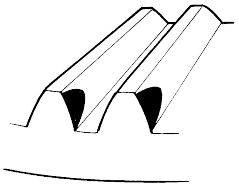
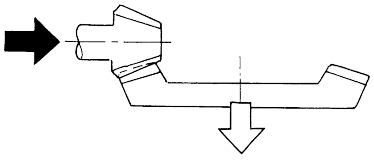


(3) Hypoid gear backlash

Backlash:

0.10 — 0.15 mm (0.0039 — 0.0059 in)

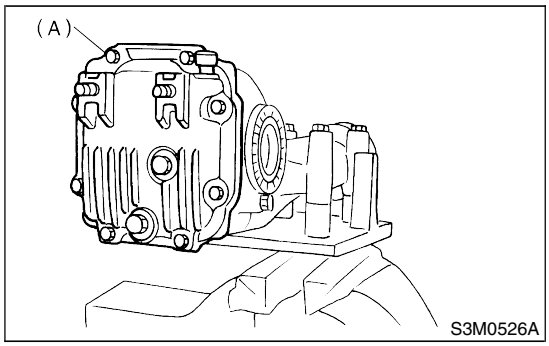


TOOTH CONTACT PATTERN		
Condition	Contact pattern	Adjustment
Correct tooth contact Tooth contact pattern slightly shifted towards toe under no load rotation. (When loaded, contact pattern moves toward heel.)	 G3M0098A	—
Face contact Backlash is too large.	This may cause noise and chipping at tooth ends.  G3M0098B	Increase thickness of drive pinion height adjusting washer in order to bring drive pinion closer to crown gear center.  G3M0098F
Flank contact Backlash is too small.	This may cause noise and stepped wear on surfaces.  G3M0098C	Reduce thickness of drive pinion height adjusting washer in order to move drive pinion away from crown gear.  G3M0098G
Toe contact	Contact area is small. This may cause chipping at toe ends.  G3M0098D	Adjust as for flank contact.  G3M0098G
Heel contact	Contact area is small. This may cause chipping at heel ends.  G3M0098E	Adjust as for face contact.  G3M0098F

➡ : Adjusting direction of drive pinion
⇨ : Adjusting direction of crown gear

21) Install rear cover and tighten bolts to specified torque.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Rear cover

E: INSPECTION S303151A10

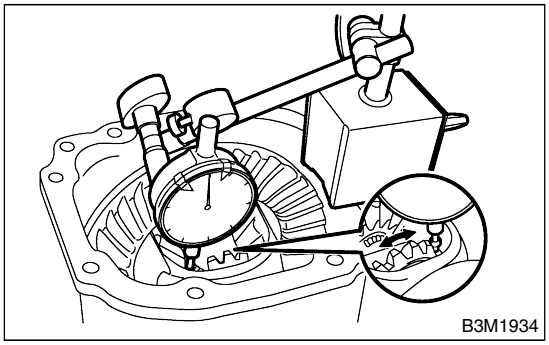
Wash all the disassembled parts clean, and examine them for wear, damage, or other defects. Repair or replace defective parts as necessary.
1) Crown gear and drive pinion
● If abnormal tooth contact is evident, find out the cause and adjust to give correct tooth contact at assembly. Replace the gear 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.

1. SIDE GEAR BACKLASH S303151A1001

Using a dial gauge, check the backlash of the side gear.

Side gear backlash:
0.05 — 0.15 mm (0.0020 — 0.0059 in)

If side gear backlash is not within the specification, adjust clearance as specified by selecting side gear trust washer.

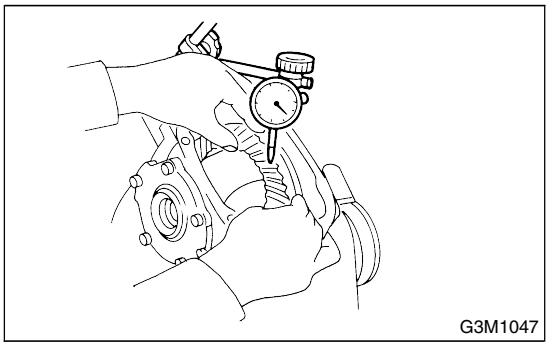


2. CROWN GEAR BACKLASH S303151A1002

Using a dial gauge, check the backlash of the crown gear.

Crown gear backlash:
0.10 — 0.15 mm (0.0039 — 0.0059 in)

If crown gear backlash is not within the specification, adjust the side bearing preload or repair if necessary.

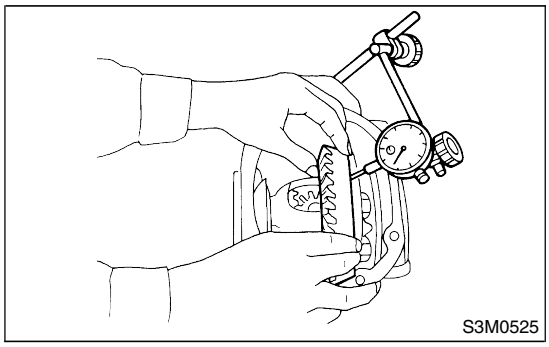


3. CROWN GEAR RUNOUT S303151A1003

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 S303151A1004

Inspect tooth contact between crown gear and drive pinion.
<Ref. to DI-47 ASSEMBLY Rear Differential for VA-type.>

F: ADJUSTMENT S303151A01

1. SIDE GEAR BACKLASH A303151A0101

Adjust side gear backlash.
<Ref. to DI-47 ASSEMBLY Rear Differential for VA-type.>

2. CROWN GEAR BACKLASH A303151A0102

Adjust crown gear backlash.
<Ref. to DI-47 ASSEMBLY Rear Differential for VA-type.>

3. TOOTH CONTACT BETWEEN CROWN GEAR AND DRIVE PINION A303151A0103

Adjust the tooth contact between crown gear and drive pinion gear.
<Ref. to DI-47 ASSEMBLY Rear Differential for VA-type.>

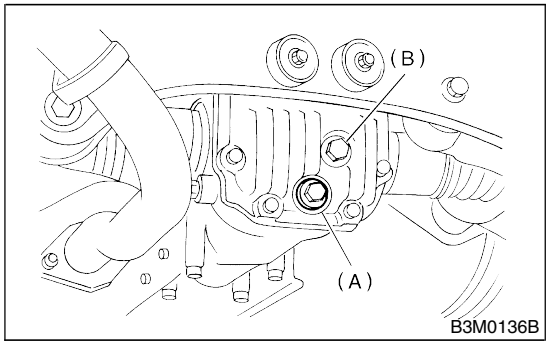
6. Rear Differential Front Oil Seal S303139

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 ground cable from battery.
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.



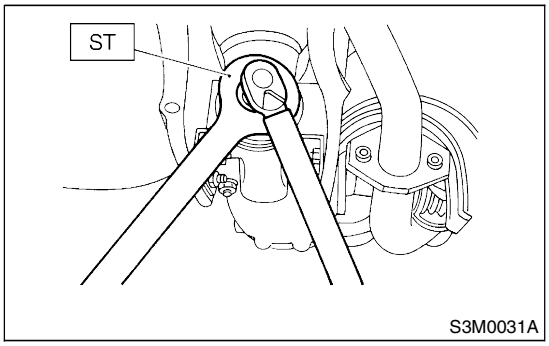
(A) Drain plug
(B) Filler plug

7) Install oil drain plug.

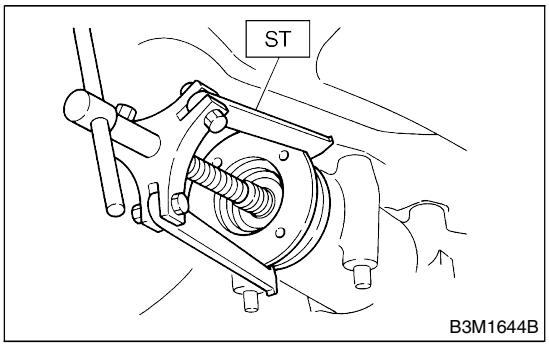
CAUTION:
- **Apply fluid packing to drain plug in T-type.**
- **VA-type uses a new aluminum gasket.**

Tightening torque:
T-type;
49 N·m (5.0 kgf-m, 36.2 ft-lb)
VA-type;
34 N·m (3.5 kgf-m, 25.3 ft-lb)

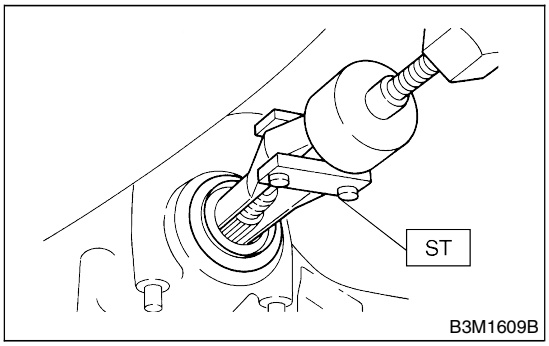
8) Remove rear exhaust pipe and muffler.
9) Remove propeller shaft from body. <Ref. to DS-17 REMOVAL, Propeller Shaft.>
10) Remove self-locking nut while holding companion flange with ST.
ST 498427200 FLANGE WRENCH



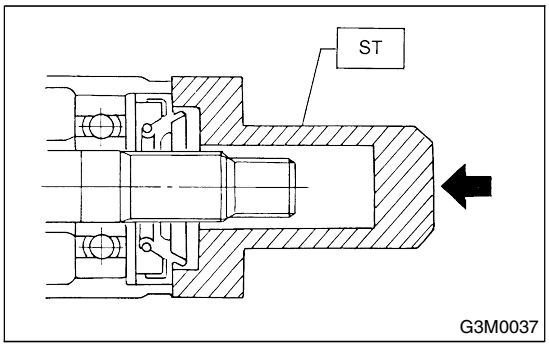
11) Extract companion flange using ST.
ST 399703600 PULLEY ASSY



12) Remove oil seal using ST.
ST 499705401 PULLER ASSY



13) Fit a new oil seal using ST.
ST 498447120 OIL SEAL INSTALLER



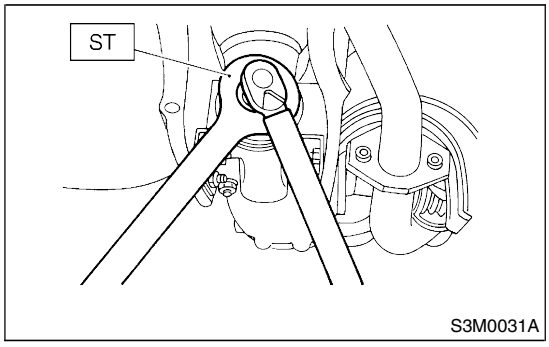
14) Install companion flange.

NOTE:
Use a plastic hammer to install companion flange.

15) 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)



16) Install in the reverse order of removal.
17) Fill differential carrier with gear oil. <Ref. to DI-22 Differential Gear Oil.>

7. Rear Differential Side Oil Seal S303137

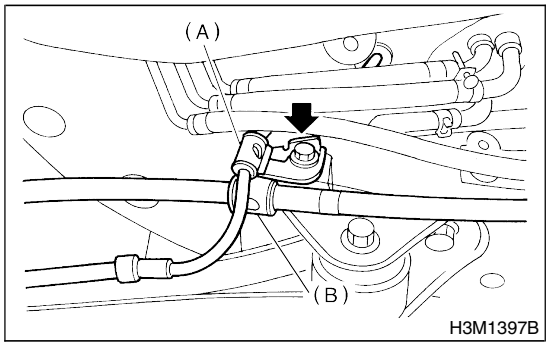
A: INSPECTION S303137A10

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

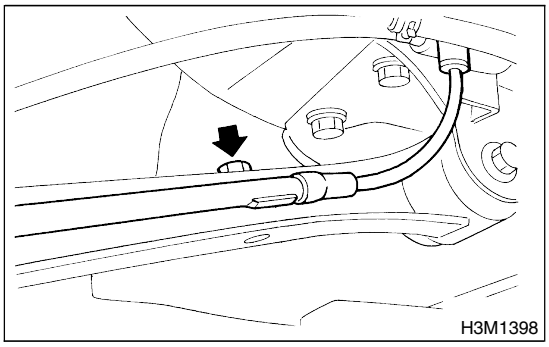
1. VA-TYPE S303137A2002

1) Set vehicle on a lift.
2) Disconnect ground terminal from battery.
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.
With OBD:
<Ref. to EX(SOHC)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11, REMOVAL, Muffler.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-12, 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.

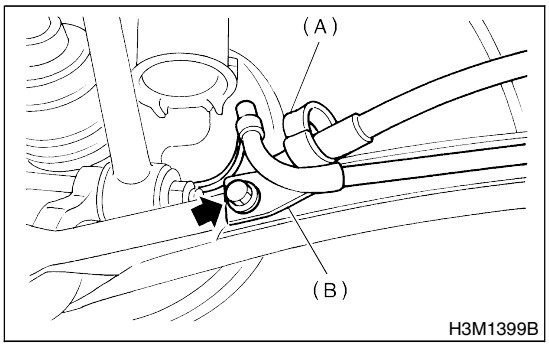


(A) ABS sensor cable clamp
(B) Parking brake cable guide

(2) Remove the ABS sensor cable clamp from the trailing link.

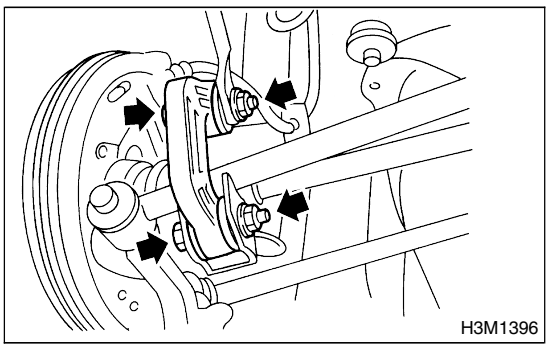


(3) Remove the ABS sensor cable clamp and parking brake cable guide from the trailing link.

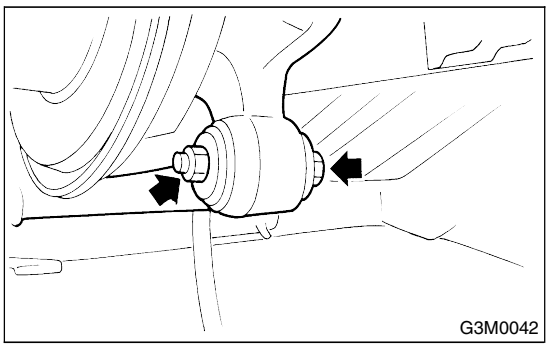


(A) Parking brake cable guide
(B) ABS sensor cable clamp

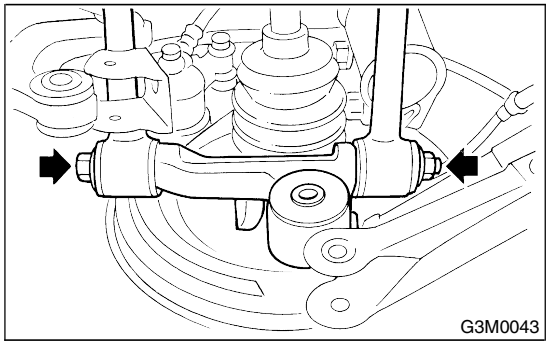
(4) Remove the rear stabilizer link.



(5) Remove the bolts which secure the trailing link to the rear housing.



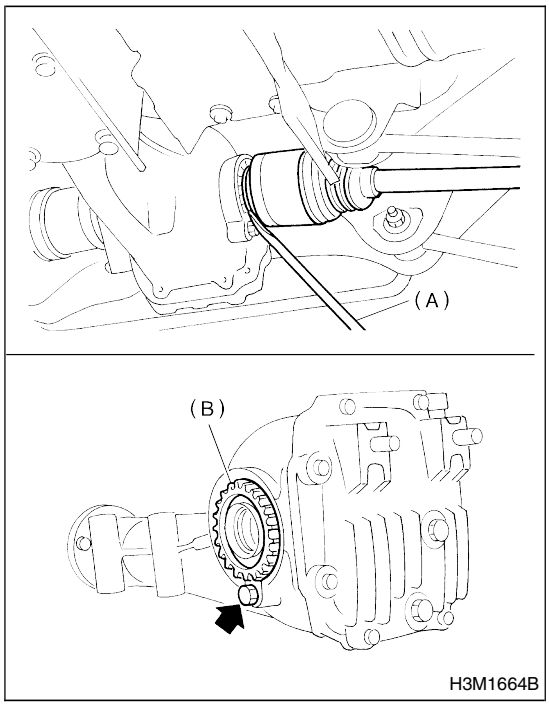
(6) Remove the bolts which secure the front and rear lateral link to the rear housing.


G3M0043

(7) Remove the DOJ from the rear differential with tire lever.

CAUTION:
When removing the DOJ from the rear differential, fit tire lever to the bolt as shown in figure so as not to damage the axle shaft holder.

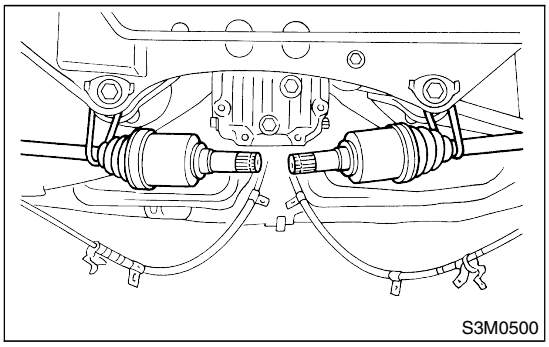
NOTE:
The side spline shaft circlip comes out together with the shaft.



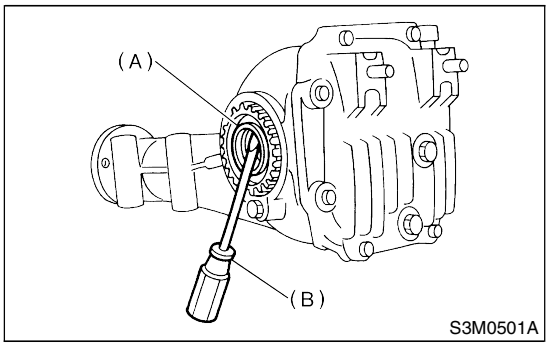
H3M1664B

(A) Tire lever
(B) Axle shaft holder

10) Secure rear drive shaft to rear crossmember using wire.


S3M0500

11) Remove oil seal with screwdriver.

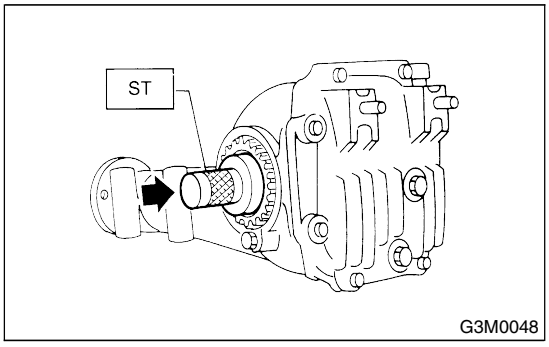


S3M0501A

(A) Side oil seal
(B) Screwdriver

12) Drive in a new side oil seal with ST.

CAUTION:
Apply chassis grease between the oil seal lips.
ST 498447100 OIL SEAL INSTALLER



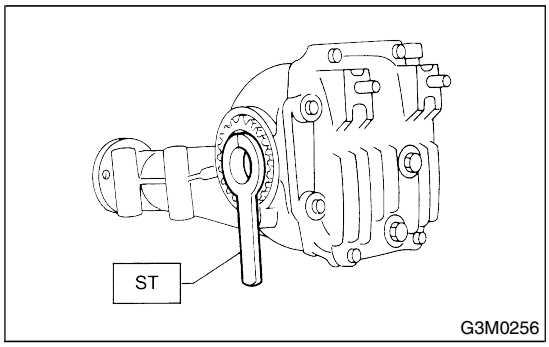
G3M0048

13) Insert the DOJ into rear differential.

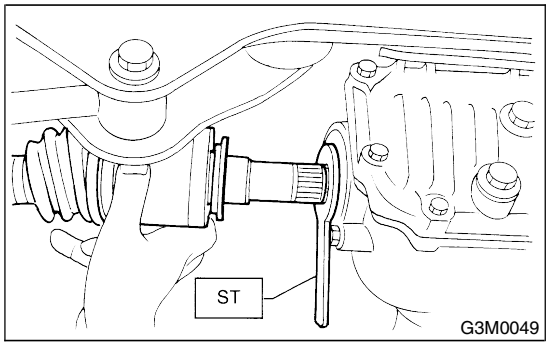
CAUTION:
Before inserting, replace the circlip at the end of the spline shaft with a new one.

(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.

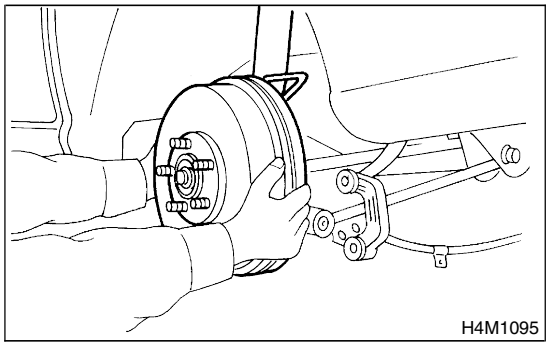


(3) Remove ST.

ST 28099PA090 SIDE OIL SEAL PROTECTOR

(4) Completely insert DOJ into rear differential by pressing rear housing.

NOTE:
Make sure that oil seal lip is not folded over inward.



14) Install in the reverse order of removal.

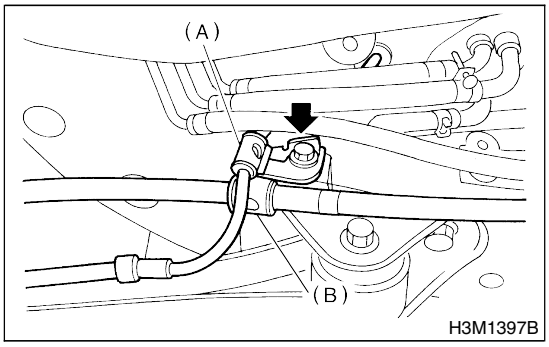
2. T-TYPE *S303137A2001*

1) Set vehicle on a lift.
2) Disconnect ground terminal from battery.
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.

Non-turbo model with OBD:
<Ref. to EX(SOHC)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11, REMOVAL, Muffler.>
Non-turbo model without OBD:
<Ref. to EX(SOHCw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-12, REMOVAL, Muffler.>
Turbo model:
<Ref. to EX(DOHC TURBO)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, REMOVAL, Muffler.>

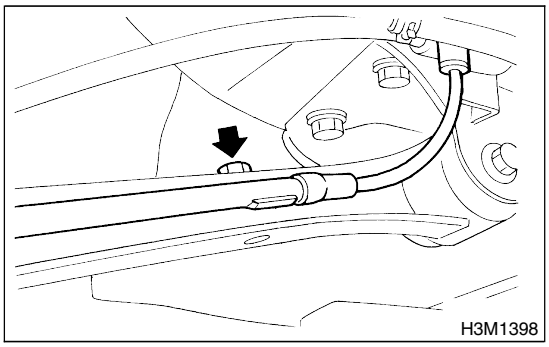
9) Remove the DOJ of rear drive shaft from rear differential.

(1) Remove the ABS sensor cable clamp and parking brake cable guide from bracket.

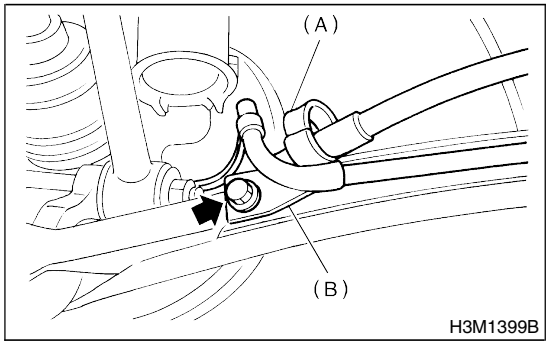


(A) ABS sensor cable clamp
(B) Parking brake cable guide

(2) Remove the ABS sensor cable clamp from the trailing link.

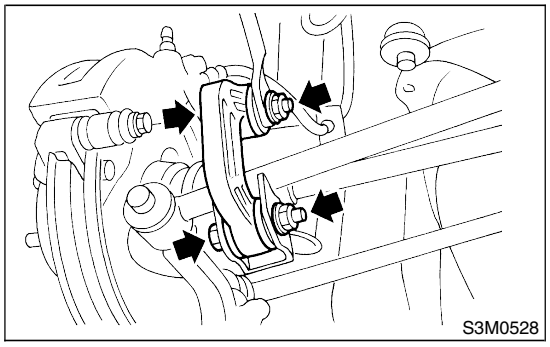


(3) Remove the ABS sensor cable clamp and parking brake cable guide from the trailing link.

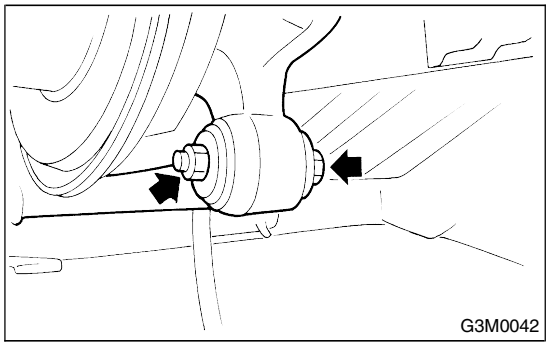


(A) ABS sensor cable clamp
(B) Parking brake cable guide

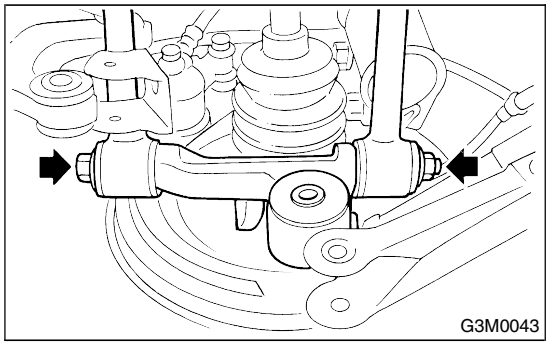
(4) Remove the rear stabilizer link.



(5) Remove the bolts which secure the trailing link to the rear housing.



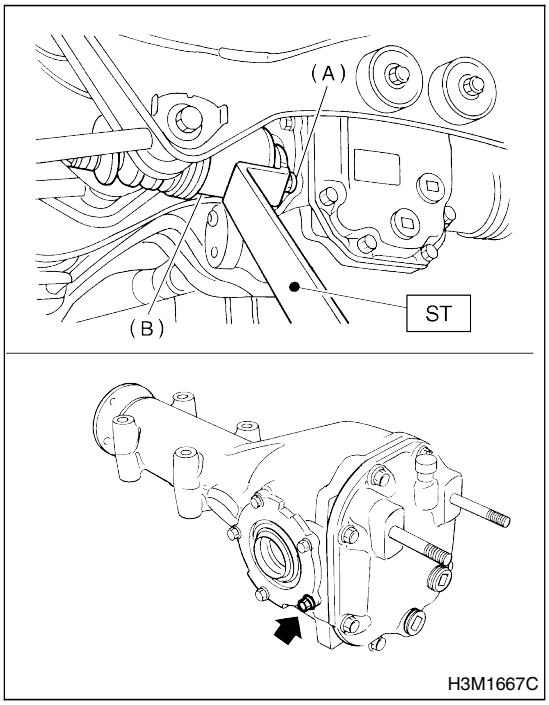
(6) Remove the bolts which secure the front and rear lateral link to the rear housing.



(7) Remove the DOJ from the rear differential by using ST.

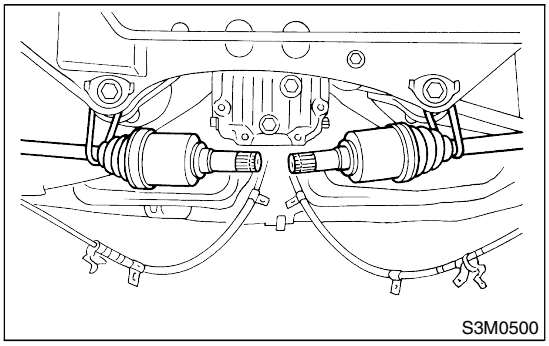
CAUTION:
When removing the DOJ from the rear differential, fit ST to the bolt as shown in figure so as not to damage the side bearing retainer.

ST 208099PA100 DRIVE SHAFT REMOVER

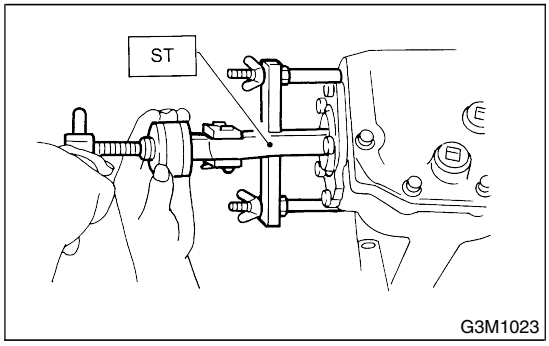


(A) Bolt
(B) DOJ

10) Secure rear drive shaft to rear crossmember using wire.

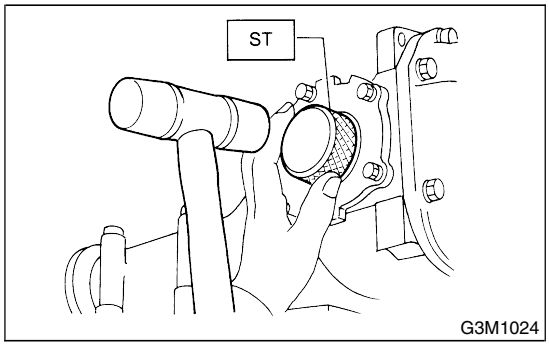


11) Remove side oil seal with ST.
ST 398527700 PULLER ASSY

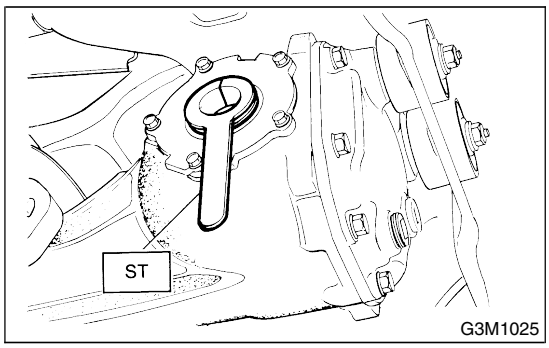


12) Drive in a new side oil seal with ST.

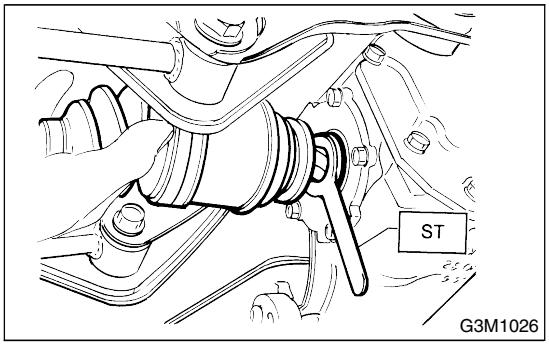
CAUTION:
Apply chassis grease between the oil seal lips.
ST 398437700 DRIFT



13) Insert the DOJ into rear differential.
(1) Install ST to rear differential.
ST 28099PA090 SIDE OIL SEAL PROTECTOR

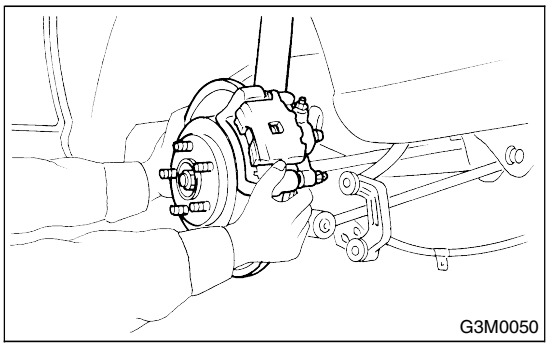


(2) Insert the spline shaft until the spline portion is inside the side oil seal.
(3) Remove ST.
ST 28099PA090 SIDE OIL SEAL PROTECTOR



(4) Completely insert DOJ into rear differential by pressing rear housing.

NOTE:
Make sure that oil seal lip is not folded over inward.



14) Install in the reverse order of removal.

8. Rear Differential Member S303135

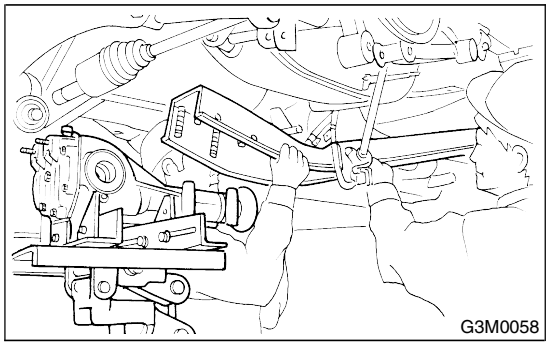
A: REMOVAL S303135A18

1) Set vehicle on a lift.
2) Disconnect ground terminal from battery.
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.
Non-turbo model with OBD:
<Ref. to EX(SOHC)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11 REMOVAL, Muffler.>
Non-turbo model without OBD:
<Ref. to EX(SOHCw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-12, REMOVAL, Muffler.>
Turbo model:
<Ref. to EX(DOHC TURBO)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, REMOVAL, Muffler.>
9) Remove rear differential front member.
VA-type:
<Ref. to DI-42, REMOVAL, Rear Differential for VA-type.>
T-type:
<Ref. to DI-25, REMOVAL, Rear Differential for T-type.>

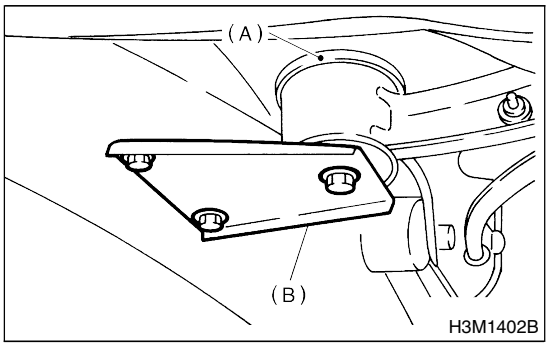
NOTE:
When removing rear differential front member, work the removal procedure as rear differential.

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.



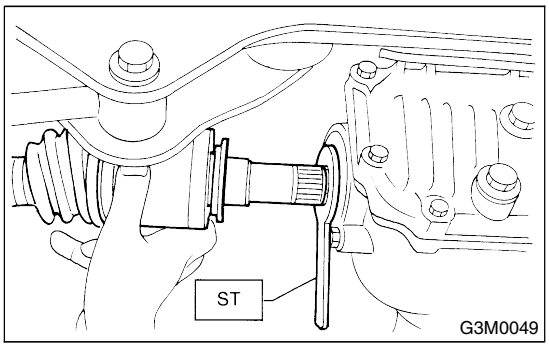
NOTE:
When installing rear differential front member, do not confuse the installation sequence of the stopper.



(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.



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.

9. 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.

MEMO:

TRANSFER CASE

TC

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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-46, 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-41, Oil Seal.>

5. Transfer Drive Gear (MT) S302146

A: NOTE S302146A15

For removal, installation and inspection work, refer to “MT” section. <Ref. to MT-52, 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-54, 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-56, Center Differential.>

10. Oil Pump S302070

A: NOTE S302070A15

For removal, installation and inspection work, refer to “MT”section. <Ref. to MT-50, Oil Pump.>

11. 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.>

12. Transfer Duty Solenoid and Valve Body S302161

A: NOTE S302161A15

For removal, installation and inspection work, refer to “AT” section. <Ref. to AT-41, TRANSFER DUTY SOLENOID AND TRANSFER VALVE BODY, REMOVAL, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>

MEMO:

DRIVE SHAFT SYSTEM

DS

Page

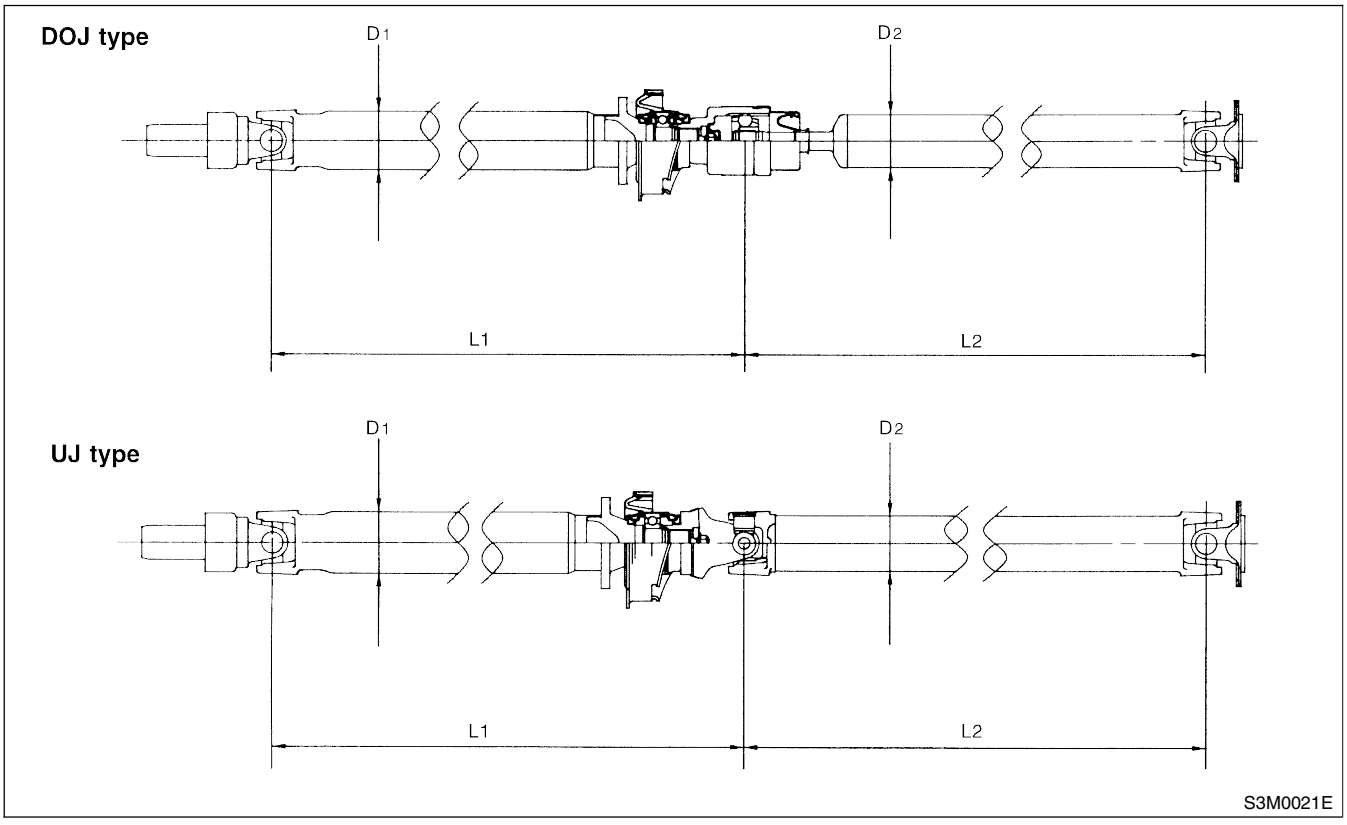
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2. Propeller Shaft....14
3. Front Axle....17
4. Rear Axle....23
5. Front Drive Shaft....32
6. Front Drive Shaft Boot....37
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8. Rear Drive Shaft Boot....44
9. General Diagnostic Table....46

1. General Description S301001

A: SPECIFICATIONS S301001E49

1. PROPELLER SHAFT S301001E4901

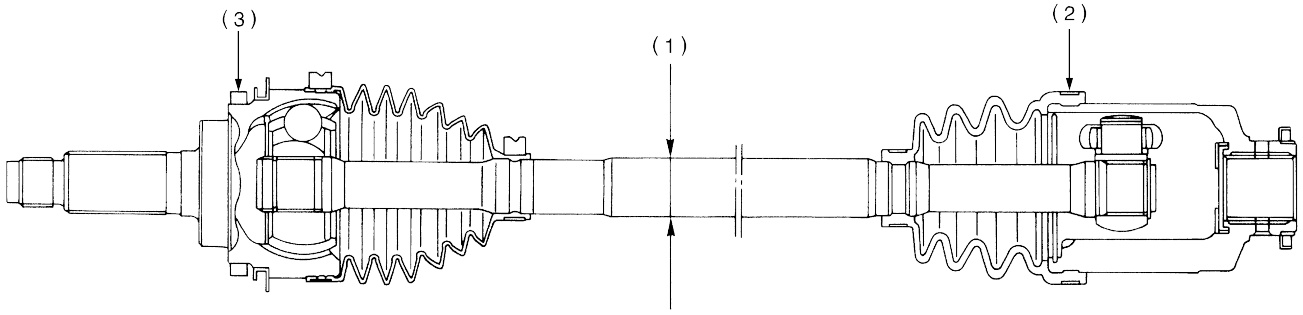
		Non-Turbo model	Turbo model
Propeller shaft type		UJ type	DOJ type
Front propeller shaft Joint-to-joint length: mm (in) L_1	AT	585 (23.03)	580 (22.83)
	MT	644 (25.35)	639 (25.16)
Rear propeller shaft Joint-to-joint length: mm (in) L_2		707 (27.83)	712 (28.03)
Outside dia. of tube mm (in)	D_1	63.5 (2.500)	
	D_2	57.0 (2.244)	



2. FRONT DRIVE SHAFT ASSEMBLY S301001E4902

Model	Tone wheel	Type of drive shaft assembly	SHAFT	Boot band identification color
			Shaft diameter	
Non-TURBO MT (With ABS)	○	BJ87L+SFJ82	28 mm (1.10 in)	Pink
Non-TURBO MT (With ABS)	—	BJ87L+SFJ82	28 mm (1.10 in)	Purple
Non-TURBO AT (With ABS)	○	BJ87L+SFJ82	26 mm (1.02 in)	—
TURBO				
Non-TURBO AT (Without ABS)	—	BJ87L+SFJ82	26 mm (1.02 in)	Brown

•BJ87+SFJ82

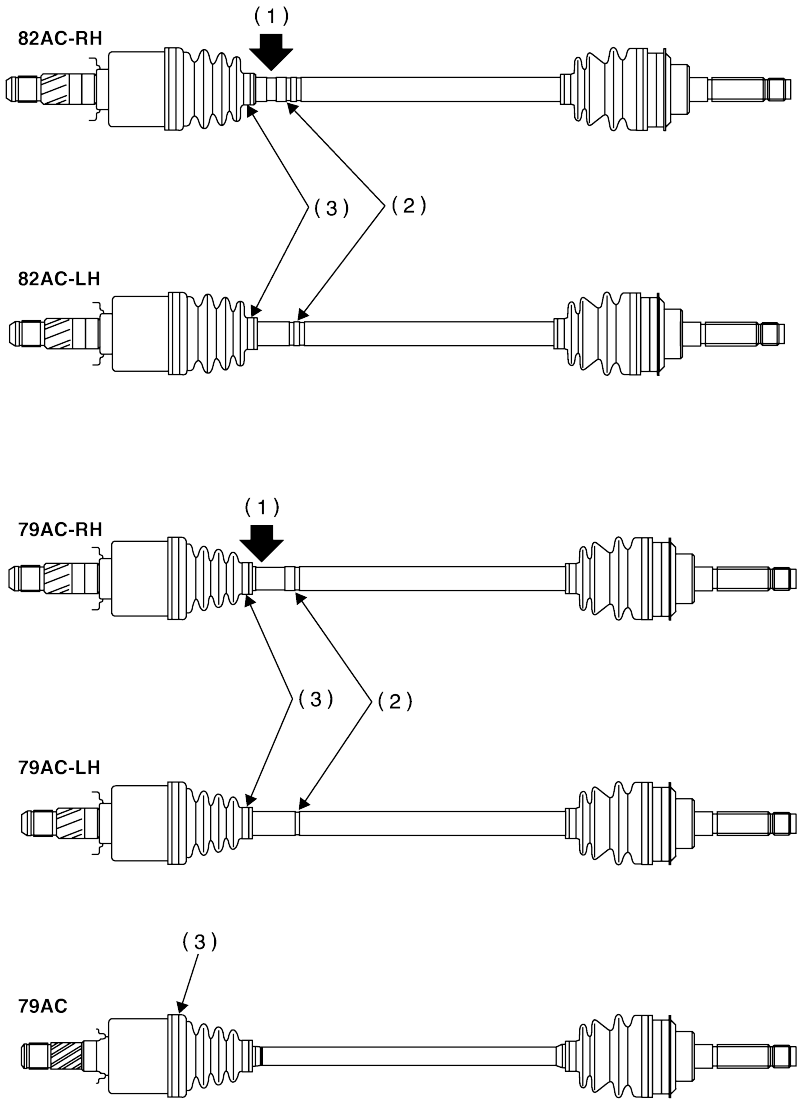


B4M2218C

(1) Measuring point
(2) Boot band identification color
(3) Tone wheel

3. REAR DRIVE SHAFT ASSEMBLY S301001E4903

Model	Type of axle shaft assembly	SHAFT	Boot band identification color
		No. of identification grooves on shaft	
TURBO	82AC-RH, 82AC-LH	2 (Two)	Auburn
NON-TURBO MT	79AC-RH, 79AC-LH	1 (One)	White
NON-TURBO AT	79AC	None	Orange

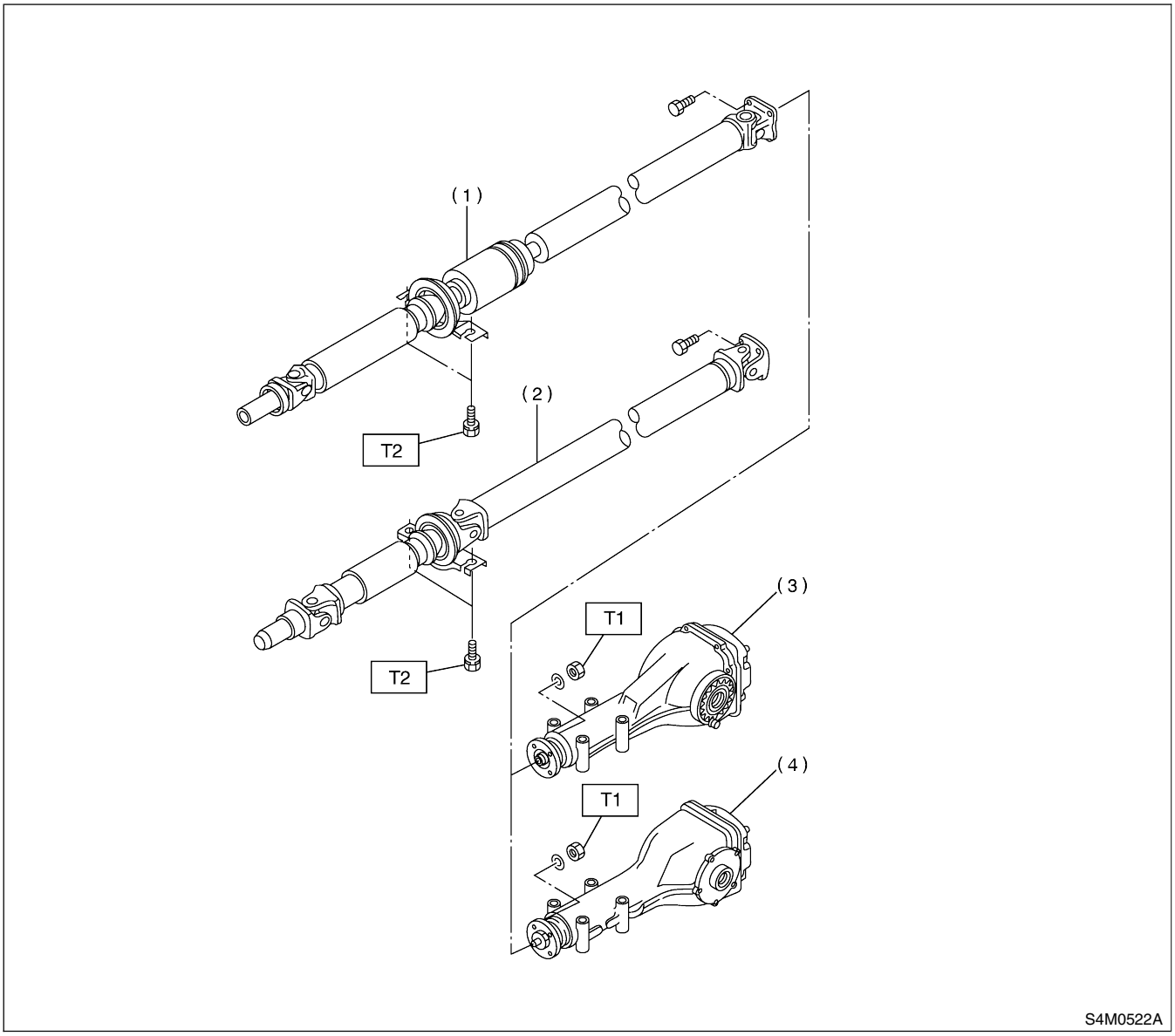


S4M0521A

(1) Indication mark of RH (2) Identification padding (3) Boot band Identification

B: COMPONENT S301001A05

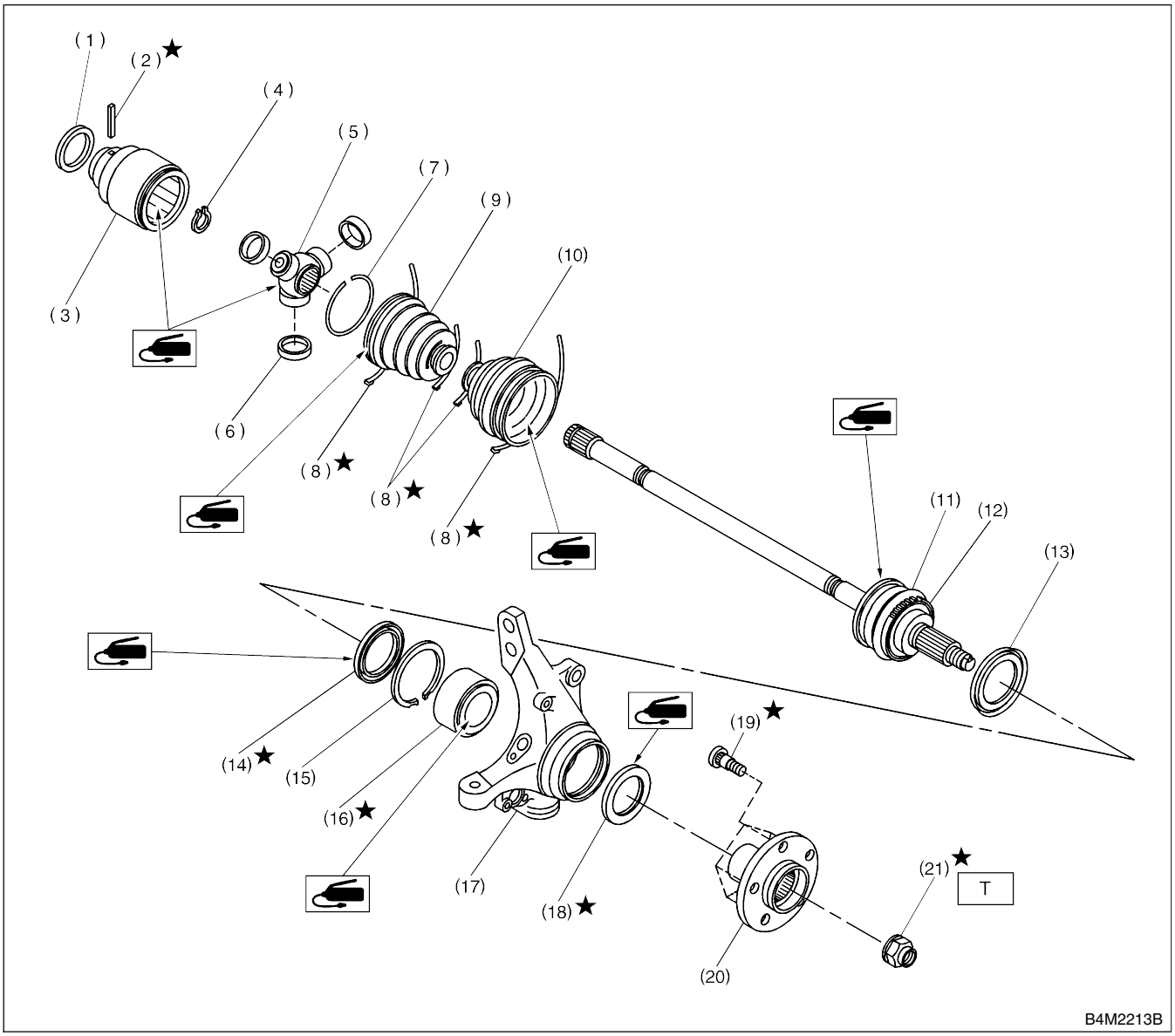
1. PROPELLER SHAFT S301001A0501



(1) Propeller shaft (Turbo model)
(2) Propeller shaft (Non-Turbo model)
(3) Rear differential (VA-type)
(4) Rear differential (T-type)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 31 (3.2, 23.1)
T2: 52 (5.3, 38.3)

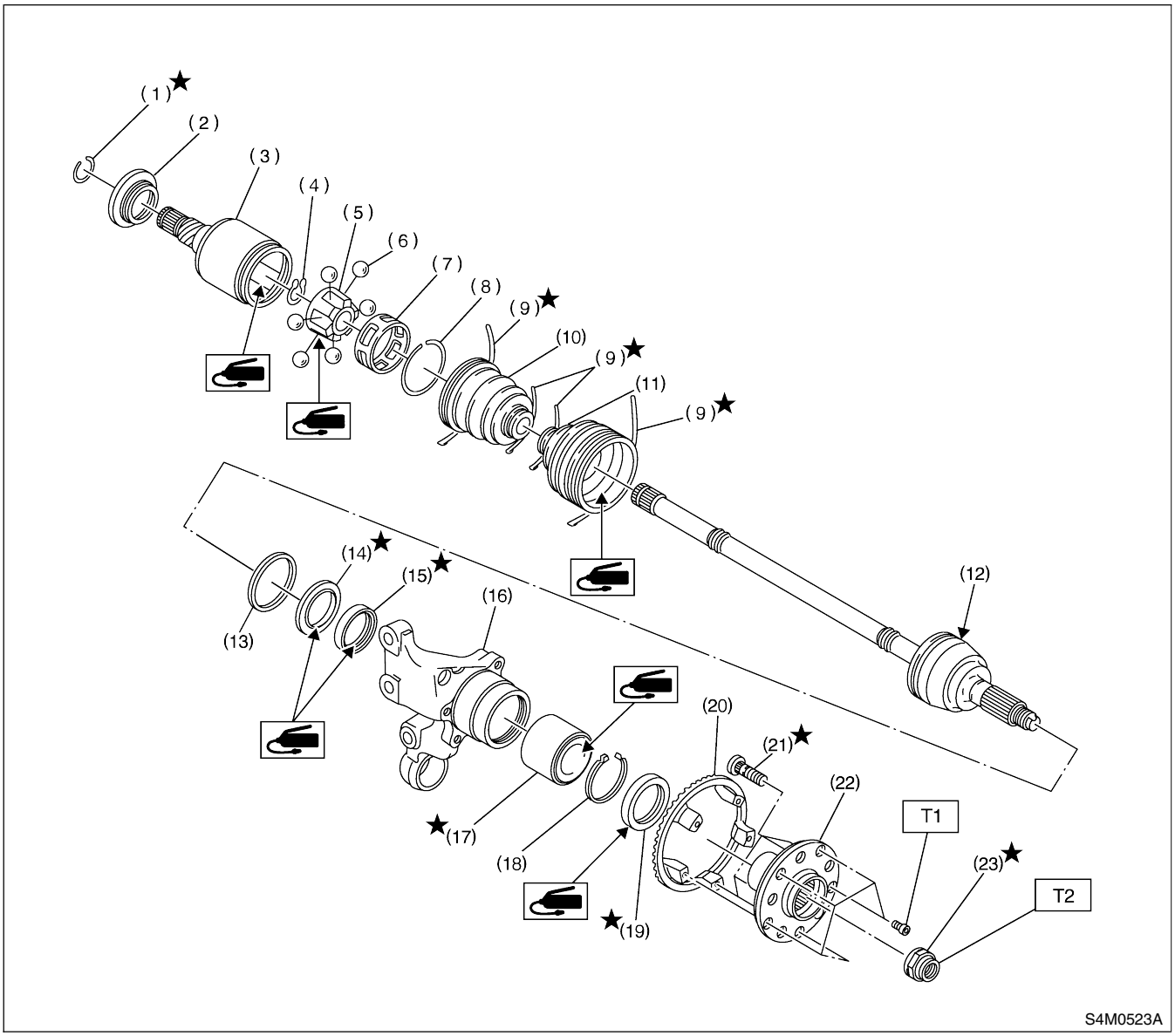
2. FRONT AXEL S301001A0502



(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) Circlip (Non-turbo AT vehicle)
(2) Baffle plate (DOJ)
(3) Outer race (DOJ)
(4) Snap ring
(5) Inner race
(6) Ball
(7) Cage
(8) Circlip
(9) Boot band
(10) Boot (DOJ)
(11) Boot (BJ or EBJ)
(12) BJ or EBJ ASSY
(13) Oil seal (IN. No. 2)
(14) Baffle palte
(15) Oil seal (IN)
(16) Housing
(17) Bearing
(18) Snap ring
(19) Oil seal (OUT)
(20) Tone wheel
(21) Hub bolt
(22) Hub
(23) 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

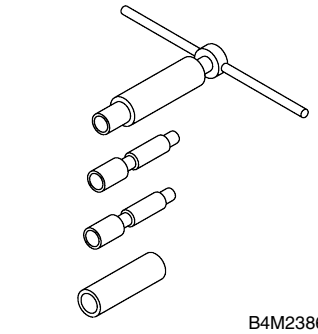
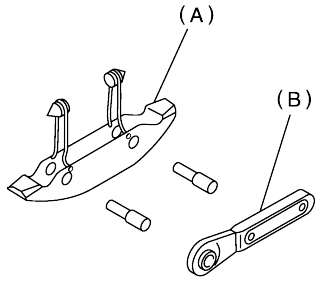
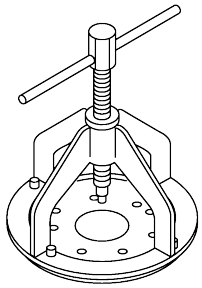
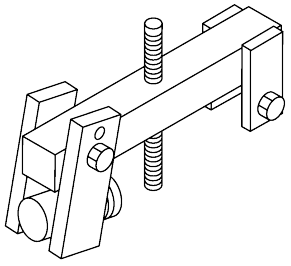
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2386	922431000	AXLE SHAFT INSTALLER	• Used for installing axle shaft into housing. • Used with ADAPTER (927390000).
 B4M2387A	925091000	BAND TIGHTENING TOOL	• Used for tightening boot band. Except front axle housing side) (A) Jig for band (B) Ratchet wrench
 B4M2388	926470000	AXLE SHAFT PULLER	Used for removing axle shaft.
 B4M2389	927060000	HUB REMOVER	• Used for removing front hub. • Used with HUB STAND (927080000).

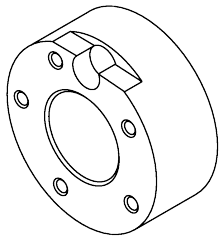
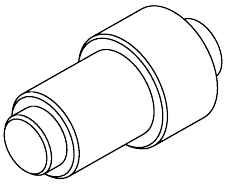
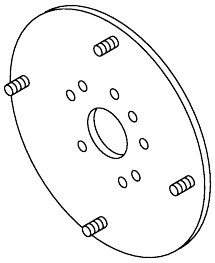
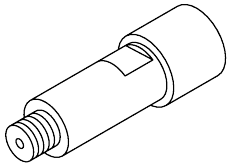
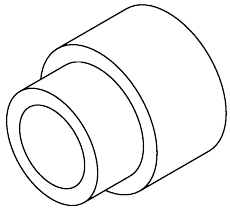
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2390	927080000	HUB STAND	Used for disassembling and assembling hub bolt in hub.
 B4M2391	927100000	BEARING REMOVER	• Used for disassembling and assembling front housing bearing. • Used with HOUSING STAND (927400000).
 B4M2392	927140000	PLATE	Same as plate 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).

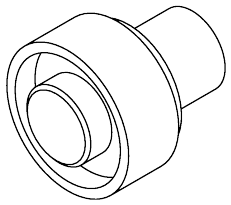
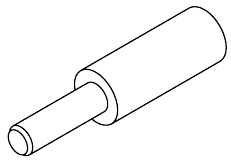
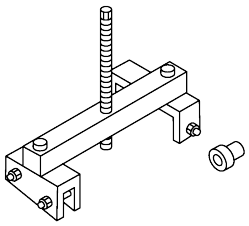
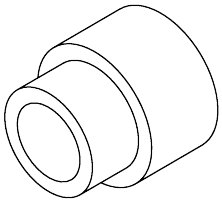
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2395	927410000	OIL SEAL INSTALLER	• Used for installing oil seal into front housing. • Used with HOUSING STAND (927400000).
 B4M2399	927120000	HUB INSTALLER	Used for installing hub.
 H5M0981	927420000	HUB REMOVER	• Used for removing rear hub. • Used with HUB STAND (927080000).
 H5M0982	927430000	HOUSING STAND	• Used for disassembling and assembling rear housing bearing. • Used with BEARING PULLER (927440000).

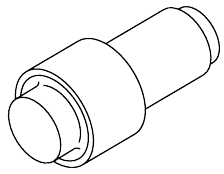
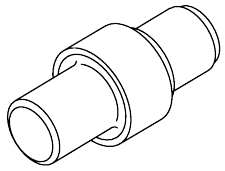
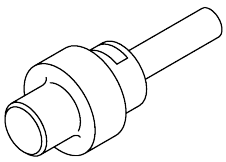
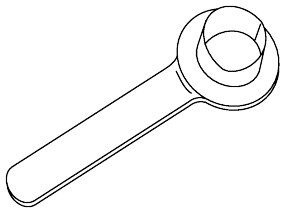
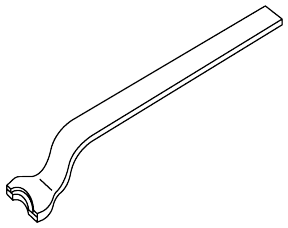
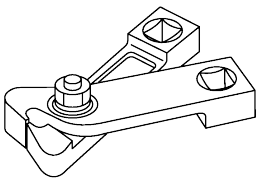
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 H5M0983	927440000	BEARING REMOVER	• Used for disassembling and assembling rear housing bearing. • Used with HOUSING STAND (927430000).
 H5M0984	927460000	OIL SEAL INSTALLER	• Used for installing outer bearing and sub bearing into housing. • Used with HOUSING STAND (927430000).
 B4M2400	927450000	HUB INSTALLER	• Used for installing rear hub into hub ASSY. • Used with HUB STAND (927080000).
 B4M2401	28099PA090	OIL SEAL PROTECTOR	• 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)

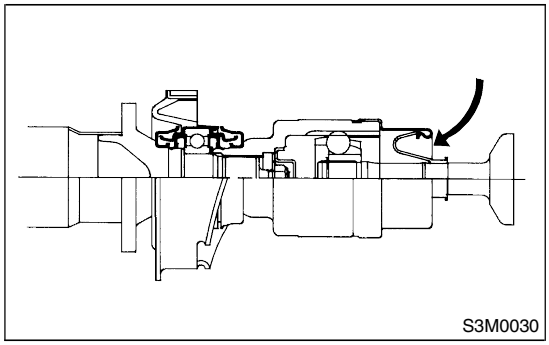
2. GENERAL PURPOSE TOOLS S301001A1702

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.

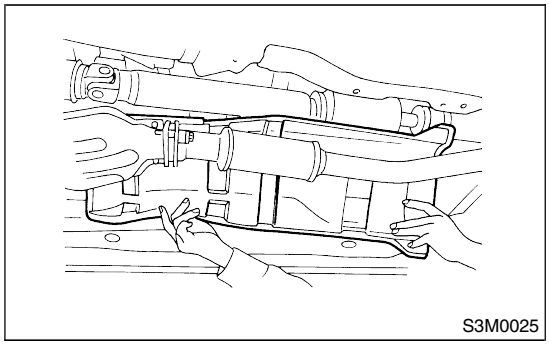
2. Propeller Shaft S301160

A: REMOVAL S301160A18

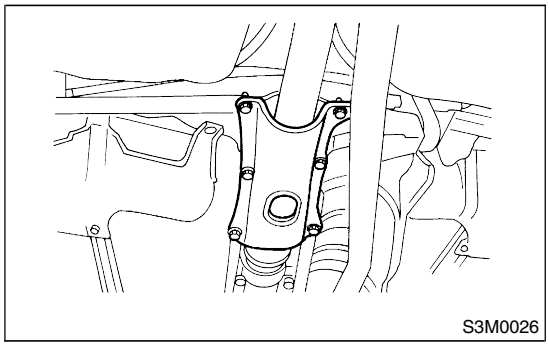
NOTE:
● Before removing propeller shaft, wrap metal parts with a cloth or rubber material.
● In case of DOJ type, before removing propeller shaft, wrap metal parts (installed at the rubber boot of center DOJ) with a cloth or rubber material, as shown in the figure. Rubber boot may be damaged due to interference with adjacent metal parts while bending the DOJ during removal.


S3M0030

1) Set vehicle on a lift.
2) Disconnect ground terminal from battery.
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. (Non-Turbo model)

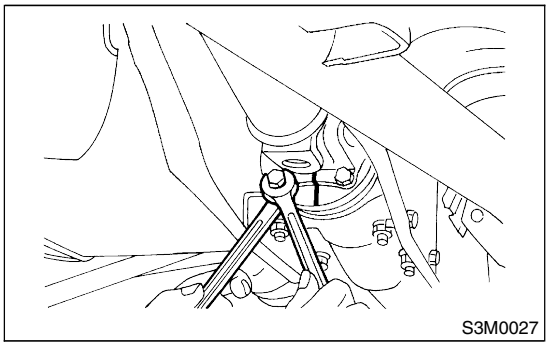

S3M0025

7) Remove differential mount front cover.

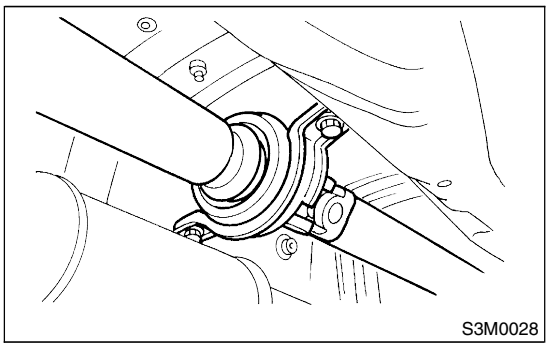

S3M0026

8) Remove the four bolts which hold propeller shaft to rear differential.

NOTE:
● Put matching mark on affected parts before removal.
● Remove all but one bolt.


S3M0027

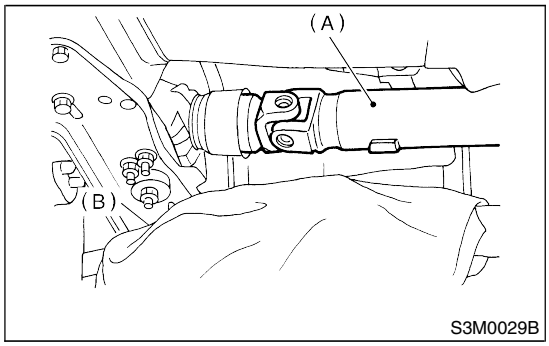
9) Remove the two bolts which hold center bearing to car body.


S3M0028

10) 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.

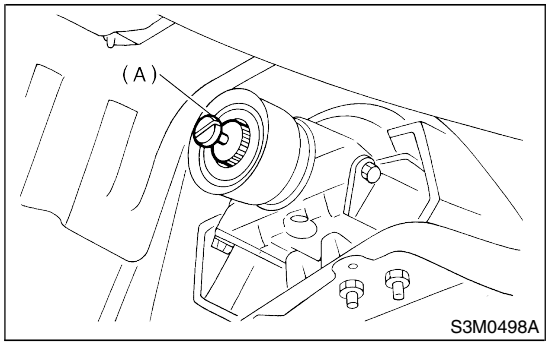
NOTE:
● Be sure to use an empty oil can to catch oil flowing out when removing propeller shaft.
● Be sure to plug the opening in transmission after removal of propeller shaft.



(A) Propeller shaft
(B) Cloth

11) Install the extension cap to transmission.

NOTE:
If extension cap is not available, place vinyl bag over opening and fasten with string to prevent gear oil or ATF from leaking.

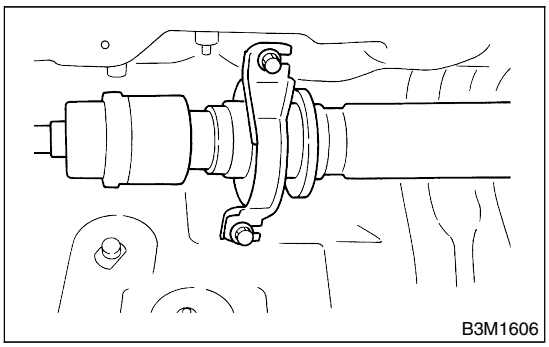


(A) Extension cap

B: INSTALLATION S301160A11

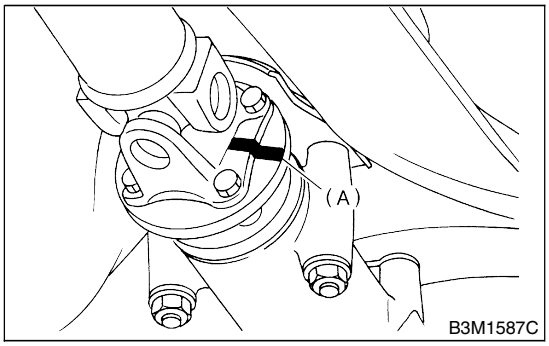
1) Insert sleeve yoke into transmission and attach center bearing to body.

Tightening torque:
52 N·m (5.3 kgf-m, 38.3 ft-lb)



2) Align matching marks and connect flange yoke and rear differential.

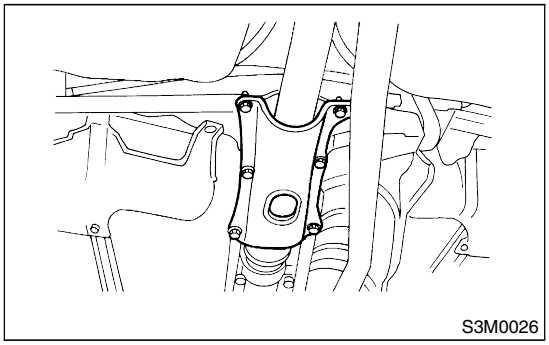
Tightening torque:
31 N·m (3.2 kgf-m, 23.1 ft-lb)



(A) Matching mark

3) Install front exhaust cover. (Non-turbo model)
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.

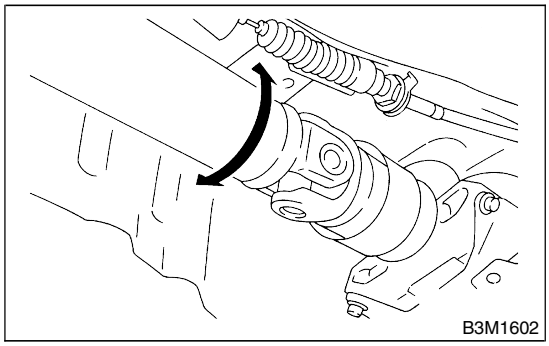
1. JOINTS AND CONNECTIONS S301160A1001

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. (Non-turbo model)
2) Turn propeller shaft by hand to see if abnormal free play exists at splines. Also move yokes to see if abnormal free play exists at spiders and bearings.



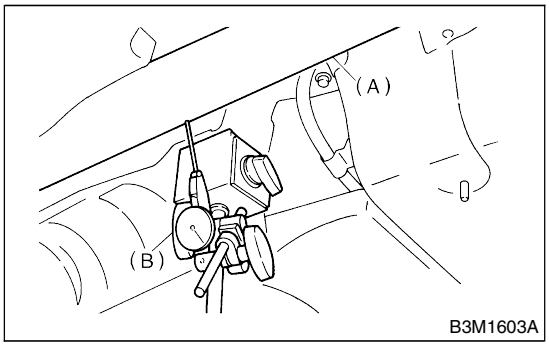
3. RUNOUT OF PROPELLER SHAFT

S301160A1003

1) Remove front exhaust cover. (Non-turbo model)
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.

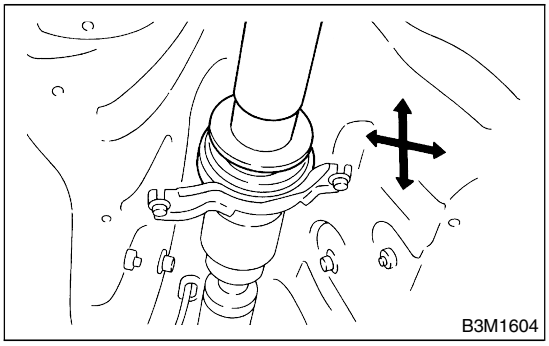
Runout:
Limit 0.6 mm (0.024 in)



(A) Propeller shaft
(B) Dial gauge

4. CENTER BEARING FREE PLAY S301160A1004

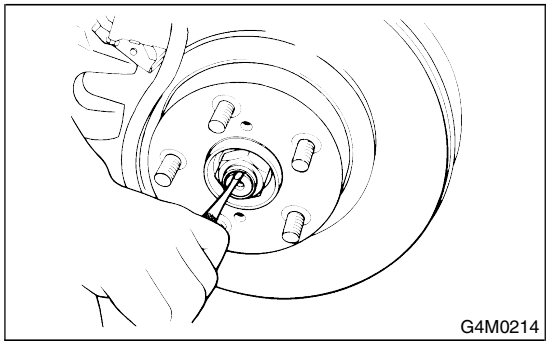
1) Remove front exhaust cover. (Non-turbo model)
2) While holding propeller shaft near center bearing with your hand, move it up and down, and left and right to check for any abnormal bearing free play.



3. Front Axle S301148

A: REMOVAL S301148A18

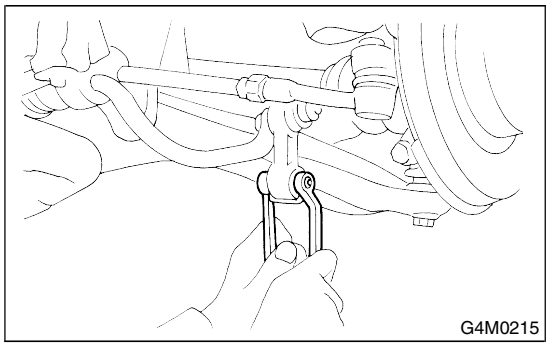
1) Disconnect ground terminal from battery.
2) Jack-up vehicle, support it with safety stands, and remove front wheels.
3) Unlock axle nut.


G4M0214

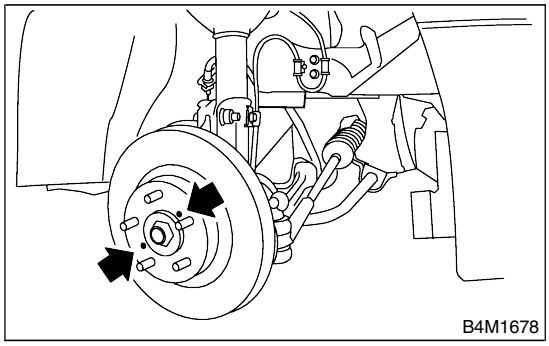
4) Remove axle nut using a socket wrench.

CAUTION:
Be sure to loose and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

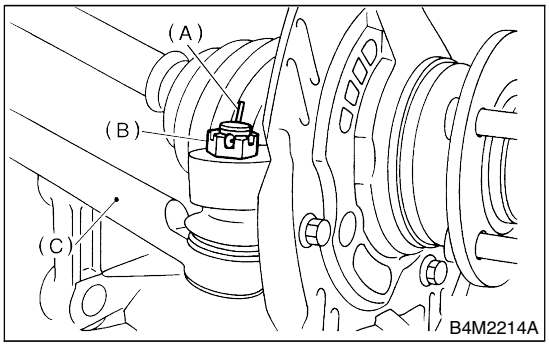
5) Remove stabilizer link.


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

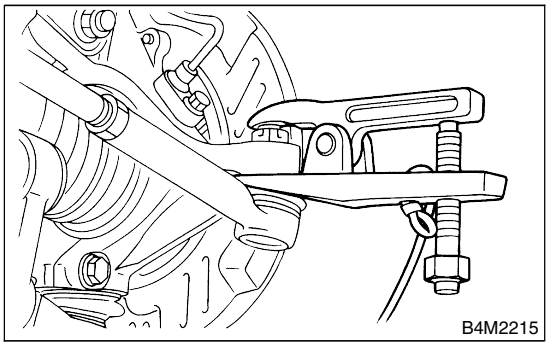
8) Remove cotter pin and castle nut which secure tie-rod end to housing knuckle arm.



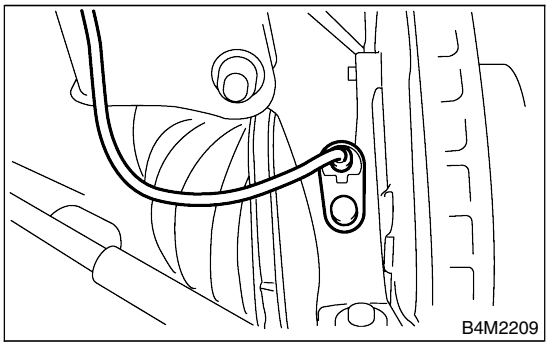
B4M2214A

(A) Cotter pin
(B) Castle nut
(C) Tie-rod

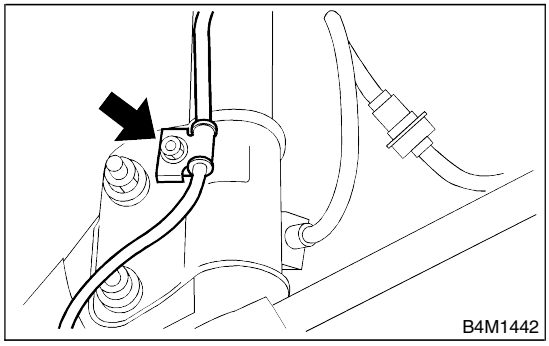
9) Using a puller, remove tie-rod ball joint from knuckle arm.


B4M2215

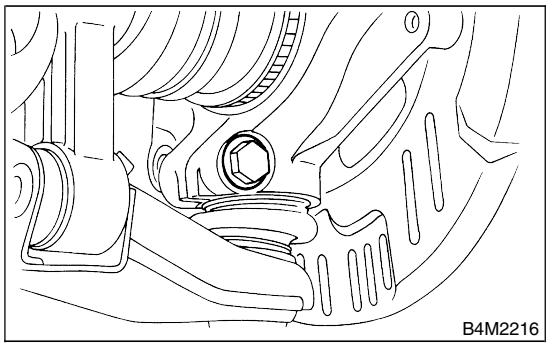
10) Remove ABS sensor assembly and harness in advance. (ABS equipped model)


B4M2209

11) Remove bolt which secures sensor harness to strut. (ABS equipped model)

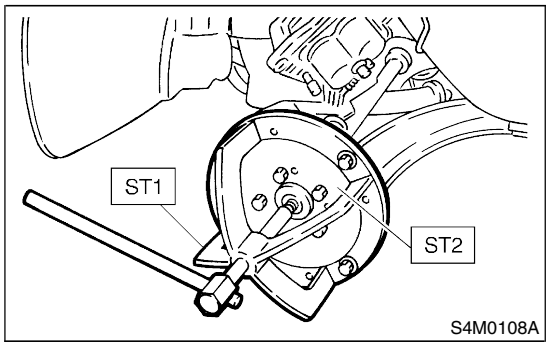

B4M1442

12) Remove transverse link ball joint from housing.


B4M2216

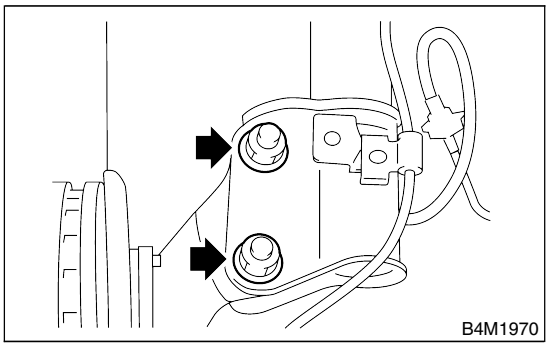
13) Remove SFJ from transmission spindle.
14) Remove front drive shaft assembly from hub. If it is hard to remove, use STs.
ST1 926470000 AXLE SHAFT PULLER
ST2 927140000 PLATE

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.



S4M0108A

15) After scribing an alignment mark on camber adjusting bolt head, remove bolts which connect housing and strut, and disconnect housing from strut.


B4M1970

B: INSTALLATION S301148A11

1) Install transverse link ball joint to housing.

Tightening torque:
49 N·m (5.0 kgf-m, 36 ft-lb)

2) While aligning alignment mark on camber adjusting bolt head, connect housing and strut.

CAUTION:
Use a new self-locking nut.

Tightening torque:
155 N·m (15.8 kgf-m, 114 ft-lb)

3) Install ABS sensor on housing.

Tightening torque:
32 N·m (3.3 kgf-m, 23.9 ft-lb)

4) Install ABS sensor harness on strut.
5) Install disc rotor on hub.
6) Install disc brake caliper on housing.

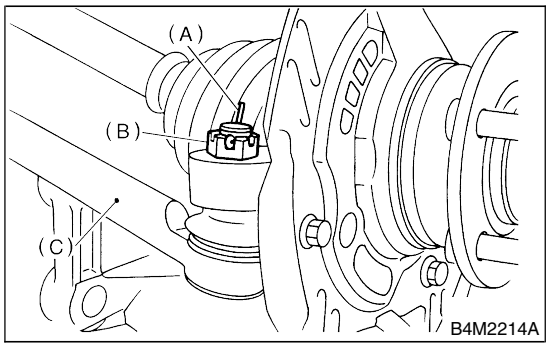
Tightening torque:
78 N·m (8 kgf-m, 57.9 ft-lb)

7) Install front drive shaft. <Ref. to DS-32 INSTALLATION, Front Drive Shaft.>
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.



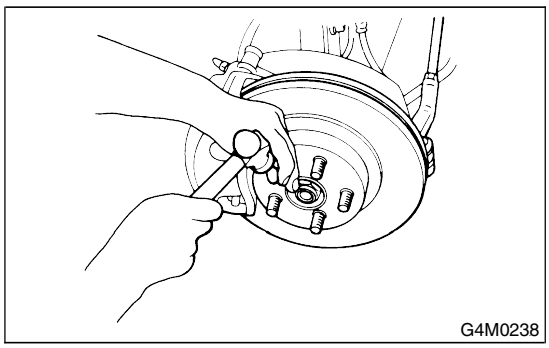
(A) Cotter pin
(B) Castle nut
(C) Tie-rod

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.

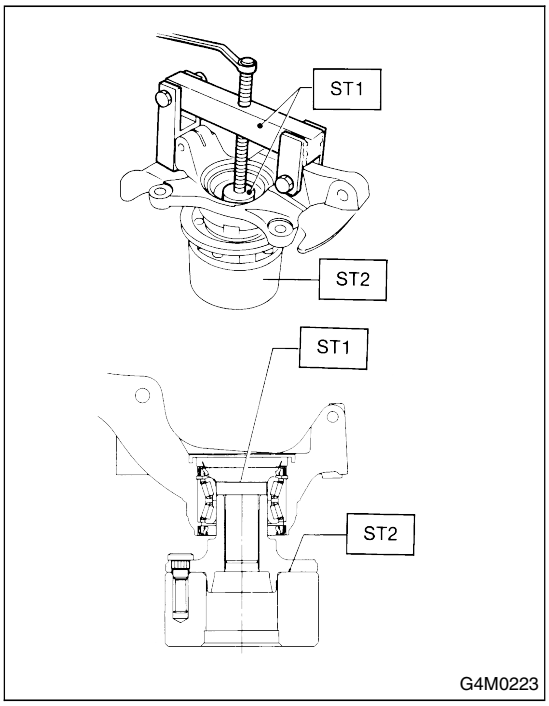


12) Install wheel and tighten wheel nuts to specified torque.

Tightening torque:
88 N·m (9 kgf-m, 65 ft-lb)

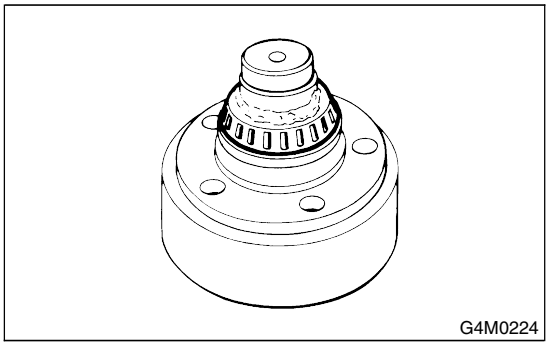
C: DISASSEMBLY S301148A06

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

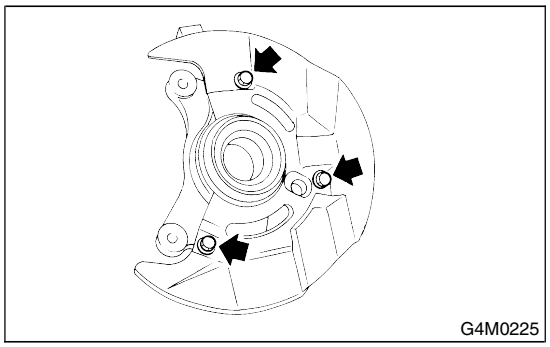


If inner bearing race remains in the hub, remove it with a suitable tool (commercially available).

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.

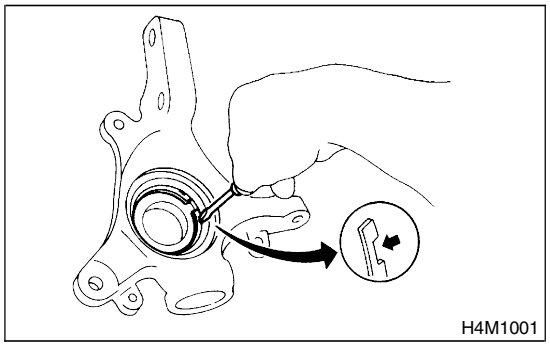


4) Using a standard screwdriver, remove outer and inner oil seals.

CAUTION:
Do not use old oil seals.

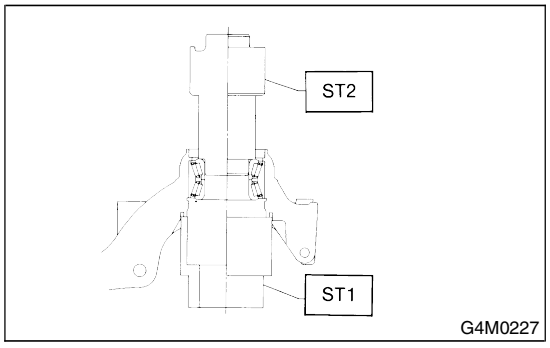
5) Using flat bladed screwdriver, remove snap ring.

CAUTION:
Remove without scratching axle housing.



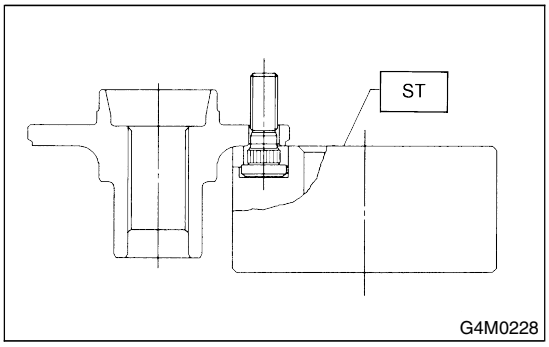
6) Using ST1, support housing securely.
7) Using ST2, press inner race to drive out outer bearing.
ST1 927400000 HOUSING STAND
ST2 927100000 BEARING REMOVER

CAUTION:
- **Do not remove outer race unless it is faulty.**
- **Discard outer race after removal.**
- **Do not replace inner or outer race separately; always replace as a unit.**



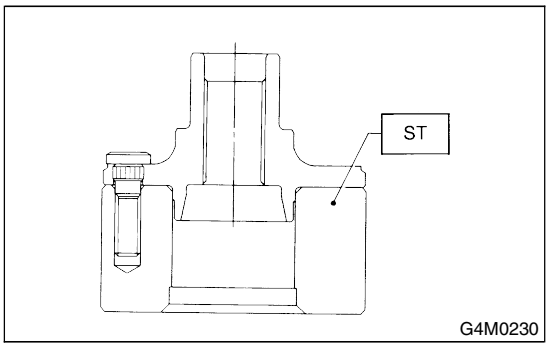
8) Using ST and a hydraulic press, drive hub bolts out.
ST 927080000 HUB STAND

CAUTION:
Be careful not to hammer hub bolts. This may deform hub.



D: ASSEMBLY S301148A02

1) Attach hub to ST securely.
ST 927080000 HUB STAND



2) Using a hydraulic press, press new hub bolts into place.

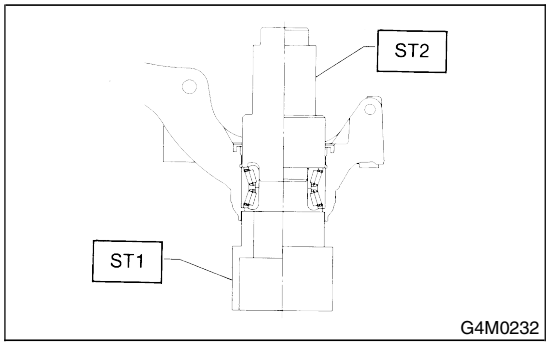
CAUTION:
Be sure to press hub bolts until their seating surfaces contact the hub.

NOTE:
Use 12 mm (0.47 in) dia. holes in HUB STAND to prevent bolts from tilting.

3) 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

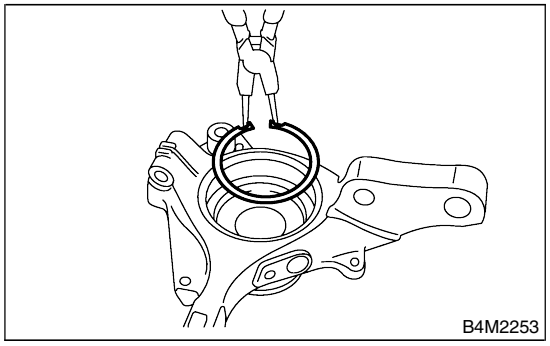
CAUTION:
• Always press outer race when installing bearing.
• Be careful not to remove plastic lock from inner race when installing bearing.
• Charge bearing with new grease when outer race is not removed.

Specified grease:
SHELL 6459N

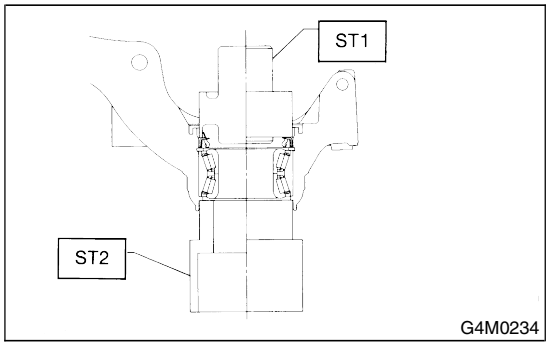


5) Using pliers, install snap ring in its groove.

CAUTION:
• Make sure to install it firmly to groove.
• Install without scratching axle housing.

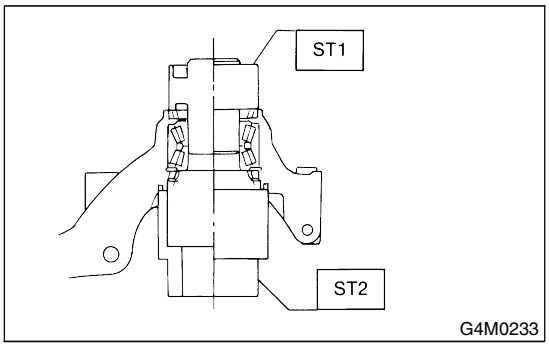


6) Using ST1 and ST2, press inner oil seal until it contacts circlip.
ST1 927410000 OIL SEAL INSTALLER
ST2 927400000 HOUSING STAND



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



9) Apply sufficient grease to oil seal lip.

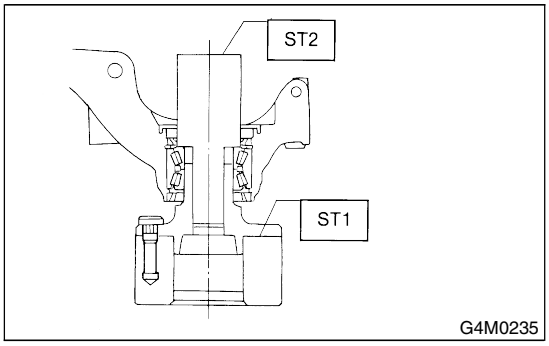
Specified grease
SHELL 6459N

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.

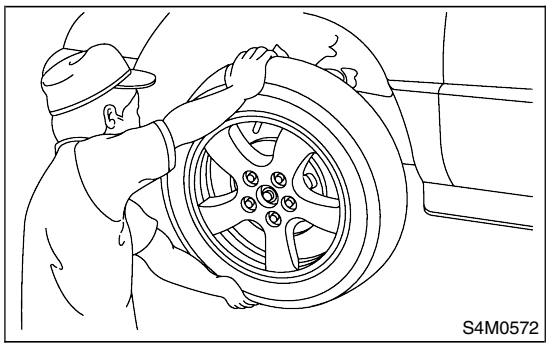
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

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



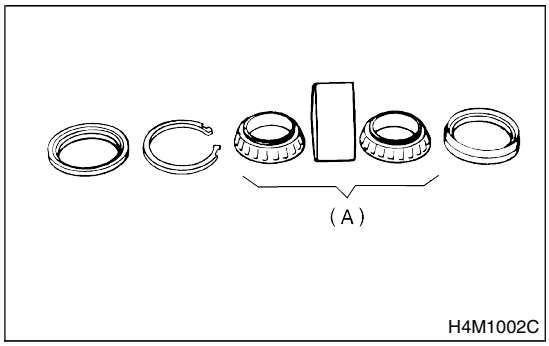
E: INSPECTION S301148A10

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

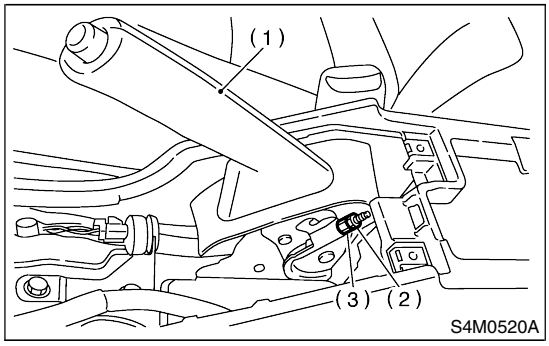
A: REMOVAL S301154A18

1. DISC BRAKE S301154A1802

1) Disconnect ground cable from battery.
2) Jack-up vehicle, and remove rear wheel cap and wheels.

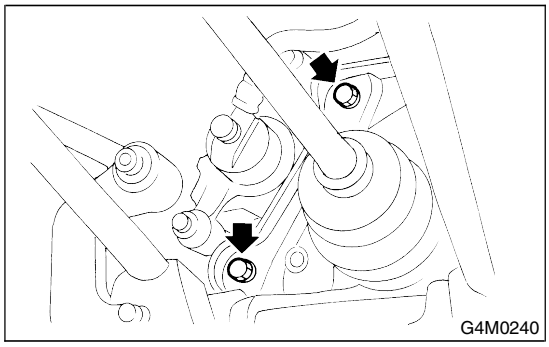
CAUTION:
Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

3) Unlock axle nut.
4) Remove axle nut using a socket wrench.
5) Return parking brake lever and loosen adjusting nut.



(1) Parking brake lever
(2) Lock nut
(3) Adjusting nut

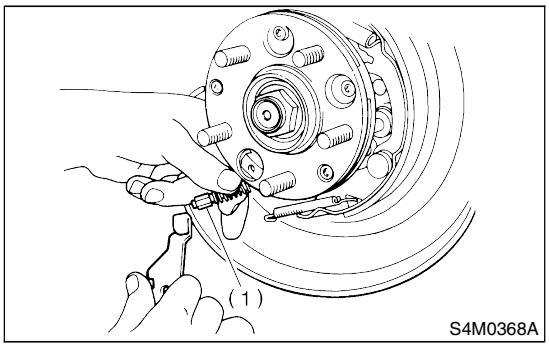
6) Remove disc brake caliper from back plate, and suspend it from strut using a piece of wire.



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.

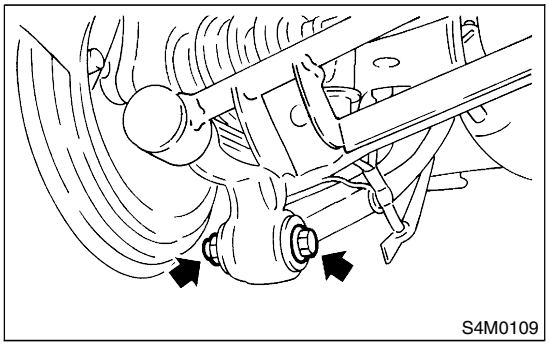
8) Disconnect parking brake cable end.



(1) Cable end

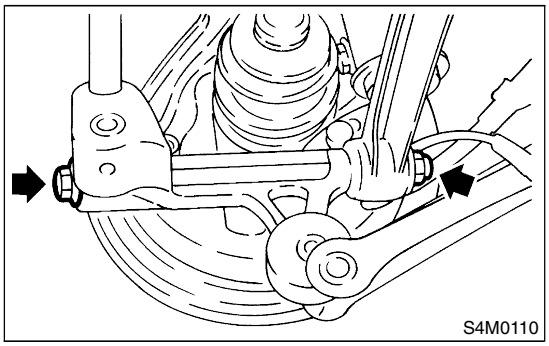
9) Disconnect rear stabilizer from rear lateral link.
10) Remove bolts which secure trailing link assembly to rear housing.

CAUTION:
Discard old self-locking nut. Replace with a new one.



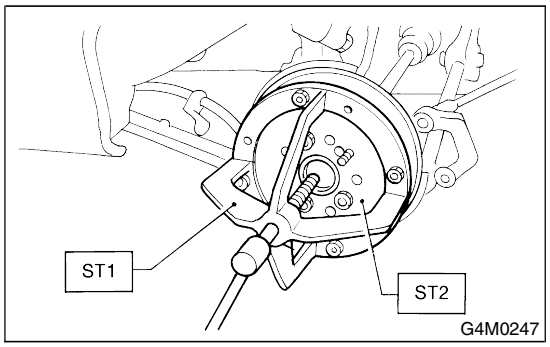
11) Remove bolts which secure lateral link assembly to rear housing.

CAUTION:
Discard old self-locking nut. Replace with a new one.

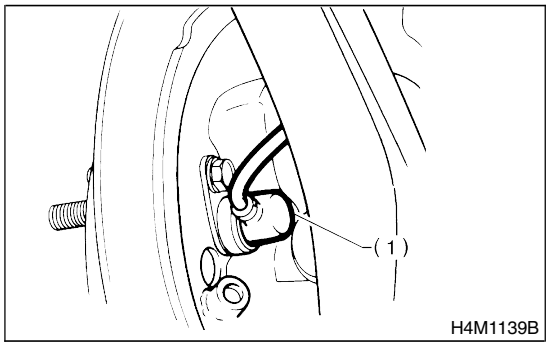


12) Disengage BJ from housing splines, and remove rear drive shaft assembly. If it is hard to remove, use STs.
ST1 926470000 AXLE SHAFT PULLER
ST2 927140000 PLATE

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.

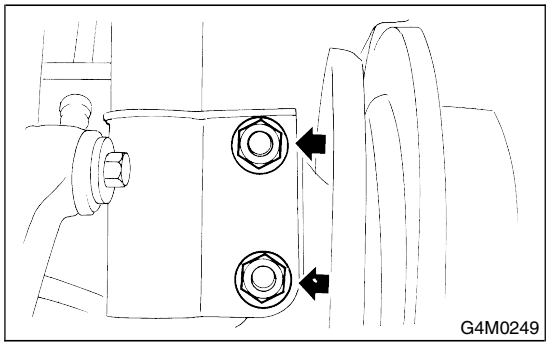


13) Remove rear ABS sensor from back plate (only vehicle equipped with ABS).



(1) ABS sensor

14) Remove bolts which secure rear housing to strut, and separate the two.

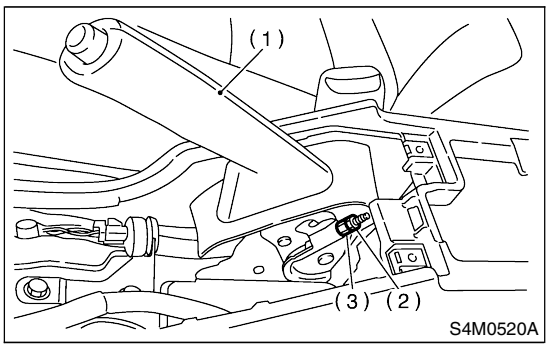


2. DRUM BRAKE S301154A1803

1) Disconnect ground cable from battery.
2) Jack-up vehicle, and remove rear wheel cap and wheels.

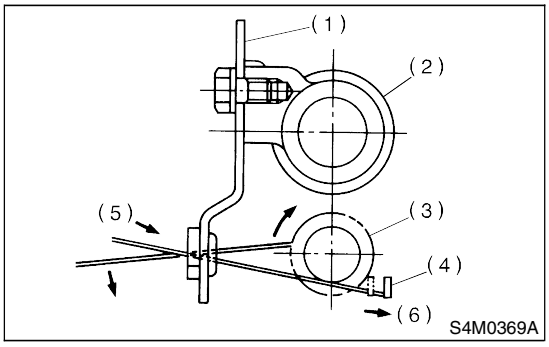
CAUTION:
Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

3) Unlock axle nut.
4) Remove axle nut using a socket wrench.
5) Return parking brake lever and loosen adjusting nut.



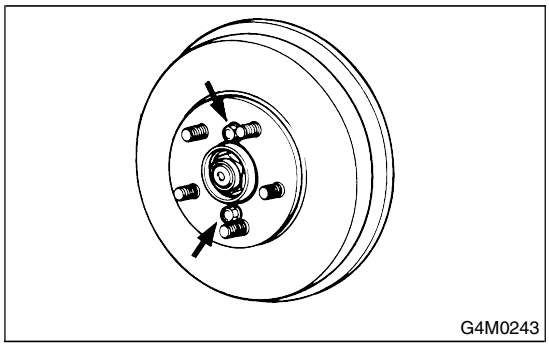
(1) Parking brake lever
(2) Lock nut
(3) Adjusting nut

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.



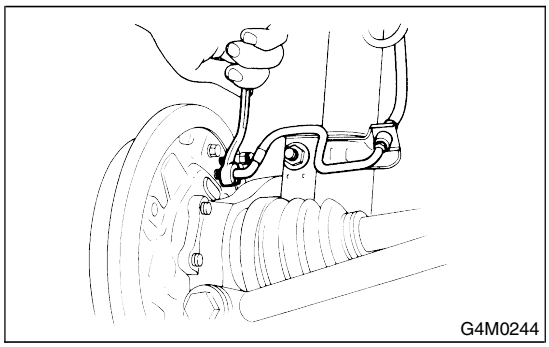
(1) Back plate
(2) Wheel cylinder
(3) Adjuster ASSY pawls
(4) Adjusting lever
(5) Tightening direction
(6) Push

NOTE:
If brake drum is difficult to remove, drive it out by installing an 8-mm bolt into bolt hole in brake drum.

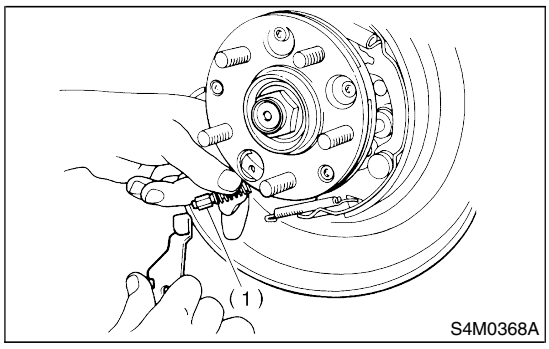

G4M0243

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.



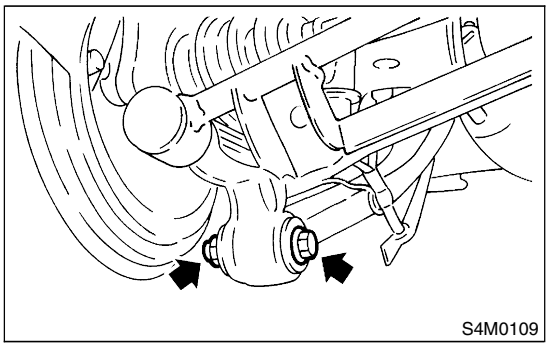
S4M0368A

(1) Cable end

10) Disconnect rear stabilizer from rear lateral link.

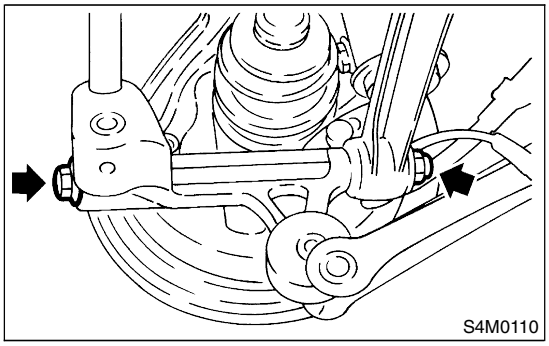
11) Remove bolts which secure trailing link assembly to rear housing.

CAUTION:
Discard old self-locking nut. Replace with a new one.


S4M0109

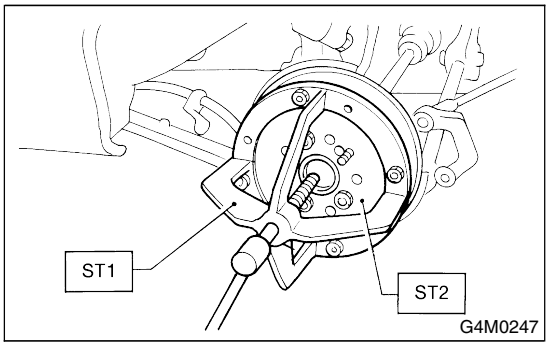
12) Remove bolts which secure lateral link assembly to rear housing.

CAUTION:
Discard old self-locking nut. Replace with a new one.


S4M0110

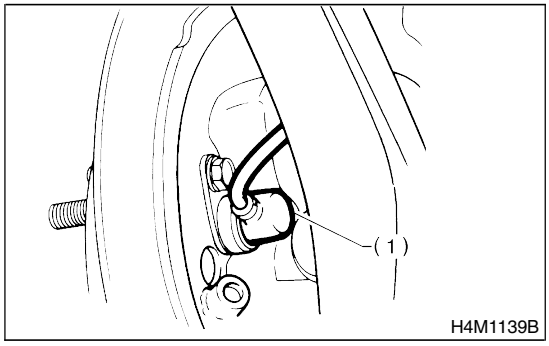
13) Disengage BJ from housing splines, and remove rear drive shaft assembly. If it is hard to remove, use STs.
ST1 926470000 AXLE SHAFT PULLER
ST2 927140000 PLATE

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.**



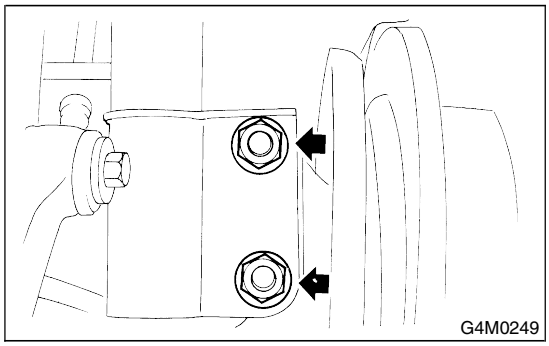
G4M0247

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)

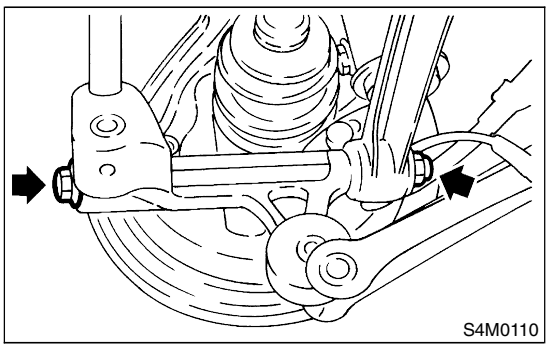
2) Fit BJ (bell joint) to rear housing splines.

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.

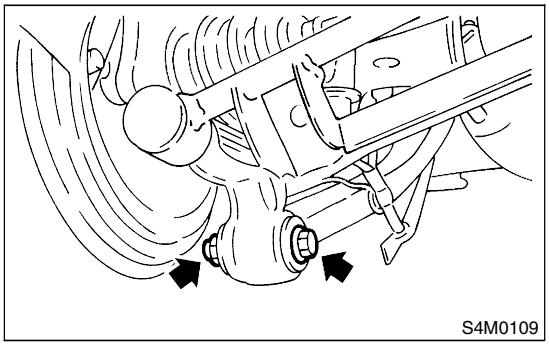
Tightening torque:
137 N·m (14 kgf-m, 101 ft-lb)



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.

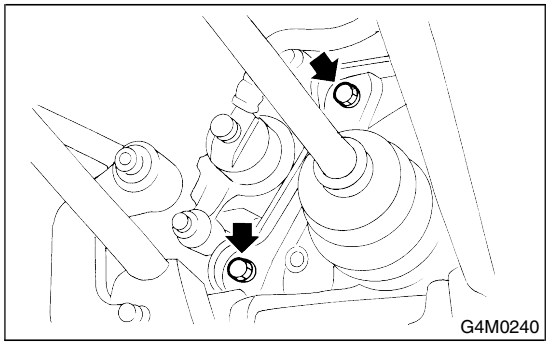
CAUTION:
Use a new self-locking nut.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)

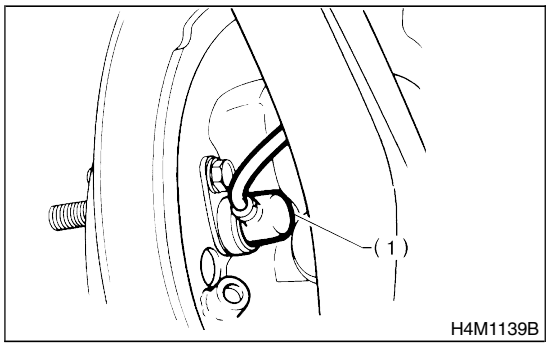
6) Connect parking brake cable to parking brake.
7) Install disc rotor on rear housing assembly.

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).



(1) ABS sensor

10) Bleed air from brake system. <Ref. to BR-47, 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)

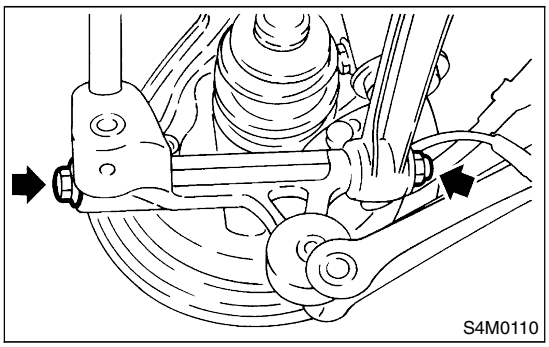
2) Fit BJ (bell joint) to rear housing splines.

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.

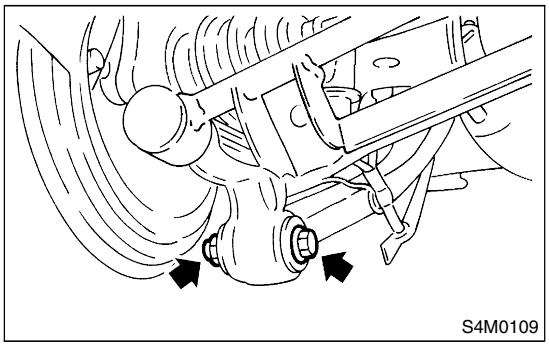
Tightening torque:
137 N·m (14 kgf-m, 101 ft-lb)


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

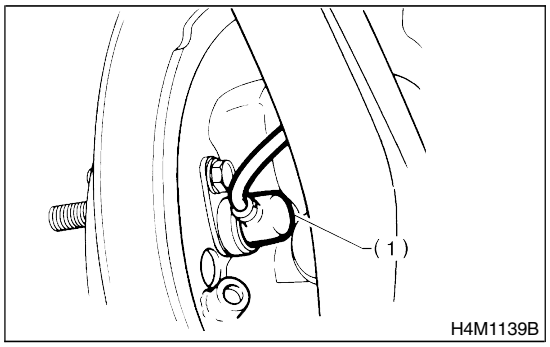
5) Connect rear stabilizer to rear lateral link.

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-47, 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)

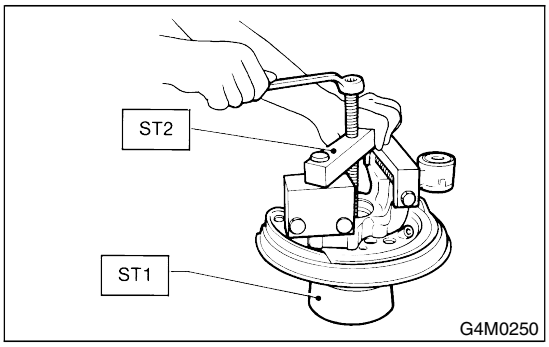
CAUTION:
• Use a new axle nut.
• Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.
• Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel 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

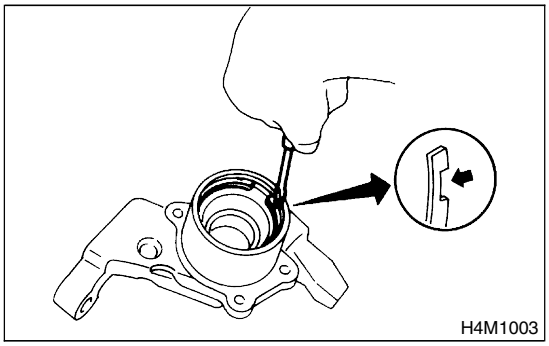


2) Remove back plate from rear housing.
3) Using a standard screwdriver, remove outer and inner oil seals.

CAUTION:
Use new oil seals.

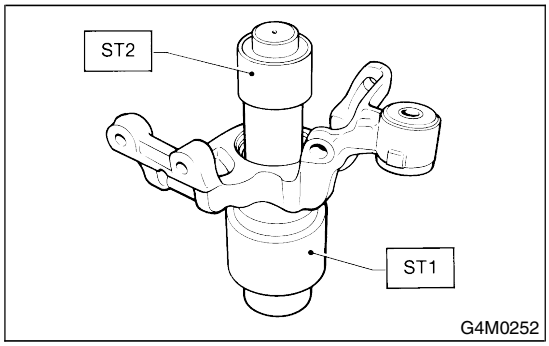
4) Using flat bladed screwdriver, remove snap ring.

CAUTION:
Remove without scratching axle housing.



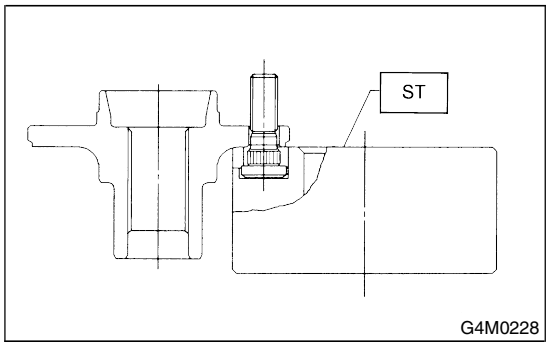
5) Using ST1 and ST2, remove bearing by pressing inner race.
ST1 927430000 HOUSING STAND
ST2 927440000 BEARING REMOVER

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.

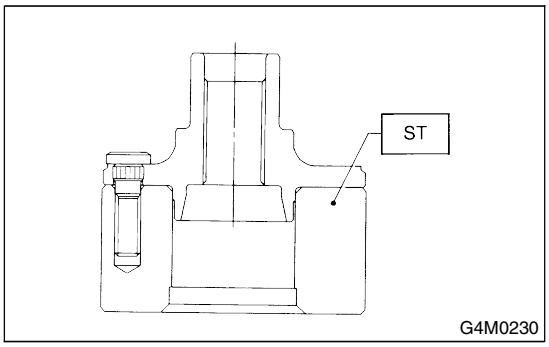


D: ASSEMBLY S301154A02

1) Using ST, press new hub bolt into place.

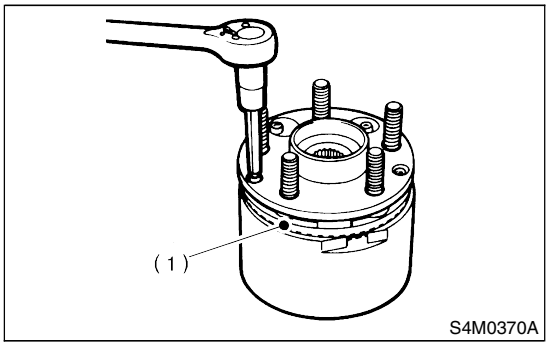
CAUTION:
- **Ensure hub bolt closely contacts hub.**
- **Use a 12 mm (0.47 in) hole in the ST to prevent hub bolt from tilting during installation.**

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).

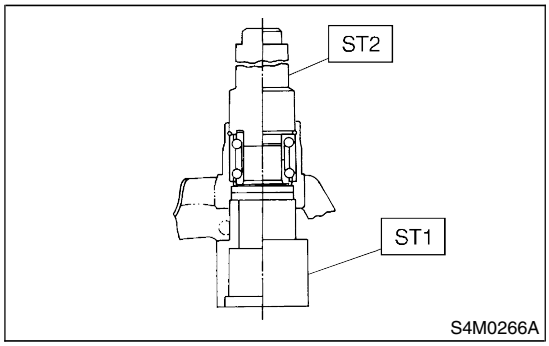
CAUTION:
- **Ensure tone wheel closely contacts hub.**
- **Be careful not to damage tone wheel teeth.**



(1) Tone wheel

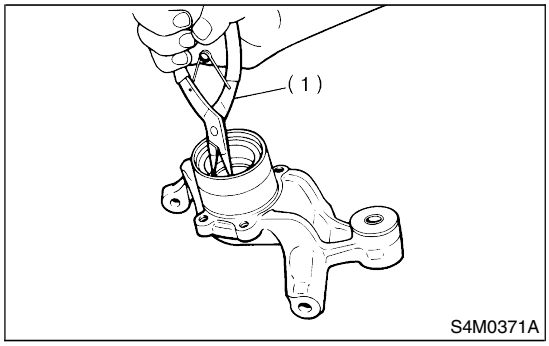
3) Clean housing interior completely. Using ST1 and ST2, press bearing into housing.
ST1 927430000 HOUSING STAND
ST2 927440000 BEARING REMOVER

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.



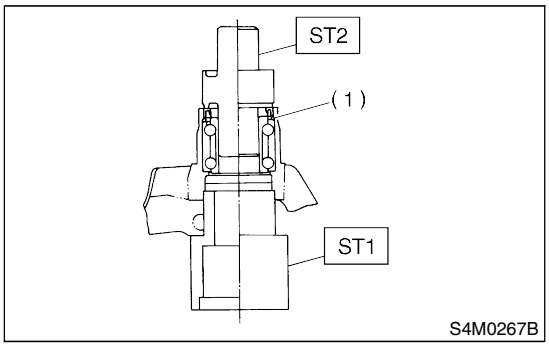
4) Using plier, install snap ring.

CAUTION:
• Ensure snap ring fits in groove properly.
• Install without scratching axle housing.



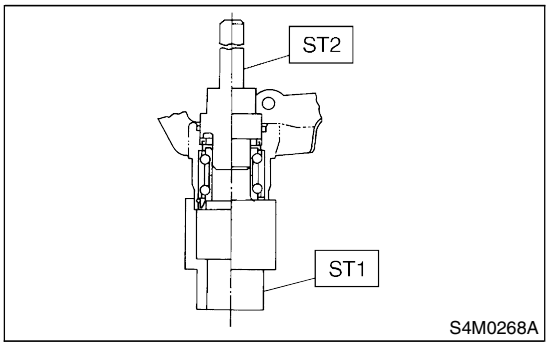
(1) Plier

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

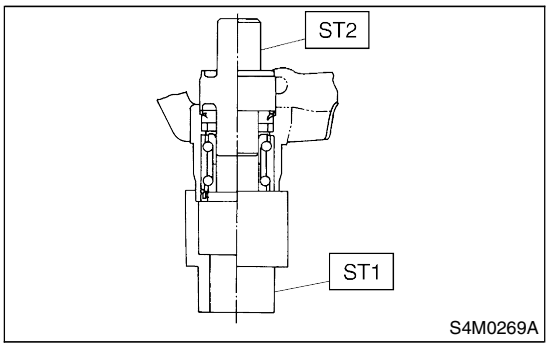


(1) Snap ring

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.

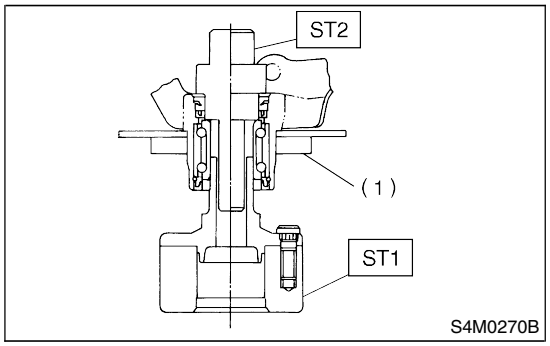
Specified grease:
SHELL 6459N

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

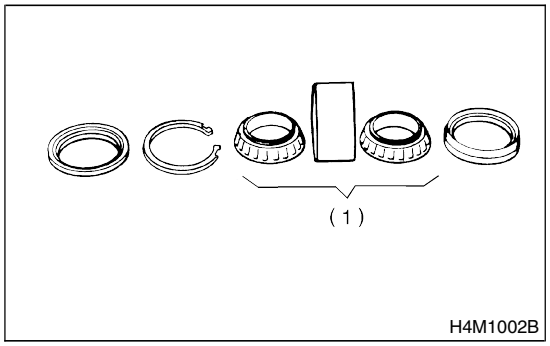


(1) Back plate

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.



(A) Replace as a set.

5. Front Drive Shaft S301153

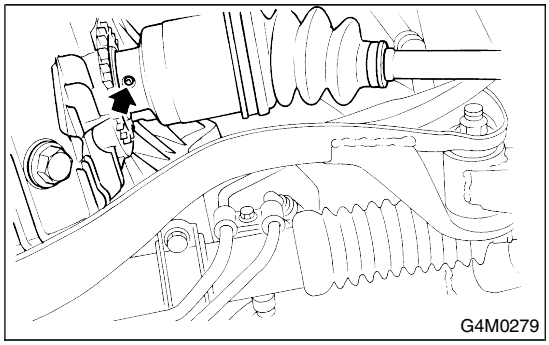
A: REMOVAL S301153A18

1) Disconnect ground terminal from battery.
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.

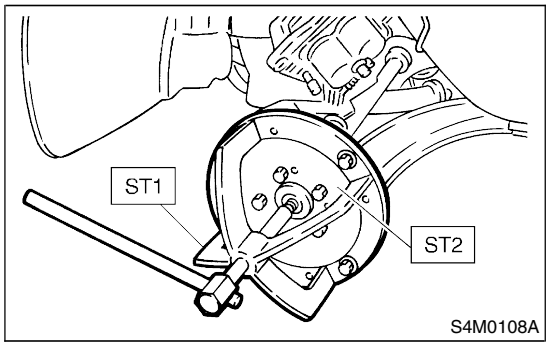
5) Remove stabilizer link from transverse link.
6) Disconnect transverse link from housing.
7) Remove spring pin which secures transmission spindle to SFJ.

CAUTION:
Use a new spring pin.



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.**



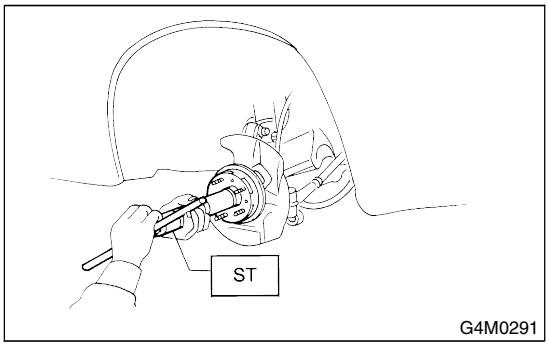
B: INSTALLATION S301153A11

1) Insert BJ into hub splines.

CAUTION:
Be careful not to damage inner oil seal lip and tone wheel.

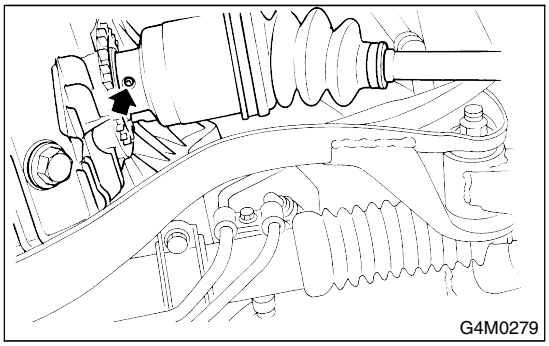
2) Using ST1 and ST2, pull drive shaft into place.
ST1 922431000 AXLE SHAFT INSTALLER
ST2 927390000 ADAPTER

CAUTION:
Do not hammer drive shaft when installing it.



3) Tighten axle nut temporarily.
4) Install SFJ on transmission spindle and drive spring pin into place.

CAUTION:
Always use a new spring pin.



5) Connect transverse link to housing.

Tightening torque (self-locking nut):
49 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.

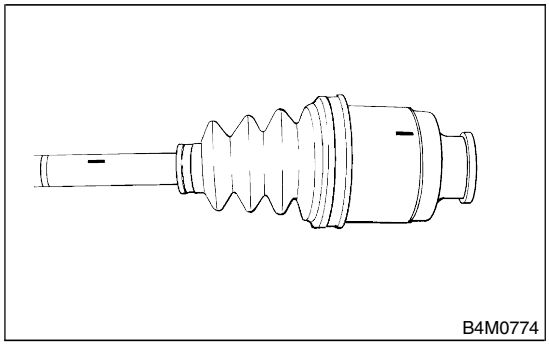
Tightening torque:
186 N·m (19 kgf-m, 137 ft-lb)

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.

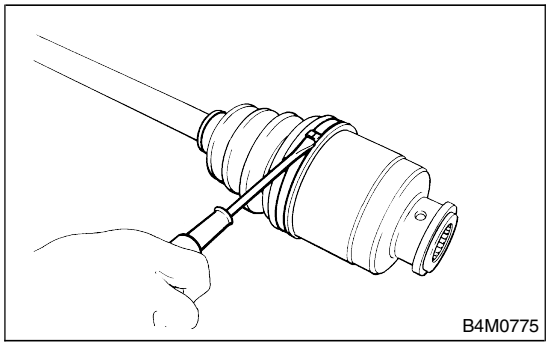
C: DISASSEMBLY S301153A06

1) Place alignment marks on shaft and outer race.

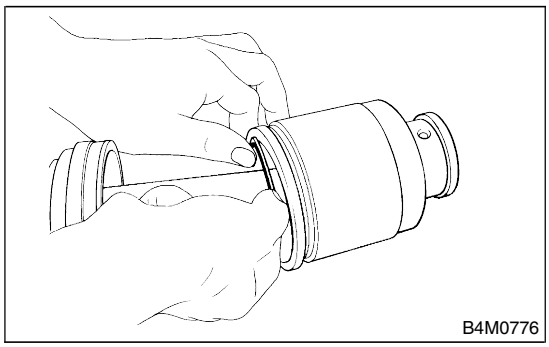

B4M0774

2) Remove SFJ boot band and boot.

CAUTION:
Be careful not to damage boot.


B4M0775

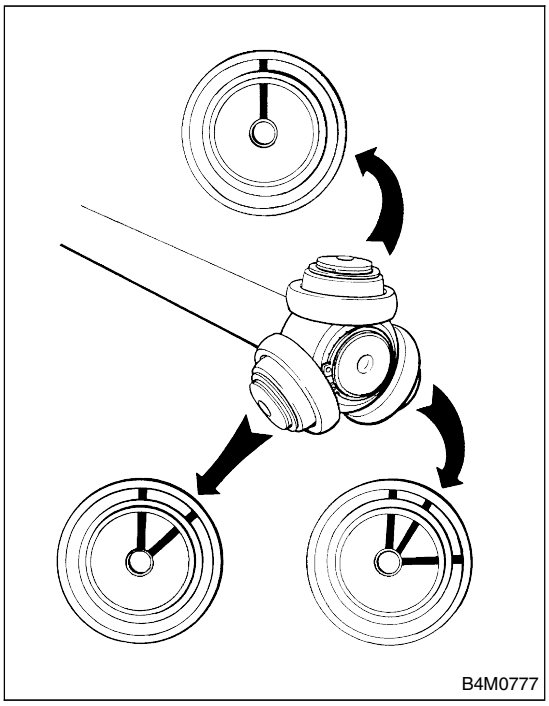
3) Remove circlip from SFJ outer race using screwdriver.


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.

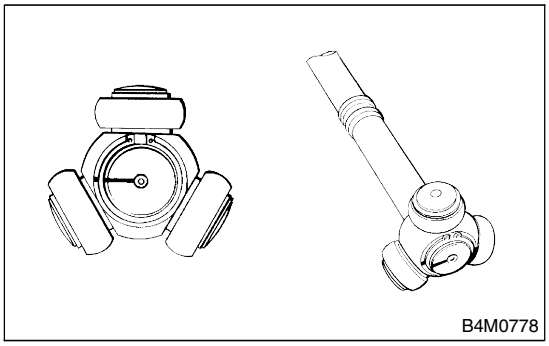
6) Place alignment mark on free ring and trunnion.


B4M0777

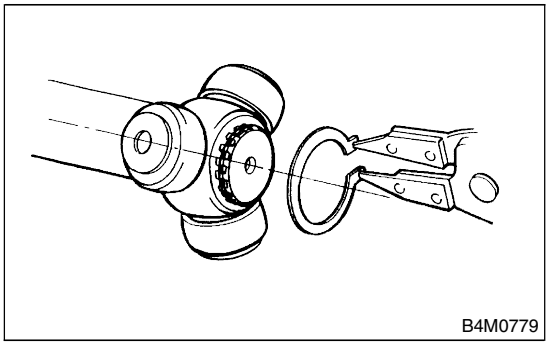
7) Remove free ring from trunnion.

CAUTION:
Be careful with the free ring position.

8) Place alignment mark on trunnion and shaft.


B4M0778

9) Remove snap ring and trunnion.

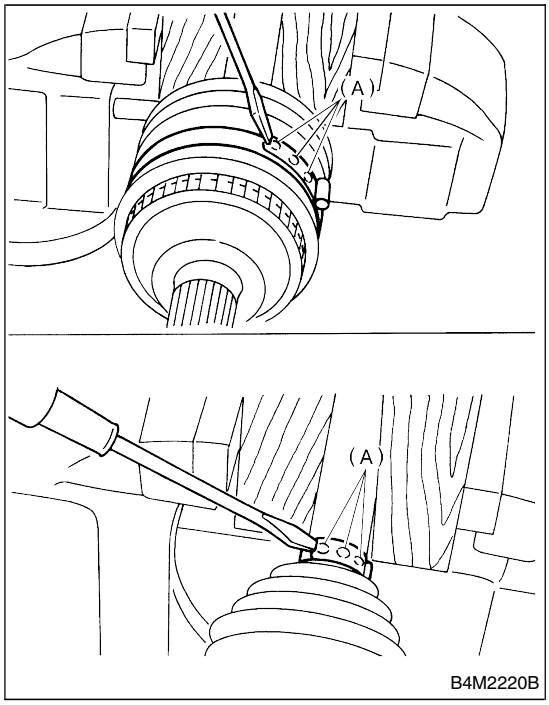

B4M0779

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.

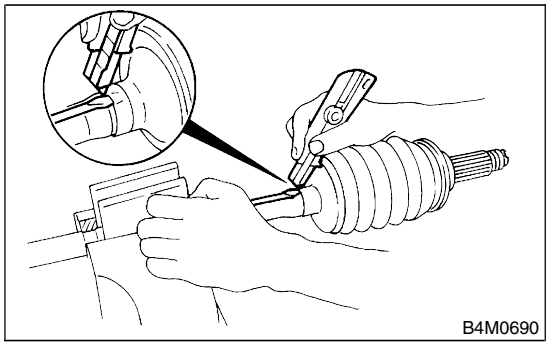
12) Raise boot band claws by means of screwdriver and hammer.



(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.

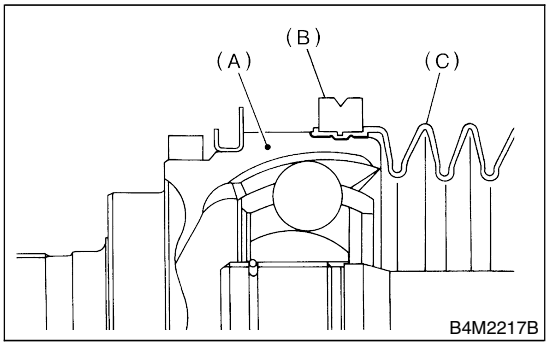
2) Place drive shaft in a vise.

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.

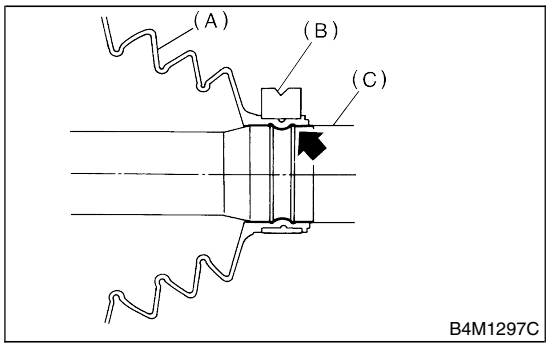
5) Install boot projecting portion to BJ groove.



(A) BJ
(B) Lorge boot band
(C) Boot

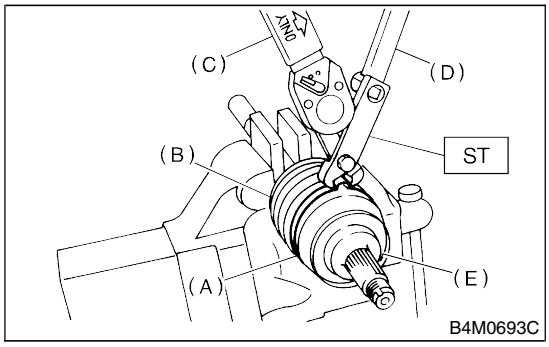
6) Set large boot band in place.

7) Install boot projecting portion to shaft groove.



(A) Boot
(B) Small boot band
(C) Shaft

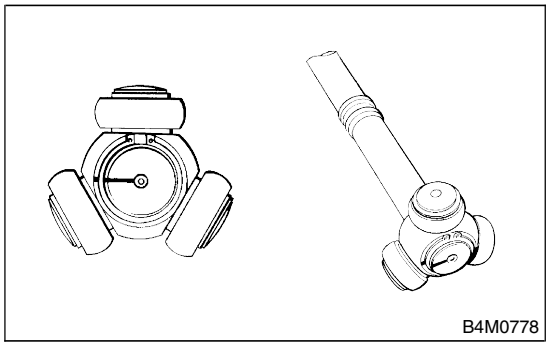
8) Tighten boot bands using ST, torque wrench and socket flex handle.
ST 28099AC000 BOOT BAND PLIER



(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.

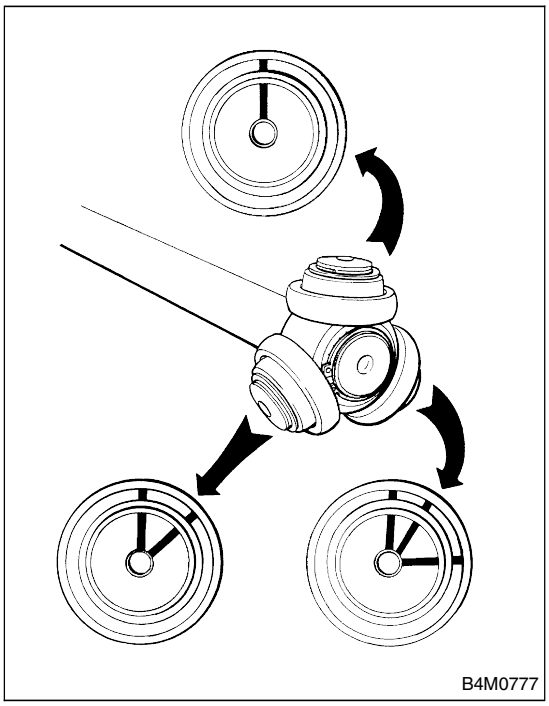


11) Install snap ring to shaft.

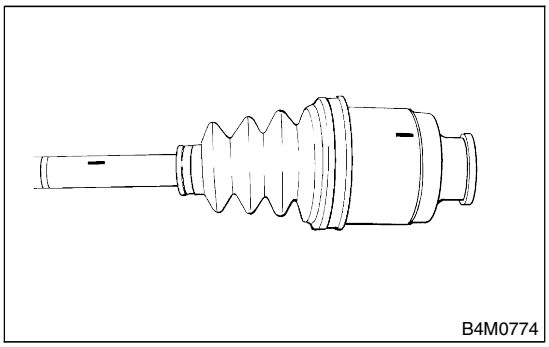
CAUTION:
Confirm that the snap ring is completely fitted in the shaft groove.

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.

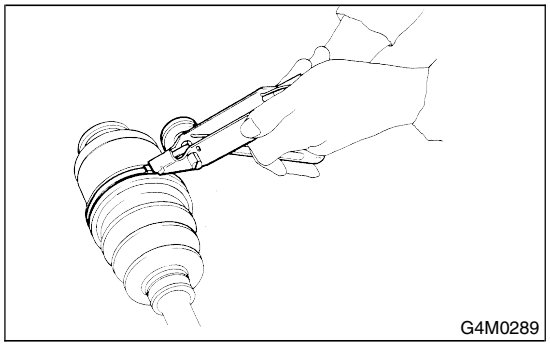
CAUTION:
Use a new band.

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.

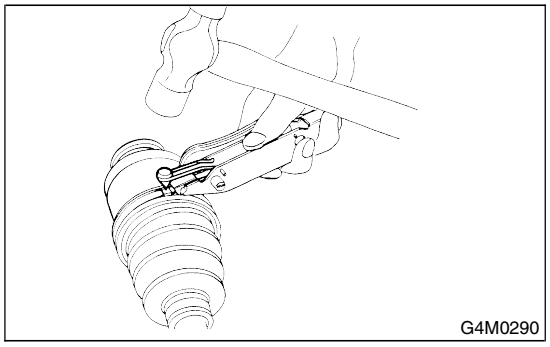
21) Tighten band by using ST.
ST 925091000 BAND TIGHTENING TOOL

NOTE:
Tighten band until it cannot be moved by hand.


G4M0289

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.


G4M0290

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.

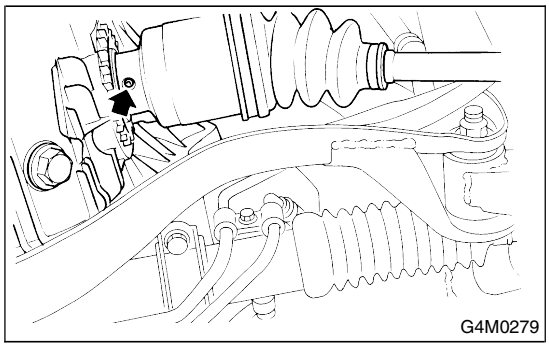
B: REPLACEMENT S301755A20

1) Set vehicle on a lift.
2) Disconnect ground terminal from battery.
3) Jack-up vehicle, support it with safety stands (rigid rocks), and remove front wheel cap and wheels.

NOTE:
Do not remove axle nut.

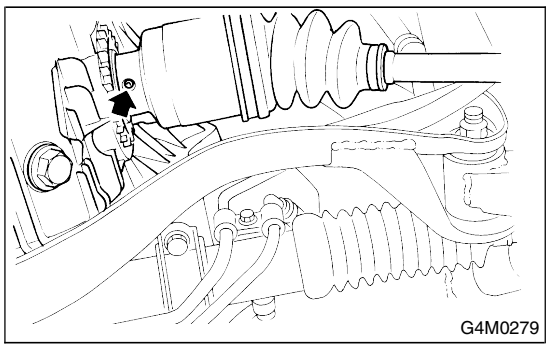
4) Remove stabilizer link.
5) Disconnect transverse link from housing.
6) Remove spring pin which secures transmission spindle to SFJ.

CAUTION:
Use a new spring pin.



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.



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 ground cable from battery.
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.

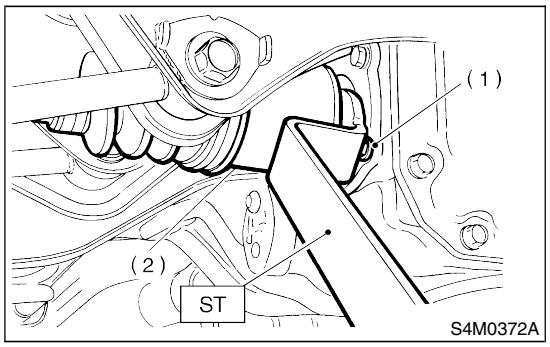
CAUTION:
Discard old self-locking nut. Replace with a new one.

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. (Except Non-TURBO AT vehicle)
ST 28099PA100 DRIVE SHAFT REMOVER

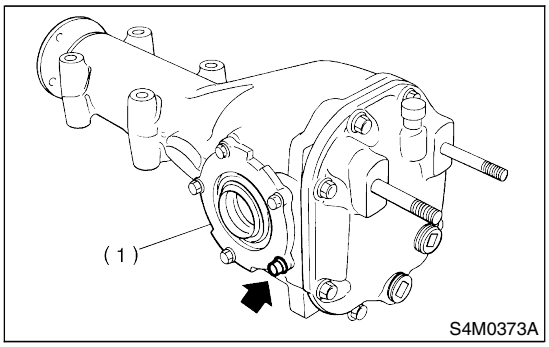
CAUTION:
Do not remove circlip attached to inside of differential.



(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.

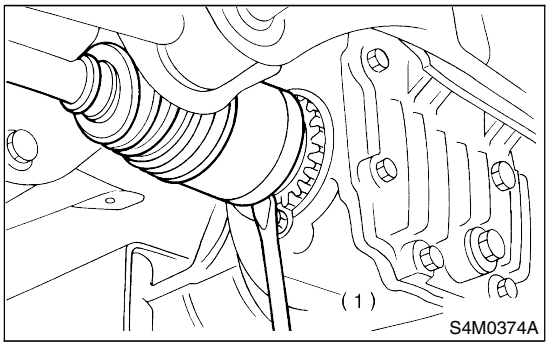
ST 28099PA100 DRIVE SHAFT REMOVER



(1) Side bearing retainer

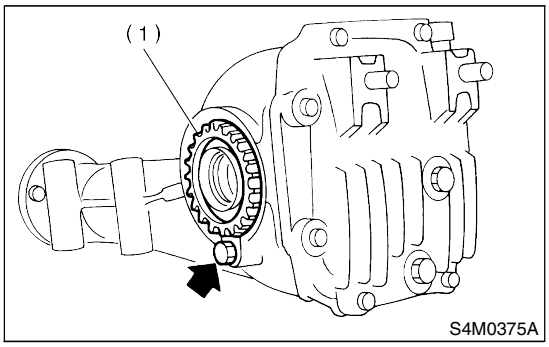
10) Remove DOJ from rear differential using tire lever. (Non-TURBO AT vehicles)

NOTE:
The side spline shaft circlip comes out together with the shaft.



(1) Tire lever

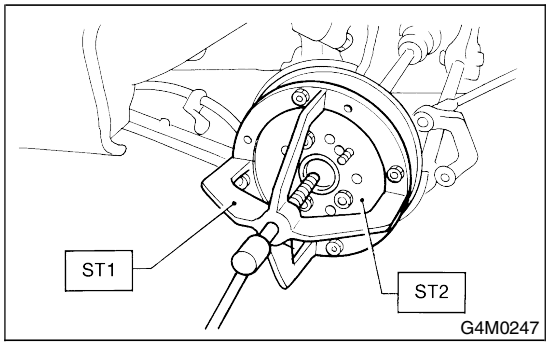
CAUTION:
When removing the DOJ from the rear differential, fit tire lever to the bolt as shown in figure so as not to damage the axle shaft holder.



(1) Axle shaft holder

11) Remove axle nut and drive shaft. If it is hard to remove, use ST1 and ST2.
ST1 926470000 AXLE SHAFT PULLER
ST2 927140000 PLATE

CAUTION:
• Be careful not to damage oil seal lip when removing rear drive shaft.
• When rear drive shaft is to be replaced, also replace inner oil seal with a new one.



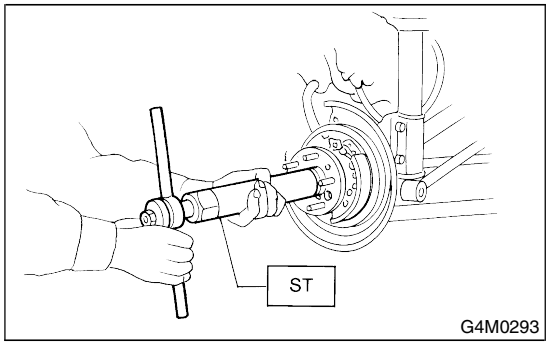
B: INSTALLATION S301156A11

1) Insert BJ into rear housing splines.

CAUTION:
Be careful not to damage inner oil seal lip.

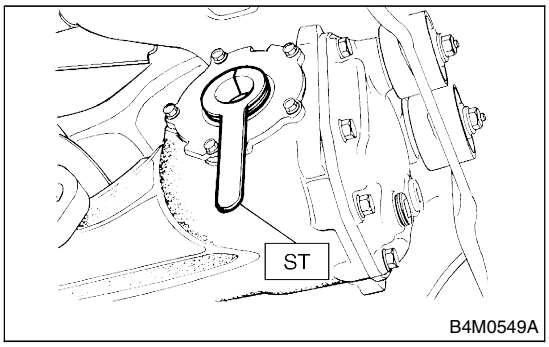
2) Using ST1 and ST2, pull drive shaft into place.
ST1 922431000 AXLE SHAFT INSTALLER
ST2 927390000 ADAPTER

CAUTION:
Do not hammer drive shaft when installing it.



3) Tighten axle nut temporarily.
4) Replace circlips from DOJ spline with new one.

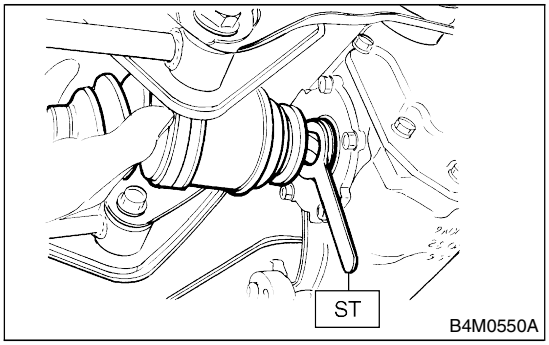
5) Using ST, install DOJ into differential.
ST 28099PA090 SIDE OIL SEAL PROTECTOR



6) Insert DOJ spline end into bore of side oil seal, and remove ST.

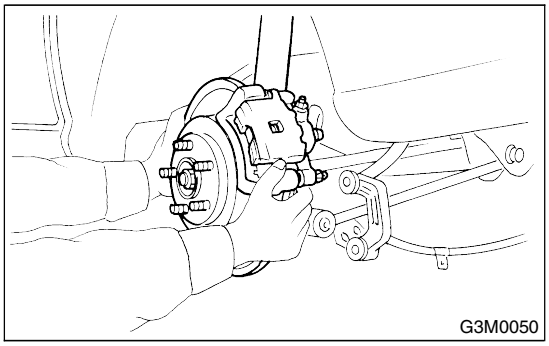
CAUTION:
Do not allow DOJ splines to damage side oil seal.

ST 28099PA090 SIDE OIL SEAL PROTECTOR



7) Align DOJ and differential splines.
8) Push housing to insert DOJ into differential.

NOTE:
Make sure DOJ is inserted properly.



9) Connect rear housing assembly to trailing link assembly, and tighten self-locking nut.

Tightening torque:
113 N·m (11.5 kgf-m, 83 ft-lb)

10) Connect rear housing assembly to lateral link assembly, and tighten self-locking nut.

Tightening torque:
137 N·m (14 kgf-m, 101 ft-lb)

11) Install stabilizer bracket.
12) While depressing brake pedal, tighten axle nut using a socket wrench.

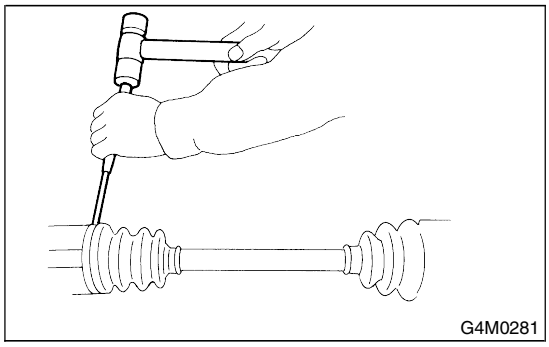
Tightening torque:
186 N·m (19 kgf-m, 137 ft-lb)

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.

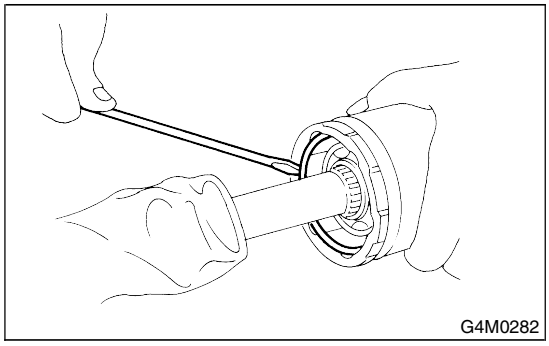
13) After tightening axle nut, lock it securely.

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.


G4M0281

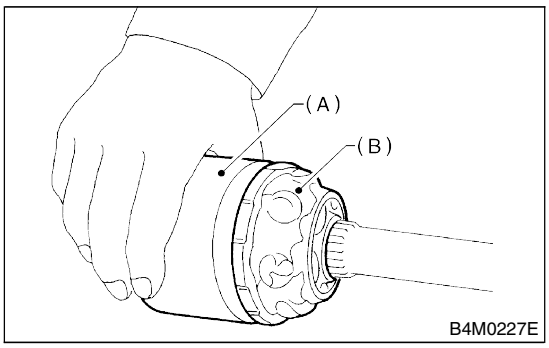
3) Remove boot band on the small end of DOJ boot in the same manner.
4) Remove the larger end of DOJ boot from DOJ outer race.
5) Pry and remove round circlip located at the neck of DOJ outer race with a screwdriver.


G4M0282

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).



B4M0227E

(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 (Non-turbo model):
Molylex No. 2 (Part No. 723223010)

EBJ side (Turbo model):
NTG 2218 (Part No. 28093AA000)

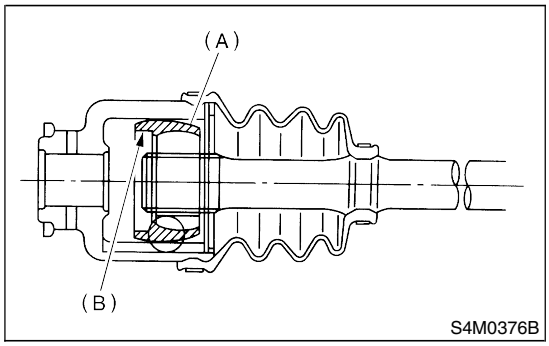
DOJ side:
VU-3A702 (Yellow) (Part No. 23223GA050)

1) Install BJ or EBJ 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.

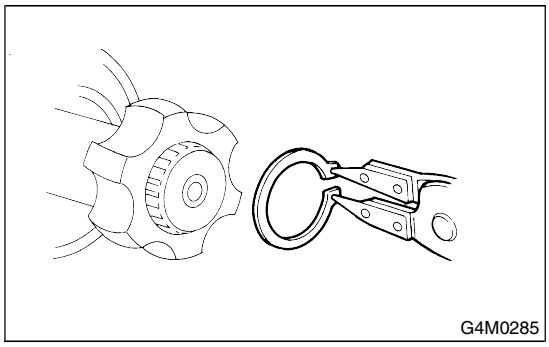
NOTE:
Insert the cage with the cut-out portion facing the shaft end, since the cage has an orientation.



(A) Cage
(B) Cut-out portion

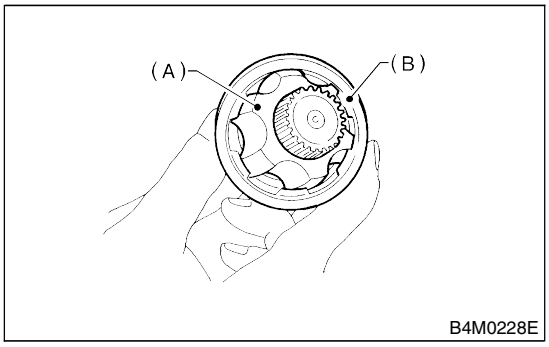
4) Install DOJ inner race on shaft and fit snap ring with pliers.

NOTE:
Confirm that the snap ring is completely fitted in the shaft groove.



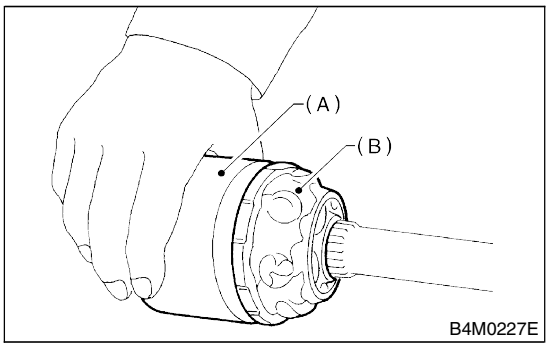
5) Install cage, which was previously fitted, to inner race fixed upon shaft.

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

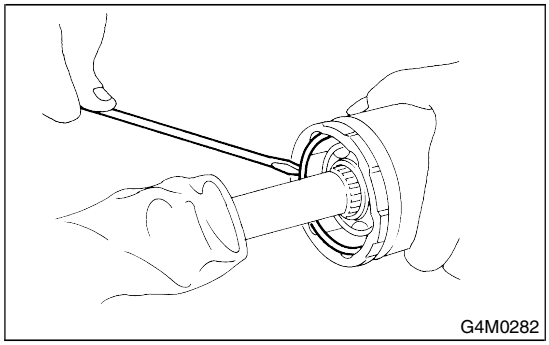
6) Fill 80 to 90 g (2.82 to 3.17 oz) of specified grease into the interior of DOJ outer race.
7) Apply a coat of specified grease to the cage pocket and six balls.
8) Insert six balls into the cage pocket.
9) Align the outer race track and ball positions and place in the part where shaft, inner race, 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.


G4M0282

11) Apply an even coat of the specified grease [20 to 30 g (0.71 to 1.06 oz)] to the entire inner surface of boot. Also apply grease to shaft.
12) Install DOJ boot taking care not to twist it.

NOTE:
- The inside of the larger end of DOJ boot and the boot groove shall be cleaned so as to be free from grease and other substances.
- When installing DOJ boot, position outer race of DOJ at center of its travel.

13) Put a band through the clip and wind twice in alignment with band groove of boot.

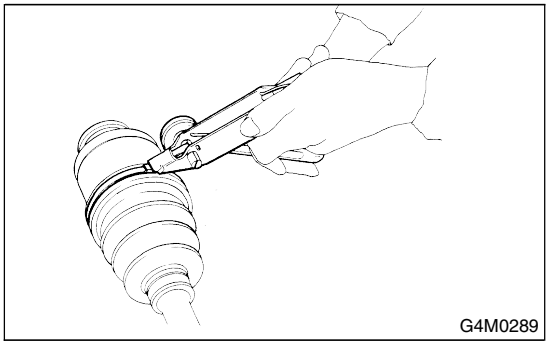
CAUTION:
Use a new band.

14) Pinch the end of band with pliers. Hold the clip and tighten securely.

NOTE:
When tightening boot, exercise care so that the air within the boot is appropriate.

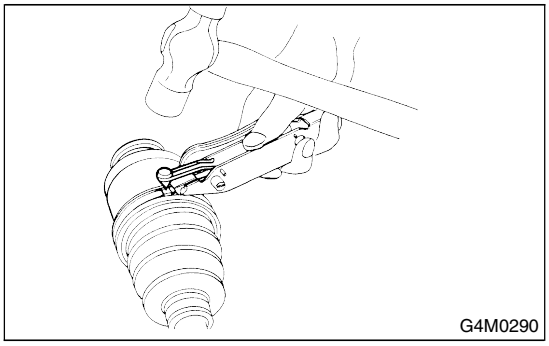
15) Tighten band by using ST.
ST 925091000 BAND TIGHTENING TOOL

NOTE:
Tighten band until it cannot be moved by hand.


G4M0289

16) Tap on the clip with the punch provided at the end of ST.
ST 925091000 BAND TIGHTENING TOOL

CAUTION:
Tap to an extent that the boot underneath is not damaged.


G4M0290

17) Cut off band with an allowance of about 10 mm (0.39 in) left from the clip and bend this allowance over the clip.

CAUTION:
Be careful so that the end of the band is in close contact with clip.

18) Fix up boot on BJ or EBJ 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) or EBJ (High efficiency compact ball fixed 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.

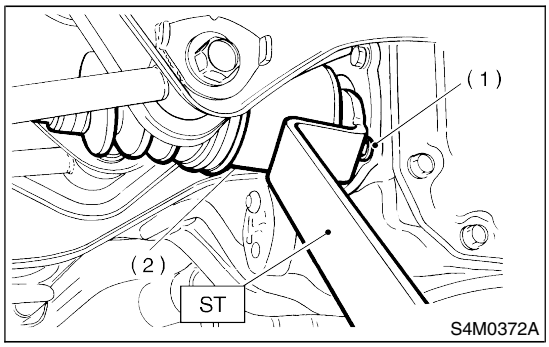
B: REPLACEMENT S301756A20

1) Set vehicle on a lift.
2) Disconnect ground cable from battery.
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

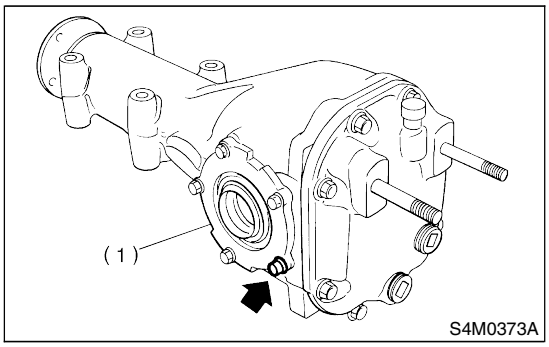
NOTE:
The side spline shaft circlip comes out together with the shaft.



(1) Bolt
(2) DOJ

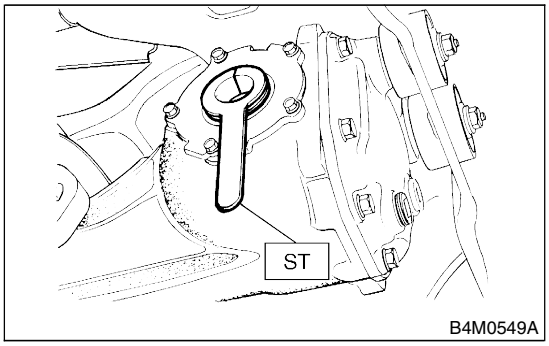
CAUTION:
Be careful not to damage side bearing retainer. Always use bolt as shown in figure, as supporting point for ST during removal.

ST 28099PA100 DRIVE SHAFT REMOVER



(1) Side bearing retainer

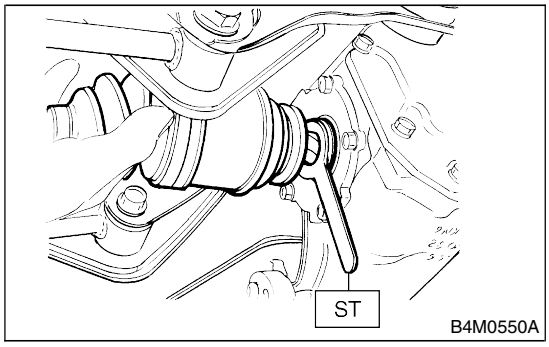
9) Remove DOJ and BJ or EBJ boots from drive shaft. <Ref. to DS-40, DISASSEMBLY, Front Drive Shaft.>
10) Install DOJ and BJ or EBJ boots to drive shaft. <Ref. to DS-40, ASSEMBLY, Rear Drive Shaft.>
11) Using ST, install DOJ into differential.
ST 28099PA090 SIDE OIL SEAL PROTECTOR



12) Insert DOJ spline end into bore of side oil seal, and remove ST.

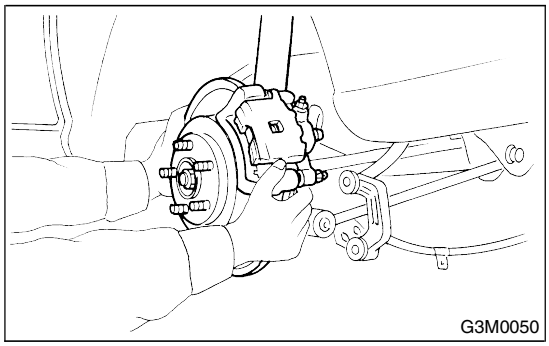
CAUTION:
Do not allow DOJ splines to damage side oil seal.

ST 28099PA090 SIDE OIL SEAL PROTECTOR



13) Align DOJ and differential splines.
14) Push housing to insert DOJ into differential.

NOTE:
Make sure DOJ is inserted properly.



CAUTION:
Discard old self-locking nut. Replace with a new one.

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

Page

1. General Description....2
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

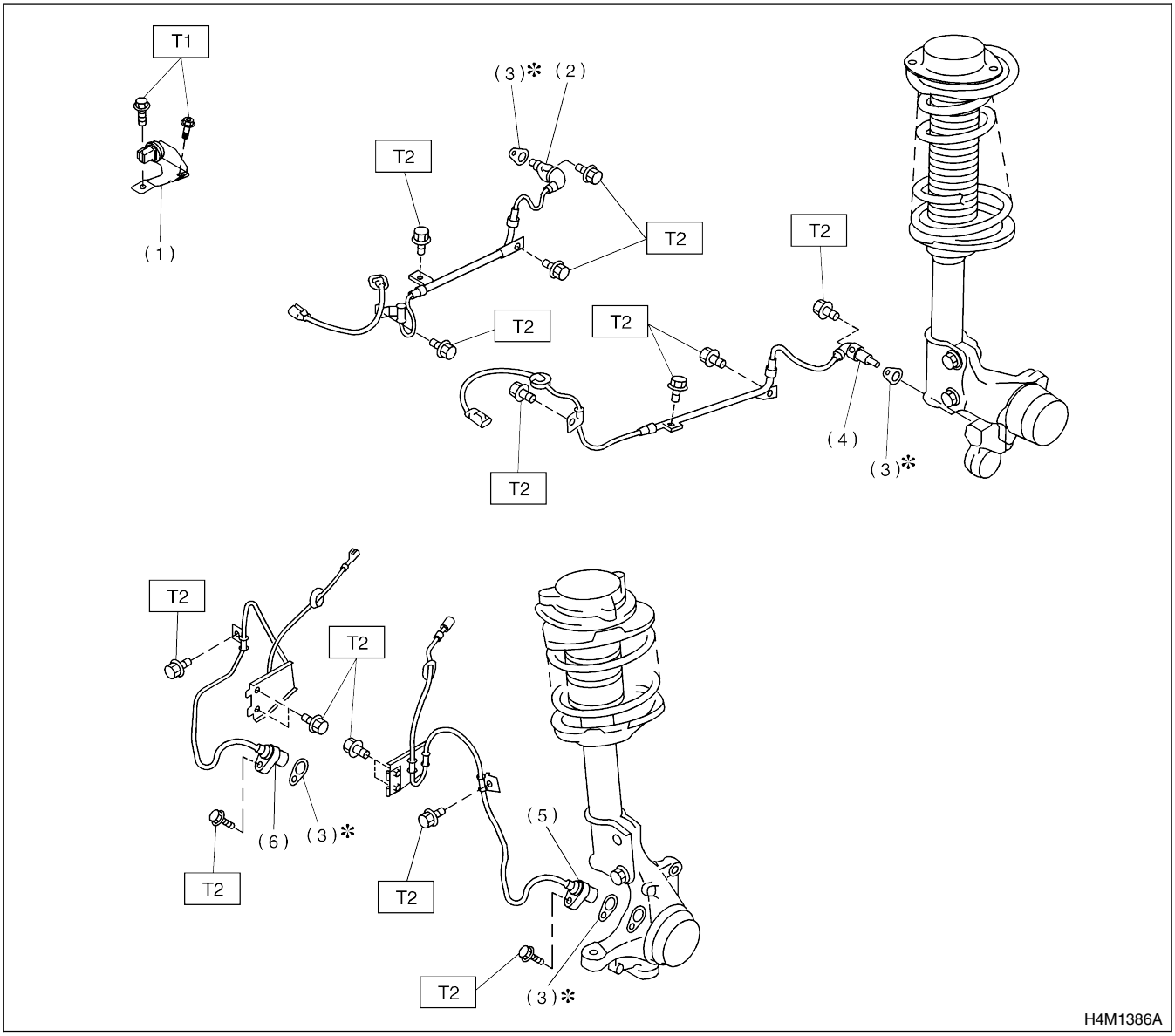
1. General Description S401001

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

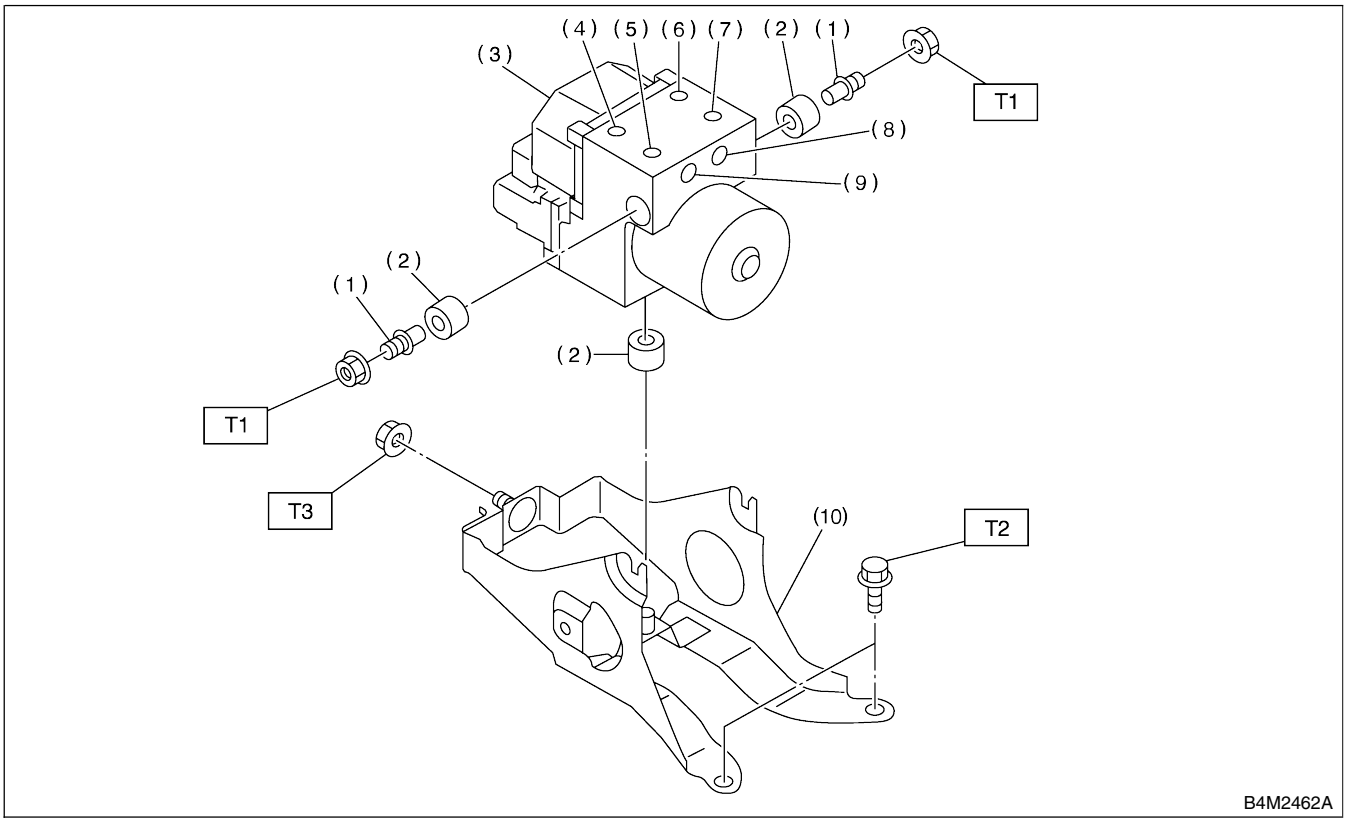
1. SENSOR S401001A0501



(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

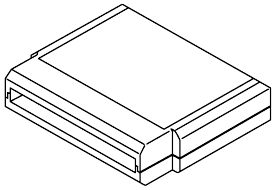
Tightening torque: N·m (kgf-m, ft-lb)
T1: 18 (1.8, 13.06)
T2: 32 (3.3, 24)
T3: 38 (3.8, 28)

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 negative terminal 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.

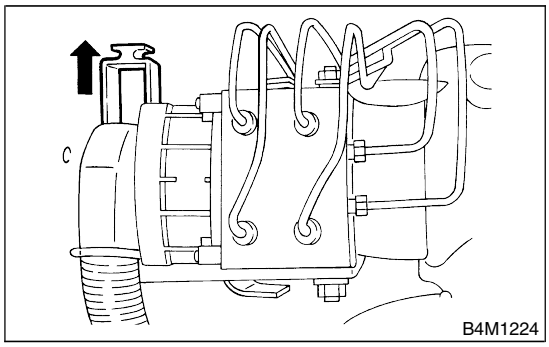
2. ABS Control Module and Hydraulic Control Unit (ABSCM&H/U) S401543

A: REMOVAL S401543A18

1) Disconnect ground terminal from battery.
2) Remove air intake duct from engine compartment to facilitate removal of ABSCM&H/U.
3) Use an air gun to get rid of water around the ABSCM&H/U.

CAUTION:
The contact will be insufficient if the terminal gets wet.

4) Pull off the lock of the ABSCM&H/U connector to remove it.


B4M1224

5) Disconnect connector from ABSCM&H/U.

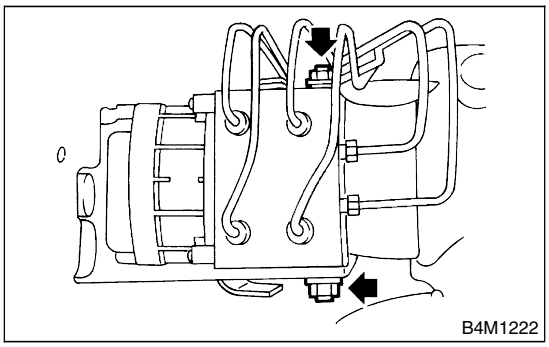
CAUTION:
Be careful not to let water or other foreign matter contact the ABSCM&H/U terminal.

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.

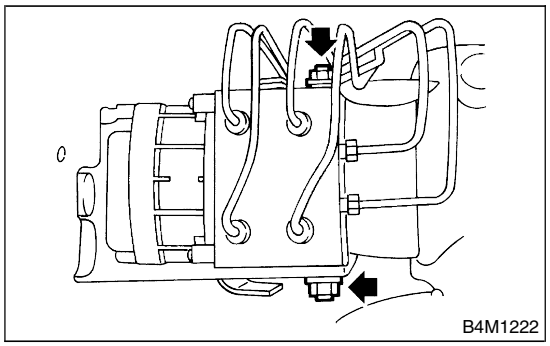
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

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)


B4M1222

4) Using cable clip, secure ABSCM&H/U harness to bracket.
5) Connect connector to ABSCM&H/U.

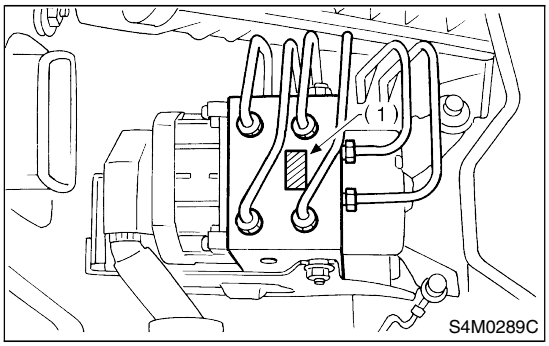
CAUTION:
• Be sure to remove all foreign matter from inside the connector before connecting.
• Ensure that the ABSCM&H/U connector is securely locked.

6) Install air intake duct.
7) Connect ground terminal to battery.
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

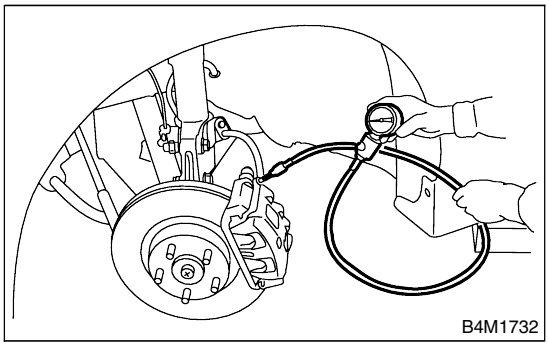
1. CHECKING THE HYDRAULIC UNIT ABS OPERATION BY PRESSURE GAUGE

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.


B4M1732

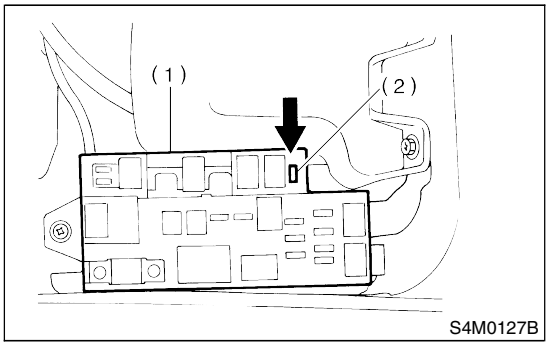
4) Bleed air from the pressure gauges.
5) Perform ABS sequence control.
<Ref. to ABS-11 ABS Sequence Control.>
6) When the hydraulic unit begins to work, and first the FL side performs decompression, holding, and compression, and then the FR side performs decompression, holding, and compression.
7) Read 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.

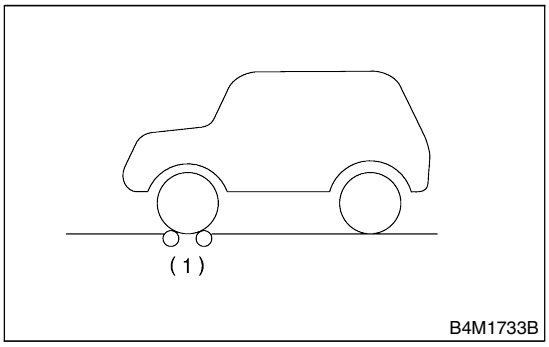
2. CHECKING THE HYDRAULIC UNIT ABS OPERATION WITH BRAKE TESTER S401543A1002

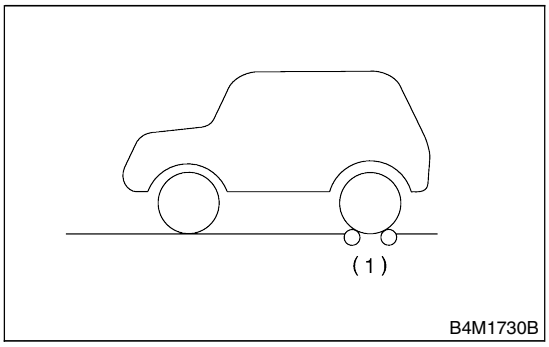
1) In the case of AWD AT vehicles, install a spare fuse with the FWD connector in the main fuse box to simulate FWD vehicles.



(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.

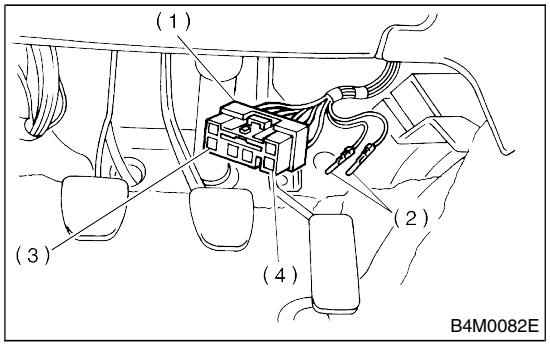
3. ABS Sequence Control S401187

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. 5 and No. 8 of the diagnosis connector beside driver's seat heater unit.



(1) Diagnosis connector
(2) Diagnosis terminals
(3) 3 terminal
(4) 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

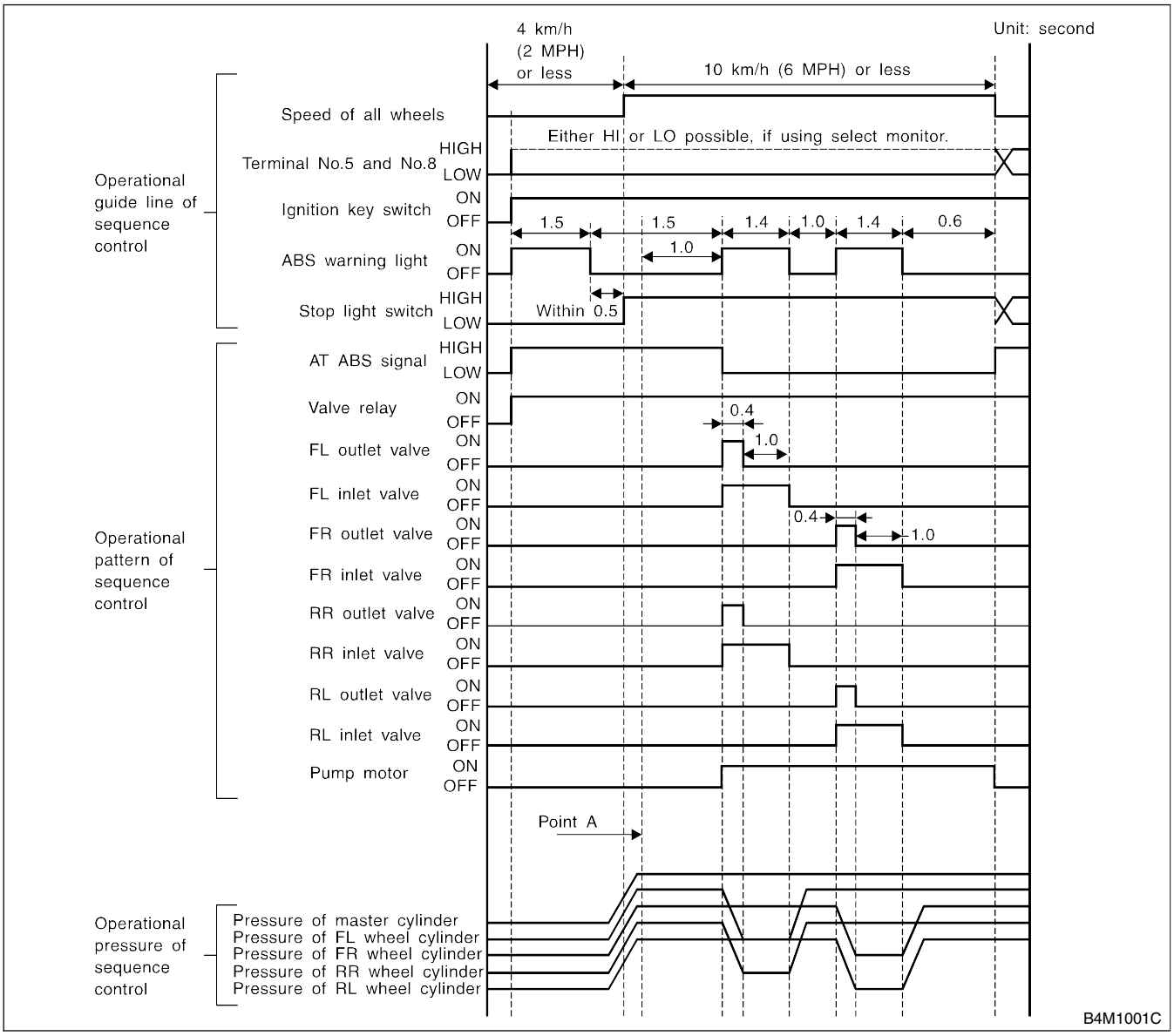
NOTE:
● In the event of any trouble, the sequence control may not be operative. In such a case, activate the sequence control, referring to "ABS SEQUENCE CONTROL WITH DIAGNOSIS CONNECTOR".
<Ref. to ABS-11 ABS SEQUENCE CONTROL WITH DIAGNOSIS CONNECTOR, OPERATION, ABS Sequence Control.>
● When the diagnosis 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 kg, 221 lb).
(2) When using the pressure gauge, depress brake pedal so as to make the pressure gauge indicate 3,432 kPa (35 kg/cm^2, 498 psi).

CAUTION:
Do not depress the clutch pedal.

7) When the message "Press YES" is displayed, press ≪YES≫ key.
8) Operation points will be displayed on select monitor.

3. CONDITIONS FOR 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.

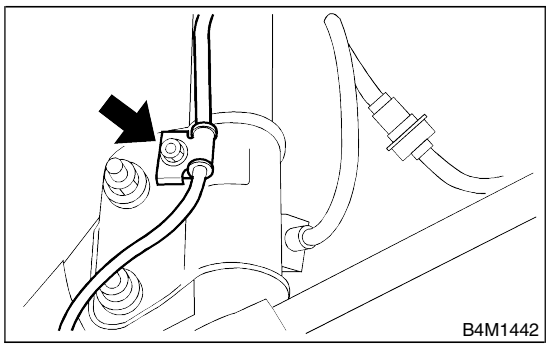
4. CONDITIONS FOR COMPLETION OF ABS SEQUENCE CONTROL S401187A1604

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. 5 or No. 8 are separated from diagnosis terminals. (When select monitor is not used.)
3) When the brake pedal is released during sequence control and the braking lamp switch is set to off.
4) When brake pedal is depressed after ignition key is turned to ON, and before ABS warning light goes out. (When select monitor is not used.)
5) When brake pedal is not depressed after ignition key is turned to ON, and within 0.5 seconds after ABS warning light goes out. (When select monitor is not used.)
6) After completion of the sequence control.
7) When malfunction is detected. (When select monitor is used.)

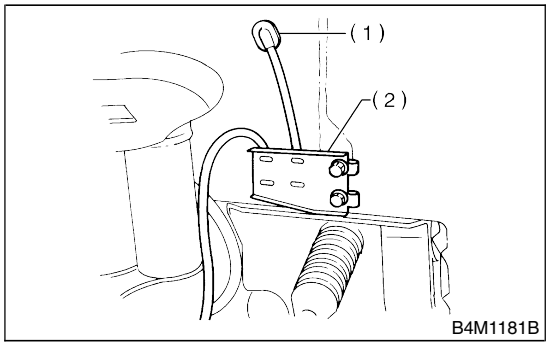
4. Front ABS Sensor S401190

A: REMOVAL S401190A18

1) Set vehicle on a lift.
2) Disconnect battery ground terminal.
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.



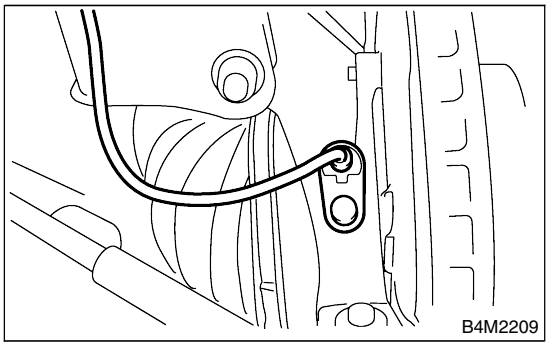
7) Remove bolts which secure sensor harness to body.



(1) To front ABS sensor connector
(2) Bracket

8) Remove bolts which secure front ABS sensor to housing, and remove front ABS sensor.

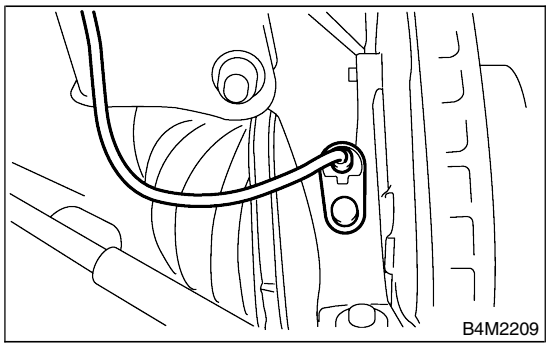
CAUTION:
- **Be careful not to damage pole piece located at tip of the sensor and teeth faces during removal.**
- **Do not pull sensor harness during removal.**



B: INSTALLATION S401190A11

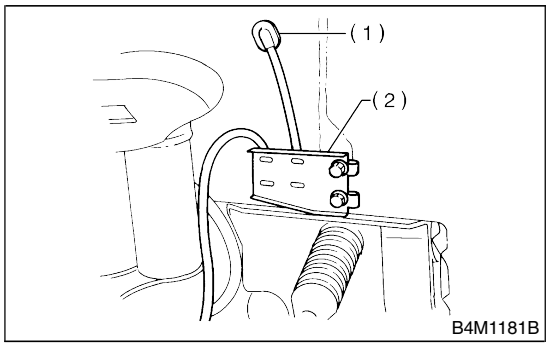
1) Temporarily install front ABS sensor on housing.

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)

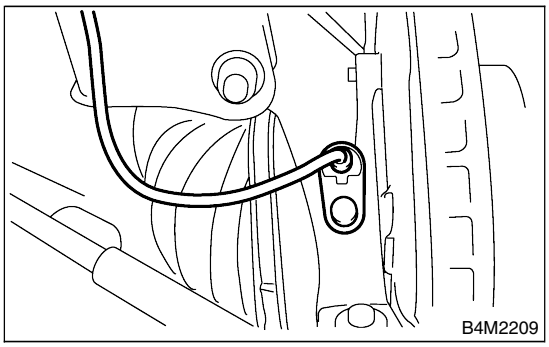


(1) To front ABS sensor connector
(2) Bracket

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

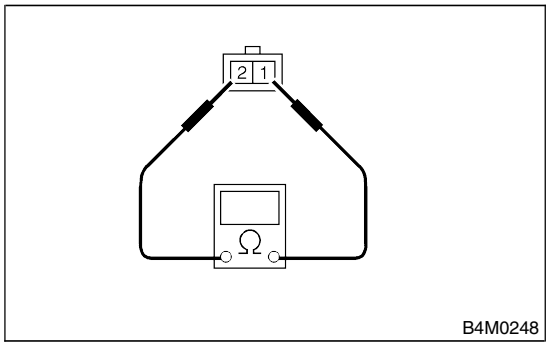
NOTE:
If the clearance is outside specifications, readjust.

4) After confirmation of the ABS sensor clearance, connect connector to ABS sensor.
5) Install the wheels.
6) Connect connector to battery ground terminal.

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.



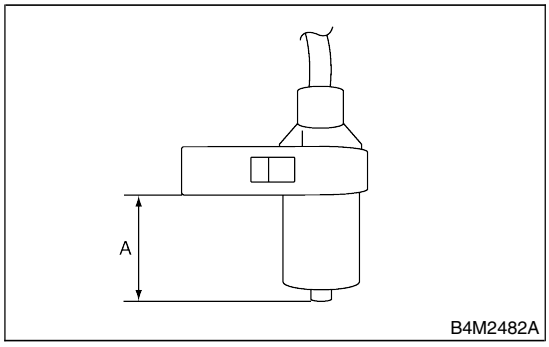
Terminal No.	Standard
1 and 2	1.25±0.25 kΩ

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.

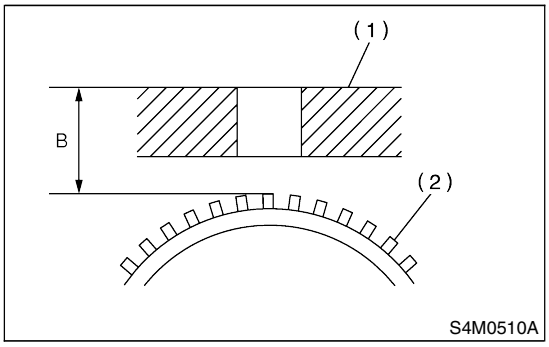
2. SENSOR GAP S401190A1002

1) Measure the distance “A” between ABS sensor surface and sensor pole face.



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.



(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 valves in the formula below and calculating.

ABS sensor clearance = B – A

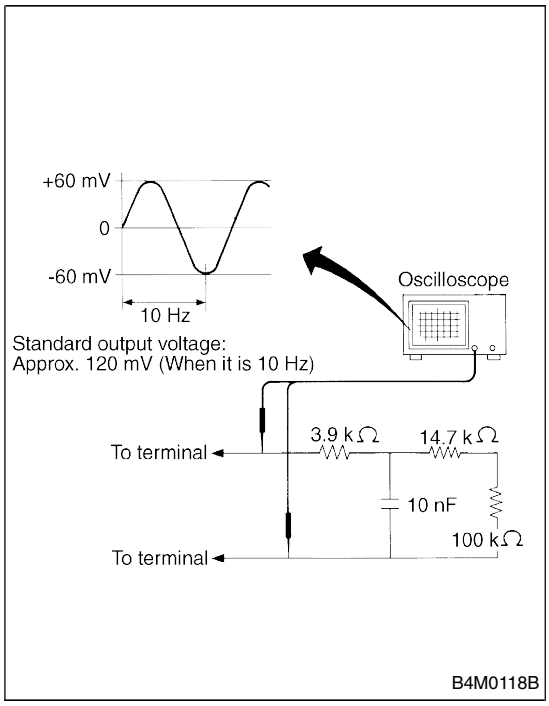
ABS sensor standard clearance:
0.3 — 0.8 mm (0.012 — 0.031 in)

NOTE:
If the clearance is outside specifications, readjust.

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.



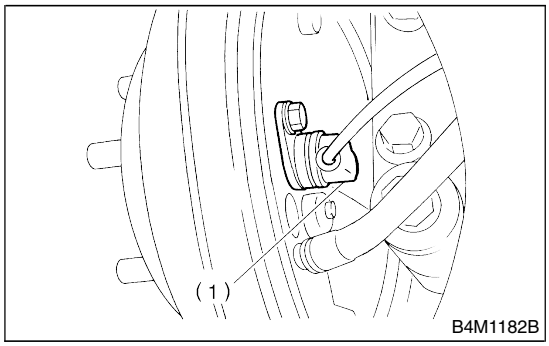
D: ADJUSTMENT S401190A01

Adjust the gap using spacer (Part No. 26755A000).

5. Rear ABS Sensor S401185

A: REMOVAL S401185A18

1) Set vehicle on a lift.
2) Disconnect battery ground terminal.
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.

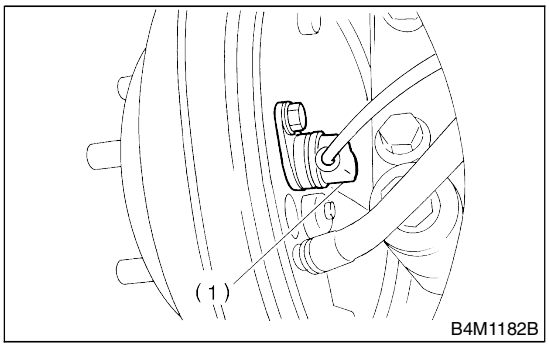


(1) Rear ABS sensor

B: INSTALLATION S401185A11

1) Temporarily install rear ABS sensor on back plate.

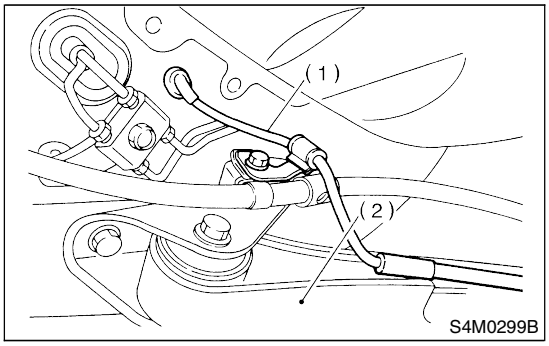
CAUTION:
Be careful not to strike ABS sensor's pole piece and tone wheel's teeth against adjacent metal parts during installation.



(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

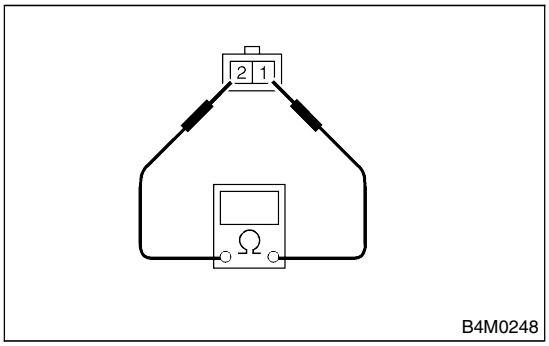
NOTE:
If the clearance is outside specifications, readjust.

4) Connect rear ABS sensor connector.
5) Install rear seat.
6) Install wheels.
7) Connect battery ground terminal.

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.



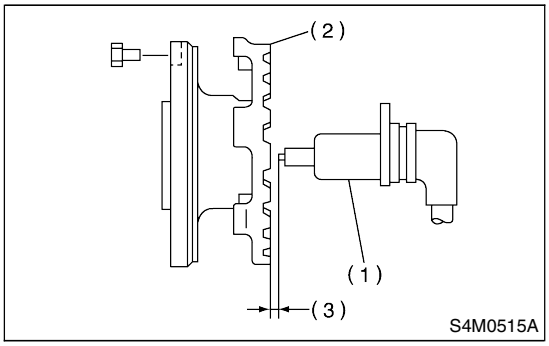
Terminal No.	Standard
1 and 2	1.0±0.2 kΩ

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

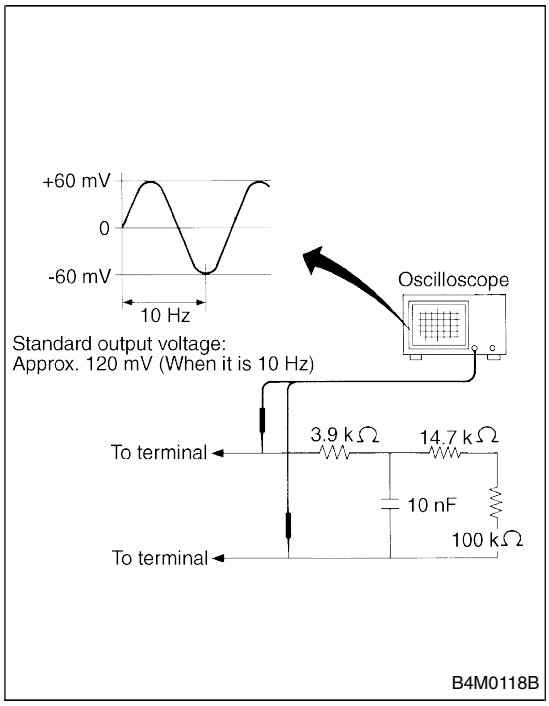
ABS sensor clearance:
0.7 — 1.2 mm (0.028 — 0.047 in)

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:
Replace BJ assembly with new one as a single unit if there are any defects found on tone wheel is unitized with BJ assembly of drive shaft.

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.>

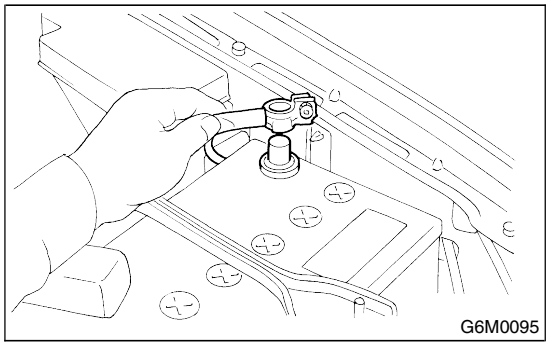
C: INSPECTION S401182A10

Visually check tone wheels teeth (44 pieces) for cracks or dents. If necessary, replace tone wheel with a new one.

8. G Sensor S401183

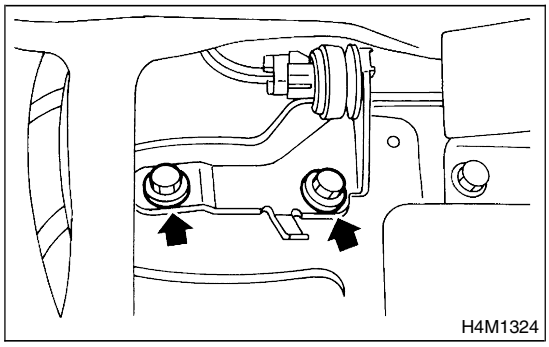
A: REMOVAL S401183A18

1) Disconnect battery ground terminal.


G6M0095

2) Remove console cover.
<Ref. to EI-30 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)			2000		
Driving system			AWD		
Model			Others	Non-TURBO Australia	TURBO
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)	218.8 × 35.0 × 4.1 (8.61 × 1.378 × 0.161)	—	
	Clearance adjustment		Automatic adjustment	—	
Master cylinder	Type		Tandem		
	Effective diameter	mm (in)	26.99 (1-1/16)		
	Reservoir type		Sealed type		
	Brake fluid reservoir capacity	cm^3 (cu in)	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			OP		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.>

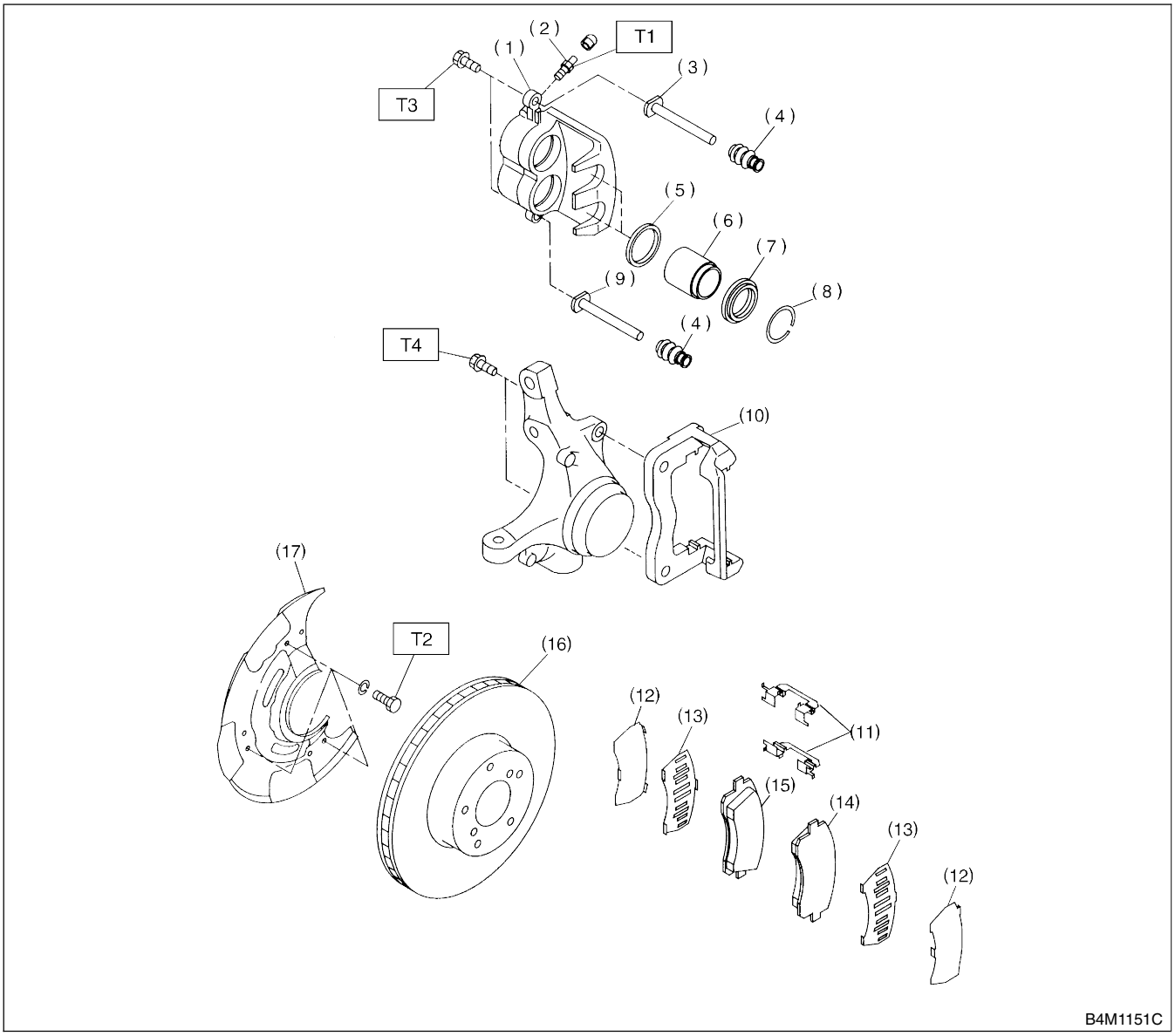
ITEM		STANDARD	SERVICE LIMIT
Front brake	Pad thickness (including back metal)	17 mm (0.67 in)	7.5 mm (0.295 in)
	Disc thickness	24 mm (0.94 in)	22 mm (0.87 in)
	Disc runout	—	0.075 mm (0.0030 in)
Rear brake (Disc type)	Pad thickness (including back metal)	14 mm (0.55 in)	6.5 mm (0.256 in)
	Disc thickness	10 mm (0.39 in)	8.5 mm (0.335 in)
	Disc runout	—	0.070 mm (0.0028 in)
Rear brake (Drum type)	Inside diameter	228.6 mm (9 in)	230.6 mm (9.08 in)
	Lining thickness	4.1 mm (0.161 in)	1.5 mm (0.059 in)
Rear brake (Disc type parking)	Inside diameter	170 mm (6.69 in)	171 mm (6.73 in)
	Lining thickness	3.2 mm (0.126 in)	1.5 mm (0.059 in)
Parking brake	Lever stroke	7 to 8 notches/196 N (20 kgf, 44 lb)	

		Brake pedal force	Fluid pressure
Brake booster	Brake fluid pressure without engine running	147 N (15 kgf, 33 lb)	588 kPa (6 kg/cm^2, 85 psi)
		294 N (30 kgf, 66 lb)	1,667 kPa (17 kg/cm^2, 242 psi)
	Brake fluid pressure with engine running and vacuum at 66.7 kPa (500 mmHg, 19.69 inHg)	147 N (15 kgf, 33 lb)	5,394 kPa (55 kg/cm^2, 782 psi)
		294 N (30 kgf, 66 lb)	10,003 kPa (102 kg/cm^2, 1,450 psi)

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

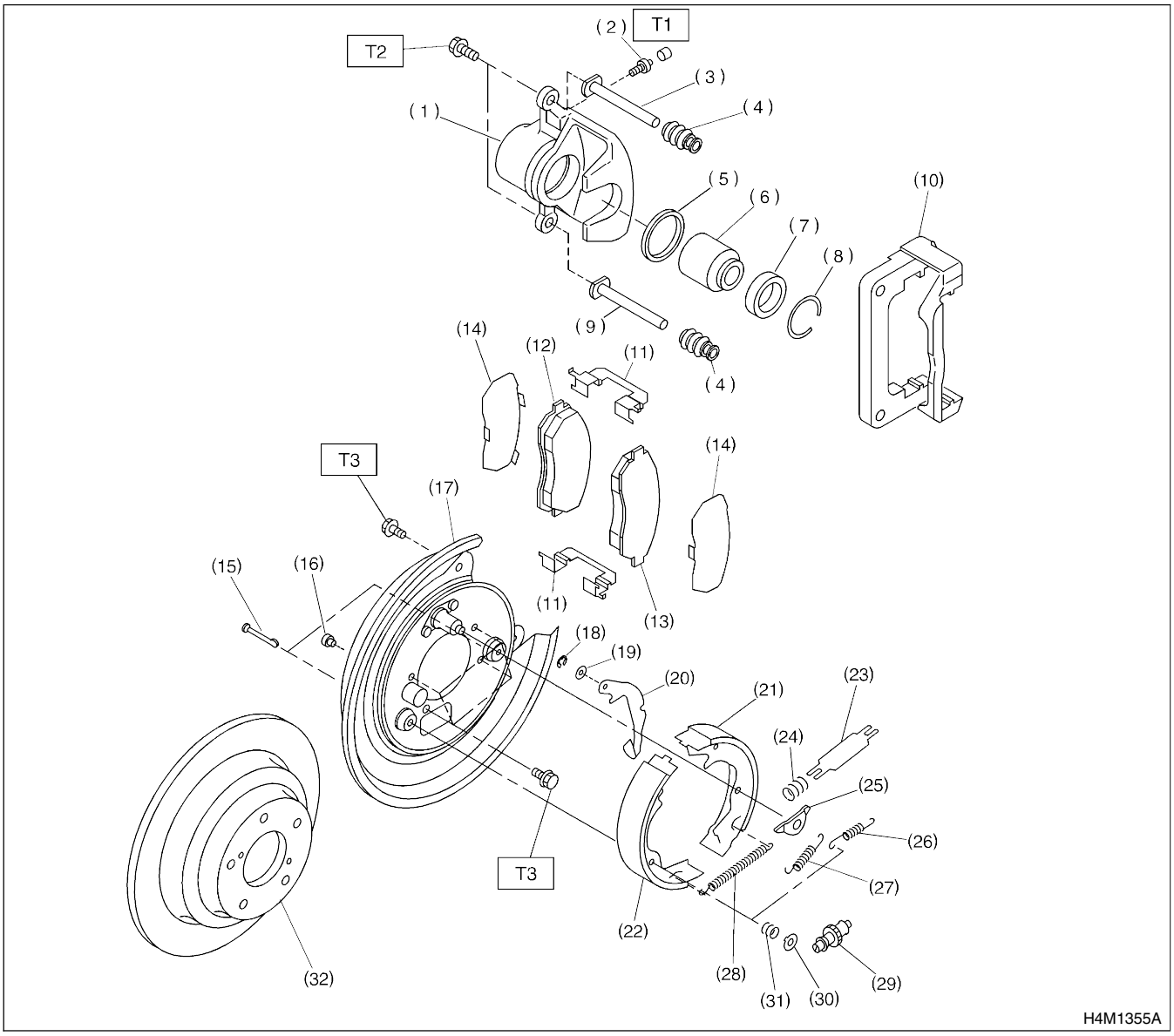
1. FRONT DISC BRAKE S405001A0511



(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

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.0)
T3: 39 (4.0, 28.9)
T4: 78 (8.0, 58)

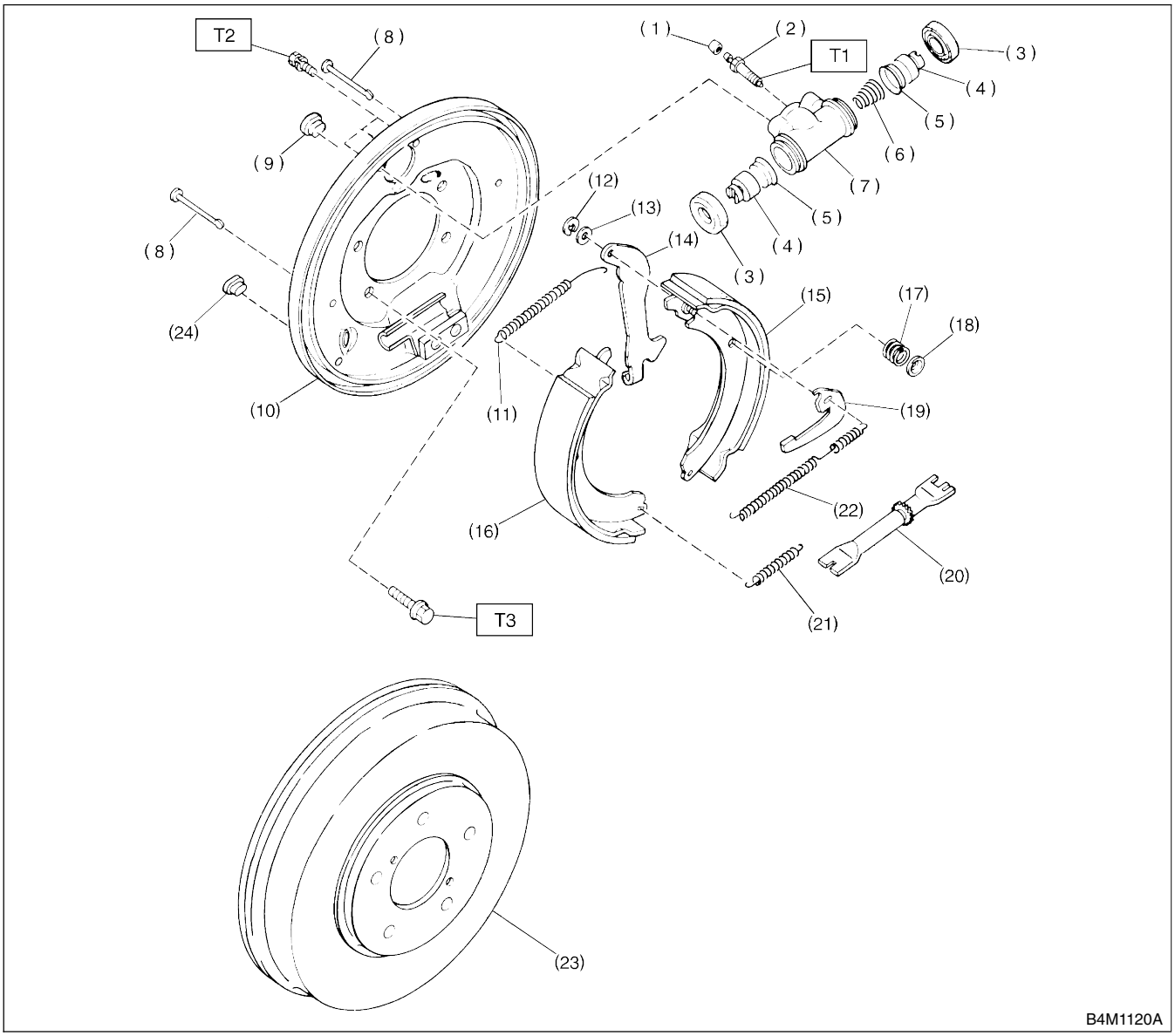
2. REAR DISC BRAKE S405001A0503



(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

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 39 (4.0, 28.9)
T3: 52 (5.3, 38.3)

3. REAR DRUM BRAKE S405001A0504

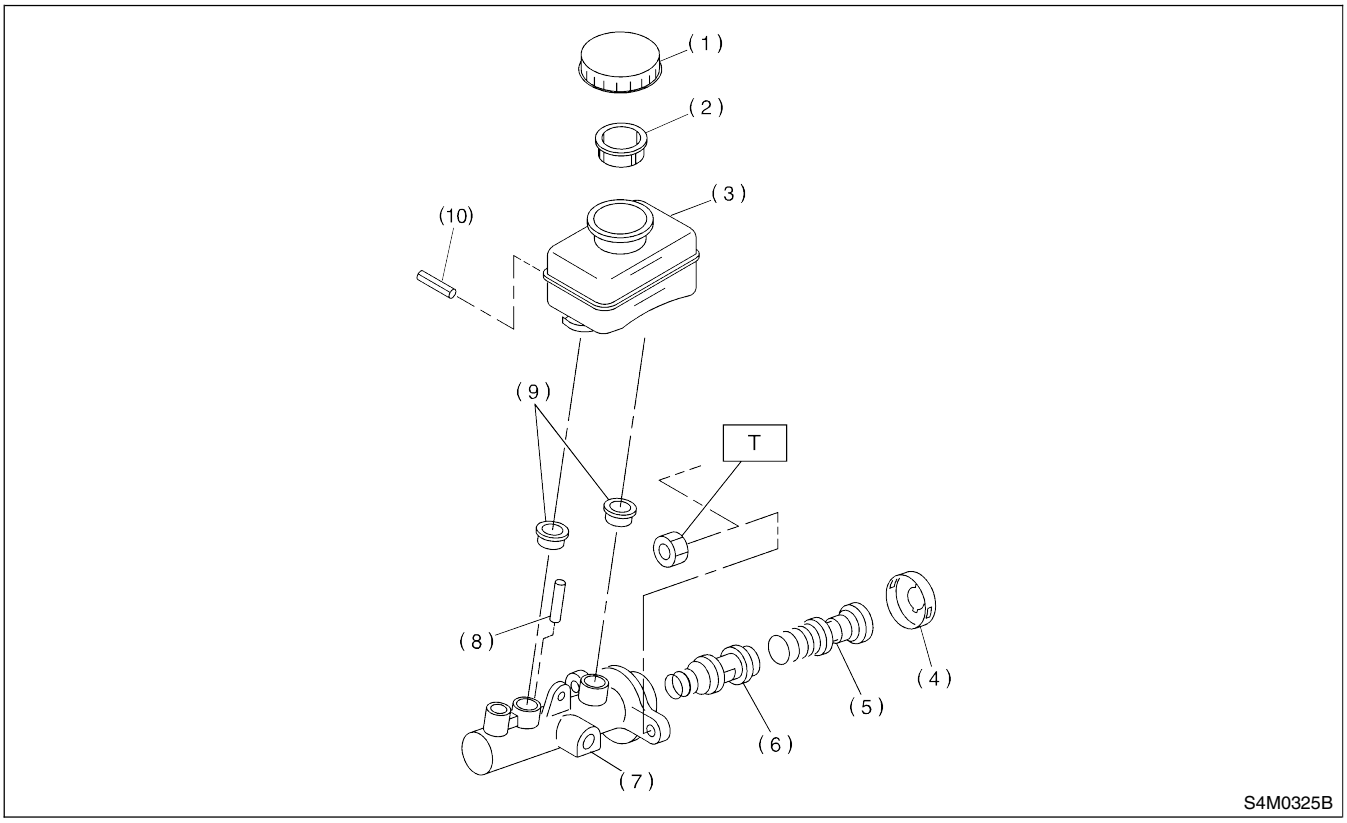


(1) Air bleeder cap
(2) Air bleeder screw
(3) Boot
(4) Piston
(5) Cup
(6) Spring
(7) Wheel cylinder body
(8) Pin
(9) Plug
(10) Back plate
(11) Upper shoe return spring
(12) Retainer
(13) Washer
(14) Parking brake lever
(15) Brake shoe (Trailing)
(16) Brake shoe (Leading)
(17) Shoe hold-down spring
(18) 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: 52 (5.3, 38.3)

4. MASTER CYLINDER S405001A0505

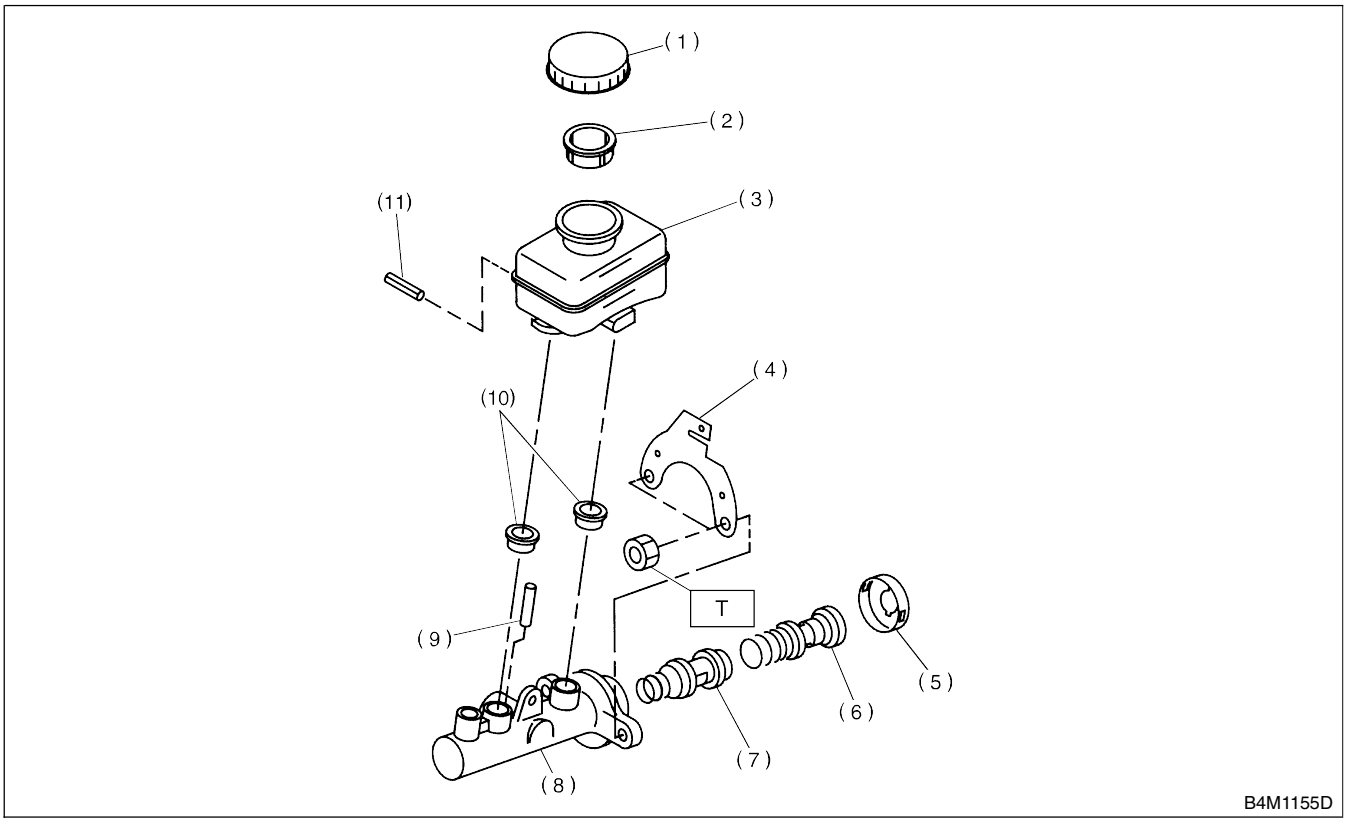
● LHD model



(1) Cap
(2) Filter
(3) Reservoir tank
(4) Piston retainer
(5) Primary piston
(6) Secondary piston
(7) Cylinder body
(8) Cylinder pin (With ABS)
(9) Seal
(10) Pin

Tightening torque: N·m (kgf-m, ft-lb)
T: 14 (1.4, 10.1)

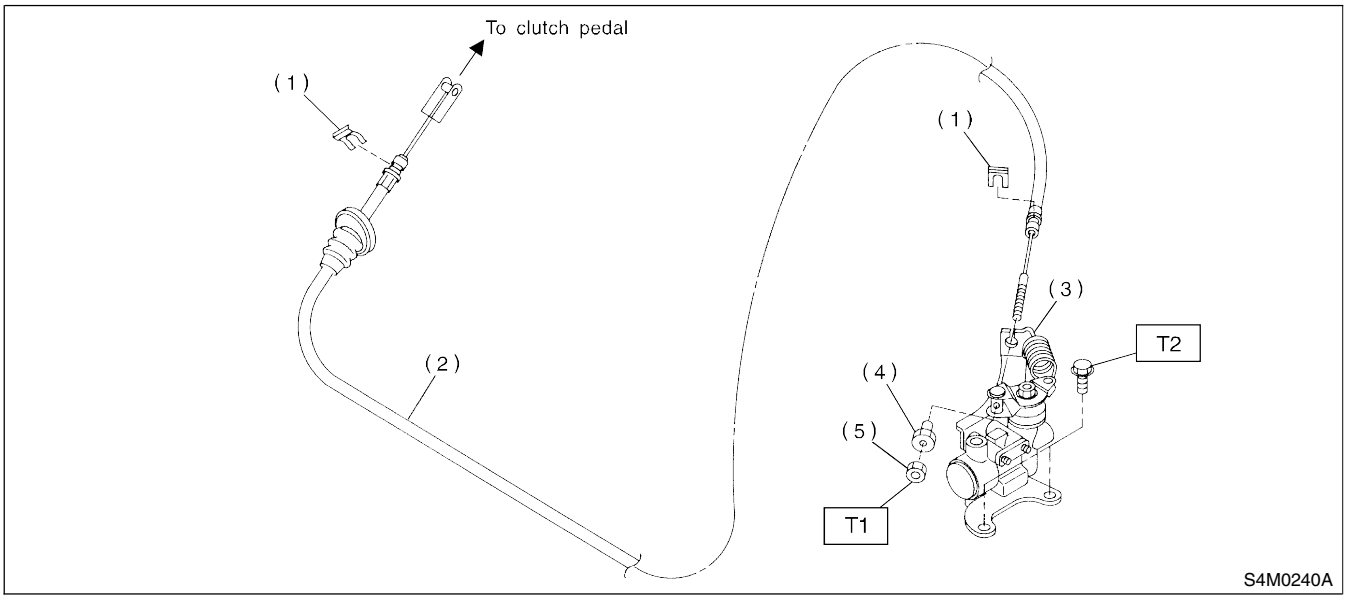
● RHD model



(1) Cap
(2) Filter
(3) Reservoir tank
(4) Bracket
(5) Piston retainer
(6) Primary piston
(7) Secondary piston
(8) Cylinder body
(9) Cylinder pin (With ABS)
(10) Seal
(11) Pin

Tightening torque: N·m (kgf-m, ft-lb)
T: 14 (1.4, 10.1)

5. HILL HOLDER S405001A0510

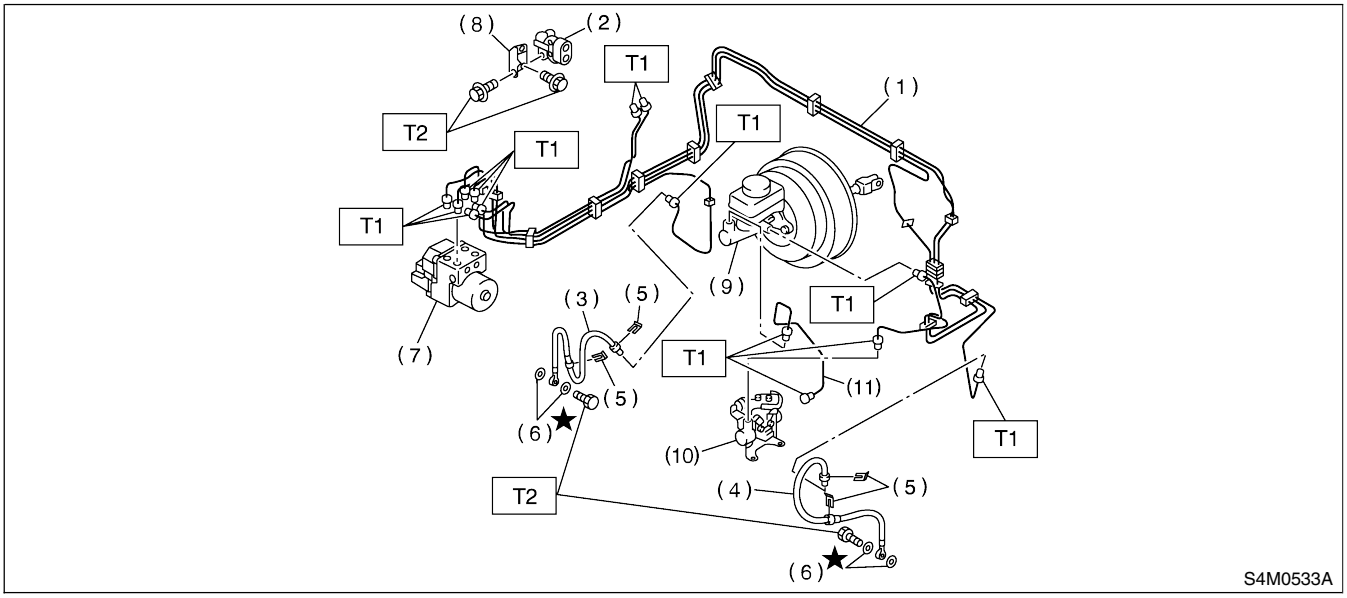


(1) Clamp
(2) PHV cable
(3) PHV (Pressure hold valve)
(4) Adjusting nut
(5) Lock nut

Tightening torque: N·m (kgf-m, ft-lb)
T1: 3.5 (0.35, 2.5)
T2: 18 (1.8, 13.0)

6. BRAKE PIPES AND HOSE S405001A0506

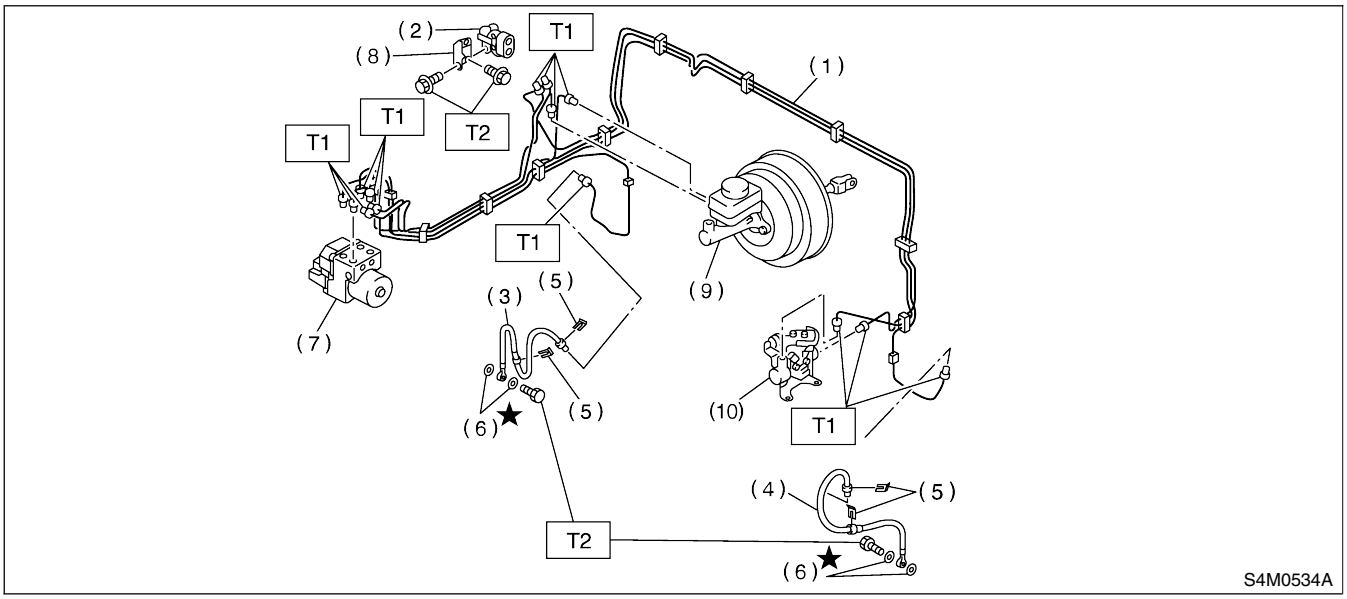
● Front brake pipe for model with ABS (LHD)



(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
(10) Hill holder
(11) Adapter pipe

Tightening torque: N·m (kgf-m, ft-lb)
T1: 15 (1.5, 10.8)
T2: 18 (1.8, 13.0)

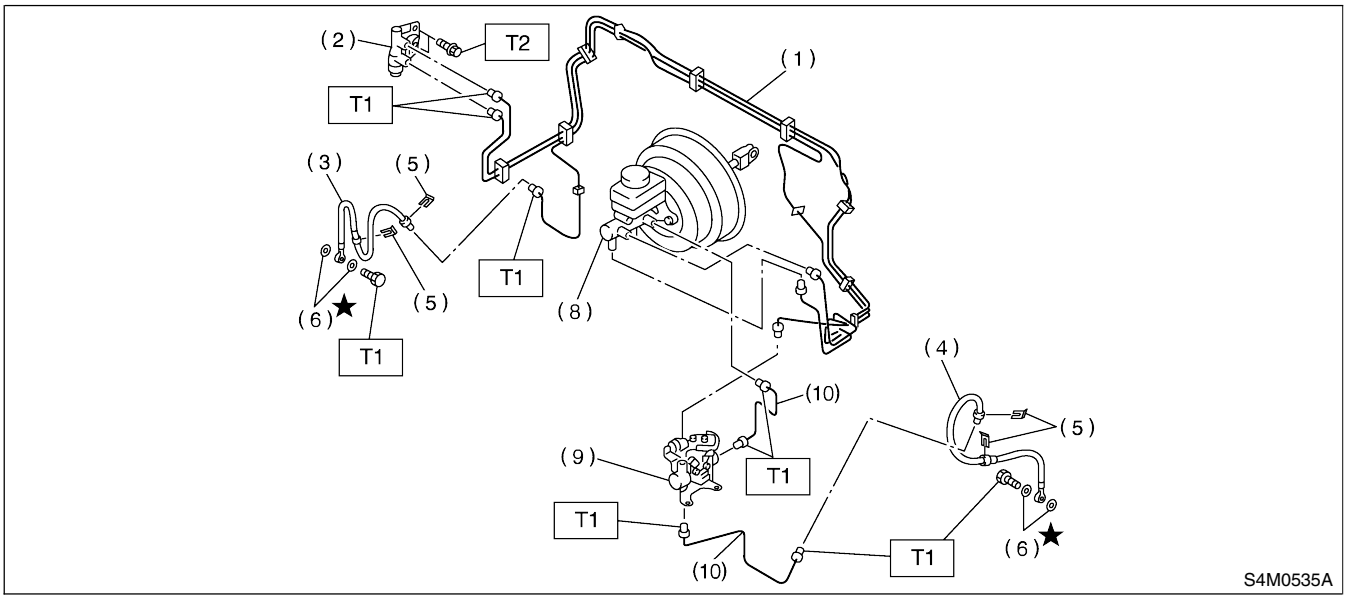
● Front brake pipe for model with ABS (RHD)



(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
(10) Hill holder
(11) Adapter pipe

Tightening torque: N·m (kgf-m, ft-lb)
T1: 15 (1.5, 10.8)
T2: 18 (1.8, 13.0)

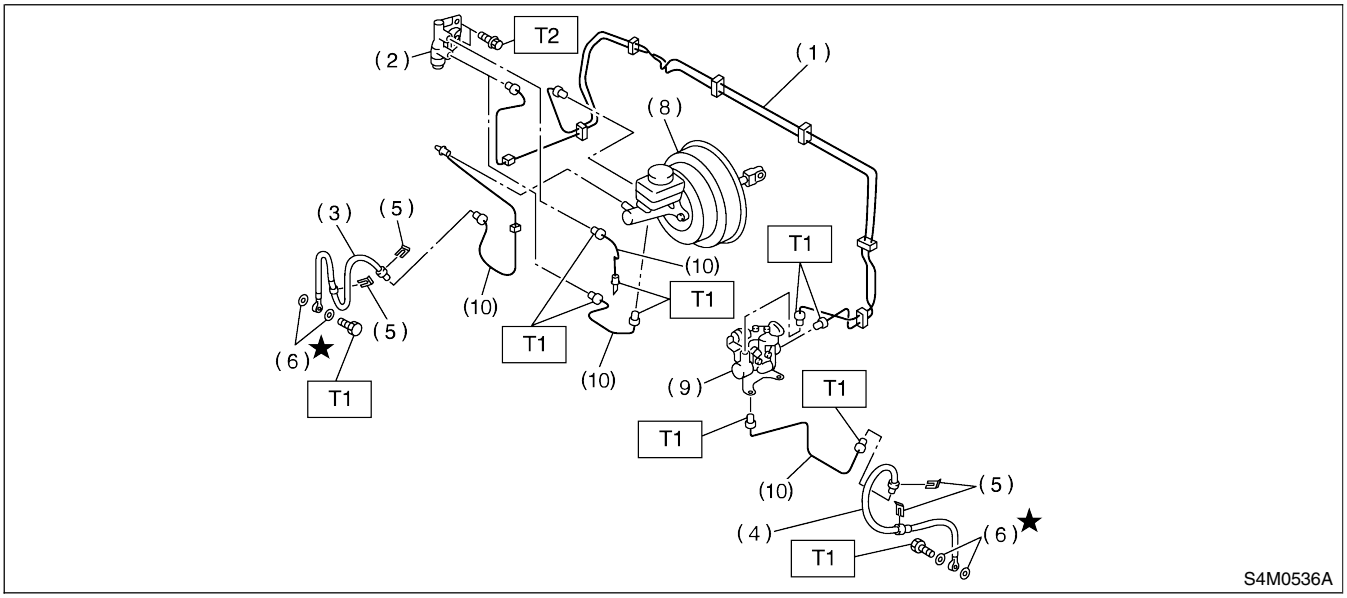
● Front brake pipe for model without ABS (LHD)



(1) Front brake pipe assembly
(2) Proportioning valve
(3) Front brake hose RH
(4) Front brake hose LH
(5) Clamp
(6) Gasket
(7) Bracket
(8) Master cylinder
(9) Hill holder
(10) Adapter pipe

Tightening torque: N·m (kgf-m, ft-lb)
T1: 15 (1.5, 10.8)
T2: 18 (1.8, 13.0)

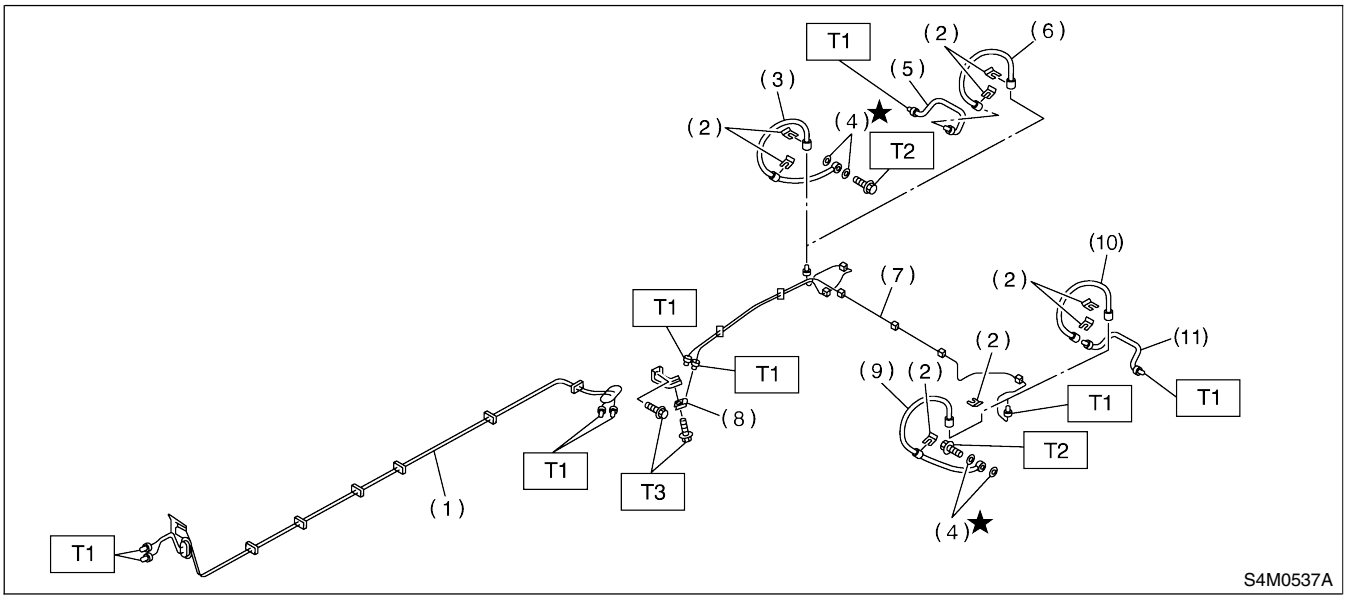
● Front brake pipe for model without ABS (RHD)



(1) Front brake pipe assembly
(2) Proportioning valve
(3) Front brake hose RH
(4) Front brake hose LH
(5) Clamp
(6) Gasket
(7) Bracket
(8) Master cylinder
(9) Hill holder
(10) Adapter pipe

Tightening torque: N·m (kgf-m, ft-lb)
T1: 15 (1.5, 10.8)
T2: 18 (1.8, 13.0)

● Center and rear brake pipe

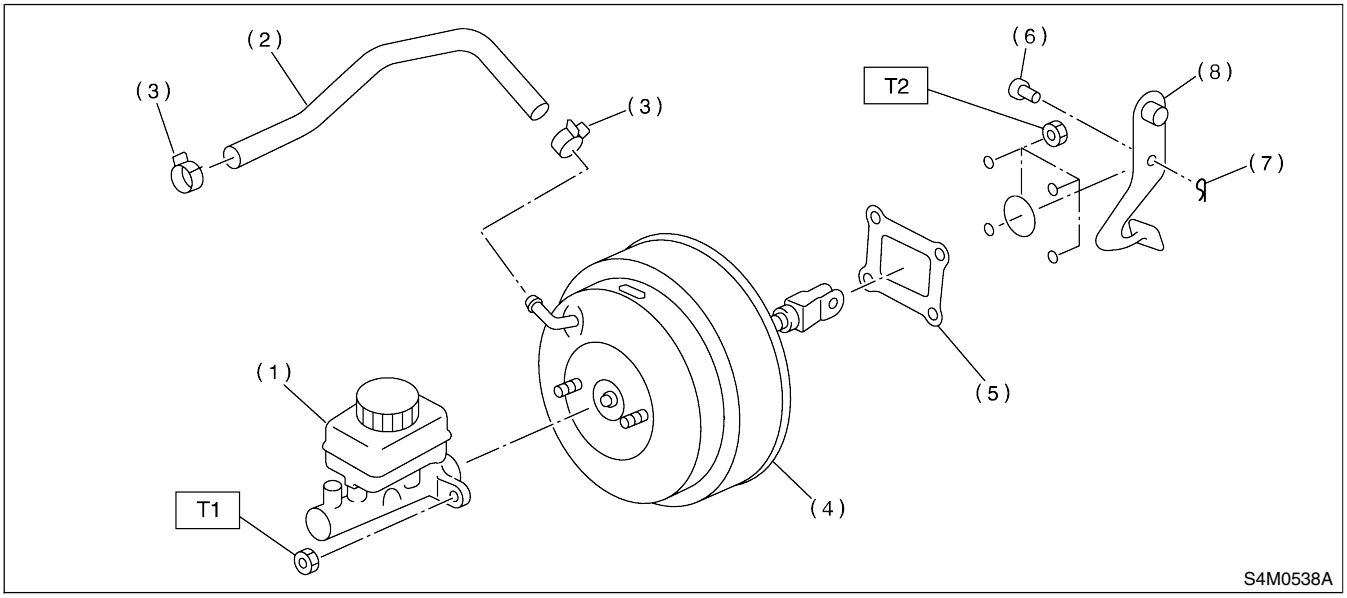


(1) Center brake pipe assembly
(2) Clamp
(3) Rear brake hose RH (With ABS)
(4) Gasket
(5) Rear brake pipe RH (Without ABS)
(6) Rear brake hose RH (Without ABS)
(7) Rear brake pipe assembly
(8) Two-way connector
(9) Rear brake hose LH (With ABS)
(10) Rear brake hose LH (Without ABS)
(11) Rear brake pipe LH (Without ABS)

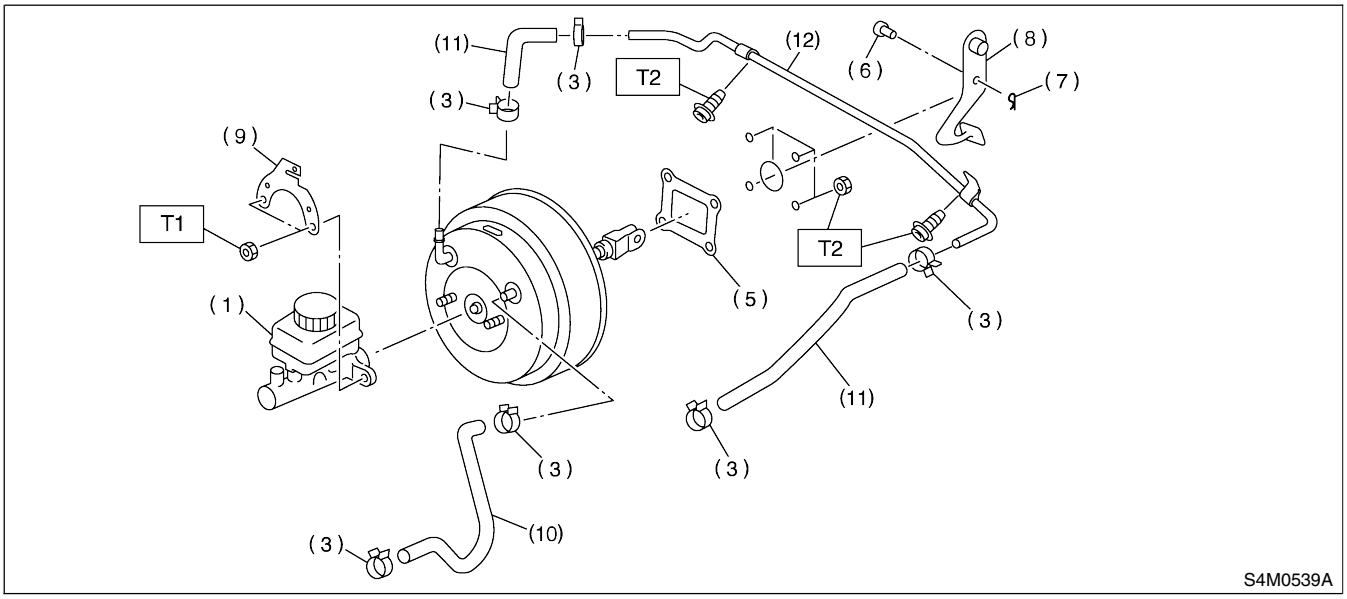
Tightening torque: N·m (kgf-m, ft-lb)
T1: 15 (1.5, 10.8)
T2: 18 (1.8, 13.0)
T3: 32 (3.3, 23.6)

7. BRAKE BOOSTER S405001A0507

● LHD model



● RHD model

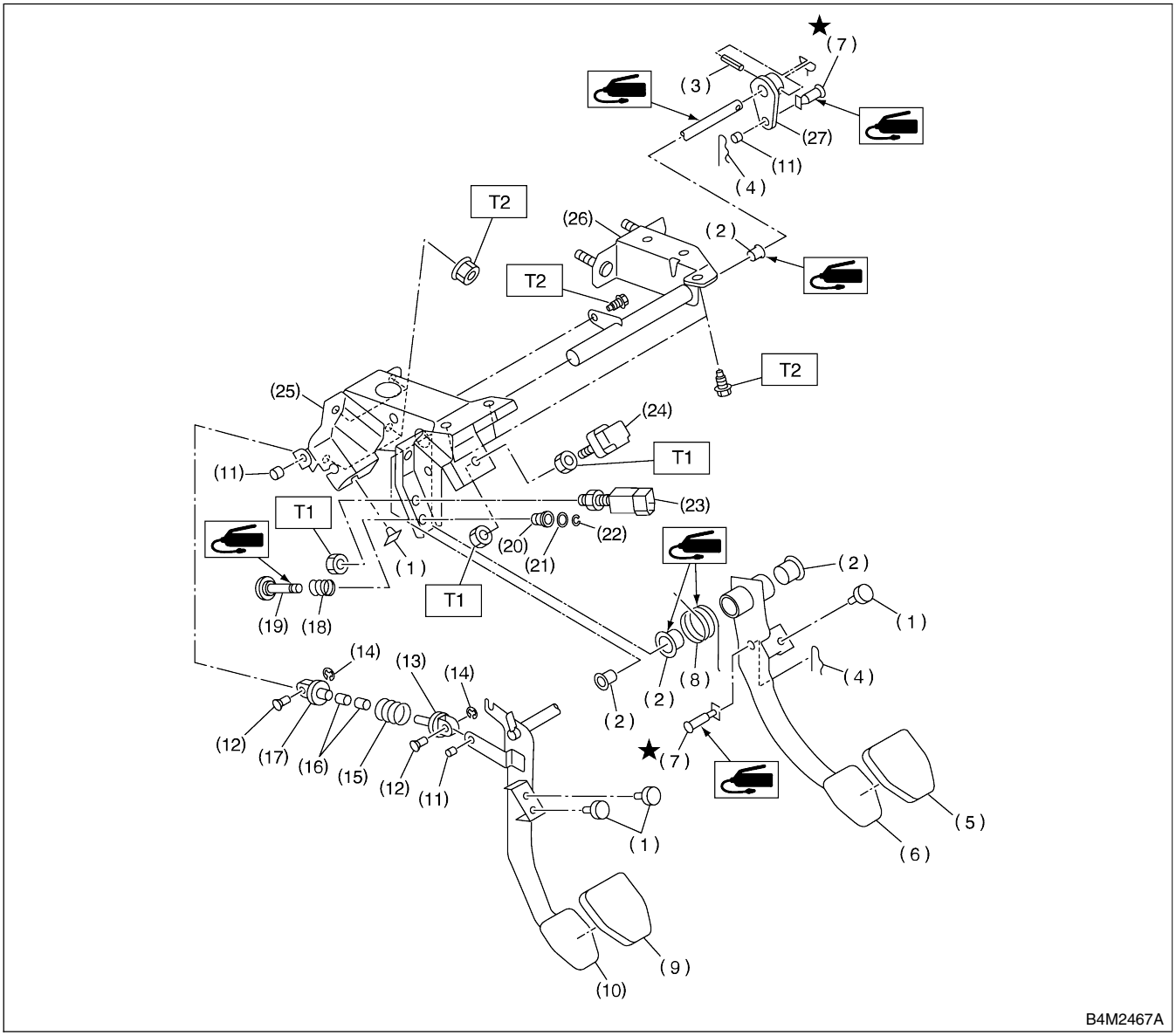


(1) Brake master cylinder
(2) Vacuum hose
(3) Clip
(4) Brake booster assembly
(5) Seal
(6) Clevis pin
(7) Snap pin
(8) Brake pedal
(9) Bracket
(10) Vacuum hose (Non-turbo model)
(11) Vacuum hose (Turbo model)
(12) Vacuum pipe (Turbo model)

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

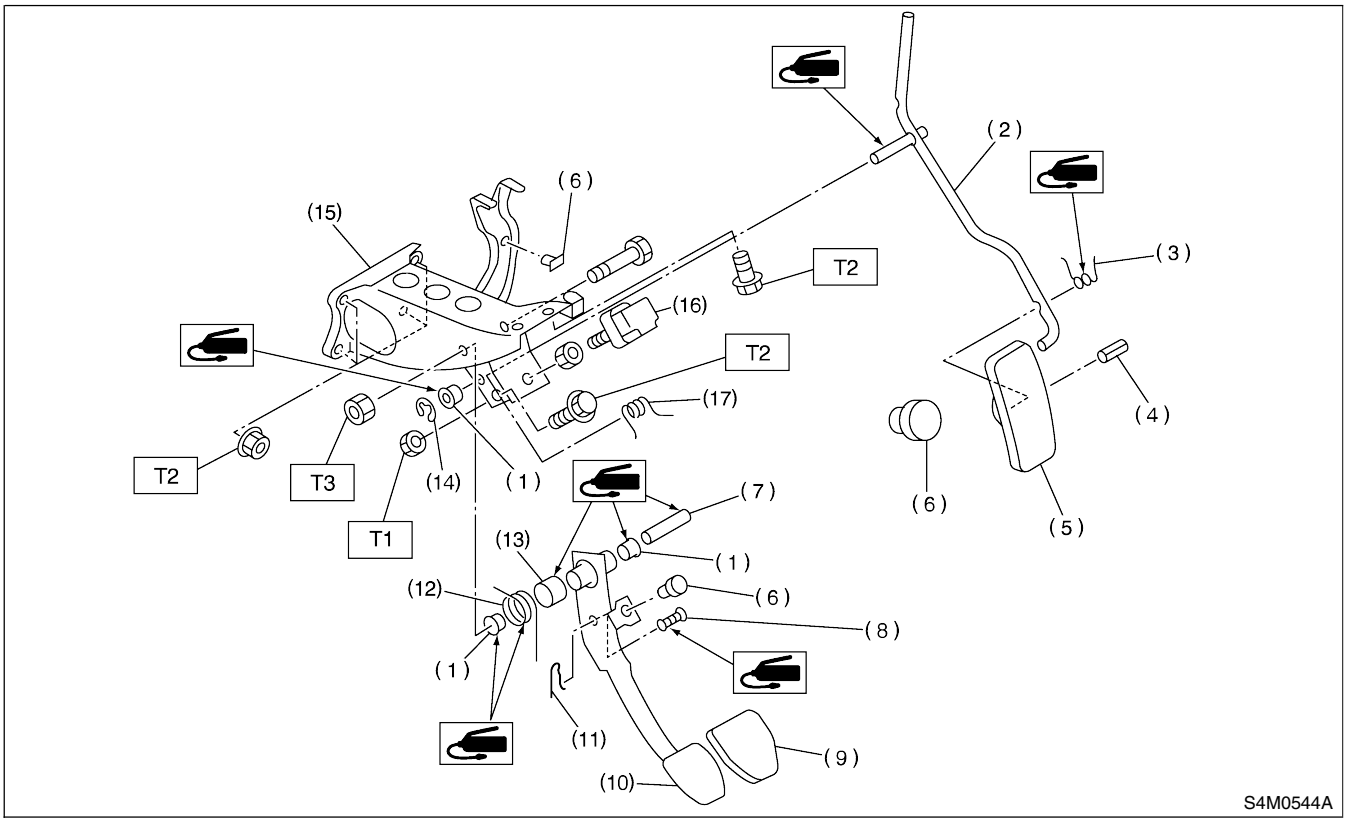
● LHD model



(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)

● RHD model

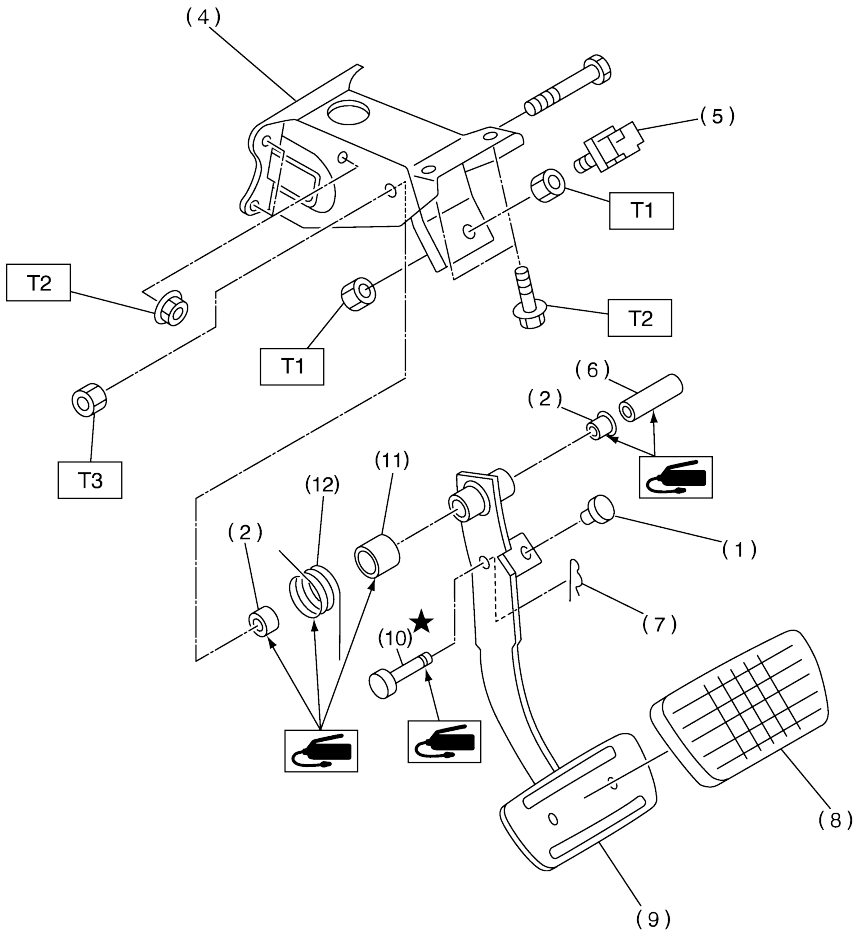


(1) Bushing
(2) Accelerator pedal
(3) Accelerator pedal spring
(4) Spring pin
(5) Accelerator pedal pad
(6) Stopper
(7) Spacer
(8) Clevis pin
(9) Brake pedal pad
(10) Brake pedal
(11) Snap pin
(12) Brake pedal spring
(13) Brake spacer
(14) Clip
(15) Pedal bracket
(16) Stop light switch
(17) Accelerator spring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.0)
T3: 29 (3.0, 21.7)

9. BRAKE PEDAL FOR AT MODEL S405001A0509

- **LHD model**

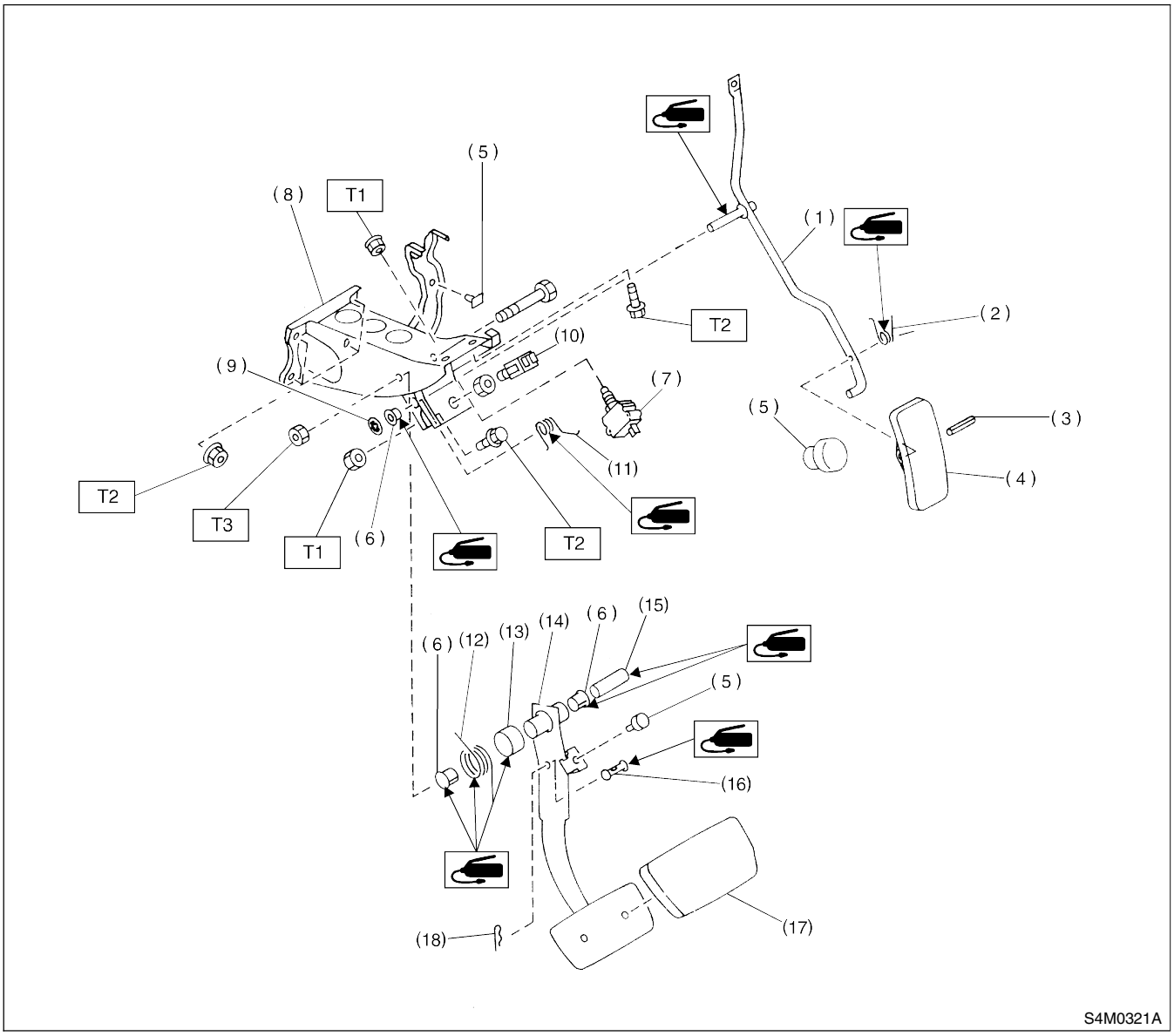


B4M2346A

(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)

● RHD model



(1) Accelerator pedal
(2) Accelerator pedal spring
(3) Spring pin
(4) Accelerator pedal pad
(5) Stopper
(6) Bushing
(7) Kick-down switch
(8) Pedal bracket
(9) Clip
(10) Stop light switch
(11) Accelerator spring
(12) Brake pedal spring
(13) Brake spacer
(14) Brake pedal
(15) Spacer
(16) Clevis pin
(17) Brake pedal pad
(18) Snap pin

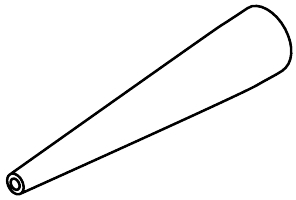
Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.0)
T3: 29 (3.0, 21.7)

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).

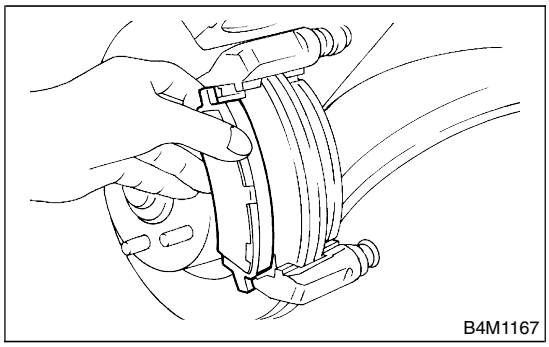
2. GENERAL PURPOSE TOOLS S405001A1702

TOOL NAME	REMARKS
Snap Ring Pliers	Used for removing and installing snap ring.

2. Front Brake Pad S405178

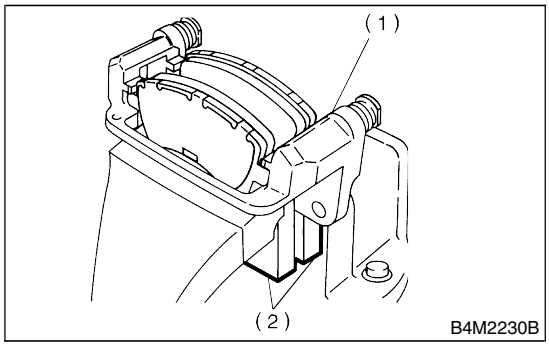
A: REMOVAL S405178A18

1) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
2) Remove lock pin.
3) Raise caliper body.
4) Remove pad.


B4M1167

NOTE:
If brake pad is difficult to remove, proceed as follows:

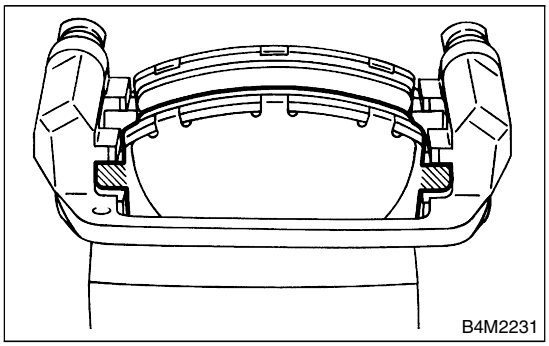
(1) Remove caliper body and fasten it provisionally to coil spring.
(2) Remove support.
(3) Place a support in a vise between wooden blocks.



B4M2230B

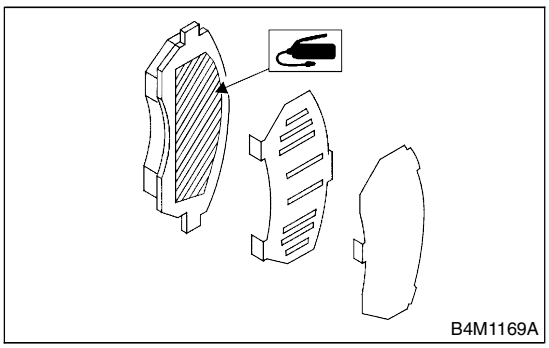
(1) Support
(2) Wooden blocks

(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.


B4M2231

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. (Australia model)


B4M1169A

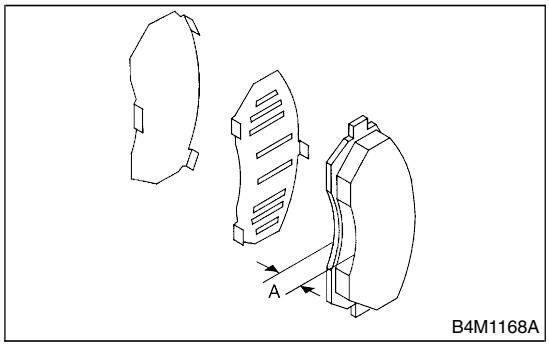
3) Install pads on support.
4) Install caliper body on support.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

NOTE:
If it is difficult to push piston during pad replacement, loosen air bleeder to facilitate work.

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)

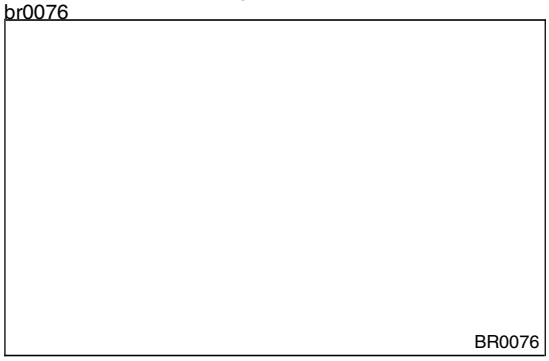
CAUTION:
● Always replace the pads for both the left and right wheels at the same time. Also replace pad clips if they are twisted or worn.
● A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of the wear indicator contacts the disc rotor, a 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

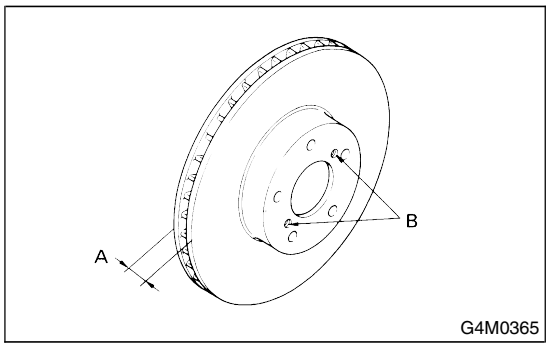
1) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
2) Remove caliper body from housing, and suspend it from strut using a wire.

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.



4) Clean mud and foreign particles from caliper body assembly and support.

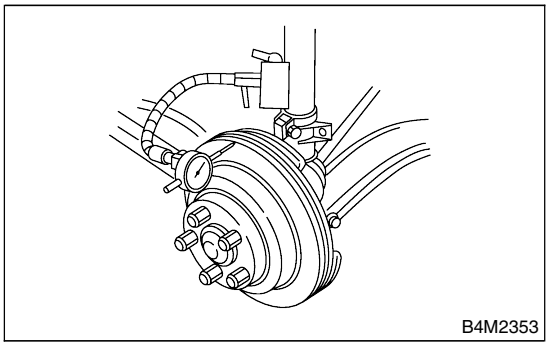
B: INSTALLATION S405173A11

1) Install the disc rotor.
2) Install the caliper body to housing.

Tightening torque:
78 N·m (8 kgf-m, 58 ft-lb)

C: INSPECTION S405173A10

1) Install disc rotor by tightening the five wheel nuts.
2) Set a dial gauge on the disc rotor. Turn disc rotor to check runout.

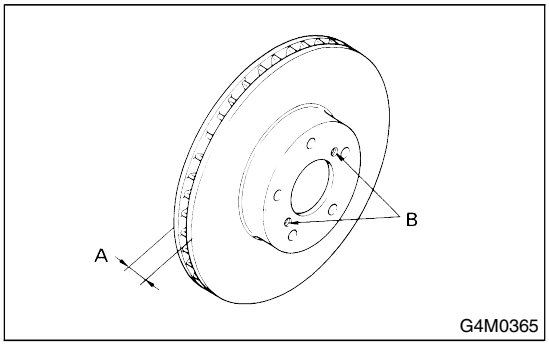


NOTE:
- Make sure that dial gauge is set 5 mm (0.20 in) inward of rotor outer perimeter.
- If disc rotor runout is above standard value, inspect play of hub bearing axial direction and runout of axle hub. <Ref. to DS-22, INSPECTION, Front Axle.>

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.



NOTE:
Make sure that micrometer is set 5 mm (0.20 in) inward of rotor outer perimeter.

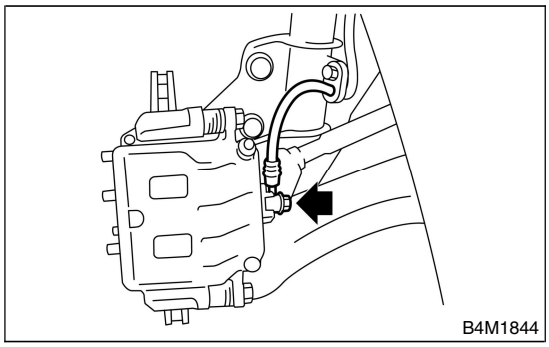
	Standard value	Service limit	Disc outer dia.
Disc rotor thickness A	24.0 mm (0.945 in)	22.0 mm (0.866 in)	277 mm (10.91 in)

4. Front Disc Brake Assembly

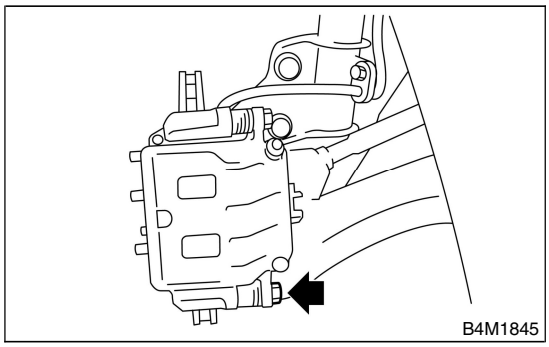
S405176

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.

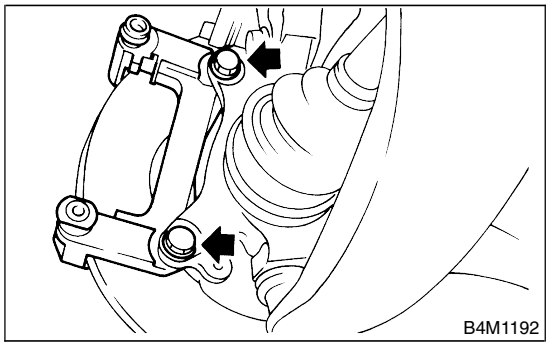


3) Remove bolt securing lock pin to caliper body.



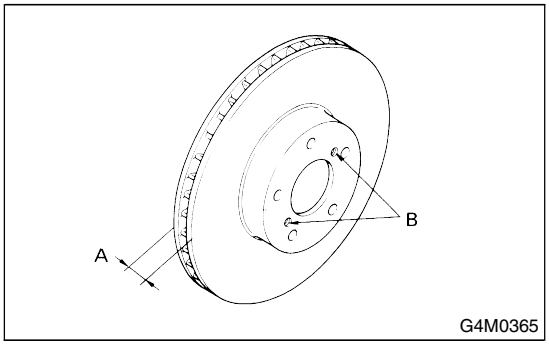
4) Raise caliper body and move it toward vehicle center to separate it from support.
5) Remove support from housing.

NOTE:
Remove support only when replacing it or the rotor. It need not be removed when servicing caliper body assembly.



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.



7) Clean mud and foreign particles from caliper body assembly and support.

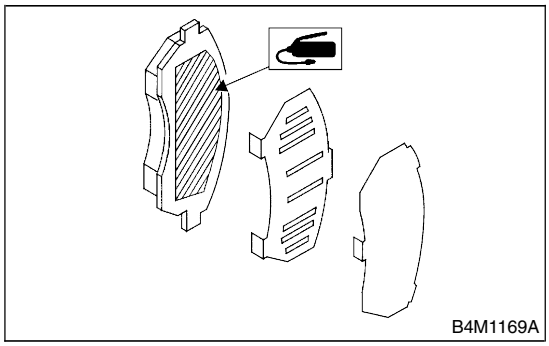
B: INSTALLATION S405176A11

1) Install disc rotor on hub.
2) Install support on housing.

Tightening torque:
78 N·m (8 kgf-m, 58 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. (Australia model)


B4M1169A

5) Install pads on support.
6) Install caliper body on support.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 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.

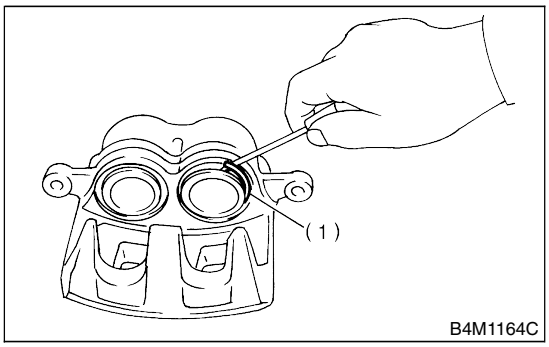
8) Bleed air from brake system.
<Ref. to BR-47, Air Bleeding.>

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.

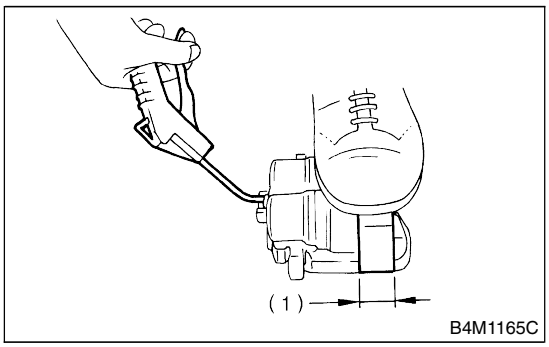


B4M1164C

(1) Boot ring

3) Remove boot from piston end.
4) Gradually supply compressed air via caliper body brake hose to force piston out.

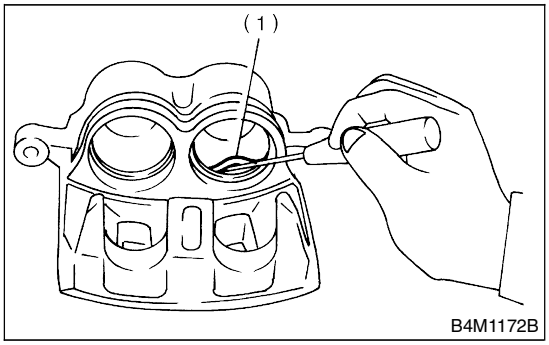
CAUTION:
Place a wooden block as shown in Figure to prevent damage to piston.



B4M1165C

(1) Place a 30 mm (1.18 in) wide wooden block here.

5) Remove piston seal from caliper body cylinder.



B4M1172B

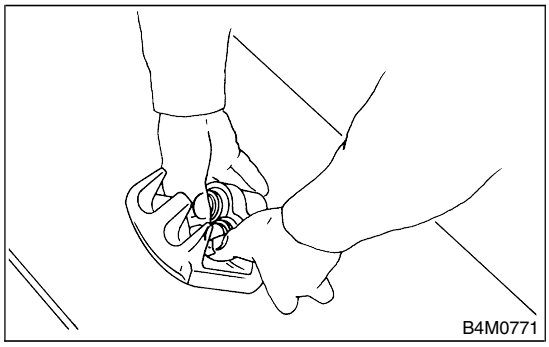
(1) Piston pin

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.

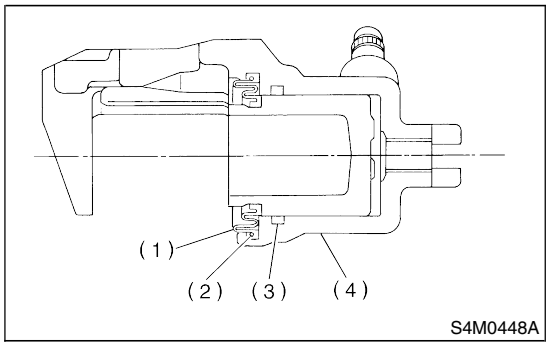
CAUTION:
Do not force piston into cylinder.



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.

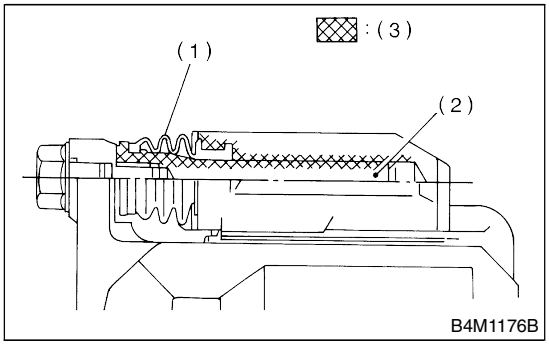


(1) Piston boot
(2) Boot ring
(3) Piston seal
(4) Caliper body

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

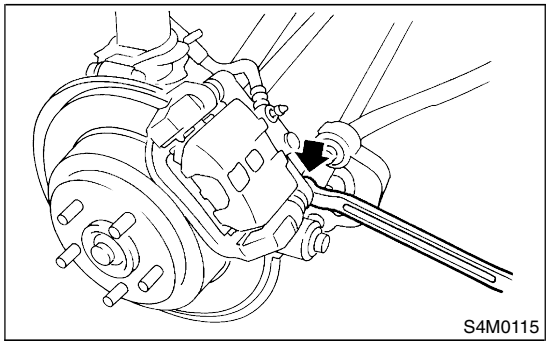
NOTE:
Repair or replace faulty parts.

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

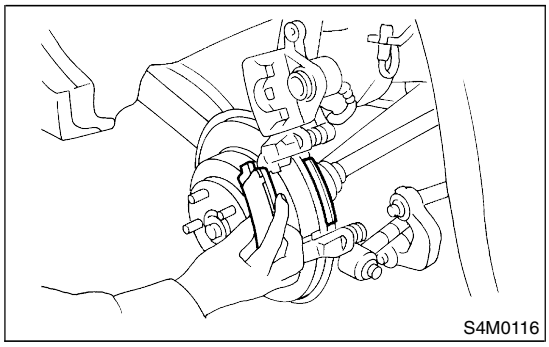
A: REMOVAL S405175A18

1) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
2) Remove lock pin.



3) Raise 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-20 REMOVAL, Front Brake Pad.>



B: INSTALLATION S405175A11

1) Apply thin coat of Molykote AS880N (Part No. 26298AC000) to the frictional portion between pad and pad clip.
2) Install pad on support.
3) Install caliper body on support.

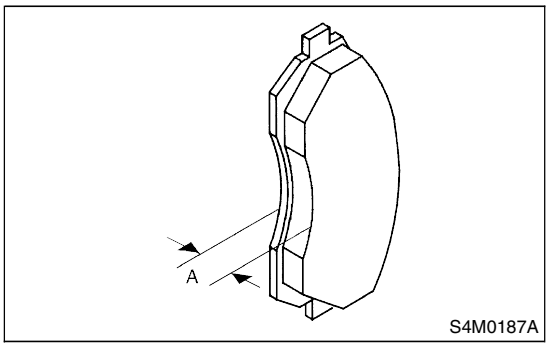
Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

NOTE:
If it is difficult to push piston during pad replacement, loosen air bleeder to facilitate work.

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)

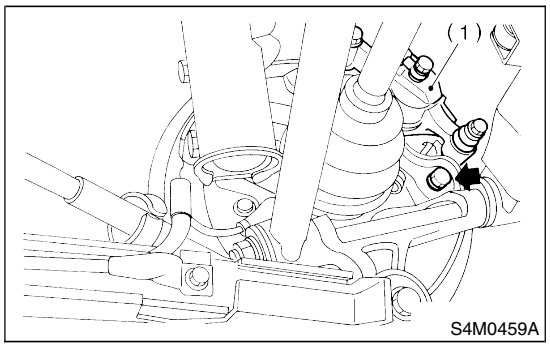


CAUTION:
• Always replace the pads for both the left and right wheels at the same time. Also replace pad clips if they are twisted or worn.
• A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of the wear indicator contacts the disc rotor, a 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 battery ground terminal 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.

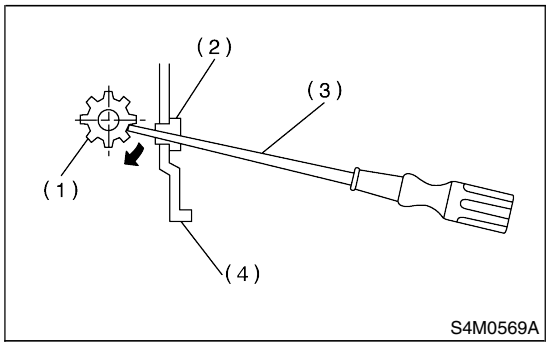


(1) Disc brake

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.

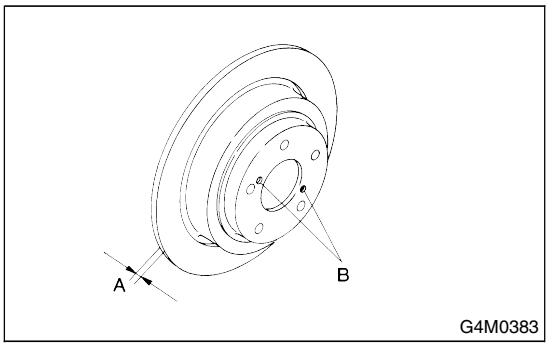
NOTE:
If the disc rotor is difficult to remove try the following two methods in order.

(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.



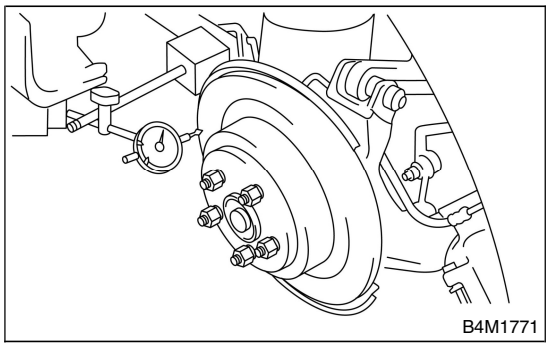
B: INSTALLATION S405177A11

1) Install in the reverse order of removal.
2) Adjust parking brake. <Ref. to PB-11 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.

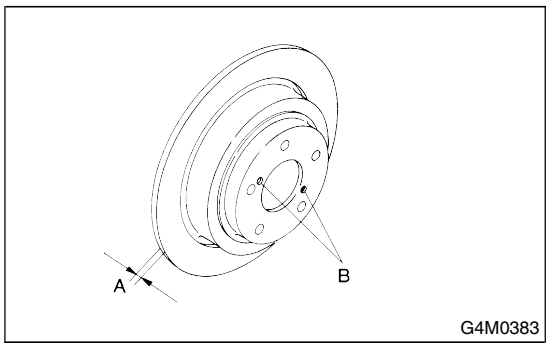
CAUTION:
Securely adjust disc rotor to hub.



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.



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

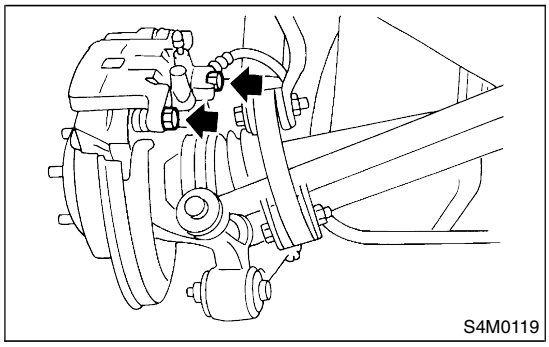
S405172

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 allow brake fluid to come in contact with vehicle body; wipe off completely if spilled.

3) Remove lock pin.



4) Raise caliper body and move it toward vehicle center to separate it from support.
5) Remove support from back plate.

NOTE:
Remove support only when replacing it or the rotor. It need not be removed when servicing caliper body assembly.

6) Clean mud and foreign particles from caliper body assembly and support.

CAUTION:
Be careful not to allow foreign particles to enter inlet (at brake hose connector).

B: INSTALLATION S405172A11

1) Install disc rotor on hub.
2) Install support on back plate.

Tightening torque:
78 N·m (8.0 kgf-m, 58 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.
4) Install pads on support.
5) Install caliper body on support.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

6) Connect brake hose.

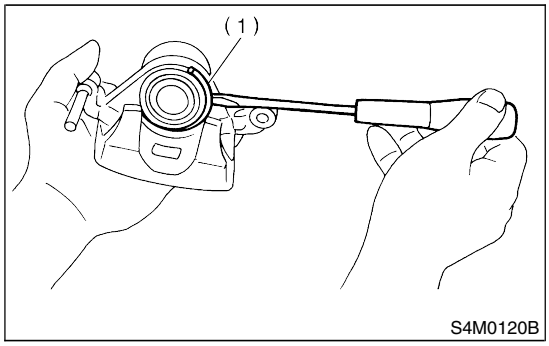
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

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-47, Air Bleeding.>

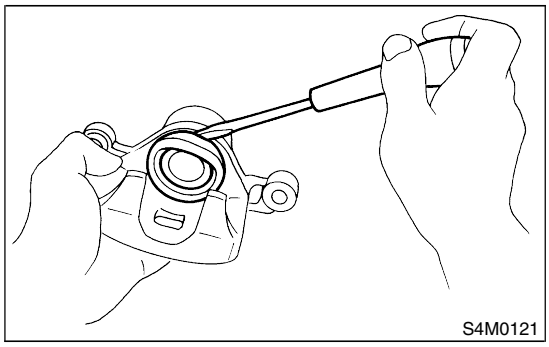
C: DISASSEMBLY S405172A06

1) Remove the boot ring.



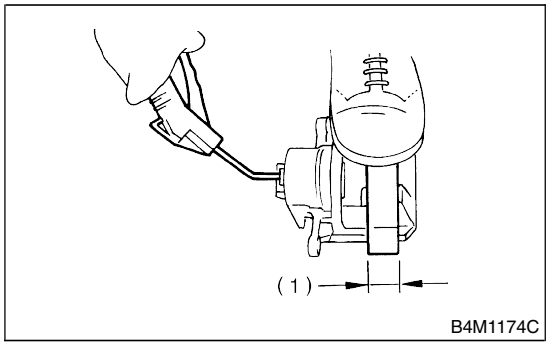
(1) Boot ring

2) Remove the piston boot.



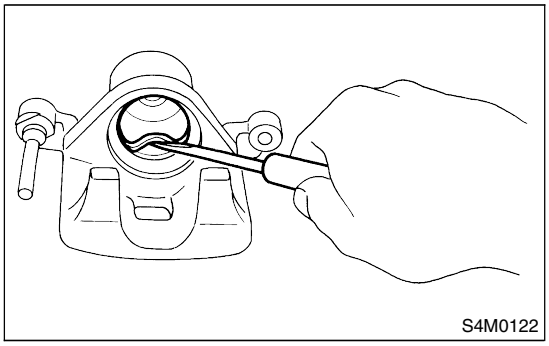
3) Gradually supply compressed air via inlet of caliper body to force piston out.

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

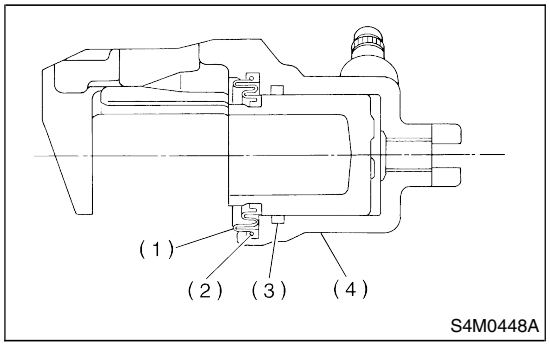
1) Clean caliper body interior using brake fluid.
2) Apply a coat of brake fluid to piston seal and fit piston seal in groove on caliper body.
3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
4) Insert piston into cylinder.

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)

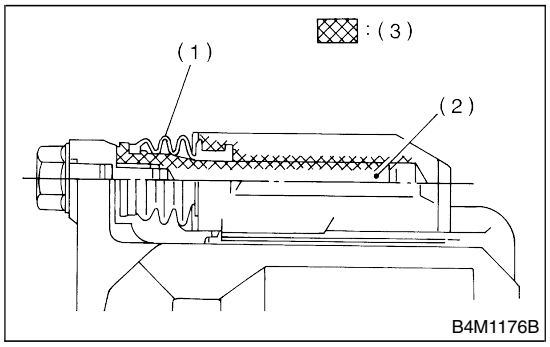
6) Install the piston boot to the caliper body, and attach boot ring.



(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.

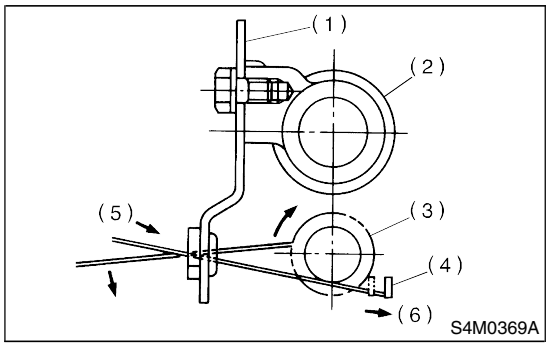
1) Check caliper body and piston for uneven wear, damage or rust.
2) Check rubber parts for damage or deterioration.

8. Rear Drum Brake Shoe S405174

A: REMOVAL S405174A18

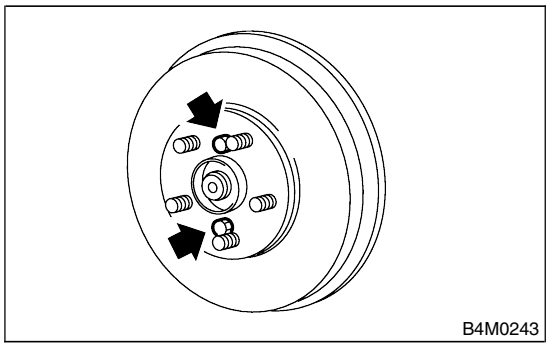
1) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
2) Release parking brake.
3) Remove brake drum from brake assembly.

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.

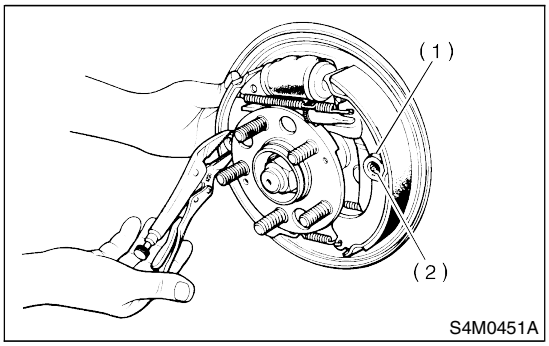


(1) Back plate
(2) Wheel cylinder
(3) Adjuster ASSY pawls
(4) Adjusting lever
(5) Tightening direction
(6) Push.

● If brake drum is difficult to remove, drive it out by installing an 8-mm bolt into bolt hole in brake drum.

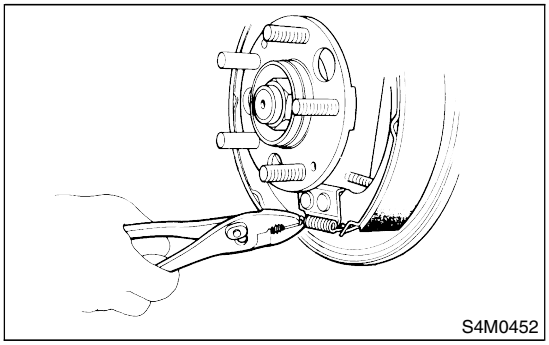


4) Hold hold-down pin by securing rear of back plate with your hand.



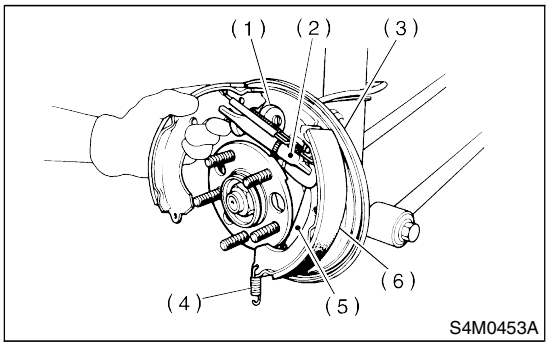
(1) Hold-down cup
(2) Hold-down pin

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.



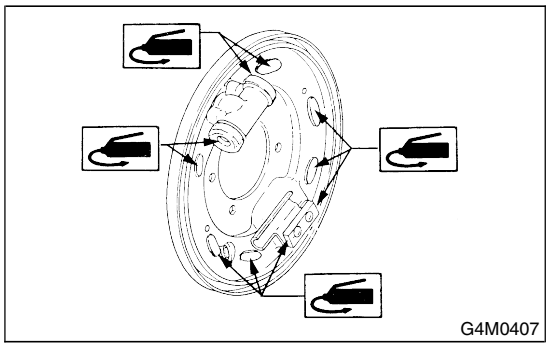
(1) Wheel cylinder
(2) Adjuster
(3) Back plate
(4) Lower shoe return spring
(5) Parking lever
(6) Trailing shoe

8) Disconnect parking brake cable from parking lever.

B: INSTALLATION S405174A11

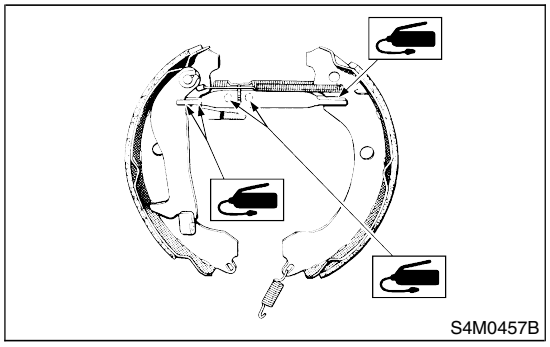
1) Clean back plate and wheel cylinder.
2) Apply grease to portions indicated by arrows in Figure.

Brake grease:
Dow Corning Molykote No. 7439 (Part No. 725191460)

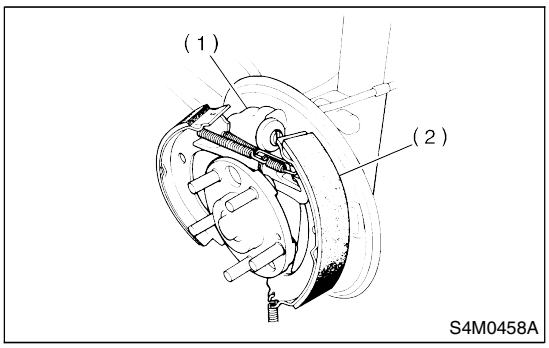


3) Apply grease to adjusting screw and both ends of adjuster.

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)

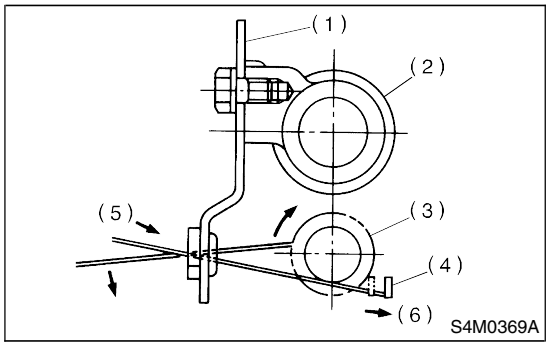
2) If the deformation or wear of back plate, shoe, etc. are notable, replace them.
3) When the shoe return spring tension is excessively weakened, replace it, taking care to identify upper and lower springs.

9. Rear Drum Brake Drum S405180

A: REMOVAL S405180A18

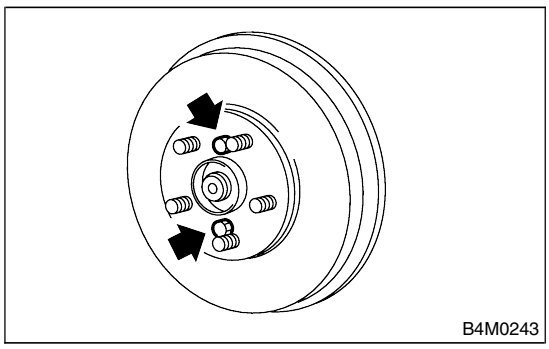
1) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
2) Release parking brake.
3) Remove brake drum from brake assembly.

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.



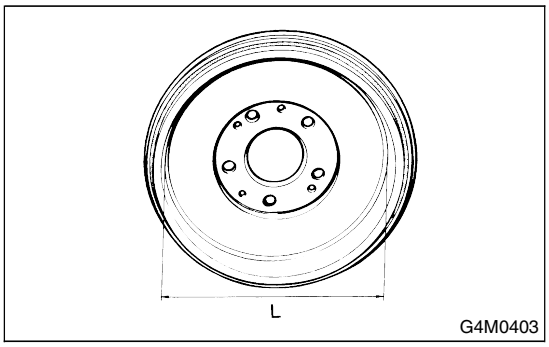
B: INSTALLATION S405180A11

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, taperingly streaked, or the outside surface of brake drum is damaged, correct or replace it.
2) Measure the drum inner diameter.

Drum inner diameter: "L"
Standard 228.6 mm (9 in)
Service limit 230.6 mm (9.08 in)

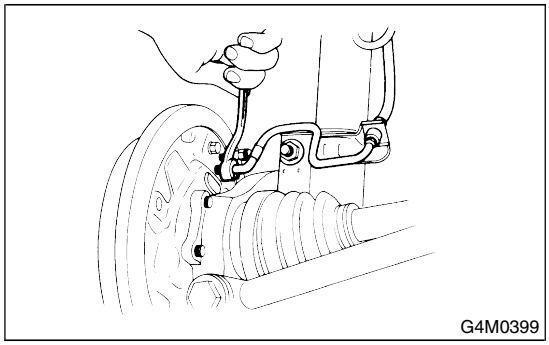


10. Rear Drum Brake Assembly

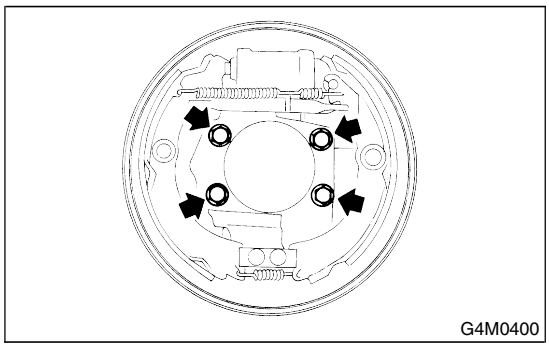
S405179

A: REMOVAL S405179A18

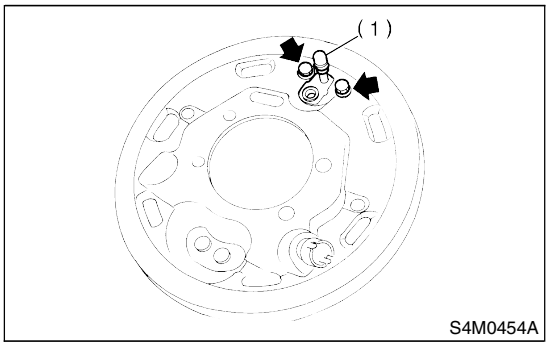
1) Disconnect battery ground terminal from battery.
2) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
3) Release parking brake.
4) Remove brake drum from brake assembly. <Ref. to BR-34, REMOVAL, Rear Drum Brake Drum.>
5) Remove brake shoe. <Ref. to BR-32, REMOVAL, Rear Drum Brake Shoe.>
6) Unscrew the brake pipe flare nut and disconnect brake pipe.


G4M0399

7) Disconnect ABS sensor from back plate. (only vehicle equipped with ABS)
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.



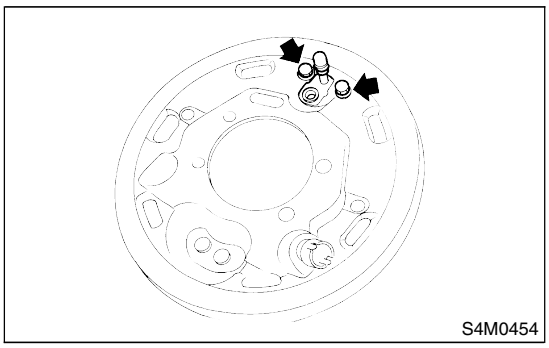
S4M0454A

(1) Air bleeder

B: INSTALLATION S405179A11

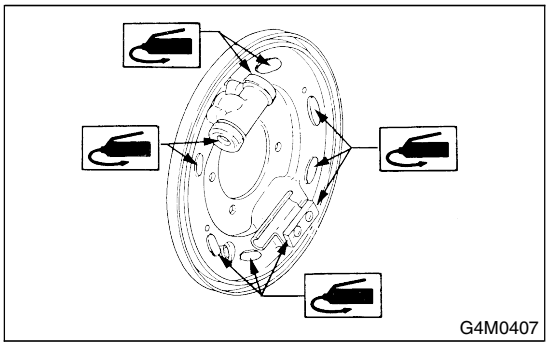
1) Clean back plate and wheel cylinder.
2) Install wheel cylinder on back plate, and tighten bolts.

Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)


S4M0454

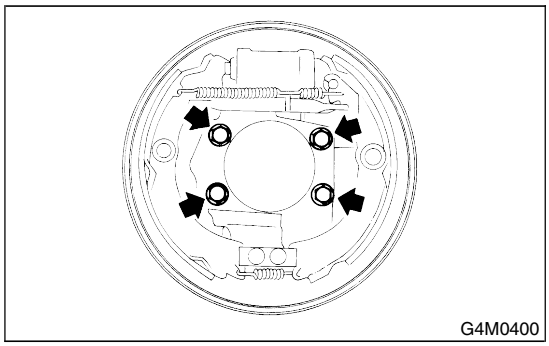
3) Apply grease to portions indicated by arrows in Figure.

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:
52 N·m (5.3 kgf-m, 38.3 ft-lb)


G4M0400

5) Install hub. <Ref. to DS-23, Rear Axle.>
6) Connect brake pipe, and tighten brake pipe flange nut.

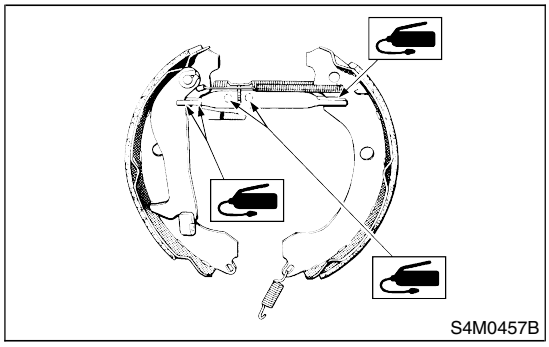
Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

7) Connect ABS sensor to back plate. (only vehicle equipped with ABS)

Tightening torque:
32 N·m (3.3 kgf-m, 24 ft-lb)

8) Apply grease to adjusting screw and both ends of adjuster.

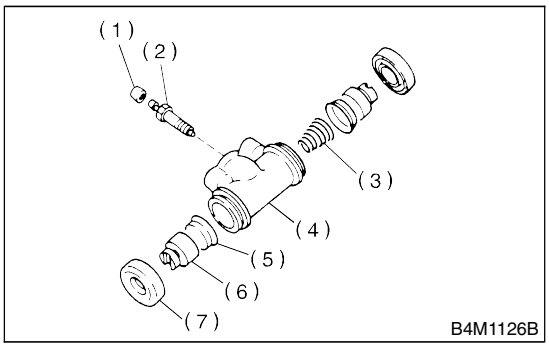
Brake grease:
Dow Corning Molykote No. 7439 (Part No. 725191460)


S4M0457B

9) Install brake shoe. <Ref. to BR-33, INSTALLATION, Rear Drum Brake Shoe.>
10) Install drum. <Ref. to BR-34, INSTALLATION, Rear Drum Brake Drum.>
11) Bleed air from brake system. <Ref. to BR-47, Air Bleeding.>

C: DISASSEMBLY S405179A06

1) Remove right and left dust boots from wheel cylinder.



B4M1126B

(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

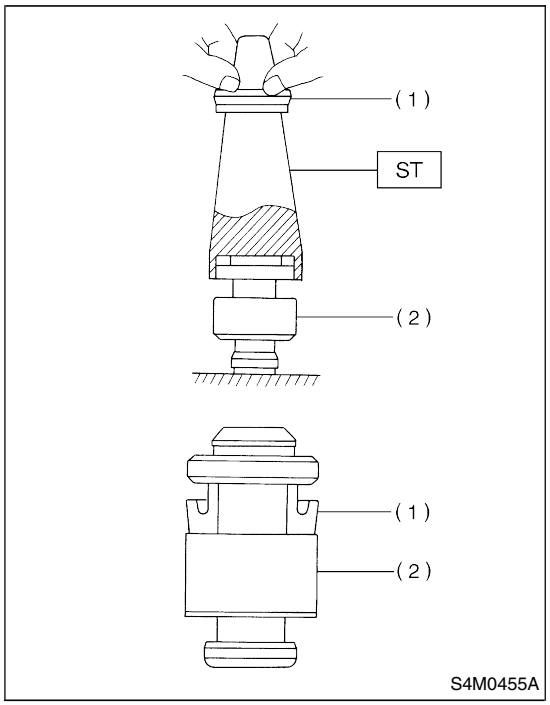
1) Clean all parts in brake fluid. Check and replace faulty parts.
- Cup and boot for damage or fatigue
- Cylinder, piston and spring or damage or rust formation

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.

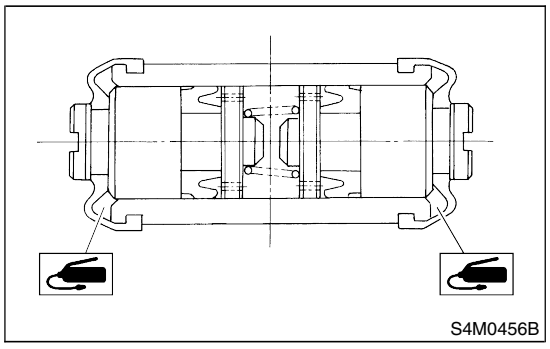


(1) Cup
(2) Piston

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-33, INSPECTION, Rear Drum Brake Shoe.>
4) Inspect brake drum. <Ref. to BR-34, INSPECTION, Rear Drum Brake Drum.>

11. Master Cylinder S405168

A: REMOVAL S405168A18

1) Pull up parking brake lever, and block the tires.
2) Disconnect battery ground terminal 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; wipe 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-47, Air Bleeding.>

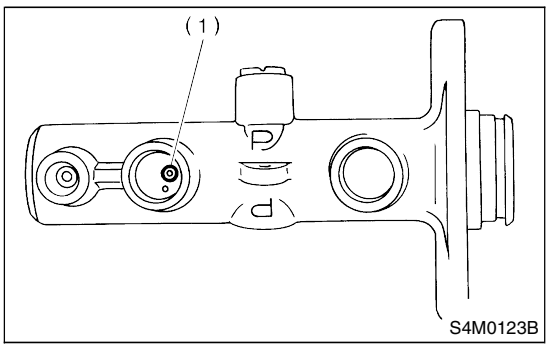
C: DISASSEMBLY S405168A06

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

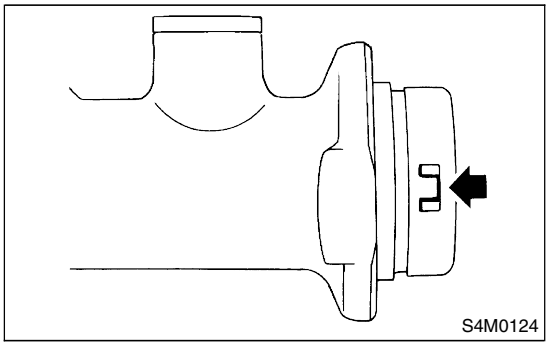
1) Remove pin with drift pin which secures reserve tank to master cylinder.
2) Remove cylinder pin with magnetic pick-up tool while pushing in primary piston. (Only vehicle equipped with ABS)



(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

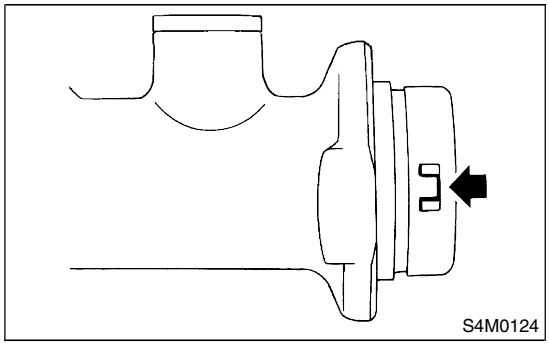
1. PRECAUTIONS FOR ASSEMBLING

S405168A0201

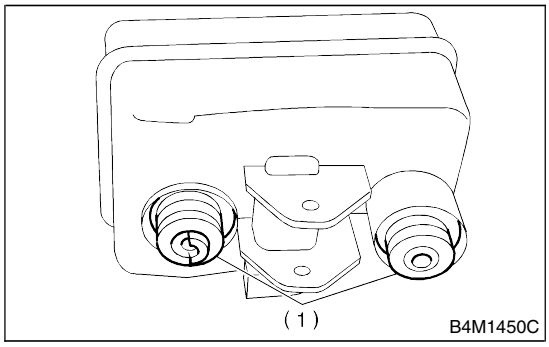
1) When assembling, be sure to use recommended brake fluid.
2) Ensure that the inside wall of cylinder, pistons, and piston cups are free from dirt when assembling.
3) Be extremely careful not to damage, scratch, or dent cylinder inside wall, pistons, and piston cups.
4) Do not drop parts. Never attempt 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 (only vehicle equipped with ABS) 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

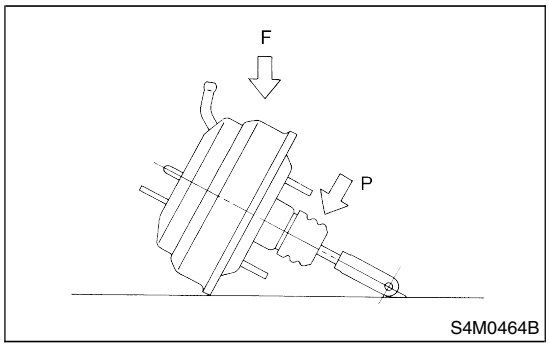
If any damage, deformation, wear, swelling, rust, and other faults are found on the primary piston assembly, secondary piston assembly, supply valve stopper, or gasket, replace the faulty part.

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

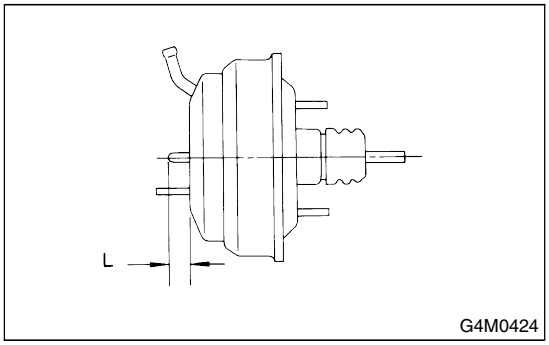
CAUTION:
If external force "F" is applied from above when brake booster is placed in this position, the resin portion as indicated by "P", may be damaged.



1) Pull up parking brake lever, and block the tires.
2) Disconnect battery ground terminal 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.

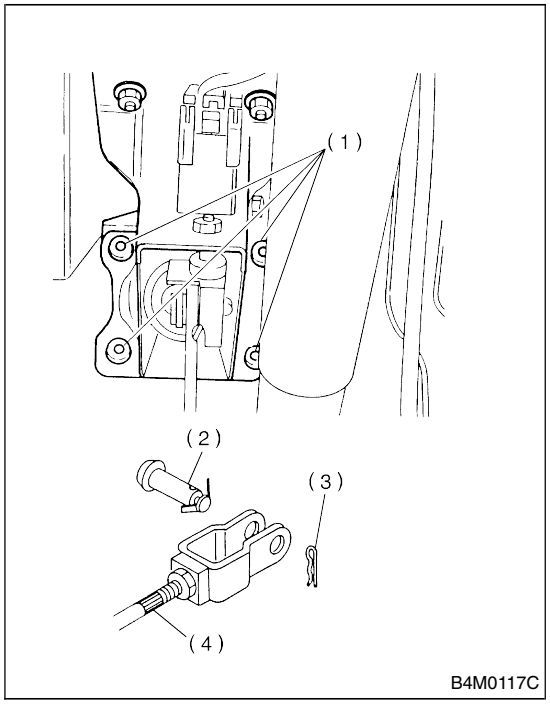
NOTE:
● Be careful not to drop brake booster. Brake booster should be discarded if it has been dropped.
● Use special care when handling operating rod. If excessive force is applied to operating rod, sufficient to cause a change in the angle in excess of ±3°, it may result in damage to the power piston 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)



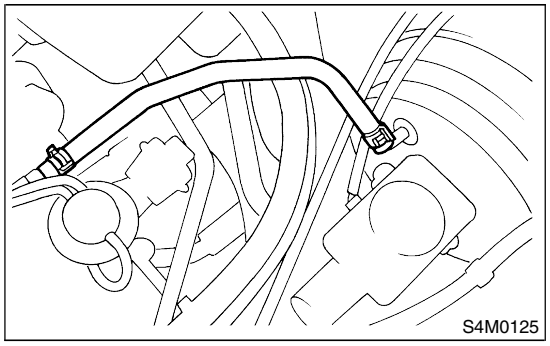
B: INSTALLATION S405166A11

1) Mount brake booster in position.
2) Connect operating rod to brake pedal with clevis pin and snap pin.



(1) Nuts
(2) Clevis pin
(3) Snap pin
(4) Operating rod

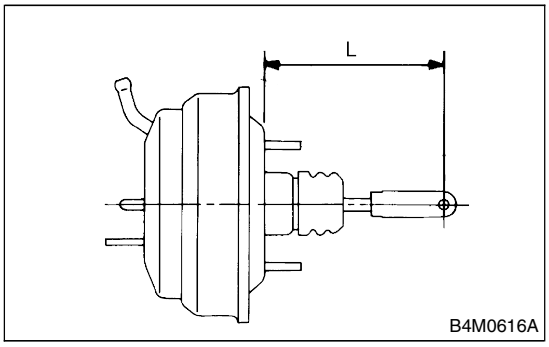
3) Connect vacuum hose to brake booster.



4) Mount master cylinder onto brake booster.
5) Connect brake pipes to master cylinder.
6) Connect electric connector for brake fluid level indicator.
7) Adjust operating rod of brake booster.

Standard: L
LHD:
144.6 mm (5.69 in)
RHD:
173.2 mm (6.82 in)

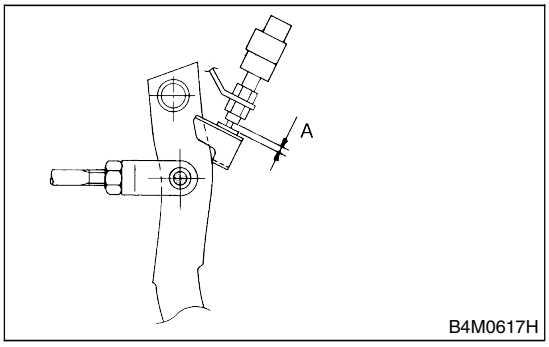
If it is not in specified value, adjust it by adjusting brake booster operating rod.



8) Measure the clearance between threaded end of stop light switch and stopper.
If it is not in specified value, adjust it by adjusting position of stop light switch.

CAUTION:
Be careful not to rotate stop light switch.

Stop light switch clearance: A
0.3 mm (0.012 in)



9) Apply grease to operating rod connecting pin to prevent it from wearing.
10) Bleed air from brake system.

Tightening torque (Air bleeder screw):
8 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

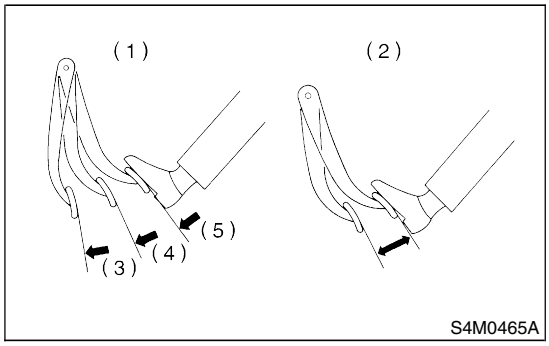
CAUTION:
When checking operation, be sure to securely apply the hand brake.

• 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.

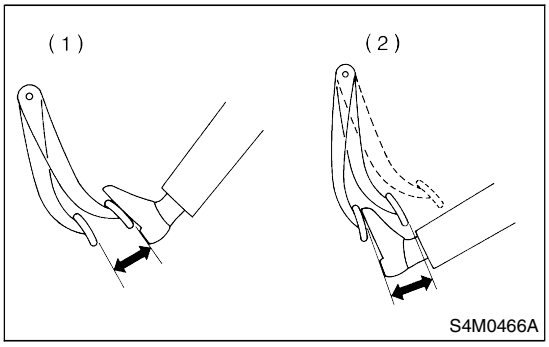


(1) OK
(2) NOT OK
(3) 1st
(4) 2nd
(5) 3rd

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.

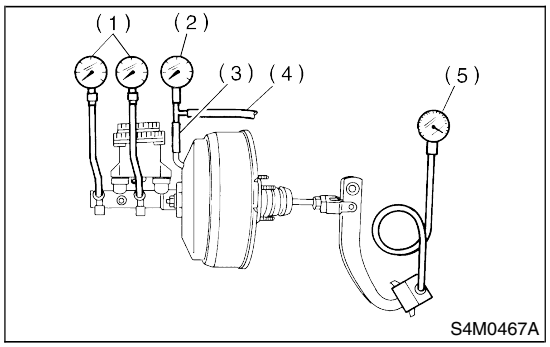
2. OPERATION CHECK (WITH GAUGES)

S405166A1002

CAUTION:
When checking operation, be sure to securely apply the hand brake.

• Checking with gauges

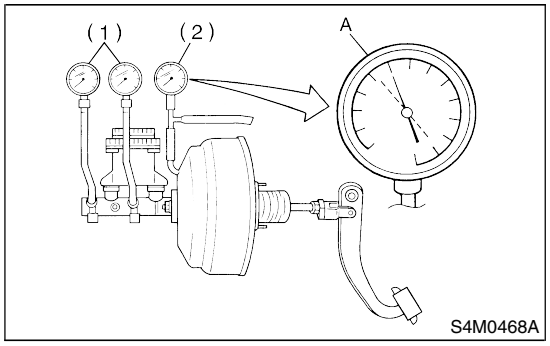
Connect gauges as shown in Figure. After bleeding air from pressure gauges, proceed to each check.



(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.



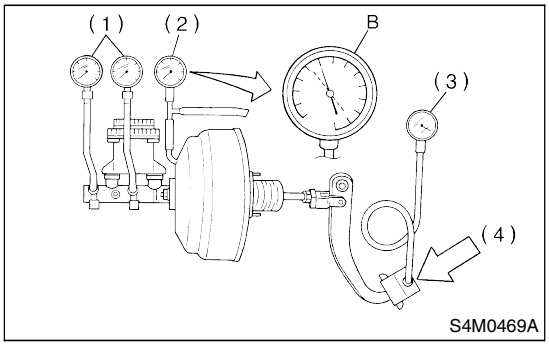
(1) Pressure gauge
(2) Vacuum gauge

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 kg, 44 lb). Keep engine running until a vacuum of 66.7 kPa (500 mmHg, 19.69 inHg) = point B is indicated on vacuum gauge while the pedal is still depressed.



(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-42 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

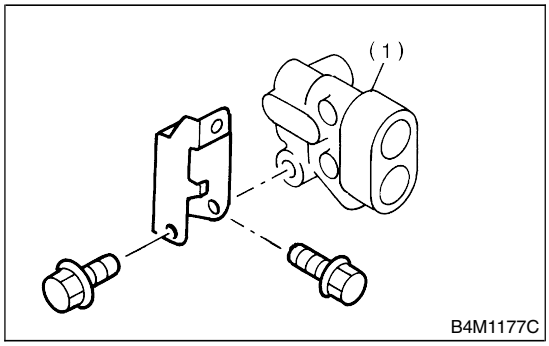
Set the vacuum gauge reading at 66.7 kPa (500 mmHg, 19.69 inHg) by running engine. Then, check the fluid pressure when brake pedal is depressed. The pressure must be greater than the standard value listed.

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

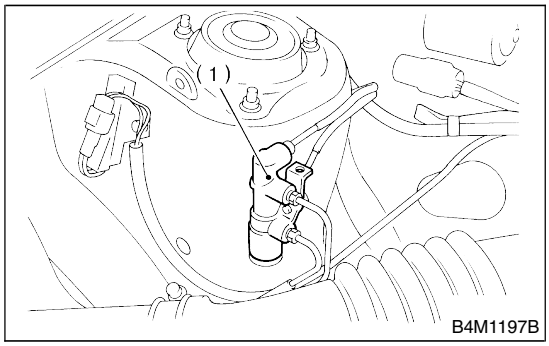
A: REMOVAL S405167A18

With ABS model



(1) Proportioning valve

Without ABS model



(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.)

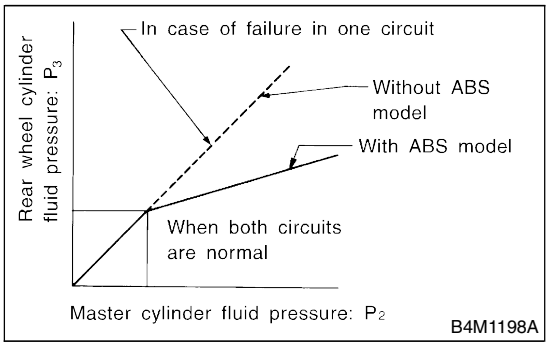
B: INSTALLATION S405167A11

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

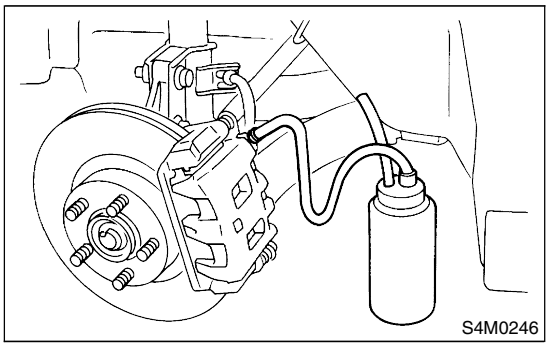
CAUTION:
• To always maintain the brake fluid characteristics, replace the brake fluid according to maintenance schedule or earlier than that when used in severe condition.
• The FMVSS No. 116, fresh DOT3 or 4 brake fluid must be used.
• Cover bleeder with waste cloth, when loosening it, to prevent brake 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.

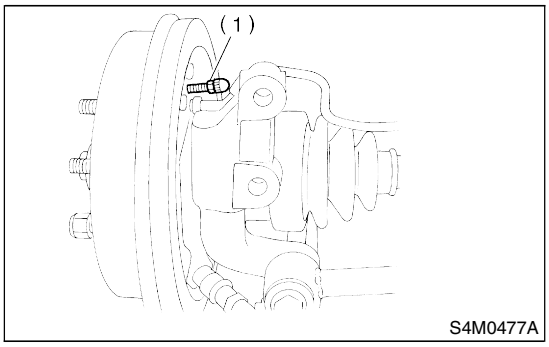
NOTE:
• During bleeding operation, keep the brake reservoir tank filled with brake fluid to eliminate entry of air.
• Brake pedal operating must be very slow.
• For convenience and safety, two people should do the work.
• The amount of brake fluid required is approximately 500 mℓ (16.9 US fl oz, 17.6 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

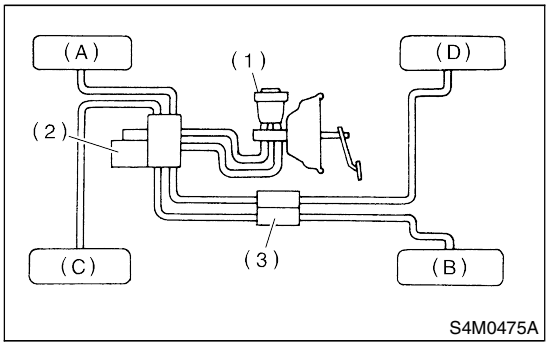
5) Install one end of a vinyl tube onto the air bleeder of and insert the other end of the tube into a container to collect the brake fluid.


S4M0246



S4M0477A

CAUTION:
Brake fluid replacement sequence; (A) Front right → (B) Rear left → (C) Front left → (D) Rear right



S4M0475A

(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

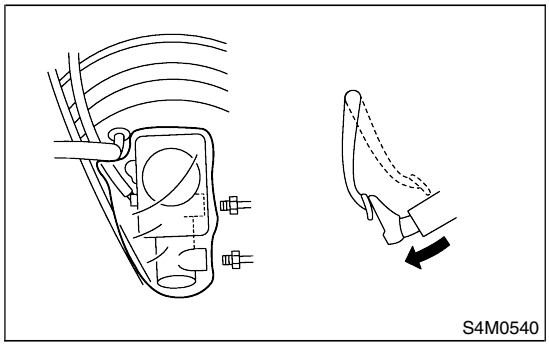
CAUTION:
● The FMVSS No. 116, fresh DOT3 or 4 brake fluid must be used.
● Cover bleeder with waste cloth when loosening it to prevent brake fluid from being splashed over surrounding parts.
● Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
● Be careful not to allow dirt or dust to get into the reservoir tank.

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.

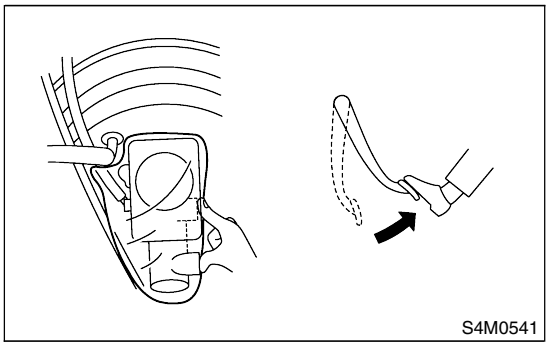
1. MASTER CYLINDER S405163E4501

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 3) and 4), until brake fluid come out of all outlet port.
7) Remove the plastic bag cover.
8) Install brake pipes to master cylinder.

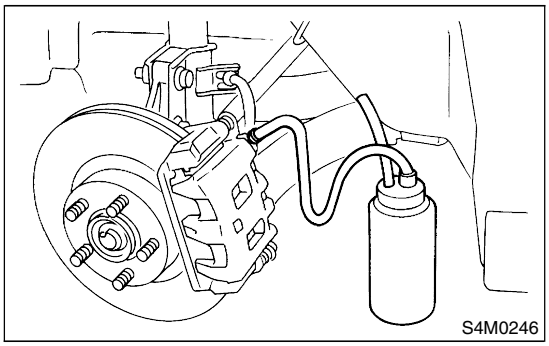
Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)

9) Cleanly wash away brake fluid spill on master cylinder etc.
10) Bleed air from brake system. <Ref. to BR-47, BRAKE LINE, PROCEDURE, Air Bleeding.>

2. BRAKE LINE S405163E4502

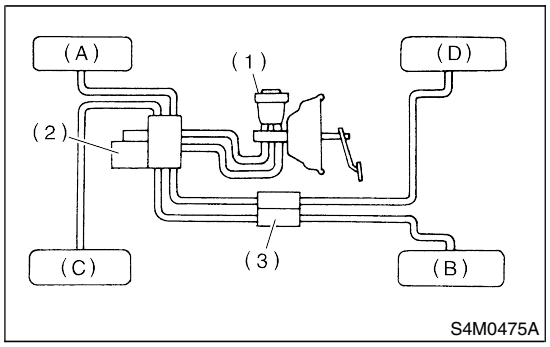
NOTE:
● During bleeding operation, keep the brake reservoir tank filled with brake fluid to eliminate entry of air.
● Brake pedal operating must be very slow.
● For convenience and safety, two people should do the work.

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

AIR BLEEDING

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.

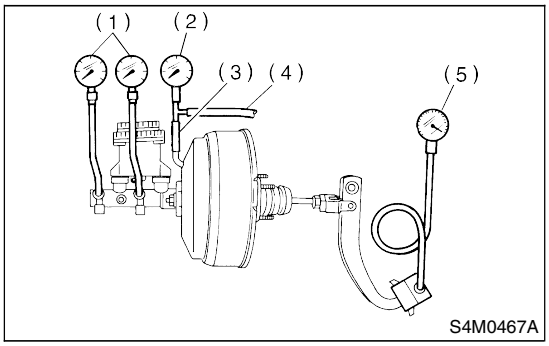
NOTE:
Brake pedal operating must be very slow.

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

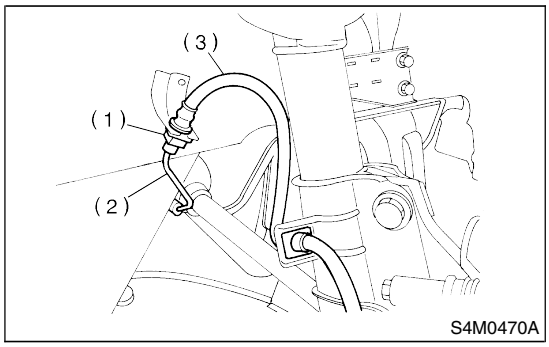
Specified pedal stroke:
Without ABS
90 mm (3.54 in)
With ABS
95 mm (3.74 in)
When depressing brake pedal with a 490 N (50 kgf, 110 lb) load.

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. (Only vehicle equipped with ABS)
<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.
(Always use flare nut wrench and be careful not to deform flare nut.)



(1) Clamp
(2) Brake pipe
(3) Brake hose

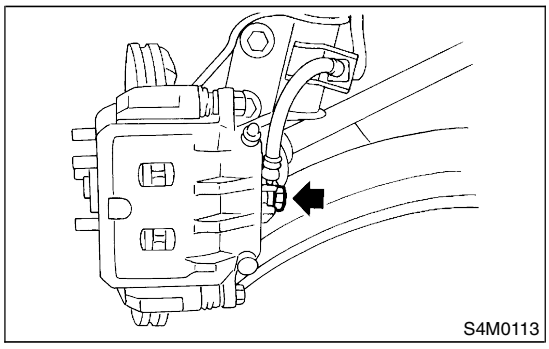
3) Pull out clamp to remove brake hose.
4) Remove clamp at strut and union bolt.

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-47, 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-47, 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.

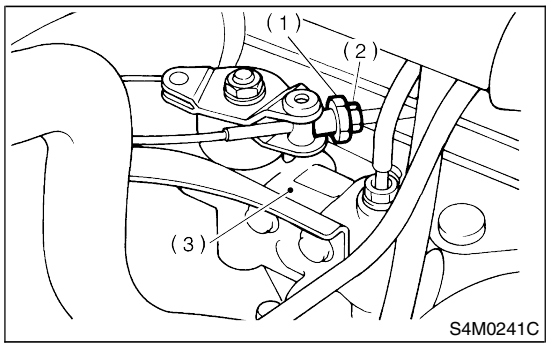
NOTE:
Use a mirror when inspecting low-visible part or back side.

18. Hill Holder S405661

A: REMOVAL S405661A18

1. PHV (PRESSURE HOLD VALVE) S405661A1801

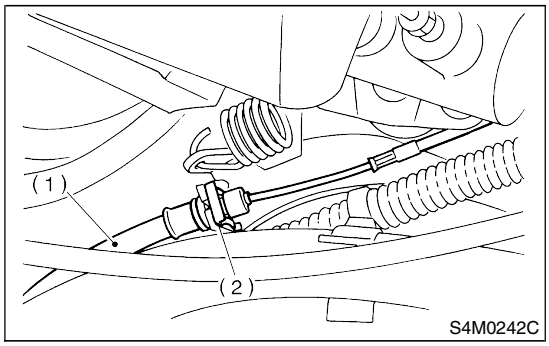
1) Remove air cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
2) Remove intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
3) Drain brake fluid from reservoir of master cylinder.
4) Remove adjusting nut and lock nut.



(1) Adjusting nut
(2) Lock nut
(3) PHV

5) Remove cable clamp, and disconnect PHV cable from PHV.

CAUTION:
Carefully protect boots and inner cable from damage when disconnecting PHV cable.



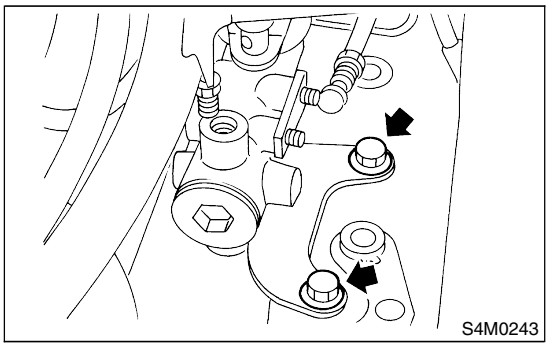
(1) PHV cable
(2) Clamp

6) Disconnect brake pipes from PHV.

CAUTION:
• Pay attention not to drop brake fluid onto body painting since it may dissolve paint.
• Pay attention not to damage hexagonal head of flare nut by using pipe wrench without fail.

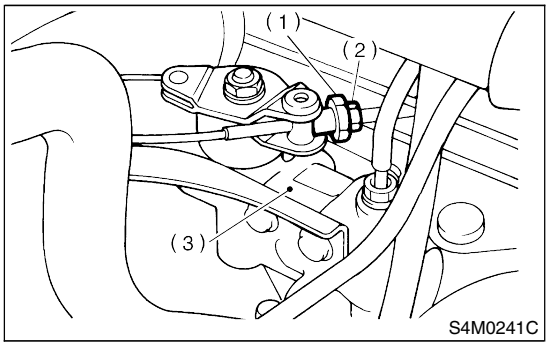
7) Detach PHV along with support from side frame.

CAUTION:
Exercise utmost care to prevent foreign matter from entering into PHV when removing it.



2. PHV CABLE S405661A1802

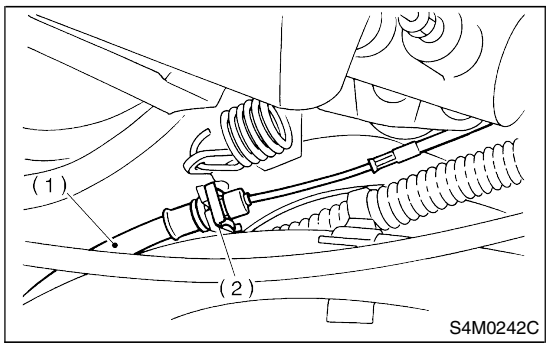
1) Remove air cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
2) Remove intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
3) Remove adjusting nut and lock nut.



(1) Adjusting nut
(2) Lock nut
(3) PHV

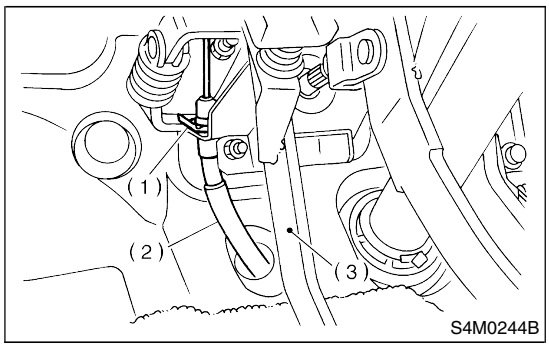
4) Remove cable clamp, and disconnect PHV cable from PHV.

CAUTION:
Carefully protect boot and inner cable from damage when disconnecting PHV cable.



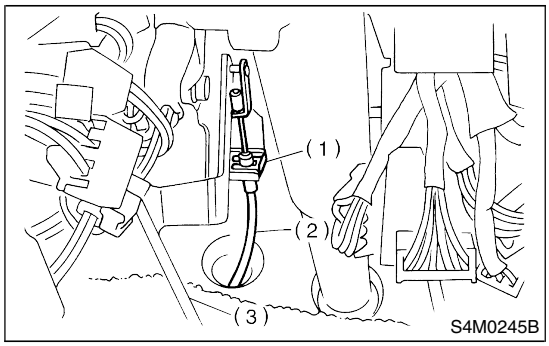
(1) PHV cable
(2) Clamp

5) Remove cable clamp from clutch pedal bracket.
LHD model



(1) Clamp
(2) PHV cable
(3) Clutch pedal

RHD model



(1) Clamp
(2) PHV cable
(3) Clutch pedal

6) Remove PHV cable.

B: INSTALLATION S405661A11

1. PHV (PRESSURE HOLD VALVE) S405661A1101

1) Install PHV onto side frame.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

2) Connect brake pipes to PHV.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

CAUTION:
Confirm that brake pipes are not deformed and/or damaged. Replace them with new ones if necessary.

3) Install PHV cable to PHV.

CAUTION:
If cable clamp (and clips) is damaged, replace it with a new one.

4) Connect PHV cable with clips.

NOTE:
Avoid sharp bending of PHV cable as it may cause breakage.

5) Apply grease to the following points.
- Hook portion of return spring
- Cable end portion of lever

Grease:
SUNLIGHT 2 (Part No. 003602010)

6) Be sure to bleed air from the brake system.
7) Adjust PHV cable. <Ref. to BR-53 ADJUSTMENT, Hill Holder.>

CAUTION:
After replacing PHV cable with new one, operate clutch pedal about 30 times as a running-in operation prior to adjustment.

8) Install air cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
9) Install intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>

2. PHV CABLE S405661A1102

1) Install PHV cable in the reverse order of removal.

CAUTION:
- **If cable clamp is damaged, replace it with a new one.**
- **Avoid sharp bending of PHV cable as it may cause breakage.**

2) Apply grease to the following points.
- Hook portion of return spring
- Cable end portion of lever

Grease:
SUNLIGHT 2 (Part No. 003602010)

3) Adjust PHV cable. <Ref. to BR-53 ADJUSTMENT, Hill Holder.>

CAUTION:
After replacing PHV cable with new one, operate clutch pedal about 30 times as a running-in operation prior to adjustment.

4) Install air cleaner case. (Non-turbo model) <Ref. to IN (SOHC)-7, INSTALLATION, Air Cleaner Case.>
5) Install intercooler. (Turbo model) <Ref. to IN (DOHC TURBO)-10, INSTALLATION, Intercooler.>

C: INSPECTION S405661A10

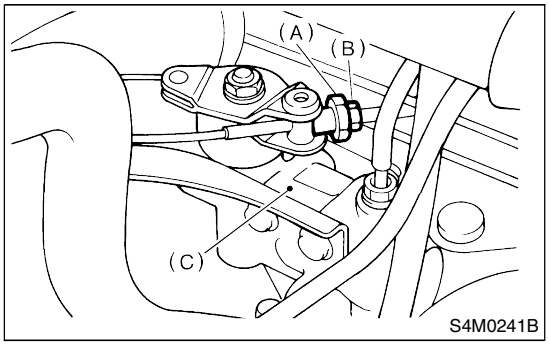
Check up removed parts as follows, and replace defective ones.
1) Check if boots of PHV cable are damaged or degraded, and if inner cable is damaged or corroded.
2) Check if return spring is worn out, damaged or corroded.
3) Confirm that rolling sound of ball is heard with PHV inclined and lever rotates smoothly.

CAUTION:
Never disassemble PHV. Replace entire PHV assembly if necessary.

D: ADJUSTMENT S405661A01

Confirm stopping and starting performances by activating hill holder on an uphill road of 3° or higher inclination.
1) If vehicle does not stop;
Tighten adjusting nut of PHV cable.
2) If vehicle does not start properly;
● Case A — When hill holder is released later than engagement of clutch pedal (Engine tends to stall.):
Loosen adjusting nut gradually until smooth starting is enabled.
● Case B — When hill holder is released earlier than engagement of clutch pedal (Vehicle slips down slightly.):
Tighten adjusting nut so that hill holder is released later than engagement of clutch pedal (status in Case A). Then make adjustment the same as in Case A.

CAUTION:
Whenever turning adjusting nut, prevent PHV cable from revolving.



(1) Adjusting nut
(2) Lock nut
(3) PHV

3) Tighten lock nut.

Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)

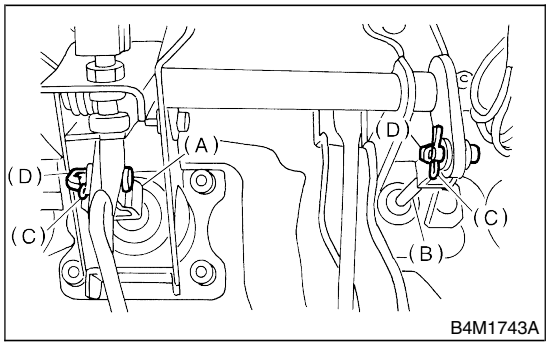
19. Brake Pedal S405541

A: REMOVAL S405541A18

1. MT MODEL S405541A1801

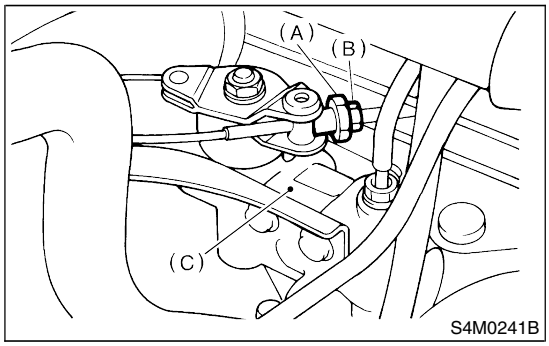
- **LHD model**

1) Pull up parking brake lever and block tires.
2) Disconnect battery ground terminal from battery.
3) Remove steering column.
<Ref. to PS-30 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

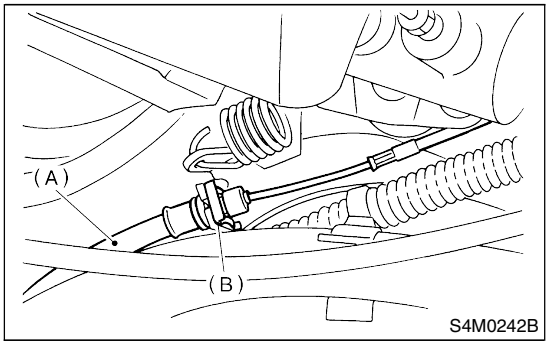
7) Remove PHV adjusting nut and lock nut.



(A) Adjusting nut
(B) Lock nut
(C) PHV

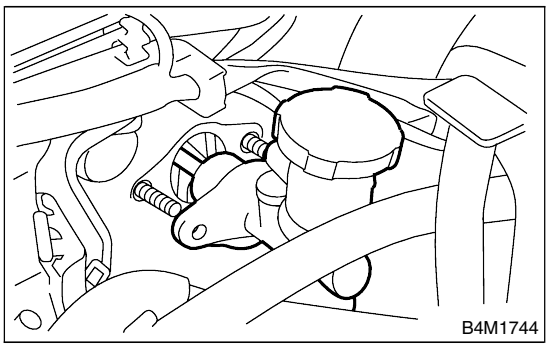
8) Remove cable clamp, and disconnect PHV cable from PHV.

CAUTION:
Carefully protect boot and inner cable from damage when disconnecting PHV cable.



(A) PHV cable
(B) Clamp

9) Remove nut which secures clutch master cylinder.



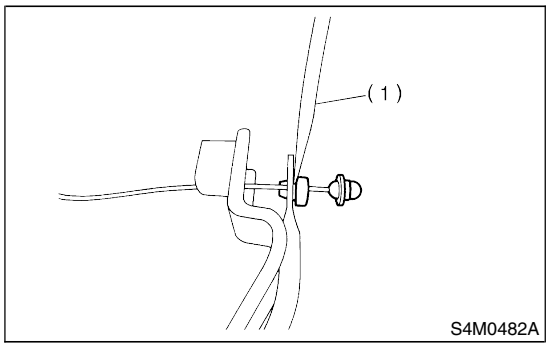
10) Remove bolts and nuts which secure brake and clutch pedals, and remove pedal assembly.

● RHD model

1) Pull up parking brake lever.
2) Disconnect battery ground terminal from battery.
3) Disconnect accelerator cable from throttle body.

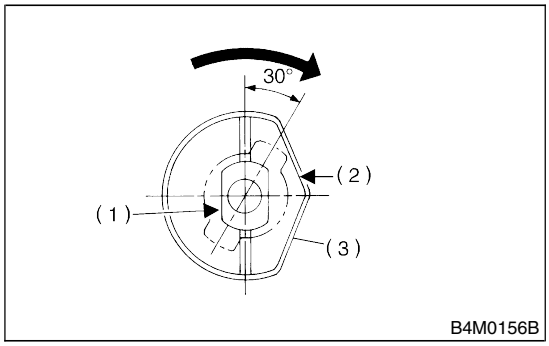
CAUTION:
Be careful not to kink accelerator cable.

4) Remove instrument panel lower cover from instrument panel.
5) Remove clevis pin which secures brake pedal to brake booster operating rod. Also disconnect electrical connectors (for stop light switch, etc.).
6) Disconnect accelerator cable from accelerator pedal lever.



(1) Slot type screwdriver

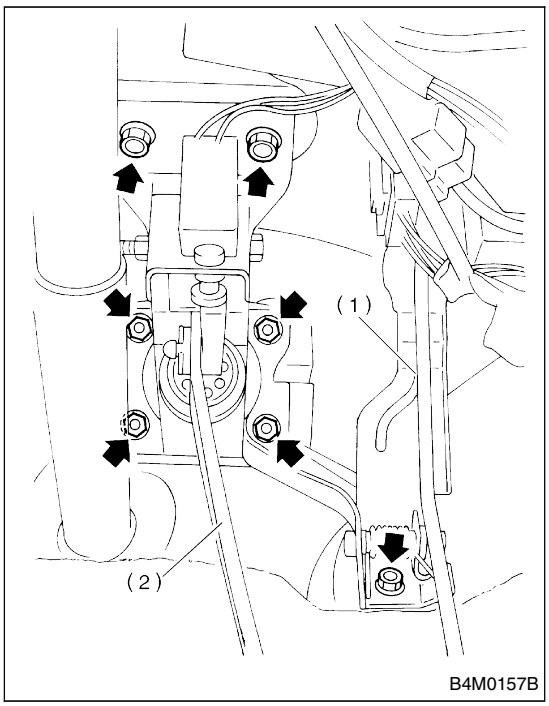
7) Remove the casing cap out of the toe board by turning it clockwise.



(1) Accelerator cable
(2) Toe board hole
(3) Casing cap

8) Pull out the cable from the toe board hole.
9) Disconnect stop light switch connector.

10) Remove nuts and bolts which secure pedal bracket.

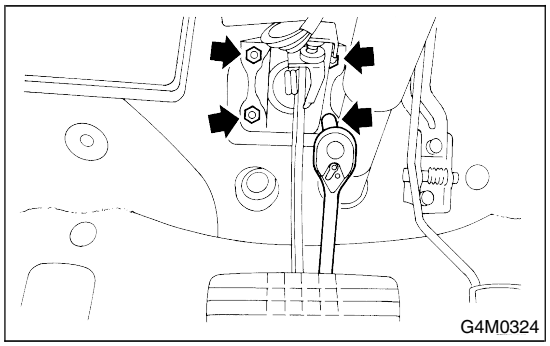


(1) Accelerator pedal
(2) Brake pedal

2. AT MODEL S405541A1802

● LHD model

1) Pull up parking brake lever.
2) Disconnect battery ground terminal 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.



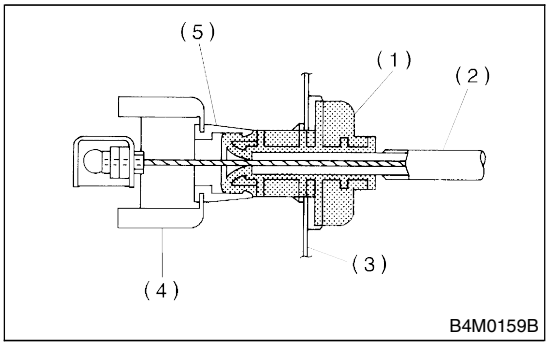
● RHD model

NOTE:
For removal procedures, refer to “MT MODEL”. <Ref. to BR-54 MT MODEL, REMOVAL, Brake 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. (LHD model only)



(1) Casing cap
(2) Accelerator cable
(3) Toe board
(4) Accelerator pedal bracket
(5) Holder

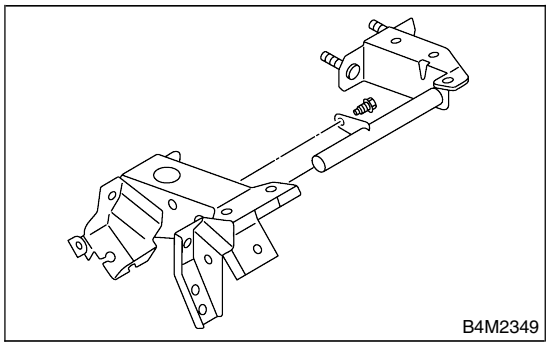
2) Adjustment of clutch pedal <Ref. to BR-58 ASSEMBLY, Brake Pedal.>
3) Inspect after pedal installation <Ref. to BR-59 INSPECTION, Brake Pedal.>

C: DISASSEMBLY S405541A06

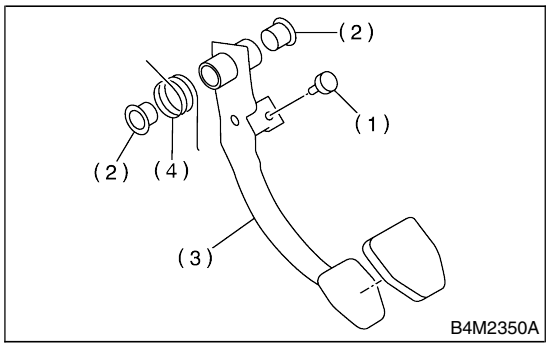
1. MT MODEL S405541A0601

• LHD model

1) Remove the stop light switch.
<Ref. to BR-60 REMOVAL, Stop Light Switch.>
2) Remove the clutch pedal.
<Ref. to CL-38 DISASSEMBLY, Clutch Pedal.>
3) Remove the clutch master cylinder bracket.



4) Remove bushing, spring and stopper.

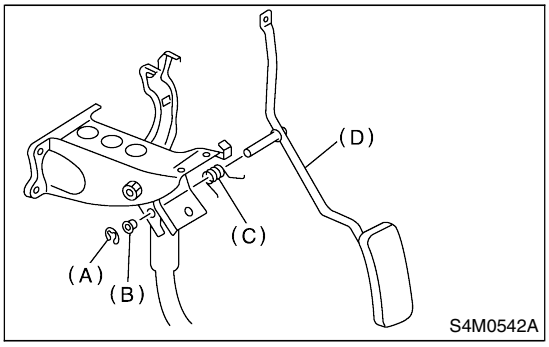


(1) Stopper
(2) Bushing
(3) Brake pedal
(4) Brake pedal spring

5) Remove the brake pedal pad.

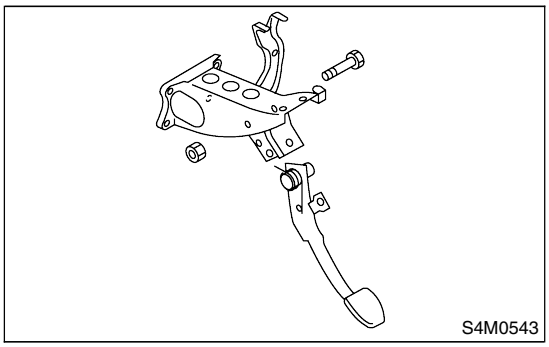
• RHD model

1) Remove the stop light switch and kick-down switch.
2) Remove clip, bushing, accelerator spring and accelerator pedal.

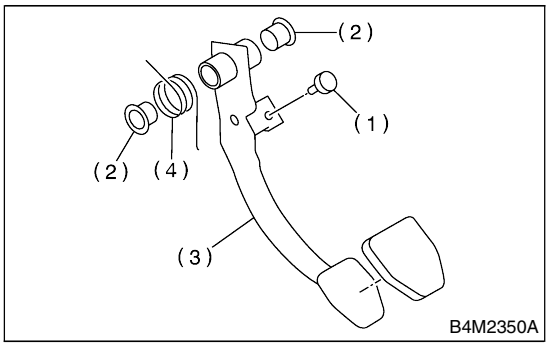


(1) Clip
(2) Bushing
(3) Accelerator spring
(4) Accelerator pedal

3) Unbolt, and then remove the brake pedal.



4) Remove spacer, bushing, brake pedal spring and brake pedal.

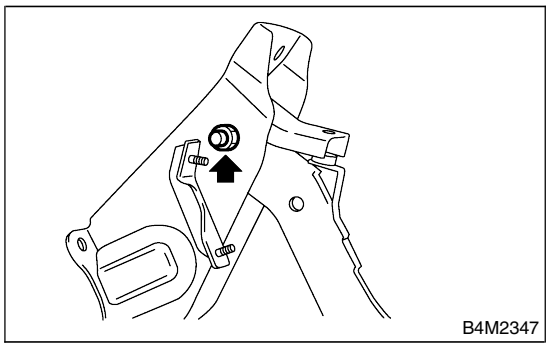


(1) Stopper
(2) Bushing
(3) Brake pedal
(4) Brake pedal spring

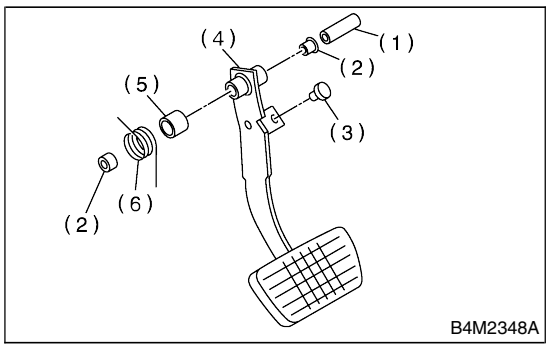
5) Remove the brake pedal pad.

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

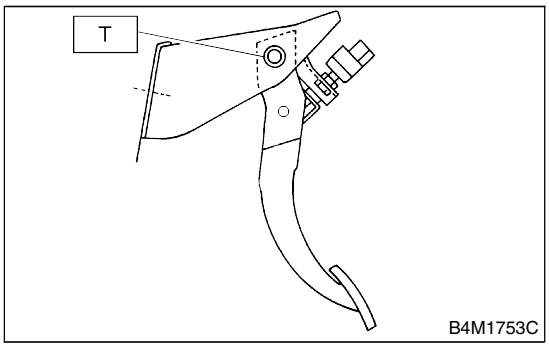
4) Remove the brake pedal pad.

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 clutch pedal effort reducing spring (vehicle with hill holder), and then install pedal bolt.

NOTE:
Clean up inside of bushings and apply grease before installing spacer.

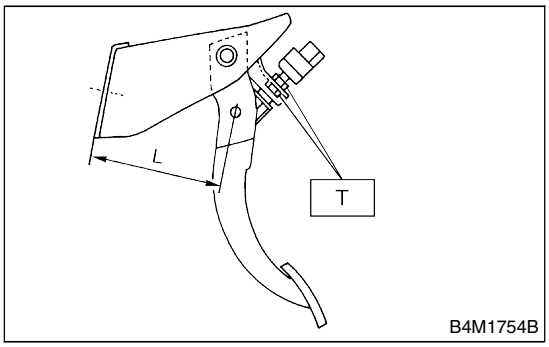
Tightening torque:
T: 29 N·m (3.0 kgf-m, 21.7 ft-lb)



4) Set brake pedal position by adjusting position of stop light switch.

Pedal position: L
LHD model
125.9 mm (4.96 in)
RHD model
154.9 mm (6.10 in)

Tightening torque:
T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)

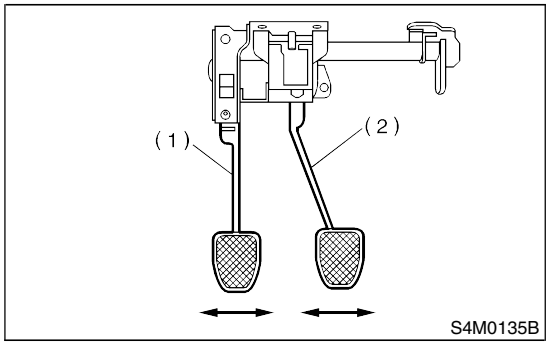


E: INSPECTION S405541A10

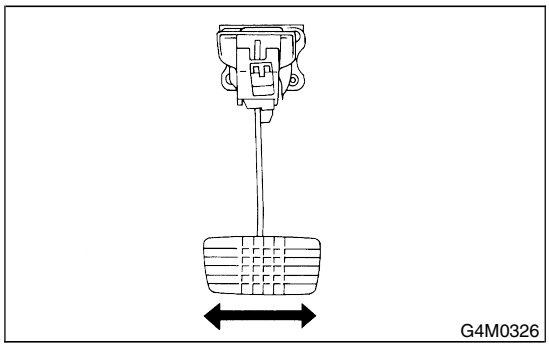
1) Move brake and clutch pedal pads in the lateral direction with a force of approximately 10 N (1 kgf, 2 lb) to ensure pedal deflection is in specified range.

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



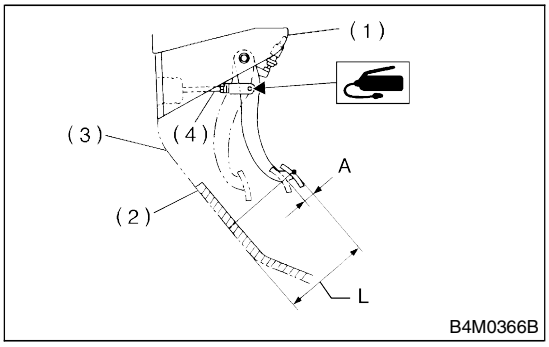
(1) Clutch pedal
(2) Brake pedal



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).]



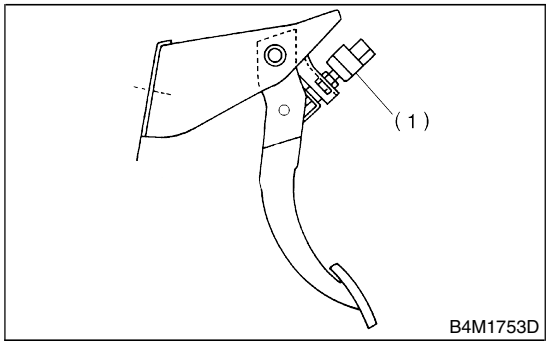
(1) Stop light switch
(2) Mat
(3) Toe board
(4) Brake booster operating rod

3) If it is not in specified value, adjust it by adjusting brake booster operating rod length.

20. Stop Light Switch S405542

A: REMOVAL S405542A18

1) Disconnect ground terminal from battery.
2) Disconnect stop light switch connector.
3) Loosen nuts, and unscrew stop light switch to remove.

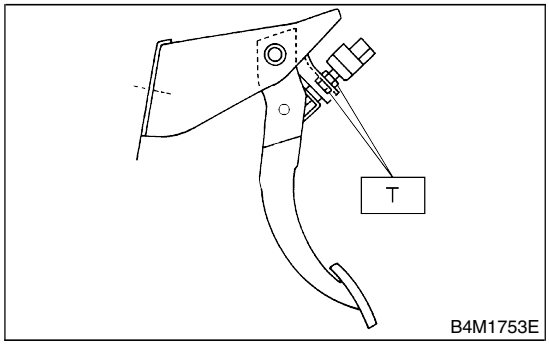


(1) Stop light switch

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-61 ADJUSTMENT, Stop Light Switch.>

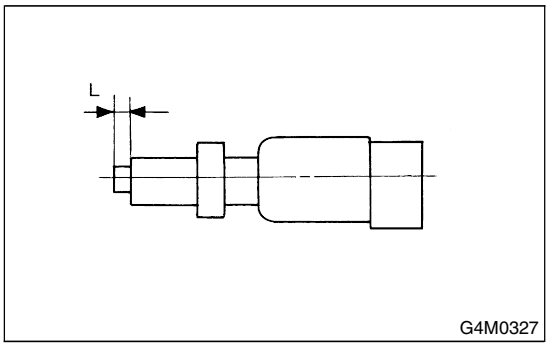
Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



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.

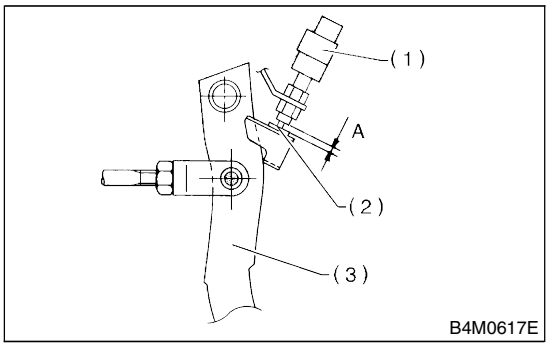
Specified position: L
$2^{+1.5}_{0}$ mm ($0.079^{+0.059}_{0}$ in)



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)



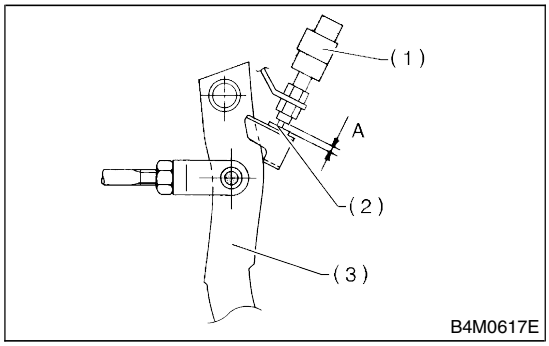
(1) Stop light switch
(2) Stopper
(3) Brake pedal

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.



21. 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.

2. HILL HOLDER S405278A1002

CAUTION:
• Description in parentheses is a characteristic of hill holder and does not indicate abnormality.
Depressing force required for clutch pedal equipped to hill holder specifications is 20 to 29 N (2 to 3 kg, 4 to 7 lb) larger than the conventional specifications, which does not constitute abnormality.
• When vehicle cannot travel (brake cannot be released) because return spring is broken, remove adjust nut, disconnect clutch and PHV, and then return PHV lever to release the brake. (Be sure to apply the parking brake before starting this operation.)
• The hill holder may not be activated on a slope of an extremely small inclination.

	Trouble and possible cause	Corrective action
1. Counterforce of clutch pedal is too strong.	(1) PHV cable is damaged or does not operate properly.	Repair or replace.
	(2) Lever of PHV is defective.	Replace entire PHV assembly.
	(3) Clutch system is anomalous.	Replace clutch system.
2. Vehicle does not stop on uphill road of 3° or higher inclination.	(1) Front side of vehicle is lowered.	Replace suspension.
	(2) PHV cable is broken.	Replace.
	(3) Play of clutch is excessive.	Adjust.
	(4) PHV cable is elongated.	Adjust.
	(5) Sealing of PHV is poor.	Replace entire PHV assembly.
3. Shock is felt when starting.	(1) Poor adjustment of starting performance.	Adjust.
	(2) When depressing the brake pedal strongly:	(The stronger brake pedal depressing force, the later hill holder releases.)
	(3) When starting on flat road after stopping reverse movement:	(Because hill holder is activated.)
4. Vehicle slips down when starting.	(1) PHV cable is elongated.	Adjust.
	(2) Clutch facing is worn out.	Adjust or replace.
	(3) Bracket (cable) or stay (PHV) is deformed.	Repair or replace.
5. Vehicle cannot start after stoppage.	(1) Return spring is fatigued or broken.	Replace.
	(2) PHV lever won't return.	Replace entire PHV assembly.
	(3) When intentionally depressing brake pedal strongly:	[When the brake pedal is depressed by a force of 1,177 N (120 kgf, 265 lb) or more.]
6. Abnormal sound is generated upon releasing brake pedal when stopping.	(1) Rotor and pad matched with each other due to inadequate depressing force to brake pedal.	(Abnormal sound is not generated when depressing brake pedal a little stronger.)
7. Abnormal sound is generated when operating clutch pedal.	(1) Grease is inadequate for the hook of return spring and sliding portion of PHV cable end.	Apply grease.
	(2) When releasing after maintaining high fluid pressure:	(Flowing sound of fluid when releasing high fluid pressure.)
	(3) Clutch system is anomalous.	Replace clutch system.

MEMO:

MEMO:

PARKING BRAKE

PB

Page

1. General Description....2
2. Parking Brake Lever....6
3. Parking Brake Cable....7
4. Parking Brake Assembly (Rear Disc Brake)....9
5. General Diagnostic Table....12

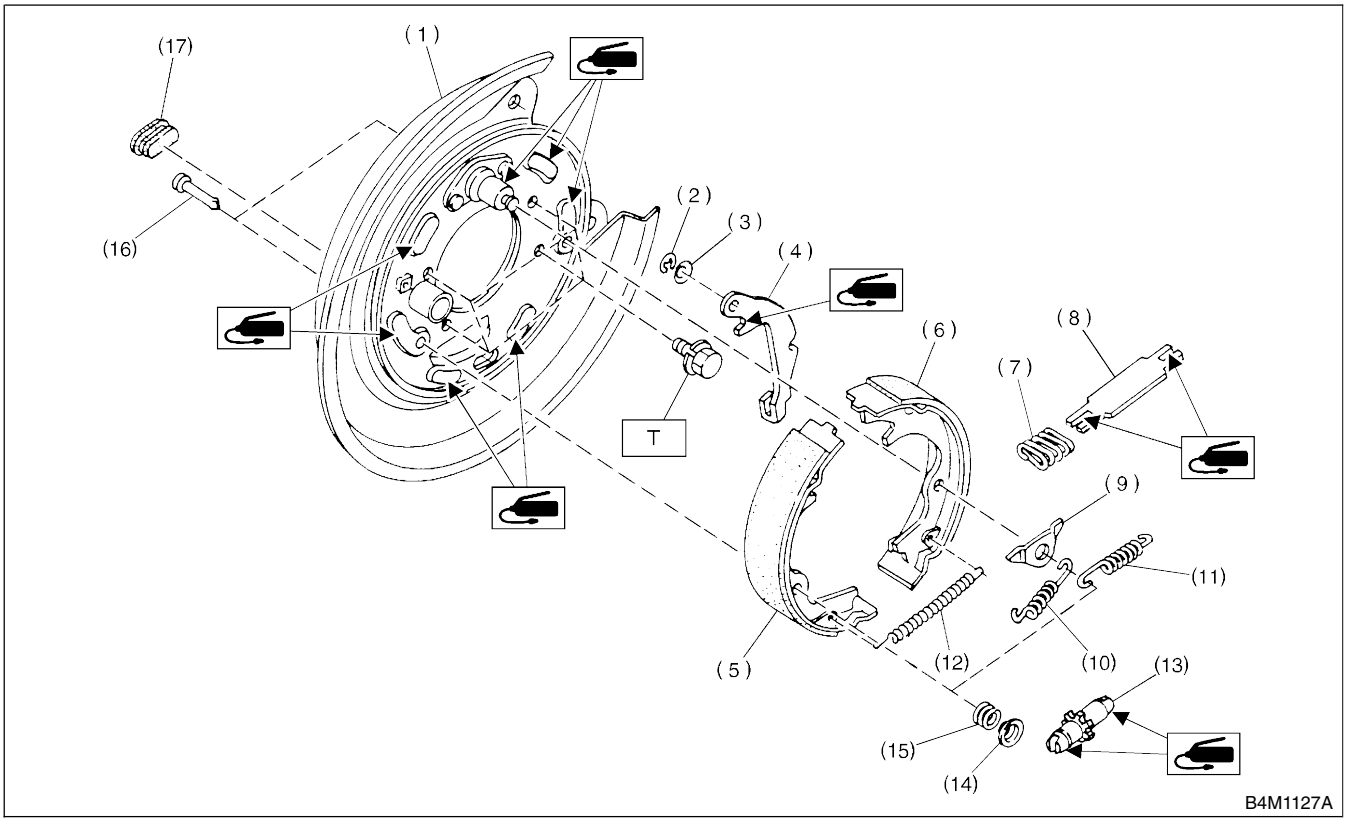
1. General Description S404001

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)	218.8 × 35.0 × 4.1 (8.61 × 1.378 × 0.161)	162.6 × 30.0 × 3.2 (6.40 × 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

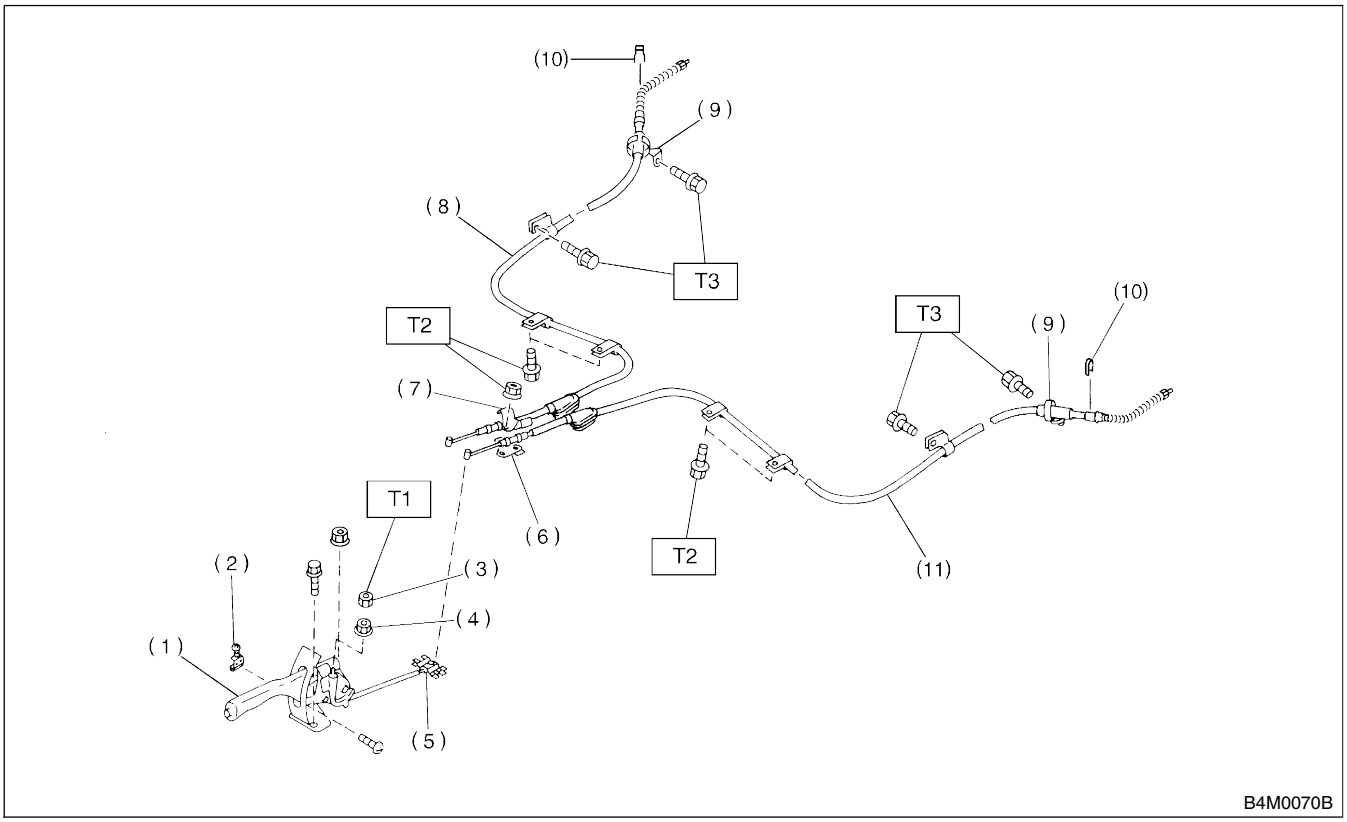
1. PARKING BRAKE (REAR DISC BRAKE) S404001A0501



(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: 52 (5.3, 38.3)

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: 5.9 (0.60, 4.3)
T2: 18 (1.8, 13.0)
T3: 32 (3.3, 24)

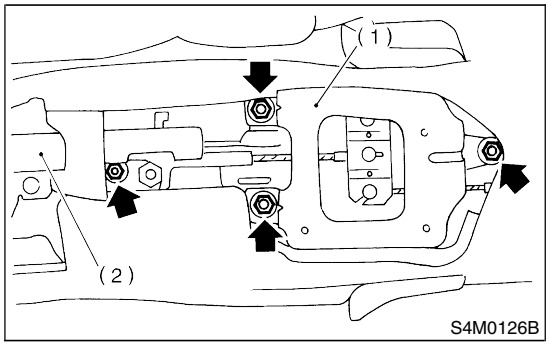
C: CAUTION S404001A03

- 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

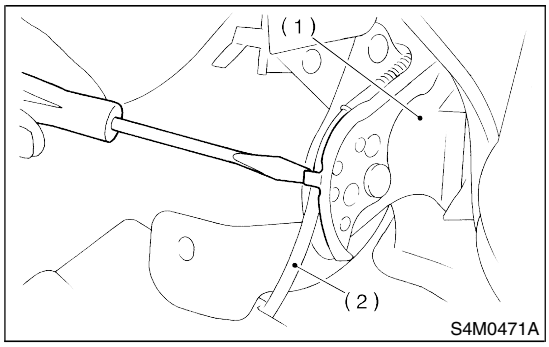
A: REMOVAL S404171A18

1) To immobilize vehicle, put the select lever in "1st " or "P" position, and lock the tires.
2) Disconnect ground terminal connector from battery.
3) Remove console cover. <Ref. to EI-30, 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 (0.6 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)

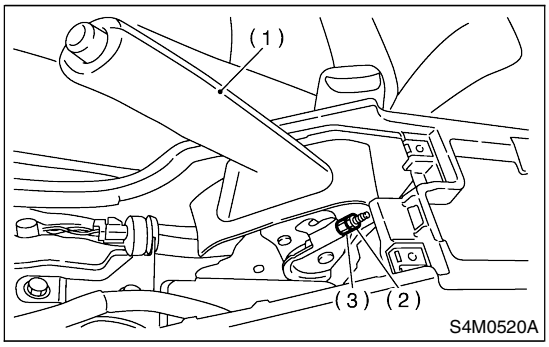
Incorrect, adjust the parking brake. <Ref. to PB-11 ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

D: ADJUSTMENT S404171A01

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 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):
5.9 N·m (0.60 kgf-m, 4.3 ft-lb)



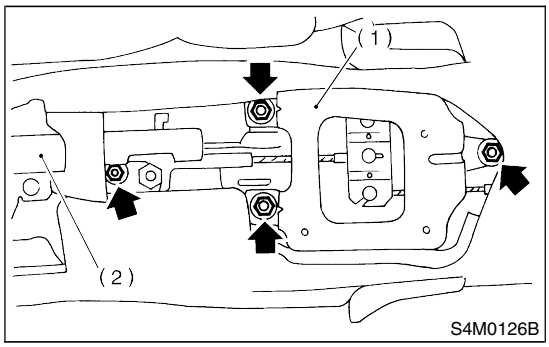
(1) Parking brake lever
(2) Lock nut
(3) Adjusting nut

5) Install console cover.

3. Parking Brake Cable S404170

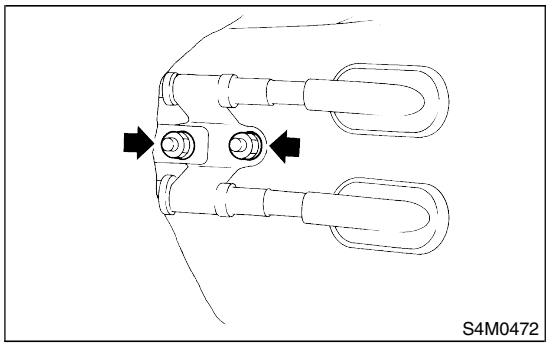
A: REMOVAL S404170A18

1) Set vehicle on a lift.
2) Disconnect battery ground terminal from battery.
3) Lift-up vehicle.
4) Remove rear tires and wheels.
5) Remove rear cushion.
6) Remove console box. <Ref. to EI-30, Console Box.>
7) Loosen parking cable adjusting nut and console bracket.
8) Remove parking brake lever.

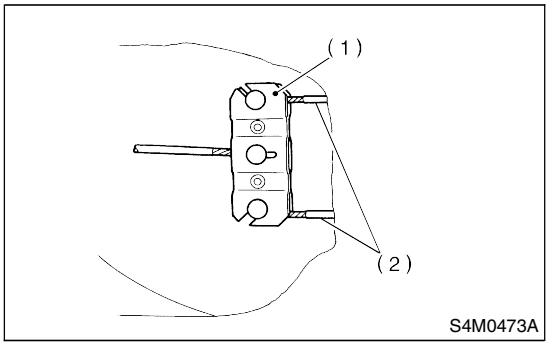


(1) Console bracket
(2) Parking brake lever

9) Roll up floor mat and remove clamps.

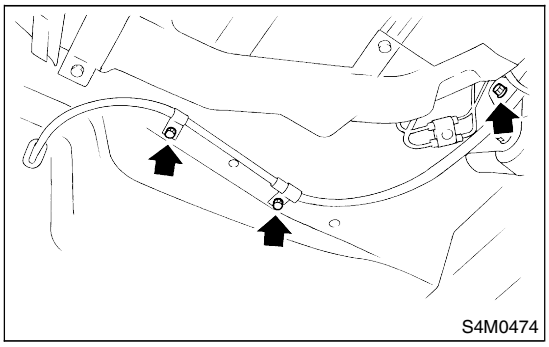


10) Remove equalizer cover.
11) Remove inner cable end from equalizer.



(1) Equalizer
(2) Inner cable end

12) Pull out parking brake cable from rear brake.
Disc brake: <Ref. to PB-9 REMOVAL, Parking Brake Assembly (Rear Disc Brake).>
Dram brake: <Ref. to BR-35, 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.>

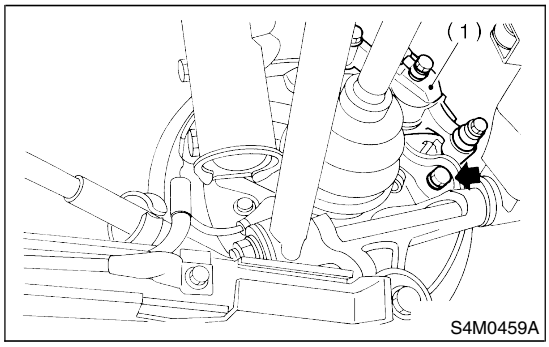
C: INSPECTION S404170A10

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

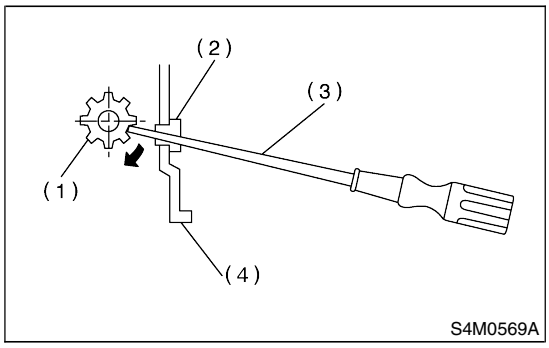
1) Set vehicle on a lift.
2) Disconnect battery ground terminal from battery.
3) Loosen wheel nuts.
4) Lift-up vehicle, and remove wheels.
5) Remove the two mounting bolts and remove the disc brake assembly.



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.

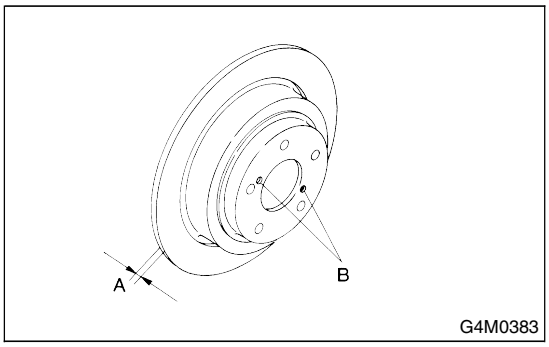
NOTE:
If the disc rotor is difficult to remove try the following two methods in order.

(1) Turn adjusting screw using a slot-type screwdriver until brake shoe gets away enough from the disc rotor.

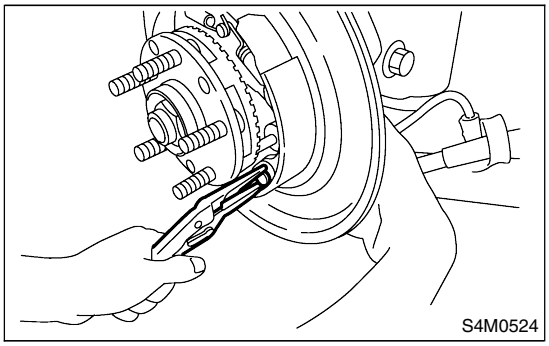


(1) Adjusting screw
(2) Adjusting hole cover (rubber)
(3) Slot-type screwdriver
(4) Back plate

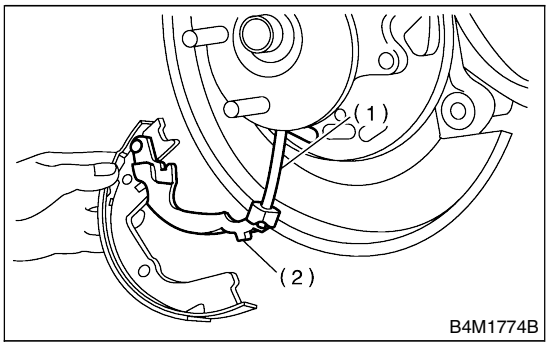
(2) If disc rotor seizes up within hub, drive disc rotor out by installing an 8-mm bolt in holes B on the rotor.



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.

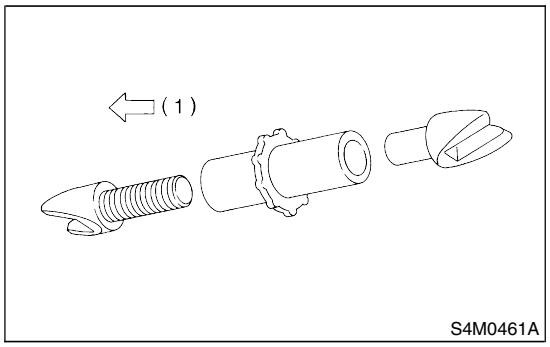
Brake grease:
Dow Corning Molykote No. 7439 (Part No. 725191460)

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.

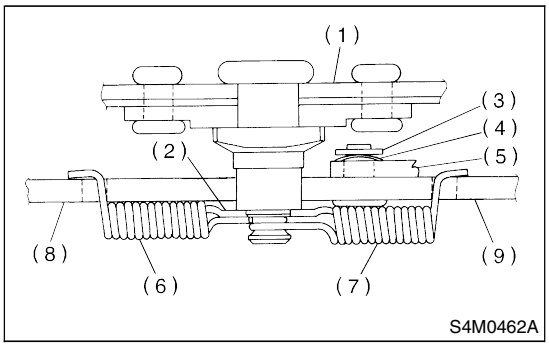
CAUTION:
- **Use new retainers and clinch them when installing brake shoes to levers.**
- **Ensure that parking lever moves smoothly.**
- **Do not confuse left parking lever with right one.**
- **Do not confuse left strut with right one.**

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-11 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.

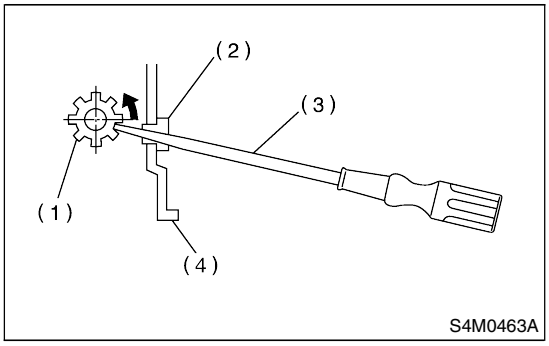
Lining thickness:
Standard
3.2 mm (0.126 in)
Service limit
1.5 mm (0.059 in)

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.

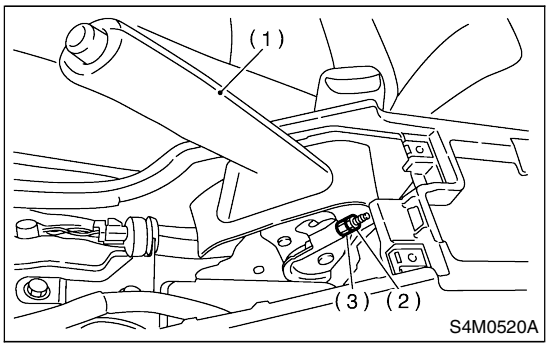


(1) Adjusting screw
(2) Adjusting hole cover (rubber)
(3) Slot-type screwdriver
(4) Back plate

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 box lid.
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 box lid.

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.

POWER ASSISTED SYSTEM (POWER STEERING)

PS

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1. General Description S601001

A: SPECIFICATIONS S601001E49

Model				LHD	RHD
Steering wheel	Free play		mm (in)	17 (0.67)	
Turning angle	Inner tire & wheel			34.4°±1.5°	
	Outer tire & wheel			30.2°±1.5°	
Steering shaft	Clearance between steering wheel and column cover		mm (in)	3.0 (0.118)	
Steering gearbox (Power steering system)	Sliding resistance		N (kgf, lb)	304.0 (31.0, 68.4) or less	
	Rack shaft play in radial direction	Right-turn steering	mm (in)	0.15 (0.0059) or less	Horizontal movement: 0.6 (0.024) or less Vertical movement: 0.4 (0.016) or less
		Left-turn steering	mm (in)	Horizontal movement: 0.3 (0.012) or less Vertical movement: 0.15 (0.0059) or less	0.4 (0.016) or less
	Input shaft play	In radial direction	mm (in)	0.18 (0.0071) or less	
		In axial direction	mm (in)	0.1 (0.004) or less	
	Turning resistance		N (kgf, lb)	Within 30 mm (1.18 in) from rack center in straight ahead position: Less than 11.18 (1.14, 2.51) Maximum allowable value: 12.7 (1.3, 2.9)	
Oil pump [Non-turbo model (Power steering system)]	Pulley shaft	Radial play	mm (in)	0.4 (0.016) or less	
		Axial play	mm (in)	0.9 (0.035) or less	
	Pulley	Ditch deflection	mm (in)	1.0 (0.039) or less	
		Resistance to rotation	N (kgf, lb)	9.22 (0.94, 2.07) or less	
	Regular pressure		kPa (kg/cm^2, psi)	981 (10, 142) or less	
	Relief pressure		kPa (kg/cm^2, psi)	7,355 (75, 1,067)	
Oil pump [Turbo model (Power steering system)]	Pulley shaft	Radial play	mm (in)	0.4 (0.016) or less	
		Axial play	mm (in)	0.6 (0.024) or less	
	Pulley	Ditch deflection	mm (in)	1.0 (0.039) or less	
		Resistance to rotation	N (kgf, lb)	9.22 (0.94, 2.07) or less	
	Regular pressure		kPa (kg/cm^2, psi)	981 (10, 142) or less	
	Relief pressure		kPa (kg/cm^2, psi)	9,807 (100, 1,422)	
Steering wheel effort (Power steering system)	At standstill with engine idling on a concrete road		N (kgf, lb)	29.4 (3.0, 6.6) or less	
	At standstill with engine stalled on a concrete road		N (kgf, lb)	294.2 (30, 66.2) or less	

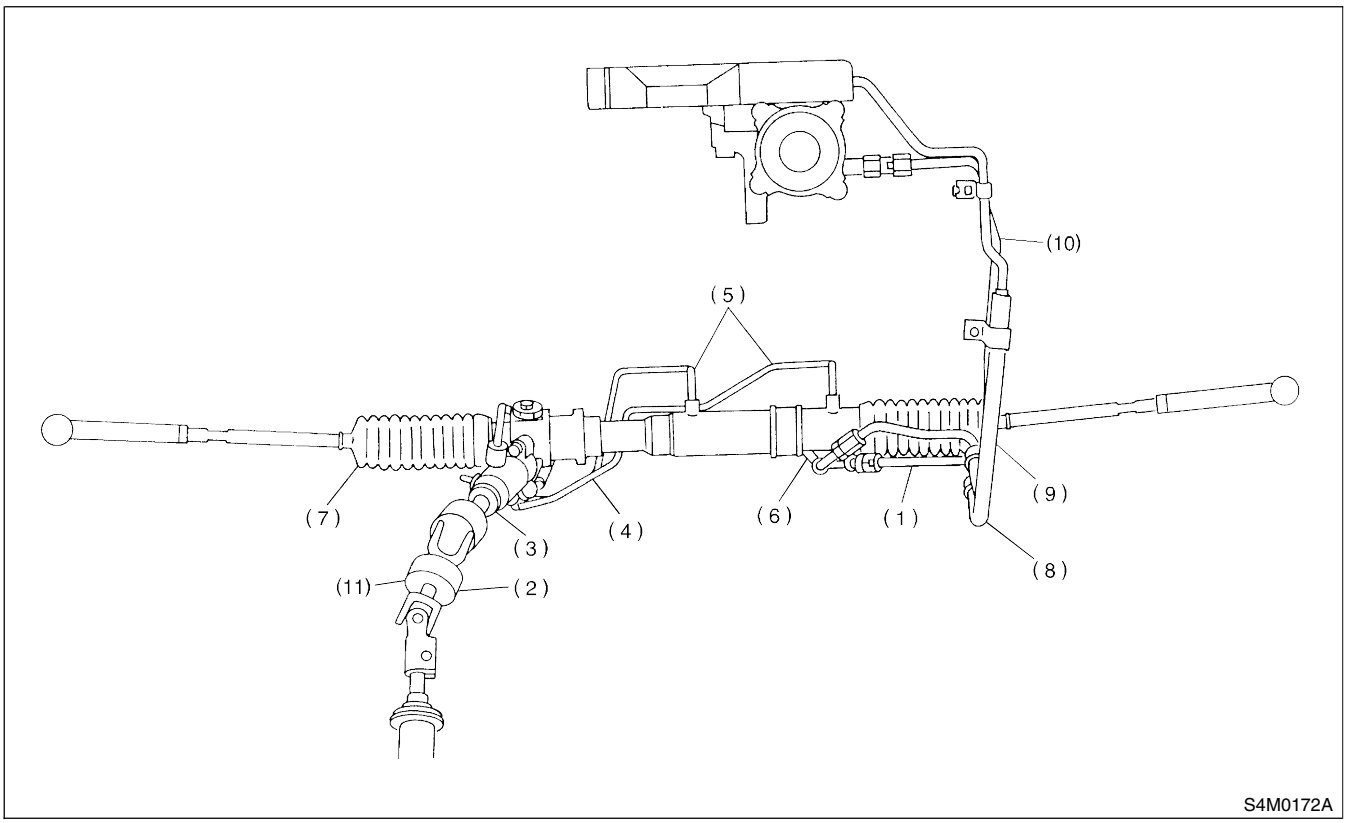
Recommended power steering fluid	Manufacturer
ATF DEXRON IIE or III	B.P.
	CALTEX
	CASTROL
	MOBIL
	SHELL
	TEXACO

Model				Non-turbo	Turbo
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)			LHD: 19.0 (3.4) RHD: 16.7 (3.0)	
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)	9.6 — 0.65 (0.586— 0.040)
	Relief pressure		kPa (kg/cm^2, psi)	7,355 (75, 1,067)	7,846 (80, 1,138)
	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	500 — 8,000
	Revolving direction			Clockwise	
Working fluid (Power steering system)	Name			ATF DEXRON IIE or III	
	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.

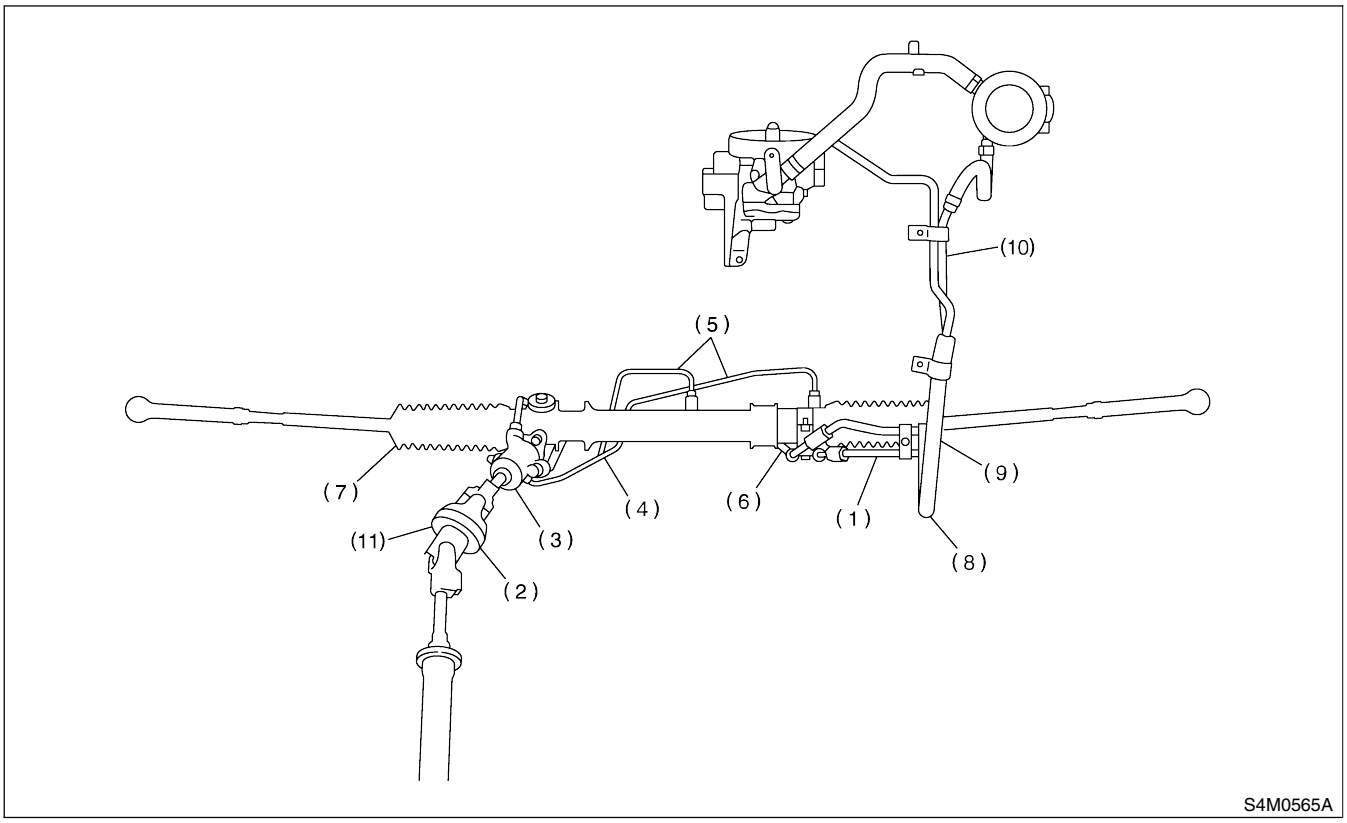
Location	Minimum allowance
(1) Crossmember — Pipe	5 mm (0.20 in)
(2) DOJ — Shaft or joint	14 mm (0.55 in)
(3) DOJ — Valve housing	11 mm (0.43 in)
(4) Pipe — Pipe	2 mm (0.08 in)
(5) Stabilizer — Pipe	5 mm (0.20 in)
(6) Exhaust pipe — Pipe	15 mm (0.59 in)
(7) Exhaust pipe — Gearbox bolt	15 mm (0.59 in)
(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 (LHD model)	20 mm (0.79 in)

- **Non-turbo model**



S4M0172A

- **Turbo model**

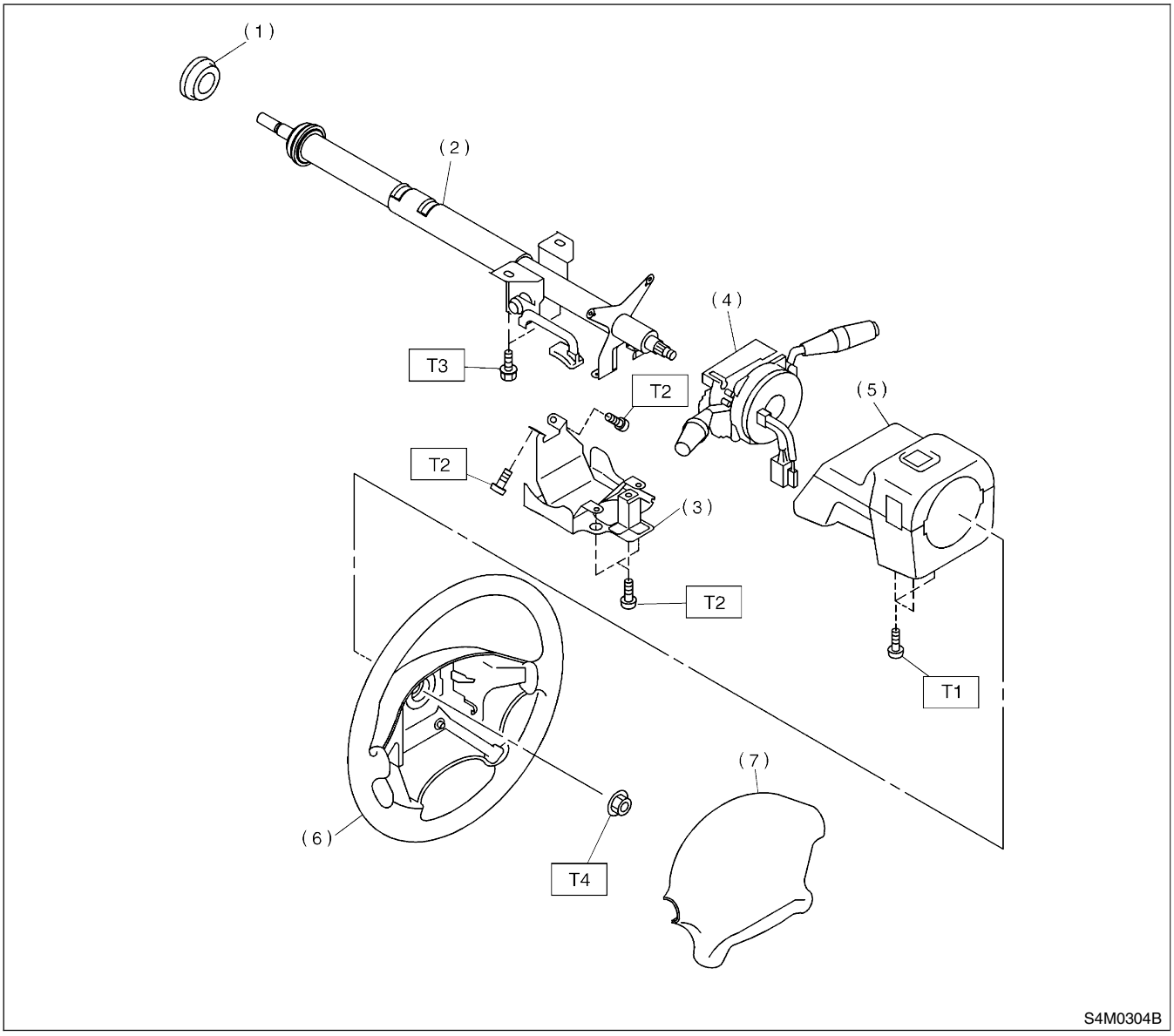


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B: COMPONENT S601001A05

1. STEERING WHEEL AND COLUMN S601001A0501

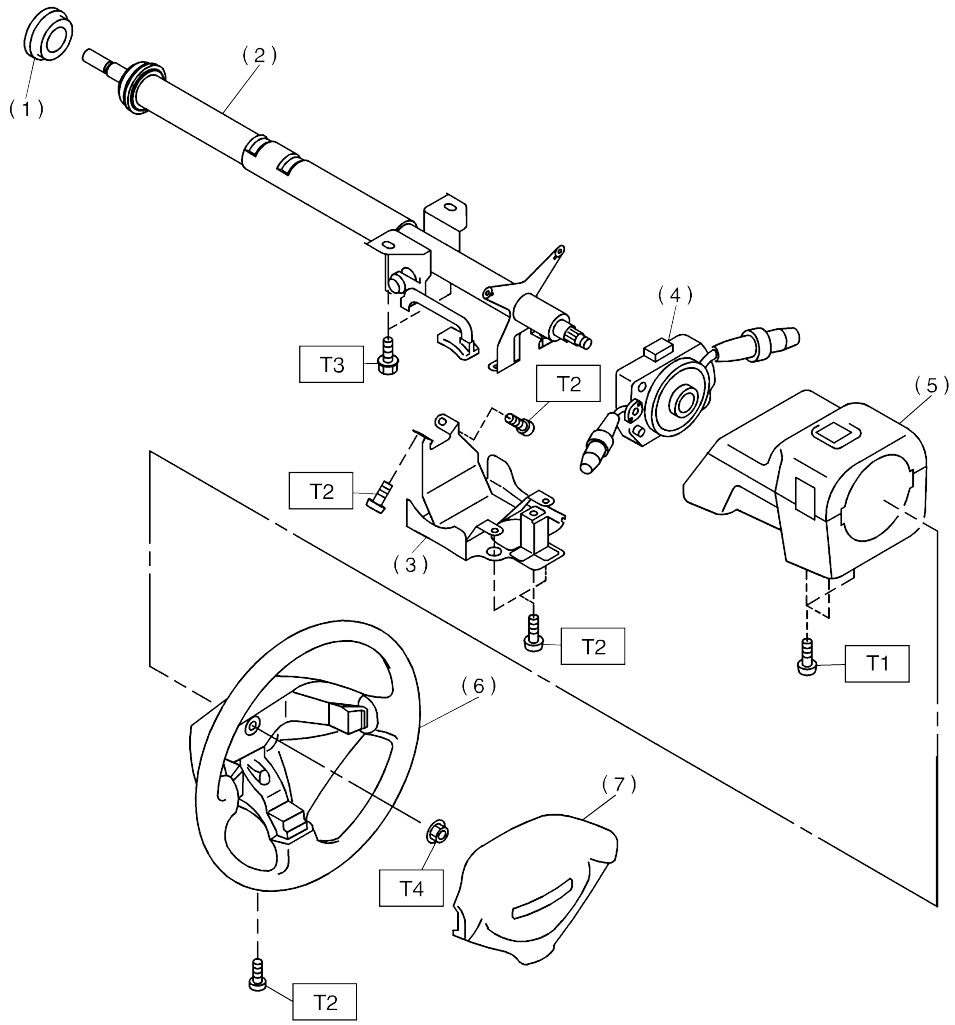
- **With Airbag Model**



(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)

● Without Airbag Model



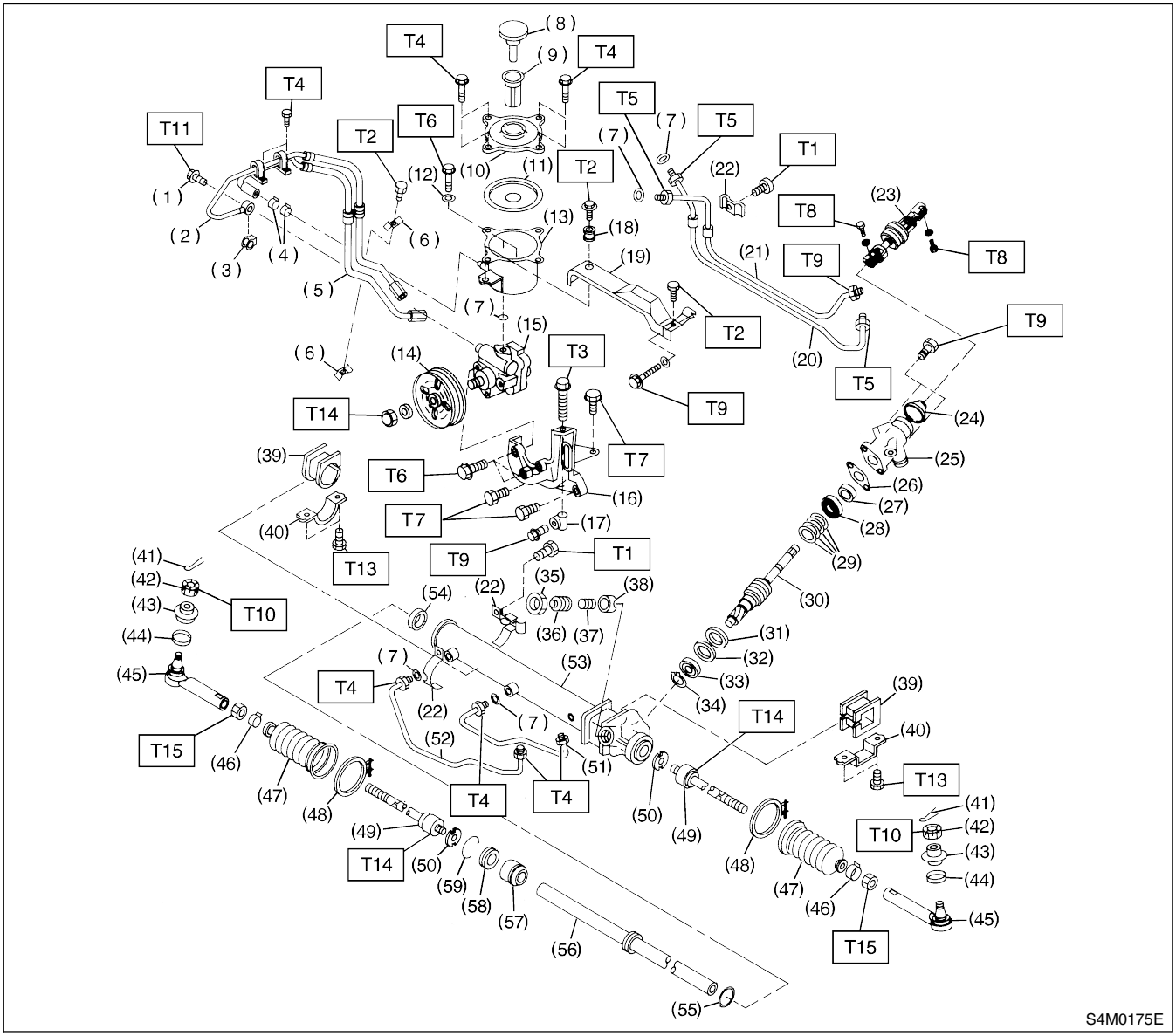
(1) Bushing
(2) Steering shaft
(3) Knee protector
(4) Combination switch
(5) Column cover
(6) Steering wheel
(7) Pad ASSY

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)

MEMO:

2. POWER ASSISTED SYSTEM FOR NON-TURBO MODEL S601001A0504

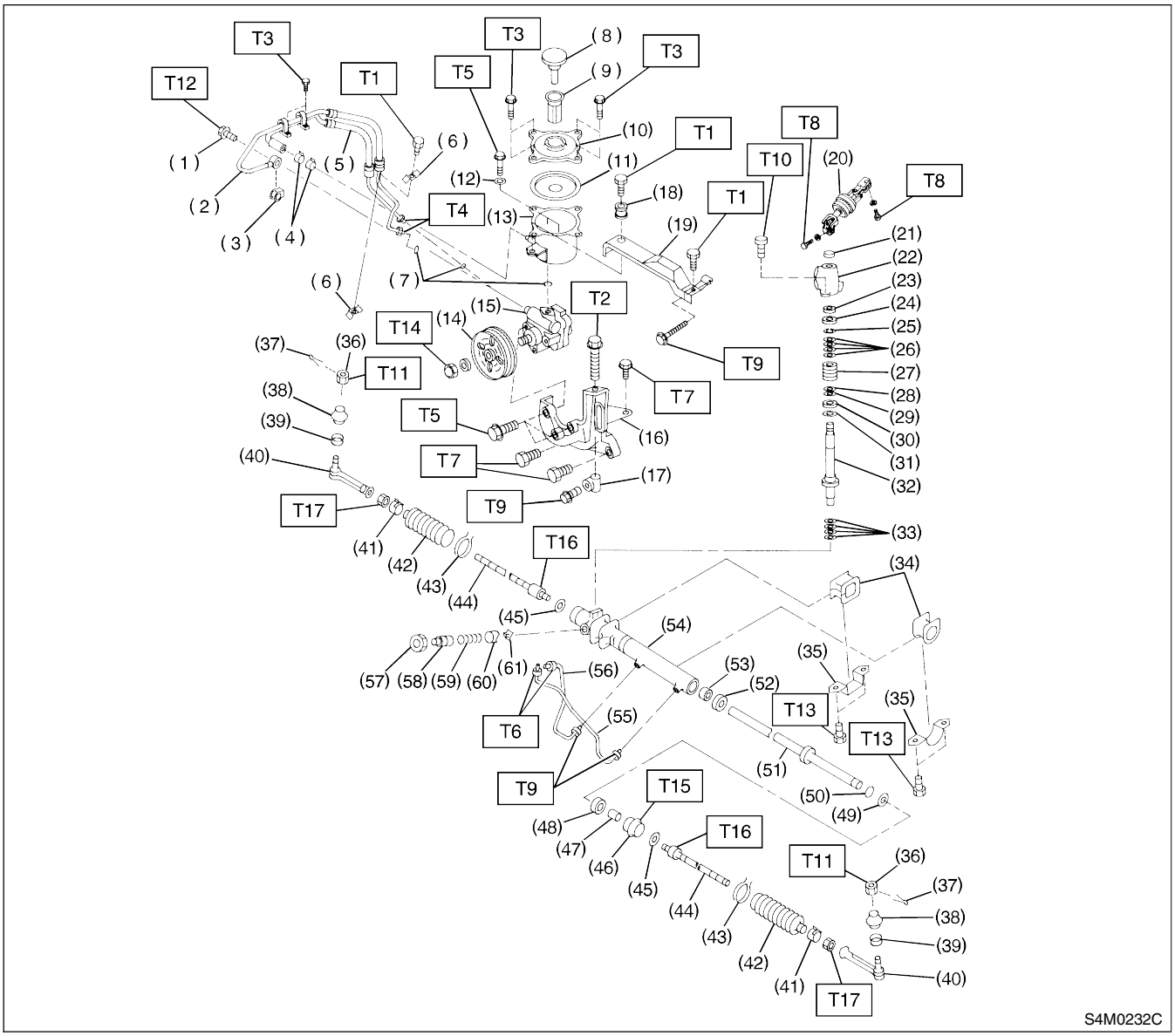
- **LHD Model**



(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)

● RHD Model

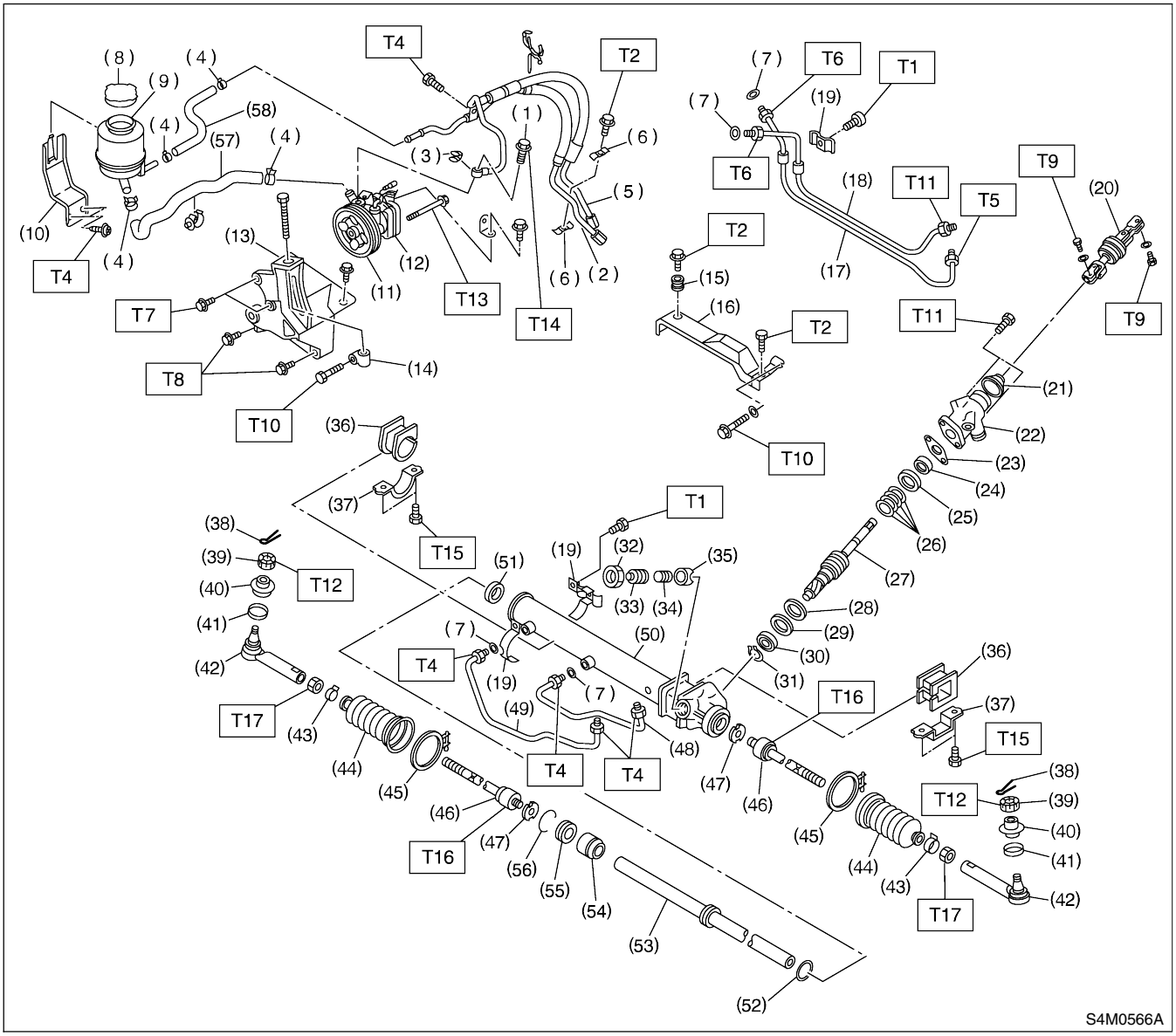

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S4M0232C

(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) Universal joint
(21) Dust cover
(22) Valve housing
(23) Oil seal
(24) Ball bearing
(25) Retaining ring
(26) Seal ring
(27) Valve sleeve
(28) Seal ring
(29) O-ring
(30) Oil seal
(31) Spacer
(32) Pinion
(33) Shim
(34) Adapter
(35) Clamp
(36) Castle nut
(37) Cotter pin
(38) Dust seal
(39) Clip
(40) Tie-rod end
(41) Clip
(42) Boot
(43) Wire
(44) Tie-rod
(45) Lock washer
(46) Holder
(47) Bushing
(48) Oil seal
(49) Oil seal
(50) O-ring
(51) Rack
(52) Oil seal
(53) Back-up washer
(54) Steering body
(55) Pipe A
(56) Pipe B
(57) Lock nut
(58) Adjusting screw
(59) Spring
(60) Sleeve
(61) Seat pad

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.4 (0.75, 5.4)
T2: 8 (0.8, 5.8)
T3: 13 (1.3, 9.4)
T4: 15 (1.5, 10.8)
T5: 18 (1.8, 13.0)
T6: 20 (2.0, 14.5)
T7: 22 (2.2, 15.9)
T8: 24 (2.4, 17.4)
T9: 24.5 (2.50, 18.1)
T10: 25 (2.5, 18.1)
T11: 27.0 (2.75, 19.9)
T12: 39 (4.0, 28.9)
T13: 59 (6.0, 43)
T14: 52 (5.3, 38)
T15: 64 (6.5, 47)
T16: 78 (8.0, 58)
T17: 83 (8.5, 61.5)

3. POWER ASSISTED SYSTEM FOR TURBO MODEL S601001A0505

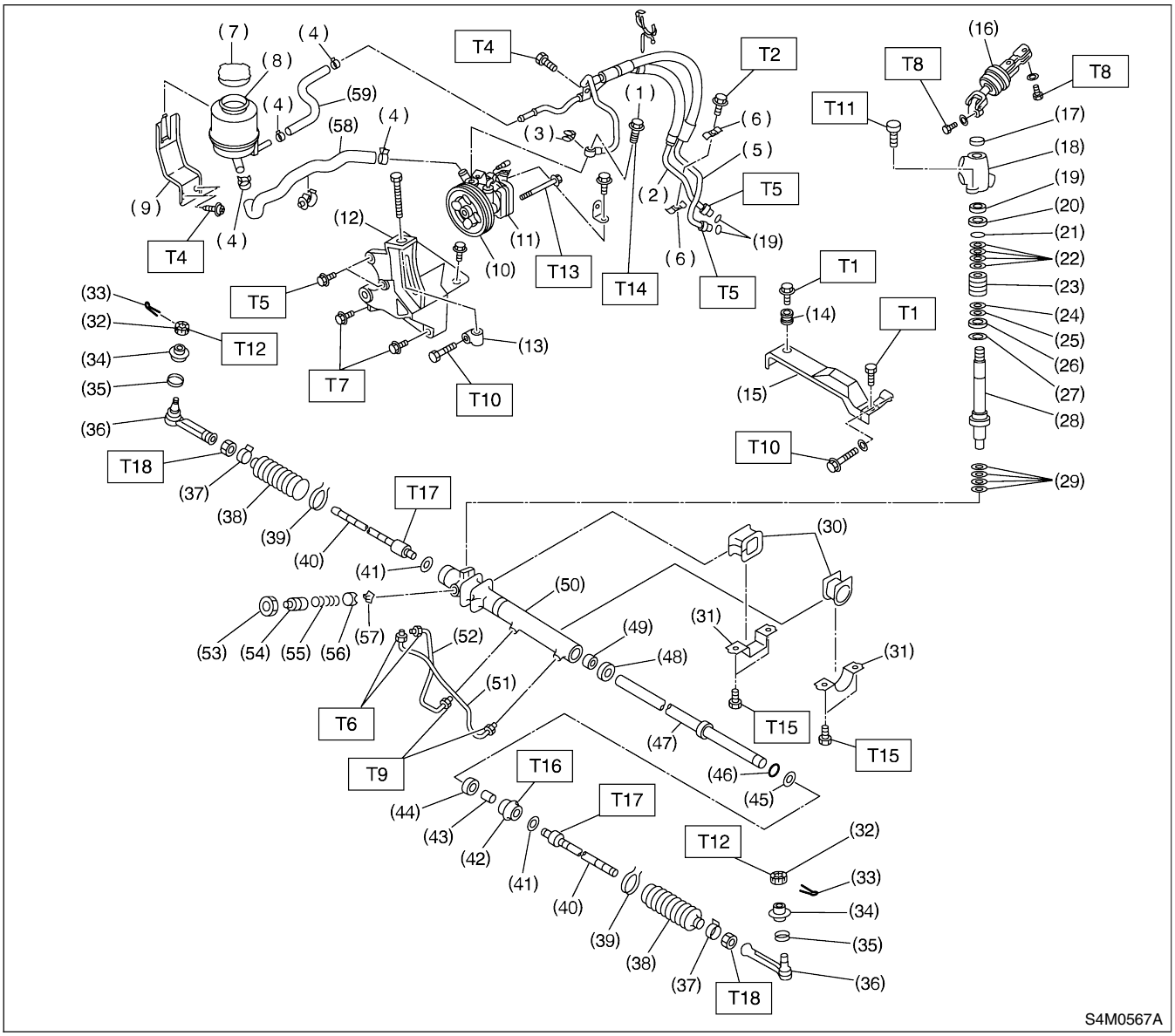
- **LHD Model**



(1) Eye bolt
(2) Pipe C
(3) Gasket
(4) Clip
(5) Pipe D
(6) Clamp E
(7) O-ring
(8) Cap
(9) Reservoir tank
(10) Reservoir tank bracket
(11) Pulley
(12) Oil pump
(13) Bracket
(14) Belt tension nut
(15) Bushing
(16) Belt cover
(17) Pipe E
(18) Pipe F
(19) Clamp plate
(20) Universal joint
(21) Dust cover
(22) Valve housing
(23) Gasket
(24) Oil seal
(25) Special bearing
(26) Seal ring
(27) Pinion and valve ASSY
(28) Oil seal
(29) Back-up washer
(30) Ball bearing
(31) Snap ring
(32) Lock nut
(33) Adjusting screw
(34) Spring
(35) Sleeve
(36) Adapter
(37) Clamp
(38) Cotter pin
(39) Castle nut
(40) Dust seal
(41) Clip
(42) Tie-rod end
(43) Clip
(44) Boot
(45) Band
(46) Tie-rod
(47) Lock washer
(48) Pipe B
(49) Pipe A
(50) Steering body
(51) Oil seal
(52) Piston ring
(53) Rack
(54) Rack bushing
(55) Rack stopper
(56) Circlip
(57) Suction hose
(58) Tank hose

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: 15 (1.5, 10.8)
T7: 15.7 (1.6, 11.6)
T8: 22 (2.2, 15.9)
T9: 24 (2.4, 17.4)
T10: 25 (2.5, 18.1)
T11: 25 (2.5, 18.1)
T12: 27 (2.75, 19.9)
T13: 37.3 (3.8, 27.5)
T14: 39 (4.0, 28.9)
T15: 59 (6.0, 43)
T16: 78 (8.0, 58)
T17: 83 (8.5, 61.5)
T18: 25 (2.5, 18.1)

● RHD Model


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(1) Eye bolt
(2) Pipe C
(3) Gasket
(4) Clip
(5) Pipe D
(6) Clamp E
(7) Cap
(8) Reservoir tank
(9) Reservoir tank bracket
(10) Pulley
(11) Oil pump
(12) Bracket
(13) Belt tension nut
(14) Bushing
(15) Belt cover
(16) Universal joint
(17) Dust cover
(18) Valve housing
(19) Oil seal
(20) Ball bearing
(21) Retaining ring
(22) Seal ring
(23) Valve sleeve
(24) Seal ring
(25) O-ring
(26) Oil seal
(27) Spacer
(28) Pinion
(29) Shim
(30) Adapter
(31) Clamp
(32) Castle nut
(33) Cotter pin
(34) Dust seal
(35) Clip
(36) Tie-rod end
(37) Clip
(38) Boot
(39) Wire
(40) Tie-rod
(41) Lock washer
(42) Holder
(43) Bushing
(44) Oil seal
(45) Seal ring
(46) O-ring
(47) Rack
(48) Oil seal
(49) Back-up ring
(50) Steering body
(51) Pipe A
(52) Pipe B
(53) Lock nut
(54) Adjusting screw
(55) Spring
(56) Sleeve
(57) Seat pad
(58) Suction hose
(59) Tank hose

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.4 (0.75, 5.4)
T2: 8 (0.8, 5.8)
T3: 13 (1.3, 9.4)
T4: 15 (1.5, 10.8)
T5: 15.7 (1.6, 11.6)
T6: 20 (2.0, 14.5)
T7: 22 (2.2, 15.9)
T8: 24 (2.4, 17.4)
T9: 24 (2.4, 17.4)
T10: 24.5 (2.50, 18.1)
T11: 25 (2.5, 18.1)
T12: 27.0 (2.75, 19.9)
T13: 37.3 (3.8, 27.5)
T14: 39 (4.0, 28.9)
T15: 59 (6.0, 43)
T16: 64 (6.5, 47)
T17: 78 (8.0, 58)
T18: 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

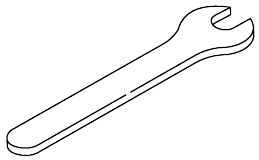
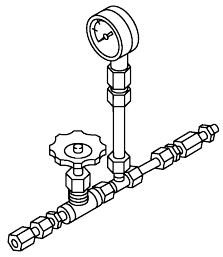
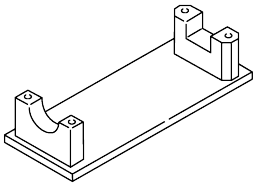
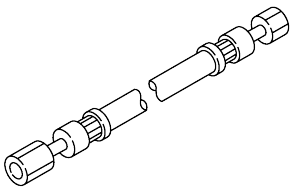
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2411	925700000	WRENCH	• Used for removing and installing tie-rod. • Apply this tool to rack.
 B4M2412	925711000	PRESSURE GAUGE	Used for measuring oil pump pressure.
 B4M2413	926200000	STAND	Used when inspecting characteristic of gearbox assembly and disassembling it.
 B4M2414	34099AC010	ADAPTER HOSE A	Used with PRESSURE GAUGE (925711000).

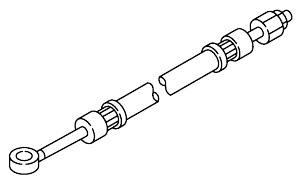
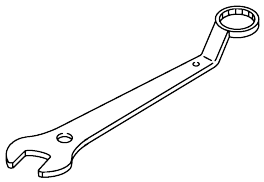
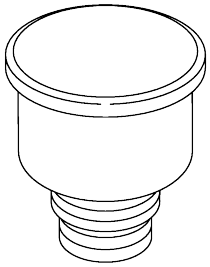
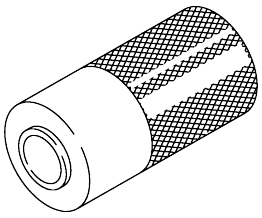
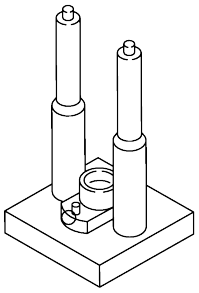
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2415	34099AC020	ADAPTER HOSE B	Used with PRESSURE GAUGE (925711000).
 B4M2416	926230000	SPANNER	• For the lock nut when adjusting backlash of gearbox. • Measurement of rotating resistance of gearbox assembly.
 B4M2419	34199AE040	OIL CHARGE GUIDE	• Used for charging power steering oil. • For TURBO model
 B4M2420	927640000	INSTALLER B	• Used for installing ball bearing into housing. • For LHD model
 B4M2421	926370000	INSTALLER A	• Used for installing valve assembly into valve housing assembly. • Used with STAND BASE (927630000). • For LHD model

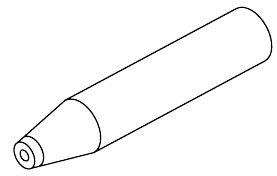
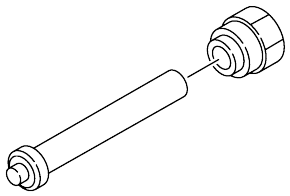
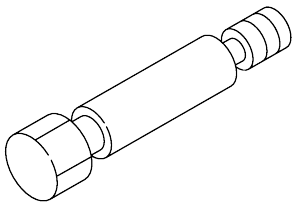
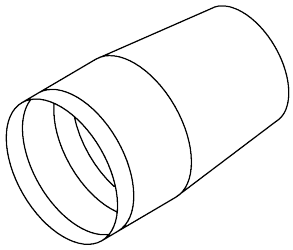
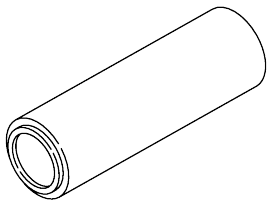
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2422	926390001	COVER & REMOVER ASSY	• Used for assembling rack assembly. • For LHD model
 B4M2423	926420000	PLUG	• When oil leaks from pinion side of gearbox assembly, remove pipe B from valve housing, attach this tool and check oil leaking points. • For LHD model
 B4M2424	926400000	GUIDE	• Right side of rack when installing rack bush. • Used with GUIDE (927660000). • For LHD model
 B4M2425	927660000	GUIDE	• Right side of rack when installing rack bush. • Used with GUIDE (926400000). • For LHD model
 B4M2426	927620000	INSTALLER B	• Used for installing oil seal of valve housing. • Used with INSTALLER A (926360000). • For LHD model

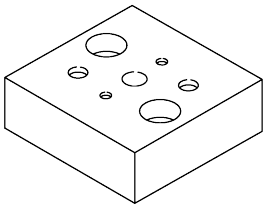
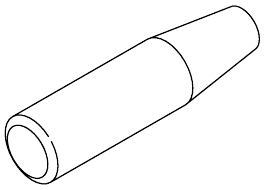
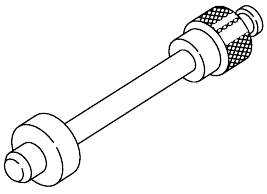
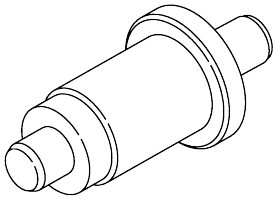
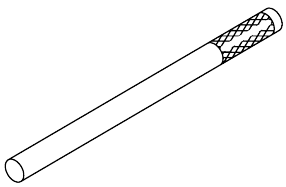
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2427	34099FA100	STAND BASE	• Used for assembling power steering gearbox. • For LHD model
 B4M2428	926360000	INSTALLER A	• Used as a guide to install oil seal. • Used with INSTALLER B (927620000). • For LHD model
 B4M2429	34199AE050	INSTALLER	• Used for installing oil seal. • For LHD model
 B4M2430	34099FA120	INSTALLER	• Used for installing valve housing oil seal. • For LHD model
 B4M2432	34199AE050	REMOVER OIL SEAL	• Used for removing back-up ring and oil seal. • For LHD model

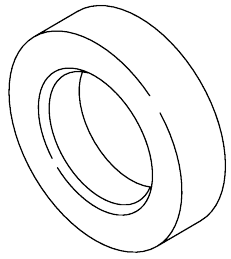
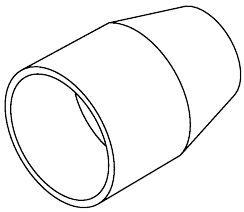
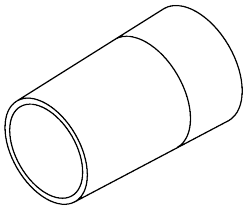
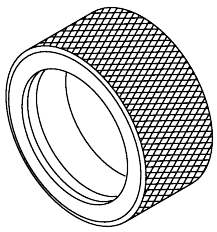
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 B4M2431	34099FA130	INSTALLER SEAL	• Used for installing valve housing oil seal. • Used with INSTALLER AND REMOVER SEAL (34099FA120). • For LHD model
 B4M2488	926250000	GUIDE	• Used for installing holder ASSY into rack hous-ing. • For RHD model
 B4M2489	926270000	COVER	• Used for installing oil seal to pinion. • For RHD model
 B4M2490	926280000	FORMER	• Used for installing seal ring to pinion. • For RHD model

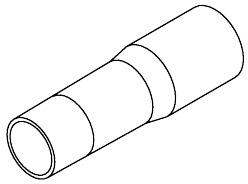
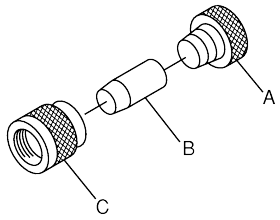
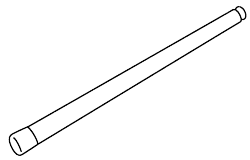
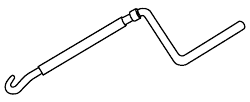
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2491	926450000	COVER	• Used for installing oil seal to pinion. • For RHD model
 B4M2492A	927490000	INSTALLER A, B, C	• Used for installing oil seal into rack ASSY. • For RHD model
 B4M2493	927580000	REMOVER	• Used for removing back-up ring and oil seal. • For RHD model
 B4M2494	927590000	WRENCH	• Used for removing wire from boot. • For RHD model

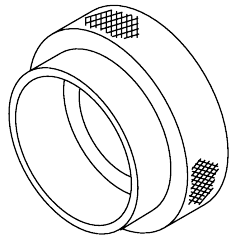
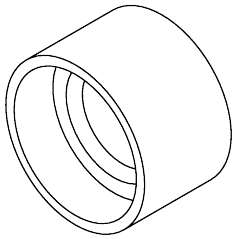
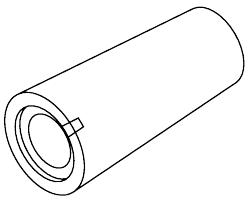
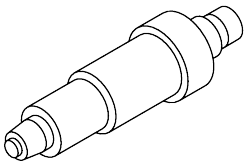
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2495	927600000	FORMER	• Used for installing seal ring to rack pinion. • For RHD model
 B4M2496	927520000	INSTALLER D	• Used for installing pinion bearing. • For RHD model
 B4M2497	927530000	INSTALLER E	• Used for installing pinion bearing. • For RHD model
 B4M2499	34099FA000	INSTALLER & REMOVER	• Used for removing and installing Y-packing. • For RHD model

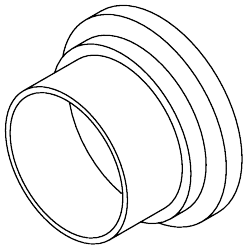
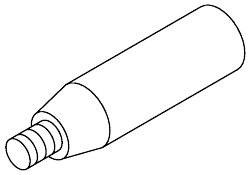
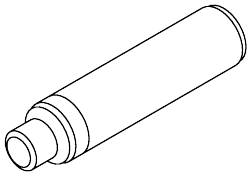
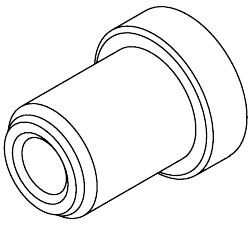
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2500	34099FA010	GUIDE	• Used for installing rack and seal into housing assembly. • For RHD model
 B4M2501	34099FA020	GUIDE	• Used for installing valve assembly into valve housing assembly. • For RHD model
 B4M2502	34099FA030	INSTALLER & REMOVER	• Used for removing and installing rack oil seal (outer & inner). • For RHD model
 B4M2503	34099FA040	INSTALLER	• Used for installing rack oil seal (outer). • For RHD model

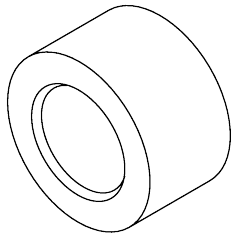
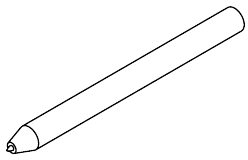
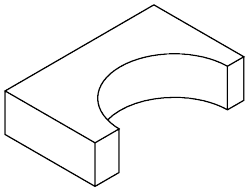
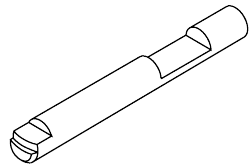
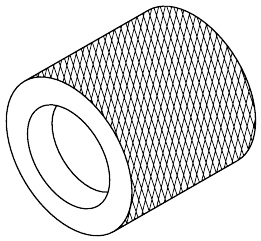
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2504	34099FA050	SPACER	• Used for installing bearing into valve housing. • For RHD model
 B4M2505	34099FA060	PUNCH	• Used for caulking. • For RHD model
 B4M2506	34099FA070	BASE	• Used for supporting housing assembly. • For RHD model
 B4M2507	34099FA080	PUNCH	• Used for removing caulking. • For RHD model

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2508	926050000	FORMER	• Used for installing seal ring to rack pinion. • For RHD model

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.

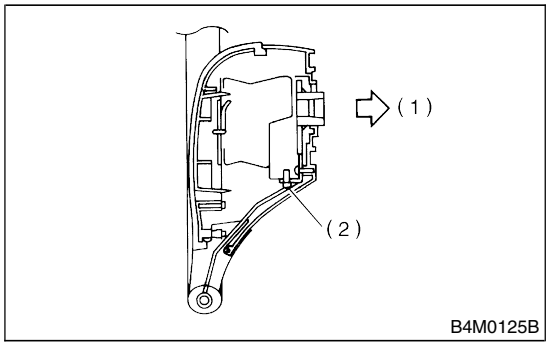
2. Steering Wheel S601274

A: REMOVAL S601274A18

1) Disconnect ground terminal from battery.
2) Set tires to straight-ahead position.
3) Remove airbag module. (with airbag model) <Ref. to AB-12 REMOVAL, Driver's Airbag Module.>

WARNING:
Always refer to "Airbag System" before performing airbag module service (if so equipped). <Ref. to AB-12 CAUTION, Driver's Airbag Module.>

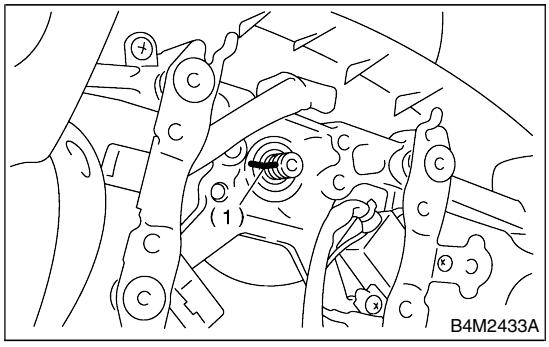
4) Remove lower screw and slide horn pad assembly forward, then disconnect connector. (without airbag model)
5) Remove horn pad by pulling on it. (without airbag model)



(1) Front
(2) Screw

6) 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:
4.5 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 (if so equipped). (with airbag model) <Ref. to AB-12 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. (with airbag model)

C: INSPECTION S601274A10

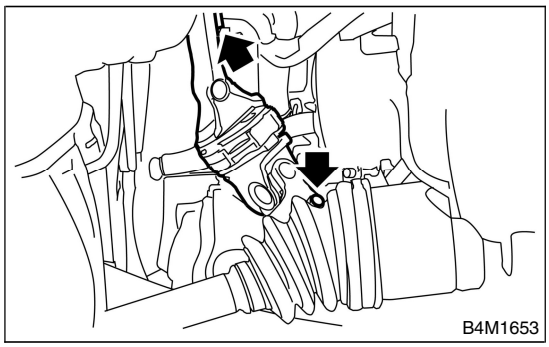
1) Check steering wheel for deformation. If the deformation is excessive, replace steering wheel.
2) Check splines on steering wheel for damage. If the damage is excessive, replace steering wheel.

3. Universal Joint S601273

A: REMOVAL S601273A18

1) Set the vehicle on the lift.
2) Remove the steering wheel. <Ref. to PS-27 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.



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. (with airbag model) <Ref. to AB-20 ADJUSTMENT, Roll Connector.>

CAUTION:
Ensure that front wheel are set straight forward direction.

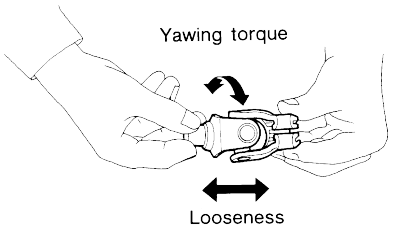
4) Install steering wheel and airbag module. (with airbag model) <Ref. to PS-27 INSPECTION, Steering Wheel.>

WARNING:
Always refer to "Airbag System" before performing airbag module service (if so equipped). <Ref. to AB-12 CAUTION, Driver's Airbag Module.> and <Ref. to AB-13 INSTALLATION, Driver's Airbag Module.>

5) Install horn pad to steering wheel. (without airbag model)

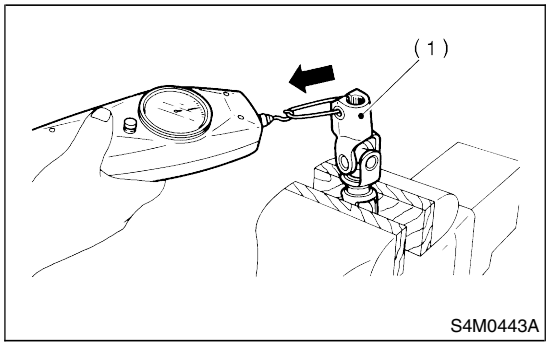
C: INSPECTION S601273A10

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.

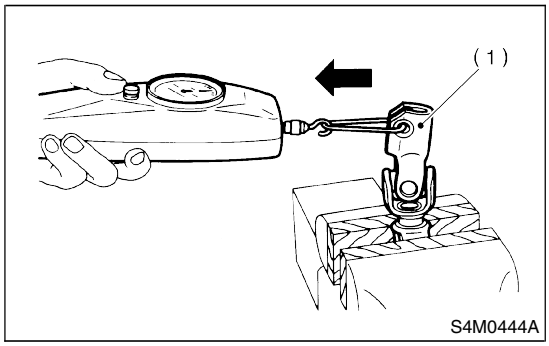
Measurement of folding torque of universal joint is as shown in the figures.

Service limit:
Maximum load; 5.49 N (0.56 kgf, 1.23 lb) or less



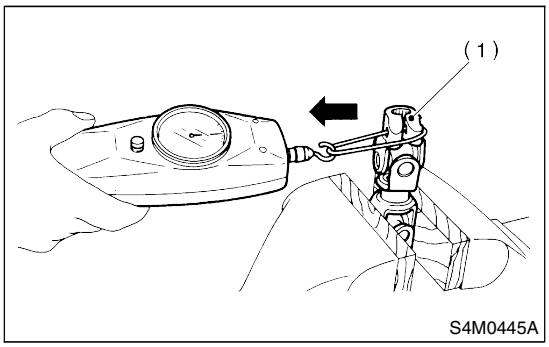
(1) Long yoke

Service limit:
Maximum load; 5.49 N (0.56 kgf, 1.23 lb) or less



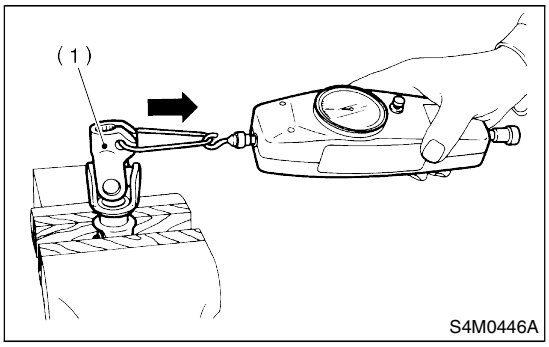
(1) Long yoke

Service limit:
Maximum load; 8.43 N (0.86 kgf, 1.90 lb) or less



(1) Short yoke

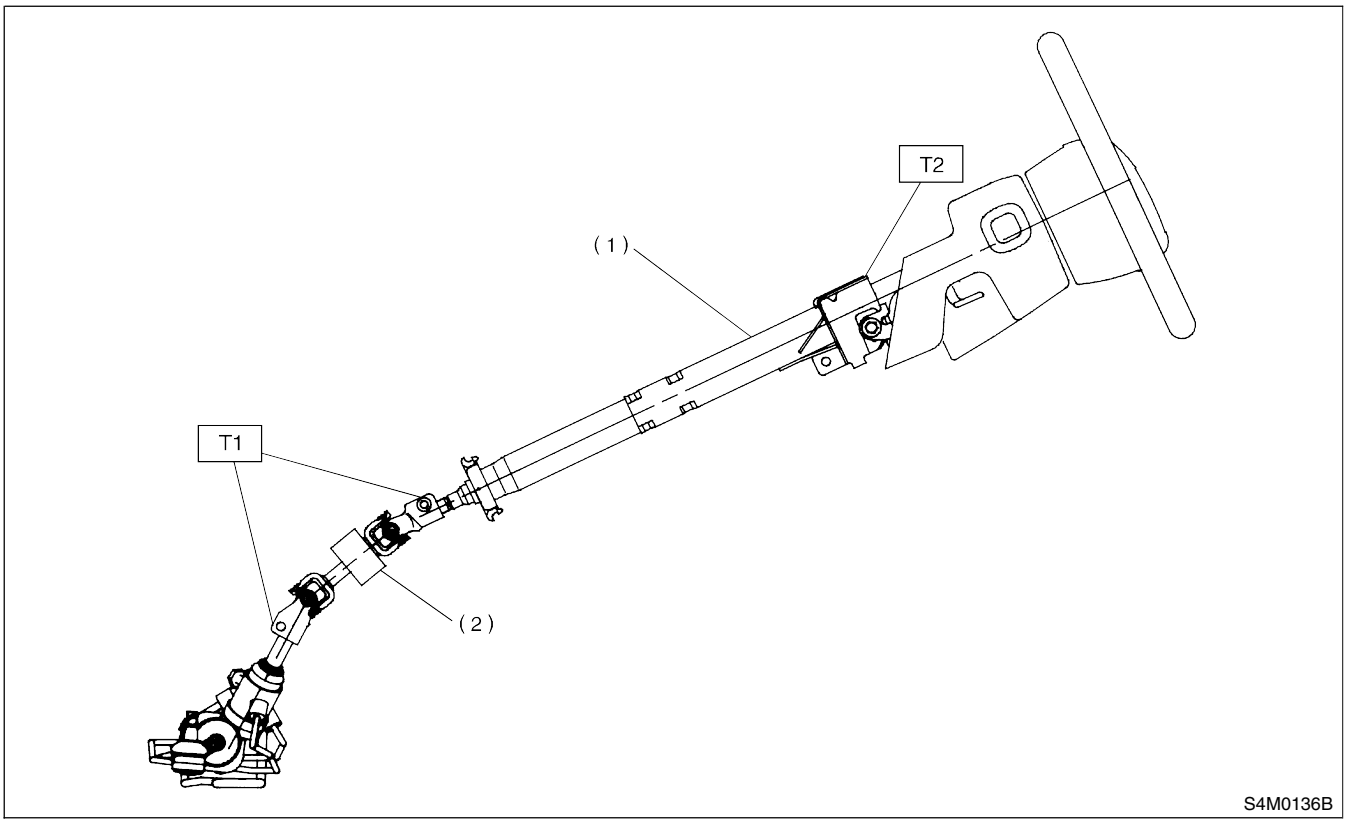
Service limit:
Maximum load; 8.43 N (0.86 kgf, 1.90 lb) or less



(1) Short yoke

4. Tilt Steering Column S601544

A: REMOVAL S601544A18



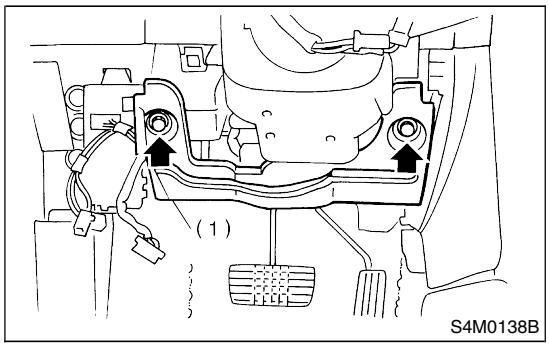
(1) Tilt steering column
(2) Universal joint

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 minus terminal.
3) Remove airbag module. <Ref. to AB-12 REMOVAL, Driver's Airbag Module.>

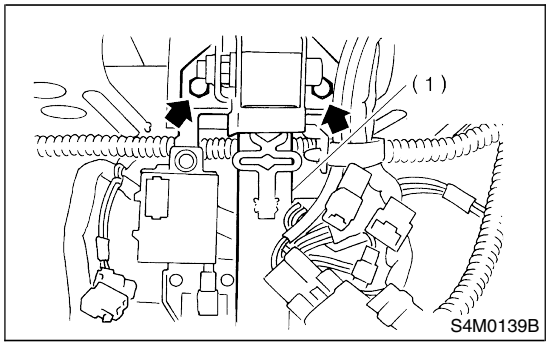
WARNING:
Always refer to "Airbag System" before performing airbag module service (if so equipped). <Ref. to AB-12 CAUTION, Driver's Airbag Module.>

4) Remove steering wheel. <Ref. to PS-27 REMOVAL, Steering Wheel.>
5) Lift-up the vehicle.
6) Remove universal joint. <Ref. to PS-28 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

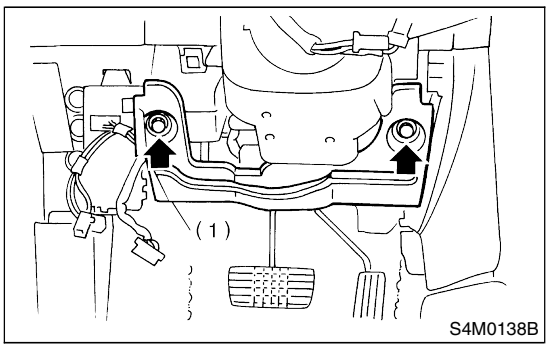
1) Insert end of steering shaft into toe board grommet.
2) Tighten steering shaft mounting bolts under instrument panel.

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-28 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-27 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. (with airbag model) <Ref. to AB-13, INSTALLATION, Driver's Airbag Module.>

WARNING:
Always refer to "Airbag System" before performing the service operation. <Ref. to AB-12 CAUTION, Driver's Airbag Module.>

11) Install horn pad to steering wheel. (without air-bag model)

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.

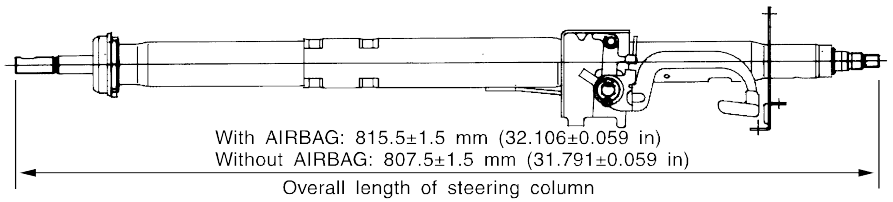
Tightening torque:
1.2 N·m (0.12 kgf-m, 0.9 ft-lb)

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:  S4M0141B	Replace steering column assembly.

2. AIRBAG MODEL INSPECTION S601544A1002

WARNING:
For airbag model inspection procedures, refer to "Airbag System". <Ref. to AB-12 CAUTION, Airbag Module.> and <Ref. to AB-13 INSPECTION, Driver's Airbag Module.>

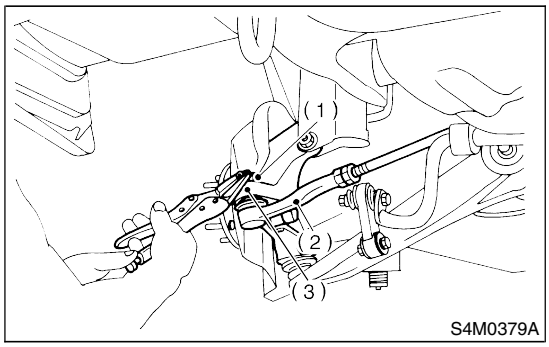
5. Steering Gearbox [LHD Model] S601272

A: REMOVAL S601272A18

1) Disconnect battery ground terminal.
2) Loosen front wheel nut.
3) Lift vehicle and remove front wheels.
4) Remove front exhaust pipe assembly. (Non-turbo model)
With OBD:
<Ref. to EX(SOHC)-5, REMOVAL, Front Exhaust Pipe.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>

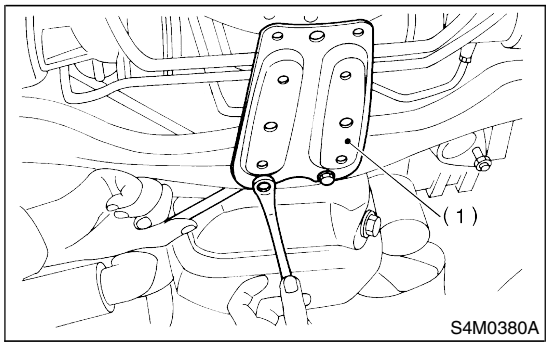
WARNING:
Be careful, exhaust pipe is hot.

5) Using a puller, remove tie-rod end from knuckle arm after pulling off cotter pin and removing castle nut.



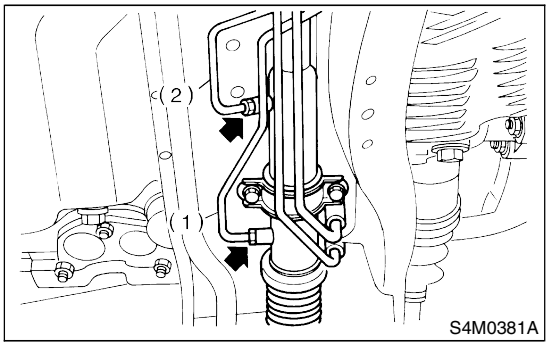
(1) Castle nut
(2) Tie-rod end
(3) Knuckle arm

6) Remove jack-up plate and front stabilizer.



(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.

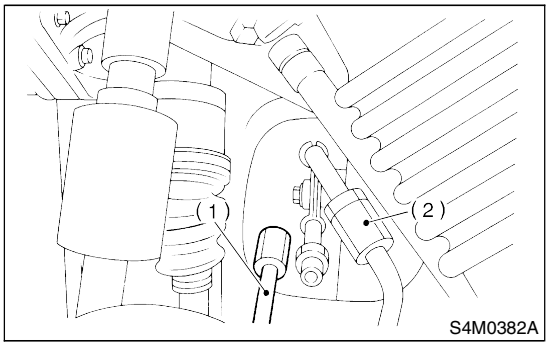


(1) Pipe A
(2) Pipe B

8) Remove universal joint. <Ref. to PS-28, REMOVAL, Universal Joint.>
9) Disconnect pipes C and D from pipe of gearbox.

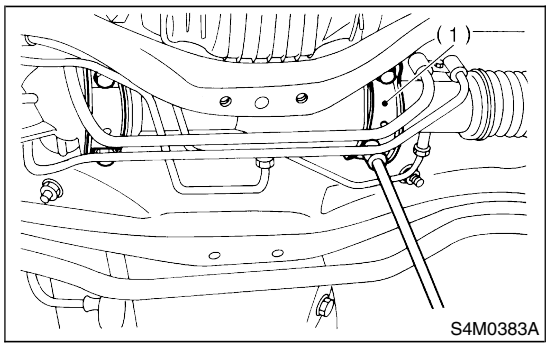
CAUTION:
Be careful not to damage these pipes.

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.

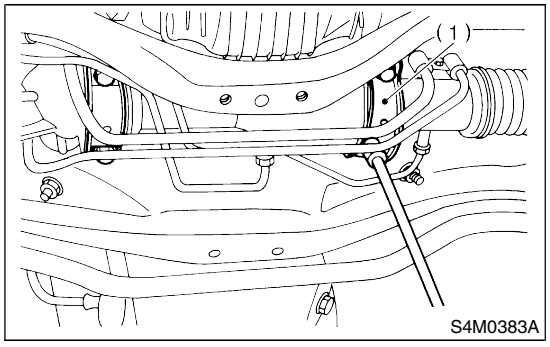


(1) Clamp

B: INSTALLATION S601272A11

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)



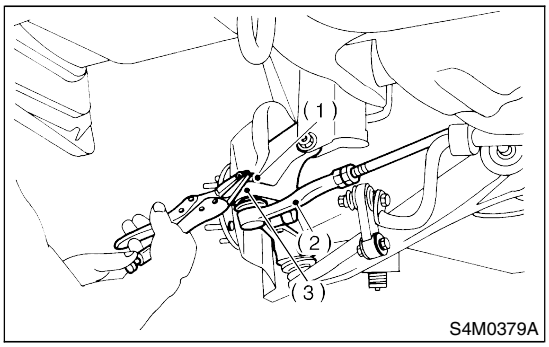
(1) Clamp

3) Install universal joint. <Ref. to PS-28, INSTALLATION, Universal Joint.>

4) Connect tie-rod end and knuckle arm, and tighten with castle nut. Fit cotter pin into the nut and bend the pin to lock.

Castle nut tightening torque:
Tighten to 27.0 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

5) Install front stabilizer to vehicle. <Ref. to FS-22, INSTALLATION, Front Stabilizer.>
6) Install front exhaust pipe assembly. (Non-turbo model)
With OBD: <Ref. to EX(SOHC)-6, INSTALLATION, Front Exhaust Pipe.>
Without OBD: <Ref. to EX(SOHCw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>
7) Install tires.
8) Tighten wheel nuts to the specified torque.

Tightening torque:
88 N·m (9.0 kgf-m, 65 ft-lb)

9) Connect ground terminal to battery.
10) Pour fluid into oil tank, and bleed air.
<Ref. to PS-101, Power Steering Fluid.>
11) Check for fluid leaks. <Ref. to PS-51, OIL LEAKING, INSPECTION, Steering Gearbox [LHD Model].>
12) Install jack-up plate.

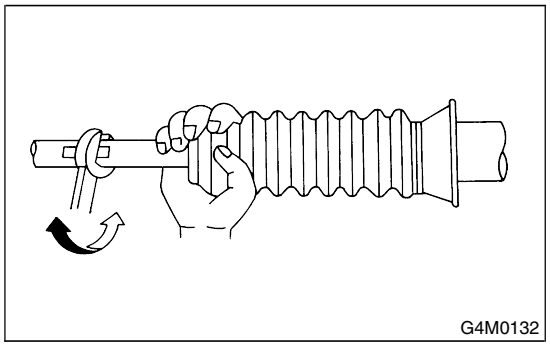
WARNING:
Be careful, exhaust manifold is hot.

13) Lower vehicle.
14) Check fluid level in oil tank.

15) After adjusting toe-in and steering angle, tighten lock nut on tie-rod end.

Tightening torque:
83 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.

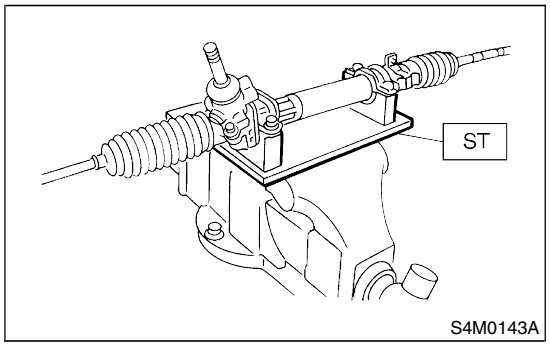

G4M0132

C: DISASSEMBLY S601272A06

1. RACK HOUSING ASSEMBLY S601272A0601

1) Disconnect four pipes from gearbox.
2) Secure gearbox removed from vehicle in vise using ST.
ST 926200000 STAND

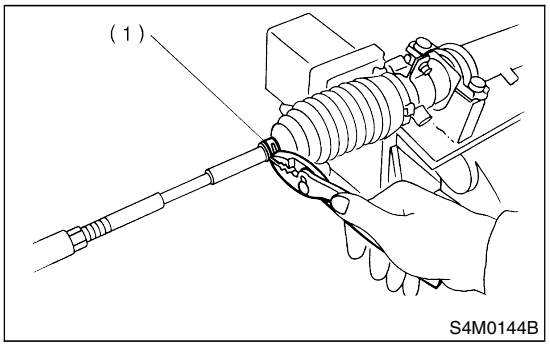
CAUTION:
Secure the gearbox in a vise using the ST as shown. Do not attempt to secure it without this ST.



S4M0143A

3) Remove tie-rod end and lock nut from gearbox.

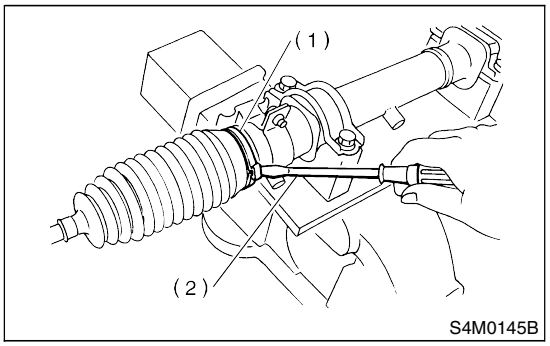
4) Remove small clip from boot using pliers, and move boot to tie-rod end side.



S4M0144B

(1) Clip

5) Using standard screwdriver, remove band from boot.

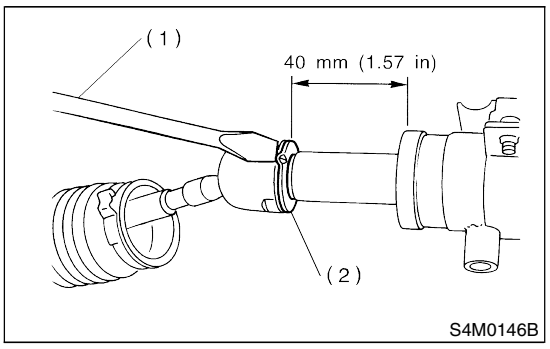


S4M0145B

(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.

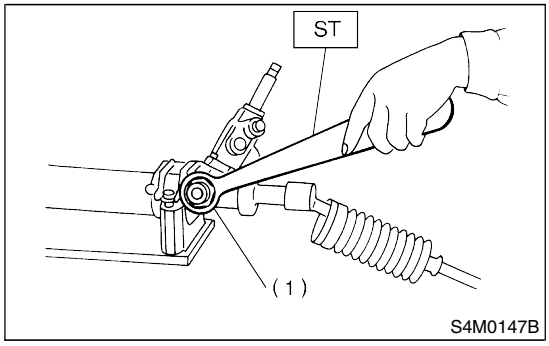
CAUTION:
Be careful not to scratch rack surface as oil leaks may result.



S4M0146B

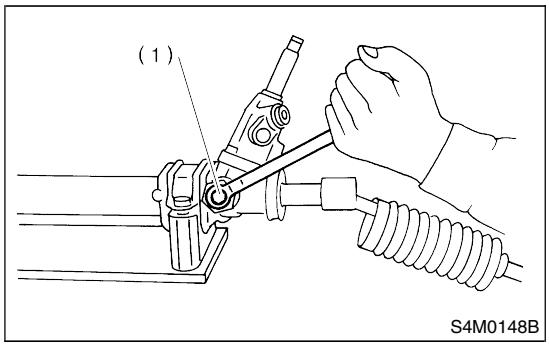
(1) Standard screwdriver
(2) Lock washer

7) Using ST, loosen lock nut.
ST 926230000 SPANNER



(1) Lock nut

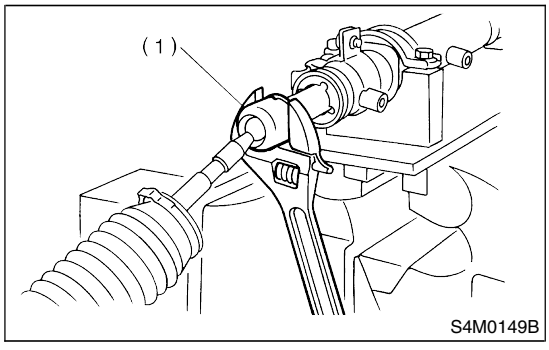
8) Tighten adjusting screw until it no longer tightens.



(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.

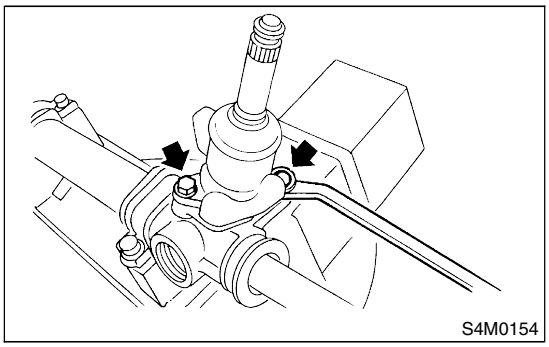


(1) Tie-rod

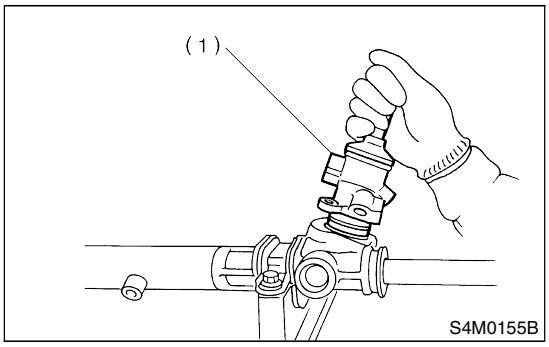
10) Loosen adjusting screw and remove spring and sleeve.

CAUTION:
Replace spring and/or sleeve if damaged.

11) Remove two bolts securing valve assembly.

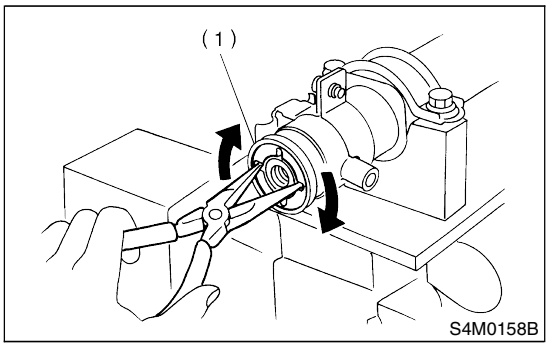


12) Carefully draw out input shaft and remove valve assembly.



(1) Valve ASSY

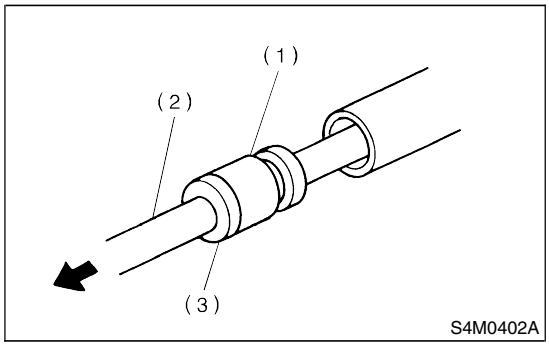
13) Using a sharp pointed pliers, rotate the rack stopper in the direction of the arrow until the end of the circlip comes out of the stopper. Rotate the circlip in the opposite direction and pull it out.



(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.

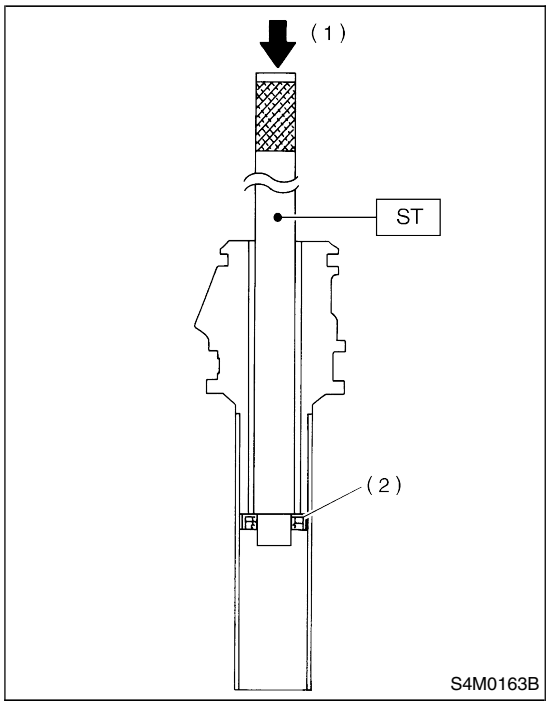


(1) Rack bushing
(2) Rack ASSY
(3) Rack stopper

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



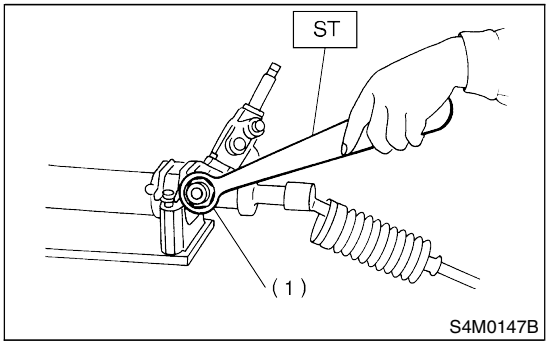
(1) Press
(2) Oil seal

NOTE:
Discard removed oil seal.

2. CONTROL VALVE ASSEMBLY S601272A0602

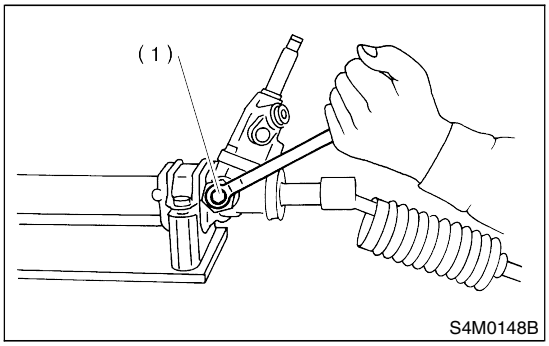
NOTE:
Parts requiring replacement are described in the smallest unit of spare parts including damaged parts and spare parts damaged. In actual disassembly work, accidental damage as well as inevitable damage to some related parts must be taken into account, and spare parts for them must also be prepared. 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



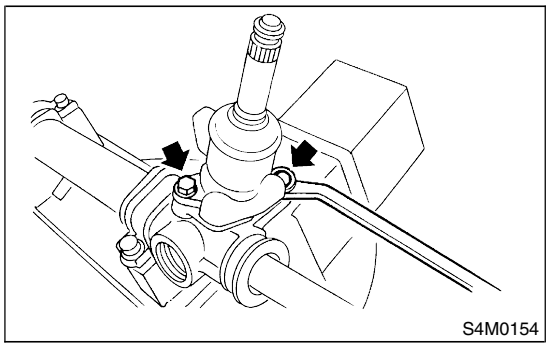
(1) Lock nut

2) Tighten adjusting screw until it no longer tightens.

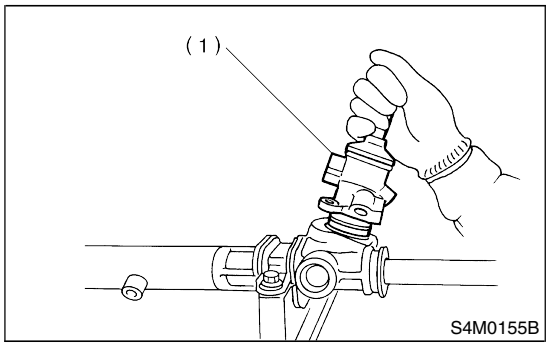


(1) Adjusting screw

3) Remove two bolts securing valve assembly.

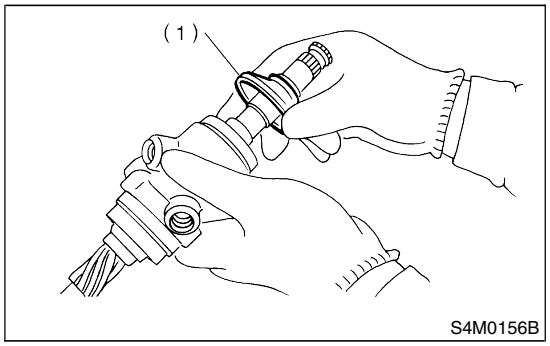


4) Carefully draw out input shaft and remove valve assembly.



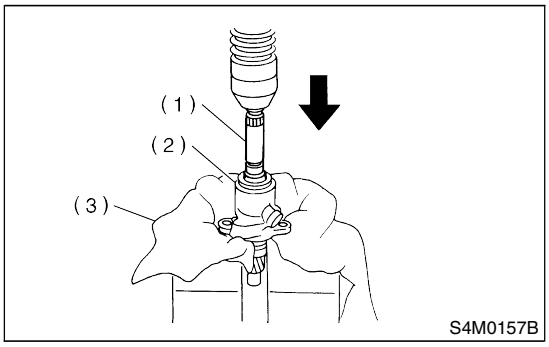
(1) Valve ASSY

5) Slide dust cover out.



(1) Dust cover

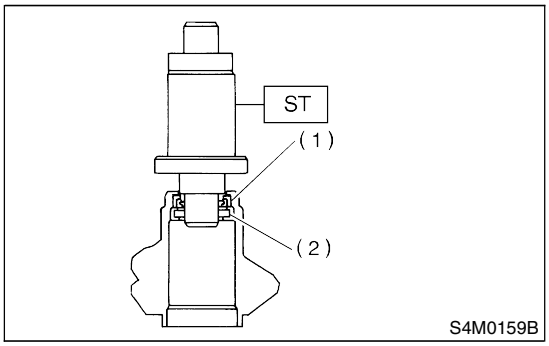
6) Using a press remove pinion and valve assembly from valve housing.



(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

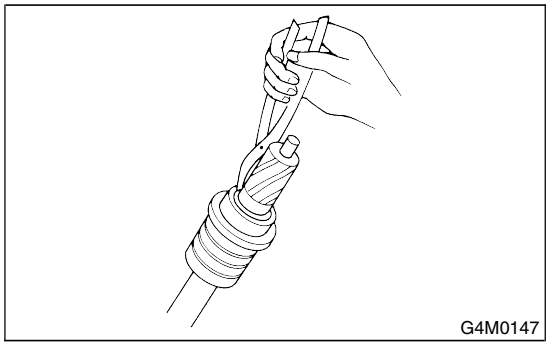
CAUTION:
- **Do not apply a force to end surface of valve housing.**
- **Do not reuse oil seal after removal.**



(1) Oil seal
(2) Special bearing

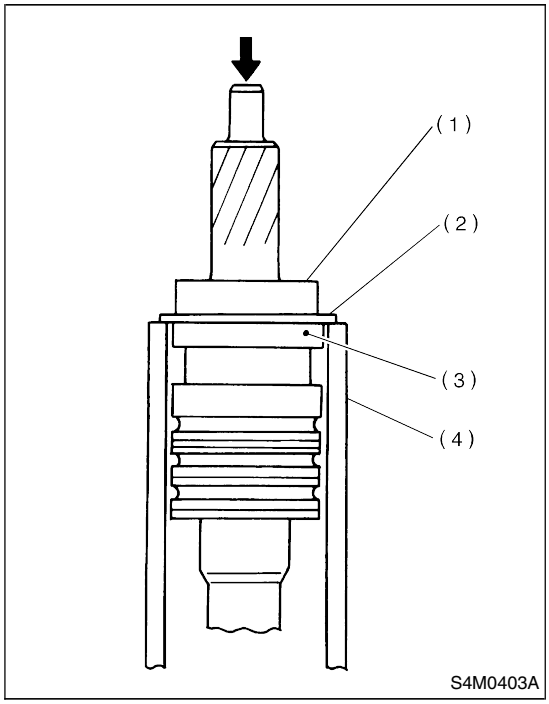
8) Remove snap ring using snap ring pliers.

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 S601272A02

1. RACK HOUSING ASSEMBLY S601272A0201

CAUTION:
Use only SUBARU genuine grease for gearbox.

Grease:
VALIANT GREASE M2
[Part No. 003608001, net 0.5 kg (1.1 lb)]

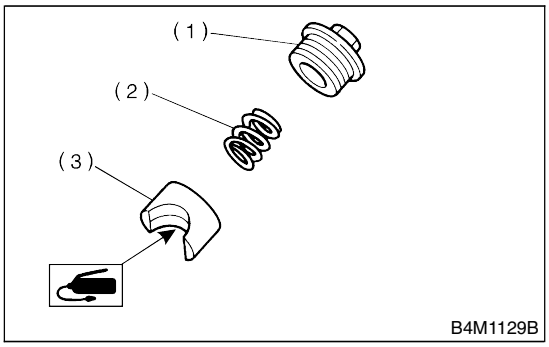
1) Clean all parts and tools before reassembling.
2) Apply grease to teeth of rack so that grease applied is about as high as teeth, and also apply a thin film of grease to sliding portion of rack shaft.

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.



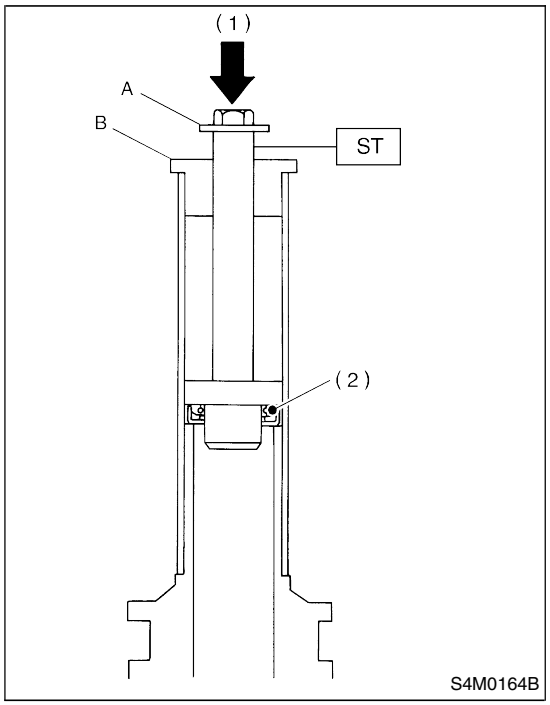
(1) Adjusting screw
(2) Spring
(3) Sleeve

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.

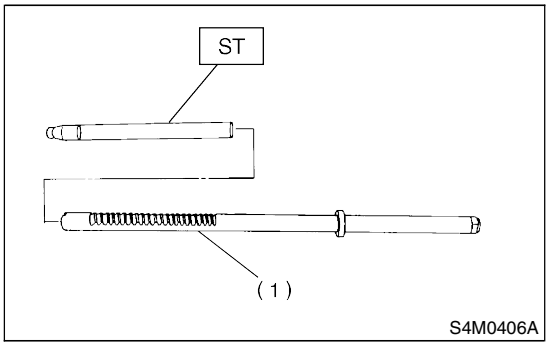


(1) Press
(2) Oil seal

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 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.

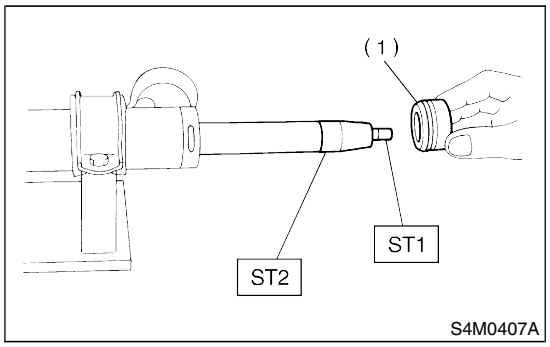
10) Insert rack assembly into rack housing from cylinder side, and remove ST after it has passed completely through oil seal.

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.

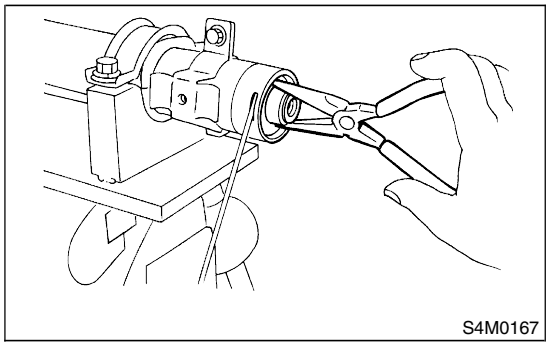


(1) Rack bushing ASSY

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.

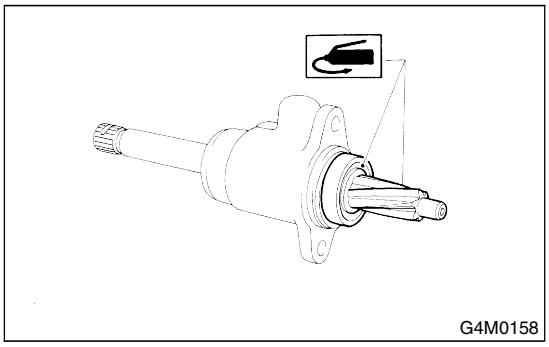
CAUTION:
Be careful not to scratch rack while winding circlip.

NOTE:
Rotate wrench another 90 to 180° after the end of circlip has been wrapped in.



14) Fit mounting rubber onto rack housing.

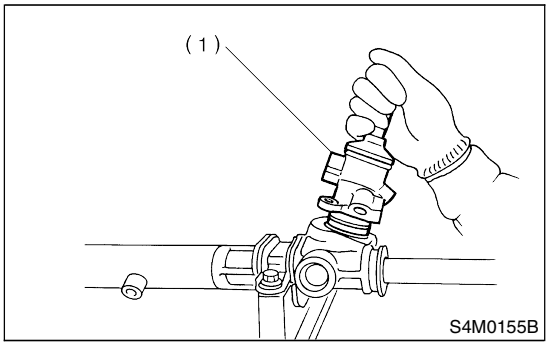
15) Apply genuine grease to pinion gear and bearing of valve assembly.



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.

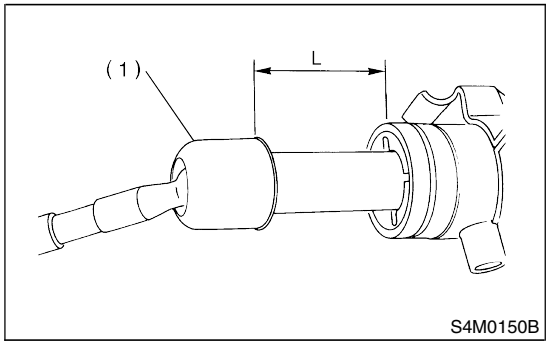
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

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)

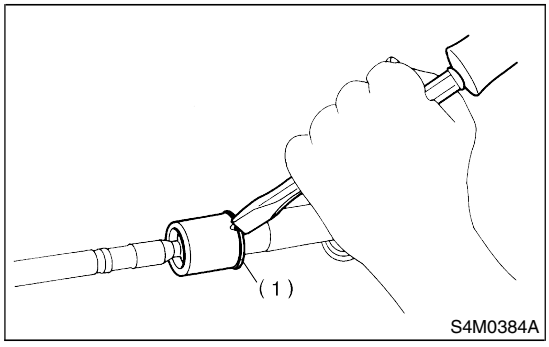
Tightening torque:
78 N·m (8.0 kgf-m, 58 ft-lb)



(1) Tie-rod

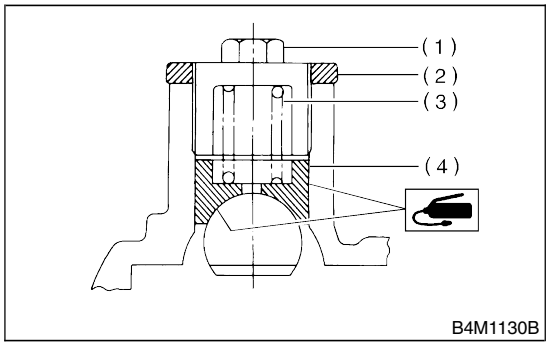
19) Bend lock washer using a chisel.

CAUTION:
Be careful not to scratch rack when bending lock washer.



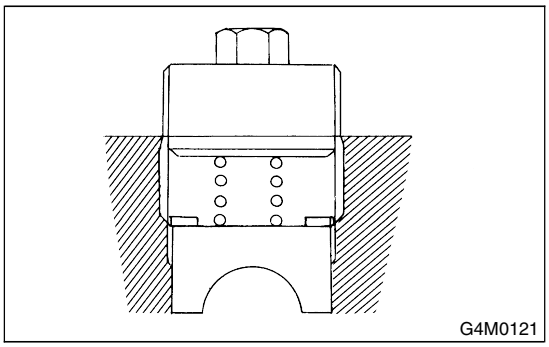
(1) Lock washer

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.



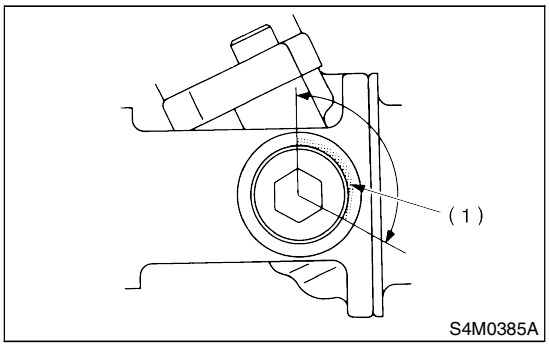
(1) Adjusting screw
(2) Lock nut
(3) Spring
(4) Sleeve

(4) Tighten adjusting screw by two threads.



(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

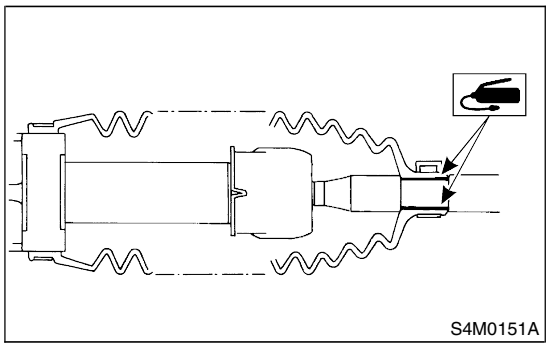
Tightening torque (Lock nut):
39 N·m (4.0 kgf-m, 29 ft-lb)

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) Inspect for service limit as per article of “Service limit”. <Ref. to PS-49, SERVICE LIMIT, INSPECTION, Steering Gearbox [LHD Model].> Make replacement and adjustment if necessary.

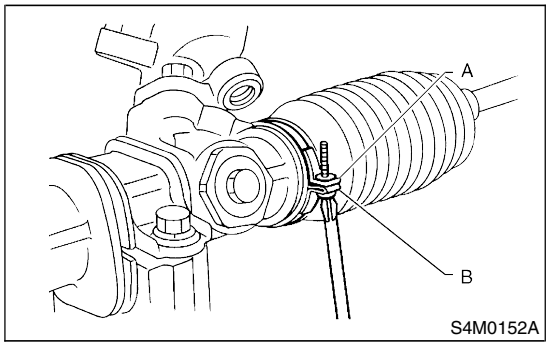
22) Install boot to housing.

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.

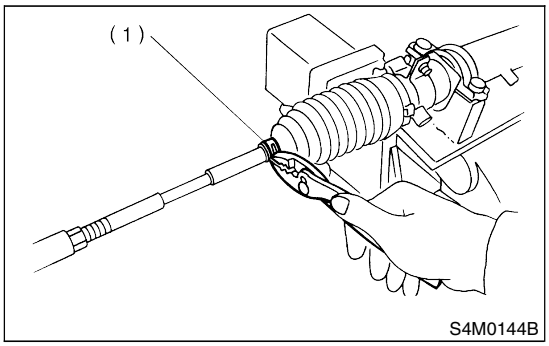
NOTE:
Always tighten the band from the underside of the gearbox.



S4M0152A

24) Fix boot end with clip (small).

CAUTION:
After installing, check boot end is positioned into groove on tie-rod.



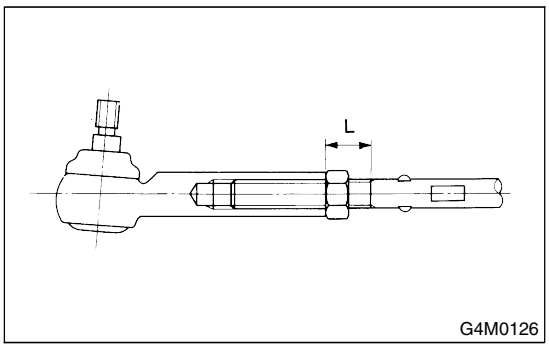
S4M0144B

(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.

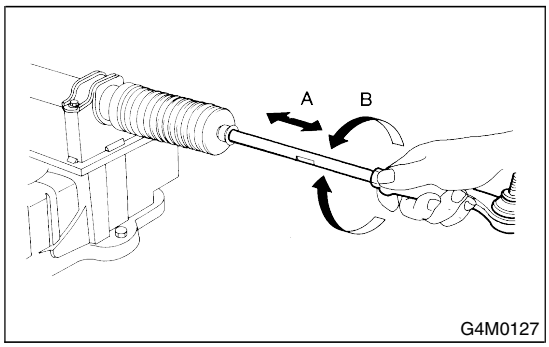
Installed tie-rod length: L
15 mm (0.59 in)

NOTE:
Pay attention to difference between right and left tie-rod ends.



G4M0126

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)

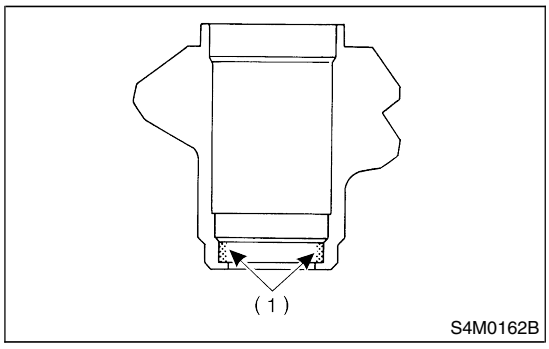
(2) Connect pipes C and D to gearbox.
Connect lower pipe C first, and upper pipe D second.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

2. CONTROL VALVE ASSEMBLY S601272A0202

Specified steering grease:
VALIANT GREASE M2 (Part No. 003608001)

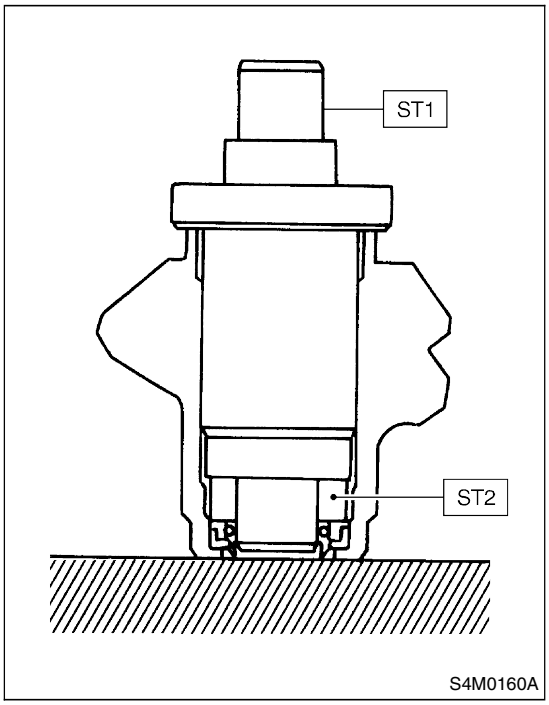
1) Clean all parts and tools before reassembling.
2) Apply a coat of specified power steering fluid to inner wall of valve housing.



(1) Fluid

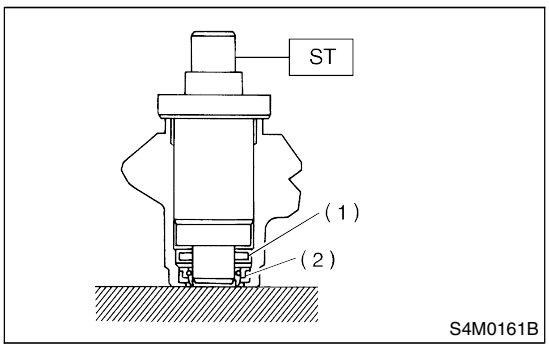
3) Attach ST2 to ST1, and press oil seal into place using a press.

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.

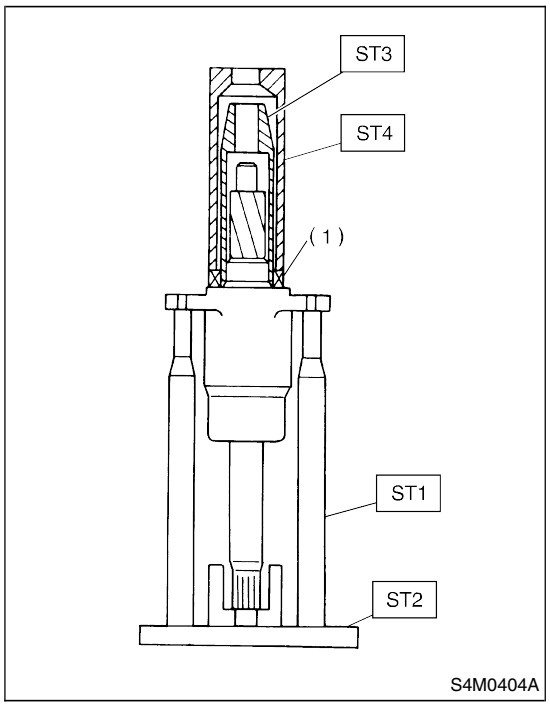


(1) Special bearing
(2) Oil seal

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

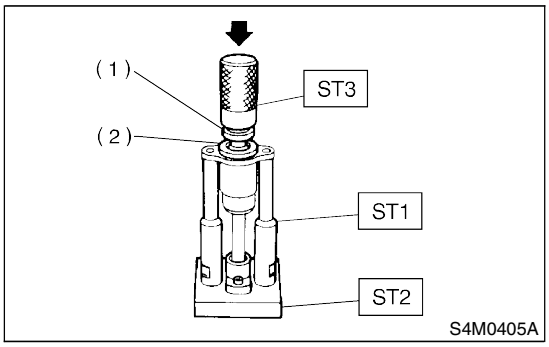


(1) Oil seal

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



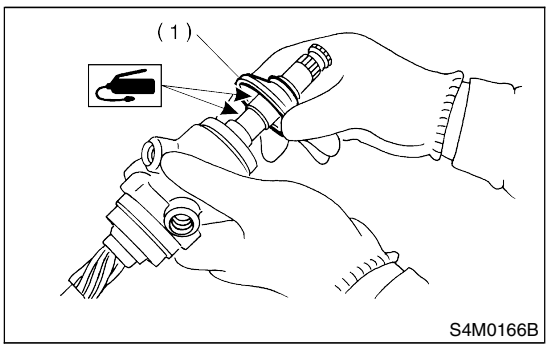
(1) Ball bearing
(2) Backing washer

NOTE:
Be careful not to tilt ball bearing during installation.

11) Install snap ring using snap ring pliers.

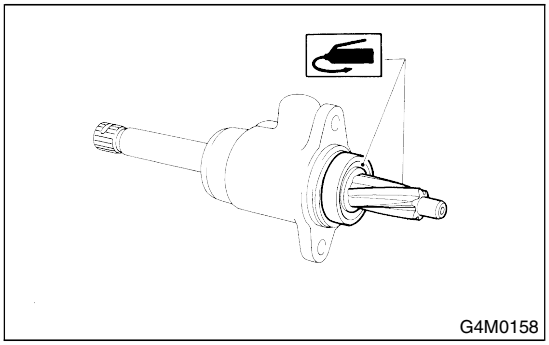
NOTE:
Rotate snap ring to check for proper installation.

12) Apply specified grease to dust cover.



(1) Dust cover

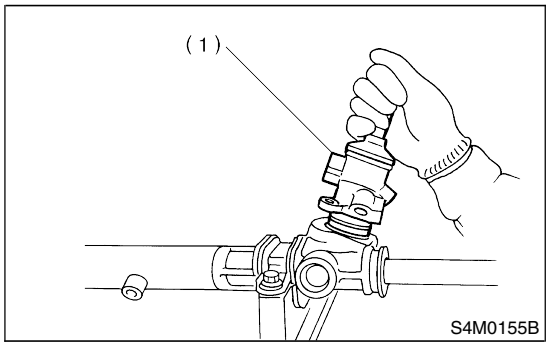
13) Install dust cover on valve assembly.
14) Apply genuine grease to pinion gear and bearing of valve assembly.



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.

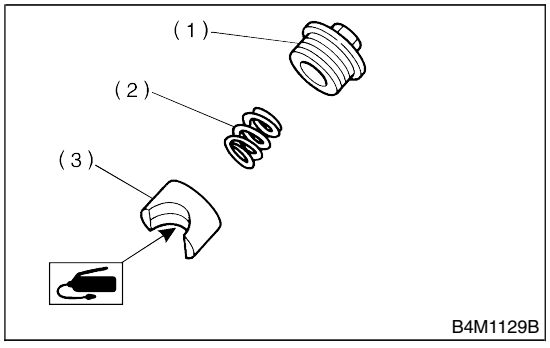
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

CAUTION:
Be sure to alternately tighten bolts.

17) Apply grease to sleeve insertion hole.
18) Apply grease to dust seal insertion hole.

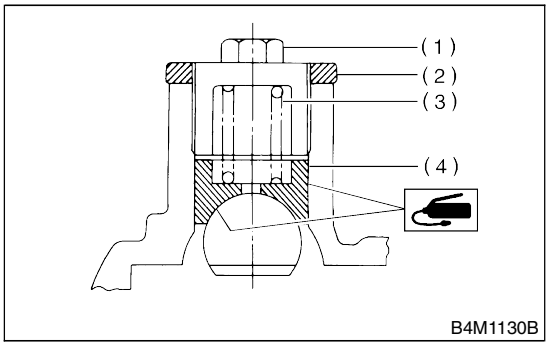
CAUTION:
Apply clean grease with clean hands. If material having a sharp edge is used for applying grease, oil seal at the inside might be damaged.

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.



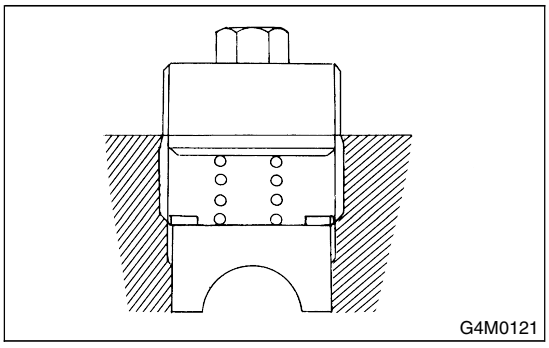
(1) Adjusting screw
(2) Spring
(3) Sleeve

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.



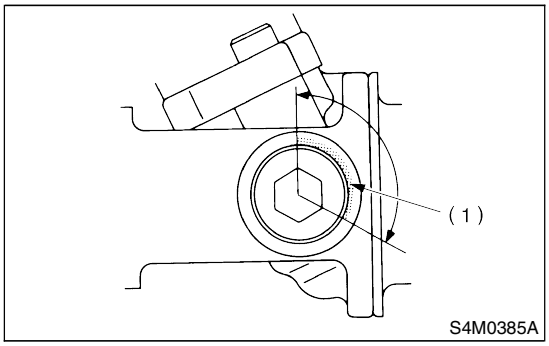
(1) Adjusting screw
(2) Lock nut
(3) Spring
(4) Sleeve

(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-49, SERVICE LIMIT, INSPECTION, Steering Gearbox [LHD Model].> Make replacement and adjustment if necessary.

E: INSPECTION S601272A10

1. BASIC INSPECTION S601272A1001

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 S601272A1002

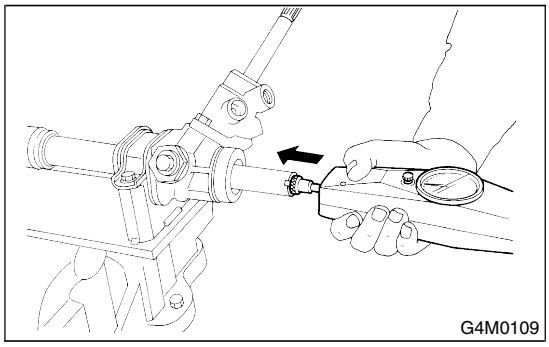
Make a measurement as follows. If it exceeds the specified service limit, adjust or replace.

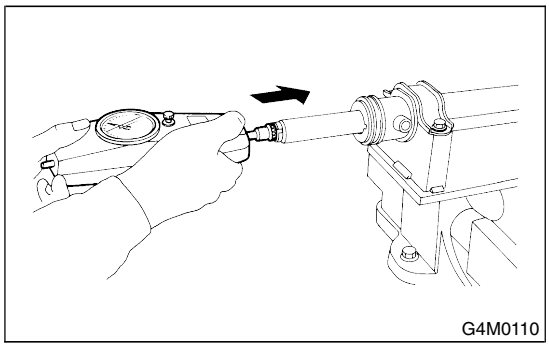
NOTE:
When making a measurement, vise gearbox by using ST. Never vise gearbox by inserting aluminum plates, etc. between vise and gearbox.

ST 926200000 STAND

Sliding resistance of rack shaft:

Service limit
304 N (31 kgf, 68 lb) or less



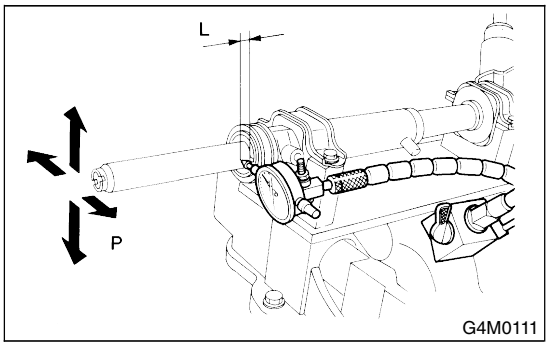


3. RACK SHAFT PLAY IN RADIAL DIRECTION S601272A1003

Right-turn steering:

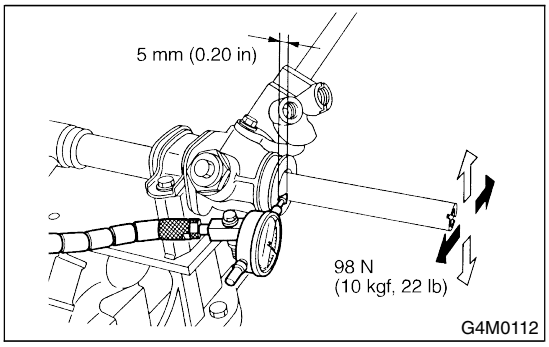
Service limit
0.19 mm (0.0075 in) or less

On condition
L: 5 mm (0.20 in)
P: 122.6 N (12.5 kgf, 27.6 lb)



Left-turn steering:

Service limit
Direction ⇦ ⇨
0.3 mm (0.012 in) or less
Direction ⬅ ➡
0.15 mm (0.0059 in) or less

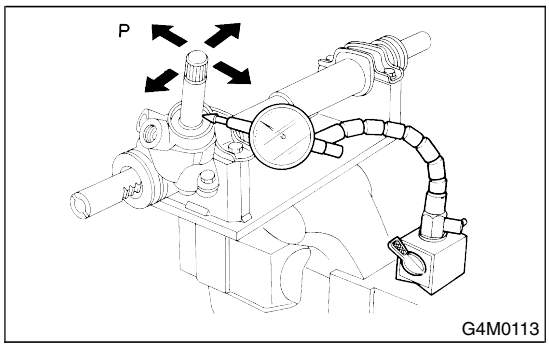


4. INPUT SHAFT PLAY S601272A1004

In radial direction:

Service limit
0.18 mm (0.0071 in) or less

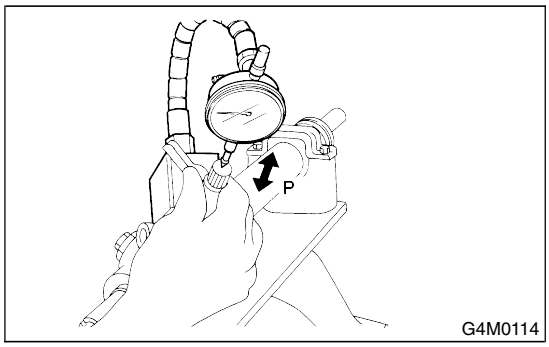
On condition
P: 98 N (10 kgf, 22 lb)



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)



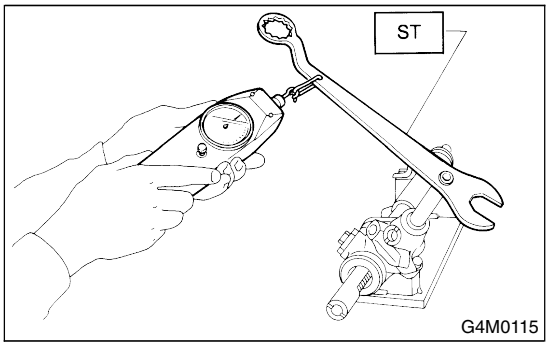
5. TURNING RESISTANCE OF GEARBOX

S601272A1005

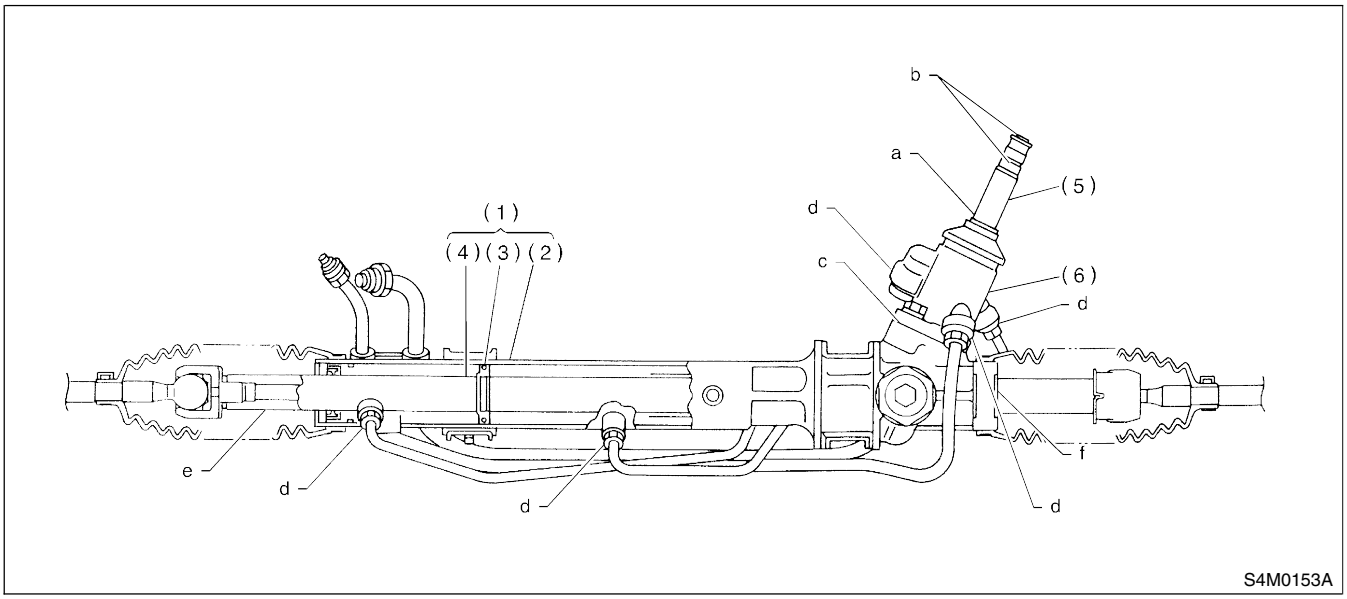
Using ST, measure gearbox turning resistance.

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)



6. OIL LEAKING S601272A1006



(1) Power cylinder
(2) Cylinder
(3) Rack piston
(4) Rack axle
(5) Input shaft
(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.

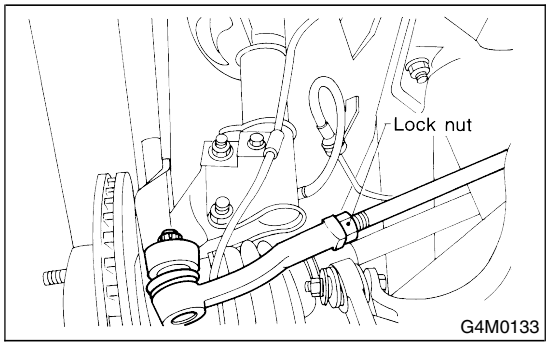
ST 926420000 PLUG

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 S601272A01

1) Adjust front toe.

Standard of front toe:
IN 3 — OUT 3 mm (IN 0.12 — OUT 0.12 in)



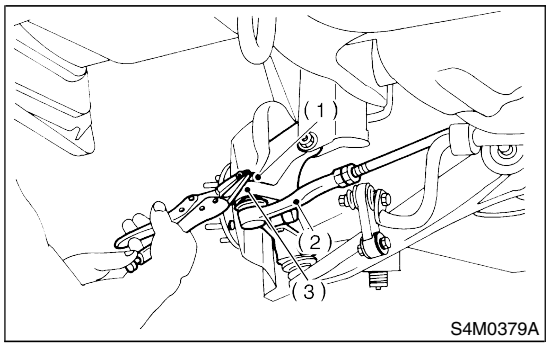
2) Adjust steering angle of wheels.

Standard of steering angle:
Inner wheel: 37.4°±1.5°
Outer wheel: 32.5°±1.5°

6. Steering Gearbox [RHD Model] S601276

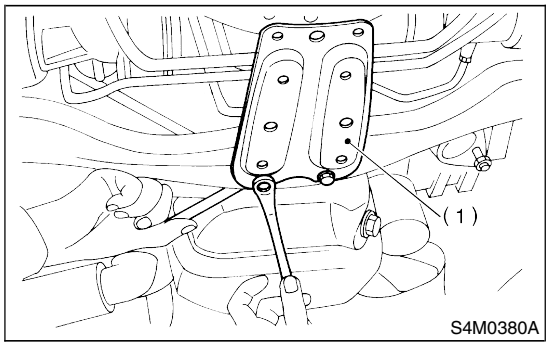
A: REMOVAL S601276A18

1) Disconnect battery minus terminal.
2) Lift vehicle with a jack and remove front wheel.
3) Disconnect front exhaust pipe assembly. (Non-turbo model)
With OBD:
<Ref. to EX(SOHC)-5, REMOVAL, Front Exhaust Pipe.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>
4) Remove universal joint. <Ref. to PS-28, REMOVAL, Universal Joint.>
5) Remove cotter pin and castle nut. Using a puller, remove tie-rod end from knuckle arm.



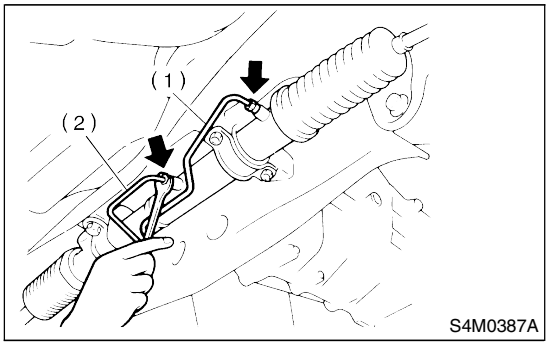
(1) Castle nut
(2) Tie-rod end
(3) Knuckle arm

6) Remove jack-up plate and stabilizer.



(1) Jack-up plate

7) Disconnect one pipe joint A from center of gearbox assembly, and connect a vinyl hose to it. While turning steering wheel to the left and right, drain fluid through the hose. Similarly, drain fluid from the other pipe joint B.



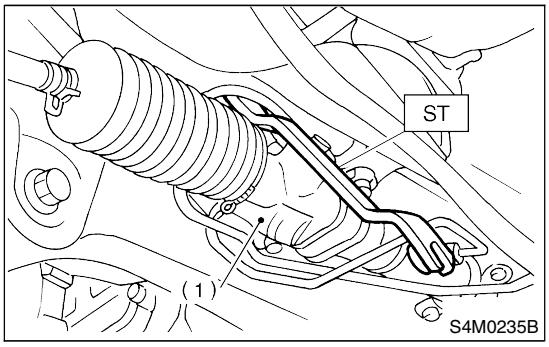
(1) Pipe A
(2) Pipe B

8) Remove lower and upper bolts from universal joint, and remove universal joint in the upward direction.

NOTE:
Scribe alignment marks on universal joint so that it can be reassembled at the original serration.

9) Using ST, remove flare nuts from control valve of gearbox assembly, and disconnect upper and lower hoses.
ST 34099AC050 GEARBOX SPANNER

CAUTION:
• Always disconnect hoses B and A in that order.
• Be careful not to damage the hoses during removal.



(1) Steering gearbox

10) Remove bolts securing gearbox to crossmember, and detach gearbox.

B: INSTALLATION S601276A11

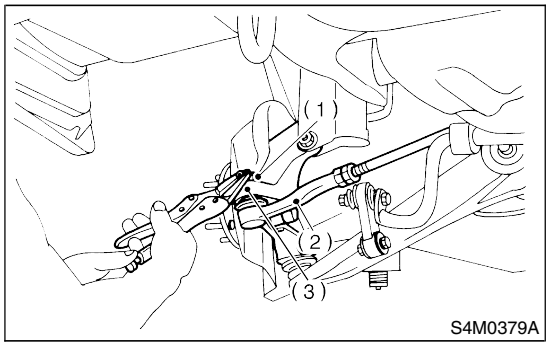
1) Insert gearbox into crossmember, being careful not to damage gearbox boot.
2) Tighten gearbox to crossmember bracket via clamp with bolt to the specified torque.

Tightening torque:
59 N·m (6.0 kgf-m, 43 ft-lb)

3) Install the universal joint. <Ref. to PS-28, INSTALLATION, Universal Joint.>
4) Connect tie-rod end and knuckle arm, and tighten with castle nut. Fit cotter pin into the nut and bend the pin to lock.

Castle nut tightening torque:
Tighten to 27.0 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

5) Install front stabilizer to vehicle. <Ref. to FS-22, INSTALLATION, Front Stabilizer.>
6) Install front exhaust pipe assembly. (Non-turbo model)
With OBD:
<Ref. to EX(SOHC)-6, INSTALLATION, Front Exhaust Pipe.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>
7) Install tires.
8) Tighten wheel nuts to the specified torque.

Tightening torque:
88 N·m (9.0 kgf-m, 65 ft-lb)

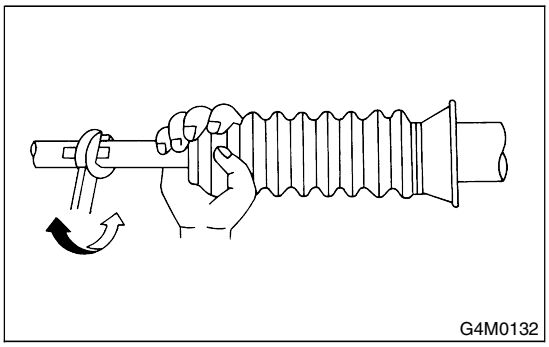
9) Connect ground terminal to battery.
10) Pour fluid into oil tank, and bleed air.
<Ref. to PS-101, Power Steering Fluid.>
11) Check for fluid leaks. <Ref. to PS-76, OIL LEAKING, INSPECTION, Steering Gearbox [RHD Model].>
12) Install jack-up plate.

WARNING:
Be careful, exhaust manifold is hot.

13) Lower vehicle.
14) Check fluid level in oil tank.
15) After adjusting toe-in and steering angle, tighten lock nut on tie-rod end.

Tightening torque:
83 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 S601276A06

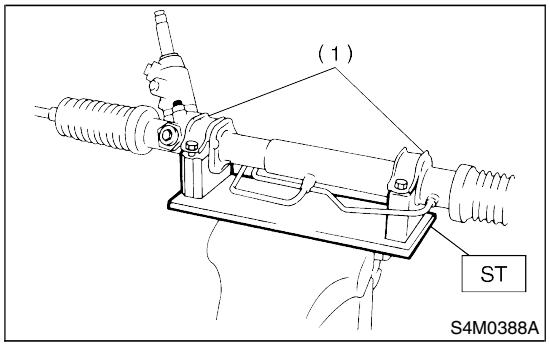
1. RACK HOUSING ASSEMBLY S601276A0601

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) Disconnect four pipes from gearbox.

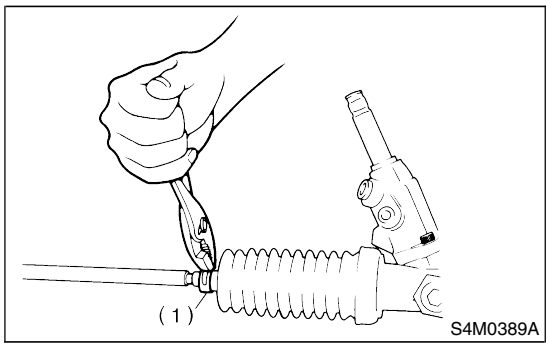
2) Secure gearbox removed from vehicle in vise using ST.
ST 926200000 STAND

CAUTION:
Secure the gearbox assembly in a vise using the ST as shown. Do not attempt to secure it without this ST.



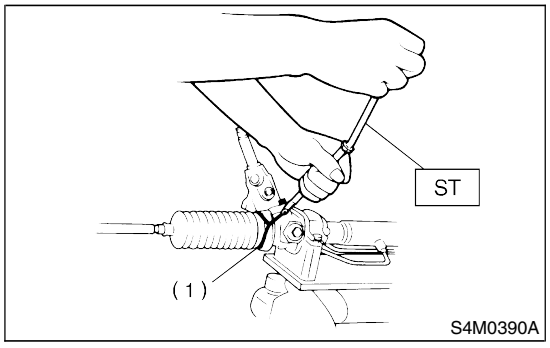
(1) Clamp

3) Pry off clip from outer end of boot, and slide boot toward tie-rod end.



(1) Clip

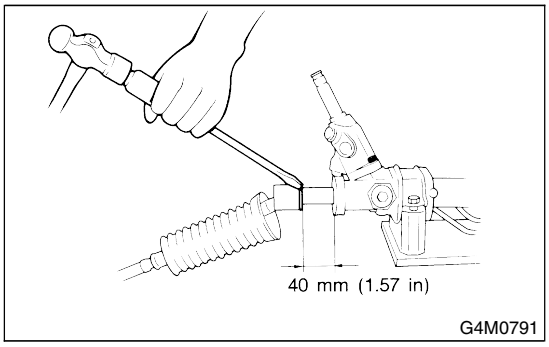
4) Using ST, remove lock wire from inner end of boot, and remove boot.
ST 927590000 WRENCH



(1) Wire

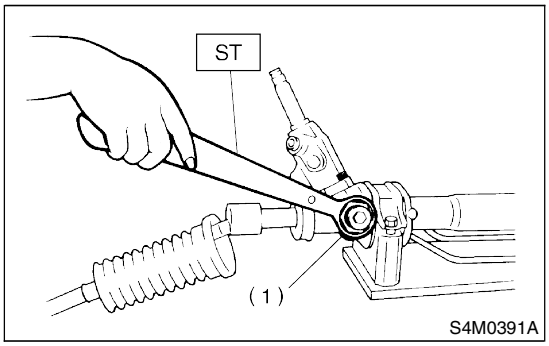
5) Extend rack approximately 40 mm (1.57 in) out. Unlock lock wire at lock washer on each side of tie-rod end using a standard screwdriver.

CAUTION:
Be careful not to scratch rack surface as oil leaks may result.



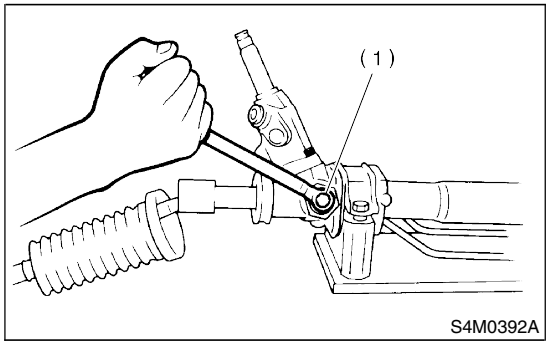
NOTE:
Parts requiring replacement are described in the smallest unit of spare parts including damaged parts and spare parts damaged. In actual disassembly work, accidental damage as well as inevitable damage to some related parts must be taken into account, and spare parts for them must also be prepared. However, it is essential to pinpoint the cause of trouble, and limit the number of replacement parts as much as possible.

6) Using ST, loosen lock nut.
ST 926230000 SPANNER



(1) Lock nut

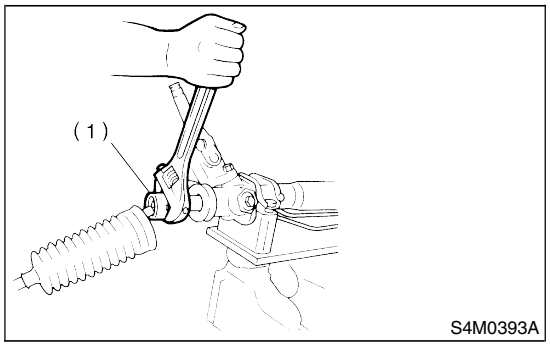
7) Tighten adjusting screw until it no longer tightens.



(1) Adjusting screw

8) Using a wrench (32 mm 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.



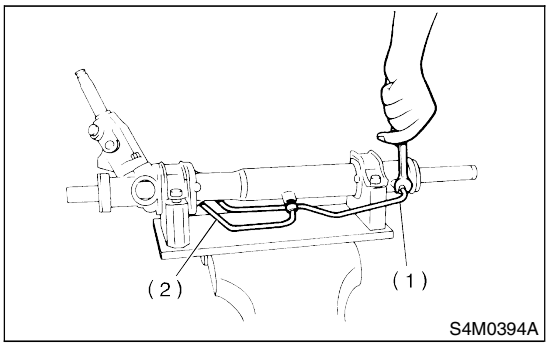
(1) Tie-rod

9) Loosen adjusting screw and remove spring and sleeve.

CAUTION:
Replace spring and/or sleeve if damaged.

10) Disconnect pipes A and B from steering body and control valve housing.

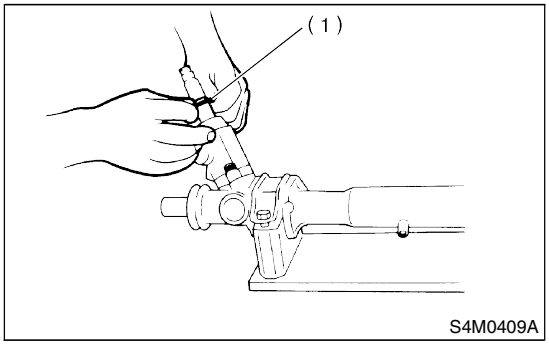
CAUTION:
Replace pipes and/or flare nuts if damaged.



(1) Pipe A
(2) Pipe B

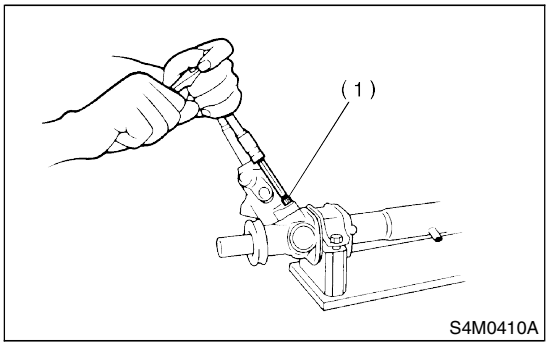
11) Slide dust cover out.

CAUTION:
• Be careful not to scratch housing or input shaft during dust cover removal. Also do not allow foreign matter to enter housing interior.
• Replace dust cover with a new one if its inside bore or lips are worn or damaged.



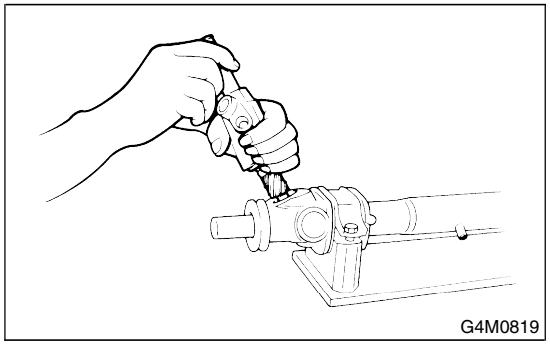
(1) Dust cover

12) Remove the two bolts securing valve housing.



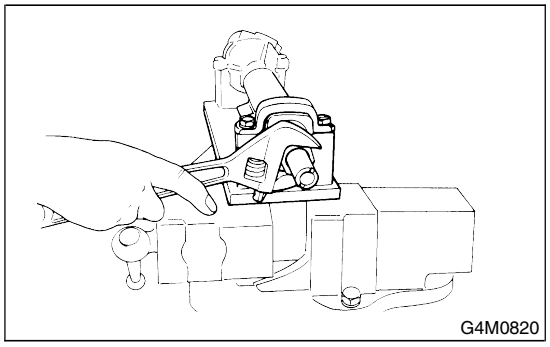
(1) Socket bolt

13) Remove valve housing, pinion and valve as a unit.



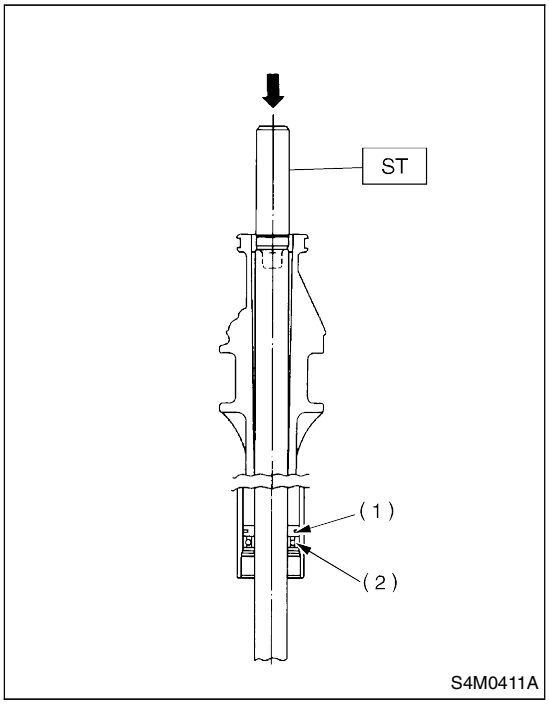
14) Remove holder using a 32 mm wrench or adjustable wrench.

CAUTION:
Discard old holder and replace with new one.



15) Install ST on valve side of rack and press outer side oil seal out.
ST 34099FA030 INSTALLER & REMOVER

CAUTION:
• Block pipe connection of steering body to prevent fluid from flowing out.
• Do not allow rack to come in contact with inner wall of cylinder. Otherwise, cylinder wall may be scratched, resulting in oil leaks.
• Remove holder and rack as a unit.
• Check rack and steering body for bends or cracks; replace as required.
• Discard oil seal after removal and replace with new ones.

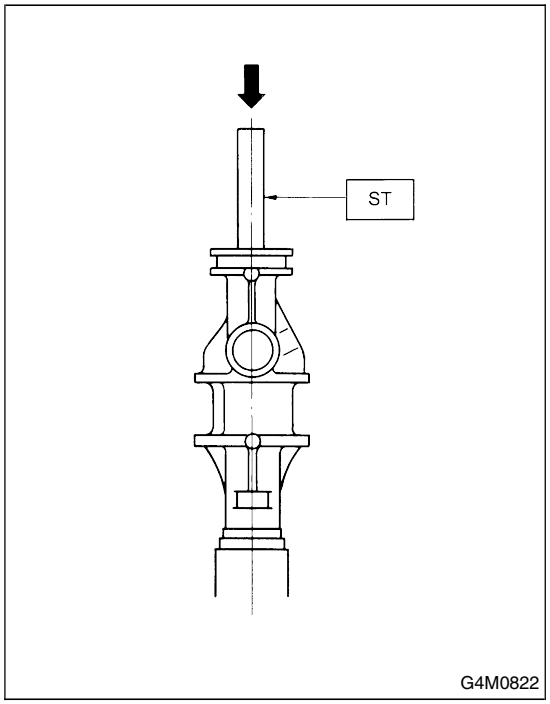


(1) Rack piston
(2) Outer side oil seal

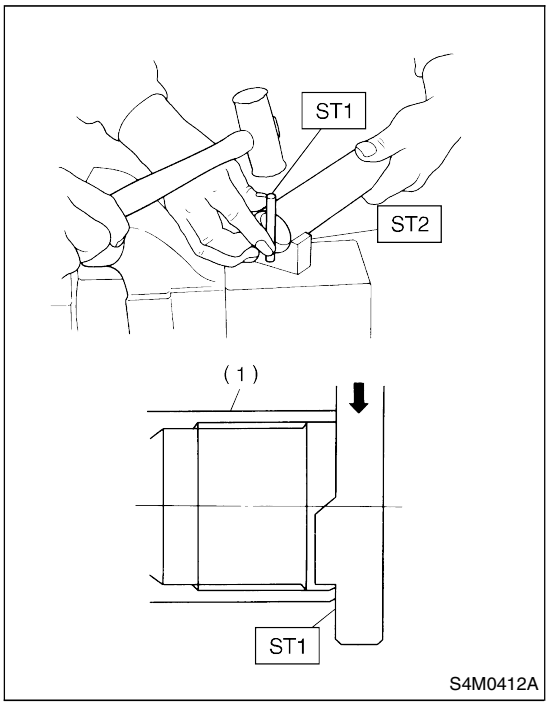
16) Insert ST from valve side and press back-up ring and oil seal out.

CAUTION:
Discard back-up ring and oil seal after removal and replace with new ones.

ST 927580000 REMOVER

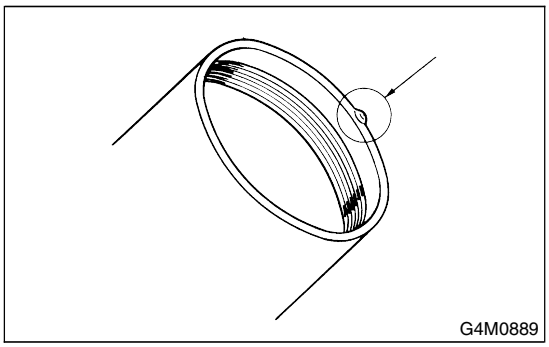


17) Using ST1 and ST2, repair cylinder's clinched sections.
ST1 34099FA080 PUNCH
ST2 34099FA070 BASE



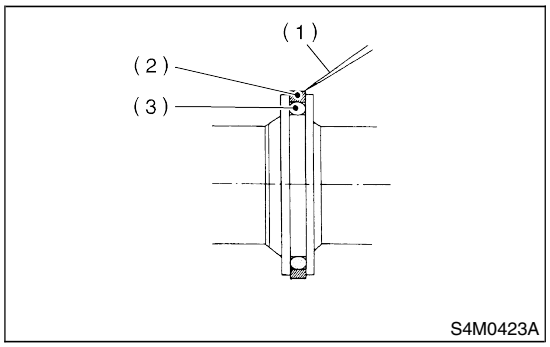
(1) Cylinder

18) If cylinder edge is deformed in a convex shape, repair using an oil stone.



19) Using a sharp-edged, long rod, remove seal ring and O-ring from rack piston.

CAUTION:
Be careful not to scratch outer surface of rack piston and seal ring groove. A scratch may reduce the sealing effect, resulting in faulty piston operation.

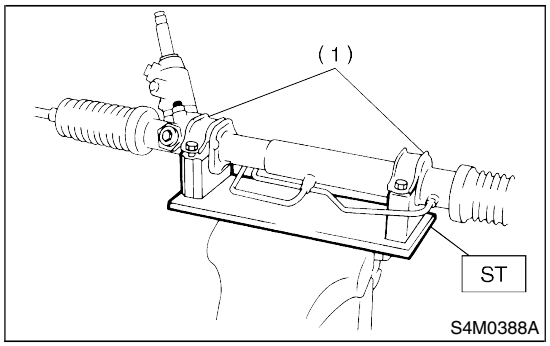


(1) Sharp-edged, long rod
(2) Seal ring
(3) O-ring

2. CONTROL VALVE ASSEMBLY *S601276A0602*

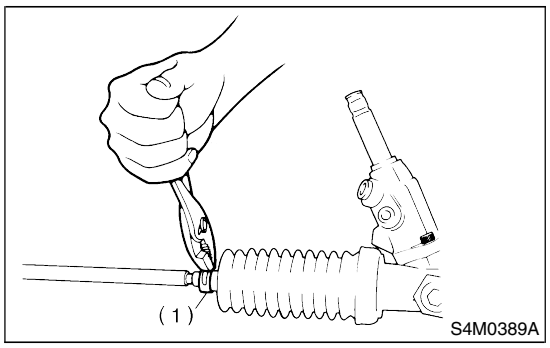
1) Disconnect four pipes from gearbox.
2) Secure gearbox removed from vehicle in vice using ST.
ST 926200000 STAND

CAUTION:
Secure the gearbox assembly in a vice using the ST as shown. Do not attempt to secure it without this ST.



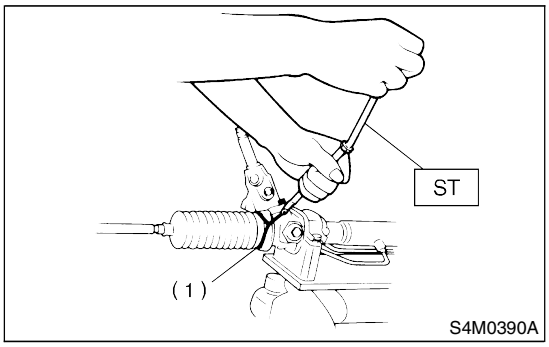
(1) Clamp

3) Pry off clip from outer end of boot, and slide boot toward tie-rod end.



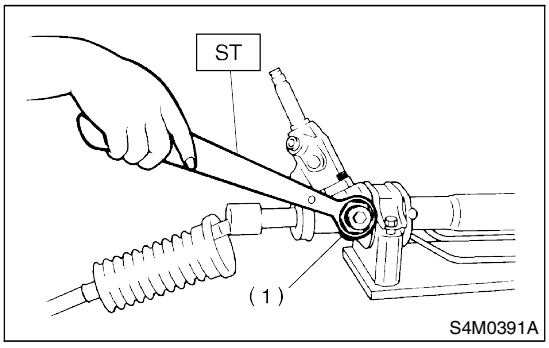
(1) Clip

4) Using ST, remove lock wire from inner end of boot, and remove boot.
ST 927590000 WRENCH



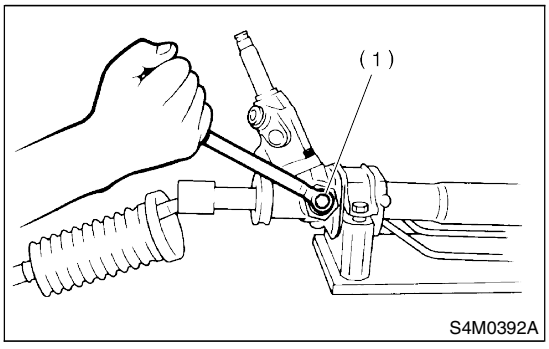
(1) Wire

5) Using ST, loosen lock nut.
ST 926230000 SPANNER



(1) Lock nut

6) Tighten adjusting screw until it no longer tightens.



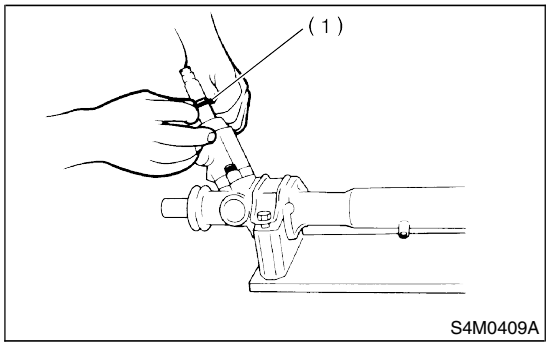
(1) Adjusting screw

7) Loosen adjusting screw and remove spring and sleeve.

CAUTION:
Replace spring and/or sleeve if damaged.

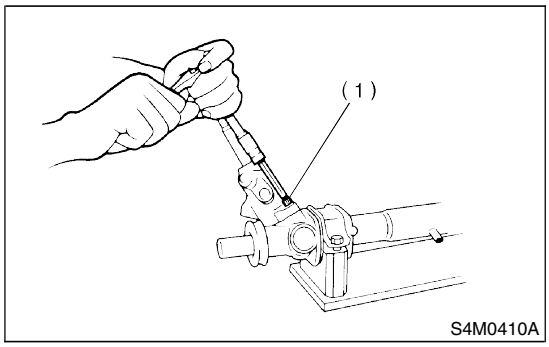
8) Slide dust cover out.

CAUTION:
• Be careful not to scratch housing or input shaft during dust cover removal. Also do not allow foreign matter to enter housing interior.
• Replace dust cover with a new one if its inside bore or lips are worn or damaged.



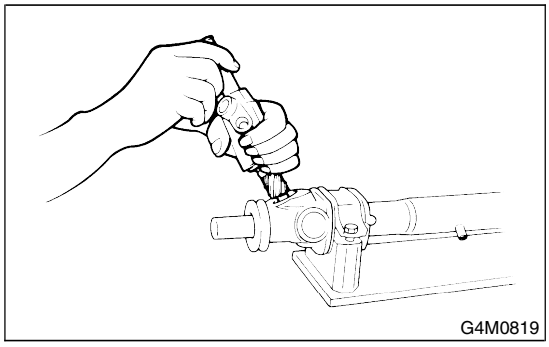
(1) Dust cover

9) Remove the two bolts securing valve housing.



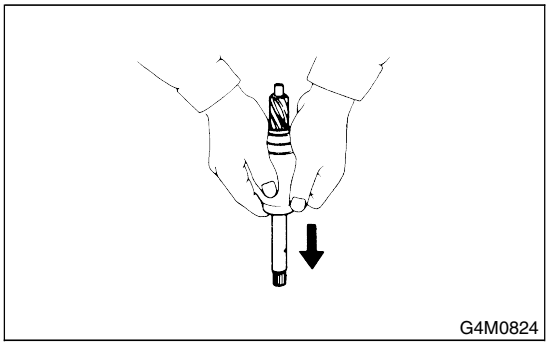
(1) Socket bolt

10) Remove valve housing, pinion and valve as a unit.



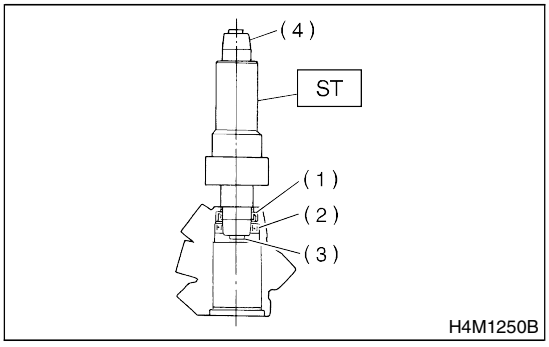
11) After removing dust cover, extract pinion and valve from valve housing.

CAUTION:
• If pinion and valve is difficult to remove, use a press.
• Discard oil seal after removal and replace with a new one.
• Check rotor for bends and serrations for damage and replace as required.



12) Using ST and press, remove dust seal, back-up washer, oil seal and ball bearing from valve housing.

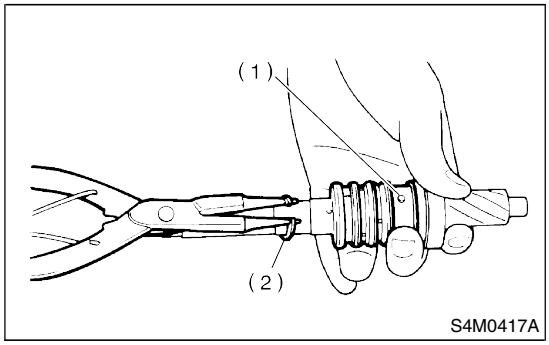
CAUTION:
• Use the "A" end of remover.
• Do not apply a force to end surface of valve housing.
• Do not reuse oil seal after removal.
ST 34099FA000 INSTALLER & REMOVER



(1) Oil seal
(2) Ball bearing
(3) A side
(4) B side

13) Remove snap ring securing valve sleeve to pinion and valve, and remove valve sleeve.

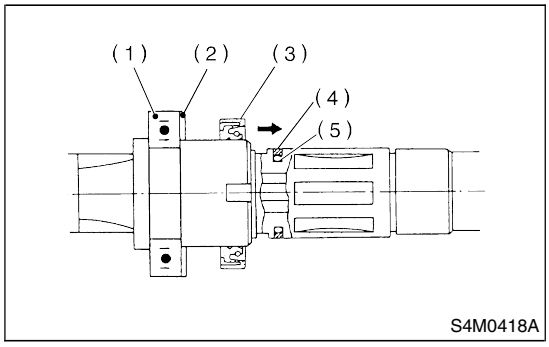
CAUTION:
Be careful not to scratch pinion and valve when removing snap ring.



(1) Valve sleeve
(2) Retaining ring

14) Remove oil seal and spacer.
15) Using a long rod, remove seal ring and O-ring from pinion.

CAUTION:
Be careful not to scratch outer surface and seal ring groove of input shaft. If scratched, sealing effect will be lost, resulting in a malfunctioning valve.



(1) Ball bearing
(2) Spacer
(3) Oil seal
(4) Seal ring
(5) O-ring

D: ASSEMBLY S601276A02

CAUTION:
Use only SUBARU genuine grease for gearbox.

Specified grease for gearbox:
VALIANT GREASE M2 (Part No. 003608001)

1. RACK HOUSING ASSEMBLY S601276A0201

1) Clean all parts and tools before reassembling.
2) Move rack shaft fully to the left and right two or three times to lubricate shaft ends with grease. Remove excess grease, being careful not to block air vent hole.

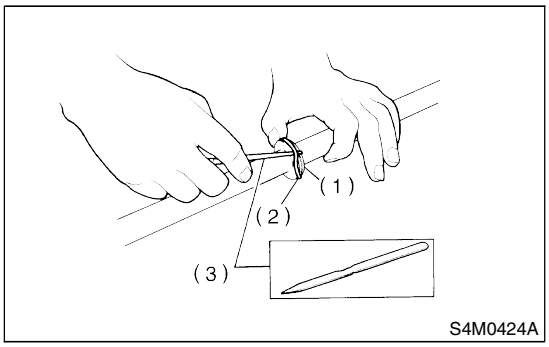
CAUTION:
• When rack is fully moved to its stroke ends with tie-rod removed, be careful not to bump rack ends.
• Ensure that screw located at end of rack shaft is free from grease.

3) Apply grease to bore wall which accommodates sleeve.

CAUTION:
Ensure that hands are clean when applying grease.

4) Install O-ring and seal ring in groove on rack piston.

CAUTION:
• Do not expand O-ring and seal ring more than necessary.
• To facilitate installation of seal ring, first position one half of entire seal ring in groove. Then slowly position the second half using a spatula, as shown.

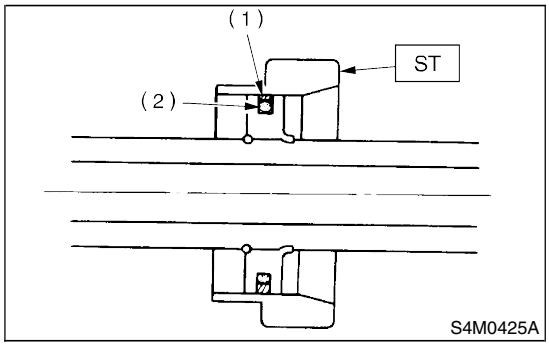


(1) O-ring
(2) Seal ring
(3) Spatula

5) Apply a coat of grease to inner surface of ST and insert rack piston into it. Leave ST at least 10 minutes until seal ring settles down in place.

CAUTION:
Be careful not to scratch rack, piston and seal ring during installation.

ST 927600000 FORMER

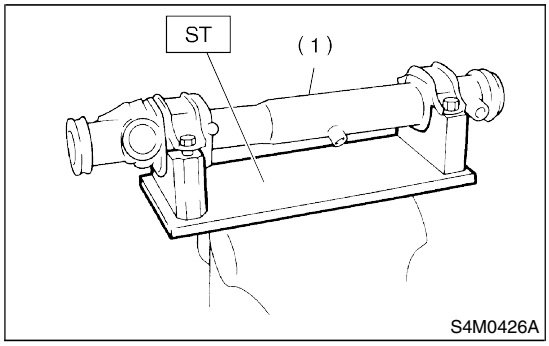


(1) Seal ring
(2) O-ring

6) Attach steering body to ST as shown. Apply a coat of grease to needle bearing.
ST 926200000 STAND

CAUTION:
- **Use a ST to support steering body.**
- **Ensure that needle bearing is free from defects. If it is faulty, replace steering body with a new one.**

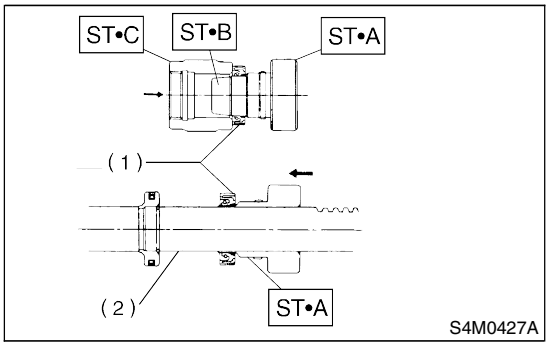
NOTE:
If steering body is removed from vehicle, be sure to remove rust and clean.



(1) Steering body

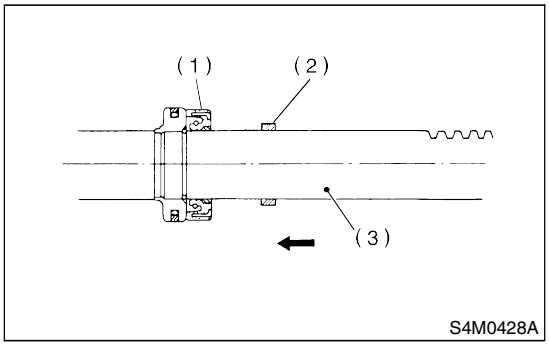
7) Using ST·B and ST·C, attach oil seal to ST·A. Insert ST·A into rack from gear side. Remove oil seal from ST·A when it approaches piston and remove STs from rack.
ST 927490000 INSTALLER; A·B·C

NOTE:
Face oil seal in the direction shown in figure.



(1) Oil-seal
(2) Rack

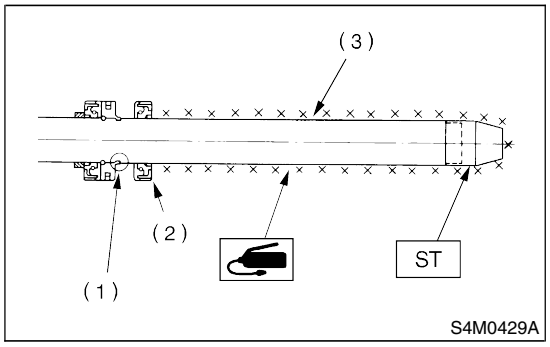
8) Install back-up ring from gear side of rack.



(1) Oil seal
(2) Back-up ring
(3) Rack

9) Install ST on rack and equally apply a thin coat of grease to rack and ST, then install oil seal.
ST 926250000 GUIDE

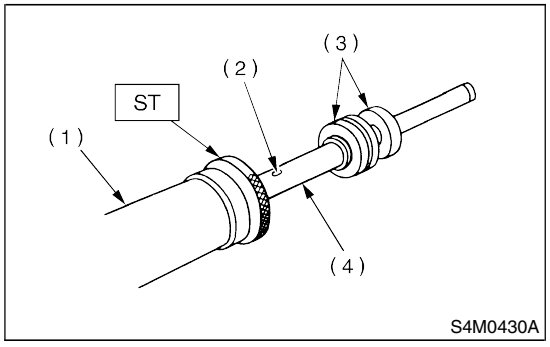
CAUTION:
Be careful not to scratch oil seal lips with piston's knurl section.



(1) Rack piston inner ring
(2) Outer side oil seal
(3) Rack

10) Apply a coat of grease to grooves in rack, sliding surface of sleeve and sealing surface of piston. Install ST on the end of steering body cylinder. Then insert rack into steering body from cylinder side.
ST 34099FA010 GUIDE (Oil seal)

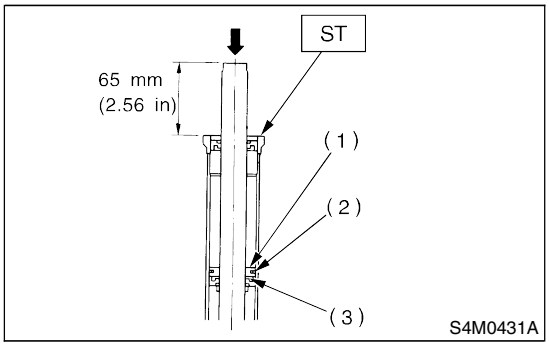
CAUTION:
- **Be sure to apply grease so that it covers the entire surface of rack gear teeth.**
- **Do not allow grease to block air vent hole on rack.**



(1) Cylinder side of steering body
(2) Air vent hole
(3) Oil seal
(4) Rack

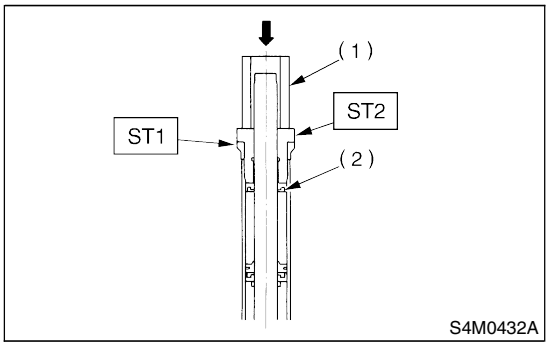
11) Slowly press inner side oil seal until distance between ST and end of rack is 65 mm (2.56 in).
ST 34099FA010 GUIDE (Oil seal)

CAUTION:
Ensure ST's inner wall is free of scratches. Otherwise, it may damage oil seal during installation.



(1) Rack piston
(2) Inner side oil seal
(3) Back-up ring

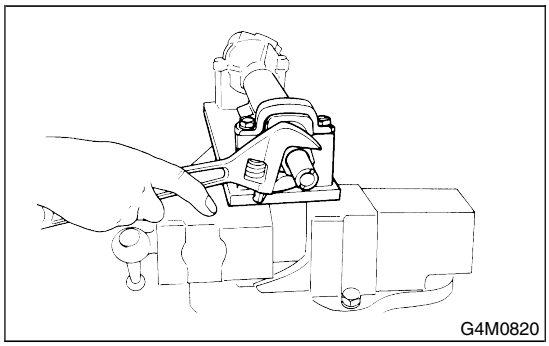
12) Pass ST2 and pipe through rack and press outer side oil seal until ST1 is in contact with ST2.
ST1 34099FA010 GUIDE (Oil seal)
ST2 34099FA040 INSTALLER (Oil seal)



(1) Pipe
(2) Outer side oil seal

13) Install holder from cylinder side of steering body.

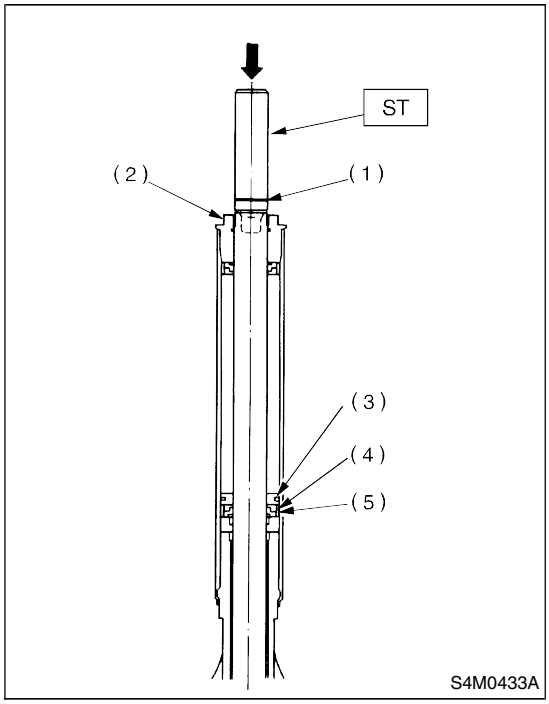
Tightening torque:
64 N·m (6.5 kgf-m, 47.0 ft-lb)



14) Attach ST to rack cylinder. Using a press, install back-up ring and oil seal.

NOTE:
Press ST until its groove is aligned with end of holder.

ST 34099FA030 INSTALLER & REMOVER

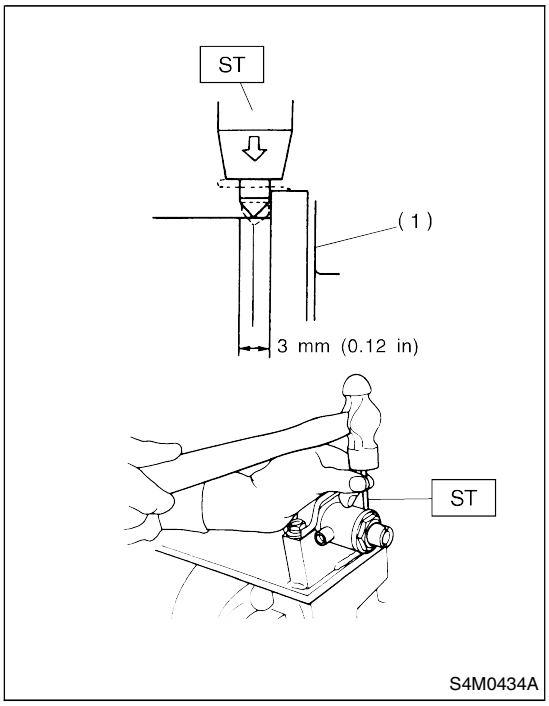


(1) Installer guide
(2) Holder
(3) Rack piston
(4) Oil seal
(5) Back-up ring

15) Using ST, clinch steering body cylinder at a point less than 3 mm (0.12 in) from holder.

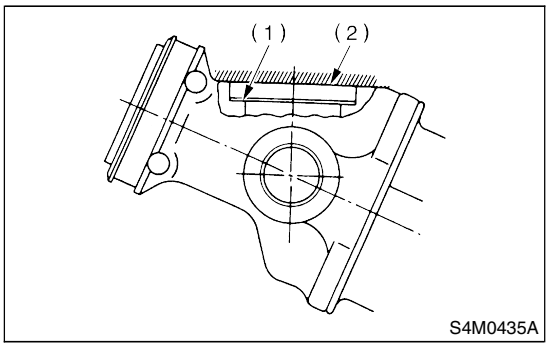
CAUTION:
Be careful not to deform holder.

ST 34099FA060 PUNCH



(1) Holder

16) Remove traces of sealer, oil, rust, etc., from mating surfaces of valve housing and steering body.
17) Position a shim in graded portion of steering body pinion housing, and apply an even coat of sealer (Fuji Bond C: 004403004) to end of pinion housing.

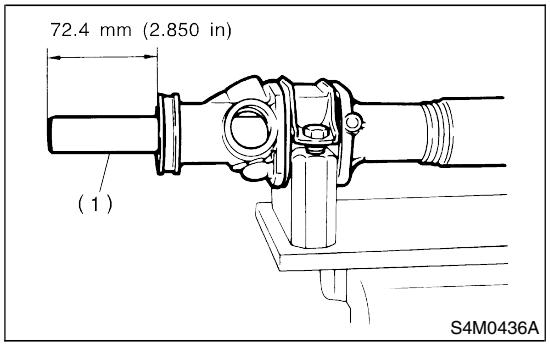


(1) Shim
(2) Fuji Bond C (004403004)

18) Use the same number of shims as that used when steering body was removed.
19) If steering body, valve housing or pinion and valve is replaced with a new one, add two or three shims, install valve on pinion housing and tighten

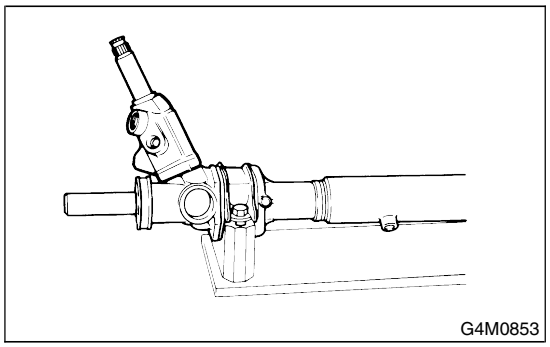
with two bolts to 25 N·m (2.5 kgf-m, 18.1 ft-lb). Then, measure clearance between steering body and valve housing using a thickness gauge. Remove shims so that the clearance is zero.

20) Extend rack 72.4 mm (2.850 in) beyond pinion side of steering body.



(1) Rack

21) Apply grease to pinion gear teeth and ball bearing. Insert valve into place.

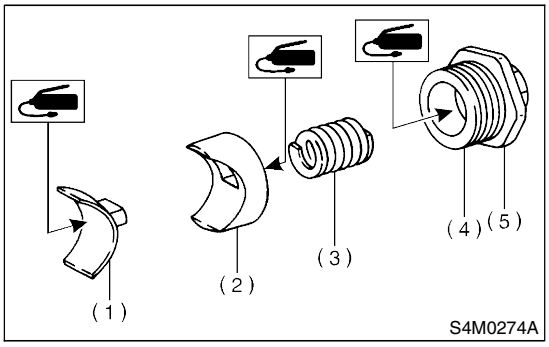


22) Alternately and slowly tighten socket bolts.

NOTE:
Replace faulty parts before installing valve. Otherwise, valve may not be installed properly.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

23) Apply a coat of grease to sliding surface of seat pad, sleeve and seating surface of spring, and insert sleeve into steering body. Charge adjusting screw with grease, insert spring into adjusting screw and install on steering body.

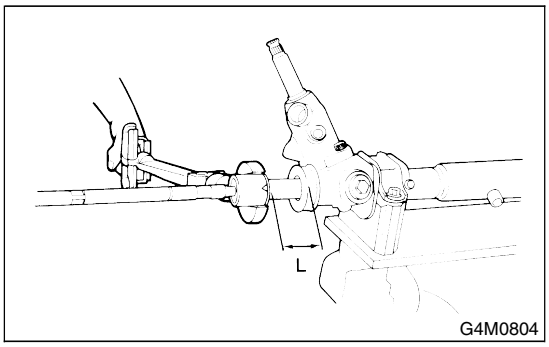


(1) Seat pad
(2) Sleeve
(3) Spring
(4) Adjusting screw
(5) Lock nut

24) Installation of tie-rod
(1) Tighten adjusting screw until it will no longer tighten.
(2) Install lock washers and tighten left and right tie-rods into rack ends.

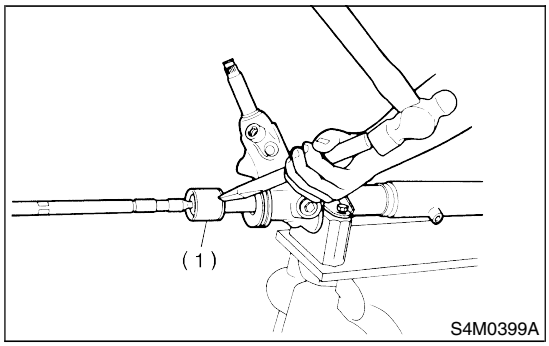
On condition
L: Approximately 40 mm (1.57 in)

Tightening torque:
78 N·m (8.0 kgf-m, 58 ft-lb)



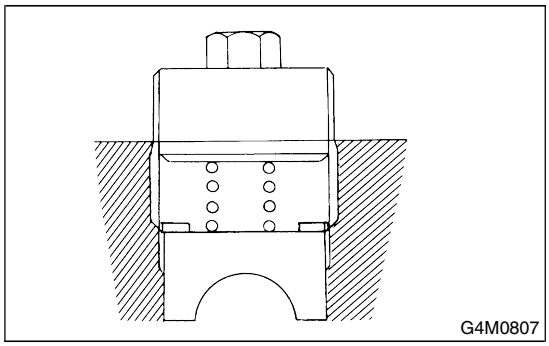
25) Using a chisel and hammer, bend lock washers (at two places).

CAUTION:
Be careful not to scratch rack.



(1) Lock washer

26) Rack and pinion backlash adjustment
(1) Loosen adjusting plug.
(2) Rotate input shaft so that rack is in the straight ahead direction. [Ensure that distance between rack end and stopper is 70.8 mm (2.787 in).]
(3) Tighten adjusting plug by two threads.



(4) Turn adjusting screw so that the entire thread area is coated with liquid packing.

Liquid packing:
THREE BOND 1102 or equivalent

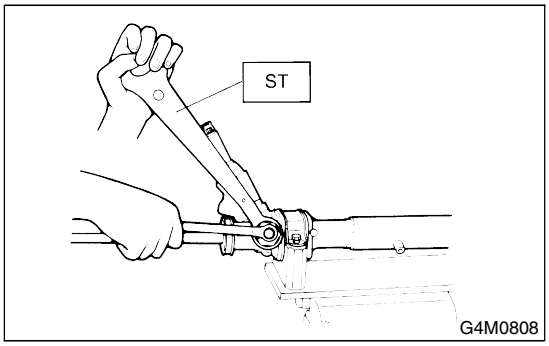
NOTE:
● Apply liquid packing of approximately 1.5 g (0.053 oz) to adjusting screw thread area.
● Also turn plug to ensure that its entire contact area is coated with liquid packing.

(5) Tighten adjusting plug to 5 N·m (0.5 kgf-m, 3.6 ft-lb) and loosen, then tighten to 5 N·m (0.5 kgf-m, 3.6 ft-lb) and loosen, and finally tighten to 5 N·m (0.5 kgf-m, 3.6 ft-lb) and loosen 30°.
(6) While holding adjusting plug using a closed wrench, tighten lock nut using ST.

ST 926300000 SPANNER

Tightening torque:
39 N·m (4 kgf-m, 29 ft-lb)

CAUTION:
● Do not allow liquid packing to come in contact with sleeve.
● While rotating input shaft to fully move rack shaft to the left and right, ensure that rack moves smoothly without binding, and that rotating torque is constant.

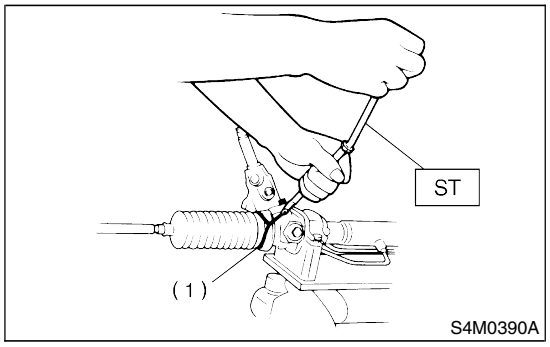


27) Installation of boot
(1) Apply a coat of grease to inner wall of boot small end.
(2) Position boot large end in rubber mount groove and gearbox, and small end in groove of tie-rod.

CAUTION:
● Ensure that both ends of boot are properly situated in grooves.
● Ensure that boot is free from abnormal swelling or dents.

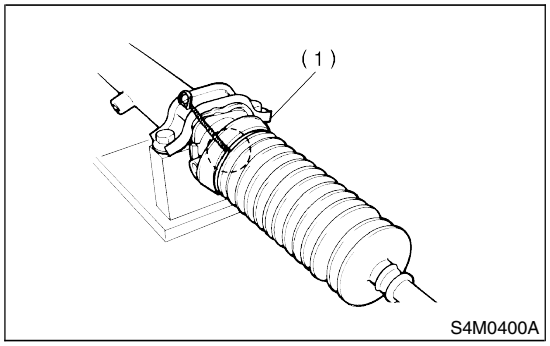
28) Attach lock wire to boot large end, and twist it while pulling it upward (with a force of approximately 39 N (4 kgf, 9 lb).
ST 927590000 WRENCH

CAUTION:
Ensure that lock wire is not loose.



(1) Wire

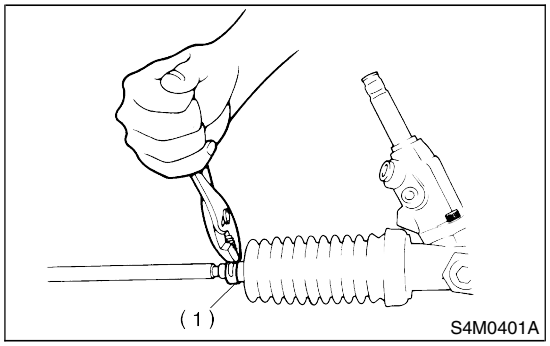
29) Then bend wire end along boot as shown.



(1) Twist wire up to this point.

30) Install clip using pliers.

CAUTION:
After installing clip, ensure that boot's small end is properly positioned in groove on tie-rod.



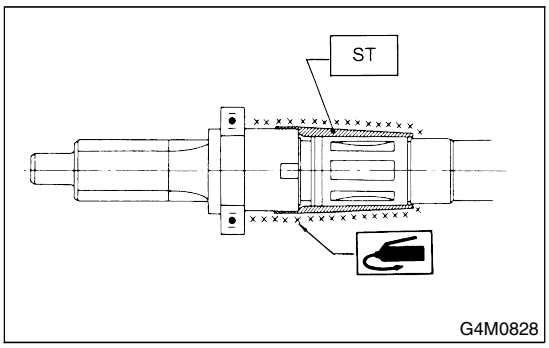
(1) Clip

31) Install pipes A and B.

Tightening torque:
Valve housing side
20 N·m (2.0 kgf-m, 14.5 ft-lb)
Steering body side
24 N·m (2.4 kgf-m, 17.4 ft-lb)

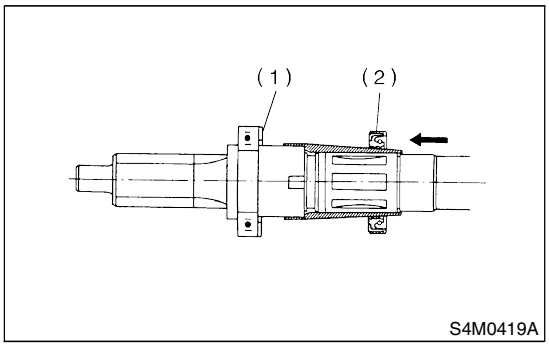
2. CONTROL VALVE ASSEMBLY *S601276A0202*

1) Clean all parts and tools before reassembling.
2) Attach ST to pinion, and apply grease to outer perimeter of the cover and mating surface of oil seal.
ST 926270000 COVER



3) Apply a coat of grease to spacer and sealing lips of oil seal, and install spacer and oil seal.

CAUTION:
- **Face chamfered side of spacer toward oil seal.**
- **Face oil seal in correct direction.**

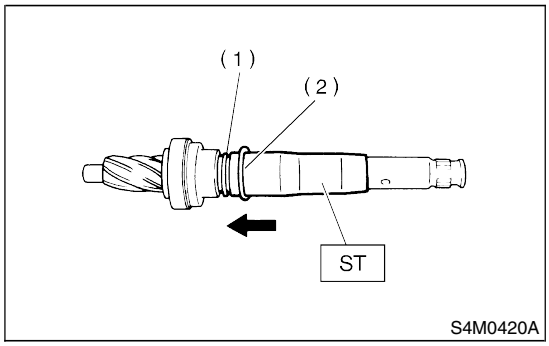


(1) Spacer
(2) Oil seal

4) Install ST to input shaft, and apply a coat of grease to the cover surface. Install O-ring and seal ring.

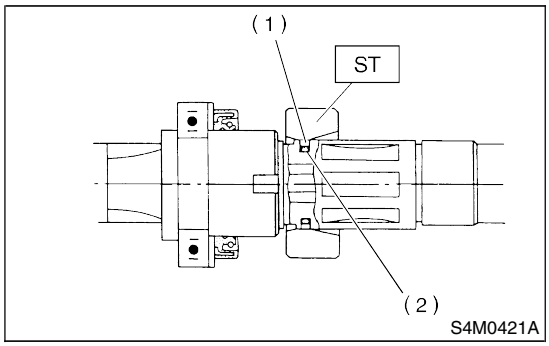
CAUTION:
Do not expand O-ring and seal ring more than necessary.

ST 926450000 COVER



(1) O-ring
(2) Seal ring

5) Apply a coat of grease to inner wall of ST, and secure seal ring assembled in the former procedure as shown. Leave seal ring unattended for approximately 10 minutes until it settles down.
ST 926280000 FORMER



(1) Seal ring
(2) O-ring

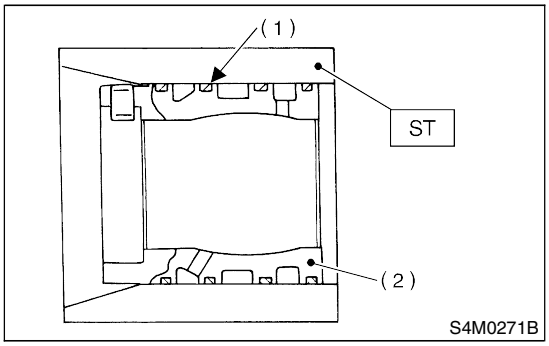
6) Remove the four seal rings from the valve sleeve using a sharp-pointed tool.

CAUTION:
Be careful not to scratch seal ring grooves on the valve sleeve. A scratch may reduce the sealing effect, resulting in faulty valve operation.

7) Clean the valve sleeve.
8) Attach the four seal rings to the valve sleeve grooves.

CAUTION:
Do not expand the seal rings more than necessary.

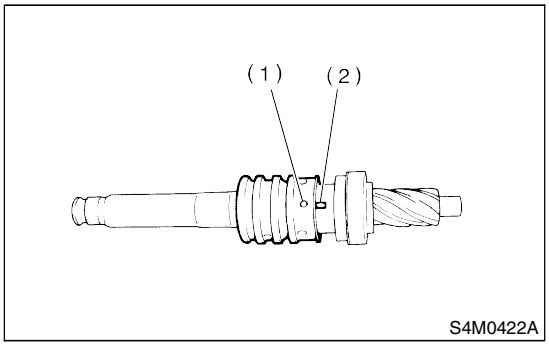
9) Apply a coat of grease to the inner wall of the ST. Secure the four seal rings (installed in the former procedure) using the ST as shown in the figure. Leave the seal rings for approximately 10 minutes until they have properly set.
ST 926050000 FORMER



(1) Seal ring
(2) Valve sleeve

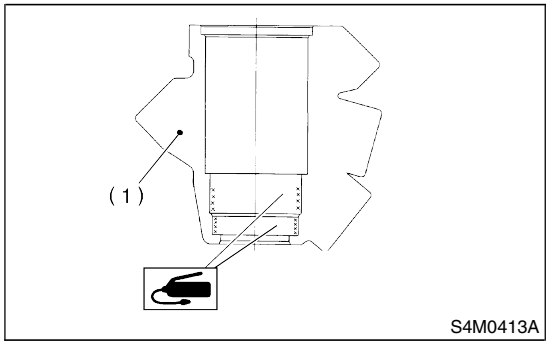
10) While aligning valve sleeve pin with groove on pinion, secure with snap ring.

CAUTION:
• Be careful not to damage inner wall of valve sleeve and contact surface of pinion.
• Before assembling valve sleeve and pinion, clean in kerosene and dry with compressed air.



(1) Pin
(2) Groove on pinion

11) Apply a coat of grease to inner wall of valve housing, oil seal and outer perimeter of dust seal.



(1) Valve housing

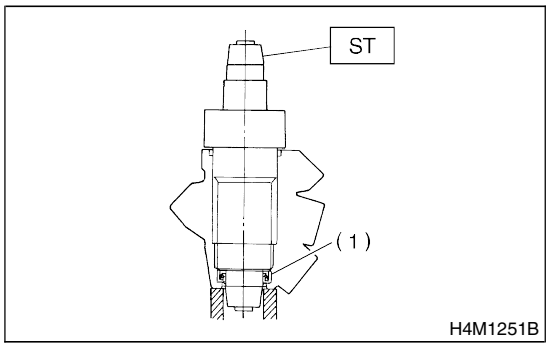
12) Using ST and press, install oil seal in valve housing.

(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.

ST 34099FA000 INSTALLER & REMOVER



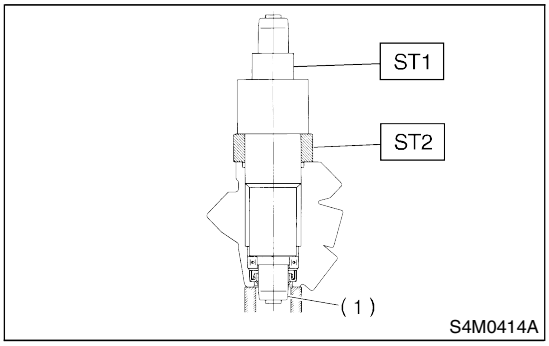
(1) Oil seal

13) Attach ST2 to ST1, and press ball bearing into place using a press.

NOTE:

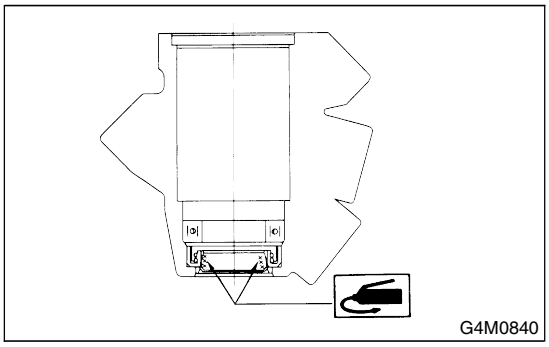
- To facilitate installation, attach ball bearing to remover and position in valve housing before pressing it into place.
- Use the “B” end of remover.

ST1 34099FA000 INSTALLER & REMOVER
ST2 34099FA050 SPACER



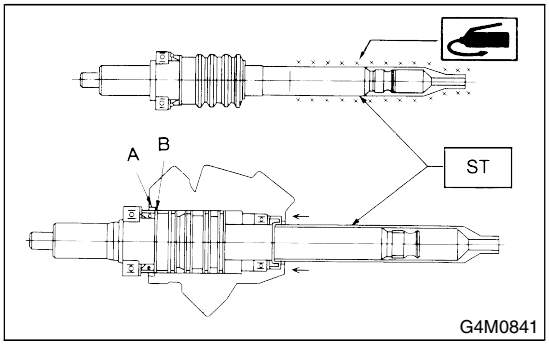
(1) B side

14) Charge oil seal with specified steering grease.



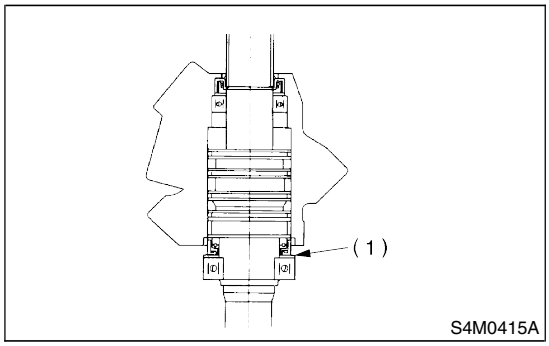
15) Apply a coat of specified steering grease to ST surface, and install ST onto end of input shaft. Insert pinion and valve until “A” of oil seal contacts “B” of valve housing. The ST is used to prevent scratching oil seal.

ST 34099FA020 GUIDE



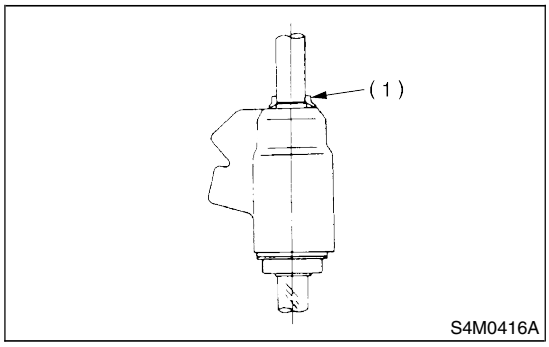
16) While supporting pinion and valve, push end of pinion until bearing contacts brazed end of valve housing.

CAUTION:
Do not allow spacer to extend beyond brazed end. Otherwise, pinion cannot be inserted properly.



(1) Spacer

17) Apply a coat of grease to sealing lips of dust cover, and insert dust cover until it contacts staged portion of input shaft.



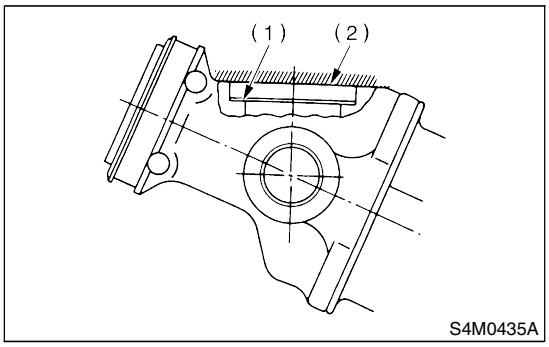
(1) Dust cover

18) Adjust sealing lip-to-housing end clearance to 0 to 0.5 mm (0 to 0.020 in). If sealing lip is too close to housing end, steering wheel will not return smoothly; if it is too far from housing end, dust or dirt will enter the clearance.

NOTE:
Ensure that pinion and valve is properly positioned in valve housing before adjustment.

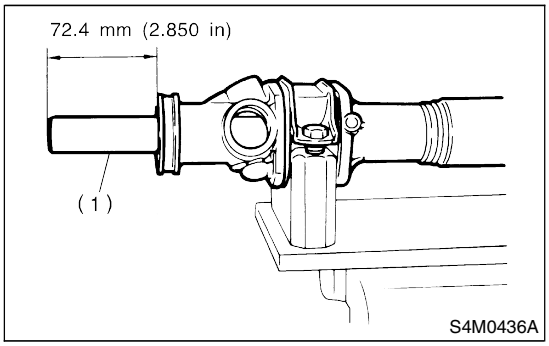
19) Remove traces of sealer, oil, rust, etc., from mating surfaces of valve housing and steering body.

20) Position a shim in graded portion of steering body pinion housing, and apply an even coat of sealer (Fuji Bond C: 004403004) to end of pinion housing.



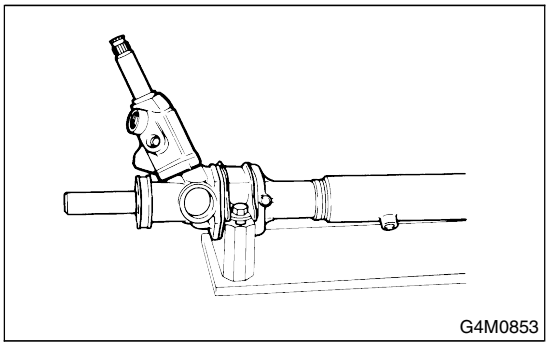
(1) Shim
(2) Fuji Bond C (004403004)

21) Use the same number of shims as that used when steering body was removed.
22) If steering body, valve housing or pinion and valve is replaced with a new one, add two or three shims, install valve on pinion housing and tighten with two bolts to 25 N·m (2.5 kgf-m, 18.1 ft-lb). Then, measure clearance between steering body and valve housing using a thickness gauge. Remove shims so that the clearance is zero.
23) Extend rack 72.4 mm (2.850 in) beyond pinion side of steering body.



(1) Rack

24) Apply grease to pinion gear teeth and ball bearing. Insert valve into place.

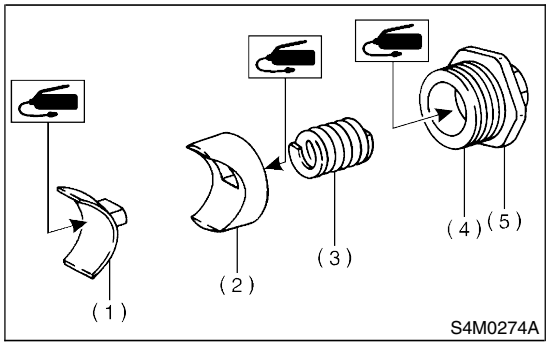


25) Alternately and slowly tighten socket bolts.

NOTE:
Replace faulty parts before installing valve. Otherwise, valve may not be installed properly.

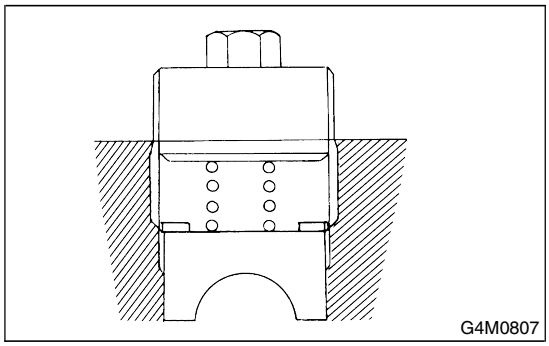
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

26) Apply a coat of grease to sliding surface of seat pad, sleeve and seating surface of spring, and insert sleeve into steering body. Charge adjusting screw with grease, insert spring into adjusting screw and install on steering body.



(1) Seat pad
(2) Sleeve
(3) Spring
(4) Adjusting screw
(5) Lock nut

27) Rack and pinion backlash adjustment
(1) Loosen adjusting plug.
(2) Rotate input shaft so that rack is in the straight ahead direction. [Ensure that distance between rack end and stopper is 70.8 mm (2.787 in).]
(3) Tighten adjusting plug by two threads.



(4) Turn adjusting screw so that the entire thread area is coated with liquid packing.

Liquid packing:
THREE BOND 1102 or equivalent

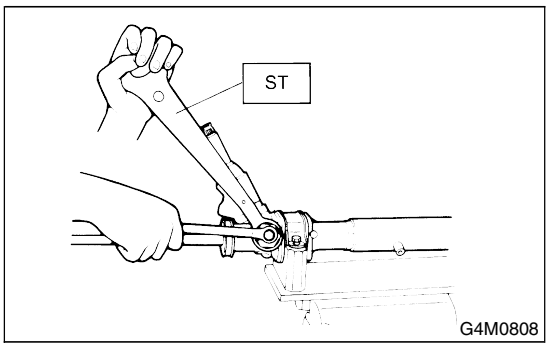
NOTE:
• Apply liquid packing of approximately 1.5 grams (0.053 oz) to adjusting screw thread area.
• Also turn plug to ensure that its entire contact area is coated with liquid packing.

(5) Tighten adjusting plug to 5 N·m (0.5 kgf-m, 3.6 ft-lb) and loosen, then tighten to 5 N·m (0.5 kgf-m, 3.6 ft-lb) and loosen, and finally tighten to 5 N·m (0.5 kgf-m, 3.6 ft-lb) and loosen 30°.
(6) While holding adjusting plug using a closed wrench, tighten lock nut using ST.

ST 926300000 SPANNER

Tightening torque:
39 N·m (4 kgf-m, 29 ft-lb)

CAUTION:
• Do not allow liquid packing to come in contact with sleeve.
• While rotating input shaft to fully move rack shaft to the left and right, ensure that rack moves smoothly without binding, and that rotating torque is constant.

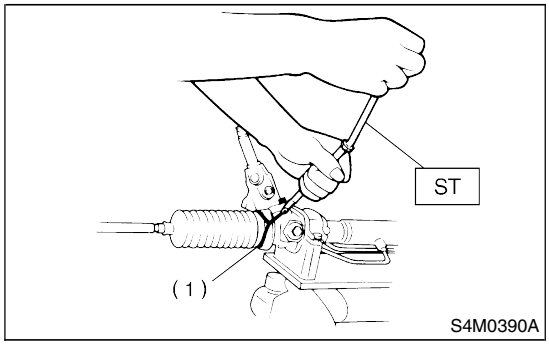


28) Installation of boot
(1) Apply a coat of grease to inner wall of boot small end.
(2) Position boot large end in rubber mount groove and gearbox, and small end in groove of tie-rod.

CAUTION:
• Ensure that both ends of boot are properly situated in grooves.
• Ensure that boot is free from abnormal swelling or dents.

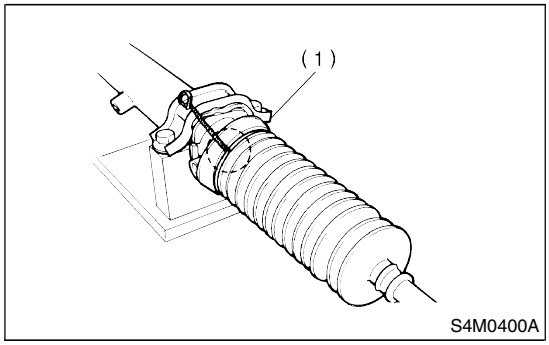
29) Attach lock wire to boot large end, and twist it while pulling it upward (with a force of approximately 39 N (4 kgf, 9 lb).
ST 927590000 WRENCH

CAUTION:
Ensure that lock wire is not loose.



(1) Wire

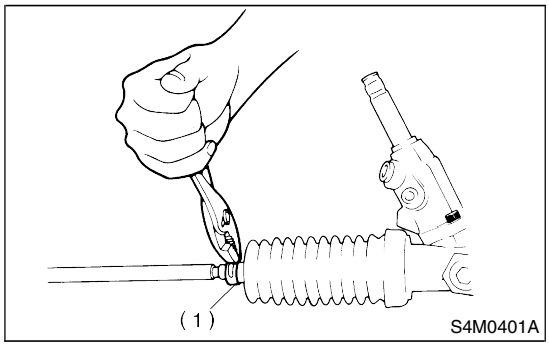
30) Then bend wire end along boot as shown.



(1) Twist wire up to this point.

31) Install clip using pliers.

CAUTION:
After installing clip, ensure that boot's small end is properly positioned in groove on tie-rod.



(1) Clip

E: INSPECTION S601276A10

1. BASIC INSPECTION S601276A1001

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 S601276A1002

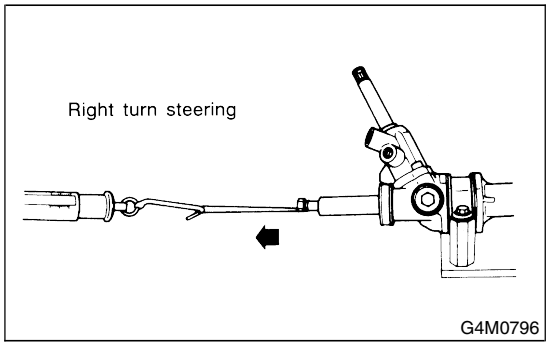
Make a measurement as follows. If it exceeds the specified service limit, adjust or replace.

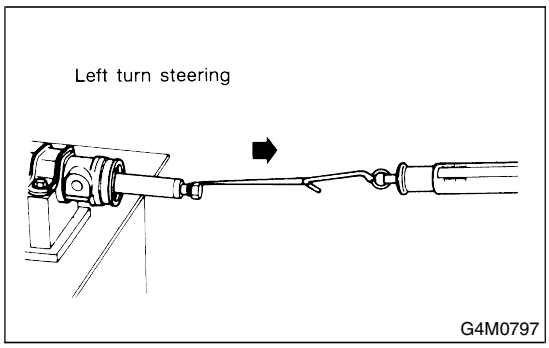
NOTE:
When making a measurement, vise gearbox by using ST. Never vise gearbox by inserting aluminum plates, etc. between vise and gearbox.
ST 926200000 STAND

Sliding resistance of rack shaft:

Service limit
304 N (31 kgf, 68 lb) or less

Difference between left and right sliding resistance
Less than 20%



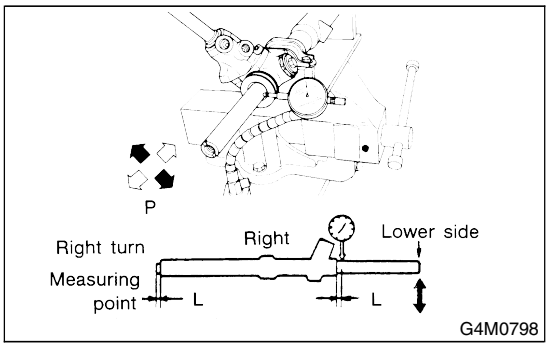


3. RACK SHAFT PLAY IN RADIAL DIRECTION S601276A1003

Right-turn steering:

Service limit
Less than 0.4 mm (0.016 in) (direction ⬅ ➡)
Less than 0.6 mm (0.024 in) (direction ⇦ ⇨)

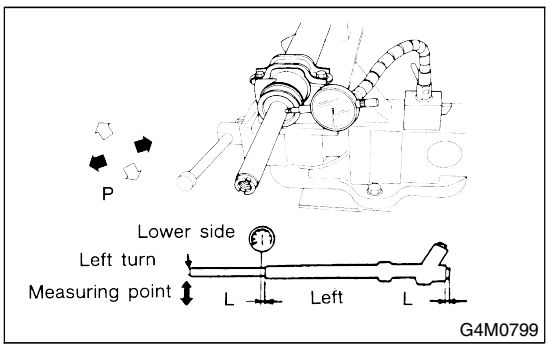
On condition
L: 5 mm (0.20 in)
P: 98 N (10 kgf, 22 lb)



Left-turn steering:

Service limit
Less than 0.4 mm (0.016 in) (direction ⬅ ➡ and ⇦ ⇨)

On condition
L: 5 mm (0.20 in)
P: 98 N (10 kgf, 22 lb)

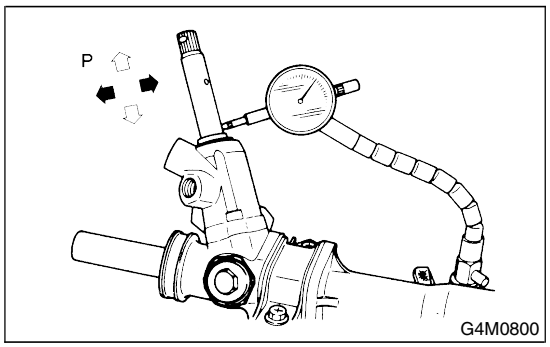


4. INPUT SHAFT PLAY S601276A1004

In radial direction:

Service limit
0.18 mm (0.0071 in) or less

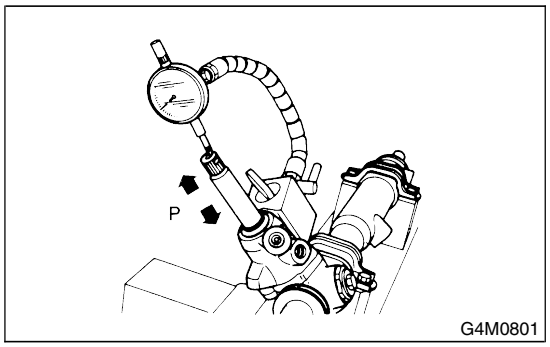
On condition
P: 98 N (10 kgf, 22 lb)



In axial direction:

Service limit
0.27 mm (0.0106 in) or less

On condition
P: 20 — 49 N (2 — 5 kgf, 4 — 11 lb)



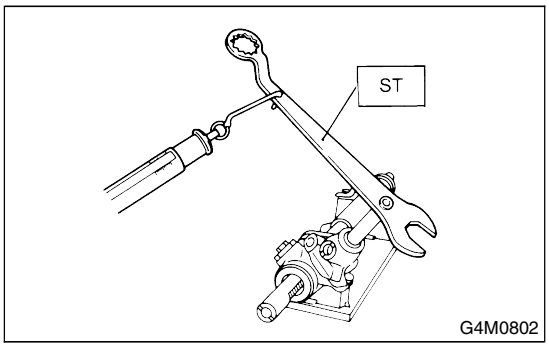
5. TURNING RESISTANCE OF GEARBOX

S601276A1005

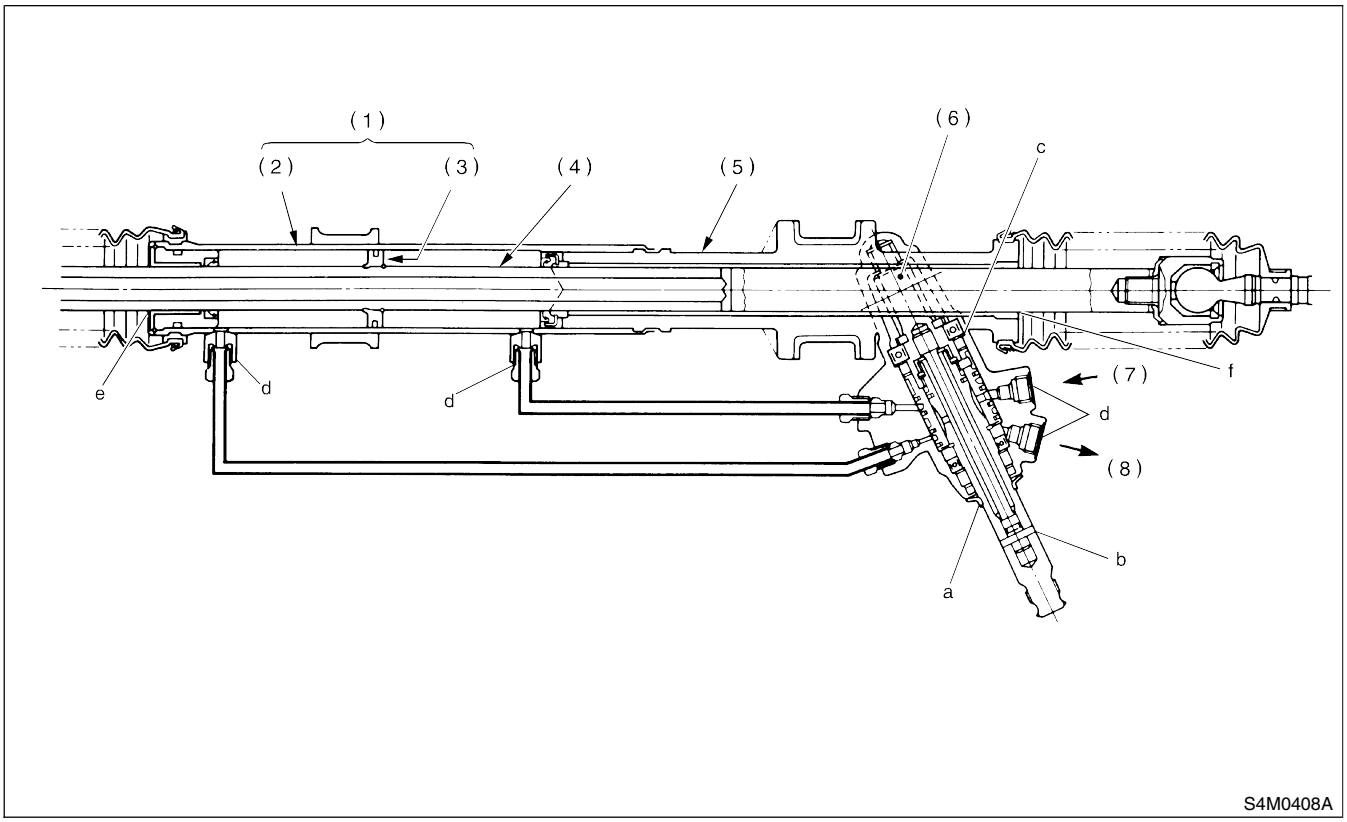
Using ST, measure gearbox turning resistance.
ST 926230000 SPANNER

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
15.79 N (1.61 kgf, 3.55 lb) or less

Difference between left and right sliding resistance:
Less than 20%



6. OIL LEAKING S601276A1006



(1) Power cylinder
(2) Cylinder
(3) Rack piston
(4) Rack shaft
(5) Gearbox
(6) Pinion shaft
(7) From pump
(8) To tank

NOTE:
If gearbox is dismounted without confirming where the leak is, it must be mounted again to locate the leak point.

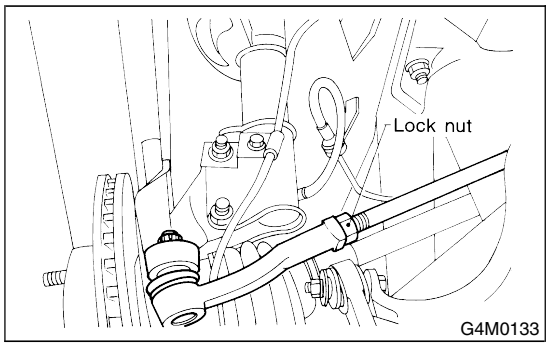
1) Even if the location of the leak can be easily found by observing the leaking condition, it is necessary to thoroughly remove the oil from the suspected portion and turn the steering wheel from lock to lock about 30 to 40 times with engine running, then make comparison of the suspected portion between 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 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 S601276A01

1) Adjust front toe.

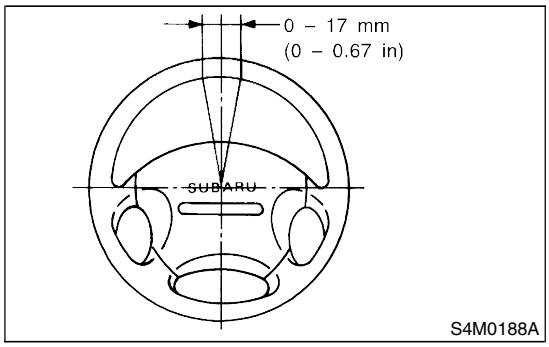
Standard of front toe:
IN 3 — OUT 3 mm (IN 0.12 — OUT 0.12 in)



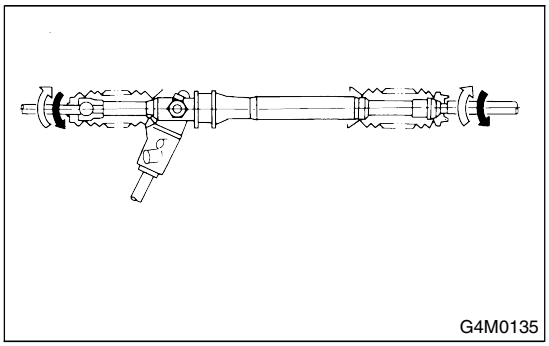
2) Adjust steering angle of wheels.

Standard of steering angle:
Inner wheel: 37.4°±1.5°
Outer wheel: 32.5°±1.5°

3) If steering wheel spokes are not horizontal when wheels are set in the straight ahead position, and error is more than 5° on the periphery of steering wheel, correctly re-install the steering wheel.



4) If steering wheel spokes are not horizontal with vehicle set in the straight ahead position after this adjustment, correct it by turning the right and left tie-rods in the same direction by the same amount.

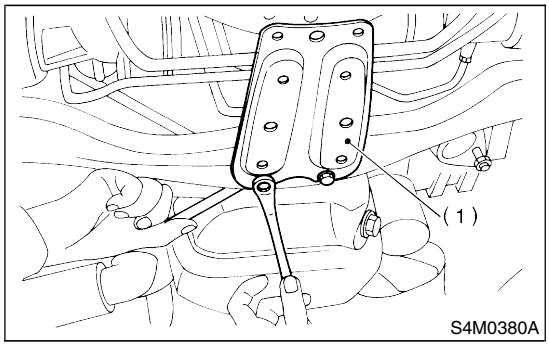


7. Pipe Assembly S601277

A: REMOVAL S601277A18

1. NON-TURBO MODEL S601277A1803

1) Set the vehicle on the lift.
2) Disconnect battery minus terminal.
3) Lift vehicle and remove jack-up plate.

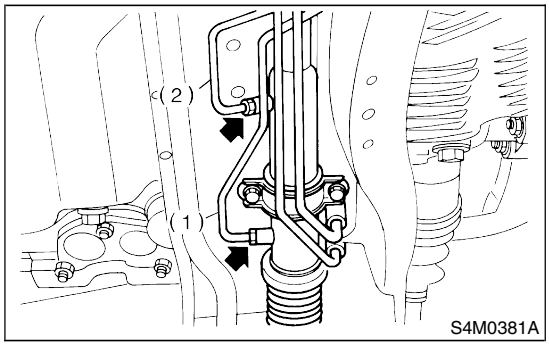


(1) Jack-up plate

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.

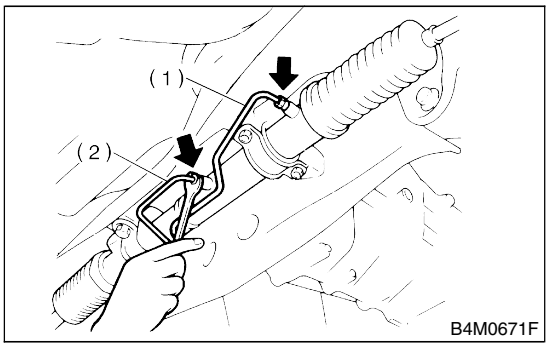
CAUTION:
Improper removal and installation of parts often causes fluid leak trouble. To prevent this, clean the surrounding portions before disassembly and reassembly, and pay special attention to keep dirt and other foreign matter from mating surfaces.

LHD model



(1) Pipe A
(2) Pipe B

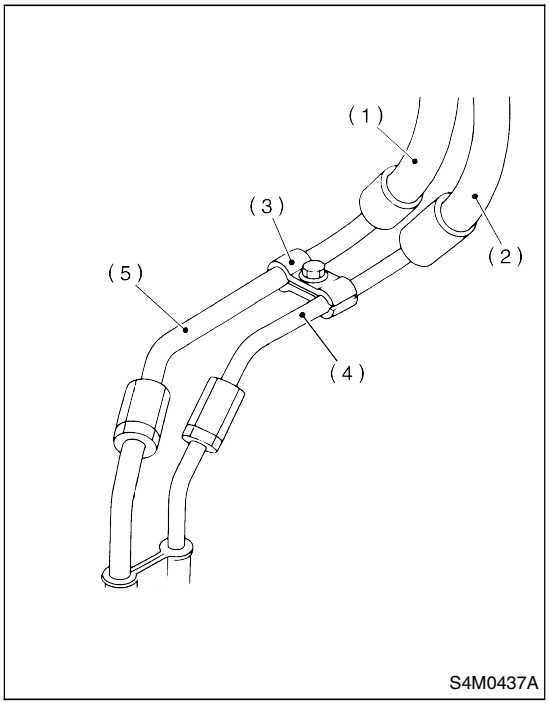
RHD model



(1) Pipe A
(2) Pipe B

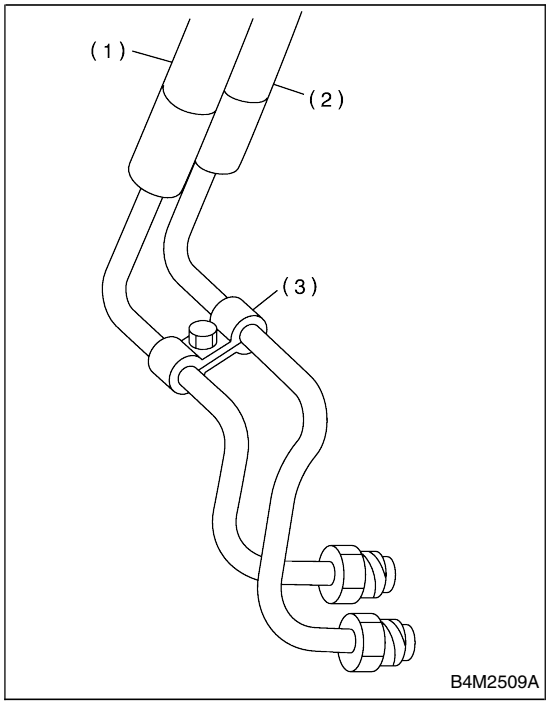
5) Remove clamp E from pipes.

LHD model



(1) Return hose
(2) Pressure hose
(3) Clamp E
(4) Pipe C
(5) Pipe D

RHD model



6) Disconnect pipe C·D.

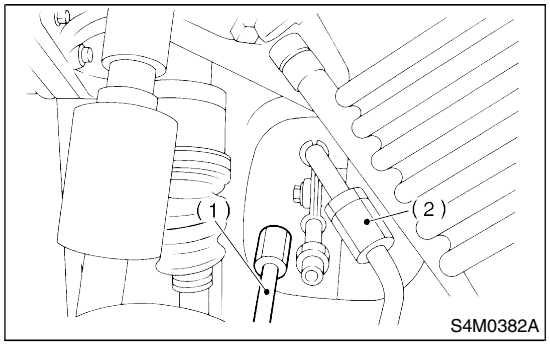
(1) LHD model

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

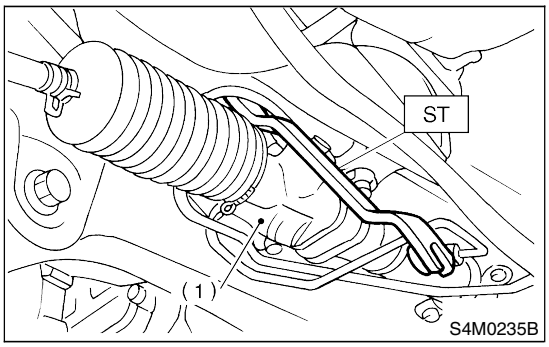
(2) RHD model

Using ST, remove flare nuts from control valve of gearbox assembly, and then disconnect pipe.
ST 34099AC050 GEARBOX SPANNER

CAUTION:

• When disconnecting pipes, use two wrenches to prevent deformities.

• Be careful to keep pipe connections free from foreign matter.



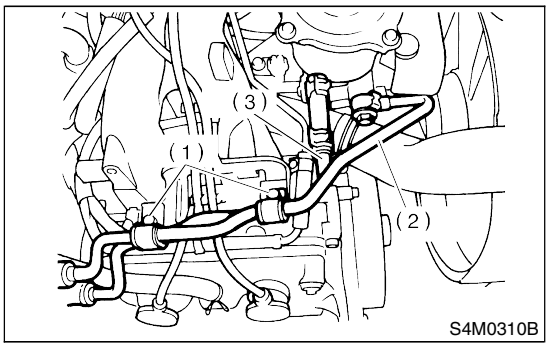
(1) Steering gearbox

7) Lower the vehicle.
8) Remove intake duct and cleaner case. <Ref. IN(SOHC)-8, INSTALLATION, Air Intake Duct.> and <Ref. IN(SOHC)-7, 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.

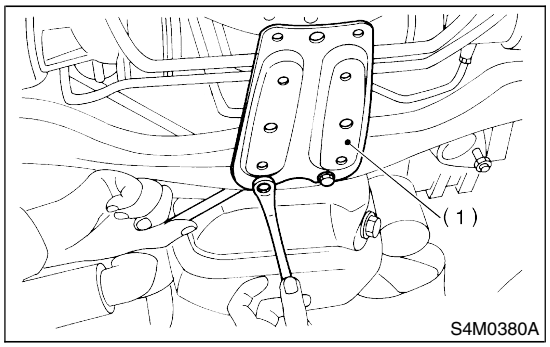


(1) Bolt A
(2) Pipe C
(3) Pipe D

2. TURBO MODEL *S601277A1804*

1) Set the vehicle on the lift.
2) Disconnect battery minus terminal.

3) Lift vehicle and remove jack-up plate.

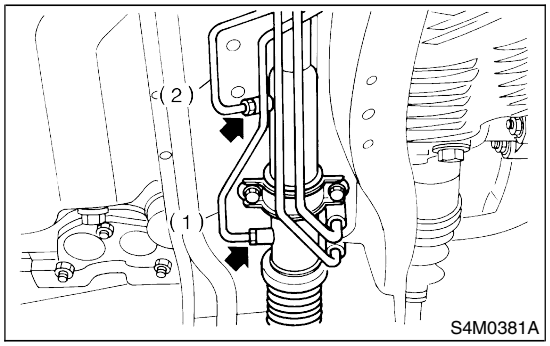


(1) Jack-up plate

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.

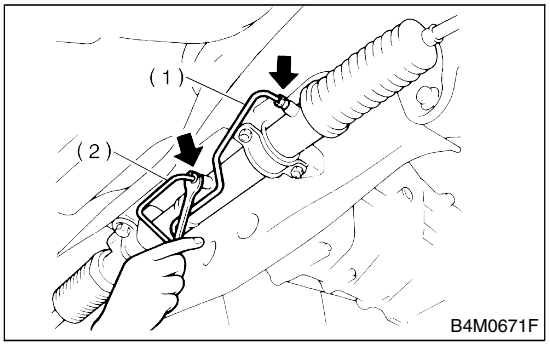
CAUTION:
Improper removal and installation of parts often causes fluid leak trouble. To prevent this, clean the surrounding portions before disassembly and reassembly, and pay special attention to keep dirt and other foreign matter from mating surfaces.

LHD model



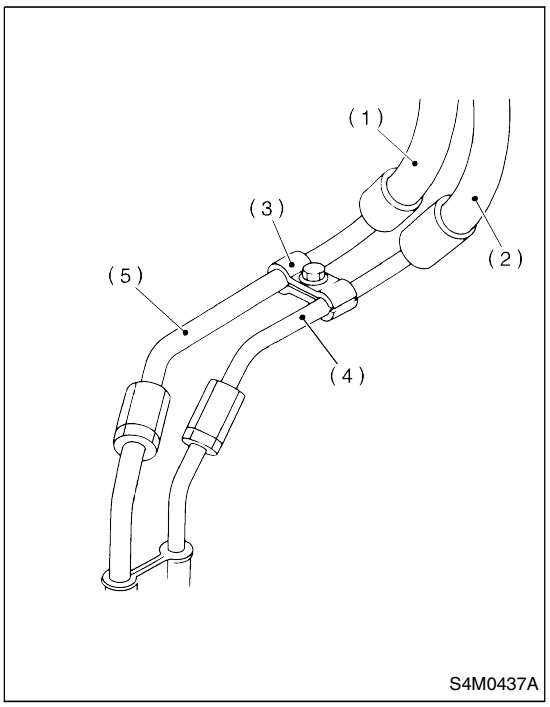
(1) Pipe A
(2) Pipe B

RHD model



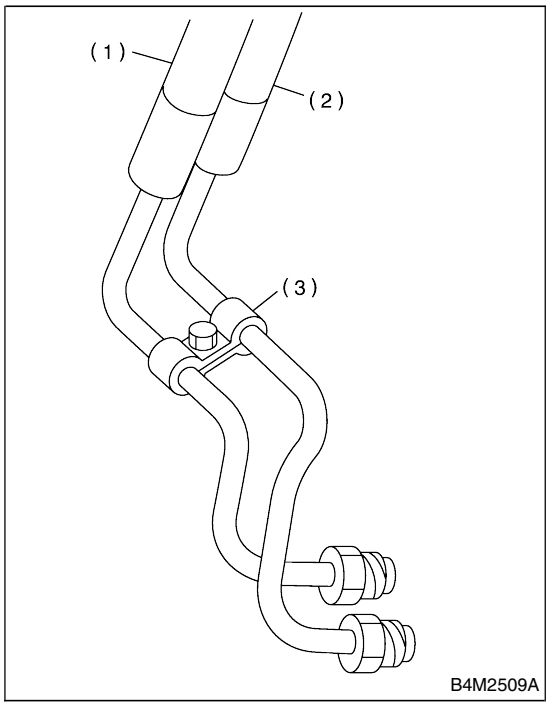
(1) Pipe A
(2) Pipe B

5) Remove clamp E from pipes.
LHD model



(1) Return hose
(2) Pressure hose
(3) Clamp E
(4) Pipe C
(5) Pipe D

RHD model



6) Disconnect pipe C·D.

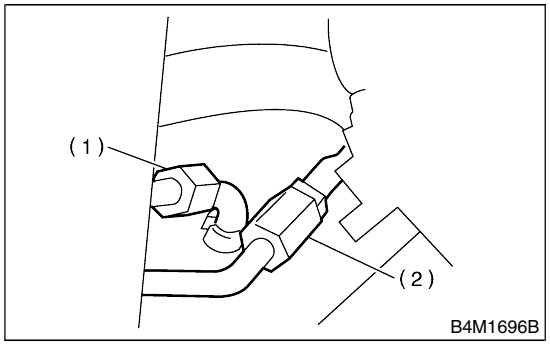
(1) LHD model

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

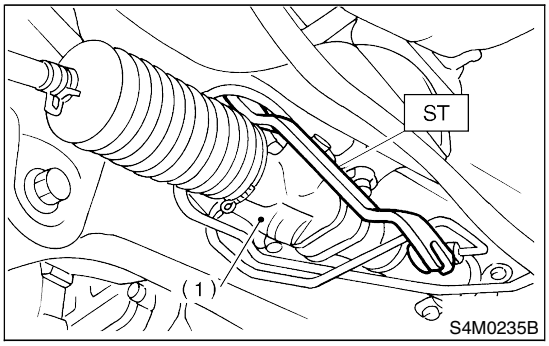
(2) RHD model

Using ST, remove flare nuts from control valve of gearbox assembly, and then disconnect pipe.
ST 34099AC050 GEARBOX SPANNER

CAUTION:

● When disconnecting pipes, use two wrenches to prevent deformities.

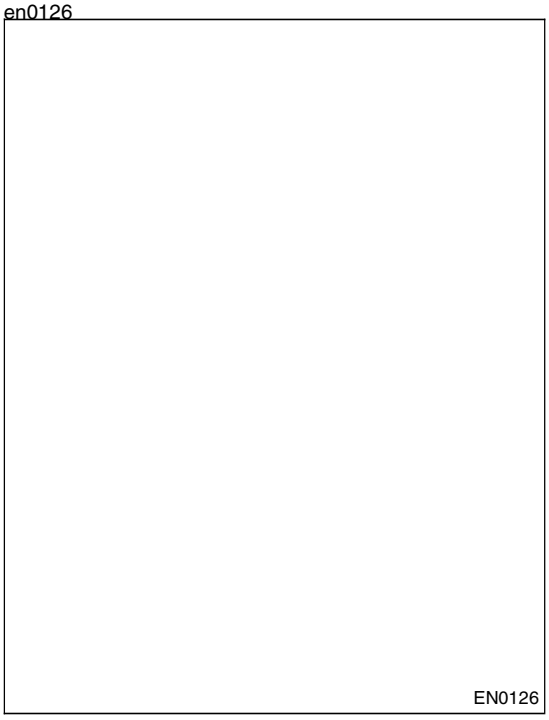
● Be careful to keep pipe connections free from foreign matter.



(1) Steering gearbox

7) Lower the vehicle.
8) Remove intake duct.
9) Remove bolt A.
(1) Remove air intake duct, air cleaner upper cover and air intake boot.
<Ref. to IN(DOHC TURBO)-8, REMOVAL, Air Intake Duct.> and <Ref. to IN(DOHC TURBO)-9, REMOVAL, Intake Duct.>
(2) Remove two bolts fixing pipe C and D.
(3) Remove coolant filler tank.

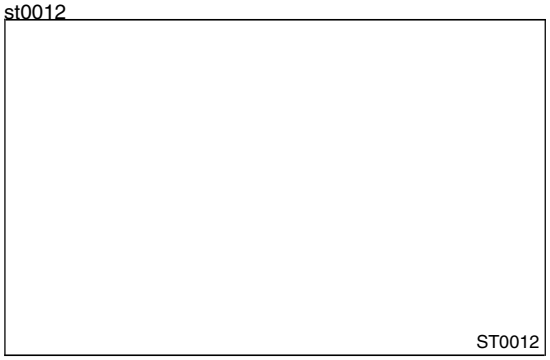
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(4) Disconnect pipe C from oil pump. Disconnect pipe D from return hose.

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.

st0012



(1) Pipe C
(2) Pipe D

B: INSTALLATION S601277A11

1. NON-TURBO MODEL S601277A1103

1) Tighten bolt A.

CAUTION:
Visually check that hose between tank and pipe D is free from bending or twisting.

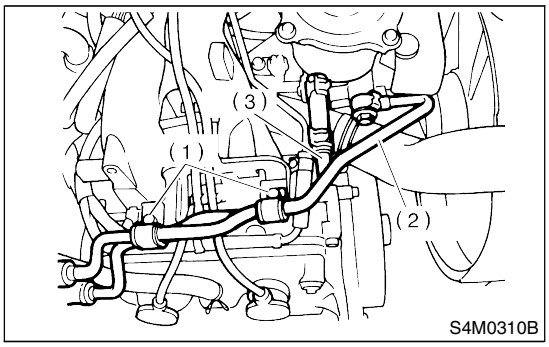
(1) Connect pipe D to oil tank.
(2) Connect pipe C or pressure hose to oil pump.

CAUTION:
Use a new gasket.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

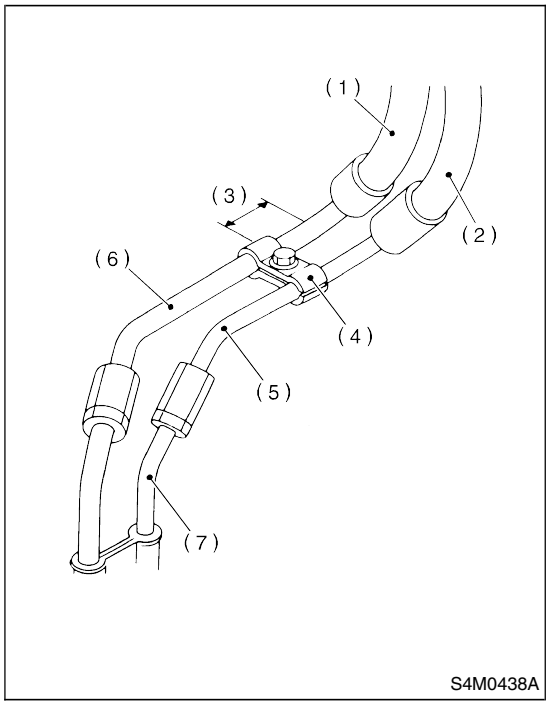
(3) Tighten bolt A.

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)



(1) Bolt A
(2) Pipe C
(3) Pipe D

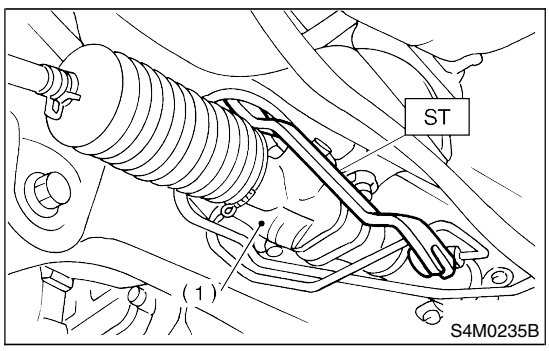
2) Temporarily connect pipes C and D. (LHD model)



(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) Using ST, remove flare nuts from control valve of gearbox assembly, and disconnect upper and lower hoses.
ST 34099AC050 GEARBOX SPANNER

CAUTION:
• Always disconnect hoses B and A in that order.
• Be careful not to damage the hoses during removal.

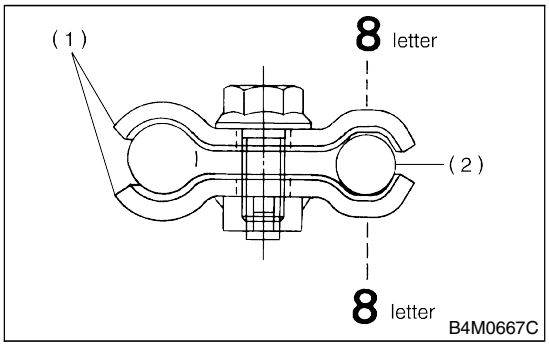


(1) Steering gearbox

4) 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)



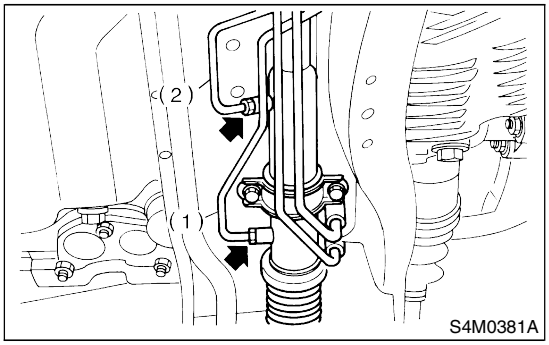
(1) Clamp E
(2) Pipe C

5) Tighten joint nut.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

6) Connect pipe A and B.
(1) LHD model
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)

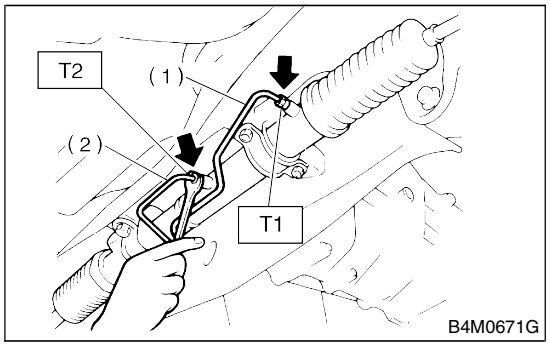


(1) Pipe A
(2) Pipe B

(2) RHD model

Connect pipes A and B to four pipe joints of gearbox. Connect upper pipe A first, and lower pipe B second.

Tightening torque:
T1: 20 N·m (2.0 kgf-m, 14.5 ft-lb)
T2: 24 N·m (2.4 kgf-m, 17.4 ft-lb)

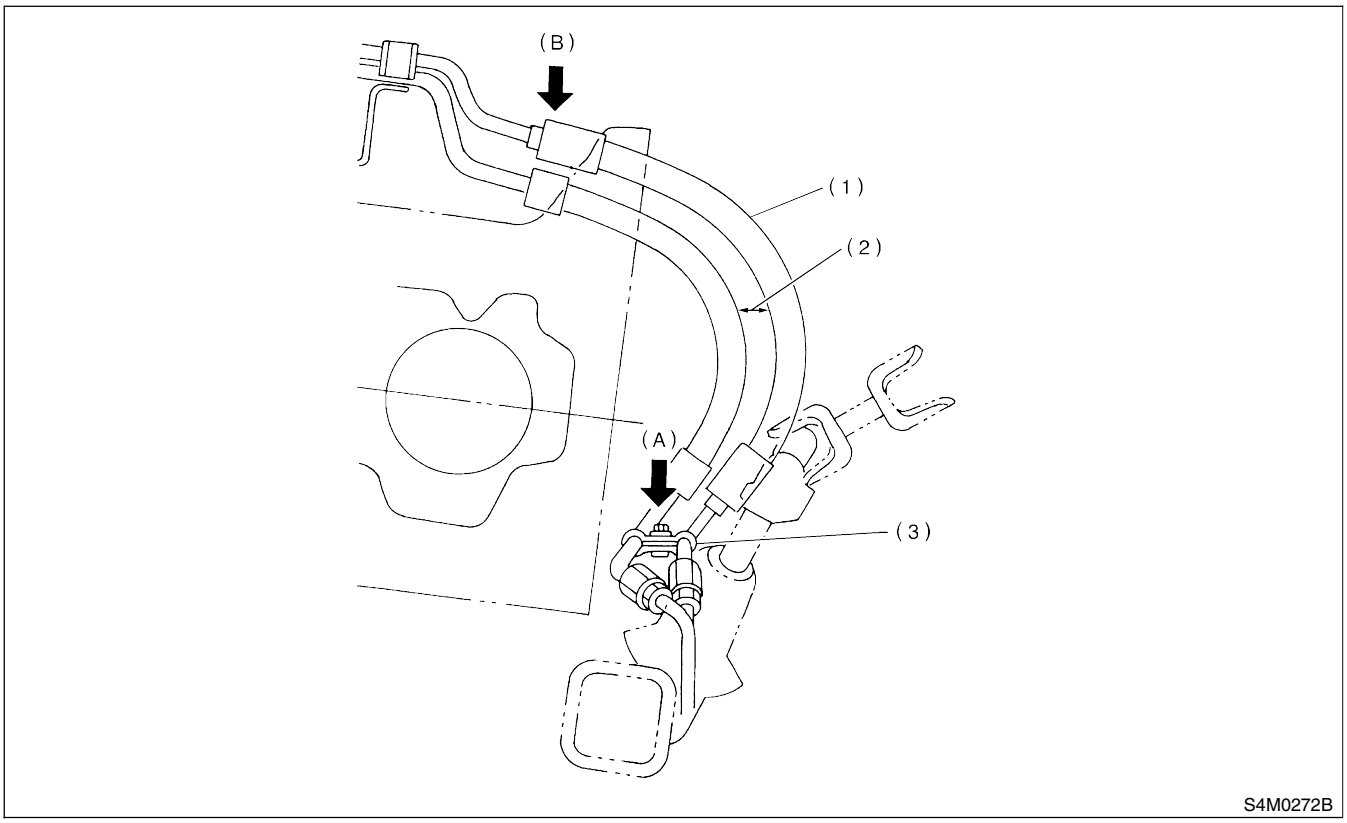


(1) Pipe A
(2) Pipe B

7) Install jack-up plate.
8) Connect battery ground terminal.
9) Feed the specified fluid.

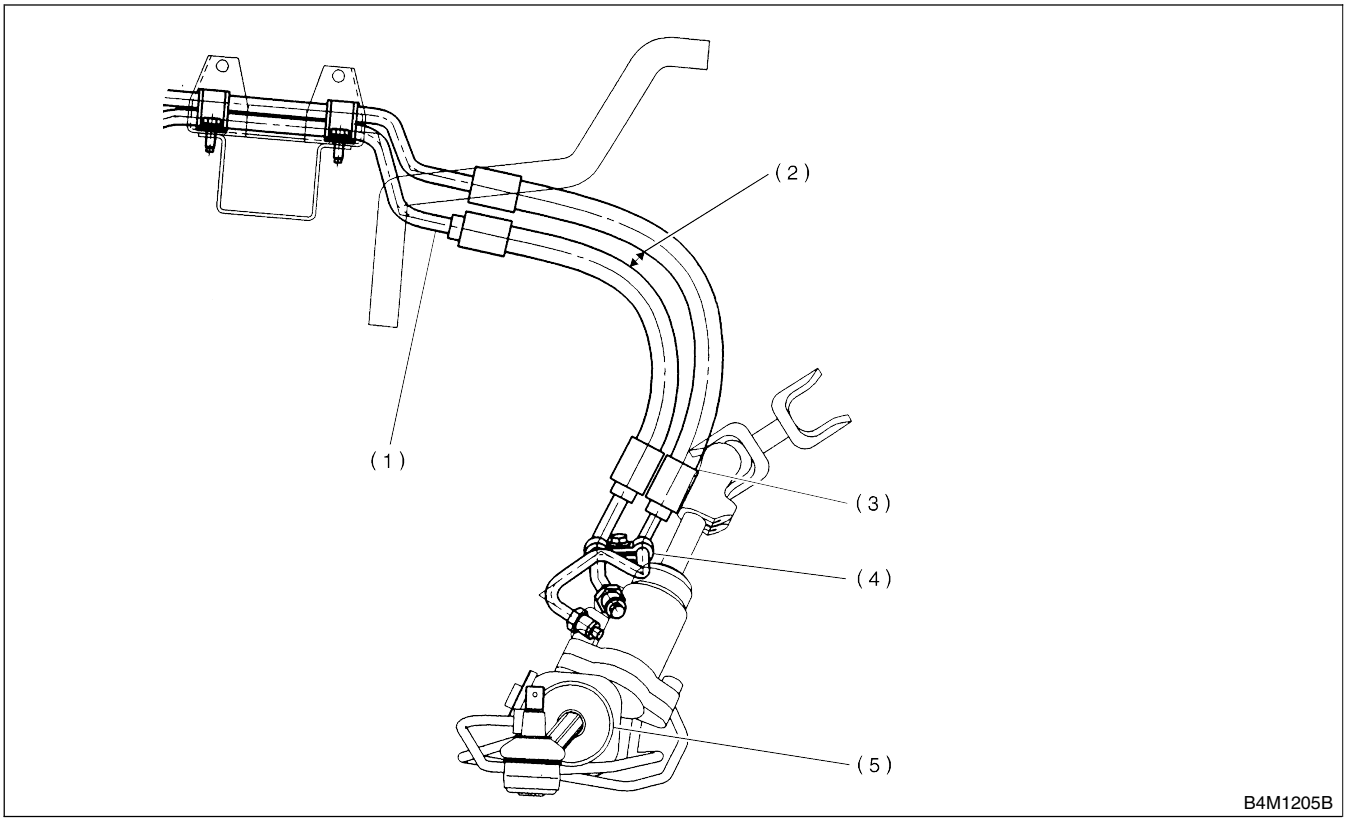
NOTE:
Never start the engine before feeding the fluid; otherwise vane pump might be seized up.

LHD model



(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)

RHD model



(1) Clearance between blow-by hose and pipe: 3 — 5 mm (0.12 — 0.20 in)
(2) No interference is allowed between hoses
(3) Clearance between side frame and hose: 15 mm (0.59 in) or more
(4) Clearance between crossmember and pipe: 5 — 13 mm (0.20 — 0.51 in)
(5) Steering gearbox

10) Finally check clearance between pipes and/or hoses, as shown above.
If clearance between cruise control pump and power steering hose is less than 10 mm (0.39 in), proceed as follows:

(1) Move clamped section (A) (refer to figure above.) down to a point where pipe is close to crossmember.

Pipe-to-crossmember clearance:
10 mm (0.39 in), min.

(2) Check that clearance between cruise control pump and power steering hose is at least 10 mm (0.39 in). If it is not, bend section (B) down until a clearance of at least 10 mm (0.39 in) is obtained.

2. TURBO MODEL S601277A1104

1) Tighten bolt A.

CAUTION:
Visually check that hose between tank and pipe D is free from bending or twisting.

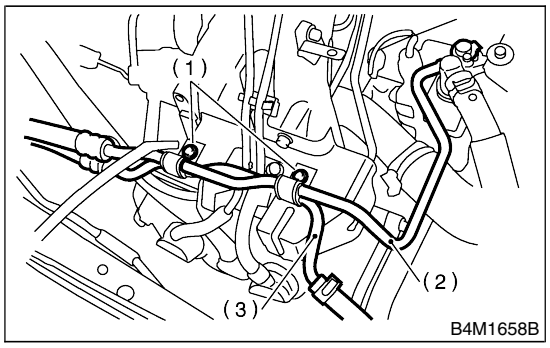
(1) Connect pipe D to oil tank.
(2) Connect pipe C or pressure hose to oil pump.

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)

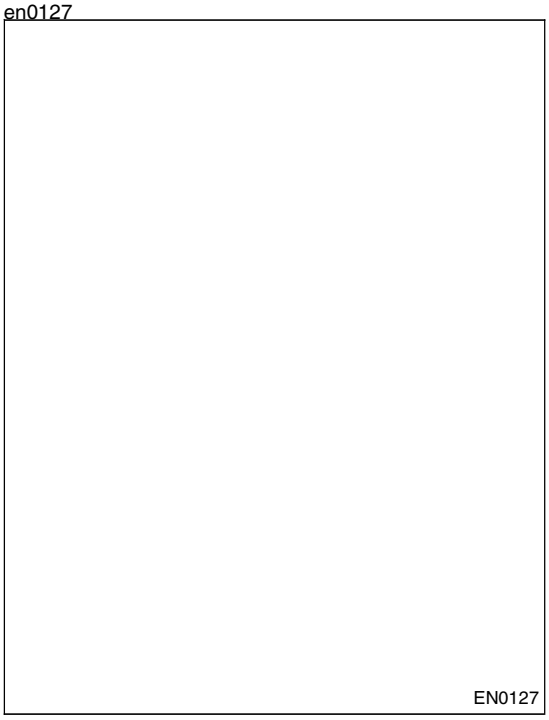


(1) Bolt A
(2) Pipe C
(3) Pipe D

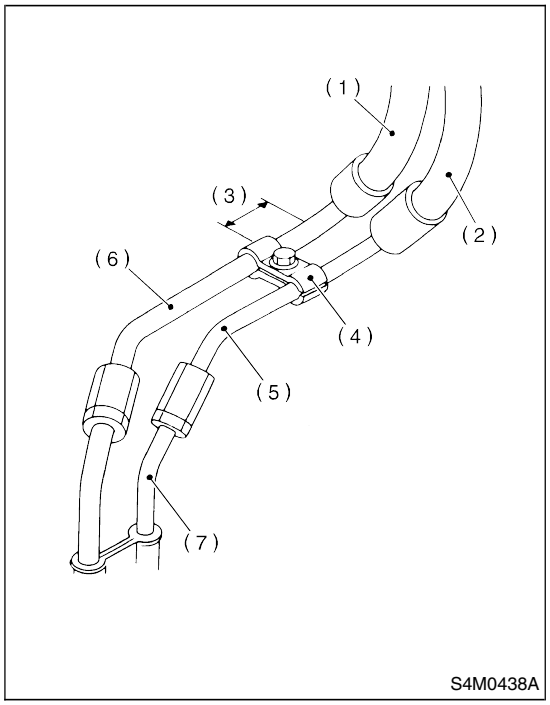
2) Install coolant filler tank. (Turbo model)

Tightening torque:
T1: 19 N·m (1.9 kgf-m, 13.7 ft-lb)
T2: 21 N·m (2.1 kgf-m, 15.2 ft-lb)

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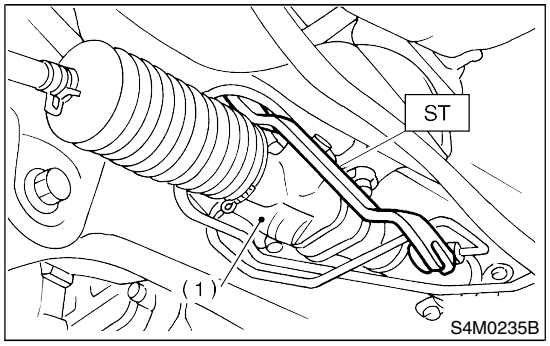


3) Temporarily connect pipes C and D. (LHD model)



(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)

4) Using ST, temporarily connect pipes to control valve of gearbox. (RHD model)
ST 34099AC050 GEARBOX SPANNER

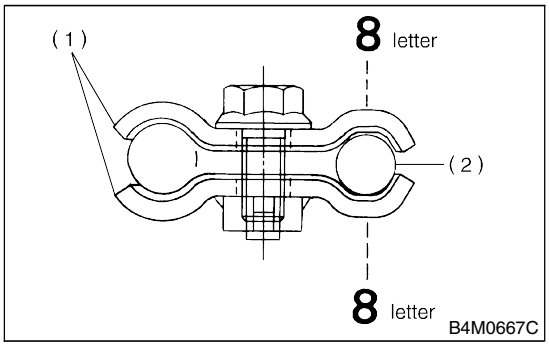


(1) Steering gearbox

5) 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)



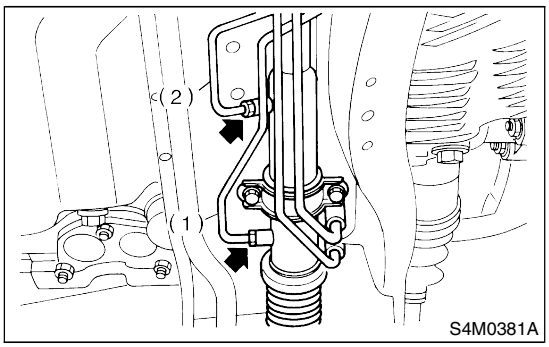
(1) Clamp E
(2) Pipe C

6) Tighten joint nut.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

7) Connect pipe A and B.
(1) LHD model
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)

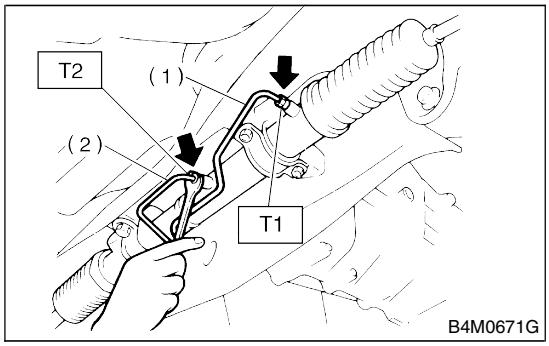


(1) Pipe A
(2) Pipe B

(2) RHD model

Connect pipes A and B to four pipe joints of gearbox. Connect upper pipe A first, and lower pipe B second.

Tightening torque:
T1: 20 N·m (2.0 kgf-m, 14.5 ft-lb)
T2: 24 N·m (2.4 kgf-m, 17.4 ft-lb)

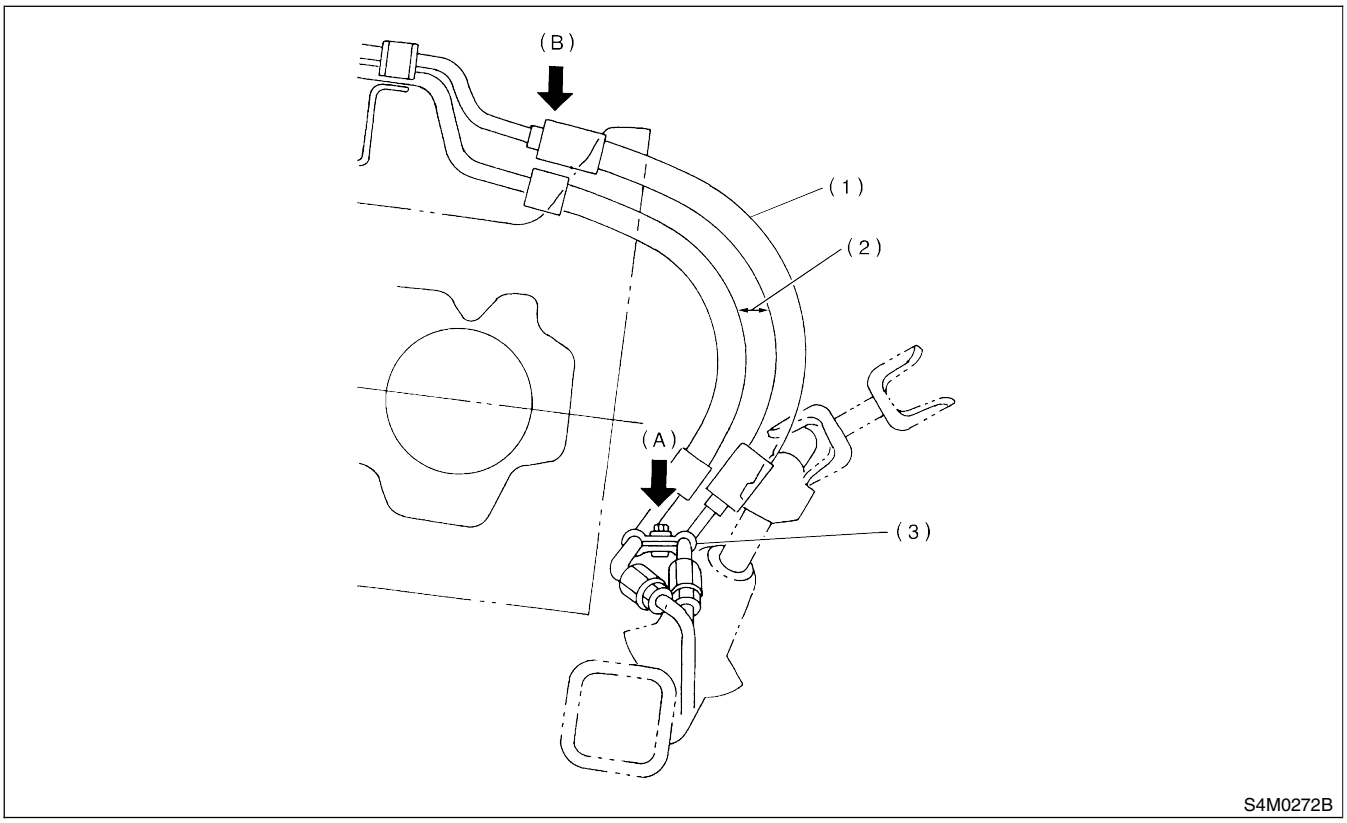


(1) Pipe A
(2) Pipe B

8) Install jack-up plate.
9) Connect battery ground terminal.
10) Feed the specified fluid.

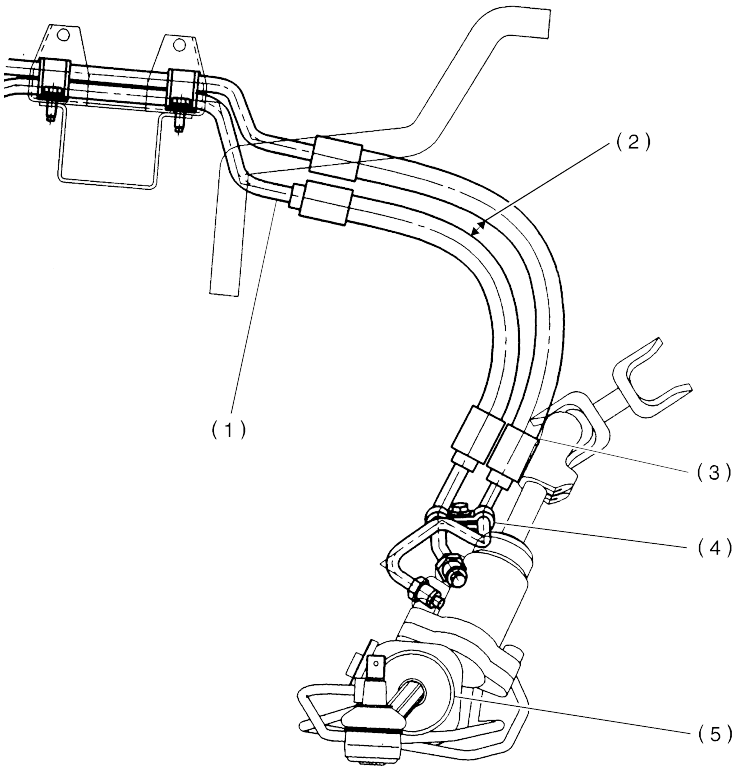
NOTE:
Never start the engine before feeding the fluid; otherwise vane pump might be seized up.

LHD model



(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)

RHD model



(1) Clearance between blow-by hose and pipe: 3 — 5 mm (0.12 — 0.20 in)
(2) No interference is allowed between hoses
(3) Clearance between side frame and hose: 15 mm (0.59 in) or more
(4) Clearance between crossmember and pipe: 5 — 13 mm (0.20 — 0.51 in)
(5) Steering gearbox

11) 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.

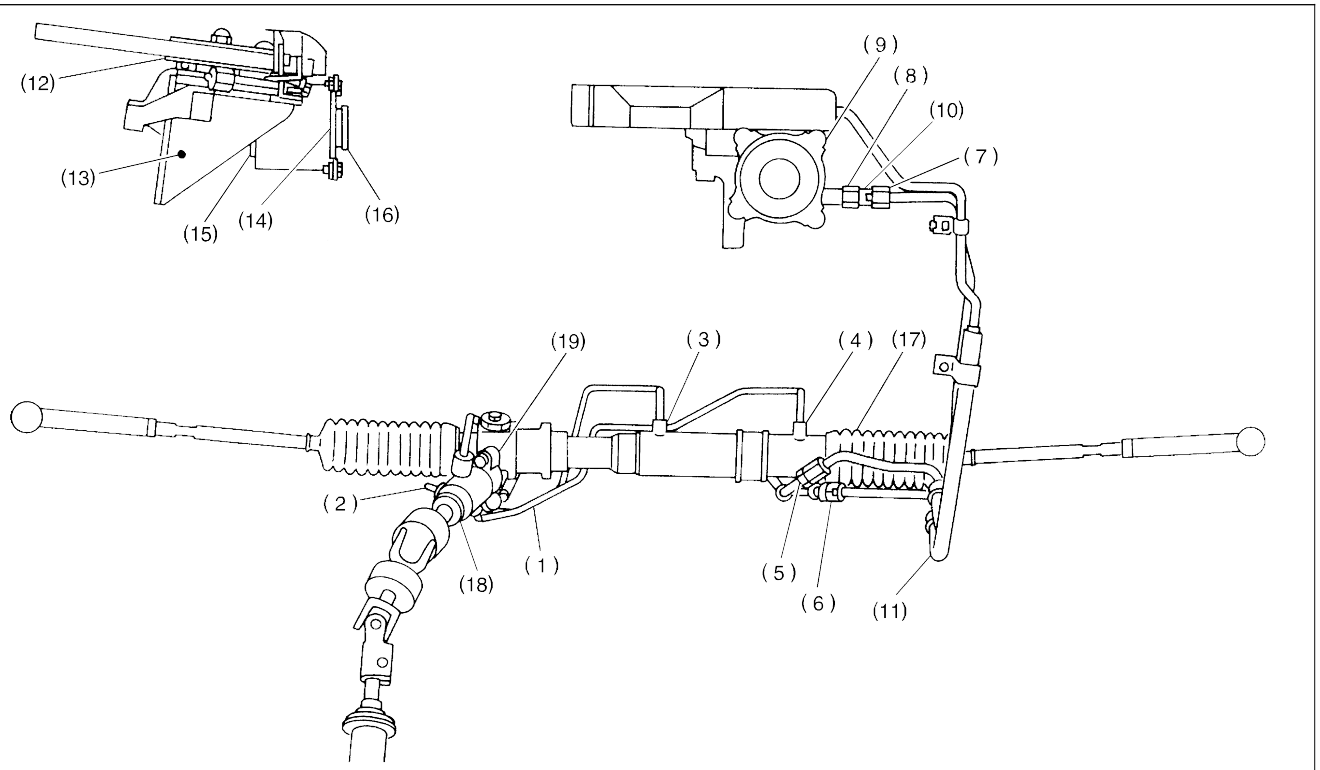
Part name	Inspection	Remedy
Pipe	• O-ring fitting surface for damage • Nut for damage • Pipe for damage	Replace with new one.
Clamp B Clamp C Clamp E	• Clamps for weak clamping force	Replace with new one.
Hose	• Flared surface for damage • Flare nut for damage • Outer surface for cracks • Outer surface for wear • Clip for damage • End coupling or adapter for degradation	Replace with new one.

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.

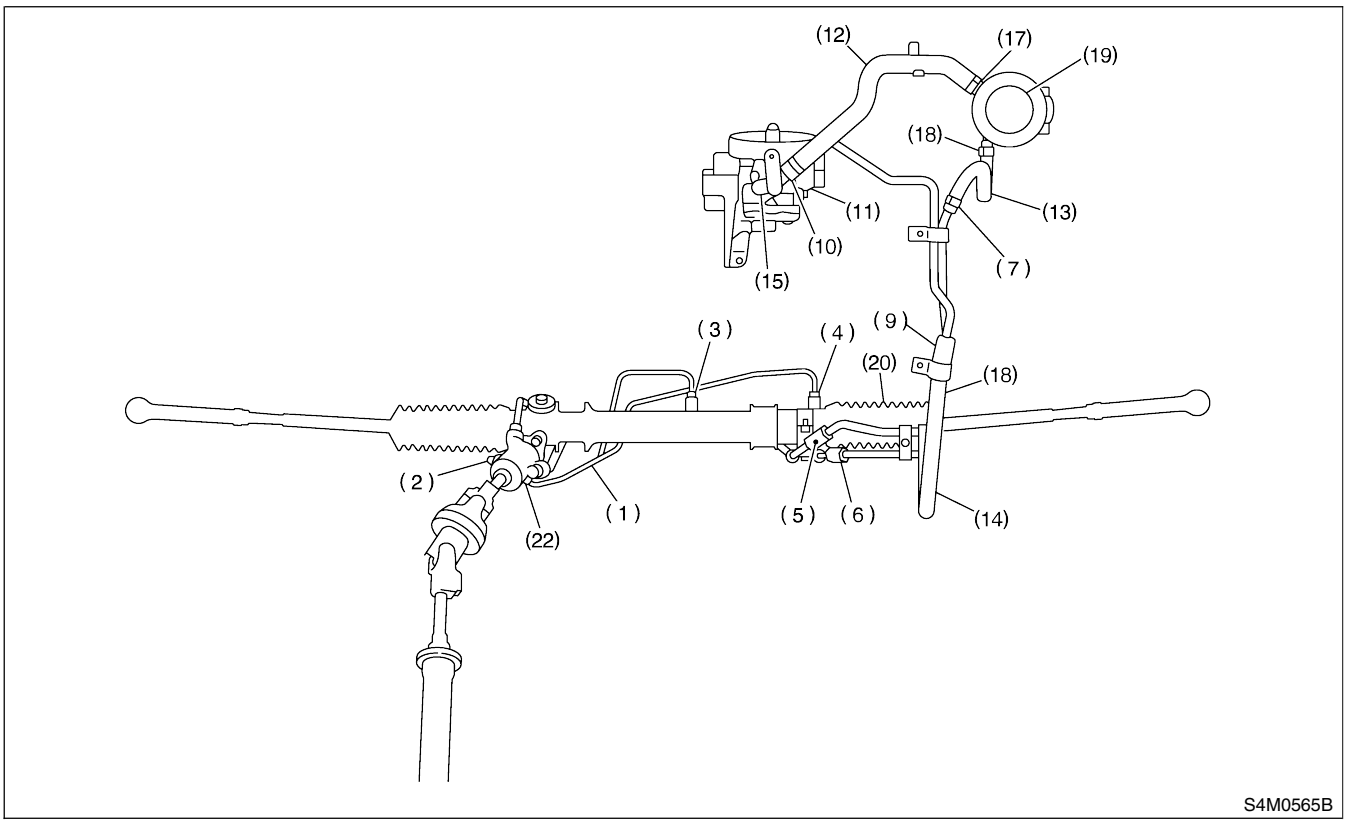
CAUTION:
It is likely that although one judges fluid leakage, there is actually no leakage. This is because the fluid spilt during the last maintenance was not completely wiped off. Be sure to wipe off spilt fluid thoroughly after maintenance.

Non-turbo model



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 gearbox also.
Leakage from hose (10) and (11) in figure	Crack or damage in hose	Replace with a new one.
	Crack or damage in hose hardware	Replace with a new one.
Leakage from surrounding of cast iron portion of oil pump (12) and (13) in figure	Damaged O-ring	Replace 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 gearbox (18) and (19) in figure	Damaged packing or oil seal	Replace problem parts.
	Damage in control valve	Replace control valve.

Turbo model



Fluid leaking area	Possible cause	Corrective action
Leakage from connecting portions of pipes and hoses, numbered with (1) through (11) 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 (12), (13) and (14) 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 (15) and (16) in figure	Damaged O-ring	Replace oil pump.
	Damaged gasket	Replace oil pump.
Leakage from oil tank (17) and (18) in figure	Crack in oil tank	Replace oil tank.
Leakage from filler neck (19)	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 (20) in figure	Damaged oil seal	Replace oil seal.
Leakage from control valve of gear-box (21) and (22) in figure	Damaged packing or oil seal	Replace problem parts.
	Damage in control valve	Replace control valve.

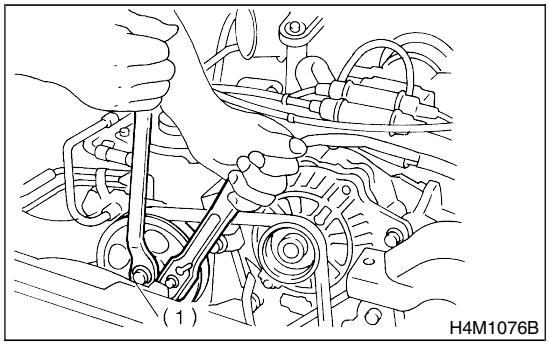
NOTE:
Fluid level is specified at optimum position (range) for ordinary use. Accordingly, if the vehicle is used often under hard conditions such as on very rough roads or in mountainous areas, fluid may bleed out from cap air vent hole. This is not a problem. If a customer complains strongly and is 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.

8. Oil Pump S601070

A: REMOVAL S601070A18

1. NON-TURBO MODEL S601070A1804

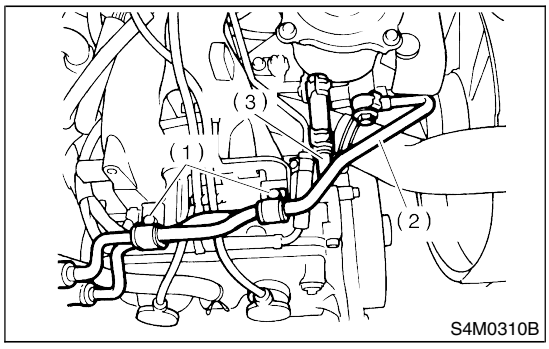
1) Remove ground cable from battery.
2) Drain the working fluid about 0.3 ℓ (0.3 US qt, 0.3 Imp qt) from oil tank.
3) Remove pulley belt cover bracket.
4) Loosen oil pump pulley nut, then remove bolts which secure alternator.



(1) Oil pump pulley nut

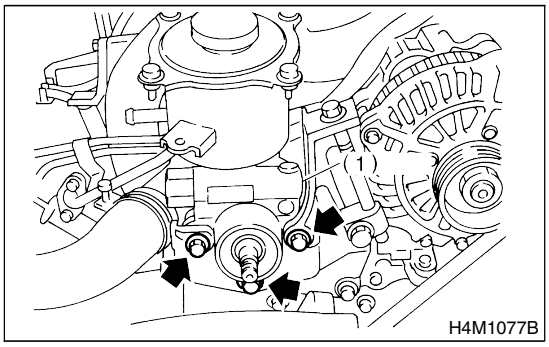
5) Loosen pulley belt(s).
6) Remove the nut and detach oil pump pulley.
7) Disconnect pipe C from oil pump. Disconnect pipe D from oil tank.

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.



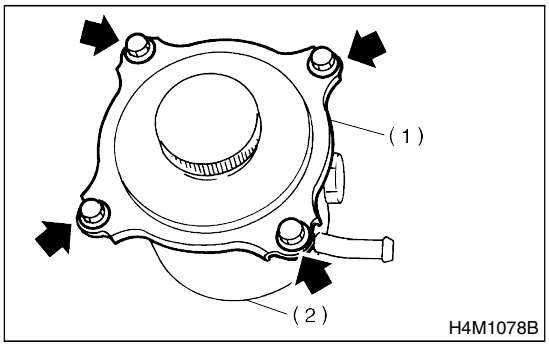
(1) Oil pump

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.

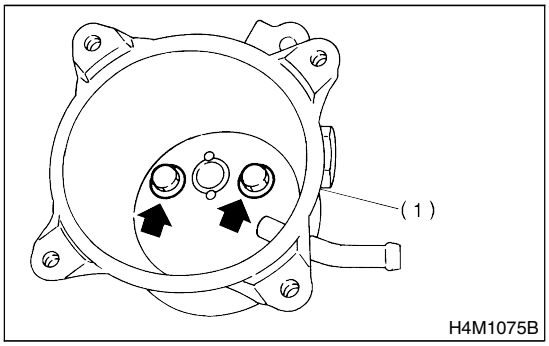
10) Place oil pump in a vise, and remove upper shell and baffle from lower shell.

CAUTION:
Do not clamp oil pump too hard; otherwise oil pump may be dented.



(1) Upper shell
(2) Lower shell

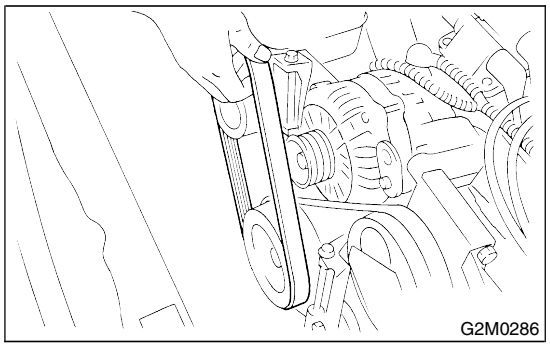
11) Remove lower shell from oil pump.



(1) Lower shell

2. TURBO MODEL S601070A1805

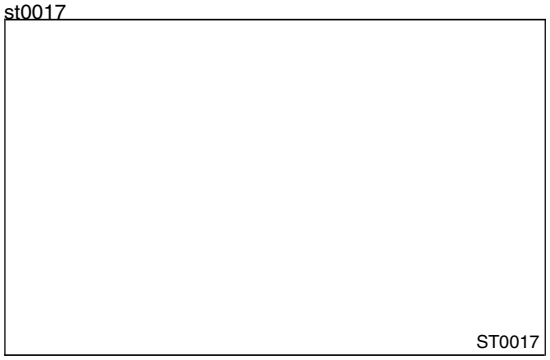
1) Remove ground terminal from battery.
2) Remove intake duct. <Ref. to IN(DOHC TURBO)-8, REMOVAL, Air Intake Duct.>
3) Remove pulley belt cover.
4) Loosen lock bolt and slider bolt and remove power steering pump drive V-belt.


G2M0286

5) Disconnect connector from power steering pressure switch.
6) Remove intake boot and air cleaner upper. <Ref. to IN(DOHC TURBO)-7, REMOVAL, Air Cleaner.>
7) Disconnect pipe C and suction hose from oil pump.

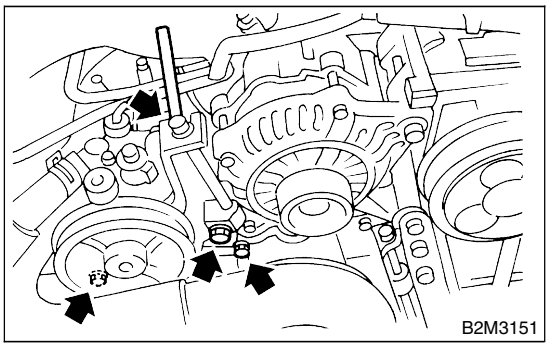
CAUTION:
● Do not allow fluid from the hose end to come into contact with pulley belt.
● To prevent foreign matter from entering the hose and pipe, cover the open ends of them with a clean cloth.

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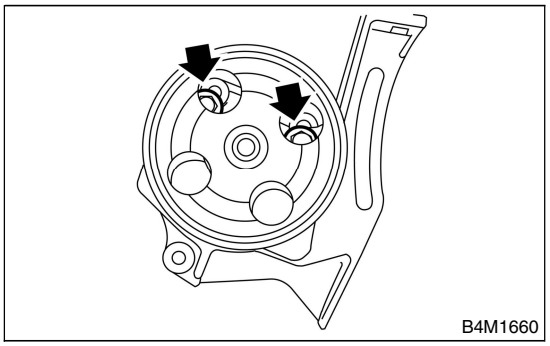
(1) Suction hose
(2) Pipe C

8) Remove bolts which install power steering pump bracket.

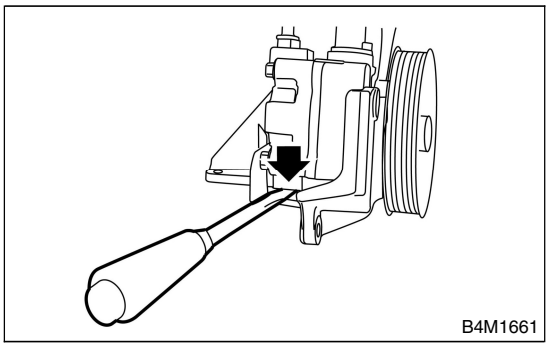

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9) Place oil pump bracket in a vise, remove two bolts from the front side of oil pump.

CAUTION:
Do not place oil pump bracket directly in the vise; use soft pads and hold oil pump lightly to protect the pump.


B4M1660

10) Remove bolt from the rear side of oil pump.
11) Disassemble oil pump and bracket by inserting a screwdriver as shown in the figure.


B4M1661

B: INSTALLATION S601070A11

1. NON-TURBO MODEL S601070A1104

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.

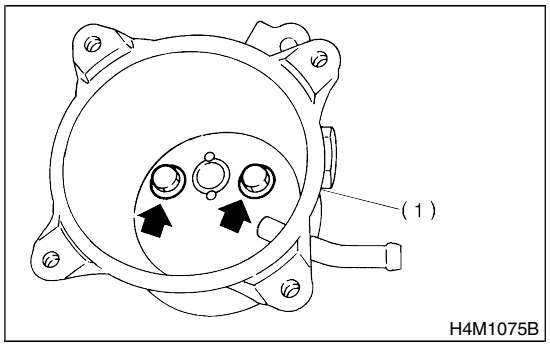
CAUTION:
Do not place oil pump directly in vise; use soft pads and hold oil pump lightly to protect it.

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)

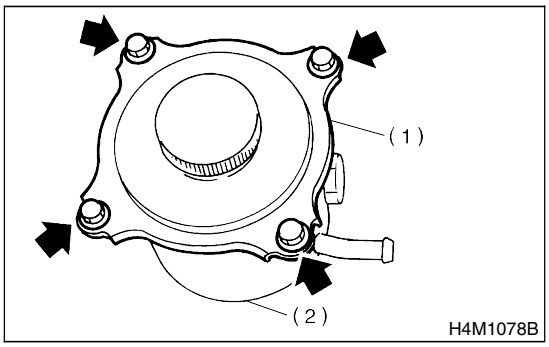
CAUTION:
Be sure to use a new seal washer.



(1) Lower shell

5) Install upper shell and baffle to lower shell.

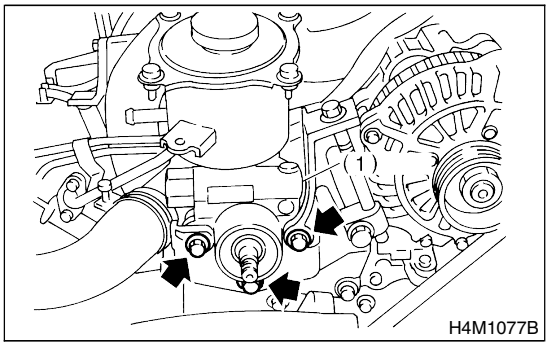
Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)



(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)



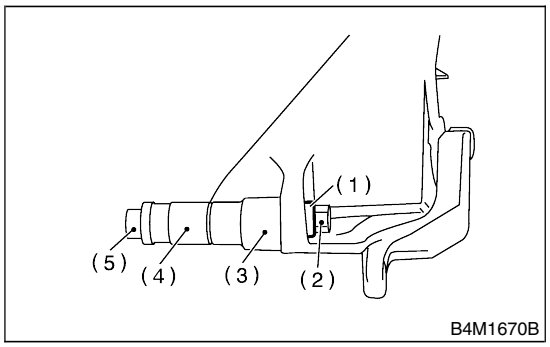
(1) Oil pump

7) Install in the reverse order of removal.
8) Inspect pulley belt tension. <Ref. to ME(SOHC)-43, INSPECTION, V-belt.>
9) Feed the specified power steering fluid. <Ref. to PS-101, Power Steering Fluid.>

2. TURBO MODEL S601070A1105

1) Install oil pump to bracket.
(1) Place oil pump bracket in a vise. Tighten bushing using a 12.7 mm (1/2″) type 14- and 21-mm box wrench until it is in contact with oil pump mounting surface.

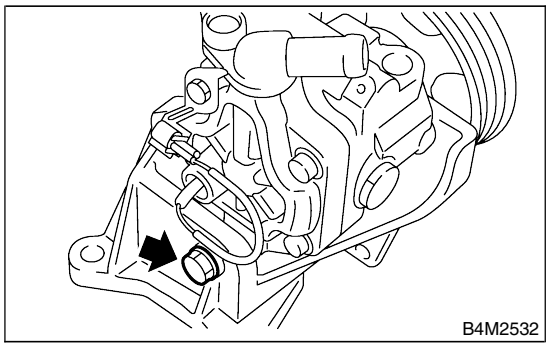
CAUTION:
Do not place oil pump bracket directly in the vise; use soft pads and hold oil pump lightly to protect the pump.



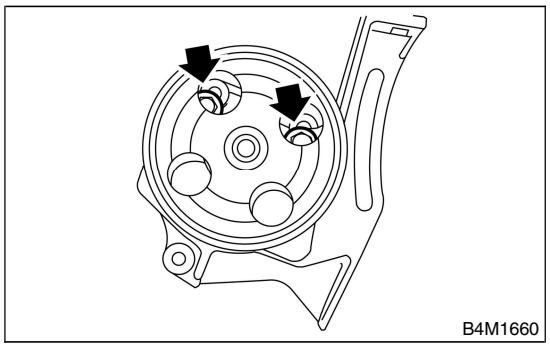
(1) Bush
(2) Nut
(3) 21 mm
(4) 14 mm
(5) Bolt

(2) Tighten bolt which installs oil pump to bracket.

Tightening torque:
37.3 N·m (3.8 kgf-m, 27.5 ft-lb)

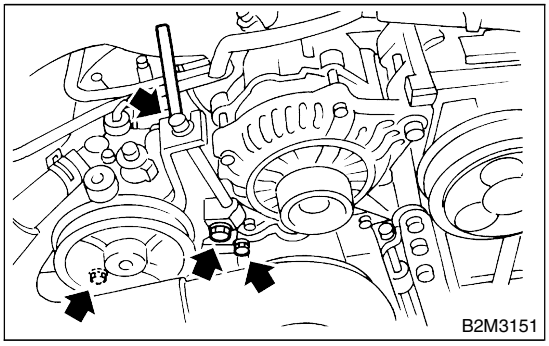


Tightening torque:
15.7 N·m (1.6 kgf-m, 11.6 ft-lb)



2) Tighten bolt which install power steering pump bracket.

Tightening torque:
22 N·m (2.2 kgf-m, 15.9 ft-lb)

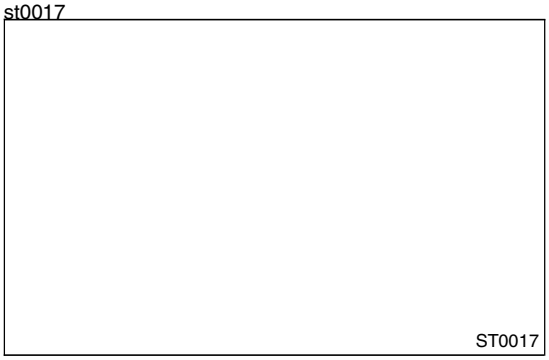


3) Interconnect pipes C and suction hose.

Tightening torque:
Joint nut
39.2 N·m (4 kgf-m, 28.9 ft-lb)

CAUTION:
If a hose is twisted at this step, the hose may come into contact with some other parts.

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(1) Suction hose
(2) Pipe C

4) Connect connector to power steering oil pressure switch.
5) Install pulley belt to oil pump.
6) Check pulley belt tension. <Ref. to ME(DOHC TURBO)-45, INSPECTION, V-belt.>
7) Tighten bolt belt tension.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)

8) Install pulley belt cover.
9) Install air intake boot.
10) Connect ground terminal of battery.
11) Feed the specified power steering fluid. <Ref. to PS-101, 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

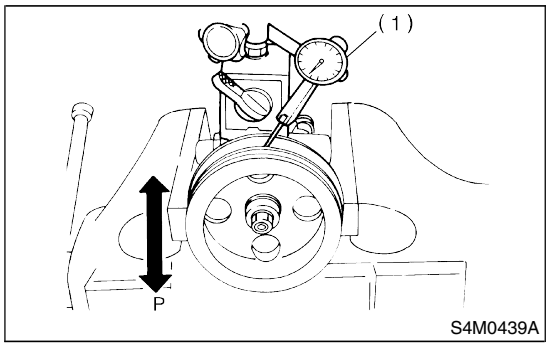
Make a measurement as follows. If it exceeds the specified service limit, replace the parts with new ones.

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

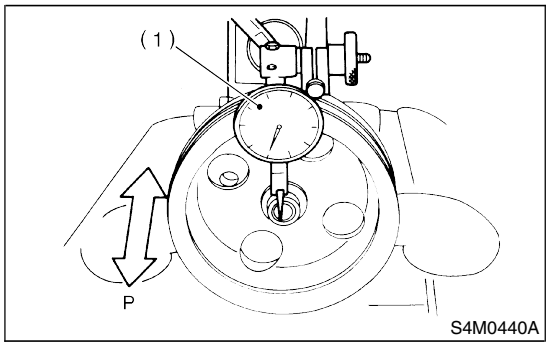
On condition:
P: 9.8 N (1.0 kgf, 2.2 lb)

Service limit:
Radial play (Direction ⟷)
0.4 mm (0.016 in) or less



(1) Dial indicator

Axial play (Direction ⟺)
Non-turbo model:
0.9 mm (0.035 in) or less
Turbo model:
0.6 mm (0.024 in) or less

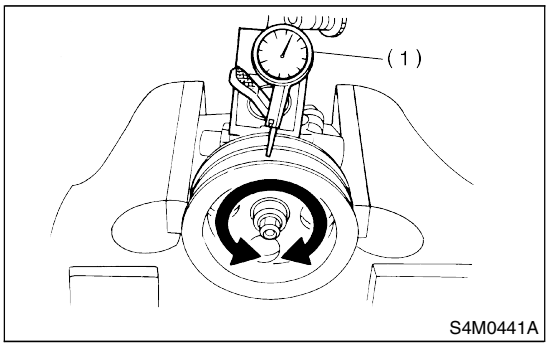


(1) Dial indicator

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.

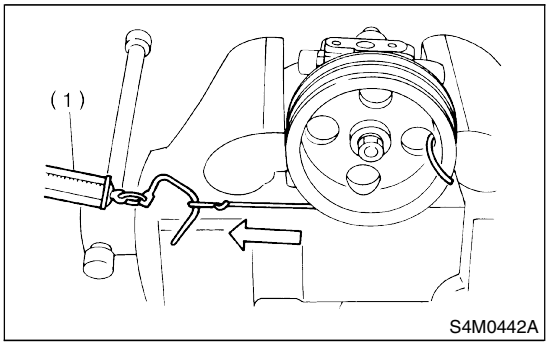


(1) Dial indicator

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

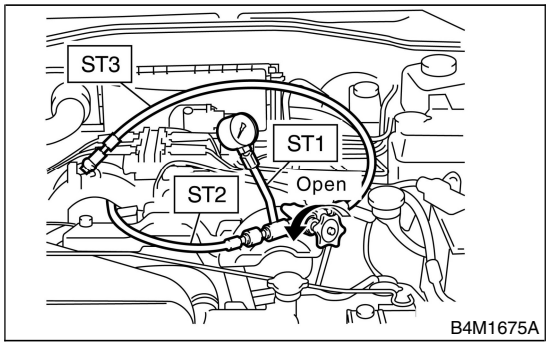
3. HYDRAULIC PRESSURE S601070A1003

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-103 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) Remove two bolts securing power steering pipes to engine.
   (2) Install ST1, 2 and 3 between power steering pump and pipes using gasket (Part No. 34621AC021) and bolt (Part No. 34620AC010).
   (3) Replenish power steering fluid up to specified level.
   (4) Open valve, and start the engine.
   (5) Measure regular pressure.

ST1 925711000 PRESSURE GAUGE
ST2 34099AC020 ADAPTER HOSE B
ST3 34099AC010 ADAPTER HOSE A

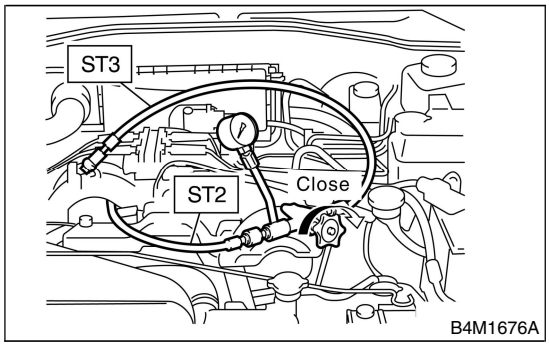


Service limit:
981 kPa (10 kg/cm^2, 142 psi) or less

   (6) 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

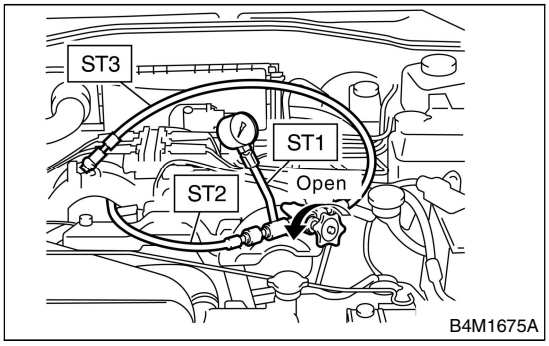


Service limit:
Non-turbo model:
7,159 — 7,748 kPa (73 — 79 kg/cm^2, 1,038 — 1,123 psi)
Turbo model:
9,611 — 10,199 kPa (98 — 104 kg/cm^2, 1,394 — 1,479 psi)

   (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:
Non-turbo model:
7,159 — 7,748 kPa (73 — 79 kg/cm^2, 1,038 — 1,123 psi)
Turbo model:
9,611 — 10,199 kPa (98 — 104 kg/cm^2, 1,394 — 1,479 psi)

   (4) If it is within the specified value, measure steering effort. <Ref. to PS-106 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.

9. Reservoir Tank S601075

A: REMOVAL S601075A18

1. NON-TURBO MODEL S601075A1804

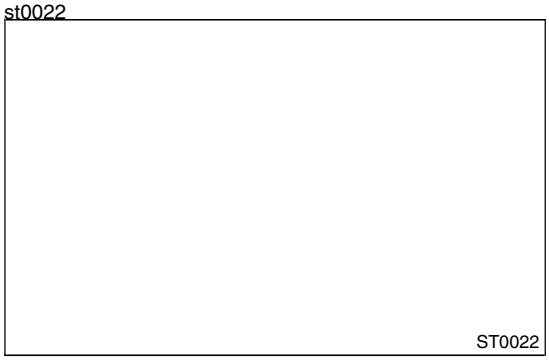
Refer to “Oil Pump” section for details of reservoir tank removal order. <Ref. to PS-93, NON-TURBO MODEL, REMOVAL, Oil Pump.>

2. TURBO MODEL S601075A1805

1) Remove air intake duct. <Ref. to IN(DOHC TURBO)-8, REMOVAL, Air Intake Duct.>
2) Drain fluid from the reservoir tank.
3) Disconnect return hose and suction hose from reservoir 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, cover the open ends of them with a clean cloth.

st0022



(1) Suction hose
(2) Pipe D
(3) Return hose

4) Remove reservoir tank from bracket by pulling it upwards.

B: INSTALLATION S601075A11

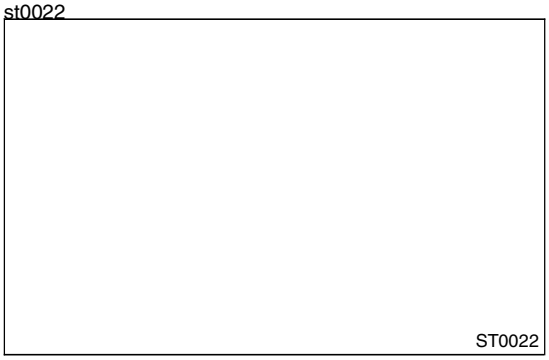
1. NON-TURBO MODEL S601075A1104

Refer to “Oil Pump” section for details of reservoir tank installation order. <Ref. to PS-95, NON-TURBO MODEL, INSTALLATION, Oil Pump.>

2. TURBO MODEL S601075A1105

1) Install reservoir tank to bracket.
2) Connect return hose and suction hose to reservoir tank.

st0022



(1) Suction hose
(2) Pipe D
(3) Return hose

3) Feed the specified power steering fluid. <Ref. to PS-101, Power Steering Fluid.>

C: INSPECTION S601075A10

Check reservoir tank for cracks, breakage, or damage. If any cracks, breakage, or damage is found, replace reservoir tank.

10. Power Steering Fluid S601275

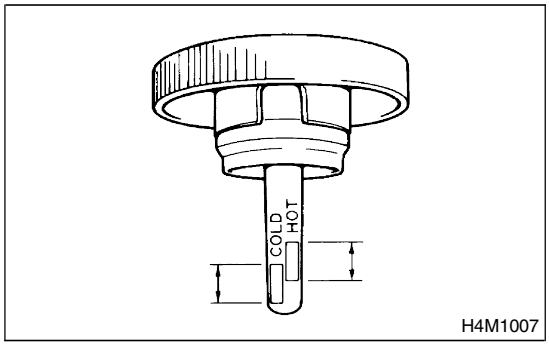
A: SPECIFICATION S601275A22

Recommended power steering fluid	Manufacturer
DEXRON IIE or III	B.P.
	CALTEX
	CASTROL
	MOBIL
	SHELL
	TEXACO

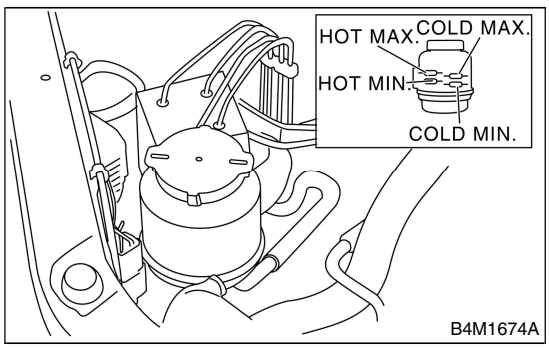
B: INSPECTION S601275A10

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.

Non-turbo model

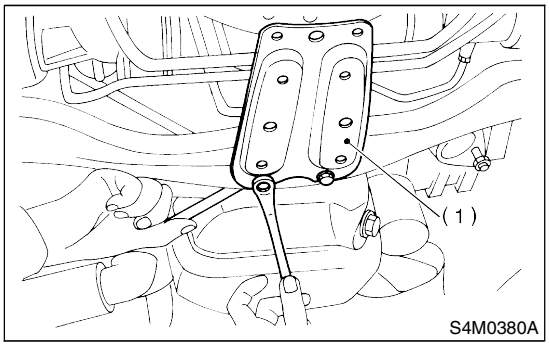


Turbo model



C: REMOVAL S601275A18

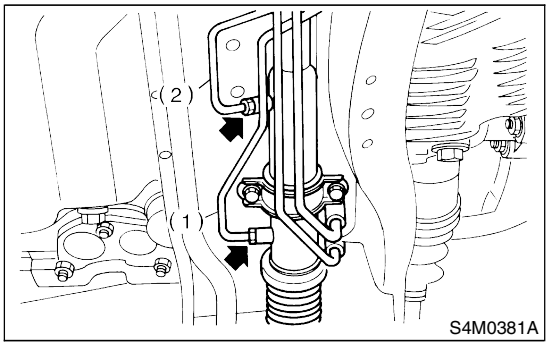
1) Set the vehicle on the lift.
2) Disconnect battery minus terminal.
3) Remove air intake duct.
4) Drain fluid from the reservoir tank.
5) Lift-up the vehicle.
6) Remove under cover.
7) Remove jack-up plate.



(1) Jack-up plate

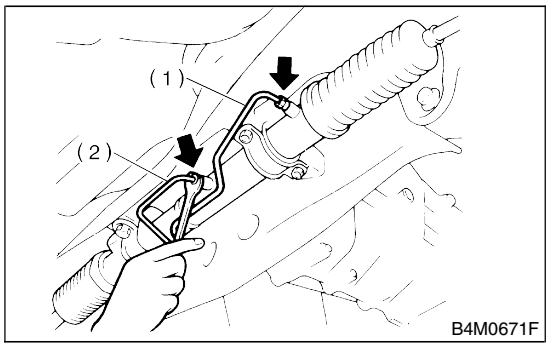
8) Disconnect one pipe joint A from center of gearbox assembly, and connect a vinyl hose to it. While turning steering wheel to the left and right, drain fluid through the hose. Similarly, drain fluid from the other pipe joint B.

LHD model



(1) Pipe A
(2) Pipe B

RHD model

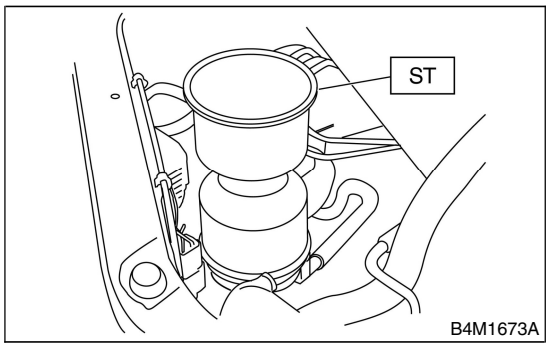


(1) Pipe A
(2) Pipe B

9) Connect pipe joint A and B.
10) When pouring power steering fluid, refer to "Installation" under "Power Steering Fluid". <Ref. to PS-102 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) Set ST on top of reservoir tank and fill it about half way with the specified fluid. (Turbo model)
ST 34199AE040 OIL CHARGE



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 2) 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.

11. 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-97 INSPECTION, Oil Pump.>	Replace problem parts.
	6. Measure steering effort. <Ref. PS-103 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-103 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.

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-90 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-29 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-29 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-50 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-49 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.

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 trouble code 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 TROUBLE CODE.** Calling up trouble code. <Ref. to ABS-20, Read Diagnostic Trouble Code.>	Is trouble code readable?	Go to step **3**.	Inspect using diagnostic chart for ABS warning light failure.<Ref. to ABS-28, Diagnostics Chart with Diagnosis Connector.> NOTE: Call up trouble code again after inspecting ABS warning light. <Ref. to ABS-20, Read Diagnostic Trouble Code.>
3	**CHECK TROUBLE CODE.** NOTE: Record all trouble codes.	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-174, 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 the trouble code. <Ref. to ABS-20, Read Diagnostic Trouble Code.>	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 Chart with Diagnosis Connector.> NOTE: For trouble code list, refer to “List of Diagnostics Trouble Code”.<Ref. to ABS-24, WITHOUT SUBARU SELECT MONITOR, LIST, List of Diagnostics Trouble Code.> 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 the trouble code. <Ref. to ABS-20, Read Diagnostic Trouble Code.>	Is only the start code issued?	Complete the diagnosis.	Inspect using “Diagnostics Chart with Diagnostic Connector”. <Ref. to ABS-28, Diagnostics Chart 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-26, WITH SUBARU SELECT MONITOR, LIST, List of Diagnostics Trouble Code.>

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-90, COMMUNICATION FOR INITIALIZING IMPOSSIBLE , Diagnostics Chart with Subaru Select Monitor.> 4) Read diagnostic trouble code. <Ref. to ABS-18, OPERATION, Subaru Select Monitor.> 5) Record all trouble codes 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-174, 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 the trouble code. <Ref. to ABS-18, READ DIAGNOSTIC TROUBLE CODE, OPERATION, Subaru Select Monitor.>	Is no trouble code 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 Chart with Subaru Select Monitor”.<Ref. to ABS-90, Diagnostics Chart with Subaru Select Monitor.> NOTE: For trouble code list, refer to “List of Diagnostics Trouble Code”.<Ref. to ABS-24, WITHOUT SUBARU SELECT MONITOR, LIST, List of Diagnostics Trouble Code.> 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 the trouble code. <Ref. to ABS-18, READ DIAGNOSTIC TROUBLE CODE, OPERATION, Subaru Select Monitor.>	Is no trouble code designated and does ABS warning light go out after turning on?	Complete the diagnosis.	Inspect using “Diagnostics Chart with Subaru Select Monitor”. <Ref. to ABS-90, Diagnostics Chart 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

ABS warning light comes on.	☐ Always ☐ Sometimes ☐ Only once ☐ Does not come on ● When / how long does it come on?:		
Ignition key position	☐ LOCK ☐ ACC ☐ ON (before starting engine) ☐ START ☐ On after starting (Engine is running) ☐ On after starting (Engine is stop)		
Timing	☐ Immediately after ignition is ON. ☐ Immediately after ignition starts.		
	☐ When advancing		km/h to km/h
			MPH to MPH
	☐ While traveling at a constant speed	km/h	MPH
	☐ When decelerating		km/h to km/h
			MPH to MPH
	☐When turning to right	Steering angle :	deg
		Steering time :	sec
	☐ When turning to left	Steering angle :	deg
		Steering time :	sec
	☐ When moving other electrical parts		
	● Parts name : ● Operating condition :		

2. SYMPTOMS S006502A0402

<table>
<tr><td rowspan="11">ABS operating condition</td><td colspan="3">☐ Performs no work.</td></tr>
<tr><td>☐ Operates only when abruptly applying brakes.</td><td>Vehicle speed :</td><td>km/h
MPH</td></tr>
<tr><td colspan="3">● How to step on brake pedal :</td></tr>
<tr><td>a) Operating time :</td><td colspan="2">sec</td></tr>
<tr><td colspan="3">b) Operating noise : ☐ Produce / ☐ Does not produce</td></tr>
<tr><td>● What kind of noise?</td><td colspan="2">☐ Knock
☐ Gong gong
☐ Bong
☐ Buzz
☐ Gong gong buzz
☐ Others :</td></tr>
<tr><td colspan="3">c) Reaction force of brake pedal</td></tr>
<tr><td></td><td colspan="2">☐ Stick
☐ Press down once with a clunk
☐ Press and released
☐ Others :</td></tr>
<tr><td rowspan="15">Behavior of vehicle</td><td colspan="3">a) Directional stability cannot be obtained or steering arm refuses to work when applying brakes :
☐ Yes / ☐ No</td></tr>
<tr><td>● When :</td><td colspan="2">☐ Vehicle turns to right
☐ Vehicle turns to left
☐ Spins
☐ Others :</td></tr>
<tr><td colspan="3">b) Directional stability cannot be obtained or steering arm refuses to work when accelerating :
☐ Yes / ☐ No</td></tr>
<tr><td>● When :</td><td colspan="2">☐ Vehicle turns to right
☐ Vehicle turns to left
☐ Spins
☐ Others :</td></tr>
<tr><td colspan="3">c) Brakes are out of order : ☐ Yes / ☐ No</td></tr>
<tr><td>● What :</td><td colspan="2">☐ Braking distance is long
☐ Brakes lock or drag
☐ Pedal stroke is long
☐ Pedal sticks
☐ Others :</td></tr>
<tr><td colspan="3">d) Poor acceleration : ☐ Yes / ☐ No</td></tr>
<tr><td>● What :</td><td colspan="2">☐ Fails to accelerate
☐ Engine stalls
☐ Others :</td></tr>
<tr><td colspan="3">e) Occurrence of vibration : ☐ Yes / ☐ No</td></tr>
<tr><td colspan="3">● Where
● What kind :</td></tr>
<tr><td colspan="3">f) Occurrence of abnormal noise : ☐ Yes / ☐ No</td></tr>
<tr><td colspan="3">● Where
● What kind :</td></tr>
<tr><td colspan="3">g) Occurrence of other phenomena : ☐ Yes / ☐ No</td></tr>
<tr><td colspan="3">● What kind :</td></tr>
</table>

CHECK LIST FOR INTERVIEW

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

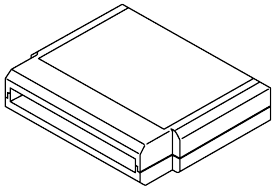
Check brake pad and rotor.
● Front <Ref. to BR-21, INSPECTION, Front Brake Pad.> and <Ref. to BR-22, INSPECTION, Front Disc Rotor.>
● Rear <Ref. to BR-26, INSPECTION, Rear Brake Pad.> and <Ref. to BR-28, INSPECTION, Rear Disc Rotor.> or <Ref. to BR-33, INSPECTION, Rear Drum Brake Shoe.> and <Ref. to BR-34, 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)

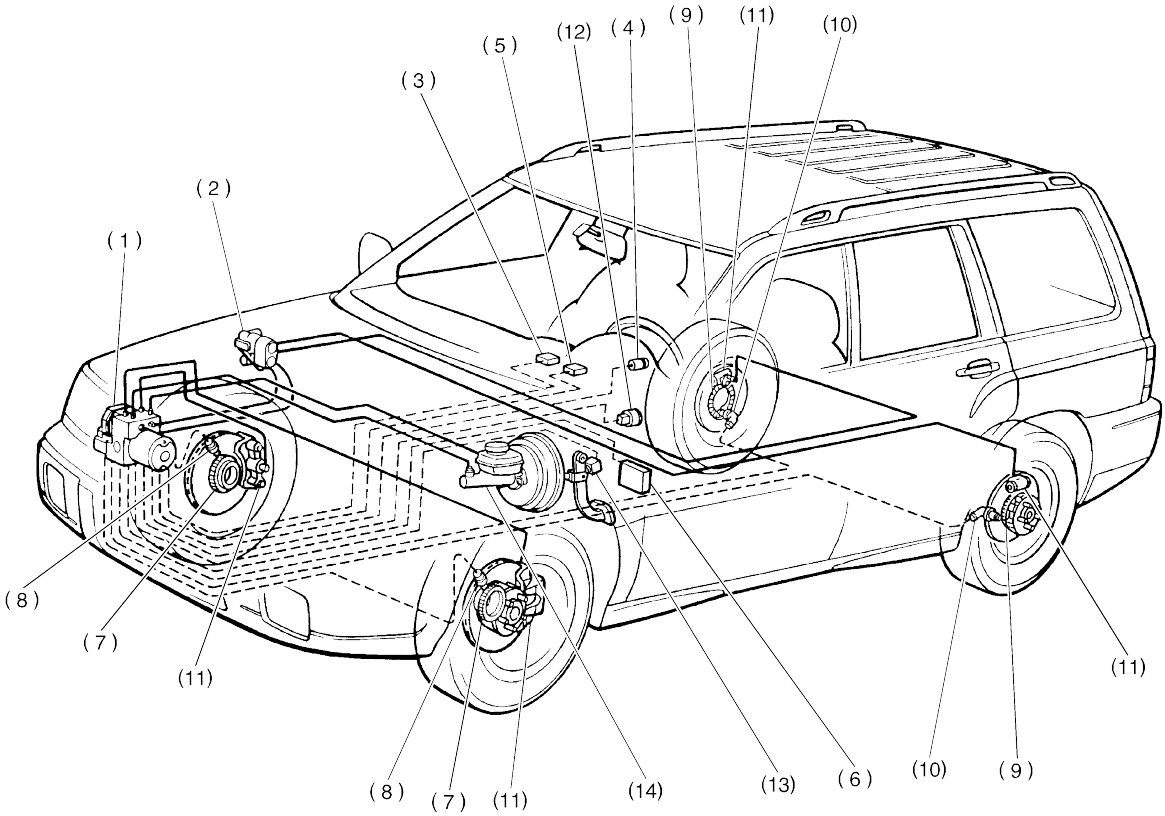
2. GENERAL PURPOSE TOOLS S006001A1702

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and ampere.
Oscilloscope	Used for measuring sensor.

MEMO:

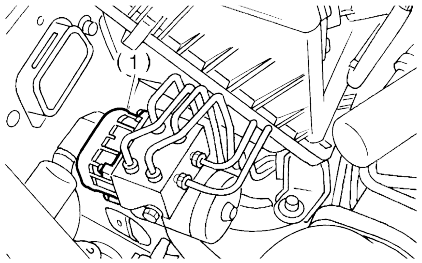
4. Electrical Components Location S006507

A: LOCATION S006507A13

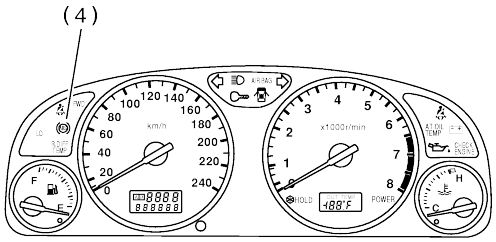


S4M0478A

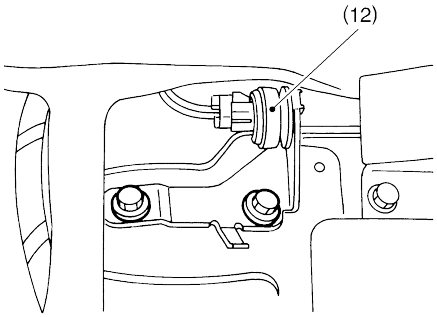
(1) ABS control module and hydraulic control unit (ABSCM&H/U)
(2) Proportioning valve
(3) Diagnosis connector
(4) ABS warning light
(5) Data link connector (for SUBARU select monitor)
(6) Automatic transmission control module
(7) Front tone wheel
(8) Front ABS sensor
(9) Rear tone wheel
(10) Rear ABS sensor
(11) Wheel cylinder
(12) G sensor
(13) Stop light switch
(14) Master cylinder



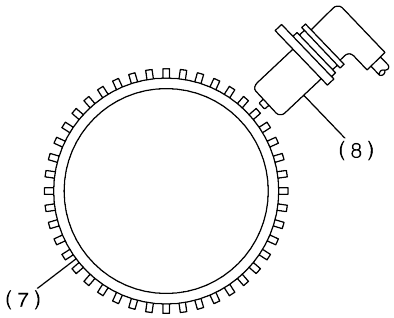
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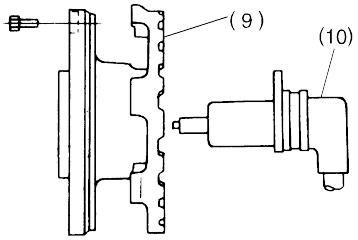
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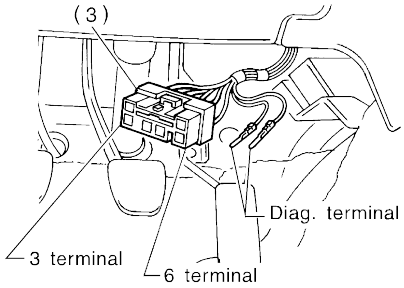
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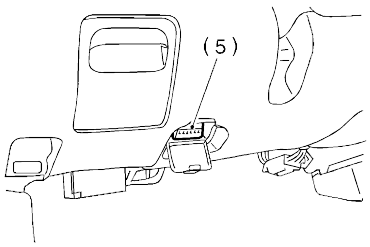
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B4M0646H



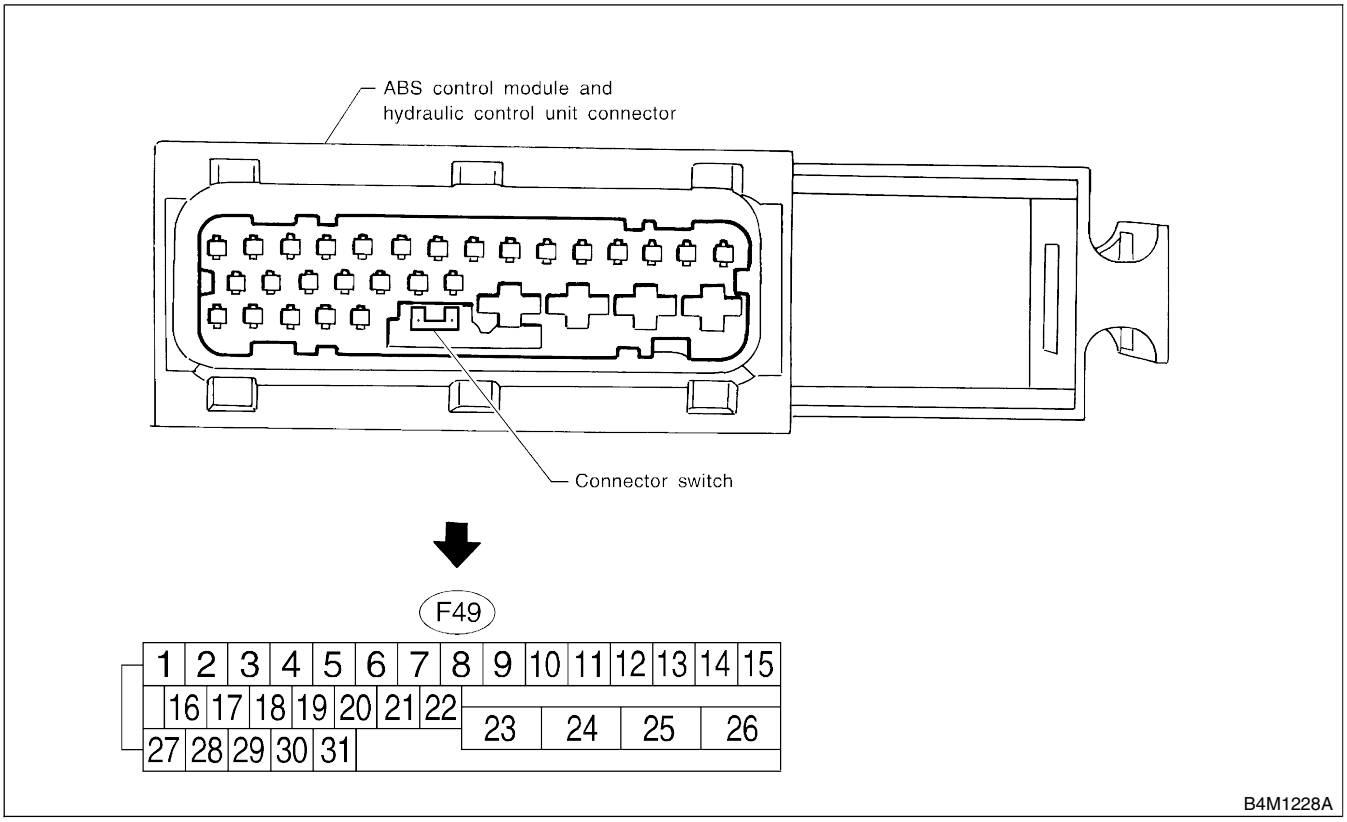
B4M0231E



S4M0056A

5. Control Module I/O Signal S006524

A: ELECTRICAL SPECIFICATION S006524A08



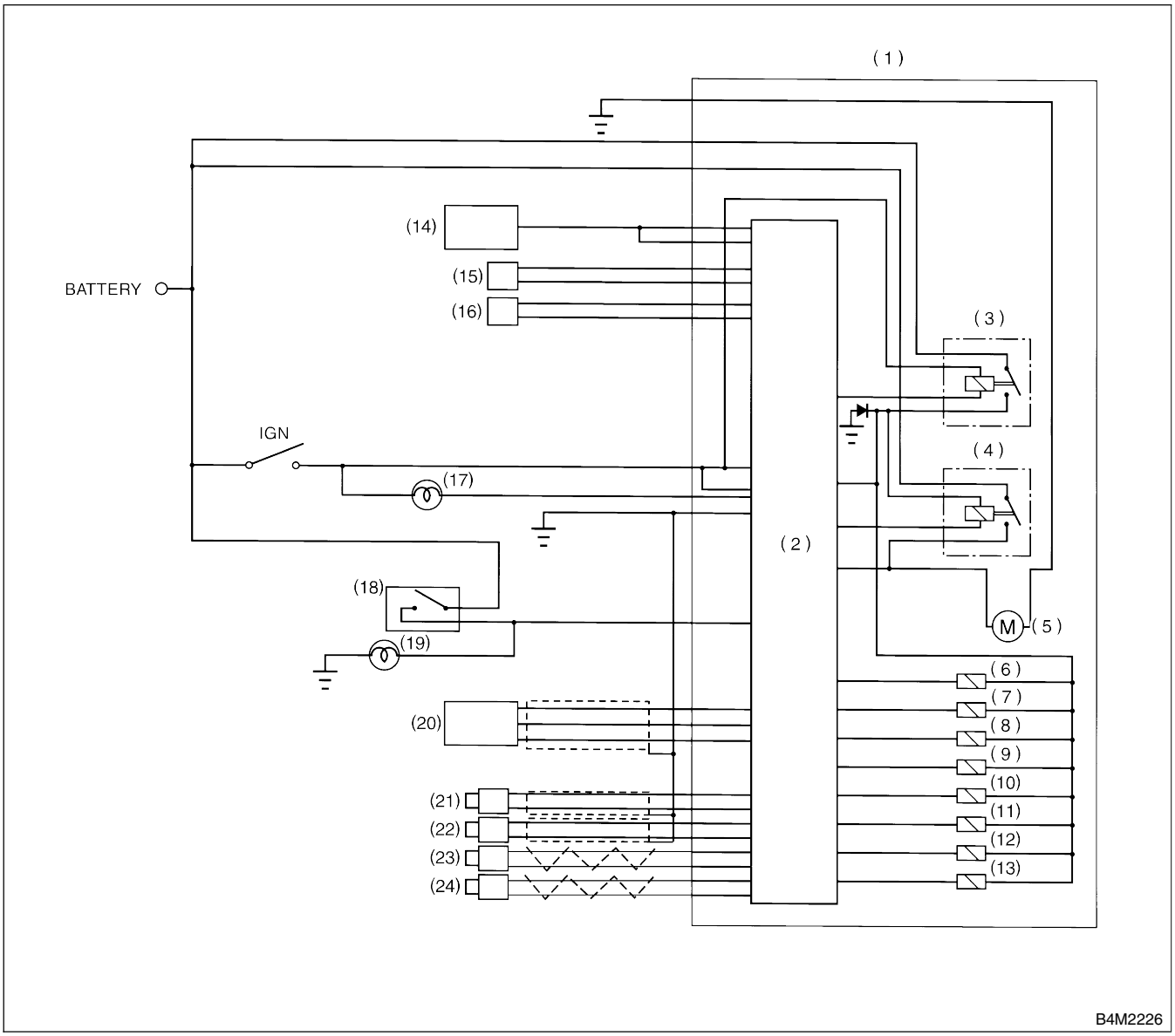
NOTE:
- The terminal numbers in the ABS control module and hydraulic control unit connector are as shown in the figure.
- When the connector is removed from the ABSCM&H/U, the connector switch closes the circuit between terminal No. 21 and No. 23. The ABS warning light illuminates.

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	—

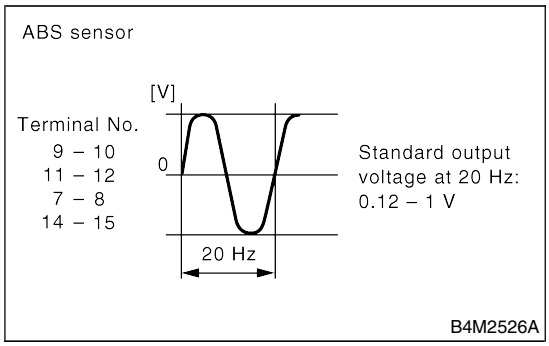
*1: Measure the I/O signal voltage after removing the connector from the ABSCM&H/U terminal.
*2: Measure the I/O signal voltage at connector (B62) and (R48) of LHD model or (B100) of RHD model.

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



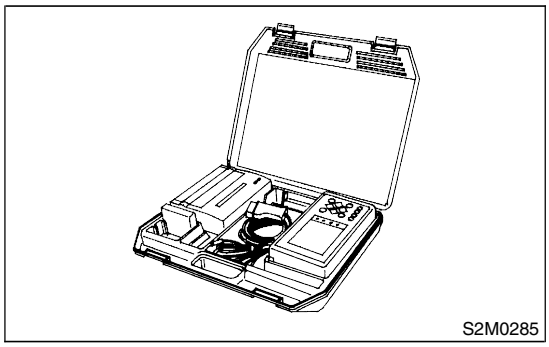
6. Subaru Select Monitor S006503

A: OPERATION S006503A16

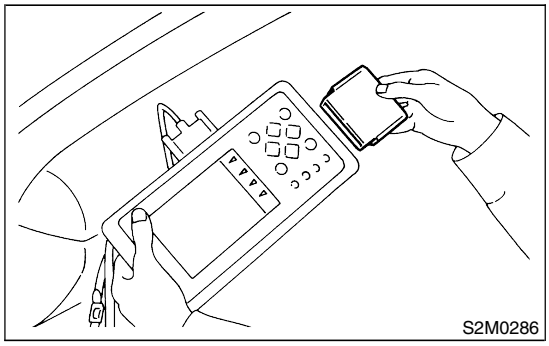
1. READ DIAGNOSTIC TROUBLE CODE

S006503A1601

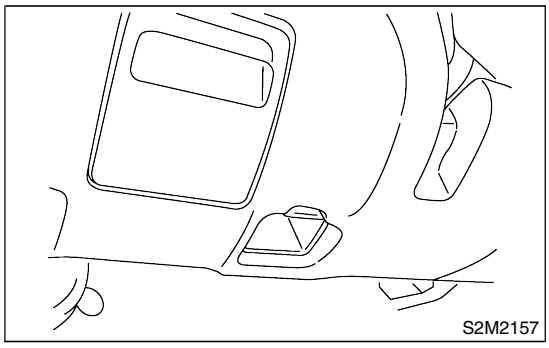
1) Prepare Subaru Select Monitor kit.


S2M0285

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.>

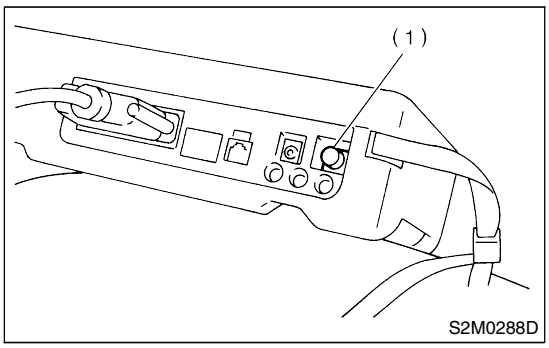

S2M0286

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) Turn ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.



S2M0288D

(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, refer to the LIST OF DIAGNOSTICS TROUBLE CODE. <Ref. to ABS-24, List of Diagnostics Trouble Code.>

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.

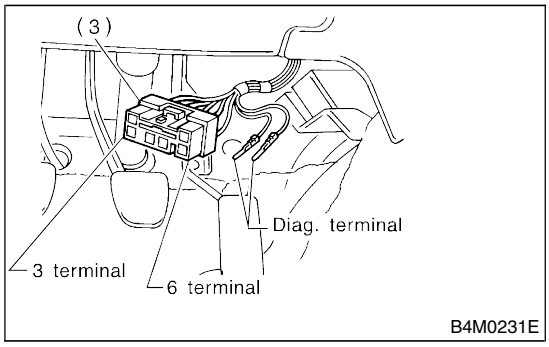
7. Read Diagnostic Trouble Code S006508

A: OPERATION S006508A16

1. WITHOUT SUBARU SELECT MONITOR

S006508A1602

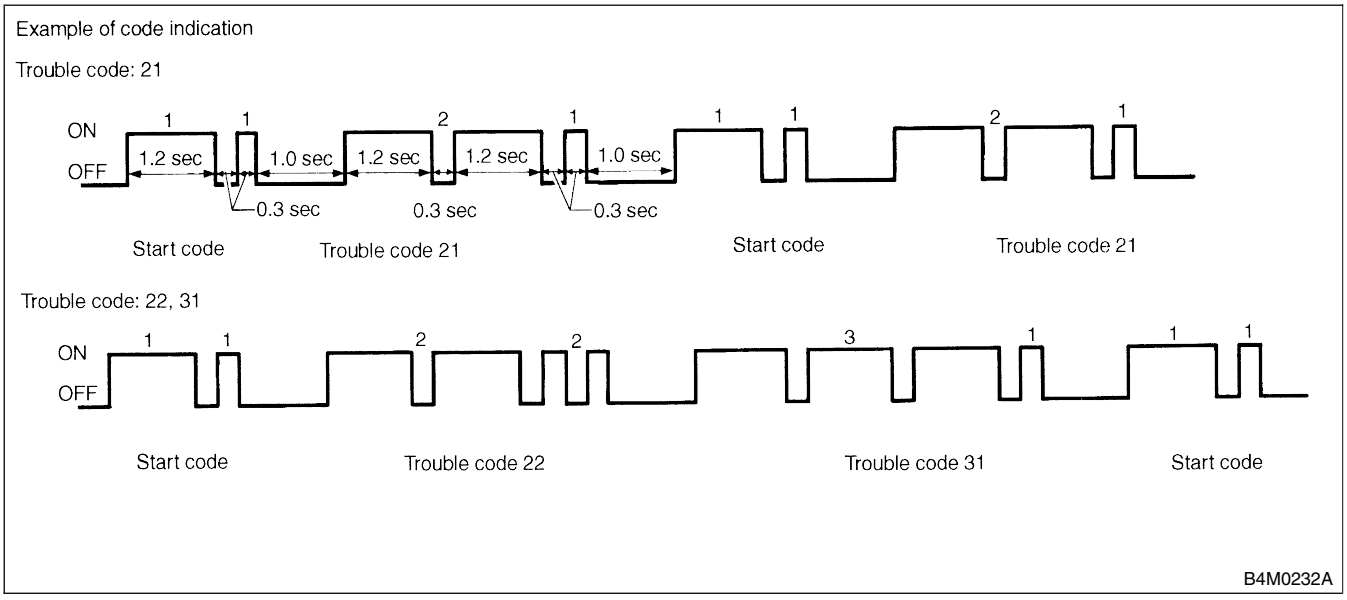
1) Take out diagnosis connector from side of driver's seat heater unit.



2) Turn ignition switch OFF.
3) Connect diagnosis connector terminal 6 to diagnosis terminal.
4) Turn ignition switch ON.
5) ABS warning light is set in the diagnostic mode and blinks to identify trouble code.

6) After the start code (11) is shown, the trouble codes will be shown in order of the last information first. These repeat for a maximum of 3 minutes.

NOTE:
- When there are no trouble codes 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 trouble code. When there are more than three, the most recent three will be stored. (Stored codes will stay in memory until they are cleared.)



2. WITH SUBARU SELECT MONITOR S006508A1601

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.

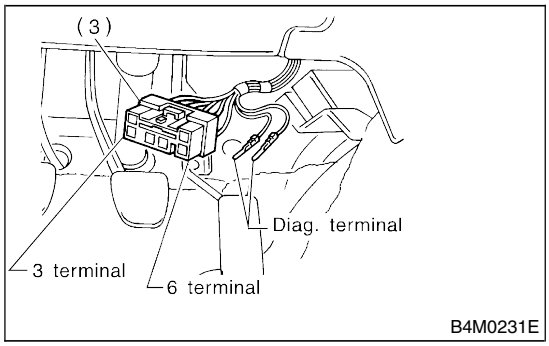
9. Clear Memory Mode S006513

A: OPERATION S006513A16

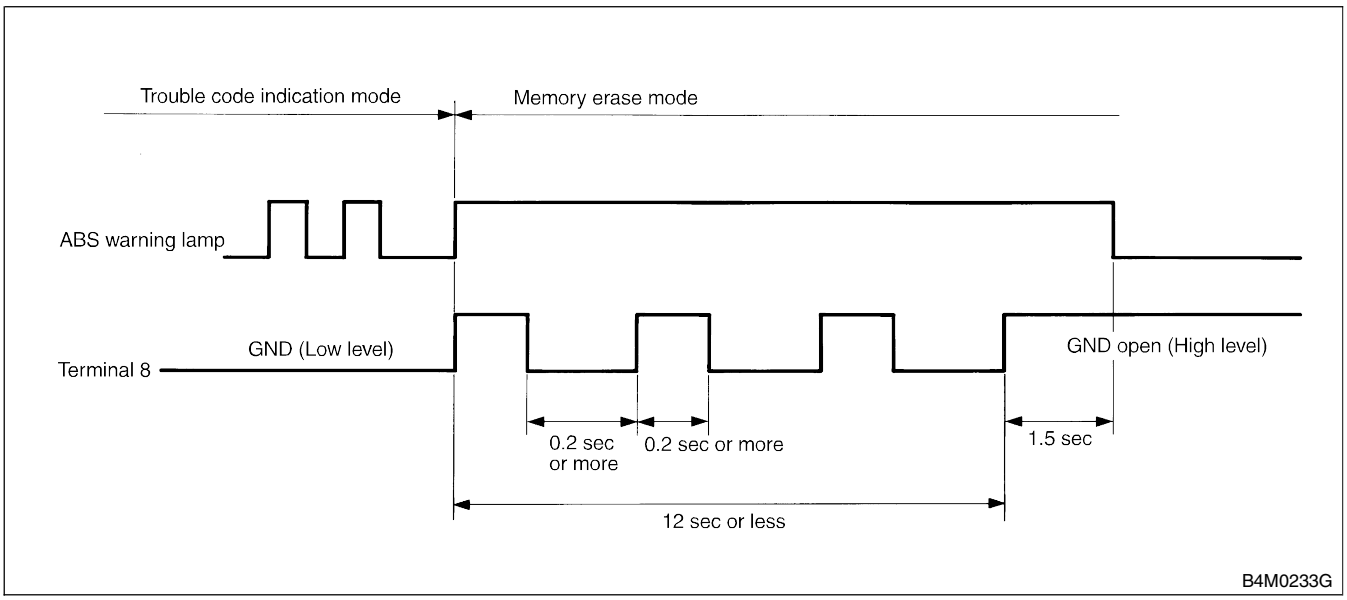
1. WITHOUT SUBARU SELECT MONITOR

S006513A1602

1) After calling up a trouble code, disconnect diagnosis connector terminal 6 from diagnosis terminal.



2) Repeat 3 times within approx. 12 seconds; connecting and disconnecting terminal 6 and diagnosis terminal for at least 0.2 seconds each time.



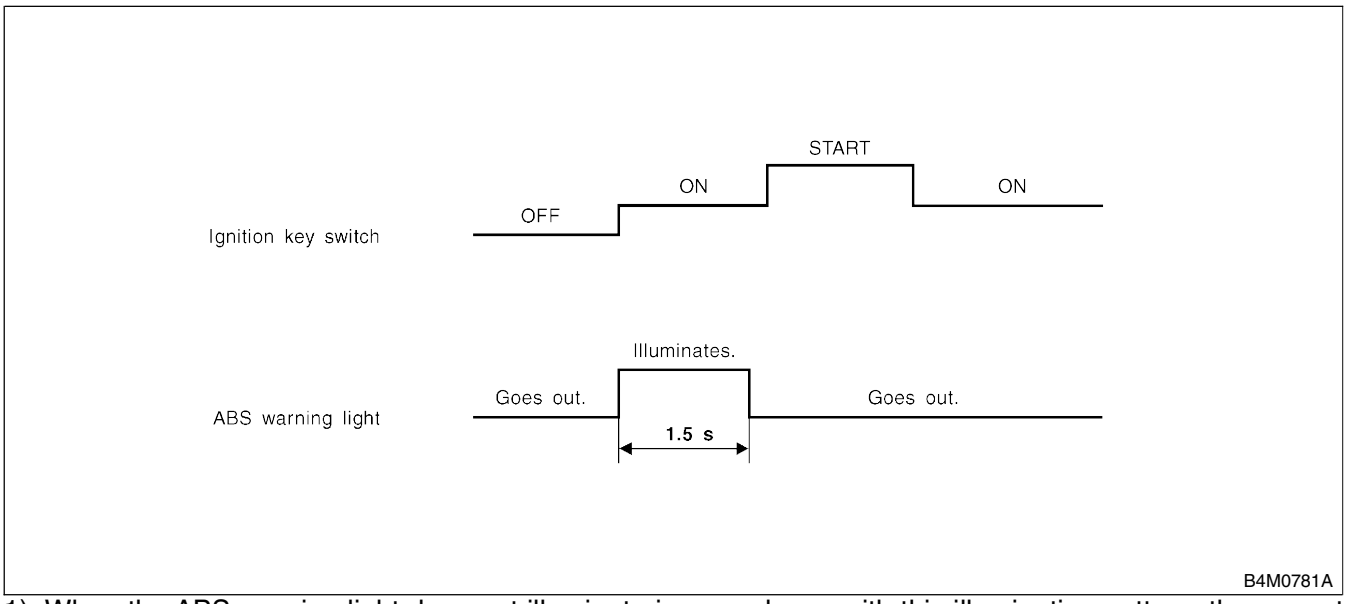
NOTE:
After diagnostics is completed, make sure to clear memory. Make sure only start code (11) is shown after memory is cleared.

2. WITH SUBARU SELECT MONITOR S006513A1601

Refer to SUBARU SELECT MONITOR for information about how to clear trouble codes. <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 Chart 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 Diagnostics Trouble Code S006511

A: LIST S006511A12

1. WITHOUT SUBARU SELECT MONITOR S006511A1201

Trouble code	Contents of diagnosis		Index No.
11	Start code ● Trouble code is shown after start code. ● Only start code is shown in normal condition.		—
21	Abnormal ABS sensor (Open circuit or input voltage too high)	Front right ABS sensor	<Ref. to ABS-42, TROUBLE CODE 21— ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (FRONT RH) —, Diagnostics Chart with Diagnosis Connector.>
23		Front left ABS sensor	<Ref. to ABS-42, TROUBLE CODE 23 — ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (FRONT LH) —, Diagnostics Chart with Diagnosis Connector.>
25		Rear right ABS sensor	<Ref. to ABS-42, TROUBLE CODE 25 — ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (REAR RH) —, Diagnostics Chart with Diagnosis Connector.>
27		Rear left ABS sensor	<Ref. to ABS-42, TROUBLE CODE 27 — ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>
22	Abnormal ABS sensor (Abnormal ABS sensor signal)	Front right ABS sensor	<Ref. to ABS-48, TROUBLE CODE 22 — ABNORMAL ABS SENSOR (FRONT RH) —, Diagnostics Chart with Diagnosis Connector.>
24		Front left ABS sensor	<Ref. to ABS-48, TROUBLE CODE 24 — ABNORMAL ABS SENSOR (FRONT LH) —, Diagnostics Chart with Diagnosis Connector.>
26		Rear right ABS sensor	<Ref. to ABS-48, TROUBLE CODE 26 — ABNORMAL ABS SENSOR (REAR RH) —, Diagnostics Chart with Diagnosis Connector.>
28		Rear left ABS sensor	<Ref. to ABS-48, TROUBLE CODE 28 — ABNORMAL ABS SENSOR (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>
29		Any one of four	<Ref. to ABS-56, TROUBLE CODE 29 — ABNORMAL ABS SENSOR SIGNAL (ANY ONE OF FOUR) —, Diagnostics Chart with Diagnosis Connector.>

LIST OF DIAGNOSTICS TROUBLE CODE

Trouble code	Contents of diagnosis		Index No.
31	Abnormal solenoid valve circuit(s) in ABS control module and hydraulic unit	Front right inlet valve	<Ref. to ABS-62, TROUBLE CODE 31 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT RH) —, Diagnostics Chart with Diagnosis Connector.>
32		Front right outlet valve	<Ref. to ABS-66, TROUBLE CODE 32 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT RH) —, Diagnostics Chart with Diagnosis Connector.>
33		Front left inlet valve	<Ref. to ABS-62, TROUBLE CODE 33 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT LH) —, Diagnostics Chart with Diagnosis Connector.>
34		Front left outlet valve	<Ref. to ABS-66, TROUBLE CODE 34 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT LH) —, Diagnostics Chart with Diagnosis Connector.>
35		Rear right inlet valve	<Ref. to ABS-62, TROUBLE CODE 35 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR RH) —, Diagnostics Chart with Diagnosis Connector.>
36		Rear right outlet valve	<Ref. to ABS-66, TROUBLE CODE 36 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR RH) —, Diagnostics Chart with Diagnosis Connector.>
37		Rear left inlet valve	<Ref. to ABS-62, TROUBLE CODE 37 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>
38		Rear left outlet valve	<Ref. to ABS-66, TROUBLE CODE 38 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>
41	Abnormal ABS control module		<Ref. to ABS-70, TROUBLE CODE 41 — ABNORMAL ABS CONTROL MODULE —, Diagnostics Chart with Diagnosis Connector.>
42	Source voltage is abnormal.		<Ref. to ABS-72, TROUBLE CODE 42 — SOURCE VOLTAGE IS ABNORMAL. —, Diagnostics Chart with Diagnosis Connector.>
44	A combination of AT control abnormal		<Ref. to ABS-74, TROUBLE CODE 44 — A COMBINATION OF AT CONTROL ABNORMAL —, Diagnostics Chart with Diagnosis Connector.>
51	Abnormal valve relay		<Ref. to ABS-76, TROUBLE CODE 51 — ABNORMAL VALVE RELAY —, Diagnostics Chart with Diagnosis Connector.>
52	Abnormal motor and/or motor relay		<Ref. to ABS-78, TROUBLE CODE 52 — ABNORMAL MOTOR AND/OR MOTOR RELAY —, Diagnostics Chart with Diagnosis Connector.>
54	Abnormal stop light switch		<Ref. to ABS-82, TROUBLE CODE 54 — ABNORMAL STOP LIGHT SWITCH —, Diagnostics Chart with Diagnosis Connector.>
56	Abnormal G sensor output voltage		<Ref. to ABS-84, TROUBLE CODE 56 — ABNORMAL G SENSOR OUTPUT VOLTAGE —, Diagnostics Chart with Diagnosis Connector.>

LIST OF DIAGNOSTICS TROUBLE CODE

2. WITH SUBARU SELECT MONITOR S006511A1202

Code	Display screen	Contents of diagnosis	Index No.
—	Communication for initializing impossible	Select monitor communication failure	<Ref. to ABS-90, COMMUNICATION FOR INITIALIZING IMPOSSIBLE , Diagnostics Chart 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-94, NO TROUBLE CODE, Diagnostics Chart 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-98, TROUBLE CODE 21 — OPEN OR SHORT CIRCUIT IN FRONT RIGHT ABS SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>
22	Front right ABS sensor abnormal signal	Front right ABS sensor abnormal signal	<Ref. to ABS-106, TROUBLE CODE 22 — FRONT RIGHT ABNORMAL ABS SENSOR SIGNAL —, Diagnostics Chart 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-98, TROUBLE CODE 23 — OPEN OR SHORT CIRCUIT IN FRONT LEFT ABS SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>
24	Front left ABS sensor abnormal signal	Front left ABS sensor abnormal signal	<Ref. to ABS-106, TROUBLE CODE 24 — FRONT LEFT ABNORMAL ABS SENSOR SIGNAL —, Diagnostics Chart 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-98, TROUBLE CODE 25 — OPEN OR SHORT CIRCUIT IN REAR RIGHT ABS SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>
26	Rear right ABS sensor abnormal signal	Rear right ABS sensor abnormal signal	<Ref. to ABS-106, TROUBLE CODE 26 — REAR RIGHT ABNORMAL ABS SENSOR SIGNAL —, Diagnostics Chart 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-98, TROUBLE CODE 27 — OPEN OR SHORT CIRCUIT IN REAR LEFT ABS SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>
28	Rear left ABS sensor abnormal signal	Rear left ABS sensor abnormal signal	<Ref. to ABS-106, TROUBLE CODE 28 — REAR LEFT ABNORMAL ABS SENSOR SIGNAL —, Diagnostics Chart 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-114, TROUBLE CODE 29 — ABNORMAL ABS SENSOR SIGNAL ON ANY ONE OF FOUR SENSOR —, Diagnostics Chart with Subaru Select Monitor.>
31	Front right inlet valve malfunction	Front right inlet valve malfunction	<Ref. to ABS-120, TROUBLE CODE 31 — FRONT RIGHT INLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
32	Front right outlet valve malfunction	Front right outlet valve malfunction	<Ref. to ABS-124, TROUBLE CODE 32 — FRONT RIGHT OUTLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
33	Front left inlet valve malfunction	Front left inlet valve malfunction	<Ref. to ABS-120, TROUBLE CODE 33 — FRONT LEFT INLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
34	Front left outlet valve malfunction	Front left outlet valve malfunction	<Ref. to ABS-124, TROUBLE CODE 34 — FRONT LEFT OUTLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
35	Rear right inlet valve malfunction	Rear right inlet valve malfunction	<Ref. to ABS-120, TROUBLE CODE 35 — REAR RIGHT INLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
36	Rear right outlet valve malfunction	Rear right outlet valve malfunction	<Ref. to ABS-124, TROUBLE CODE 36 — REAR RIGHT OUTLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
37	Rear left inlet valve malfunction	Rear left inlet valve malfunction	<Ref. to ABS-120, TROUBLE CODE 37 — REAR LEFT INLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>

LIST OF DIAGNOSTICS TROUBLE CODE

Code	Display screen	Contents of diagnosis	Index No.
38	Rear left outlet valve malfunction	Rear left outlet valve malfunction	<Ref. to ABS-124, TROUBLE CODE 38 — REAR LEFT OUTLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
41	ABS control module malfunction	ABS control module and hydraulic control unit malfunction	<Ref. to ABS-128, TROUBLE CODE 41 — ABS CONTROL MODULE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
42	Power supply voltage too low	Power supply voltage too low	<Ref. to ABS-130, TROUBLE CODE 42 — POWER SUPPLY VOLTAGE TOO LOW —, Diagnostics Chart with Subaru Select Monitor.>
42	Power supply voltage too high	Power supply voltage too high	<Ref. to ABS-132, TROUBLE CODE 42 — POWER SUPPLY VOLTAGE TOO HIGH —, Diagnostics Chart with Subaru Select Monitor.>
44	ABS-AT control (Non Controlled)	ABS-AT control (Non Controlled)	<Ref. to ABS-134, TROUBLE CODE 44 — ABS-AT CONTROL (NON CONTROLLED) —, Diagnostics Chart with Subaru Select Monitor.>
44	ABS-AT control (Controlled)	ABS-AT control (Controlled)	<Ref. to ABS-136, TROUBLE CODE 44 — ABS-AT CONTROL (CONTROLLED) —, Diagnostics Chart with Subaru Select Monitor.>
51	Valve relay malfunction	Valve relay malfunction	<Ref. to ABS-138, TROUBLE CODE 51 — VALVE RELAY MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
51	Valve relay ON failure	Valve relay ON failure	<Ref. to ABS-140, TROUBLE CODE 51 — VALVE RELAY ON FAILURE —, Diagnostics Chart with Subaru Select Monitor.>
52	Open circuit in motor relay circuit	Open circuit in motor relay circuit	<Ref. to ABS-142, TROUBLE CODE 52 — OPEN CIRCUIT IN MOTOR RELAY CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>
52	Motor relay ON failure	Motor relay ON failure	<Ref. to ABS-146, TROUBLE CODE 52 — MOTOR RELAY ON FAILURE —, Diagnostics Chart with Subaru Select Monitor.>
52	Motor malfunction	Motor malfunction	<Ref. to ABS-150, TROUBLE CODE 52 — MOTOR MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
54	Stop light switch signal circuit malfunction	Stop light switch signal circuit malfunction	<Ref. to ABS-154, TROUBLE CODE 54 — STOP LIGHT SWITCH SIGNAL CIRCUIT MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
56	Open or short circuit in G sensor circuit	Open or short circuit in G sensor circuit	<Ref. to ABS-156, TROUBLE CODE 56 — OPEN OR SHORT CIRCUIT IN G SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>
56	Battery short in G sensor circuit	Battery short in G sensor circuit	<Ref. to ABS-160, TROUBLE CODE 56 — BATTERY SHORT IN G SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>
56	Abnormal G sensor high μ output	Abnormal G sensor high μ output	<Ref. to ABS-166, TROUBLE CODE 56 — ABNORMAL G SENSOR HIGH μ OUTPUT —, Diagnostics Chart with Subaru Select Monitor.>
56	Detection of G sensor stick	Detection of G sensor stick	<Ref. to ABS-170, TROUBLE CODE 56 — DETECTION OF G SENSOR STICK —, Diagnostics Chart with Subaru Select Monitor.>

NOTE:
High μ means high friction coefficient against road surface.

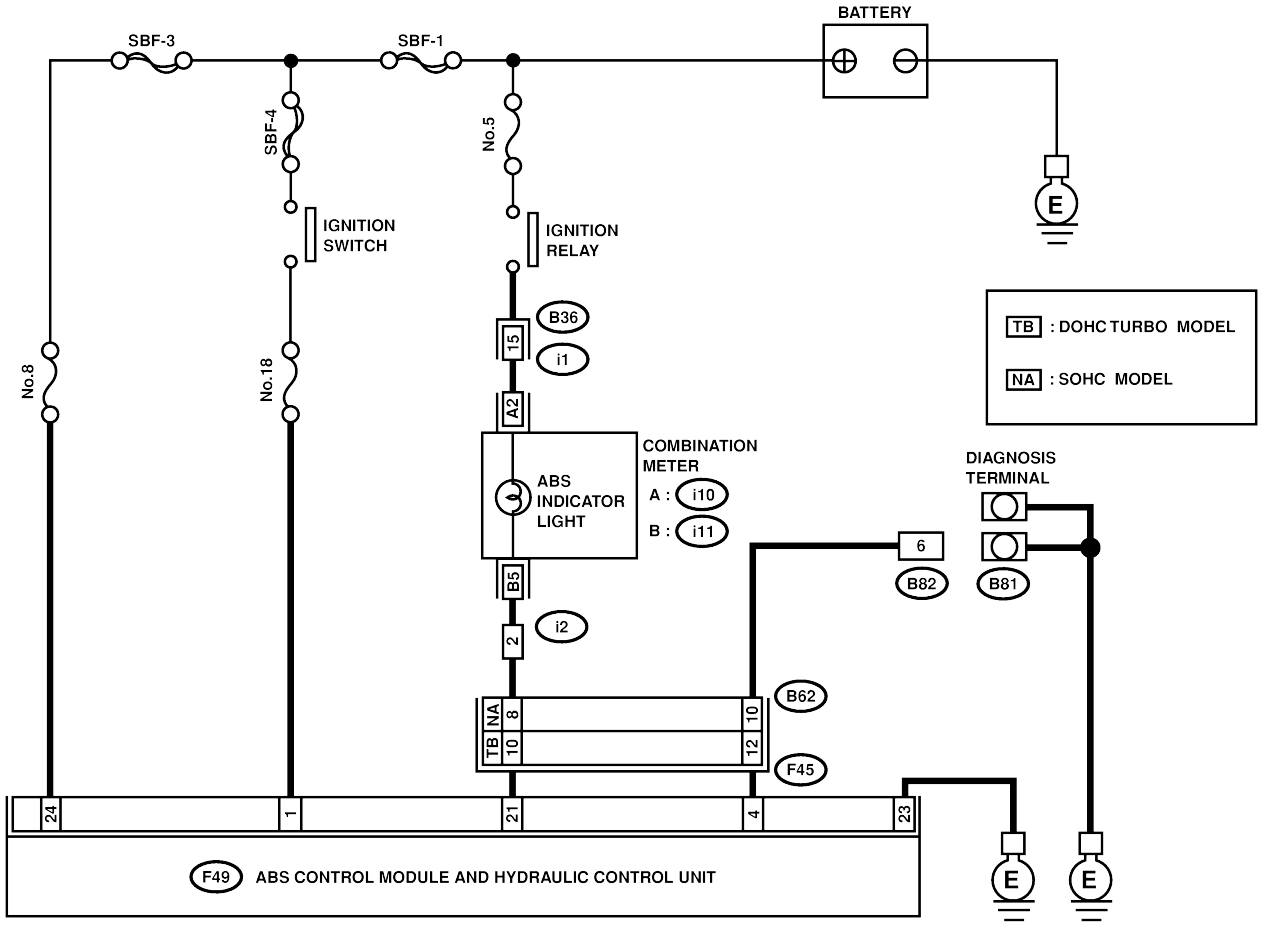
12. Diagnostics Chart with Diagnosis Connector S006522

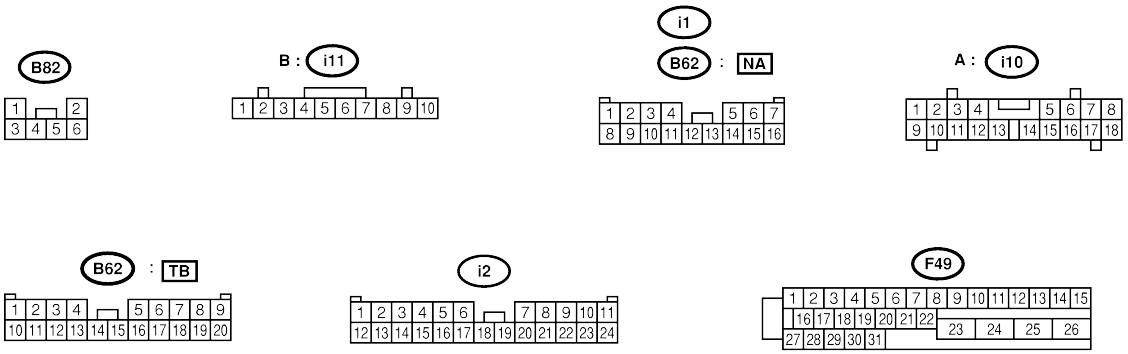
A: ABS WARNING LIGHT DOES NOT COME ON. S006522E24

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.

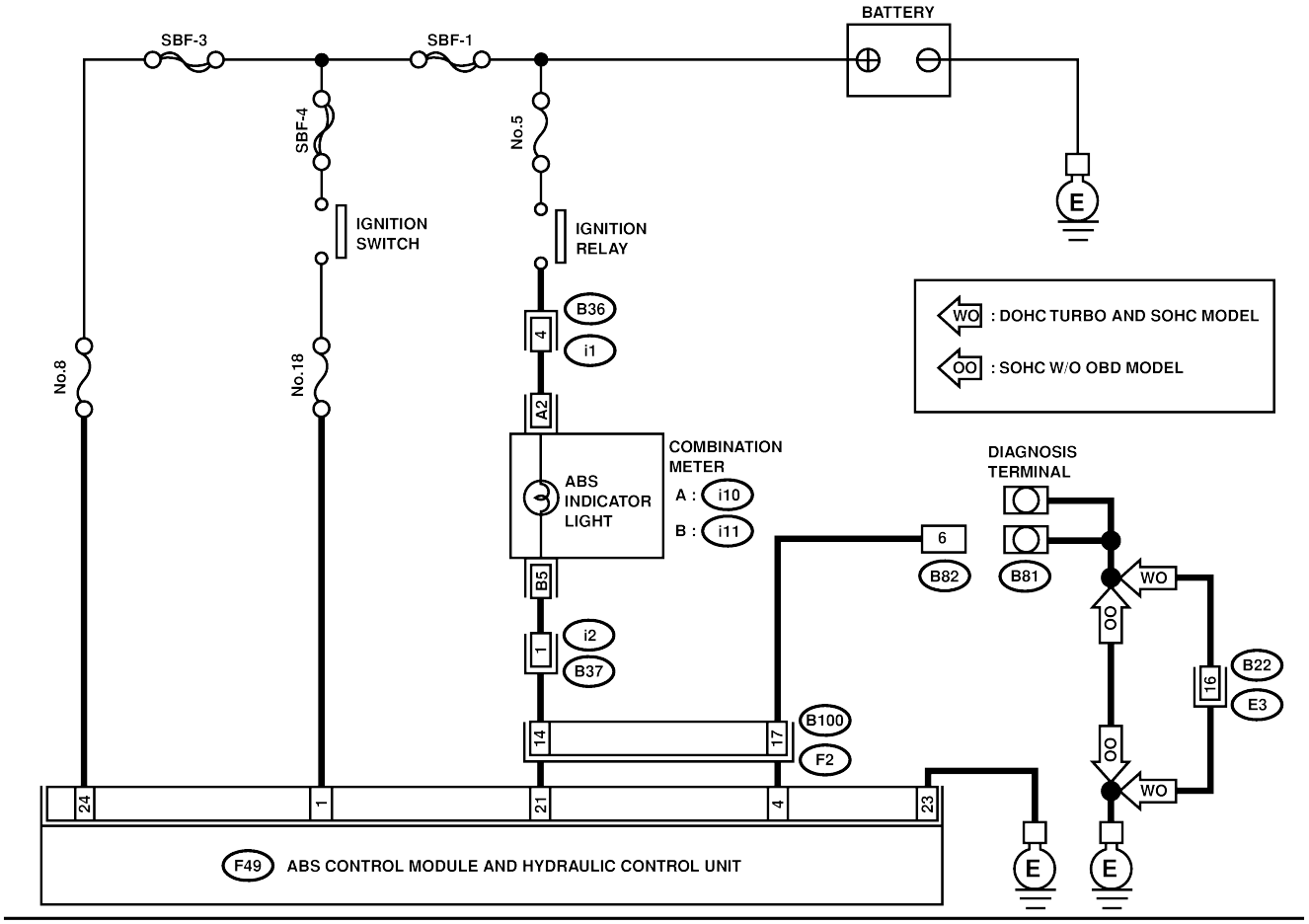
WIRING DIAGRAM: LHD MODEL

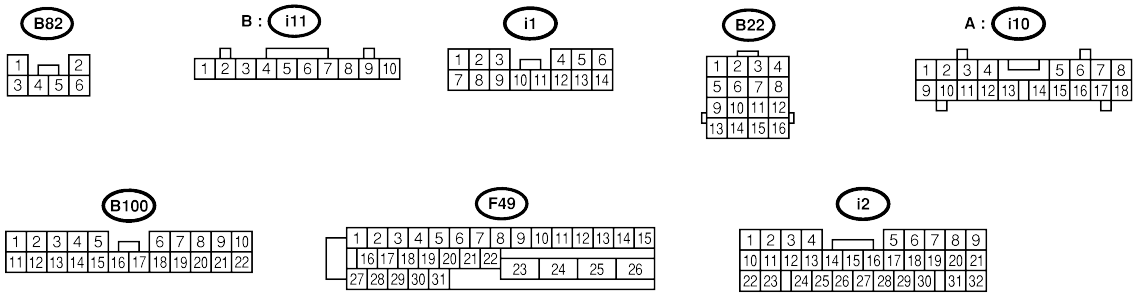




S4M0553

WIRING DIAGRAM: RHD MODEL





S4M0554

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

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-15, 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-15, Combination Meter Assembly.>
3	**CHECK BATTERY SHORT OF ABS WARNING LIGHT HARNESS.** 1) Disconnect connector (B62) or (B100) from connector (F45) or (F2). 2) Measure voltage between connector (B200) and chassis ground. ***Connector & terminal*** ***LHD turbo: (B62) No. 10 (+) — Chassis ground (–):*** ***LHD non-turbo: (B62) No. 8 (+) — Chassis ground (–):*** ***RHD: (B100) No. 14 (+) — 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) or (B100) and chassis ground. ***Connector & terminal*** ***LHD turbo: (B62) No. 10 (+) — Chassis ground (–):*** ***LHD non-turbo: (B62) No. 8 (+) — Chassis ground (–):*** ***RHD: (B100) No. 14 (+) — 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) or (B100) and chassis ground. ***Connector & terminal*** ***LHD turbo: (B62) No. 10 (+) — Chassis ground (–):*** ***LHD non-turbo: (B62) No. 8 (+) — Chassis ground (–):*** ***RHD: (B100) No. 14 (+) — Chassis ground (–):***	Is the voltage between 10 and 15 V?	Go to step **6**.	Repair wiring harness.

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

No.	Step	Check	Yes	No
6	**CHECK BATTERY SHORT OF ABS WARNING LIGHT HARNESS.** 1) Turn ignition switch to OFF. 2) Measure voltage between connector (F45) or (F2) and chassis ground. ***Connector & terminal*** ***LHD turbo: (F45) No. 10 (+) — Chassis ground (–):*** ***LHD non-turbo: (F45) No. 8 (+) — Chassis ground (–):*** ***RHD: (F2) No. 14 (+) — 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) or (F2) and chassis ground. ***Connector & terminal*** ***LHD turbo: (F45) No. 10 (+) — Chassis ground (–):*** ***LHD non-turbo: (F45) No. 8 (+) — Chassis ground (–):*** ***RHD: (F2) No. 14 (+) — 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.
9	**CHECK WIRING HARNESS.** Measure resistance between connector (F45) or (F2) and chassis ground. ***Connector & terminal*** ***LHD turbo: (F45) No. 10 (+) — Chassis ground (–):*** ***LHD non-turbo: (F45) No. 8 (+) — Chassis ground (–):*** ***RHD: (F2) No. 14 (+) — 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).>

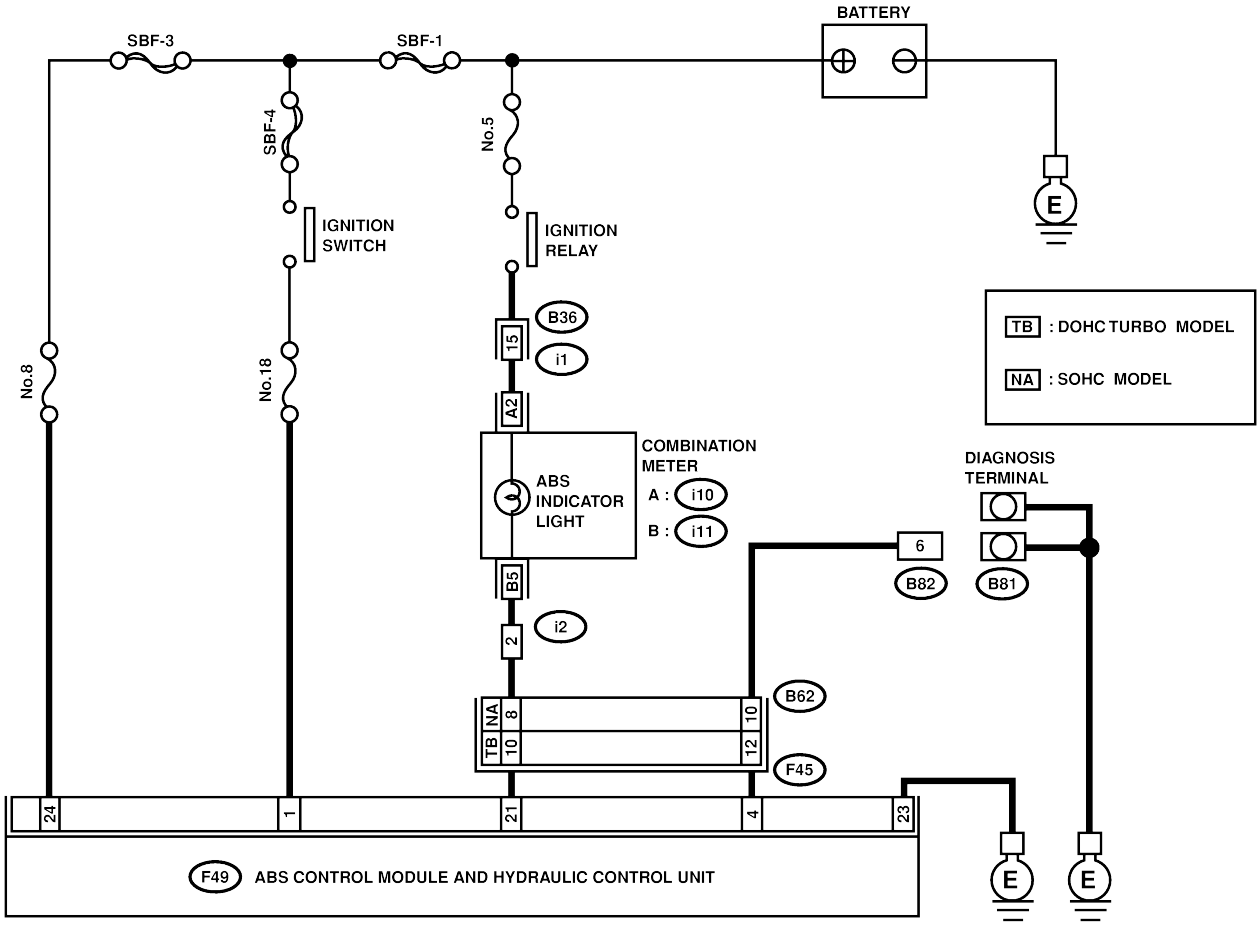
MEMO:

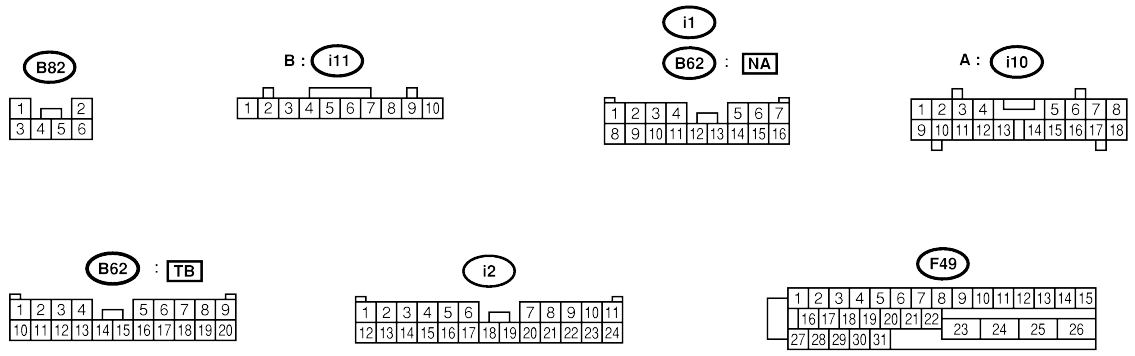
B: ABS WARNING LIGHT DOES NOT GO OFF. S006522E25

DIAGNOSIS:
- ABS warning light circuit is open or shorted.

TROUBLE SYMPTOM:
- When starting the engine and while ABS warning light is kept ON.

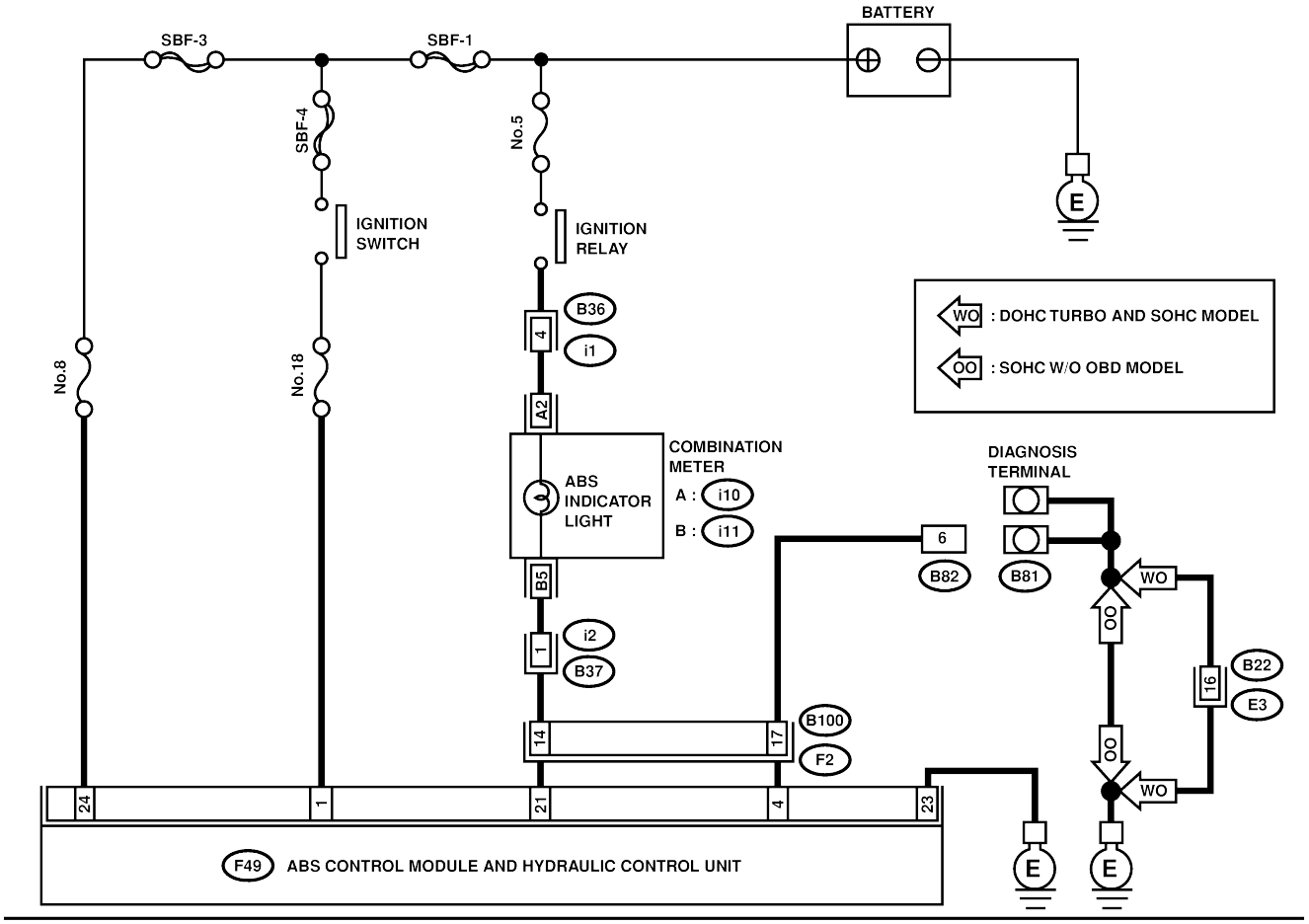
WIRING DIAGRAM: LHD MODEL

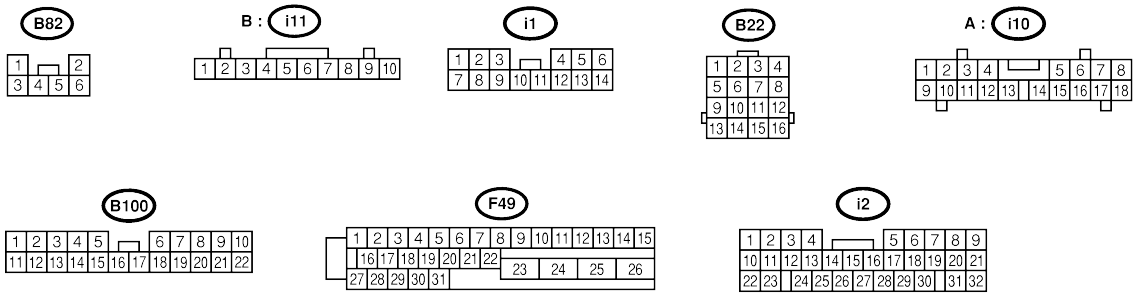




S4M0553

WIRING DIAGRAM: RHD MODEL





S4M0554

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

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) or (F2) from connector (B62) or (B100). 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) or (F2) and chassis ground. ***Connector & terminal*** ***LHD turbo: (F45) No. 10 — Chassis ground:*** ***LHD non-turbo: (F45) No. 8 — Chassis ground:*** ***RHD: (F2) No. 14 — 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) or (F2) and chassis ground. ***Connector & terminal*** ***LHD turbo: (F45) No. 10 — Chassis ground:*** ***LHD non-turbo: (F45) No. 8 — Chassis ground:*** ***RHD: (F2) No. 14 — 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).>

C: TROUBLE CODE DOES NOT APPEAR. S006522E50

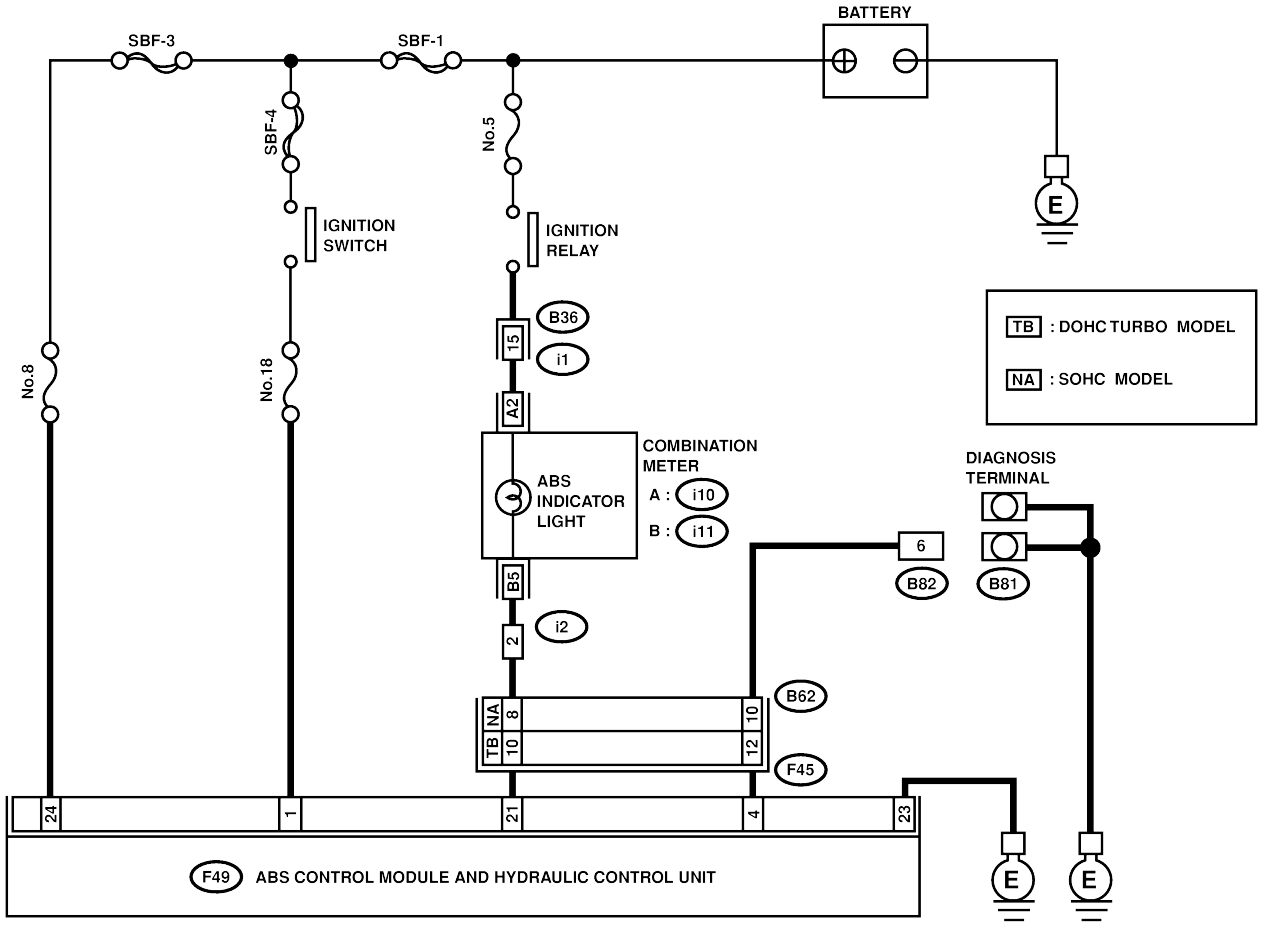
DIAGNOSIS:

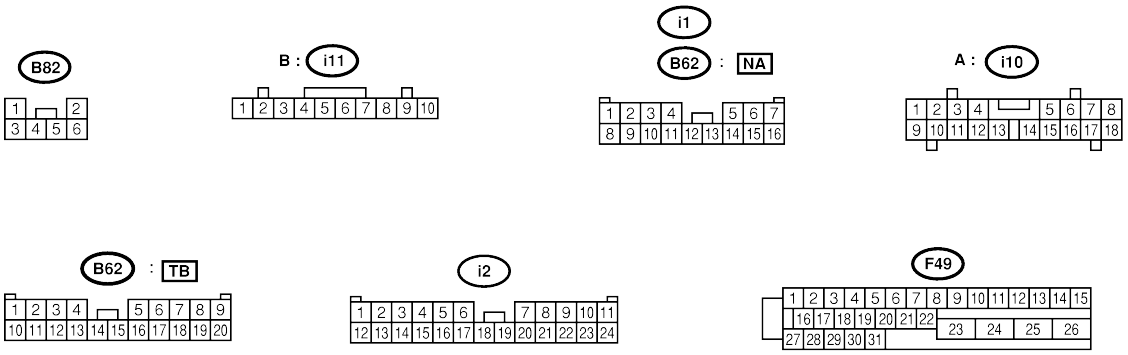
- Diagnosis circuit is open.

TROUBLE SYMPTOM:

- The ABS warning light turns on or off normally but the start code cannot be read out in the diagnostic mode.

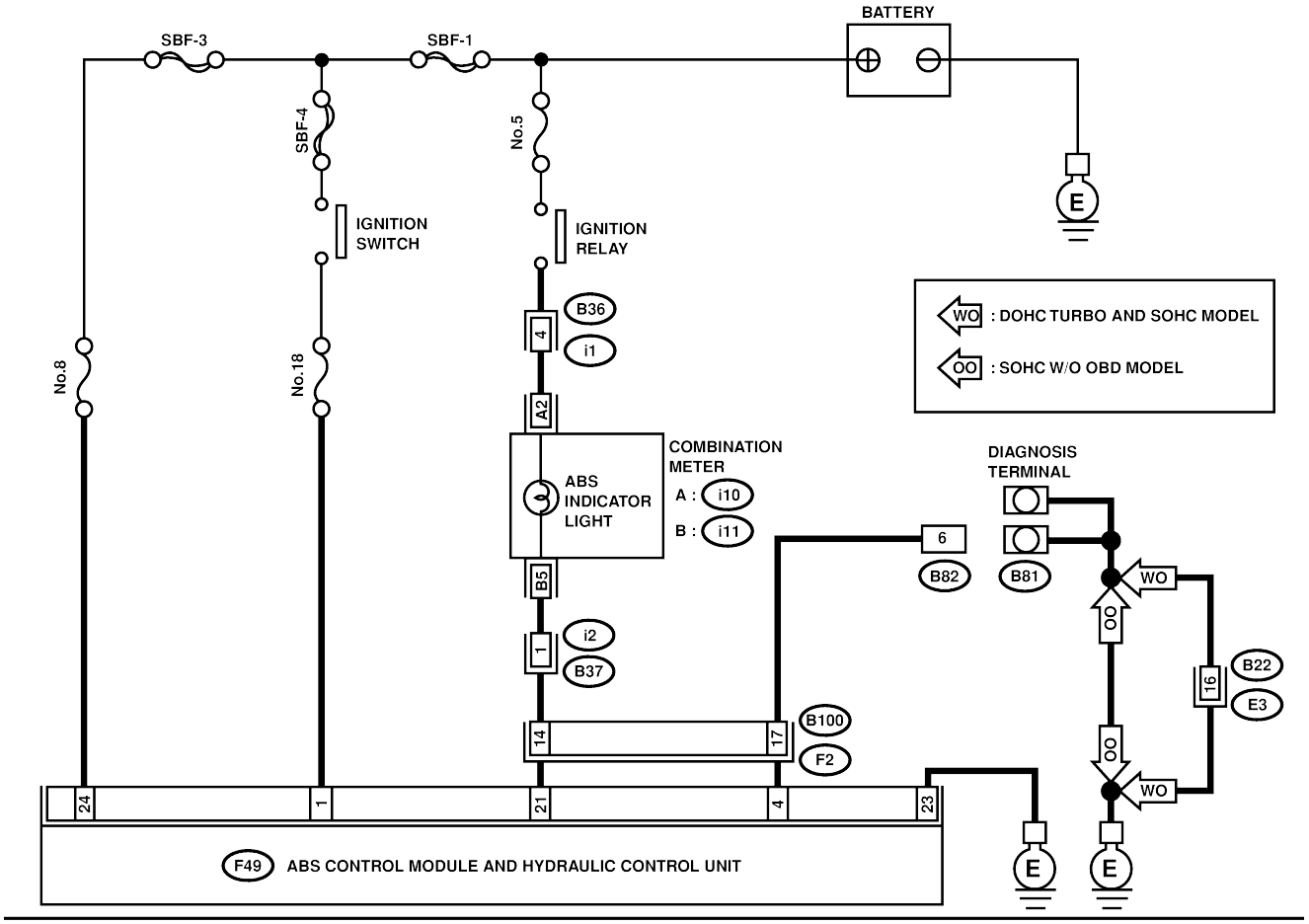
WIRING DIAGRAM: LHD MODEL

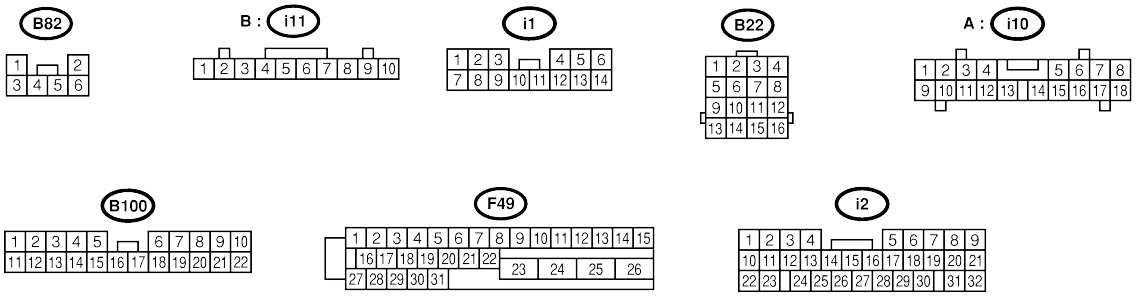




S4M0553

WIRING DIAGRAM: RHD MODEL





S4M0554

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

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).>

D: TROUBLE CODE 21 — ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (FRONT RH) —

S006522E60

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 27. <Ref. to ABS-42, TROUBLE CODE 27 — ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>

E: TROUBLE CODE 23 — ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (FRONT LH) —

S006522E61

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 27. <Ref. to ABS-42, TROUBLE CODE 27 — ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>

F: TROUBLE CODE 25 — ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (REAR RH) —

S006522E62

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 27. <Ref. to ABS-42, TROUBLE CODE 27 — ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>

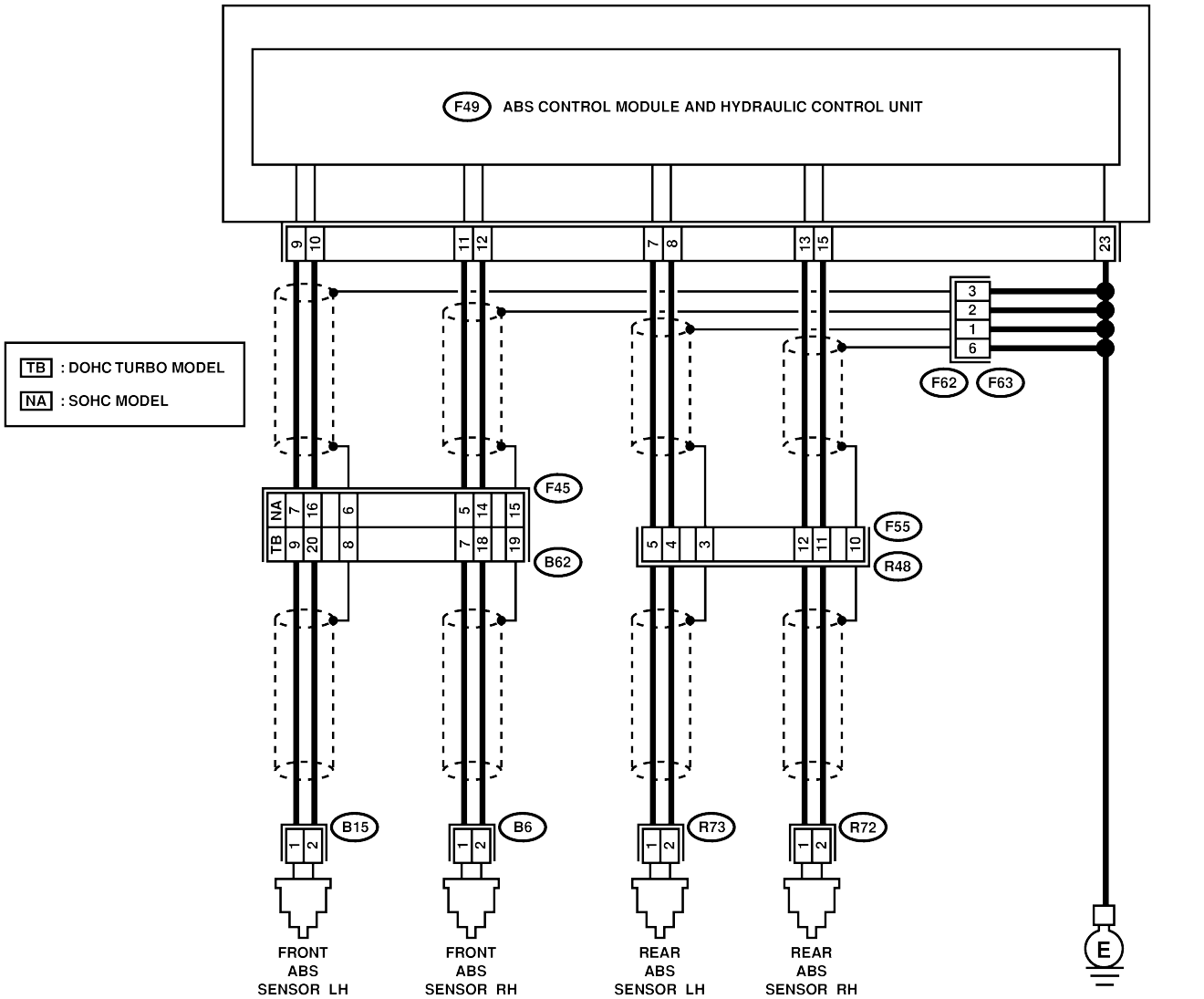
G: TROUBLE CODE 27 — ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (REAR LH) —

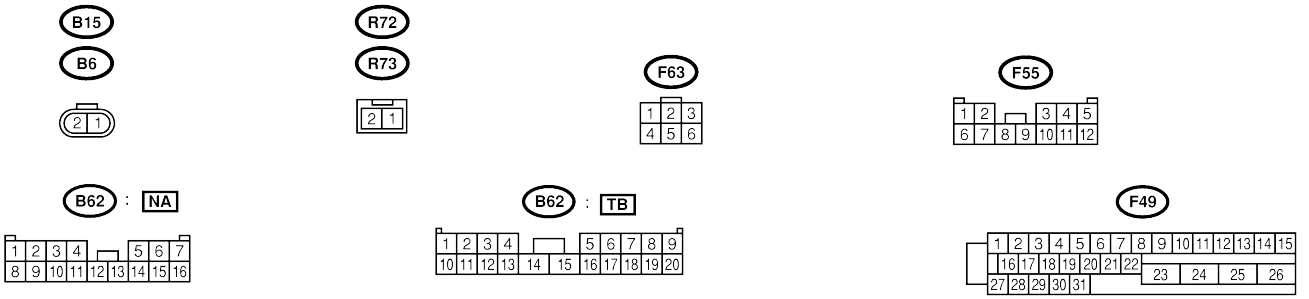
S006522E63

DIAGNOSIS:
- Faulty ABS sensor (Broken wire, input voltage too high)
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS does not operate.

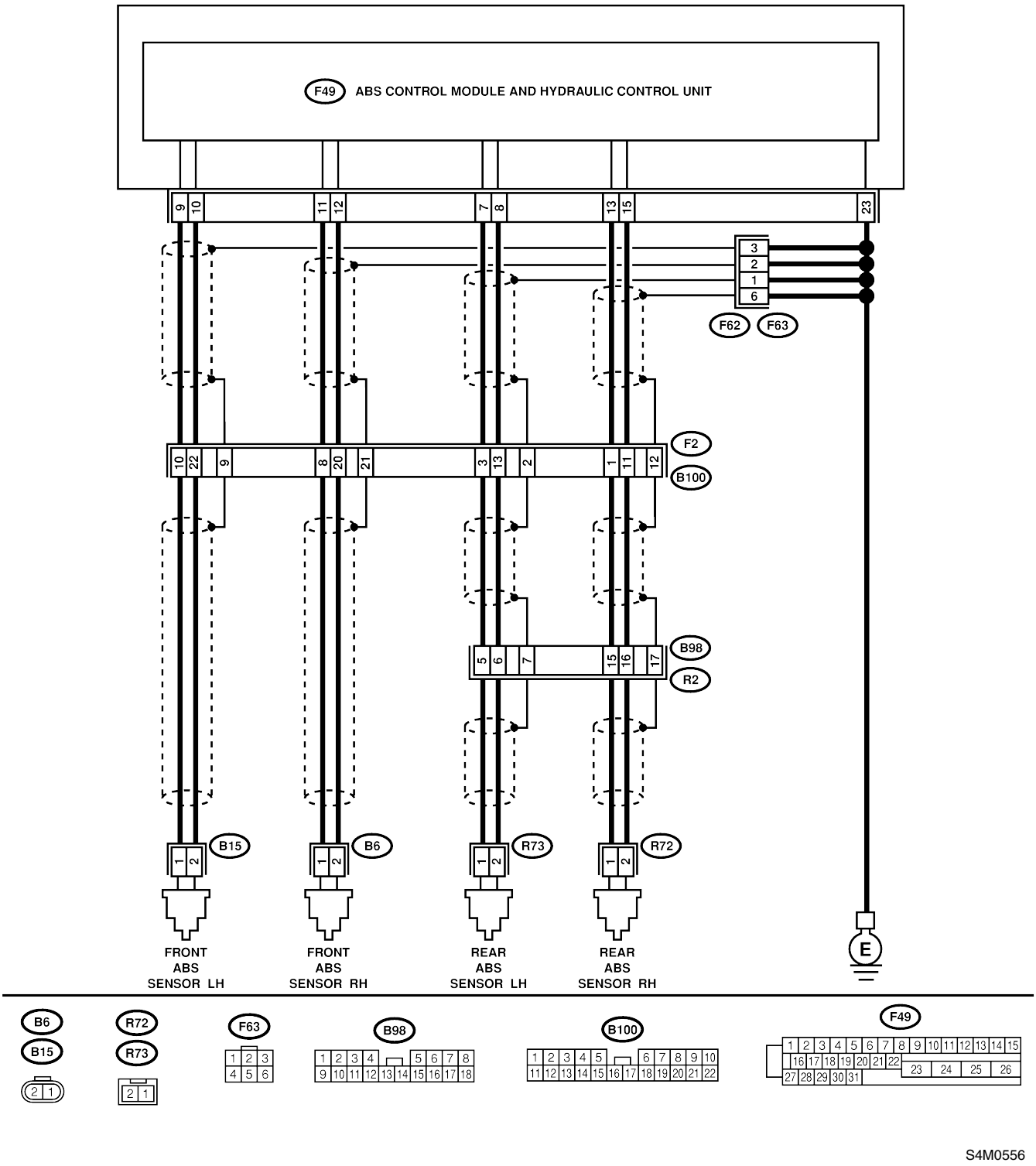
WIRING DIAGRAM: LHD MODEL





S4M0555

WIRING DIAGRAM: RHD MODEL



S4M0556

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

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*** ***Trouble code 21 / (F49) No. 11 — No. 12:*** ***Trouble code 23 / (F49) No. 9 — No. 10:*** ***Trouble code 25 / (F49) No. 13 — No. 15:*** ***Trouble code 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.

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

No.	Step	Check	Yes	No
5	**CHECK BATTERY SHORT OF HARNESS.** Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***Trouble code 21 / (F49) No. 11 (+) — Chassis ground (–):*** ***Trouble code 23 / (F49) No. 9 (+) — Chassis ground (–):*** ***Trouble code 25 / (F49) No. 13 (+) — Chassis ground (–):*** ***Trouble code 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*** ***Trouble code 21 / (F49) No. 11 (+) — Chassis ground (–):*** ***Trouble code 23 / (F49) No. 9 (+) — Chassis ground (–):*** ***Trouble code 25 / (F49) No. 13 (+) — Chassis ground (–):*** ***Trouble code 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*** ***Trouble code 21 / (F49) No. 11 — Chassis ground:*** ***Trouble code 23 / (F49) No. 9 — Chassis ground:*** ***Trouble code 25 / (F49) No. 13 — Chassis ground:*** ***Trouble code 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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact. NOTE: Check harness and connectors between ABSCM&H/U and ABS sensor.

H: TROUBLE CODE 22 — ABNORMAL ABS SENSOR (FRONT RH) — S006522E64

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 28. <Ref. to ABS-48, TROUBLE CODE 28 — ABNORMAL ABS SENSOR (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>

I: TROUBLE CODE 24 — ABNORMAL ABS SENSOR (FRONT LH) — S006522E65

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 28. <Ref. to ABS-48, TROUBLE CODE 28 — ABNORMAL ABS SENSOR (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>

J: TROUBLE CODE 26 — ABNORMAL ABS SENSOR (REAR RH) — S006522E66

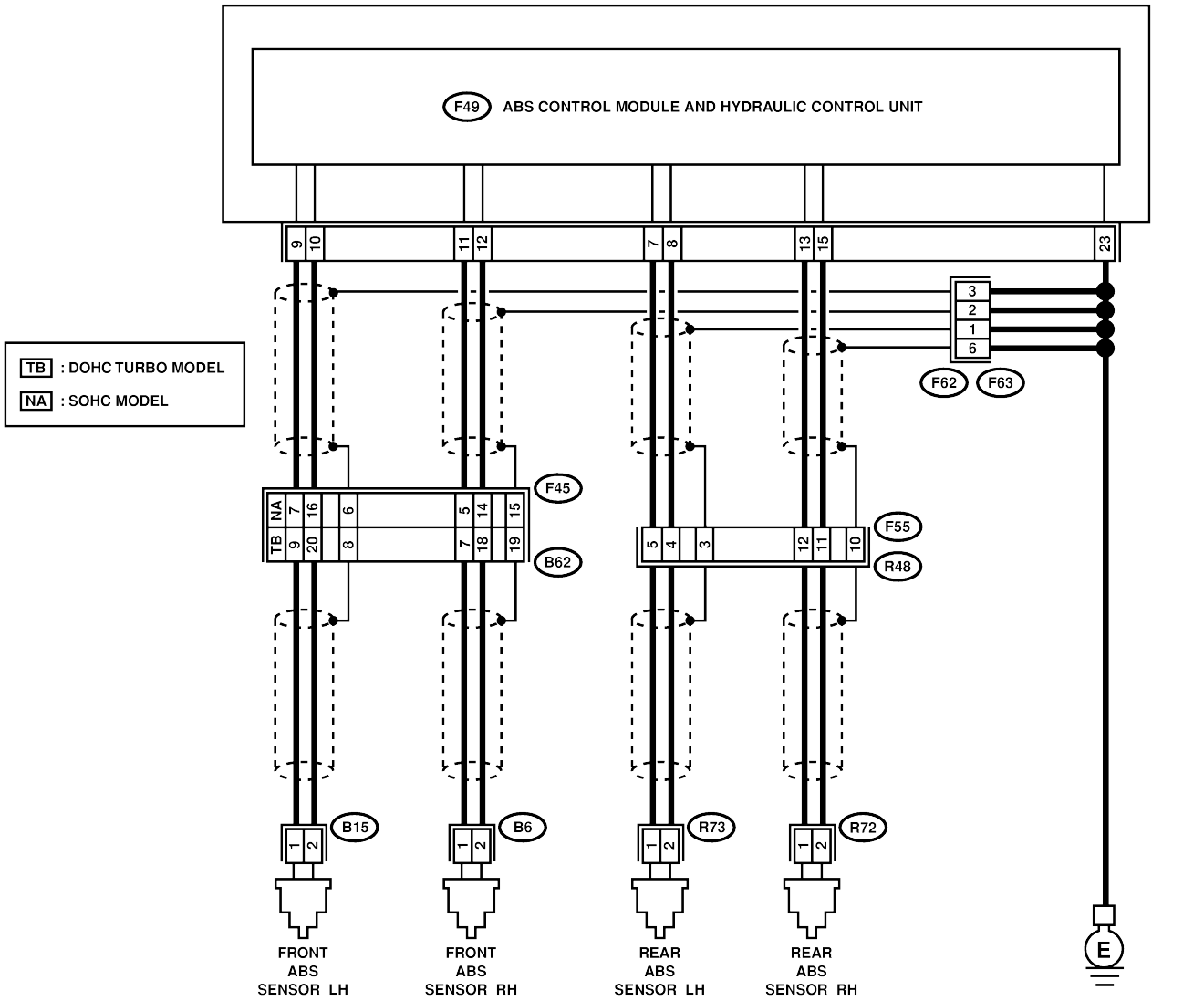
NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 28. <Ref. to ABS-48, TROUBLE CODE 28 — ABNORMAL ABS SENSOR (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>

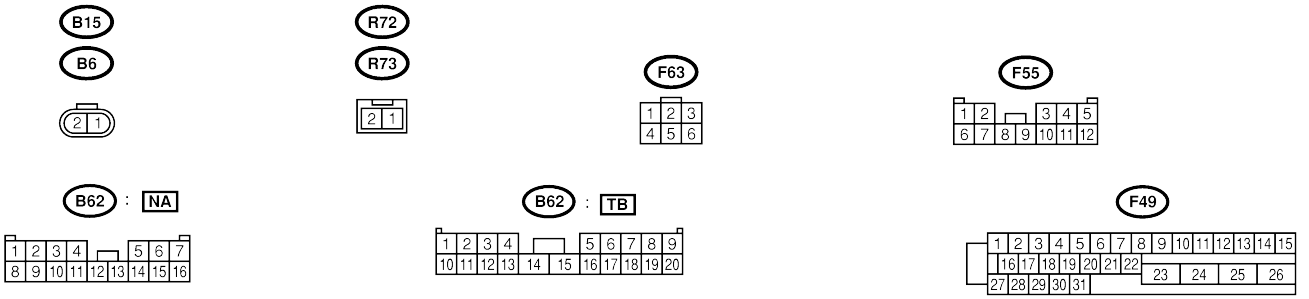
K: TROUBLE CODE 28 — ABNORMAL ABS SENSOR (REAR LH) — S006522E67

DIAGNOSIS:
- Faulty ABS sensor signal (noise, irregular signal, etc.)
- Faulty harness/connector

TROUBLE SYMPTOM:
- ABS does not operate.

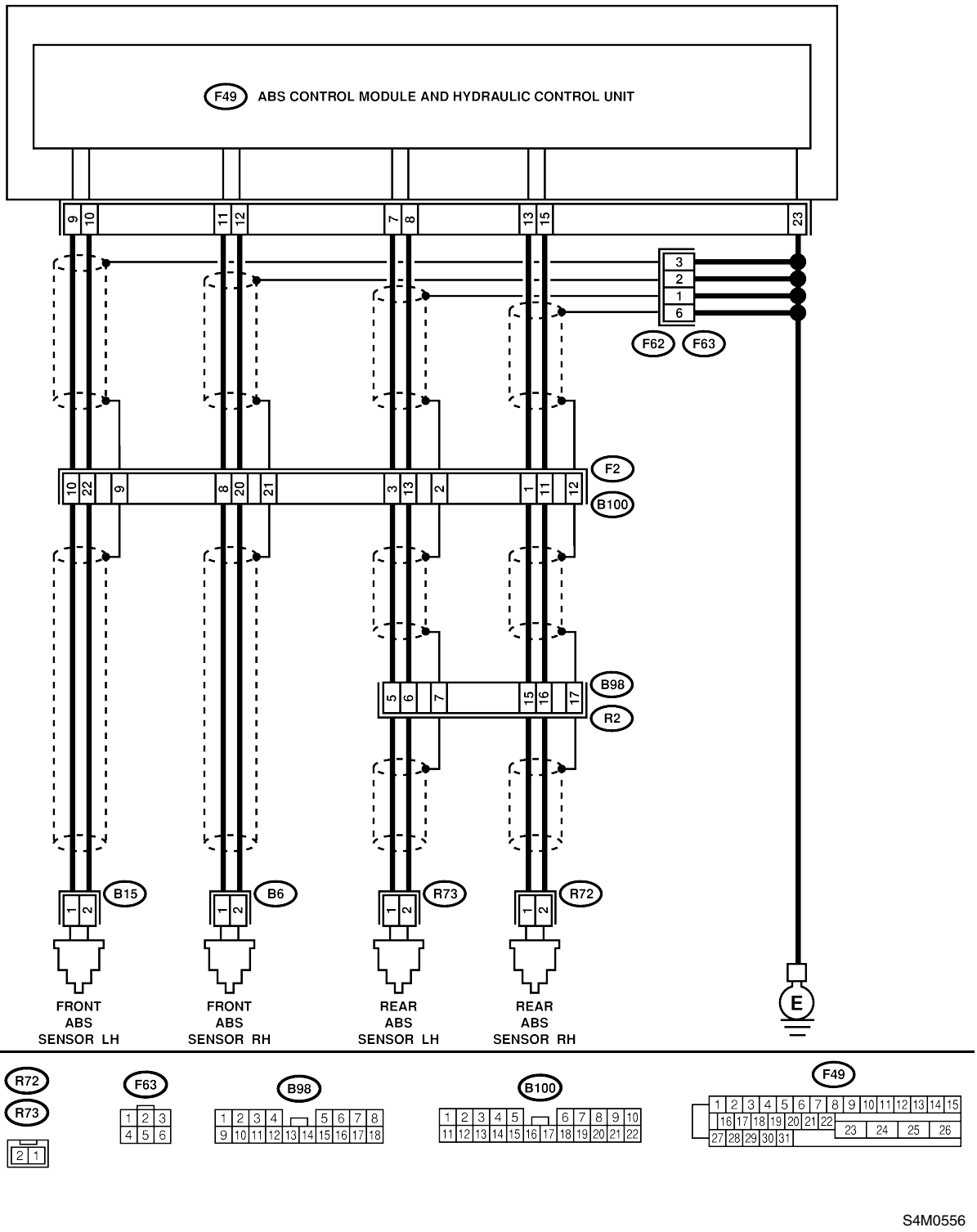
WIRING DIAGRAM: LHD MODEL





S4M0555

WIRING DIAGRAM: RHD MODEL



S4M0556

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

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 trouble code 29. ***Connector & terminal*** ***Trouble code 22 /*** ***LHD turbo: (B62) No. 7 (+) — No. 18 (–):*** ***LHD non-turbo: (B62) No. 5 (+) — No. 14 (–):*** ***RHD: (B100) No. 8 (+) — No. 20 (–):*** ***Trouble code 24 /*** ***LHD turbo: (B62) No. 9 (+) — No. 20 (–):*** ***LHD non-turbo: (B62) No. 7 (+) — No. 16 (–):*** ***RHD: (B100) No. 10 (+) — No. 22 (–):*** ***Trouble code 26 /*** ***LHD: (F55) No. 12 (+) — No. 11 (–):*** ***RHD: (B98) No. 15 (+) — No. 16 (–):*** ***Trouble code 28 /*** ***LHD: (F55) No. 5 (+) — No. 4 (–):*** ***RHD: (B98) No. 5 (+) — No. 6 (–):***	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 trouble code.	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**.

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

No.	Step	Check	Yes	No
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**.
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*** ***Trouble code 22 / (F49) No. 11 — No. 12:*** ***Trouble code 24 / (F49) No. 9 — No. 10:*** ***Trouble code 26 / (F49) No. 13 — No. 15:*** ***Trouble code 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.

No.	Step	Check	Yes	No
11	**CHECK GROUND SHORT OF HARNESS.** Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***Trouble code 22 / (F49) No. 11 — Chassis ground:*** ***Trouble code 24 / (F49) No. 9 — Chassis ground:*** ***Trouble code 26 / (F49) No. 13 — Chassis ground:*** ***Trouble code 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.
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*** ***Trouble code 22 /*** ***LHD turbo: (B62) No. 19 — Chassis ground:*** ***LHD non-turbo: (B62) No. 15 — Chassis ground:*** ***RHD: (B100) No. 21 — Chassis ground:*** ***Trouble code 24 /*** ***LHD turbo: (B62) No. 8 — Chassis ground:*** ***LHD non-turbo: (B62) No. 6 — Chassis ground:*** ***RHD: (B100) No. 9 — Chassis ground:*** ***Trouble code 26 /*** ***LHD: (F55) No. 10 — Chassis ground:*** ***RHD: (B100) No. 12 — Chassis ground:*** ***Trouble code 28 /*** ***LHD: (F55) No. 3 — Chassis ground:*** ***RHD: (B100) No. 2 — 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 trouble code.	Is the same trouble code 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**.

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

No.	Step	Check	Yes	No
18	**CHECK ANY OTHER TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary noise interference.

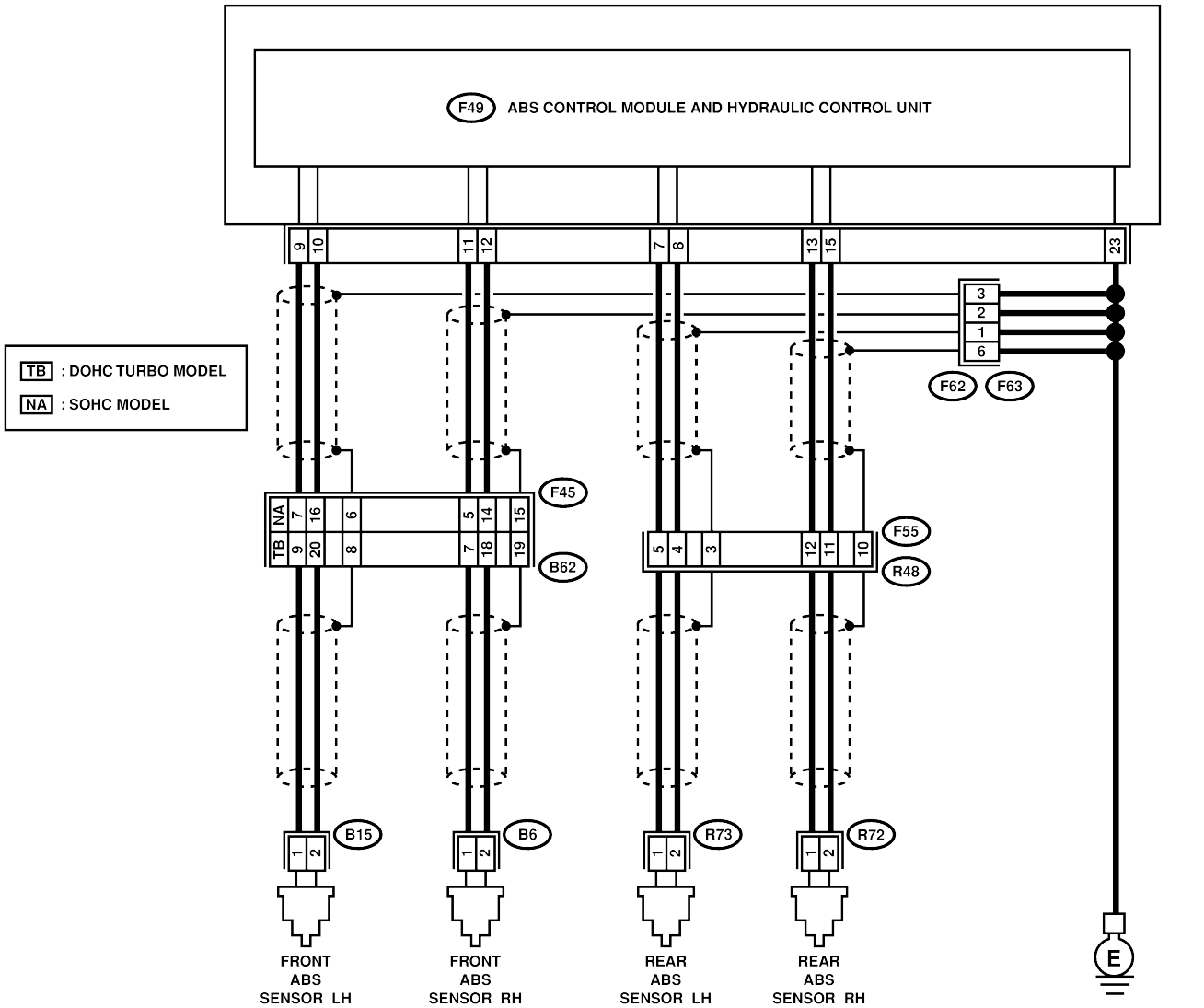
MEMO:

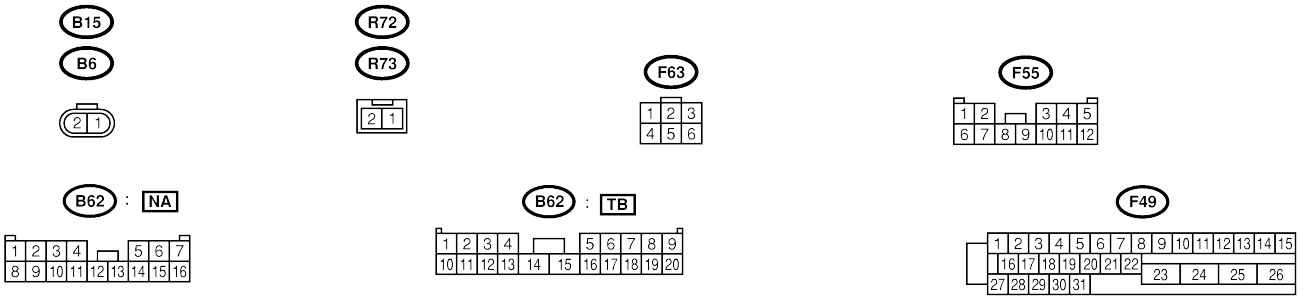
L: TROUBLE CODE 29 — ABNORMAL ABS SENSOR SIGNAL (ANY ONE OF FOUR) — S006522E68

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.

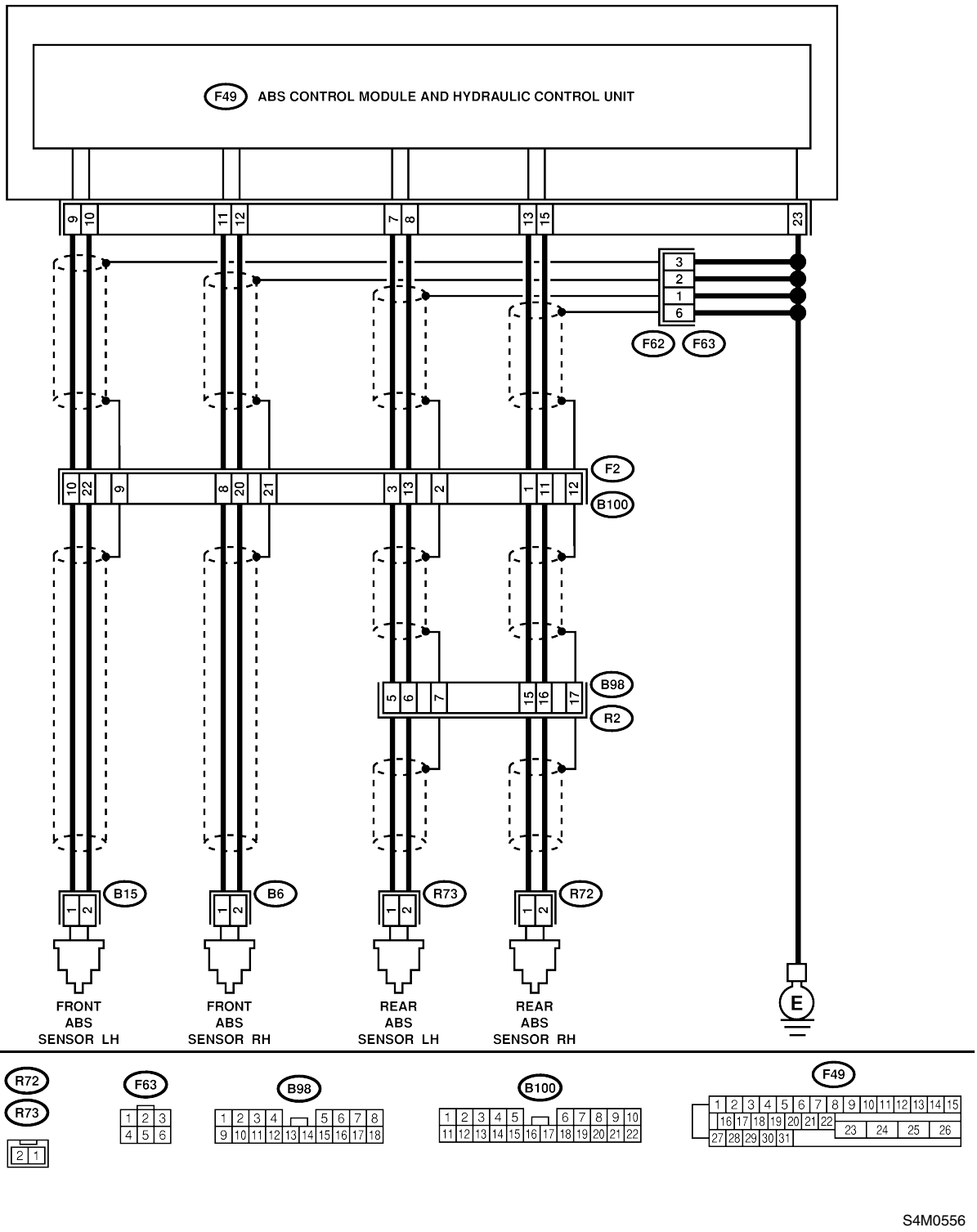
WIRING DIAGRAM: LHD MODEL





S4M0555

WIRING DIAGRAM: RHD MODEL



S4M0556

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 trouble code. NOTE: When the wheels turn freely for a long time, such as when the vehicle is towed or jacked-up, or when steering wheel is continuously turned all the way, this trouble code may sometimes occur.	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**.

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

No.	Step	Check	Yes	No
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 trouble code 29. ***Connector & terminal*** ***Front RH*** ***LHD turbo: (B62) No. 7 (+) — No. 18 (–):*** ***LHD non-turbo: (B62) No. 5 (+) — No. 14 (–):*** ***RHD: (B100) No. 8 (+) — No. 20 (–):*** ***Front LH*** ***LHD turbo: (B62) No. 9 (+) — No. 20 (–):*** ***LHD non-turbo: (B62) No. 7 (+) — No. 16 (–):*** ***RHD: (B100) No. 10 (+) — No. 22 (–):*** ***Rear RH*** ***LHD: (F55) No. 12 (+) — No. 11 (–):*** ***RHD: (B98) No. 15 (+) — No. 16 (–):*** ***Rear LH*** ***LHD: (F55) No. 5 (+) — No. 4 (–):*** ***RHD: (B98) No. 5 (+) — No. 6 (–):***	Is oscilloscope pattern smooth, as shown in figure?	Go to step **12**.	Go to step **9**.
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.>

No.	Step	Check	Yes	No
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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

M: TROUBLE CODE 31 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT RH) —

S006522E69

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 37. <Ref. to ABS-62, TROUBLE CODE 37 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>

N: TROUBLE CODE 33 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT LH) —

S006522E70

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 37. <Ref. to ABS-62, TROUBLE CODE 37 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>

O: TROUBLE CODE 35 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR RH) —

S006522E71

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 37. <Ref. to ABS-62, TROUBLE CODE 37 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>

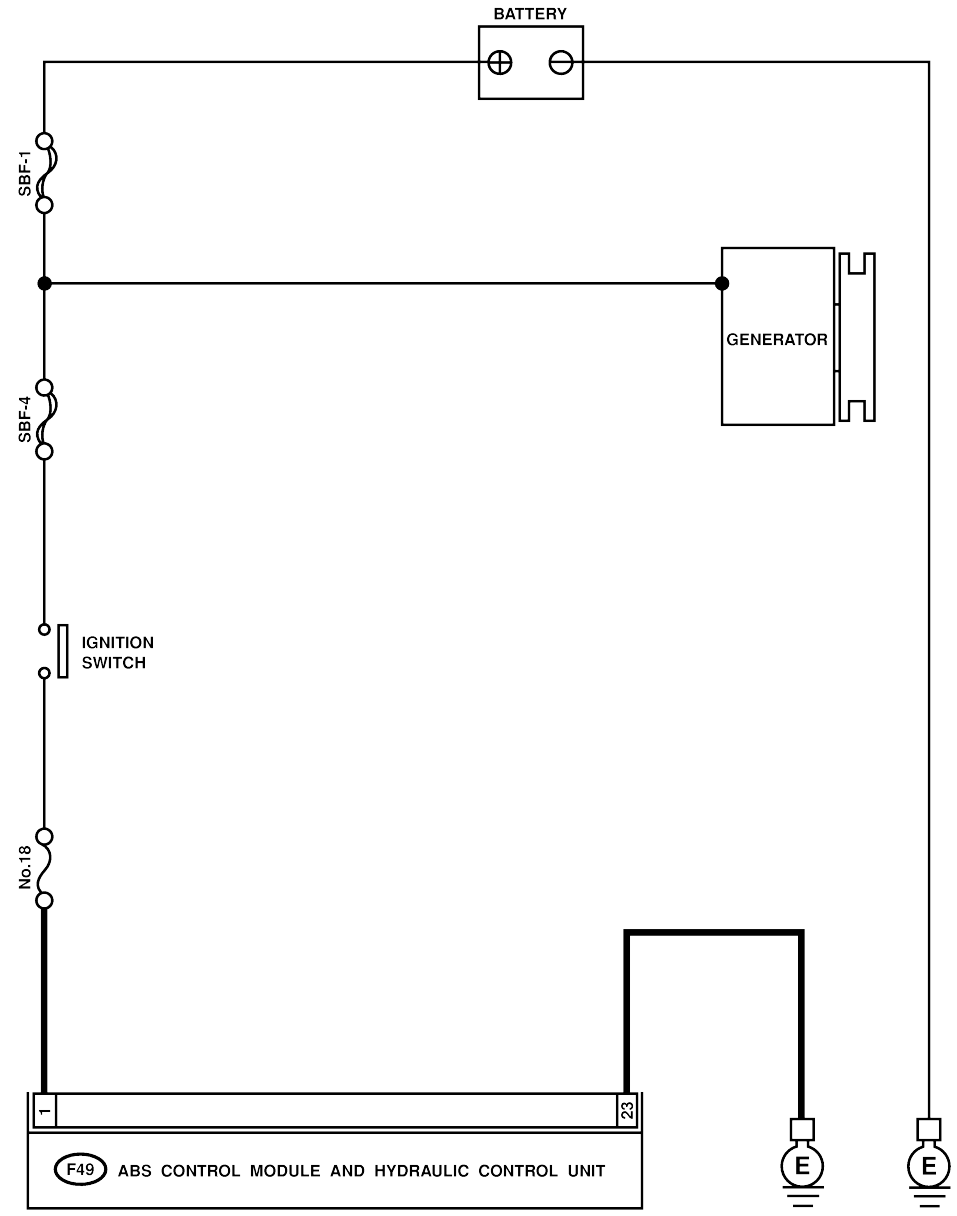
P: TROUBLE CODE 37 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH) —

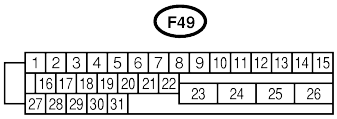
S006522E72

DIAGNOSIS:
- Faulty harness/connector
- Faulty inlet solenoid valve in ABSCM&H/U

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0557

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

MEMO:

Q: TROUBLE CODE 32 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT RH) — S006522E73

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 38. <Ref. to ABS-66, TROUBLE CODE 38 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>

R: TROUBLE CODE 34 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT LH) — S006522E74

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 38. <Ref. to ABS-66, TROUBLE CODE 38 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>

S: TROUBLE CODE 36 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR RH) — S006522E75

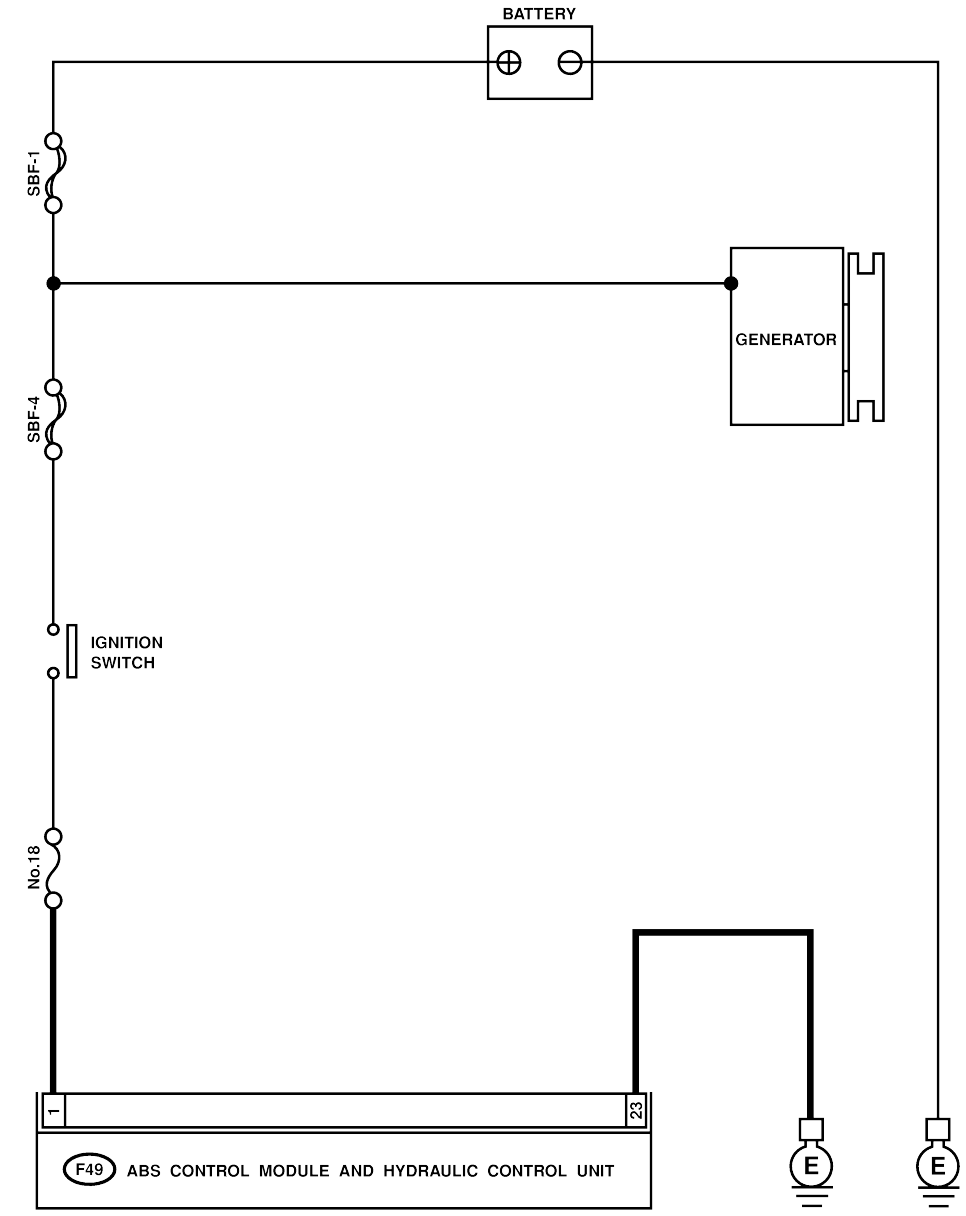
NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 38. <Ref. to ABS-66, TROUBLE CODE 38 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>

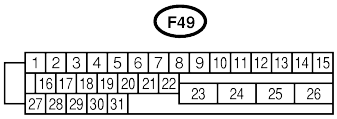
T: TROUBLE CODE 38 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH) — S006522E76

DIAGNOSIS:
- Faulty harness/connector
- Faulty outlet solenoid valve in ABSCM&H/U

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0557

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

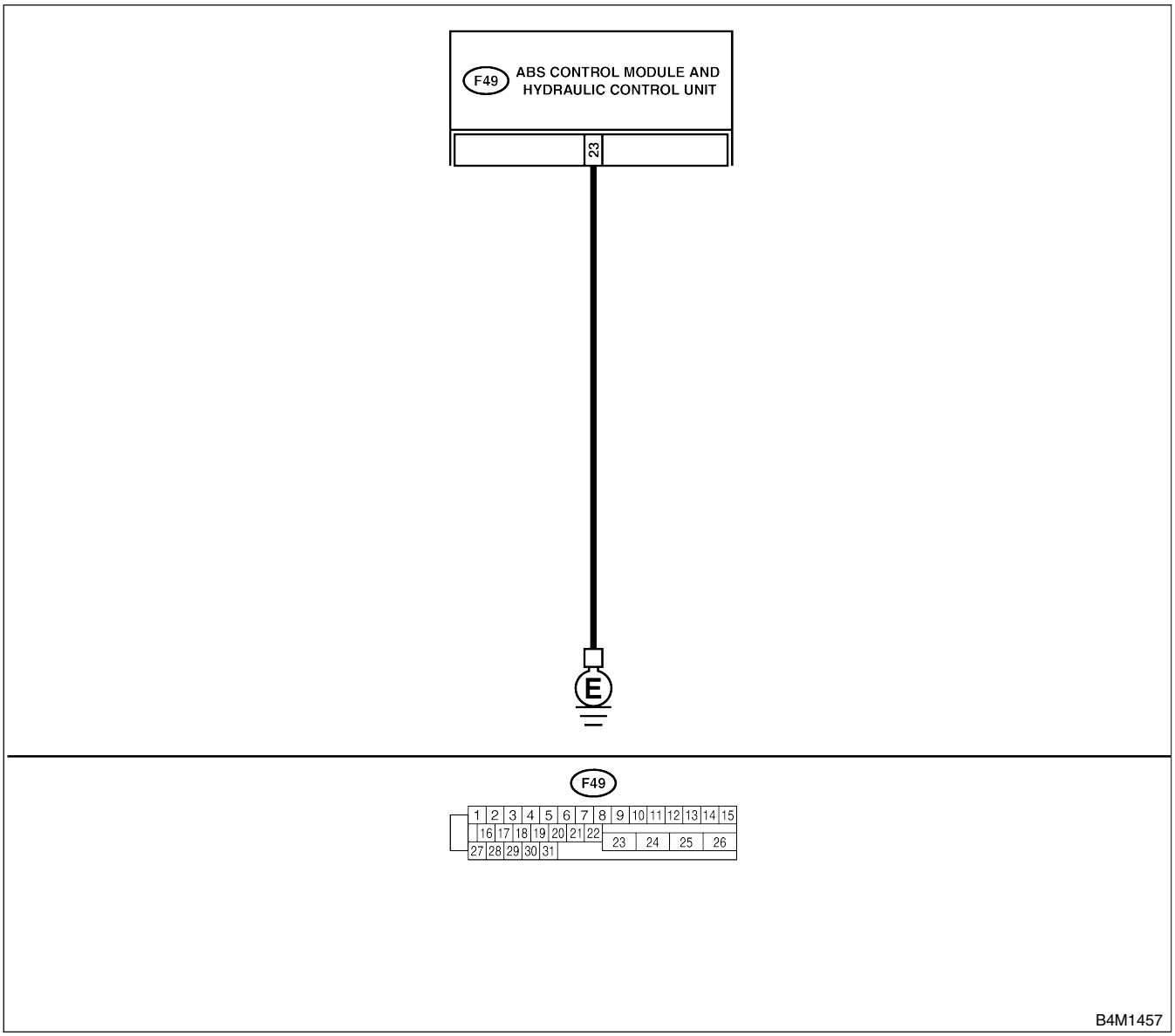
MEMO:

U: TROUBLE CODE 41
— ABNORMAL ABS CONTROL MODULE — S006522D29

DIAGNOSIS:
- Faulty ABSCM&H/U.

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

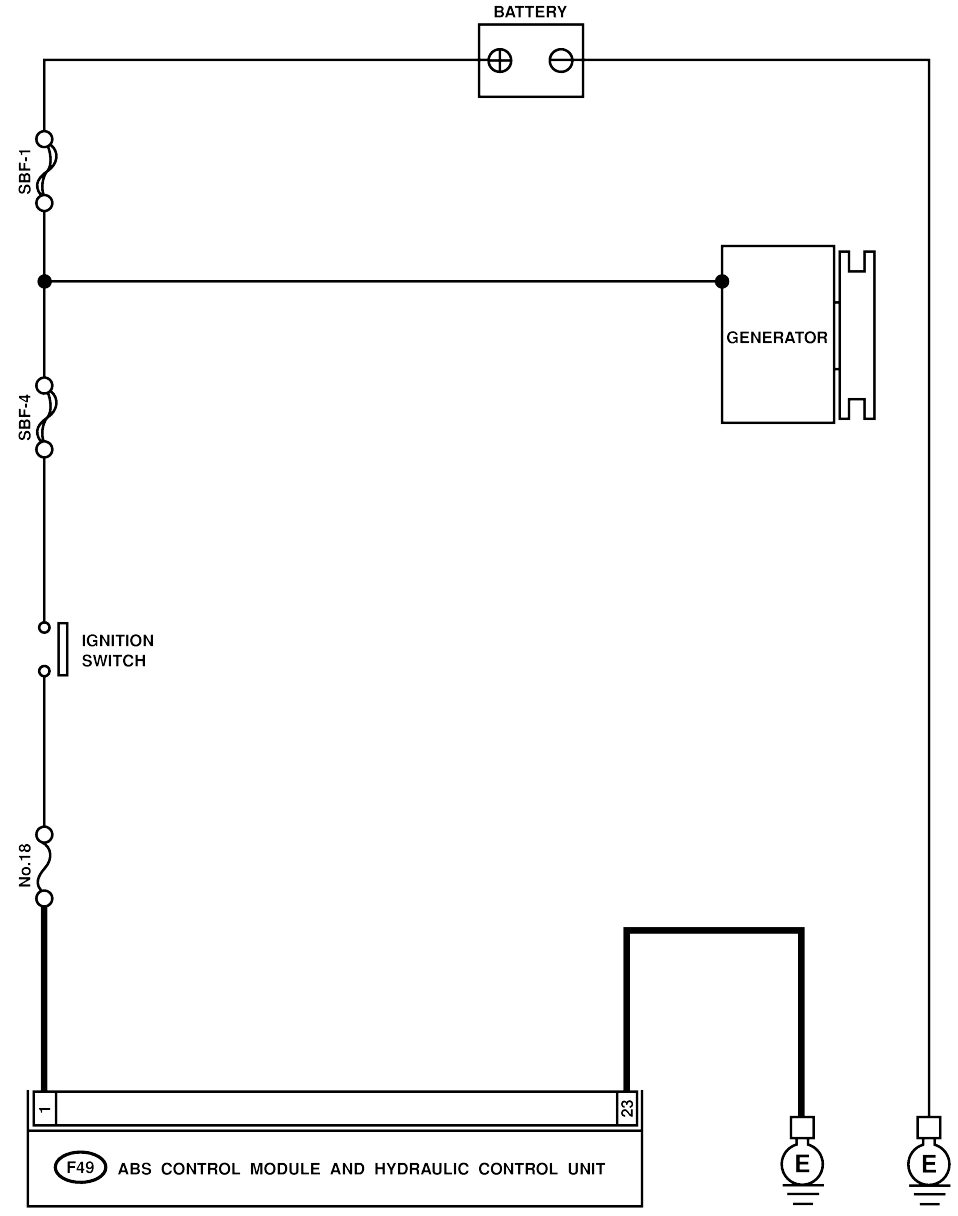
No.	Step	Check	Yes	No
1	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Measure resistance between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

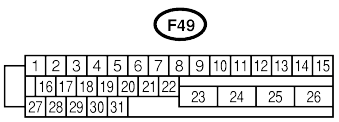
V: TROUBLE CODE 42
— SOURCE VOLTAGE IS ABNORMAL. — S006522D37

DIAGNOSIS:
- Power source voltage of the ABSCM&H/U is low or high.

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0557

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

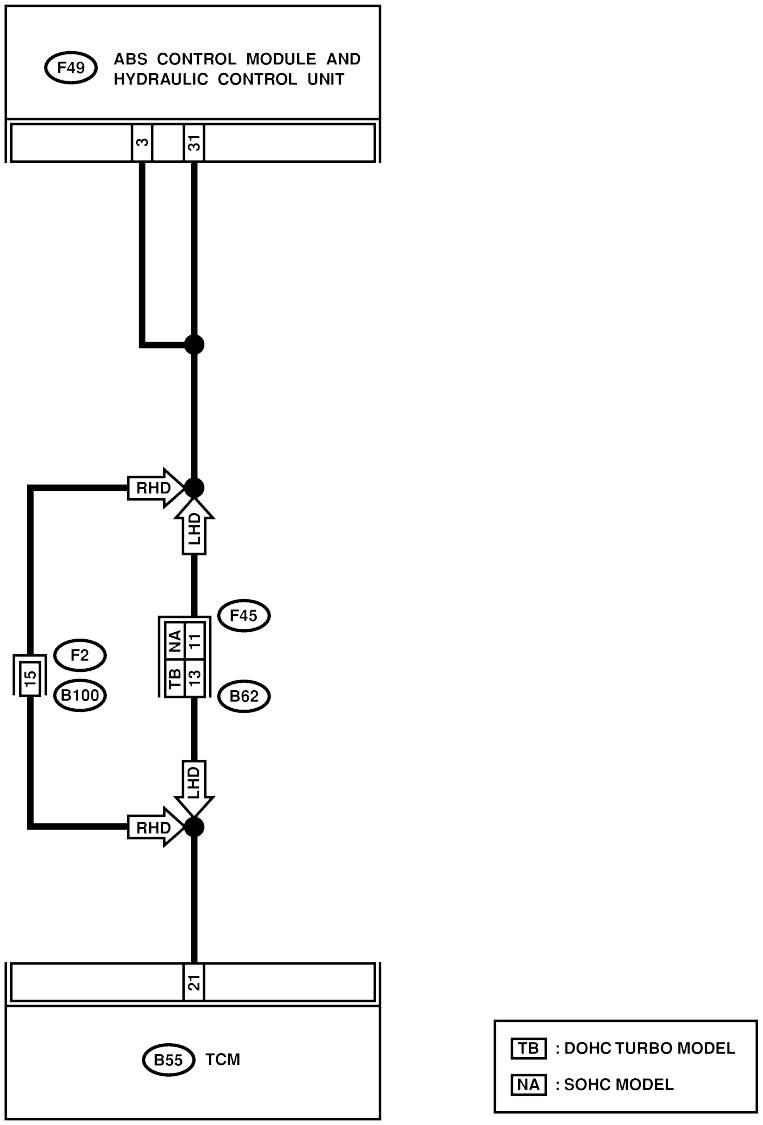
No.	Step	Check	Yes	No
1	**CHECK GENERATOR.** 1) Start engine. 2) Idling after warm-up. 3) Measure voltage between generator B terminal and chassis ground. ***Terminal*** ***Generator B terminal — Chassis ground:***	Is the voltage between 10 and 17 V?	Go to step **2**.	Repair generator. <Ref. to SC-12, 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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

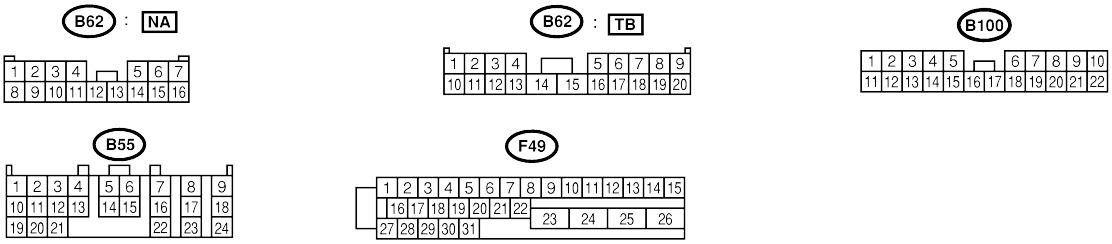
W: TROUBLE CODE 44
— A COMBINATION OF AT CONTROL ABNORMAL — S006522D42

DIAGNOSIS:
- Combination of AT control faults

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0558

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

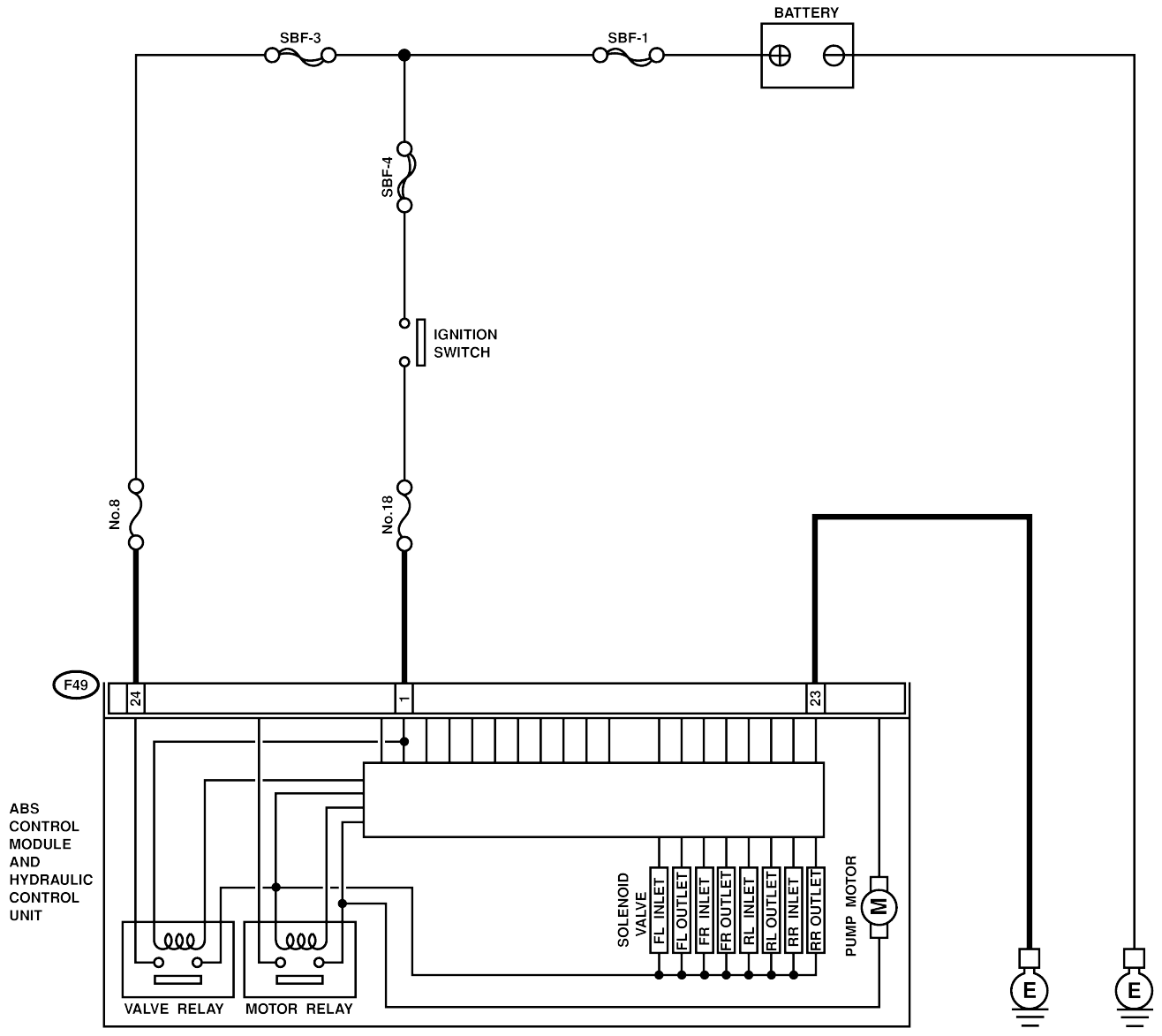
No.	Step	Check	Yes	No
1	**CHECK SPECIFICATIONS OF THE ABSCM&H/U.** Check specifications of the mark to the ABSCM&H/U. ***C7: AT*** ***C8: MT***	Is an ABSCM&H/U for AT model installed on a MT model?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **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*** ***(B55) No. 21 (+) — 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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

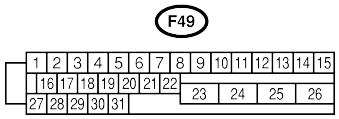
X: TROUBLE CODE 51
— ABNORMAL VALVE RELAY — S006522D61

DIAGNOSIS:
- Faulty valve relay

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0559

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

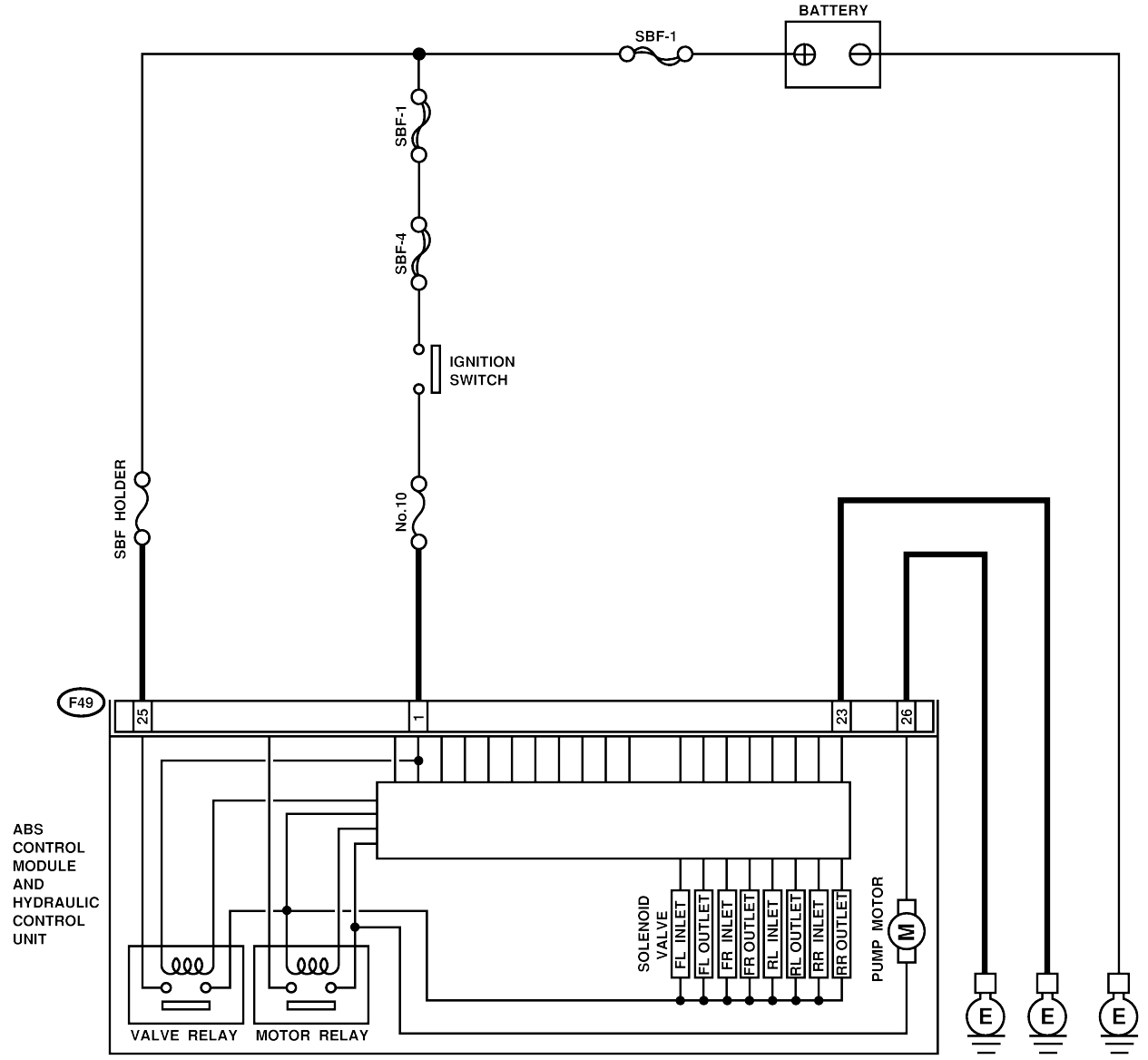
No.	Step	Check	Yes	No
1	**CHECK FUSE.**	Is the fuse blown out?	Replace fuse.	Go to step **2**.
2	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Run the engine at idle. 4) Measure voltage between ABSCM&H/U connector and chassis ground. ***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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

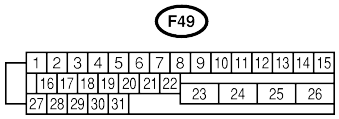
Y: TROUBLE CODE 52 — ABNORMAL MOTOR AND/OR MOTOR RELAY — S006522D65

DIAGNOSIS:
- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0560

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

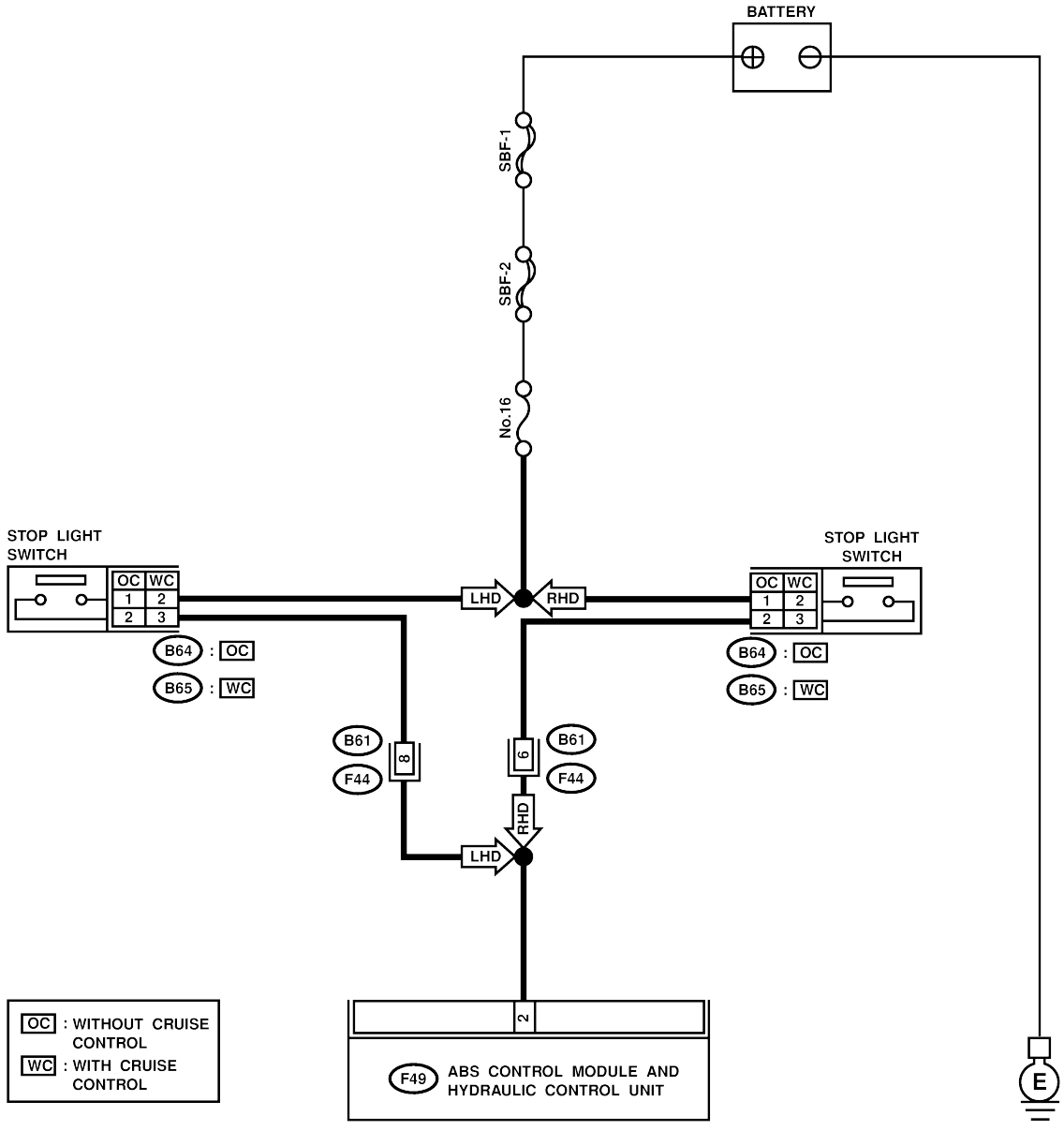
MEMO:

Z: TROUBLE CODE 54
— ABNORMAL STOP LIGHT SWITCH — S006522D72

DIAGNOSIS:
- Faulty stop light switch

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0561

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

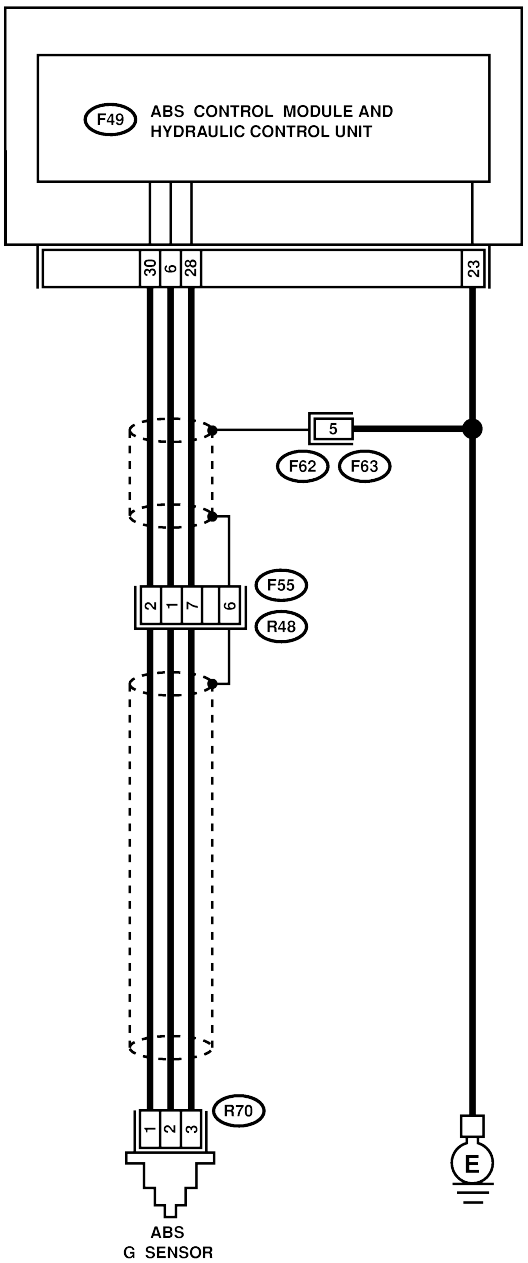
No.	Step	Check	Yes	No
1	**CHECK STOP LIGHTS COME ON.** Depress the brake pedal.	Do stop lights come on?	Go to step **2**.	Repair stop lights circuit.
2	**CHECK OPEN CIRCUIT IN HARNESS.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Depress brake pedal. 4) Measure voltage 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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

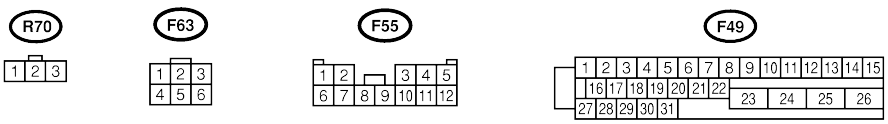
AA: TROUBLE CODE 56
— ABNORMAL G SENSOR OUTPUT VOLTAGE — S006522E77

DIAGNOSIS:
- Faulty G sensor output voltage

TROUBLE SYMPTOM:
- ABS does not operate.

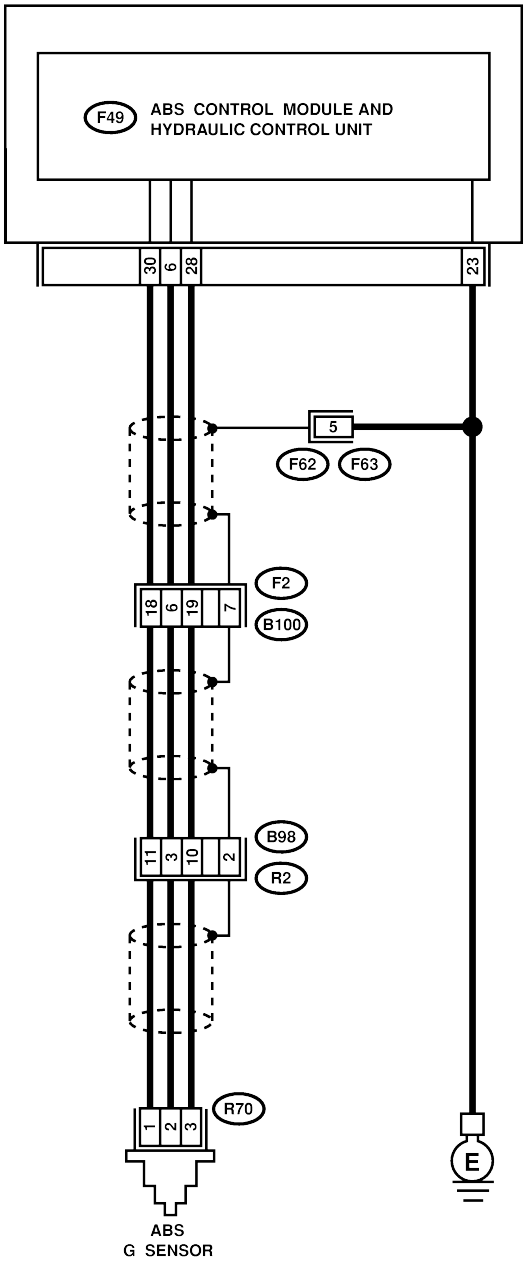
WIRING DIAGRAM: LHD MODEL

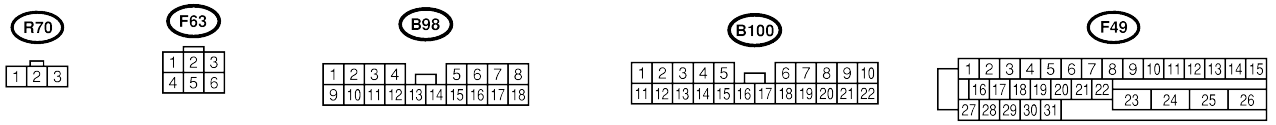




S4M0562

WIRING DIAGRAM: RHD MODEL





S4M0563

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

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 trouble code.	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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

AB: SELECT MONITOR S006522E48

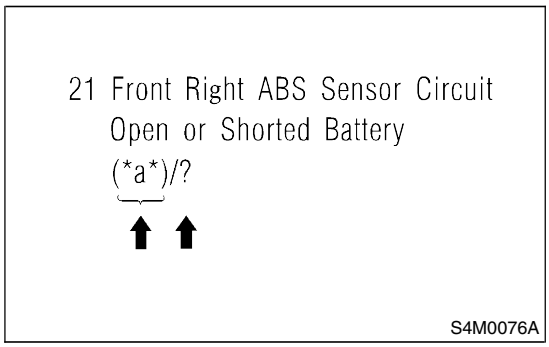
Applicable cartridge of select monitor: <Ref. to ABS-10, Special Tools, PREPARATION TOOL, General Description.>

NOTE:
For basic handling of the select monitor, refer to its Operation Manual.

AC: TROUBLE CODES ARE DISPLAYED. S006522E51

A maximum of 3 trouble codes are displayed in order of occurrence.

- If a particular trouble code is not properly stored in memory (due to a drop in ABSCM&H/U power supply, etc.) when a problem occurs, the trouble code, followed by a question mark "?", appears on the select monitor display. This shows it may be an unreliable reading.



- *a* refers to the troubles in order of occurrence (Latest, Old, Older and Reference).

Display screen	Contents to be monitored
Latest	The most recent trouble code appears on the select monitor display.
Old	The second most recent trouble code appears on the select monitor display.
Older	The third most recent trouble code appears on the select monitor display.
Reference	A specified period of time proceeding trouble code appears on the select monitor display.

AD: CLEAR MEMORY S006522E33

Display screen	Contents to be monitored
Clear memory?	Function of clearing trouble code and freeze frame data.

AE: ANALOG DATA ARE DISPLAYED. S006522E29

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. S006522E43

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

S006522E23

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 S006522E39

NOTE:
- Data stored at the time of trouble occurrence is shown on display.
- Each time trouble occurs, the latest information is stored in the freeze frame data in memory.
- If freeze frame data is not properly stored in memory (due to a drop in ABSCM power supply, etc.), a trouble code, preceded by a question mark "?", appears on the select monitor display. This shows it may be an unreliable reading.

Display screen	Contents to be monitored
FR wheel speed	Wheel speed detected by the Front Right ABS sensor is displayed in km/h or mile/h.
FL wheel speed	Wheel speed detected by the Front Left ABS sensor is displayed in km/h or mile/h.
RR wheel speed	Wheel speed detected by the Rear Right ABS sensor is displayed in km/h or mile/h.
RL wheel speed	Wheel speed detected by the Rear Left ABS sensor is displayed in km/h or mile/h.
ABSCM power voltage	Power (in volts) supplied to ABSCM&H/U appears on the select monitor display.
G sensor output voltage	Refers to vehicle acceleration detected by the analog G sensor. It appears on the select monitor display in volts.
Motor relay monitor	Motor relay operation monitor signal
Stop light switch	Stop light switch signal
ABS signal to TCM	ABS operation signal from ABS control module to TCM
ABS-AT control	ABS operation signal from ABS control module to TCM
ABS operation signal	ABS operation signal

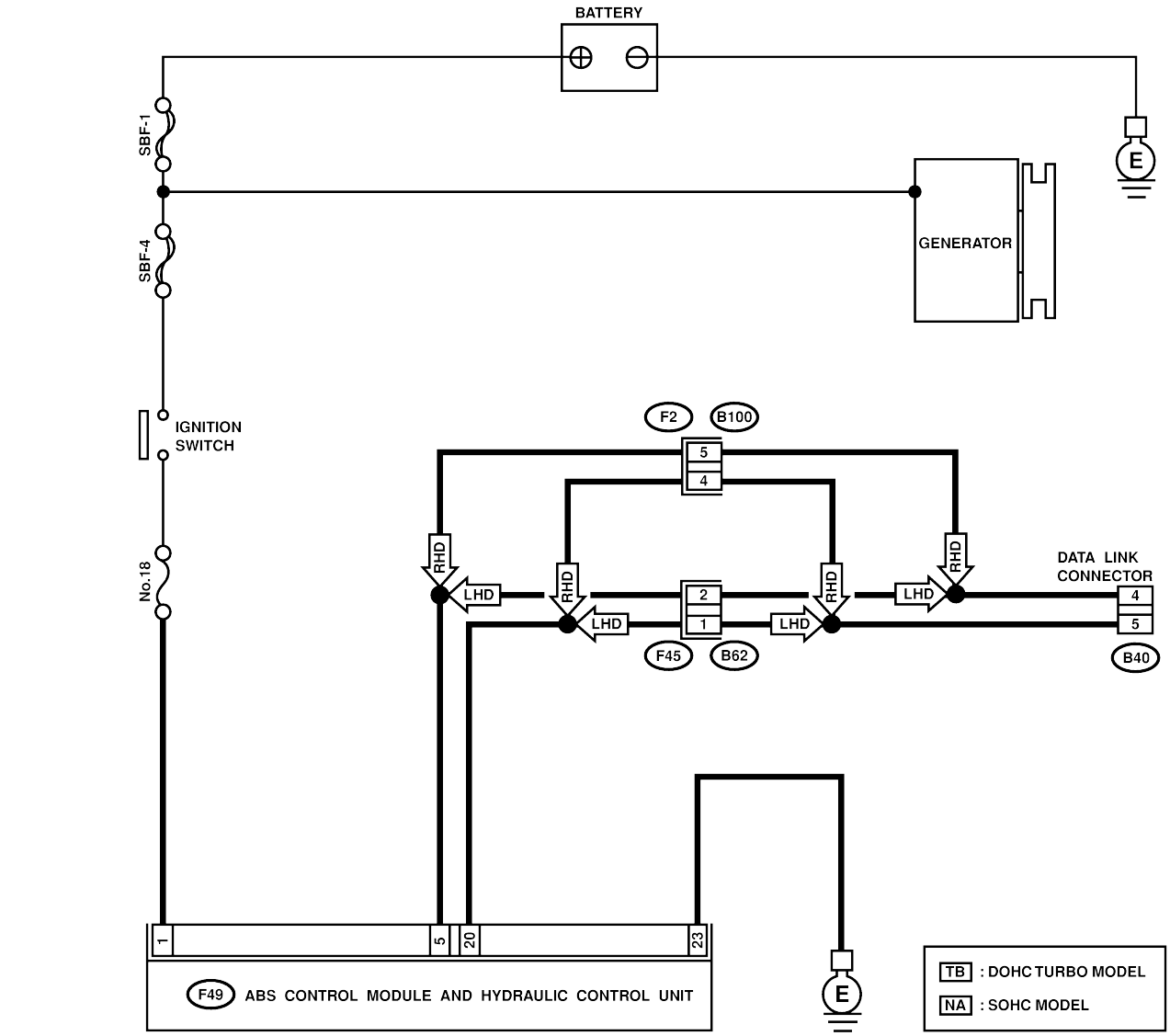
13. Diagnostics Chart with Subaru Select Monitor S006583

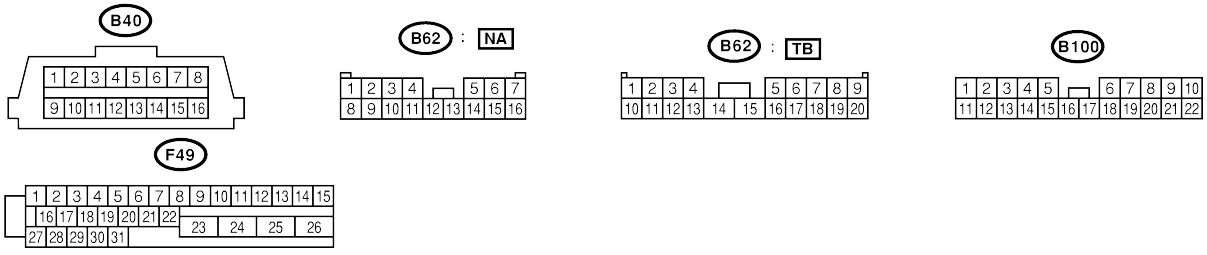
A: COMMUNICATION FOR INITIALIZING IMPOSSIBLE S006583E34

DIAGNOSIS:
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS warning light remains on.

WIRING DIAGRAM:





S4M0564

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

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).>

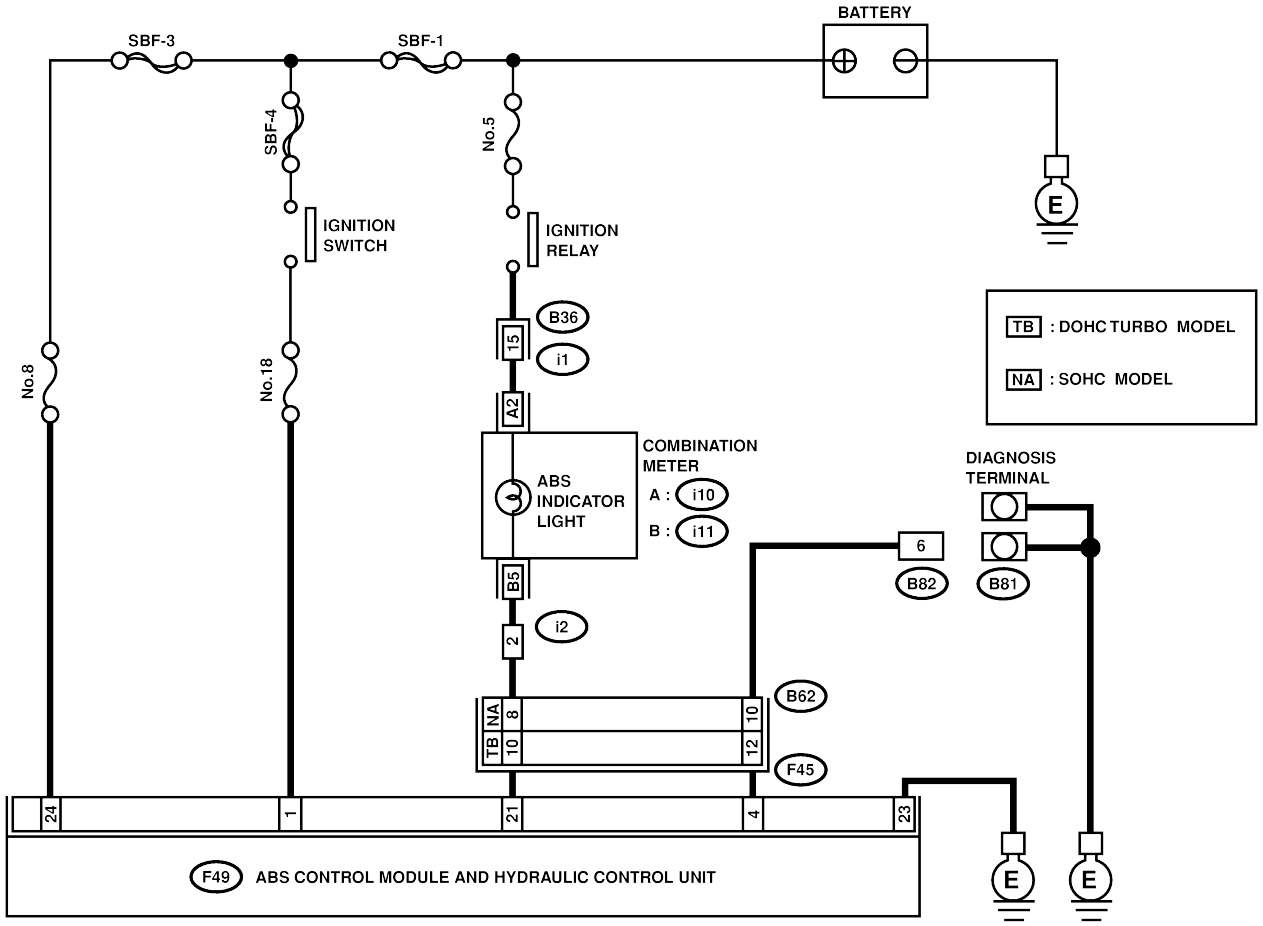
B: NO TROUBLE CODE S006583E41

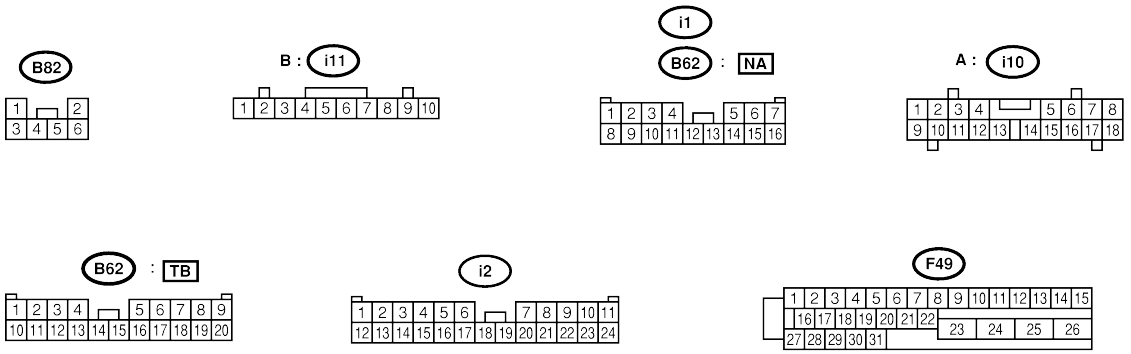
DIAGNOSIS:
- ABS warning light circuit is shorted.

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: LHD MODEL

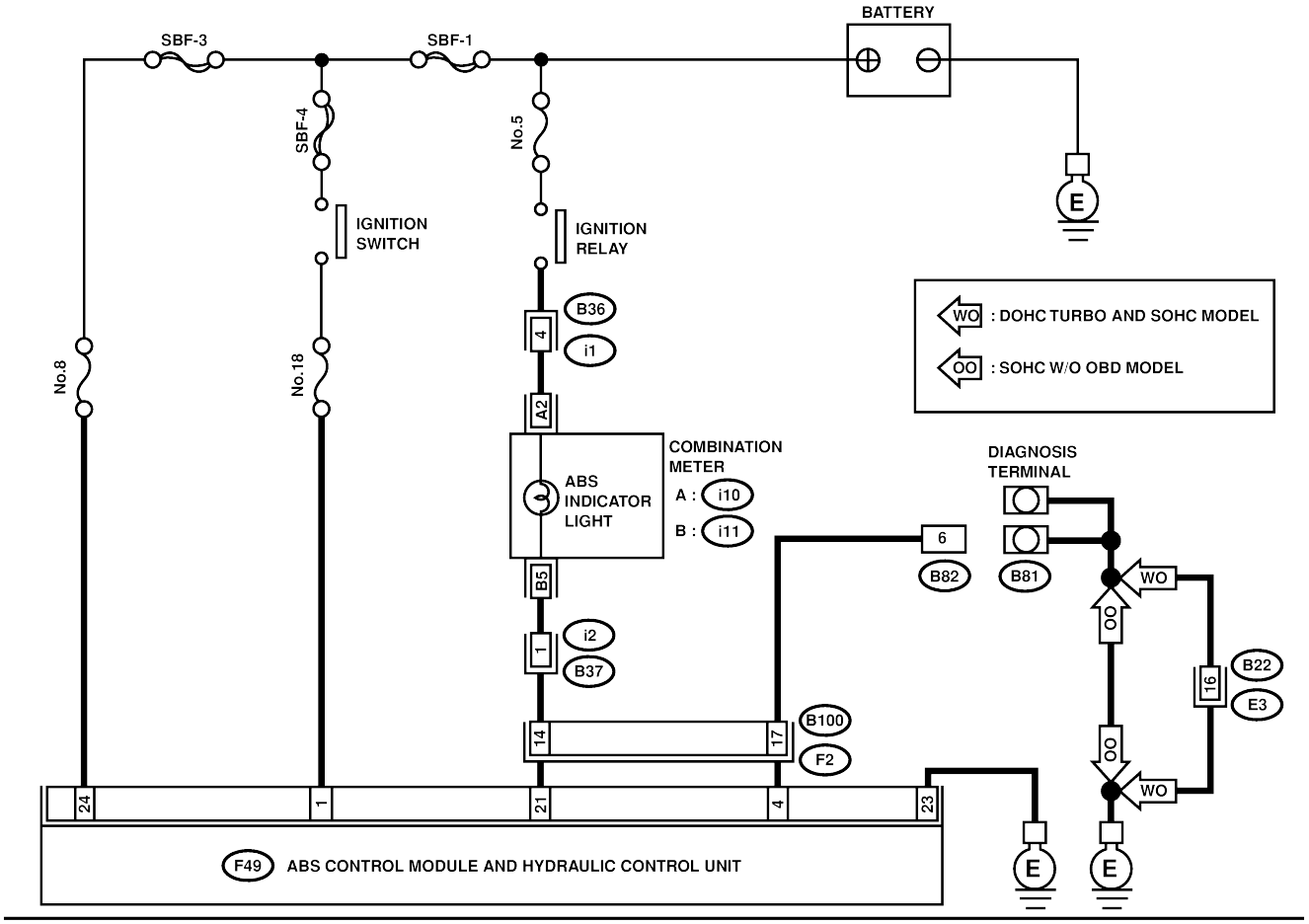


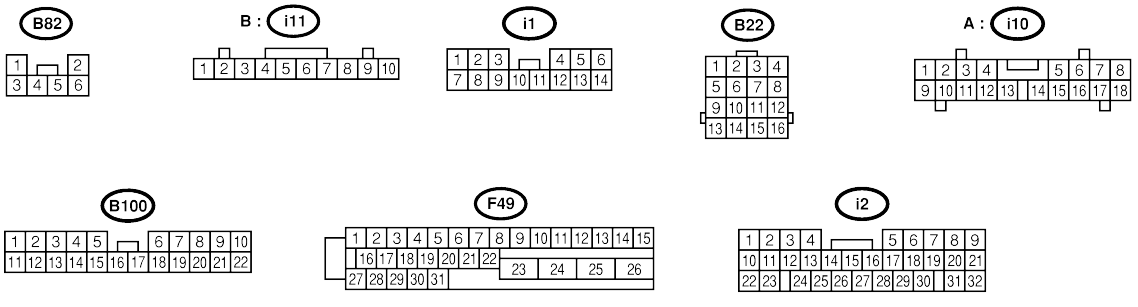


S4M0553

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

WIRING DIAGRAM: RHD MODEL





S4M0554

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

No.	Step	Check	Yes	No
1	**CHECK WIRING HARNESS.** 1) Turn ignition switch to OFF. 2) Disconnect connector (F45) or (F2) from connector (B62) or (B100). 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) or (F2) and chassis ground. ***Connector & terminal*** ***LHD turbo: (F45) No. 10 — Chassis ground:*** ***LHD non-turbo: (F45) No. 8 — Chassis ground:*** ***RHD: (F2) No. 14 — 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) or (F2) and chassis ground. ***Connector & terminal*** ***LHD turbo: (F45) No. 10 — Chassis ground:*** ***LHD non-turbo: (F45) No. 8 — Chassis ground:*** ***RHD: (F2) No. 14 — 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).>

C: TROUBLE CODE 21
— OPEN OR SHORT CIRCUIT IN FRONT RIGHT ABS SENSOR CIRCUIT — S006583C50

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 27. <Ref. to ABS-98, TROUBLE CODE 27 — OPEN OR SHORT CIRCUIT IN REAR LEFT ABS SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>

D: TROUBLE CODE 23
— OPEN OR SHORT CIRCUIT IN FRONT LEFT ABS SENSOR CIRCUIT — S006583C60

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 27. <Ref. to ABS-98, TROUBLE CODE 27 — OPEN OR SHORT CIRCUIT IN REAR LEFT ABS SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>

E: TROUBLE CODE 25
— OPEN OR SHORT CIRCUIT IN REAR RIGHT ABS SENSOR CIRCUIT — S006583C69

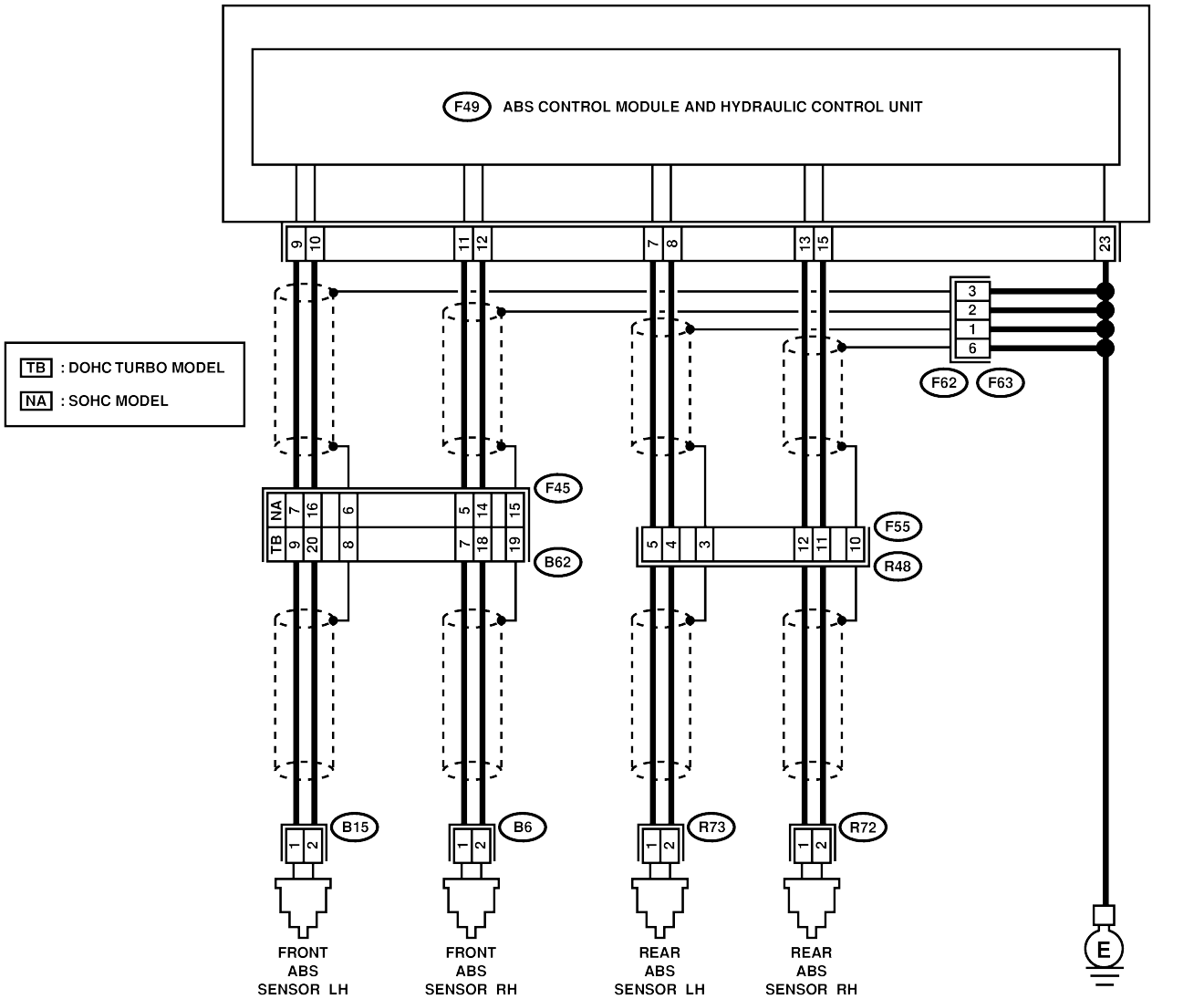
NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 27. <Ref. to ABS-98, TROUBLE CODE 27 — OPEN OR SHORT CIRCUIT IN REAR LEFT ABS SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>

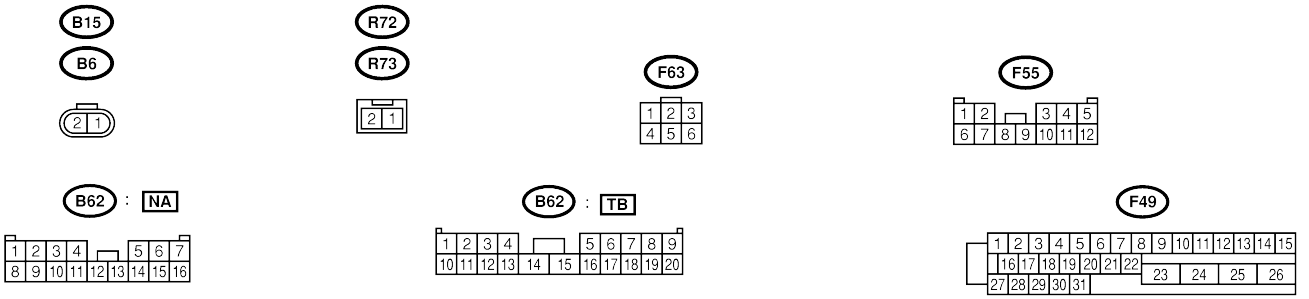
F: TROUBLE CODE 27
— OPEN OR SHORT CIRCUIT IN REAR LEFT ABS SENSOR CIRCUIT — S006583C78

DIAGNOSIS:
- Faulty ABS sensor (Broken wire, input voltage too high)
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS does not operate.

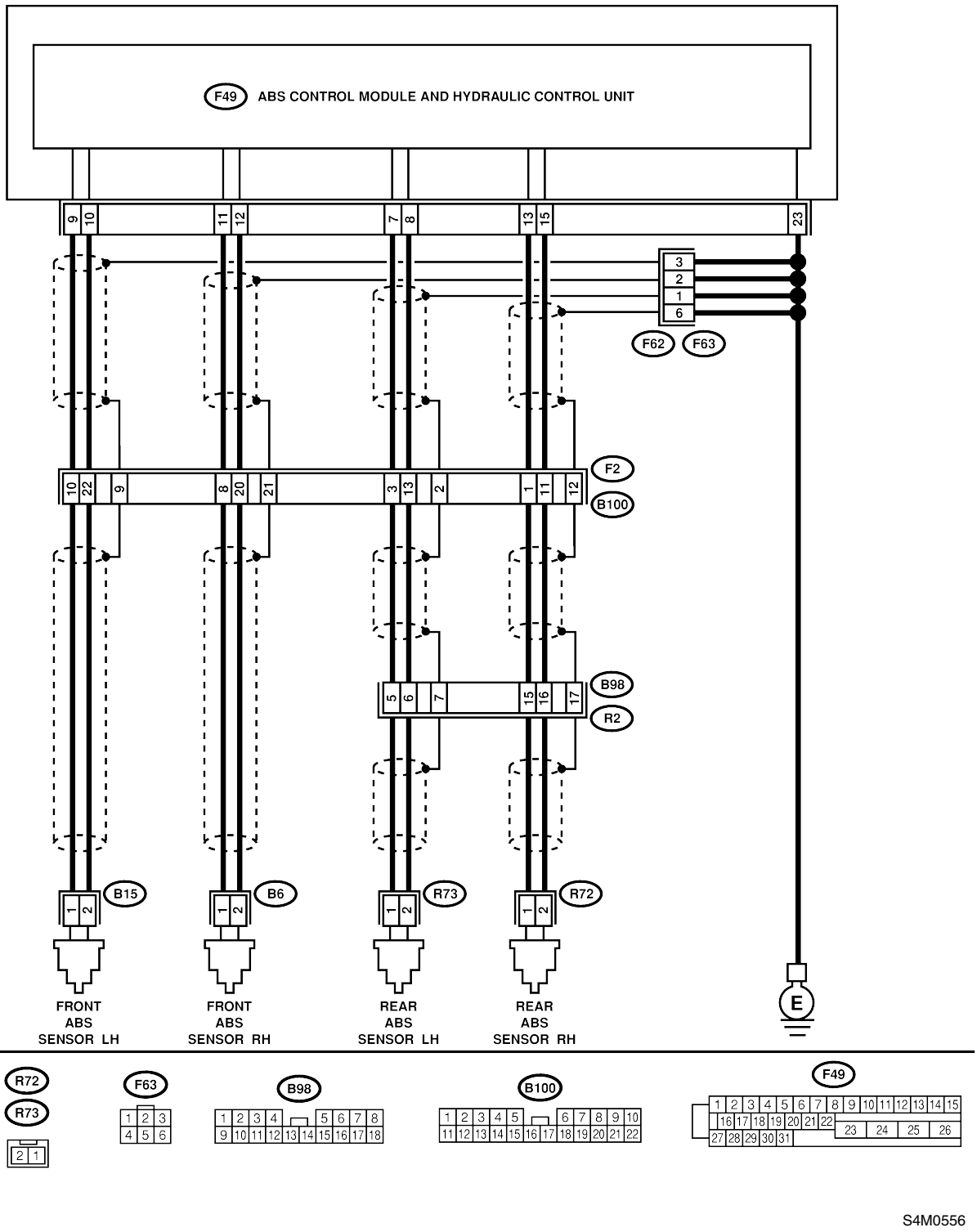
WIRING DIAGRAM: LHD MODEL





S4M0555

WIRING DIAGRAM: RHD MODEL



S4M0556

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	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*** ***Trouble code 21 / (F49) No. 11 — No. 12:*** ***Trouble code 23 / (F49) No. 9 — No. 10:*** ***Trouble code 25 / (F49) No. 13 — No. 15:*** ***Trouble code 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*** ***Trouble code 21 / (F49) No. 11 (+) — Chassis ground (–):*** ***Trouble code 23 / (F49) No. 9 (+) — Chassis ground (–):*** ***Trouble code 25 / (F49) No. 13 (+) — Chassis ground (–):*** ***Trouble code 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*** ***Trouble code 21 / (F49) No. 11 (+) — Chassis ground (–):*** ***Trouble code 23 / (F49) No. 9 (+) — Chassis ground (–):*** ***Trouble code 25 / (F49) No. 13 (+) — Chassis ground (–):*** ***Trouble code 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).>

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

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*** ***Trouble code 21 / (F49) No. 11 — Chassis ground:*** ***Trouble code 23 / (F49) No. 9 — Chassis ground:*** ***Trouble code 25 / (F49) No. 13 — Chassis ground:*** ***Trouble code 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 trouble code.	Is the same trouble code as in the current diagnosis still being output?	Replace ABSCM&H/U.	Go to step **21**.
21	**CHECK ANY OTHER TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact. NOTE: Check harness and connectors between ABSCM&H/U and ABS sensor.

MEMO:

G: TROUBLE CODE 22 — FRONT RIGHT ABNORMAL ABS SENSOR SIGNAL — S006583C54

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 28. <Ref. to ABS-106, TROUBLE CODE 28 — REAR LEFT ABNORMAL ABS SENSOR SIGNAL —, Diagnostics Chart with Subaru Select Monitor.>

H: TROUBLE CODE 24 — FRONT LEFT ABNORMAL ABS SENSOR SIGNAL — S006583C64

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 28. <Ref. to ABS-106, TROUBLE CODE 28 — REAR LEFT ABNORMAL ABS SENSOR SIGNAL —, Diagnostics Chart with Subaru Select Monitor.>

I: TROUBLE CODE 26 — REAR RIGHT ABNORMAL ABS SENSOR SIGNAL — S006583C73

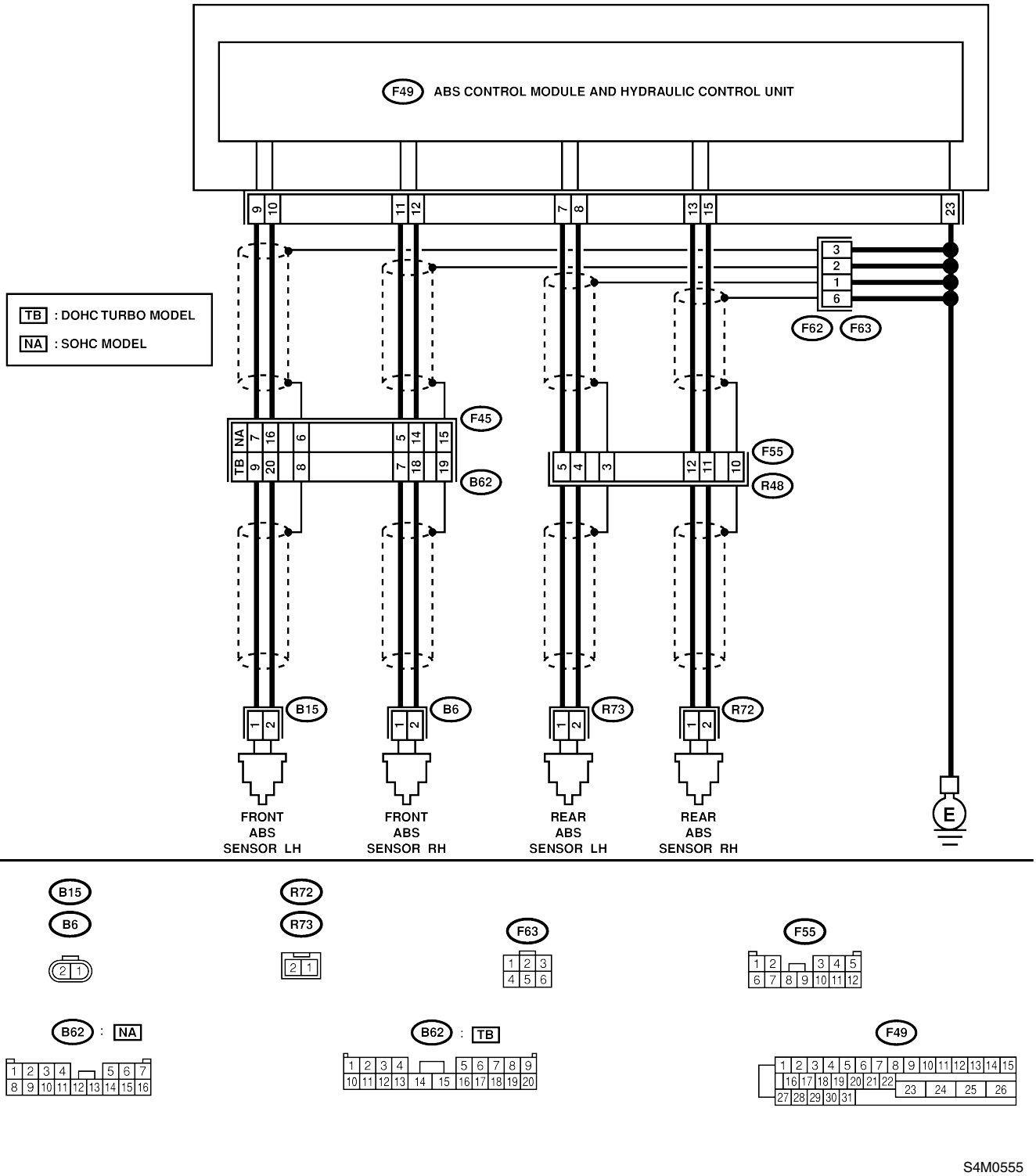
NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 28. <Ref. to ABS-106, TROUBLE CODE 28 — REAR LEFT ABNORMAL ABS SENSOR SIGNAL —, Diagnostics Chart with Subaru Select Monitor.>

J: TROUBLE CODE 28 — REAR LEFT ABNORMAL ABS SENSOR SIGNAL — S006583C82

DIAGNOSIS:
- Faulty ABS sensor signal (noise, irregular signal, etc.)
- Faulty harness/connector

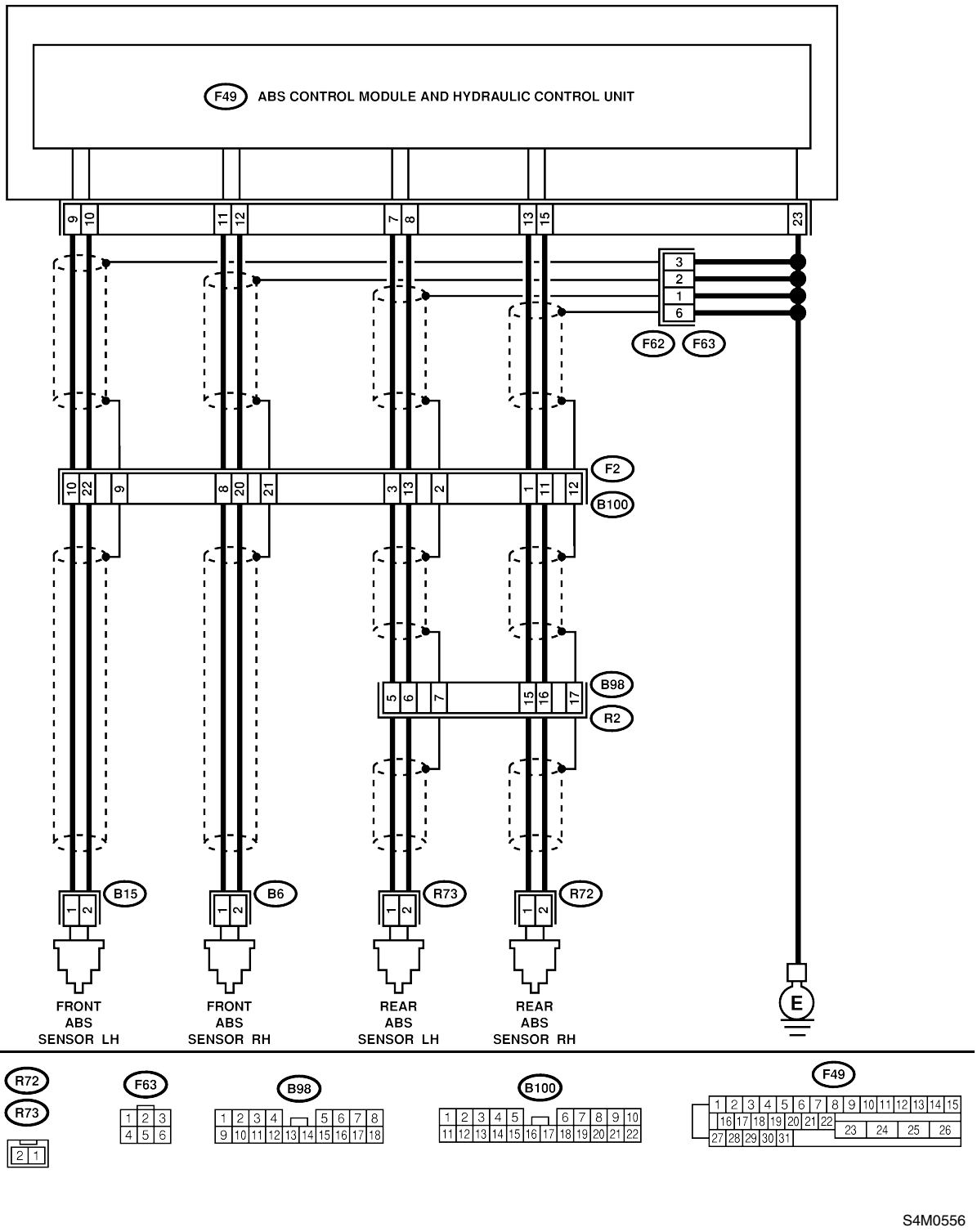
TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM: LHD MODEL



S4M0555

WIRING DIAGRAM: RHD MODEL



S4M0556

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

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*** ***Trouble code 22 /*** ***LHD turbo: (B62) No. 19 — Chassis ground:*** ***LHD non-turbo: (B62) No. 15 — Chassis ground:*** ***RHD: (B100) No. 21 — Chassis ground:*** ***Trouble code 24 /*** ***LHD turbo: (B62) No. 8 — Chassis ground:*** ***LHD non-turbo: (B62) No. 6 — Chassis ground:*** ***RHD: (B100) No. 9 — Chassis ground:*** ***Trouble code 26 /*** ***LHD: (F55) No. 10 — Chassis ground:*** ***RHD: (B100) No. 12 — Chassis ground:*** ***Trouble code 28 /*** ***LHD: (F55) No. 3 — Chassis ground:*** ***RHD: (B100) No. 2 — 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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	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.

No.	Step	Check	Yes	No
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.
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 trouble code 29. ***Connector & terminal*** ***Trouble code 22 /*** ***LHD turbo: (B62) No. 7 (+) — No. 18 (–):*** ***LHD non-turbo: (B62) No. 5 (+) — No. 14 (–):*** ***RHD: (B100) No. 8 (+) — No. 20 (–):*** ***Trouble code 24 /*** ***LHD turbo: (B62) No. 9 (+) — No. 20 (–):*** ***LHD non-turbo: (B62) No. 7 (+) — No. 16 (–):*** ***RHD turbo: (B100) No. 10 (+) — No. 22 (–):*** ***Trouble code 26 /*** ***LHD: (F55) No. 12 (+) — No. 11 (–):*** ***RHD: (B98) No. 15 (+) — No. 16 (–):*** ***Trouble code 28 /*** ***LHD: (F55) No. 5 (+) — No. 4 (–):*** ***RHD: (B98) No. 5 (+) — No. 6 (–):***	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 trouble code.	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**.

No.	Step	Check	Yes	No
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.>
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*** ***Trouble code 22 / (F49) No. 11 — No. 12:*** ***Trouble code 24 / (F49) No. 9 — No. 10:*** ***Trouble code 26 / (F49) No. 13 — No. 15:*** ***Trouble code 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.

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

No.	Step	Check	Yes	No
18	**CHECK GROUND SHORT OF HARNESS.** Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***Trouble code 22 / (F49) No. 11 — Chassis ground:*** ***Trouble code 24 / (F49) No. 9 — Chassis ground:*** ***Trouble code 26 / (F49) No. 13 — Chassis ground:*** ***Trouble code 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**.
23	**CHECK SHIELD CIRCUIT.** 1) Connect all connectors. 2) Measure resistance between shield connector and chassis ground. ***Connector & terminal*** ***Trouble code 22 /*** ***LHD turbo: (B62) No. 19 — Chassis ground:*** ***LHD non-turbo: (B62) No. 15 — Chassis ground:*** ***RHD: (B100) No. 21 — Chassis ground:*** ***Trouble code 24 /*** ***LHD turbo: (B62) No. 8 — Chassis ground:*** ***LHD non-turbo: (B62) No. 6 — Chassis ground:*** ***RHD: (B100) No. 9 — Chassis ground:*** ***Trouble code 26 /*** ***LHD: (F55) No. 10 — Chassis ground:*** ***RHD: (B100) No. 12 — Chassis ground:*** ***Trouble code 28 /*** ***LHD: (F55) No. 3 — Chassis ground:*** ***RHD: (B100) No. 2 — 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 trouble code.	Is the same trouble code 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**.

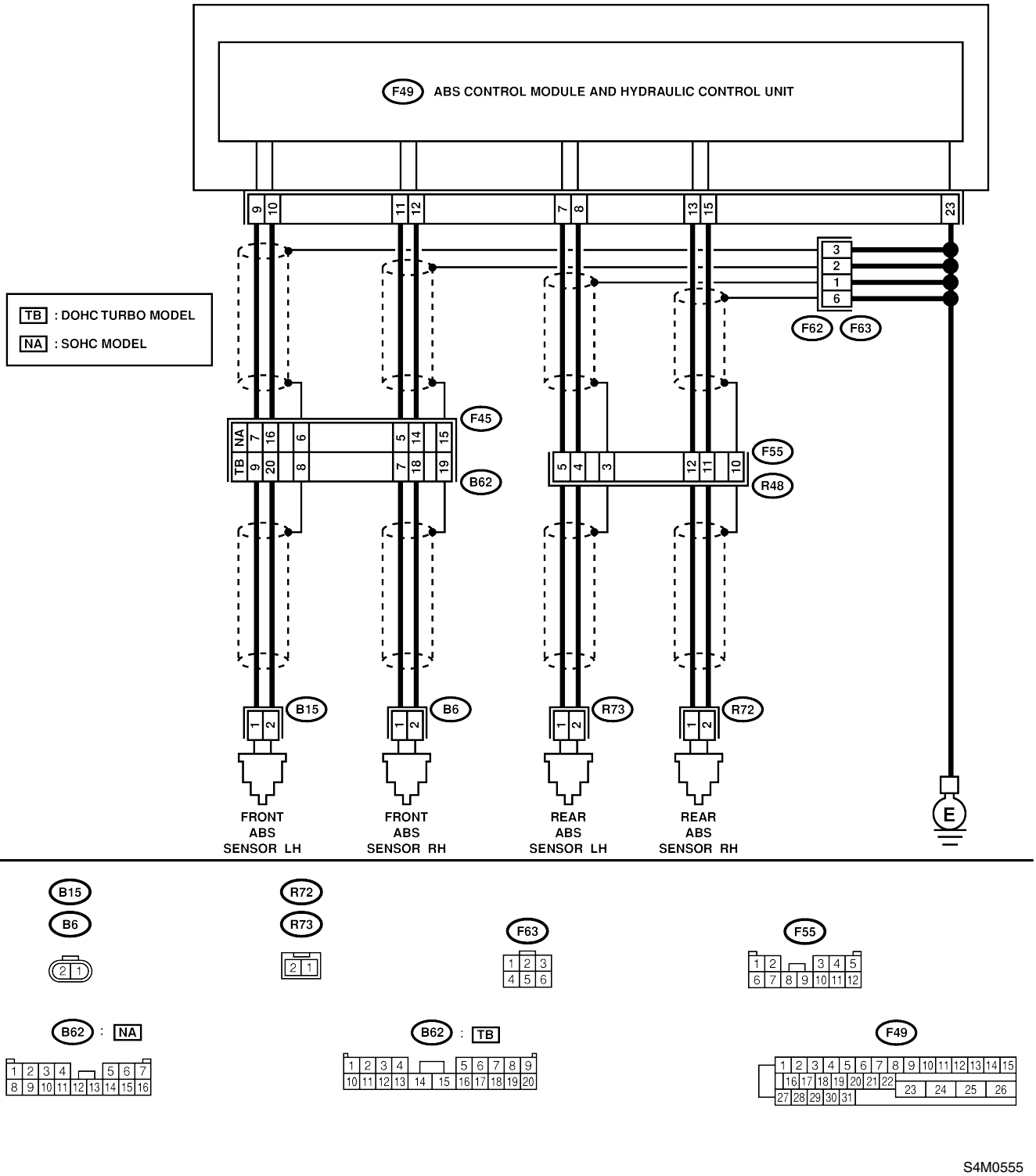
No.	Step	Check	Yes	No
25	**CHECK ANY OTHER TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary noise interference.

K: TROUBLE CODE 29
— ABNORMAL ABS SENSOR SIGNAL ON ANY ONE OF FOUR SENSOR — S006583E78

DIAGNOSIS:
- Faulty ABS sensor signal (noise, irregular signal, etc.)
- Faulty tone wheel
- Wheels turning freely for a long time

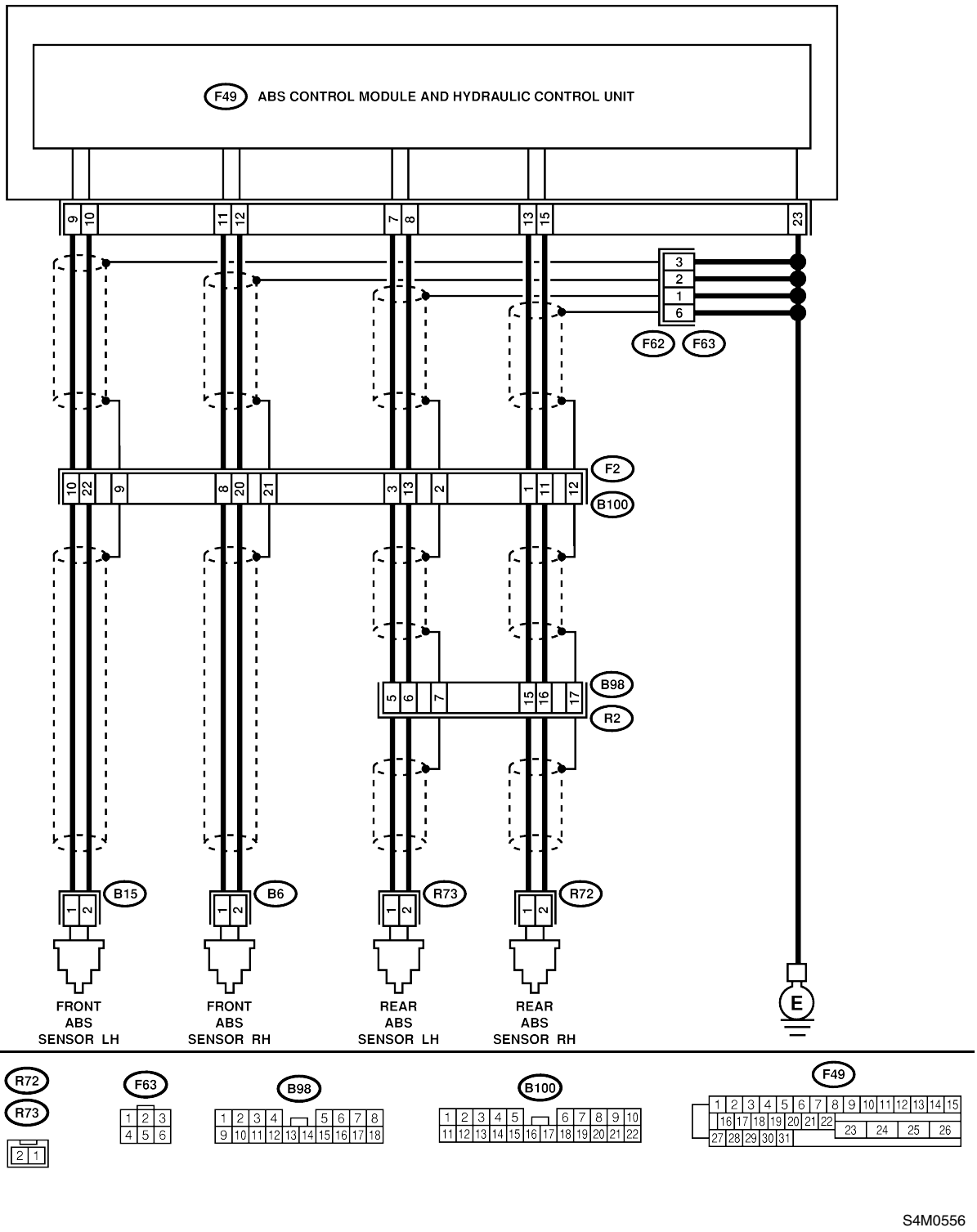
TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM: LHD MODEL



S4M0555

WIRING DIAGRAM: RHD MODEL



S4M0556

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 trouble code. NOTE: When the wheels turn freely for a long time, such as when the vehicle is towed or jacked-up, or when steering wheel is continuously turned all the way, this trouble code may sometimes occur.	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**.

No.	Step	Check	Yes	No
8	**CHECK ABS SENSOR SIGNAL.** 1) Raise all four wheels of ground. 2) Turn ignition switch OFF. 3) Connect the oscilloscope to the connector (B99), (F95) or (F94) in accordance with trouble code. 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 trouble code 29. ***Connector & terminal*** ***Front RH*** ***LHD turbo: (B62) No. 7 (+) — No. 18 (–):*** ***LHD non-turbo: (B62) No. 5 (+) — No. 14 (–):*** ***RHD: (B100) No. 8 (+) — No. 20 (–):*** ***Front LH*** ***LHD turbo: (B62) No. 9 (+) — No. 20 (–):*** ***LHD non-turbo: (B62) No. 7 (+) — No. 16 (–):*** ***RHD: (B100) No. 10 (+) — No. 22 (–):*** ***Rear RH*** ***LHD: (F55) No. 12 (+) — No. 11 (–):*** ***RHD: (B98) No. 15 (+) — No. 16 (–):*** ***Rear LH*** ***LHD: (F55) No. 5 (+) — No. 4 (–):*** ***RHD: (B98) No. 5 (+) — No. 6 (–):***	Is oscilloscope pattern smooth, as shown in figure?	Go to step **12**.	Go to step **9**.
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.>

No.	Step	Check	Yes	No
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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

L: TROUBLE CODE 31 — FRONT RIGHT INLET VALVE MALFUNCTION — S006583C93

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 37. <Ref. to ABS-120, TROUBLE CODE 37 — REAR LEFT INLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>

M: TROUBLE CODE 33 — FRONT LEFT INLET VALVE MALFUNCTION — S006583D03

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 37. <Ref. to ABS-120, TROUBLE CODE 37 — REAR LEFT INLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>

N: TROUBLE CODE 35 — REAR RIGHT INLET VALVE MALFUNCTION — S006583D11

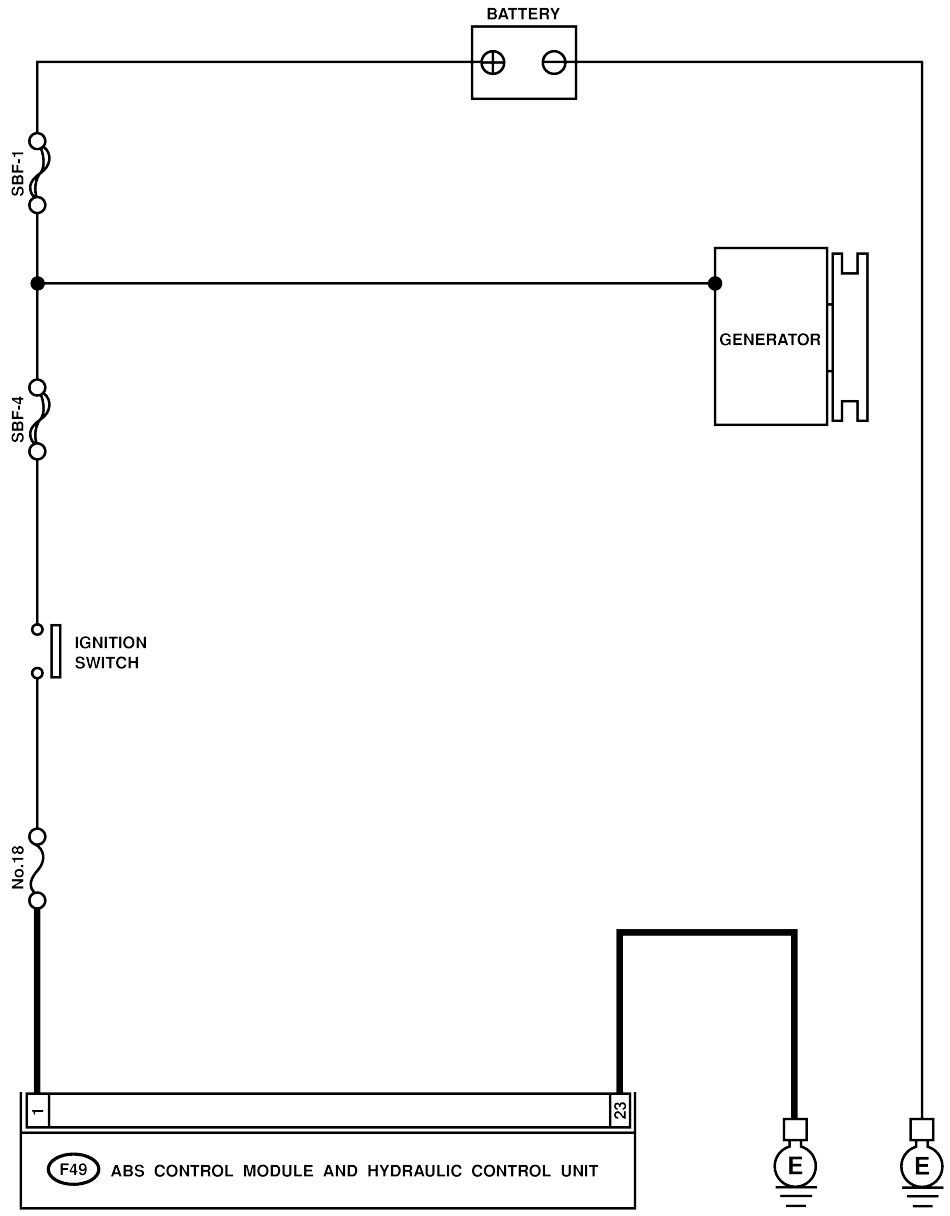
NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 37. <Ref. to ABS-120, TROUBLE CODE 37 — REAR LEFT INLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>

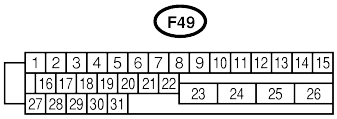
O: TROUBLE CODE 37 — REAR LEFT INLET VALVE MALFUNCTION — S006583D20

DIAGNOSIS:
- Faulty harness/connector
- Faulty inlet solenoid valve

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0557

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

MEMO:

P: TROUBLE CODE 32 — FRONT RIGHT OUTLET VALVE MALFUNCTION — S006583C99

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 38. <Ref. to ABS-124, TROUBLE CODE 38 — REAR LEFT OUTLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>

Q: TROUBLE CODE 34 — FRONT LEFT OUTLET VALVE MALFUNCTION — S006583D08

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 38. <Ref. to ABS-124, TROUBLE CODE 38 — REAR LEFT OUTLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>

R: TROUBLE CODE 36 — REAR RIGHT OUTLET VALVE MALFUNCTION — S006583D15

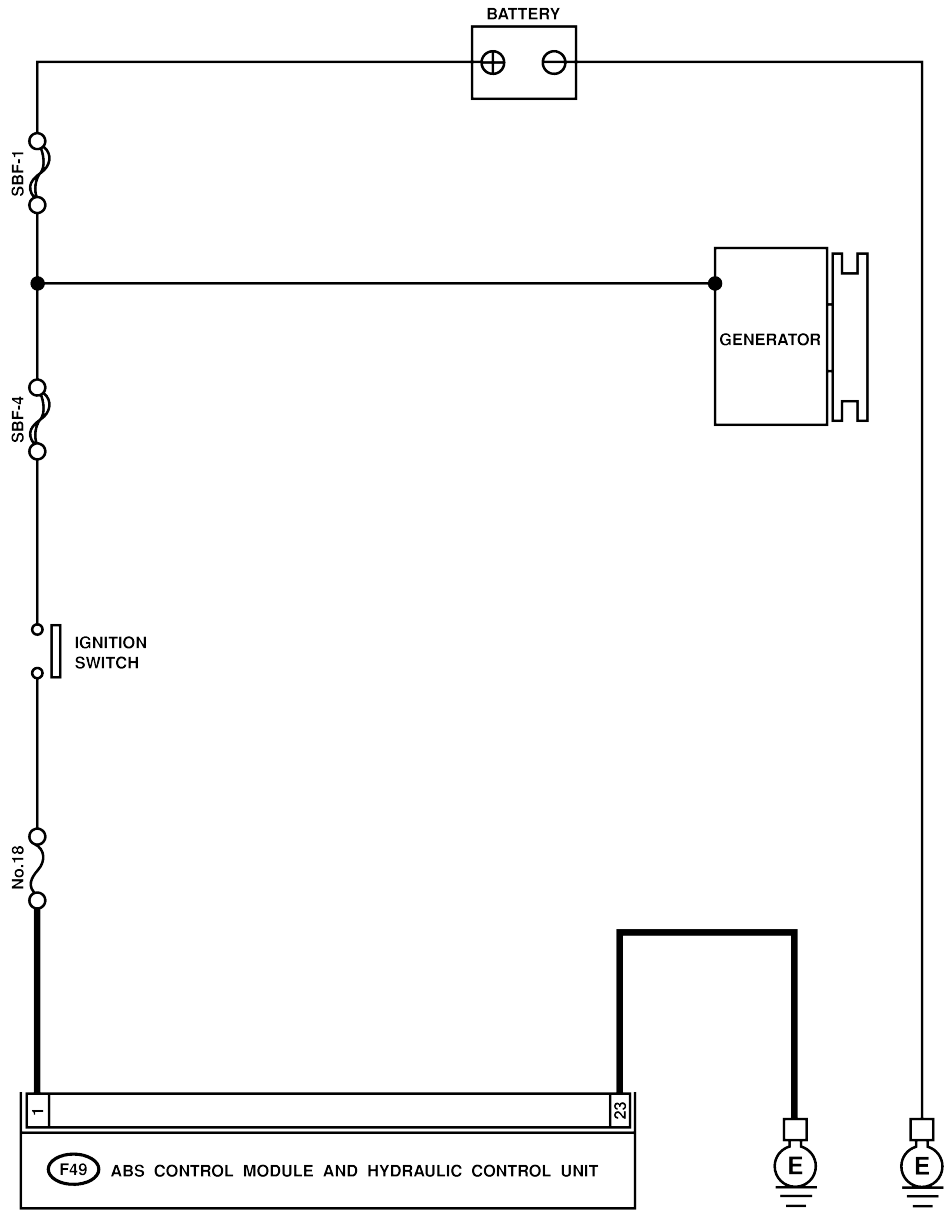
NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 38. <Ref. to ABS-124, TROUBLE CODE 38 — REAR LEFT OUTLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>

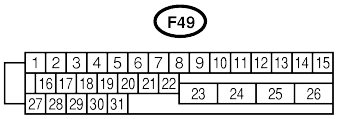
S: TROUBLE CODE 38 — REAR LEFT OUTLET VALVE MALFUNCTION — S006583D24

DIAGNOSIS:
- Faulty harness/connector
- Faulty outlet solenoid valve

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0557

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

MEMO:

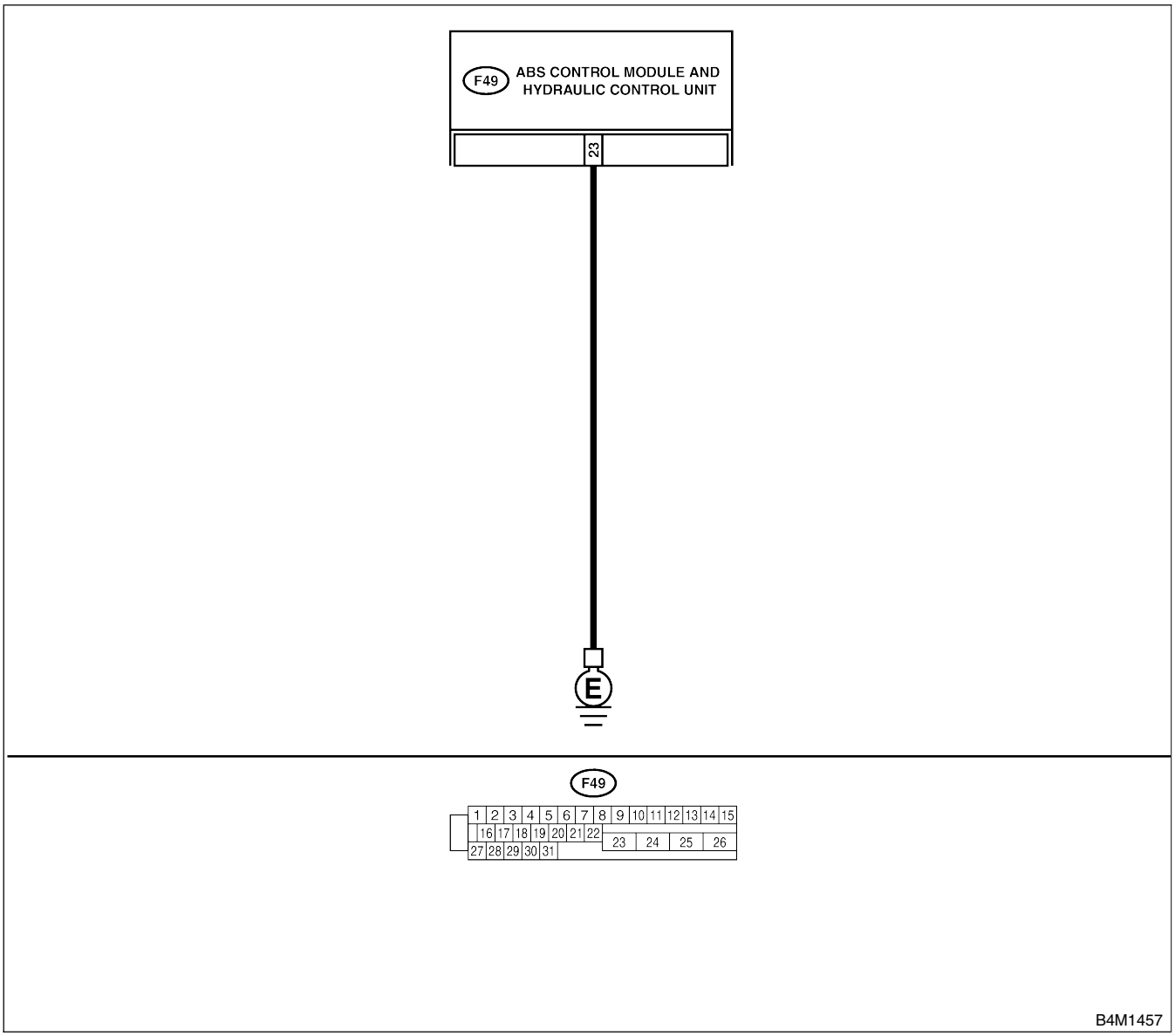
T: TROUBLE CODE 41
— ABS CONTROL MODULE MALFUNCTION —

S006583D31

DIAGNOSIS:
- Faulty ABSCM&H/U

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

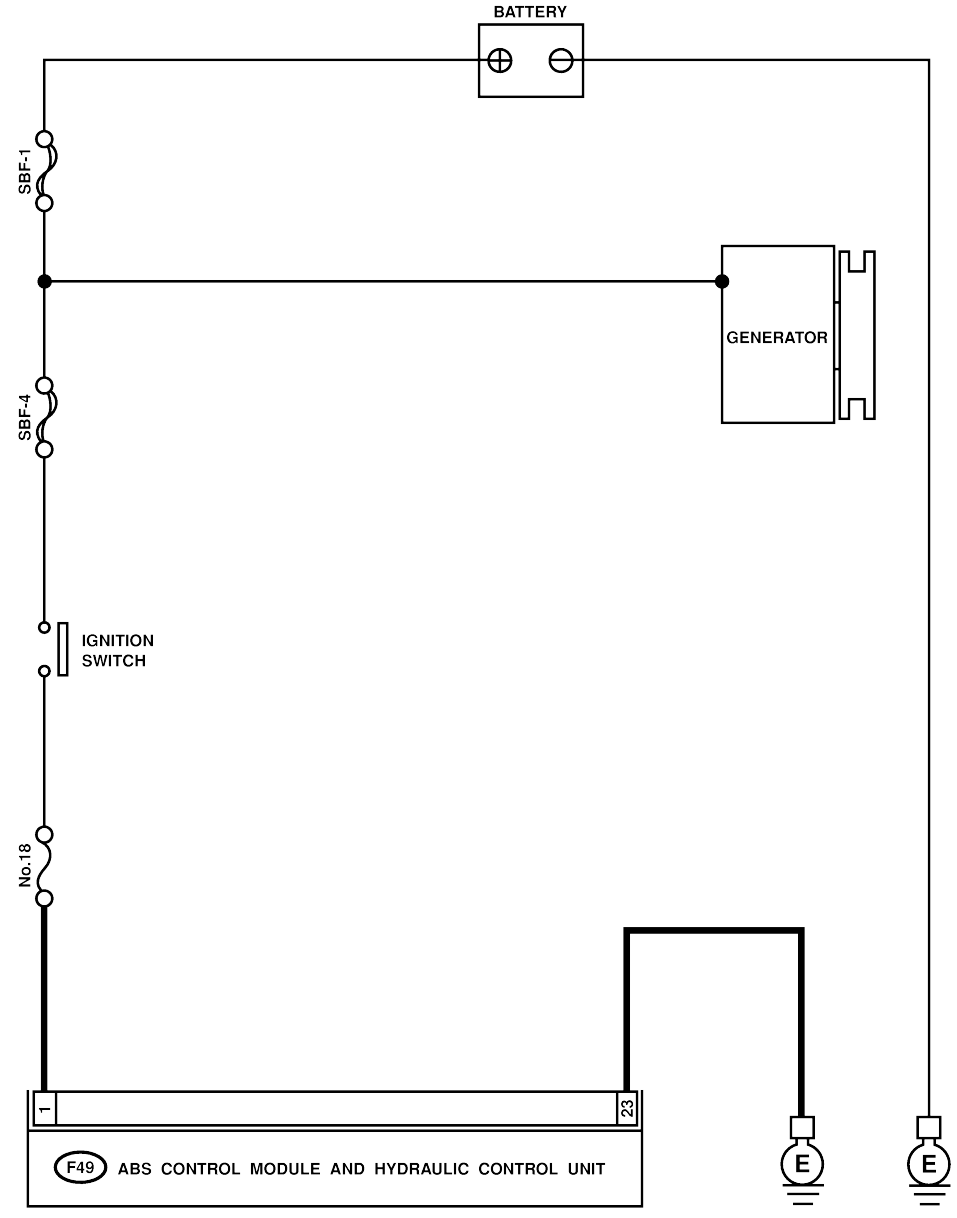
No.	Step	Check	Yes	No
1	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Measure resistance between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

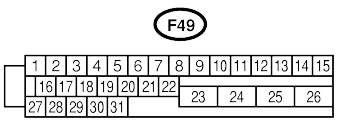
U: TROUBLE CODE 42
— POWER SUPPLY VOLTAGE TOO LOW — S006583D36

DIAGNOSIS:
- Power source voltage of the ABSCM&H/U is low.

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0557

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

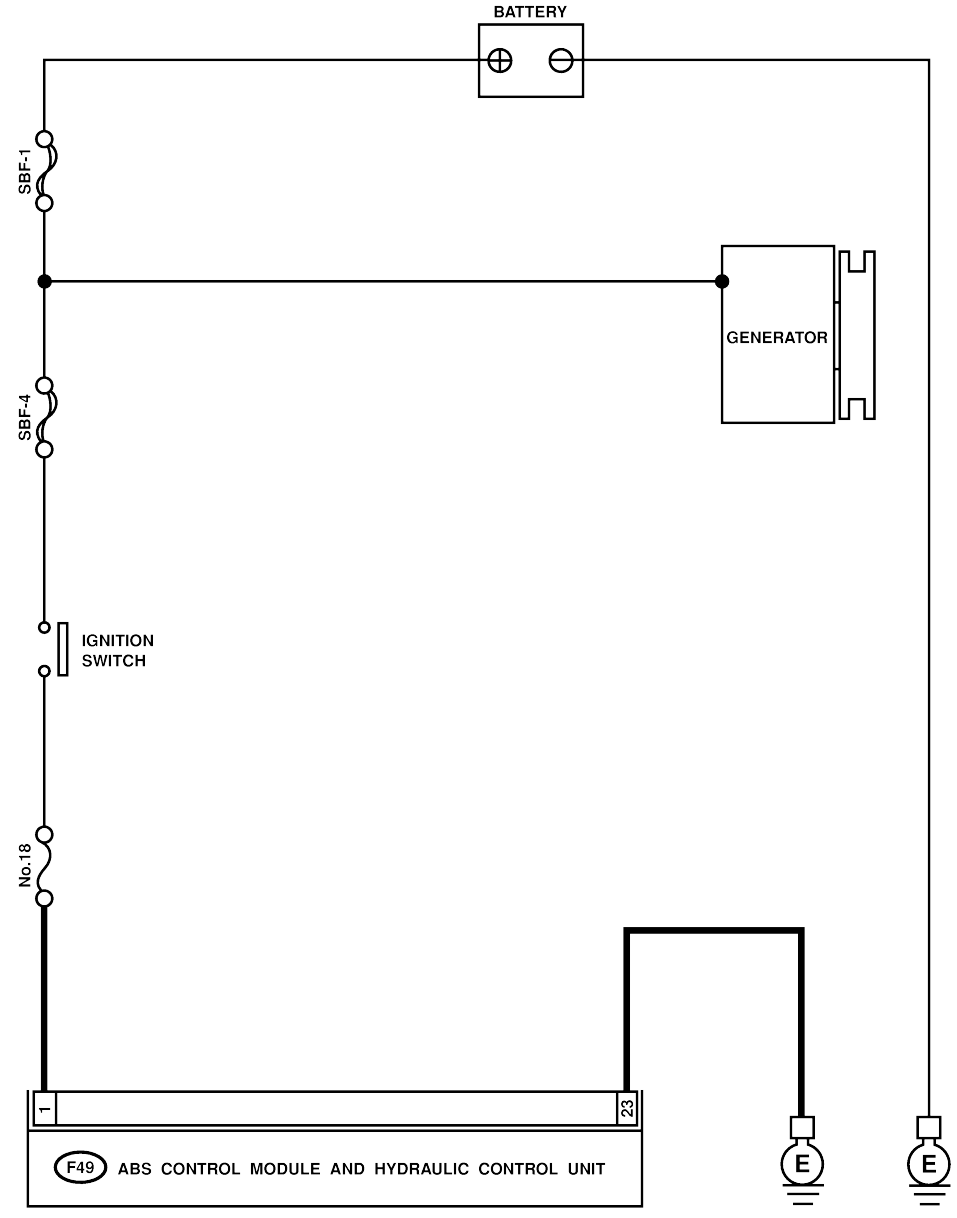
No.	Step	Check	Yes	No
1	**CHECK GENERATOR.** 1) Start engine. 2) Idling after warm-up. 3) Measure voltage between generator B terminal and chassis ground. ***Terminal*** ***Generator B terminal — Chassis ground:***	Is the voltage between 10 and 15 V?	Go to step **2**.	Repair generator. <Ref. to SC-12, 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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

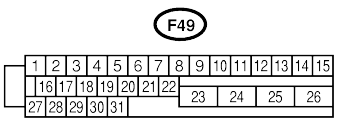
V: TROUBLE CODE 42
— POWER SUPPLY VOLTAGE TOO HIGH — S006583D35

DIAGNOSIS:
- Power source voltage of the ABSCM&H/U is high.

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0557

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

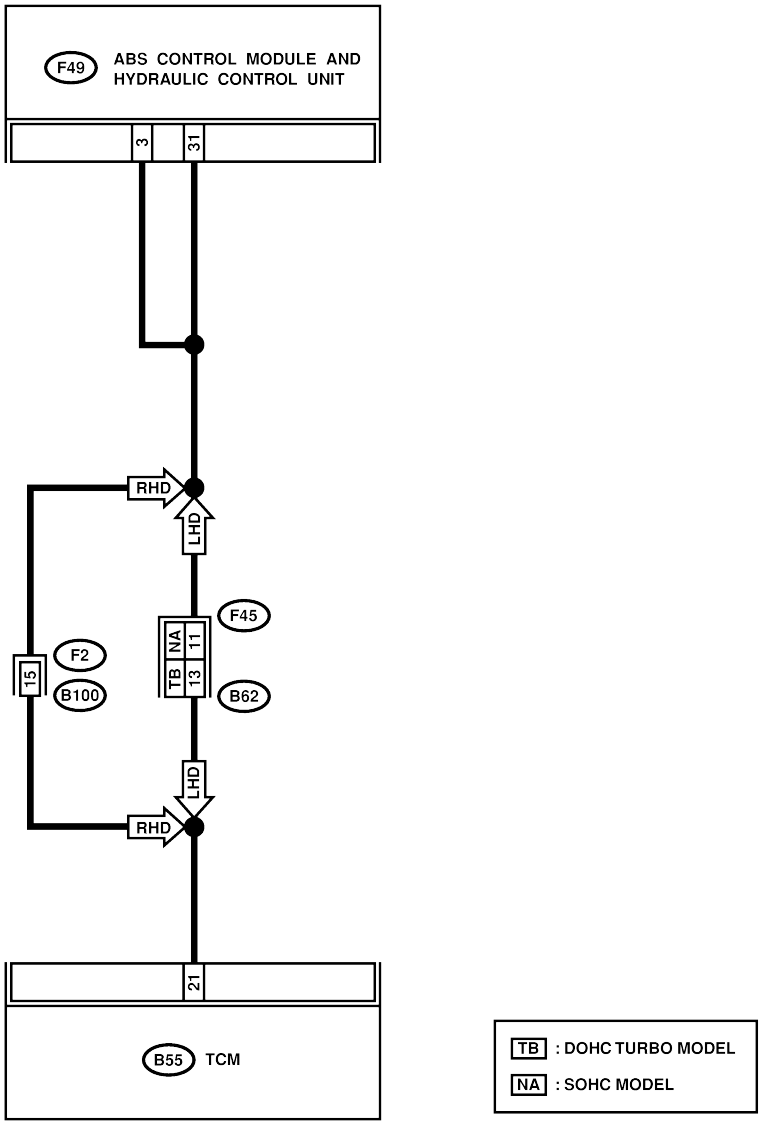
No.	Step	Check	Yes	No
1	**CHECK GENERATOR.** 1) Start engine. 2) Idling after warm-up. 3) Measure voltage between generator B terminal and chassis ground. ***Terminal*** ***Generator B terminal — Chassis ground:***	Is the voltage between 10 and 17 V?	Go to step **2**.	Repair generator. <Ref. to SC-12, 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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

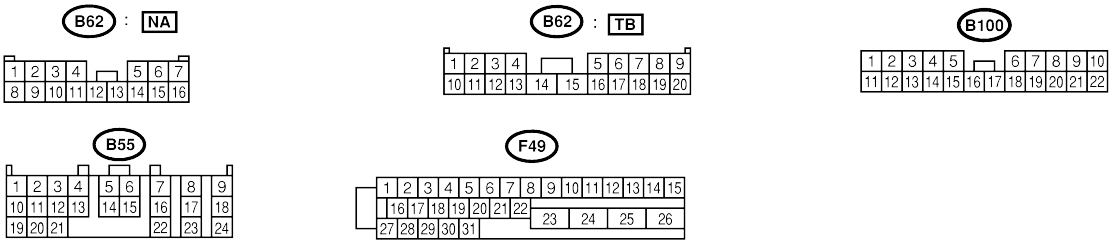
W: TROUBLE CODE 44
— ABS-AT CONTROL (NON CONTROLLED) — S006583E79

DIAGNOSIS:
- Combination of AT control faults

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0558

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

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*** ***(B55) No. 21 (+) — 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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

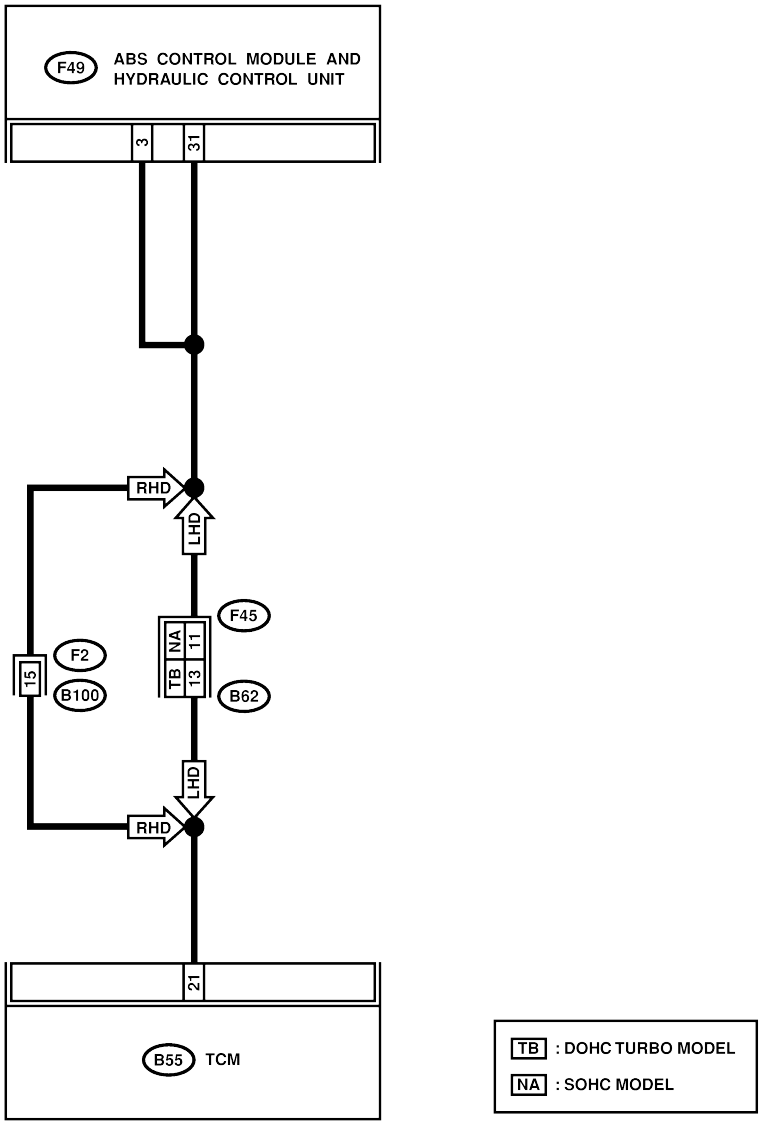
X: TROUBLE CODE 44
— ABS-AT CONTROL (CONTROLLED) —

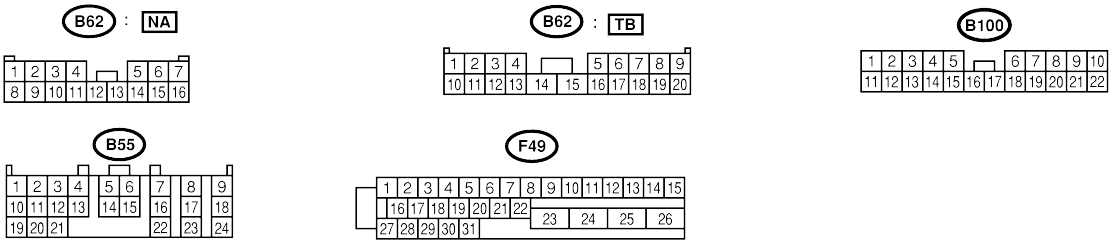
S006583E80

DIAGNOSIS:
- Combination of AT control faults

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0558

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

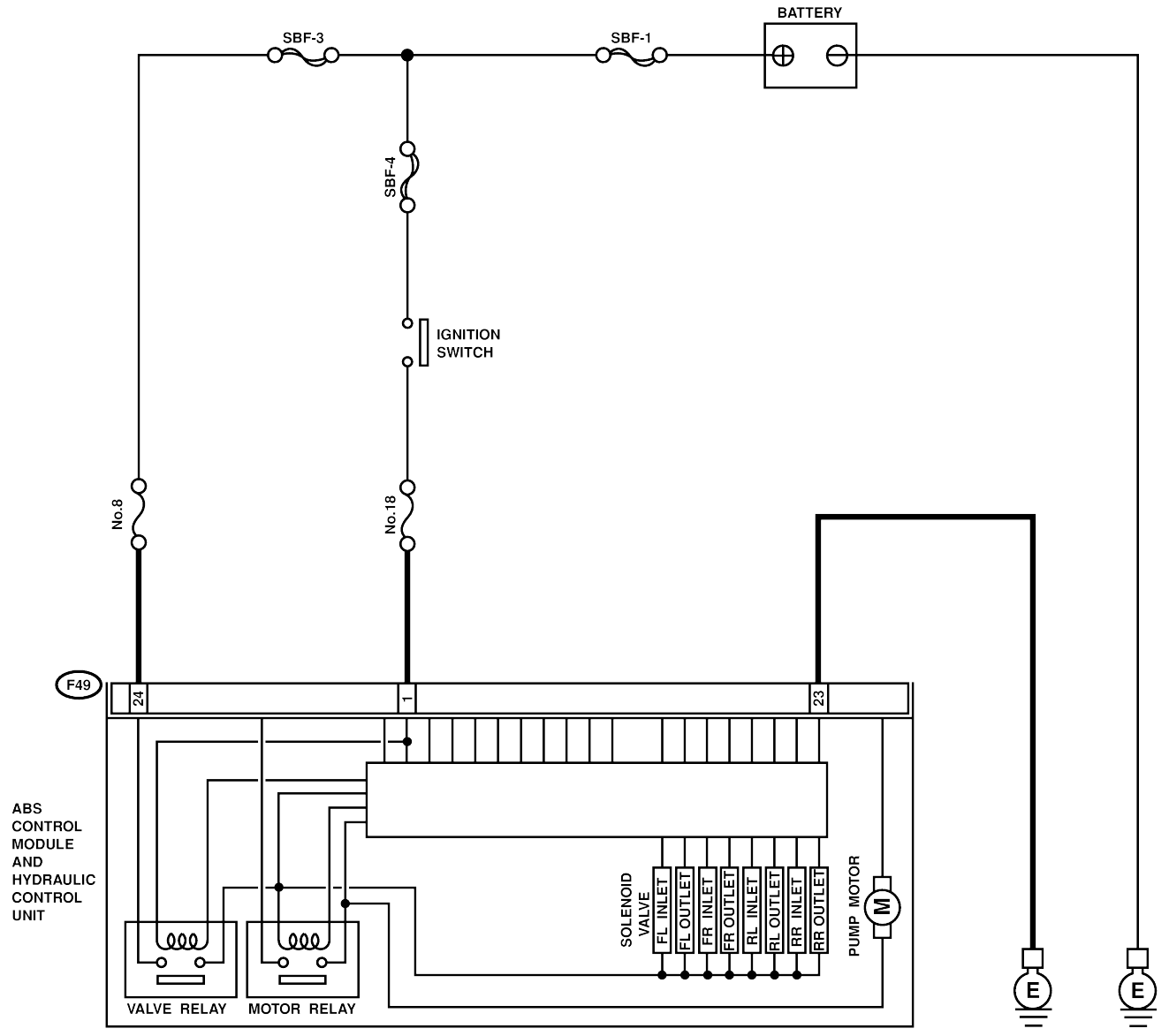
No.	Step	Check	Yes	No
1	**CHECK BATTERY SHORT OF HARNESS.** 1) Turn ignition switch to OFF. 2) Disconnect two connectors from TCM. 3) Disconnect connector from ABSCM&H/U. 4) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 3 (+) — Chassis ground (–):***	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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

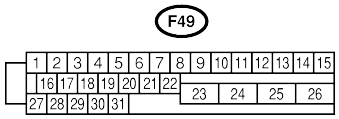
Y: TROUBLE CODE 51
— VALVE RELAY MALFUNCTION — S006583E81

DIAGNOSIS:
- Faulty valve relay

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0559

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

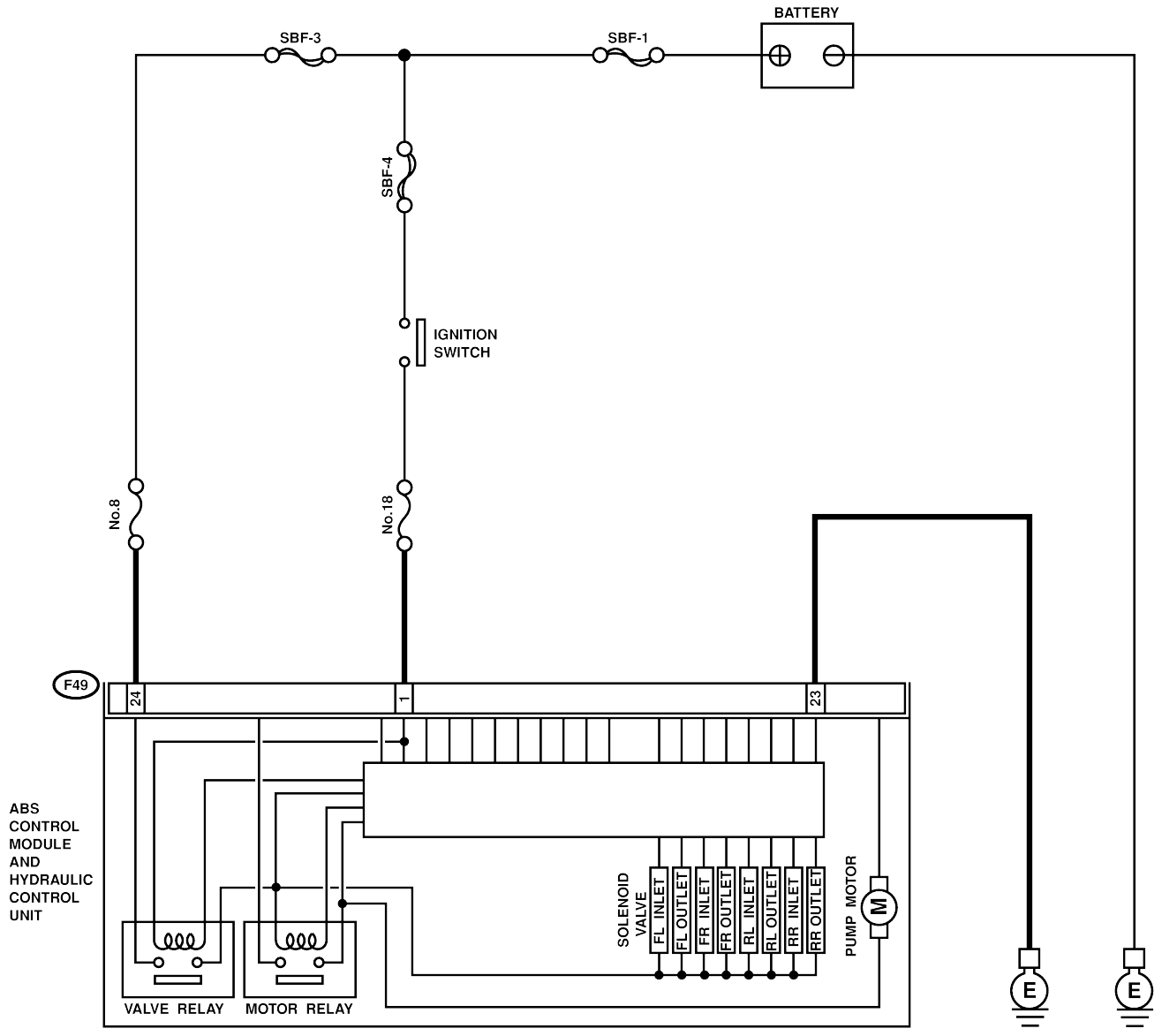
No.	Step	Check	Yes	No
1	**CHECK FUSE.**	Is the fuse blown out?	Replace fuse.	Go to step **2**.
2	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Run the engine at idle. 4) Measure voltage between ABSCM&H/U connector and chassis ground. ***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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

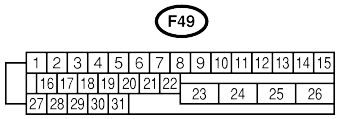
Z: TROUBLE CODE 51
— VALVE RELAY ON FAILURE — S006583D63

DIAGNOSIS:
- Faulty valve relay

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0559

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

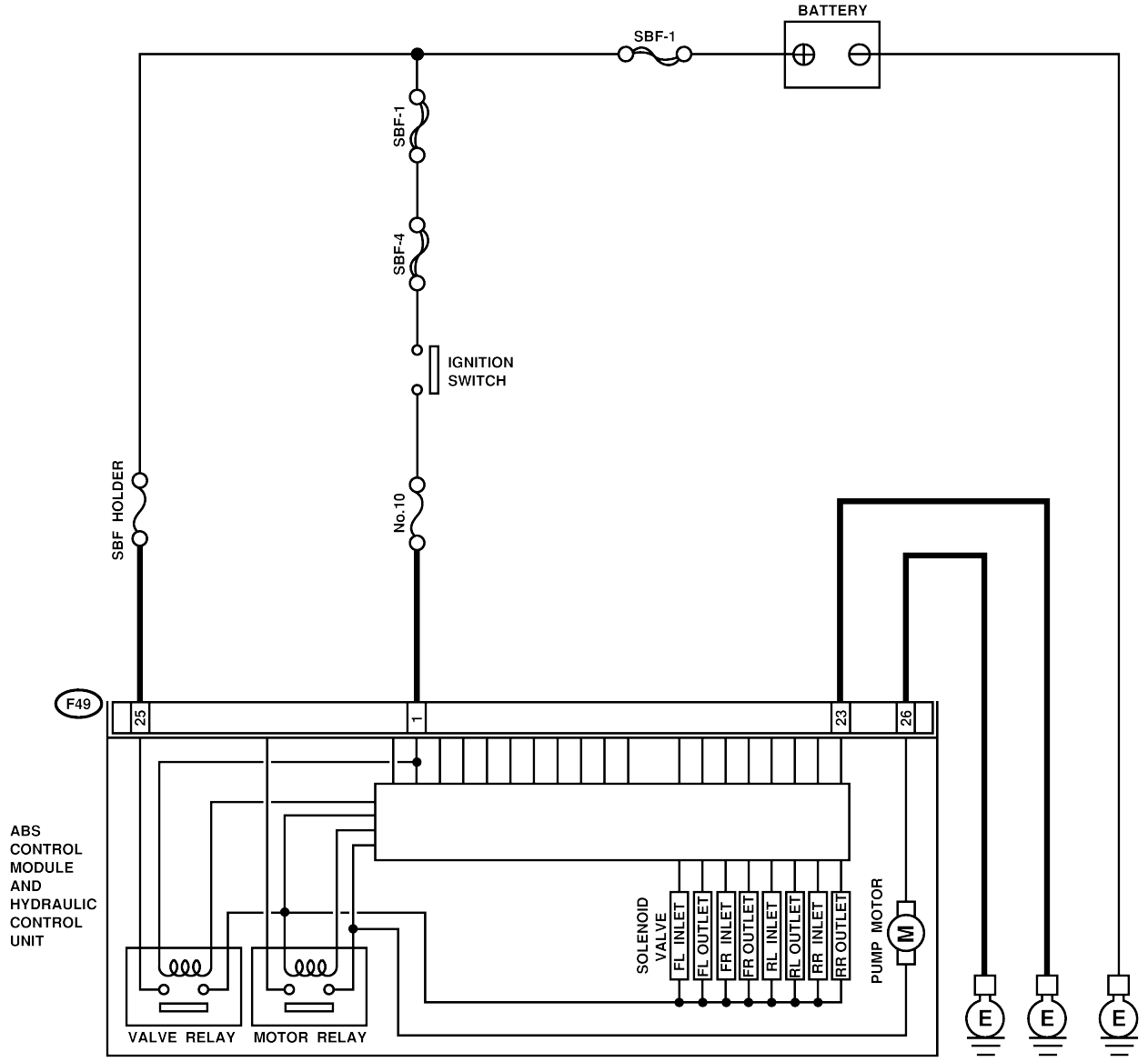
No.	Step	Check	Yes	No
1	**CHECK VALVE RELAY IN ABSCM&H/U.** Measure resistance between ABSCM&H/U terminals. ***Terminals*** ***No. 23 (+) — No. 24 (–):***	Is the resistance more than 1 MΩ?	Go to step **2**.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

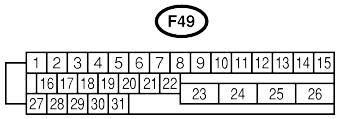
AA: TROUBLE CODE 52 — OPEN CIRCUIT IN MOTOR RELAY CIRCUIT — S006583E82

DIAGNOSIS:
- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0560

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

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 SBF6.
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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

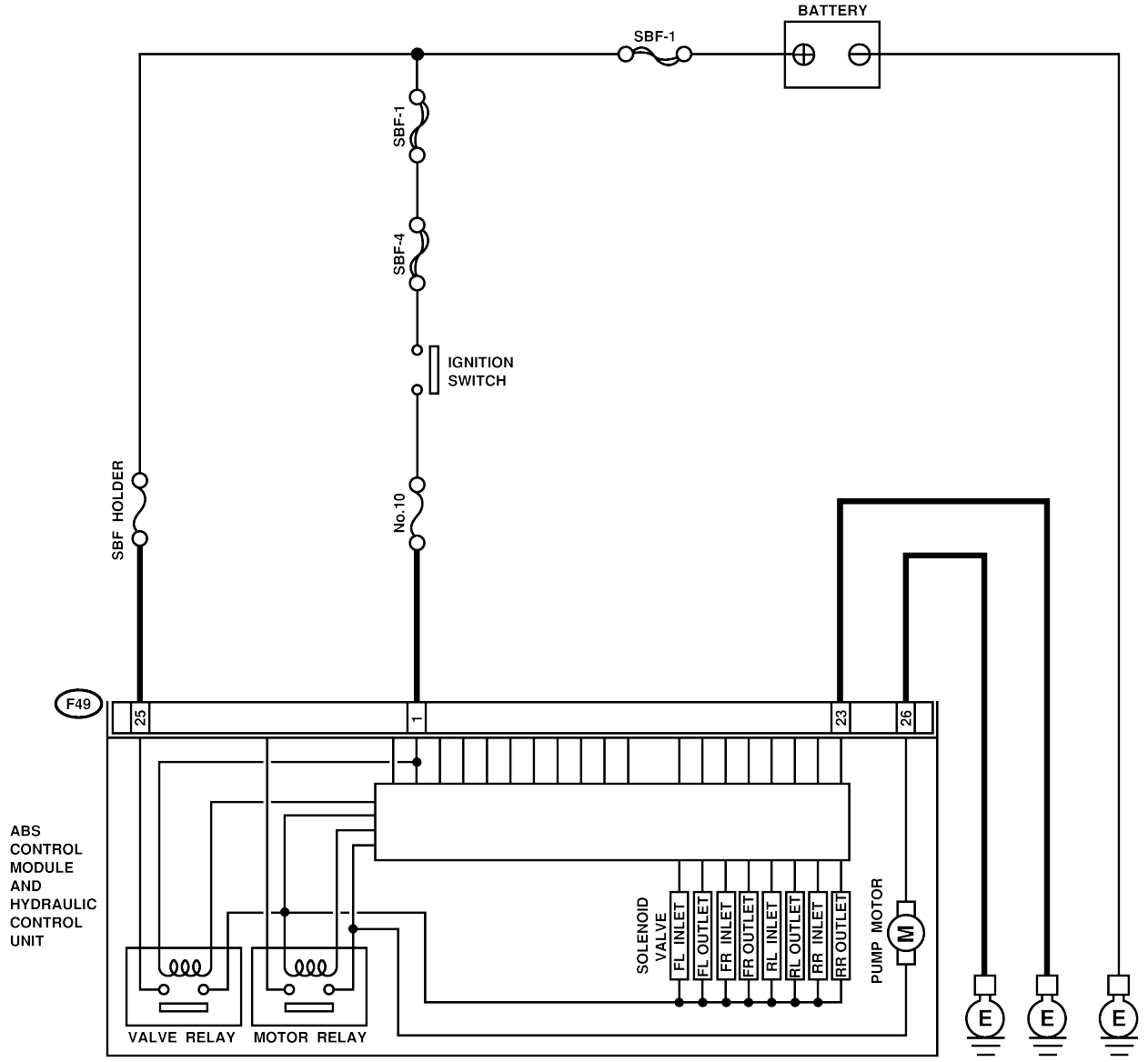
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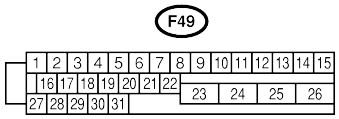
AB: TROUBLE CODE 52 — MOTOR RELAY ON FAILURE — S006583E83

DIAGNOSIS:
- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0560

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

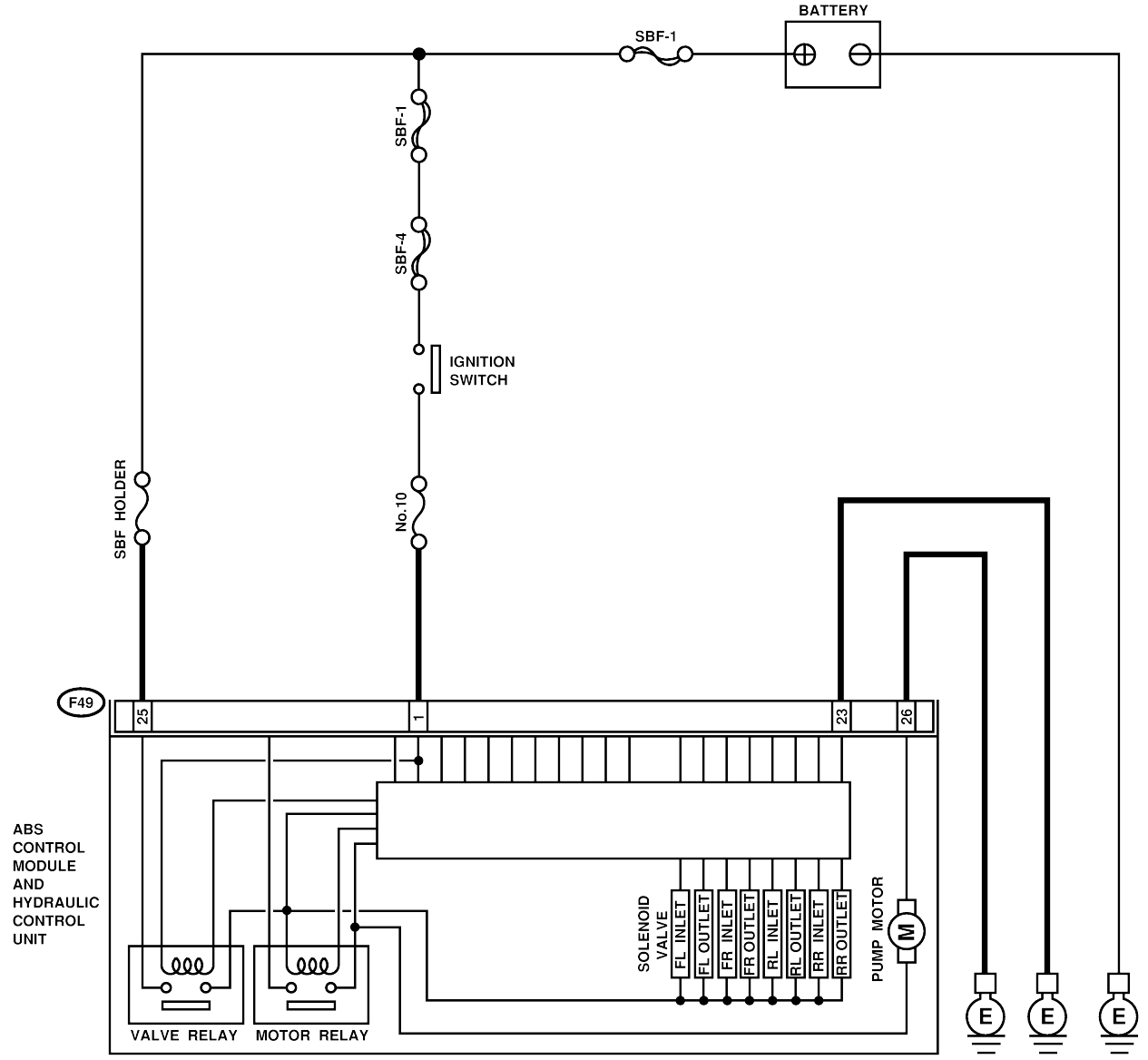
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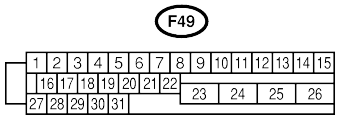
AC: TROUBLE CODE 52 — MOTOR MALFUNCTION — S006583D68

DIAGNOSIS:
- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0560

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

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 SBF6.
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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

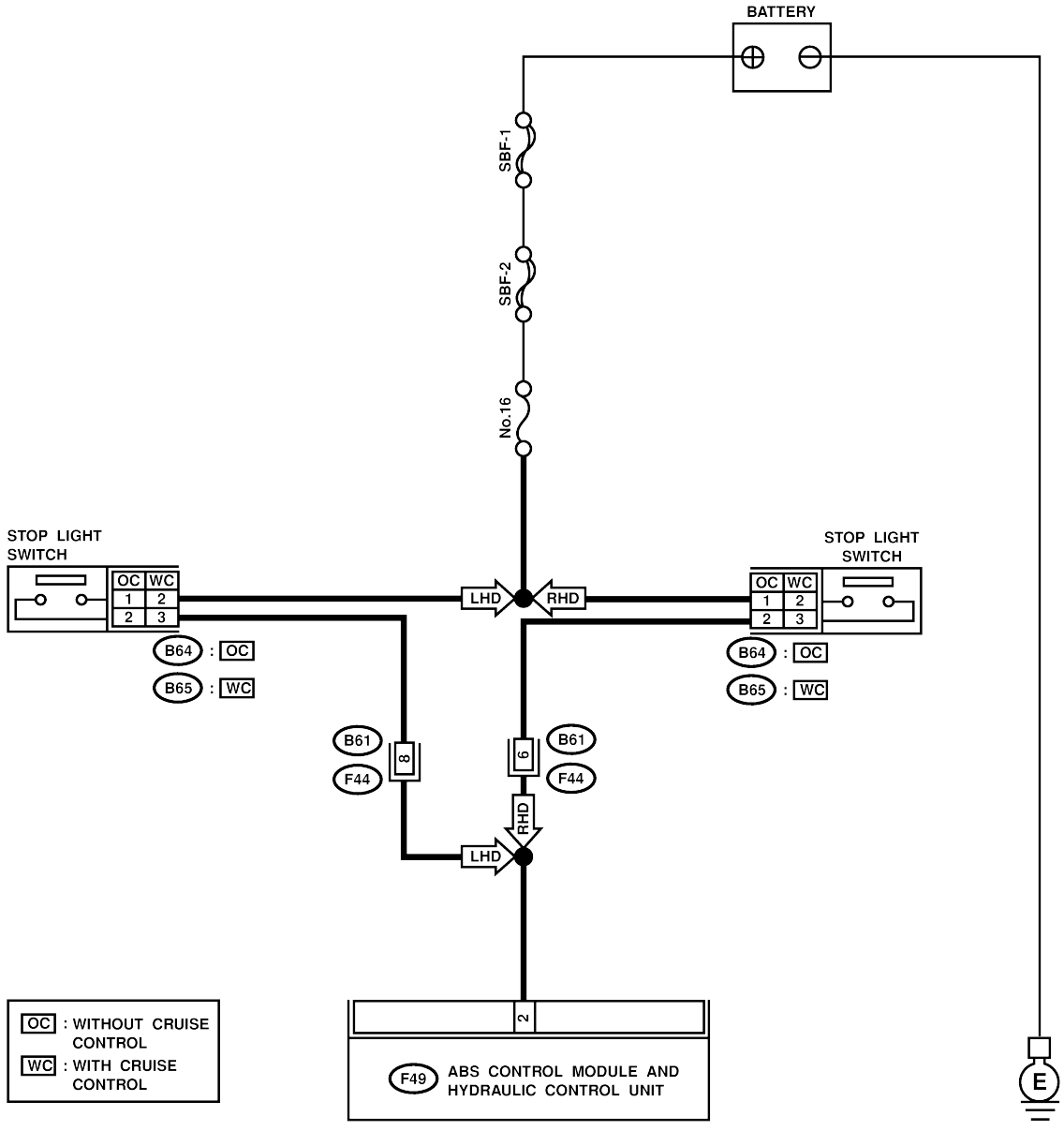
MEMO:

AD: TROUBLE CODE 54
— STOP LIGHT SWITCH SIGNAL CIRCUIT MALFUNCTION — S006583E84

DIAGNOSIS:
- Faulty stop light switch

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0561

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

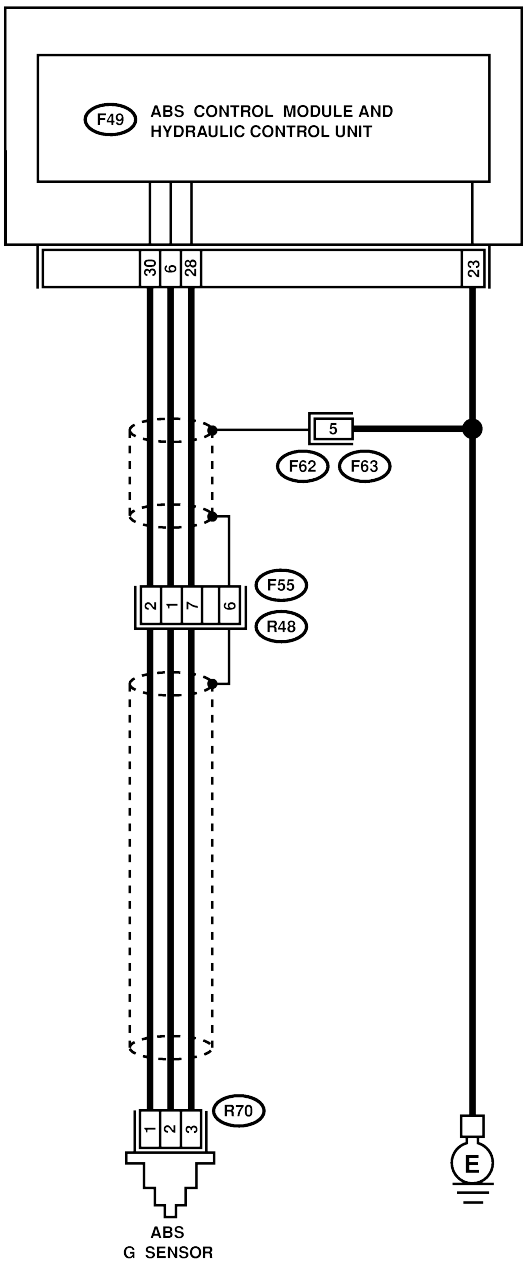
No.	Step	Check	Yes	No
1	**CHECK OUTPUT OF STOP LIGHT SWITCH USING SELECT MONITOR.** 1) Select “Current data display & Save” on the select monitor. 2) Release the brake pedal. 3) Read the stop light switch output in the select monitor data display.	Is the reading indicated on monitor display less than 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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

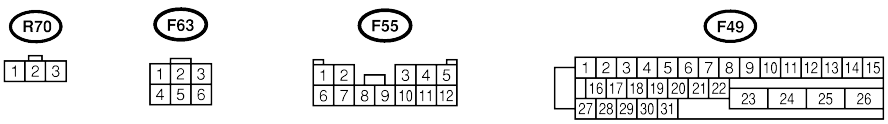
AE: TROUBLE CODE 56
— OPEN OR SHORT CIRCUIT IN G SENSOR CIRCUIT — S006583E85

DIAGNOSIS:
- Faulty G sensor output voltage

TROUBLE SYMPTOM:
- ABS does not operate.

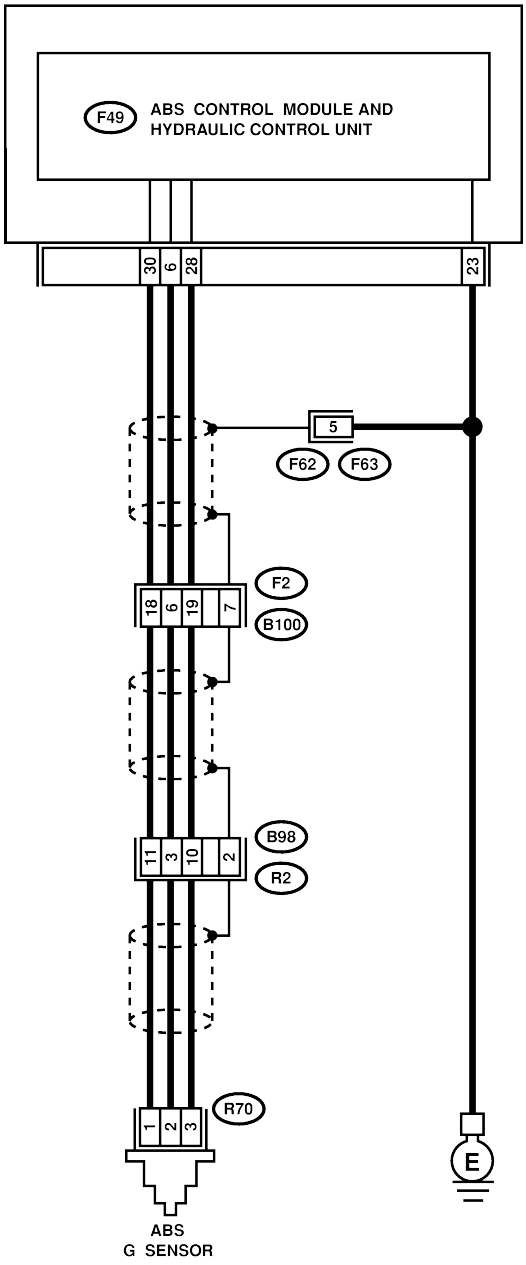
WIRING DIAGRAM: LHD MODEL

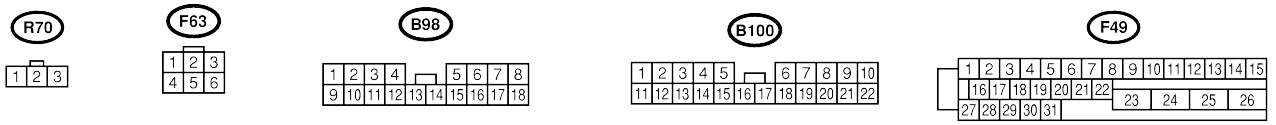




S4M0562

WIRING DIAGRAM: RHD MODEL





S4M0563

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	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.>

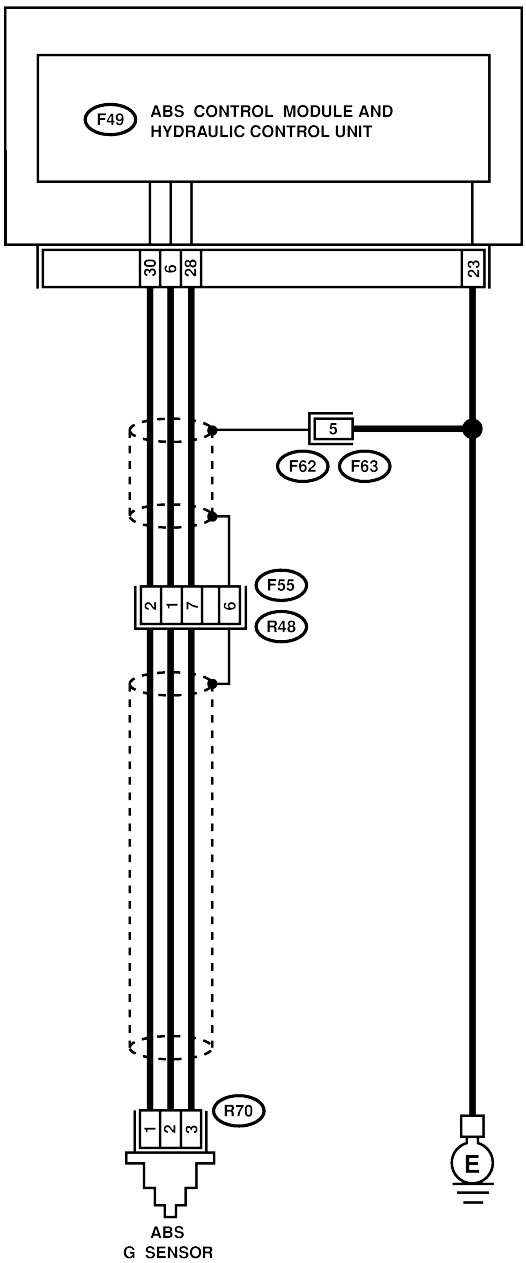
No.	Step	Check	Yes	No
10	**CHECK G SENSOR.** Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (–):***	Is the voltage between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?	Go to step **11**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

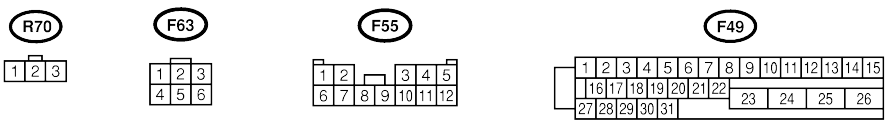
AF: TROUBLE CODE 56
— BATTERY SHORT IN G SENSOR CIRCUIT — S006583E86

DIAGNOSIS:
- Faulty G sensor output voltage

TROUBLE SYMPTOM:
- ABS does not operate.

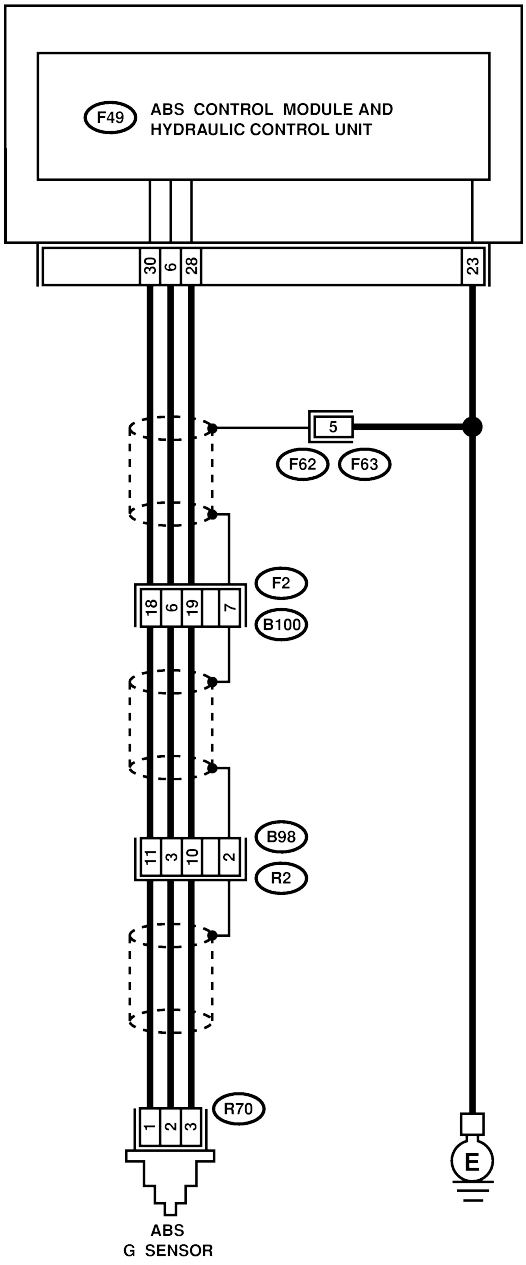
WIRING DIAGRAM: LHD MODEL

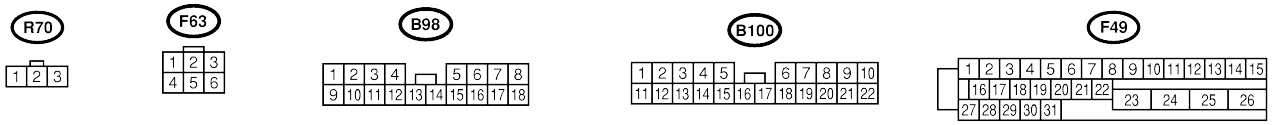




S4M0562

WIRING DIAGRAM: RHD MODEL





S4M0563

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	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.>

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

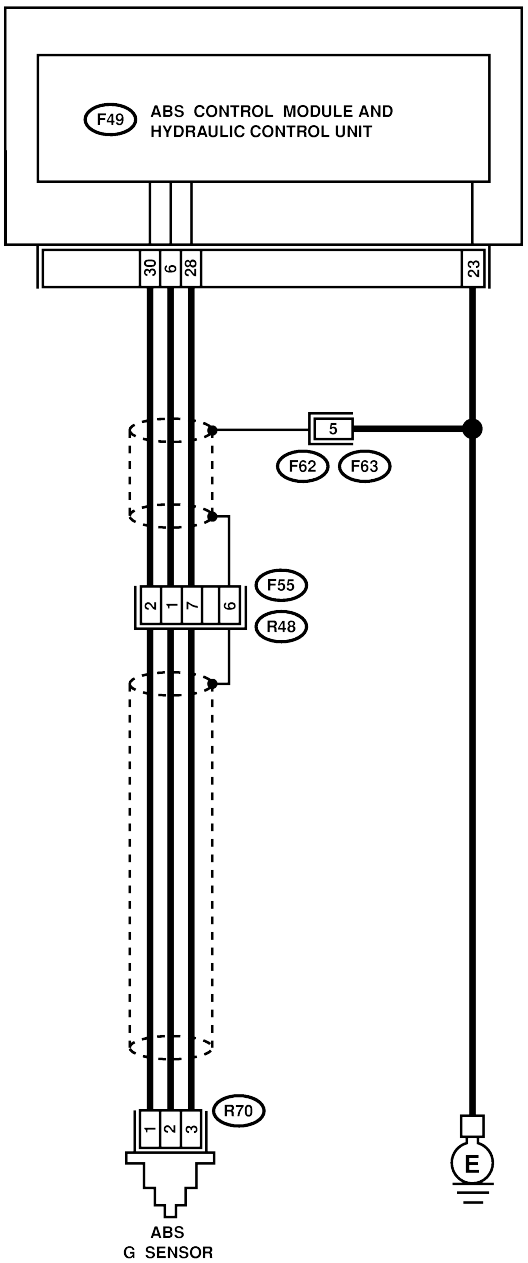
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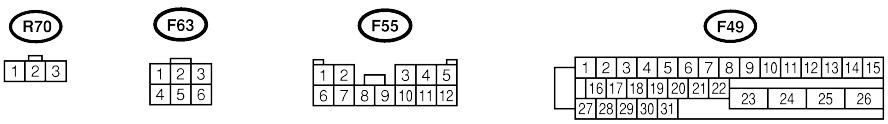
AG: TROUBLE CODE 56
— ABNORMAL G SENSOR HIGH μ OUTPUT — S006583E87

DIAGNOSIS:
- Faulty G sensor output voltage

TROUBLE SYMPTOM:
- ABS does not operate.

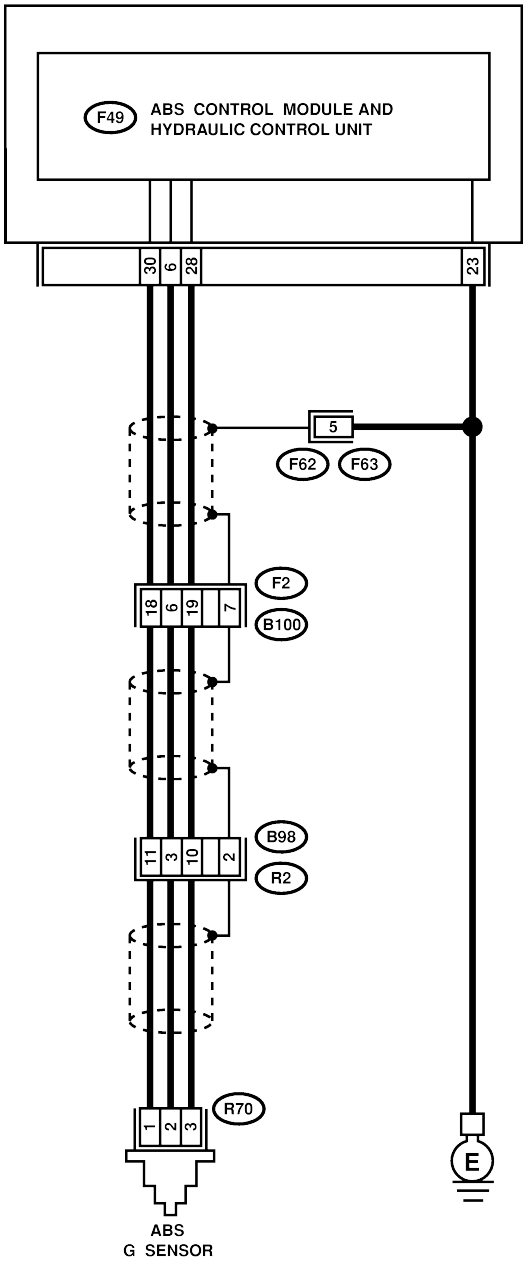
WIRING DIAGRAM: LHD MODEL

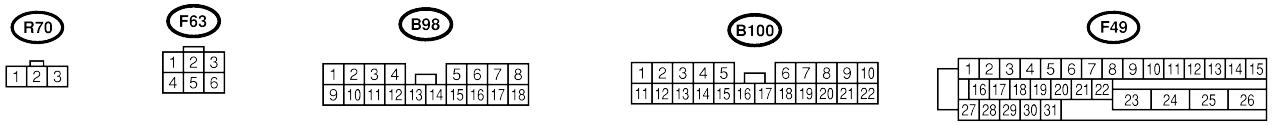




S4M0562

WIRING DIAGRAM: RHD MODEL





S4M0563

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	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.>

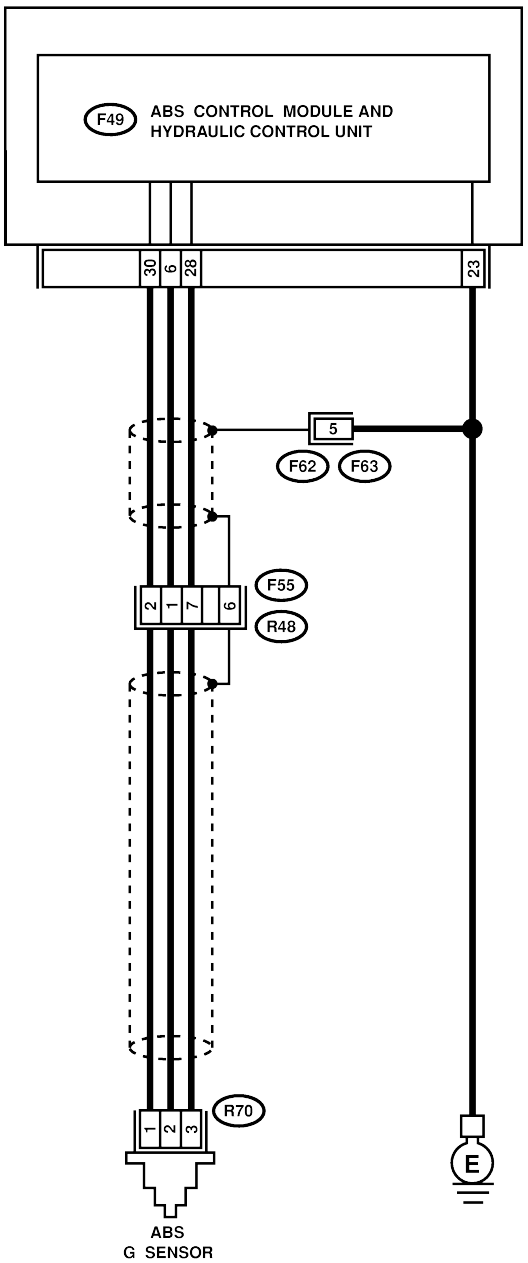
No.	Step	Check	Yes	No
10	**CHECK ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Connect all connectors. 3) Erase the memory. 4) Perform inspection mode. 5) Read out the trouble code.	Is the same trouble code as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **11**.
11	**CHECK ANY OTHER TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary poor contact.

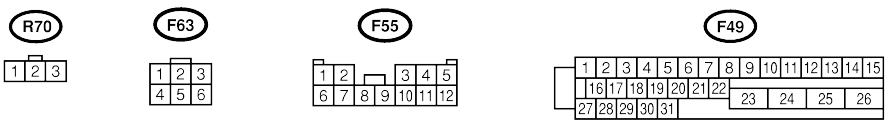
AH: TROUBLE CODE 56
— DETECTION OF G SENSOR STICK — S006583E88

DIAGNOSIS:
- Faulty G sensor output voltage

TROUBLE SYMPTOM:
- ABS does not operate.

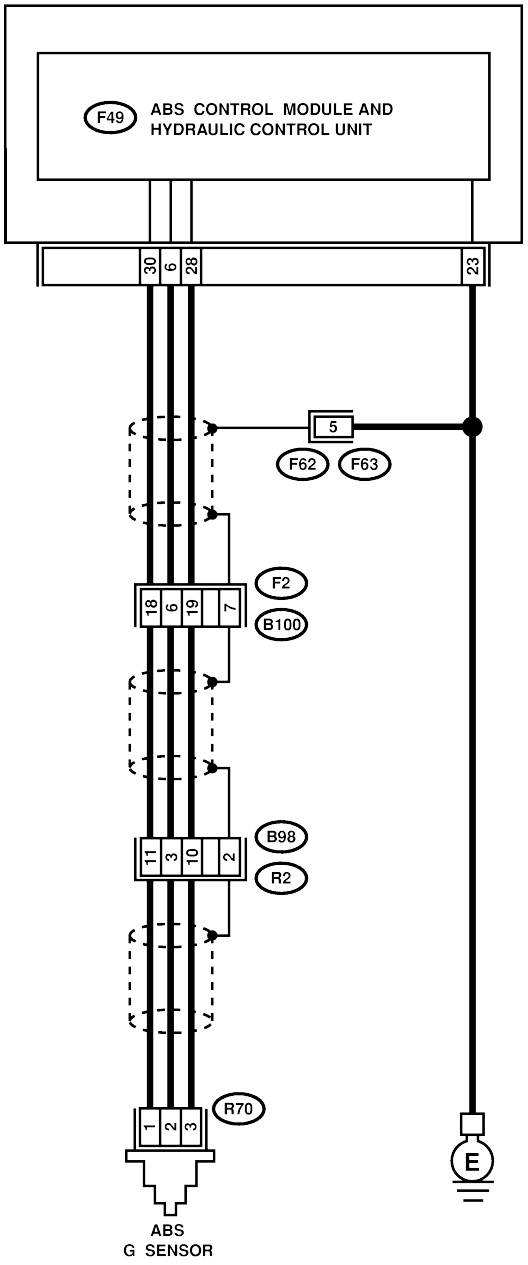
WIRING DIAGRAM: LHD MODEL

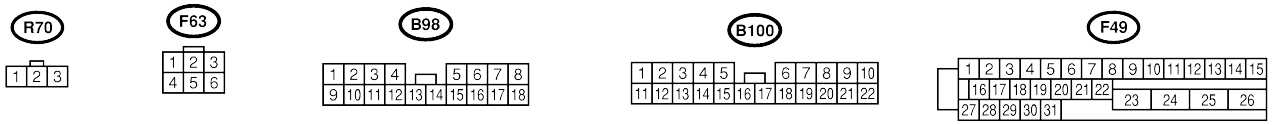




S4M0562

WIRING DIAGRAM: RHD MODEL





S4M0563

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

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 trouble code.	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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	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 trouble code.	Is the same trouble code 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 TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	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

GENERAL DIAGNOSTICS TABLE

MEMO:

GENERAL DIAGNOSTICS TABLE

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

AC

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1. General Description S701001

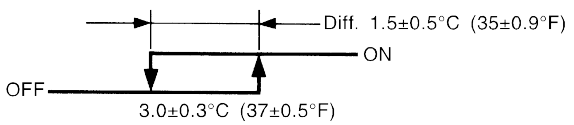
A: SPECIFICATIONS S701001E49

1. HEATER SYSTEM S701001E4901

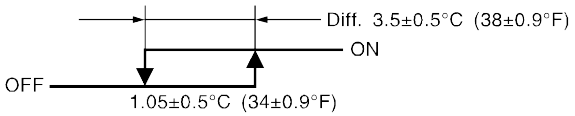
Item		Specifications		Condition
Heating capacity		LHD model	5.1 kW (4,386 kcal/h, 17,404 BTU/h) or more	• Mode selector switch: HEAT • Temperature control switch: FULL HOT • Temperature difference between hot water and inlet air: 65°C (149°F) • Hot water flow rate: 360 ℓ (95.1 US gal, 79.2 Imp gal)/h
		RHD model	4.93 kW (4,240 kcal/h, 16,824 BTU/h) or more	
Air flow rate		LHD model	280 m^3 (9,887 cu ft)/h	Heat mode (FRESH), FULL HOT at 12.5 V
		RHD model	300 m^3 (10,593 cu ft)/h	
Max air flow rate		LHD model	480 m^3 (16,949 cu ft)/h	• Temperature control switch: FULL COLD • Blower fan speed: 4th position • Mode selector lever: RECIRC
		RHD model	460 m^3 (16,243 cu ft)/h	
Heater core size (height × length × width)		LHD model	193.5 × 152 × 35.0 mm (7.62 × 5.98 × 1.378 in)	—
		RHD model	161.4 × 176.4 × 32 mm (6.35 × 6.94 × 1.26 in)	
Blower motor	Type	LHD model	Magnet motor 260 W or less	at 12 V
		RHD model	Magnet motor 250 W or less	
	Fan type and size (diameter × width)	LHD model	Sirocco fan type 150 × 75 mm (5.91 × 2.95 in)	—
		RHD model	Sirocco fan type 150 × 75 mm (5.91 × 2.95 in)	

2. A/C SYSTEM S701001E4902

● LHD Model:

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

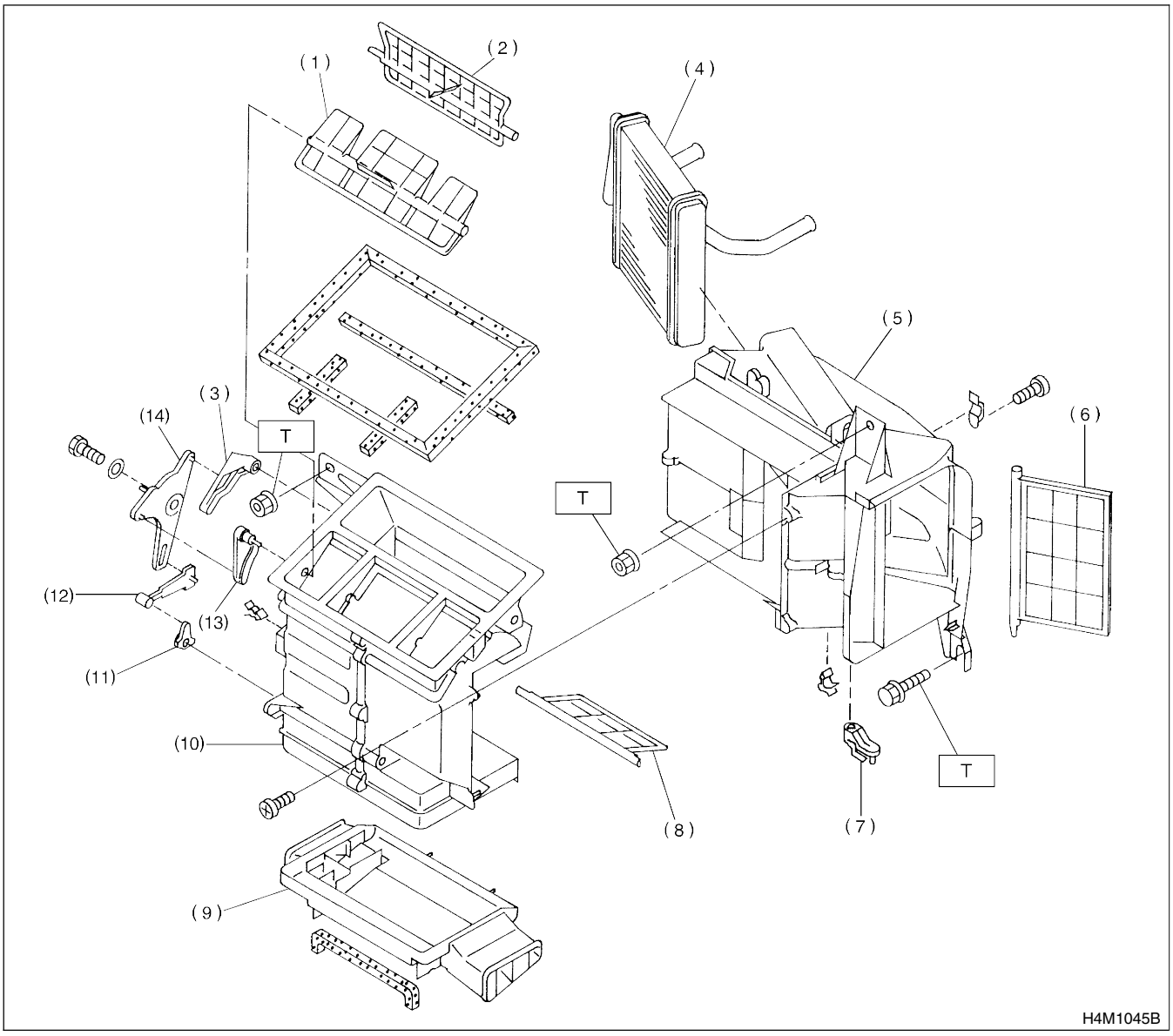
● RHD Model:

Item			Specifications
Type of air conditioner			Reheat air-mix type
Cooling capacity			5.059 kW (4,350 kcal/h, 17,261 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	0.231 m^2 (2.48 sq ft)
		Dimensions (W × H × T)	20 × 331 × 698 × mm (0.79 × 13.03 × 27.48 in)
		Radiation area	7.2 m^2 (77 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	250 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 (1.8±0.25 kg/cm^2, 26±3.6 psi)
		OFF → ON	Less than 216 kPa (2.2 kg/cm^2, 31 psi)
	High-pressure switch operating pressure	ON → OFF	2,650±200 kPa (27.02±2.04 kg/cm^2, 384±29 psi)
		OFF → ON	1,471±200 kPa (15±2.04 kg/cm^2, 213±29 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)			 S4M0275A

B: COMPONENT S701001A05

1. HEATER UNIT S701001A0501

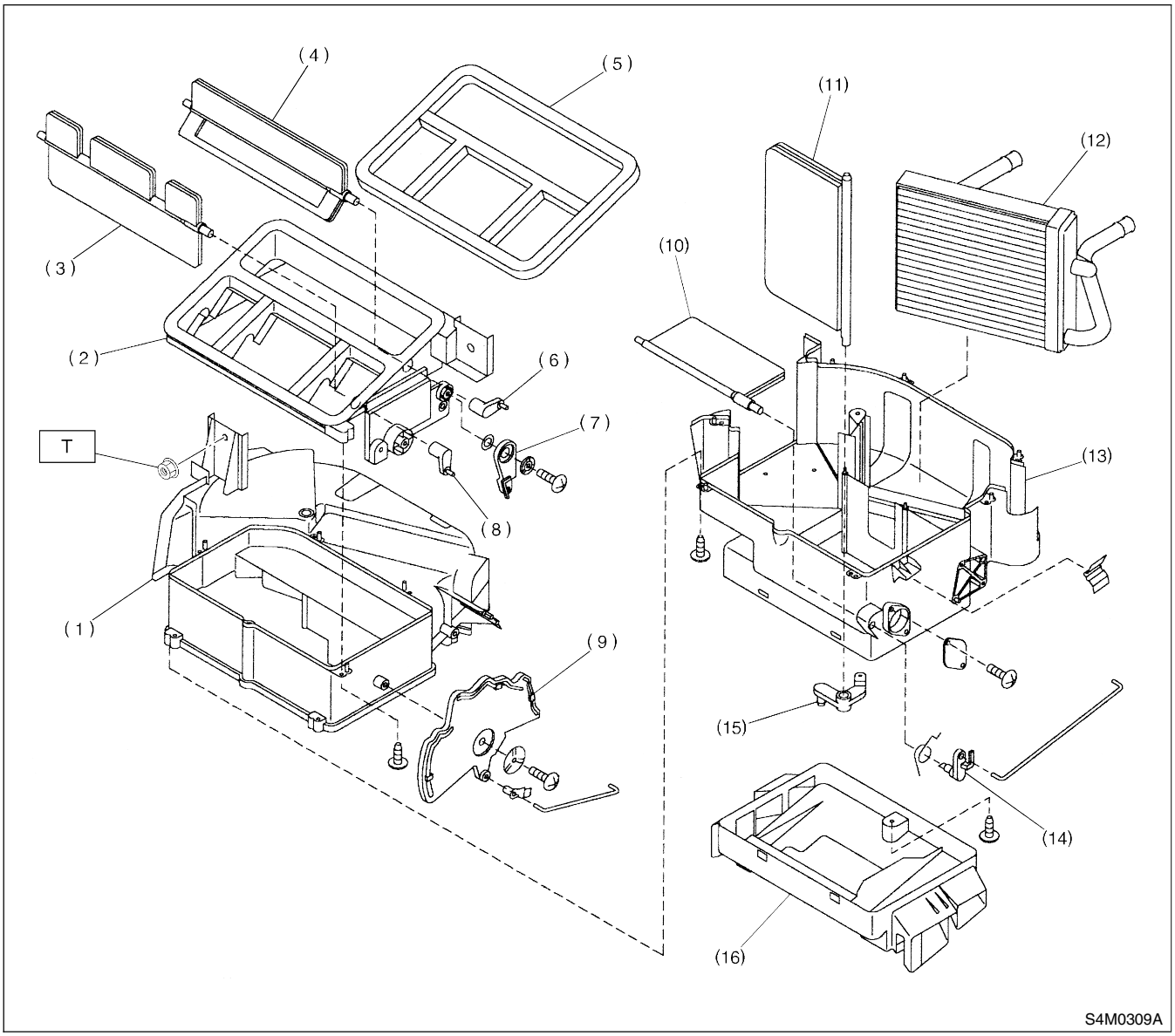
- **LHD Model:**



(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)

- **RHD Model:**

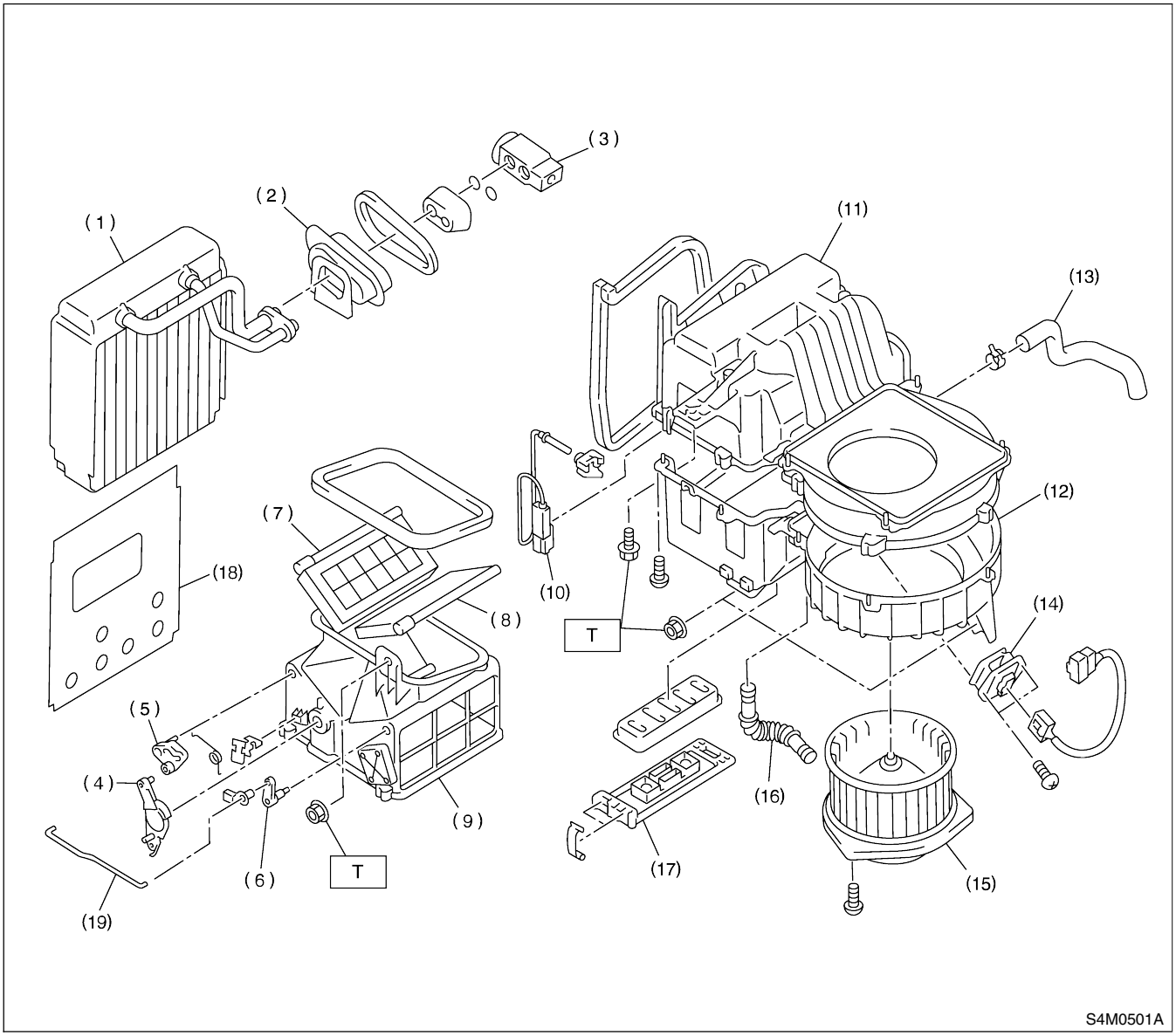


(1) Heater case upper A
(2) Heater case upper B
(3) Vent door
(4) DEF door
(5) Sealing sponge
(6) DEF door lever
(7) DEF door link
(8) Vent door lever
(9) Side link
(10) Foot door
(11) Mix door
(12) Heater core
(13) Heater case lower
(14) Foot door lever
(15) Mix door lever
(16) Foot duct

Tightening torque: N·m (kg-m, ft-lb)
T: 7.35 (0.750, 5.421)

2. INTAKE UNIT WITH EVAPORATOR S701001A0505

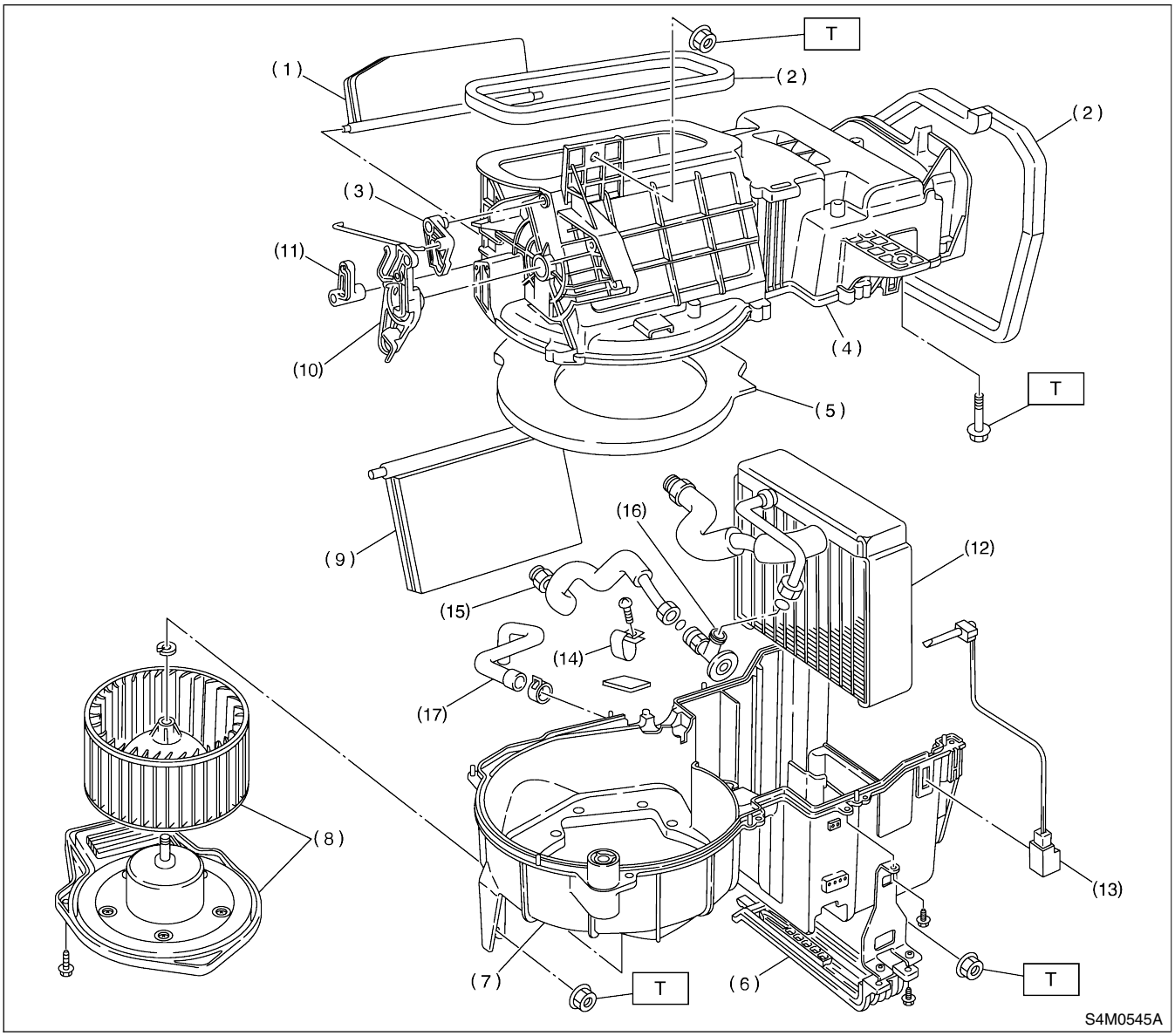
- **LHD Model:**



(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)

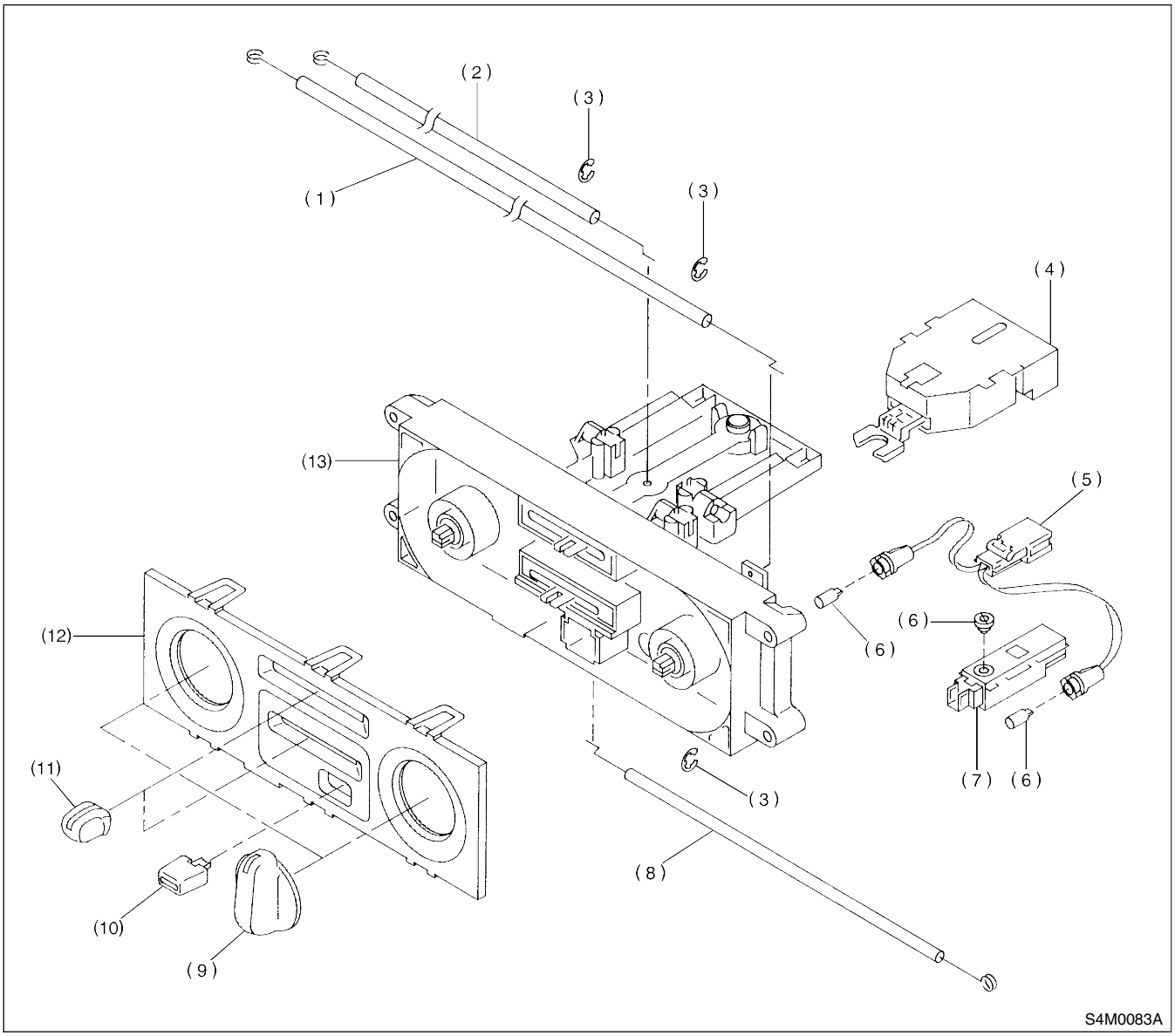
● RHD Model:



(1) Door (A)
(2) Sealing sponge
(3) Door (B) lever
(4) Intake unit case upper
(5) Separator
(6) Cover
(7) Intake unit case lower
(8) Blower motor ASSY
(9) Door (B)
(10) Link
(11) Door (A) lever
(12) Evaporator (With A/C model)
(13) Thermo control amplifier (With A/C model)
(14) Clamp
(15) Pippe (With A/C model)
(16) Expansion valve (With A/C model)
(17) Drain hose

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.35 (0.750, 5.421)

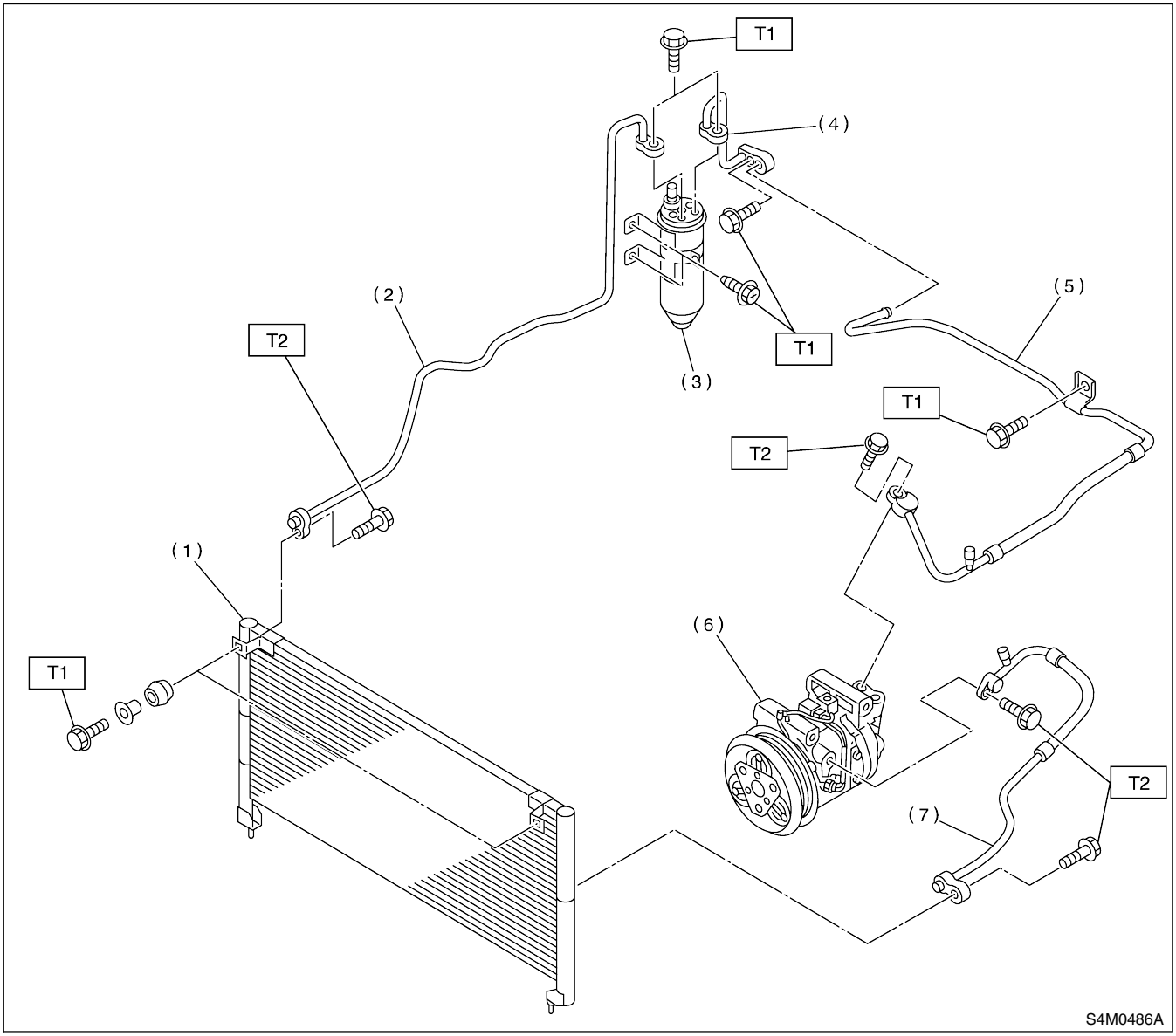
3. CONTROL UNIT S701001A0503



(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

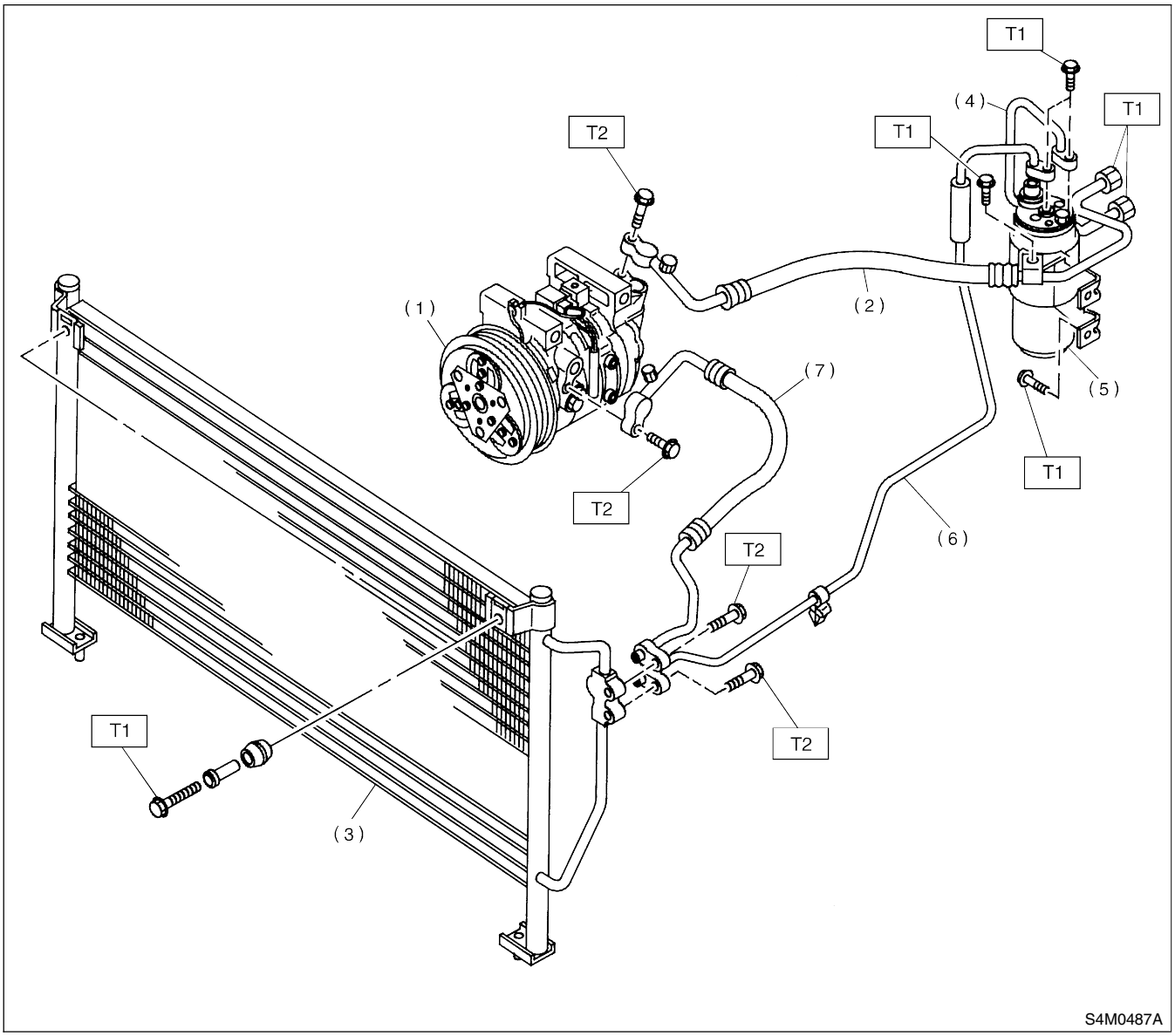
- **LHD Model:**



(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)

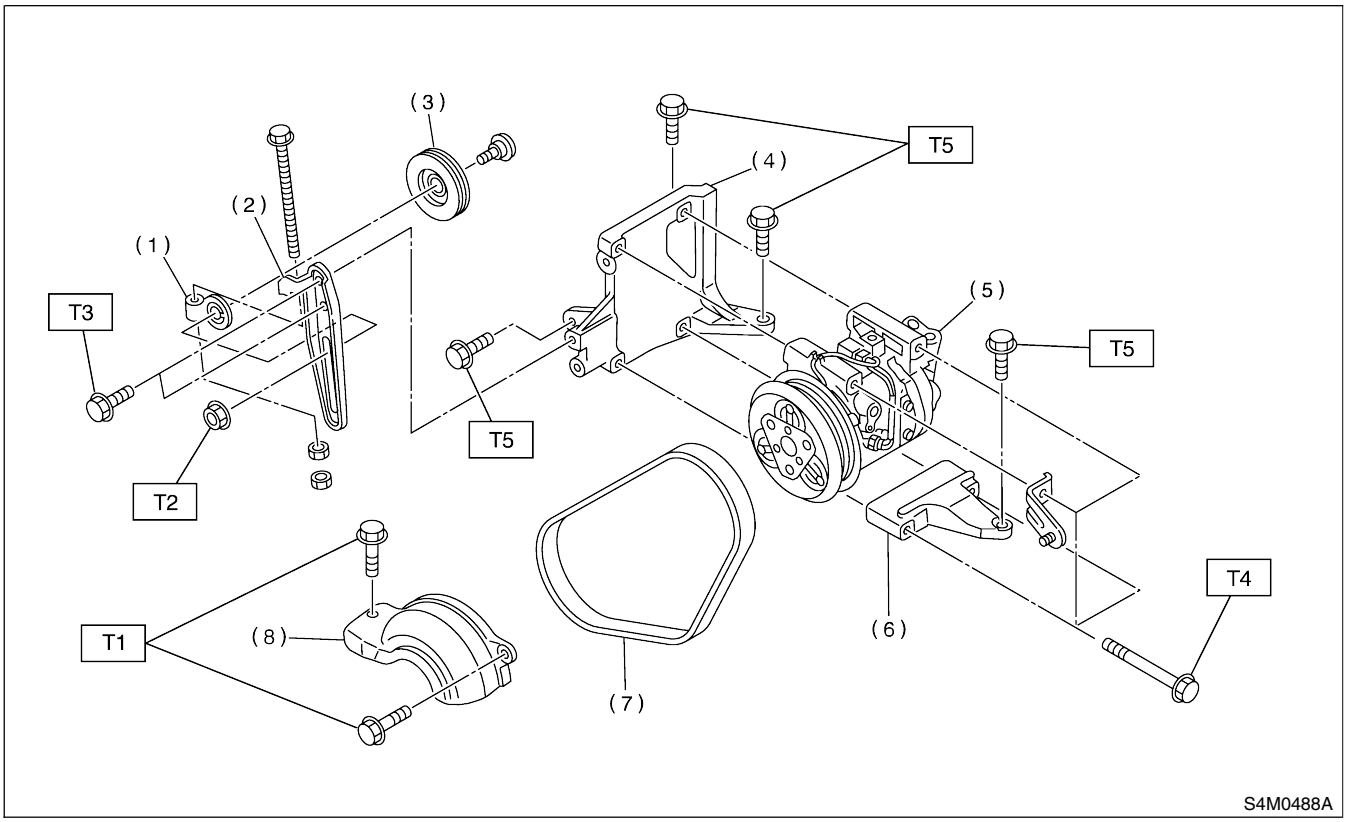
- **RHD Model:**



(1) Compressor
(2) Hose (Low-pressure)
(3) Condenser
(4) Pipe (From receiver drier to intake unit)
(5) Receiver drier
(6) Pipe (From condenser to receiver drier)
(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



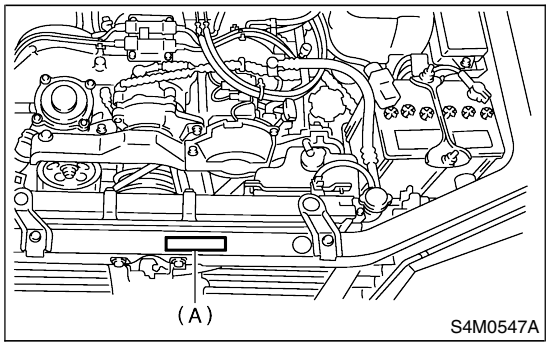
(1) Idler pulley adjuster
(2) Idler pulley bracket
(3) Idler pulley
(4) Compressor bracket upper
(5) Compressor
(6) Compressor bracket lower
(7) V-belt
(8) Compressor belt cover

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.



2. COMPRESSOR OIL S701001A0302

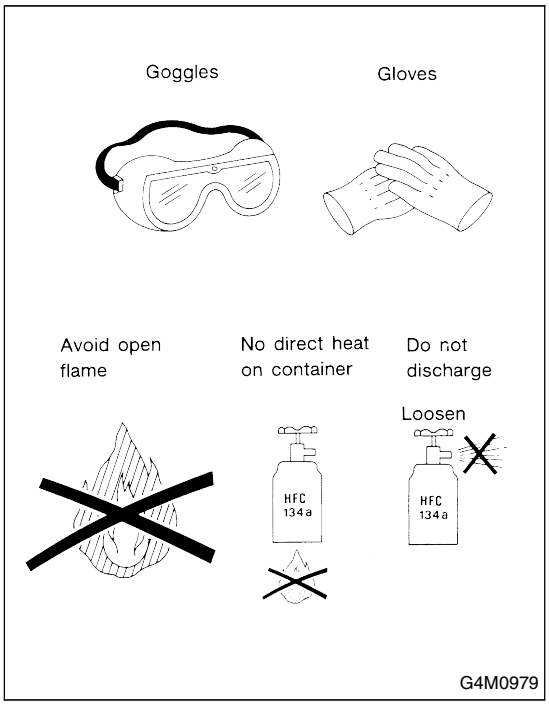
● HFC-134a compressor oil has no compatibility with that for R12 system.
● Use only the manufacturer-authorized compressor oil for the HFC-134a system; only use ZXL200PG.
● Do not mix multiple compressor oils.
If HFC-12 compressor oil is used in a HFC-134a A/C system, the compressor may become stuck 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.

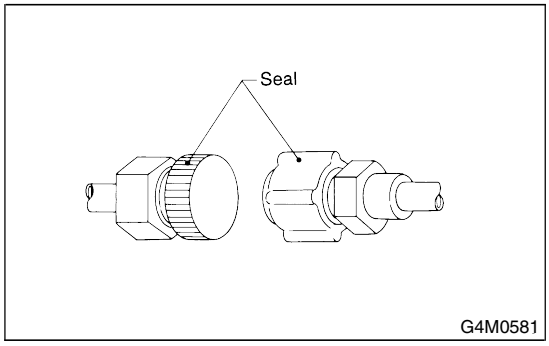
4. HANDLING OF REFRIGERANT S701001A0304

● 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.

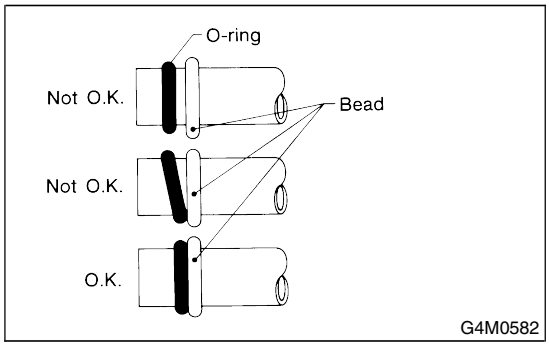


5. O-RING CONNECTIONS S701001A0305

- 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.



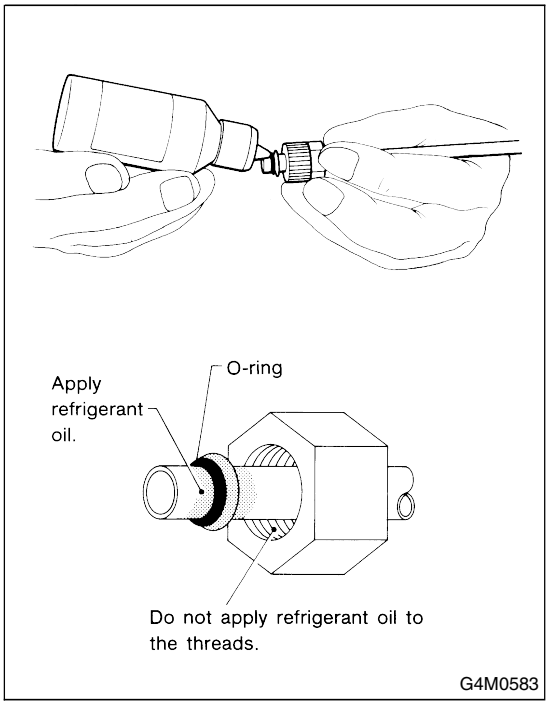
- Visually check the surfaces and mating surfaces of O-rings, threads, and connecting points. If a failure is found, replace the applicable parts.
- Install the O-rings at right angle to the tube beards.



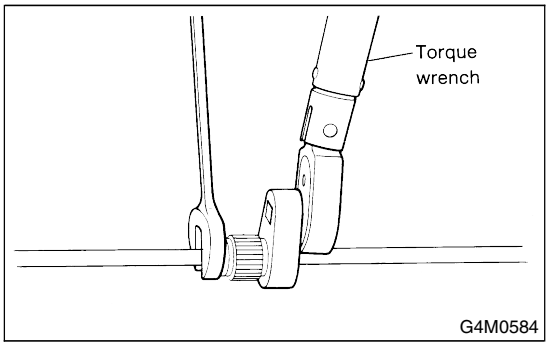
- Use the oil specified in the service manual to lubricate the O-rings.

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.



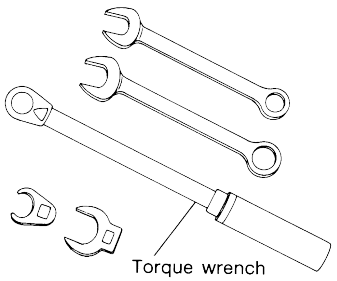
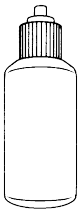
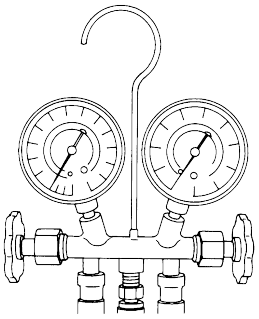
- When connecting hoses or pipes, use 2 wrenches (a torque wrench for tightening). While securing one side with a wrench, tighten the other side to the specified torque with a torque wrench. If only one wrench is used to tighten, the tightening torque will be excessive or insufficient. This may cause a pipe distortion or gas leak, resulting in damage to hoses and pipes.
- After tightening, using 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.

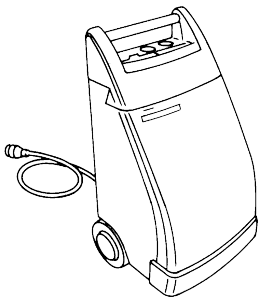
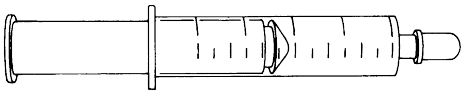
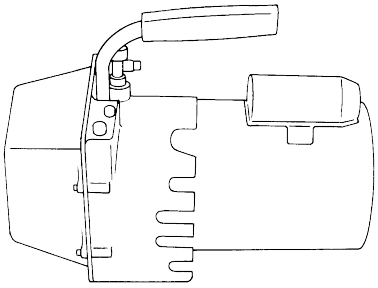
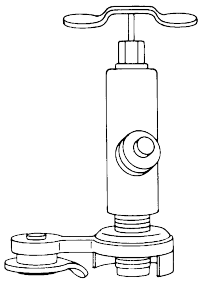


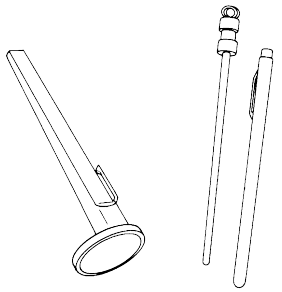
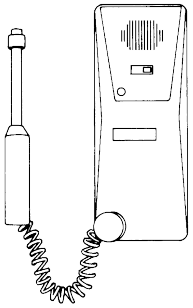
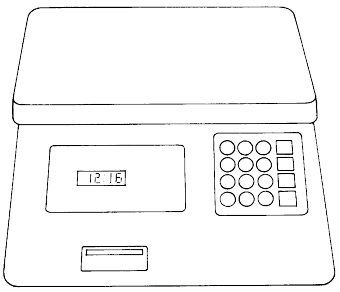
D: PREPARATION TOOL S701001A17

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 the vehicle in the shade and draftless condition.
2) Connect the manifold gauge set.
3) Open the front windows and close all doors.
4) Open the hood.
5) Increase engine rpm to 1,500.
6) Turn ON the A/C switch.
7) Turn the temperature control switch to MAX COOL.
8) Put in RECIRC position.
9) Turn the 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

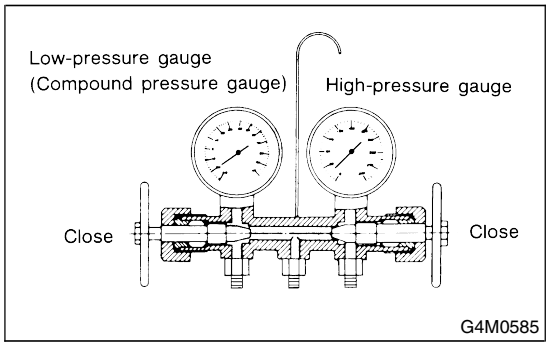
Symptom	Probable cause	Repair order
High-pressure side is unusually high.	• Defective condenser fan motor • Clogged condenser fan • Too much refrigerant • Air inside the system • Defective receiver dryer	• Replace the fan motor. • Clean the condenser fin. • Discharge refrigerant. • Replace the receiver 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

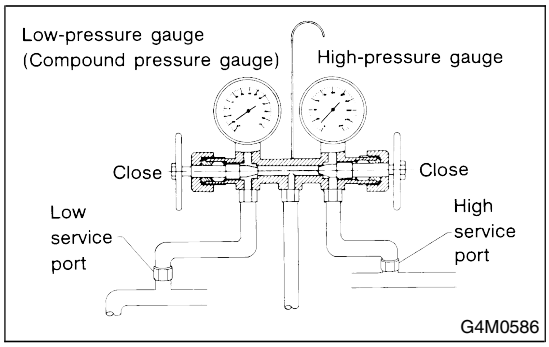
A: OPERATION S701291A16

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) Turn the A/C switch ON.
Leave the engine running for approx. 5 minutes to activate the compressor. Perform the refrigerating cycle with the refrigerant to discharge the compressor oil remaining on the functional parts into the compressor as much as possible.
2) Stop the engine.
3) Close the valves on the low-/high-pressure sides of the manifold gauge set.



4) Install the low-/high-pressure hoses to the service ports on the low-/high-pressure sides of the vehicle respectively.



5) Connect the center hose to the refrigerant recovery system.
6) Follow the operation manual to activate the refrigerant recovery system.

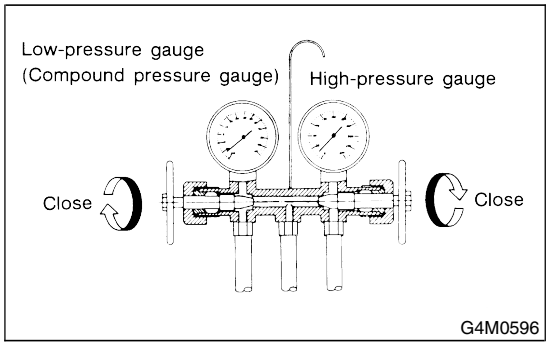
4. Refrigerant Charging Procedure S701292

A: OPERATION S701292A16

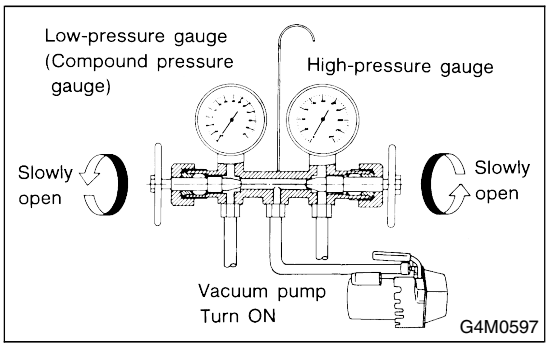
CAUTION:
• During operation, be sure to wear safety goggles and protective gloves.
• Before charging the refrigerant, evacuate the system to remove small amounts of moisture remaining in the system.
The moisture in the system can be completely evacuated only under the minimum vacuum level. The minimum 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)

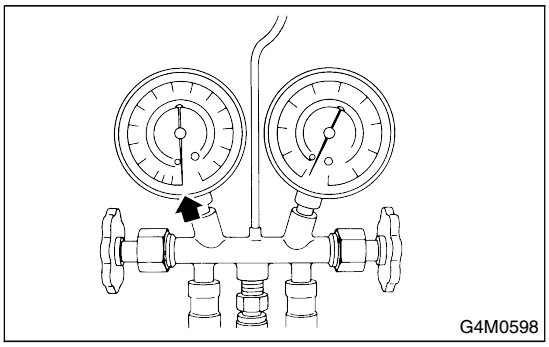
1) Close the valves on low-/high-pressure sides of the manifold gauge.



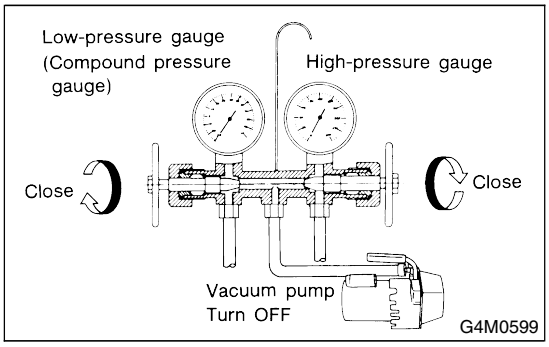
2) Install the low-/high-pressure hoses to the corresponding service ports on the vehicle respectively.
3) Connect the center hose of the manifold gauge set with the vacuum pump.
4) Carefully open the valves on the low-/high-pressure sides to activate the vacuum pump.



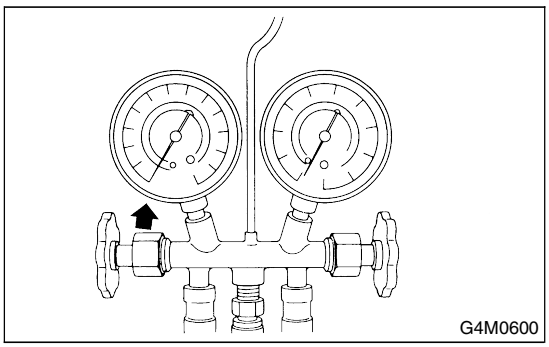
5) After the low-pressure gauge reaches 100.0 kPa (750 mmHg, 29.5 inHg) or higher, evacuate the system for approx. 15 minutes.



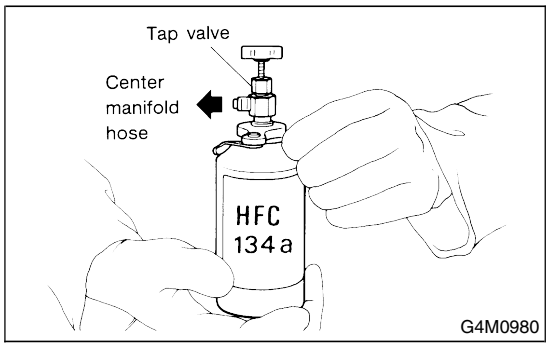
6) After 15 minutes of evacuation, if the reading shows 100.0 kPa (750 mmHg, 29.5 inHg) or higher, close the valves on the both sides to stop the vacuum pump.



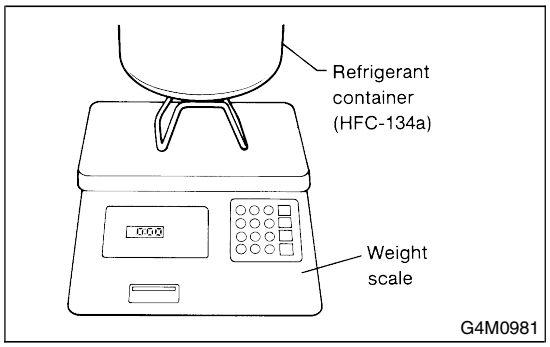
7) Note the low-pressure gauge reading.



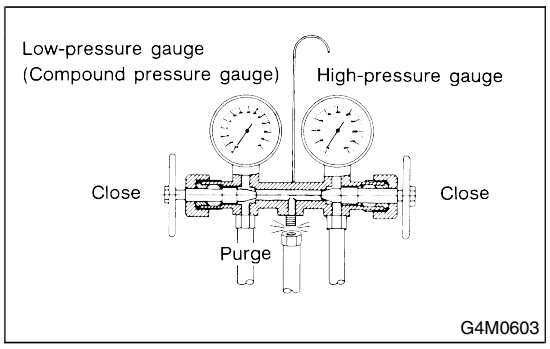
8) Leave it at least 5 minutes, and then check the low-pressure gauge reading for any changes.
When a gauge indicator shows near to zero point, this is a sign of leakage. Check pipe connector points, repair them, make sure there is no leakage by air bleeding.
9) Following the can tap operation manual instructions, install it to the refrigerant can.



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 weighting scale.

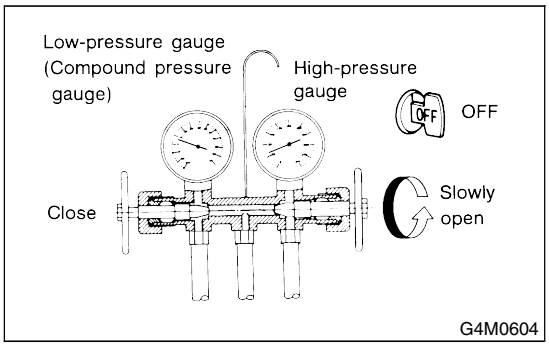


12) Confirm that all the 3 hoses are tightly connected to the manifold gauge set.



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.

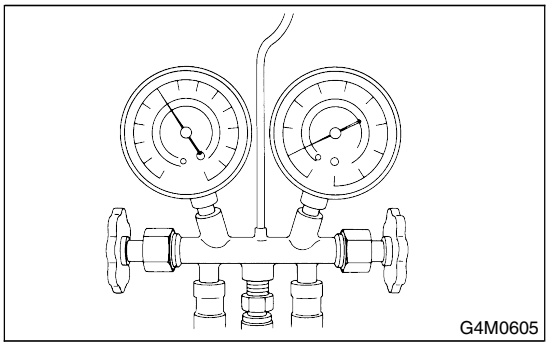


CAUTION:
Never run the engine during charging from the high-pressure side.

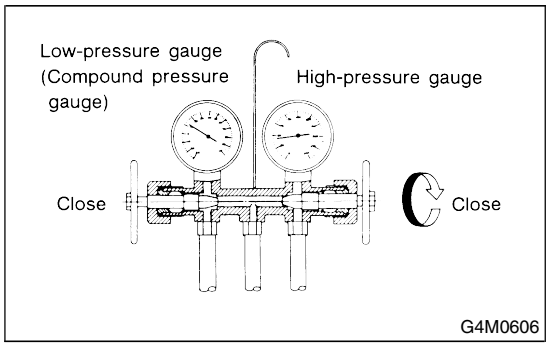
16) Close the high-pressure valve when the low-pressure gauge reaches 98 kPa (1 kg/cm^2, 14 psi).
Using a leak tester, check the system for leaks.
If any leakage is found after the refrigerant recovery is completed, repair the applicable area.
17) After confirming that there are no leaks with the leak 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- and 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.



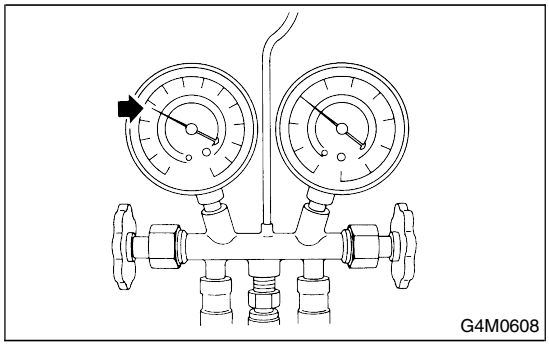
19) If the HFC-134a source is empty, close the high-pressure valve, close the valve on the can tap, and replace the HFC-134a source with a new one to restart the operation.



20) Confirm that both the low- and 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 the high-pressure valve with the engine running.



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.

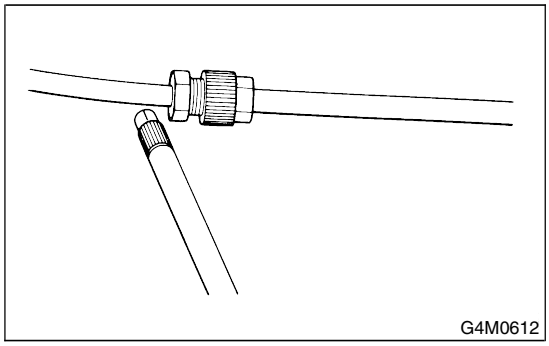
Refrigerant amount		
Refrigerant	Minimum	Maximum
HFC-134a	0.6 kg (1.3 lb)	0.7 kg (1.5 lb)

27) Disconnect the hose from the service port, and install the service port cap.

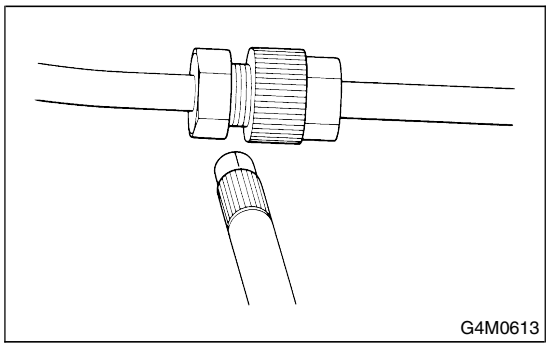
5. Refrigerant Leak Check S701293

A: INSPECTION S701293A10

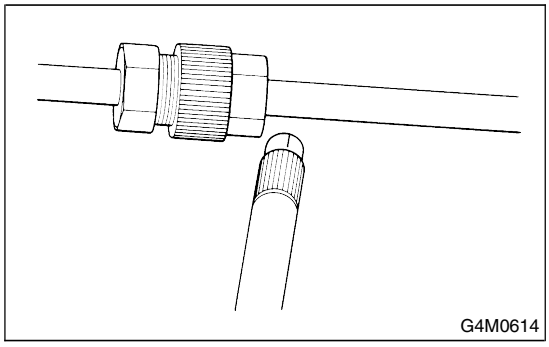
1) Operate the A/C system for approx. 10 minutes, and confirm that the high-side pressure shows at least 690 kPa (7.03 kg/cm^2, 100 psi). Then stop the engine to start the leak test.
2) Starting from the connection between the high-pressure tube and evaporator, check the system for leaks along the high-pressure side through the compressor. The following items must be checked thoroughly.
- Connection between the tube and tube fitting



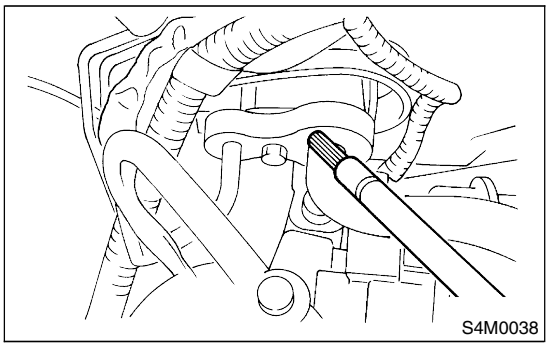
- Connection between 2 parts



- Connection between the tube and nut

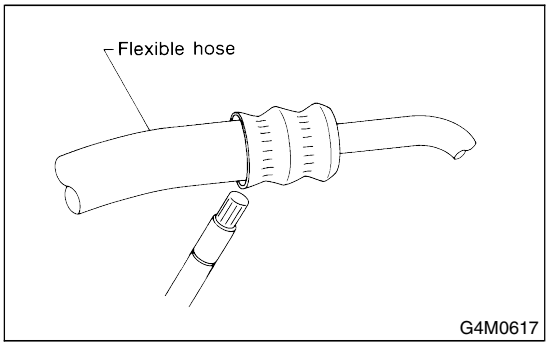


3) Check the joint and seam between the pressure switch (dual switch) and receiver dryer.
4) Check the connections between the condenser and tubes, and welded joints on the condenser.
The leak tester may detect the oil on the condenser fins as a leak.
5) Check the joint between the compressor and hoses.
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



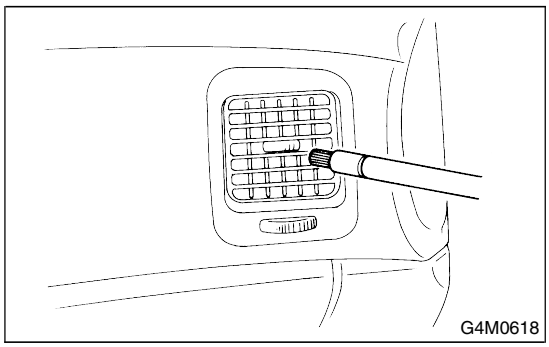
10) Visually check the rubber area of the flexible hose for cracks.
Check the entire length of the flexible hose, especially the connection with the metal hose end.

CAUTION:
Carefully check the external surface of hoses and tubes at approx. 25 mm (0.98 in) per second.

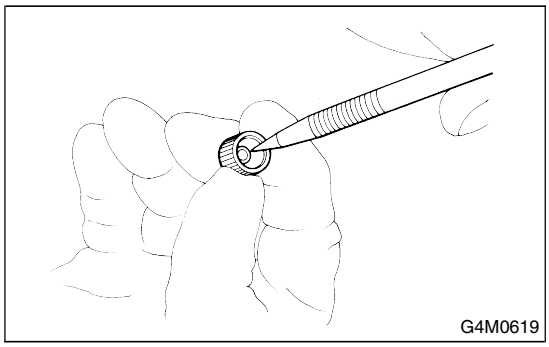


11) Disconnect the drain hose from the evaporator case, and check the hose end for at least 10 seconds.
After the test is finished, reconnect the drain hose.

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 grill on the instrument panel. While moving the tester closer to the grill, run the blower for 1 or 2 seconds, then stop it. Check the grill 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 rpm to 1,500.
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) Leave in this condition for 10 minutes.

B: REPLACEMENT S701294A20

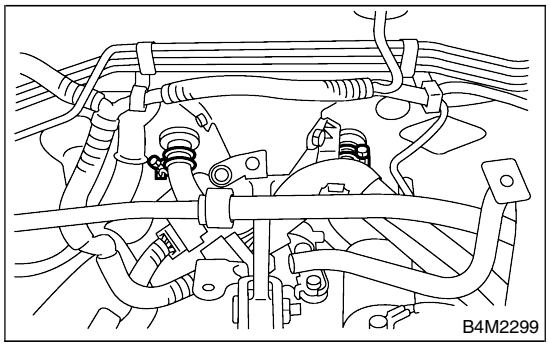
NOTE:
- If a component is replaced, add an appropriate amount of compressor oil.
- When replacing the compressor, the new compressor will already have the specified amount of oil in it. Install the new compressor after removing the same amount of oil that is remaining in the compressor removed.

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)

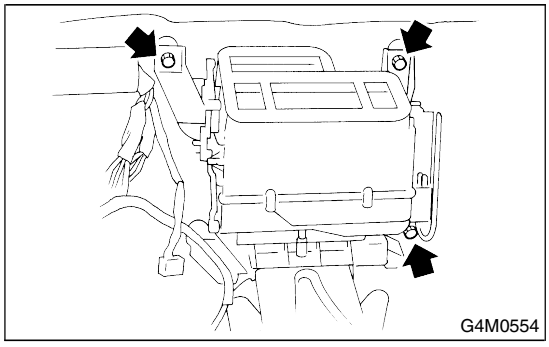
7. Heater Unit S701290

A: REMOVAL S701290A18

1) Disconnect ground cable from battery.
2) Drain engine coolant. <Ref. to CO-14, DRAINING OF ENGINE, REPLACEMENT, Engine Coolant.>
3) Remove air cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner.>
4) Remove intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
5) Release heater hose clamps in engine compartment to remove the hoses.


B4M2299

6) Remove instrument panel. <Ref. to EI-31 REMOVAL, Instrument Panel Assembly.>
7) Loosen nuts and bolts of support beam to remove support beam.
8) Remove A/C unit. <Ref. to AC-36 REMOVAL, Intake Unit.>
9) Loosen nuts and bolts of heater unit to remove heater unit.


G4M0554

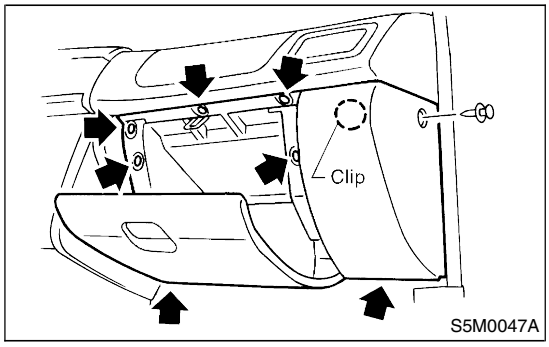
B: INSTALLATION S701290A11

1) Install in the reverse order of removal.
2) Refill engine coolant. <Ref. to CO-14, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

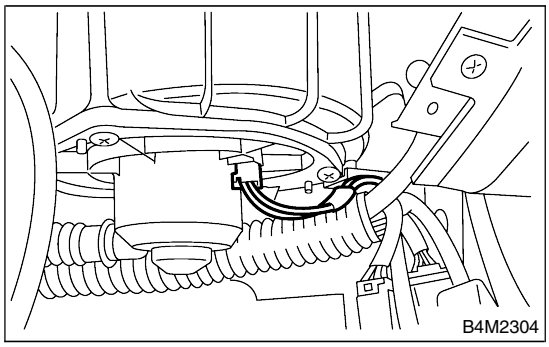
8. Blower Motor Assembly S701295

A: REMOVAL S701295A18

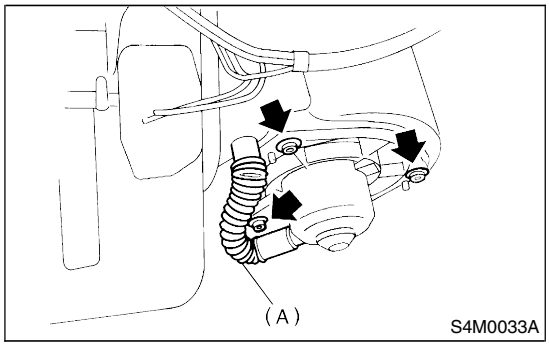
1) Disconnect ground cable from battery.
2) Remove glove box.



3) Disconnect motor connector.



4) Remove 3 screws.
5) Disconnect aspirator pipe (A) and remove blower motor.

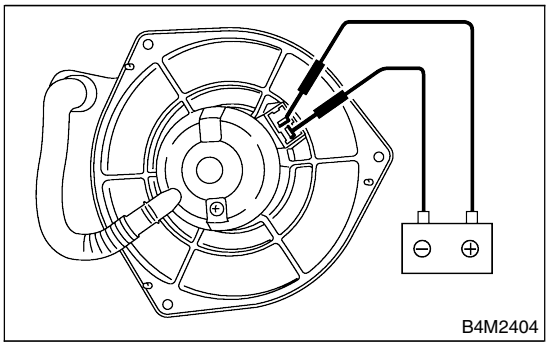


B: INSTALLATION S701295A11

Install in the reverse order of removal.

C: INSPECTION S701295A10

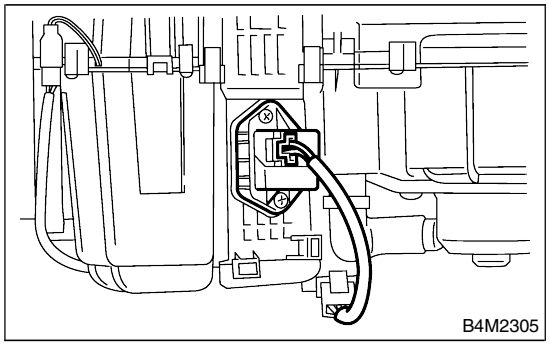
Connect motor connector terminal 1 from the battery to the positive (+) lead and terminal 2 to the negative (–) lead. Make sure the motor runs smoothly.



9. Power Transistor (Heater Blower Resistor) S701553

A: REMOVAL S701553A18

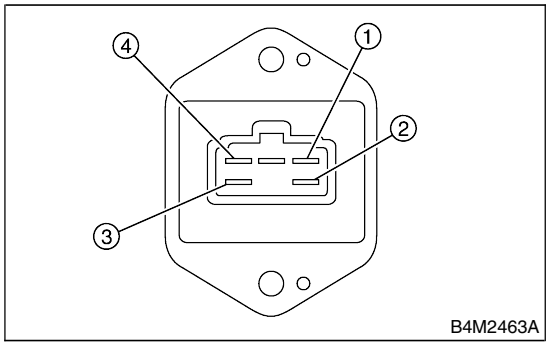
1) Remove glove box. <Ref. to EI-28 REMOVAL, Glove Box.>
2) Disconnect power transistor connector.
3) Loosen 2 screws to remove power transistor.


B4M2305

B: INSTALLATION S701553A11

Install in the reverse order of removal.

C: INSPECTION S701553A10



B4M2463A

Check continuity between connector terminals.

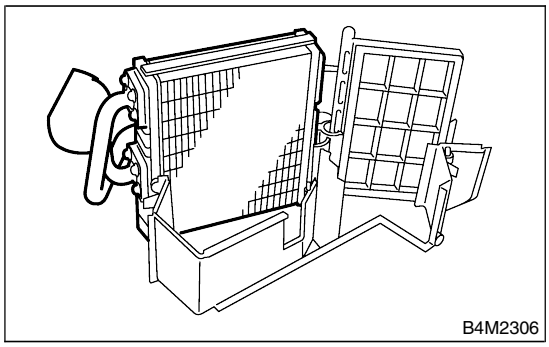
Tester connection	Condition	Specified condition
4 — 3	Constant	Approx. 0.4 Ω
3 — 2	Constant	Approx. 0.7 Ω
2 — 1	Constant	Approx. 1.5 Ω

If NG, replace the blower resistor.

10. Heater Core S701554

A: REMOVAL S701554A18

1) Remove heater unit. <Ref. to AC-26 REMOVAL, Heater Unit.>
2) Remove screws to separate heater unit case.
3) Remove heater core.



B: INSTALLATION S701554A11

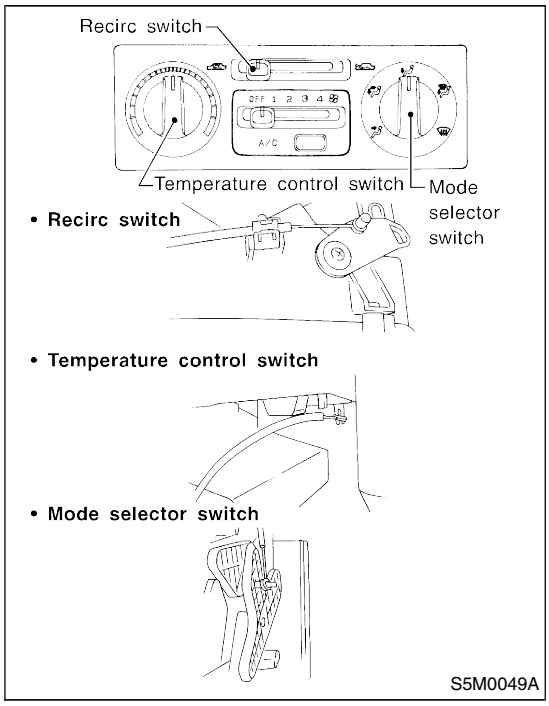
Install in the reverse order of removal.

11. Control Unit S701285

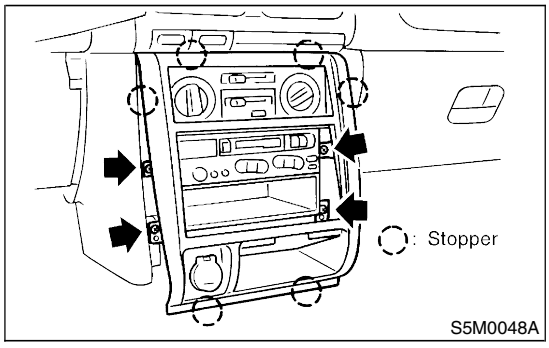
A: REMOVAL S701285A18

1) Disconnect GND cable from battery.
2) Set temperature control switch to “FULL HOT” and mode selector switch to “DEF” position and recirc switch to “FRESH” position.
3) Disconnect temperature control cable and mode door control cable from heater unit then disconnect recirc control cable from intake unit.

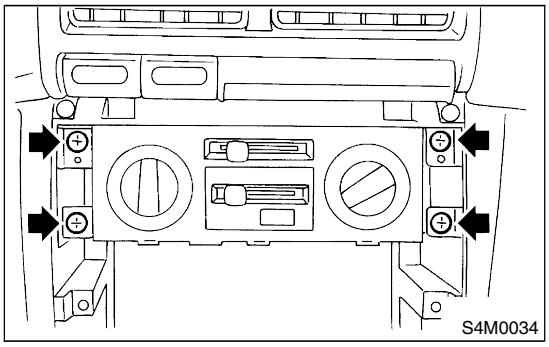
NOTE:
Do not attempt to move links during installation.



4) Remove console box. <Ref. to EI-30 REMOVAL, Console Box.>
5) Remove center panel and then disconnect connector.
6) Remove audio.



7) Remove control unit assembly from center console.



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.

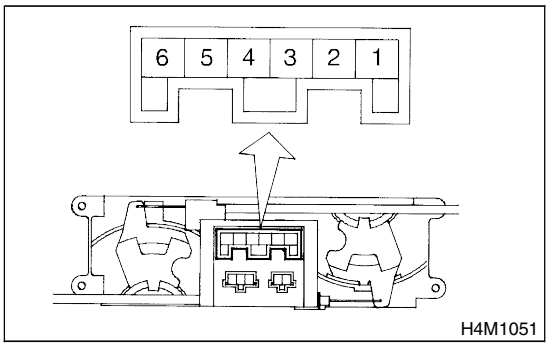
C: INSPECTION S701285A10

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

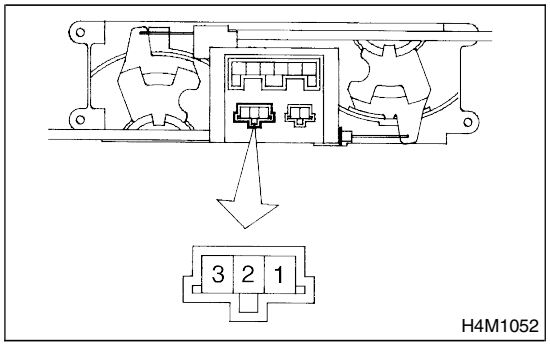


2. A/C SWITCH S701285A1004

Check A/C switch continuity between each terminal.

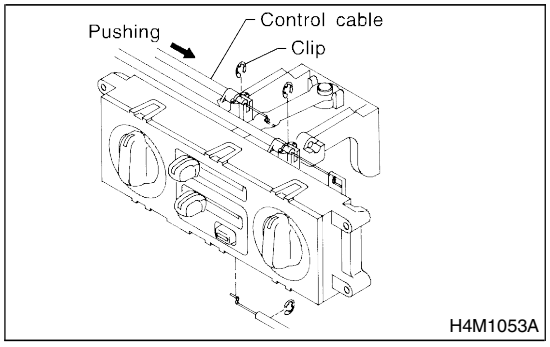
Terminal	Switch ON	Illumi.
1		○
2	○	○
3	○	○

H5M1281A



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.



12. Compressor S701281

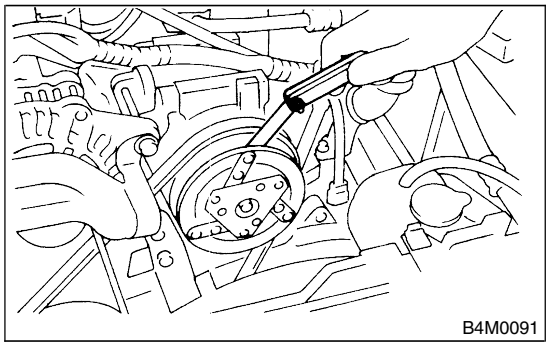
A: INSPECTION S701281A10

1. MAGNETIC CLUTCH CLEARANCE

S701281A1001

1) Check the clearance of the entire circumference around the drive plate and pulley.

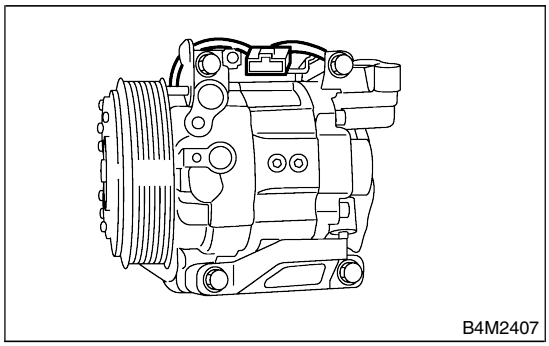
Standard:
0.45±0.15 mm (0.0177±0.0059 in)


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.

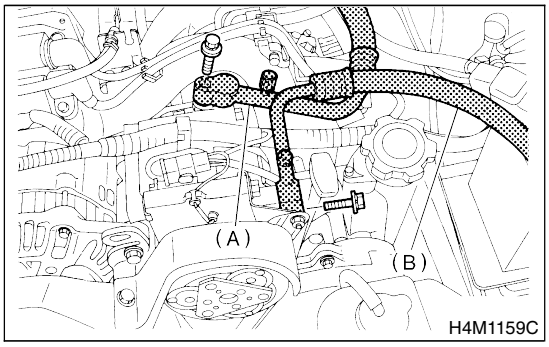

B4M2407

3) Make sure the magnet clutch engages.
If NG, replace the compressor.

B: REMOVAL S701281A18

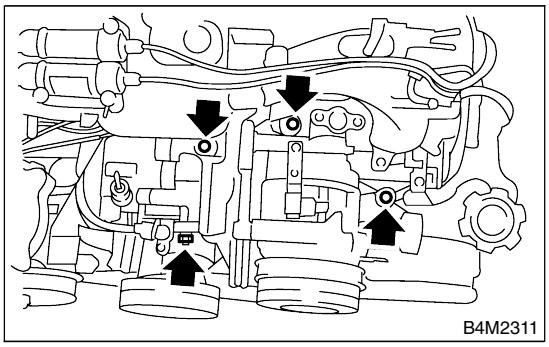
1) Perform oil return operation. <Ref. to AC-25 OPERATION, Compressor Oil.>
2) Turn A/C switch OFF and stop the engine.
3) Using refrigerant recovery system, discharge refrigerant. <Ref. to AC-19 OPERATION, Refrigerant Recovery Procedure.>
4) Disconnect ground cable from battery.
5) Disconnect low-pressure 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.

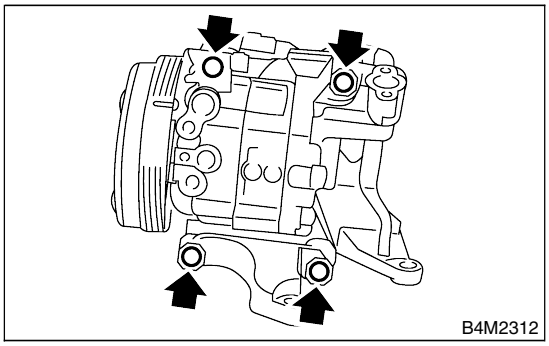


H4M1159C

6) Remove V-belt. (SOHC) <Ref. to ME(SOHC)-42, REMOVAL, V-belt.> or (DOHC TURBO) <Ref. to ME(DOHC TURBO)-44, 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

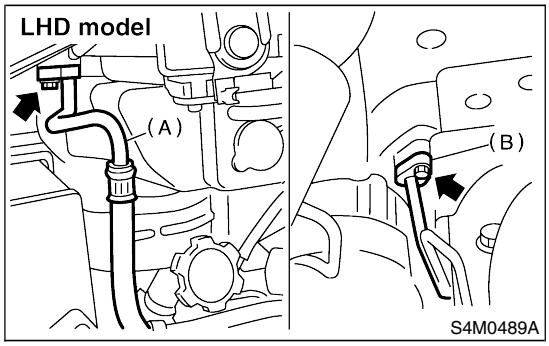
C: INSTALLATION S701281A11

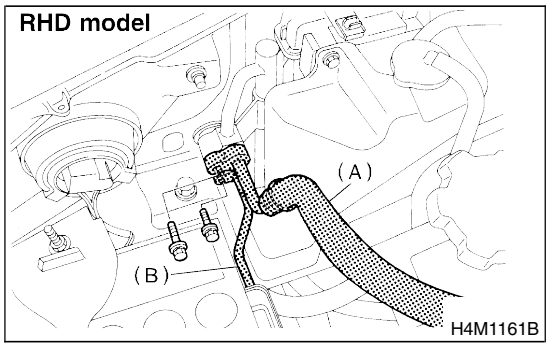
1) Install in the reverse order of removal.
2) Replace O-rings on low-/high-pressure hoses with new ones, then apply compressor oil.
3) When replacing compressor, adjust amount of compressor oil. <Ref. to AC-25 Compressor Oil.>
4) Charge refrigerant. <Ref. to AC-20 OPERATION, Refrigerant Charging Procedure.>

13. Condenser S701282

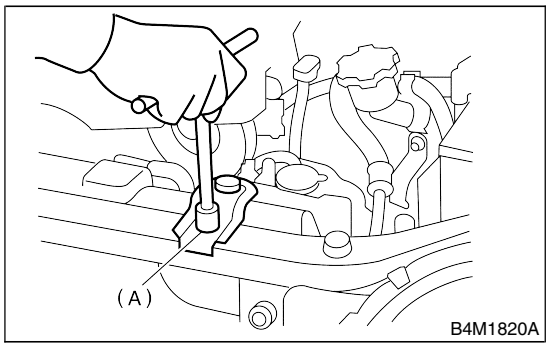
A: REMOVAL S701282A18

1) Using refrigerant recovery system, discharge refrigerant. <Ref. to AC-19 OPERATION, Refrigerant Recovery Procedure.>
2) Disconnect ground cable from battery.
3) Disconnect high-pressure hose (A) and high-pressure pipe (B) from condenser.

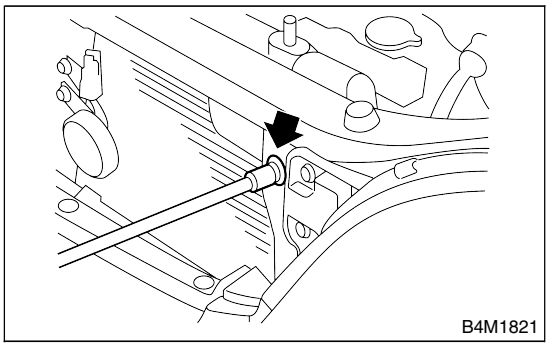




4) Remove radiator bracket (A).



5) Remove 2 bolts. While lifting condenser, pull it out through the space between the radiator and the radiator panel.

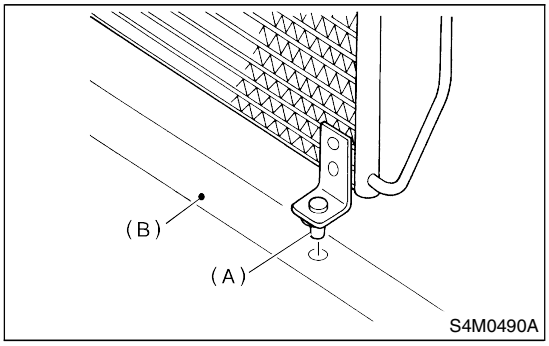


CAUTION:
Be careful not to damage condenser fins. If a damaged fin is found, repair it using a thin screwdriver.
If condenser is replaced, add appropriate amount of compressor oil to the compressor. <Ref. to AC-25 REPLACEMENT, Compressor Oil.>

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 of condenser has been fitted into holes on radiator panel.



2) Charge refrigerant. <Ref. to AC-20 OPERATION, Refrigerant Charging Procedure.>

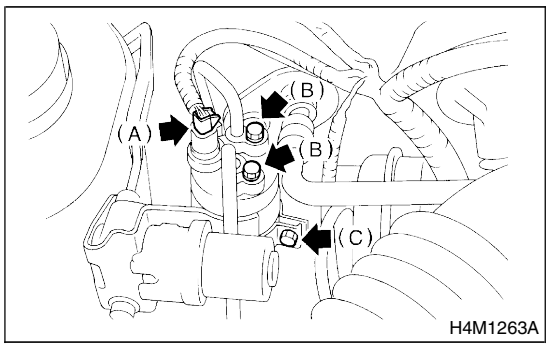
C: INSPECTION S701282A10

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-19 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-25 REPLACEMENT, Compressor Oil.>

B: INSTALLATION S701283A11

1) Install in the reverse order of removal.

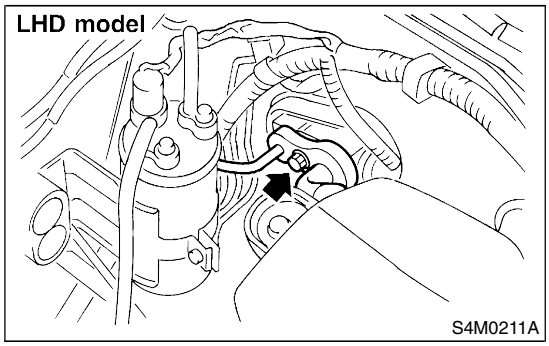
CAUTION:
Replace O-rings with new ones, and apply compressor oil.

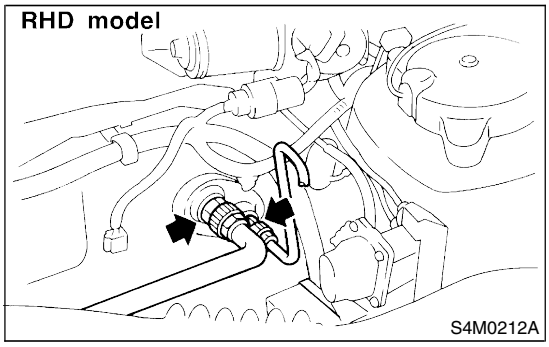
2) Charge refrigerant. <Ref. to AC-20 OPERATION, Refrigerant Charging Procedure.>

15. Intake Unit S701632

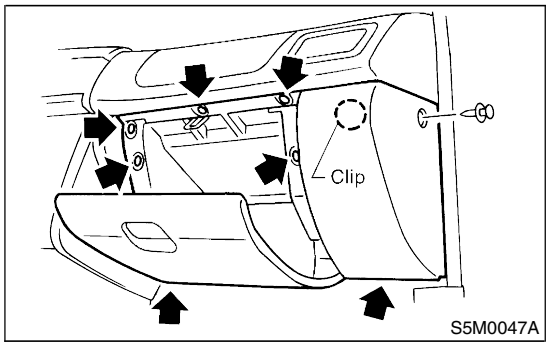
A: REMOVAL S701632A18

1) Using refrigerant recovery system, discharge refrigerant. <Ref. to AC-19 OPERATION, Refrigerant Recovery Procedure.>
2) Disconnect ground cable from battery.
3) LHD: Remove bolt then disconnect discharge pipe and suction pipe.
RHD: Disconnect discharge pipe, suction pipe and grommets.

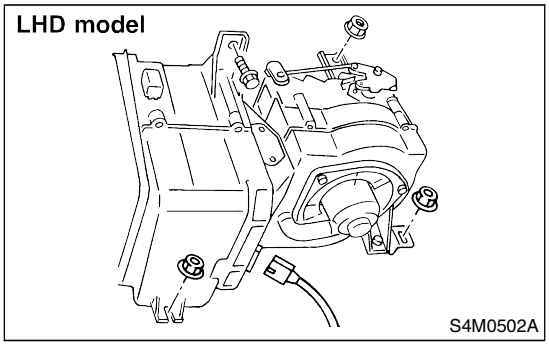


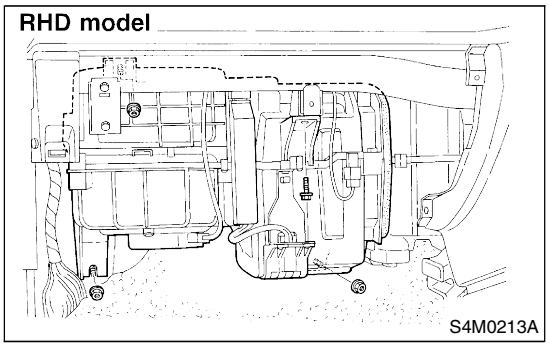


4) Remove glove box.



5) Disconnect the harness connector from intake unit.
6) Disconnect drain hose.
7) Remove intake unit mounting bolt and nut.





B: INSTALLATION S701632A11

1) Install in the reverse order of removal.

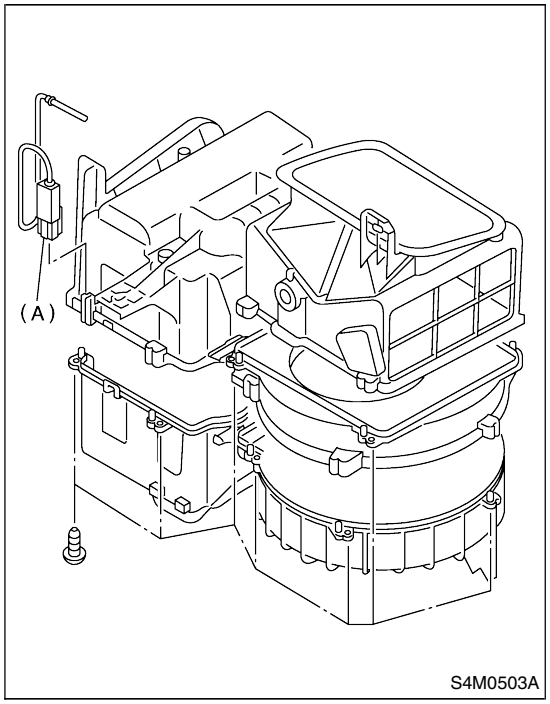
CAUTION:
Replace O-rings with new ones, and apply compressor oil.

2) Charge refrigerant. <Ref. to AC-20 OPERATION, Refrigerant Charging Procedure.>

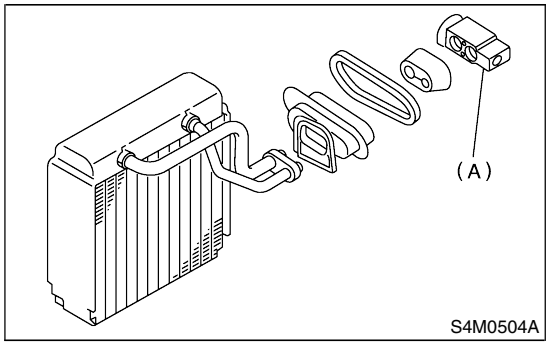
C: DISASSEMBLY S701632A06

1. LHD MODEL S701632A0601

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.

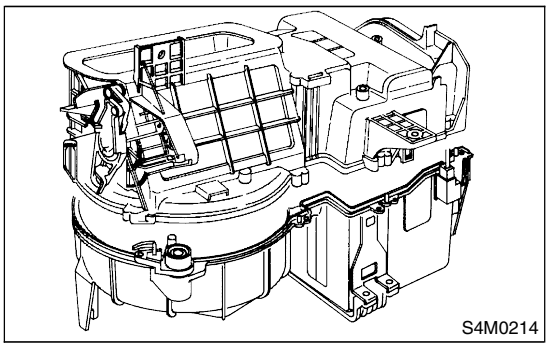


4) Remove the block expansion valve (A) from pipes.

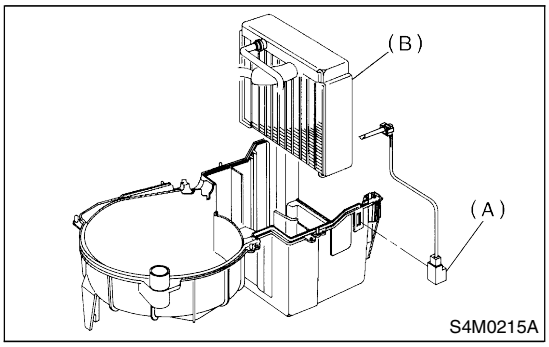


2. RHD MODEL S701632A0602

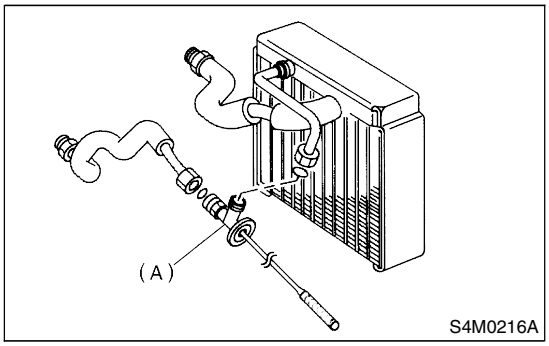
1) Remove some screws, then separate intake unit case.



2) Remove thermostat (A) from lower case and then detach evaporator (B).



3) Disconnect the connection between the expansion valve and pipe from receiver drier.
4) Remove the expansion valve (A) from pipes.



CAUTION:
If evaporator is replaced, add appropriate amount of compressor oil to evaporator. <Ref. to AC-25 REPLACEMENT, Compressor Oil.>

D: ASSEMBLY S701632A02

Assemble in the reverse order of disassembly.

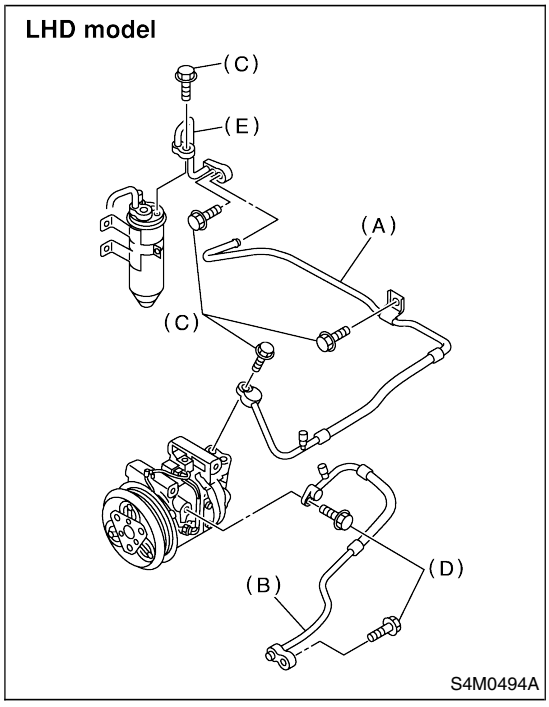
CAUTION:
Replace O-rings with new ones, and then apply compressor oil.

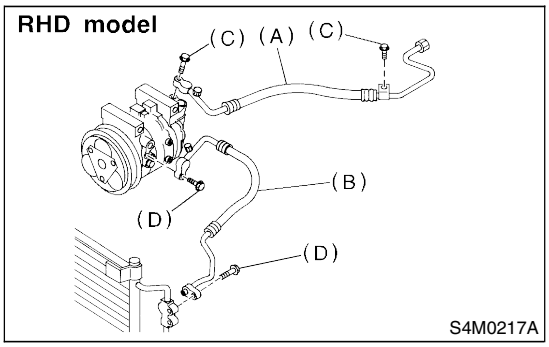
16. Flexible Hose S701286

A: REMOVAL S701286A18

CAUTION:
• When disconnecting/connecting hoses, do not apply excessive force them. 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-19 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.





B: INSTALLATION S701286A11

CAUTION:
When disconnecting/connecting hoses, do not apply an excessive force them. 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.

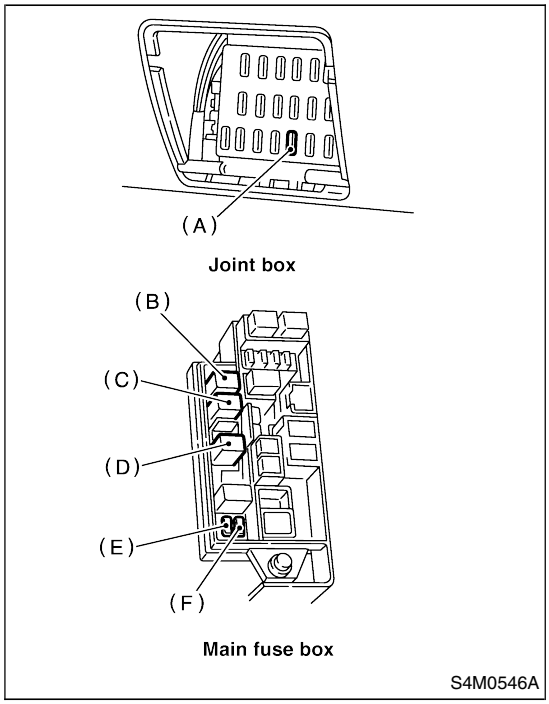
1) Install in the reverse order of removal.
2) Charge refrigerant. <Ref. to AC-20 OPERATION, Refrigerant Charging Procedure.>

C: INSPECTION S701286A10

NOTE:
If cracking, damage, or swelling is found on a hose, replace it with a new one.

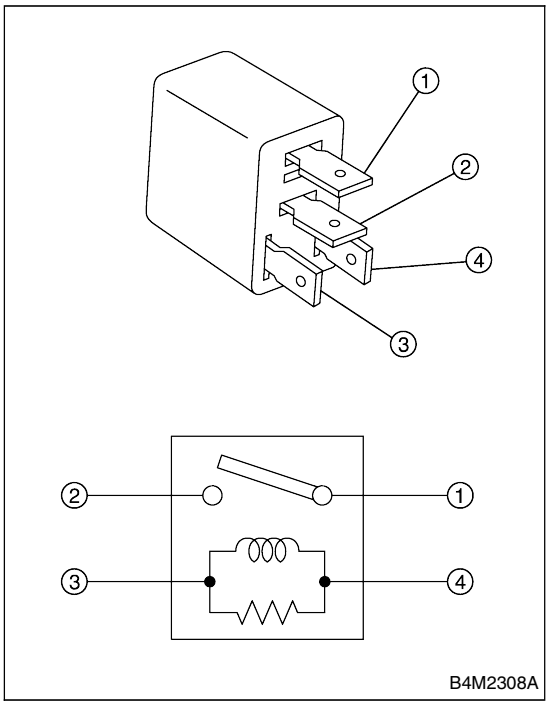
17. Relay and Fuse S701287

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

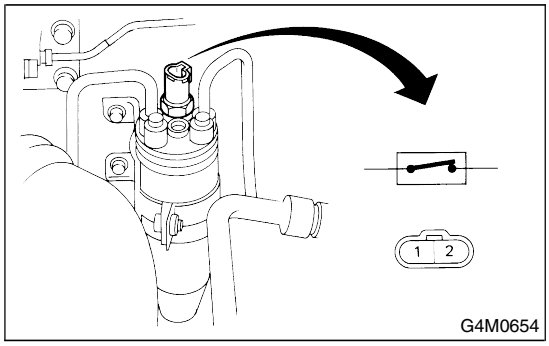


(3) — (4): Continuity exists.
(1) — (2): No continuity
While applying battery voltage to the cable between (3) and (4), check continuity between (1) and (2).
If no continuity exists, replace the relay with a new one.

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.



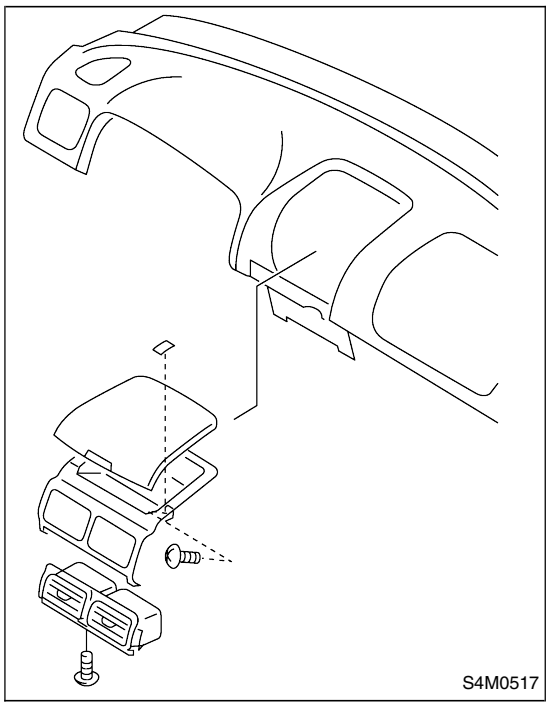
	Terminal	Operation	High-pressure side line pressure
High and low pressure switch	1 — 2	Turns OFF.	Increasing to 2,940±200 kPa (29.98±2.04 kg/cm^2, 426.3±29.0 psi): LHD model 2,650±200 kPa (27.02±2.04 kg/cm^2, 384±29 psi): RHD model
			Decreasing to 177±25 kPa (1.80±0.25 kg/cm^2, 25.6±3.6 psi):
		Turns 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): LHD model 1,471±200 kPa (15±2.04 kg/cm^2, 213 ±29 psi): RHD model

19. Air Vent Grille S701284

A: REMOVAL S701284A18

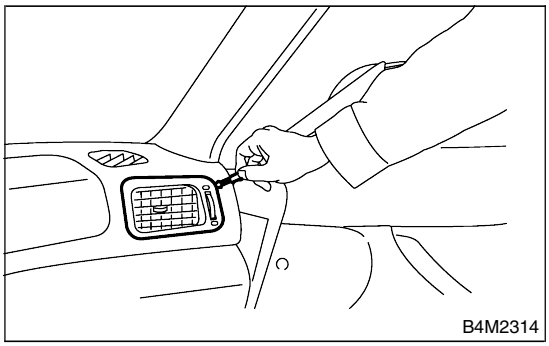
1. CENTER AIR VENT GRILLE S701284A1803

1) Remove center panel.
2) Loosen screw to remove grille.



2. SIDE AIR VENT GRILLE S701284A1804

1) Remove grille using sharp-edged screwdriver.



CAUTION:
Wrap screwdriver with vinyl tape to prevent damage to interior parts.

B: INSTALLATION S701284A11

Install in the reverse order of removal.

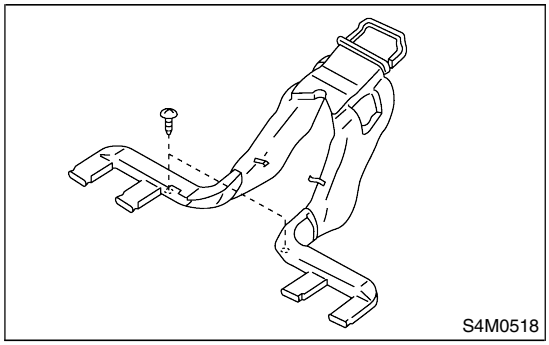
C: INSPECTION S701284A10

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-26 REMOVAL, Heater Unit.>
3) Remove front side sill cover.
4) Pull off floor mat to remove heater duct.



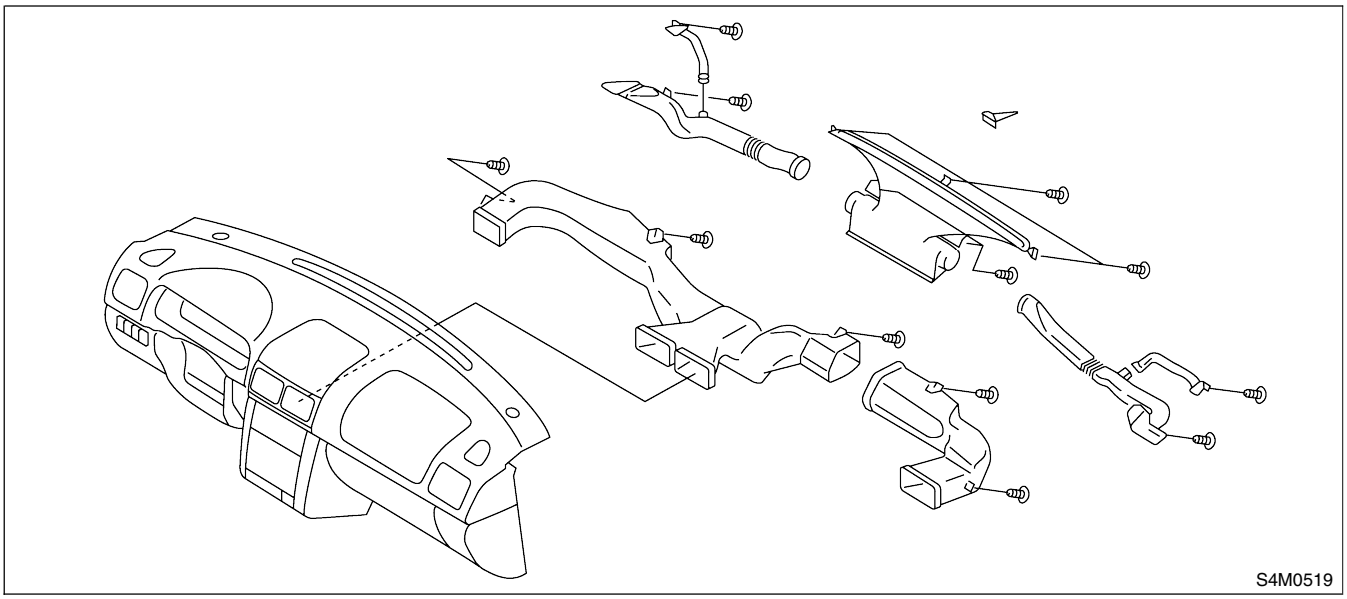
B: INSTALLATION S701556A11

Install in the reverse order of removal.

21. Heater Vent Duct S701557

A: REMOVAL S701557A18

1) Remove instrument panel. <Ref. to EI-31 REMOVAL, Instrument Panel.>
2) Remove screws.
3) Remove heater vent duct.



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 resister
		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

AIRBAG SYSTEM

AB

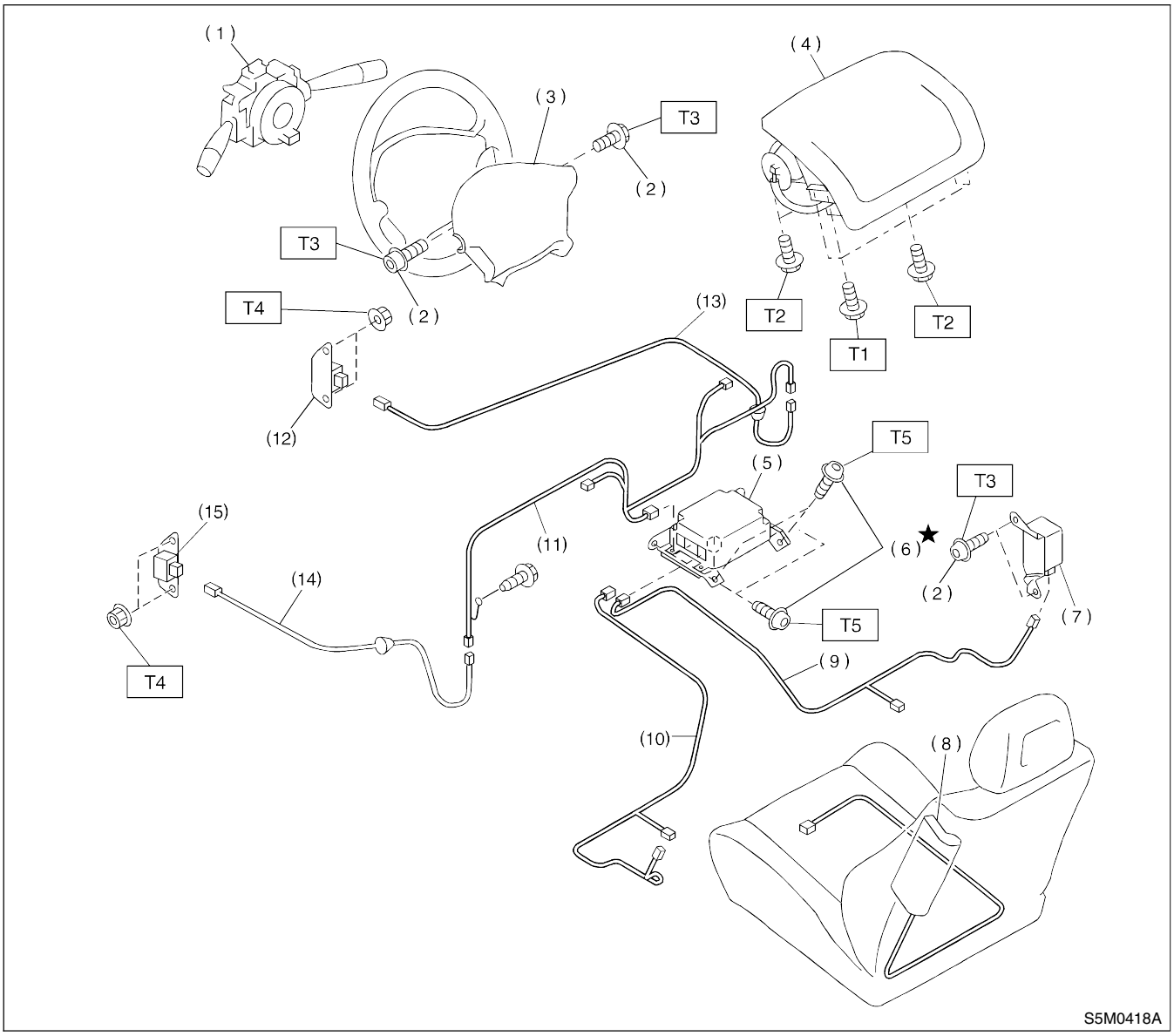
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1. General Description S802001

A: COMPONENT S802001A05

1. SRS AIRBAG S802001A0501

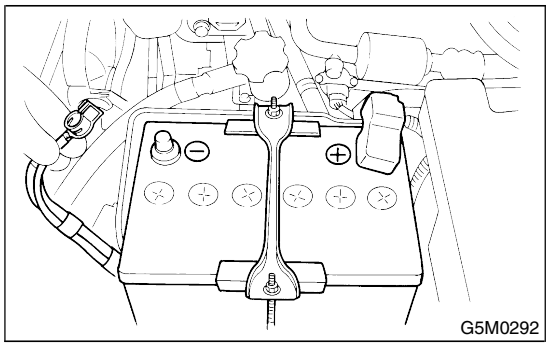


(1) Combination switch ASSY with roll connector
(2) TORX® bolt T30
(3) Airbag module ASSY (Driver)
(4) Airbag module ASSY (Passenger)
(5) Airbag control module
(6) TORX® bolt T40
(7) Side airbag sensor
(8) Side airbag module
(9) Side airbag harness (RH)
(10) Side airbag harness (LH)
(11) Airbag main harness
(12) Front sub sensor (RH)
(13) Front sub sensor harness (RH)
(14) Front sub sensor harness (LH)
(15) Front sub sensor (LH)

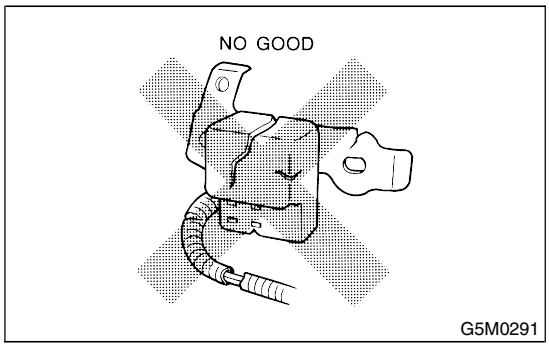
Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.3)
T2: 7.4 (0.75, 5.4)
T3: 10 (1.0, 7.2)
T4: 20 (2.0, 14.5)
T5: 25 (2.5, 18.1)

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.

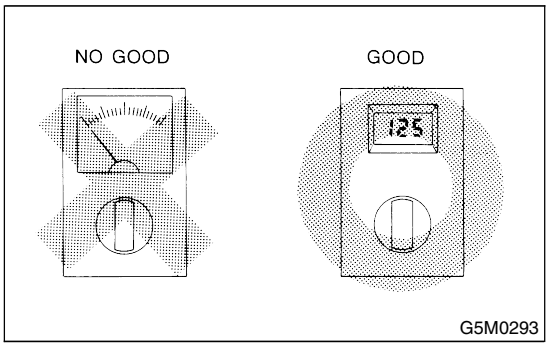

G5M0292

● If sensors, airbag module, airbag control module and harness are deformed or damaged, replace them with new genuine parts.

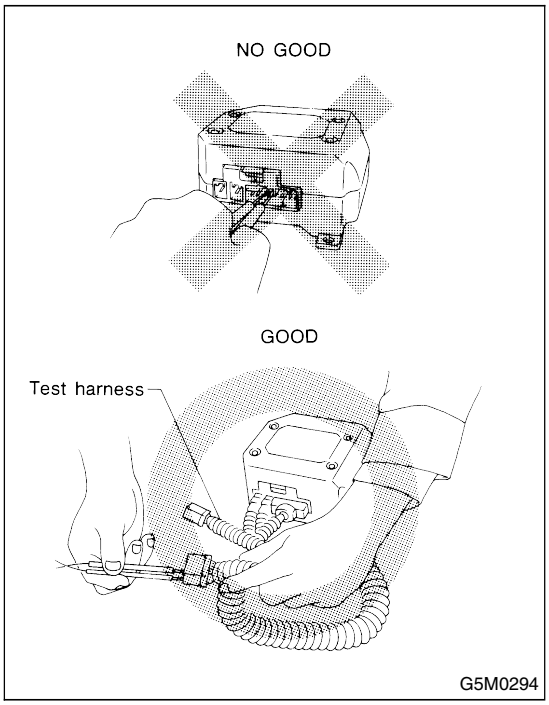


G5M0291

● 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.

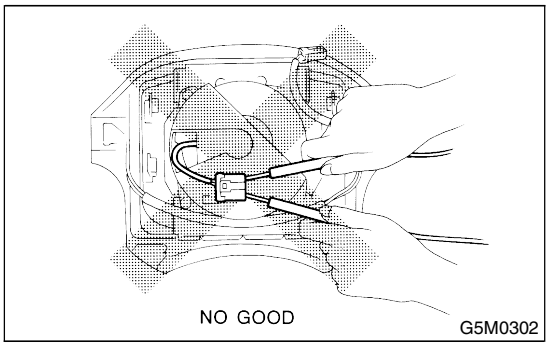


G5M0293



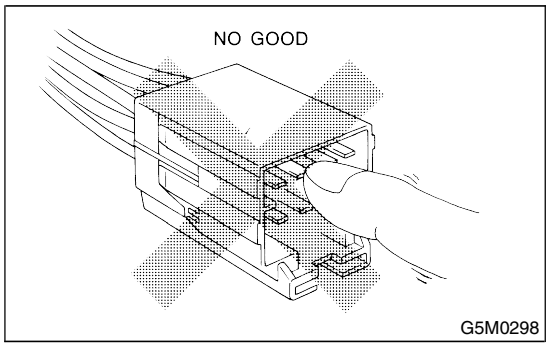
G5M0294

● Do not check continuity of the driver, passenger and side airbag modules.

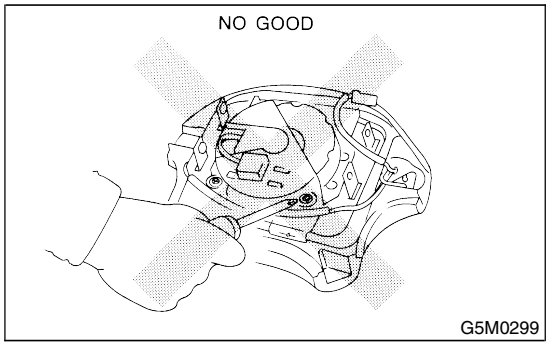


G5M0302

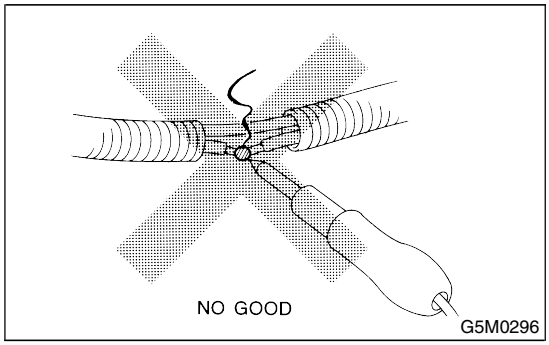
● Do not allow water or oil to come in contact with the connector terminals. Do not touch the connector terminals.



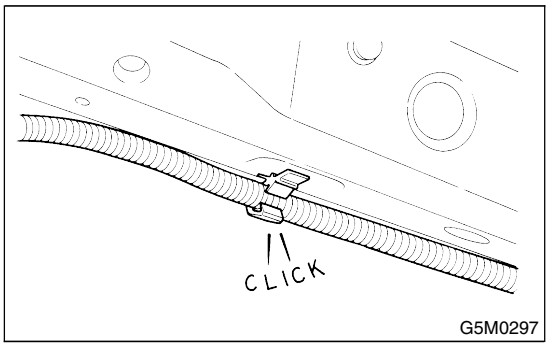
● Either of the airbag modules for driver, passenger or side, must not be disassembled.



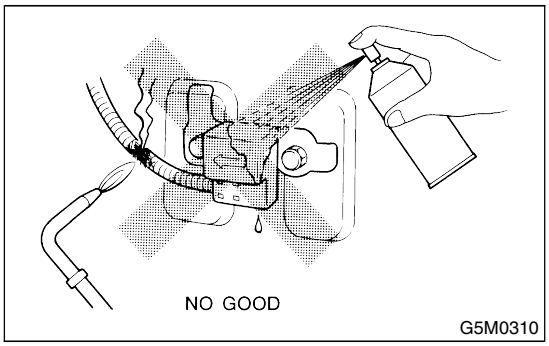
● If any damage, opening, or rust is found on the airbag system wire harness, do not attempt to repair using soldering equipment. Be sure to replace the faulty harness with a new genuine part.



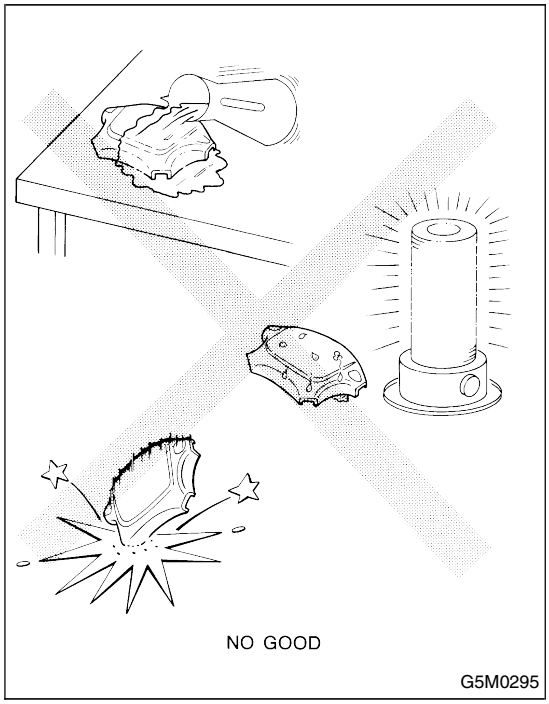
● Install the wire harness securely with the specified clips to avoid interference or tongled up with other parts.



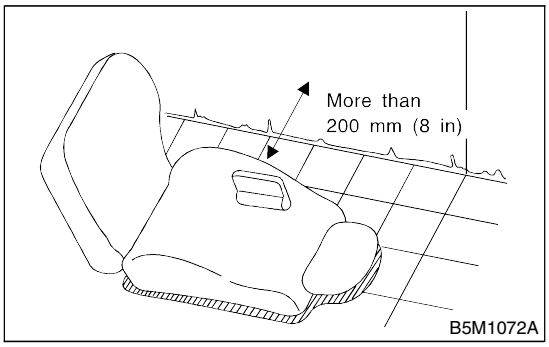
● When painting or performing sheet metal work on the front part of the vehicle, including the front wheel apron, front fender, and front side frame, remove the front sub sensors and wire harness of the airbag system.
● When painting or performing sheet metal work on the side of the vehicle, including the side sill, center pillar, and front and rear doors, remove the side airbag sensors and wire harness of the airbag system.



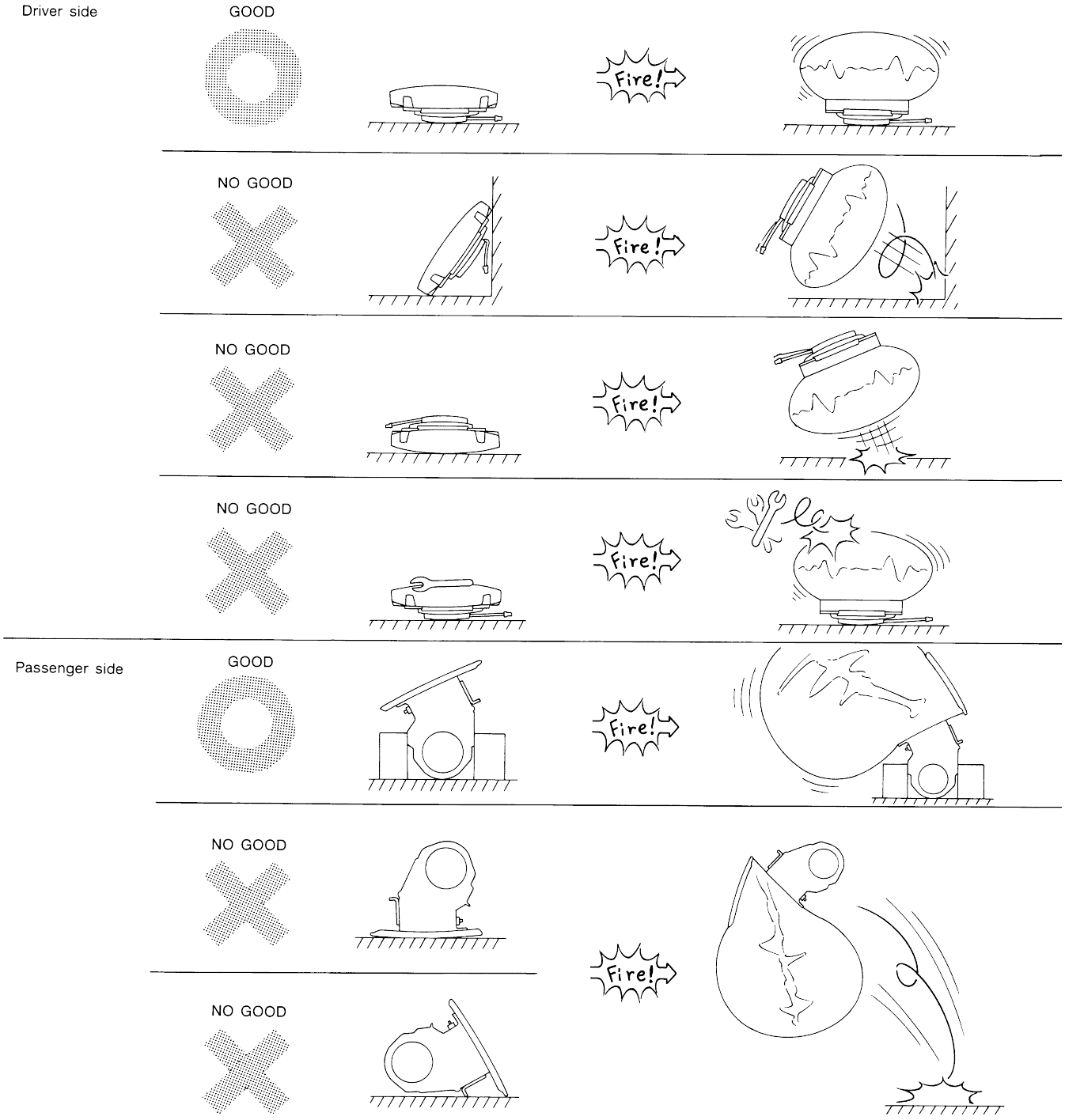
● Do not drop the airbag modulator parts, subject them to high temperature over 93°C (199°F), or let water, oil, or grease get on them; otherwise, the internal parts may be damaged and reliability greatly lowered.



● The removed front seat with the airbag module must be kept at least 200 mm (8 in) away from walls and other objects.



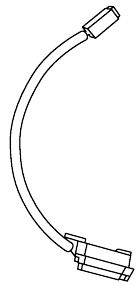
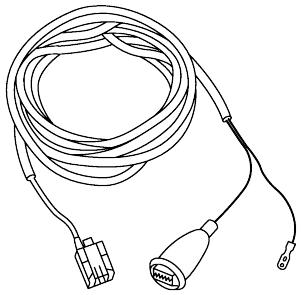
● When storing a removed airbag module, do not place any objects on it or pile airbag modules on top of each other. If the airbag inflates for some reason when it is placed with its pad side facing downward or under any object, a serious accident may result.


Driver side
GOOD
Fire!
NO GOOD
Fire!
NO GOOD
Fire!
NO GOOD
Fire!
Passenger side
GOOD
Fire!
NO GOOD
Fire!
NO GOOD

G5M0604

C: PREPARATION TOOL S802001A17

1. SPECIAL TOOLS S801001A1703

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B5M1114	98299FC030	DEPLOYMENT ADAPTER A	• Used for deploying the airbag module. • Used with DEPLOYMENT TOOL (98299PA030).
 B5M1115	98299PA030	DEPLOYMENT TOOL	• Used for deploying the airbag module. • Used with DEPLOYMENT ADAPTER A (98299FC030).

2. GENERAL TOOL S802001A1701

TOOL NAME	REMARKS
TORX® T30	Used for removal/installation of drivers airbag module
TORX® T40 (Tamper resistant type)	Used for removal/installation of airbag control module

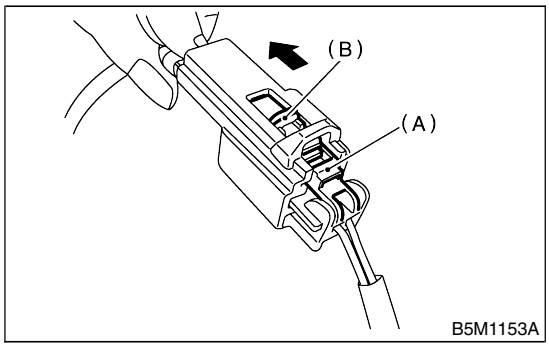
2. Airbag Connector S802659

A: OPERATION S802659A16

1. DRIVER'S AIRBAG, PASSENGER'S AIRBAG, SIDE AIRBAG S802659A1605

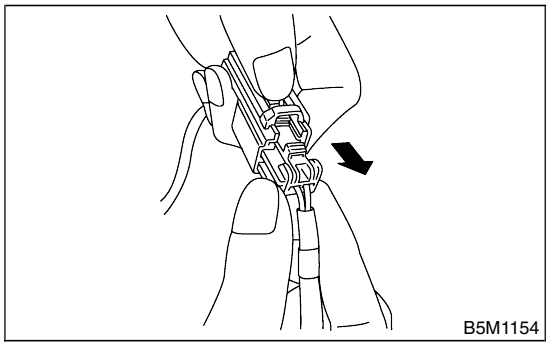
- **How to disconnect:**

1) Push lock arm (A).
2) With lock arm (A) pushed in, move slide lock (B) in the direction of the arrow.



3) With slide lock (B) pulled, remove lock arm (A) to its original position, and then pull in the direction of the arrow and separate the connector.

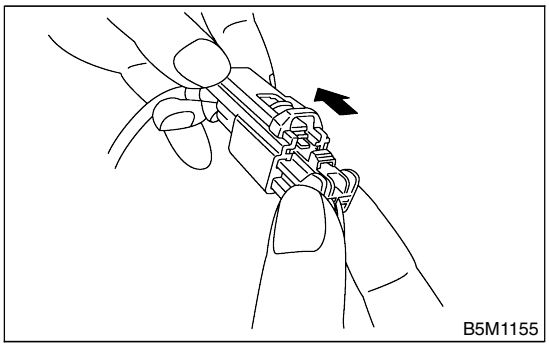
CAUTION:
When pulling, be sure to hold onto the connector and not the wire.



- **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.

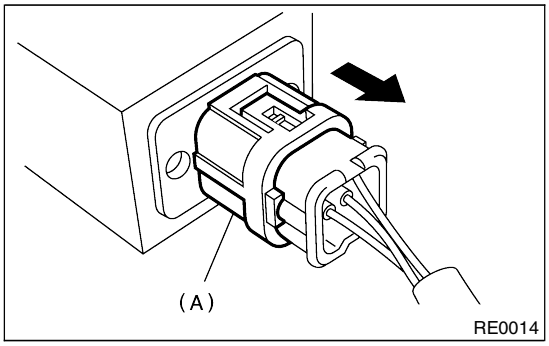


2. FRONT SUB-SENSOR, SIDE AIRBAG SENSOR S802659A1603

- **How to disconnect:**

1) Holding outer part (A), pull it in the direction of the arrow.

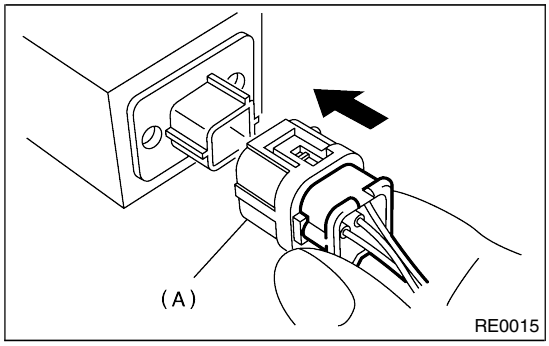
CAUTION:
When pulling, be sure to hold onto the connector and not the wire.



● **How to connect:**

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.



3. Inspection Locations After a Collision S802306

A: INSPECTION S802306A10

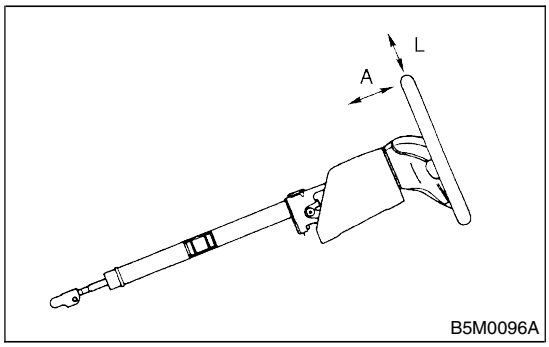
If the vehicle is involved in a collision on any side, even if it is a slight collision, be sure to check the following system parts.

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 7 mm (0.28 in)



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

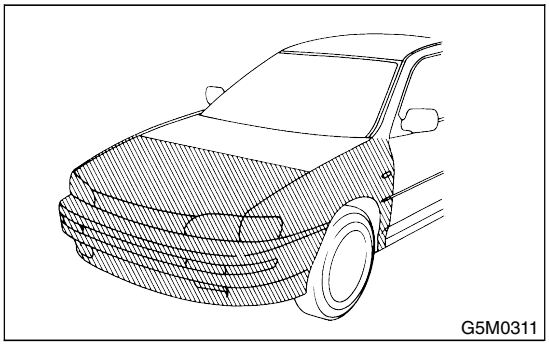
Check for the following, and replace damaged parts with new parts.
- Front seat is damaged or deformed.
- Harness and/or connector is cracked, deformed or open.
- Lead wire is exposed.

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:



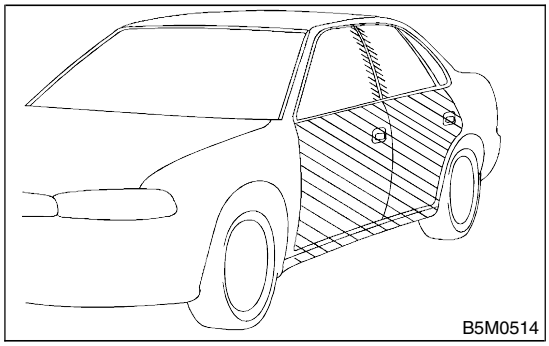
Check for the following, and replace damaged parts with new parts.
- Front sub sensor is cracked or deformed.
- Mounting bracket is cracked or deformed.
- Connector is scratched or cracked.
- Airbag is deployed.

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:



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.

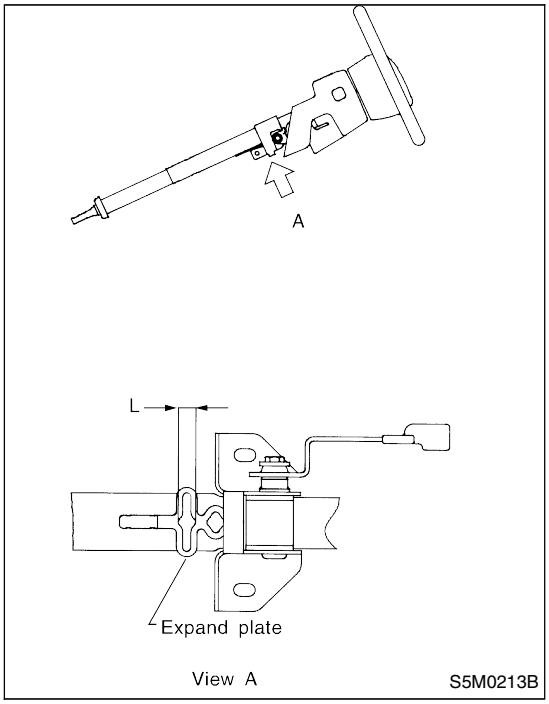
10. ROLL CONNECTOR S802306A1010

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)

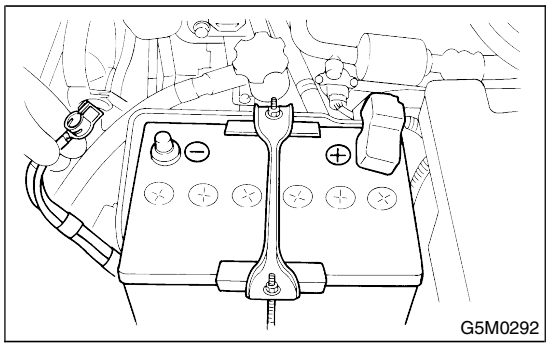


If necessary, replace them with new parts.

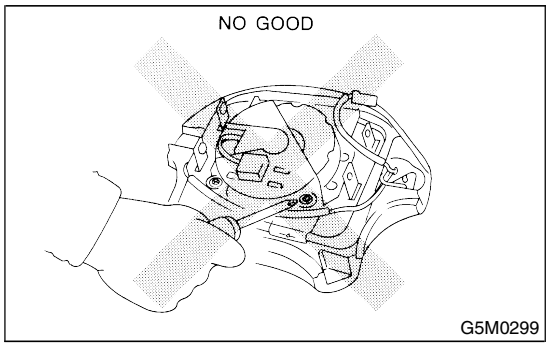
4. Driver's Airbag Module S802307

A: CAUTION S802307A03

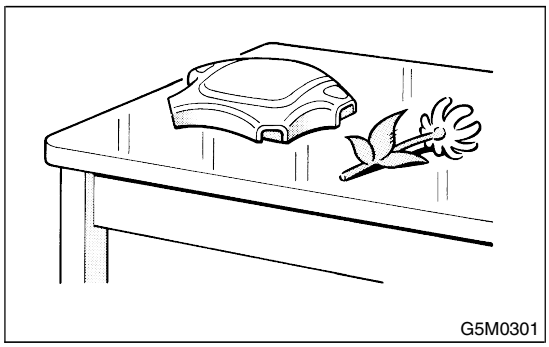
When disconnecting and connecting the airbag connector, be sure to turn the ignition switch OFF, disconnect the ground cable from the battery, and wait for more than 20 seconds before starting work.



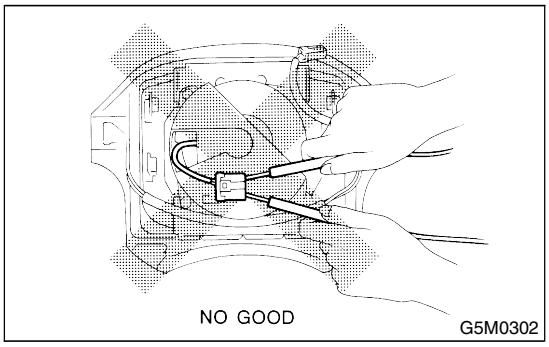
The airbag module (driver, passenger, and side) must not be disassembled.
The airbag module cannot be used again once inflated.



After removal, keep the airbag module with the pad facing upward on a dry, clean, and flat surface away from heat and light sources, and moisture and dust.



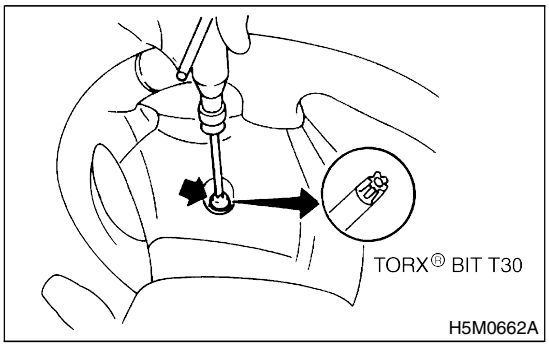
Do not check continuity of the airbag module (driver, passenger, and side).



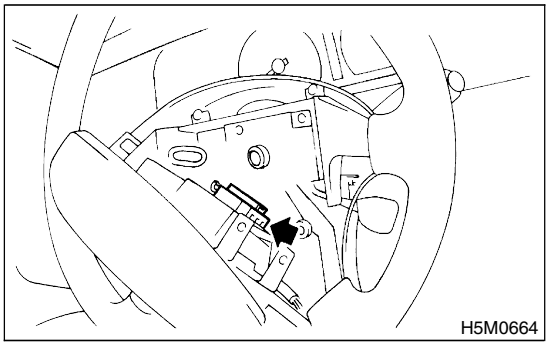
Do not use the airbag system and pretensioners on other vehicles. When replacing parts, be sure to replace them with new parts.

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 the ground cable from the battery, and wait for at least 20 seconds before starting work.
4) Using TORX® BIT T30, remove two TORX® bolts on side of 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

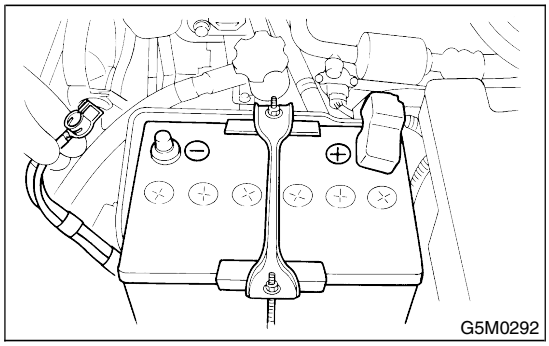
Check for the following, and replace damaged parts with new parts.
● Airbag module, harness, connector, and mounting bracket are damaged.

5. Passenger's Airbag Module

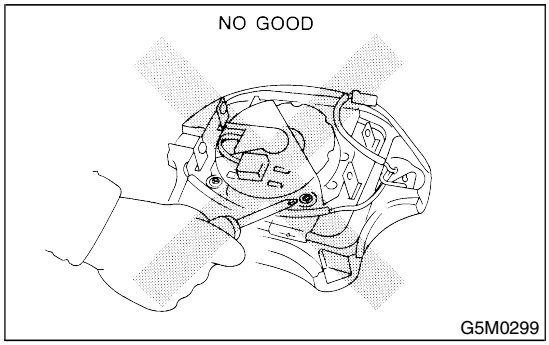
S802308

A: CAUTION S802308A03

When disconnecting and connecting the airbag connector, 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.

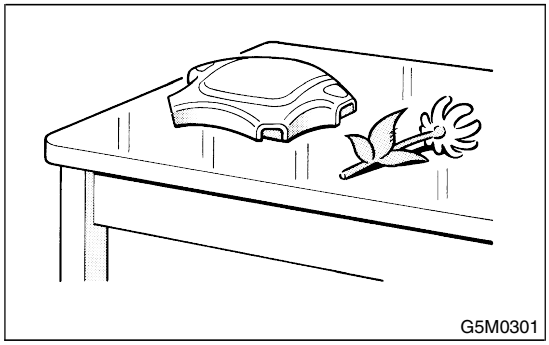

G5M0292

The airbag module (driver, passenger, and side) must not be disassembled.
The airbag module cannot be used again once inflated.

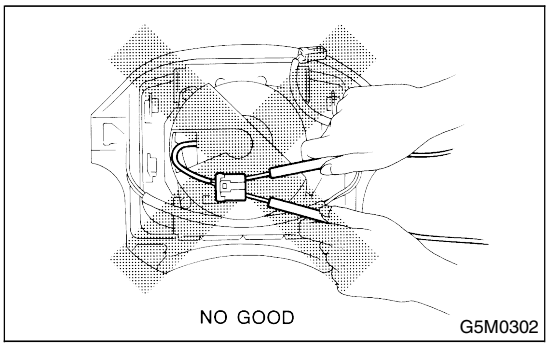


G5M0299

After removal, keep the airbag module with the pad facing upward on a dry, clean, and flat surface away from heat and light sources, and moisture and dust.


G5M0301

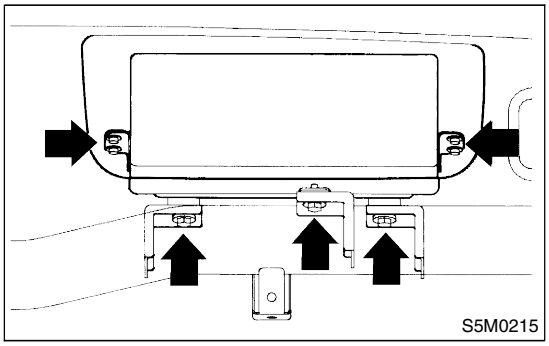
Do not check continuity of the airbag module (driver, passenger, and side) with airbag removed from the vehicle.



G5M0302

B: REMOVAL S802308A18

1) Turn ignition switch OFF.
2) Disconnect the ground cable from the battery, and wait for at least 20 seconds before starting work.
3) Remove glove box. <Ref. to EI-28 REMOVAL, Glove Box.>
4) Detach airbag connector from support beam bracket, and then disconnect airbag connector.
5) Remove seven bolts, and then carefully remove airbag module.


S5M0215

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.

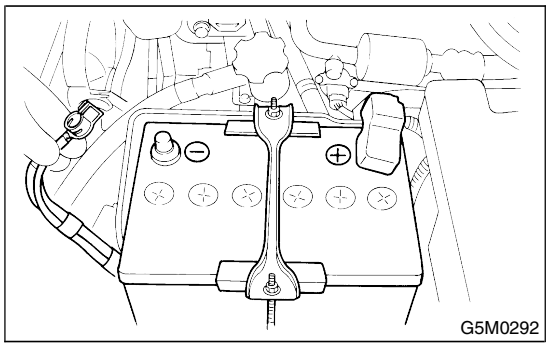
D: INSPECTION S802308A10

Check for the following, and replace damaged parts with new parts.
- Airbag module, harness, connector, and mounting bracket are damaged.

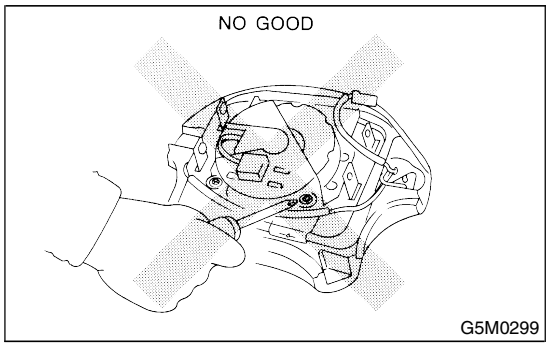
6. Side Airbag Module S802311

A: CAUTION S802311A03

When disconnecting and connecting airbag connector, 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.

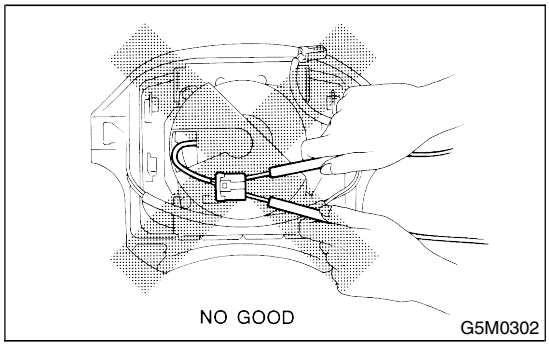

G5M0292

The airbag module (driver, passenger, and side) must not be disassembled.
The airbag module cannot be used again once inflated.



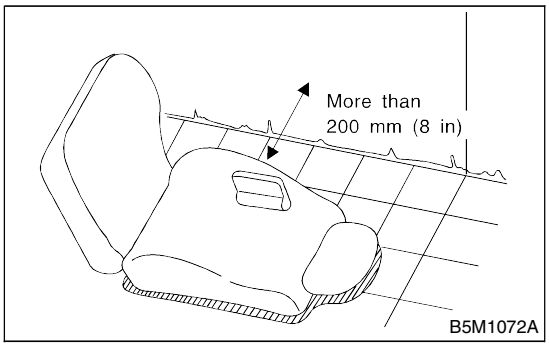
G5M0299

Do not check continuity of the airbag module (driver, passenger, and side) with airbag removed from the vehicle.



G5M0302

The removed front seat with the airbag module must be kept at least 200 mm (8 in) away from walls and other objects.



B5M1072A

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.>

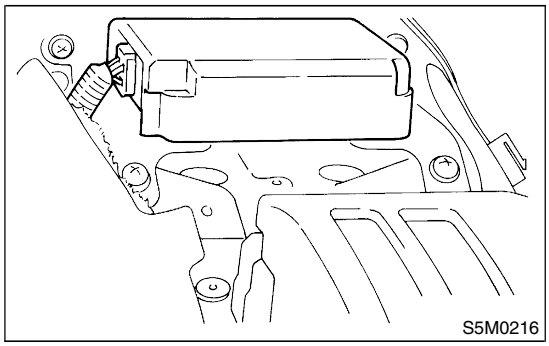
D: INSPECTION S802311A10

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.

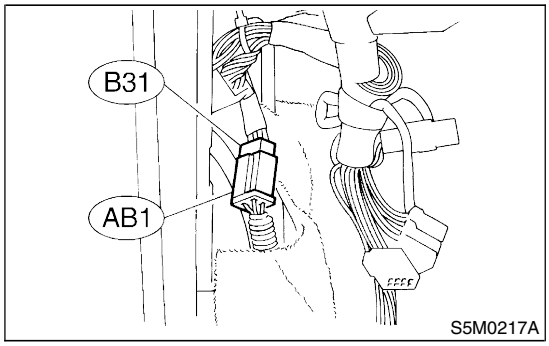
7. Main Harness S802310

A: REMOVAL S802310A18

1) Turn ignition switch OFF.
2) Disconnect the ground cable from the battery and wait for at least 20 seconds before starting work.
3) Remove instrument panel. <Ref. to EI-31 REMOVAL, Instrument Panel Assembly.>
4) Disconnect connector from airbag control module.

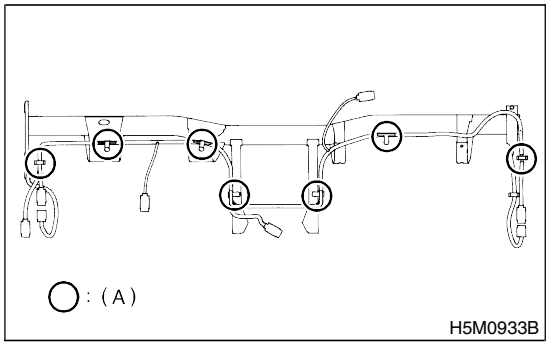

S5M0216

5) Disconnect body harness connector (B31) from airbag connector (ABI) 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.

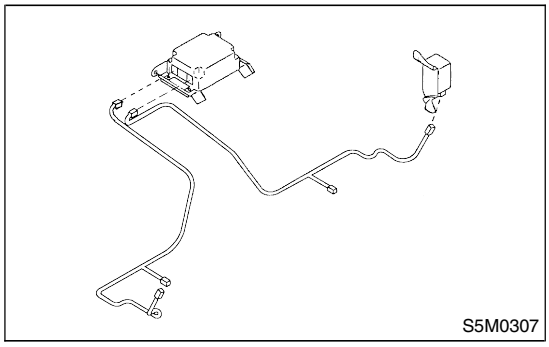
C: INSPECTION S802310A10

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 the ground cable from the 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-30 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 Air Bag Sensor.>
7) Detach clips, and then remove side airbag harness.



B: INSTALLATION S802309A11

Install in the reverse order of removal.

C: INSPECTION S802309A10

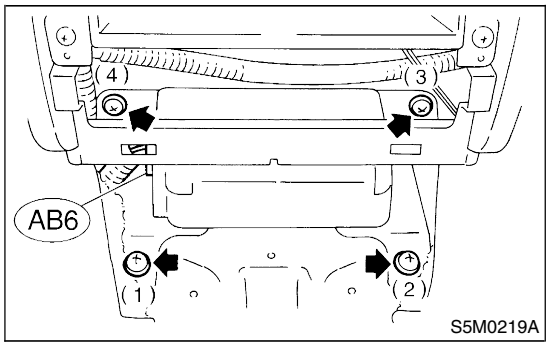
Check for the following, and replace damaged parts with new parts.
- Harness and/or connector is damaged.

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 the ground cable from the battery, and wait for at least 20 seconds before starting work.
3) Remove console box. <Ref. to EI-30 Removal, CONSOLE BOX.>
4) Disconnect connector from airbag control module.
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.

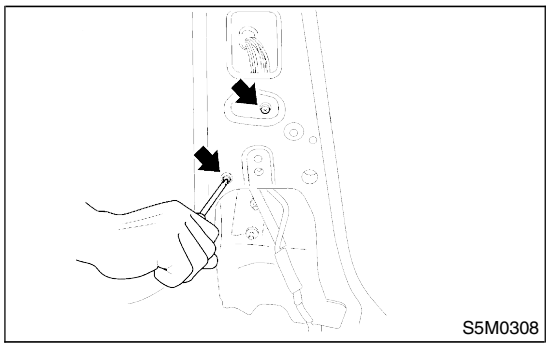
C: INSPECTION S802302A10

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 the ground cable from the battery, and wait for at least 20 seconds before starting work.
3) Remove center pillar lower trim. <Ref. to EI-38, REMOVAL, Lower Inner Trim.>
4) Remove Outer Belt (FRONT). <Ref. to SB-6, OUTER BELT (FRONT), REMOVAL, Front Seat Belt.>
5) Remove two TORX® bolts, and then detach side airbag sensor.



B: INSTALLATION S802298A11

CAUTION:
Use new TORX® nuts during installation.
Install in the reverse order of removal.

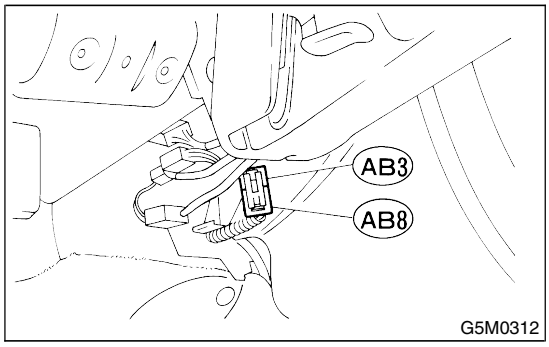
C: INSPECTION S802298A10

Check for the following, and replace damaged parts with new parts.
- Bracket connector for side airbag sensor is damaged.

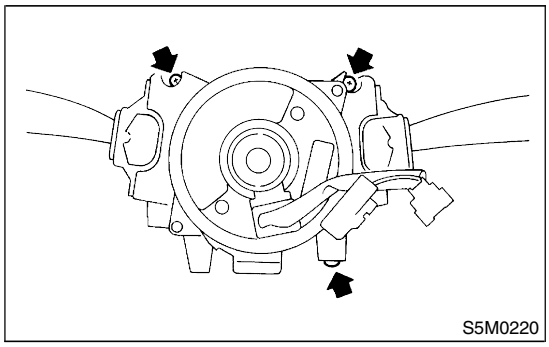
11. Roll Connector S802299

A: REMOVAL S802299A18

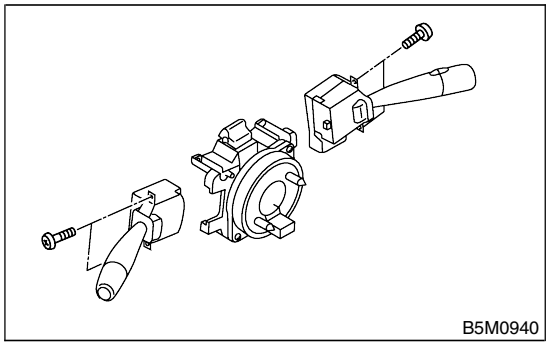
1) Turn ignition switch OFF.
2) Disconnect the ground cable from the battery, and wait for at least 20 seconds before starting work.
3) Remove instrument panel lower cover.
4) Disconnect airbag connector (AB3) and (AB8) below steering column.



5) Remove driver's airbag module. <Ref. to AB-12, Driver's Airbag Module.>
6) Remove steering wheel. <Ref. to PS-27, REMOVAL, Steering Wheel.>
7) Remove steering column cover.
8) Remove screws, and then remove combination switch assembly.



9) Remove lighting switch and wiper switch from roll connector.



B: INSTALLATION S802299A11

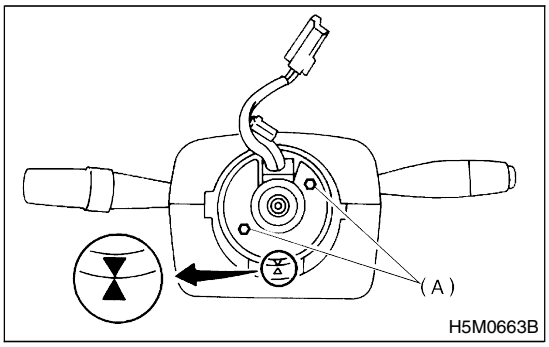
1) Install combination switch assembly and steering column cover in the reverse order of removal.
2) Adjust centering roll connector. <Ref. to AB-20 ADJUSTMENT, Roll Connector.>
3) Install steering wheel and airbag module.

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

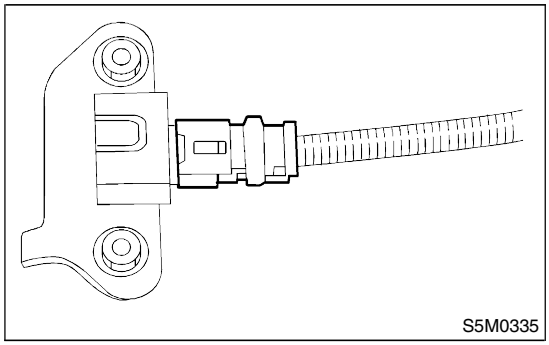
1) Check that front wheels are positioned in straight ahead direction.
2) Turn roll connector pin (A) clockwise until it stops.
3) Turn roll connector pin (A) counterclockwise approximately 2.65 turns until "▲" marks are aligned.



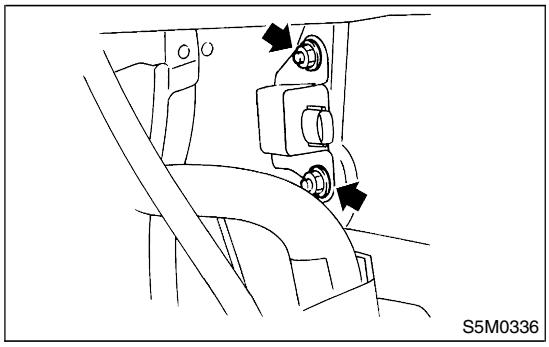
12. Front Sub Sensor S802300

A: REMOVAL S802300A18

1) Turn ignition switch OFF.
2) Disconnect the ground cable from the battery, and wait for at least 20 seconds before starting work.
3) Remove front wheel and mud guard. <Ref. to EI-21 REMOVAL, Mud Guard.>
4) Disconnect connector from front sub sensor.


S5M0335

5) Remove front sub sensor.


S5M0336

B: INSTALLATION S802300A11

Install in the reverse order of removal.

C: INSPECTION S802300A10

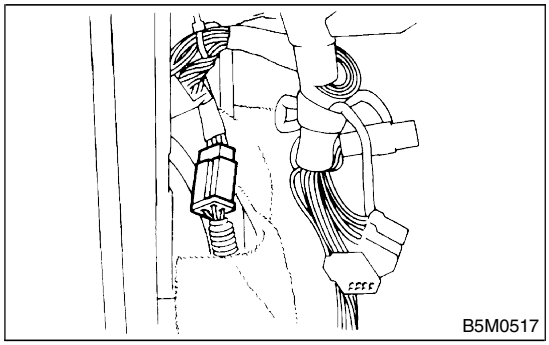
Check for the following, and replace damaged parts with new parts.
● Front sub sensor, mounting bracket, and connector are damaged.

13. Front Sub Sensor Harness

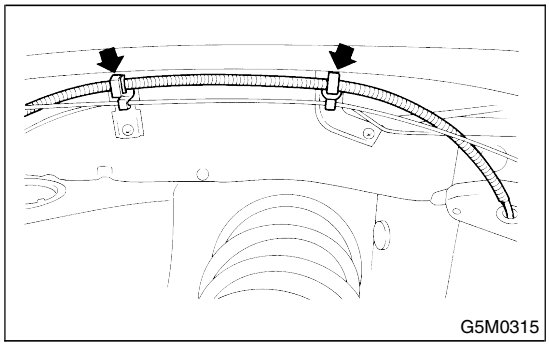
S802572

A: REMOVAL S802572A18

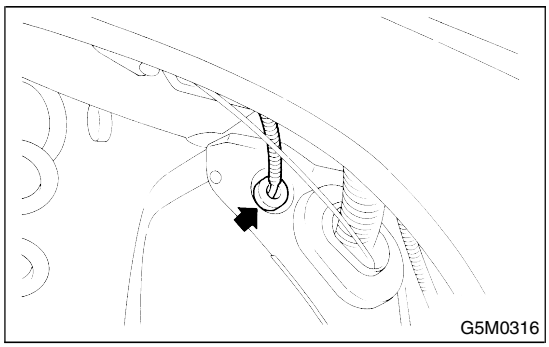
1) Turn ignition switch OFF.
2) Disconnect the ground cable from the battery, and wait for at least 20 seconds before starting work.
3) Remove front side sill cover, and then disconnect front sub sensor connector.



4) Disconnect connector from front sub sensor. <Ref. to AB-21 REMOVAL, Front Sub Sensor.>
5) Remove wiring harness clips.



6) Remove grommet, and then detach front sub sensor harness.



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.

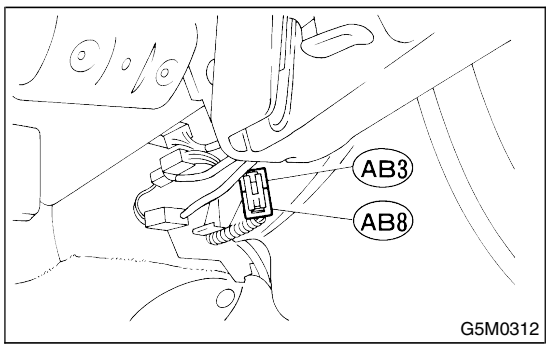
14. Disposal of Airbag Module (Deploying While Installed in Vehicle) S802573

A: OPERATION S802573A16

CAUTION:
- **Do not discard undeployed airbag module because it may cause serious personal injury when accidentally deployed.**
- **As a rule, the airbag module should be deployed while still installed in the vehicle. Do not remove it unless necessary.**
- **Deployment of the airbag module should be done on a flat place free from any possible danger. Avoid deploying outdoors during rainy or windy weather.**
- **Because deploying the airbag module causes a high explosive noise, be sure to warn people in the area, and do not allow anyone within a 5 m (16 ft) radius of the disposal site.**
- **Some smoke will be emitted from deployment of the airbag module. Therefore, it must be deployed in a well-ventilated place with no fire alarms nearby.**
- **Wear gloves, goggles, and earplugs during this operation. Wash your hands afterwards.**
- **After deployment, the airbag module will be especially hot. Leave it unattended for 40 minutes, and then discard it.**
- **Do not let water get on the deployed airbag module.**
- **Wrap the deployed airbag module in an airtight vinyl bag, and discard it.**
- **If circumstances do not permit airbag module deployment, contact a Subaru dealer.**

1. AIRBAG MODULE (DRIVER) S802573A1601

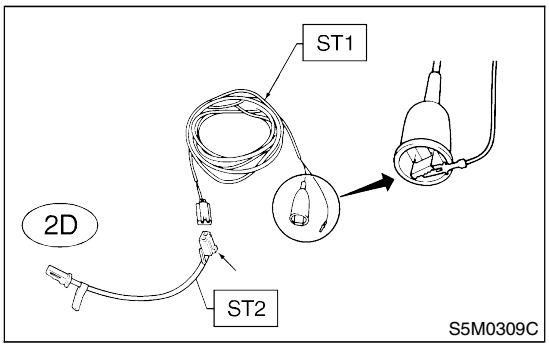
1) Turn ignition switch OFF.
2) Disconnect the ground cable from the battery, and wait for at least 20 seconds before starting work.
3) Remove lower cover.
4) Disconnect airbag connector (AB3) and (AB8) below steering column.



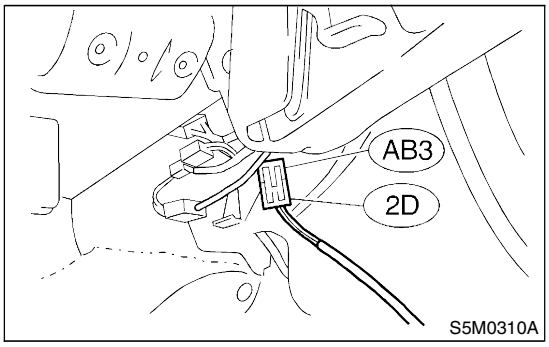
5) Short terminal to alligator clip furnished as deployment tool (ST1).
6) Connect the deployment tool (ST1) and deployment adapter (ST2).

ST1	98299PA030	DEPLOYMENT TOOL A
ST2	98299FC030	DEPLOYMENT ADAPTER

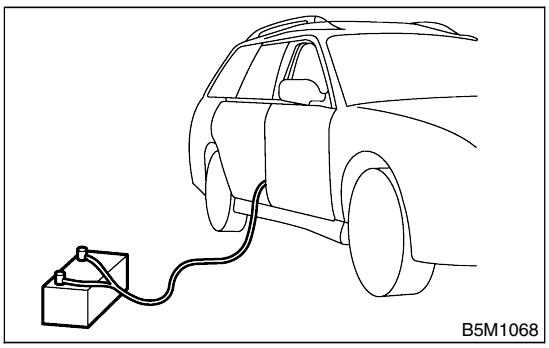
CAUTION:
The deployment tool should be kept shorted until just before deployment of the airbag module.



7) Connect deployment adapter (ST2) connector (2D) to airbag connector (AB3).

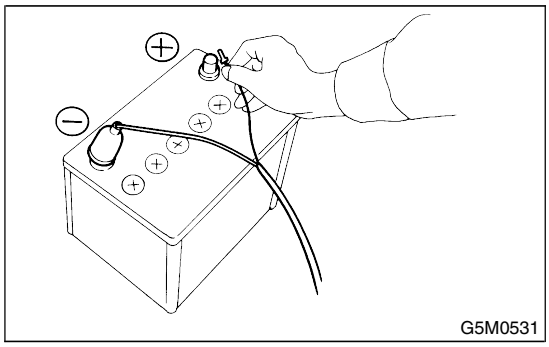


8) Extend the deployment tool to the limit, and make sure that the vehicle is empty. Close all windows, sunroof, and rear gate completely.



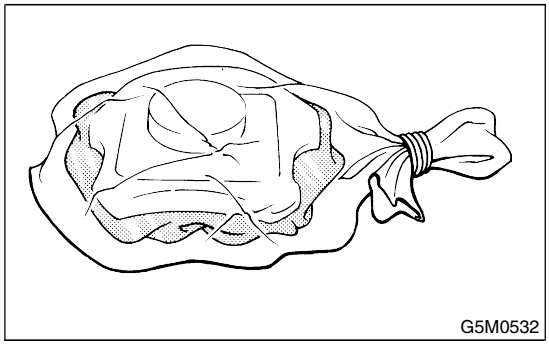
9) Move the battery at least 5 m (16 ft) from vehicle, and secure the nearby area. Connect the deployment tool alligator clip to the battery minus terminal.

10) Connect the other terminal of the deployment tool to the battery plus terminal. Then, deploy the airbag module.



CAUTION:
● After deployment, the airbag module will be especially hot. Leave it unattended for 40 minutes, and then discard it.
● Do not let water get on the deployed airbag module.

11) Remove airbag module. <Ref. to AB-12 Driver's Airbag Module.>
12) Wrap the deployed airbag module in an airtight vinyl bag, and discard it.

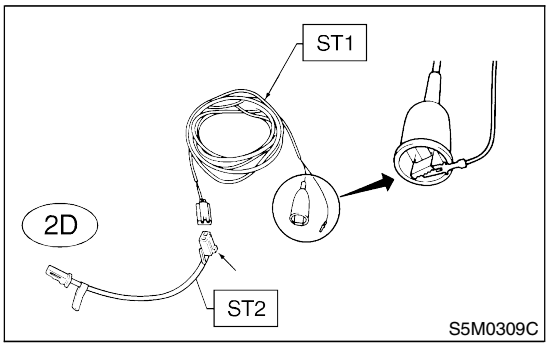


2. AIRBAG MODULE (PASSENGER) S802573A1602

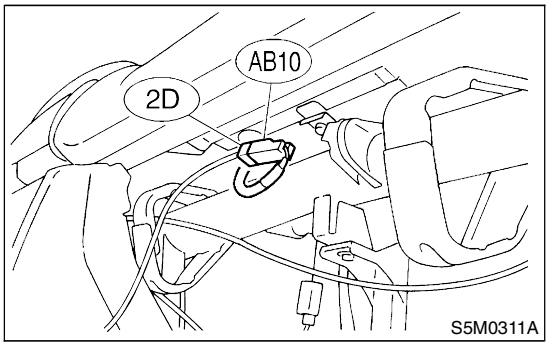
1) Turn ignition switch OFF.
2) Disconnect the ground cable from the battery, and wait for at least 20 seconds before starting work.
3) Remove the glove box. <Ref. to EI-28, REMOVAL, Glove Box.>
4) Disconnect airbag connectors (AB9) and (AB10).
5) Short terminal to alligator clip furnished as deployment tool (ST1).
6) Connect the deployment tool (ST1) and deployment adapter (ST2).

ST1	98299PA030	DEPLOYMENT TOOL A
ST2	98299FC030	DEPLOYMENT ADAPTER

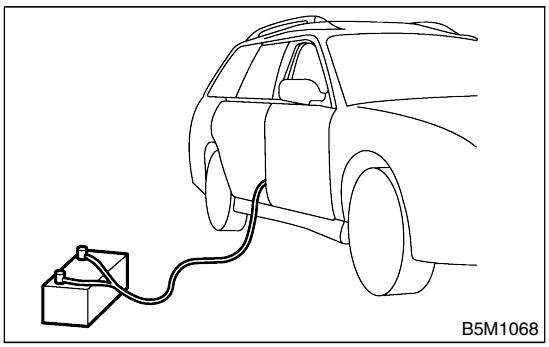
CAUTION:
The deployment tool should be kept shorted until just before deployment of the airbag module.



7) Connect deployment adapter (ST2) connector (2D) to airbag connector (AB10).

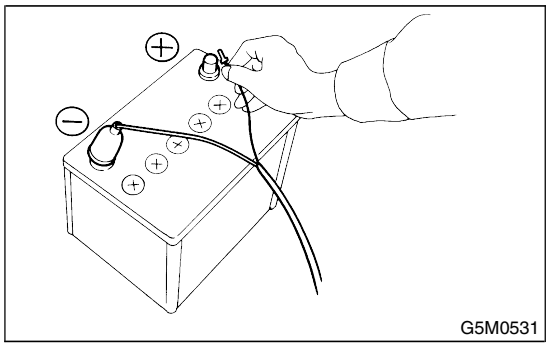


8) Extend the deployment tool to the limit, and make sure that the vehicle is empty. Close all windows, sunroof, and rear gate completely.



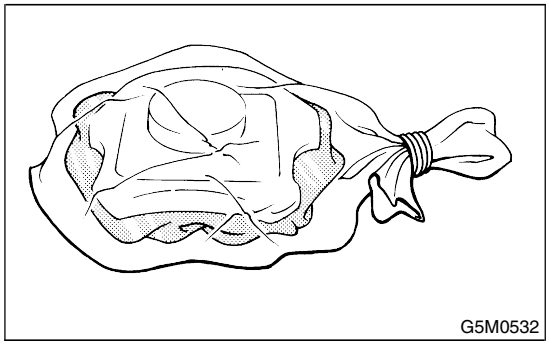
9) Move the battery at least 5 m (16 ft) from vehicle, and secure the nearby area. Connect the deployment tool alligator clip to the battery minus terminal.

10) Connect the other terminal of the deployment tool to the battery plus terminal. Then, deploy the airbag module.



CAUTION:
• After deployment, the airbag module will be especially hot. Leave it unattended for 40 minutes, and then discard it.
• Do not let water get on the deployed airbag module.

11) Remove airbag module. <Ref. to AB-14 Passenger's Airbag Module.>
12) Wrap the deployed airbag module in an airtight vinyl bag, and discard it.

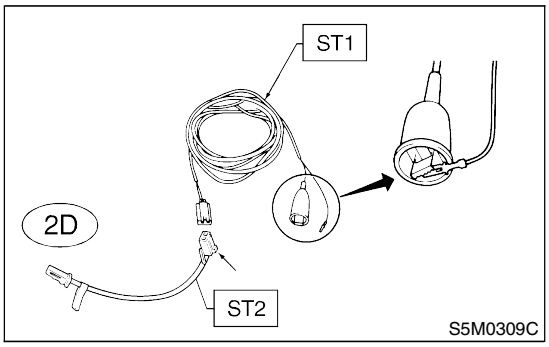


3. AIRBAG MODULE (SIDE) *S802573A1603*

1) Turn ignition switch OFF.
2) Disconnect the ground cable from the battery, and wait for at least 20 seconds before starting work.
3) Disconnect the side airbag module connector (yellow) under the front seat cushion.
4) Adjust both the front seat and front seat backrest to center positions.
5) Short terminal to alligator clip furnished as deployment tool (ST1).
6) Connect the deployment tool (ST1) and deployment adapter (ST2).

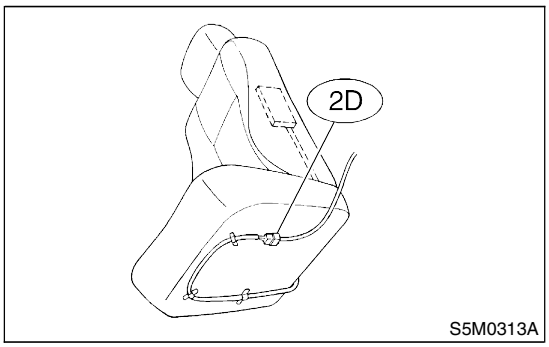
ST1	98299PA030	DEPLOYMENT TOOL A
ST2	98299FC030	DEPLOYMENT ADAPTER

CAUTION:
The deployment tool should be kept shorted until just before deployment of the airbag module.

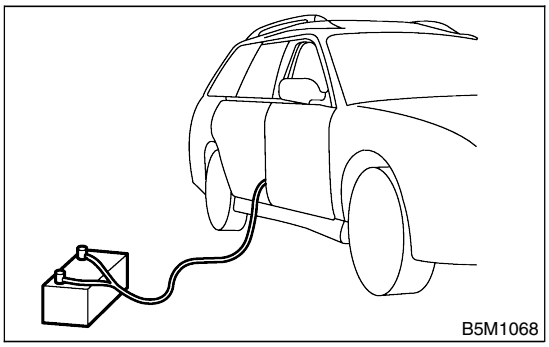


7) Connect deployment adapter (ST2) connector (2D) to side airbag module connector (yellow).

CAUTION:
Do not put any objects on the front seat.

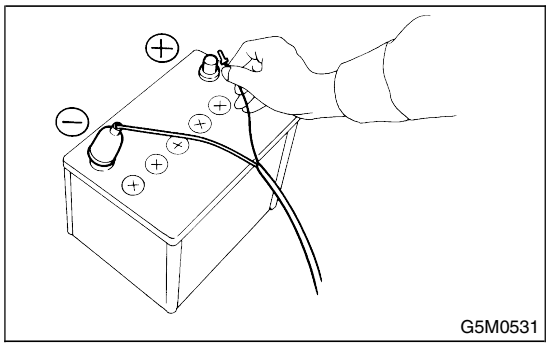


8) Extend the deployment tool to the limit, and make sure that the vehicle is empty. Close all windows, sunroof, and rear gate completely.



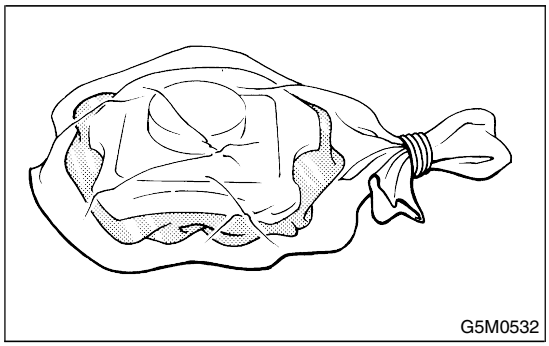
9) Move the battery at least 5 m (16 ft) from vehicle, and secure the nearby area. Connect the deployment tool alligator clip to the battery minus terminal.

10) Connect the other terminal of the deployment tool to the battery plus terminal. Then, deploy the airbag module.



CAUTION:
• After deployment, the airbag module will be especially hot. Leave it unattended for 40 minutes, and then discard it.
• Do not let water get on the deployed airbag module.

11) Remove side airbag module.
12) Wrap the deployed airbag module in an air-tight vinyl bag, and discard it.



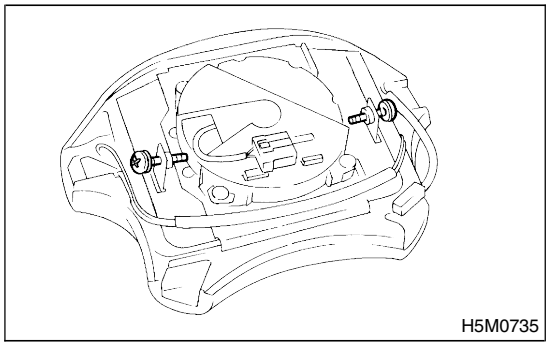
15. Disposal of Airbag Module (Deploying After Removal from Vehicle) S802574

A: OPERATION S802574A16

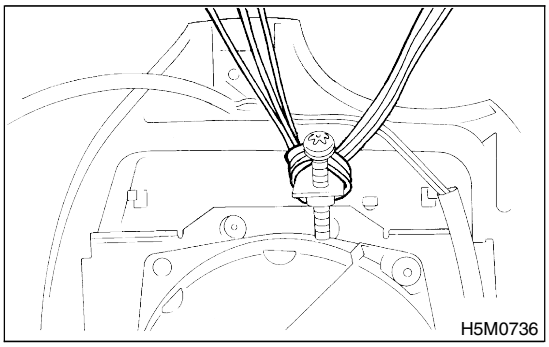
CAUTION:
• Do not discard undeployed airbag module because it may cause serious personal injury when accidentally deployed.
• As a rule, the airbag module should be deployed while still installed in the vehicle. Do not remove it unless necessary.
• Deployment of the airbag module should be done on a flat place free from any possible danger. Avoid deploying outdoors during rainy or windy weather.
• Do not damage the airbag module or drop it.
• Because deploying the airbag module causes a high explosive noise, be sure to warn people in the area, and do not allow anyone within a 5 m (16 ft) radius of the disposal site.
• Some smoke will be emitted from deployment of the airbag module. Therefore, it must be deployed in a well-ventilated place with no fire alarms nearby.
• Wear gloves, goggles, and earplugs during this operation. Wash your hands afterwards.
• After deployment, the airbag module will be especially hot. Leave it unattended for 40 minutes, and then discard it.
• Do not let water get on the deployed airbag module.
• Wrap the deployed airbag module in an airtight vinyl bag, and discard it.
• If circumstances do not permit airbag module deployment, contact a Subaru dealer.

1. AIRBAG MODULE (DRIVER) S802574A1601

1) Turn ignition switch OFF.
2) Disconnect the ground cable from the battery, and wait for at least 20 seconds before starting work.
3) Remove airbag module. <Ref. to AB-12 Driver's Airbag Module.>
4) Install the removed bolts to airbag module.


H5M0735

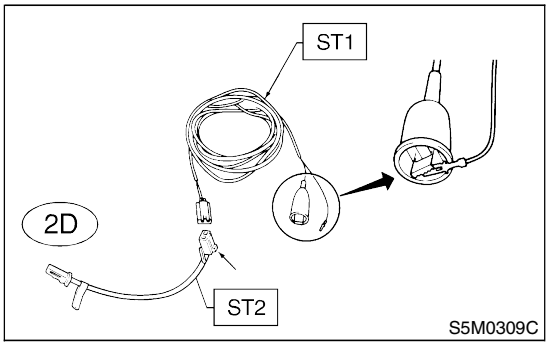
5) Bundle three wire automotive harnesses [each with a sectional area of 1.25 mm^2 (0.00194 sq in) or more], and bind them twofold around the airbag module stay.


H5M0736

6) Short terminal to alligator clip furnished as deployment tool (ST1).
7) Connect the deployment tool (ST1) and deployment adapter (ST2).

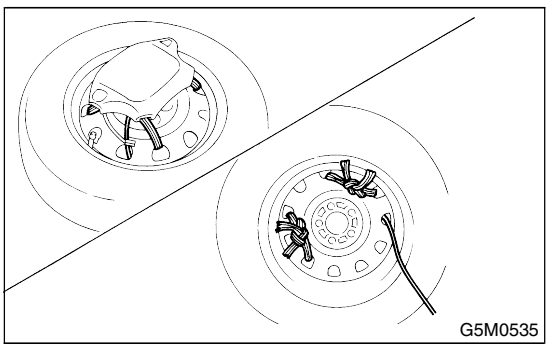
ST1	98299PA030	DEPLOYMENT TOOL A
ST2	98299FC030	DEPLOYMENT ADAPTER

CAUTION:
The deployment tool should be kept shorted until just before deployment of the airbag module.

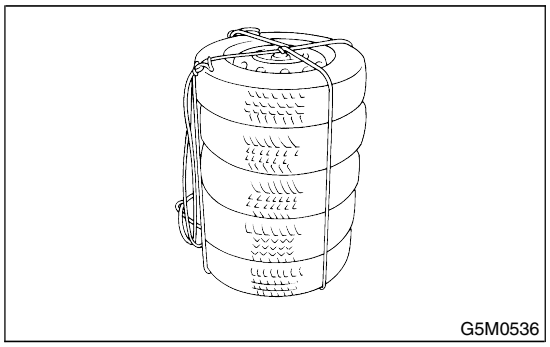


S5M0309C

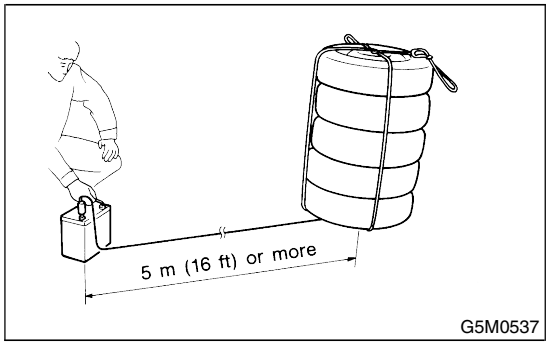
8) Connect deployment adapter (ST2) connector (2D) to airbag module.
9) Install airbag module with pad side facing upward on the wheel with the tire.


G5M0535

10) Put three tires without the wheel on the tire installed with the airbag module. Put on an additional tire with the wheel, and then fasten them tight with rope.

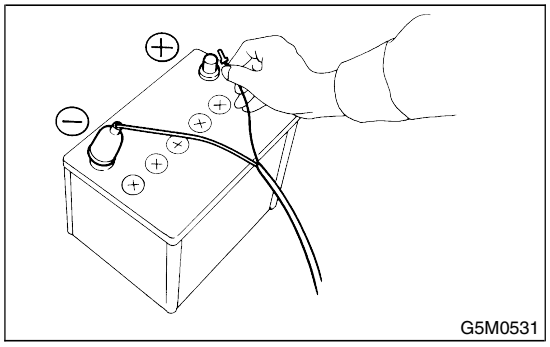

G5M0536

11) Move the battery at least 5 m (16 ft) from vehicle, and secure the nearby area. Connect the deployment tool alligator clip to the battery minus terminal.



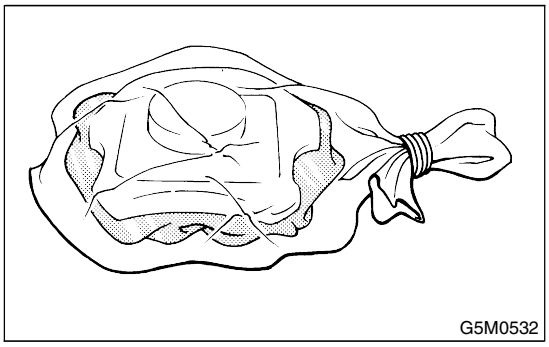
G5M0537

12) Connect the other terminal of the deployment tool to the battery plus terminal. Then, deploy the airbag module.


G5M0531

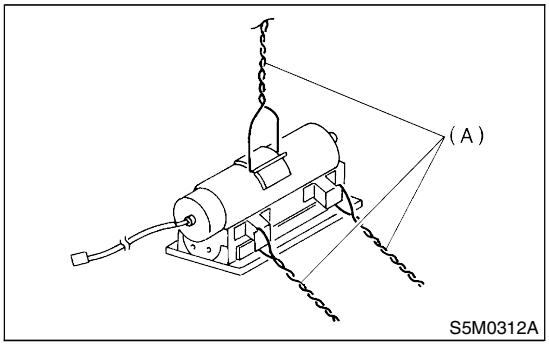
CAUTION:
• After deployment, the airbag module will be especially hot. Leave it unattended for 40 minutes, and then discard it.
• Do not let water get on the deployed airbag module.

13) Wrap the deployed airbag module in an airtight vinyl bag, and discard it.


G5M0532

2. AIRBAG MODULE (PASSENGER) S802574A1602

1) Turn ignition switch OFF.
2) Disconnect the ground cable from the battery, and wait for at least 20 seconds before starting work.
3) Remove airbag module. <Ref. to AB-14 Passenger's Airbag Module.>
4) Bundle three wire automotive harnesses [each with a sectional area of 1.25 mm^2 (0.00194 sq in) or more], and route them through the airbag module bracket (A). Then, twist them for added strength.

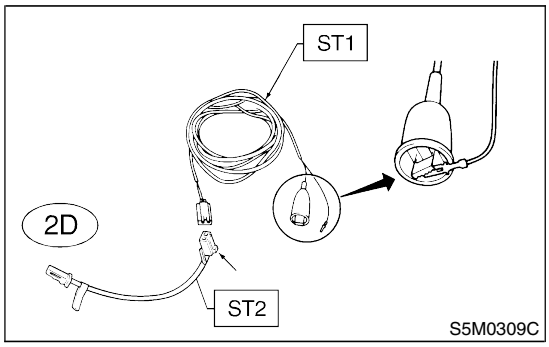


S5M0312A

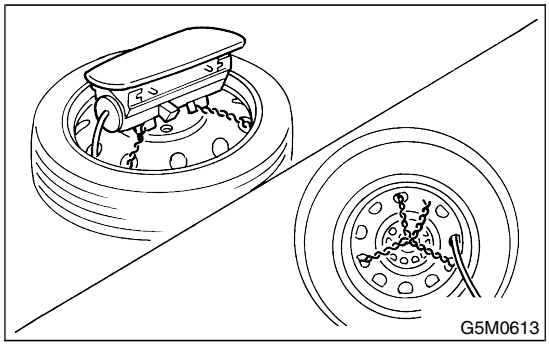
5) Short terminal to alligator clip furnished as deployment tool (ST1).
6) Connect the deployment tool (ST1) and deployment adapter (ST2).

ST1	98299PA030	DEPLOYMENT TOOL A
ST2	98299FC030	DEPLOYMENT ADAPTER

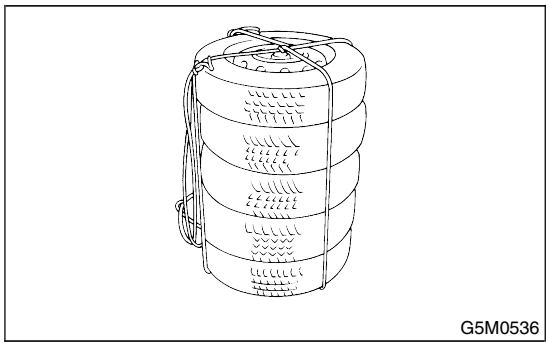
CAUTION:
The deployment tool should be kept shorted until just before deployment of the airbag module.



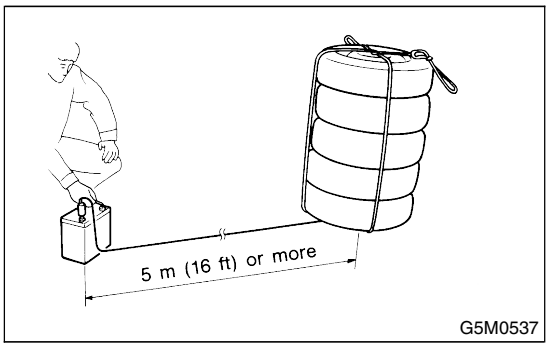
7) Connect deployment adapter (ST2) connector (2D) to airbag module.
8) Install airbag module with pad side facing upward on 14 inch or greater size wheel with the tire.



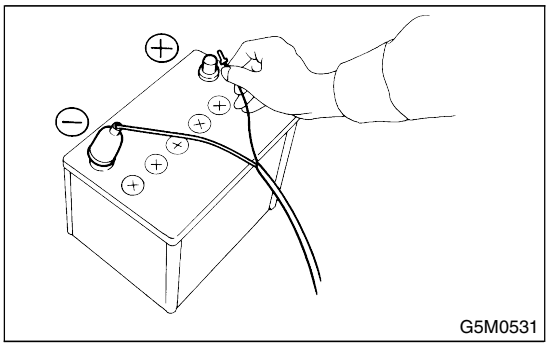
9) Put three tires without the wheel on the tire installed with the airbag module. Put on an additional tire with the wheel on top, and then fasten them tight with rope.



10) Move the battery at least 5 m (16 ft) from vehicle, and secure the nearby area. Connect the deployment tool alligator clip to the battery minus terminal.

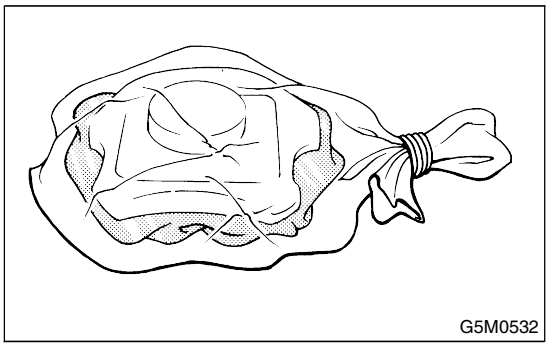


11) Connect the other terminal of the deployment tool to the battery plus terminal. Then, deploy the airbag module.



CAUTION:
- **After deployment, the airbag module will be especially hot. Leave it unattended for 40 minutes, and then discard it.**
- **Do not let water get on the deployed airbag module.**

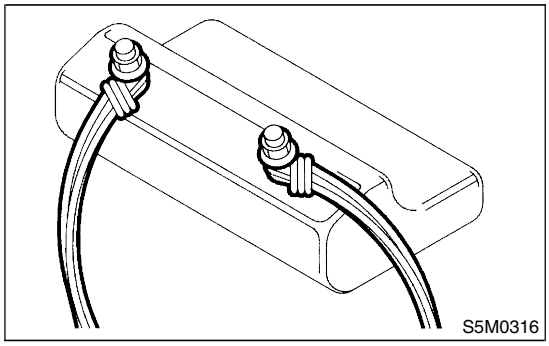
12) Wrap the deployed airbag module in an air-tight vinyl bag, and discard it.



3. AIRBAG MODULE (SIDE) *S802574A1603*

1) Turn ignition switch OFF.
2) Disconnect the ground cable from the battery, and wait for at least 20 seconds before starting work.

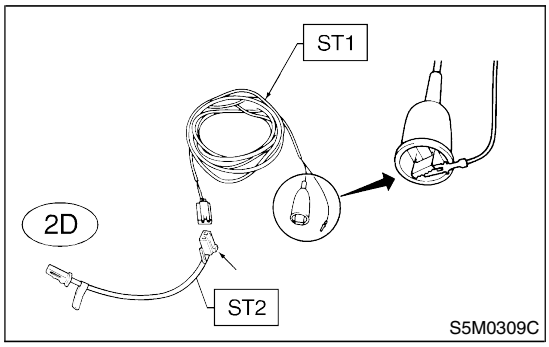
3) Remove front seat. <Ref. to SE-5 REMOVAL, Front Seat.>
4) Remove side airbag module.
5) Install nuts to side airbag module.
6) Bundle three wire automotive harnesses [each with a sectional area of 1.25 mm^2 (0.00194 sq in) or more], and bind them twofold around the airbag module stay.


S5M0316

7) Short terminal to alligator clip furnished as deployment tool (ST1).
8) Connect the deployment tool (ST1) and deployment adapter (ST2).

ST1	98299PA030	DEPLOYMENT TOOL
ST2	98299FC030	DEPLOYMENT ADAPTER A

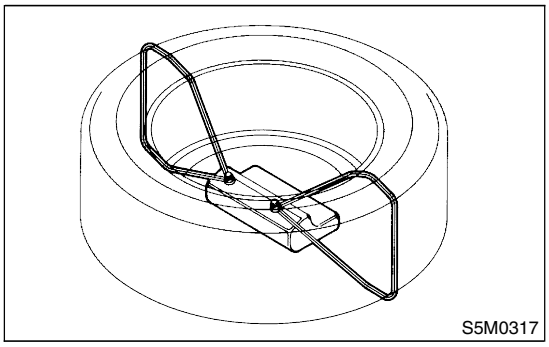
CAUTION:
The deployment tool should be kept shorted until just before deployment of the airbag module.



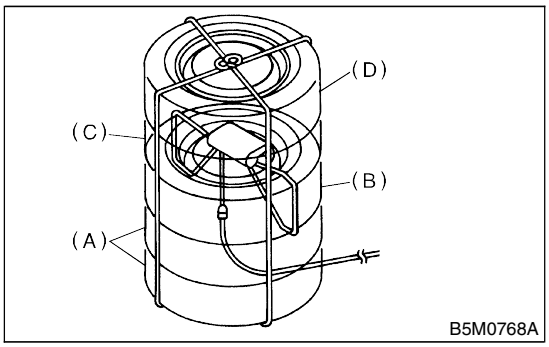
S5M0309C

9) Connect deployment adapter (ST2) connector (2D) to airbag module.

10) Install side airbag module on 14 inch or greater size tire without disk wheel.

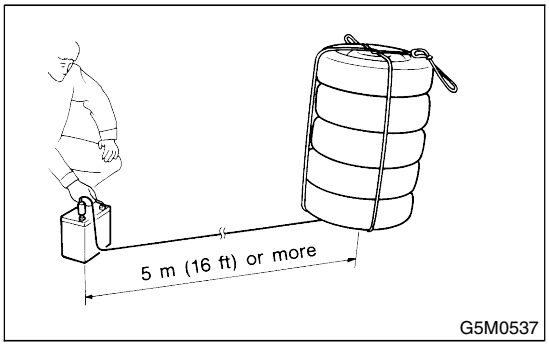

S5M0317

Put two tires without the wheel (A) under the tire installed with the side airbag module (B). Put on an additional tire without disk wheel (C), and then put a tire with the wheel (D) on top. Fasten them tight with rope.



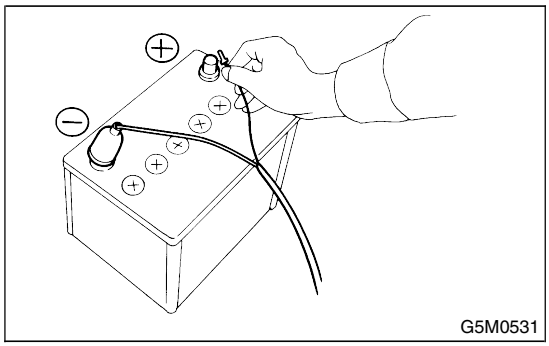
B5M0768A

11) Move the battery at least 5 m (16 ft) from the vehicle, and secure the nearby area. Connect the deployment tool alligator clip to the battery minus terminal.



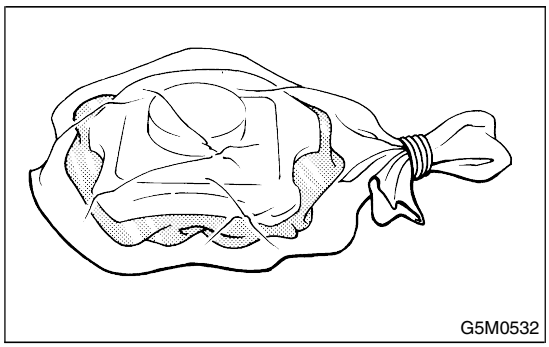
G5M0537

12) Connect the other terminal of the deployment tool to the battery plus terminal. Then, deploy the airbag module.


G5M0531

CAUTION:
• After deployment, the airbag module will be especially hot. Leave it unattended for 40 minutes, and then discard it.
• Do not let water get on the deployed airbag module.

13) Wrap the deployed airbag module in an air-tight vinyl bag, and discard it.


G5M0532

MEMO:

SEAT BELT SYSTEM

SB

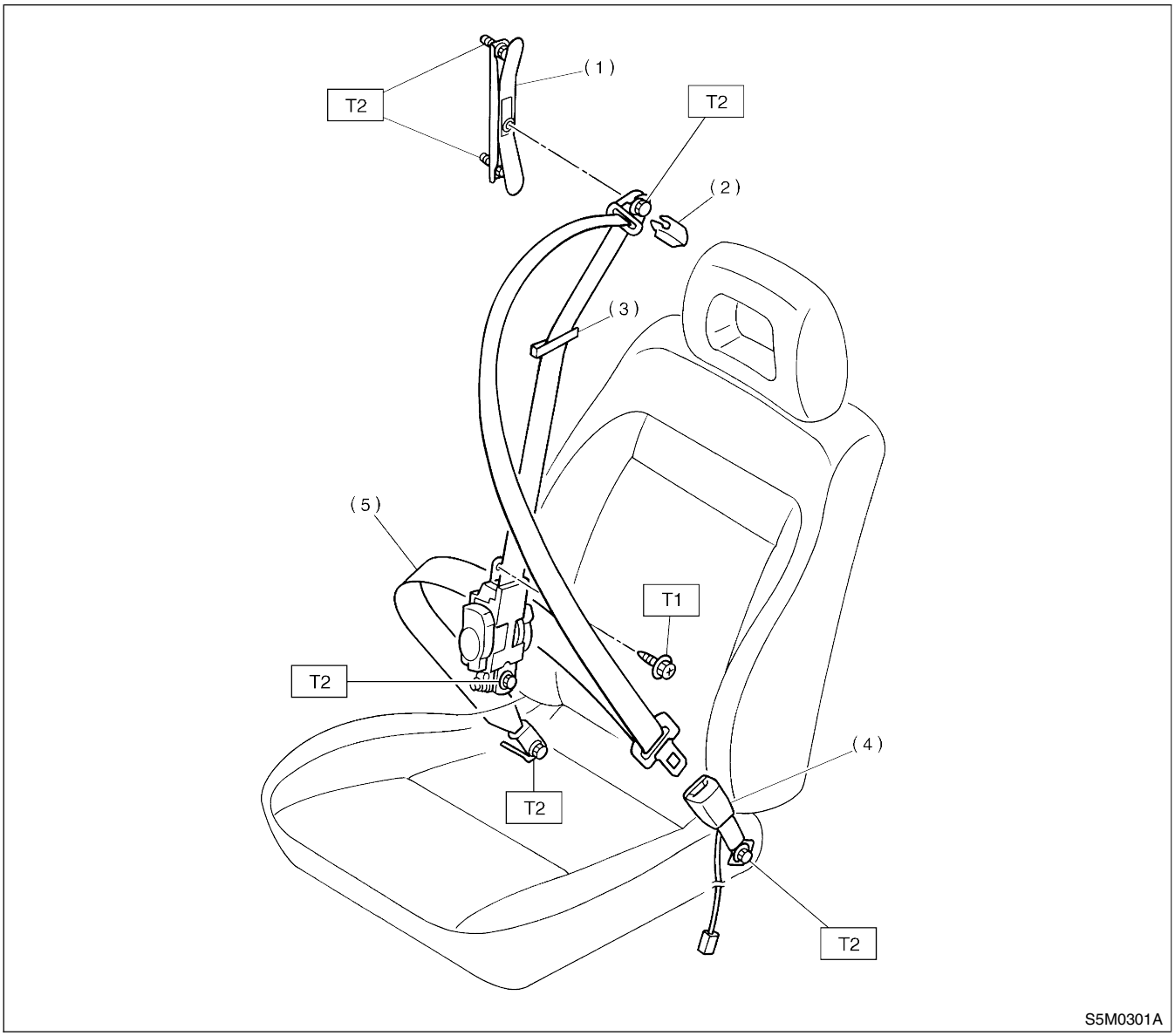
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2. Inspection Locations After a Collision 5
3. Front Seat Belt....6
4. Rear Seat Belt....8
5. Disposal of Pretensioner....10

1. General Description S801001

A: COMPONENT S801001A05

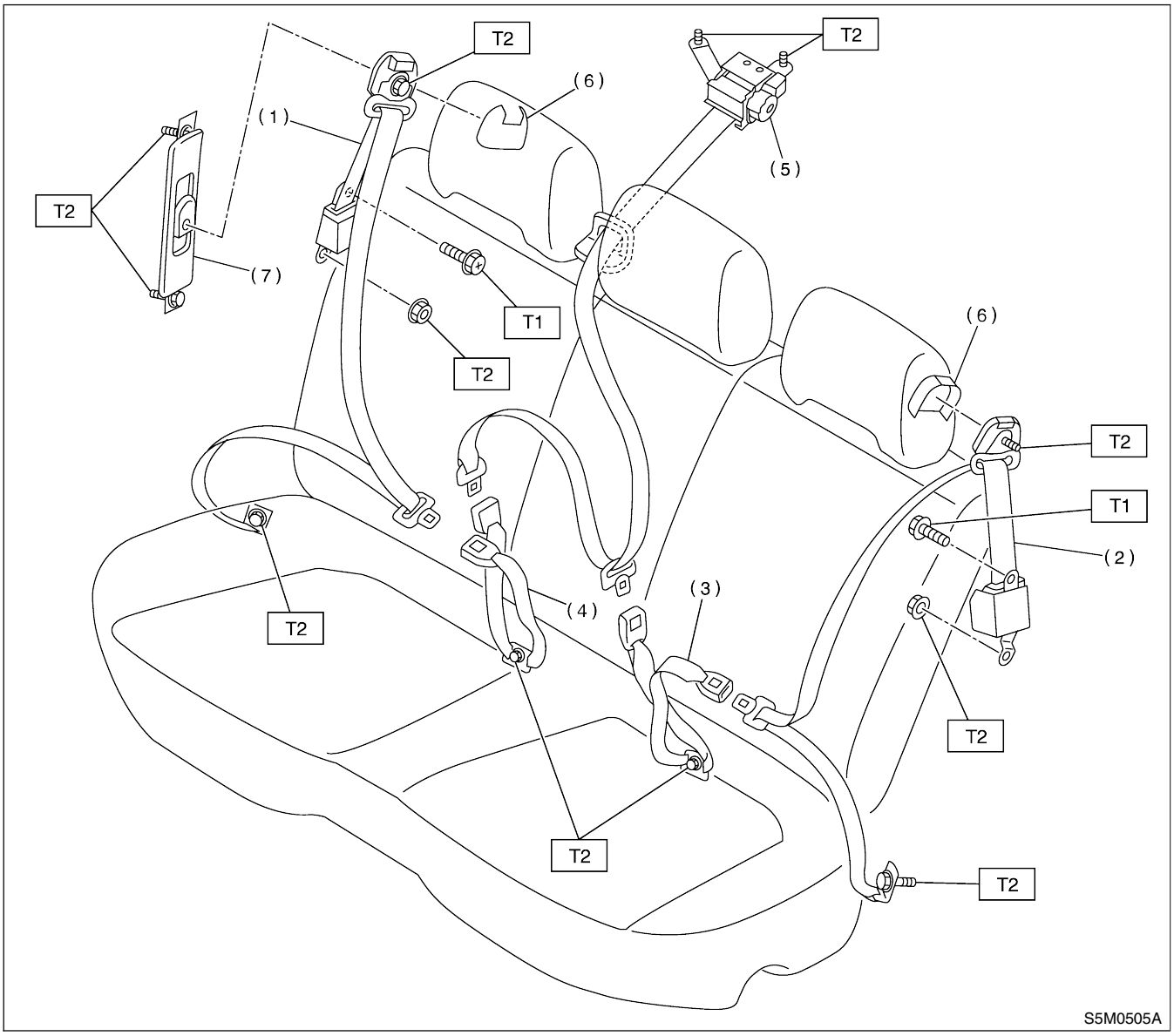
1. FRONT SEAT BELT S801001A0501



(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

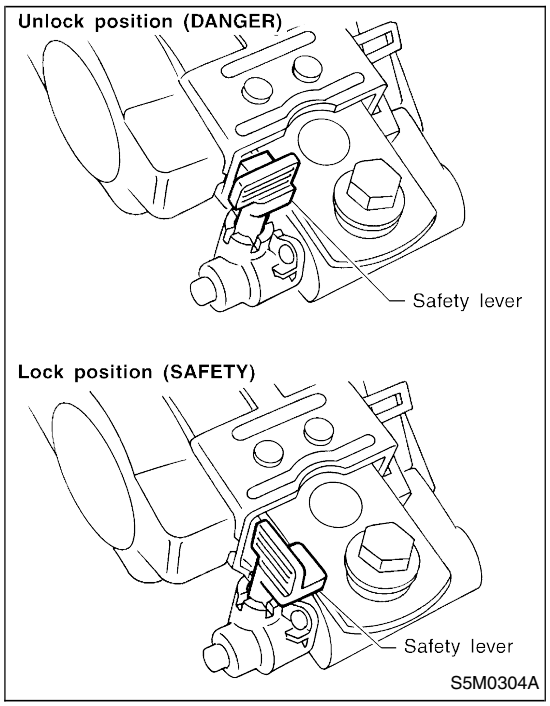


(1) Outer seat belt RH
(2) Outer seat belt LH
(3) Inner seat belt LH
(4) Inner seat belt RH
(5) Outer seat belt CENTER
(6) Anchor cover
(7) Adjustable anchor ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 30 (3.1, 22)

B: CAUTION S801001A03

● Before removing pretensioner, be sure to rotate while pulling the safety lever to the right until it stops to set the lock position.



● Do not drop or apply any impact to the pretensioner.
● If oil, grease, or water gets on the pretensioner, wipe it off immediately with a dry cloth.
● Do not expose the pretensioner to high temperature or flame.
● Do not disassemble or attempt to repair the pretensioner. If it is dented, cracked, or deformed, replace it with a new one.
● Do not use the pretensioner parts from other vehicles. Always replace parts with new parts
● When handling a seat belt with a deployed pretensioner, wear gloves and goggles. Wash your hands afterwards.
● Do not re-use a seat belt with a deployed pretensioner again.
● Be sure to deploy pretensioner before disposal. <Ref. to SB-10 OPERATION Disposal of Pretensioner.>
● If the material gets in your eyes or on your skin during deployment, wash it away with clean water, and then consult a doctor.

2. Inspection Locations After a Collision S801306

A: INSPECTION S801306A10

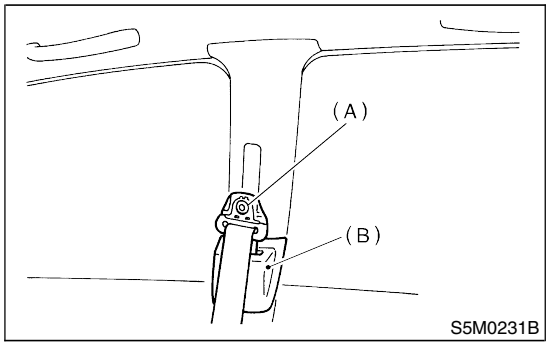
Check for the following, and then replace with new parts if necessary.
- Center pillar lower garnish is discolored or cracked.
- Wire harness and/or connector is damaged.

3. Front Seat Belt S801303

A: REMOVAL S801303A18

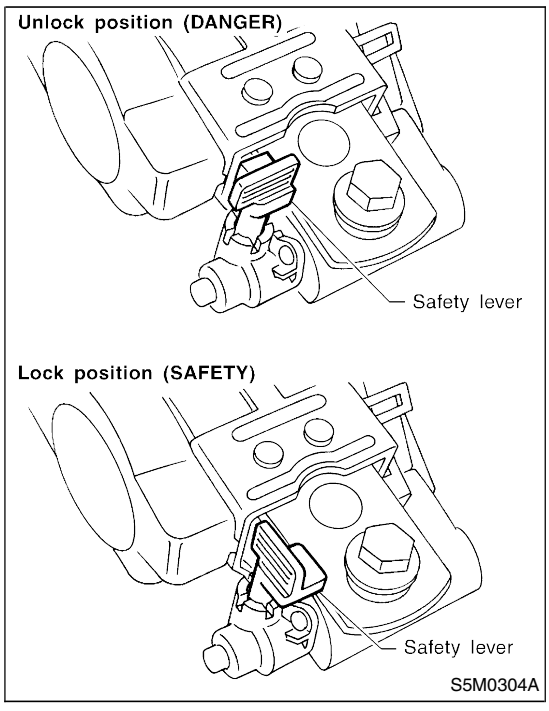
1. OUTER BELT (FRONT) S801303A1807

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-38 REMOVAL, Lower Inner Trim.>

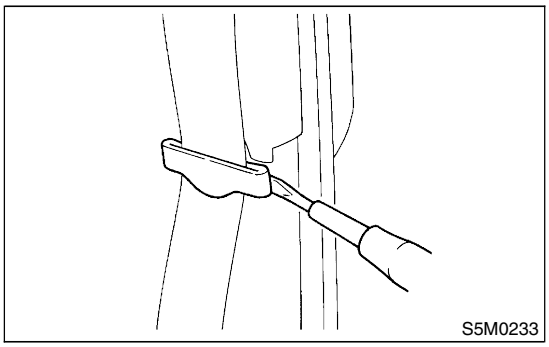


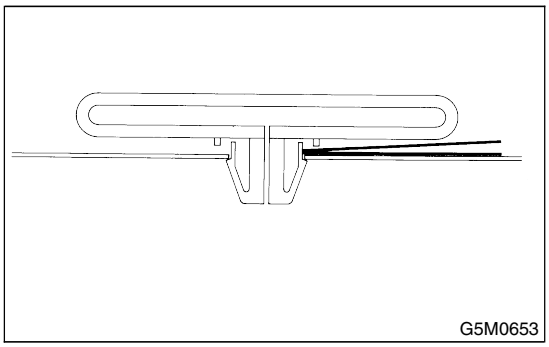
4) Rotate while pulling the safety lever to the right until it stops, then set the lock position.

CAUTION:
Once undeployed pretensioner has been removed from the vehicle body, do not move the safety lever until re-installation.

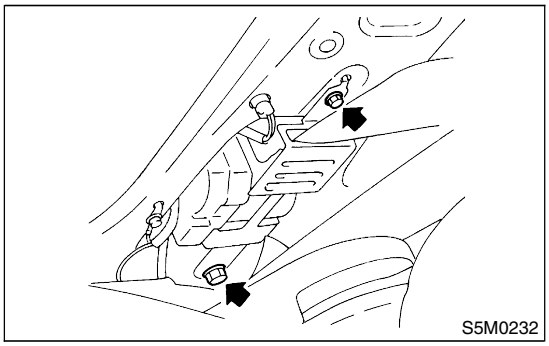


5) Remove webbing guide.





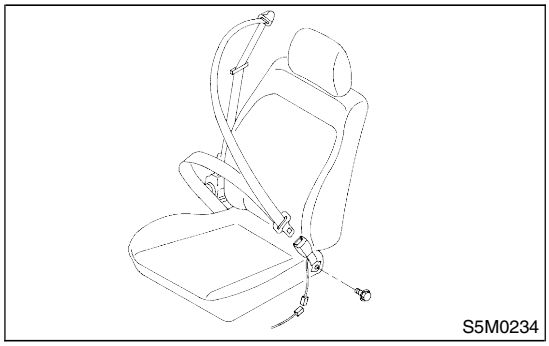
6) Remove lap anchor bolt.
7) Remove belt retractor and outer belt.



CAUTION:
• Do not drop or apply any impact to pretensioner.
• Pretensioner and bracket should be treated as an assembly. Do not attempt to disassemble it.

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.
● Pretensioner is cracked or deformed.
● Seat belt is slackened, bent, or frayed. Seat belt is abnormally wound or extended.

2. INNER BELT (FRONT) S801303A1002

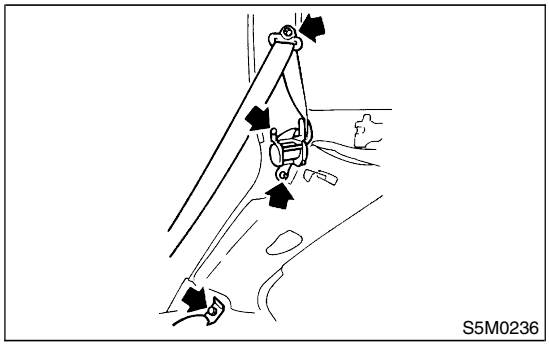
Check for the following, and replace with new parts if necessary.
● Inner belt is deformed or damaged.
● Seat belt buckle is engaged improperly.

4. Rear Seat Belt S801304

A: REMOVAL S801304A18

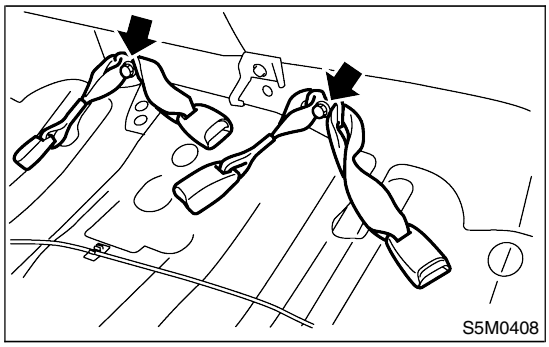
1. OUTER BELT SIDE S801304A1809

1) Remove rear seat. <Ref. to SE-6 REMOVAL, Rear Seat.>
2) Remove side sill rear upper cover. <Ref. to EI-38 REMOVAL, Lower Inner Trim.>
3) Remove quarter trim. <Ref. to EI-39 REMOVAL, Rear Quarter Trim.>
4) Remove bolts, then detach outer belt side.



2. INNER BELT S801304A1810

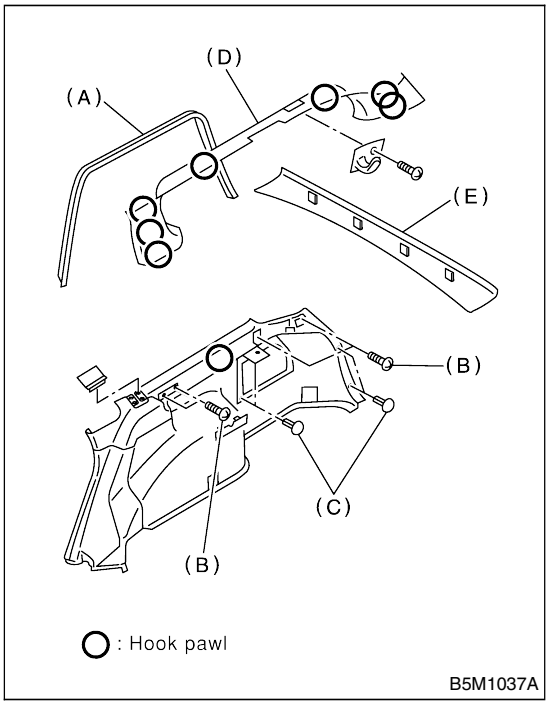
1) Remove the rear cushion. <Ref. to SE-6 REMOVAL, Rear Seat.>
2) Remove bolts, and then detach inner belt.



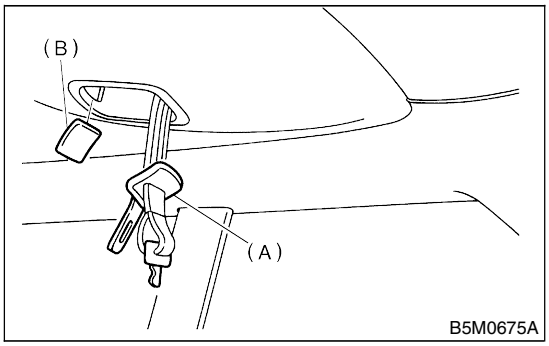
3. OUTER BELT CENTER S801304A1811

CAUTION:
When removing clip, use great care not to damage the roof trim.

1) Remove rear rail trim (I).
2) Remove strut cover (J).
3) Remove rear outer belt side anchor bolt.
4) Remove caps and screws then remove rear quarter upper trim (H).

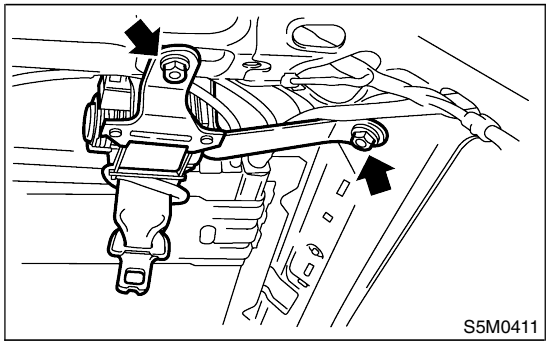


5) Remove cover (B) while detaching snap lock carefully. Put the outer belt center tongue (A) out to the other side of the trim through the hole.



6) Remove clips and hang down rear end of roof trim.

7) 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.

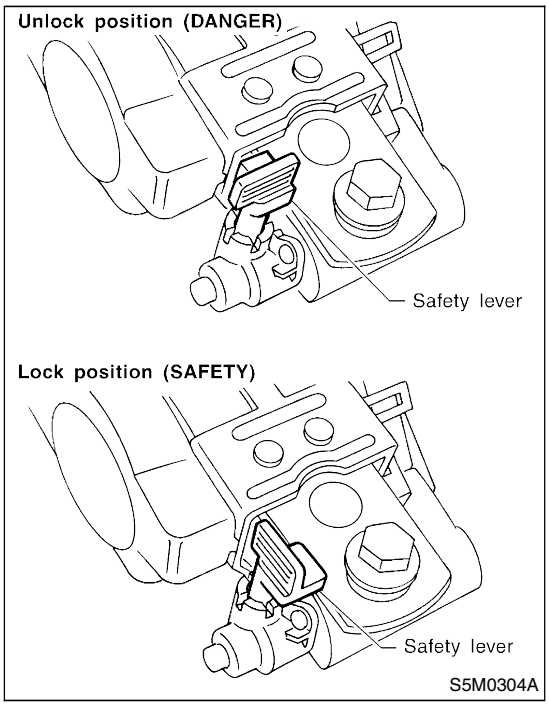
5. Disposal of Pretensioner S801305

A: CAUTION S801305A03

- Do not discard undeployed pretensioners, because they may cause serious personal injury when accidentally deployed.
- Deployment of the pretensioners should be done on a flat place free from any possible danger. Avoid deploying outdoors during rainy or windy weather.
- Do not drop or damage pretensioner.
- Because deploying the pretensioners causes a high-explosive noise, be sure to warn people in the area, and do not allow anyone within a 5-meter (16 ft) radius of the disposal site.
- Some smoke will be emitted after deployment of the pretensioners. Therefore, it must be deployed in a well-ventilated area with no smoke alarms nearby.
- Wear gloves, goggles, and earplugs during this operation. Wash your hands afterwards.
- After deployment, the pretensioner is especially hot. Leave it unattended for 40 minutes, and then discard it.
- Do not let water get on the deployed pretensioner.
- Wrap the deployed the pretensioner in an air-tight vinyl bag, and then discard it.

B: OPERATION S801305A16

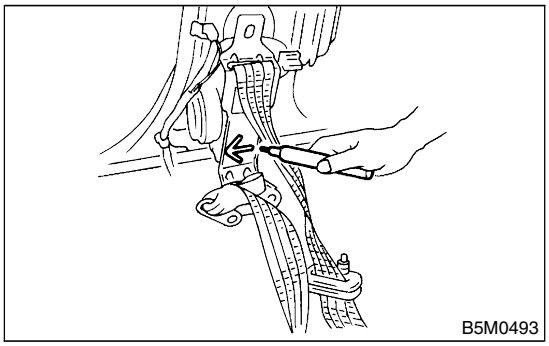
1) Rotate while pulling the safety lever to the right until it stops, then set the lock position.



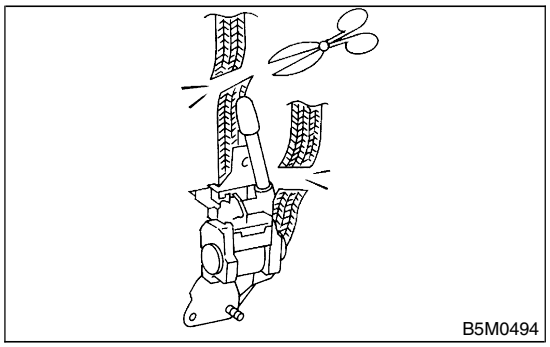
2) Remove outer belt (FRONT). <Ref. to SB-6 OUTER BELT (FRONT), REMOVAL, Front Seat Belt.>

3) Mark an arrow on pretensioner which indicates vehicle front.

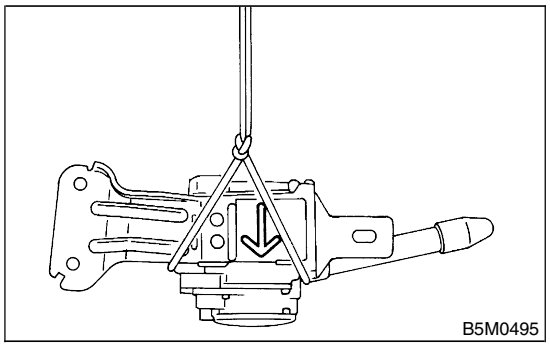
WARNING:
Never move the safety lever of pretensioner until instructed to do so.



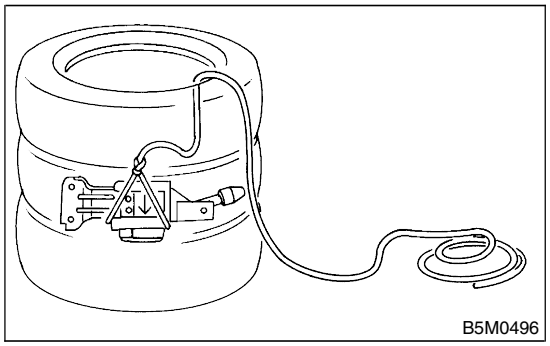
4) Cut the webbing of the pretensioner.



5) Tie the pretensioner with a rope of a minimum 6 m (20 ft) so that the arrow on the pretensioner faces downward.

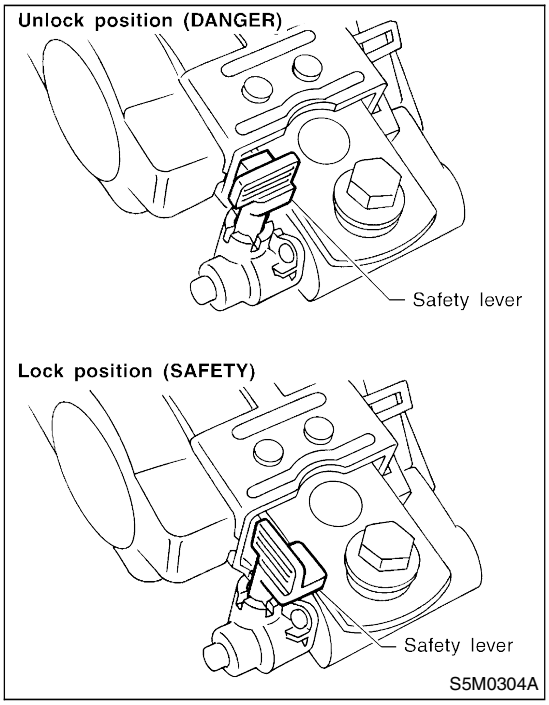


6) Pile three tires without disc wheels on a flat and rigid floor. Softly place the pretensioner in the tires with the arrow facing downward.



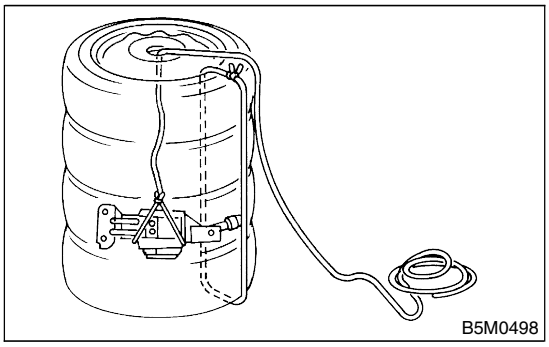
7) Rotate while pulling the safety lever to the left until it stops, then set the unlock position.

CAUTION:
Pay careful attention not to apply impact to the pretensioner with its safety system unlocked. It may deploy even with a slight impact.



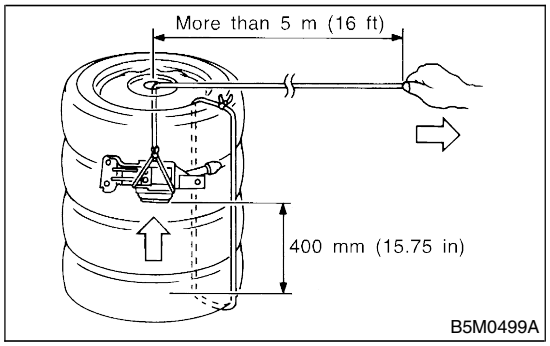
8) Put a tire with disk wheel on the three tires so that the rope comes out of the wheel center as shown in the figure. Then, fix the four tires with another rope.

WARNING:
Pay careful attention not to apply impact to the pretensioner with its safety system unlocked. It may deploy even with a slight impact.



9) Pull the rope on the pretensioner from a minimum 5 m (16 ft) away from the tires so that the pretensioner is lifted a minimum 400 mm (15.75 in) from the floor.

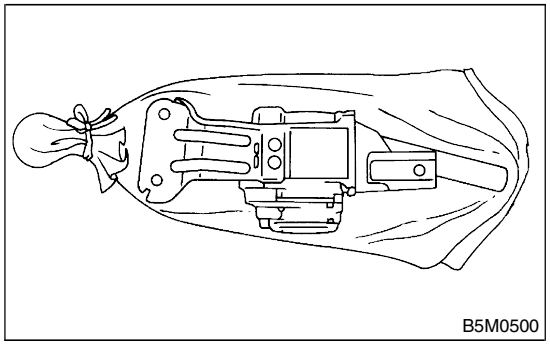
CAUTION:
Before pulling the rope, confirm the safety in the working area, and inform the people around you of the deployment.



10) Release the rope to drop the pretensioner so that the pretensioner is deployed by impact.

CAUTION:
• The pretensioner may not deploy if the safety system is locked completely or it falls in a direction different from the one shown by the arrow. In this case, repeat the procedure from the beginning paying attention not to apply impact to the pretensioner.
• After deployment, the pretensioner is extremely hot. Leave it unattended for 40 minutes.
• Do not let water get on the deployed pretensioner.

11) Wrap the deployed pretensioner in an airtight vinyl bag and discard it.



LIGHTING SYSTEM

LI

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29.	Room Light	61
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1. General Description S914001

A: SPECIFICATIONS S914001E49

Headlight		12 V — 60 W/55 W (Halogen)
Front turn signal light		12 V — 21 W
Side turn signal light		12 V — 5 W
Parking light		12 V — 5 W
Front fog light		12 V — 51 W
Rear fog light		12 V — 21 W
Rear combination light	Tail/Stop light	12 V — 5/21 W
	Turn signal light	12 V — 21 W
	Back-up light	12 V — 16 W
License plate light		12 V — 5 W
High-mounted stop light		12 V — 10 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

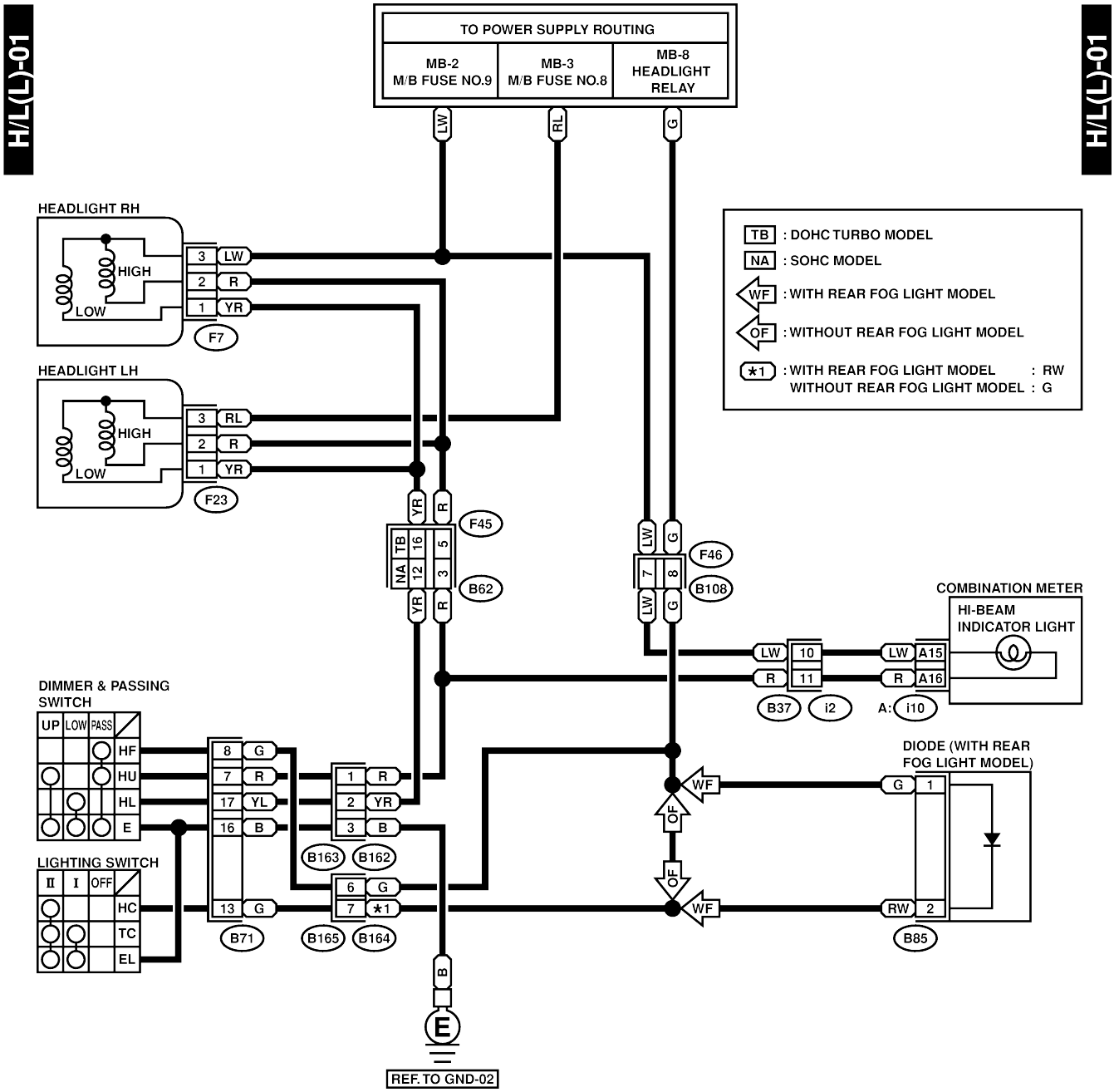
TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance and voltage.

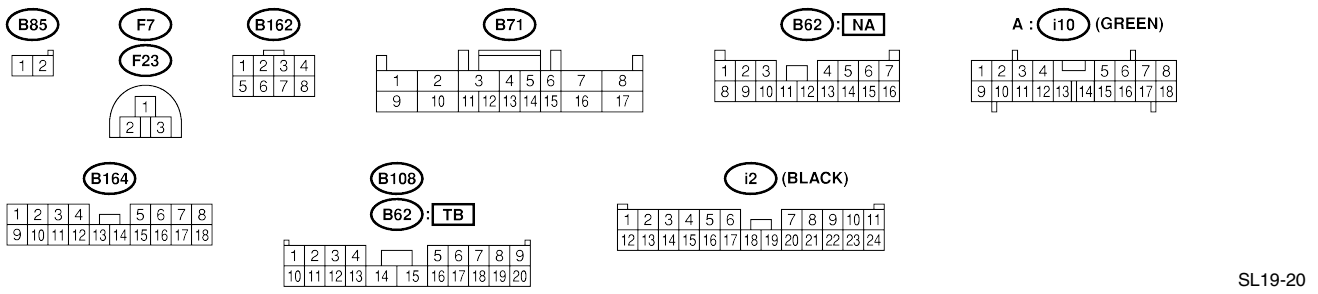
MEMO:

2. Headlight and Tail Light System S914415

A: SCHEMATIC S914415A21

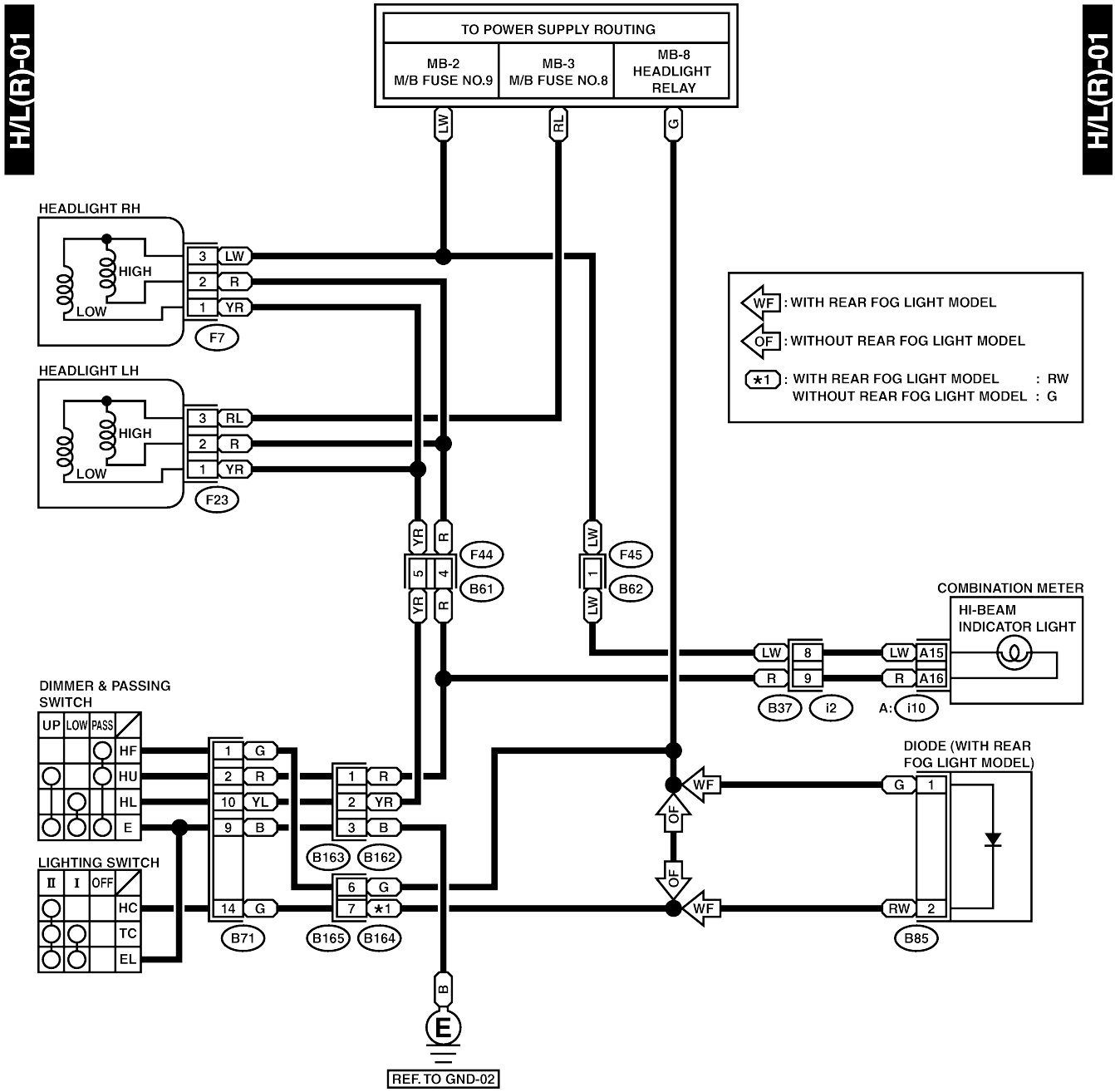
1. HEADLIGHT LHD MODEL S914415A2104

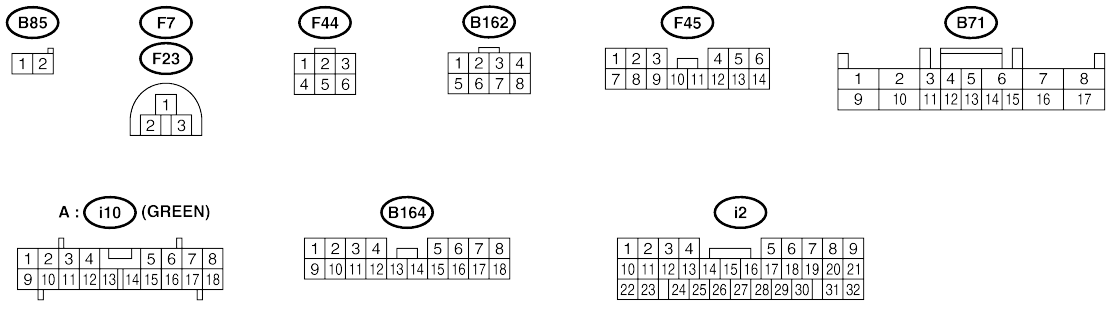




SL19-20

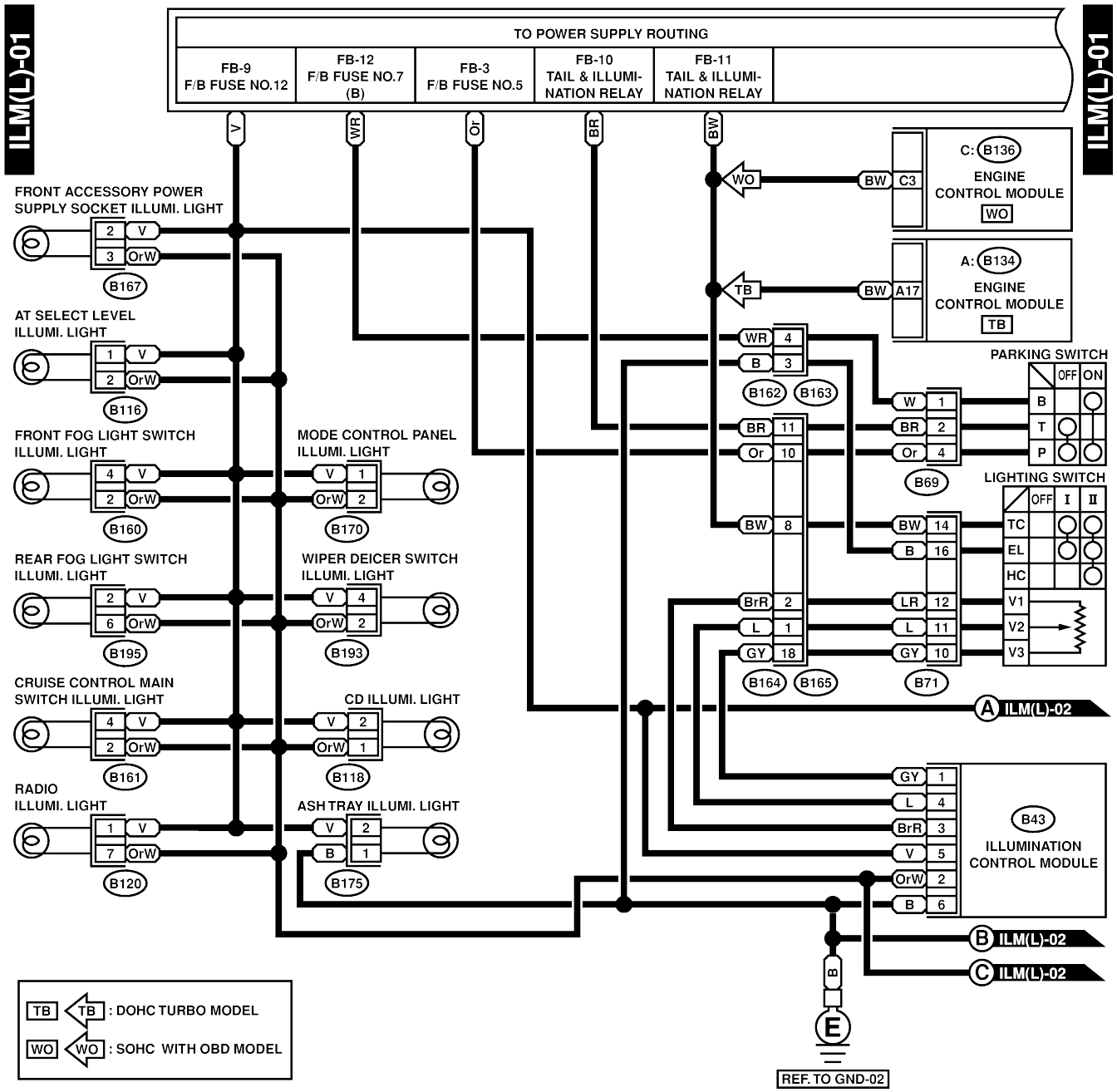
2. HEADLIGHT RHD MODEL S914415A2105

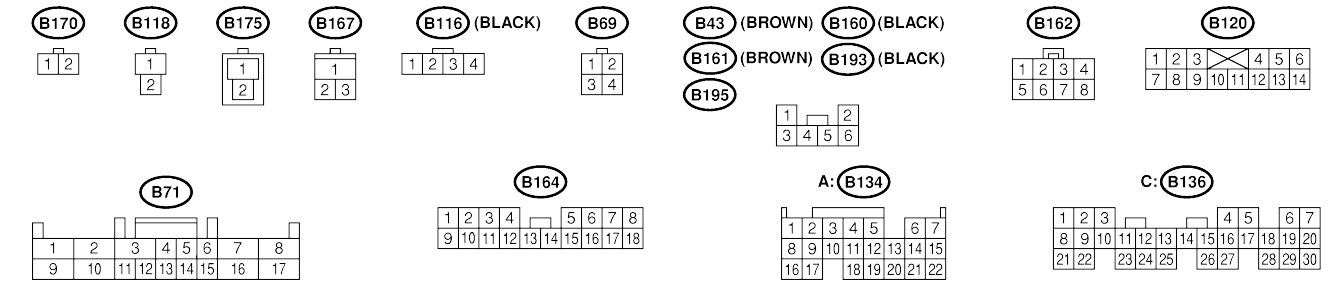




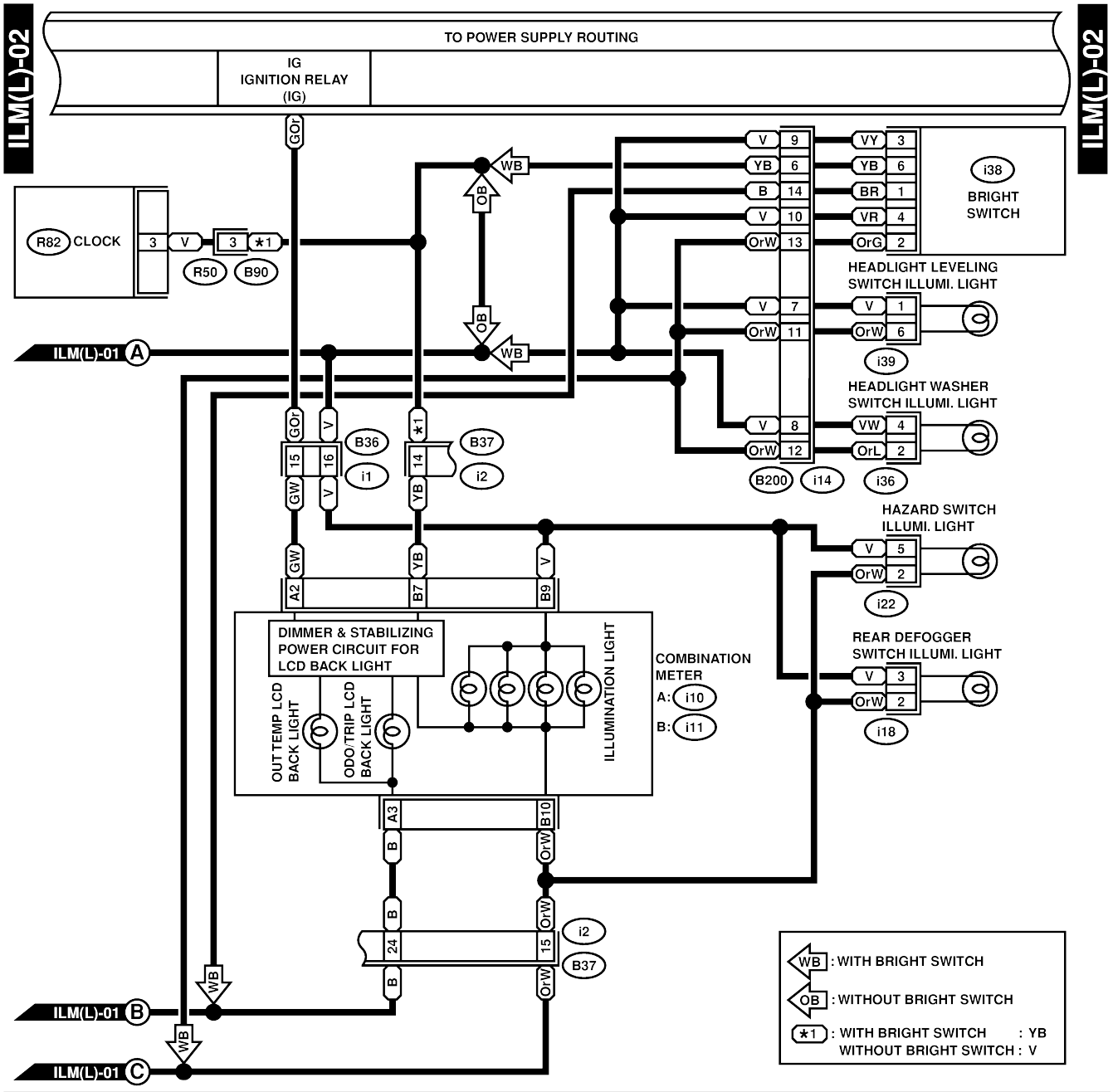
SR19-20

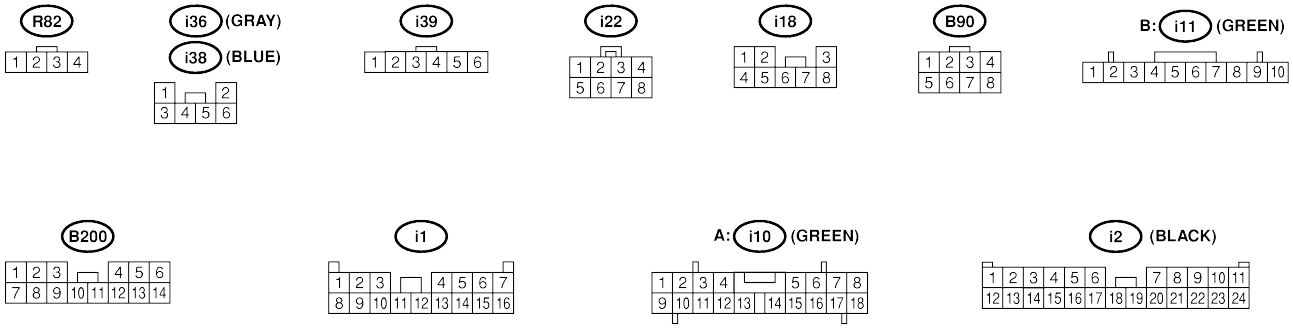
3. CLEARANCE LIGHT AND ILLUMINATION LIGHT LHD MODEL S914415A2106





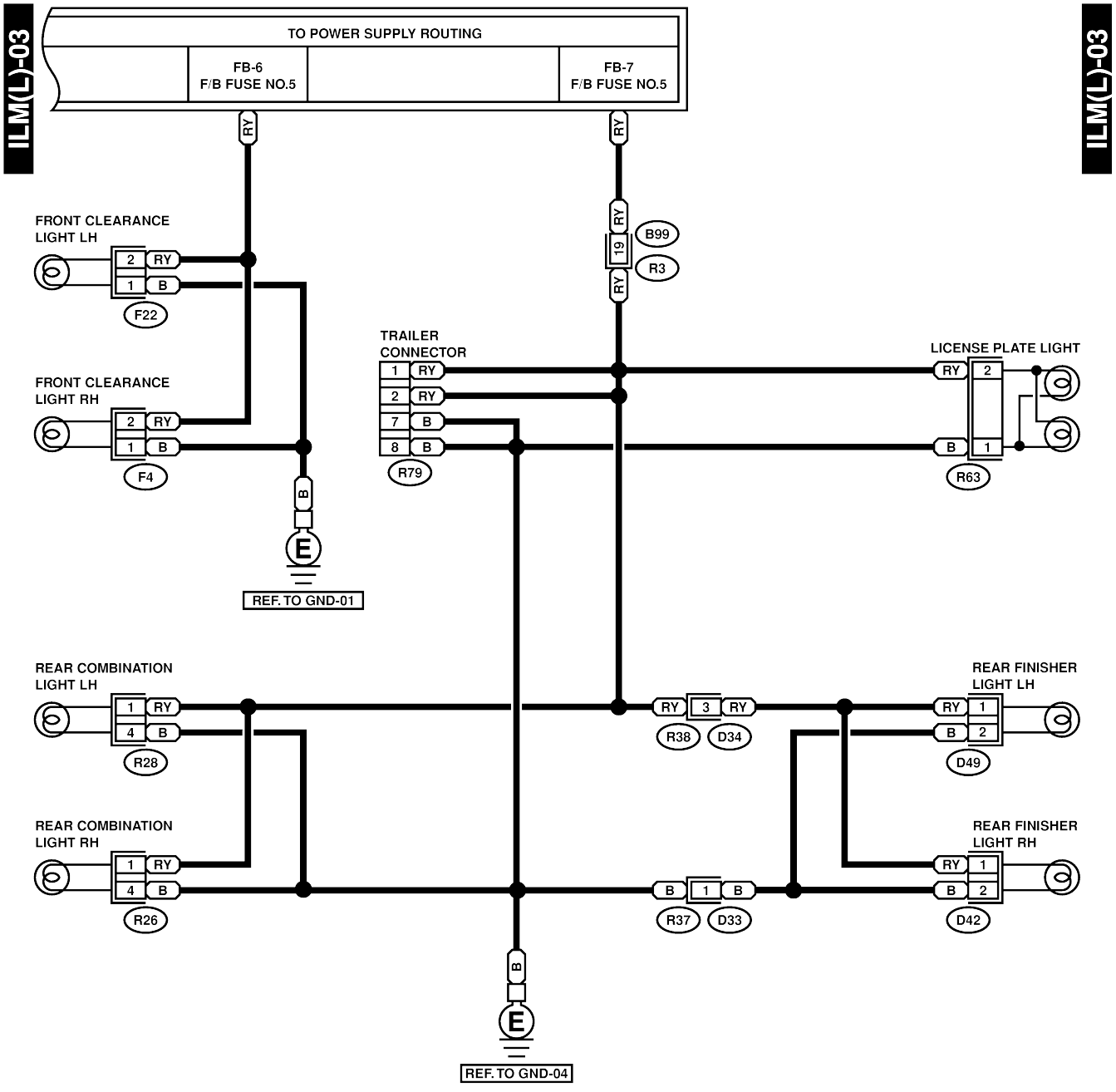
SL21-20A

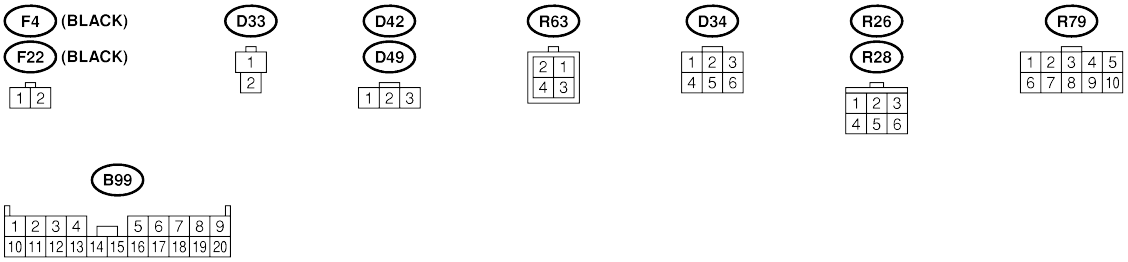

ILM(L)-02
TO POWER SUPPLY ROUTING
IG
IGNITION RELAY
(IG)
ILM(L)-02
R82 CLOCK
R50
B90
ILM(L)-01 A
ILM(L)-01 B
ILM(L)-01 C
B36
B37
i1
i2
B200
i14
i36
i38
BRIGHT SWITCH
HEADLIGHT LEVELING SWITCH ILLUMI. LIGHT
i39
HEADLIGHT WASHER SWITCH ILLUMI. LIGHT
HAZARD SWITCH ILLUMI. LIGHT
i22
REAR DEFOGGER SWITCH 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
WB : WITH BRIGHT SWITCH
OB : WITHOUT BRIGHT SWITCH
*1 : WITH BRIGHT SWITCH : YB
WITHOUT BRIGHT SWITCH : V


R82
i36 (GRAY)
i38 (BLUE)
i39
i22
i18
B90
B: i11 (GREEN)
B200
i1
A: i10 (GREEN)
i2 (BLACK)

SL21-20B

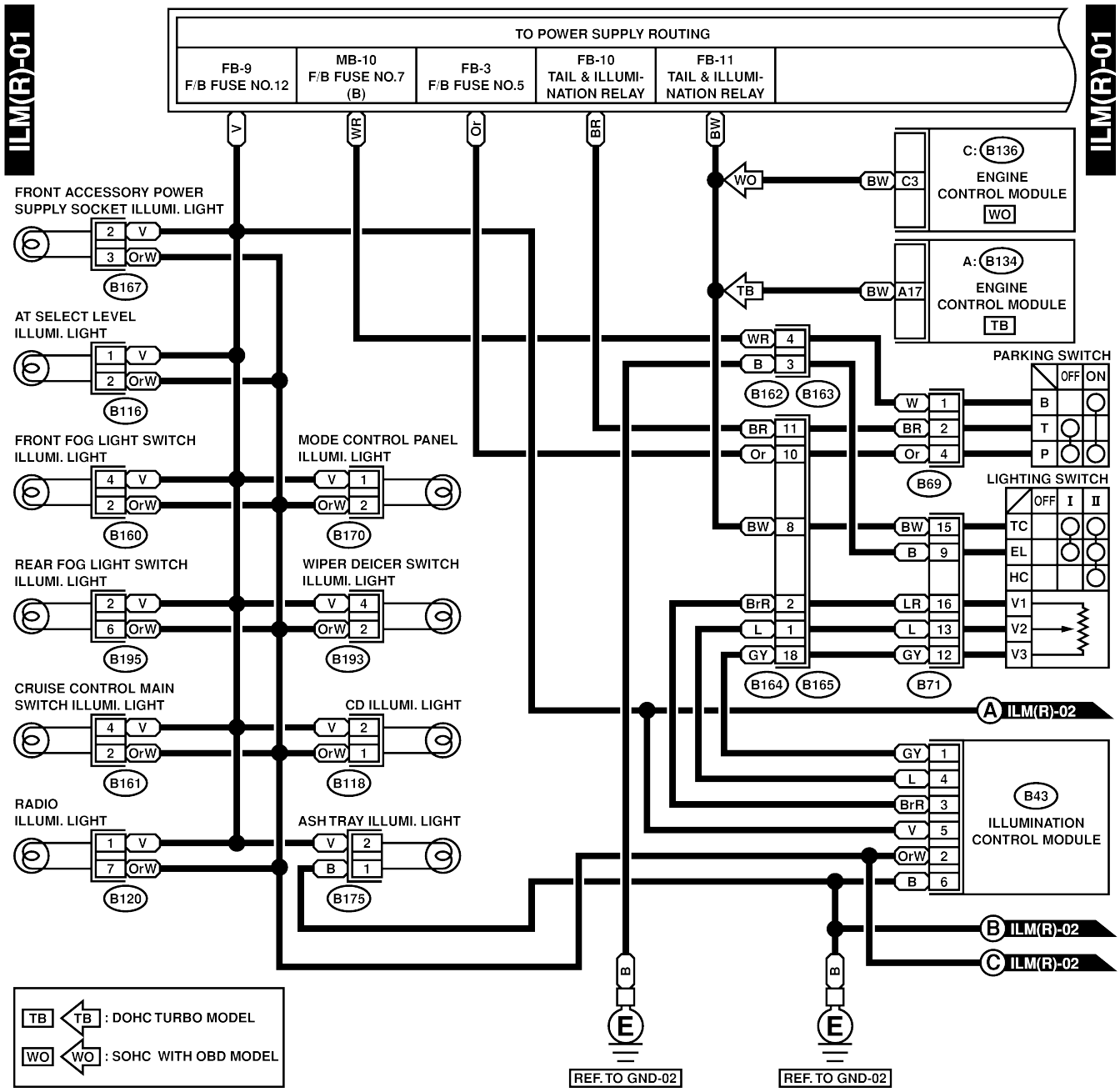
HEADLIGHT AND TAIL LIGHT SYSTEM

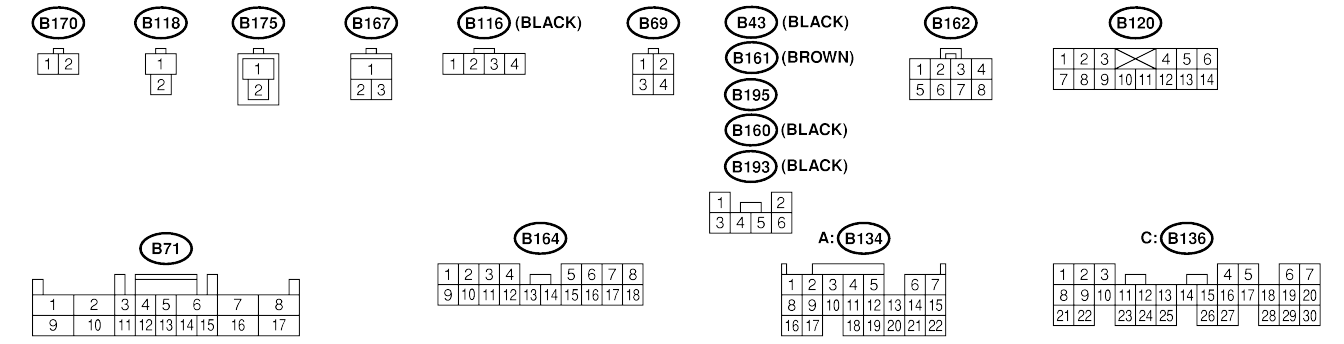




SL21-20C

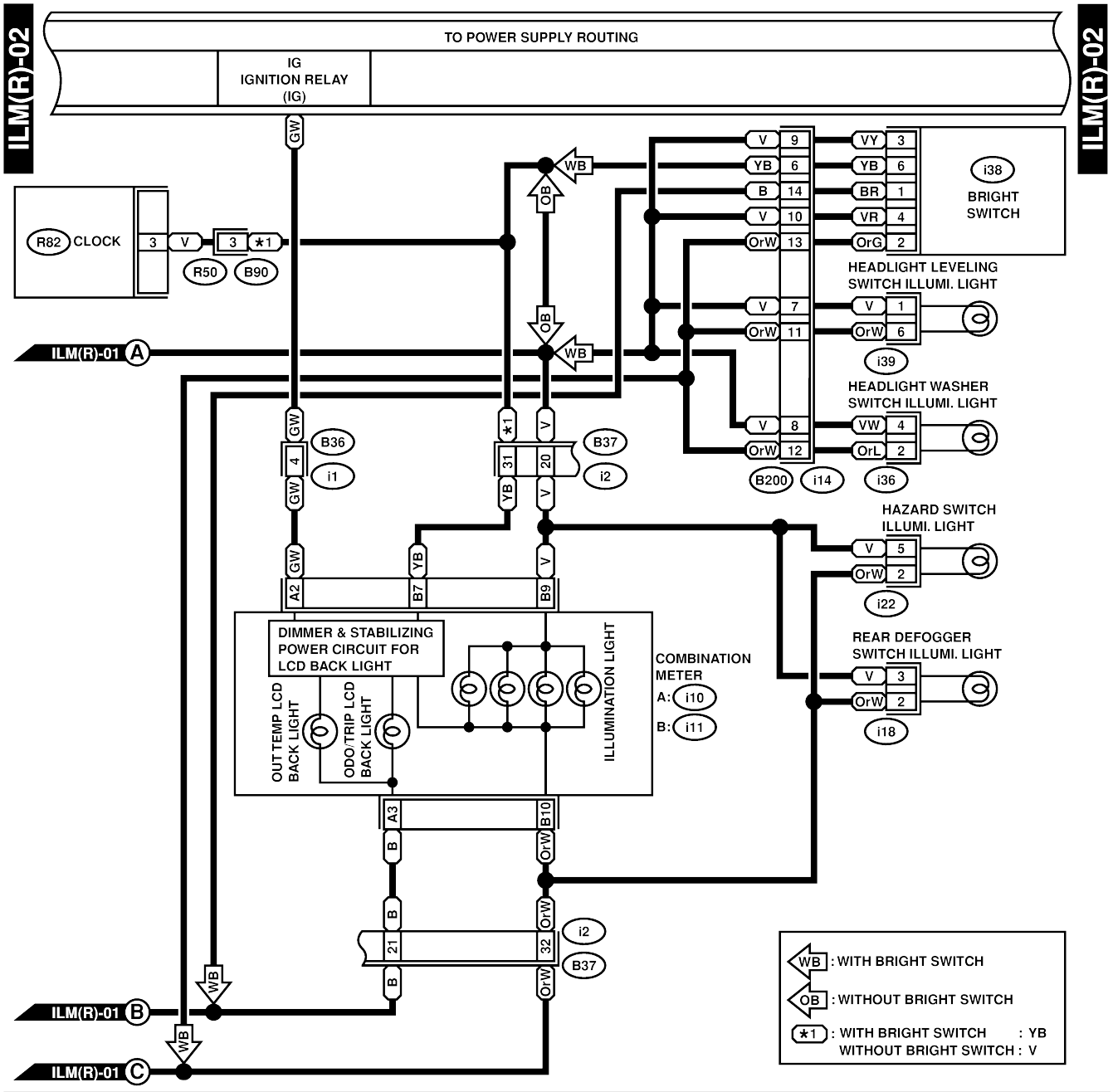
4. CLEARANCE LIGHT AND ILLUMINATION LIGHT RHD MODEL S914415A2107

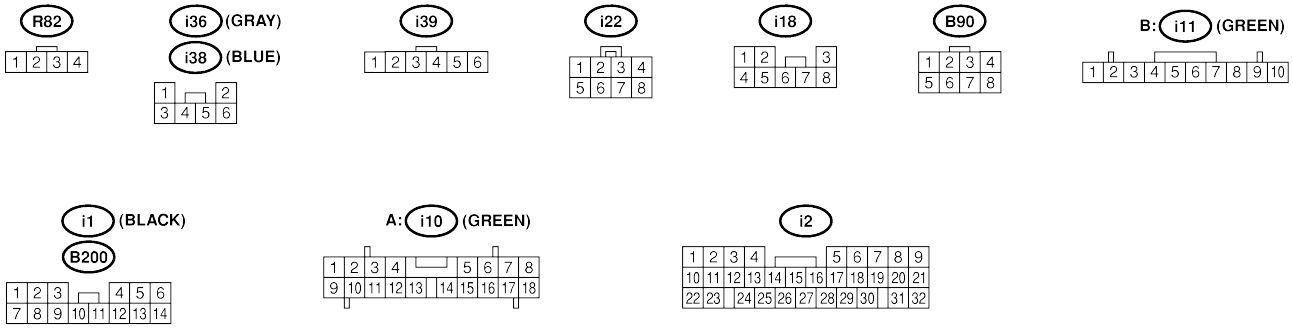




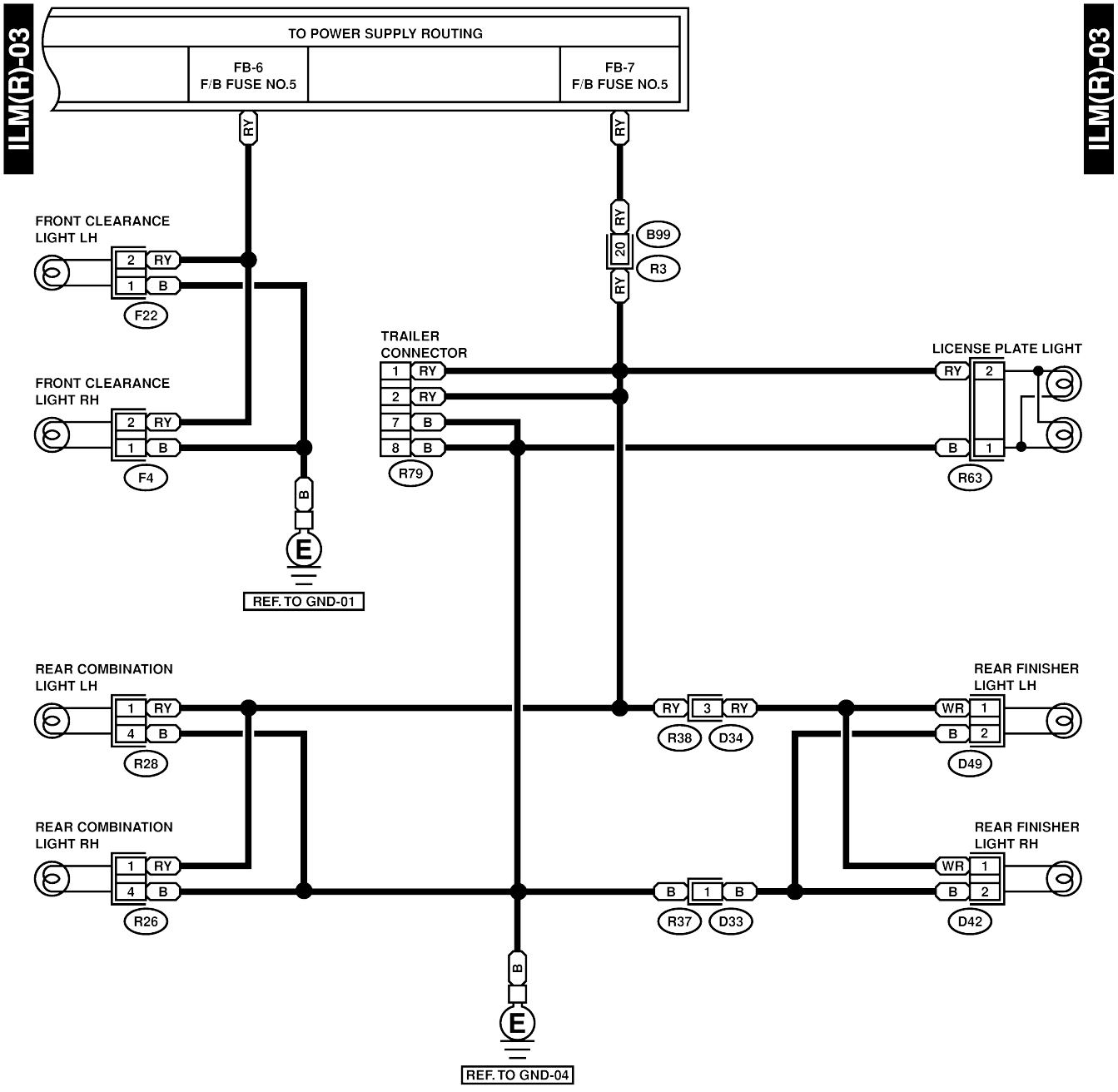
SR21-20A

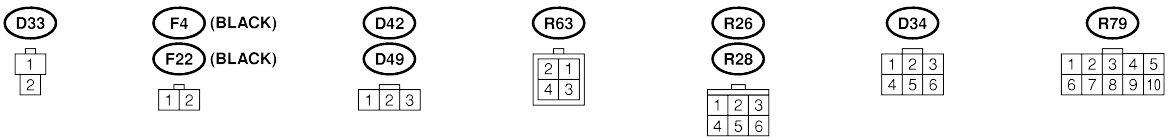
HEADLIGHT AND TAIL LIGHT SYSTEM

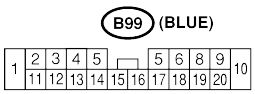




SR21-20B


ILM(R)-03
ILM(R)-03
TO POWER SUPPLY ROUTING
FB-6
F/B FUSE NO.5
FB-7
F/B FUSE NO.5
RY
FRONT CLEARANCE
LIGHT LH
2 RY
1 B
F22
FRONT CLEARANCE
LIGHT RH
2 RY
1 B
F4
B
E
REF. TO GND-01
RY
20
B99
R3
TRAILER
CONNECTOR
1 RY
2 RY
7 B
8 B
R79
LICENSE PLATE LIGHT
RY 2
B 1
R63
REAR COMBINATION
LIGHT LH
1 RY
4 B
R28
RY 3 RY
R38 D34
REAR FINISHER
LIGHT LH
WR 1
B 2
D49
REAR COMBINATION
LIGHT RH
1 RY
4 B
R26
B 1 B
R37 D33
REAR FINISHER
LIGHT RH
WR 1
B 2
D42
B
E
REF. TO GND-04


D33
F4 (BLACK)
F22 (BLACK)
D42
D49
R63
R26
R28
D34
R79


B99 (BLUE)

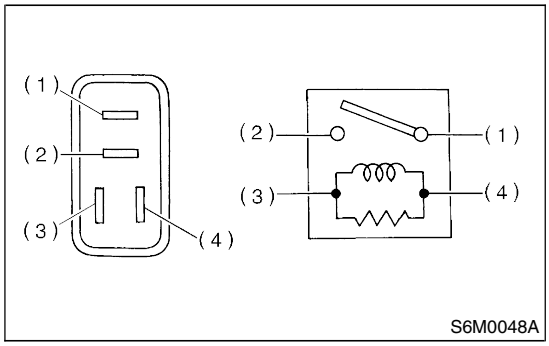
SR21-20C

B: INSPECTION S914415A10

1. HEADLIGHT RELAY S914415A1001

Check continuity between terminals when terminal No. 4 is connected to battery and terminal No. 3 is grounded.

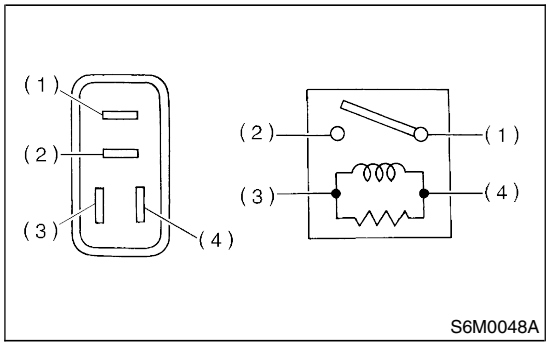
When current flows.	Between terminals No. 1 and No. 2	Continuity exists.
When current does not flow.	Between terminals No. 1 and No. 2	Continuity does not exist.
	Between terminals No. 3 and No. 4	Continuity exists.



2. TAIL AND ILLUMINATION RELAY S914415A1002

Check continuity between terminals (indicated in table below) when terminal No. 4 is connected to battery and terminal No. 3 is grounded.

When current flows.	Between terminals No. 1 and No. 2	Continuity exists.
When current does not flow.	Between terminals No. 1 and No. 2	Continuity does not exist.
	Between terminals No. 3 and No. 4	Continuity exists.

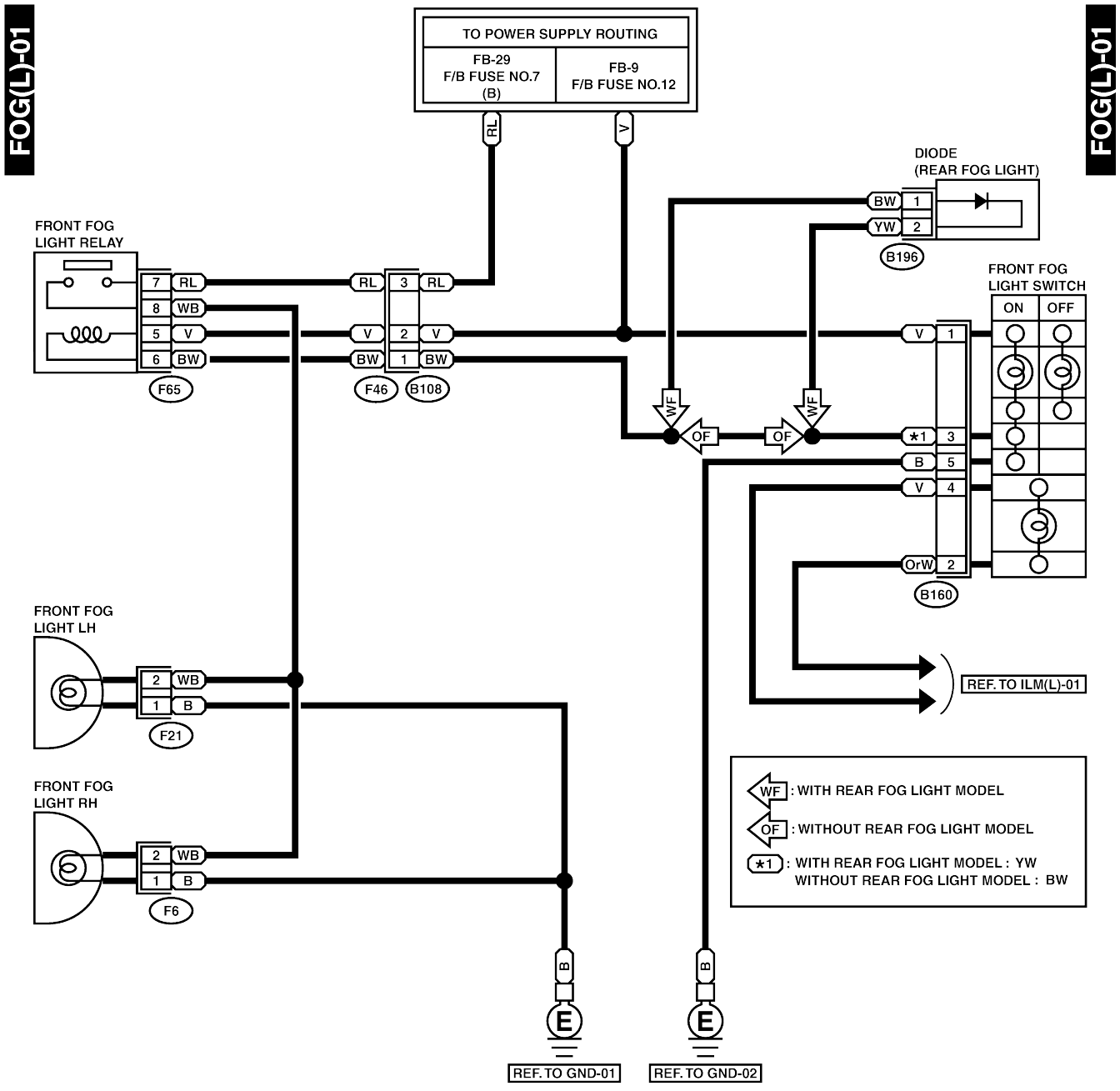


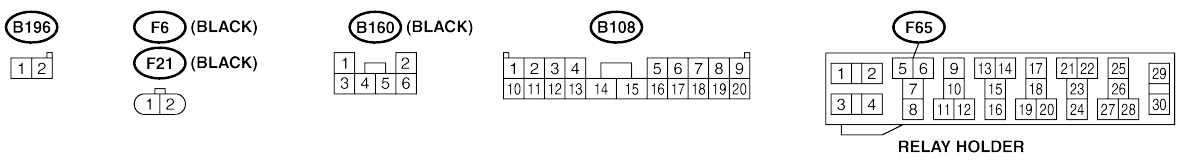
MEMO:

3. Front Fog Light System S914473

A: SCHEMATIC S914473A21

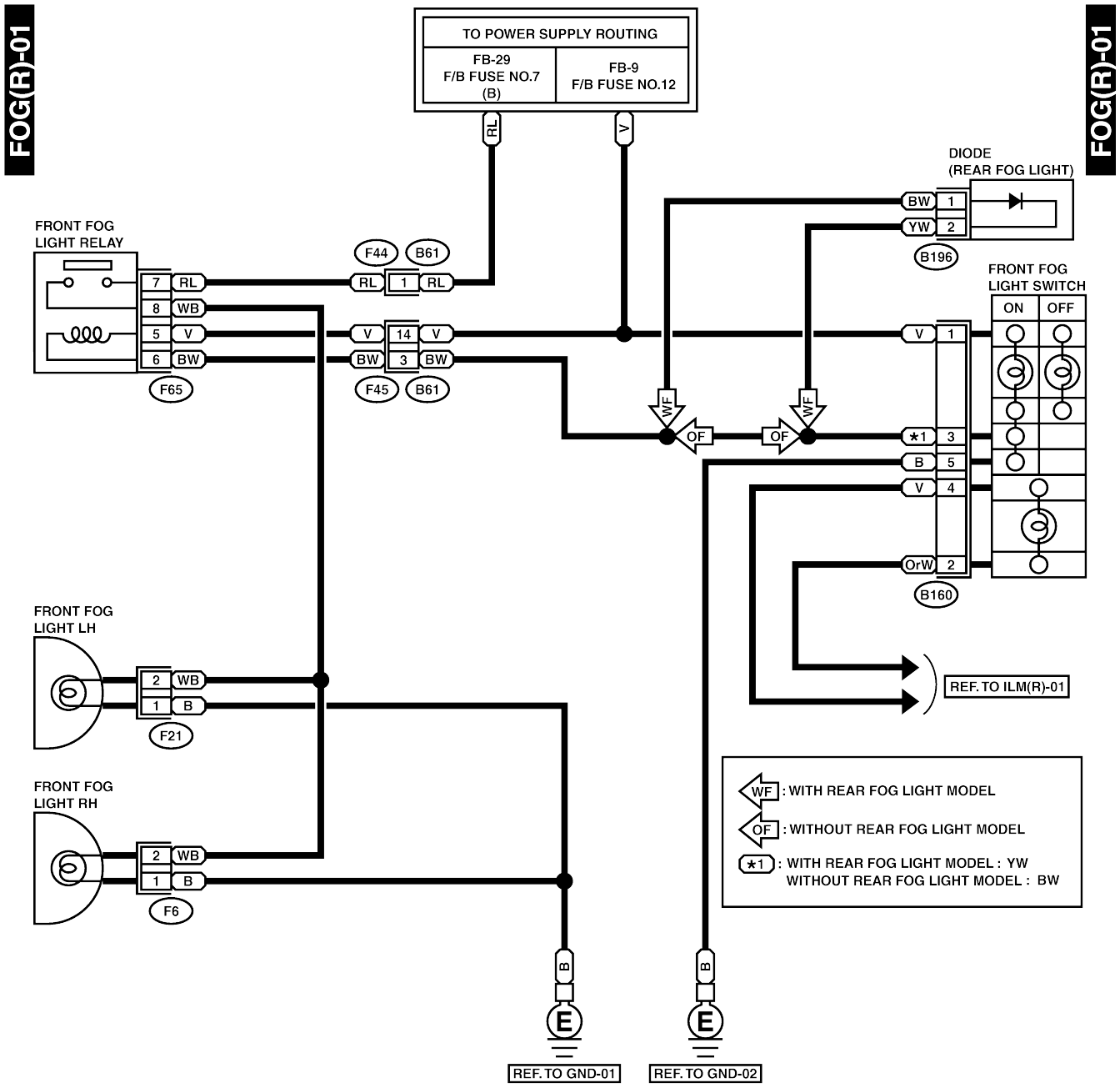
1. FRONT FOG LIGHT LHD MODEL S914473A2105

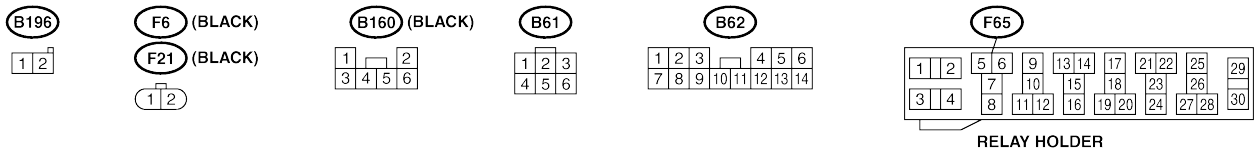




SL22-20

2. FRONT FOG LIGHT RHD MODEL S914473A2106

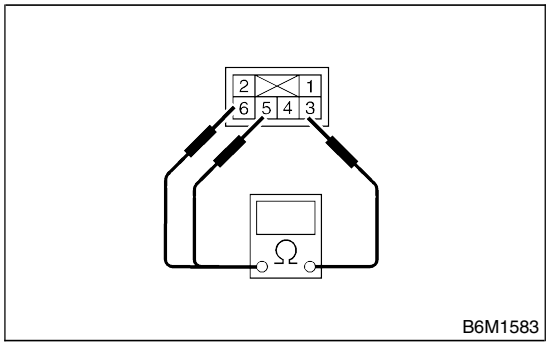




SR22-20

B: INSPECTION S914473A10

1. FRONT FOG LIGHT SWITCH S914473A1001



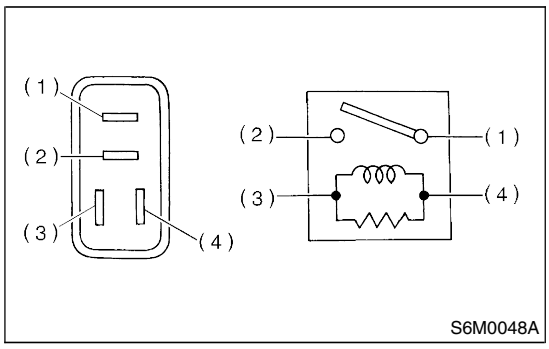
Check continuity between terminals when operating the switch.

Switch position	Tester connection	Specified condition
OFF	—	No continuity
ON	3 - 5 - 6	Continuity

2. FRONT FOG LIGHT RELAY S914473A1002

Check continuity between terminals (indicated in table below) when terminal No. 4 is connected to battery and terminal No. 3 is grounded.

When current flows.	Between terminals No. 1 and No. 2	Continuity exists.
When current does not flow.	Between terminals No. 1 and No. 2	Continuity does not exist.
	Between terminals No. 3 and No. 4	Continuity exists.

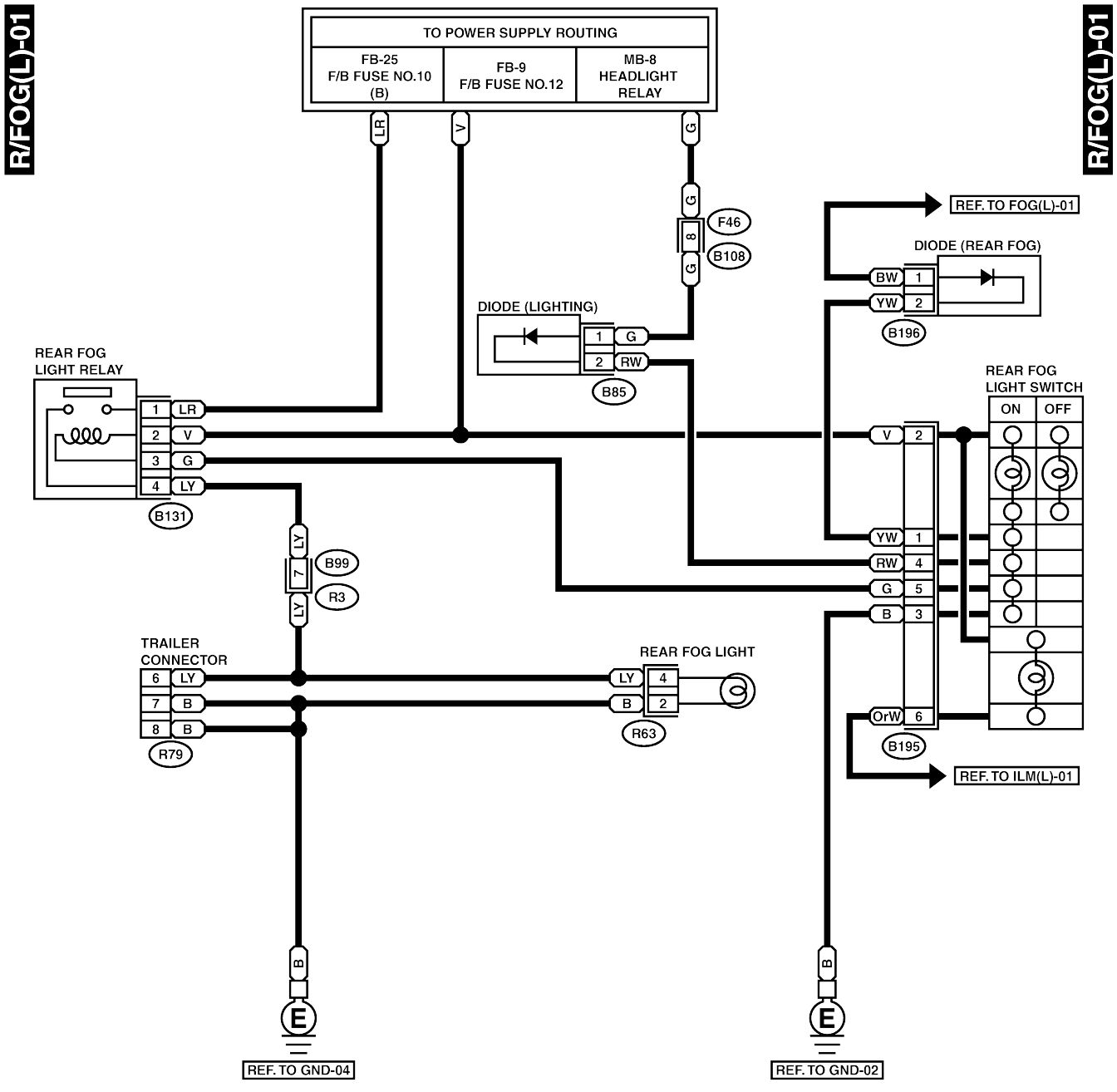


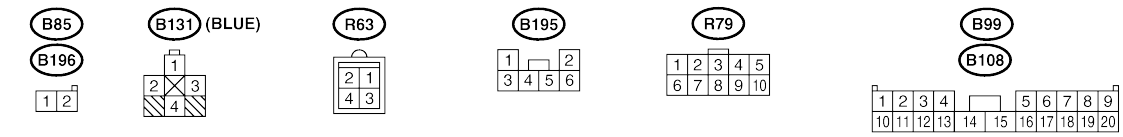
MEMO:

4. Rear Fog Light System S914476

A: SCHEMATIC S914476A21

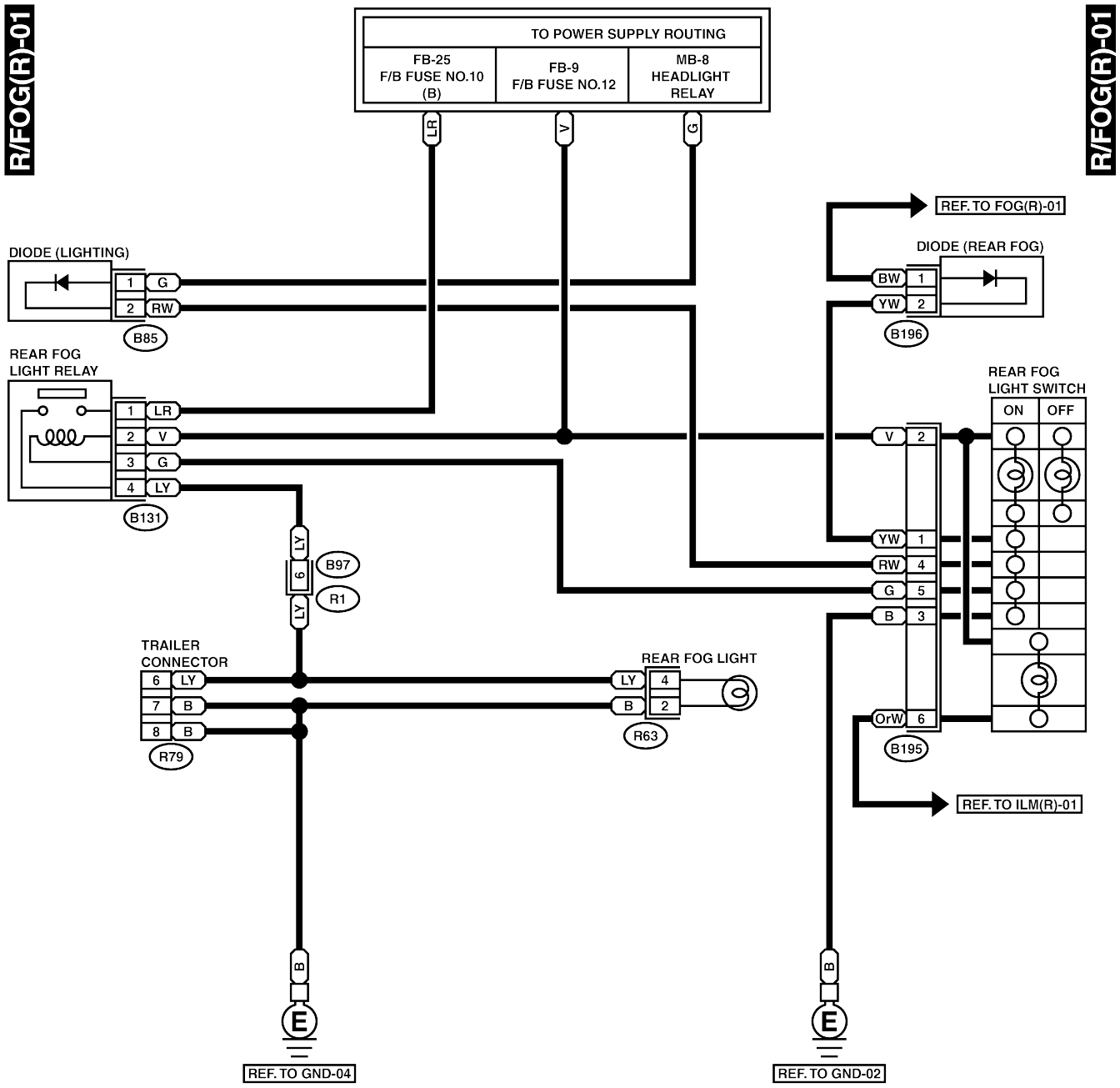
1. REAR FOG LIGHT LHD MODEL S914476A2102

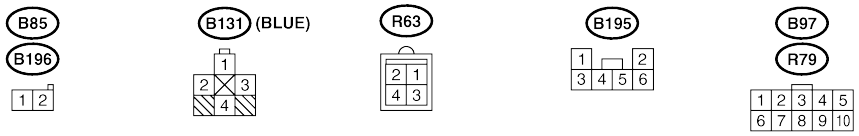




SL30-20

2. REAR FOG LIGHT RHD MODEL S914476A2103





SR30-20

B: INSPECTION S914476A10

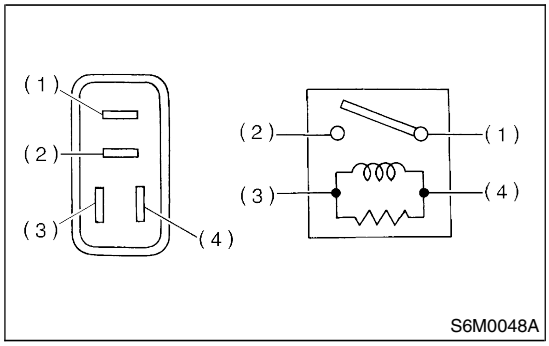
1. REAR FOG LIGHT SWITCH S914476A1001

1) Turn ignition switch ON.
2) Turn on the headlight or front fog light.
3) Push the rear fog light switch and check if the rear fog light turns on.

2. REAR FOG LIGHT RELAY S914476A1002

Check continuity between terminals (indicated in table below) when terminal No. 4 is connected to battery and terminal No. 3 is grounded.

When current flows.	Between terminals No. 1 and No. 2	Continuity exists.
When current does not flow.	Between terminals No. 1 and No. 2	Continuity does not exist.
	Between terminals No. 3 and No. 4	Continuity exists.

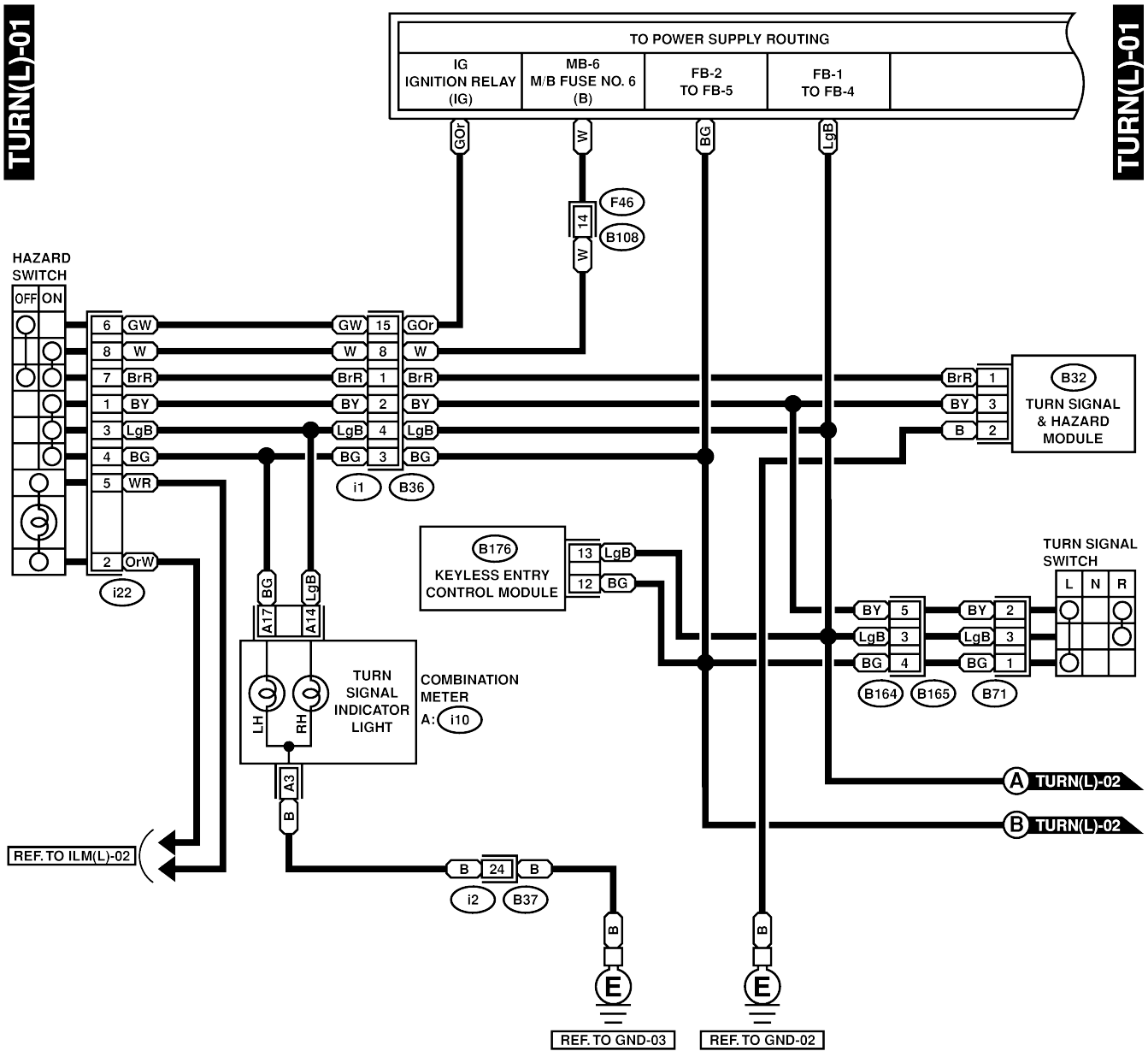


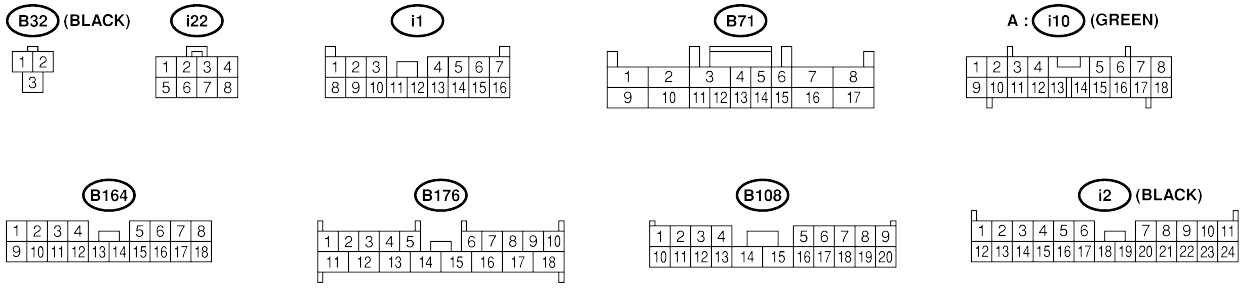
MEMO:

5. Turn Signal and Hazard Light System S914481

A: SCHEMATIC S914481A21

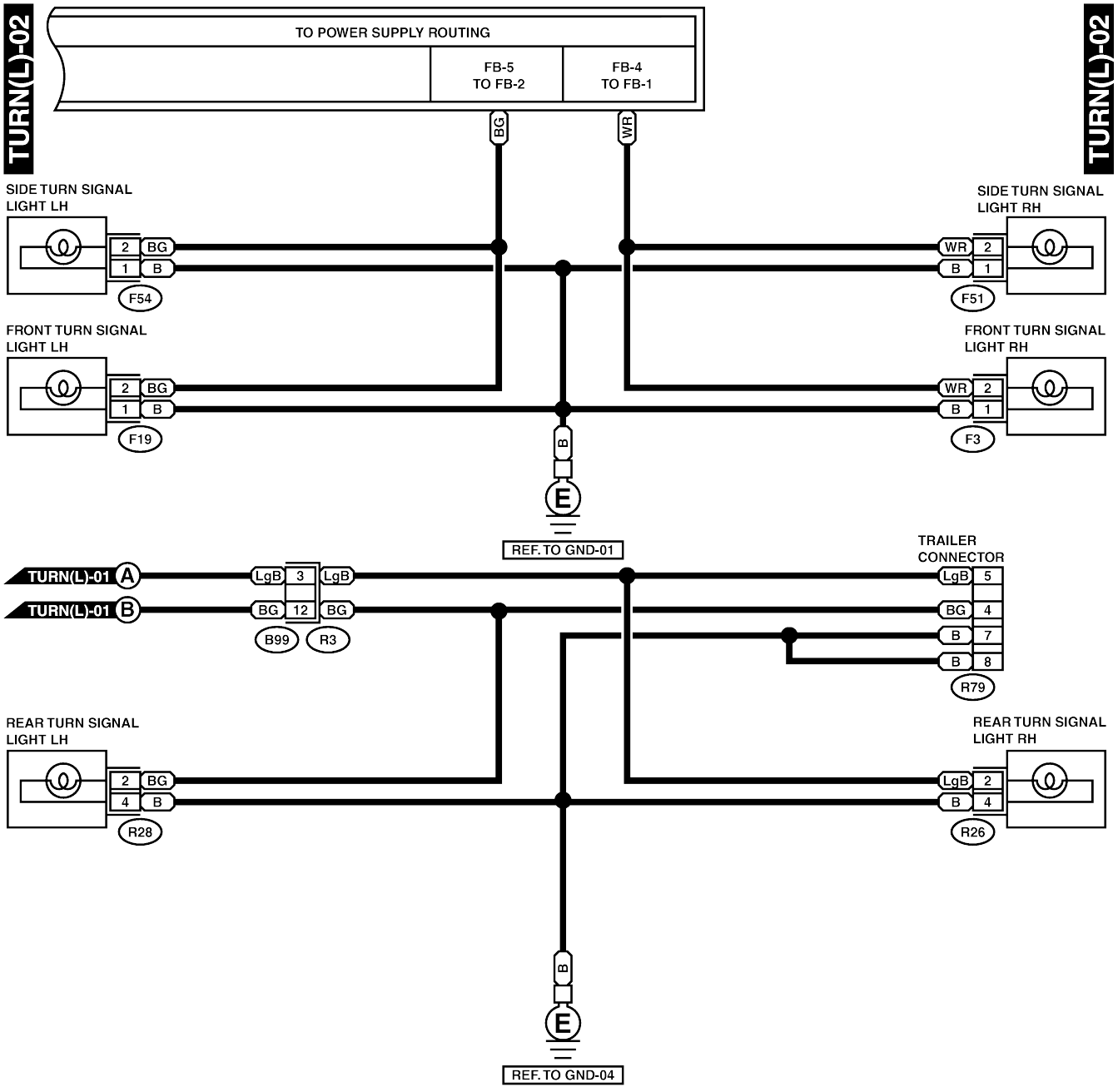
1. TURN SIGNAL LIGHT AND HAZARD LIGHT LHD MODEL S914481A2102





SL26-20A

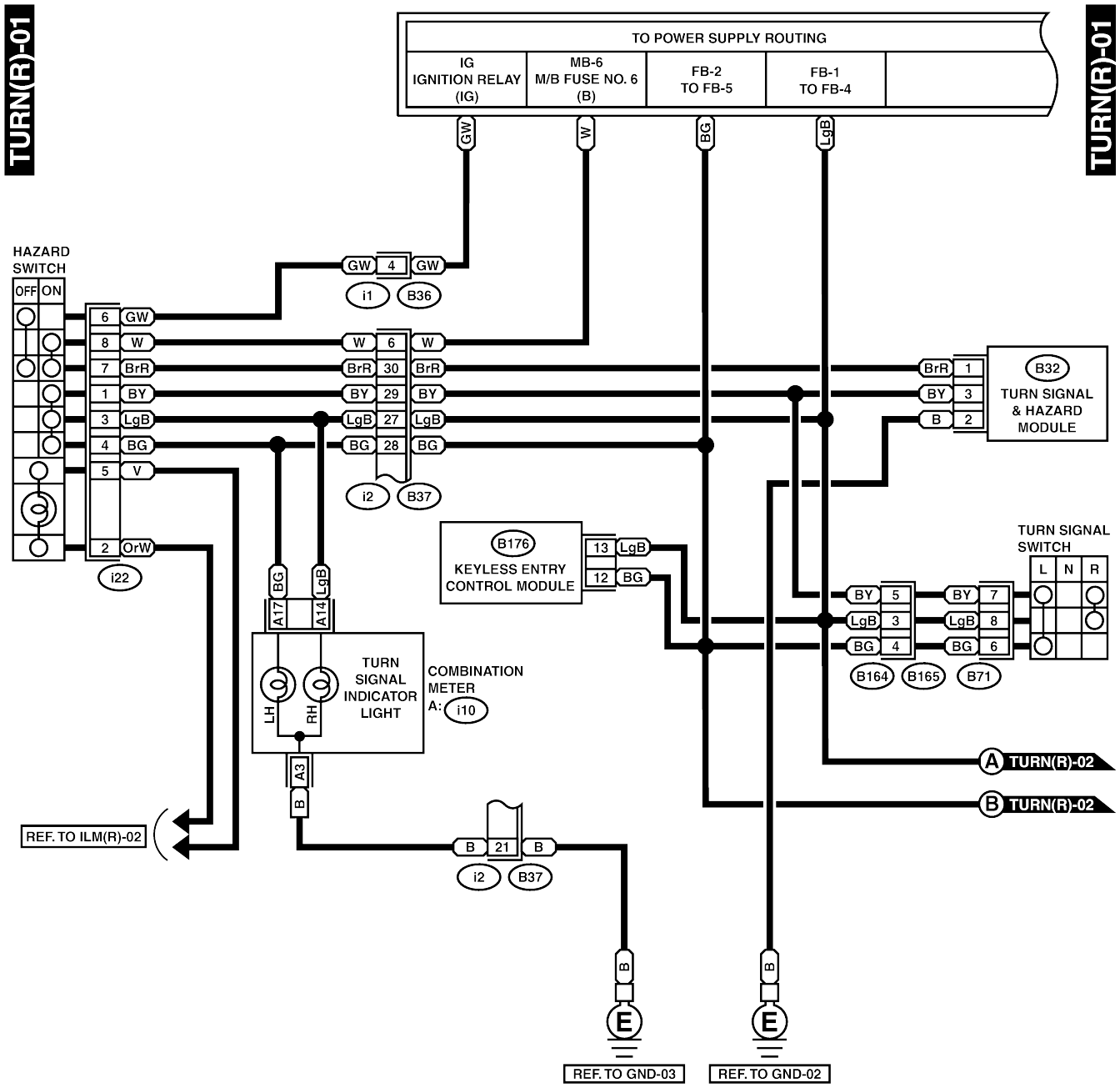
TURN SIGNAL AND HAZARD LIGHT SYSTEM

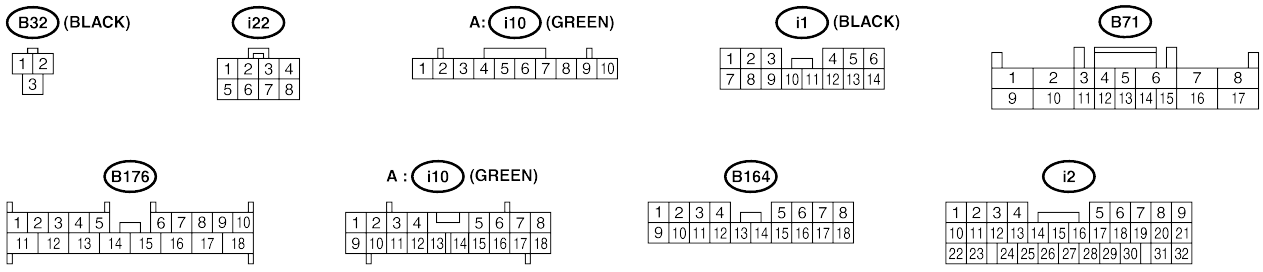




SL26-20B

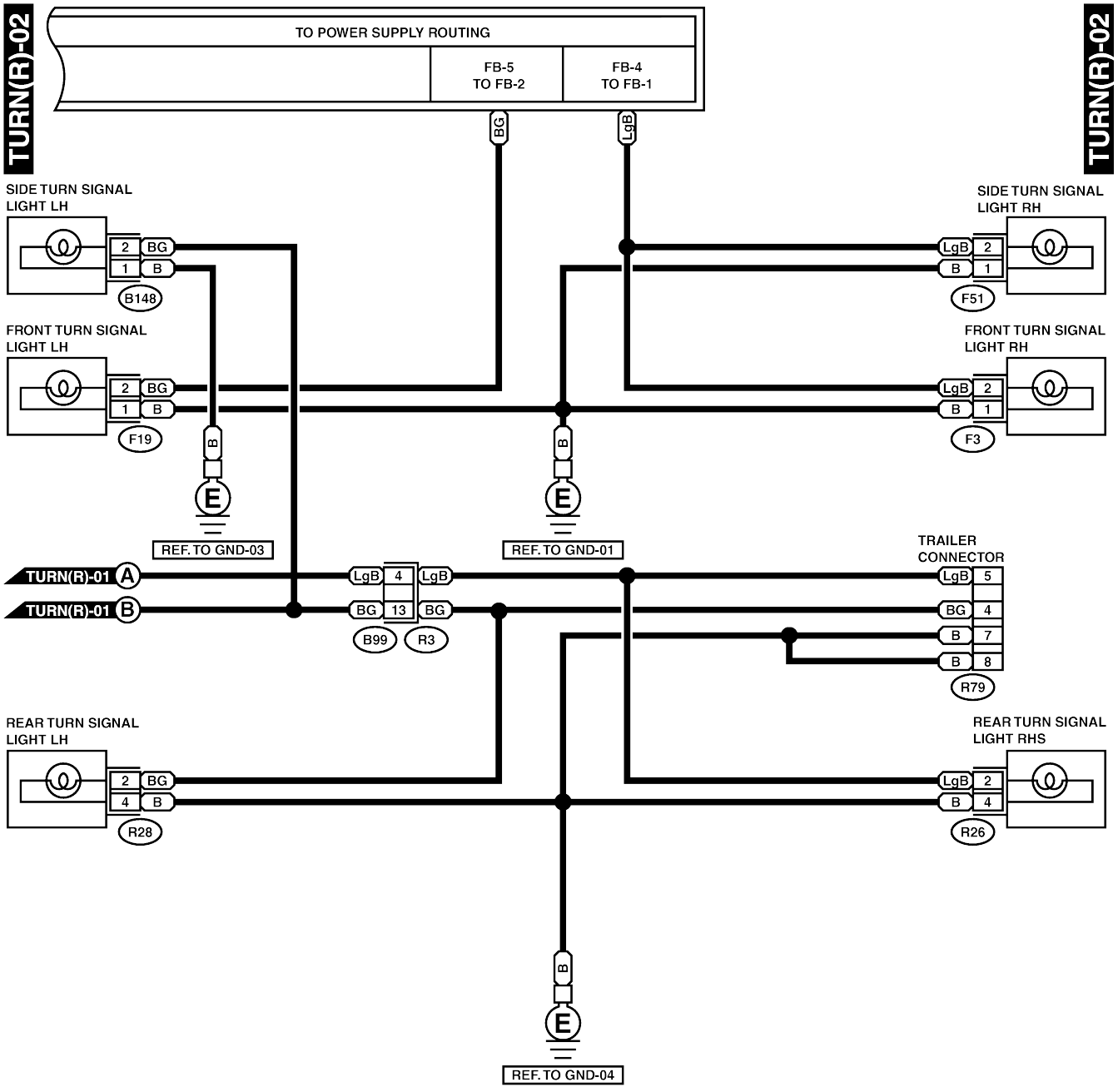
2. TURN SIGNAL LIGHT AND HAZARD LIGHT RHD MODEL S914481A2103

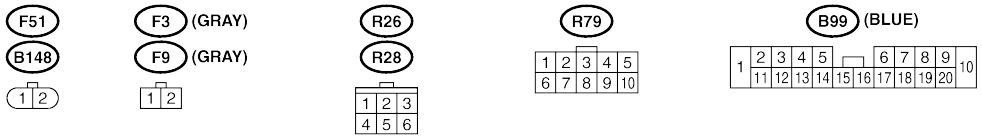




SR26-20A

TURN SIGNAL AND HAZARD LIGHT SYSTEM





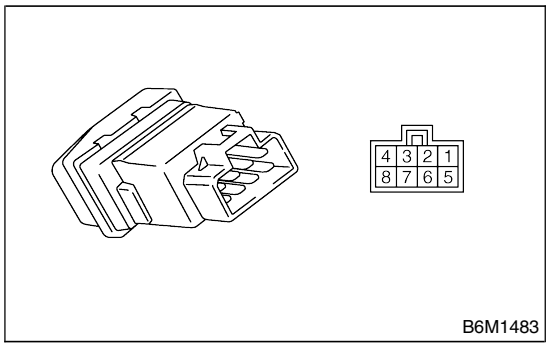
SR26-20B

B: INSPECTION S914481A10

1. TURN SIGNAL SWITCH S914481A1001

<Ref. to LI-40 REMOVAL, Combination Switch (Light).>

2. HAZARD SWITCH S914481A1002

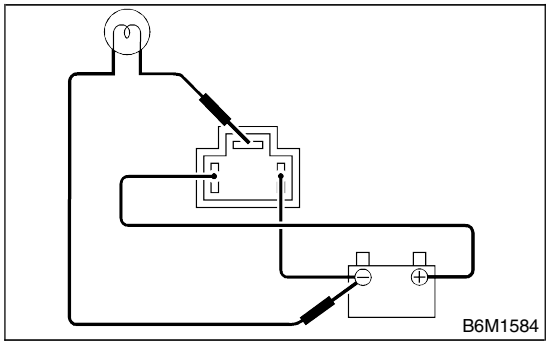


Check continuity between terminals when operating the switch.

Switch position	Tester connection	Specified condition
OFF	6 - 7	Continuity
ON	1 - 3 - 4, 7 - 8	Continuity

3. TURN SIGNAL & HAZARD MODULE

S914481A1003

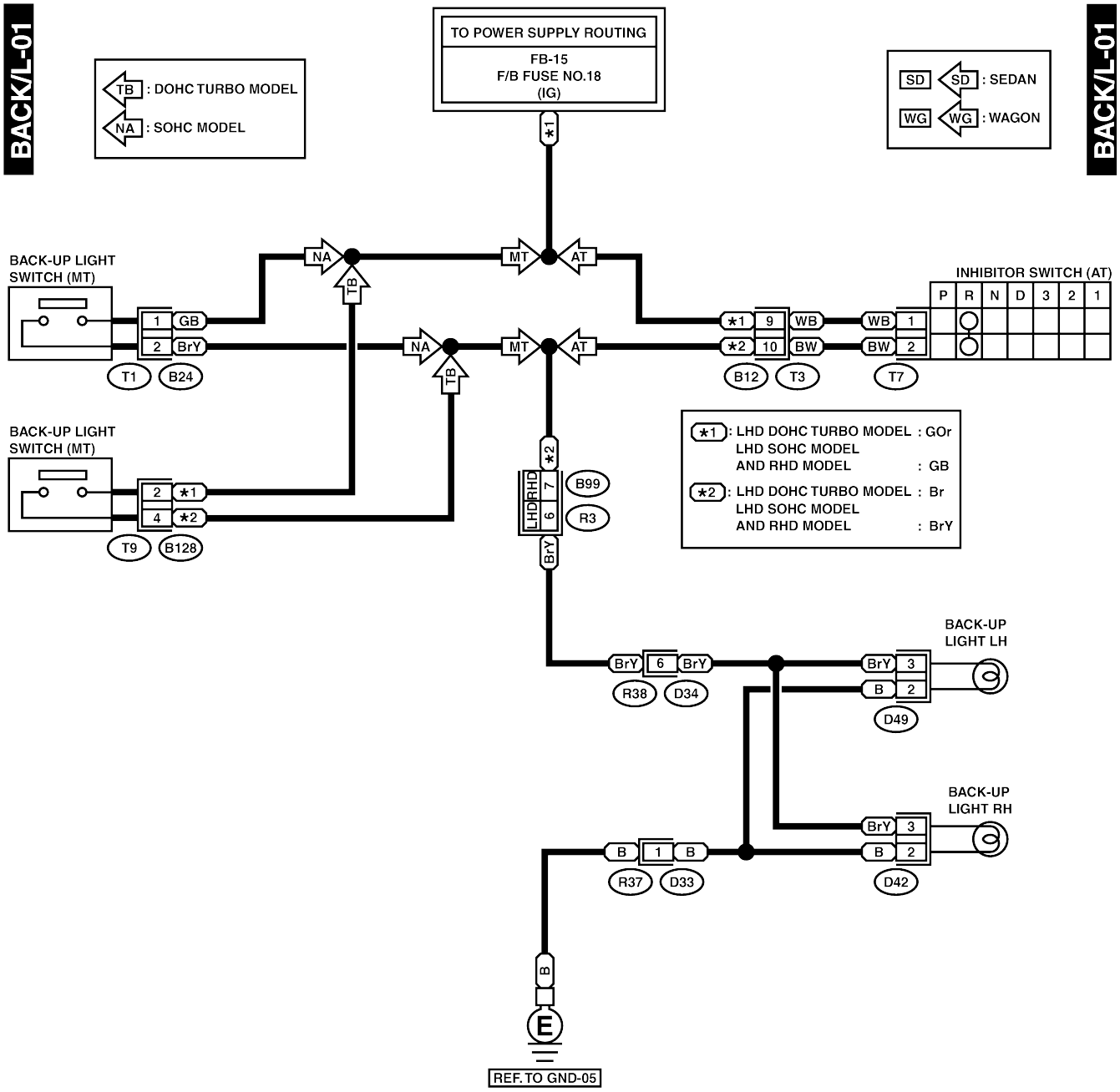


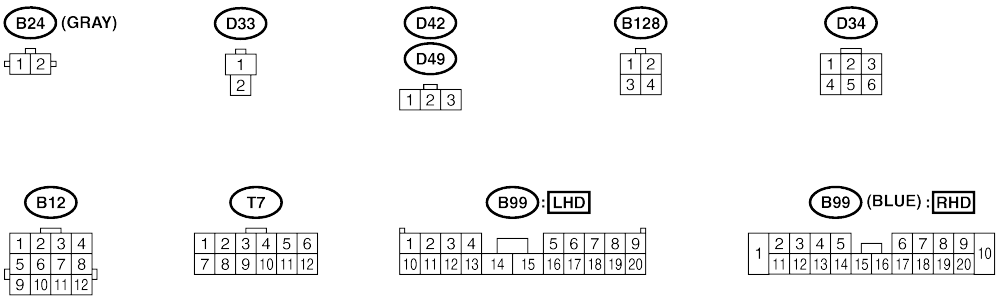
Connect battery and turn signal light bulb to the module, as shown in the figure. The module is properly functioning if it blinks when power is supplied to the circuit.

6. Back-up Light System S914414

A: SCHEMATIC S914414A21

1. BACK-UP LIGHT S914414A2101





SG29-20

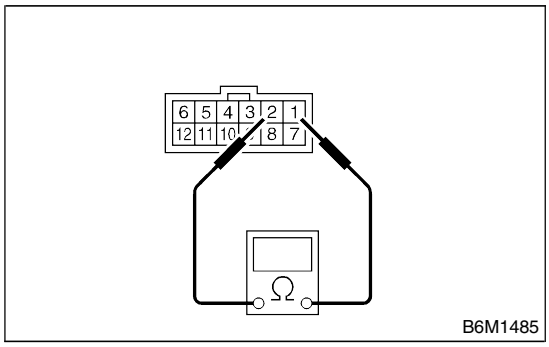
B: INSPECTION S914414A10

1. BACK-UP LIGHT SWITCH (M/T) S914414A1001

Check continuity between terminals.

Switch position	Tester connection	Specified condition
When shift lever is set in reverse position	Turbo engine model: 2 - 4 Non-turbo engine model: 1 - 2	Continuity
Other positions		No continuity

2. INHIBITOR SWITCH (A/T) S914414A1002



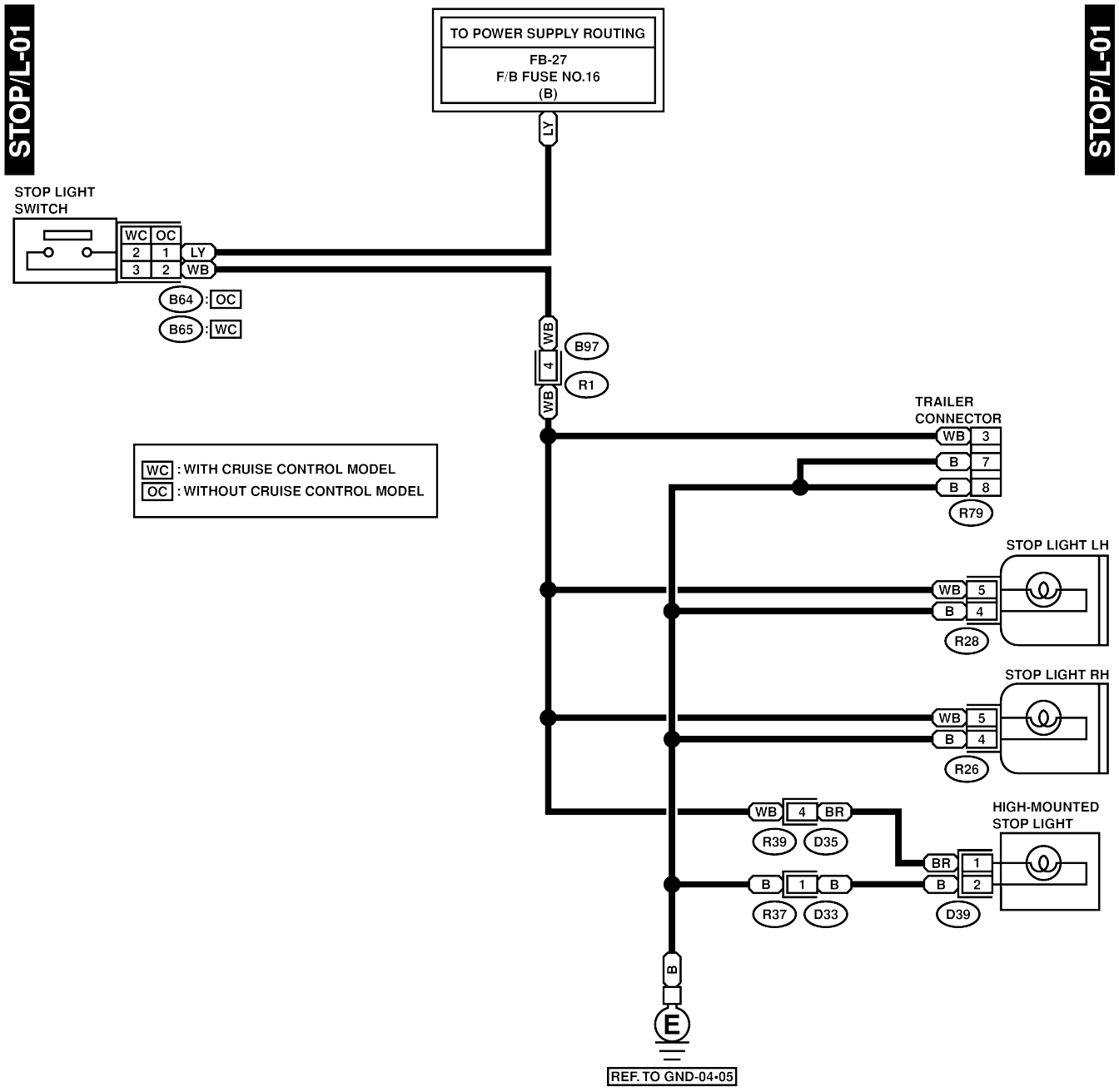
Check continuity between terminals.

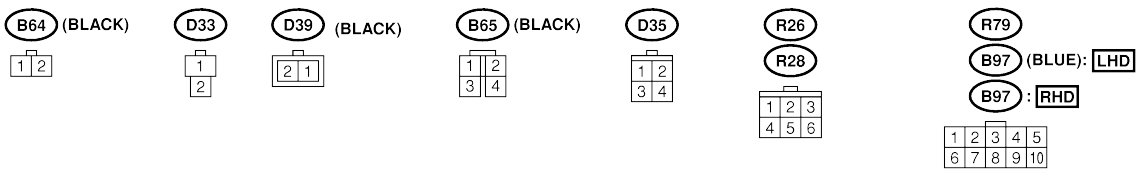
Switch position	Tester connection	Specified condition
When select lever is set in “R” position	1 - 2	Continuity
Other positions		No continuity

7. Stop Light System S914417

A: SCHEMATIC S914417A21

1. STOP LIGHT S914417A2103

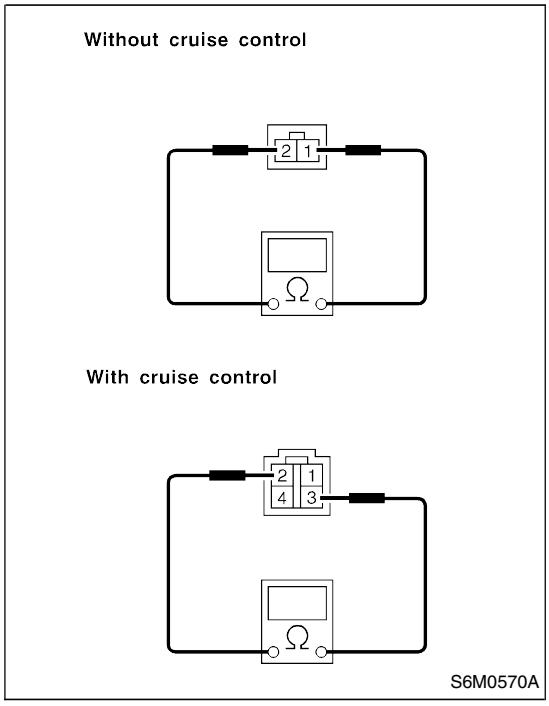




SG25-20

B: INSPECTION S914417A10

1. STOP LIGHT SWITCH S914417A1001



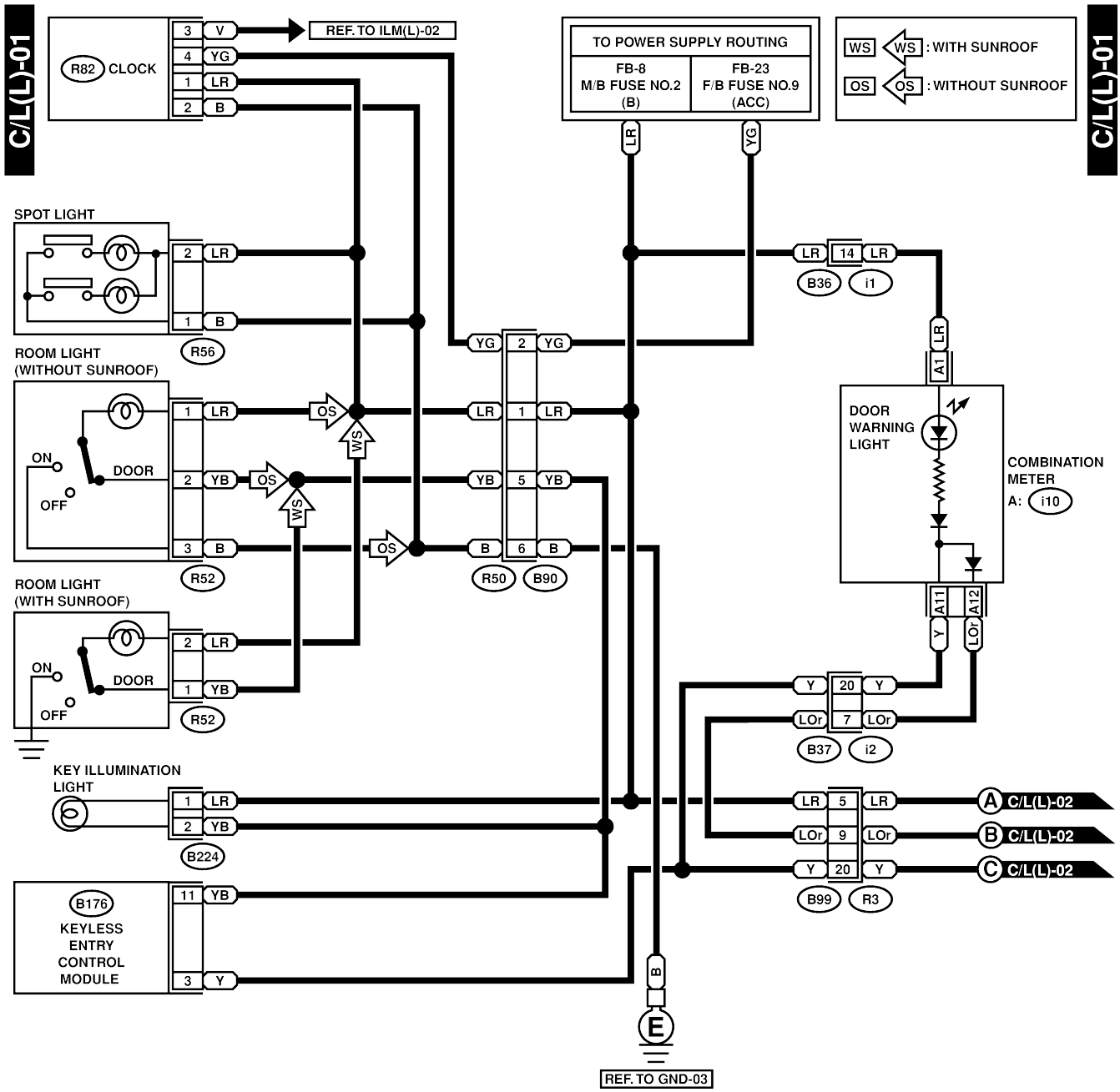
Check continuity between terminals.

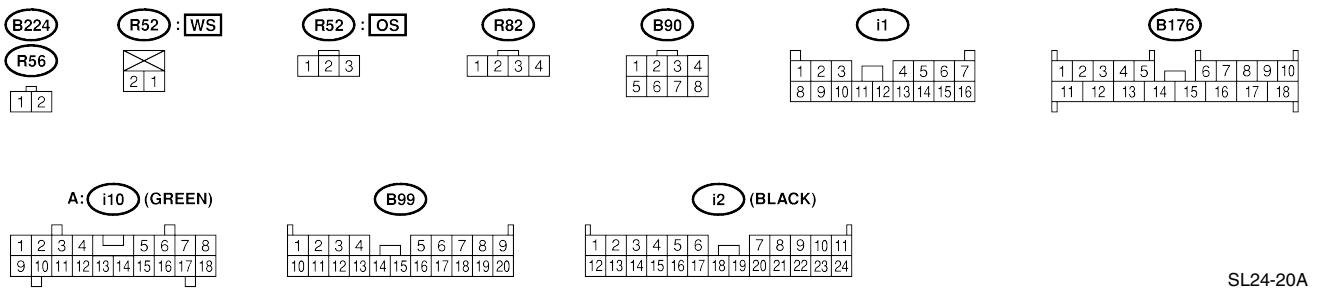
Switch position	Tester connection	Specified condition
When brake pedal is depressed	1 - 2: Without cruise control 2 - 3: With cruise control	Continuity
When brake pedal is released		No continuity

8. Interior Light System S914418

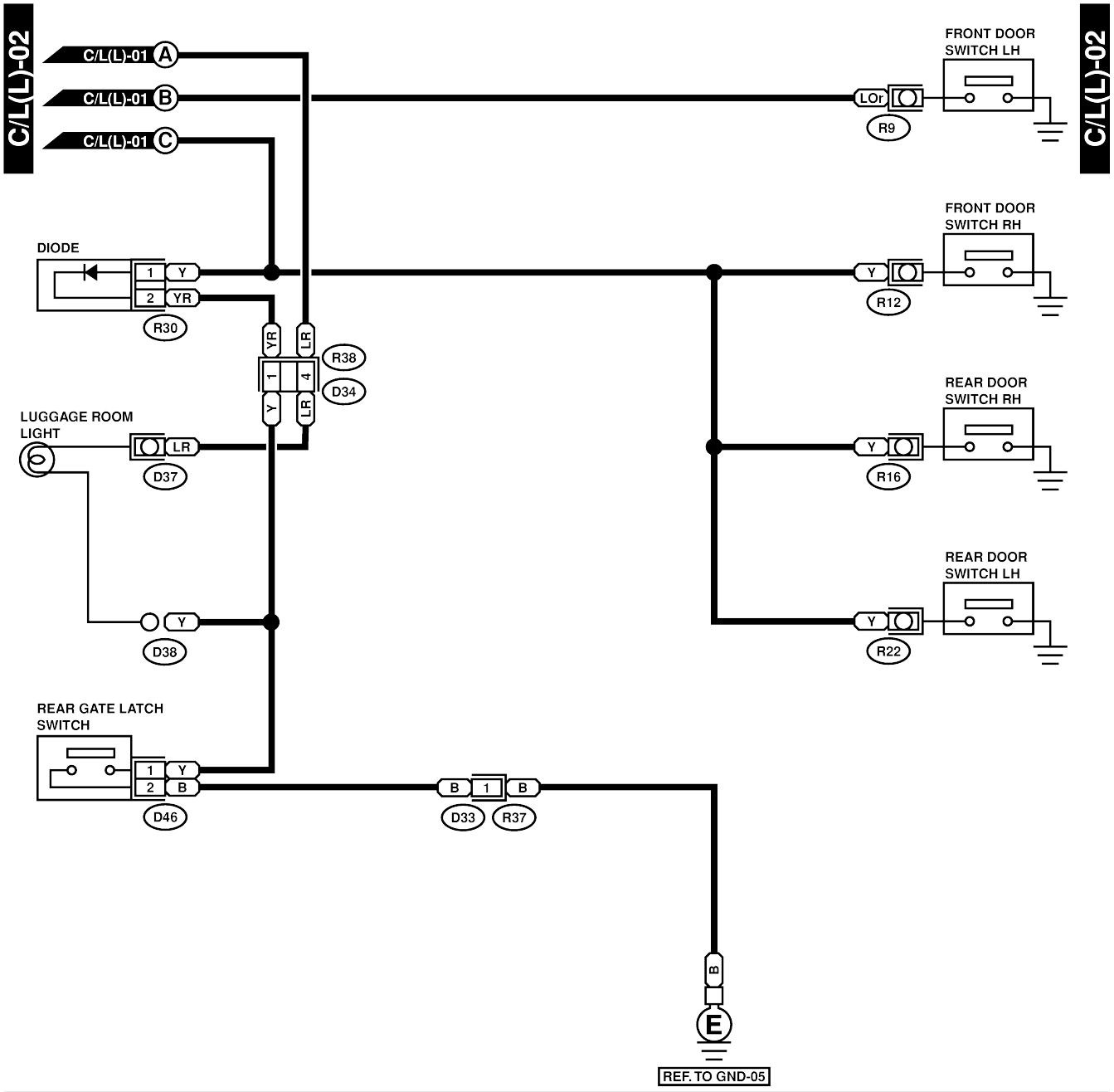
A: SCHEMATIC S914418A21

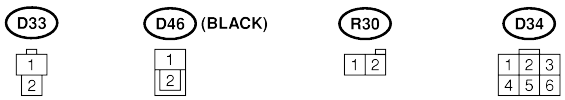
1. INTERIOR LIGHT LHD MODEL S914418A2102





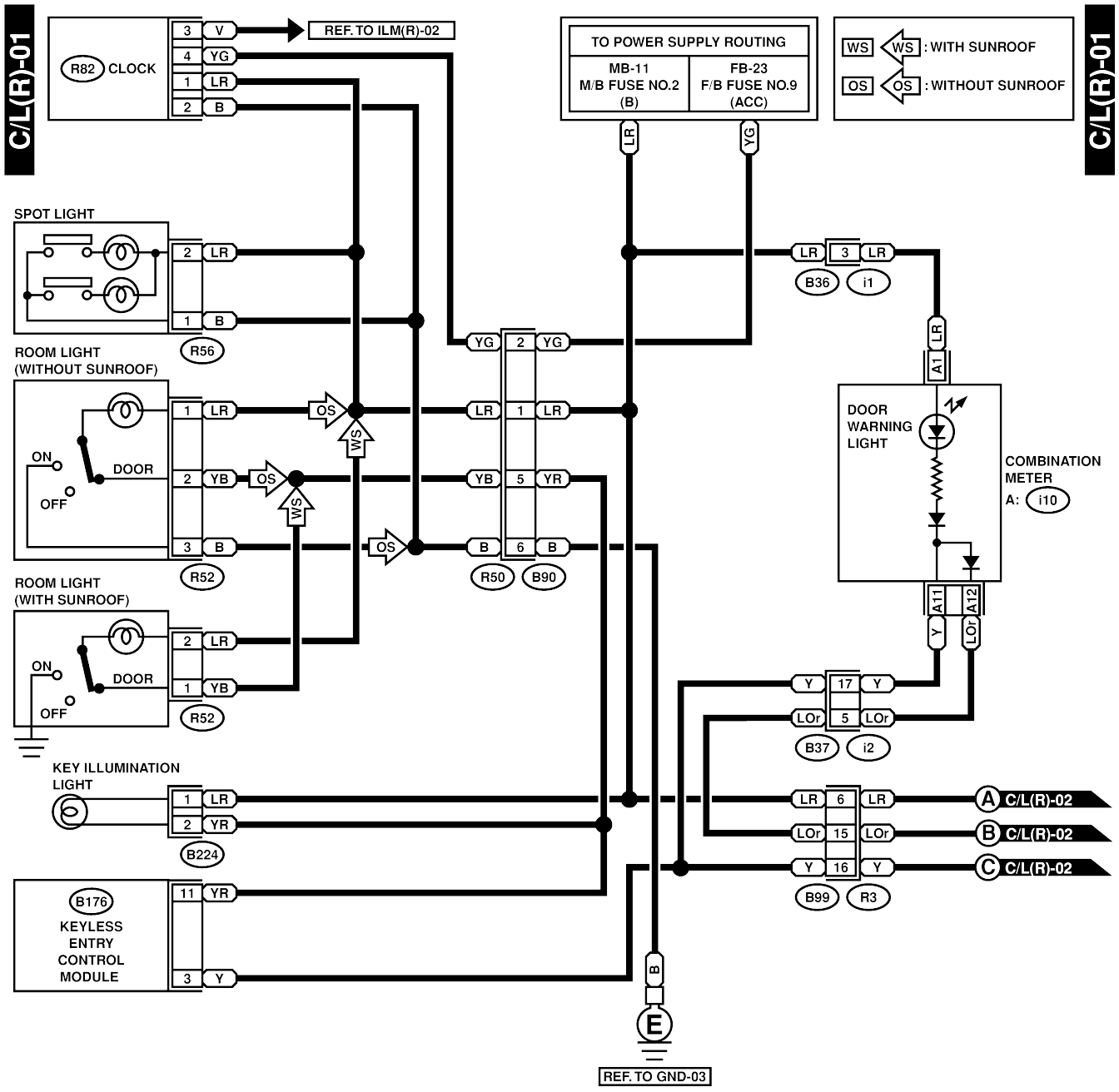
SL24-20A

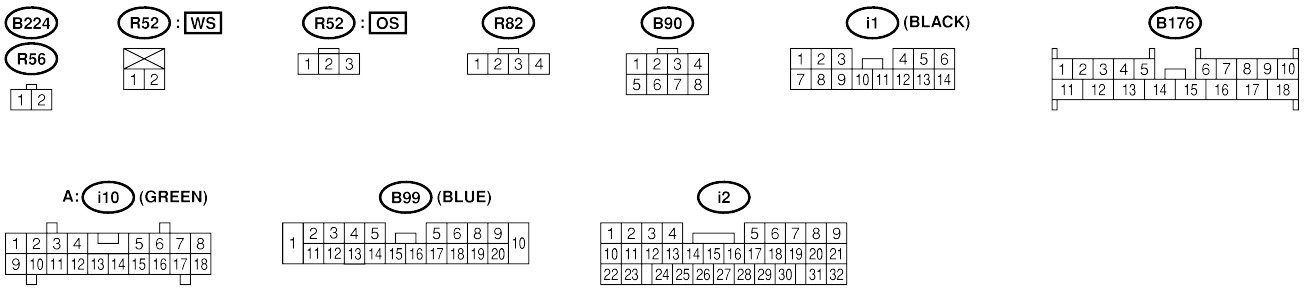

C/L(L)-02
C/L(L)-01 A
C/L(L)-01 B
C/L(L)-01 C
C/L(L)-02
FRONT DOOR SWITCH LH
LOr
R9
FRONT DOOR SWITCH RH
Y
R12
REAR DOOR SWITCH RH
Y
R16
REAR DOOR SWITCH LH
Y
R22
DIODE
1
2
Y
YR
R30
YR
LR
R38
1
4
D34
Y
LR
LUGGAGE ROOM LIGHT
LR
D37
Y
D38
REAR GATE LATCH SWITCH
1
2
Y
B
D46
B
1
B
D33
R37
B
E
REF. TO GND-05


D33
1
2
D46 (BLACK)
1
2
R30
1 2
D34
1 2 3
4 5 6

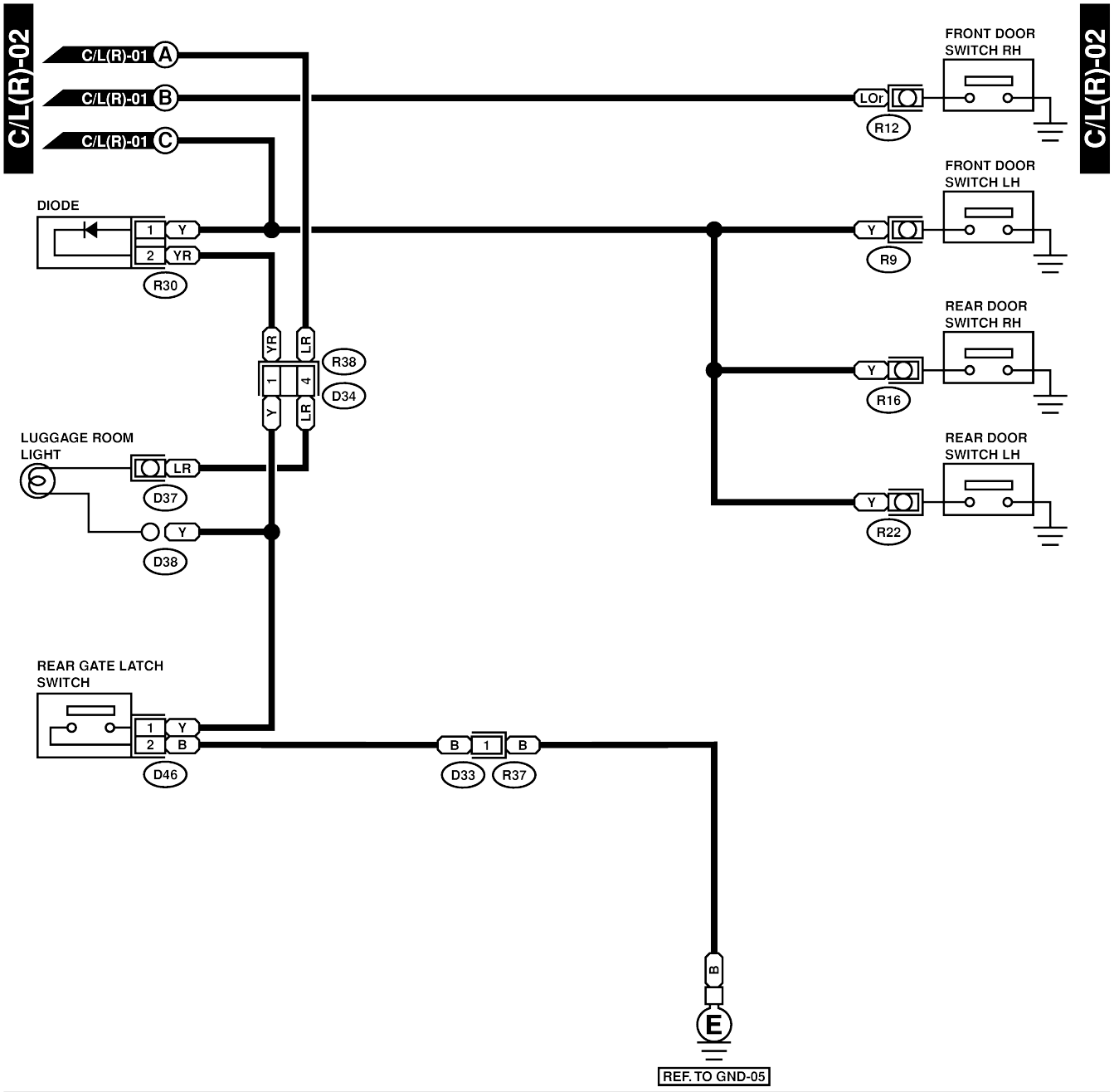
SL24-20B

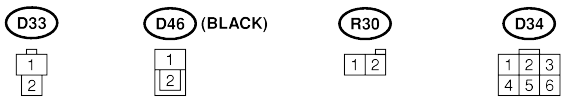
2. INTERIOR LIGHT RHD MODEL S914418A2103





SR24-20A


C/L(R)-02
C/L(R)-01 A
C/L(R)-01 B
C/L(R)-01 C
C/L(R)-02
FRONT DOOR SWITCH RH
LOr
R12
FRONT DOOR SWITCH LH
Y
R9
REAR DOOR SWITCH RH
Y
R16
REAR DOOR SWITCH LH
Y
R22
DIODE
1 Y
2 YR
R30
YR
LR
R38
1
4
D34
Y
LR
LUGGAGE ROOM LIGHT
LR
D37
Y
D38
REAR GATE LATCH SWITCH
1 Y
2 B
D46
B 1 B
D33
R37
B
E
REF. TO GND-05


D33
1
2
D46 (BLACK)
1
2
R30
1 2
D34
1 2 3
4 5 6

SR24-20B

B: INSPECTION S914418A10

1. DOOR SWITCH S914418A1001

Check continuity between terminals.

Switch position	Tester connection	Specified condition
When door is open.	1 - ground	Continuity
When door is closed.		No continuity

2. REAR GATE LATCH SWITCH S914418A1002

Check continuity between terminals.

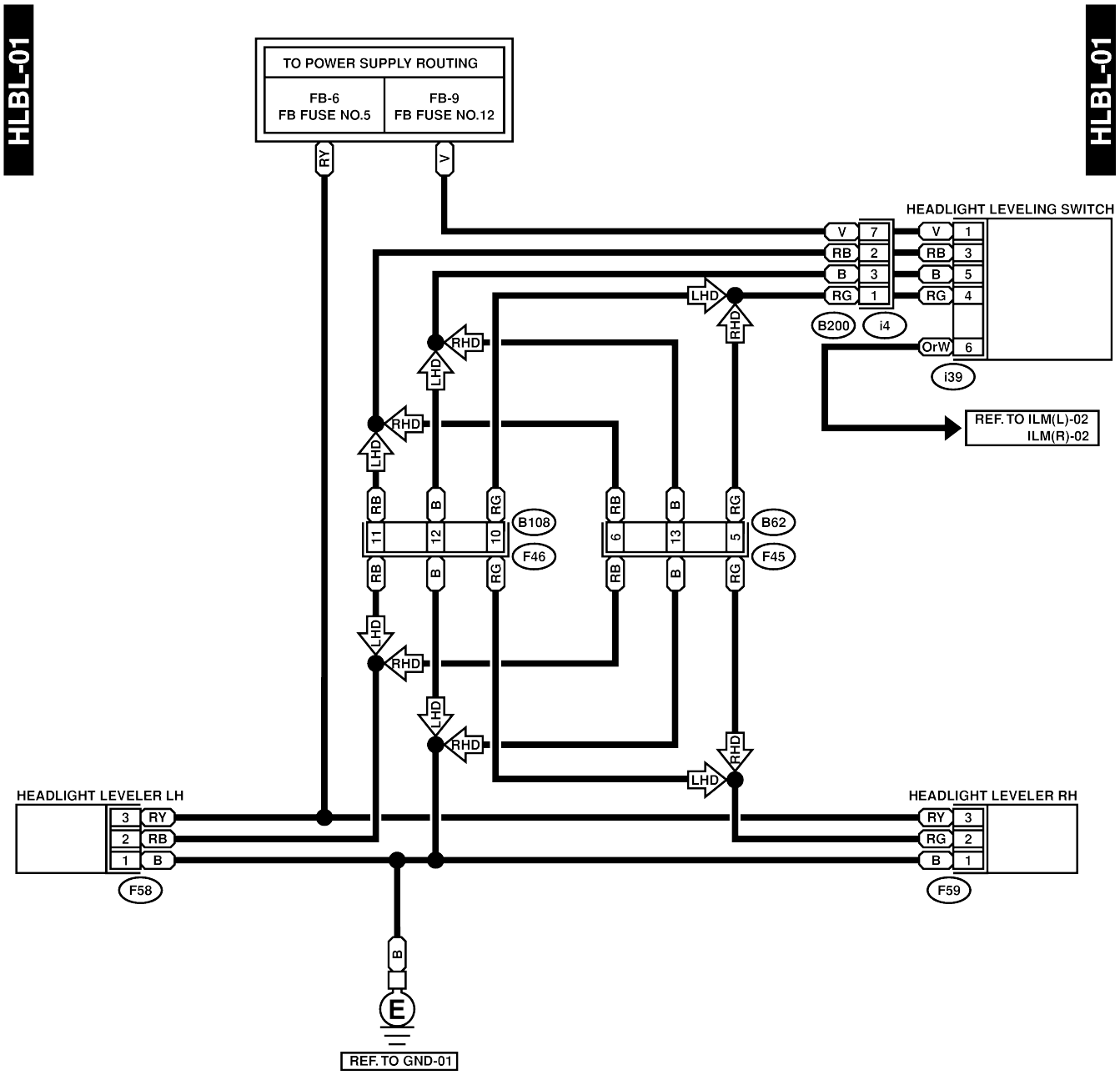
Switch position	Tester connection	Specified condition
When rear gate is open.	1 - 2	Continuity
When rear gate is closed.		No continuity

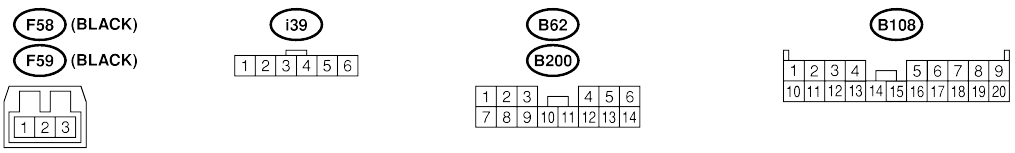
MEMO:

9. Headlight Beam Leveler System S914493

A: SCHEMATIC S914493A21

1. HEADLIGHT BEAM LEVELER S914493A2101





SG83-20

B: INSPECTION S914493A10

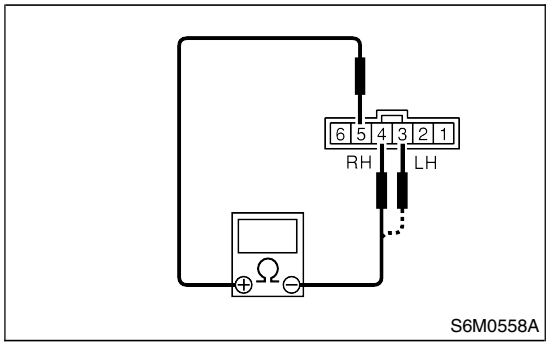
1. HEADLIGHT BEAM LEVELER ACTUATOR S914493A1001

1) Turn on the headlights.
2) Confirm the headlight beam level is lowered by changing the switch position to 0 - 1 - 2 - 3 - 4 - 5.

2. HEADLIGHT BEAM LEVELER SWITCH

S914493A1002

Measure the resistance between headlight beam leveler switch terminals at each switch position.



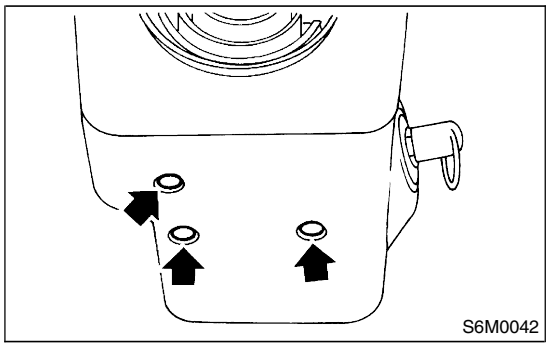
Switch position	Resistance
0	2.7 kΩ
1	1.2 kΩ
2	750 Ω
3	350 Ω
4	120 Ω
5	1 - 10 Ω

10. Combination Switch (Light)

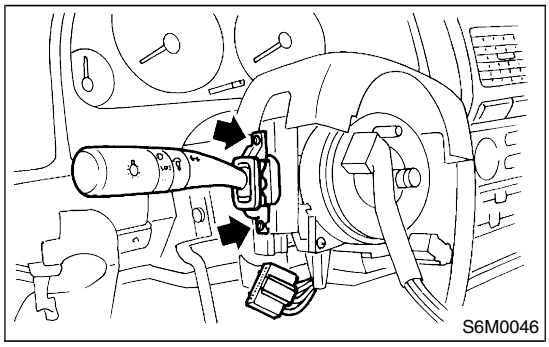
S914411

A: REMOVAL S914411A18

1) Remove instrument panel lower cover. <Ref. to EI-31 REMOVAL, Instrument Panel Assembly.>
2) Remove screws which secure upper column cover to lower column cover.



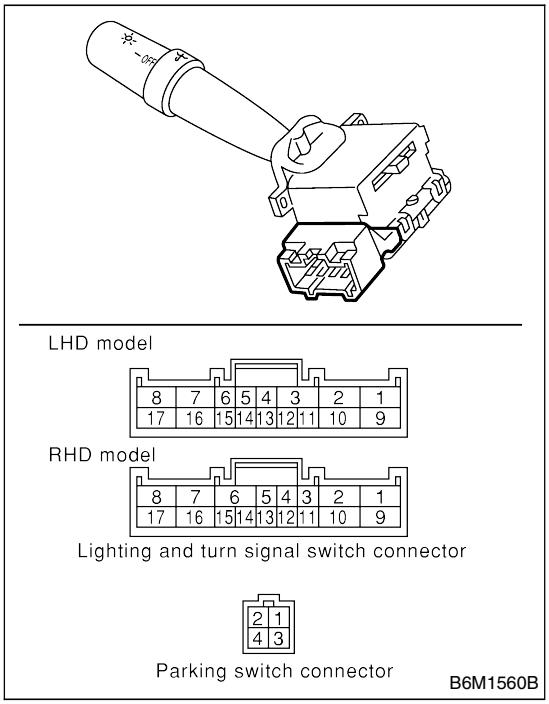
3) Disconnect connector from combination switch.
4) Remove screws which secure switch and remove switch.



B: INSTALLATION S914411A11

Install in the reverse order of removal.

C: INSPECTION S914411A10



Move combination switch to respective positions and check continuity between terminals.

1. LIGHTING SWITCH S914411A1001

LHD model:

Switch position	Tester connection	Specified condition
OFF	—	No continuity
Tail	14 - 16	Continuity
Head	13 - 14 - 16	Continuity

RHD model:

Switch position	Tester connection	Specified condition
OFF	—	No continuity
Tail	9 - 15	Continuity
Head	9 - 14 - 15	Continuity

2. DIMMER AND PASSING SWITCH S914411A1002

LHD model:

Switch position	Tester connection	Specified condition
Passing	7 - 8 - 16	Continuity
Low beam	16 - 17	Continuity
High beam	7 - 16	Continuity

RHD model:

Switch position	Tester connection	Specified condition
Passing	1 - 2 - 9	Continuity
Low beam	9 - 10	Continuity
High beam	2 - 9	Continuity

3. TURN SIGNAL SWITCH S914411A1003

LHD model:

Switch position	Tester connection	Specified condition
Left	1 - 2	Continuity
Neutral	—	No continuity
Right	2 - 3	Continuity

RHD model:

Switch position	Tester connection	Specified condition
Left	6 - 7	Continuity
Neutral	—	No continuity
Right	7 - 8	Continuity

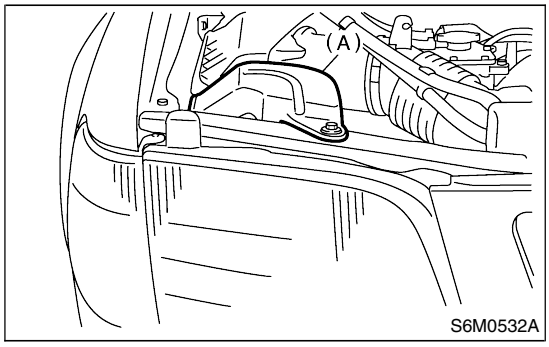
4. PARKING SWITCH S914411A1004

Switch position	Tester connection	Specified condition
OFF	2 - 4	Continuity
ON	1 - 4	Continuity

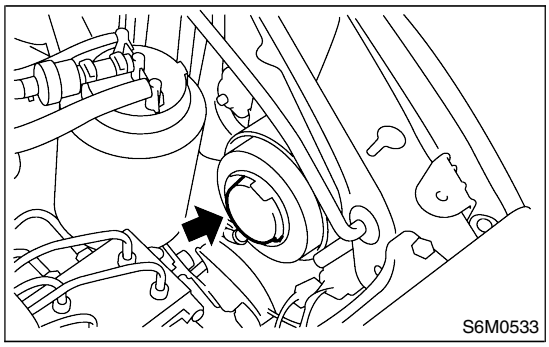
11. Headlight Assembly S914409

A: REMOVAL S914409A18

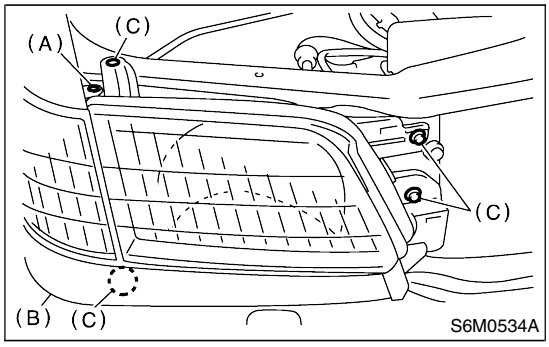
1) Remove duct (A) (when right side headlight is removed).



2) Disconnect headlight bulb connector.



3) Remove front grille. <Ref. to EI-10 REMOVAL, Front Grille.>
4) Remove screw (A) then remove front turn signal light while disconnecting connector.
5) Remove extension (B). <Ref. to EI-12, REMOVAL, Front Bumper.>
6) Remove bolts (C) which secure headlight and remove headlight.



B: INSTALLATION S914409A11

Install in the reverse order of removal.

C: ADJUSTMENT S914409A01

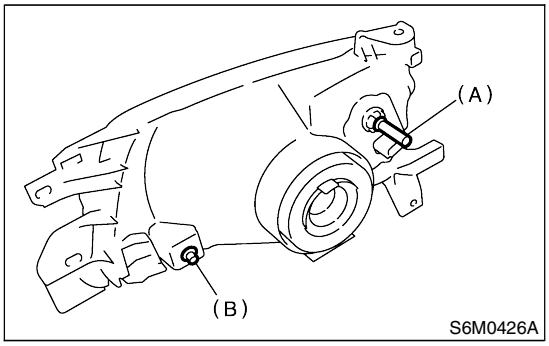
1. HEADLIGHT AIMING S914409A0101

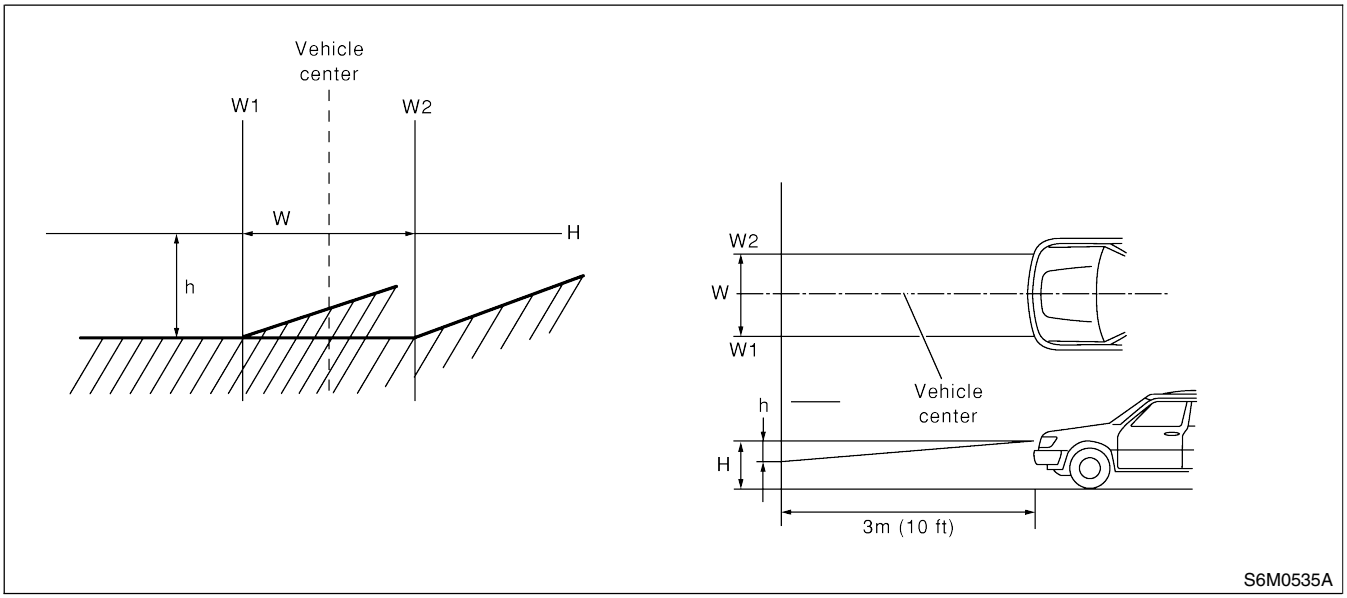
CAUTION:
Turn off the light before adjusting headlight aiming. If the light is necessary to check aiming, do not turn on for more than two minutes.

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.

Turn the headlights on and then adjust the low beam pattern to the following positions on the screen.

NOTE:
- Set the headlight leveler switch to "0" position.
- Adjust vertical aim (A) first, then horizontal aim (B).





This illustration is for LHD model.
The pattern for RHD model is symmetrically opposite.

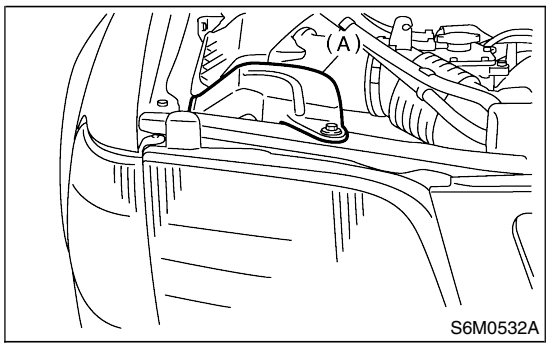
W mm (in)	H mm (in)		h mm (in) at 3 m (10 ft)
	Non-turbo model	Turbo model	
1,090 (42.91)	710 (27.95)	697 (27.44)	30 (1.18)

12. Headlight Bulb S914410

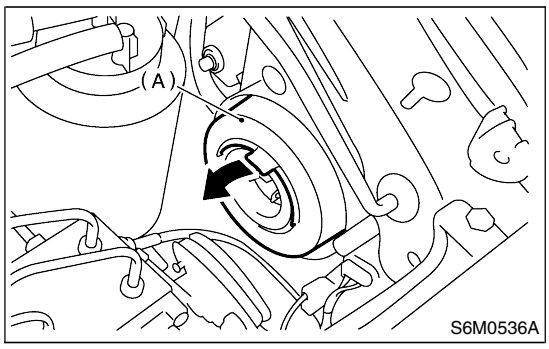
A: REMOVAL S914410A18

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 the performance.

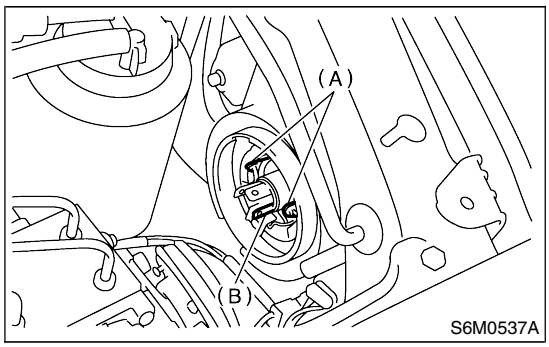
1) Remove duct (A) (when right side headlight is removed).



2) Disconnect headlight bulb connector.
3) Remove back cover (A).



4) Push to remove spring retainer (A) and then detach headlight bulb (B).



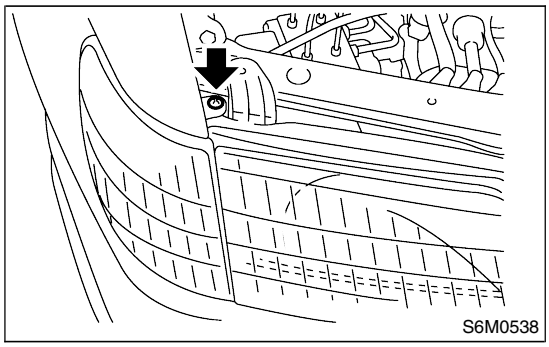
B: INSTALLATION S914410A11

Install in the reverse order of removal.

13. Front Turn Signal Light Assembly S914408

A: REMOVAL S914408A18

1) Remove screw and disconnect connector, and then detach front turn signal light assembly.



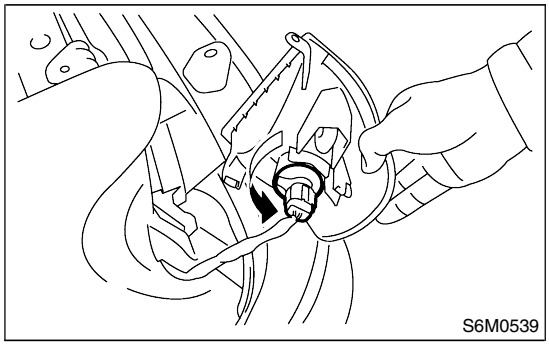
B: INSTALLATION S914408A11

Install in the reverse order of removal.

14. Front Turn Signal Light Bulb S914412

A: REMOVAL S914412A18

1) Remove front turn signal light assembly. <Ref. to LI-45, REMOVAL, Front Turn Signal Light Assembly.>
2) Turn the socket and remove the bulb.



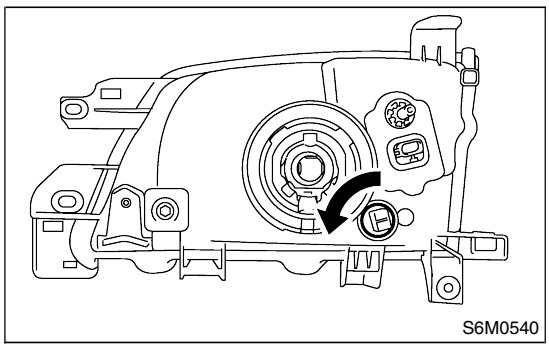
B: INSTALLATION S914412A11

Install in the reverse order of removal.

15. Parking Light Bulb S914419

A: REMOVAL S914419A18

1) Remove headlight assembly. <Ref. to LI-42 REMOVAL, Headlight Assembly.>
2) Turn the socket and remove the bulb.



B: INSTALLATION S914419A11

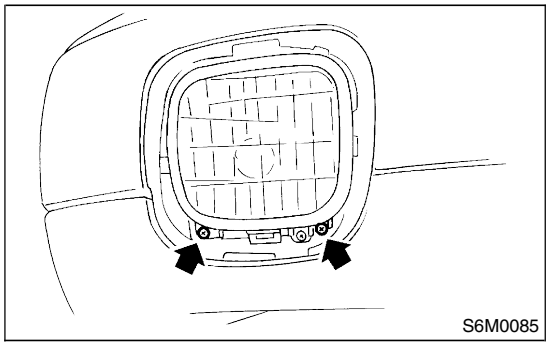
Install in the reverse order of removal.

16. Front Fog Light Assembly

S914427

A: REMOVAL S914427A18

1) Remove the two screws, then draw out the front fog light from front bumper.



2) Disconnect the connector.

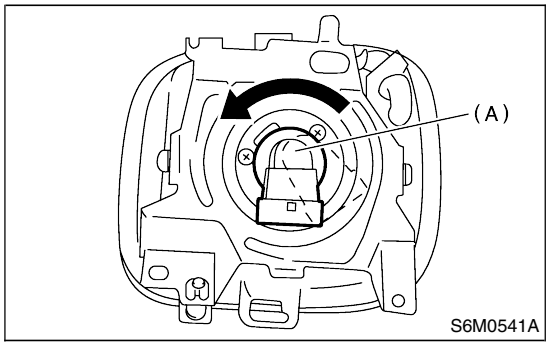
B: INSTALLATION S914427A11

Install in the reverse order of removal.

17. Front Fog Light Bulb S914428

A: REMOVAL S914428A18

1) Remove front fog light assembly. <Ref. to LI-48 REMOVAL, Front Fog Light Assembly.>
2) Remove front fog light bulb (A).



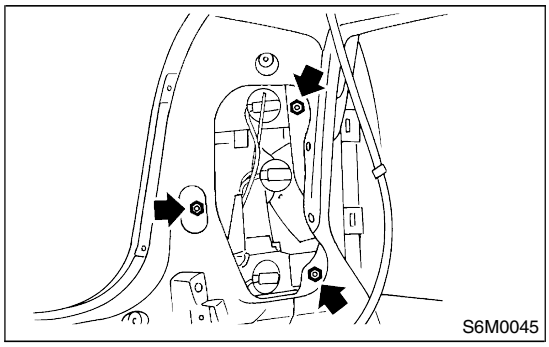
B: INSTALLATION S914428A11

Install in the reverse order of removal.

18. Rear Combination Light Assembly S914426

A: REMOVAL S914426A18

1) Remove rear quarter upper and lower trim. <Ref. to EI-39 REMOVAL, Rear Quarter Trim.>
2) Remove nuts and disconnect connector.



3) Attach adhesive cloth tape to body area around rear combination light.
4) 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

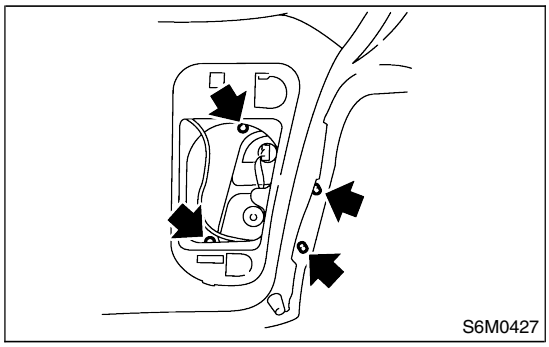
Install in the reverse order of removal.

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.

19. Rear Finisher Light Assembly S914429

A: REMOVAL S914429A18

1) Remove rear gate trim access hole cover.
2) Remove the four nuts.



3) Detach rear finisher light while disconnecting connector.
4) Install in the reverse order of removal.

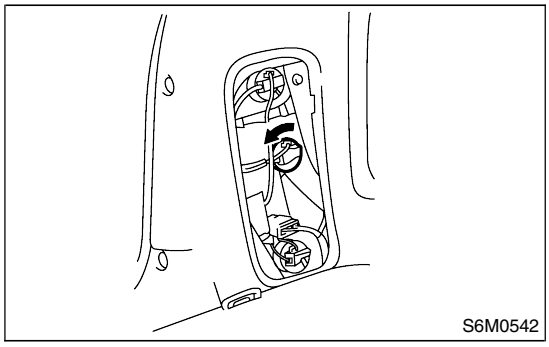
B: INSTALLATION S914429A11

Install in the reverse order of removal.

20. Brake/Tail Light Bulb S914430

A: REMOVAL S914430A18

1) Remove rear combination light cover.
2) Turn the socket and remove the bulb.



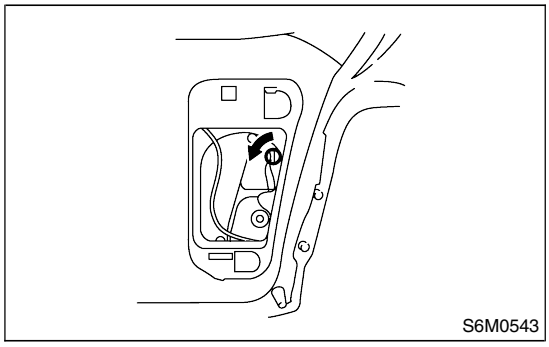
B: INSTALLATION S914430A11

Install in the reverse order of removal.

21. Back-up Light Bulb S914424

A: REMOVAL S914424A18

1) Remove rear gate trim access hole cover.
2) Turn the socket and remove the bulb.



B: INSTALLATION S914424A11

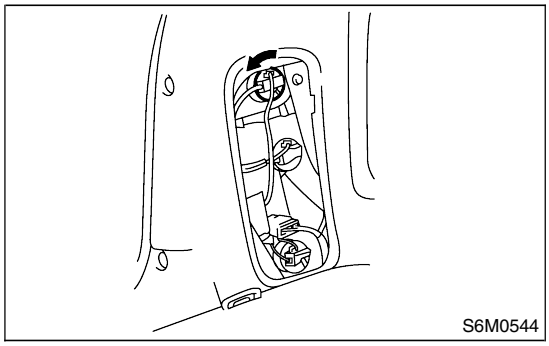
Install in the reverse order of removal.

22. 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.

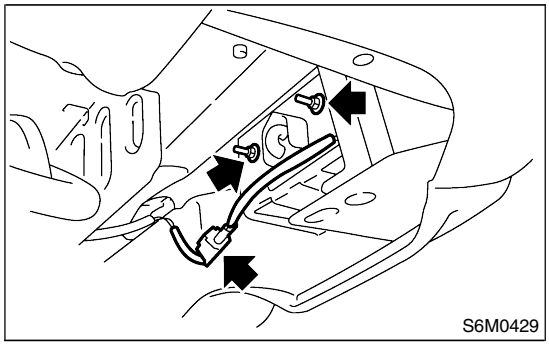
23. Rear Fog Light Assembly

S914422

A: REMOVAL S914422A18

1) Disconnect connector from rear fog light.
2) Remove nuts and then detach rear fog light.

NOTE:
Take out rear fog light by pulling out it from behind the bumper.



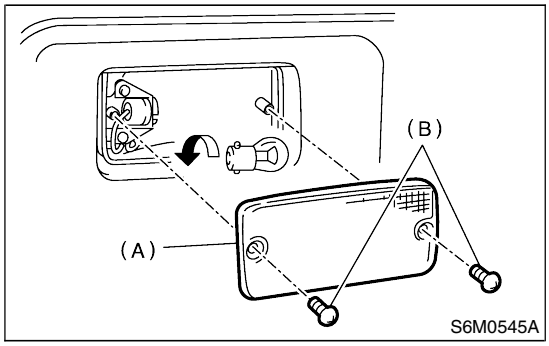
B: INSTALLATION S914422A11

Install in the reverse order of removal.

24. Rear Fog Light Bulb S914423

A: REMOVAL S914423A18

1) Remove screw (A) and rear fog light lens (B).



2) Remove the bulb.

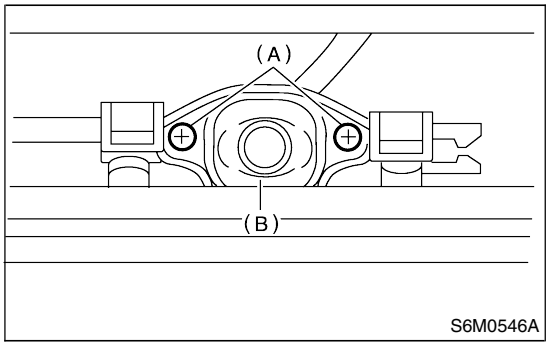
B: INSTALLATION S914423A11

Install in the reverse order of removal.

25. License Plate Light S914420

A: REMOVAL S914420A18

1) Remove license plate light mounting screw (A) and then remove the lens (B)



2) Remove the bulb.

B: INSTALLATION S914420A11

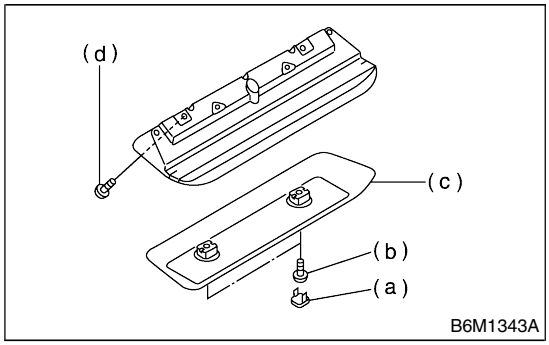
Install in the reverse order of removal.

26. High-mounted Stop Light

S914425

A: REMOVAL S914425A18

1) Remove cap (a) by prying on the edge with a screwdriver.
2) Remove screws (b) and then detach cover (c).
3) Remove screws (d) and then detach high-mounted stop light while disconnecting connector.



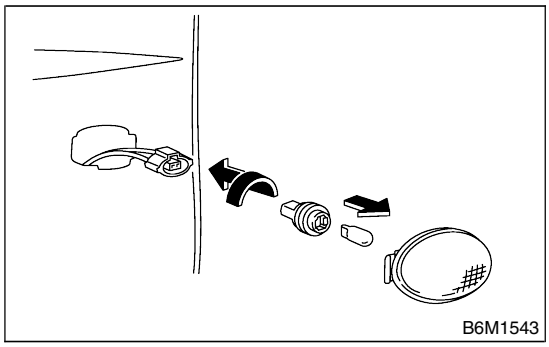
B: INSTALLATION S914425A11

Install in the reverse order of removal.

27. Side Turn Signal Light S914407

A: REMOVAL S914407A18

1) Pull out the light from body while pushing it in direction of vehicle front.
2) Disconnect harness connector and remove the light.



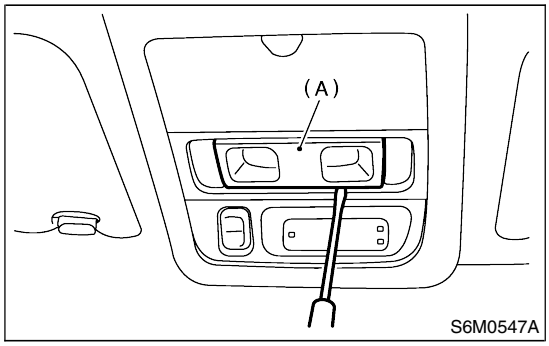
B: INSTALLATION S914407A11

Install in the reverse order of removal.

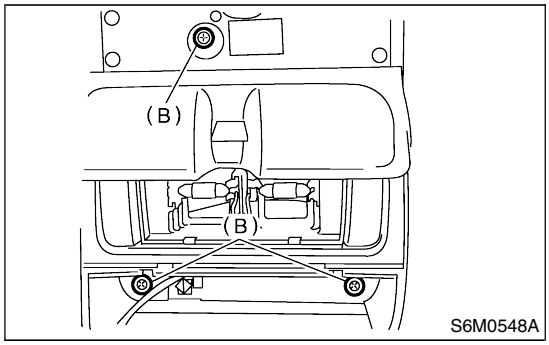
28. Spot Light S914398

A: REMOVAL S914398A18

1) Remove spot light lens (A).



2) Remove sunroof switch. <Ref. to SR-12, REMOVAL, Sunroof Switch.>
3) Remove spot light mounting screw (B).



4) Disconnect harness connectors and remove spot light.

B: INSTALLATION S914398A11

Install in the reverse order of removal.

C: INSPECTION S914398A10

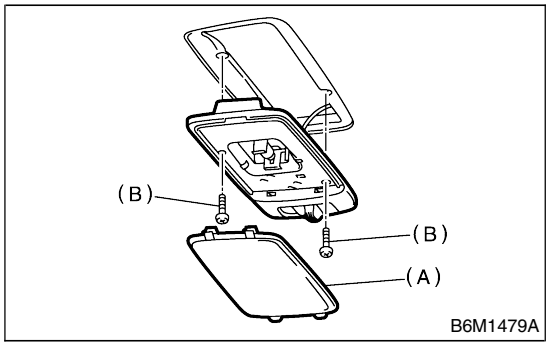
Check continuity between terminals.

Switch position	Tester connection	Specified condition
OFF	—	No continuity
ON	1 - 2	Continuity

29. Room Light S914397

A: REMOVAL S914397A18

1) Remove lens (A) and room light mounting screws (B).

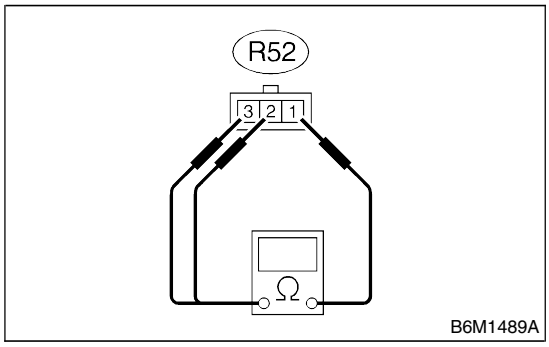


2) Disconnect harness connectors and remove the light.

B: INSTALLATION S914397A11

Install in the reverse order of removal.

C: INSPECTION S914397A10



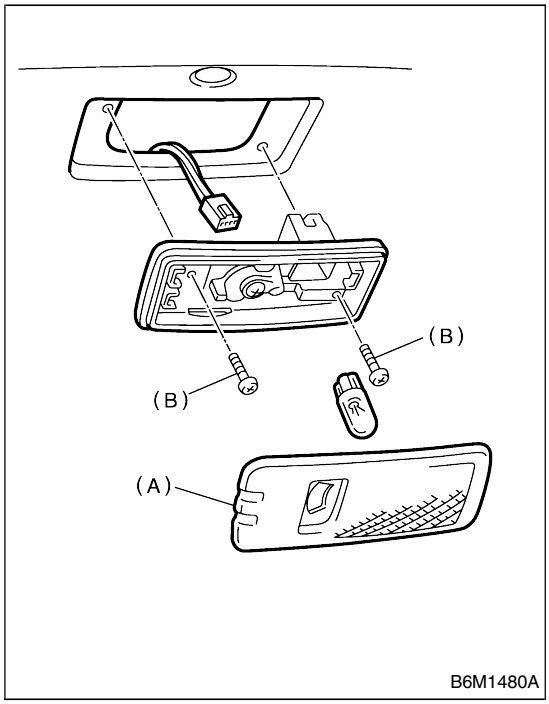
Check continuity between terminals.

Switch position	Tester connection	Specified condition
OFF	—	No continuity
ON	1 - 3	Continuity
DOOR	1 - 2	Continuity

30. Luggage Room Light S914399

A: REMOVAL S914399A18

1) Remove lens (A) and luggage room light mounting screws (B).

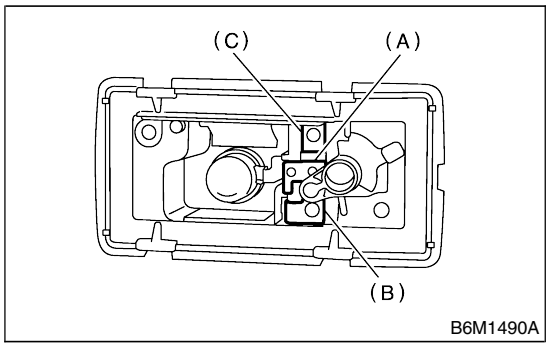


2) Disconnect harness connectors and remove luggage room light.

B: INSTALLATION S914399A11

Install in the reverse order of removal.

C: INSPECTION S914399A10



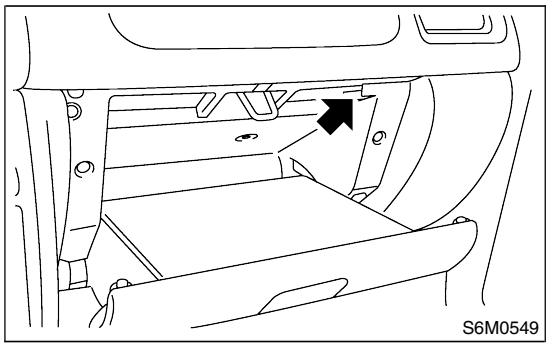
Turn the switch each position and check continuity between terminals.

Switch position	Tester connection	Specified condition
OFF	—	No continuity
ON	(A) - (C)	Continuity
DOOR	(A) - (B)	Continuity

31. Glove Box Light S914396

A: REMOVAL S914396A18

1) Remove glove box. <Ref. to EI-28 REMOVAL, Glove Box.>
2) Disconnect harness connector.
3) Remove glove box light.



B: INSTALLATION S914396A11

Install in the reverse order of removal.

MEMO:

WIPER AND WASHER SYSTEMS

WW

		Page
1.	General Description	2
2.	Wiper and Washer System	6
3.	Combination Switch (Wiper)	10
4.	Wiper Blade	12
5.	Washer Tank and Motor	13
6.	Front Wiper Arm	14
7.	Front Wiper Motor and Link	15
8.	Front Washer	17
9.	Rear Wiper Arm	19
10.	Rear Wiper Motor	20
11.	Rear Washer	21
12.	Wiper Control Relay	23
13.	Headlight Washer	24

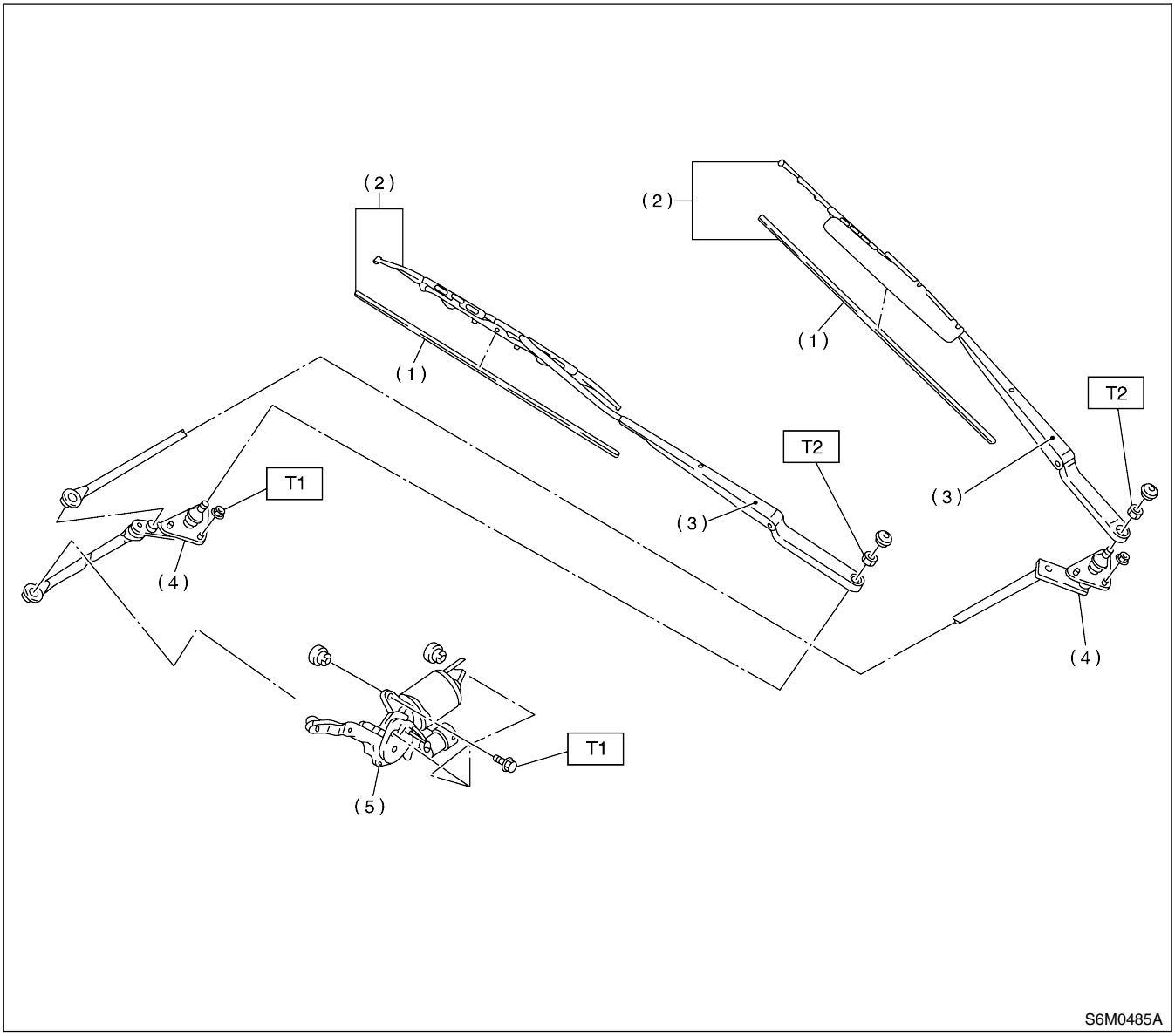
1. General Description S902001

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

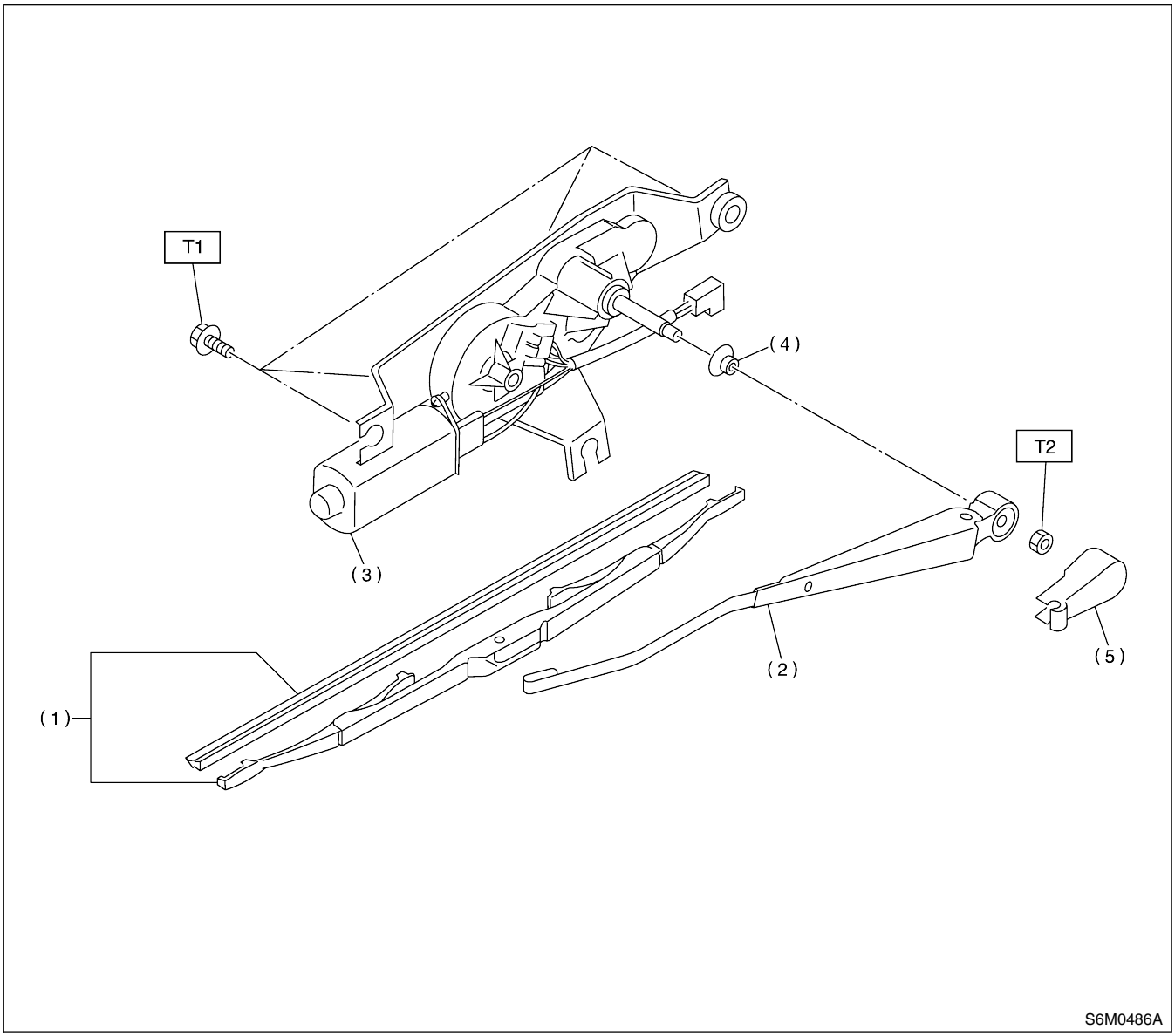
1. FRONT WIPER S902001A0501



(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)

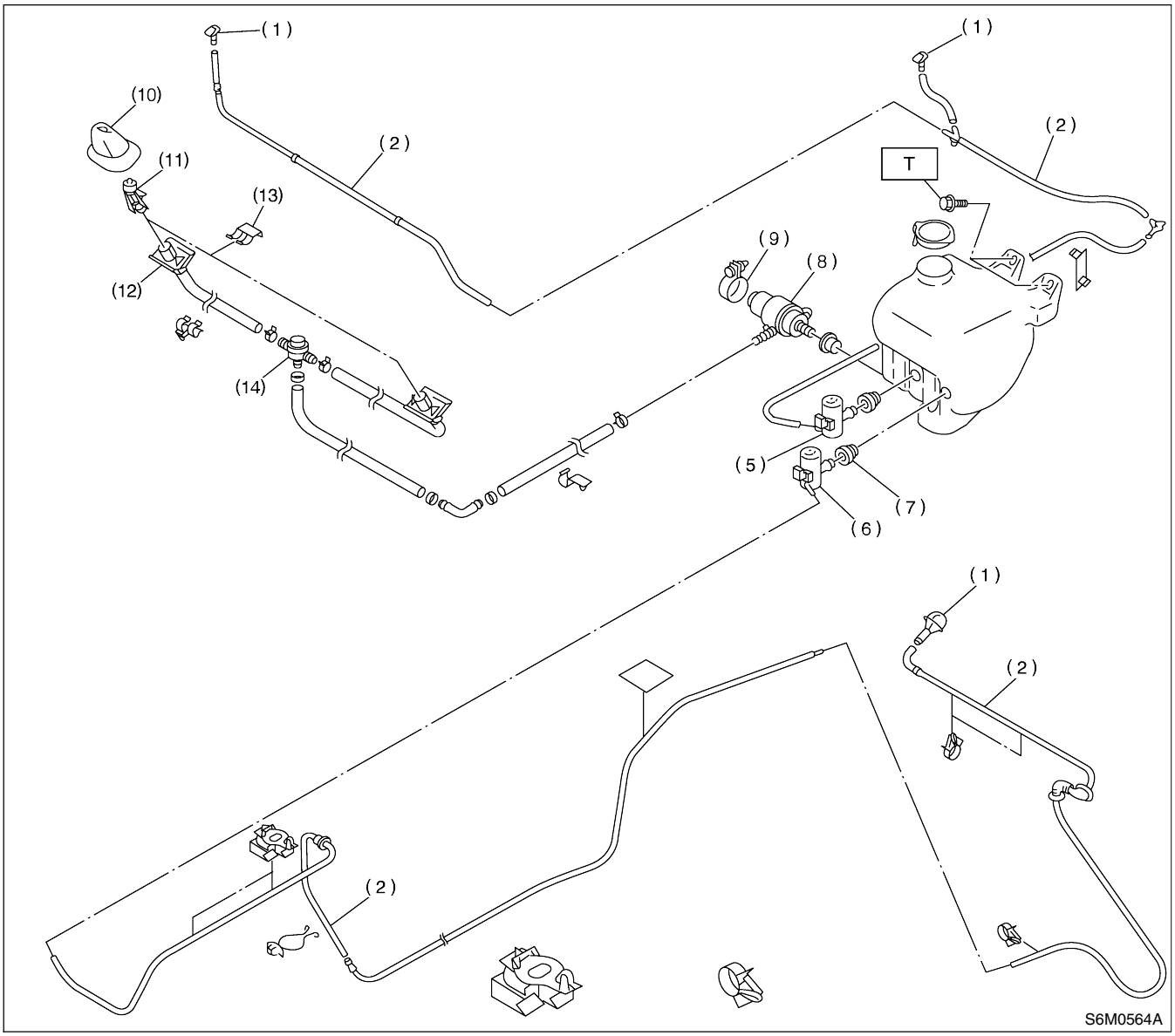
2. REAR WIPER S902001A0502



(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
(8) Headlight washer motor
(9) Motor bracket
(10) Headlight washer case
(11) Headlight washer upper nozzle
(12) Headlight washer lower nozzle
(13) Clip
(14) Joint valve

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.

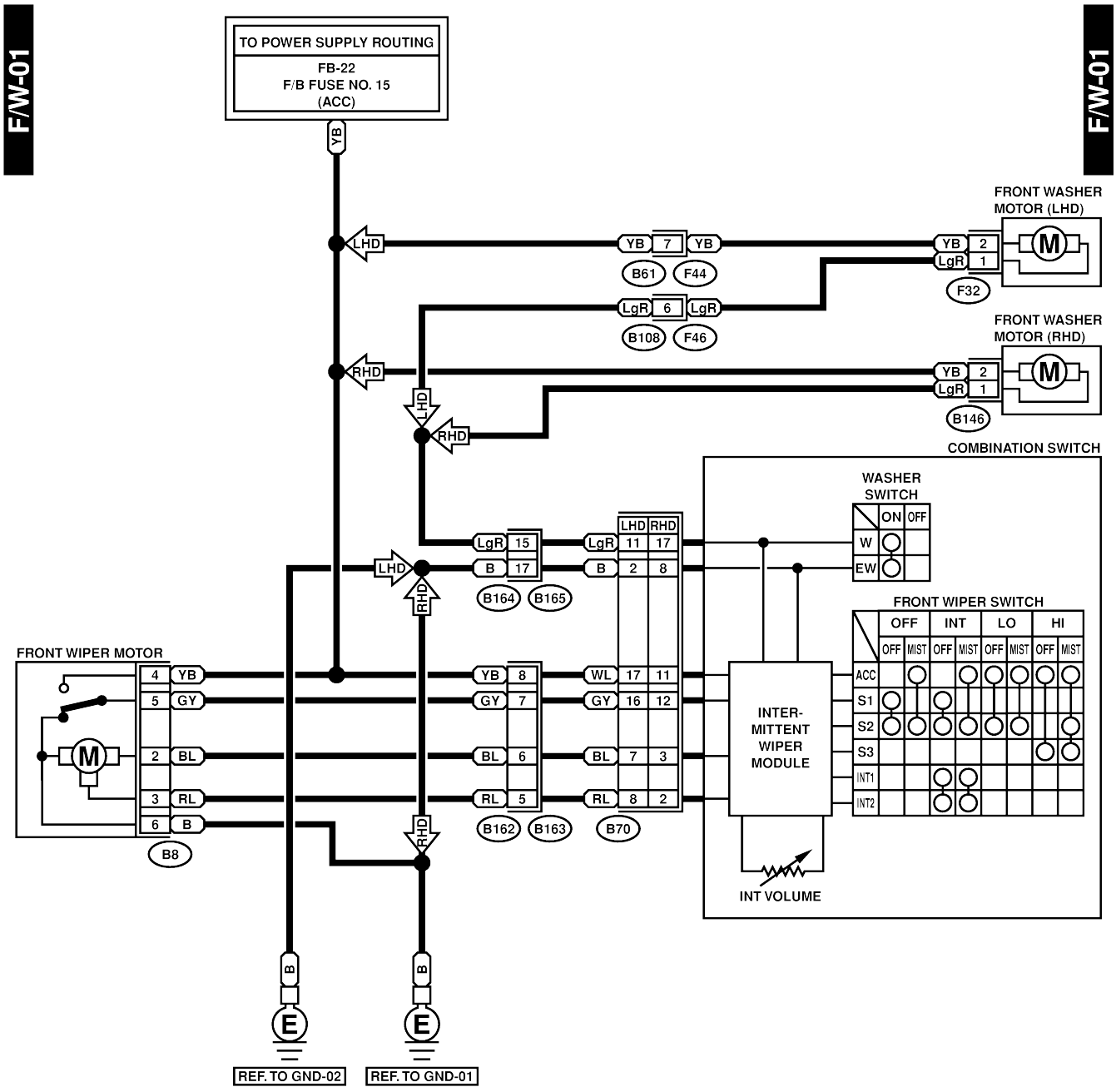
- Be careful that wire harnesses of airbag system pass near electrical parts and switches.
- Wire harnesses and connectors of all airbag system are yellow color. Do not use a tester on these circuits.
- Care must be taken when installing the piping hose so that no bending, jamming, etc. are caused.
- 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.

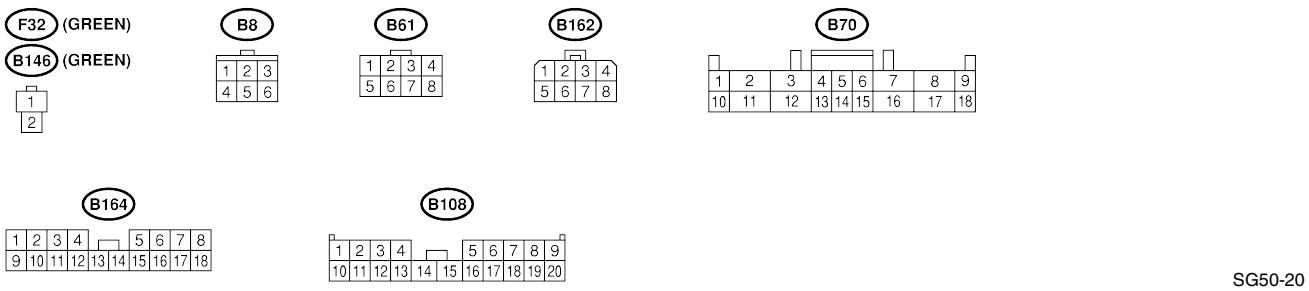
MEMO:

2. Wiper and Washer System S902394

A: SCHEMATIC S902394A21

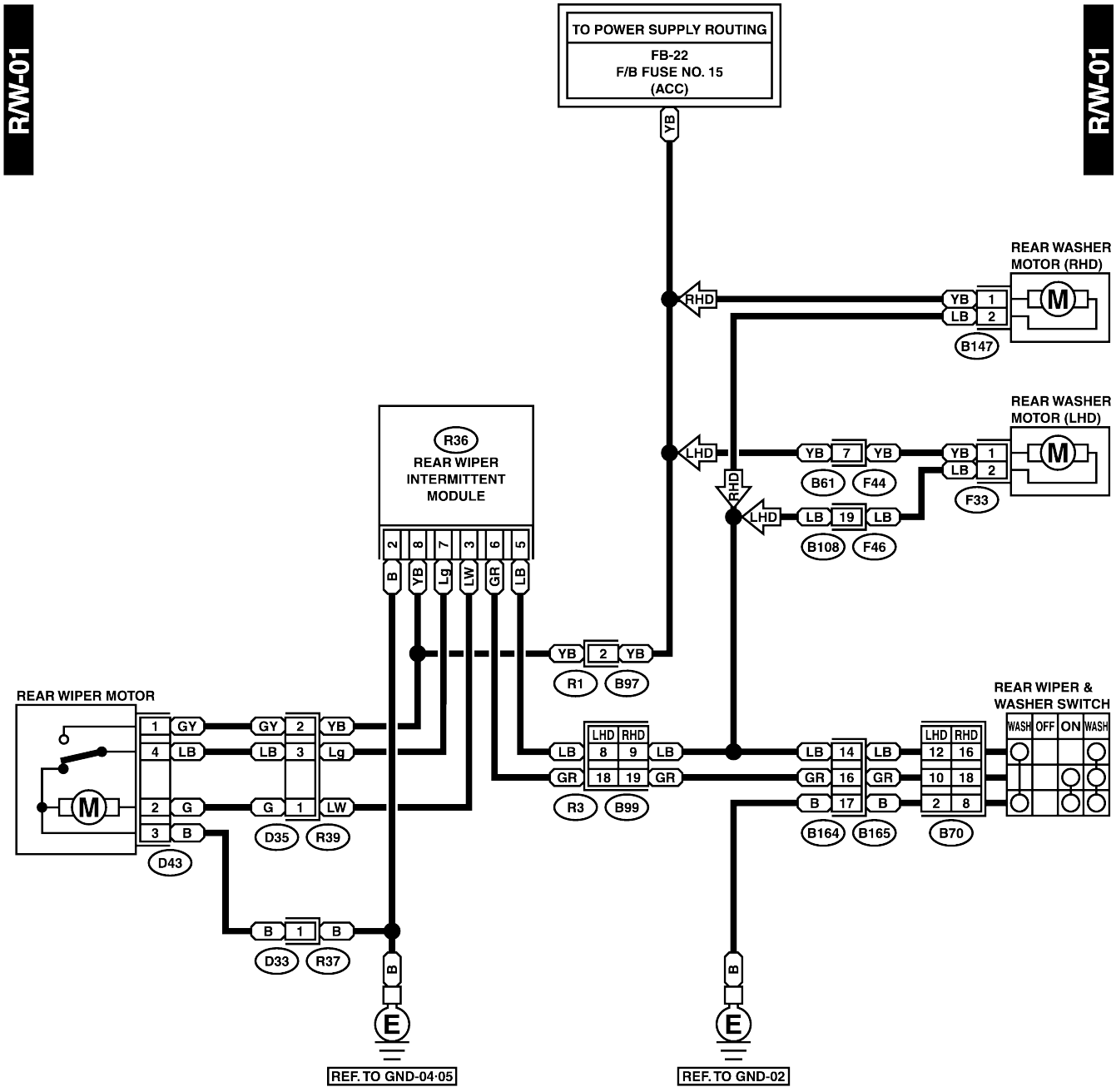
1. WIPER AND WASHER (FRONT) S902394A2101

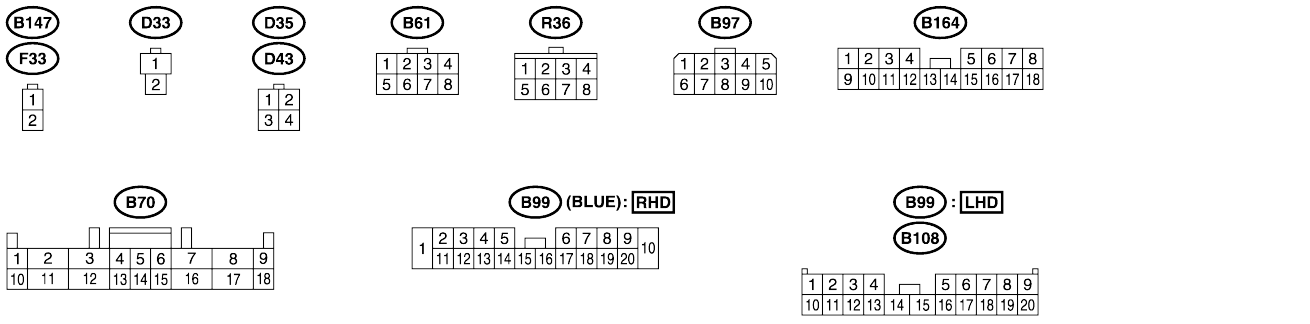




SG50-20

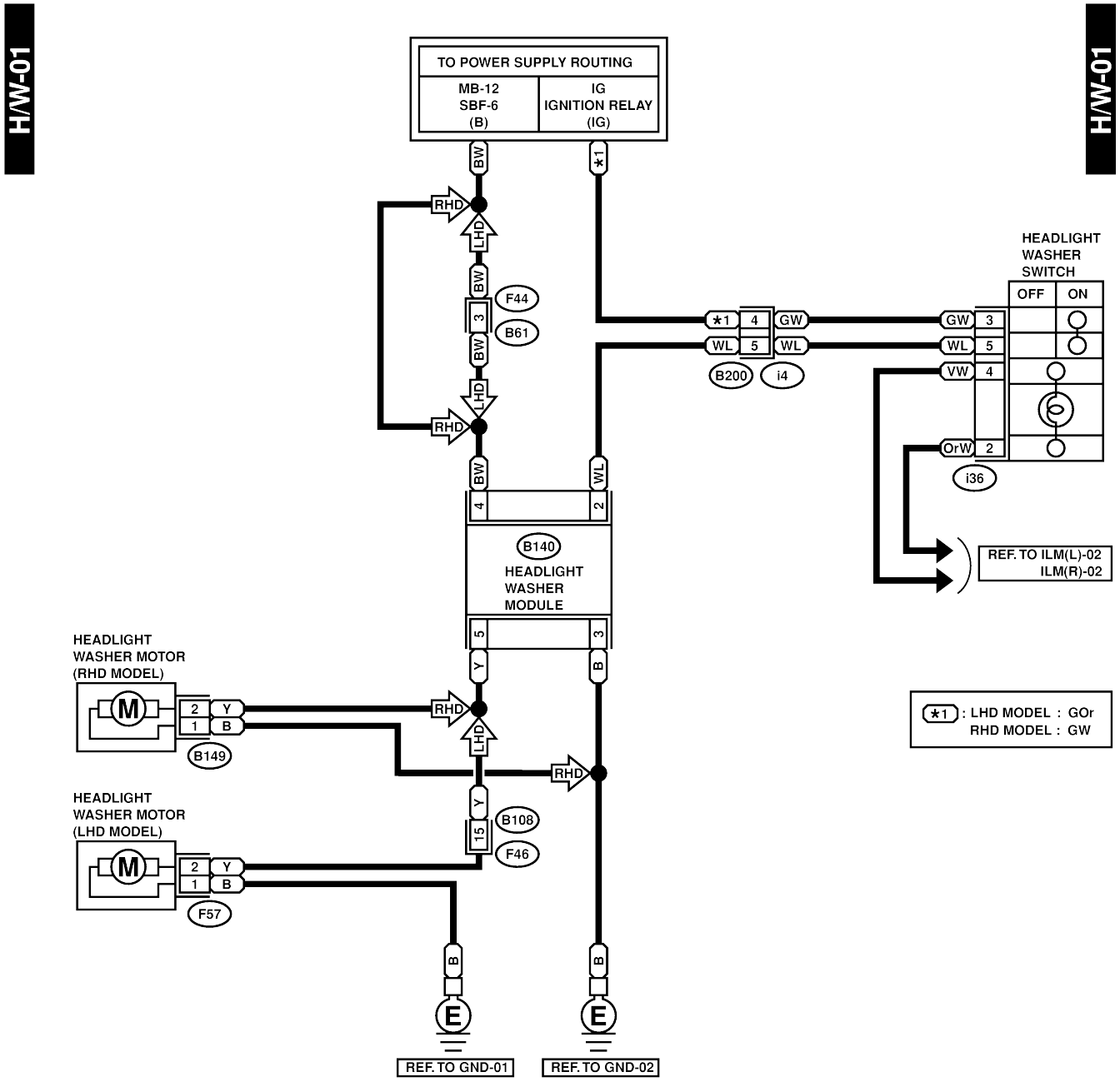
2. WIPER AND WASHER (REAR) S902394A2102

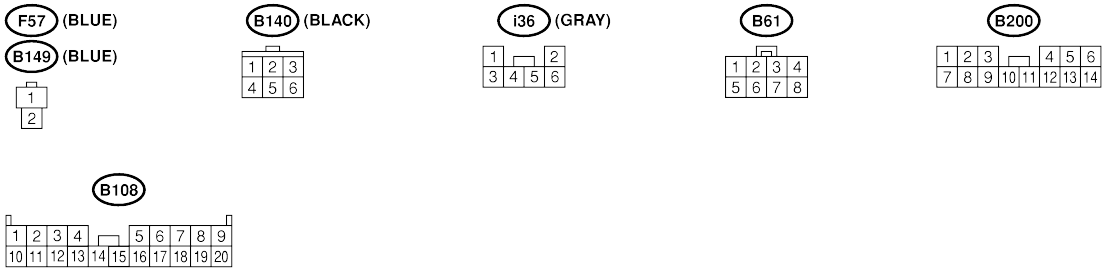




SG51-20

3. HEADLIGHT WASHER S902394A2107





SG53-20

B: INSPECTION S902394A10

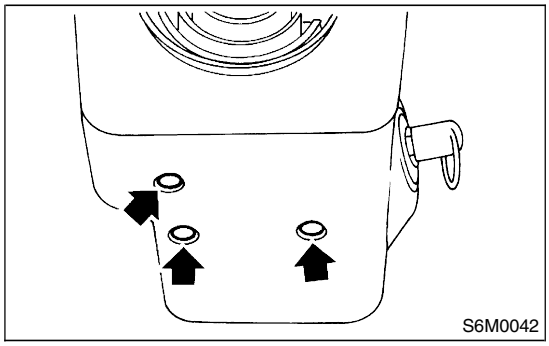
Symptom	Repair order
Wiper and washers do not operate.	(1) Wiper fuse (F/B No. 14, 15) (2) Combination switch (3) Wiper motor (4) Wire harness
Wipers do not operate in LO or HI.	(1) Combination switch (2) Wiper motor (3) Wire harness
Wipers do not operate in INT.	(1) Combination switch (2) Wiper motor (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)

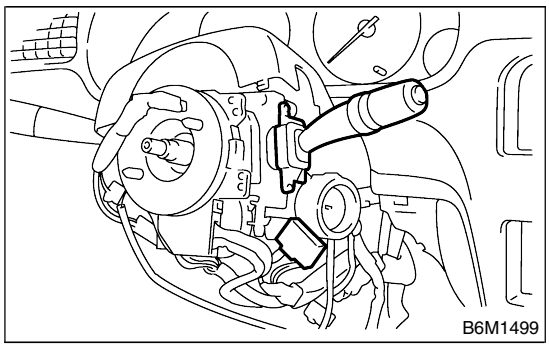
S902395

A: REMOVAL S902395A18

1) Loosen screw to remove a steering column cover.



2) Disconnect connectors from combination switches.
3) Loosen screw to remove combination switch.

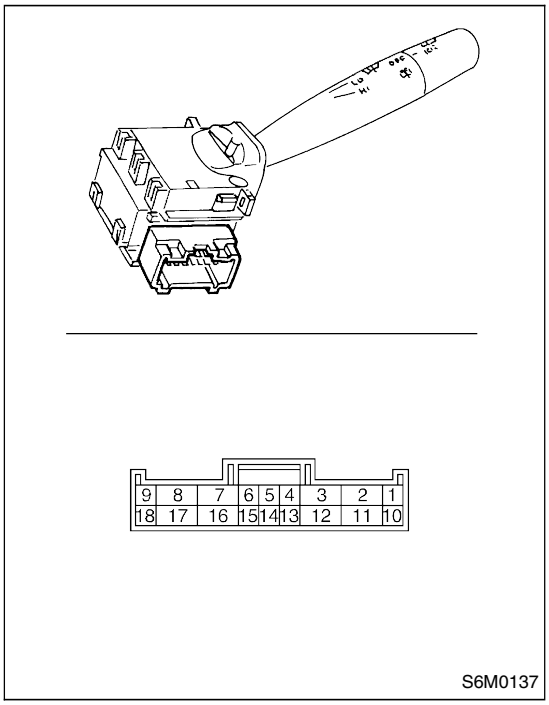


B: INSTALLATION S902395A11

Install in the reverse order of removal.

C: INSPECTION S902395A10

- Inspect the continuity between each connector terminal.



LHD model:

	Switch position	Test connection	Specified condition
FRONT	OFF	7 — 16	Continuity
	INT	7 — 16	Continuity
	LO	7 — 17	Continuity
	HI	8 — 17	Continuity
	Washer ON	2 — 11	Continuity
REAR	Washer ON	2 — 10 — 12	Continuity
	OFF	—	No continuity
	ON	2 — 10	Continuity
	Washer ON	2 — 10 — 12	Continuity

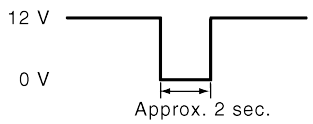
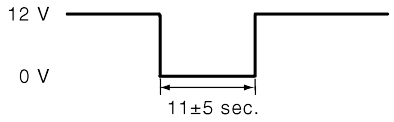
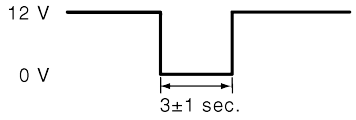
If continuity is not as specified, replace the switch.

RHD model:

	Switch position	Test connection	Specified condition
FRONT	OFF	3 — 12	Continuity
	INT	3 — 12	Continuity
	LO	3 — 11	Continuity
	HI	2 — 11	Continuity
	Washer ON	8 — 17	Continuity
REAR	Washer ON	8 — 16 — 18	Continuity
	OFF	—	No continuity
	ON	8 — 18	Continuity
	Washer ON	8 — 16 — 18	Continuity

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 from after the second time the wiper stops.)

Switch position	Voltage
MIN.	
MAX.	
Non variable type	

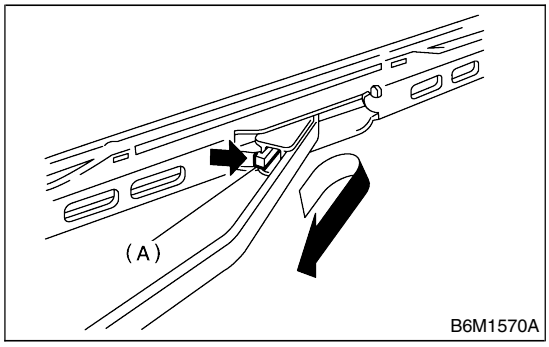
B6M1465A

If operation is not as specified, replace the switch.

4. Wiper Blade S902392

A: REMOVAL S902392A18

While pushing locking clip (A) up, pull out blade from arm to arrow direction.

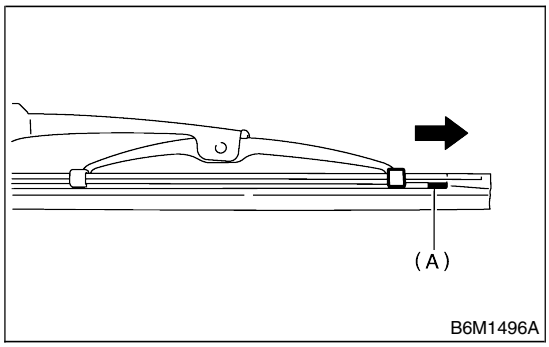


B: INSTALLATION S902392A11

1) Install in the reverse order of removal.
2) Confirm that clip was locked securely.

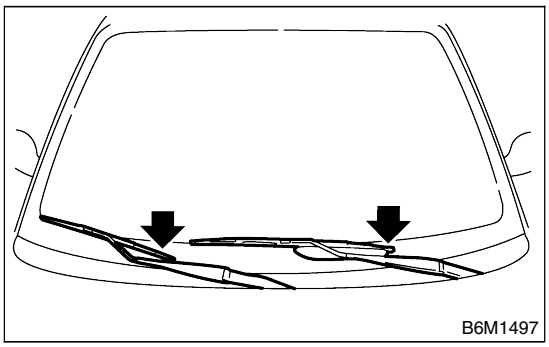
C: DISASSEMBLY S902392A06

Pull on side (A) of the wiper rubber stopper and remove the rubber from the blade assembly.

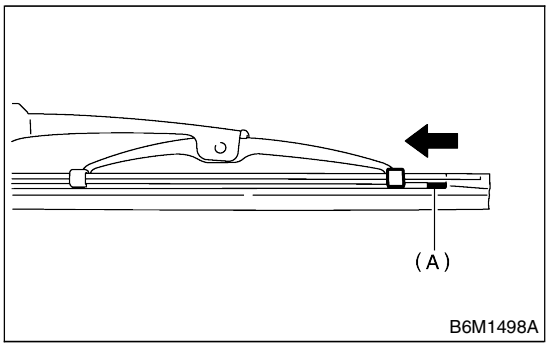


D: ASSEMBLY S902392A02

1) Insert the wiper rubber onto the blade so that the stopper is in the position shown (at the bottom of the wiper arm).



2) Make sure the wiper rubber is securely fastened to the pull stopper (A).



E: INSPECTION S902392A10

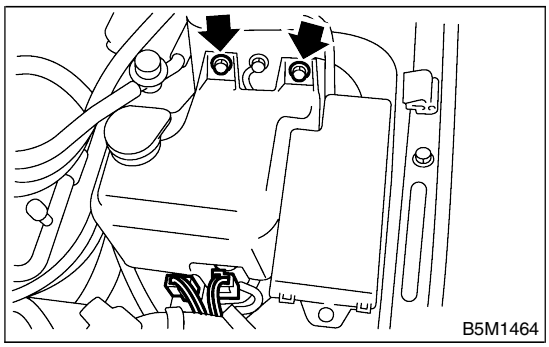
1) When the wiper does not perform well, inspect the following:
- Make sure the movable part of the blade assembly moves smoothly.
- Make sure the wiper rubber is not deformed or damaged.

2) Replace with a new part if damage is found.

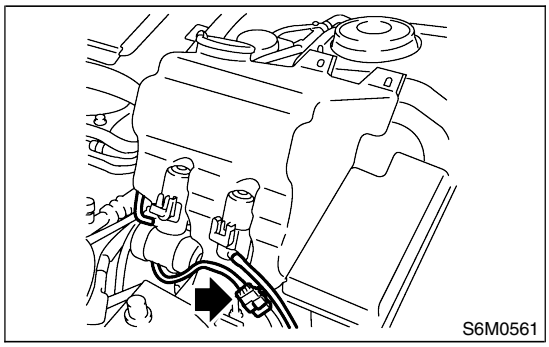
5. Washer Tank and Motor S902405

A: REMOVAL S902405A18

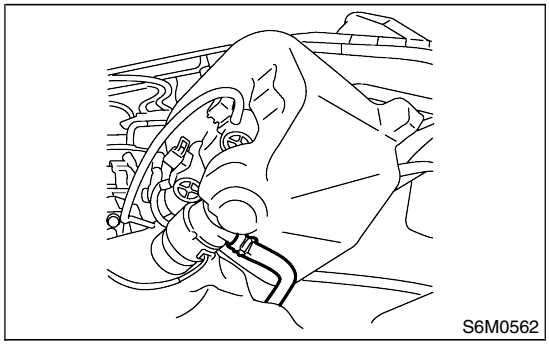
1) Disconnect the ground cable from the battery.
2) Remove the two bolts, and then disconnect the connectors from washer motors.



3) Lift the washer tank, and then disconnect the connector from headlight washer motor. Disconnect washer hoses.



4) Disconnect the washer hose from the motor, and then detach the washer tank.

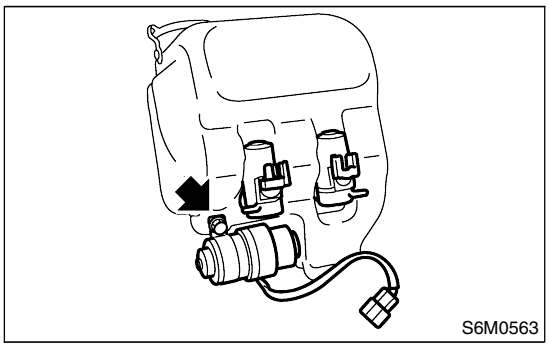


B: INSTALLATION S902405A11

Install in the reverse order of removal.

C: DISASSEMBLY S902405A06

Remove bolt, and then pull out washer motor from tank.

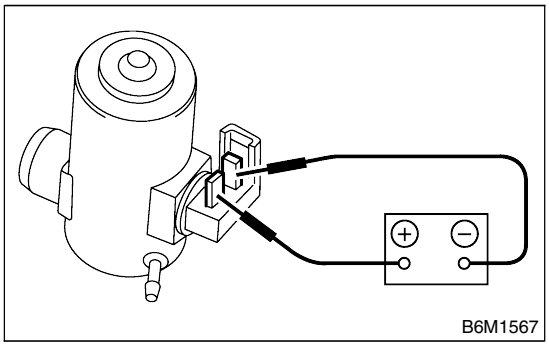


D: ASSEMBLY S902405A02

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.

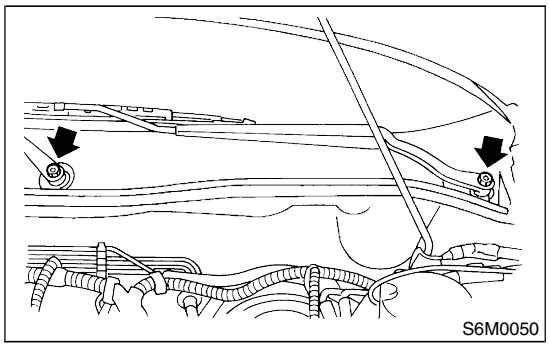


6. Front Wiper Arm S902404

A: REMOVAL S902404A18

NOTE:
The positions for RHD model are symmetrically opposite.

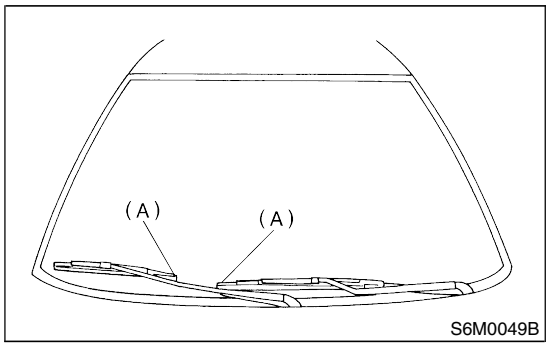
1) Open hood.
2) Remove cap.
3) Loosen nut to remove wiper arm.


S6M0050

B: INSTALLATION S902404A11

NOTE:
The positions for RHD model are symmetrically opposite.

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.

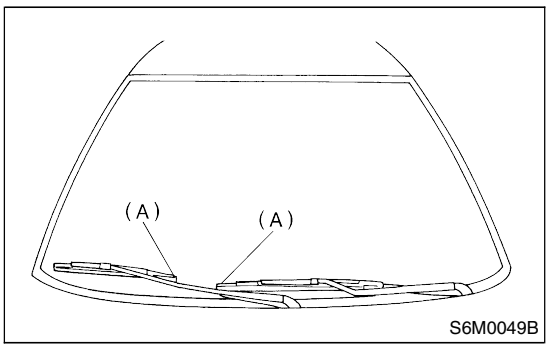


S6M0049B

C: ADJUSTMENT S902404A01

NOTE:
The positions for RHD model are symmetrically opposite.

Operate wiper once. Align wiper blade to ceramic print point mark (A) of front window pane.



S6M0049B

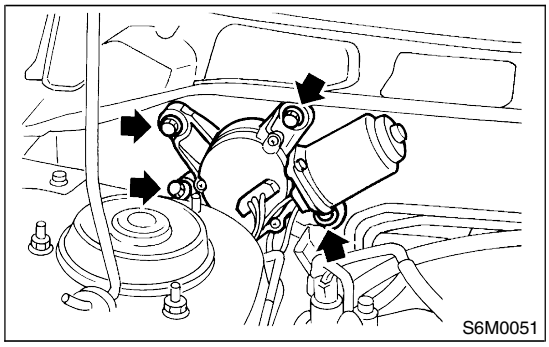
7. Front Wiper Motor and Link

S902406

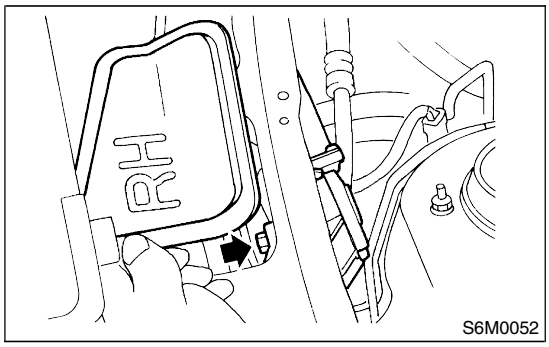
A: REMOVAL S902406A18

NOTE:
The positions for RHD model are symmetrically opposite.

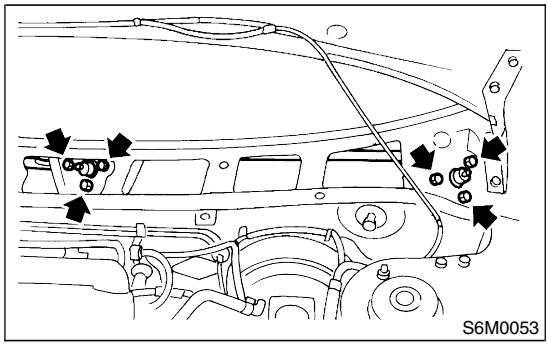
1) Remove cowl panel. <Ref. to EI-25 REMOVAL, Cowl Panel.>
2) Disconnect connector of motor, and remove motor attaching bolts.


S6M0051

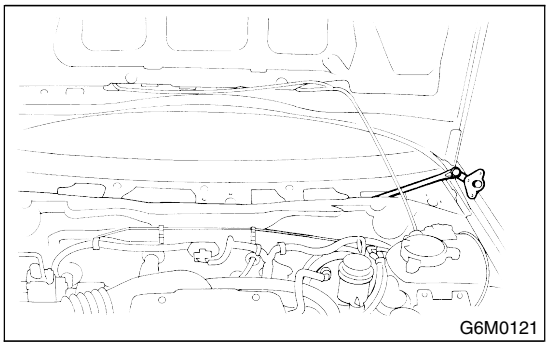
3) Remove cowl cover, and remove the motor link nut on the back side of the motor.


S6M0052

4) Remove bolts which secure sleeve unit.


S6M0053

5) Remove wiper link from service hole in front panel.

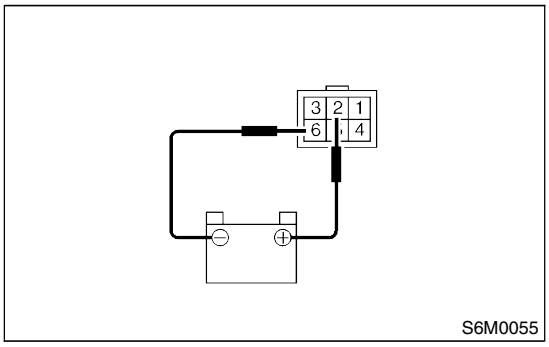

G6M0121

B: INSTALLATION S902406A11

Install in the reverse order of removal.

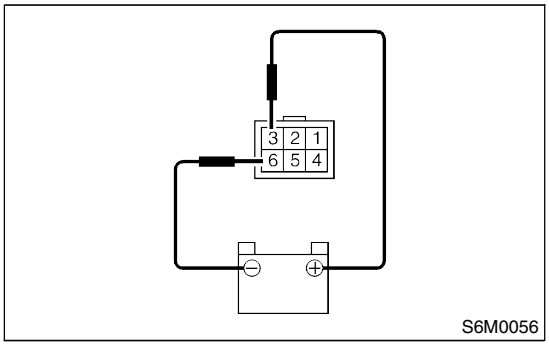
C: INSPECTION S902406A10

1) When battery is connected to terminal of connectors, confirm that motor operates at low speed.



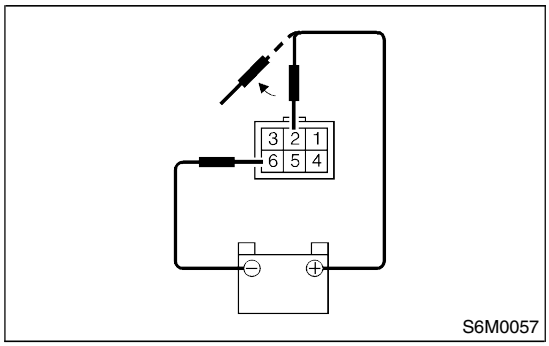
S6M0055

2) When battery is connected to terminal of connectors, confirm that motor operates at high speed.

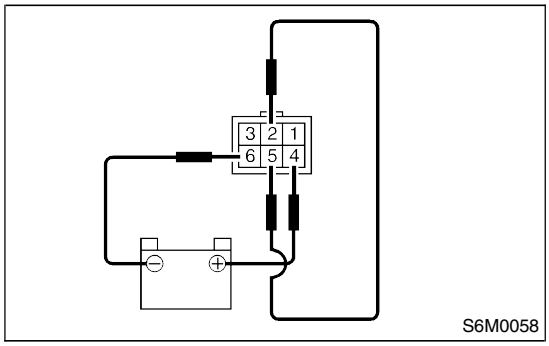


S6M0056

3) Connect battery to terminals of connector, and remove terminal connection with motor rotated at low speed, and stop wiper motor through operation.

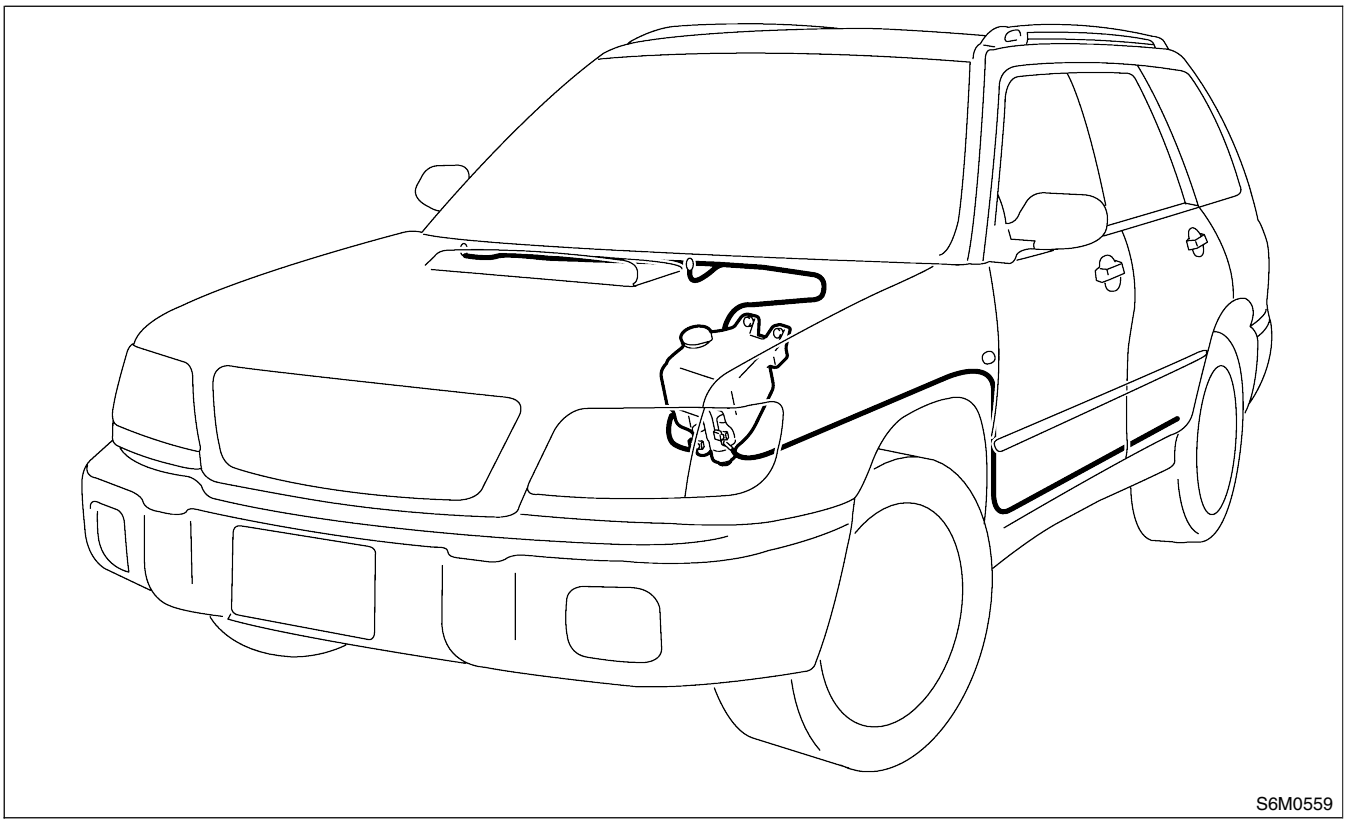


4) Connect battery and confirm that motor stops at automatic stop position after motor operates at low speed again.



8. Front Washer S902401

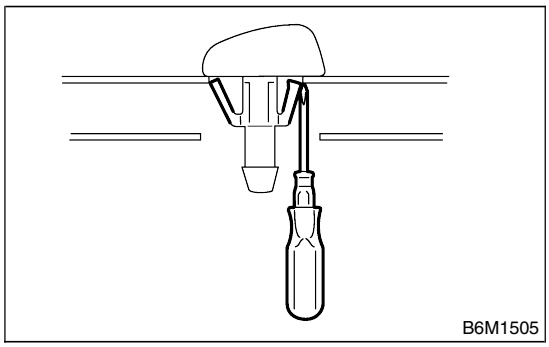
A: LOCATION S902401A13



B: REMOVAL S902401A18

1. NOZZLE S902401A1801

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.



C: INSTALLATION S902401A11

1. NOZZLE S902401A1101

1) Install in the reverse order of removal.
2) Adjust the position of the washer liquid sprayer. <Ref. to WW-18 ADJUSTMENT, Front Washer.>

D: INSPECTION S902401A10

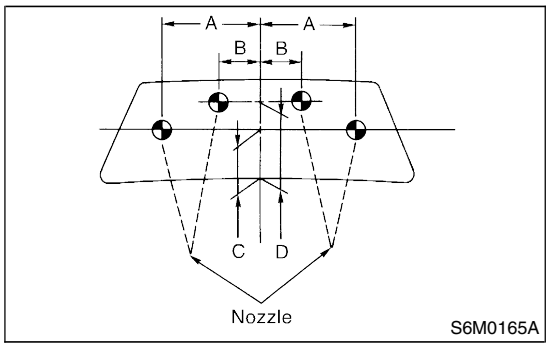
- Make sure the nozzle and hose are not clogged.
- Make sure the hose is not bent.

E: ADJUSTMENT S902401A01

NOTE:
Adjustment positions for left-handed vehicle. Carry out left-right symmetry for adjustment positions for right-handed vehicle.

1) Turn wiper switch to OFF position.
2) When vehicle stops, adjust washer injection position as shown in the figure.

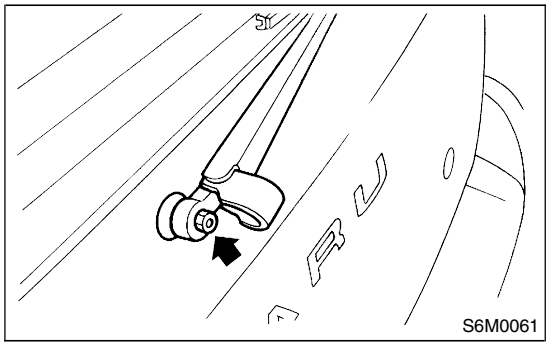
Injection position:
A: 410 mm (16.14 in)
B: 150 mm (5.91 in)
C: 370 mm (14.57 in)
D: 530 mm (20.87 in)



9. Rear Wiper Arm S902402

A: REMOVAL S902402A18

1) Raise wiper arm cover.
2) Loosen nut to remove wiper arm.



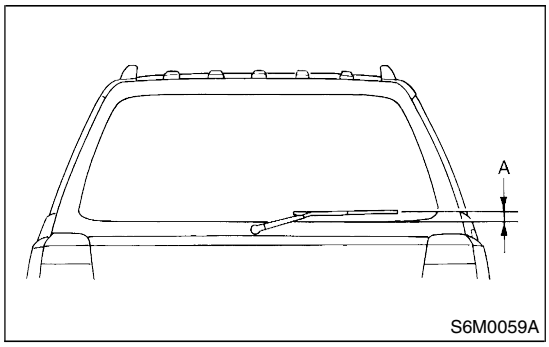
B: INSTALLATION S902402A11

1) Install in the reverse order of removal.
2) Adjust the position of the wiper blade. <Ref. to WW-19, ADJUSTMENT, Rear Wiper Arm.>

C: ADJUSTMENT S902402A01

1) Operate 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)

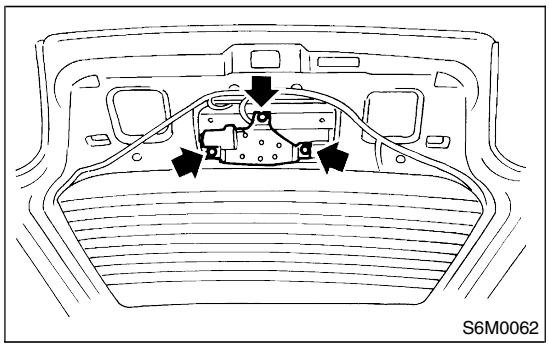


10. Rear Wiper Motor S902532

A: REMOVAL S902532A18

1) Remove rear wiper arm.
<Ref. to WW-19, REMOVAL, Rear Wiper Arm.>
2) Remove rear gate lower trim. <Ref. to EI-42 REMOVAL, Rear Gate Trim.>
3) Unclip clip of harness and disconnect connector of wiper motor.
4) Loosen bolts to remove wiper motor assembly.

CAUTION:
Be careful not to damage O-ring when removing wiper motor assembly.

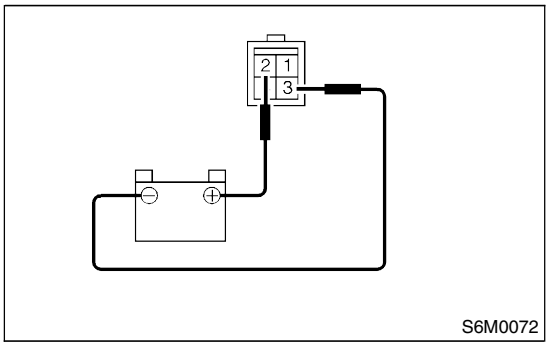

S6M0062

B: INSTALLATION S902532A11

1) Install in the reverse order of removal.

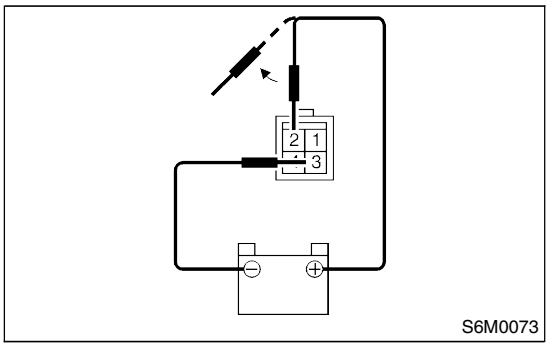
C: INSPECTION S902532A10

1) Connect battery to wiper motor connector and confirm that wiper motor operates.



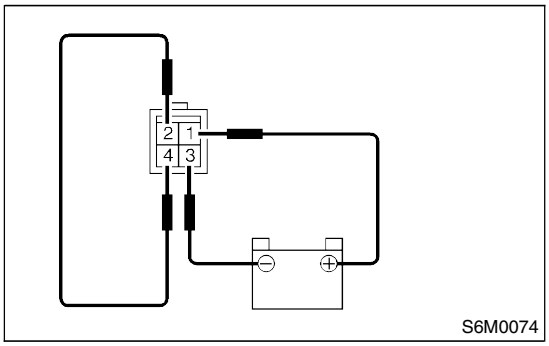
S6M0072

2) Connect battery to terminal of connector and remove terminal connections with motor rotated, and stop wiper motor through operation.



S6M0073

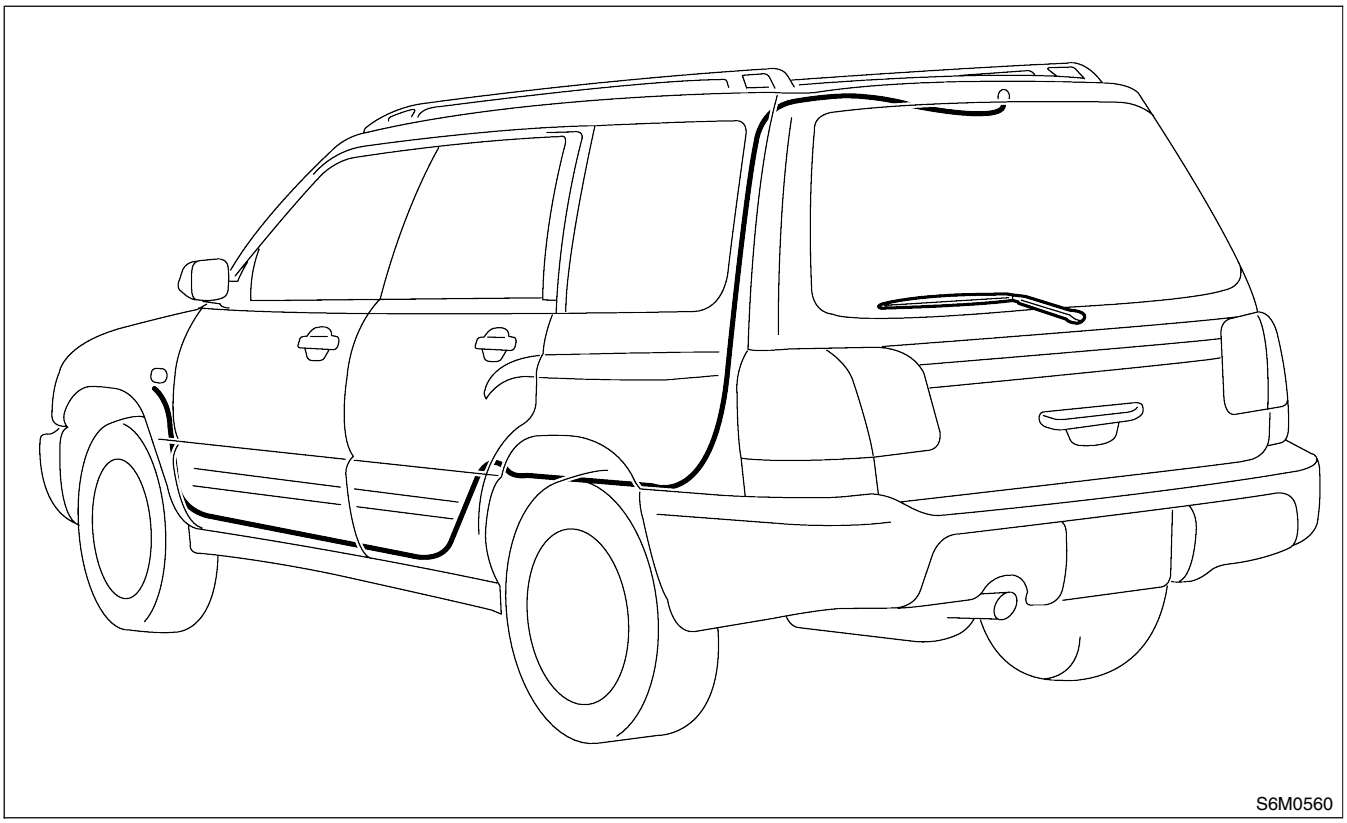
3) Connect battery and confirm that motor stops at automatic stop position after motor operates at low speed again.



S6M0074

11. Rear Washer S902400

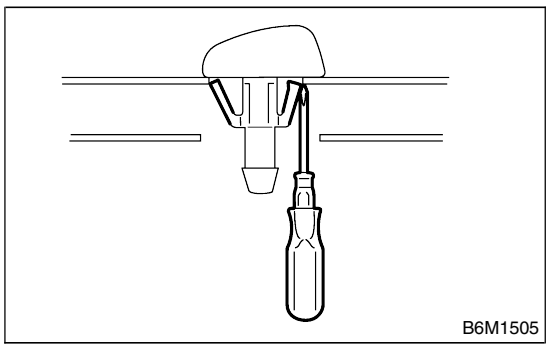
A: LOCATION S902400A13



B: REMOVAL S902400A18

1. NOZZLE S902400A1801

1) Remove the high-mount stop light. <Ref. to LI-58 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.



C: INSTALLATION S902400A11

1. NOZZLE S902400A1101

1) Install in the reverse order of removal.
2) Adjust the position of the washer liquid sprayer. <Ref. to WW-22 ADJUSTMENT, Rear Washer.>

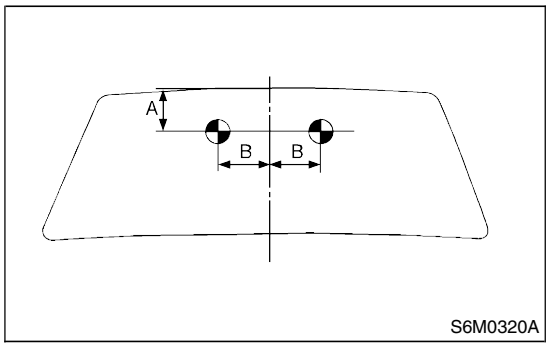
D: INSPECTION S902400A10

- Make sure the nozzle and hose are not clogged.
- Make sure the hose is not bent.

E: ADJUSTMENT S902400A01

1) Turn wiper switch to OFF position.
2) When vehicle stops, adjust washer injection position as shown in the figure.

Injection position:
A: 60 mm (2.36 in)
B: 60 mm (2.36 in)

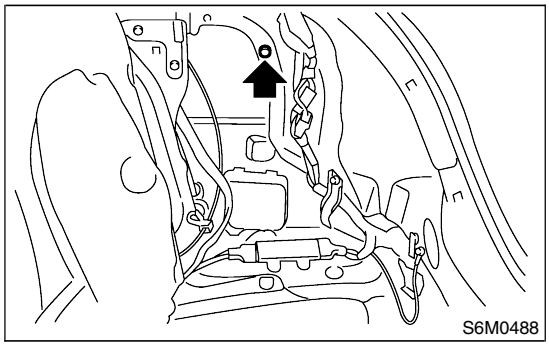


12. Wiper Control Relay S902403

A: REMOVAL S902403A18

1. WAGON S902403A1801

1) Remove right quarter lower trim.<Ref. to EI-39 REMOVAL, Rear Quarter Trim.>
2) Remove quarter pocket.
3) Loosen nut to remove control unit.


S6M0488

B: INSTALLATION S902403A11

1. WAGON S902403A1101

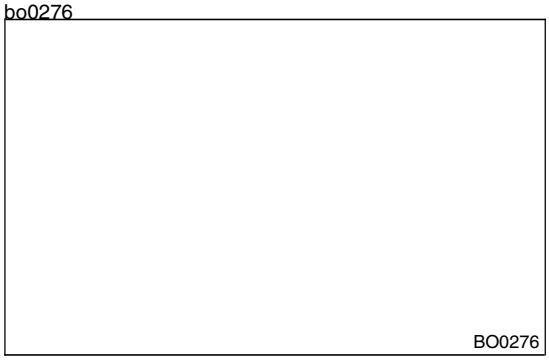
Install in the reverse order of removal.

C: INSPECTION S902403A10

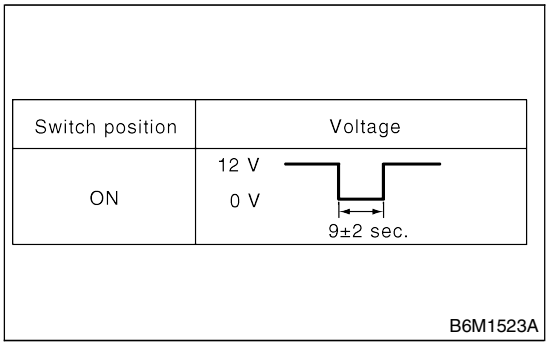
1. WAGON S902403A1001

1) Disconnect the connector from the wiper control relay.
2) 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


BO0276

3) Measure the voltage when the wiper relay is operated.



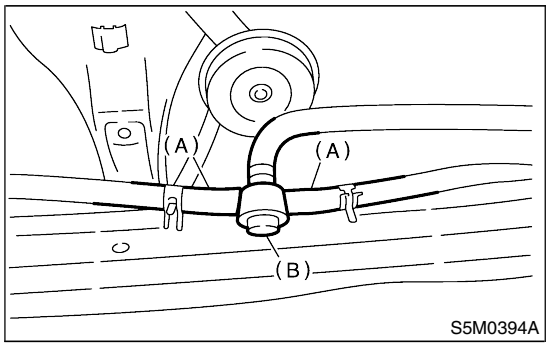
If operation is not as specified, replace the switch.

13. Headlight Washer S902736

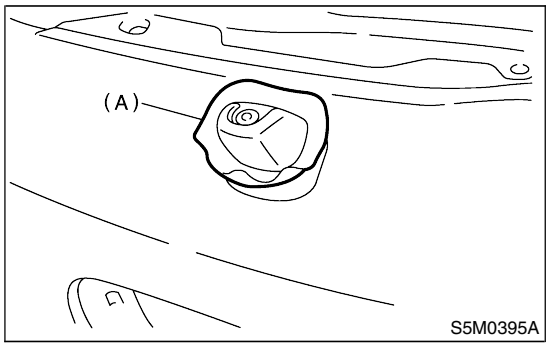
A: REMOVAL S902736A18

1) Disconnect the ground cable from the battery.
2) Remove the front grille. <Ref. to EI-10, REMOVAL, Front Grille.>
3) Draw out headlight washer hose.
4) Disconnect hose (A) from valve (B).

NOTE:
Washer fluid may drain from valve. Put a pan under the valve, then disconnect valve from hose while pinching the hose edge.

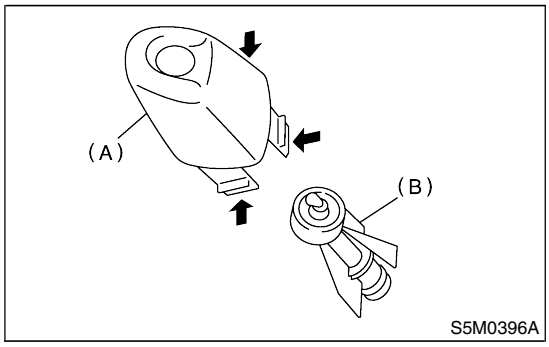


5) Remove nozzle cover (A).



6) Push the three pawls to remove outer nozzle (A). Then, pull out inner nozzle (B).

NOTE:
Before pushing the outer nozzle pawls, cover the bumper to avoid scratches.



B: INSTALLATION S902736A11

Install in the reverse order of removal.

ENTERTAINMENT

ET

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4.	Accessory Power Socket System	10
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7.	Rear Speaker	13
8.	Antenna	14
9.	Antenna Amplifier	15
10.	Cigarette Lighter	16
11.	Accessory Power Socket	17

1. General Description S901001

A: CAUTION S901001A03

- 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.

B: PREPARATION TOOL S901001A17

1. GENERAL TOOLS S901001A1701

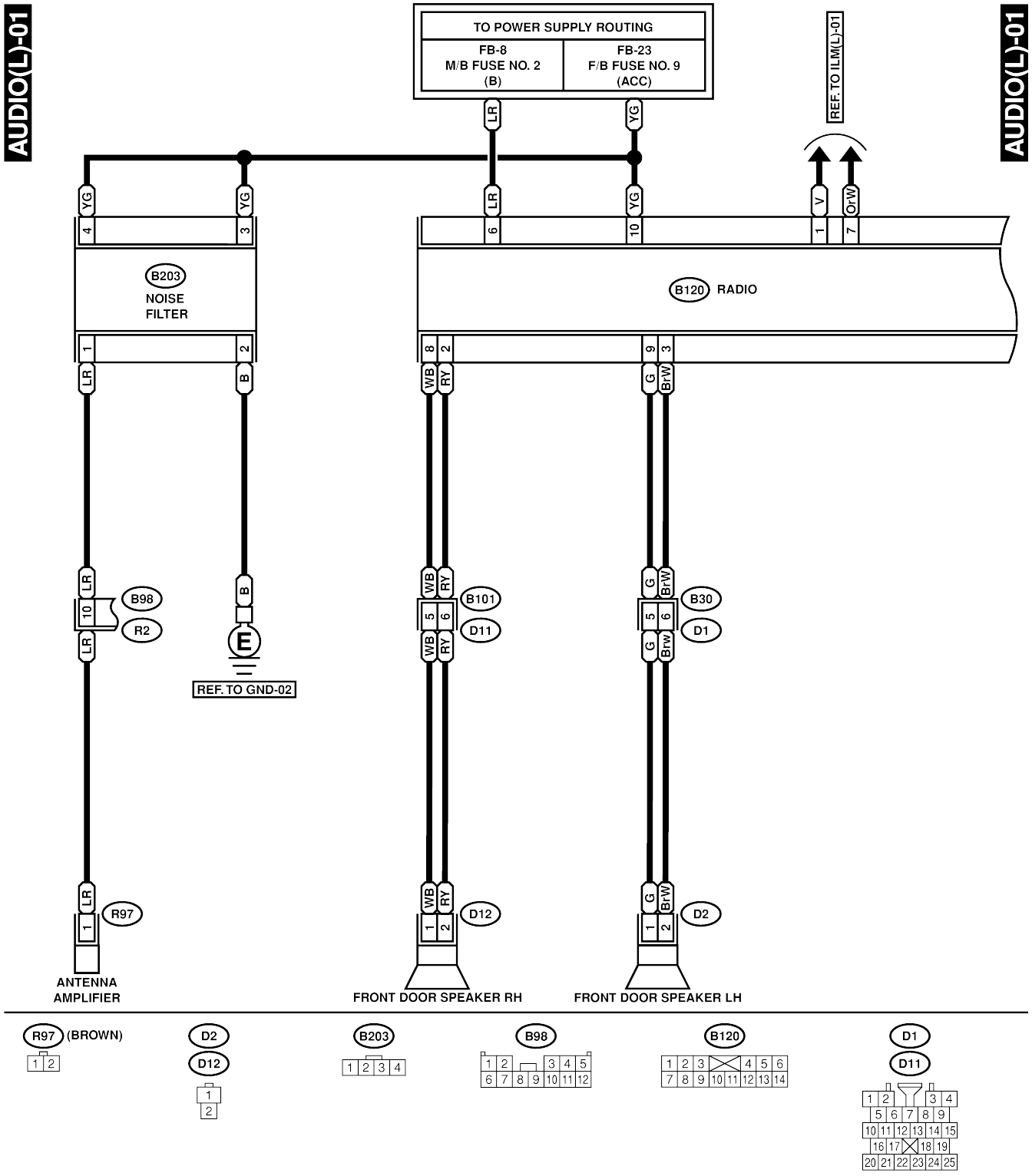
TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance and voltage.
Conductive Silver Composition (DUPONT NO. 4817 or equivalent)	Used for repairing antenna wire.

MEMO:

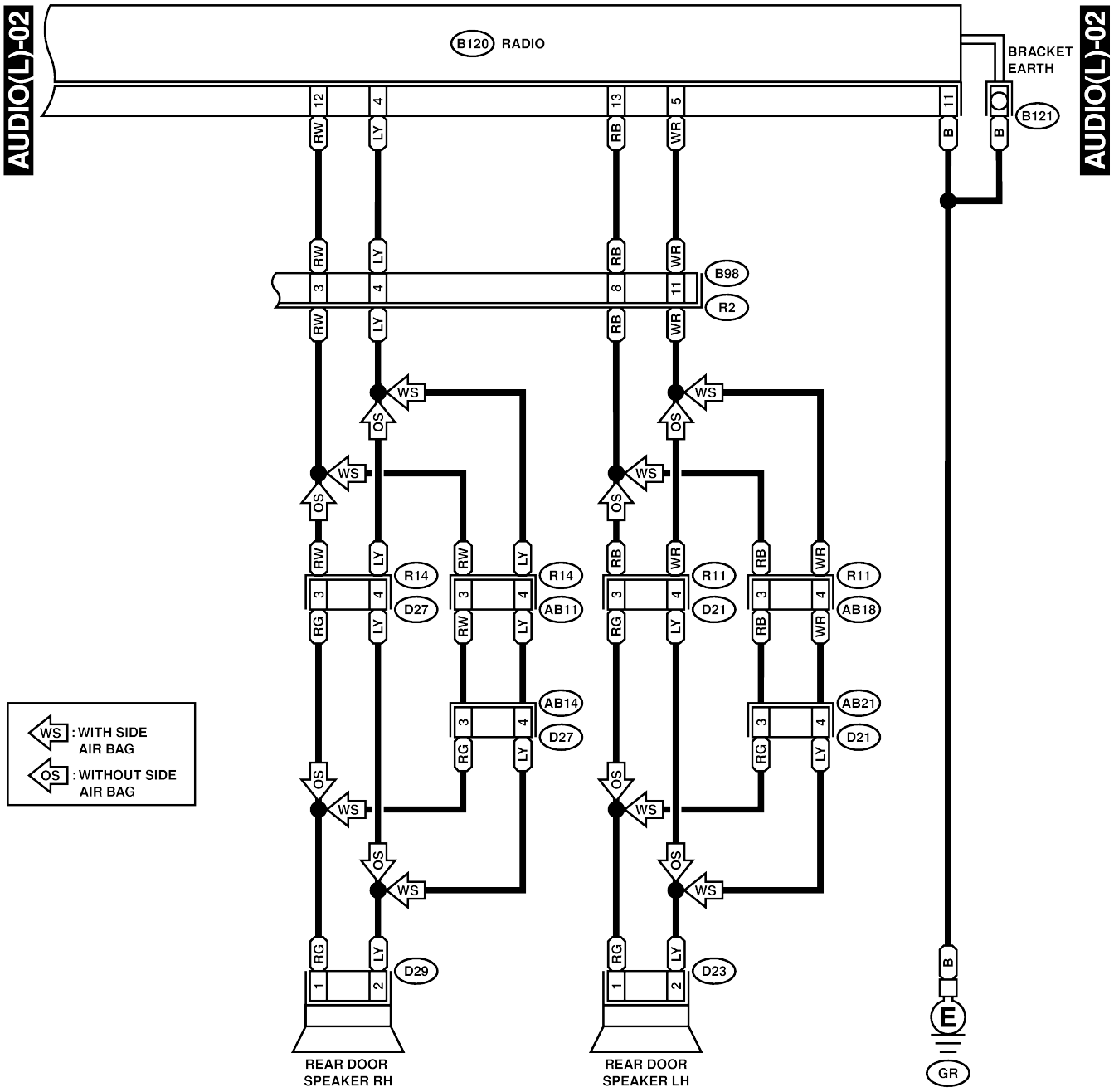
2. Radio System S901467

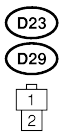
A: SCHEMATIC S901467A21

1. RADIO LHD MODEL S901467A2103

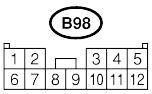


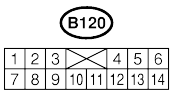
SL76-20A


AUDIO(L)-02
B120 RADIO
BRACKET EARTH
B121
AUDIO(L)-02
B98
R2
WS : WITH SIDE AIR BAG
OS : WITHOUT SIDE AIR BAG
R14
D27
AB11
AB14
R11
D21
AB18
AB21
D29
D23
REAR DOOR SPEAKER RH
REAR DOOR SPEAKER LH
GR


D23
D29

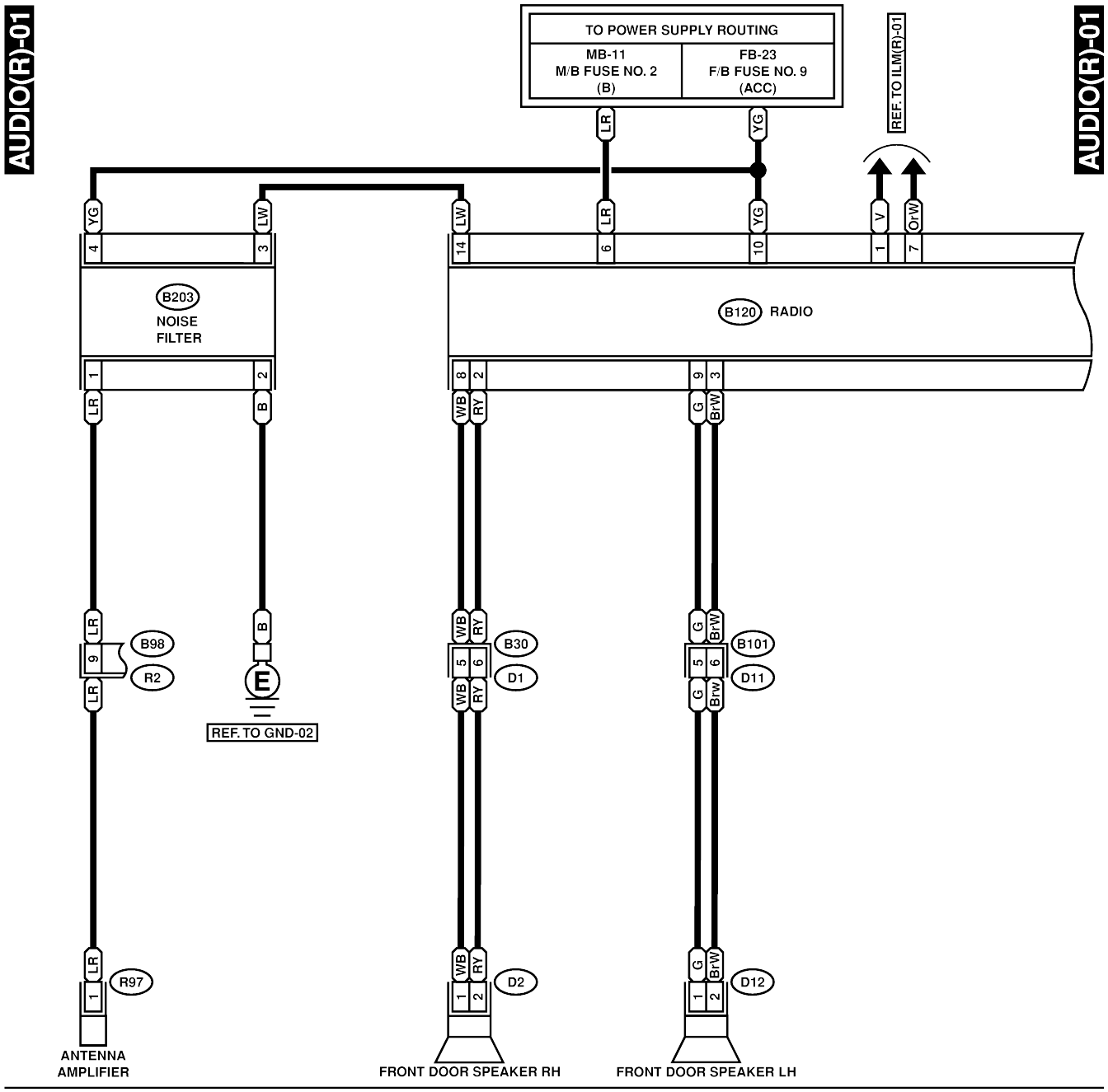

D21
D27
AB11
AB18


B98

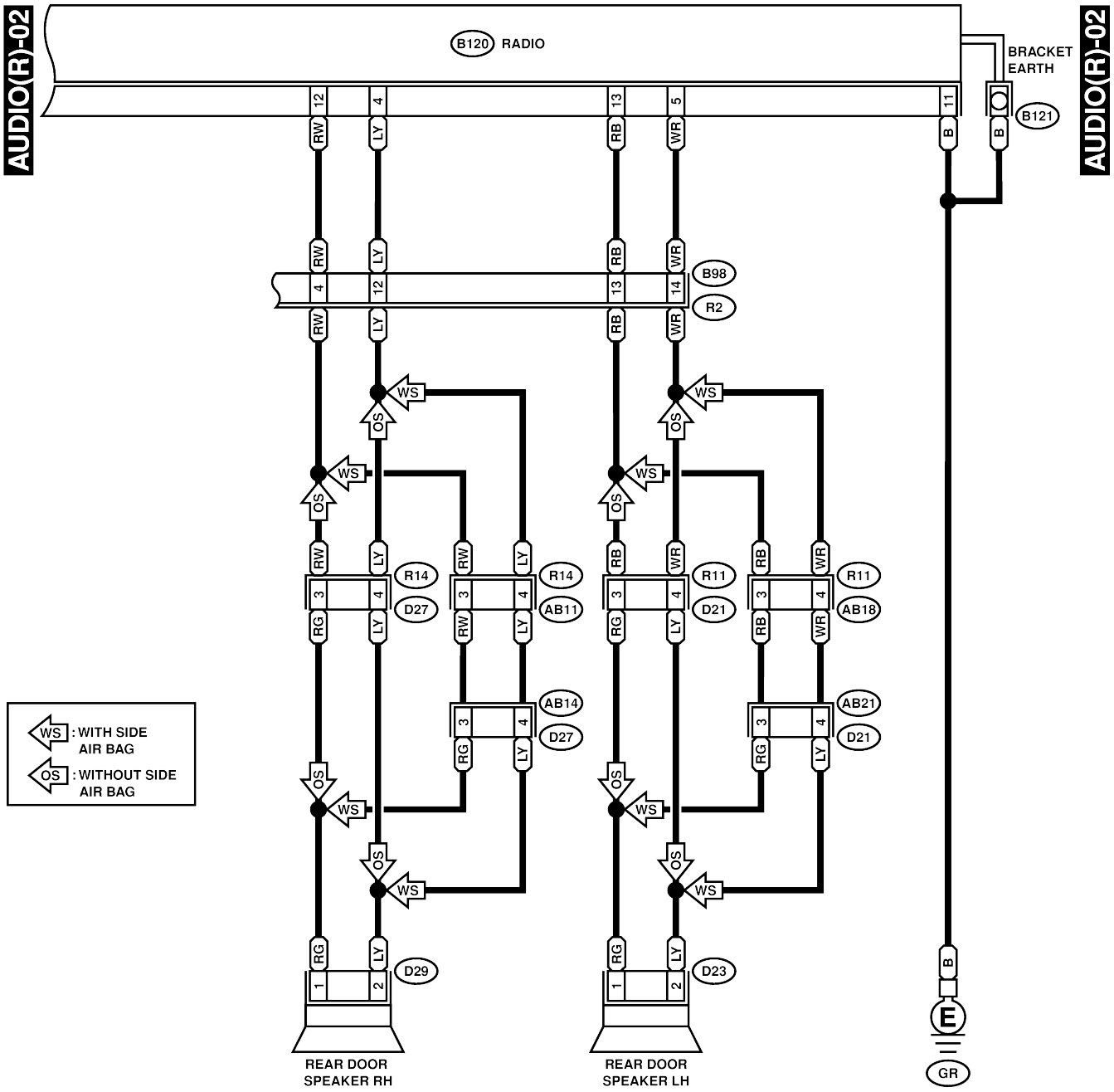

B120

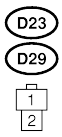
SL76-20B

2. RADIO RHD MODEL S901467A2104

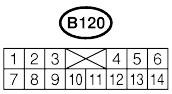


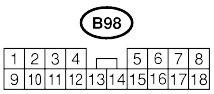
SR76-20A


AUDIO(R)-02
AUDIO(R)-02
B120 RADIO
BRACKET EARTH
B121
B98
R2
WS : WITH SIDE AIR BAG
OS : WITHOUT SIDE AIR BAG
R14
D27
AB11
AB14
R11
D21
AB18
AB21
D29
D23
REAR DOOR SPEAKER RH
REAR DOOR SPEAKER LH
GR


D23
D29


D21
D27
AB11
AB18


B120


B98

SR76-20B

B: INSPECTION S901467A10

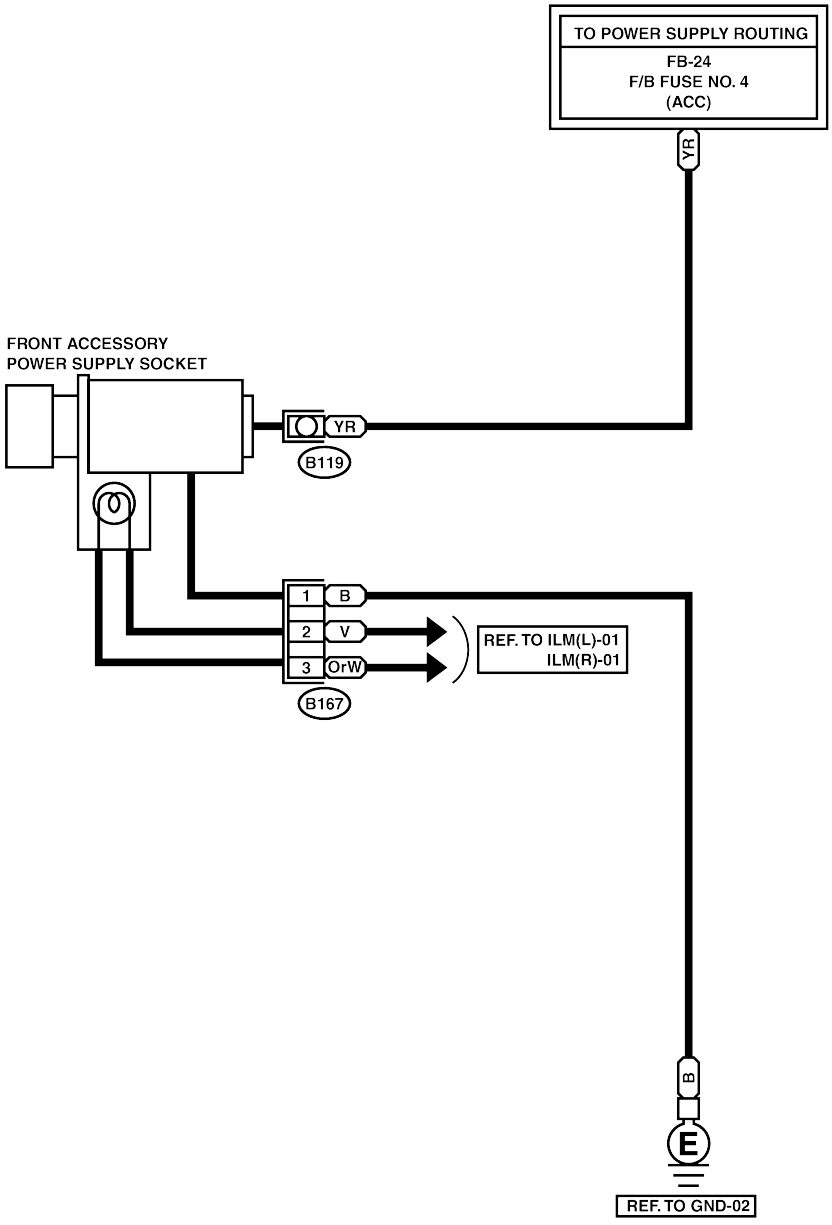
Symptom	Repair order
No power coming in (No display and no sound from speakers)	(1) Check fuse and power supply for radio. (2) Check radio ground. (3) Remove radio for repair.
A specific speaker does not operate.	(1) Check speaker. (2) Check output circuit between radio and speaker.
Radio generates noise 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

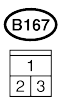
A: SCHEMATIC S901494A21

1. CIGARETTE LIGHTER S901494A2101

FAPS-01



FAPS-01

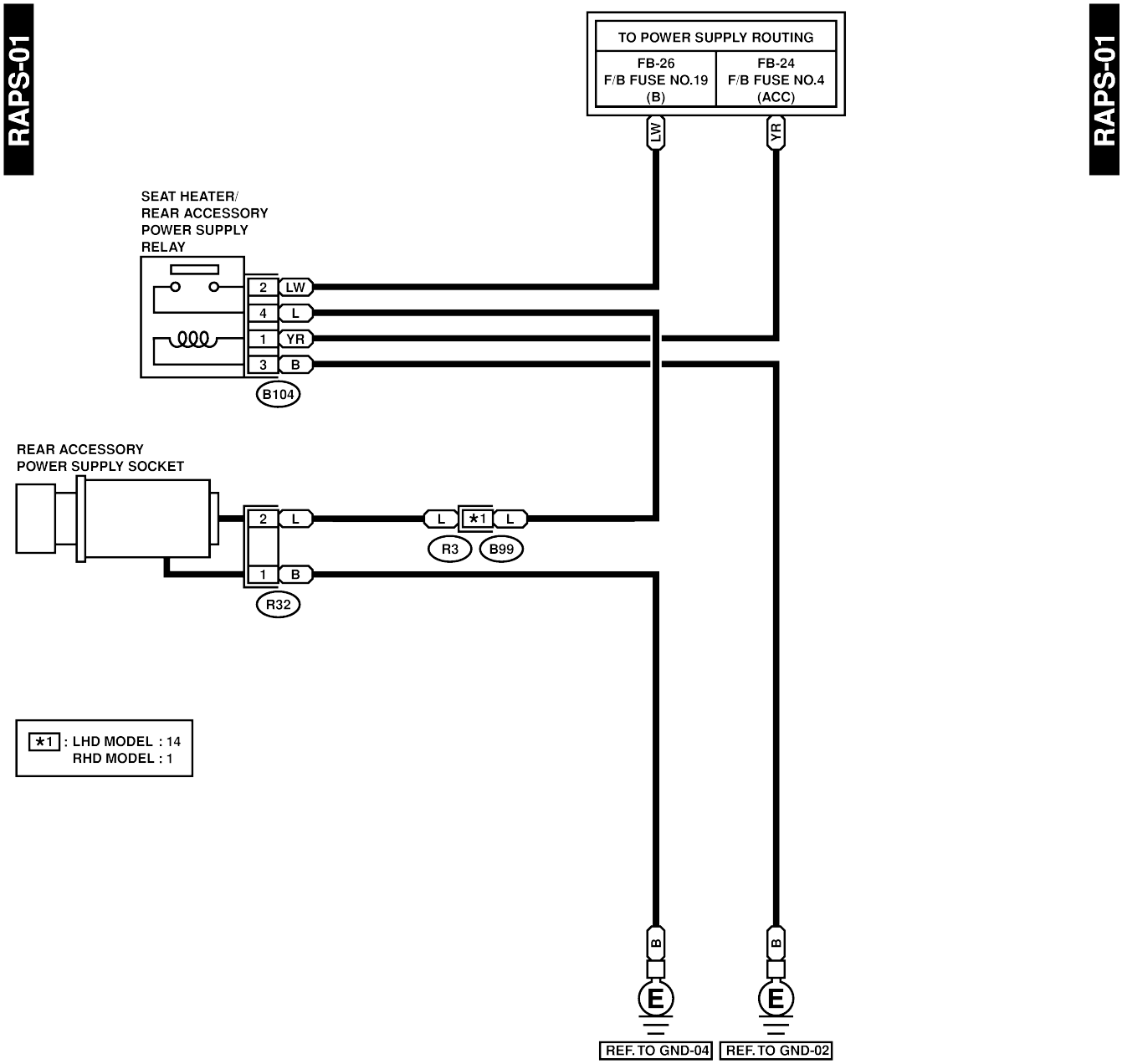


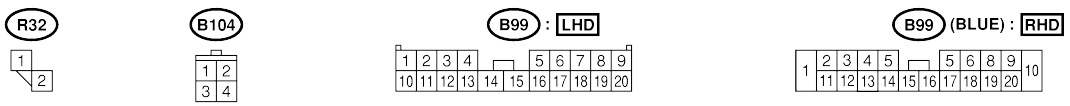
SG97-20

4. Accessory Power Socket System S901785

A: SCHEMATIC S901785A21

1. ACCESSORY POWER SOCKET S901785A2101



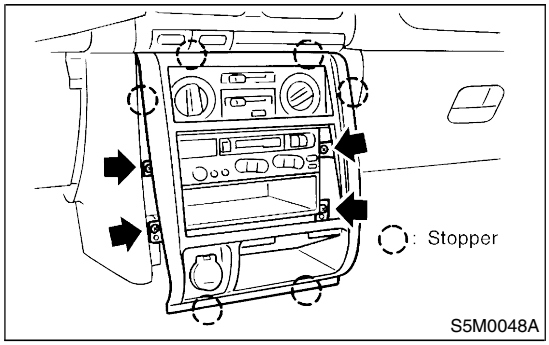


SG90-20

5. Radio Body S901469

A: REMOVAL S901469A18

1) Remove console box. <Ref. to EI-30 REMOVAL, Console Box.>
2) Remove AT cover (AT model).
3) Remove center panel.
4) Remove fitting screws, and slightly pull radio out from center console.



5) Disconnect electric connectors and antenna feeder cord.

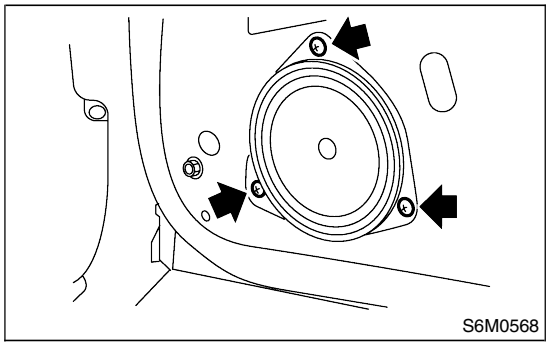
B: INSTALLATION S901469A11

Install in the reverse order of removal.

6. Front Speaker S901466

A: REMOVAL S901466A18

1) Remove front door trim. <Ref. to EI-26 REMOVAL, Front Door Trim.>
2) Remove front speaker mounting screws.



3) Disconnect harness connector and remove front speaker.

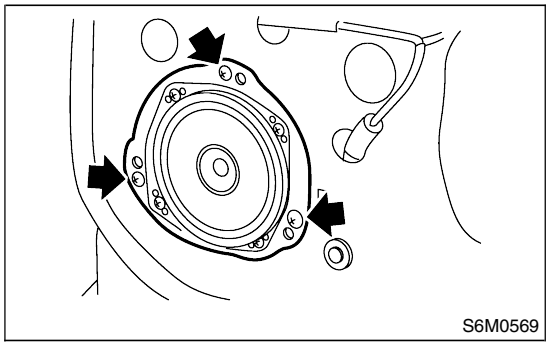
B: INSTALLATION S901466A11

Install in the reverse order of removal.

7. Rear Speaker S901470

A: REMOVAL S901470A18

1) Remove rear door trim. <Ref. to EI-27> REMOVAL, Rear Door Trim.
2) Remove rear speaker mounting screws.



3) Disconnect harness connector and remove rear speaker.

B: INSTALLATION S901470A11

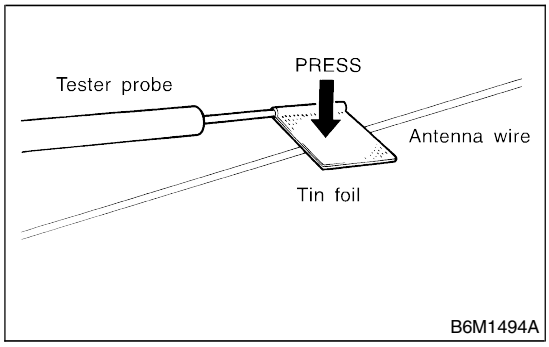
Install in the reverse order of removal.

8. Antenna S901463

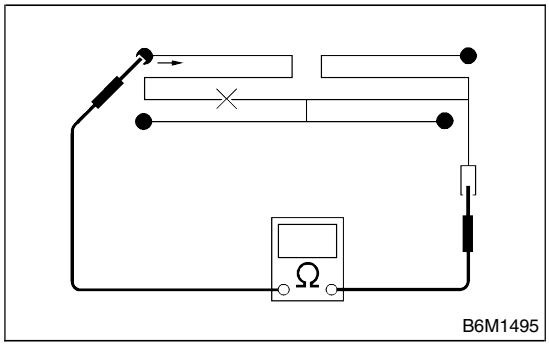
A: INSPECTION S901463A10

Check continuity between antenna terminal and each antenna wire.
If an antenna wire is OK, continuity should exist. If an antenna wire is broken, no continuity should exist.

NOTE:
When checking continuity, wind a piece of tin foil around the tip of the tester probe and press the foil against the wire with your finger.

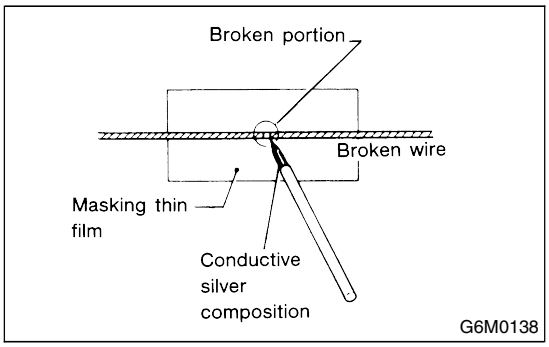


To locate the broken point, move the probe along the antenna wire.



B: REPAIR S901463A19

1) Clean antenna wire and the 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.

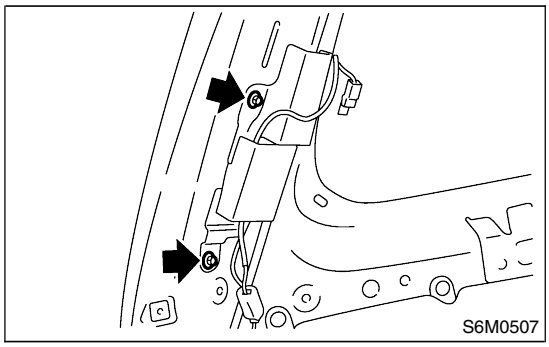


4) Dry out the deposited portion.
5) After repair has been completed, check repaired wire for continuity.

9. Antenna Amplifier S901460

A: REMOVAL S901460A18

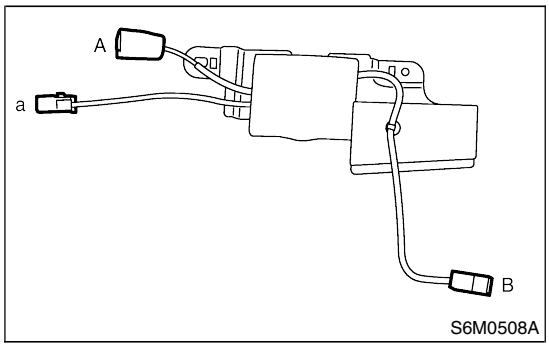
1) Remove rear quarter lower trim. <Ref. to EI-39 REMOVAL, Rear Quarter Trim.>
2) Disconnect harness connector and terminal.
3) Remove mounting screw and detach antenna amplifier.



B: INSTALLATION S901460A11

Install in the reverse order of removal.

C: INSPECTION S901460A10



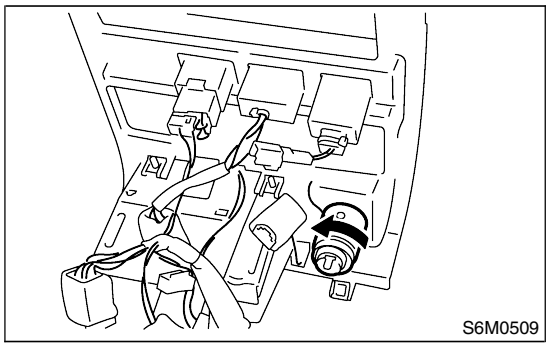
Measure resistance between terminal and amplifier body.

Tester connection	Resistance
A — Amplifier	More than 100 kΩ
B — Amplifier	More than 100 kΩ
a — Amplifier	More than 100 kΩ

10. Cigarette Lighter S901461

A: REMOVAL S901461A18

1) Remove center panel. <Ref. to ET-11 REMOVAL, Radio Body.>
2) Disconnect harness connectors and remove cigarette lighter.



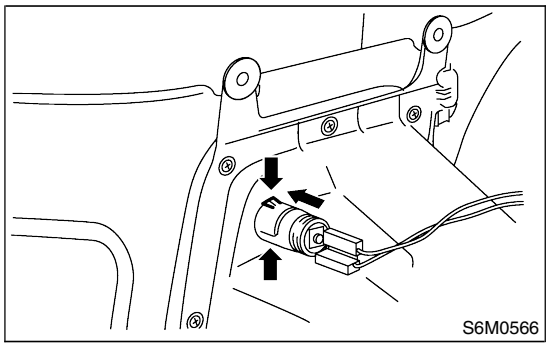
B: INSTALLATION S901461A11

Install in the reverse order of removal.

11. Accessory Power Socket S901786

A: REMOVAL S901786A18

1) Remove rear quarter lower trim. <Ref. to EI-39, REMOVAL, Rear Quarter Trim.>
2) Disconnect harness connectors and remove accessory power socket.



B: INSTALLATION S901786A11

Install in the reverse order of removal.

MEMO:

COMMUNICATION SYSTEM

COM

Page

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2. Horn System....3
3. Horn....5
4. Horn Switch....6

1. General Description S904001

A: PREPARATION TOOL S904001A17

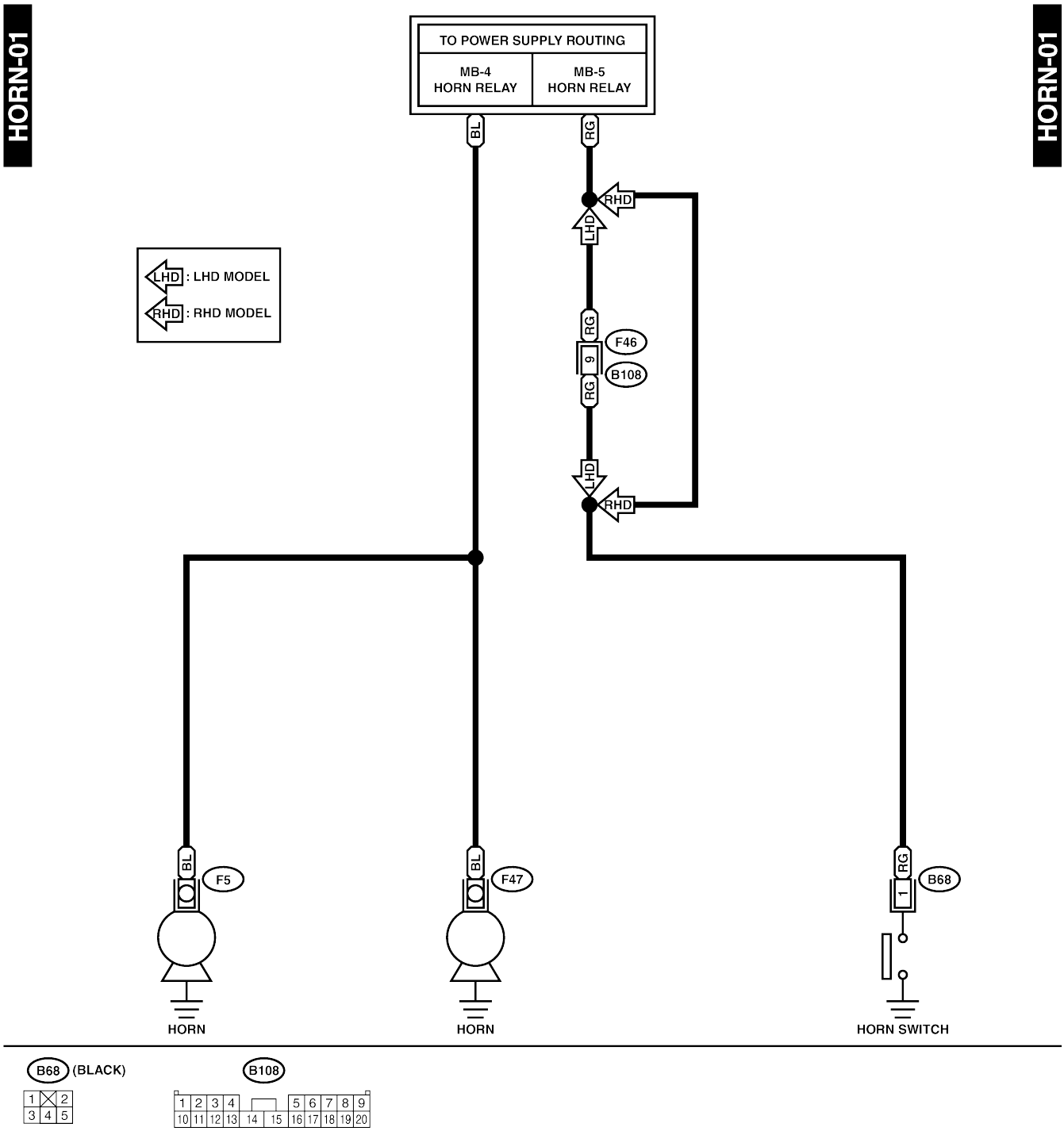
1. GENERAL TOOLS S904001A1701

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance and voltage.

2. Horn System S904436

A: SCHEMATIC S904436A21

1. HORN S904436A2101



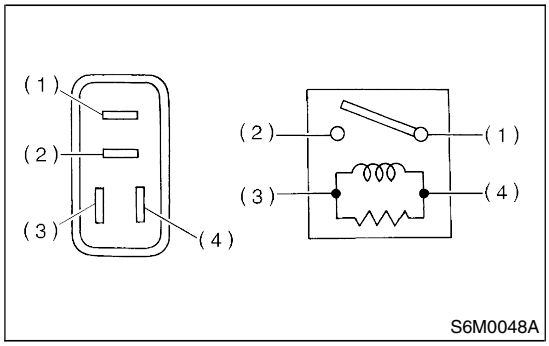
SG74-20

B: INSPECTION S904436A10

1. HORN RELAY S904436A1001

Check continuity between terminals (indicated in table below) when terminal No. 4 is connected to battery and terminal No. 3 is grounded.

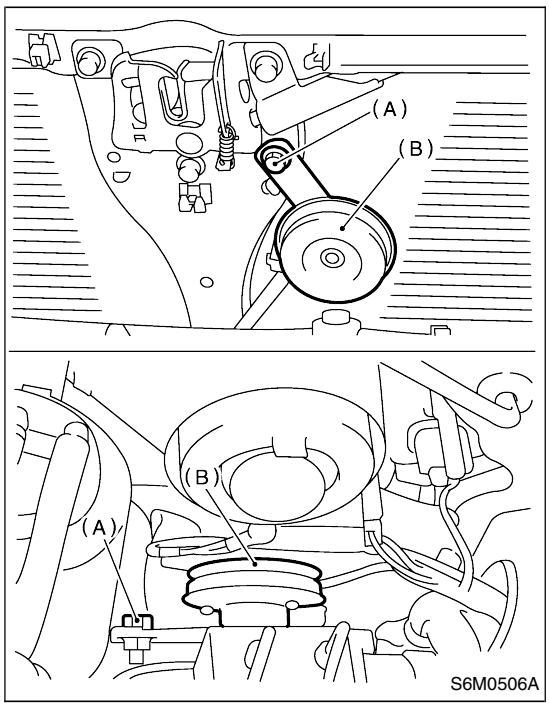
When current flows.	Between terminals No. 1 and No. 2	Continuity exists.
When current does not flow.	Between terminals No. 1 and No. 2	Continuity does not exist.
	Between terminals No. 3 and No. 4	Continuity exists.



3. Horn S904437

A: REMOVAL S904437A18

1) Remove horn bracket mounting bolt (A).
2) Disconnect harness connector and remove horn assembly (B).

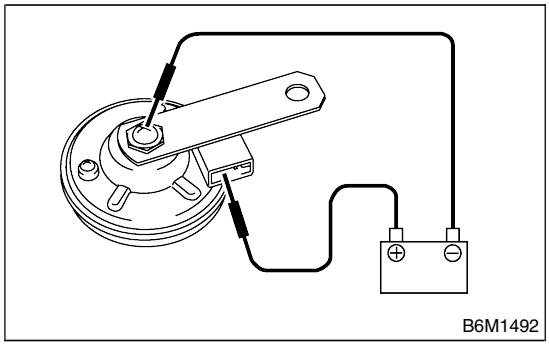


B: INSTALLATION S904437A11

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.

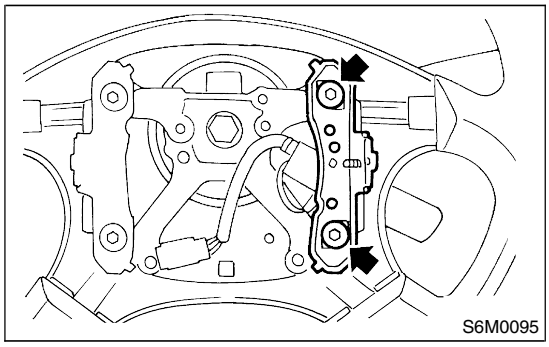


4. Horn Switch S904434

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) Remove the driver's airbag module. <Ref. to AB-12 Driver's Airbag Module.>
2) Remove horn switch from steering wheel as shown.

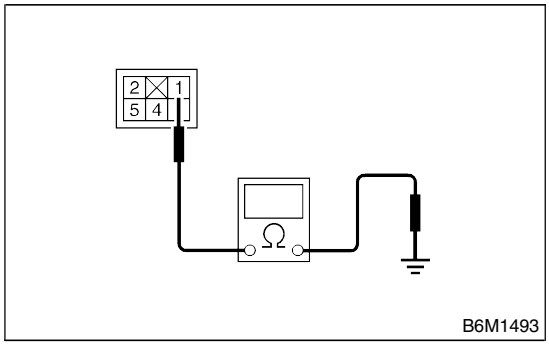


B: INSTALLATION S904434A11

Install in the reverse order of removal.

C: INSPECTION S904434A10

Check continuity between terminals.



Switch position	Tester connection	Specified condition
When horn switch is pushed.	1—Body ground	Continuity
When horn switch is not pushed.		No continuity

GLASS/WINDOWS/MIRRORS

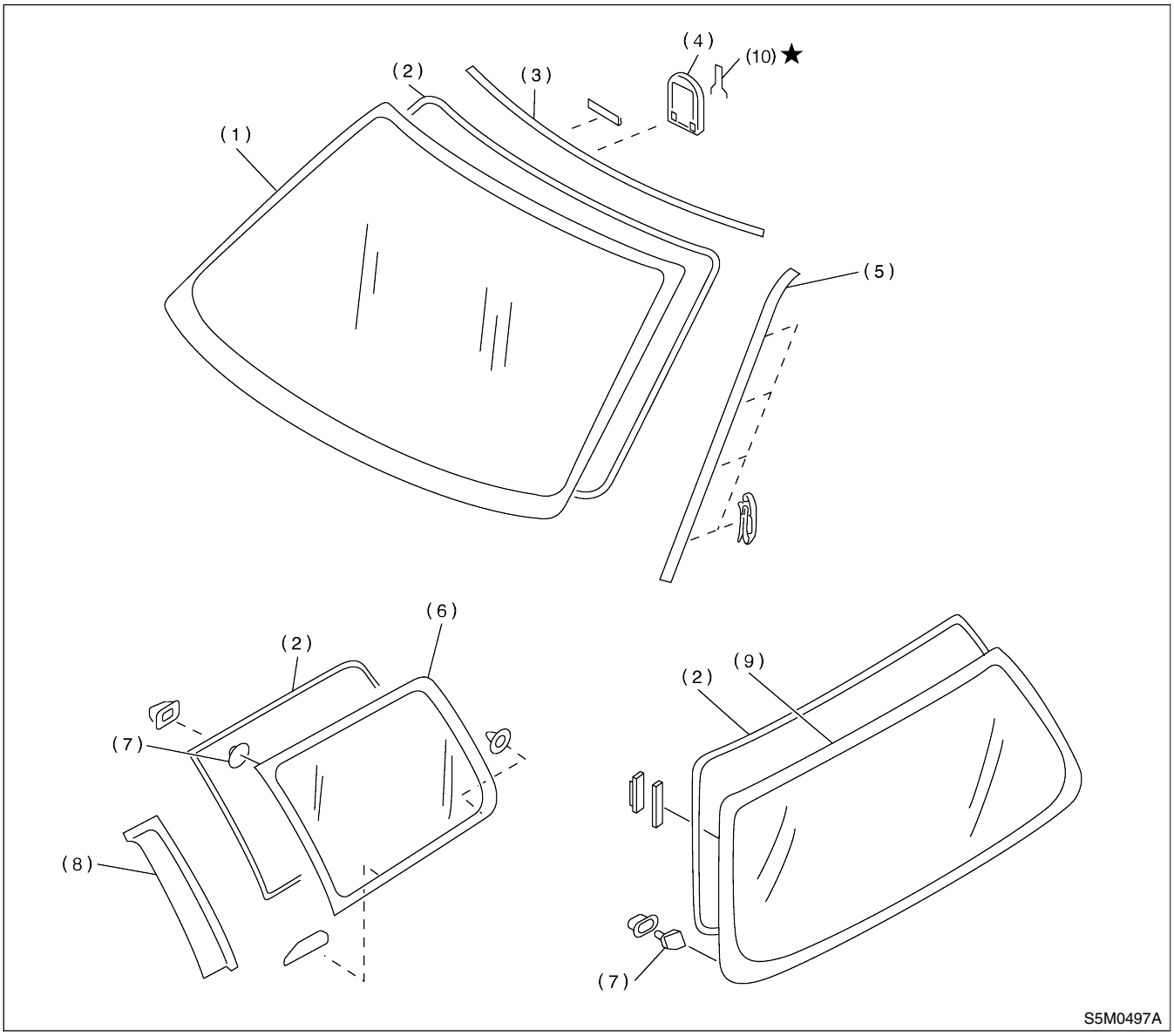
GW

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1.	General Description	2
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4.	Windshield Wiper Deicer System	23
5.	Remote Control Mirror System	25
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12.	Rear Quarter Glass	39
13.	Roof Window Glass	41
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19.	Outer Mirror	51
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1. General Description S905001

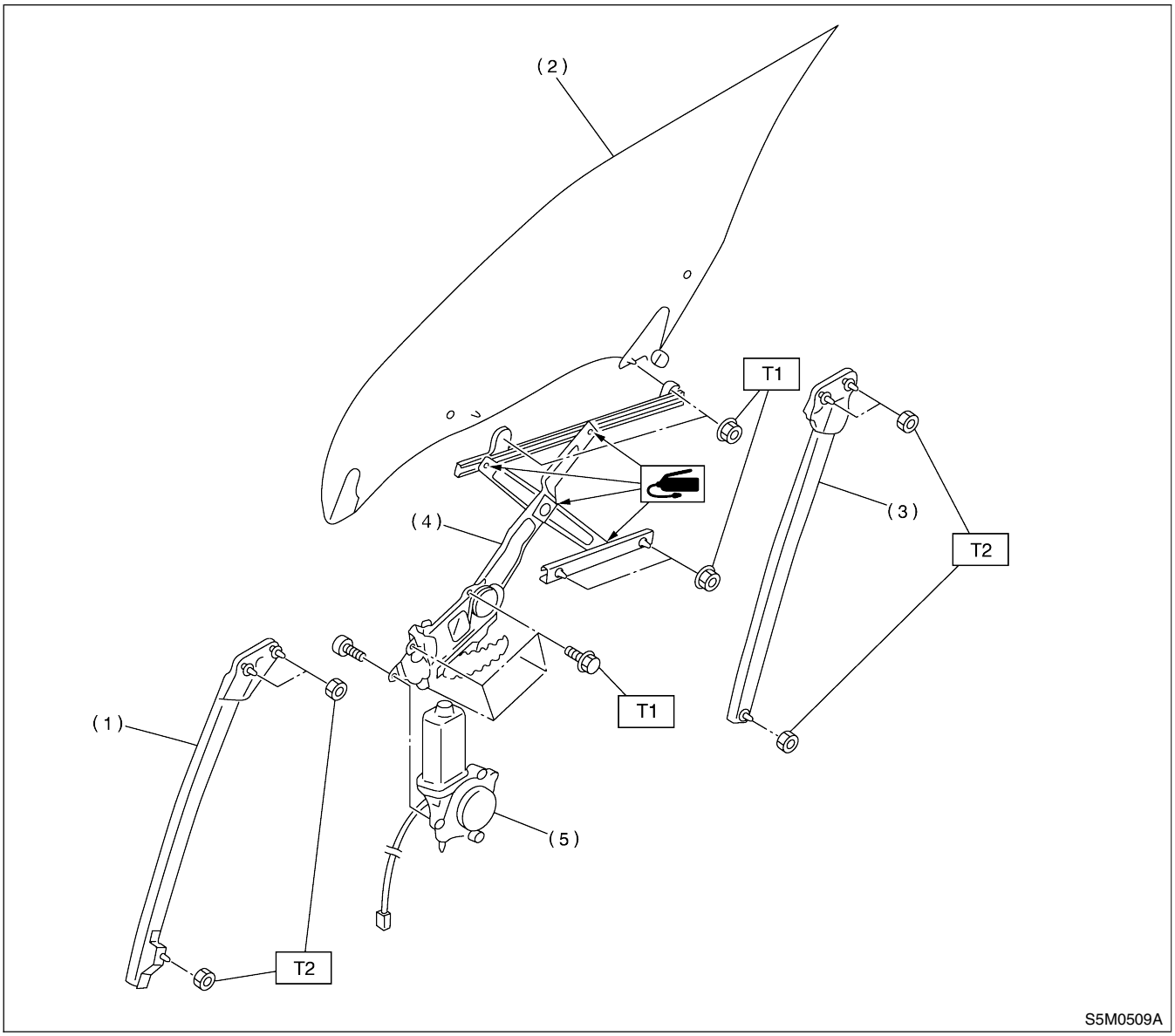
A: COMPONENT S905001A05

1. FIXED GLASS S905001A0506



(1) Windshield glass
(2) Dam rubber
(3) Molding
(4) Rearview mirror mount
(5) Side molding
(6) Rear quarter glass
(7) Locate pin
(8) Rear quarter garnish
(9) Rear gate glass
(10) Spring

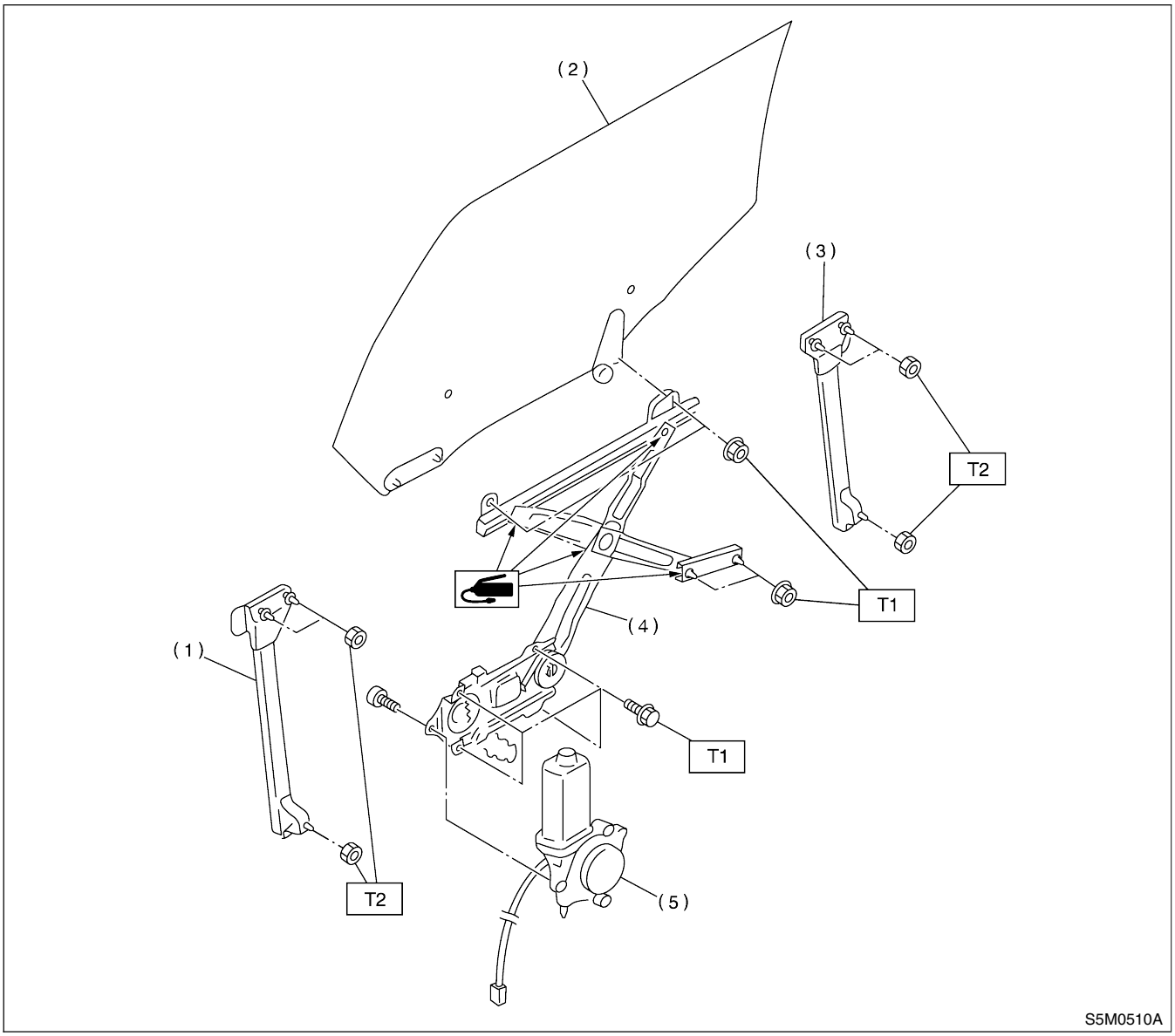
2. FRONT DOOR GLASS S905001A0503



(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: 7.35 (0.75, 5.4)
T2: 14 (1.4, 10.1)

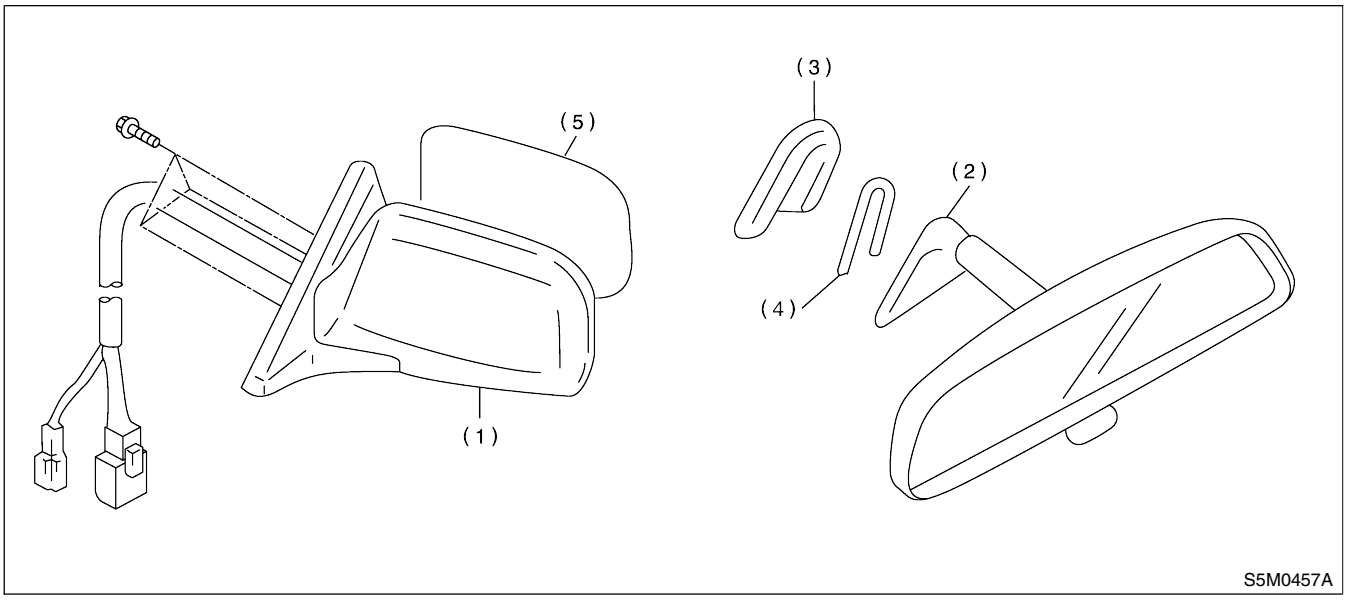
3. REAR DOOR GLASS S905001A0504



(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: 7.35 (0.75, 5.4)
T2: 14 (1.4, 10.1)

4. MIRRORS S905001A0505



(1) Outer mirror
(2) Inner rearview mirror
(3) Mount
(4) Spring
(5) Mirror

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

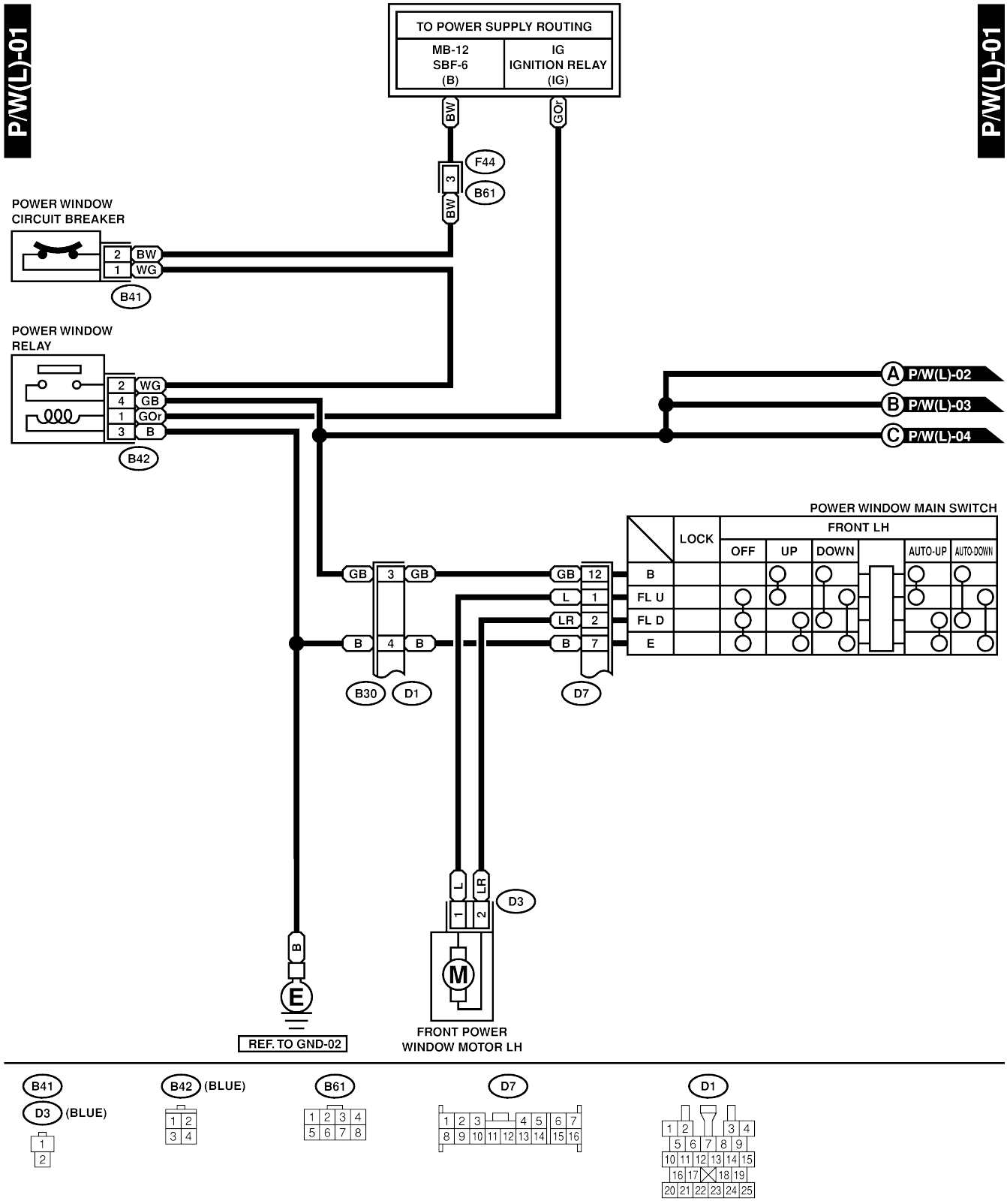
TOOL NAME	REMARKS
Circuit Tester	Used for checking voltage and continuity.
Piano Wire	Used for window glass removal.
Windshield Knife	Used for window glass removal.

2. Power Window System S905456

A: SCHEMATIC S905456A21

POWER WINDOW SYSTEM

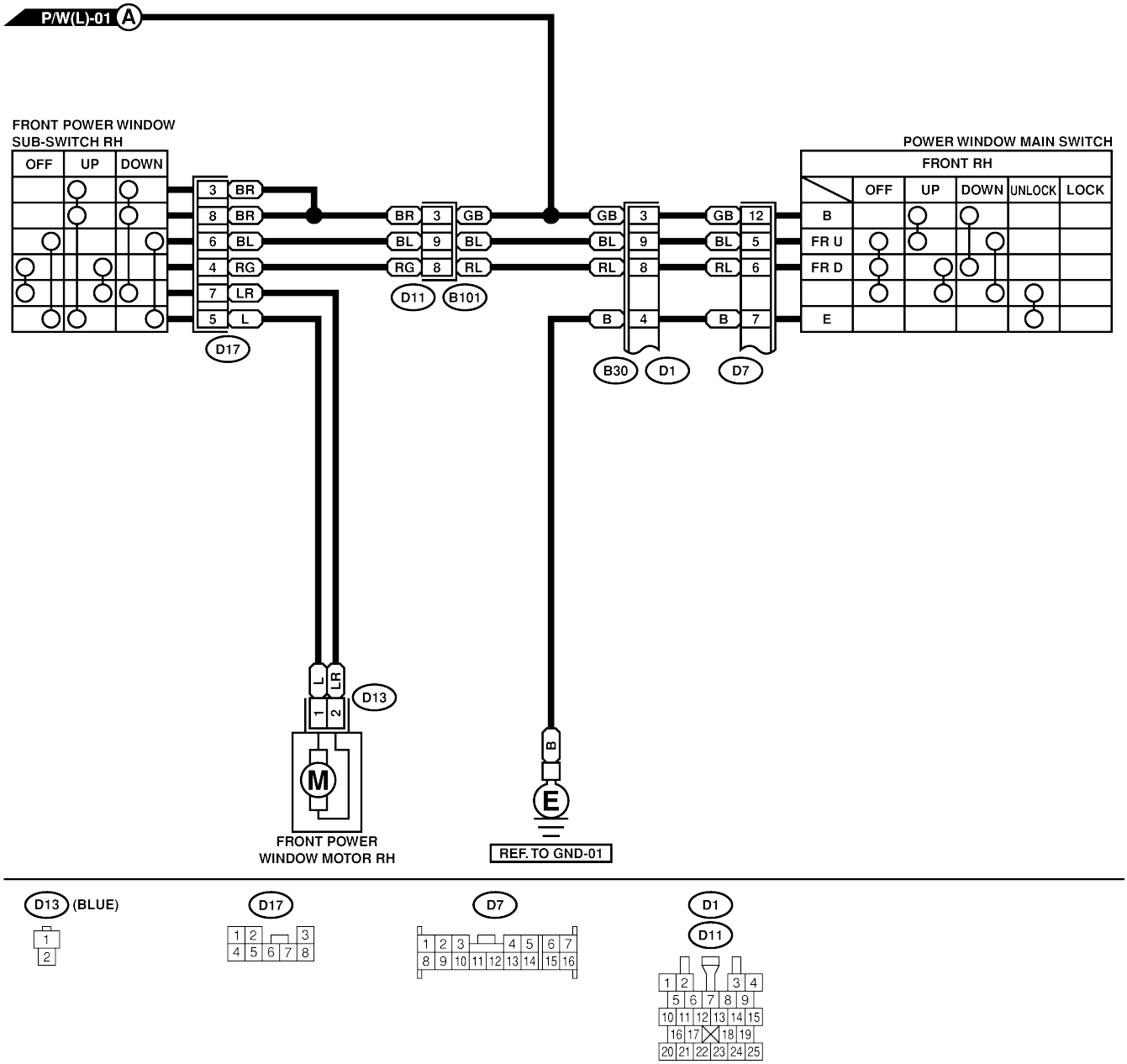
1. POWER WINDOW LHD MODEL S905456A2101



SL70-20A

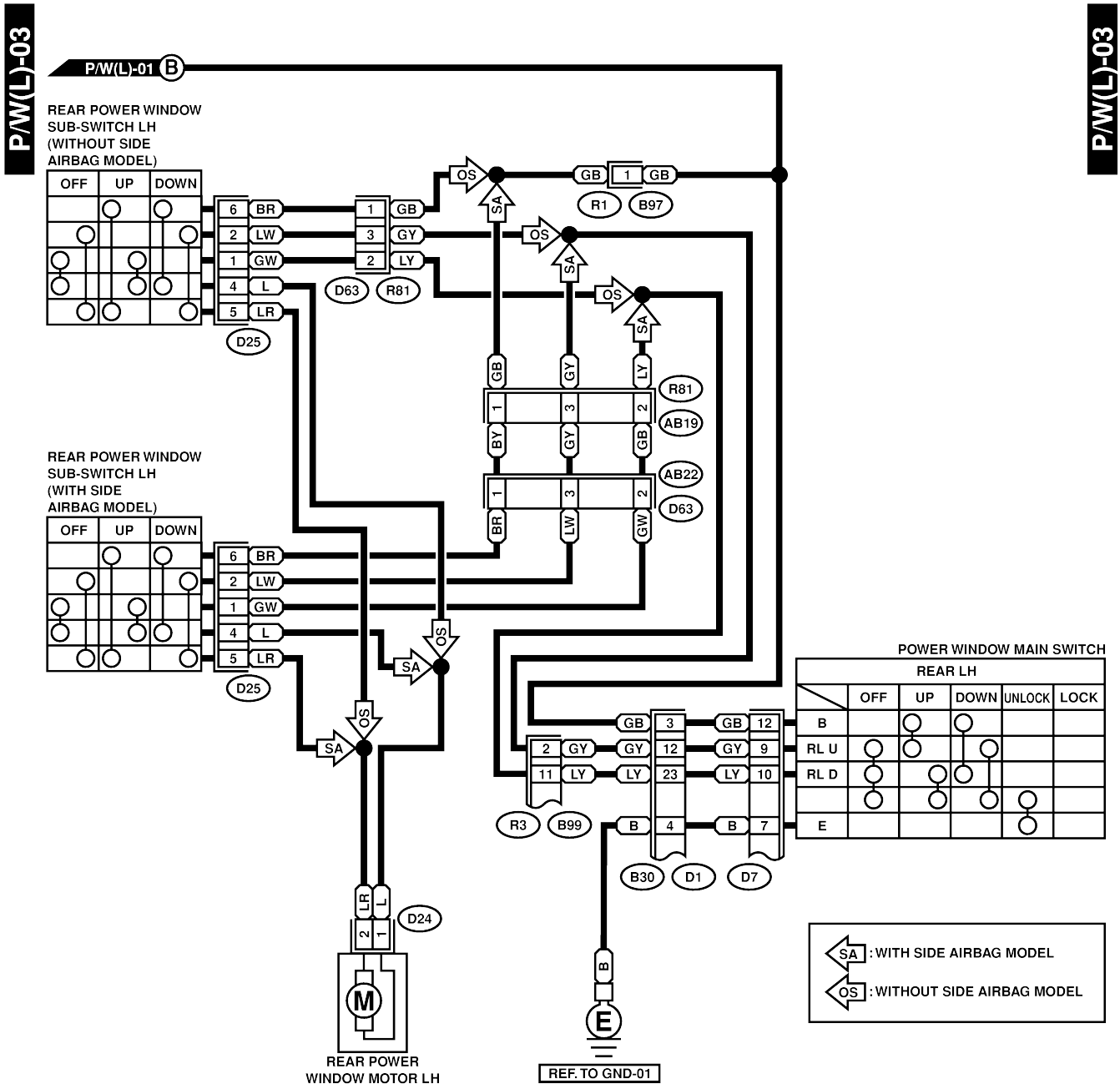
P/W(L)-02

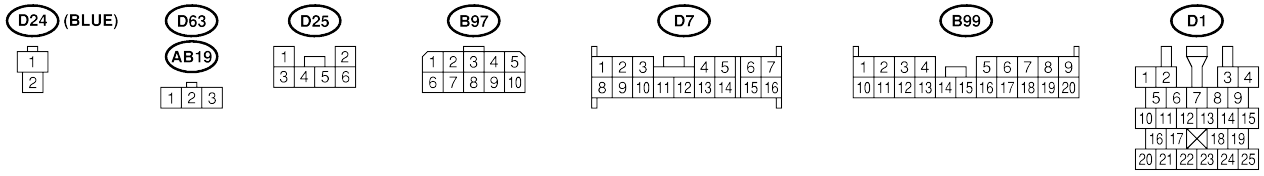
P/W(L)-02



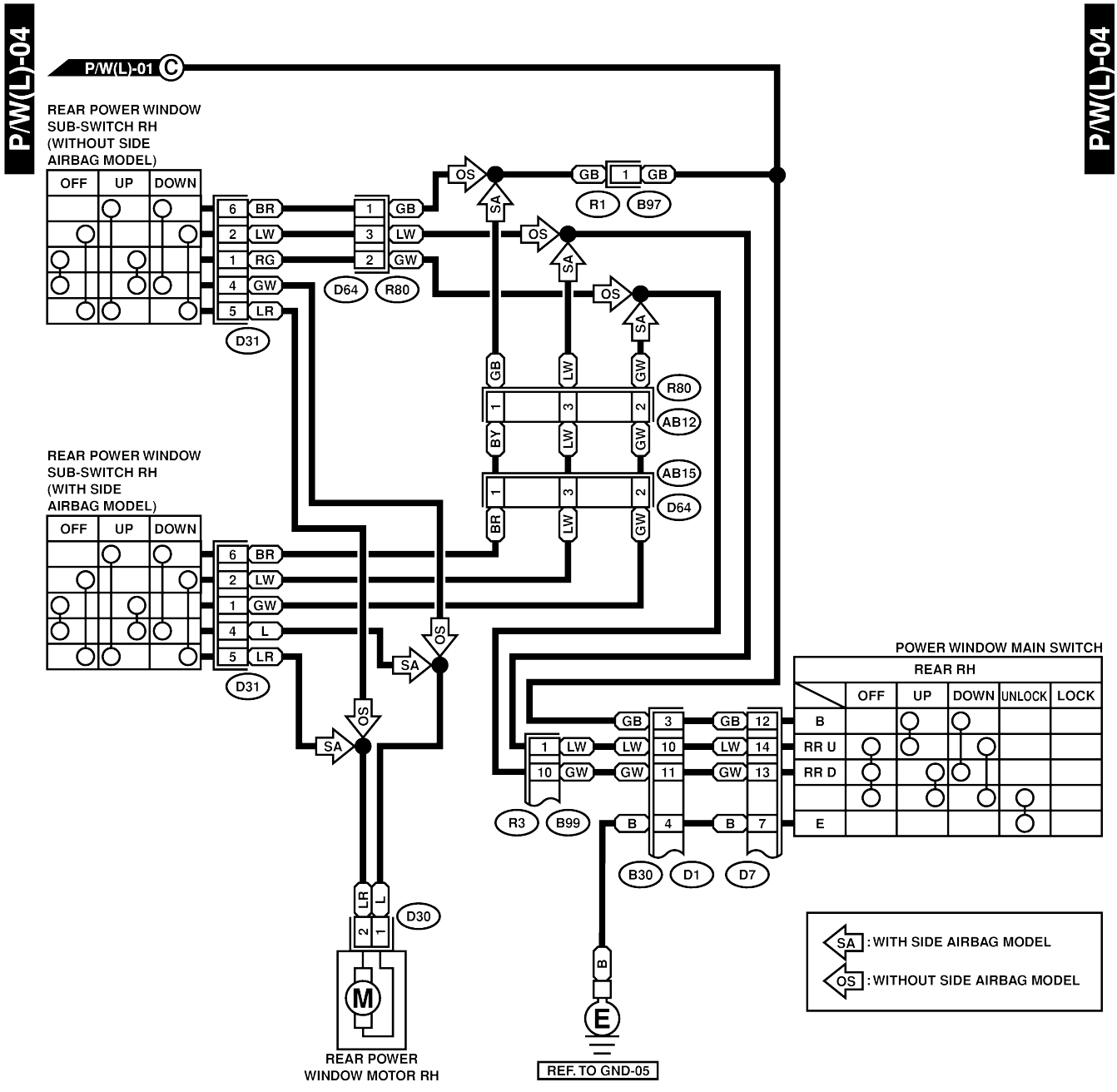
SL70-20B

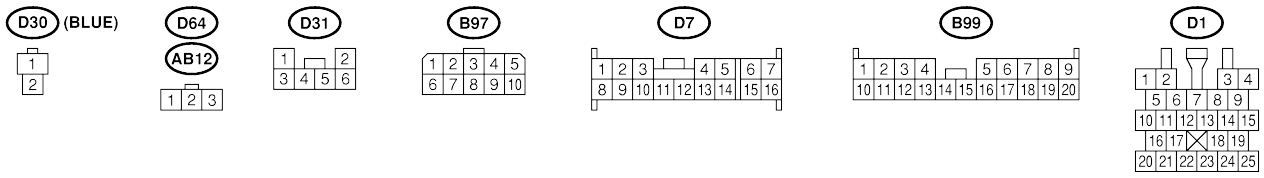
POWER WINDOW SYSTEM





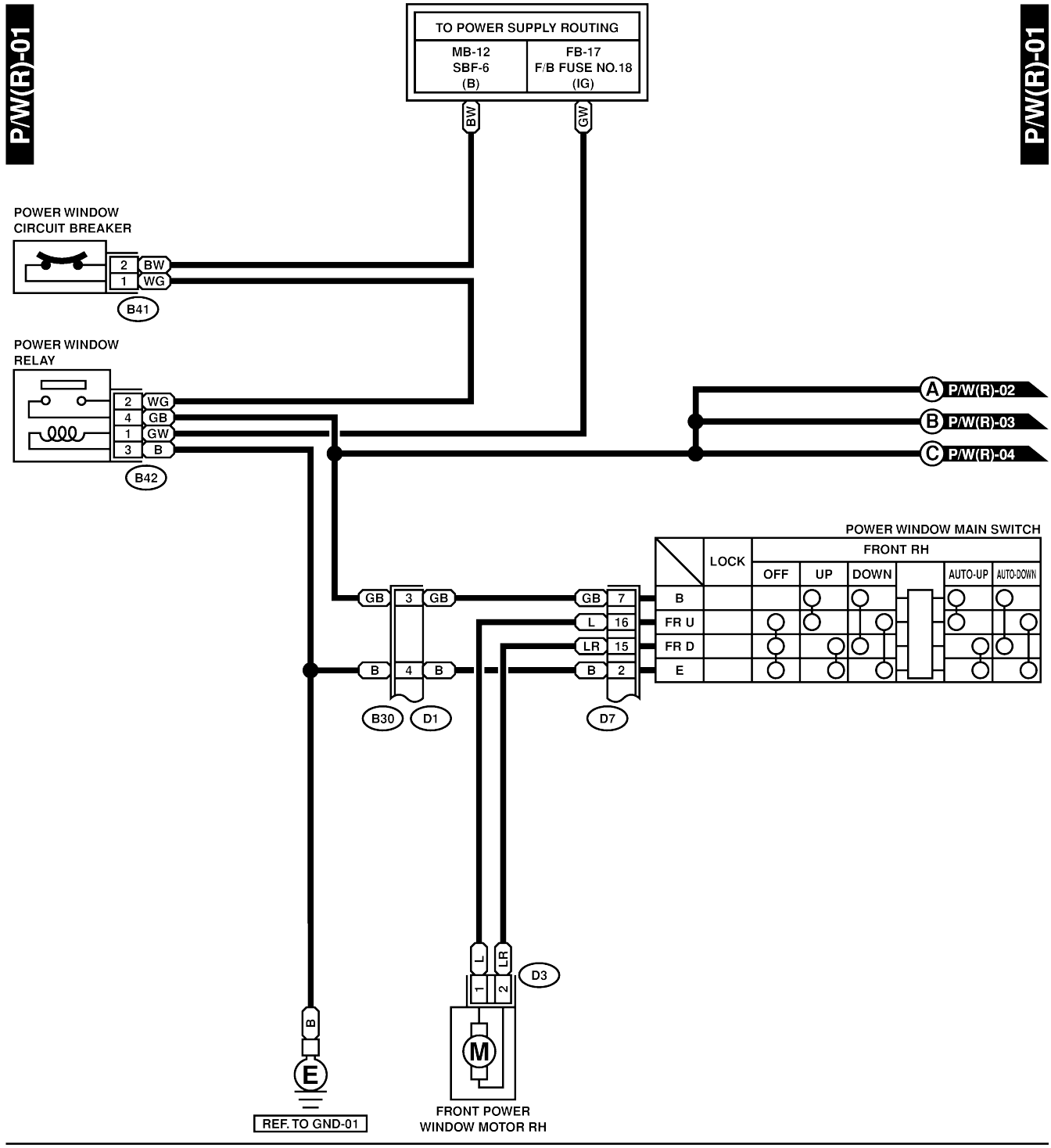
SL70-20C

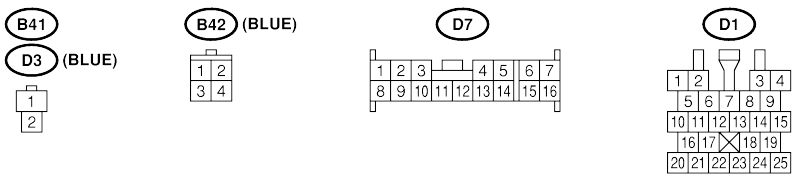

P/W(L)-04
P/W(L)-04
P/W(L)-01 C
REAR POWER WINDOW SUB-SWITCH RH (WITHOUT SIDE AIRBAG MODEL)
OFF UP DOWN
6 BR
2 LW
1 RG
4 GW
5 LR
D31
1 GB
3 LW
2 GW
D64
R80
OS
SA
GB 1 GB
R1
B97
REAR POWER WINDOW SUB-SWITCH RH (WITH SIDE AIRBAG MODEL)
OFF UP DOWN
6 BR
2 LW
1 GW
4 L
5 LR
D31
GB LW GW
BY LW GW
BR LW GW
R80
AB12
AB15
D64
POWER WINDOW MAIN SWITCH
REAR RH
OFF UP DOWN UNLOCK LOCK
B
RR U
RR D
E
1 LW
10 GW
GB 3
LW 10
GW 11
GB 12
LW 14
GW 13
R3
B99
B 4
B 7
B30
D1
D7
LR
L
2
1
D30
M
REAR POWER WINDOW MOTOR RH
B
E
REF. TO GND-05
SA : WITH SIDE AIRBAG MODEL
OS : WITHOUT SIDE AIRBAG MODEL


D30 (BLUE)
D64
AB12
D31
B97
D7
B99
D1

SL70-20D

2. POWER WINDOW RHD MODEL S905456A2102

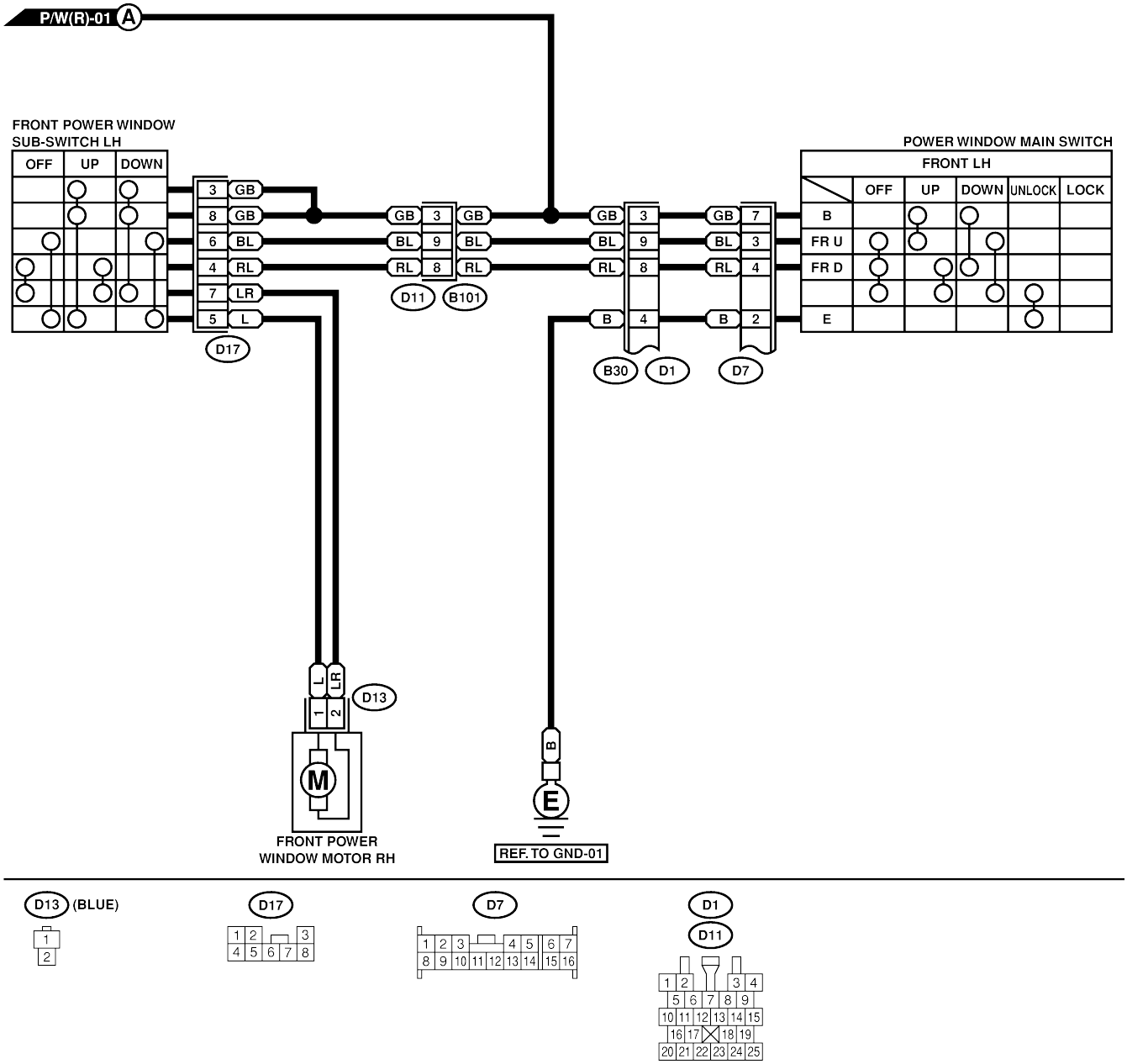




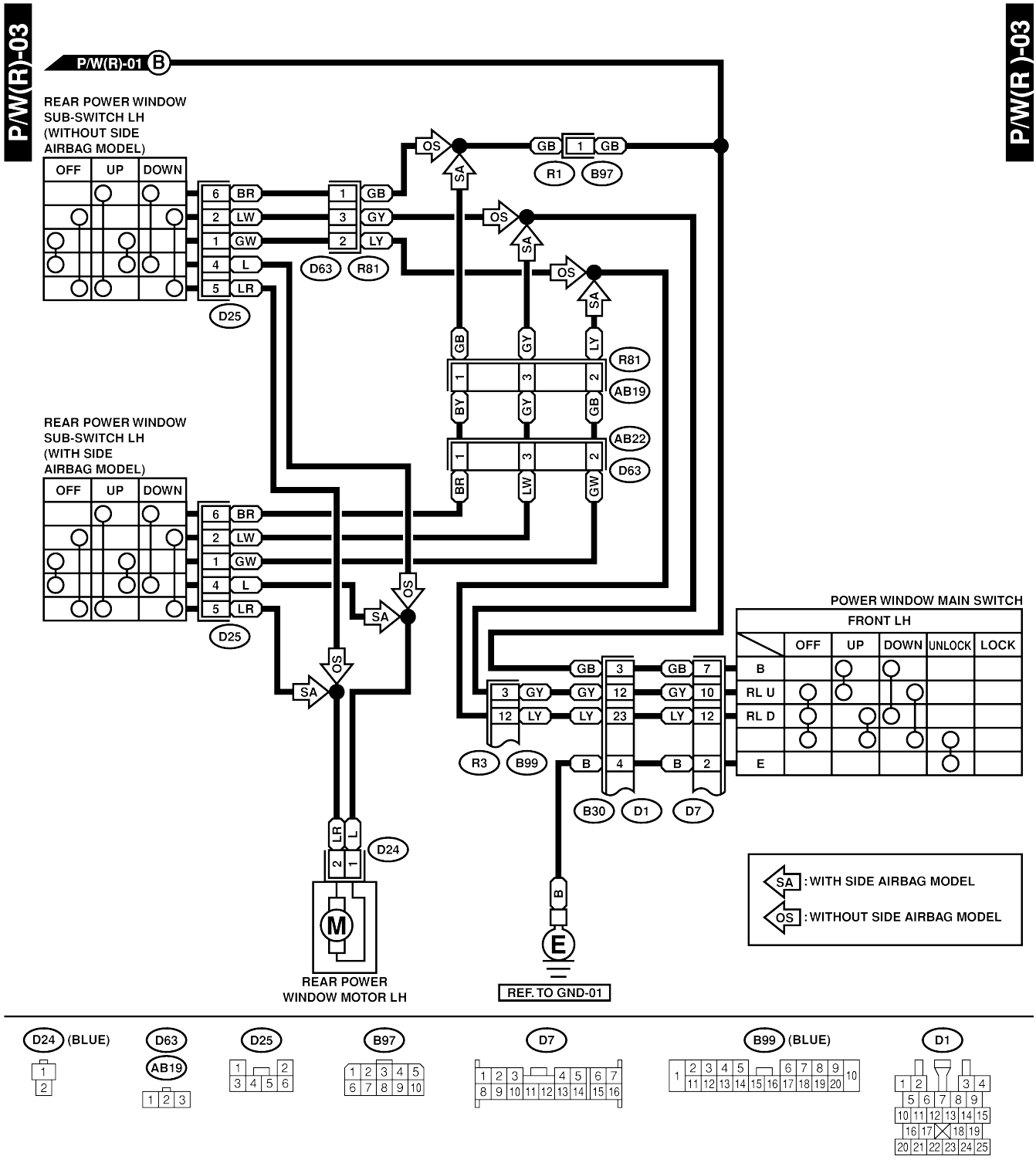
SR70-20A

P/W(R)-02

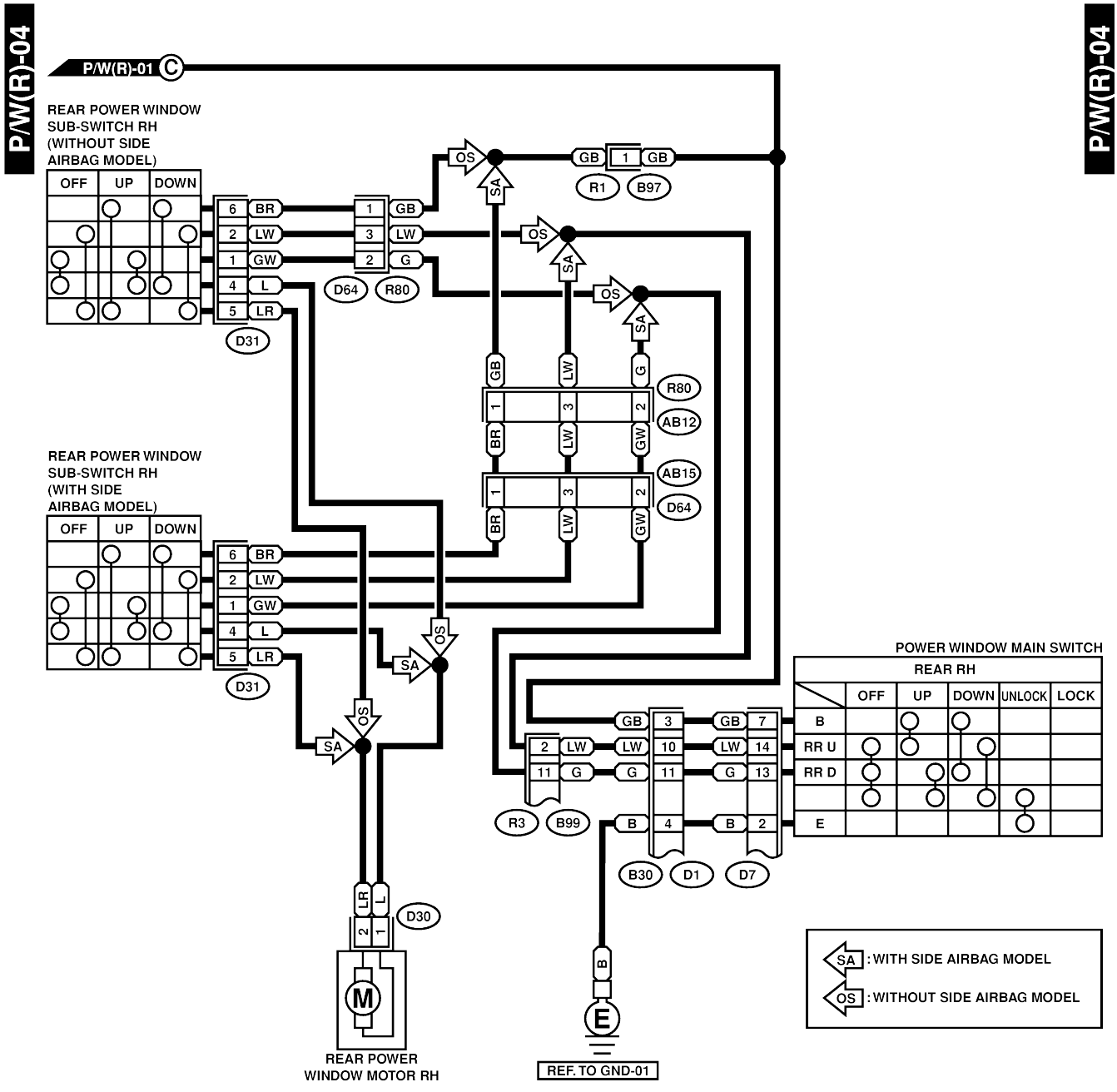
P/W(R)-02

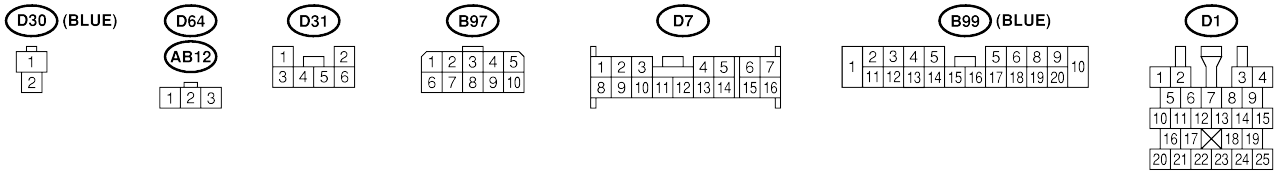


SR70-20B


P/W(R)-03
P/W(R)-01 B
REAR POWER WINDOW SUB-SWITCH LH (WITHOUT SIDE AIRBAG MODEL)
OFF UP DOWN
6 BR
2 LW
1 GW
4 L
5 LR
D25
1 GB
3 GY
2 LY
D63 R81
OS SA
GB 1 GB
R1 B97
R81
AB19
AB22
D63
REAR POWER WINDOW SUB-SWITCH LH (WITH SIDE AIRBAG MODEL)
POWER WINDOW MAIN SWITCH
FRONT LH
OFF UP DOWN UNLOCK LOCK
B
RL U
RL D
E
GB 3 GB 7
3 GY GY 12 GY 10
12 LY LY 23 LY 12
B 4 B 2
R3 B99
B30 D1 D7
LR L
2 1
D24
M
REAR POWER WINDOW MOTOR LH
B
E
REF. TO GND-01
SA : WITH SIDE AIRBAG MODEL
OS : WITHOUT SIDE AIRBAG MODEL
D24 (BLUE)
D63
AB19
D25
B97
D7
B99 (BLUE)
D1

SR70-20C


P/W(R)-04
P/W(R)-04
P/W(R)-01 C
REAR POWER WINDOW SUB-SWITCH RH (WITHOUT SIDE AIRBAG MODEL)
OFF UP DOWN
6 BR
2 LW
1 GW
4 L
5 LR
D31
OS
SA
GB 1 GB
R1 B97
1 GB
3 LW
2 G
D64 R80
R80
AB12
AB15
D64
REAR POWER WINDOW SUB-SWITCH RH (WITH SIDE AIRBAG MODEL)
POWER WINDOW MAIN SWITCH
REAR RH
OFF UP DOWN UNLOCK LOCK
B
RR U
RR D
E
GB 3 GB 7
2 LW LW 10 LW 14
11 G G 11 G 13
R3 B99
B 4 B 2
B30 D1 D7
LR L
2 1
D30
M
REAR POWER WINDOW MOTOR RH
B
E
REF. TO GND-01
SA : WITH SIDE AIRBAG MODEL
OS : WITHOUT SIDE AIRBAG MODEL


D30 (BLUE)
D64
AB12
D31
B97
D7
B99 (BLUE)
D1

SR70-20D

B: INSPECTION S905456A10

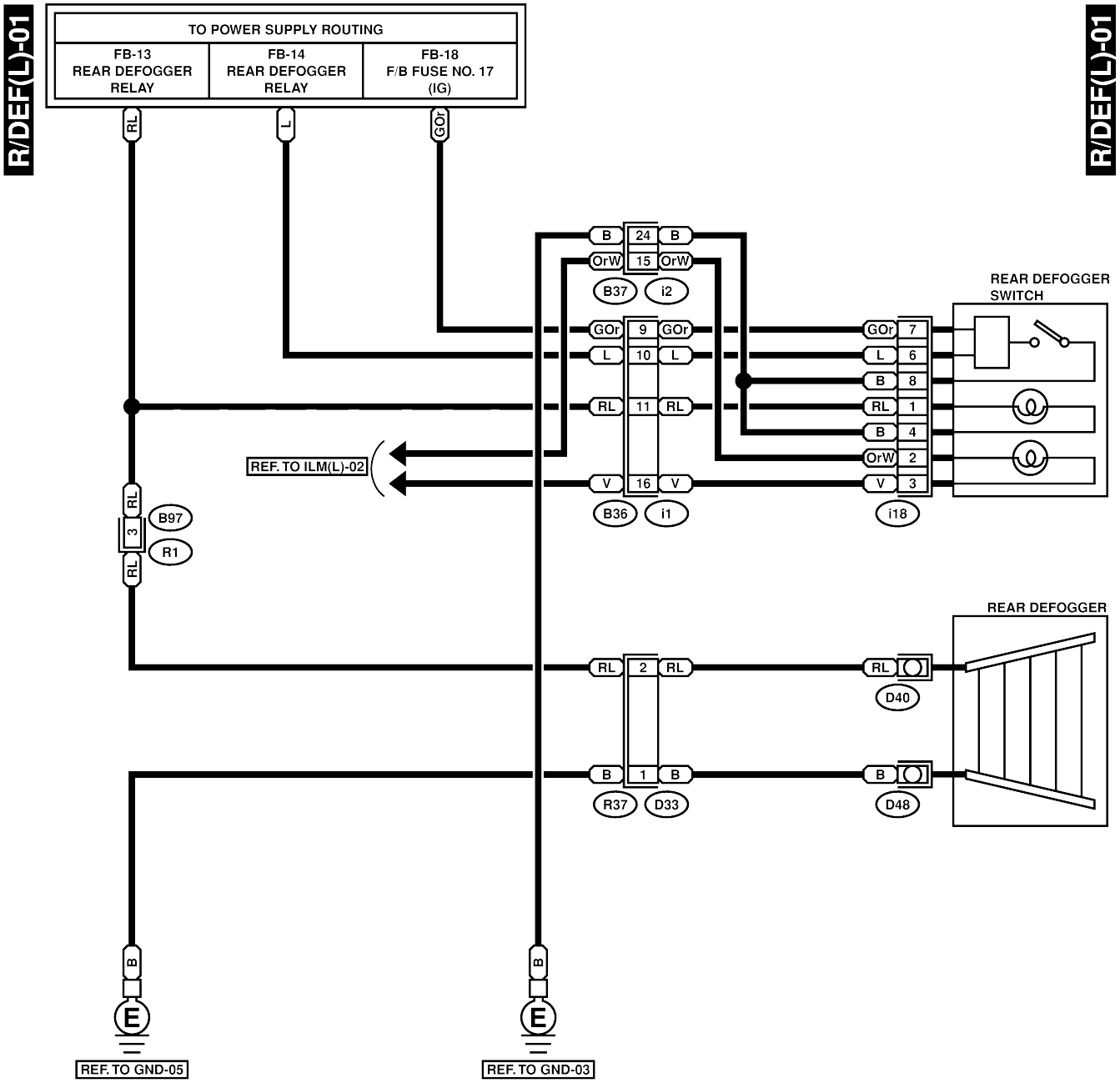
Symptom	Repair order
All power windows does not operate.	(1) Fuse (SBF-6) (F/B No. 18) (2) Power window circuit breaker (3) Power window relay (4) Wire harness
One window does not operate.	(1) Power window main switch (2) Power window sub switch (3) Power window motor (4) Wire harness
“Window Lock” does not operate.	(1) Power window main switch

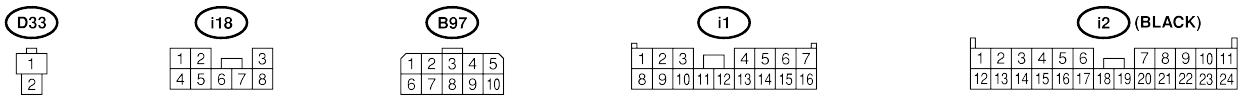
3. Rear Window Defogger System S905455

A: SCHEMATIC S905455A21

REAR WINDOW DEFOGGER SYSTEM

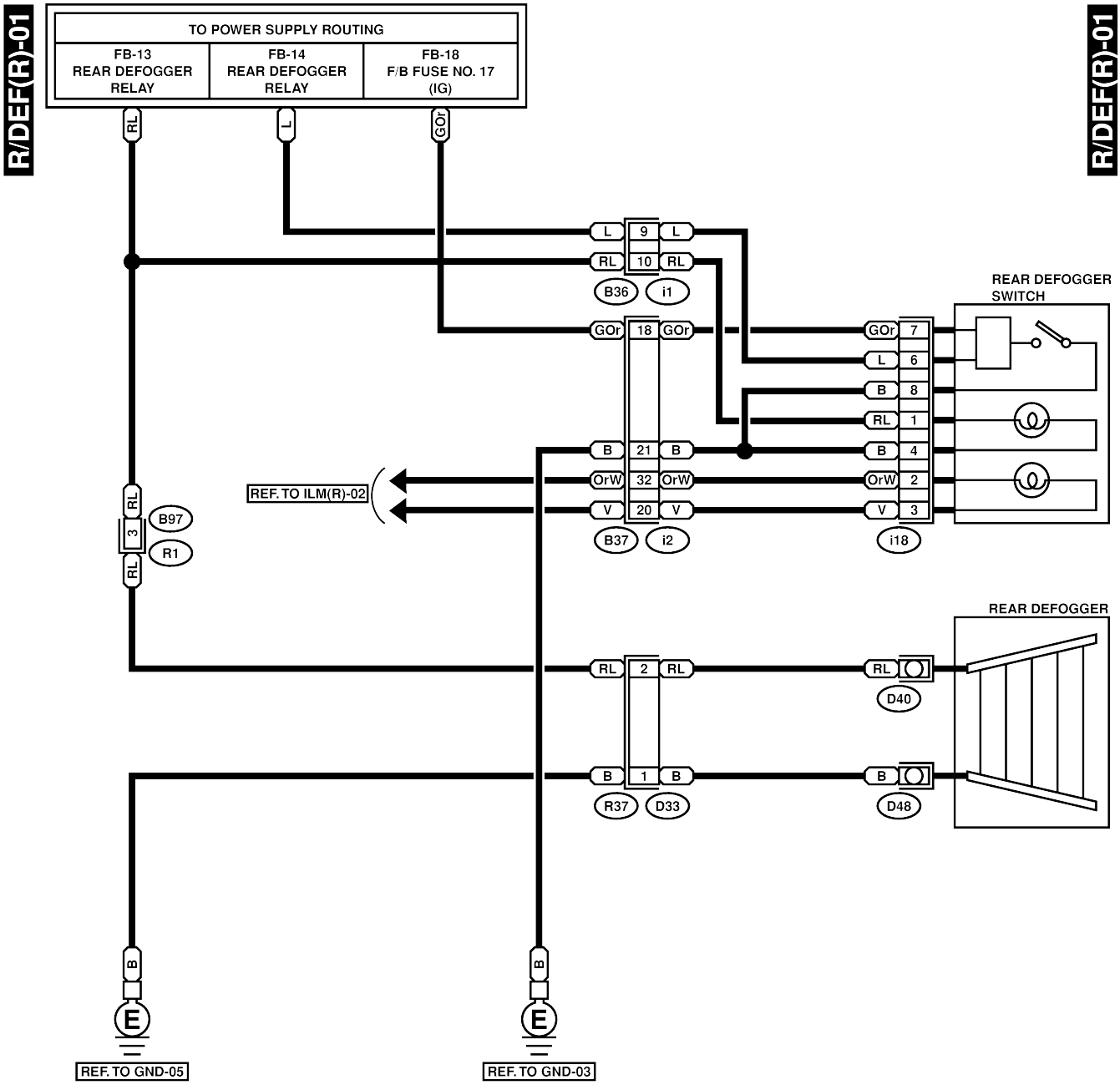
1. REAR WINDOW DEFOGGER LHD MODEL S905455A2102

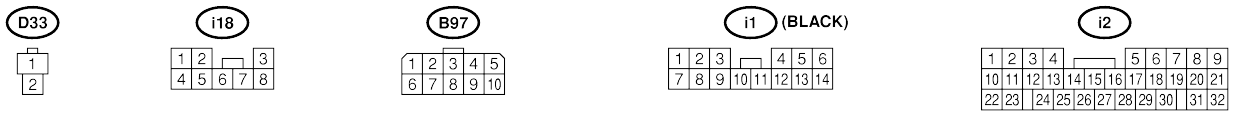




SL52-20

2. REAR WINDOW DEFOGGER RHD MODEL S905455A2103





SR52-20

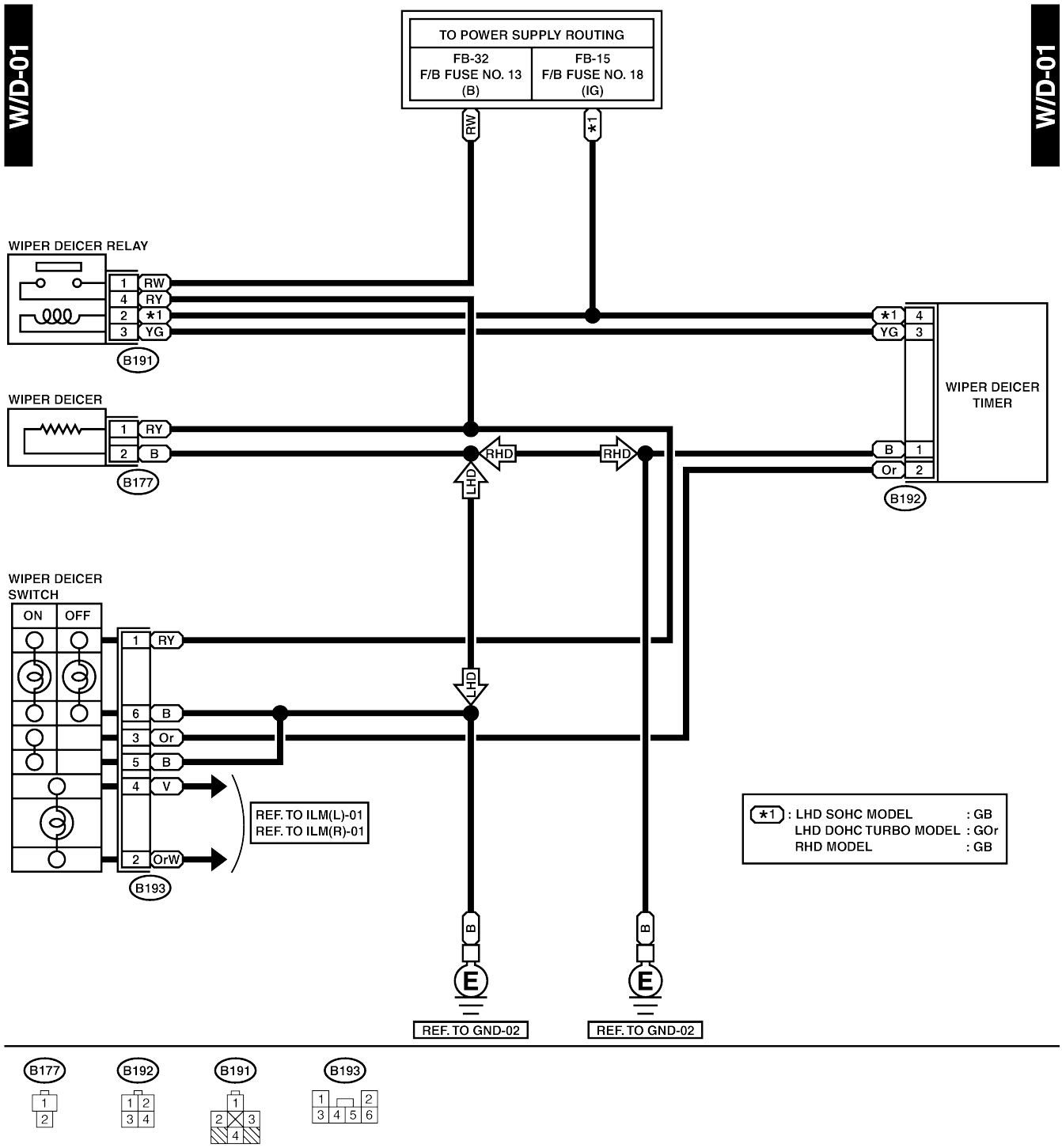
B: INSPECTION S905455A10

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

1. WINDSHIELD WIPER DEICER S905457A2101



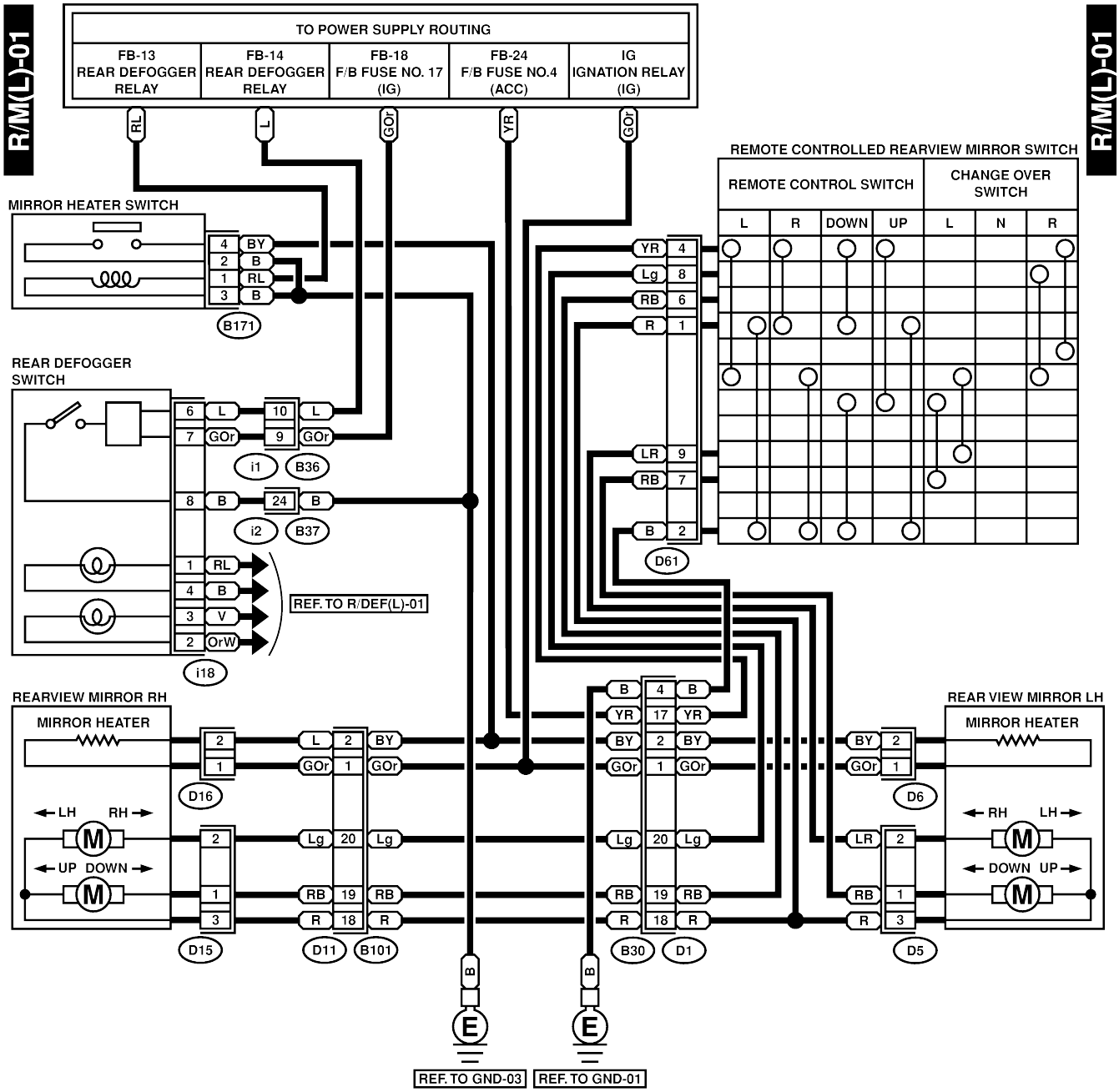
B: INSPECTION S905457A10

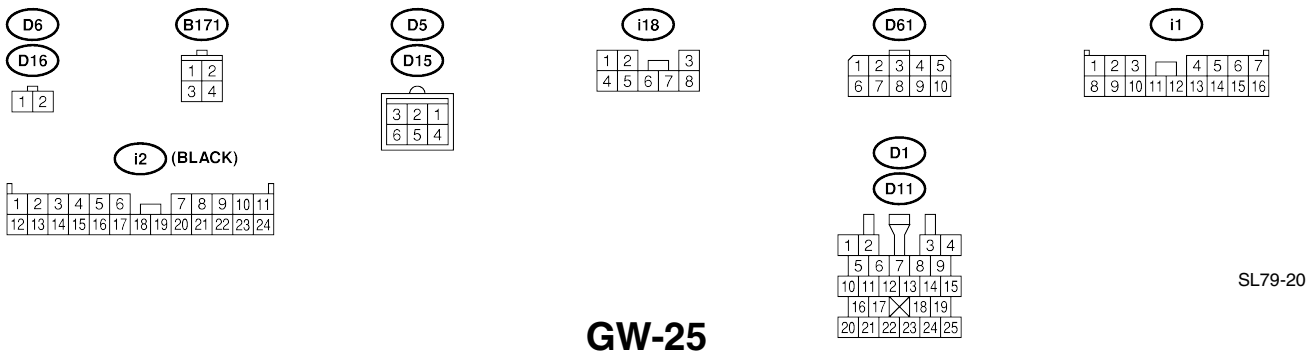
Symptom	Repair order
Wiper deicer does not operate.	(1) Fuse (F/B No. 18, 19) (2) Wiper deicer relay (3) Wiper deicer switch (4) Wire harness

5. Remote Control Mirror System S905458

A: SCHEMATIC S905458A21

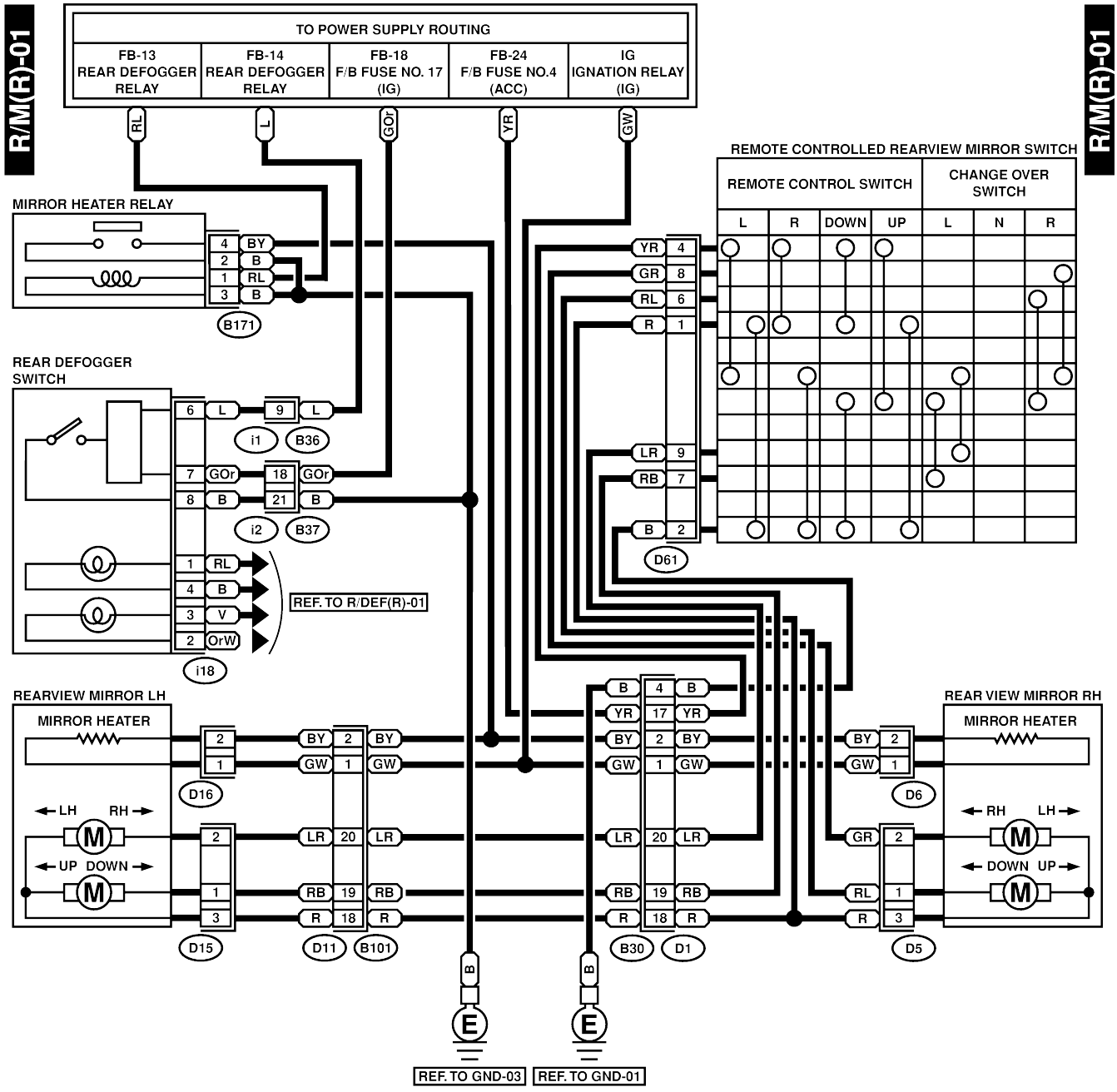
1. REMOTE CONTROL MIRROR LHD MODEL S905458A2102

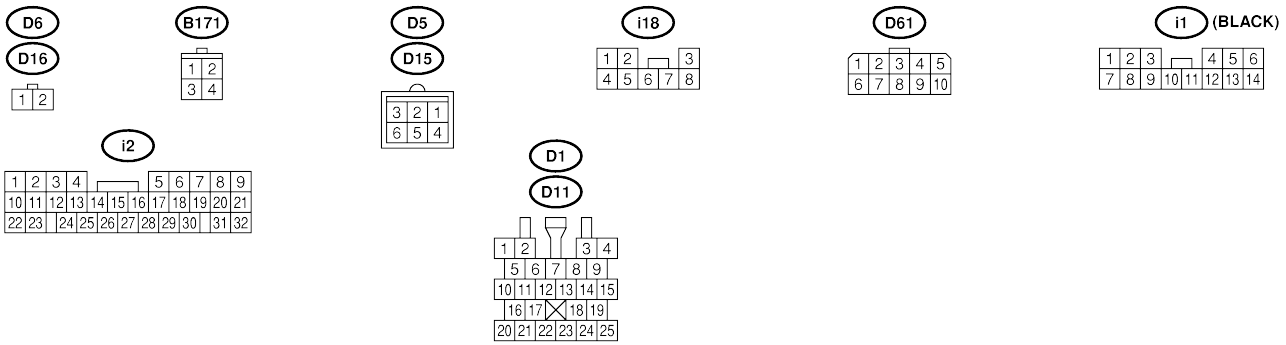




SL79-20

2. REMOTE CONTROL MIRROR RHD MODEL S905458A2103





SR79-20

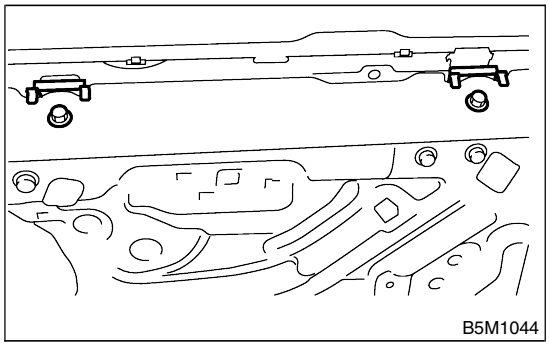
B: INSPECTION S905458A10

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

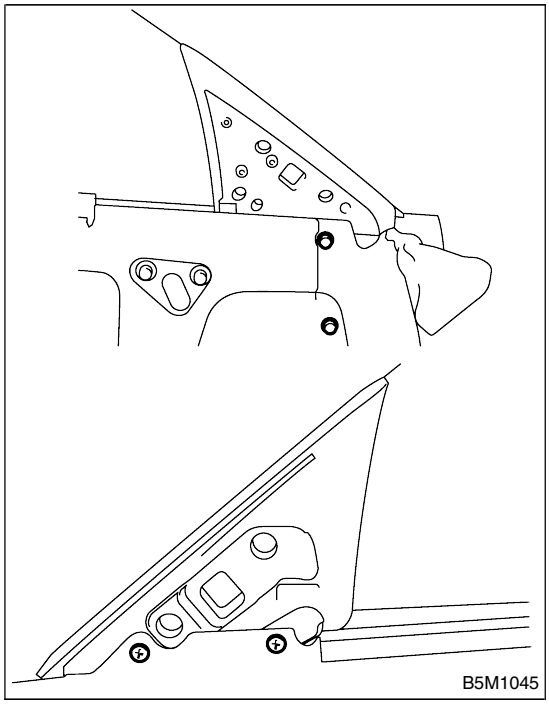
6. Front Door Glass S905452

A: REMOVAL S905452A18

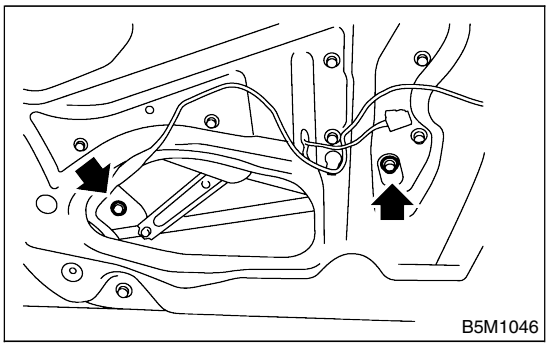
1) Remove door trim. <Ref. to EI-26, REMOVAL, Front Door Trim.>
2) Remove sealing cover. <Ref. to EB-13, REMOVAL, Front Sealing Cover.>
3) Remove inner remote. <Ref. to SL-27, REMOVAL, Front Inner Remote.>
4) Remove inner stabilizer.


B5M1044

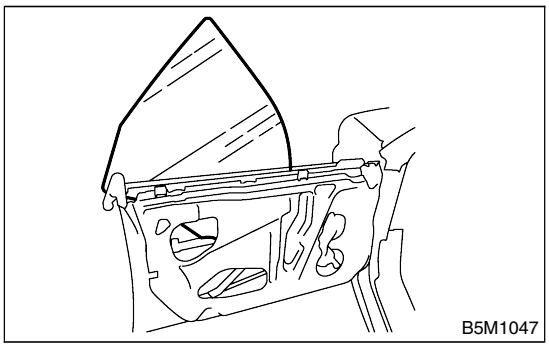
5) Remove outer mirror. <Ref. to GW-49, REMOVAL, Outer Mirror Assembly.>
6) Remove gusset.


B5M1045

7) 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

8) 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.

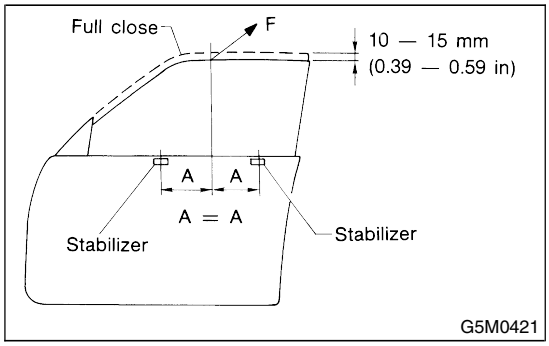
CAUTION:
Make sure that glass stay is placed securely in sash.

2) Adjust front door glass. <Ref. to GW-29, ADJUSTMENT, Front Door Glass.>

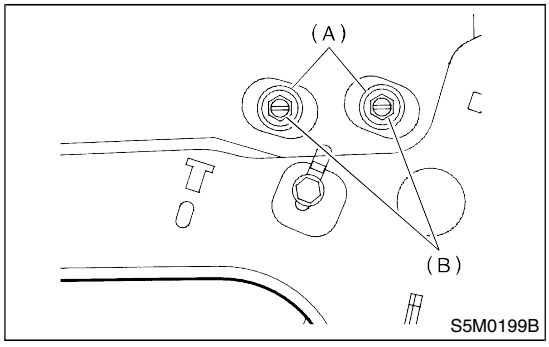
C: ADJUSTMENT S905452A01

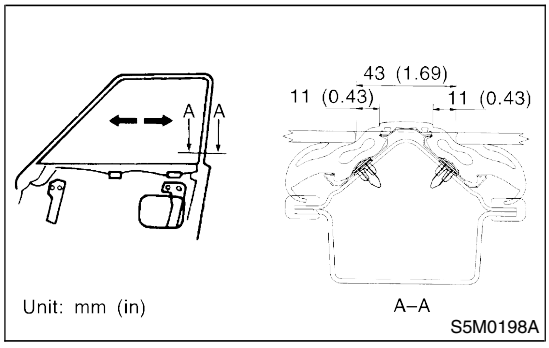
NOTE:
Before adjustment, ensure that all adjusting bolts of stabilizer, upper stopper, and sash are loose and door glass is raised so that it is in contact with weatherstrip.

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 45.0±4.9 N (4.59±0.50 kgf, 10.12±1.10 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.

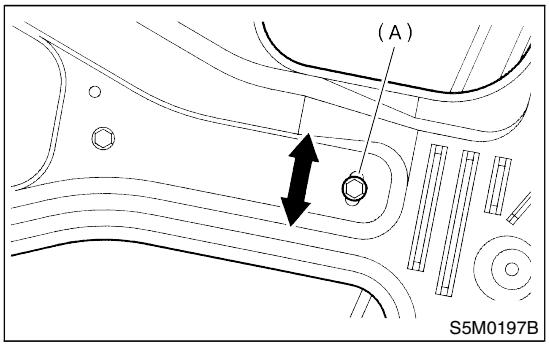


4) For adjustment of clearance between front and rear glasses, loosen nuts (A), and move glass sash back and forward until clearance becomes the value shown.

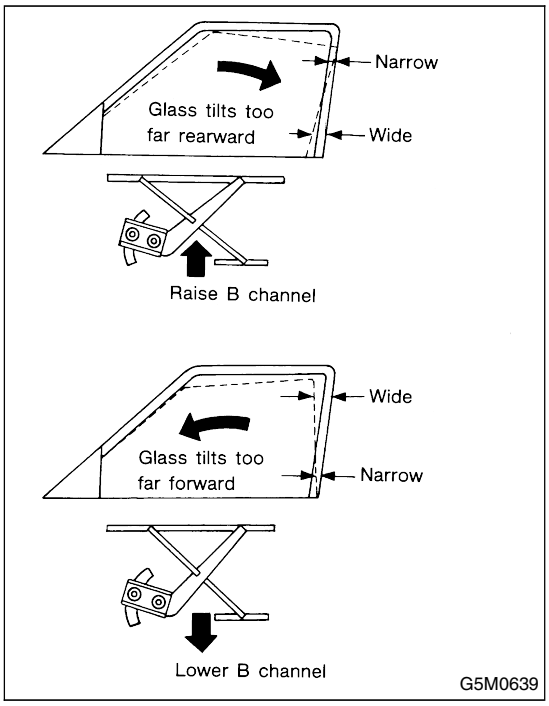




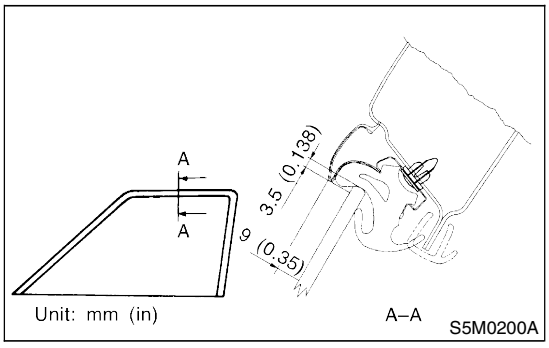
5) For adjustment of upper and lower ends of center pillar, loosen adjusting nut (A).



6) Adjust so that upper and lower ends of center pillar are the same size.



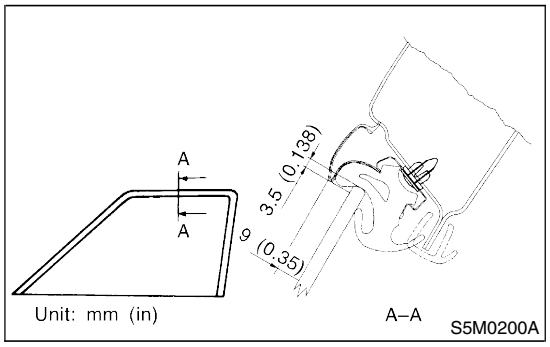
7) For glass stroke adjustment, close door, raise glass until positional relationship between glass and weatherstrip becomes as shown. And secure the glass so that upper stopper lightly touches the glass holder.



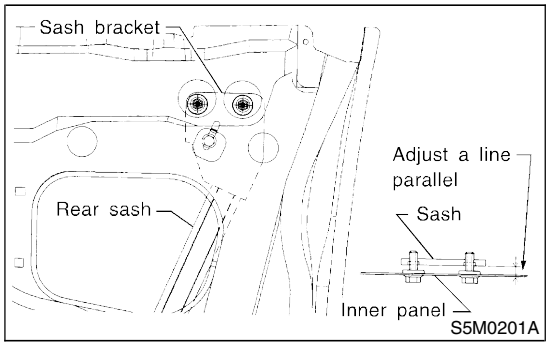
8) After stabilizer adjustment, carry out glass crimp adjustment. First, visually ensure positional relationship between retainer & molding and glass of the roof side, and then begin with rear sash adjustment. Adjust two adjusting bolts alternately step by step to obtain dimensions shown below (cross-section 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.



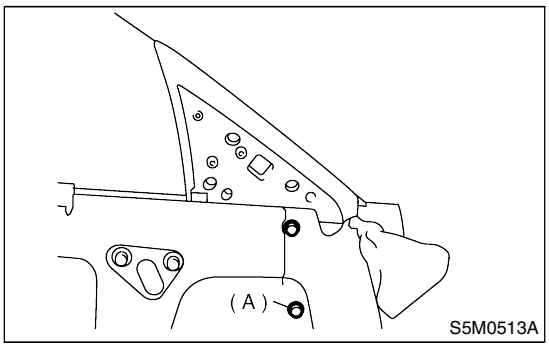
CAUTION:
Do not tilt sash bracket to inner panel during adjustment. Otherwise smooth regulator operation cannot be achieved.



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.

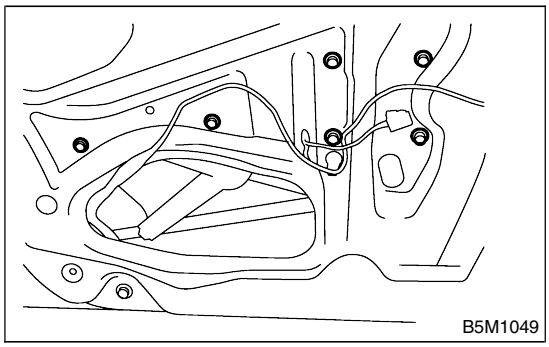


14) After adjustment, tighten bolts and nuts.

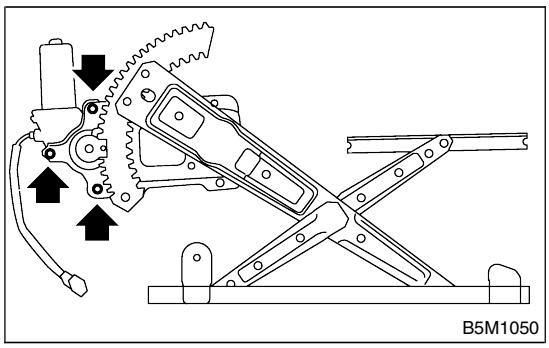
7. Front Regulator and Motor Assembly S905449

A: REMOVAL S905449A18

1) Remove door trim. <Ref. to EI-26, REMOVAL, Front Door Trim.>
2) Remove sealing cover. <Ref. to EB-13, REMOVAL, Front Sealing Cover.>
3) Remove inner remote. <Ref. to SL-27, REMOVAL, Front Inner Remote.>
4) Remove door glass. <Ref. to GW-28, REMOVAL, Front Door Glass.>
5) Disconnect electrical connector.
6) Loosen four bolts and two nuts to pull out regulator assembly.


B5M1049

7) 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-29, ADJUSTMENT, Front Door Glass.>

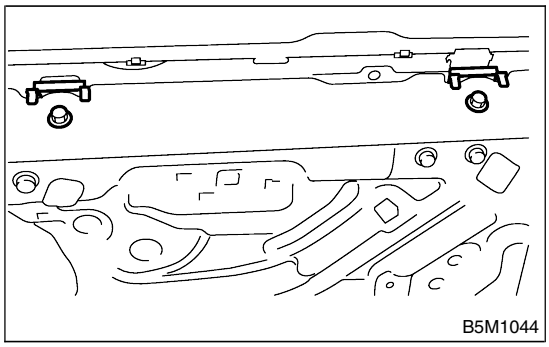
C: INSPECTION S905449A10

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.

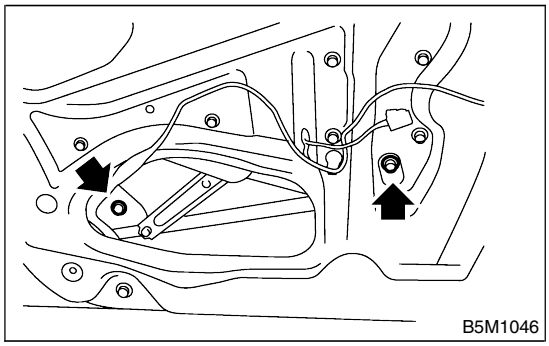
8. Rear Door Glass S905450

A: REMOVAL S905450A18

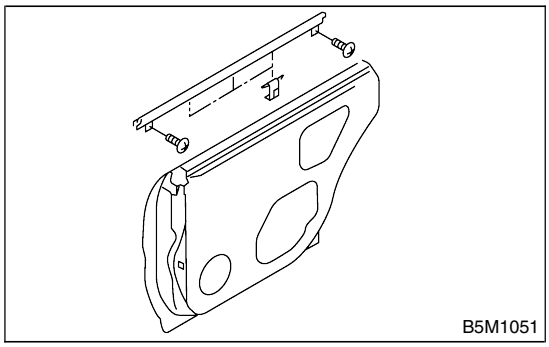
1) Remove door trim. <Ref. to EI-27, REMOVAL, Rear Door Trim.>
2) Remove sealing cover. <Ref. to EB-16, REMOVAL, Rear Sealing Cover.>
3) Remove stabilizer.


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.

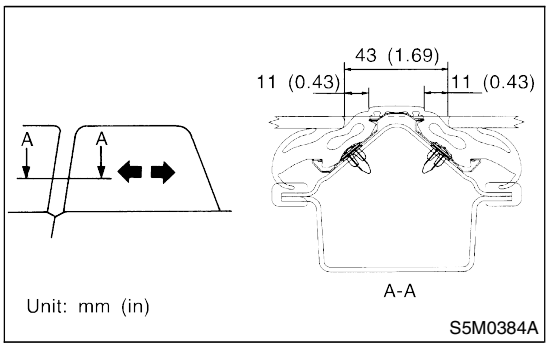
CAUTION:
Make sure that glass stay is placed securely in sash.

2) Adjust rear door glass. <Ref. to GW-32, 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.

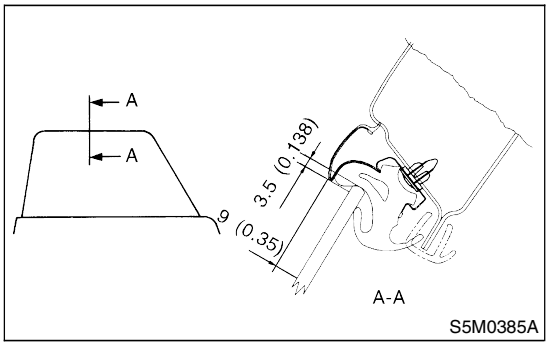
1) Adjust glass position using the following dimensions as a guide line.



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 be opened 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.



S5M0385A

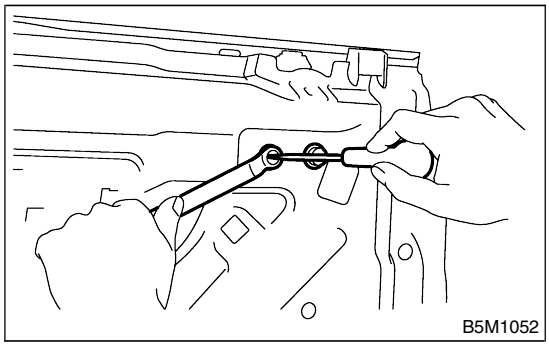
CAUTION:
• If crimp of rear glass is higher than necessary, glass may get caught in weatherstrip of center pillar corner, resulting in early

wear of weatherstrip. Be careful when adjusting.
• After adjustment, move glass up and down to check whether it is caught.

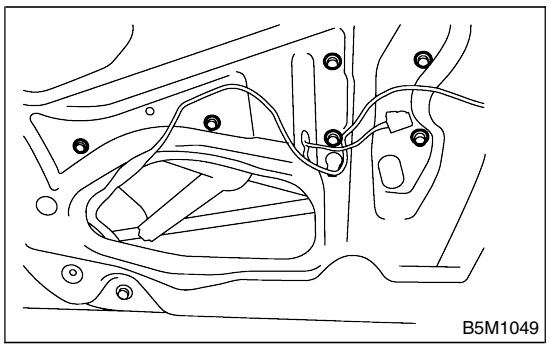
9. Rear Regulator and Motor Assembly S905451

A: REMOVAL S905451A18

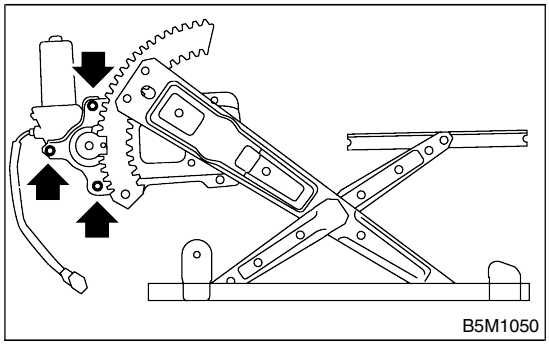
1) Remove door trim. <Ref. to EI-27, REMOVAL, Rear Door Trim.>
2) Remove sealing cover. <Ref. to EB-16, REMOVAL, Rear Sealing Cover.>
3) Remove door glass. <Ref. to GW-32, REMOVAL, Rear Door Glass.>
4) Secure bolts using screwdriver to remove front sash adjusting nut.


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-32, 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.

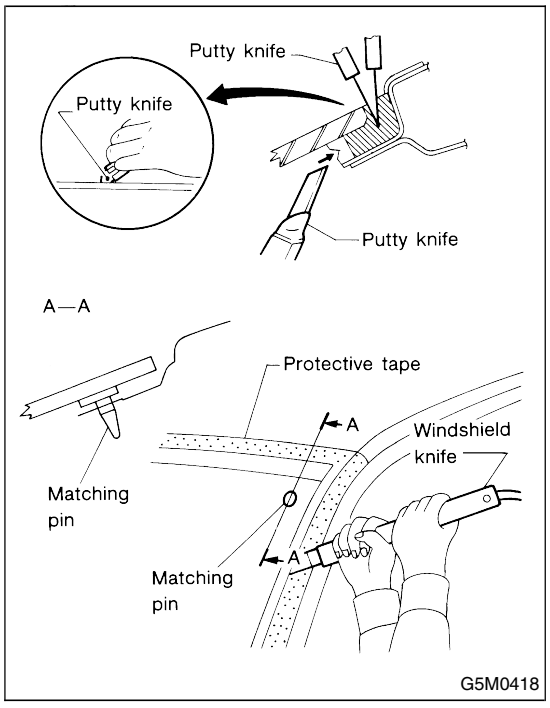
10. Windshield Glass S905448

A: REMOVAL S905448A18

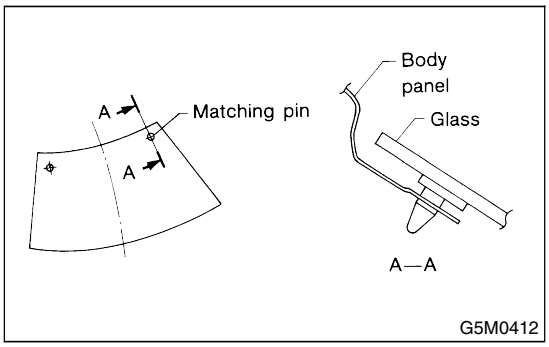
1. USING WINDSHIELD KNIFE S905448A1801

1) Remove cowl panel. <Ref. to EI-25, 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.**

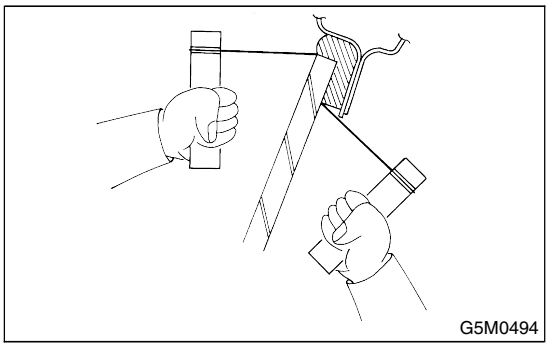


NOTE:
Because matching pins are bonded to the corners of glass, use piano wire to cut the pin.



2. USING PIANO WIRE S905448A1802

1) Remove cowl panel. <Ref. to EI-25, 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.



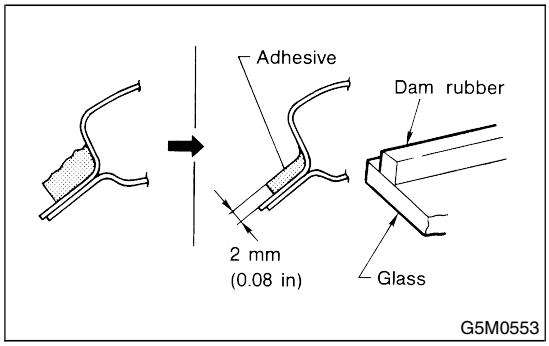
6) Pull the wire ends alternately to cut off the adhesive layer.

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.**

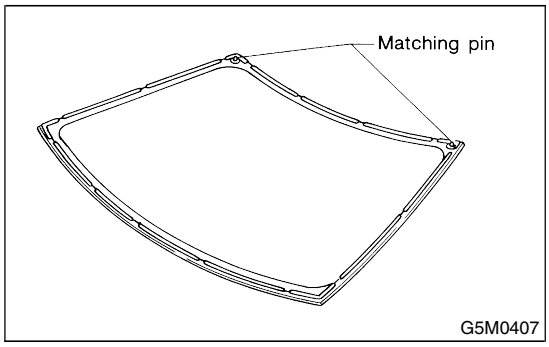
B: INSTALLATION S905448A11

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.

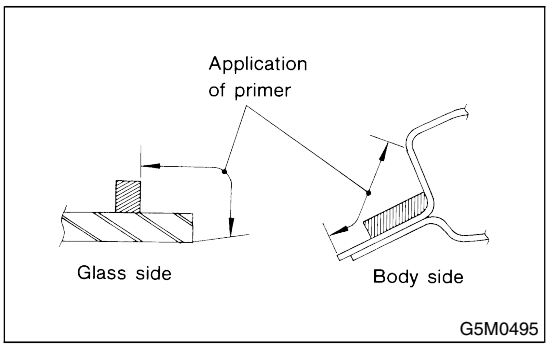


3) Clean body with alcohol or white gasoline to remove thoroughly chips, dusts, and dirts from body face.
4) Place glass on body.
5) Adjust glass position to make uniform clearance between body and glass in four corners.
6) Place matching pins and body on glass.

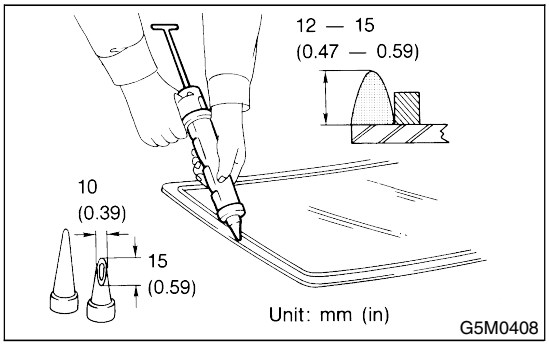


7) Remove glass from body.
8) Apply primer to adhesive layer of glass using sponge.
9) Apply primer to adhesive layer of body.

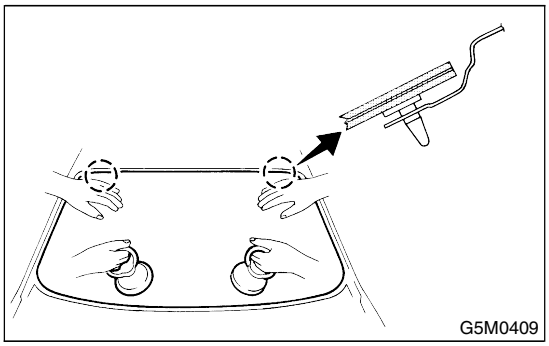
CAUTION:
- **Primer once attached to the painted surface of the body and internal trim is hard to wipe off. Mask the circumference of such areas.**
- **Let primer dry for about ten minutes before installing the glass.**
- **Do not touch surface coated with primer.**



10) Cut off cartridge nozzle tip and set it in sealant gun as shown.

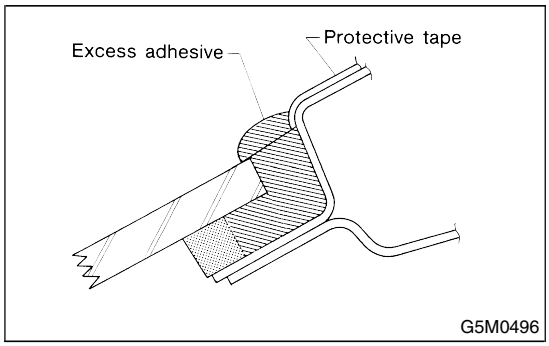


11) Apply adhesive to glass end surface as shown.
12) Fit matching pins using suction rubber cup to install windshield glass.

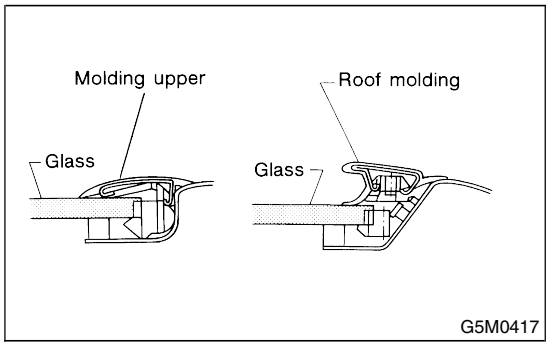


13) Lightly press windshield glass for tight fit.

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.



15) First, press-fit upper front window molding and last, roof molding.



CAUTION:
● When door is opened/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.

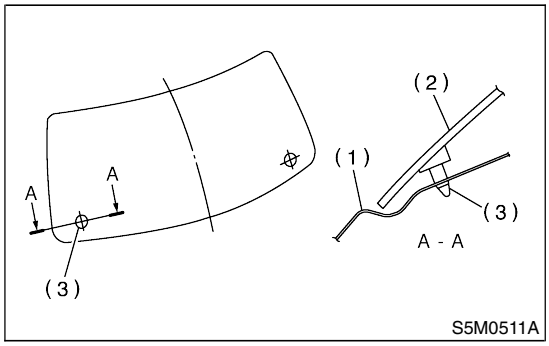
18) Install cowl panel. <Ref. to EI-25, INSTALLATION, Cowl Panel.>

11. Rear Gate Glass S905376

A: REMOVAL S905376A18

1) Remove real wiper motor. <Ref. to WW-20, REMOVAL, Rear Wiper Motor.>
2) Remove electrical connector from rear defogger terminal.
3) Remove glass in the same procedure as for windshield glass. <Ref. to GW-35, REMOVAL, Windshield Glass.>

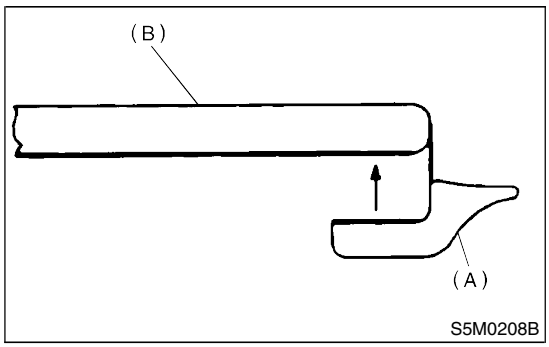
NOTE:
A matching pin is cemented to corners of the glass on the compartment side. Use a piano wire when cutting each pin.



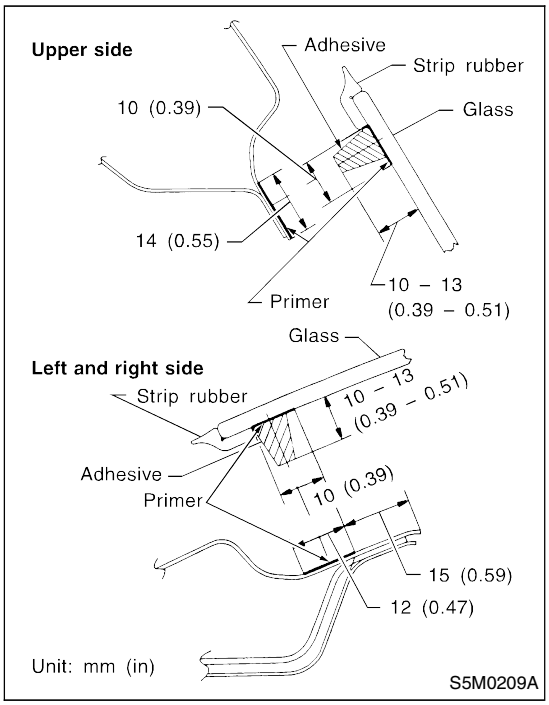
(1) Body panel
(2) Glass
(3) Matching pin

B: INSTALLATION S905376A11

1) Install a new rubber strip (A) by aligning it with the end of the rear gate glass (B).



2) Install glass in the same procedure as for windshield glass. <Ref. to GW-36, INSTALLATION, Windshield Glass.>



3) About one hour after installation, conduct a leak test.

CAUTION:
• When door is opened/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.

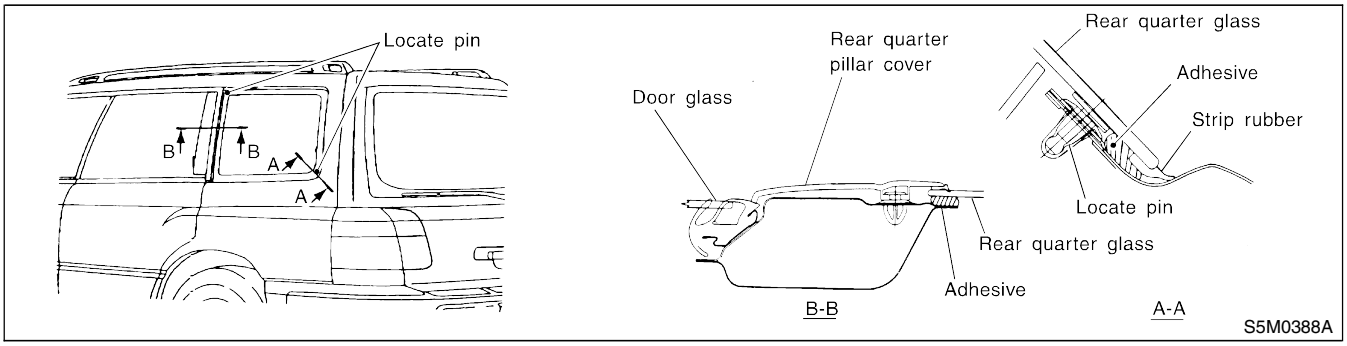
CAUTION:
When a vehicle is returned to the user, tell him or her that the vehicle should not be subjected to heavy impact for at least three days.

5) Connect rear defogger terminals.
6) Install rear wiper. <Ref. to WW-20, INSTALLATION, Rear Wiper Motor.>

12. Rear Quarter Glass S905453

A: REMOVAL S905453A18

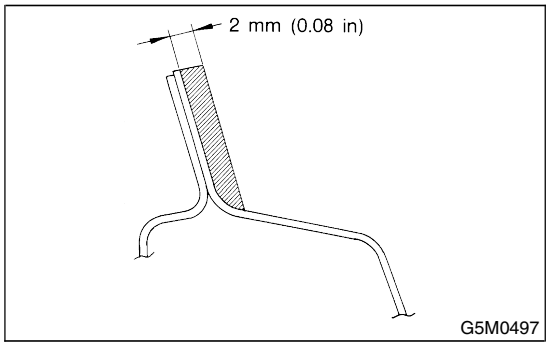
1) Remove rear quarter molding on corner.
2) Remove glass in the same procedure as for windshield glass. <Ref. to GW-35, REMOVAL, Windshield.>



B: INSTALLATION S905453A11

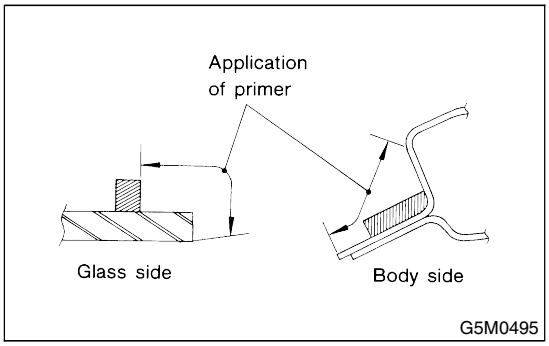
1) Using a putty knife, etc., cut layer of adhesive stick firmly to body and finish it into a smooth surface of about 2 mm (0.08 in) in thickness.

CAUTION:
Be careful not to damage body finish.

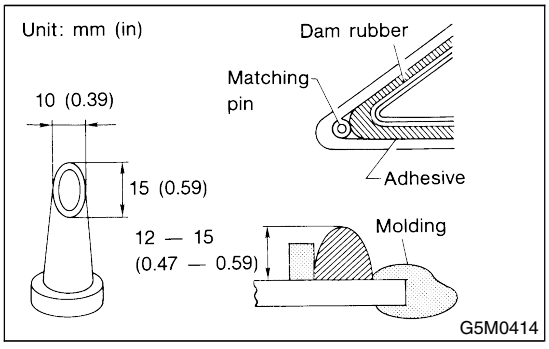


2) Remove chips, dirt and dust from body surface.
3) Clean body wall surface and upper surface of adhesive layer with a solvent such as alcohol or white gasoline.
4) Remove dirt and dust from surface of glass to be adhered.
5) Clean surface of glass to be adhered with alcohol or white gasoline.
6) Using 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.

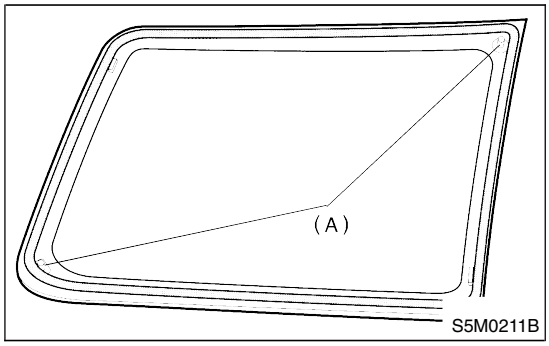


8) Cut nozzle tip as shown in the figure.



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 opened/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-7, REMOVAL, Sunroof Lid.>

B: INSTALLATION S905339A11

<Ref. to SR-7, INSTALLATION, Sunroof Lid.>

C: ADJUSTMENT S905339A01

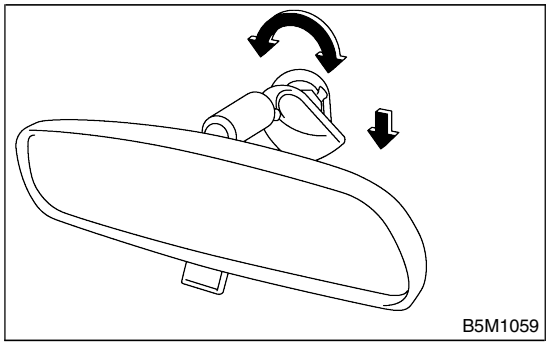
<Ref. to SR-7, ADJUSTMENT, Sunroof Lid.>

14. Inner Rearview Mirror S905340

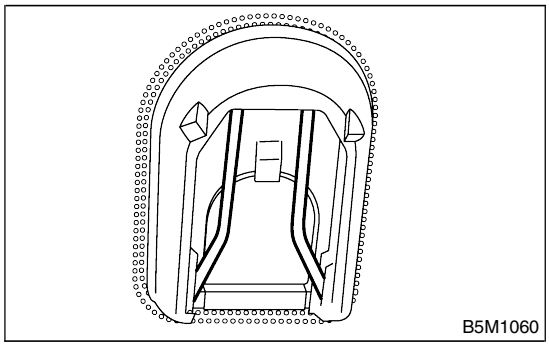
A: REMOVAL S905340A18

NOTE:
The spring cannot be reused. Prepare a new spring before removal.

1) Turn mirror base 90 degrees clockwise or counterclockwise to remove it.



2) Remove spring from mirror base.



CAUTION:
Be careful not to damage the mirror surface.

B: INSTALLATION S905340A11

Install in the reverse order of removal.

C: INSPECTION S905340A10

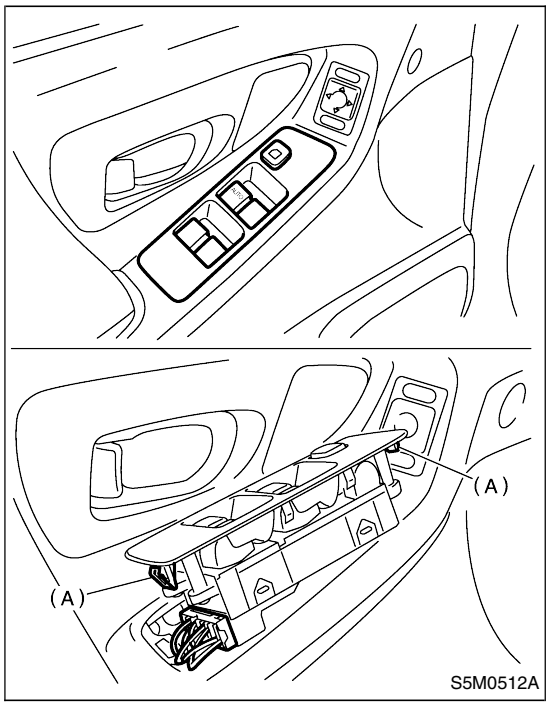
Do not let mirror be damaged.

15. Power Window Control Switch S905621

A: REMOVAL S903621A18

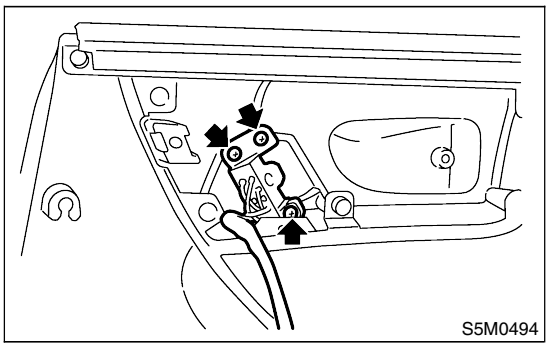
1. MAIN SWITCH S903621A1801

1) Release two hooks (A) of switch panel to remove power window main switch.
2) Disconnect electrical connector from power window main switch.



2. SUB-SWITCH S903621A1802

1) Remove door trim. <Ref. to EI-27, REMOVAL, Rear Door Trim.>
2) Remove screws and sub-switch.



B: INSTALLATION S903621A11

1. MAIN SWITCH S903621A1101

Install in the reverse order of removal.

2. SUB-SWITCH S903621A1102

Install in the reverse order of removal.

C: INSPECTION S903621A10

1. MAIN SWITCH (LHD MODEL) S903621A1003

Check continuity between connector terminals.
Driver's switch:

Switch position	Tester connection	Specified condition
AUTO UP	12 — 1, 2 — 7	Continuity
UP	12 — 1, 2 — 7	Continuity
OFF	1 — 2 — 7	Continuity
DOWN	12 — 2, 1 —7	Continuity
AUTO DOWN	12 — 2, 1 —7	Continuity

Front passenger's switch:

Switch position	Tester connection	Specified condition
UP	12 — 5, 6 — 7	Continuity
OFF	5 — 6 — 7	Continuity
DOWN	12 — 6, 5 — 7	Continuity

Rear left switch:

Switch position	Tester connection	Specified condition
UP	12 — 9, 10 — 7	Continuity
OFF	9 — 10 — 7	Continuity
DOWN	12 — 10, 9 — 7	Continuity

Rear right switch:

Switch position	Tester connection	Specified condition
UP	12 — 14, 13 — 7	Continuity
OFF	14 — 13 — 7	Continuity
DOWN	12 — 13, 14 — 7	Continuity

If NG, replace the main switch.

2. MAIN SWITCH (RHD MODEL) S903621A1004

Check continuity between connector terminals.
Driver's switch:

Switch position	Tester connection	Specified condition
AUTO UP	7 — 16, 15 — 2	Continuity
UP	7 — 16, 15 — 2	Continuity
OFF	16 — 15 — 2	Continuity
DOWN	7 — 15, 16 —2	Continuity
AUTO DOWN	7 — 15, 16 —2	Continuity

Front passenger's switch:

Switch position	Tester connection	Specified condition
UP	7 — 3, 4 — 2	Continuity
OFF	3 — 4 — 2	Continuity
DOWN	7 — 4, 3 — 2	Continuity

Rear left switch:

Switch position	Tester connection	Specified condition
UP	7 — 10, 12 — 2	Continuity
OFF	10 — 12 — 2	Continuity
DOWN	7 — 12, 10 — 2	Continuity

Rear right switch:

Switch position	Tester connection	Specified condition
UP	7 — 14, 13 — 12	Continuity
OFF	14 — 13 — 2	Continuity
DOWN	7 — 13, 14 — 2	Continuity

If NG, replace the main switch.

3. SUB-SWITCH (FRONT) S903621A1005

Check continuity between connector terminals.
Front passenger's door switch:

Switch position	Tester connection	Specified condition
UP	8 — 3 — 5, 4 — 7	Continuity
OFF	4 — 7, 6 — 5	Continuity
DOWN	8 — 3 — 7, 6 — 5	Continuity

If NG, replace the sub-switch.

4. SUB-SWITCH (REAR) S903621A1006

Check continuity between connector terminals.
Rear door switch:

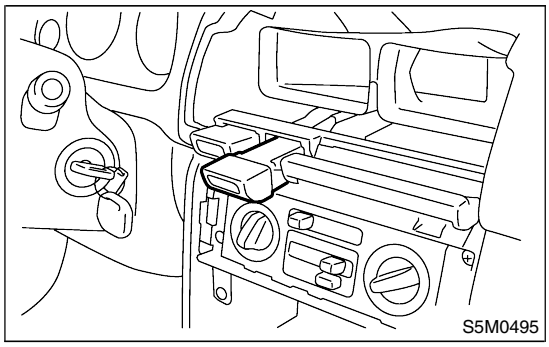
Switch position	Tester connection	Specified condition
UP	6 — 5, 1 — 4	Continuity
OFF	1 — 4, 2 — 5	Continuity
DOWN	6 — 4, 2 — 5	Continuity

If NG, replace the sub-switch.

16. Rear Window Defogger Switch S905559

A: REMOVAL S905559A18

1) Remove center air vent grille. <Ref. to AC-41, REMOVAL, Air Vent Grille.>
2) Pull out switch and disconnect the connector.



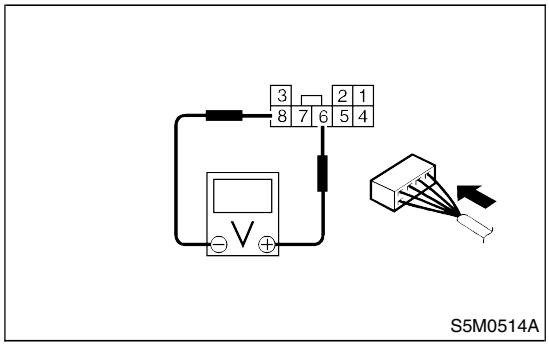
B: INSTALLATION S905559A11

Install in the reverse order of removal.

C: INSPECTION S905559A10

1) Turn ignition switch ON.
2) Check continuity between terminals on the wire harness side with connectors connected.

Connector & terminal
(i18) No. 6 (+) — No. 8 (–):



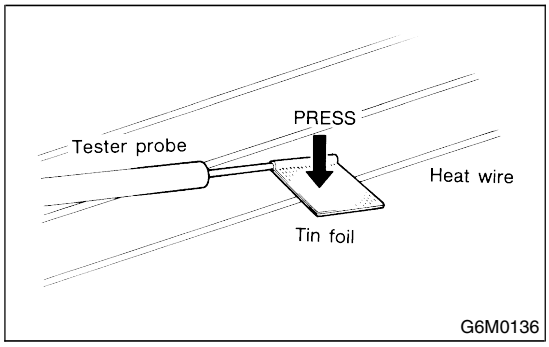
IGN SW	Switch position	Tester connection	Specified condition
ON	OFF	(i18)6 — (i18)8	10V — 14V
ON	ON	6 — 8	0V

17. Rear Window Defogger S905341

A: INSPECTION S905341A10

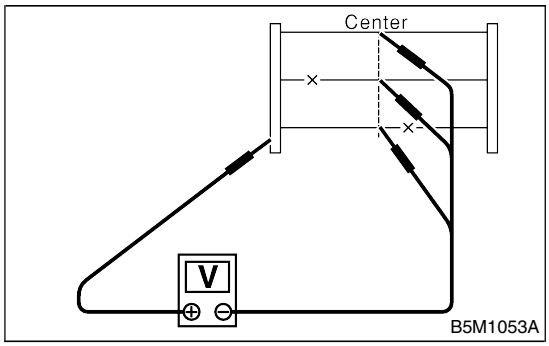
CAUTION:
When wiping stain on glass off with cloth, use a dry and soft cloth and move it in the direction of the heat wire extension to avoid damage to the heat wire.

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.



4) Measure voltage at wire center with DC voltmeter.

Standard voltage:
Approx. 6 volts



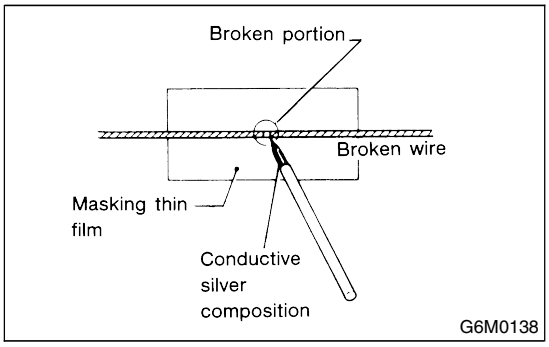
Voltage	Criteria
Approx. 6 V	OK
Approx. 12 V or 0 V	Broken

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 S905341A11

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.

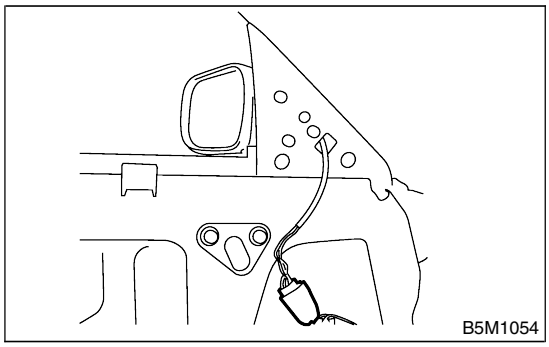


4) After repair, check wire.

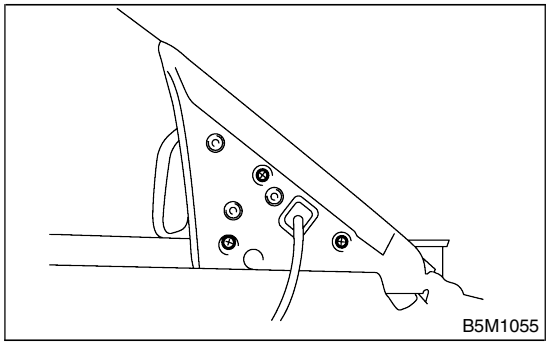
18. Outer Mirror Assembly S905338

A: REMOVAL S905338A18

1) Remove door trim. <Ref. to EI-26, 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 connection
OFF	—
UP	1 (+) — 3 (–)
DOWN	3 (+) — 1 (–)
LEFT	2 (+) — 3 (–)
RIGHT	3 (+) — 2 (–)

If NG, replace the mirror.

Mirror heater equipped model:

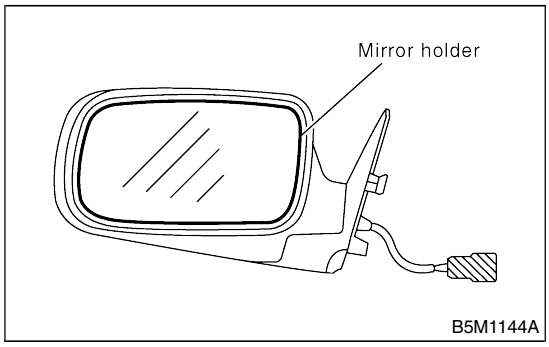
Switch position	Terminal connection
OFF	—
UP	2 (+) — 4 (–)
DOWN	4 (+) — 2 (–)
LEFT	3 (+) — 4 (–)
RIGHT	4 (+) — 3 (–)

If NG, replace the mirror.

19. Outer Mirror S905658

A: REPLACEMENT S905658A20

1) Remove the door mirror assembly. <Ref. to GW-49, 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.)



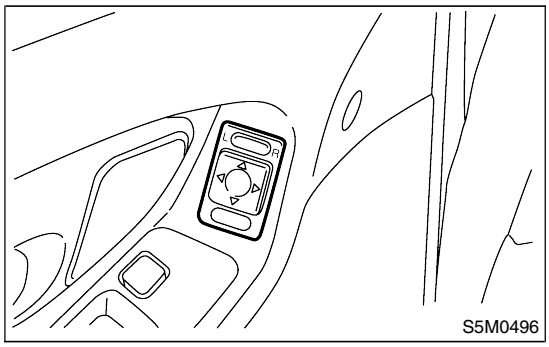
4) Warm the area around the mirror holder with a hair drier until the edges of the mirror holder become soft (about 2 or 3 minutes with a 1,000 W drier.)
5) Remove the backing of the new two-sided tape, and push the mirror in to install it.

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.

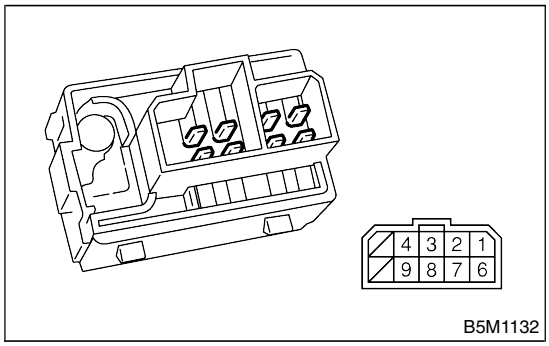


B: INSTALLATION S905342A11

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	Tester connection	Specified condition
NEUTRAL	All terminals	No continuity
UP	7 — 4, 2 — 1	Continuity
DOWN	7 — 2, 4 — 1	Continuity
LEFT	9 — 4, 2 — 1	Continuity
RIGHT	9 — 2, 4 — 1	Continuity

Change over switch right position:

Switch position	Tester connection	Specified condition
NEUTRAL	All terminals	No continuity
UP	6 — 4, 2 — 1	Continuity
DOWN	6 — 2, 4 — 1	Continuity
LEFT	8 — 4, 2 — 1	Continuity
RIGHT	8 — 2, 4 — 1	Continuity

If NG, replace the switch.

21. Wiper Deicer S905622

A: INSPECTION S905622A10

Refer to INSPECTION under Rear Window Defogger. <Ref. to GW-48, INSPECTION, Rear Window Defogger.>

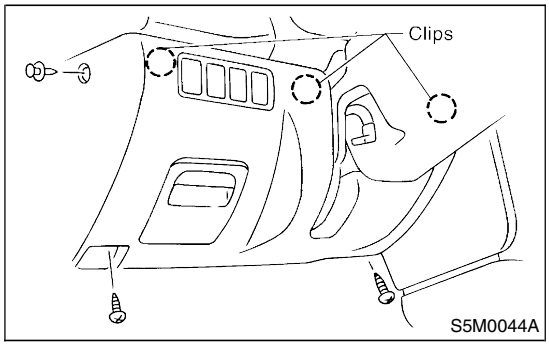
B: REPAIR S905622A11

Refer to REPAIR under Rear Window Defogger. <Ref. to GW-48, 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	Tester connection	Specified condition
OFF	—	No continuity
ON	3 — 5	Continuity

If NG, replace the switch.

MEMO:

BODY STRUCTURE

BS

Page

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

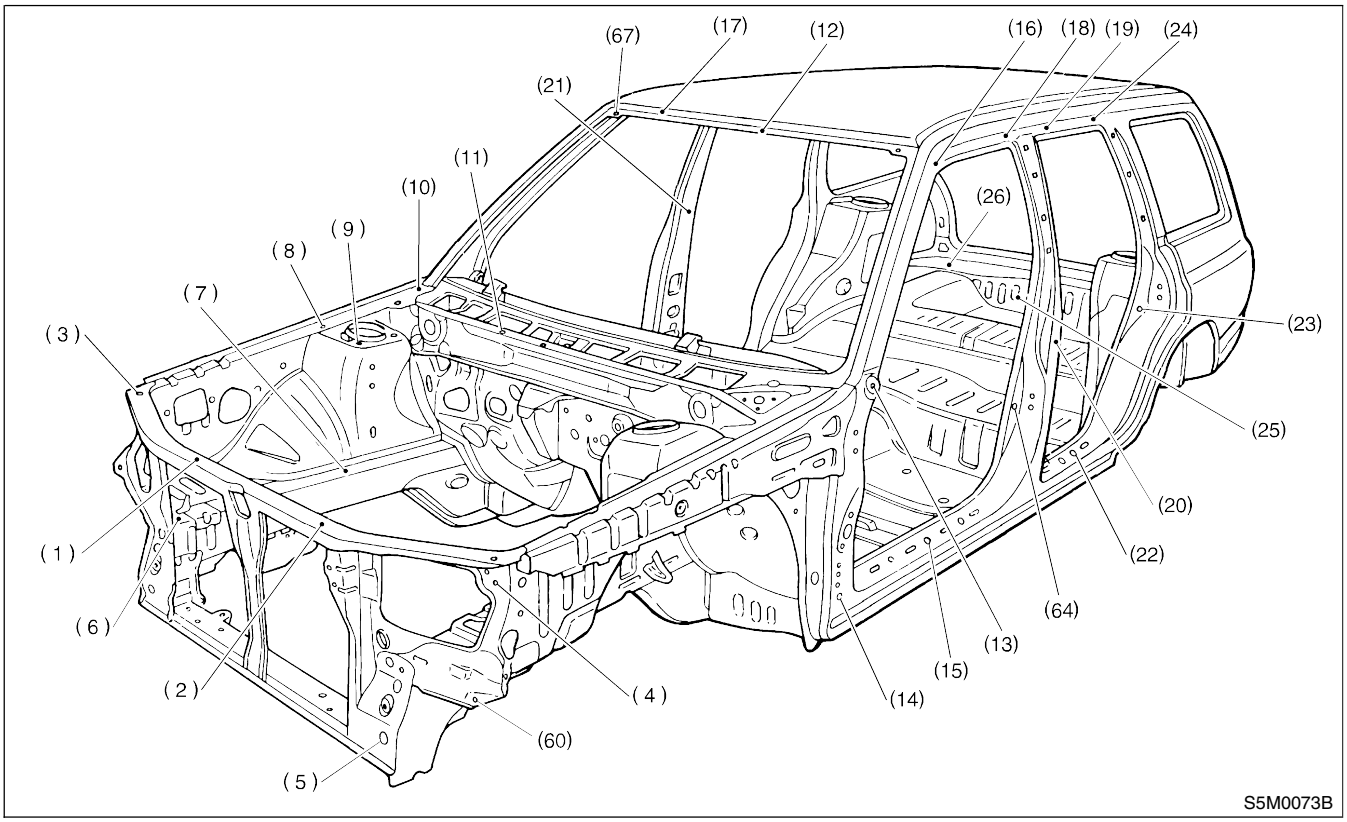
2. Datum Points S906540

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.

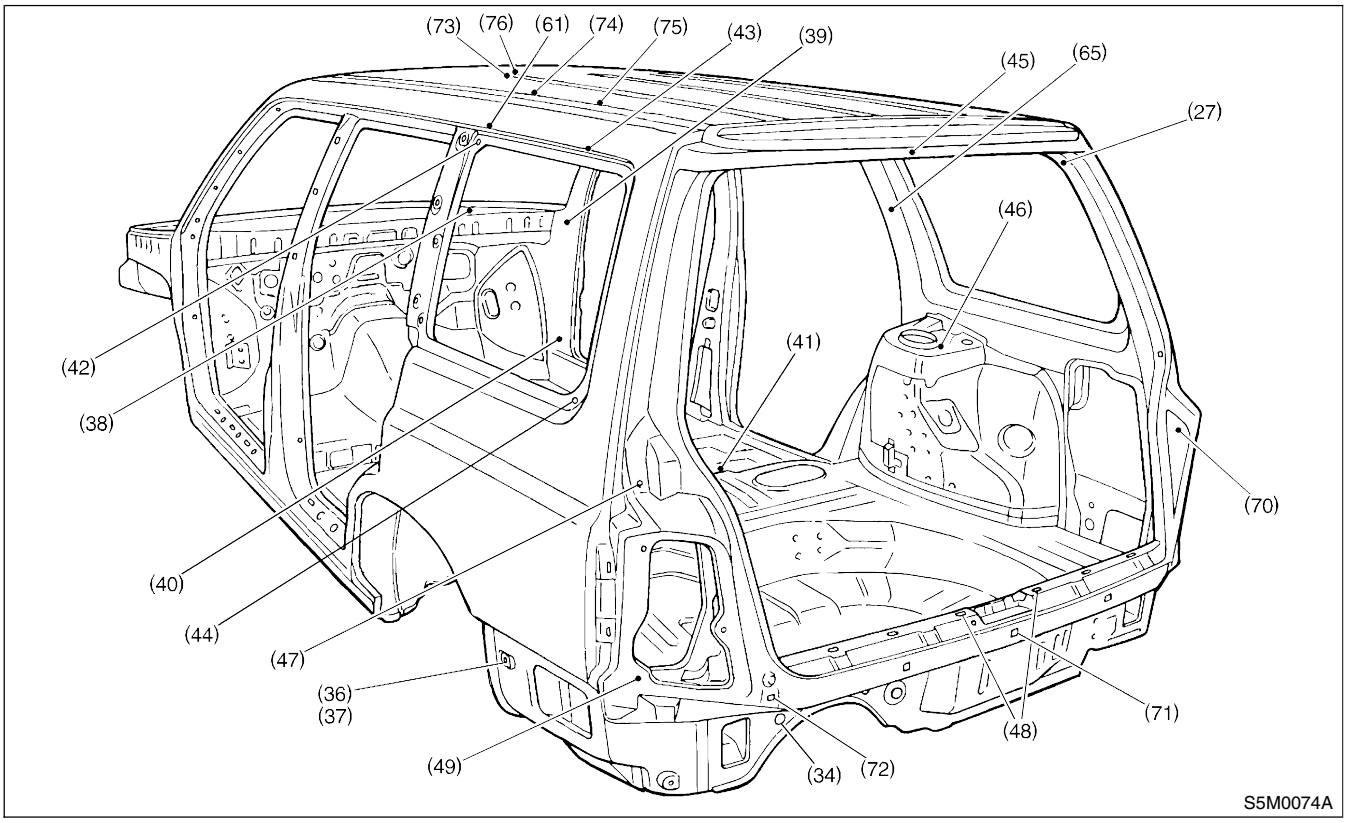
DATUM POINTS

1. ROOM SECTION S906540A1301



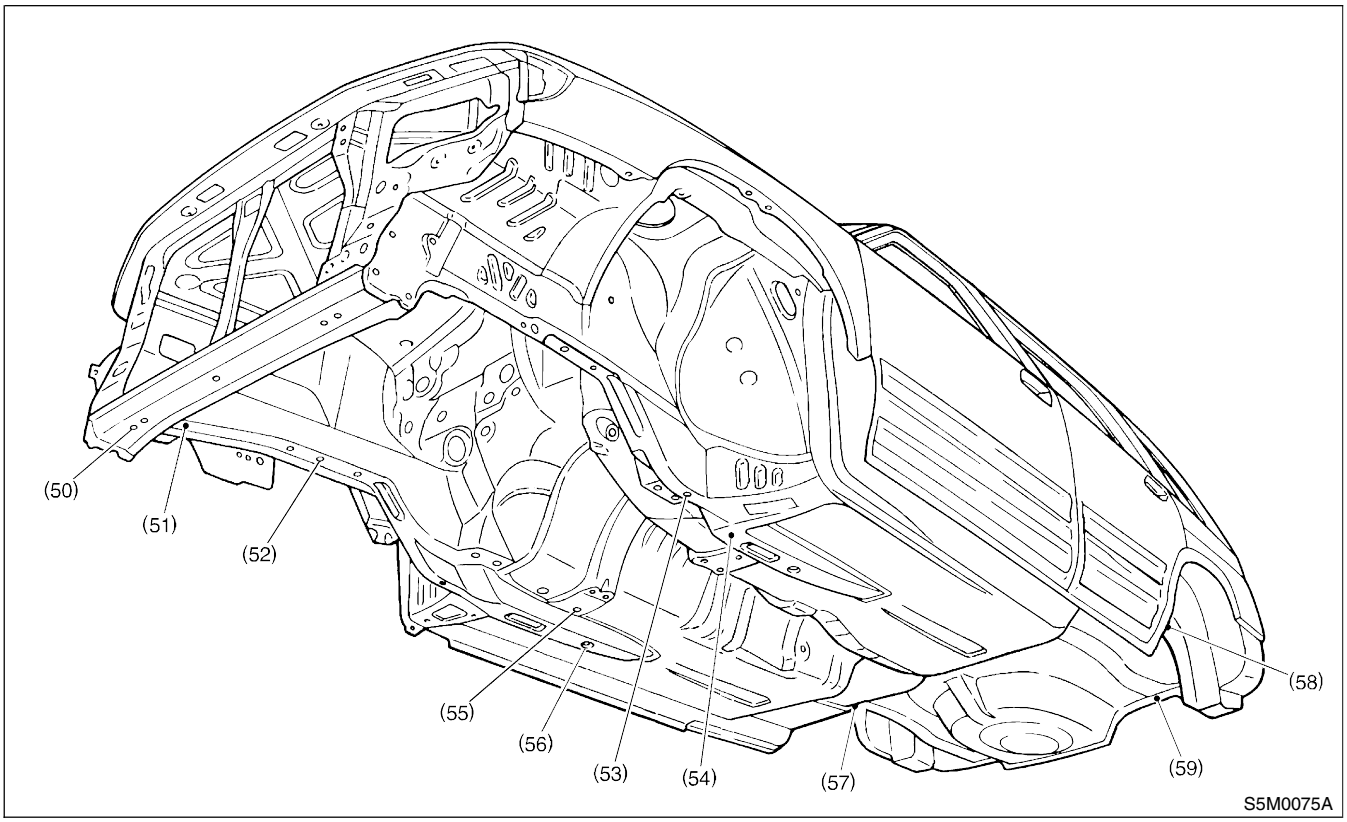
(1) Radiator panel (UPR) repair bolt hole M8 (Right)
(2) Radiator panel (UPR) repair bolt hole M8 (Left)
(3) Fender attaching bolt hole M6 (Symmetrical)
(4) Repair locator 8 mm (0.31 in) dia. (Symmetrical)
(5) Radiator panel side gauge hole 24 mm (0.94 in) dia. (Symmetrical)
(6) Front bumper mounting 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



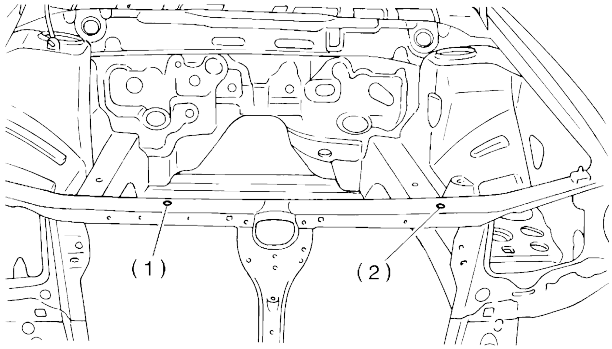
(27) Rear pillar (Inner) harness and hose clip attaching hole 7 mm (0.28 in) dia. (Symmetrical)
(34) Rear skirt gauge hole 20 mm (0.79 in) dia. (Symmetrical)
(36) Rear quarter bumper side gauge hole 20 mm (0.79 in) dia. (Left)
(37) Rear quarter bumper side gauge hole 20 mm (0.79 in) dia. (Right)
(38) 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 12 mm (0.47 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

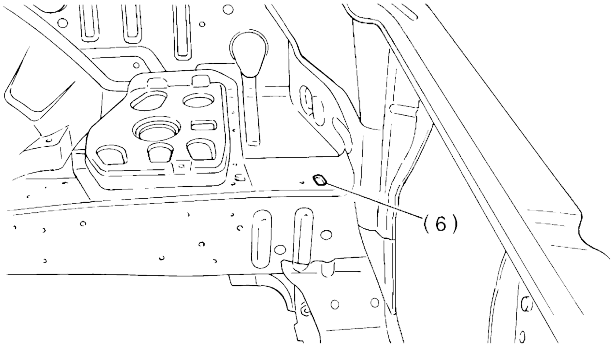


(50) Radiator panel (LWR) frame gauge hole 15 mm (0.59 in) dia. (Symmetrical)
(51) Front side frame gauge hole 20 mm (0.79 in) dia. (Symmetrical)
(52) Front crossmember attaching hole 12.4 mm (0.488 in) dia. (Symmetrical)
(53) Front suspension attaching bolt hole M14
(54) Side frame gauge hole 20 mm (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)

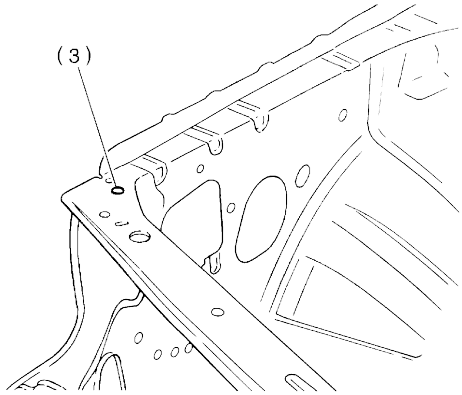
DATUM POINTS



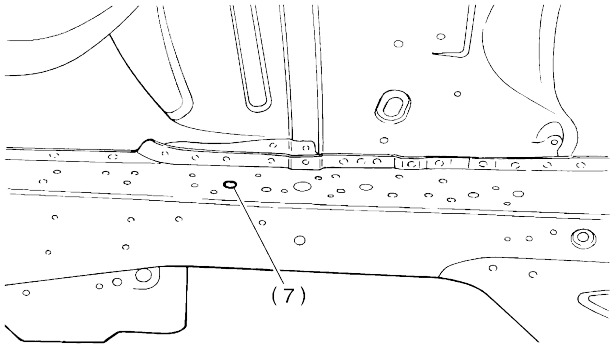
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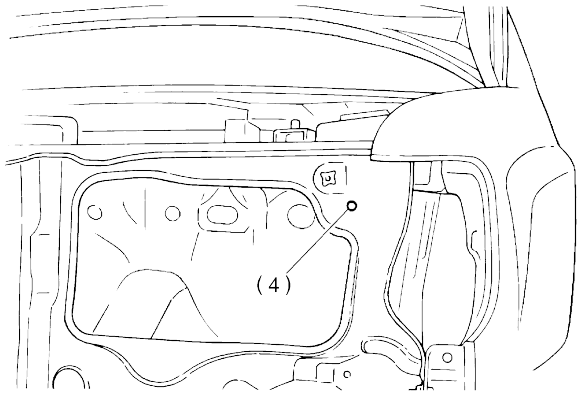
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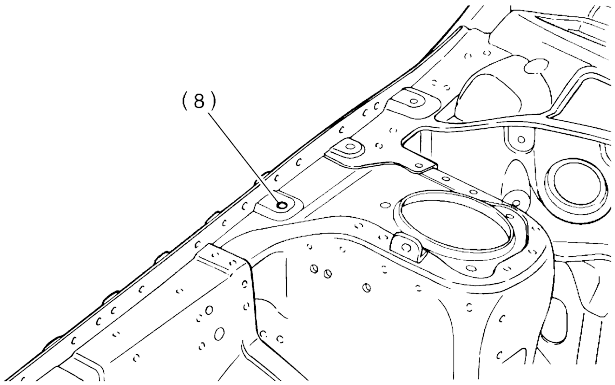
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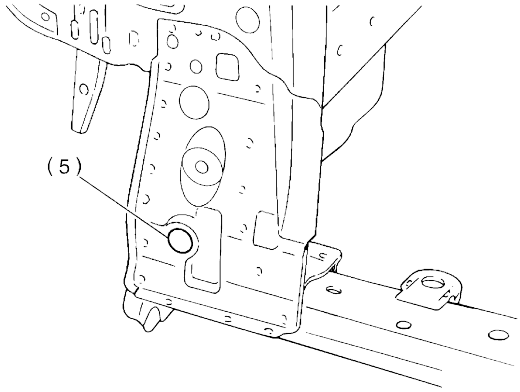
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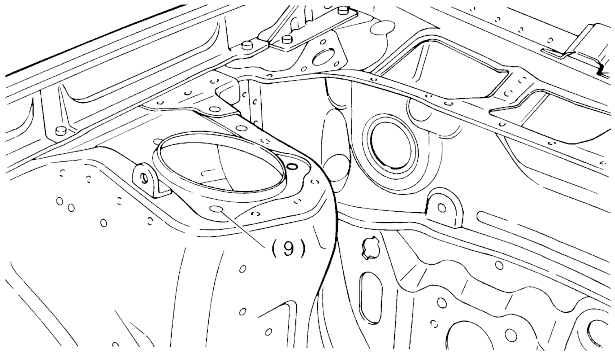
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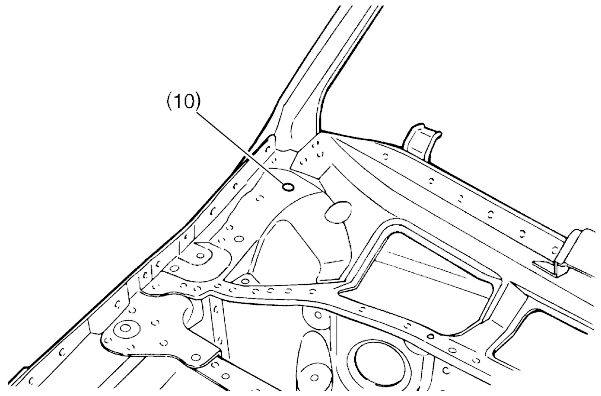


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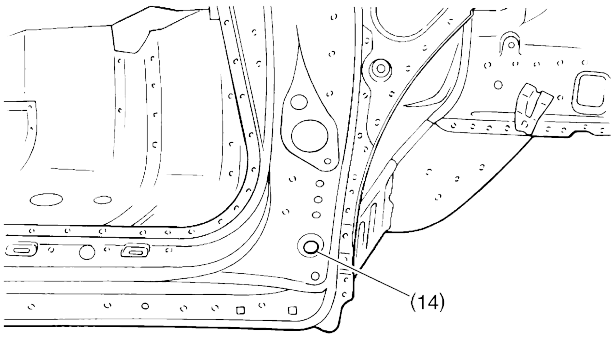


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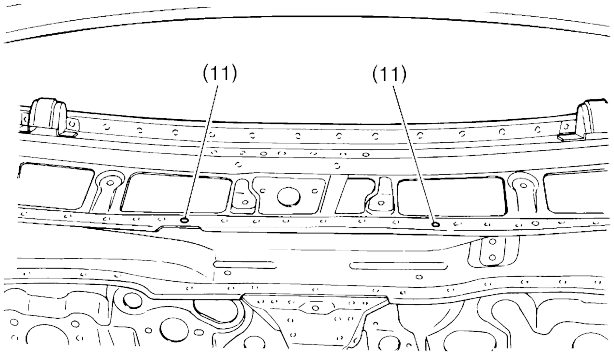
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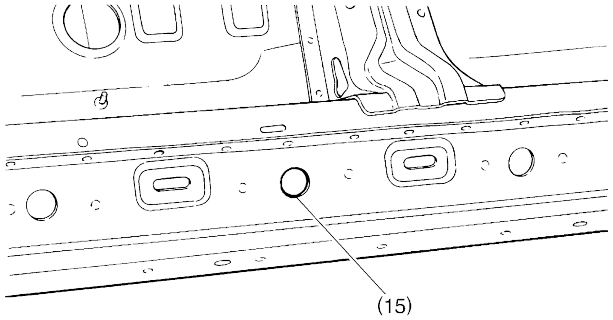
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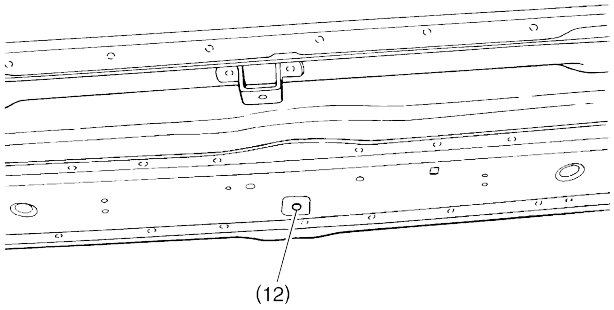
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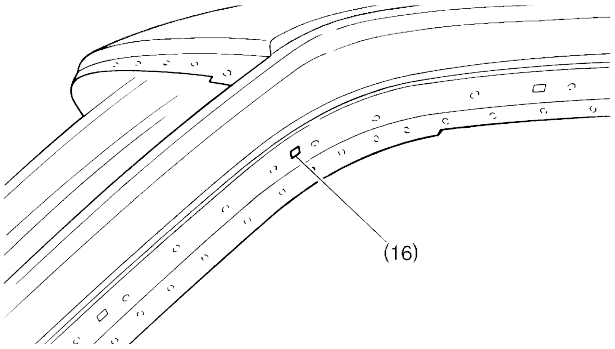
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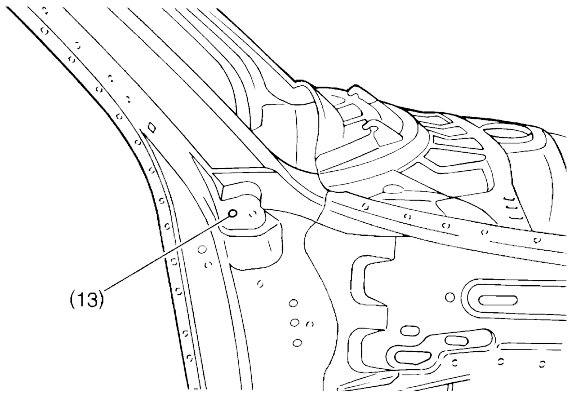
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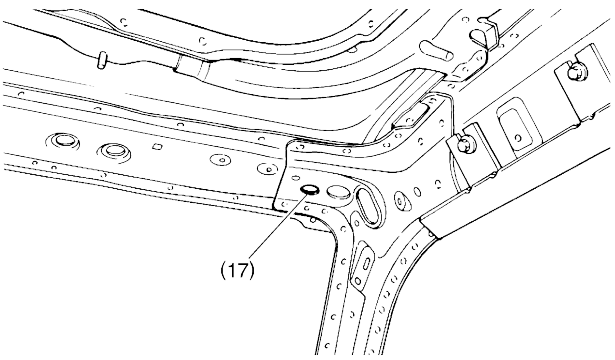
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S5M0089A

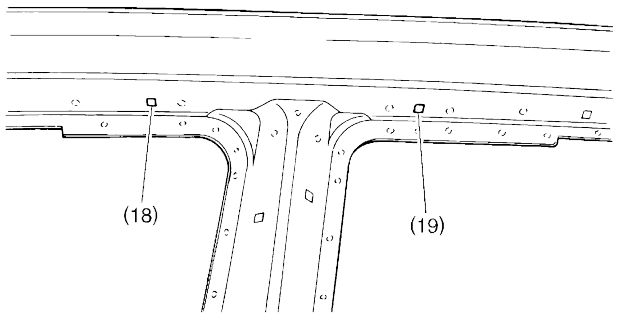


S5M0090A

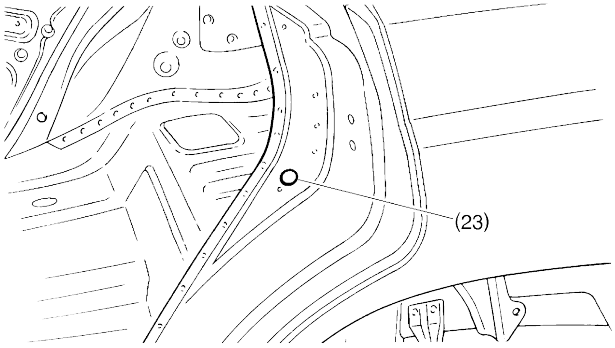


S5M0091A

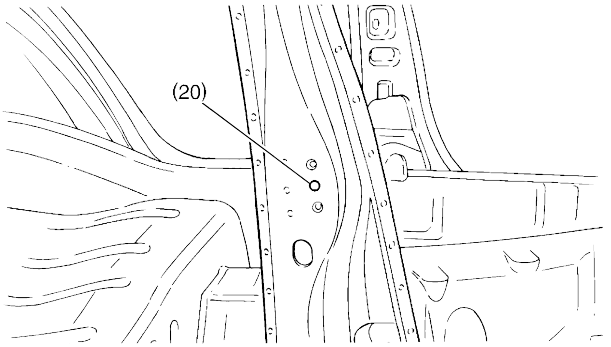
DATUM POINTS



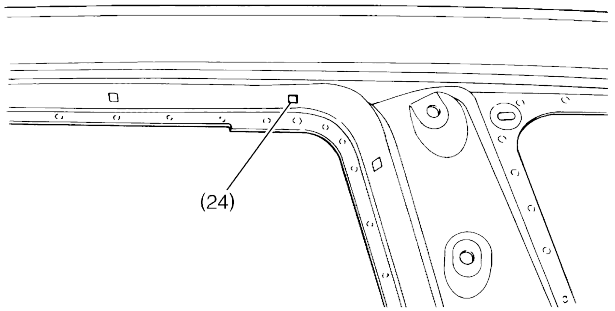
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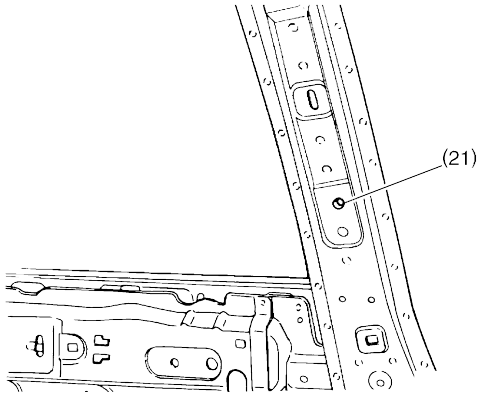
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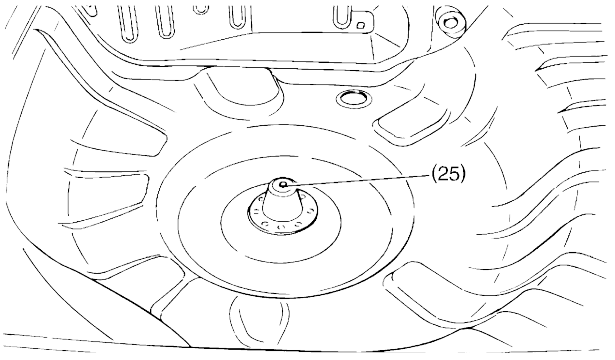
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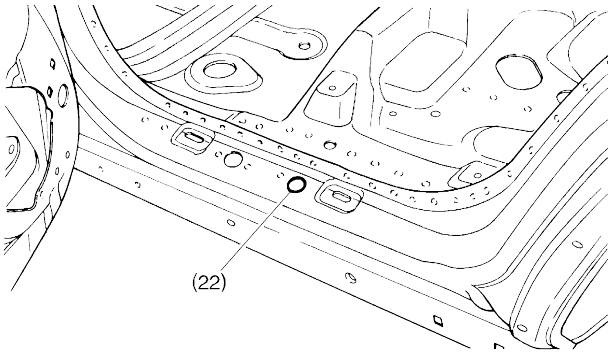
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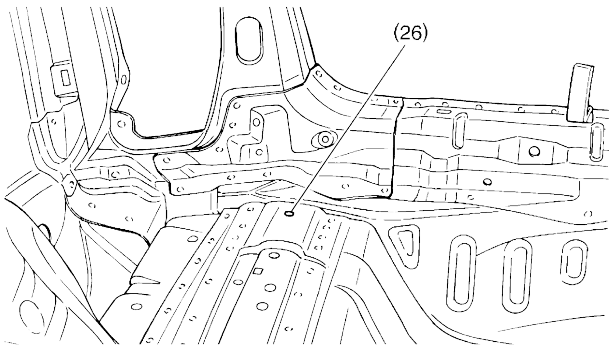
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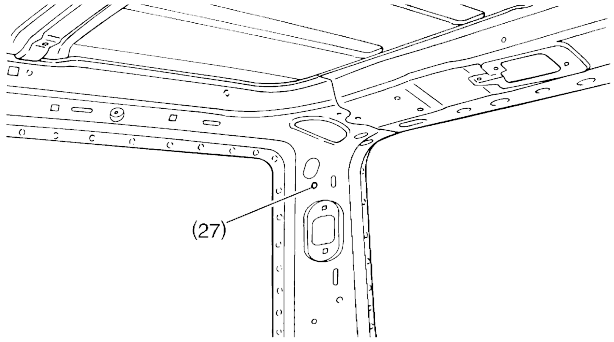


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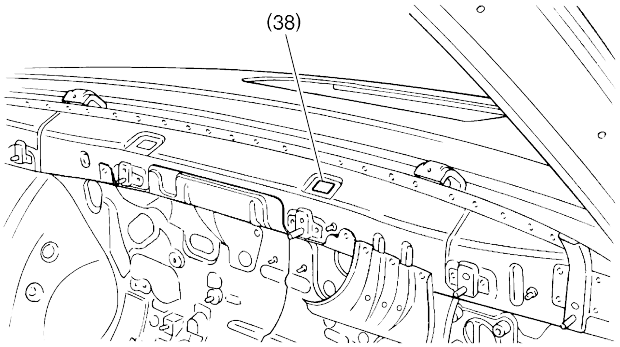


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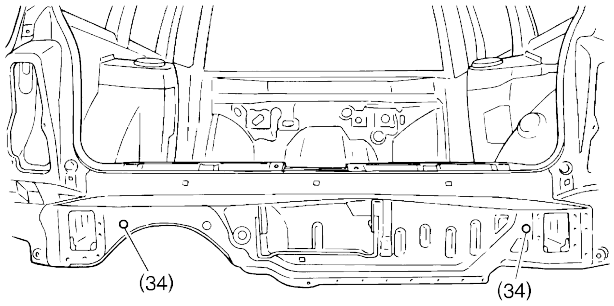
DATUM POINTS



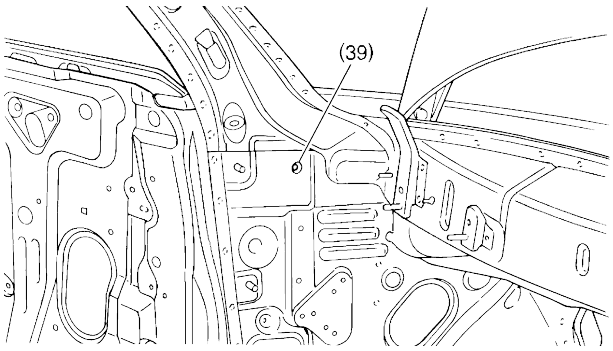
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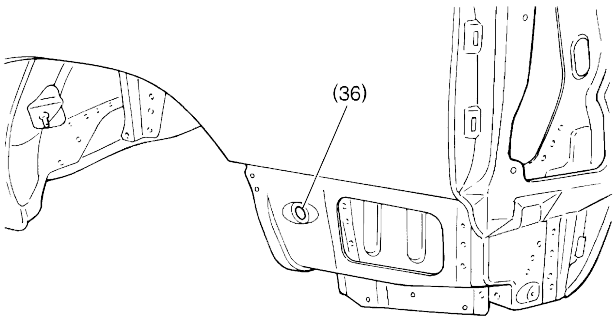
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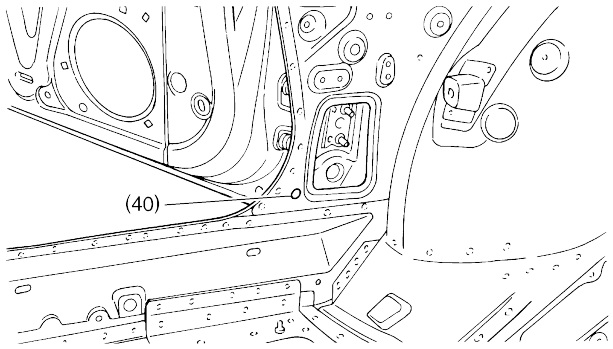
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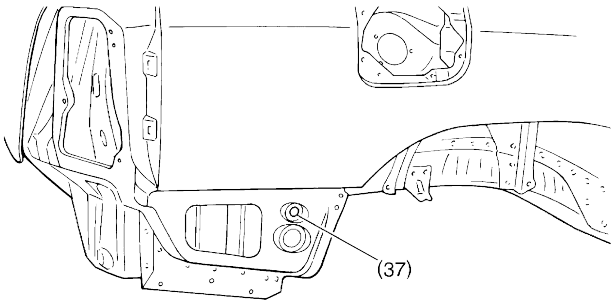
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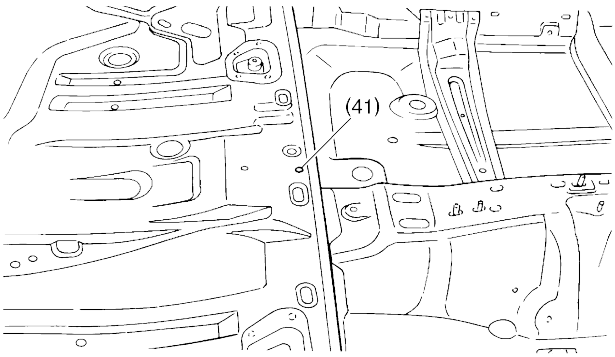
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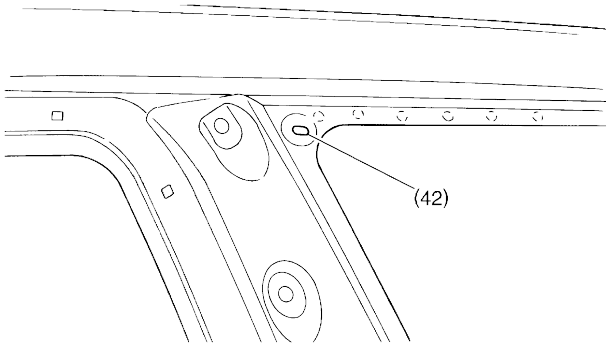


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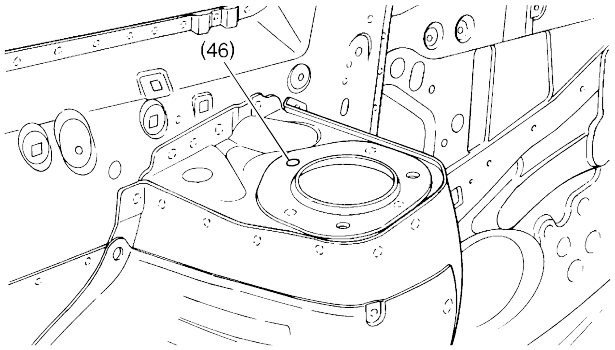


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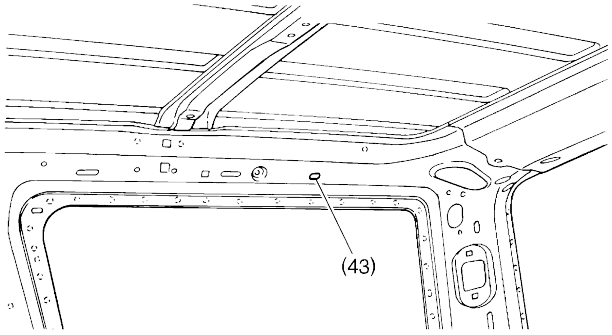
DATUM POINTS



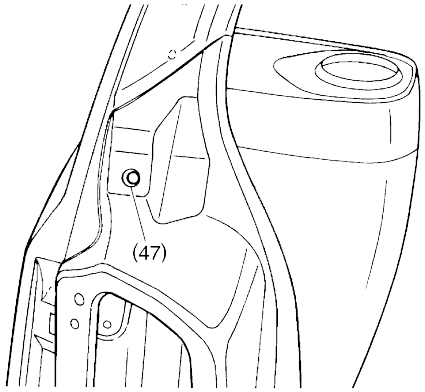
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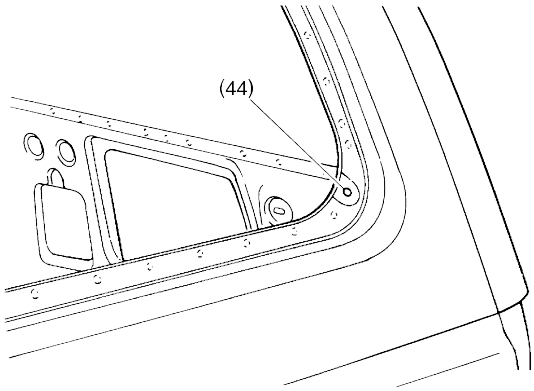
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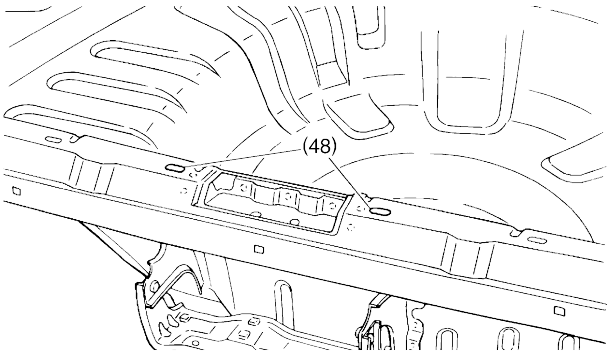
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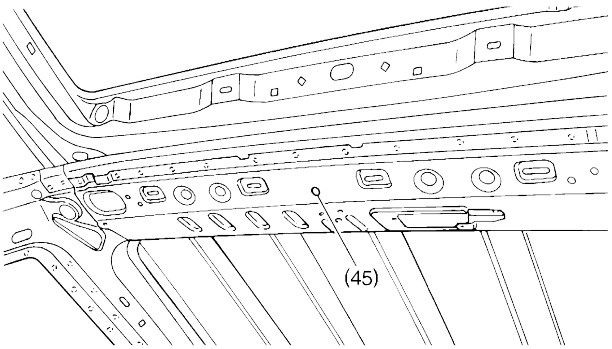
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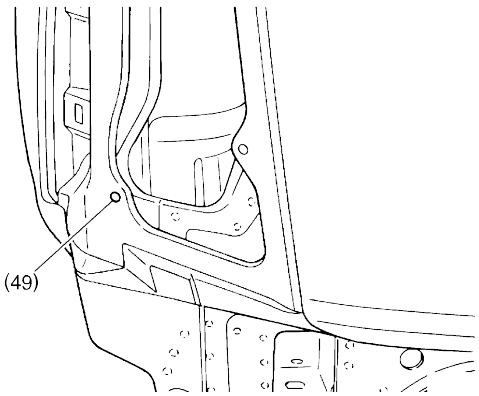
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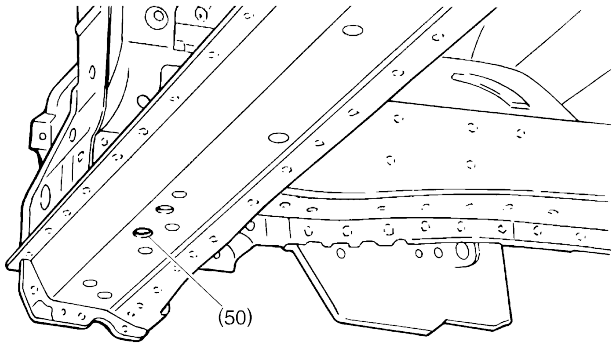


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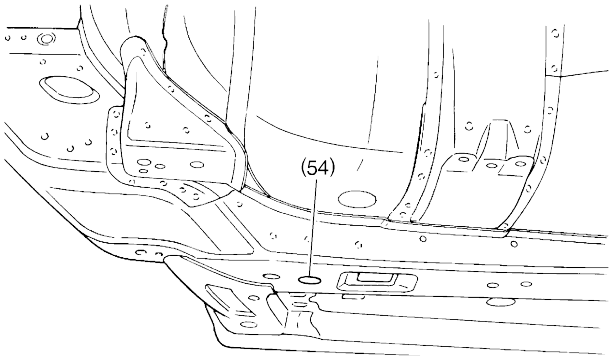


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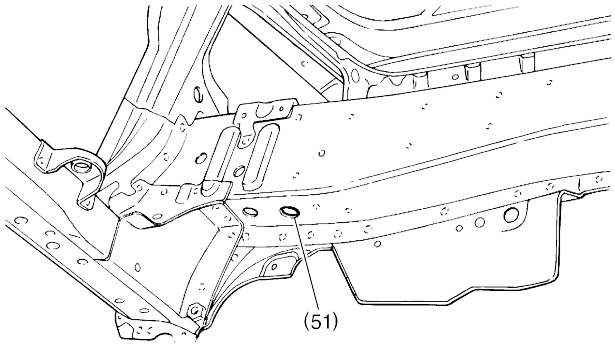
DATUM POINTS



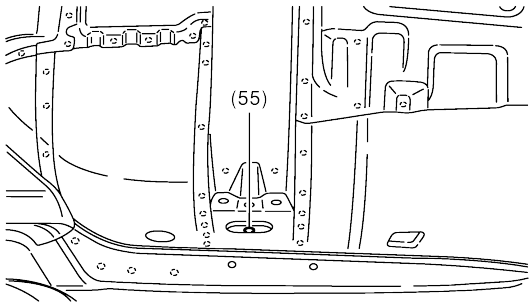
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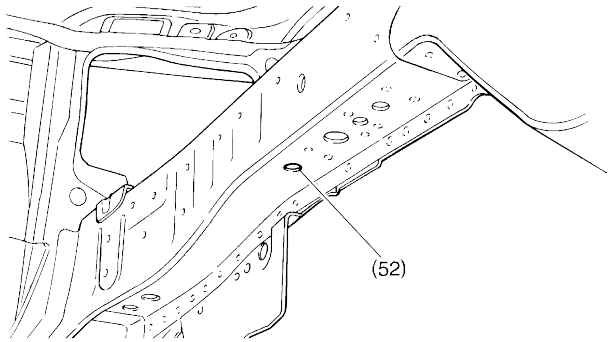
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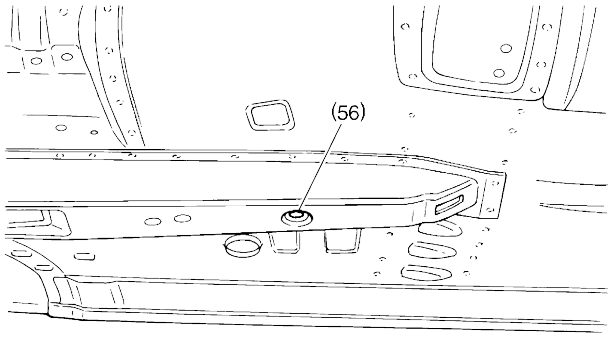
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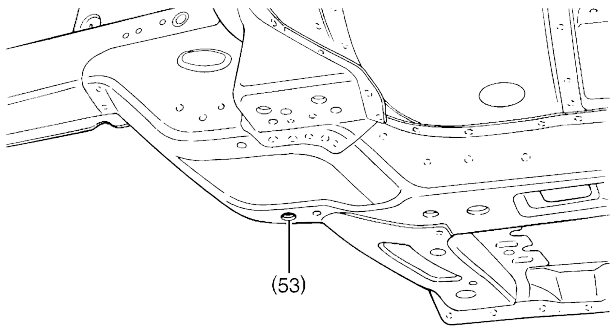
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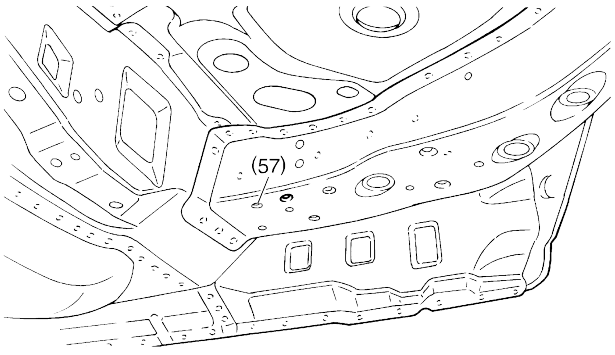
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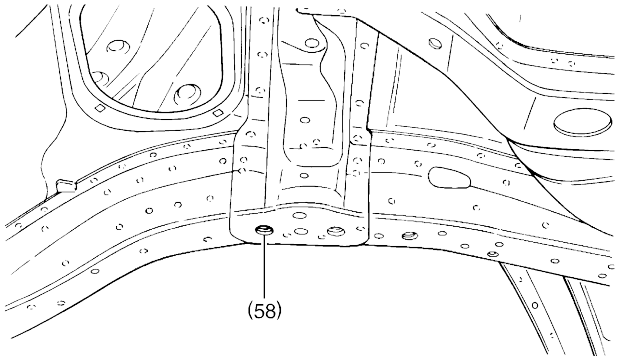


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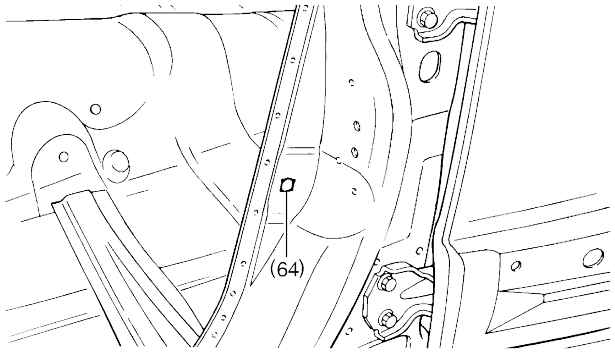


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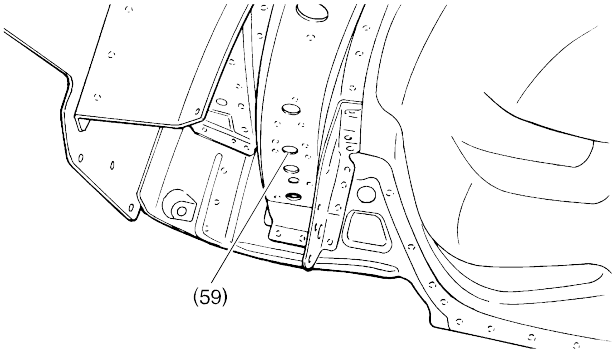
DATUM POINTS



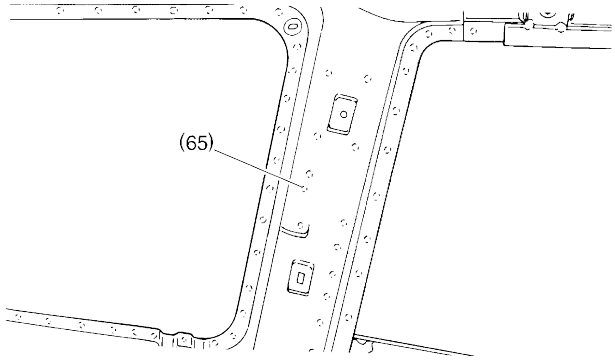
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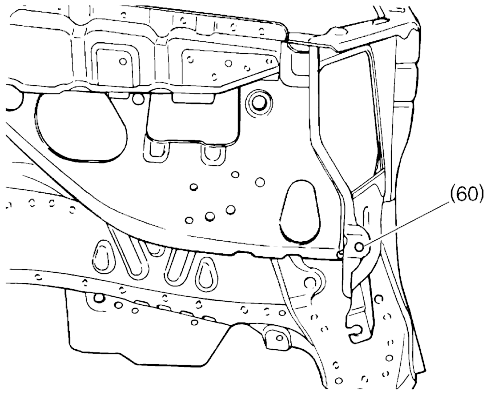
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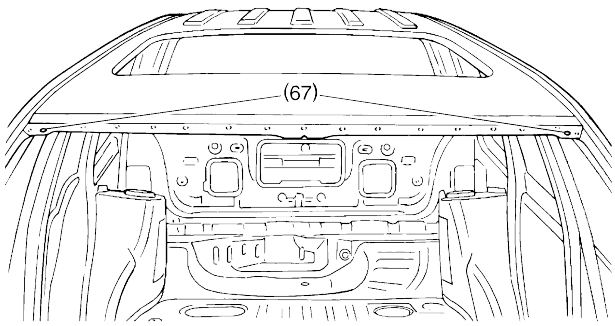
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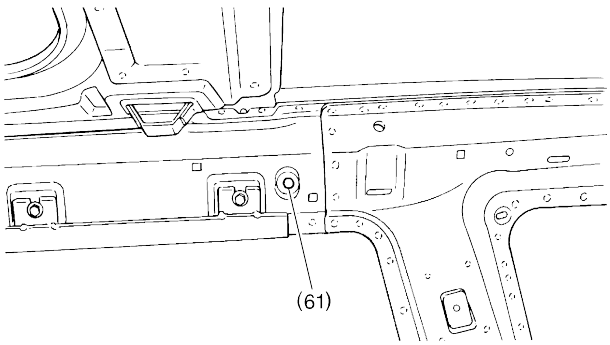
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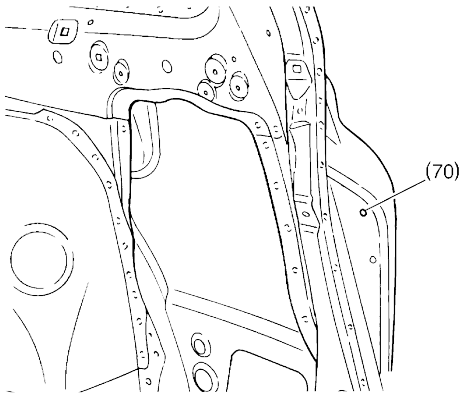
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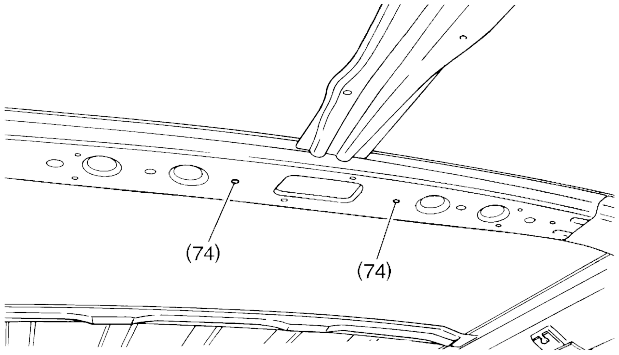


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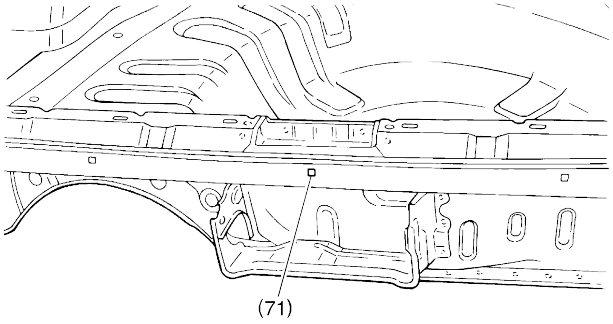


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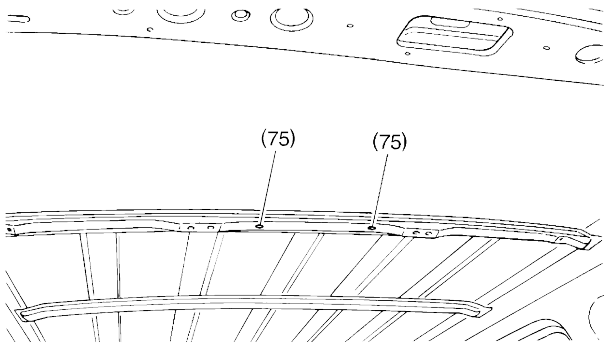
DATUM POINTS



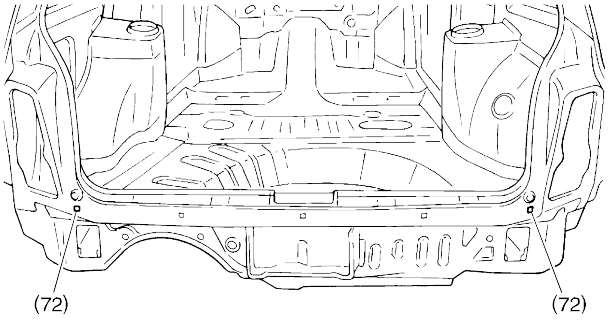
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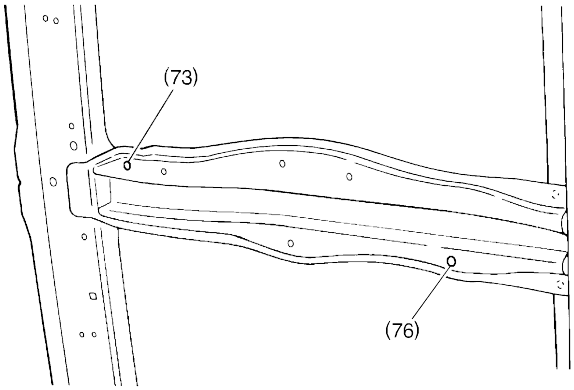
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S5M0135A



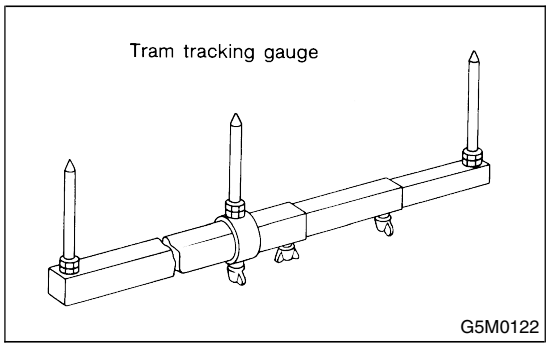
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3. Datum Dimensions S906337

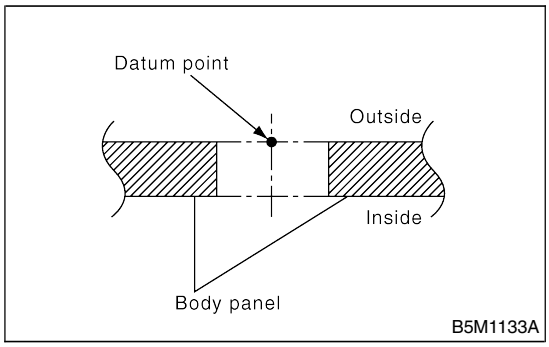
A: MEASUREMENT S906337A14

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.

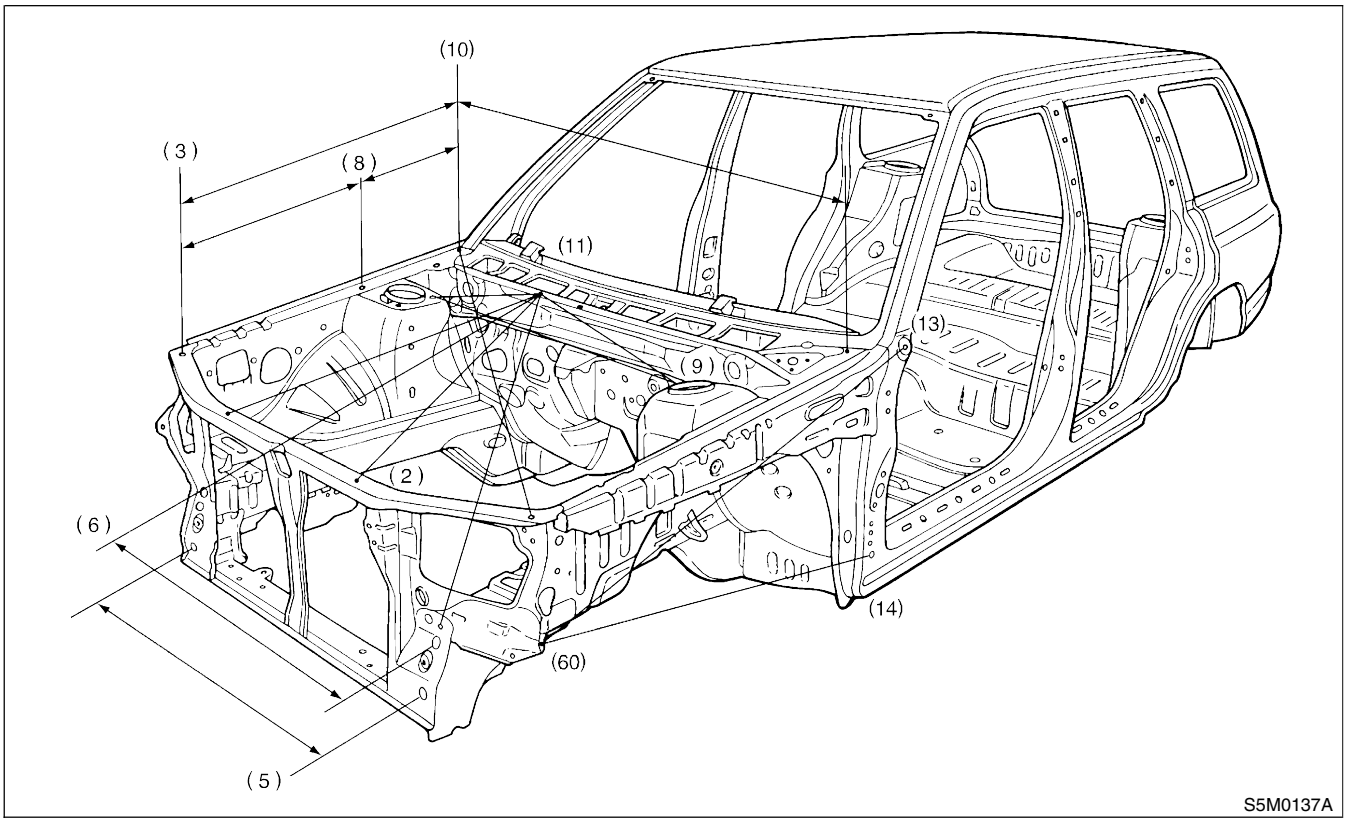


- Measure at the center of the circle around the outside of the body panel.



DATUM DIMENSIONS

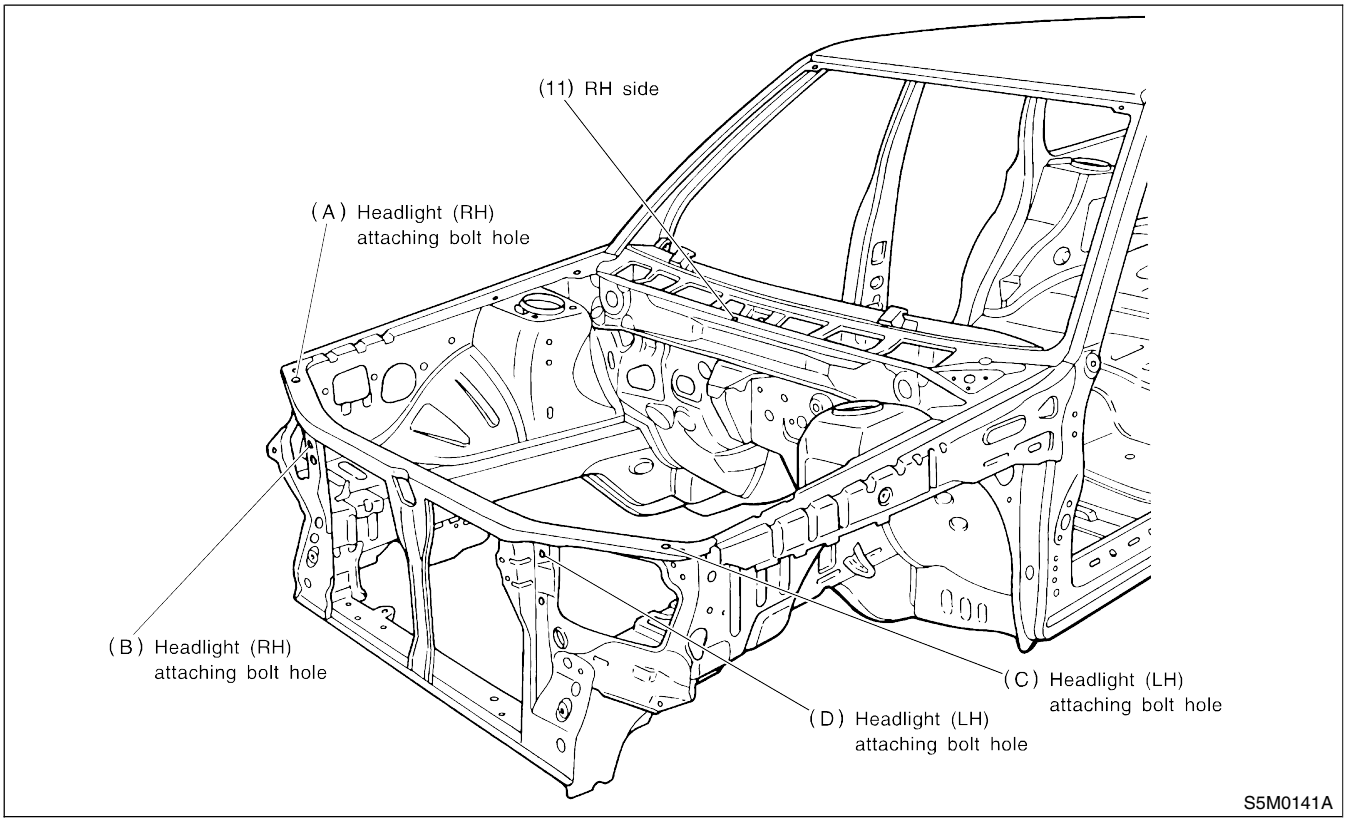
1. FRONT STRUCTURE S906337A1401



S5M0137A

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)

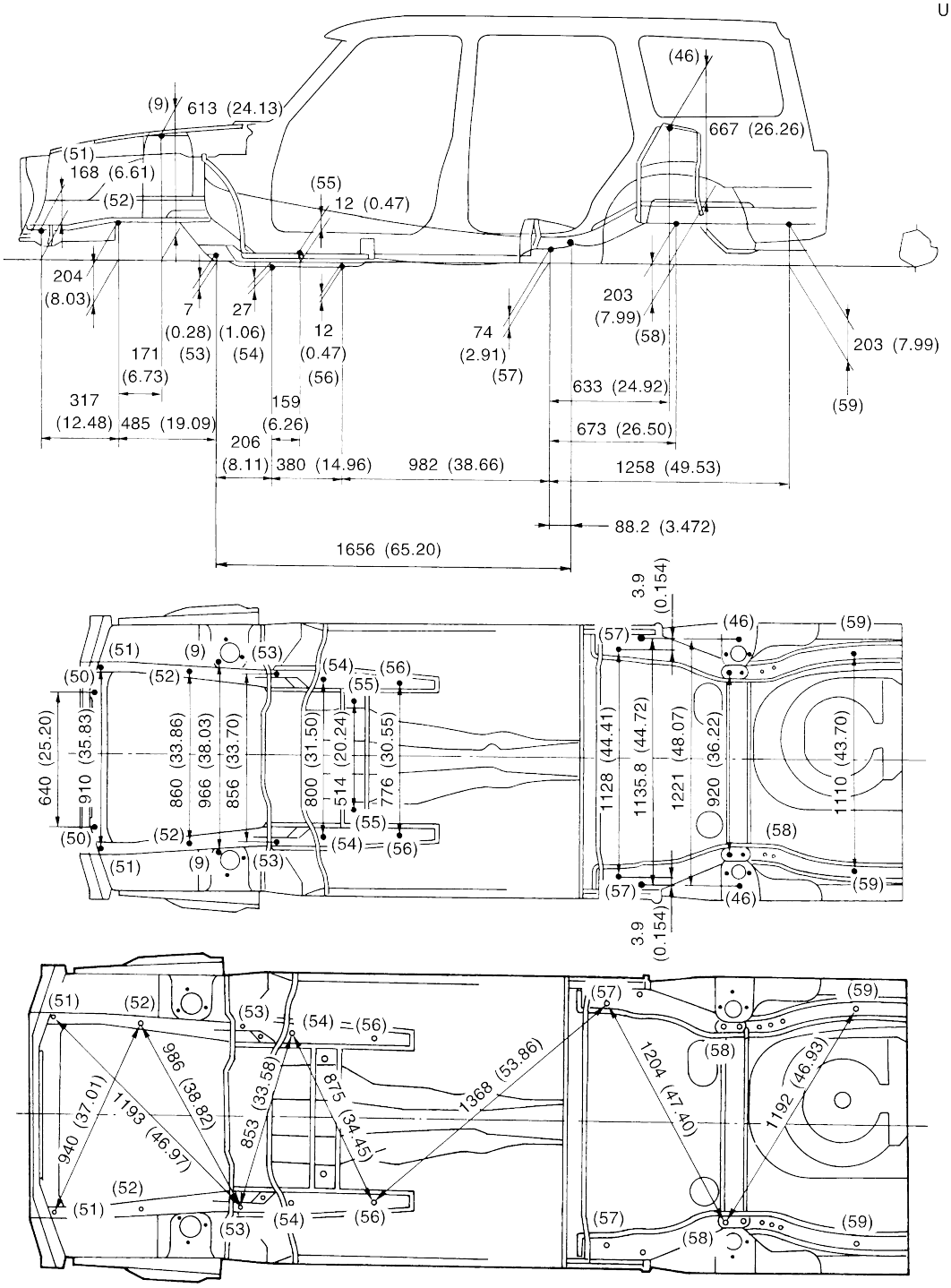


Unit: mm (in)

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)

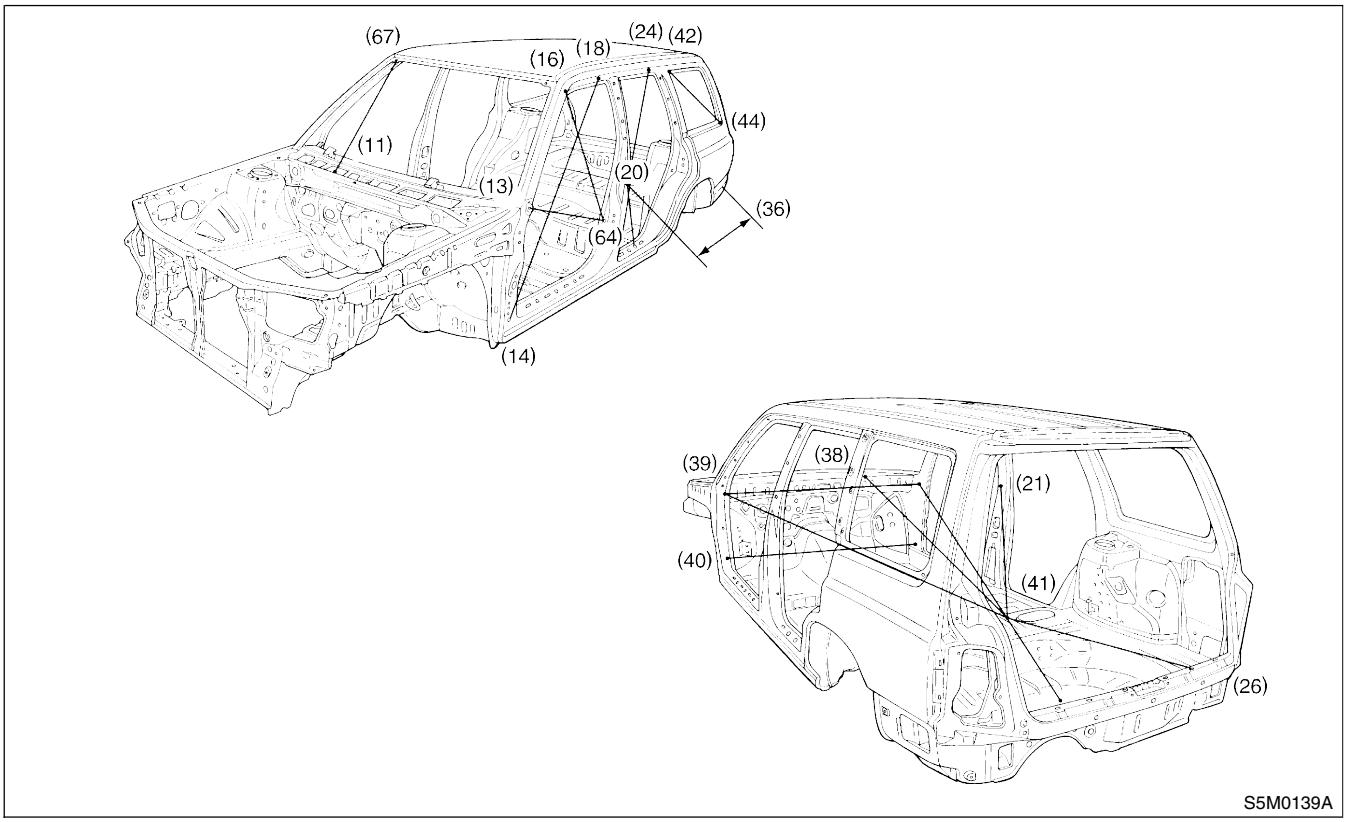
2. CENTER STRUCTURE S906337A1402

Unit: mm (in)



S5M0138B

3. WINDSHIELD AND DOORS S906337A1403

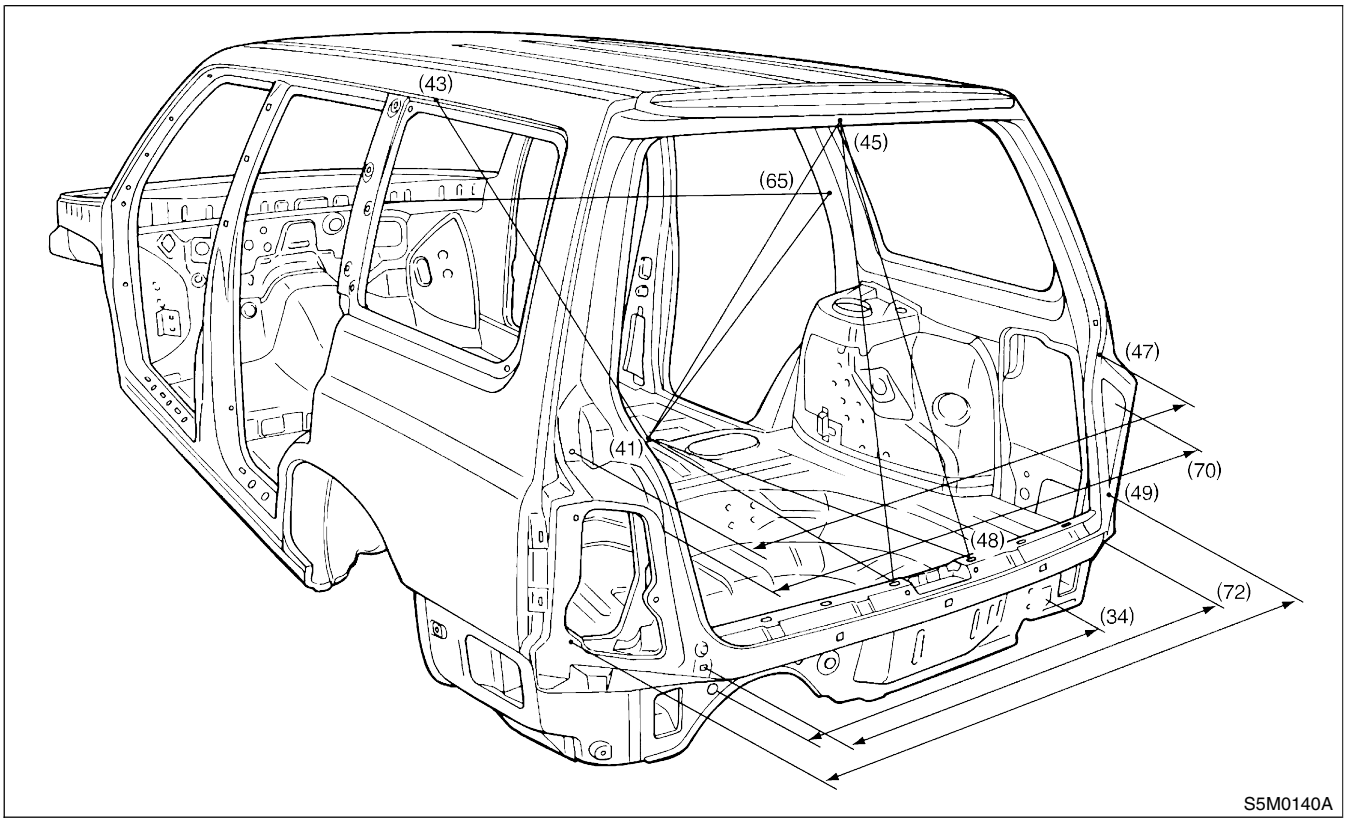


DATUM DIMENSIONS

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)	1,157 (45.55)
(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)

DATUM DIMENSIONS

MEMO:

INSTRUMENTATION/DRIVER INFO

IDI

		Page
1.	General Description	2
2.	Combination Meter System	4
3.	Combination Meter Assembly	15
4.	Speedometer	17
5.	Tachometer	18
6.	Fuel Gauge	19
7.	Water Temperature Gauge	20
8.	Ambient Sensor	21

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
	LO indicator light	14 V — 1.4 W
	HOLD indicator light	14 V — 1.4 W
	POWER indicator light	14 V — 1.4 W
	Rear differential oil temperature warning light	14 V — 1.4 W
	Immobilizer 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 circuit plate.
- Do not drop or otherwise apply impact.

C: PREPARATION TOOL S907001A17

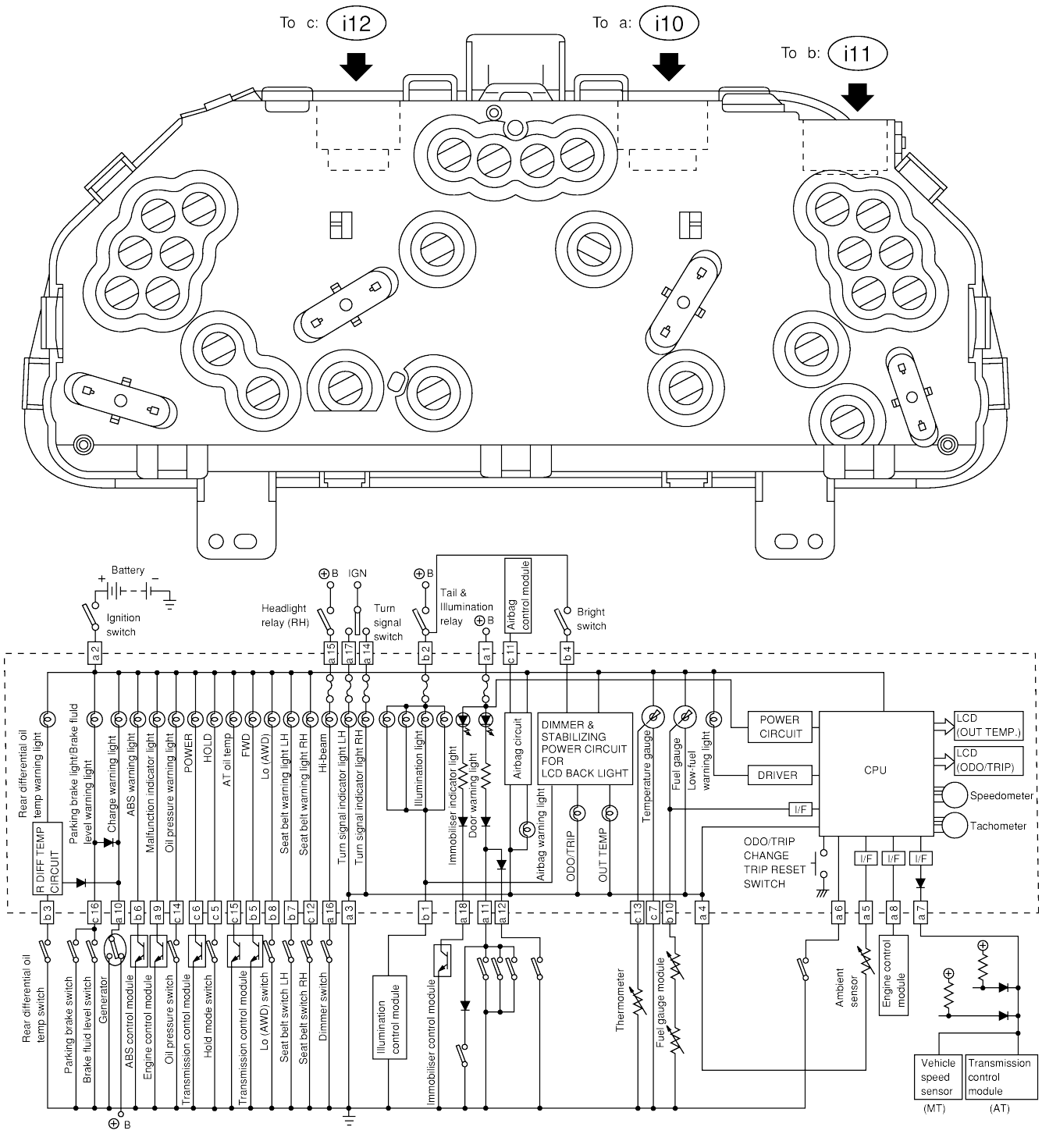
1. GENERAL TOOLS S907001A1701

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance and voltage.

2. Combination Meter System S907607

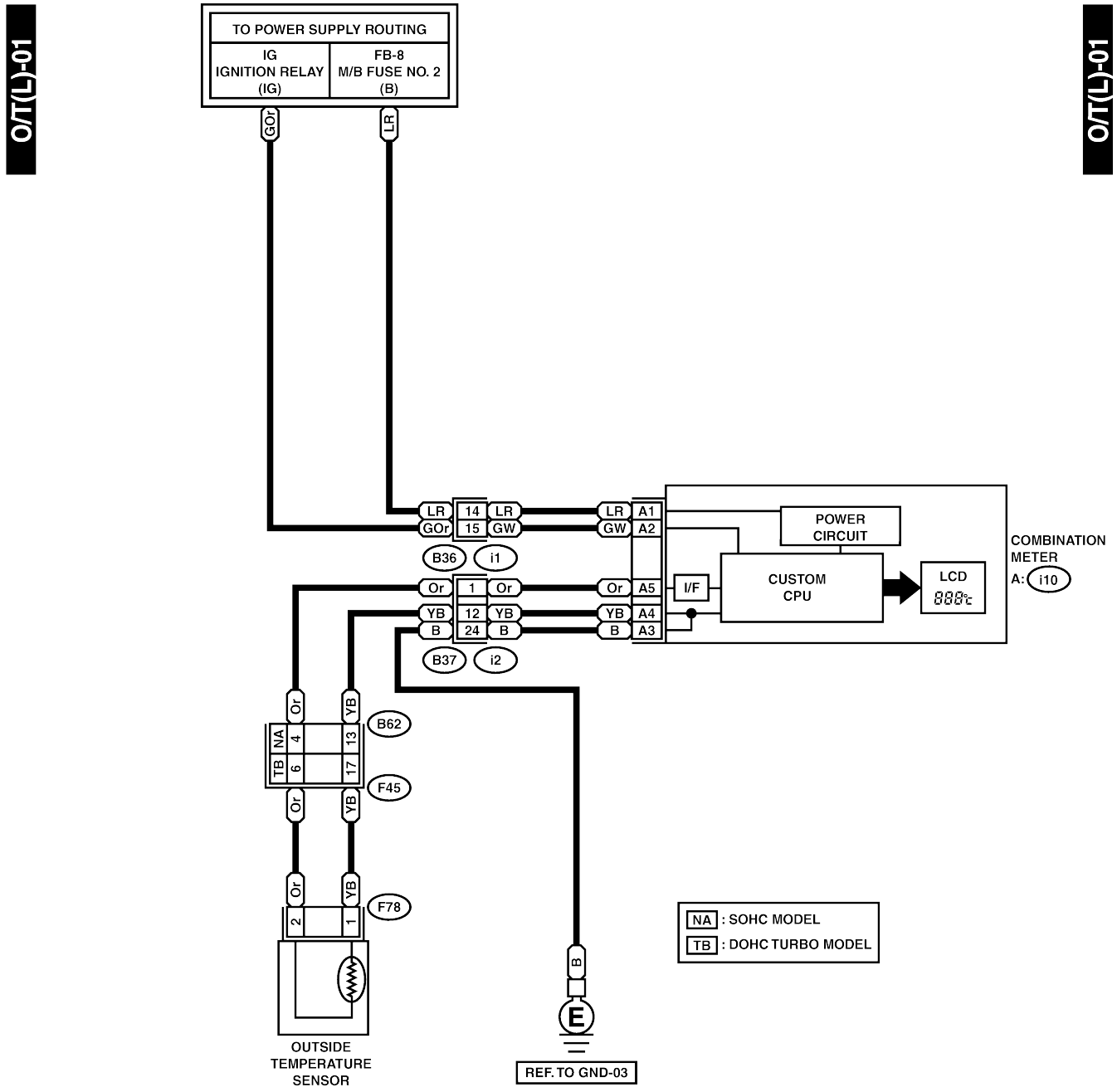
A: SCHEMATIC S907607A21

1. COMBINATION METER S907607A2101



SG6420A

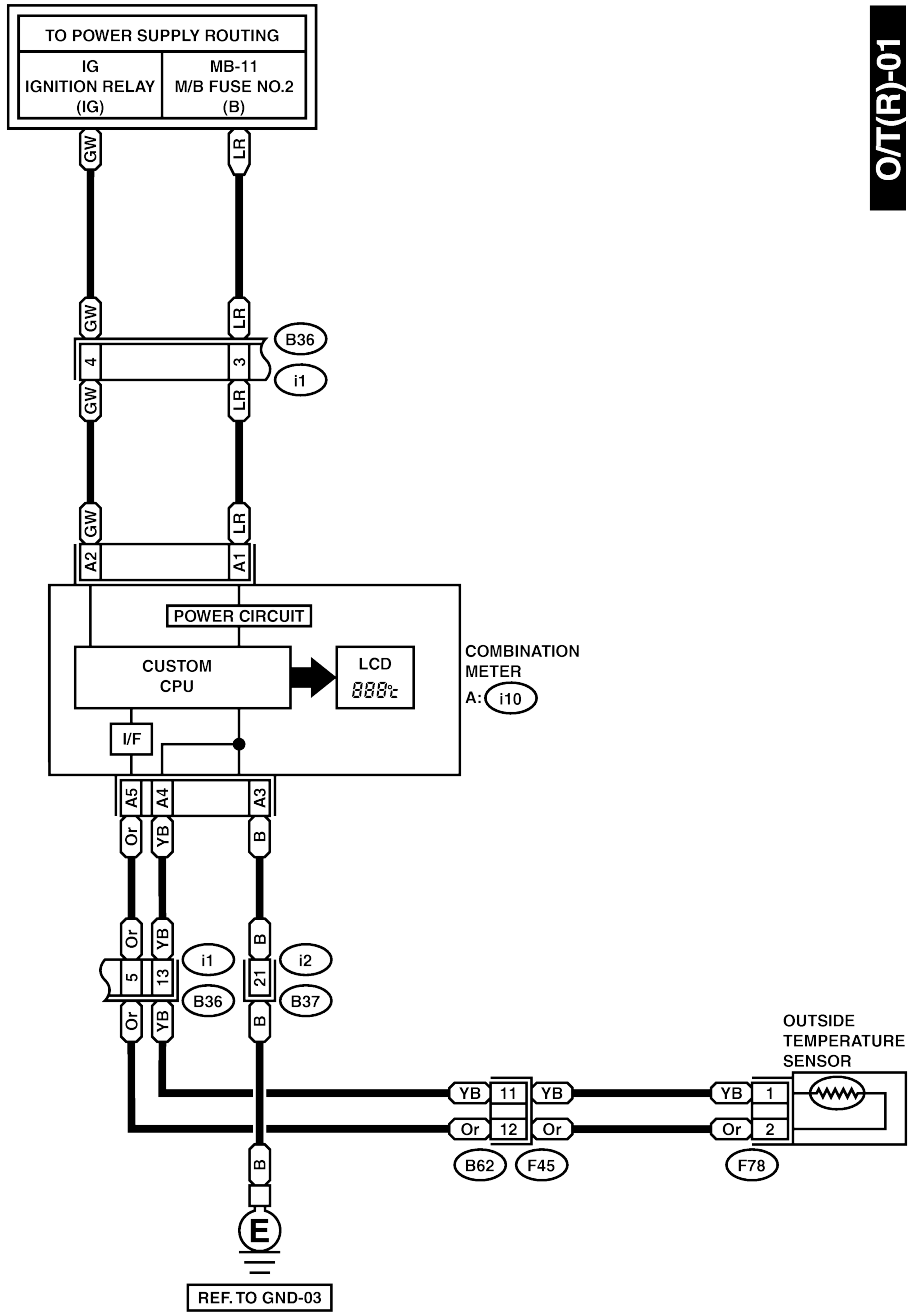
2. OUTSIDE TEMPERATURE INDICATOR LHD MODEL S907607A2103

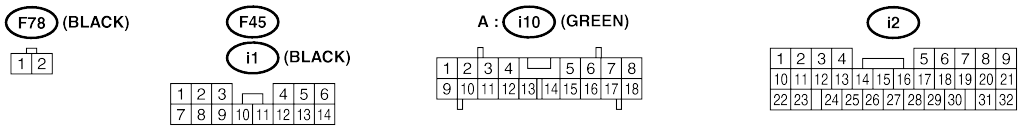


SL96-20

3. OUTSIDE TEMPERATURE INDICATOR RHD MODEL S907607A2104

O/T(R)-01





SR96-20

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-8 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-9 CHECK VEHICLE SPEED SENSOR, INSPECTION, Combination Meter System.>
		AT: <Ref. to IDI-11 CHECK TRANSMISSION CONTROL MODULE, INSPECTION, Combination Meter System.>
Tachometer does not operate.	(1) Engine control module (2) Harness (3) Tachometer	<Ref. to IDI-11 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-12 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-13 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-14 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-15 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-17 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*** ***(B56) No. 17 (+) — 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*** ***(B56) No. 17 — (i10) No. 7:***	Is the resistance less than 10 Ω?	Check speed meter. <Ref. to IDI-17 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 (B84, B134 or B136) and engine ground. ***Connector & terminal*** ***SOHC model:*** ***(B134) No. 30 (+) — Engine ground (–):*** ***SOHC without OBD model:*** ***(B84) No. 6 (+) — Engine ground (–):*** ***DOHC turbo model:*** ***(B136) No. 9 (+) — Engine ground (–):***	Is the voltage 0 ←→ 13 V or more?	Go to step **2**.	Check engine control module. <Ref. to EN(SOHC)-2, Basic Diagnostic Procedure.>, <Ref. to EN(SOHCw/oOBD)-2, Basic Diagnostic Procedure.> or <Ref. to EN(DOHC TURBO)-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 (B84, B134 or B136) and combination meter harness connector (i11). ***Connector & terminal*** ***SOHC model:*** ***(B134) No. 30 — (i10) No. 8:*** ***SOHC without OBD model:*** ***(B84) No. 6 (+) — (i10) No. 8:*** ***DOHC turbo model:*** ***(B136) No. 9 (+) — (i10) No. 8:***	Is the resistance less than 10 Ω?	Check tachometer. <Ref. to IDI-18 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(SOHC)-64, REMOVAL, Fuel Level Sensor.>, <Ref. to FU(SOHCw/oOBD)-52, REMOVAL, Fuel Level Sensor.> or <Ref. to FU(DOHC TURBO)-62, REMOVAL, Fuel Level Sensor.> 2) Measure resistance between fuel level sensor terminals when setting the float to FULL and EMPTY position. ***Terminals*** ***No. 3 — No. 5:***	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(SOHC)-65, REMOVAL, Fuel Sub Level Sensor.>, <Ref. to FU(SOHCw/oOBD)-53, REMOVAL, Fuel Sub Level Sensor.> or <Ref. to FU(DOHC TURBO)-63, REMOVAL, Sub Fuel 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. 10:***	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-19, 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(SOHC)-122, DTC P0117—ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT LOW INPUT—, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>, <Ref. to EN(SOHCw/oOBD)-70, DTC21 ENGINE COOLANT TEMPERATURE SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> or <Ref. to EN(DOHC TURBO)-130, DTC P0117—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-20 REMOVAL, Water Temperature Gauge.>	Repair wiring harness.

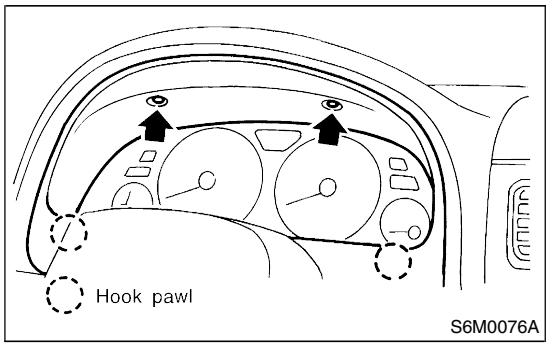
8. CHECK OUTSIDE TEMPERATURE INDICATOR S907607A1009

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-21 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.

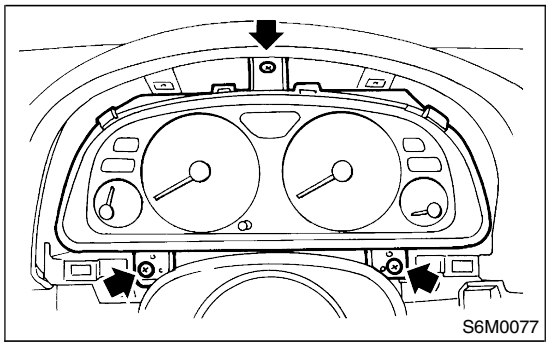
3. Combination Meter Assembly S907335

A: REMOVAL S907335A18

1) Disconnect ground cable from battery.
2) Set tilt steering at the lowest position.
3) Remove screws and detach meter visor.



4) Remove screws of combination meter and pull out the meter toward you.



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

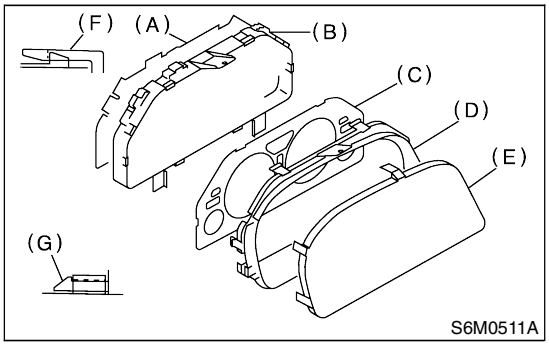
Install in the reverse order of removal.

CAUTION:
• Make sure that electrical connector is connected securely.
• Make sure that each meter operates normally.

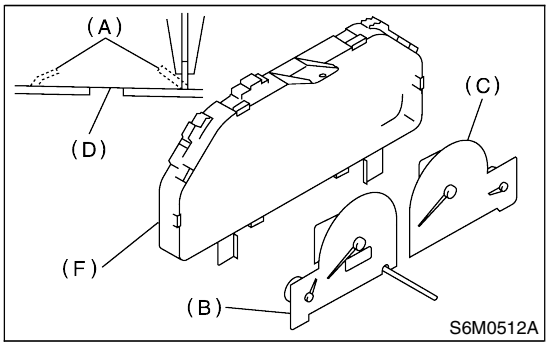
C: DISASSEMBLY S907335A06

CAUTION:
Use gloves to avoid damage and getting fingerprints on the glass surface and meter surfaces.

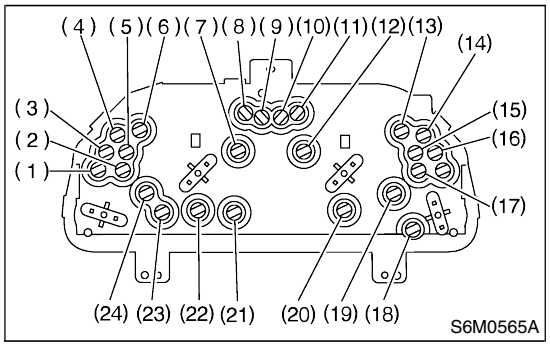
1) Disengage claw (F) to remove case (B) from back cover (A).
2) Disengage claw (G) to remove meter glass (E), reflector (D), and window plate (C) from inner case.



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).



1. BULB REPLACEMENT S907335A0601



(1) Check engine
(2) Oil pressure
(3) Charge
(4) Seat belt (RHD)
(5) AT oil temp.
(6) Brake
(7) Tachometer
(8) Turn RH
(9) Airbag warning light
(10) HI-beam
(11) Turn LH
(12) Speedometer
(13) FWD
(14) Seat belt (LHD)
(15) ABS
(16) AWD LO
(17) R. DIFF TEMP
(18) Low fuel
(19) Speedometer and fuel gauge
(20) Odometer and trip meter
(21) HOLD
(22) Outside air temperature display
(23) POWER
(24) Tachometer and temperature gauge

D: ASSEMBLY S907335A02

Assemble in the reverse order of disassembly.

4. Speedometer S907608

A: REMOVAL S907608A18

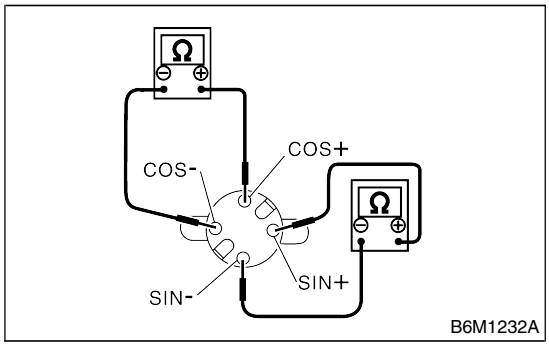
Disassemble combination meter, and then remove speedometer and fuel gauge assembly. <Ref. to IDI-15 DISASSEMBLY, Combination Meter Assembly.>

B: INSTALLATION S907608A11

Install in the reverse order of removal.

C: INSPECTION S907608A10

Measure resistance between speedometer terminals.



Tester connection	Resistance
Terminals SIN+ —SIN—	200±8 Ω
Terminals COS+ —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

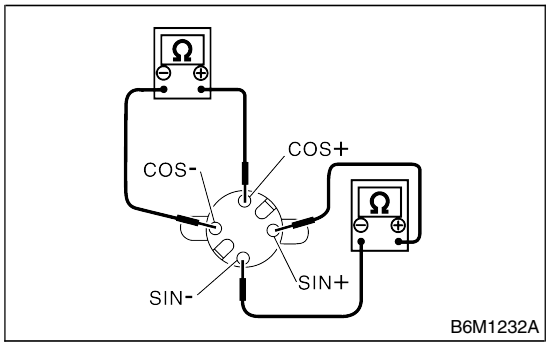
Disassemble combination meter, and then remove tachometer and water temperature gauge assembly. <Ref. to IDI-15 DISASSEMBLY, Combination Meter Assembly.>

B: INSTALLATION S907609A11

Install in the reverse order of removal.

C: INSPECTION S907609A10

Measure resistance between tachometer terminals.



Tester connection	Resistance
Terminals SIN+ —SIN—	200±8 Ω
Terminals COS+ —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

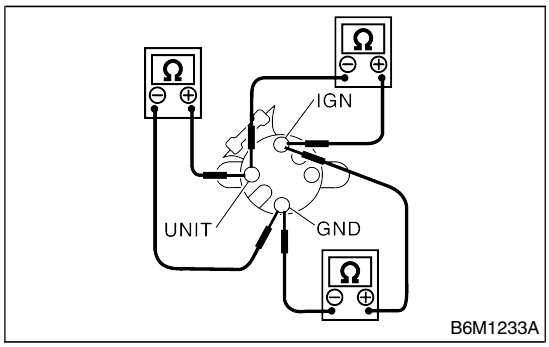
Disassemble combination meter, and then remove speedometer and fuel gauge assembly. <Ref. to IDI-15 DISASSEMBLY, Combination Meter Assembly.>

B: INSTALLATION S907610A11

Install in the reverse order of removal.

C: INSPECTION S907610A10

Measure resistance between fuel gauge terminals.



Tester connection	Resistance
Terminals IGN — GND	170±10 Ω
Terminals IGN — UNIT	35±10 Ω
Terminals UNIT — 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

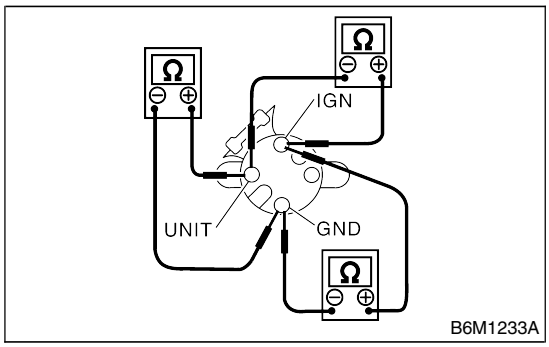
Disassemble combination meter, and then remove tachometer and water temperature gauge assembly. <Ref. to IDI-15 DISASSEMBLY, Combination Meter Assembly.>

B: INSTALLATION S907611A11

Install in the reverse order of removal.

C: INSPECTION S907611A10

Measure resistance between fuel gauge terminals.



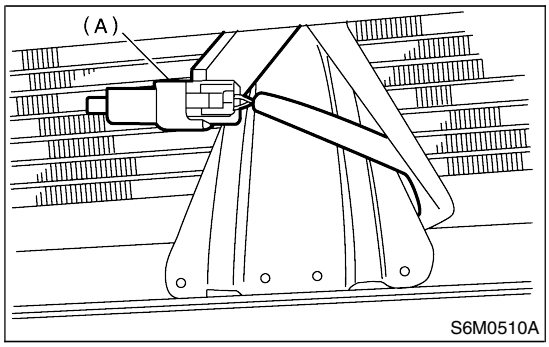
Tester connection	Resistance
Terminals IGN — GND	208±10 Ω
Terminals IGN — UNIT	56±10 Ω
Terminals UNIT — GND	264±10 Ω

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.

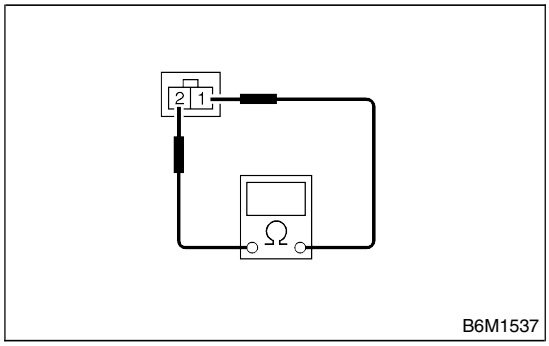


B: INSTALLATION S907644A11

Install in the reverse order of removal.

C: INSPECTION S907644A10

Measure resistance between ambient sensor terminals.



Tester connection	Resistance
1 — 2	3.0 kΩ/25°C (77°F)

If NG, replace the ambient sensor.

MEMO:

SEATS

SE

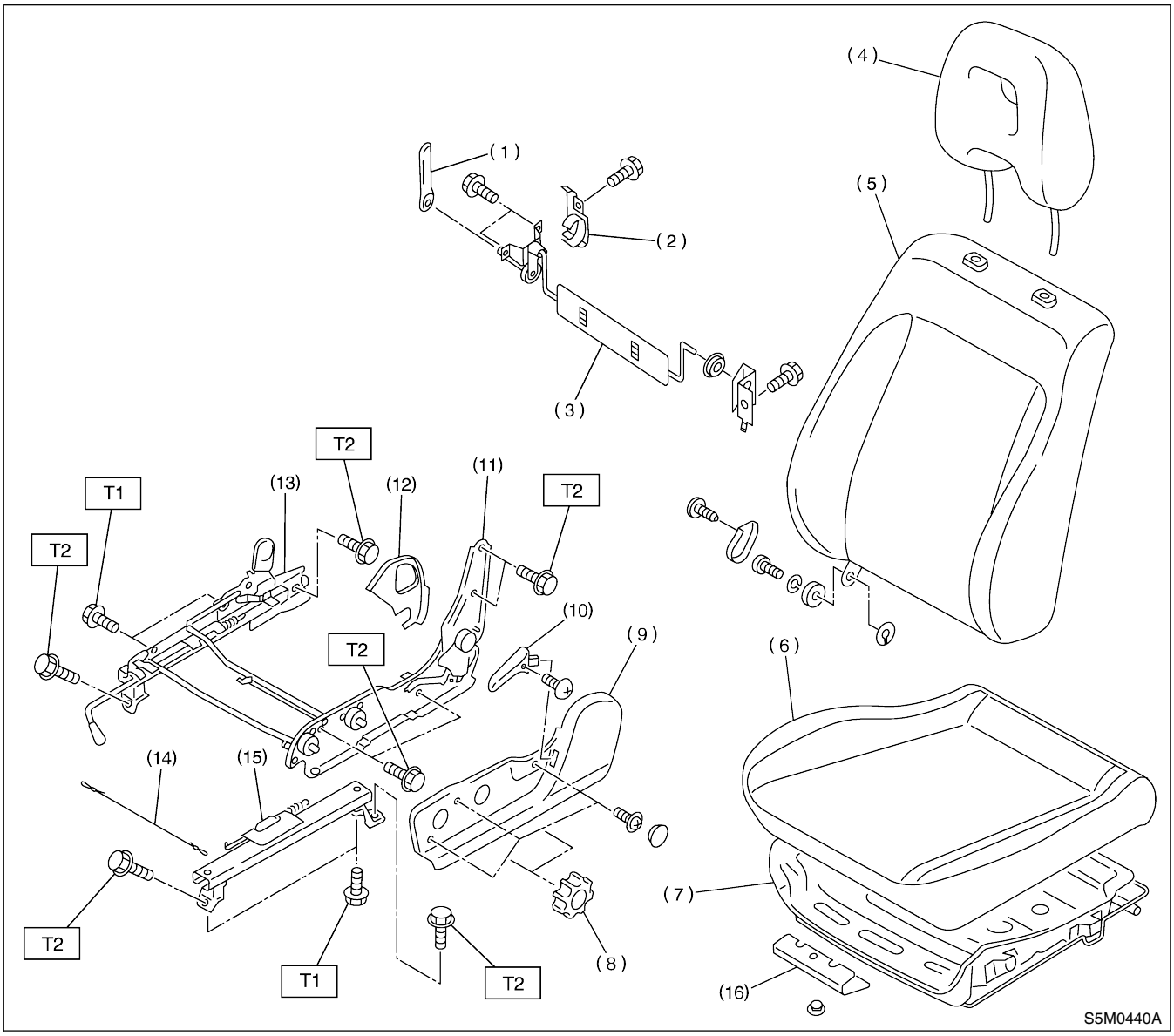
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2. Front Seat....5
3. Rear Seat....6

1. General Description S908001

A: COMPONENT S908001A05

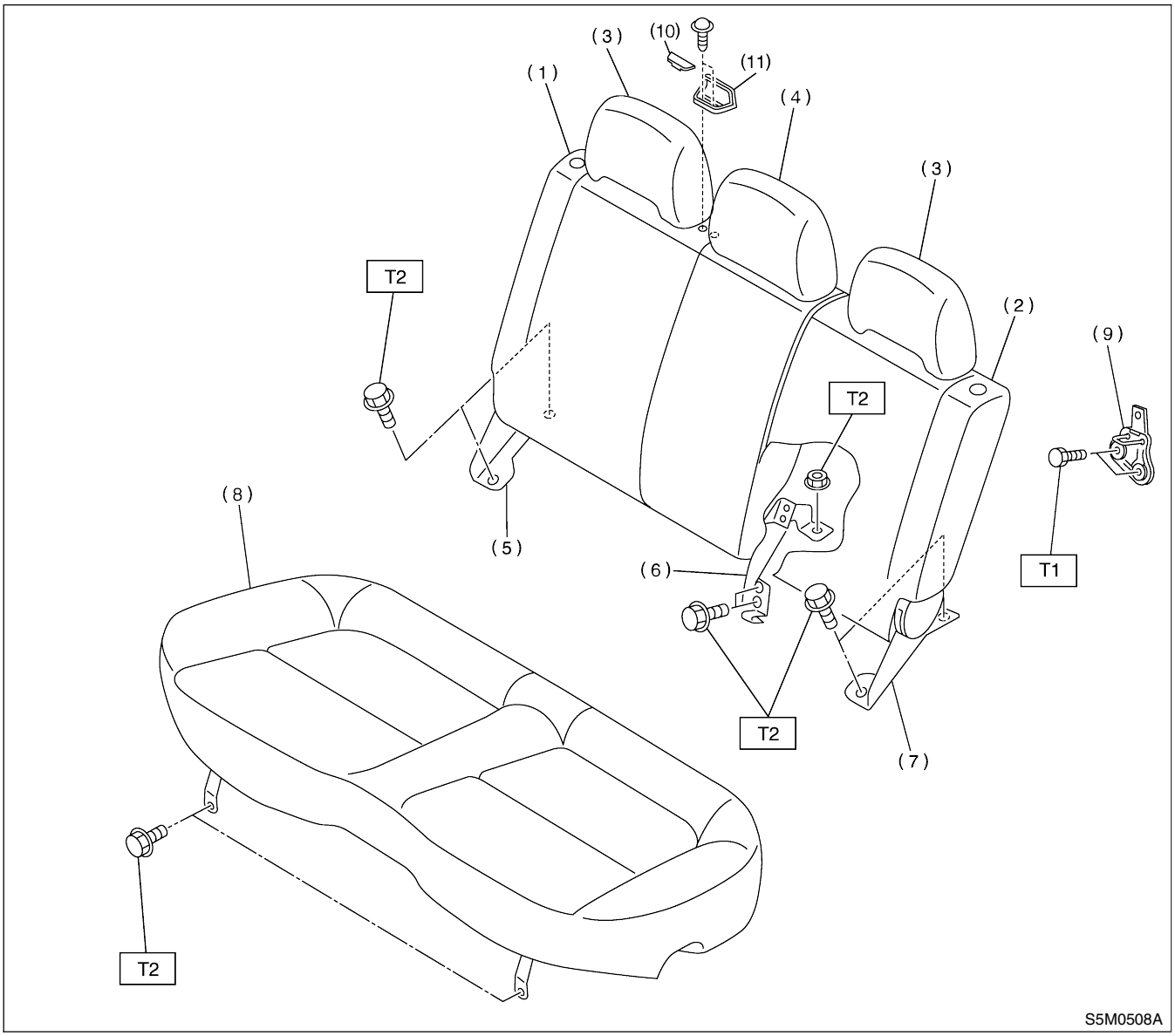
1. FRONT SEAT S908001A0501



(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: 10 (1.0, 7.2)
T2: 25 (2.5, 18.1)

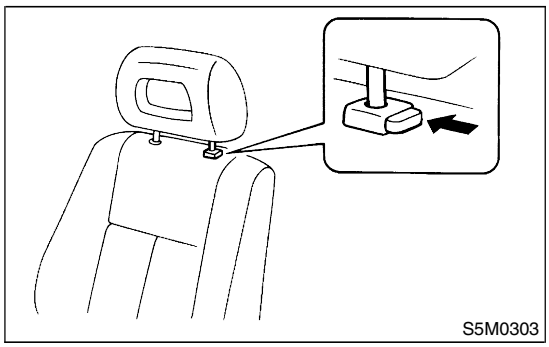
B: CAUTION S908001A03

- 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.

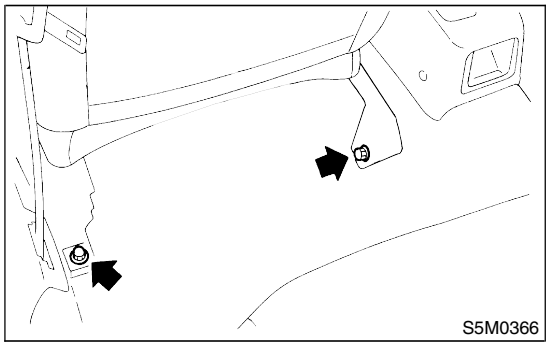
2. Front Seat S908343

A: REMOVAL S908343A18

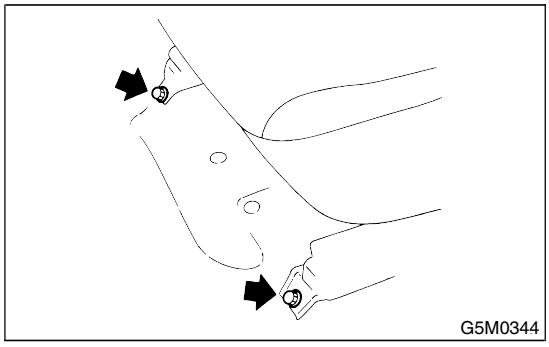
1) While operating button (located on top of backrest), lift headrest out with hand placed between backrest and headrest.


S5M0303

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.

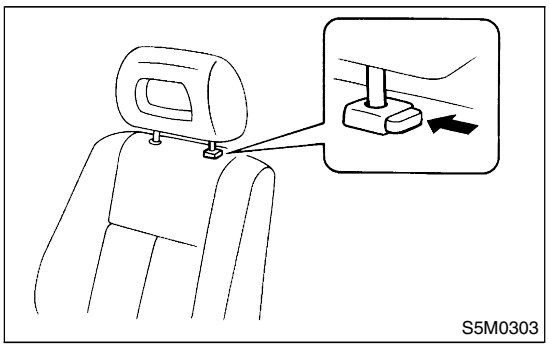

G5M0344

7) While disconnecting side airbag connector, detach front seat. (Side airbag equipped vehicle) and inner belt connector.

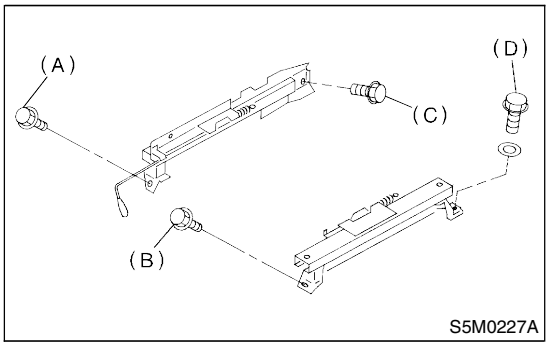
CAUTION:
• When removing seat from vehicle, take care not to damage body, seat, or trim.
• After the front seat has been removed from side airbag equipped vehicle, store it as instructed in AIRBAG REPAIR SECTION. <Ref. to AB-15, CAUTION, Side Airbag Module.>

B: INSTALLATION S908343A11

1) While operating button (located on top of backrest), lift headrest out by placing your hand between backrest and headrest.


S5M0303

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

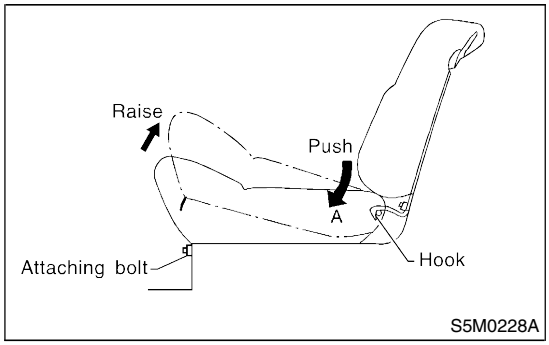
7) Connect inner belt connector.
8) Connect side airbag connector. (Side airbag equipped model)
9) Install bolt cover on rear end of slide rail.
10) Install headrest on backrest.

CAUTION:
Confirm that seat can move smoothly and be locked securely at any position.

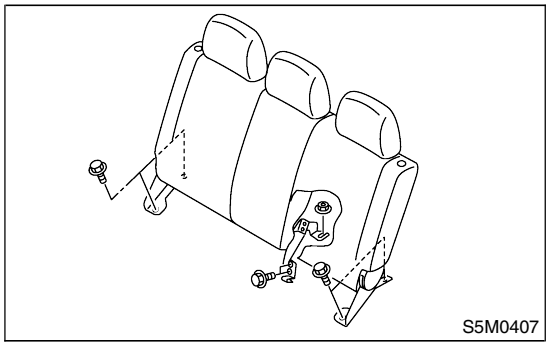
3. Rear Seat S908350

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.



3) Remove rear quarter lower trim. <Ref. to EI-39, REMOVAL, Rear Quarter Trim.>
4) Remove bolts and nuts.



5) Detach backrest.

B: INSTALLATION S908350A11

Install in the reverse order of removal.

SECURITY AND LOCKS

SL

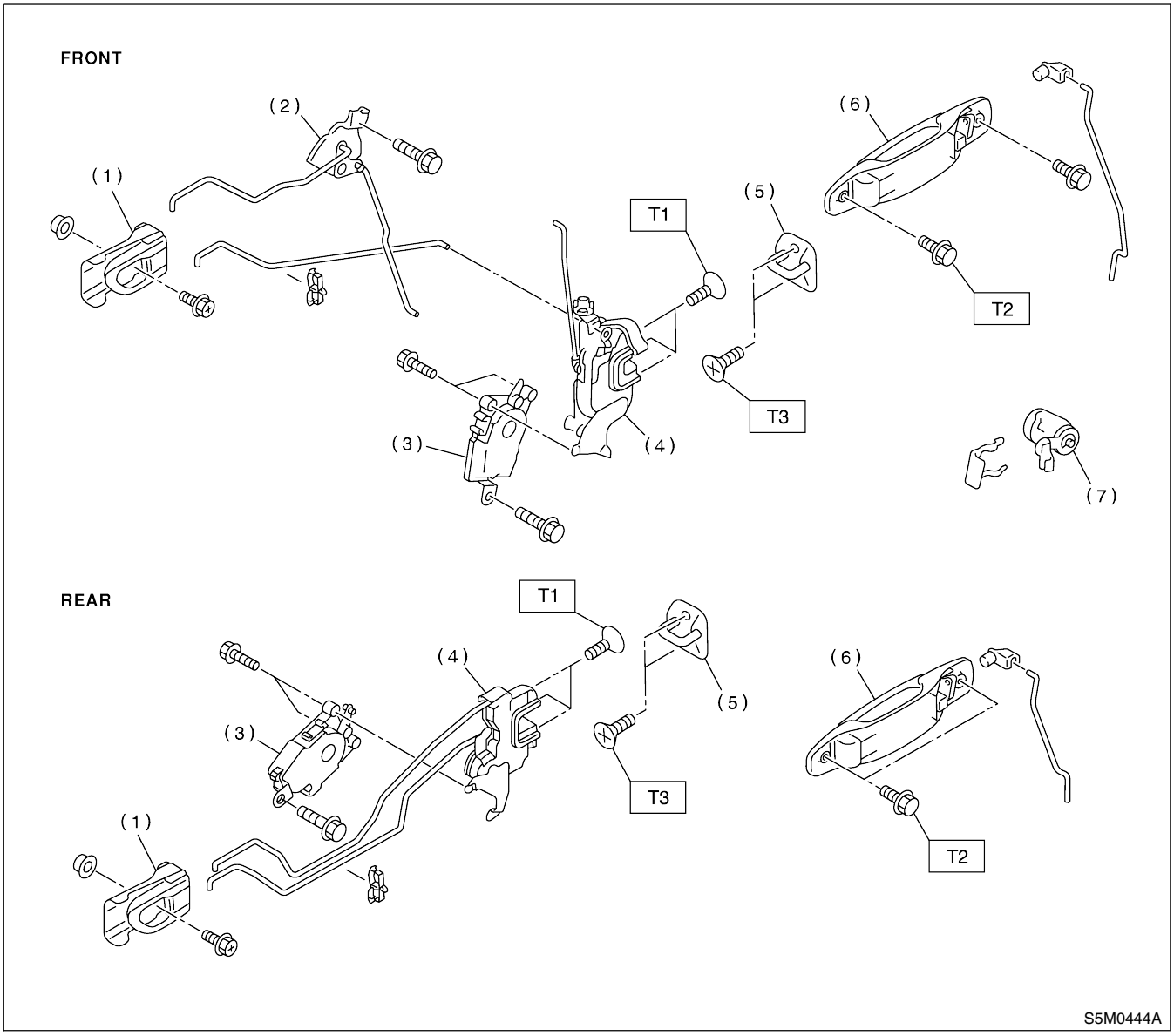
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5.	Front Outer Handle	28
6.	Front Door Latch Assembly	29
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1. General Description S909001

A: SPECIFICATIONS S909001E49

B: COMPONENT S909001A05

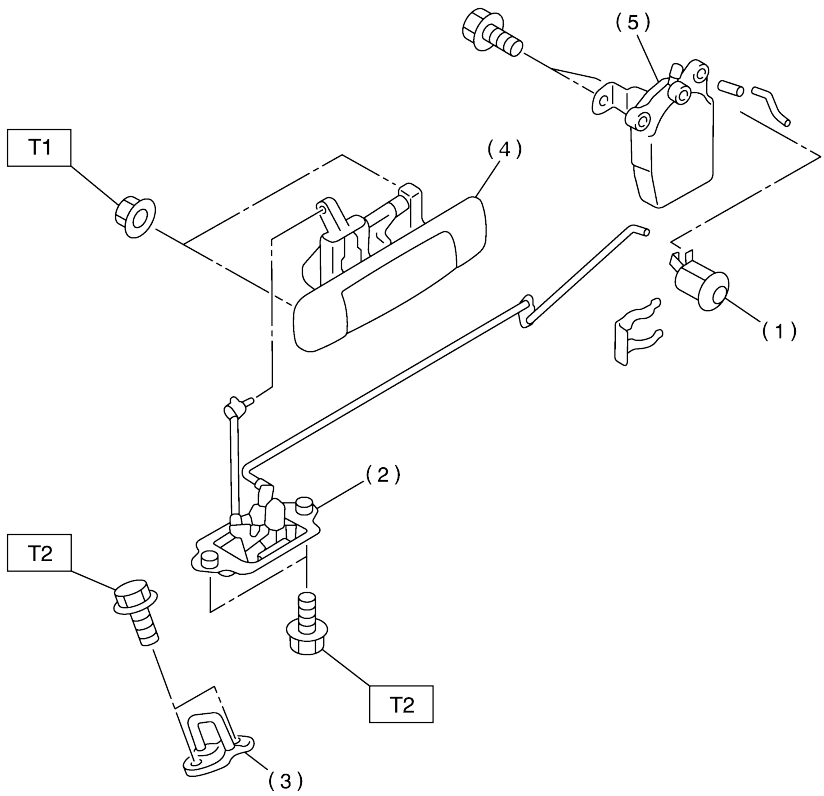
1. DOOR LOCK ASSEMBLY S909001A0501



(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: 6.4 (0.65, 4.7)
T2: 7.4 (0.75, 5.4)
T3: 14 (1.4, 10.1)

2. REAR GATE LOCK S909001A0502

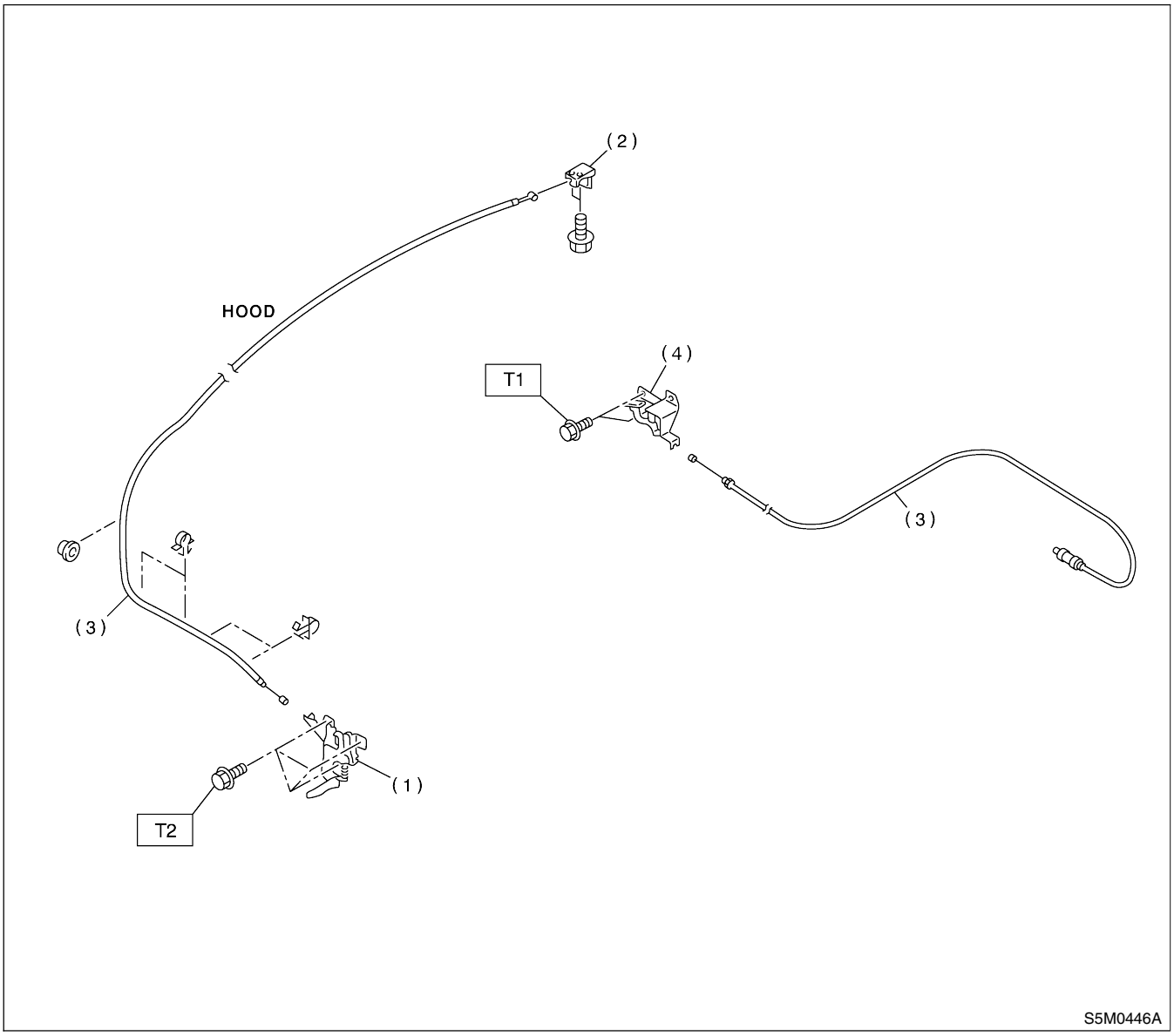


S5M0445A

(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: 7.4 (0.75, 5.4)
T2: 25 (2.5, 18.1)

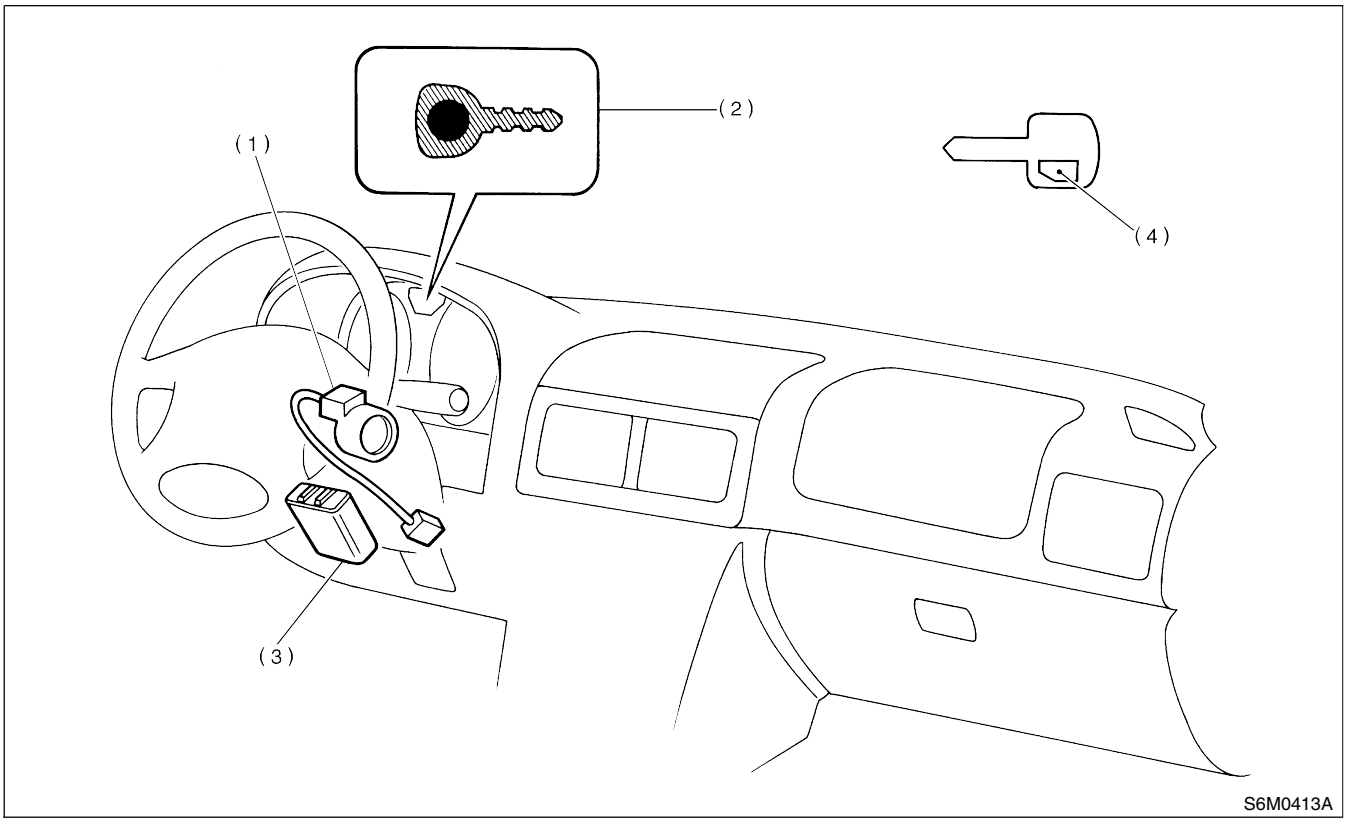
3. HOOD LOCK AND REMOTE OPENERS S909001A0503



(1) Hood lock ASSY
(2) Lever ASSY
(3) Cable
(4) Cover
(5) Pull handle ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 32 (3.3, 23.9)

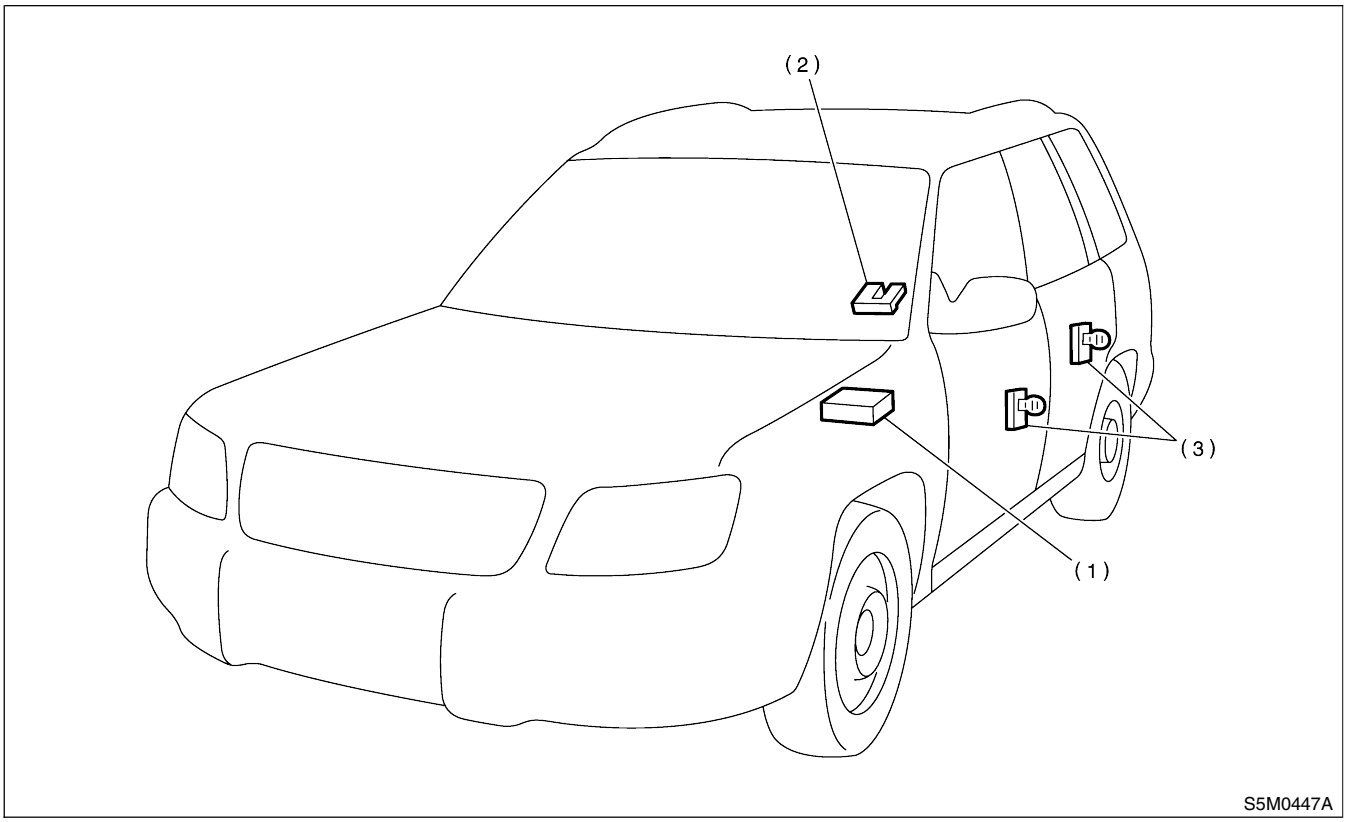
4. IMMOBILIZER SYSTEM S909001A0509



(1) Antenna
(2) Immobilizer indicator light (LED bulb)
(3) Immobilizer control module (IMM ECM): LHD model
(4) Transponder

NOTE:
IMM ECM location for RHD model is symmetrically opposite.

5. KEYLESS ENTRY SYSTEM S909001A0505



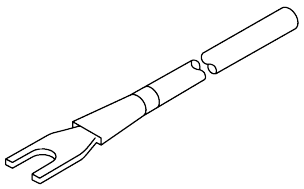
(1) Keyless entry control module (2) Rear gate latch switch (3) Door switch

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

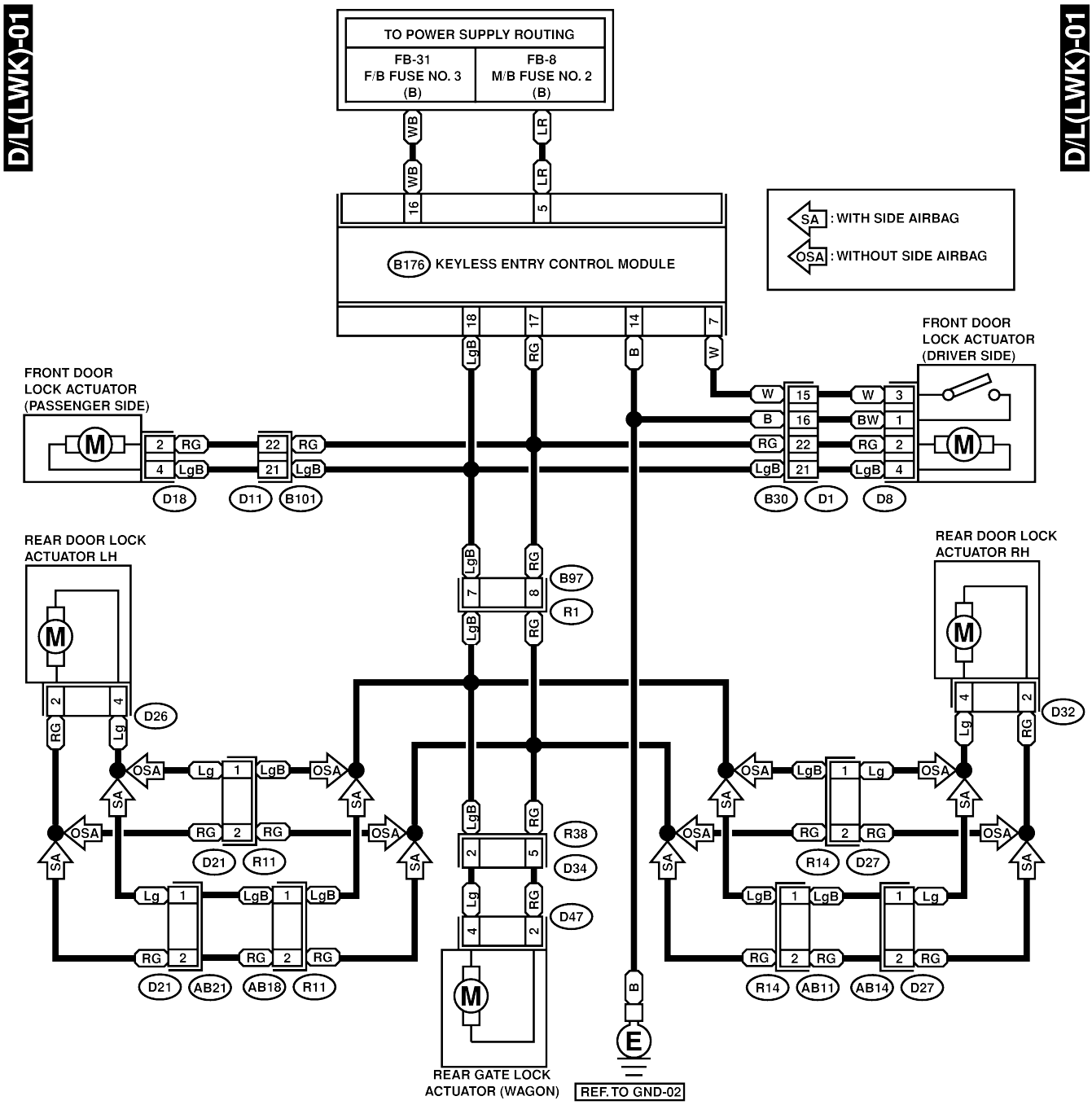
2. GENERAL TOOLS S909001A1702

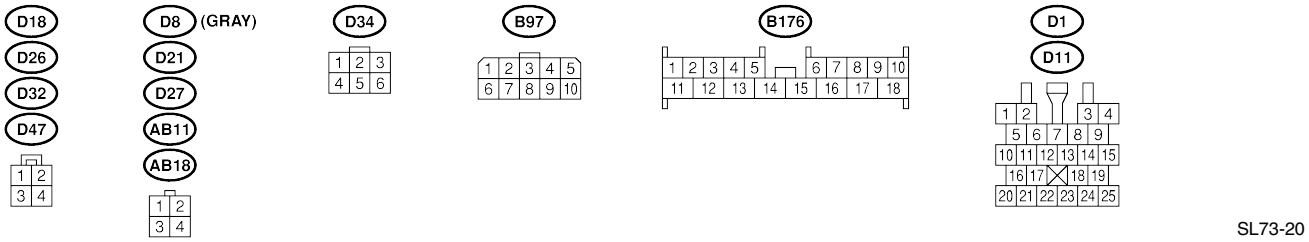
TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance and voltage.
Drill	Used for replacing ignition key lock.

2. Door Lock Control System S909348

A: SCHEMATIC S909348A21

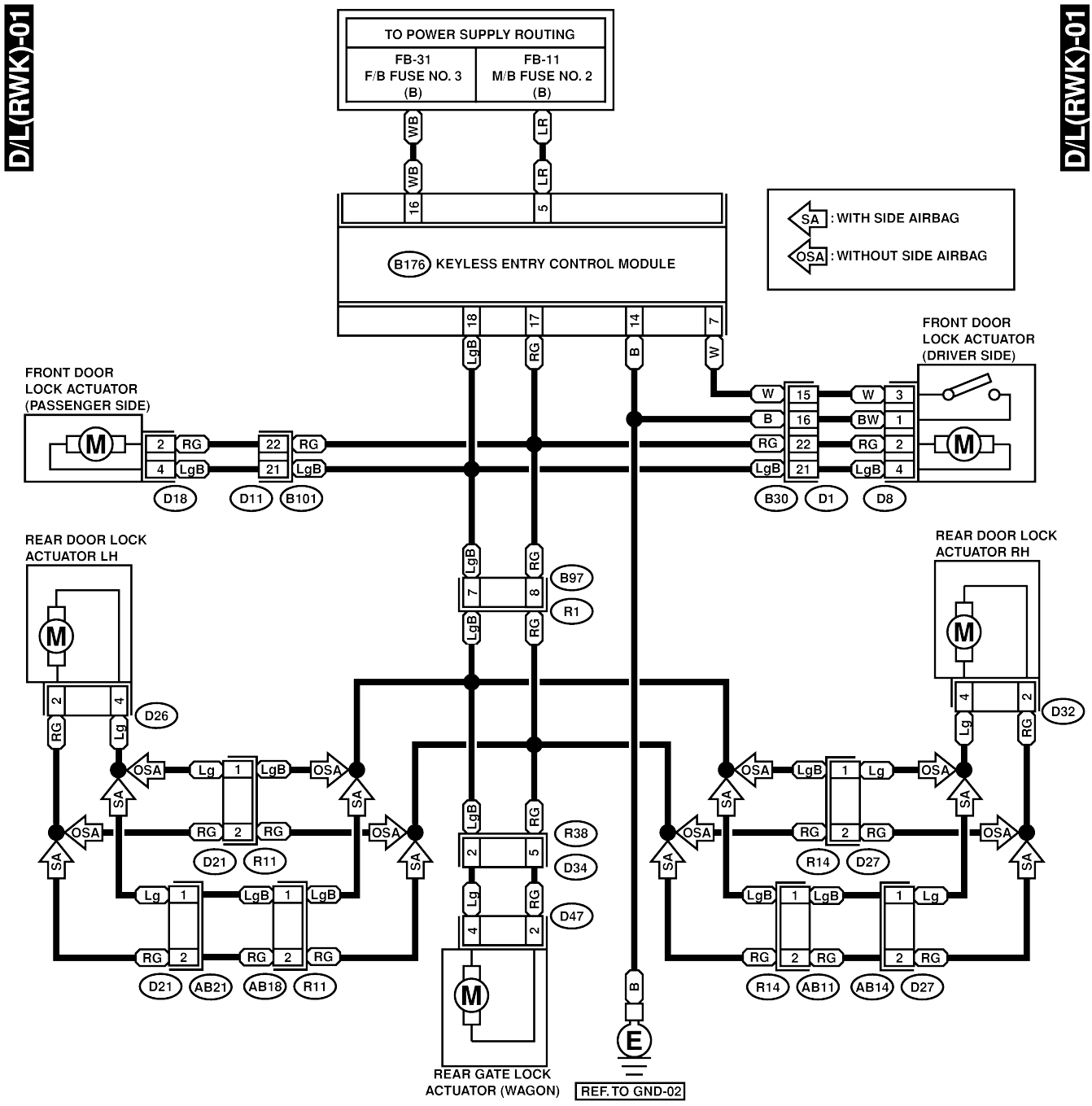
1. DOOR LOCK CONTROL LHD MODEL S909348A2106

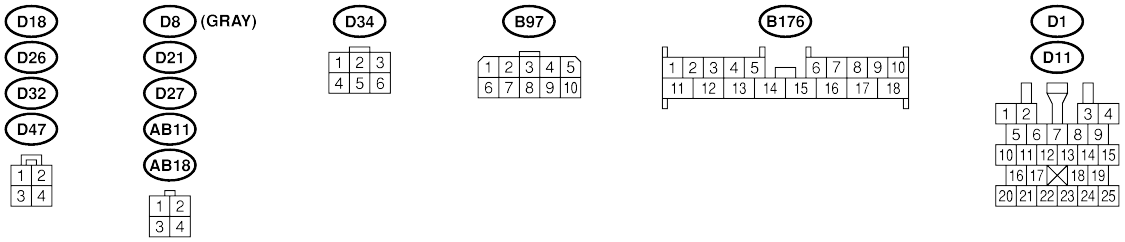




SL73-20

2. DOOR LOCK CONTROL RHD MODEL S909348A2107





SR73-20

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-10 CHECK FUSE, INSPECTION, Door Lock Control System.>
	2. Check the power supply and ground circuit for the keyless entry control module.	<Ref. to SL-11 CHECK POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, Door Lock Control System.>
	3. Check the door lock switch and the circuit.	<Ref. to SL-11 CHECK DOOR LOCK SWITCH AND CIRCUIT, INSPECTION, Door Lock Control System.>
	4. Check the door lock actuator and the circuit.	<Ref. to SL-12 CHECK DOOR LOCK ACTUATOR AND CIRCUIT, INSPECTION, Door Lock Control System.>
The door lock switch (knob) does not operate.	Check the door lock switch and the circuit.	<Ref. to SL-11 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-12 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. 2 (in the main fuse box) and 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-11 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*** ***(B176) No. 5 (+) — Chassis ground (–):*** ***(B176) No. 16 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Check the harness for open circuits or shorts between the keyless entry control module and the fuse.
2	**CHECK GROUND CIRCUIT.** Measure the resistance between the harness connector terminal and chassis ground. ***Connector & terminal*** ***(B176) No. 14 (+) — 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 keyless entry control module harness connector. 2) Measure the resistance between the harness connector terminal and chassis ground when moving the driver's door lock knob to UNLOCK. ***Connector & terminal*** ***(B176) No. 7 (+) — 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 driver's door lock knob is moved to LOCK. ***Connector & terminal*** ***(B176) No. 7 (+) — Chassis ground (–):***	Is the resistance less than 10 Ω?	Go to step **3**.	The door lock switch is OK.
3	**CHECK DOOR LOCK SWITCH.** 1) Disconnect the driver's door lock switch (actuator) harness connector. 2) Check the continuity between the door lock switch terminals when moving the door lock knob to UNLOCK. ***Terminal*** ***No. 1 — No. 3:***	Does continuity exist?	Go to step **4**.	Replace the door lock switch (actuator).
4	**CHECK DOOR LOCK SWITCH.** Check the continuity between the door lock switch terminals when moving the door lock knob to LOCK. ***Terminal*** ***No. 1 — No. 3:***	Does continuity exist?	Replace the door lock switch (actuator).	Check the harness for open circuits or shorts between the keyless entry control module and the door lock switch.

5. CHECK DOOR LOCK ACTUATOR AND CIRCUIT S909348A1005

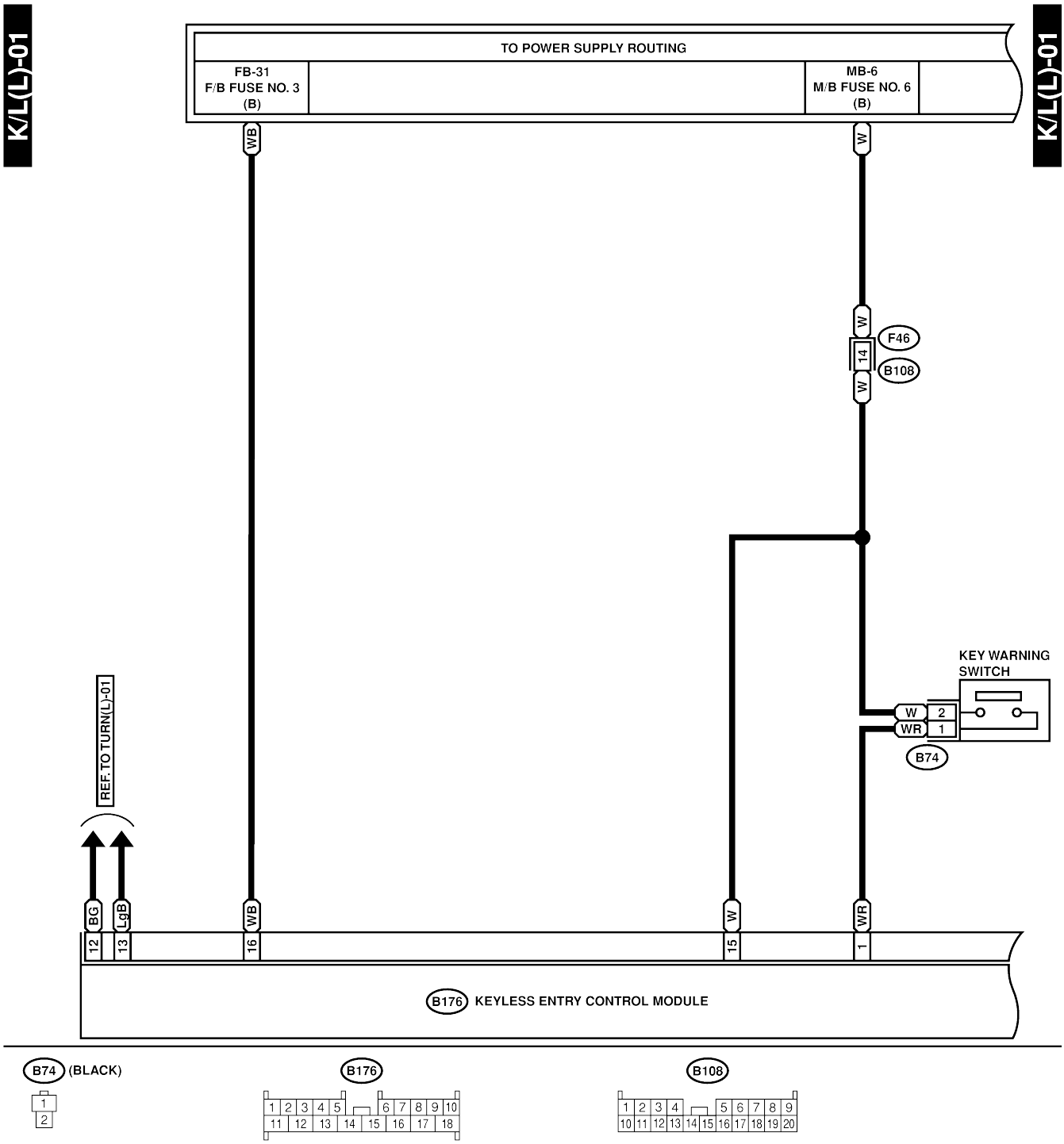
No.	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL.** Measure the voltage between the harness connector terminal and chassis ground when moving the door lock knob to LOCK. ***Connector & terminal*** ***(B176) No. 18 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Replace the keyless entry control module.
2	**CHECK OUTPUT SIGNAL.** Measure the voltage between the harness connector terminal and chassis ground when moving the door lock knob to UNLOCK. ***Connector & terminal*** ***(B176) No. 17 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	Replace the 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 or shorts between the keyless entry control module and the door lock actuator.	Replace the door lock actuator.

MEMO:

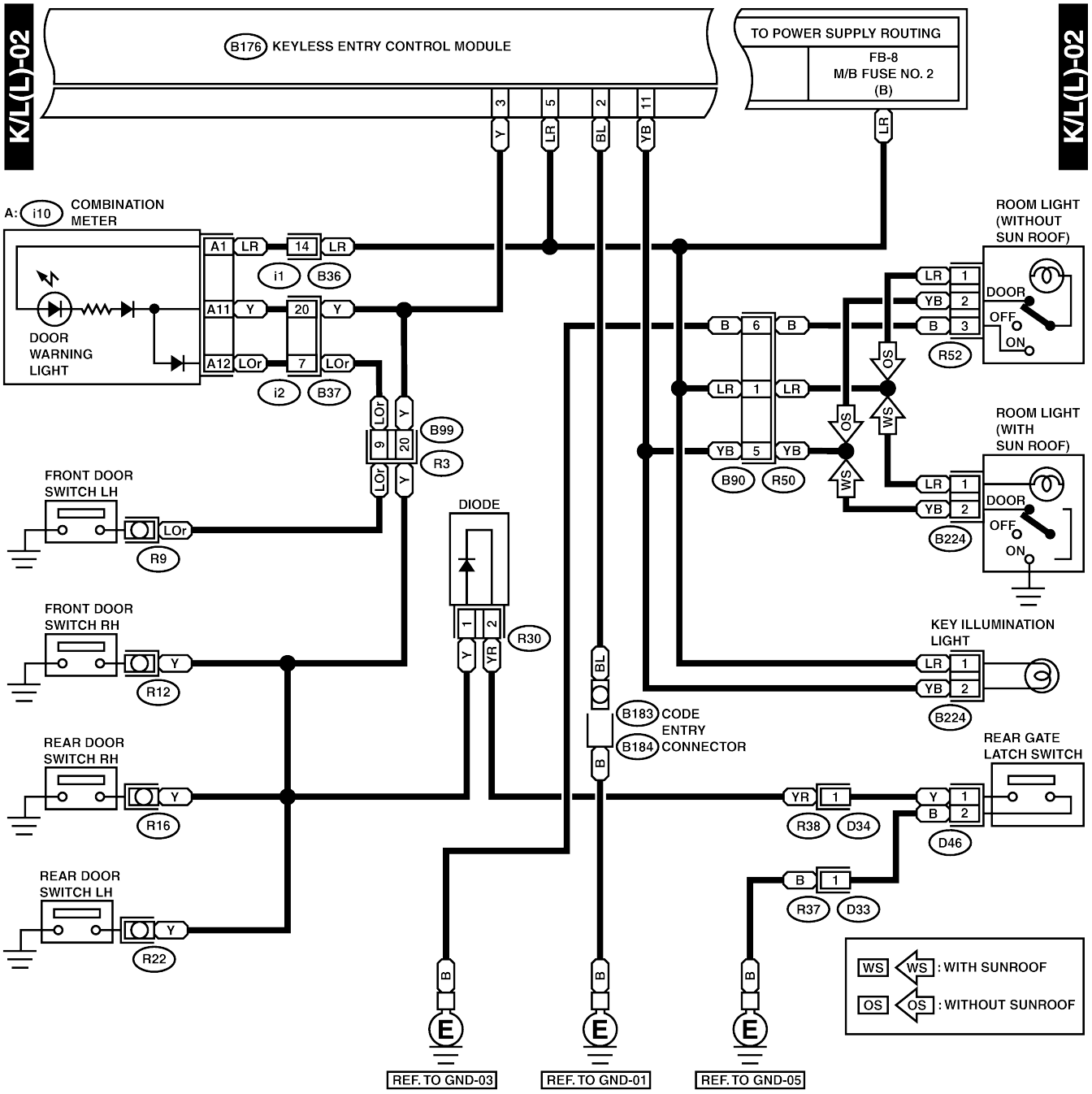
3. Keyless Entry System S909345

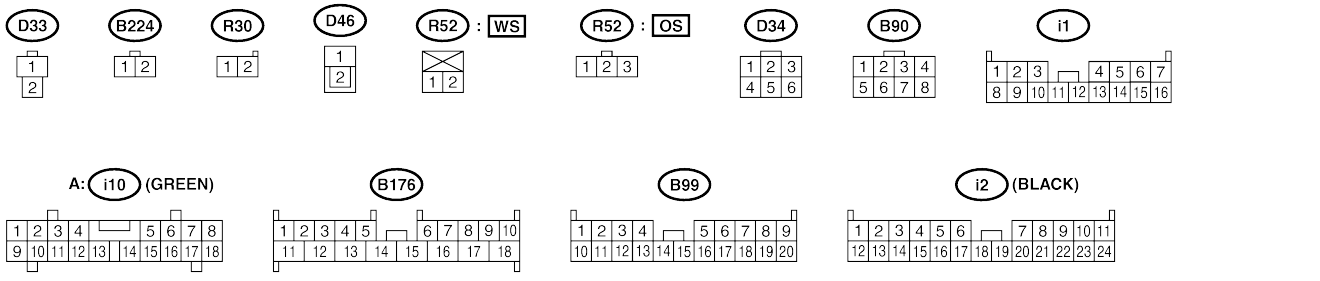
A: SCHEMATIC S909345A21

1. KEYLESS ENTRY LHD MODEL S909345A2101

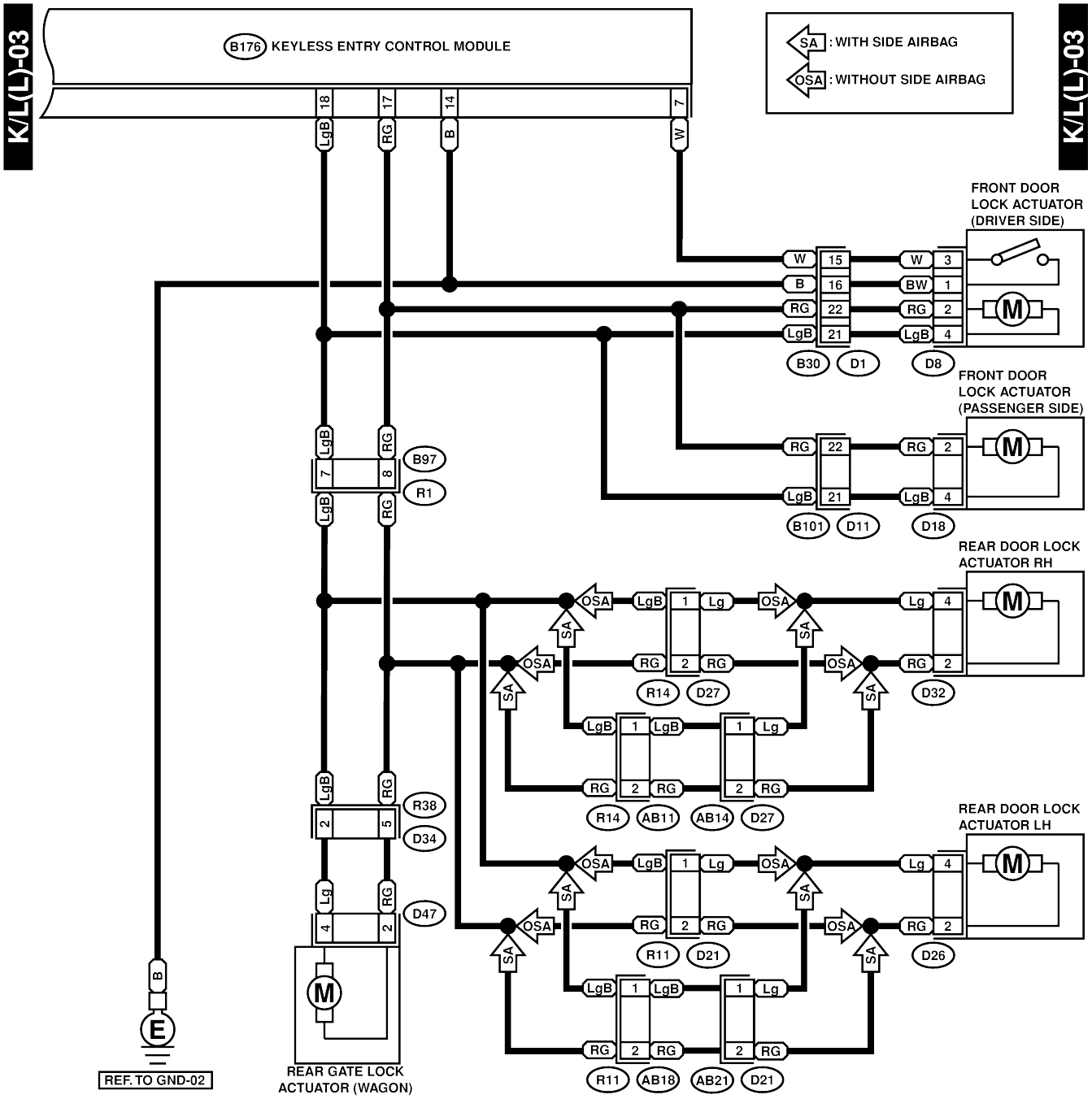


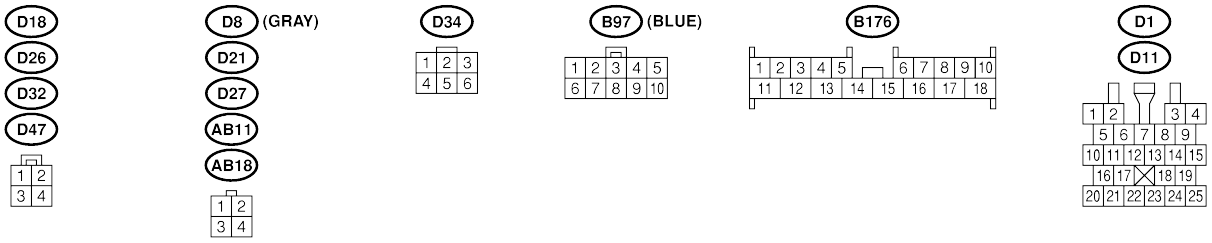
SL77-20A


K/L(L)-02
B176 KEYLESS ENTRY CONTROL MODULE
TO POWER SUPPLY ROUTING
FB-8
M/B FUSE NO. 2
(B)
K/L(L)-02
A: i10 COMBINATION METER
DOOR WARNING LIGHT
ROOM LIGHT (WITHOUT SUN ROOF)
ROOM LIGHT (WITH SUN ROOF)
FRONT DOOR SWITCH LH
FRONT DOOR SWITCH RH
REAR DOOR SWITCH RH
REAR DOOR SWITCH LH
DIODE
KEY ILLUMINATION LIGHT
REAR GATE LATCH SWITCH
B183 CODE ENTRY B184 CONNECTOR
WS : WITH SUNROOF
OS : WITHOUT SUNROOF
REF. TO GND-03
REF. TO GND-01
REF. TO GND-05


D33
B224
R30
D46
R52 : WS
R52 : OS
D34
B90
i1
A: i10 (GREEN)
B176
B99
i2 (BLACK)

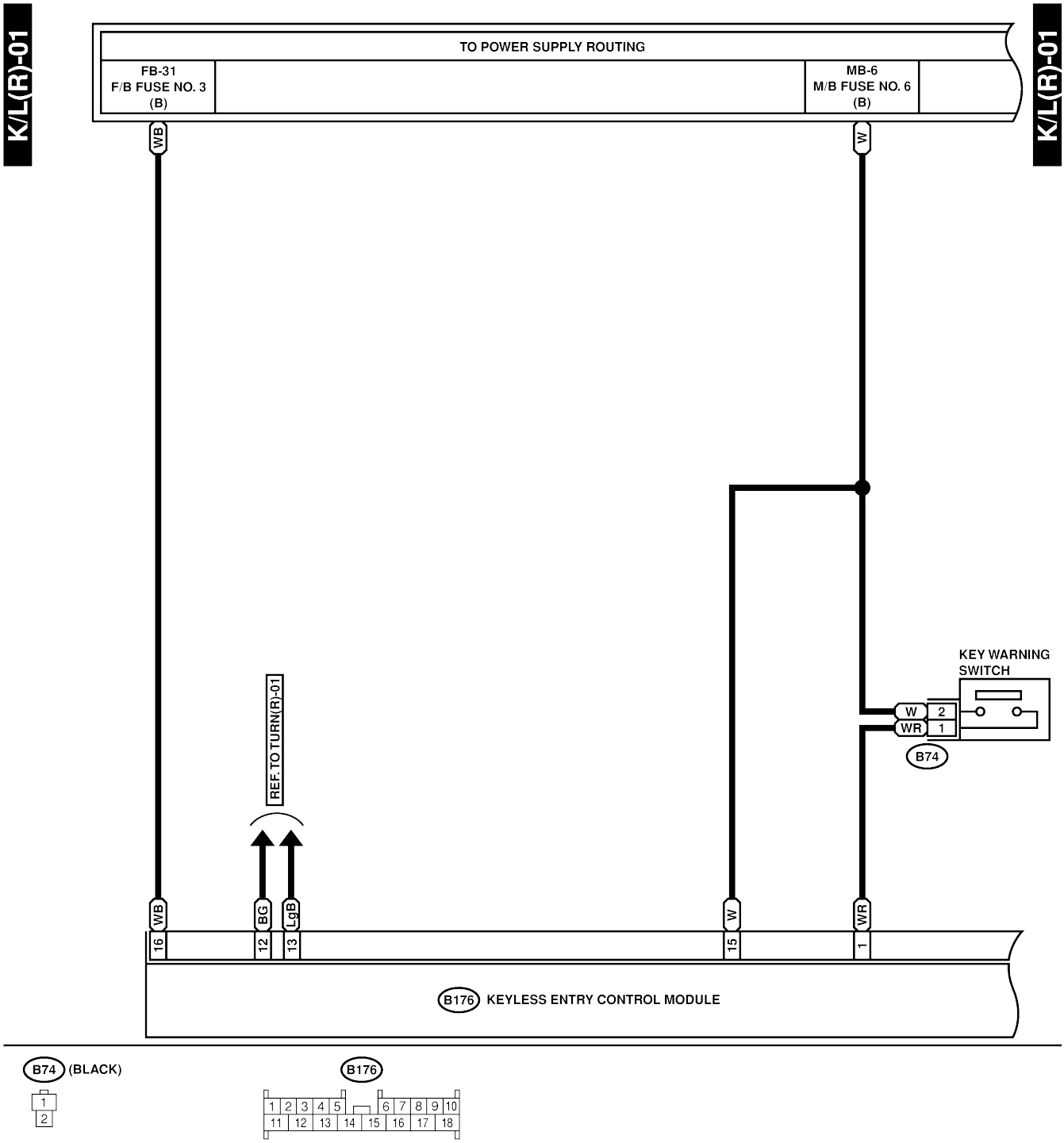
SL77-20B


K/L(L)-03
B176 KEYLESS ENTRY CONTROL MODULE
SA : WITH SIDE AIRBAG
OSA : WITHOUT SIDE AIRBAG
K/L(L)-03
FRONT DOOR LOCK ACTUATOR (DRIVER SIDE)
FRONT DOOR LOCK ACTUATOR (PASSENGER SIDE)
REAR DOOR LOCK ACTUATOR RH
REAR DOOR LOCK ACTUATOR LH
REAR GATE LOCK ACTUATOR (WAGON)
REF. TO GND-02
B97
R1
R38
D34
D47
R14
D27
D32
AB11
AB14
R11
D21
D26
AB18
AB21
B30
D1
D8
B101
D11
D18


D18
D26
D32
D47
D8 (GRAY)
D21
D27
AB11
AB18
D34
B97 (BLUE)
B176
D1
D11

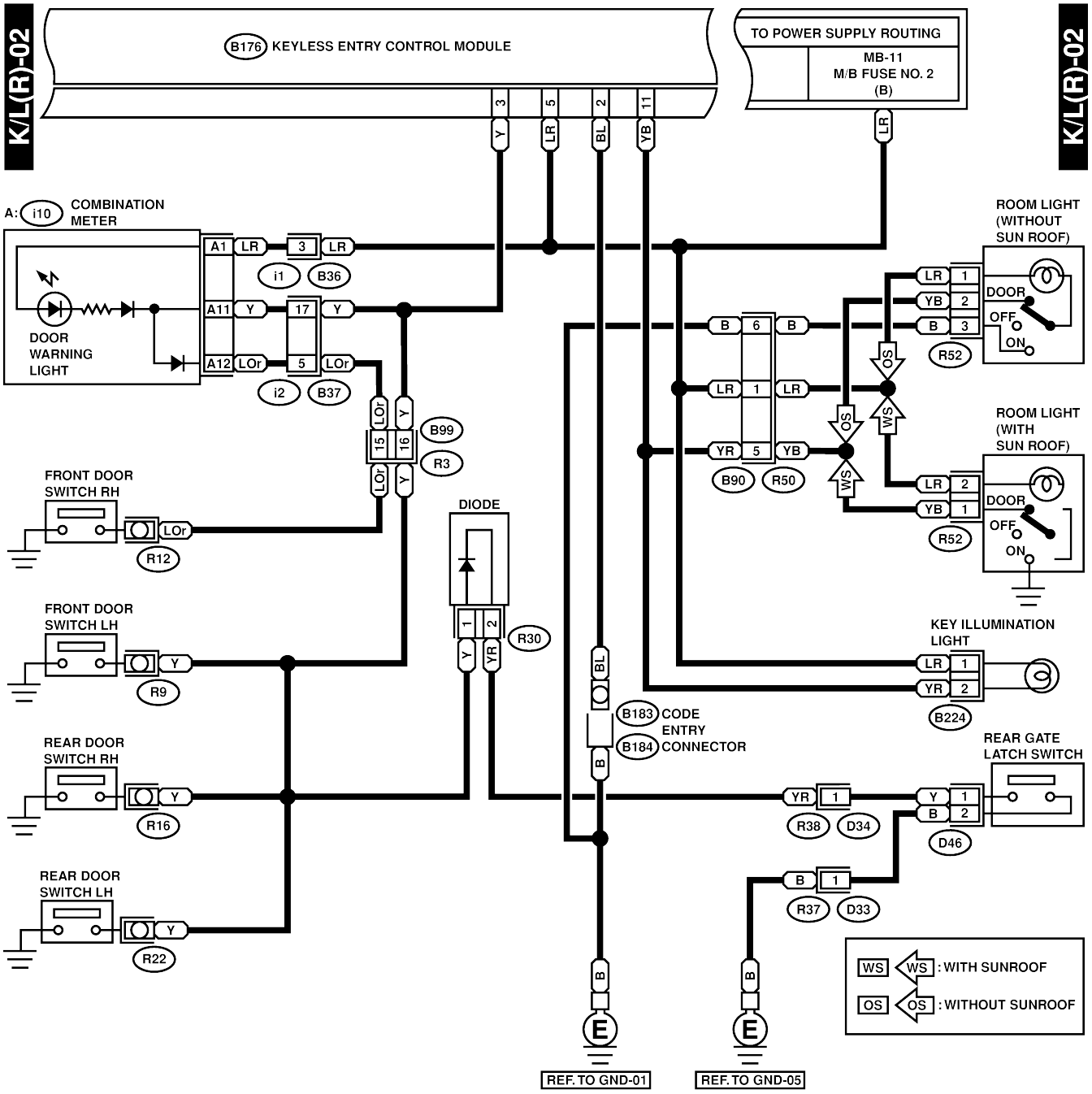
SL77-20C

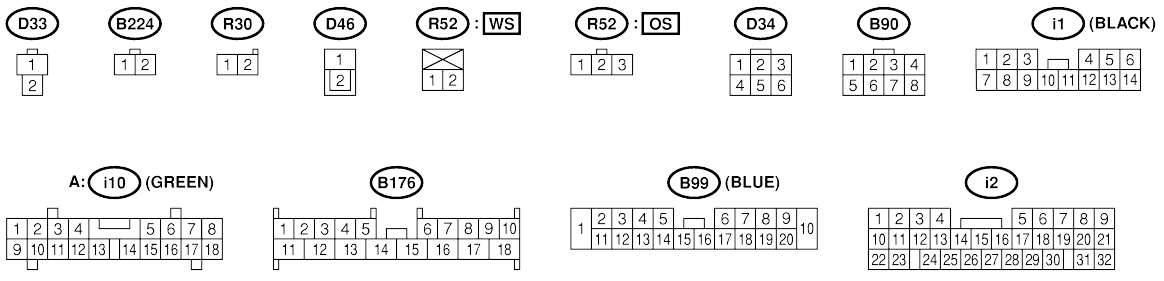
2. KEYLESS ENTRY RHD MODEL S909345A2102



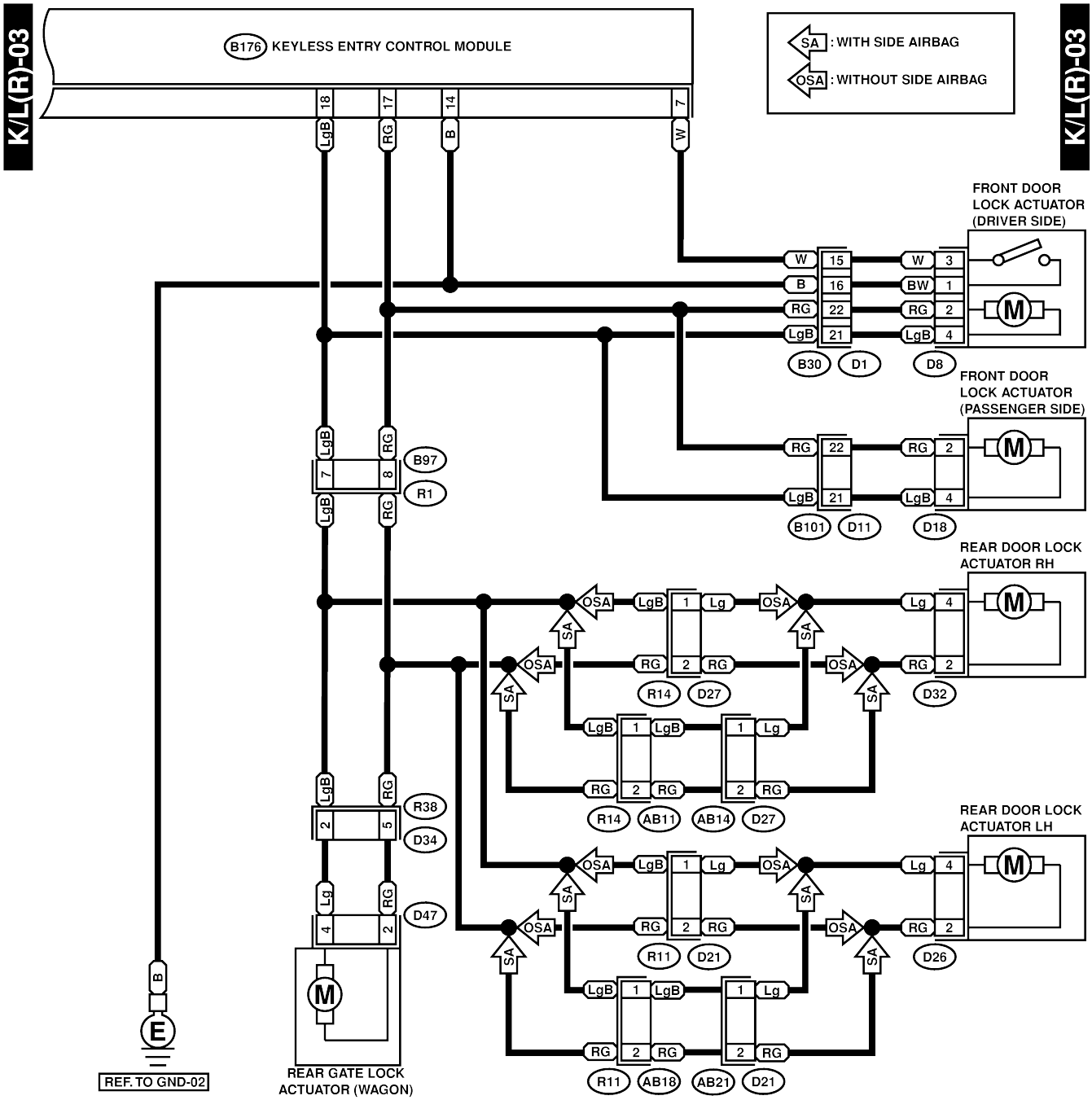
SR77-20A

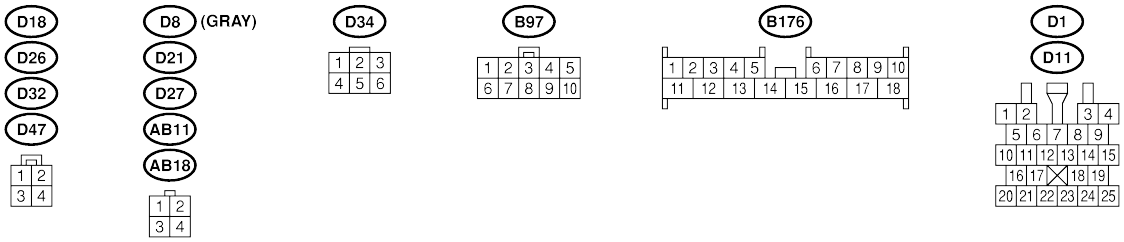
KEYLESS ENTRY SYSTEM





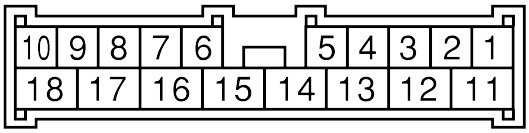
SR77-20B


K/L(R)-03
B176 KEYLESS ENTRY CONTROL MODULE
SA : WITH SIDE AIRBAG
OSA : WITHOUT SIDE AIRBAG
K/L(R)-03
FRONT DOOR LOCK ACTUATOR (DRIVER SIDE)
FRONT DOOR LOCK ACTUATOR (PASSENGER SIDE)
REAR DOOR LOCK ACTUATOR RH
REAR DOOR LOCK ACTUATOR LH
REAR GATE LOCK ACTUATOR (WAGON)
REF. TO GND-02
B97
R1
R38
D34
D47
R14
D27
D32
AB11
AB14
R11
D21
D26
AB18
AB21
B30
D1
D8
B101
D11
D18


D18
D26
D32
D47
D8 (GRAY)
D21
D27
AB11
AB18
D34
B97
B176
D1
D11

SR77-20C

B: ELECTRICAL SPECIFICATION S909345A08



B5M1141

Content	Terminal No.	Measuring condition
Key warning switch	1 (INPUT)	Battery voltage is present when inserting the key into the ignition switch.
Registration connector	2 (INPUT)	0 V is present when connecting the registration connector.
Door switch	3 (INPUT)	0 V is present when any door is open.
Empty	4	—
Power supply	5	Battery voltage is constantly present.
Empty	6	—
Door lock switch	7 (INPUT)	0 V is present when driver's door is unlocked.
Empty	8	—
Empty	9	—
Empty	10	—
Room light/Ignition switch illumination	11 (OUTPUT)	• 0 V is present when pressing the transmitter OPEN button. • 0 V is present when any door is open.
Turn signal light (Right)	12 (OUTPUT)	Battery voltage is present when pressing the transmitter OPEN or LOCK button.
Turn signal light (Left)	13 (OUTPUT)	Battery voltage is present when pressing the transmitter OPEN or LOCK button.
Ground	14	0 V is constantly present.
Power supply (Hazard light)	15	Battery voltage is constantly present.
Power supply	16	Battery voltage is constantly present.
Door and rear gate lock actuator (Unlock)	17 (OUTPUT)	Battery voltage is present when pressing the transmitter OPEN button.
Door and rear gate lock actuator (Lock)	18 (OUTPUT)	Battery voltage is present when pressing the transmitter LOCK button.

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.	<Ref. to SL-22 CHECK TRANSMITTER BATTERY, INSPECTION, Keyless Entry System.>
	2. Check the fuse.	<Ref. to SL-22 CHECK FUSE, INSPECTION, Keyless Entry System.>
	3. Check the keyless entry control module power supply and ground circuit.	<Ref. to SL-23 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 registered.	1. Check the transmitter battery.	<Ref. to SL-22 CHECK TRANSMITTER BATTERY, INSPECTION, Keyless Entry System.>
	2. Check the registration connector circuit.	<Ref. to SL-23 CHECK REGISTRATION CONNECTOR CIRCUIT, INSPECTION, Keyless Entry System.>
	3. 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-10 INSPECTION, Door Lock Control System.>	1. Check the transmitter battery.	<Ref. to SL-22 CHECK TRANSMITTER BATTERY, INSPECTION, Keyless Entry System.>
	2. Check the key warning switch.	<Ref. to SL-24 CHECK KEY WARNING SWITCH, INSPECTION, Keyless Entry System.>
	3. Check the door switch.	<Ref. to SL-24 CHECK DOOR SWITCH, INSPECTION, Keyless Entry System.>
	4. Replace the keyless entry control module.	<Ref. to SL- 44 Keyless Entry Control Module.>
The hazard light does not operate.	1. Check the transmitter battery	<Ref. to SL-22 CHECK TRANSMITTER BATTERY, INSPECTION, Keyless Entry System.>
	2. Check the key warning switch.	<Ref. to SL-24 CHECK KEY WARNING SWITCH, INSPECTION, Keyless Entry System.>
	3. Check the door switch.	<Ref. to SL-24 CHECK DOOR SWITCH, INSPECTION, Keyless Entry System.>
	4. Check the hazard light operation.	<Ref. to SL-25 CHECK HAZARD LIGHT OPERATION, INSPECTION, Keyless Entry System.>
	5. Replace the keyless entry control module.	<Ref. to SL-44 Keyless Entry Control Module.>

Symptom	Repair order	Reference
The room light and ignition switch illumination operation does not activate.	1. Check the transmitter battery.	<Ref. to SL-22 CHECK TRANSMITTER BATTERY, INSPECTION, Keyless Entry System.>
	2. Check the room light operation.	<Ref. to SL-26 CHECK ROOM LIGHT OPERATION, INSPECTION, Keyless Entry System.>
	3. Check the ignition switch illumination circuit.	<Ref. to SL-26 CHECK IGNITION SWITCH ILLUMINATION CIRCUIT, INSPECTION, Keyless Entry System.>
	4. Check the key warning switch.	<Ref. to SL-24 CHECK KEY WARNING SWITCH, INSPECTION, Keyless Entry System.>
	5. Check the door switch.	<Ref. to SL-24 CHECK DOOR SWITCH, INSPECTION, Keyless Entry System.>
	6. Replace the keyless entry control module.	<Ref. to SL-44 Keyless Entry Control Module.>

2. CHECK TRANSMITTER BATTERY S909345A1011

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 battery voltage OK?	Further inspection is necessary, refer to “SYMPTOM CHART”. <Ref. to SL-21 SYMPTOM CHART, INSPECTION, Keyless Entry System.>	Replace the transmitter battery.

3. CHECK FUSE S909345A1004

No.	Step	Check	Yes	No
1	**CHECK FUSE.** Remove and visually check fuse No. 2 (in the main fuse box), 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-23 CHECK POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, Keyless Entry system.>

4. 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. 5, No. 15, No. 16 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Check the harness for open circuits or 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. 14 (+) — Chassis ground (–):***	Is the resistance less than 10 Ω?	The power supply and ground circuit are OK.	Repair the harness.

5. CHECK REGISTRATION CONNECTOR CIRCUIT S909345A1012

No.	Step	Check	Yes	No
1	**REGISTRATION CONNECTOR INPUT VOLTAGE INSPECTION** 1) Disconnect registration connector. 2) Measure voltage between keyless entry control module harness connector and chassis ground. ***Connector & terminal*** ***(B176) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Repair harness, and (or) connector.
2	**REGISTRATION CONNECTOR INPUT VOLTAGE INSPECTION** 1) Connect registration connector. 2) Measure voltage between keyless entry control module harness connector and chassis ground. ***Connector & terminal*** ***(B176) No. 2 (+) — Chassis ground (–):***	Is the voltage 0 V?	Registration connector circuit is OK.	Repair harness, and (or) connector.

6. 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*** ***(B176) No. 3 (+) — Chassis ground (–):***	Is the voltage 0 V when each door and rear gate is opened?	Go to step **2**.	Go to step **3**.
2	**CHECK DOOR SWITCH CIRCUIT.** Measure the voltage between the keyless entry control module harness connector terminal and chassis ground. ***Connector & terminal*** ***(B176) No. 3 (+) — chassis ground (–):***	Is the voltage more than 10 V when each door and 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) Check the continuity 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:***	Does continuity exist when the door switch is pushed?	Replace the door switch.	Go to step **4**.
4	**CHECK DOOR SWITCH.** Check continuity 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:***	Does continuity exist 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.

7. 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. 1 (+) — chassis ground (–):***	Is the voltage more than 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. 1 (+) — 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) Check the continuity between the key warning switch terminals. ***Terminal*** ***No. 1 — No. 2:***	Does continuity exist?	Go to step **5**.	Replace key warning switch.
5	**CHECK KEY WARNING SWITCH.** 1) Remove the key from the ignition switch. 2) Check the continuity between the key warning switch terminals. ***Terminal*** ***No. 1 — No. 2:***	Does continuity exist?	Replace key warning switch.	Check the following: • Harness for open circuits or shorts between the key warning switch and fuse • Harness for open circuits and shorts between the keyless entry control module and key warning switch

8. CHECK HAZARD LIGHT OPERATION

S909345A1013

No.	Step	Check	Yes	No
1	**CHECK HAZARD LIGHT OPERATION.** Make sure the hazard light blinks when hazard switch is turned ON.	Does hazard light brink?	Go to step **2**.	Check hazard light circuit.
2	**CHECK OUTPUT SIGNAL.** 1) Remove the key from ignition switch. 2) Close all doors and rear gate. 3) Measure voltage between keyless entry control module harness connector terminal and chassis ground when LOCK or OPEN button of transmitter is pressed. ***Connector & terminal*** ***(B176) No. 12, No. 13 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Check harness for open or short between keyless entry control module and turn signal lights.	Replace the keyless entry control module.

9. 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*** ***(B176) No. 11 — (R52) No. 2:***	Is the resistance less than 10 Ω?	The room light operation circuit is OK.	Check the harness for open circuits or shorts between the keyless entry control module and room light.

10. CHECK IGNITION SWITCH ILLUMINATION CIRCUIT

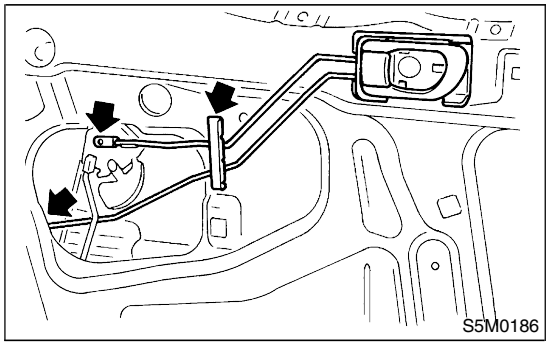
S909345A1014

No.	Step	Check	Yes	No
1	**CHECK IGNITION SWITCH ILLUMINATION POWER SUPPLY.** 1) Disconnect the ignition switch illumination harness connector. 2) Measure voltage between the ignition switch illumination harness connector terminal and chassis ground. ***Connector & terminal*** ***(B224) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Check harness for open circuit or shorts between the ignition switch illumination and fuse.
2	**CHECK HARNESS BETWEEN IGNITION SWITCH ILLUMINATION AND KEYLESS ENTRY CONTROL MODULE.** 1) Disconnect the keyless entry control module harness connector. 2) Measure the resistance between the keyless entry harness connector terminal and the ignition switch illumination harness connector. ***Connector & terminal*** ***(B176) No. 11 — (B224) No. 2:***	Is the resistance less than 10 Ω?	Check the ignition switch illumination. If NG, replace the ignition switch illumination.	Repair the harness.

4. Front Inner Remote S909344

A: REMOVAL S909344A18

1) Remove the door trim. <Ref. to EI-26 REMOVAL, Front Door Trim.>
2) Remove the sealing cover. <Ref. to EB-13 REMOVAL, Front Sealing Cover.>
3) Remove the two rod joints.
4) Unlatch rod holder
5) Remove the front inner remote.



B: INSTALLATION S909344A11

Install in the reverse order of removal.

NOTE:
Make sure the inner remote works properly after installation.

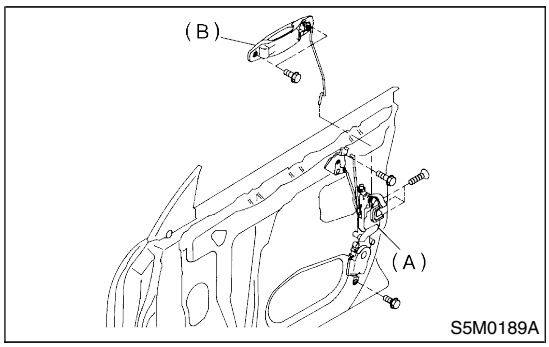
C: INSPECTION S909344A10

1) Make sure the rod is not deformed.
2) Make sure the lever and rod work smoothly.

5. Front Outer Handle S909349

A: REMOVAL S909349A18

1) Remove the door trim. <Ref. to EI-26 REMOVAL, Front Door Trim.>
2) Remove the sealing cover. <Ref. to EB-13 REMOVAL, Front Sealing Cover.>
3) Remove the front inner remote. <Ref. to SL-27 REMOVAL, Front Inner Remote.>
4) Remove the two bolts. 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

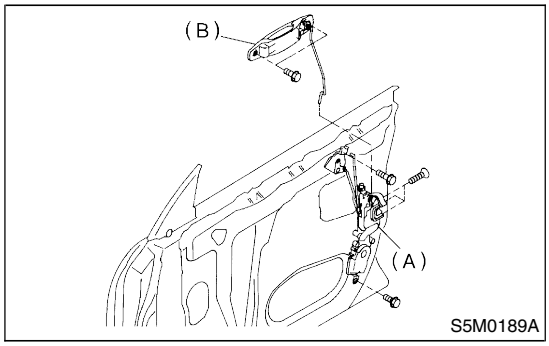
1) Make sure the rod is not deformed.
2) Make sure the lever and rod work smoothly.

6. Front Door Latch Assembly

S909334

A: REMOVAL S909334A18

1) Remove the front door trim. <Ref. to EI-26 REMOVAL, Front Door Trim.>
2) Remove the sealing cover. <Ref. to EB-13 REMOVAL, Front Sealing Cover.>
3) Remove the front inner remote. <Ref. to SL-27 REMOVAL, Front Inner Remote.>
4) Turn rod holder to disconnect joint between key lock and rod.
5) Turn rod holder to disconnect joint between outer handle and rod.
6) Turn rod holder to disconnect joint between crank and rod.
7) Remove the three screws and bolt.



8) 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.

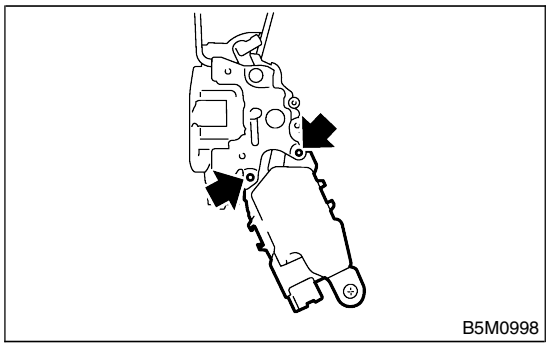
C: INSPECTION S909334A10

1) Make sure the rod is not deformed.
2) Make sure the lever and rod work smoothly.

7. Front Door Lock Actuator S909319

A: REMOVAL S909319A18

1) Remove the front door latch assembly. <Ref. to SL-27 REMOVAL, Front Door Latch Assembly.>
2) Remove the bolt. Remove the front door lock actuator.

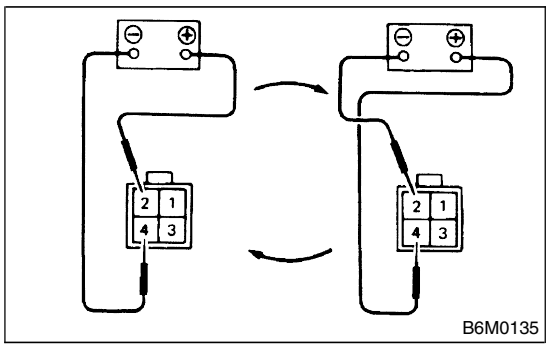


B: INSTALLATION S909319A11

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.



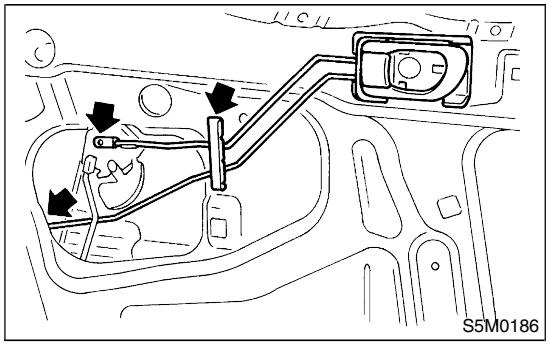
Battery connection	Actuator operation
No. 2 (+) — No. 4 (–)	Unlocked → Locked
No. 4 (+) — No. 2 (–)	Locked → Unlocked

If NG, replace the door lock actuator.

8. Rear Inner Remote S909321

A: REMOVAL S909321A18

1) Remove the rear door trim. <Ref. to EI-27 REMOVAL, Rear Door Trim.>
2) Remove the sealing cover. <Ref. to EB-16 REMOVAL, Rear Sealing Cover.>
3) Remove the two rod joints.
4) Remove the inner remote.



B: INSTALLATION S909321A11

Install in the reverse order of removal.

NOTE:
Make sure the inner remote works properly after installation.

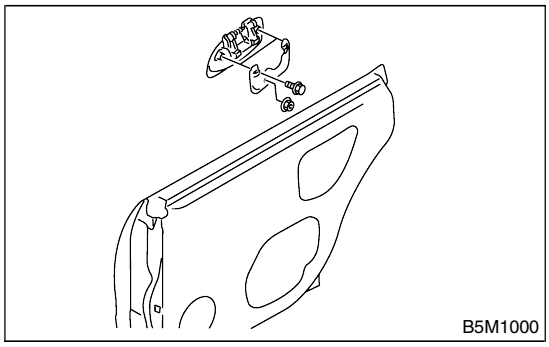
C: INSPECTION S909321A10

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.

9. Rear Outer Handle S909322

A: REMOVAL S909322A18

1) Remove the rear door trim. <Ref. to EI-27 REMOVAL, Rear Door Trim.>
2) Remove the sealing cover. <Ref. to EB-16 REMOVAL, Rear Sealing Cover.>
3) Remove the rear inner remote. <Ref. to SL-31 REMOVAL, Rear Inner Remote.>
4) Remove the rear door latch assembly. <Ref. to SL-33 REMOVAL, Rear Door Latch Assembly.>
5) Remove the two bolts and nut. Remove the rear outer handle.



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

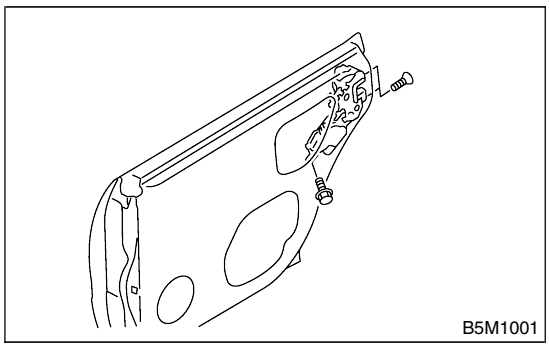
1) Make sure the rod is not deformed.
2) Make sure the lever and rod work smoothly.

10. Rear Door Latch Assembly

S909320

A: REMOVAL S909320A18

1) Remove the rear door trim. <Ref. to EI-27 REMOVAL, Rear Door Trim.>
2) Remove the sealing cover. <Ref. to EB-16 REMOVAL, Rear Sealing Cover.>
3) Remove the rear inner remote. <Ref. to SL-31 REMOVAL, Rear Inner Remote.>
4) Remove the three screws and bolt.



5) 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.

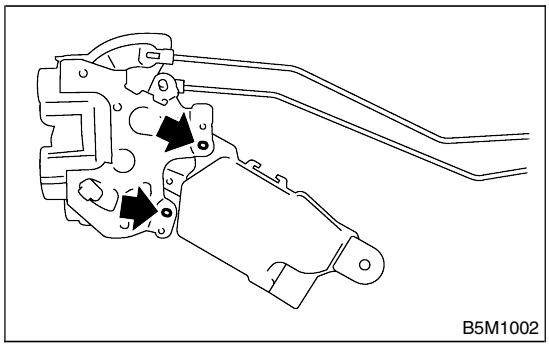
C: INSPECTION S909320A10

1) Make sure the rod is not deformed.
2) Make sure the lever and rod work smoothly.

11. 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.



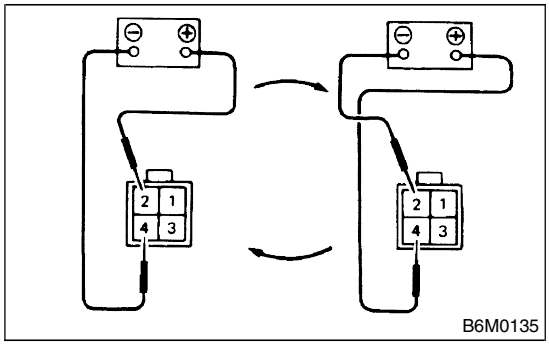
B: INSTALLATION S909323A11

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.



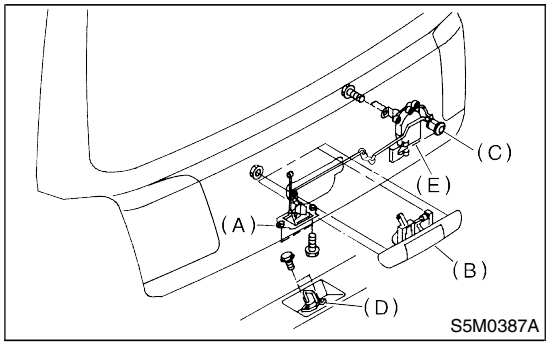
Battery connection	Actuator operation
No. 2 (+) — No. 4 (–)	Unlocked → Locked
No. 4 (+) — No. 2 (–)	Locked → Unlocked

If NG, replace the door lock actuator.

12. Rear Gate Outer Handle S909626

A: REMOVAL S909626A18

1) Remove the rear gate lower trim. <Ref. to 42 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

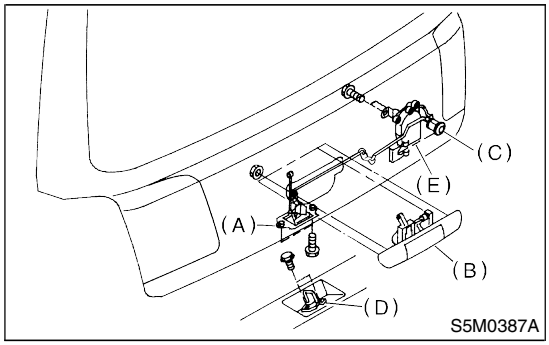
1) Inspect the rod for deformation.
2) Make sure the lever and rod move smoothly.

13. Rear Gate Latch Assembly

S909316

A: REMOVAL S909316A18

1) Remove the rear gate lower trim. <Ref. to EI-42 REMOVAL, Rear Gate Trim.>
2) Disconnect rod (latch to link) from latch (A).
3) Disconnect rod (latch to outer handle) from outer handle (B).
4) Remove bolts from latch (A).



5) 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.

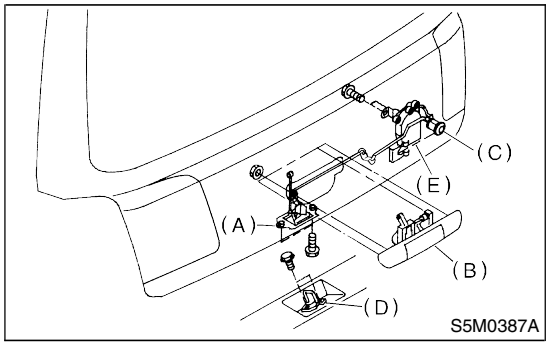
C: INSPECTION S909316A10

1) Make sure the rod is not deformed.
2) Make sure the lever and rod work smoothly.

14. Rear Gate Latch Lock Actuator S909313

A: REMOVAL S909313A18

1) Remove rear gate trim. <Ref. to EI-42 REMOVAL, Rear Gate Trim.>
2) Disconnect rod from key cylinder.
3) Loosen two bolts to remove rear gate actuator (E).



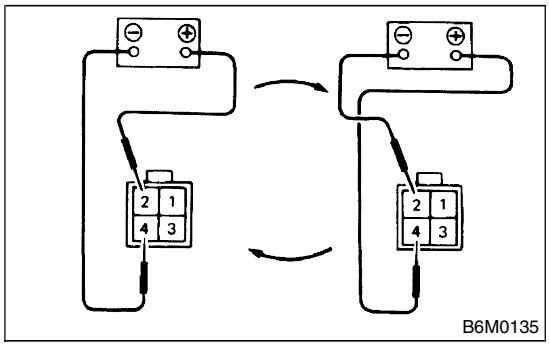
B: INSTALLATION S909313A11

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.



Battery connection	Actuator operation
No. 2 (+) — No. 4 (–)	Unlocked → Locked
No. 4 (+) — No. 2 (–)	Locked → Unlocked

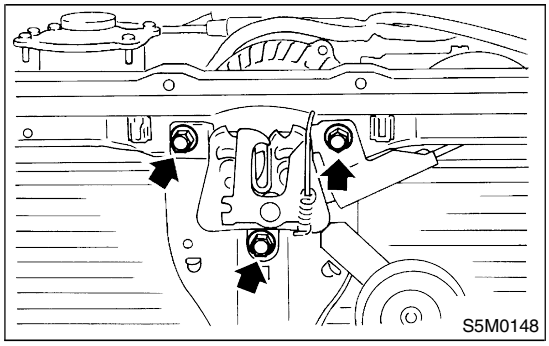
If NG, replace the rear gate latch lock actuator.

15. 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.



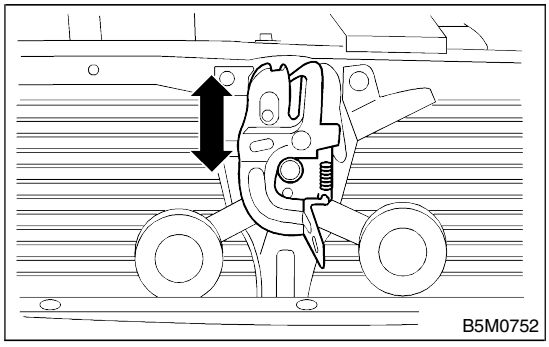
B: INSTALLATION S909595A11

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.



D: INSPECTION S909595A10

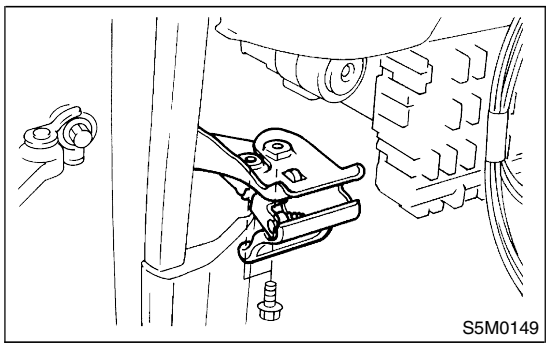
1) Check the striker for bending or abnormal wear.
2) Check the safety lever for improper movement.
3) Check other levers and the spring for rust formation and unsmooth movement.

16. Remote Openers S909317

A: REMOVAL S909317A18

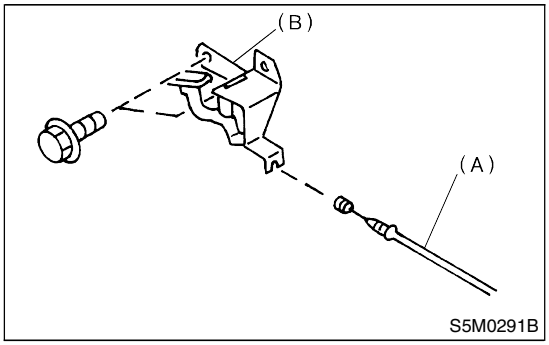
1. HOOD OPENER S909317A1801

1) Remove the release cable from the hood lock.
2) Remove the bolt. Remove the opener lever.

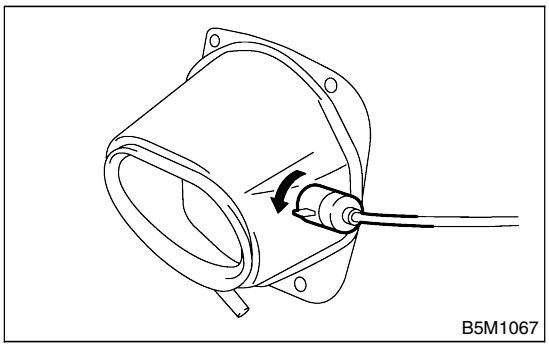


2. FUEL FLAP OPENER S909317A1803

1) Remove the rear seat. <Ref. to SE-6 REMOVAL, Rear Seat.>
2) Remove the center pillar lower trim and side sill cover on the passenger side. Remove the rear pillar lower trim. Pull back the floor mat. Remove the clip holding the cable.
3) Remove the bolt. Remove the opener pull handle.



4) Remove the cable from the opener pull handle.
5) Remove the right rear quarter trim. <Ref. to EI-39 REMOVAL, Rear Quarter Trim.>
6) Rotate the fuel lock inside the quarter panel to left and remove.



B: INSTALLATION S909317A11

1. HOOD OPENER S909317A1101

Install in the reverse order of removal.

2. FUEL FLAP OPENER S909317A1103

Install in the reverse order of removal.

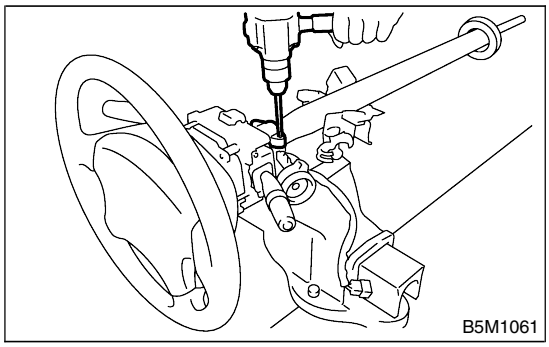
C: INSPECTION S909317A10

Make sure the fuel flap opens and closes smoothly.

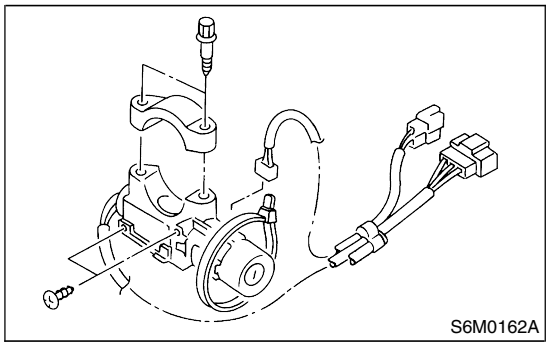
17. Ignition Key Lock S909318

A: REPLACEMENT S909318A20

1) Remove the battery ground cable.
2) Remove the steering column. <Ref. to DS-30 REMOVAL, Steering Column.>
3) Secure the steering column in a vise. Remove the bolt with a drill.



4) Remove the ignition key lock.
5) Use a new torn bolt. Tighten the torn bolt to the end of the thread.



B: INSPECTION S909318A10

1) Remove the instrument panel lower cover.
2) Remove the lower column cover.
3) Unfasten the holddown 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 check the continuity between the terminals of the ignition connector.

Switch position	Tester connection	Specified condition
LOCK		
ACC	No. 1 — No. 2	Continuity
ON	No. 1 — No. 2 — No. 4	Continuity
ST	No. 1 — No. 3 — No. 4	Continuity

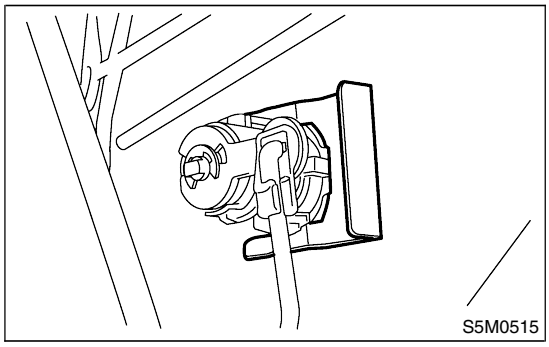
If NG, replace the ignition switch.

18. Key Lock Cylinders S909326

A: REPLACEMENT S909326A20

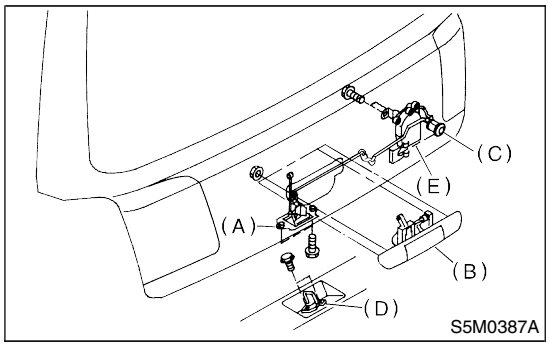
1. FRONT DOOR S909326A2001

1) Remove the door trim. <Ref. to EI-26 REMOVAL, Front Door Trim.>
2) Pull back the sealing cover.
3) Remove the rod clamp. Remove the lock plate. Replace the key cylinder.



2. REAR GATE S909326A2003

1) Remove the rear gate lower trim. <Ref. to EI-42 REMOVAL, Rear Gate Trim.>
2) Remove the rod clamp. Remove the lock plate. Replace the key cylinder (C).



19. Immobilizer Control Module

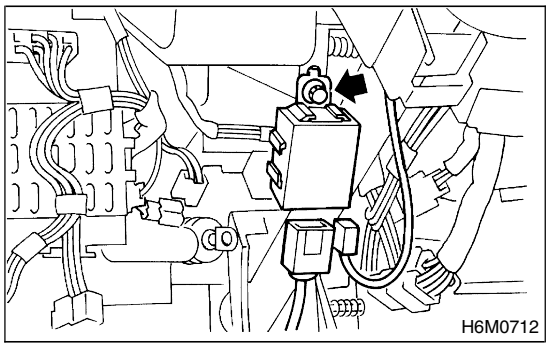
S909315

A: REMOVAL S909315A18

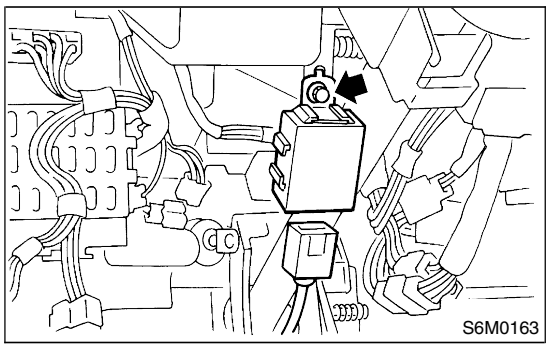
NOTE:
The following positions for removal and installation are for LHD models. The positions for RHD models are symmetrically opposite.

1) Disconnect GND cable from battery.
2) Remove instrument panel lower cover. <Ref. to EI-31 REMOVAL, Instrument Panel Assembly.>
3) Disconnect connector from immobilizer control module.
4) Remove immobilizer control module.

DOHC Turbo and SOHC with OBD model:



SOHC without OBD model:



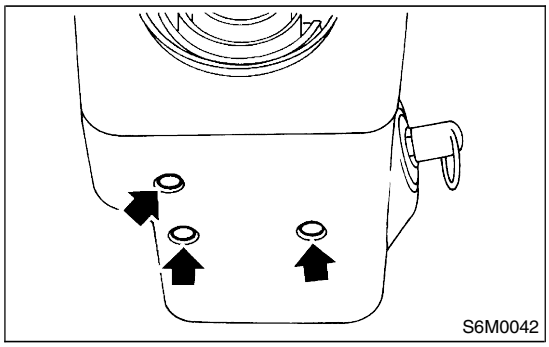
B: INSTALLATION S909315A11

Install in the reverse order of removal.

20. Immobilizer Antenna S909331

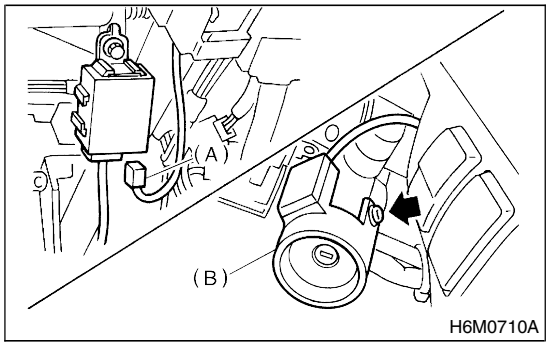
A: REMOVAL S909331A18

1) Disconnect GND cable from battery.
2) Remove instrument panel lower cover. <Ref. to EI-31 REMOVAL, Instrument Panel Assembly.>
3) Remove screws, separate upper column cover and lower column cover.

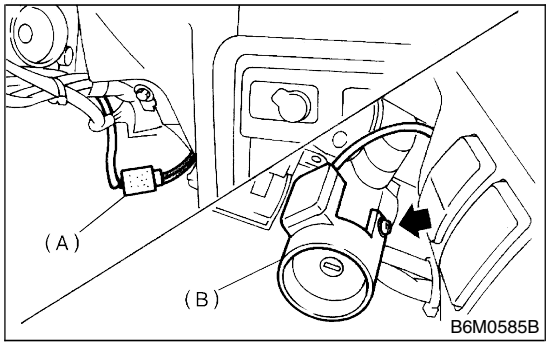


4) Disconnect immobilizer antenna connector (A) from immobilizer control module.
5) Remove immobilizer antenna (B).

DOHC Turbo and SOHC with OBD model:



SOHC without OBD model:



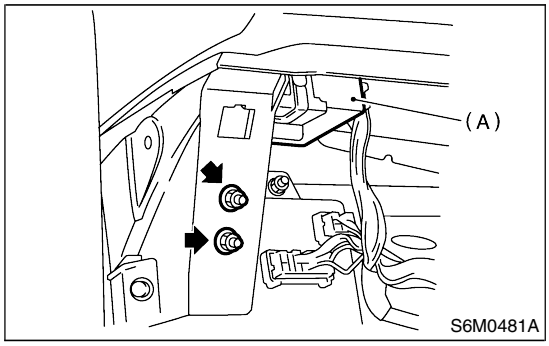
B: INSTALLATION S909331A11

Install in the reverse order of removal.

21. Keyless Entry Control Module S909324

A: REMOVAL S909324A18

1) Disconnect battery ground cable.
2) Remove instrument panel lower cover. <Ref. to EI-31 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.

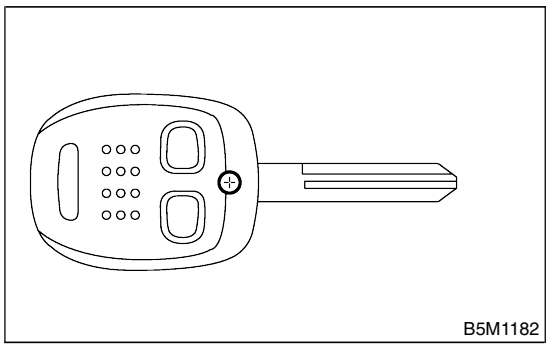
22. Keyless Transmitter S909325

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.



B: INSTALLATION S909325A11

1. TRANSMITTER BATTERY S909325A1101

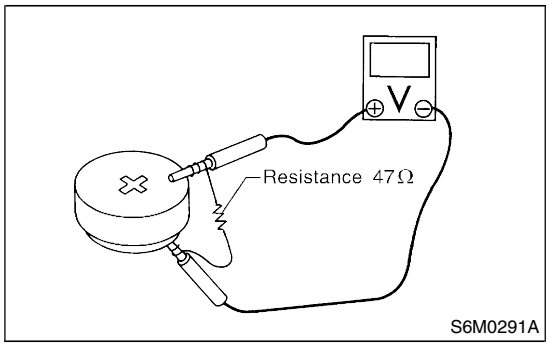
Install in the reverse order of removal.

C: INSPECTION S909325A10

1. TRANSMITTER BATTERY S909325A1001

1) 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.



Tester connection		Voltage (V)
(+)	(–)	
Battery (+) terminal	Battery (–) terminal	More than 2

If NG, replace the battery. (Use CR1620 or equivalent.)

D: REPLACEMENT S909325A20

1. TRANSMITTER REGISTRATION S909325A2001

NOTE:
A maximum of 3 transmitters can be registered for each individual vehicle.

1) Remove the side sill cover at the driver's side, then connect the registration connectors at the front pillar lower section.
2) Unlock the door lock.
3) Press any button of the transmitter twice to be registered.
4) The door lock will automatically lock and unlock in sequence. This indicates the completion of transmitter registration for the first transmitter.
5) If registration of a second transmitter is now to be carried out, press any button of that transmitter twice.
6) The door lock will automatically lock and unlock in sequence. This indicates the completion of transmitter registration for the second transmitter.
7) If registration of third transmitter is now to be carried out, repeat procedure of step 5) and 6).
8) Disconnect the registration connectors after the completion of all registration operations. After confirming the operation of the door lock using the newly registered transmitter(s), reinstall the side sill cover at the driver's side.

MEMO:

SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)

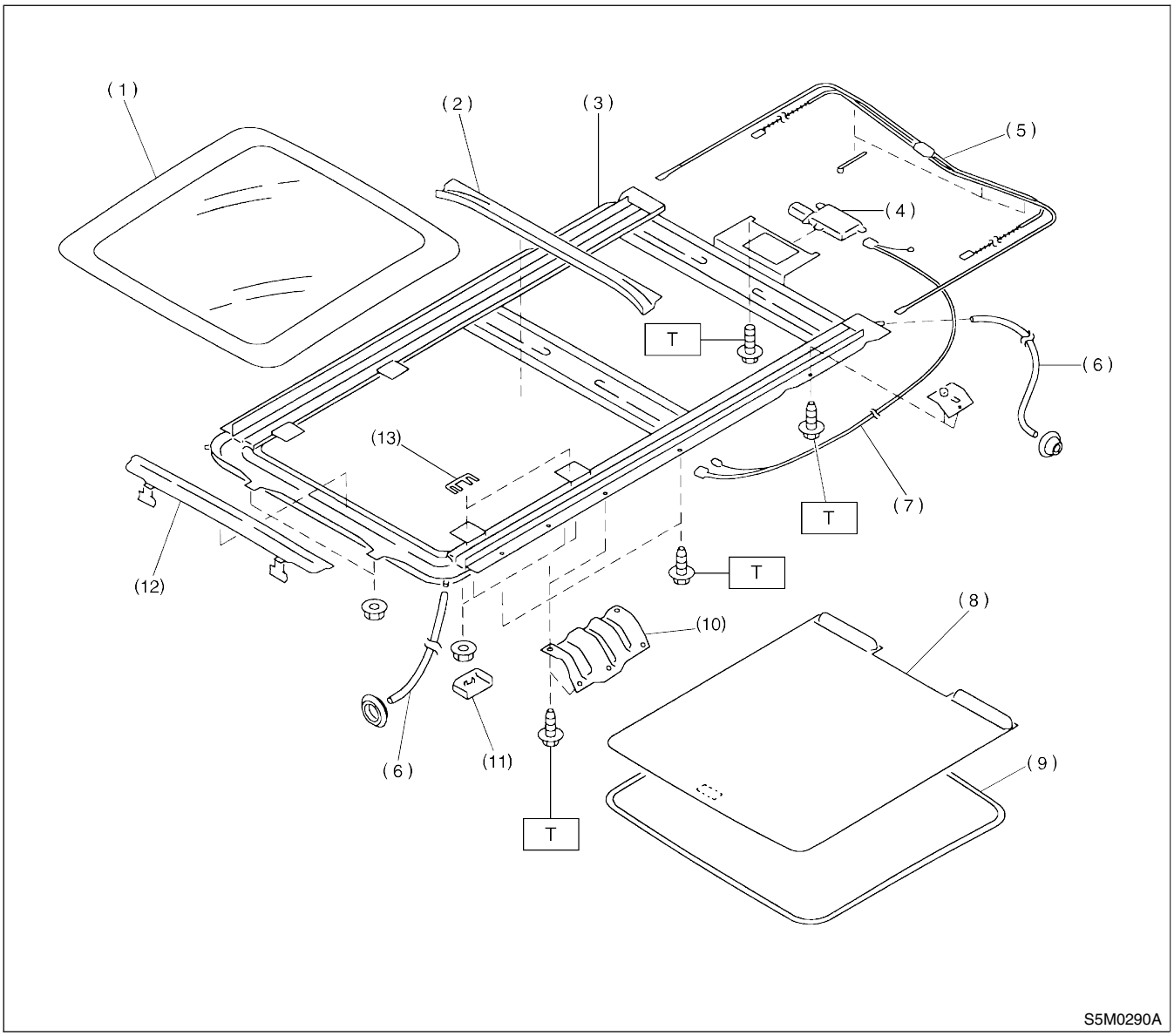
SR

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2. Sunroof Control System....5
3. Sunroof Lid....7
4. Sunroof Assembly....8
5. Sunroof Motor....10
6. Sunroof Switch....12

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 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

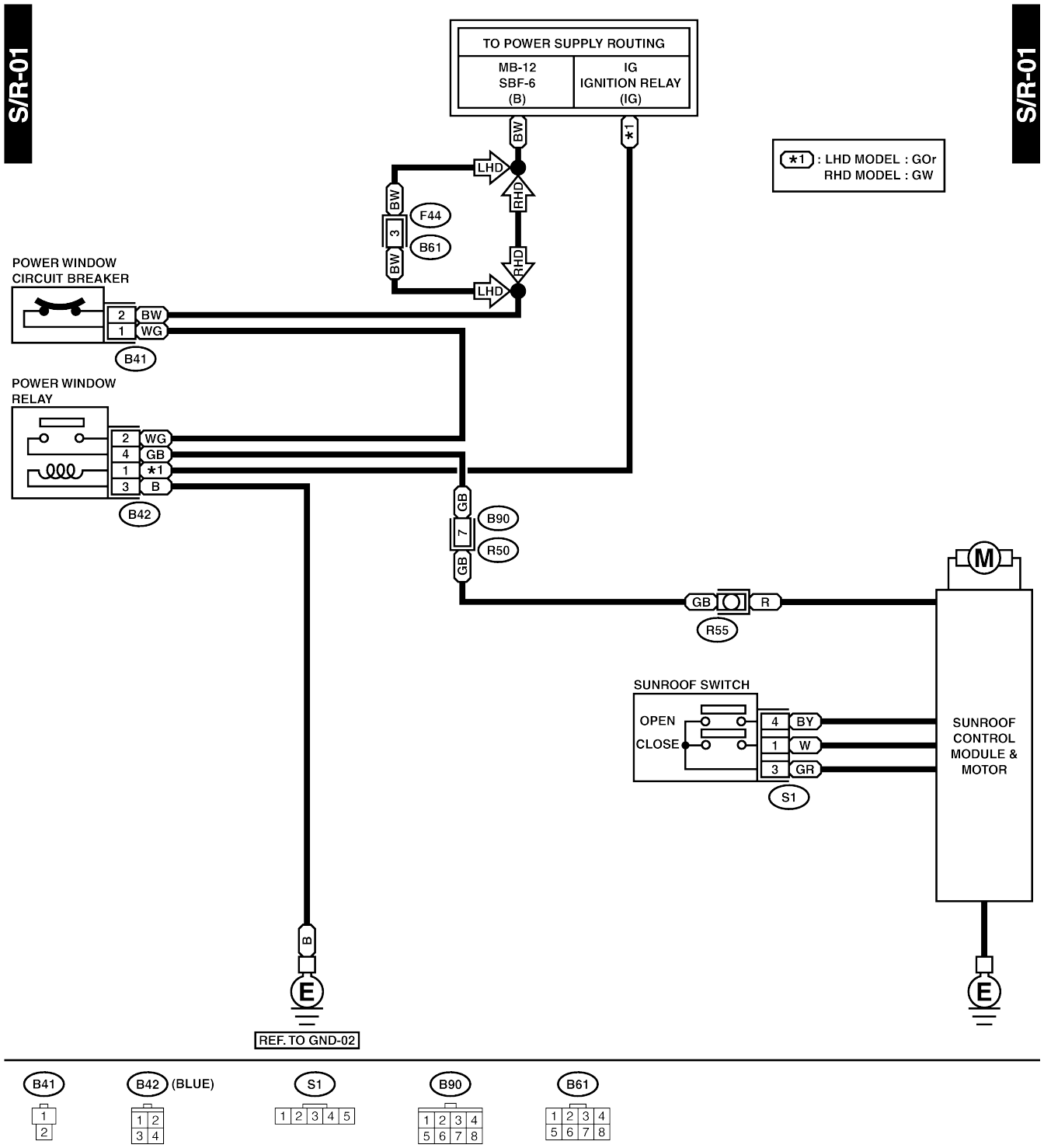
1. GENERAL TOOLS S910001A1701

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance and voltage.

2. Sunroof Control System S910328

A: SCHEMATIC S910328A21

1. SUNROOF S910328A2101



SG75-20

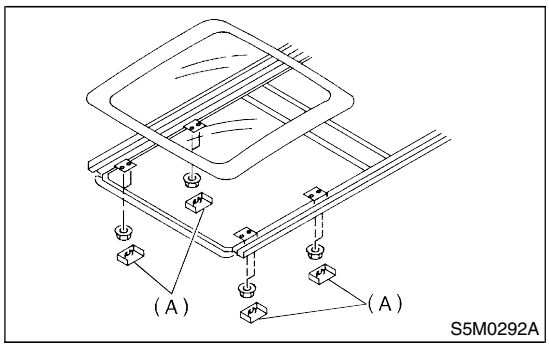
B: INSPECTION S910328A10

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 eight nuts.



3) Carefully remove glass lid.

B: INSTALLATION S910536A11

Install in the reverse order of removal.

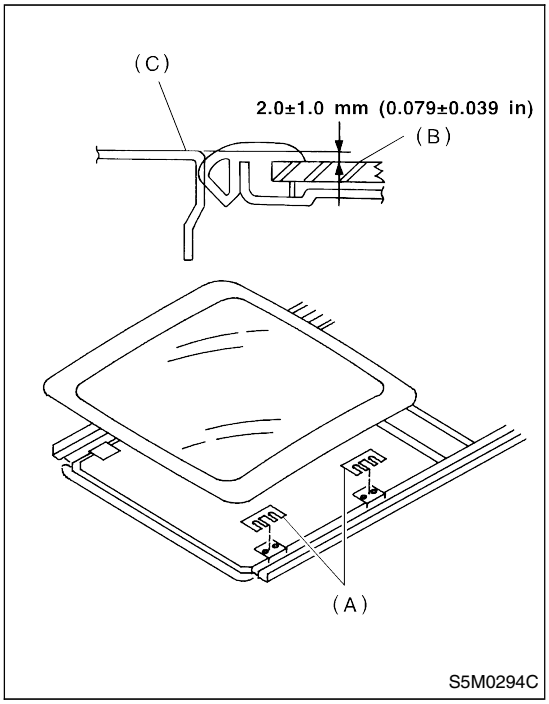
C: ADJUSTMENT S910536A01

1. ALIGNMENT OF HEIGHT BETWEEN SUNROOF LID AND ROOF PANEL S910536A0101

Loosen sunroof lid nuts and then adjust height by adding (max: four 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

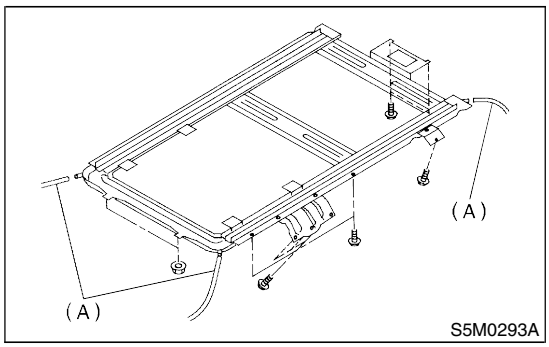
2.0±1.0 mm (0.079±0.039 in)



4. Sunroof Assembly S910329

A: REMOVAL S910329A18

1) Remove roof trim. <Ref. to EI-41, REMOVAL, Roof Trim.>
2) Remove sunroof lid. <Ref. to SR-7, REMOVAL, Sunroof Lid.>
3) Disconnect the four drain tubes (A) from sunroof frame.
4) Disconnect sunroof harness connector.
5) Remove bolts and nuts and then detach sunroof frame.



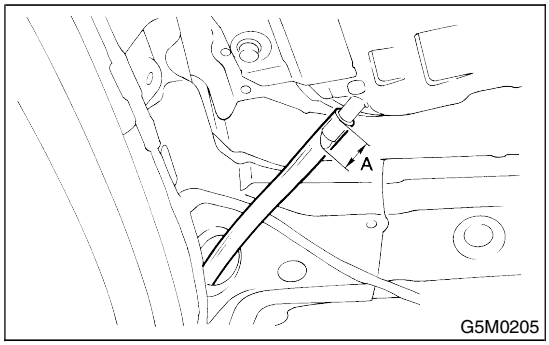
B: INSTALLATION S910329A11

Install in the reverse order of removal.

CAUTION:
Be careful not to snag harness.

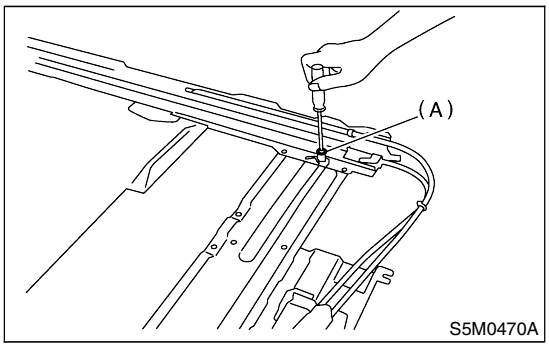
NOTE:
- Make sure to connect harness connector.
- When installing drain tube, insert it securely into drain pipe.

Length A:
15 mm (0.59 in) or more

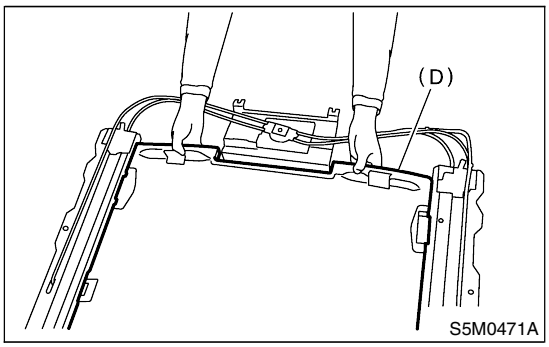


C: DISASSEMBLY S910329A06

1) Remove sunroof frame.
2) Remove rail stoppers (A).



3) Pull out the sunshade (B) from sunroof frame.



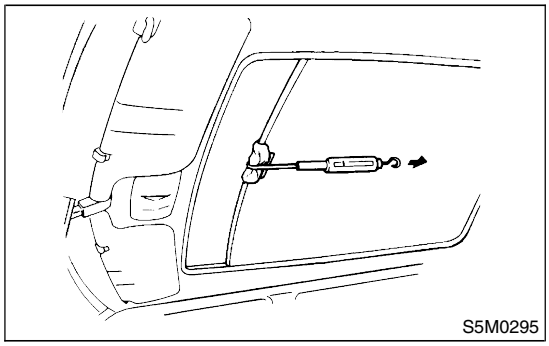
D: ASSEMBLY S910329A02

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.

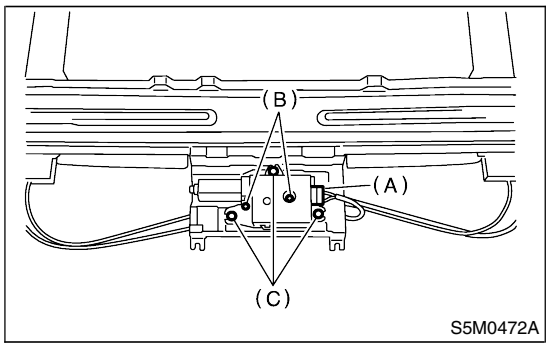
3) If force required exceeds specifications, check the sunroof glass lid, sunshade and deflector, and guide rail assembly for improper installation.

5. Sunroof Motor S910537

A: REMOVAL S910537A18

CAUTION:
• Fully open sunroof when removing sunroof motor.
• When removing clip, use great care to not damage the roof trim.

1) Completely open the sunroof.
2) Remove roof trim. <Ref. to EI-41, REMOVAL, Roof Trim.>
3) Disconnect harness connector (A) and remove sunroof motor mounting screw (B) and nut (C).



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) Operate the sunroof switch, and check the sunroof stop position.
4) Move sunroof to completely closed position.

5) Check sunroof operation with the following procedure.

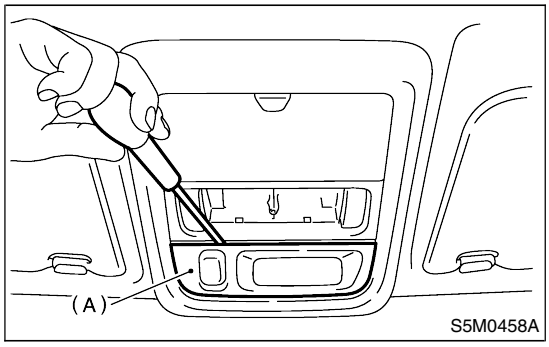
Checking order	Switch position
(1) Completely close sunroof.	Closed
(2) Open sunroof until it is almost completely open.	Open
(3) Completely open sunroof.	Open
(4) Close sunroof 500 mm (19.69 in) from completely open position.	Closed
(5) Completely close sunroof.	Closed

6) Install trim in the reverse order of removal.

6. Sunroof Switch S910538

A: REMOVAL S910538A18

1) Disconnect ground cable from battery.
2) Remove sunroof switch panel (A).

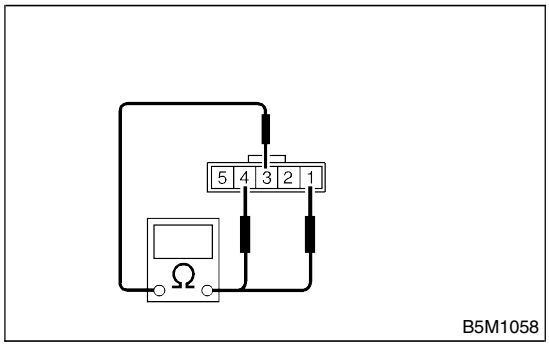


3) Disconnect harness connectors and remove sunroof switch.

B: INSTALLATION S910538A11

Install in the reverse order of removal.

C: INSPECTION S910538A10



Check continuity between terminals when operating the switch.

Switch position	Tester connection	Specified condition
Open	3 — 4	Continuity
Close	1 — 3	Continuity

EXTERIOR/INTERIOR TRIM

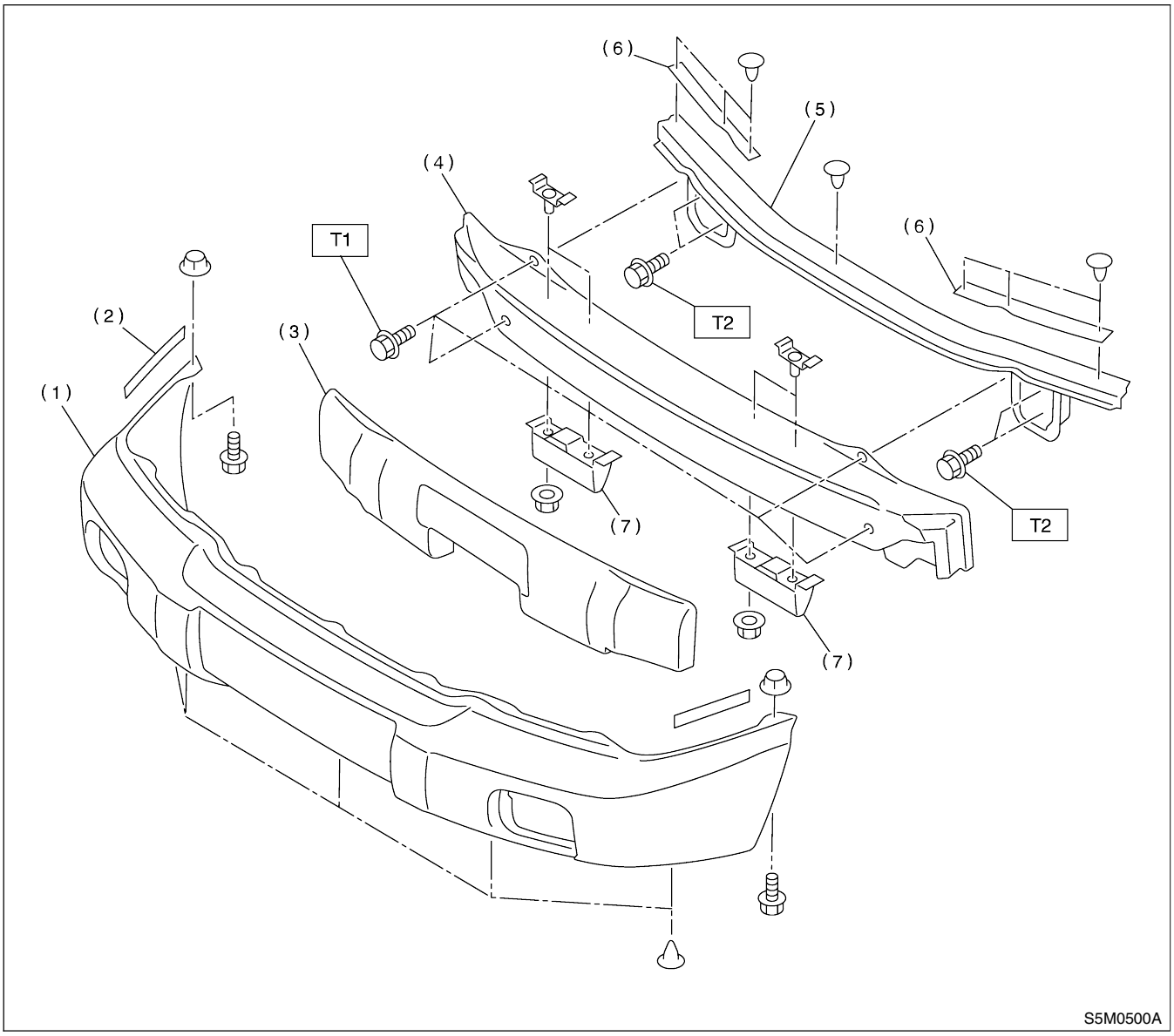
EI

		Page
1.	General Description	2
2.	Front Grille	10
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19.	Roof Trim	41
20.	Rear Gate Trim	42
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1. General Description S911001

A: COMPONENT S911001A05

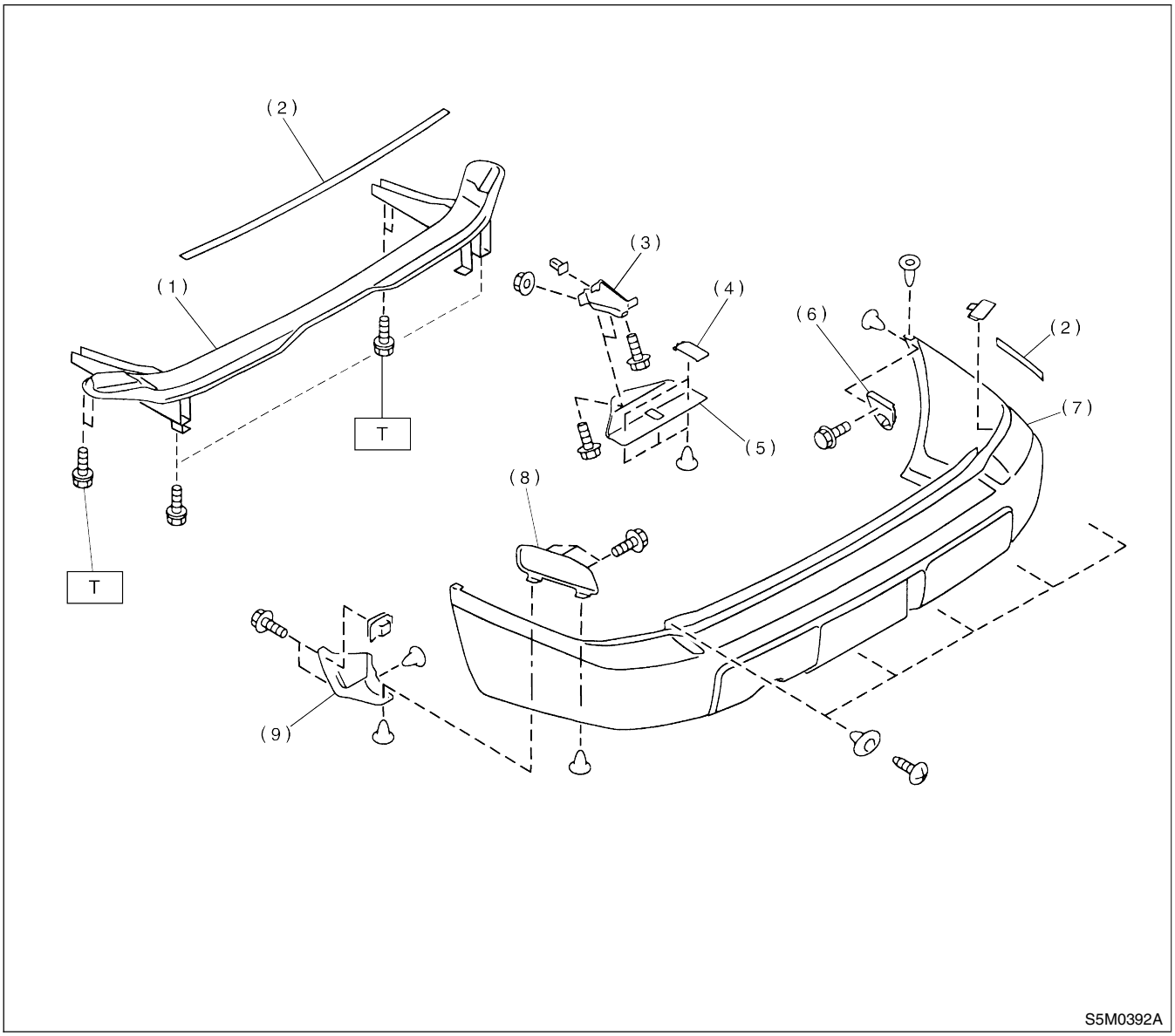
1. FRONT BUMPER S911001A0501



(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)

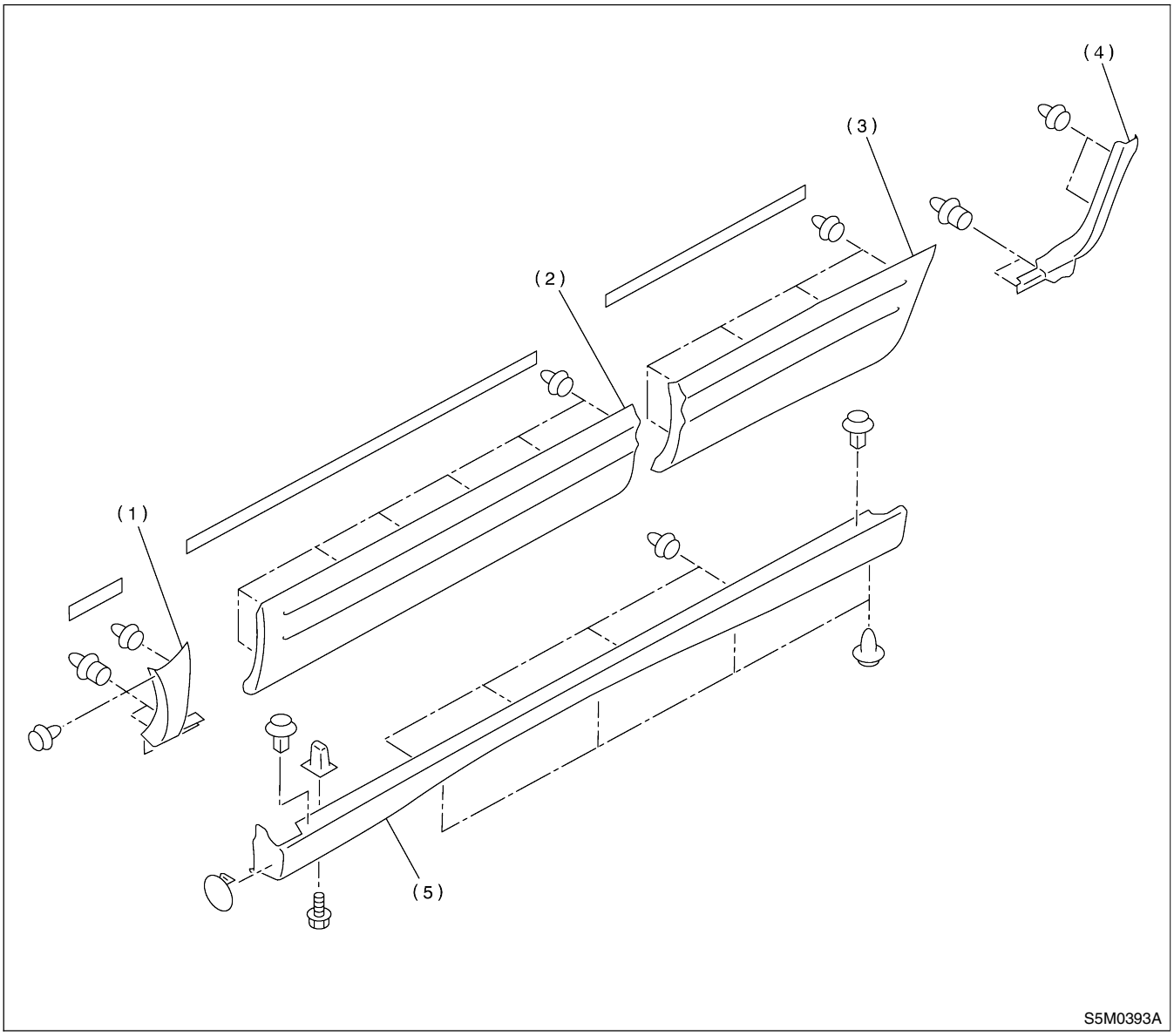
2. REAR BUMPER S911001A0511



(1) Bumper beam
(2) Cushion
(3) Lower center bracket
(4) Rear bumper plate
(5) Lower bracket
(6) Side upper bracket
(7) Bumper face
(8) Bumper side plate

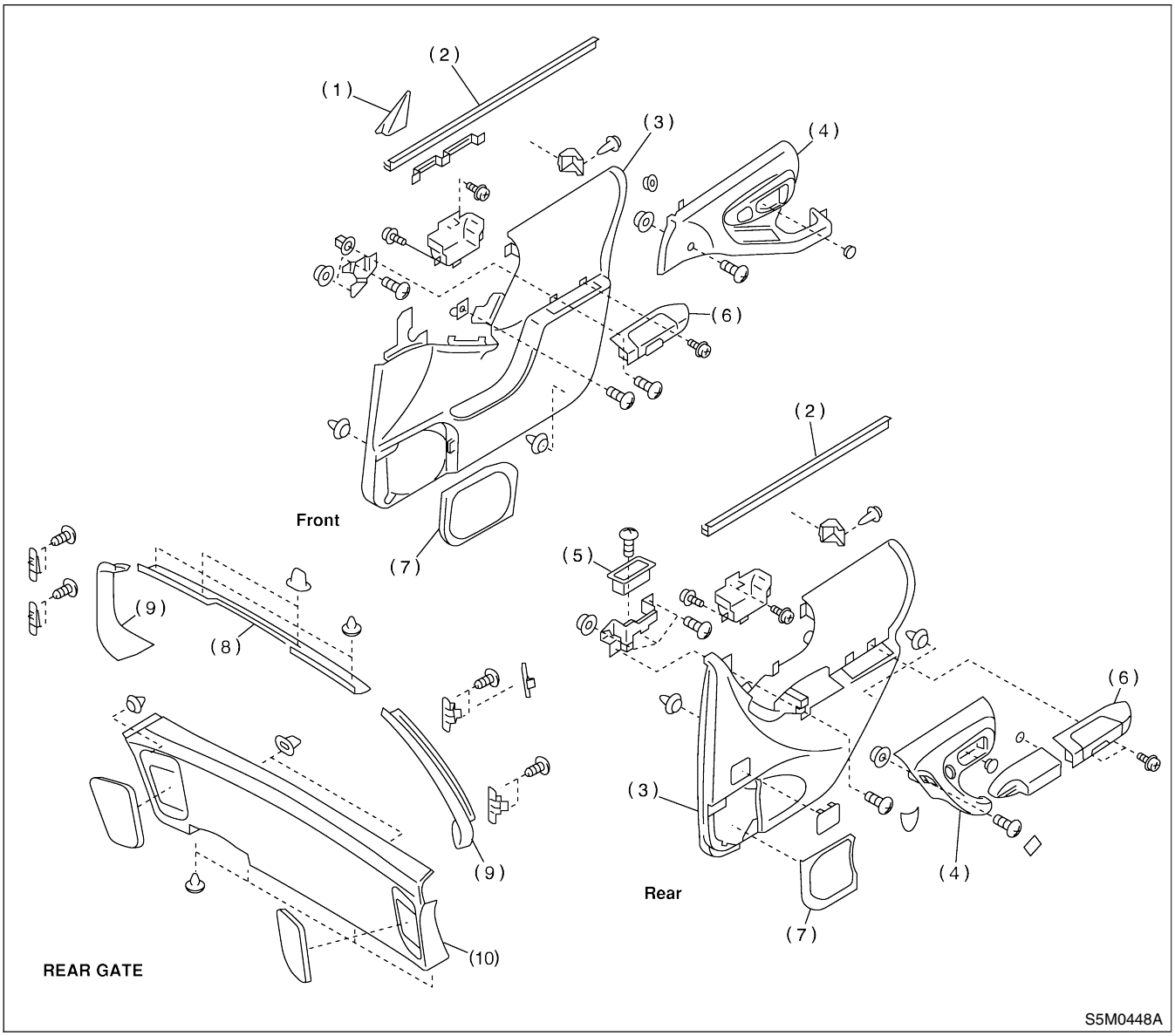
Tightening torque: N·m (kgf-m, ft-lb)
T: 93 (9.5, 69)

3. SIDE PROTECTOR S911001A0504



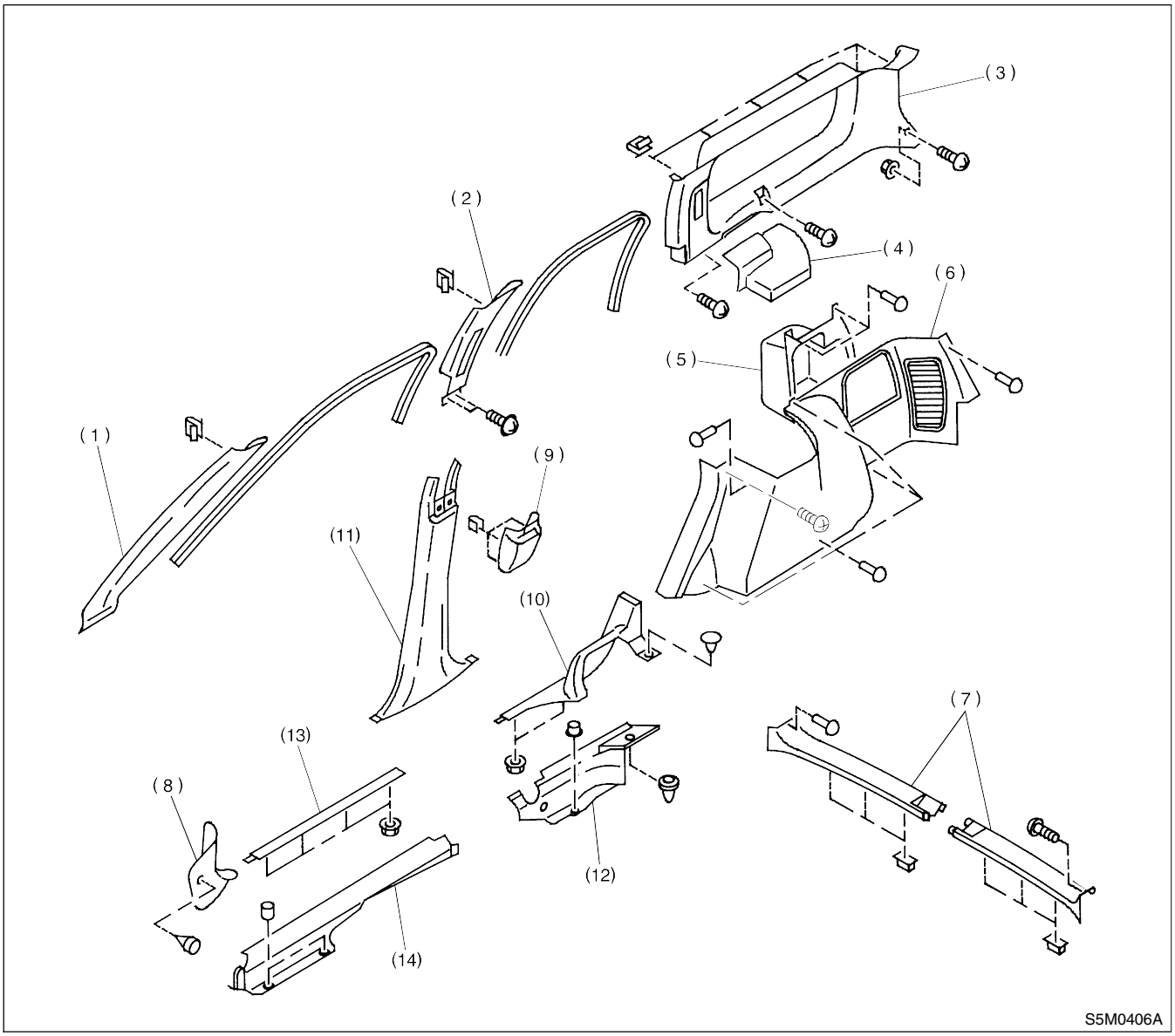
(1) Side protector (Front fender)
(2) Side protector (Front door)
(3) Side protector (Rear door)
(4) Side protector (Rear quarter)
(5) Side protector (Side sill)

4. DOOR TRIM S911001A0505



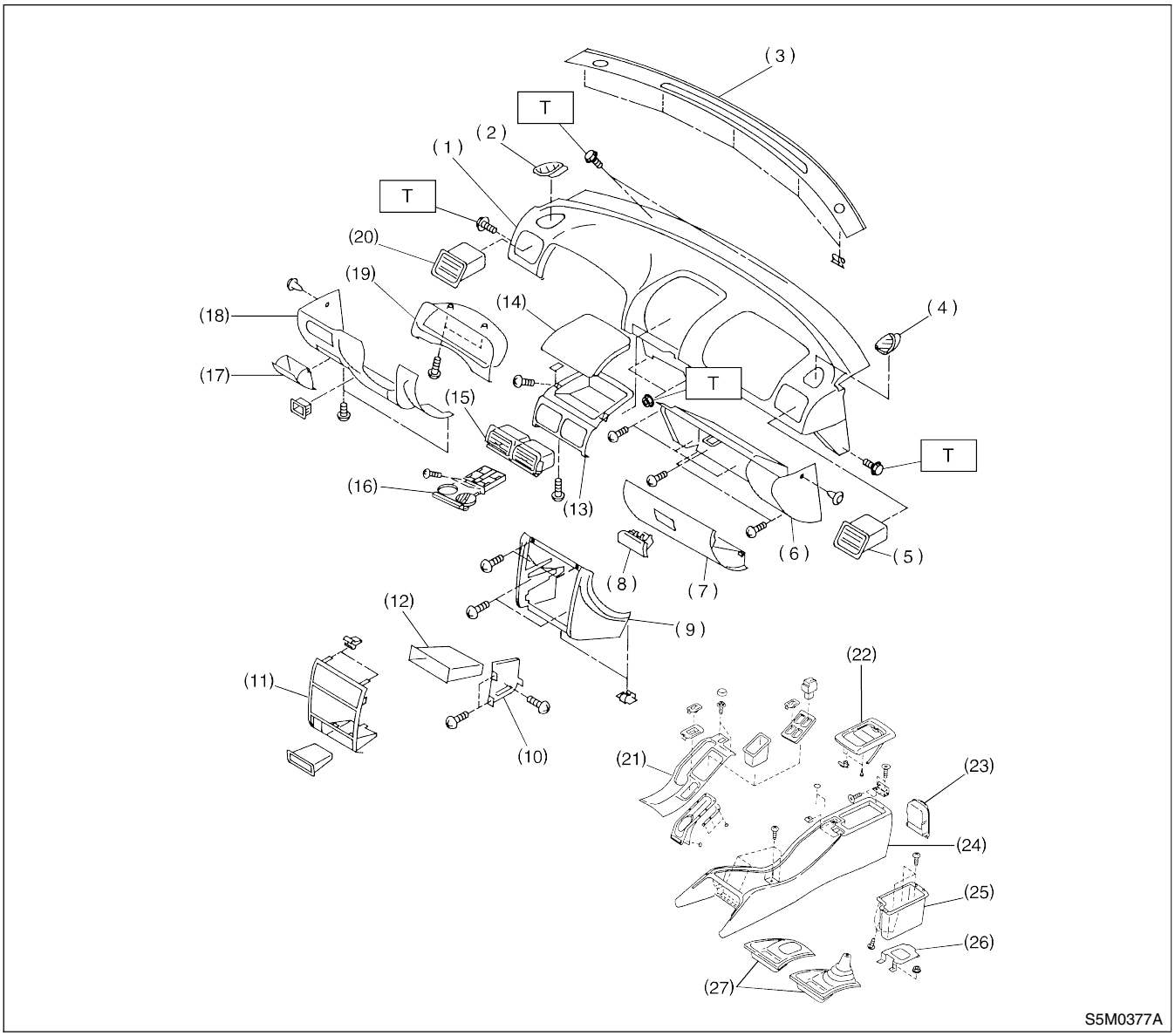
(1) Gusset cover
(2) Weatherstrip
(3) Trim panel
(4) Pull handle
(5) Handle
(6) Pocket
(7) Speaker grille
(8) Upper trim
(9) Side trim
(10) Lower trim

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

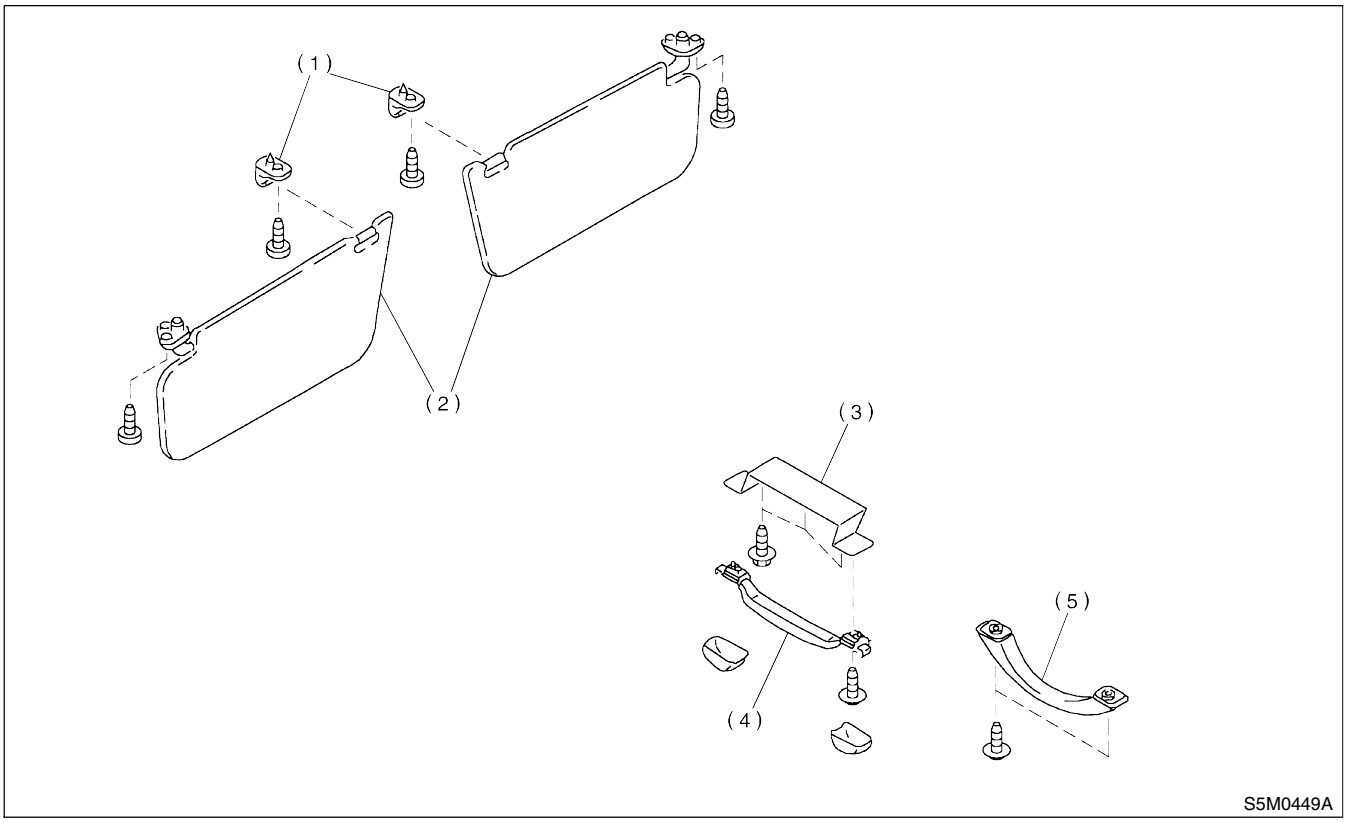
6. INSTRUMENT PANEL S911001A0508



(1) Pad & frame
(2) Grille side (D)
(3) Front def. 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)

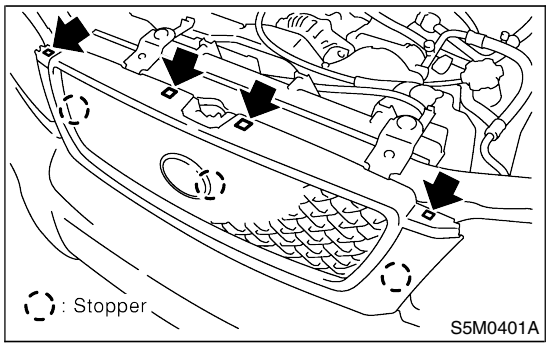
B: PREPARATION TOOL S911001A17

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.



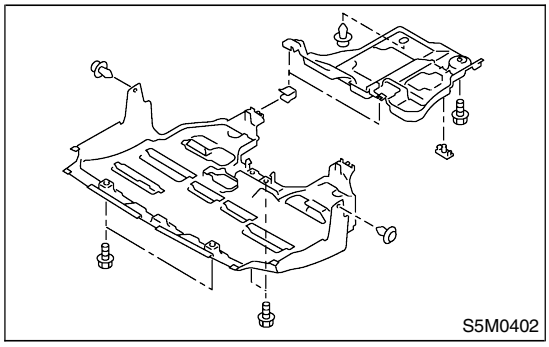
B: INSTALLATION S911379A11

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

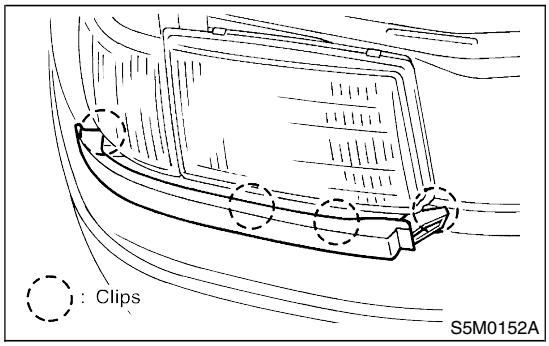
Install in the reverse order of removal.

4. Front Bumper S911371

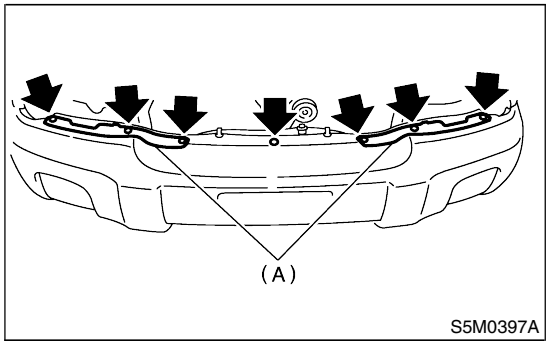
A: REMOVAL S911371A18

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.**

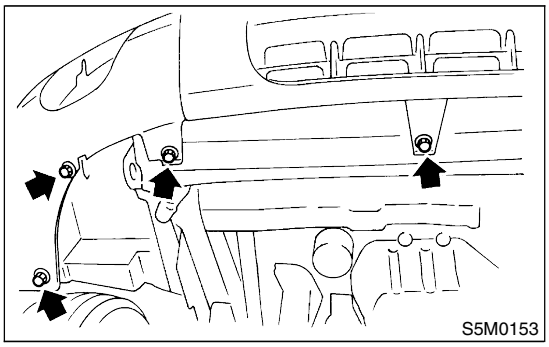
1) Disconnect the ground cable from the battery.
2) Remove front fog light. <Ref. to LI-48, REMOVAL, Front Fog Light Assembly.>
3) Remove the front grille. <Ref. to EI-10, REMOVAL, Front Grille.>
4) Remove headlight washer nozzle. (Headlight washer equipped vehicle) <Ref. to WW-24, REMOVAL, Headlight Washer.>
5) Remove the extension of both sides.



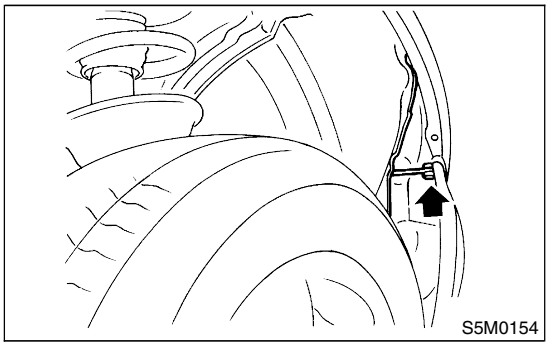
6) Remove the seven clips and then detach plate (A).



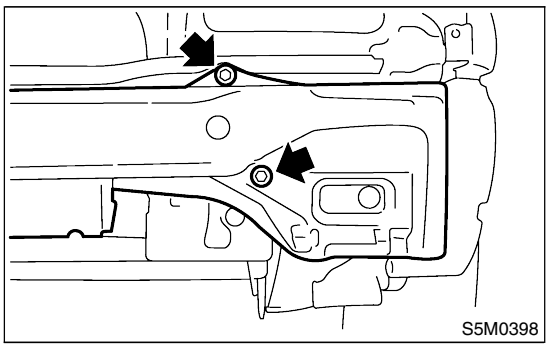
7) Remove under cover. <Ref. to EI-11, REMOVAL, Front Under Cover.>
8) Remove the seven clips from under side of bumper.



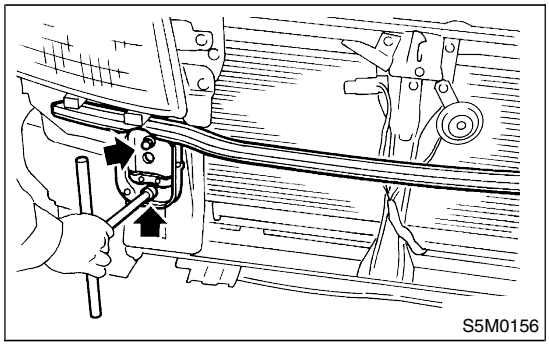
9) Turn over the front mud guard of the front portion and then remove bolt.



10) Remove bumper face and E/A foam.
11) Remove the four bolts and then detach the back beam.



12) Remove the four bolts and then detach the beam upper.



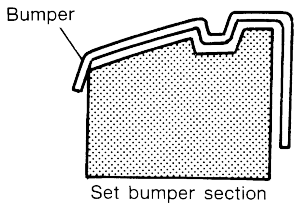
B: INSTALLATION *S911371A11*

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.

C: REPAIR S911371A19

1. COATING METHOD FOR PP BUMPER S911371A1901

<table>
<tr><th>Process No.</th><th>Process name</th><th colspan="2">Job contents</th></tr>
<tr><td>1</td><td>Bumper mounting</td><td>Set bumper on paint worktable if required. Use paint worktable conforming to inner shape of bumper when possible.</td><td>

G5M0164</td></tr>
<tr><td>2</td><td>Masking</td><td colspan="2">Mask specified part (black base) with masking tape. Use masking tape for PP (example, Nichiban No. 533, etc.).</td></tr>
<tr><td>3</td><td>Degreasing, cleaning</td><td colspan="2">Clean all parts to be painted with white gasoline, normal alcohol, etc. to remove dirt, oil, fat, etc.</td></tr>
<tr><td>4</td><td>Primer paint</td><td colspan="2">Apply primer one to all parts to be painted, using air gun. Use primer (clear).</td></tr>
<tr><td>5</td><td>Drying</td><td colspan="2">Dry at normal temperature [10 to 15 min. at 20°C (68°F)].
In half-dried condition, PP primer paint is dissolved by solvent, e.g. thinner, etc.
Therefore, if dust or dirt must be removed, use ordinary alcohol, etc.</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Top coat paint (I)</td><td>Solid color</td><td>Metallic color</td></tr>
<tr><td>Use section (block) paint for top coat.
• Paint in use (for each color):
Solid paint
Hardener PB
Thinner T-301
• Mixing ratio:
Main agent vs. hardener = 4:1
• Viscosity: 10 — 13 sec/20°C (68°F)
• Film thickness: 35 — 45μ
• Spraying pressure: 245 — 343 kPa
(2.5 — 3.5 kg/cm^2, 36 — 50 psi)</td><td>Use section (block) paint for top coat.
• Paint in use (for each color):
Metallic paint
Hardener PB
Thinner T-306
• Mixing ratio:
Main agent vs. hardener = 10:1
• Viscosity: 10 — 13 sec/20°C (68°F)
• Film thickness: 15 — 20μ
• Spraying pressure: 245 — 343 kPa
(2.5 — 3.5 kg/cm^2, 36 — 50 psi)</td></tr>
<tr><td>7</td><td>Drying</td><td>Not required.</td><td>Dry at normal temperature [10 min. or more at 20°C (68°F)].
In half-dried condition, avoid dust, dirt.</td></tr>
<tr><td>8</td><td>Top coat paint (II)</td><td>Not required.</td><td>Apply a clear coat to parts with top coat paint (I), three times, at 5 — 7 minutes intervals.
• Paint in use:
Metallic paint
Hardener PB
Thinner T-301
• Mixing ratio: Clear vs. hardener = 6:1
• Viscosity: 14 — 16 sec/20°C (68°F)
• Film thickness: 25 — 30μ
• Spraying pressure: 245 — 343 kPa
(2.5 — 3.5 kg/cm^2, 36 — 50 psi)</td></tr>
<tr><td>9</td><td>Drying</td><td colspan="2">60°C (140°F), 60 min. or 80°C (176°F), 30 min.
If higher than 80°C (176°F), PP may be deformed. Keep maximum temperature of 80°C (176°F).</td></tr>
<tr><td>10</td><td>Inspection</td><td colspan="2">Paint check.</td></tr>
<tr><td>11</td><td>Masking removal</td><td colspan="2">Remove masking in process No. 2.</td></tr>
</table>

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>

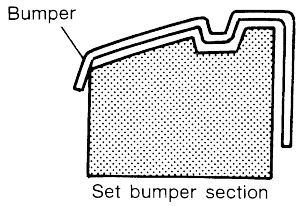
• Deep damage caused by scratching fences, etc.

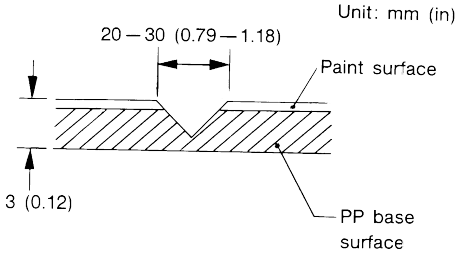
A dent cannot be repaired but a whitened or swelled part can be removed.

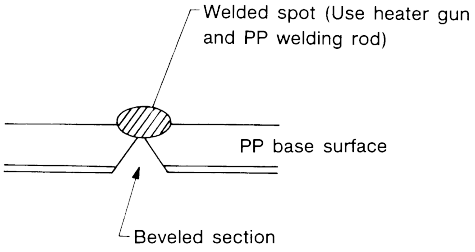
<table>
<tr><th>Process No.</th><th>Process name</th><th colspan="2">Job contents</th></tr>
<tr><td>1</td><td>Cleaning</td><td colspan="2">Clean damaged area with water.</td></tr>
<tr><td>2</td><td>Removal of damaged area</td><td colspan="2">Cut off protruding area, if any, due to collision, using a 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

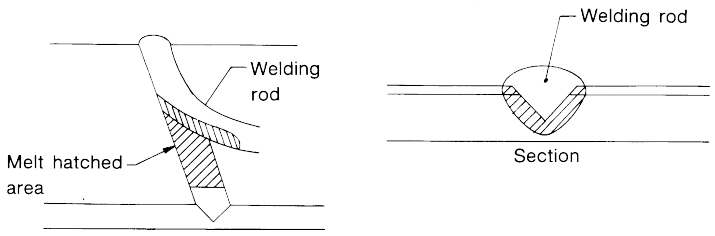
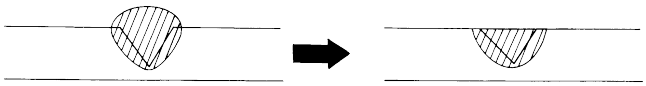
Much of the peripheral grained surface must be sacrificed for repair, and the degree of restoration is not really worth the expense. (The surface, however, will become almost flush with adjacent areas.)
Recommended repair kit: PP Part Repair Kit (NRM)

<table>
<tr><th>Process No.</th><th>Process name</th><th colspan="2">Job contents</th></tr>
<tr><td>1</td><td>Bumper removal</td><td colspan="2">Remove bumper as required.</td></tr>
<tr><td>2</td><td>Part removal</td><td colspan="2">Remove parts built into bumper as required.</td></tr>
<tr><td>3</td><td>Bumper placement</td><td>Place bumper on a paint worktable as required.
It is recommended that contour of worktable accommodate internal shape of bumper.</td><td>

G5M0164</td></tr>
<tr><td>4</td><td>Surface preparation</td><td colspan="2">Remove dust, oil, etc. from areas to be repaired and surrounding areas, using a suitable solvent (NRM No. 900 Precleno, white gasoline, or alcohol).</td></tr>
<tr><td>5</td><td>Cutting</td><td>If nature of damage are cracks or holes, cut a guide slit of 20 to 30 mm (0.79 to 1.18 in) in length along the crack or hole up to the bumper's base surface. Then, bevel or "vee-out" the affected area using a knife or grinder.</td><td>

G5M0165</td></tr>
<tr><td>6</td><td>Sanding (I)</td><td colspan="2">Grind beveled surface with sand paper (#40 to #60) to smooth finish.</td></tr>
<tr><td>7</td><td>Cleaning</td><td colspan="2">Clean the sanded surface with the same solvent as used in Process No. 4.</td></tr>
<tr><td rowspan="2">8</td><td rowspan="2">Temporary welding</td><td colspan="2">Grind the side just opposite the beveled area with sand paper (#40 to #60) and clean using a solvent.
Temporarily spot-weld the side, using a PP welding rod and heater gun.</td></tr>
<tr><td colspan="2">

G5M0166
NOTE:
• Do not melt welding rod until it flows out. This results in reduced strength.
• Leave the welded spot unattended until it cools completely.</td></tr>
</table>

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.

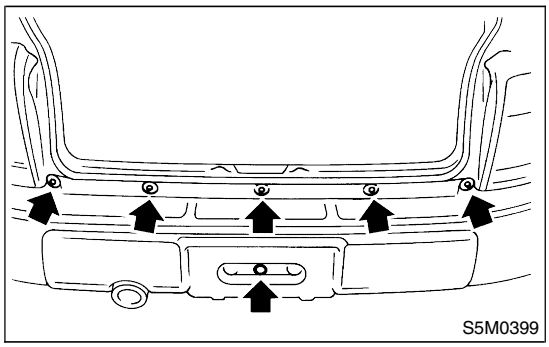
Process No.	Process name	Job contents	
		Solid color	Metallic color
19	Top coat (I)	Use a “block” coating method. ● Recommended paint: Suncryl (SC) No. 307 Flex Hardener SC Reducer (thinner) ● Mixing ratio: 3 : 1 Suncryl (SC) vs. No. 307 Flex Hardener ● Viscosity: 11 — 13 sec/20°C (68°F) ● Coated film thickness: 40 — 50µ ● Spraying thickness: 245 — 343 kPa (2.5 — 3.5 kg/cm^2, 36 — 50 psi)	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)
20	Leave unattended.	Not required.	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.
21	Top coat (II)	Not required.	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)
22	Drying	Allow the coated surface to dry at 20°C (68°F) for two hours or 60°C (140°F) for 30 minutes. NOTE: Do not allow the temperature to exceed 80°C (176°F) since this will deform the PP substrate.	
23	Inspection	Carefully check the condition of the repaired area.	
24	Masking removal	Remove masking tape applied in Process No. 11 and 13.	
25	Parts installation	Install parts on bumper in reverse order of removal.	
26	Bumper installation	Install bumper.	

5. Rear Bumper S911370

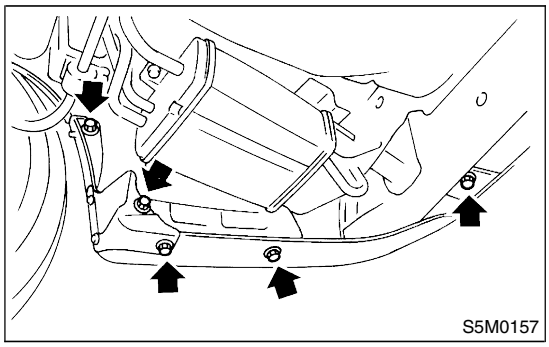
A: REMOVAL S911370A18

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.

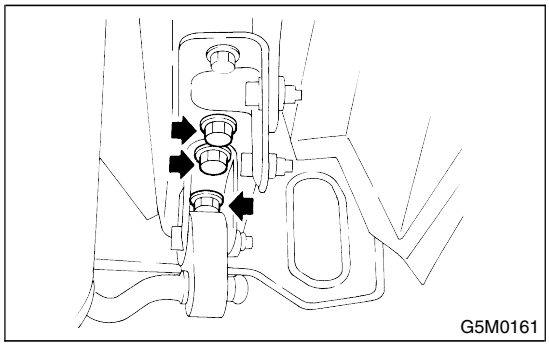
1) Disconnect the ground cable from the battery.
2) Open rear gate.
3) Remove the five screws and the clip from the rear bumper.


S5M0399

4) Disconnect license plate light and rear fog light (if equipped) connectors.
5) Remove bolts and clips from under side of bumper.


S5M0157

6) Remove bumper face.
7) Remove bolts from bumper stay.


G5M0161

8) 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.

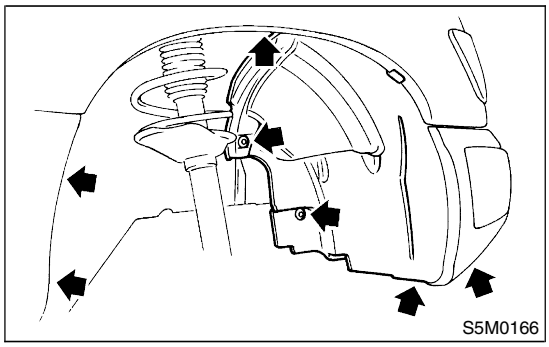
C: REPAIR S911370A19

Refer to front bumper repair. <Ref. to EI-12 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.

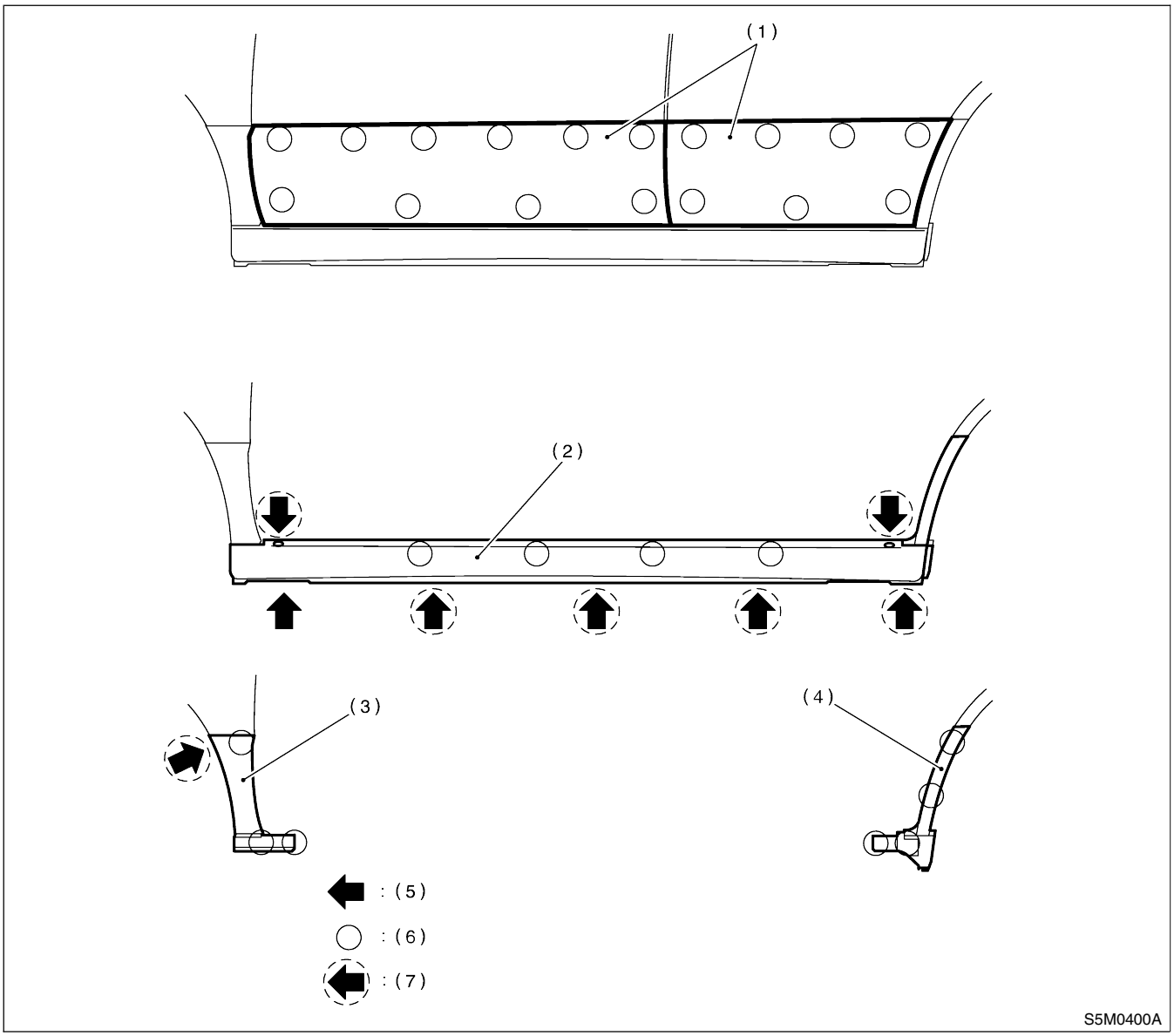


B: INSTALLATION S911374A11

Insert hook into body, and tighten it with screw and clip.

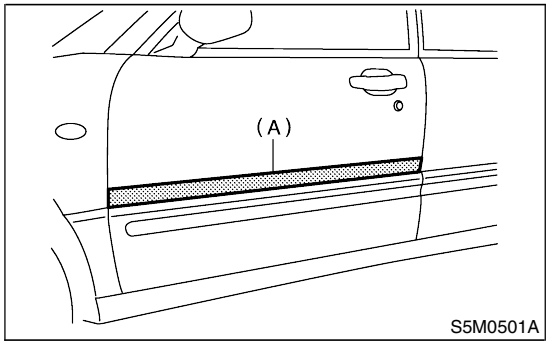
7. Protector S911380

A: REMOVAL S911380A18

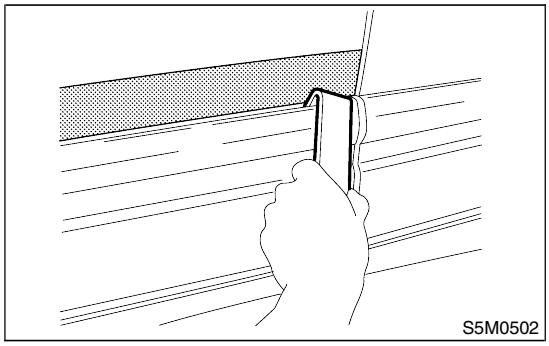


(1) Side protector (Door)
(2) Side protector (Side sill)
(3) Side protector (Front fender)
(4) Side protector (Rear quarter)
(5) Screw
(6) Clip
(7) Clip

1) Attach masking tape (A) on the upper painted area of the protector.



2) Release clip engagement using clip remover, and remove the protector while peeling off two-sided tape.



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).

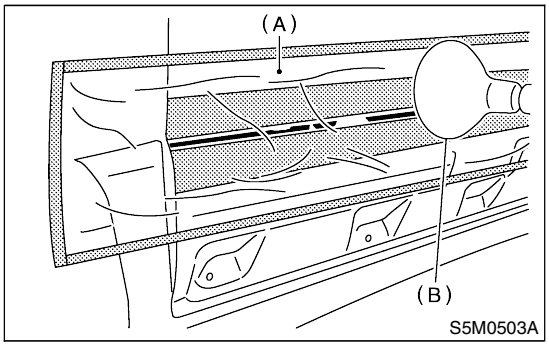
3) Apply an even coat of adhesive remover to the two-sided tape.

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.



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.

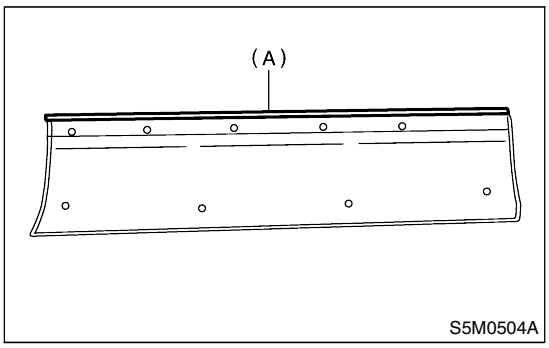
B: INSTALLATION *S911380A11*

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



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 kg, 11 lb) with roller. Do not allow air to enter mating surface of the two.

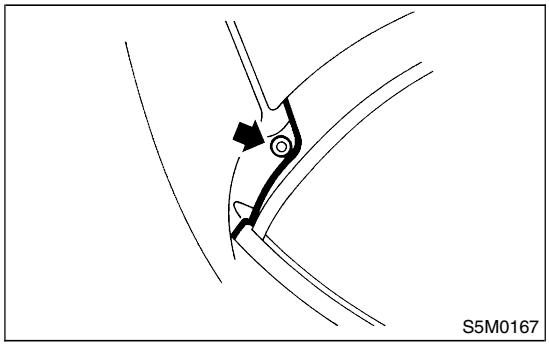
CAUTION:
- **To maintain adhesive power, do not wash the vehicle for 24 hours after tape application.**
- **Push clip in securely using hands.**

(To prevent deformation, do not use excessive force.)

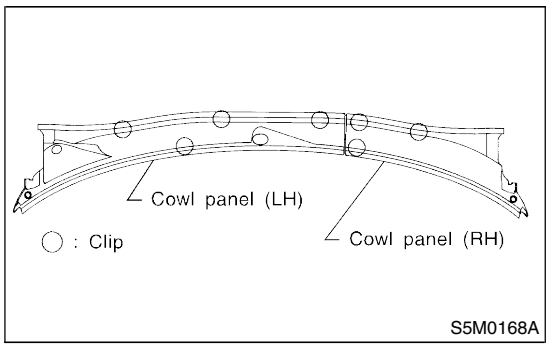
8. Cowl Panel S911387

A: REMOVAL S911387A18

1) Remove cowl panel side.



2) Open hood.
3) Remove wiper arm. <Ref. to WW-14 REMOVAL, Wiper Arm.>
4) Lift cowl panel (RH), and then lift cowl panel (LH).



B: INSTALLATION S911387A11

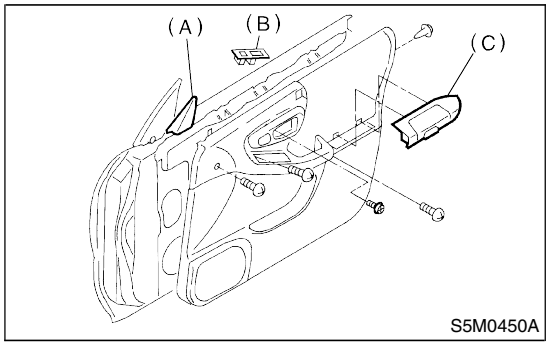
Install in the reverse order of removal.

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

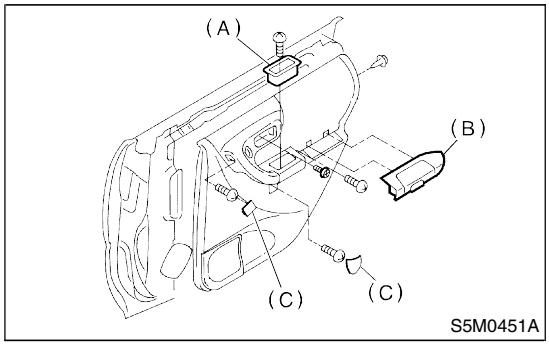
Install in the reverse order of removal.

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.



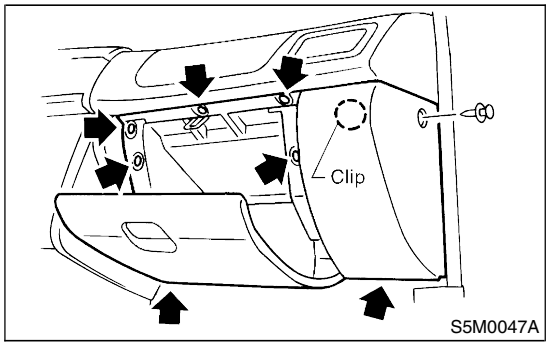
B: INSTALLATION S911354A11

Install in the reverse order of removal.

11. Glove Box S911558

A: REMOVAL S911558A18

Loosen screws to remove glove box.



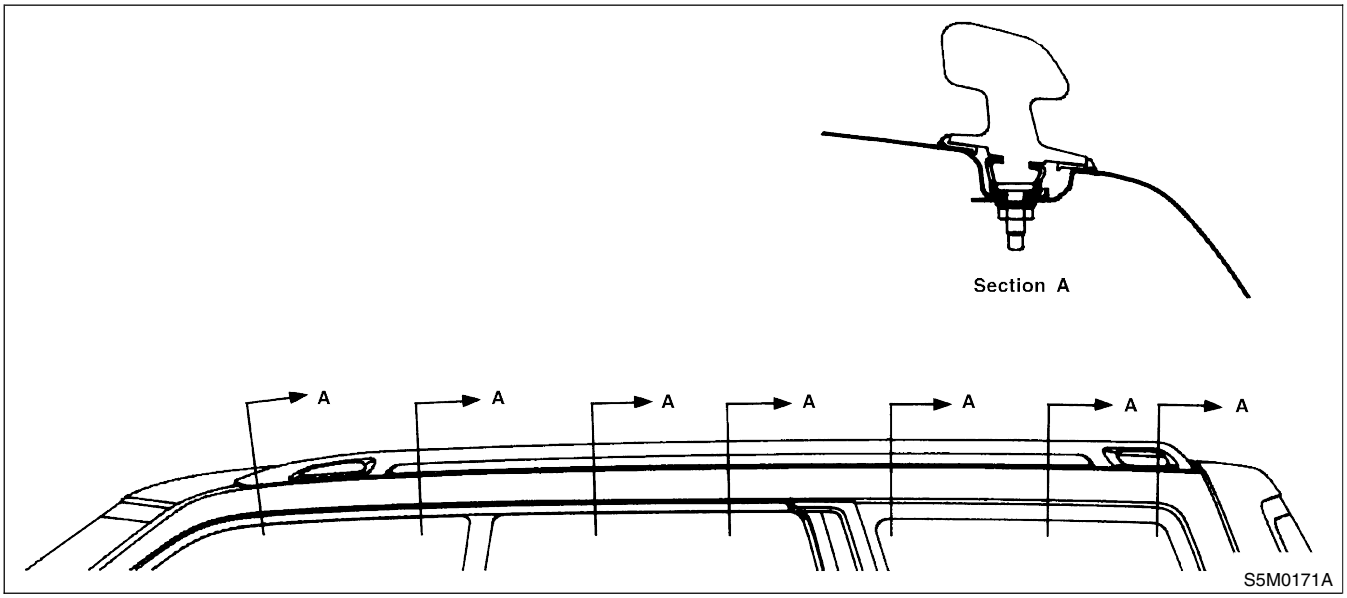
B: INSTALLATION S911558A11

Install in the reverse order of removal.

12. Roof Rail S911383

A: REMOVAL S911383A18

1) Remove roof trim. <Ref. to EI-41 REMOVAL, Roof Trim.>
2) Remove seven mounting nuts and then detach roof rail carefully.



B: INSTALLATION S911383A11

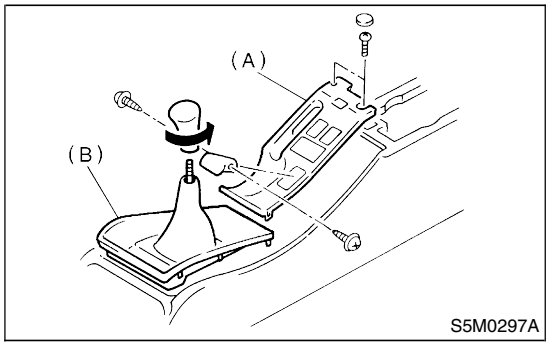
Install in the reverse order of removal.

CAUTION:
Be careful not to scratch body panels with roof rail stud bolts when removing and installing them.

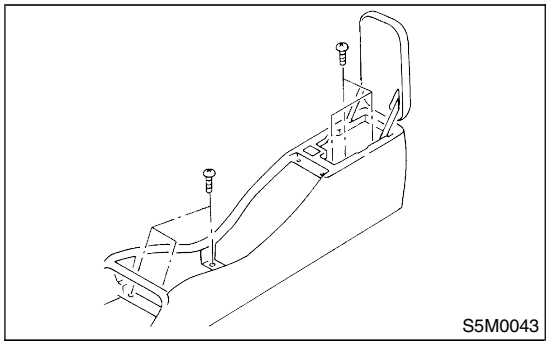
13. Console Box S911382

A: REMOVAL S911382A18

1) Remove shift knob and drive select lever (MT model).
2) Remove console cover (A) and front cover (B).



3) Remove console box.



B: INSTALLATION S911382A11

Install in the reverse order of removal.

14. Instrument Panel Assembly

S911381

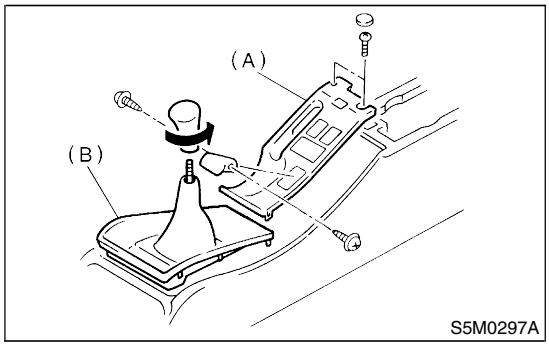
A: REMOVAL S911381A18

Airbag system wiring harness is routed near combination meter.

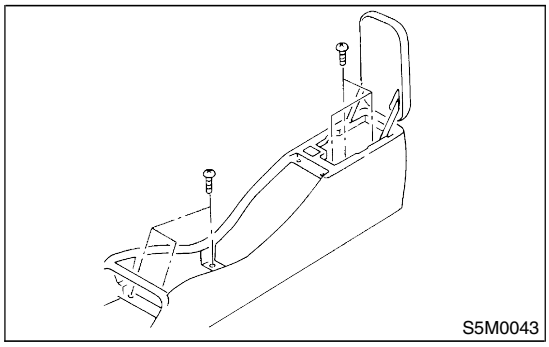
CAUTION:
● All airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.
● Be careful not to damage airbag system wiring harness when servicing the instrument panel.

NOTE:
The following positions for removal and installation are for LHD models. The positions for RHD models are symmetrically opposite.

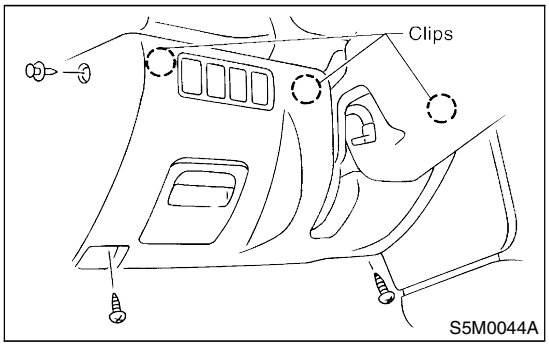
1) Disconnect GND cable from battery.
2) Remove shift knob and drive select lever. (MT model)
3) Remove console cover (A) and front cover (B).



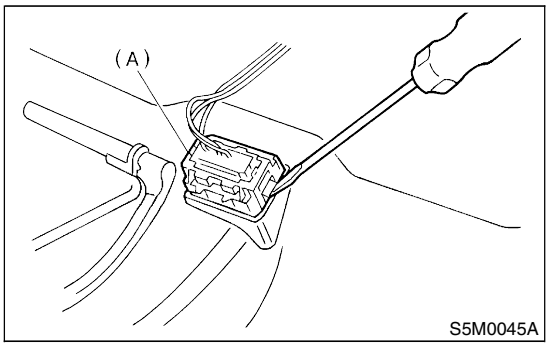
4) Remove console box.



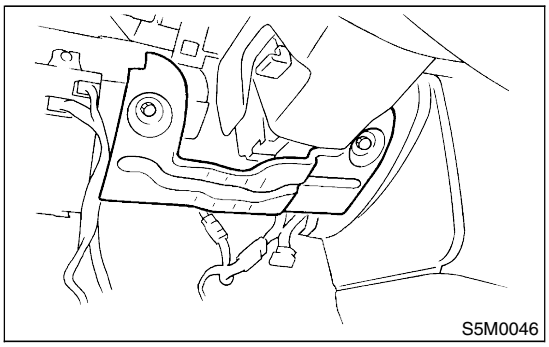
5) Remove lower cover and then disconnect connector.



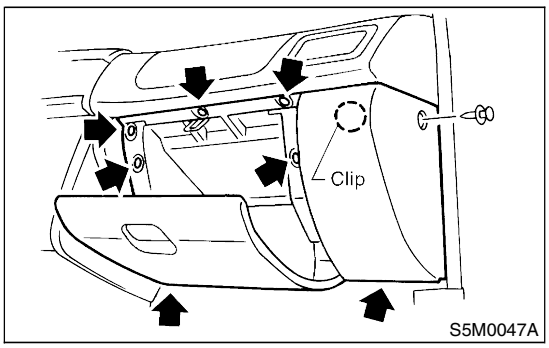
6) Disconnect data link connector (A) from lower cover.



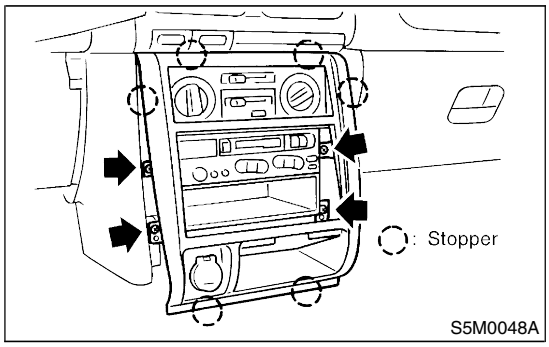
7) Remove knee panel.



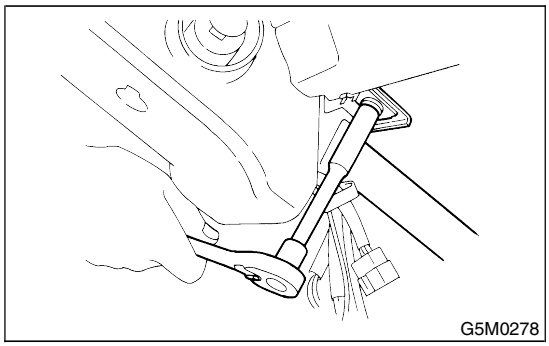
8) Remove glove box.



9) Remove center panel and disconnect connector.
10) Remove audio.



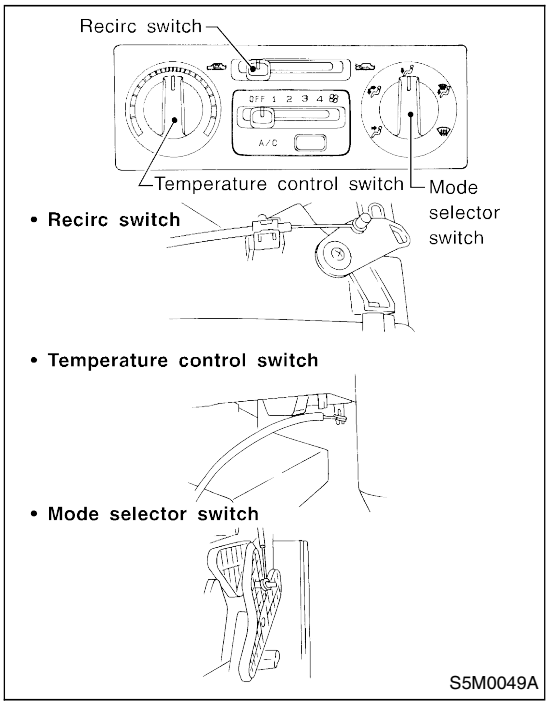
11) Remove two bolts and lower steering column.



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.

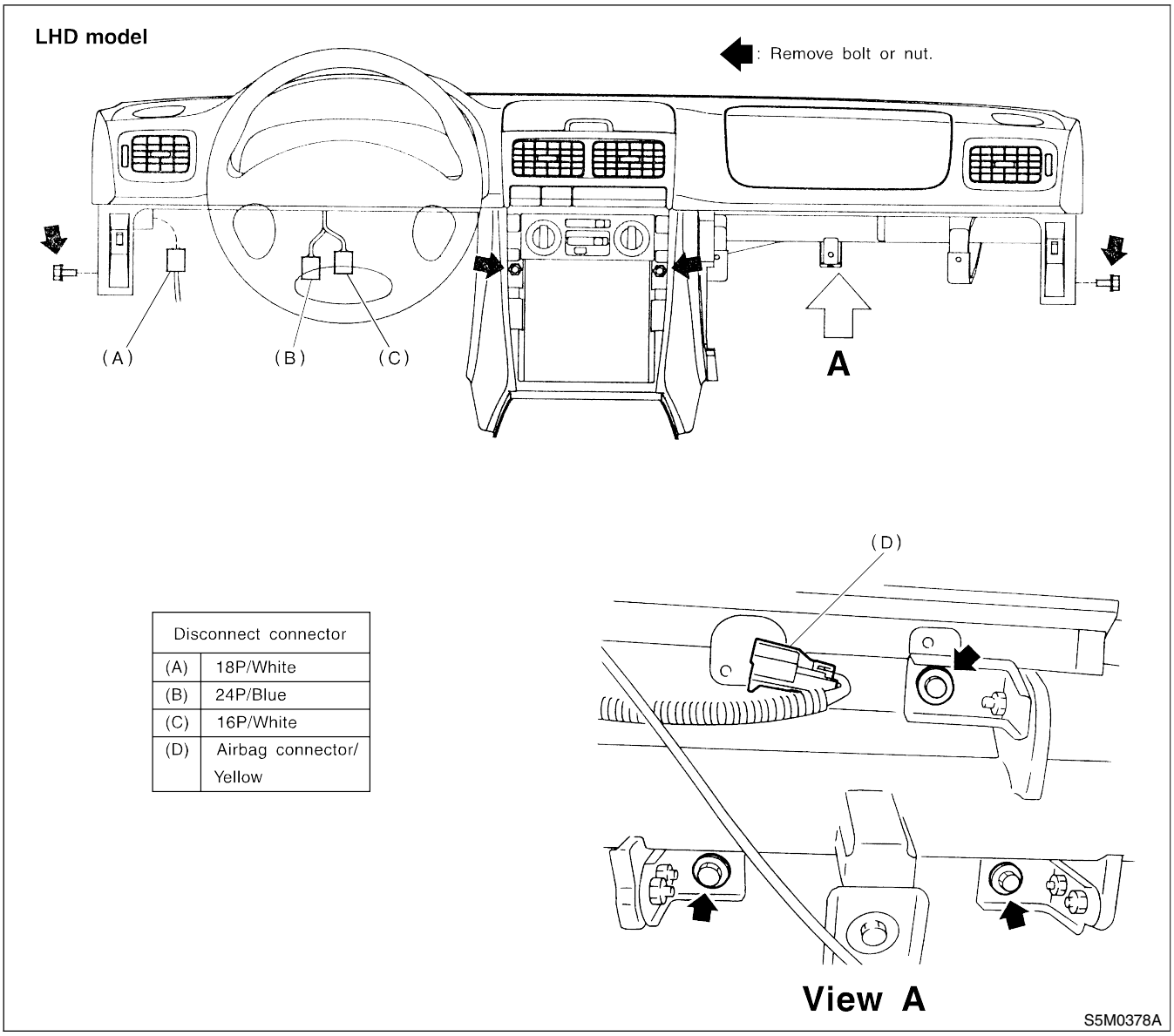
NOTE:
Do not move switch and link when installing.



14) Disconnect harness connectors and then remove the installing bolts and nuts.

CAUTION:
Be sure to hold socket section and not harness when disconnecting.

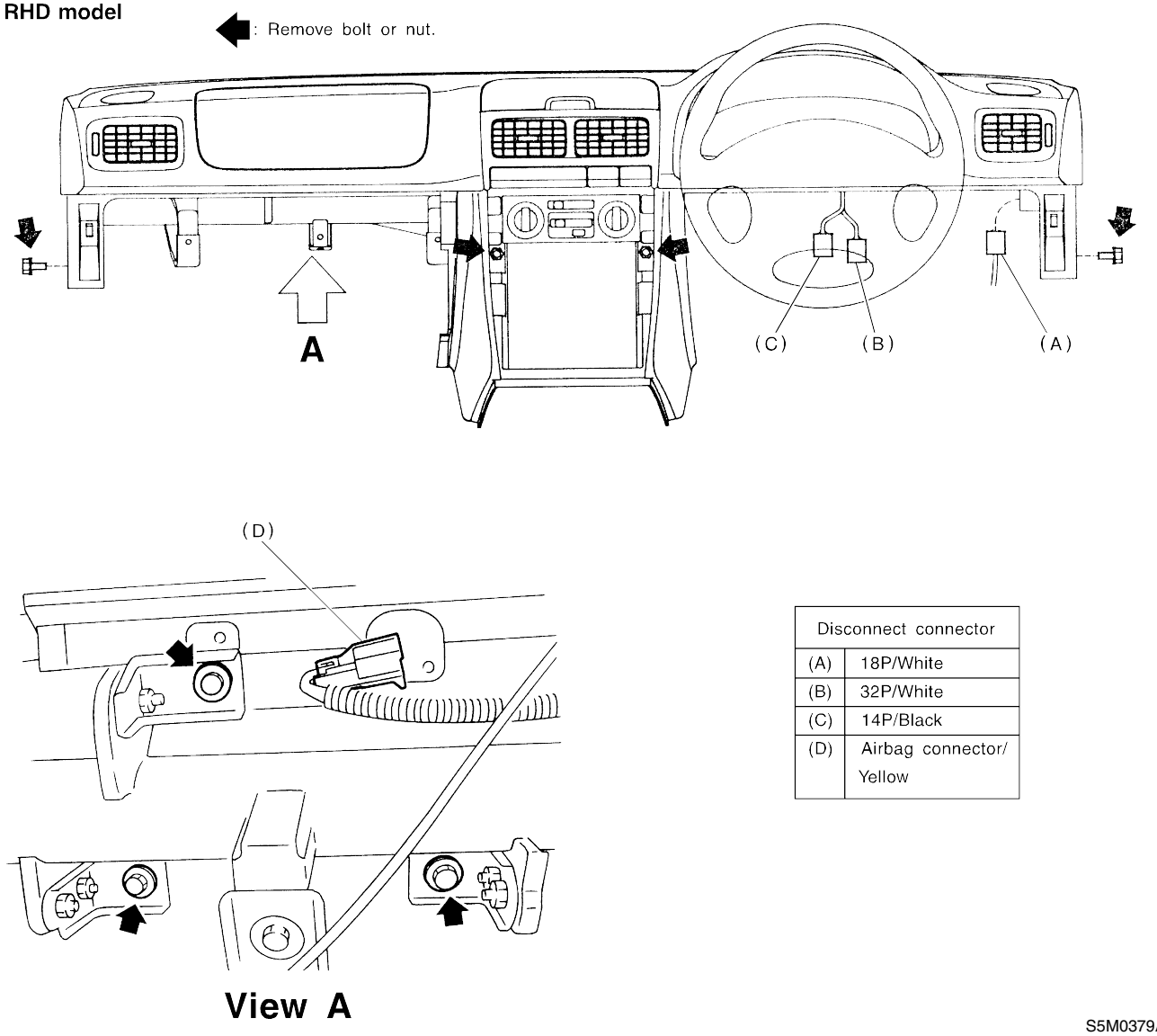
NOTE:
Put matching mark, if necessary, for easy reassembly.



Disconnect connector	
(A)	18P/White
(B)	24P/Blue
(C)	16P/White
(D)	Airbag connector/ Yellow

INSTRUMENT PANEL ASSEMBLY

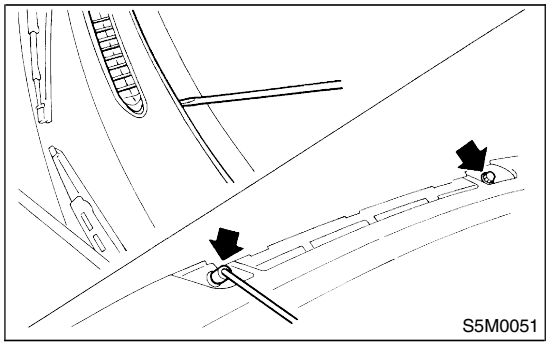
RHD model



Disconnect connector	
(A)	18P/White
(B)	32P/White
(C)	14P/Black
(D)	Airbag connector/ Yellow

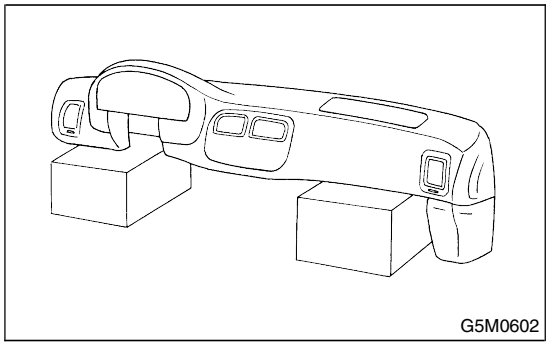
S5M0379A

15) Remove front defroster grille and two bolts.



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.

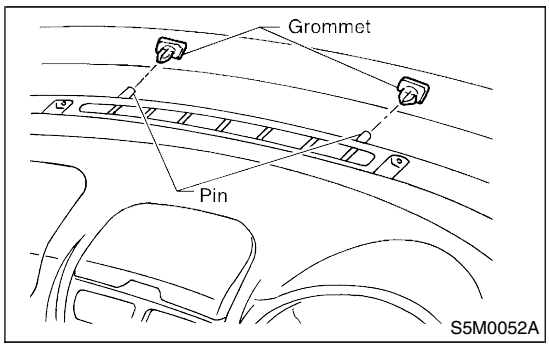


B: INSTALLATION S911381A11

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.**

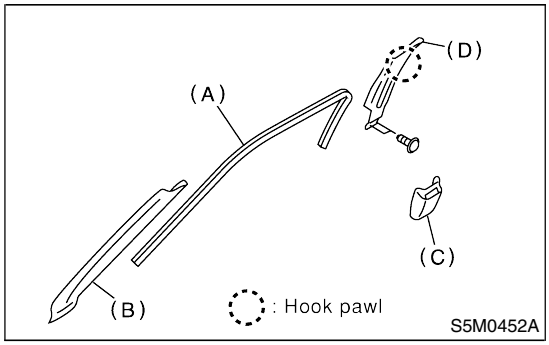
NOTE:
When setting the instrument panel into position, push the two pins into grommet on the body panel.



15. 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).

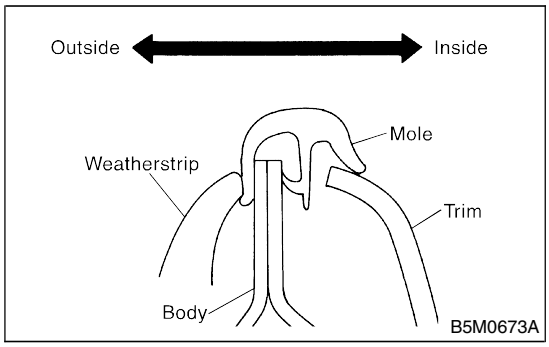


B: INSTALLATION S911384A11

Install in the reverse order of removal.

CAUTION:
Be sure to securely hook pawls of inner trim panel to body flange.

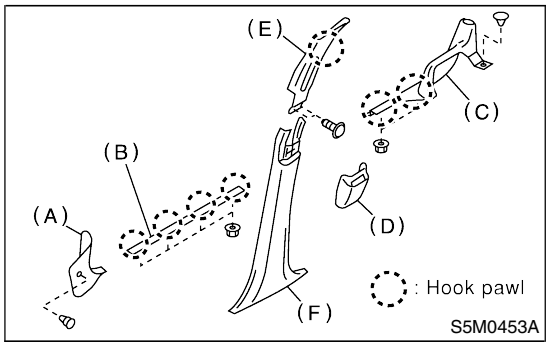
NOTE:
When installing center pillar upper trim and front pillar upper trim, be sure to set front mole as shown in figure.



16. 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

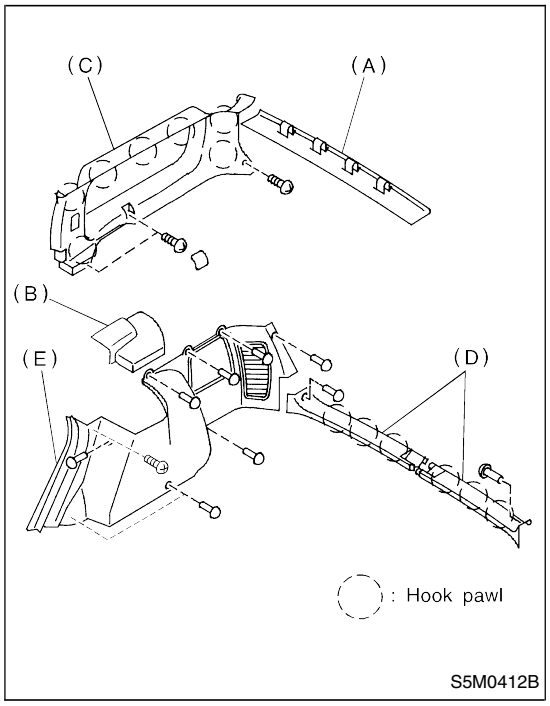
Install in the reverse order of removal.

CAUTION:
Be sure to securely hook pawls of inner trim panel to body flange.

17. 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-44, REMOVAL, Luggage Floor Mat.>
7) Remove rear quarter lower trim (E).

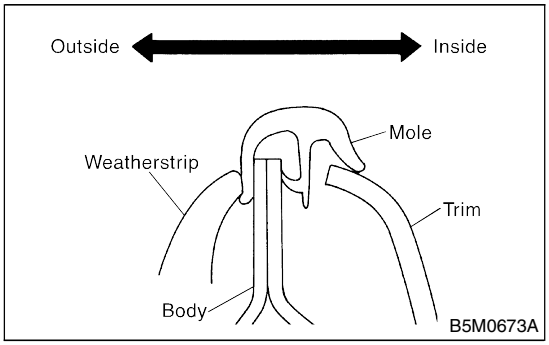


B: INSTALLATION S911358A11

Install in the reverse order of removal.

CAUTION:
Be sure to securely hook pawls of inner trim panel to body flange.

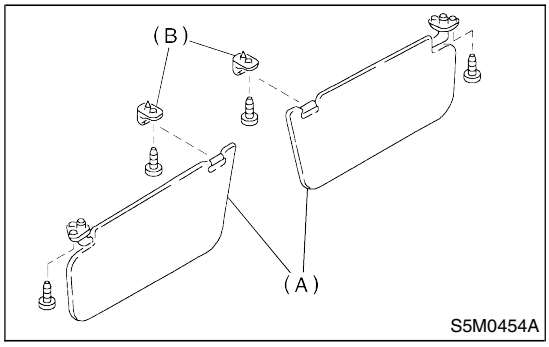
NOTE:
When installing rear quarter upper trim, be sure to set rear mole as shown in the figure.



18. Sun Visor S911359

A: REMOVAL S911359A18

Remove mounting screws then detach sun visor (A) and hook (B).



B: INSTALLATION S911359A11

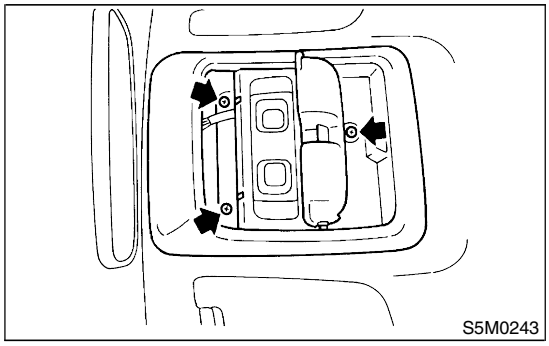
Install in the reverse order of removal.

19. Roof Trim S911360

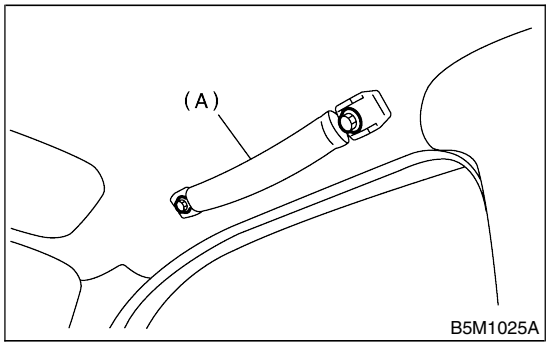
A: REMOVAL S911360A18

CAUTION:
When removing clip, use great care not to damage the roof trim.

1) Disconnect ground cable from battery.
2) Remove head console.

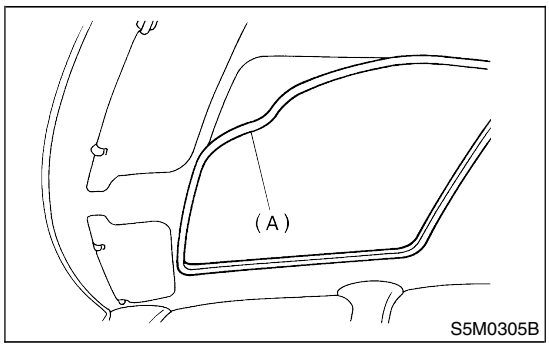

S5M0243

3) Remove sun visor and hook of both sides. <Ref. to EI-40, REMOVAL, Sun Visor.>
4) Remove assist grips (A).



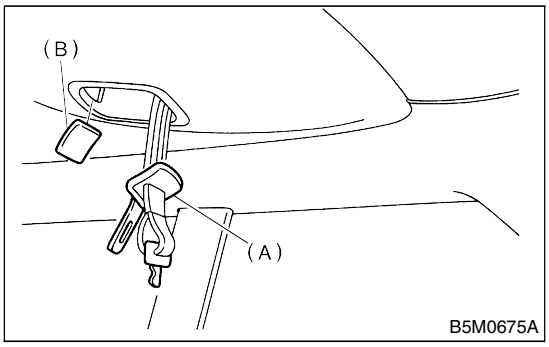
B5M1025A

5) Remove upper inner trim. <Ref. to EI-37, REMOVAL, Upper Inner Trim.>
6) Remove rear quarter trim. <Ref. to EI-39, REMOVAL, Rear quarter Trim.>
7) Detach sunroof garnish (A). (Sunroof equipped model)



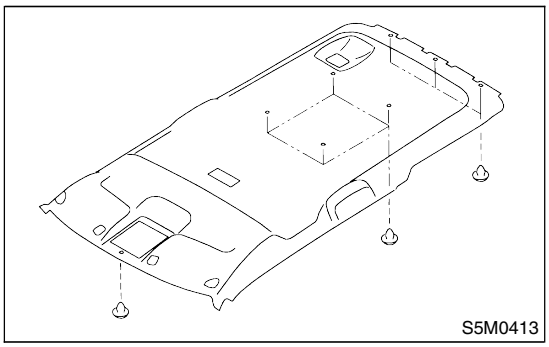
S5M0305B

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

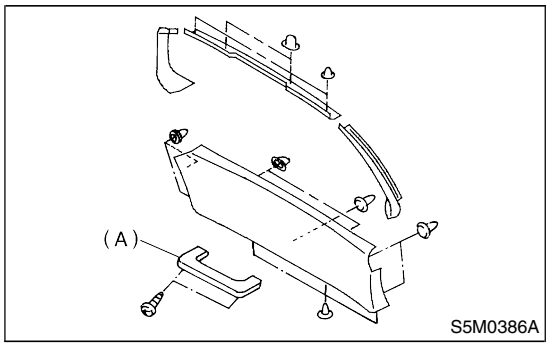
Install in the reverse order of removal.

20. 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.

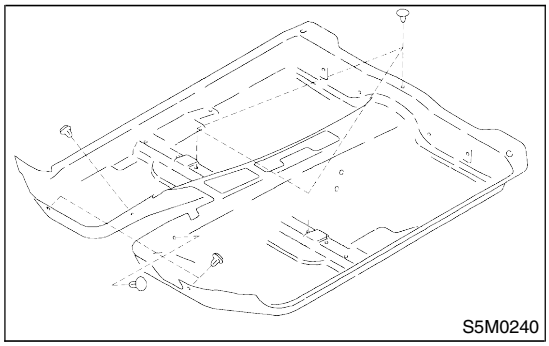
21. Floor Mat S911362

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-30 Console Box.>
4) Remove front pillar lower trim, side sill rear upper cover and center pillar lower trim. <Ref. to EI-38 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.


S5M0240

B: INSTALLATION S911362A11

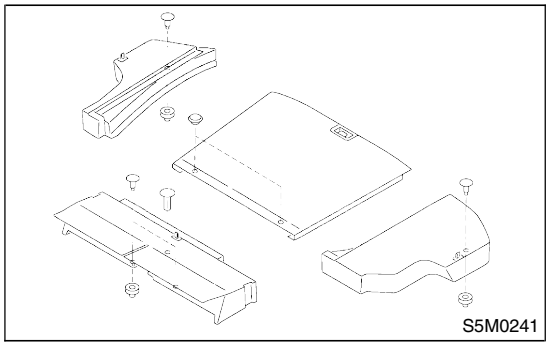
Install in the reverse order of removal.

NOTE:
- Secure mat firmly with hook and Velcro tape.
- Insert mat edge firmly into the groove of side sill cover.

22. 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.

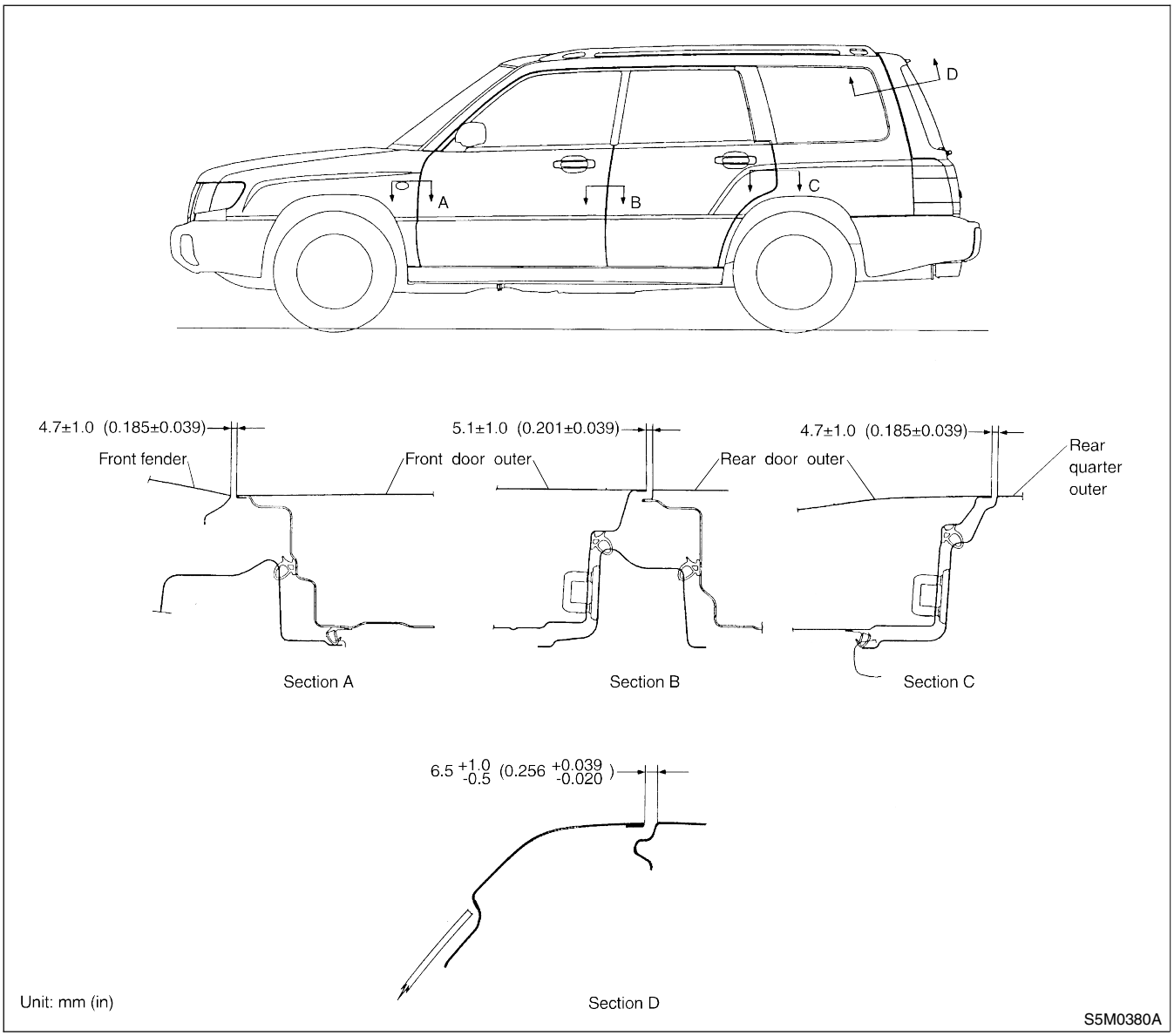
EXTERIOR BODY PANELS

EB

		Page
1.	General Description	2
2.	Front Hood	9
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

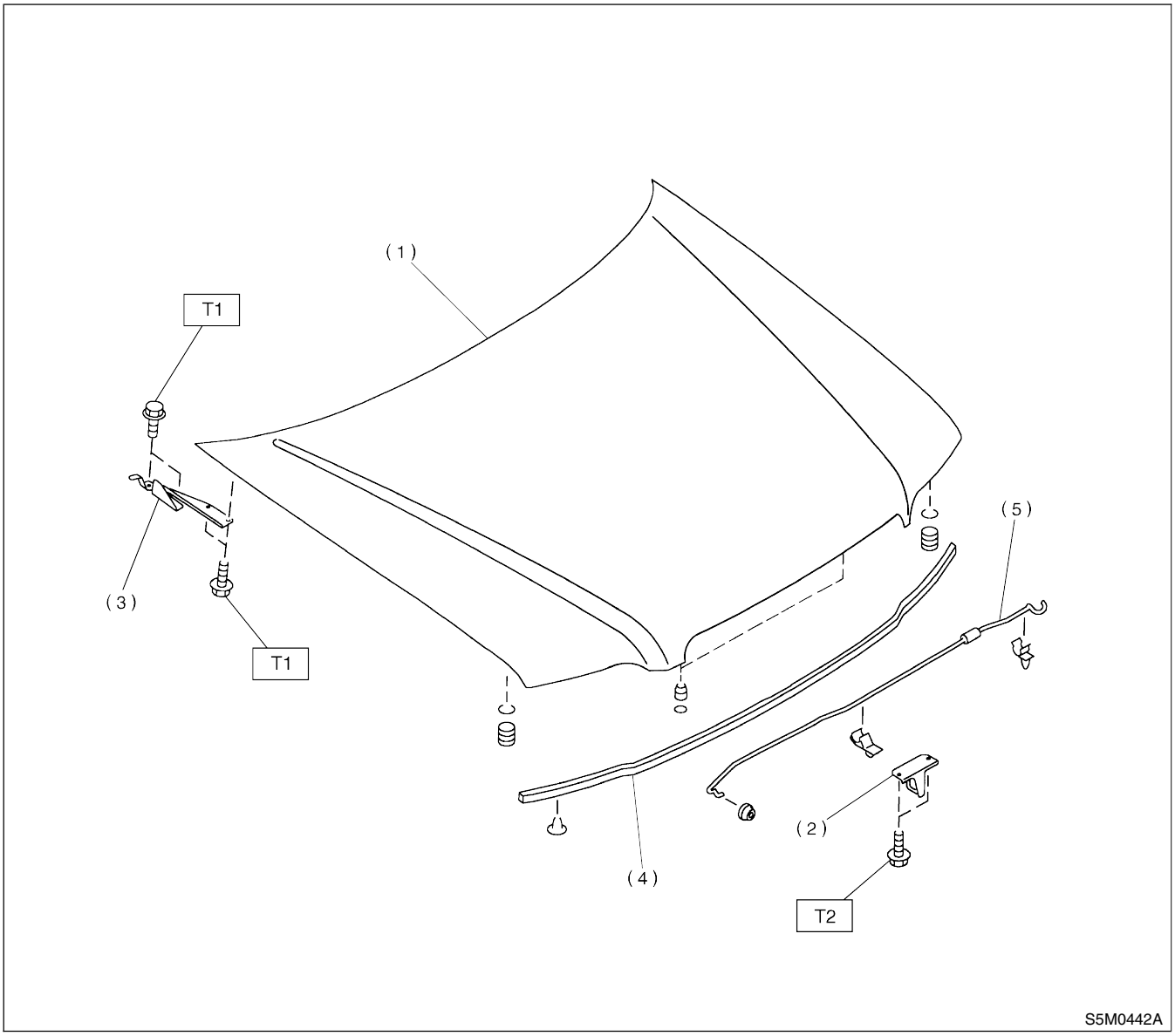
1. General Description S913001

A: SPECIFICATIONS S913001E49



B: COMPONENT S913001A05

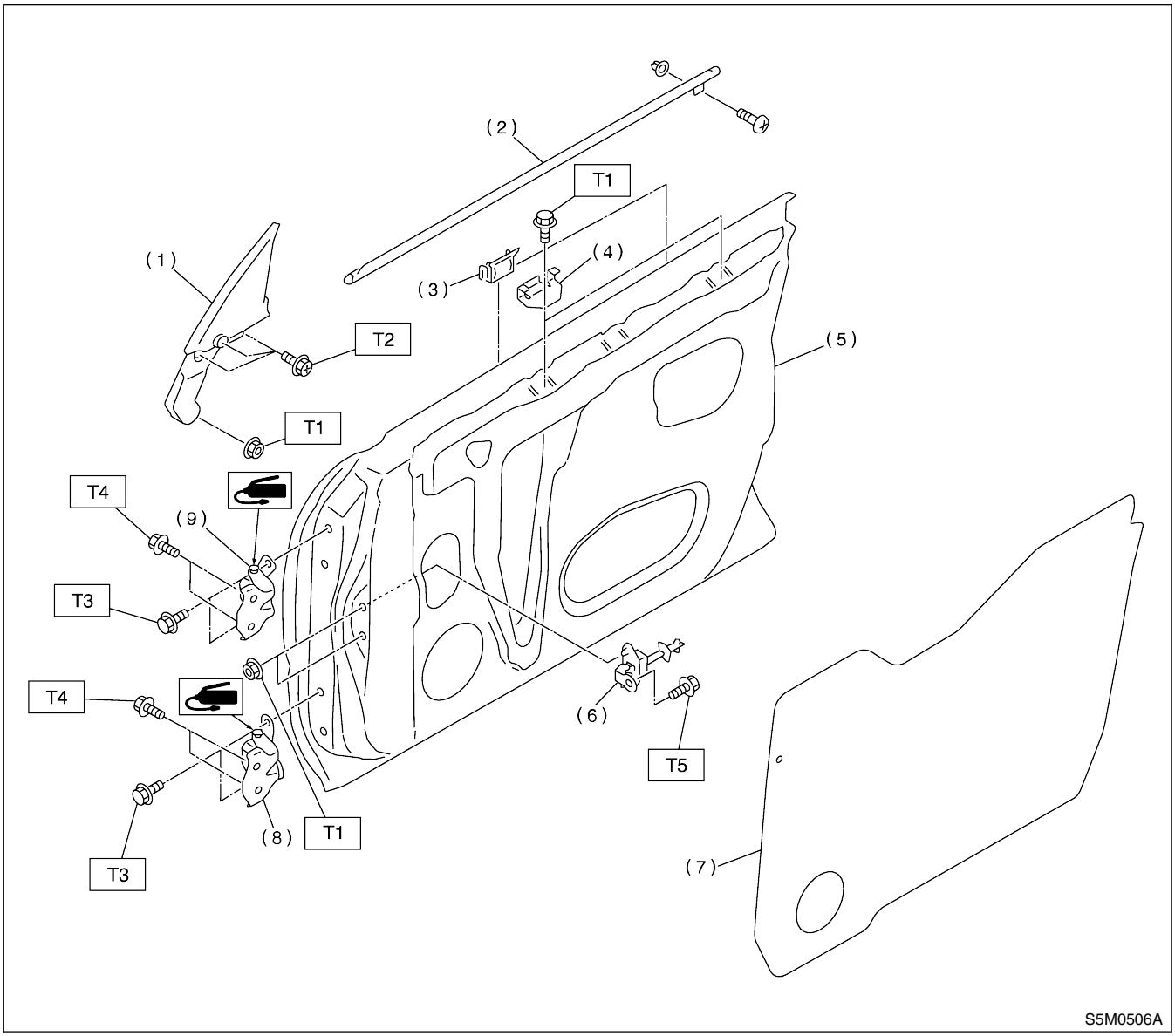
1. FRONT HOOD S913001A0501



(1) Front hood
(2) Striker
(3) Hinge
(4) Seal
(5) Front hood stay

Tightening torque: N·m (kg-m, ft-lb)
T1: 24.5 (2.5, 18.1)
T2: 33 (3.4, 25)

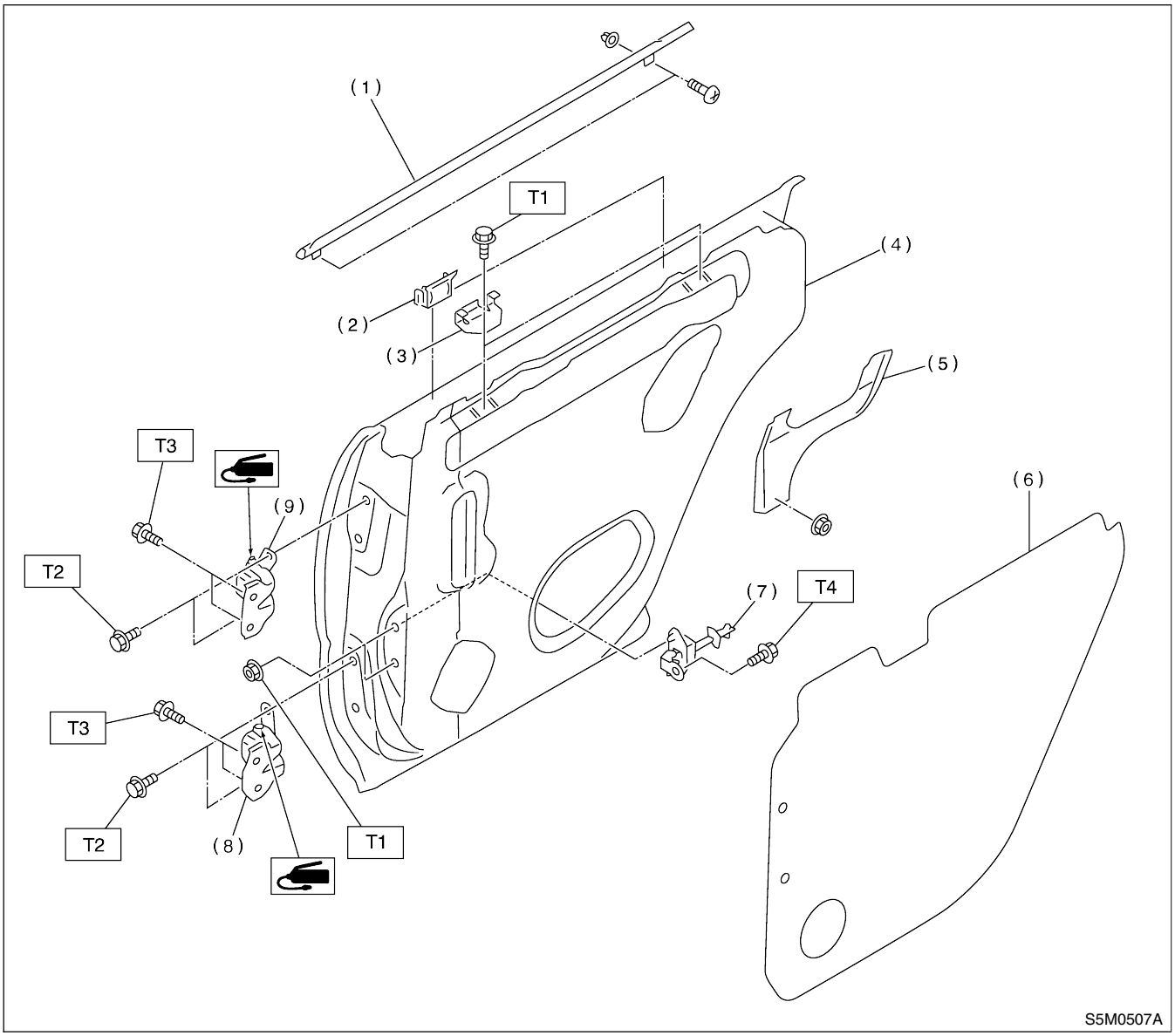
2. FRONT DOOR PANEL S913001A0502



(1) Gusset
(2) Weatherstrip
(3) Stabilizer (Outer)
(4) Stabilizer (Inner)
(5) Door panel
(6) Checker
(7) Sealing cover
(8) Lower hinge
(9) Upper hinge

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.35 (0.75, 5.4)
T2: 13 (1.3, 9.4)
T3: 25 (2.5, 18)
T4: 30 (3.1, 22)
T5: 32 (3.3, 24)

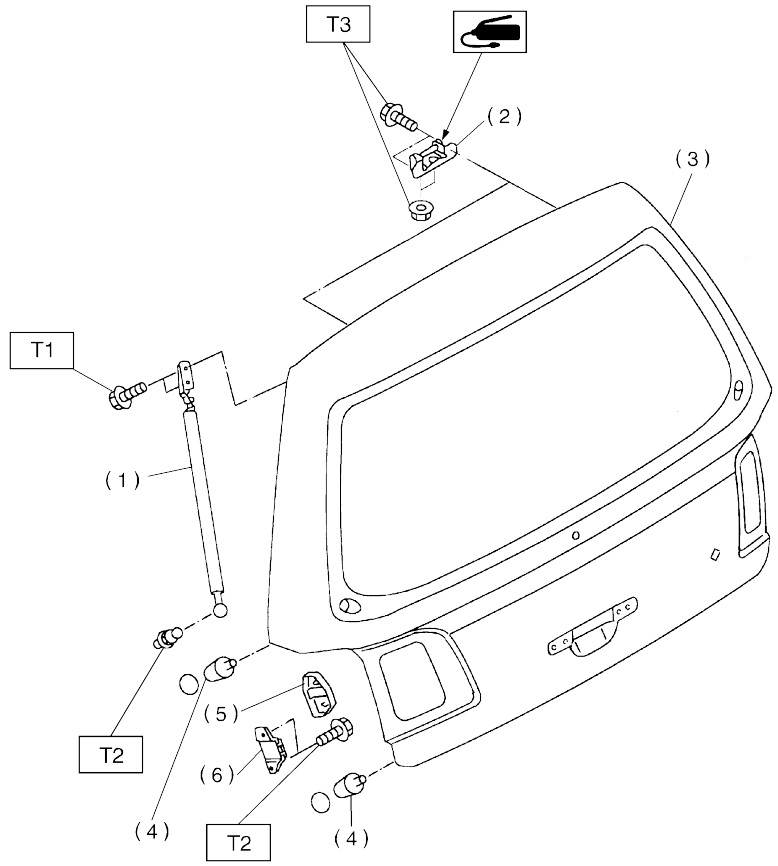
3. REAR DOOR PANEL S913001A0503



(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: 7.35 (0.75, 5.4)
T2: 25 (2.5, 18)
T3: 30 (3.1, 18)
T4: 32 (3.3, 24)

4. REAR GATE PANEL S913001A0505



S5M0443B

(1) Gas stay
(2) Hinge
(3) Rear gate
(4) Stopper
(5) Buffer cover
(6) Buffer (Back door)

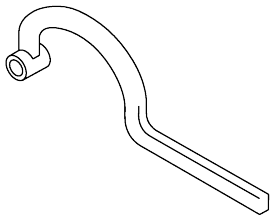
Tightening torque: N·m (kg-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 14 (1.4, 10.1)
T3: 25 (2.5, 18.1)

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.

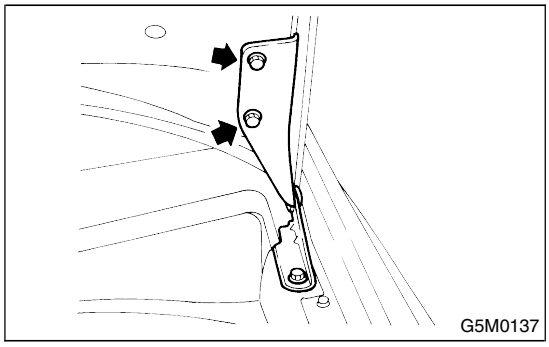
2. GENERAL TOOL S913001A1702

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.

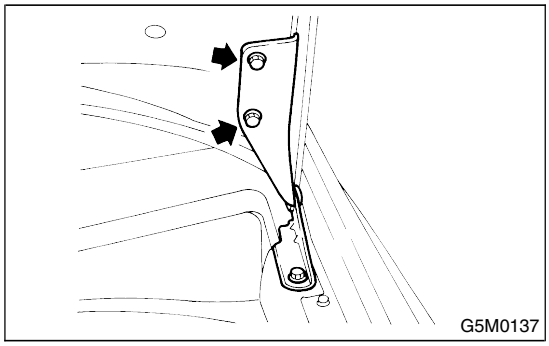


B: INSTALLATION S913367A11

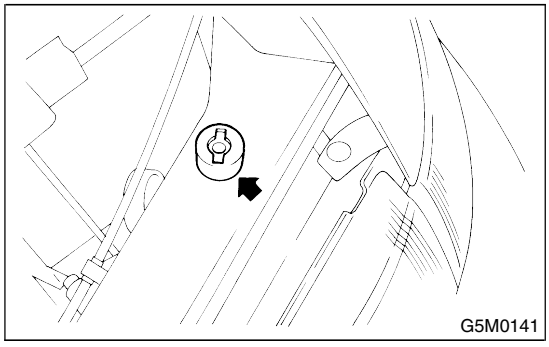
1) Install in the reverse order of removal.
2) Adjust clearance between hood and fender. Clearance must be equal at both sides.

C: ADJUSTMENT S913367A01

1) Use hinge mounting holes to align front hood longitudinally and laterally.



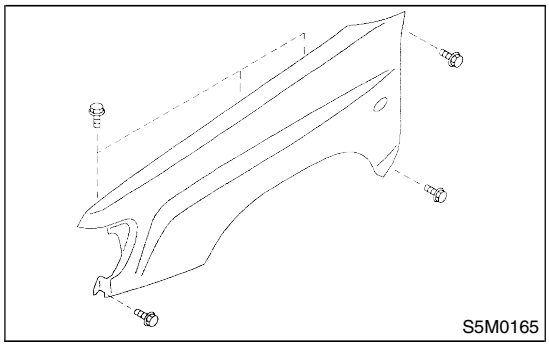
2) Adjust height at front end of hood. <Ref. to SL-38 ADJUSTMENT, Front Hood Lock Assembly.>
3) Rotate hood buffer to adjust lateral height.



3. Fender Panel S913368

A: REMOVAL S913368A18

1) Disconnect ground (–) cable from battery.
2) Remove side protectors and fender protectors. <Ref. to EI-22, REMOVAL, Protector.>
3) Remove mud guard. <Ref. to EI-21 REMOVAL, Mud Guard.>
4) Remove front bumper face. <Ref. to EI-12 REMOVAL, Front Bumper.>
5) Remove headlights. <Ref. to LI-42 REMOVAL, Headlight Assembly.>
6) Remove bolts to remove front fender.



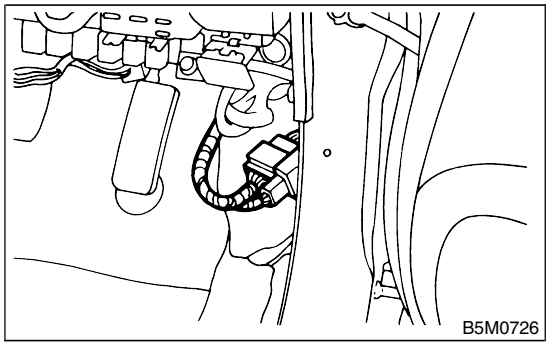
B: INSTALLATION S913368A11

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.

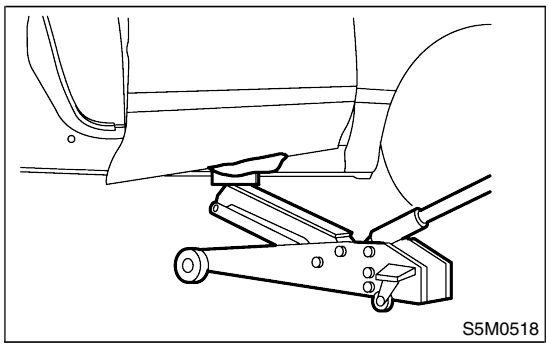
4. Front Door Panel S913366

A: REMOVAL S913366A18

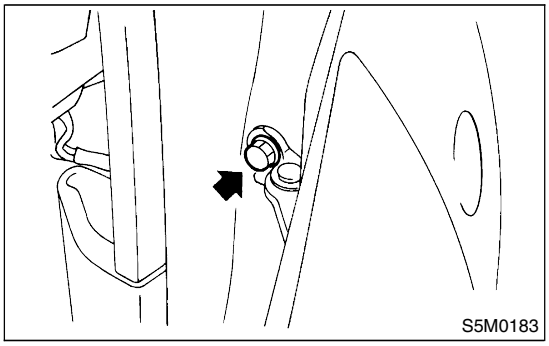
1) Disconnect (–) cable from battery.
2) Remove front door trim. <Ref. to EI-26 REMOVAL, Front Door Trim.>
3) Remove outer mirror assembly. <Ref. to GW-49 REMOVAL, Outer Mirror Assembly.>
4) Remove front door glass. <Ref. to GW-28, REMOVAL, Front Door Glass.>
5) Remove front door regulator and motor. <Ref. to GW-31 REMOVAL, Front Regulator and Motor.>
6) Remove front door latch assembly. <Ref. to SL-29 REMOVAL, Front Door Latch Assembly.>
7) Remove front outer handle. <Ref. to SL-28 REMOVAL, Front Outer Handle.>
8) Remove front pillar lower trim to disconnect connector from body harness.


B5M0726

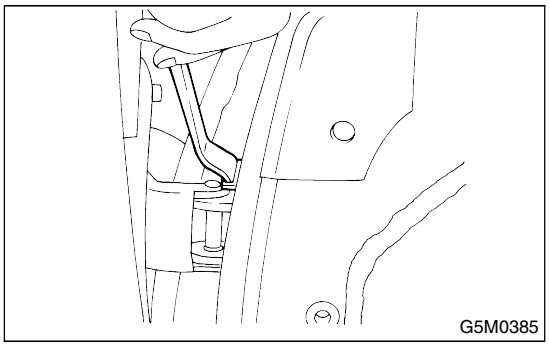
9) Put wooden block on jack and place jack under door. Support door with a jack to protect it from damage.


S5M0518

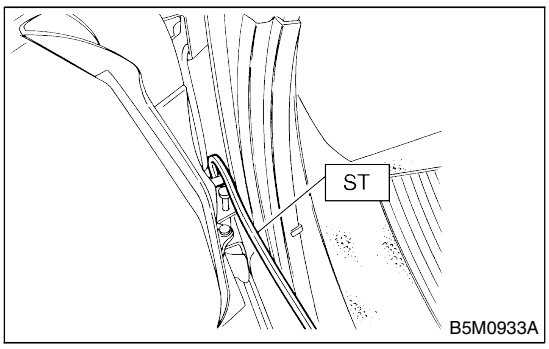
10) Remove checker bolts.


S5M0183

11) Remove door-side bolts for upper and lower hinges to remove door.


G5M0385

12) Using special tool, remove body-side bolts for upper and lower hinges, and remove door hinges.
ST 925610000 DOOR HINGE WRENCH



B5M0933A

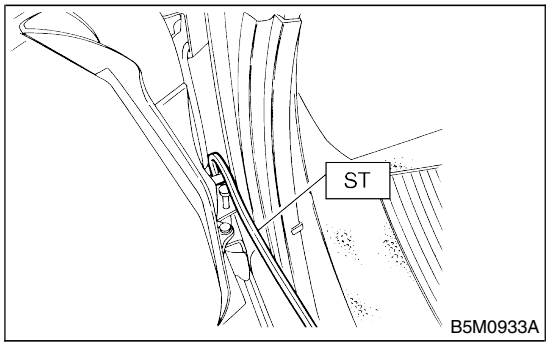
CAUTION:
• During removal and installation of doors, do not damage body.
• Doors are heavy. Be careful not to drop and damage them.

B: INSTALLATION S913366A11

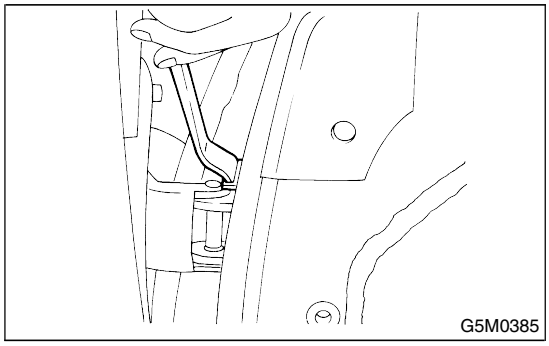
1) Install in the reverse order of removal.
2) Apply grease to sliding area of door hinges.

C: ADJUSTMENT S913366A01

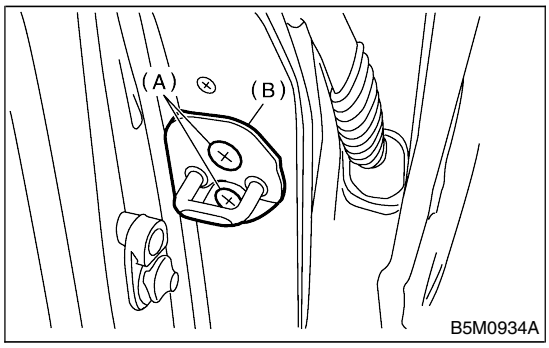
1) Using special tool, loosen body-side bolts of upper and lower hinges to align the position of front door panel longitudinally and vertically.
ST 925610000 DOOR HINGE WRENCH



2) Loosen door-side bolts of upper and lower hinges to align the position of front door panel vertically and laterally at the front end.



3) 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.



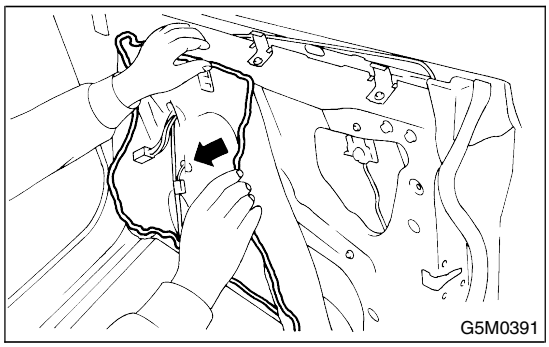
CAUTION:
Do not use impact wrench. Welding area on striker nut plate is easily broken.

5. Front Sealing Cover S913564

A: REMOVAL S913564A18

1) Remove front door trim. <Ref. to EI-26 REMOVAl, Front Door Trim.>
2) Remove front speaker. <Ref. to EI-12 REMOVAL, Front Speaker.>
3) Using a spatula, remove sealer.

CAUTION:
• Carefully remove sealer. Excessive force will easily break the cover.
• If cover gets broken, replace it with a new one.



B: INSTALLATION S913564A11

1) Install in the reverse order of removal.
2) When replacing sealing cover, use CEMEDINE 5430L sealer.
3) Press sealer-applied area firmly to prevent any floating on surface.

Sealer:
CEMEDINE 5430L or equivalent

CAUTION:
• Apply a uniform bead of sealer.
• Attach sealing cover, keeping it from becoming wrinkled.
• Breaks in the bead will allow water leakage and contamination.

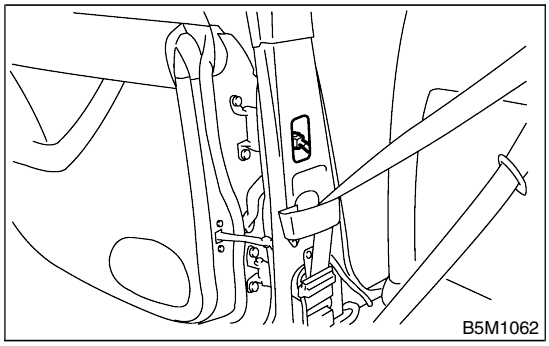
C: INSPECTION S913564A10

If sealing cover is damaged, replace it with a new one.

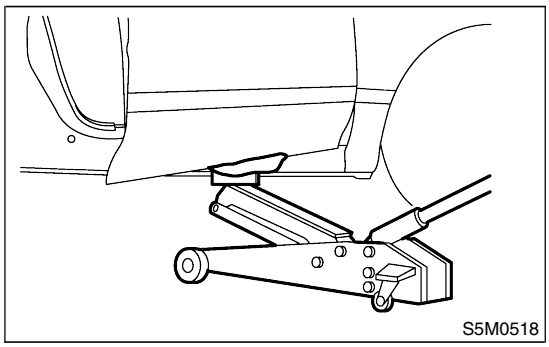
6. Rear Door Panel S913364

A: REMOVAL S913364A18

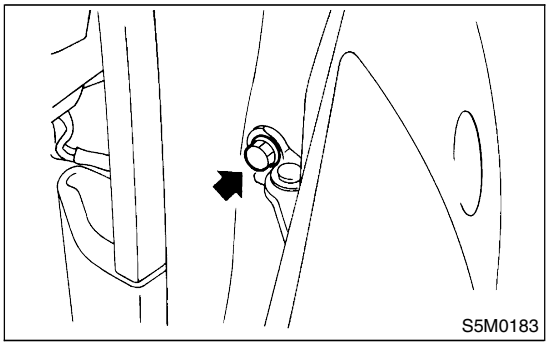
1) Disconnect (–) cable from battery.
2) Remove rear door trim. <Ref. to EI-27 REMOVAL, Rear Door Trim.>
3) Remove rear door glass. <Ref. to GW-32, REMOVAL, Rear Door Glass.>
4) Remove rear door regulator and motor assembly. <Ref. to GW-34 REMOVAL, Rear Regulator and Motor Assembly.>
5) Remove rear outer handle. <Ref. to SL-32 REMOVAL, Rear Outer Handle.>
6) Remove center pillar lower trim. <Ref. to EI-38 REMOVAL, Lower Inner Trim.>
7) Remove seatbelt bracket and blind plug.
Disconnect connector of door harness and remove door hinge nut.


B5M1062

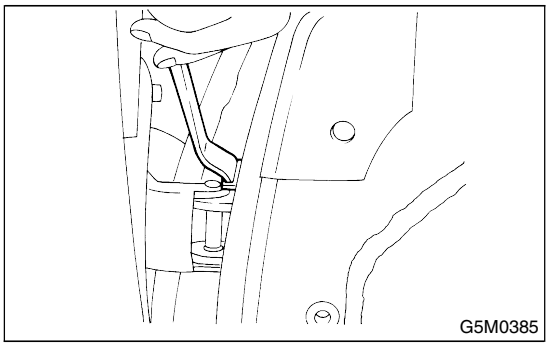
8) Put a wooden block on the jack and place the jack under the door. Support the door with the jack to protect it.


S5M0518

9) Remove checker bolts.


S5M0183

10) Remove door-side bolts for upper and lower hinges to remove door.


G5M0385

11) Using special tool, remove body-side bolts for upper and lower hinges, and remove door hinges.

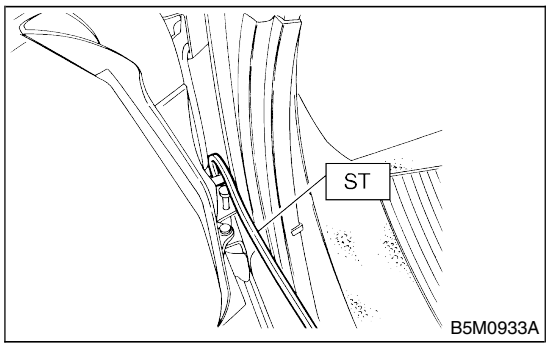
CAUTION:
- **During removal and installation of doors, do not damage body.**
- **Doors are heavy. Be careful not to drop and damage them.**

B: INSTALLATION S913364A11

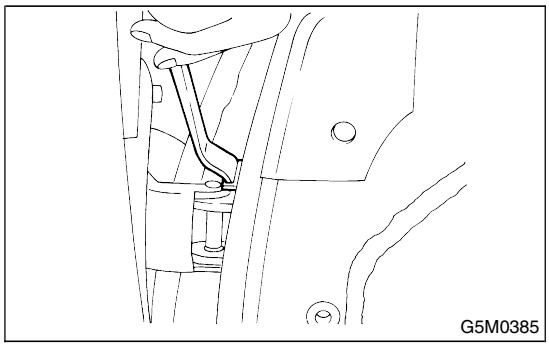
1) Install in the reverse order of removal.
2) Apply grease to sliding area of door hinges.

C: ADJUSTMENT S913364A01

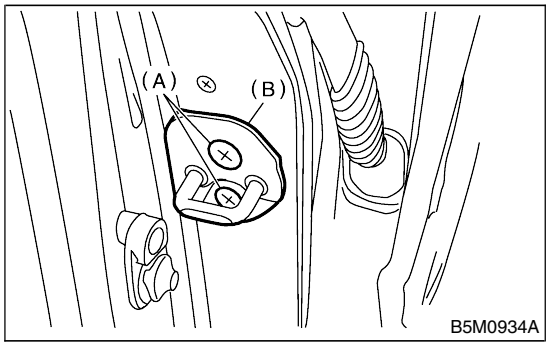
1) Using special tool, loosen body-side bolts of upper and lower hinges to align the position of rear door panel longitudinally and vertically.



2) Loosen door-side bolts of upper and lower hinges to align the position of rear door panel vertically and laterally at front-end.



3) 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.



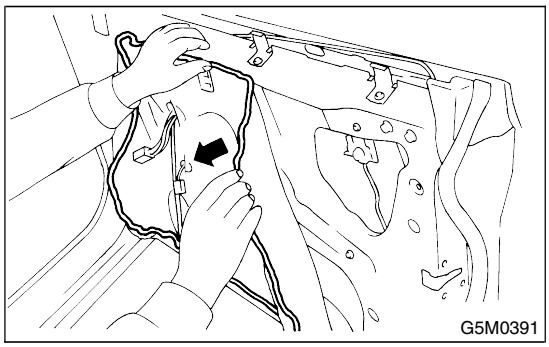
CAUTION:
Do not use an impact wrench. The welding area on the striker nut plate is easily broken.

7. Rear Sealing Cover S913565

A: REMOVAL S913565A18

1) Remove rear door trim. <Ref. to EI-27 REMOVAL, Rear Door Trim.>
2) Remove rear speaker. <Ref. to ET-13 REMOVAL, Rear Speaker.>
3) Using a spatula, remove sealer.

CAUTION:
• Carefully remove sealer. Excessive force will easily break the cover.
• If cover gets broken, replace it with a new one.



B: INSTALLATION S913565A11

1) Install in the reverse order of removal.
2) When replacing sealing cover, use CEMEDINE 5430L sealer.
3) Press sealer-applied area firmly to prevent any floating on surface.

Sealer:
CEMEDINE 5430L or equivalent

CAUTION:
• Apply an uniform bead of sealer.
• Attach sealing cover, keeping it from becoming wrinkled.
• Breaks in the bead will allow water leakage and contamination.

C: INSPECTION S913565A10

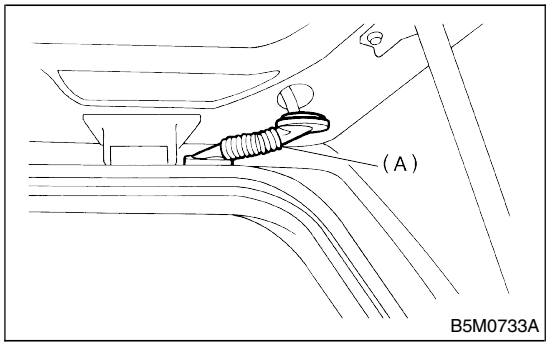
If sealing cover gets damaged, replace it with a new one.

8. Rear Gate Panel S913363

A: REMOVAL S913363A18

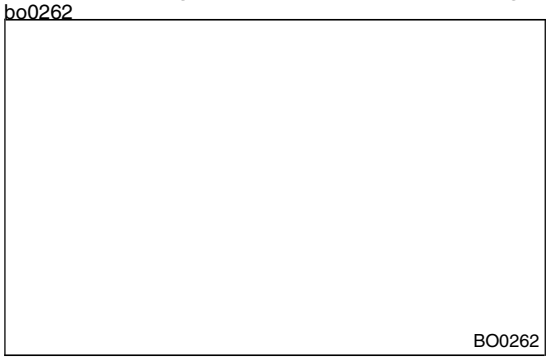
1. REAR GATE PANEL S913363A1801

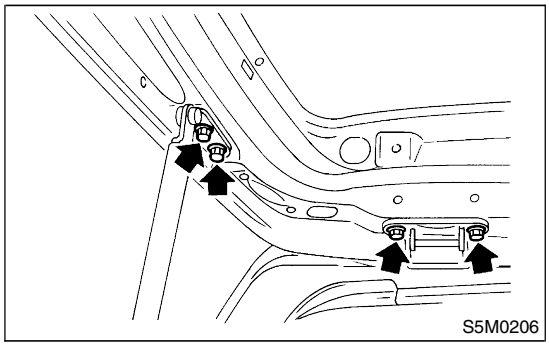
1) Open rear gate.
2) Remove rear gate outer handle. <Ref. to SL-35 REMOVAL, Rear Gate Outer Handle.>
3) Remove rear gate latch assembly. <Ref. to SL-36 REMOVAL, Rear Gate Latch Assembly.>
4) Remove rear gate key lock cylinders. <Ref. to SL-41 REMOVAL, Key Lock Cylinders.>
5) Remove rear wiper. <Ref. to WW-20 REMOVAL, Rear Wiper Motor.>
6) Disconnect connectors of rear wiper, rear defogger, and other lighting devices.
7) Disconnect washer hose.
8) Remove rubber duct (A) connection, and pull out harness and washer hose from rear gate.



B5M0733A

9) Using a support, support the rear gate while removing gas stay mounting bolts.
10) Loosen rear gate bolts to remove rear gate.

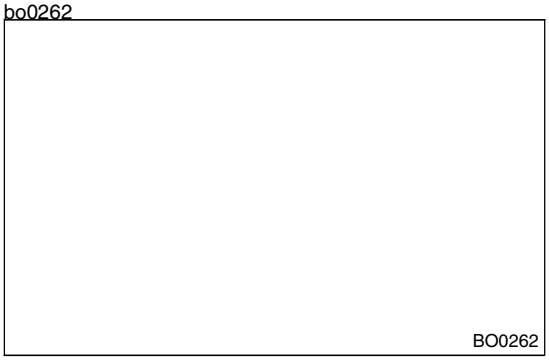
bo0262

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

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.**

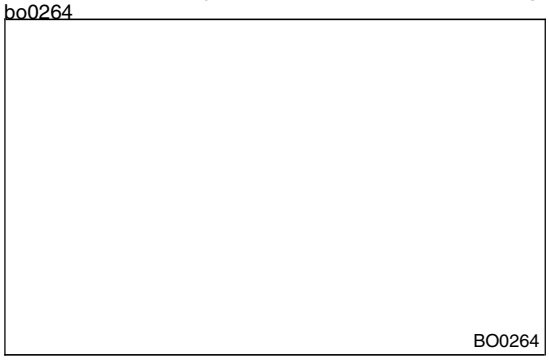
C: DISPOSAL S913363A07

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.

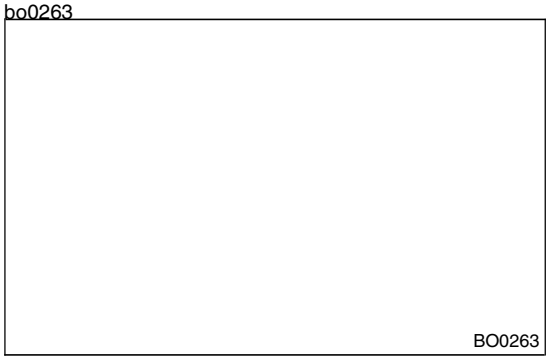
bo0264



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.

bo0263



CRUISE CONTROL SYSTEM

CC

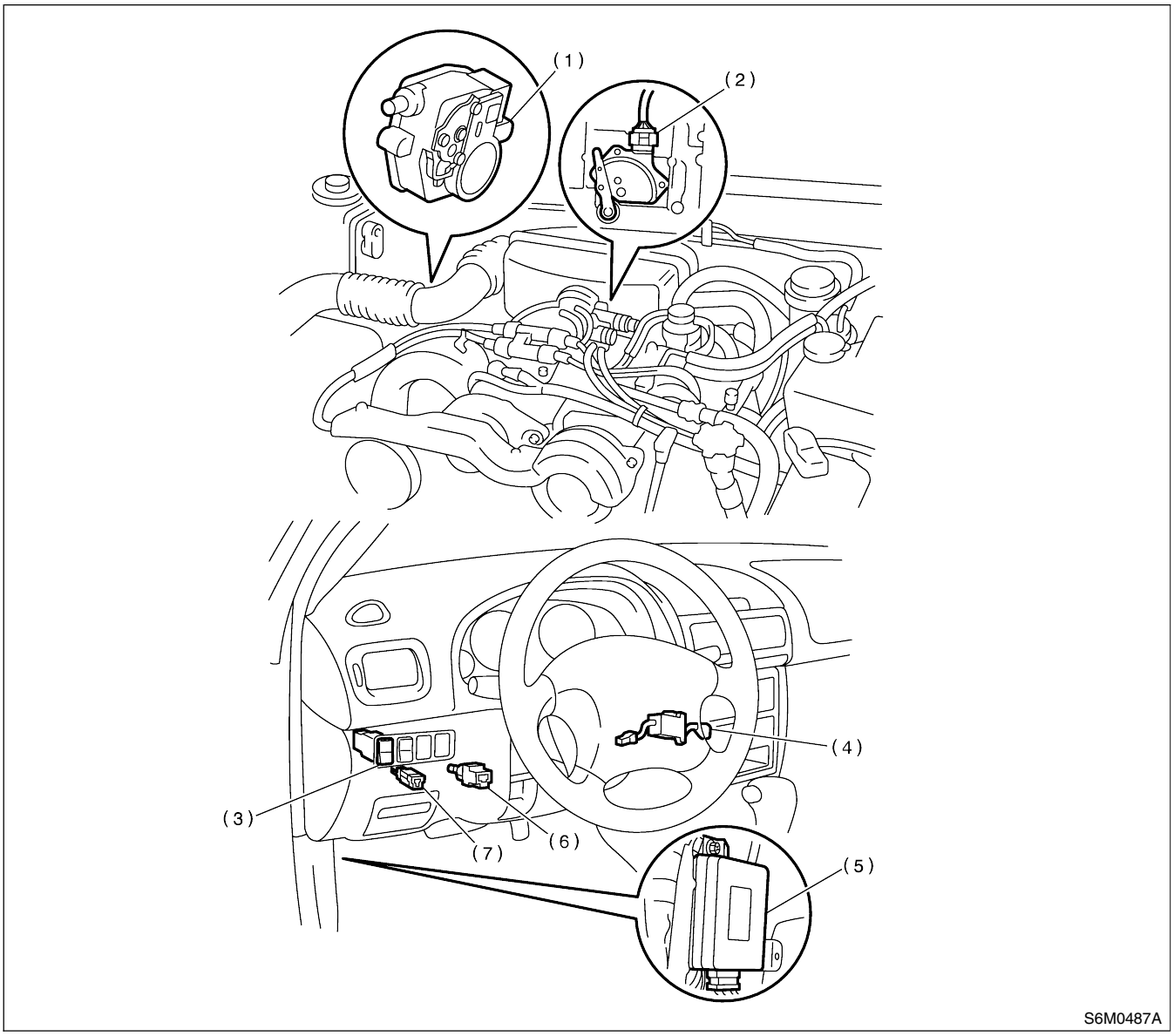
Page

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2. Actuator (Turbo Model) 5
3. Actuator (Non-turbo Model)....7
4. Cruise Control Module 8
5. Cruise Control Main Switch....9
6. Cruise Control Command Switch....10
7. Stop and Brake Switch....11
8. Clutch Switch....12
9. Inhibitor Switch....13

1. General Description S912001

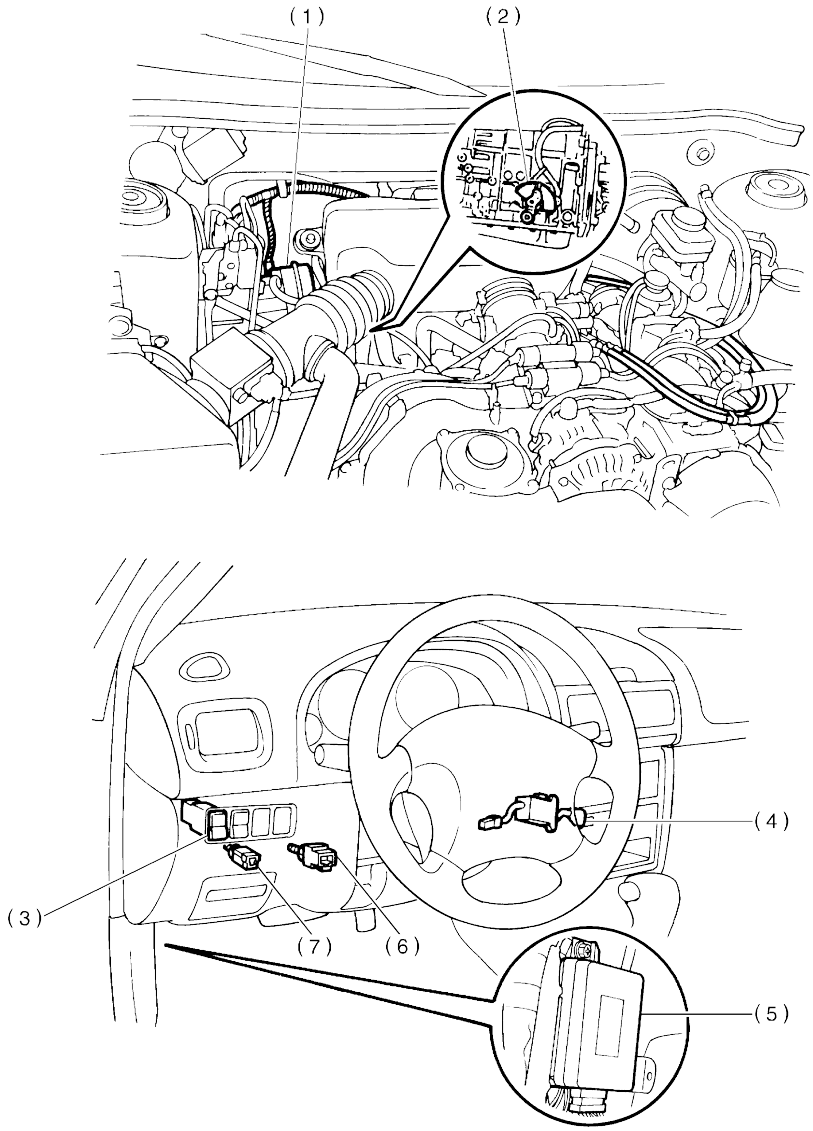
A: COMPONENT S912001A05

1. TURBO MODEL S912001A0501



(1) Actuator
(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)

2. NON-TURBO MODEL S912001A0502



(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)

NOTE:
Electrical component location are for LHD vehicles. Cruise control actuator and cruise control module location for RHD vehicles are symmetrically opposite.

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

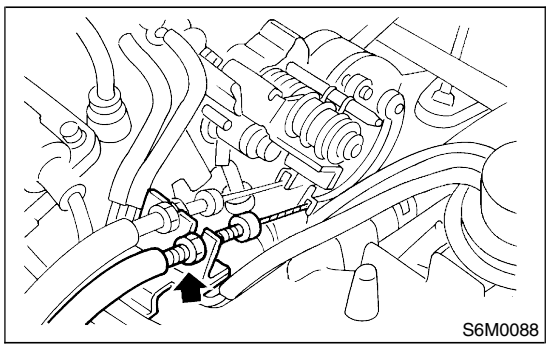
TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance and voltage.

2. Actuator (Turbo Model) S912753

A: REMOVAL S912753A18

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) Remove clip bands from cruise control cable.
2) Loosen nut which secures cruise control cable end to throttle cam and then remove cable from throttle cam.


S6M0088

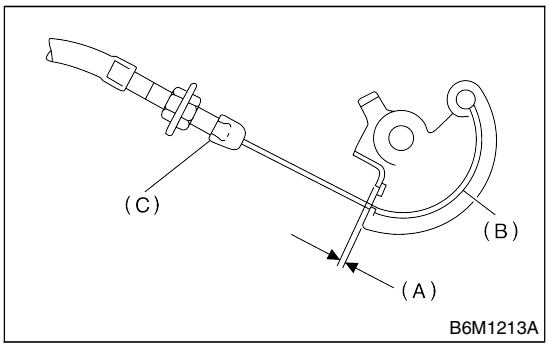
3) Remove actuator attaching bolts.
4) Remove actuator while disconnecting connector.

B: INSTALLATION S912753A11

Install in the reverse order of removal.

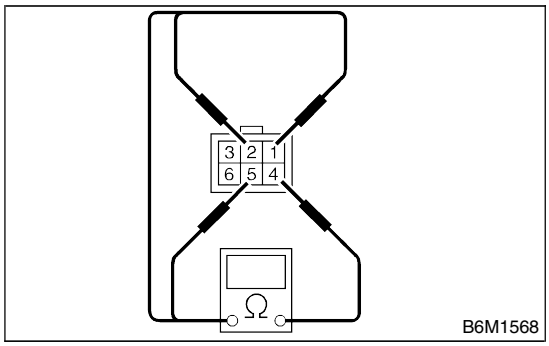
Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)

NOTE:
(A): Must be adjusted when cable end outer is fixed in place, so that gap between throttle cam and lever is 0 — 1 mm (0 — 0.04 in).
(Must be attached while throttle cam is being pulled by wire cable.)
(B): Must be coated evenly on cam end inner connection.
(C): Cover must be inserted securely, until tip of cable touches cover stopper.



B6M1213A

C: INSPECTION S912753A10



Measure resistance between cruise control actuator terminals.

Tester connection	Resistance (Ω)
4 — 1	Approx. 5
4 — 2	Approx. 5
4 — 5	Approx. 5
3 — 6	Approx. 39

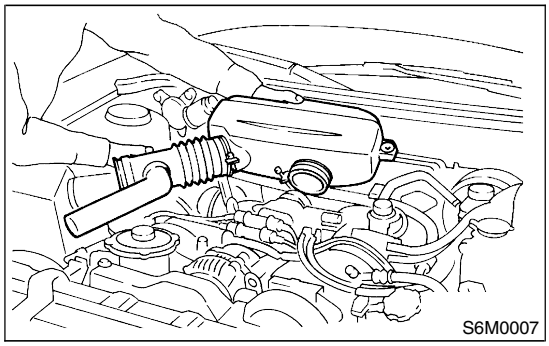
If NG, replace cruise control actuator.

3. Actuator (Non-turbo Model)

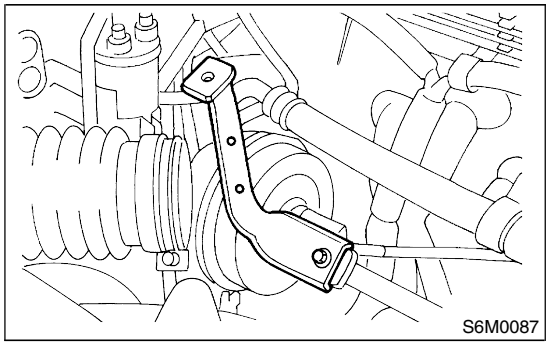
S912754

A: REMOVAL S912754A18

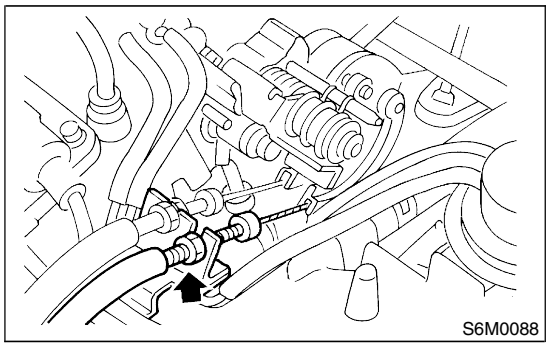
1) Remove air intake chamber.


S6M0007

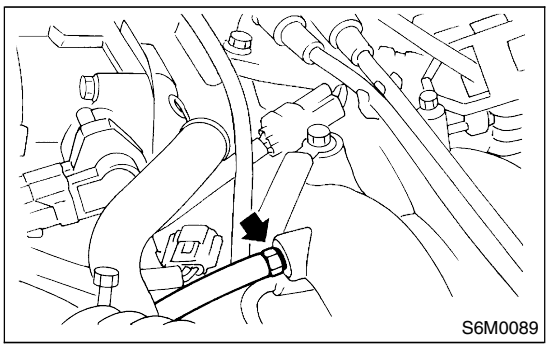
2) Remove air intake chamber stay.
3) Remove clip bands from cruise control cable.


S6M0087

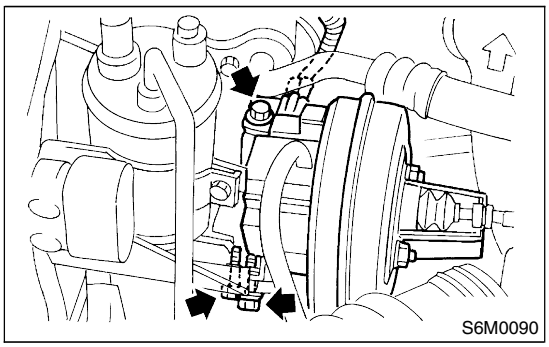
4) Remove cruise control cable end from throttle cam.


S6M0088

5) Disconnect cruise control vacuum hose from intake manifold.


S6M0089

6) Remove actuator attaching bolts.
7) Disconnect connector from actuator, then remove the actuator.


S6M0090

B: INSTALLATION S912754A11

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.

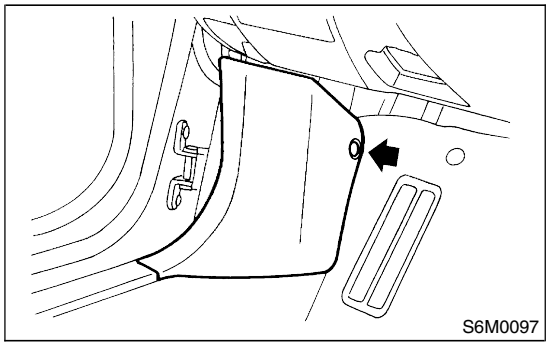
Fluid packing:
THREE BOND 1105 or equivalent

CAUTION:
• Be careful not to apply excessive load to the wire cable when adjusting and/or installing; otherwise, the actuator may be deformed or damaged.
• Do not bend cable sharply with a radius less than 100 mm (3.94 in); otherwise, cable may bend permanently, resulting in poor performance.
• When installing cable, be careful not to sharply bend or pinch the inner cable; otherwise, the cable may break.

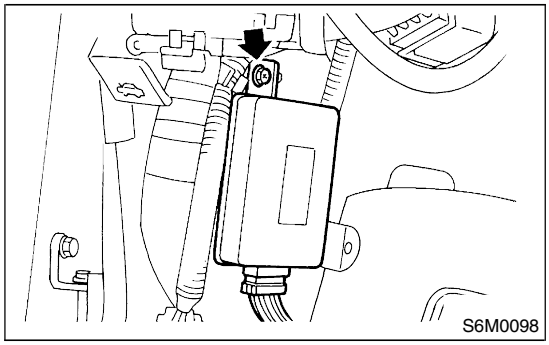
4. Cruise Control Module S912500

A: REMOVAL S912500A18

1) Remove front pillar lower trim.



2) Disconnect connector from cruise control module.
3) Remove bolt, then remove cruise control module.



B: INSTALLATION S912500A11

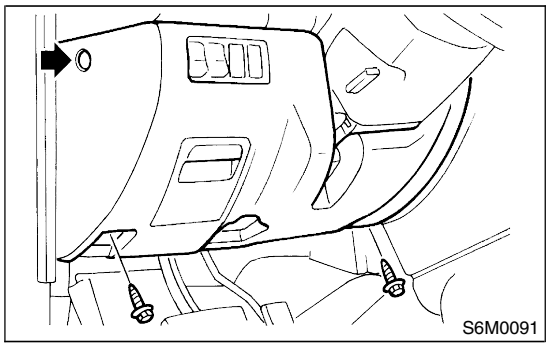
Install in the reverse order of removal.

5. Cruise Control Main Switch

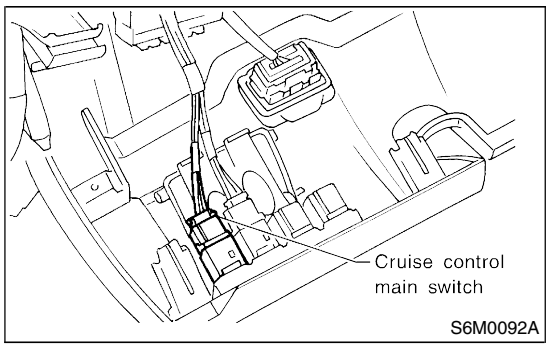
S912498

A: REMOVAL S912498A18

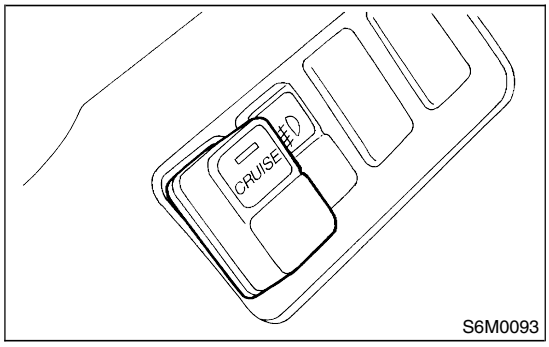
1) Remove screws and clip from instrument panel lower cover.
2) Remove panel lower cover.



3) Disconnect connector from cruise control main switch.



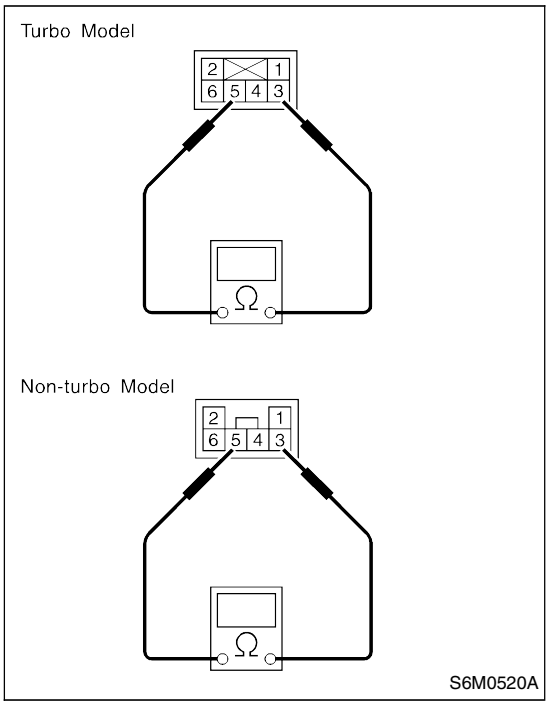
4) Remove main switch by pushing it outward.



B: INSTALLATION S912498A11

Install in the reverse order of removal.

C: INSPECTION S912498A10



Check continuity between cruise control main switch terminals.

Switch position	Tester connection	Specified condition
OFF	3 — 5	No continuity
ON	3 — 5	Continuity

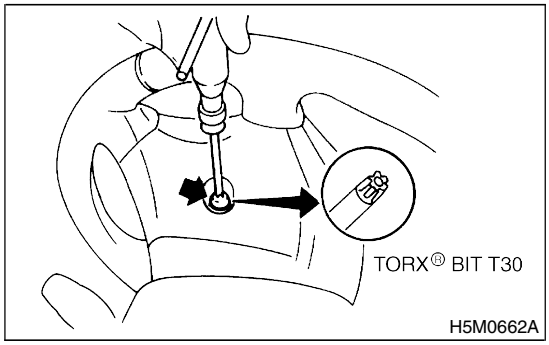
If NG, replace cruise control main switch.

6. Cruise Control Command Switch S912497

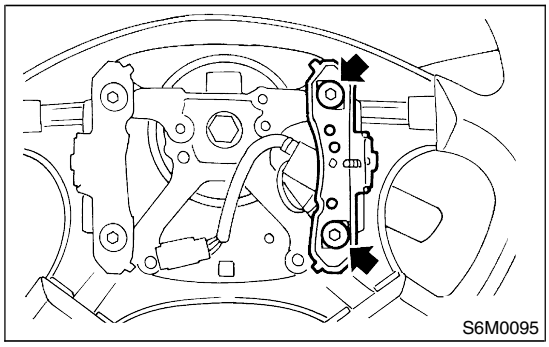
A: REMOVAL S912497A18

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.>

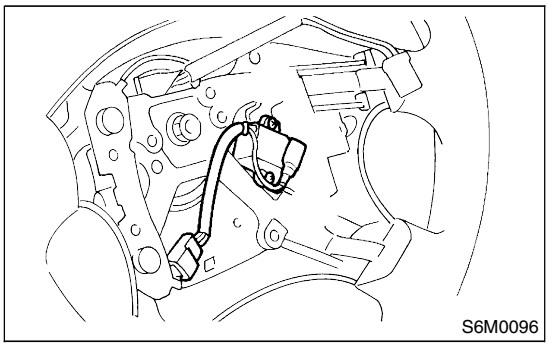
1) Set front wheels in straight ahead position.
2) Turn ignition switch OFF.
3) Disconnect battery ground cable from battery and wait for at least 20 seconds before starting work.
4) Using TORX® BIT T30 (Tamper resistant type), loosen two TORX® bolts which secure driver's airbag module.



5) Disconnect airbag module connector on back of airbag module.
6) Remove horn switch from steering wheel as shown.



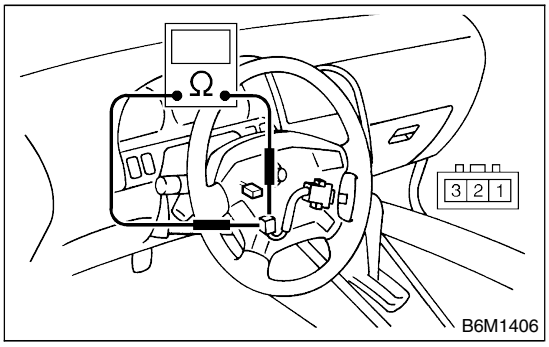
7) Disconnect horn and cruise control command switch connector, then remove cruise control command switch.



B: INSTALLATION S912497A11

Install is in the reverse order of removal.

C: INSPECTION S912497A10



Check continuity between cruise control command switch terminals.

Switch	Position	Tester connection	Specified condition
CANCEL	ON	1 (+) — 2 (–)	Continuity
	ON	1 (+) — 3 (–)	Continuity
SET/COAST	OFF	1 — 3	No continuity
	ON	1 — 3	Continuity
RESUME/ ACCEL	OFF	1 — 2	No continuity
	ON	1 — 2	Continuity

If NG, replace cruise control command switch.

7. Stop and Brake Switch S912496

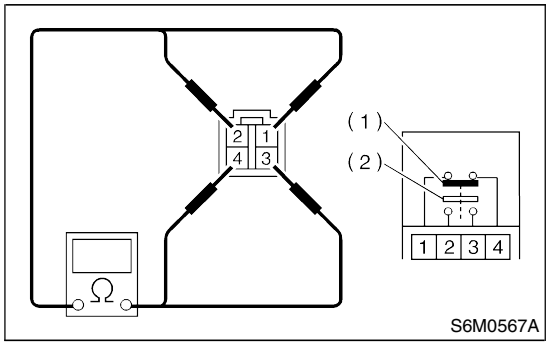
A: REMOVAL S912496A18

Disconnect connector from switch, and then remove the switch. <Ref. to BR-60 REMOVAL, Stop Light Switch.>

B: INSTALLATION S912496A11

Install in the reverse order of removal.

C: INSPECTION S912496A10



Check continuity brake switch (1) and stop light switch (2) between terminals.

Switch	Pedal	Tester connection	Specified condition
Brake	Released	1 — 4	Continuity
	Depressed	1 — 4	No continuity
Stop light	Released	2 — 3	No continuity
	Depressed	2 — 3	Continuity

If NG, replace stop and brake switch.

8. Clutch Switch S912258

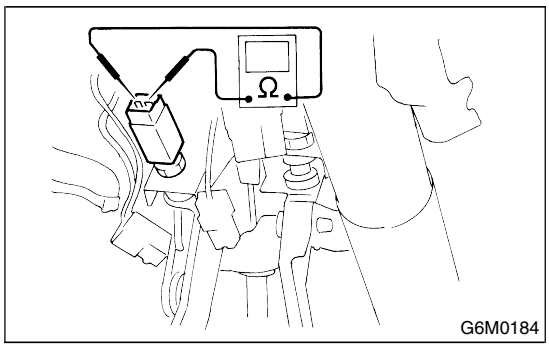
A: REMOVAL S912258A18

Disconnect the connector from the switch, and then remove the switch. <Ref. to CL-38 DISASSEMBLY, Clutch Pedal.>

B: INSTALLATION S912258A11

Install in the reverse order of removal.

C: INSPECTION S912258A10



Check continuity between clutch switch terminals.

Switch	Pedal	Tester connection	Specified condition
Clutch	Released	1 — 2	Continuity
	Depressed	1 — 2	No continuity

If NG, replace the clutch switch.

9. Inhibitor Switch S912243

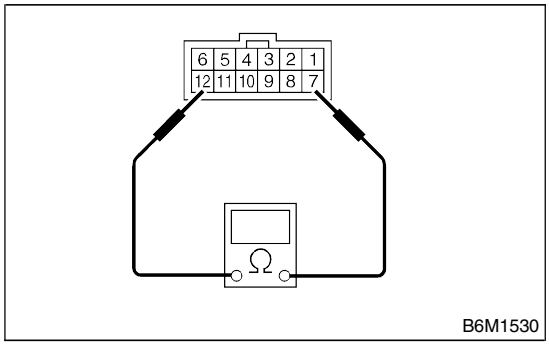
A: REMOVAL S912243A18

Disconnect connector from switch, 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



Check continuity between inhibitor switch terminals.

Selector lever position	Tester connection	Specified condition
P	7 — 12	Continuity
N		Continuity
Except P and N		No continuity

If NG, replace inhibitor switch.

MEMO:

AIRBAG SYSTEM (DIAGNOSTICS)

AB

		Page
1.	Basic Diagnostic Procedure	2
2.	Check List for Interview	3
3.	General Description	4
4.	Electrical Components Location	16
5.	A/B Control Module I/O Signal	18
6.	Airbag Connector	24
7.	Airbag Warning Light Illumination Pattern	26
8.	Read Diagnostic Trouble Code	27
9.	Inspection Mode	28
10.	Clear Memory Mode	29
11.	Airbag Warning Light Failure	30
12.	List of Diagnostic Trouble Code	36
13.	Diagnostic Chart with Trouble Code	39

1. Basic Diagnostic Procedure

S002627

A: PROCEDURE S002501E45

No.	Step	Check	Yes	No
1	**Read Diagnostic Trouble Code.** <Ref. to AB-27 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-27 Read Diagnostics Trouble Code.>	Is the trouble code being detected?	Go to step **3**.	Go to “Airbag Warning Light Failure”. <Ref. to AB-30 Airbag Warning Light Failure.>
3	**Perform the diagnosis.** 1) Judge the possible cause from “List of Diagnostic Trouble Code” <Ref. to AB-36 List of Diagnostic Trouble Code.>. 2) Inspect using “Diagnostic Chart with Trouble Code”. (DTC) 3) Repair the cause of the trouble. 4) Perform the clear memory mode. <Ref. to AB-29 Clear Memory Mode.> 5) Perform the inspection mode. <Ref. to AB-28 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

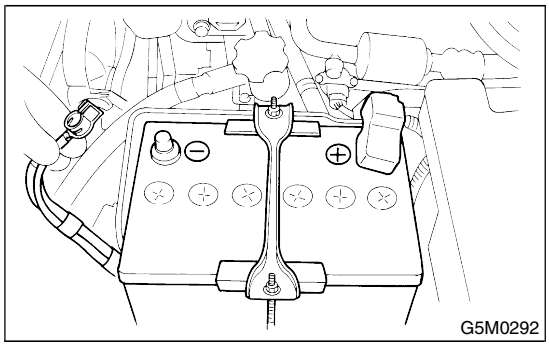
A: CHECK S002502A04

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:)		

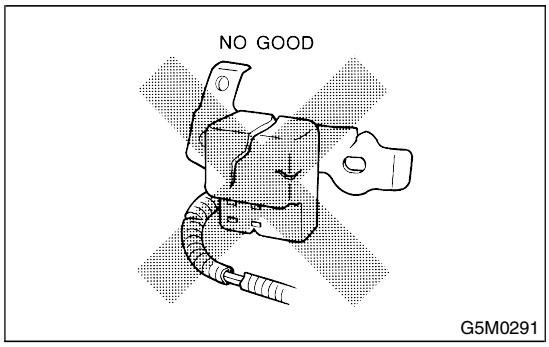
3. General Description S002001

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

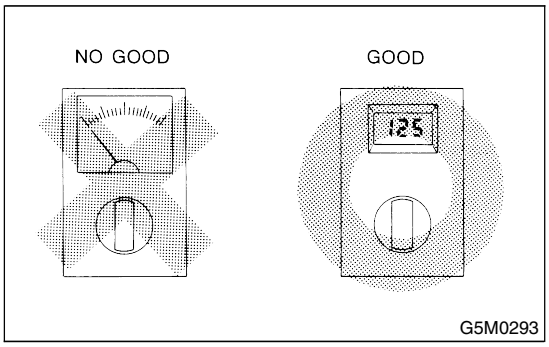
- If sensors, airbag module, airbag control module and harness are deformed or damaged, replace them with new genuine parts.
- Do not use the airbag system on other vehicles. When replacing parts, be sure to replace them with new parts.



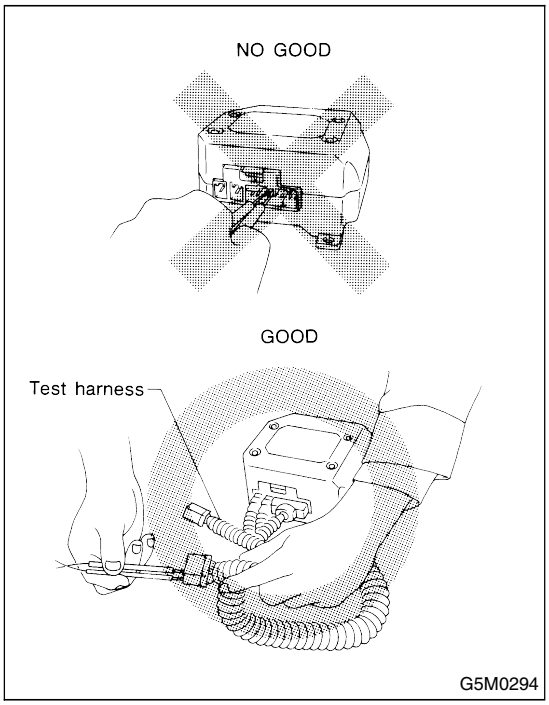
G5M0291

- 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.

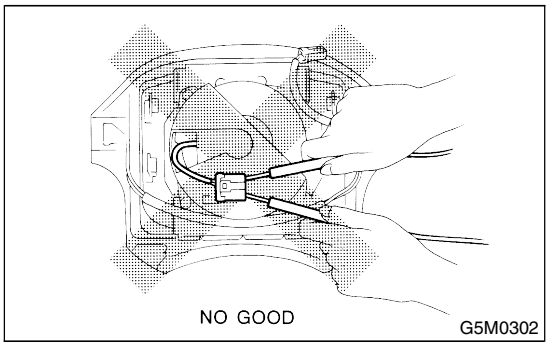


G5M0293



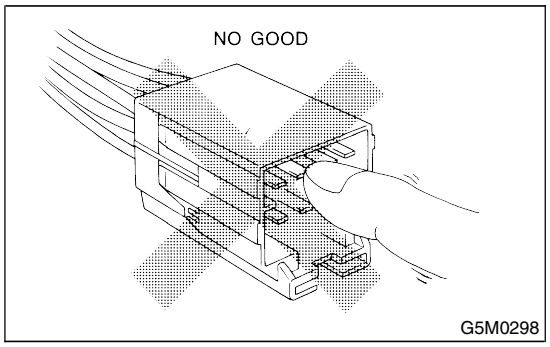
G5M0294

- Do not check continuity of the airbag module (driver, passenger, and side).

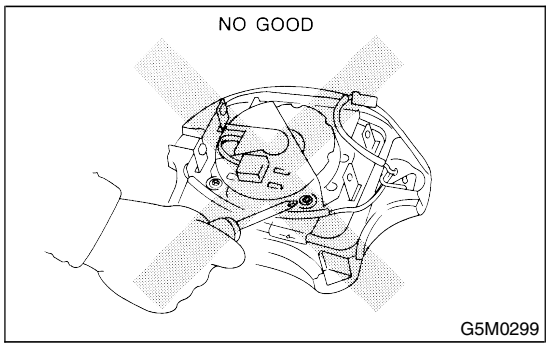


G5M0302

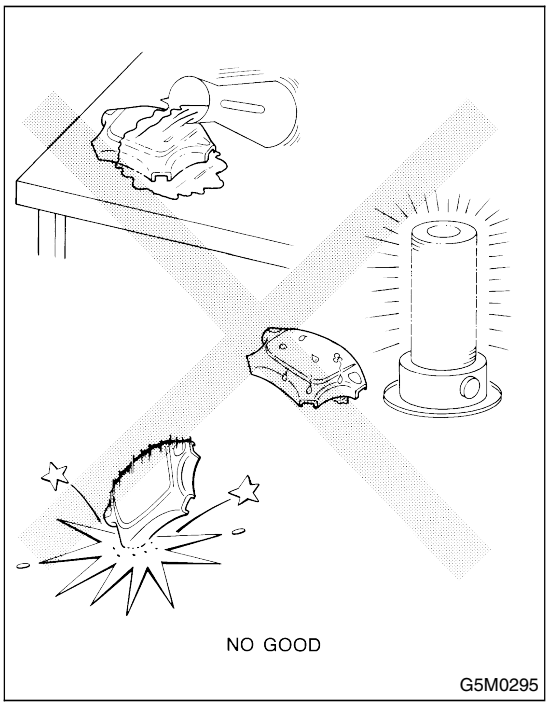
● Do not allow water or oil to come in contact with the connector terminals. Do not touch the connector terminals.



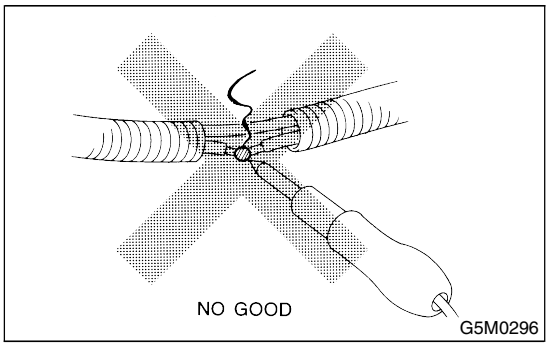
● The airbag module (driver, passenger, and side) must not be disassembled.
● The airbag module cannot be used again once inflated.



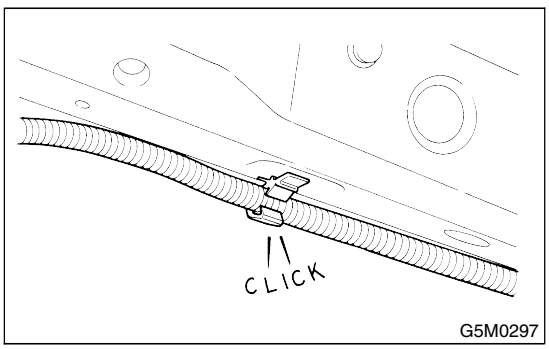
● Do not drop the airbag modulator parts, subject them to high temperature over 93°C (199°F), or let water, oil, or grease get on them; otherwise, the internal parts may be damaged and reliability greatly lowered.



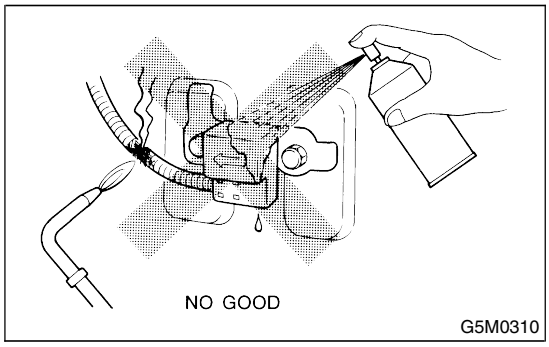
● If any damage, opening or rust is found on the airbag system wire harness, do not attempt to repair using soldering equipment. Be sure to replace the faulty harness with a new genuine part.



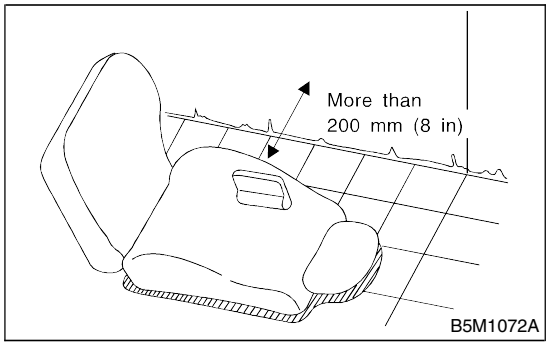
● Install the wire harness securely with the specified clips to avoid interference or tangled up with other parts.



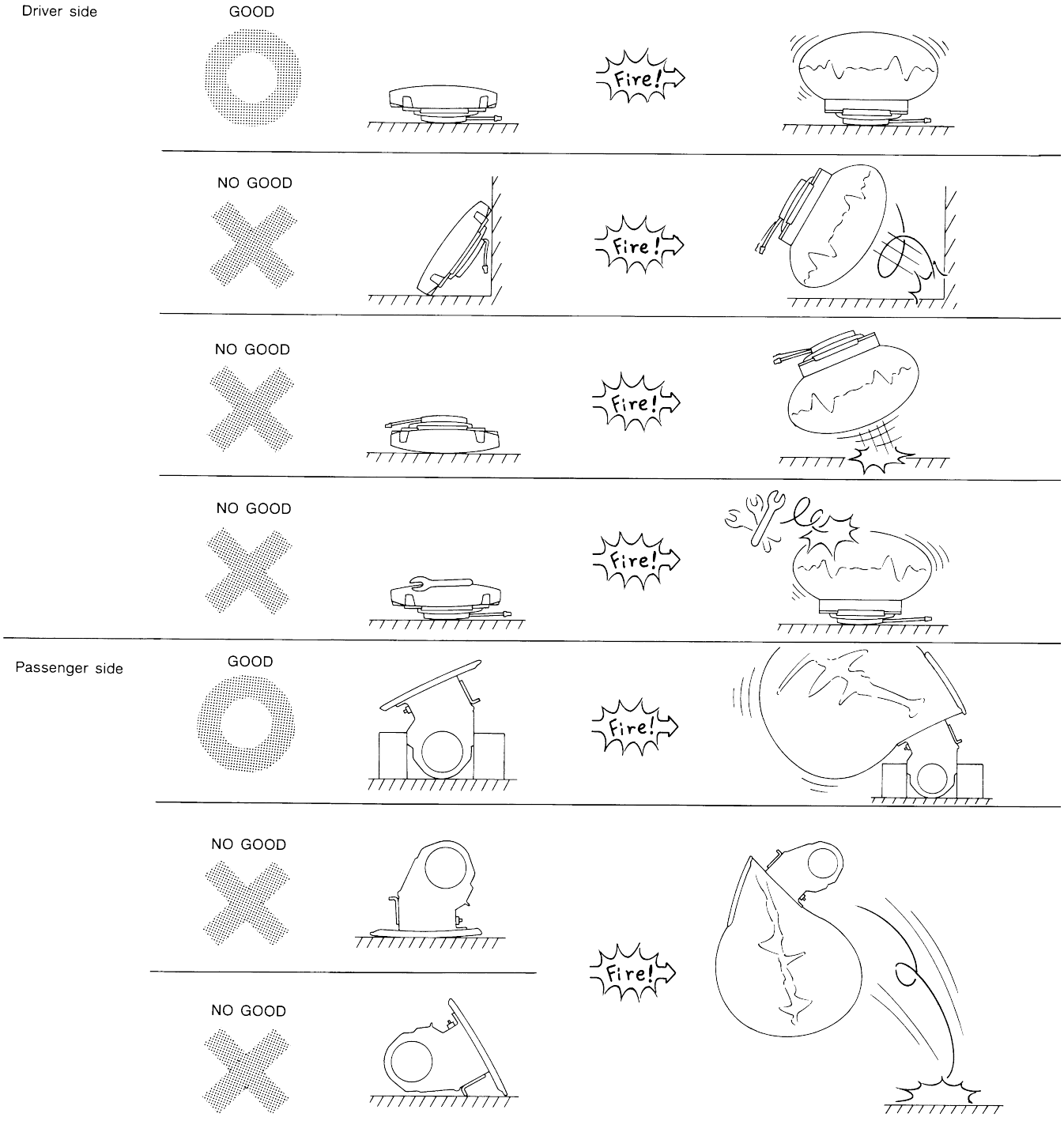
● When painting or performing sheet metal work on the front part of the vehicle, including the front wheel apron, front fender, and front side frame, remove the front sub sensors and wire harness of the airbag system.
● When painting or performing sheet metal work on the side of the vehicle, including the side sill, center pillar, and front and rear doors, remove the side airbag sensors and wire harness of the airbag system.



● The removed front seat with the airbag module must be kept at least 200 mm (8 in) away from walls and other objects.



● 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
Fire!
NO GOOD

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

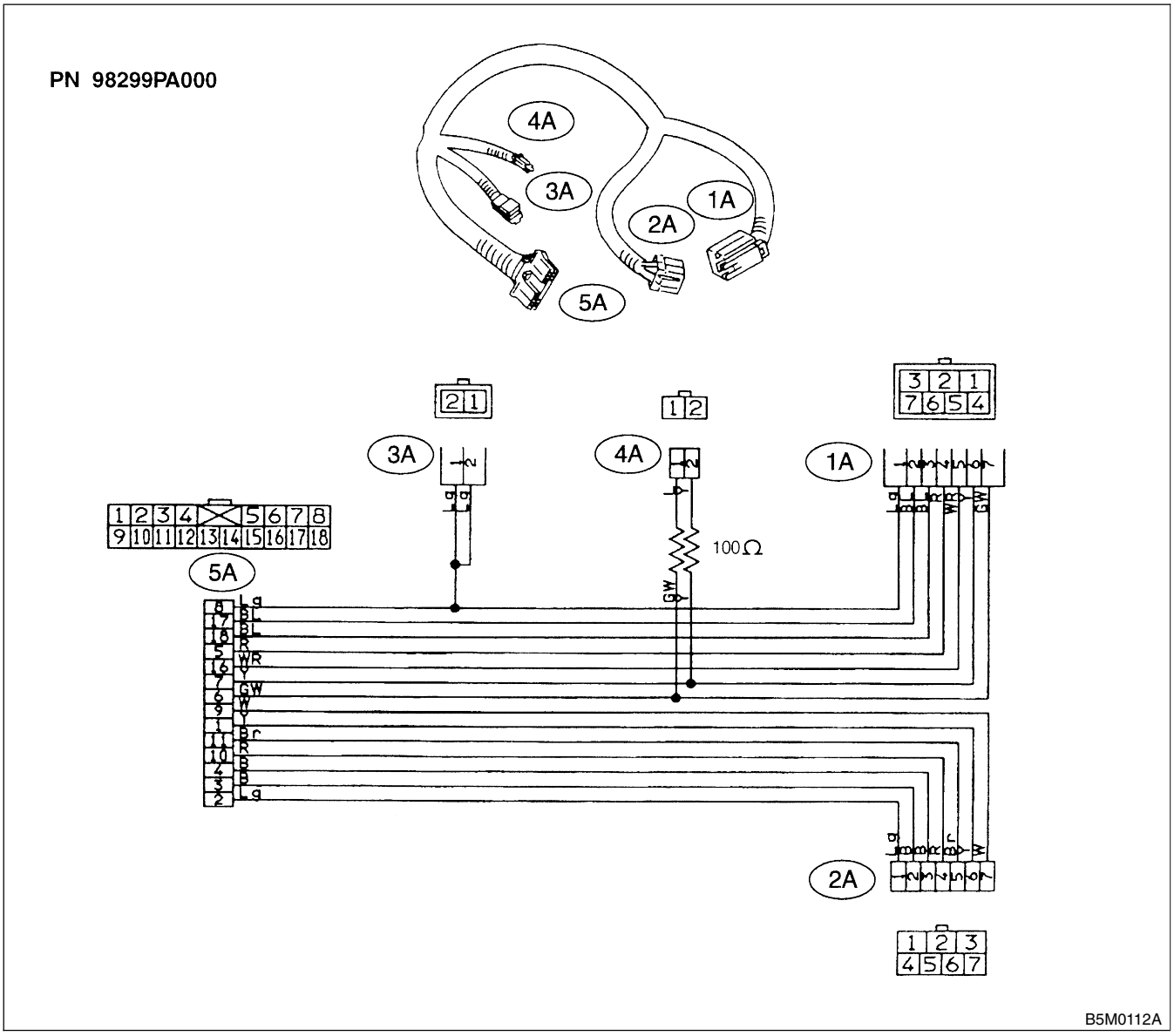
Specific gravity: Above 1.260

C: PREPARATION TOOL S002001A17

CAUTION:
Be sure to use specified test harness A, F, G, H and I or I2 when measuring voltage, resistance, etc. of AIRBAG system component parts.

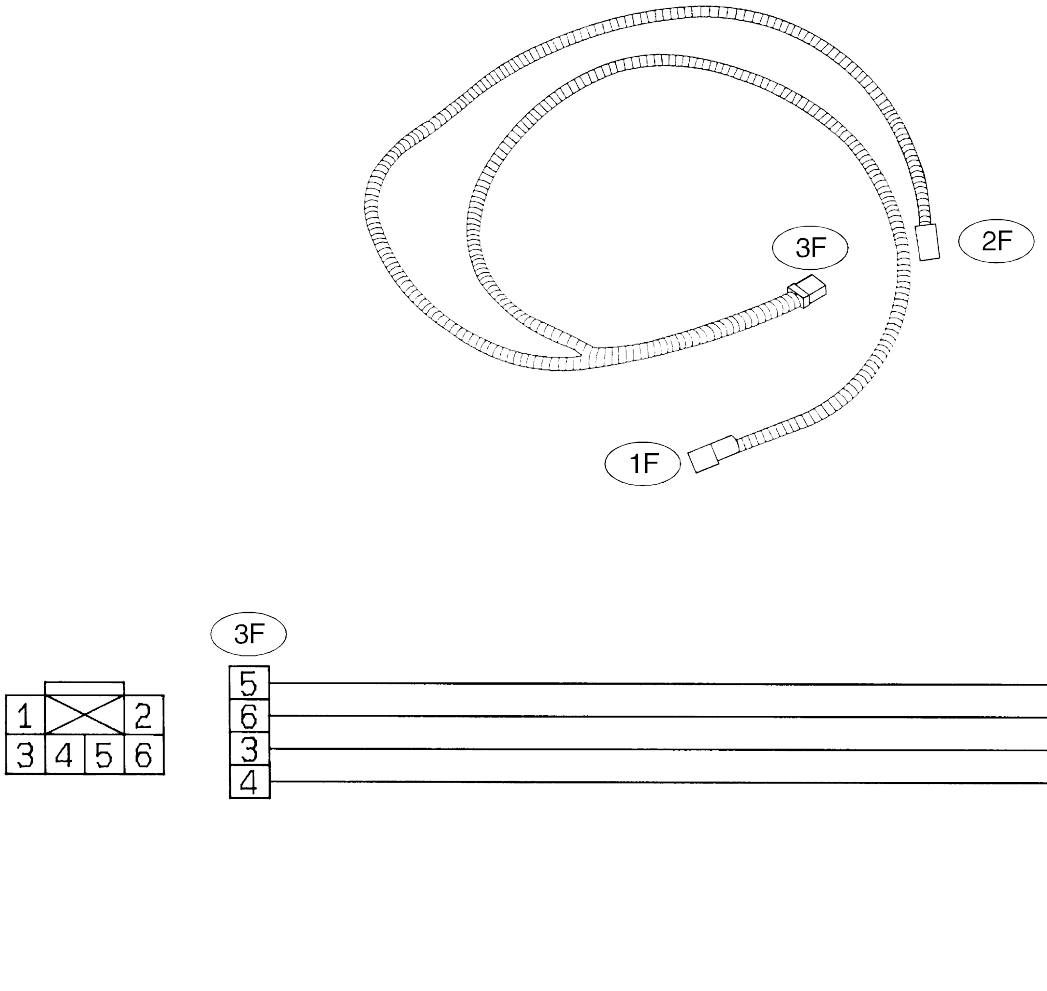
1. TEST HARNESS A S002001A1701

PN 98299PA000



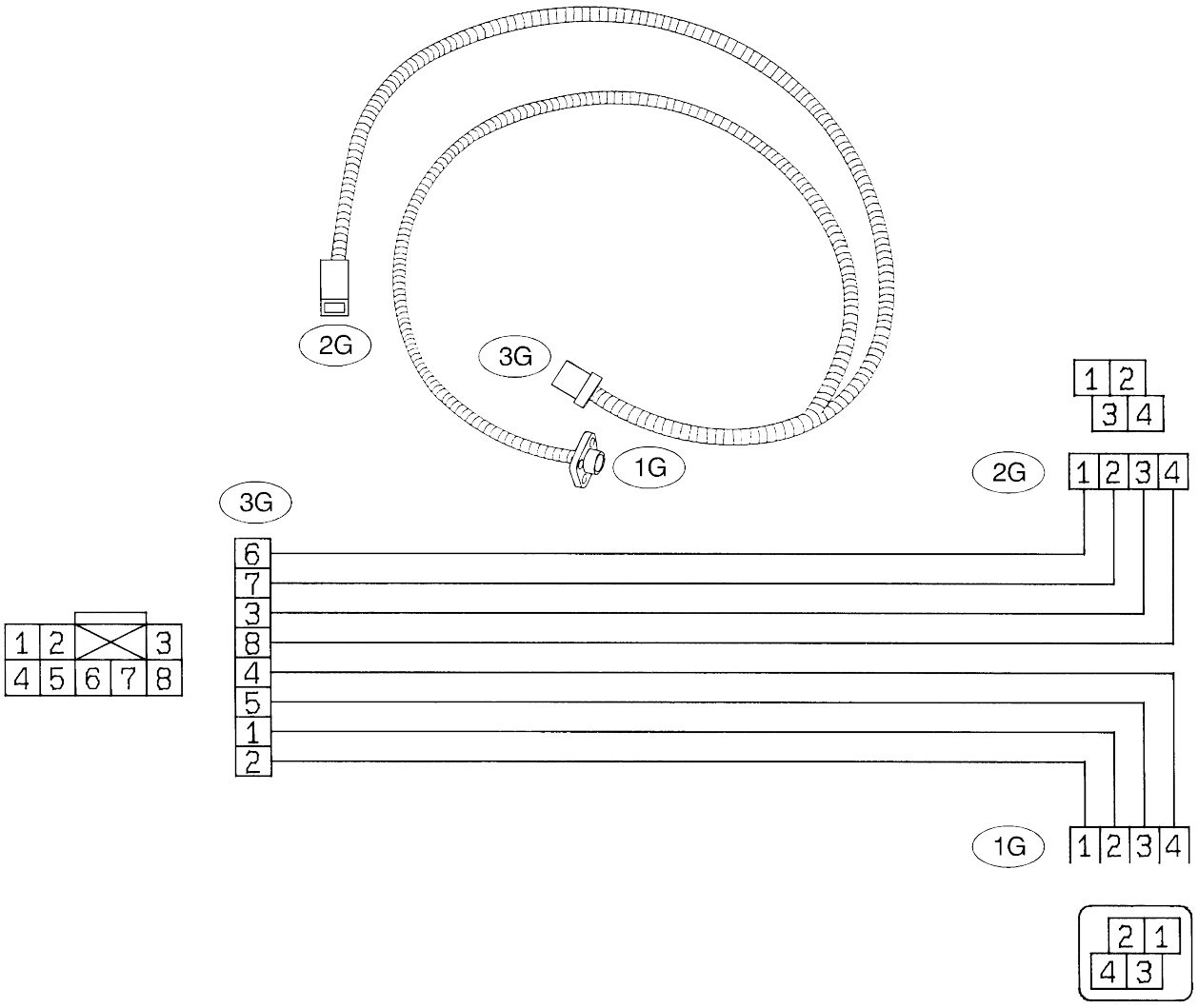
2. TEST HARNESS F S002001A1702

PN 98299FC010



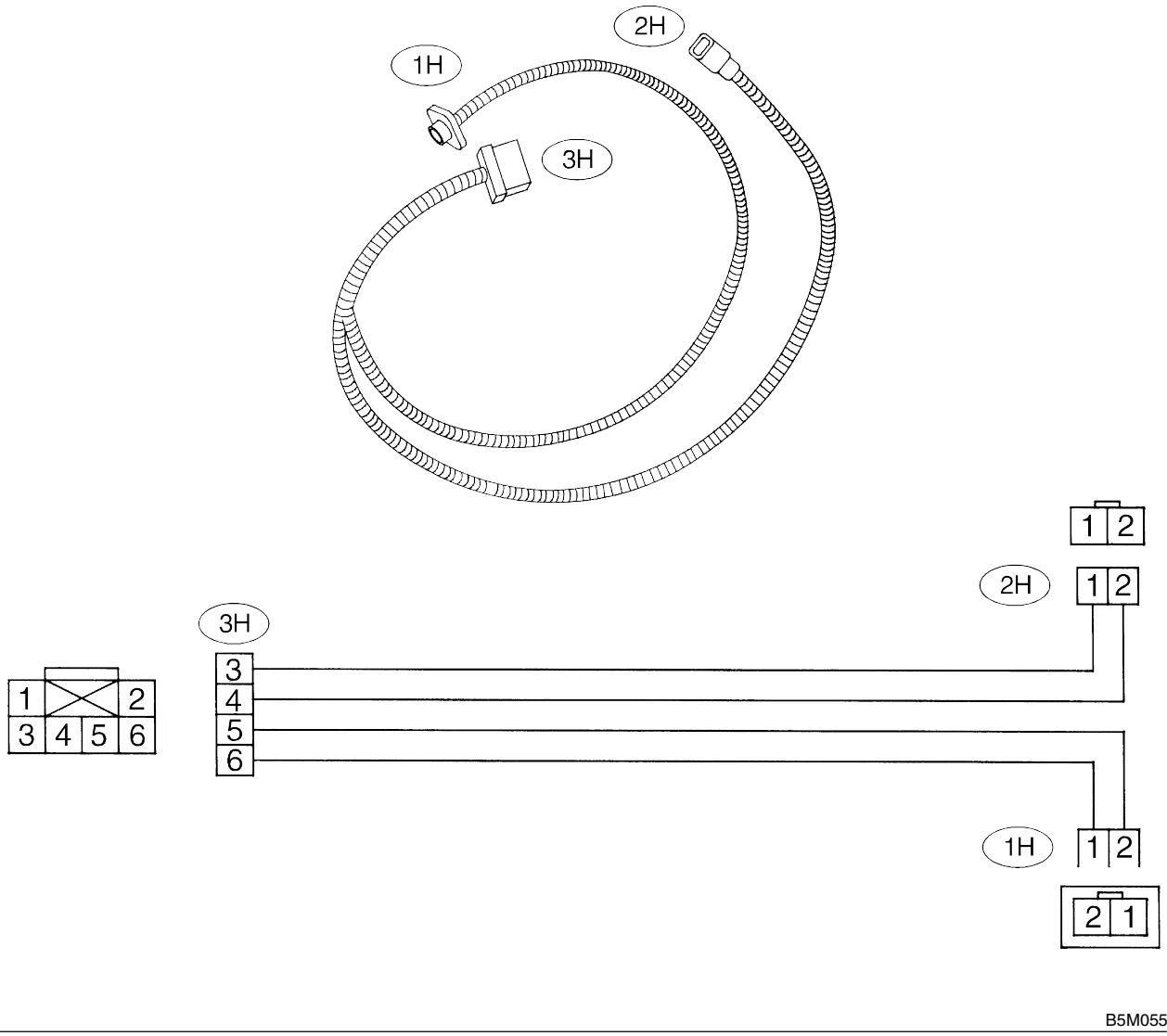
3. TEST HARNESS G S002001A1703

PN 98299FC020



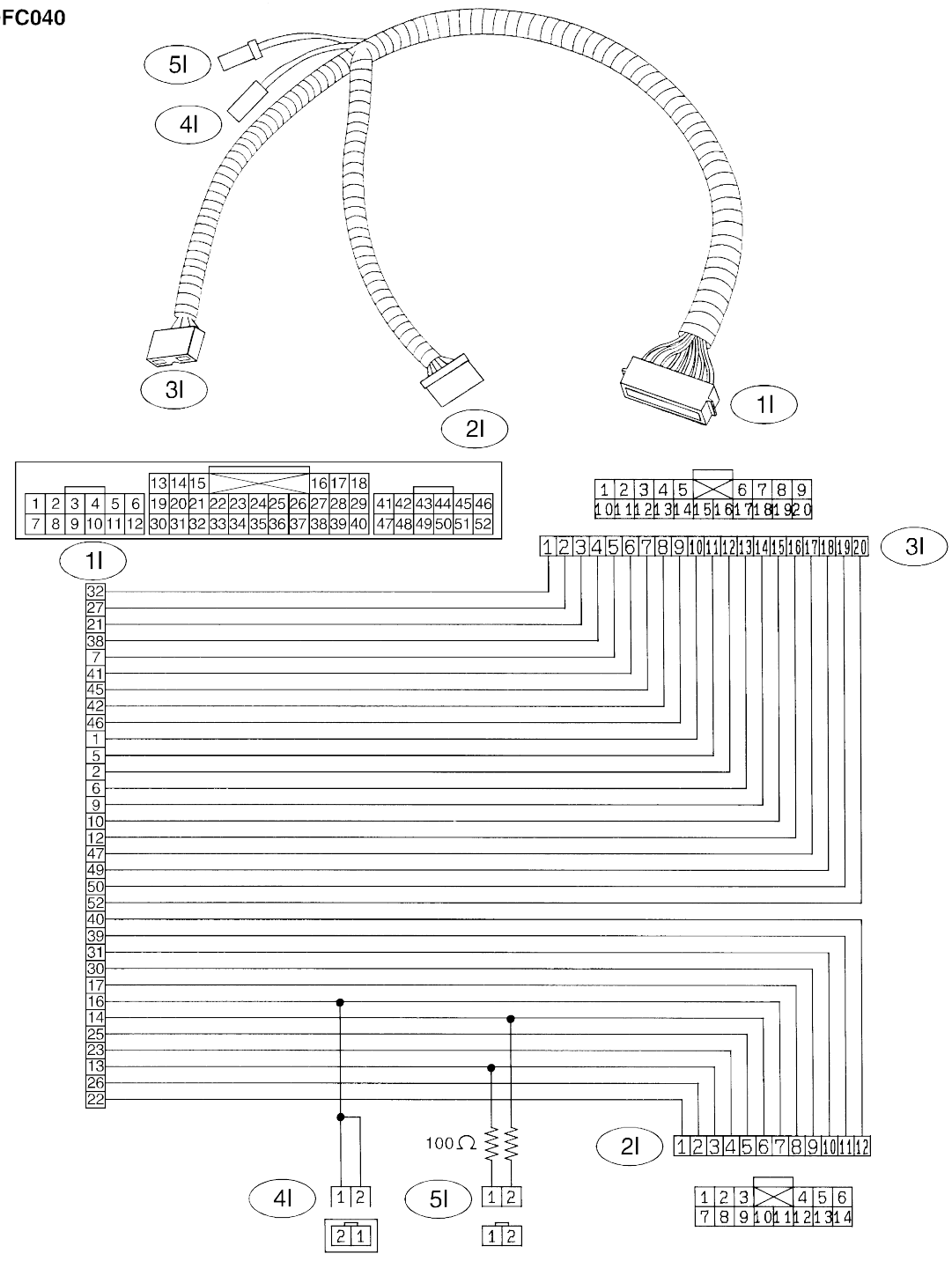
4. TEST HARNESS H S002001A1704

PN 98299FA030



5. TEST HARNESS I S002001A1705

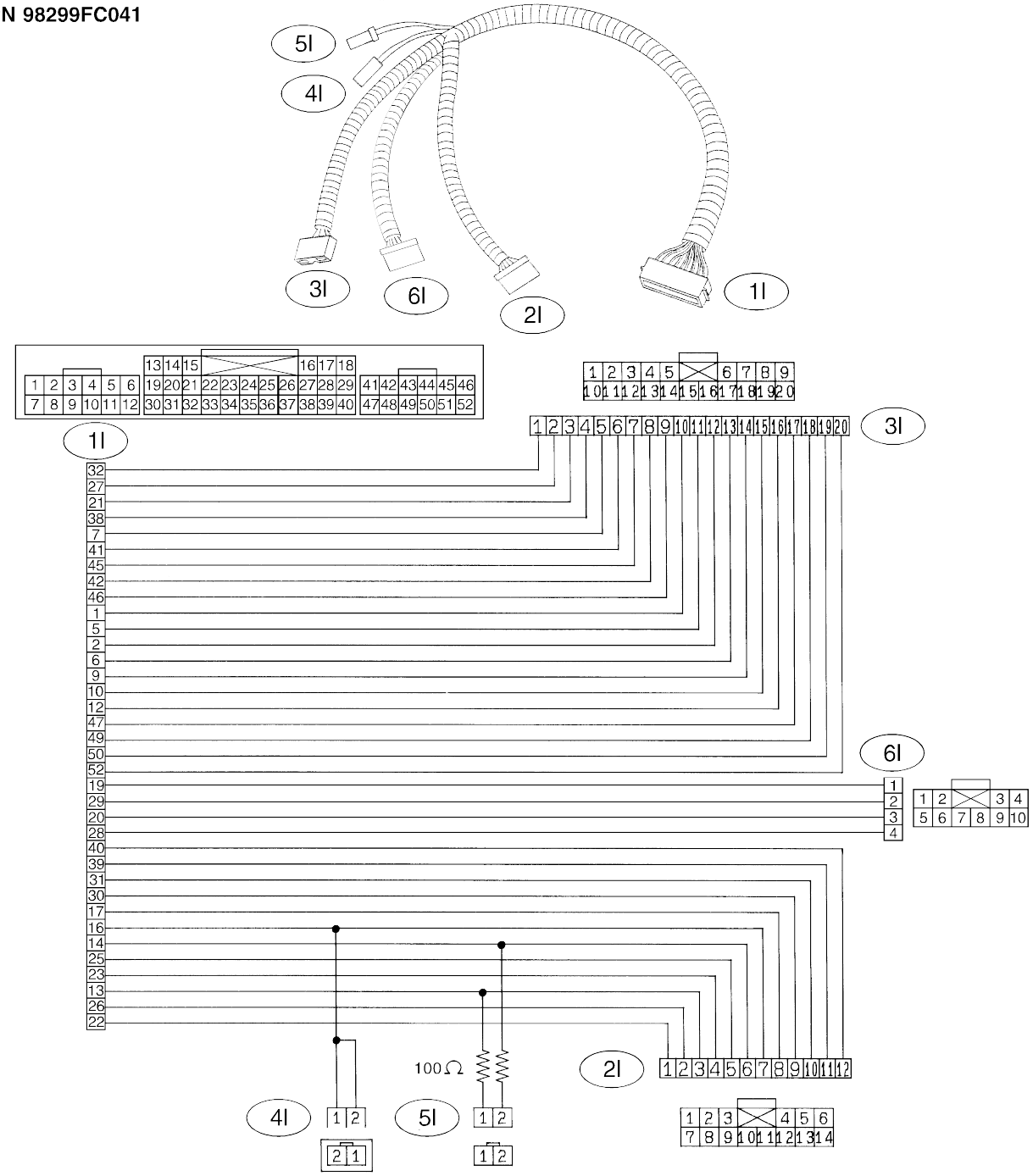
PN 98299FC040



S5M0340A

6. TEST HARNESS I2 S002001A1706

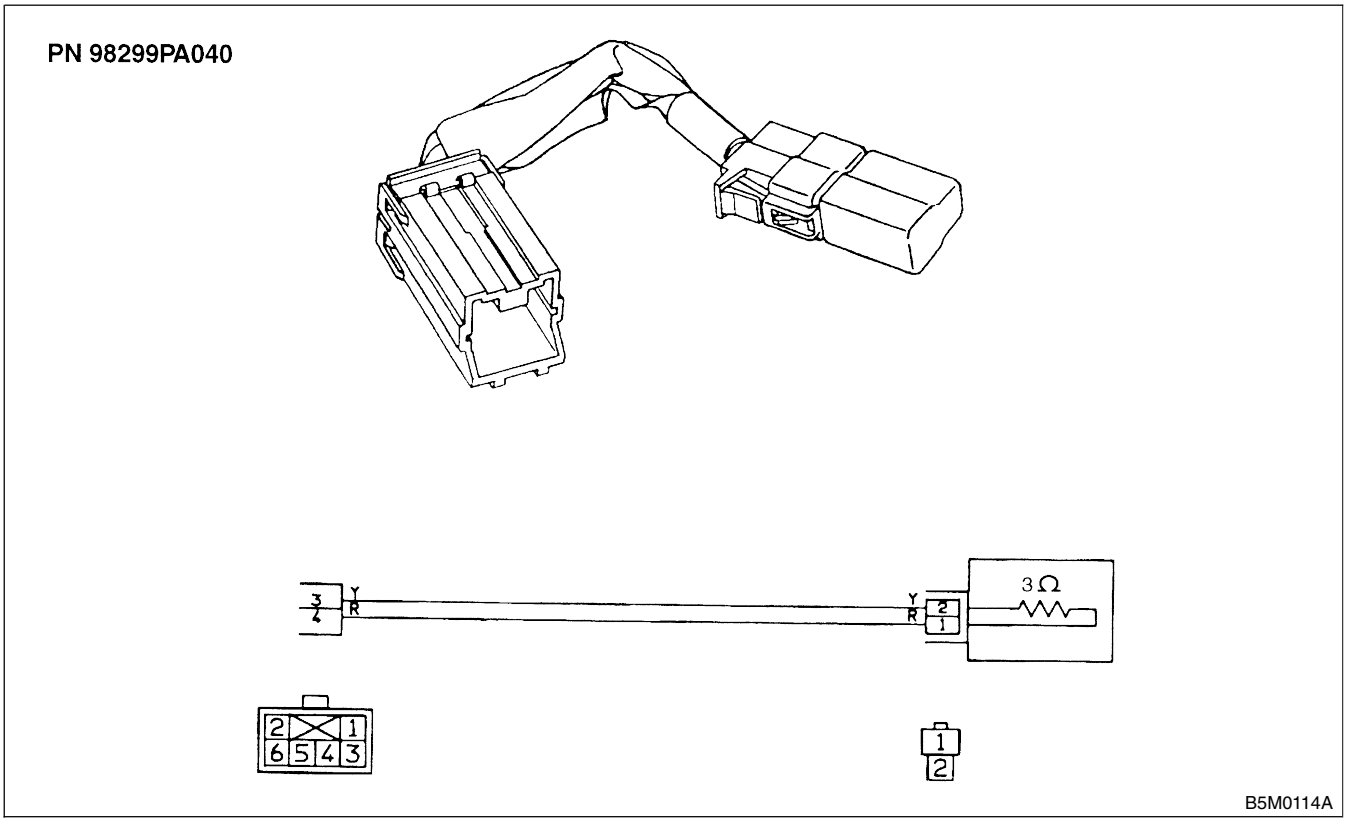
PN 98299FC041



B5M0927A

7. AIRBAG RESISTOR S002001A1707

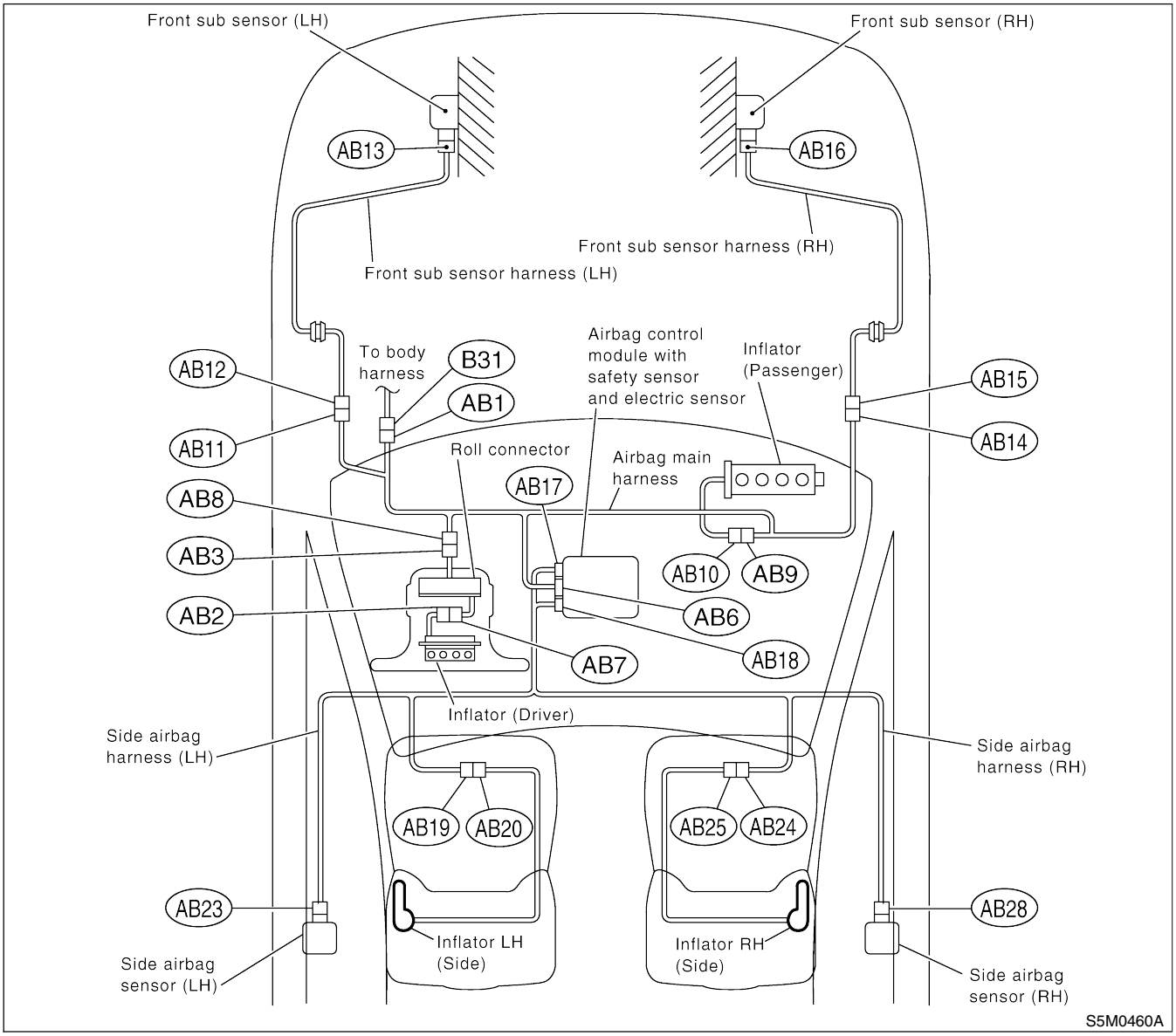
The airbag resistor is used during diagnostics. The airbag resistor has the same resistance as the airbag module and thus provides safety when used instead of the airbag module. It also makes it possible to finish, diagnostics in less time.



4. Electrical Components Location S002507

A: LOCATION S002507A13

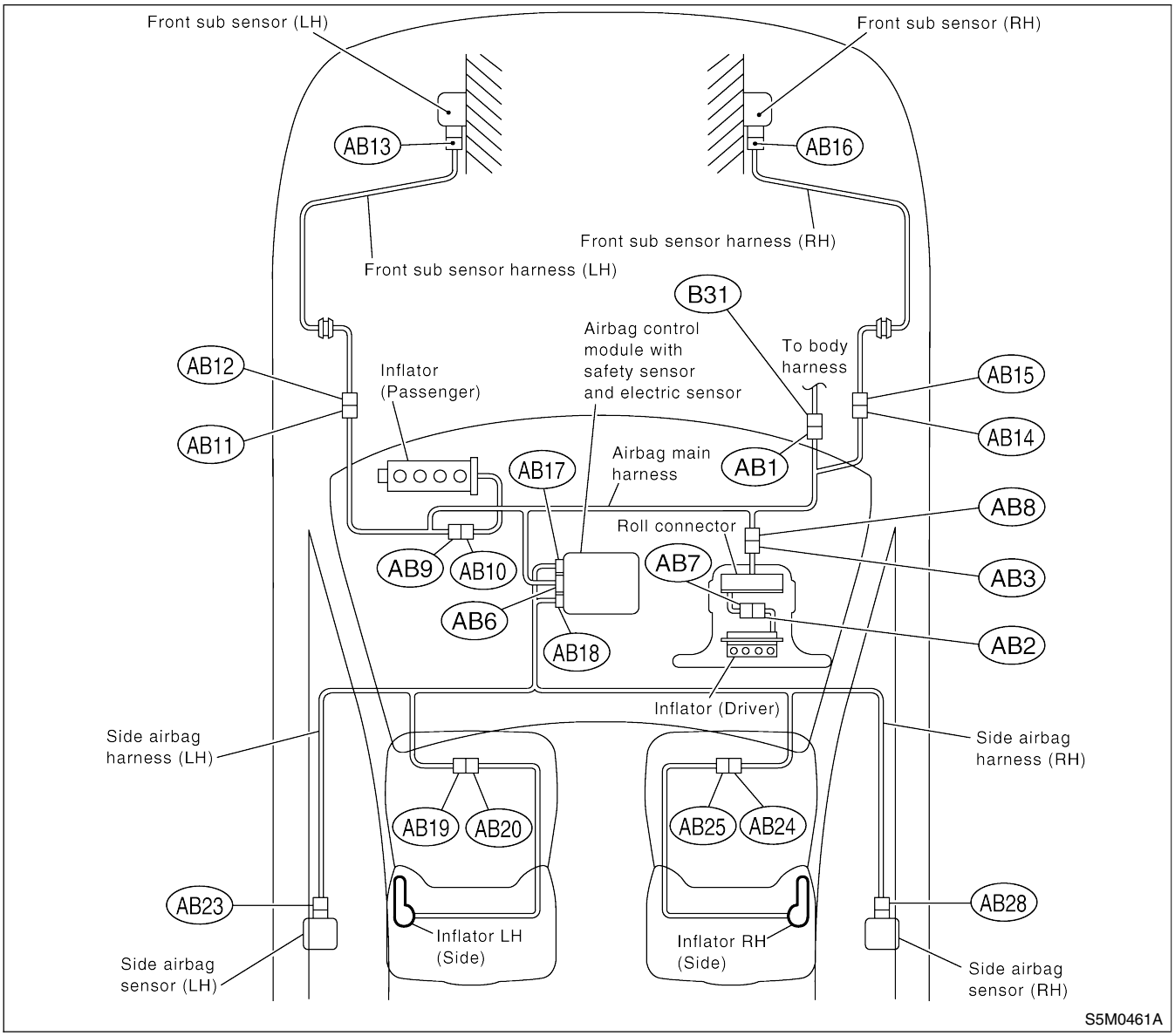
1. LHD MODEL S002507A1301



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

2. RHD MODEL S002507A1302



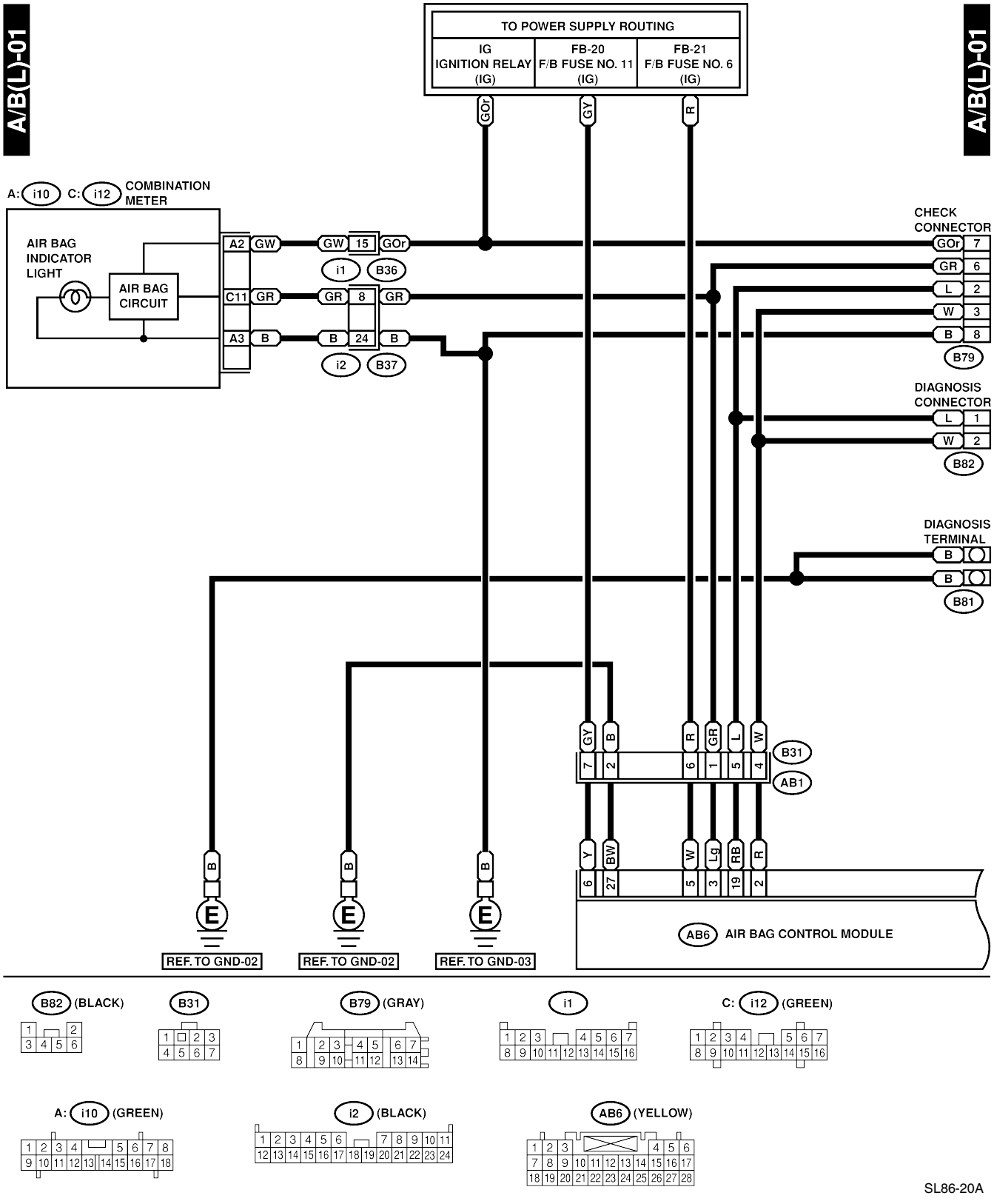
Connector No.	(AB1)	(AB2)	(AB3)	(AB6)	(AB7)	(AB8)	(AB9)	(AB10)	(AB11)	(AB12)	(AB13)
Pole	7	2	2	28	2	2	2	2	2	2	2
Color	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Blue	Blue	Yellow
Male/ Female	Male	Male	Male	Female	Female	Female	Female	Male	Female	Male	Female

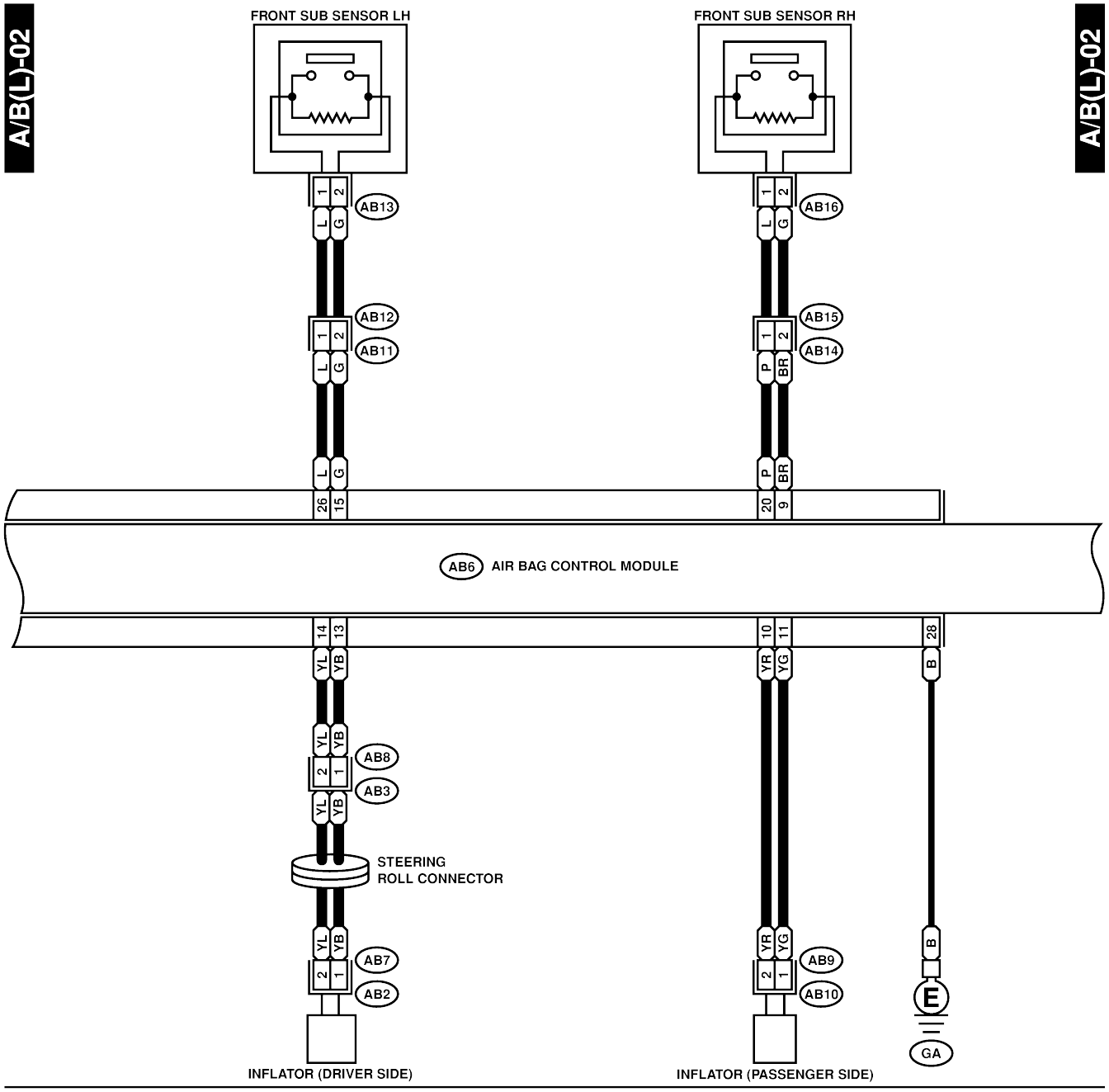
Connector No.	(AB14)	(AB15)	(AB16)	(AB17)	(AB18)	(AB19)	(AB20)	(AB23)	(AB24)	(AB25)	(AB28)
Pole	2	2	12	12	2	2	4	2	2	4	
Color	Blue	Blue	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Male/ Female	Female	Male	Female	Female	Female	Female	Male	Female	Female	Male	Female

5. A/B Control Module I/O Signal S002745

A: SCHEMATIC S002745A21

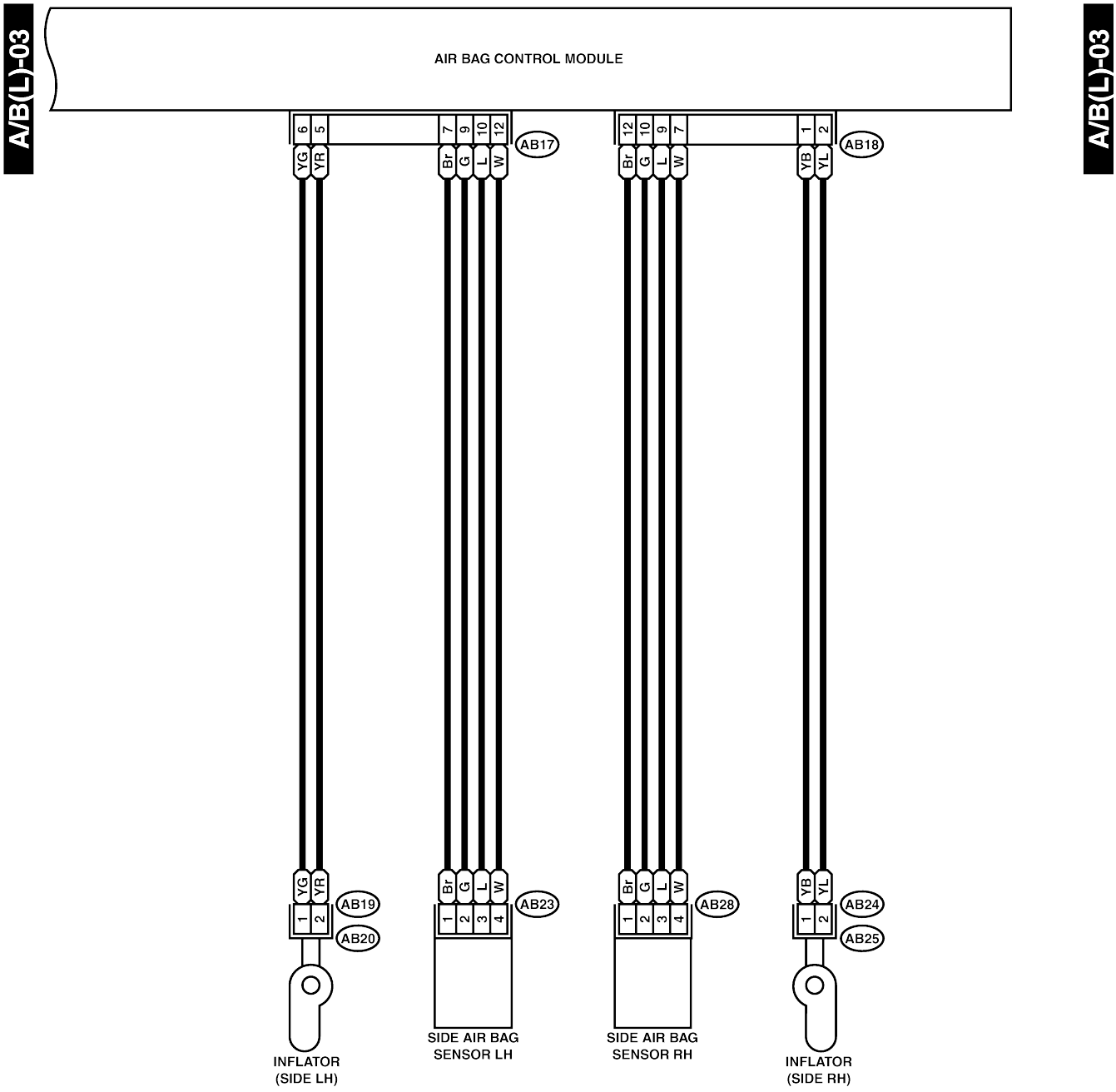
1. AIRBAG LHD MODEL S002745A2101

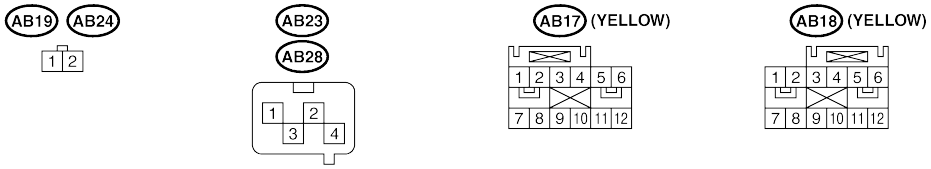



A/B(L)-02
A/B(L)-02
FRONT SUB SENSOR LH
FRONT SUB SENSOR RH
AB13
AB16
AB12
AB11
AB15
AB14
AB6 AIR BAG CONTROL MODULE
AB8
AB3
STEERING
ROLL CONNECTOR
AB7
AB2
AB9
AB10
E
GA
INFLATOR (DRIVER SIDE)
INFLATOR (PASSENGER SIDE)
AB7 AB11 (BLUE)
AB8 AB14 (BLUE)
AB9
AB13
AB16
AB6 (YELLOW)

SL86-20B

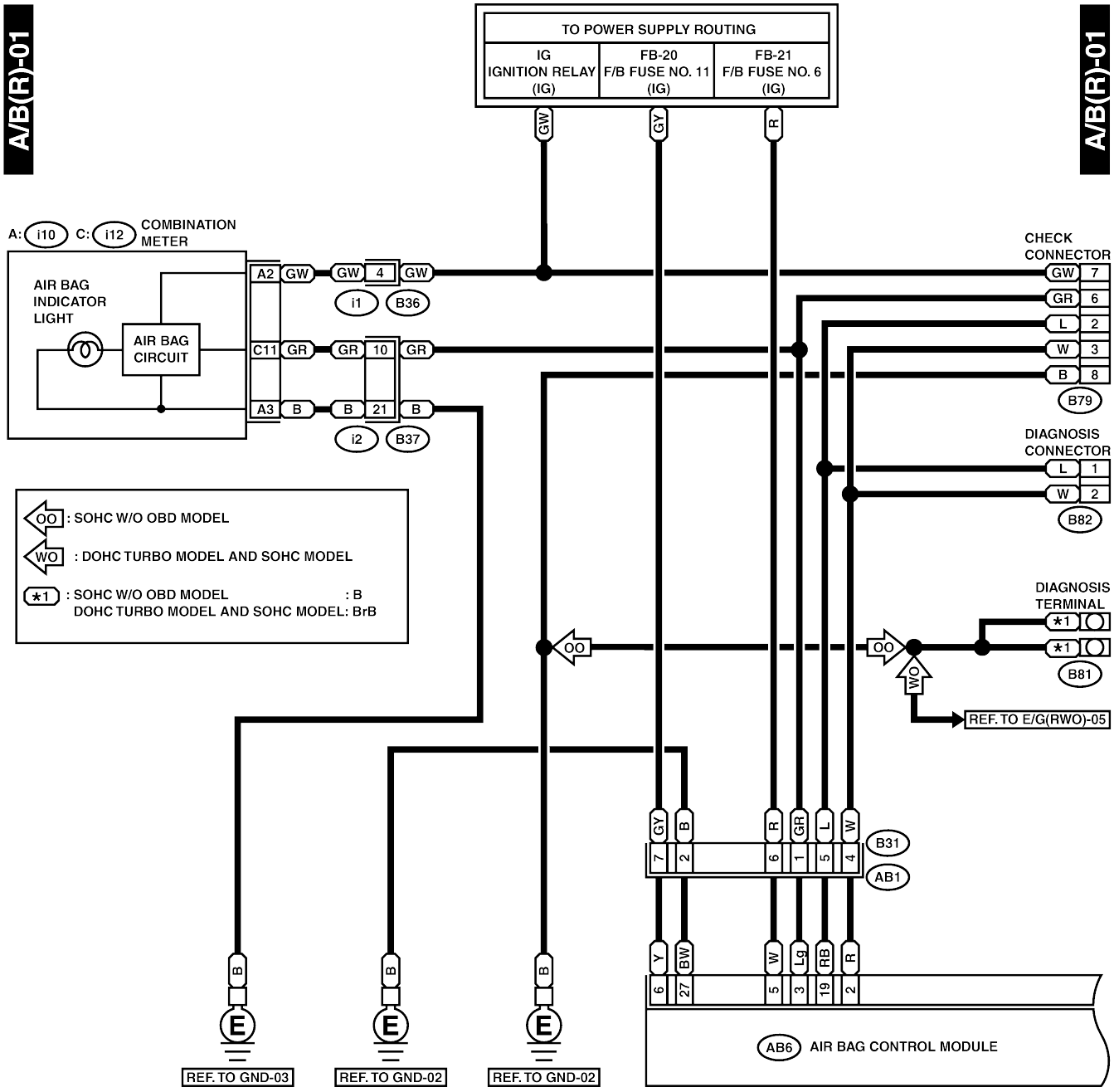
A/B CONTROL MODULE I/O SIGNAL

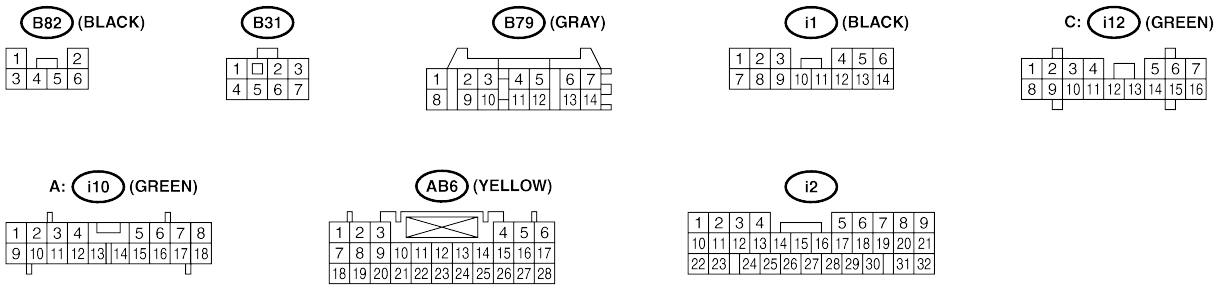




SL86-20C

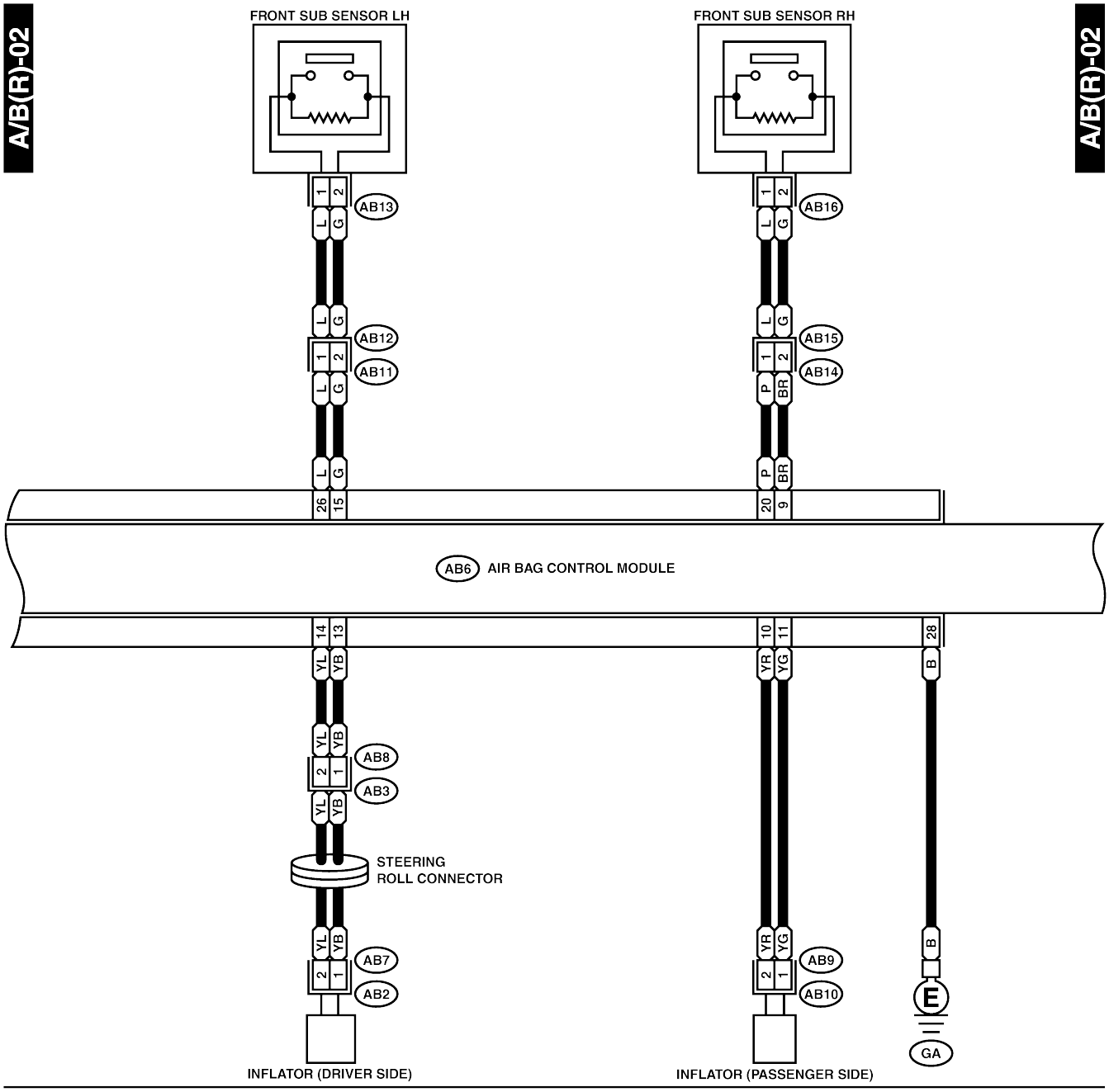
2. AIRBAG RHD MODEL S002745A2102



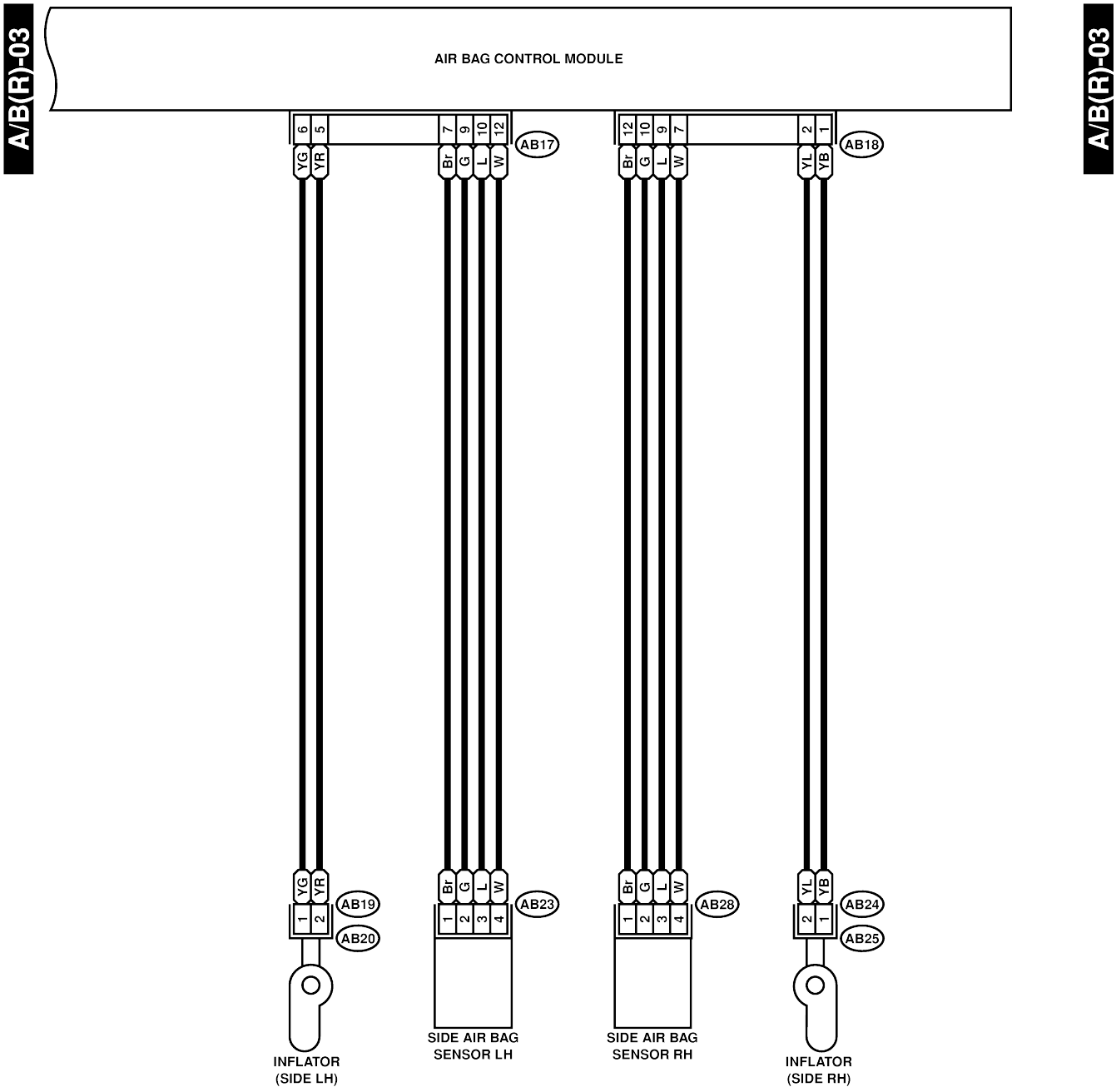


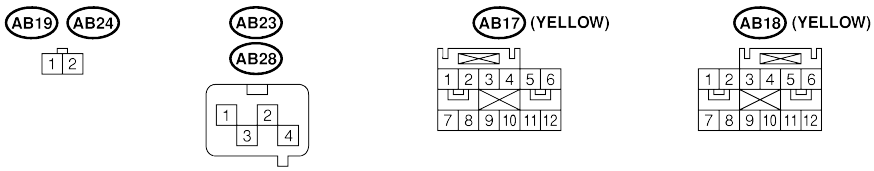
SR86-20A

A/B CONTROL MODULE I/O SIGNAL



SR86-20B


A/B(R)-03
AIR BAG CONTROL MODULE
A/B(R)-03
6 5 7 9 10 12
AB17
YG YR Br G L W
12 10 9 7 2 1
AB18
Br G L W YL YB
YG YR
AB19
1 2
AB20
Br G L W
AB23
1 2 3 4
Br G L W
AB28
1 2 3 4
YL YB
AB24
2 1
AB25
INFLATOR (SIDE LH)
SIDE AIR BAG SENSOR LH
SIDE AIR BAG SENSOR RH
INFLATOR (SIDE RH)


AB19
AB24
1 2
AB23
AB28
1 2 3 4
AB17 (YELLOW)
1 2 3 4 5 6
7 8 9 10 11 12
AB18 (YELLOW)
1 2 3 4 5 6
7 8 9 10 11 12

SR86-20C

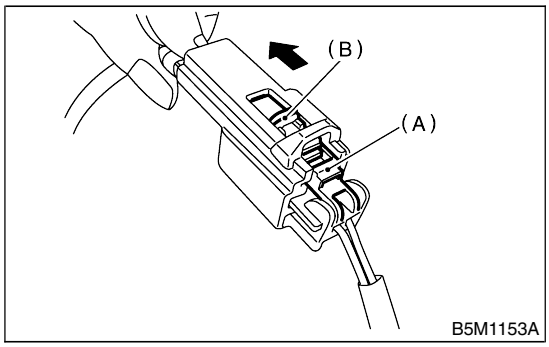
6. Airbag Connector S002659

A: OPERATION S002659A16

1. DRIVER'S AIRBAG, PASSENGER'S AIRBAG, SIDE AIRBAG S002659A1607

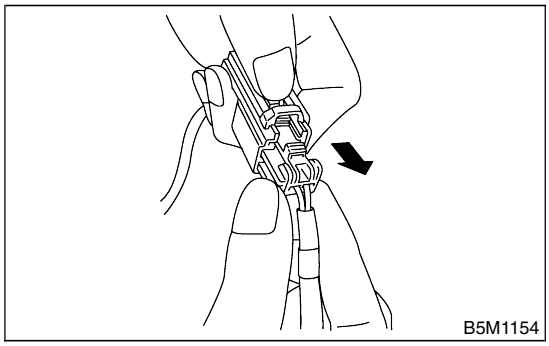
- **How to disconnect:**

1) Push lock arm (A).
2) With lock arm (A) pushed in, move slide lock (B) in the direction of the arrow.



3) With slide lock (B) pulled, remove lock arm (A) to its original position, and then pull in the direction of the arrow and separate the connector.

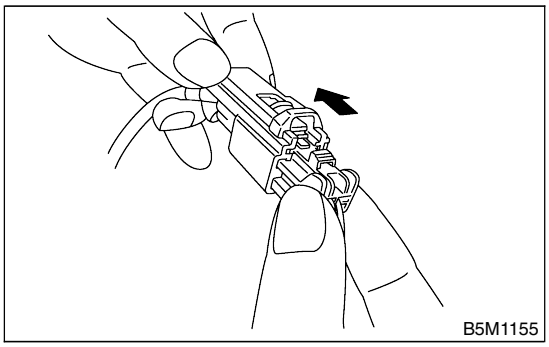
CAUTION:
When pulling, be sure to hold onto the connector and not the wire.



- **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.

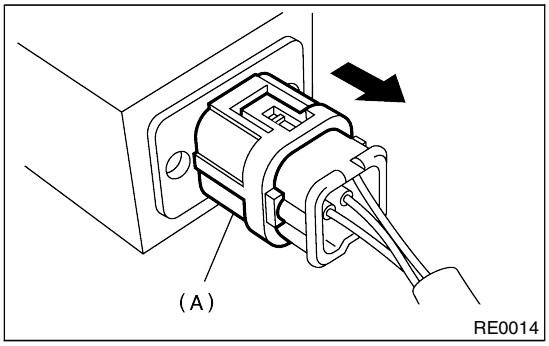


2. FRONT SUB-SENSOR, SIDE AIRBAG SENSOR S002659A1603

- **How to disconnect:**

1) Holding outer part (A), pull it in the direction of the arrow.

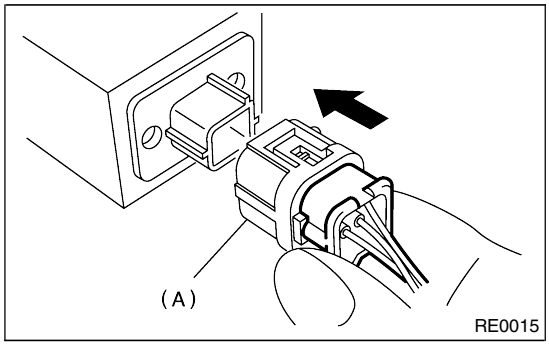
CAUTION:
When pulling, be sure to hold onto the connector and not the wire.



● How to connect:

Holding the connector, and push it in carefully until a connecting sound is heard.

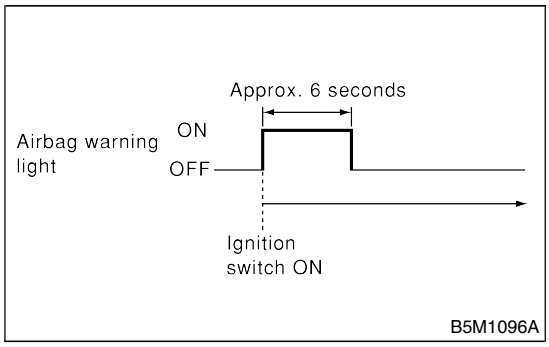
CAUTION:
● Outer (A) moves back, and so do not put your hand on the outer part.
● Be sure to insert the connector in until it locks. Then pull on it gently to make sure that it is locked.



7. Airbag Warning Light Illumination Pattern S002629

A: INSPECTION S002629A10

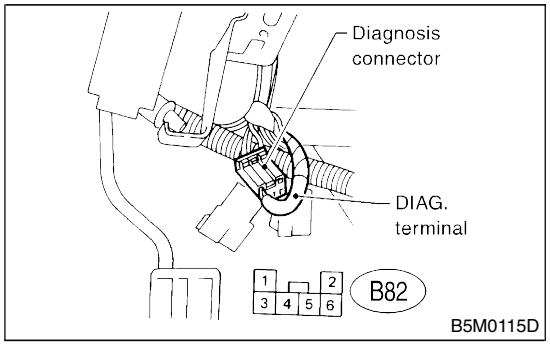
Keep the ignition switch ON, and confirm that the airbag warning light remains off approximately 6 seconds after being turned on.



8. Read Diagnostic Trouble Code S002508

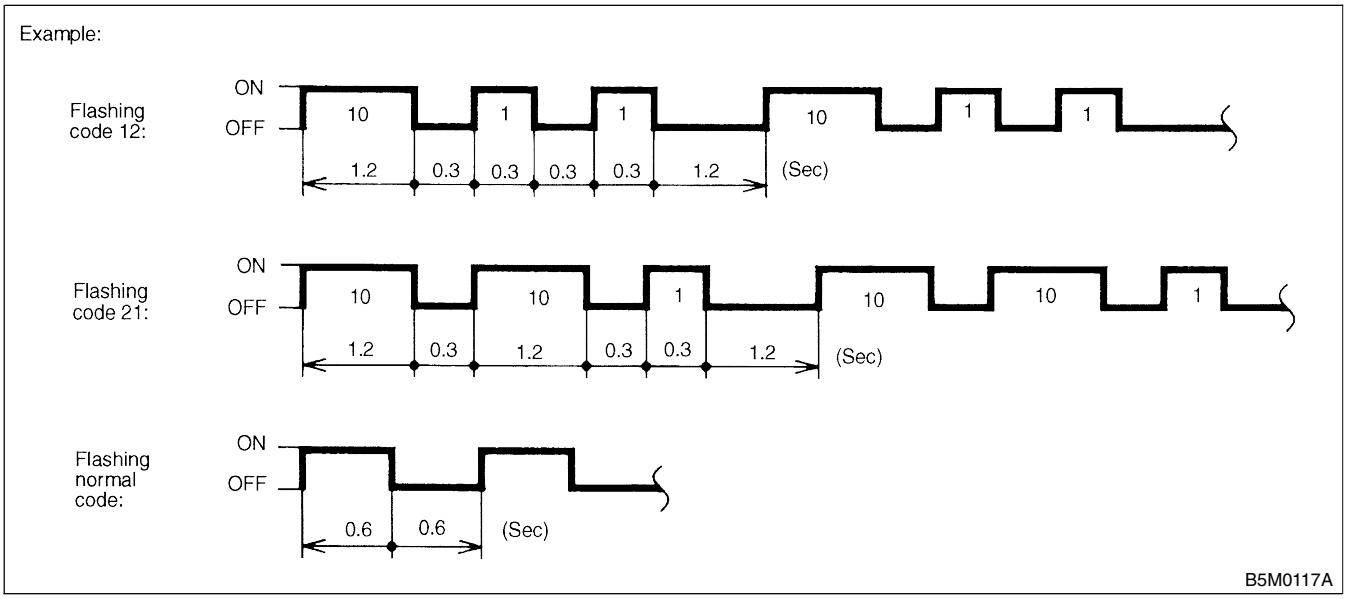
A: OPERATION S002508A16

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.



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-36 List of Diagnostic Trouble Code.>
- "Airbag Warning Light Failure" <Ref. to AB-30 Airbag Warning Light Failure.>



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

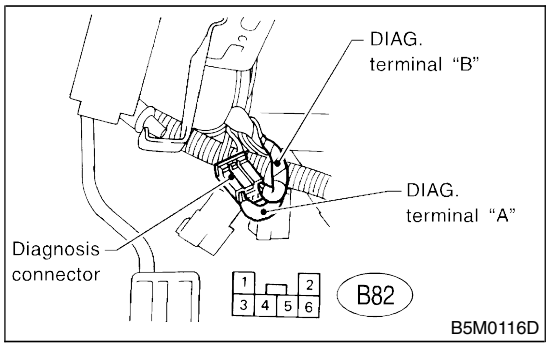
A: OPERATION S002510A16

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.



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.

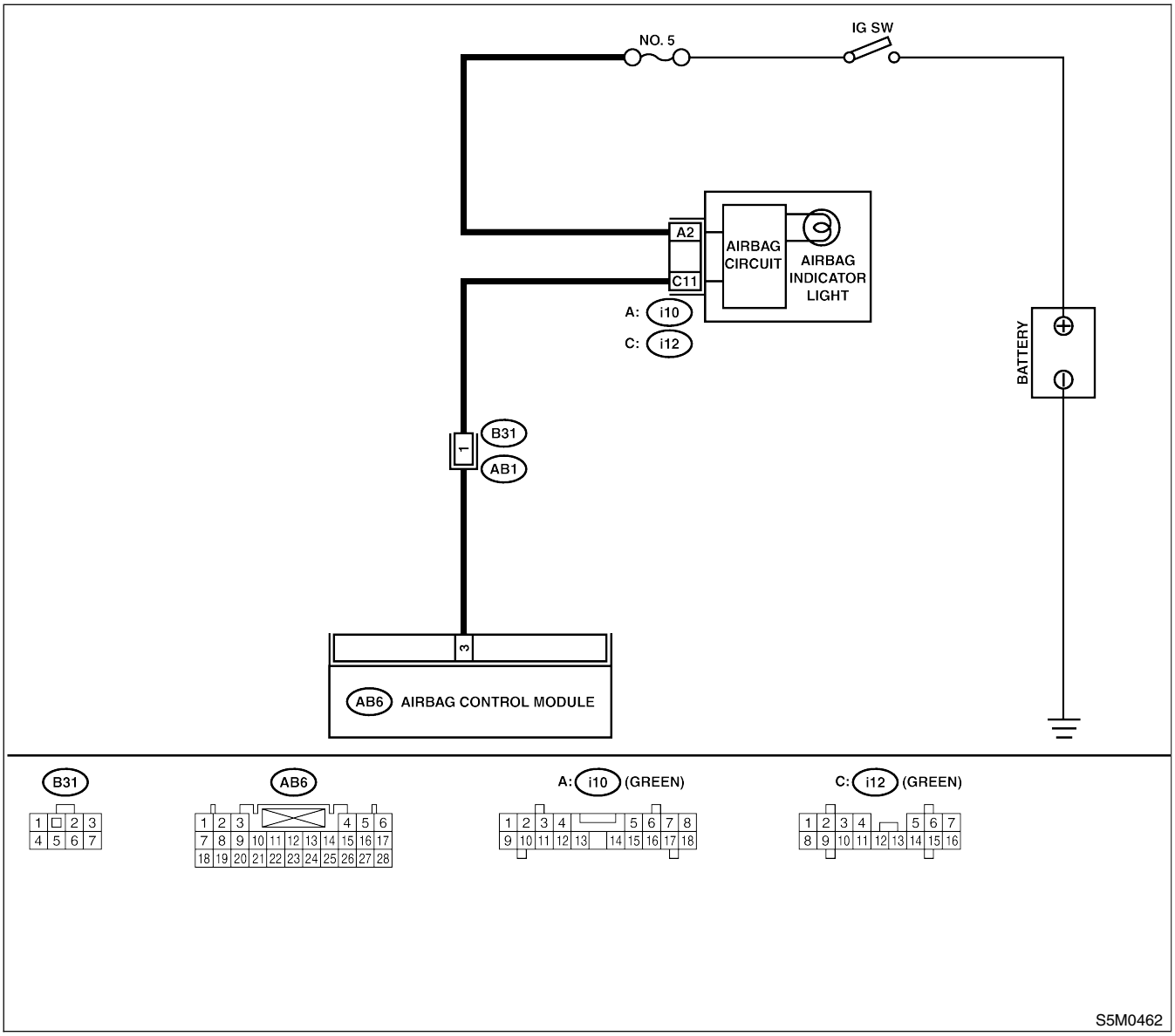
11. Airbag Warning Light Failure S002681

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**.

AIRBAG WARNING LIGHT FAILURE

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-15 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

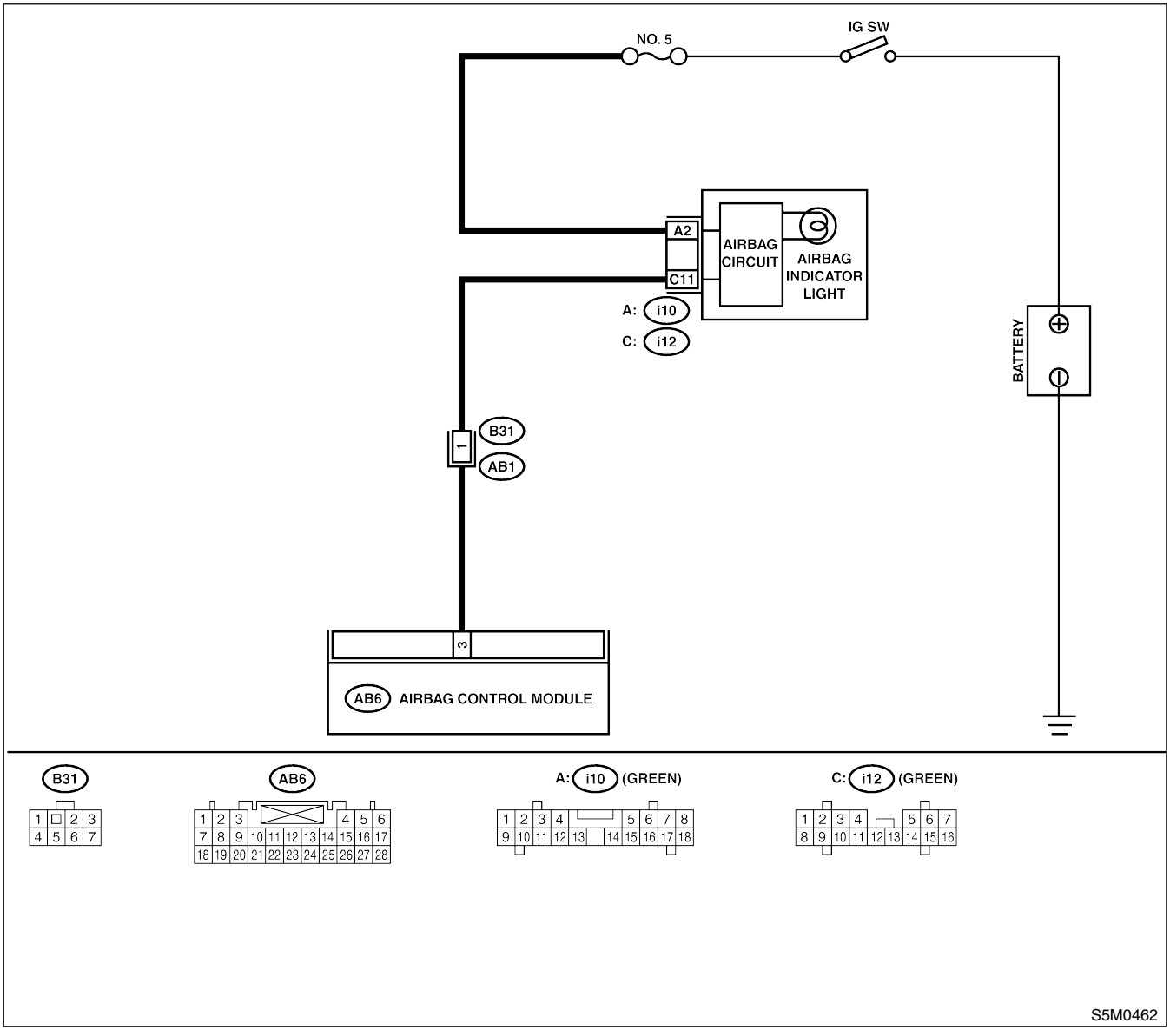
DIAGNOSIS:

- 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-15 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 S002511

A: LIST S002511A12

Trouble code/ Contents of troubles	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-39 TROUBLE CODE 11, Diagnostic Chart with Trouble Code.>
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-43 TROUBLE CODE 12, Diagnostic Chart with Trouble Code.>
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-45 TROUBLE CODE 15, Diagnostic Chart with Trouble Code.>
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-47 TROUBLE CODE 16, Diagnostic Chart with Trouble Code.>
21	Provided.	Airbag control module is faulty.	<Ref. to AB-48 TROUBLE CODE 21, Diagnostic Chart with Trouble Code.>
22	Provided.	Front airbag module is inflated.	<Ref. to AB-49 TROUBLE CODE 22, Diagnostic Chart with Trouble Code.>
23	Not provided.	(AB6), (AB17) and (AB18) are not connected properly to airbag control module.	<Ref. to AB-50 TROUBLE CODE 23, Diagnostic Chart with Trouble Code.>
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-51 TROUBLE CODE 24, Diagnostic Chart with Trouble Code.>
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-53 TROUBLE CODE 25, Diagnostic Chart with Trouble Code.>
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-55 TROUBLE CODE 31, Diagnostic Chart with Trouble Code.>

Trouble code/ Contents of troubles	Memory function	Contents of diagnosis	Index No.
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-59 TROUBLE CODE 32, Diagnostic Chart with Trouble Code.>
41	Provided.	• Side airbag harness (RH) is faulty. • Side airbag module (RH) is faulty. • Airbag control module is faulty.	<Ref. to AB-63 TROUBLE CODE 41, Diagnostic Chart with Trouble Code.>
42	Provided.	• Side airbag harness (LH) is faulty. • Side airbag module (LH) is faulty. • Airbag control module is faulty.	<Ref. to AB-65 TROUBLE CODE 42, Diagnostic Chart with Trouble Code.>
45	Provided.	• Side airbag harness (RH) is shorted to power supply. • Airbag control module is faulty.	<Ref. to AB-67 TROUBLE CODE 45, Diagnostic Chart with Trouble Code.>
46	Provided.	• Side airbag harness (LH) is shorted to power supply. • Airbag control module is faulty.	<Ref. to AB-69 TROUBLE CODE 46, Diagnostic Chart with Trouble Code.>
51	Provided.	• Side airbag sensor (RH) is faulty. • Side airbag harness (RH) is faulty. • Airbag control module is faulty.	<Ref. to AB-71 TROUBLE CODE 51, Diagnostic Chart with Trouble Code.>
52	Provided.	• Side airbag sensor (LH) is faulty. • Side airbag harness (LH) is faulty. • Airbag control module is faulty.	<Ref. to AB-73 TROUBLE CODE 52, Diagnostic Chart with Trouble Code.>
53	Provided.	Side airbag sensor (RH) is faulty.	<Ref. to AB-74 TROUBLE CODE 53, Diagnostic Chart with Trouble Code.>
54	Provided.	Side airbag sensor (LH) is faulty.	<Ref. to AB-74 TROUBLE CODE 54, Diagnostic Chart with Trouble Code.>
55	Provided.	Side airbag module is inflated.	<Ref. to AB-74 TROUBLE CODE 55, Diagnostic Chart with Trouble Code.>

MEMO:

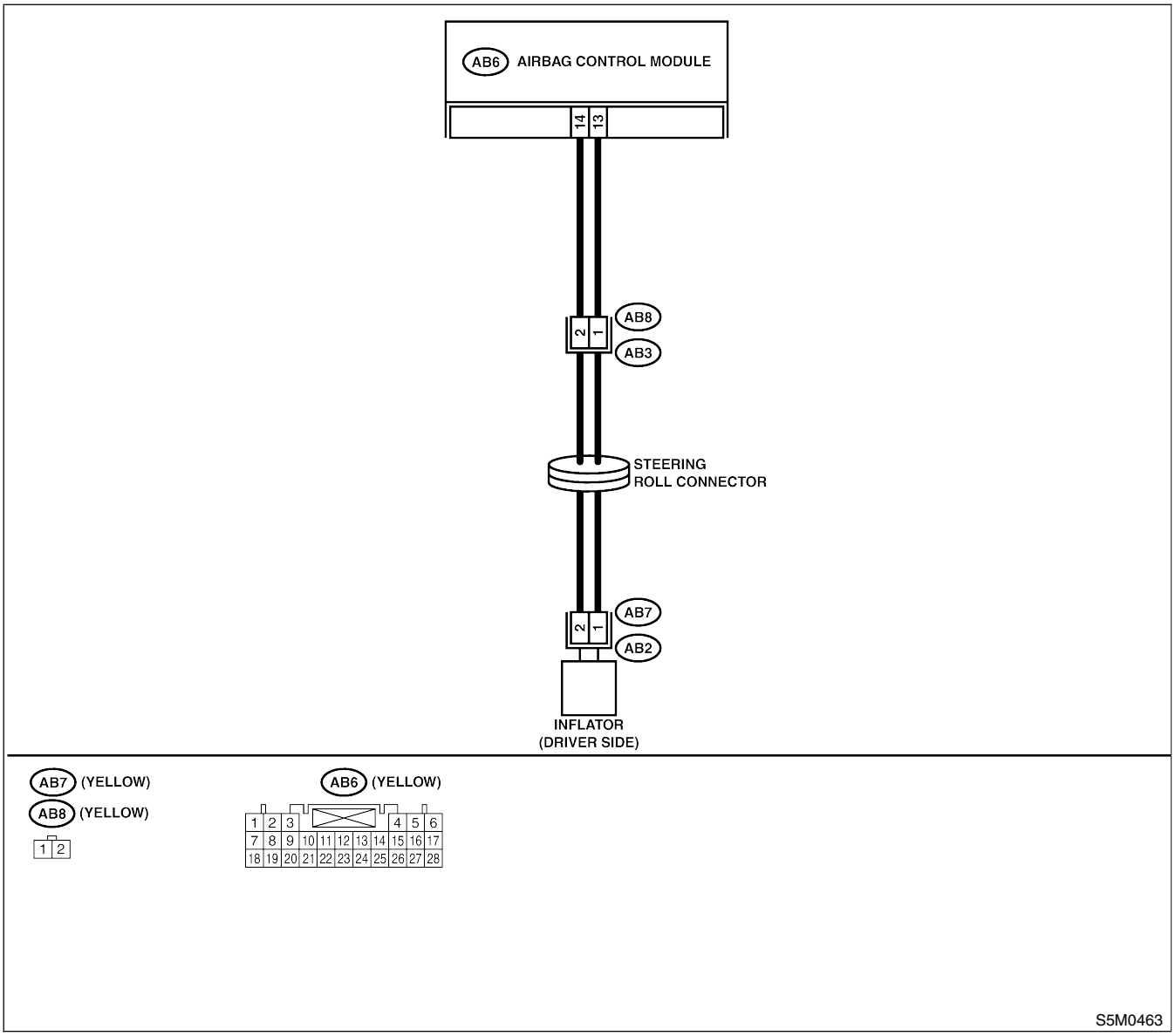
13. Diagnostic Chart with Trouble Code S002630

A: TROUBLE CODE 11 S002630C38

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 battery ground cable, and wait more than 20 seconds. 2) Remove the driver's airbag module. <Ref. to AB-12 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-12 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: TROUBLE CODE 12 S002630C40

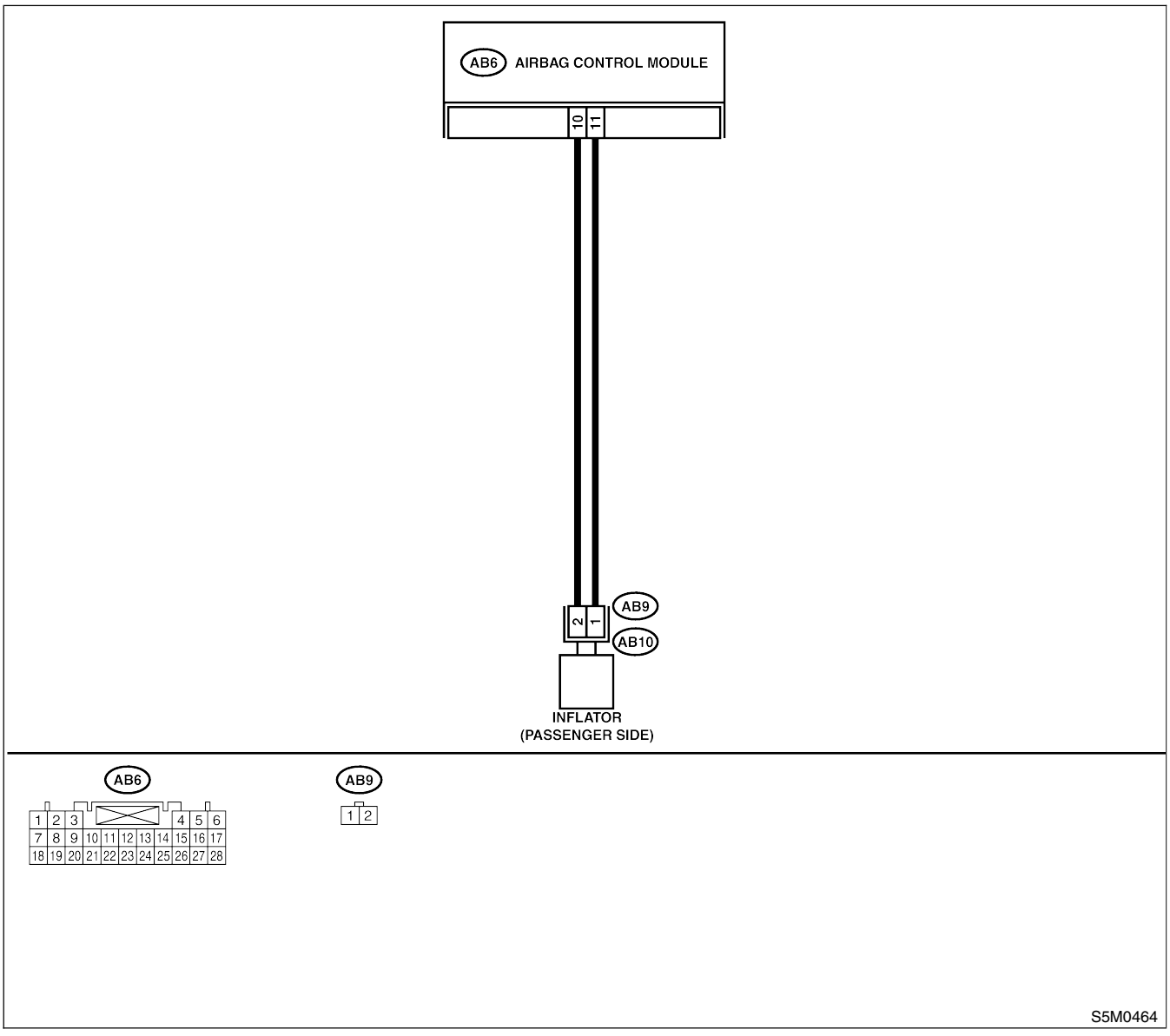
DIAGNOSIS:

- 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:



DIAGNOSTIC CHART WITH TROUBLE CODE

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: TROUBLE CODE 15 S002630C41

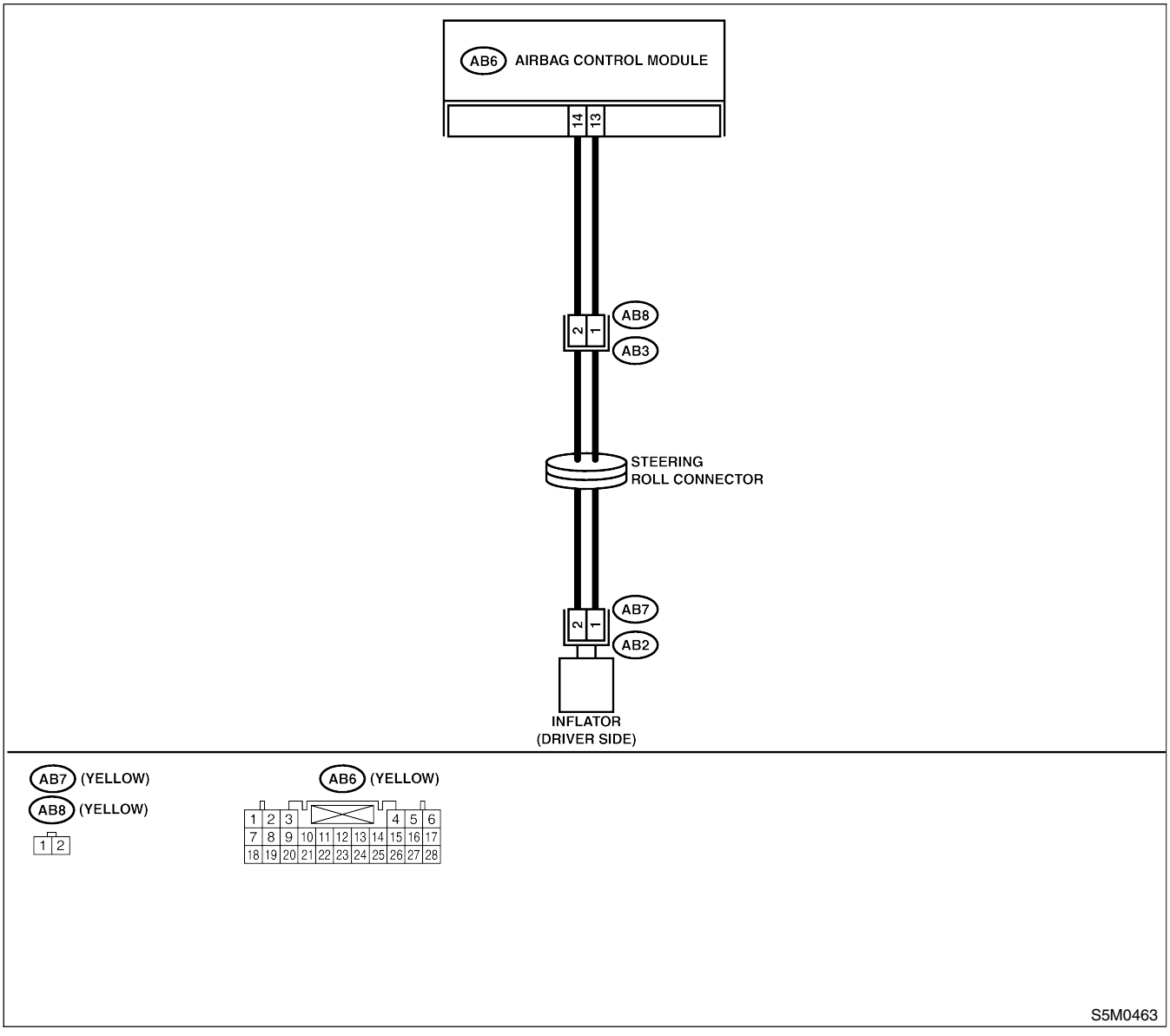
DIAGNOSIS:

- 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:



DIAGNOSTIC CHART WITH TROUBLE CODE

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-12 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-12 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: TROUBLE CODE 16 S002630C42

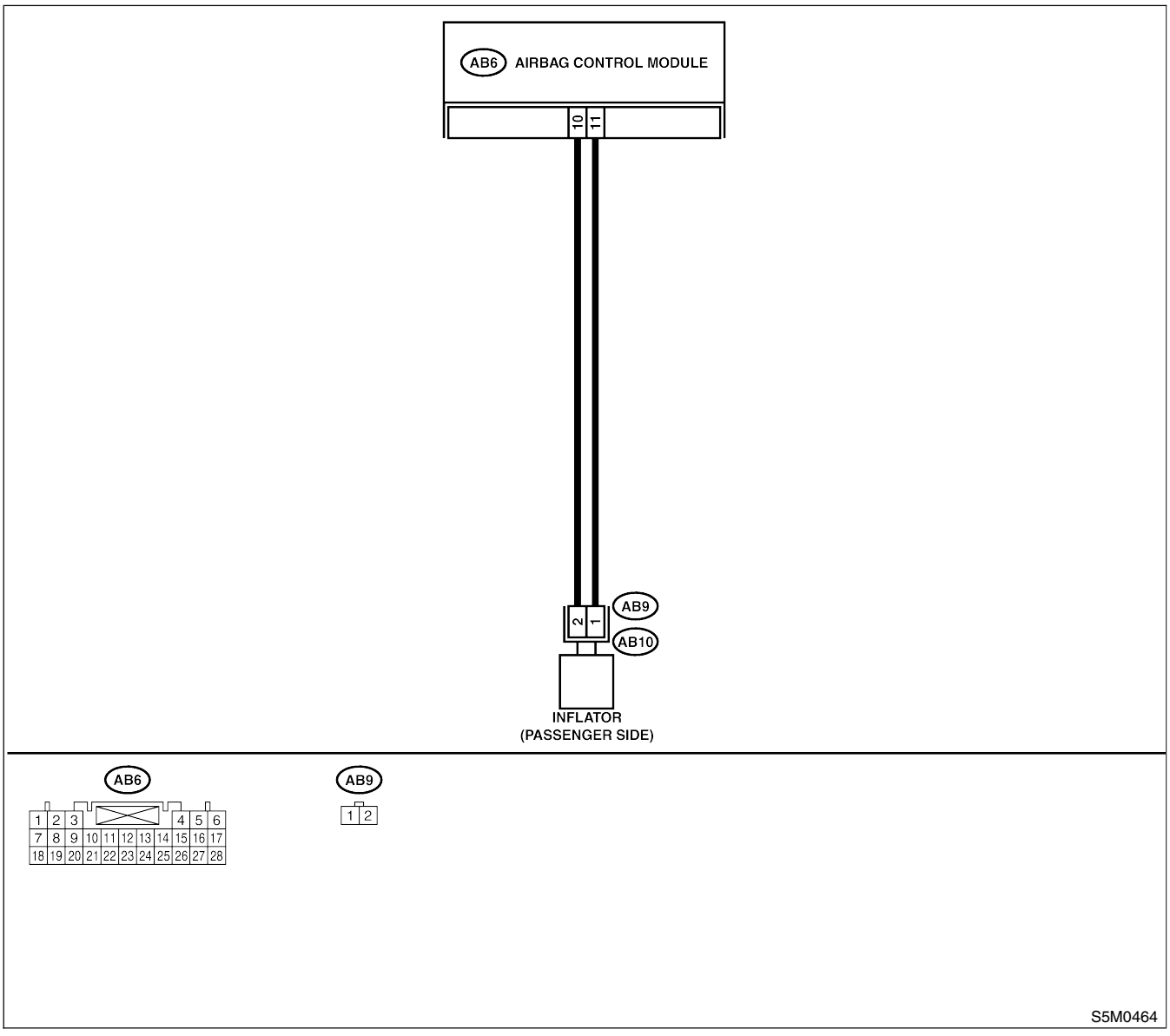
DIAGNOSIS:

- 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: TROUBLE CODE 21 *S002630C45*

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-27 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-29 Clear Memory Mode.>

F: TROUBLE CODE 22 S002630C51

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-12 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: TROUBLE CODE 23 S002630C56

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: TROUBLE CODE 24 S002630C61

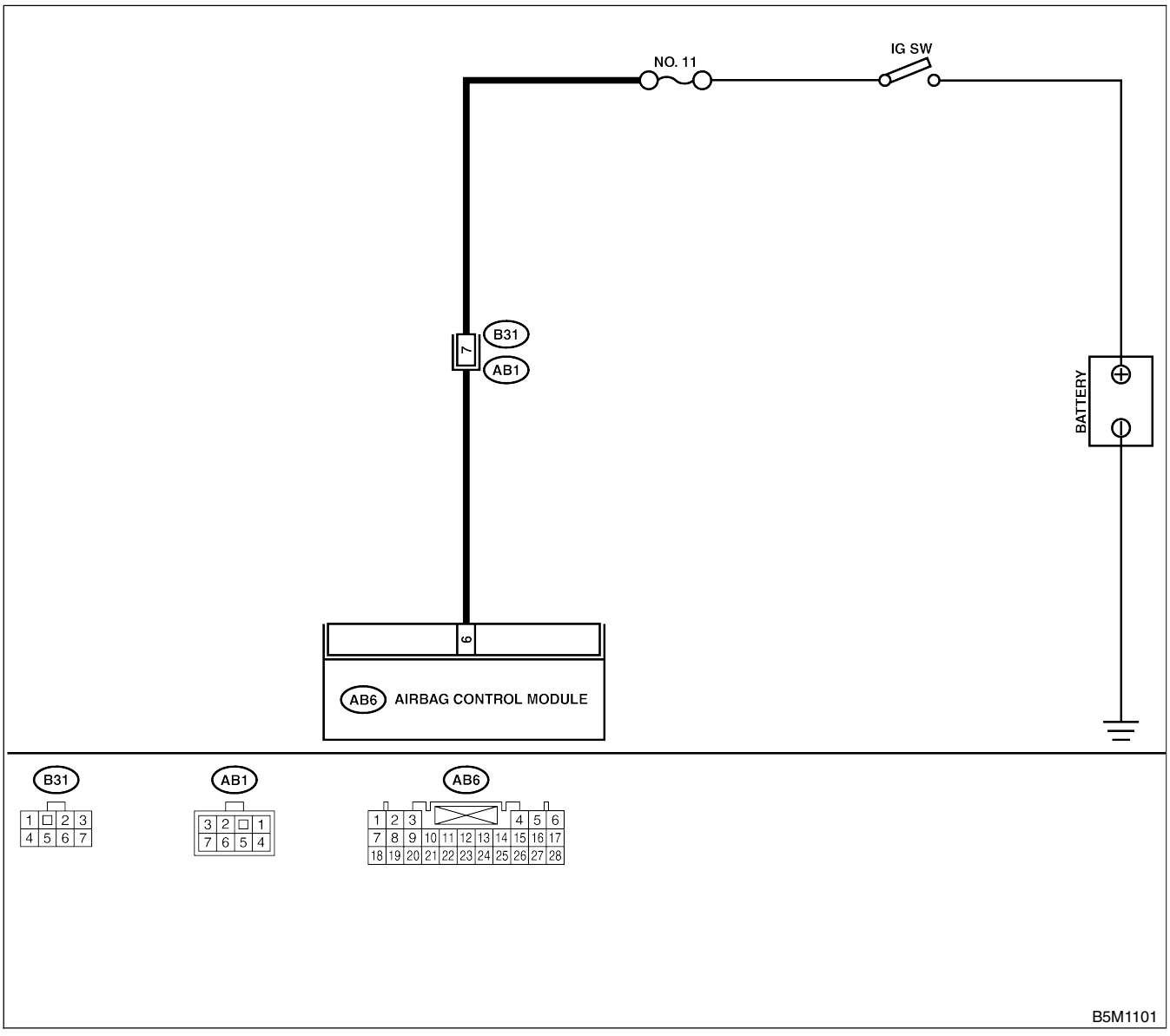
DIAGNOSIS:

- 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:



DIAGNOSTIC CHART WITH TROUBLE CODE

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: TROUBLE CODE 25 S002630C66

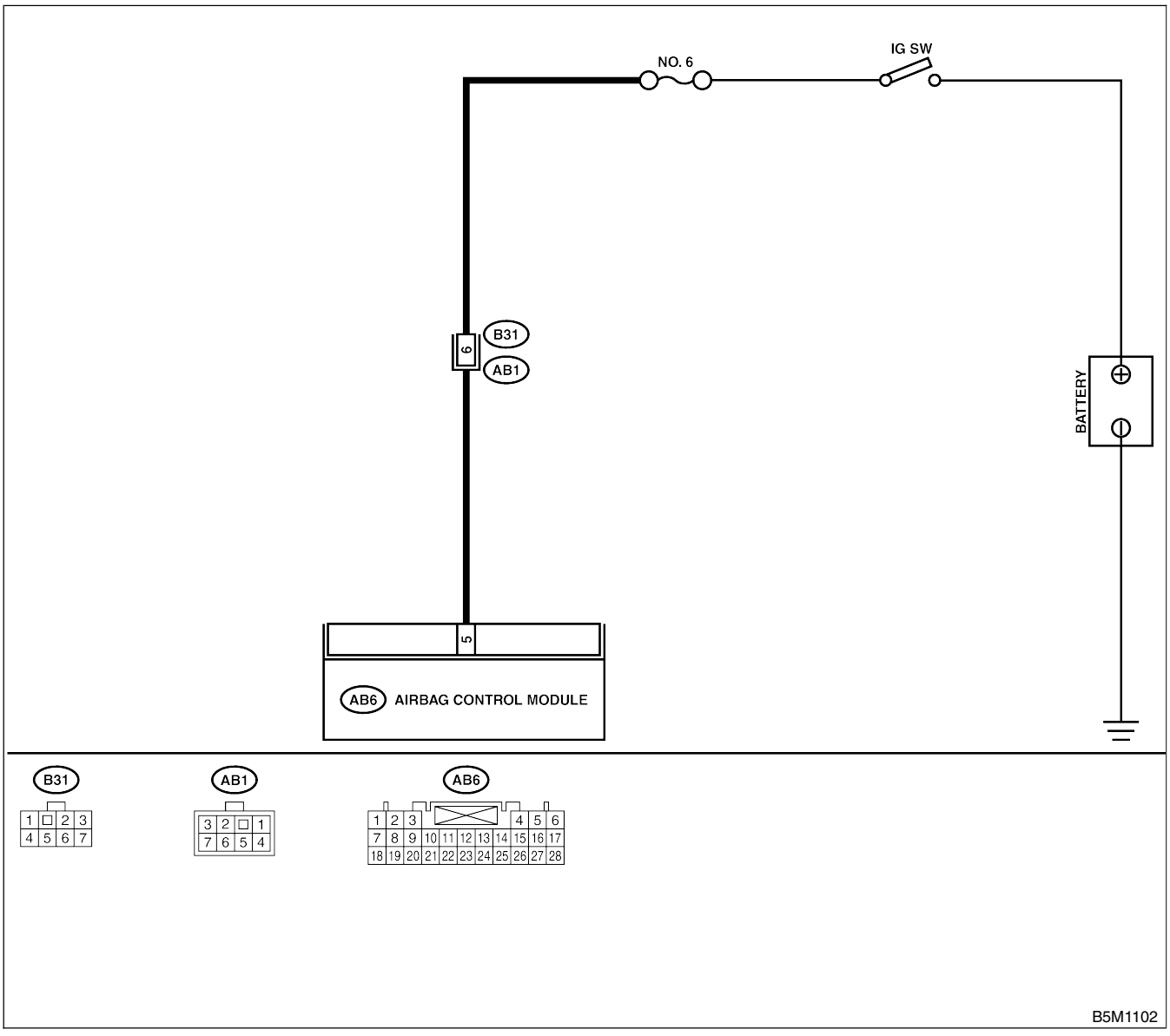
DIAGNOSIS:

- 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:



DIAGNOSTIC CHART WITH TROUBLE CODE

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: TROUBLE CODE 31 S002630C89

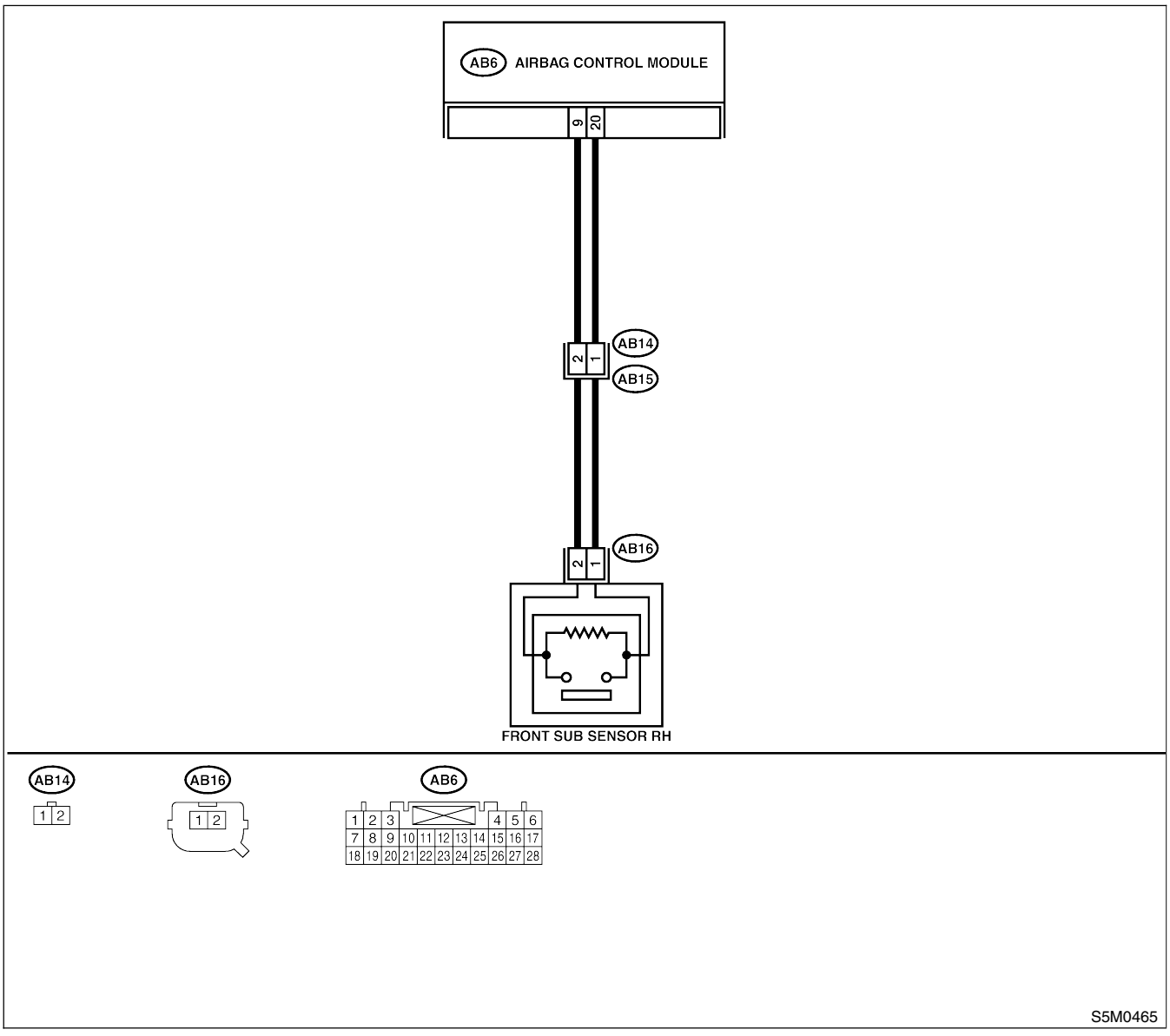
DIAGNOSIS:

- 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:



DIAGNOSTIC CHART WITH TROUBLE CODE

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-31 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: TROUBLE CODE 32 S002630C95

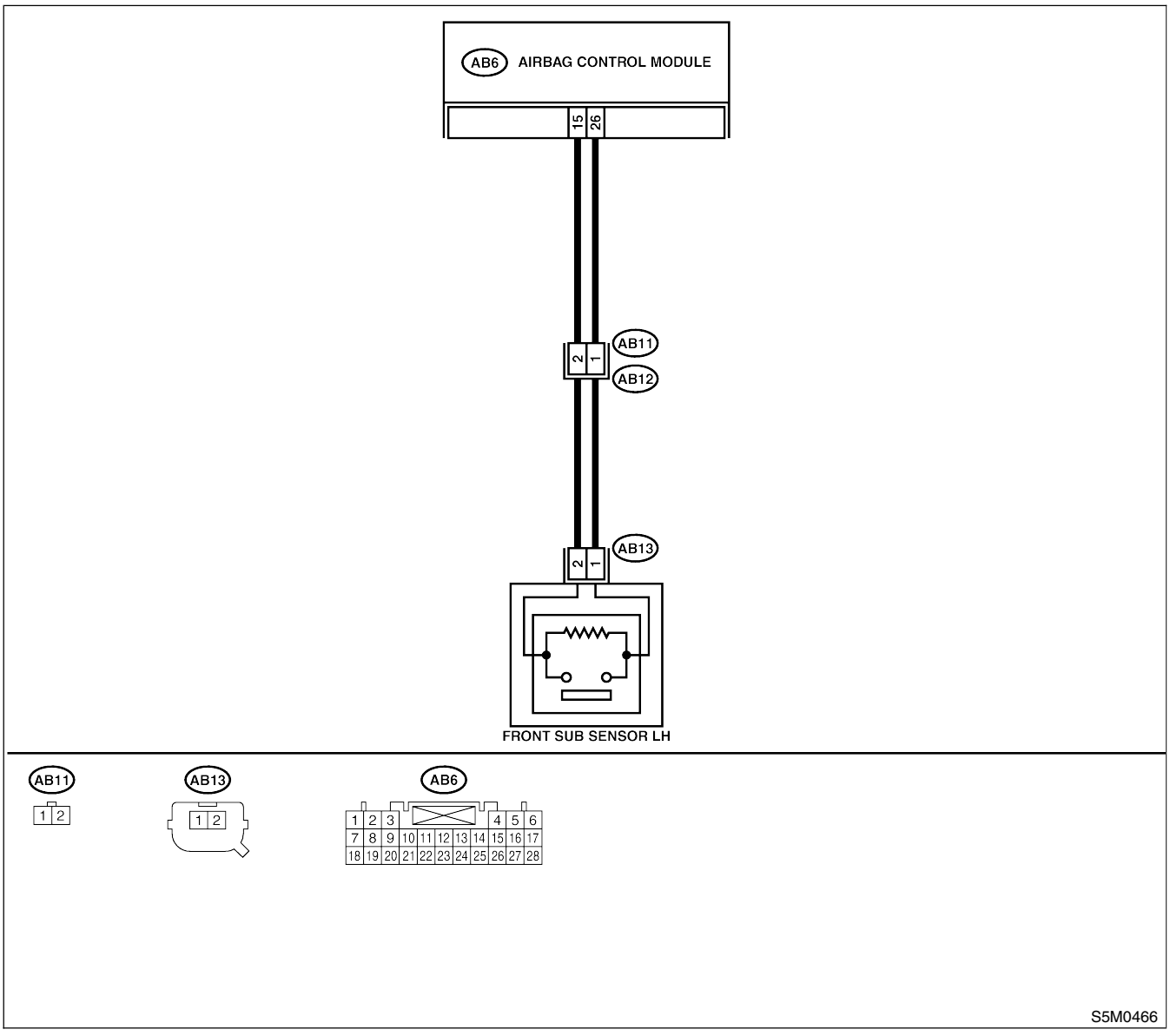
DIAGNOSIS:

- 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:



DIAGNOSTIC CHART WITH TROUBLE CODE

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 air-bag 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 air-bag 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-31 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 air-bag 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 air-bag 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: TROUBLE CODE 41 S002630D28

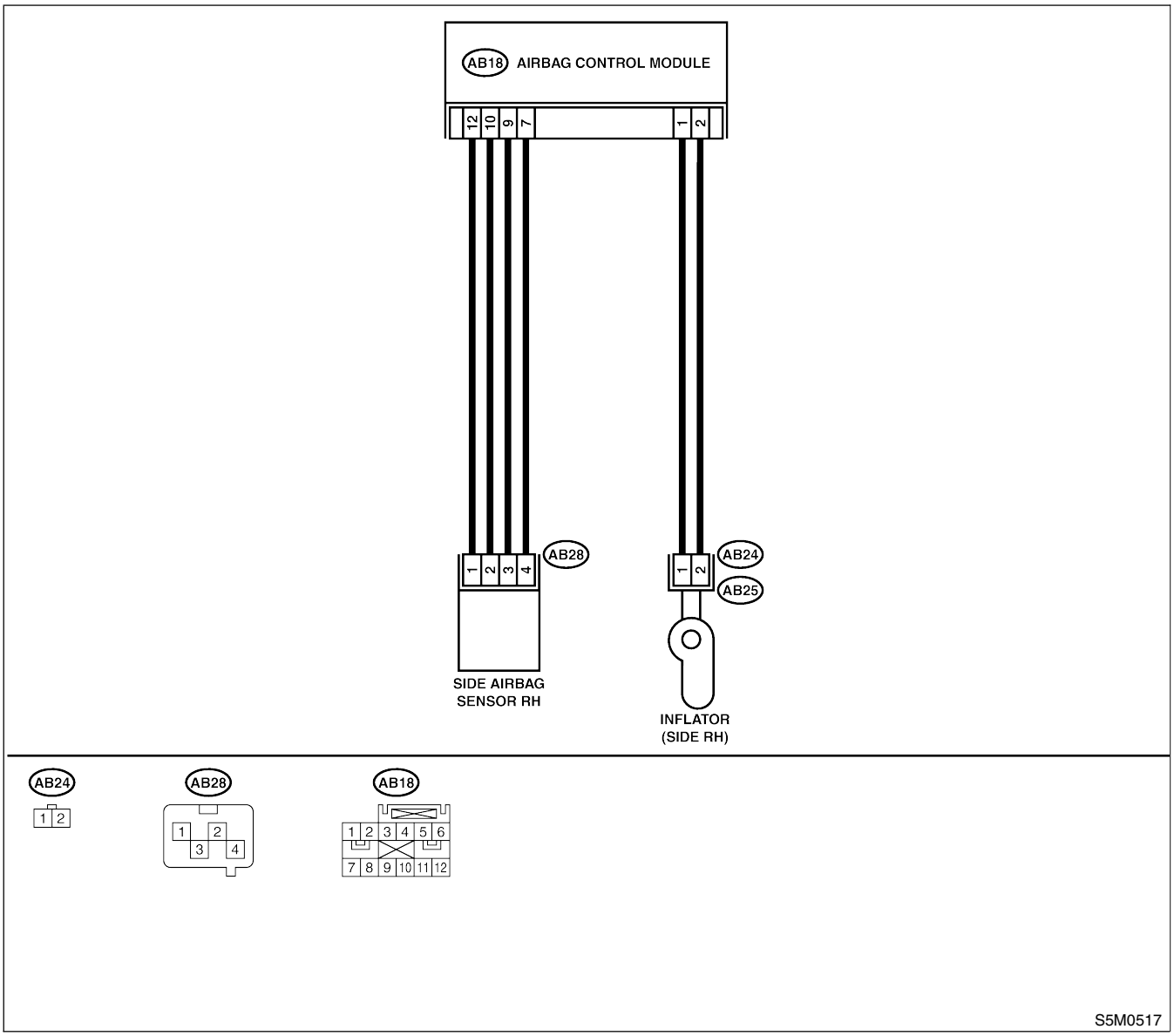
DIAGNOSIS:

- 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:



DIAGNOSTIC CHART WITH TROUBLE CODE

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: TROUBLE CODE 42 S002630D33

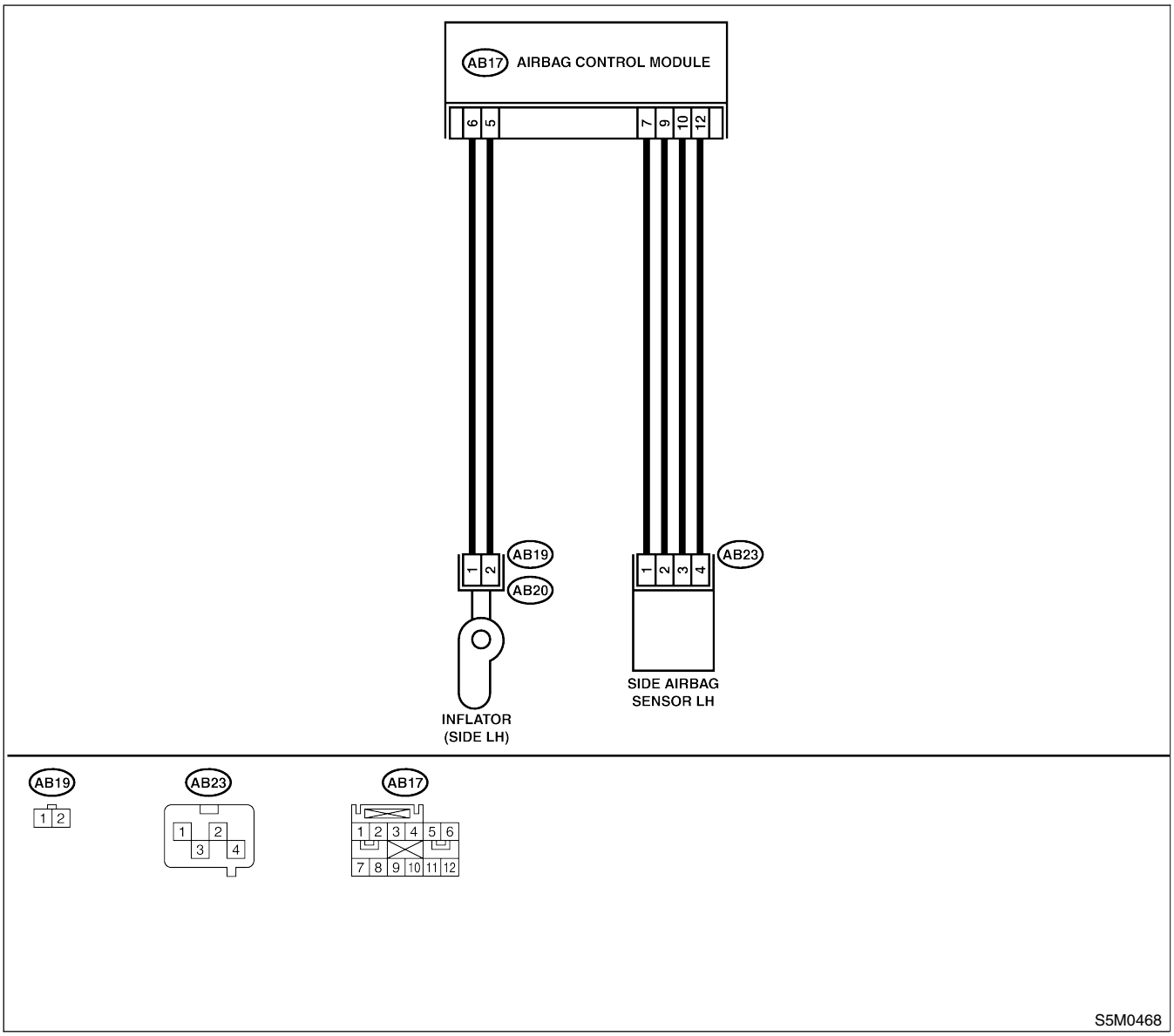
DIAGNOSIS:

- 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:



DIAGNOSTIC CHART WITH TROUBLE CODE

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: TROUBLE CODE 45 S002630D45

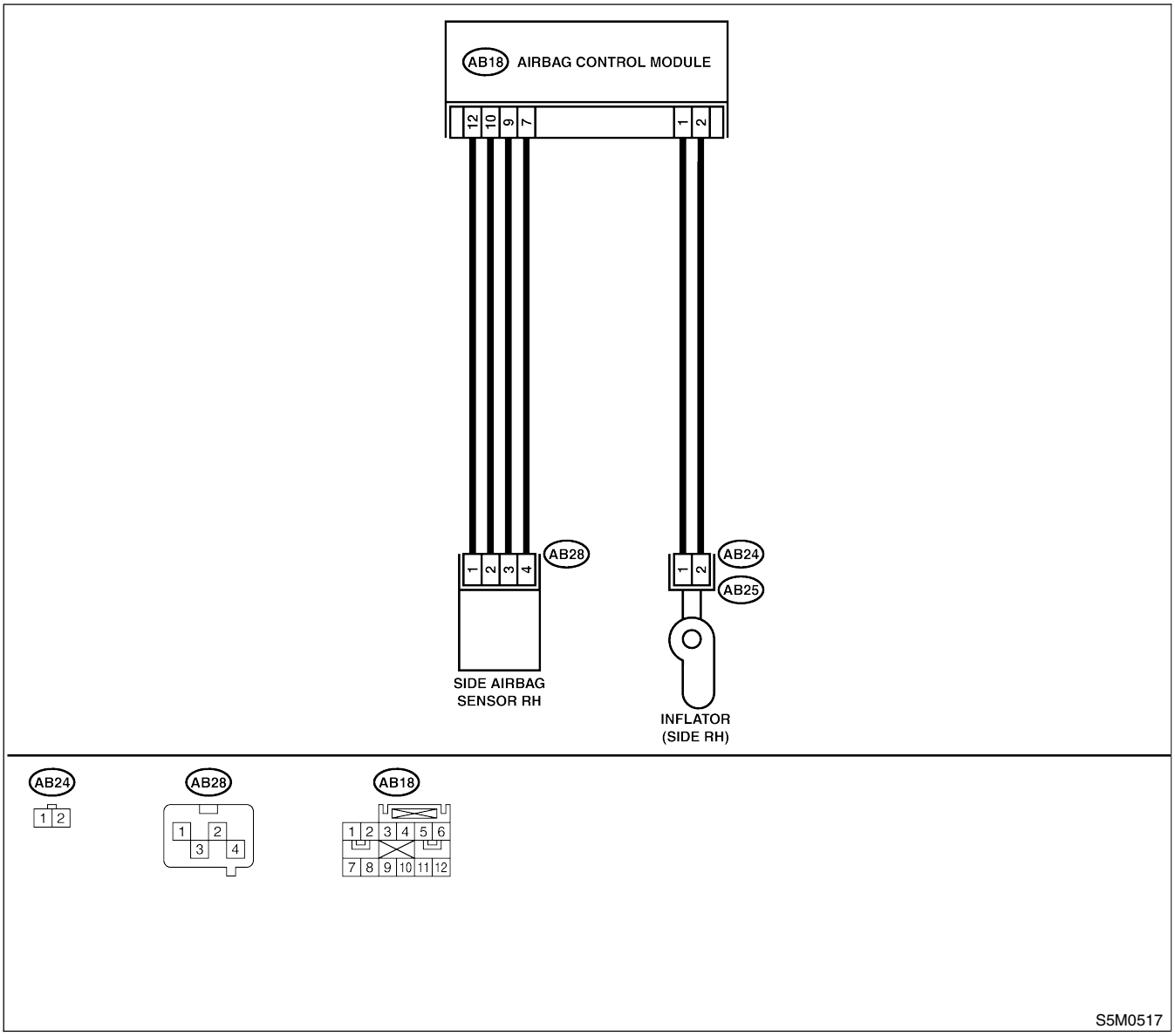
DIAGNOSIS:

- 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:



DIAGNOSTIC CHART WITH TROUBLE CODE

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: TROUBLE CODE 46 S002630D50

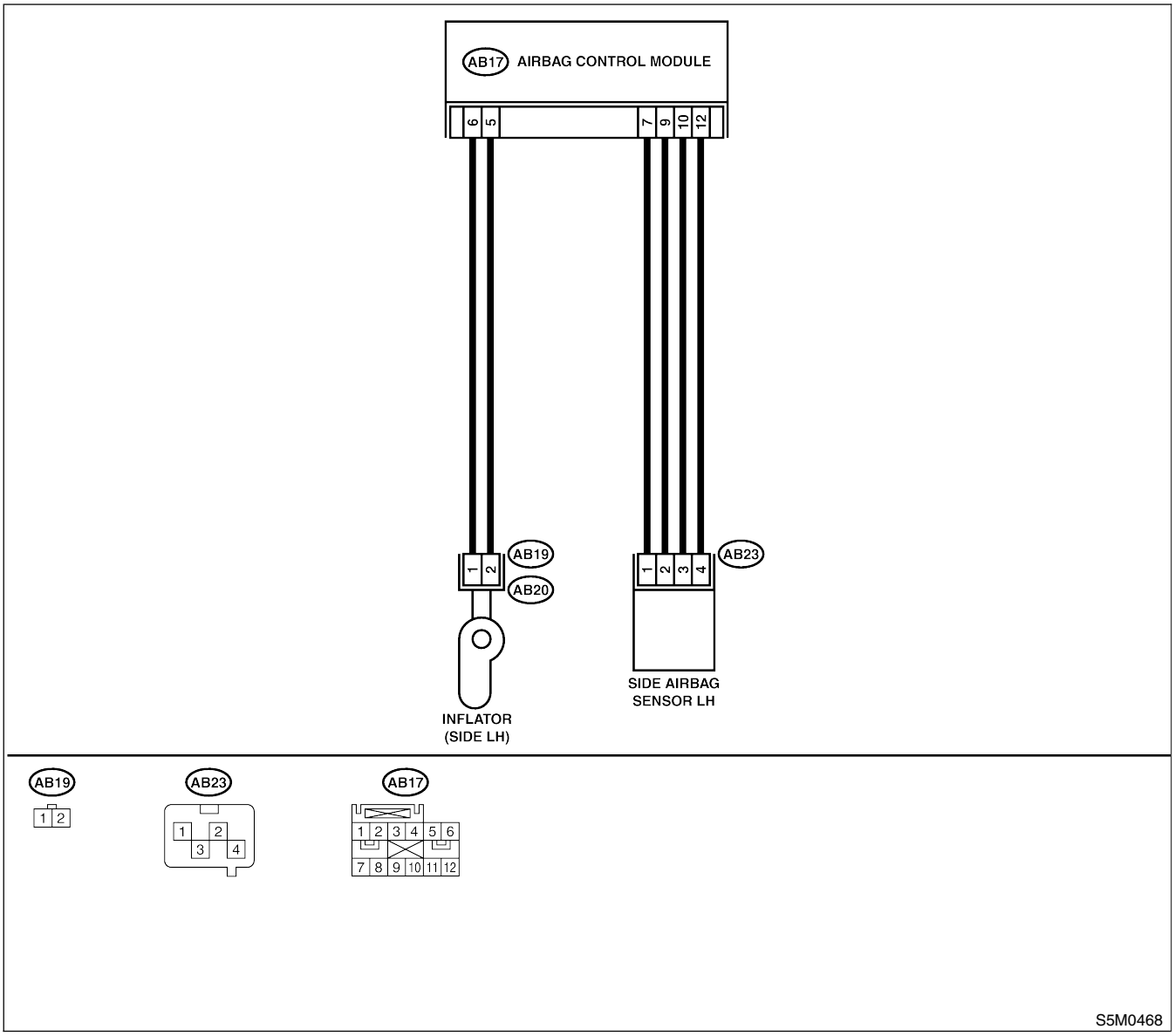
DIAGNOSIS:

- 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:



DIAGNOSTIC CHART WITH TROUBLE CODE

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: TROUBLE CODE 51 S002630D60

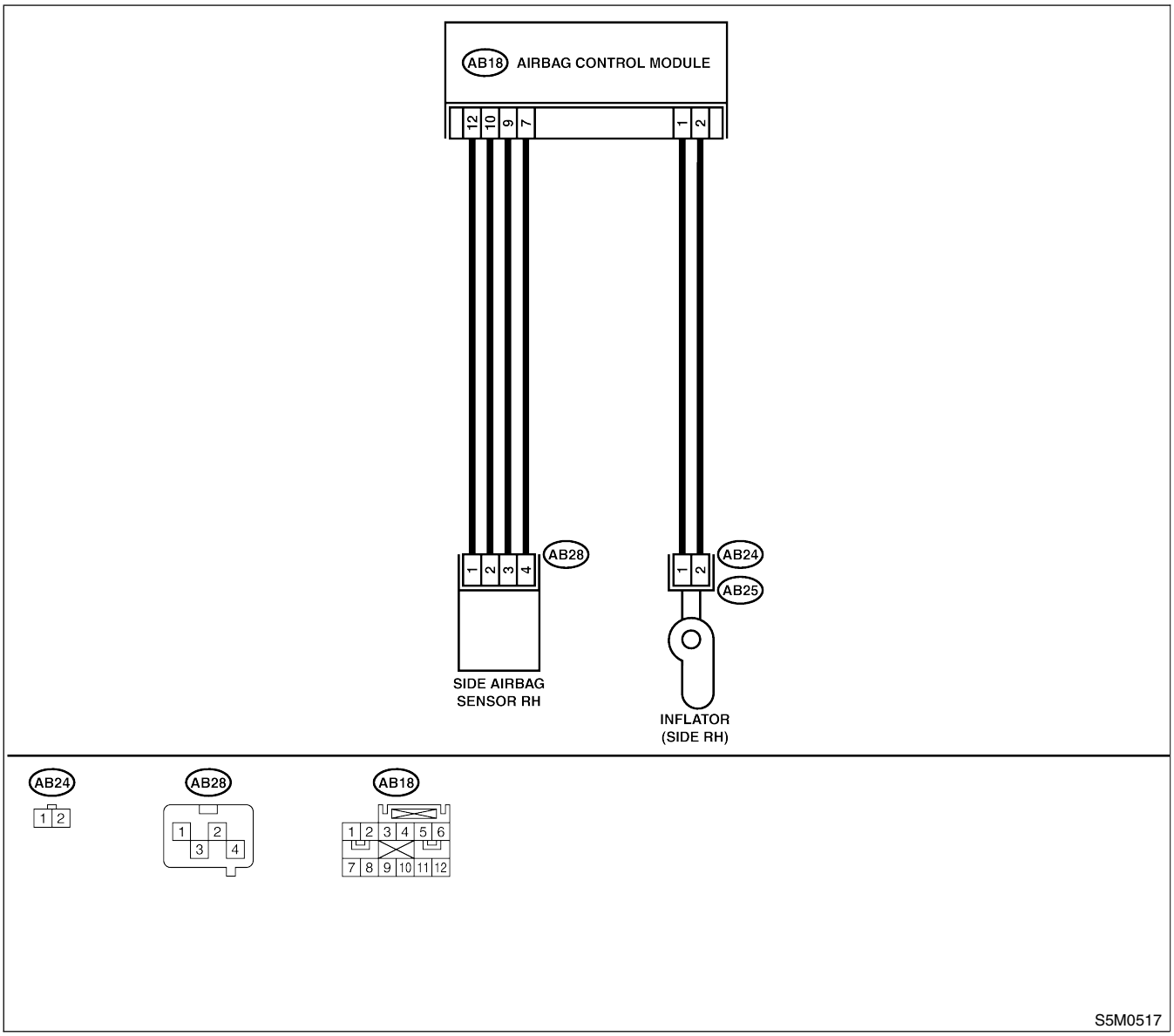
DIAGNOSIS:

- 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: TROUBLE CODE 52 S002630D64

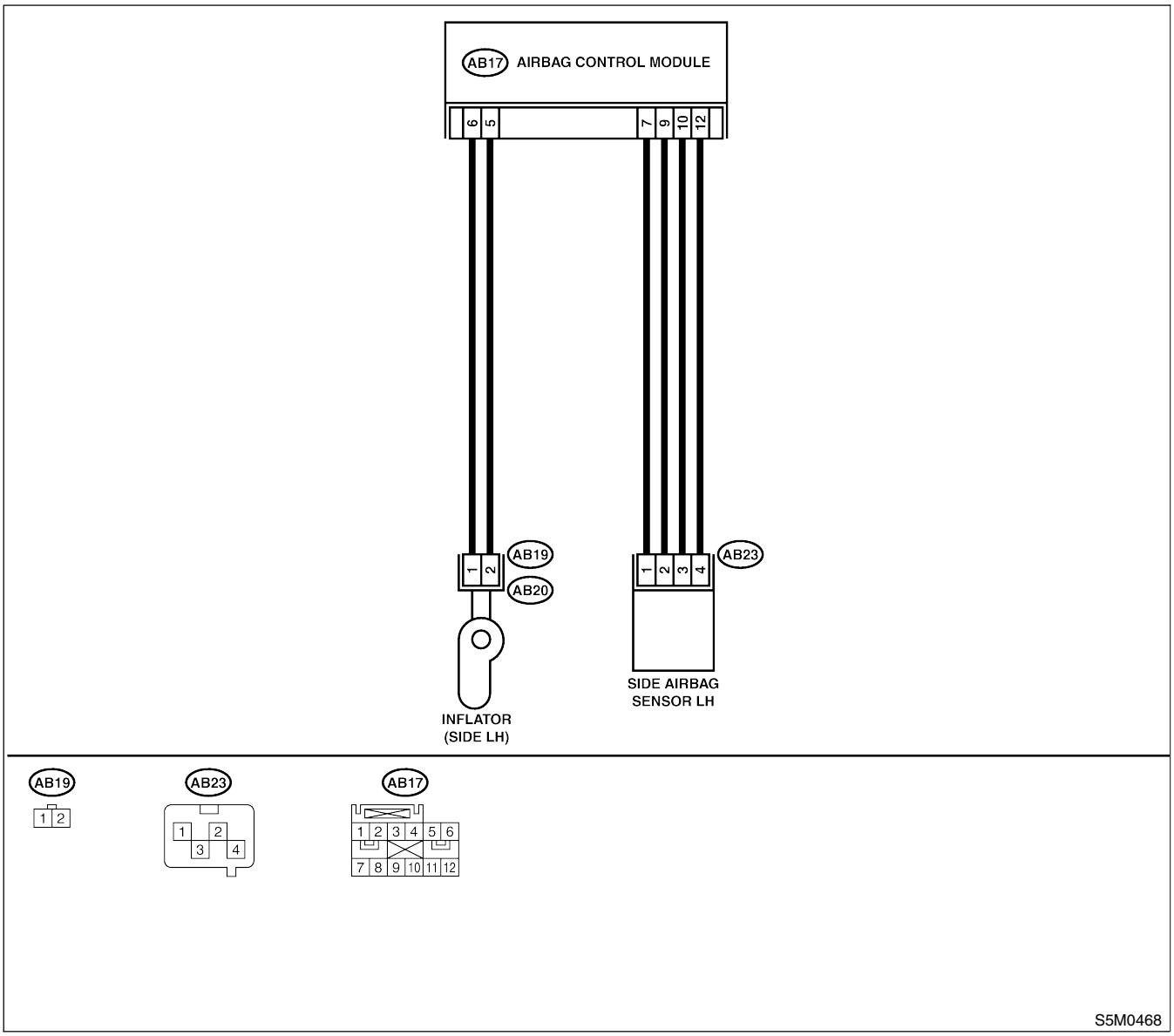
DIAGNOSIS:

- 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: TROUBLE CODE 53 *S002630D69*

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: TROUBLE CODE 54 *S002630D70*

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: TROUBLE CODE 55 *S002630D73*

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.>

CRUISE CONTROL SYSTEM (DIAGNOSTICS)

CC

Page

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6. Diagnostics Chart with Symptom (Turbo Model) 21
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9. Diagnostics Chart with Trouble Code (Non-turbo Model) 57

1. Basic Diagnostic Procedure S003501

A: PROCEDURE S003501E45

No.	Step	Check	Yes	No
1	**START DIAGNOSIS.** 1) Perform pre-inspection. <Ref. to CC-6 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. **Turbo model:** <Ref. to CC-21 SYMPTOM CHART, Diagnostics Chart with Symptom (Turbo Model).> **Non-turbo model:** <Ref. to CC-49, SYMPTOM CHART, Diagnostics Chart with Symptom (Non-turbo Model).>
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-19 Subaru Select Monitor.>	Is trouble code indicated?	Go to “Diagnostics Chart with 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. **Turbo model:** <Ref. to CC-21 SYMPTOM CHART, Diagnostics Chart with Symptom (Turbo Model).> **Non-turbo model:** <Ref. to CC-49, SYMPTOM CHART, Diagnostics Chart with Symptom (Non-turbo Model).>
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. **Turbo model:** <Ref. to CC-21 SYMPTOM CHART, Diagnostics Chart with Symptom (Turbo Model).> **Non-turbo model:** <Ref. to CC-49, SYMPTOM CHART, Diagnostics Chart with Symptom (Non-turbo Model).>

No.	Step	Check	Yes	No
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. **Turbo model:** <Ref. to CC-21 SYMPTOM CHART, Diagnostics Chart with Symptom (Turbo Model).> **Non-turbo model:** <Ref. to CC-49, SYMPTOM CHART, Diagnostics Chart with Symptom (Non-turbo Model).>
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. **Turbo model:**<Ref. to CC-21 SYMPTOM CHART, Diagnostics Chart with Symptom (Turbo Model).> **Non-turbo model:** <Ref. to CC-49, SYMPTOM CHART, Diagnostics Chart with Symptom (Non-turbo Model).>
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. **Turbo model:** <Ref. to CC-21 SYMPTOM CHART, Diagnostics Chart with Symptom (Turbo Model).> **Non-turbo model:** <Ref. to CC-49, SYMPTOM CHART, Diagnostics Chart with Symptom (Non-turbo Model).>

No.	Step	Check	Yes	No
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. **Turbo model:** <Ref. to CC-21 SYMPTOM CHART, Diagnostics Chart with Symptom (Turbo Model).> **Non-turbo model:** <Ref. to CC-49, SYMPTOM CHART, Diagnostics Chart with Symptom (Non-turbo Model).>
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. **Turbo model:** <Ref. to CC-21 SYMPTOM CHART, Diagnostics Chart with Symptom (Turbo Model).> **Non-turbo model:** <Ref. to CC-49, SYMPTOM CHART, Diagnostics Chart with Symptom (Non-turbo Model).>

2. General Description S003001

A: CAUTION S003001A03

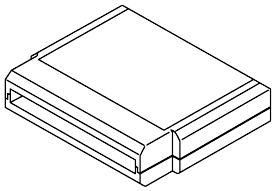
1. SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG" S003001A0301

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

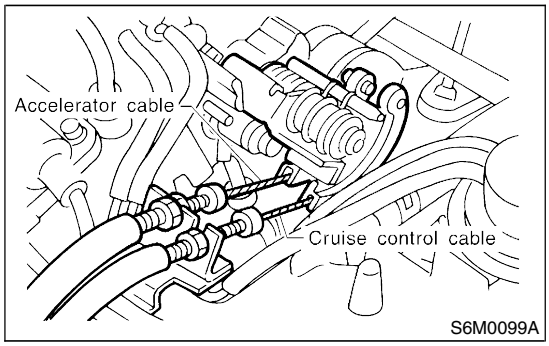
1. BATTERY S003001A1002

Measure battery voltage and specific gravity of electrolyte.

Standard voltage:
12 V, or more

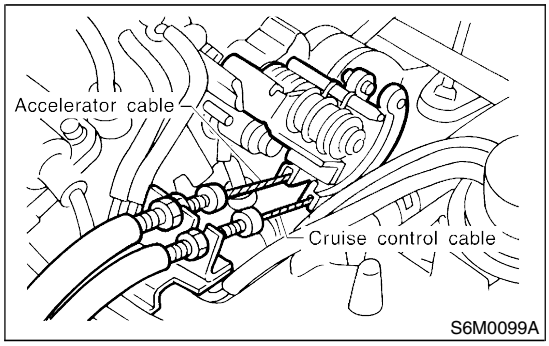
Specific gravity:
Above 1.260

2. CRUISE CONTROL CABLE S003001A1003



Check the cruise control cable installation.
If NG, install the cable securely.

3. ACCELERATOR CABLE S003001A1004

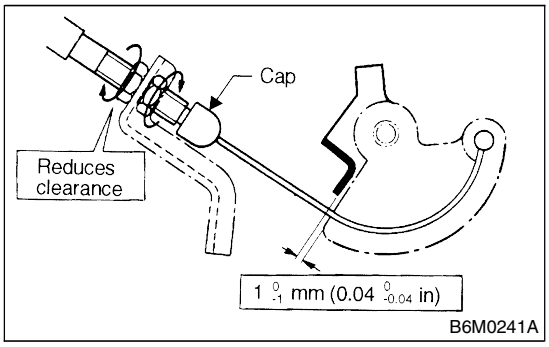


Check movement of the accelerator cable when the cruise control throttle is moved by hand.
If NG, check throttle cam.

4. THROTTLE CAM S003001A1005

Check that the throttle cam moves smoothly.
If NG, repair throttle cam.

5. CABLE FREE PLAY S003001A1006



Check that the throttle cam-to-lever clearance is within specifications.

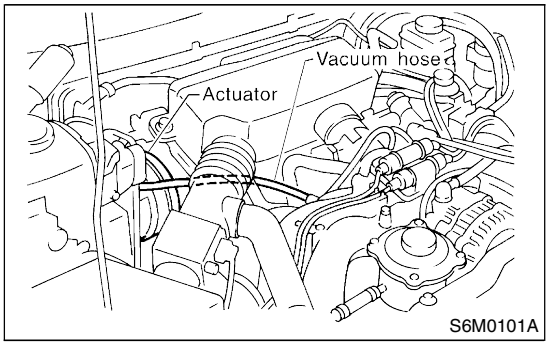
Throttle cam-to-lever clearance:
0 — 1 mm (0 — 0.04 in)

If NG, adjust the clearance with the adjust nut.

NOTE:
Check that the cap is positioned in the groove.

6. VACUUM HOSE (NON-TURBO MODEL)

S003001A1009



Check vacuum hose (which connects actuator and intake manifold).
If NG, replace vacuum hose.

7. ACTUATOR (NON-TURBO MODEL) S003001A1010

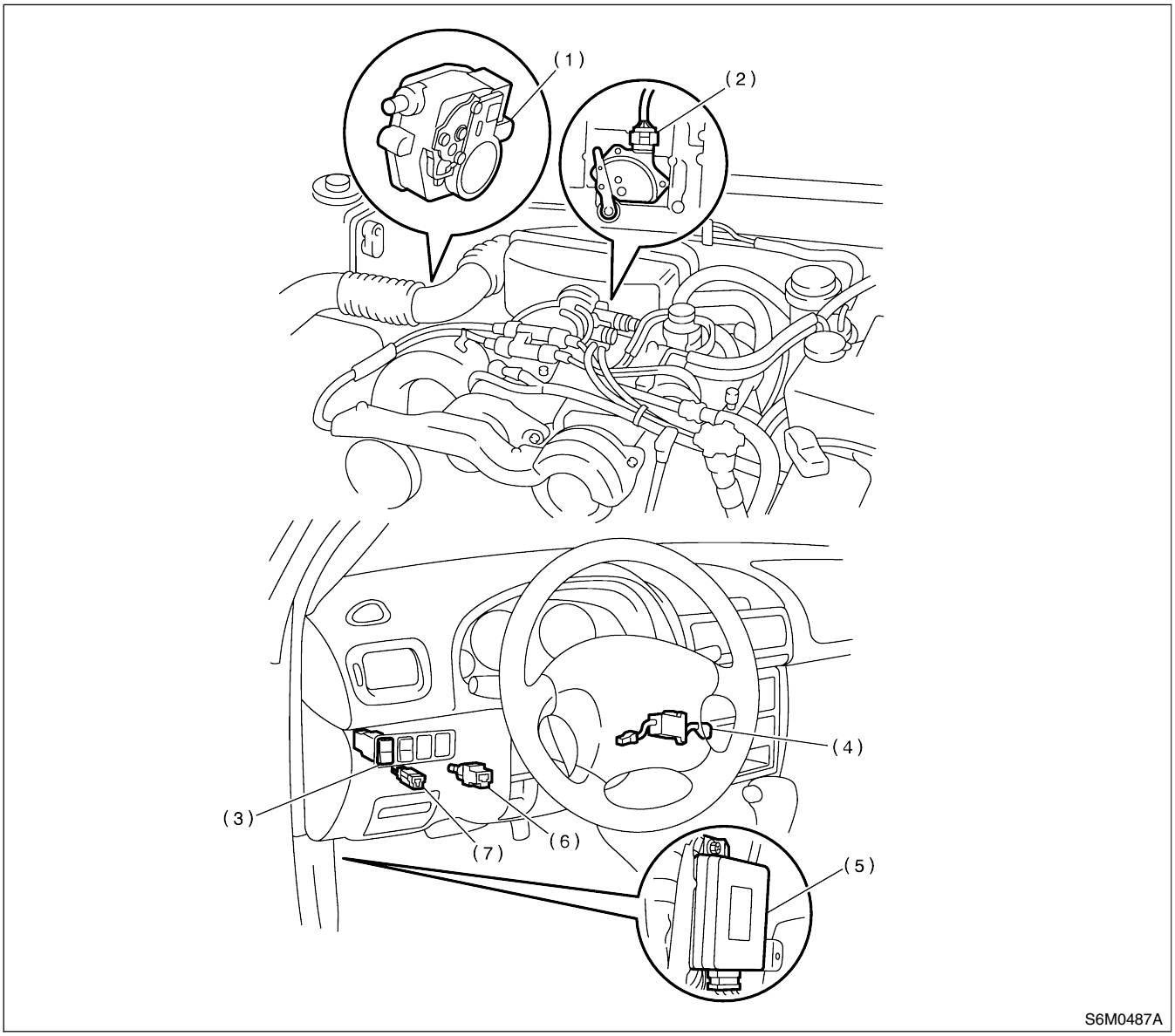
No.	Step	Check	Yes	No
1	**MEASURE RESISTANCE OF VALVE.** 1) Disconnect connector from actuator. 2) Measure resistance between terminals of actuator. ***Terminals*** ***No. 2 — No. 3:***	Is resistance less than 22 Ω?	Go to step **2**.	Replace actuator. <Ref. to CC-7, REMOVAL, Actuator (Non-turbo Model).>
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-7, REMOVAL, Actuator (Non-turbo Model).>
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-7, REMOVAL, Actuator (Non-turbo Model).>
4	**CHECK FOR LEAKAGE AND STICKING OF VALVES.** 1) Disconnect connector from actuator. 2) Disconnect vacuum hose from actuator. 3) Connect 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-7, REMOVAL, Actuator (Non-turbo Model).>
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-7, REMOVAL, Actuator (Non-turbo Model).>
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-7, REMOVAL, Actuator (Non-turbo Model).>
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-7, REMOVAL, Actuator (Non-turbo Model).>
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-7, REMOVAL, Actuator (Non-turbo Model).>

3. Electrical Components Location S003507

A: LOCATION S003507A13

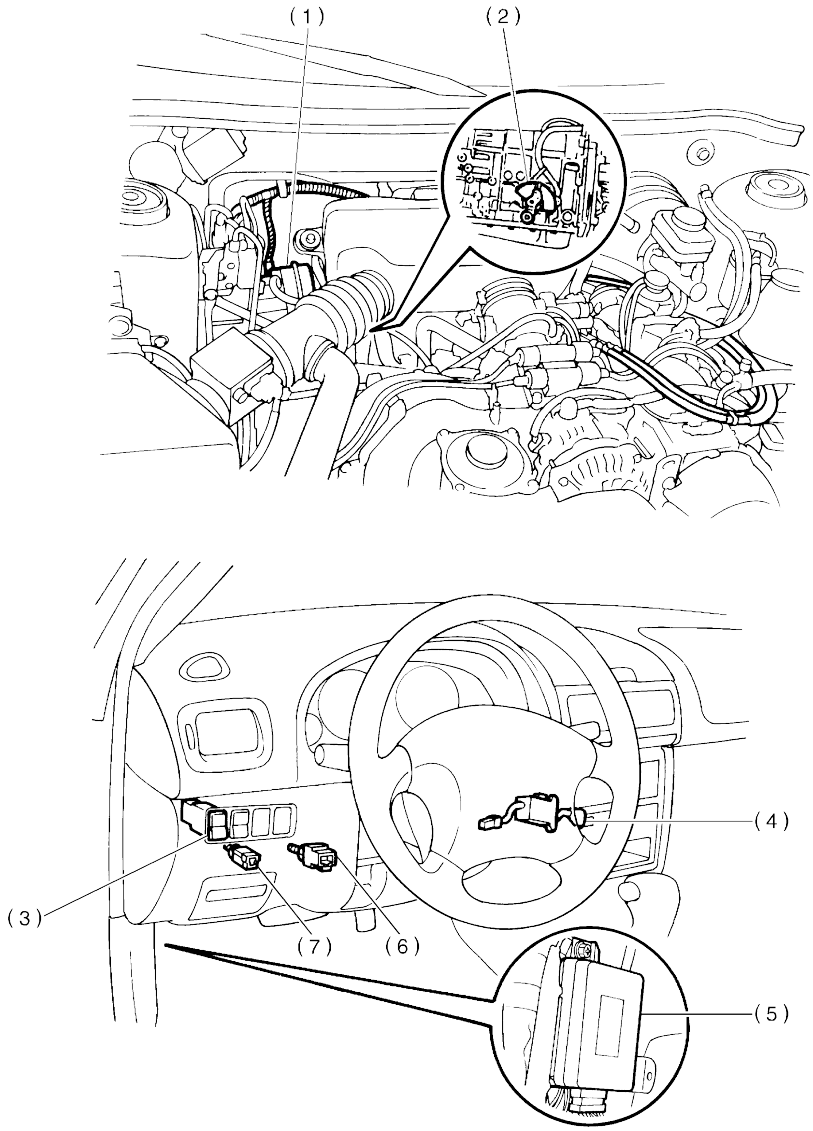
NOTE:
Electrical component locations are for LHD vehicles.
Cruise control actuator and cruise control module locations for RHD vehicles are symmetrically opposite.

1. TURBO MODEL S003507A1301



(1) Actuator
(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)

2. NON-TURBO MODEL S003507A1302

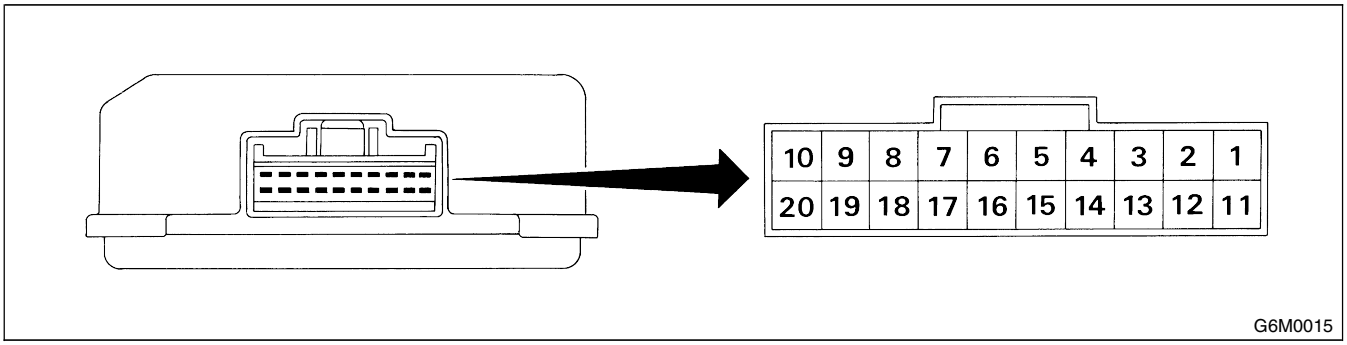


(1) Actuator (with valves)
(2) Inhibitor switch (AT)
(3) Cruise control main switch
(4) Cruise control command switch
(5) Cruise control module
(6) Stop and brake switch
(7) Clutch switch (MT)

4. Cruise Control Module I/O Signal S003515

A: ELECTRICAL SPECIFICATION S003515A08

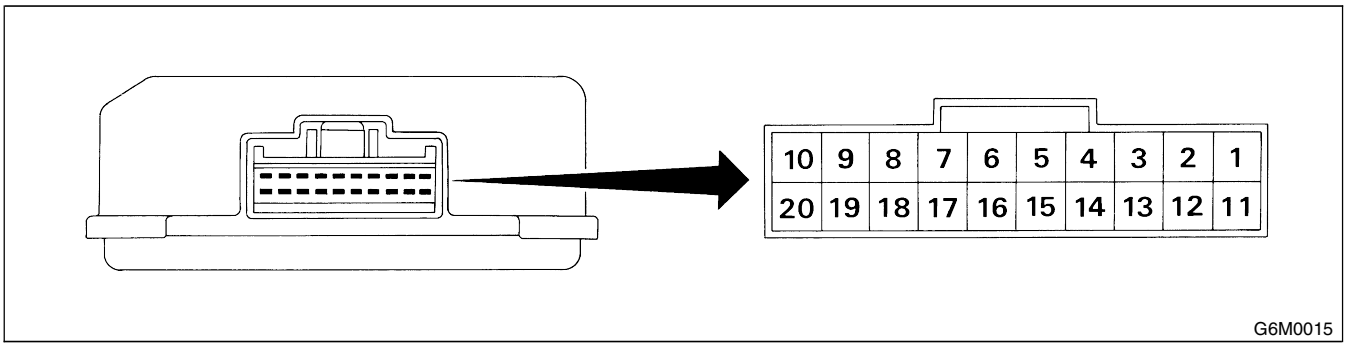
1. TURBO MODEL S003515A0801



Content	Terminal No.	Measuring conditions and I/O signals (ignition switch ON and engine idling)
Main light	1	• Battery voltage is present when main switch is turned OFF. • “0” volt is present when main switch is turned ON.
Inhibitor switch (AT)	4	• Battery voltage is present when selector lever is other than “P” or “N” position. • “0” volt is present when selector lever is set to “P” or “N” position.
Motor B	5	• ON-and-OFF (“0”-and-battery voltage) operation is alternately repeated while cruise control is operating. • “0” volt is present when main switch is turned OFF.
Ground	6	—
Motor A	7	• ON-and-OFF (“0”-and-battery voltage) operation is alternately repeated while cruise control is operating. • “0” volt is present when main switch is turned OFF.
RESUME/ACCEL switch	9	• Battery voltage is present when command switch is turned to RESUME/ACCEL position. • “0” volt is present when command switch is released.
SET/COAST switch	10	• Battery voltage is present when command switch is turned to SET/COAST position. • “0” volt is present when command switch is released.
Main power supply	11	• Battery voltage is present when main power is turned ON. • “0” volt is present when main power is turned OFF.
Ignition switch	12	• Battery voltage is present when ignition switch is turned ON. • “0” volt is present when ignition switch is turned OFF.
Motor C	13	• ON-and-OFF (“0”-and-battery voltage) operation is alternately repeated while cruise control is operating. • “0” volt is present when main switch is turned OFF.
Motor clutch	14	• ON-and-OFF (“0”-and-battery voltage) operation is alternately repeated while cruise control is operating. • “0” volt is present when vehicle is stopped.
Cruise control main switch	15	• Battery voltage is present during pressing the cruise control main switch, and then battery voltage is present while main switch is turned ON. • “0” volt is present when main switch is turned OFF.
Brake switch	16	Leave clutch pedal released (MT), while cruise control main switch is turned ON. Then check that; • Battery voltage is present when brake pedal is released. • “0” volt is present when brake pedal is depressed. Additionally only in MT vehicle, keep the cruise control main switch to ON and leave brake pedal released. Then check that; • Battery voltage is present when clutch pedal is released. • “0” volt is present when clutch pedal is depressed.

Content	Terminal No.	Measuring conditions and I/O signals (ignition switch ON and engine idling)
Data link connector	17	—
Data link connector	18	—
Vehicle speed sensor (MT) TCM (AT)	19	Lift-up the vehicle until all four wheels are raised off ground, and then rotate any wheel manually. Approx. “5” and “0” volt pulse signals are alternately input to cruise control module.
Stop light switch	20	Turn ignition switch to OFF. Then check that; ● Battery voltage is present when brake pedal is depressed. ● “0” volt is present when brake pedal is released.
NOTE: Voltage at terminals 5, 7, 13 and 14 cannot be checked unless vehicle is driving by cruise control operation.		

2. NON-TURBO MODEL S003515A0802



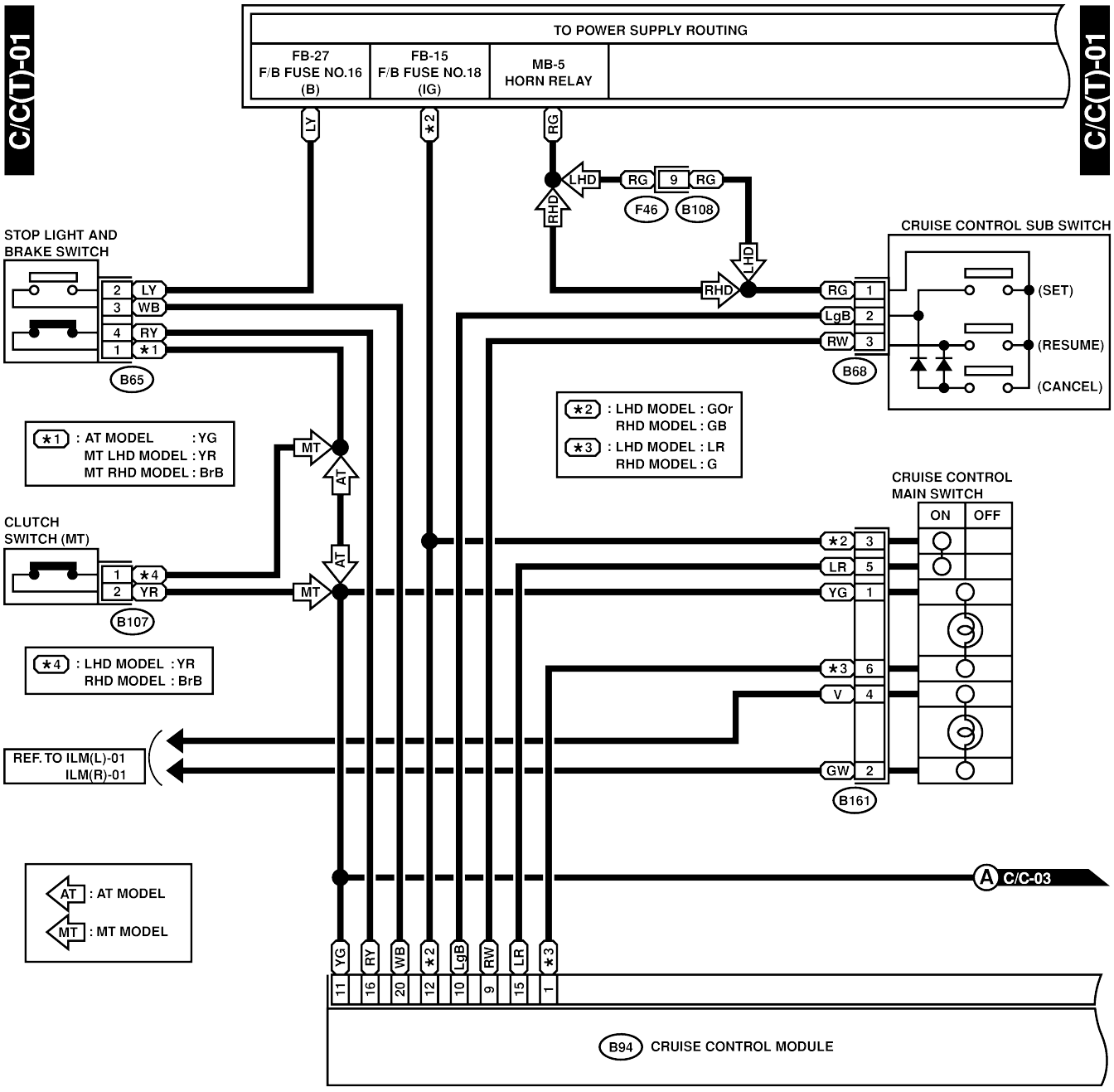
Content	Terminal No.	Measuring conditions and I/O signals (ignition switch ON and engine idling)
Vent valve	1	● Power supply is ON when vehicle is stopped. ● ON-and-OFF (“0”-and-battery voltage) operation is alternately repeated while cruise control is operating.
Safety valve	2	● Power supply is ON when 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.

CRUISE CONTROL MODULE I/O SIGNAL

Content	Terminal No.	Measuring conditions and I/O signals (ignition switch ON and engine idling)
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	—
Check connector/ OBD-II service connector	14	—
Check connector/ OBD-II service 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 driving by cruise control operation.		

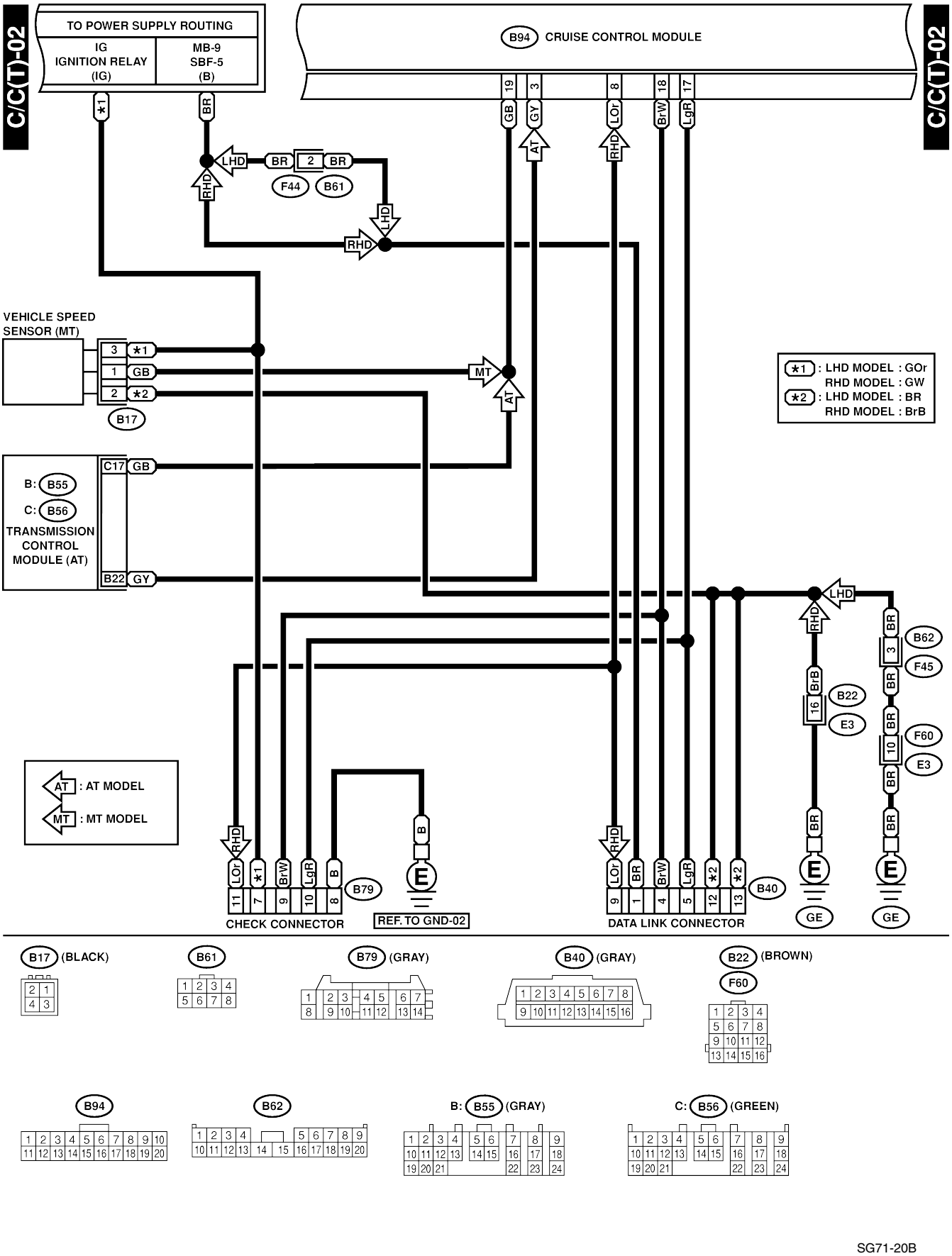
B: SCHEMATIC S003515A21

1. CRUISE CONTROL TURBO MODEL S003515A2107

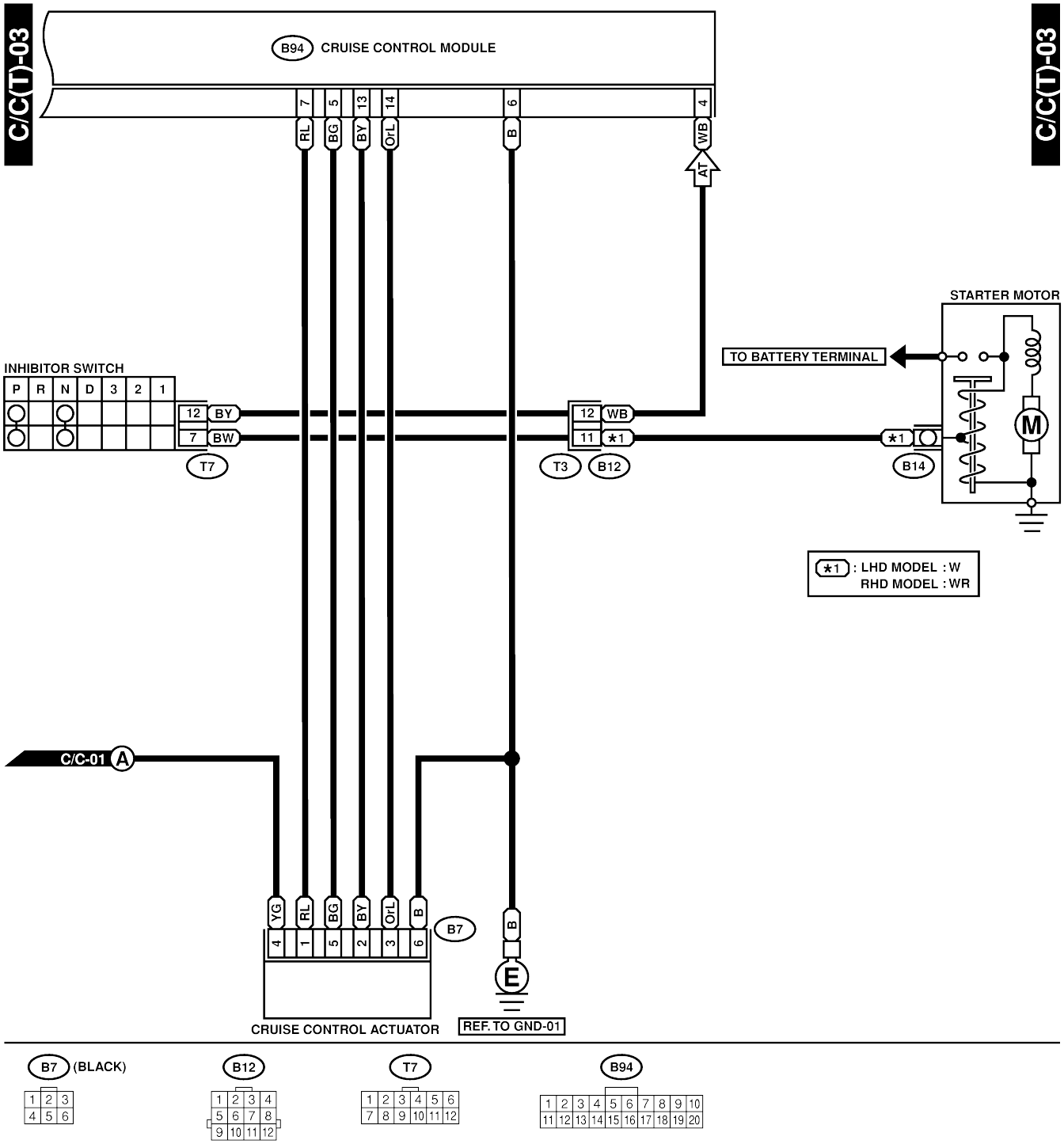


SG71-20A

CRUISE CONTROL MODULE I/O SIGNAL



SG71-20B

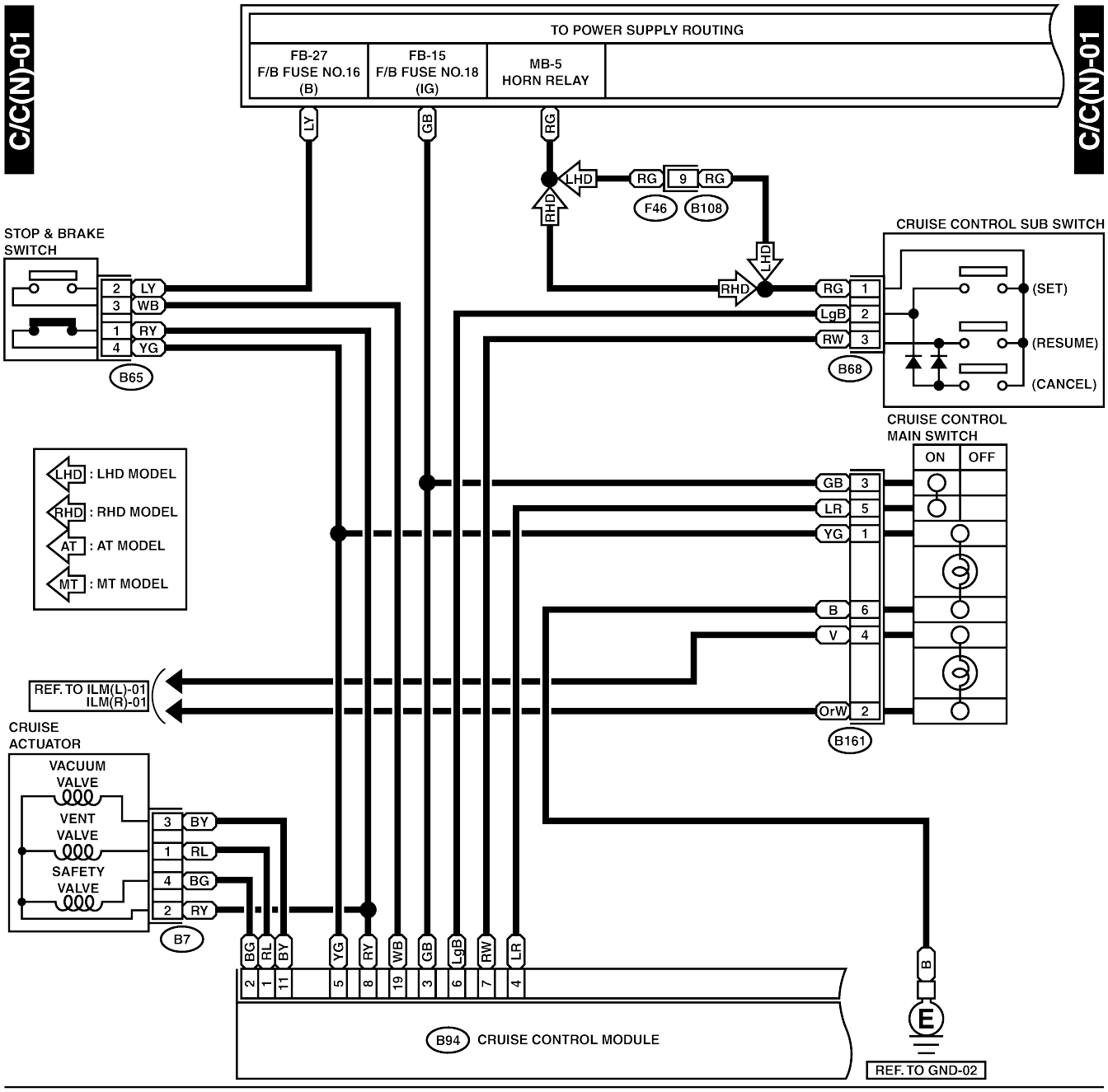

C/C(T)-03
B94 CRUISE CONTROL MODULE
7 5 13 14 6 4
RL BG BY OrL B WB
AT
C/C(T)-03
STARTER MOTOR
TO BATTERY TERMINAL
INHIBITOR SWITCH
P R N D 3 2 1
12 BY
7 BW
T7
12 WB
11 *1
T3 B12
*1
B14
M
*1 : LHD MODEL : W
RHD MODEL : WR
C/C-01 A
YG RL BG BY OrL B
4 1 5 2 3 6
B7
B
E
CRUISE CONTROL ACTUATOR
REF. TO GND-01

B7 (BLACK)
1 2 3
4 5 6
B12
1 2 3 4
5 6 7 8
9 10 11 12
T7
1 2 3 4 5 6
7 8 9 10 11 12
B94
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20

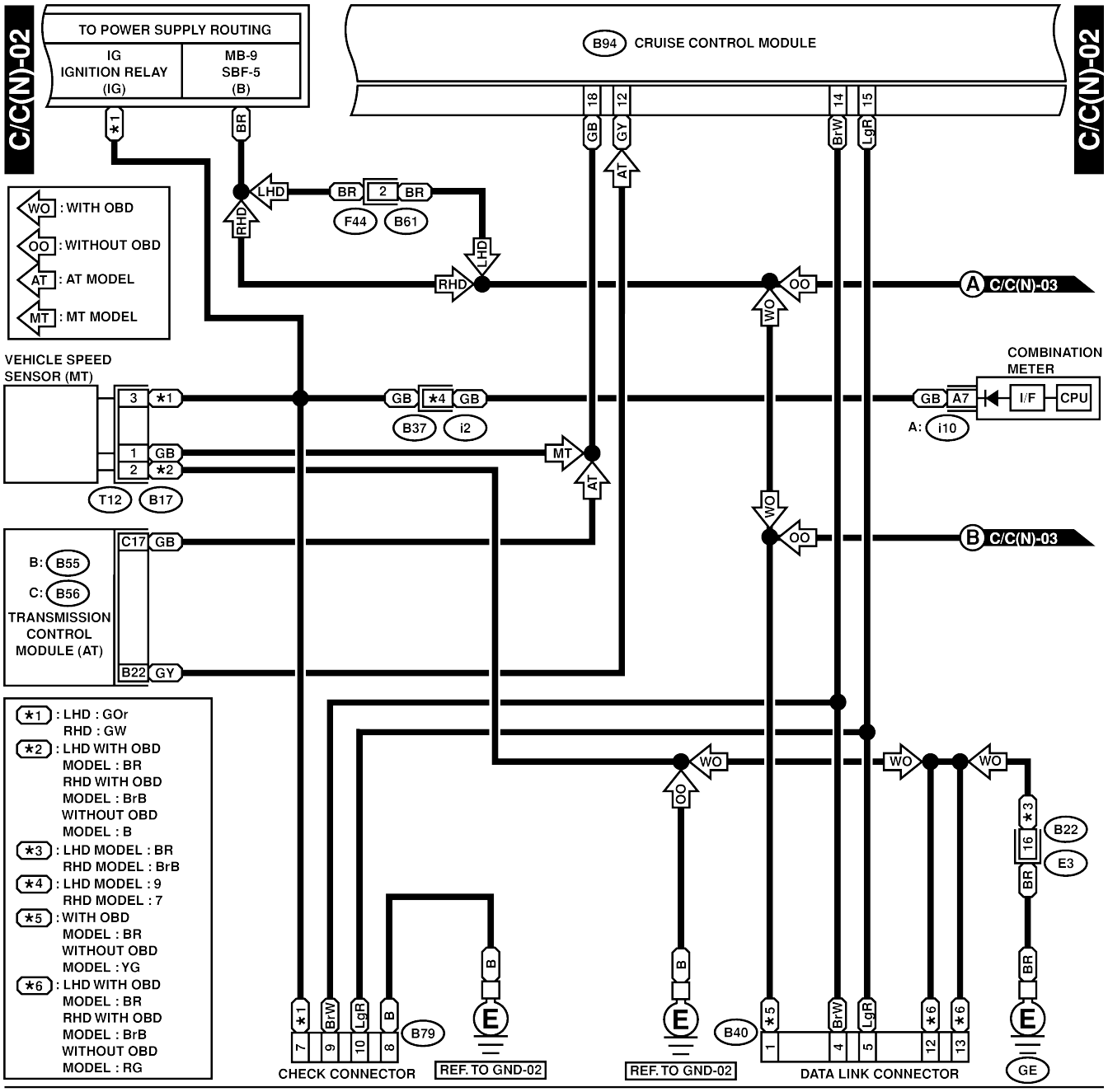
SG71-20C

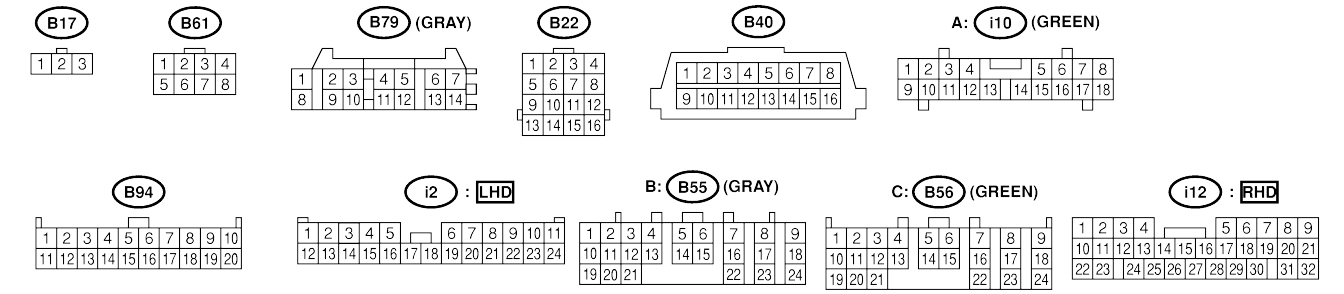
2. CRUISE CONTROL NON-TURBO MODEL

S003515A2108



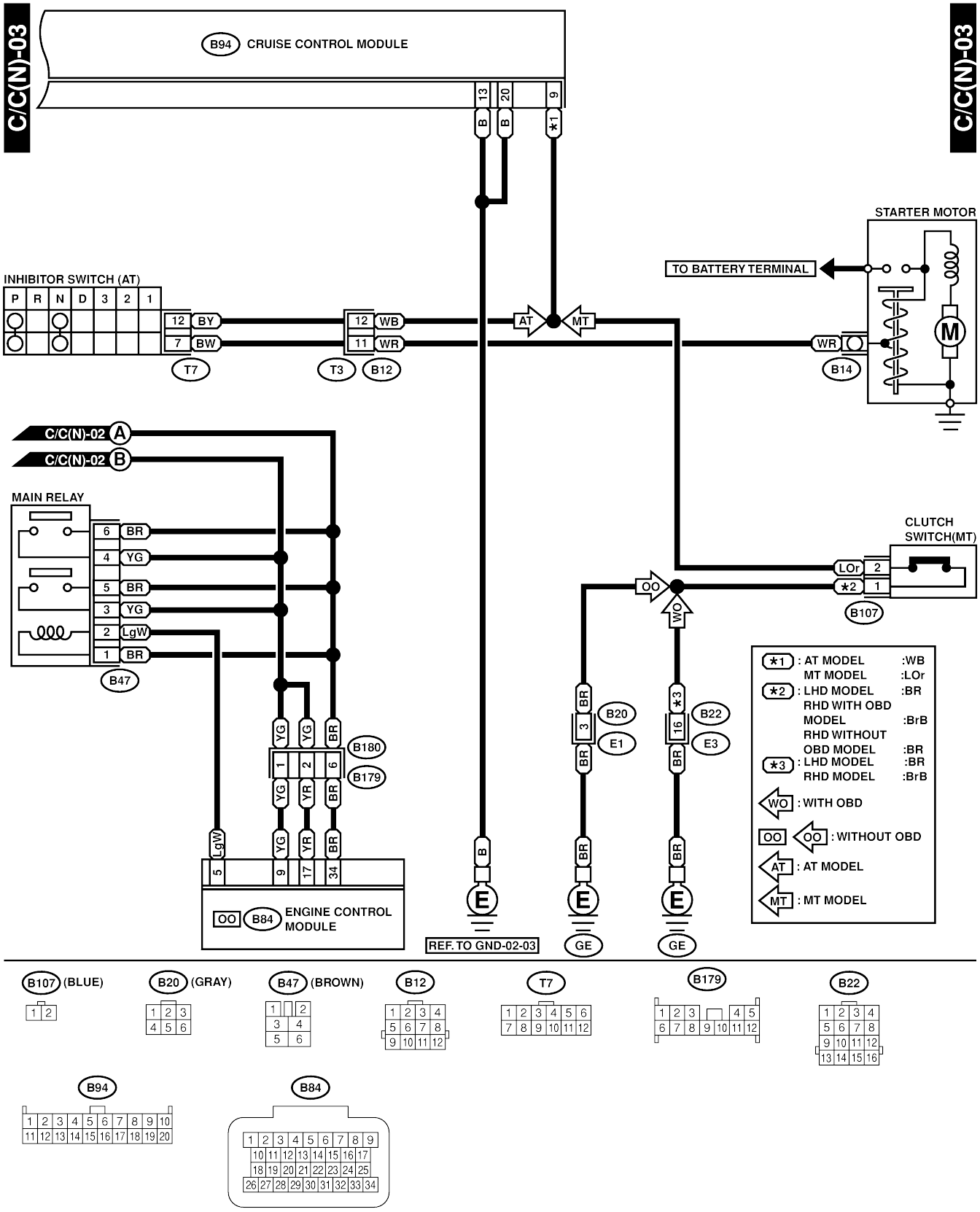
SG71-21A


C/C(N)-02
TO POWER SUPPLY ROUTING
IG
IGNITION RELAY
(IG)
MB-9
SBF-5
(B)
B94 CRUISE CONTROL MODULE
WO : WITH OBD
OO : WITHOUT OBD
AT : AT MODEL
MT : MT MODEL
VEHICLE SPEED SENSOR (MT)
T12
B17
TRANSMISSION CONTROL MODULE (AT)
B: B55
C: B56
C17
B22
F44
B61
B37
i2
A: i10
COMBINATION METER
I/F
CPU
A7
A C/C(N)-03
B C/C(N)-03
CHECK CONNECTOR
B79
REF. TO GND-02
B40
DATA LINK CONNECTOR
E3
GE
*1 : LHD : GOr
RHD : GW
*2 : LHD WITH OBD
MODEL : BR
RHD WITH OBD
MODEL : BrB
WITHOUT OBD
MODEL : B
*3 : LHD MODEL : BR
RHD MODEL : BrB
*4 : LHD MODEL : 9
RHD MODEL : 7
*5 : WITH OBD
MODEL : BR
WITHOUT OBD
MODEL : YG
*6 : LHD WITH OBD
MODEL : BR
RHD WITH OBD
MODEL : BrB
WITHOUT OBD
MODEL : RG


B17
B61
B79 (GRAY)
B22
B40
A: i10 (GREEN)
B94
i2 : LHD
B: B55 (GRAY)
C: B56 (GREEN)
i12 : RHD

SG71-21B

CRUISE CONTROL MODULE I/O SIGNAL



SG71-21C

5. Subaru Select Monitor S003503

A: OPERATION S003503A16

1. GENERAL S003503A1604

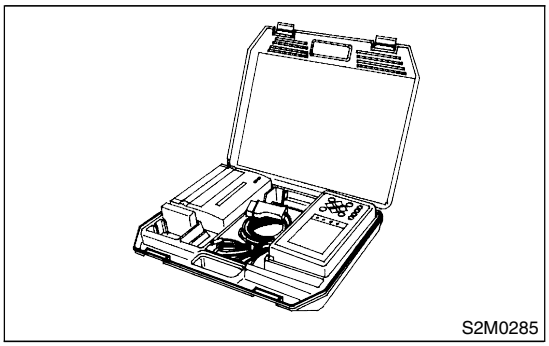
The on-board diagnosis function of the cruise control system uses an external Subaru Select Monitor.
The on-board diagnosis function operates in two categories, which are used depending on the type of problems;
1) Cruise cancel conditions diagnosis
   (1) This category of diagnosis requires actual vehicle 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.

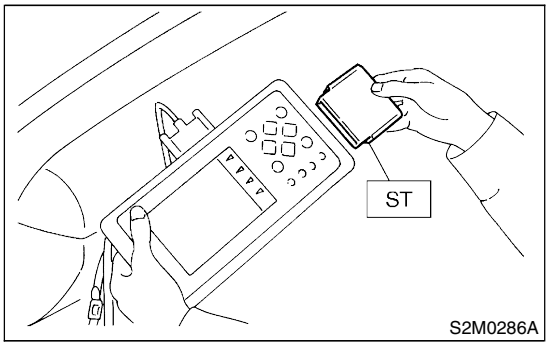
2) Real-time diagnosis
The real-time diagnosis function is used to determine whether or not the input signal system is in good order, according to signal emitted from switches, sensors, etc.
   (1) Vehicle cannot be driven at cruise speed because problem occurs in the cruise control system or its associated circuits.
   (2) Monitor the signal conditions from switches and sensors.

2. CRUISE CANCEL CONDITIONS DIAGNOSIS S003503A1605

1) Prepare Subaru Select Monitor kit.

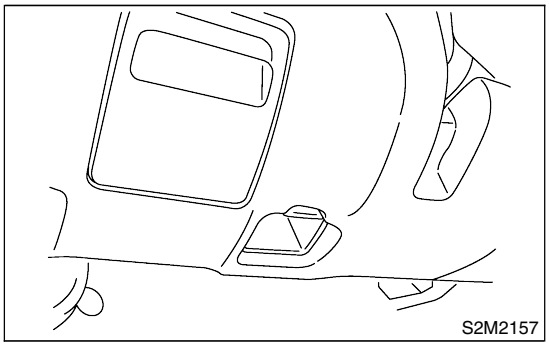

S2M0285

2) Connect diagnosis cable to Subaru Select Monitor.
3) Insert cartridge into Subaru Select Monitor.



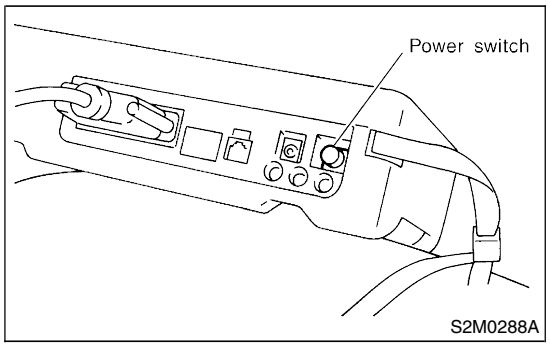
S2M0286A

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.



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-37 LIST OF DIAGNOSTIC TROUBLE CODE, Diagnostics Chart with Trouble Code (Turbo Model).> or <Ref. to CC-57, LIST OF DIAGNOSTIC TROUBLE CODE, Diagnostics Chart with Trouble Code (Non-turbo Model).>

6. Diagnostics Chart with Symptom (Turbo Model) S003749

A: SYMPTOM CHART S003749F22

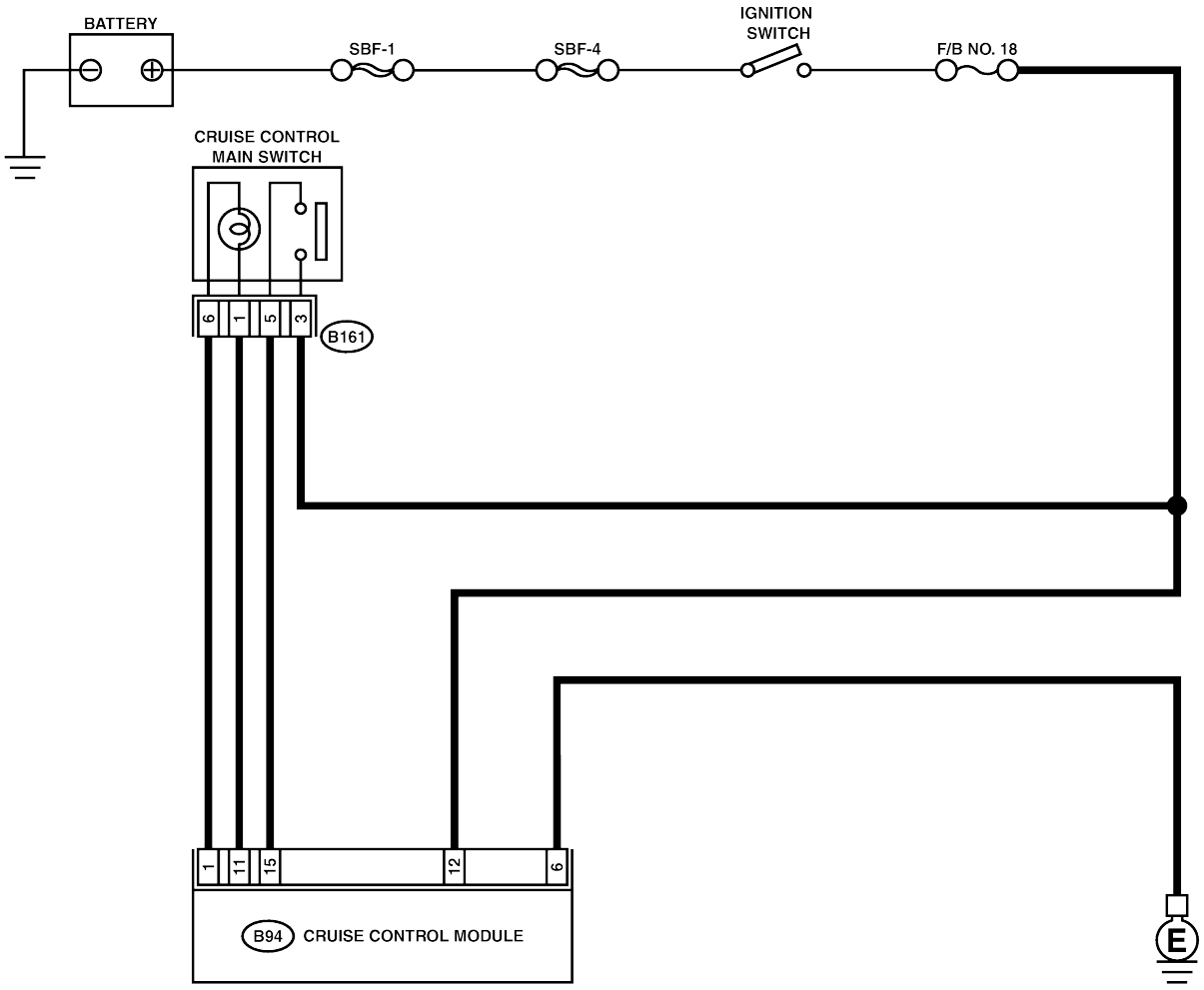
	Symptom	Repair area	Reference
1	Cruise control main switch is not turned ON.	(1) Check power supply.	<Ref. to CC-23 CHECK POWER SUPPRY, Diagnostics Chart with Symptom (Turbo Model).>
		(2) Check cruise control main switch.	<Ref. to CC-25 CHECK CRUISE CONTROL MAIN SWITCH, Diagnostics Chart with Symptom (Turbo Model).>
2	Cruise control cannot be set.	(1) Check SET/COAST switch.	<Ref. to CC-29 CHECK CRUISE CONTROL COMMAND SWITCH, Diagnostics Chart with Symptom (Turbo Model).>
		(2) Check stop light switch and brake switch.	<Ref. to CC-31 CHECK STOP LIGHT SWITCH AND BRAKE SWITCH, Diagnostics Chart with Symptom (Turbo Model).>
		(3) Check clutch switch (MT).	<Ref. to CC-33 CHECK CLUTCH SWITCH (MT), Diagnostics Chart with Symptom (Turbo Model).>
		(4) Check inhibitor switch (AT).	<Ref. to CC-35 CHECK INHIBITOR SWITCH (AT), Diagnostics Chart with Symptom (Turbo Model).>
		(5) Check vehicle speed sensor.	<Ref. to CC-39 DIAGNOSTIC TROUBLE CODE 22 — VEHICLE SPEED SENSOR —, Diagnostics Chart with Trouble Code (Turbo Model).>
		(6) Check motor drive system.	<Ref. to CC-43 DIAGNOSTIC TROUBLE CODE 35 AND 36 — ACTUATOR MOTOR — , Diagnostics Chart with Trouble Code (Turbo Model).>
		(7) Check motor clutch drive system.	<Ref. to CC-45 DIAGNOSTIC TROUBLE CODE 37 — ACTUATOR MOTOR CLUTCH — , Diagnostics Chart with Trouble Code (Turbo Model).>
3	Vehicle speed is not held within set speed ±3 km/h (±2 MPH).	(1) Check vehicle speed sensor.	<Ref. to CC-39 DIAGNOSTIC TROUBLE CODE 22 — VEHICLE SPEED SENSOR —, Diagnostics Chart with Trouble Code (Turbo Model).>
		(2) Check motor drive system.	<Ref. to CC-43 DIAGNOSTIC TROUBLE CODE 35 AND 36 — ACTUATOR MOTOR — , Diagnostics Chart with Trouble Code (Turbo Model).>
		(3) Check motor clutch drive system.	<Ref. to CC-45 DIAGNOSTIC TROUBLE CODE 37 — ACTUATOR MOTOR CLUTCH — , Diagnostics Chart with Trouble Code (Turbo Model).>
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-29 CHECK CRUISE CONTROL COMMAND SWITCH, Diagnostics Chart with Symptom (Turbo Model).>
		(2) Check motor drive system.	<Ref. to CC-43 DIAGNOSTIC TROUBLE CODE 35 AND 36 — ACTUATOR MOTOR — , Diagnostics Chart with Trouble Code (Turbo Model).>
		(3) Check motor clutch drive system.	<Ref. to CC-45 DIAGNOSTIC TROUBLE CODE 37 — ACTUATOR MOTOR CLUTCH — , Diagnostics Chart with Trouble Code (Turbo Model).>
5	Vehicle speed does not decrease after SET/COAST switch has been pressed.	(1) Check SET/COAST switch.	<Ref. to CC-29 CHECK CRUISE CONTROL COMMAND SWITCH, Diagnostics Chart with Symptom (Turbo Model).>
		(2) Check motor drive system.	<Ref. to CC-43 DIAGNOSTIC TROUBLE CODE 35 AND 36 — ACTUATOR MOTOR — , Diagnostics Chart with Trouble Code (Turbo Model).>
		(3) Check motor clutch drive system.	<Ref. to CC-45 DIAGNOSTIC TROUBLE CODE 37 — ACTUATOR MOTOR CLUTCH — , Diagnostics Chart with Trouble Code (Turbo Model).>

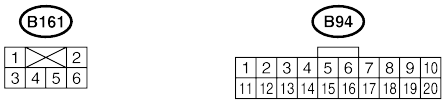
DIAGNOSTICS CHART WITH SYMPTOM (TURBO MODEL)

Symptom		Repair area	Reference
6	Cruise control is not released after CANCEL switch has been pressed.	(1) Check CANCEL switch.	<Ref. to CC-29 CHECK CRUISE CONTROL COMMAND SWITCH, Diagnostics Chart with Symptom (Turbo Model).>
		(2) Check motor drive system.	<Ref. to CC-43 DIAGNOSTIC TROUBLE CODE 35 AND 36 — ACTUATOR MOTOR — , Diagnostics Chart with Trouble Code (Turbo Model).>
		(3) Check motor clutch drive system.	<Ref. to CC-45 DIAGNOSTIC TROUBLE CODE 37 — ACTUATOR MOTOR CLUTCH — , Diagnostics Chart with Trouble Code (Turbo Model).>
7	Cruise control is not released after brake pedal has been depressed.	(1) Check stop light switch and brake switch.	<Ref. to CC-31 CHECK STOP LIGHT SWITCH AND BRAKE SWITCH, Diagnostics Chart Symptom (Turbo Model).>
		(2) Check motor drive system.	<Ref. to CC-43 DIAGNOSTIC TROUBLE CODE 35 AND 36 — ACTUATOR MOTOR — , Diagnostics Chart with Trouble Code (Turbo Model).>
		(3) Check motor clutch drive system.	<Ref. to CC-45 DIAGNOSTIC TROUBLE CODE 37 — ACTUATOR MOTOR CLUTCH — , Diagnostics Chart with Trouble Code (Turbo Model).>
8	Cruise control is not released after clutch pedal has been depressed (MT).	(1) Check clutch switch.	<Ref. to CC-33 CHECK CLUTCH SWITCH (MT), Diagnostics Chart with Symptom (Turbo Model).>
		(2) Check motor drive system.	<Ref. to CC-43 DIAGNOSTIC TROUBLE CODE 35 AND 36 — ACTUATOR MOTOR — , Diagnostics Chart with Trouble Code (Turbo Model).>
		(3) Check motor clutch drive system.	<Ref. to CC-45 DIAGNOSTIC TROUBLE CODE 37 — ACTUATOR MOTOR CLUTCH — , Diagnostics Chart with Trouble Code (Turbo Model).>

B: CHECK POWER SUPPLY S003749F23

TROUBLE SYMPTOM:
Cruise control can be set normally, but indicator does not come on. (When main switch is pressed.)
WIRING DIAGRAM:





S6M0521

DIAGNOSTICS CHART WITH SYMPTOM (TURBO MODEL)

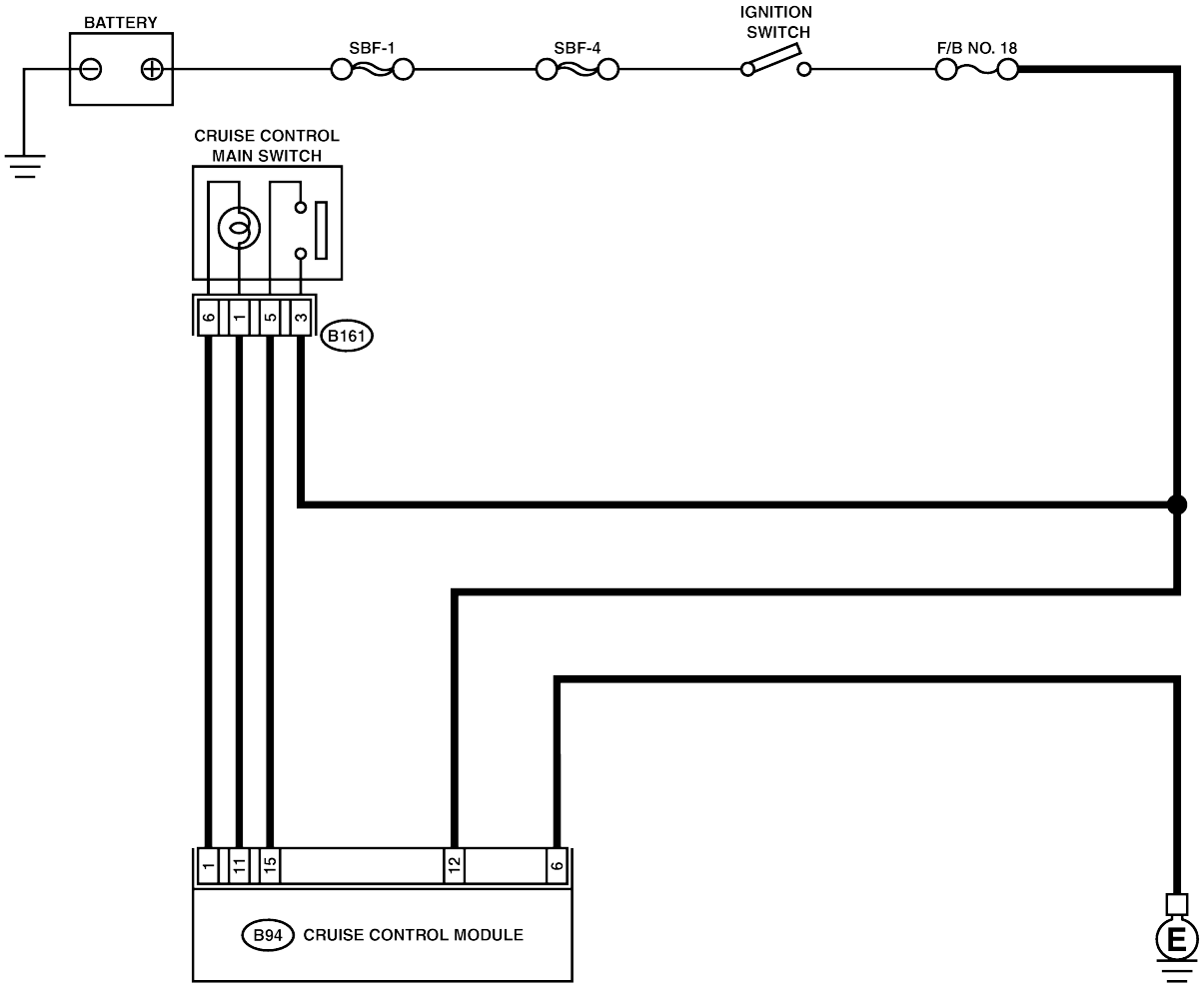
No.	Step	Check	Yes	No
1	**CHECK POWER SUPPLY.** 1) Disconnect cruise control module harness connector. 2) Turn ignition switch ON. 3) Measure voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B94) No. 12 (+) — Chassis ground (–):***	Is the voltage more than 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. 6 (+) — Chassis ground (–):***	Is the resistance less than 10 Ω?	Power supply and ground circuit are OK.	Repair harness.

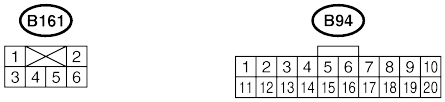
C: CHECK CRUISE CONTROL MAIN SWITCH S003749F24

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:





S6M0521

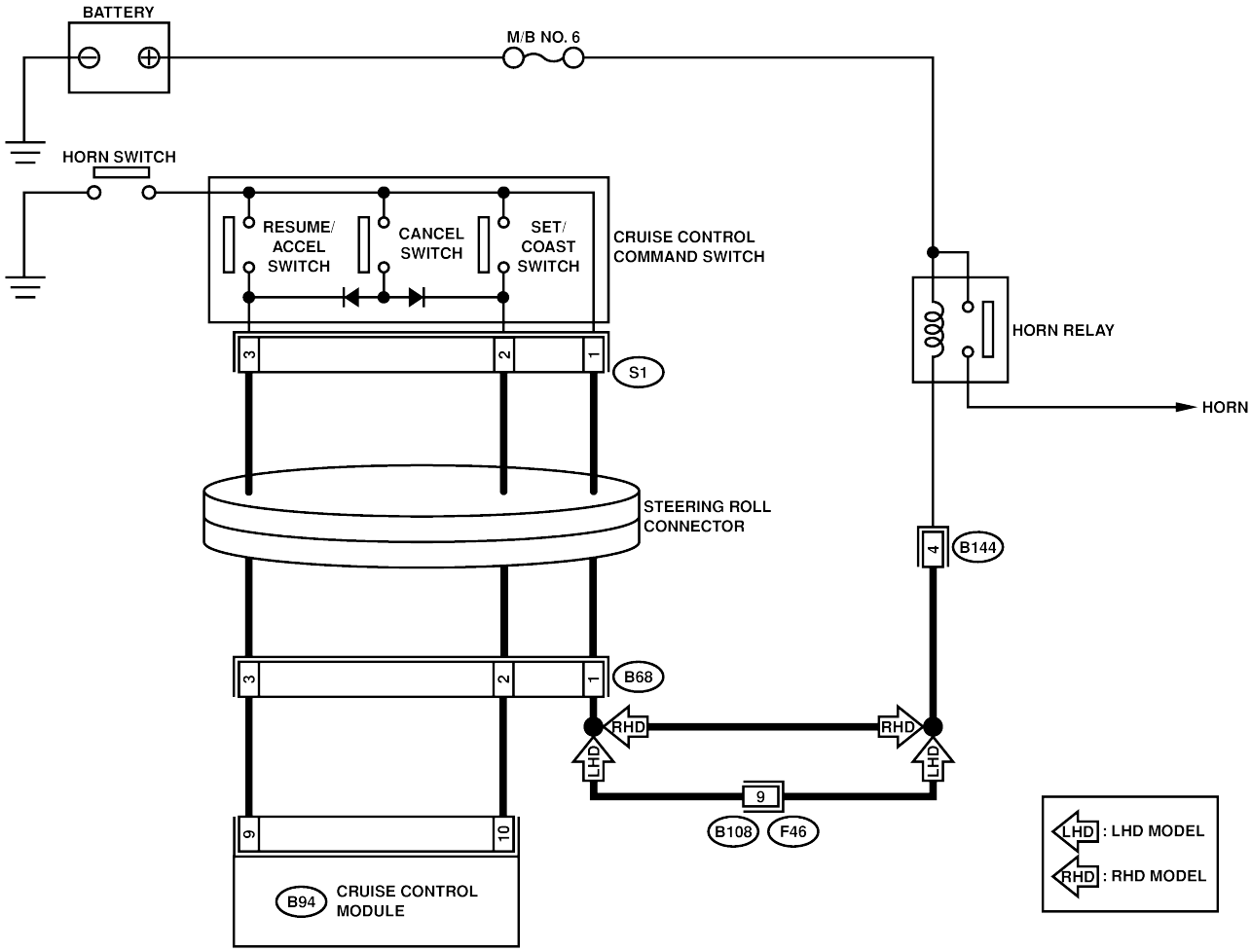
DIAGNOSTICS CHART WITH SYMPTOM (TURBO MODEL)

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. 15 (+) — (B161) No. 5 (–):*** ***(B94) No. 1 (+) — (B161) No. 6 (–):*** ***(B94) No. 11(+) — (B161) No. 1 (–):***	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-9 Cruise Control Main Switch.>	Is cruise control main switch OK?	Replace cruise control module.	Replace cruise control main switch.

MEMO:

D: CHECK CRUISE CONTROL COMMAND SWITCH S003749F25

TROUBLE SYMPTOM:
Cruise control cannot be set. (Cancelled immediately.)
WIRING DIAGRAM:





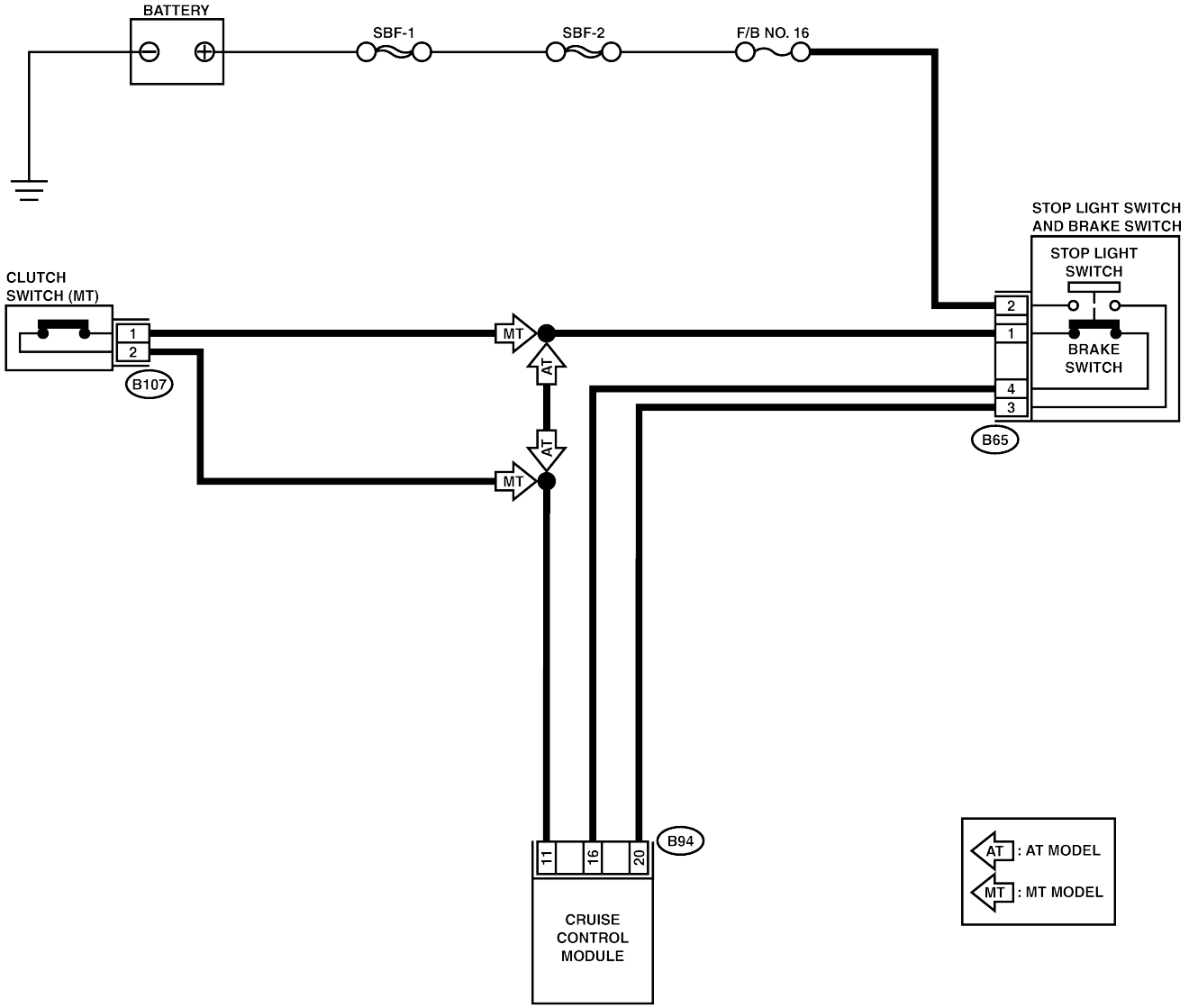
S6M0522

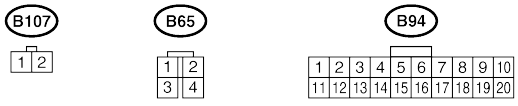
DIAGNOSTICS CHART WITH SYMPTOM (TURBO MODEL)

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. 10 (+) — 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. 9 (+) — 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. 9 (+) — Chassis ground (–):*** ***(B94) No. 10 (+) — 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-4 HORN RELAY, INSPECTION, Horn System.> • Check harness for open or short between cruise control command switch and fuse & relay box.
5	**CHECK CRUISE CONTROL COMMAND SWITCH.** Remove and check cruise control command switch. <Ref. to CC-10 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: CHECK STOP LIGHT SWITCH AND BRAKE SWITCH S003749F26

TROUBLE SYMPTOM:
Cruise control cannot be set.
WIRING DIAGRAM:





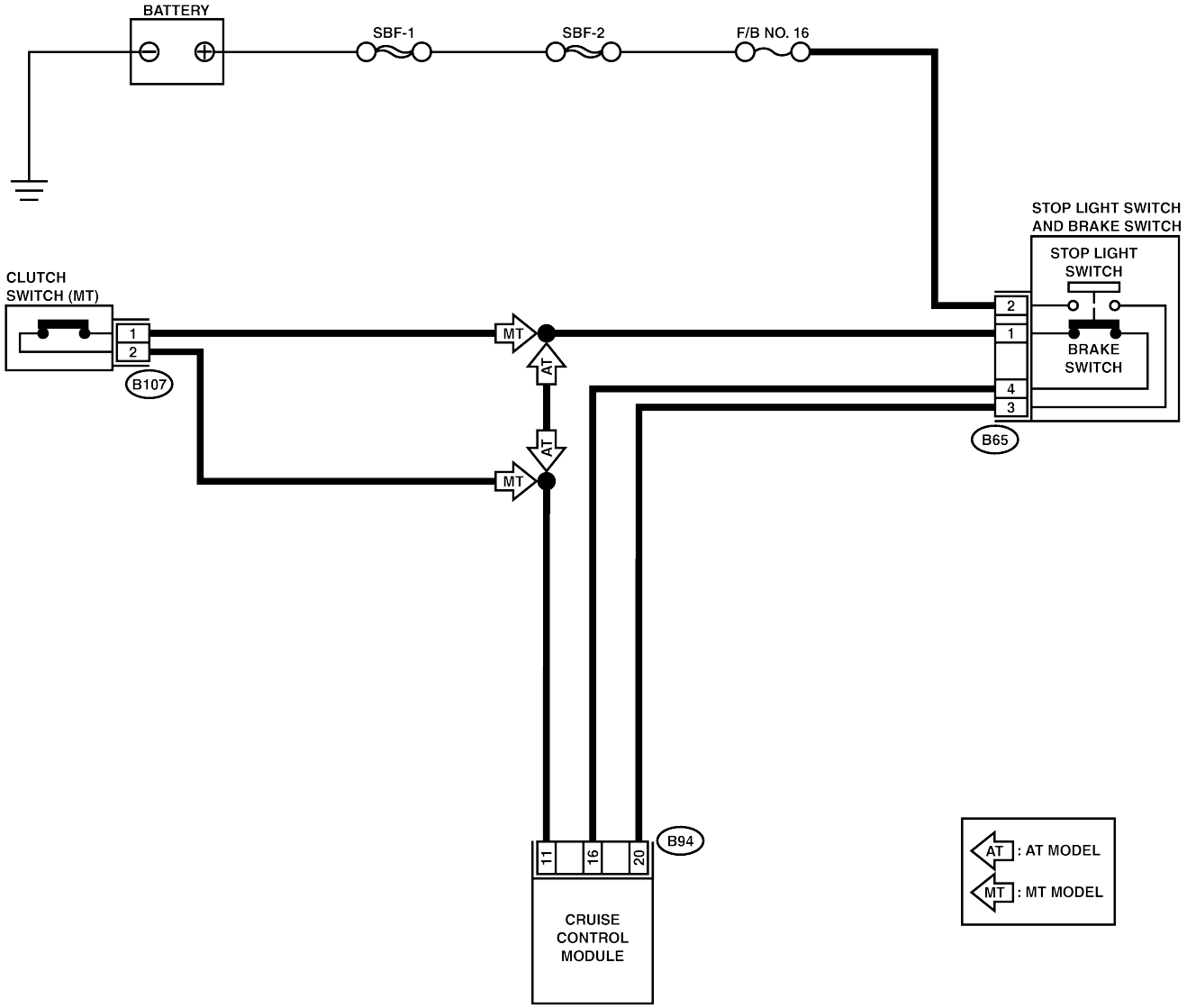
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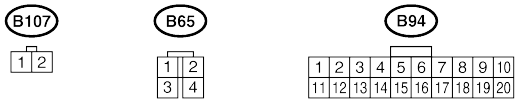
DIAGNOSTICS CHART WITH SYMPTOM (TURBO MODEL)

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. 1 (+) — 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 (AT). • Check clutch switch and the circuit (MT).
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. 20 (+) — (B65) No. 3 (–):*** ***(B94) No. 16 (+) — (B65) No. 4 (–):***	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-11 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.

F: CHECK CLUTCH SWITCH (MT) S003749F27

TROUBLE SYMPTOM:
Cruise control cannot be set.
WIRING DIAGRAM:





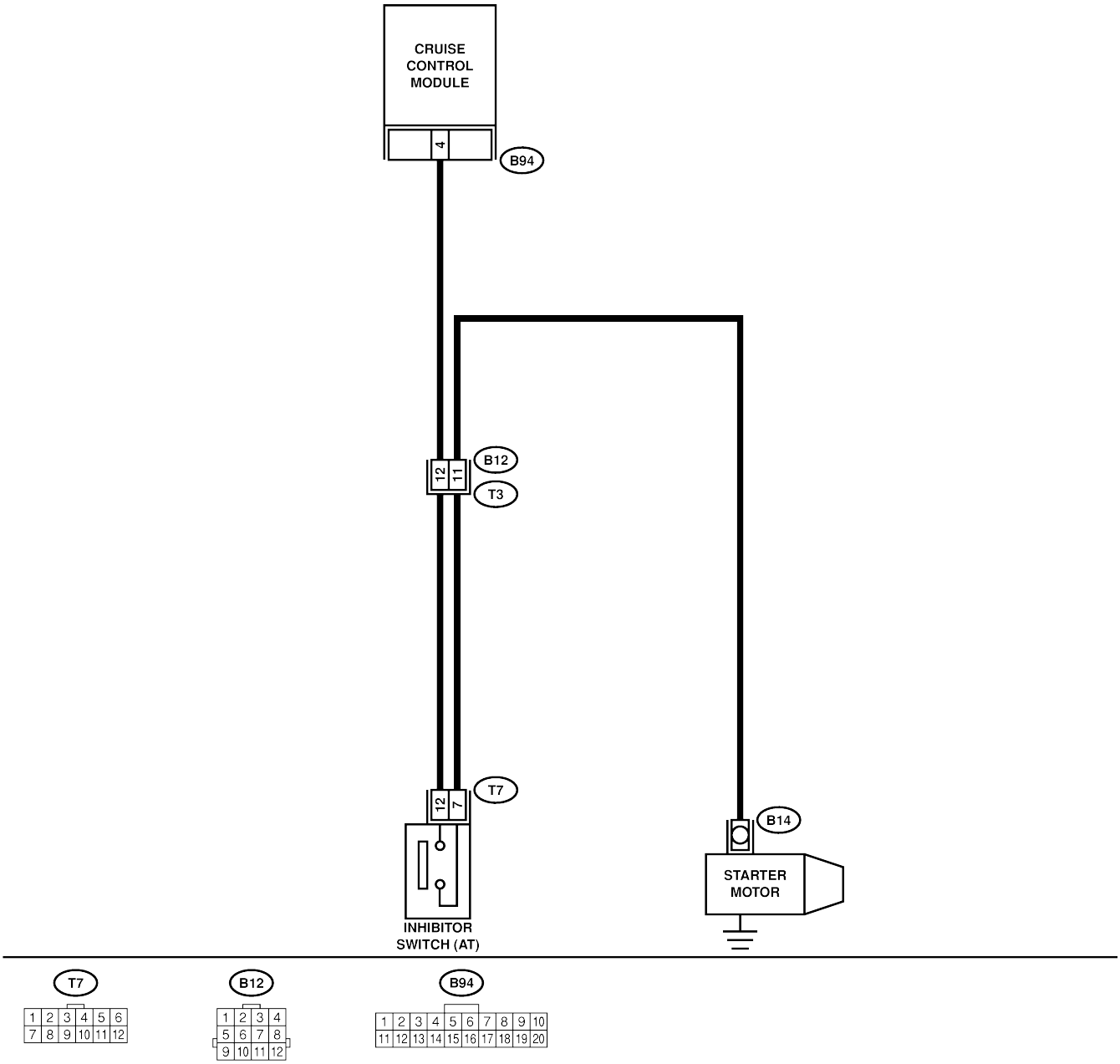
S6M0523

DIAGNOSTICS CHART WITH SYMPTOM (TURBO MODEL)

No.	Step	Check	Yes	No
1	**CHECK CLUTCH SWITCH CIRCUIT.** 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 **2**.	Check harness for open or short between clutch switch and cruise control module.
2	**CHECK CLUTCH SWITCH CIRCUIT.** 1) Turn cruise control main switch and ignition switch OFF. 2) Disconnect stop light switch and brake switch harness connector. 3) Measure resistance between clutch switch harness connector terminal and stop light switch and brake switch harness connector terminal. ***Connector & terminal*** ***(B107) No. 1 (+) — (B65) No. 1 (–):***	Is the resistance less than 10 Ω?	Go to step **3**.	Repair harness.
3	**CHECK CLUTCH SWITCH.** Remove and check clutch switch. <Ref. to CC-12 Clutch Switch.>	Is clutch switch OK?	Clutch switch circuit is OK.	Replace clutch switch.

G: CHECK INHIBITOR SWITCH (AT) S003749F28

TROUBLE SYMPTOM:
Cruise control cannot be set.
WIRING DIAGRAM:



B6M1527

DIAGNOSTICS CHART WITH SYMPTOM (TURBO MODEL)

No.	Step	Check	Yes	No
1	**CHECK INHIBITOR SWITCH CIRCUIT.** 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.** 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 chassis ground. ***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.** Remove and check inhibitor switch. <Ref. to CC-13 Inhibitor Switch.>	Is inhibitor switch OK?	Inhibitor switch circuit is OK.	Replace inhibitor switch.

7. Diagnostics Chart with Trouble Code (Turbo Model) S003750

A: LIST OF DIAGNOSTIC TROUBLE CODE S003750E40

Diagnostic trouble code	Item	Contents of diagnosis	Reference
21	Inner relay is seized.	Cruise control module inner relay is seized when main switch is OFF.	<Ref. to CC-38 DIAGNOSTIC TROUBE CODE 21, 24, 25, AND 2A — CRUISE CONTROL MODULE BUILT-IN RELAY, CPU RAM —, Diagnostics Chart with Trouble Code (Turbo Model).>
22	Vehicle speed sensor	Vehicle speed signal changes more than 10 km/h (6 MPH) within 350 ms.	<Ref. to CC-39 DIAGNOSTIC TROUBLE CODE 22 — VEHICLE SPEED SENSOR —, Diagnostics Chart with Trouble Code (Turbo Model).>
24	Cruise control module is abnormal.	Two vehicle speed values stored in cruise control module memory are not the same.	<Ref. to CC-38 DIAGNOSTIC TROUBE CODE 21, 24, 25, AND 2A — CRUISE CONTROL MODULE BUILT-IN RELAY, CPU RAM —, Diagnostics Chart with Trouble Code (Turbo Model).>
25	Cruise control module is abnormal.	Two output values stored in cruise control module memory are not the same.	<Ref. to CC-38 DIAGNOSTIC TROUBE CODE 21, 24, 25, AND 2A — CRUISE CONTROL MODULE BUILT-IN RELAY, CPU RAM —, Diagnostics Chart with Trouble Code (Turbo Model).>
28	Wiring harness opened.	Open wiring harness circuit is detected via control module relay when main switch is ON.	<Ref. to CC-42 DIAGNOSTIC TROUBLE CODE 28 — WIRING HARNESS OPENED —, Diagnostics Chart with Trouble Code (Turbo Model).>
35	Motor drive system is abnormal.	• Motor output circuit is open or shorted. • Motor drive circuit is open or shorted.	<Ref. to CC-43 DIAGNOSTIC TROUBLE CODE 35 AND 36 — ACTUATOR MOTOR — , Diagnostics Chart with Trouble Code (Turbo Model).>
36	Trouble of motor	Motor turning speed is slow.	<Ref. to CC-43, DIAGNOSTIC TROUBLE CODE 35 AND 36 — ACTUATOR MOTOR —, Diagnostics Chart with Trouble Code (Turbo Model).>

Diagnostic trouble code	Item	Contents of diagnosis	Reference
37	Motor clutch drive system is abnormal.	• Motor clutch output circuit is open or shorted. • Motor clutch drive circuit is open or shorted.	<Ref. to CC-45 DIAGNOSTIC TROUBLE CODE 37 — ACTUATOR MOTOR CLUTCH — , Diagnostics Chart with Trouble Code (Turbo Model).>
38	Motor drive shaft does not engage properly.	Motor drive gear engagement is not properly adjusted.	<Ref. to CC-47 DIAGNOSTIC TROUBLE CODE 38 — MOTOR DRIVE SHAFT DOES NOT ENGAGE PROPERLY.— , Diagnostics Chart with Trouble Code (Turbo Model).>
39	Motor is overloaded.	Current flows through motor more frequently than under normal conditions.	<Ref. to CC-48 DIAGNOSTIC TROUBLE CODE 39 — MOTOR IS OVERLOADED.—, Diagnostics Chart with Trouble Code (Turbo Model).>
2A	Cruise control module is abnormal.	Cruise control module self-diagnosis function senses abnormality.	<Ref. to CC-38 DIAGNOSTIC TROUBE CODE 21, 24, 25, AND 2A — CRUISE CONTROL MODULE BUILT-IN RELAY, CPU RAM —, Diagnostics Chart with Trouble Code (Turbo Model).>

B: DIAGNOSTIC TROUBLE CODE 21, 24, 25 AND 2A — CRUISE CONTROL MODULE BUILT-IN RELAY, CPU RAM — S003750F29

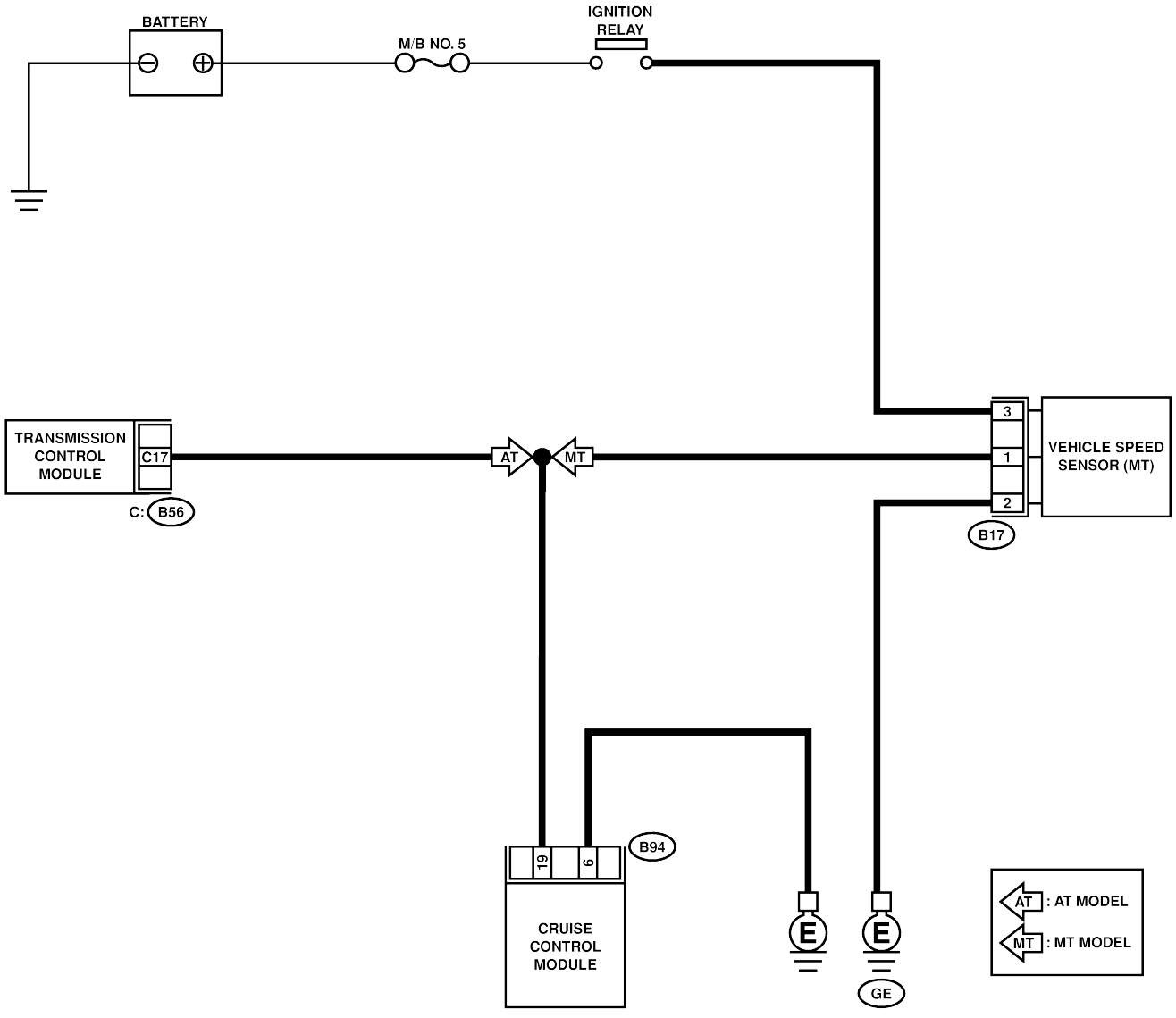
DIAGNOSIS:
- Poor welding of built-in relay of cruise control module.
- Failure of built-in CPU RAM of cruise control module.

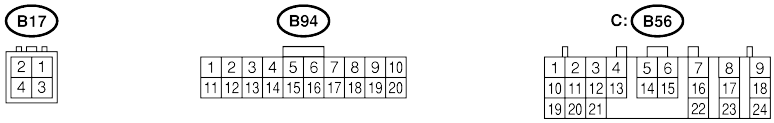
TROUBLE SYMPTOM:
- Cruise control is canceled and memorized cruise speed is also canceled.
- Once cruise control is canceled, cruise control cannot be set until the ignition switch and cruise control main switch turns OFF, and then turns ON again.

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.)

C: DIAGNOSTIC TROUBLE CODE 22 — VEHICLE SPEED SENSOR — S003750F30

DIAGNOSIS:
Disconnection or short circuit of vehicle speed sensor system.
TROUBLE SYMPTOM:
Cruise control cannot be set. (Cancelled immediately.)
WIRING DIAGRAM:





S6M0524

DIAGNOSTICS CHART WITH TROUBLE CODE (TURBO MODEL)

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) Disconnect harness connector from cruise control module. 2) Measure resistance between vehicle speed sensor harness connector terminal and cruise control module harness connector terminal. ***Connector & terminal*** ***(B17) No. 1 — (B94) No. 19:***	Is the resistance less than 10 Ω?	Go to step **4**.	Repair harness.
4	**CHECK HARNESS BETWEEN VEHICLE SPEED SENSOR AND ENGINE GROUND.** 1) Turn ignition switch to OFF. 2) 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. 19 (+) — Chassis ground (–):***	Is the voltage less than 1 V ←→ more than 4 V?	Replace cruise control module. <Ref. to CC-8 Cruise Control Module.>	Replace vehicle speed sensor.

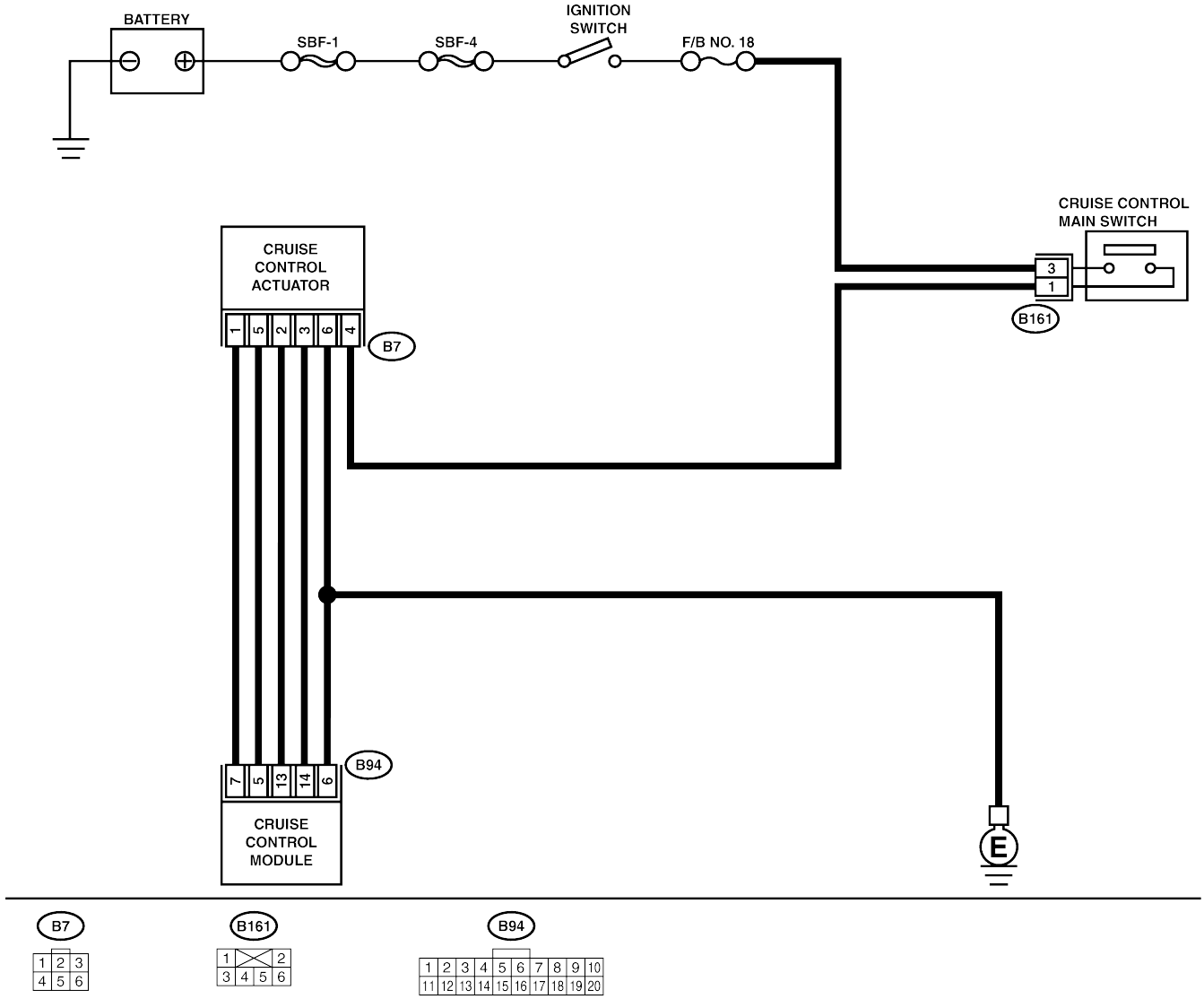
No.	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN CRUISE CONTROL MODULE AND TRANSMISSION CONTROL MODULE.** 1) Disconnect harness connector from transmission control module and cruise control module. 2) Measure resistance between cruise control module harness connector terminal and transmission control 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. 19 — (B56) No. 17:***	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*** ***(B56) No. 17 (+) — Chassis ground (–):***	Is the voltage less than 1 V ←→ more than 4 V?	Replace cruise control module. <Ref. to CC-8 Cruise Control Module.>	Replace transmission control module. <Ref. to AT-48 Transmission Control Module (TCM).>

D: DIAGNOSTIC TROUBLE CODE 28 — WIRING HARNESS OPENED. — S003750F31

No.	Step	Check	Yes	No
1	**CHECK BATTERY.** Measure battery specific gravity of electrolyte.	Is battery specific gravity more than 1.250?	Go to step **2**.	Charge or replace battery. Go to step **2**.
2	**CHECK FUSES, CONNECTORS AND HARNESSES.** Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.	Is there anything unusual about the appearance of main fuse, fuse, harness, connector and grounding?	Repair or replace faulty parts.	End of inspection.

E: DIAGNOSTIC TROUBLE CODE 35 AND 36 — ACTUATOR MOTOR — S003750F32

DIAGNOSIS:
Open or poor contact of cruise control actuator motor.
TROUBLE SYMPTOM:
Cruise control cannot be set. (Cancelled immediately.)
WIRING DIAGRAM:



S6M0525

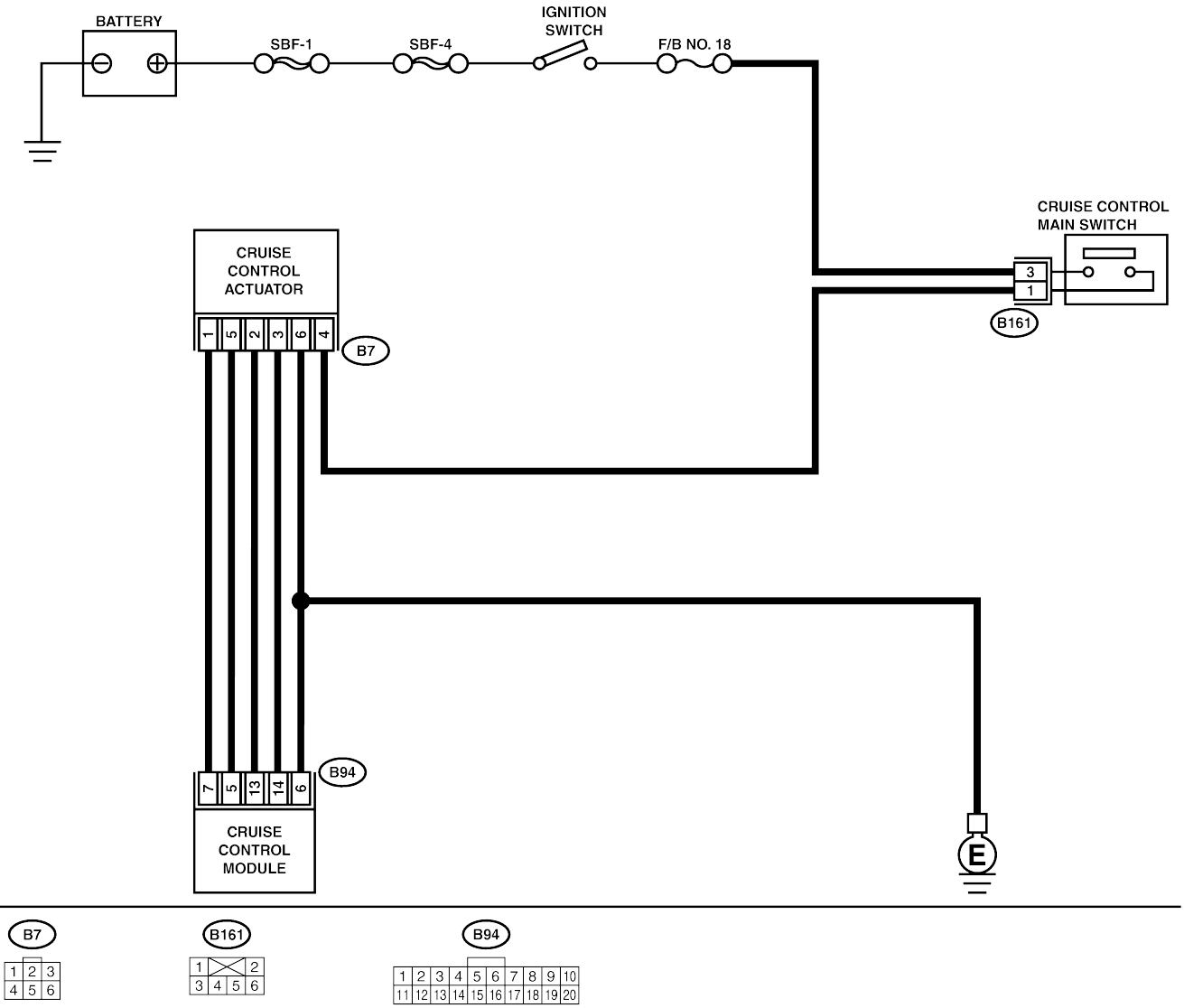
DIAGNOSTICS CHART WITH TROUBLE CODE (TURBO MODEL)

No.	Step	Check	Yes	No
1	**CHECK POWER SUPPLY.** 1) Turn ignition switch OFF. 2) Disconnect harness connector from cruise control actuator. 3) Turn ignition switch ON. 4) Turn cruise control main switch ON. 5) Measure voltage between cruise control actuator harness connector terminal and chassis ground. ***Terminals*** ***(B7) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Check harness for open or short between cruise control main switch and cruise control actuator.
2	**CHECK GROUND CIRCUIT OF ACTUATOR.** Measure resistance between cruise control actuator harness connector terminal and chassis ground. ***Terminals*** ***(B7) No. 6 (+) — Chassis ground (–):***	Is resistance less than 10 Ω?	Go to step **3**.	Repair harness.
3	**MEASURE RESISTANCE OF ACTUATOR.** Measure resistance of cruise control actuator motor. ***Terminals*** ***No. 4 — No. 1:*** ***No. 4 — No. 2:*** ***No. 4 — No. 5:***	Is resistance approximately 5 Ω?	Go to step **4**.	Replace cruise control actuator. <Ref. to CC-5, Actuator (Turbo Model).>
4	**CHECK HARNESS BETWEEN ACTUATOR AND CRUISE CONTROL MODULE.** 1) Disconnect harness connector from cruise control module. 2) Measure resistance between cruise control module harness connector terminal and cruise control actuator harness connector terminal. ***Connector & terminal*** ***(B7) No. 1 — (B94) No. 7:***	Is resistance less than 10 Ω?	Go to step **5**.	Repair harness.
5	**CHECK HARNESS BETWEEN ACTUATOR AND CRUISE CONTROL MODULE.** Measure resistance between cruise control module harness connector terminal and cruise control actuator harness connector terminal . ***Connector & terminal*** ***(B7) No. 5 — (B94) No. 5:***	Is resistance less than 10 Ω?	Replace cruise control module. <Ref. to CC-8 Cruise Control Module.>	Repair harness.

F: DIAGNOSTIC TROUBLE CODE 37 — ACTUATOR MOTOR CLUTCH —

S003750F33

DIAGNOSIS:
Open or poor contact of cruise control actuator motor clutch.
TROUBLE SYMPTOM:
Cruise control cannot be set. (Cancelled immediately.)
WIRING DIAGRAM:



S6M0525

DIAGNOSTICS CHART WITH TROUBLE CODE (TURBO MODEL)

No.	Step	Check	Yes	No
1	**CHECK POWER SUPPLY.** 1) Turn ignition switch OFF. 2) Disconnect harness connector from cruise control actuator. 3) Turn ignition switch ON. 4) Turn cruise control main switch ON. 5) Measure voltage between cruise control actuator harness connector terminal and chassis ground. ***Terminals*** ***(B7) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Check harness for open or short between cruise control main switch and cruise control actuator.
2	**CHECK GROUND CIRCUIT OF ACTUATOR.** Measure resistance between cruise control actuator harness connector terminal and chassis ground. ***Terminals*** ***(B7) No. 6 — Chassis ground:***	Is resistance less than 10 Ω?	Go to step **3**.	Repair harness.
3	**MEASURE RESISTANCE OF ACTUATOR CLUTCH.** Measure resistance of cruise control actuator clutch. ***Terminals*** ***No. 3 — No. 6:***	Is resistance approximately 39 Ω?	Go to step **4**.	Replace cruise control actuator. <Ref. to CC-5, Actuator (Turbo Model).>
4	**CHECK HARNESS BETWEEN ACTUATOR AND CRUISE CONTROL MODULE.** 1) Disconnect harness connector from cruise control module. 2) Measure resistance between cruise control module harness connector terminal and cruise control actuator harness connector terminal. ***Connector & terminal*** ***(B7) No. 2 — (B94) No. 13:***	Is resistance less than 10 Ω?	Go to step **5**.	Repair harness.
5	**CHECK HARNESS BETWEEN ACTUATOR AND CRUISE CONTROL MODULE.** Measure resistance between cruise control module harness connector terminal and cruise control actuator harness connector terminal. ***Connector & terminal*** ***(B7) No. 3 — (B94) No. 14:***	Is resistance less than 10 Ω?	Replace cruise control module. <Ref. to CC-8 Cruise Control Module.>	Repair harness.

G: DIAGNOSTIC TROUBLE CODE 38 — MOTOR DRIVE SHAFT DOES NOT ENGAGE PROPERLY. — S003750F34

No.	Step	Check	Yes	No
1	**CHECK ACTUATOR MOTOR.** 1) Disconnect harness connector from cruise control actuator. 2) Remove cruise control actuator from mounting bracket. 3) Pull cable by hand to check for looseness or status of inner gear engagement.	Are foreign particles caught in inner gear or does inner gear engage and disengage improperly?	Replace cruise control actuator. <Ref. to CC-5, Actuator (Turbo Model).>	Check the cruise control cable adjustment. <Ref. to CC-6 CABLE FREE PLAY, INSPECTION, General Description.>

H: DIAGNOSTIC TROUBLE CODE 39 — MOTOR IS OVERLOADED. — S003750F35

No.	Step	Check	Yes	No
1	**CHECK THE OPERATING CURRENT TO ACTUATOR MOTOR.** 1) Connect Subaru Select Monitor to data link connector. 2) Try to drive the vehicle while operating the cruise control system. 3) Check the operation current to the cruise control actuator motor.	Is current more than 10A?	Replace cruise control module. <Ref. to CC-8 Cruise Control Module.>	Check the power supply circuit. <Ref. to CC-23, CHECK POWER SUPPLY, Diagnostics Chart with Symptom (Turbo Model).>

8. Diagnostics Chart with Symptom (Non-turbo Model) S003751

A: SYMPTOM CHART S003751F22

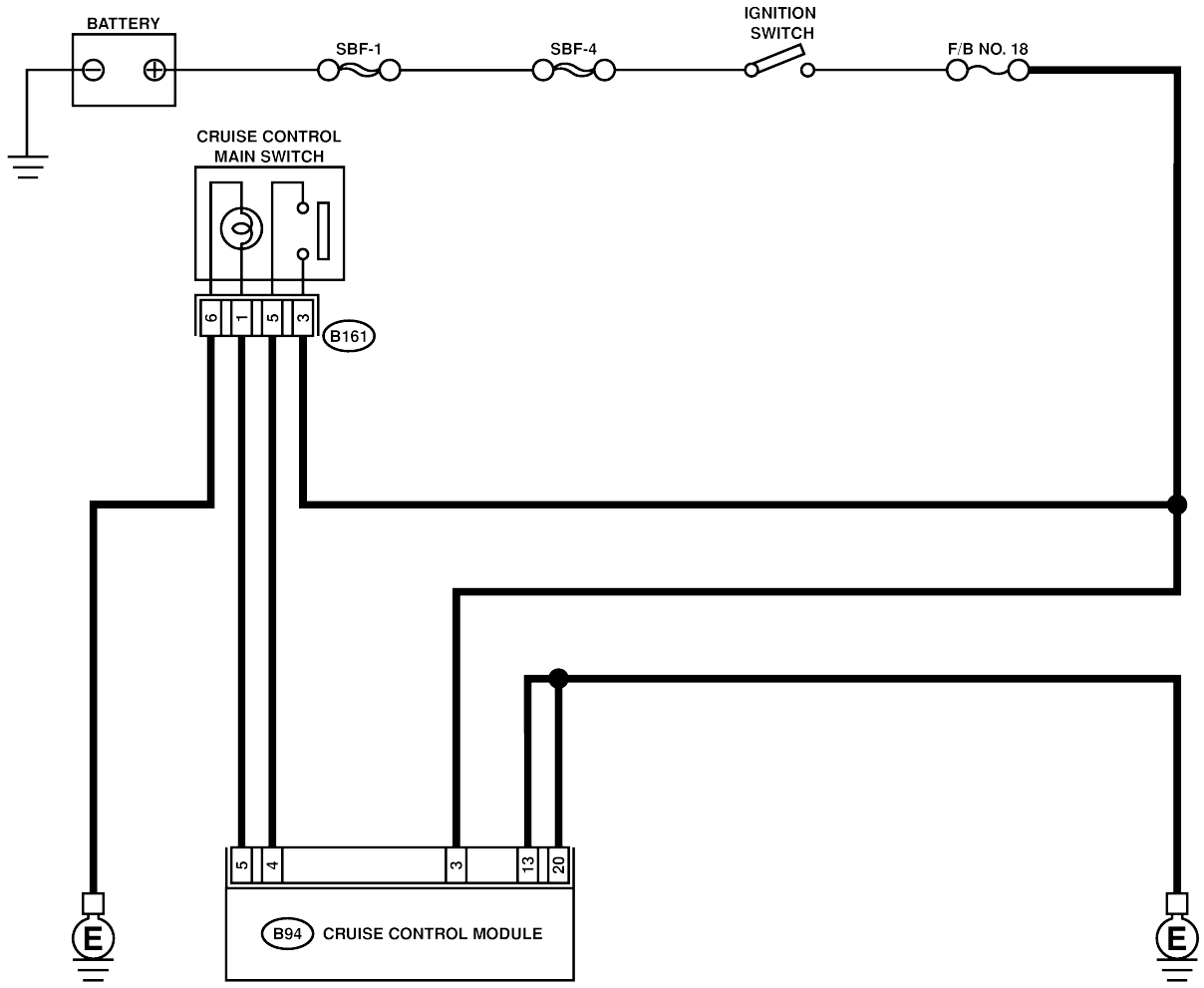
	Symptom	Repair area	Reference
1	Cruise control main switch is not turned ON.	(1) Check power supply.	<Ref. to CC-51 CHECK POWER SUPPLY, Diagnostics Chart with Symptom (Non-turbo Model).>
		(2) Check cruise control main switch.	<Ref. to CC-53 CHECK CRUISE CONTROL MAIN SWITCH, Diagnostics Chart with Symptom (Non-turbo Model).>
2	Cruise control cannot be set.	(1) Check SET/COAST switch.	<Ref. to CC-66 DIAGNOSTIC TROUBLE CODE 14 — SET/COAST SWITCH, RESUME/ACCEL SWITCH AND CANCEL SWITCH —, Diagnostics Chart with Trouble Code (Non-turbo Model).>
		(2) Check stop light switch and brake switch.	<Ref. to CC-59 DIAGNOSTIC TROUBLE CODE 11 — BRAKE SWITCH AND STOP LIGHT SWITCH —, Diagnostics Chart with Trouble Code (Non-turbo Model).>
		(3) Check clutch switch (MT).	<Ref. to CC-61 DIAGNOSTIC TROUBLE CODE 12 — CLUTCH SWITCH AND INHIBITOR SWITCH —, Diagnostics Chart with Trouble Code (Non-turbo Model).>
		(4) Check inhibitor switch (AT).	<Ref. to CC-61 DIAGNOSTIC TROUBLE CODE 12 — CLUTCH SWITCH AND INHIBITOR SWITCH —, Diagnostics Chart with Trouble Code (Non-turbo Model).>
		(5) Check vehicle speed sensor.	<Ref. to CC-63, DIAGNOSTIC TROUBLE CODE 13 AND 24 — SPEED SENSOR SYSTEM —, Diagnostics Chart with Trouble Code (Non-turbo Model).>
		(6) Check actuator.	<Ref. to CC-68 DIAGNOSTIC TROUBLE CODE 21, 22 AND 23 — VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE —, Diagnostics Chart with Trouble Code (Non-turbo Model).>
3	Vehicle speed is not held within set speed ±3 km/h (±2 MPH).	(1) Check vehicle speed sensor.	<Ref. to CC-63, DIAGNOSTIC TROUBLE CODE 13 AND 24 — SPEED SENSOR SYSTEM —, Diagnostics Chart with Trouble Code (Non-turbo Model).>
		(2) Check actuator.	<Ref. to CC-68 DIAGNOSTIC TROUBLE CODE 21, 22 AND 23 — VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE —, Diagnostics Chart with Trouble Code (Non-turbo Model).>
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-66 DIAGNOSTIC TROUBLE CODE 14 — SET/COAST SWITCH, RESUME/ACCEL SWITCH AND CANCEL SWITCH —,Diagnostics Chart with Trouble Code (Non-turbo Model).>
		(2) Check actuator.	<Ref. to CC-68 DIAGNOSTIC TROUBLE CODE 21, 22 AND 23 — VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE —, Diagnostics Chart with Trouble Code (Non-turbo Model).>
5	Vehicle speed does not decrease after SET/COAST switch has been pressed.	(1) Check SET/COAST switch.	<Ref. to CC-66 DIAGNOSTIC TROUBLE CODE 14 — SET/COAST SWITCH, RESUME/ACCEL SWITCH AND CANCEL SWITCH —,Diagnostics Chart with Trouble Code (Non-turbo Model).>
		(2) Check actuator.	<Ref. to CC-68 DIAGNOSTIC TROUBLE CODE 21, 22 AND 23 — VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE —, Diagnostics Chart with Trouble Code (Non-turbo Model).>

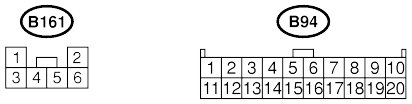
DIAGNOSTICS CHART WITH SYMPTOM (NON-TURBO MODEL)

	Symptom	Repair area	Reference
6	Cruise control is not released after CANCEL switch has been pressed.	(1) Check CANCEL switch.	<Ref. to CC-66 DIAGNOSTIC TROUBLE CODE 14 — SET/COAST SWITCH, RESUME/ACCEL SWITCH AND CANCEL SWITCH —,Diagnostics Chart with Trouble Code (Non-turbo Model).>
		(2) Check actuator.	<Ref. to CC-68 DIAGNOSTIC TROUBLE CODE 21, 22 AND 23 — VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE —, Diagnostics Chart with Trouble Code (Non-turbo Model).>
7	Cruise control is not released after brake pedal has been depressed.	(1) Check stop light switch and brake switch.	<Ref. to CC-59 DIAGNOSTIC TROUBLE CODE 11 — BRAKE SWITCH AND STOP LIGHT SWITCH —, Diagnostics Chart with Trouble Code (Non-turbo Model).>
		(2) Check actuator.	<Ref. to CC-68 DIAGNOSTIC TROUBLE CODE 21, 22 AND 23 — VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE —, Diagnostics Chart with Trouble Code (Non-turbo Model).>
8	Cruise control is not released after clutch pedal has been depressed (MT).	(1) Check clutch switch.	<Ref. to CC-61 DIAGNOSTIC TROUBLE CODE 12 — CLUTCH SWITCH AND INHIBITOR SWITCH —, Diagnostics Chart with Trouble Code (Non-turbo Model).>
		(2) Check actuator.	<Ref. to CC-68 DIAGNOSTIC TROUBLE CODE 21, 22 AND 23 — VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE —, Diagnostics Chart with Trouble Code (Non-turbo Model).>

B: CHECK POWER SUPPLY S003751F23

TROUBLE SYMPTOM:
Cruise control can be set normally, but indicator does not come on. (When main switch is pressed.)
WIRING DIAGRAM:





S6M0526

DIAGNOSTICS CHART WITH SYMPTOM (NON-TURBO MODEL)

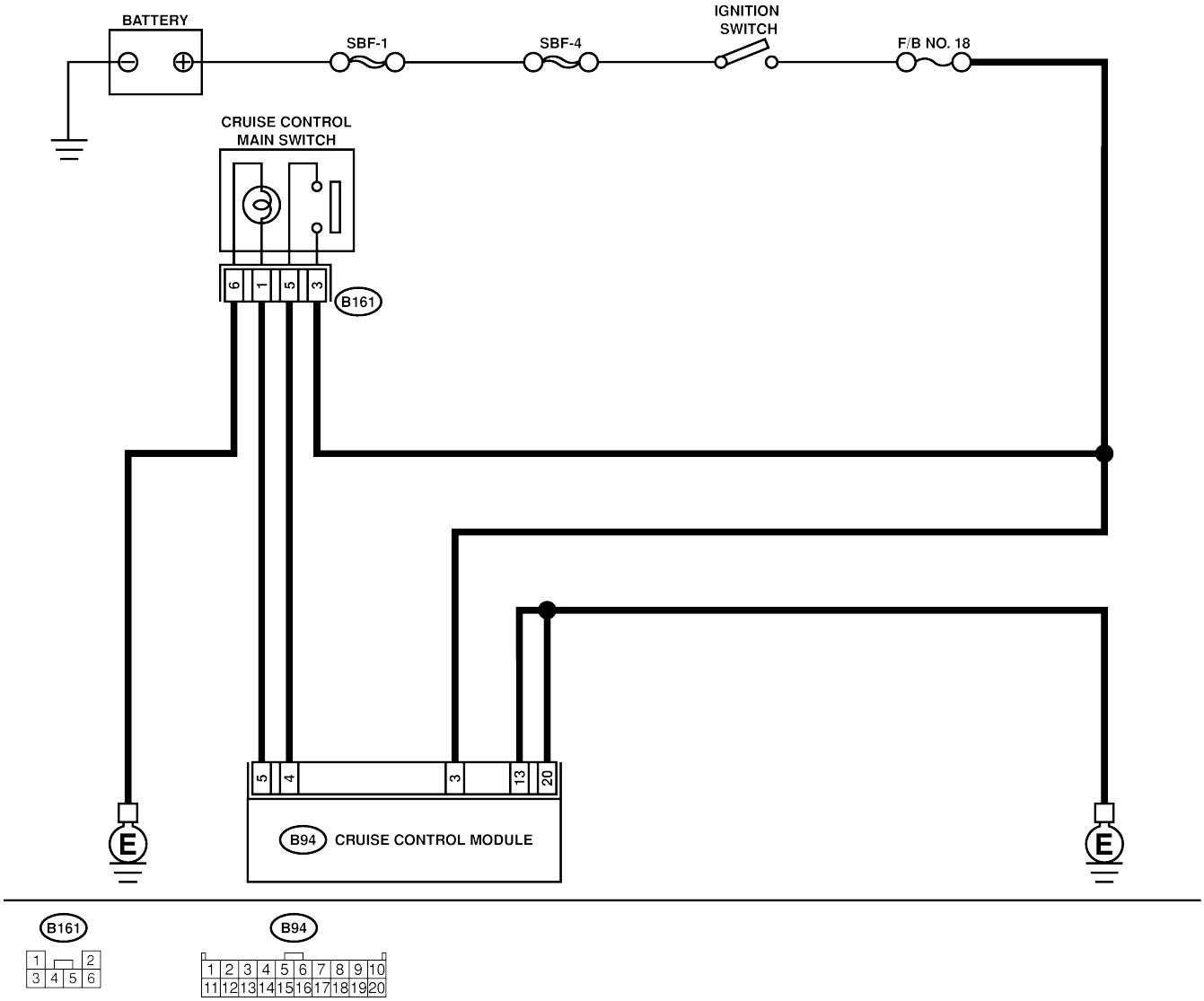
No.	Step	Check	Yes	No
1	**CHECK POWER SUPPLY.** 1) Disconnect cruise control module harness connector. 2) Turn ignition switch ON. 3) Measure voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B94) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 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 S003751F24

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:



S6M0526

DIAGNOSTICS CHART WITH SYMPTOM (NON-TURBO MODEL)

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-9 Cruise Control Main Switch.>	Is cruise control main switch OK?	Replace cruise control module.	Replace cruise control main switch.

MEMO:

9. Diagnostics Chart with Trouble Code (Non-turbo Model) S003752

A: LIST OF DIAGNOSTIC TROUBLE CODE S003752E40

Diagnostic code	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-59 DIAGNOSTIC TROUBLE CODE 11 — BRAKE SWITCH AND STOP LIGHT SWITCH —, Diagnostics Chart with Trouble Code (Non-turbo Model).>
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-61 DIAGNOSTIC TROUBLE CODE 12 — CLUTCH SWITCH AND INHIBITOR SWITCH —, Diagnostics Chart with Trouble Code (Non-turbo Model).>
13	LOW SPEED LIMIT	Low-speed control limiter	<Ref. to CC-63 DIAGNOSTIC TROUBLE CODE 13 AND 24 — VEHICLE SPEED SENSOR SYSTEM —, Diagnostics Chart with Trouble Code (Non-turbo Model).>
14	CANCEL SW	Input signal from cancel switch (faulty SET/COAST switch or RESUME/ACCEL switch)	<Ref. to CC-66 DIAGNOSTIC TROUBLE CODE 14 — SET/COAST SWITCH, RESUME/ACCEL SWITCH AND CANCEL SWITCH —, Diagnostics Chart with Trouble Code (Non-turbo Model).>
21	VACUUM VALVE	Faulty vacuum valve or valve drive system	<Ref. to CC-68 DIAGNOSTIC TROUBLE CODE 21, 22 AND 23 — VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE —, Diagnostics Chart with Trouble Code (Non-turbo Model).>
22	VENT 2 VALVE	Faulty vent 2 valve or valve drive system	<Ref. to CC-68 DIAGNOSTIC TROUBLE CODE 21, 22 AND 23 — VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE —, Diagnostics Chart with Trouble Code (Non-turbo Model).>
23	VENT 1 VALVE	Faulty vent 1 valve or valve drive system	<Ref. to CC-68 DIAGNOSTIC TROUBLE CODE 21, 22 AND 23 — VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE —, Diagnostics Chart with Trouble Code (Non-turbo Model).>

DIAGNOSTICS CHART WITH TROUBLE CODE (NON-TURBO MODEL)

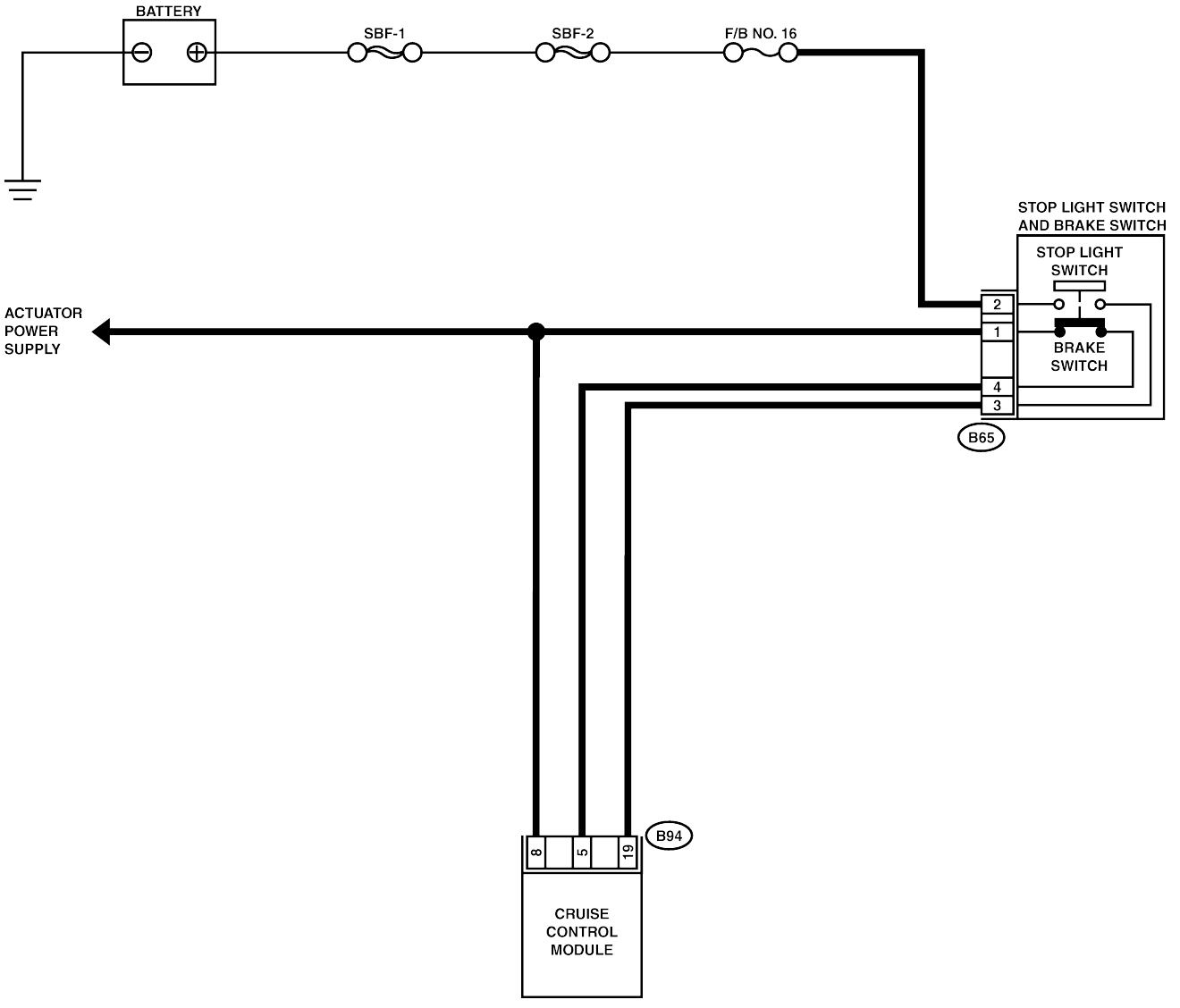
Diagnostic code	Item	Contents of diagnosis	Index No.
24	SPEED SENSOR	Faulty vehicle speed sensor 2 (MT) or transmission control module (AT)	<Ref. to CC-63 DIAGNOSTIC TROUBLE CODE 13 AND 24 — VEHICLE SPEED SENSOR SYSTEM —, Diagnostics Chart with Trouble Code (Non-turbo Model).>
25	CONTROL MODULE	Faulty CPU RAM included in cruise control module	<Ref. to CC-70 DIAGNOSTIC TROUBLE CODE 25 — CRUISE CONTROL MODULE BUILT-IN RELAY AND CPU RAM —, Diagnostics Chart with Trouble Code (Non-turbo Model).>

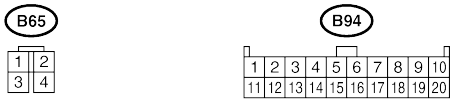
B: DIAGNOSTIC TROUBLE CODE 11 — BRAKE SWITCH AND STOP LIGHT SWITCH — S003752H52

DIAGNOSIS:

- Failure or disconnection of the stop light switch and brake switch.

WIRING DIAGRAM:





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DIAGNOSTICS CHART WITH TROUBLE CODE (NON-TURBO MODEL)

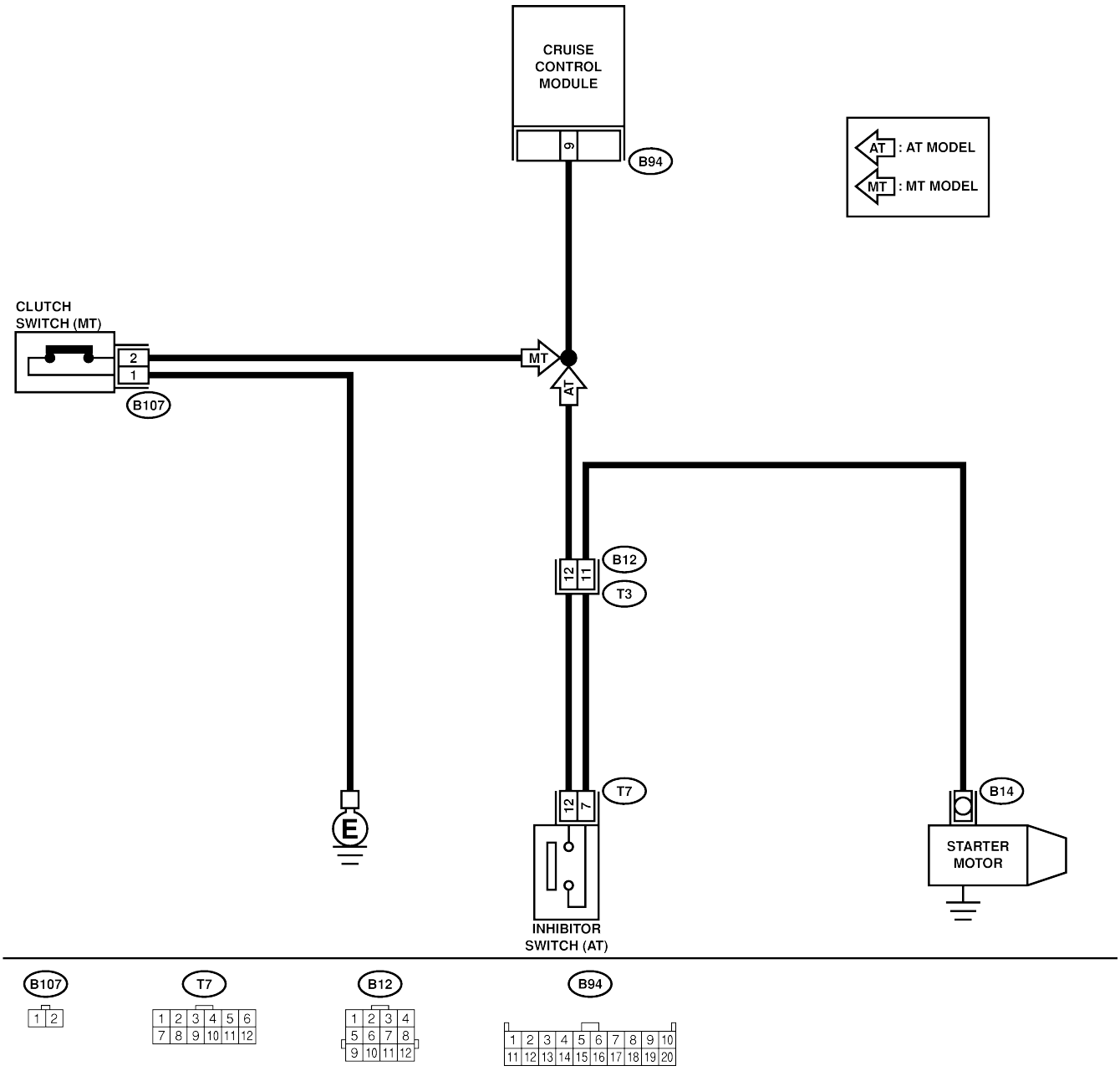
No.	Step	Check	Yes	No
1	**CHECK STOP LIGHT SWITCH AND BRAKE SWITCH CIRCUIT.** 1) Disconnect stop light switch and brake switch harness connector. 2) Turn ignition switch ON. 3) Turn cruise control main switch ON. 4) Measure voltage between harness connector terminal and chassis ground. ***Connector & 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. 1 (+) — 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. 5 (+) — (B65) No. 4 (–):*** ***(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-11 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.

C: DIAGNOSTIC TROUBLE CODE 12 — CLUTCH SWITCH AND INHIBITOR SWITCH — S003752H53

DIAGNOSIS:

- Failure or disconnection of the clutch switch. (MT)
- Failure or disconnection of the inhibitor switch. (AT)

WIRING DIAGRAM:



S6M0528

DIAGNOSTICS CHART WITH TROUBLE CODE (NON-TURBO MODEL)

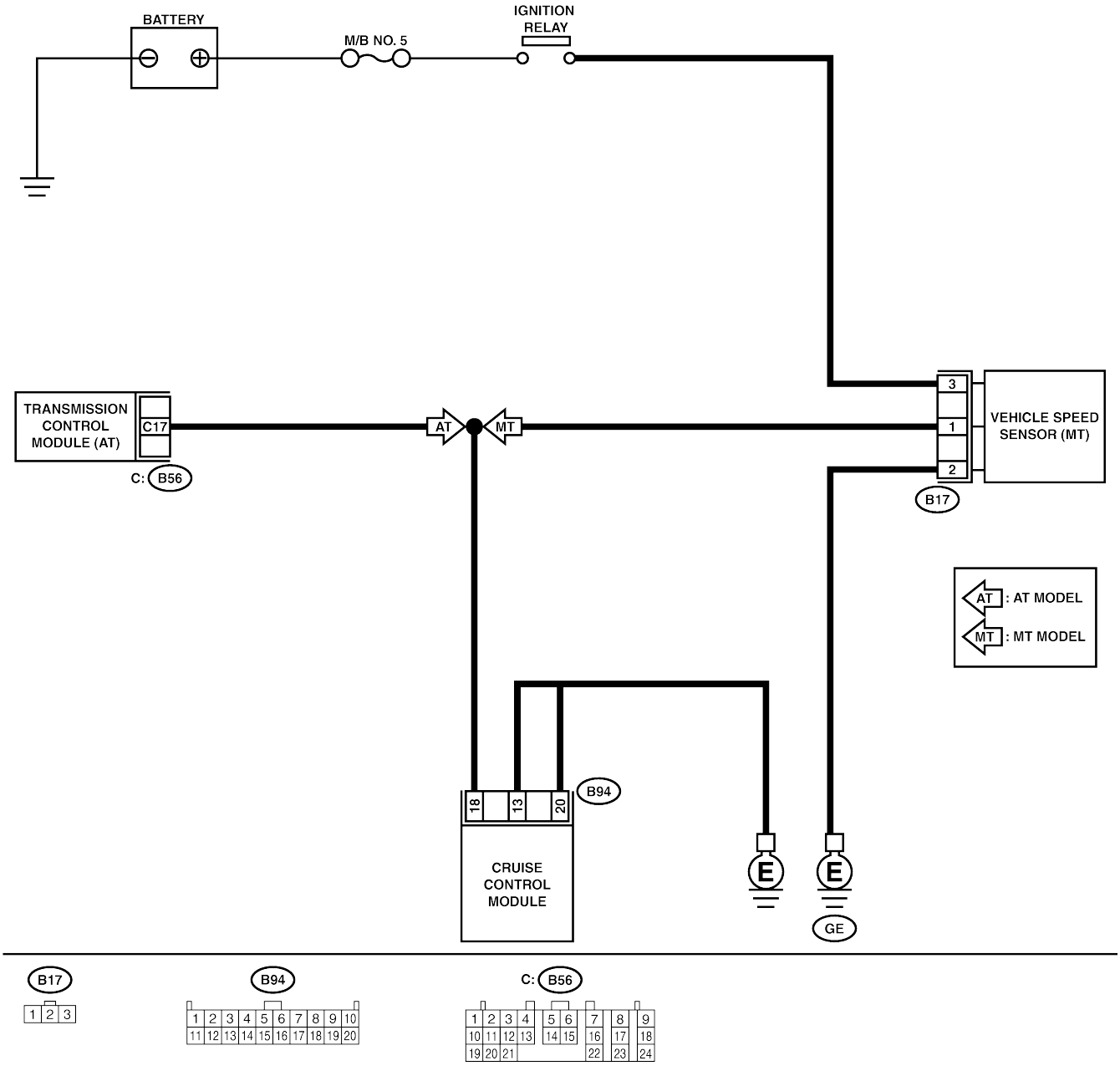
No.	Step	Check	Yes	No
1	**CHECK INHIBITOR SWITCH CIRCUIT (AT).** 1) Disconnect inhibitor switch harness connector. 2) Turn ignition switch ON. 3) Turn cruise control main switch ON. 4) Measure voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(T7) No. 12 (+) — 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 chassis ground. ***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-13 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) Disconnect stop light switch and brake switch harness connector. 3) Measure resistance between clutch switch harness connector terminal and stop light switch and brake switch harness connector terminal. ***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-12 Clutch Switch.>	Is clutch switch OK?	Clutch switch circuit is OK.	Replace clutch switch.

D: DIAGNOSTIC TROUBLE CODE 13 AND 24 — VEHICLE SPEED SENSOR SYSTEM — S003752F52

DIAGNOSIS:

● Disconnection or short circuit of vehicle speed sensor (MT model) or transmission control module (AT model).

WIRING DIAGRAM:



S6M0529

DIAGNOSTICS CHART WITH TROUBLE CODE (NON-TURBO MODEL)

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) Disconnect harness connector from cruise control module. 2) 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.** 1) Turn ignition switch to OFF. 2) 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-8 Cruise Control Module.>	Replace vehicle speed sensor.

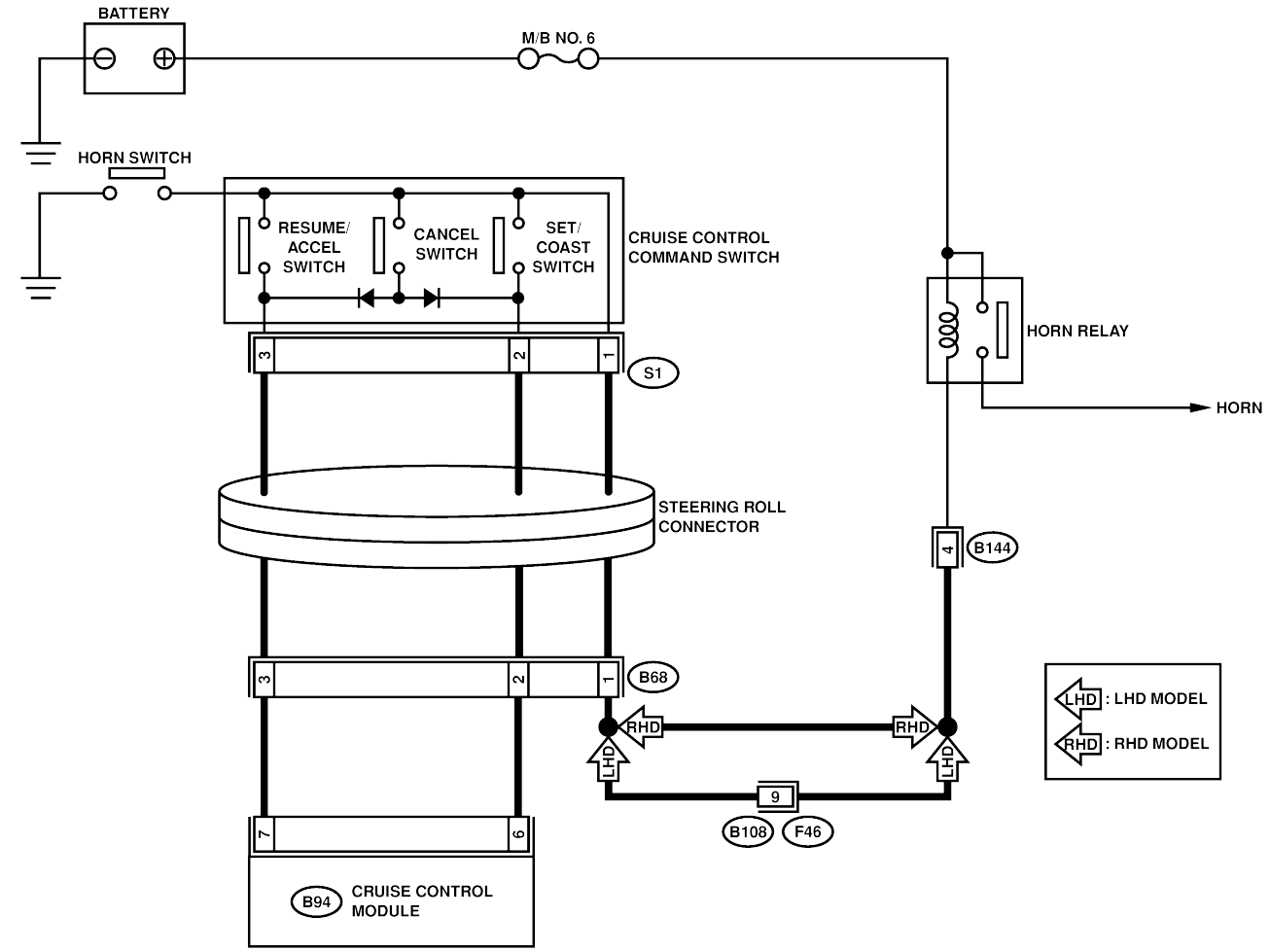
No.	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN CRUISE CONTROL MODULE AND TRANSMISSION CONTROL MODULE.** 1) Disconnect harness connector from transmission control module and cruise control module. 2) Measure resistance between cruise control module harness connector terminal and transmission control 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 — (B56) No. 17:***	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*** ***(B56) No. 17 (+) — Chassis ground (–):***	Is the voltage less than 1 V ←→ more than 4 V?	Replace cruise control module. <Ref. to CC-8 Cruise Control Module.>	Replace transmission control module. <Ref. to AT-48 Transmission Control Module (TCM).>

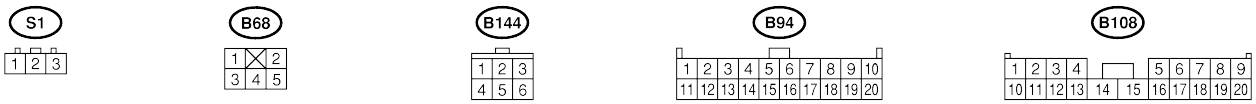
E: DIAGNOSTIC TROUBLE CODE 14 — SET/COAST SWITCH, RESUME/ACCEL SWITCH AND CANCEL SWITCH — S003752H54

DIAGNOSIS:

- Short circuit inside the SET SW and RESUME SW.

WIRING DIAGRAM:





S6M0530

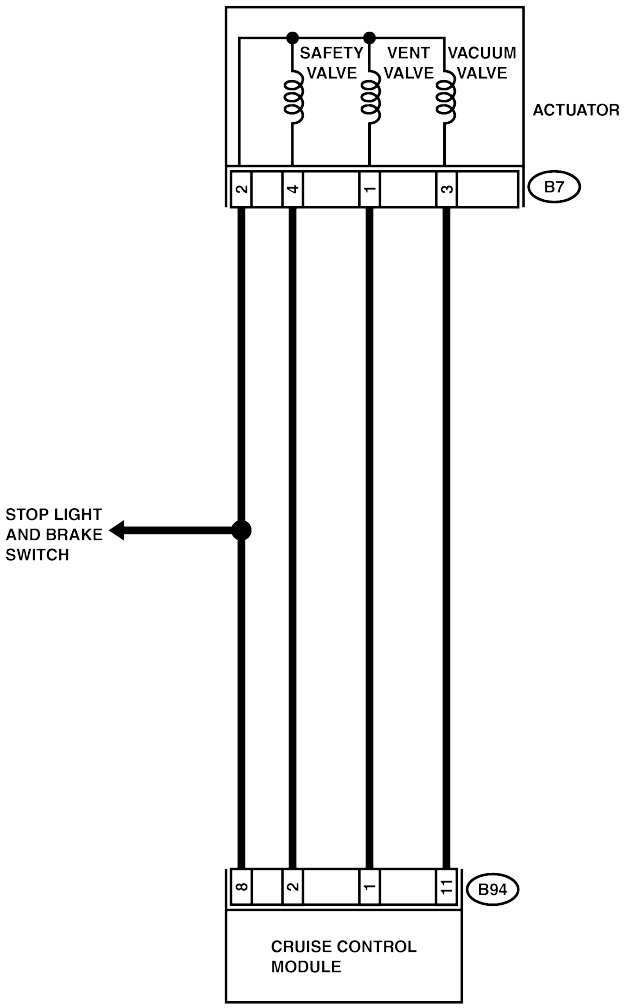
No.	Step	Check	Yes	No
1	**CHECK SET/COAST SWITCH CIRCUIT.** 1) Disconnect cruise control module harness connector. 2) Turn ignition switch ON. 3) Measure voltage between harness connector terminal and chassis ground when SET/COAST switch is pressed and not pressed. ***Connector & terminal*** ***(B94) 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-4 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-10 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.

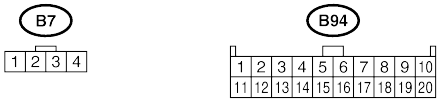
F: DIAGNOSTIC TROUBLE CODE 21, 22 AND 23 — VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE — S003752H55

DIAGNOSIS:

- Open or poor contact of vacuum valve, vent 2 valve and vent 1 valve.

WIRING DIAGRAM:





S6M0531

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-7, REMOVAL, Actuator (Non-turbo Model).>
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-7, REMOVAL, Actuator (Non-turbo Model).>
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-7, REMOVAL, Actuator (Non-turbo Model).>
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-8 REMOVAL, Cruise Control Module.>	Repair or replace wiring harness between actuator and cruise control module.

G: DIAGNOSTIC TROUBLE CODE 25 — CRUISE CONTROL MODULE BUILT-IN RELAY AND CPU RAM — S003752H56

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.)

IMMOBILIZER (DIAGNOSTICS)

IM

Page

1. Basic Diagnostic Procedure 2
2. General Description 3
3. Electrical Components Location 5
4. Immobilizer Control Module I/O Signal 6
5. Subaru Select Monitor 14
6. Read Diagnostic Trouble Code 16
7. Clear Memory Mode 18
8. Diagnostics Chart for Immobilizer Indicator Light 19
9. List of Diagnostic Trouble Code 25
10. Diagnostics Chart with Trouble Code 26

1. Basic Diagnostic Procedure

S009501

A: PROCEDURE S009501E45

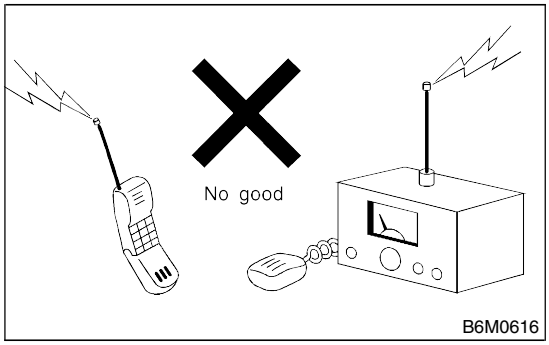
No.	Step	Check	Yes	No
1	**CHECK ILLUMINATION OF IMMOBILIZER INDICATOR LIGHT.** Turn ignition switch ON.	Does immobilizer indicator light illuminate?	Go to step **2**.	Go to step **3**.
2	**CHECK ENGINE START.** Turn ignition switch to START position.	Is the engine hard to start?	Go to step **5**.	Go to step **3**.
3	**CHECK ILLUMINATION OF IMMOBILIZER INDICATOR LIGHT.** 1) Turn ignition switch to OFF or ACC position. 2) Wait at least 60 seconds.	Does immobilizer indicator light blink?	Go to step **4**.	Check immobilizer indicator light circuit. <Ref. to IM-19, CHECK IMMOBILIZER INDICATOR CIRCUIT, INSPECTION, Diagnostics Chart for Immobilizer Indicator Light.>
4	**CHECK ILLUMINATION OF IMMOBILIZER INDICATOR LIGHT.** Remove key from ignition switch.	Does immobilizer indicator light begin to blink 5 seconds after the key is removed?	The immobilizer system is OK.	Check key switch circuit. <Ref. to IM-22, CHECK KEY SWITCH CIRCUIT, INSPECTION, Diagnostics Chart for Immobilizer Indicator Light.>
5	**CHECK INDICATION OF DTC ON DISPLAY.** 1) Turn ignition switch OFF. 2) Connect the Subaru Select Monitor to data link connector. <Ref. to IM-14, OPERATION, Subaru Select Monitor.> 3) Turn ignition switch and Subaru Select Monitor switch ON. 4) Read DTC on the display.	Is trouble code indicated on display?	Go to step **6**.	Repair the related parts.
6	**PERFORM THE DIAGNOSIS.** 1) Inspect using “Diagnostics Chart with Trouble Code”. <Ref. to IM-26, Diagnostics Chart with Trouble Code.> 2) Repair the trouble cause. 3) Perform clear memory mode. 4) Read DTC again.	Is trouble code indicated on display?	Inspect using “Diagnostic Chart with Trouble Code”. <Ref. to IM-26, Diagnostics Chart with Trouble Code.>	Finish the diagnostics.

2. General Description S009001

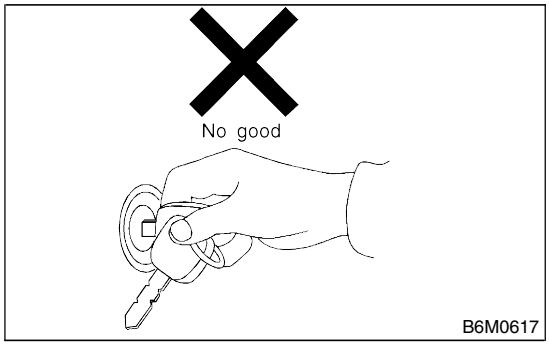
A: CAUTION S009001A03

CAUTION:

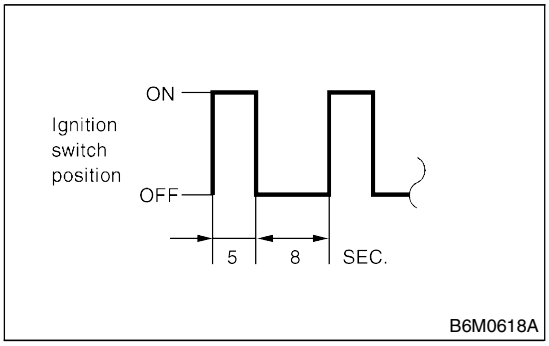
- **Airbag system wiring harness is routed near the immobilizer control module. All airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.**
- **Be careful not to damage airbag system wiring harness when servicing the immobilizer control module.**
- **While diagnostic items are being checked, do not operate radios, portable telephones, etc. which emit electromagnetic waves near or inside the vehicle.**



- **When ignition switch is being turned ON or OFF while diagnostic items are being checked, do not allow keys with different ID codes close to the ignition switch. If ignition key is in a key holder, remove it from holder before carrying out diagnoses.**



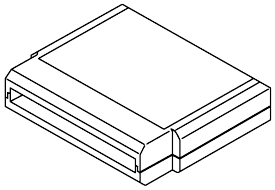
- **When repeatedly turning ignition ON or OFF while diagnostic items are being checked, it should be switched in cycles of "ON" for at least 5 seconds → "OFF" for at least 8 seconds.**



- **If engine fails to start with a registered ignition key, detach ignition key from ignition switch and wait for approximately 1 second until immobilizer indicator light begins to flash. Start engine again.**
- **Before checking diagnostic items, obtain all keys for vehicle to be checked possessed by owner.**

B: PREPARATION TOOL S009001A17

1. SPECIAL TOOLS S009001A1701

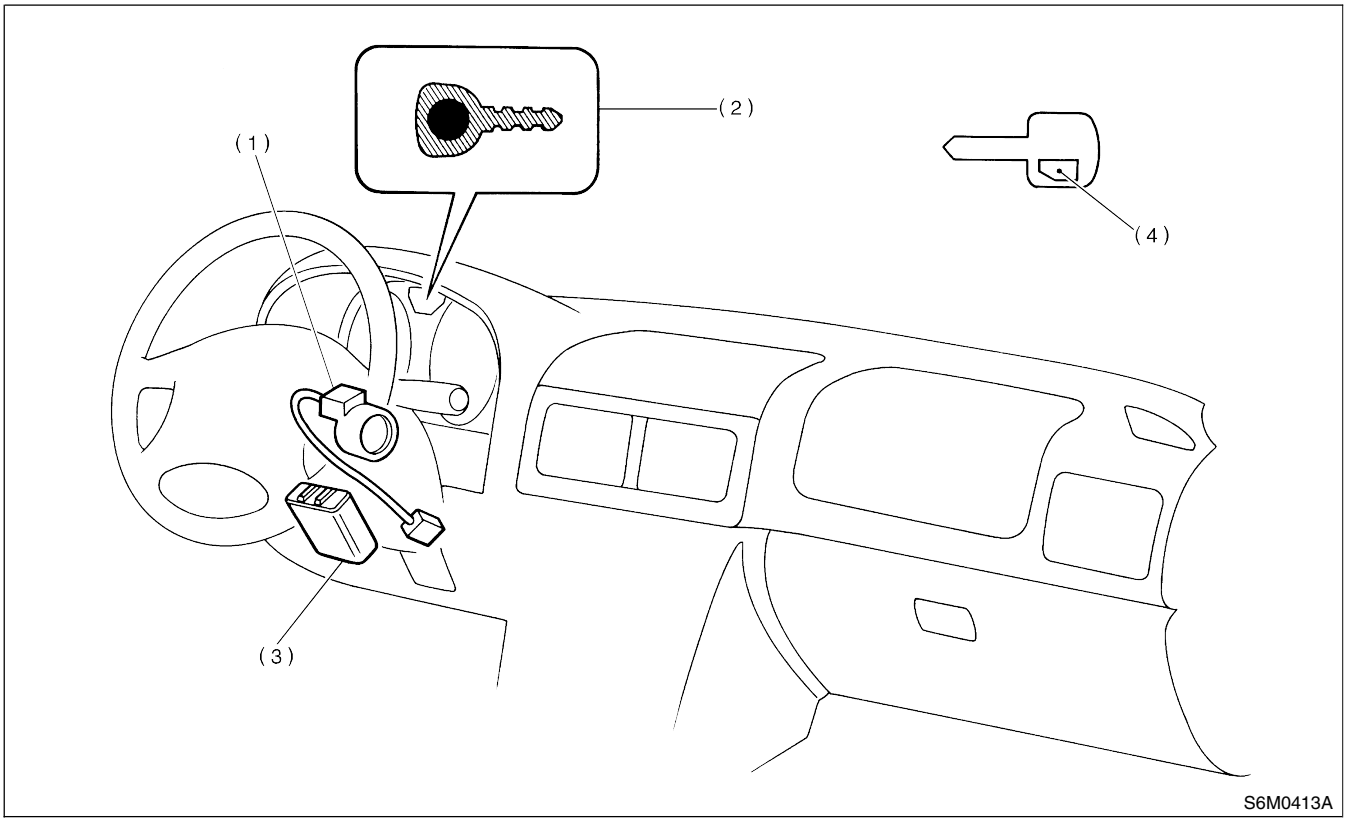
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3876	24082AA150 (Newly adopted tool)	CARTRIDGE	Troubleshooting for electrical systems.
 B2M3877	22771AA030	SELECT MONITOR KIT	Troubleshooting for electrical systems. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. GENERAL TOOLS S009001A1702

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.

3. Electrical Components Location S009507

A: LOCATION S009507A13



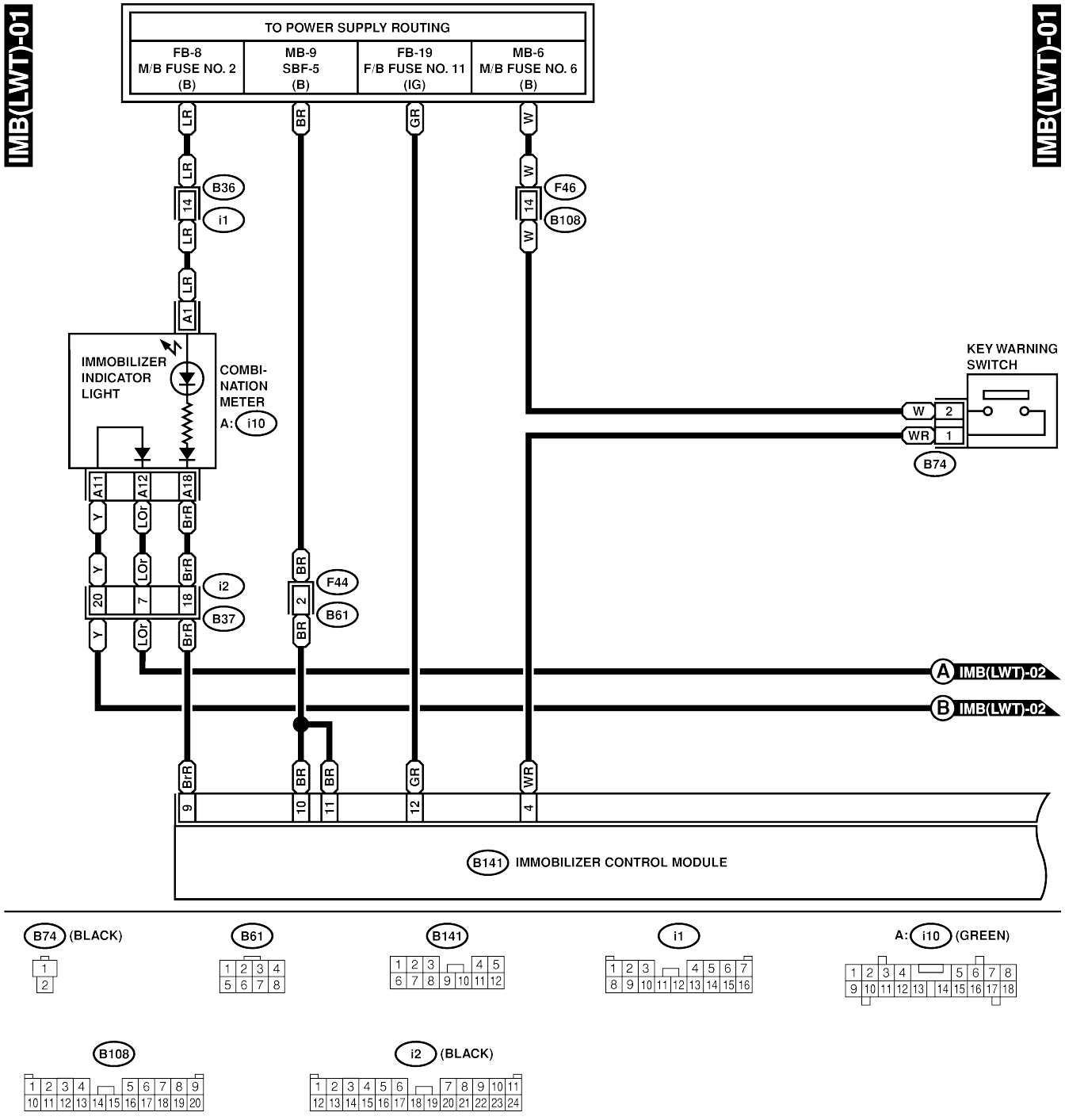
(1) Antenna
(2) Immobilizer indicator light (LED bulb)
(3) Immobilizer control module (IMM ECM)
(4) Transponder

NOTE:
IMM ECM location for RHD model is symmetrically opposite.

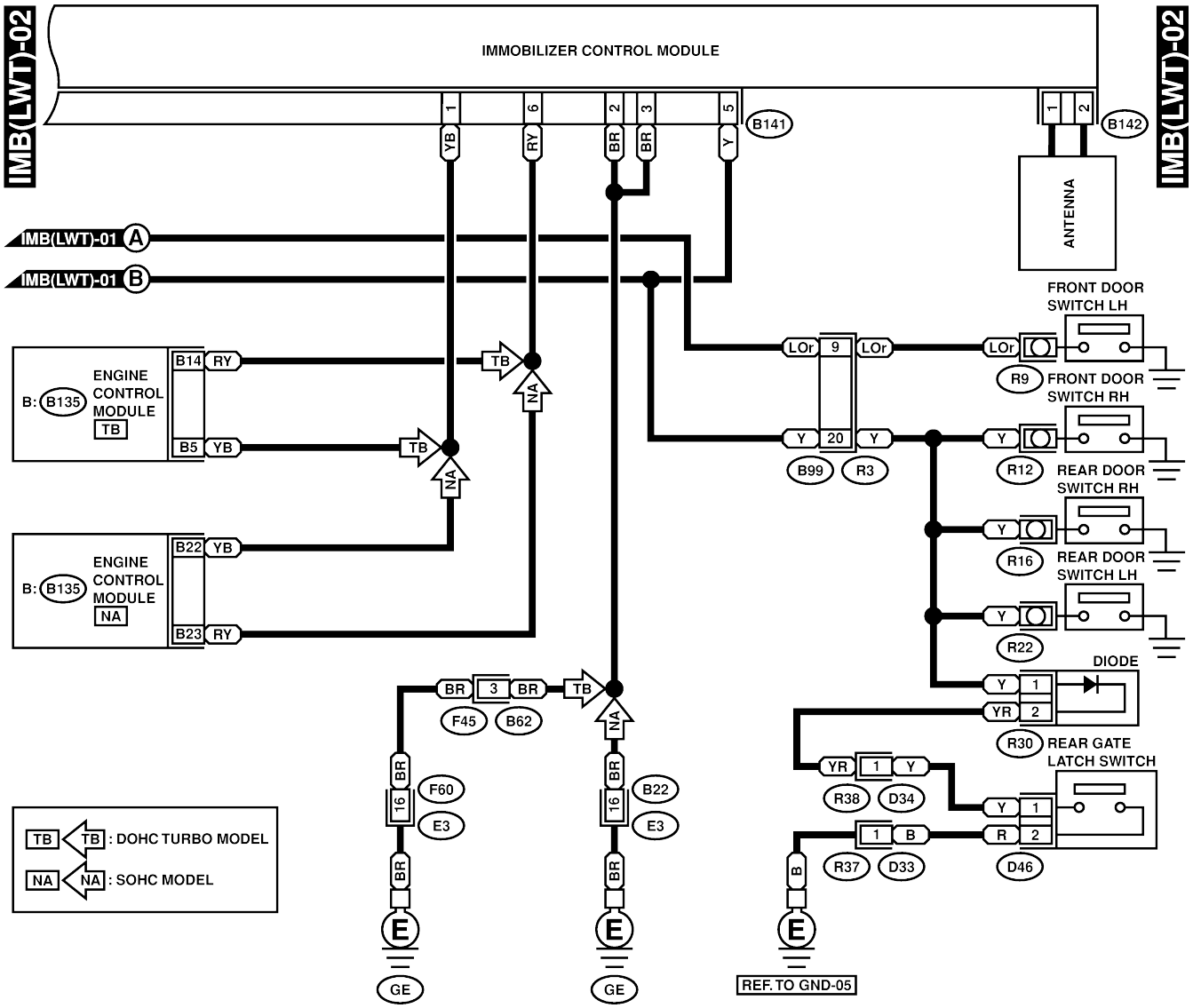
4. Immobilizer Control Module I/O Signal S009517

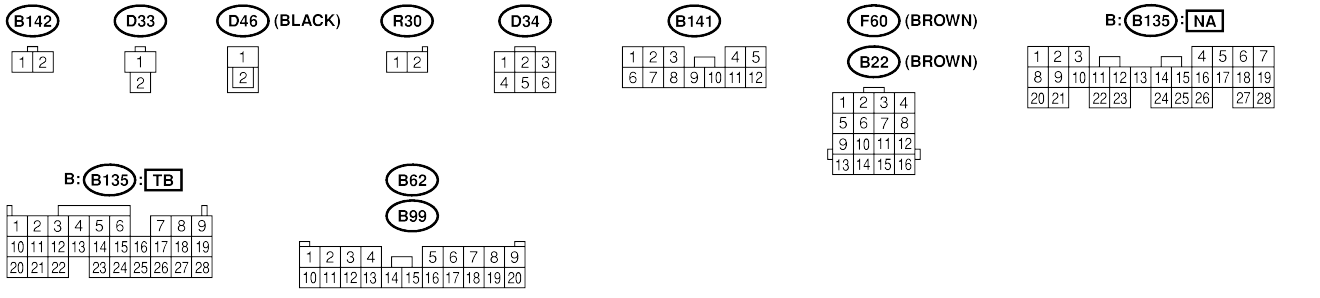
A: SCHEMATIC S009517A21

1. IMMOBILIZER LHD WITH OBD MODEL S009517A2103



SL91-20A

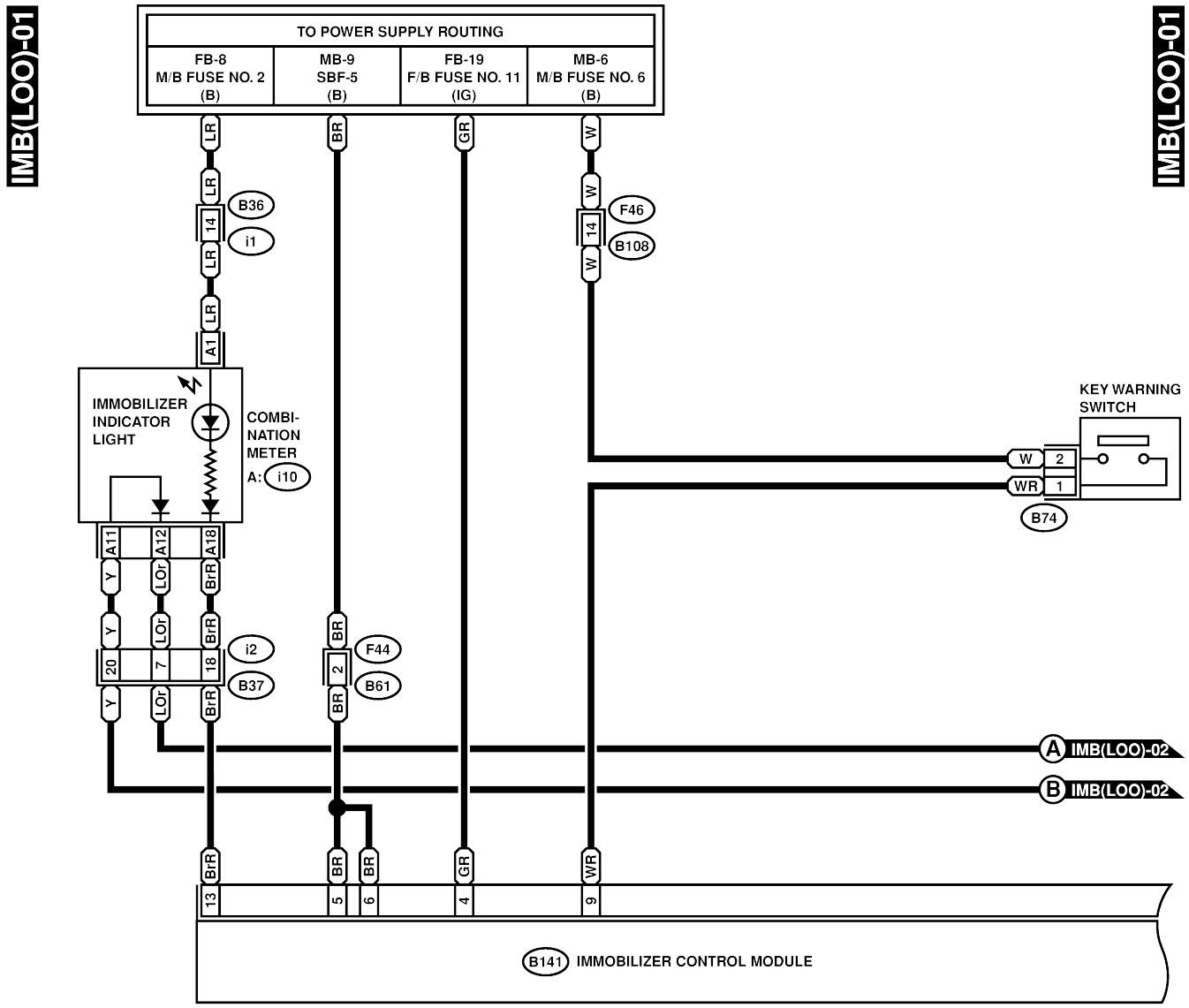

IMB(LWT)-02
IMMOBILIZER CONTROL MODULE
IMB(LWT)-02
B141
B142
ANTENNA
IMB(LWT)-01 A
IMB(LWT)-01 B
FRONT DOOR SWITCH LH
FRONT DOOR SWITCH RH
REAR DOOR SWITCH RH
REAR DOOR SWITCH LH
DIODE
REAR GATE LATCH SWITCH
B: B135 ENGINE CONTROL MODULE TB
B: B135 ENGINE CONTROL MODULE NA
TB : DOHC TURBO MODEL
NA : SOHC MODEL
REF. TO GND-05
GE
GE

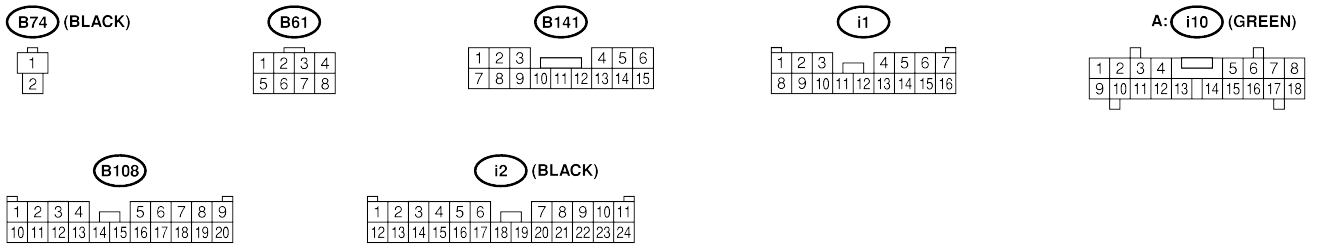

B142
D33
D46 (BLACK)
R30
D34
B141
F60 (BROWN)
B22 (BROWN)
B: B135 : NA
B: B135 : TB
B62
B99

SL91-20B

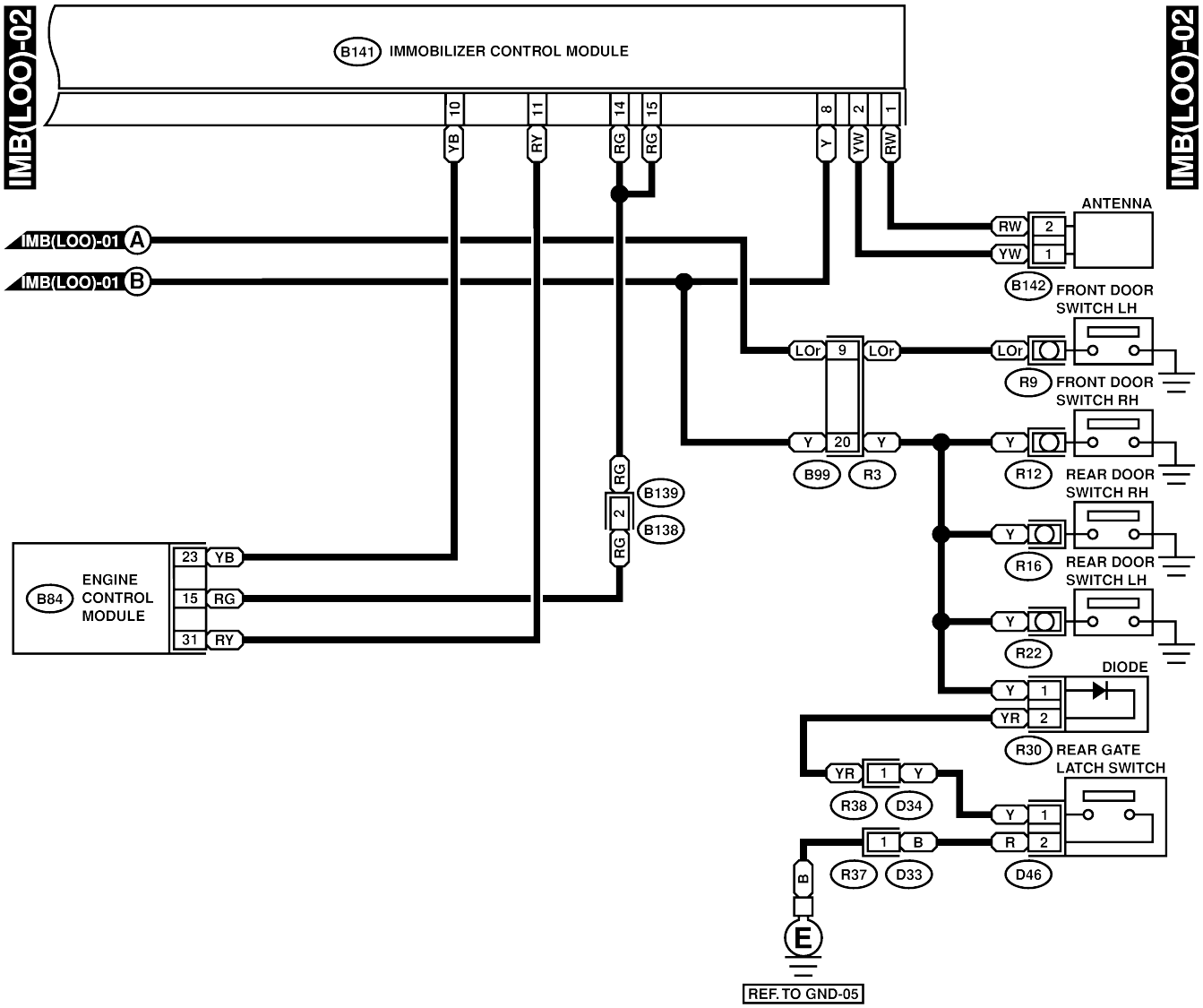
2. IMMOBILIZER LHD WITHOUT OBD MODEL

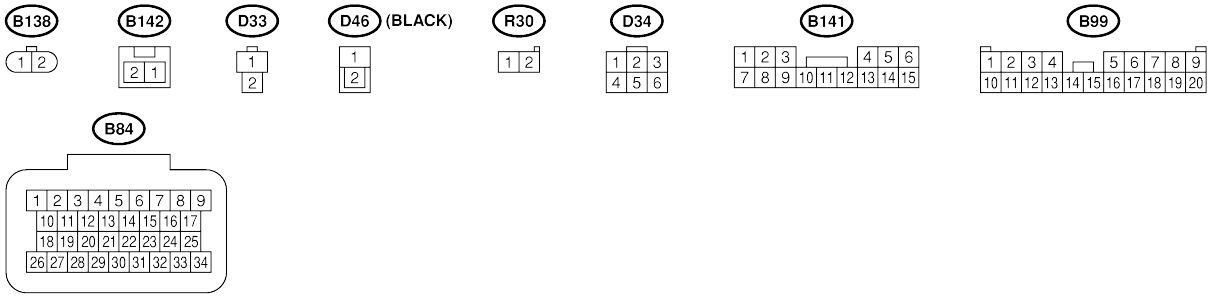
S009517A2104





SL91-21A


IMB(LOO)-02
B141 IMMOBILIZER CONTROL MODULE
10 11 14 15 8 2 1
YB RY RG RG Y YW RW
IMB(LOO)-01 A
IMB(LOO)-01 B
ANTENNA
RW 2
YW 1
B142 FRONT DOOR SWITCH LH
LOr 9 LOr
R9 FRONT DOOR SWITCH RH
Y 20 Y
B99 R3
R12 REAR DOOR SWITCH RH
R16 REAR DOOR SWITCH LH
R22
DIODE
Y 1
YR 2
R30 REAR GATE LATCH SWITCH
YR 1 Y
R38 D34
Y 1
1 B
R 2
R37 D33
D46
B
E
REF. TO GND-05
RG
B139
2
B138
RG
B84 ENGINE CONTROL MODULE
23 YB
15 RG
31 RY

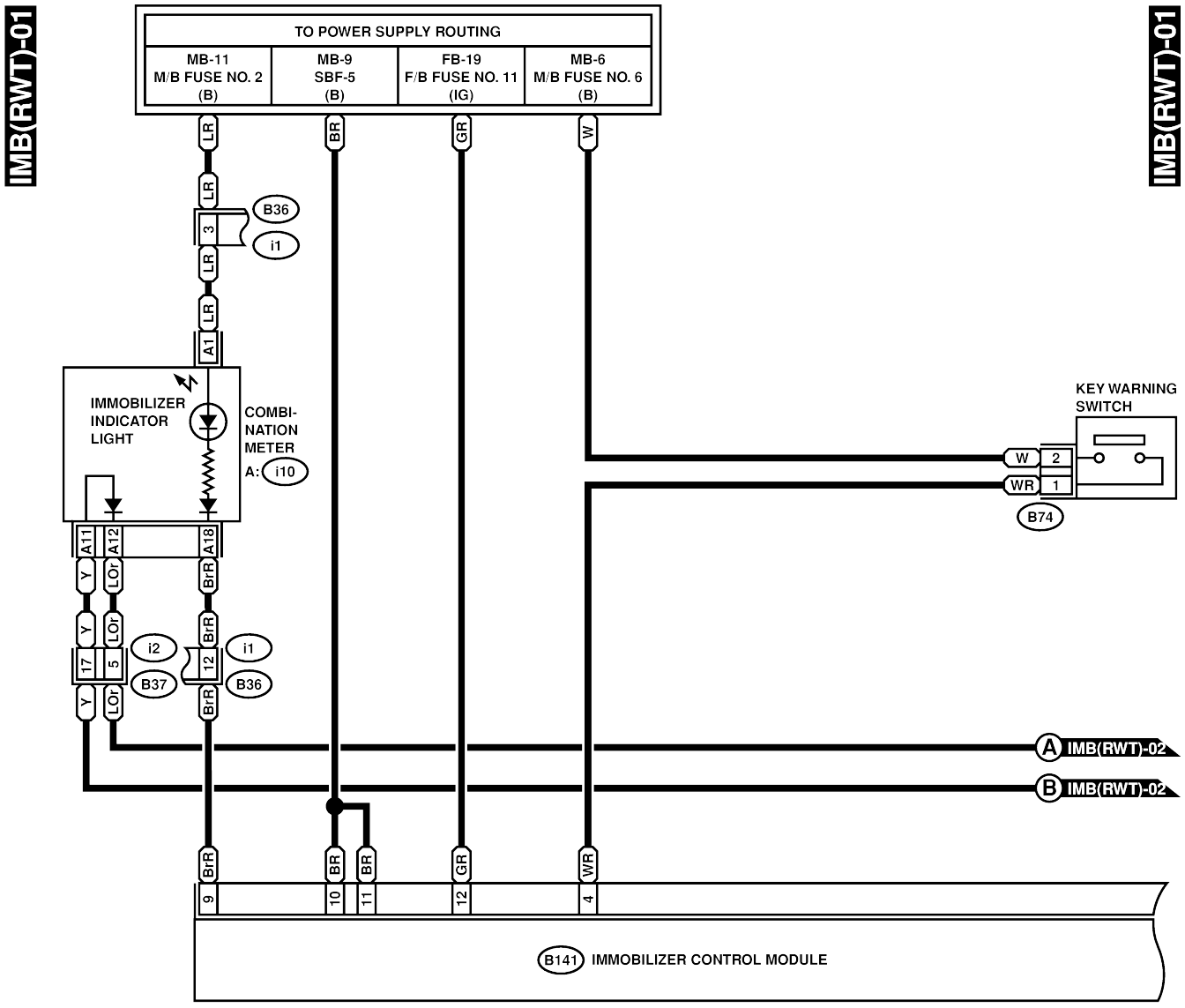

B138
1 2
B142
2 1
D33
1
2
D46 (BLACK)
1
2
R30
1 2
D34
1 2 3
4 5 6
B141
1 2 3 4 5 6
7 8 9 10 11 12 13 14 15
B99
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19 20

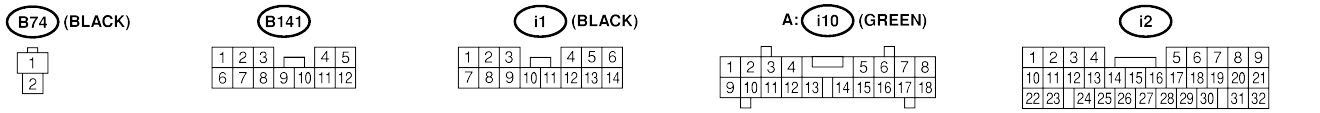
B84
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25
26 27 28 29 30 31 32 33 34

SL91-21B

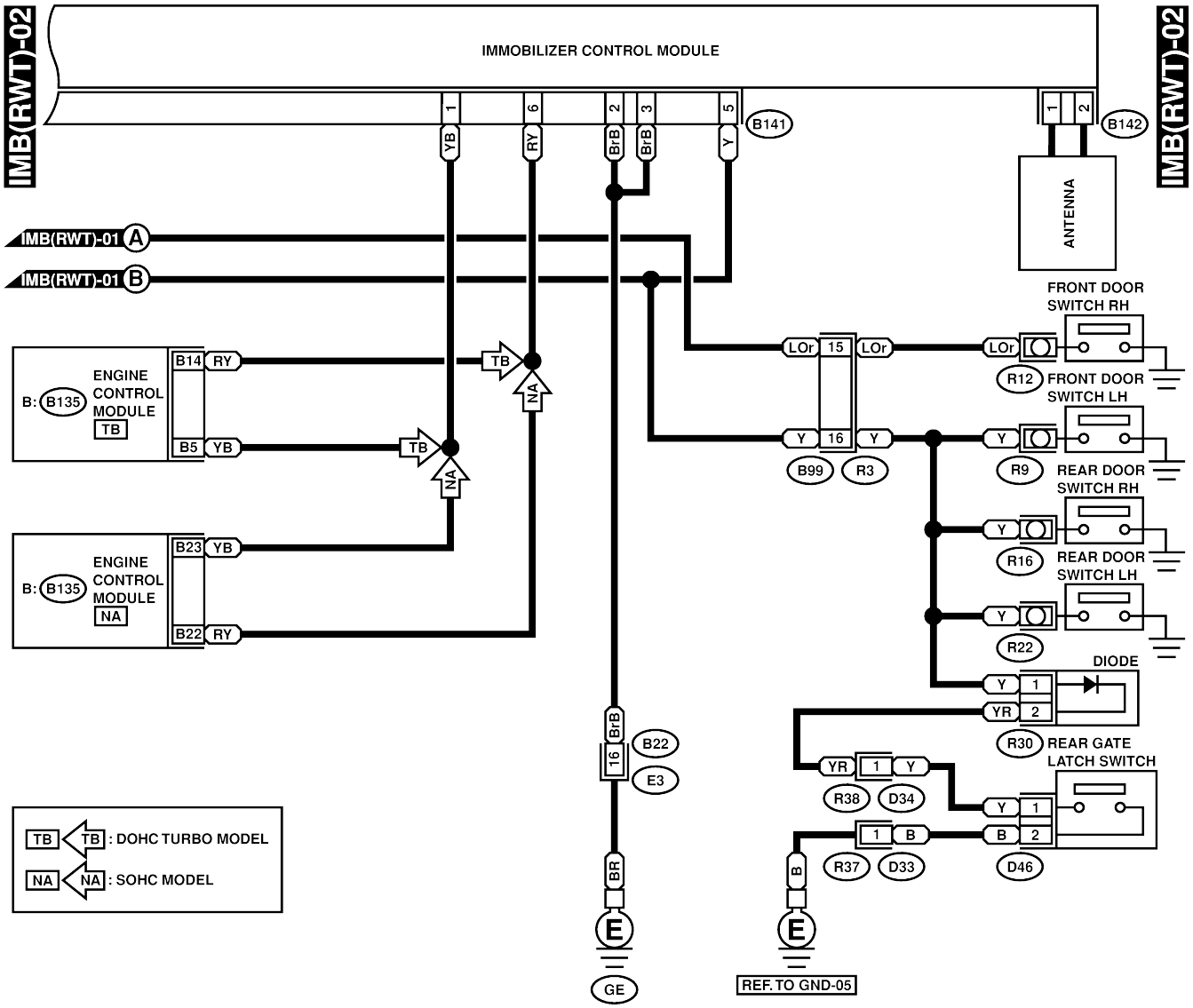
3. IMMOBILIZER RHD WITH OBD MODEL

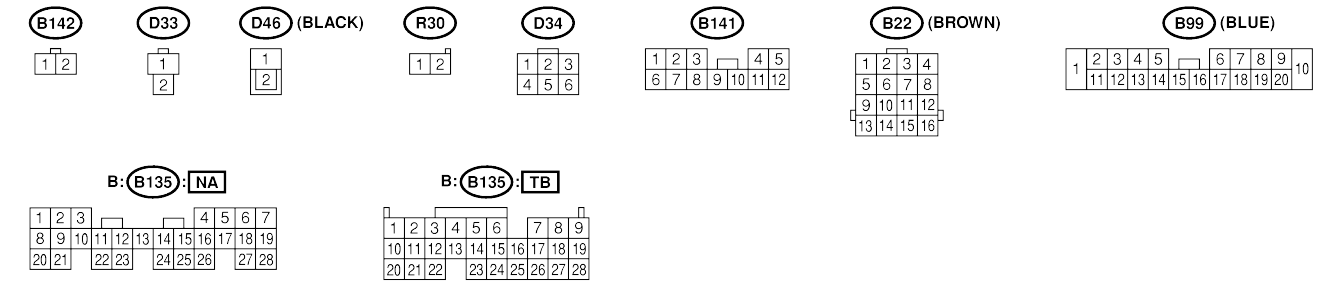
S009517A2105





SR91-20A

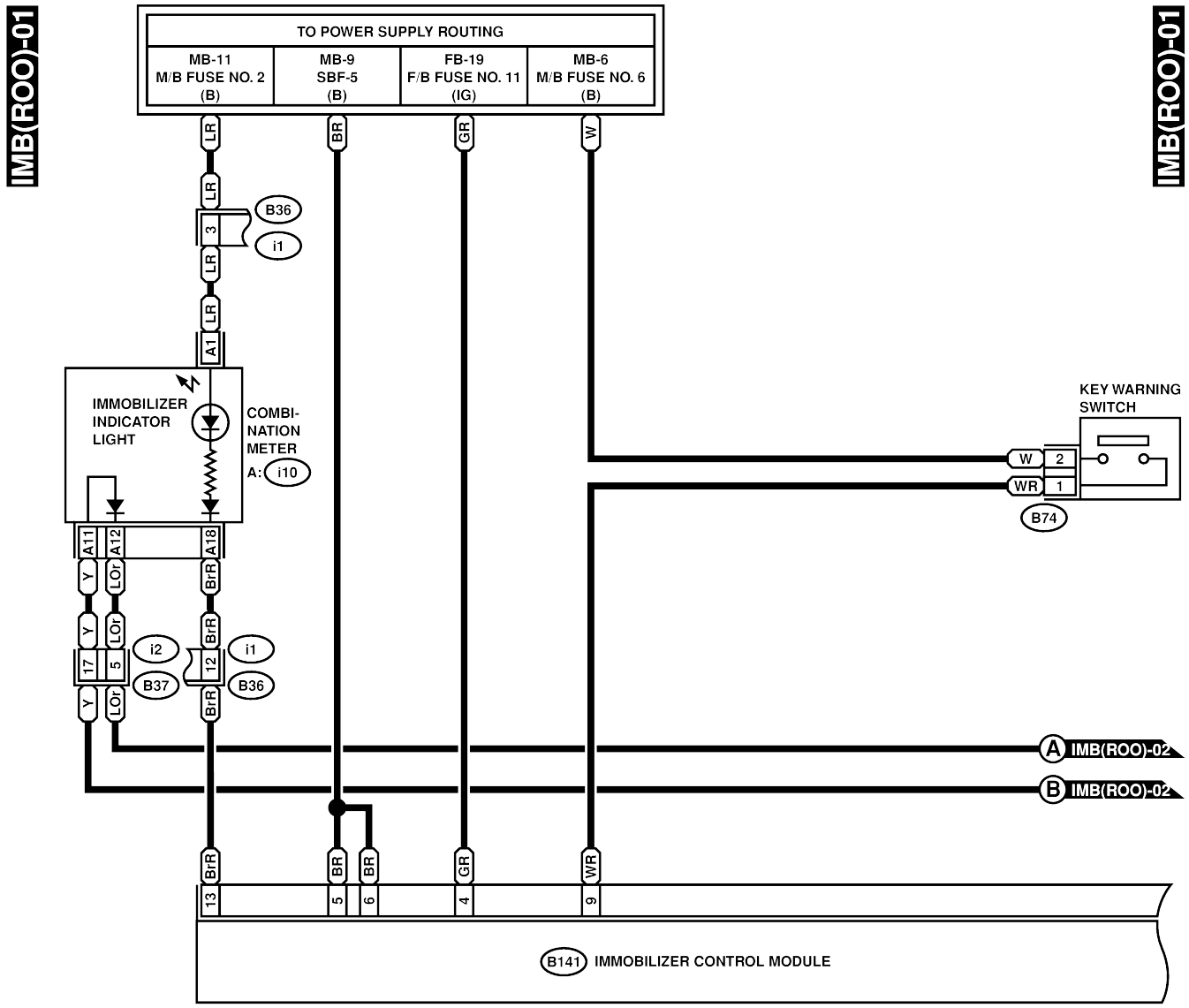

IMB(RWT)-02
IMMOBILIZER CONTROL MODULE
B141
B142
ANTENNA
IMB(RWT)-01 A
IMB(RWT)-01 B
FRONT DOOR SWITCH RH
FRONT DOOR SWITCH LH
REAR DOOR SWITCH RH
REAR DOOR SWITCH LH
DIODE
REAR GATE LATCH SWITCH
ENGINE CONTROL MODULE
TB
NA
B99
R3
R12
R9
R16
R22
R30
R38
D34
R37
D33
D46
B22
E3
GE
REF. TO GND-05
TB : DOHC TURBO MODEL
NA : SOHC MODEL

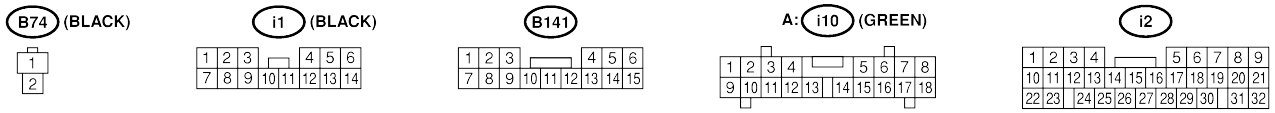

B142
D33
D46 (BLACK)
R30
D34
B141
B22 (BROWN)
B99 (BLUE)
B: B135 : NA
B: B135 : TB

SR91-20B

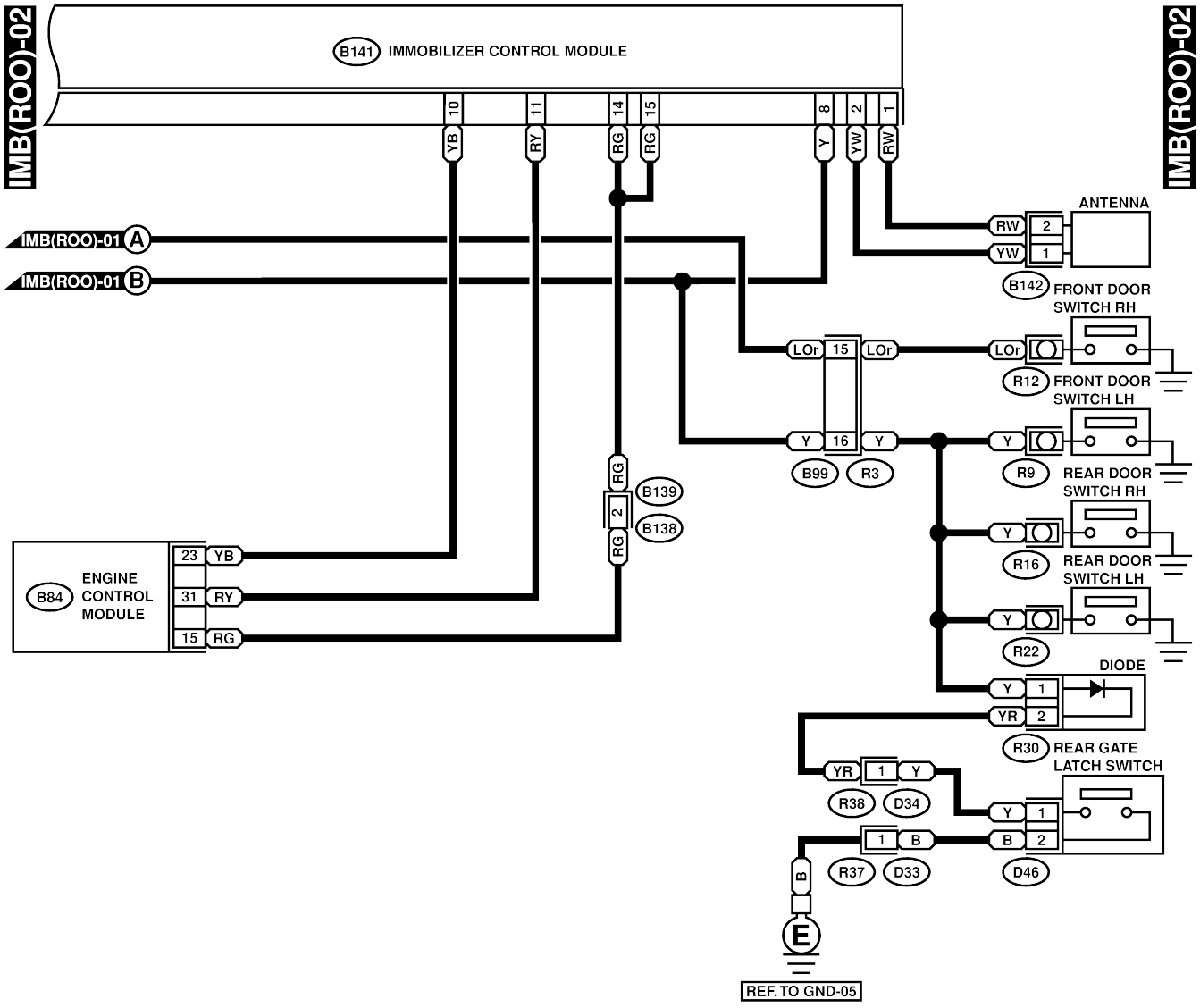
4. IMMOBILIZER RHD WITHOUT OBD MODEL

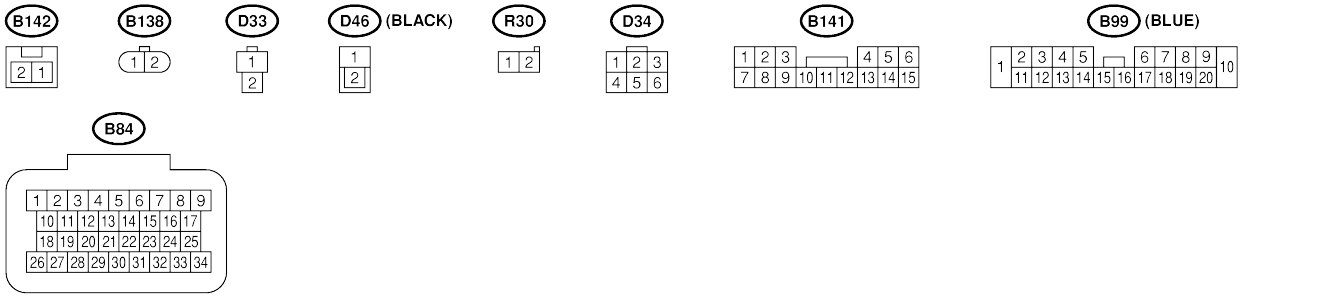
S009517A2106





SR91-21A


IMB(ROO)-02
B141 IMMOBILIZER CONTROL MODULE
10 11 14 15 8 2 1
YB RY RG RG Y YW RW
IMB(ROO)-01 A
IMB(ROO)-01 B
ANTENNA
RW 2
YW 1
B142 FRONT DOOR SWITCH RH
LOr 15 LOr
R12 FRONT DOOR SWITCH LH
Y 16 Y
B99 R3
R9 REAR DOOR SWITCH RH
R16 REAR DOOR SWITCH LH
R22
DIODE
Y 1
YR 2
R30 REAR GATE LATCH SWITCH
YR 1 Y
R38 D34
Y 1
1 B
B 2
R37 D33
D46
B
E
REF. TO GND-05
RG
B139
2
B138
RG
B84 ENGINE CONTROL MODULE
23 YB
31 RY
15 RG


B142
2 1
B138
1 2
D33
1
2
D46 (BLACK)
1
2
R30
1 2
D34
1 2 3
4 5 6
B141
1 2 3 4 5 6
7 8 9 10 11 12 13 14 15
B99 (BLUE)
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20
B84
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

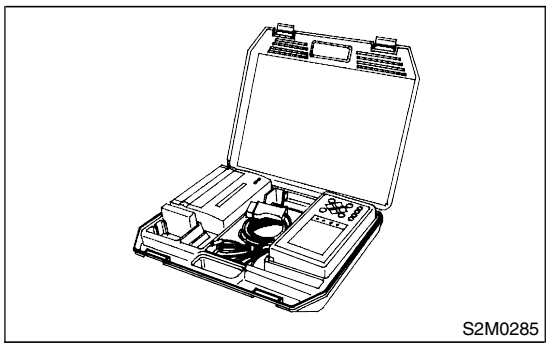
SR91-21B

5. Subaru Select Monitor S009503

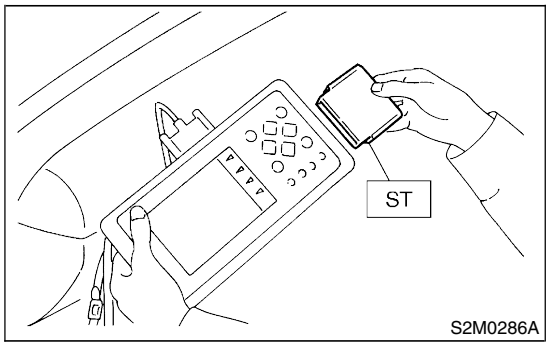
A: OPERATION S009503A16

1. HOW TO USE SUBARU SELECT MONITOR S009503A1605

1) Prepare Subaru Select Monitor kit.

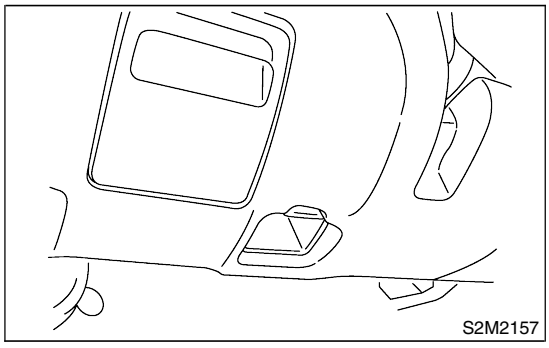

S2M0285

2) Connect diagnosis cable to Subaru Select Monitor.
3) Insert cartridge into Subaru Select Monitor. <Ref. to IM-4, SPECIAL TOOLS, PREPARATION TOOL, General Description.>



S2M0286A

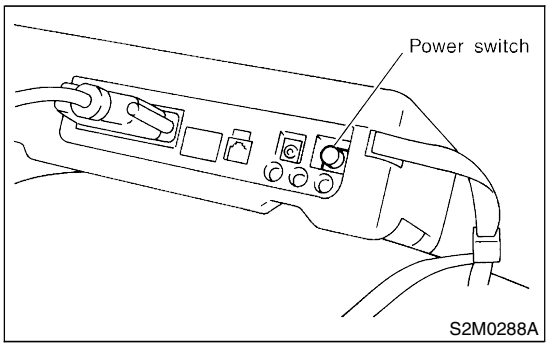
4) Connect Subaru Select Monitor to data link connector.
(1) Data link connector located in the lower portion of the instrument panel (on the driver's side).


S2M2157

(2) Connect diagnosis cable to data link connector.

CAUTION:
Do not connect scan tools except for Subaru Select Monitor.

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.

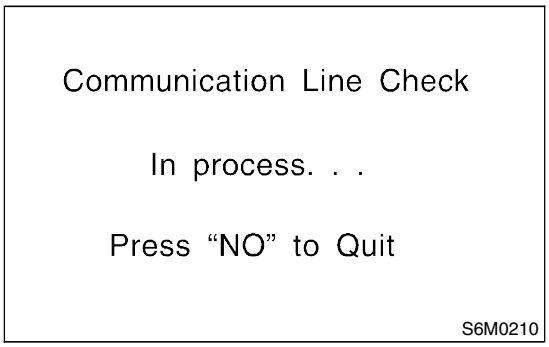
2. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE. S009503A1606

Refer to Read Diagnostic Trouble Code for information about how to indicate DTC. <Ref. to IM-16, Read Diagnostic Trouble Code.>

3. INTERFACE CHECK S009503A1604

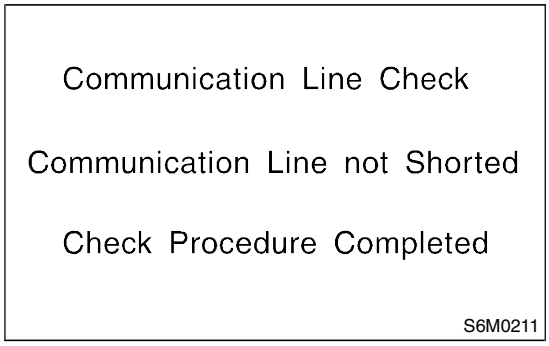
NOTE:
Communication line between ECM and IMM ECM can be checked in ≪System Operation Check Mode≫. This is referred to as "interface check".

1) Connect select monitor.
2) Set the ≪System Operation Check Mode≫ menu display screen then select ≪Immobilizer System≫.
3) Screen indicates as shown.



S6M0210

4) Start interface check.
5) Does “Communication Line not Shorted” appear on screen?
If “YES”. Go to step 6).
If “NO”. Go to step 7).



6) After diagnostic results, it is determined that short circuit is not a diagnostic item. This completes interface check.
7) If a problem is detected, repair. <Ref. to IM-27, DTC P1572 — IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT) —, Diagnostics Chart with Trouble Code.>

6. Read Diagnostic Trouble Code S009508

A: OPERATION S009508A16

1. WITH SUBARU SELECT MONITOR S009508A1601

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.

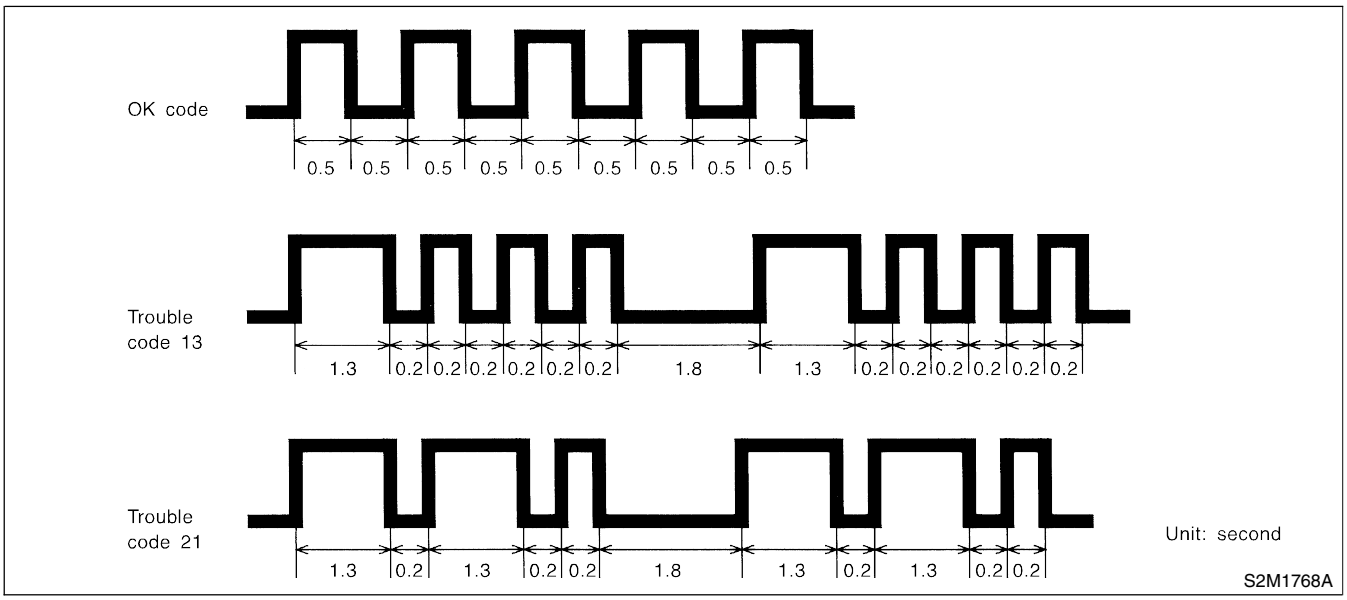
NOTE:
- For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
- For detailed concerning diagnostic trouble codes, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to IM-25, LIST, List of Diagnostic Trouble Code.>

2. WITHOUT SUBARU SELECT MONITOR S009508A1602

No.	Step	Check	Yes	No
1	**CHECK STATUS OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL).** 1) Turn ignition switch to OFF. 2) Connect read memory connector. <Ref. to EN(SOHCw/oOBD)-10, LOCATION, Electrical Components Location.> 3) Turn ignition switch to ON.	Does the MIL come on?	Go to step **2**.	Check the following and repair if necessary. NOTE: ● Open or short circuit in engine control module power supply or ground line ● Open or short circuit in CHECK ENGINE malfunction indicator lamp
2	**CHECK DIAGNOSTIC TROUBLE CODE (DTC).**	Does the MIL indicate diagnostic trouble code (DTC)?	Record diagnostic trouble code (DTC). Then turn ignition switch to OFF, disconnect read memory connector.	Complete read diagnostic trouble code. Turn ignition switch to OFF and disconnect read memory connector.

The CHECK ENGINE malfunction indicator lamp (MIL) flashes the code corresponding to the faulty parts. The long segment (1.3 seconds ON) indicates a “ten”, and the short segment (0.2 seconds ON) signifies “one”. And middle segment (0.5 seconds ON) means OK code.

NOTE:
● For detailed concerning diagnostic trouble codes, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to IM-25, LIST, List of Diagnostic Trouble Code.>



7. Clear Memory Mode S009513

A: OPERATION S009513A16

1. WITH SUBARU SELECT MONITOR

S009513A1601

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:
● Are the memory has been cleared, the ISC 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. WITHOUT SUBARU SELECT MONITOR S009513A1602

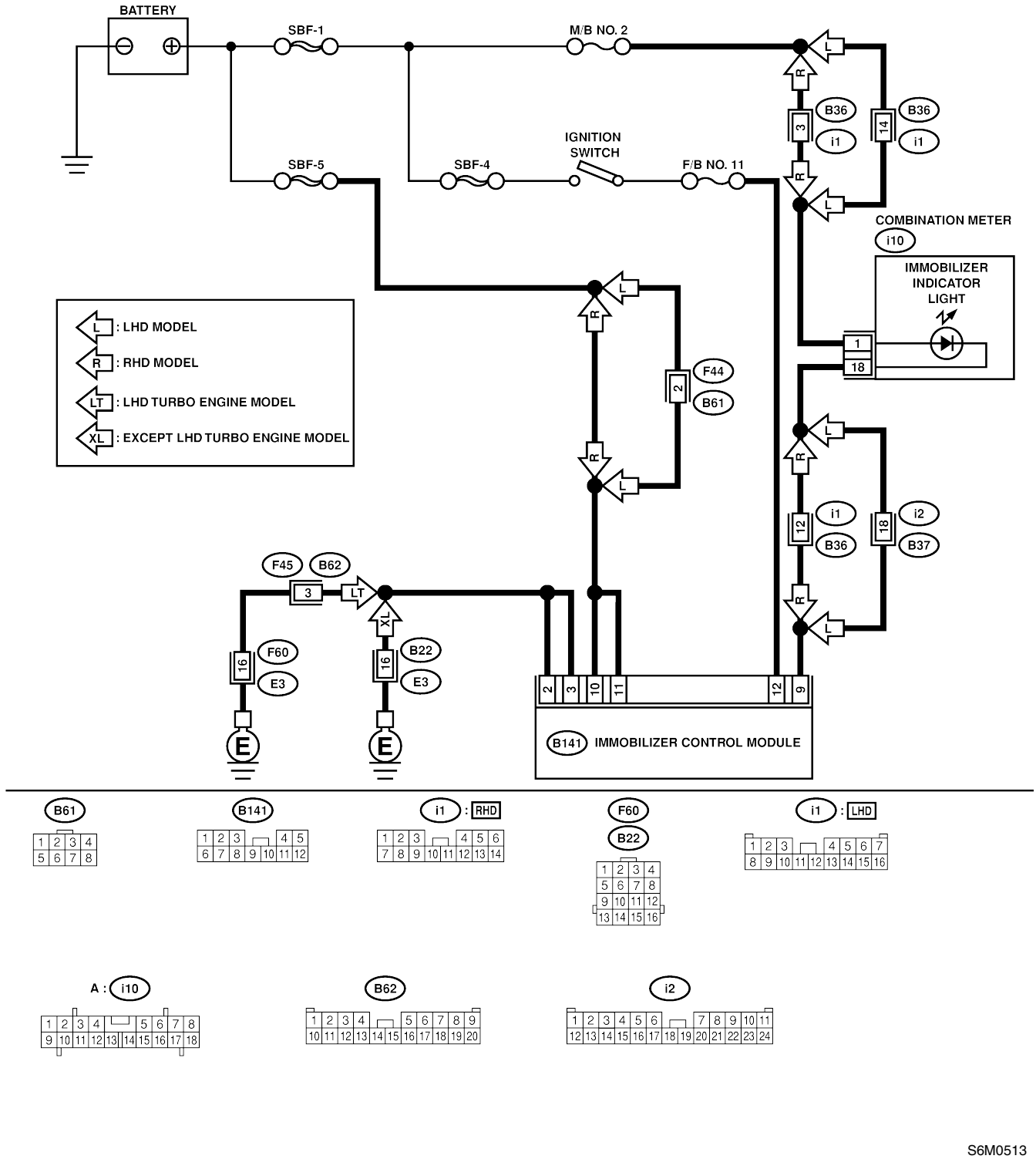
No.	Step	Check	Yes	No
1	**CHECK STATUS OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL).** 1) Turn ignition switch to OFF. 2) Set shift lever to neutral position (MT vehicles), or set selector lever to "P" position (AT vehicles). 3) Connect test mode connector and read memory connector. 4) Turn ignition switch to ON.	Does the MIL come on?	Go to step **2**.	Check the following and repair if necessary. NOTE: ● Open or short circuit in engine control module power supply or ground line ● Open or short circuit in CHECK ENGINE malfunction indicator lamp
2	**CHECK DIAGNOSTIC TROUBLE CODE (DTC).** 1) Set selector lever "N" position, and then set selector lever to "P" position again (AT vehicles only). 2) Start the engine. 3) Drive vehicle at speed greater than 11 km/h (7 MPH) for at least one minute. 4) Warm-up engine above 2,000 rpm.	Does the MIL indicate diagnostic trouble code (DTC)? <Ref. to IM-25, LIST, List of Diagnostic Trouble Code.>	Record diagnostic trouble code. Repair the trouble cause.	Turn ignition switch to OFF, Disconnect read memory connector and test mode connector. Complete clear memory mode.

8. Diagnostics Chart for Immobilizer Indicator Light S009641

A: INSPECTION S009641A10

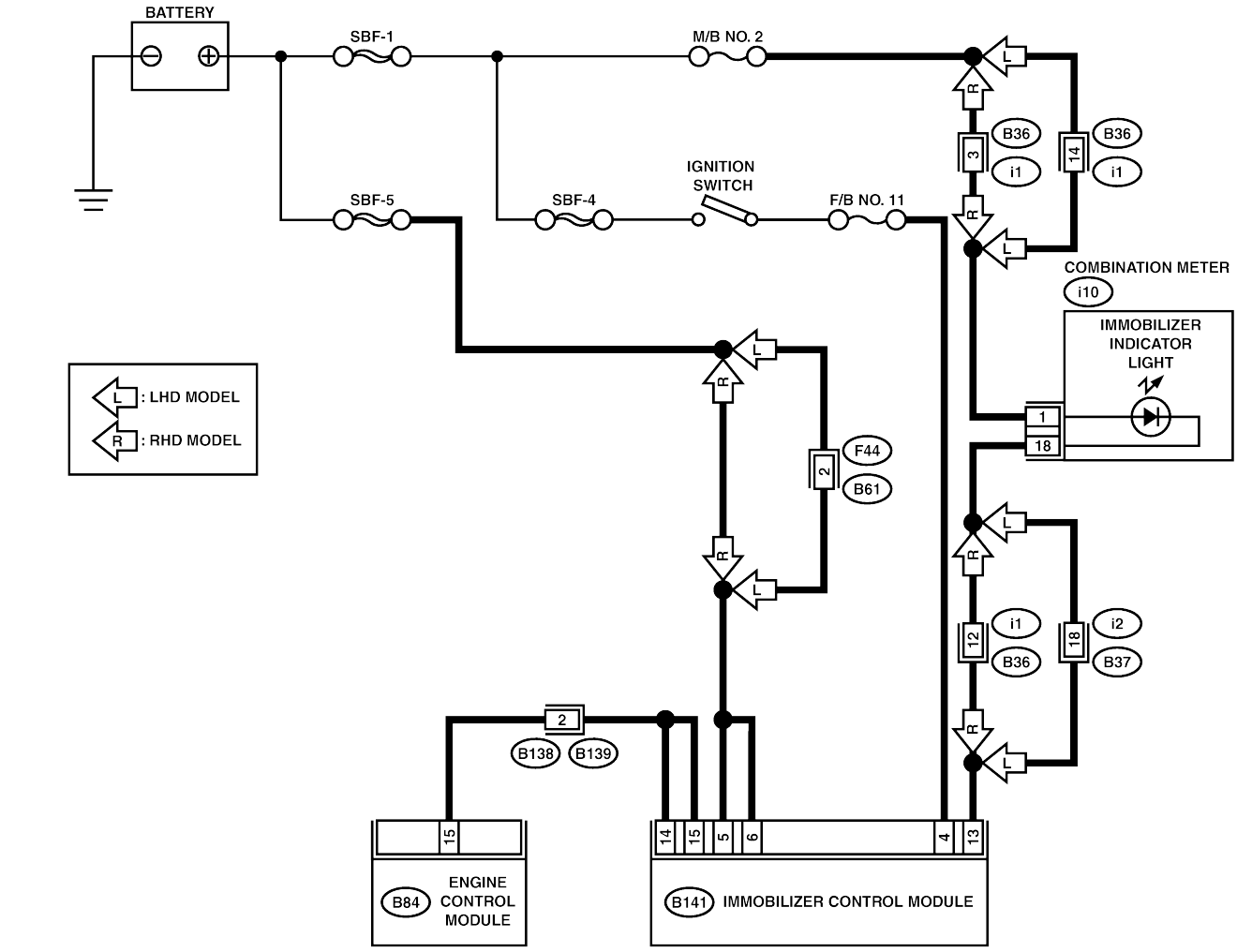
1. CHECK IMMOBILIZER INDICATOR CIRCUIT S009641A1001

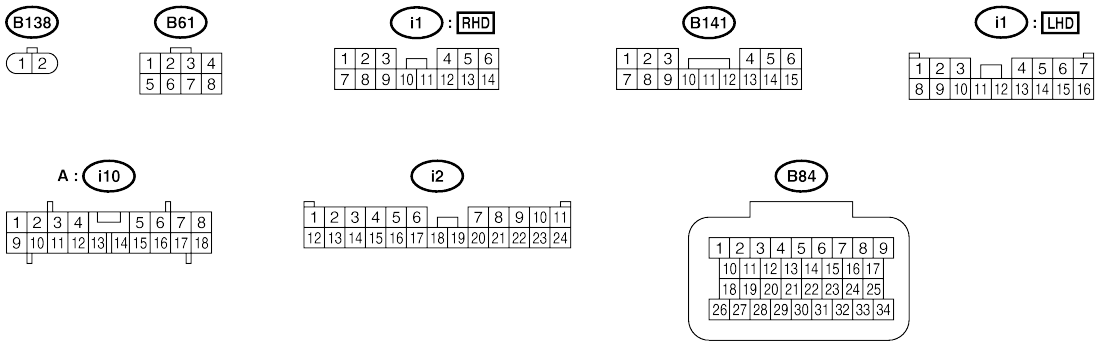
WIRING DIAGRAM (WITH OBD MODEL):



S6M0513

WIRING DIAGRAM (WITHOUT OBD MODEL):





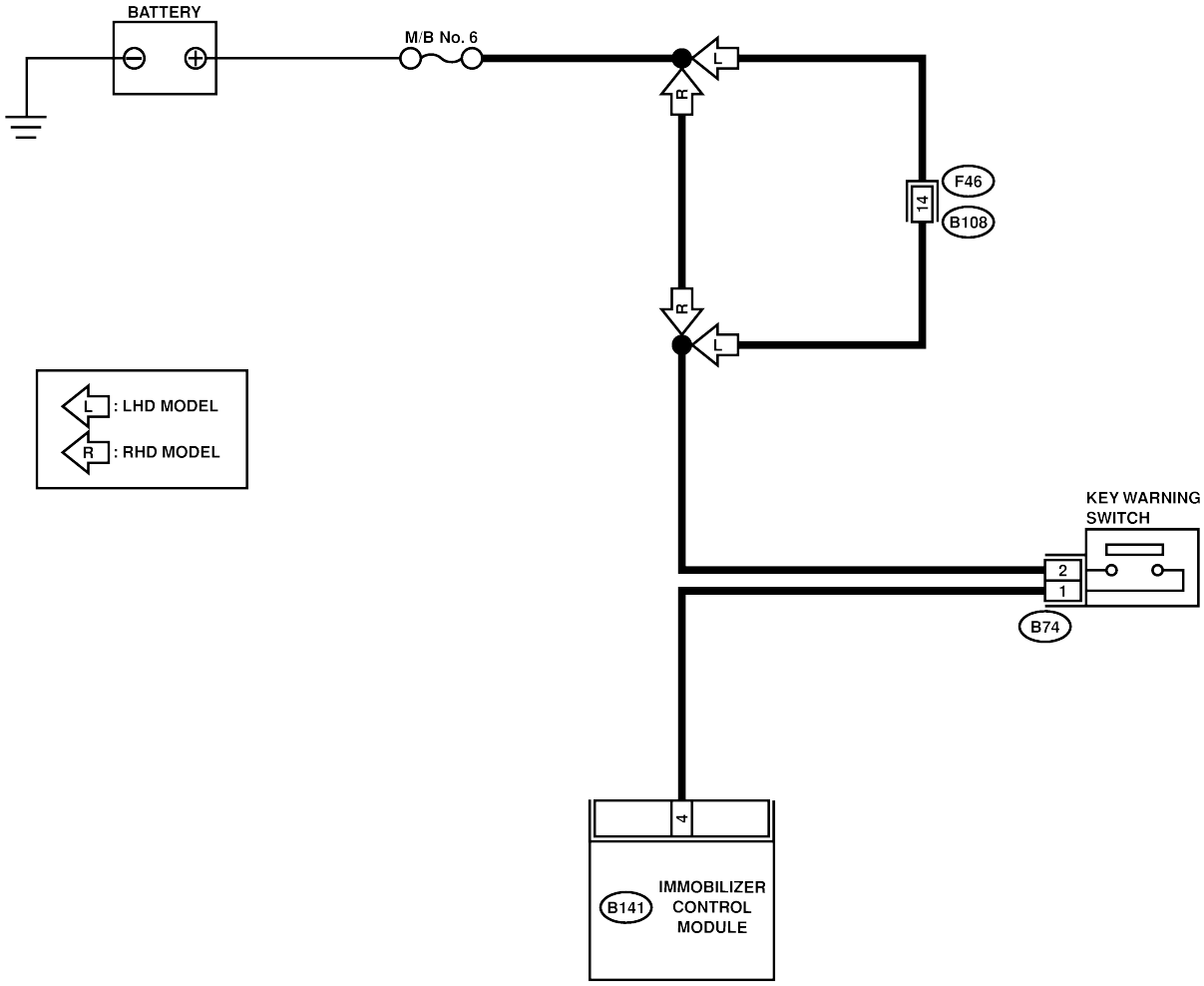
S6M0514

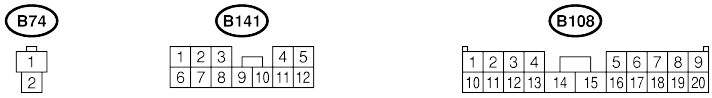
DIAGNOSTICS CHART FOR IMMOBILIZER INDICATOR LIGHT

No.	Step	Check	Yes	No
1	**CHECK IMMOBILIZER INDICATOR LIGHT COMES ON.** 1) Turn ignition switch OFF. 2) Disconnect harness connector from IMM ECM. 3) Connect a resistor (750 Ω) between IMM ECM harness connector terminal No. 9 and chassis ground.	Does indicator light comes on?	Go to step **2**.	Go to step **5**.
2	**CHECK IMM ECM GROUND CIRCUIT.** Measure resistance between IMM ECM harness connector terminal and chassis ground. ***Connector & terminal*** ***With OBD:*** ***(B141) No. 2, No. 3 (+) — Chassis ground (–):*** ***Without OBD:*** ***(B141) No. 14, No. 15 (+) — Chassis ground (–):***	Is the resistance less than 10 Ω?	Go to step **3**.	Repair open circuit of IMM ECM ground circuit.
3	**CHECK IMM ECM IGNITION CIRCUIT.** 1) Turn ignition switch ON. (Engine OFF.) 2) Measure voltage between IMM ECM harness connector terminal and chassis ground. ***Connector & terminal*** ***With OBD:*** ***(B141) No. 12 (+) — Chassis ground (–):*** ***Without OBD:*** ***(B141) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4**..	Check harness for open or short between IMM ECM and ignition switch.
4	**CHECK IMM ECM POWER SUPPLY CIRCUIT.** 1) Turn ignition switch OFF. 2) Measure voltage between IMM ECM harness connector terminal and chassis ground. ***Connector & terminal*** ***With OBD:*** ***(B141) No. 10, No. 11 (+) — Chassis ground (–):*** ***Without OBD:*** ***(B141) No. 5, No. 6 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Replace IMM ECM <Ref. to SL-42, Immobilizer Control Module.> and then replace all ignition keys (including the transponder). Then perform teaching operation. Refer to teaching operation manual (Pub. No. S0820GZ).	Check harness for open or short between IMM ECM and fuse.
5	**CHECK COMBINATION METER CIRCUIT.** 1) Remove combination meter. <Ref. to IDI-15, Combination Meter Assembly.> 2) Measure voltage between combination meter harness connector terminal and chassis ground. ***Connector & terminal*** ***(i10) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **6**.	Check harness for open or short between combination meter and fuse.
6	**CHECK COMBINATION METER CIRCUIT.** Measure resistance between IMM ECM harness connector terminal and combination meter harness connector terminal. ***Connector & terminal*** ***With OBD:*** ***(B141) No. 9 — (i10) No. 18:*** ***Without OBD:*** ***(B141) No. 13 (+) — (i10) No. 18:***	Is the resistance less than 10 Ω?	Faulty LED bulb. Replace combination meter printed circuit. <Ref. to IDI-15, DISASSEMBLY, Combination Meter Assembly.>	Repair harness or connector.

2. CHECK KEY SWITCH CIRCUIT S009641A1002

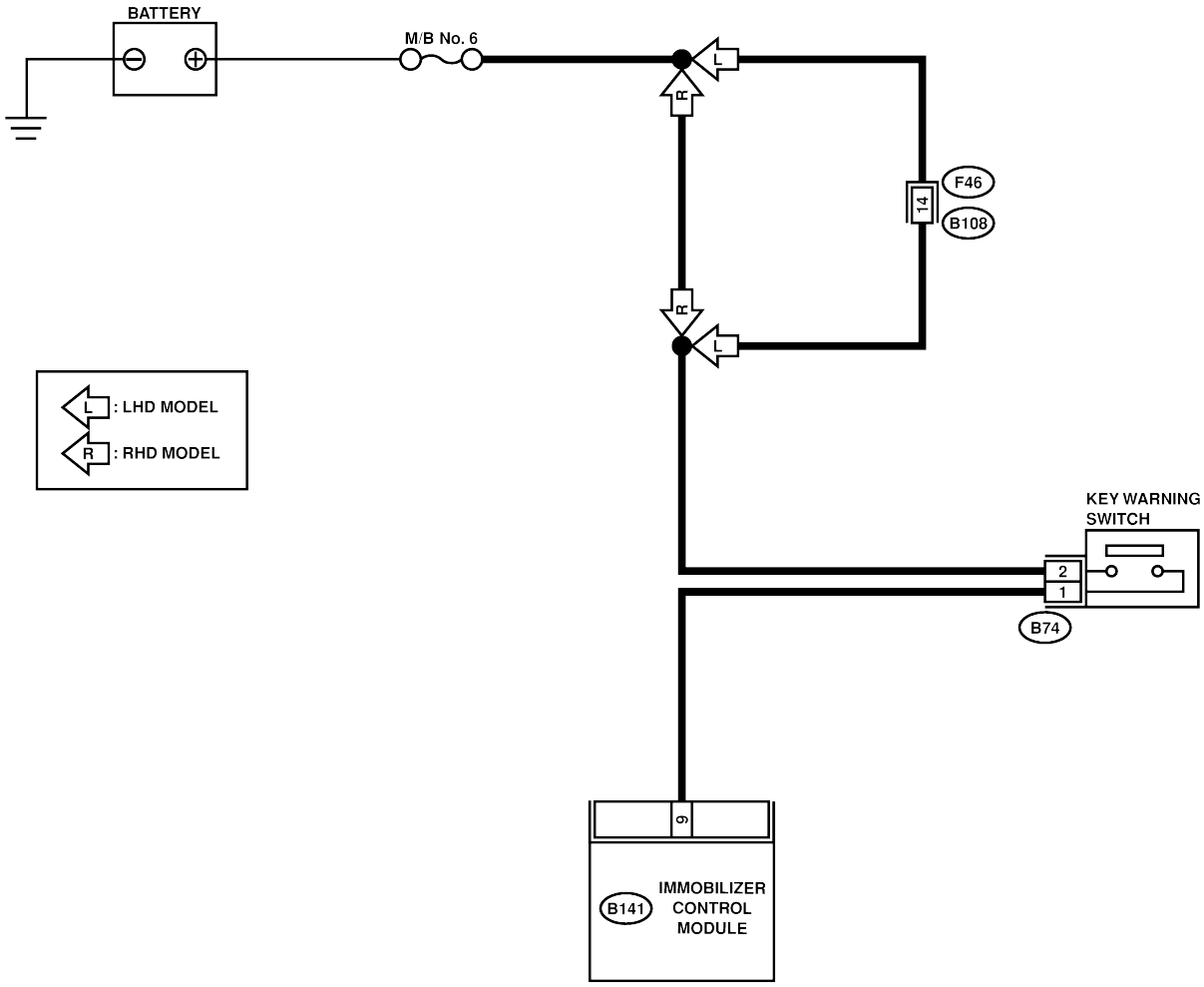
WIRING DIAGRAM (WITH OBD MODEL):

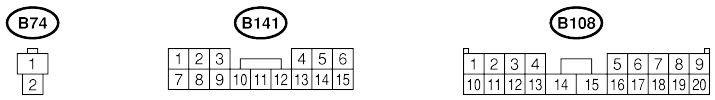




S6M0515

WIRING DIAGRAM (WITHOUT OBD MODEL):





S6M0516

DIAGNOSTICS CHART FOR IMMOBILIZER INDICATOR LIGHT

No.	Step	Check	Yes	No
1	**CHECK POWER SUPPLY CIRCUIT.** 1) Disconnect harness connector from key warning switch. 2) Turn ignition switch ACC or LOCK position (The key inserted). 3) Measure voltage between key warning switch harness connector terminal and chassis ground. ***Connector & terminal*** ***(B74) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Check harness for open or short between key warning switch and fuse.
2	**CHECK KEY SWITCH.** 1) Insert the ignition key to the ignition switch. (OFF or ACC position) 2) Check continuity between key warning switch connector terminals. ***Connector & terminal*** ***No. 1 — No. 2:***	Dose continuity exist?	Go to step **3**.	Replace key warning switch.
3	**CHECK KEY SWITCH.** 1) Remove the ignition key from the ignition switch. 2) Check continuity between key warning switch connector terminals. ***Connector & terminal*** ***No. 1 — No. 2:***	Does continuity exsit?	Replace key warning switch.	Go to step **4**.
4	**CHECK HARNESS BETWEEN KEY SWITCH AND IMM ECM.** 1) Disconnect harness connector from key warning switch. 2) Disconnect harness connector from IMM ECM. 3) Measure resistance between key warning switch harness connector terminal and IMM ECM harness connector terminal. ***Connector & terminal*** ***With OBD:*** ***(B74) No. 1 — (B141) No. 4:*** ***Without OBD:*** ***(B74) No. 1 — (B141) No. 9:***	Is the resistance less than 10 Ω?	Replace IMM ECM <Ref. to SL-42, Immobilizer Control Module.> and then replace all ignition keys (including the transponder). Then perform teaching operation. Refer to teaching operation manual (Pub. No. S0820GZ).	Repair harness between key warning switch and IMM ECM.

9. List of Diagnostic Trouble Code S009511

A: LIST S009511A12

DTC		Item	Contents of diagnosis	Index No.
Without OBD	With OBD			
53	P1571	Reference Code Incompatibility	Reference code incompatibility between IMM ECM and ECM	<Ref. to IM-26, DTC P1571 — REFERENCE CODE INCOMPATIBILITY —, Diagnostics Chart with Trouble Code.>
	P1572	IMM Circuit Failure (Except Antenna Circuit)	Communication failure between IMM ECM and ECM	<Ref. to IM-27, DTC P1572 — IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT) —, Diagnostics Chart with Trouble Code.>
	P1574	Key Communication Failure	Failure of IMM ECM to verify key (transponder) ID code	<Ref. to IM-33, DTC P1574 — KEY COMMUNICATION FAILURE —, Diagnostics Chart with Trouble Code.>
	P0153	Use of Unregistered Key	Incorrect immobilizer key (Use of unregistered key in IMM ECM)	<Ref. to IM-34, DTC P0153 — INNCORRECT IMMOBILIZER KEY (USE OF UNREGISTERED KEY) —, Diagnostics Chart with Trouble Code.>
	P1576	EGI Control Module EEPROM	ECM malfunctioning	<Ref. to IM-34, DTC P1576 — EGI CONTROL MODULE EEPROM —, Diagnostics Chart with Trouble Code.>
	P1577	IMM Control Module EEPROM	IMM ECM malfunctioning	<Ref. to IM-34, DTC P1577 — IMM CONTROL MODULE EEPROM —, Diagnostics Chart with Trouble Code.>
	P1570	ANTENNA	Faulty antenna	<Ref. to IM-35, DTC P1570 — ANTENNA —, Diagnostics Chart with Trouble Code.>

NOTE:
- When reading diagnostic trouble code except with SUBARU SELECT MONITOR, the item cannot be specified. Therefore diagnose for all items.
- When a diagnostic trouble code except for the above immobilizer trouble code has been output, carry out diagnosis for the engine trouble code. <Ref. to EN(SOHC)-80, List of Diagnostic Trouble Code (DTC).> or <Ref. to EN(SOHCw/oOBD)-65, List of Diagnostic Trouble Code (DTC).> or <Ref. to EN(DOHC TURBO)-82, List of Diagnostic Trouble Code (DTC).>

10. Diagnostics Chart with Trouble Code S009620

A: DTC P1571 — REFERENCE CODE INCOMPATIBILITY — S009620H45

DIAGNOSIS:

- Reference code incompatibility between IMM ECM and ECM

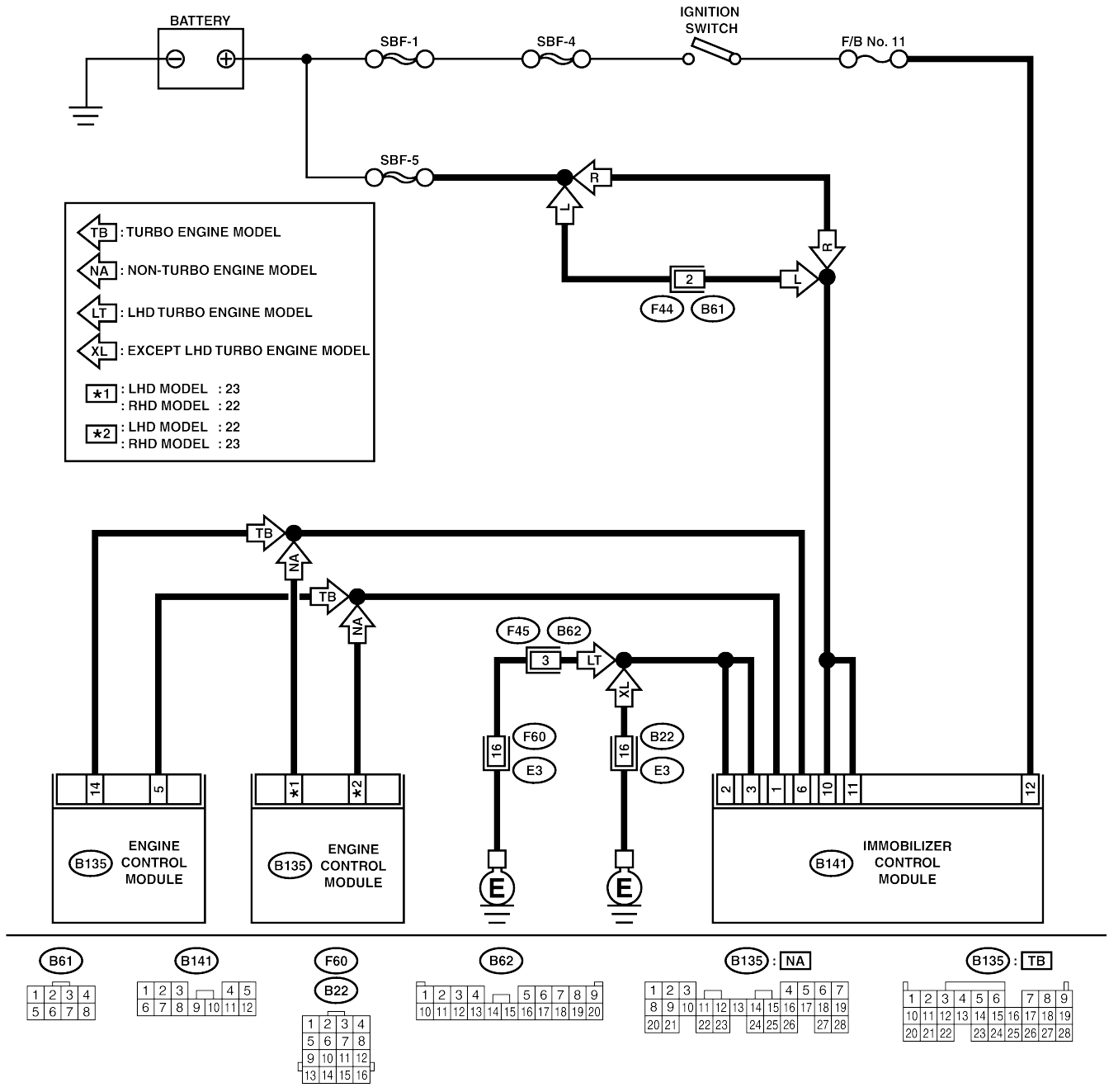
No.	Step	Check	Yes	No
1	**PERFORM TEACHING OPERATION ON IGNITION KEY.** Perform teaching operation on all keys of the vehicle. Refer to teaching operation manual.	Is teaching operation for all keys completed?	END	Replace ECM. <Ref. to FU(SOHC)-49, Engine Control Module.>, <Ref. to FU(SOHCw/oOBD)-38, Engine Control Module.>, or <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>, IMM ECM <Ref. to SL-42, Immobilizer Control Module.> and then replace all ignition keys (including the transponder). Then perform teaching operation. Refer to teaching operation manual (Pub. No. S0820GZ).

B: DTC P1572 — IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT) — S009620H46

DIAGNOSIS:

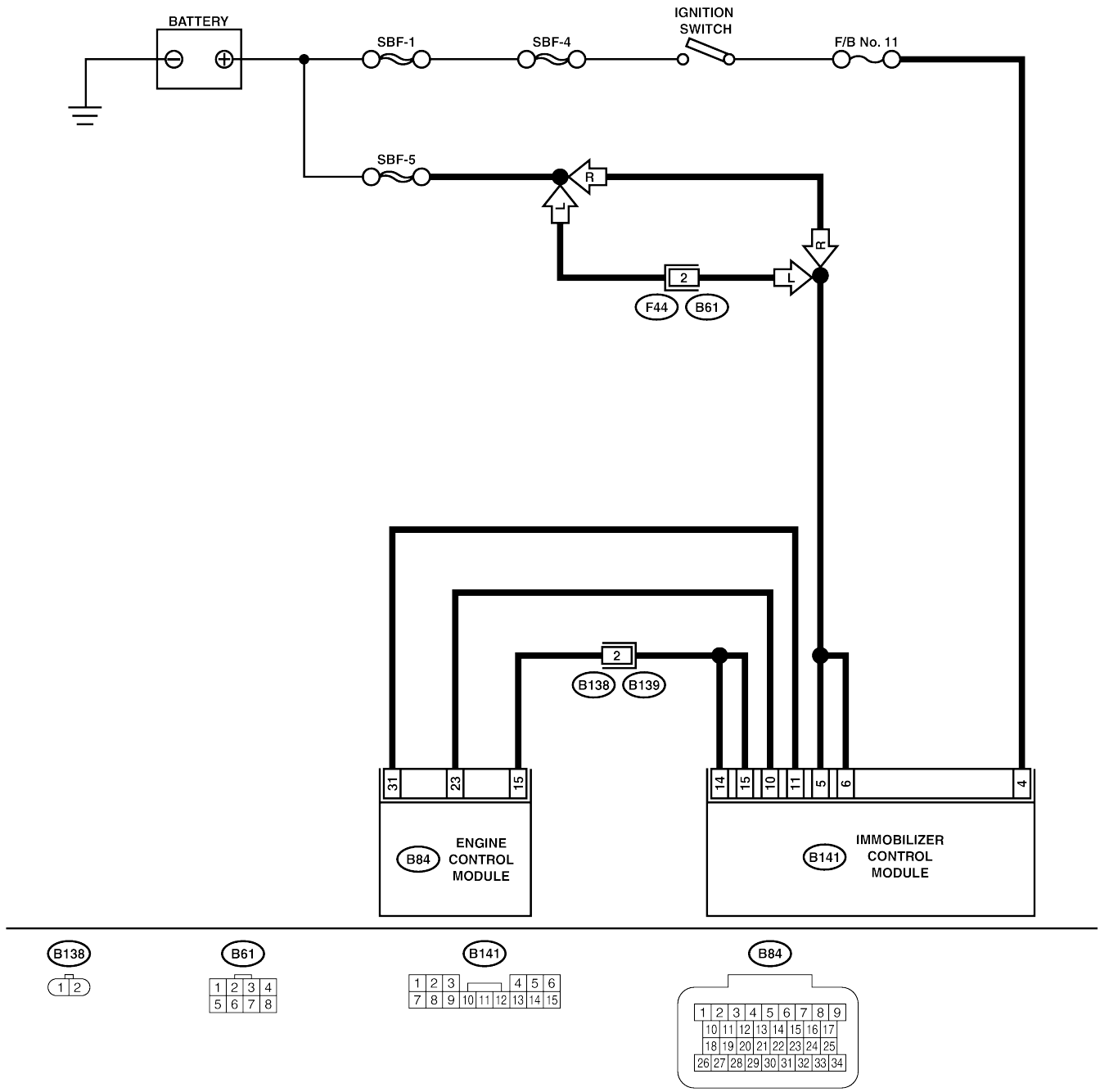
- Communication failure between IMM ECM and ECM

WIRING DIAGRAM (WITH OBD MODEL):



S6M0517

WIRING DIAGRAM (WITHOUT OBD MODEL):



S6M0518

No.	Step	Check	Yes	No
1	**CHECK POWER SUPPLY CIRCUIT OF IMM ECM.** 1) Turn ignition switch OFF. 2) Disconnect harness connector from IMM ECM. 3) Measure voltage between IMM ECM harness connector terminal and chassis ground. ***Connector & terminal*** ***With OBD:*** ***(B141) No. 10, No. 11 (+) — Chassis ground (–):*** ***Without OBD:*** ***(B141) No. 5, No. 6 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Check harness for open or short between IMM ECM and fuse.
2	**CHECK POWER SUPPLY CIRCUIT OF IMM ECM.** 1) Turn ignition switch ON. (Engine OFF.) 2) Measure voltage between IMM ECM harness connector terminal and chassis ground. ***Connector & terminal*** ***With OBD:*** ***(B141) No. 12 (+) — Chassis ground (–):*** ***Without OBD:*** ***(B141) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	Check harness for open or short between IMM ECM and ignition switch.
3	**CHECK GROUND CIRCUIT OF IMM ECM.** 1) Turn ignition switch OFF. 2) Measure resistance between IMM ECM harness connector terminal and chassis ground. ***Connector & terminal*** ***With OBD:*** ***(B141) No. 2, No .3 (+) — Chassis ground (–):*** ***Without OBD:*** ***(B141) No. 14, No. 15 (+) — Chassis ground (–):***	Is the resistance less than 10 Ω?	Go to step **4**.	Repair open circuit of IMM ECM ground circuit.
4	**CHECK HARNESS BETWEEN IMM ECM AND ECM.** 1) Disconnect harness connector from ECM and IMM ECM. 2) Measure resistance between IMM ECM harness connector terminal and ECM harness connector terminal. ***Connector & terminal*** ***With OBD (turbo):*** ***(B141) No. 1 — (B135) No. 5:*** ***With OBD (LHD non-turbo):*** ***(B141) No. 1 — (B135) No. 22:*** ***With OBD (RHD non-turbo):*** ***(B141) No. 1 — (B135) No. 23:*** ***Without OBD:*** ***(B141) No. 10 — (B84) No. 23:***	Is the resistance less than 10 Ω?	Go to step **5**.	Repair open circuit of harness between IMM ECM and ECM.

No.	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN IMM ECM AND ECM.** Measure resistance between IMM ECM harness connector terminal and ECM harness connector terminal. ***Connector & terminal*** ***With OBD (turbo):*** ***(B141) No. 6 (+) — (B135) No. 14 (–):*** ***With OBD (LHD non-turbo):*** ***(B141) No. 6 (+) — (B135) No. 23 (–):*** ***With OBD (RHD non-turbo):*** ***(B141) No. 6 — (B135) No. 22:*** ***Without OBD:*** ***(B141) No. 11 — (B84) No. 31:***	Is the resistance less than 10 Ω?	Go to step **6**.	Repair open circuit of harness between IMM ECM and ECM.
6	**CHECK HARNESS OF COMMUNICATION LINE.** 1) Turn ignition switch ON. (Engine OFF.) 2) Measure voltage between IMM ECM harness connector terminal and chassis ground. ***Connector & terminal*** ***With OBD:*** ***(B141) No. 1, No. 6 (+) — Chassis ground (–):*** ***Without OBD:*** ***(B141) No. 10, No. 11 (+) — Chassis ground (–):***	Is the voltage 0 V?	Go to step **7**.	Repair harness between IMM ECM and ECM, because there is short circuit in battery voltage line or ignition switch “ON” line.
7	**CHECK HARNESS OF COMMUNICATION LINE.** Measure voltage between ECM harness connector terminal and engine ground. ***Connector & terminal*** ***With OBD (turbo):*** ***(B135) No. 5, No. 14 (+) — Chassis ground (–):*** ***With OBD (non-turbo):*** ***(B135) No. 22, No. 23 (+) — Chassis ground (–):*** ***Without OBD:*** ***(B84) No. 23, No. 31 (+) — Chassis ground (–):***	Is the voltage 0 V?	Go to step **8**.	Repair harness between IMM ECM and ECM, because there is short circuit in battery voltage line or ignition switch “ON” line.
8	**CHECK ECM BY INTERFACE CHECK.** 1) Connect harness connector to ECM. 2) Disconnect harness connector from IMM ECM. 3) Perform interface check. <Ref. to IM-14, INTERFACE CHECK, OPERATION, Subaru Select Monitor.>	Does “Commun. Line Shorted to Ground” appear on screen?	Replace ECM. <Ref. to FU(SOHC)-49, Engine Control Module.>, <Ref. to FU(SOHCw/oOBD)-38, Engine Control Module.>, or <Ref. to FU(DOHC TURBO)-47, Engine Control Module.> Then perform teaching operation. Refer to teaching operation manual (Pub. No. S0820GZ).	Go to step **9**.

No.	Step	Check	Yes	No
9	**CHECK ECM BY INTERFACE CHECK.** Perform interface check.	Does “Commun. Line Shorted to Battery” appear on screen?	Replace ECM. <Ref. to FU(SOHC)-49, Engine Control Module.>, <Ref. to FU(SOHCw/ oOBD)-38, Engine Control Module.> or <Ref. to FU(DOHC TURBO)-47, Engine Control Module.> Then perform teaching operation. Refer to teaching operation manual (Pub. No. S0820GZ).	Go to step **10**.
10	**CHECK ECM BY INTERFACE CHECK.** Perform interface check.	Does “Communication Line not Shorted” appear on screen?	Replace IMM ECM <Ref. to SL-42, Immobilizer Control Module.> and then replace all ignition keys (including the transponder). Then perform teaching operation. Refer to teaching operation manual (Pub. No. S0820GZ).	When “**Check (Time Out)**” appears on screen, perform interface check again.

MEMO:

C: DTC P1574 — KEY COMMUNICATION FAILURE — S009620H47

DIAGNOSIS:
- Failure of IMM ECM to verify key (transponder) ID code

No.	Step	Check	Yes	No
1	**CHECK IMM ECM FUNCTION.** Insert the key to ignition switch (LOCK position), measure changes in voltage between Antenna connector. ***Connector & terminal*** ***(B142) No. 1 — No. 2:***	Is the voltage –30 to 30 V? (Approximately 0.1 second after inserting the key.) Is the voltage 0 V? (Approximately 1 second after inserting the key.)	Go to step **2**.	Replace IMM ECM <Ref. to SL-42, Immobilizer Control Module.> and then replace all ignition keys (including the transponder). Then perform teaching operation. Refer to teaching operation manual (Pub. No. S0820GZ).
2	**CHECK IGNITION KEY (TRANSPONDER).** 1) Remove the key from ignition switch. 2) Start engine using other keys that have undergone the teaching operation, furnished with vehicle.	Does engine start?	Replace ignition key (including the transponder). Then perform teaching operation. Refer to teaching operation manual (Pub. No. S0820GZ).	Replace IMM ECM <Ref. to SL-42, Immobilizer Control Module.> and then replace all ignition keys (including the transponder). Then perform teaching operation. Refer to teaching operation manual (Pub. No. S0820GZ).

D: DTC P0153 — INCORRECT IMMOBILIZER KEY (USE OF UNREGISTERED KEY) — S009620H48

DIAGNOSIS:
- Use of unregistered key in IMM ECM

No.	Step	Check	Yes	No
1	**PERFORM TEACHING OPERATION ON IGNITION KEY.** Perform teaching operation on all keys of the vehicle. Refer to teaching operation manual (Pub. No. S0820GZ).	Is teaching operation for all keys completed?	END	Replace all ignition keys (including the transponder). Go to step **2**.
2	**PERFORM TEACHING OPERATION ON IGNITION KEY.** Perform teaching operation on all keys with vehicle. Refer to teaching operation manual (Pub. No. S0820GZ).	Is teaching operation for all keys completed?	END	Replace IMM ECM <Ref. to SL-42, Immobilizer Control Module.> and then replace all ignition keys (including the transponder). Then perform teaching operation. Refer to teaching operation manual (Pub. No. S0820GZ).

E: DTC P1576 — EGI CONTROL MODULE EEPROM — S009620H49

DIAGNOSIS:
- ECM malfunctioning

1. REPLACE ECM. S009620H4901

Replace ECM.
<Ref. to FU(SOCH)-49, Engine Control Module.>,
<Ref. to FU(SOHCw/oOBD)-38, Engine Control Module.> or <Ref. to FU(DOHC TURBO)-47, Engine Control Module.>
Then perform teaching operation. Refer to teaching operation manual (Pub. No. S0820GZ).

F: DTC P1577 — IMM CONTROL MODULE EEPROM — S009620H50

DIAGNOSIS:
- IMM ECM malfunctioning

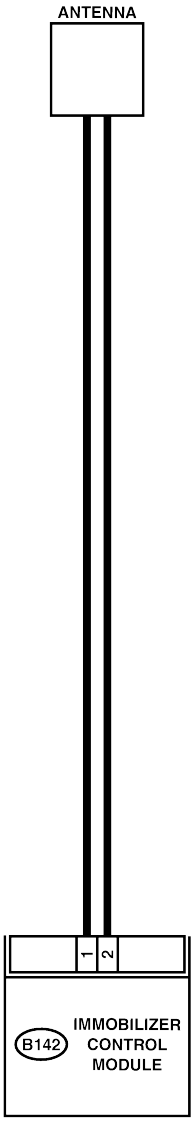
1. REPLACE IMM ECM. S009620H5001

Replace IMM ECM <Ref. to SL-42, Immobilizer Control Module.> and then replace all ignition keys (including the transponder). Then perform teaching operation. Refer to teaching operation manual (Pub. No. S0820GZ).

G: DTC P1570 — ANTENNA — S009620H51

DIAGNOSIS:
- Faulty antenna

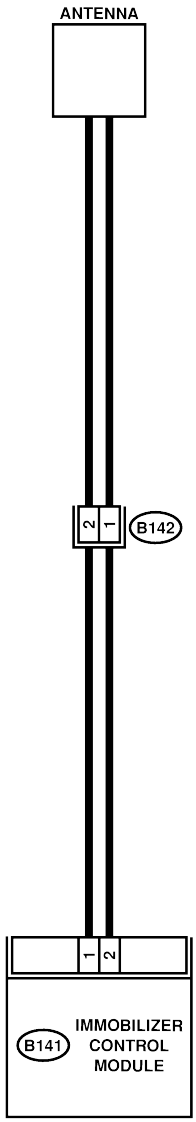
WIRING DIAGRAM (WITH OBD MODEL):

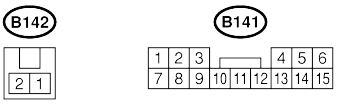




B6M1534

WIRING DIAGRAM (WITHOUT OBD MODEL):





S6M0519

No.	Step	Check	Yes	No
1	**CHECK ENGINE TYPE.**	Is the vehicle with OBD?	Go to step **2**.	Go to step **8**.
2	**CHECK ANTENNA CIRCUIT.** 1) Turn ignition switch OFF. Disconnect harness antenna connector from IMM ECM. <Ref. to SL-43, Immobilizer Antenna.> 2) Measure resistance of antenna circuit. ***Connector & terminal*** ***(B142) No. 1 — No. 2:***	Is the resistance less than 10 Ω?	Go to step **3**.	Replace antenna. <Ref. to SL-43, Immobilizer Antenna.>
3	**CHECK ANTENNA CIRCUIT.** Measure resistance between antenna harness connector and chassis ground. ***Connector & terminal*** ***(B142) No. 1 (+) — Chassis ground (–):***	Is the resistance less than 10 Ω?	Replace antenna. <Ref. to SL-43, Immobilizer Antenna.>	Go to step **4**.
4	**CHECK ANTENNA CIRCUIT.** Measure resistance between antenna harness connector and chassis ground. ***Connector & terminal*** ***(B142) No. 2 (+) — Chassis ground (–):***	Is the resistance less than 10 Ω?	Replace antenna. <Ref. to SL-43, Immobilizer Antenna.>	Go to step **5**.
5	**CHECK ANTENNA CIRCUIT.** 1) Turn ignition switch ON. (Engine OFF.) 2) Measure voltage between antenna harness connector and chassis ground. ***Connector & terminal*** ***(B142) No. 1 (+) — Chassis ground (–):***	Is the voltage 0 V?	Go to step **6**.	Replace antenna. <Ref. to SL-43, Immobilizer Antenna.>
6	**CHECK ANTENNA CIRCUIT.** Measure voltage between antenna harness connector and chassis ground. ***Connector & terminal*** ***(B142) No. 2 (+) — Chassis ground (–):***	Is the voltage 0 V?	Go to step **7**.	Replace antenna. <Ref. to SL-43, Immobilizer Antenna.>
7	**CHECK IMM ECM FUNCTION.** 1) Turn ignition switch OFF. 2) Connect antenna harness connector to IMM ECM. 3) Insert the key to ignition switch, measure changes in voltage between antenna harness connector. ***Connector & terminal*** ***(B142) No. 1 — No. 2:***	Is the voltage –30 to 30 V? (Approximately 0.1 second after inserting the key.) Is the voltage 0 V? (Approximately 1 second after inserting the key.)	Go to step **15**.	Replace IMM ECM <Ref. to SL-42, Immobilizer Control Module.> and then replace all ignition keys (including the transponder). Then perform teaching operation. Refer to teaching operation manual (Pub. No. S0820GZ).
8	**CHECK ANTENNA CIRCUIT.** 1) Turn ignition switch OFF. 2) Disconnect harness antenna connector. <Ref. to SL-43, Immobilizer Antenna.> 3) Measure resistance of antenna circuit. ***Connector & terminal*** ***(B142) No. 1 — No. 2:***	Is the resistance less than 10 Ω?	Go to step **9**.	Replace antenna. <Ref. to SL-43, Immobilizer Antenna.>

No.	Step	Check	Yes	No
9	**CHECK ANTENNA CIRCUIT.** 1) Disconnect IMM ECM harness connector. 2) Measure resistance between IMM ECM harness connector terminal and antenna harness connector terminal. ***Connector & terminal*** ***(B141) No. 1 — (B142) No. 2:*** ***(B141) No. 2 — (B142) No. 1:***	Is the resistance less than 10 Ω?	Go to step **10**.	Repair harness between IMM ECM and antenna harness connector.
10	**CHECK ANTENNA CIRCUIT.** Measure resistance between IMM ECM harness connector and chassis ground. ***Connector & terminal*** ***(B141) No. 1 (+) — Chassis ground (–):***	Is the resistance less than 10 Ω?	Repair harness between IMM ECM and antenna harness connector.	Go to step **11**.
11	**CHECK ANTENNA CIRCUIT.** Measure resistance between IMM ECM harness connector and chassis ground. ***Connector & terminal*** ***(B141) No. 2 (+) — Chassis ground (–):***	Is the resistance less than 10 Ω?	Repair harness between IMM ECM and antenna harness connector.	Go to step **12**.
12	**CHECK ANTENNA CIRCUIT.** 1) Turn ignition switch ON. (Engine OFF.) 2) Measure voltage between IMM ECM harness connector and chassis ground. ***Connector & terminal*** ***(B141) No. 1 (+) — Chassis ground (–):***	Is the voltage 0 V?	Go to step **13**.	Repair harness between IMM ECM and antenna harness connector.
13	**CHECK ANTENNA CIRCUIT.** Measure voltage between IMM ECM harness connector and chassis ground. ***Connector & terminal*** ***(B141) No. 2 (+) — Chassis ground (–):***	Is the voltage 0 V?	Go to step **14**.	Repair harness between IMM ECM and antenna harness connector.
14	**CHECK IMM ECM FUNCTION.** 1) Turn ignition switch OFF. 2) Connect antenna harness connector and IMM ECM harness connector. 3) Insert the key to ignition switch, measure changes in voltage between IMM ECM harness connector. ***Connector & terminal*** ***(B141) No. 1 — No. 2:***	Is the voltage –30 to 30 V? (Approximately 0.1 second after inserting the key.) Is the voltage 0 V? (Approximately 1 second after inserting the key.)	Go to step **15**.	Replace IMM ECM <Ref. to SL-42, Immobilizer Control Module.> and then replace all ignition keys (including the transponder). Then perform teaching operation. Refer to teaching operation manual (Pub. No. S0820GZ).
15	**CHECK IGNITION KEY (TRANSPONDER).** 1) Remove key from ignition switch. 2) Start engine using other keys that have undergone the teaching operation, furnished with vehicle.	Does engine start?	Replace ignition key (including the transponder). Then perform teaching operation. Refer to teaching operation manual (Pub. No. S0820GZ).	Replace IMM ECM <Ref. to SL-42, Immobilizer Control Module.> and then replace all ignition keys (including the transponder). Then perform teaching operation. Refer to teaching operation manual (Pub. No. S0820GZ).

WIRING SYSTEM

WI

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DIAGNOSTICS CHART WITH TROUBLE CODE

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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.

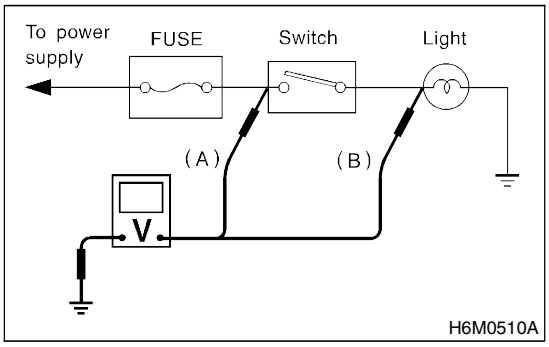
5. CONFIRMATION OF SYSTEM OPERATION S903267E3105

After repairing, ensure that the system operates properly.

B: BASIC INSPECTION S903627G51

1. VOLTAGE MEASUREMENT S903627G5101

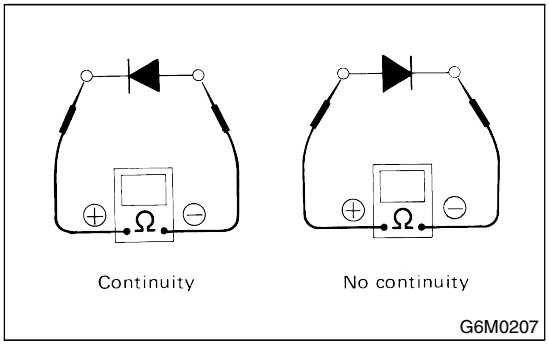
1) Using a voltmeter, connect the negative lead to a good ground point or negative battery terminal and the positive lead to the connector or component terminal.
2) Contact the positive probe of the voltmeter on connector (A).
The voltmeter will indicate a voltage.
3) Shift the positive probe to connector (B). The voltmeter will indicate no voltage.



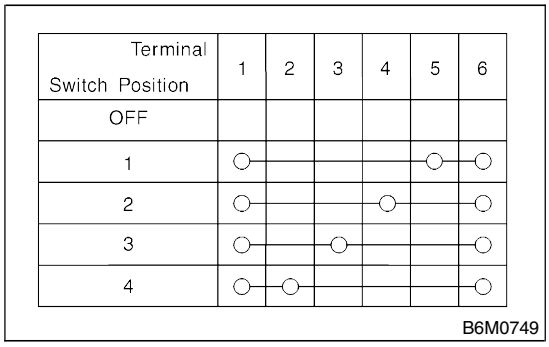
4) With test set-up held as it is, turn switch ON. The voltmeter will indicate a voltage and, at the same time, the light will come on.
5) The circuit is in good order. If a problem such as a lamp failing to light occurs, use the procedures outlined above to track down the malfunction.

2. CIRCUIT CONTINUITY CHECKS S903627G5102

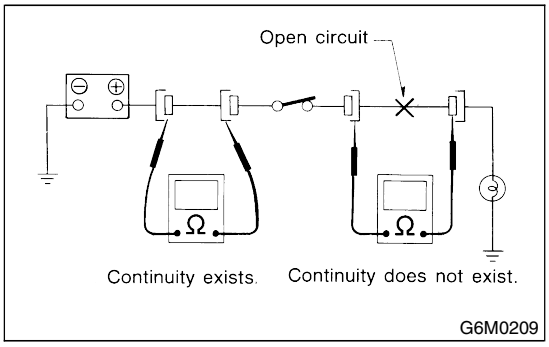
1) Disconnect the battery terminal or connector so there is no voltage between the check points.
Contact the two leads of an ohmmeter to each of the check points.
If the circuit has diodes, reverse the two leads and check again.
2) Use an ohmmeter to check for diode continuity.
When contacting the negative lead to the diode positive side and the positive lead to the negative side, there should be continuity.
When contacting the two leads in reverse, there should be no continuity.



3) Symbol "◯—◯" indicates that continuity exists between two points or terminals. For example, when a switch position is "3", continuity exists among terminals 1, 3 and 6, as shown in table below.

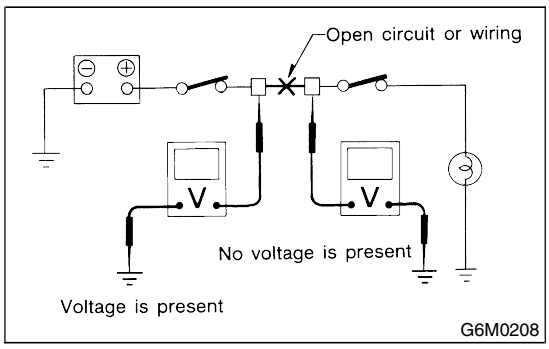


2) Ohmmeter method:
Disconnect all connectors affected, and check continuity in the wiring between adjacent connectors. When the ohmmeter indicates "infinite", the wiring is open.



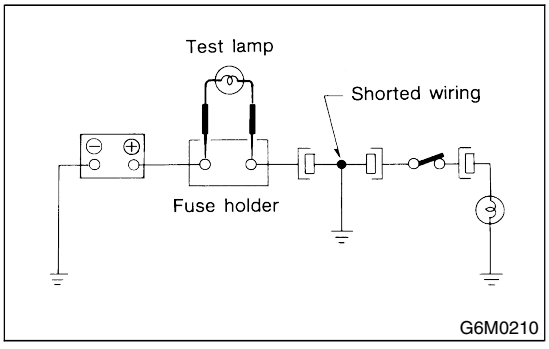
3. HOW TO DETERMINE AN OPEN CIRCUIT S903627G5103

1) Voltmeter Method:
An open circuit is determined by measuring the voltage between respective connectors and ground using a voltmeter, starting with the connector closest to the power supply. The power supply must be turned ON so that current flows in the circuit. If voltage is not present between a particular connector and ground, the circuit between that connector and the previous connector is open.

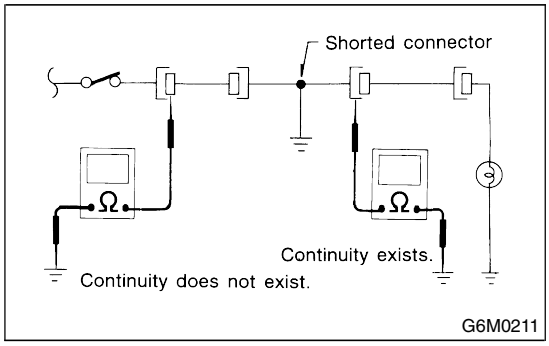


4. HOW TO DETERMINE A SHORT CIRCUIT S903627G5104

1) Test lamp method:
Connect a test lamp (rated at approximately 3 watts) in place of the blown fuse and allow current to flow through the circuit. Disconnect one connector at a time from the circuit, starting with the one located farthest from the power supply. If the test lamp goes out when a connector is disconnected, the wiring between that connection and the next connector (farther from the power supply) is shorted.



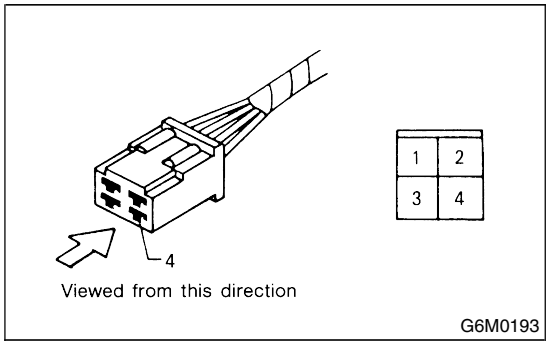
2) Ohmmeter method:
Disconnect all affected connectors, and check continuity between each connector and ground. When ohmmeter indicates continuity between a particular connector and ground, that connector is shorted.



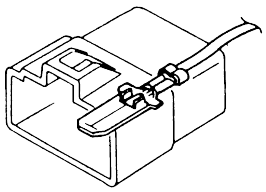
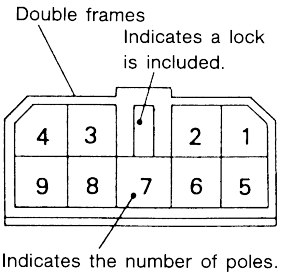
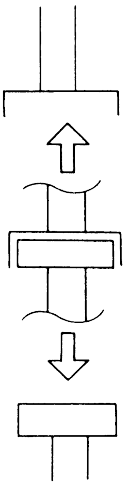
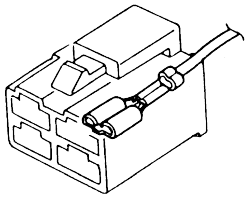
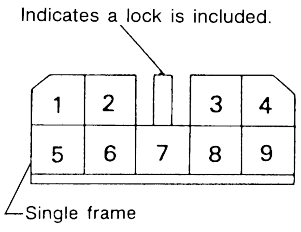
C: HOW TO READ WIRING DIAGRAMS S903627G52

1. WIRING DIAGRAM S903627G5201

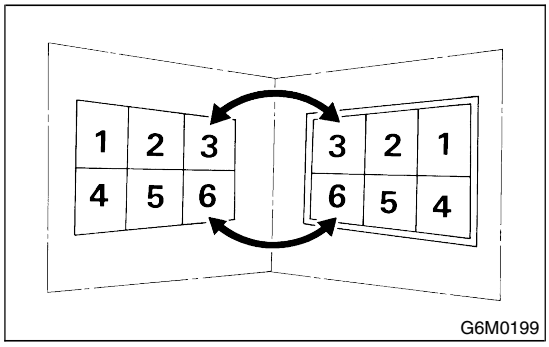
The wiring diagram of each system is illustrated so that you can understand the path through which the electric current flows from the battery.
Sketches and codes are used in the diagrams. They should read as follows:
● Each connector and its terminal position are indicated by a sketch of the connector in a disconnected state which is viewed from the front.



● The number of poles or pins, presence of a lock, and pin number of each terminal are indicated in the sketch of each connector. In the sketch, the highest pole number refers to the number of poles which the connector has. For example, the sketch of the connector shown in figure indicates the connector has 9 poles.

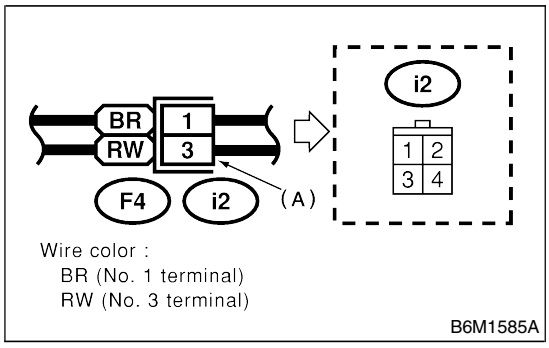
Connector used in vehicle	Connector shown in wiring diagram		
	Sketch	Symbol	Number of poles
 G6M0194	 G6M0196	 G6M0198	Numbered in order from upper right to lower left.
 G6M0195	 G6M0197		Numbered in order from upper left to lower right.

● When one set of connectors is viewed from the front side, the pole numbers of one connector are symmetrical to those of the other. When these two connectors are connected as a unit, the poles which have the same number are joined.

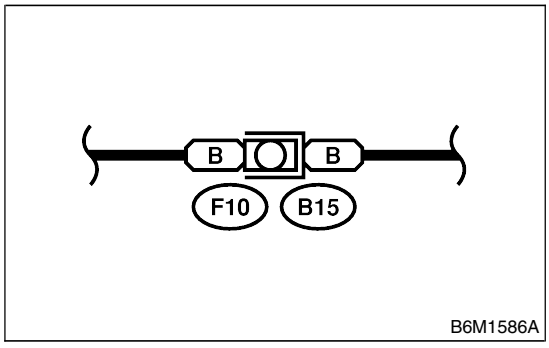


● Electrical wiring harness:
The connectors are numbered along with the number of poles, external colors, and mating connections in the accompanying list.
● The sketch of each connector in the wiring diagram usually shows the (A) side of the connector. The relationship between the wire color, terminal number and connector is described in figure.

NOTE:
A wire which runs in one direction from a connector terminal sometimes may have a different color from that which runs in the other direction from that terminal.

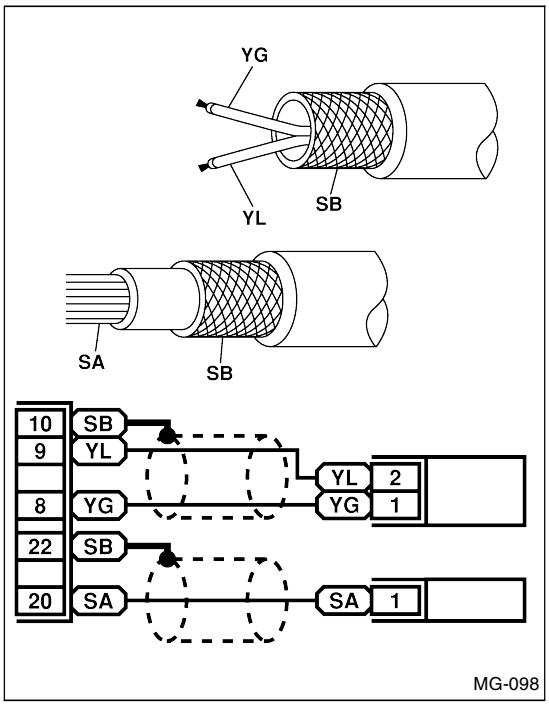


● In wiring diagram, connectors which have no terminal number refer to one-pole types. Sketches of these connectors are omitted intentionally.

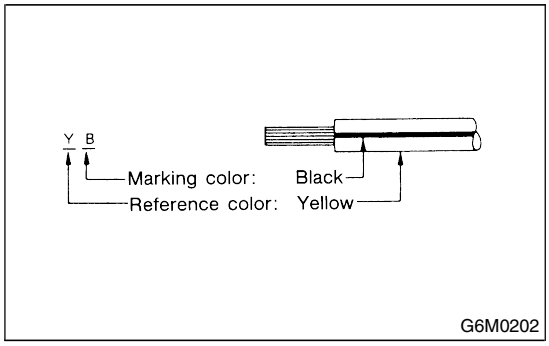


● The following color codes are used to indicate the colors of the wires used.

Color code	Color
L	Blue
B	Black
Y	Yellow
G	Green
R	Red
W	White
Br	Brown
Lg	Light green
Gr	Gray
P	Pink
Or	Orange
Lb	Light Blue
V	Violet
SA	Sealed (Inner)
SB	Sealed (Outer)



● 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.



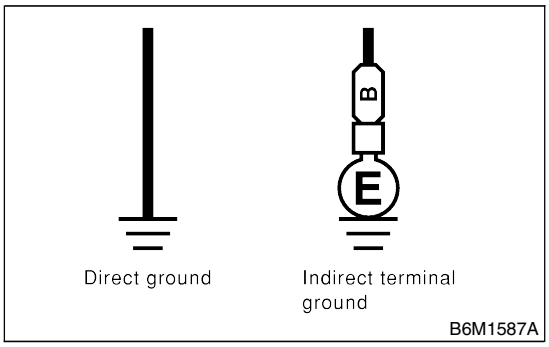
● The table lists the nominal sectional areas and allowable currents of the wires.

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.

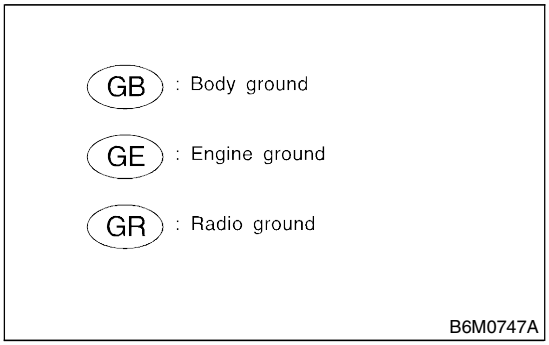
Nominal sectional area mm^2	No. of strands/ strand diameter	Outside diameter of finished wiring mm	Allowable current Amps/ 40°C (104°F)
0.3	7/0.26	1.8	7
0.5	7/0.32	2.2 (or 2.0)	12
0.75	30/0.18	2.6 (or 2.4)	16
0.85	11/0.32	2.4 (or 2.2)	16
1.25	16/0.32	2.7 (or 2.5)	21
2	26/0.32	3.1 (or 2.9)	28
3	41/0.32	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.

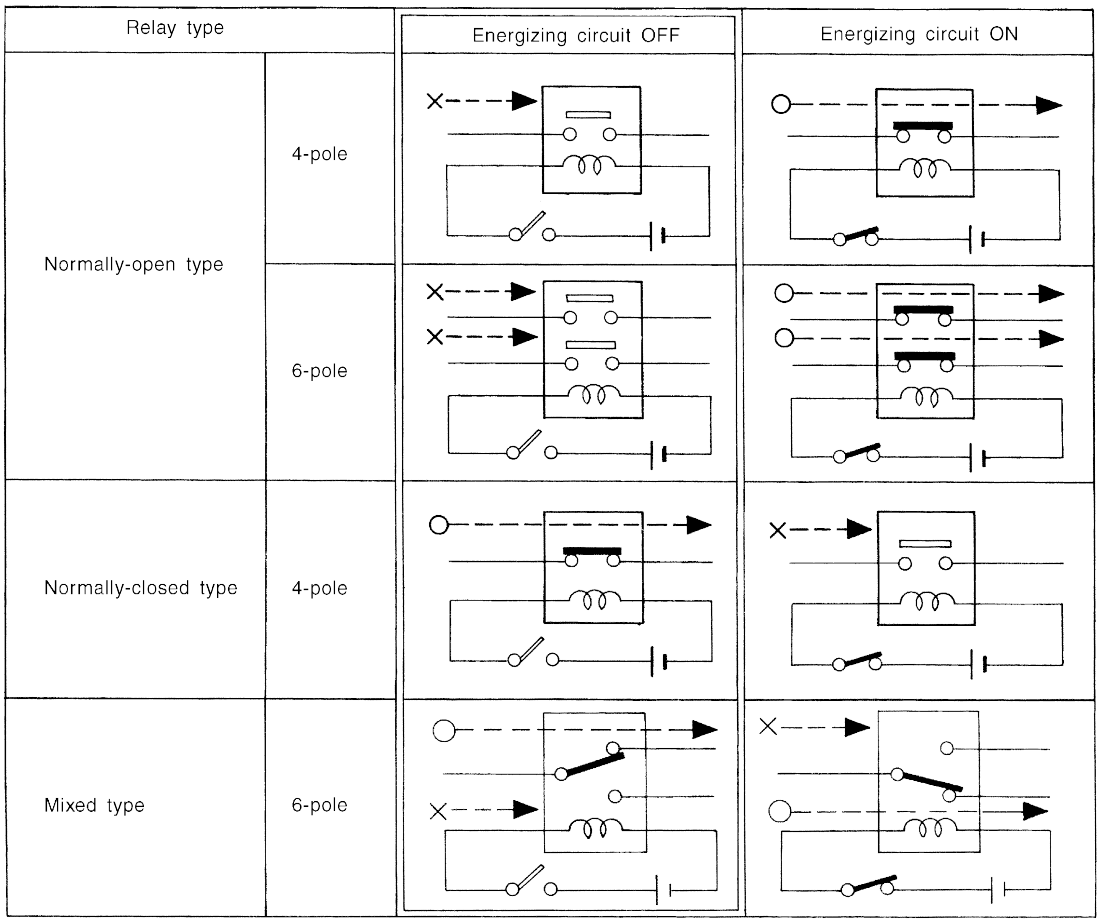


● The ground points shown in the wiring diagram refer to the following:

NOTE:
All wiring harnesses are provided with a ground point which should be securely connected.

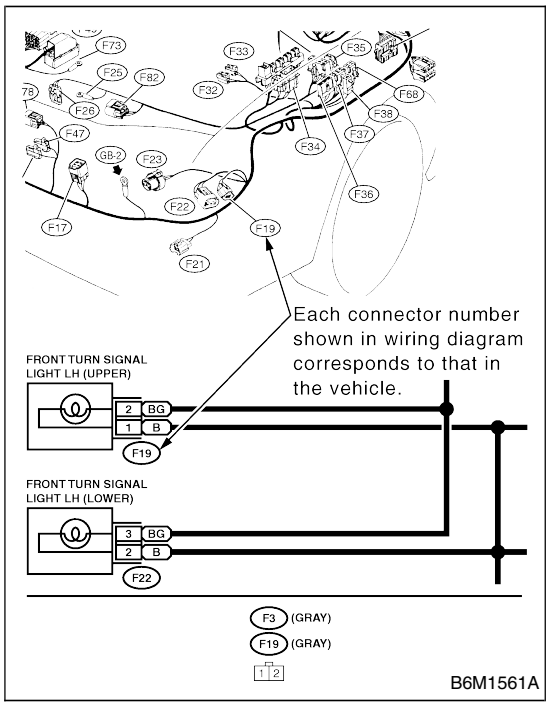


● Relays are classified as normally-open or normally-closed. The normally-closed relay has one or more contacts.
The wiring diagram shows the relay mode when the energizing circuit is OFF.



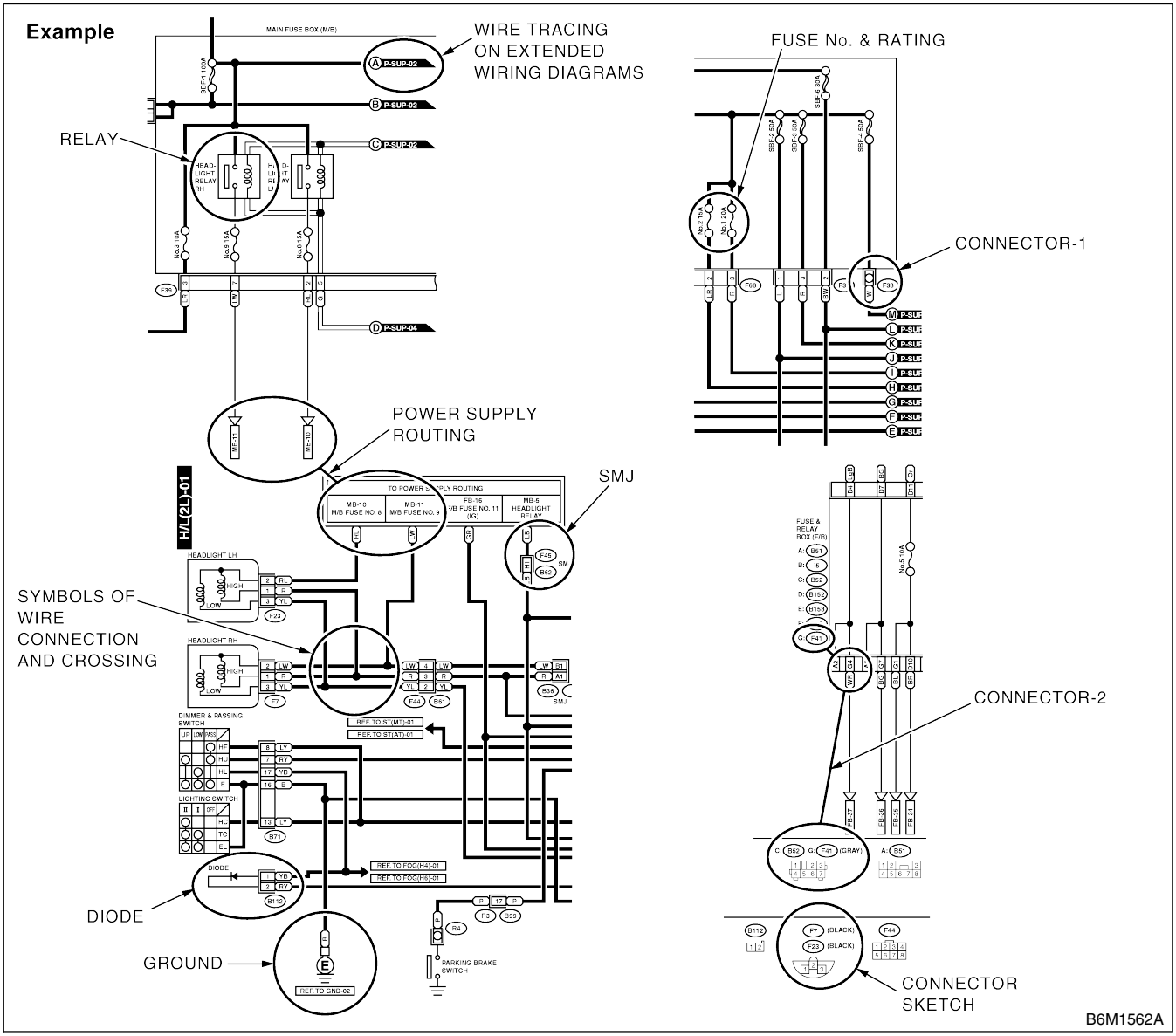
● Each connector number shown in the wiring diagram corresponds to that in the wiring harness. The location of each connector in the actual vehicle is determined by reading the first character of the connector (for example, a “F” for F8, “i” for i16, etc.) and the type of wiring harness.
The first character 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
i	Instrument panel wiring harness
R	Rear wiring harness, Fuel tank cord, Roof cord, Rear gate code



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.

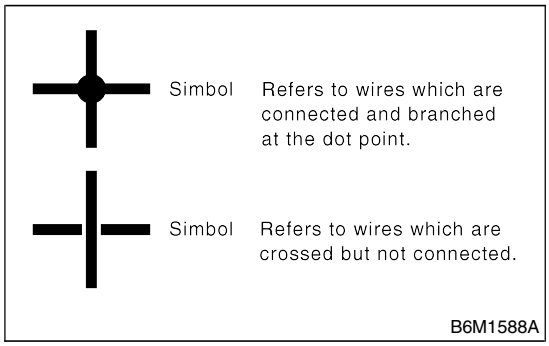
8. DIODE S903627G5308

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 S903627G54

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

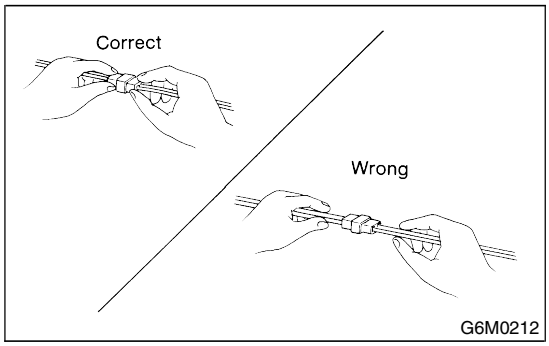
2. Working Precautions S903706

A: PRECAUTIONS WHEN WORKING WITH THE PARTS MOUNTED ON THE VEHICLE S903706G38

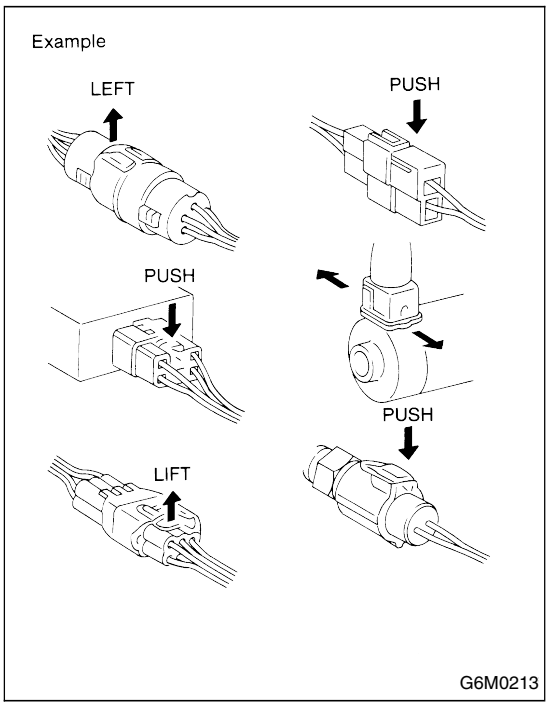
1) When working under a vehicle which is jacked-up, always be sure to use safety stands.
2) The parking brake must always be applied during working. Also, in automatic transmission vehicles, keep the select lever set to the P (Parking) range.
3) Be sure the workshop is properly ventilated when running 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

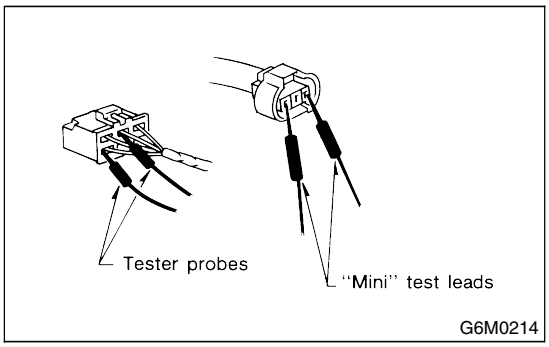
1) The battery cable must be disconnected from the battery's (–) terminal, and the ignition switch must be set to the OFF position, unless otherwise required by the diagnostics.
2) Securely fasten the wiring harness with clamps and slips so that the harness does not interfere with the body end parts 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.



5) Some connectors are provided with a lock. One type of such a connector is disconnected by pushing the lock, and the other, by moving the lock up. In either type the lock shape must be identified before attempting to disconnect the connector.
To connect, insert the connector until it snaps and confirm that it is tightly connected.



6) When checking continuity between connector terminals, or measuring voltage across the terminal and ground, always contact tester probe(s) on terminals from the wiring connection side. If the probe is too thick to gain access to the terminal, use "mini" test leads.
To check 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.



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

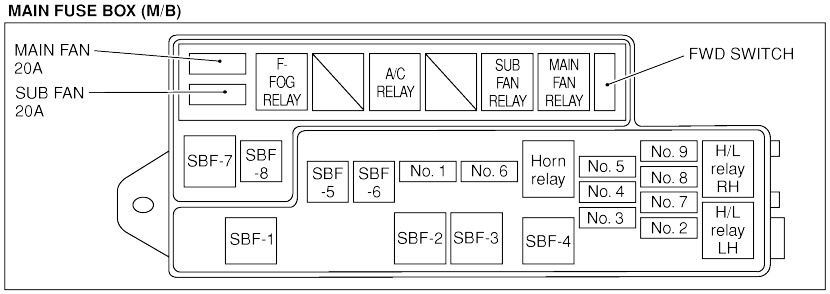
A: SCHEMATIC S903465A21

1. LHD MODEL S903465A2101

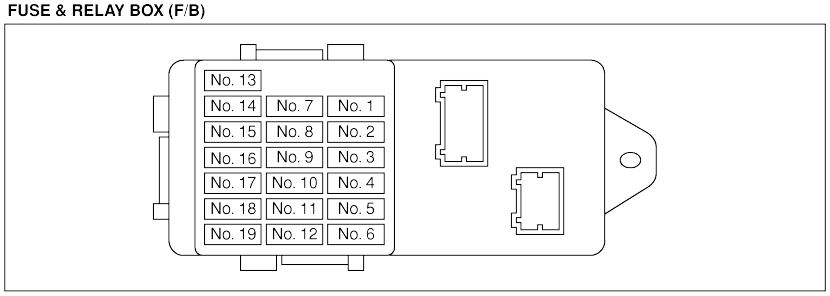
P-SUP(L)-01

P-SUP(L)-01

MAIN FUSE BOX (M/B)

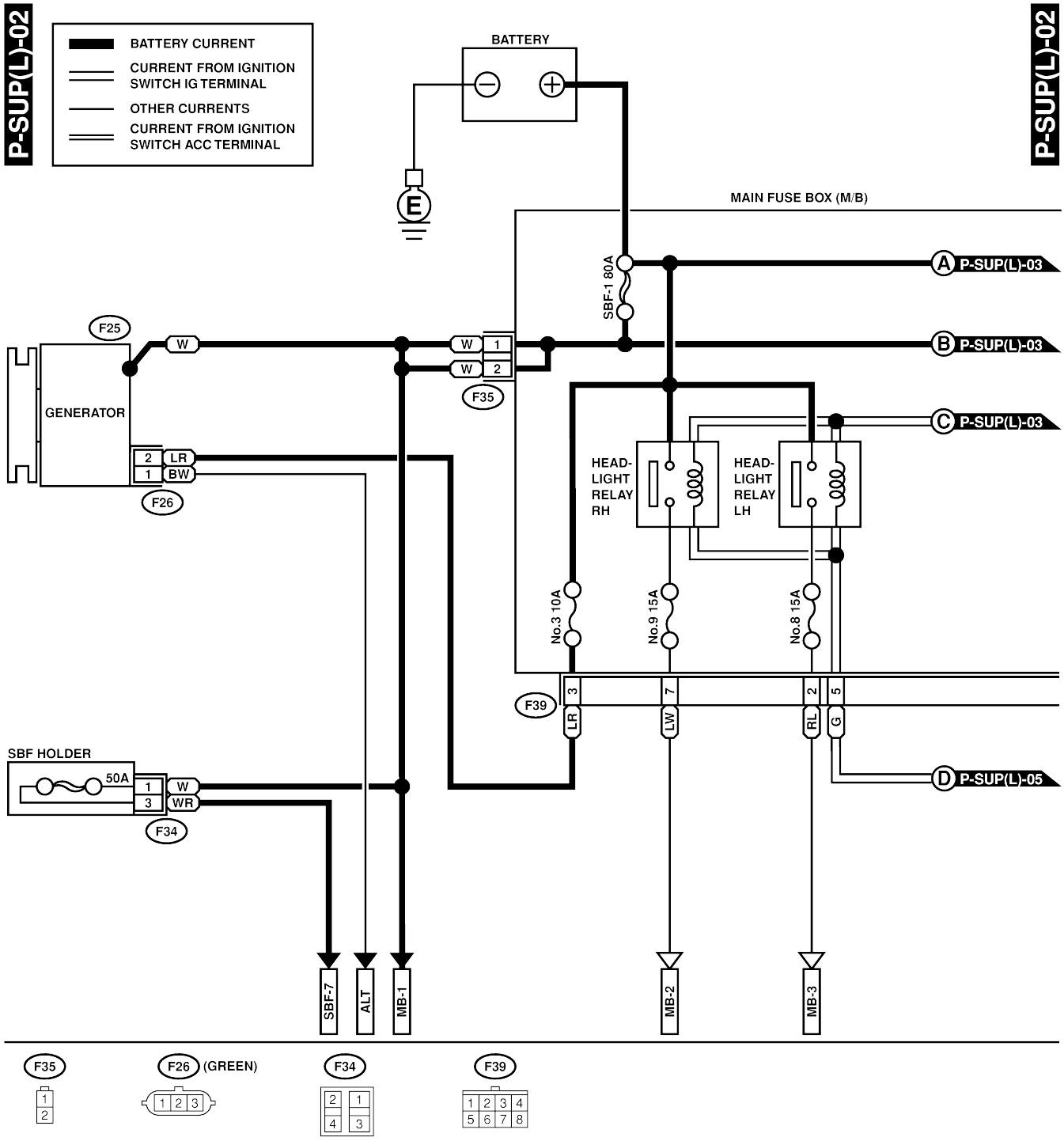


FUSE & RELAY BOX (F/B)



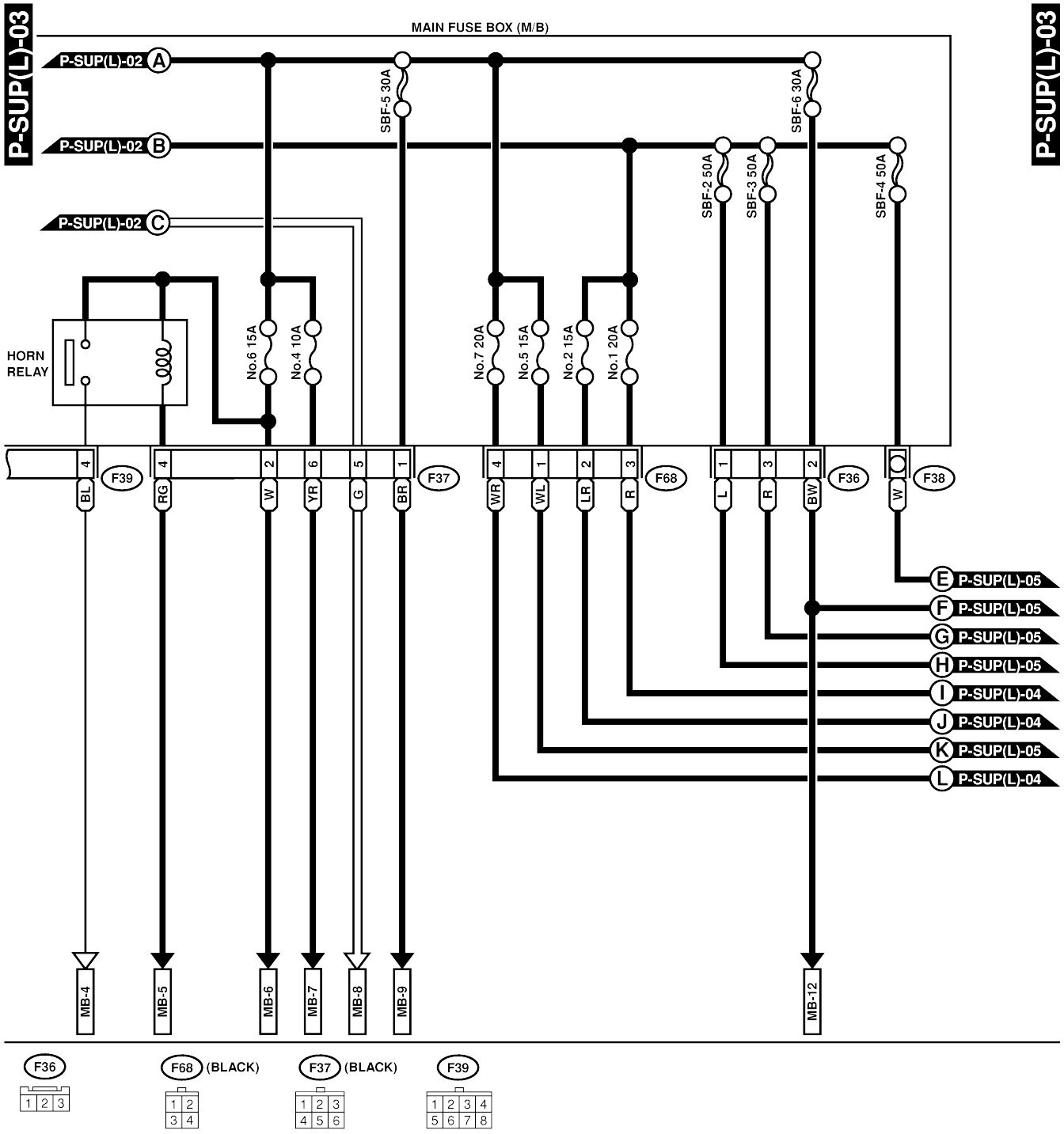
SL01-20A

POWER SUPPLY ROUTING

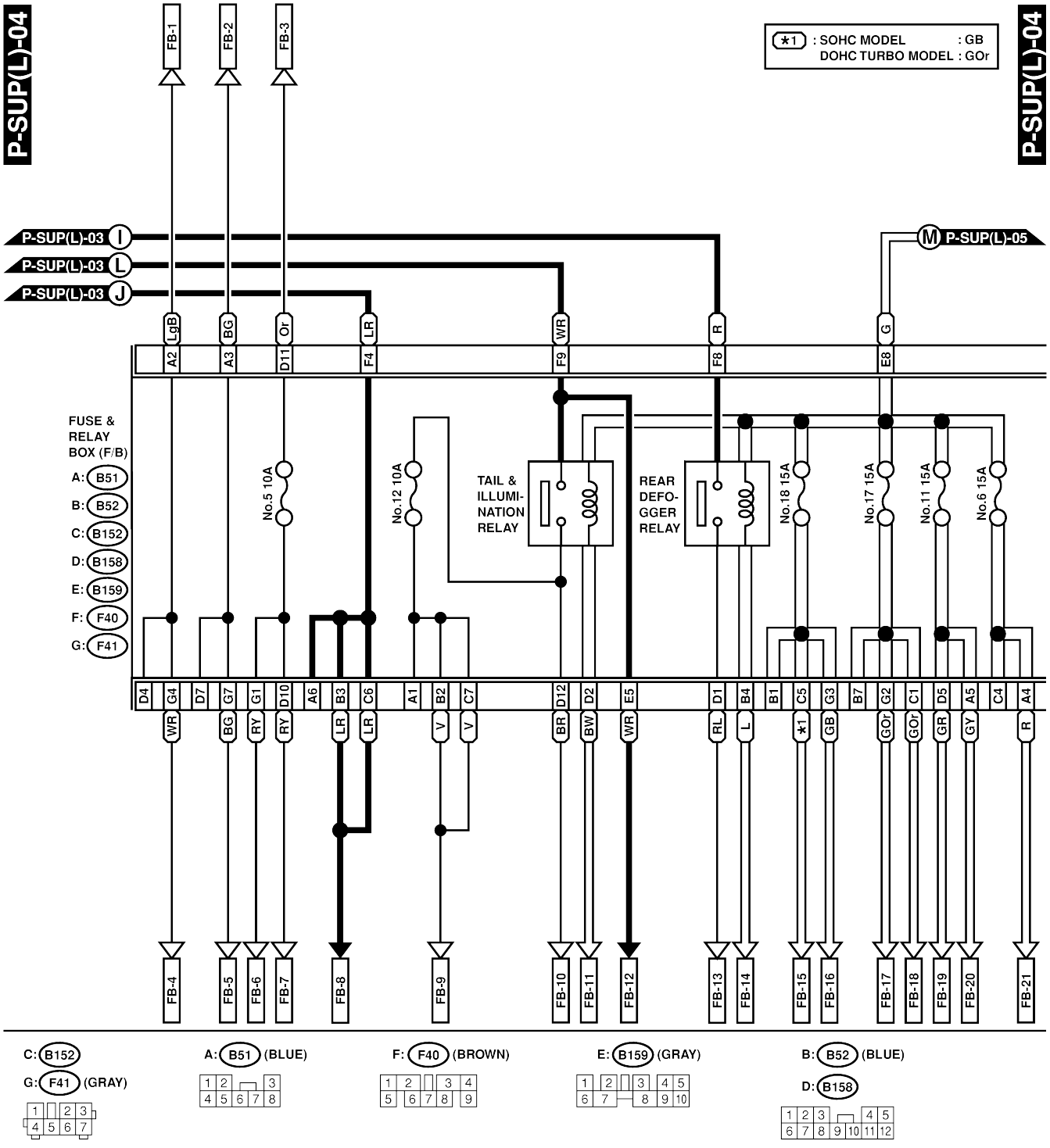


SL01-20B

POWER SUPPLY ROUTING

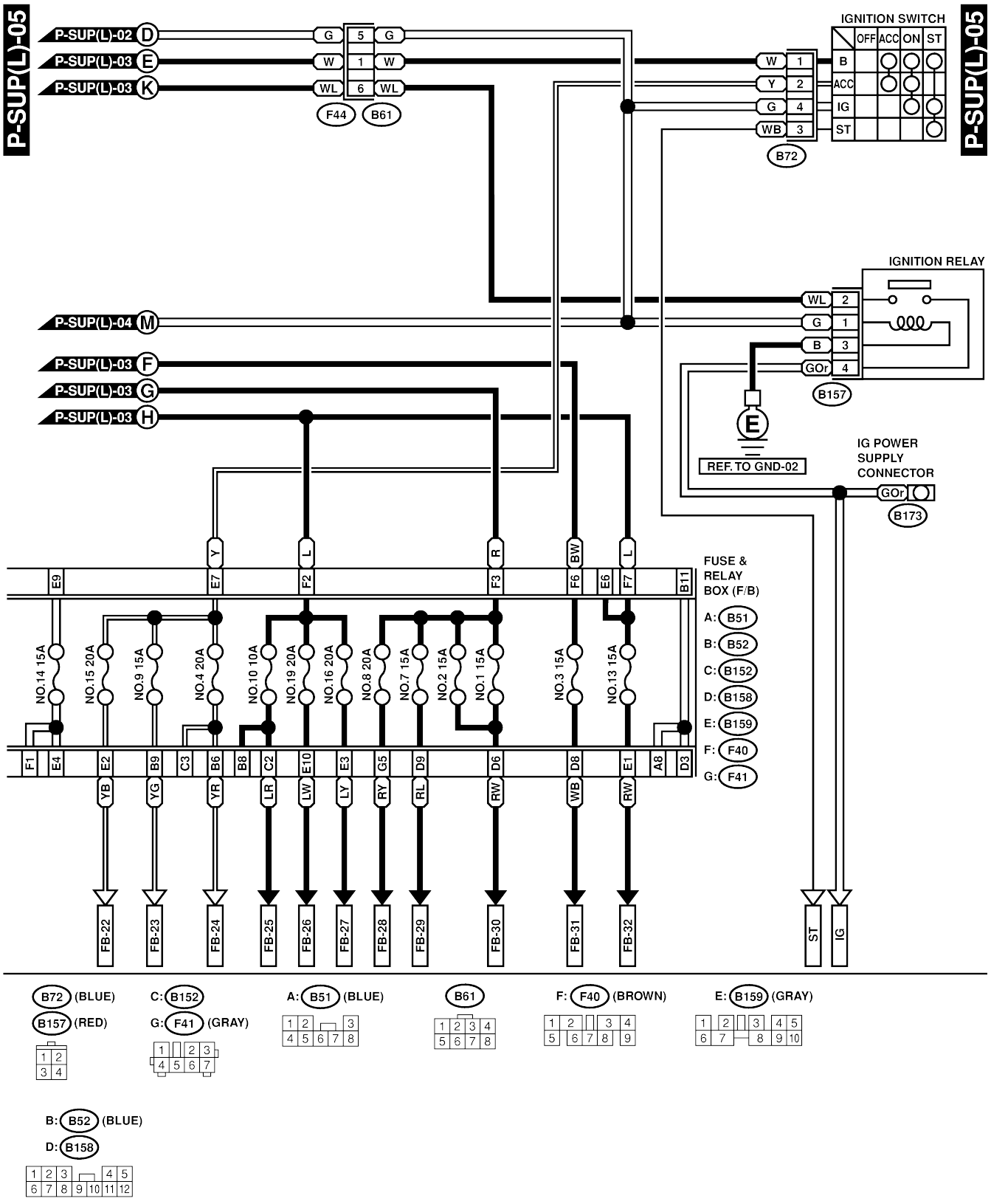


SL01-20C


P-SUP(L)-04
P-SUP(L)-04
FB-1
FB-2
FB-3
*1 : SOHC MODEL : GB
DOHC TURBO MODEL : GOr
P-SUP(L)-03 I
P-SUP(L)-03 L
P-SUP(L)-03 J
M P-SUP(L)-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 *1 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

SL01-20D

POWER SUPPLY ROUTING



SL01-20E

No.	Load
MB-1	A/C relay holder
MB-2	Headlight RH Combination meter
MB-3	Headlight LH
MB-4	Horn
MB-5	Horn switch
MB-6	Hazard switch Key switch Keyless entry control module
MB-7	Transmission control module
MB-8	Diode (With rear fog light) Diode (lighting) Lighting switch
MB-9	Data link connector Engine control module Fuel pump relay Main relay Immobilizer control module
MB-12	Headlight washer module Power window circuit breaker
SBF-7	ABS control module
ALT-1	Combination meter
IG	Check connector Combination meter Hazard switch Headlight washer switch Mirror heater condenser Mirror heater LH Mirror heater RH Power window relay Seatbelt timer Speed warning module Vehicle speed sensor (MT)
ST	Engine control module (AT) Inhibitor switch (AT) Starter motor (AT)
FB-1	Combination meter Hazard switch Rear turn signal light RH Trailer connector Turn signal switch
FB-2	Combination meter Keyless entry control module Hazard switch Turn signal switch Rear turn signal light LH
FB-3	Parking switch
FB-4	Side turn signal light RH Front turn signal light RH
FB-5	Side turn signal light LH Front turn signal light LH
FB-6	Front clearance light LH Front clearance light RH Headlight leveler LH Headlight leveler RH
FB-7	License plate light Trailer connector

No.	Load
FB-8	Combination meter Radio Room light Keyless entry control module Key illumination light Clock Luggage room light Spot light
FB-9	Rear fog light relay Headlight leveling switch Illumination light Illumination control module Front fog light relay Front fog light switch
FB-10	Parking switch
FB-11	Lighting switch
FB-12	Parking switch
FB-13	Rear defogger switch Rear defogger Mirror heater relay
FB-14	Rear defogger
FB-15	Wiper deicer Wiper deicer time Back-up light switch (MT) Inhibitor switch (AT)
FB-16	ABS control module A/C relay holder
FB-17	Air conditioner relay A/C relay holder
FB-18	Mode control panel Blower motor relay Pressure switch Rear defogger switch
FB-19	Fuel pump relay Engine control module Ignition and igniter Transmission control module Immobilizer control module
FB-20	Airbag control module
FB-21	Airbag control module
FB-22	Front washer motor Front wiper motor Front wiper switch Rear wiper motor Rear wiper intermittent module
FB-23	Noise killer Radio Clock
FB-24	Remote rearview mirror switch Seat heater/rear accessory power supply relay Front accessory power supply socket
FB-25	Rear fog light relay
FB-26	Seat heater/rear accessory power supply relay
FB-27	Stop light Stop light switch

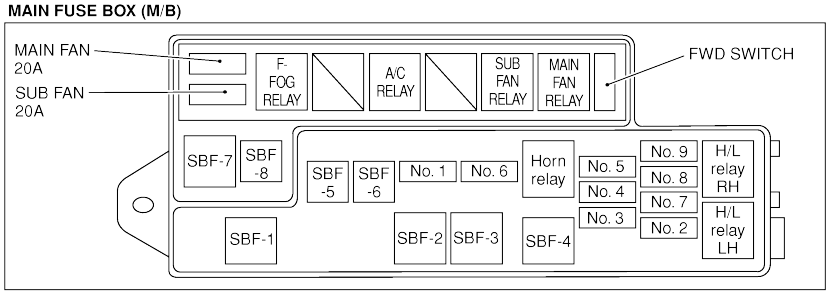
No.	Load
FB-28	ABS control module
FB-29	Front fog light relay
FB-30	Blower motor relay
FB-31	Keyless entry control module
FB-32	Wiper deicer relay

2. RHD MODEL S903465A2102

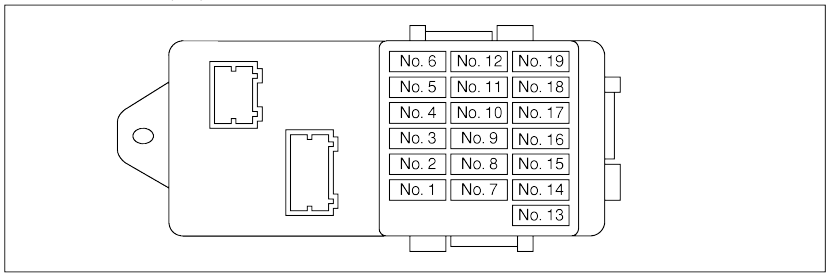
P-SUP(R)-01

P-SUP(R)-01

MAIN FUSE BOX (M/B)

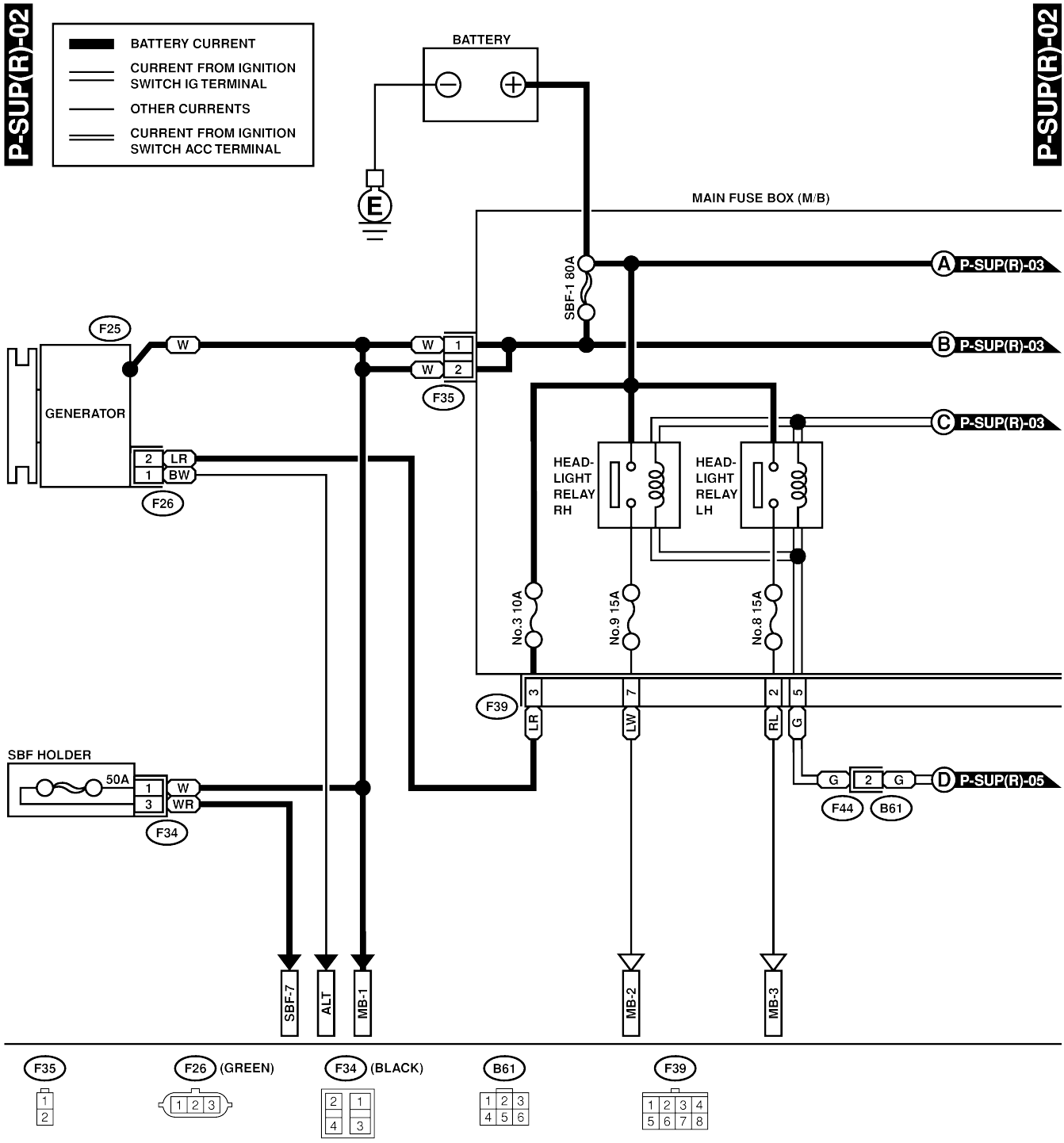


FUSE & RELAY BOX (F/B)

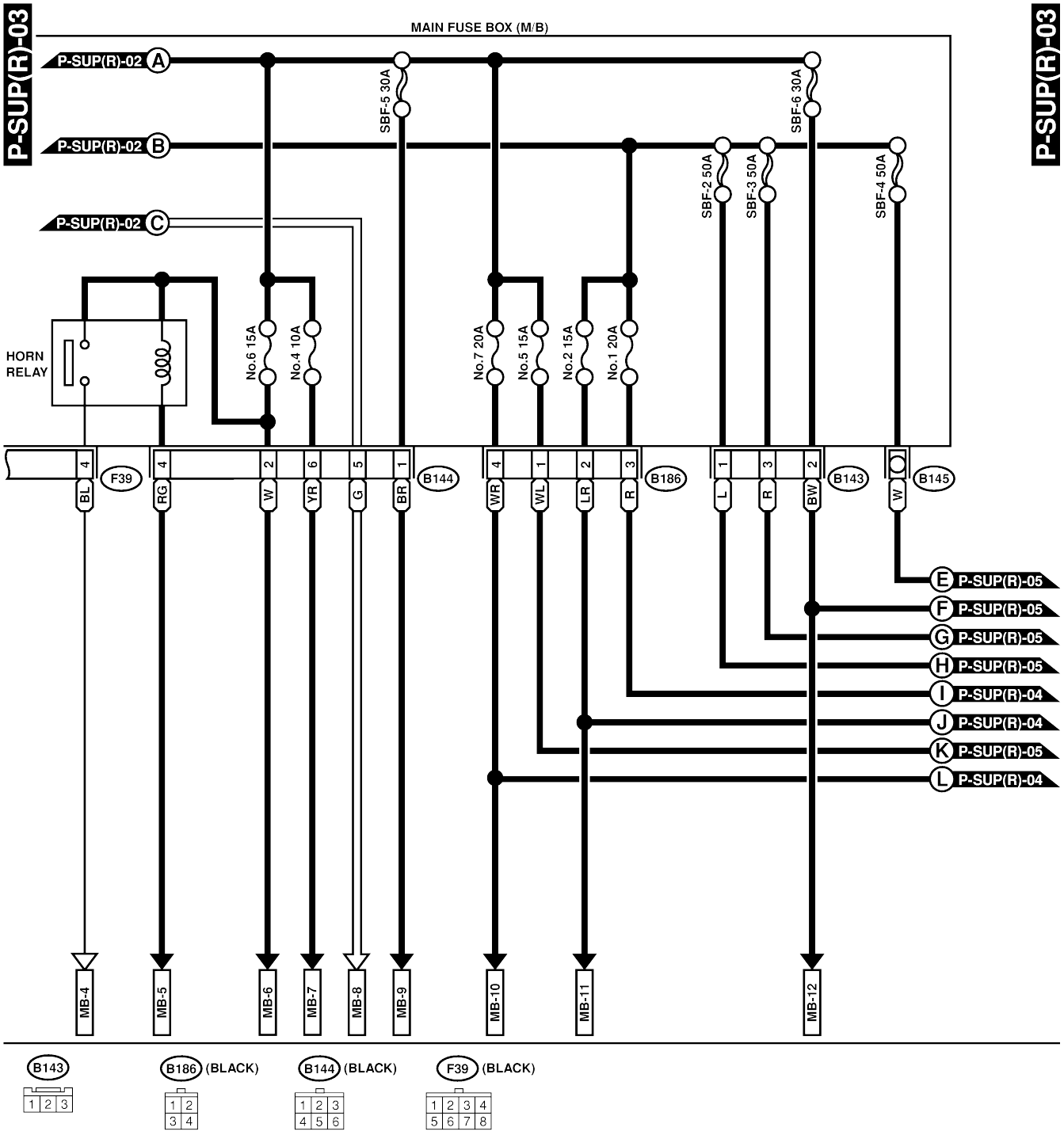


SR01-20A

POWER SUPPLY ROUTING

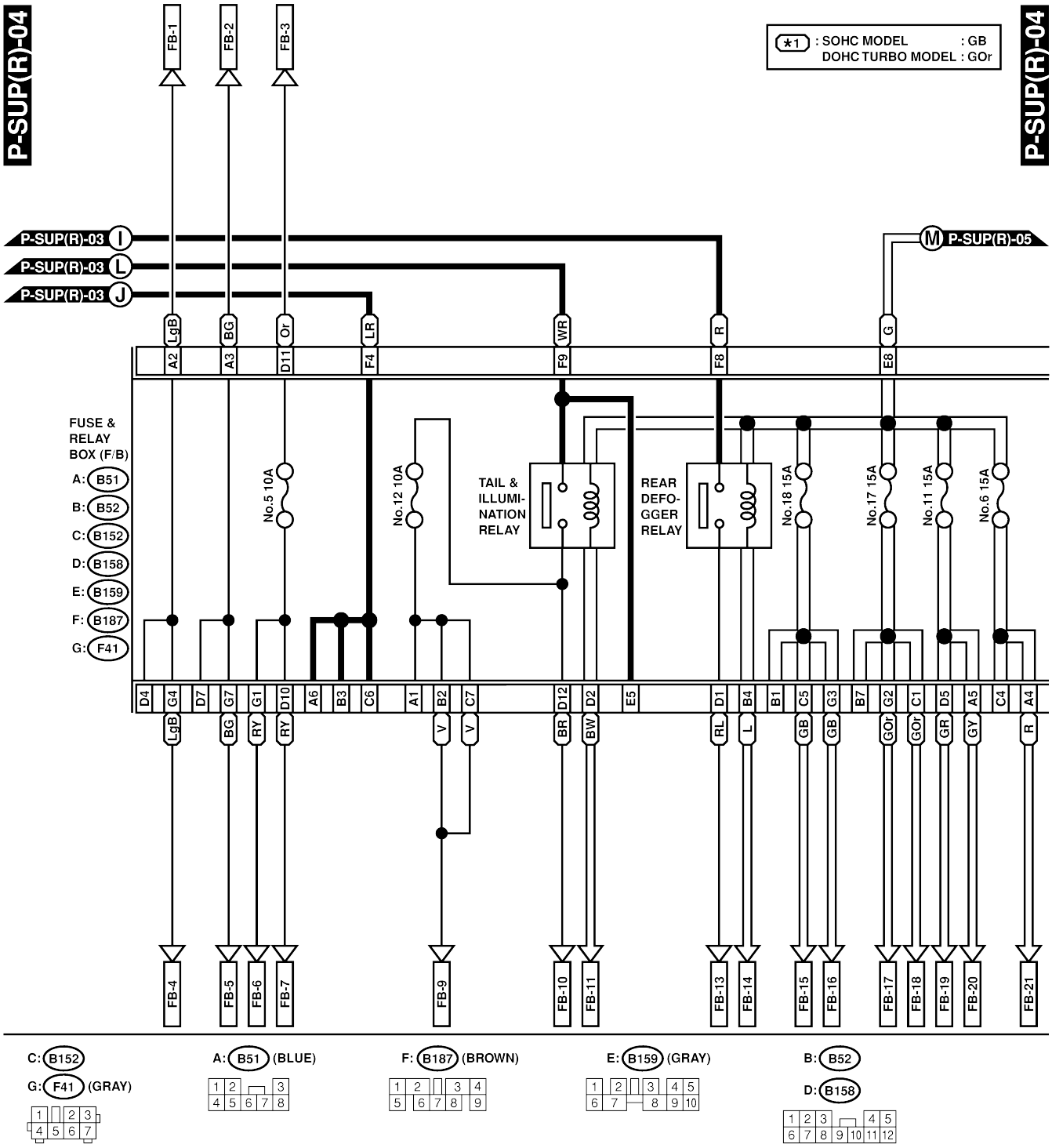


SR01-20B

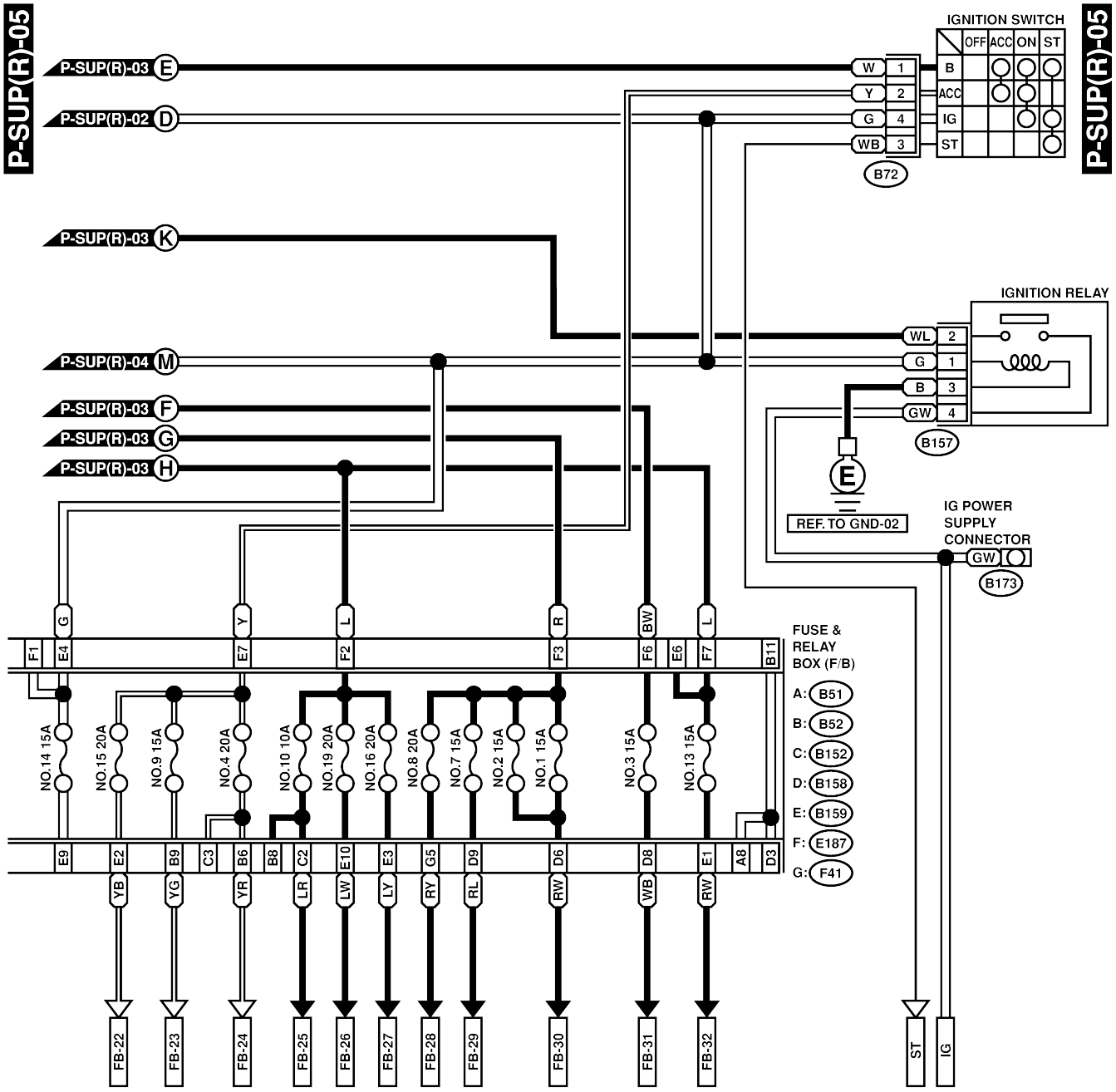

P-SUP(R)-03
P-SUP(R)-03
MAIN FUSE BOX (M/B)
P-SUP(R)-02 A
P-SUP(R)-02 B
P-SUP(R)-02 C
SBF-5 30A
SBF-6 30A
SBF-2 50A
SBF-3 50A
SBF-4 50A
HORN RELAY
No.6 15A
No.4 10A
No.7 20A
No.5 15A
No.2 15A
No.1 20A
F39
B144
B186
B143
B145
BL
RG
W
YR
G
BR
WR
WL
LR
R
L
R
BW
W
E P-SUP(R)-05
F P-SUP(R)-05
G P-SUP(R)-05
H P-SUP(R)-05
I P-SUP(R)-04
J P-SUP(R)-04
K P-SUP(R)-05
L P-SUP(R)-04
MB-4
MB-5
MB-6
MB-7
MB-8
MB-9
MB-10
MB-11
MB-12
B143
B186 (BLACK)
B144 (BLACK)
F39 (BLACK)

SR01-20C

POWER SUPPLY ROUTING



SR01-20D



B72 (BLUE)
B157 (RED)
C: B152
G: F41 (GRAY)
A: B51 (BLUE)
F: B187 (BROWN)
E: B159 (GRAY)
B: B52
D: B158

SR01-20E

POWER SUPPLY ROUTING

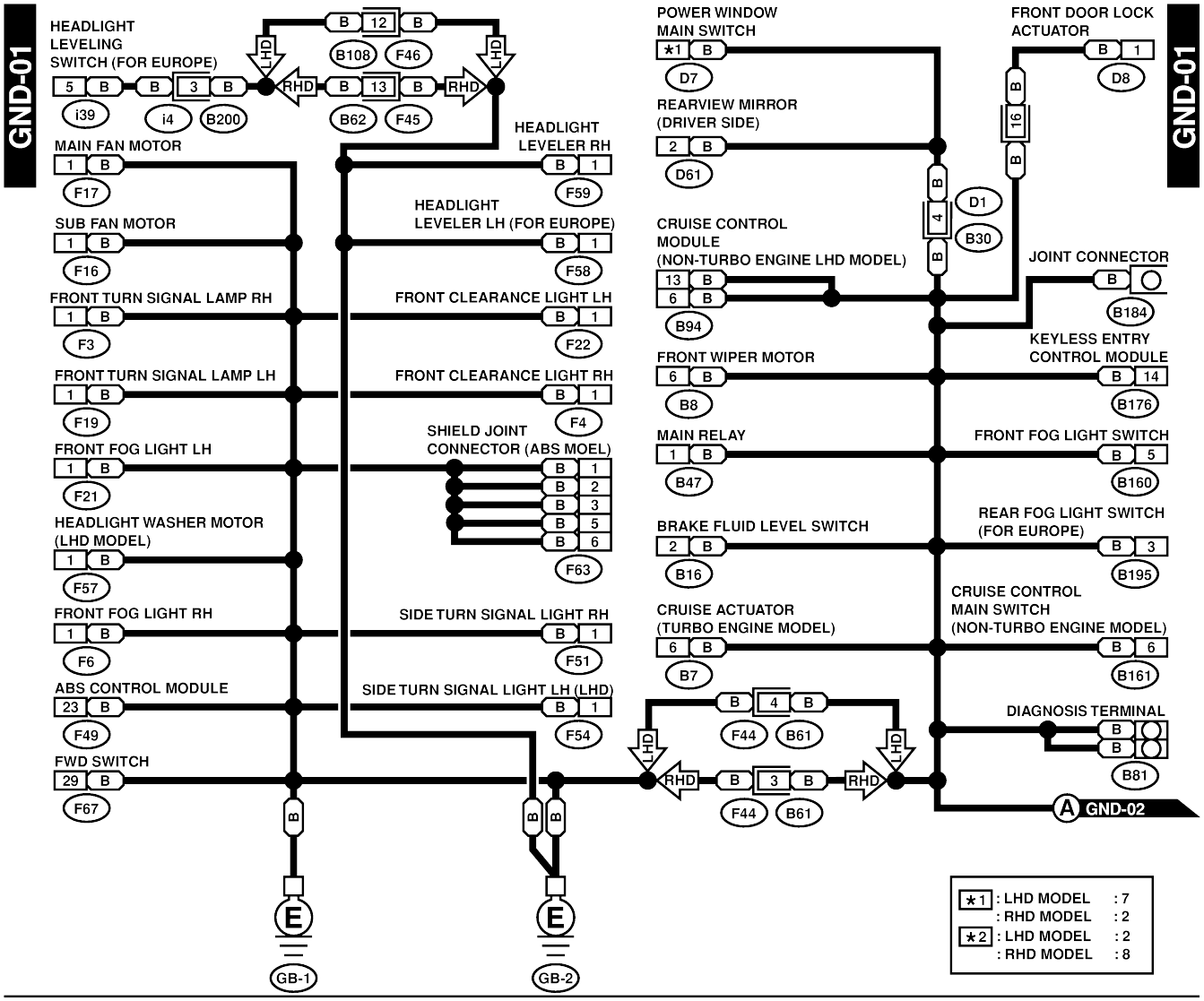
No.	Load
MB-1	A/C relay holder
MB-2	Headlight RH Combination meter
MB-3	Headlight LH
MB-4	Horn
MB-5	Horn switch
MB-6	Hazard switch Key switch Keyless entry control module
MB-7	Transmission control module
MB-8	Diode (With rear fog light) Diode (lighting) Lighting switch
MB-9	Check connector Data link connector Engine control module Fuel pump relay Immobilizer control module Main relay
MB-10	Parking switch
MB-11	Combination meter Radio Room light Keyless entry control module Key illumination light Clock Luggage room light Spot light
MB-12	Headlight washer module Power window circuit breaker
SBF-7	ABS control module
ALT-1	Combination meter
IG	Check connector Combination meter Hazard switch Headlight washer switch Mirror heater condenser Mirror heater LH Mirror heater RH Power window relay Seatbelt timer Speed warning module Vehicle speed sensor (MT)
ST	Engine control module (AT) Inhibitor switch (AT) Starter motor (AT)
FB-1	Combination meter Trailer connector Rear turn signal light RH Hazard switch Turn signal switch Keyless entry control module

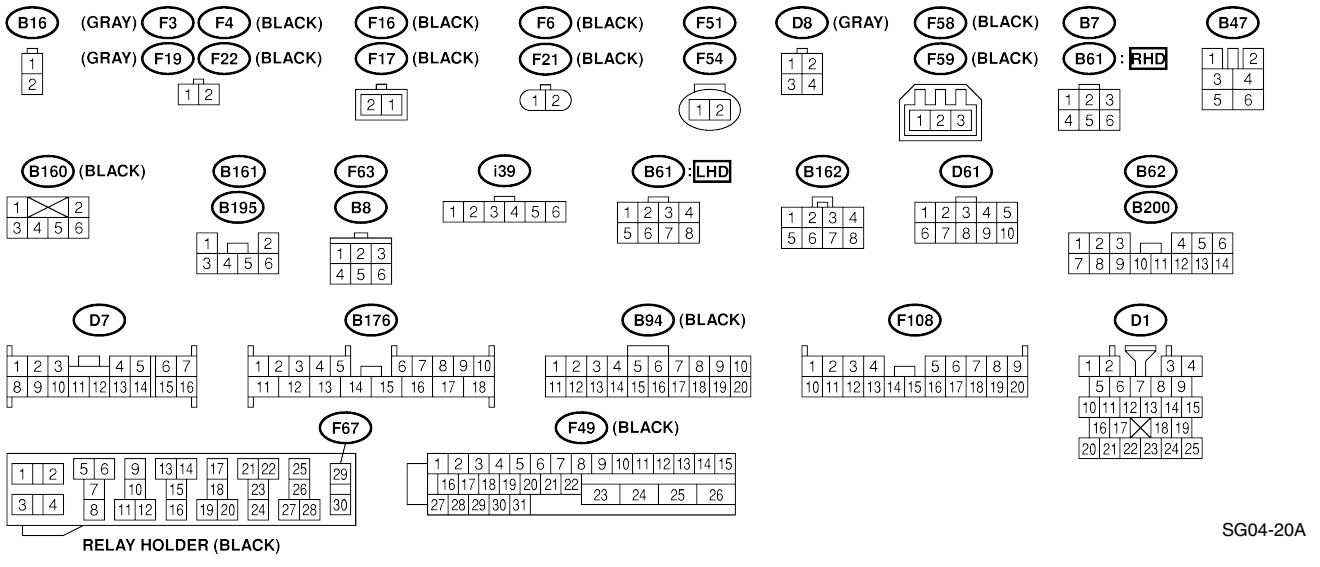
No.	Load
FB-2	Combination meter Keyless entry control module Hazard switch Turn signal switch Trailer connector Side turn signal light LH Rear turn signal light LH Front turn signal light RH
FB-3	Parking switch
FB-4	Side turn signal light RH Front turn signal light RH
FB-5	Front turn signal light LH
FB-6	Front clearance light LH Front clearance light RH Headlight leveler LH Headlight leveler RH
FB-7	License plate light Trailer connector
FB-9	Rear fog light relay Headlight leveling switch Illumination light Illumination control module Front fog light relay Front fog light switch
FB-10	Parking switch
FB-11	Lighting switch
FB-13	Rear defogger switch Rear defogger Mirror heater relay
FB-14	Rear defogger
FB-15	Back-up light switch (MT) Inhibitor switch (AT) Wiper deicer Wiper deicer timer
FB-16	ABS control module A/C relay holder
FB-17	Air conditioner relay A/C relay holder Power window relay
FB-18	Mode control panel Blower motor relay Pressure switch Rear defogger switch
FB-19	Fuel pump relay Engine control module Ignition and Igniter Transmission control module Immobilizer control module
FB-20	Airbag control module
FB-21	Airbag control module
FB-22	Front washer motor Front wiper motor Front wiper switch Rear wiper motor Rear wiper intermittent module

No.	Load
FB-23	Noise killer Radio Clock
FB-24	Remote rearview mirror switch Seat heater/rear accessory power supply relay Front accessory power supply socket
FB-25	Rear fog light relay
FB-26	Seat heater/rear accessory power supply relay
FB-27	Stop light Stop light switch
FB-28	ABS control module
FB-29	Front fog light relay
FB-30	Blower motor relay
FB-31	Keyless entry control module
FB-32	Wiper deicer relay

4. Ground Distribution S903472

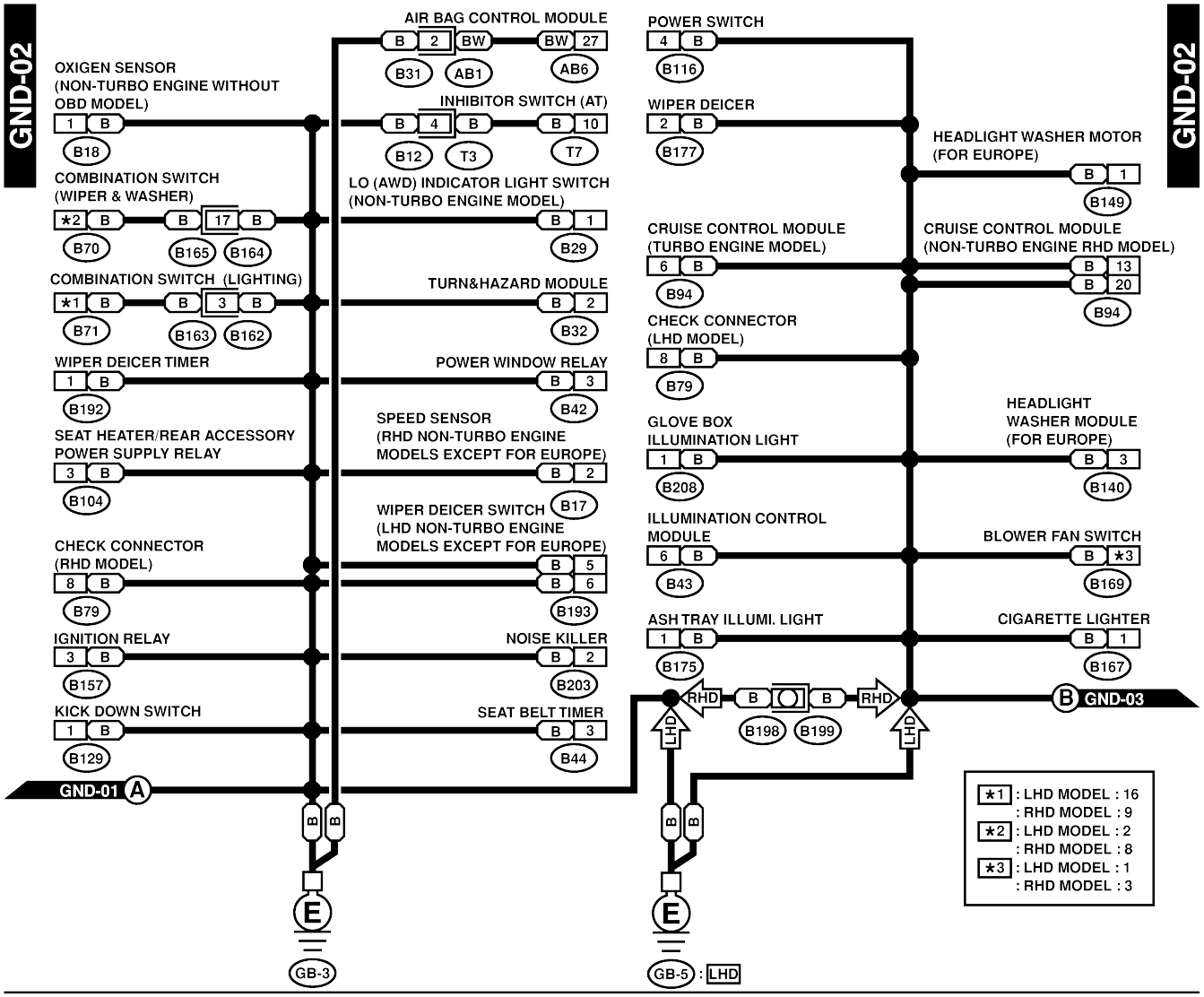
A: SCHEMATIC S903472A21

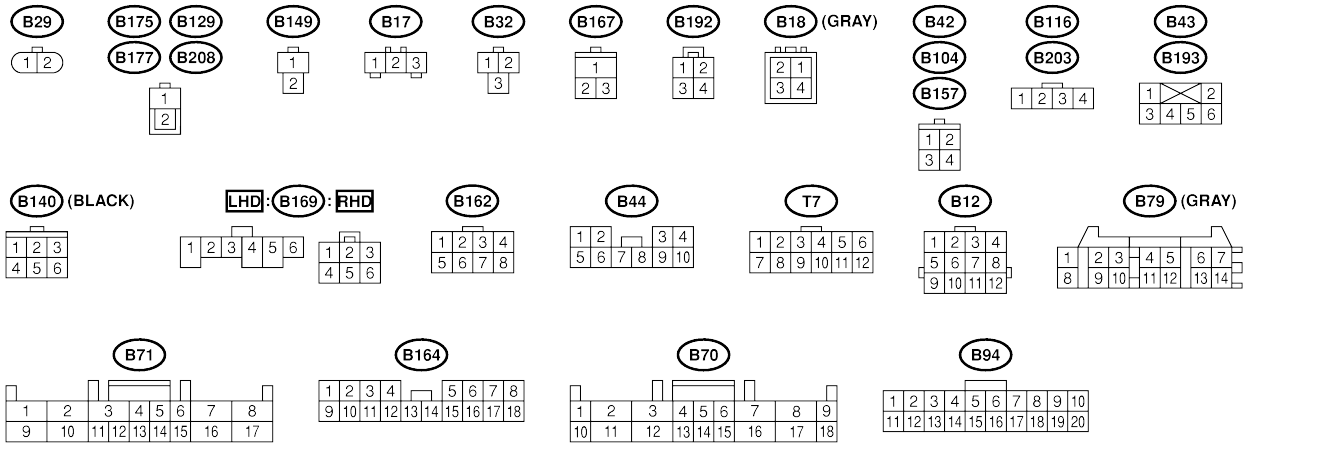




SG04-20A

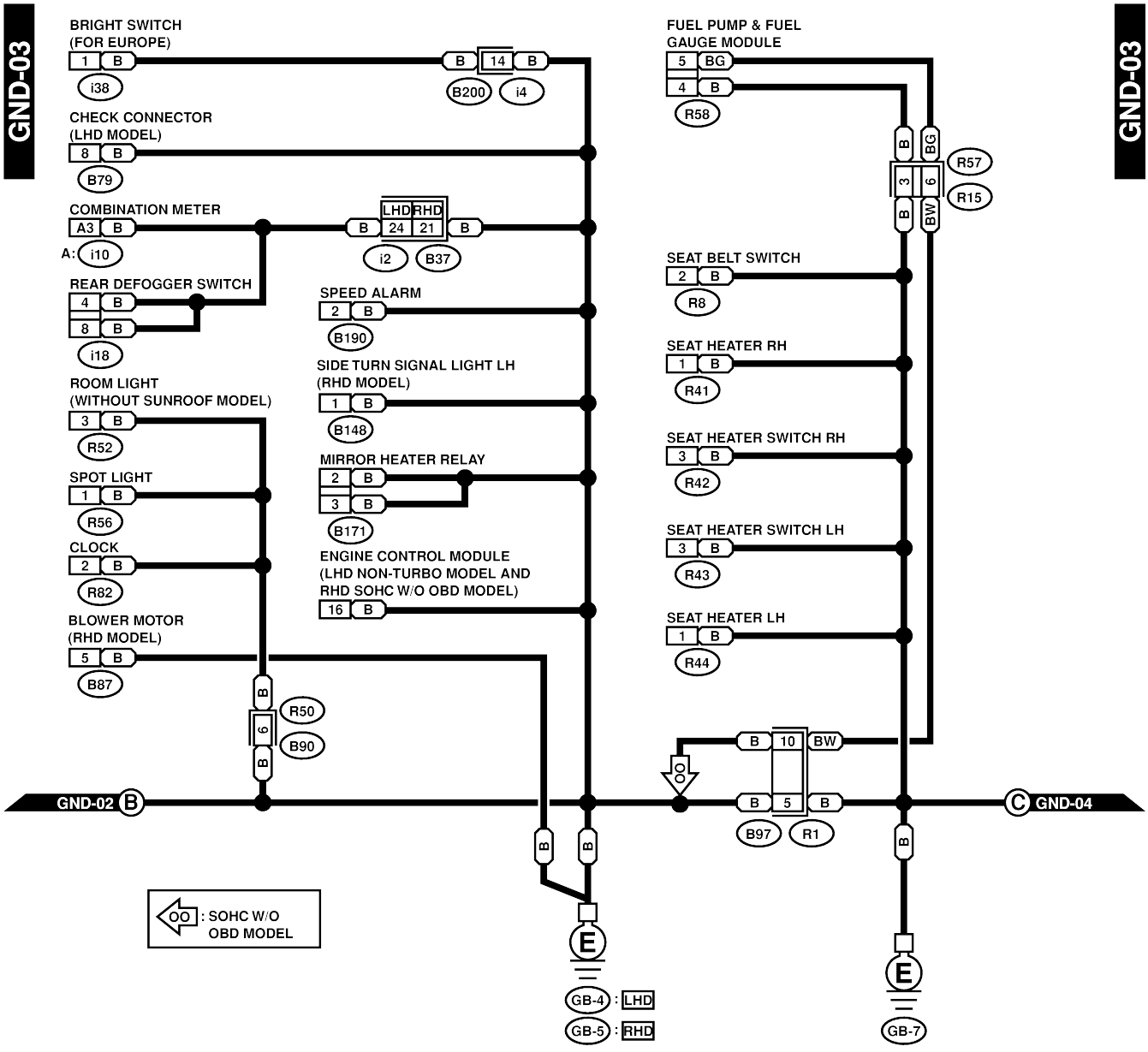
GROUND DISTRIBUTION

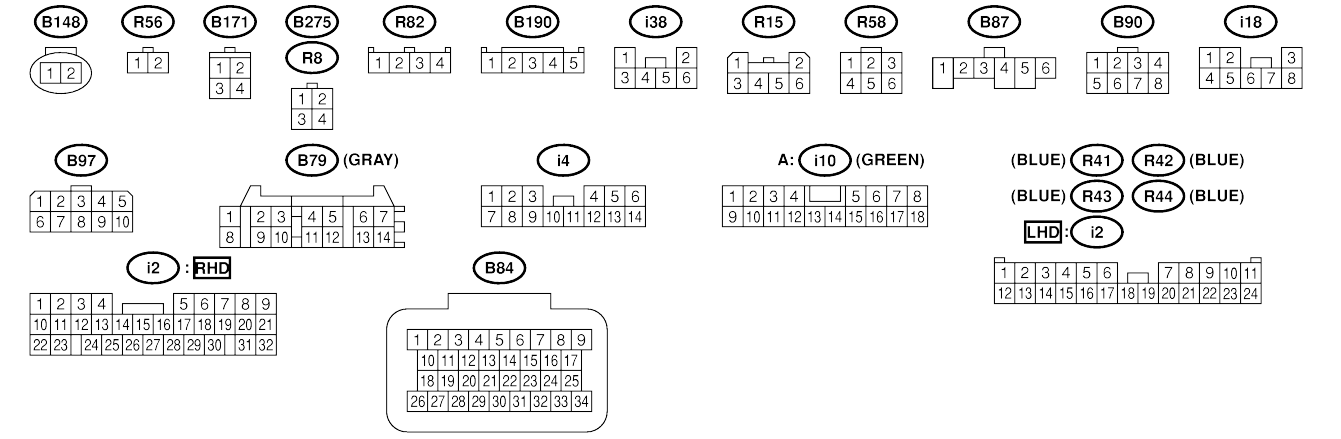




SG04-20B

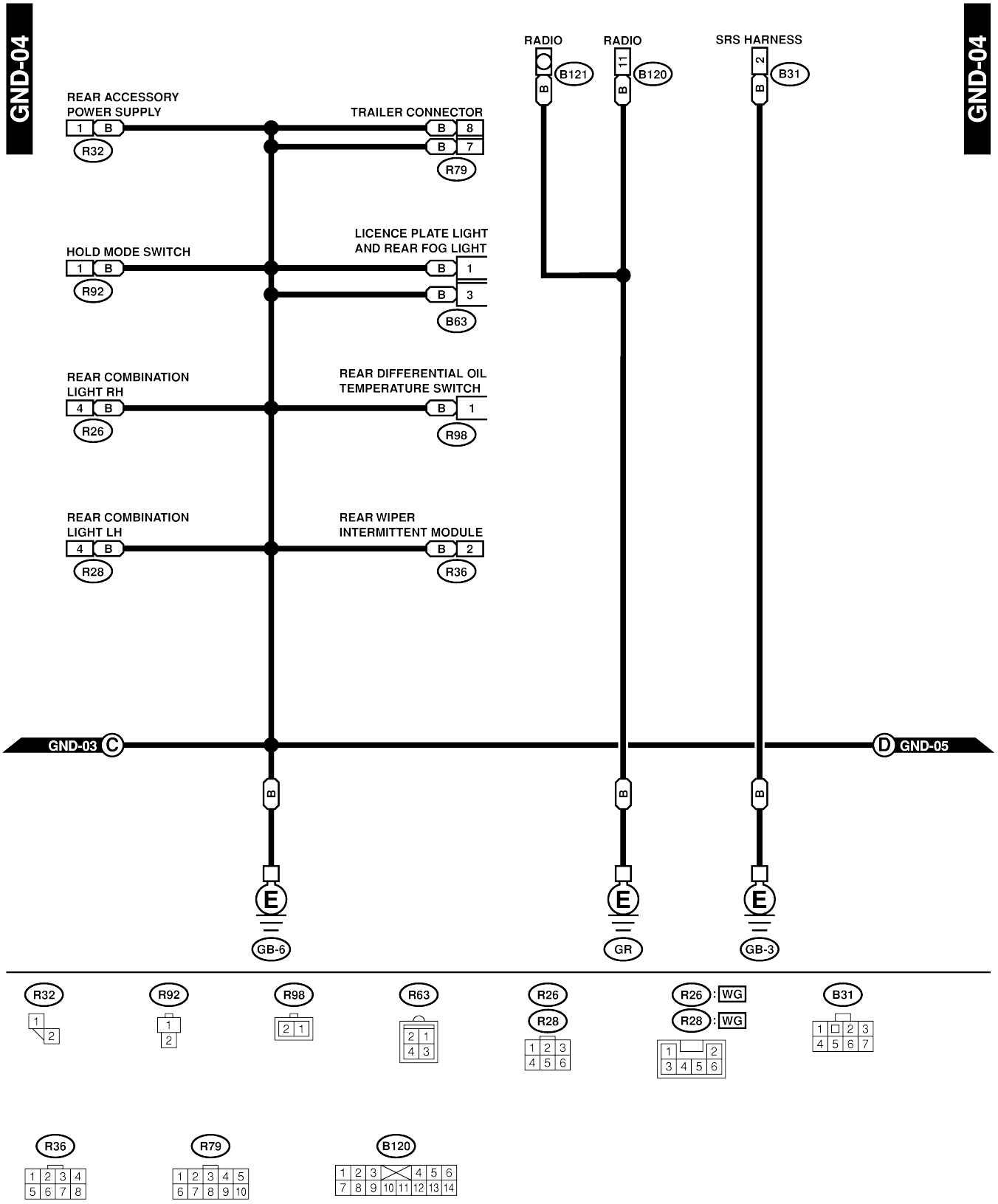
GROUND DISTRIBUTION





SG04-20C

GROUND DISTRIBUTION

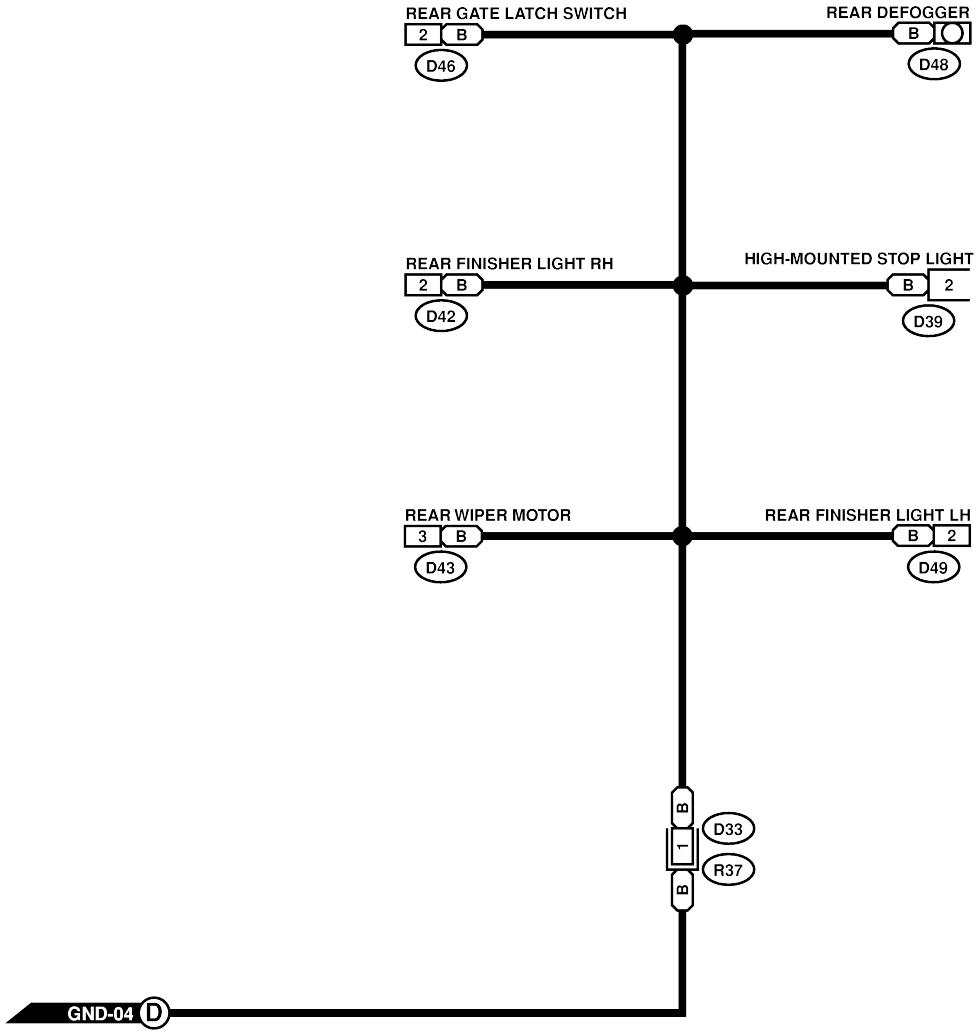


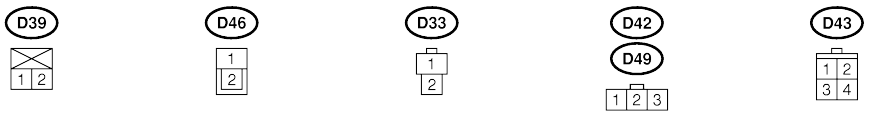
SG04-20D

GROUND DISTRIBUTION

GND-05

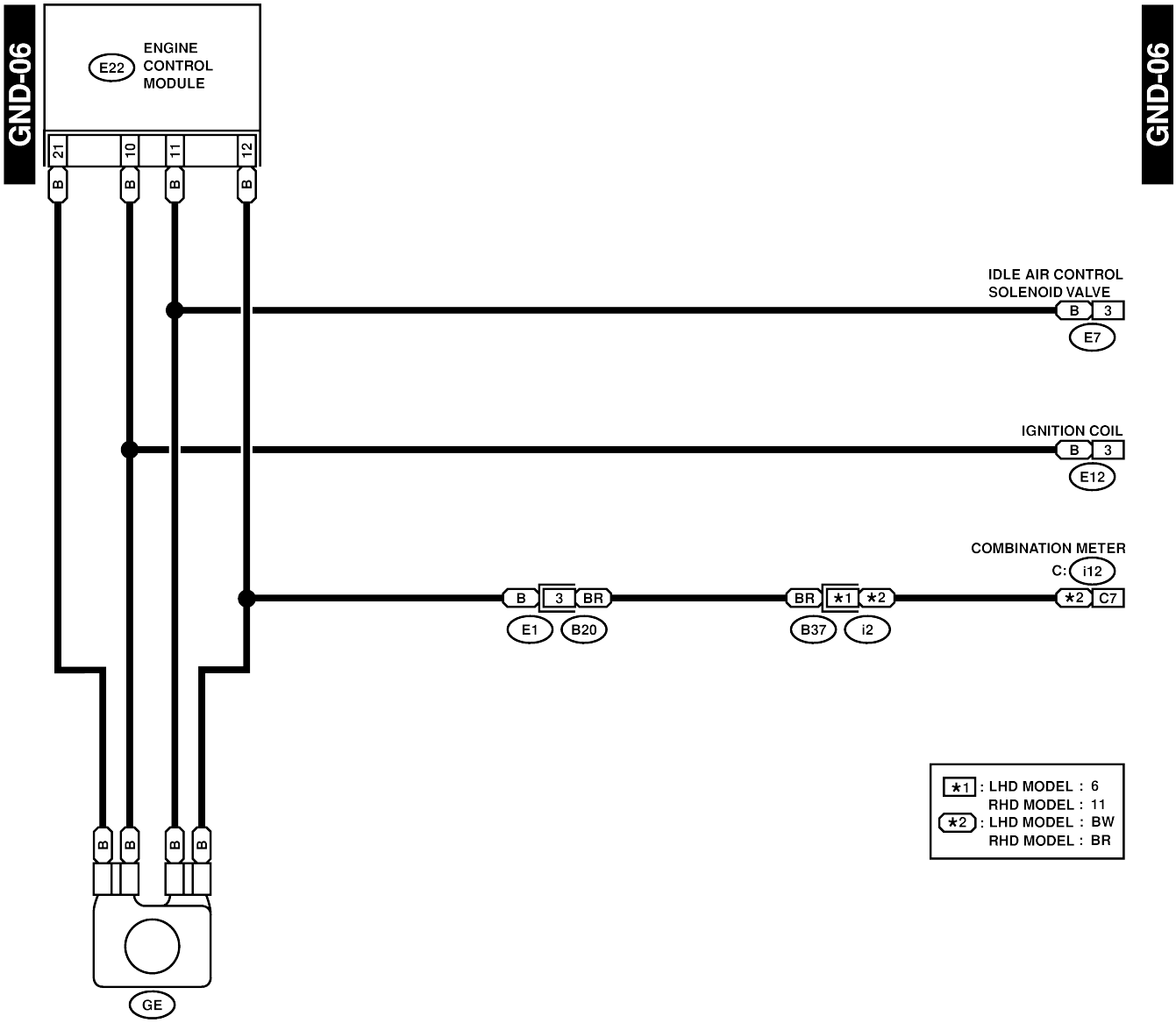
GND-05



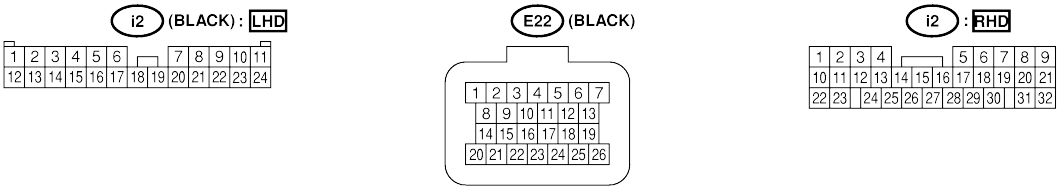


SG04-20E

GROUND DISTRIBUTION

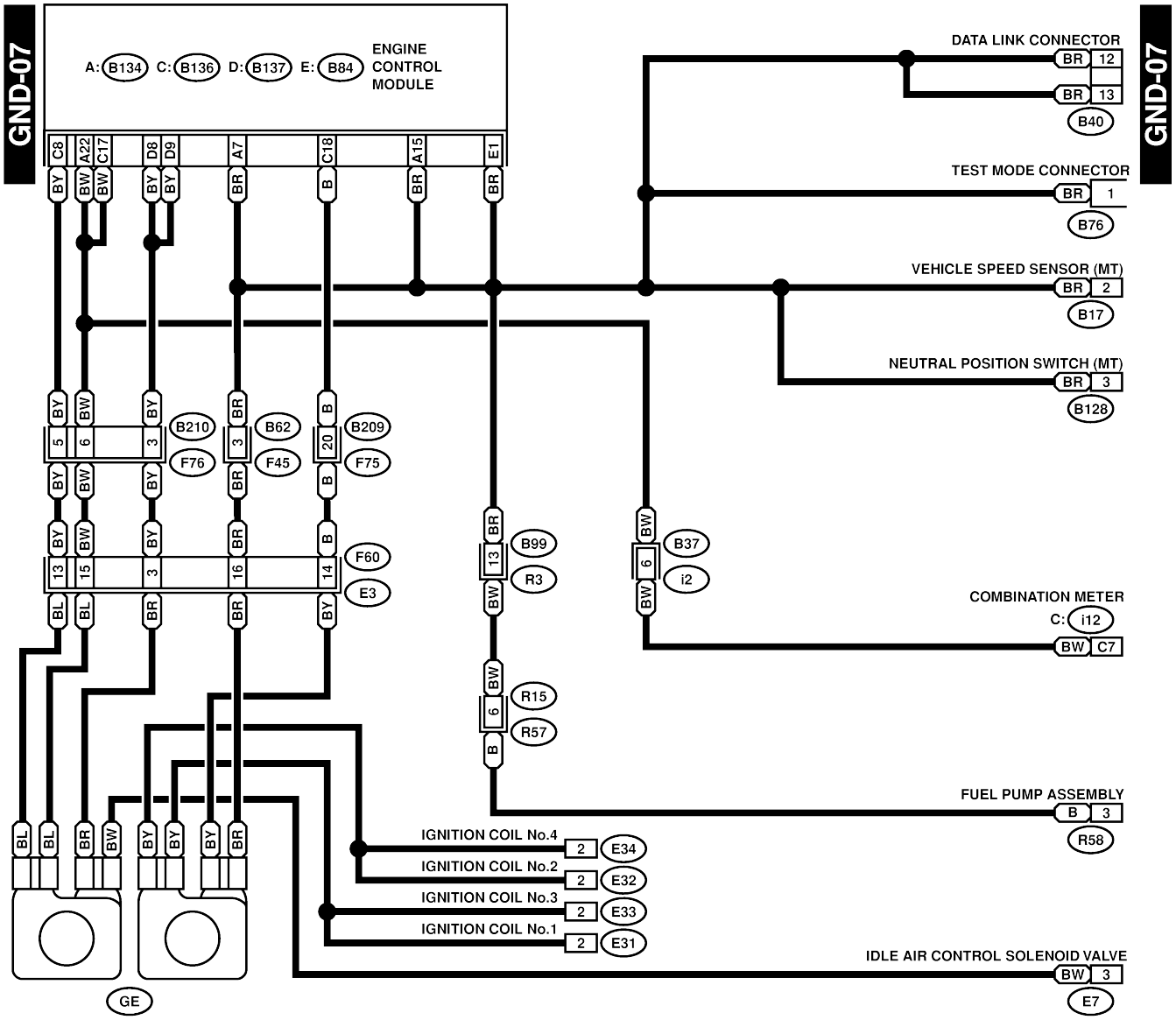


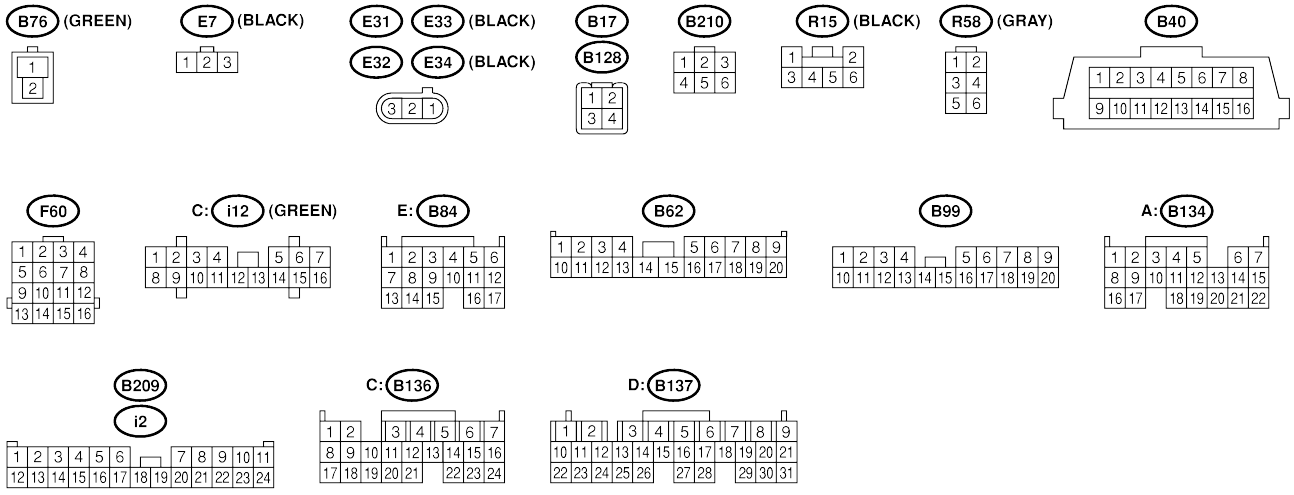




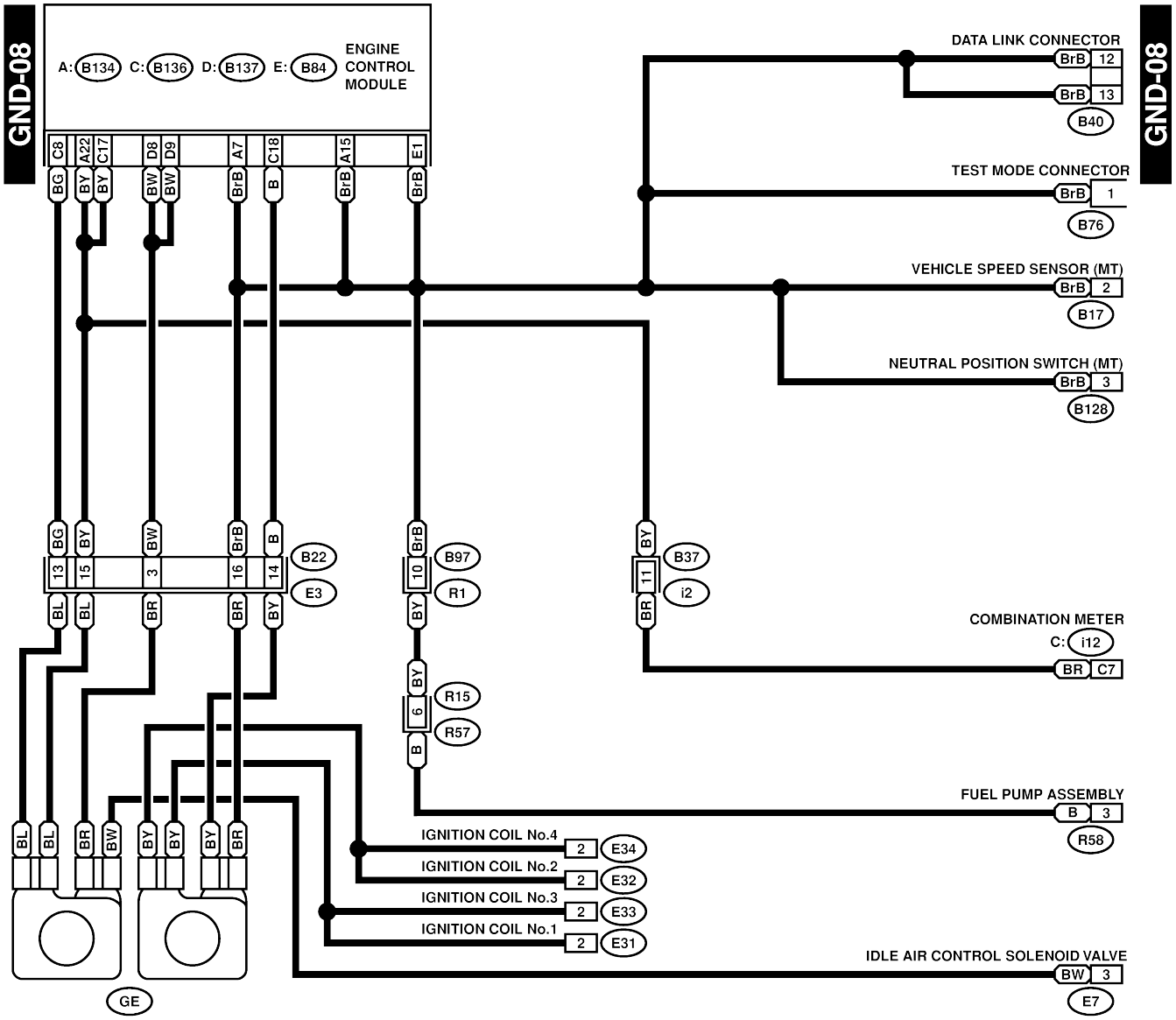
SG04-20F

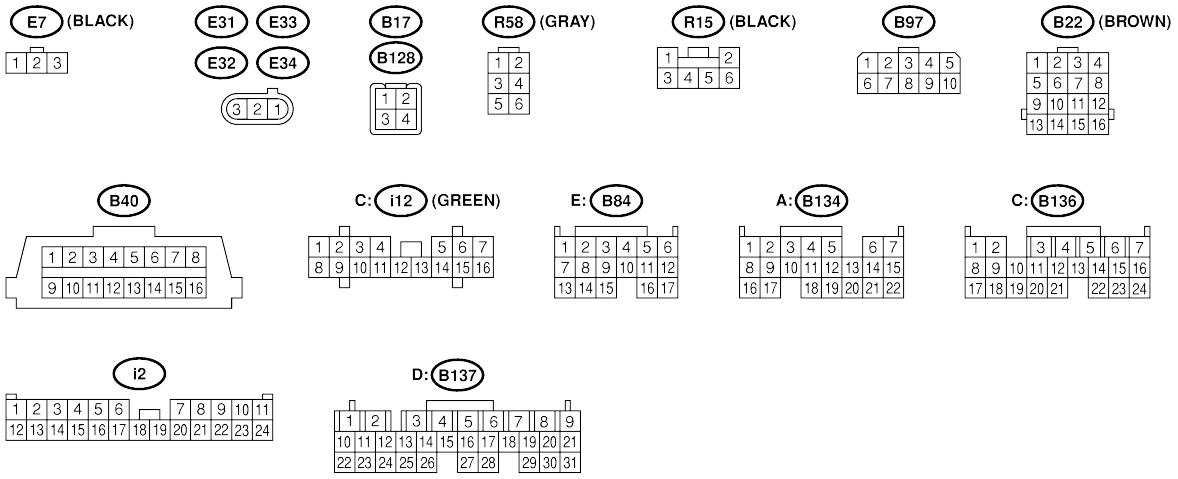
GROUND DISTRIBUTION





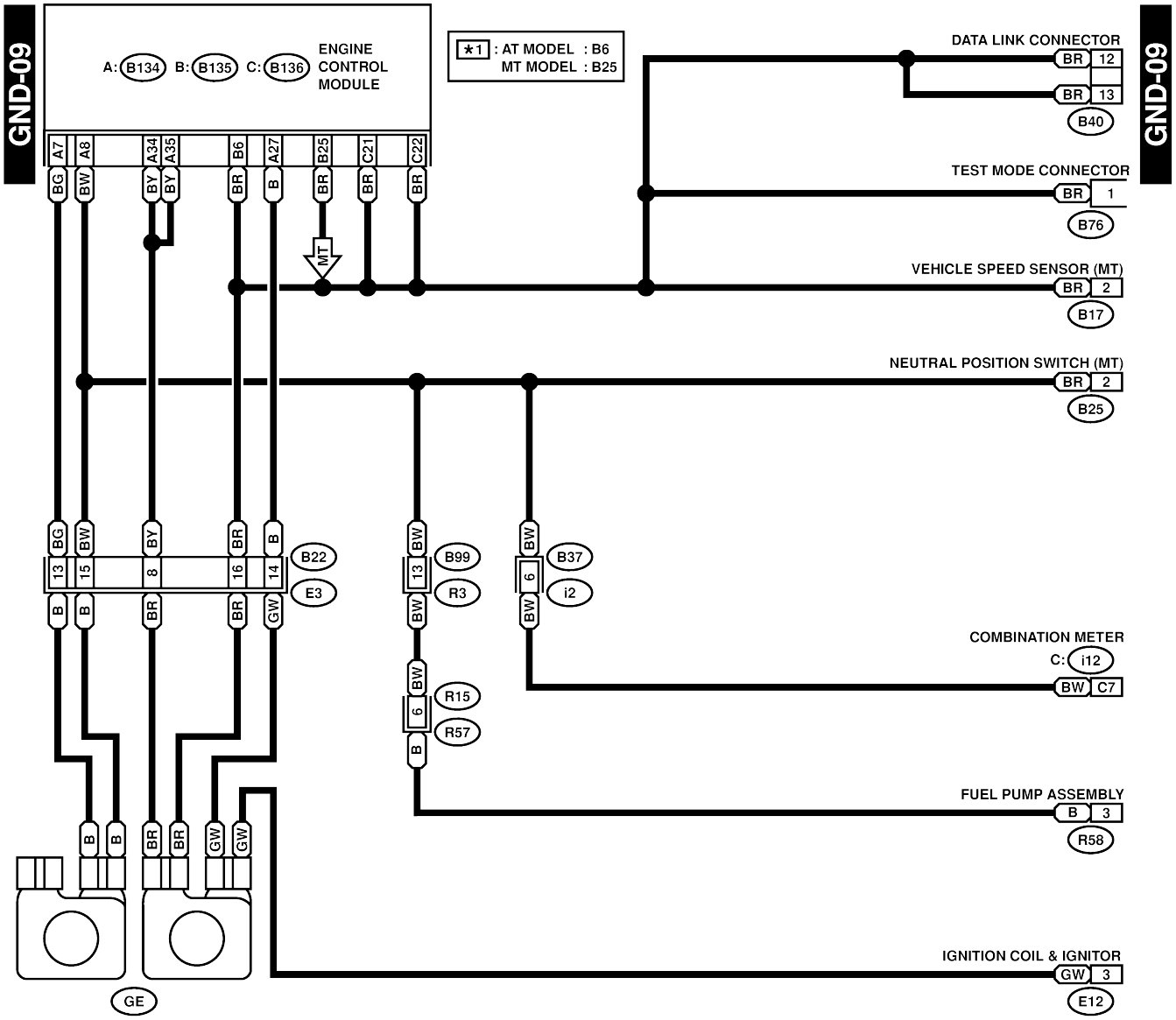
SG04-20G

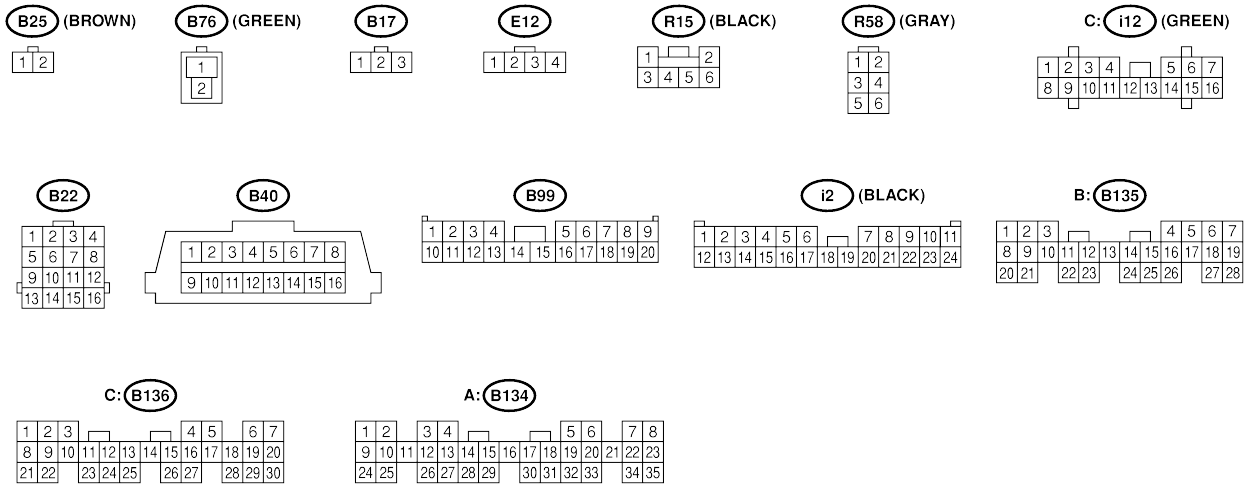

GND-08
A: B134 C: B136 D: B137 E: B84
ENGINE CONTROL MODULE
C8 A22 C17 D8 D9 A7 C18 A15 E1
BG BY BY BW BW BrB B BrB BrB
DATA LINK CONNECTOR
BrB 12
BrB 13
B40
TEST MODE CONNECTOR
BrB 1
B76
VEHICLE SPEED SENSOR (MT)
BrB 2
B17
NEUTRAL POSITION SWITCH (MT)
BrB 3
B128
BG BY BW BrB B
13 15 3 16 14
B22
E3
BrB
10
B97
R1
BY
11
B37
i2
BR
COMBINATION METER
C: i12
BR C7
BY
6
R15
R57
B
FUEL PUMP ASSEMBLY
B 3
R58
BL BL BR BW BY BY BY BR
IGNITION COIL No.4 2 E34
IGNITION COIL No.2 2 E32
IGNITION COIL No.3 2 E33
IGNITION COIL No.1 2 E31
IDLE AIR CONTROL SOLENOID VALVE
BW 3
E7
GE


E7 (BLACK)
1 2 3
E31 E33
E32 E34
3 2 1
B17
B128
1 2
3 4
R58 (GRAY)
1 2
3 4
5 6
R15 (BLACK)
1 2
3 4 5 6
B97
1 2 3 4 5
6 7 8 9 10
B22 (BROWN)
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
B40
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16
C: i12 (GREEN)
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16
E: B84
1 2 3 4 5 6
7 8 9 10 11 12
13 14 15 16 17
A: B134
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15
16 17 18 19 20 21 22
C: B136
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24
i2
1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19 20 21 22 23 24
D: B137
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19 20 21
22 23 24 25 26 27 28 29 30 31

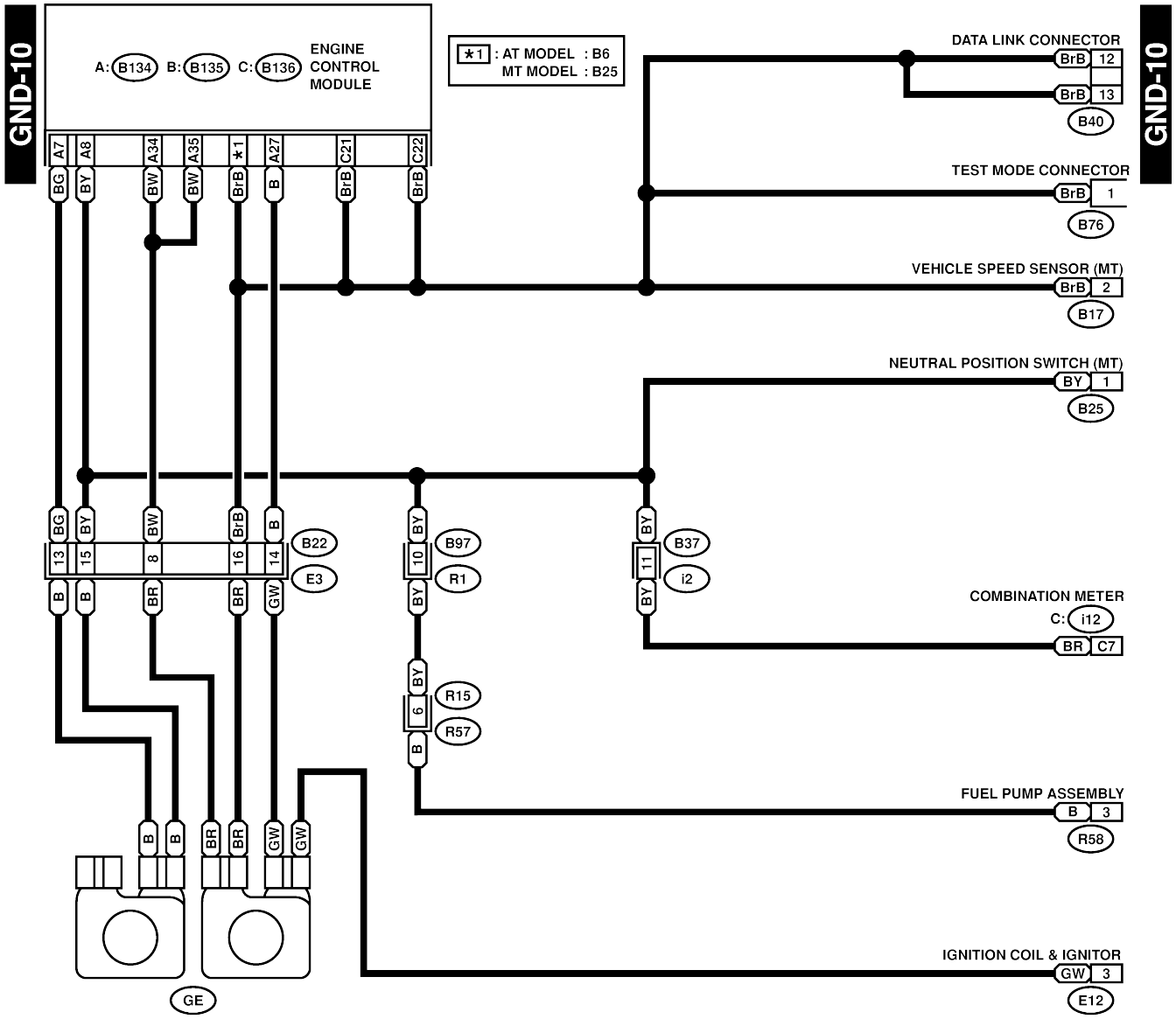
SG04-20H

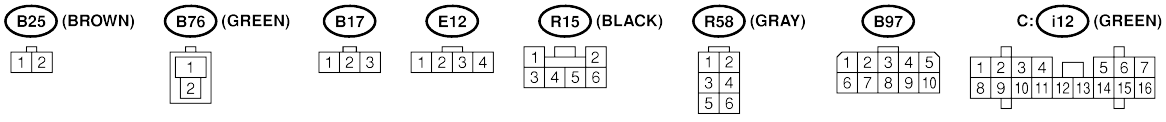
GROUND DISTRIBUTION

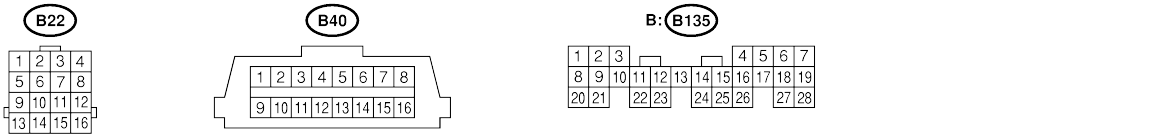


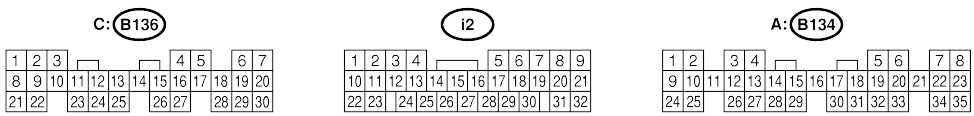


SG04-20I


GND-10
A: B134 B: B135 C: B136 ENGINE CONTROL MODULE
*1 : AT MODEL : B6
MT MODEL : B25
A7 A8 A34 A35 *1 A27 C21 C22
BG BY BW BW BrB B BrB BrB
DATA LINK CONNECTOR
BrB 12
BrB 13
B40
TEST MODE CONNECTOR
BrB 1
B76
VEHICLE SPEED SENSOR (MT)
BrB 2
B17
NEUTRAL POSITION SWITCH (MT)
BY 1
B25
BG BY BW BrB B
13 15 8 16 14
B22
E3
B BR BR GW
BY 10
B97
R1
BY 11
B37
i2
COMBINATION METER
C: i12
BR C7
BY 6
R15
R57
B
FUEL PUMP ASSEMBLY
B 3
R58
B B BR BR GW GW
IGNITION COIL & IGNITOR
GW 3
E12
GE
GND-10

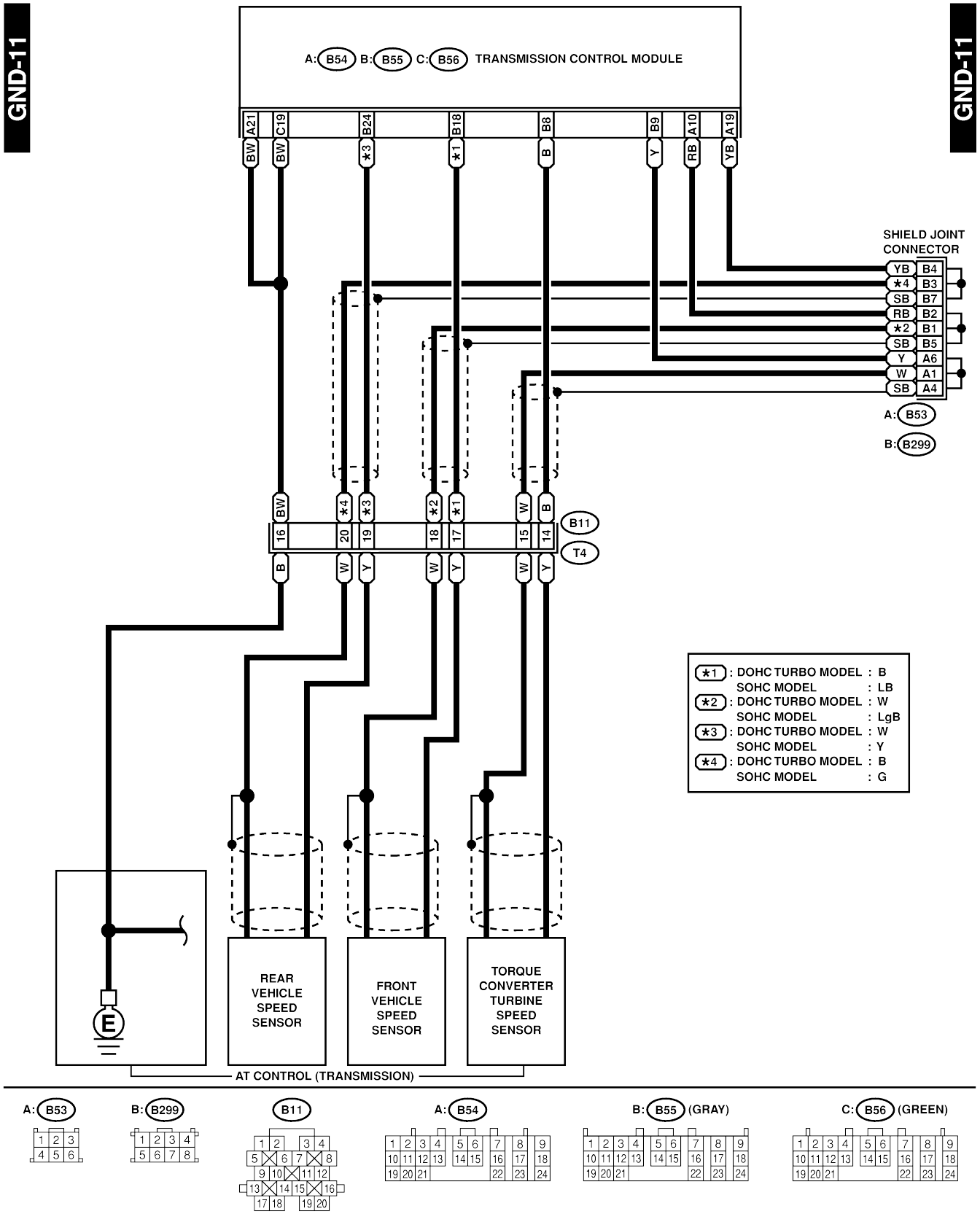

B25 (BROWN)
B76 (GREEN)
B17
E12
R15 (BLACK)
R58 (GRAY)
B97
C: i12 (GREEN)


B22
B40
B: B135


C: B136
i2
A: B134

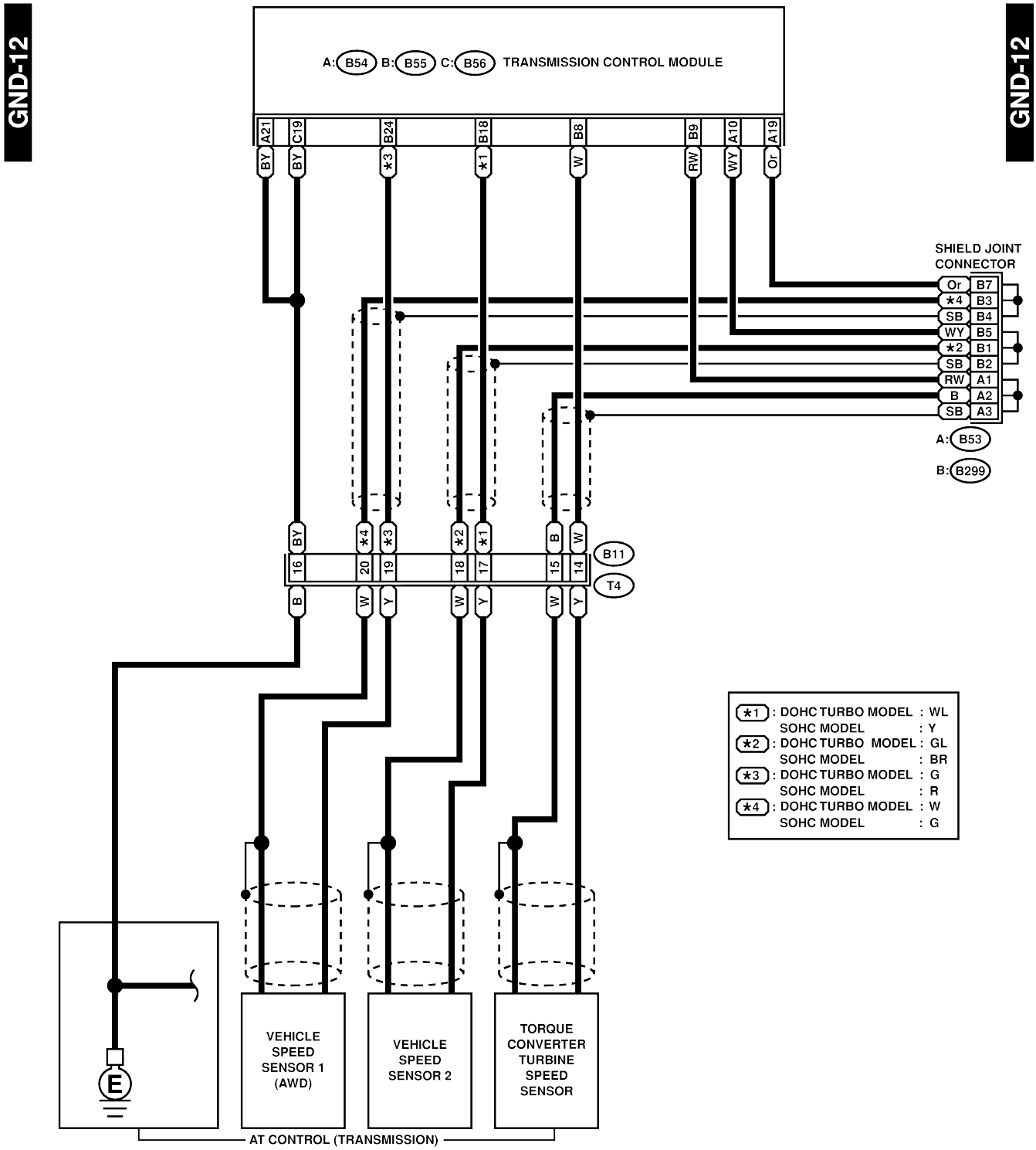
SG04-20J

GROUND DISTRIBUTION



SG04-20K

GROUND DISTRIBUTION

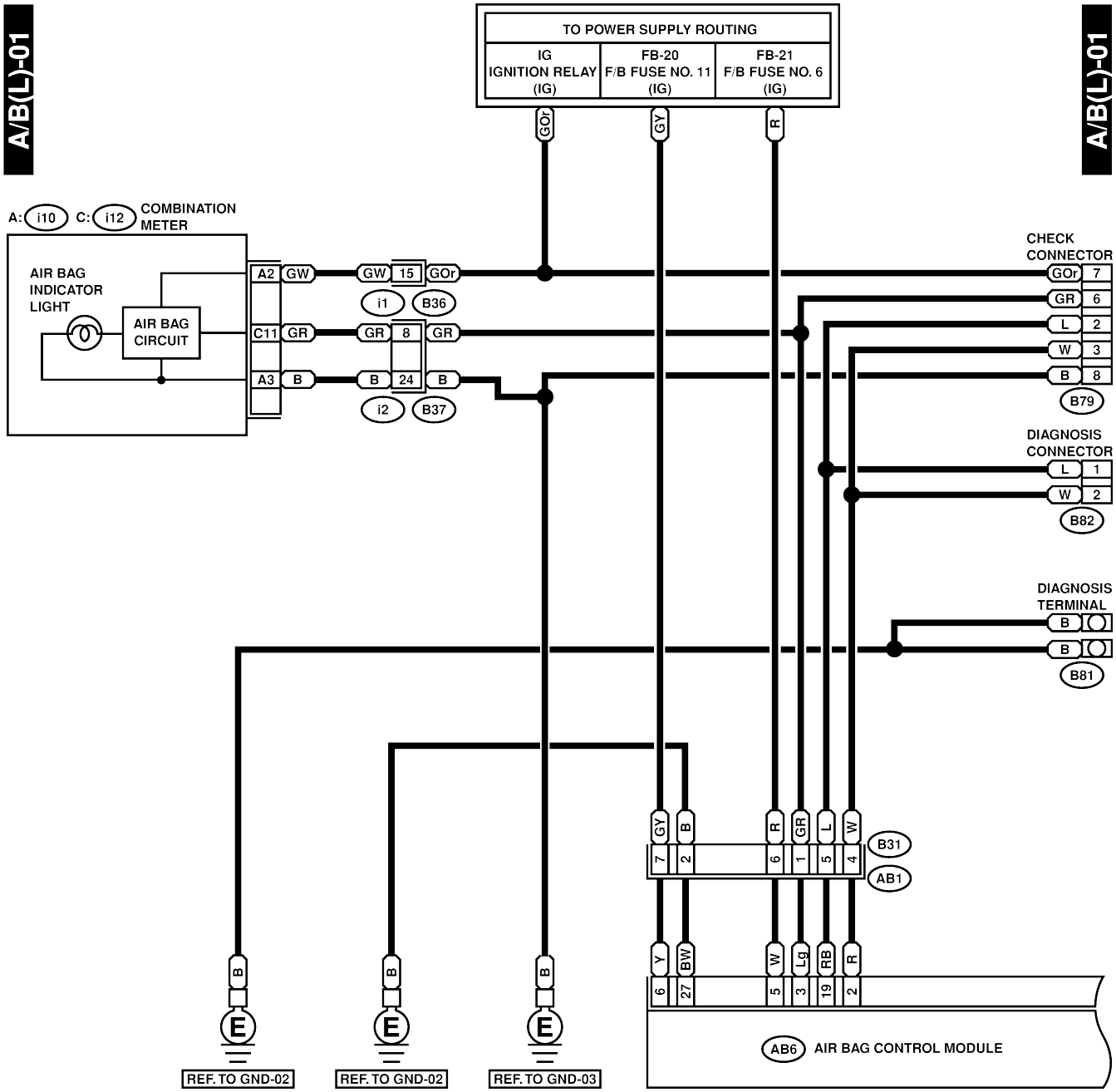


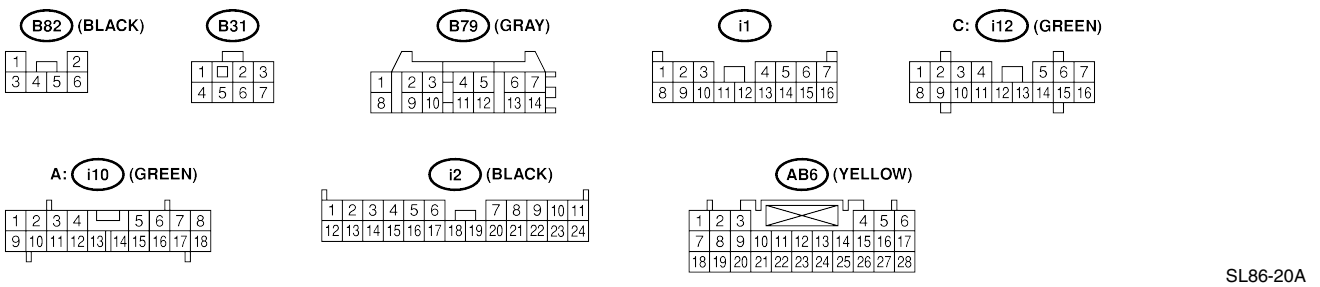
SG04-20L

5. Airbag System S903491

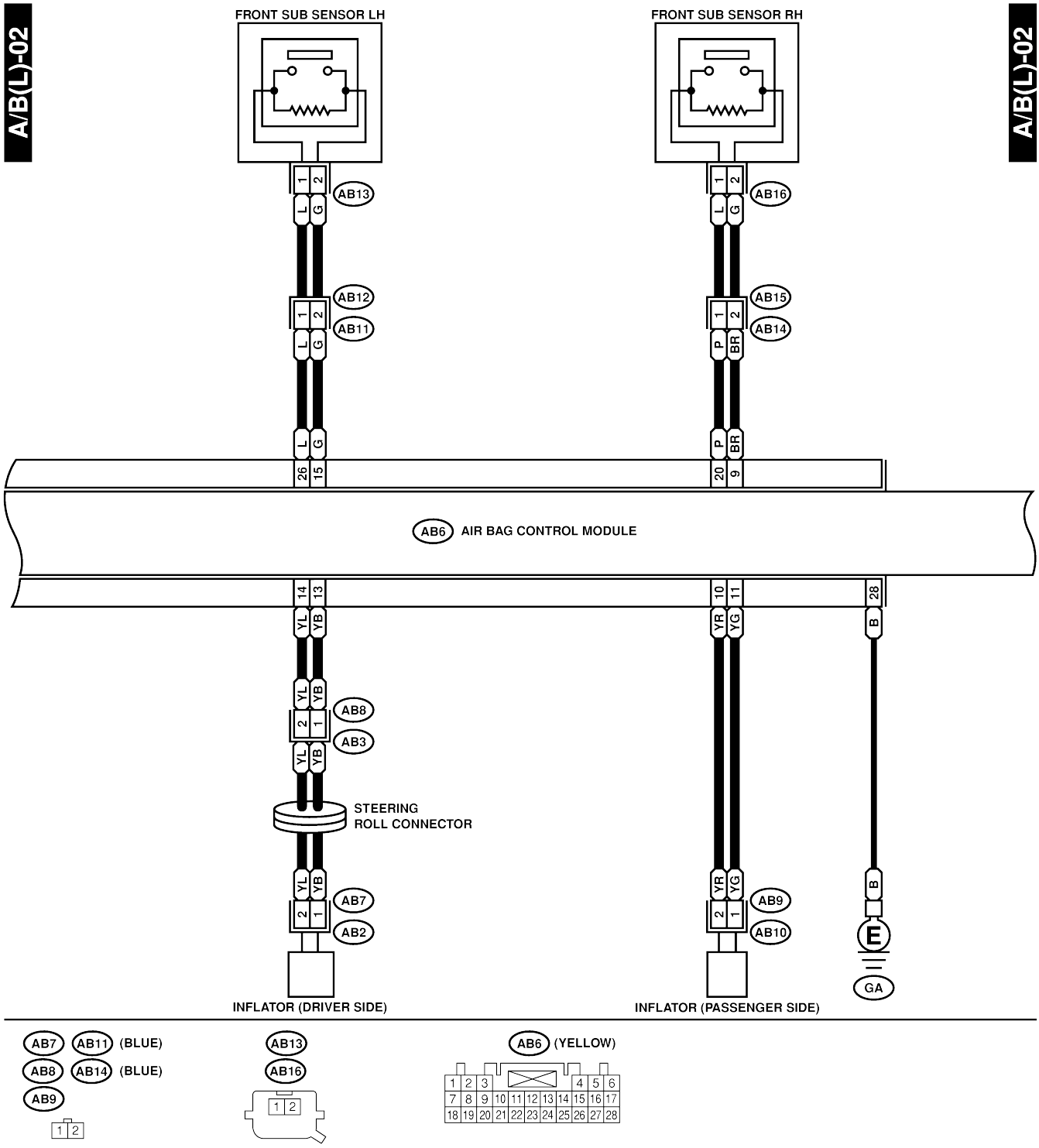
A: SCHEMATIC S903491A21

1. LHD MODEL S903491A2101

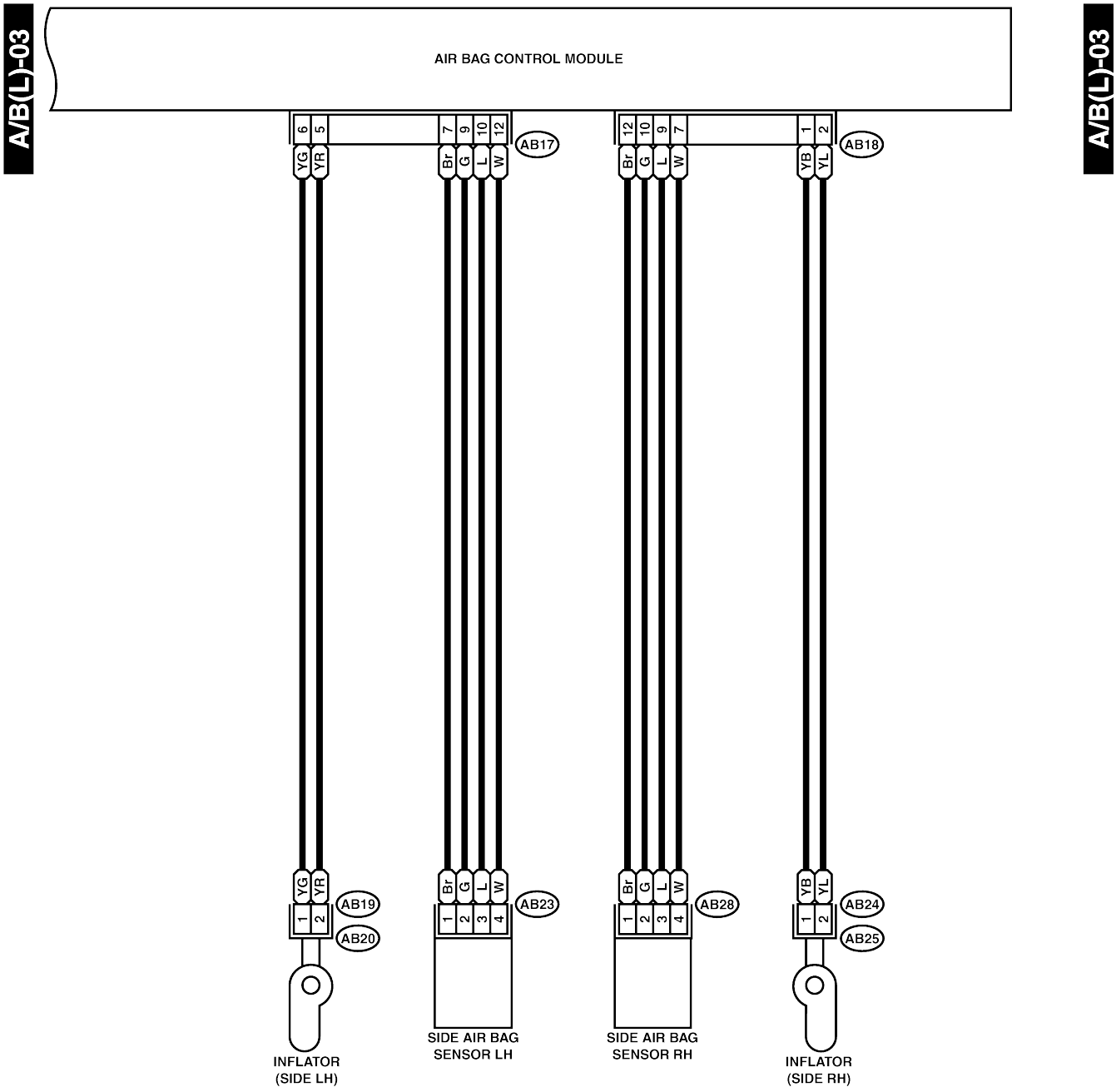


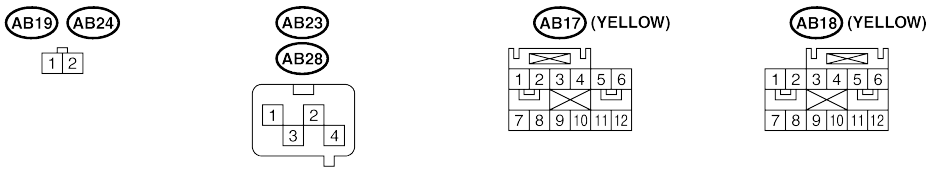


SL86-20A


A/B(L)-02
A/B(L)-02
FRONT SUB SENSOR LH
FRONT SUB SENSOR RH
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 (BLUE)
AB8 AB14 (BLUE)
AB9
AB13
AB16
AB6 (YELLOW)

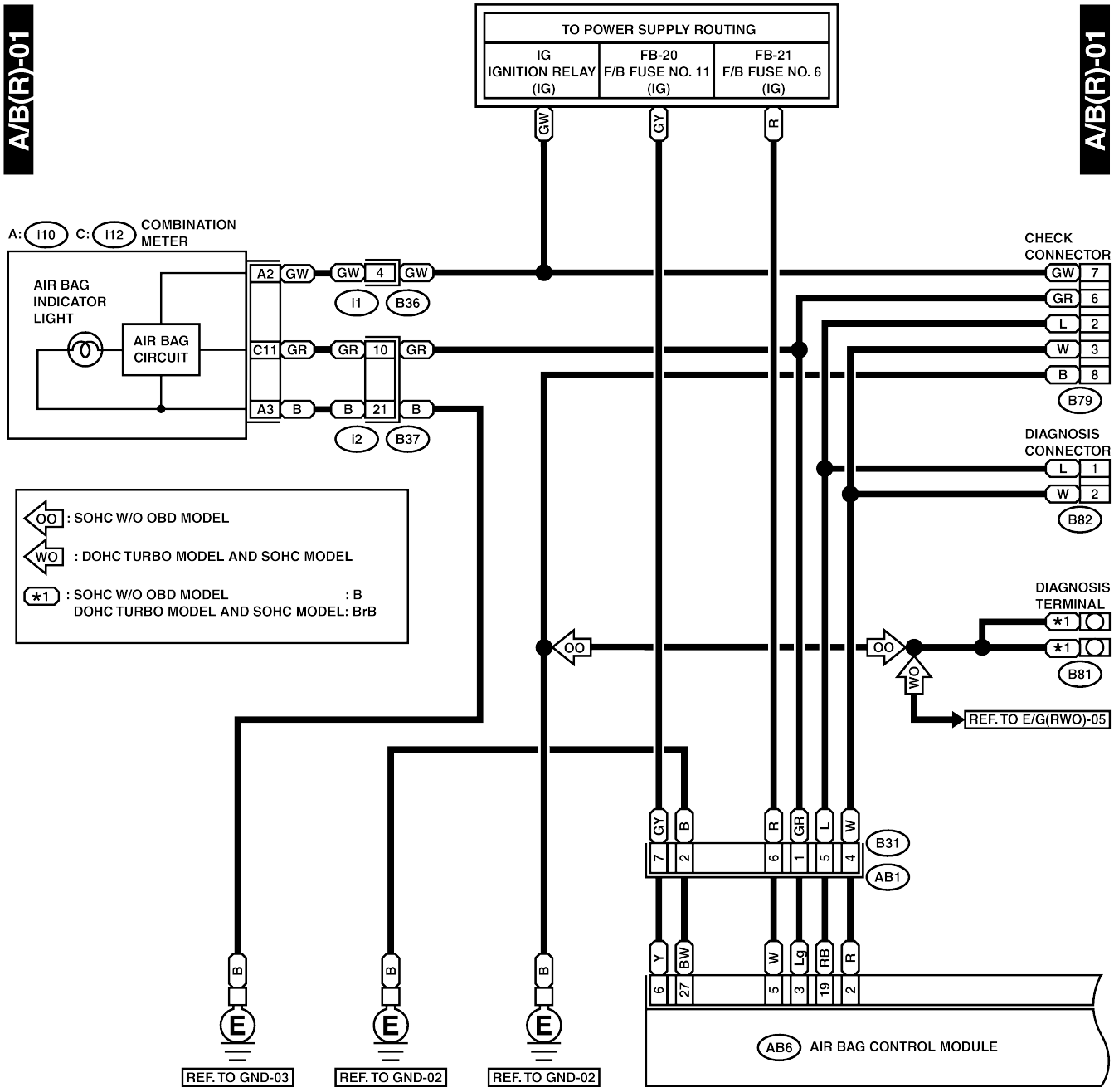
SL86-20B

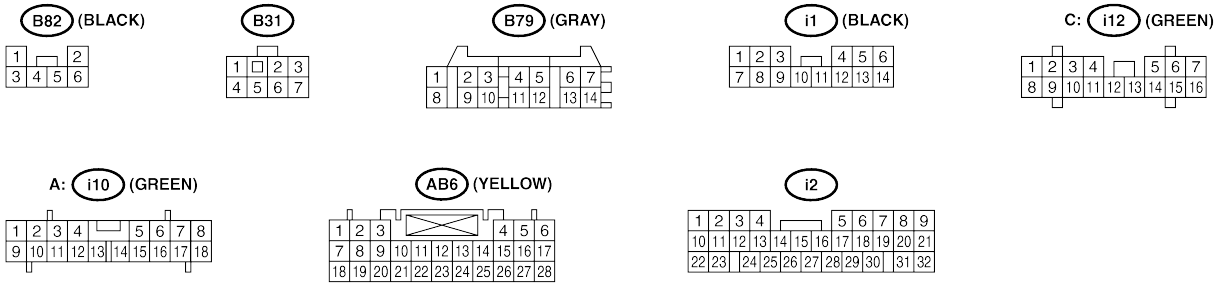

A/B(L)-03
AIR BAG CONTROL MODULE
A/B(L)-03
AB17
AB18
AB19
AB20
AB23
AB28
AB24
AB25
INFLATOR (SIDE LH)
SIDE AIR BAG SENSOR LH
SIDE AIR BAG SENSOR RH
INFLATOR (SIDE RH)


AB19
AB24
AB23
AB28
AB17 (YELLOW)
AB18 (YELLOW)

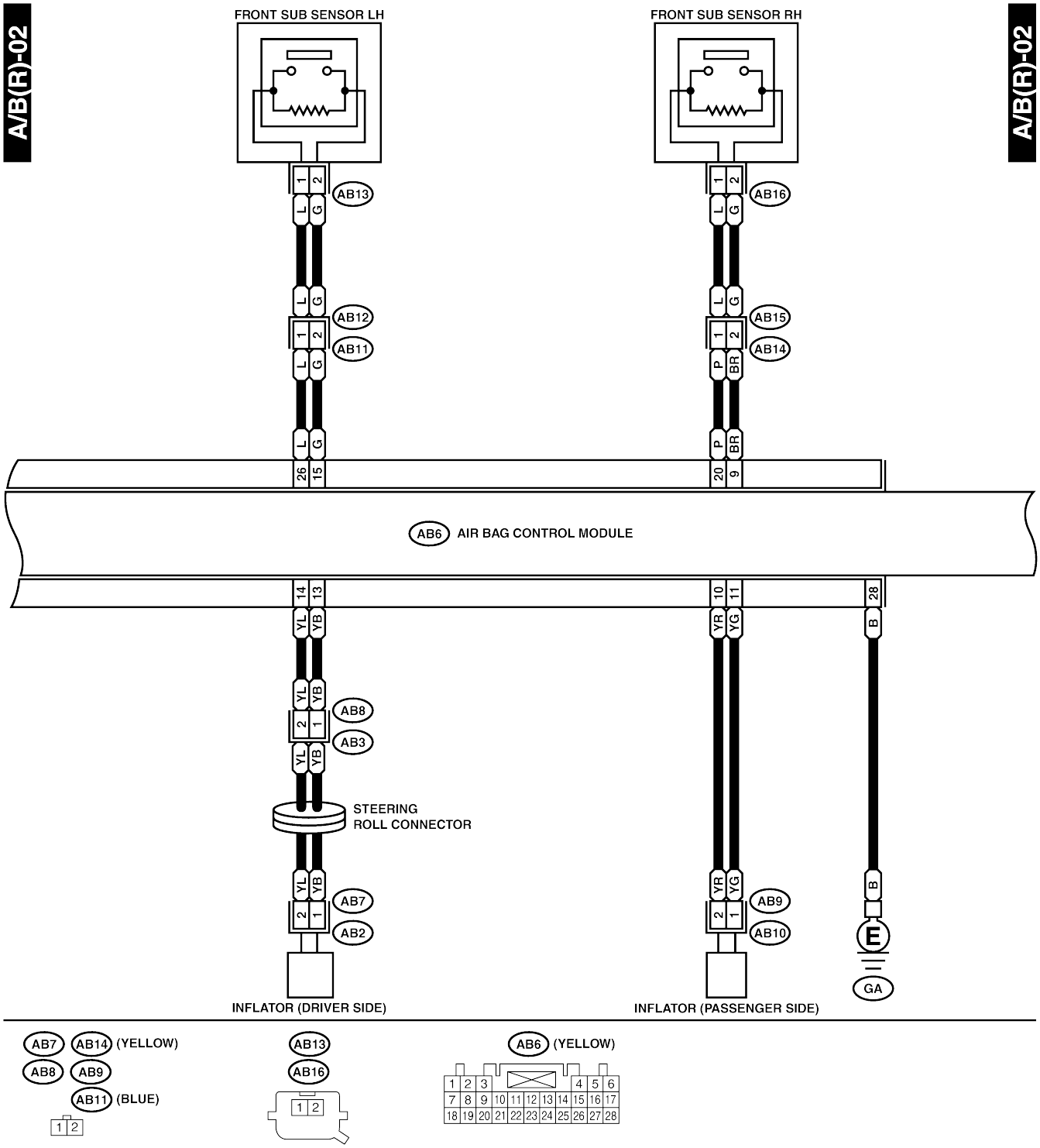
SL86-20C

2. RHD MODEL S903491A2102

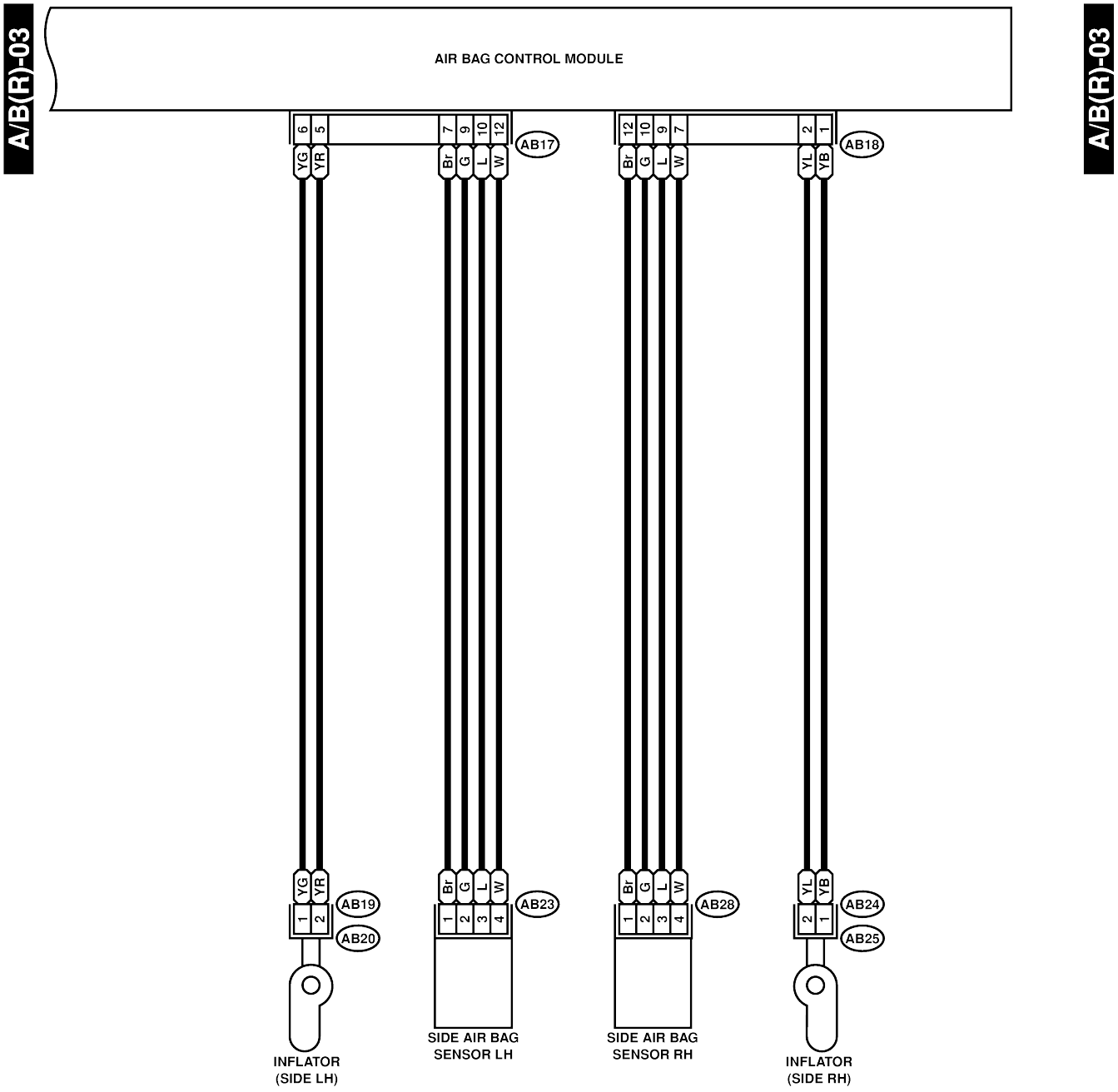


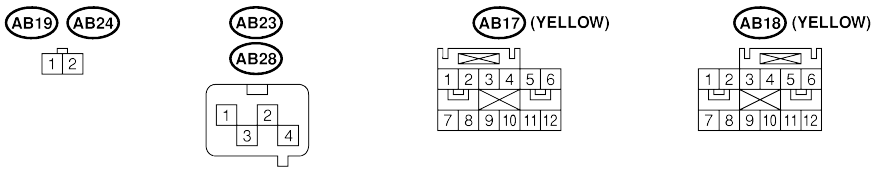


SR86-20A


A/B(R)-02
A/B(R)-02
FRONT SUB SENSOR LH
FRONT SUB SENSOR RH
AB13
AB16
AB12
AB15
AB11
AB14
AB6 AIR BAG CONTROL MODULE
AB8
AB3
STEERING
ROLL CONNECTOR
AB7
AB2
AB9
AB10
E
GA
INFLATOR (DRIVER SIDE)
INFLATOR (PASSENGER SIDE)
AB7 AB14 (YELLOW)
AB8 AB9
AB11 (BLUE)
AB13
AB16
AB6 (YELLOW)

SR86-20B


A/B(R)-03
AIR BAG CONTROL MODULE
A/B(R)-03
6 5 7 9 10 12
AB17
YG YR Br G L W
12 10 9 7 2 1
AB18
Br G L W YL YB
YG YR
AB19
1 2
AB20
Br G L W
AB23
1 2 3 4
Br G L W
AB28
1 2 3 4
YL YB
AB24
2 1
AB25
INFLATOR
(SIDE LH)
SIDE AIR BAG
SENSOR LH
SIDE AIR BAG
SENSOR RH
INFLATOR
(SIDE RH)

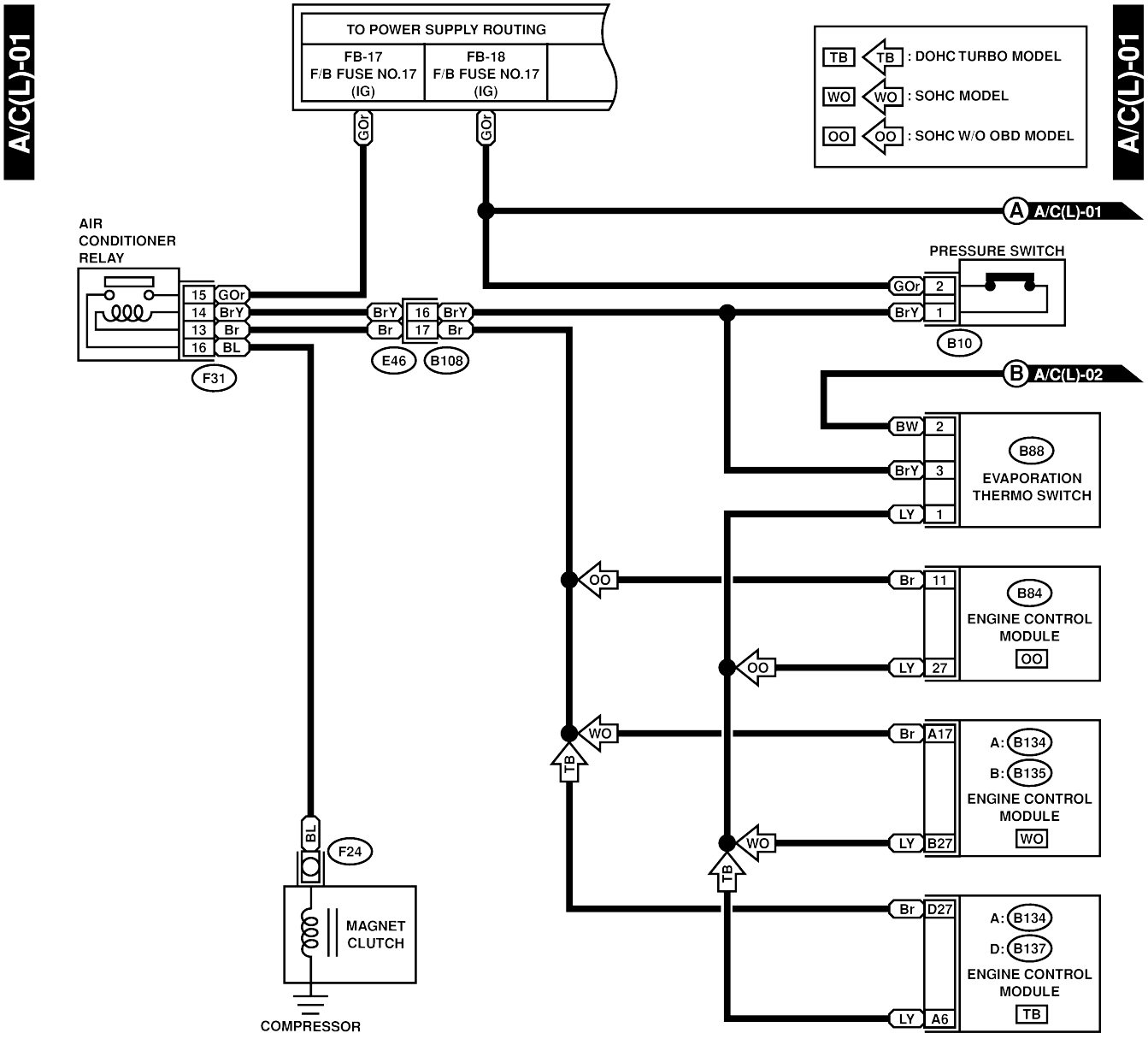

AB19
AB24
1 2
AB23
AB28
1 2
3 4
AB17 (YELLOW)
1 2 3 4 5 6
7 8 9 10 11 12
AB18 (YELLOW)
1 2 3 4 5 6
7 8 9 10 11 12

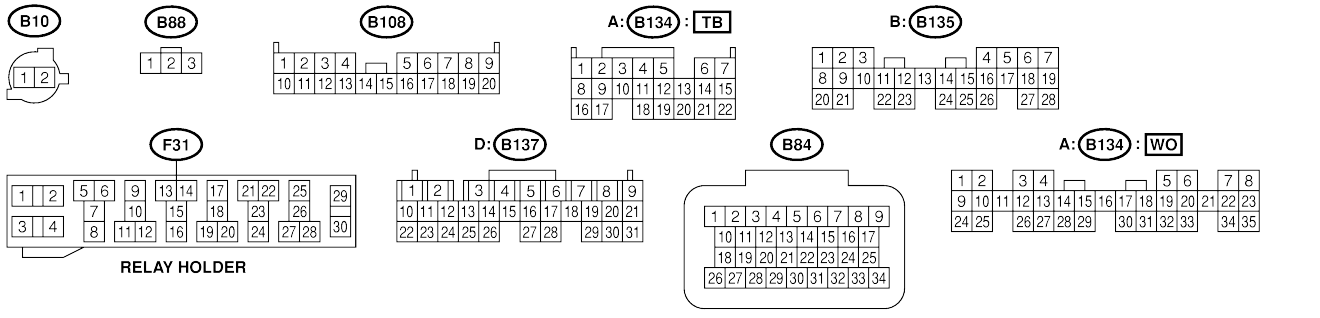
SR86-20C

6. Air Conditioning System S903471

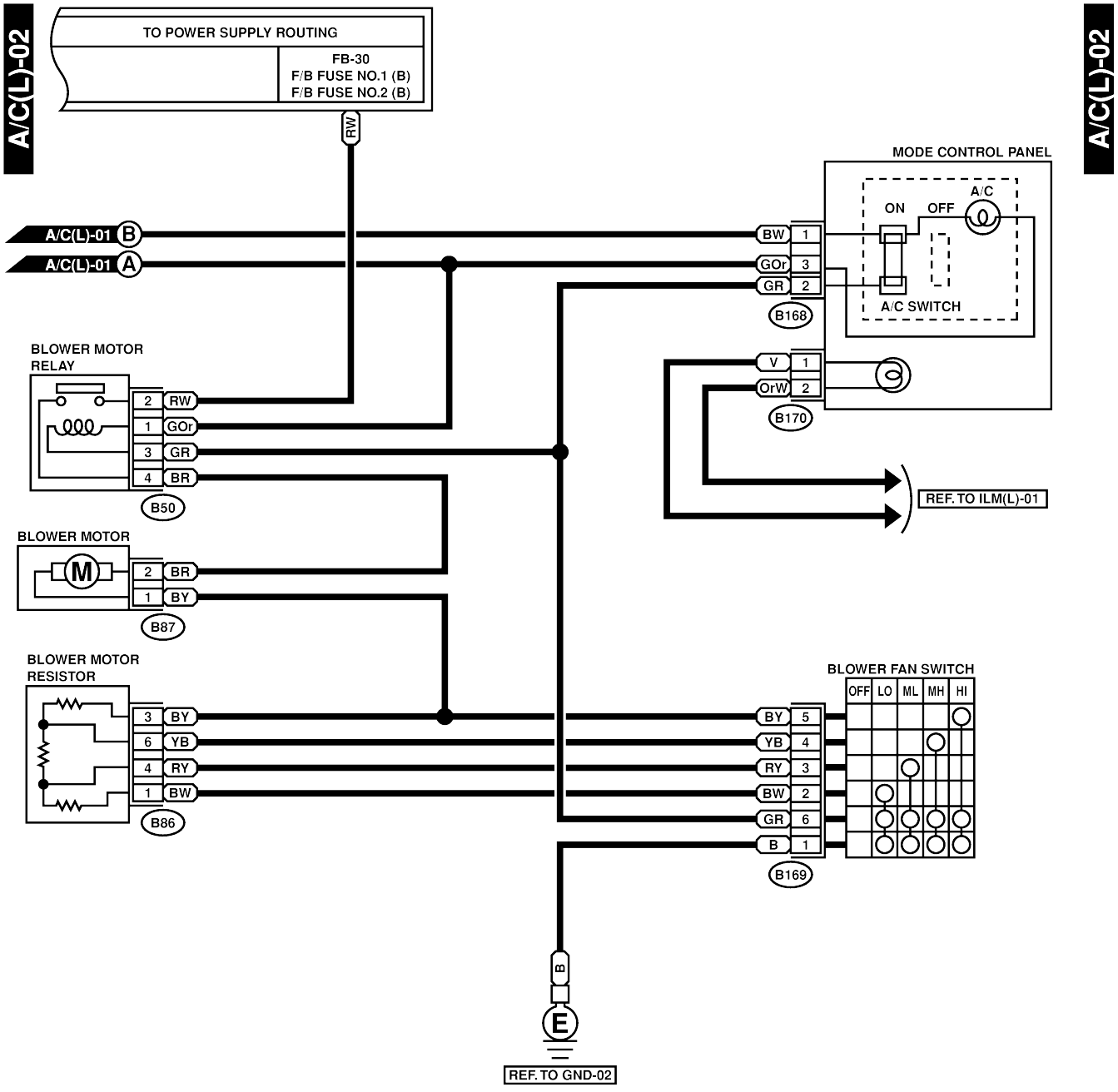
A: SCHEMATIC S903471A21

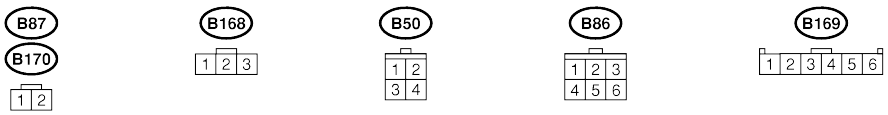
1. LHD MODEL S903471A2111





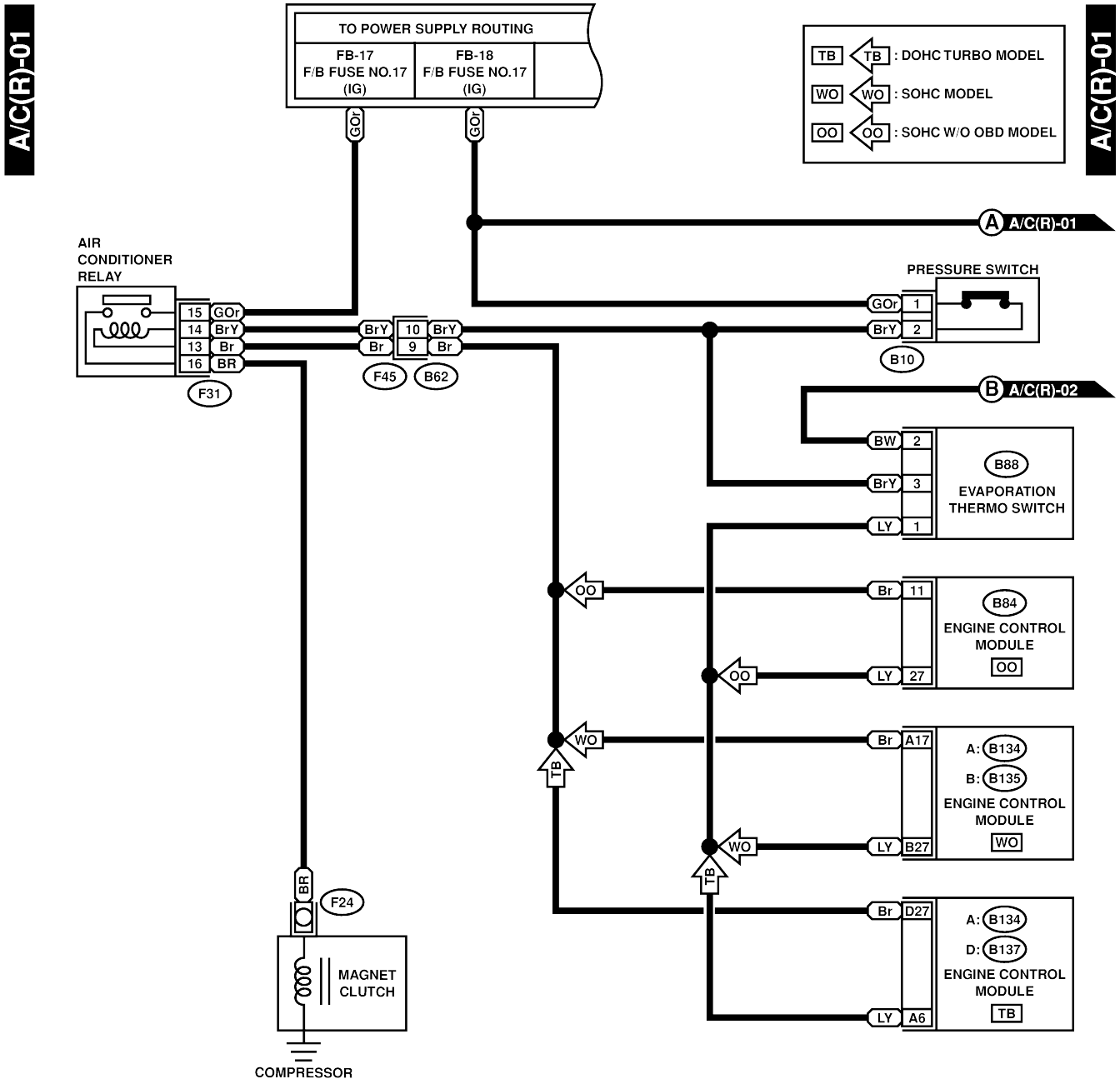
SL45-20A

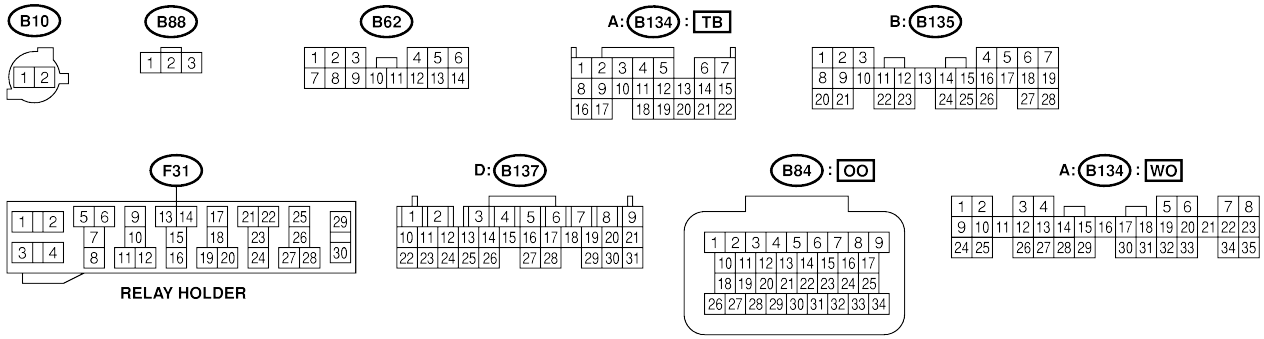

A/C(L)-02
TO POWER SUPPLY ROUTING
FB-30
F/B FUSE NO.1 (B)
F/B FUSE NO.2 (B)
RW
MODE CONTROL PANEL
A/C
ON
OFF
A/C SWITCH
A/C(L)-01 B
A/C(L)-01 A
BW 1
GOr 3
GR 2
B168
V 1
OrW 2
B170
REF. TO ILM(L)-01
BLOWER MOTOR RELAY
2 RW
1 GOr
3 GR
4 BR
B50
BLOWER MOTOR
M
2 BR
1 BY
B87
BLOWER MOTOR RESISTOR
3 BY
6 YB
4 RY
1 BW
B86
BLOWER FAN SWITCH
OFF LO ML MH HI
BY 5
YB 4
RY 3
BW 2
GR 6
B 1
B169
B
E
REF. TO GND-02


B87
B170
1 2
B168
1 2 3
B50
1 2
3 4
B86
1 2 3
4 5 6
B169
1 2 3 4 5 6

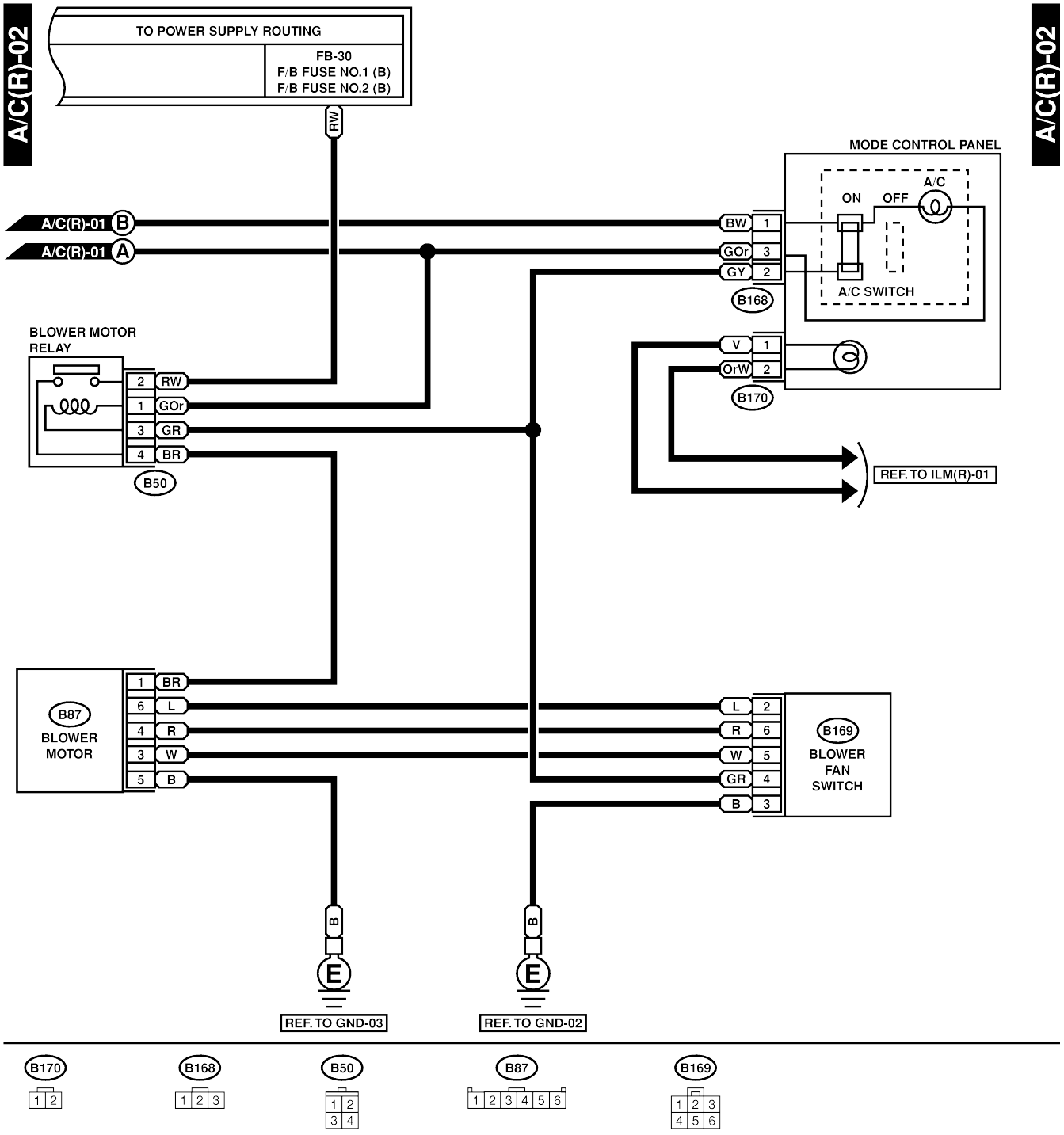
SL45-20B

2. RHD MODEL S903471A2112





SR45-20A

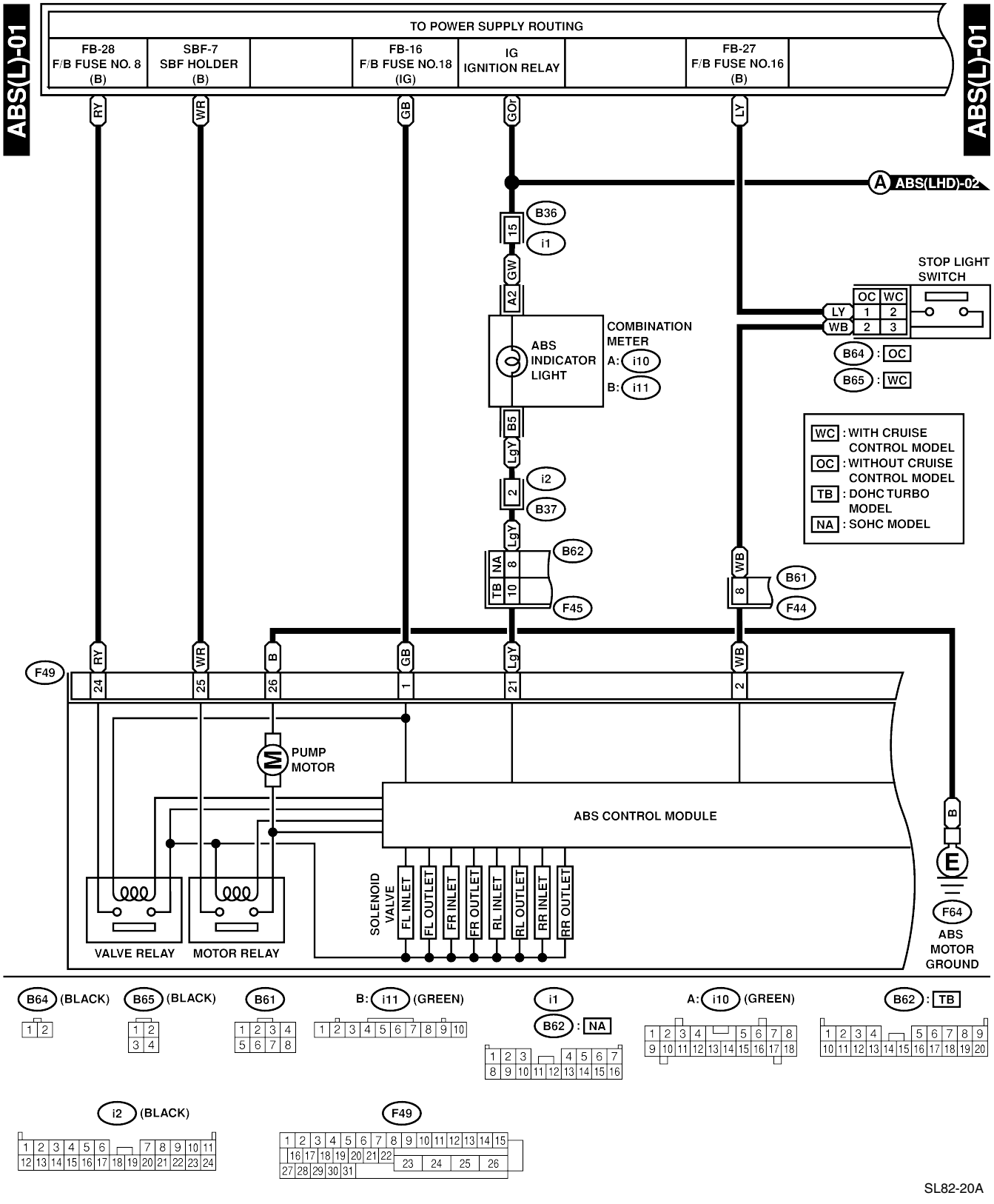

A/C(R)-02
A/C(R)-02
TO POWER SUPPLY ROUTING
FB-30
F/B FUSE NO.1 (B)
F/B FUSE NO.2 (B)
RW
MODE CONTROL PANEL
A/C
ON
OFF
A/C SWITCH
A/C(R)-01 B
A/C(R)-01 A
BW 1
GOr 3
GY 2
B168
BLOWER MOTOR
RELAY
2 RW
1 GOr
3 GR
4 BR
B50
V 1
OrW 2
B170
REF. TO ILM(R)-01
B87
BLOWER
MOTOR
1 BR
6 L
4 R
3 W
5 B
L 2
R 6
W 5
GR 4
B 3
B169
BLOWER
FAN
SWITCH
B
E
REF. TO GND-03
B
E
REF. TO GND-02
B170
1 2
B168
1 2 3
B50
1 2
3 4
B87
1 2 3 4 5 6
B169
1 2 3
4 5 6

SR45-20B

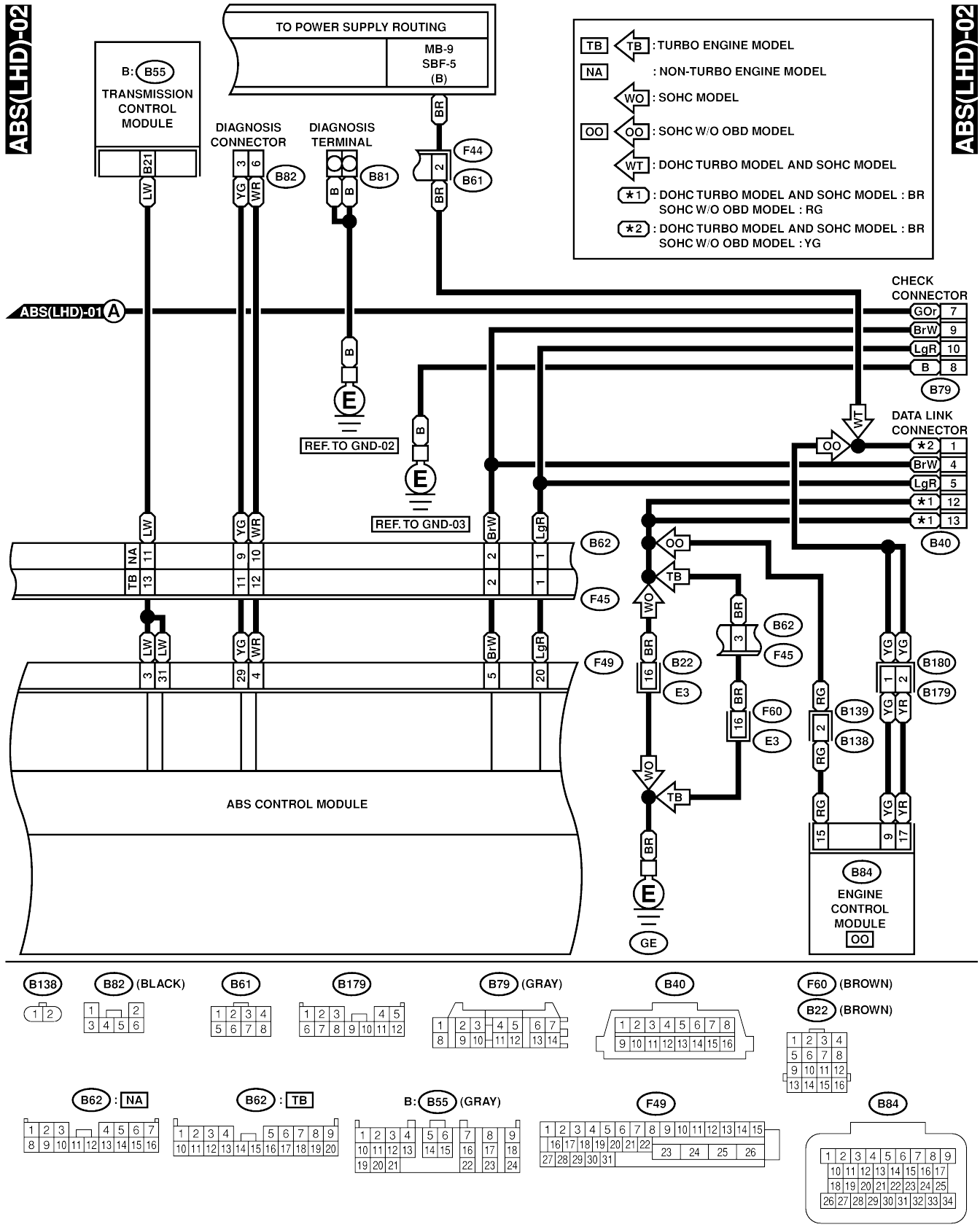
7. Anti-lock Brake System S903484

A: SCHEMATIC S903484A21

1. LHD MODEL S903484A2101

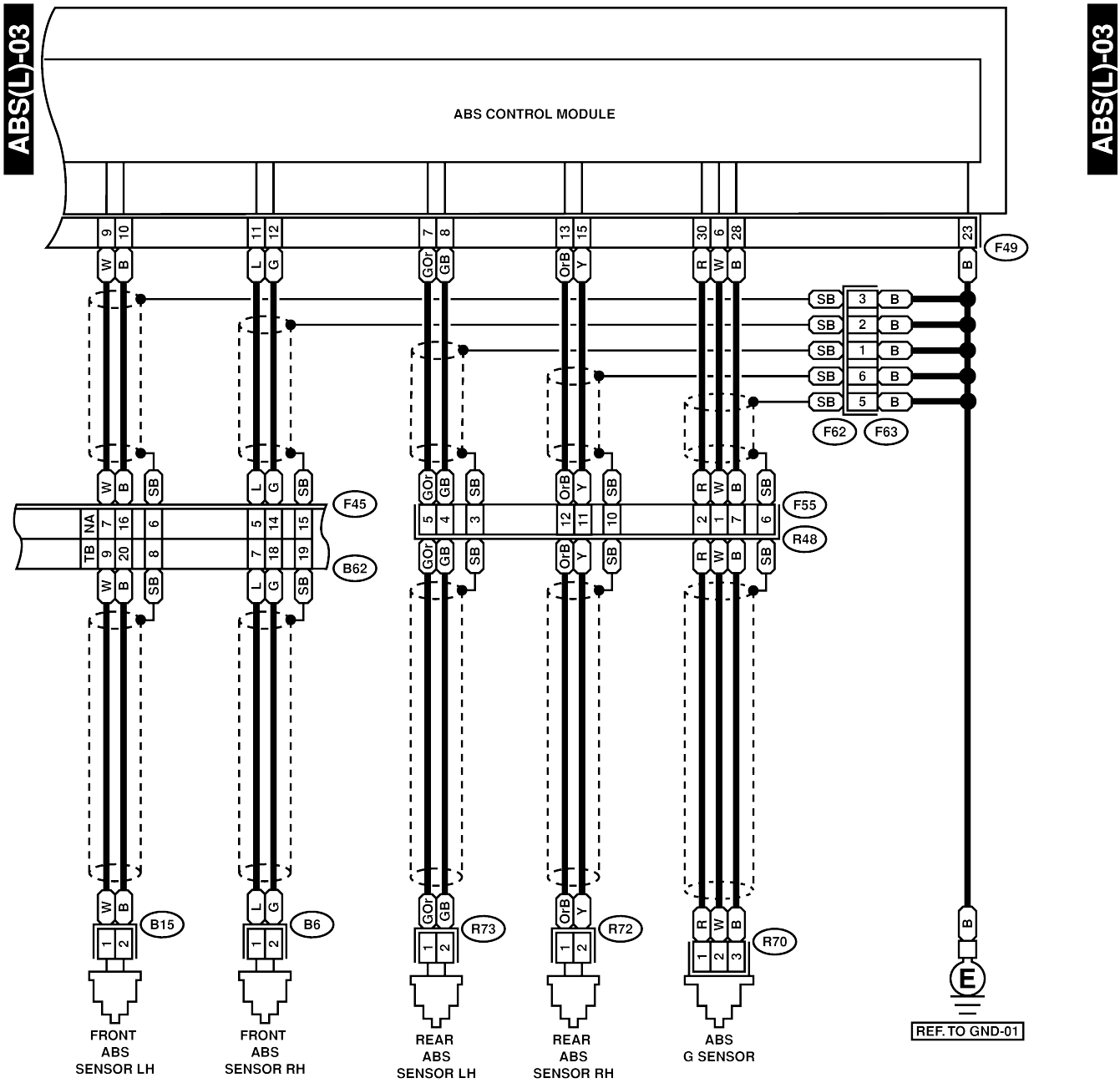


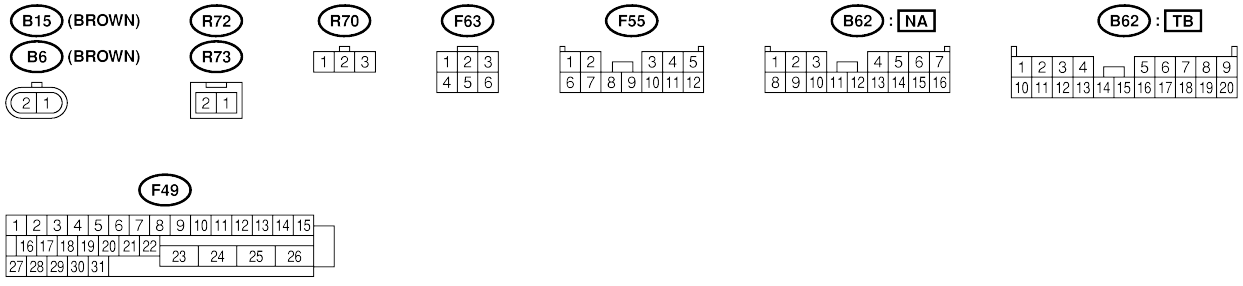
SL82-20A


ABS(LHD)-02
ABS(LHD)-02
TO POWER SUPPLY ROUTING
MB-9
SBF-5
(B)
B: B55
TRANSMISSION CONTROL MODULE
DIAGNOSIS CONNECTOR
DIAGNOSIS TERMINAL
B82
B81
F44
B61
TB : TURBO ENGINE MODEL
NA : NON-TURBO ENGINE MODEL
WO : SOHC MODEL
OO : SOHC W/O OBD MODEL
WT : DOHC TURBO MODEL AND SOHC MODEL
*1 : DOHC TURBO MODEL AND SOHC MODEL : BR
SOHC W/O OBD MODEL : RG
*2 : DOHC TURBO MODEL AND SOHC MODEL : BR
SOHC W/O OBD MODEL : YG
ABS(LHD)-01 A
CHECK CONNECTOR
GOr 7
BrW 9
LgR 10
B 8
B79
DATA LINK CONNECTOR
*2 1
BrW 4
LgR 5
*1 12
*1 13
B40
REF. TO GND-02
REF. TO GND-03
B62
F45
F49
B22
E3
F60
B139
B138
B180
B179
ABS CONTROL MODULE
B84
ENGINE CONTROL MODULE
GE

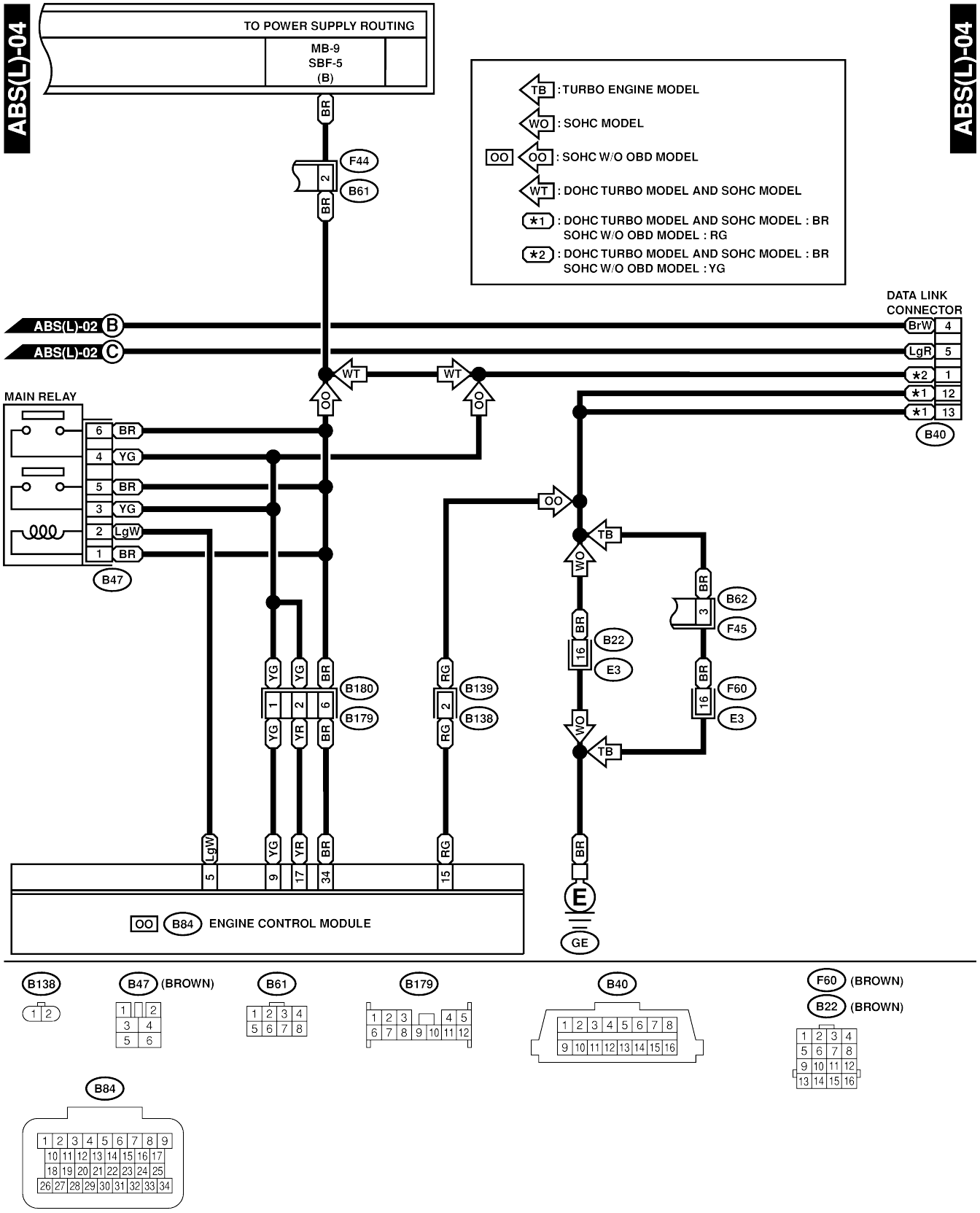
B138
B82 (BLACK)
B61
B179
B79 (GRAY)
B40
F60 (BROWN)
B22 (BROWN)
B62 : NA
B62 : TB
B: B55 (GRAY)
F49
B84

SL82-20B


ABS(L)-03
ABS CONTROL MODULE
ABS(L)-03
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

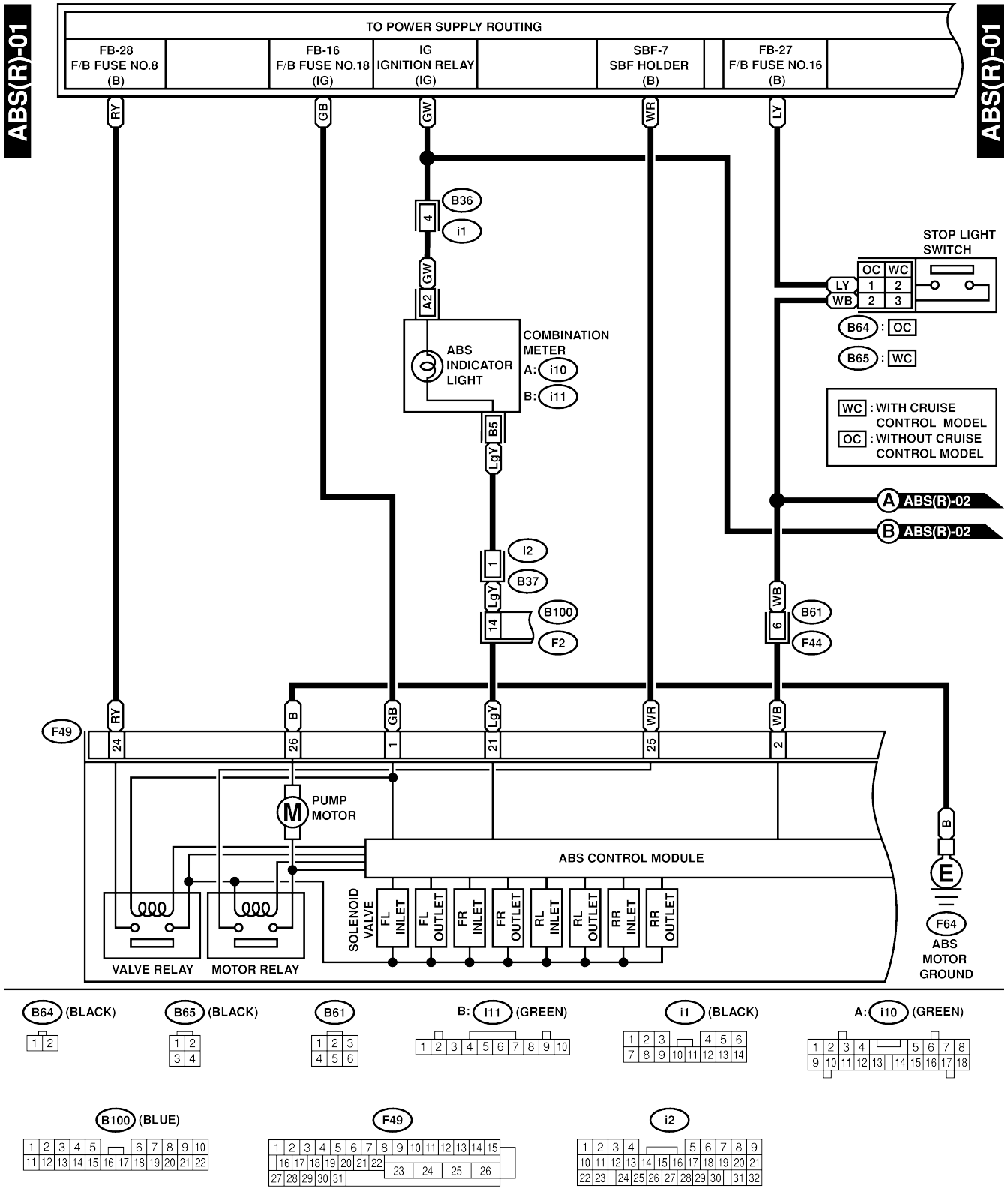

B15 (BROWN)
B6 (BROWN)
R72
R73
R70
F63
F55
B62 : NA
B62 : TB
F49

SL82-20C


ABS(L)-04
ABS(L)-04
TO POWER SUPPLY ROUTING
MB-9
SBF-5
(B)
TB : TURBO ENGINE MODEL
WO : SOHC MODEL
OO : SOHC W/O OBD MODEL
WT : DOHC TURBO MODEL AND SOHC MODEL
*1 : DOHC TURBO MODEL AND SOHC MODEL : BR
SOHC W/O OBD MODEL : RG
*2 : DOHC TURBO MODEL AND SOHC MODEL : BR
SOHC W/O OBD MODEL : YG
DATA LINK CONNECTOR
ABS(L)-02 B
ABS(L)-02 C
MAIN RELAY
B47
B40
F44
B61
B62
F45
B22
E3
F60
B180
B179
B139
B138
OO B84 ENGINE CONTROL MODULE
GE
B138
B47 (BROWN)
B61
B179
B40
F60 (BROWN)
B22 (BROWN)
B84

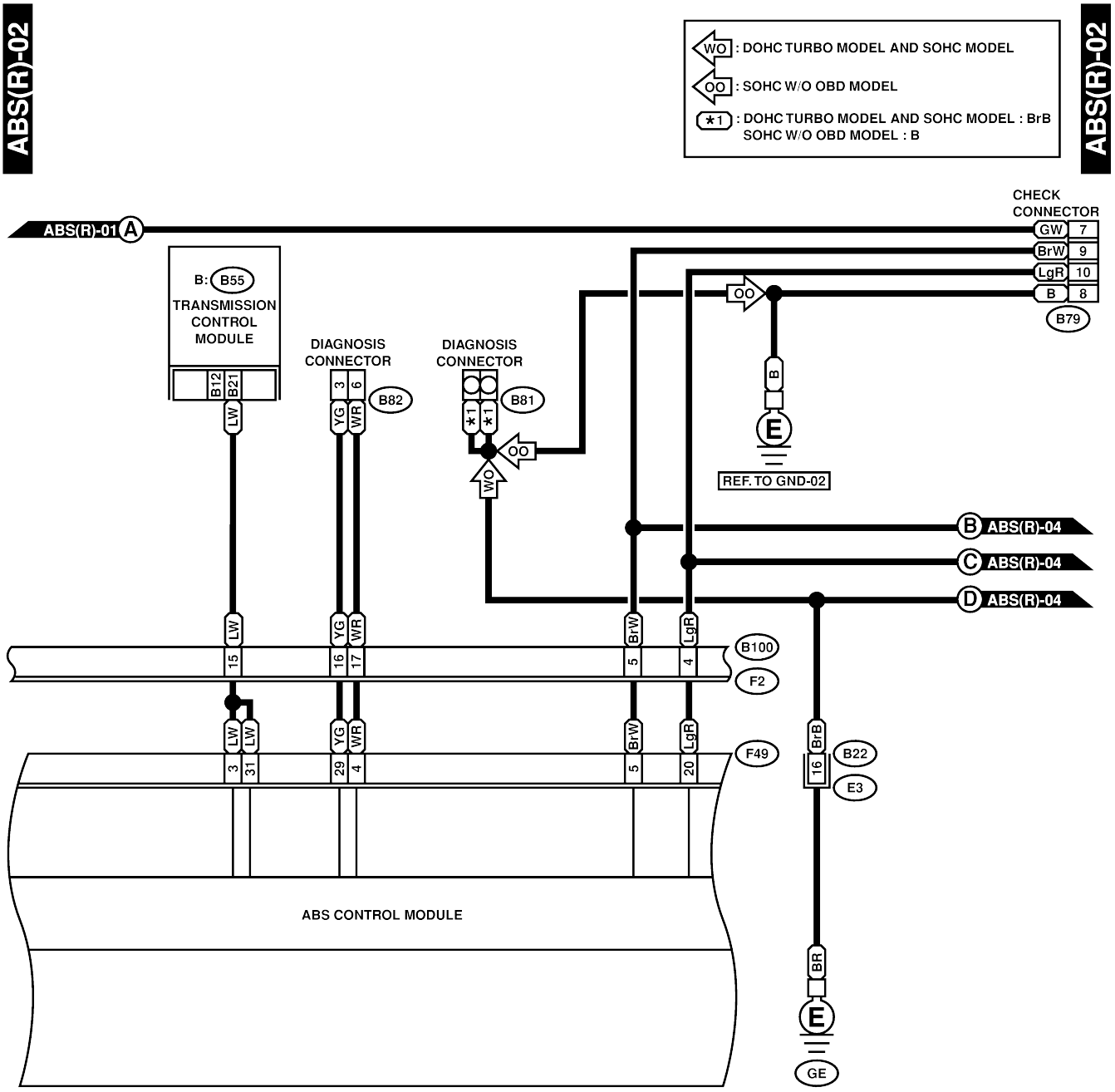
SL82-20D

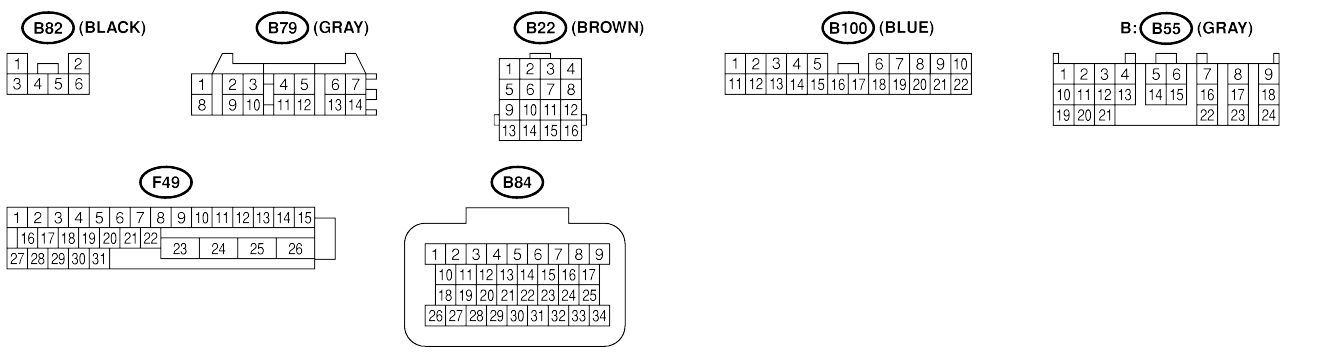
2. RHD MODEL S903484A2102



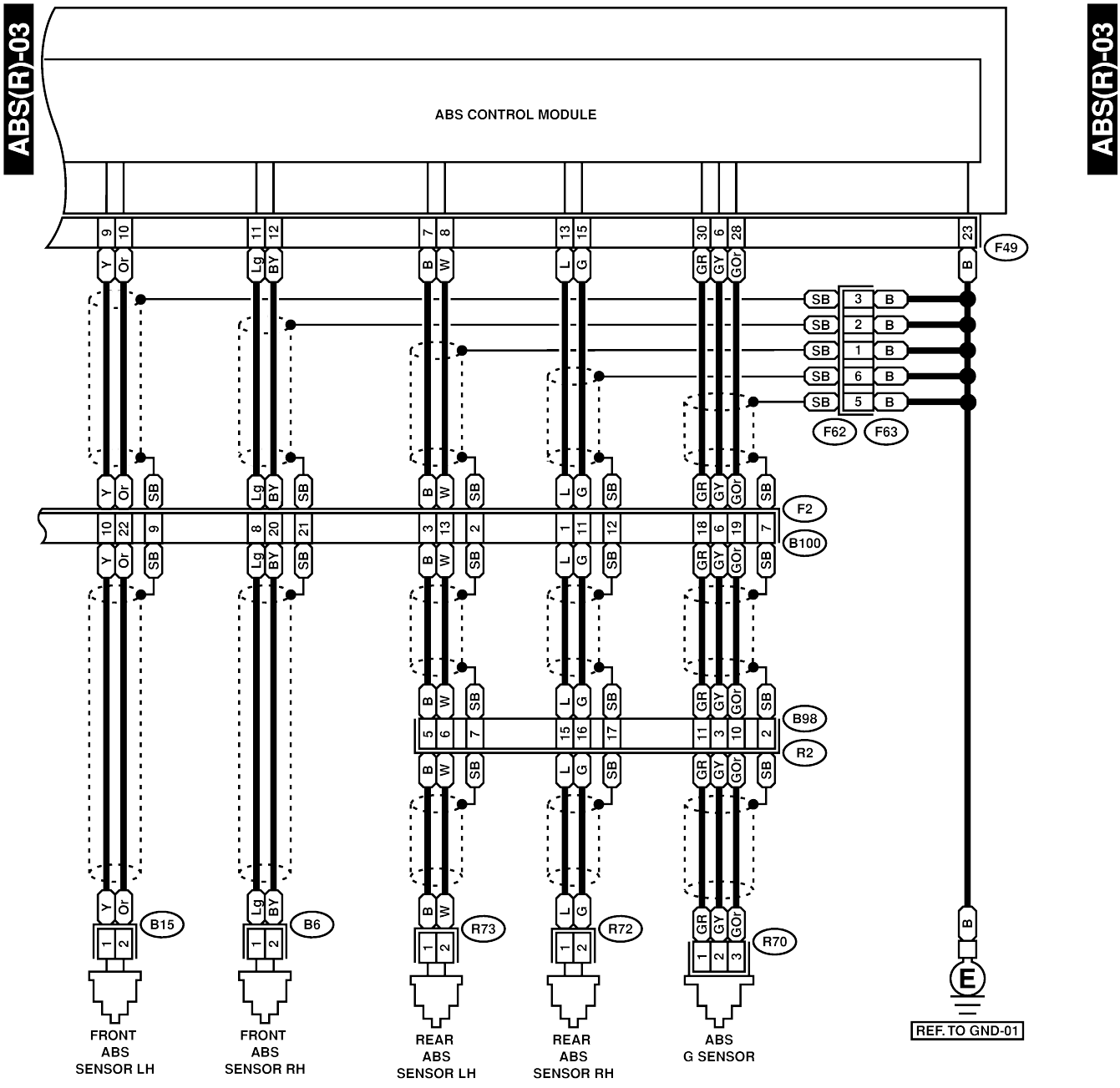
SR82-20A

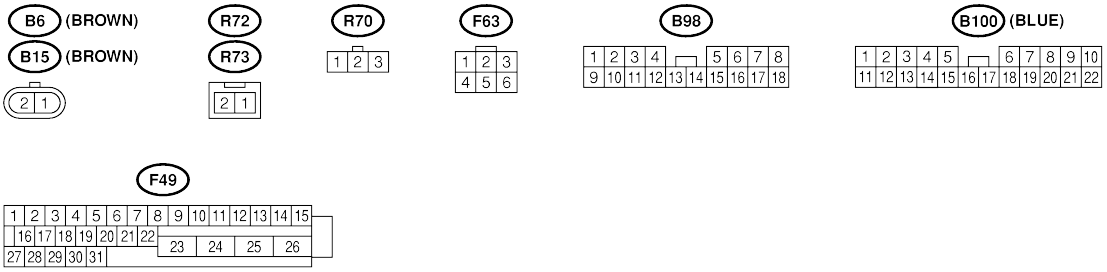
ABS(R)-02



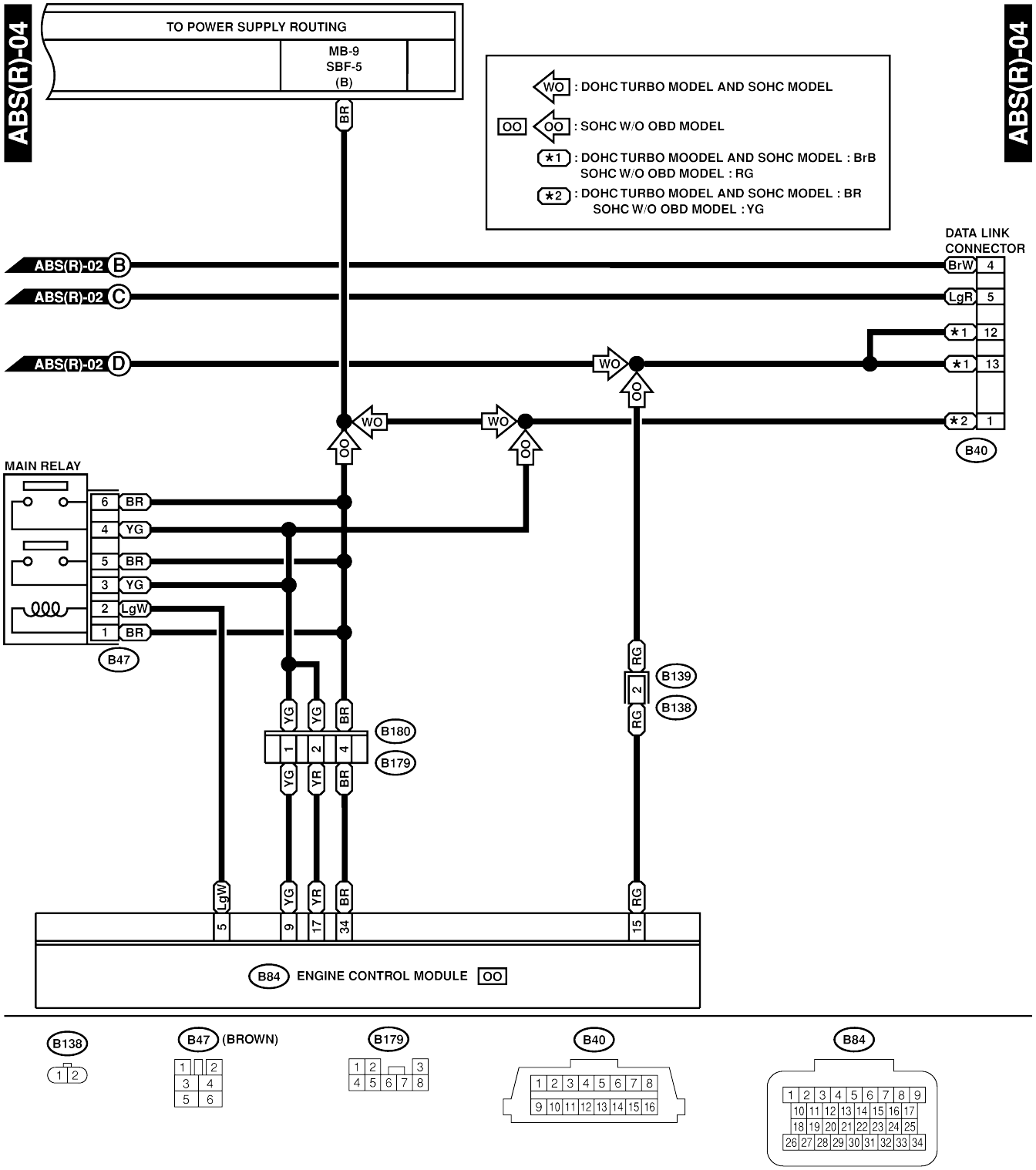


SR82-20B


ABS(R)-03
ABS(R)-03
ABS CONTROL MODULE
F49
F62
F63
F2
B100
B98
R2
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


B6 (BROWN)
B15 (BROWN)
R72
R73
R70
F63
B98
B100 (BLUE)
F49

SR82-20C


ABS(R)-04
TO POWER SUPPLY ROUTING
MB-9
SBF-5
(B)
BR
WO : DOHC TURBO MODEL AND SOHC MODEL
OO : SOHC W/O OBD MODEL
*1 : DOHC TURBO MOODEL AND SOHC MODEL : BrB
SOHC W/O OBD MODEL : RG
*2 : DOHC TURBO MODEL AND SOHC MODEL : BR
SOHC W/O OBD MODEL : YG
DATA LINK CONNECTOR
ABS(R)-02 B
ABS(R)-02 C
ABS(R)-02 D
BrW 4
LgR 5
*1 12
*1 13
*2 1
B40
MAIN RELAY
6 BR
4 YG
5 BR
3 YG
2 LgW
1 BR
B47
RG
2
B139
B138
YG YG BR
1 2 4
B180
B179
YG YR BR
LgW YG YR BR RG
5 9 17 34 15
B84 ENGINE CONTROL MODULE OO

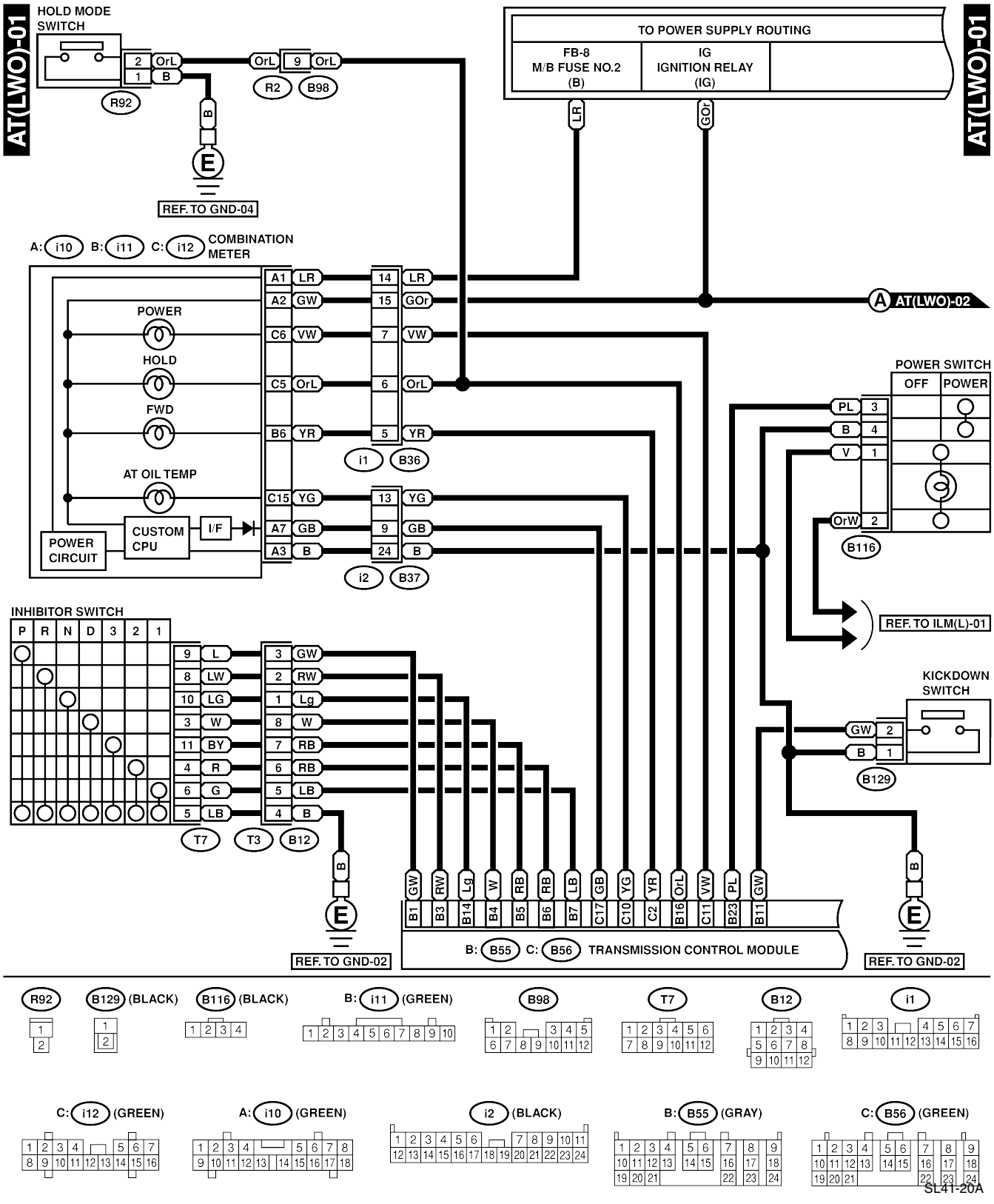
B138
1 2
B47 (BROWN)
1 2
3 4
5 6
B179
1 2 3
4 5 6 7 8
B40
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16
B84
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25
26 27 28 29 30 31 32 33 34

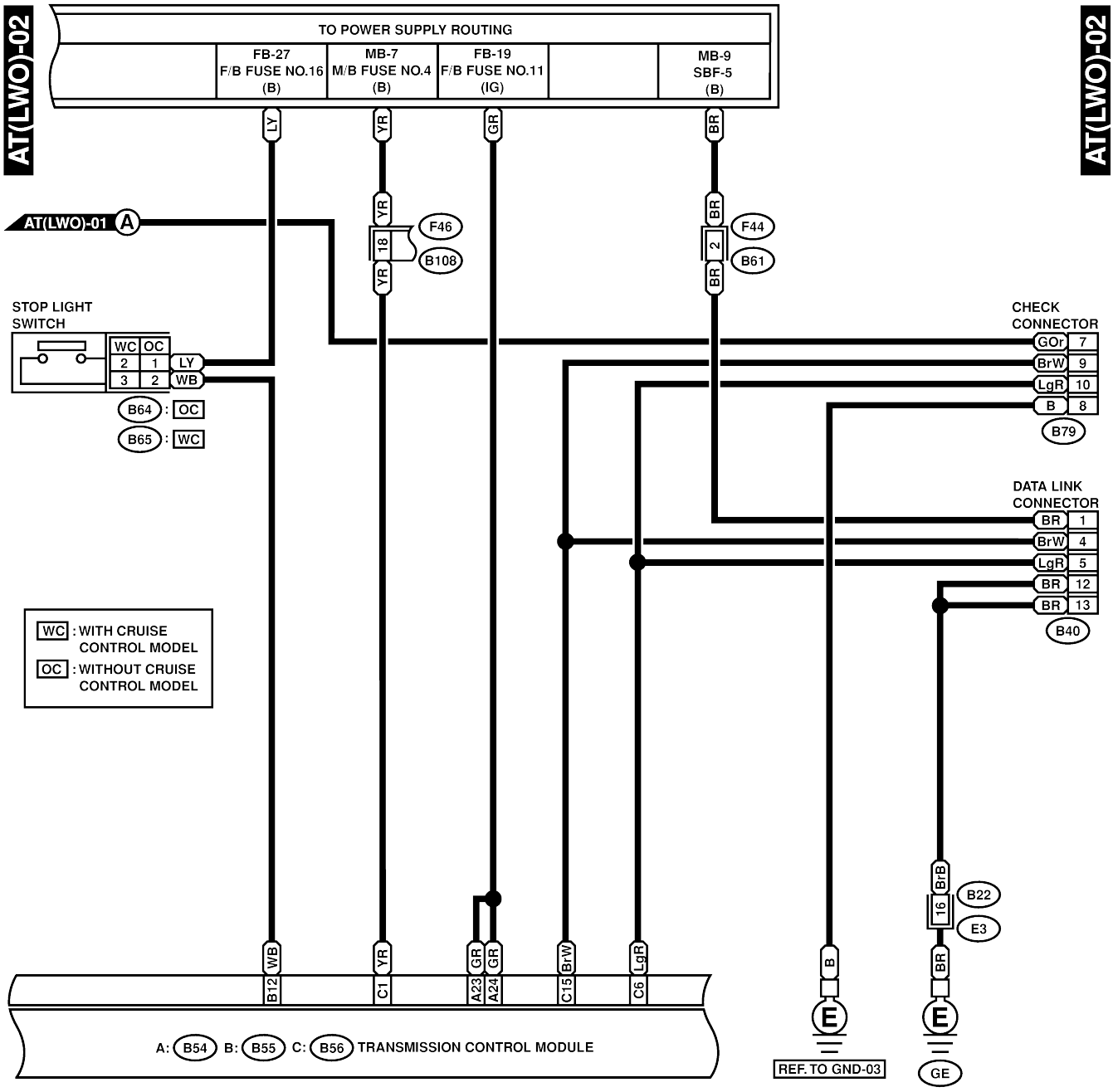
SR82-20D

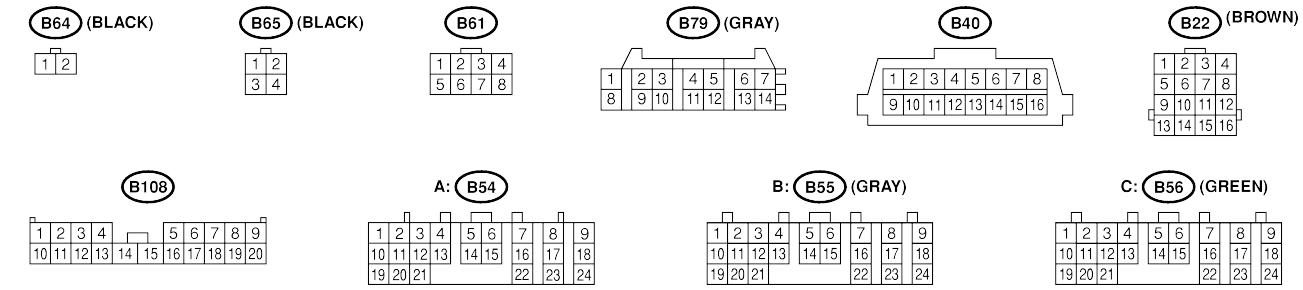
8. A/T Control System S903485

A: SCHEMATIC S903485A21

1. LHD NON-TURBO MODEL WITH OBD S903485A2110

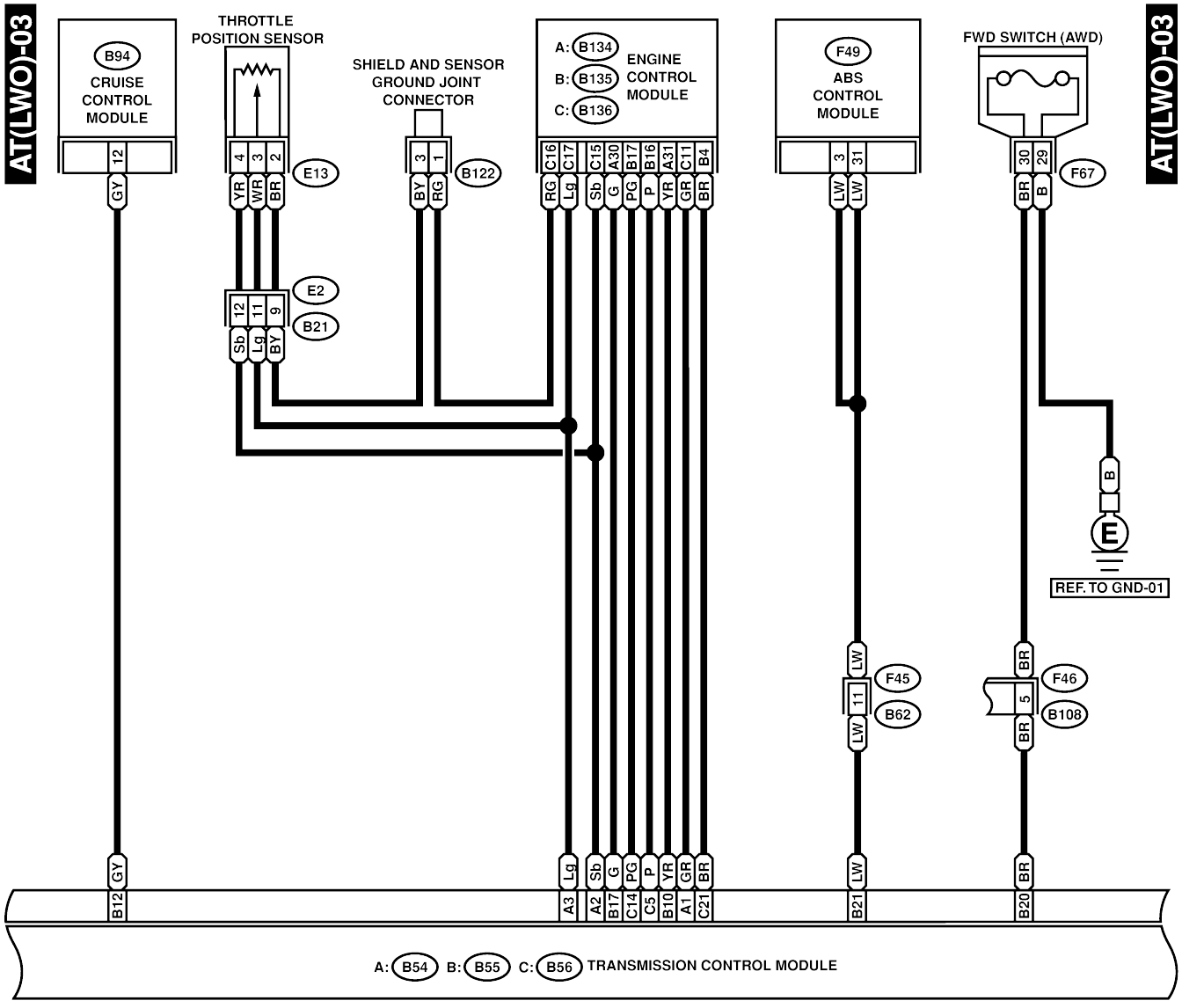


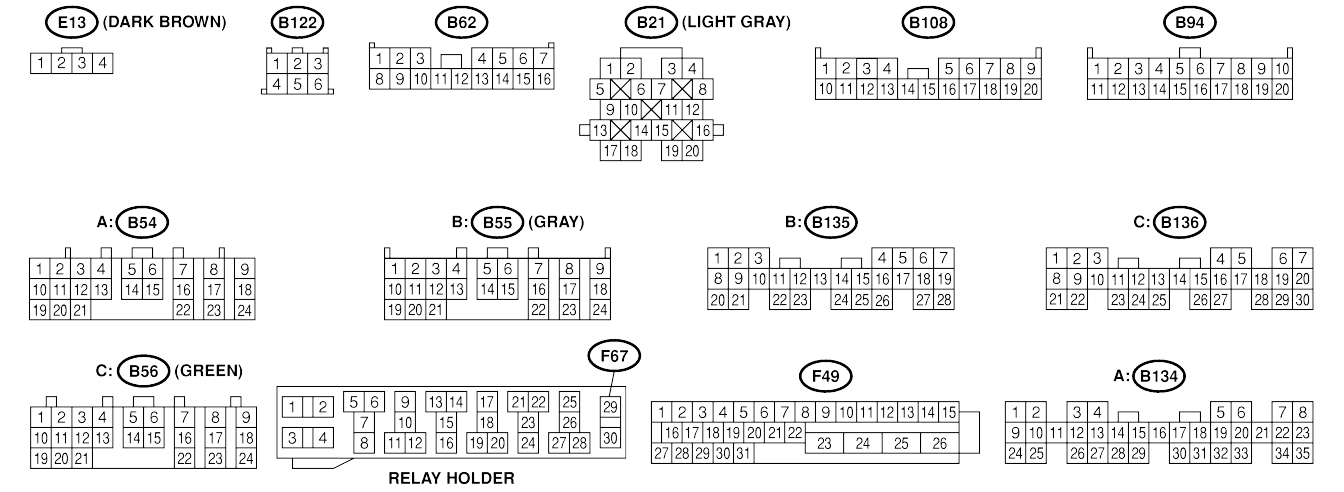

AT(LWO)-02
AT(LWO)-02
TO POWER SUPPLY ROUTING
FB-27
F/B FUSE NO.16
(B)
MB-7
M/B FUSE NO.4
(B)
FB-19
F/B FUSE NO.11
(IG)
MB-9
SBF-5
(B)
LY
YR
GR
BR
AT(LWO)-01 A
F46
B108
F44
B61
STOP LIGHT SWITCH
WC OC
LY
WB
B64 : OC
B65 : WC
CHECK CONNECTOR
GOr 7
BrW 9
LgR 10
B 8
B79
DATA LINK CONNECTOR
BR 1
BrW 4
LgR 5
BR 12
BR 13
B40
WC : WITH CRUISE CONTROL MODEL
OC : WITHOUT CRUISE CONTROL MODEL
B12 WB
C1 YR
A23 GR
A24 GR
C15 BrW
C6 LgR
B
BR
BrB
16
B22
E3
A: B54 B: B55 C: B56 TRANSMISSION CONTROL MODULE
REF. TO GND-03
GE


B64 (BLACK)
B65 (BLACK)
B61
B79 (GRAY)
B40
B22 (BROWN)
B108
A: B54
B: B55 (GRAY)
C: B56 (GREEN)

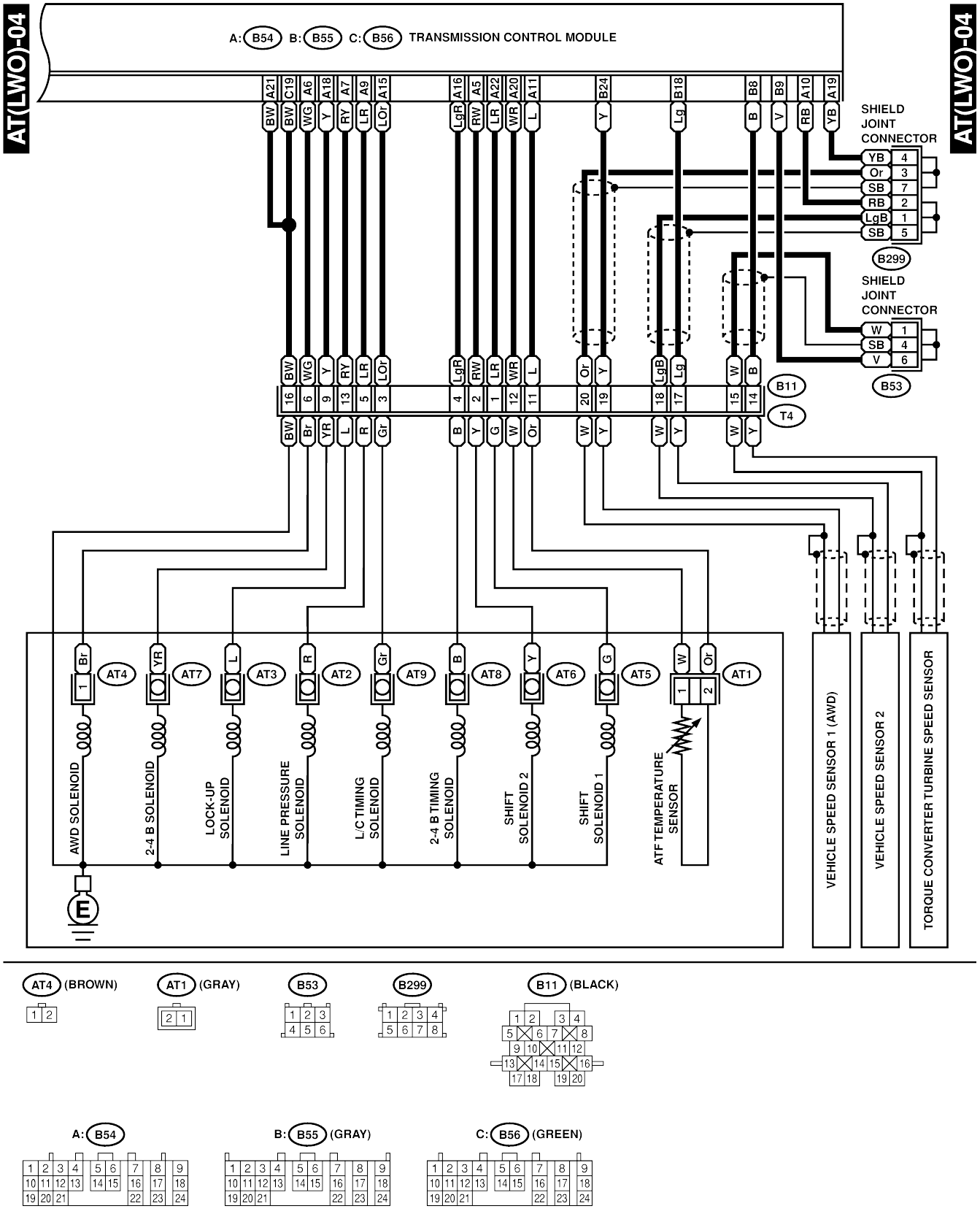
SL41-20B

A/T CONTROL SYSTEM



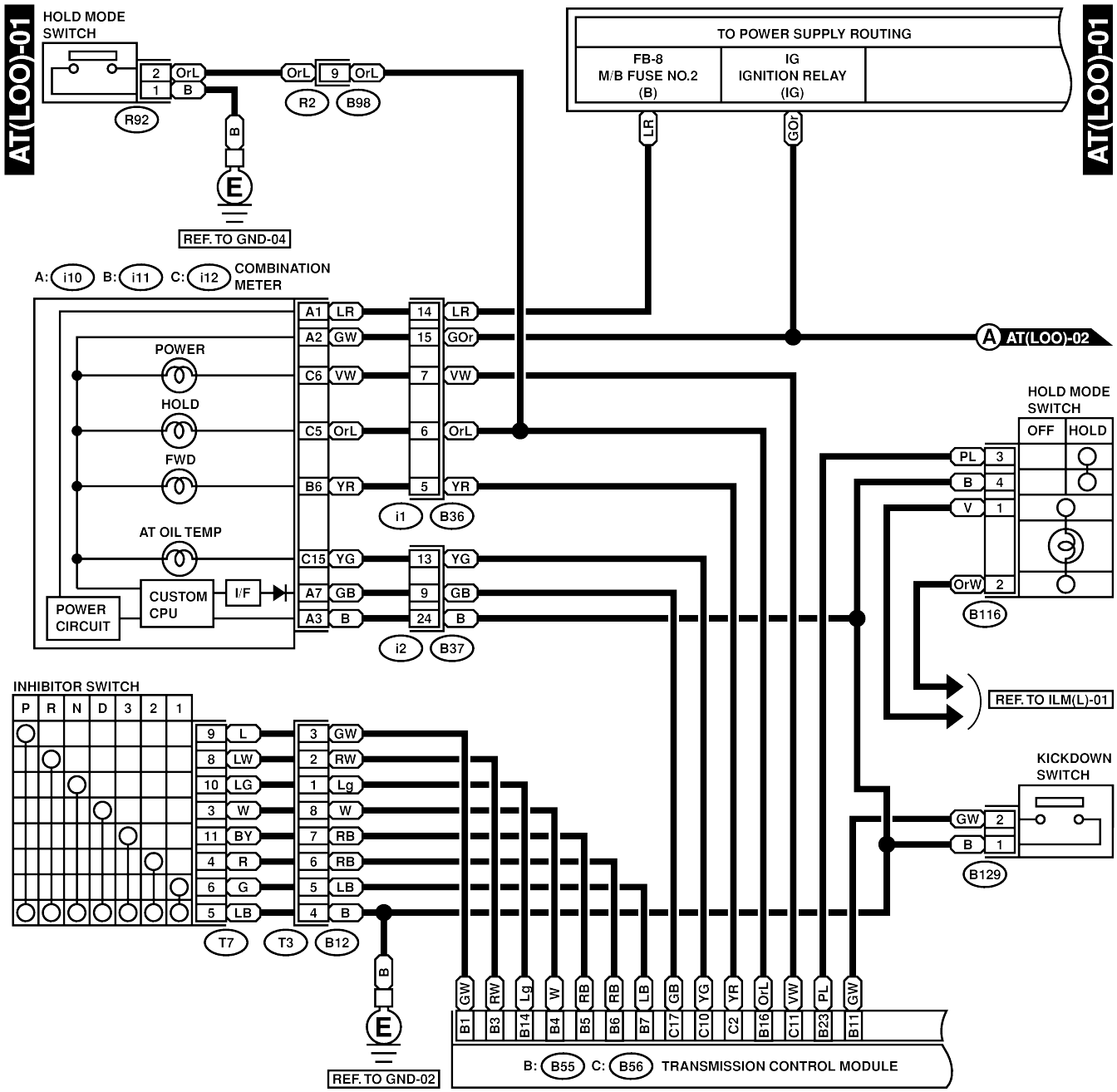


SL41-20C

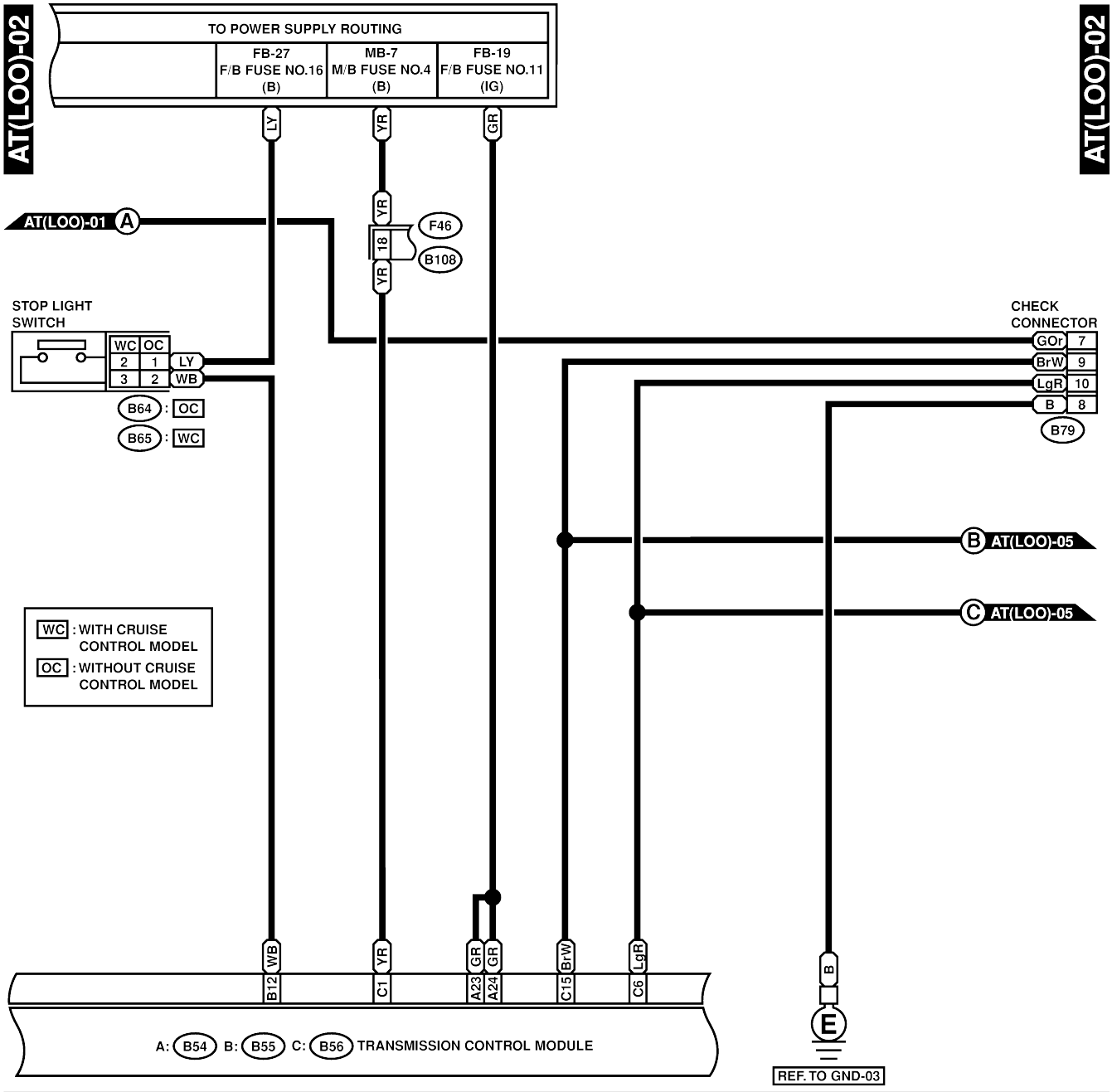

AT(LWO)-04
AT(LWO)-04
A: B54 B: B55 C: B56 TRANSMISSION CONTROL MODULE
SHIELD JOINT CONNECTOR
B299
SHIELD JOINT CONNECTOR
B53
B11
T4
AWD SOLENOID
2-4 B SOLENOID
LOCK-UP SOLENOID
LINE PRESSURE SOLENOID
L/C TIMING SOLENOID
2-4 B TIMING SOLENOID
SHIFT SOLENOID 2
SHIFT SOLENOID 1
ATF TEMPERATURE SENSOR
VEHICLE SPEED SENSOR 1 (AWD)
VEHICLE SPEED SENSOR 2
TORQUE CONVERTER TURBINE SPEED SENSOR
AT4 (BROWN)
AT1 (GRAY)
B53
B299
B11 (BLACK)
A: B54
B: B55 (GRAY)
C: B56 (GREEN)

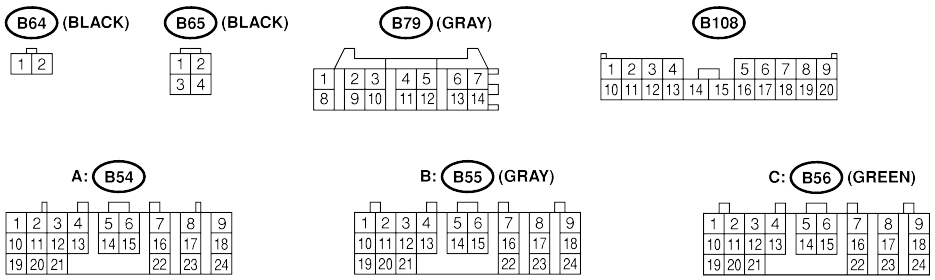
SL41-20D

2. LHD NON-TURBO MODEL WITHOUT OBD S903485A2111



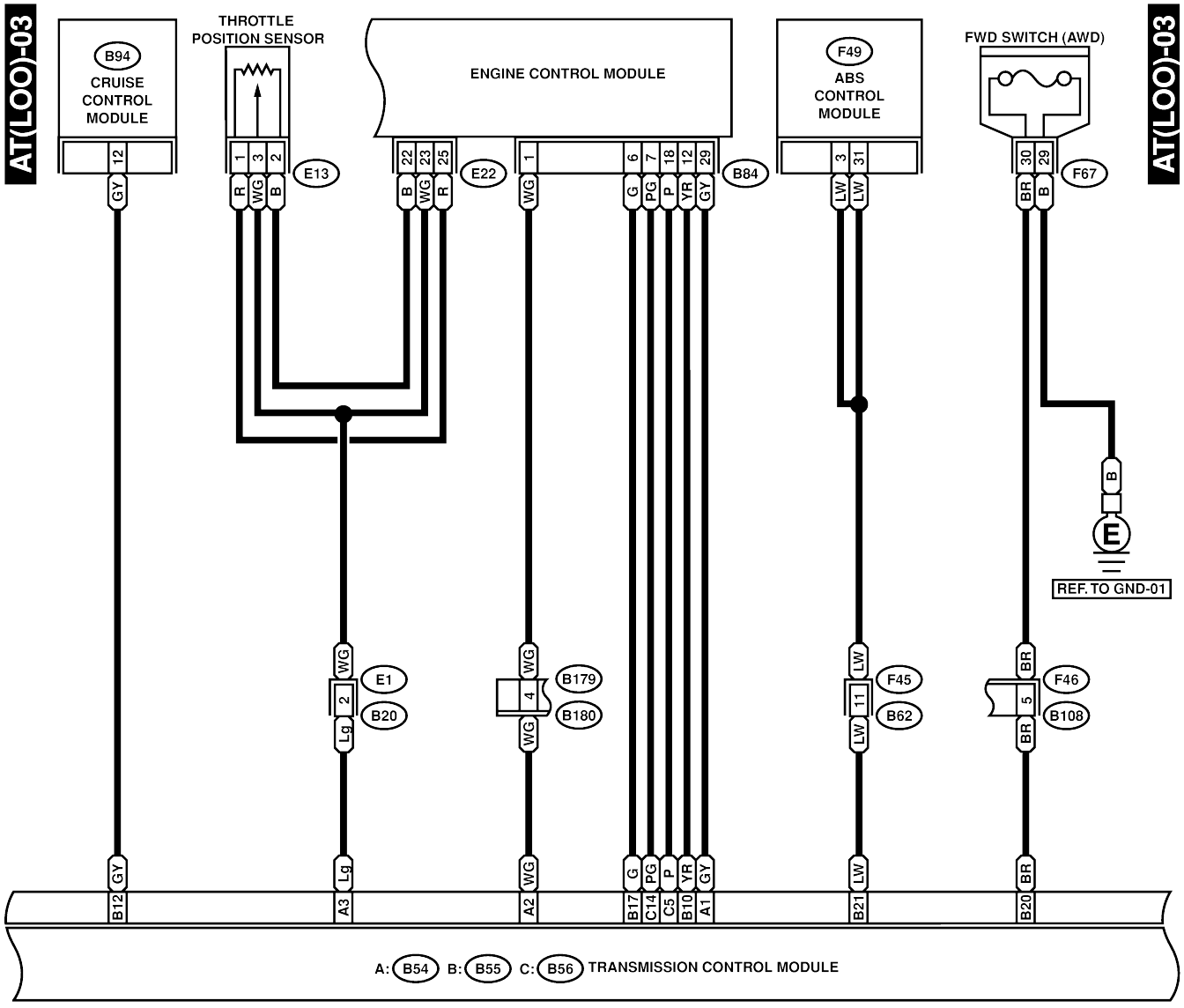
SL41-21A

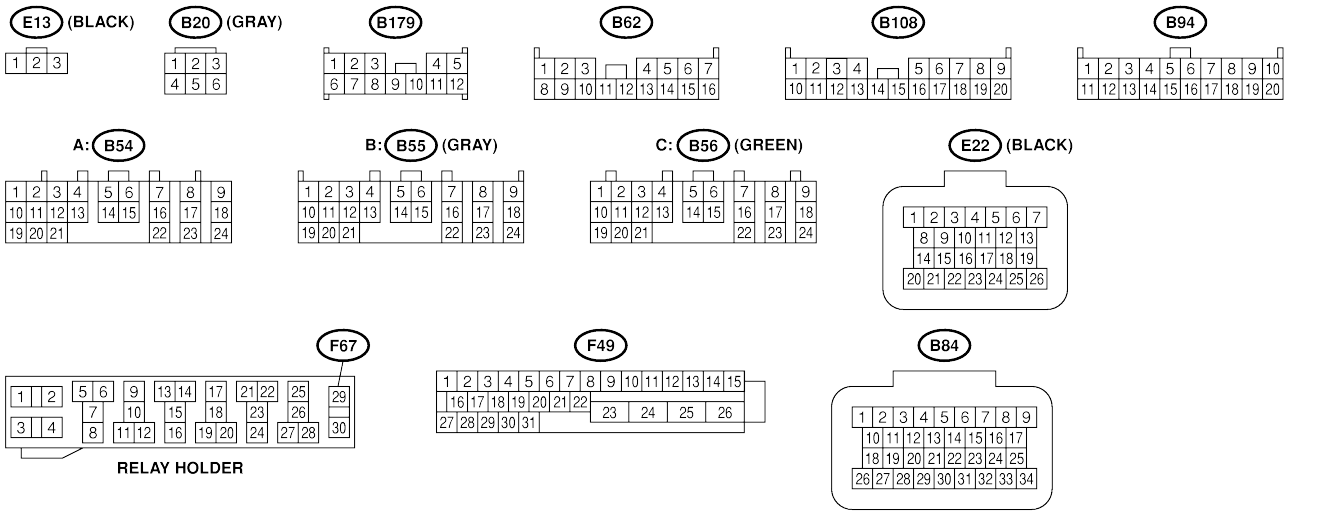

AT(LOO)-02
TO POWER SUPPLY ROUTING
FB-27
F/B FUSE NO.16
(B)
MB-7
M/B FUSE NO.4
(B)
FB-19
F/B FUSE NO.11
(IG)
LY
YR
GR
AT(LOO)-01 A
F46
18
B108
STOP LIGHT SWITCH
WC OC
2 1 LY
3 2 WB
B64 : OC
B65 : WC
CHECK CONNECTOR
GOr 7
BrW 9
LgR 10
B 8
B79
B AT(LOO)-05
C AT(LOO)-05
WC : WITH CRUISE CONTROL MODEL
OC : WITHOUT CRUISE CONTROL MODEL
WB
YR
GR
GR
BrW
LgR
B
B12
C1
A23
A24
C15
C6
E
REF. TO GND-03
A: B54 B: B55 C: B56 TRANSMISSION CONTROL MODULE


B64 (BLACK)
B65 (BLACK)
B79 (GRAY)
B108
A: B54
B: B55 (GRAY)
C: B56 (GREEN)

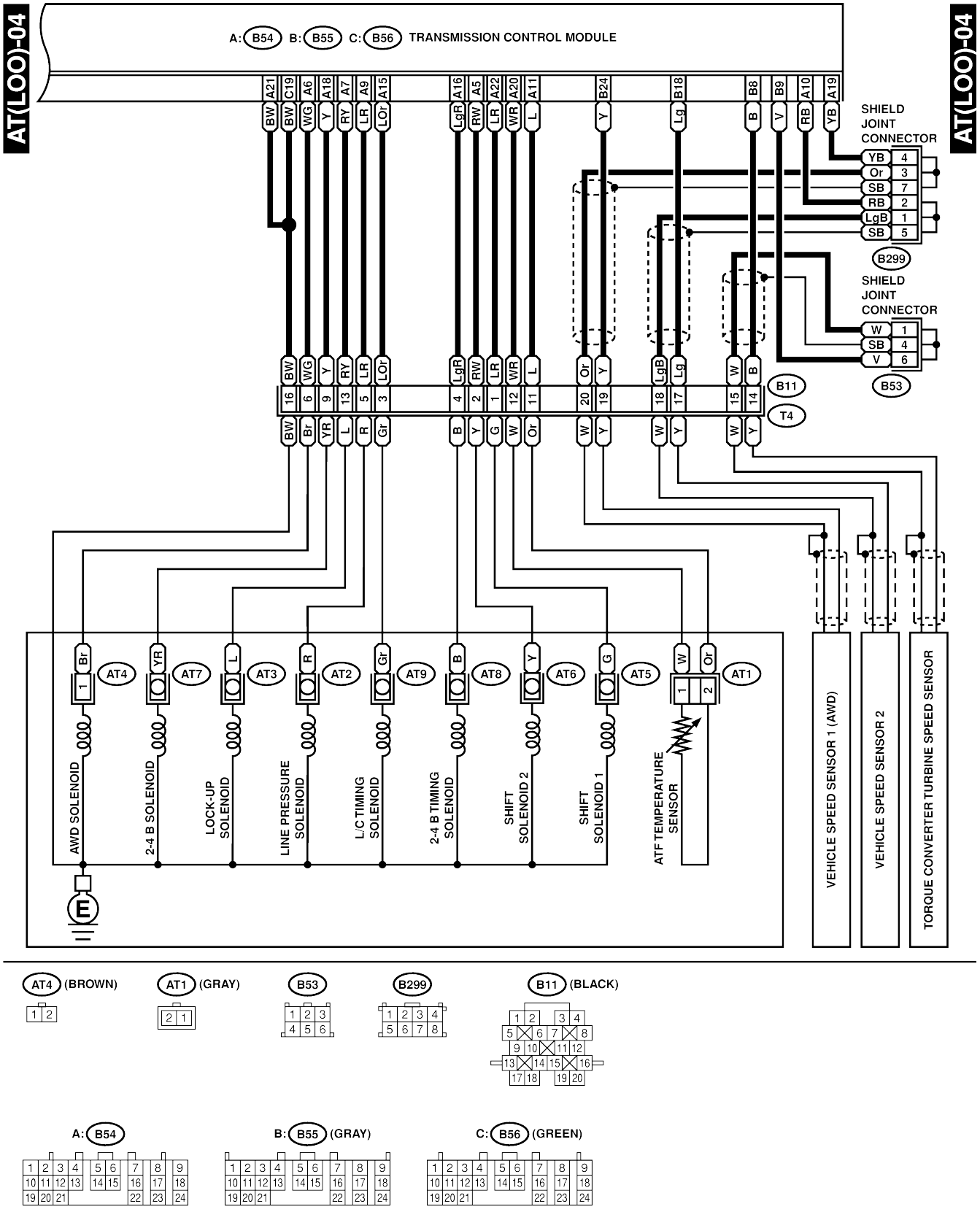
SL41-21B

A/T CONTROL SYSTEM

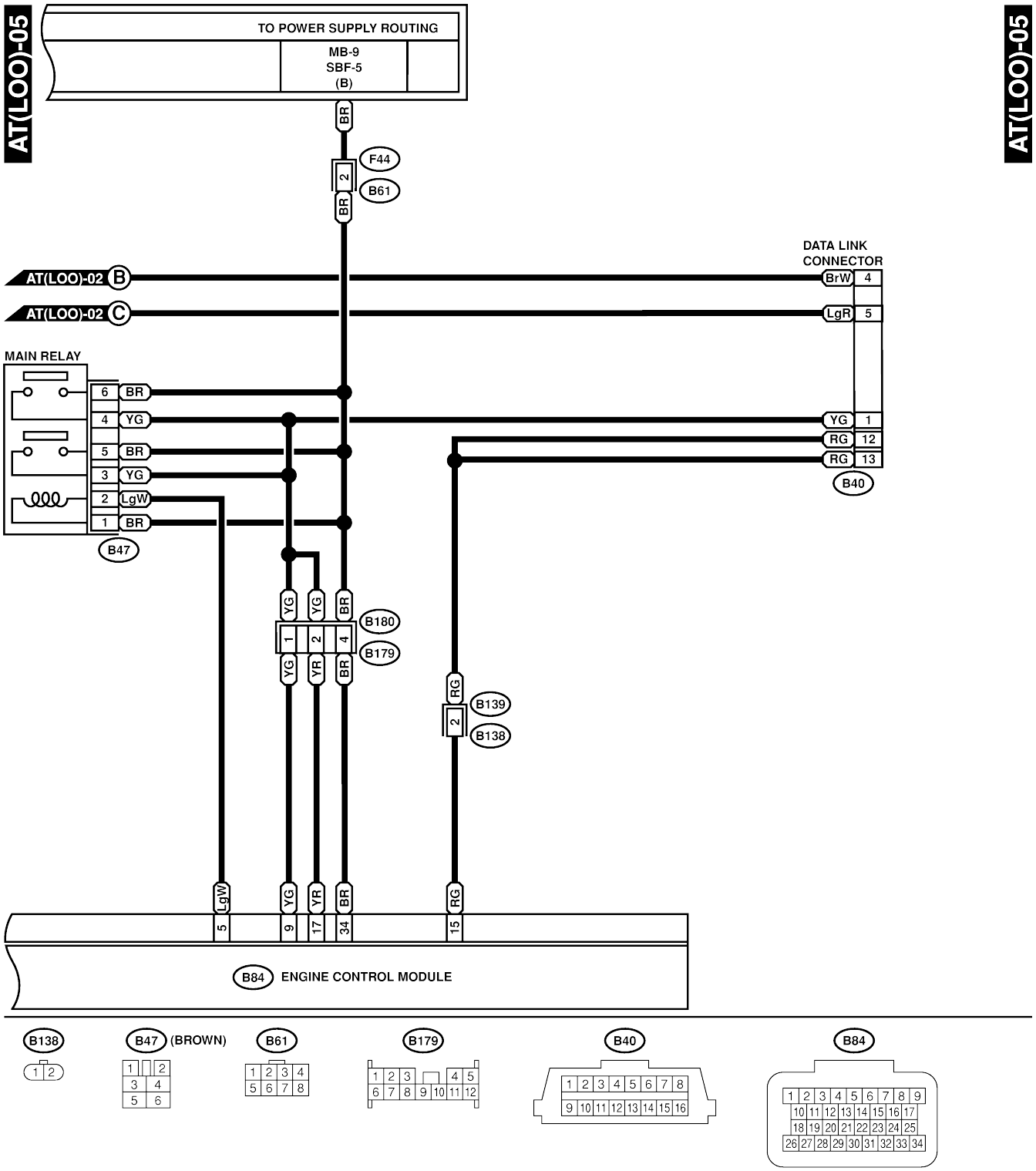




SL41-21C


AT(LOO)-04
A: B54 B: B55 C: B56 TRANSMISSION CONTROL MODULE
SHIELD JOINT CONNECTOR
B299
SHIELD JOINT CONNECTOR
B53
B11
T4
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
AT4 (BROWN)
AT1 (GRAY)
B53
B299
B11 (BLACK)
A: B54
B: B55 (GRAY)
C: B56 (GREEN)

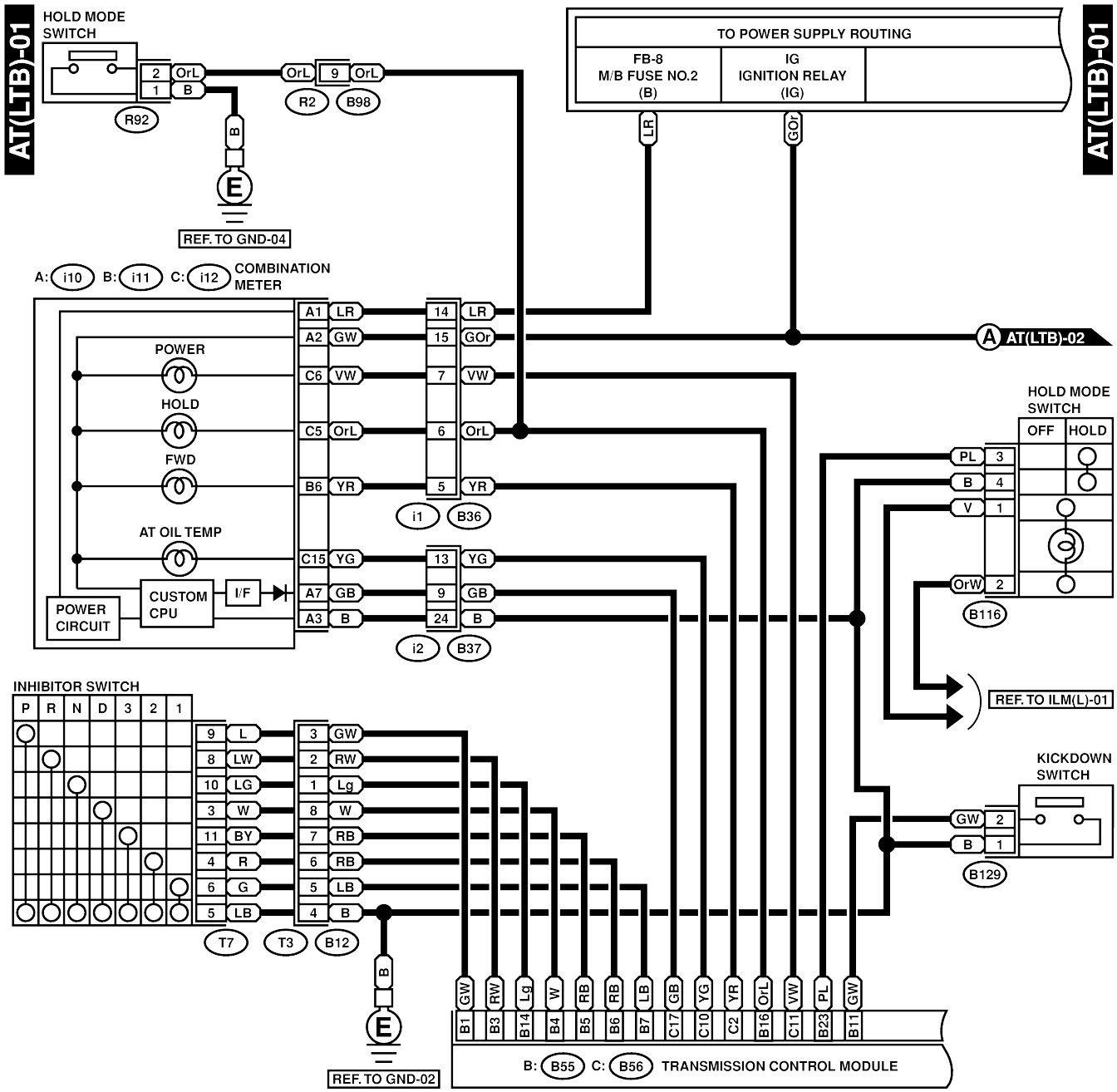
SL41-21D

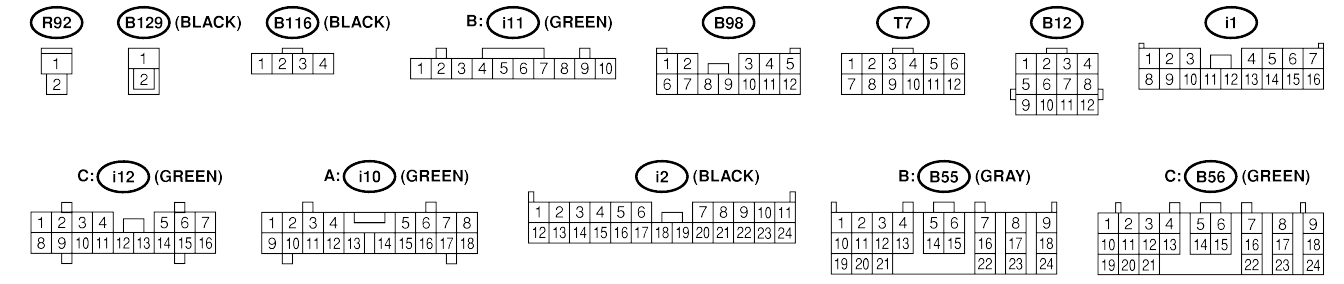

AT(LOO)-05
AT(LOO)-05
TO POWER SUPPLY ROUTING
MB-9
SBF-5
(B)
BR
F44
2
B61
BR
DATA LINK
CONNECTOR
AT(LOO)-02 B
AT(LOO)-02 C
BrW 4
LgR 5
MAIN RELAY
6 BR
4 YG
5 BR
3 YG
2 LgW
1 BR
B47
YG 1
RG 12
RG 13
B40
YG YG BR
B180
1 2 4
B179
YG YR BR
RG
B139
2
B138
LgW YG YR BR RG
5 9 17 34 15
B84 ENGINE CONTROL MODULE

B138
1 2
B47 (BROWN)
1 2
3 4
5 6
B61
1 2 3 4
5 6 7 8
B179
1 2 3 4 5
6 7 8 9 10 11 12
B40
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16
B84
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

SL41-21E

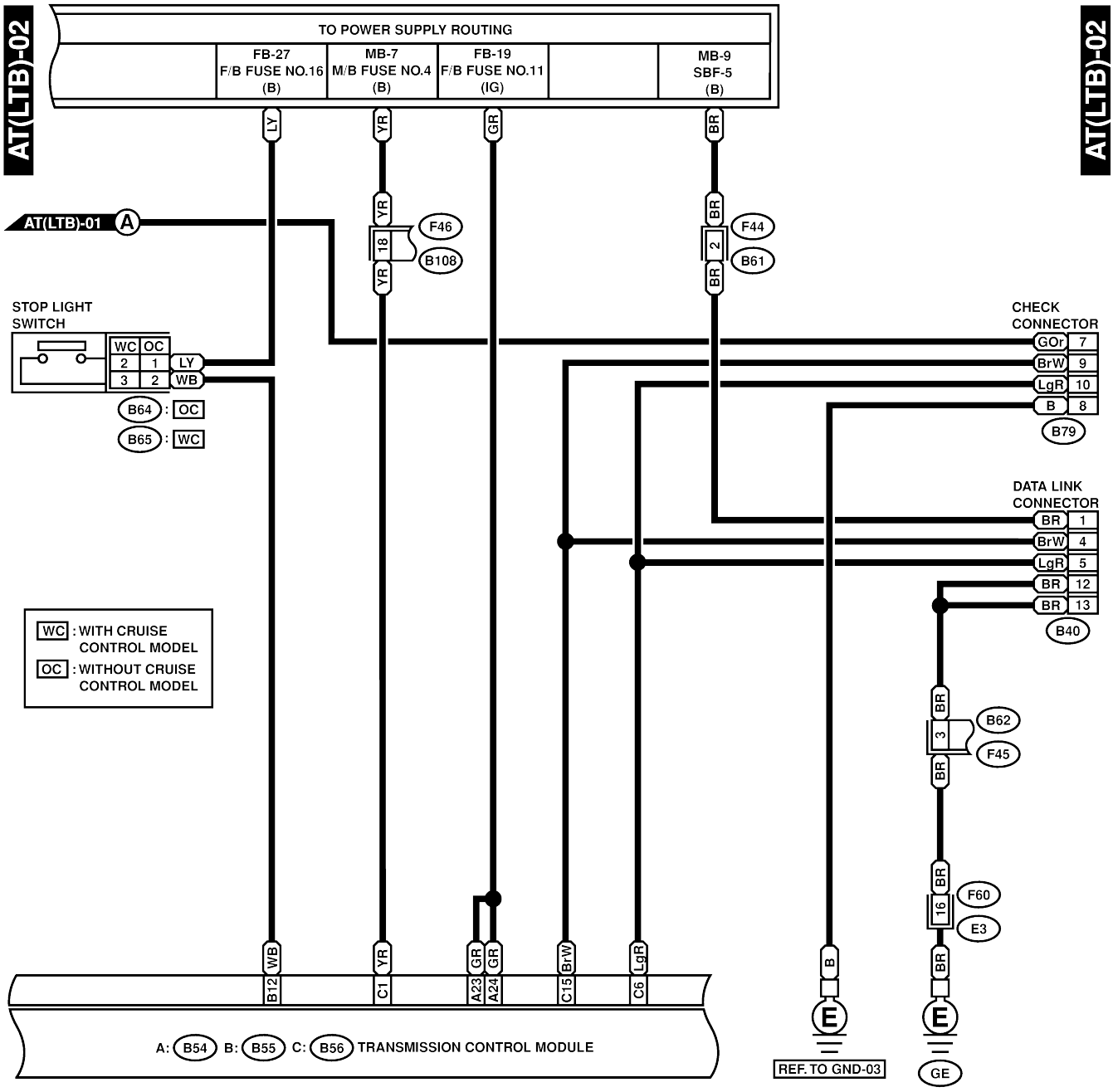
3. LHD TURBO MODEL S903485A2112

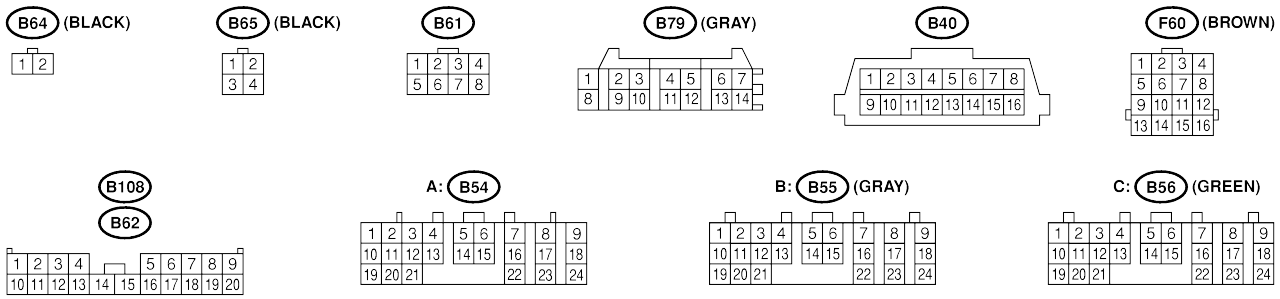




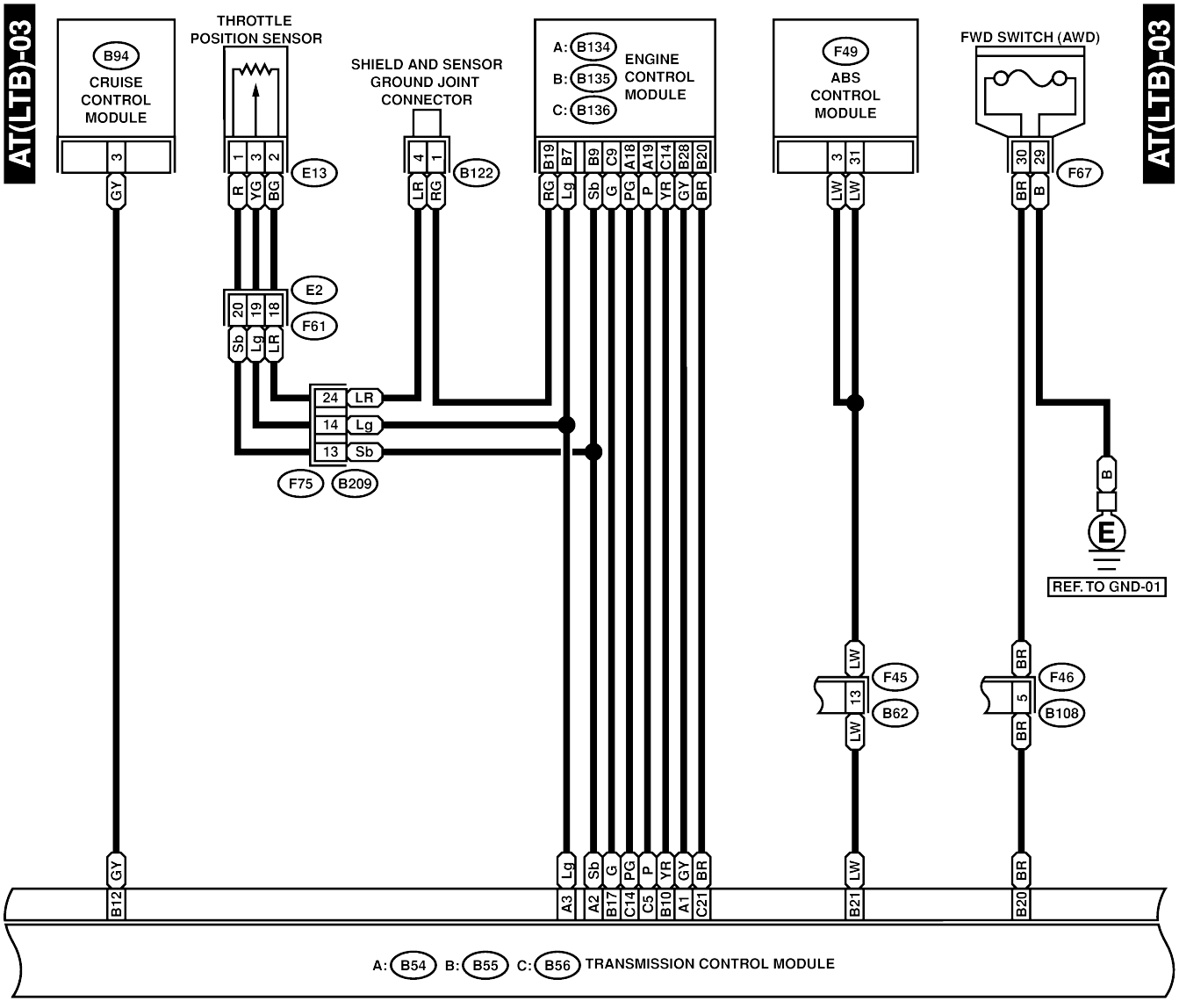
SL41-22A

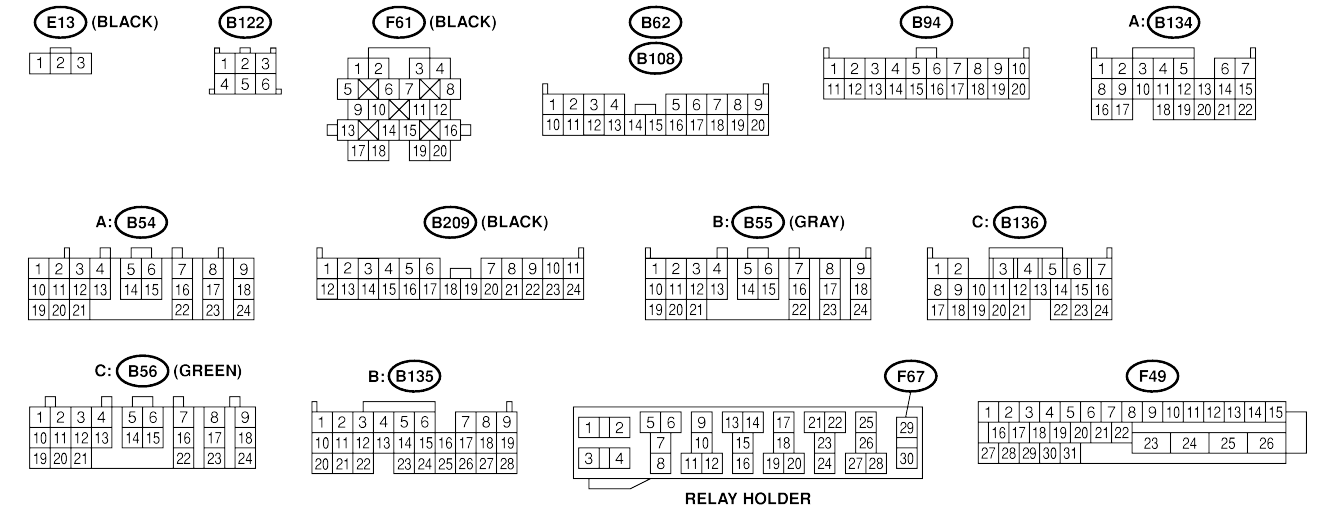
A/T CONTROL SYSTEM



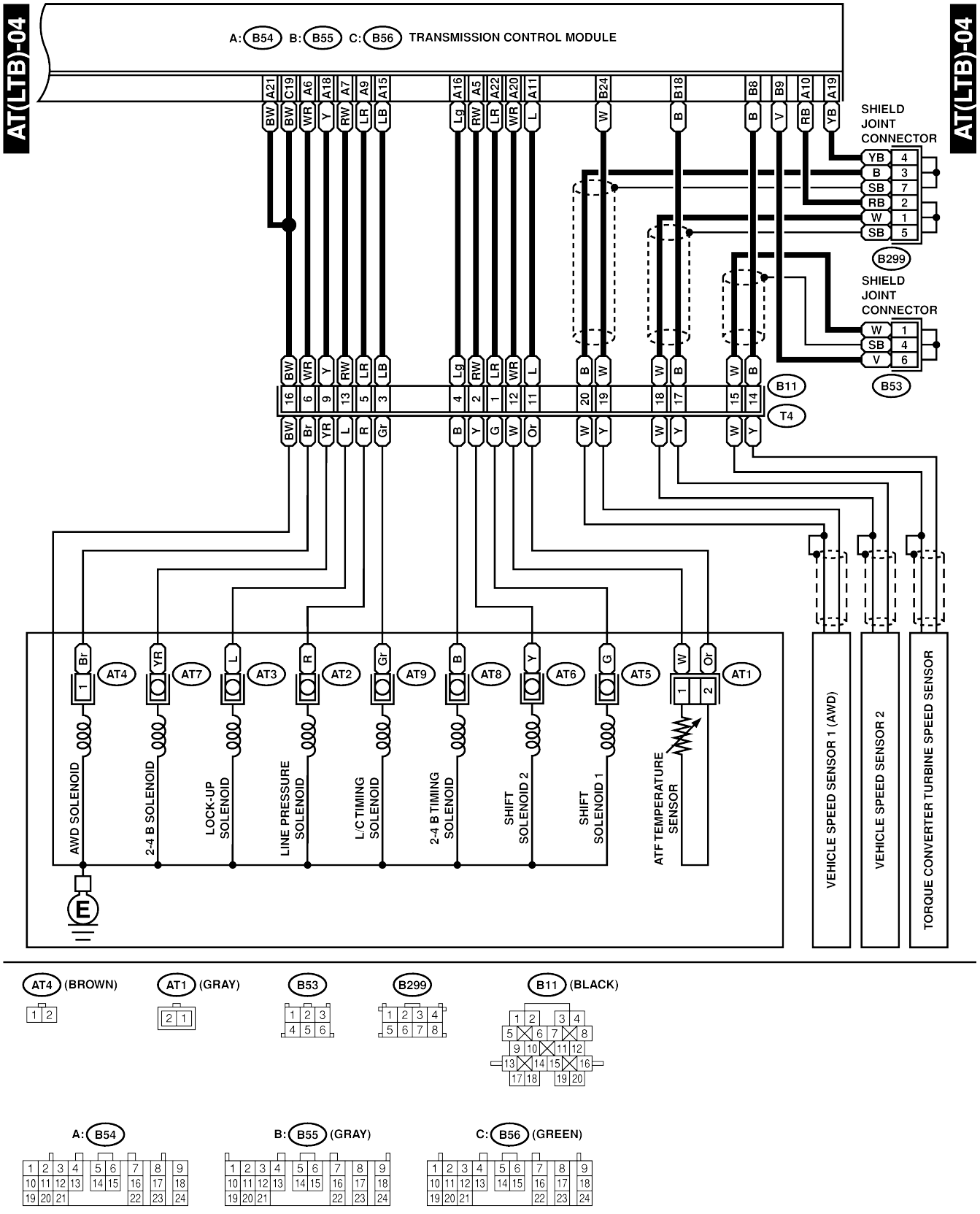


SL41-22B


AT(LTB)-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)
AT(LTB)-03
E13
B122
E2
F61
F75
B209
F67
REF. TO GND-01
F45
B62
F46
B108
A: B54 B: B55 C: B56 TRANSMISSION CONTROL MODULE

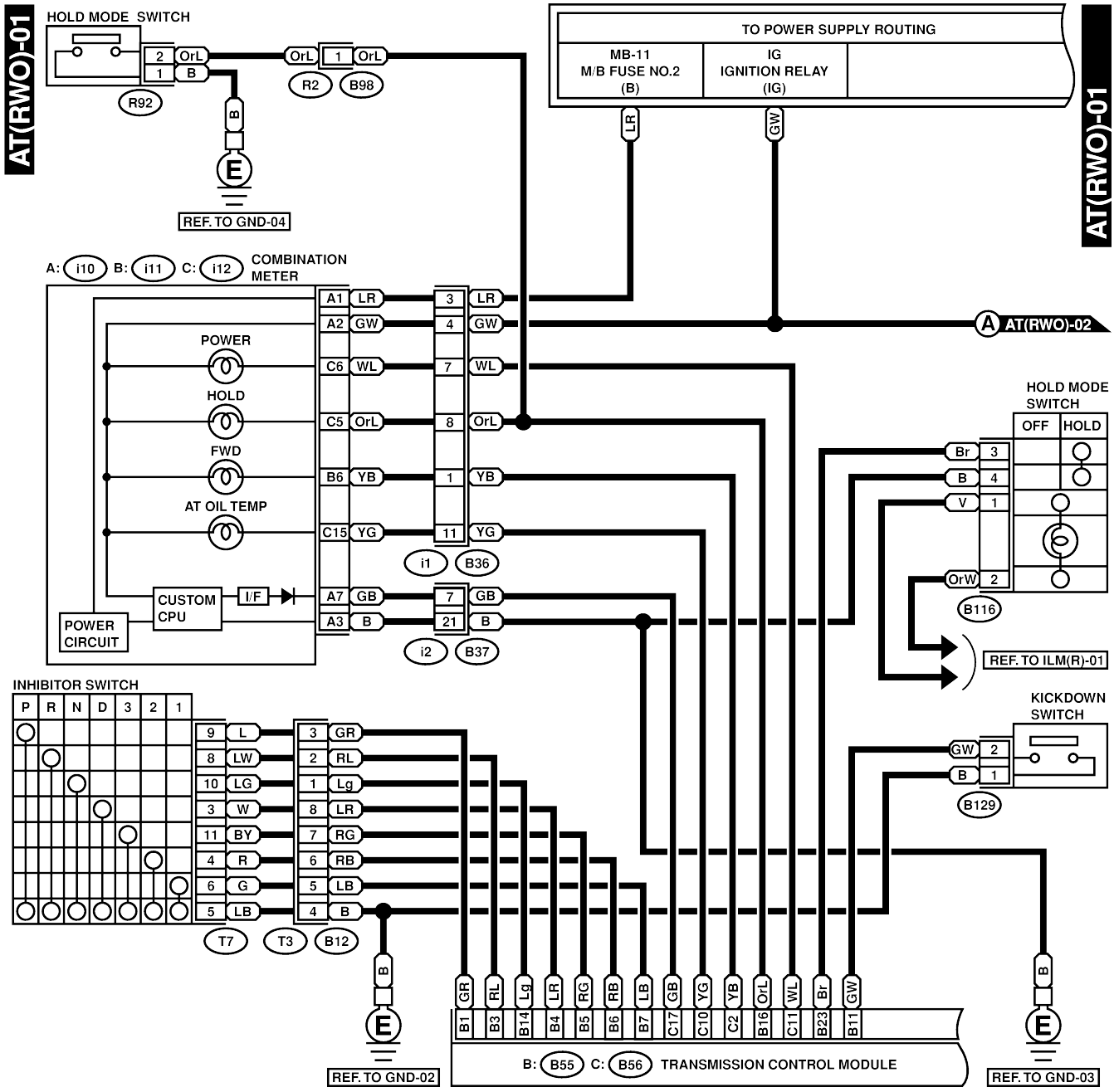

E13 (BLACK)
B122
F61 (BLACK)
B62
B108
B94
A: B134
A: B54
B209 (BLACK)
B: B55 (GRAY)
C: B136
C: B56 (GREEN)
B: B135
F67
RELAY HOLDER
F49

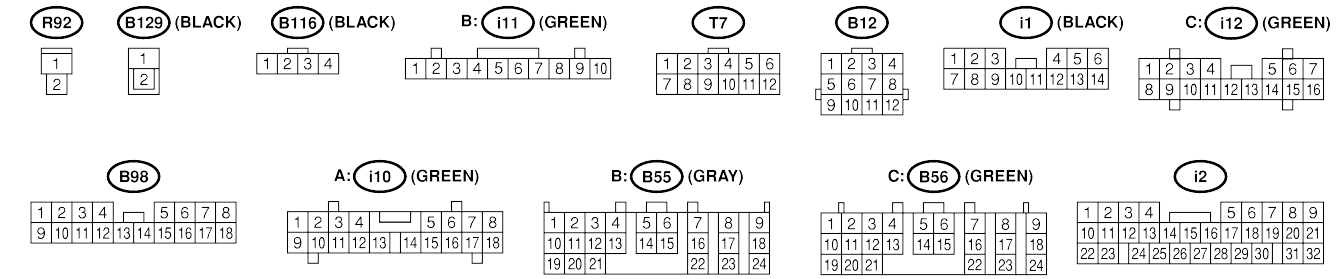
SL41-22C


AT(LTB)-04
AT(LTB)-04
A: B54 B: B55 C: B56 TRANSMISSION CONTROL MODULE
A21 C19 A6 A18 A7 A9 A15 A16 A5 A22 A20 A11 B24 B18 B8 B9 A10 A19
BW BW WR Y RW LR LB Lg RW LR WR L W B B V RB YB
SHIELD JOINT CONNECTOR
YB 4
B 3
SB 7
RB 2
W 1
SB 5
B299
SHIELD JOINT CONNECTOR
W 1
SB 4
V 6
B53
BW WR Y RW LR LB Lg RW LR WR L B W W B W B
16 6 9 13 5 3 4 2 1 12 11 20 19 18 17 15 14
B11
T4
BW Br YR L R Gr B Y G W Or W Y W Y W Y
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)
B53
B299
B11 (BLACK)
A: B54
B: B55 (GRAY)
C: B56 (GREEN)

SL41-22D

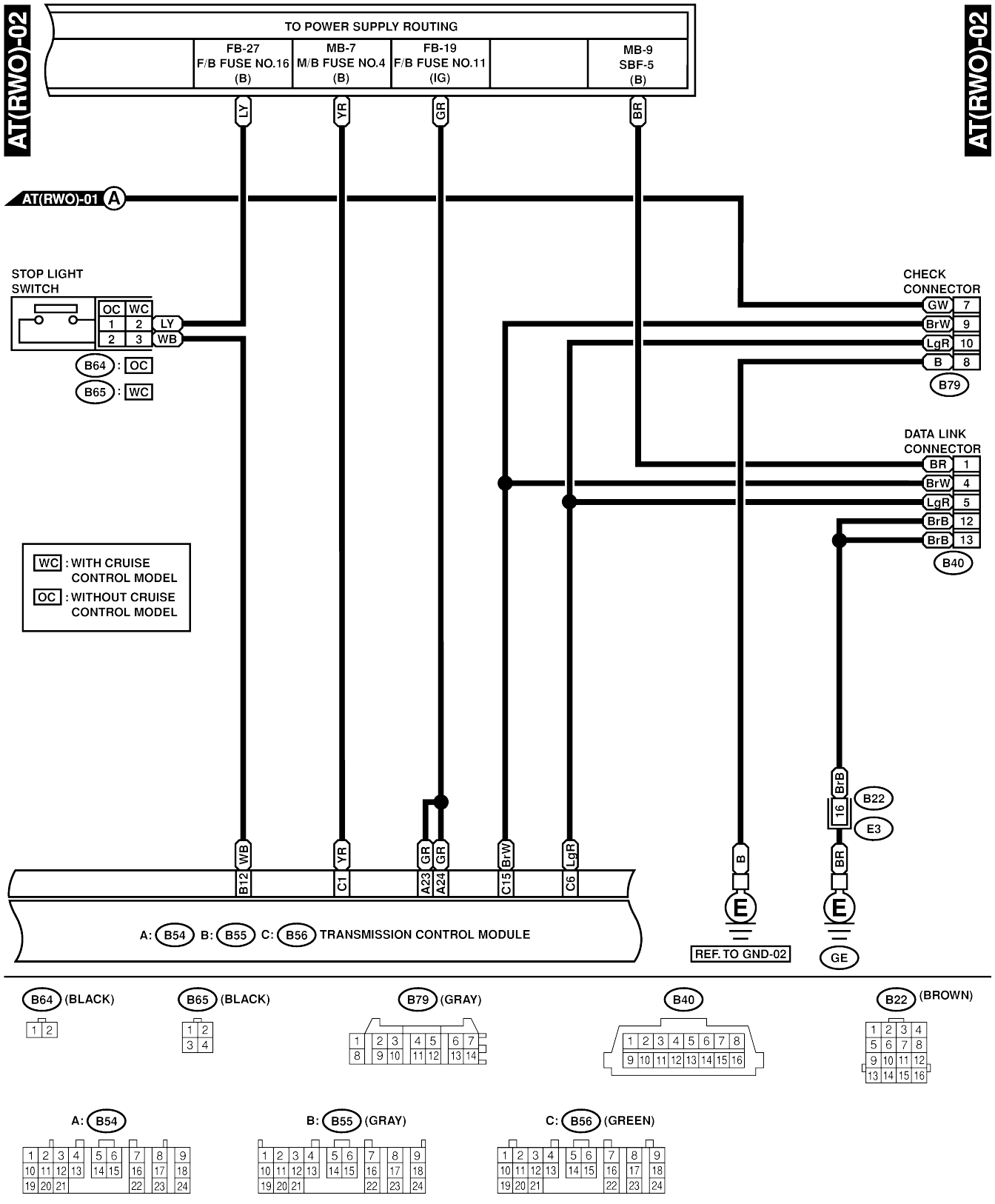
4. RHD NON-TURBO MODEL WITH OBD S903485A2113



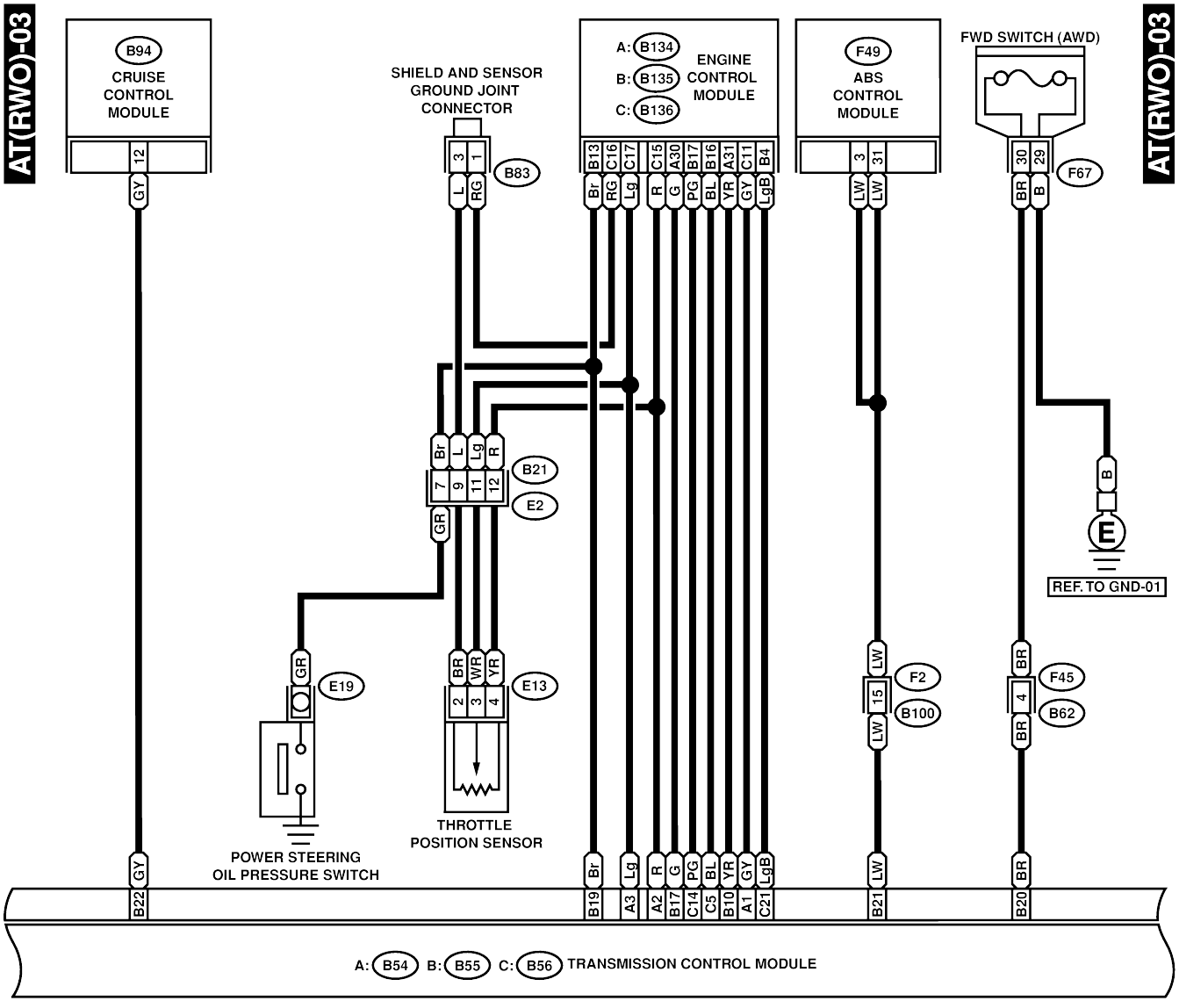


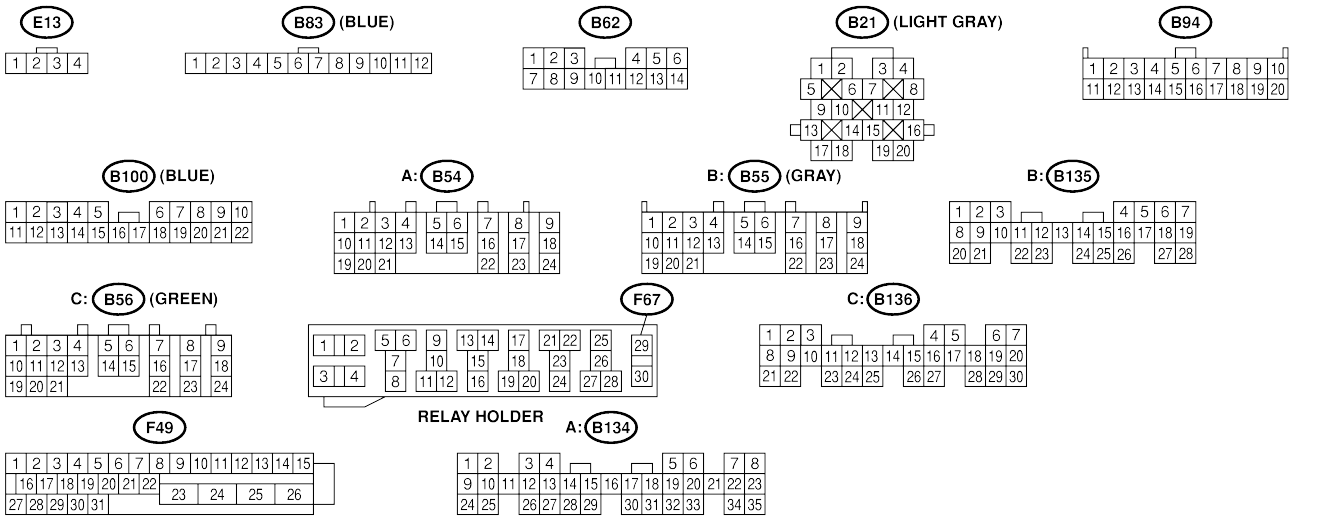
SR41-20A

A/T CONTROL SYSTEM

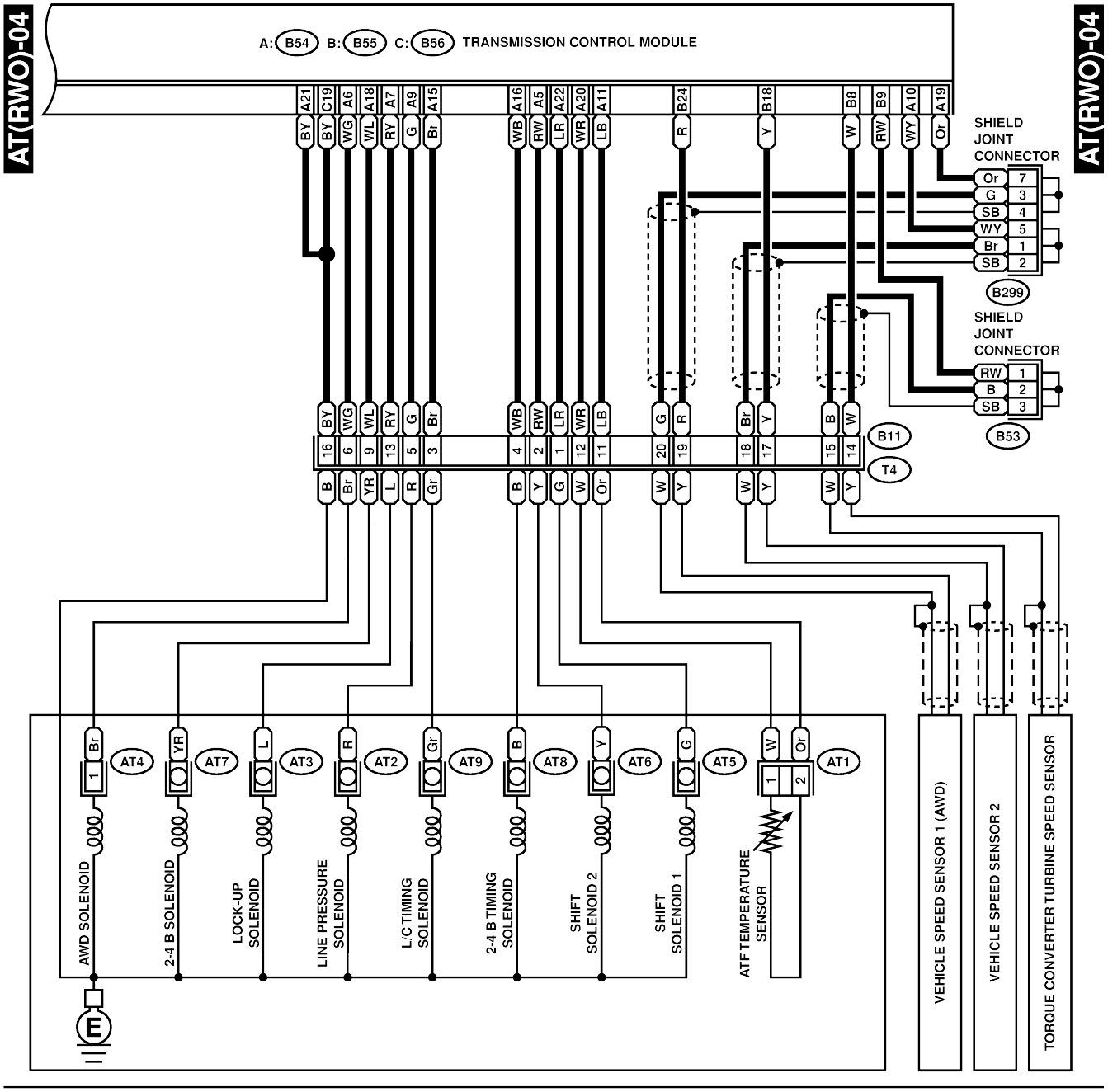


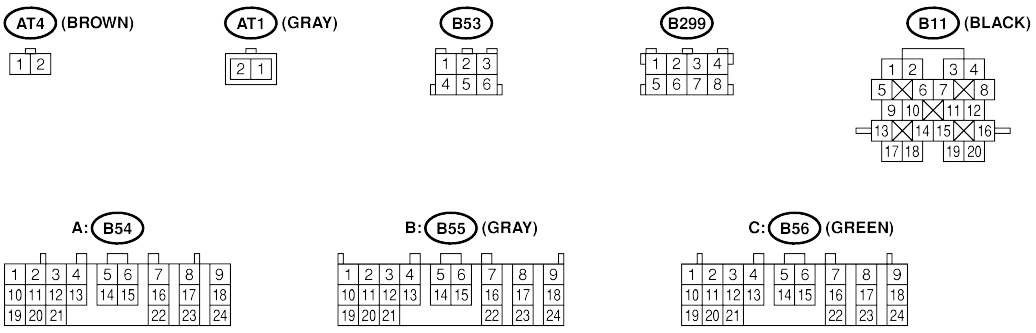
SR41-20B


AT(RWO)-03
AT(RWO)-03
B94
CRUISE CONTROL MODULE
12
GY
SHIELD AND SENSOR GROUND JOINT CONNECTOR
3
1
B83
L
RG
A: B134
B: B135
C: B136
ENGINE CONTROL MODULE
B13 C16 C17 C15 A30 B17 B16 A31 C11 B4
Br RG Lg R G PG BL YR GY LgB
F49
ABS CONTROL MODULE
3
31
LW
LW
FWD SWITCH (AWD)
30
29
F67
BR
B
B
E
REF. TO GND-01
Br L Lg R
7 9 11 12
B21
E2
GR
GR
E19
BR WR YR
2 3 4
E13
THROTTLE POSITION SENSOR
POWER STEERING OIL PRESSURE SWITCH
LW
15
F2
B100
BR
4
F45
B62
GY
B22
Br
B19
Lg
A3
R
A2
G
B17
PG
C14
BL
C5
YR
B10
GY
A1
LgB
C21
LW
B21
BR
B20
A: B54 B: B55 C: B56 TRANSMISSION CONTROL MODULE


E13
1 2 3 4
B83 (BLUE)
1 2 3 4 5 6 7 8 9 10 11 12
B62
1 2 3 4 5 6
7 8 9 10 11 12 13 14
B21 (LIGHT GRAY)
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
B94
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20
B100 (BLUE)
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20 21 22
A: B54
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18
19 20 21 22 23 24
B: B55 (GRAY)
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18
19 20 21 22 23 24
B: B135
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28
C: B56 (GREEN)
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18
19 20 21 22 23 24
F67
1 2 5 6 9 13 14 17 21 22 25 29
3 4 7 10 15 18 23 26 30
8 11 12 16 19 20 24 27 28
RELAY HOLDER
C: B136
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30
F49
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
A: B134
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
24 25 26 27 28 29 30 31 32 33 34 35

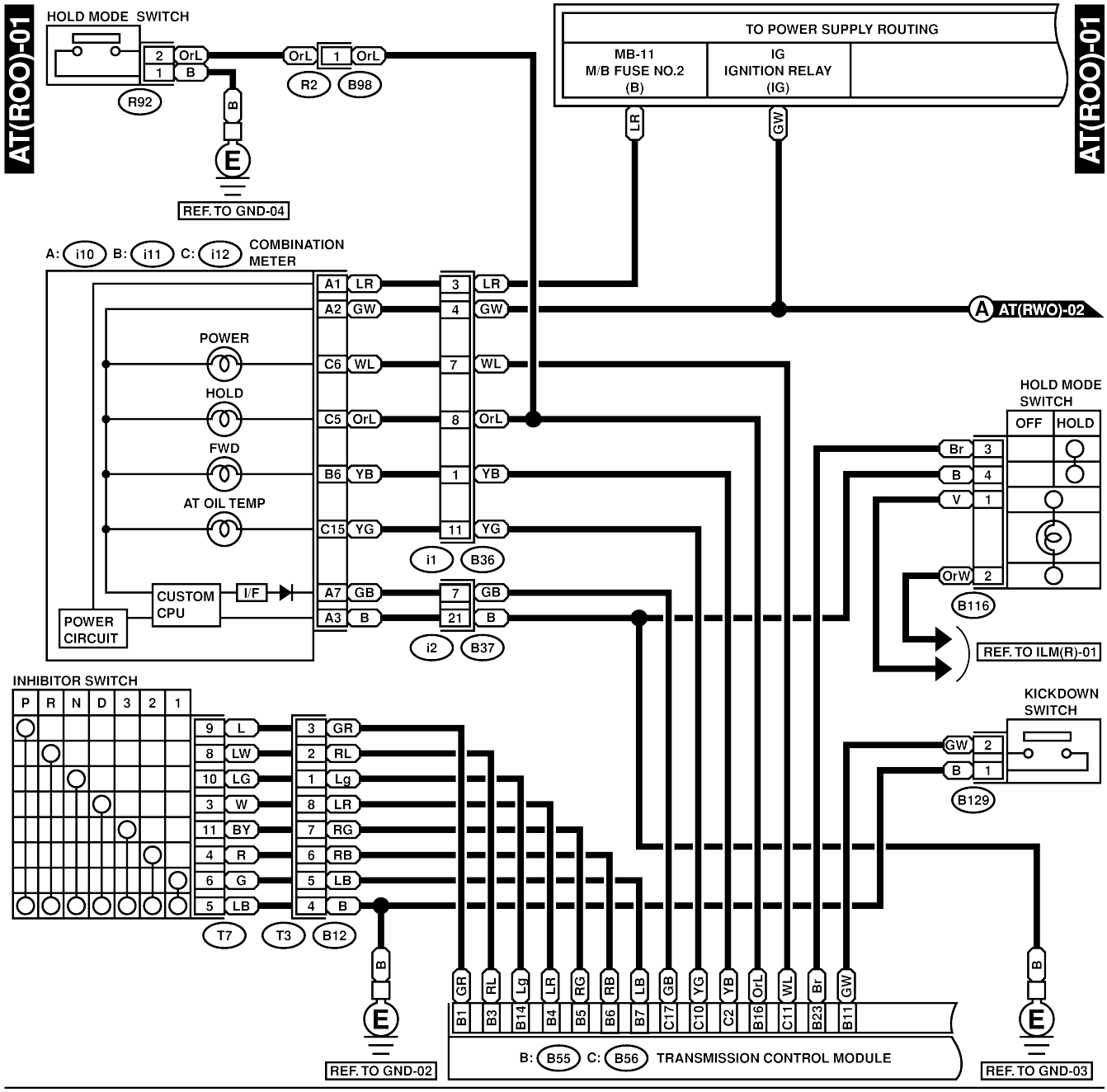
SR41-20C

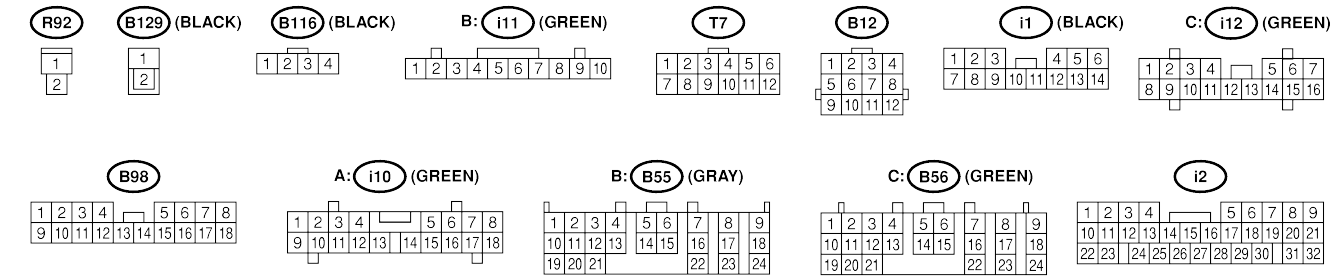

AT(RWO)-04
AT(RWO)-04
A: B54 B: B55 C: B56 TRANSMISSION CONTROL MODULE
SHIELD JOINT CONNECTOR
B299
SHIELD JOINT CONNECTOR
B53
B11
T4
AWD SOLENOID
2-4 B SOLENOID
LOCK-UP SOLENOID
LINE PRESSURE SOLENOID
L/C TIMING SOLENOID
2-4 B TIMING SOLENOID
SHIFT SOLENOID 2
SHIFT SOLENOID 1
ATF TEMPERATURE SENSOR
VEHICLE SPEED SENSOR 1 (AWD)
VEHICLE SPEED SENSOR 2
TORQUE CONVERTER TURBINE SPEED SENSOR


AT4 (BROWN)
AT1 (GRAY)
B53
B299
B11 (BLACK)
A: B54
B: B55 (GRAY)
C: B56 (GREEN)

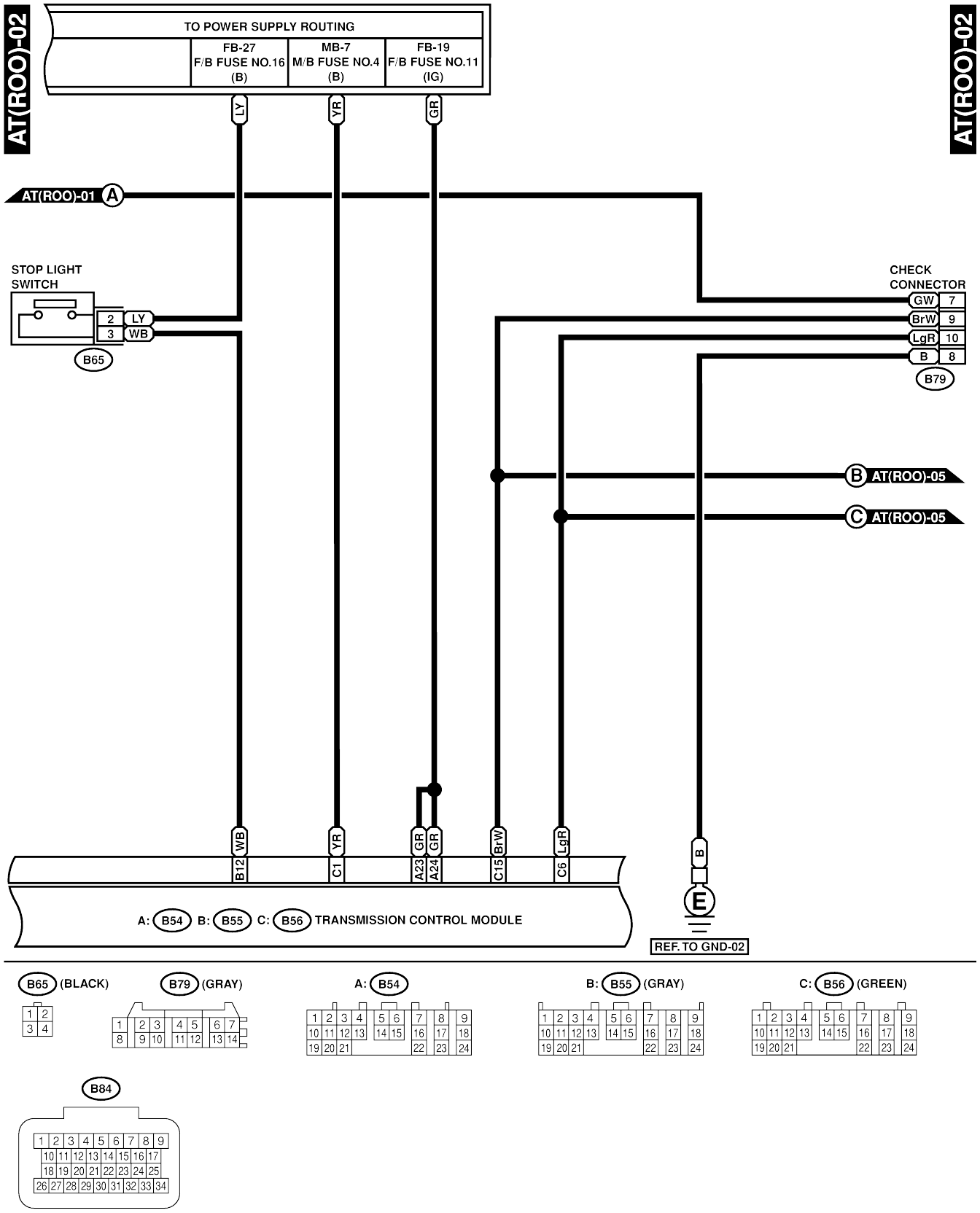
SR41-20D

5. RHD NON-TURBO MODEL WITHOUT OBD S903485A2114

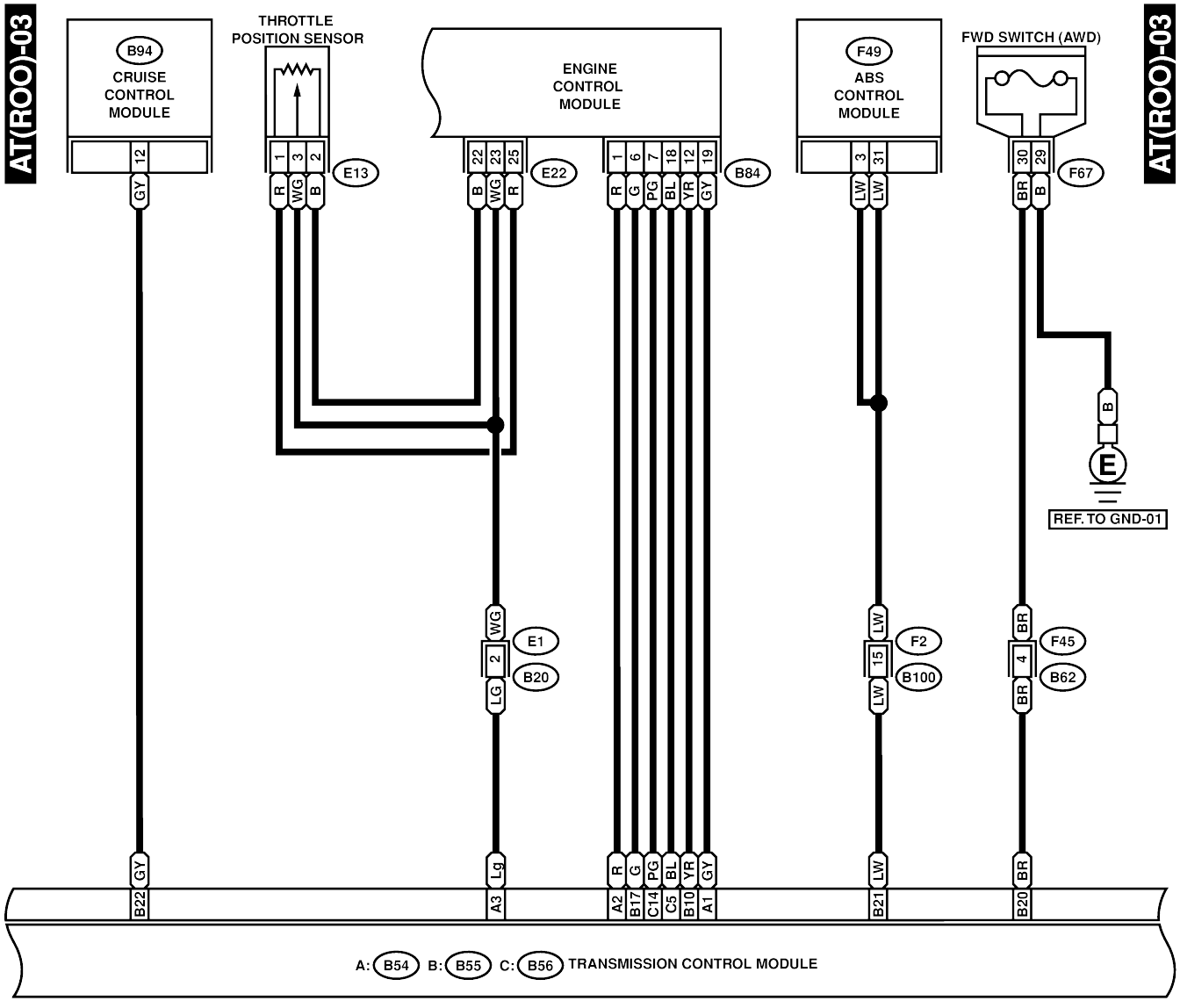


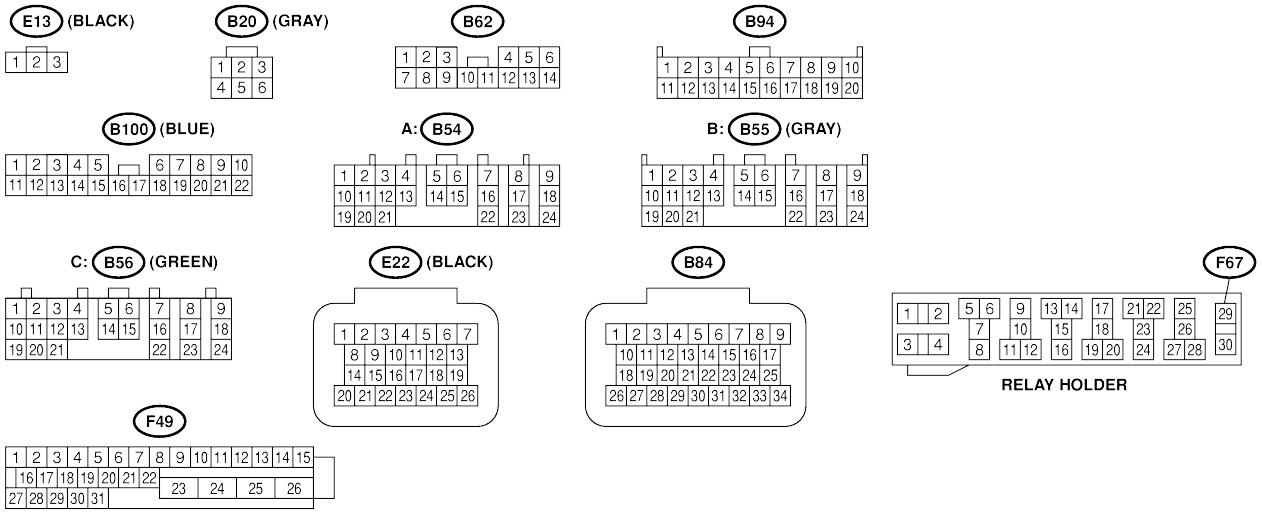


SR41-21A

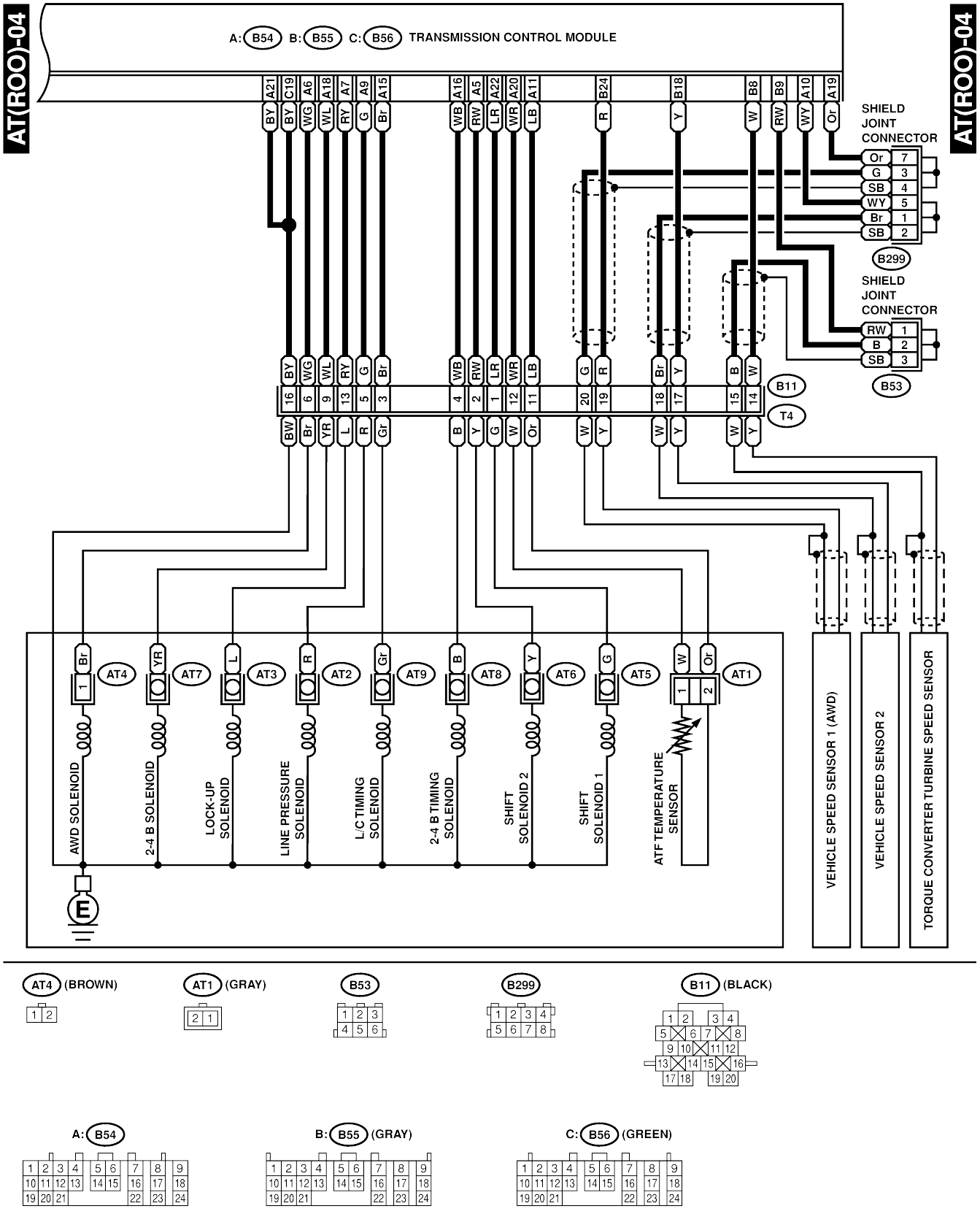

AT(ROO)-02
TO POWER SUPPLY ROUTING
FB-27
F/B FUSE NO.16
(B)
MB-7
M/B FUSE NO.4
(B)
FB-19
F/B FUSE NO.11
(IG)
LY
YR
GR
AT(ROO)-01 A
STOP LIGHT
SWITCH
2
3
LY
WB
B65
CHECK
CONNECTOR
GW 7
BrW 9
LgR 10
B 8
B79
B AT(ROO)-05
C AT(ROO)-05
WB
YR
GR
GR
BrW
LgR
B12
C1
A23
A24
C15
C6
B
E
REF. TO GND-02
A: B54 B: B55 C: B56 TRANSMISSION CONTROL MODULE
B65 (BLACK)
B79 (GRAY)
A: B54
B: B55 (GRAY)
C: B56 (GREEN)
B84

SR41-21B

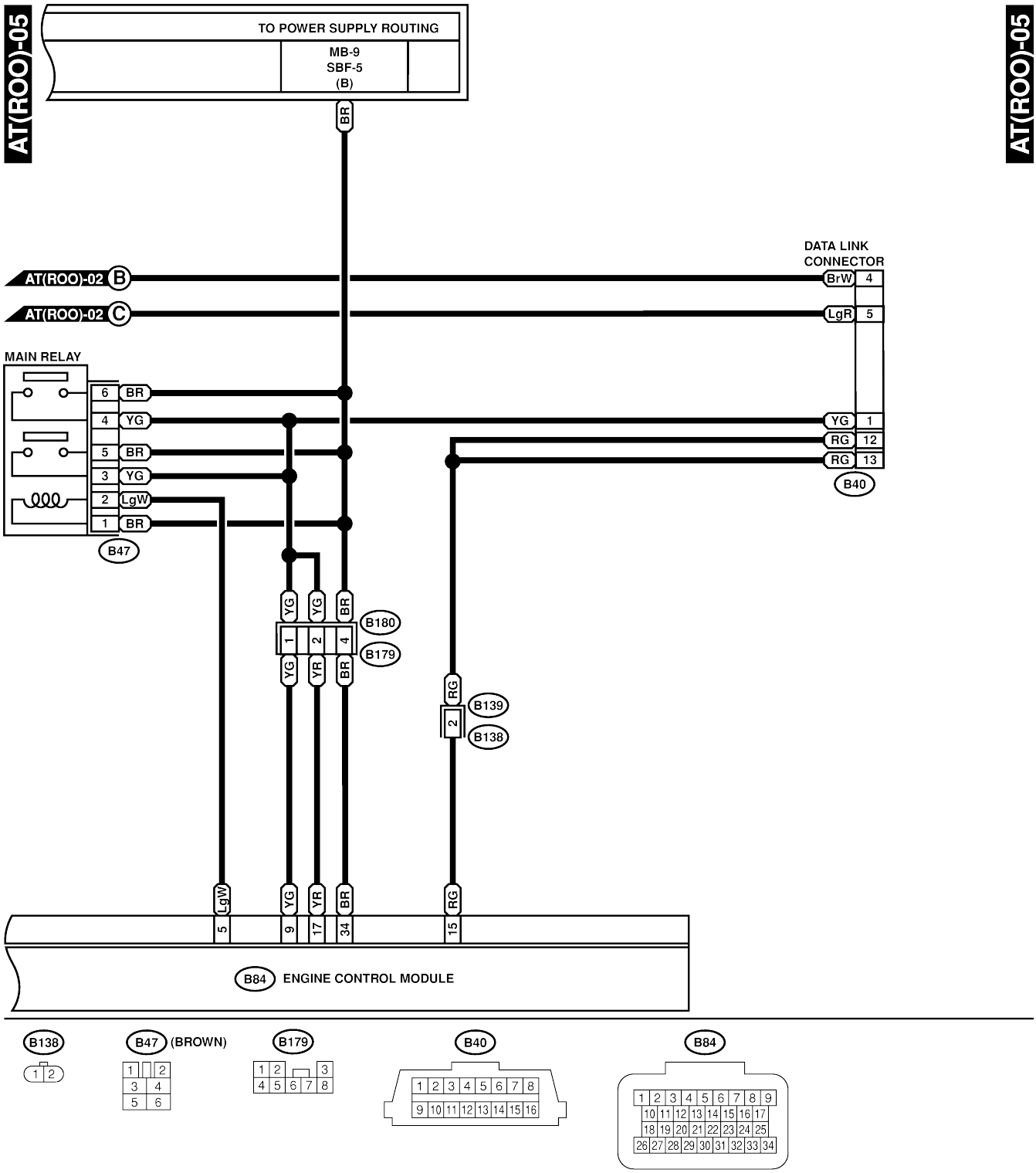

AT(ROO)-03
AT(ROO)-03
B94
CRUISE CONTROL MODULE
12
GY
THROTTLE POSITION SENSOR
1
3
2
R
WG
B
E13
ENGINE CONTROL MODULE
22
23
25
B
WG
R
E22
1
6
7
18
12
19
R
G
PG
BL
YR
GY
B84
F49
ABS CONTROL MODULE
3
31
LW
LW
FWD SWITCH (AWD)
30
29
BR
B
F67
B
E
REF. TO GND-01
WG
2
E1
B20
LG
LW
15
F2
B100
LW
BR
4
F45
B62
BR
GY
Lg
R
G
PG
BL
YR
GY
LW
BR
B22
A3
A2
B17
C14
C5
B10
A1
B21
B20
A: B54 B: B55 C: B56 TRANSMISSION CONTROL MODULE


E13 (BLACK)
B20 (GRAY)
B62
B94
B100 (BLUE)
A: B54
B: B55 (GRAY)
C: B56 (GREEN)
E22 (BLACK)
B84
F67
RELAY HOLDER
F49

SR41-21C


AT(ROO)-04
AT(ROO)-04
A: B54 B: B55 C: B56 TRANSMISSION CONTROL MODULE
SHIELD JOINT CONNECTOR
B299
SHIELD JOINT CONNECTOR
B53
B11
T4
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
AT4 (BROWN)
AT1 (GRAY)
B53
B299
B11 (BLACK)
A: B54
B: B55 (GRAY)
C: B56 (GREEN)

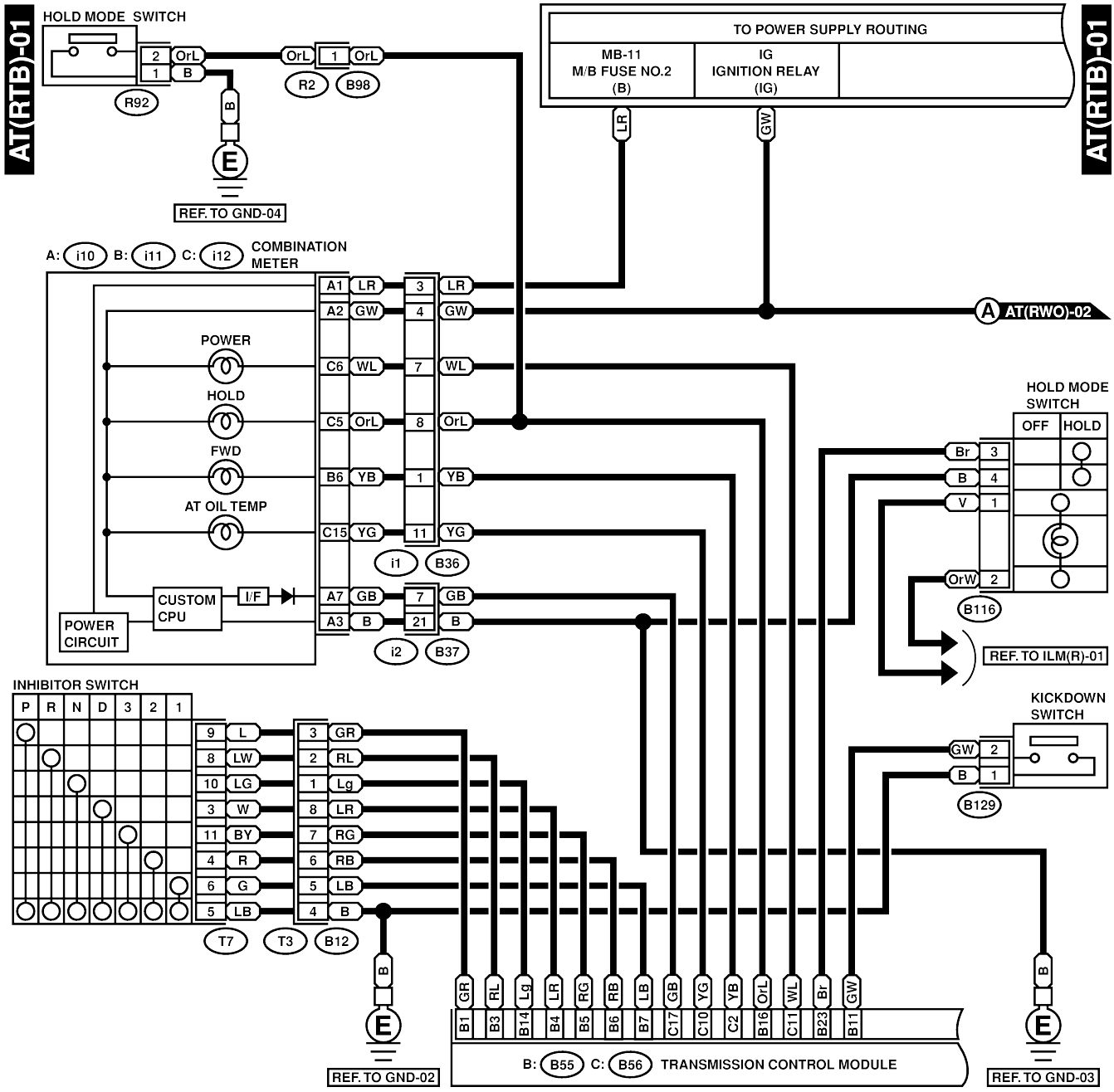
SR41-21D

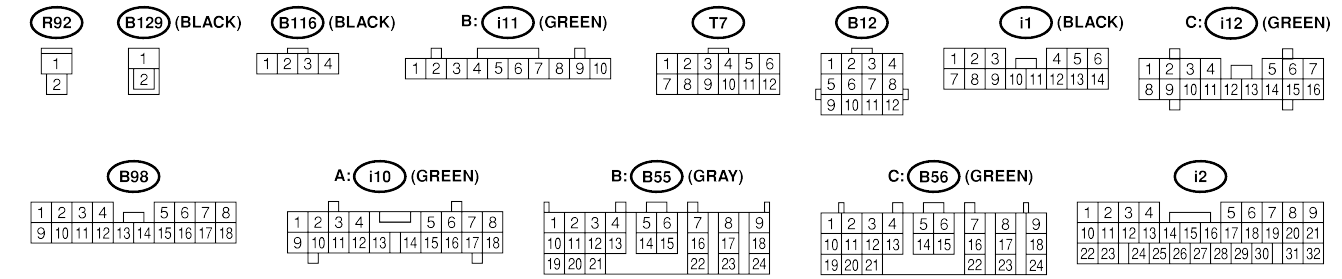

AT(ROO)-05
AT(ROO)-05
TO POWER SUPPLY ROUTING
MB-9
SBF-5
(B)
BR
DATA LINK
CONNECTOR
AT(ROO)-02 B
AT(ROO)-02 C
BrW 4
LgR 5
MAIN RELAY
6 BR
4 YG
5 BR
3 YG
2 LgW
1 BR
B47
YG 1
RG 12
RG 13
B40
YG YG BR
B180
1 2 4
B179
YG YR BR
RG
B139
2
B138
LgW YG YR BR RG
5 9 17 34 15
B84 ENGINE CONTROL MODULE

B138
1 2
B47 (BROWN)
1 2
3 4
5 6
B179
1 2 3
4 5 6 7 8
B40
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16
B84
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

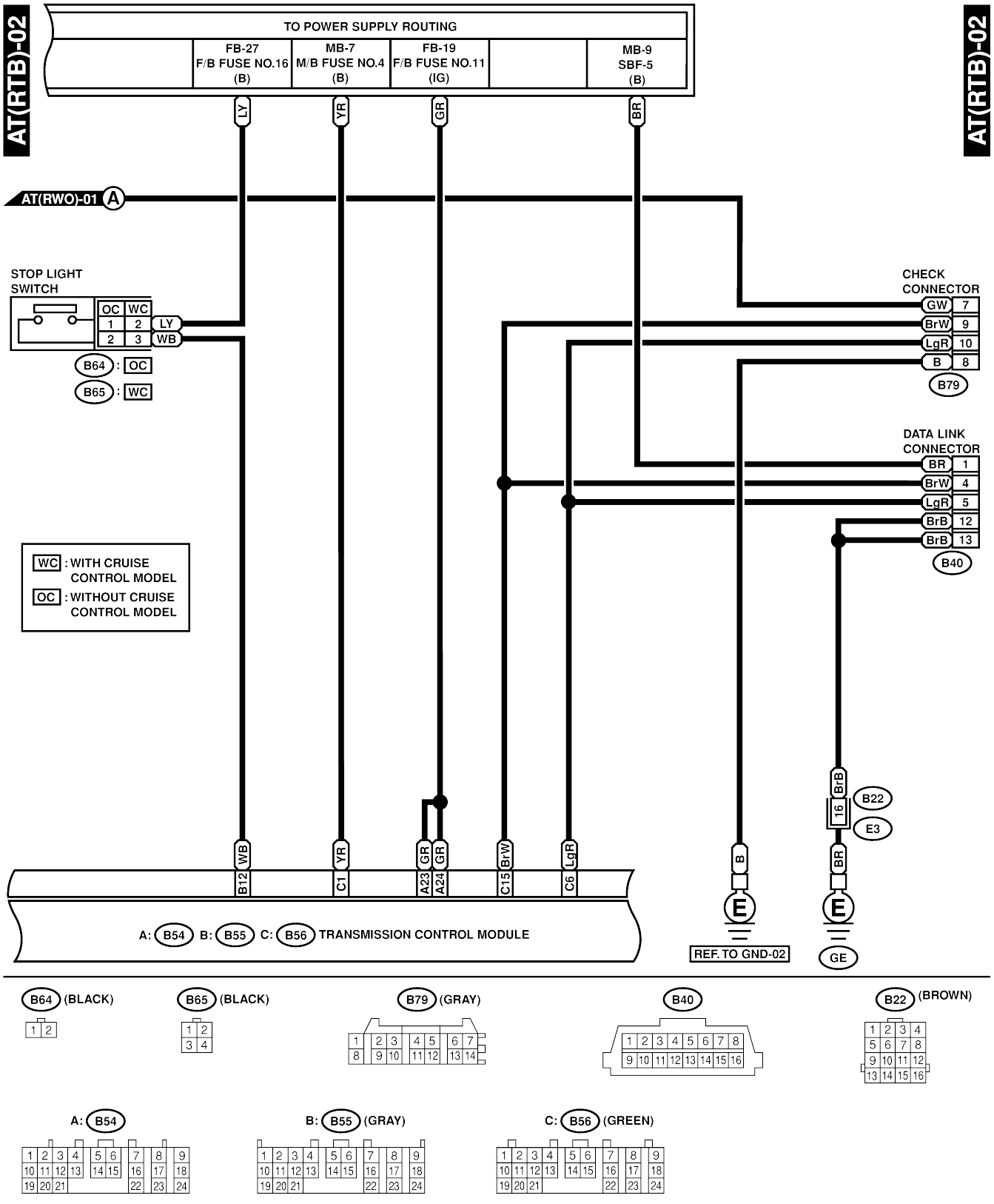
SR41-21E

6. RHD TURBO MODEL S903485A2115





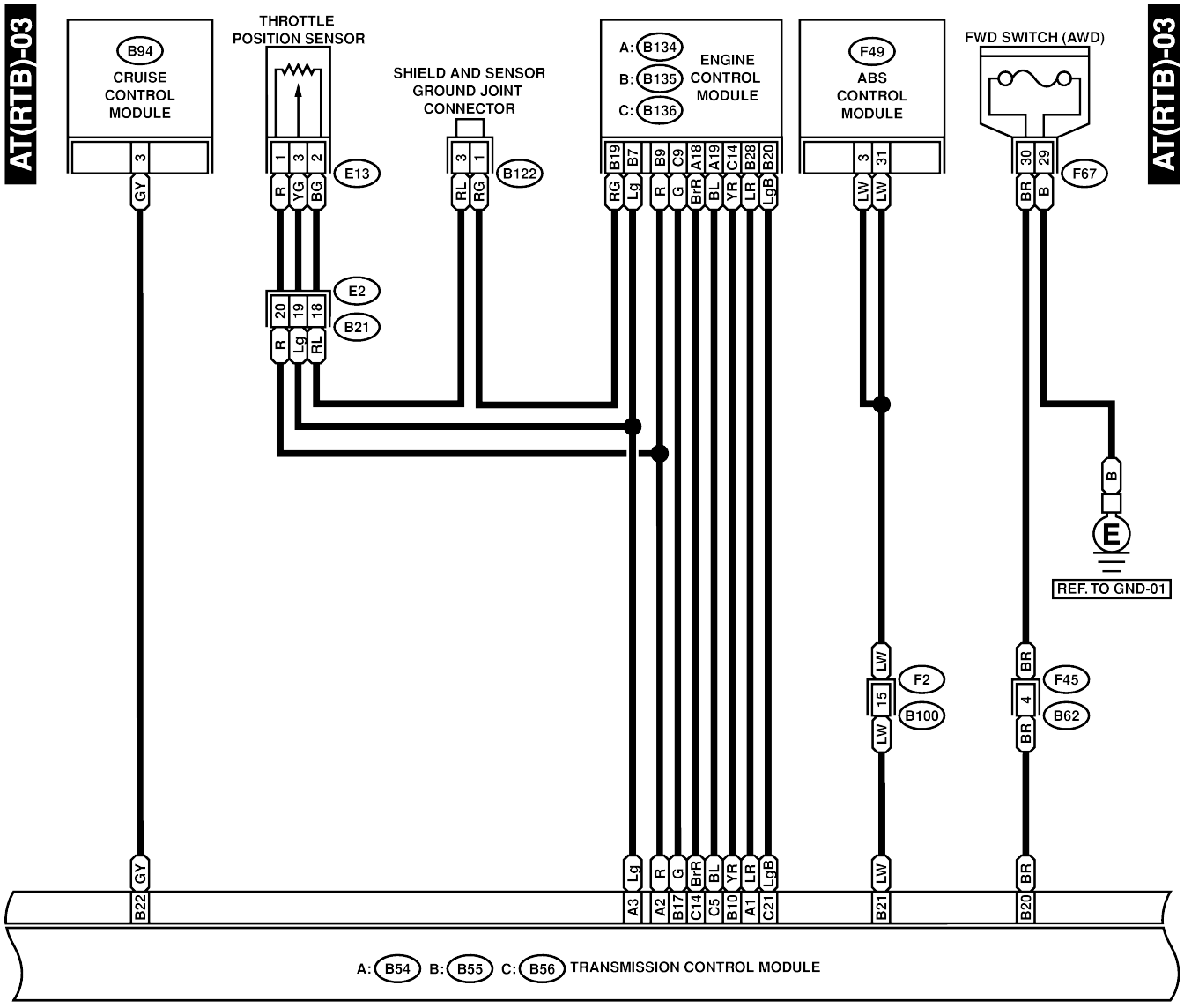
SR41-22A

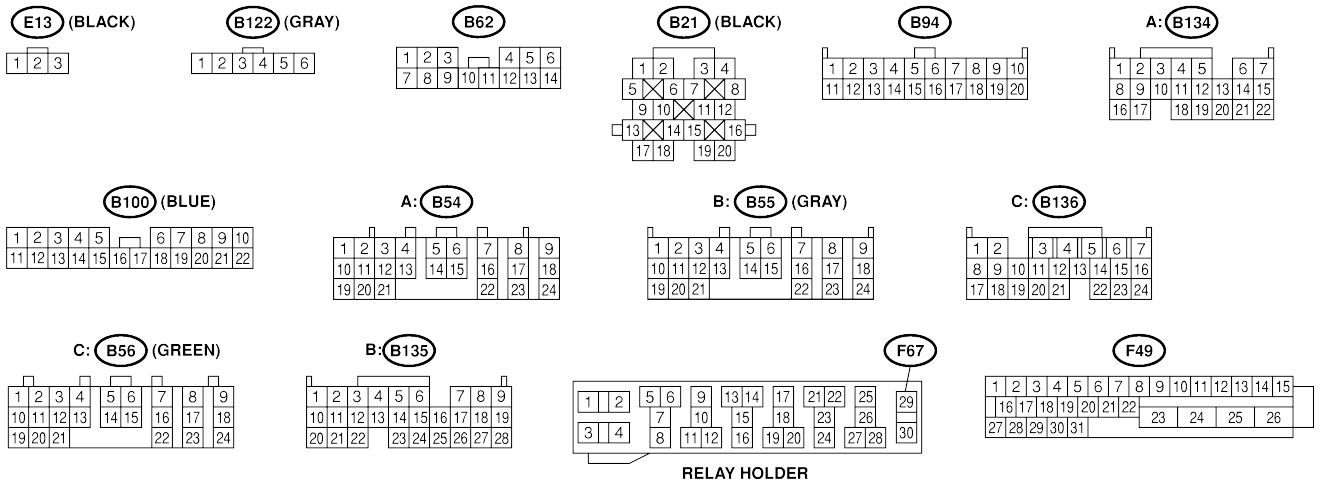

AT(RTB)-02
TO POWER SUPPLY ROUTING
FB-27
F/B FUSE NO.16
(B)
MB-7
M/B FUSE NO.4
(B)
FB-19
F/B FUSE NO.11
(IG)
MB-9
SBF-5
(B)
AT(RTB)-02
LY
YR
GR
BR
AT(RWO)-01 A
STOP LIGHT SWITCH
OC WC
1 2 LY
2 3 WB
B64 : OC
B65 : WC
CHECK CONNECTOR
GW 7
BrW 9
LgR 10
B 8
B79
DATA LINK CONNECTOR
BR 1
BrW 4
LgR 5
BrB 12
BrB 13
B40
WC : WITH CRUISE CONTROL MODEL
OC : WITHOUT CRUISE CONTROL MODEL
WB
YR
GR
GR
BrW
LgR
B
BrB
BR
B12
C1
A23
A24
C15
C6
16
B22
E3
E
E
A: B54 B: B55 C: B56 TRANSMISSION CONTROL MODULE
REF. TO GND-02
GE

B64 (BLACK)
B65 (BLACK)
B79 (GRAY)
B40
B22 (BROWN)
A: B54
B: B55 (GRAY)
C: B56 (GREEN)

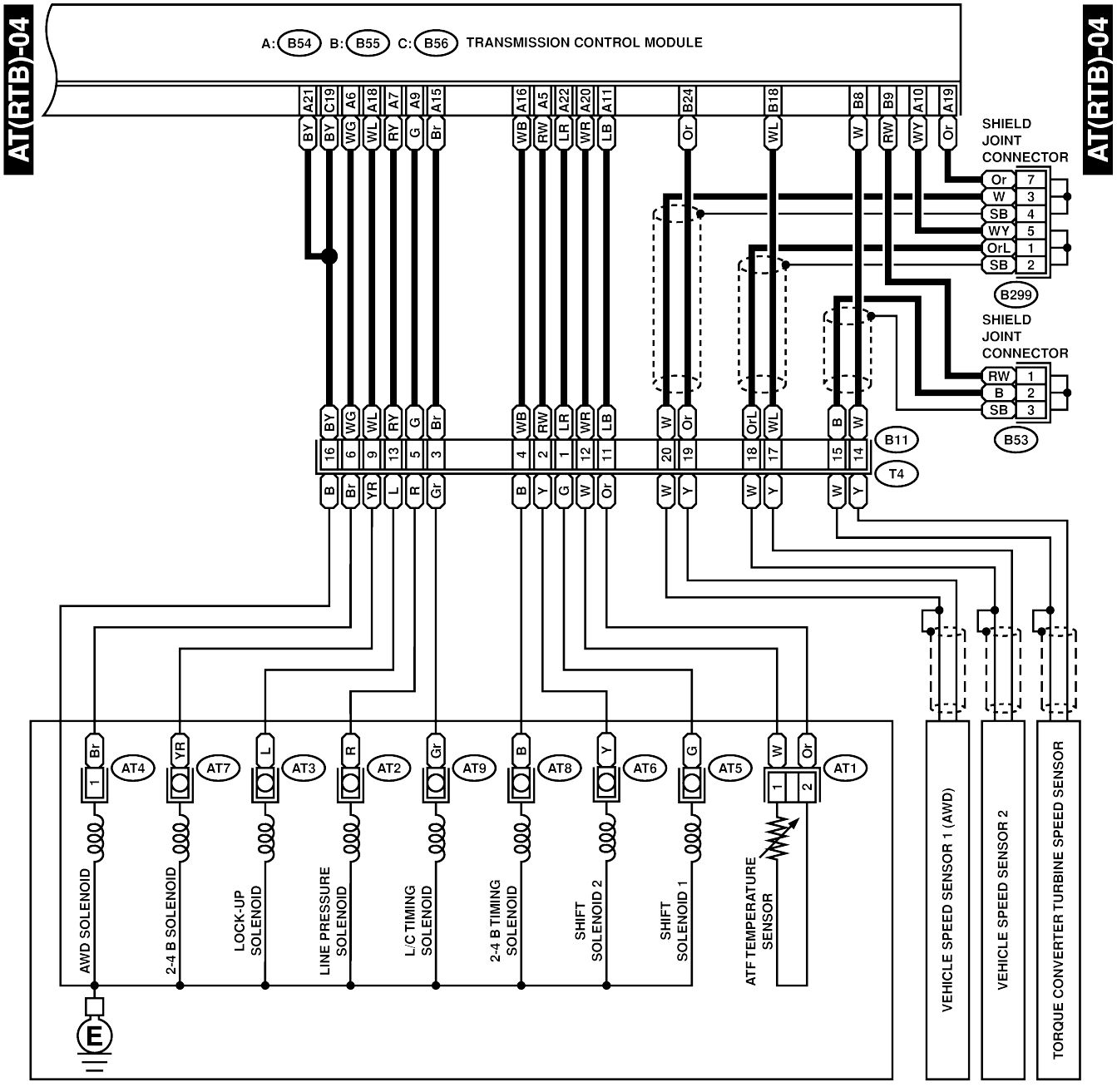
SR41-22B

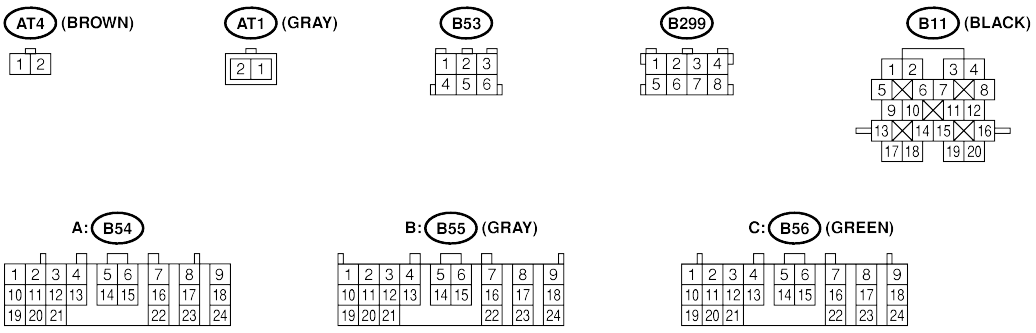
A/T CONTROL SYSTEM





SR41-22C


AT(RTB)-04
A: B54 B: B55 C: B56 TRANSMISSION CONTROL MODULE
SHIELD JOINT CONNECTOR
B299
SHIELD JOINT CONNECTOR
B53
B11
T4
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

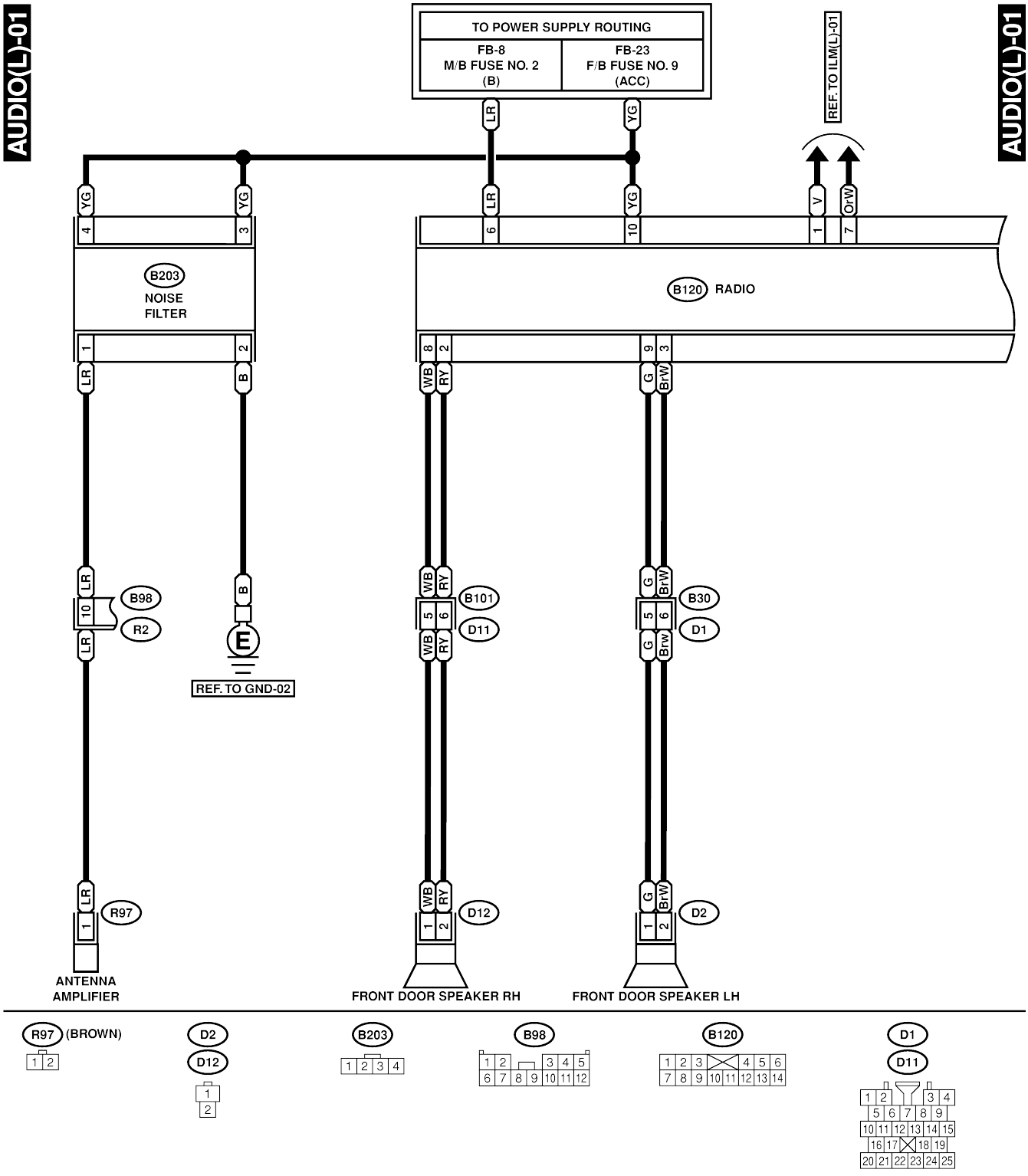

AT4 (BROWN)
AT1 (GRAY)
B53
B299
B11 (BLACK)
A: B54
B: B55 (GRAY)
C: B56 (GREEN)

SR41-22D

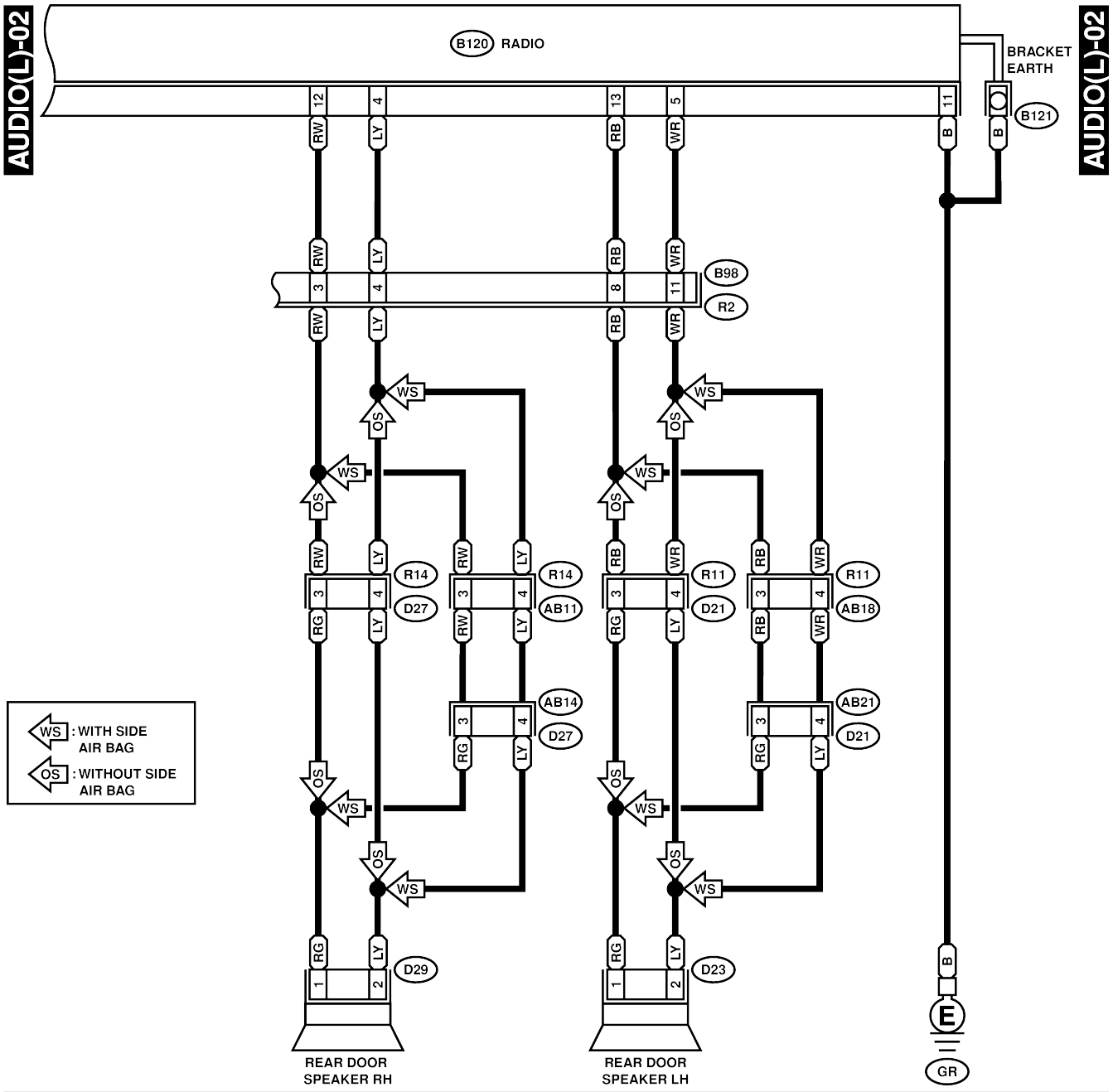
9. Audio System S903486

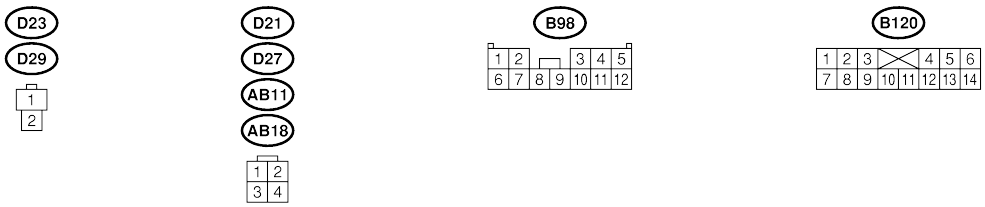
A: SCHEMATIC S903486A21

1. LHD MODEL S903486A2101



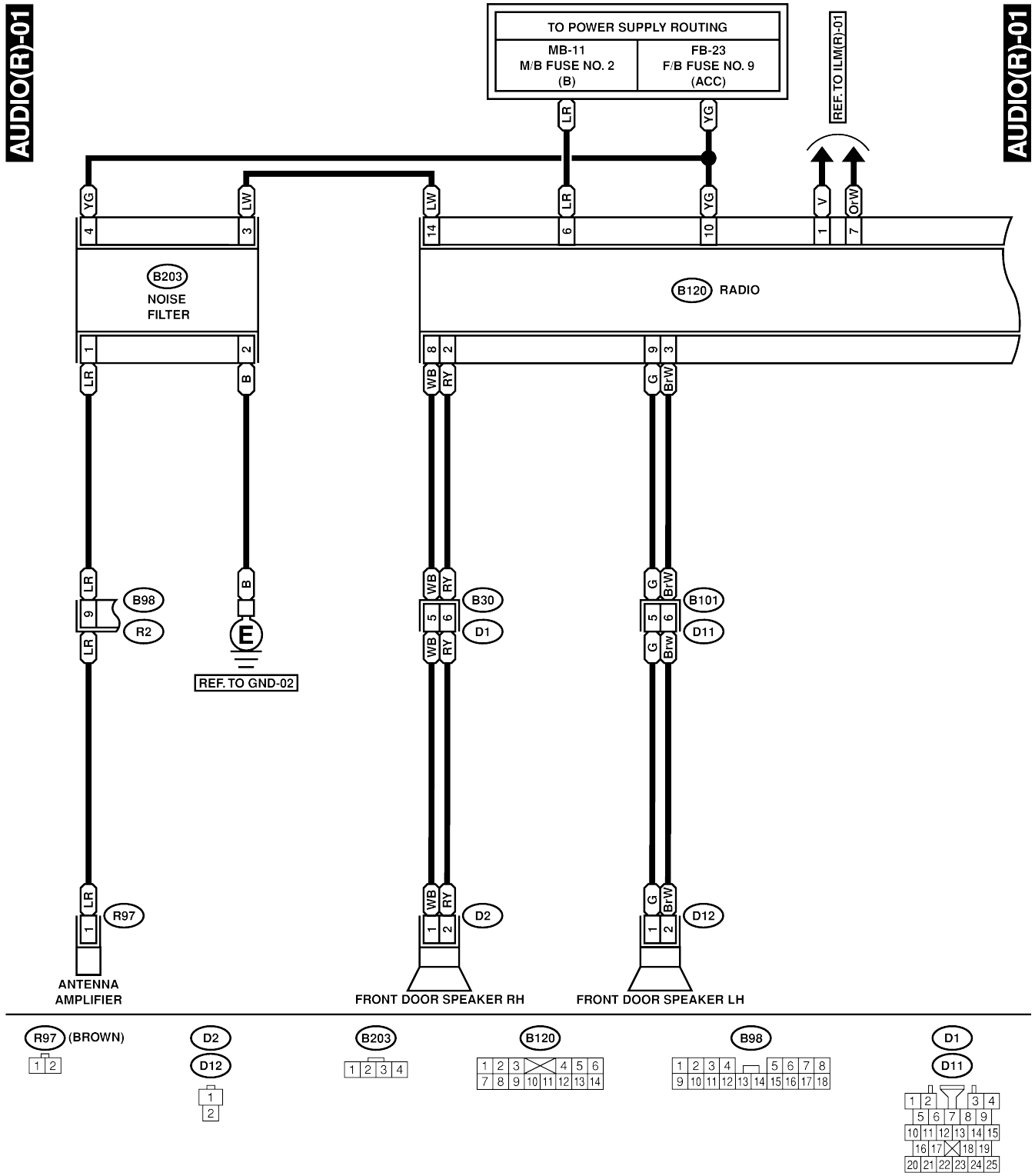
SL76-20A


AUDIO(L)-02
AUDIO(L)-02
B120 RADIO
BRACKET EARTH
B121
B98
R2
R14
D27
AB11
AB14
R11
D21
AB18
AB21
D29
D23
WS : WITH SIDE AIR BAG
OS : WITHOUT SIDE AIR BAG
REAR DOOR SPEAKER RH
REAR DOOR SPEAKER LH
GR

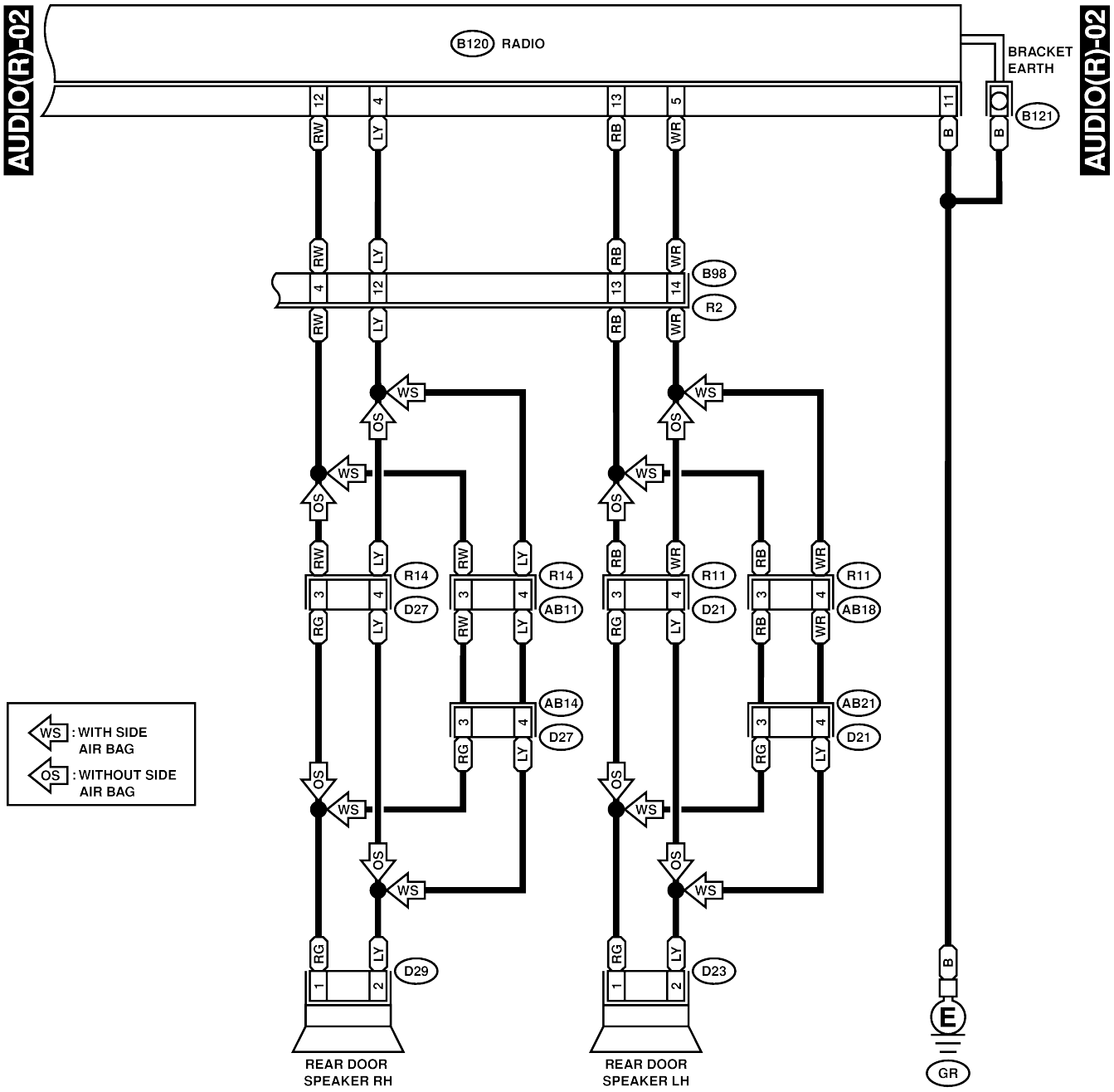

D23
D29
D21
D27
AB11
AB18
B98
B120

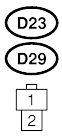
SL76-20B

2. RHD MODEL S903486A2102

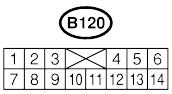


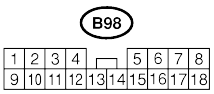
SR76-20A


AUDIO(R)-02
AUDIO(R)-02
B120 RADIO
BRACKET EARTH
B121
B98
R2
R14
D27
AB11
AB14
R11
D21
AB18
AB21
D29
D23
WS : WITH SIDE AIR BAG
OS : WITHOUT SIDE AIR BAG
REAR DOOR SPEAKER RH
REAR DOOR SPEAKER LH
GR


D23
D29


D21
D27
AB11
AB18

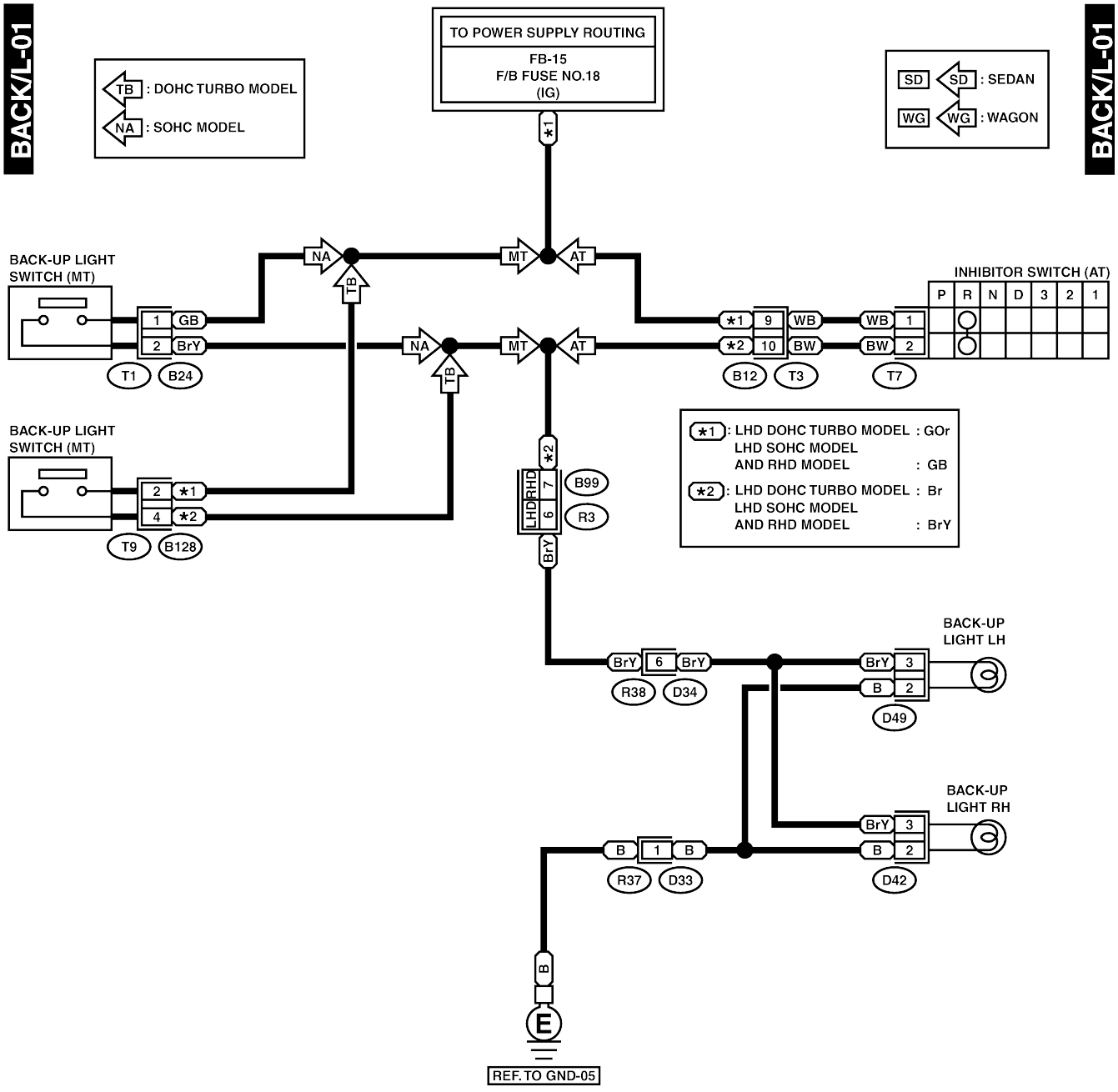

B120

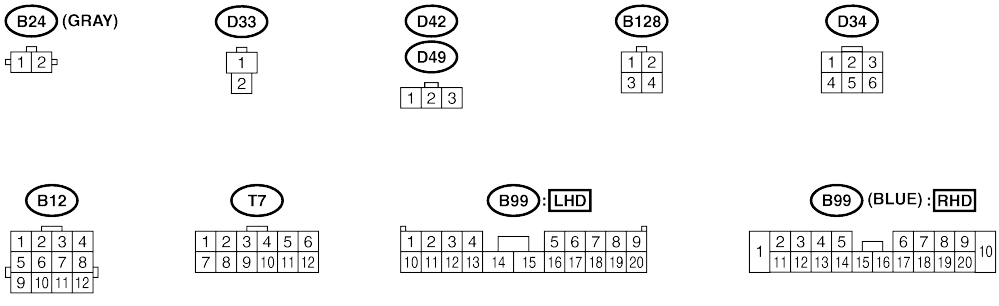

B98

SR76-20B

10. Back-up Light System S903414

A: SCHEMATIC S903414A21

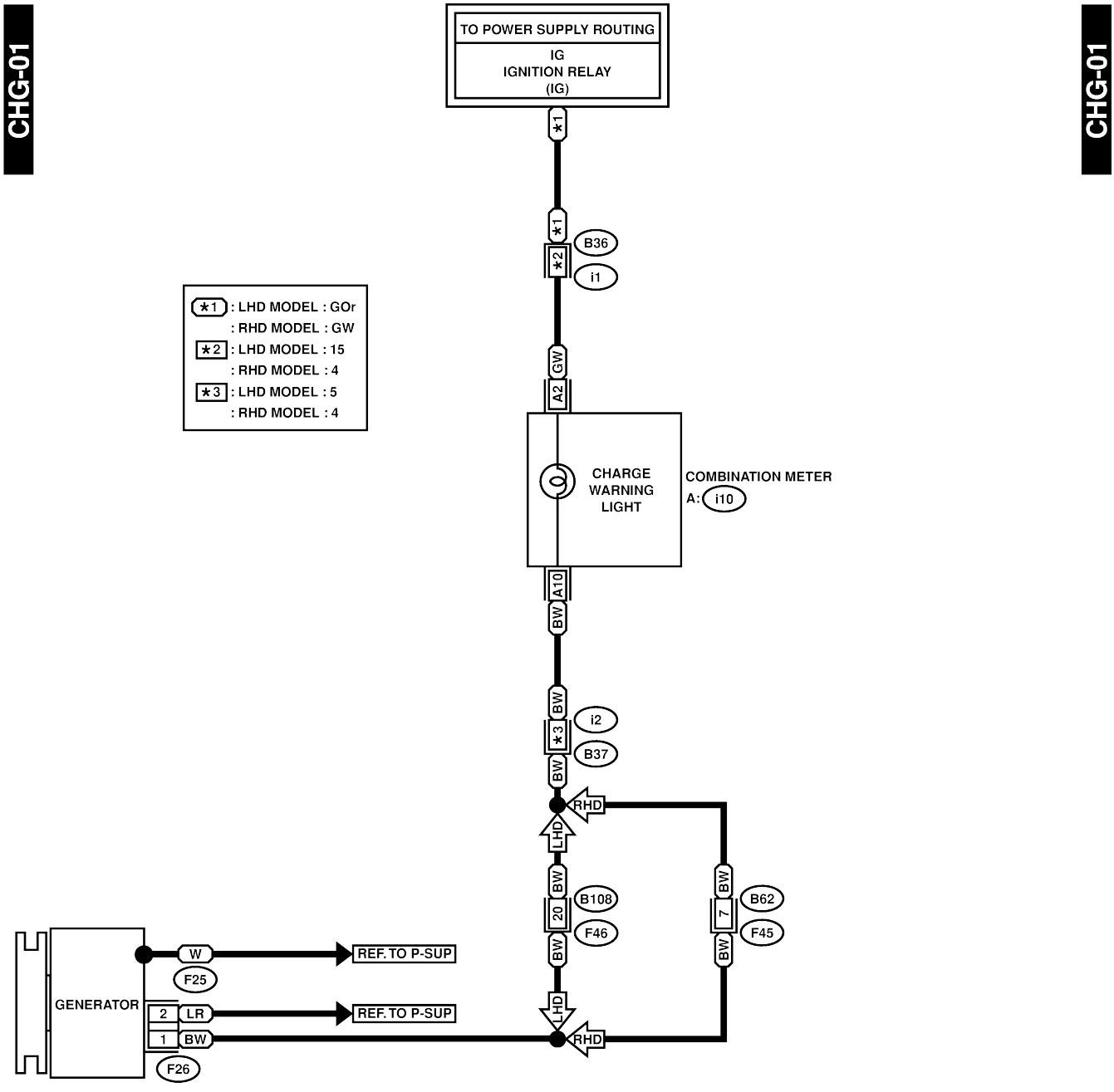




SG29-20

11. Charging System S903487

A: SCHEMATIC S903487A21

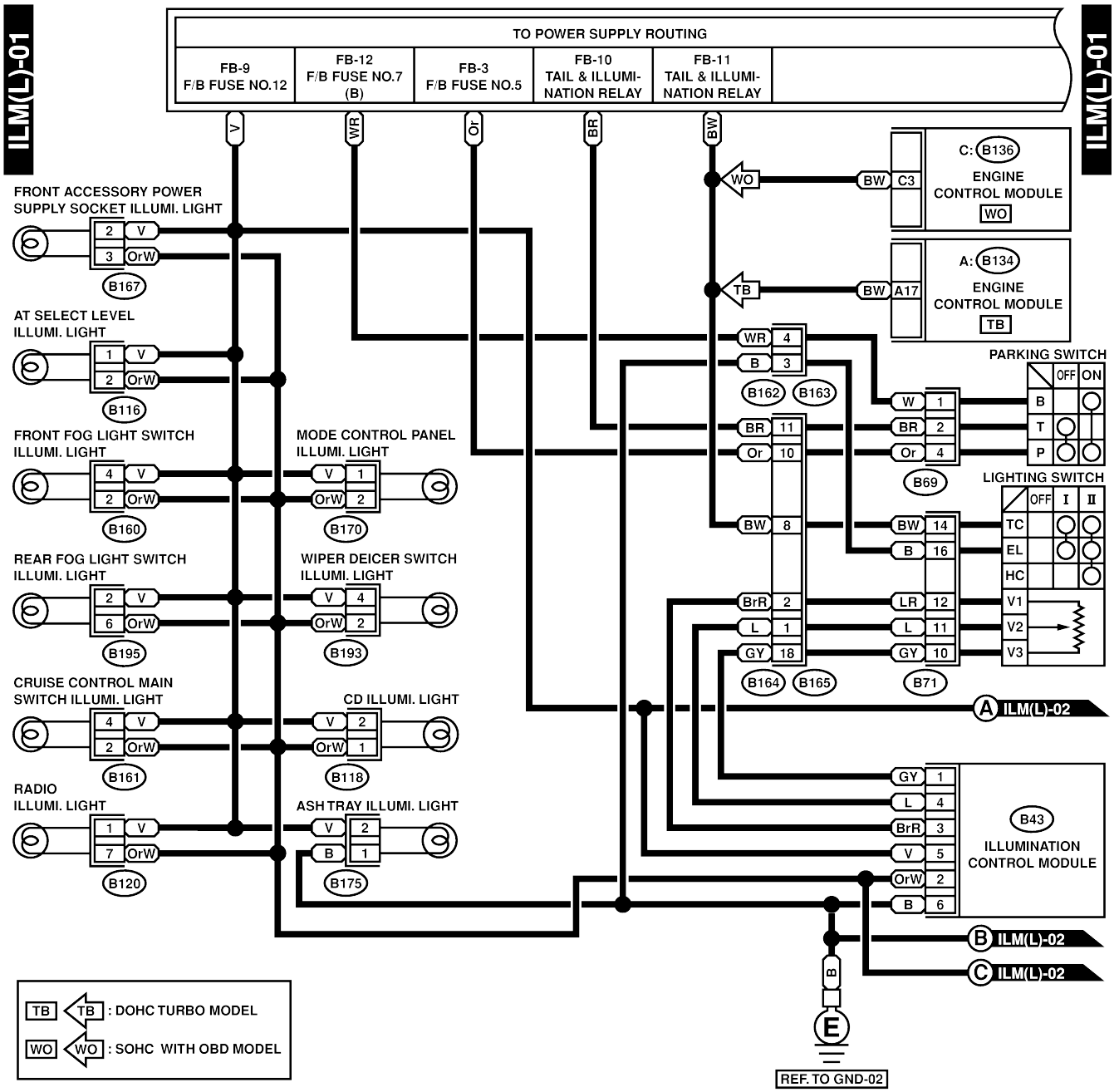


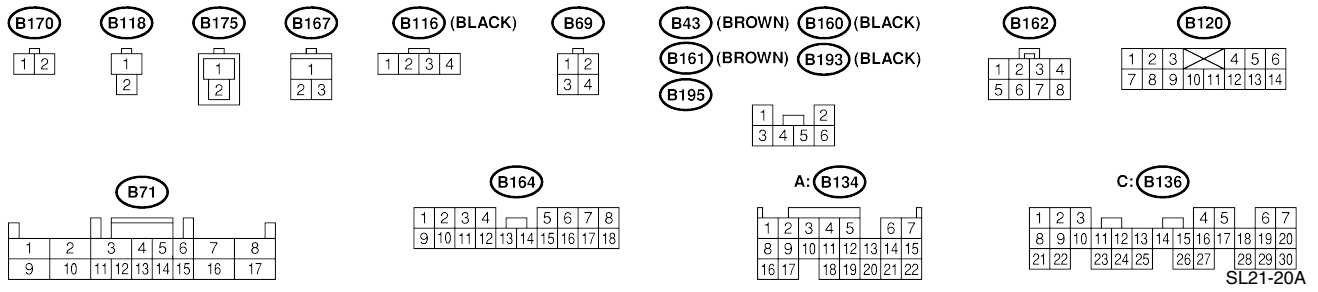
SG02-20

12. Clearance Light and Illumination Light System S903489

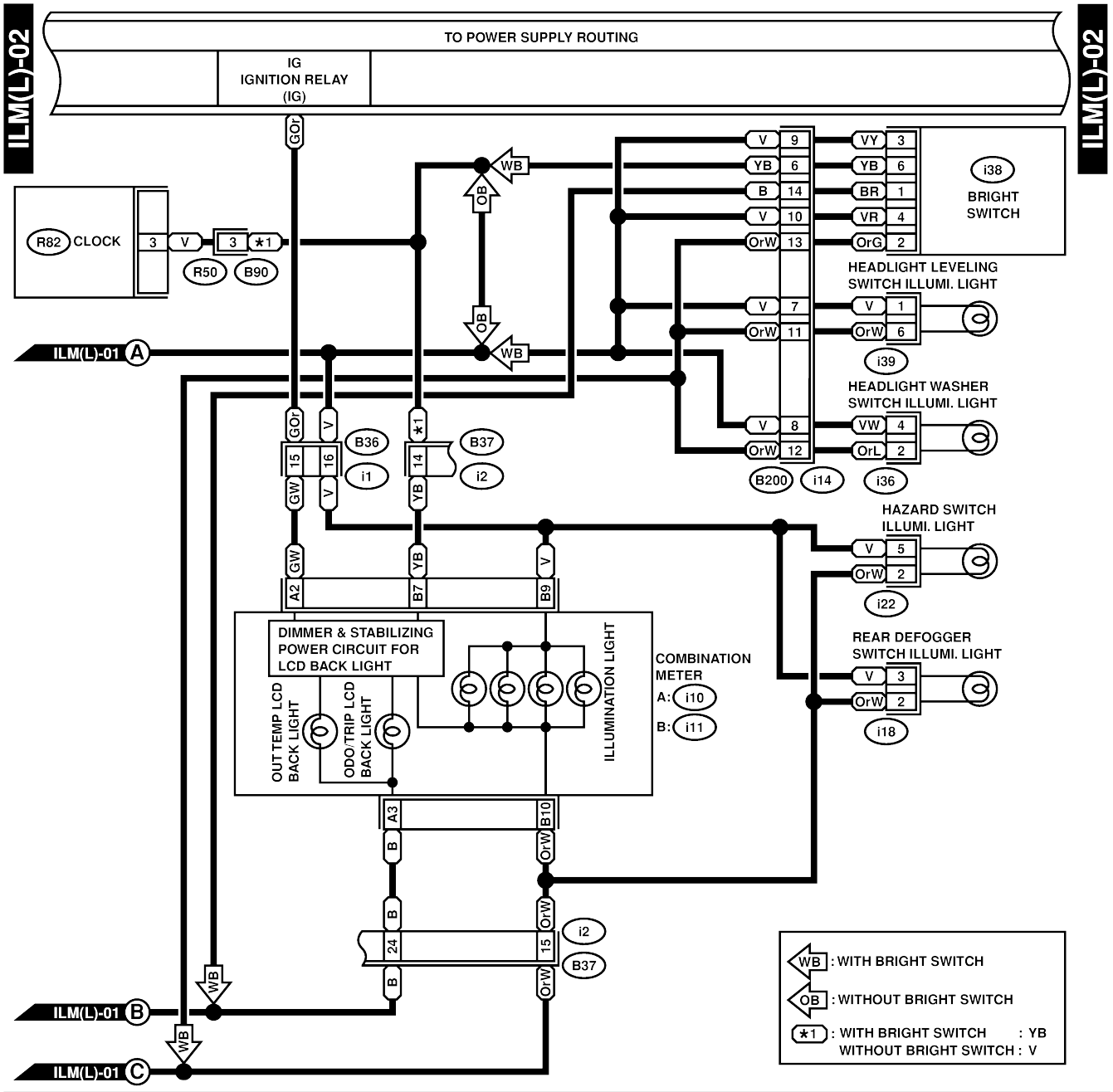
A: SCHEMATIC S903489A21

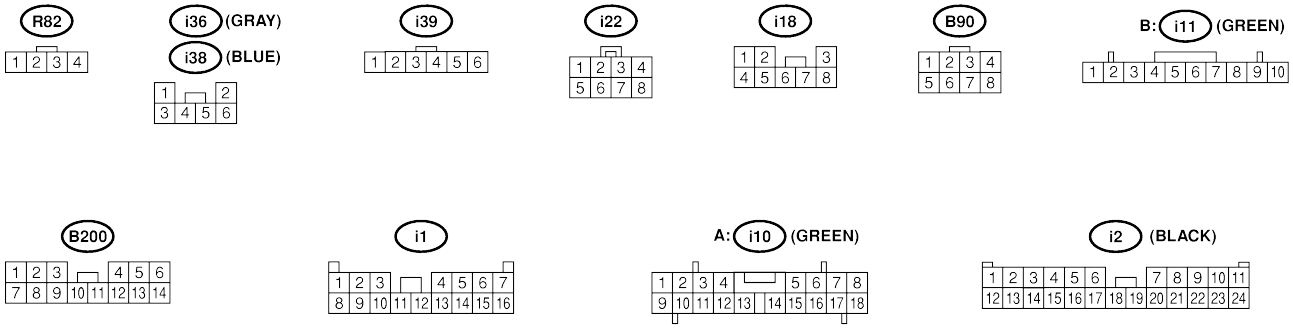
1. LHD MODEL S903489A2101





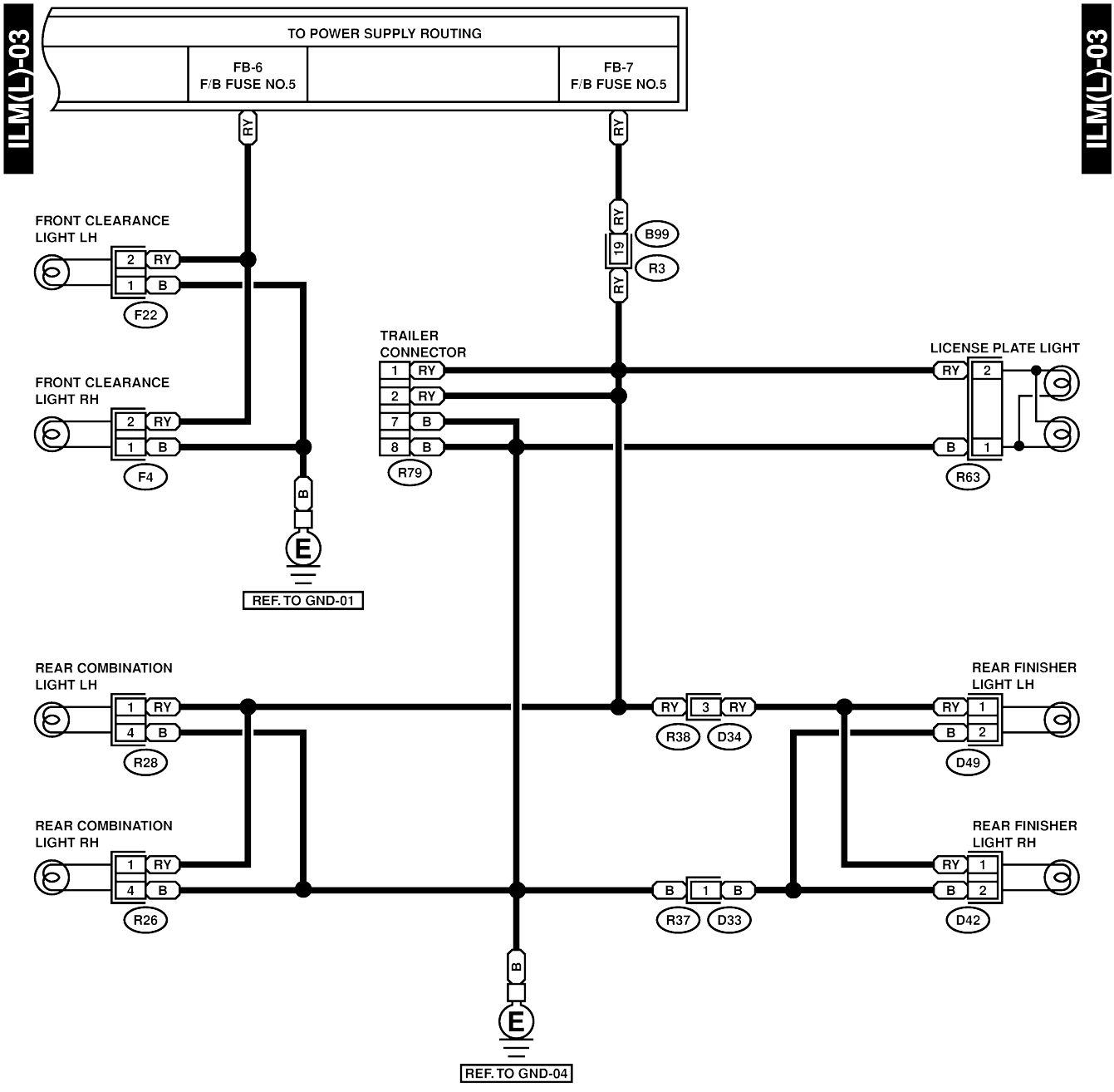
SL21-20A

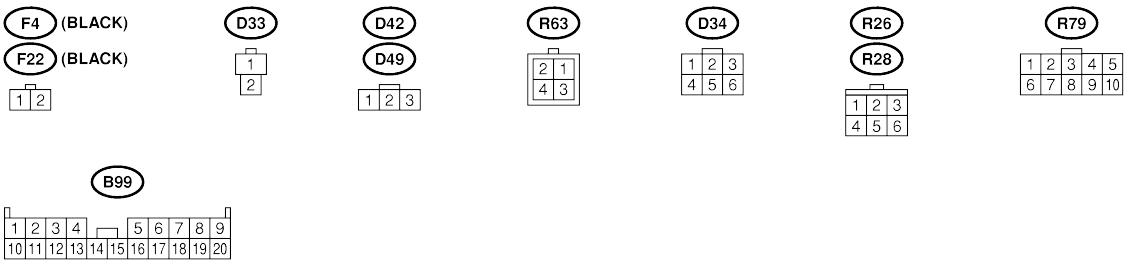

ILM(L)-02
TO POWER SUPPLY ROUTING
IG
IGNITION RELAY
(IG)
ILM(L)-02
R82 CLOCK
R50
B90
ILM(L)-01 A
ILM(L)-01 B
ILM(L)-01 C
WB
OB
B36
B37
i1
i2
i38
BRIGHT SWITCH
HEADLIGHT LEVELING SWITCH ILLUMI. LIGHT
i39
HEADLIGHT WASHER SWITCH ILLUMI. LIGHT
B200
i14
i36
HAZARD SWITCH ILLUMI. LIGHT
i22
REAR DEFOGGER SWITCH 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
WB : WITH BRIGHT SWITCH
OB : WITHOUT BRIGHT SWITCH
*1 : WITH BRIGHT SWITCH : YB
WITHOUT BRIGHT SWITCH : V


R82
i36 (GRAY)
i38 (BLUE)
i39
i22
i18
B90
B: i11 (GREEN)
B200
i1
A: i10 (GREEN)
i2 (BLACK)

SL21-20B

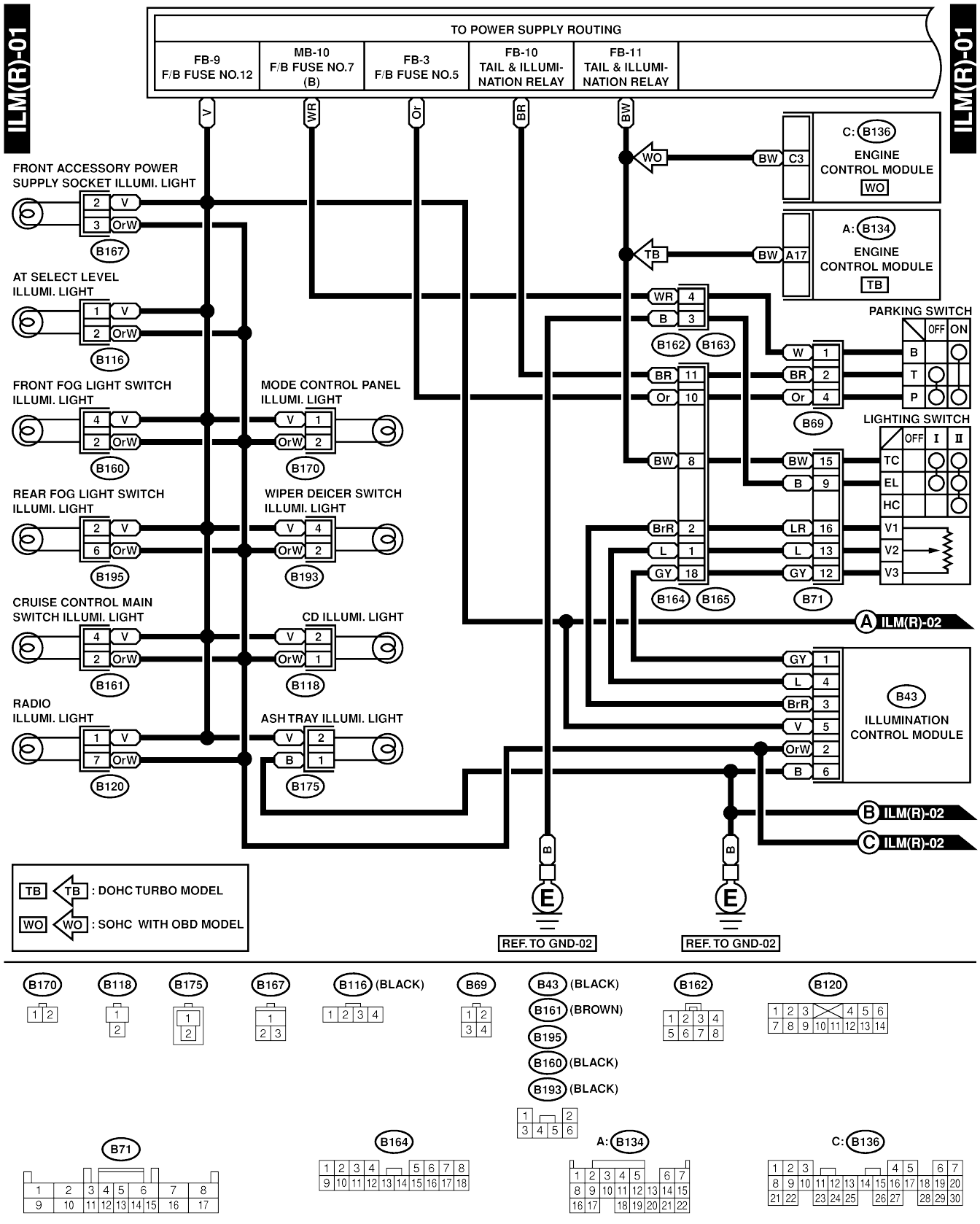
CLEARANCE LIGHT AND ILLUMINATION LIGHT SYSTEM





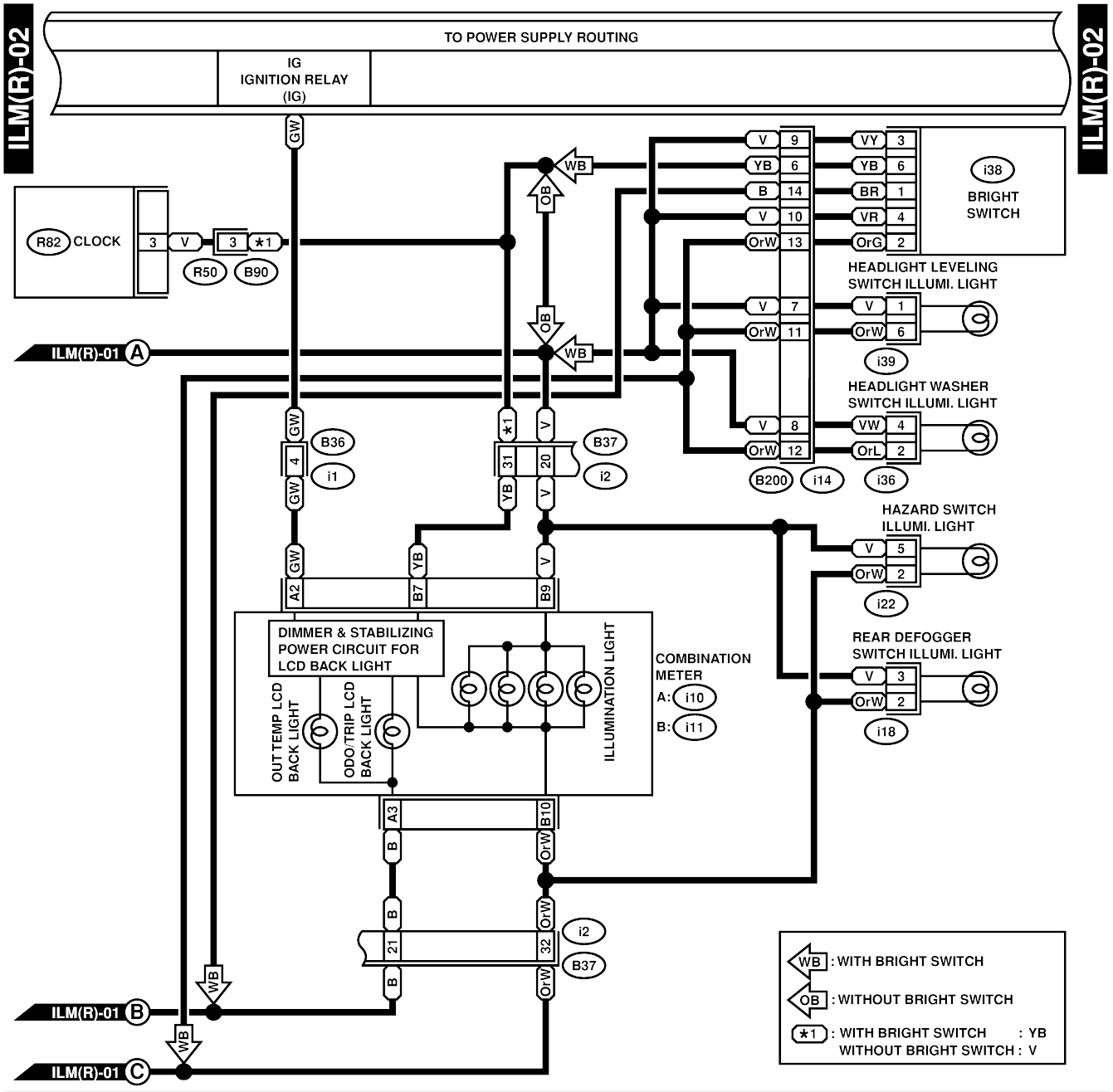
SL21-20C

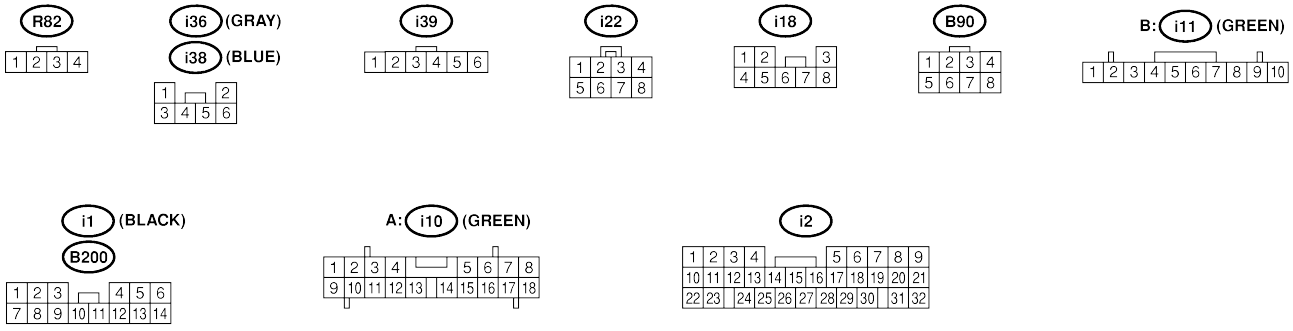
2. RHD MODEL S903489A2102



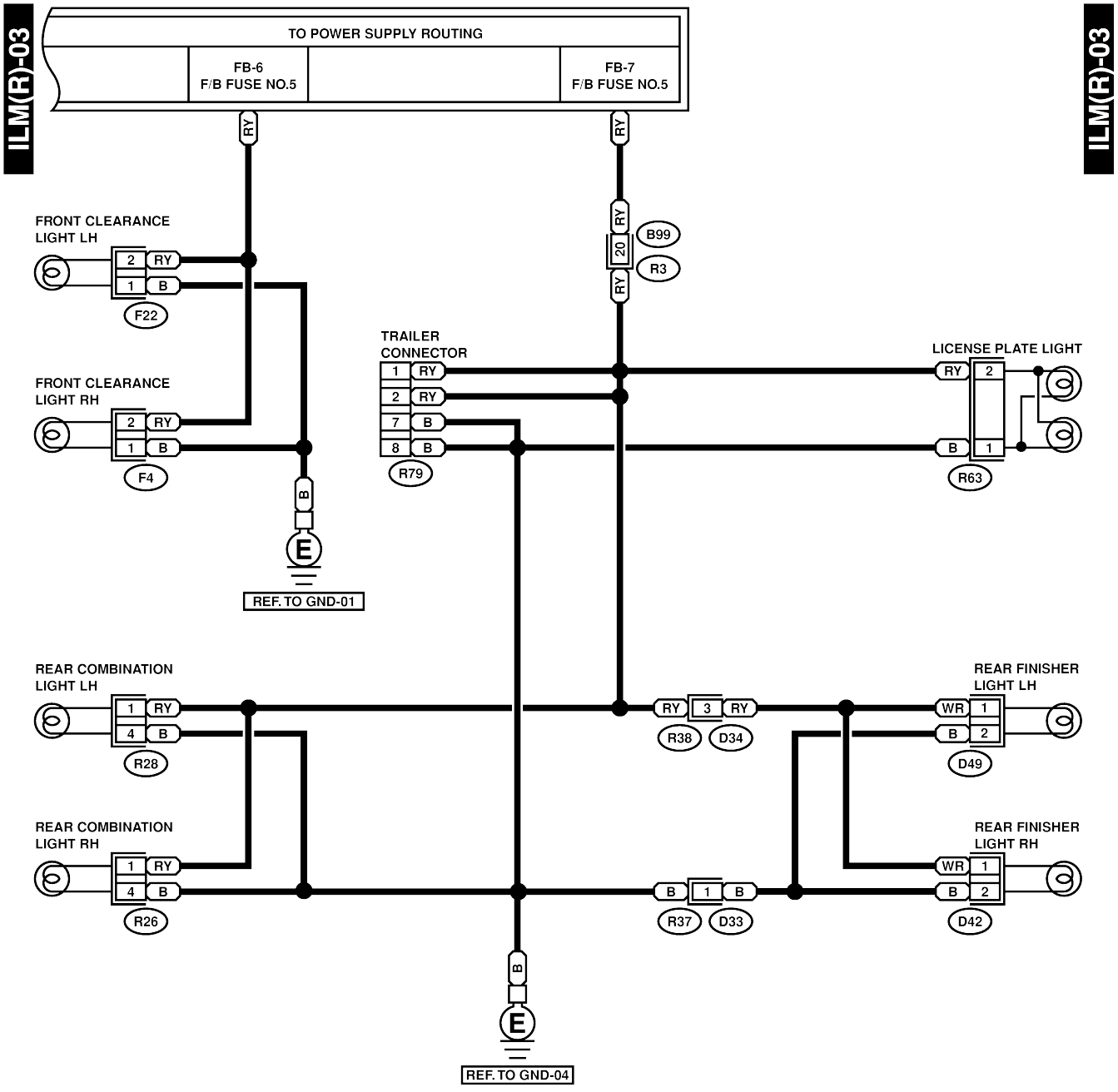
SR21-20A

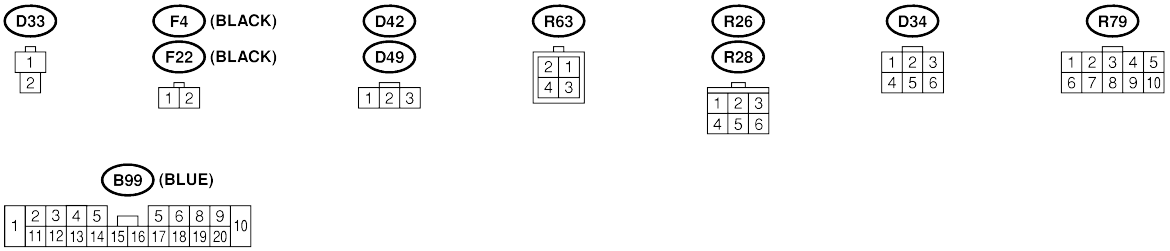
CLEARANCE LIGHT AND ILLUMINATION LIGHT SYSTEM





SR21-20B


ILM(R)-03
ILM(R)-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
F22
F4
TRAILER CONNECTOR
R79
B99
R3
LICENSE PLATE LIGHT
R63
REF. TO GND-01
REAR COMBINATION LIGHT LH
REAR COMBINATION LIGHT RH
R28
R26
R38
D34
R37
D33
REAR FINISHER LIGHT LH
REAR FINISHER LIGHT RH
D49
D42
REF. TO GND-04

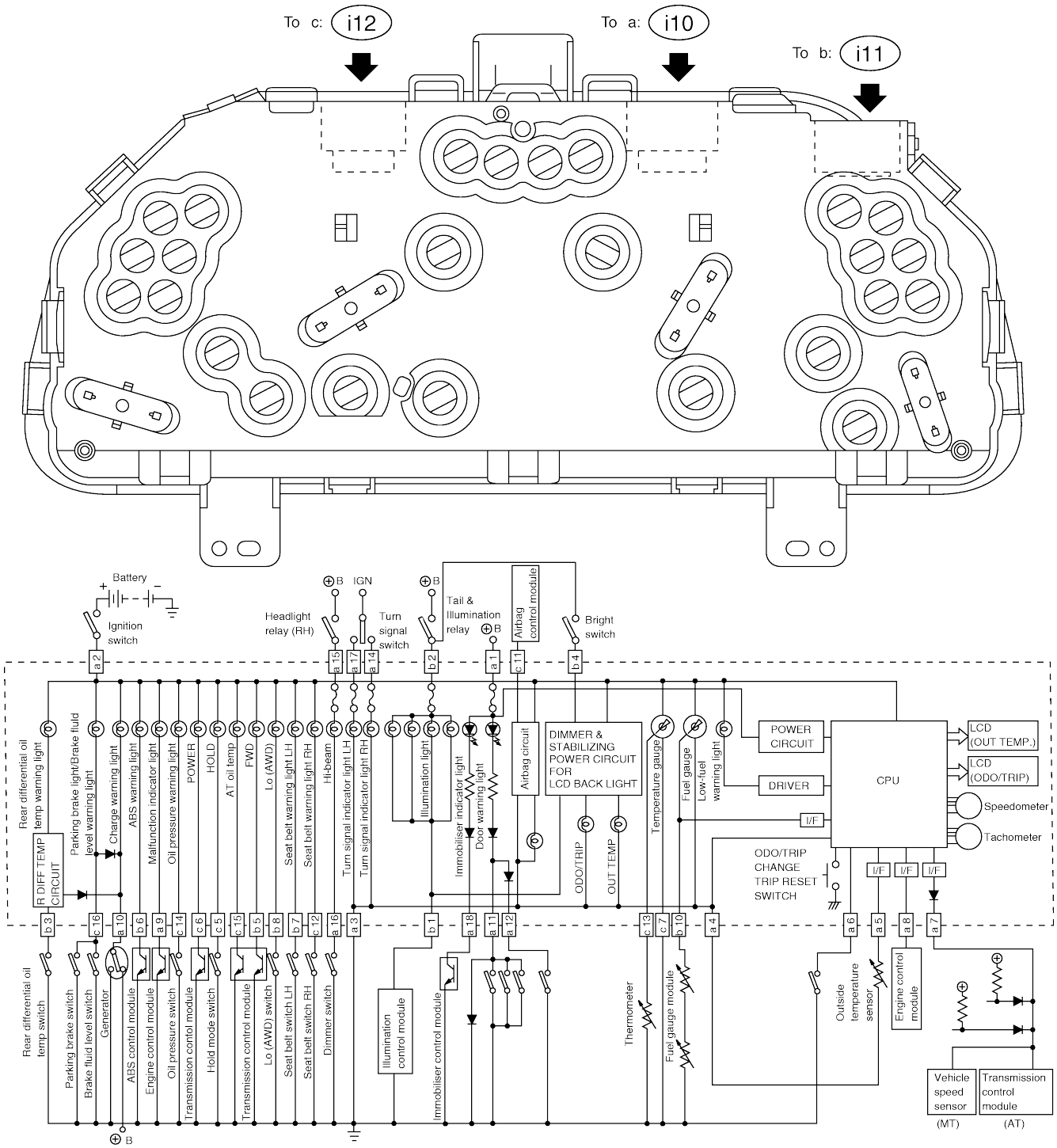

D33
F4 (BLACK)
F22 (BLACK)
D42
D49
R63
R26
R28
D34
R79

B99 (BLUE)

SR21-20C

13. Combination Meter S903488

A: SCHEMATIC S903488A21



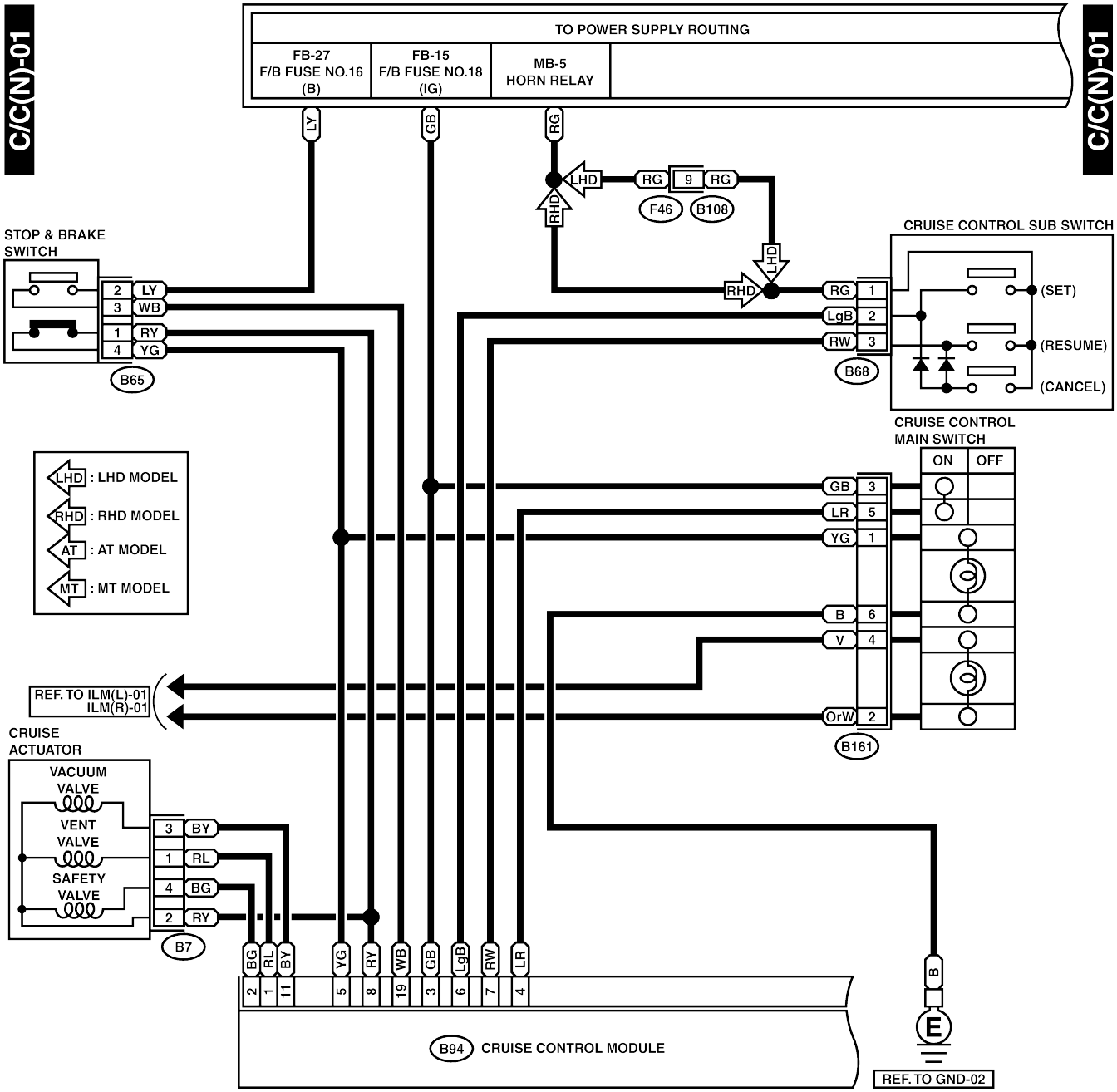
SG64-03

MEMO:

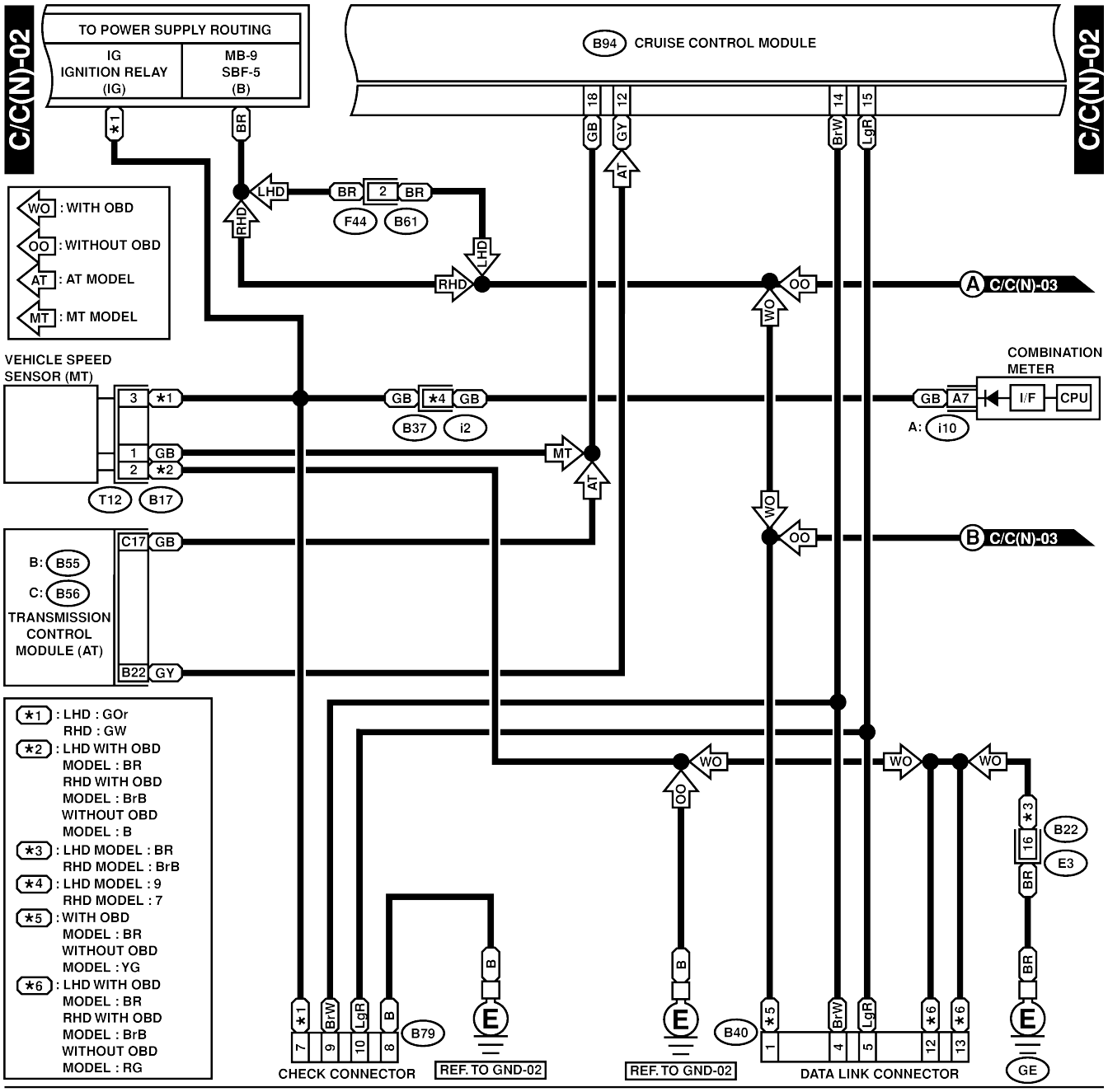
14. Cruise Control System S903495

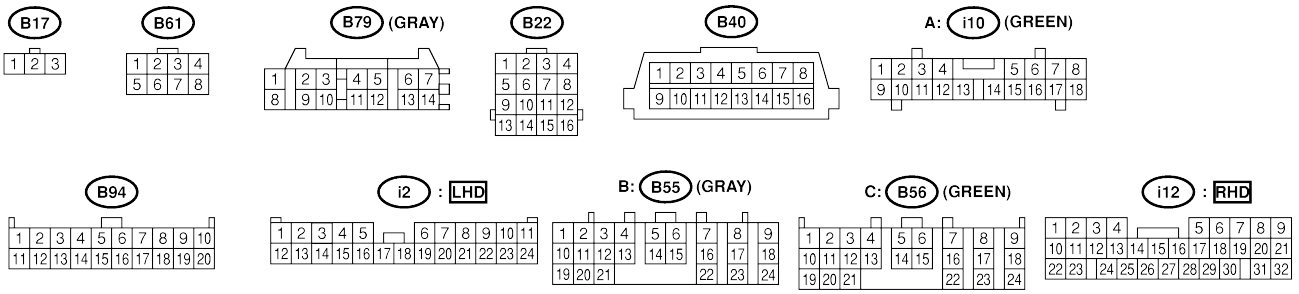
A: SCHEMATIC S903495A21

1. NON-TURBO MODEL S903495A2109



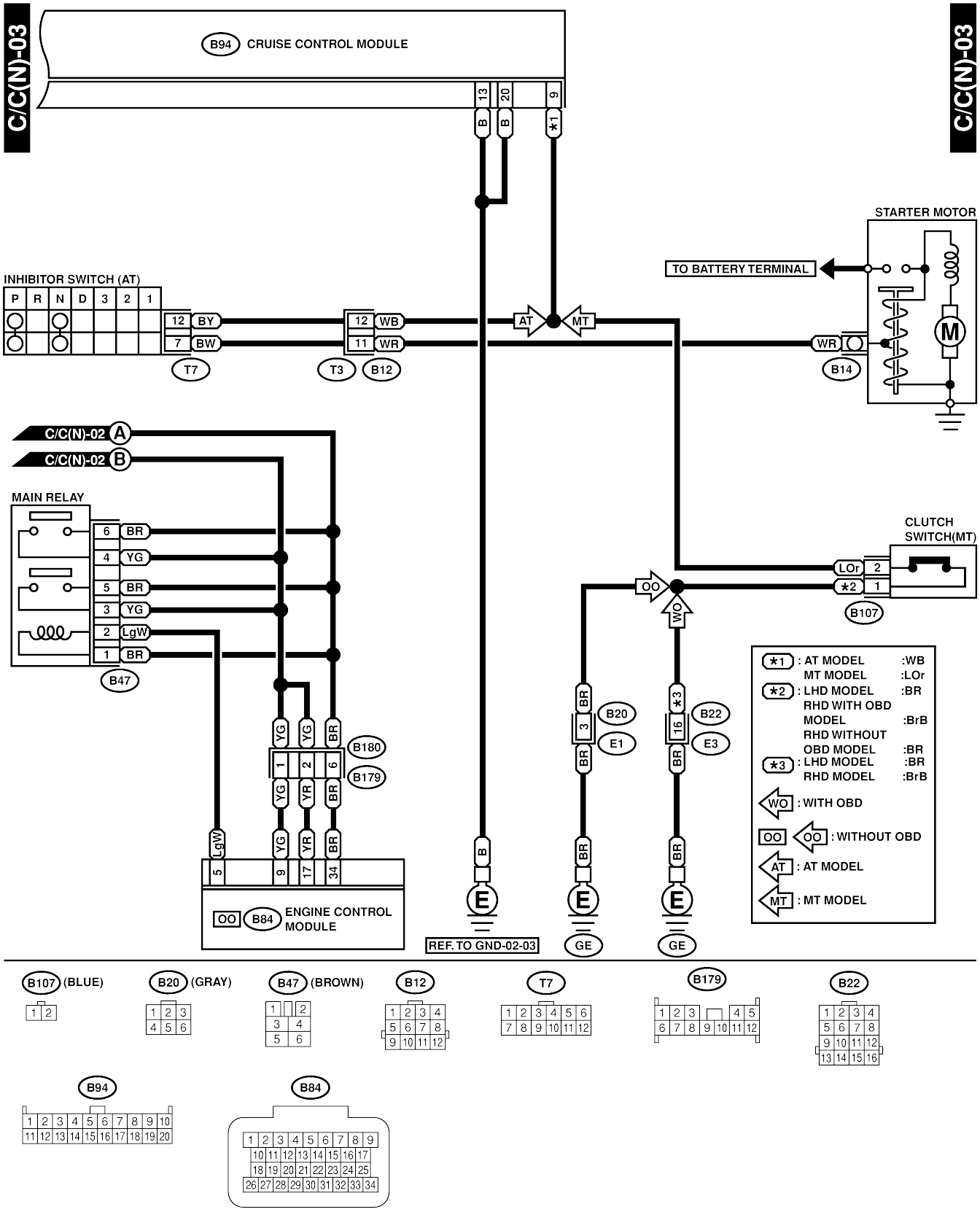
SG71-21A


C/C(N)-02
TO POWER SUPPLY ROUTING
IG
IGNITION RELAY
(IG)
MB-9
SBF-5
(B)
B94 CRUISE CONTROL MODULE
WO : WITH OBD
OO : WITHOUT OBD
AT : AT MODEL
MT : MT MODEL
LHD
RHD
F44
B61
A C/C(N)-03
B C/C(N)-03
VEHICLE SPEED SENSOR (MT)
COMBINATION METER
I/F
CPU
A: i10
T12
B17
B37
i2
B: B55
C: B56
TRANSMISSION CONTROL MODULE (AT)
*1 : LHD : GOr
RHD : GW
*2 : LHD WITH OBD MODEL : BR
RHD WITH OBD MODEL : BrB
WITHOUT OBD MODEL : B
*3 : LHD MODEL : BR
RHD MODEL : BrB
*4 : LHD MODEL : 9
RHD MODEL : 7
*5 : WITH OBD MODEL : BR
WITHOUT OBD MODEL : YG
*6 : LHD WITH OBD MODEL : BR
RHD WITH OBD MODEL : BrB
WITHOUT OBD MODEL : RG
CHECK CONNECTOR
REF. TO GND-02
REF. TO GND-02
DATA LINK CONNECTOR
GE
B79
B40
B22
E3


B17
B61
B79 (GRAY)
B22
B40
A: i10 (GREEN)
B94
i2 : LHD
B: B55 (GRAY)
C: B56 (GREEN)
i12 : RHD

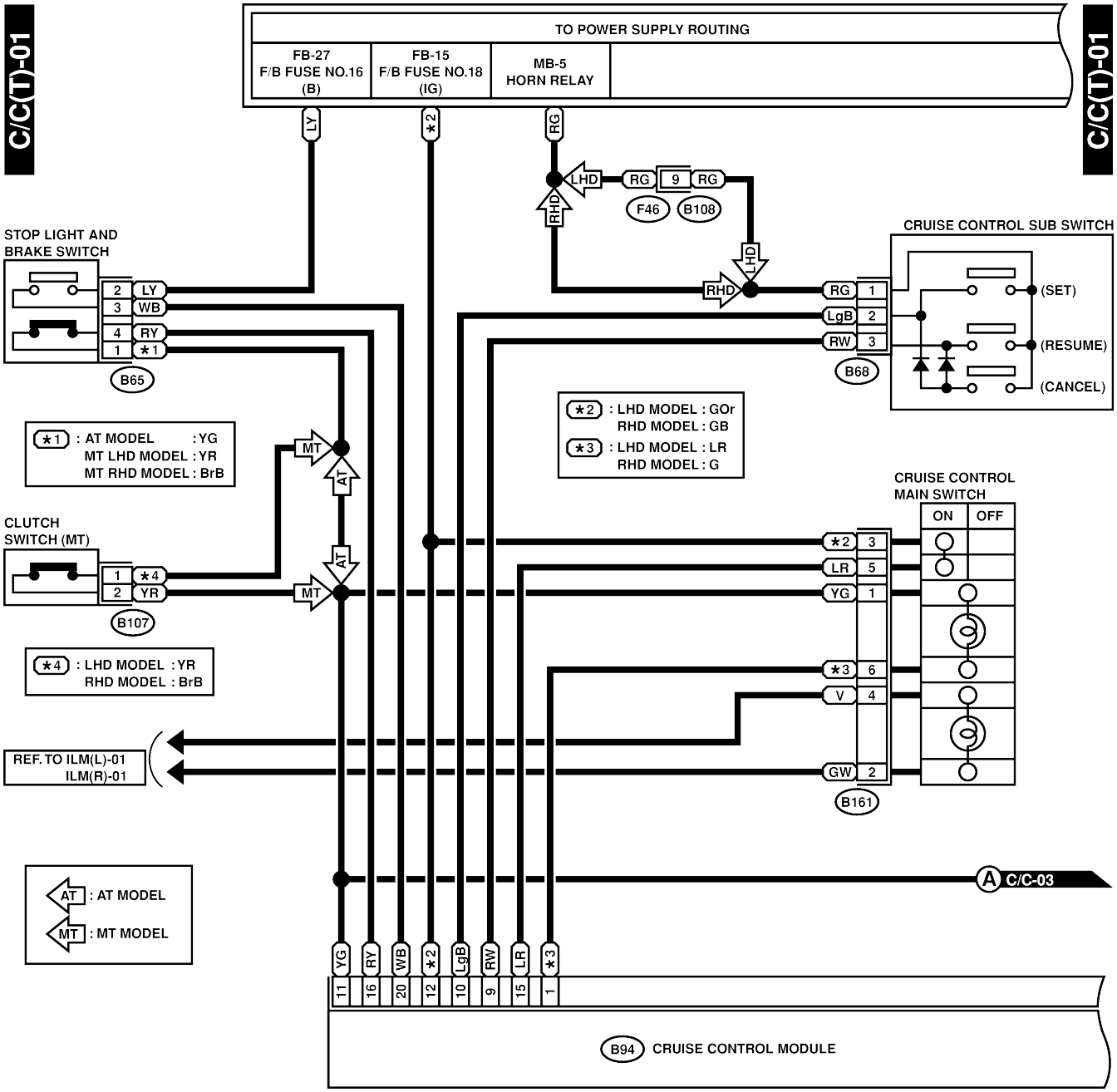
SG71-21B

CRUISE CONTROL SYSTEM



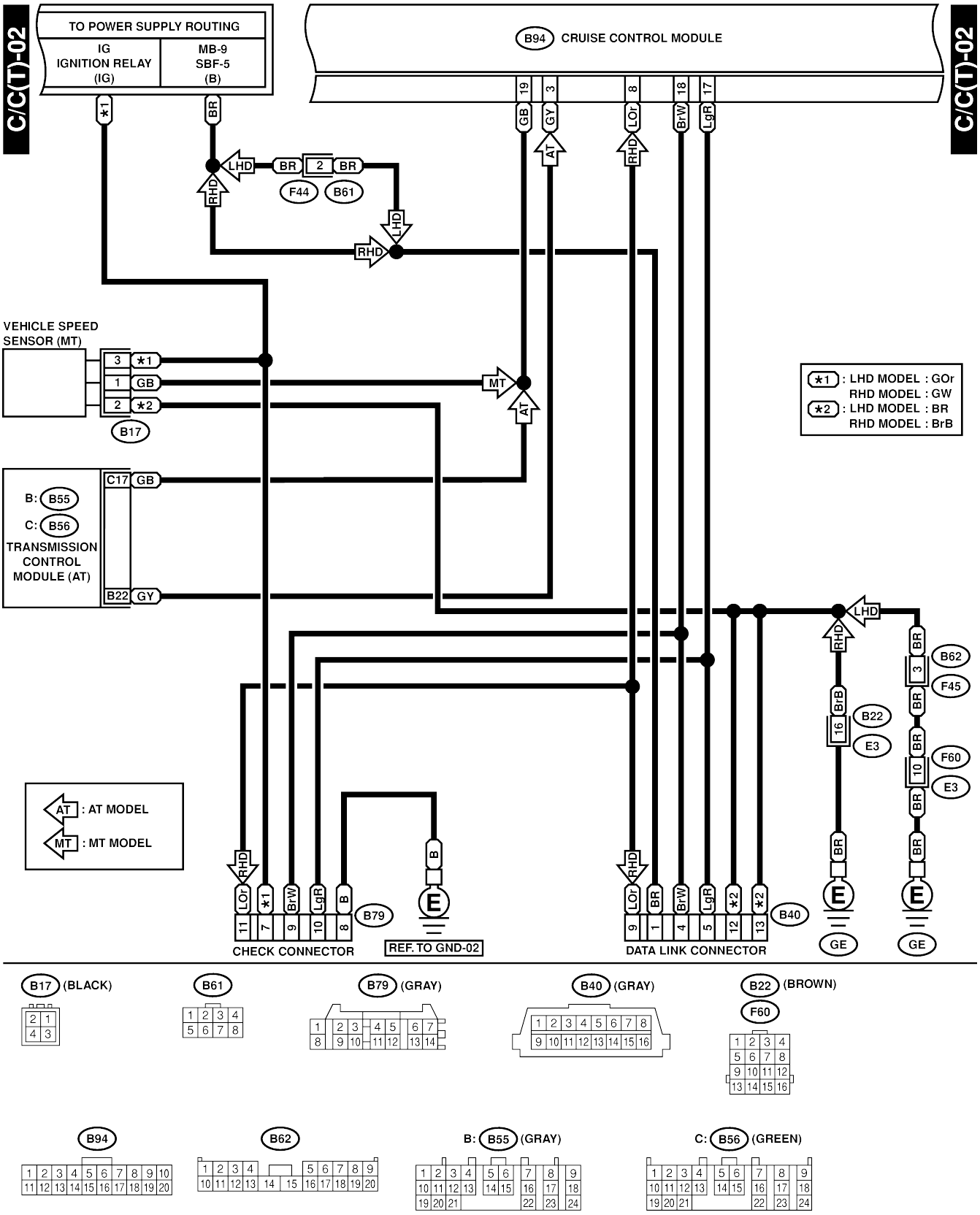
SG71-21C

2. TURBO MODEL S903495A2110

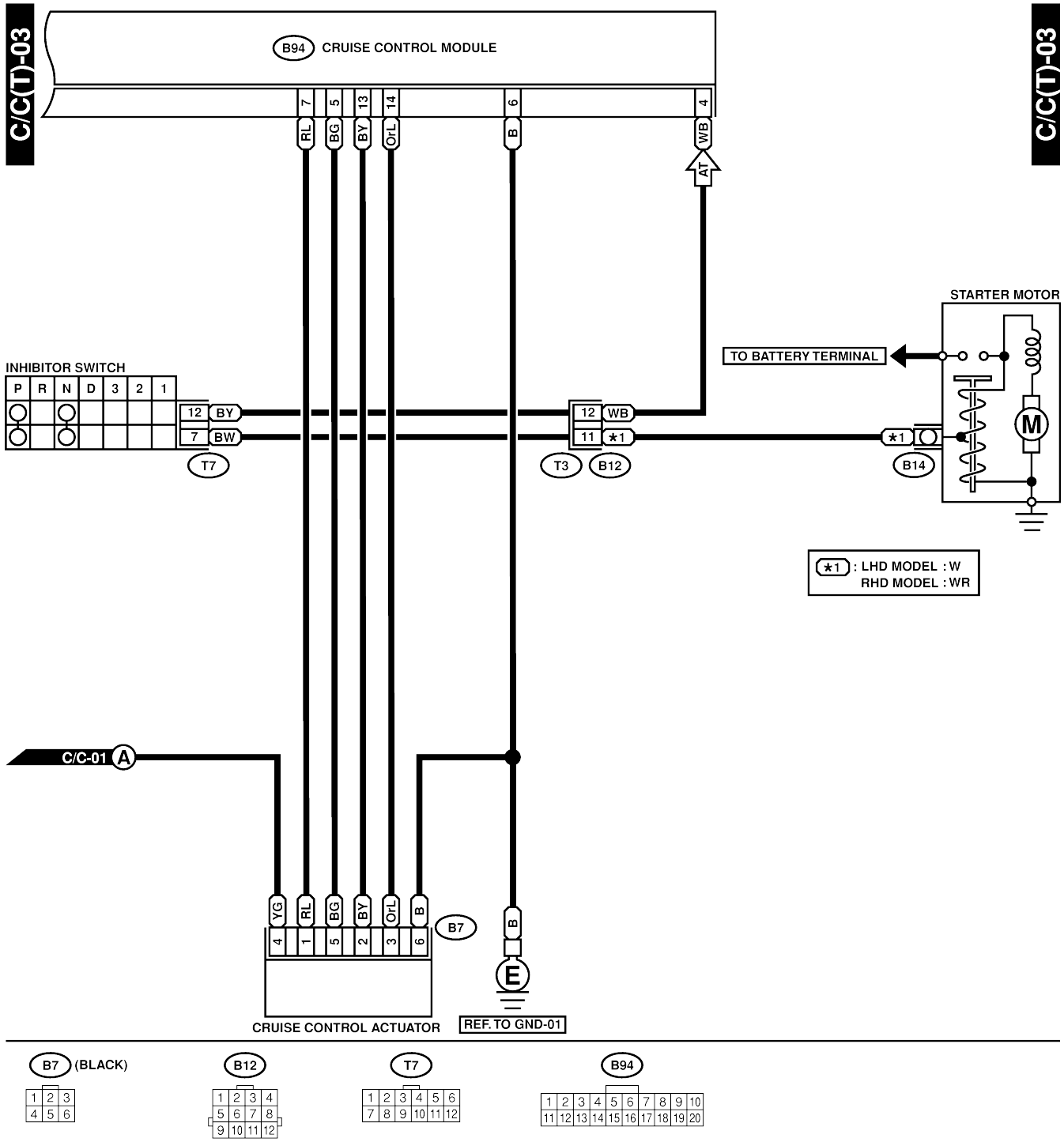


SG71-20A

CRUISE CONTROL SYSTEM



SG71-20B


C/C(T)-03
C/C(T)-03
B94 CRUISE CONTROL MODULE
7 5 13 14 6 4
RL BG BY OrL B WB
AT
STARTER MOTOR
TO BATTERY TERMINAL
INHIBITOR SWITCH
P R N D 3 2 1
12 BY
7 BW
T7
12 WB
11 *1
T3 B12
*1
B14
M
*1 : LHD MODEL : W
RHD MODEL : WR
C/C-01 A
YG RL BG BY OrL B
4 1 5 2 3 6
B7
B
E
CRUISE CONTROL ACTUATOR
REF. TO GND-01

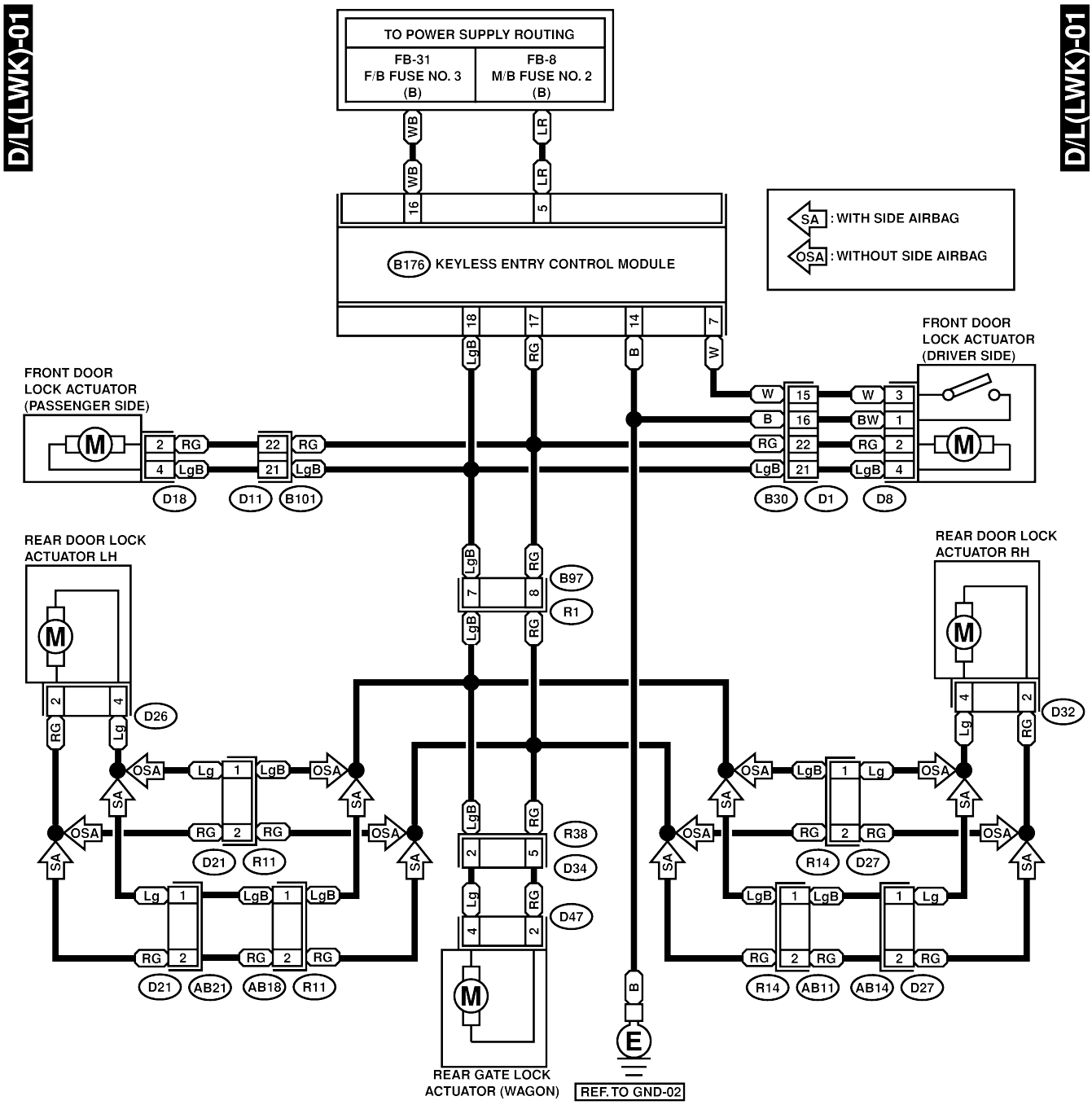
B7 (BLACK)
1 2 3
4 5 6
B12
1 2 3 4
5 6 7 8
9 10 11 12
T7
1 2 3 4 5 6
7 8 9 10 11 12
B94
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20

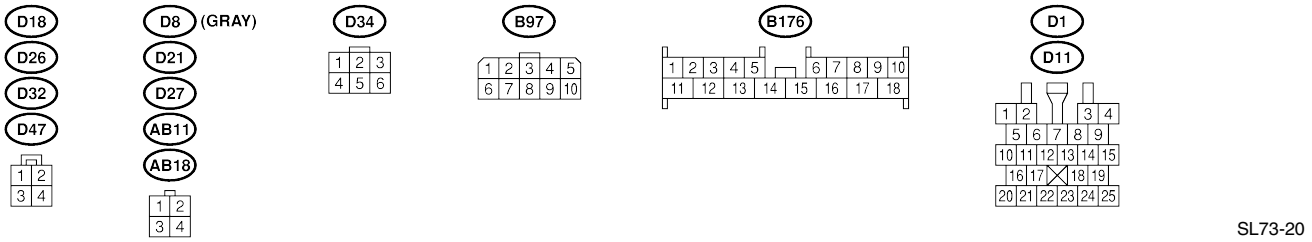
SG71-20C

15. Door Lock System S903490

A: SCHEMATIC S903490A21

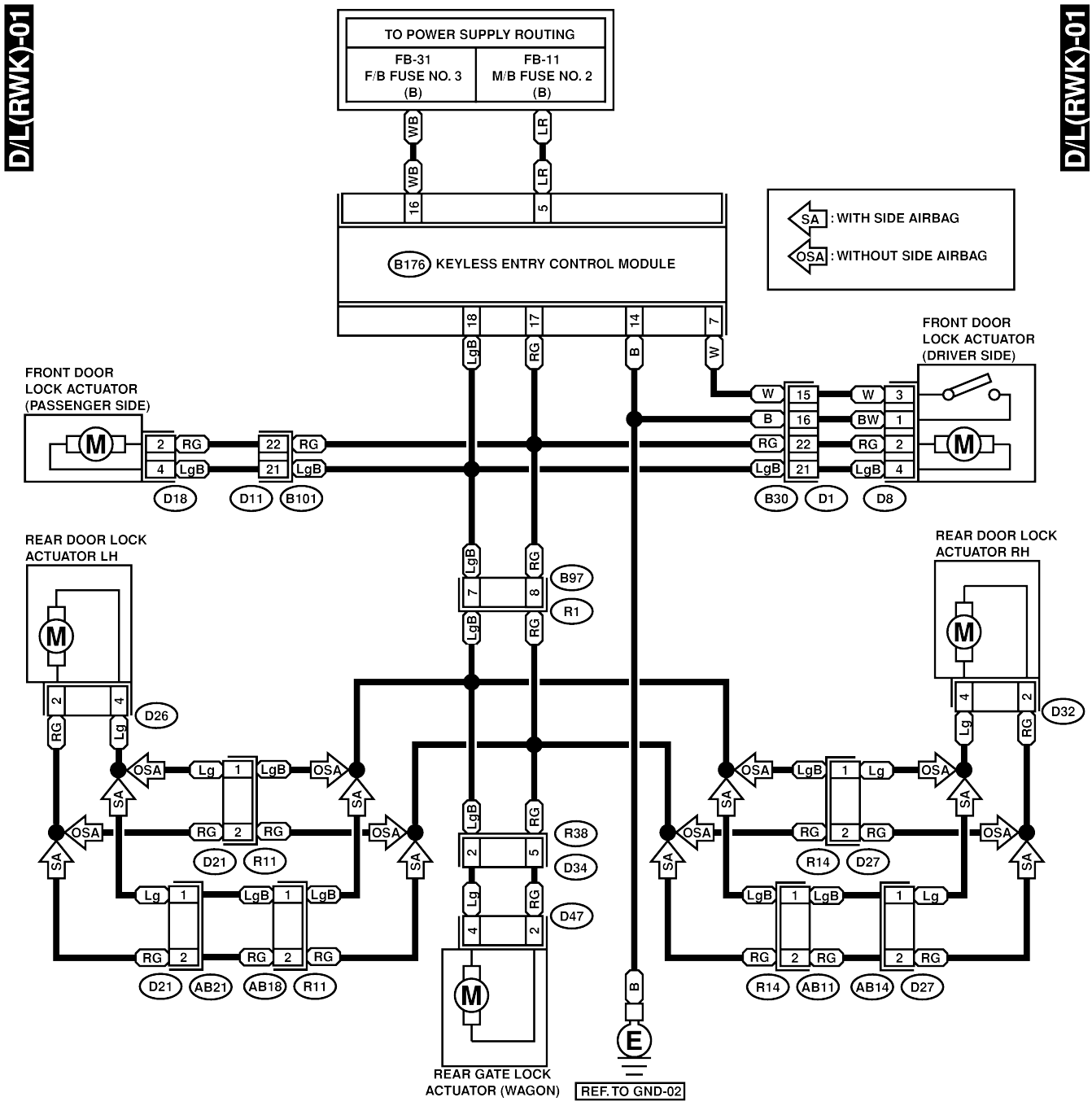
1. LHD WITH KEYLESS ENTRY MODEL S903490A2105

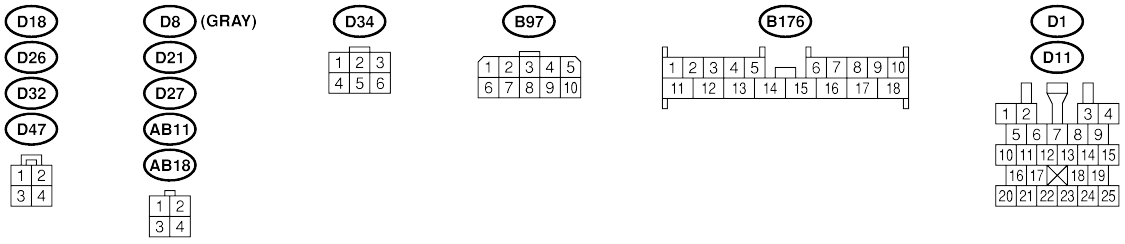




SL73-20

2. RHD WITH KEYLESS ENTRY MODEL S903490A2106



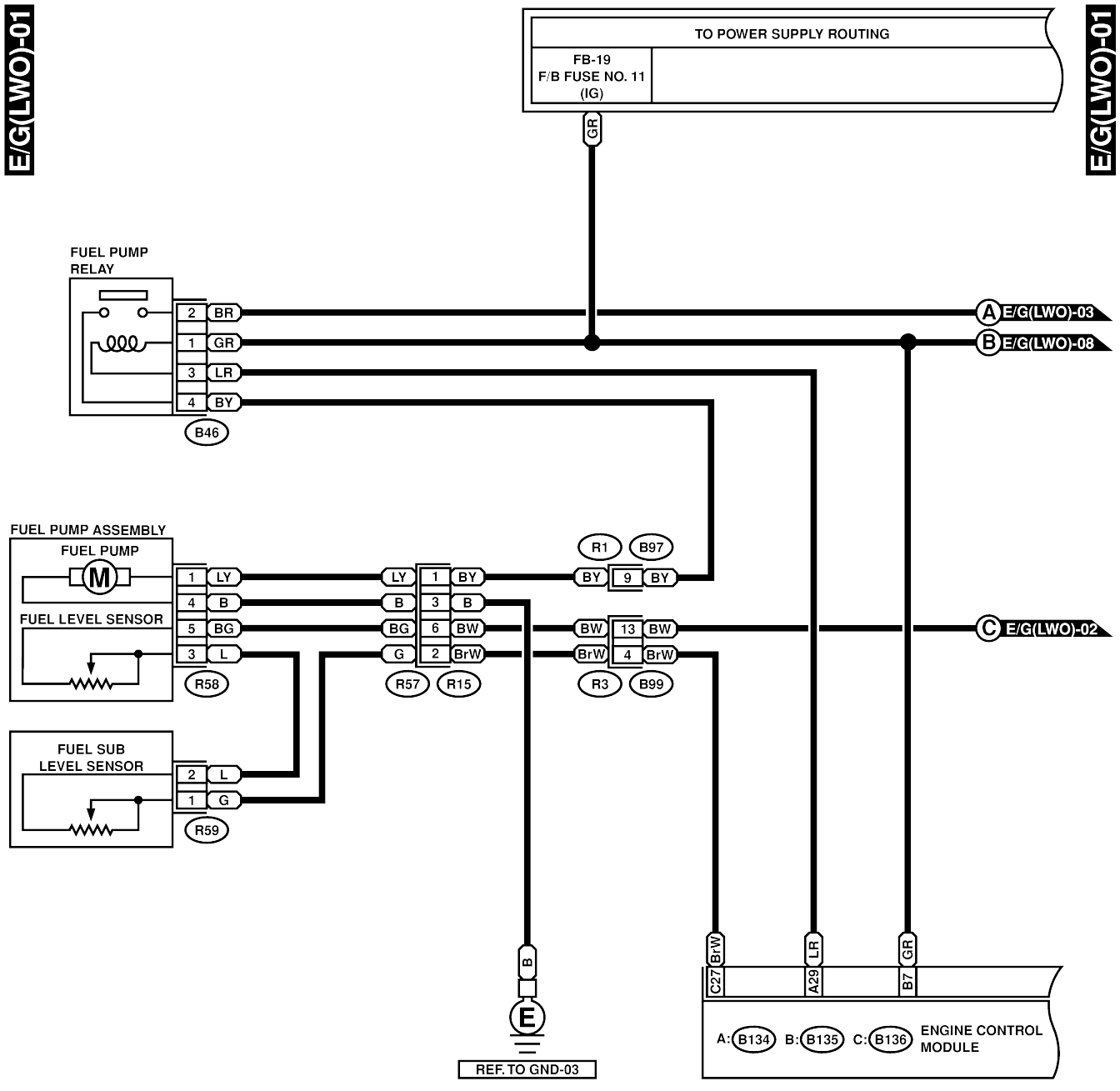


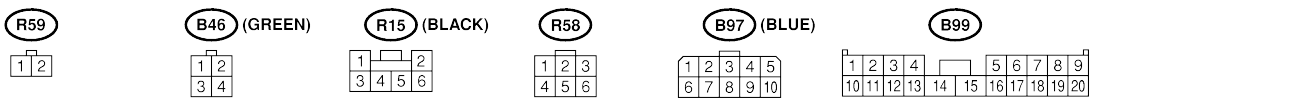
SR73-20

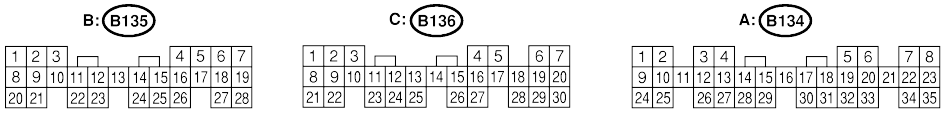
16. Engine Electrical System S903482

A: SCHEMATIC S903482A21

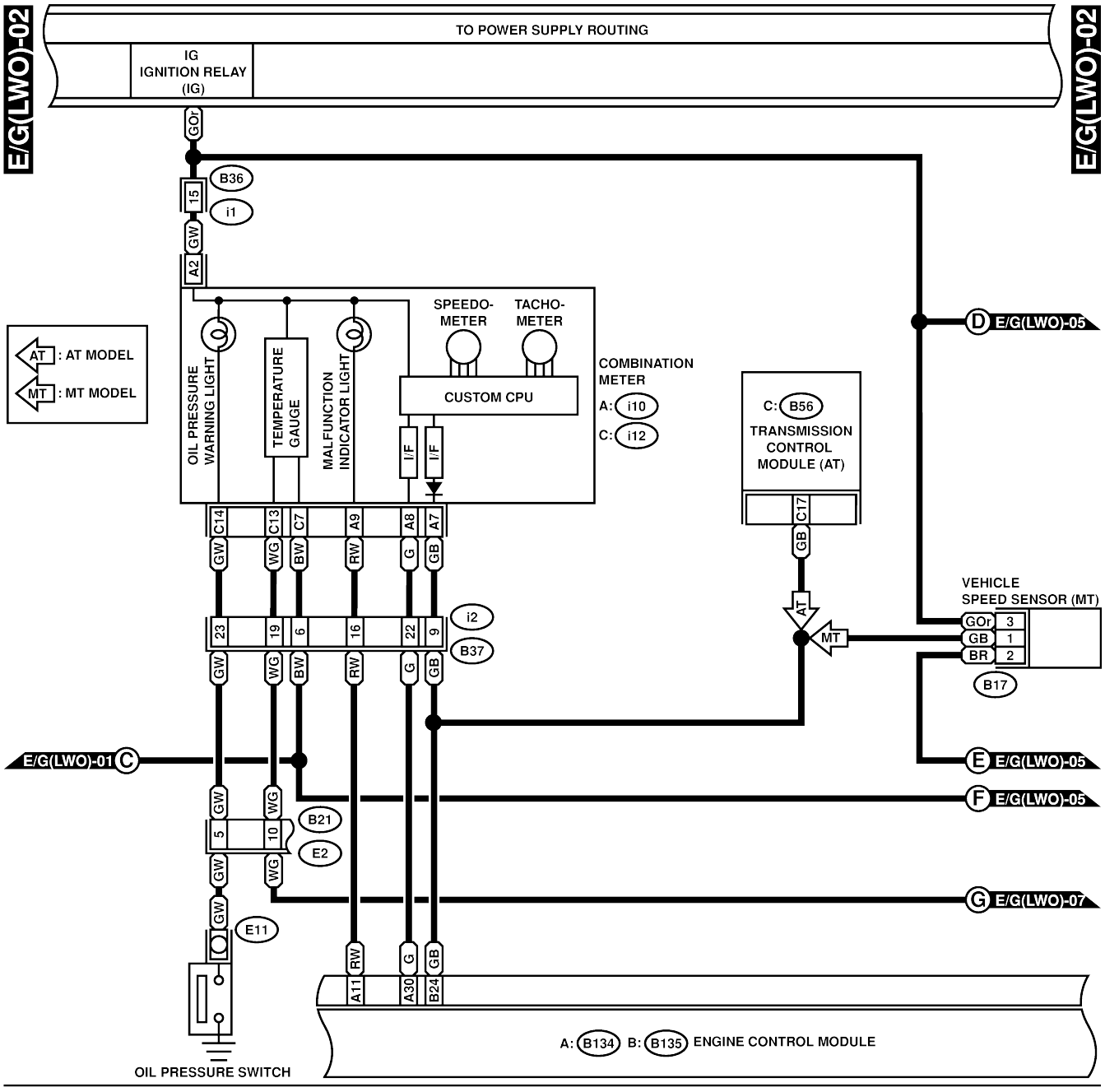
1. LHD SOHC MODEL S903482A2121

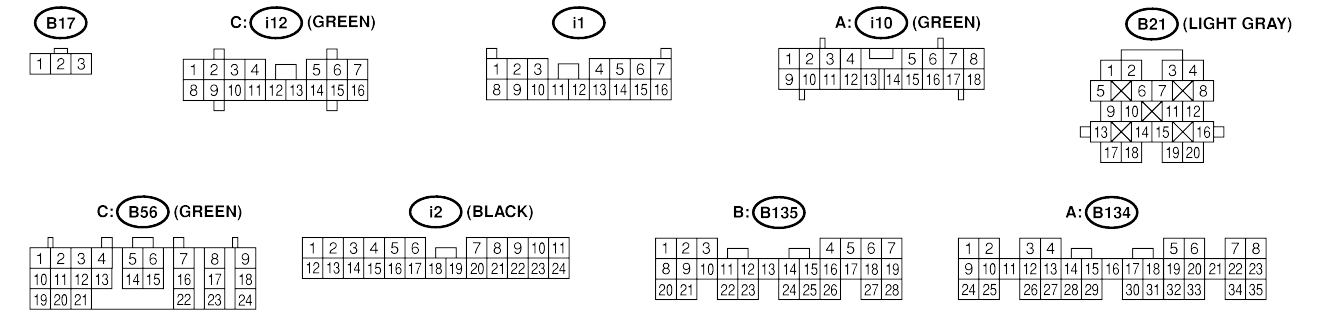




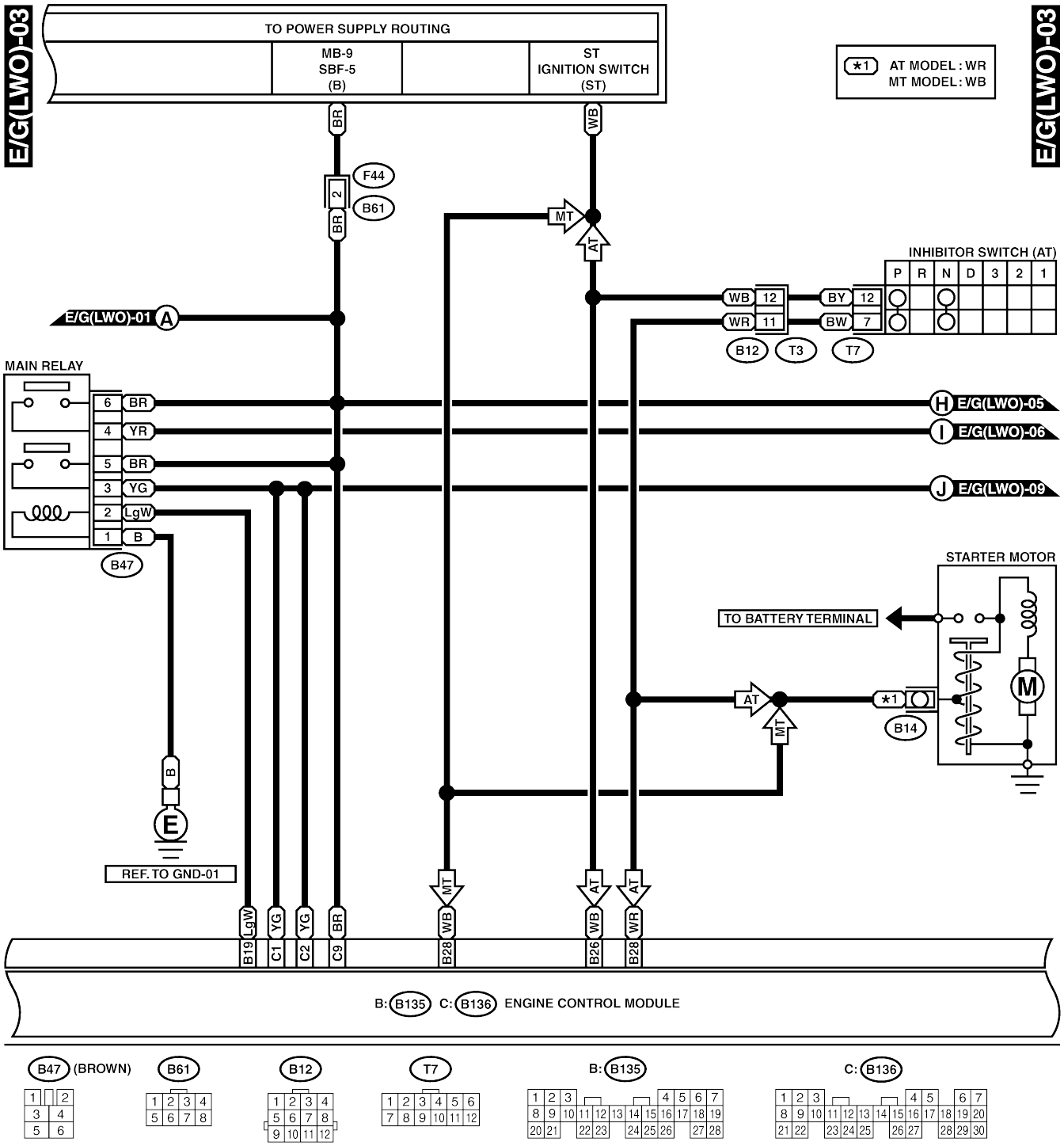


SL10-20A


E/G(LWO)-02
TO POWER SUPPLY ROUTING
IG
IGNITION RELAY
(IG)
GOr
B36
15
i1
GW
A2
AT : AT MODEL
MT : MT MODEL
SPEEDO-METER
TACHO-METER
OIL PRESSURE WARNING LIGHT
TEMPERATURE GAUGE
MALFUNCTION INDICATOR LIGHT
CUSTOM CPU
I/F
I/F
COMBINATION METER
A: i10
C: i12
C: B56
TRANSMISSION CONTROL MODULE (AT)
C17
GB
AT
MT
D E/G(LWO)-05
VEHICLE SPEED SENSOR (MT)
GOr 3
GB 1
BR 2
B17
C14
C13
C7
A9
A8
A7
GW
WG
BW
RW
G
GB
23
19
6
16
22
9
i2
B37
E/G(LWO)-01 C
E E/G(LWO)-05
F E/G(LWO)-05
G E/G(LWO)-07
5
10
B21
E2
E11
A11
A30
B24
OIL PRESSURE SWITCH
A: B134 B: B135 ENGINE CONTROL MODULE


B17
C: i12 (GREEN)
i1
A: i10 (GREEN)
B21 (LIGHT GRAY)
C: B56 (GREEN)
i2 (BLACK)
B: B135
A: B134

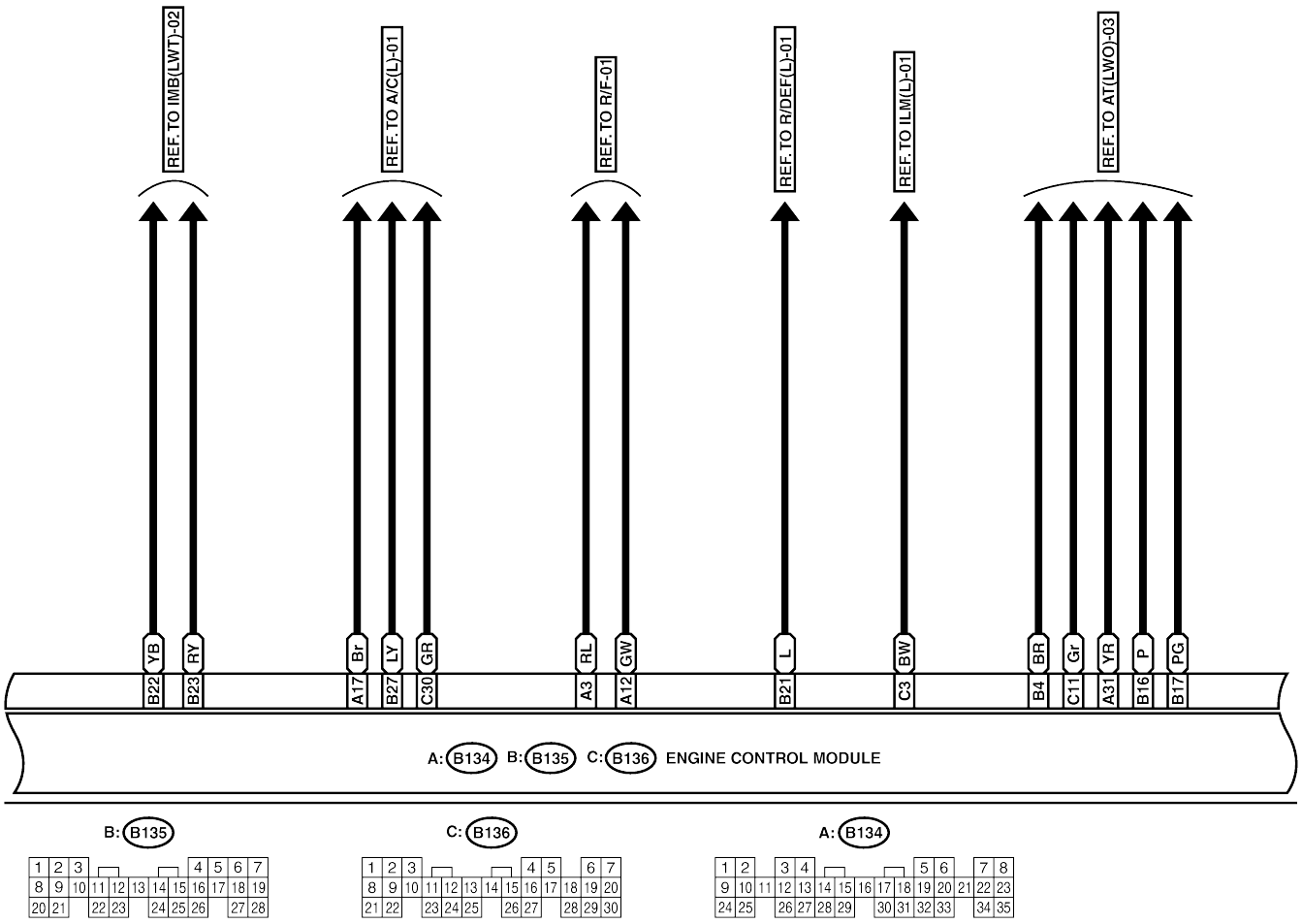
SL10-20B


E/G(LWO)-03
TO POWER SUPPLY ROUTING
MB-9
SBF-5
(B)
ST
IGNITION SWITCH
(ST)
*1 AT MODEL : WR
MT MODEL : WB
BR
WB
F44
B61
MT
AT
INHIBITOR SWITCH (AT)
P R N D 3 2 1
WB 12
WR 11
BY 12
BW 7
B12 T3 T7
E/G(LWO)-01 A
MAIN RELAY
6 BR
4 YR
5 BR
3 YG
2 LgW
1 B
B47
H E/G(LWO)-05
I E/G(LWO)-06
J E/G(LWO)-09
STARTER MOTOR
TO BATTERY TERMINAL
M
*1
B14
B
E
REF. TO GND-01
LgW YG YG BR WB WB WR
B19 C1 C2 C9 B28 B26 B28
B: B135 C: B136 ENGINE CONTROL MODULE
B47 (BROWN)
B61
B12
T7
B: B135
C: B136

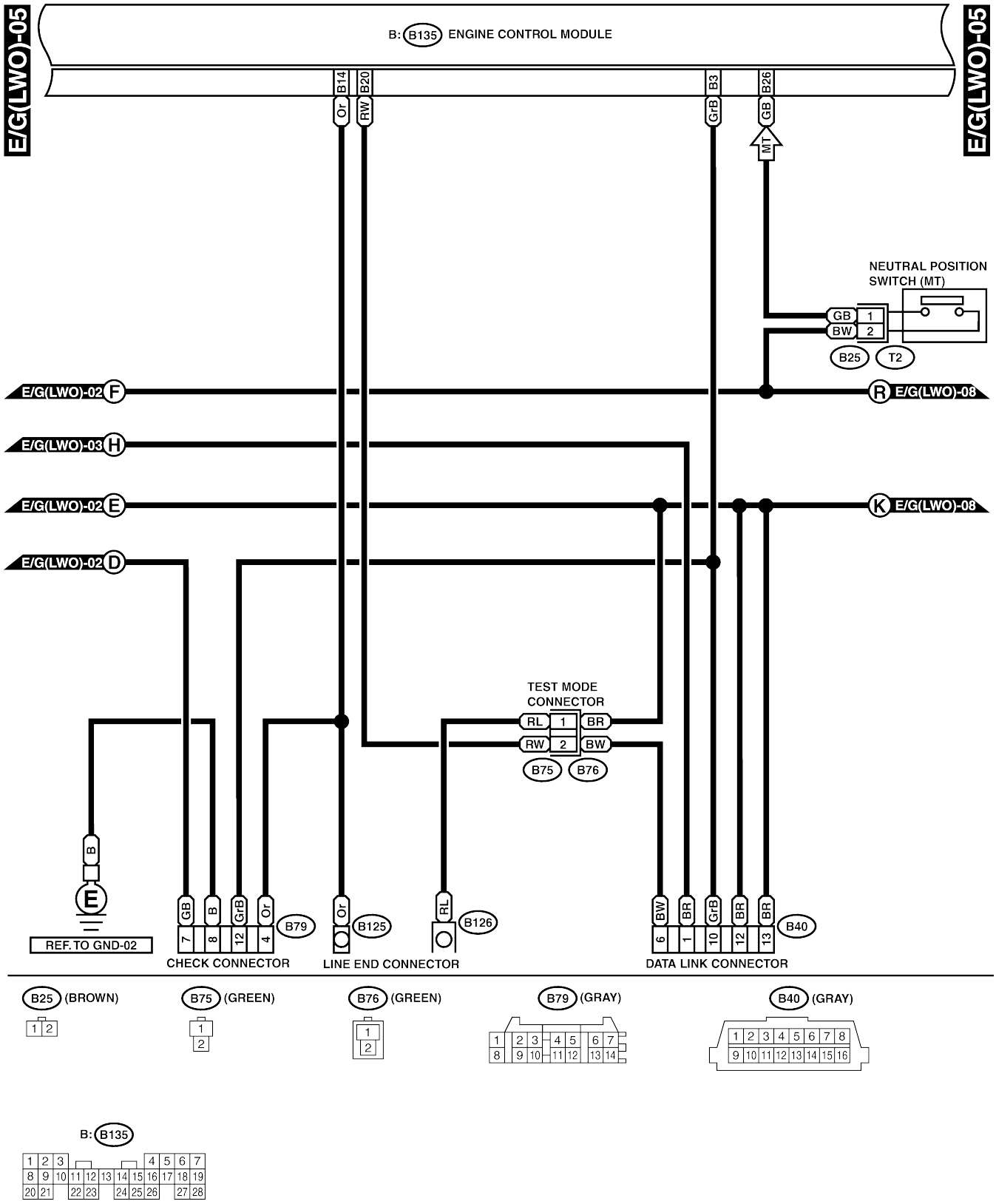
SL10-20C

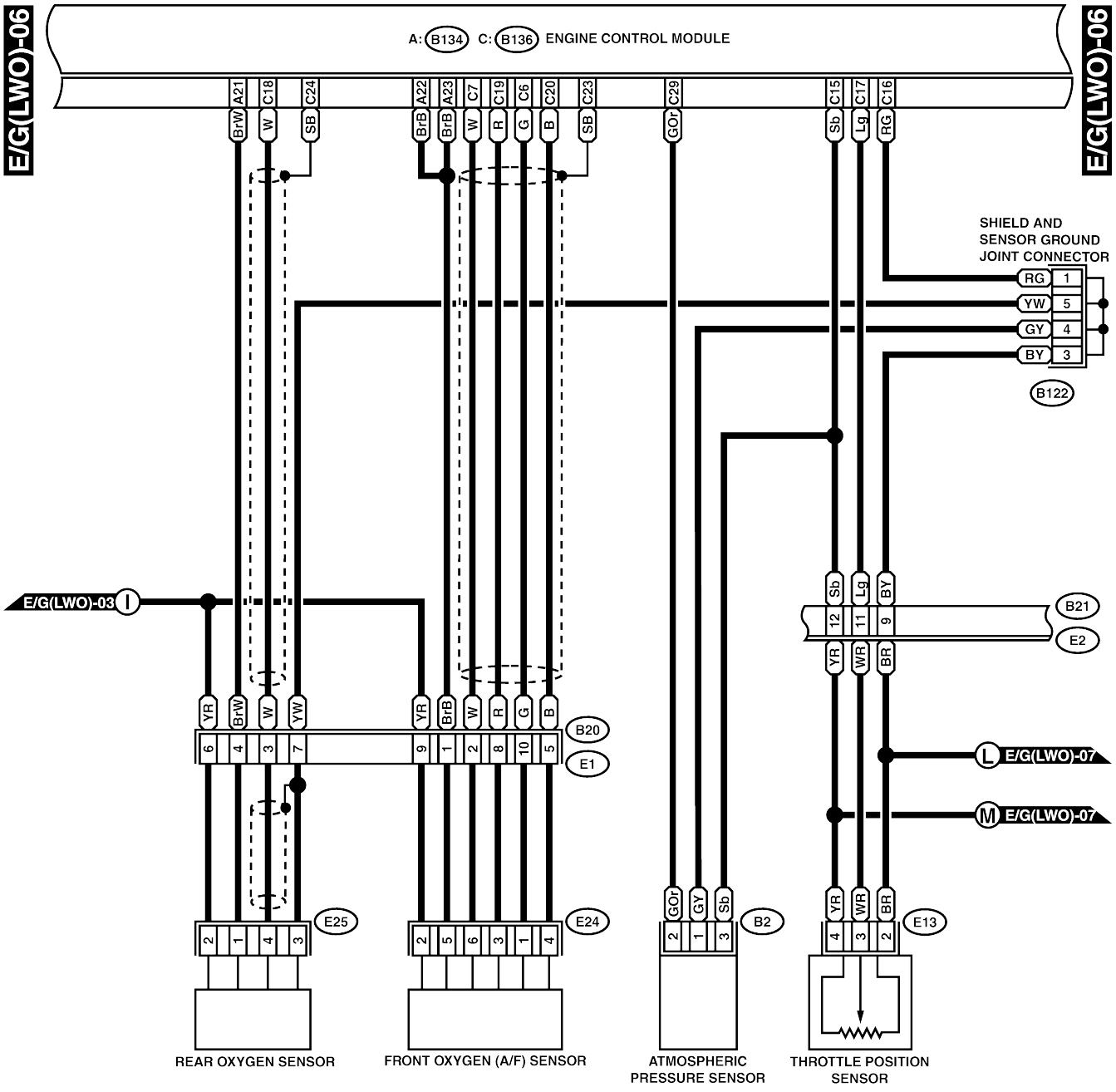
E/G(LWO)-04

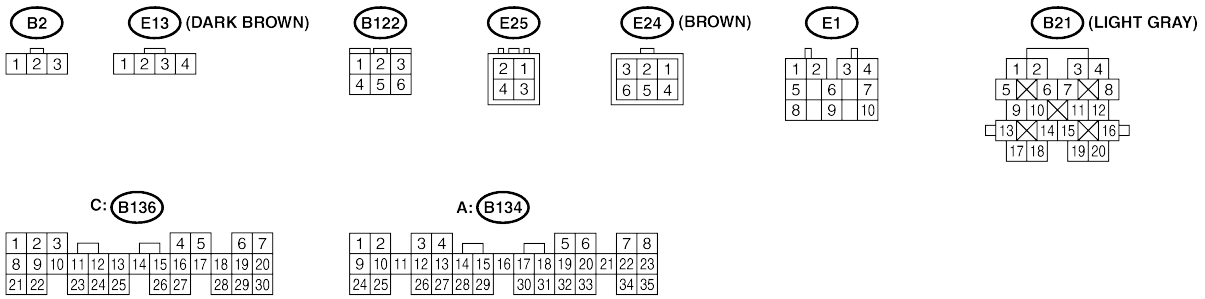
E/G(LWO)-04



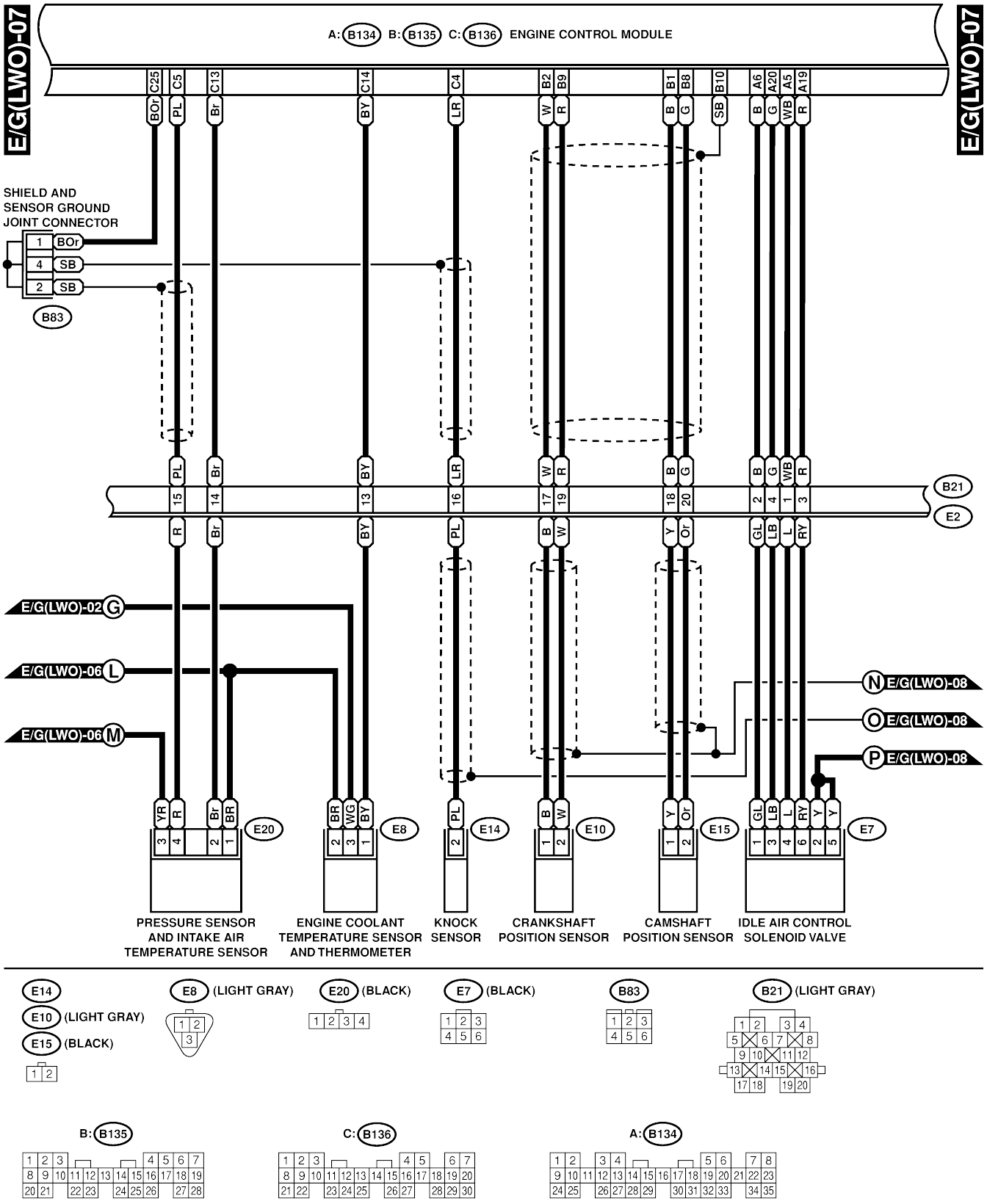
SL10-20D


E/G(LWO)-05
B: B135 ENGINE CONTROL MODULE
E/G(LWO)-05
B14
B20
B3
B26
Or
RW
GrB
GB
MT
NEUTRAL POSITION SWITCH (MT)
GB
BW
1
2
B25
T2
E/G(LWO)-02 F
R E/G(LWO)-08
E/G(LWO)-03 H
E/G(LWO)-02 E
K E/G(LWO)-08
E/G(LWO)-02 D
TEST MODE CONNECTOR
RL
RW
BR
BW
B75
B76
B
E
REF. TO GND-02
GB
B
GrB
Or
B79
Or
B125
RL
B126
BW
BR
GrB
BR
BR
B40
7
8
12
4
6
1
10
12
13
CHECK CONNECTOR
LINE END CONNECTOR
DATA LINK CONNECTOR
B25 (BROWN)
B75 (GREEN)
B76 (GREEN)
B79 (GRAY)
B40 (GRAY)
B: B135


E/G(LWO)-06
A: B134 C: B136 ENGINE CONTROL MODULE
E/G(LWO)-06
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 Sb Lg RG
SHIELD AND SENSOR GROUND JOINT CONNECTOR
RG 1
YW 5
GY 4
BY 3
B122
E/G(LWO)-03 I
Sb Lg BY
12 11 9
B21
E2
YR WR BR
YR BrW W YW YR BrB W R G B
B20
6 4 3 7 9 1 2 8 10 5
E1
L E/G(LWO)-07
M E/G(LWO)-07
E25
E24
GOr GY Sb
B2
YR WR BR
E13
2 1 4 3 2 5 6 3 1 4
2 1 3
4 3 2
REAR OXYGEN SENSOR
FRONT OXYGEN (A/F) SENSOR
ATMOSPHERIC PRESSURE SENSOR
THROTTLE POSITION SENSOR

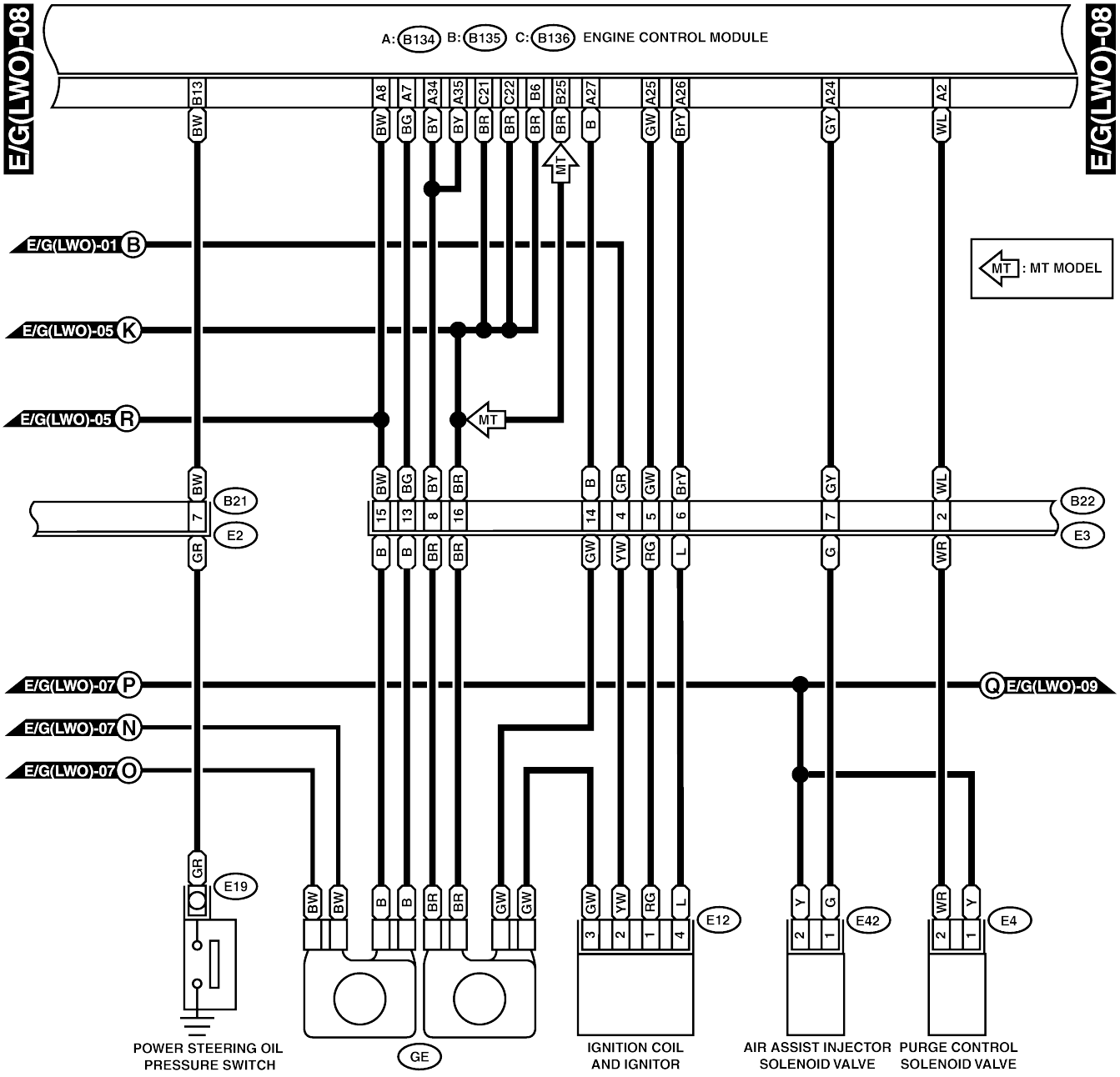

B2
E13 (DARK BROWN)
B122
E25
E24 (BROWN)
E1
B21 (LIGHT GRAY)
C: B136
A: B134

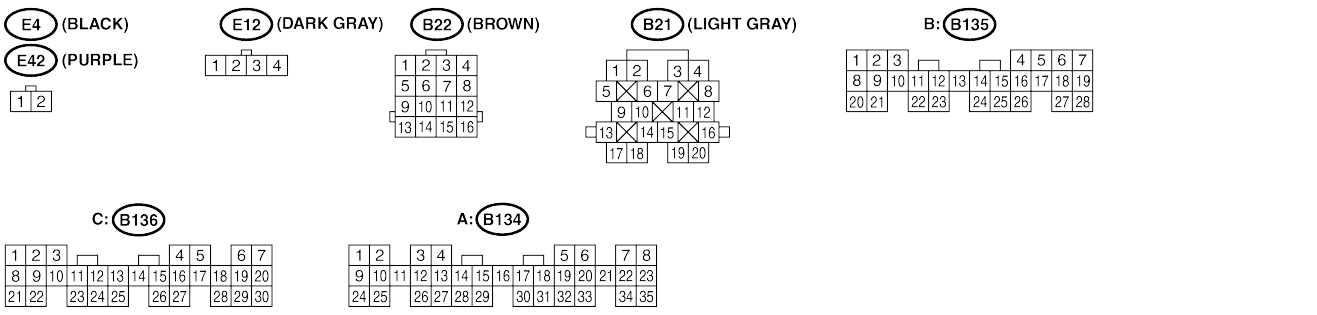
SL10-20F


E/G(LWO)-07
A: B134 B: B135 C: B136 ENGINE CONTROL MODULE
E/G(LWO)-07
SHIELD AND SENSOR GROUND JOINT CONNECTOR
B83
B21
E2
E/G(LWO)-02 G
E/G(LWO)-06 L
E/G(LWO)-06 M
N E/G(LWO)-08
O E/G(LWO)-08
P E/G(LWO)-08
E20
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

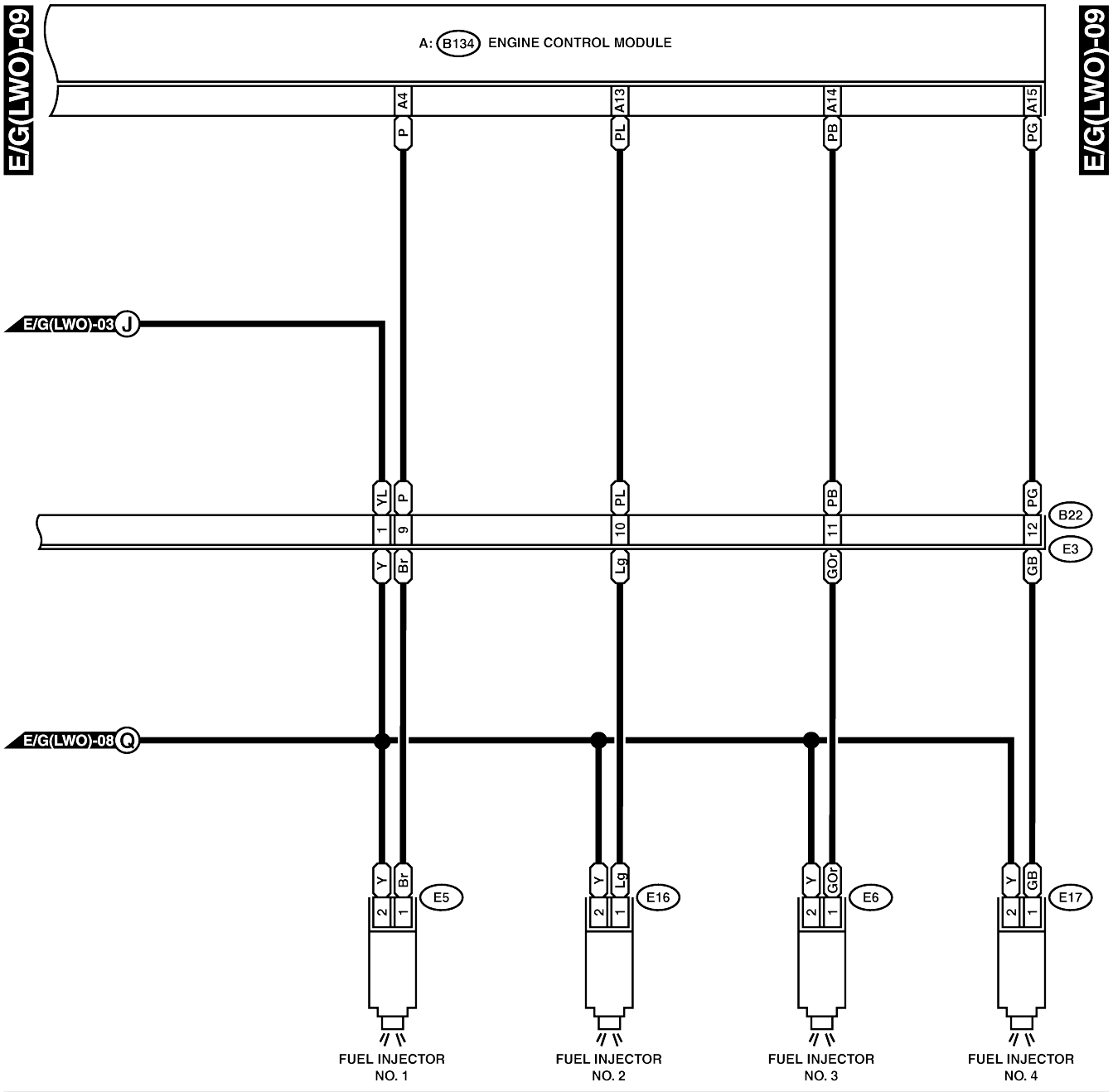
E14
E10 (LIGHT GRAY)
E15 (BLACK)
E8 (LIGHT GRAY)
E20 (BLACK)
E7 (BLACK)
B83
B21 (LIGHT GRAY)
B: B135
C: B136
A: B134

SL10-20G


E/G(LWO)-08
A: B134 B: B135 C: B136 ENGINE CONTROL MODULE
E/G(LWO)-08
MT : MT MODEL
E/G(LWO)-01 B
E/G(LWO)-05 K
E/G(LWO)-05 R
MT
B21
E2
B22
E3
E/G(LWO)-07 P
E/G(LWO)-07 N
E/G(LWO)-07 O
Q E/G(LWO)-09
E19
E12
E42
E4
POWER STEERING OIL PRESSURE SWITCH
GE
IGNITION COIL AND IGNITOR
AIR ASSIST INJECTOR SOLENOID VALVE
PURGE CONTROL SOLENOID VALVE


E4 (BLACK)
E42 (PURPLE)
E12 (DARK GRAY)
B22 (BROWN)
B21 (LIGHT GRAY)
B: B135
C: B136
A: B134

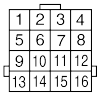
SL10-20H



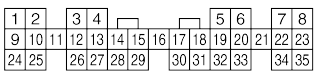
E5 (LIGHT GRAY)
E6 (LIGHT GRAY)
E16 (LIGHT GRAY)
E17 (LIGHT GRAY)



B22 (BROWN)

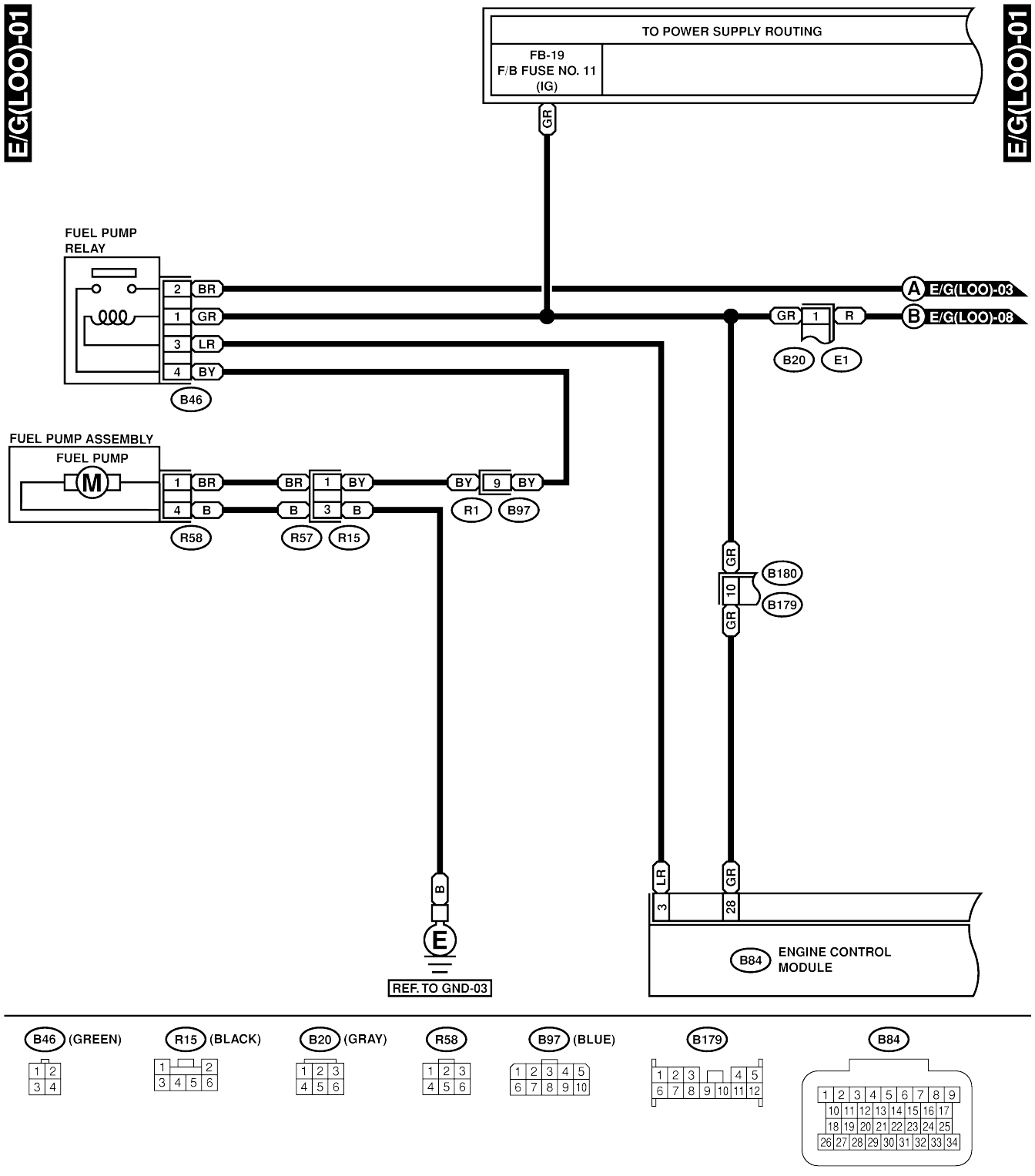


A: B134

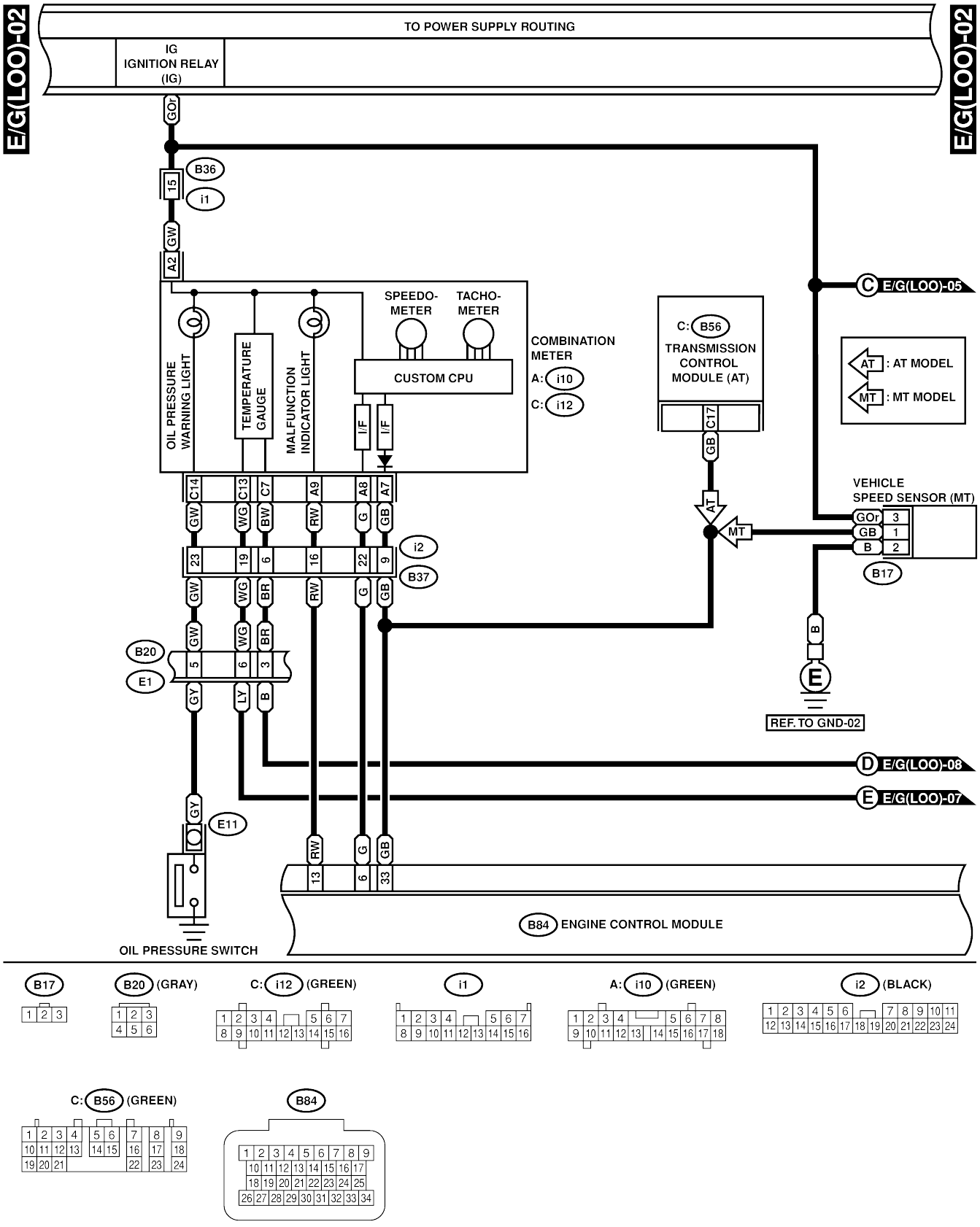


SL10-20I

2. LHD SOHC W/O OBD MODEL S903482A2120

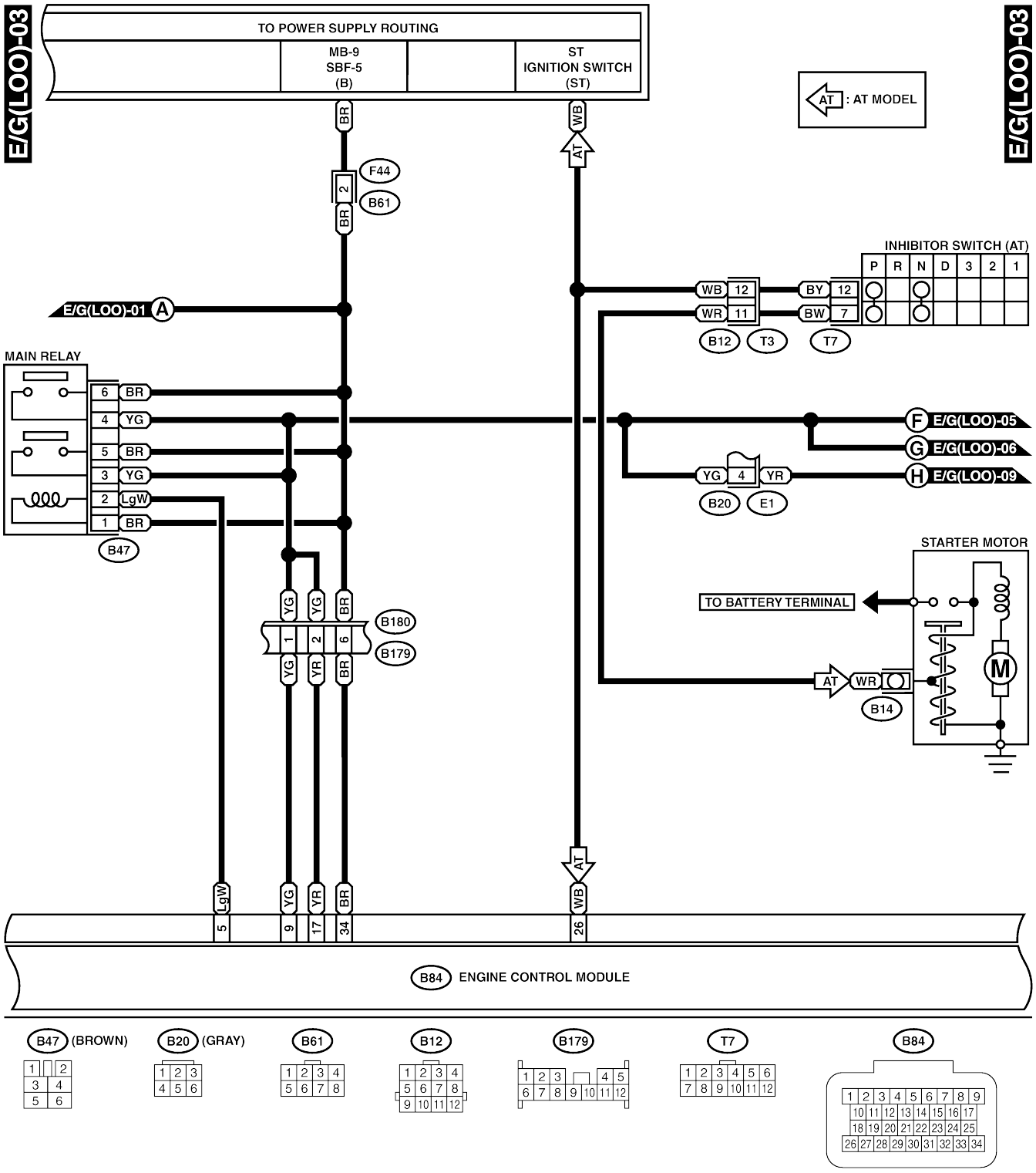


SL10-21A


E/G(LOO)-02
E/G(LOO)-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
CUSTOM CPU
I/F
I/F
OIL PRESSURE WARNING LIGHT
TEMPERATURE GAUGE
MALFUNCTION INDICATOR LIGHT
C14
C13
C7
A9
A8
A7
GW
WG
BW
RW
G
GB
23
19
6
16
22
9
i2
B37
C: B56
TRANSMISSION CONTROL MODULE (AT)
C17
GB
AT
MT
C E/G(LOO)-05
AT : AT MODEL
MT : MT MODEL
VEHICLE SPEED SENSOR (MT)
GOr
GB
B
3
1
2
B17
B20
E1
5
6
3
GY
LY
B
B
E
REF. TO GND-02
D E/G(LOO)-08
E E/G(LOO)-07
GY
E11
RW
G
GB
13
6
33
B84 ENGINE CONTROL MODULE
OIL PRESSURE SWITCH

B17
B20 (GRAY)
C: i12 (GREEN)
i1
A: i10 (GREEN)
i2 (BLACK)
C: B56 (GREEN)
B84

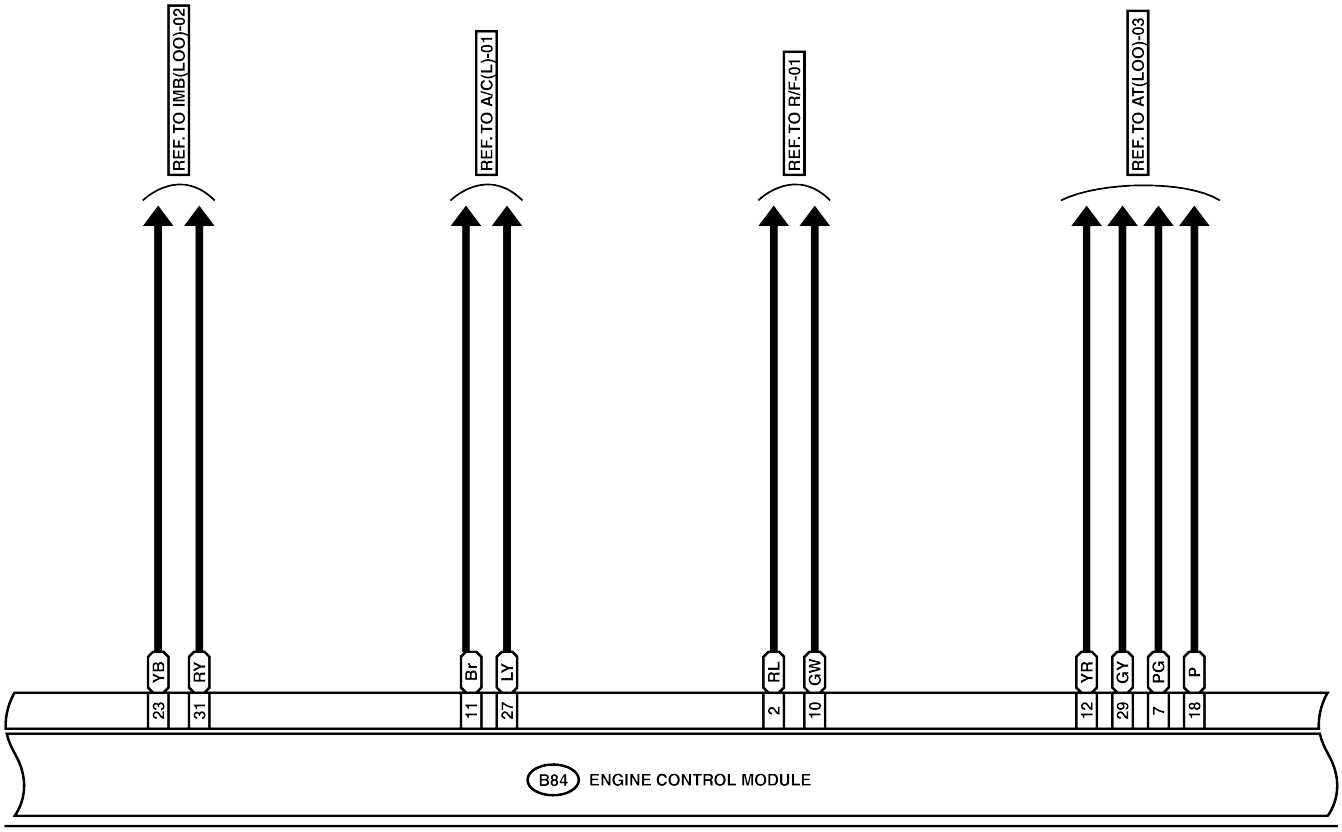
SL10-21B

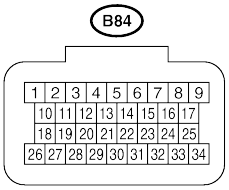

E/G(LOO)-03
TO POWER SUPPLY ROUTING
MB-9
SBF-5
(B)
ST
IGNITION SWITCH
(ST)
AT : AT MODEL
E/G(LOO)-03
F44
B61
INHIBITOR SWITCH (AT)
P R N D 3 2 1
E/G(LOO)-01 A
WB 12
WR 11
BY 12
BW 7
B12 T3 T7
MAIN RELAY
6 BR
4 YG
5 BR
3 YG
2 LgW
1 BR
B47
F E/G(LOO)-05
G E/G(LOO)-06
H E/G(LOO)-09
YG 4 YR
B20 E1
STARTER MOTOR
TO BATTERY TERMINAL
M
AT WR
B14
B180
B179
LgW 5
YG 9
YR 17
BR 34
WB 26
B84 ENGINE CONTROL MODULE
B47 (BROWN)
B20 (GRAY)
B61
B12
B179
T7
B84

SL10-21C

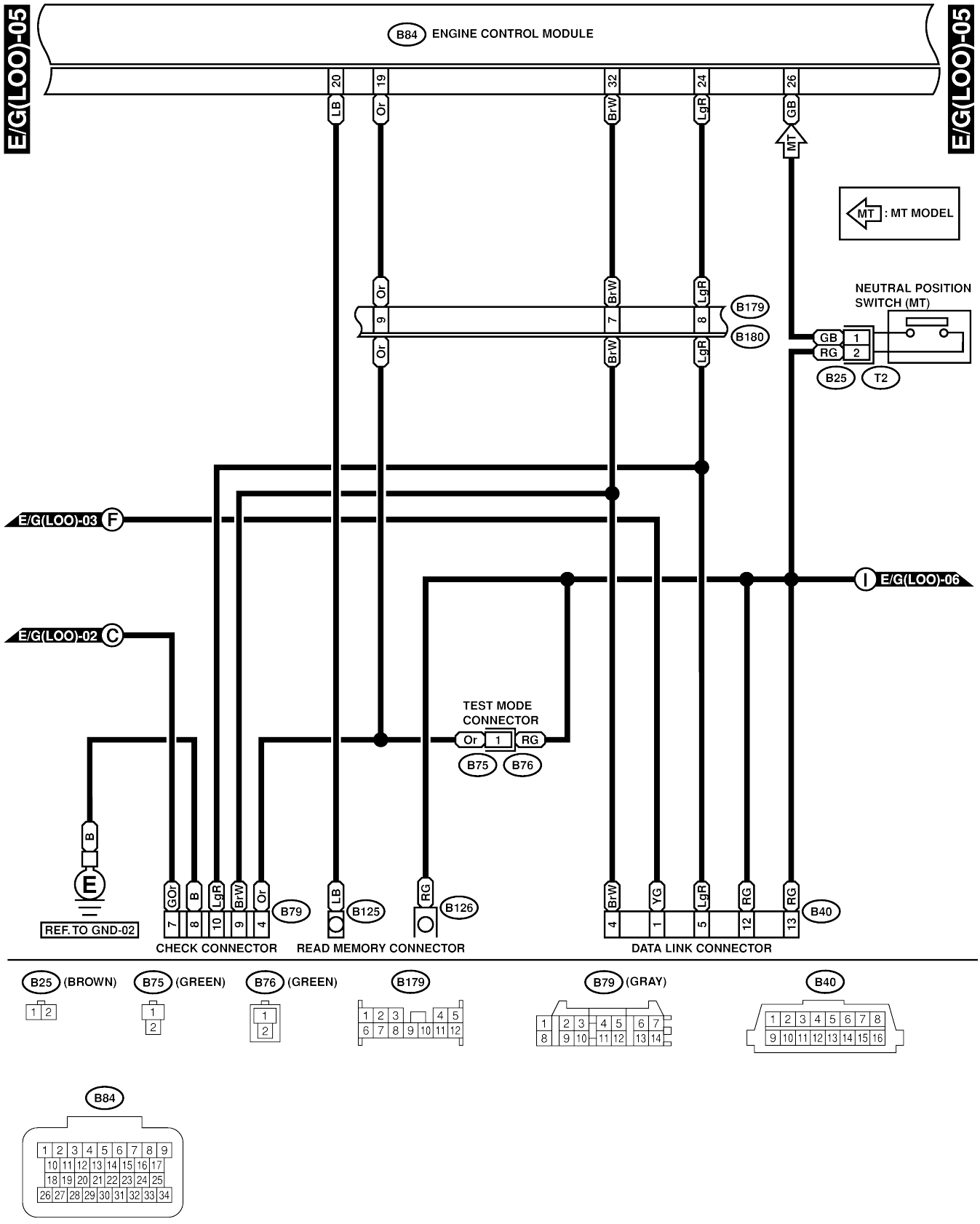
E/G(LOO)-04

E/G(LOO)-04

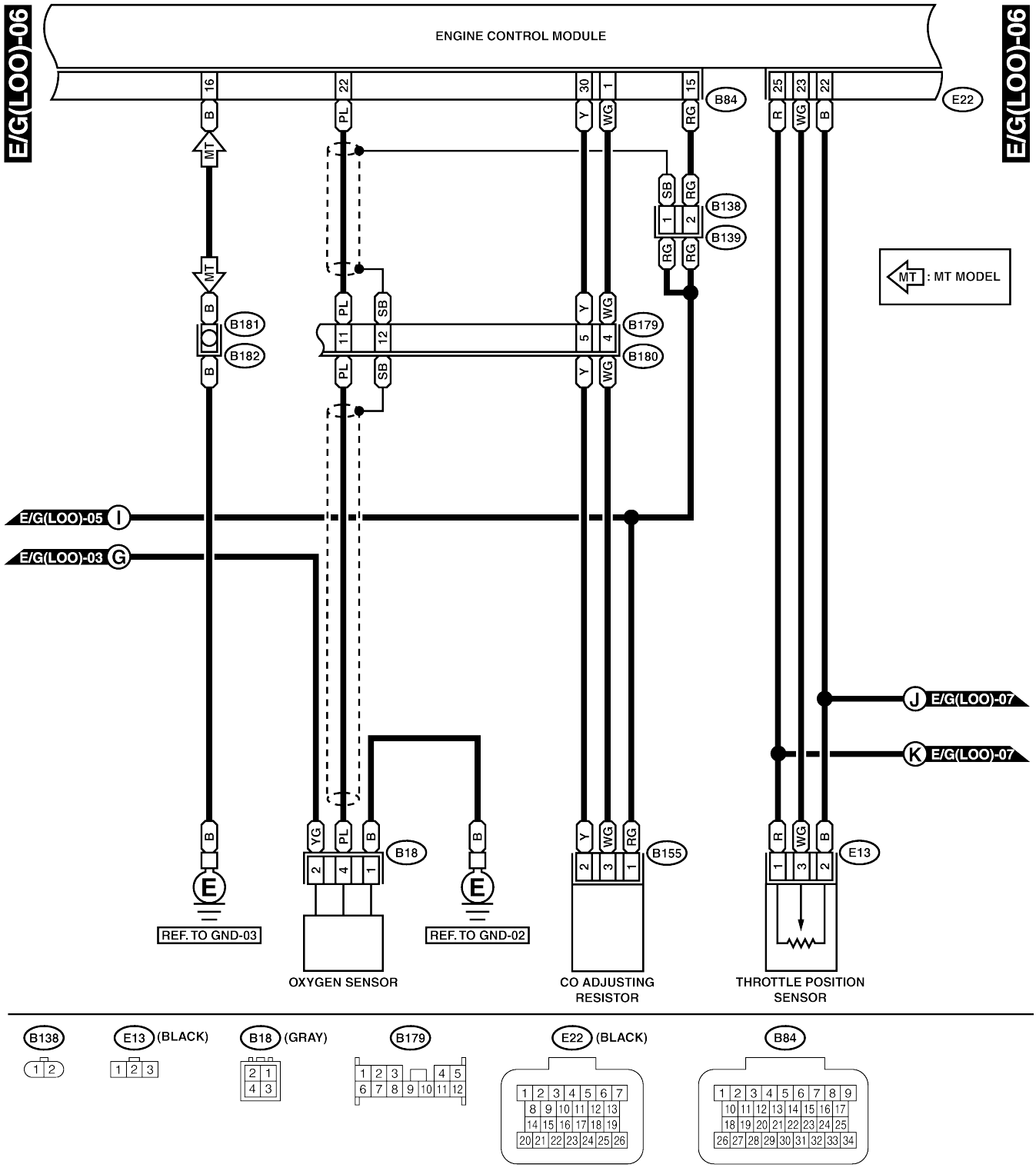




SL10-21D

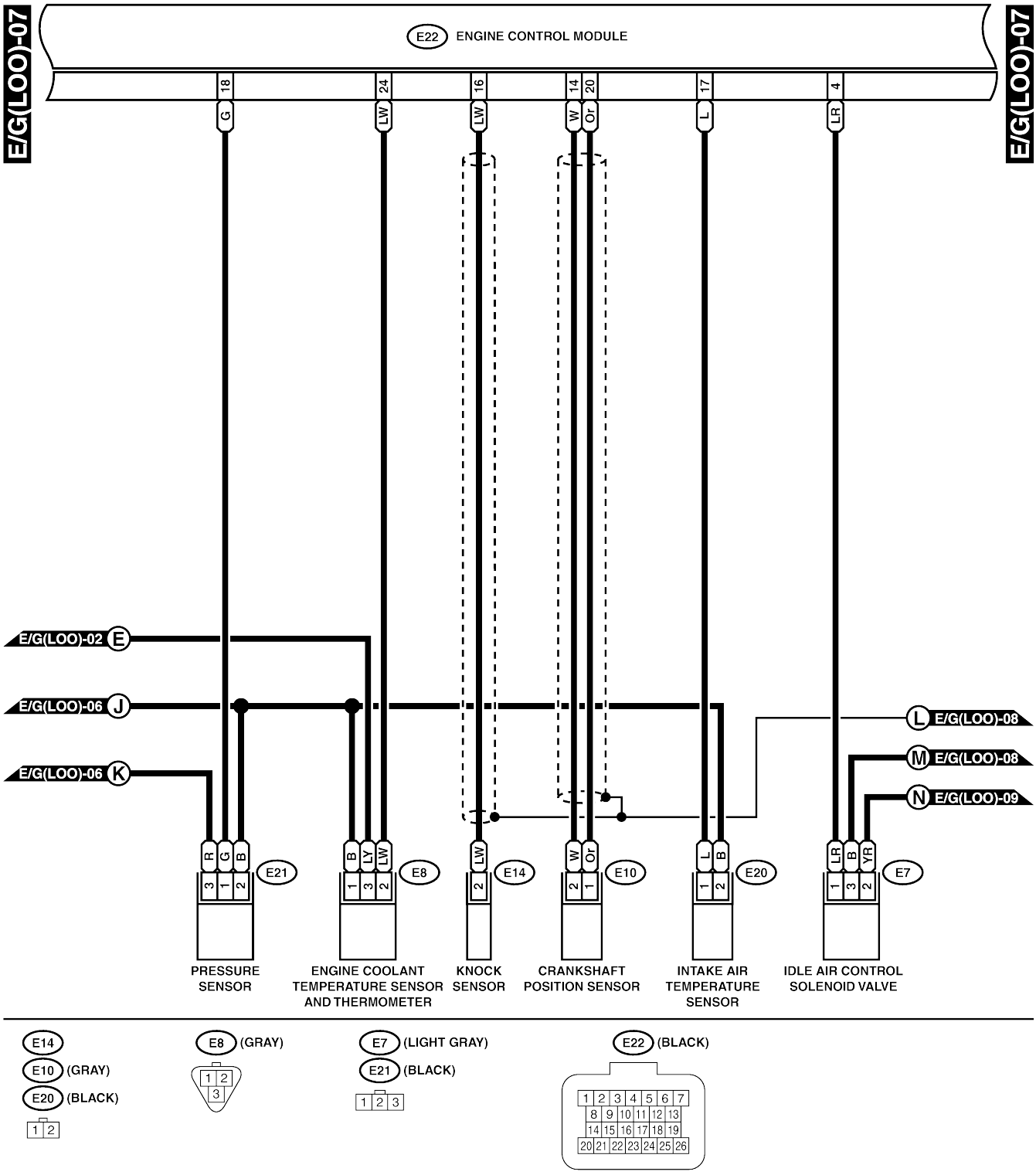

E/G(LOO)-05
E/G(LOO)-05
B84 ENGINE CONTROL MODULE
20 LB
19 Or
32 BrW
24 LgR
26 GB
MT
MT : MT MODEL
NEUTRAL POSITION SWITCH (MT)
GB 1
RG 2
B25
T2
B179
B180
9 Or
7 BrW
8 LgR
E/G(LOO)-03 F
E/G(LOO)-06 I
E/G(LOO)-02 C
TEST MODE CONNECTOR
Or 1 RG
B75
B76
B
E
REF. TO GND-02
7 GOr
8 B
10 LgR
9 BrW
4 Or
B79
CHECK CONNECTOR
LB
B125
READ MEMORY CONNECTOR
RG
B126
4 BrW
1 YG
5 LgR
12 RG
13 RG
B40
DATA LINK CONNECTOR
B25 (BROWN)
B75 (GREEN)
B76 (GREEN)
B179
B79 (GRAY)
B40
B84

SL10-21E

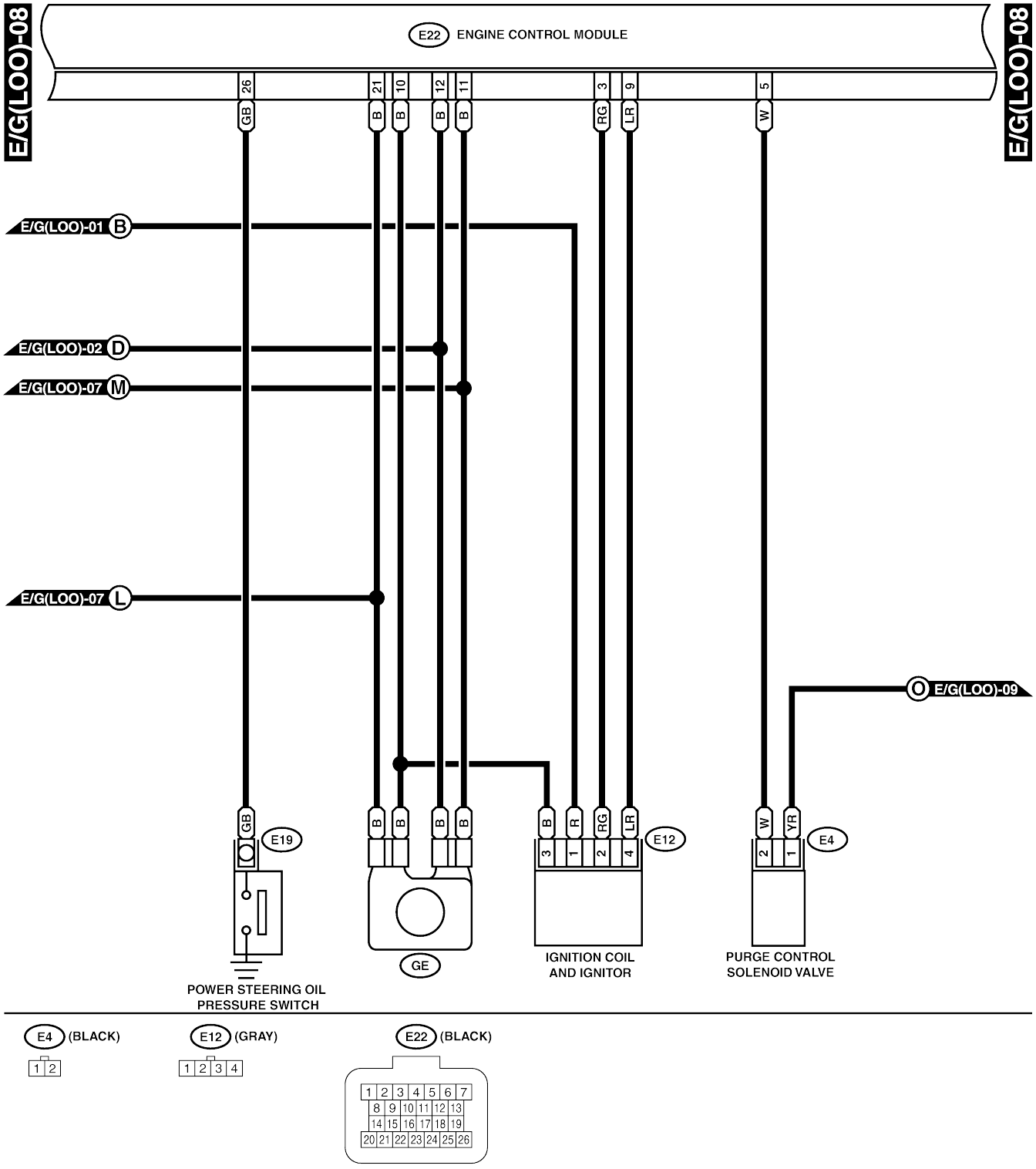

E/G(LOO)-06
ENGINE CONTROL MODULE
E/G(LOO)-06
B84
E22
B138
B139
B181
B182
B179
B180
MT : MT MODEL
E/G(LOO)-05 I
E/G(LOO)-03 G
J E/G(LOO)-07
K E/G(LOO)-07
B18
B155
E13
REF. TO GND-03
REF. TO GND-02
OXYGEN SENSOR
CO ADJUSTING RESISTOR
THROTTLE POSITION SENSOR

B138
E13 (BLACK)
B18 (GRAY)
B179
E22 (BLACK)
B84

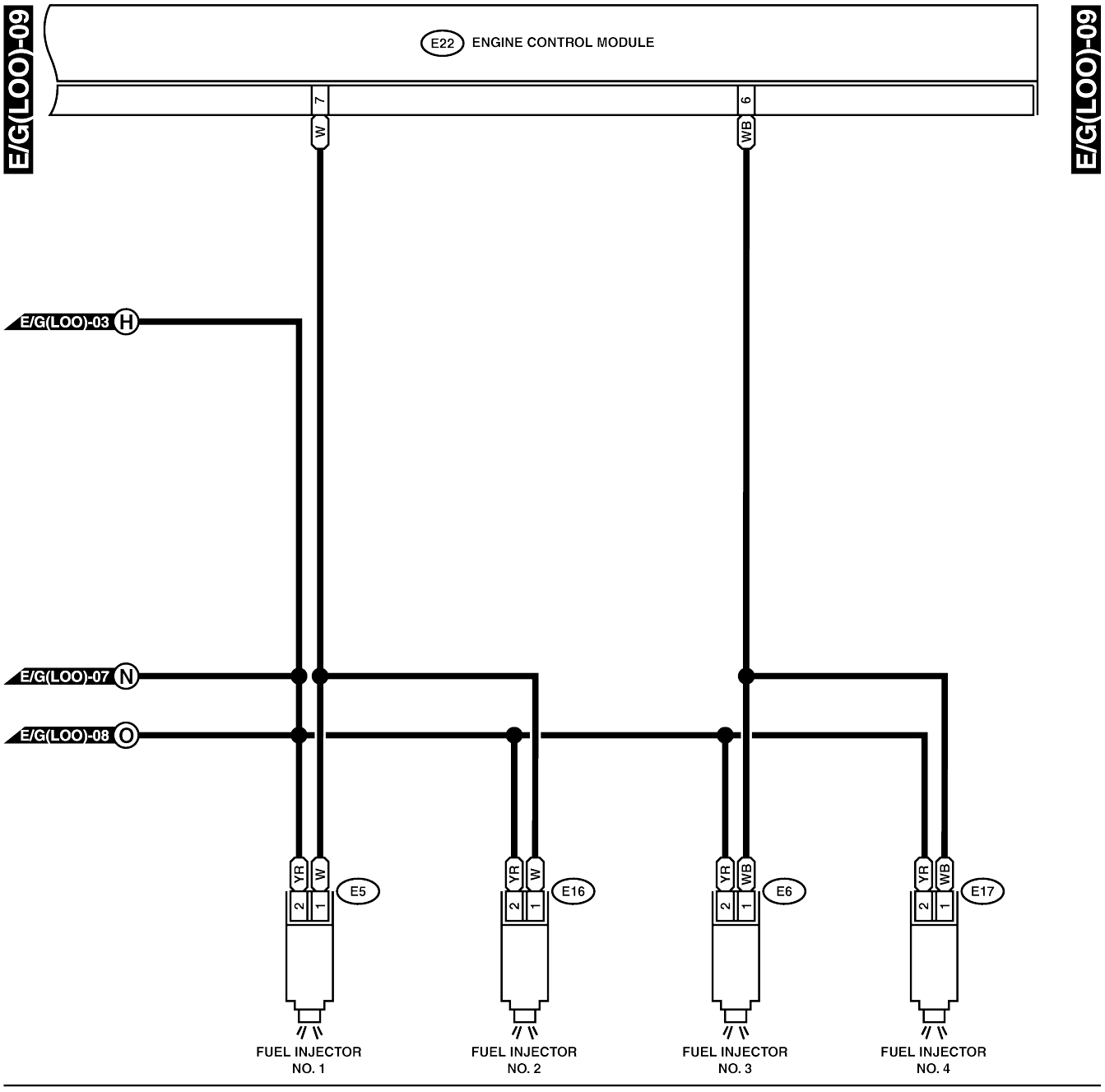
SL10-21F

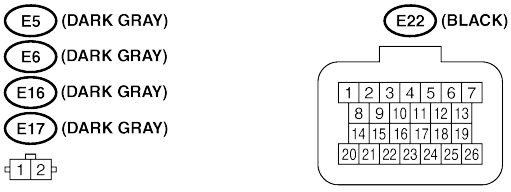

E/G(LOO)-07
E/G(LOO)-07
E22 ENGINE CONTROL MODULE
18
24
16
14
20
17
4
G
LW
LW
W
Or
L
LR
E/G(LOO)-02 E
E/G(LOO)-06 J
E/G(LOO)-06 K
L E/G(LOO)-08
M E/G(LOO)-08
N E/G(LOO)-09
R G B
B LY LW
LW
W Or
L B
LR B YR
E21
E8
E14
E10
E20
E7
PRESSURE SENSOR
ENGINE COOLANT TEMPERATURE SENSOR AND THERMOMETER
KNOCK SENSOR
CRANKSHAFT POSITION SENSOR
INTAKE AIR TEMPERATURE SENSOR
IDLE AIR CONTROL SOLENOID VALVE
E14
E10 (GRAY)
E20 (BLACK)
E8 (GRAY)
E7 (LIGHT GRAY)
E21 (BLACK)
E22 (BLACK)

SL10-21G


E/G(LOO)-08
E22 ENGINE CONTROL MODULE
E/G(LOO)-08
26
21
10
12
11
3
9
5
GB
B
B
B
B
RG
LR
W
E/G(LOO)-01 B
E/G(LOO)-02 D
E/G(LOO)-07 M
E/G(LOO)-07 L
O E/G(LOO)-09
E19
E12
E4
GE
POWER STEERING OIL PRESSURE SWITCH
IGNITION COIL AND IGNITOR
PURGE CONTROL SOLENOID VALVE
E4 (BLACK)
E12 (GRAY)
E22 (BLACK)

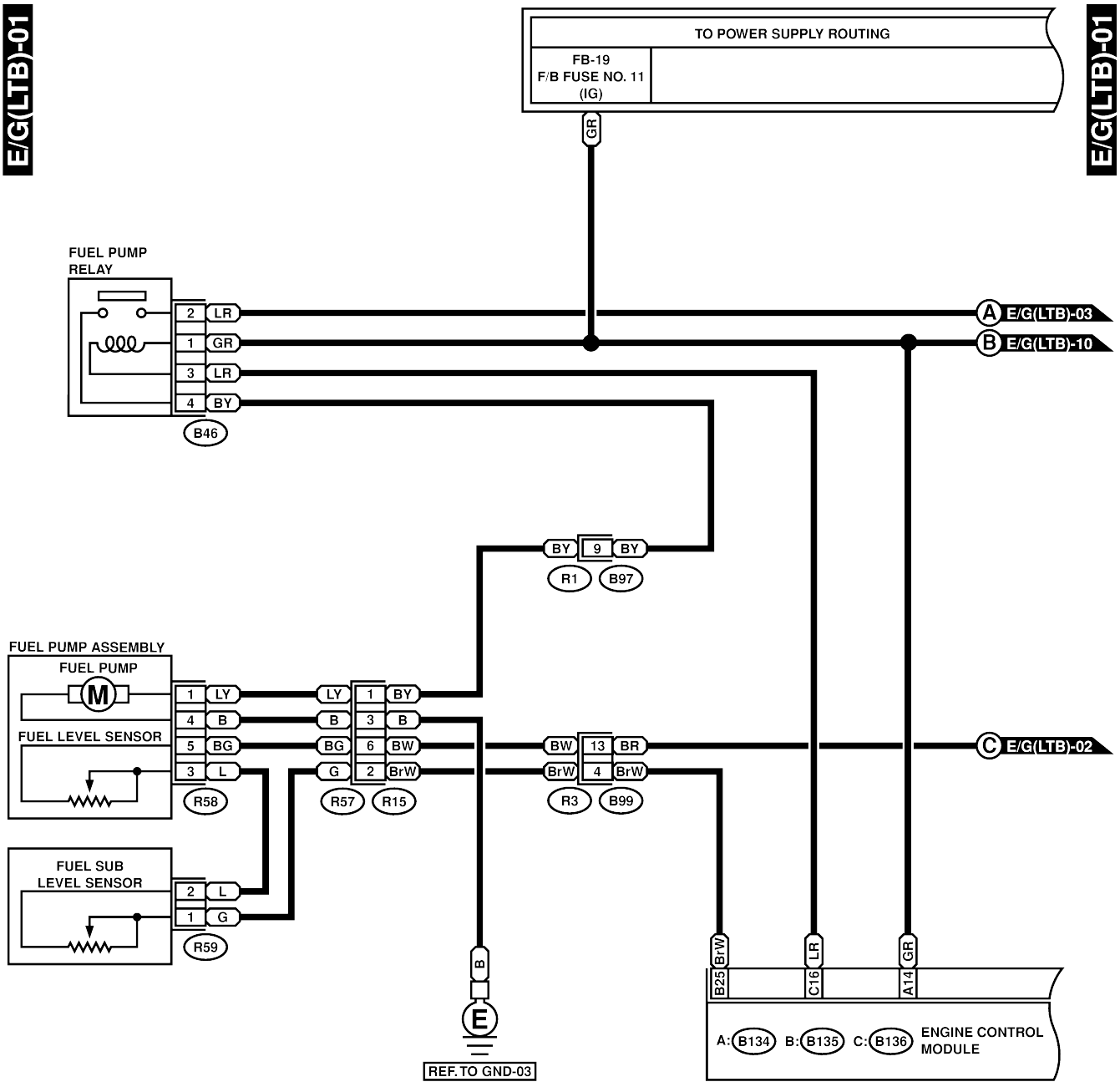
SL10-21H

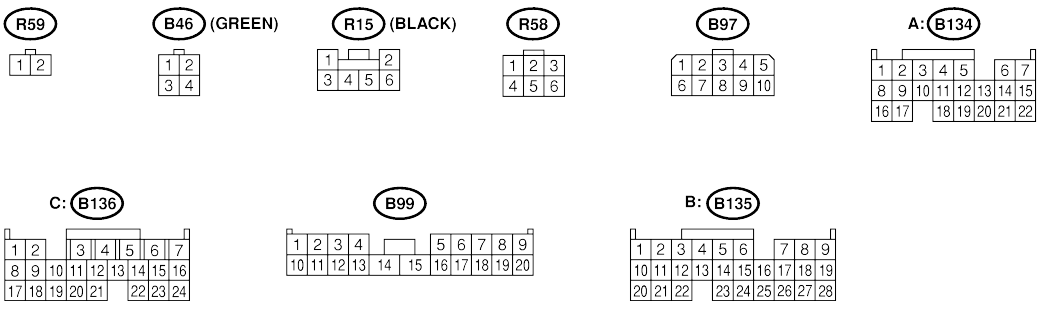

E/G(LOO)-09
E/G(LOO)-09
E22 ENGINE CONTROL MODULE
7
6
W
WB
E/G(LOO)-03 H
E/G(LOO)-07 N
E/G(LOO)-08 O
YR
W
WB
2
1
E5
E16
E6
E17
FUEL INJECTOR NO. 1
FUEL INJECTOR NO. 2
FUEL INJECTOR NO. 3
FUEL INJECTOR NO. 4


E5 (DARK GRAY)
E6 (DARK GRAY)
E16 (DARK GRAY)
E17 (DARK GRAY)
1 2
E22 (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

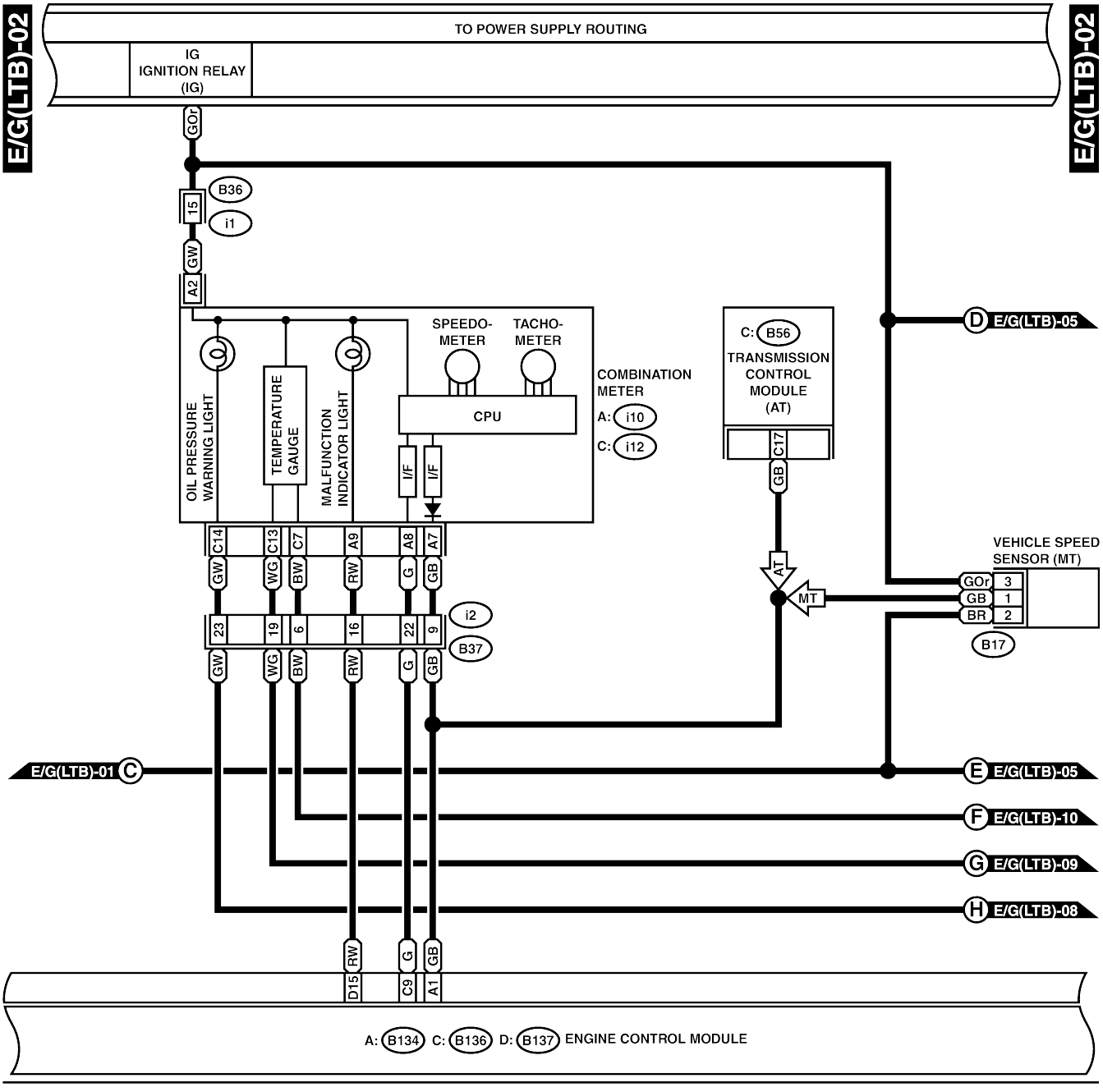
SL10-21I

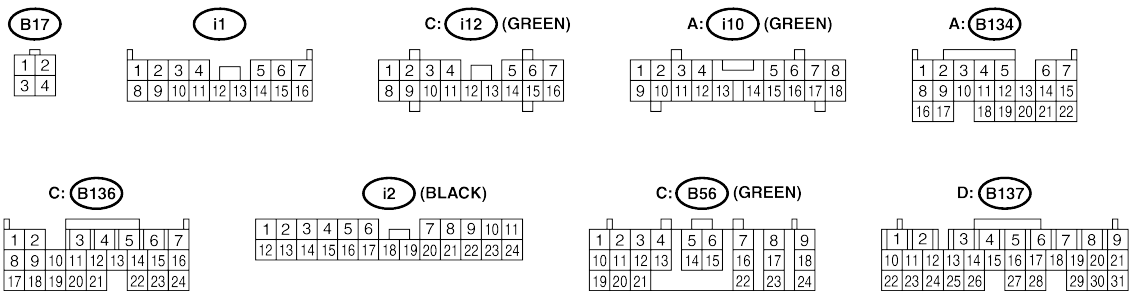
3. LHD DOHC TURBO MODEL S903482A2122



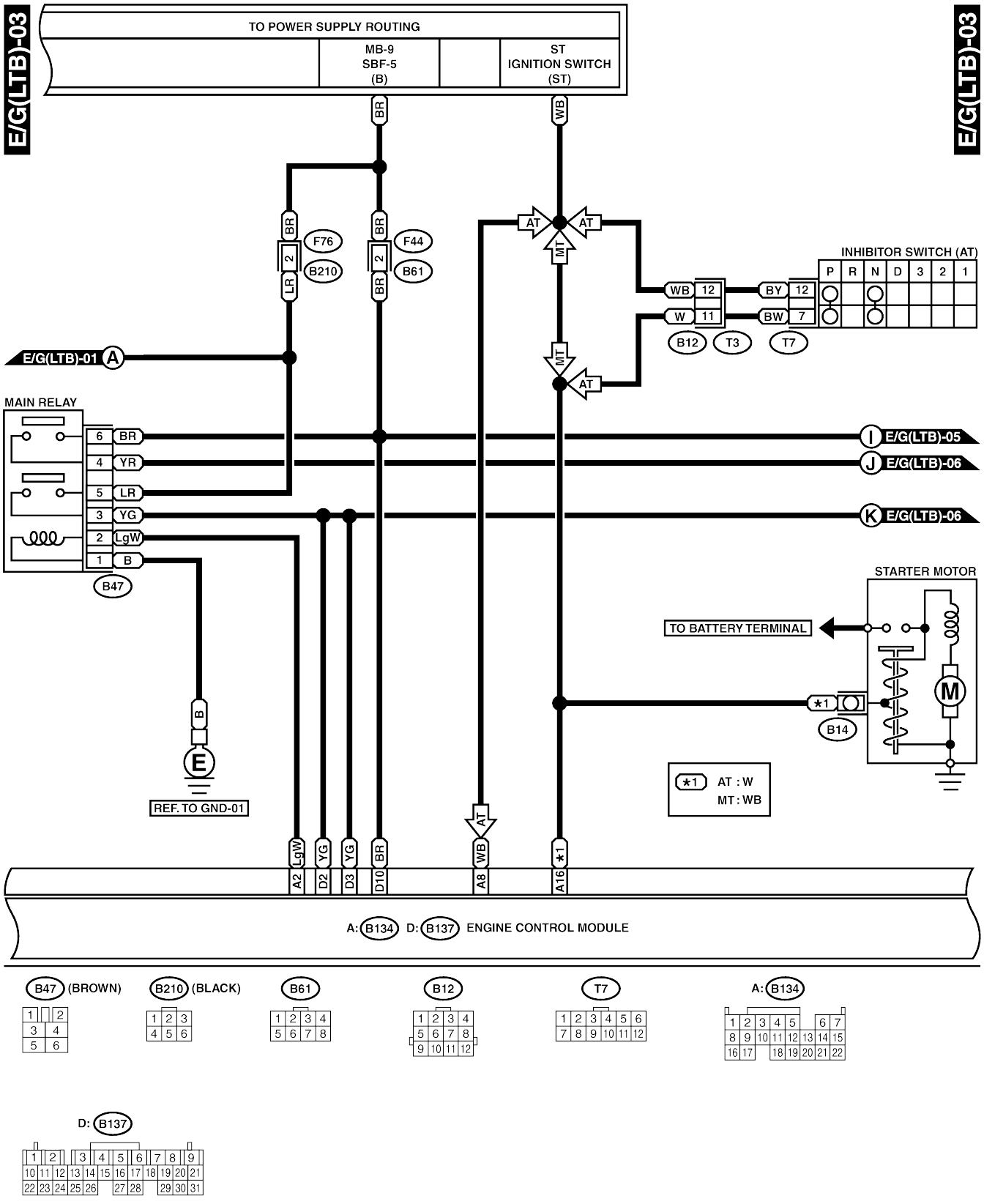


SL10-22A


E/G(LTB)-02
TO POWER SUPPLY ROUTING
IG
IGNITION RELAY
(IG)
E/G(LTB)-02
GOr
B36
i1
15
GW
A2
SPEEDO-METER
TACHO-METER
COMBINATION METER
A: i10
C: i12
CPU
OIL PRESSURE WARNING LIGHT
TEMPERATURE GAUGE
MALFUNCTION INDICATOR LIGHT
I/F
I/F
C: B56
TRANSMISSION CONTROL MODULE (AT)
C17
GB
D E/G(LTB)-05
AT
MT
VEHICLE SPEED SENSOR (MT)
GOr 3
GB 1
BR 2
B17
C14 C13 C7 A9 A8 A7
GW WG BW RW G GB
23 19 6 16 22 9
i2
B37
E/G(LTB)-01 C
E E/G(LTB)-05
F E/G(LTB)-10
G E/G(LTB)-09
H E/G(LTB)-08
RW G GB
D15 C9 A1
A: B134 C: B136 D: B137 ENGINE CONTROL MODULE


B17
i1
C: i12 (GREEN)
A: i10 (GREEN)
A: B134
C: B136
i2 (BLACK)
C: B56 (GREEN)
D: B137

SL10-22B


E/G(LTB)-03
TO POWER SUPPLY ROUTING
MB-9
SBF-5
(B)
ST
IGNITION SWITCH
(ST)
E/G(LTB)-03
BR
WB
F76
B210
F44
B61
AT
MT
INHIBITOR SWITCH (AT)
P R N D 3 2 1
WB 12
W 11
BY 12
BW 7
B12 T3 T7
E/G(LTB)-01 A
MAIN RELAY
6 BR
4 YR
5 LR
3 YG
2 LgW
1 B
B47
I E/G(LTB)-05
J E/G(LTB)-06
K E/G(LTB)-06
STARTER MOTOR
TO BATTERY TERMINAL
*1
B14
M
B
E
REF. TO GND-01
*1 AT : W
MT : WB
LgW YG YG BR WB *1
A2 D2 D3 D10 A8 A16
A: B134 D: B137 ENGINE CONTROL MODULE

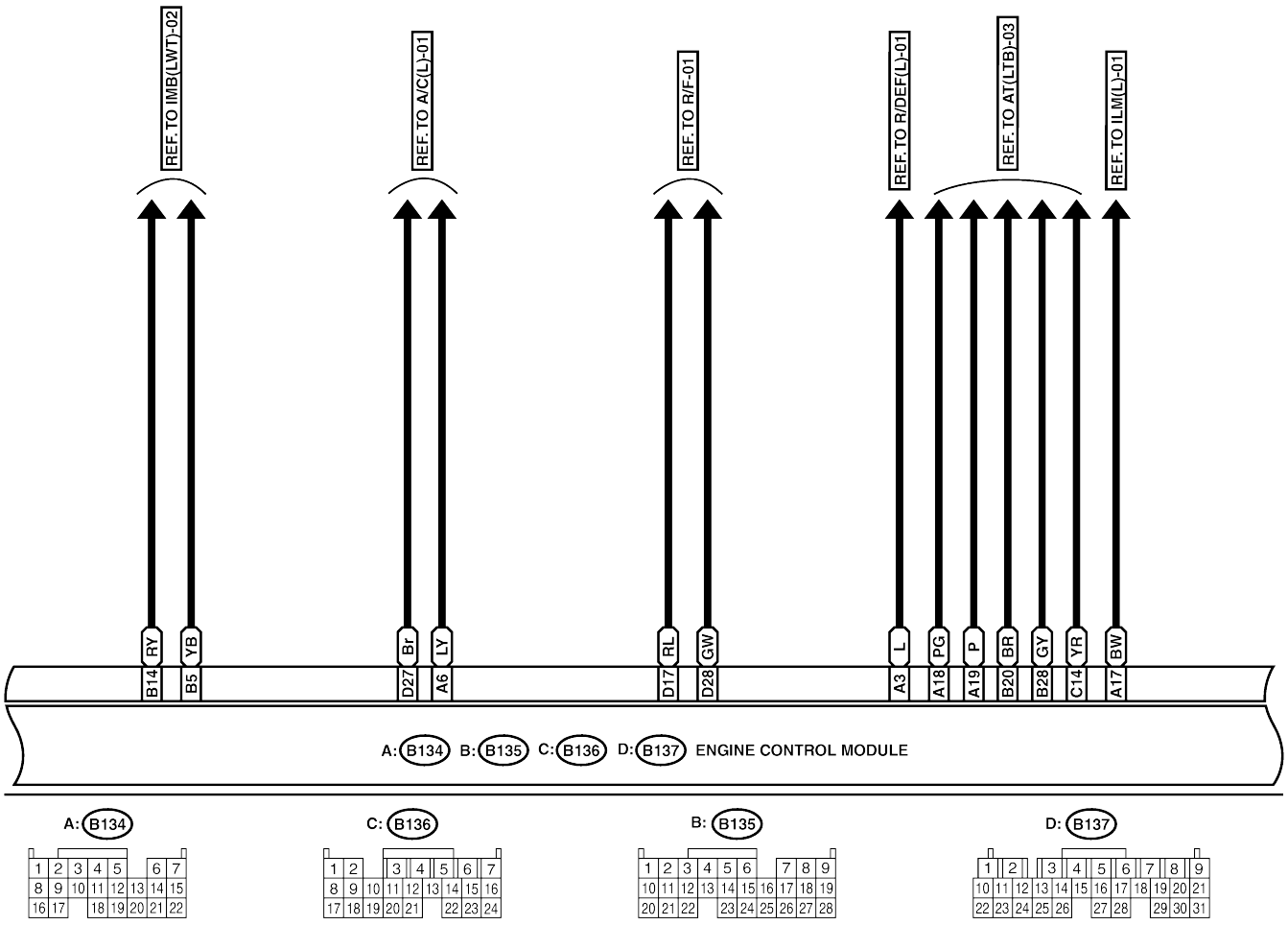
B47 (BROWN)
B210 (BLACK)
B61
B12
T7
A: B134

D: B137

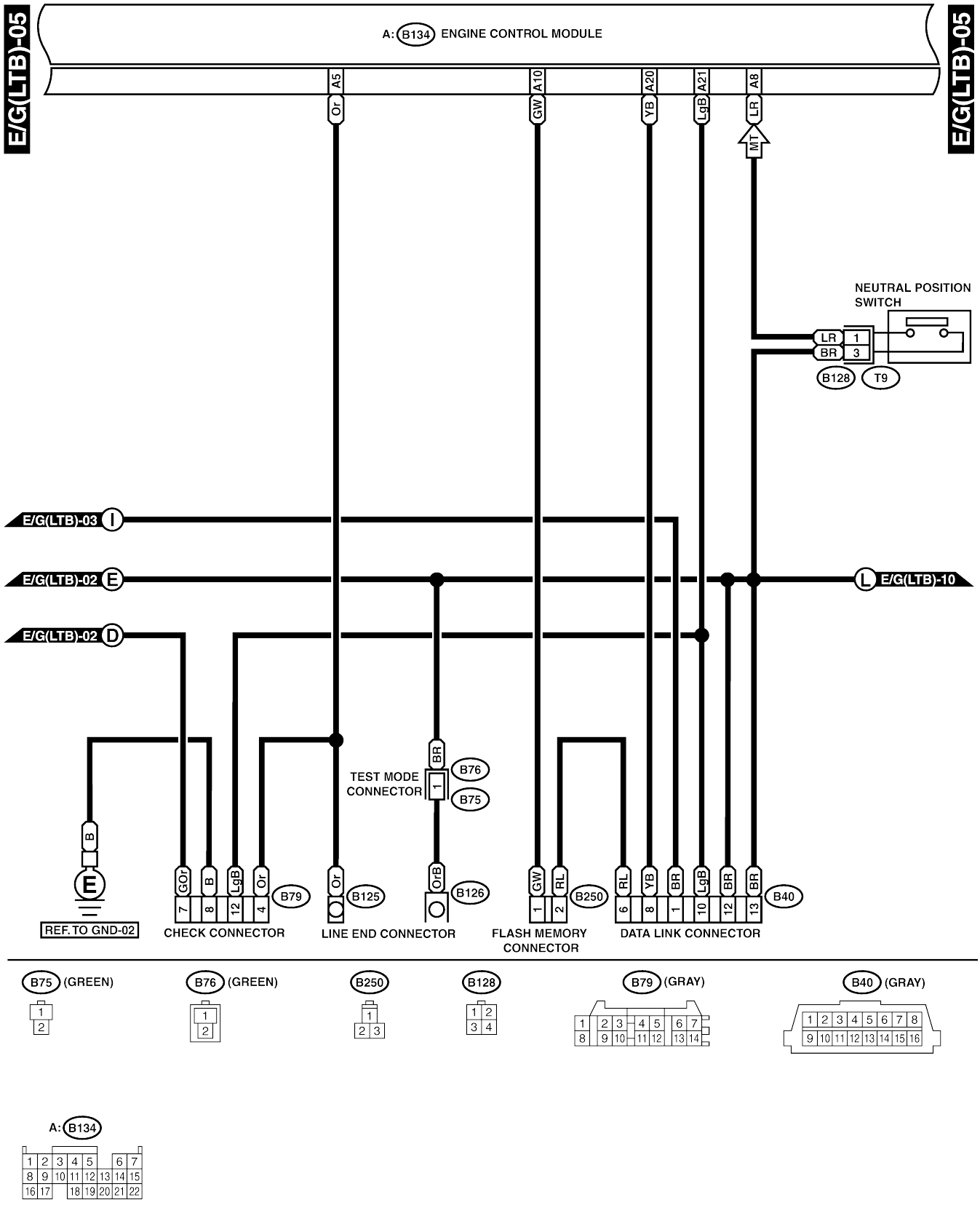
SL10-22C

E/G(LTB)-04

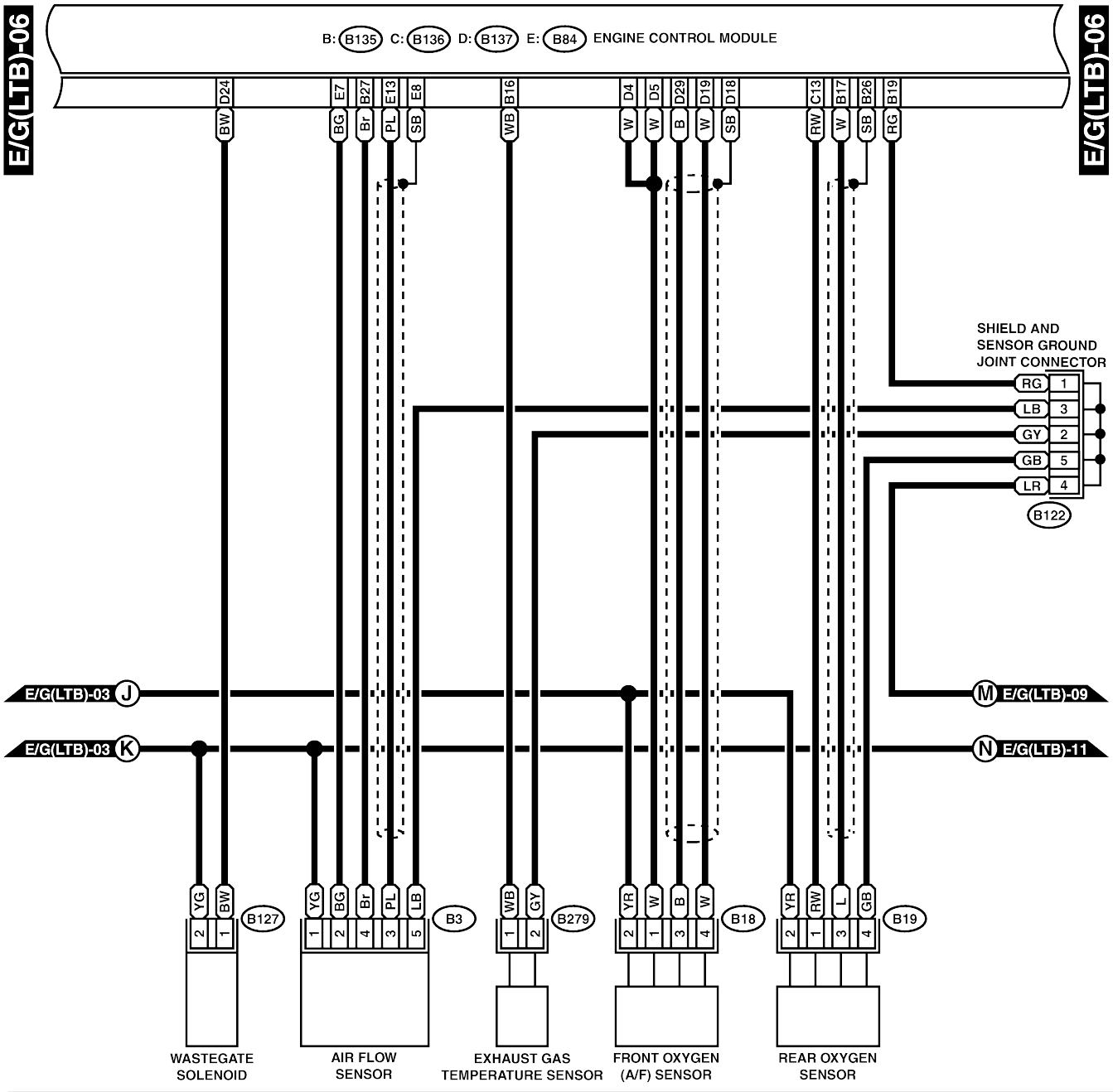
E/G(LTB)-04

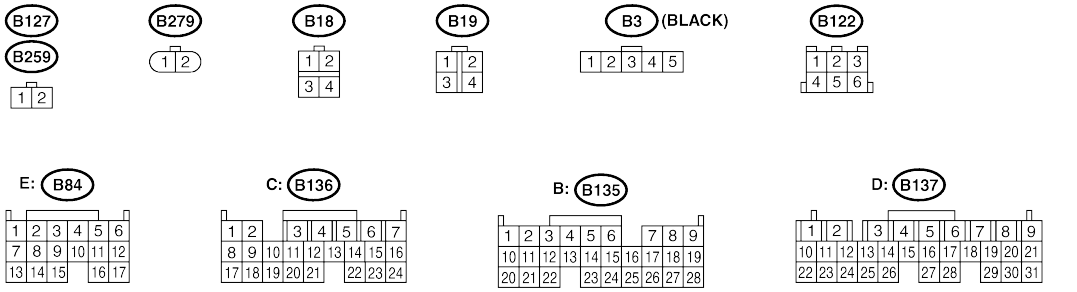


SL10-22D

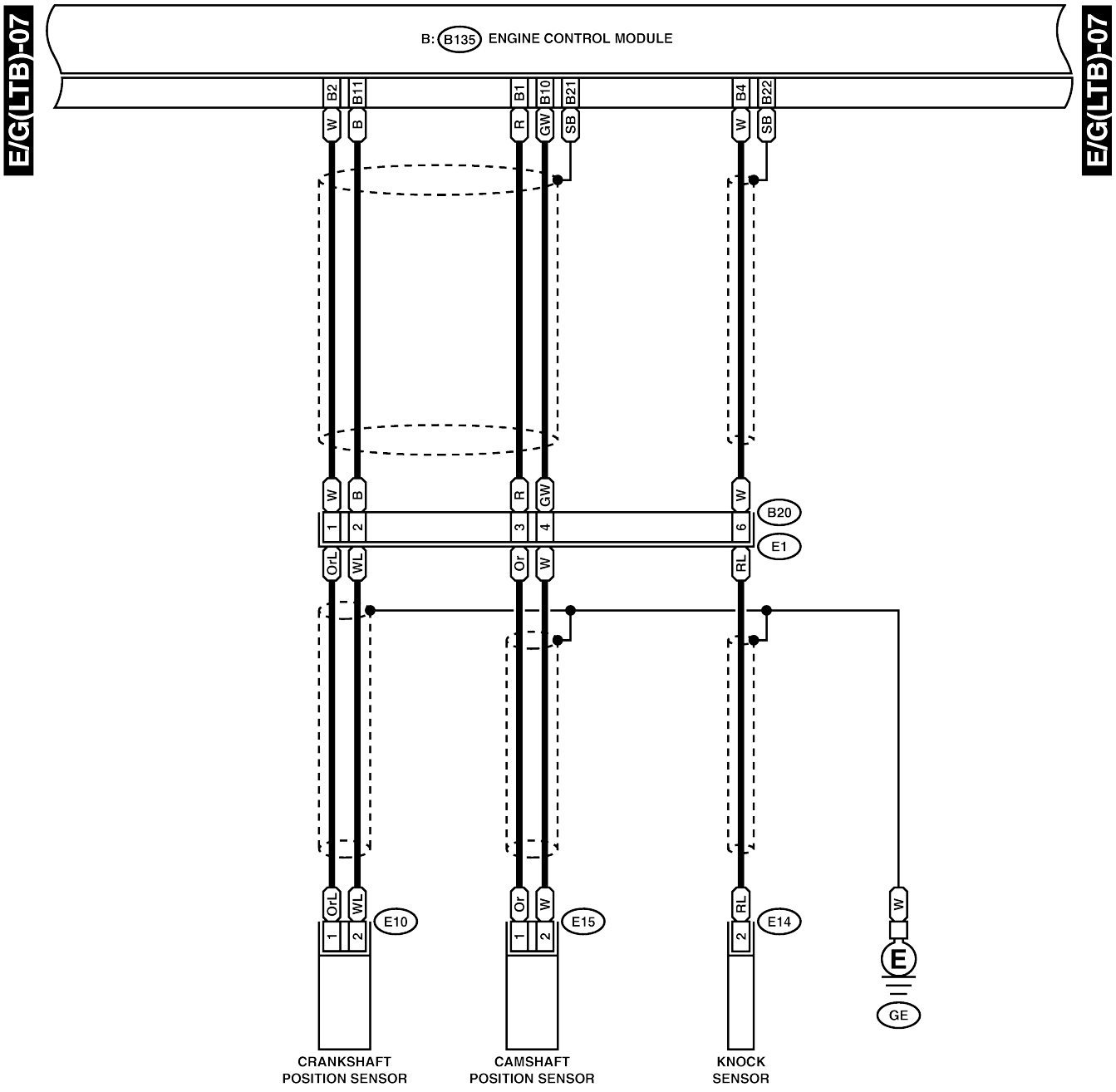

E/G(LTB)-05
A: B134 ENGINE CONTROL MODULE
E/G(LTB)-05
A5
A10
A20
A21
A8
Or
GW
YB
LgB
LR
MT
NEUTRAL POSITION SWITCH
LR
BR
1
3
B128
T9
E/G(LTB)-03 I
E/G(LTB)-02 E
E/G(LTB)-02 D
L E/G(LTB)-10
B
E
REF. TO GND-02
GOr
B
LgB
Or
7
8
12
4
B79
CHECK CONNECTOR
Or
B125
LINE END CONNECTOR
BR
1
B76
B75
TEST MODE CONNECTOR
OrB
B126
GW
RL
1
2
B250
FLASH MEMORY CONNECTOR
RL
YB
BR
LgB
BR
BR
6
8
1
10
12
13
B40
DATA LINK CONNECTOR
B75 (GREEN)
B76 (GREEN)
B250
B128
B79 (GRAY)
B40 (GRAY)
A: B134

SL10-22E

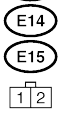

E/G(LTB)-06
B: B135 C: B136 D: B137 E: B84 ENGINE CONTROL MODULE
E/G(LTB)-06
D24 BW
E7 BG
B27 Br
E13 PL
E8 SB
B16 WB
D4 W
D5 W
D29 B
D19 W
D18 SB
C13 RW
B17 W
B26 SB
B19 RG
SHIELD AND SENSOR GROUND JOINT CONNECTOR
RG 1
LB 3
GY 2
GB 5
LR 4
B122
E/G(LTB)-03 J
E/G(LTB)-03 K
M E/G(LTB)-09
N E/G(LTB)-11
YG BW B127
YG BG Br PL LB B3
WB GY B279
YR W B W B18
YR RW L GB B19
WASTEGATE SOLENOID
AIR FLOW SENSOR
EXHAUST GAS TEMPERATURE SENSOR
FRONT OXYGEN (A/F) SENSOR
REAR OXYGEN SENSOR


B127
B259
B279
B18
B19
B3 (BLACK)
B122
E: B84
C: B136
B: B135
D: B137

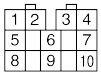
SL10-22F



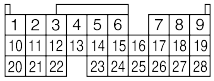
E10 (LIGHT GRAY)
E14 (GRAY)
E15 (LIGHT GRAY)



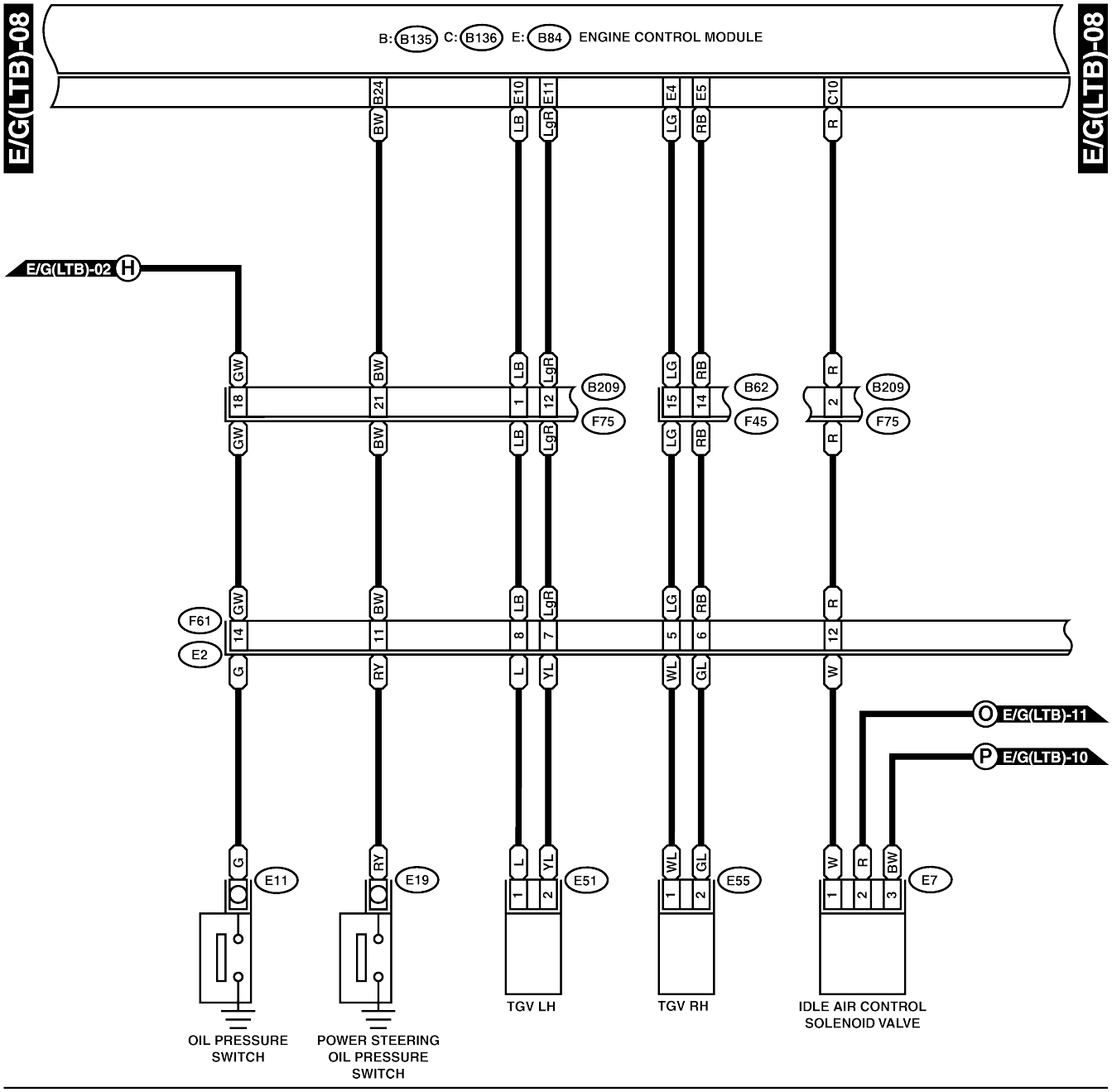
B20 (LIGHT GRAY)

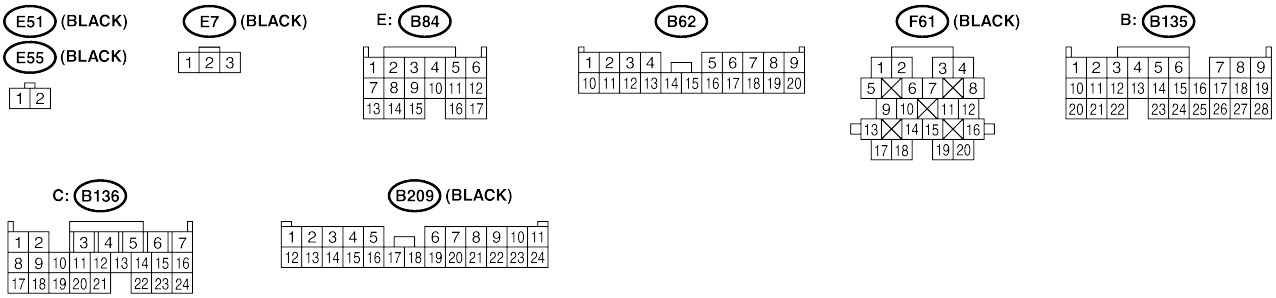


B: B135

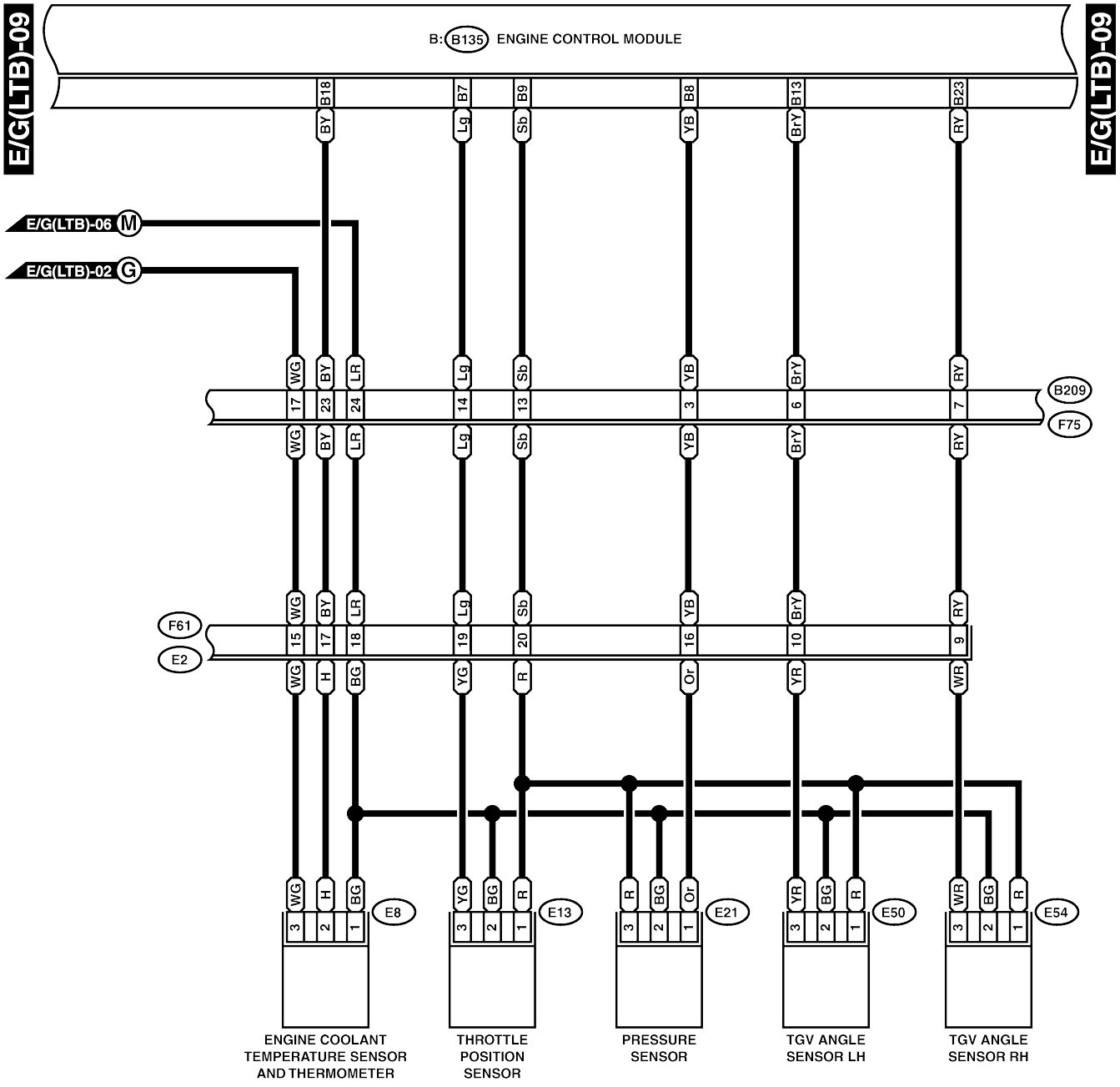


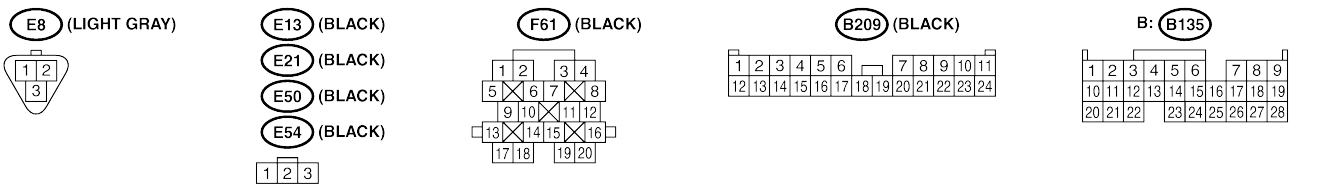
SL10-22G


E/G(LTB)-08
B: B135 C: B136 E: B84 ENGINE CONTROL MODULE
E/G(LTB)-08
E/G(LTB)-02 H
B209
F75
B62
F45
B209
F75
F61
E2
E/G(LTB)-11 O
E/G(LTB)-10 P
E11
E19
E51
E55
E7
OIL PRESSURE SWITCH
POWER STEERING OIL PRESSURE SWITCH
TGV LH
TGV RH
IDLE AIR CONTROL SOLENOID VALVE

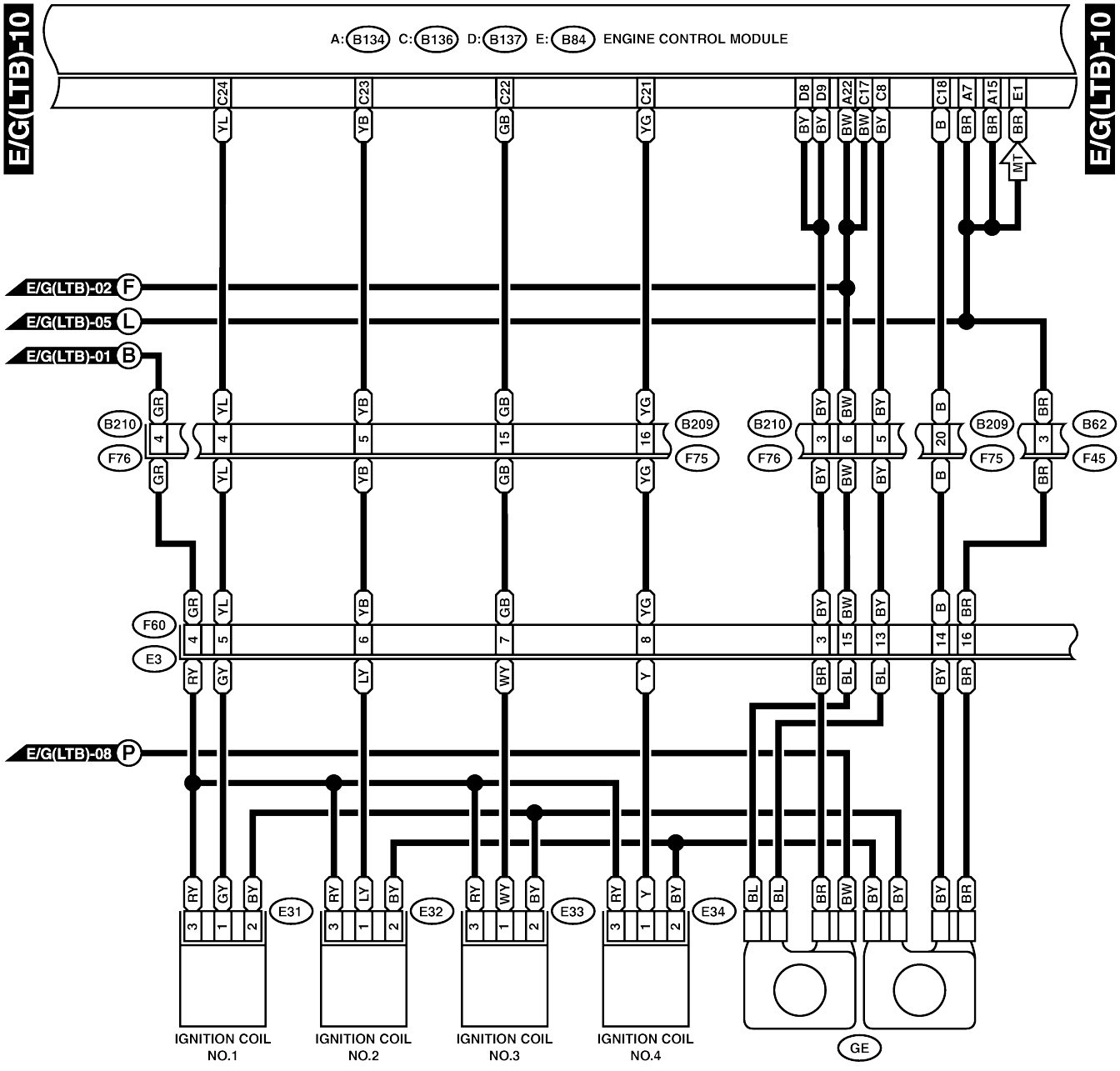

E51 (BLACK)
E55 (BLACK)
E7 (BLACK)
E: B84
B62
F61 (BLACK)
B: B135
C: B136
B209 (BLACK)

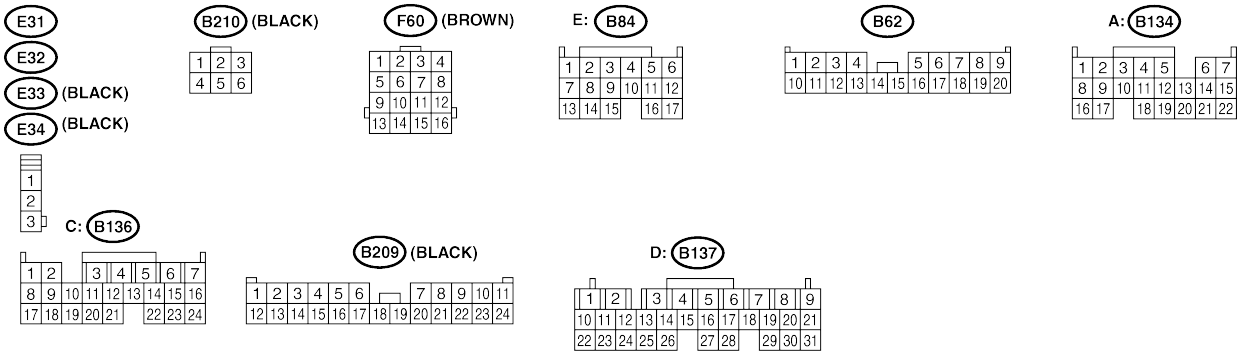
SL10-22H


E/G(LTB)-09
E/G(LTB)-09
B: B135 ENGINE CONTROL MODULE
B18
B7
B9
B8
B13
B23
BY
Lg
Sb
YB
BrY
RY
E/G(LTB)-06 M
E/G(LTB)-02 G
WG
LR
17
23
24
14
13
3
6
7
B209
F75
F61
E2
15
18
19
20
16
10
9
H
BG
YG
R
Or
YR
WR
E8
E13
E21
E50
E54
ENGINE COOLANT TEMPERATURE SENSOR AND THERMOMETER
THROTTLE POSITION SENSOR
PRESSURE SENSOR
TGV ANGLE SENSOR LH
TGV ANGLE SENSOR RH

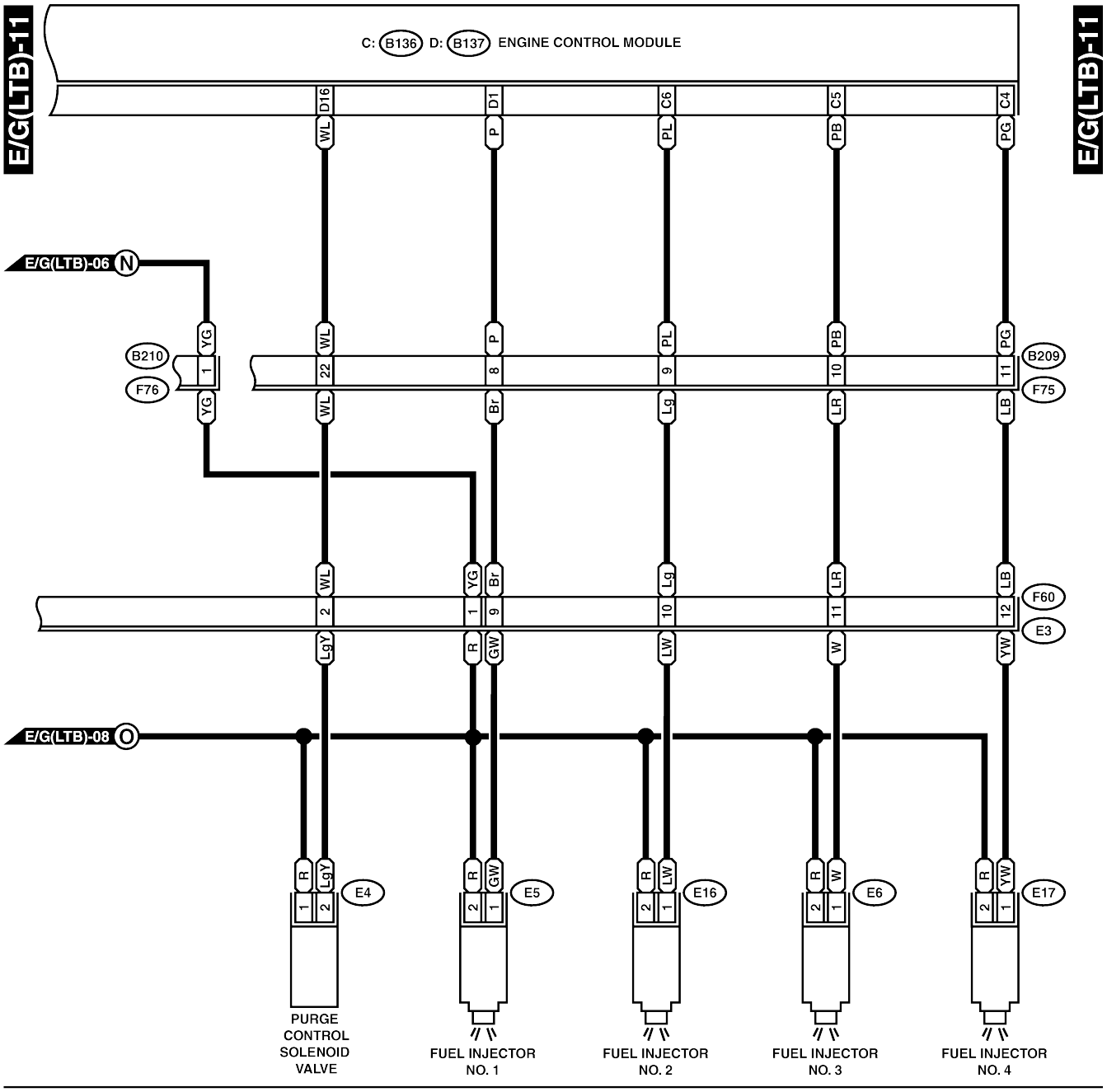

E8 (LIGHT GRAY)
E13 (BLACK)
E21 (BLACK)
E50 (BLACK)
E54 (BLACK)
F61 (BLACK)
B209 (BLACK)
B: B135

SL10-22I


E/G(LTB)-10
A: B134 C: B136 D: B137 E: B84 ENGINE CONTROL MODULE
E/G(LTB)-02 F
E/G(LTB)-05 L
E/G(LTB)-01 B
E/G(LTB)-08 P
B210
F76
B209
F75
B62
F45
F60
E3
MT
IGNITION COIL NO.1
IGNITION COIL NO.2
IGNITION COIL NO.3
IGNITION COIL NO.4
E31
E32
E33
E34
GE


E31
E32
E33 (BLACK)
E34 (BLACK)
B210 (BLACK)
F60 (BROWN)
E: B84
B62
A: B134
C: B136
B209 (BLACK)
D: B137

SL10-22J



E5 (DARK GRAY)
E6 (DARK GRAY)
E16 (DARK GRAY)
E17 (DARK GRAY)



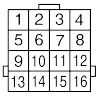
E4 (BLACK)



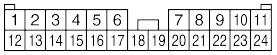
B210 (BLACK)



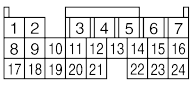
F60 (BROWN)



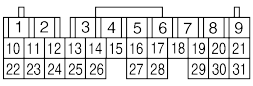
B209 (BLACK)



C: B136

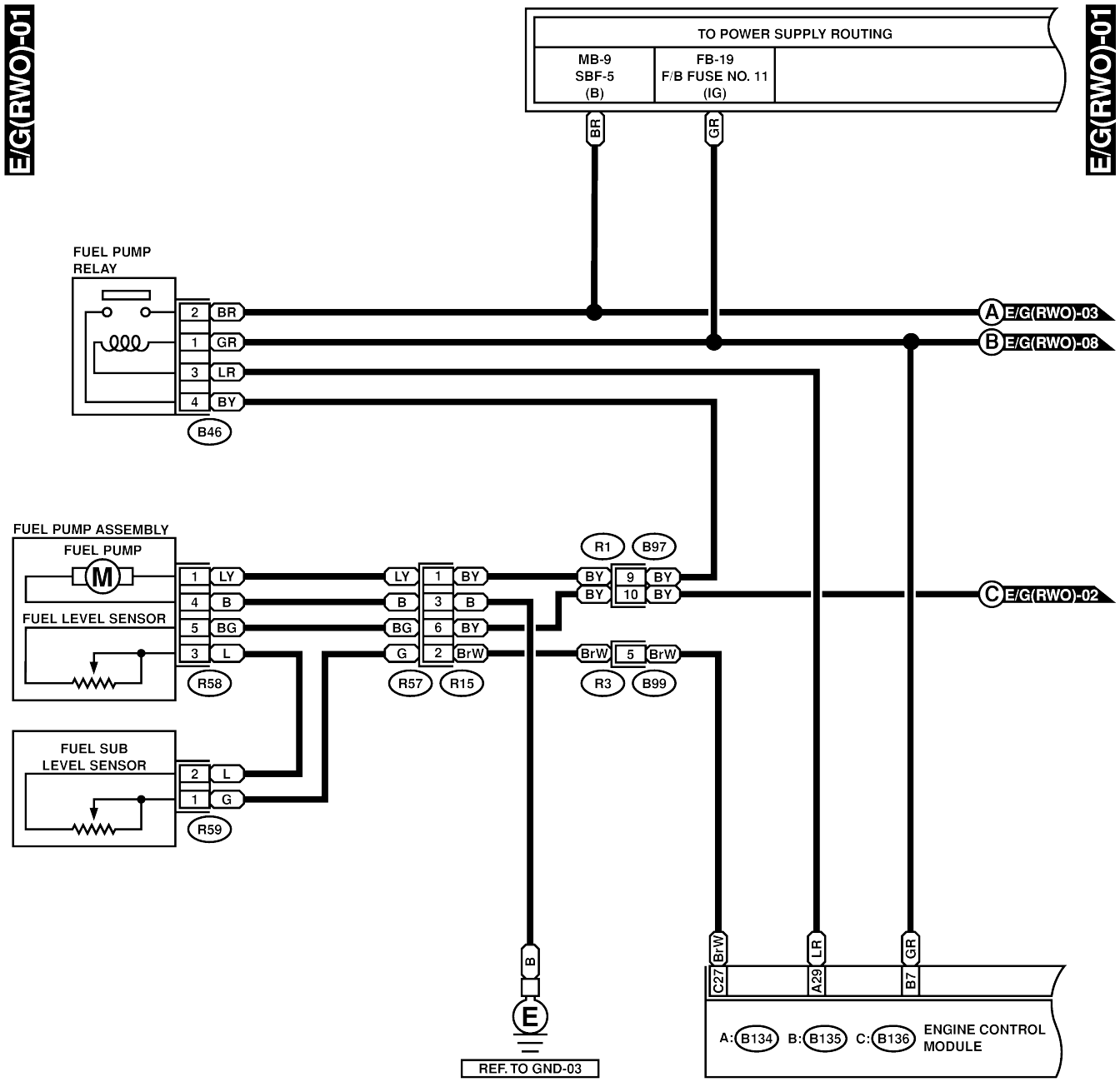


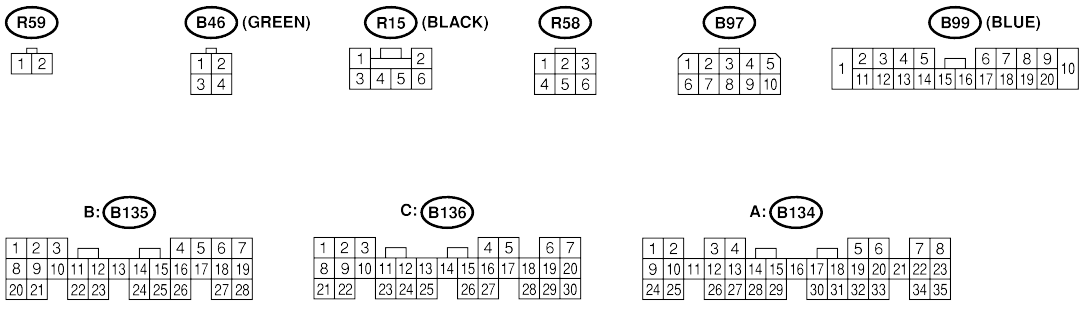
D: B137



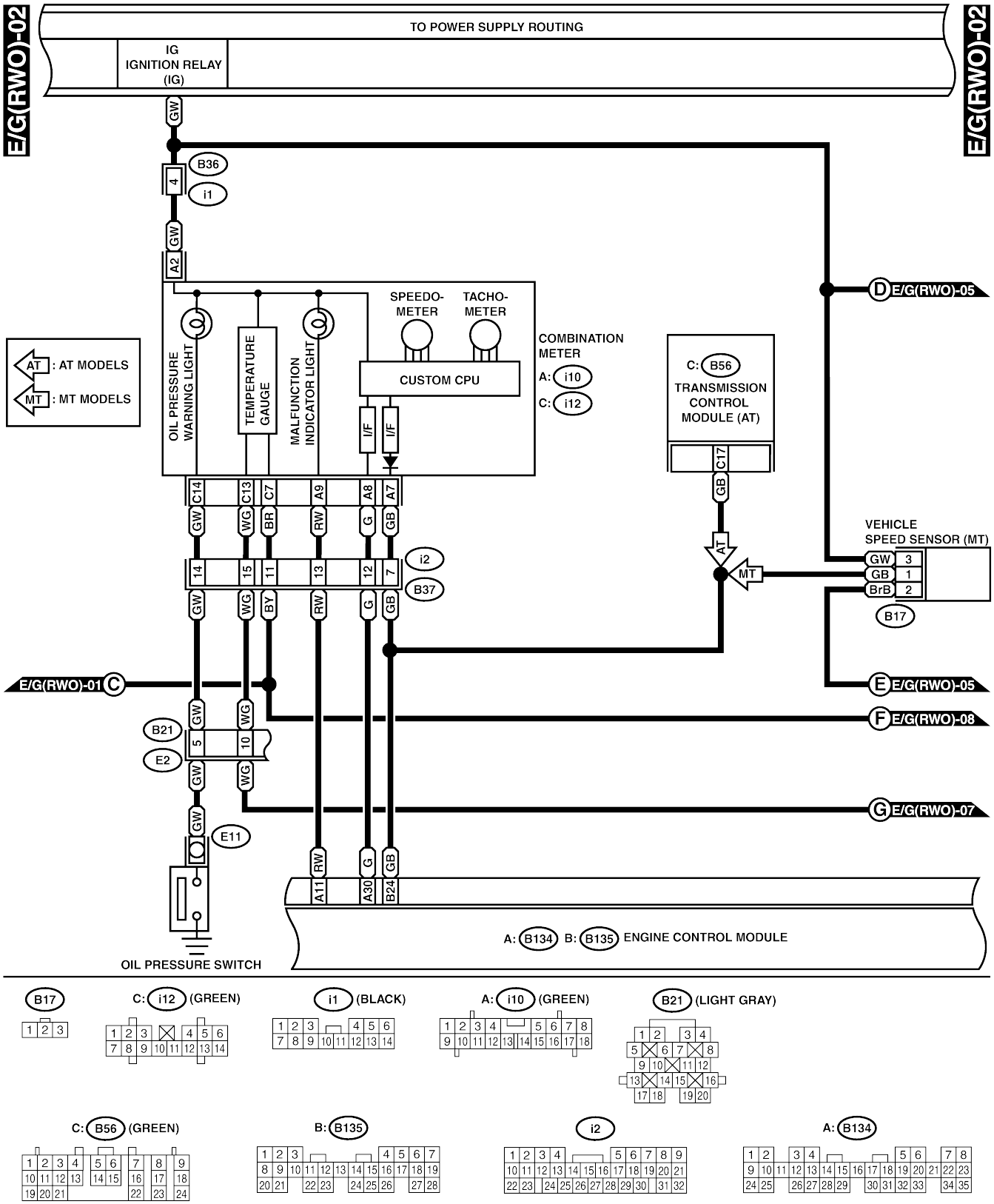
SL10-22K

4. RHD SOHC MODEL S903482A2124

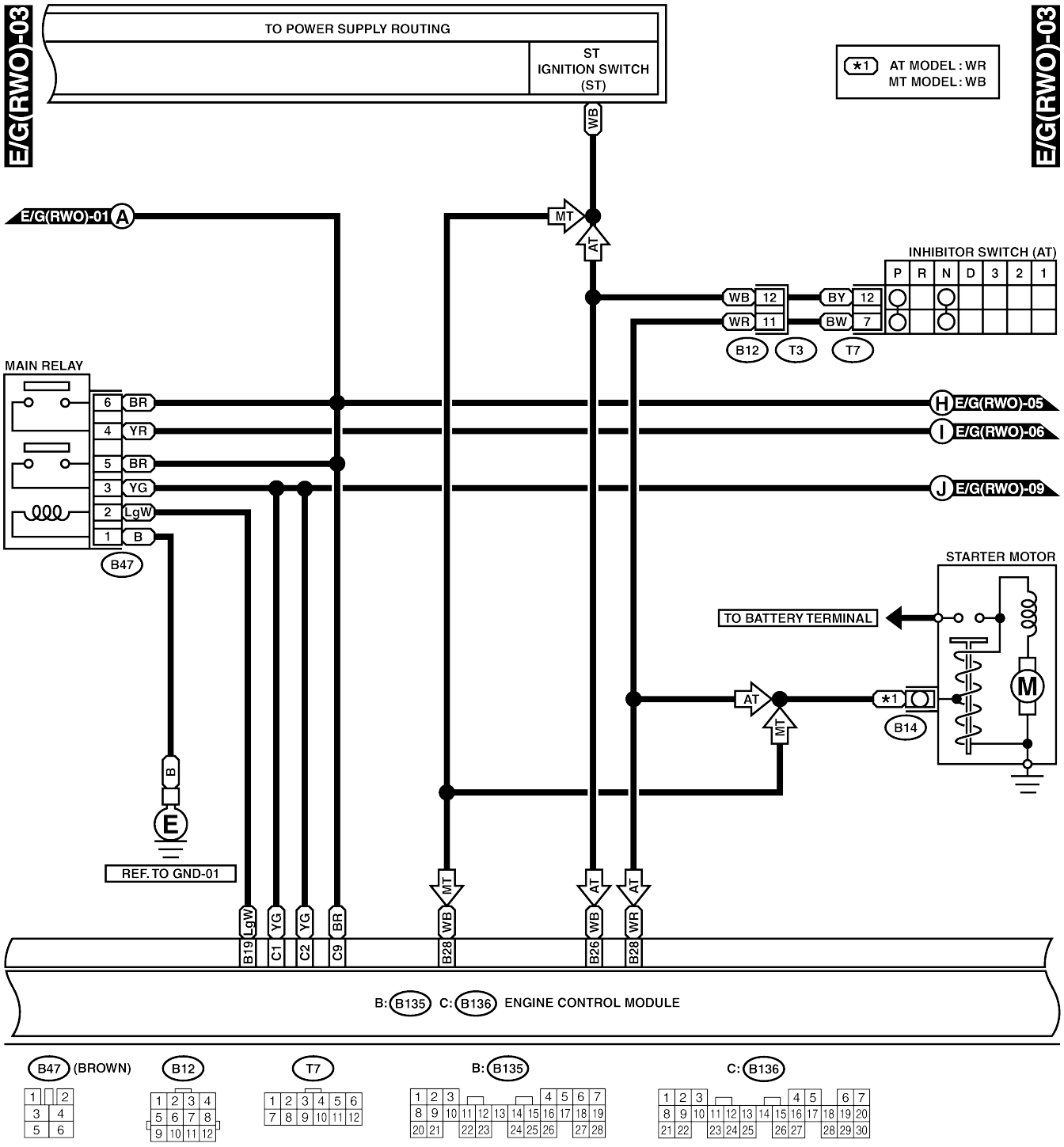




SR10-20A


E/G(RWO)-02
TO POWER SUPPLY ROUTING
IG
IGNITION RELAY
(IG)
E/G(RWO)-02
GW
B36
4
i1
GW
A2
D E/G(RWO)-05
AT : AT MODELS
MT : MT MODELS
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
C: B56
TRANSMISSION CONTROL MODULE (AT)
C17
GB
AT
MT
VEHICLE SPEED SENSOR (MT)
GW 3
GB 1
BrB 2
B17
C14 C13 C7 A9 A8 A7
GW WG BR RW G GB
14 15 11 13 12 7
i2
B37
GW WG BY RW G GB
E/G(RWO)-01 C
E E/G(RWO)-05
F E/G(RWO)-08
G E/G(RWO)-07
B21
5 10
E2
GW WG
GW
E11
RW G GB
A11 A30 B24
A: B134 B: B135 ENGINE CONTROL MODULE
OIL PRESSURE SWITCH
B17
C: i12 (GREEN)
i1 (BLACK)
A: i10 (GREEN)
B21 (LIGHT GRAY)
C: B56 (GREEN)
B: B135
i2
A: B134

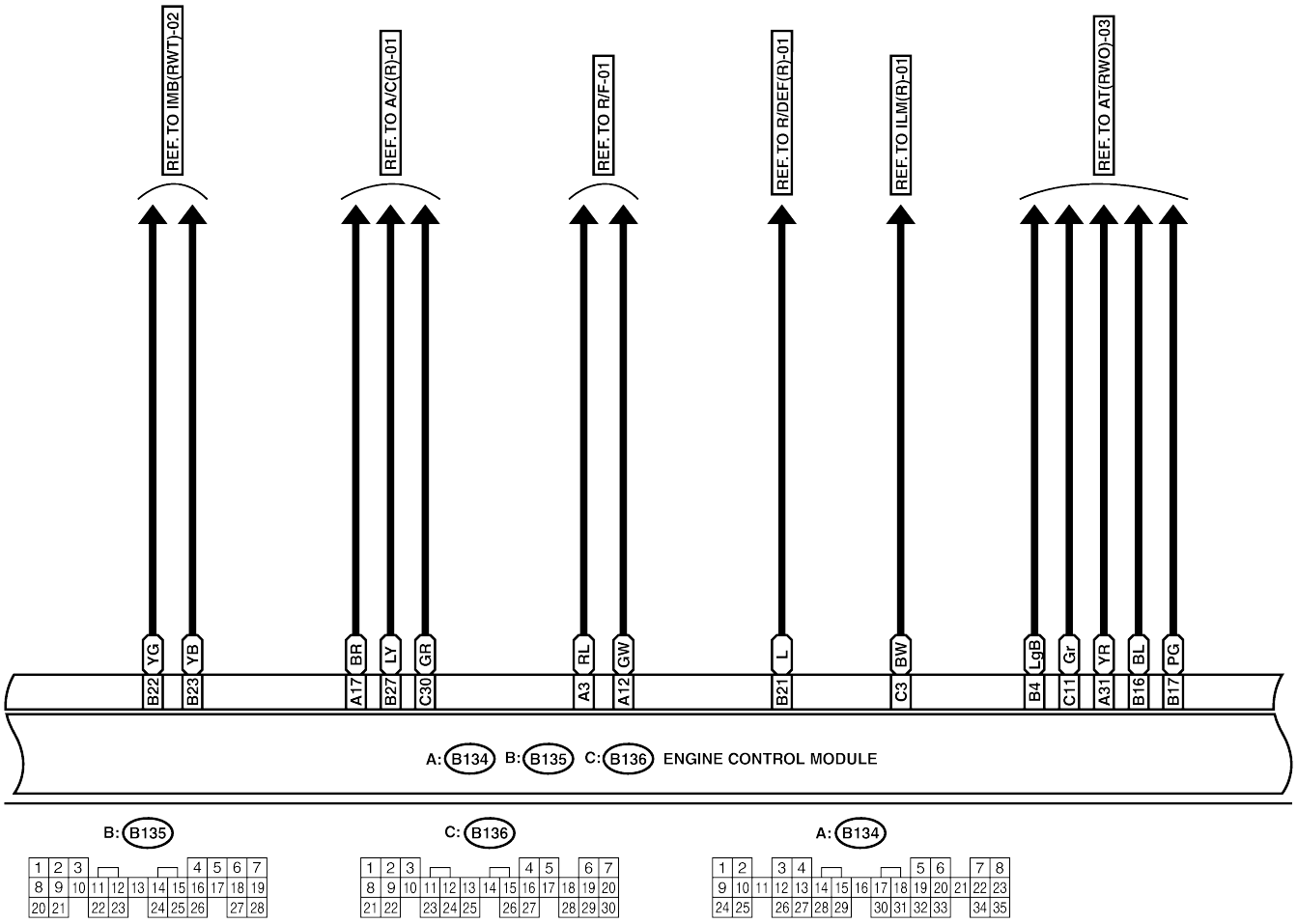
SR10-20B


E/G(RWO)-03
TO POWER SUPPLY ROUTING
ST
IGNITION SWITCH
(ST)
*1 AT MODEL : WR
MT MODEL : WB
E/G(RWO)-01 A
MT
AT
INHIBITOR SWITCH (AT)
P R N D 3 2 1
WB 12
WR 11
BY 12
BW 7
B12 T3 T7
MAIN RELAY
6 BR
4 YR
5 BR
3 YG
2 LgW
1 B
B47
H E/G(RWO)-05
I E/G(RWO)-06
J E/G(RWO)-09
STARTER MOTOR
TO BATTERY TERMINAL
M
*1
B14
B
E
REF. TO GND-01
B19 LgW
C1 YG
C2 YG
C9 BR
B28 WB
B26 WB
B28 WR
B: B135 C: B136 ENGINE CONTROL MODULE
B47 (BROWN)
B12
T7
B: B135
C: B136

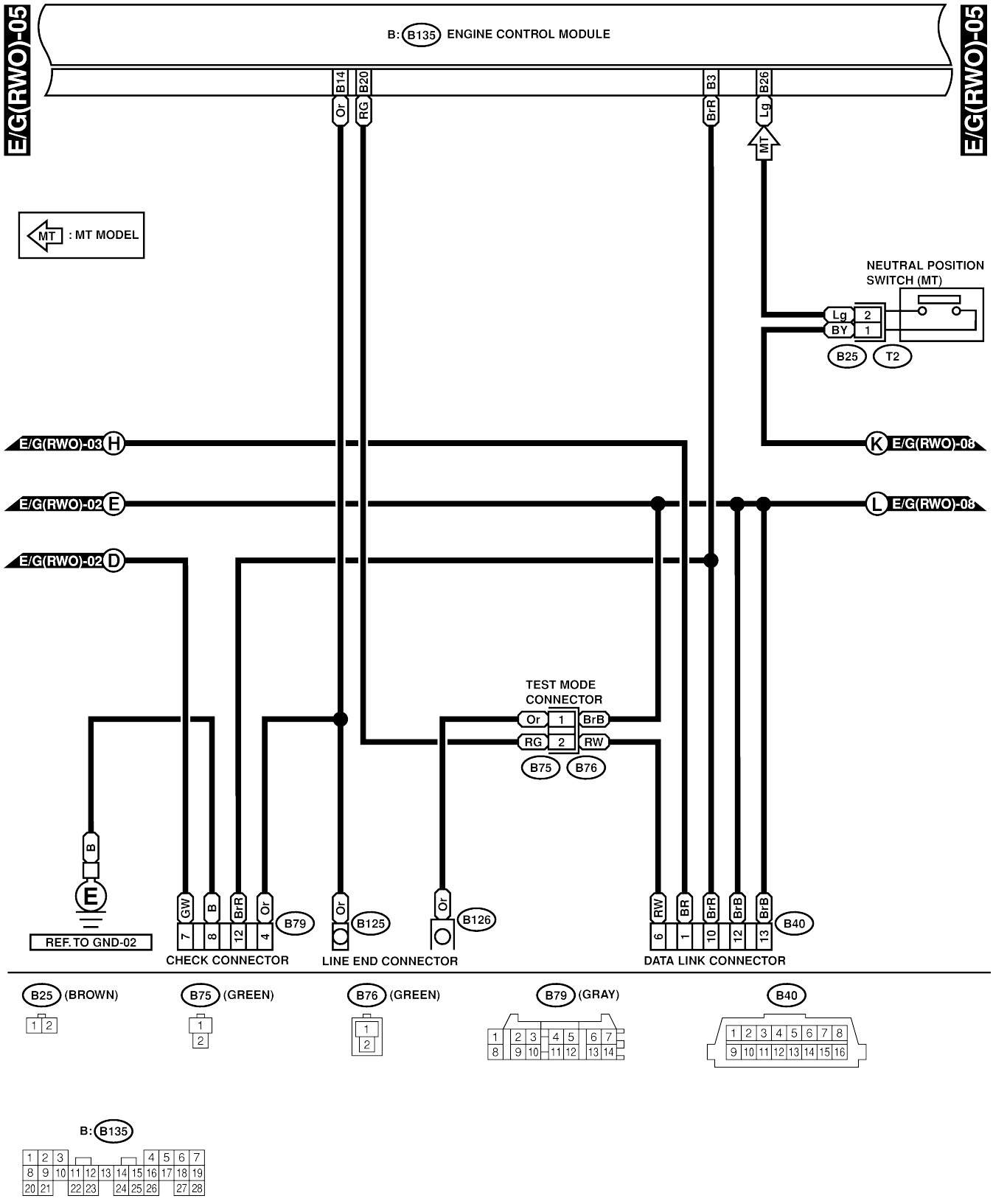
SR10-20C

E/G(RWO)-04

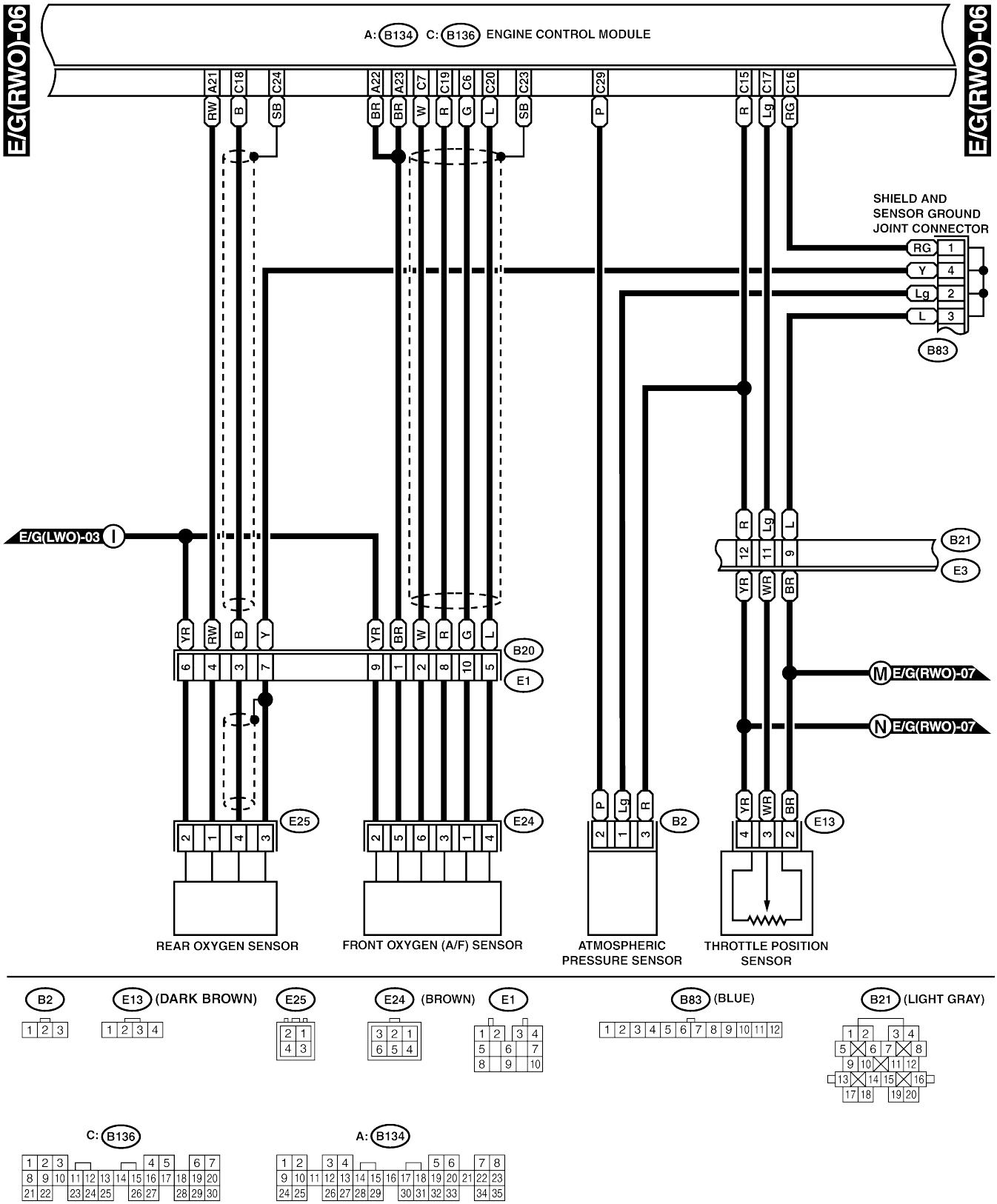
E/G(RWO)-04



SR10-20D

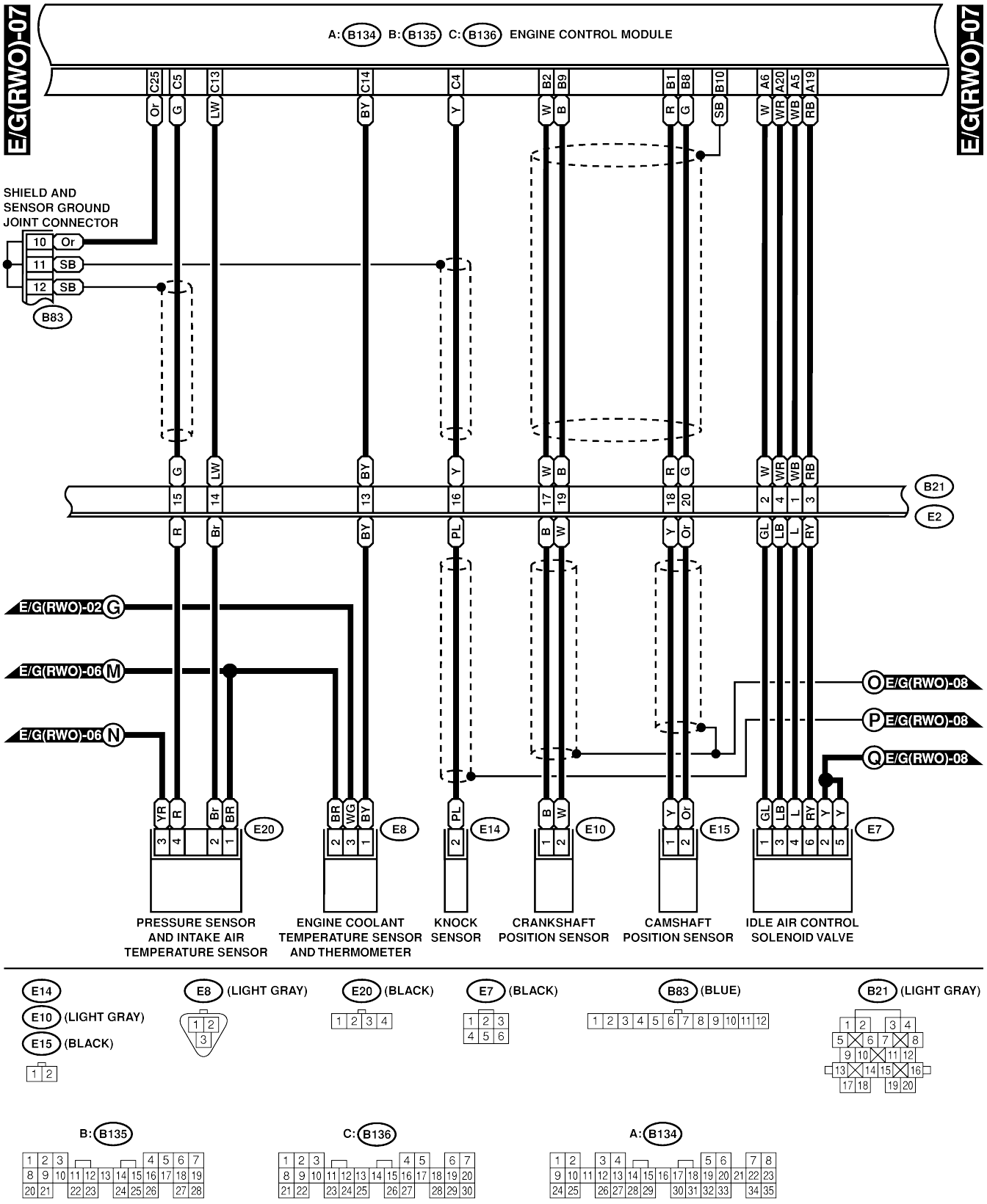

E/G(RWO)-05
B: B135 ENGINE CONTROL MODULE
E/G(RWO)-05
B14
B20
B3
B26
Or
RG
BrR
Lg
MT
MT : MT MODEL
NEUTRAL POSITION SWITCH (MT)
Lg
BY
2
1
B25
T2
E/G(RWO)-03 H
K E/G(RWO)-08
E/G(RWO)-02 E
L E/G(RWO)-08
E/G(RWO)-02 D
TEST MODE CONNECTOR
Or
RG
1
2
BrB
RW
B75
B76
B
E
REF. TO GND-02
GW
B
BrR
Or
7
8
12
4
B79
Or
B125
Or
B126
RW
BR
BrR
BrB
BrB
6
1
10
12
13
B40
CHECK CONNECTOR
LINE END CONNECTOR
DATA LINK CONNECTOR
B25 (BROWN)
B75 (GREEN)
B76 (GREEN)
B79 (GRAY)
B40
B: B135

SR10-20E


E/G(RWO)-06
A: B134 C: B136 ENGINE CONTROL MODULE
E/G(RWO)-06
SHIELD AND SENSOR GROUND JOINT CONNECTOR
B83
E/G(LWO)-03 I
B21
E3
B20
E1
M E/G(RWO)-07
N E/G(RWO)-07
E25
E24
B2
E13
REAR OXYGEN SENSOR
FRONT OXYGEN (A/F) SENSOR
ATMOSPHERIC PRESSURE SENSOR
THROTTLE POSITION SENSOR

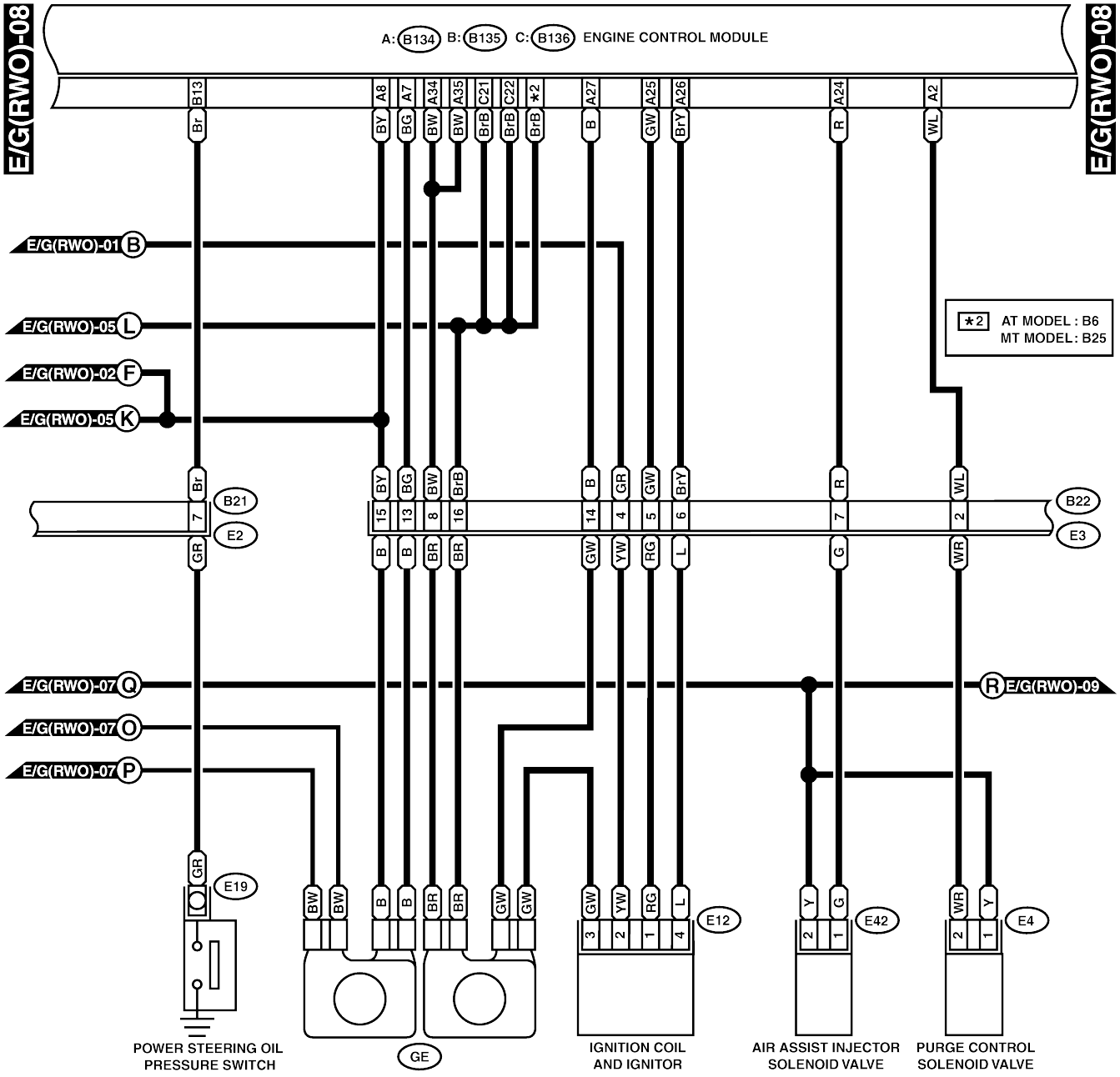
B2
E13 (DARK BROWN)
E25
E24 (BROWN)
E1
B83 (BLUE)
B21 (LIGHT GRAY)
C: B136
A: B134

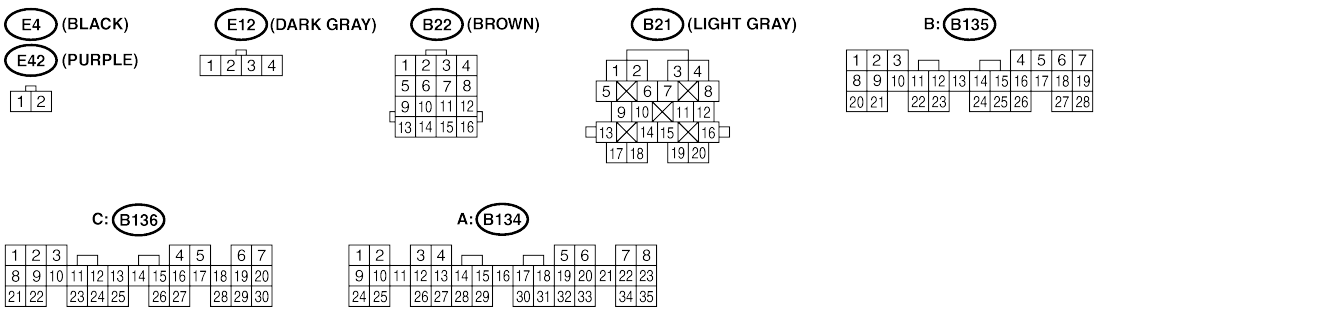
SR10-20F


E/G(RWO)-07
A: B134 B: B135 C: B136 ENGINE CONTROL MODULE
SHIELD AND SENSOR GROUND JOINT CONNECTOR
B83
B21
E2
E/G(RWO)-02 G
E/G(RWO)-06 M
E/G(RWO)-06 N
O E/G(RWO)-08
P E/G(RWO)-08
Q E/G(RWO)-08
E20
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

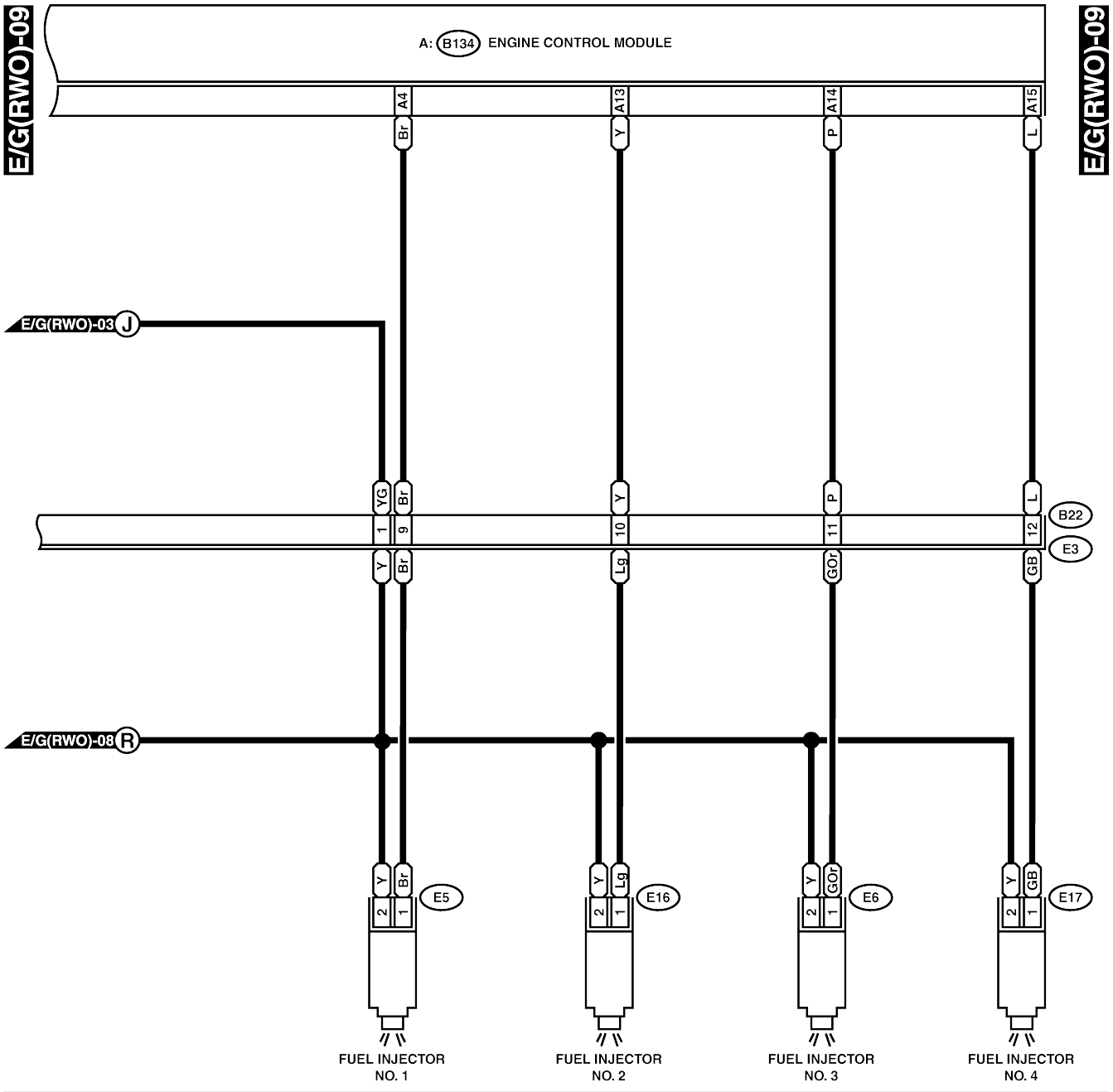
E14
E10 (LIGHT GRAY)
E15 (BLACK)
E8 (LIGHT GRAY)
E20 (BLACK)
E7 (BLACK)
B83 (BLUE)
B21 (LIGHT GRAY)
B: B135
C: B136
A: B134

SR10-20G


E/G(RWO)-08
A: B134 B: B135 C: B136 ENGINE CONTROL MODULE
E/G(RWO)-01 B
E/G(RWO)-05 L
E/G(RWO)-02 F
E/G(RWO)-05 K
*2 AT MODEL : B6
MT MODEL: B25
B21
E2
B22
E3
E/G(RWO)-07 Q
E/G(RWO)-07 O
E/G(RWO)-07 P
R E/G(RWO)-09
E19
E12
E42
E4
POWER STEERING OIL PRESSURE SWITCH
GE
IGNITION COIL AND IGNITOR
AIR ASSIST INJECTOR SOLENOID VALVE
PURGE CONTROL SOLENOID VALVE

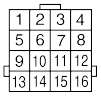

E4 (BLACK)
E42 (PURPLE)
E12 (DARK GRAY)
B22 (BROWN)
B21 (LIGHT GRAY)
B: B135
C: B136
A: B134

SR10-20H

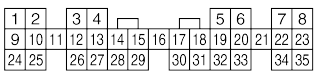


E5 (LIGHT GRAY)
E6 (LIGHT GRAY)
E16 (LIGHT GRAY)
E17 (LIGHT GRAY)

B22 (BROWN)

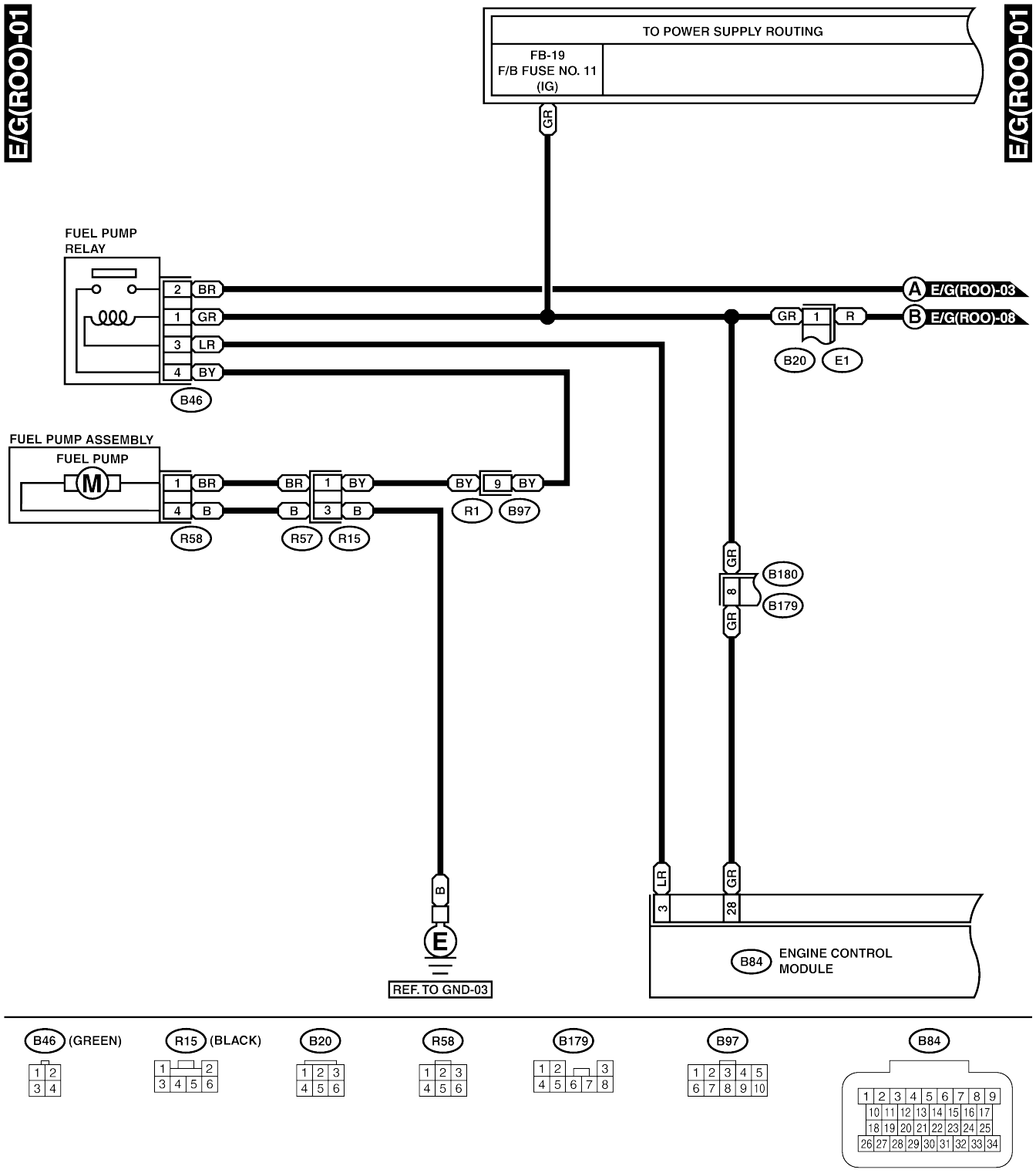


A: B134

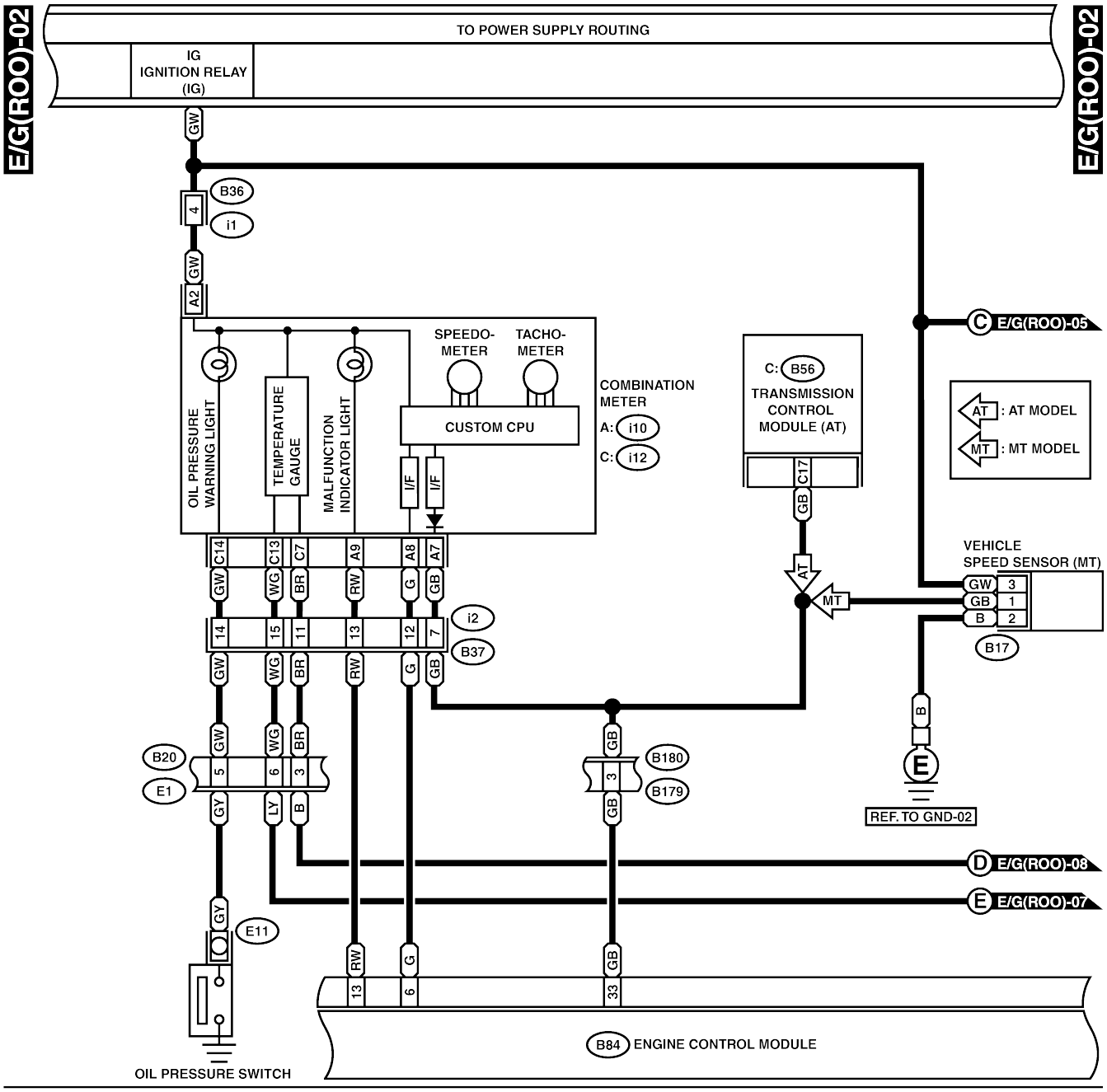


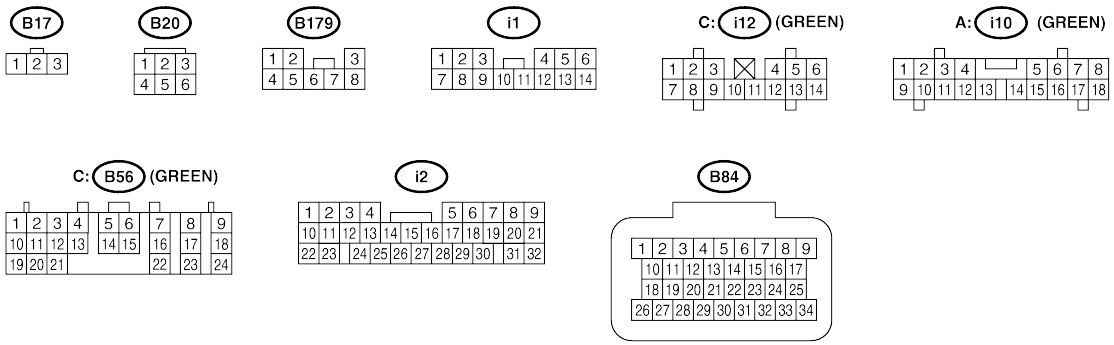
SR10-20I

5. RHD SOHC W/O OBD MODEL S903482A2123

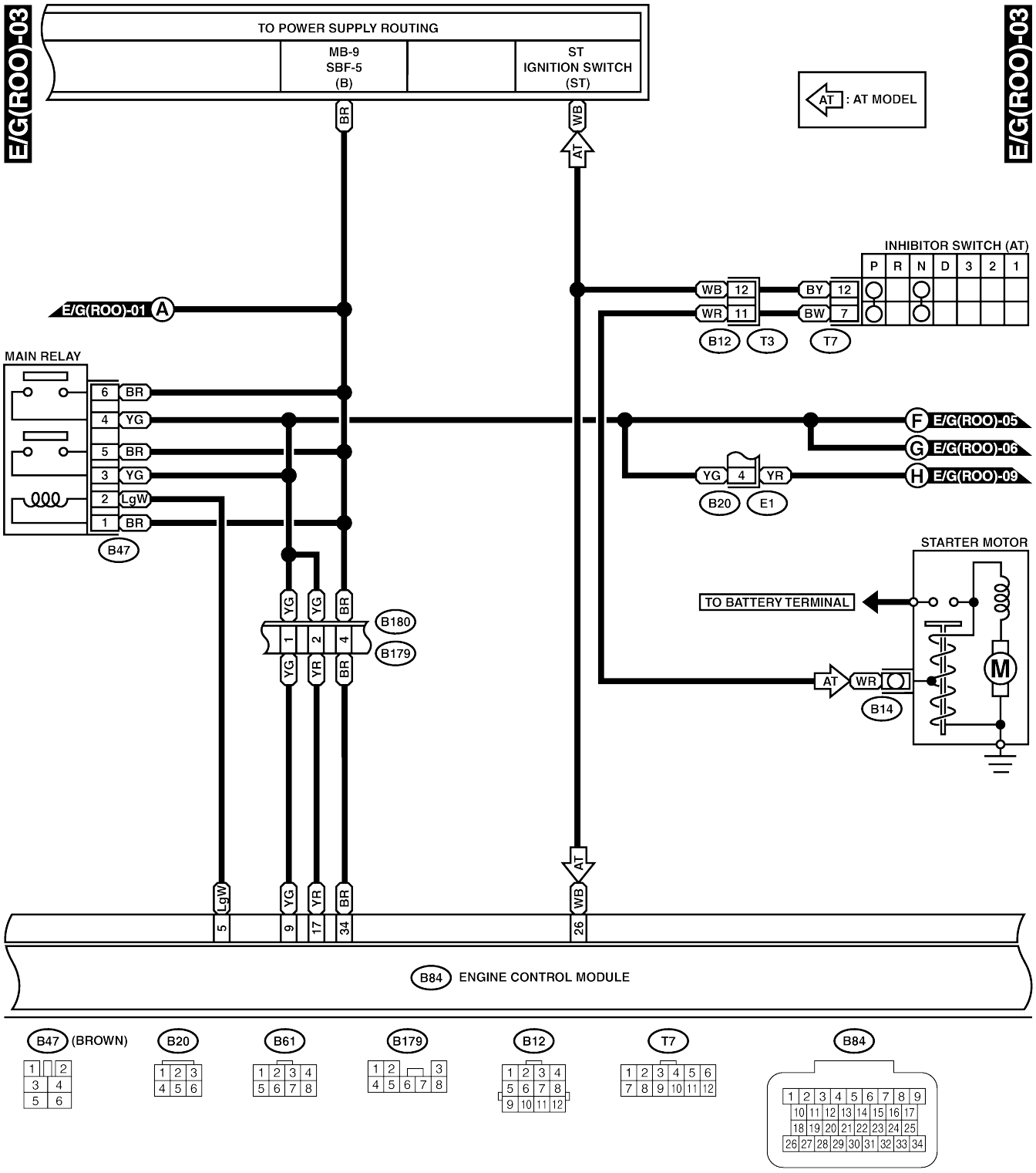


SR10-21A


E/G(ROO)-02
TO POWER SUPPLY ROUTING
IG
IGNITION RELAY
(IG)
GW
B36
4
i1
A2
SPEEDO-METER
TACHO-METER
COMBINATION METER
A: i10
C: i12
CUSTOM CPU
I/F
OIL PRESSURE WARNING LIGHT
TEMPERATURE GAUGE
MALFUNCTION INDICATOR LIGHT
C: B56
TRANSMISSION CONTROL MODULE (AT)
C17
C E/G(ROO)-05
AT : AT MODEL
MT : MT MODEL
VEHICLE SPEED SENSOR (MT)
B17
i2
B37
B20
E1
B180
B179
REF. TO GND-02
D E/G(ROO)-08
E E/G(ROO)-07
E11
OIL PRESSURE SWITCH
B84 ENGINE CONTROL MODULE


B17
B20
B179
i1
C: i12 (GREEN)
A: i10 (GREEN)
C: B56 (GREEN)
i2
B84

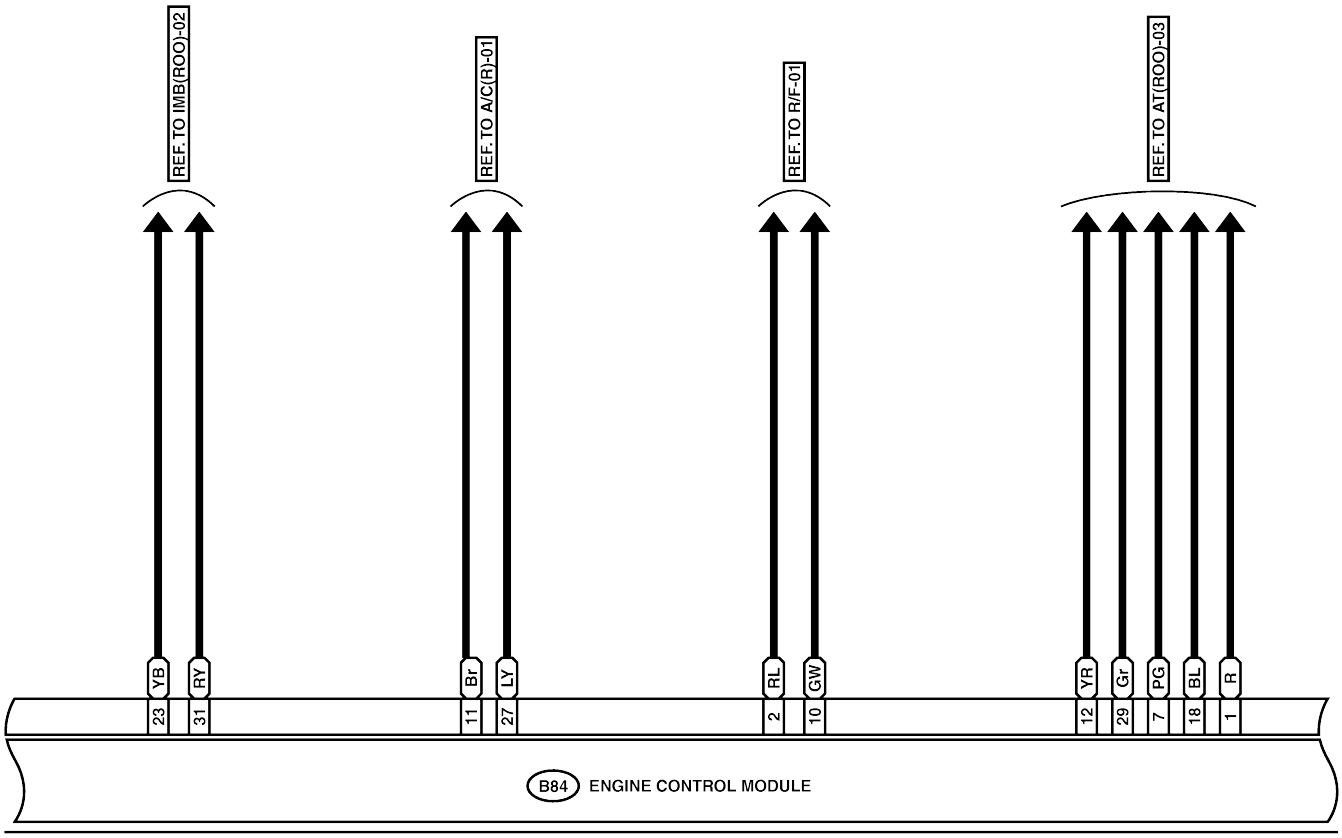
SR10-21B

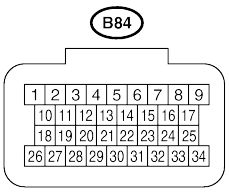

E/G(ROO)-03
TO POWER SUPPLY ROUTING
MB-9
SBF-5
(B)
ST
IGNITION SWITCH
(ST)
AT : AT MODEL
INHIBITOR SWITCH (AT)
P R N D 3 2 1
E/G(ROO)-01 A
MAIN RELAY
6 BR
4 YG
5 BR
3 YG
2 LgW
1 BR
B47
WB 12
WR 11
BY 12
BW 7
B12 T3 T7
F E/G(ROO)-05
G E/G(ROO)-06
H E/G(ROO)-09
YG 4 YR
B20 E1
STARTER MOTOR
TO BATTERY TERMINAL
M
AT WR
B14
B180
B179
LgW YG YR BR WB
5 9 17 34 26
B84 ENGINE CONTROL MODULE
B47 (BROWN)
B20
B61
B179
B12
T7
B84

SR10-21C

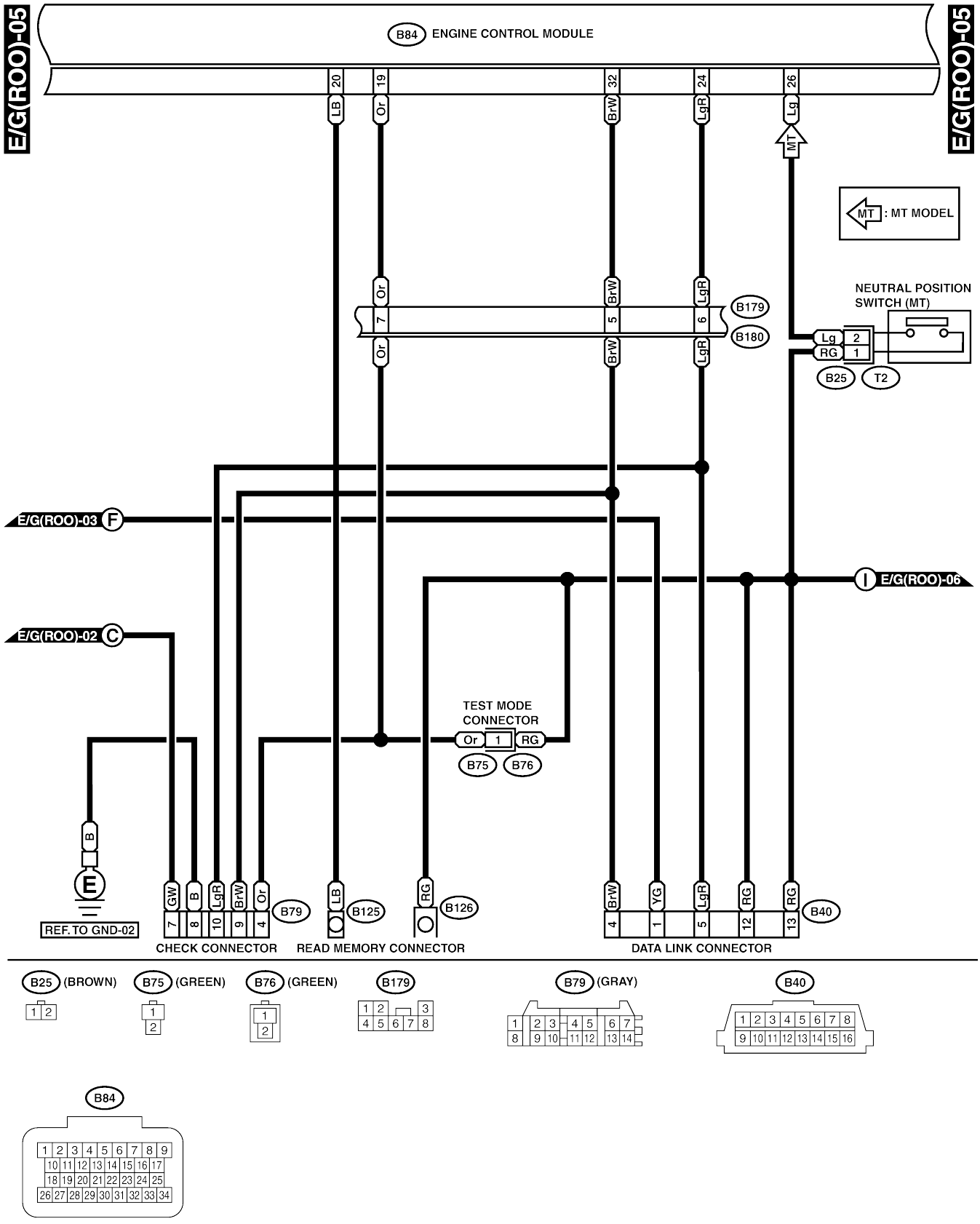
E/G(ROO)-04

E/G(ROO)-04

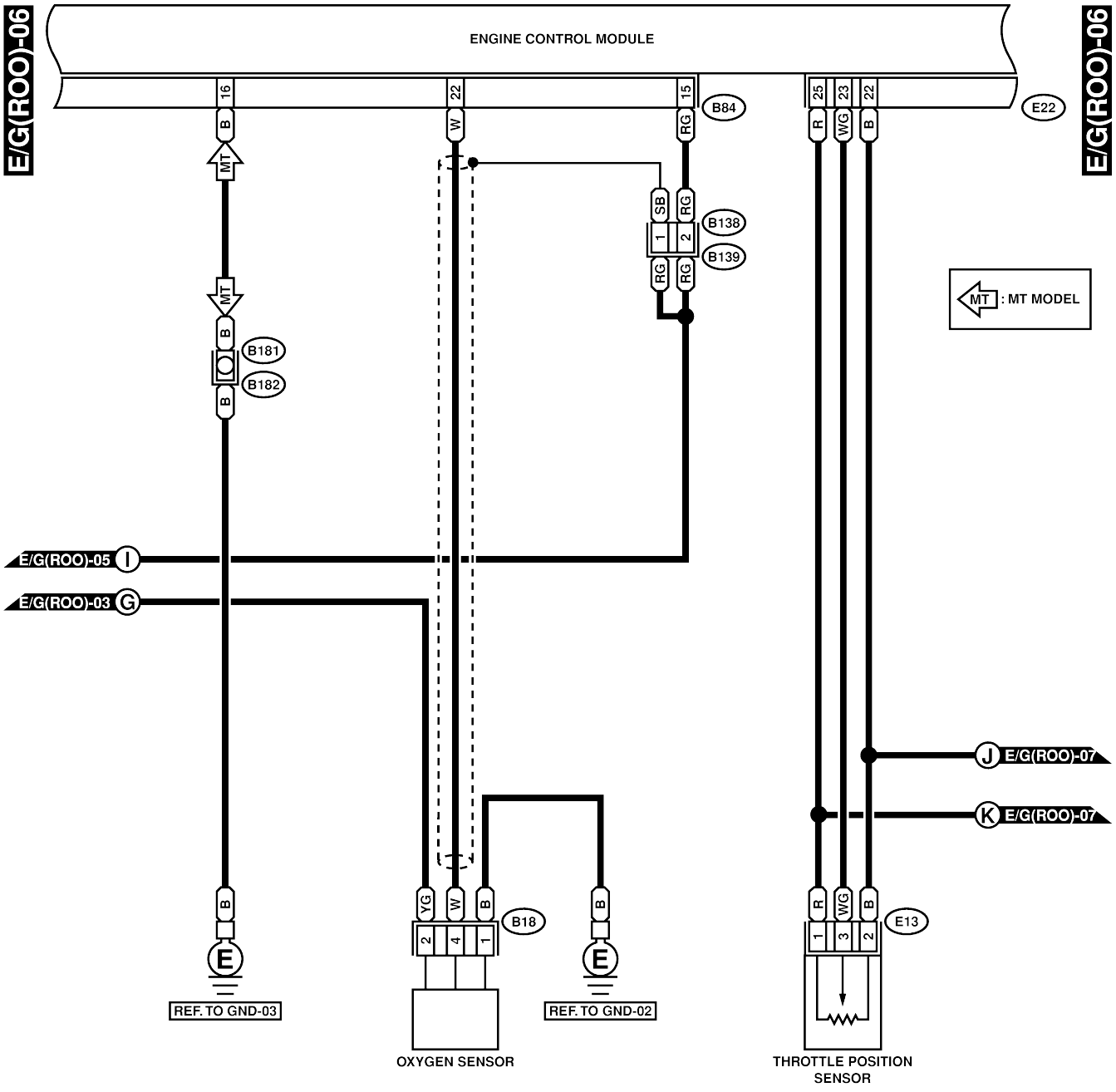


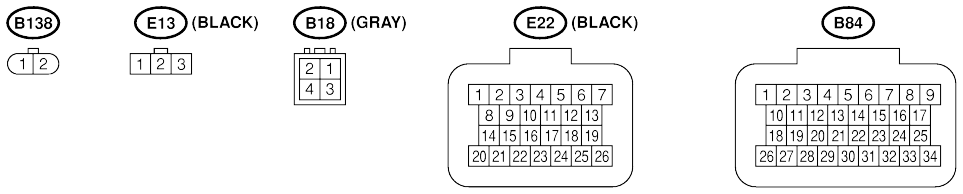


SR10-21D

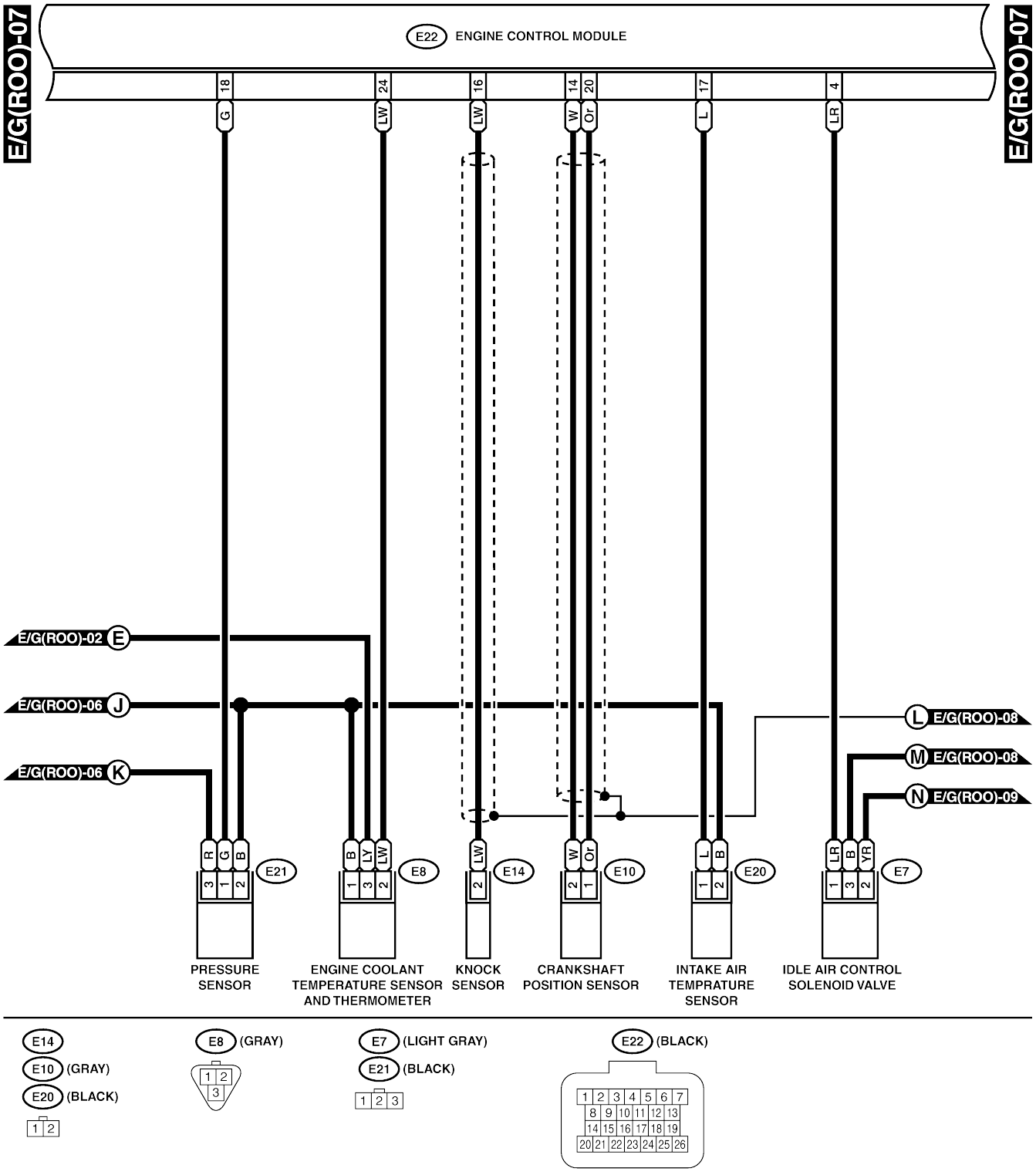

E/G(ROO)-05
B84 ENGINE CONTROL MODULE
20 LB
19 Or
32 BrW
24 LgR
26 Lg
MT
MT : MT MODEL
NEUTRAL POSITION SWITCH (MT)
Lg 2
RG 1
B25 T2
B179
B180
7 Or
5 BrW
6 LgR
E/G(ROO)-03 F
E/G(ROO)-06 I
E/G(ROO)-02 C
TEST MODE CONNECTOR
Or 1 RG
B75 B76
B
REF. TO GND-02
GW 7
B 8
LgR 10
BrW 9
Or 4
B79
LB
B125
RG
B126
CHECK CONNECTOR
READ MEMORY CONNECTOR
BrW 4
YG 1
LgR 5
RG 12
RG 13
B40
DATA LINK CONNECTOR
B25 (BROWN)
B75 (GREEN)
B76 (GREEN)
B179
B79 (GRAY)
B40
B84

SR10-21E

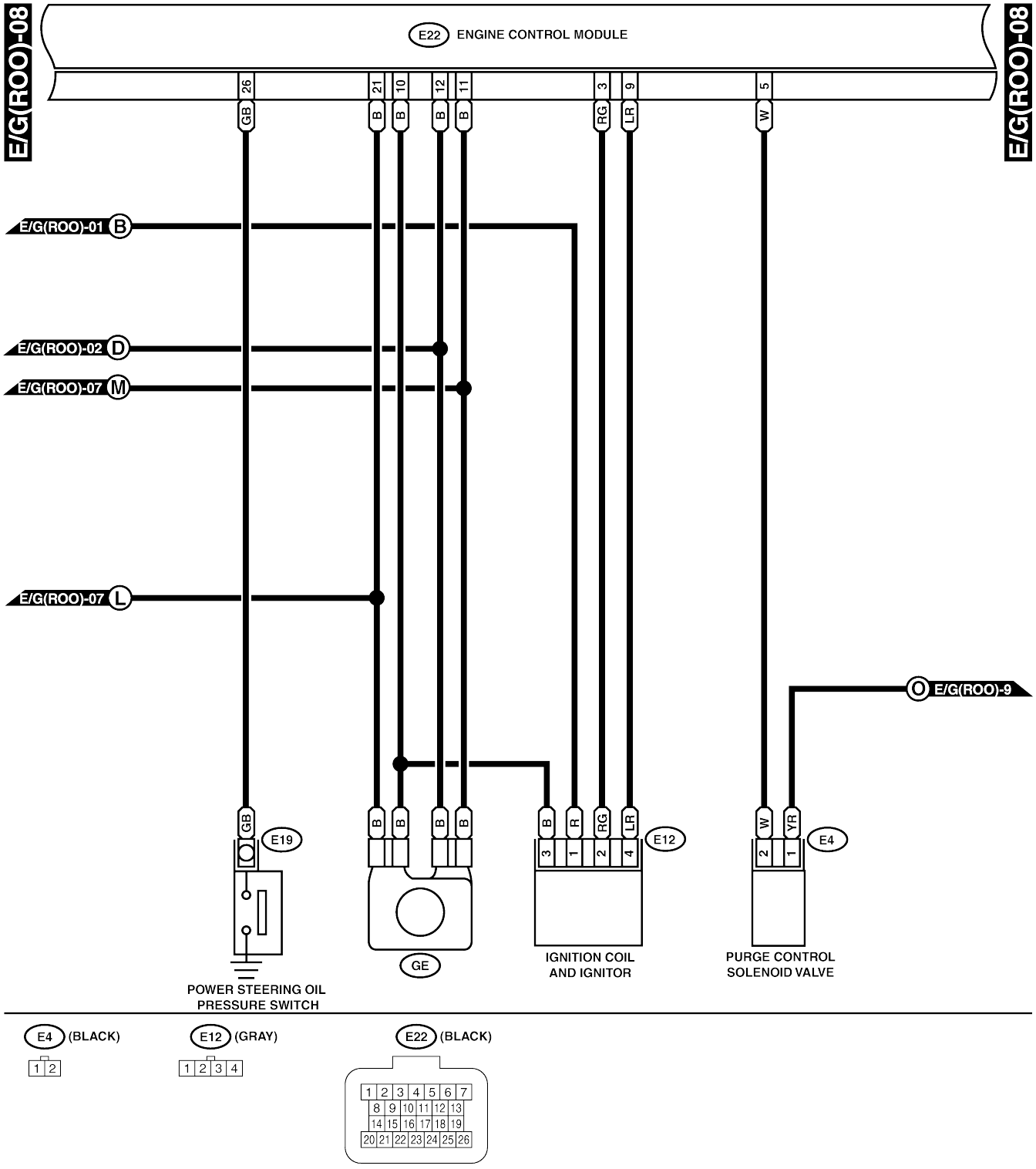

E/G(ROO)-06
ENGINE CONTROL MODULE
E/G(ROO)-06
16
22
15
B84
25
23
22
E22
B
W
RG
R
WG
B
MT
SB
RG
1
2
B138
B139
RG
RG
MT : MT MODEL
MT
B
B181
B182
B
E/G(ROO)-05 I
E/G(ROO)-03 G
J E/G(ROO)-07
K E/G(ROO)-07
B
YG
W
B
B18
B
R
WG
B
E13
2
4
1
1
3
2
E
E
REF. TO GND-03
REF. TO GND-02
OXYGEN SENSOR
THROTTLE POSITION SENSOR


B138
1 2
E13 (BLACK)
1 2 3
B18 (GRAY)
2 1
4 3
E22 (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
B84
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

SR10-21F

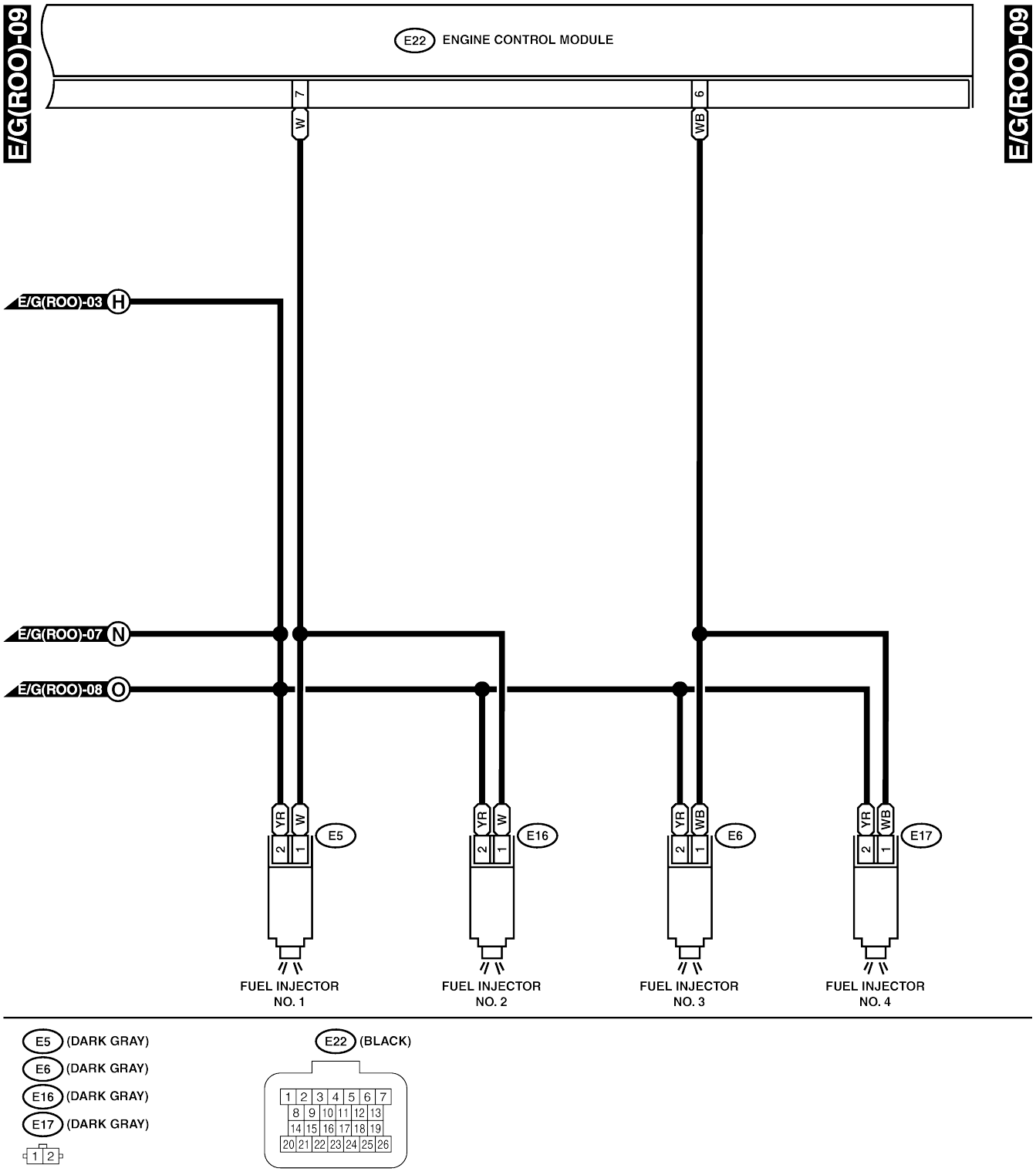

E/G(ROO)-07
E22 ENGINE CONTROL MODULE
E/G(ROO)-07
18 G
24 LW
16 LW
14 W
20 Or
17 L
4 LR
E/G(ROO)-02 E
E/G(ROO)-06 J
E/G(ROO)-06 K
L E/G(ROO)-08
M E/G(ROO)-08
N E/G(ROO)-09
R G B E21
B LY LW E8
LW E14
W Or E10
L B E20
LR B YR E7
PRESSURE SENSOR
ENGINE COOLANT TEMPERATURE SENSOR AND THERMOMETER
KNOCK SENSOR
CRANKSHAFT POSITION SENSOR
INTAKE AIR TEMPRATURE SENSOR
IDLE AIR CONTROL SOLENOID VALVE
E14
E10 (GRAY)
E20 (BLACK)
E8 (GRAY)
E7 (LIGHT GRAY)
E21 (BLACK)
E22 (BLACK)

SR10-21G


E/G(ROO)-08
E22 ENGINE CONTROL MODULE
E/G(ROO)-08
26 21 10 12 11 3 9 5
GB B B B B RG LR W
E/G(ROO)-01 B
E/G(ROO)-02 D
E/G(ROO)-07 M
E/G(ROO)-07 L
E/G(ROO)-9 O
GB E19
B B B B B R RG LR E12
W YR E4
GE
POWER STEERING OIL PRESSURE SWITCH
IGNITION COIL AND IGNITOR
PURGE CONTROL SOLENOID VALVE

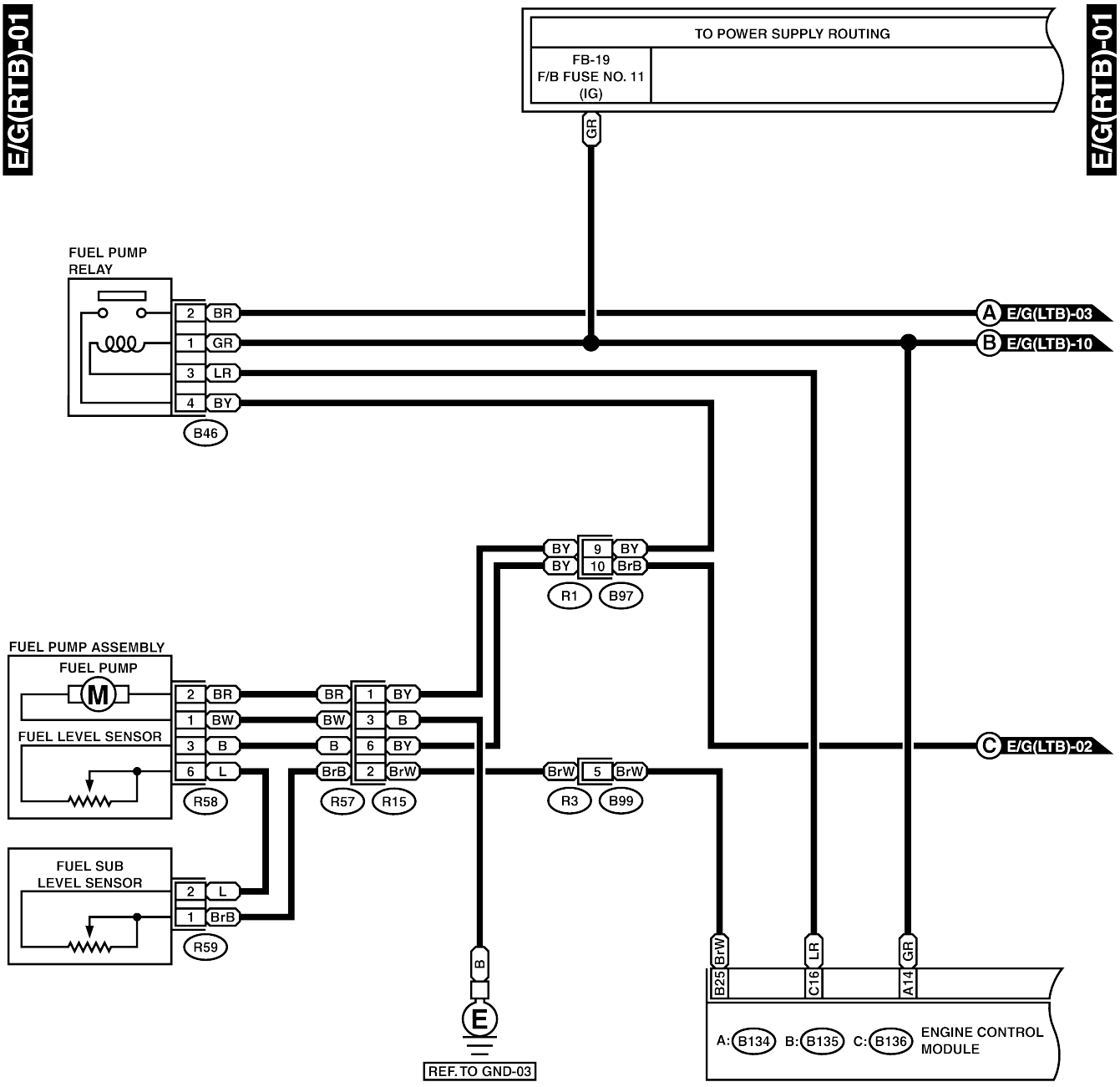
E4 (BLACK)
1 2
E12 (GRAY)
1 2 3 4
E22 (BLACK)
1 2 3 4 5 6 7
8 9 10 11 12 13
14 15 16 17 18 19
20 21 22 23 24 25 26

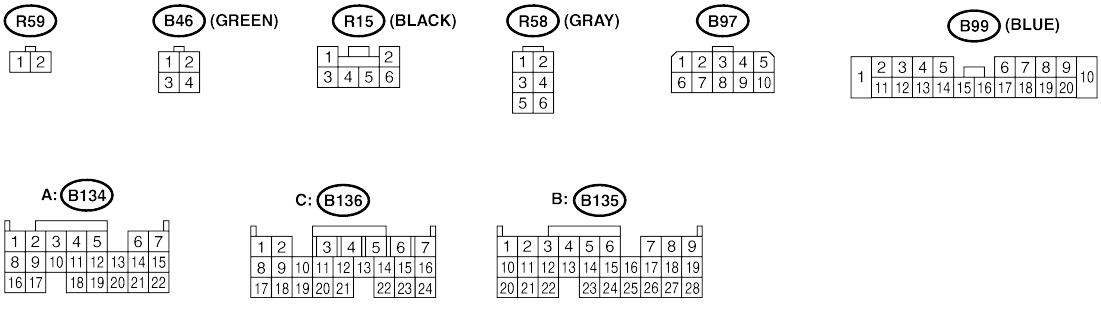
SR10-21H


E/G(ROO)-09
E22 ENGINE CONTROL MODULE
E/G(ROO)-09
7
6
W
WB
E/G(ROO)-03 H
E/G(ROO)-07 N
E/G(ROO)-08 O
YR
W
WB
2
1
E5
E16
E6
E17
FUEL INJECTOR NO. 1
FUEL INJECTOR NO. 2
FUEL INJECTOR NO. 3
FUEL INJECTOR NO. 4
E5 (DARK GRAY)
E6 (DARK GRAY)
E16 (DARK GRAY)
E17 (DARK GRAY)
1 2
E22 (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

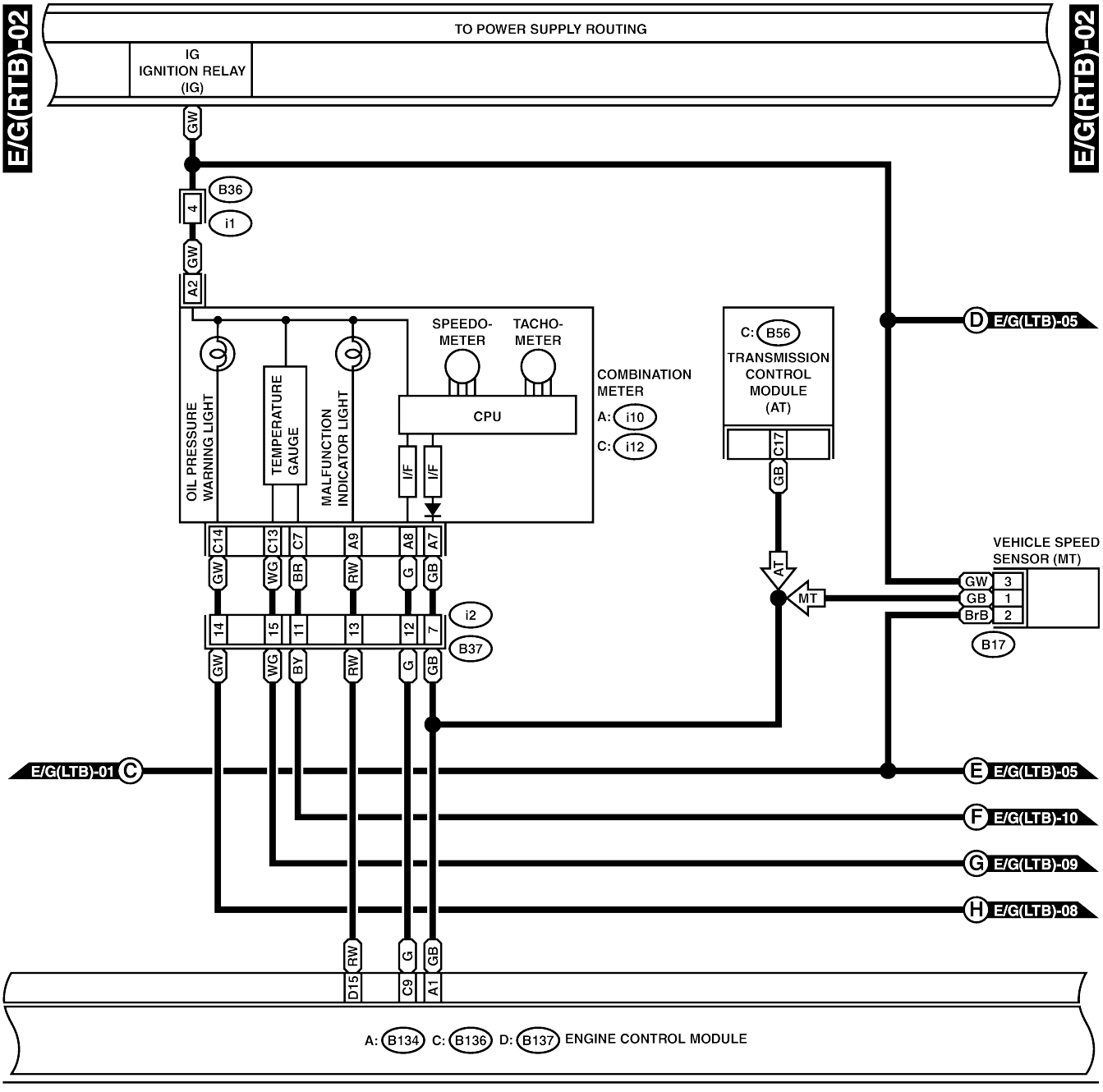
SR10-21I

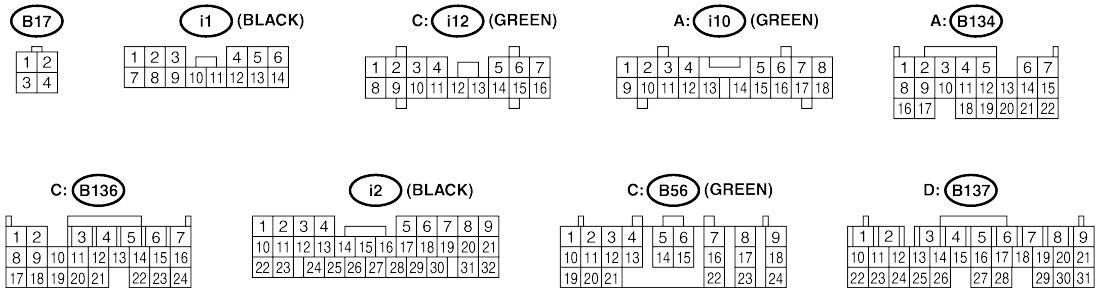
6. RHD DOHC TURBO MODEL S903482A2125



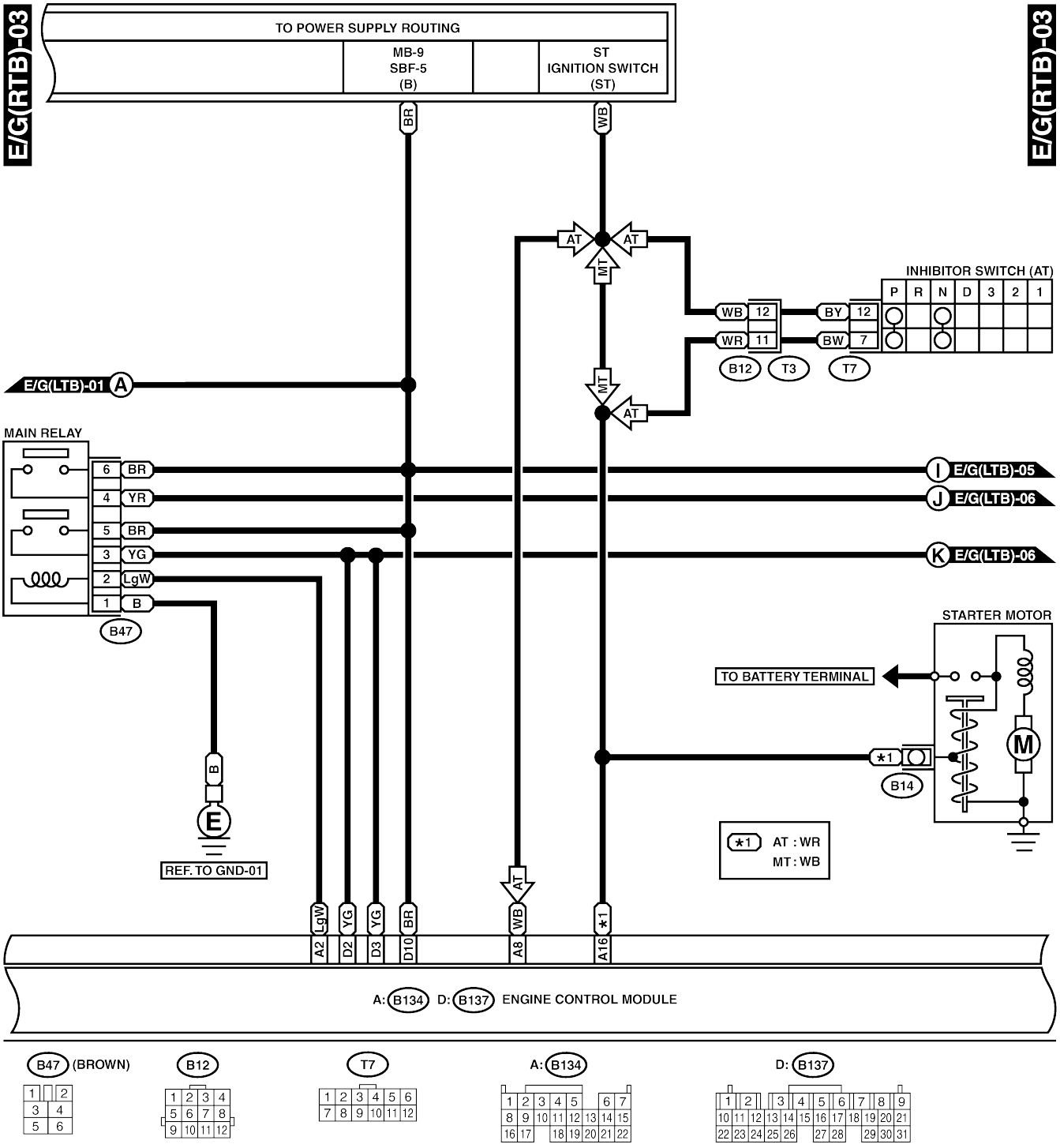


SR10-22A


E/G(RTB)-02
E/G(RTB)-02
TO POWER SUPPLY ROUTING
IG
IGNITION RELAY
(IG)
GW
B36
4
i1
GW
A2
SPEEDO-METER
TACHO-METER
COMBINATION METER
A: i10
C: i12
CPU
OIL PRESSURE WARNING LIGHT
TEMPERATURE GAUGE
MALFUNCTION INDICATOR LIGHT
I/F
I/F
C: B56
TRANSMISSION CONTROL MODULE (AT)
C17
GB
D E/G(LTB)-05
AT
MT
VEHICLE SPEED SENSOR (MT)
GW 3
GB 1
BrB 2
B17
C14 C13 C7 A9 A8 A7
GW WG BR RW G GB
14 15 11 13 12 7
i2
B37
GW WG BY RW G GB
E/G(LTB)-01 C
E E/G(LTB)-05
F E/G(LTB)-10
G E/G(LTB)-09
H E/G(LTB)-08
RW G GB
D15 C9 A1
A: B134 C: B136 D: B137 ENGINE CONTROL MODULE


B17
i1 (BLACK)
C: i12 (GREEN)
A: i10 (GREEN)
A: B134
C: B136
i2 (BLACK)
C: B56 (GREEN)
D: B137

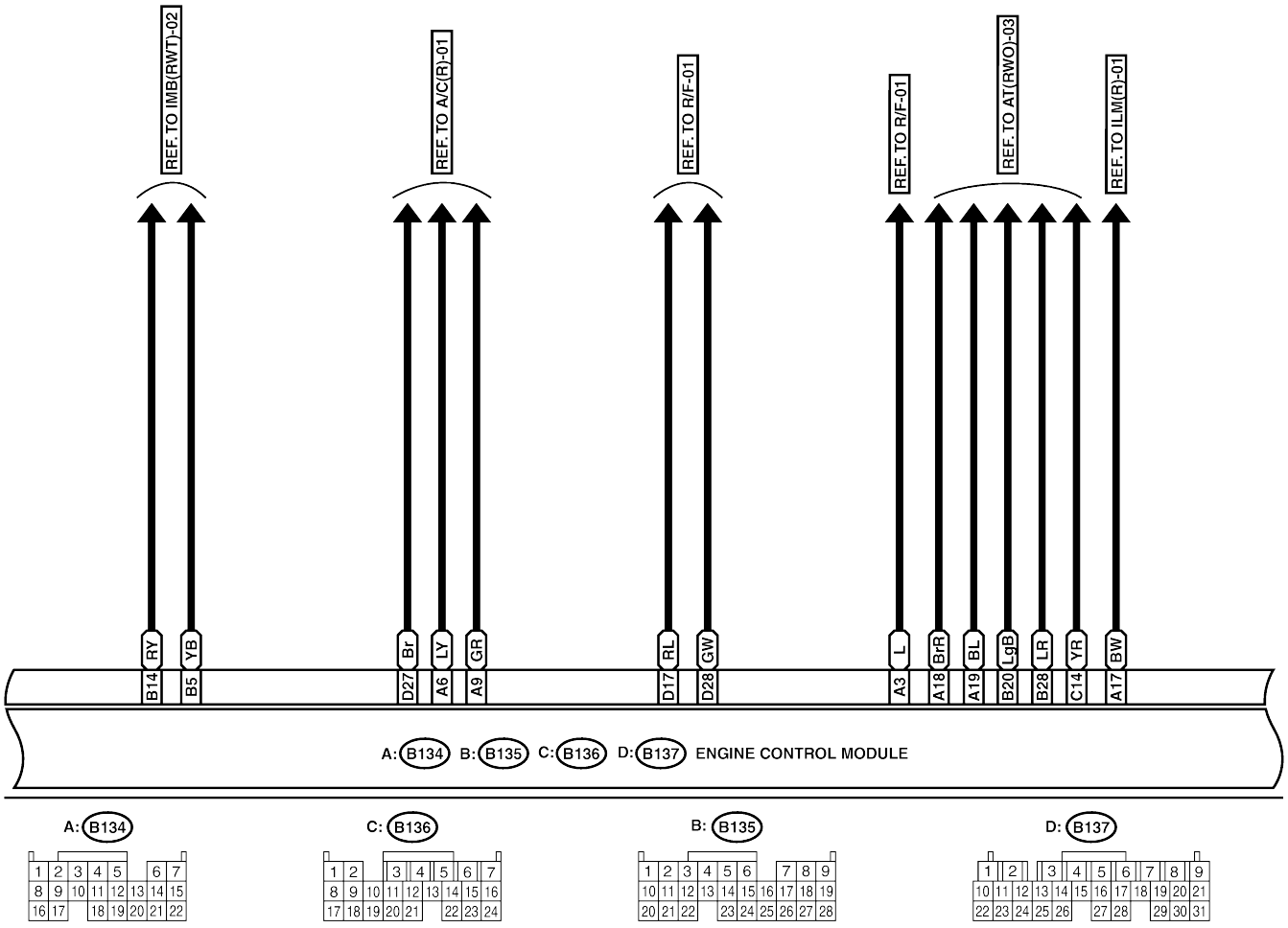
SR10-22B


E/G(RTB)-03
TO POWER SUPPLY ROUTING
MB-9
SBF-5
(B)
ST
IGNITION SWITCH
(ST)
BR
WB
AT
MT
INHIBITOR SWITCH (AT)
P R N D 3 2 1
WB 12
WR 11
BY 12
BW 7
B12 T3 T7
E/G(LTB)-01 A
MAIN RELAY
6 BR
4 YR
5 BR
3 YG
2 LgW
1 B
B47
I E/G(LTB)-05
J E/G(LTB)-06
K E/G(LTB)-06
STARTER MOTOR
TO BATTERY TERMINAL
M
*1
B14
B
E
REF. TO GND-01
*1 AT : WR
MT : WB
LgW
YG
YG
BR
WB
*1
A2
D2
D3
D10
A8
A16
A: B134 D: B137 ENGINE CONTROL MODULE
B47 (BROWN)
B12
T7
A: B134
D: B137

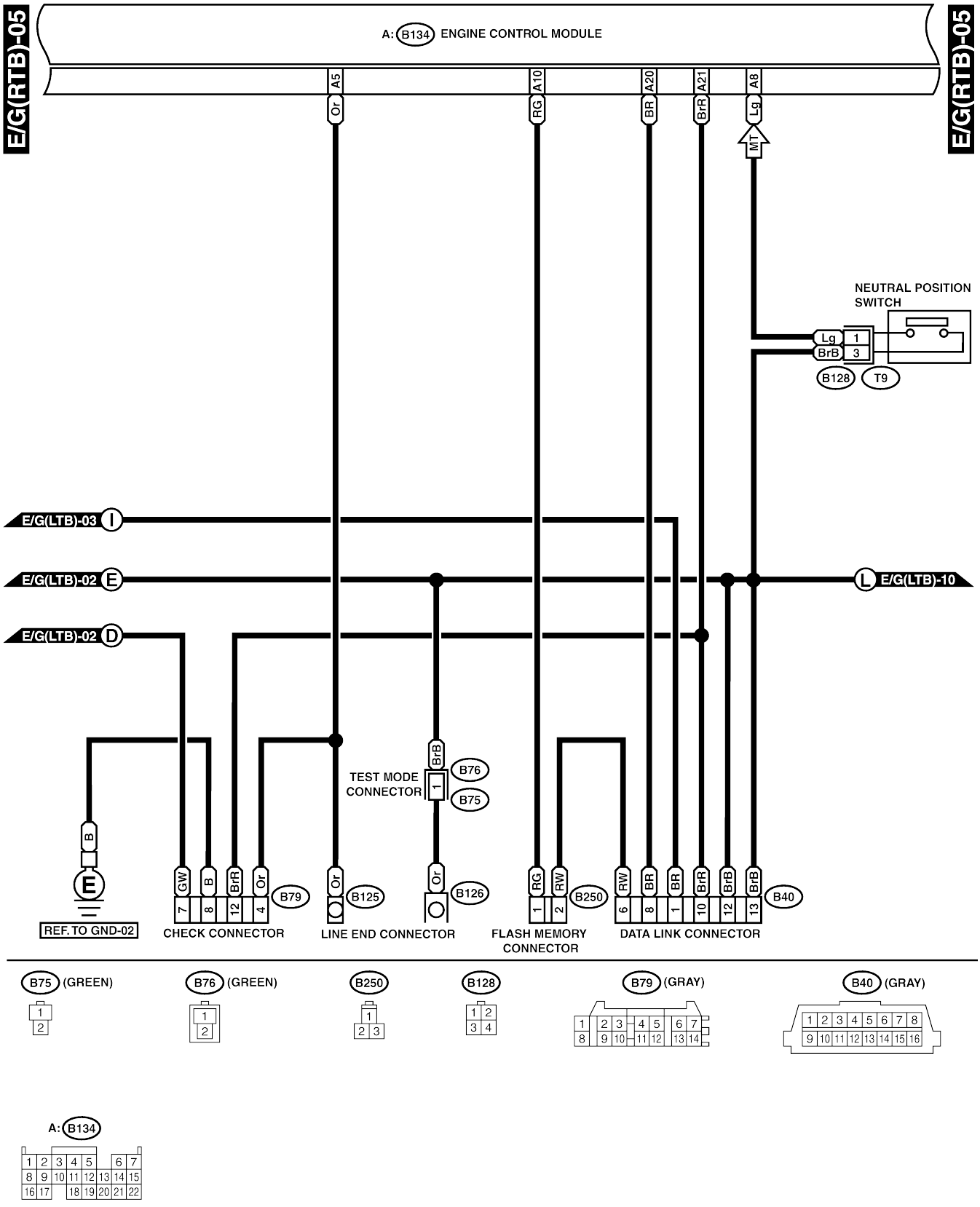
SR10-22C

E/G(RTB)-04

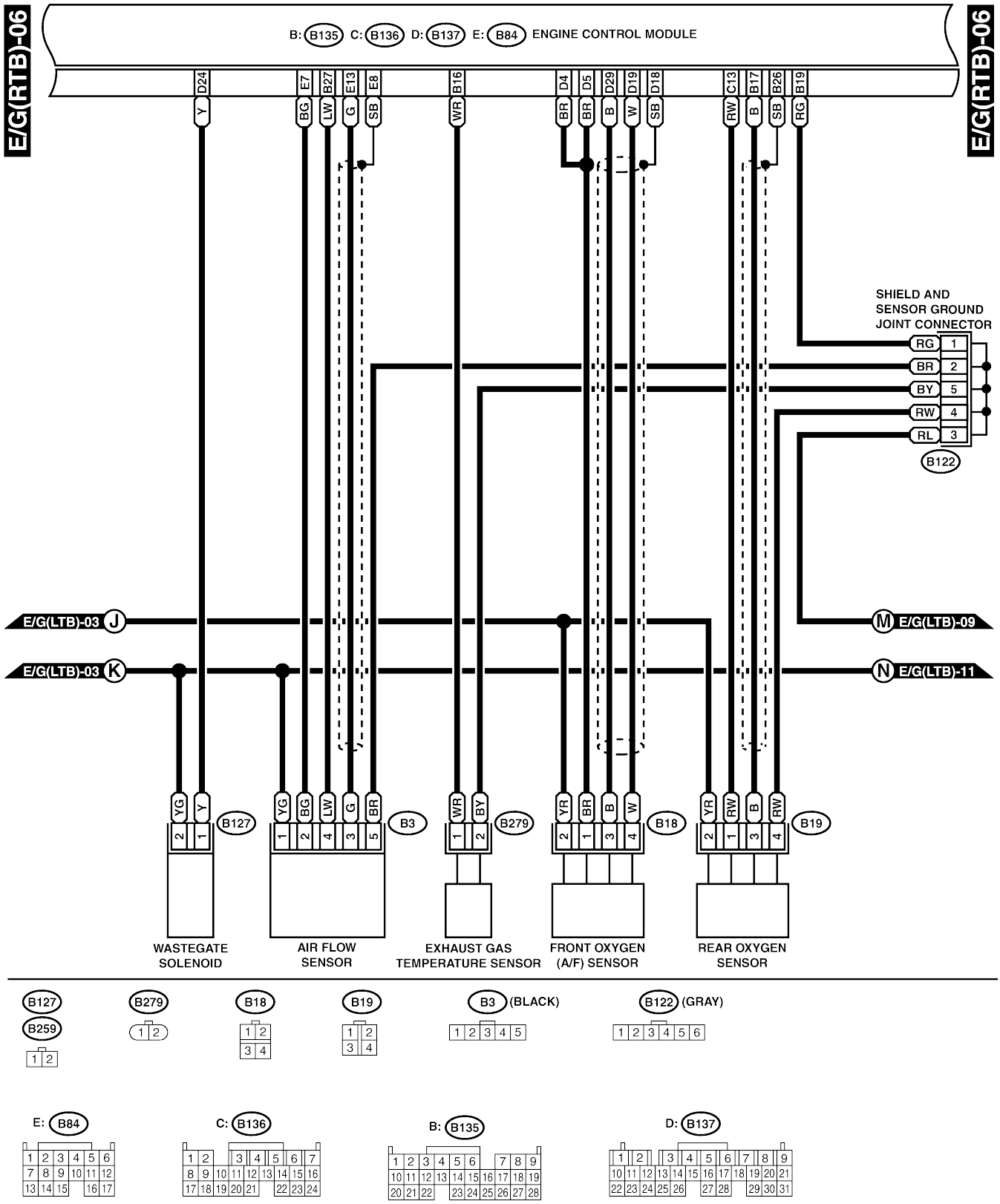
E/G(RTB)-04



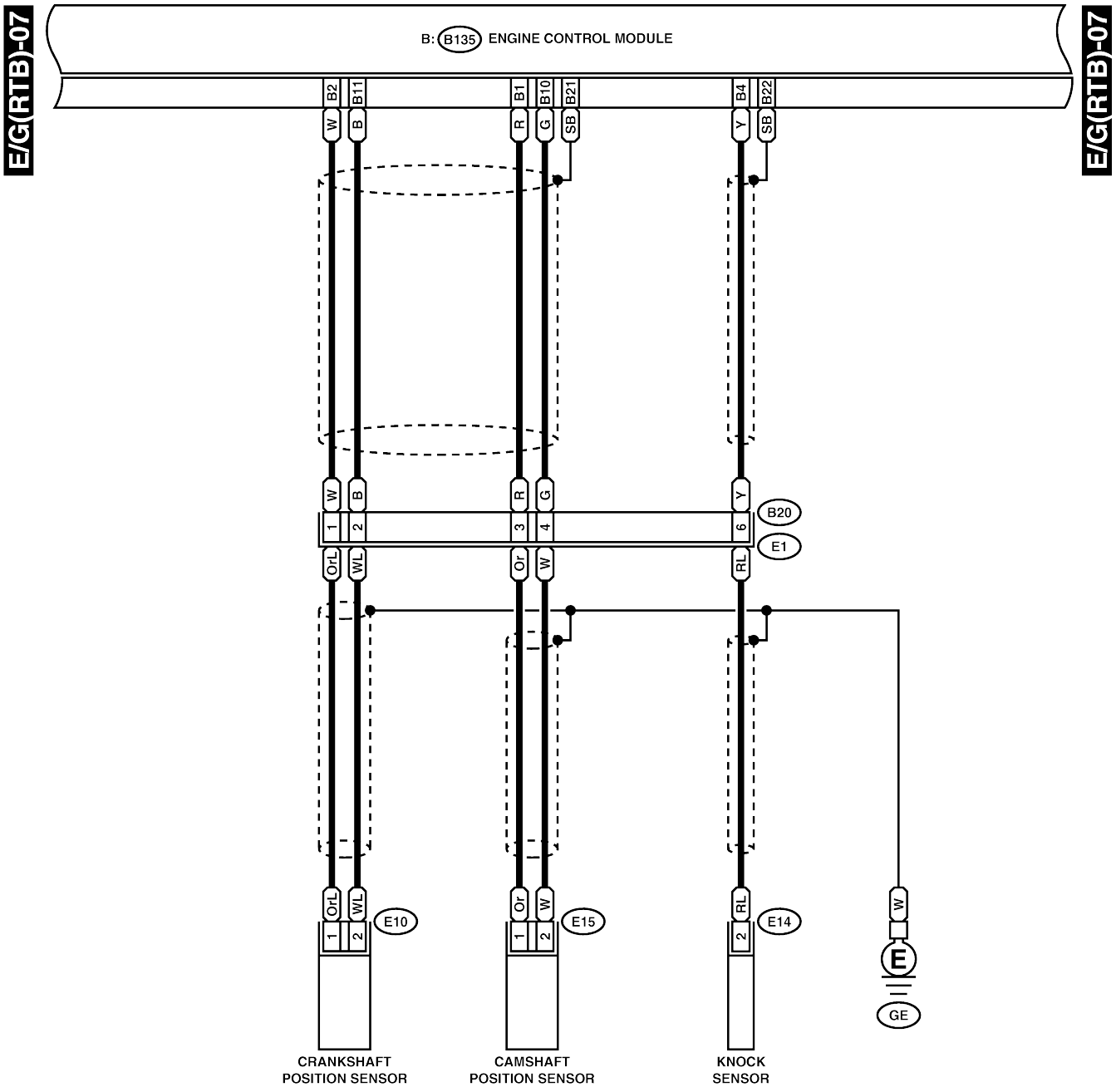
SR10-22D


E/G(RTB)-05
A: B134 ENGINE CONTROL MODULE
E/G(RTB)-05
A5
A10
A20
A21
A8
Or
RG
BR
BrR
Lg
MT
NEUTRAL POSITION SWITCH
Lg
BrB
1
3
B128
T9
E/G(LTB)-03 I
E/G(LTB)-02 E
E/G(LTB)-02 D
L E/G(LTB)-10
B
E
REF. TO GND-02
GW
B
BrR
Or
7
8
12
4
B79
CHECK CONNECTOR
Or
B125
LINE END CONNECTOR
BrB
B76
TEST MODE CONNECTOR
1
B75
Or
B126
RG
RW
1
2
B250
FLASH MEMORY CONNECTOR
RW
BR
BR
BrR
BrB
BrB
6
8
1
10
12
13
B40
DATA LINK CONNECTOR
B75 (GREEN)
B76 (GREEN)
B250
B128
B79 (GRAY)
B40 (GRAY)
A: B134

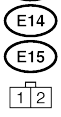
SR10-22E


E/G(RTB)-06
E/G(RTB)-06
B: B135 C: B136 D: B137 E: B84 ENGINE CONTROL MODULE
D24 E7 B27 E13 E8 B16 D4 D5 D29 D19 D18 C13 B17 B26 B19
Y BG LW G SB WR BR BR B RW B SB RG
SHIELD AND SENSOR GROUND JOINT CONNECTOR
RG 1
BR 2
BY 5
RW 4
RL 3
B122
E/G(LTB)-03 J
E/G(LTB)-03 K
M E/G(LTB)-09
N E/G(LTB)-11
YG Y B127
YG BG LW G BR B3
WR BY B279
YR BR B W B18
YR RW B RW B19
WASTEGATE SOLENOID
AIR FLOW SENSOR
EXHAUST GAS TEMPERATURE SENSOR
FRONT OXYGEN (A/F) SENSOR
REAR OXYGEN SENSOR
B127
B259
B279
B18
B19
B3 (BLACK)
B122 (GRAY)
E: B84
C: B136
B: B135
D: B137

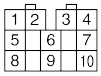
SR10-22F



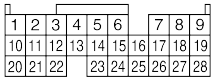
E10 (LIGHT GRAY)
E14 (GRAY)
E15 (LIGHT GRAY)



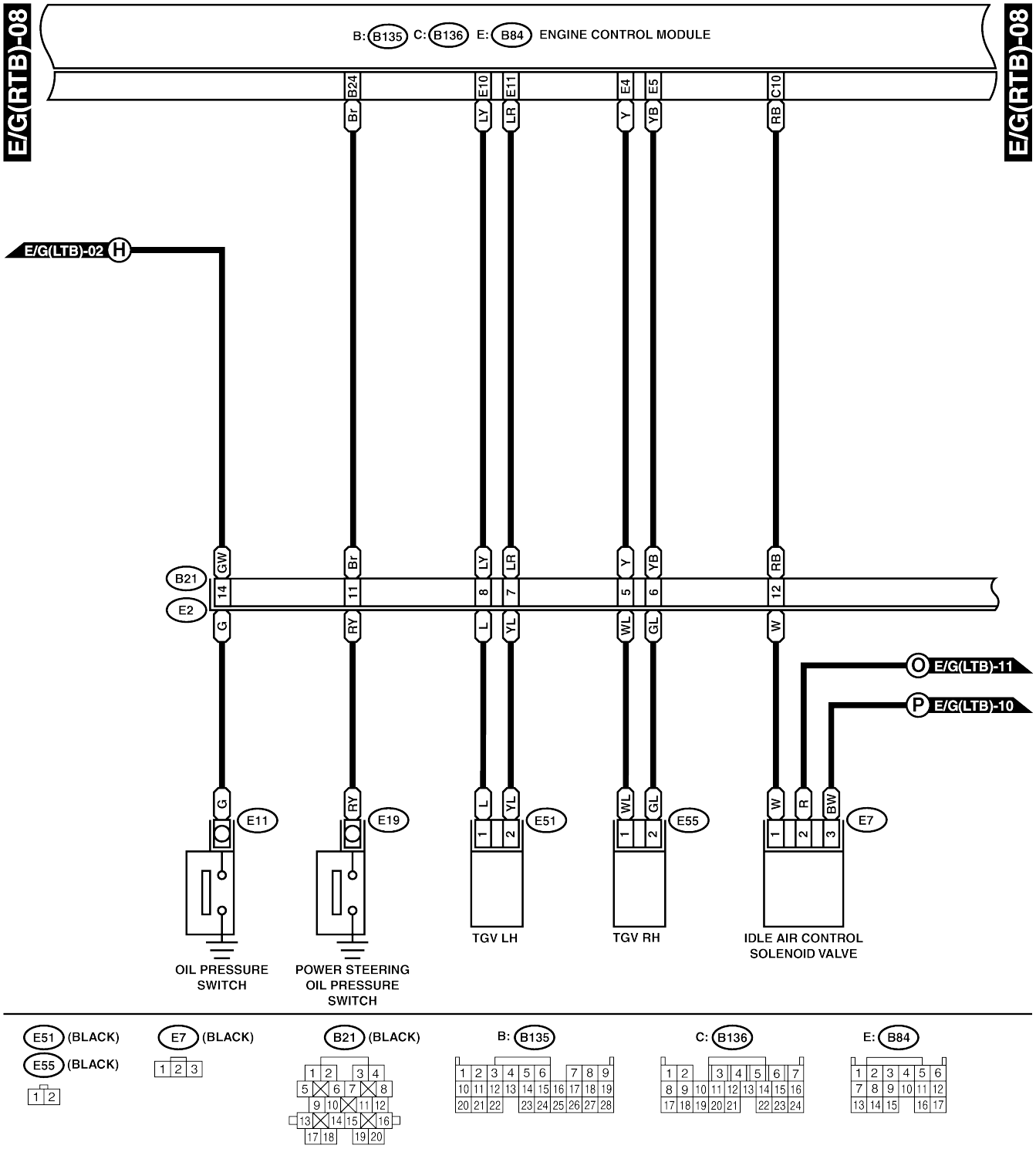
B20 (LIGHT GRAY)



B: B135

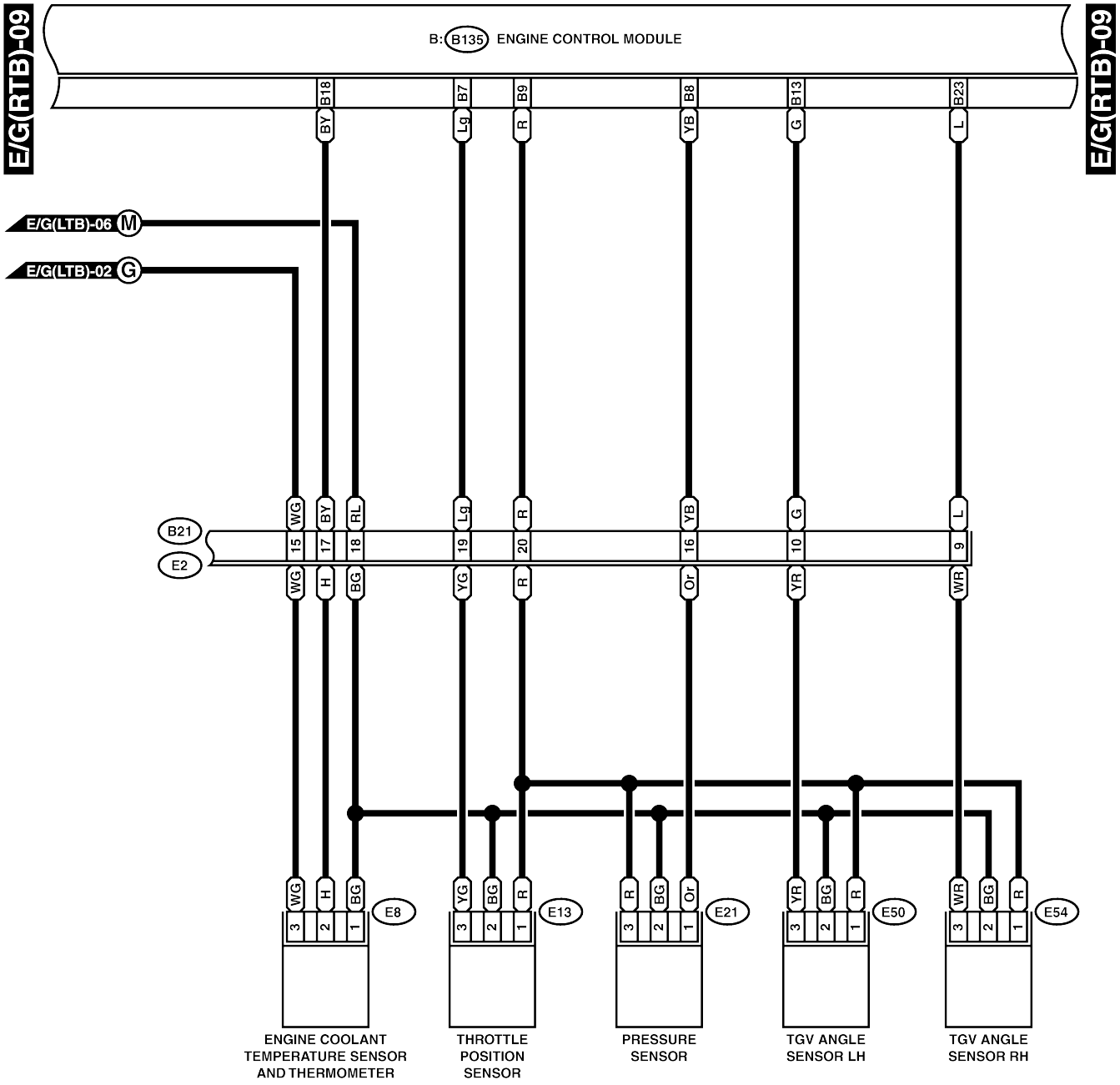


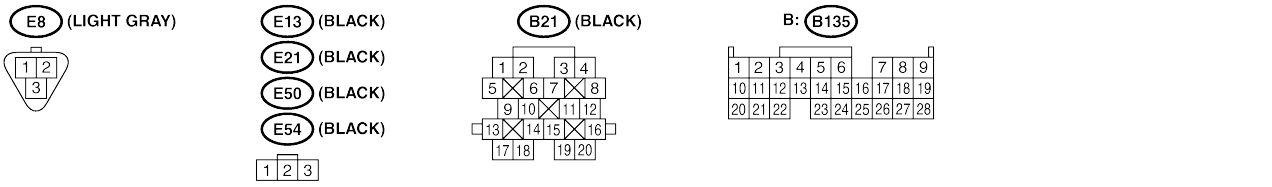
SR10-22G


E/G(RTB)-08
E/G(RTB)-08
B: B135 C: B136 E: B84 ENGINE CONTROL MODULE
B24 Br
E10 LY
E11 LR
E4 Y
E5 YB
C10 RB
E/G(LTB)-02 H
B21
E2
GW
Br
LY
LR
Y
YB
RB
14
11
8
7
5
6
12
G
RY
L
YL
WL
GL
W
E/G(LTB)-11 O
E/G(LTB)-10 P
G
RY
L
YL
WL
GL
W
R
BW
E11
E19
E51
E55
E7
1
2
3
OIL PRESSURE SWITCH
POWER STEERING OIL PRESSURE SWITCH
TGV LH
TGV RH
IDLE AIR CONTROL SOLENOID VALVE

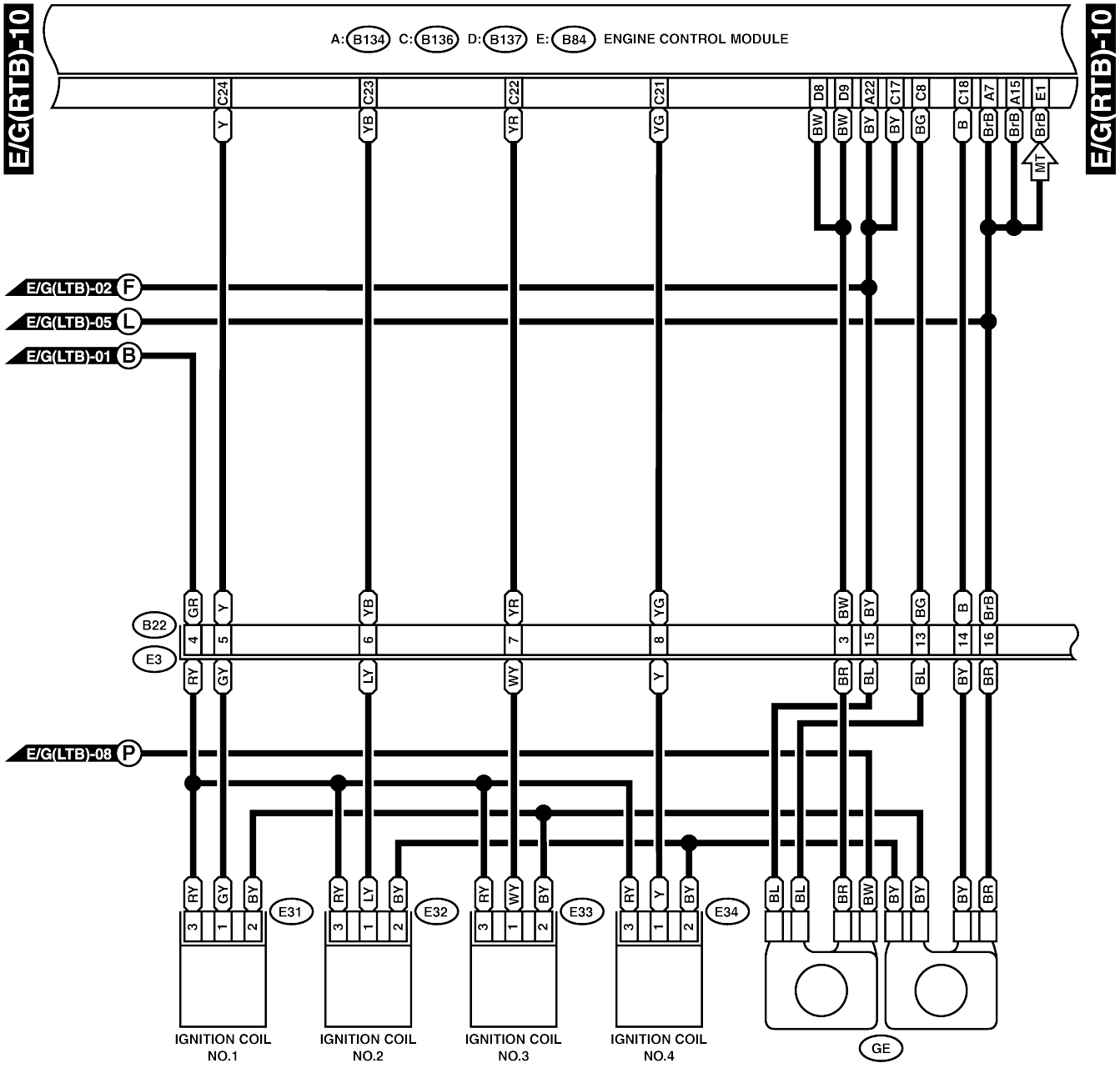
E51 (BLACK)
E55 (BLACK)
E7 (BLACK)
B21 (BLACK)
B: B135
C: B136
E: B84

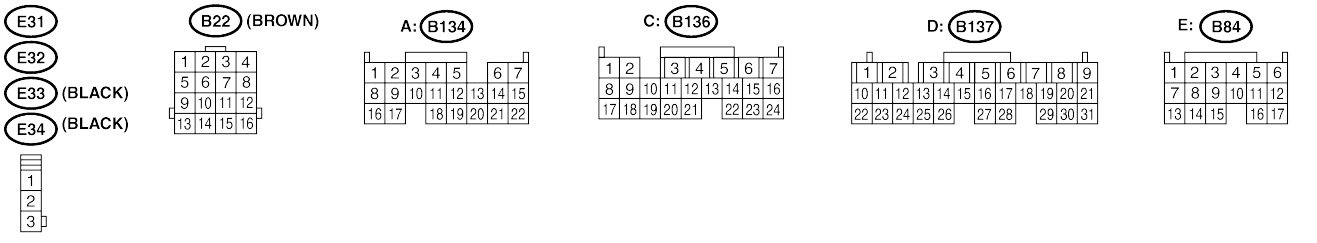
SR10-22H


E/G(RTB)-09
E/G(RTB)-09
B: B135 ENGINE CONTROL MODULE
B18 B7 B9 B8 B13 B23
BY Lg R YB G L
E/G(LTB)-06 M
E/G(LTB)-02 G
B21
E2
WG BY RL Lg R YB G L
15 17 18 19 20 16 10 9
WG H BG YG R Or YR WR
WG H BG E8
YG BG R E13
R BG Or E21
YR BG R E50
WR BG R E54
3 2 1
ENGINE COOLANT TEMPERATURE SENSOR AND THERMOMETER
THROTTLE POSITION SENSOR
PRESSURE SENSOR
TGV ANGLE SENSOR LH
TGV ANGLE SENSOR RH

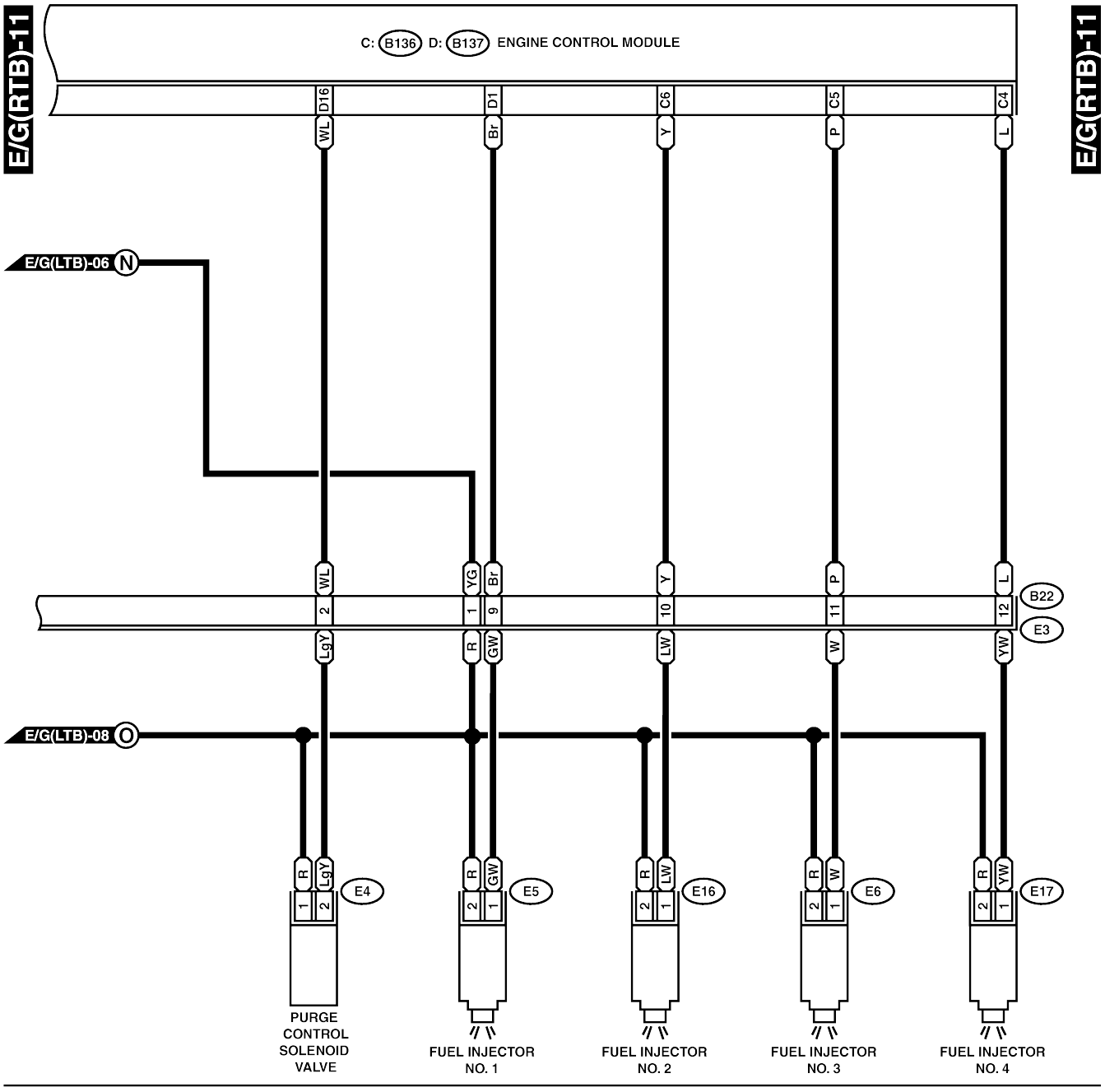

E8 (LIGHT GRAY)
E13 (BLACK)
E21 (BLACK)
E50 (BLACK)
E54 (BLACK)
B21 (BLACK)
B: B135

SR10-22I


E/G(RTB)-10
A: B134 C: B136 D: B137 E: B84 ENGINE CONTROL MODULE
E/G(RTB)-10
C24 C23 C22 C21 D8 D9 A22 C17 C8 C18 A7 A15 E1
Y YB YR YG BW BW BY BY BG B BrB BrB BrB
MT
E/G(LTB)-02 F
E/G(LTB)-05 L
E/G(LTB)-01 B
B22
E3
GR Y YB YR YG BW BY BG B BrB
4 5 6 7 8 3 15 13 14 16
RY GY LY WY Y BR BL BL BY BR
E/G(LTB)-08 P
RY GY BY E31
RY LY BY E32
RY WY BY E33
RY Y BY E34
BL BL BR BW BY BY BY BR
IGNITION COIL NO.1
IGNITION COIL NO.2
IGNITION COIL NO.3
IGNITION COIL NO.4
GE


E31
E32
E33 (BLACK)
E34 (BLACK)
B22 (BROWN)
A: B134
C: B136
D: B137
E: B84

SR10-22J

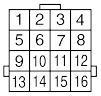


E5 (DARK GRAY)
E6 (DARK GRAY)
E16 (DARK GRAY)
E17 (DARK GRAY)

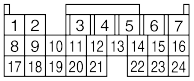
E4 (BLACK)



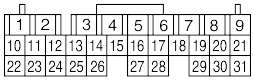
B22 (BROWN)



C: B136



D: B137

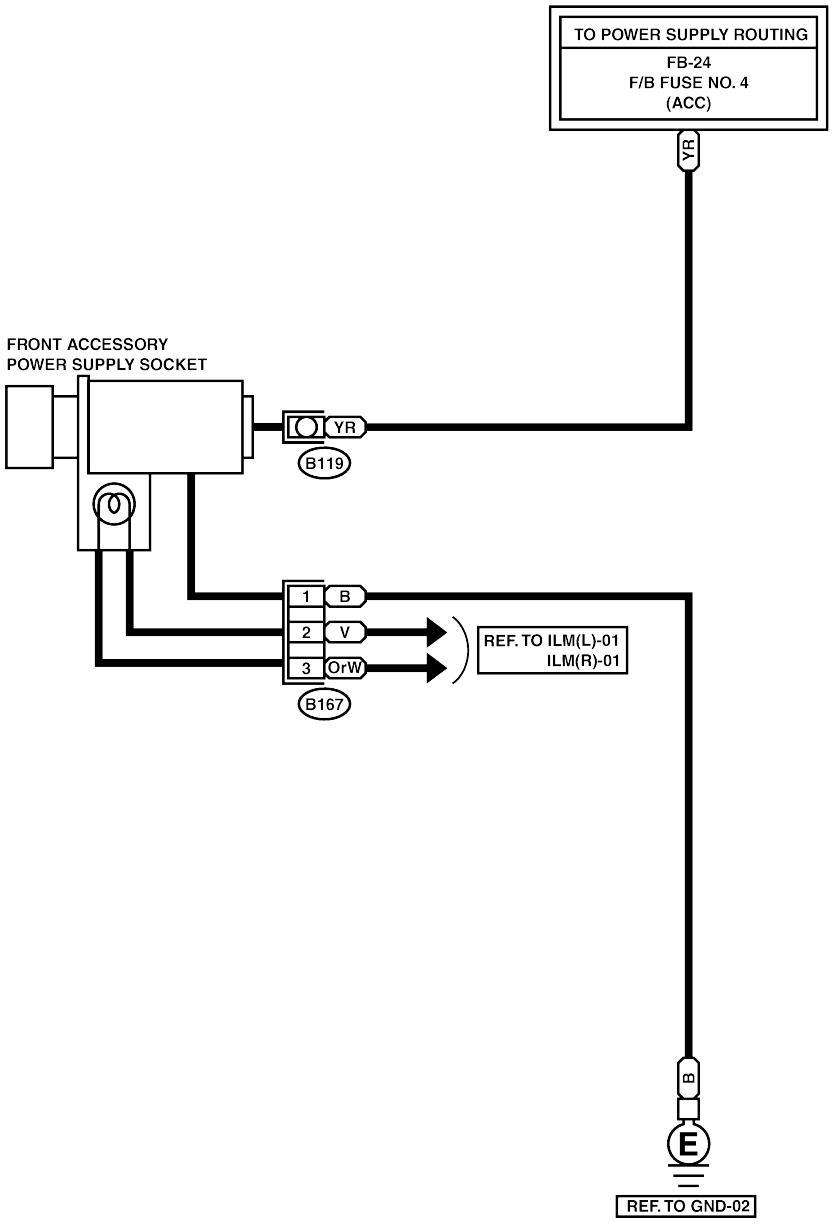


SR10-22K

17. Front Accessory Power Supply System S903664

A: SCHEMATIC S903664A21

FAPS-01



FAPS-01

B167

1	
2	3

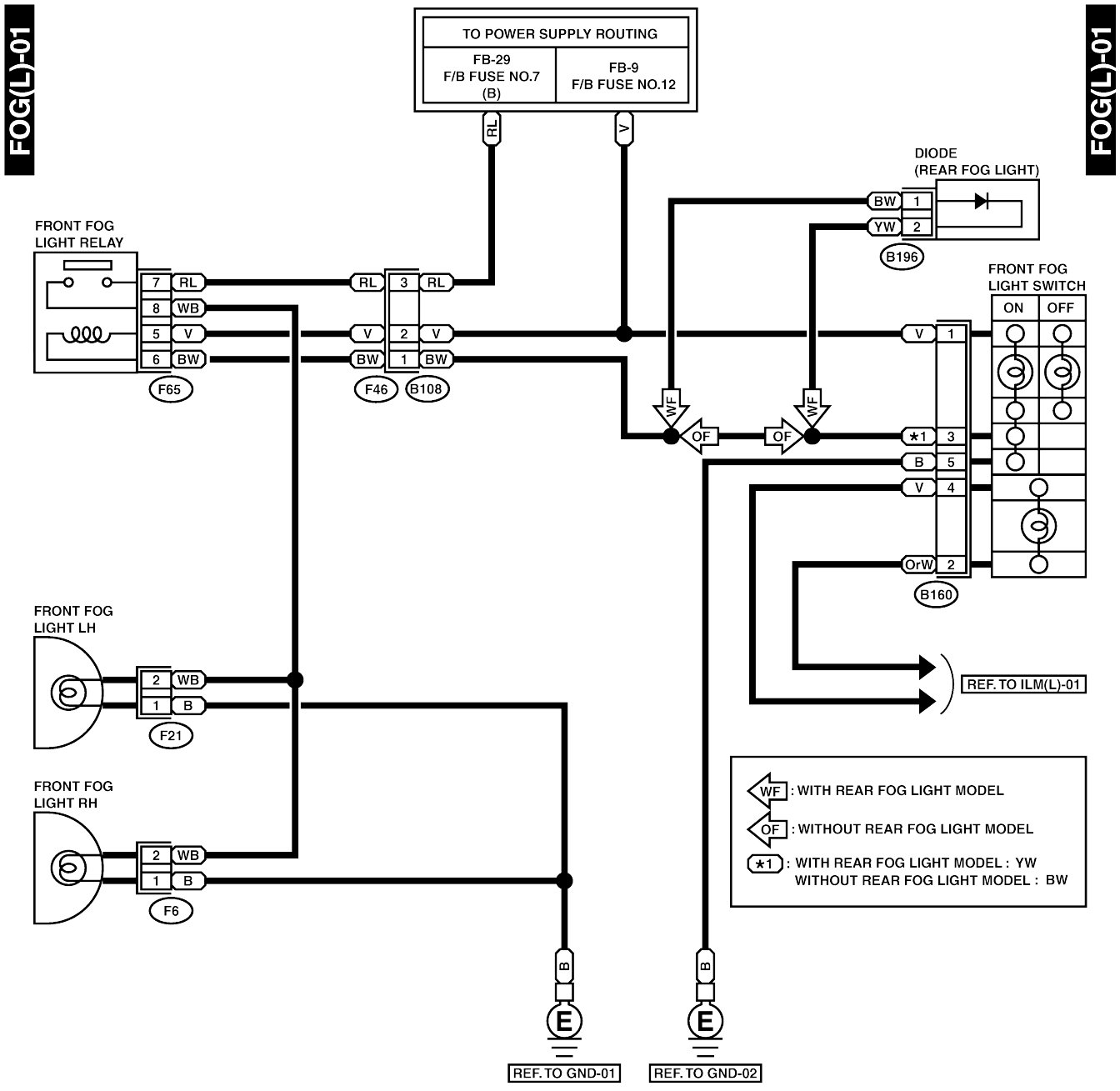
SG97-20

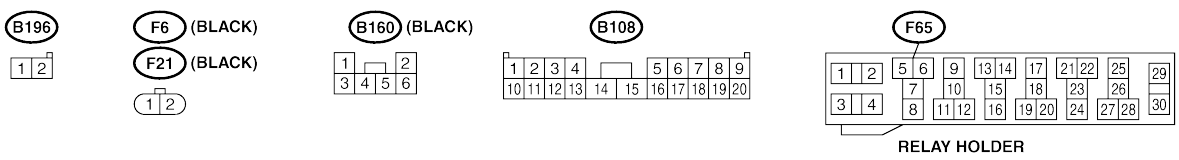
MEMO:

18. Front Fog Light System S903473

A: SCHEMATIC S903473A21

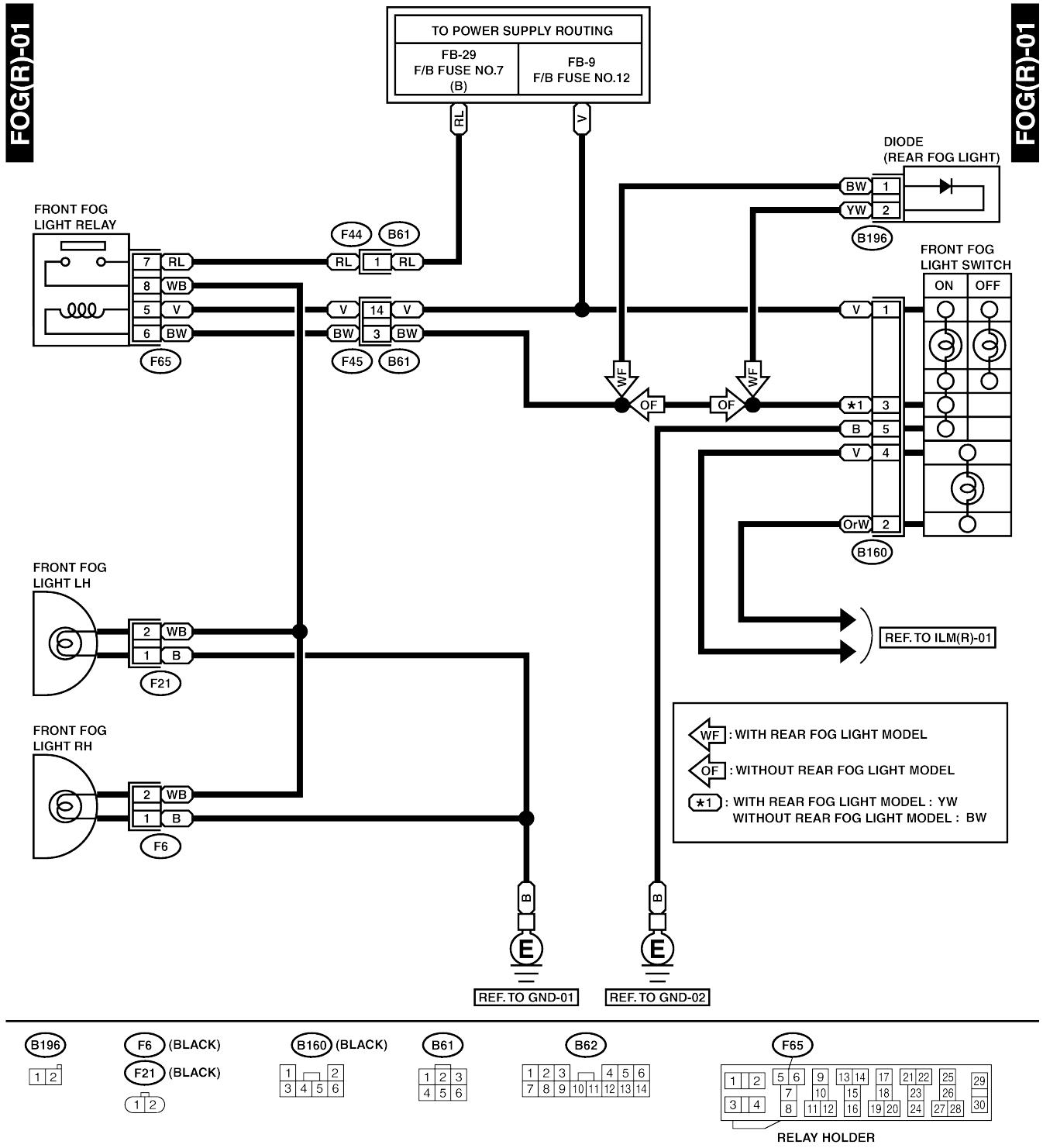
1. LHD MODEL S903473A2101





SL22-20

2. RHD MODEL S903473A2102

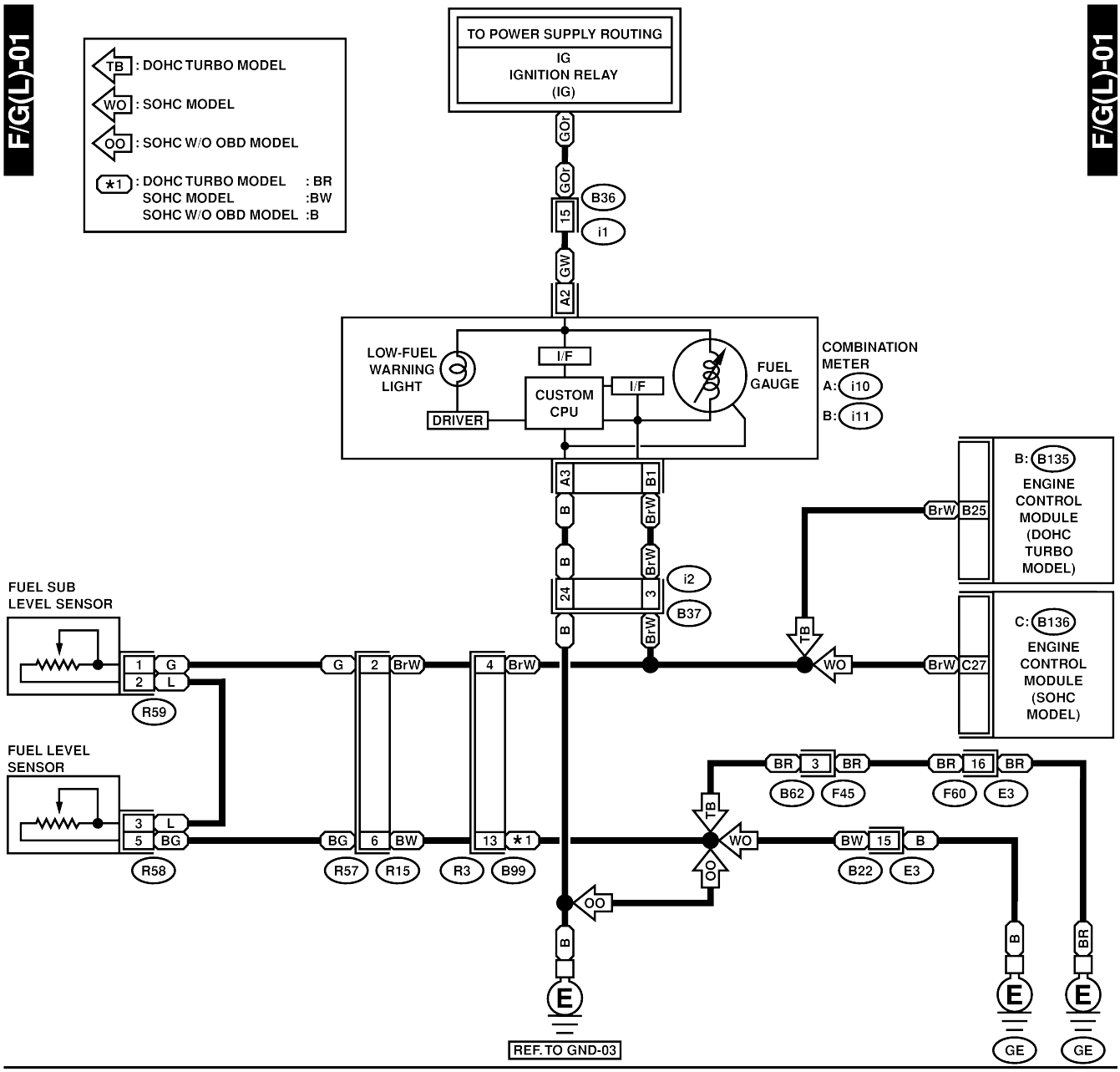


SR22-20

19. Fuel Gauge System S903046

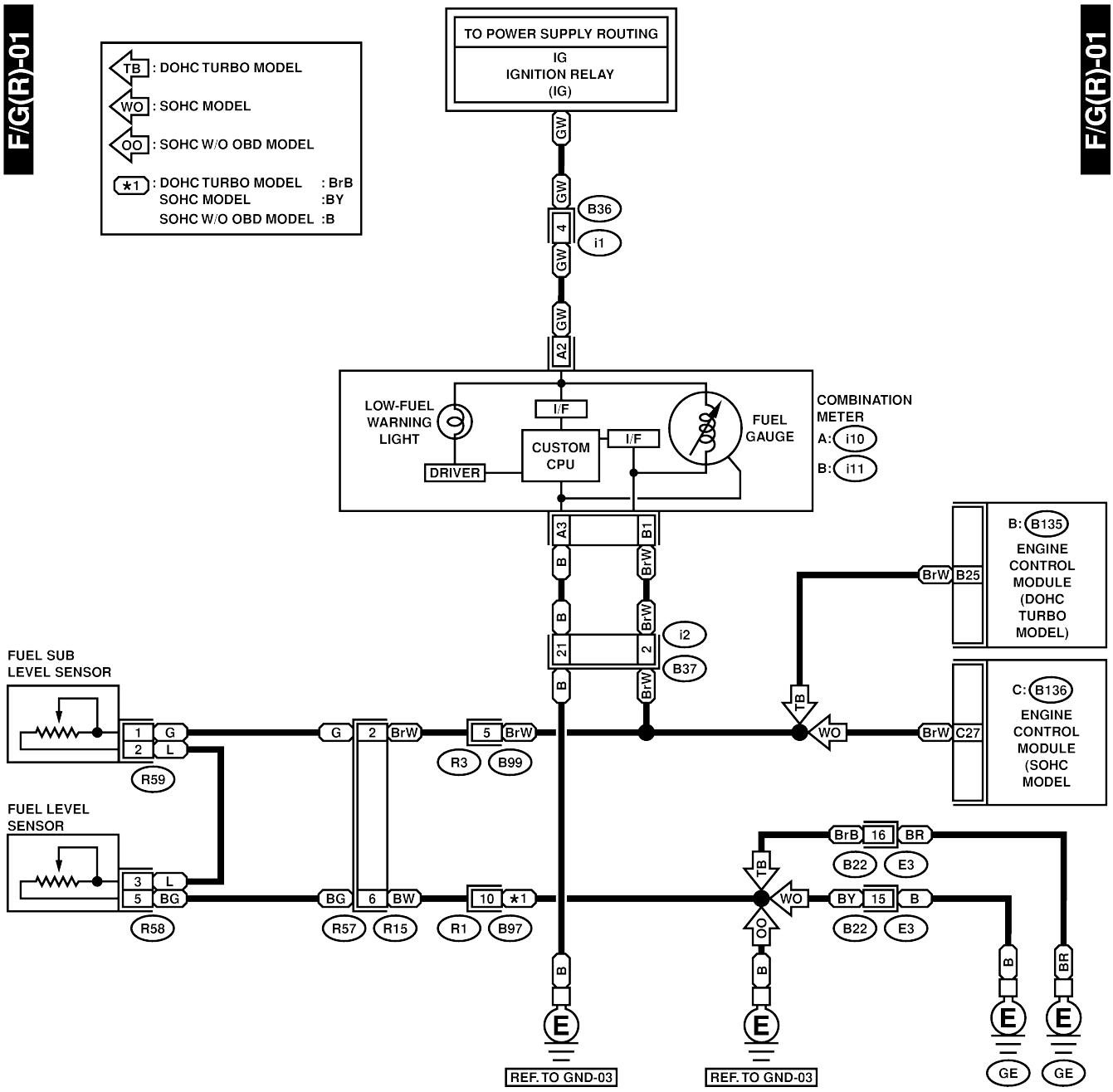
A: SCHEMATIC S903046A21

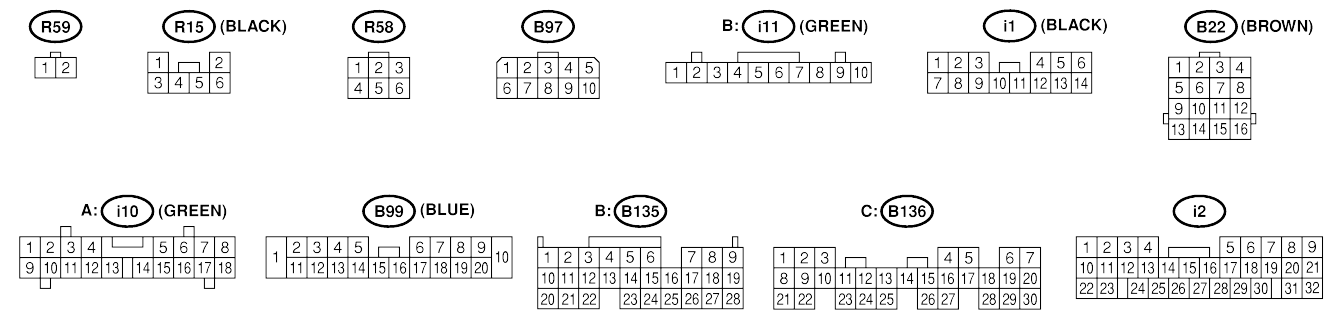
1. LHD MODEL S903046A2105



SL61-20

2. RHD MODEL S903046A2106



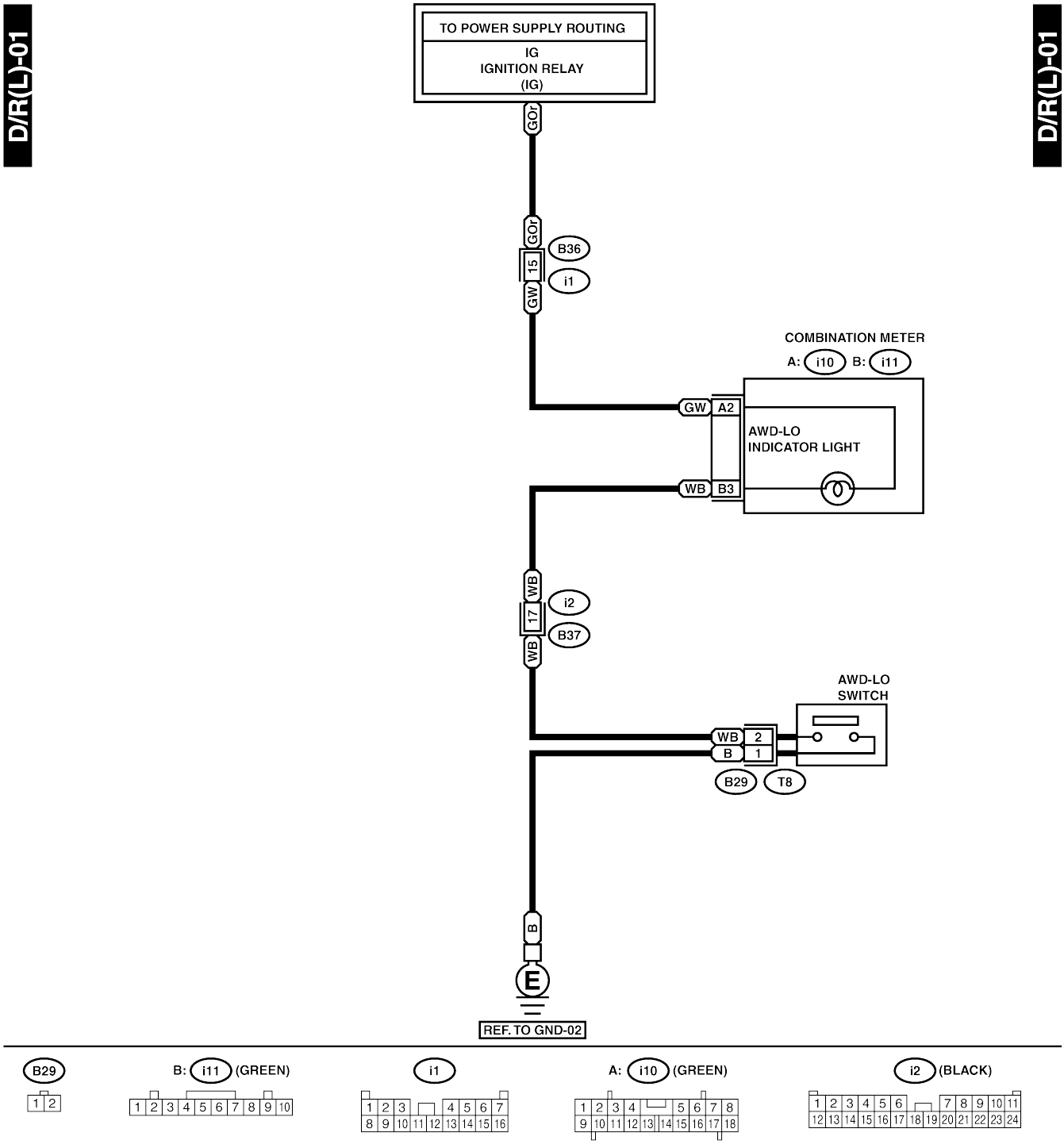


SR61-20

20. Full-Time Dual-Range System S903492

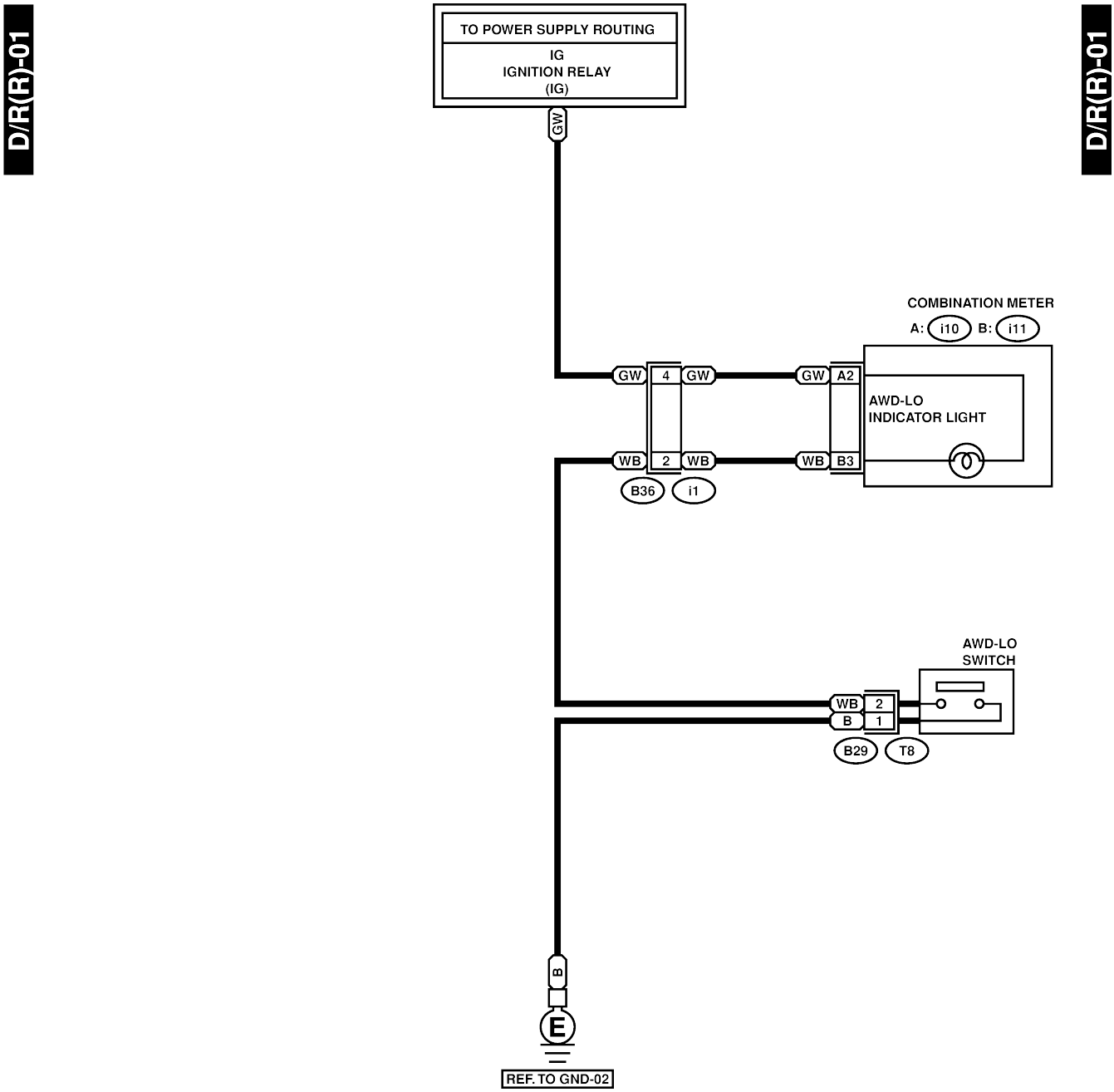
A: SCHEMATIC S903492A21

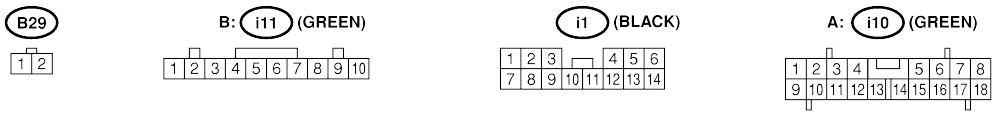
1. LHD MODEL S903492A2101



SL38-20

2. RHD MODEL S903492A2102

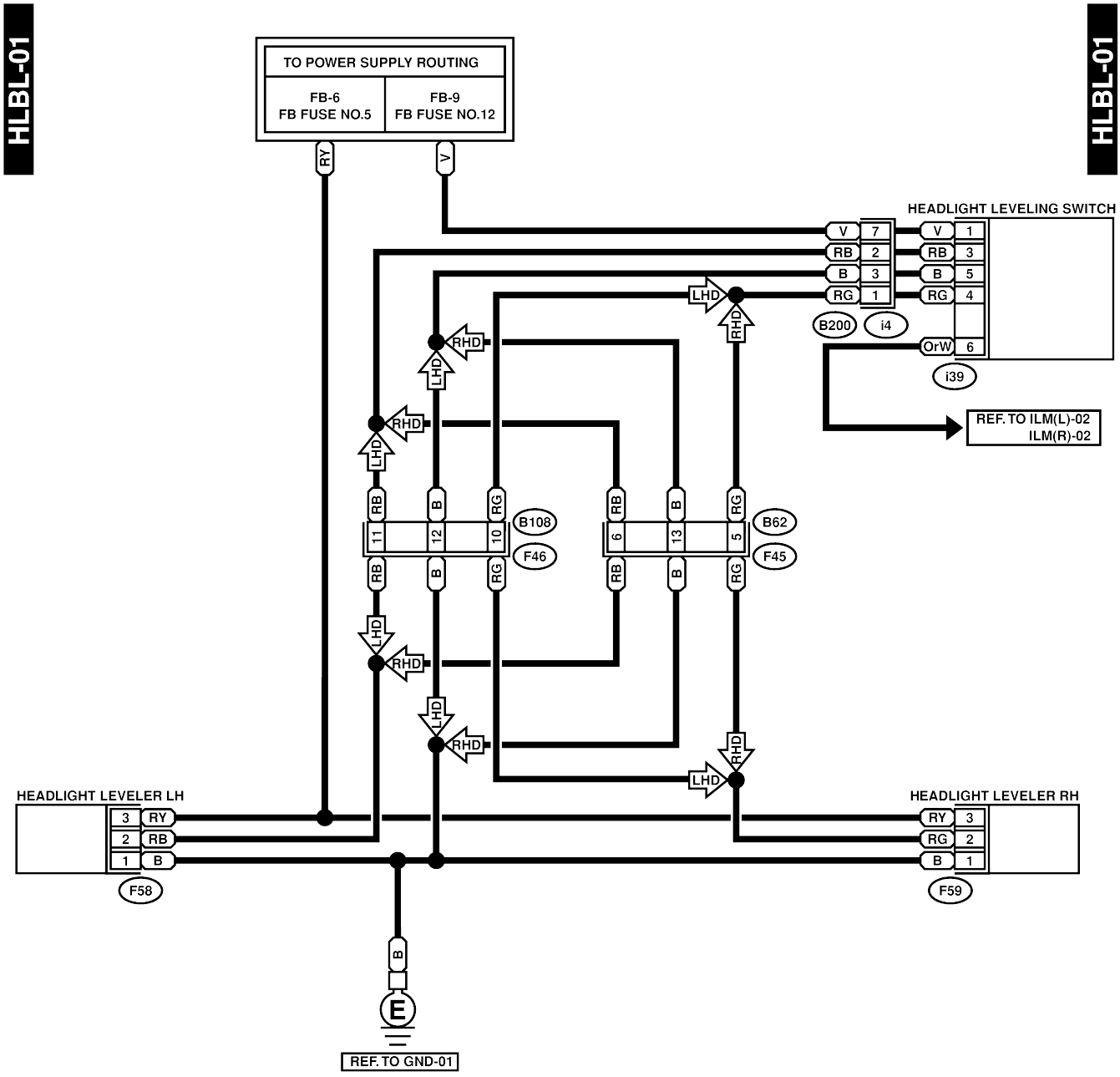


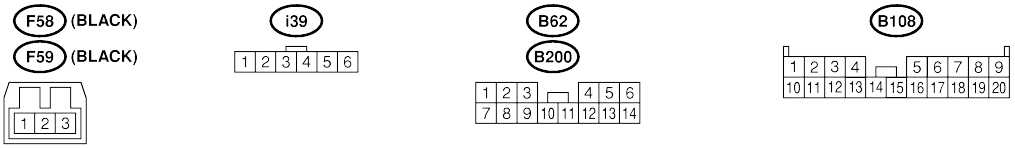


SR38-20

21. Headlight Beam Leveler System S903493

A: SCHEMATIC S903493A21





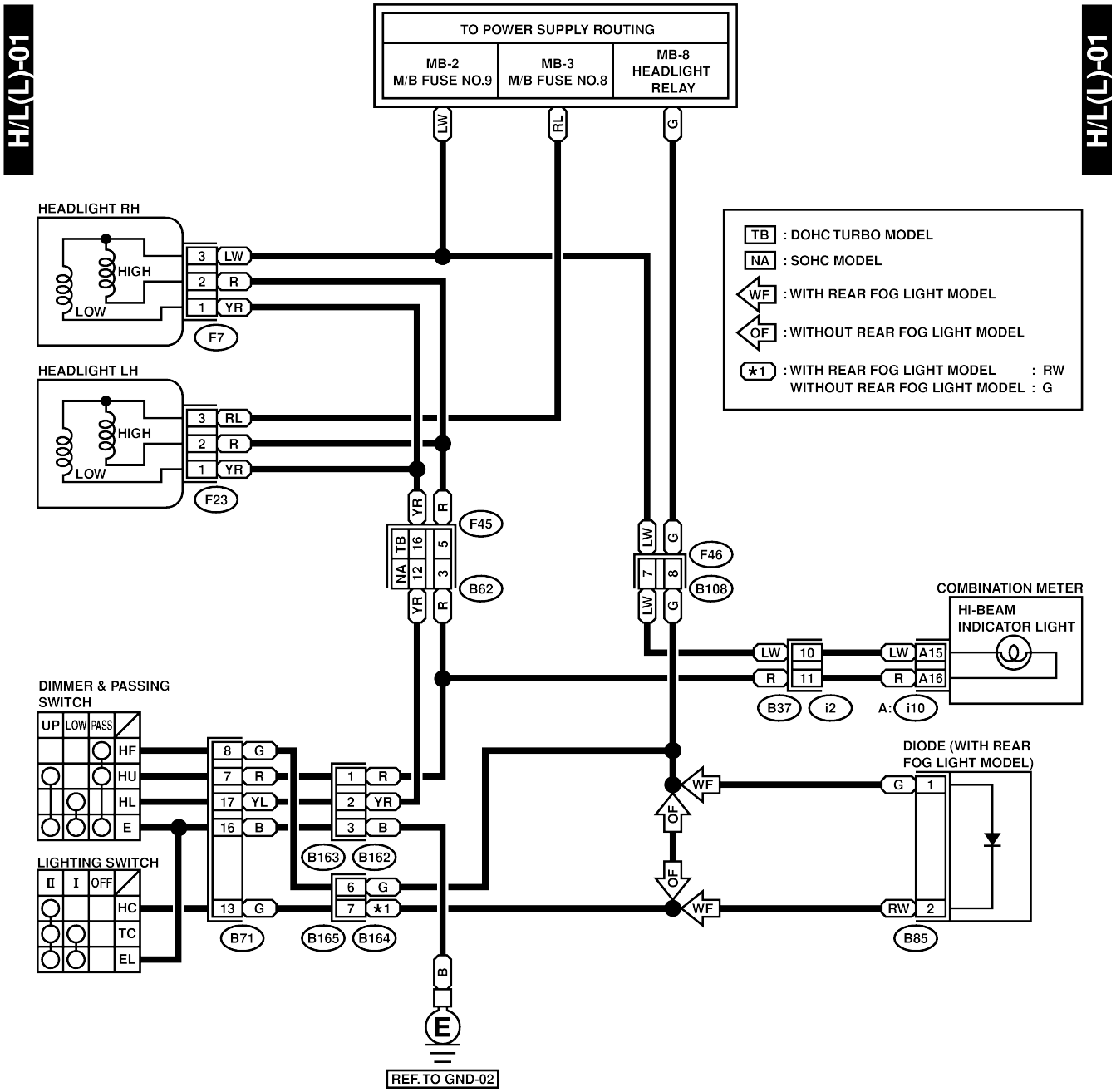
SG83-20

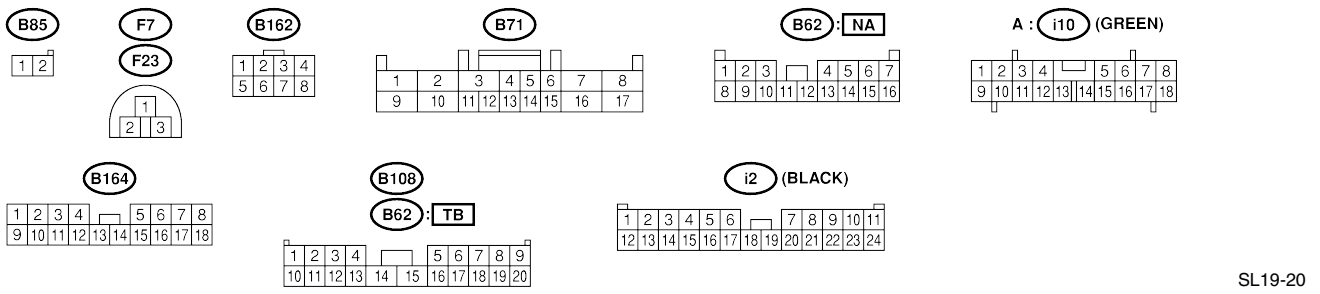
MEMO:

22. Headlight System S903474

A: SCHEMATIC S903474A21

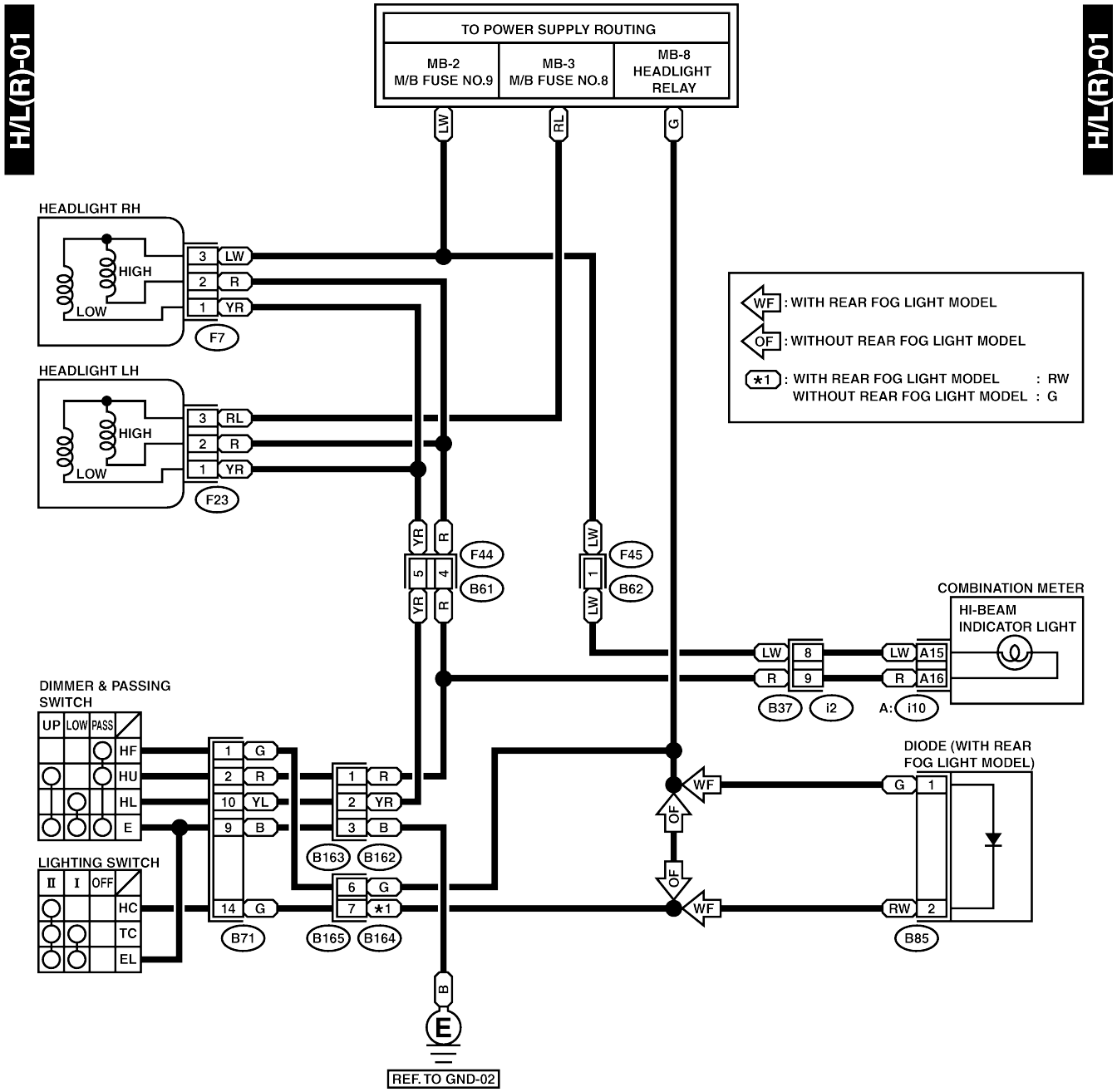
1. LHD MODEL S903474A2101

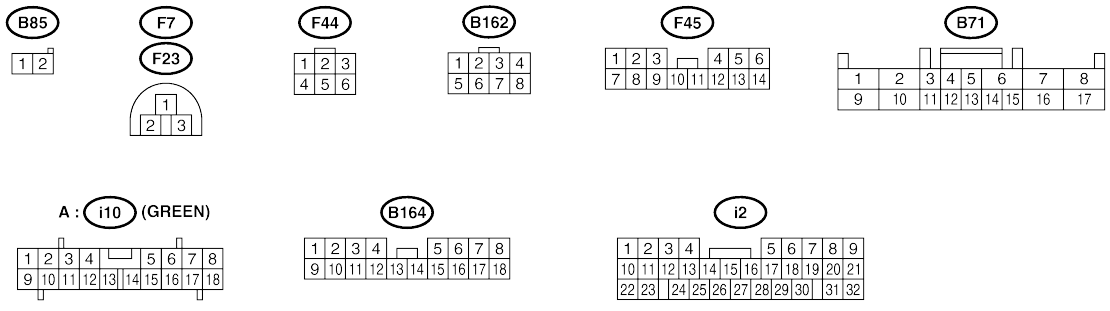




SL19-20

2. RHD MODEL S903474A2102

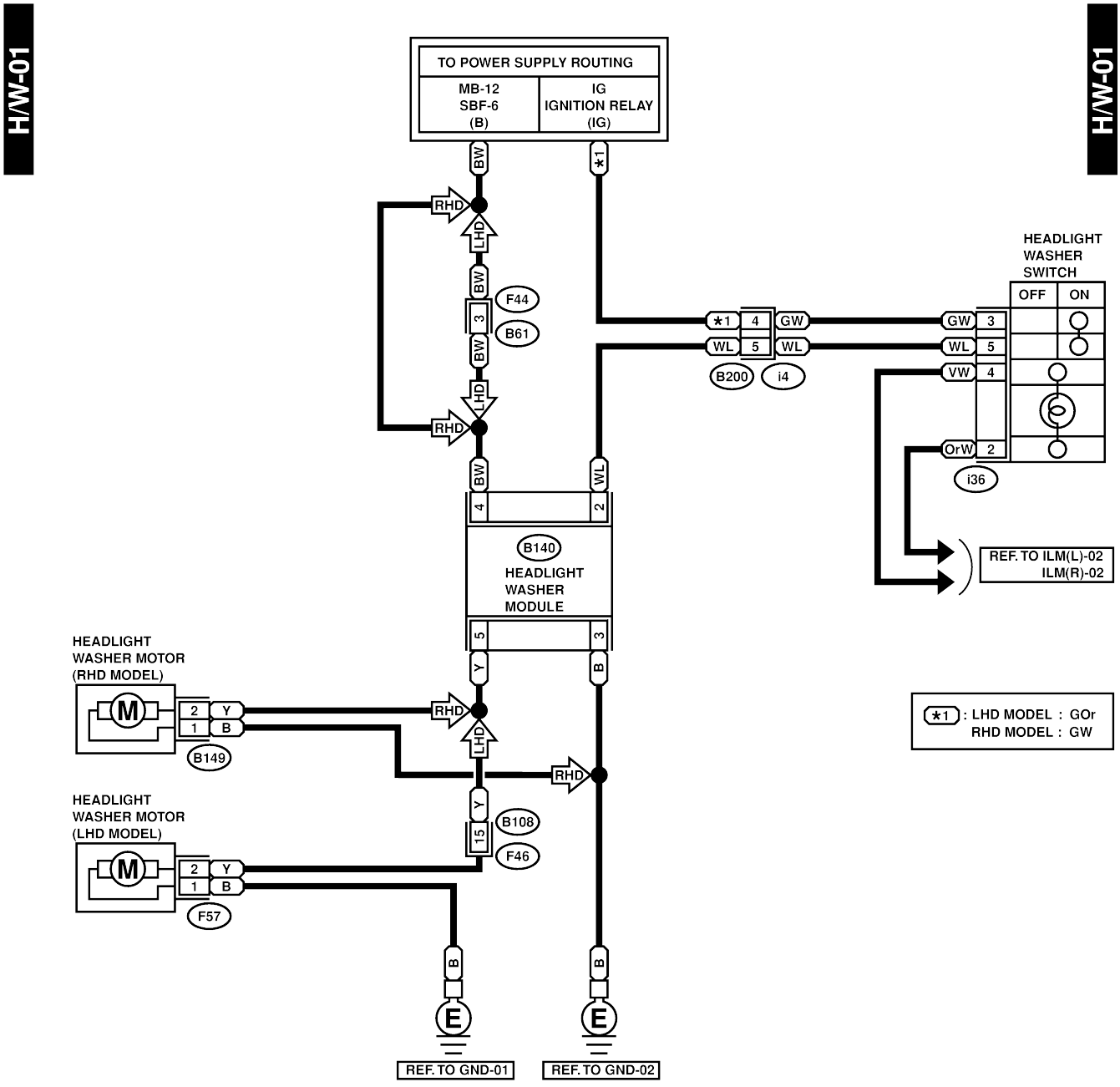


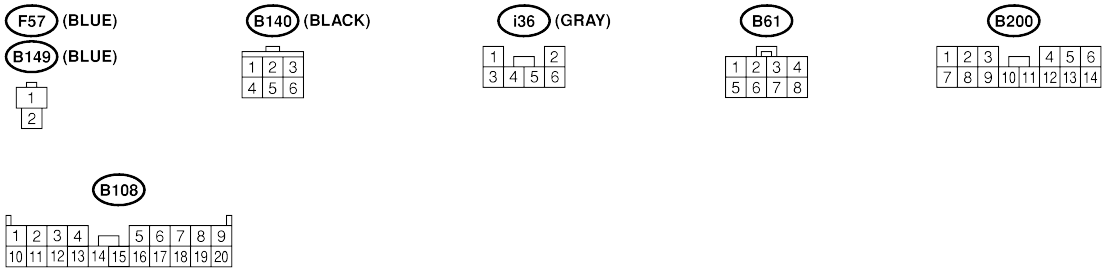


SR19-20

23. Headlight Washer System S903746

A: SCHEMATIC S903746A21

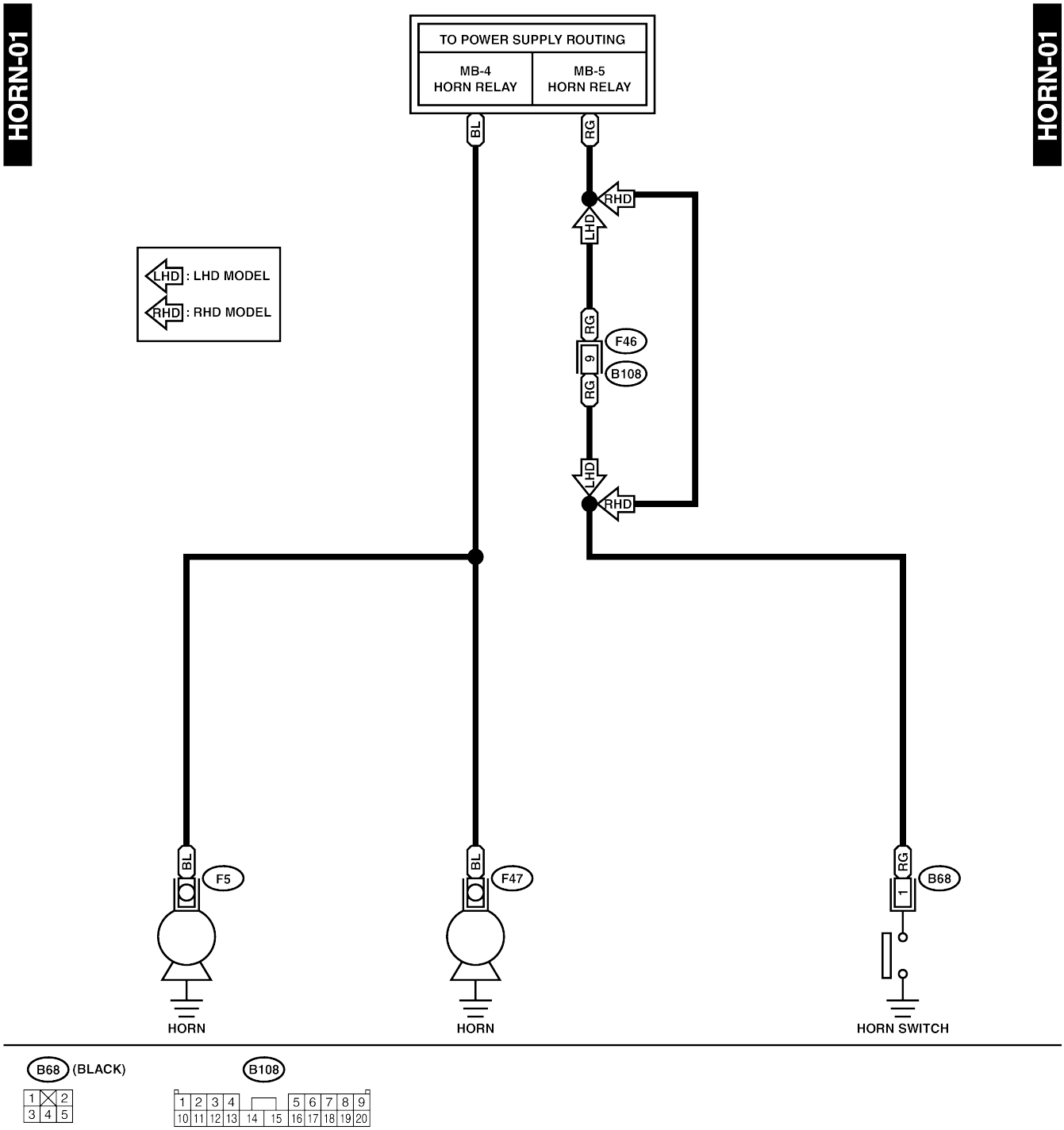




SG53-20

24. Horn System S903436

A: SCHEMATIC S903436A21

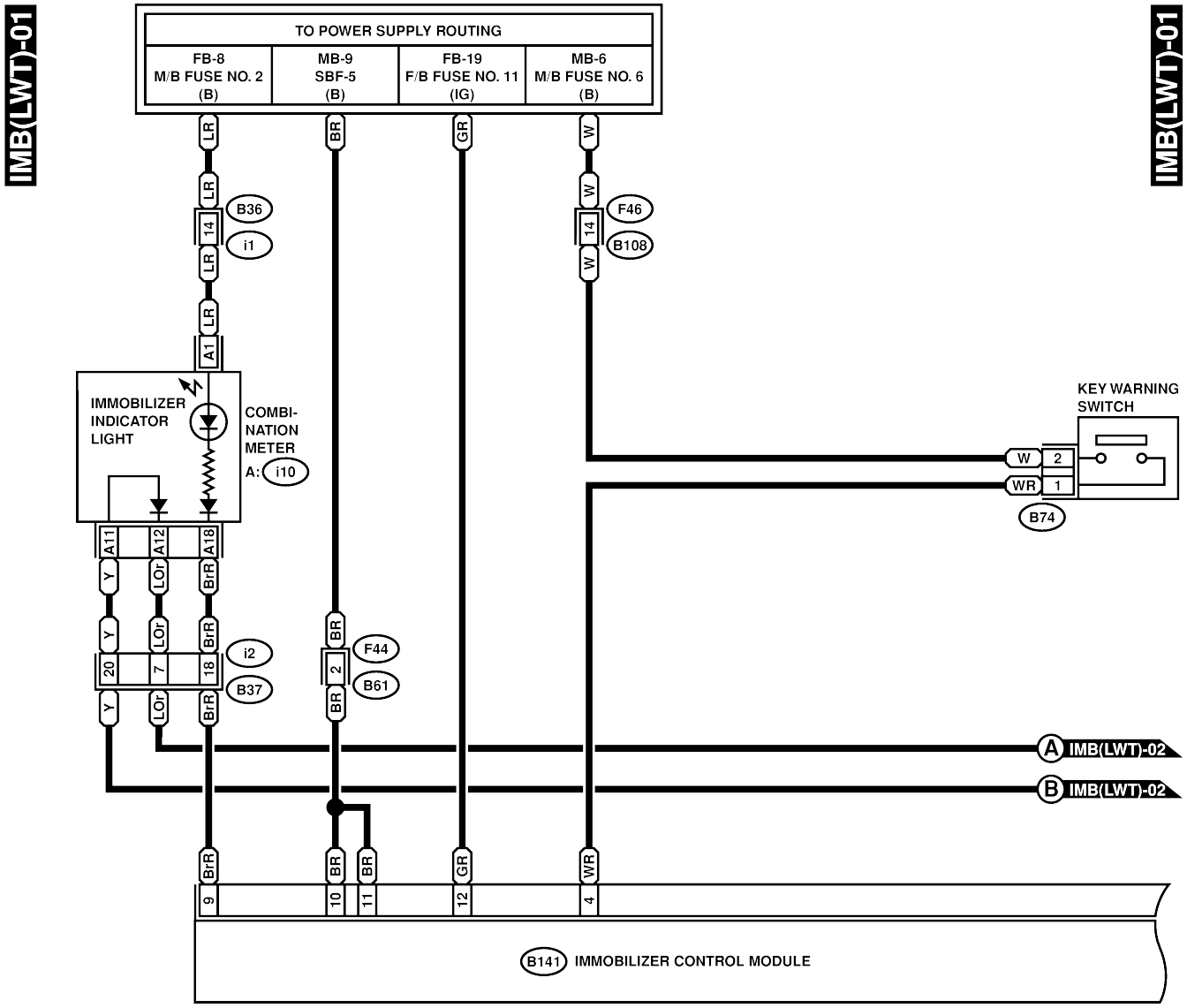


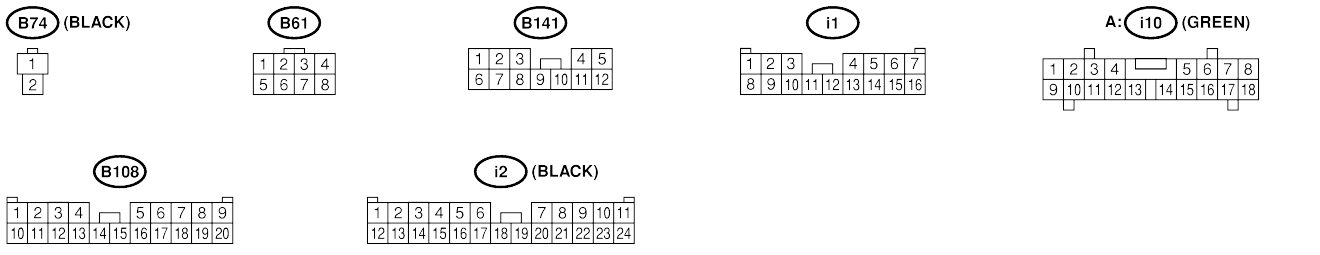
SG74-20

25. Immobilizer System S903346

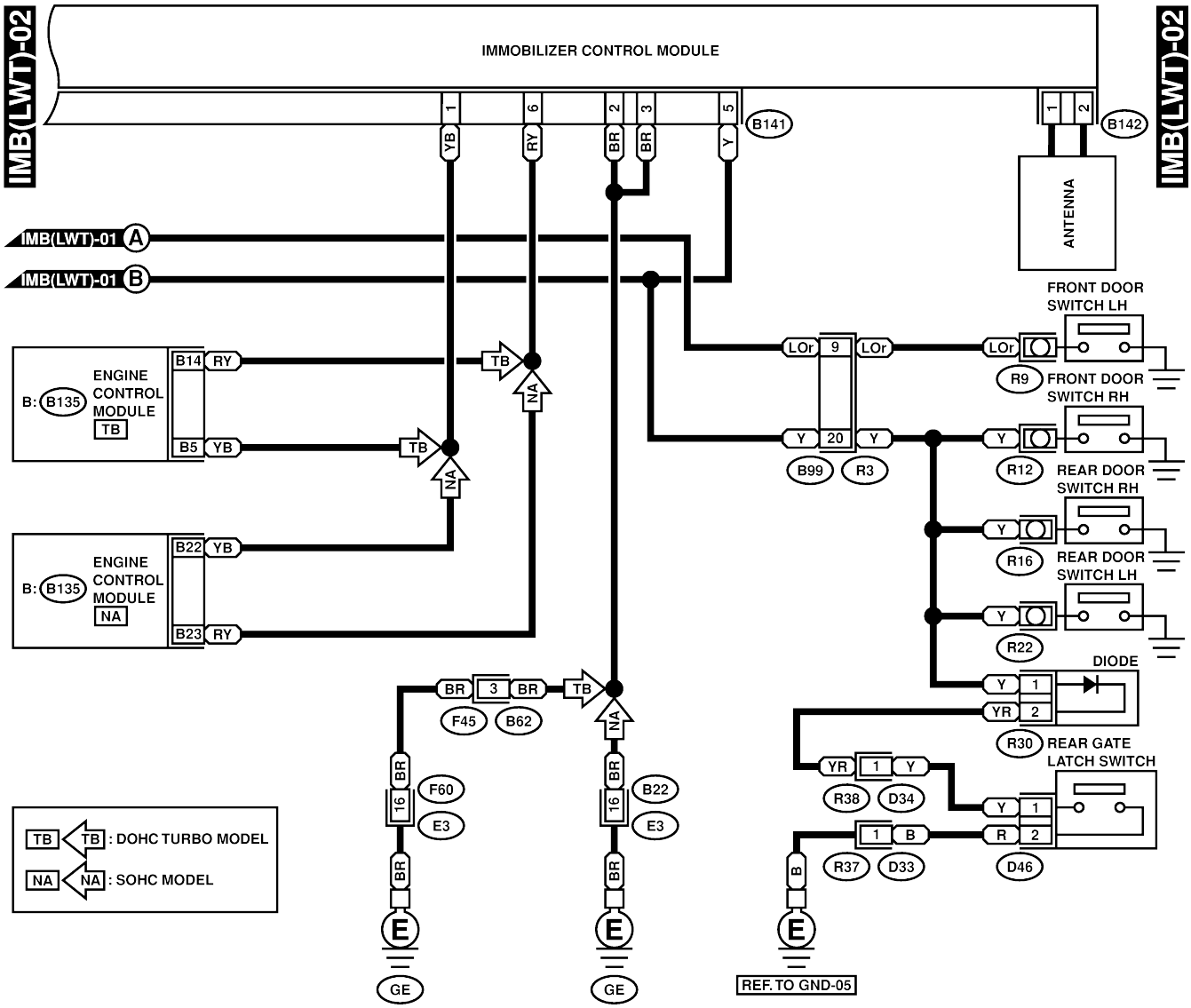
A: SCHEMATIC S903346A21

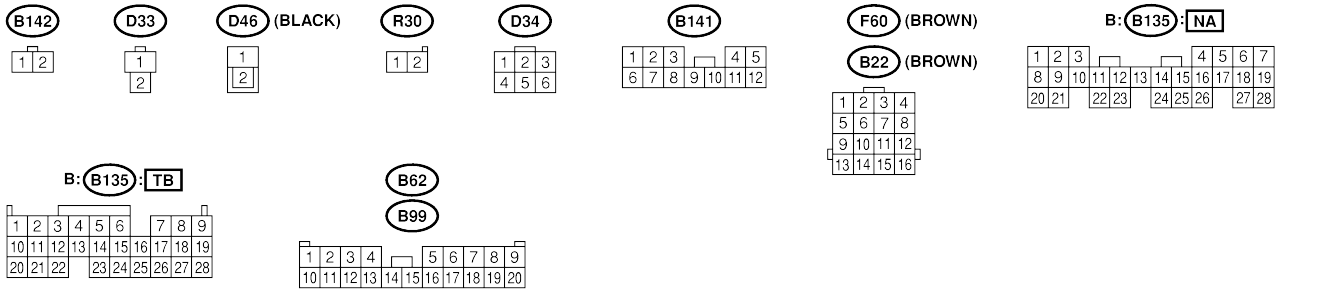
1. LHD MODEL WITH OBD S903346A2103





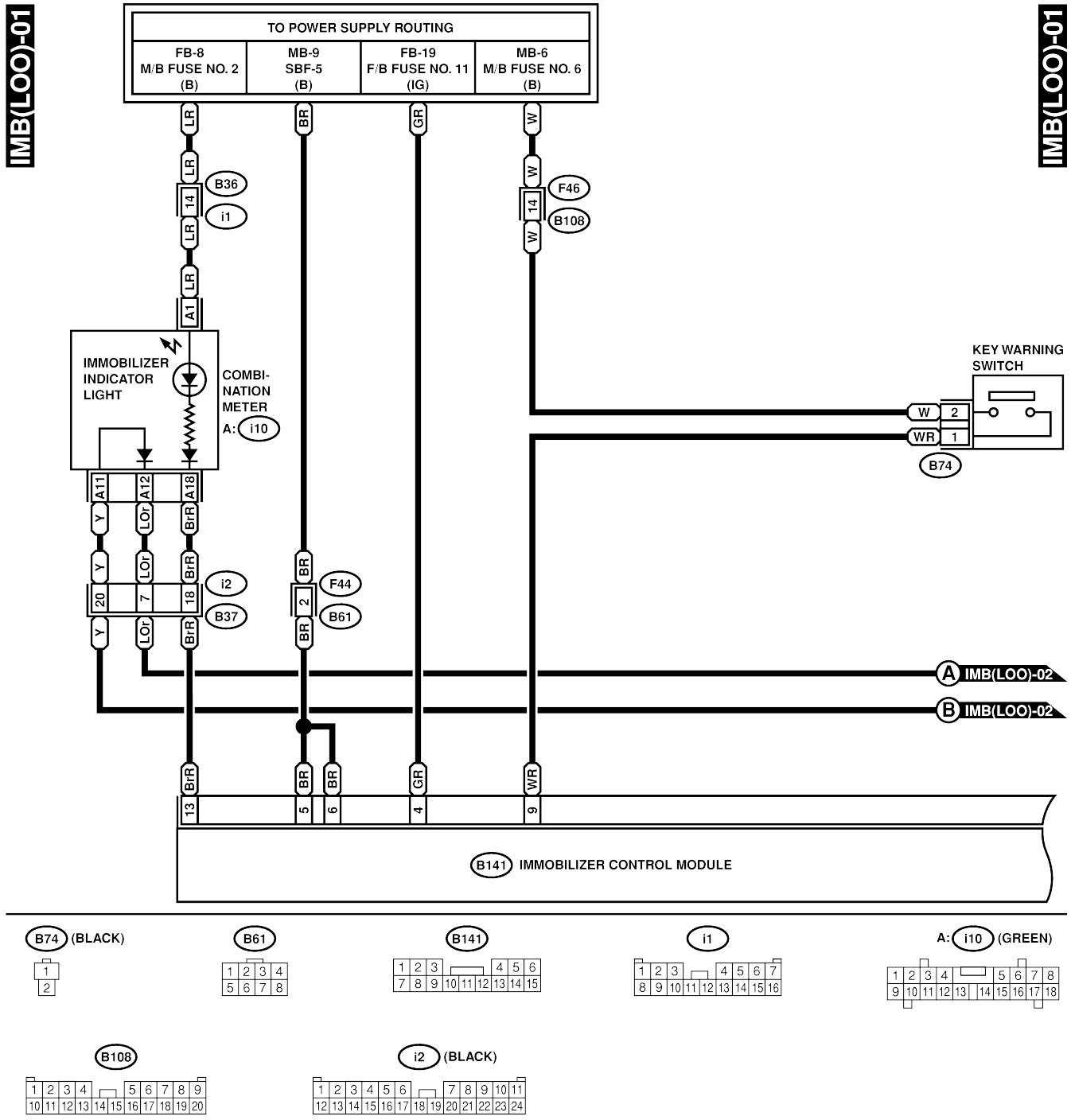
SL91-20A


IMB(LWT)-02
IMMOBILIZER CONTROL MODULE
IMB(LWT)-02
B141
B142
ANTENNA
IMB(LWT)-01 A
IMB(LWT)-01 B
FRONT DOOR SWITCH LH
FRONT DOOR SWITCH RH
REAR DOOR SWITCH RH
REAR DOOR SWITCH LH
DIODE
REAR GATE LATCH SWITCH
B: B135 ENGINE CONTROL MODULE TB
B: B135 ENGINE CONTROL MODULE NA
TB : DOHC TURBO MODEL
NA : SOHC MODEL
REF. TO GND-05
GE
GE

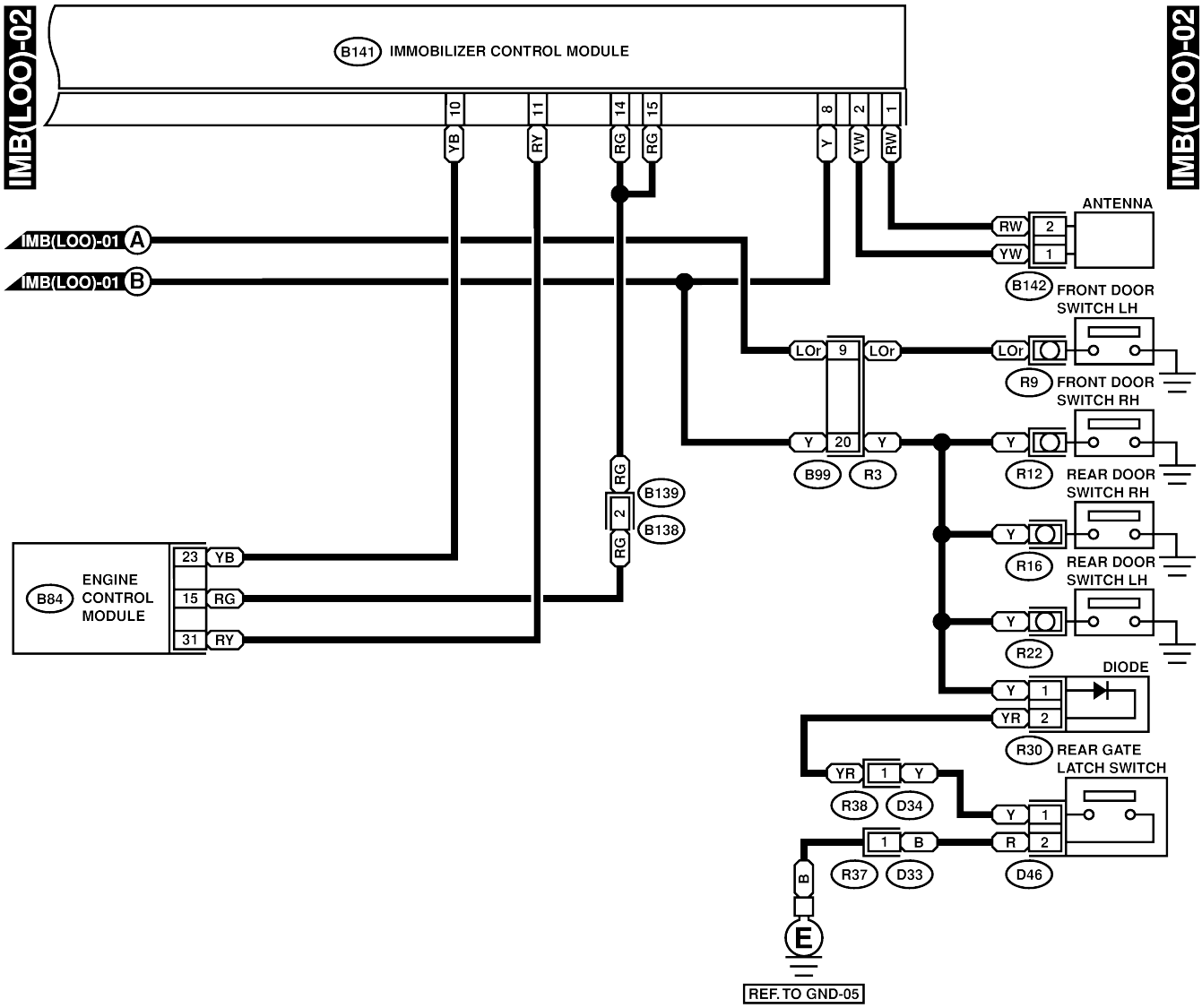

B142
D33
D46 (BLACK)
R30
D34
B141
F60 (BROWN)
B22 (BROWN)
B: B135 : NA
B: B135 : TB
B62
B99

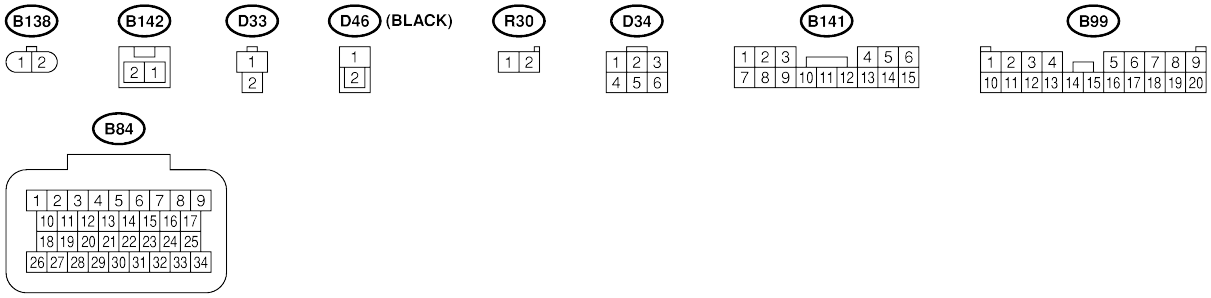
SL91-20B

2. LHD NON-TURBO MODEL WITHOUT OBD S903346A2104



SL91-21A

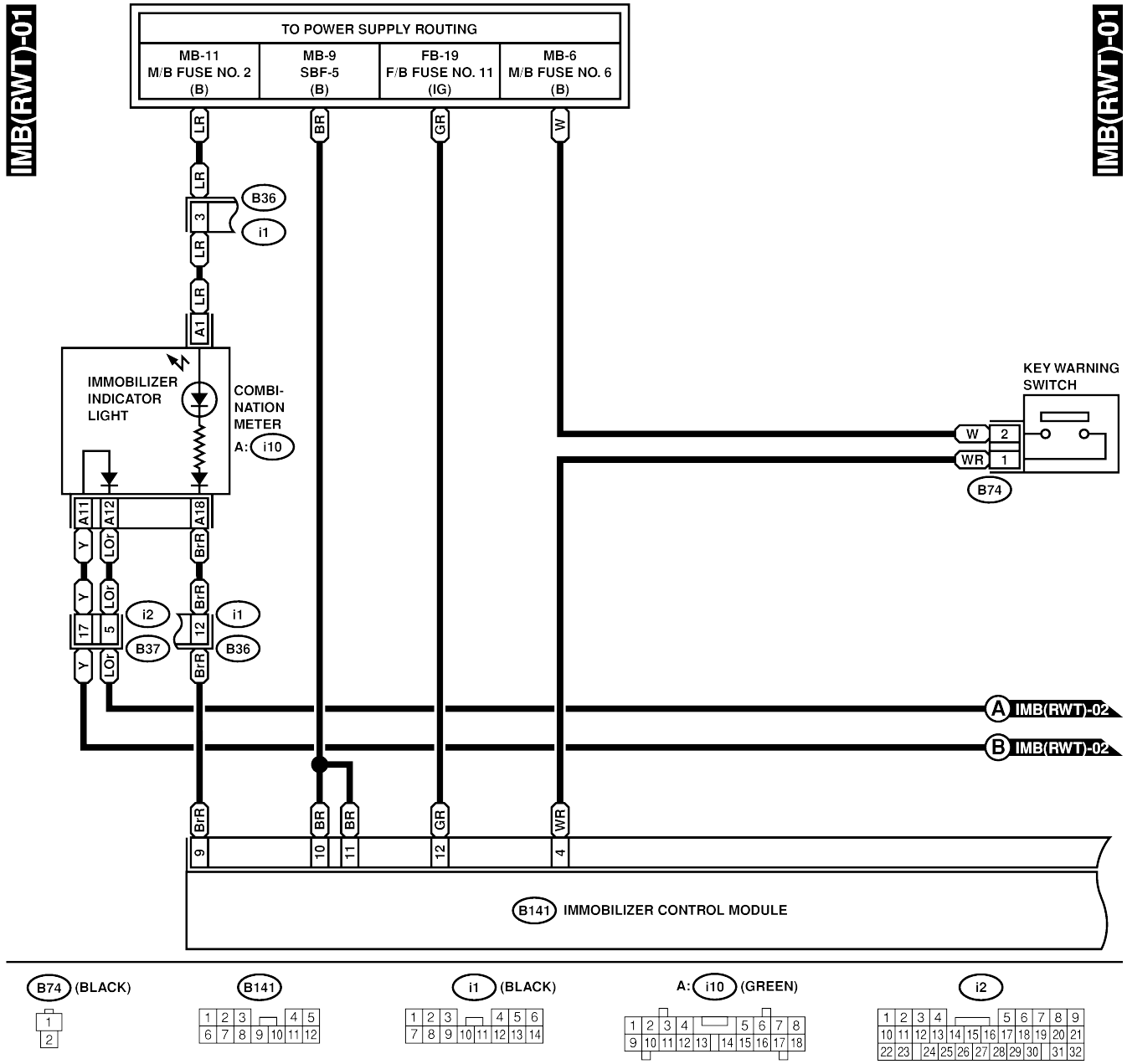

IMB(LOO)-02
B141 IMMOBILIZER CONTROL MODULE
10
11
14
15
8
2
1
YB
RY
RG
RG
Y
YW
RW
IMB(LOO)-01 A
IMB(LOO)-01 B
ANTENNA
RW
2
YW
1
B142
FRONT DOOR SWITCH LH
LOr
9
LOr
LOr
R9
FRONT DOOR SWITCH RH
Y
20
Y
Y
B99
R3
R12
REAR DOOR SWITCH RH
RG
2
RG
B139
B138
Y
R16
REAR DOOR SWITCH LH
B84
ENGINE CONTROL MODULE
23
YB
15
RG
31
RY
Y
R22
DIODE
Y
1
YR
2
R30
REAR GATE LATCH SWITCH
YR
1
Y
R38
D34
Y
1
1
B
R
2
R37
D33
D46
B
E
REF. TO GND-05


B138
1 2
B142
2 1
D33
1
2
D46 (BLACK)
1
2
R30
1 2
D34
1 2 3
4 5 6
B141
1 2 3 4 5 6
7 8 9 10 11 12 13 14 15
B99
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20

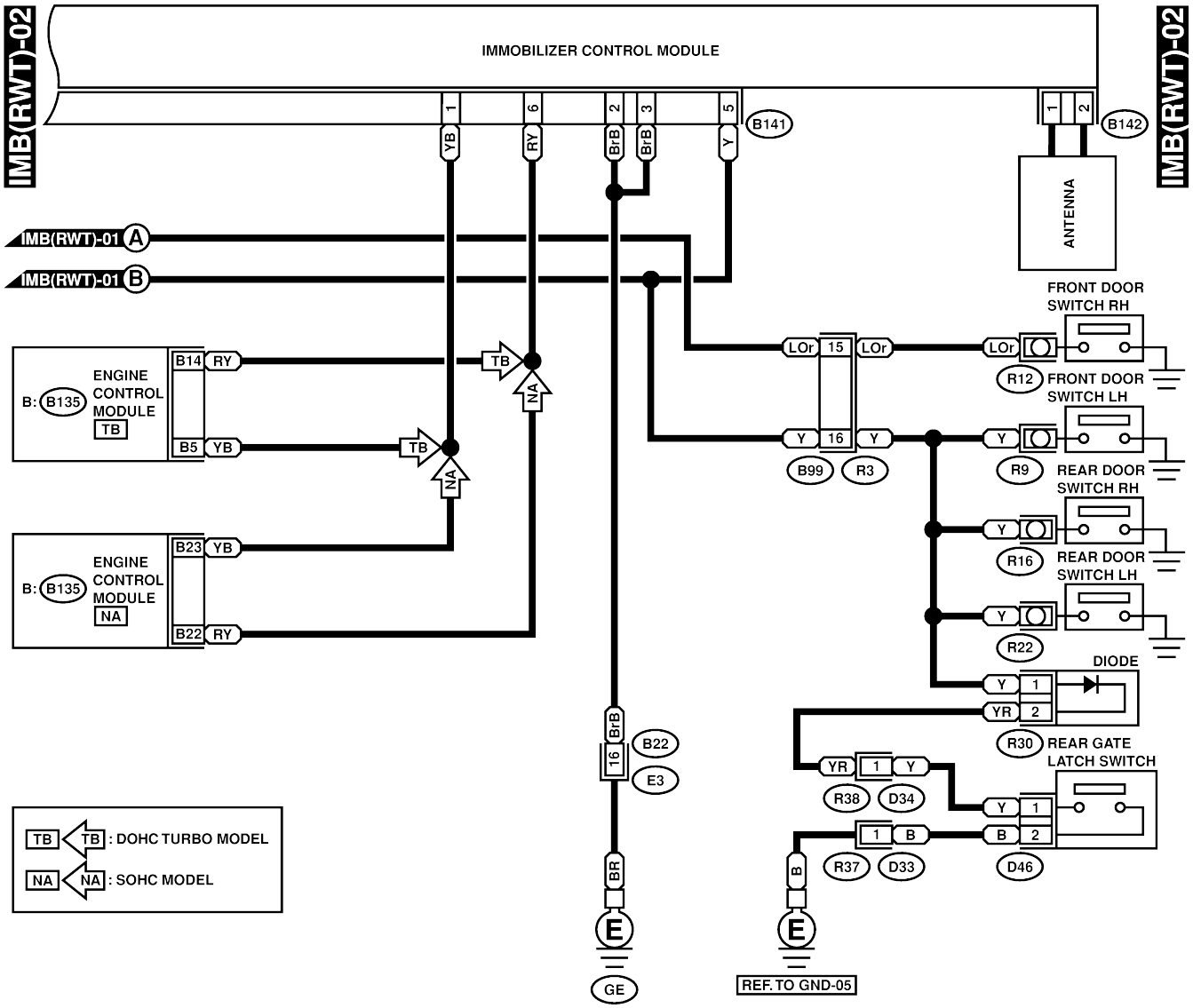
B84
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25
26 27 28 29 30 31 32 33 34

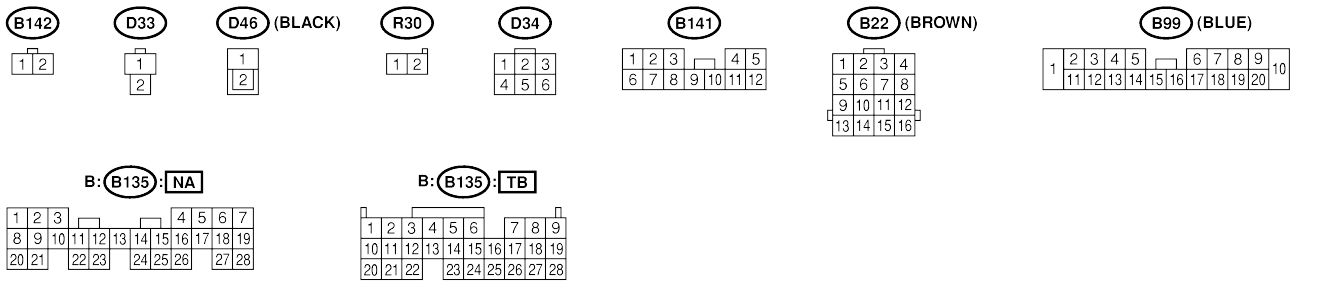
SL91-21B

3. RHD MODEL WITH OBD S903346A2105



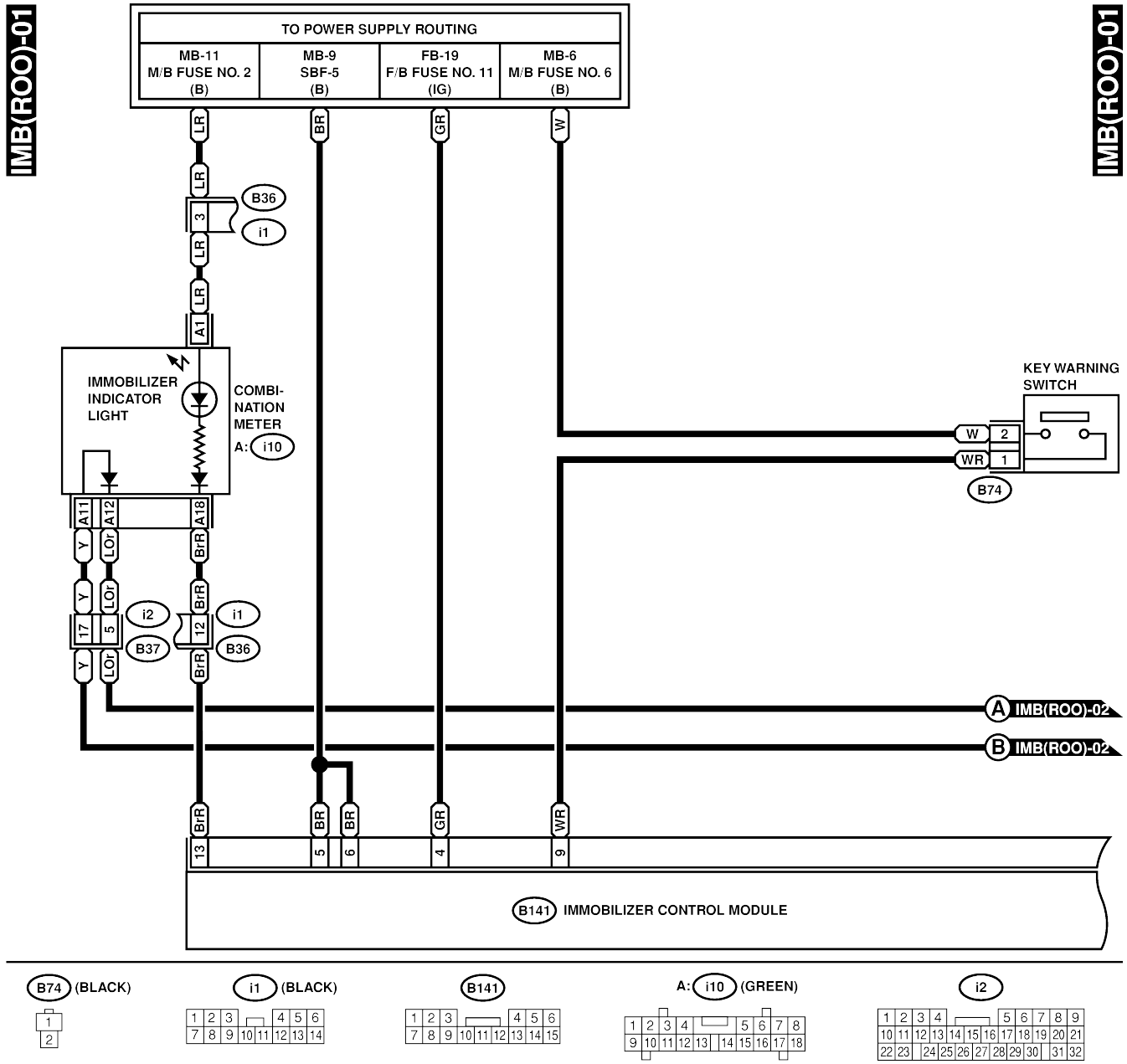
SR91-20A


IMB(RWT)-02
IMMOBILIZER CONTROL MODULE
IMB(RWT)-02
B141
B142
YB
RY
BrB
BrB
Y
ANTENNA
IMB(RWT)-01 A
IMB(RWT)-01 B
FRONT DOOR SWITCH RH
FRONT DOOR SWITCH LH
REAR DOOR SWITCH RH
REAR DOOR SWITCH LH
DIODE
REAR GATE LATCH SWITCH
ENGINE CONTROL MODULE
TB
NA
B14
B5
B23
B22
LOr
Y
YR
B
BR
B99
R3
R12
R9
R16
R22
R30
R38
D34
R37
D33
D46
B22
E3
GE
REF. TO GND-05
TB : DOHC TURBO MODEL
NA : SOHC MODEL

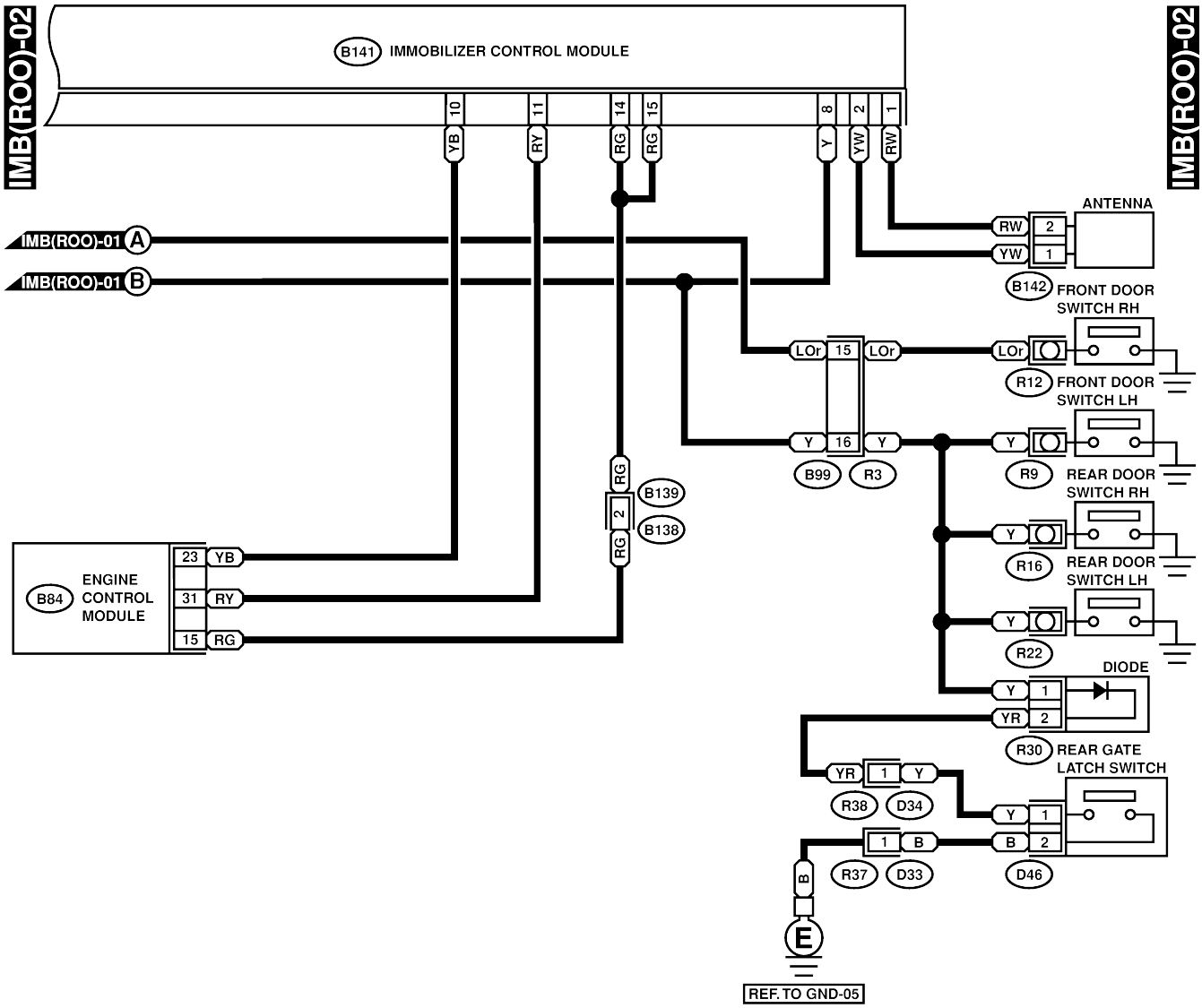

B142
D33
D46 (BLACK)
R30
D34
B141
B22 (BROWN)
B99 (BLUE)
B: B135 : NA
B: B135 : TB

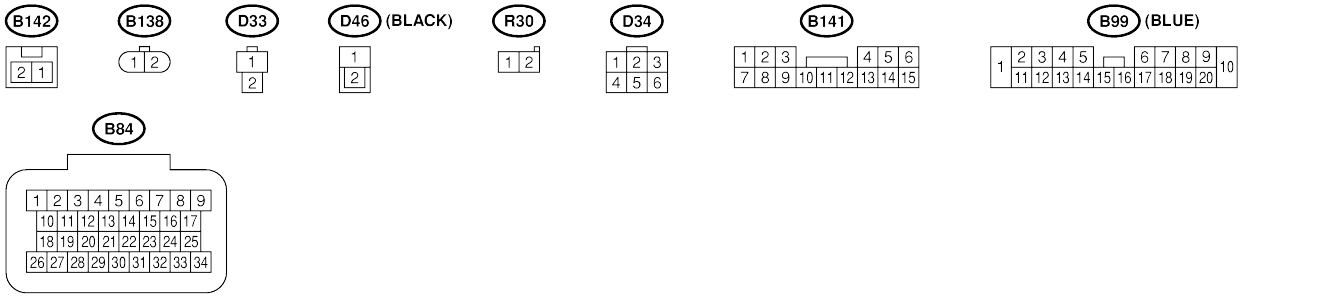
SR91-20B

4. RHD NON-TURBO MODEL WITHOUT OBD S903346A2106



SR91-21A


IMB(ROO)-02
B141 IMMOBILIZER CONTROL MODULE
10
11
14
15
8
2
1
YB
RY
RG
RG
Y
YW
RW
IMB(ROO)-01 A
IMB(ROO)-01 B
ANTENNA
RW
2
YW
1
B142
FRONT DOOR SWITCH RH
LOr
15
LOr
LOr
R12
FRONT DOOR SWITCH LH
Y
16
Y
Y
B99
R3
R9
REAR DOOR SWITCH RH
RG
B139
2
B138
RG
Y
R16
REAR DOOR SWITCH LH
B84
ENGINE CONTROL MODULE
23
YB
31
RY
15
RG
Y
R22
DIODE
Y
1
YR
2
R30
REAR GATE LATCH SWITCH
YR
1
Y
R38
D34
Y
1
1
B
B
2
R37
D33
D46
B
E
REF. TO GND-05
IMB(ROO)-02


B142
2 1
B138
1 2
D33
1
2
D46 (BLACK)
1
2
R30
1 2
D34
1 2 3
4 5 6
B141
1 2 3 4 5 6
7 8 9 10 11 12 13 14 15
B99 (BLUE)
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20

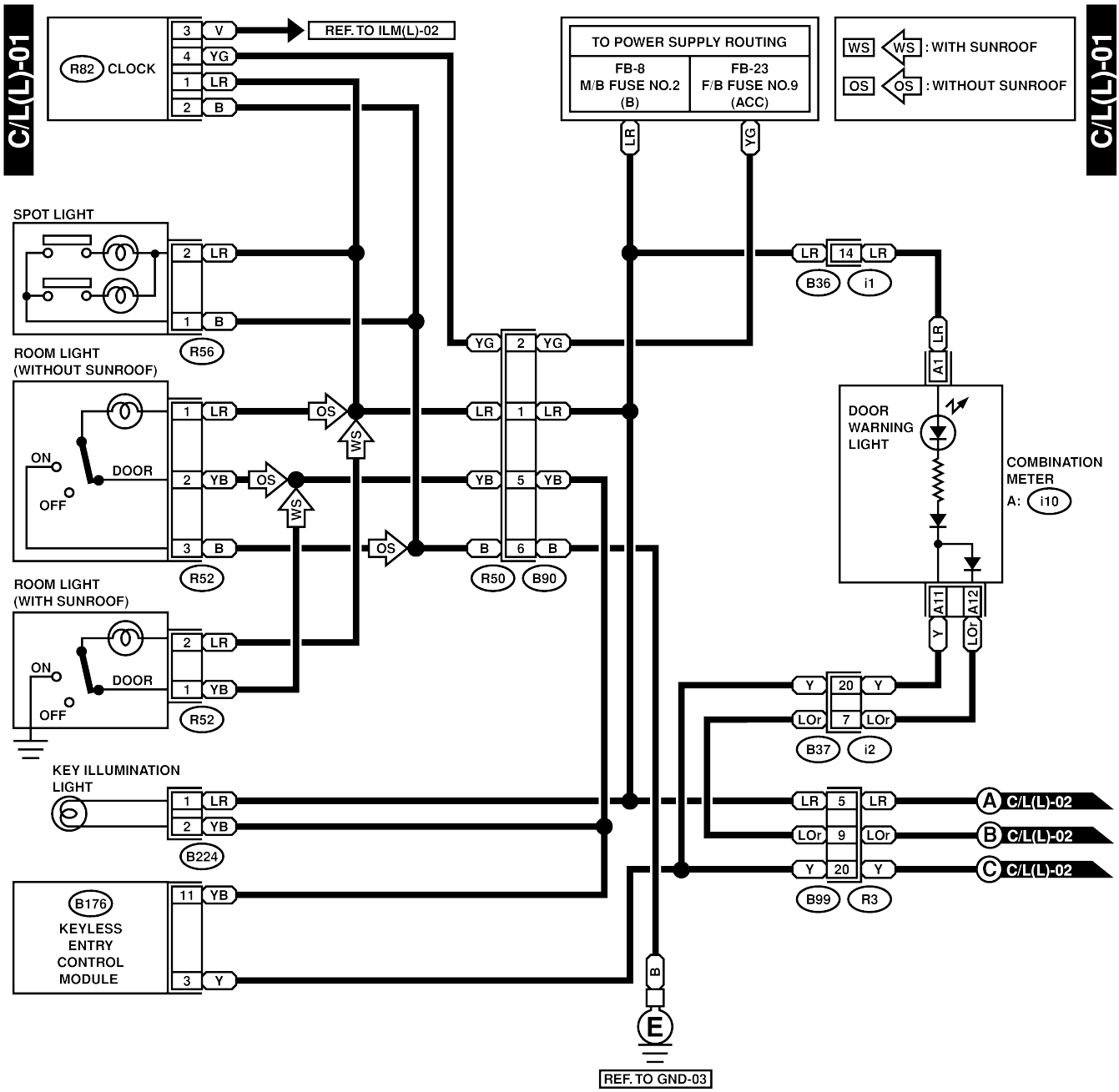
B84
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25
26 27 28 29 30 31 32 33 34

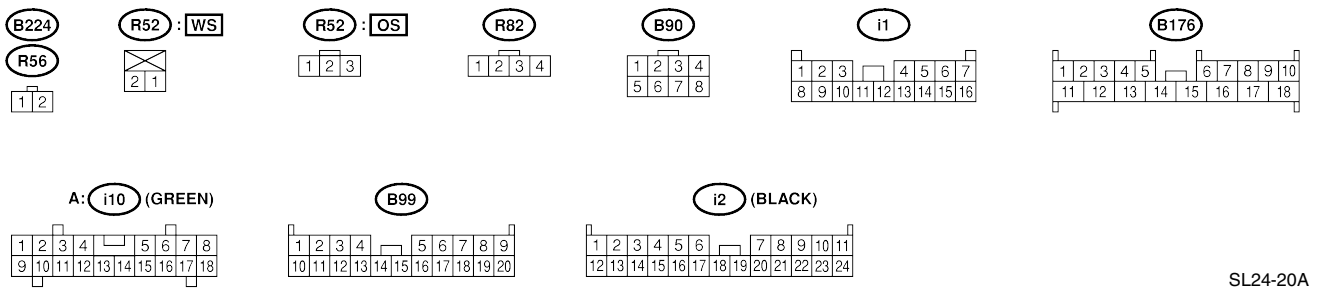
SR91-21B

26. In Compartment Light System S903665

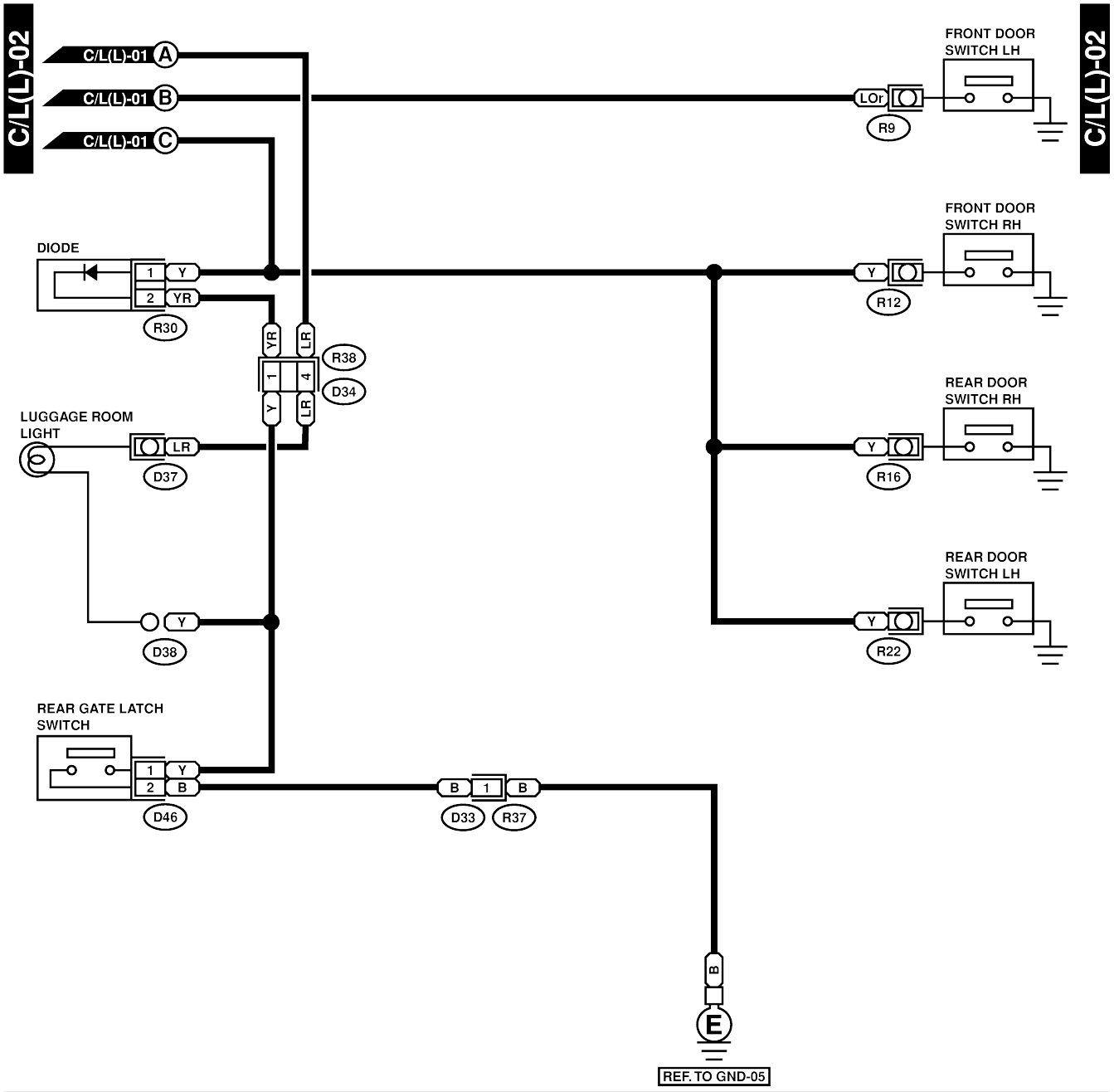
A: SCHEMATIC S903665A21

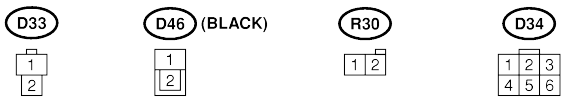
1. LHD MODEL S903665A2101





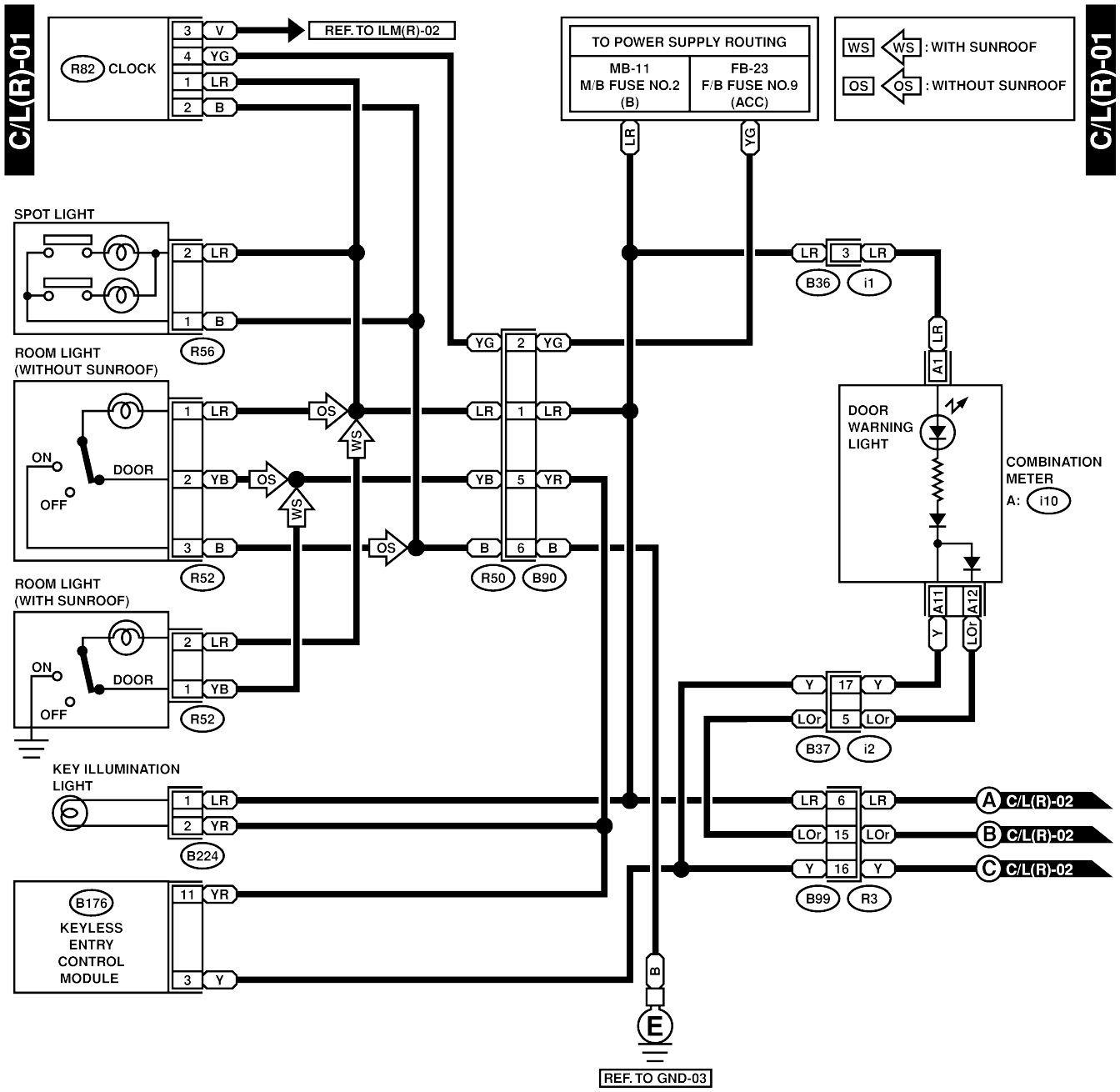
SL24-20A

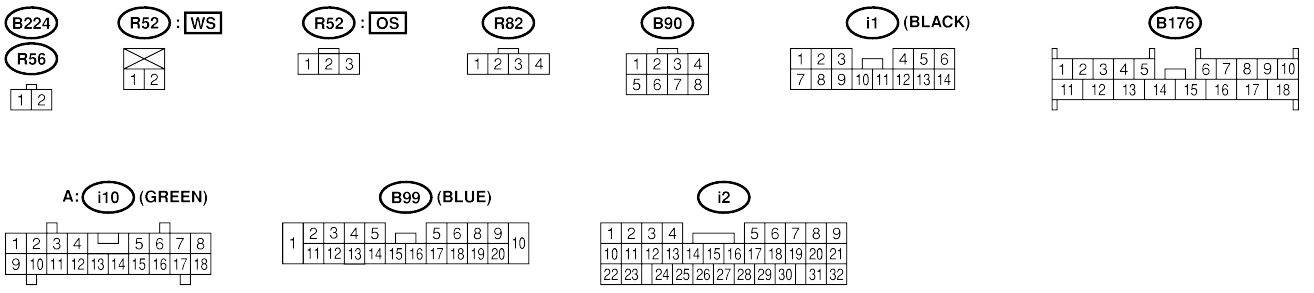

C/L(L)-02
C/L(L)-01 A
C/L(L)-01 B
C/L(L)-01 C
C/L(L)-02
FRONT DOOR SWITCH LH
LOr
R9
FRONT DOOR SWITCH RH
Y
R12
REAR DOOR SWITCH RH
Y
R16
REAR DOOR SWITCH LH
Y
R22
DIODE
1 Y
2 YR
R30
YR
LR
R38
1
4
D34
Y
LR
LUGGAGE ROOM LIGHT
LR
D37
Y
D38
REAR GATE LATCH SWITCH
1 Y
2 B
D46
B
1
B
D33
R37
B
E
REF. TO GND-05


D33
1
2
D46 (BLACK)
1
2
R30
1 2
D34
1 2 3
4 5 6

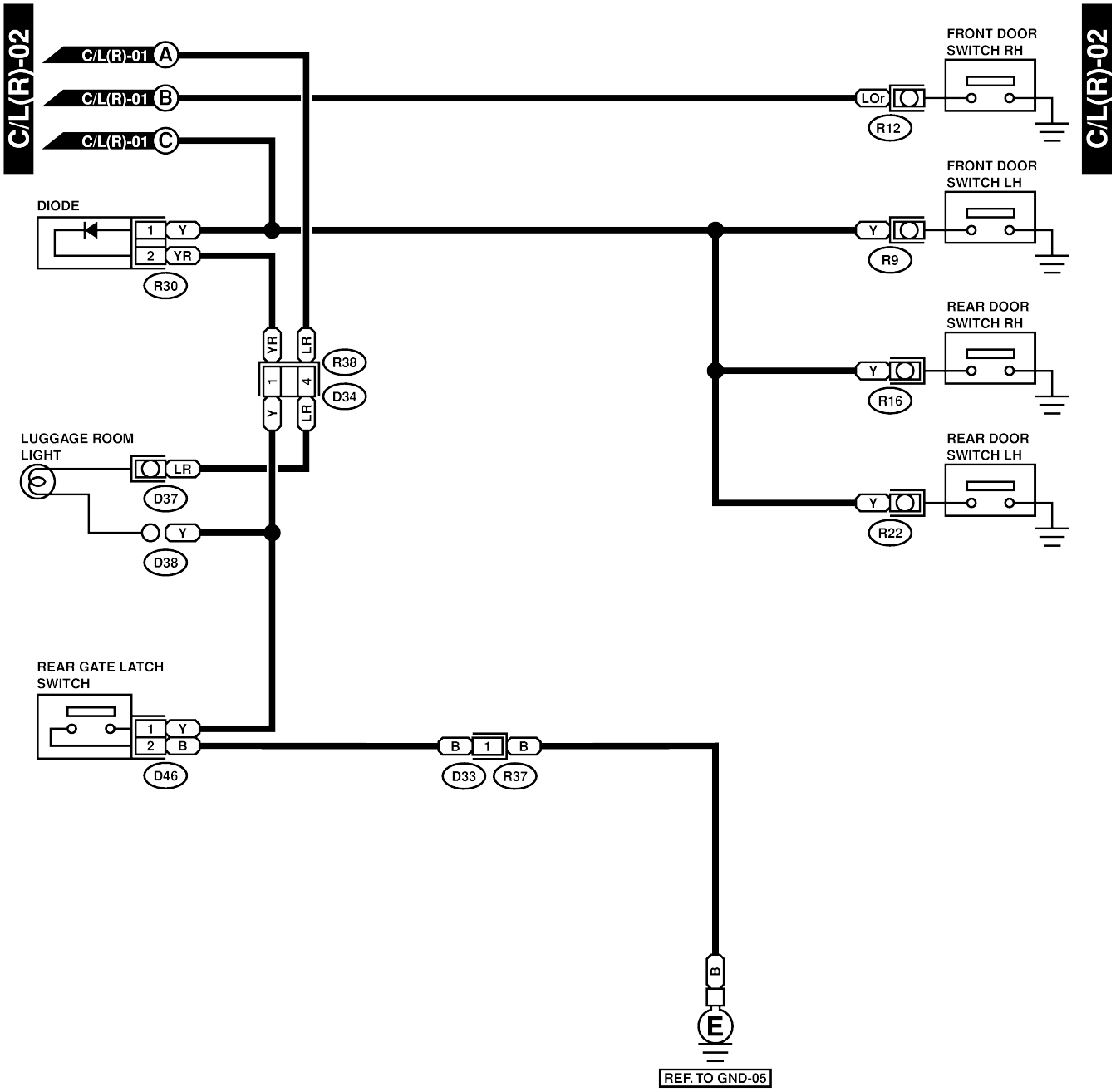
SL24-20B

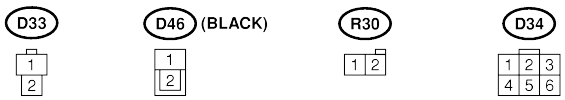
2. RHD MODEL S903665A2102





SR24-20A


C/L(R)-02
C/L(R)-01 A
C/L(R)-01 B
C/L(R)-01 C
C/L(R)-02
FRONT DOOR SWITCH RH
LOr
R12
FRONT DOOR SWITCH LH
Y
R9
REAR DOOR SWITCH RH
Y
R16
REAR DOOR SWITCH LH
Y
R22
DIODE
1 Y
2 YR
R30
YR
LR
R38
1
4
D34
Y
LR
LUGGAGE ROOM LIGHT
LR
D37
Y
D38
REAR GATE LATCH SWITCH
1 Y
2 B
D46
B 1 B
D33
R37
B
E
REF. TO GND-05

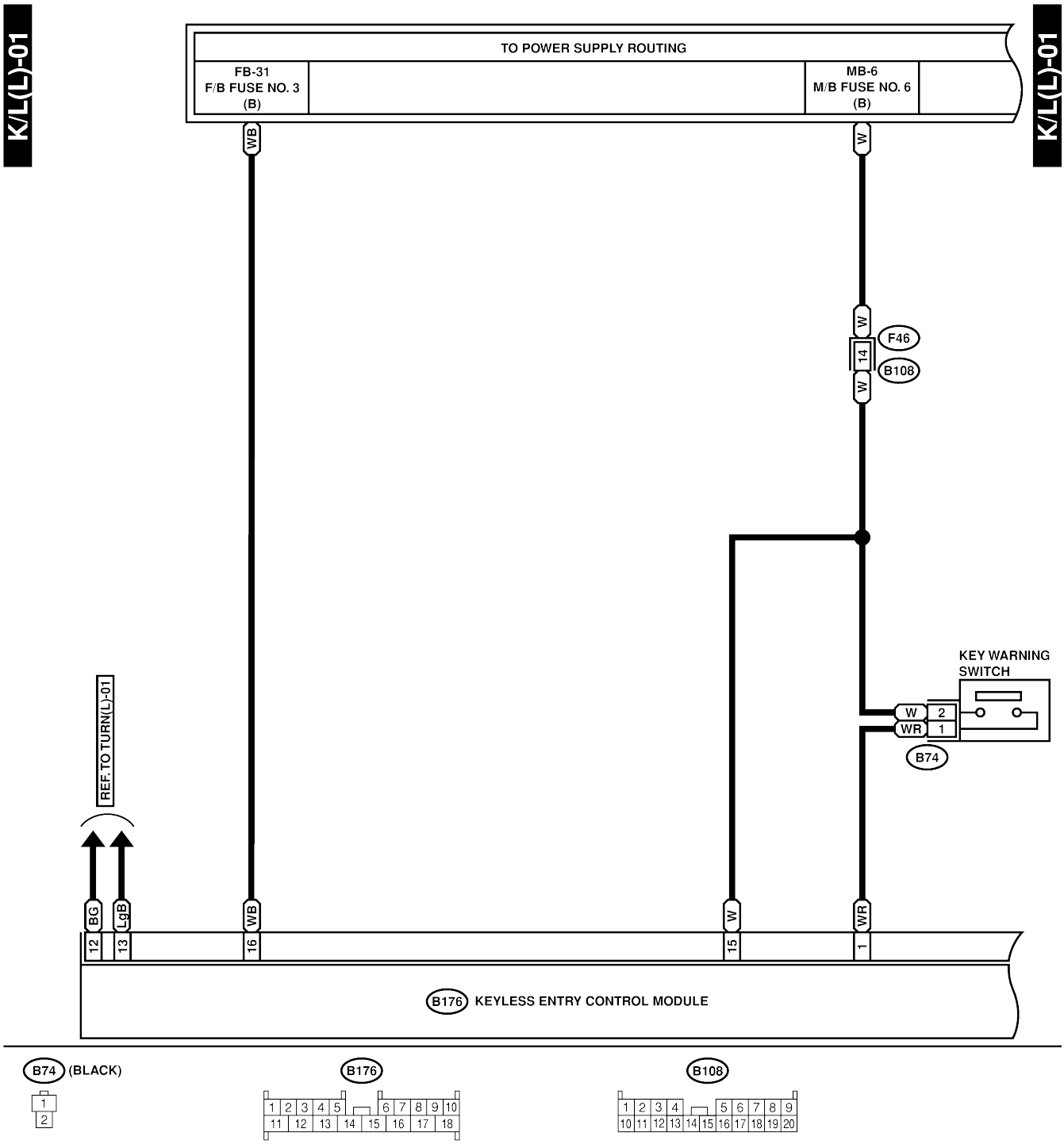

D33
1
2
D46 (BLACK)
1
2
R30
1 2
D34
1 2 3
4 5 6

SR24-20B

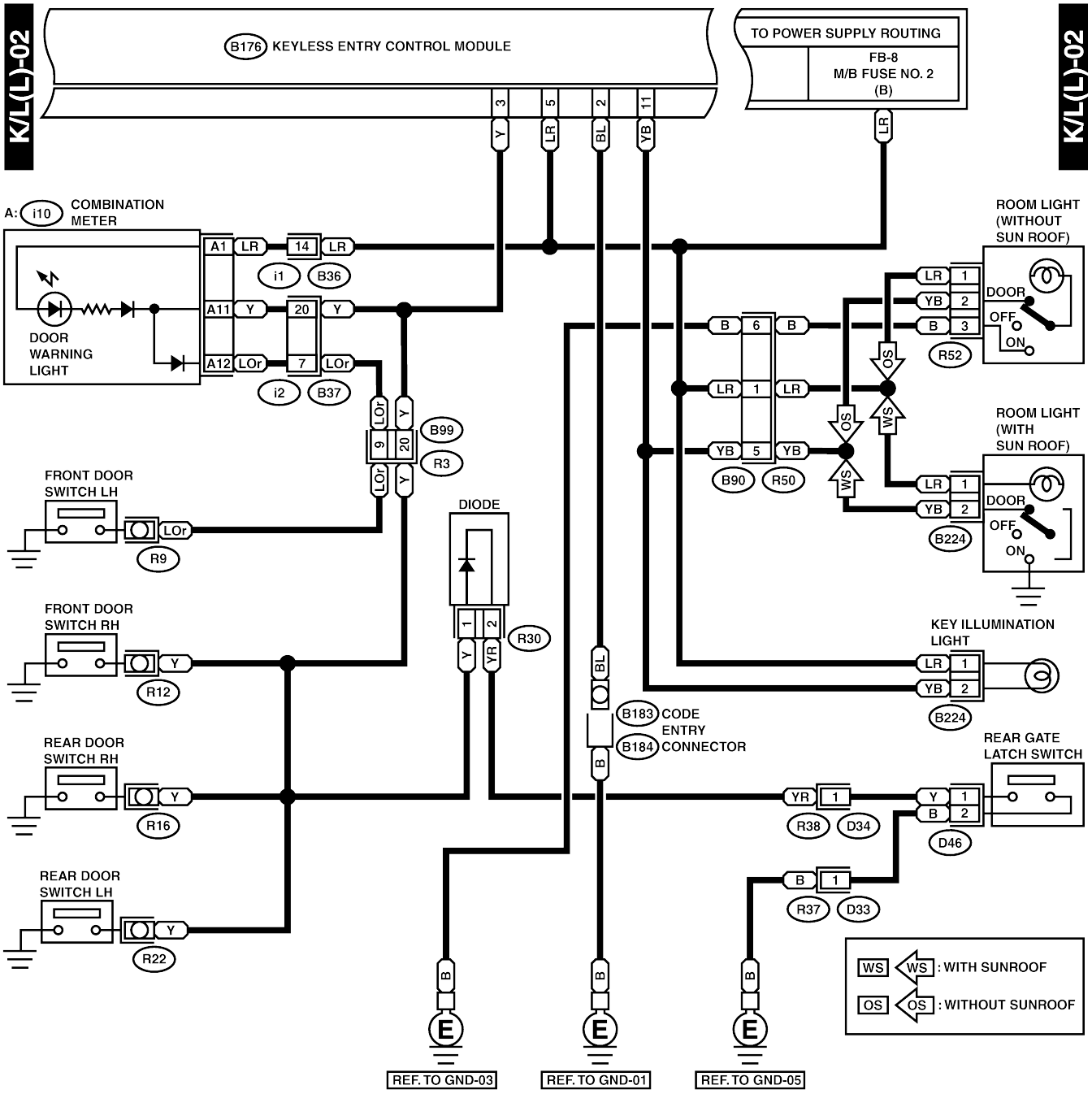
27. Keyless Entry System S903345

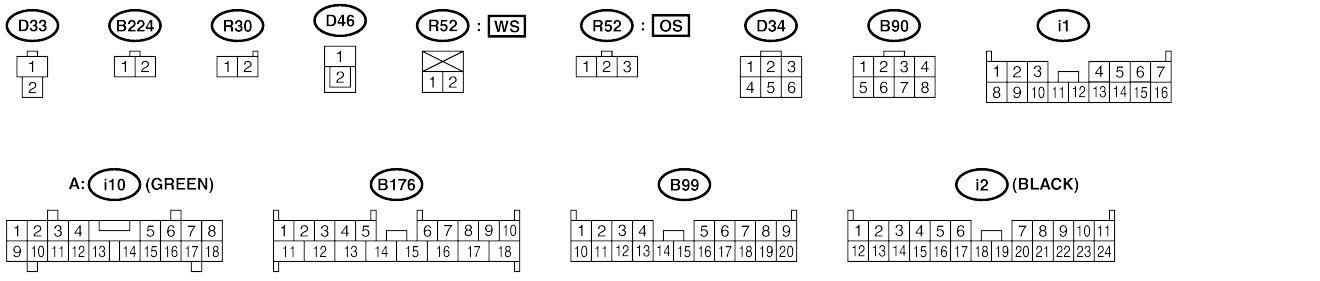
A: SCHEMATIC S903345A21

1. LHD MODEL S903345A2101



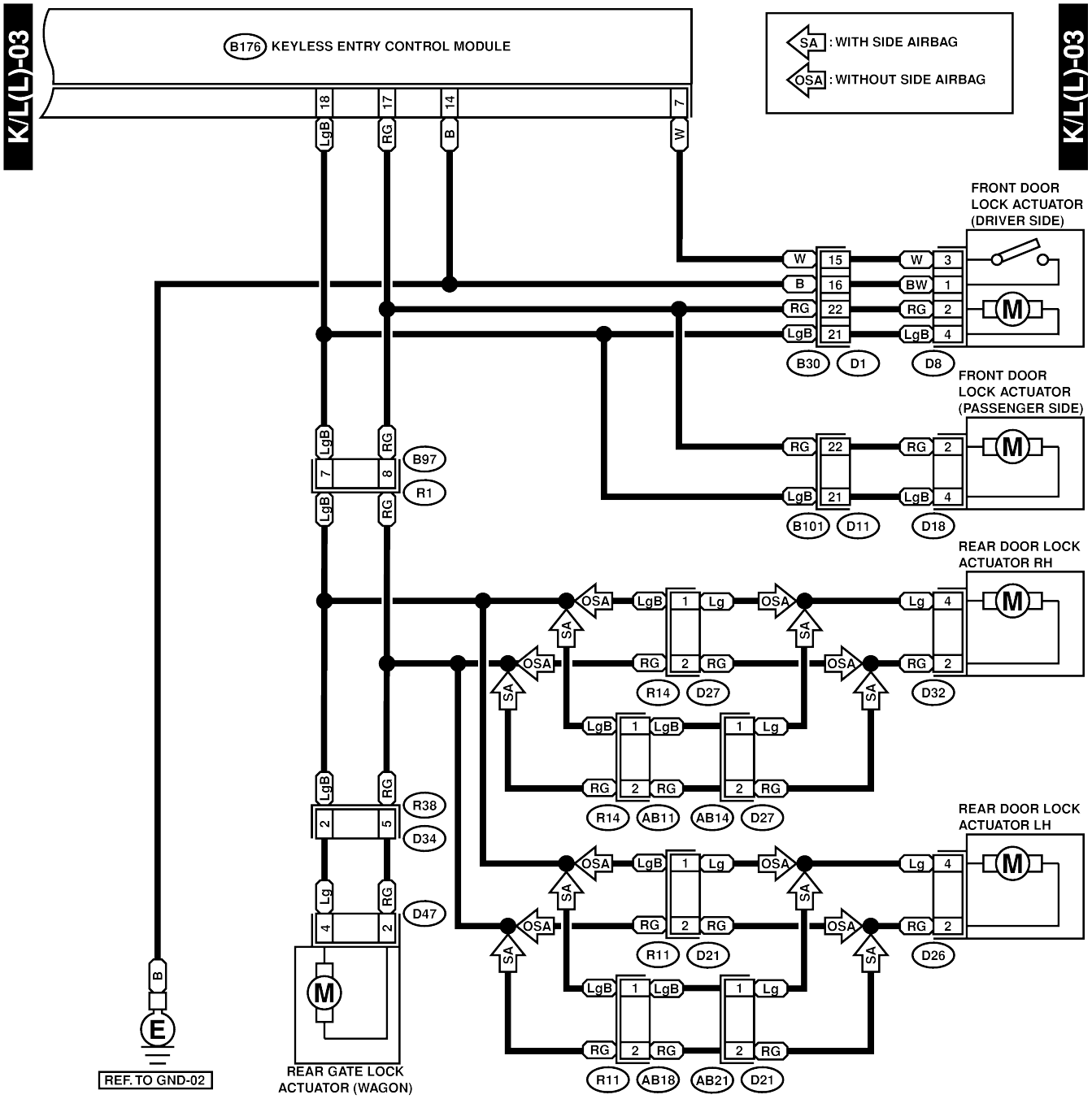
SL77-20A

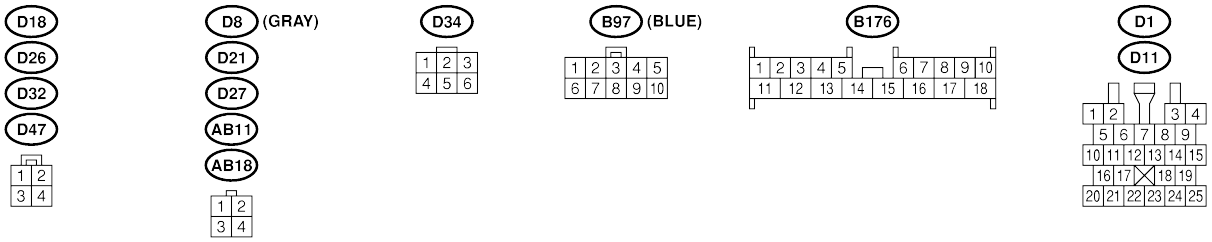

K/L(L)-02
B176 KEYLESS ENTRY CONTROL MODULE
TO POWER SUPPLY ROUTING
FB-8
M/B FUSE NO. 2
(B)
K/L(L)-02
A: i10 COMBINATION METER
DOOR WARNING LIGHT
ROOM LIGHT (WITHOUT SUN ROOF)
ROOM LIGHT (WITH SUN ROOF)
FRONT DOOR SWITCH LH
FRONT DOOR SWITCH RH
REAR DOOR SWITCH RH
REAR DOOR SWITCH LH
DIODE
KEY ILLUMINATION LIGHT
REAR GATE LATCH SWITCH
B183 CODE ENTRY B184 CONNECTOR
WS : WITH SUNROOF
OS : WITHOUT SUNROOF
REF. TO GND-03
REF. TO GND-01
REF. TO GND-05


D33
B224
R30
D46
R52 : WS
R52 : OS
D34
B90
i1

A: i10 (GREEN)
B176
B99
i2 (BLACK)

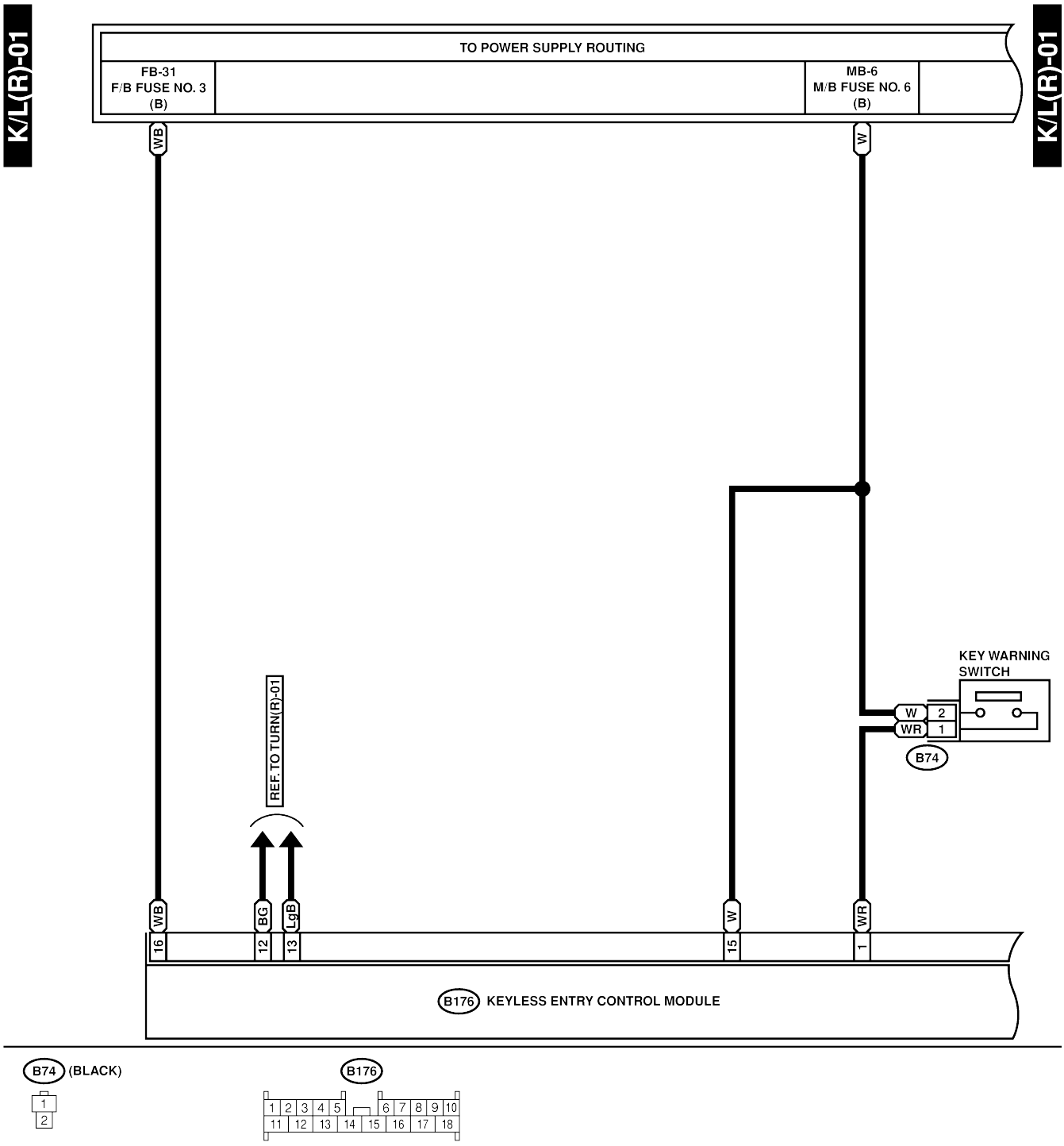
SL77-20B


K/L(L)-03
B176 KEYLESS ENTRY CONTROL MODULE
SA : WITH SIDE AIRBAG
OSA : WITHOUT SIDE AIRBAG
K/L(L)-03
FRONT DOOR LOCK ACTUATOR (DRIVER SIDE)
FRONT DOOR LOCK ACTUATOR (PASSENGER SIDE)
REAR DOOR LOCK ACTUATOR RH
REAR DOOR LOCK ACTUATOR LH
REAR GATE LOCK ACTUATOR (WAGON)
REF. TO GND-02
B97
R1
R38
D34
D47
R14
D27
D32
AB11
AB14
R11
D21
D26
AB18
AB21
B30
D1
D8
B101
D11
D18


D18
D26
D32
D47
D8 (GRAY)
D21
D27
AB11
AB18
D34
B97 (BLUE)
B176
D1
D11

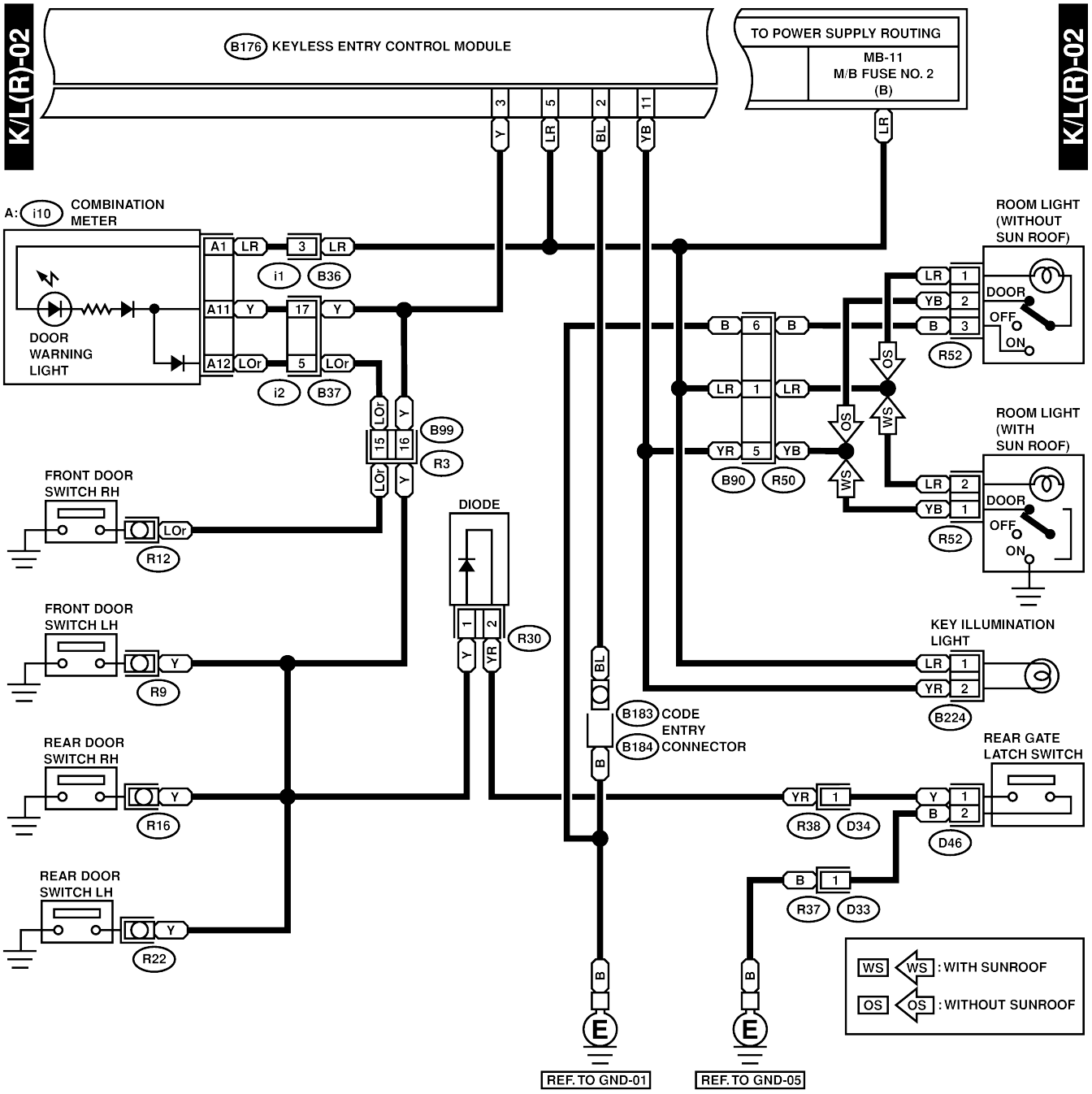
SL77-20C

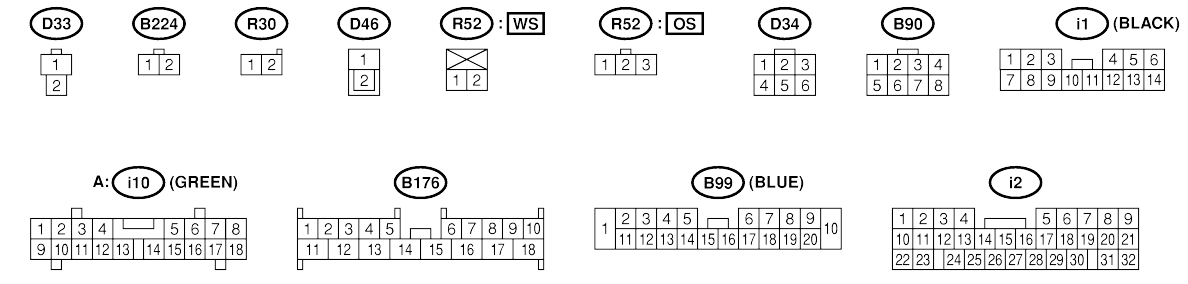
2. RHD MODEL S903345A2102



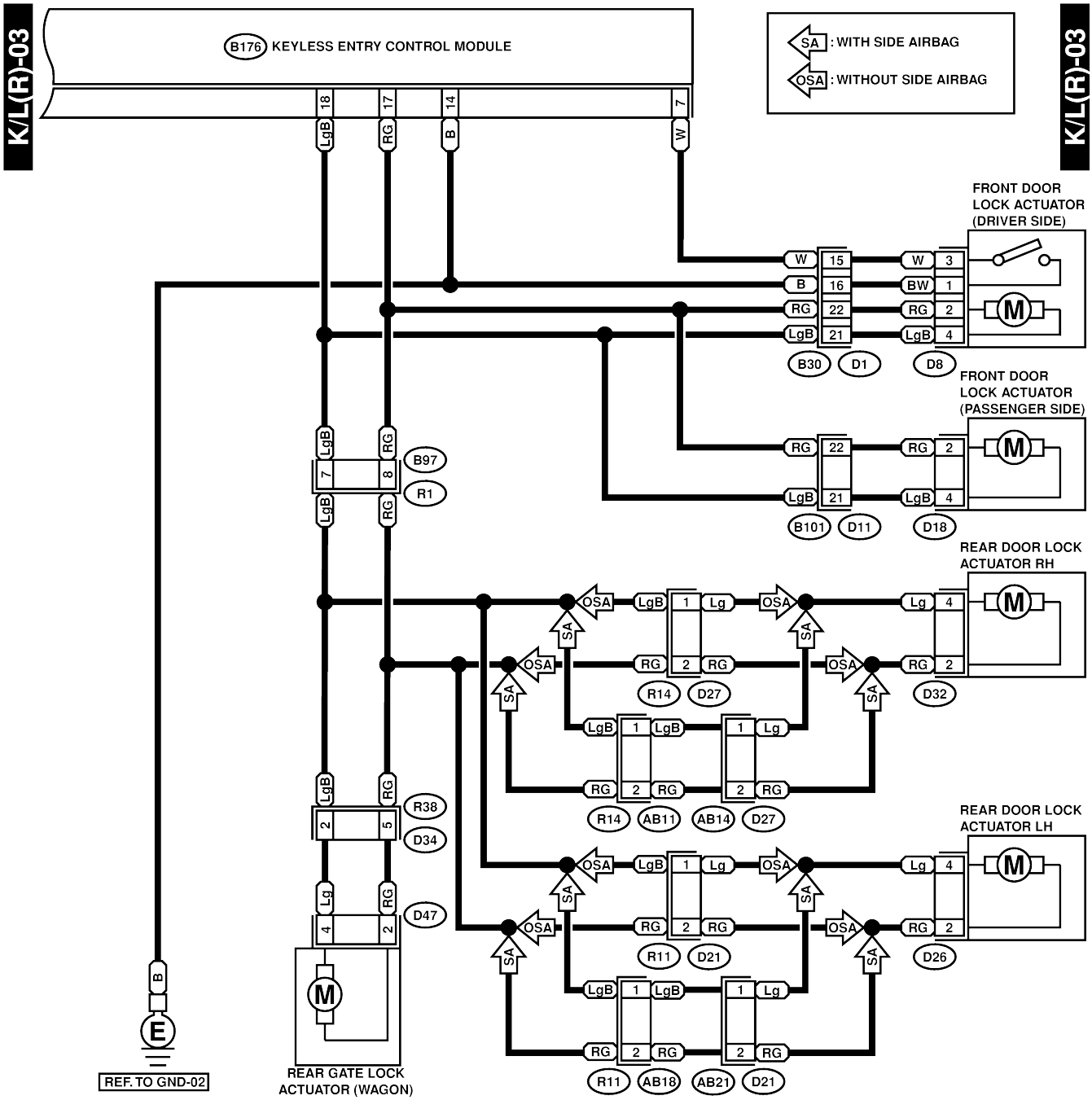
SR77-20A

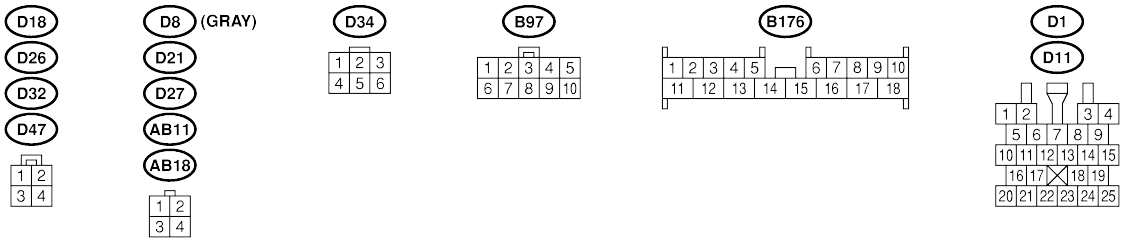
KEYLESS ENTRY SYSTEM





SR77-20B


K/L(R)-03
B176 KEYLESS ENTRY CONTROL MODULE
SA : WITH SIDE AIRBAG
OSA : WITHOUT SIDE AIRBAG
K/L(R)-03
FRONT DOOR LOCK ACTUATOR (DRIVER SIDE)
FRONT DOOR LOCK ACTUATOR (PASSENGER SIDE)
REAR DOOR LOCK ACTUATOR RH
REAR DOOR LOCK ACTUATOR LH
REAR GATE LOCK ACTUATOR (WAGON)
REF. TO GND-02
B30
D1
D8
B101
D11
D18
R14
D27
D32
AB11
AB14
R11
D21
D26
AB18
AB21
B97
R1
R38
D34
D47

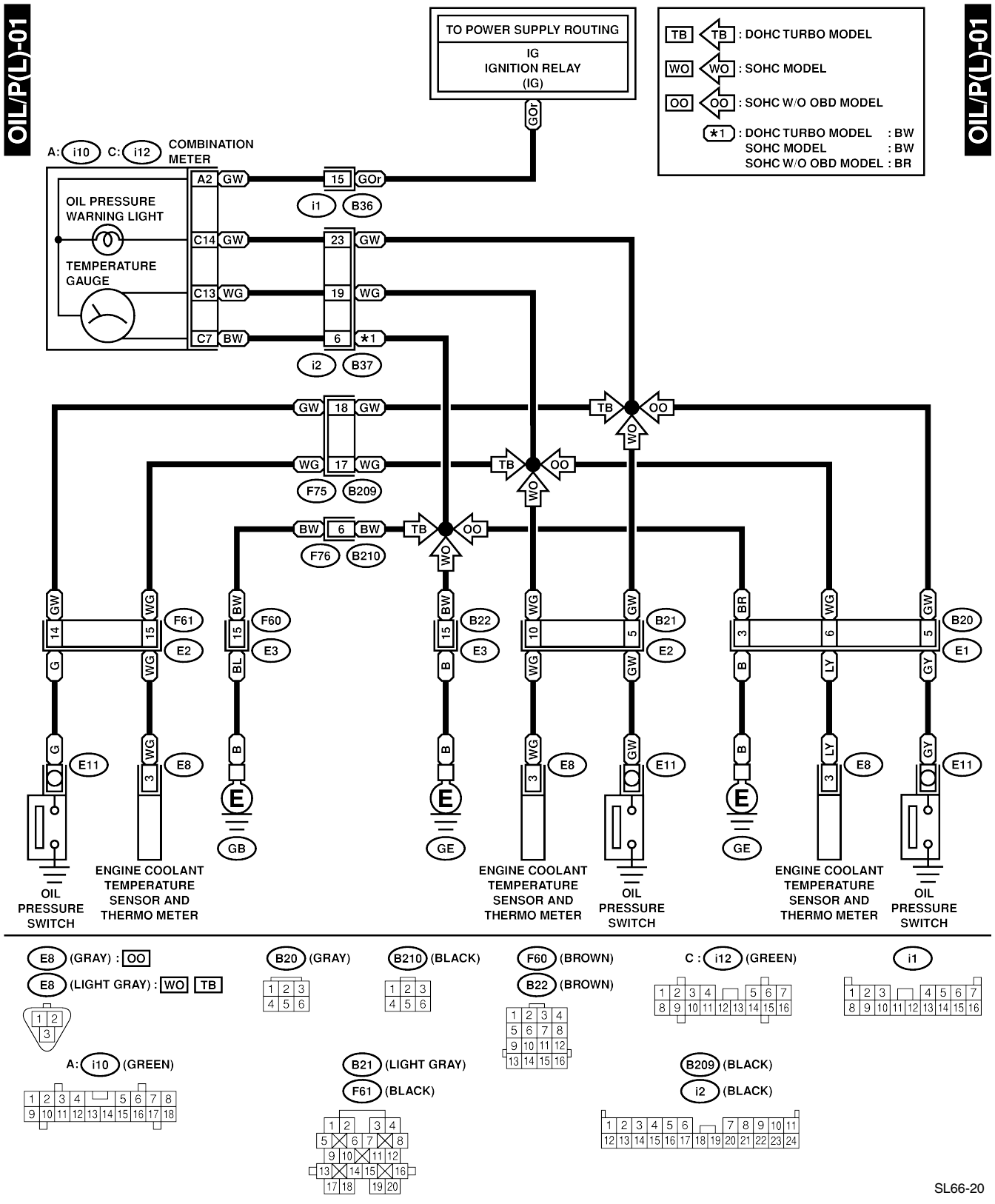

D18
D26
D32
D47
D8 (GRAY)
D21
D27
AB11
AB18
D34
B97
B176
D1
D11

SR77-20C

28. Oil Pressure and Temperature Gauge System S903725

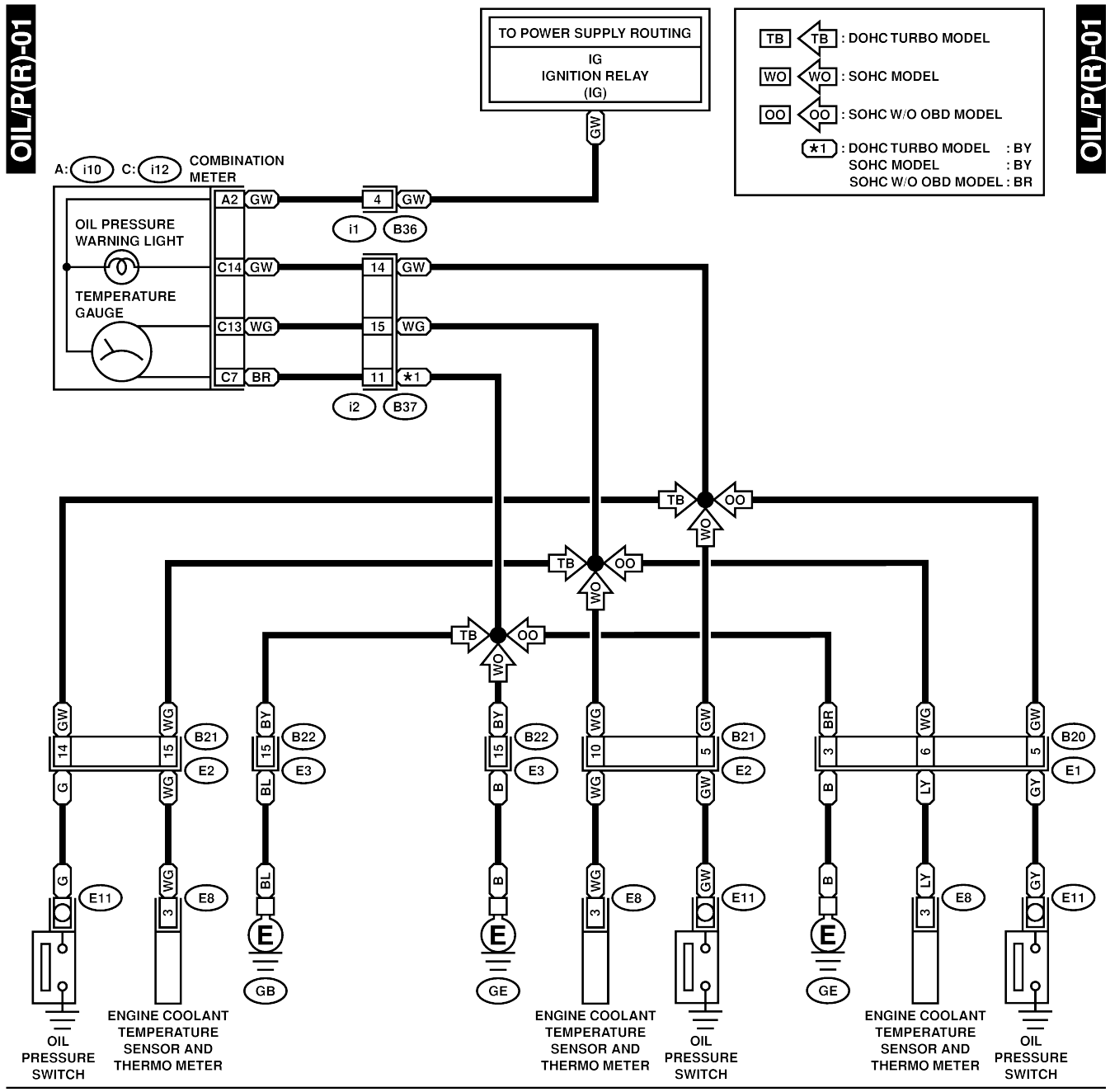
A: SCHEMATIC S903725A21

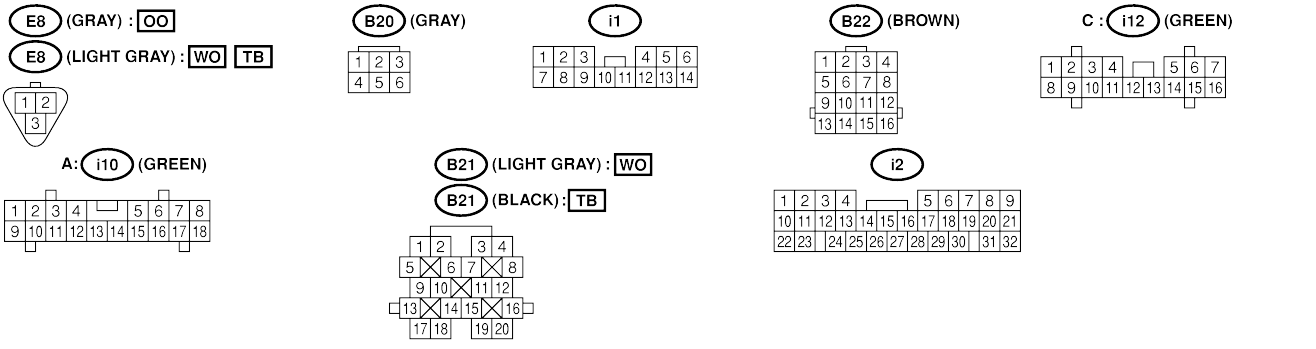
1. LHD MODEL S903725A2101



SL66-20

2. RHD MODEL S903725A2102



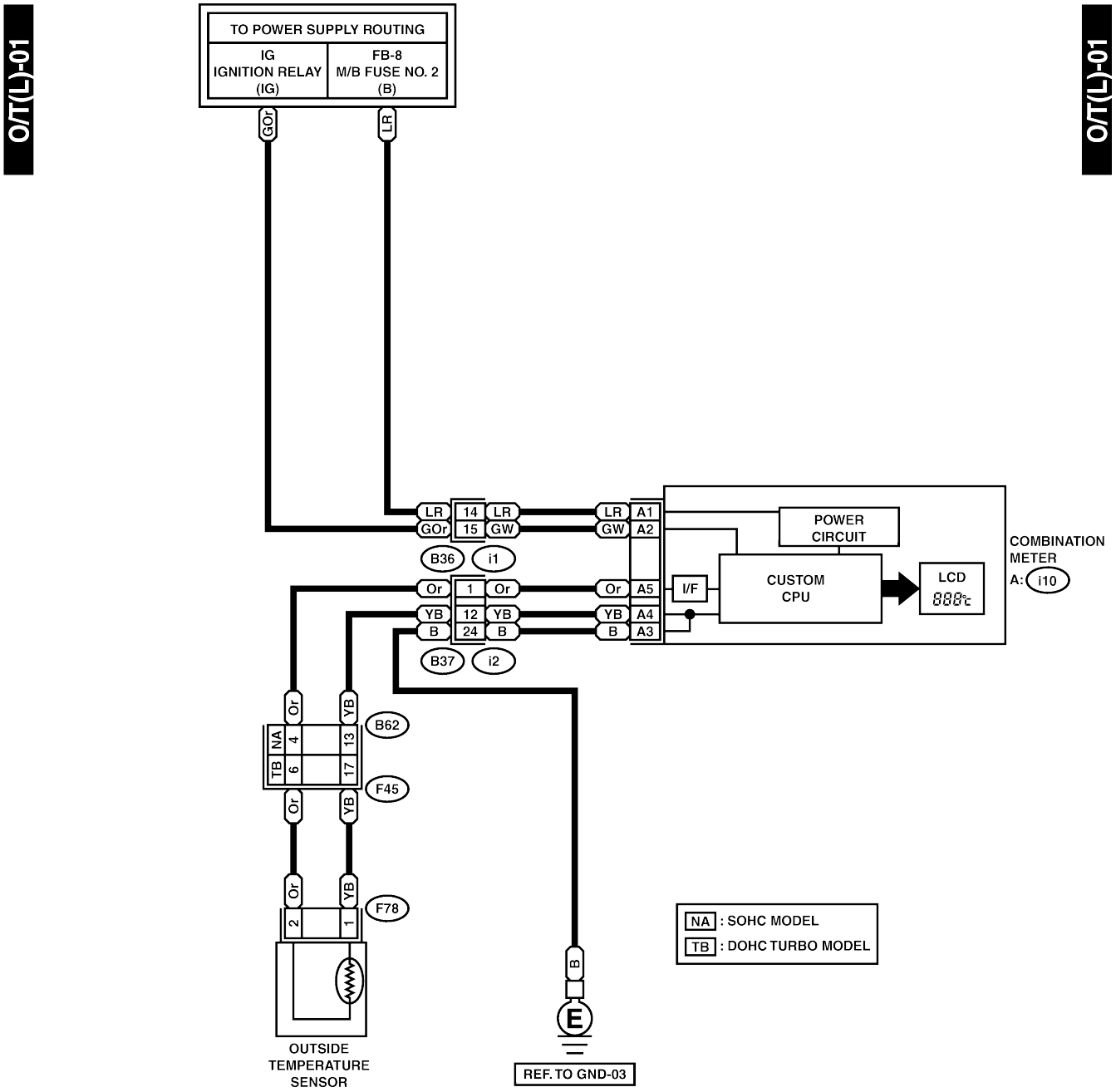


SR66-20

29. Outside Temperature Display System S903668

A: SCHEMATIC S903668A21

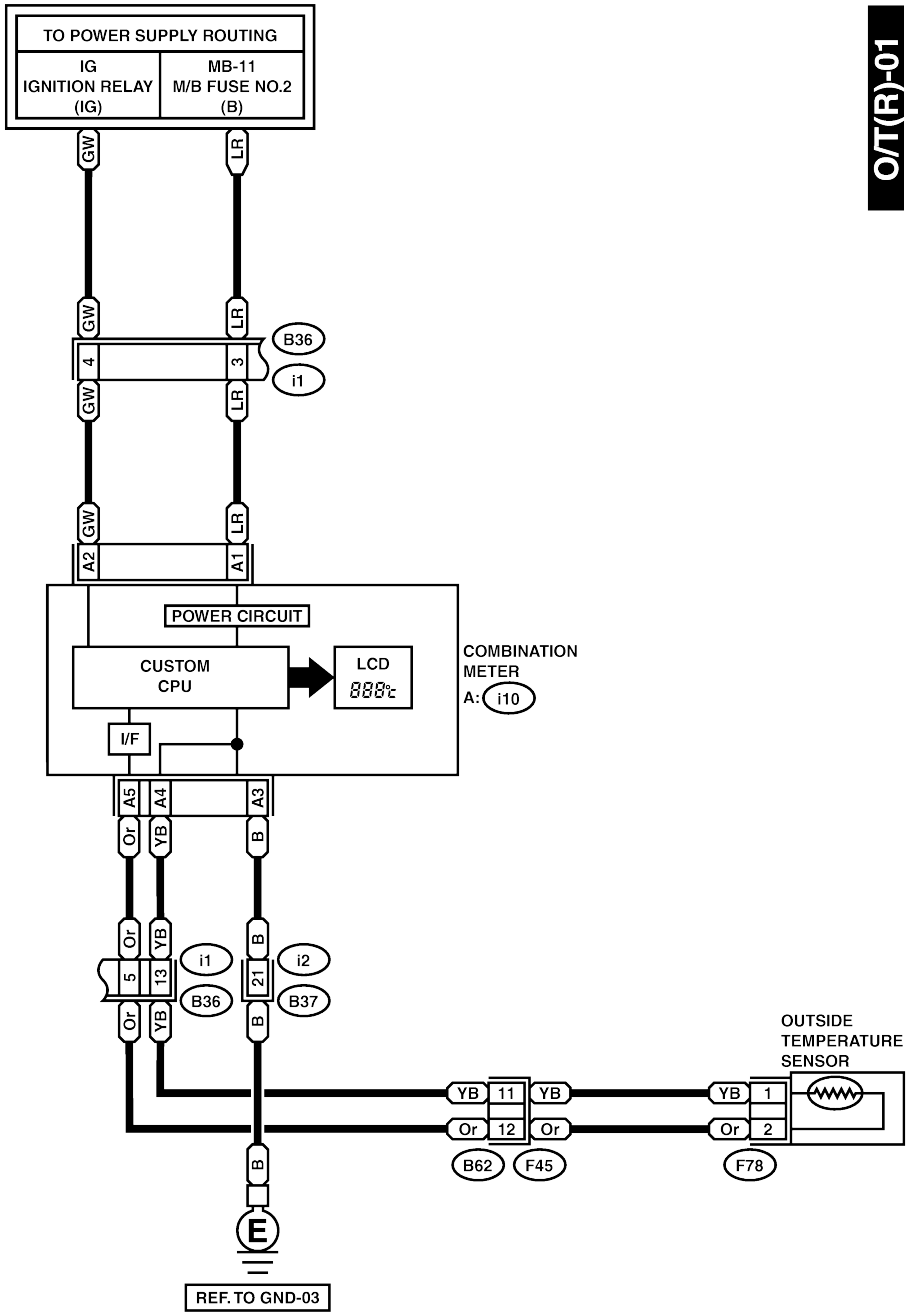
1. LHD MODEL S903668A2191

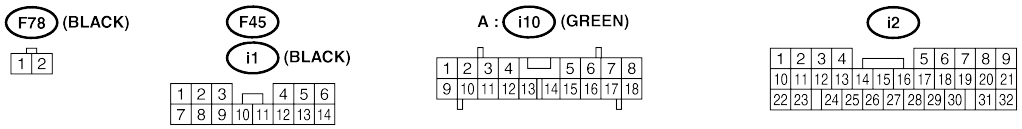


SL96-20

2. RHD MODEL S903668A2102

O/T(R)-01

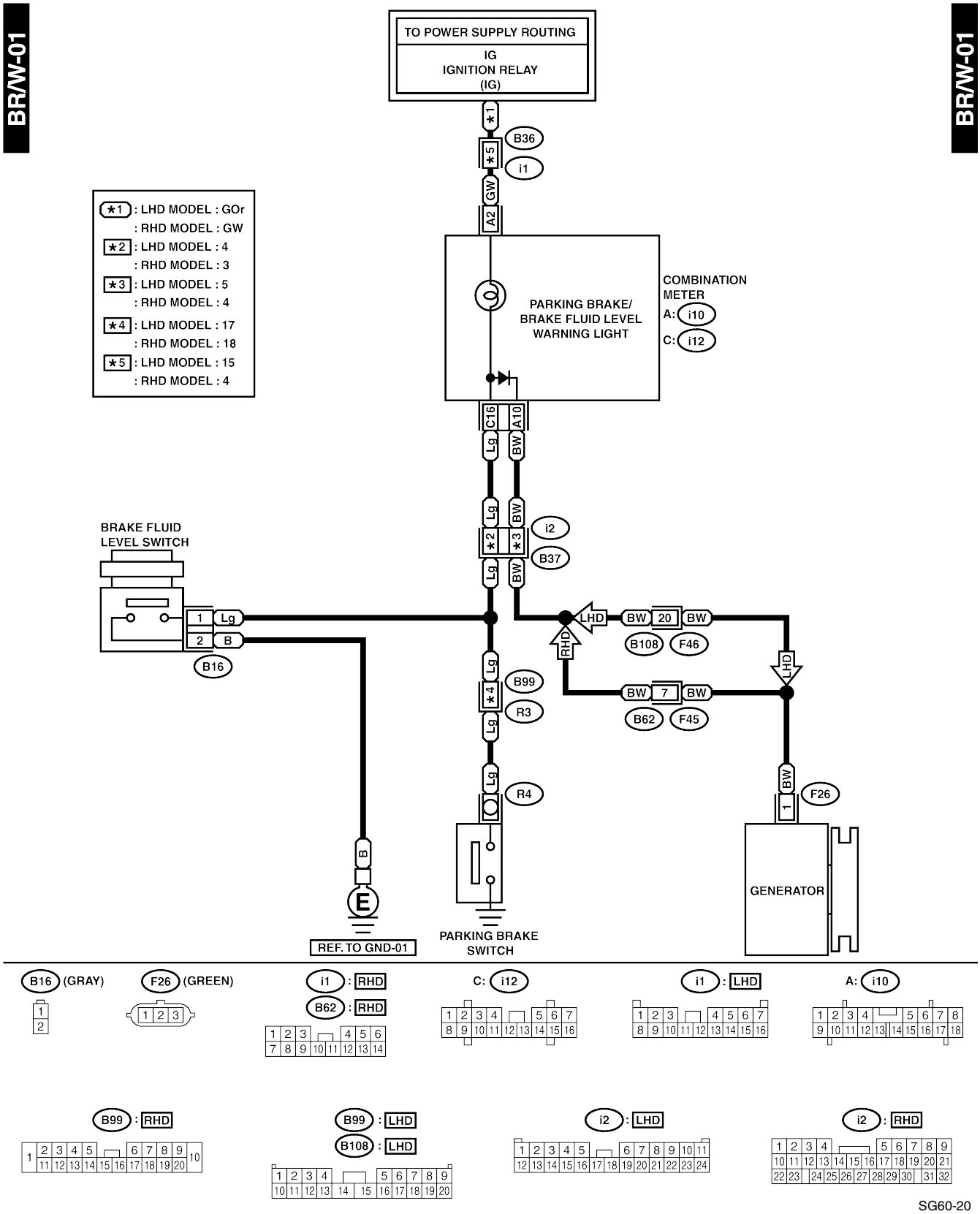




SR96-20

30. Parking Brake and Brake Fluid Level Warning System S903478

A: SCHEMATIC S903478A21



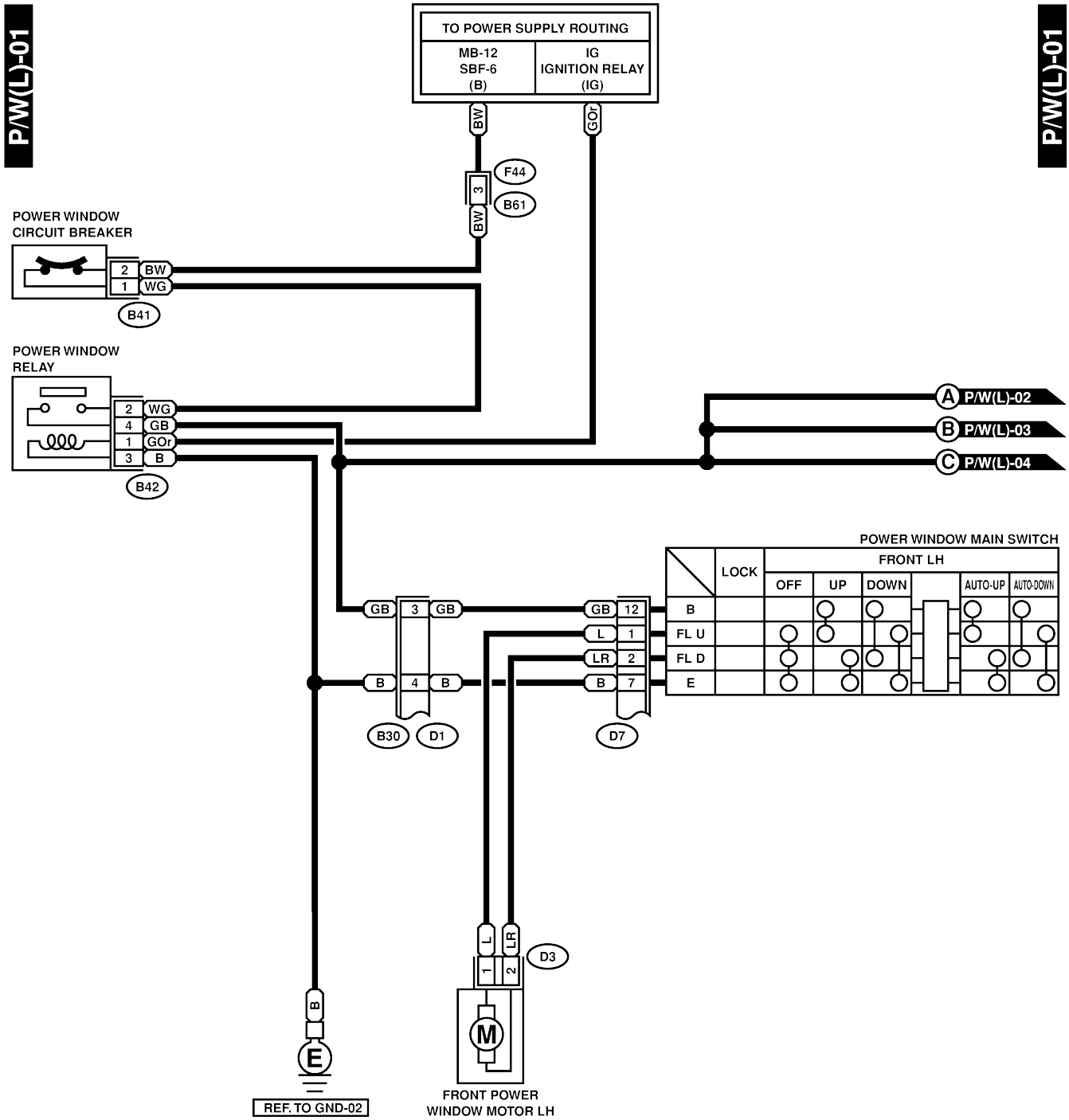
SG60-20

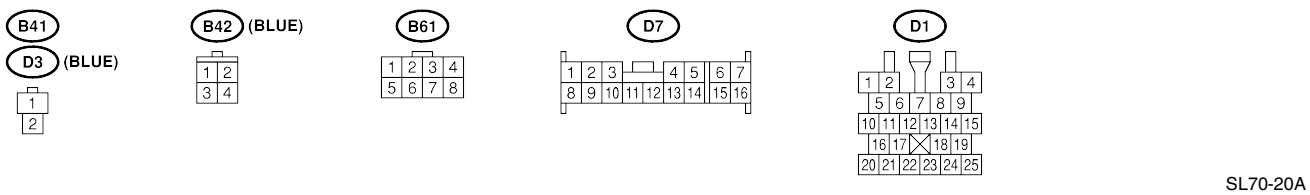
MEMO:

31. Power Window System S903456

A: SCHEMATIC S903456A21

1. LHD MODEL S903456A2101

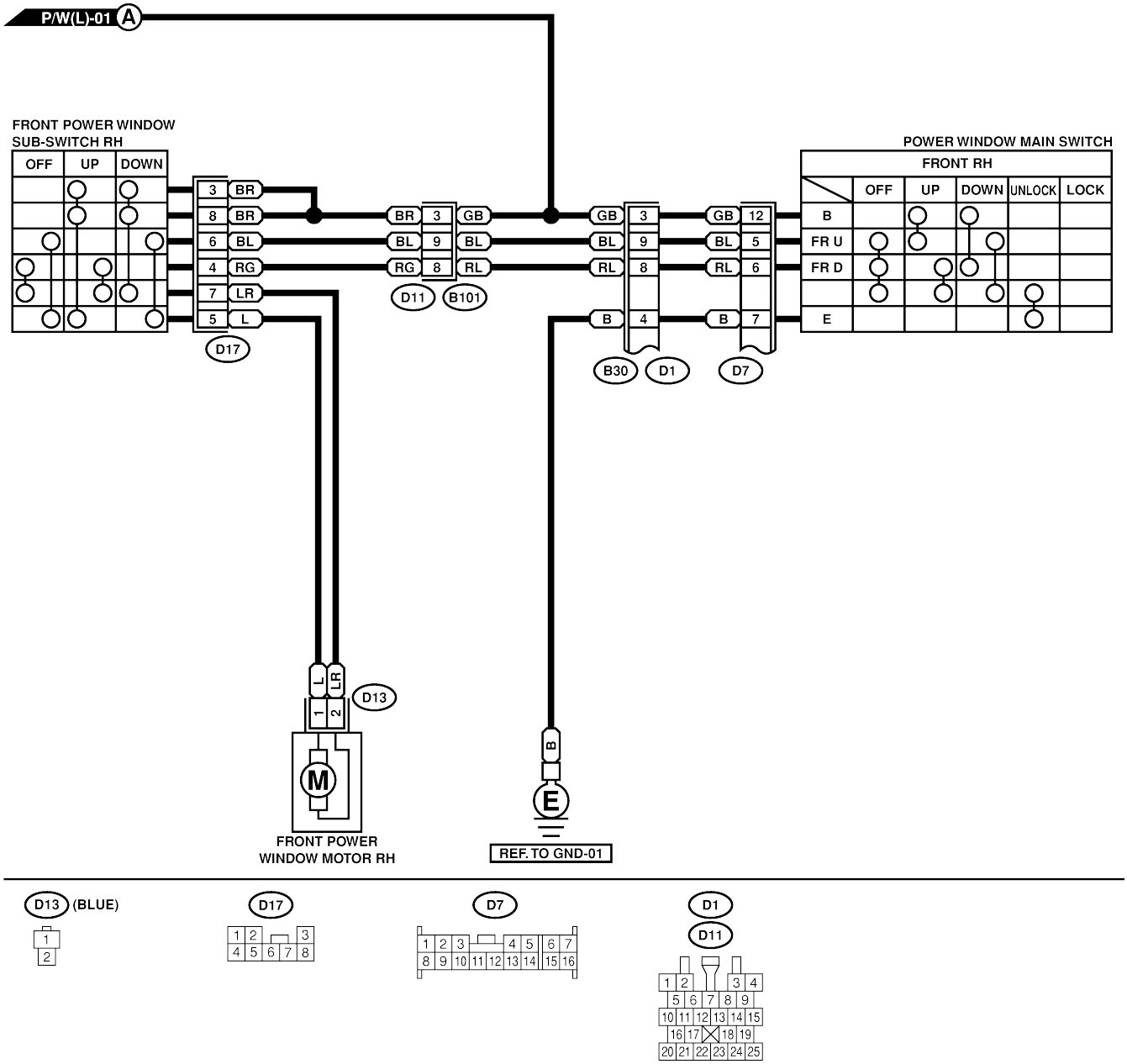




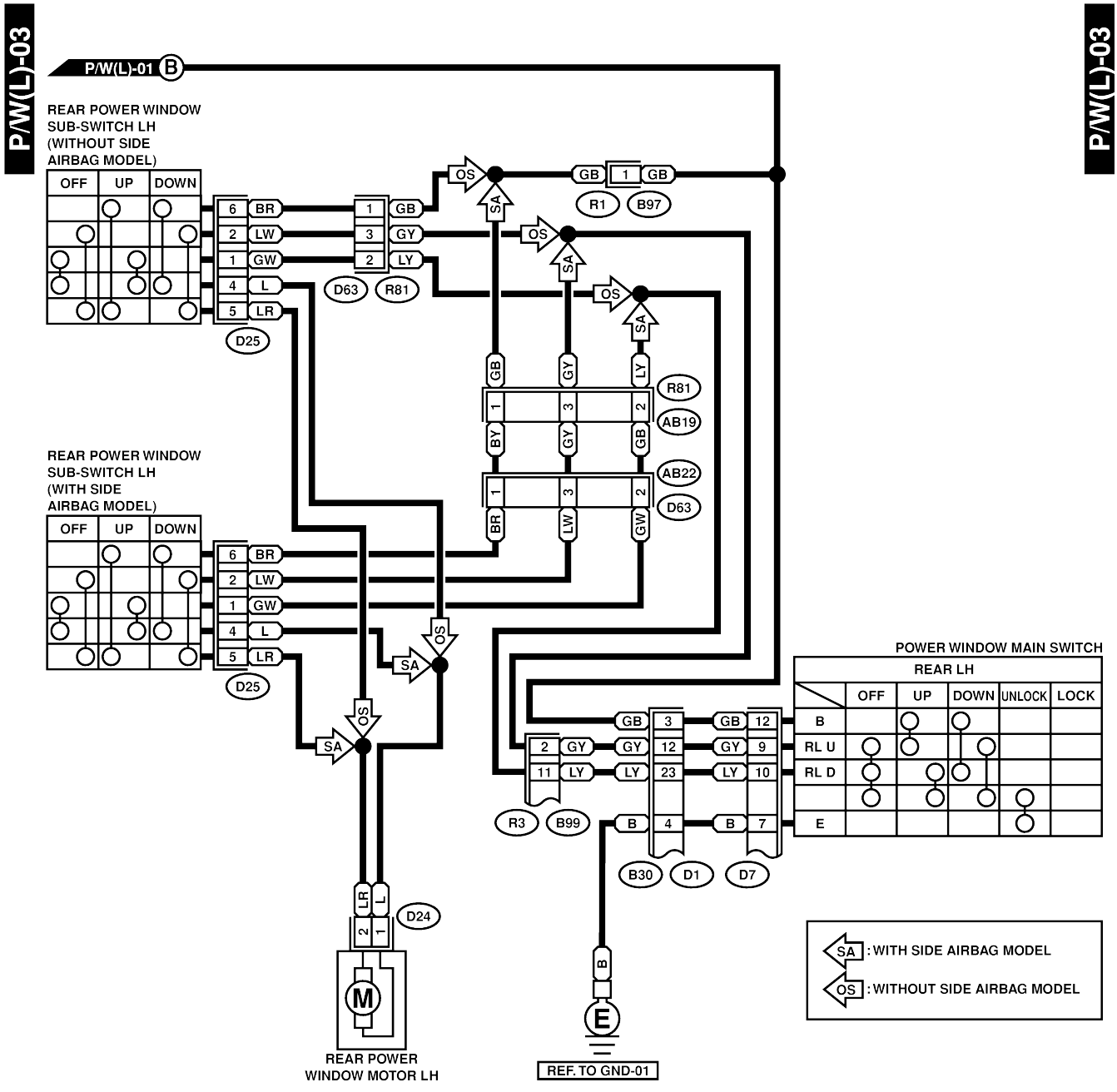
SL70-20A

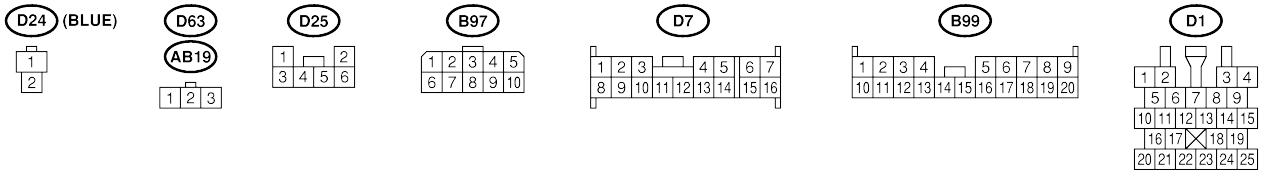
P/W(L)-02

P/W(L)-02

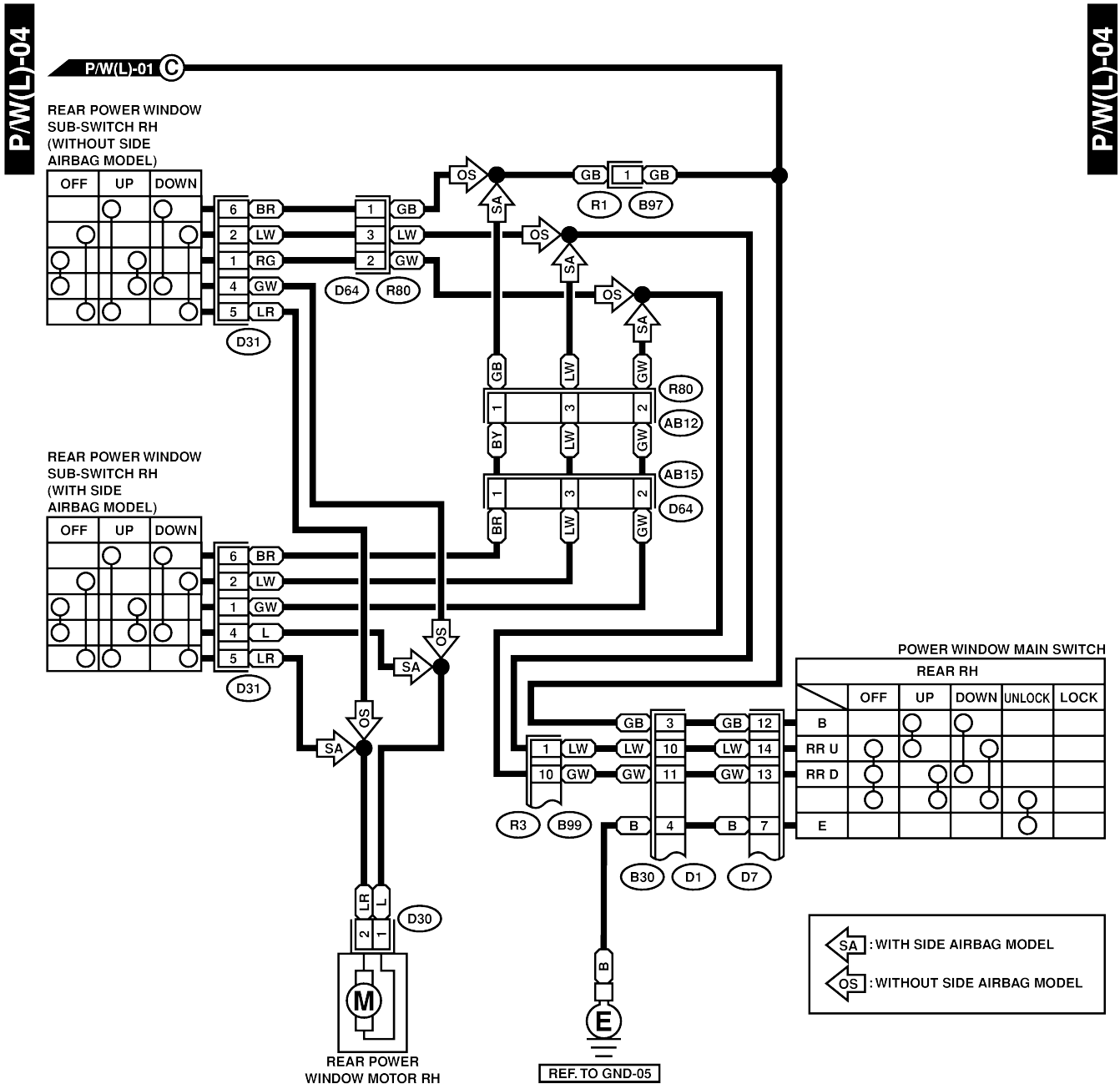


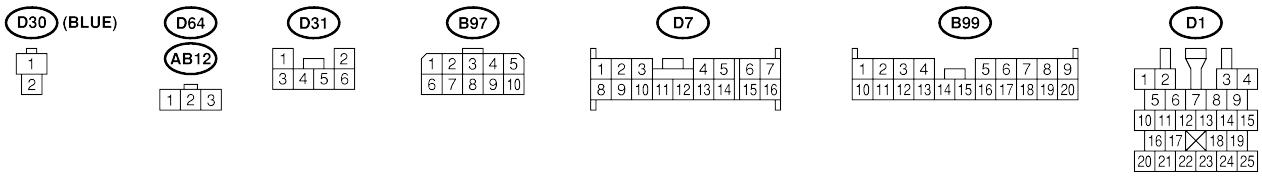
SL70-20B


P/W(L)-03
P/W(L)-03
P/W(L)-01 B
REAR POWER WINDOW SUB-SWITCH LH (WITHOUT SIDE AIRBAG MODEL)
OFF UP DOWN
6 BR
2 LW
1 GW
4 L
5 LR
D25
1 GB
3 GY
2 LY
D63 R81
OS SA
GB 1 GB
R1 B97
REAR POWER WINDOW SUB-SWITCH LH (WITH SIDE AIRBAG MODEL)
GB GY LY
1 3 2
R81
AB19
BY GY GB
AB22
D63
BR LW GW
POWER WINDOW MAIN SWITCH
REAR LH
OFF UP DOWN UNLOCK LOCK
B
RL U
RL D
E
GB 3 GB 12
2 GY GY 12 GY 9
11 LY LY 23 LY 10
R3 B99
B 4 B 7
B30 D1 D7
LR L
2 1
D24
M
REAR POWER WINDOW MOTOR LH
B
E
REF. TO GND-01
SA : WITH SIDE AIRBAG MODEL
OS : WITHOUT SIDE AIRBAG MODEL


D24 (BLUE)
D63
AB19
D25
B97
D7
B99
D1

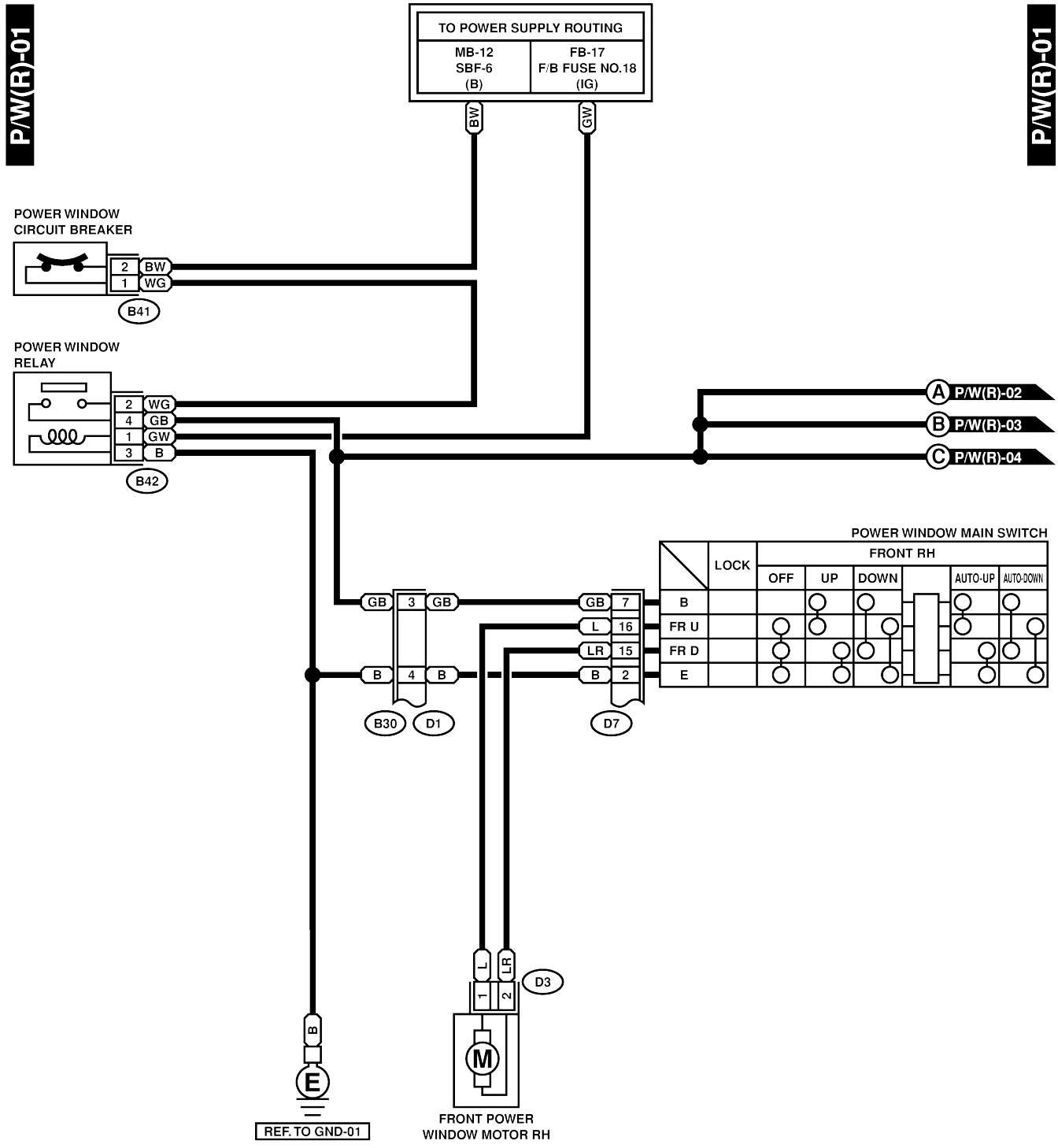
SL70-20C

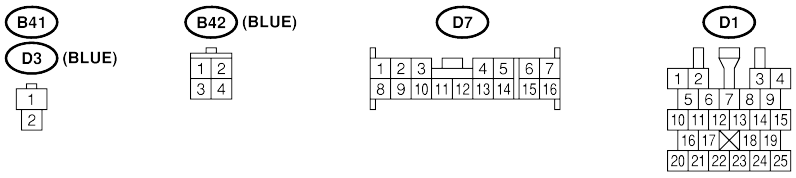

P/W(L)-04
P/W(L)-04
P/W(L)-01 C
REAR POWER WINDOW SUB-SWITCH RH (WITHOUT SIDE AIRBAG MODEL)
OFF UP DOWN
6 BR
2 LW
1 RG
4 GW
5 LR
D31
1 GB
3 LW
2 GW
D64 R80
OS SA
GB 1 GB
R1 B97
REAR POWER WINDOW SUB-SWITCH RH (WITH SIDE AIRBAG MODEL)
OFF UP DOWN
6 BR
2 LW
1 GW
4 L
5 LR
D31
GB LW GW
1 3 2
R80
AB12
BY LW GW
AB15
D64
BR LW GW
POWER WINDOW MAIN SWITCH
REAR RH
OFF UP DOWN UNLOCK LOCK
B
RR U
RR D
E
1 LW
10 GW
GB 3 GB 12
LW 10 LW 14
GW 11 GW 13
R3 B99
B 4 B 7
B30 D1 D7
LR L
2 1
D30
M
REAR POWER WINDOW MOTOR RH
B
E
REF. TO GND-05
SA : WITH SIDE AIRBAG MODEL
OS : WITHOUT SIDE AIRBAG MODEL


D30 (BLUE)
D64
AB12
D31
B97
D7
B99
D1

SL70-20D

2. RHD MODEL S903456A2102

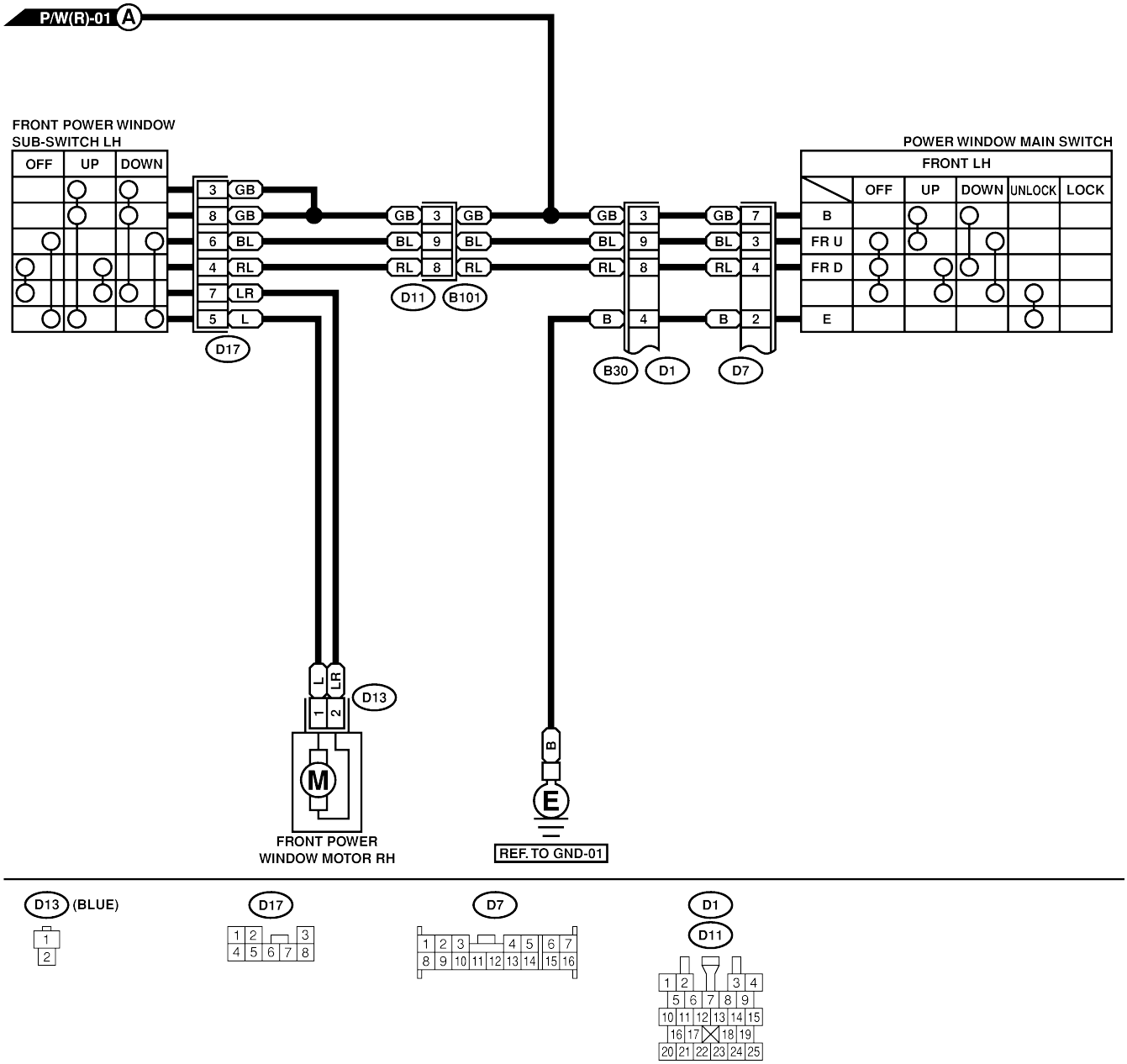




SR70-20A

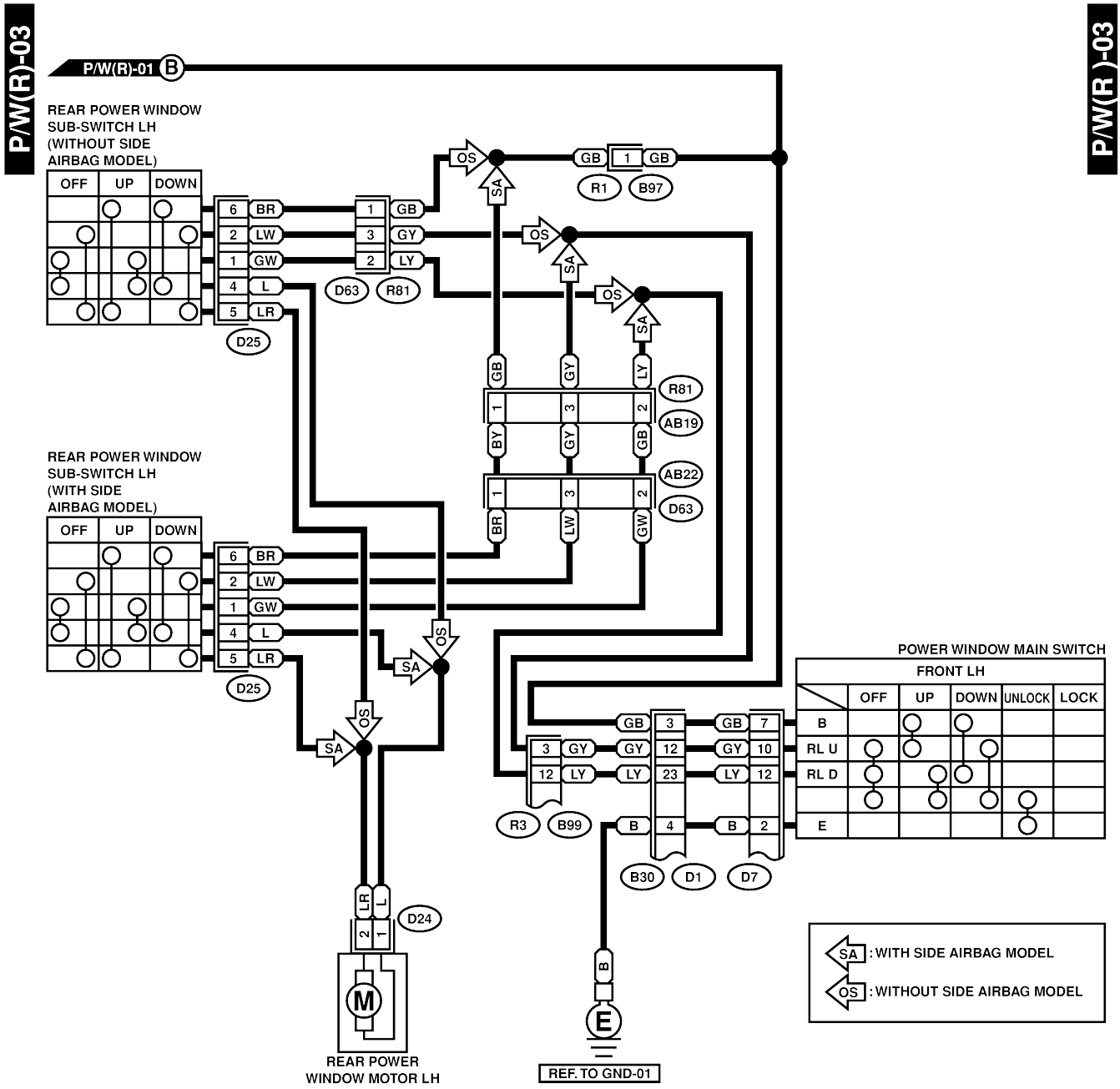
P/W(R)-02

P/W(R)-02

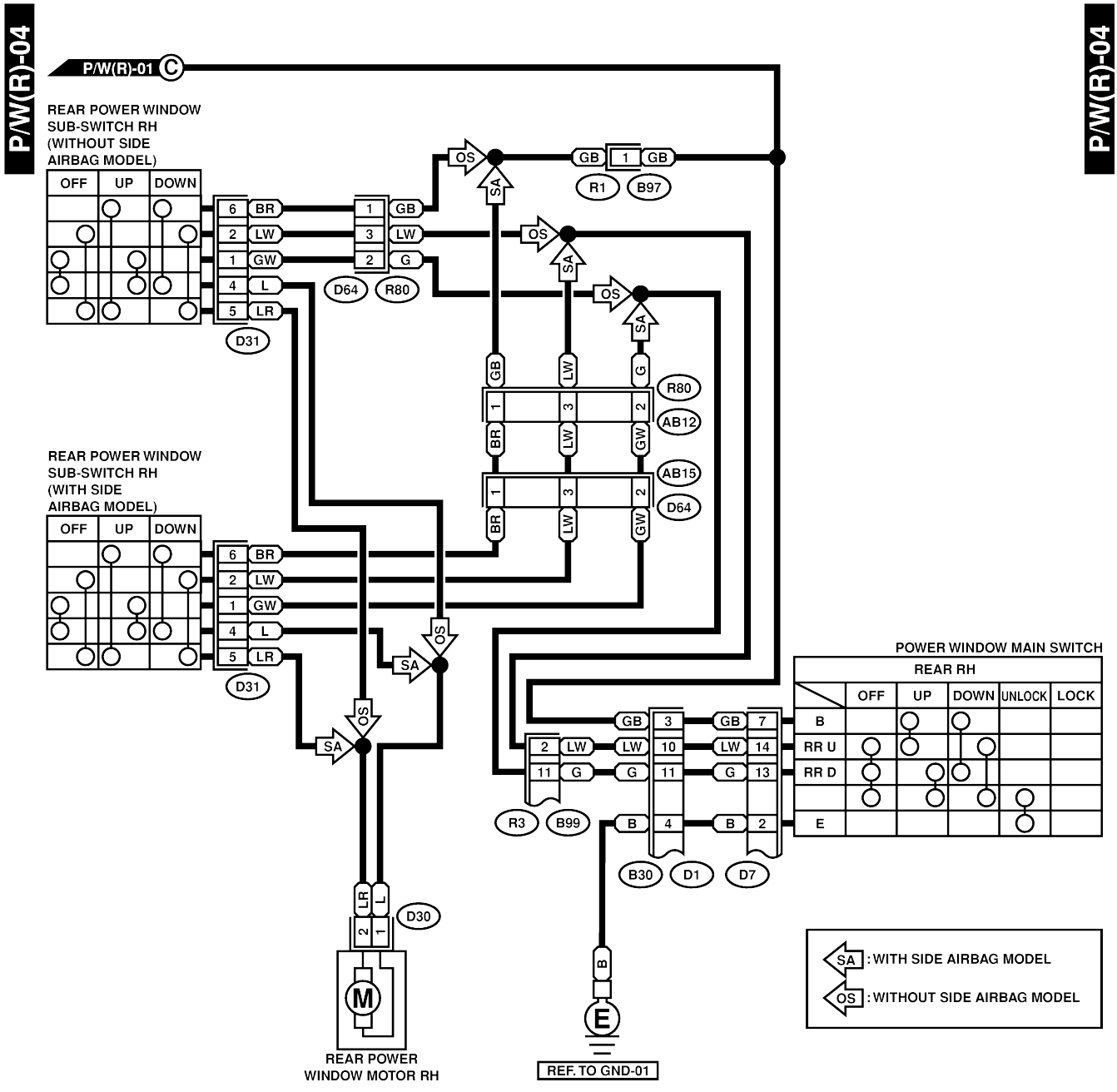


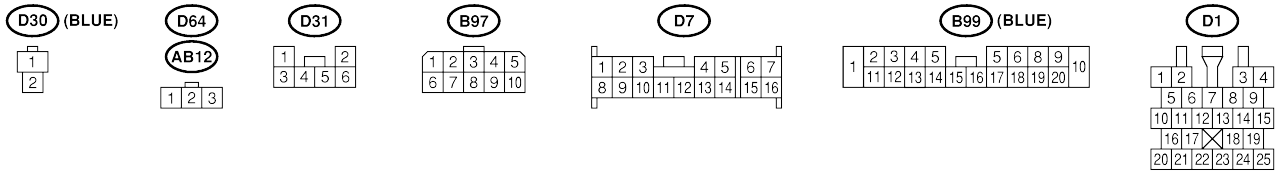
SR70-20B

POWER WINDOW SYSTEM



SR70-20C

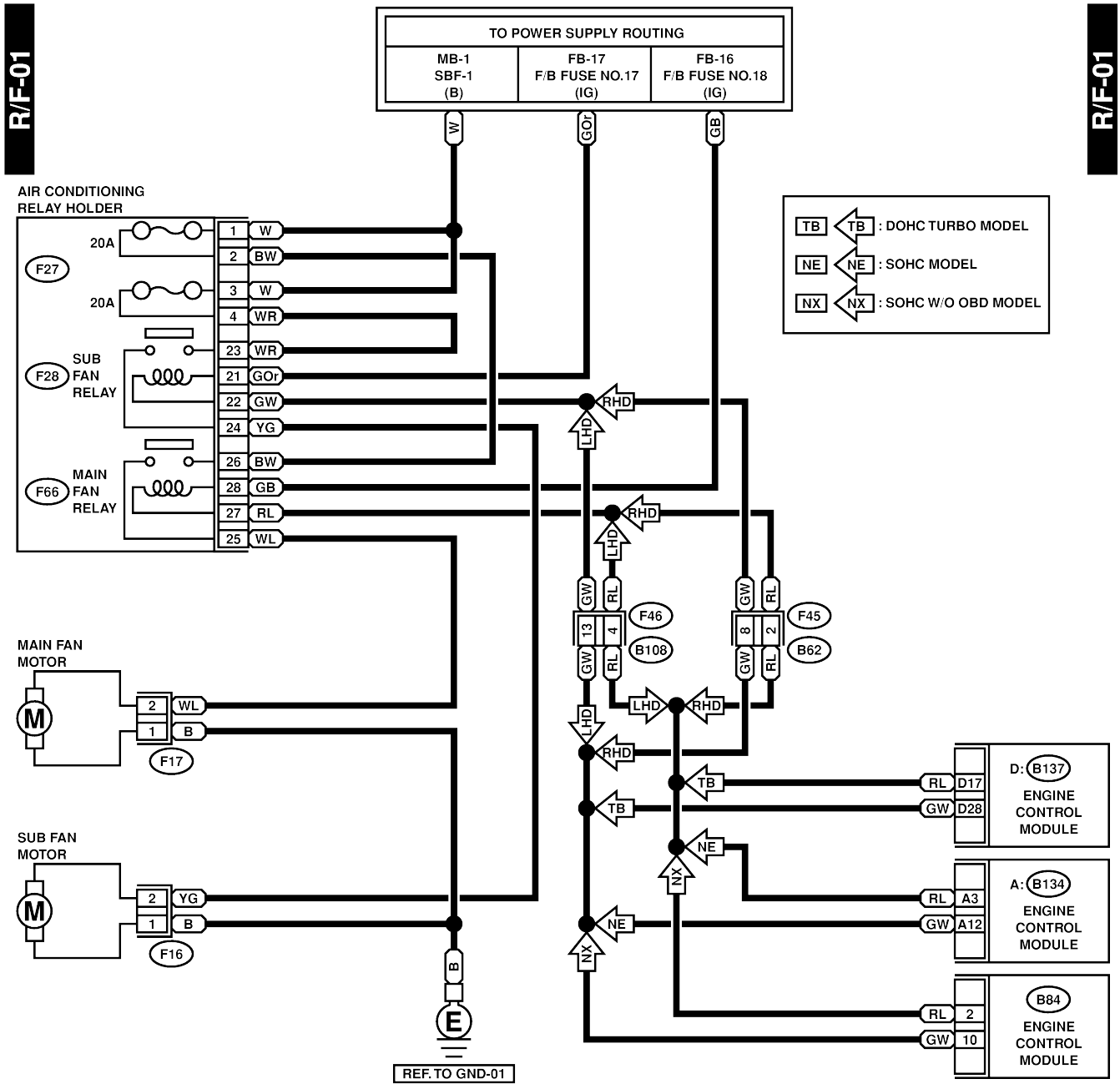

P/W(R)-04
P/W(R)-04
P/W(R)-01 C
REAR POWER WINDOW SUB-SWITCH RH (WITHOUT SIDE AIRBAG MODEL)
OFF UP DOWN
6 BR
2 LW
1 GW
4 L
5 LR
D31
1 GB
3 LW
2 G
D64 R80
OS SA
GB 1 GB
R1 B97
R80
AB12
AB15
D64
REAR POWER WINDOW SUB-SWITCH RH (WITH SIDE AIRBAG MODEL)
POWER WINDOW MAIN SWITCH
REAR RH
OFF UP DOWN UNLOCK LOCK
B
RR U
RR D
E
GB 3 GB 7
2 LW LW 10 LW 14
11 G G 11 G 13
B 4 B 2
R3 B99
B30 D1 D7
LR L
2 1
D30
M
REAR POWER WINDOW MOTOR RH
B
E
REF. TO GND-01
SA : WITH SIDE AIRBAG MODEL
OS : WITHOUT SIDE AIRBAG MODEL


D30 (BLUE)
D64
AB12
D31
B97
D7
B99 (BLUE)
D1

SR70-20D

32. Radiator Fan System S903480

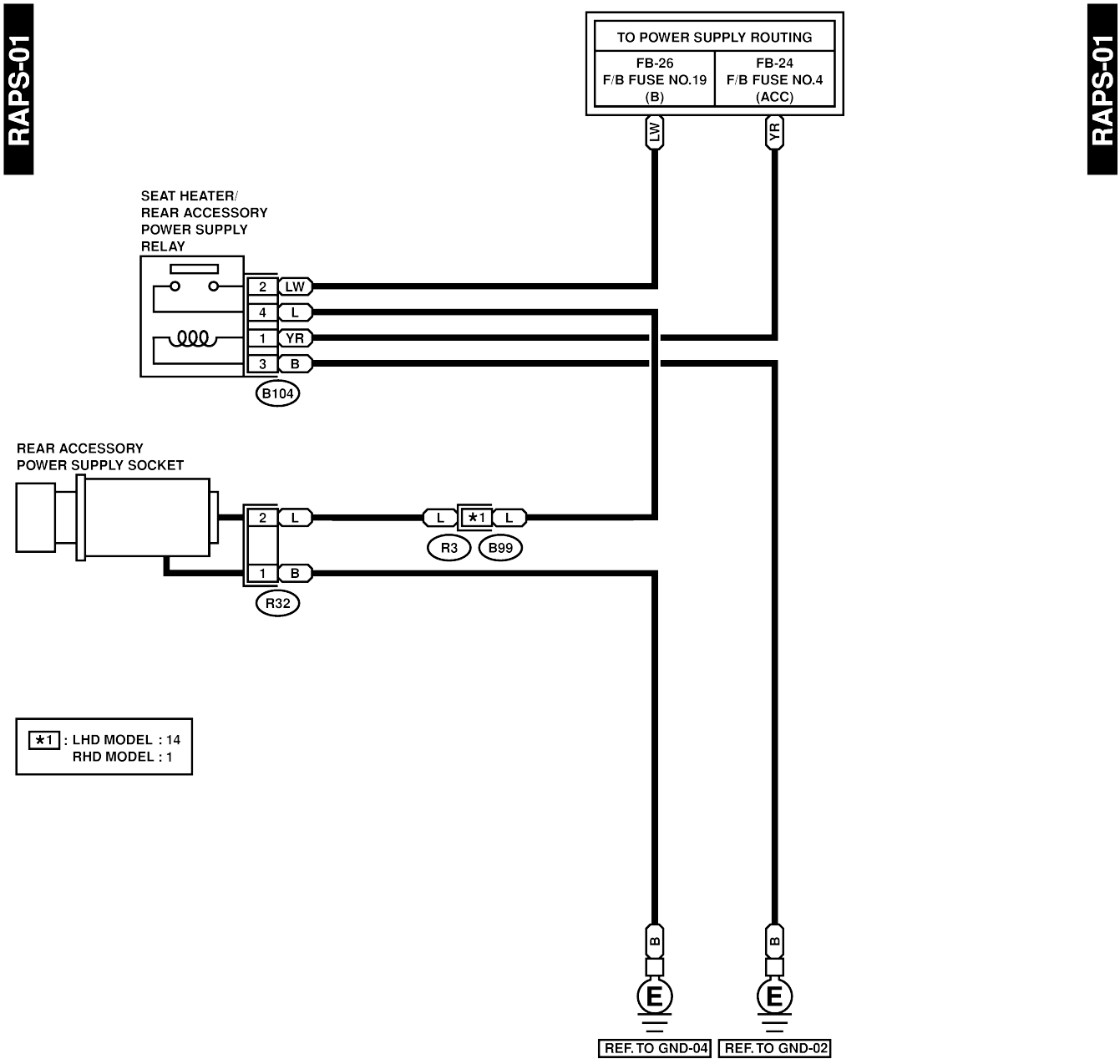
A: SCHEMATIC S903480A21

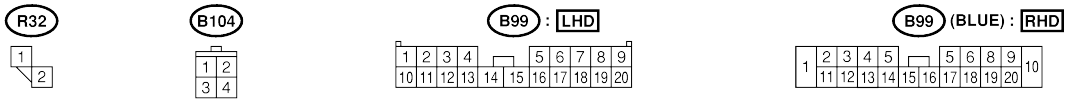


SG14-20

33. Rear Accessory Power Supply System S903670

A: SCHEMATIC S903670A21

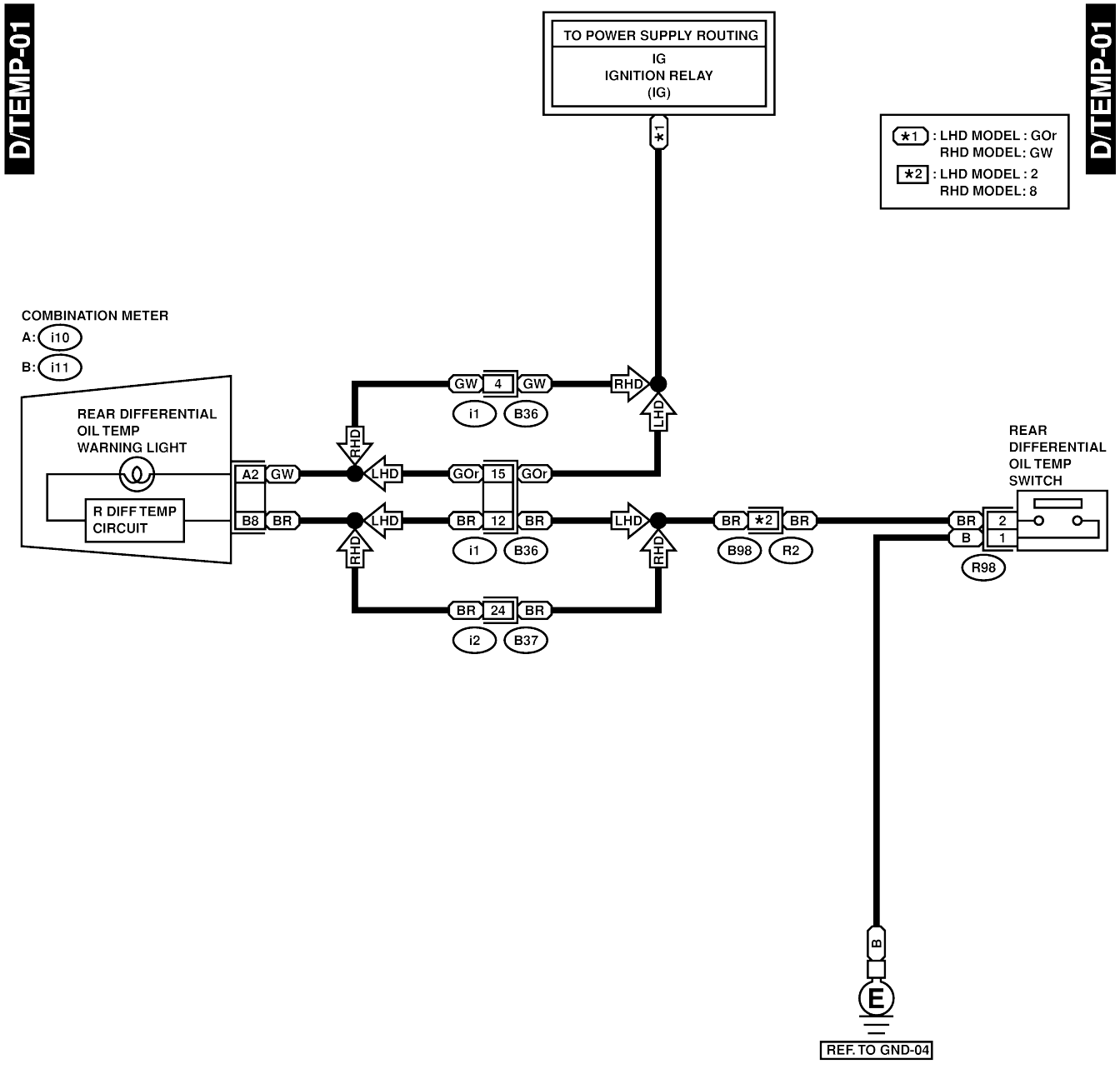


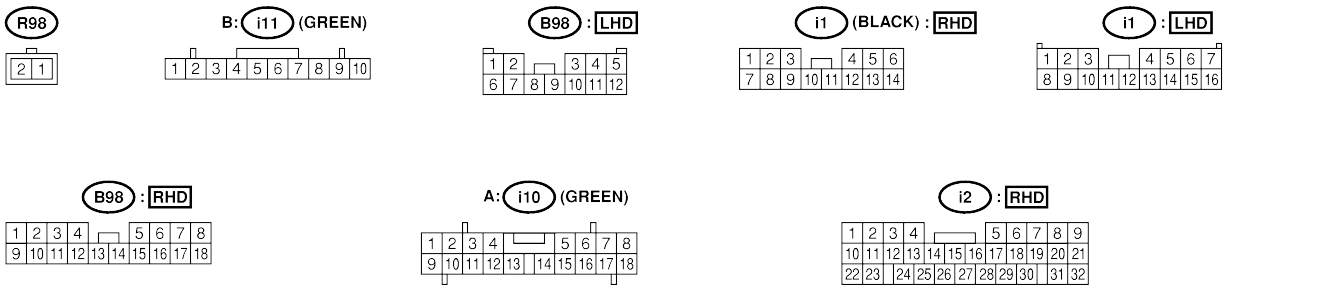


SG90-20

34. Rear Differential Oil Temperature Warning System S903747

A: SCHEMATIC S903747A21





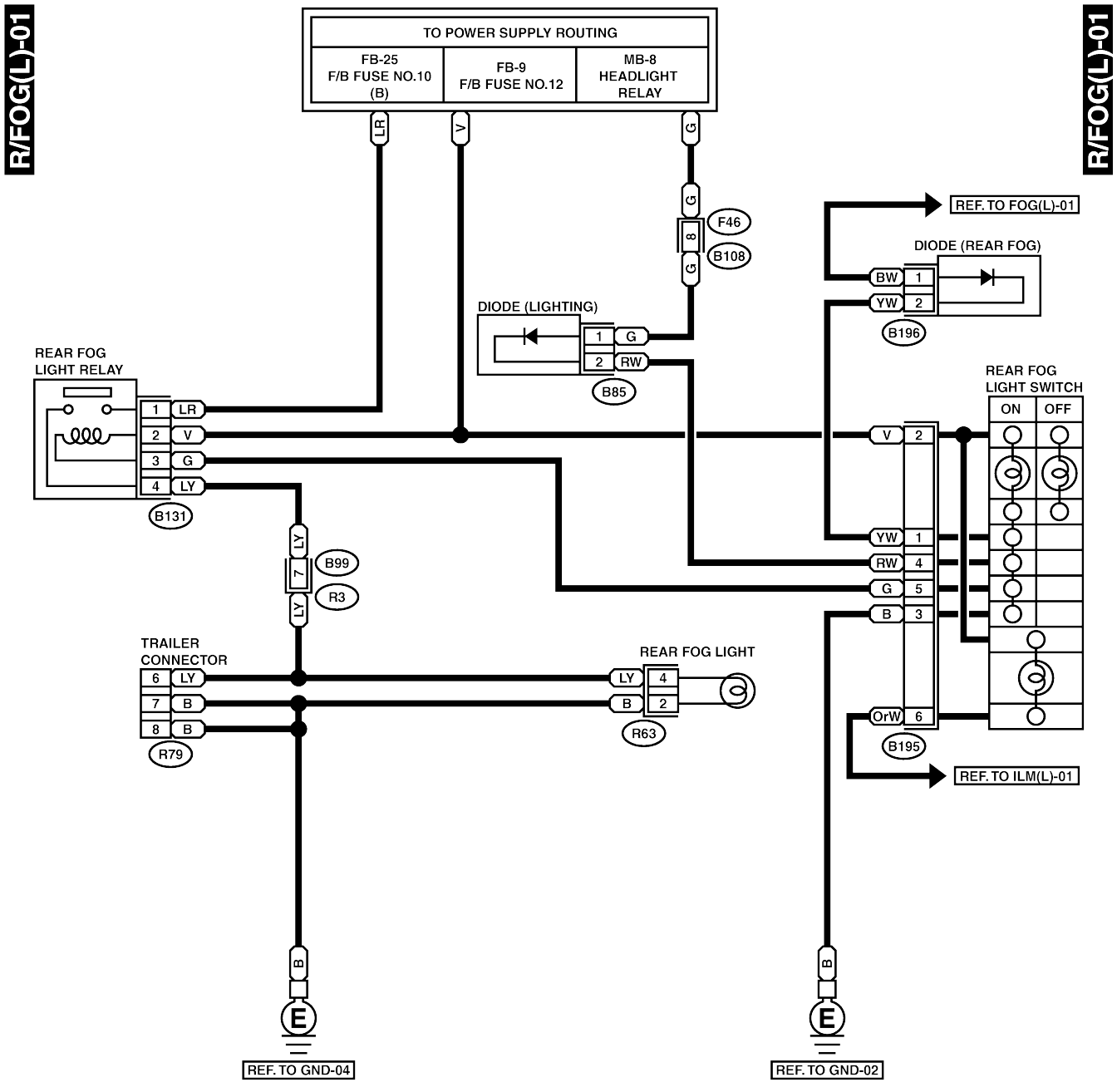
SG94-20

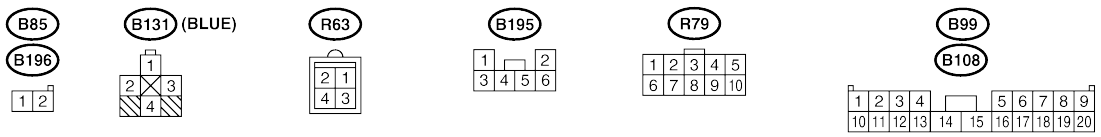
MEMO:

35. Rear Fog Light System S903476

A: SCHEMATIC S903476A21

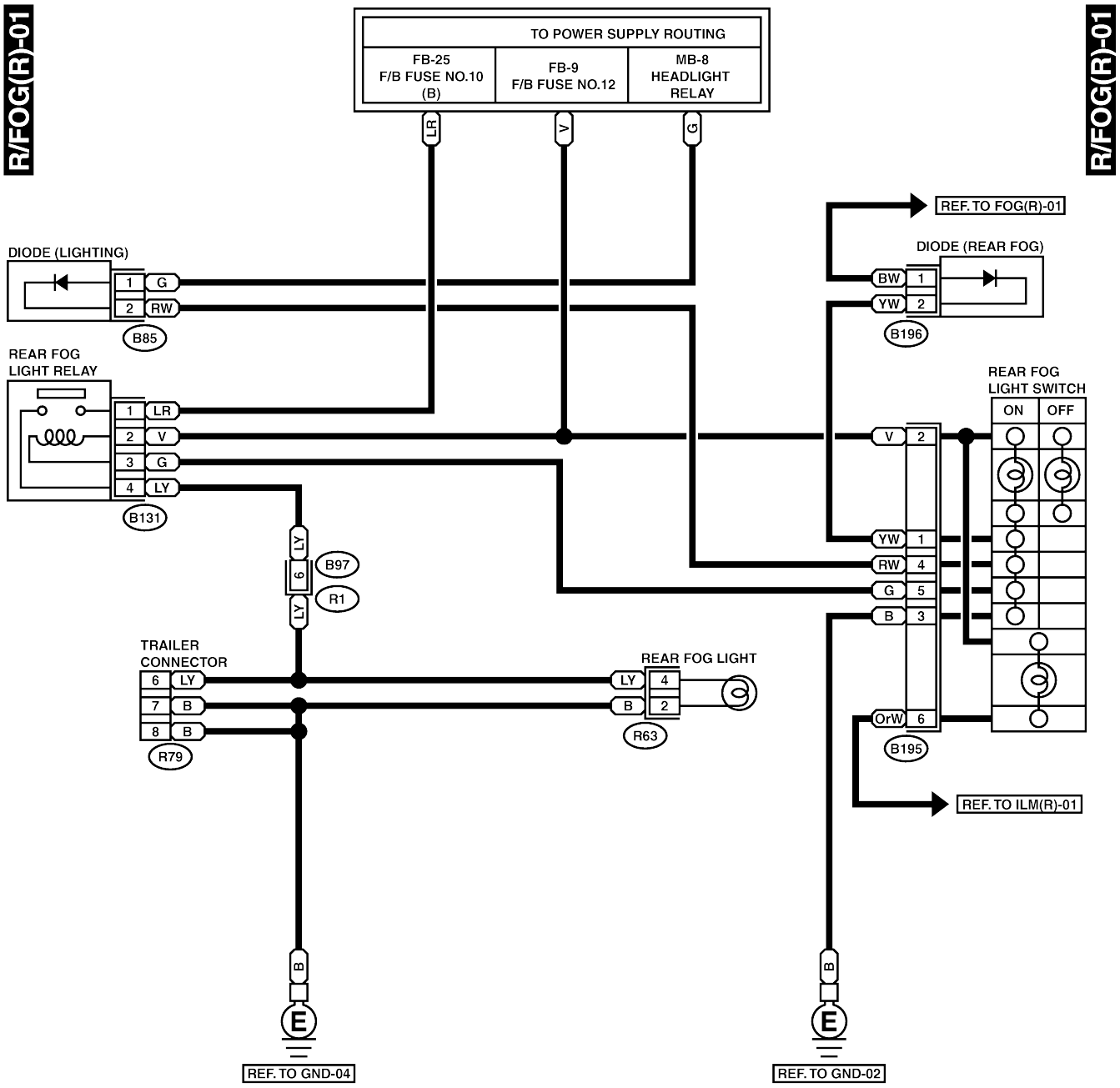
1. LHD MODEL S903476A2101

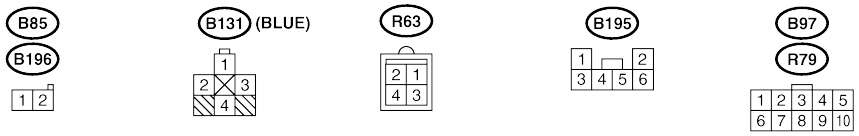




SL30-20

2. RHD MODEL S903476A2102

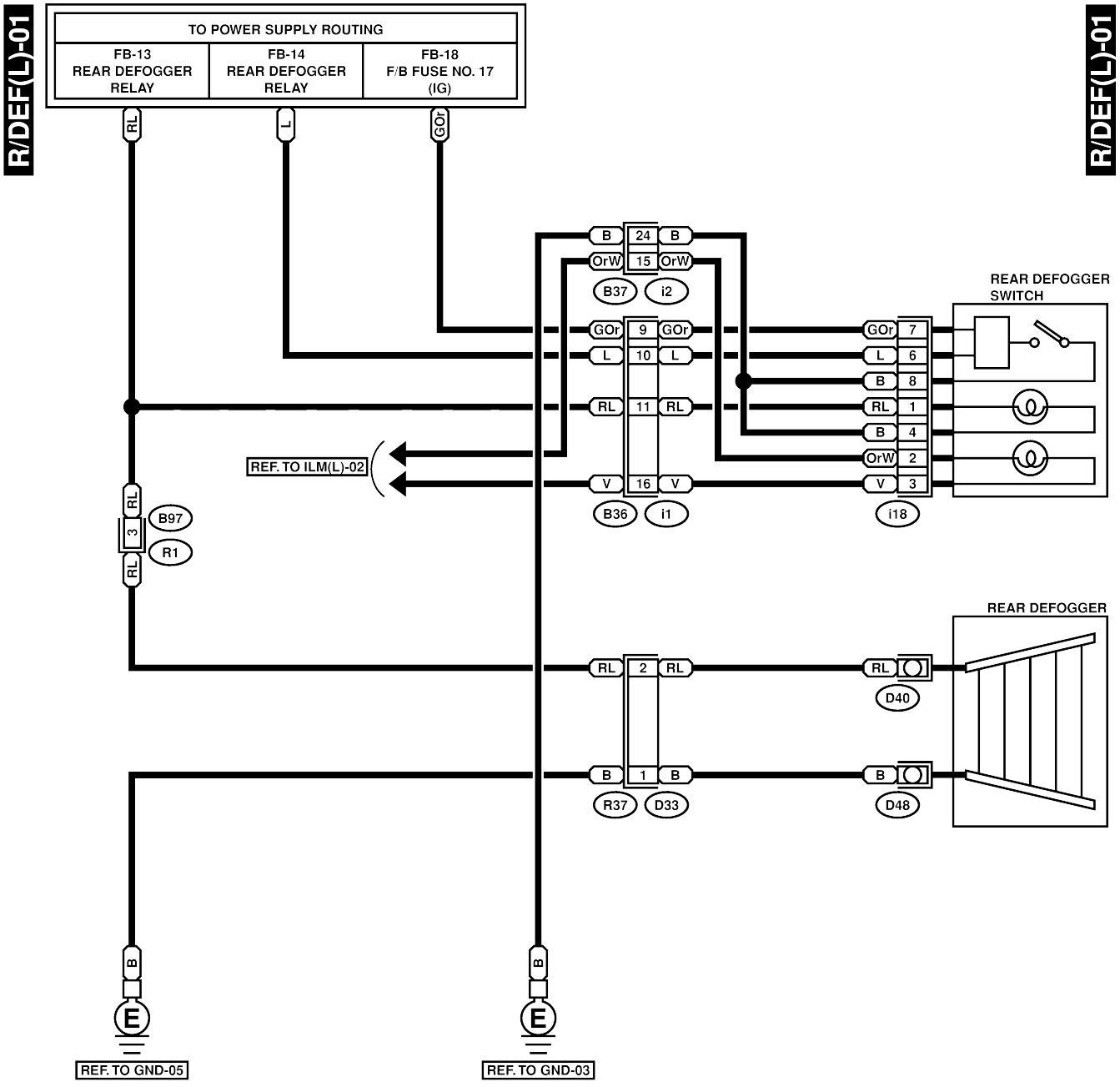


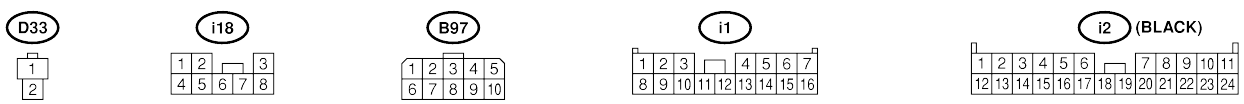


36. Rear Window Defogger System S903455

A: SCHEMATIC S903455A21

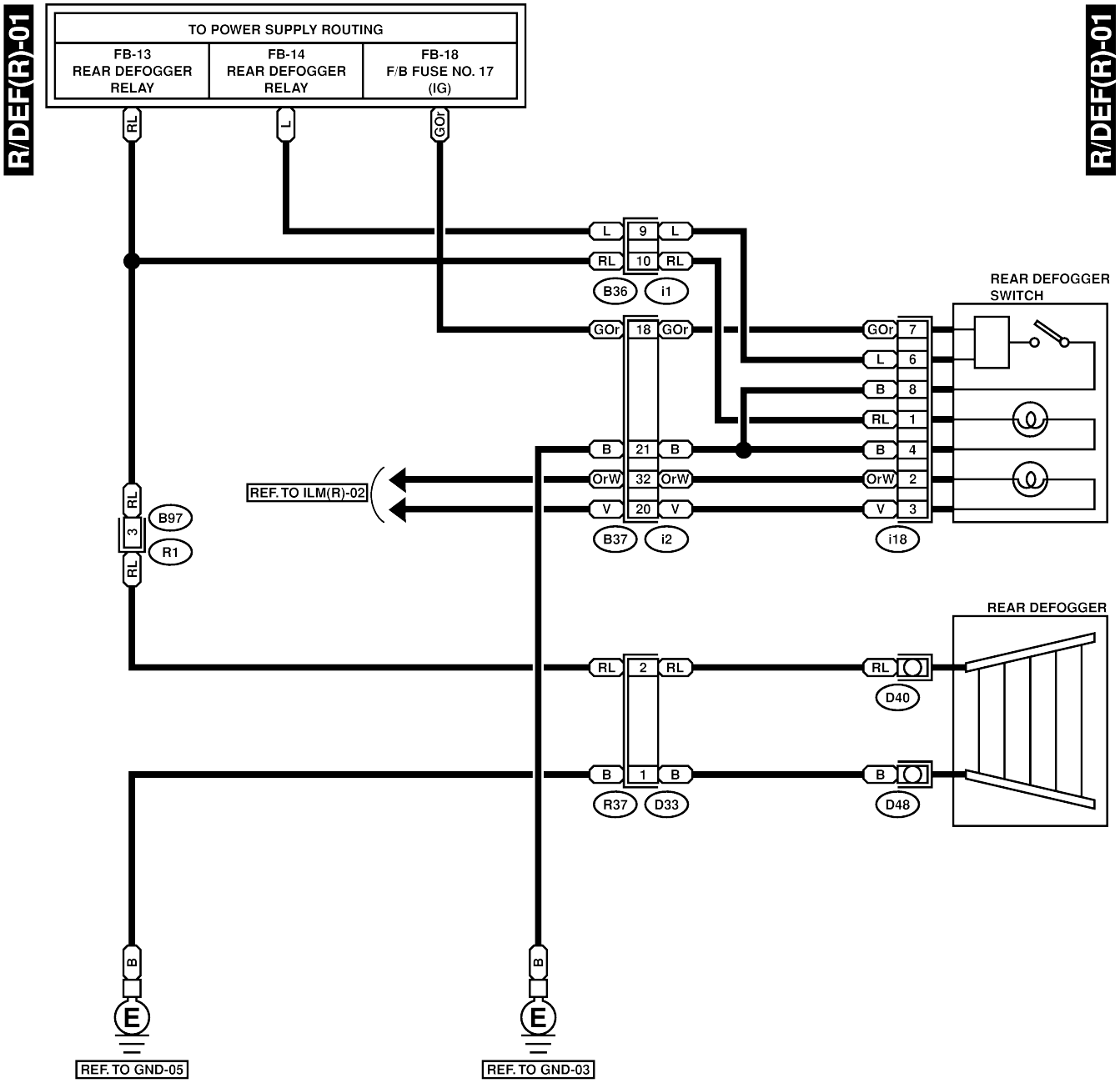
1. LHD MODEL S903455A2101

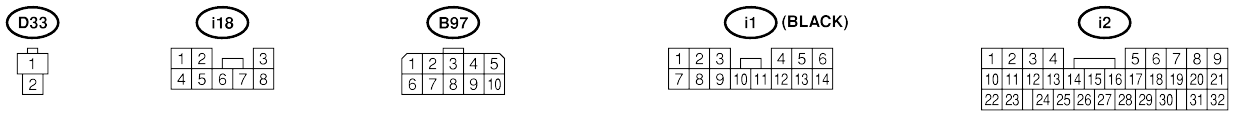




SL52-20

2. RHD MODEL S903455A2102

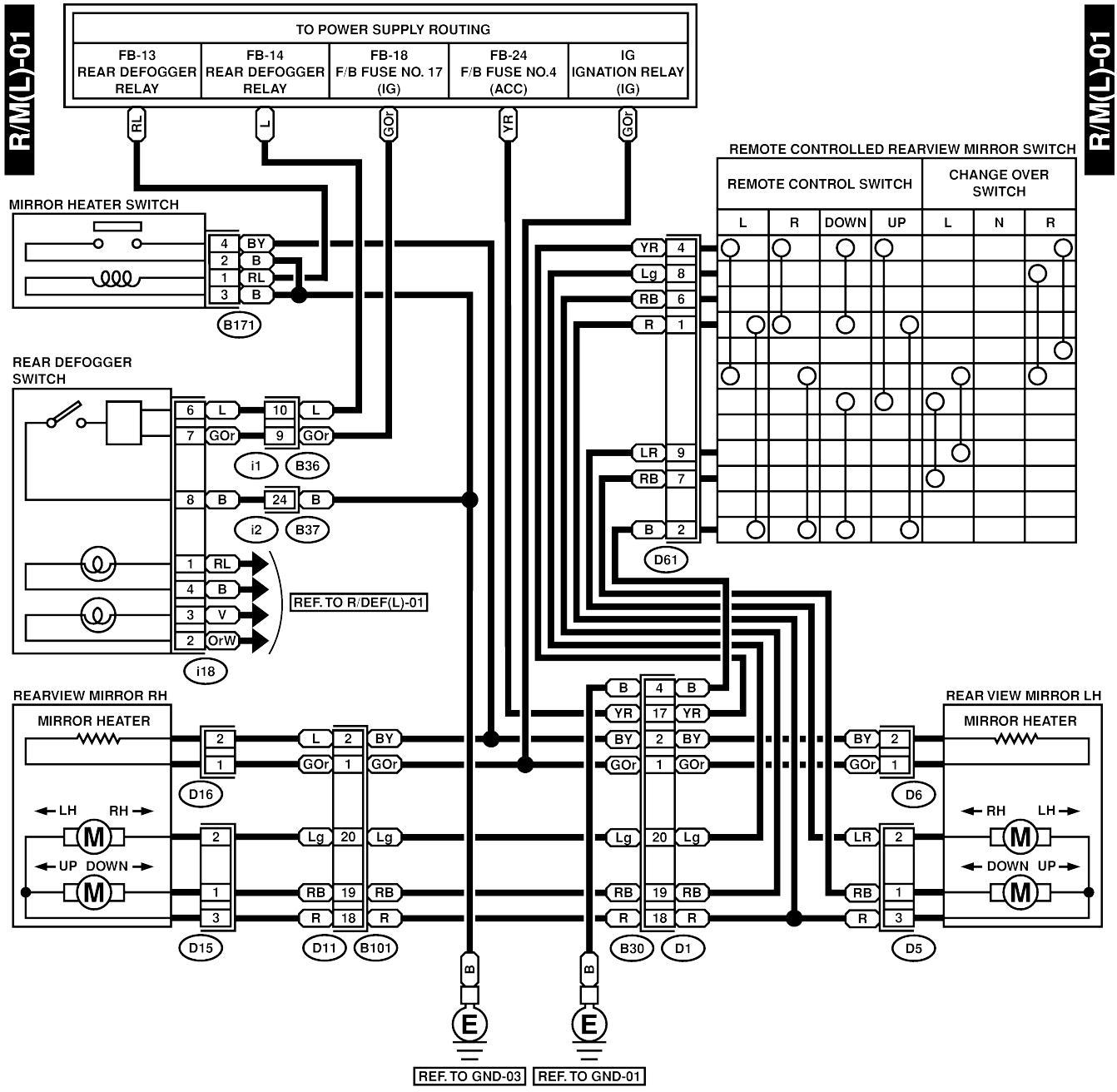


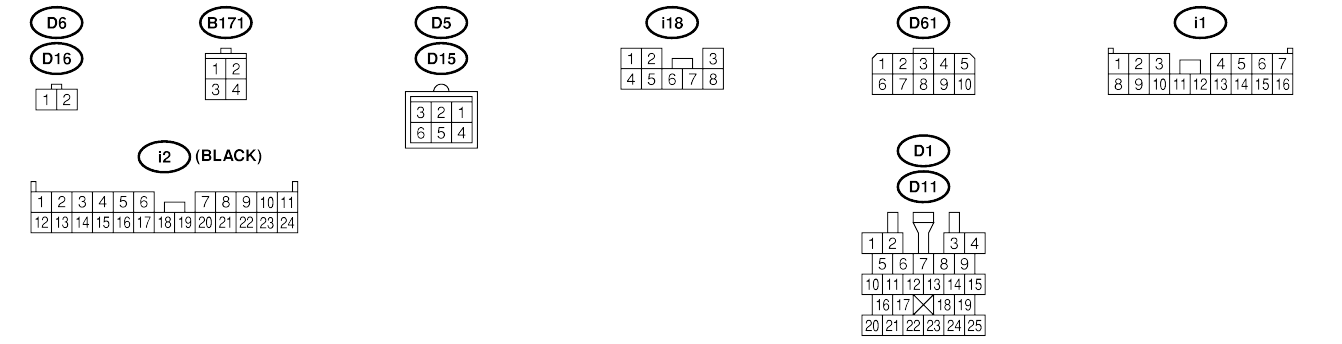


37. Remote Controlled Rearview Mirror System S903459

A: SCHEMATIC S903459A21

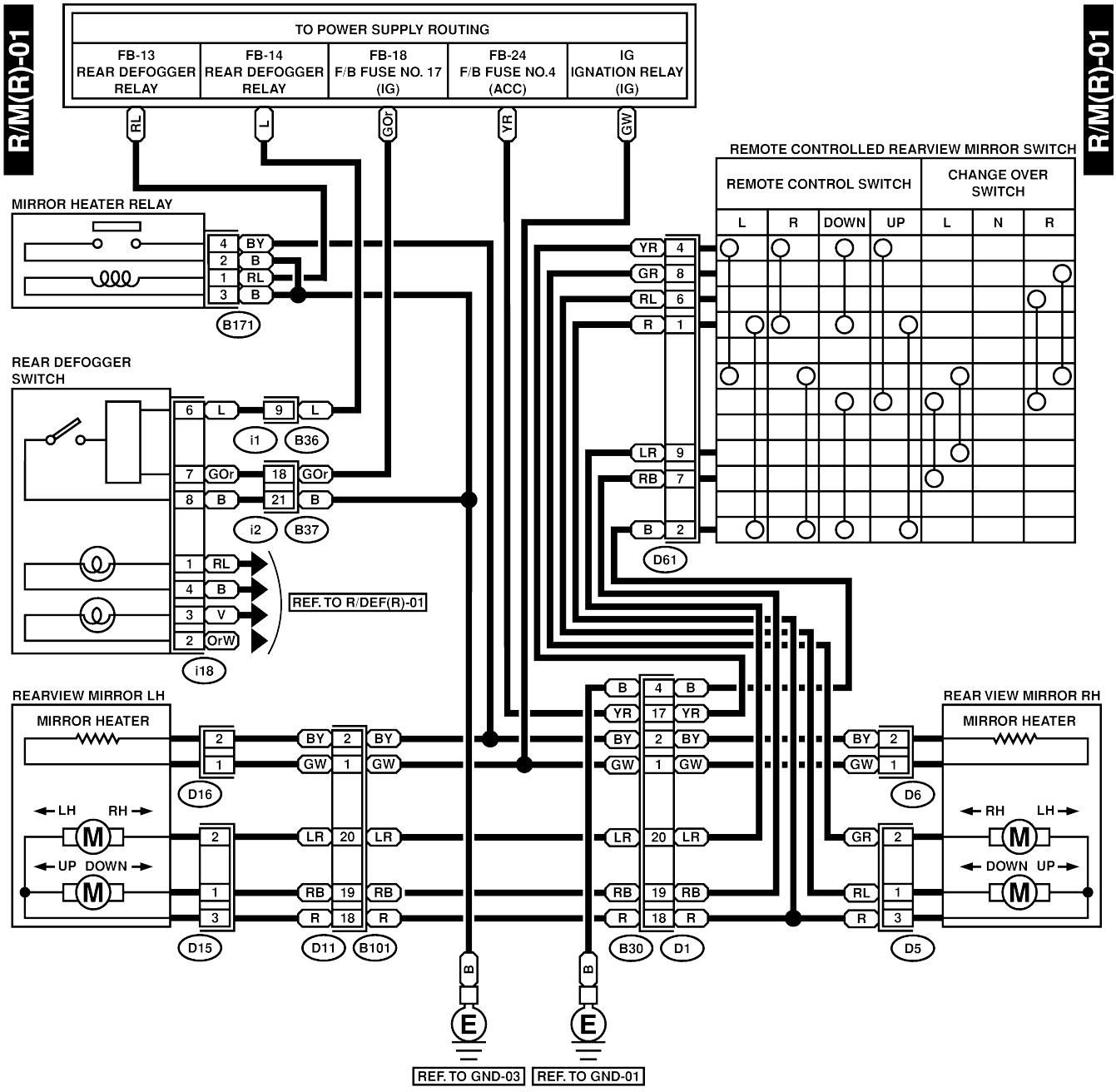
1. LHD MODEL S903459A2101

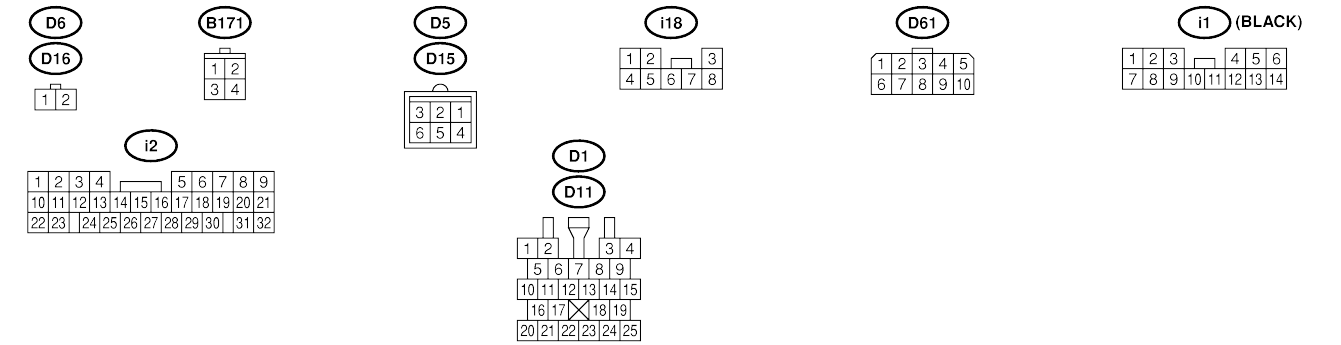




SL79-20

2. RHD MODEL S903459A2102





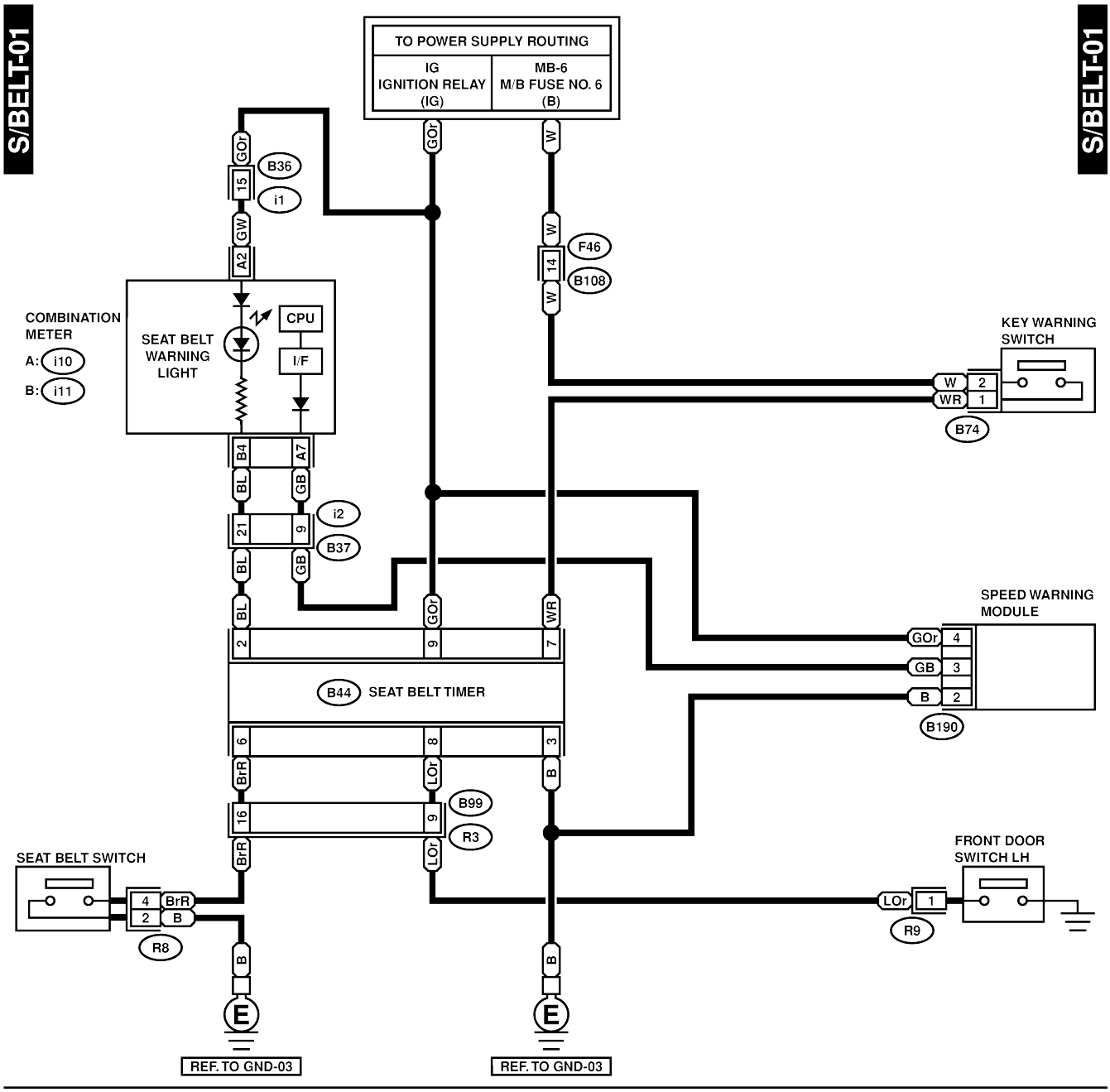
SR79-20

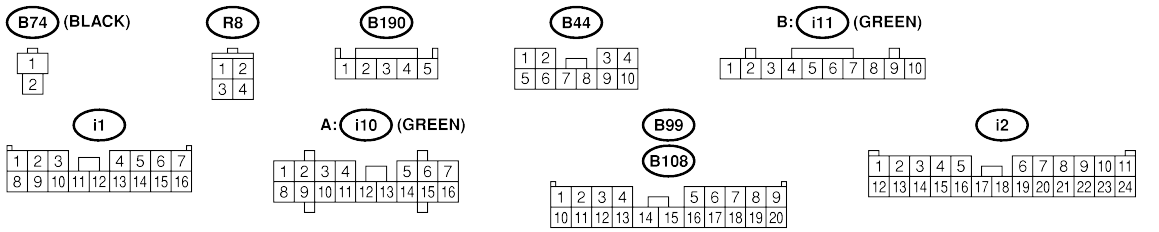
MEMO:

38. Seat Belt Warning System S903483

A: SCHEMATIC S903483A21

1. LHD MODEL S903483A2101

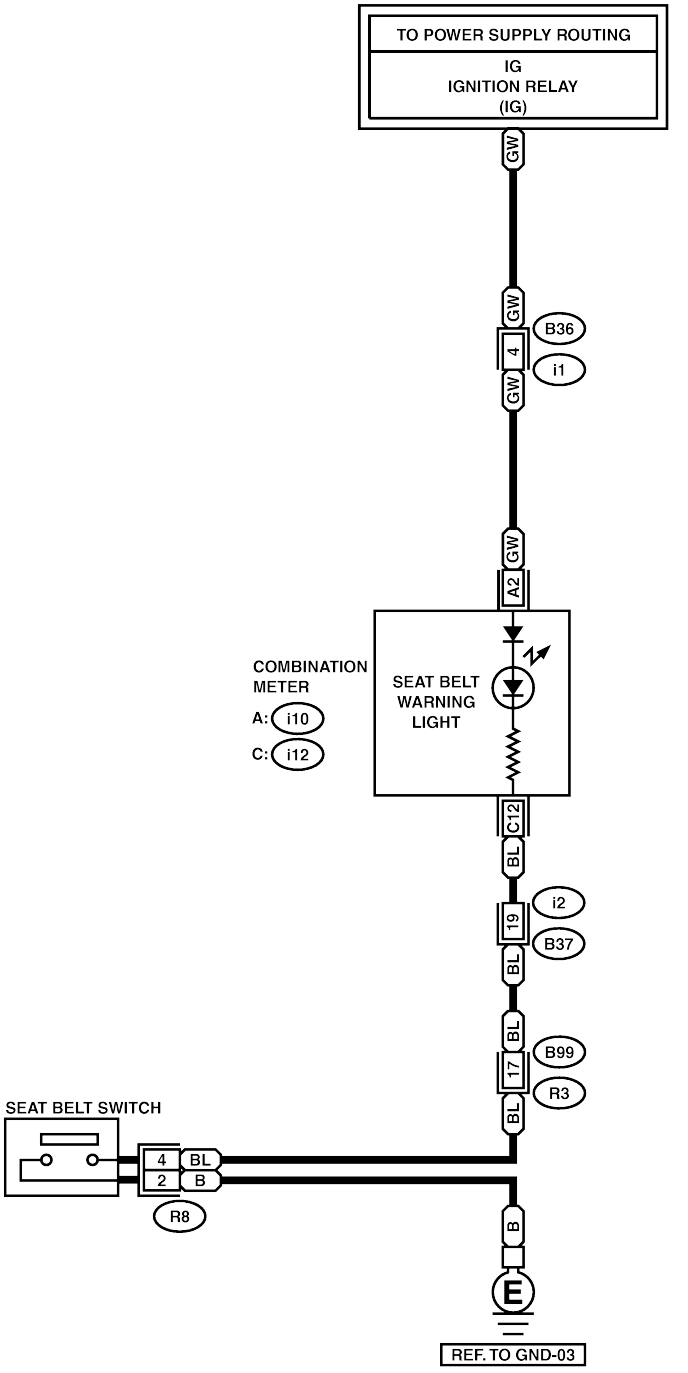




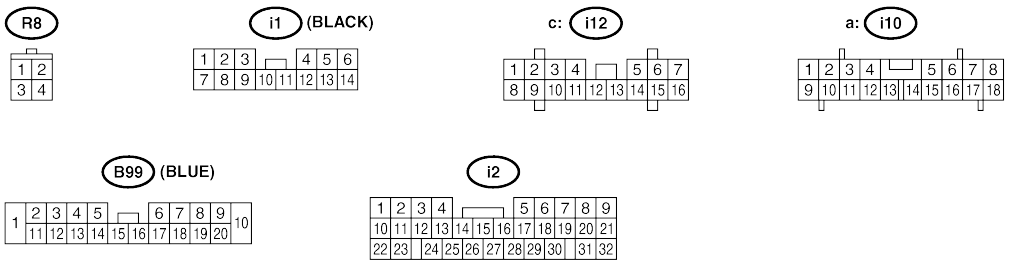
SL87-20

2. RHD MODEL S903483A2102

S/BELT-01



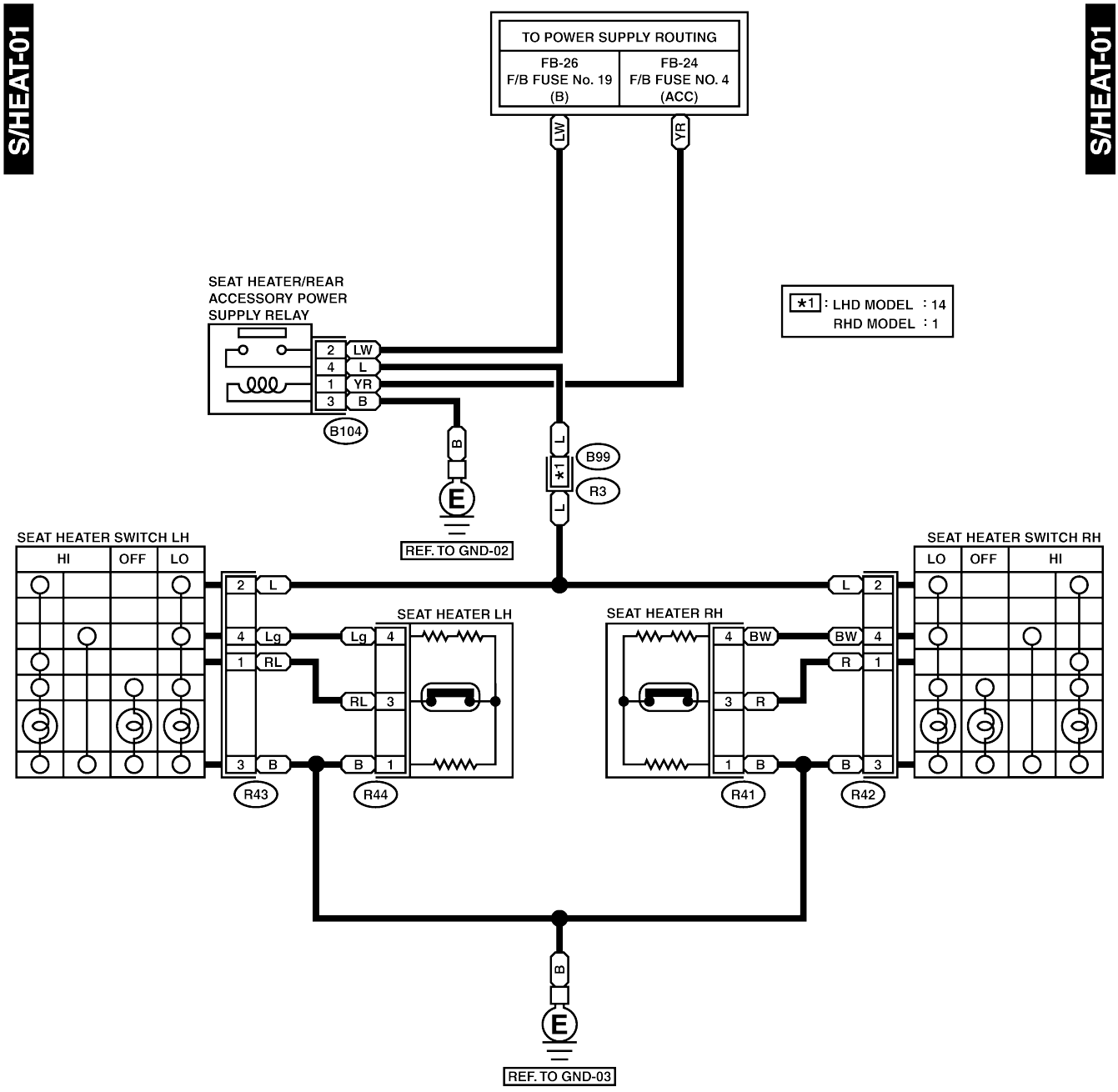
S/BELT-01

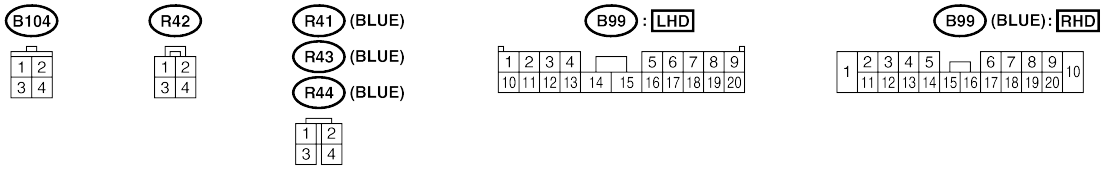


SR87-20

39. Seat Heater System S903462

A: SCHEMATIC S903462A21

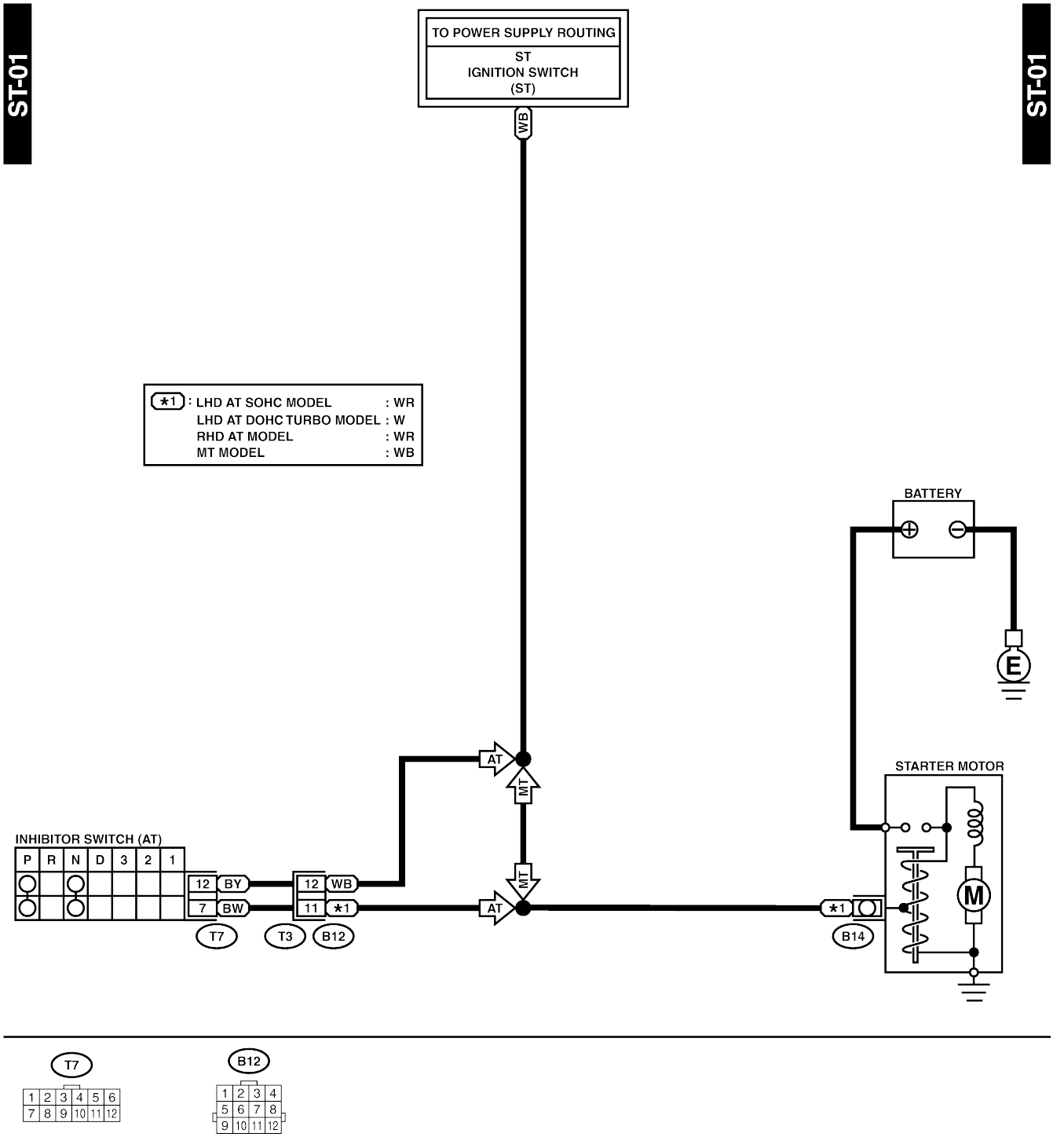




SG84-20

40. Starter System S903439

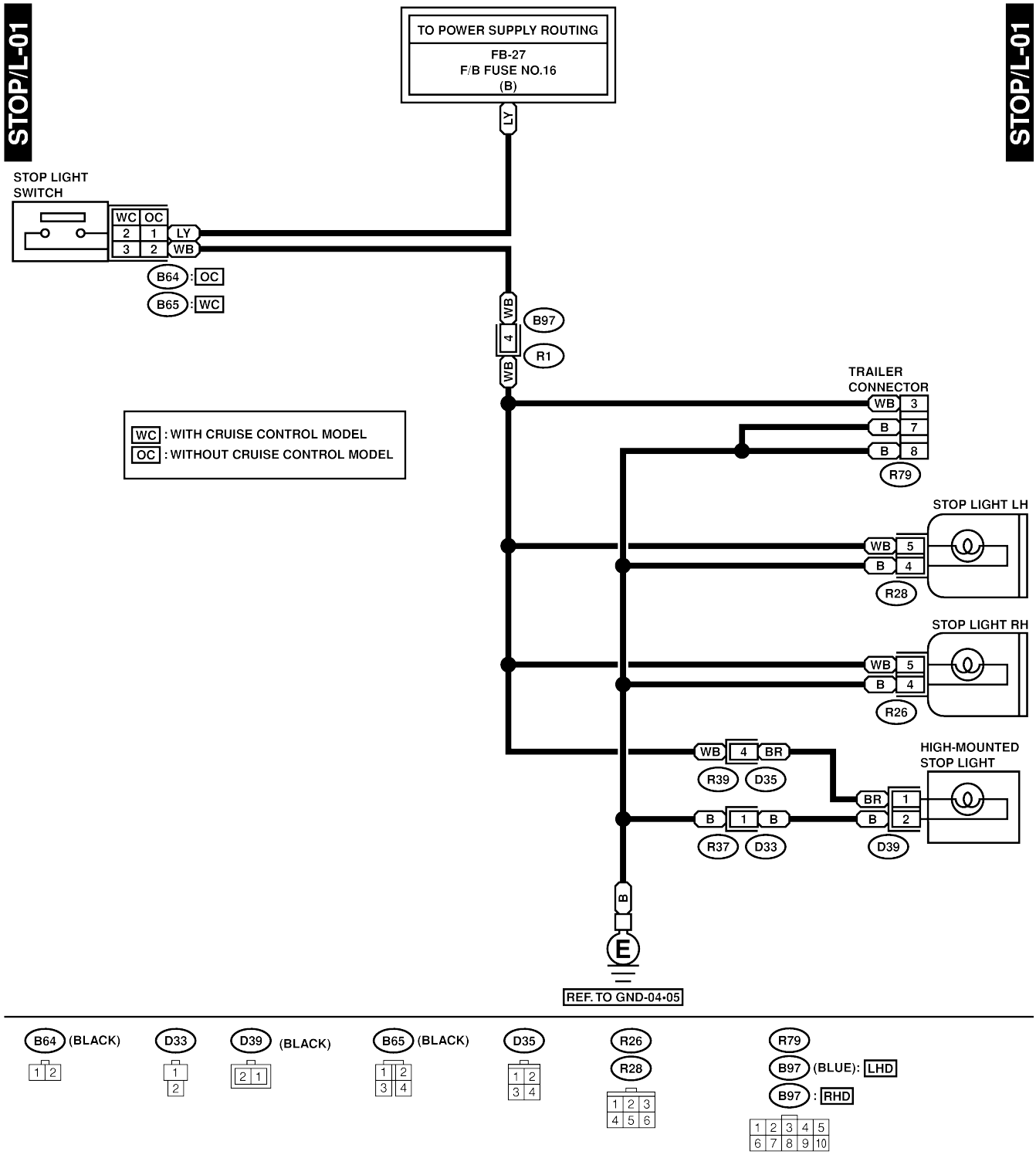
A: SCHEMATIC S903439A21



SG03-20

41. Stop Light System S903417

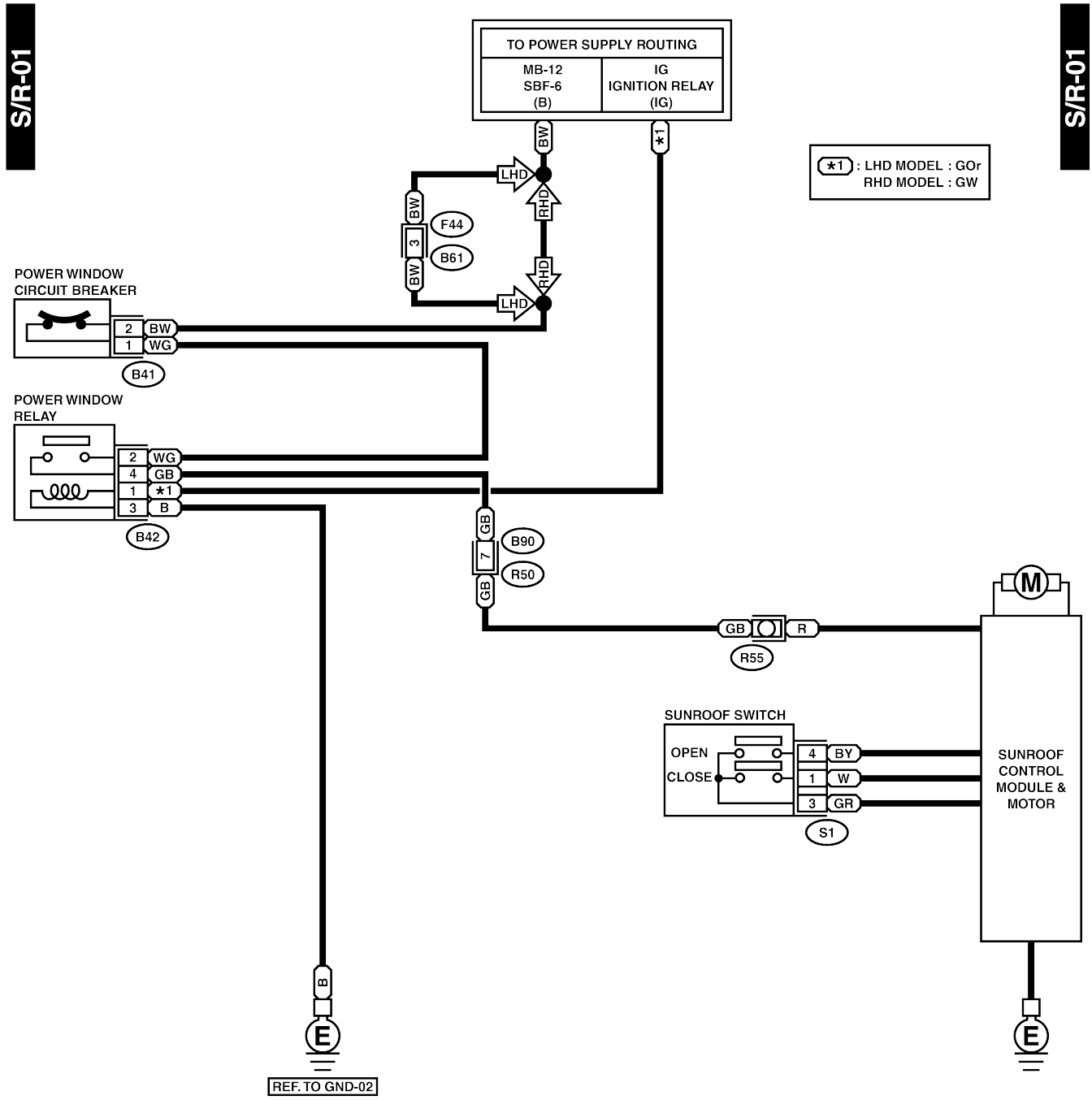
A: SCHEMATIC S903417A21

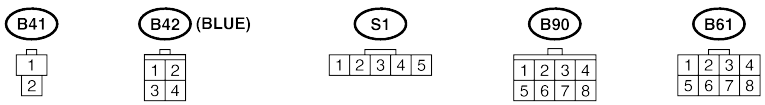


SG25-20

42. Sunroof System S903440

A: SCHEMATIC S903440A21



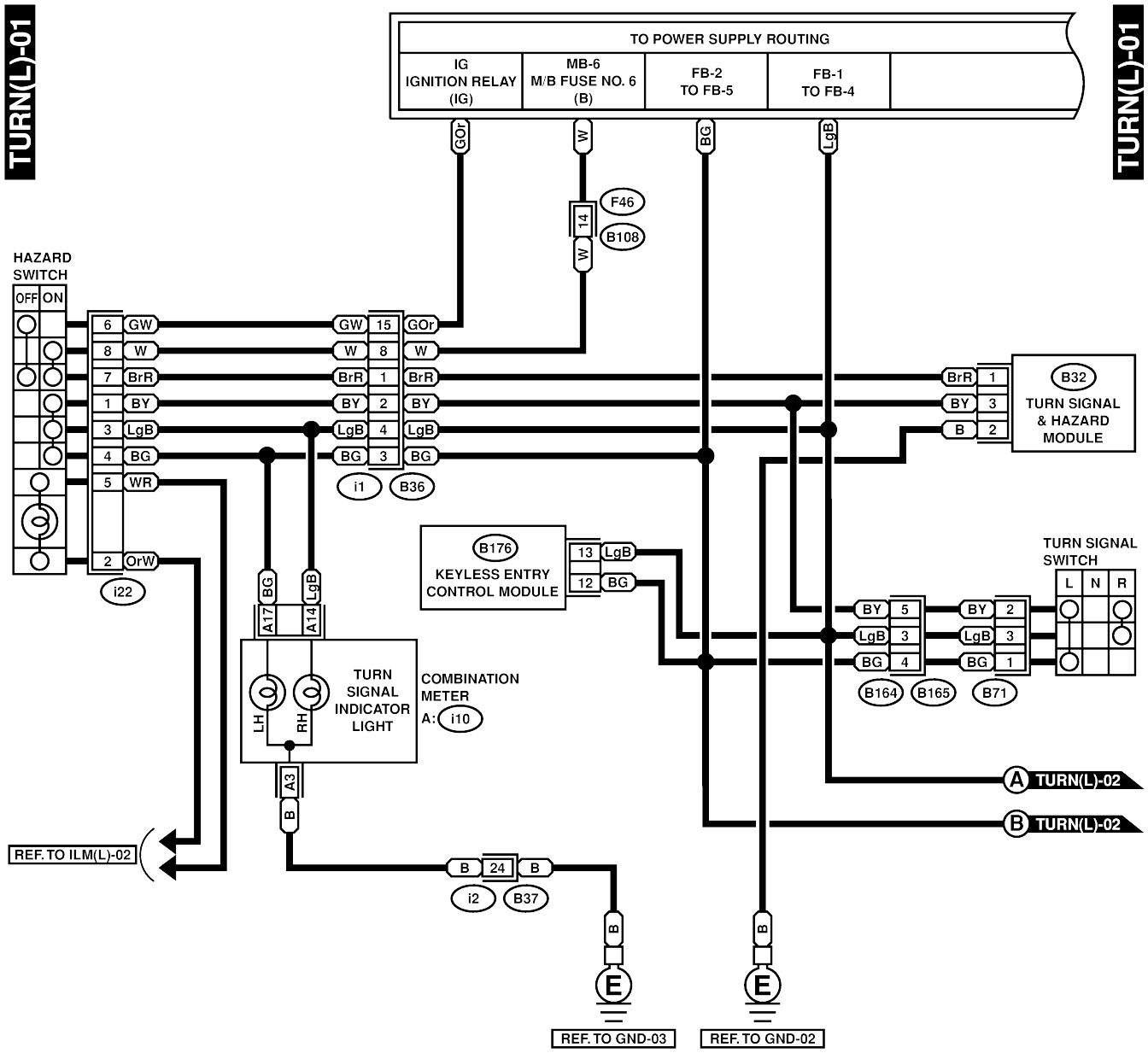


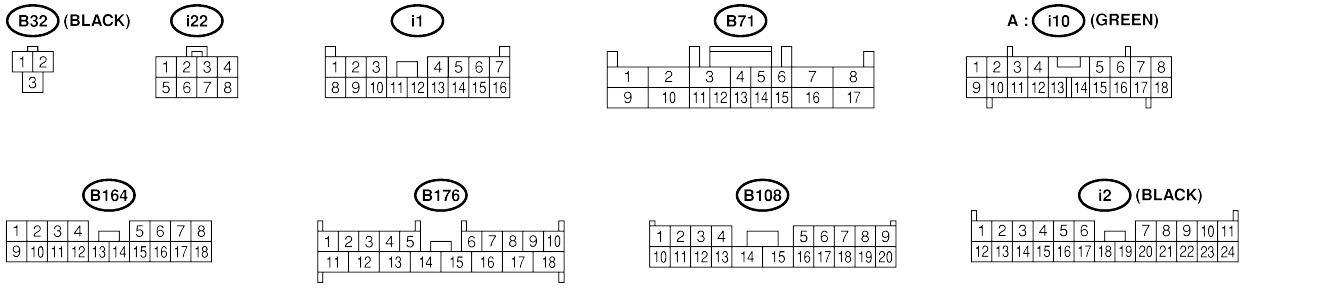
SG75-20

43. Turn Signal Light and Hazard Light System S903481

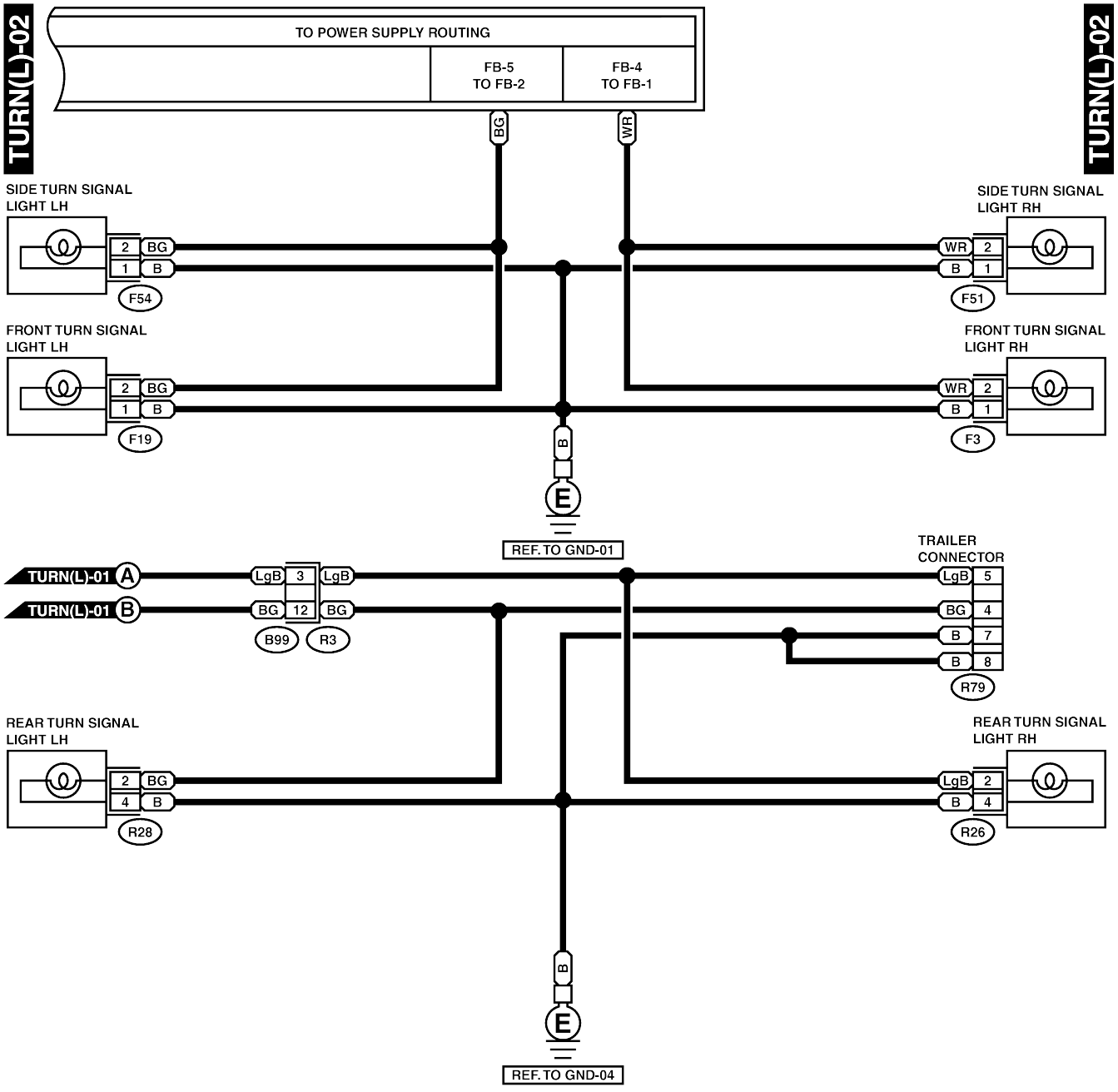
A: SCHEMATIC S903481A21

1. LHD MODEL S903481A2101





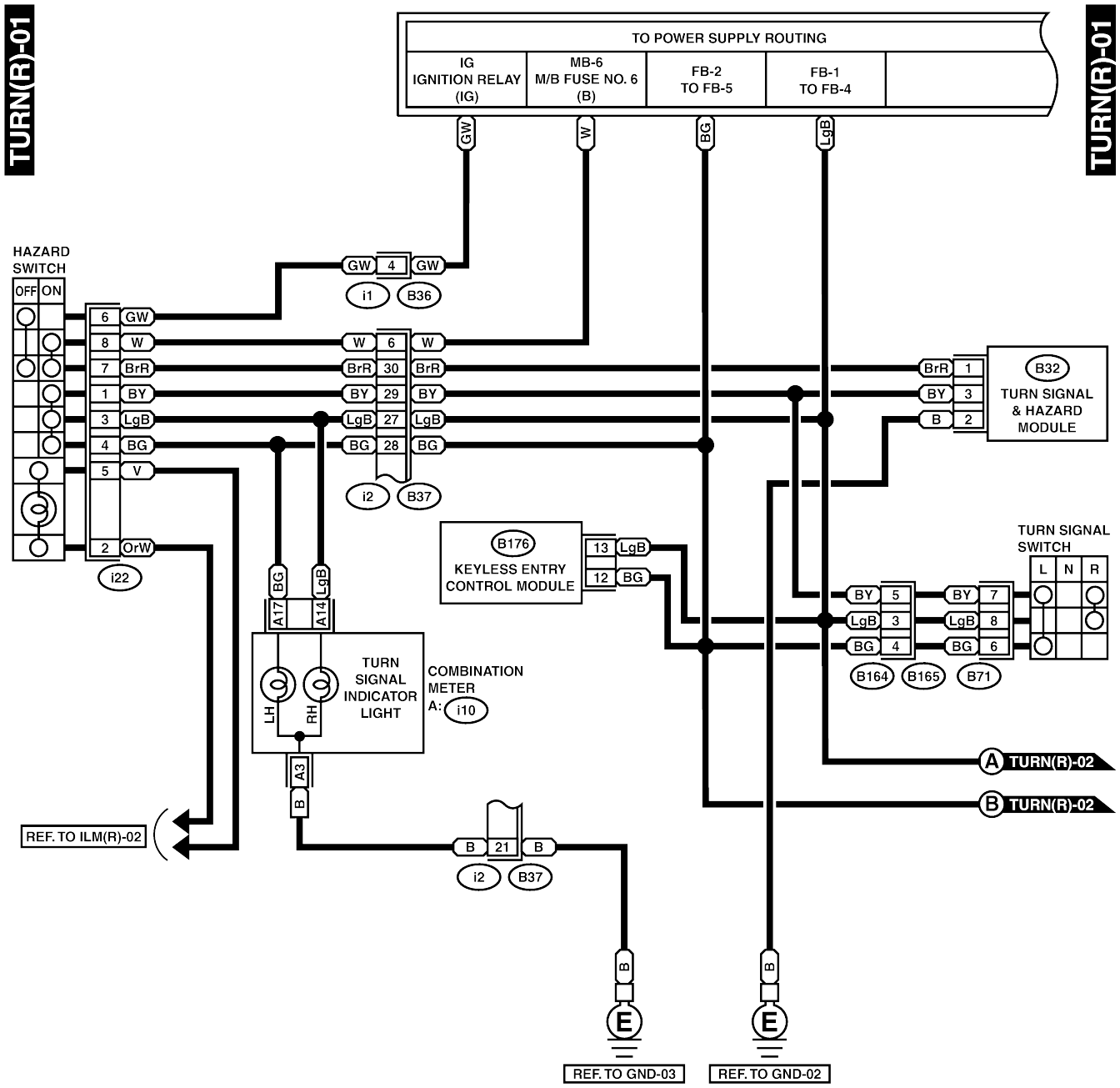
SL26-20A

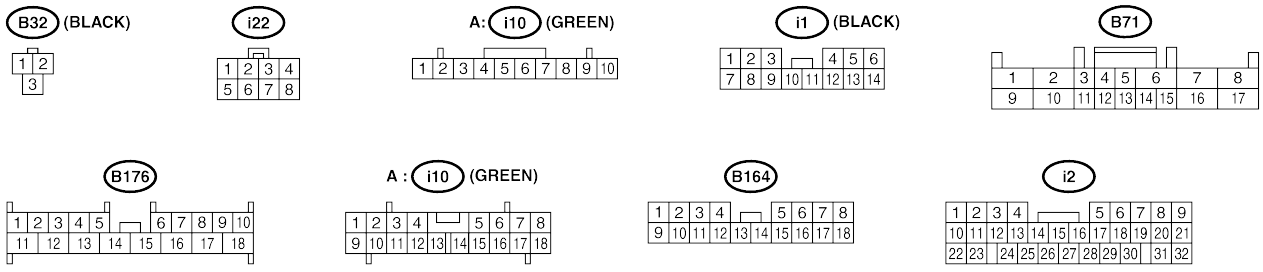

TURN(L)-02
TO POWER SUPPLY ROUTING
FB-5
TO FB-2
FB-4
TO FB-1
BG
WR
TURN(L)-02
SIDE TURN SIGNAL
LIGHT LH
SIDE TURN SIGNAL
LIGHT RH
2 BG
1 B
F54
WR 2
B 1
F51
FRONT TURN SIGNAL
LIGHT LH
FRONT TURN SIGNAL
LIGHT RH
2 BG
1 B
F19
WR 2
B 1
F3
B
E
REF. TO GND-01
TRAILER
CONNECTOR
TURN(L)-01 A
TURN(L)-01 B
LgB 3 LgB
BG 12 BG
B99
R3
LgB 5
BG 4
B 7
B 8
R79
REAR TURN SIGNAL
LIGHT LH
REAR TURN SIGNAL
LIGHT RH
2 BG
4 B
R28
LgB 2
B 4
R26
B
E
REF. TO GND-04


F51
F54
1 2
F3 (GRAY)
F19 (GRAY)
1 2
R26
R28
1 2 3
4 5 6
R79
1 2 3 4 5
6 7 8 9 10
B99
1 2 3 4
10 11 12 13 14 15 16 17 18 19 20
5 6 7 8 9

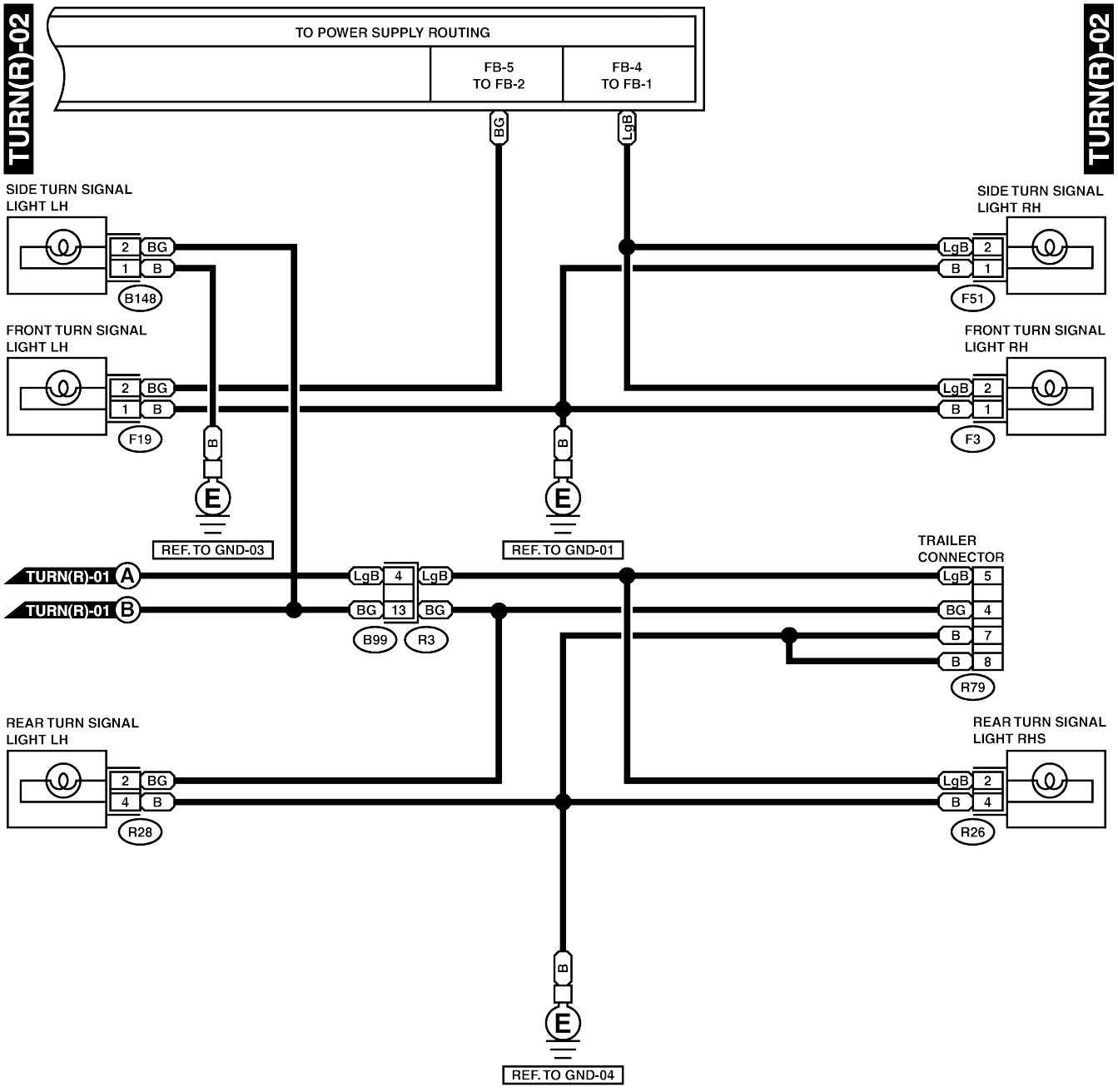
SL26-20B

2. RHD MODEL S903481A2102





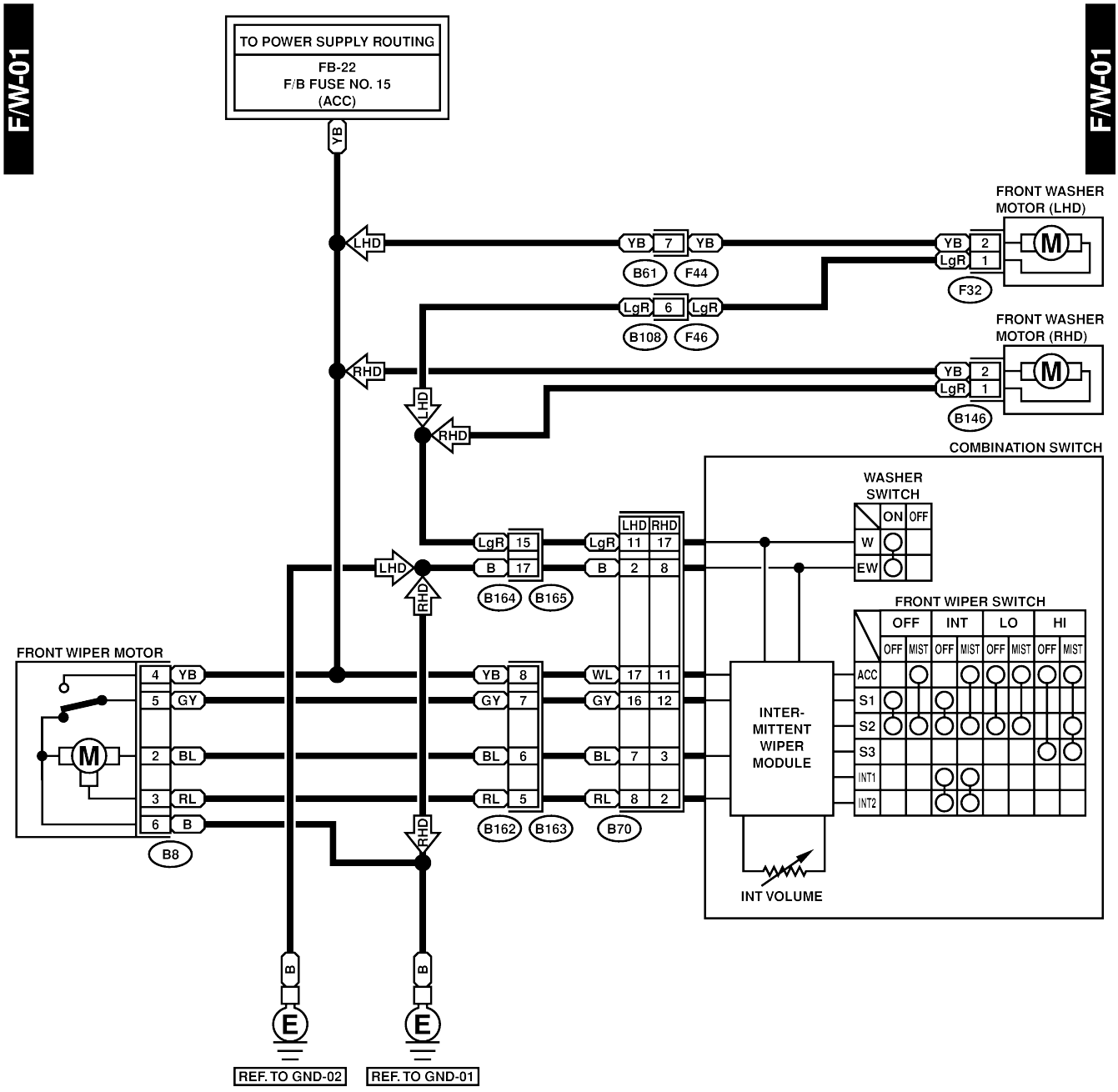
SR26-20A

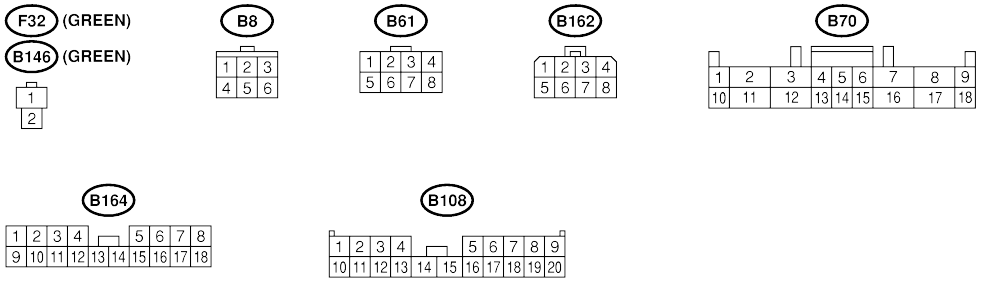

TURN(R)-02
TO POWER SUPPLY ROUTING
FB-5
TO FB-2
FB-4
TO FB-1
BG
LgB
TURN(R)-02
SIDE TURN SIGNAL
LIGHT LH
SIDE TURN SIGNAL
LIGHT RH
2 BG
1 B
B148
LgB 2
B 1
F51
FRONT TURN SIGNAL
LIGHT LH
FRONT TURN SIGNAL
LIGHT RH
2 BG
1 B
F19
LgB 2
B 1
F3
B
E
REF. TO GND-03
REF. TO GND-01
TRAILER
CONNECTOR
TURN(R)-01 A
TURN(R)-01 B
LgB 4 LgB
BG 13 BG
B99
R3
LgB 5
BG 4
B 7
B 8
R79
REAR TURN SIGNAL
LIGHT LH
REAR TURN SIGNAL
LIGHT RHS
2 BG
4 B
R28
LgB 2
B 4
R26
REF. TO GND-04
F51
B148
F3 (GRAY)
F9 (GRAY)
R26
R28
R79
B99 (BLUE)

SR26-20B

44. Wiper and Washer System (Front) S903442

A: SCHEMATIC S903442A21

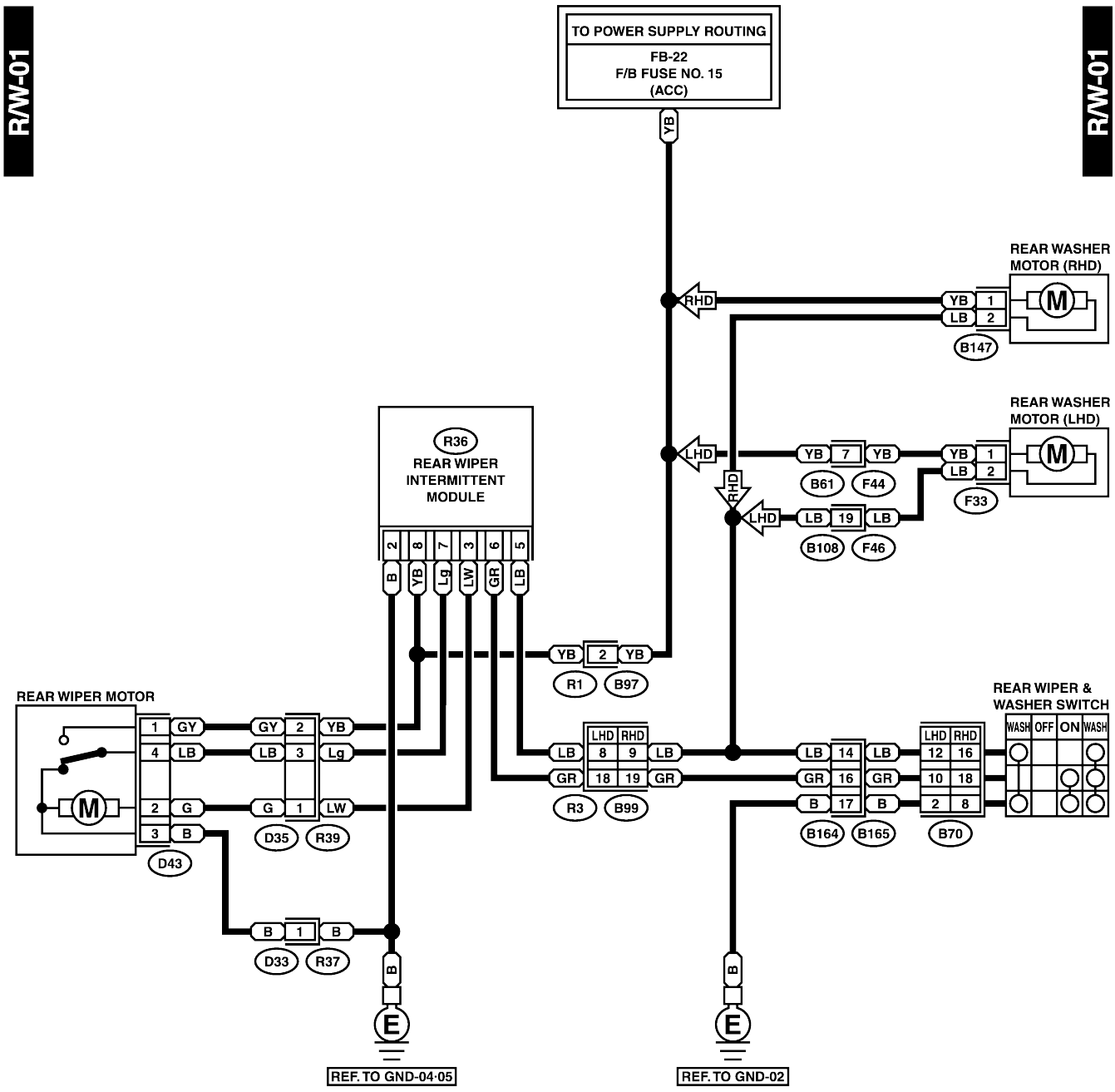


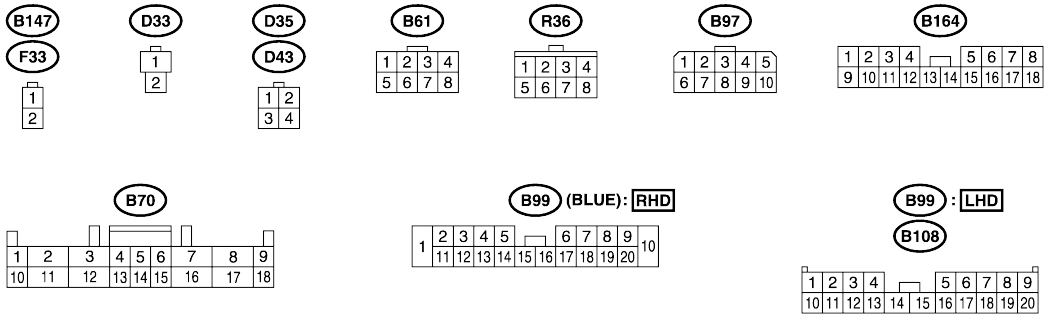


SG50-20

45. Wiper and Washer System (Rear) S903443

A: SCHEMATIC S903443A21

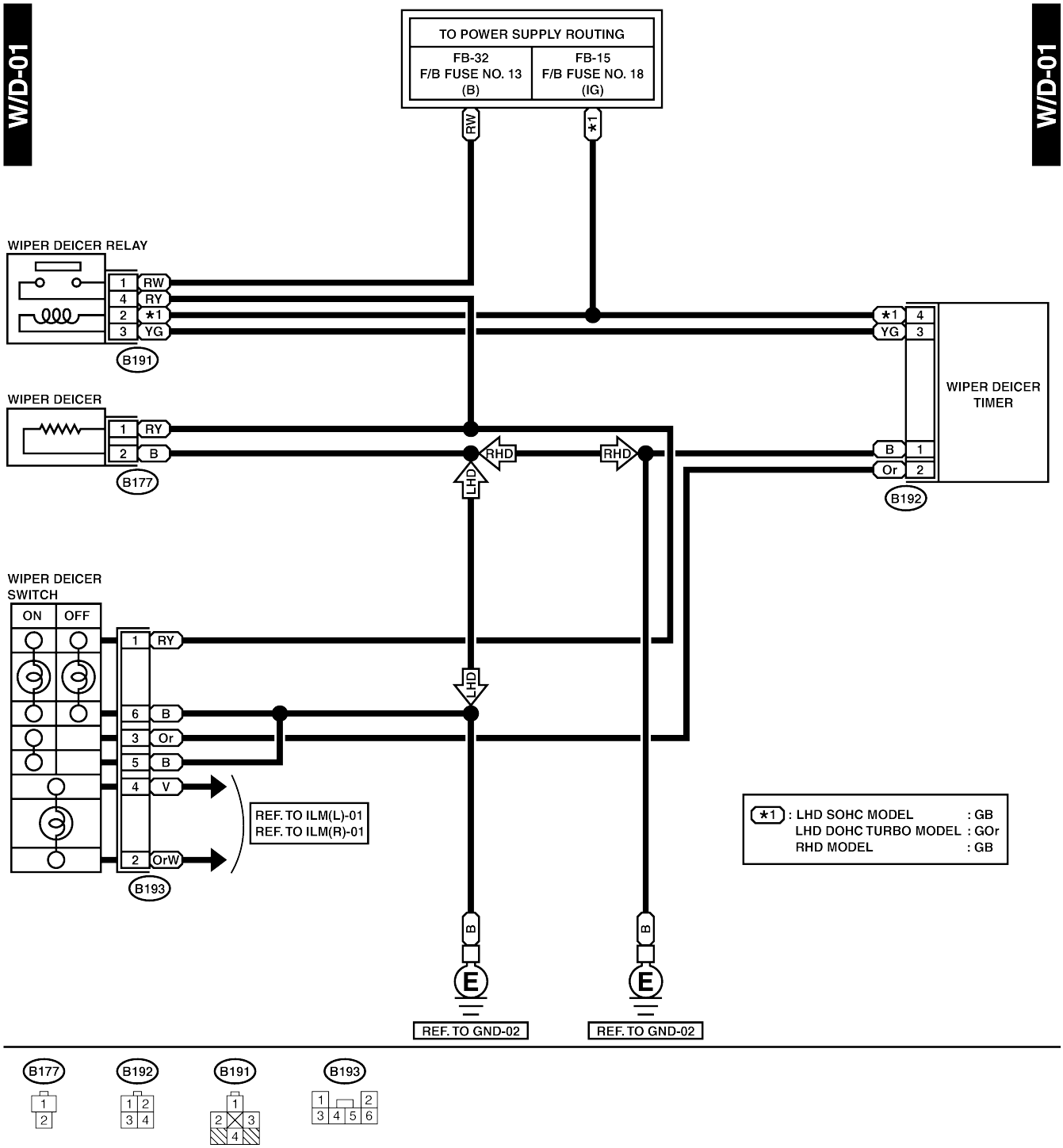




SG51-20

46. Wiper Deicer System S903444

A: SCHEMATIC S903444A21



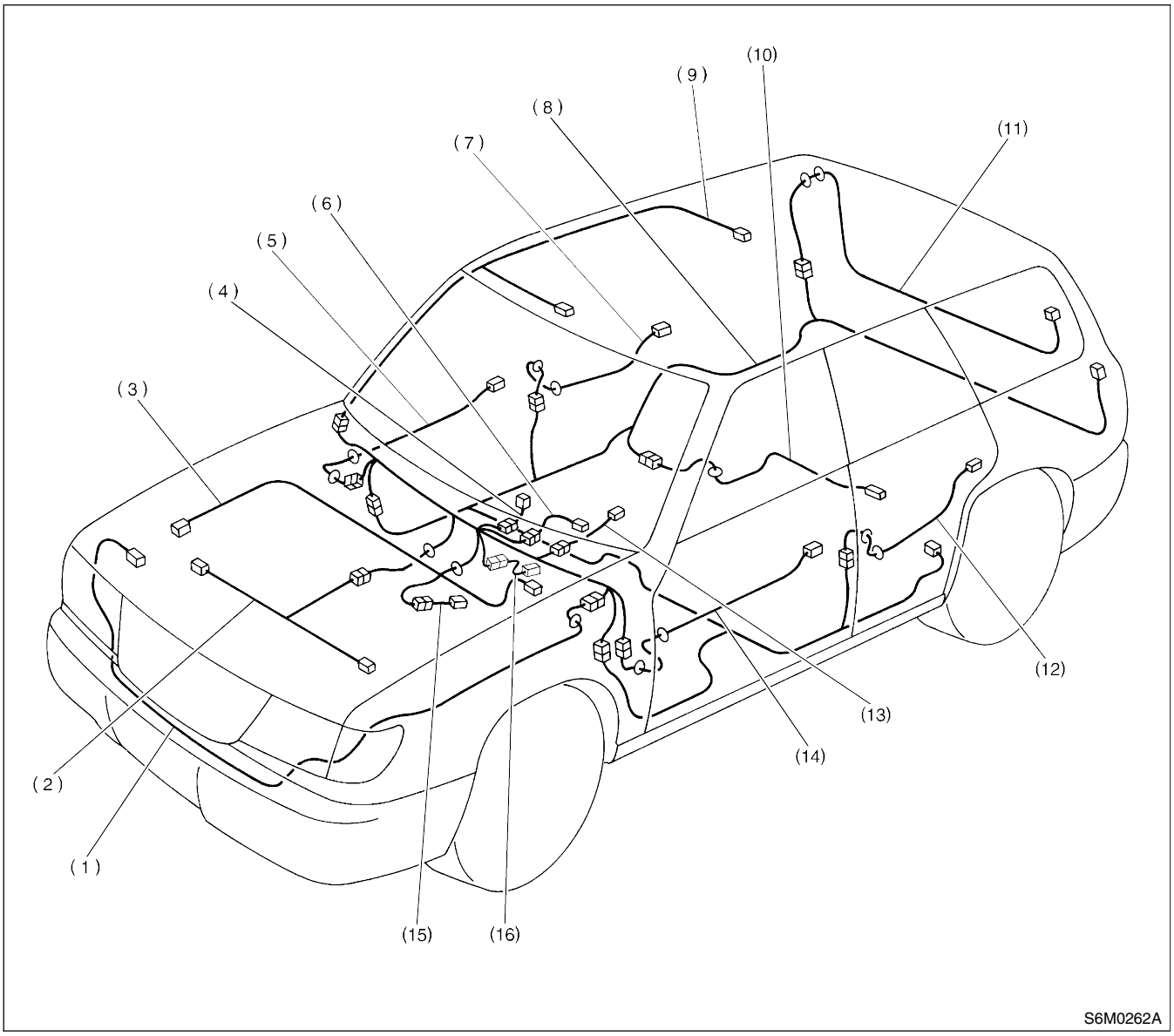
SG78-20

MEMO:

47. Overall Systems S903672

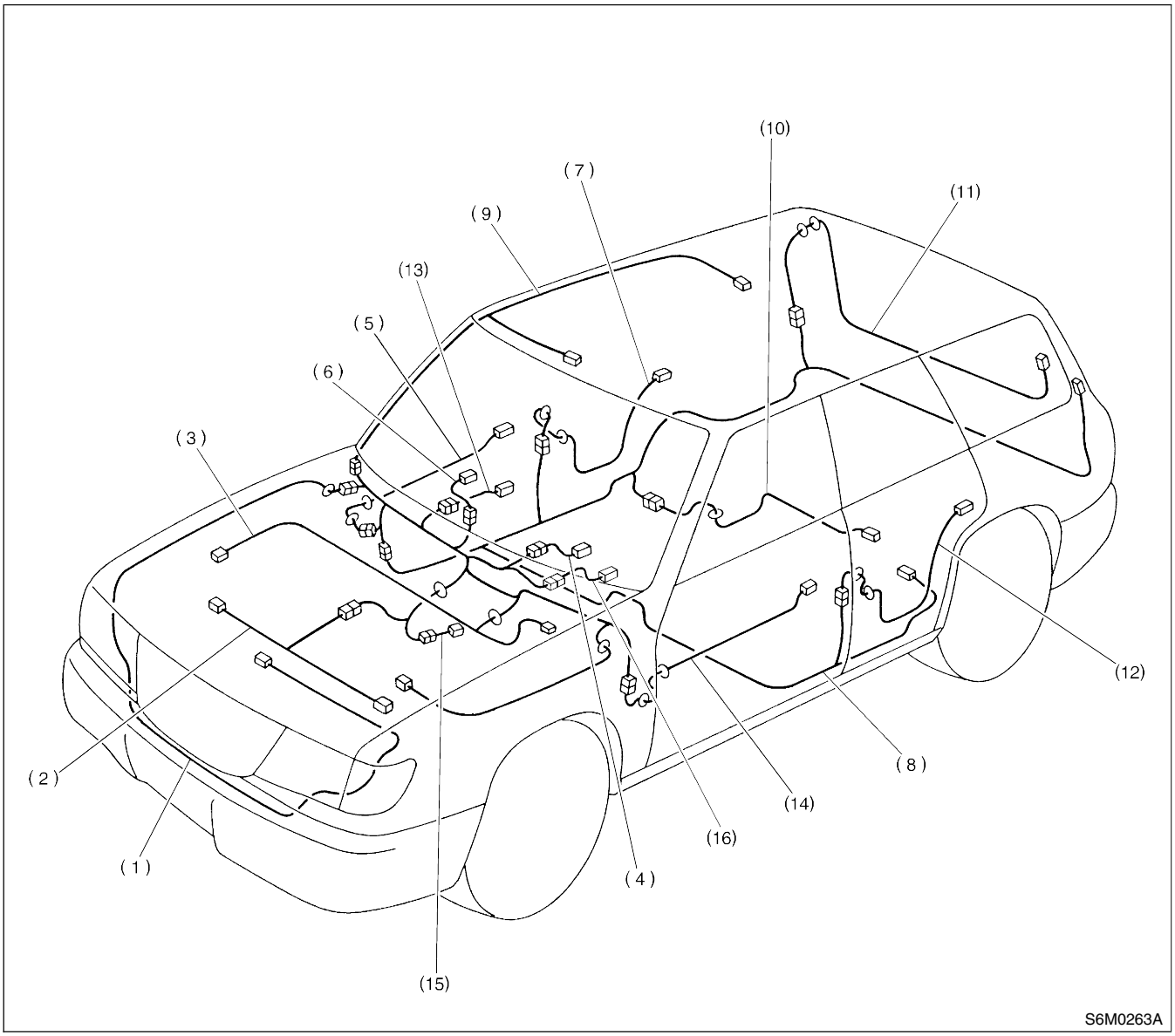
A: LOCATION S903672A13

1. LHD MODEL S903672A1307



(1) Front wiring harness
(2) Engine wiring harness
(3) Bulkhead wiring harness
(4) Instrument panel center harness
(5) Front door cord RH
(6) Instrument panel meter harness
(7) Rear door cord RH
(8) Rear wiring harness
(9) Roof cord
(10) Fuel tank cord
(11) Rear gate cord
(12) Rear door cord LH
(13) Combination switch cord
(14) Front door cord LH
(15) Transmission cord
(16) Panel-center harness

2. RHD MODEL S903672A1308



(1) Front wiring harness
(2) Engine wiring harness
(3) Bulkhead wiring harness
(4) Instrument panel center harness
(5) Front door cord RH
(6) Instrument panel meter harness
(7) Rear door cord RH
(8) Rear wiring harness
(9) Roof cord
(10) Fuel tank cord
(11) Rear gate cord
(12) Rear door cord LH
(13) Combination switch cord
(14) Front door cord LH
(15) Transmission cord
(16) Panel-center harness

48. Front Wiring Harness S903445

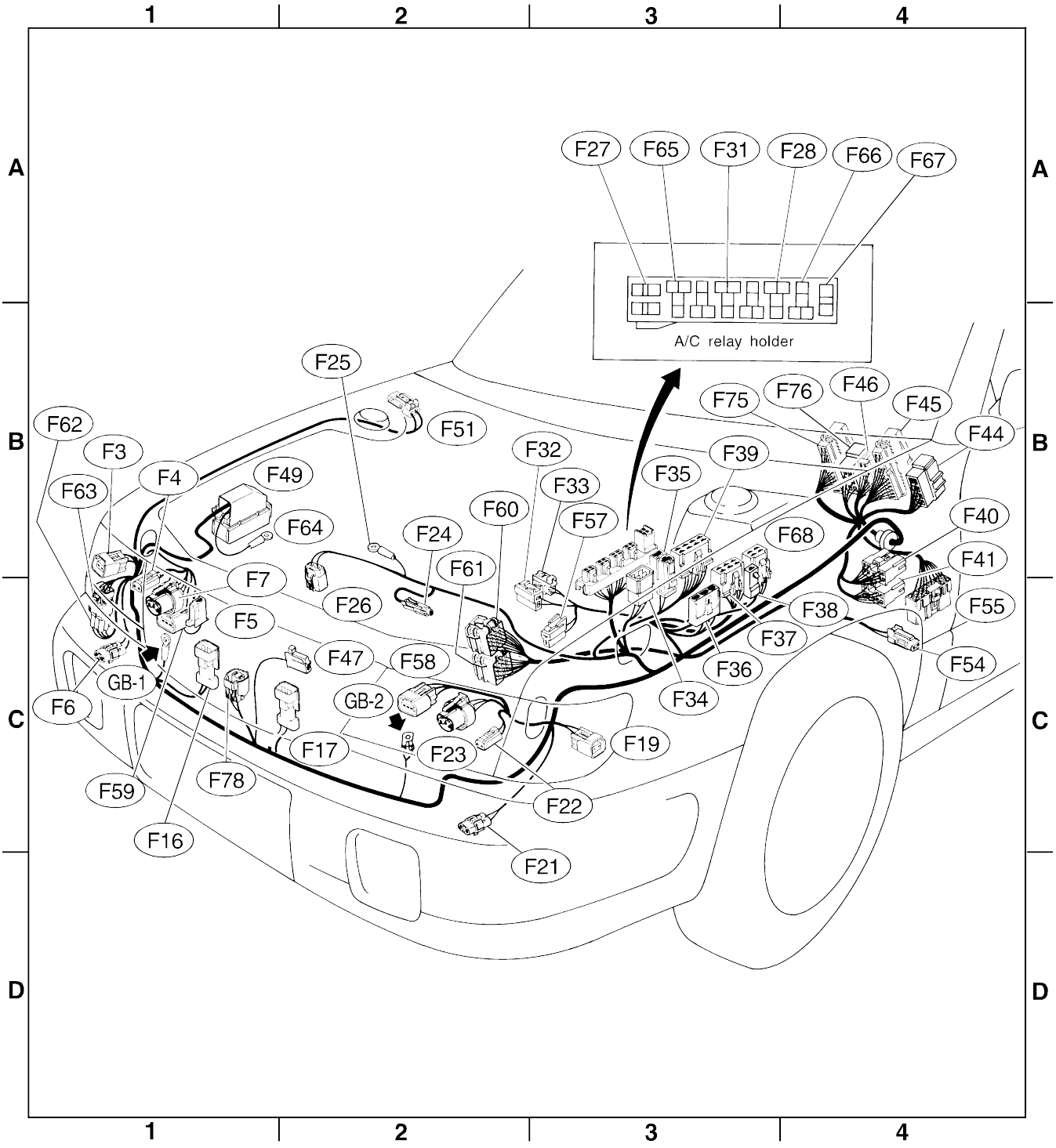
A: LOCATION S903445A13

1. LHD MODEL S903445A1302

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
F3	2	Gray	B-1		Front turn signal light RH
F4	2	Black	B-1		Front clearance light RH
F5	1	★	C-1		Horn
F6	2	Black	C-1		Front fog light RH
F7	3	★	C-1		Headlight RH
F16	2	Black	D-1		Sub fan motor
F17	2	Black	C-2		Radiator main fan motor
F19	2	Gray	C-3		Front turn signal light LH
F21	2	Black	D-3		Front fog light LH
F22	2	Black	D-3		Front clearance light LH
F23	3	★	C-2		Headlight LH
F24	1	Black	B-2		A/C compressor
F25	1	★	B-2		Generator
F26	3	Green	C-2		
F27	4	★	A-3		A/C fuse (Relay holder)
F28	4	★	A-4		A/C sub fan relay (Relay holder)
F31	4	★	A-3		A/C relay (Relay holder)
F32	2	Green	B-3		Front washer motor
F33	2	★	B-3		Rear washer motor
F34	4	★	C-3		SBF holder (ABS)
F35	2	★	B-3		M/B
F36	3	★	C-3		
F37	6	Black	C-3		
F38	1	★	C-4		
F39	8	★	B-3		
F40	9	Brown	B-4		F/B
F41	7	Gray	C-4		
F44	8	White	B-4	B61	Bulkhead wiring harness
F45	20	★	B-4	B62	Bulkhead wiring harness (DOHC turbo model)
	16	★	B-4	B62	Bulkhead wiring harness (SOHC model)
F46	20	★	B-4	B108	Bulkhead wiring harness
F47	1	★	C-2		Horn
F49	31	★	B-2		ABS control module
F51	2	★	B-2		Side turn signal light RH

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
F54	2	★	C-4		Side turn signal light LH
F55	12	★	C-4	R48	Rear harness
F57	2	Blue	B-3		Headlight washer motor
F58	3	Black	C-2		Headlight leveler LH
F59	3	Black	D-1		Headlight leveler RH
F60	16	★	B-2	E3	Engine wiring harness (DOHC turbo model)
F61	20	Black	C-2	E2	Engine wiring harness (DOHC turbo model)
F62	6	★	B-1	F63	Shield joint connector (ABS)
F63	6	★	B-1	F62	
F64	1	★	B-2		ABS motor ground
F65	4	★	A-3		Front fog light relay (Relay holder)
F66	4	★	A-4		Radiator main fan relay (Relay holder)
F67	2	★	A-4		FWD switch (Relay holder)
F68	4	Black	B-4		M/B
F75	24	Black	B-3	B209	Bulkhead wiring harness (DOHC turbo model)
F76	6	Black	B-4	B210	Bulkhead wiring harness (DOHC turbo model)
F78	2	Black	D-1		Outside temperature sensor

★: Non-colored


1
2
3
4
A
B
C
D
F27
F65
F31
F28
F66
F67
A/C relay holder
F25
F62
F3
F4
F49
F63
F64
F51
F32
F33
F60
F57
F24
F61
F26
F7
F5
F47
F58
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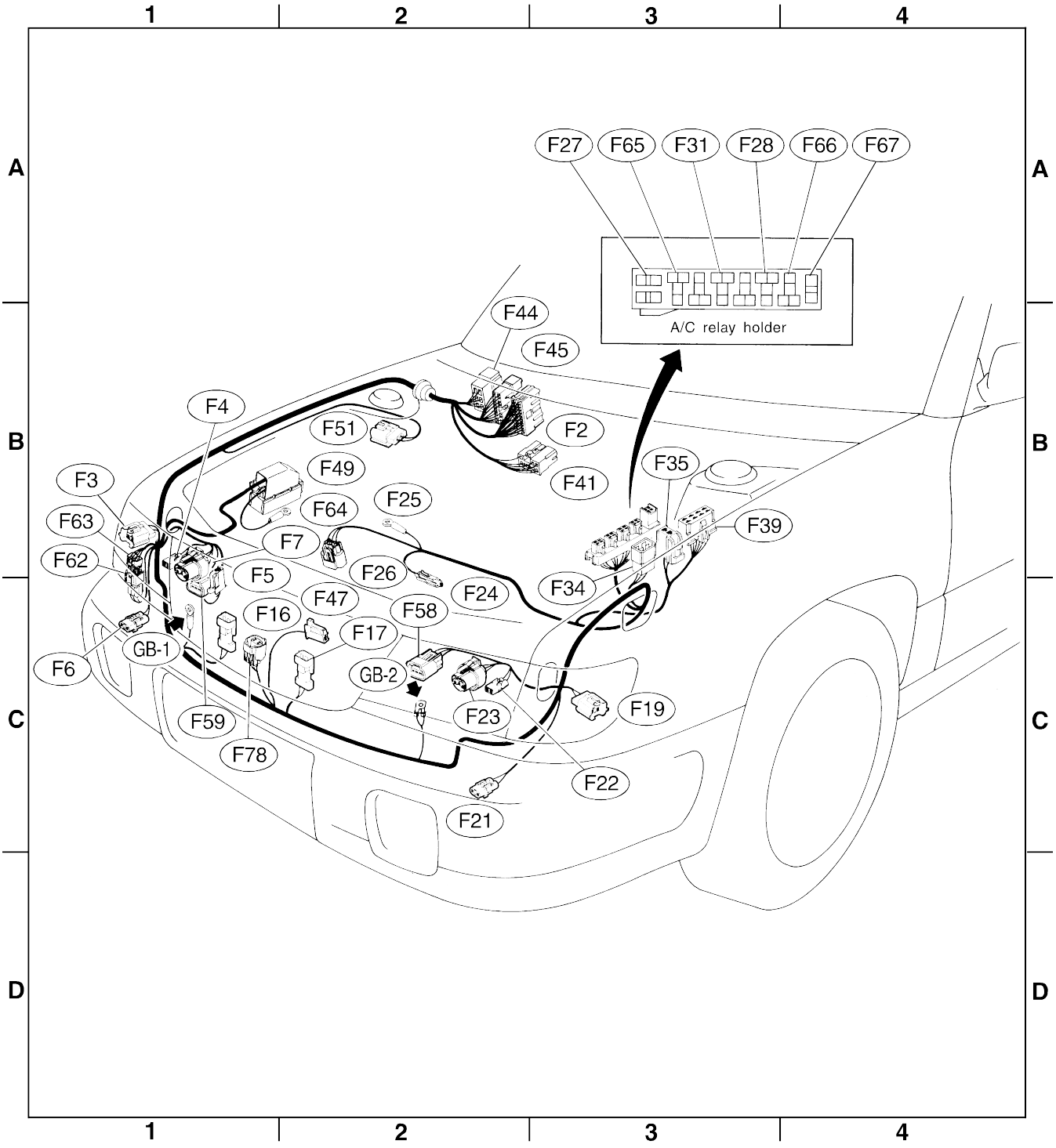
S6M0489

2. RHD MODEL S903445A1303

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
F2	22	Blue	B-3	B100	Bulkhead wiring harness (ABS)
F3	2	Gray	B-1		Front turn signal light RH
F4	2	Black	B-1		Front clearance light RH
F5	1	★	C-1		Horn
F6	2	Black	C-1		Front fog light RH
F7	3	★	C-2		Headlight RH
F16	2	Black	C-1		Sub fan motor
F17	2	Black	C-2		Radiator main fan motor
F19	2	Gray	C-3		Front turn signal light LH
F21	2	Black	D-2		Front fog light LH
F22	2	Black	D-3		Front clearance light LH
F23	3	★	C-2		Headlight LH
F24	1	Black	C-2		A/C compressor
F25	1	★	B-2		Generator
F26	3	Green	C-2		
F27	4	★	A-3		A/C fuse (Relay holder)
F28	4	★	A-3		A/C sub fan relay (Relay holder)
F31	4	★	A-3		A/C relay (Relay holder)
F34	4	★	C-3		SBF holder (ABS)
F35	2	★	B-3		M/B
F39	8	Black	B-3		
F41	7	Gray	B-3		F/B
F44	6	★	B-2	B61	Bulkhead wiring harness
F45	14	★	B-3	B62	
F47	1	★	C-2		Horn
F49	31	★	B-2		ABS control module
F51	2	★	B-2		Side turn signal light RH
F58	3	Black	C-2		Headlight leveler LH
F59	3	Black	C-1		Headlight leveler RH
F62	6	★	C-1	F63	Shield joint connector (ABS)
F63	6	★	B-1	F62	
F64	1	★	B-2		ABS motor ground
F65	4	★	A-3		Front fog light relay (Relay holder)
F66	4	★	A-4		Radiator main fan relay (Relay holder)
F67	2	★	A-4		FWD switch (Relay holder)
F78	2	Black	D-1		Outside temperature sensor

★: Non-colored

FRONT WIRING HARNESS



S6M0490

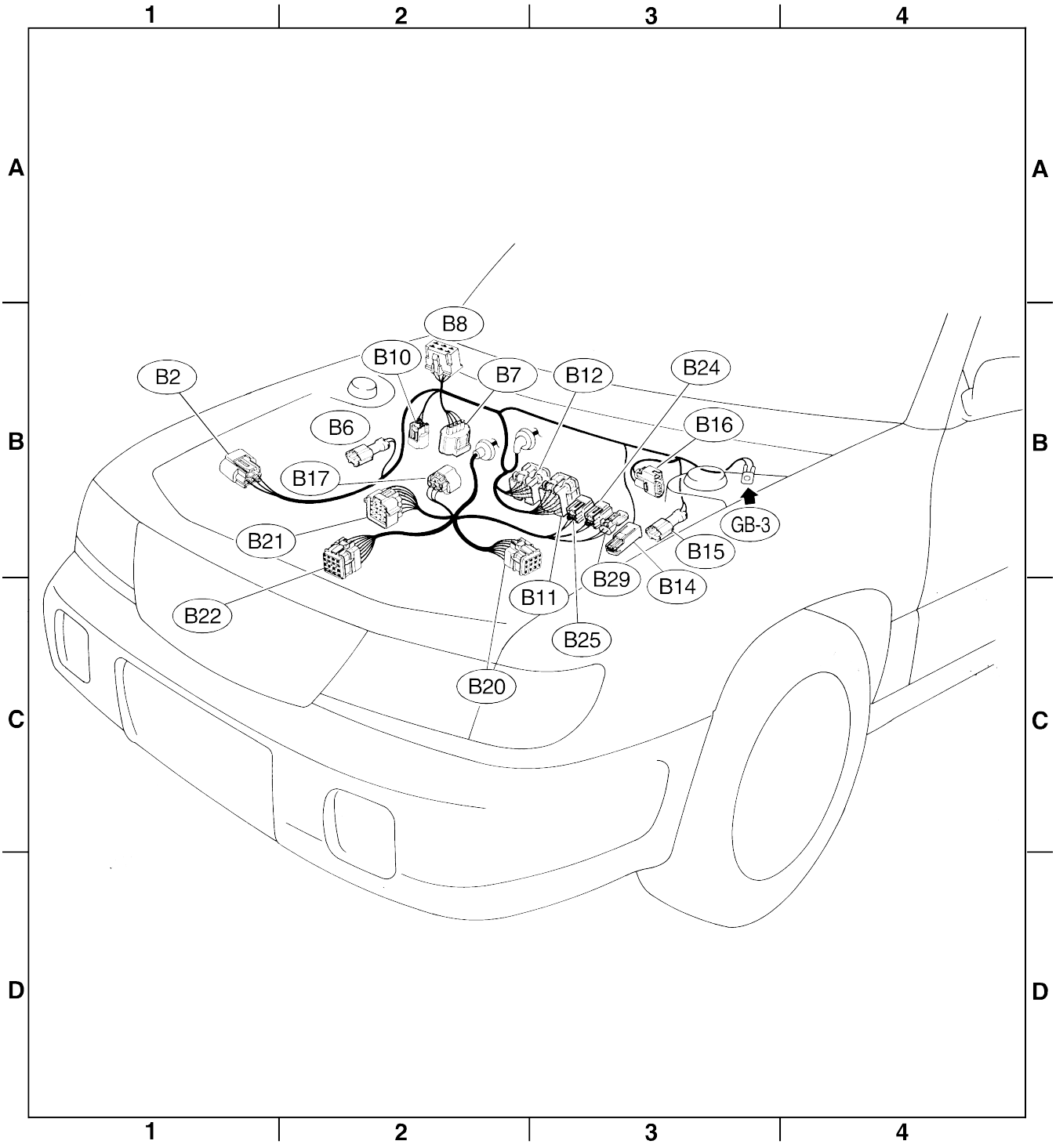
49. Bulkhead Wiring Harness (In Engine Room) S903438

A: LOCATION S903438A13

1. LHD NON-TURBO MODEL WITH OBD S903438A1308

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B2	3	Black	B-1		Pressure sensor
B6	2	Brown	B-2		ABS front sensor RH
B7	4	Gray	B-2		Cruise control actuator
B8	6	★	B-2		Front wiper motor
B10	2	Brown	B-2		A/C pressure switch
B11	20	Black	C-3	T4	Transmission (AT)
B12	12	★	B-3	T3	
B14	1	Black	C-3		Starter (Magnet)
B15	2	Brown	B-3		ABS front sensor LH
B16	2	Gray	B-3		Brake fluid level switch
B17	3	Black	B-2		Vehicle speed sensor (MT)
B20	10	Gray	C-3	E1	Engine wiring harness
B21	20	Gray	B-1	E2	Engine wiring harness
B22	16	Brown	C-1	E3	
B24	2	Gray	B-3	T1	Back-up light switch (MT)
B25	2	Brown	C-3	T2	Neutral position switch (MT)
B29	2	Gray	C-3	T8	Lo (AWD) indicator light switch (MT)
★: Non-colored					

BULKHEAD WIRING HARNESS (IN ENGINE ROOM)

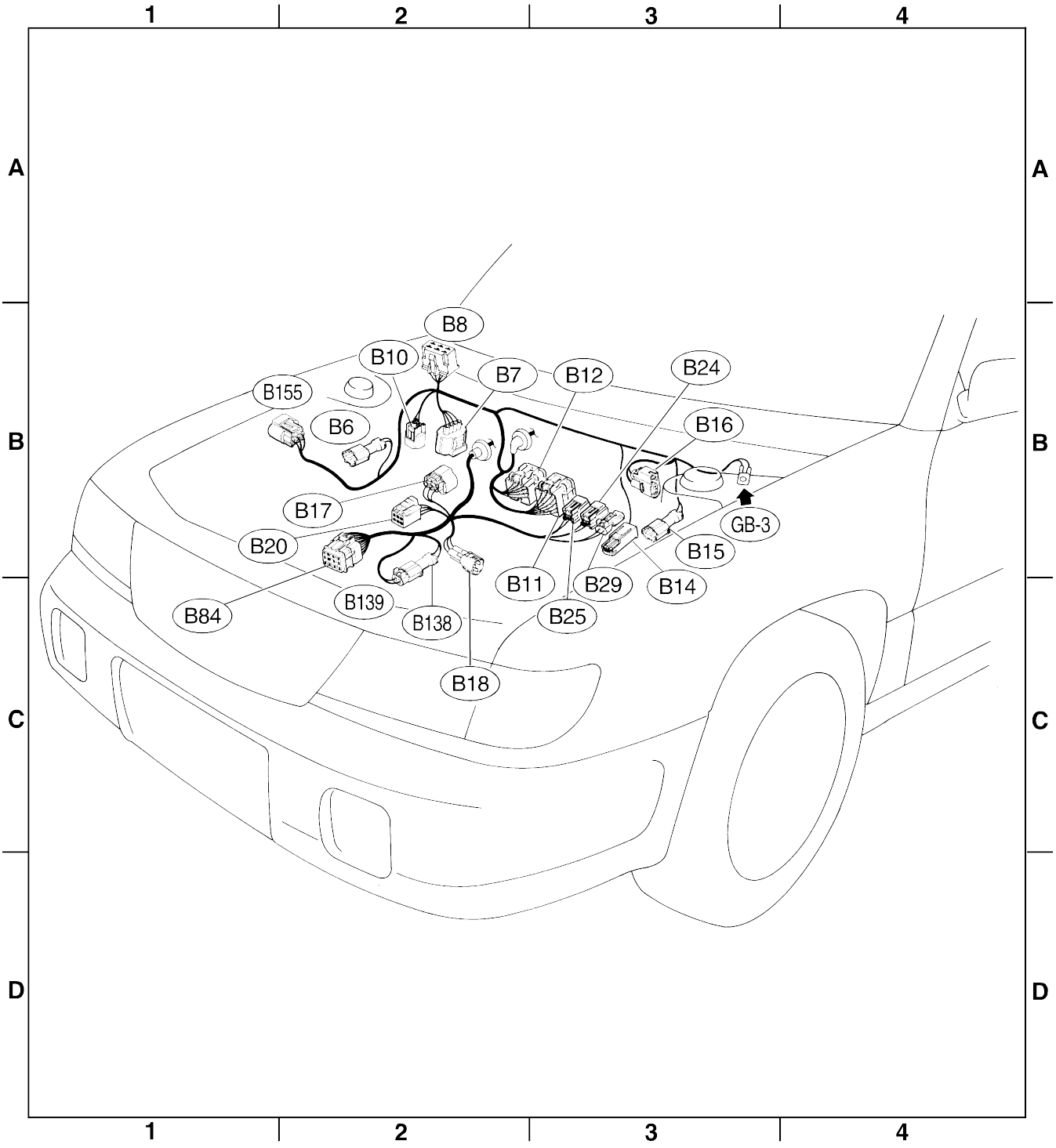


S6M0491

2. LHD NON-TURBO MODEL WITHOUT OBD S903438A1309

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B6	2	Brown	B-2		ABS front sensor RH
B7	4	Gray	B-2		Cruise control actuator
B8	6	★	B-2		Front wiper motor
B10	2	Brown	B-2		A/C pressure switch
B11	20	Black	C-3	T4	Transmission (AT)
B12	12	★	B-3	T3	
B14	1	Black	C-3		Starter (Magnet)
B15	2	Brown	B-3		ABS front sensor LH
B16	2	Gray	B-3		Brake fluid level switch
B17	3	Black	B-2		Vehicle speed sensor (MT)
B18	4	Gray	C-2		Oxygen sensor (Catalytic converter equipped vehicle)
B20	6	Gray	B-1	E1	Engine wiring harness (AT)
B24	2	Gray	B-3	T1	Back-up light switch (MT)
B25	2	Brown	C-3	T2	Neutral position switch (MT)
B29	2	Gray	C-3	T8	Lo (AWD) indicator light switch (MT)
B84	34	Black	C-1		Engine control module
B138	2	Gray	C-2	B139	Joint connector (E/G)
B139	2	Gray	C-2	B138	
B155	3	★	B-2		CO resistor (Catalytic converter equipped vehicle)
★: Non-colored					

BULKHEAD WIRING HARNESS (IN ENGINE ROOM)



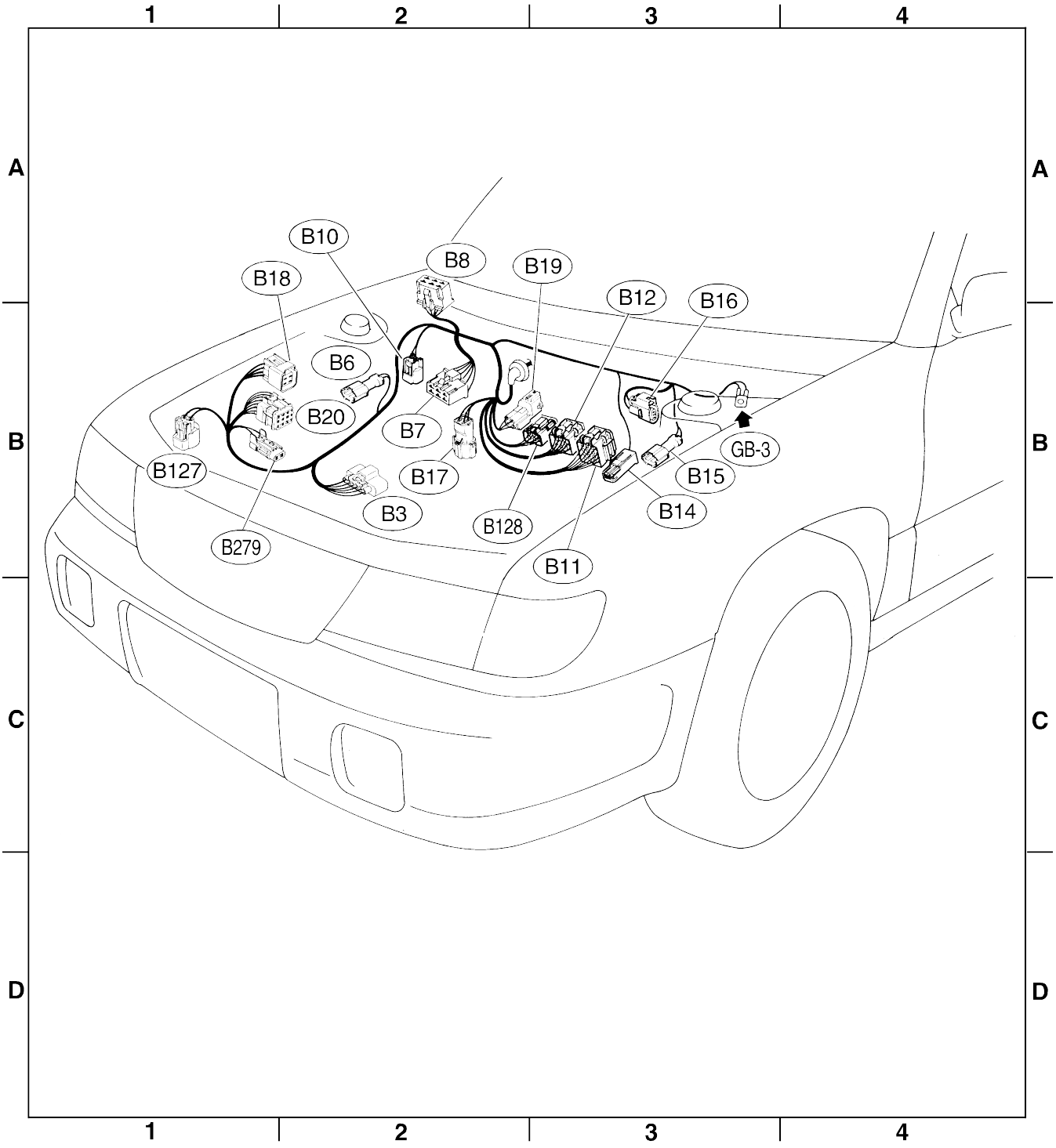
S6M0492

BULKHEAD WIRING HARNESS (IN ENGINE ROOM)

3. LHD TURBO MODEL S903438A1310

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B3	5	Black	B-2		Mass air flow sensor
B6	2	Brown	B-2		ABS front sensor RH
B7	6	Black	B-2		Cruise control actuator
B8	6	★	A-2		Front wiper motor
B10	2	Brown	A-2		A/C pressure switch
B11	20	Black	C-3	T4	Transmission (AT)
B12	12	★	A-3	T3	
B14	1	Black	B-3		Starter (Magnet)
B15	2	Brown	B-3		ABS front sensor LH
B16	2	Gray	A-3		Brake fluid level switch
B17	4	Black	B-2		Vehicle speed sensor (MT)
B18	4	Gray	A-1		Front oxygen (A/F) sensor
B19	4	★	A-3	T5	Oxygen sensor
B20	10	★	B-2	E1	Engine wiring harness
B127	2	Gray	B-1		Wastgate control solenoid valve
B128	4	Gray	B-2	T9	Transmission (MT)
B279	2	Gray	C-1		Exhaust temperature sensor
★: Non-colored					

BULKHEAD WIRING HARNESS (IN ENGINE ROOM)

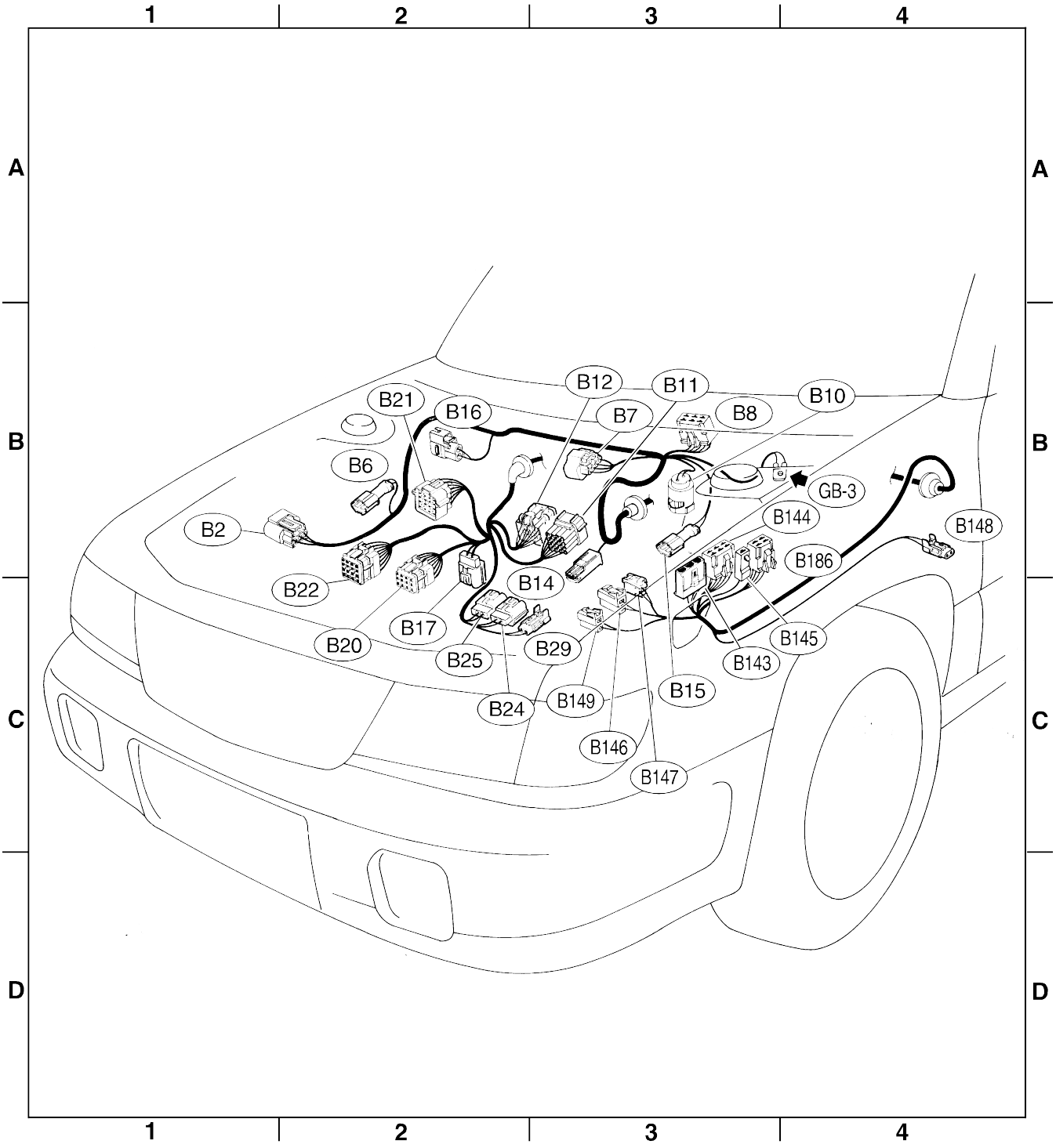


S6M0493

4. RHD NON-TURBO MODEL WITH OBD S903438A1311

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B2	3	Black	B-1		Pressure sensor
B6	2	Brown	B-2		ABS front sensor RH (ABS)
B7	4	Gray	B-3		Cruise control actuator
B8	6	★	B-3		Front wiper motor
B10	2	Brown	B-4		A/C pressure switch
B11	20	Black	B-3	T4	Transmission (AT)
B12	12	★	B-3	T3	
B14	1	Black	B-3		Starter (Magnet)
B15	2	Brown	C-3		ABS front sensor LH (ABS)
B16	2	Gray	B-2		Brake fluid level switch
B17	3	Black	C-2		Vehicle speed sensor (MT)
B20	10	Gray	C-2	E1	Engine wiring harness
B21	20	Gray	B-2	E2	Engine wiring harness
B22	16	Brown	B-2	E3	
B24	2	Gray	C-2	T1	Back-up light switch (MT)
B25	2	Brown	C-2	T2	Neutral position switch (MT)
B29	2	Gray	C-3	T8	Lo (AWD) indicator light switch (MT)
B143	3	★	C-3		M/B
B144	6	Black	B-4		
B145	1	★	C-4		
B146	2	Green	C-3		Front washer motor
B147	2	★	C-3		Rear washer motor
B148	2	★	B-4		Side turn signal light LH
B149	2	Blue	C-3		Headlight washer motor (With OBD)
B186	4	Black	B-4		M/B
★: Non-colored					

BULKHEAD WIRING HARNESS (IN ENGINE ROOM)



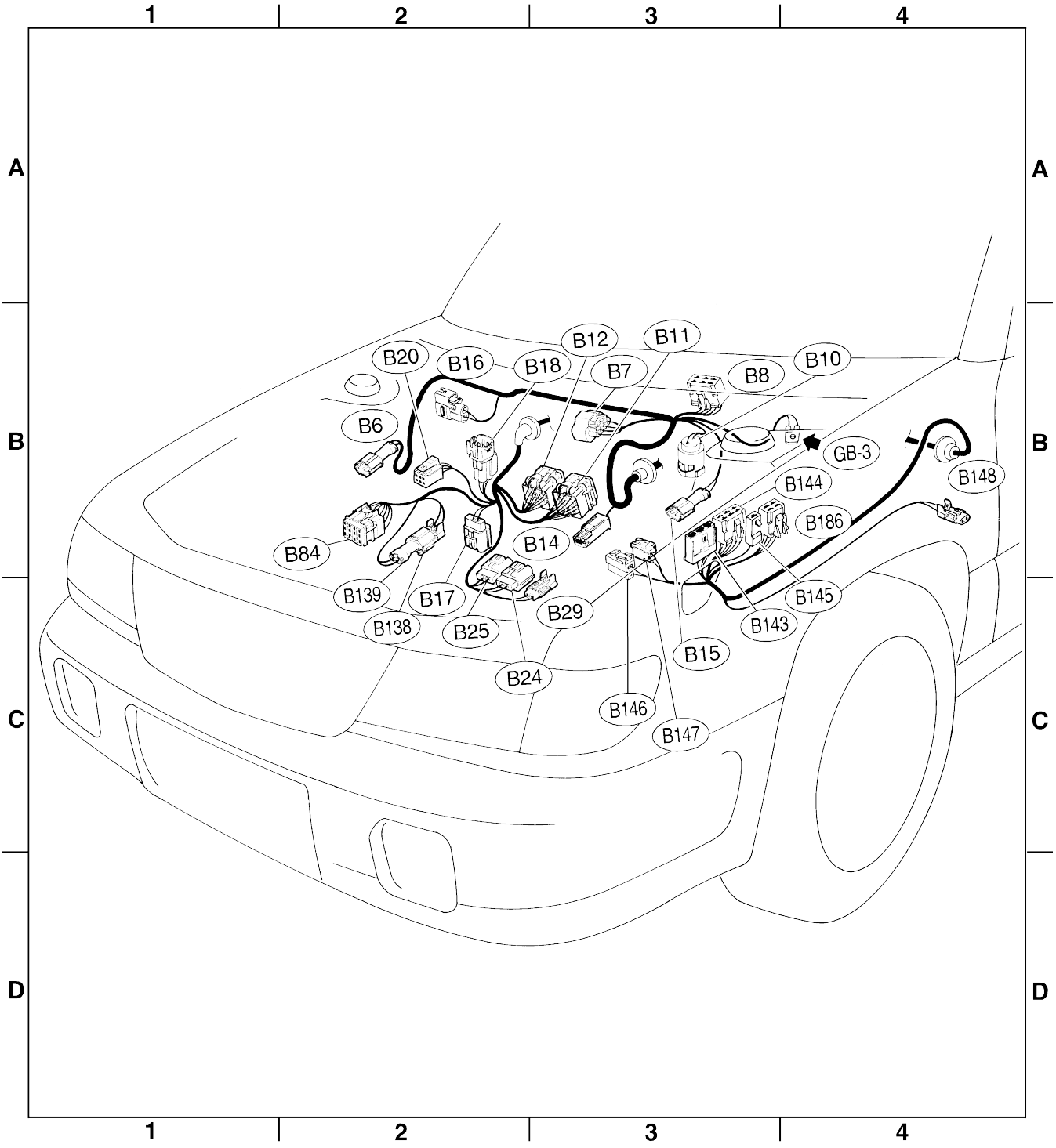
S6M0494

5. RHD NON-TURBO MODEL WITHOUT OBD S903438A1312

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B6	2	Brown	B-2		ABS front sensor RH (ABS)
B7	4	Gray	B-3		Cruise control actuator
B8	6	★	B-3		Front wiper motor
B10	2	Brown	B-4		A/C pressure switch
B11	20	Black	B-3	T4	Transmission (AT)
B12	12	★	B-3	T3	
B14	1	Black	B-3		Starter (Magnet)
B15	2	Brown	C-3		ABS front sensor LH (ABS)
B16	2	Gray	B-2		Brake fluid level switch
B17	3	Black	C-2		Vehicle speed sensor (MT)
B18	4	Gray	B-3		Oxygen sensor (Catalytic converter equipped vehicle)
B20	6	Gray	B-2	E1	Engine wiring harness (AT)
B24	2	Gray	C-2	T1	Back-up light switch (MT)
B25	2	Brown	C-2	T2	Neutral position switch (MT)
B29	2	Gray	C-3	T8	Lo (AWD) indicator light switch (MT)
B84	34	Black	B-2		Engine control module
B138	2	Gray	C-2	B139	Joint connector (E/G)
B139	2	Gray	C-2	B138	
B143	3	★	C-3		M/B
B144	6	Black	B-4		
B145	1	★	C-4		
B146	2	Green	C-3		Front washer motor
B147	2	★	C-3		Rear washer motor
B148	2	★	B-4		Side turn signal light LH
B186	4	Black	B-4		M/B

★: Non-colored

BULKHEAD WIRING HARNESS (IN ENGINE ROOM)



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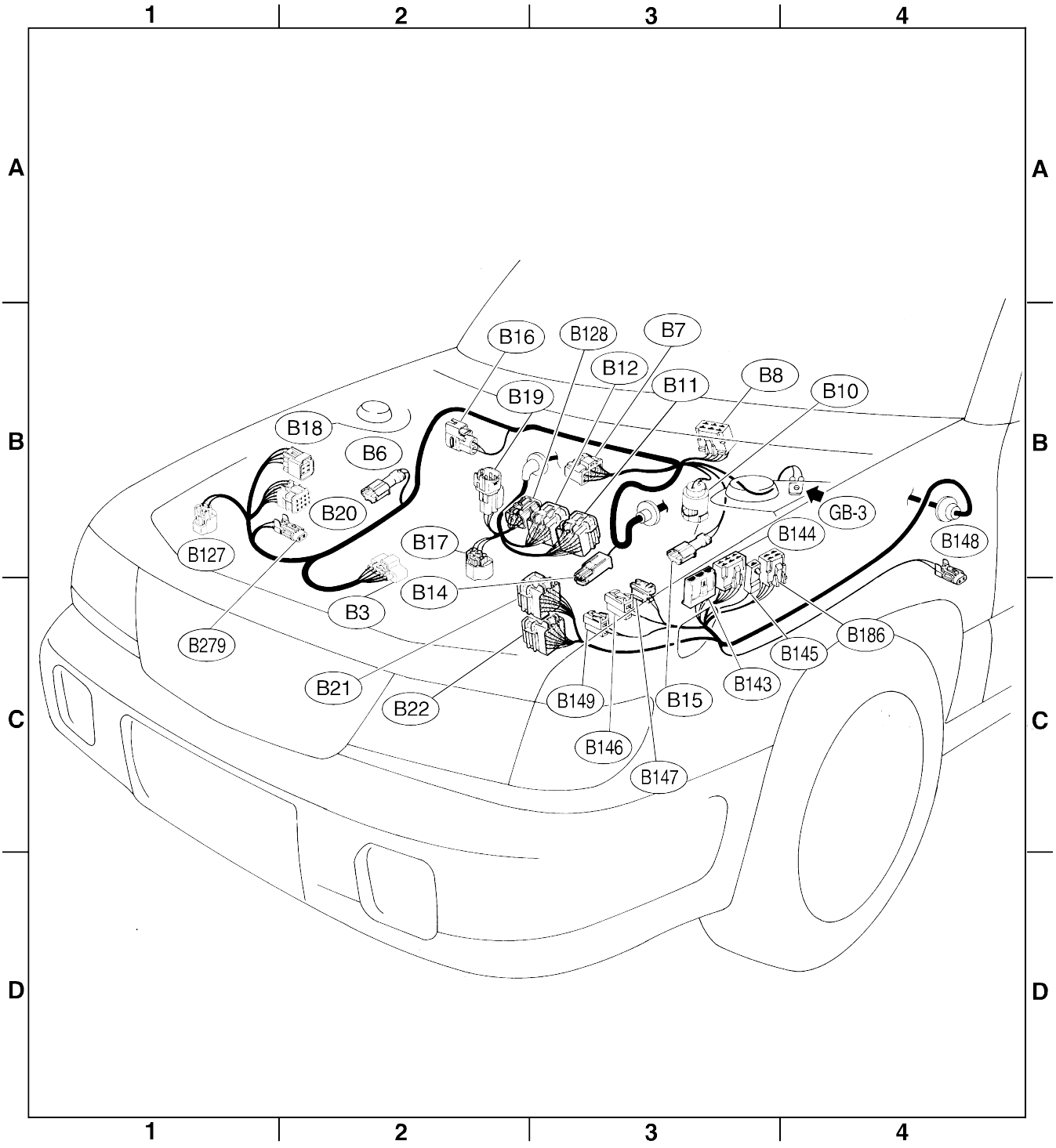
BULKHEAD WIRING HARNESS (IN ENGINE ROOM)

6. RHD TURBO MODEL S903438A1313

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B3	5	Black	B-2		Mass air flow sensor
B6	2	Brown	B-2		ABS front sensor RH
B7	6	Black	B-3		Cruise control actuator
B8	6	★	B-3		Front wiper motor
B10	2	Brown	B-4		A/C pressure switch
B11	20	Black	B-3	T4	Transmission (AT)
B12	12	★	B-3	T3	
B14	1	Black	C-2		Starter (Magnet)
B15	2	Brown	C-3		ABS front sensor LH
B16	2	Gray	B-2		Brake fluid level switch
B17	4	Black	B-2		Vehicle speed sensor (MT)
B18	4	Gray	B-2		Front oxygen (A/F) sensor
B19	4	★	B-2	T5	Oxygen sensor
B20	10	★	B-2	E1	Engine wiring harness
B21	20	★	C-2	E2	Engine wiring harness
B22	16	Brown	C-2	E3	Engine wiring harness
B127	2	Gray	B-1		Wastegate control solenoid valve
B128	4	Gray	B-3	T9	Transmission (MT)
B143	3	★	C-3		M/B
B144	6	Black	B-4		
B145	1	★	C-4		
B146	2	Green	C-3		Front washer motor
B147	2	★	C-3		Rear washer motor
B148	2	★	B-4		Side turn signal light LH
B149	2	Blue	C-3		Headlight washer motor (With OBD)
B186	4	Black	C-4		M/B
B279	2	Gray	C-1		Exhaust temperature sensor

★: Non-colored

BULKHEAD WIRING HARNESS (IN ENGINE ROOM)



S6M0496

50. Bulkhead Wiring Harness (In Compartment) S903446

A: LOCATION S903446A13

1. LHD MODEL S903446A1308

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B30	25	★	C-1	D1	Front door cord LH
B31	7	Yellow	C-1	AB1	SRS (Airbag) harness
B32	3	Black	A-2		Turn & hazard module
B36	16	★	B-3	i1	Instrument panel meter harness
B37	24	Black	B-2	i2	
B40	16	Black	D-2		Data link connector
B41	2	★	A-1		Power window circuit breaker
B42	4	Blue	B-1		Power window relay
B43	6	Brown	B-4		Illumination control module
B44	10	★	D-3		Seat belt timer
B46	4	Green	C-1		Fuel pump relay
B47	6	Brown	B-1		Main relay
B50	4	★	B-1		Blower relay
B51	8	Blue	D-2		F/B
B52	12	Blue	C-1		
B53	6	★	B-2		Shield joint connector (AT)
B54	24	★	C-2		Transmission control module (AT)
B55	24	Gray	D-2		
B56	24	Green	D-2		
B61	8	★	B-1	F44	Front wiring harness
B62	20	★	B-1	F45	Front wiring harness (DOHC turbo model)
	16	★	B-1	F45	Front wiring harness (SOHC model)
B64	2	Black	A-2		Stop light switch (Without cruise control)
B65	4	Black	A-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
B74	2	Black	C-2		Key warning switch
B75	2	Green	B-1	B76	Test mode connector
B76	2	Green	A-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	★	D-4		Shield joint connector (SOHCwithOBD)
B84	17	★	C-4		Engine control module (SOHCw/oOBD model)
B85	2	★	A-3		Diode (Lighting) (With OBD)
B86	6	★	A-3		Blower motor resistor
B87	2	★	B-3		Blower motor
B88	3	★	B-4		Evaporator thermoswitch
B90	8	★	A-4	R50	Roof cord
B94	20	★	C-1		Cruise control module
B97	10	Blue	B-4	R1	Rear wiring harness
B98	12	★	B-4	R2	
B99	20	★	B-4	R3	
B101	25	★	B-4	D11	Front door cord RH
B104	4	★	C-1		Seat heater/rear accessory power supply relay

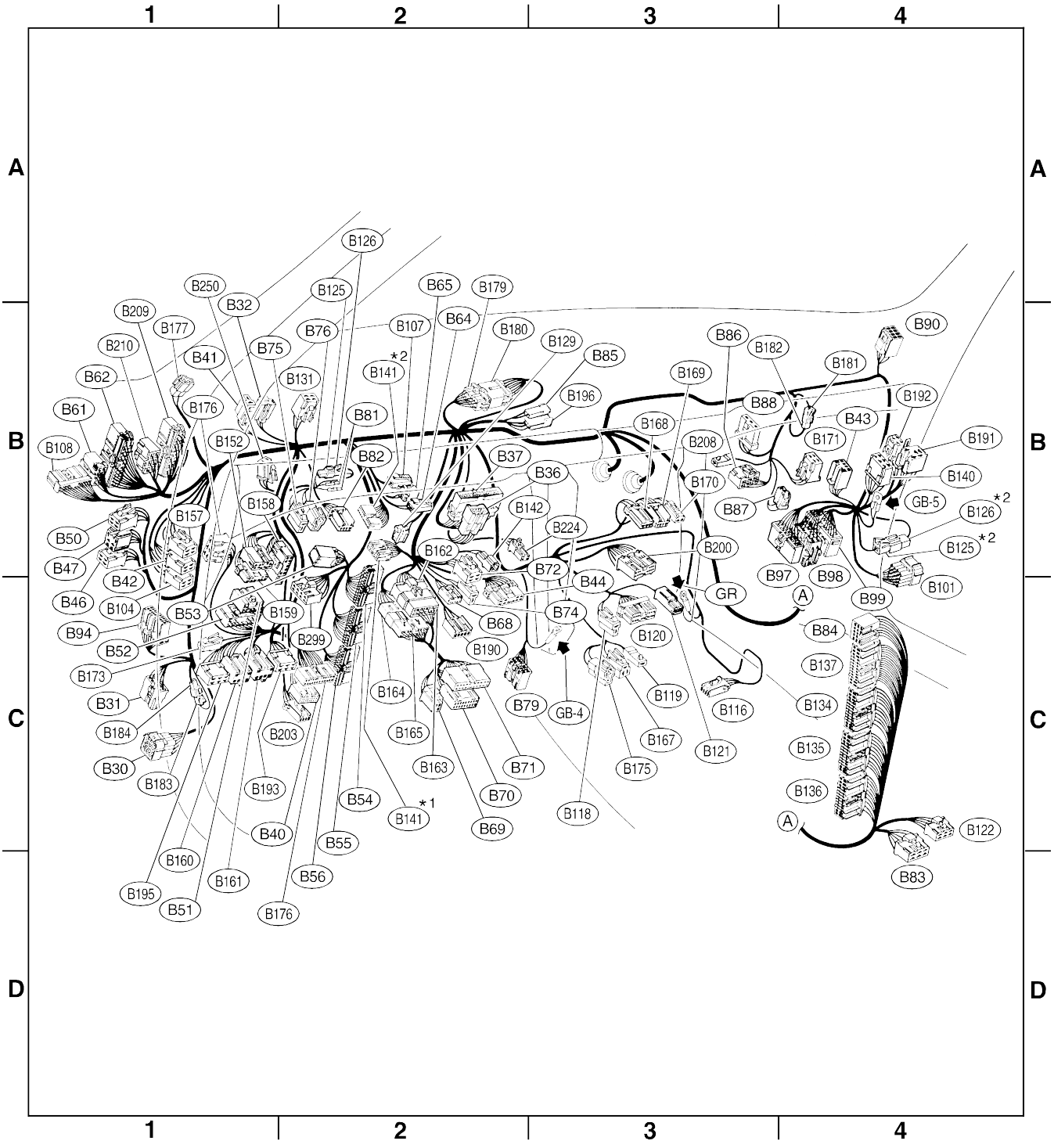
Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B107	2	Blue	A-2		Clutch switch (MT)
B108	20	★	B-1	F46	Front wiring harness
B116	4	Black	C-3		Select lever illumination light and power switch (AT)
B118	2	★	D-3		CD player illumination light
B119	1	★	C-3		Cigarette lighter (Power)
B120	14	★	C-3		Radio
B121	1	Black	C-3		Audio ground
B122	6	★	D-4		Sensor ground joint connector (With OBD)
B125	1	Black	A-2	B126	Read memory connector (Without OBD) (*1)
	1	Green	B-4		Line end connector (With OBD) (*2)
B126	1	Black	A-2	B125	Read memory connector (Without OBD) (*1)
	1	Green	B-4		Line end connector (With OBD) (*2)
B129	2	Black	A-2		Kick-down switch (AT)
B131	4	Blue	B-2		Rear fog light relay (With OBD)
B134	22	★	C-4		Engine control module (DOHC turbo model)
	35	Gray	C-3		Engine control module (SOHC model)
B135	28	★	C-4		Engine control module (DOHC turbo model)
	28	Gray	C-3		Engine control module (SOHC model)
B136	24	★	D-4		Engine control module (DOHC turbo model)
	30	Gray	D-3		Engine control module (SOHC model)
B137	31	★	C-4		Engine control module (DOHC turbo model)
B140	6	Black	B-4		Headlight washer module (With OBD)
B141	12	★	D-2		Immobilizer control module (With OBD) (*1)
	15	★	A-2		Immobilizer control module (Without OBD) (*2)
B142	2	★	A-3		Immobilizer antenna
B152	7	★	B-1		F/B
B157	4	Red	B-1		Ignition relay
B158	12	★	B-1		F/B
B159	10	Gray	C-1		F/B
B160	6	Black	D-1		Front fog light switch
B161	6	Brown	D-1		Cruise control main switch
B162	8	★	B-2	B163	Combination switch cord
B164	18	★	C-2	B165	Combination switch cord
B167	3	★	C-3		Cigarette lighter (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 (With OBD)
B173	1	★	D-1		IG power supply connector
B175	2	★	C-3		Ash tray illumination light

BULKHEAD WIRING HARNESS (IN COMPARTMENT)

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B176	18	★	D-2		Keyless entry control module
B177	2	★	A-1		Wiper deicer (With OBD)
B179	12	★	A-2	B180	Joint connector (E/G) (SOHC without OBD)
B180	12	★	A-2	B179	
B181	1	★	A-4	B182	Joint connector (E/G) (MT) (SOHC without OBD)
B182	1	★	A-4	B181	
B183	1	★	D-1	B184	Joint connector (Keyless entry)
B184	1	★	C-1	B183	
B190	5	Blue	D-3		Speed alarm (SOHC without OBD)
B191	4	Blue	B-4		Wiper deicer relay (With OBD)
B192	4	★	B-4		Wiper deicer timer (With OBD)
B193	6	Black	C-2		Wiper deicer switch (With OBD)
B195	6	★	D-1		Rear fog light switch (With OBD)
B196	2	★	B-3		Diode (Rear fog light) (With OBD)
B200	14	★	B-3	i4	Panel-center harness (With OBD)
B203	4	★	C-2		Noise FILTER
B208	2	Black	B-3		Glove compartment illumi. light (DOHC turbo model)
B209	24	Black	A-1	F75	Front wiring harness (DOHC turbo model)
B210	6	Black	A-1	F76	
B224	2	★	A-3		Key switch illumination light
B250	3	★	A-2		Flash memory connector (DOHC turbo model)
B299	6	★	C-2		Shield joint connector (AT)

★: Non-colored

BULKHEAD WIRING HARNESS (IN COMPARTMENT)



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2. RHD MODEL S903446A1309

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B30	25	★	D-4	D1	Front door cord RH
B31	7	Yellow	D-4	AB1	SRS (Airbag) harness
B32	3	Black	B-4		Turn & hazard module
B36	14	Black	A-3	i1	Instrument panel meter harness
B37	32	★	B-2	i2	
B40	16	★	D-3		Data link connector
B41	2	★	A-4		Power window circuit breaker
B42	4	Blue	C-4		Power window relay
B43	6	Black	B-1		Illumination control module
B46	4	Green	C-4		Fuel pump relay
B47	6	Brown	C-4		Main relay
B50	4	★	B-4		Blower relay
B51	8	Blue	C-4		F/B
B52	12	Blue	C-4		
B53	6	★	B-3		Shield joint connector (AT)
B54	24	White	B-2		Transmission control module (AT)
B55	24	Gray	B-2		
B56	24	Green	C-2		
B61	6	White	B-4	F44	Front wiring harness
B62	14	★	B-4	F45	
B64	2	Black	A-3		Stop light switch (Without cruise control)
B65	4	Black	A-3		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-3		Ignition switch
B74	2	Black	D-2		Key warning switch
B75	2	Green	A-2	B76	Test mode connector
B76	2	Green	A-2	B75	
B79	14	Gray	C-2		Check connector
B81	1 × 2	★	A-2		Diagnosis terminal (Ground)
B82	6	Black	A-2		Diagnosis connector
B83	12	Blue	D-1		Shield joint connector (SOHC model)
B84	17	★	C-1		Engine control module (SOHCw/oOBD model)
B85	2	★	A-4		Diode (Rear fog light) (With OBD)
B87	6	White	B-1		Blower motor
B88	3	★	B-1		Evaporator thermoswitch
B90	8	★	B-4	R50	Roof cord
B94	20	Black	C-1		Cruise control module (DOHC turbo model)
	20	★	C-1		Cruise control module (SOHC model)
B97	10	White	C-4	R1	Rear wiring harness
B98	18	★	C-4	R2	
B99	20	Blue	C-4	R3	
B100	22	Blue	B-4	F2	Front wiring harness (With ABS model)
B101	25	★	C-1	D11	Front door cord LH
B104	4	★	C-4		Seat heater/rear accessory power supply relay
B107	2	Blue	C-3		Clutch switch (MT)
B116	4	Black	C-2		Select lever illumination light and power switch (AT)

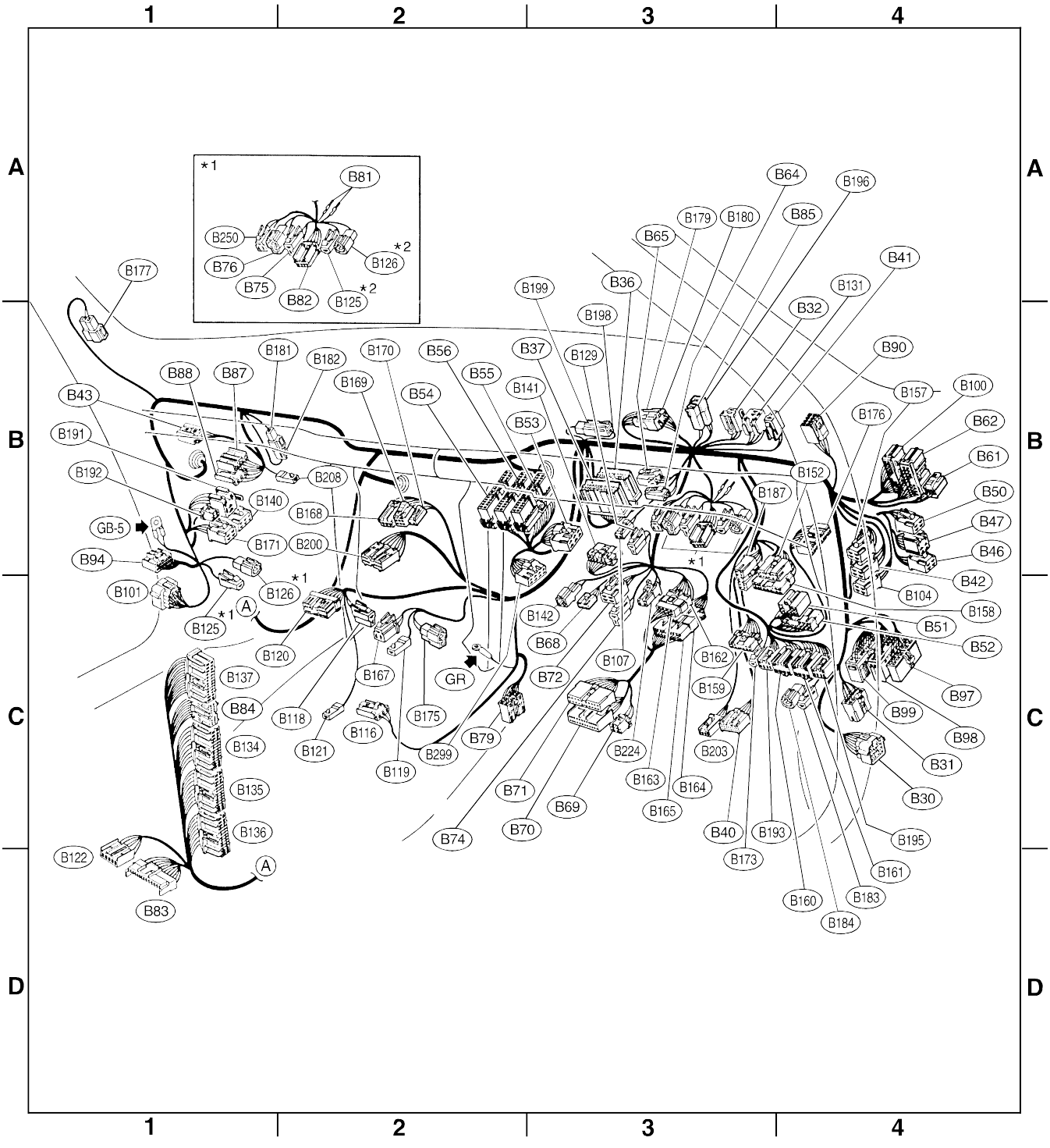
Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B118	2	★	C-1		CD player illumination light
B119	1	★	D-2		Front accessory power supply (Power)
B120	14	★	C-1		Radio
B121	1	Black	D-2		Audio ground
B122	6	Gray	D-1		Sensor ground joint connector (DOHC turbo model)
B125	1	Black	A-2	B126	Read memory connector (Without OBD)
	1	Green	C-1	B126	Line end connector (With OBD) (*1)
B126	1	Black	A-2	B125	Read memory connector (With OBD)
	1	Green	C-1	B125	Line end connector (With OBD) (*1)
B129	2	Black	B-3		Kick-down switch (AT)
B131	4	Blue	A-4		Rear fog light relay (With OBD)
B134	35	Gray	D-1		Engine control module (Non-turbo model with OBD)
	22	★	D-1		Engine control module (DOHC turbo model)
B135	28	Gray	D-1		Engine control module (Non-turbo model with OBD)
	28	★	D-1		Engine control module (DOHC turbo model)
B136	30	Gray	D-1		Engine control module (Non-turbo model with OBD)
	24	★	D-1		Engine control module (DOHC turbo model)
B137	31	★	C-1		Engine control module (DOHC turbo model)
B140	6	Black	B-1		Headlight washer module (With OBD)
B141	15	★	C-3		Immobilizer control module (Without OBD)
	12	★	C-3		Immobilizer control module (With OBD)
B142	2	★	D-2		Immobilizer antenna
B152	7	★	B-3		F/B
B157	4	Red	B-4		Ignition relay
B158	12	★	C-4		F/B
B159	10	Gray	C-3		F/B
B160	6	Black	D-4		Front fog light switch
B161	6	Brown	D-4		Cruise control main switch
B162	8	White	D-3	B163	Combination switch cord
B164	18	★	D-3	B165	Combination switch cord
B167	3	★	C-2		Cigarette lighter (Ground)
B168	3	White	B-2		A/C switch
B169	6	White	B-2		Blower fan switch
B170	2	White	B-2		Mode control panel illumination light
B171	4	★	C-1		Mirror heater relay
B173	1	★	D-3		IG power supply connector
B175	2	★	D-2		Ash tray illumination light
B176	18	★	B-4		Keyless entry control module
B177	2	★	A-1		Wiper deicer
B179	8	★	A-3	B180	Joint connector (E/G) (SOHC model without OBD)
B180	8	★	A-3	B179	

BULKHEAD WIRING HARNESS (IN COMPARTMENT)

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B181	1	★	B-1	B182	Joint connector (E/G) (SOHC model without OBD)
B182	1	★	B-2	B181	
B183	1	★	D-4	B184	Joint connector (Keyless entry)
B184	1	★	D-4	B183	
B187	9	Brown	C-3		F/B
B191	4	Blue	B-1		Wiper deicer relay
B192	4	White	C-1		Wiper deicer timer
B193	6	Black	D-3		Wiper deicer switch
B195	6	★	D-4		Rear fog light switch (With OBD)
B196	2	★	A-4		Diode (Rear fog light) (With OBD)
B198	1	★	B-3	B199	Joint connector (Ground)
B199	1	★	A-2	B198	
B200	14	★	C-2	i4	Panel-center harness (With OBD)
B203	4	★	D-3		Noise FILTER
B208	2	Black	B-2		Glove compartment illumi. light (DOHC turbo model)
B224	2	★	D-3		Key switch illumination light
B250	3	★			Flash memory connector (DOHC turbo model)
B299	8	★	C-2		Shield joint connector (AT)

★: Non-colored

BULKHEAD WIRING HARNESS (IN COMPARTMENT)



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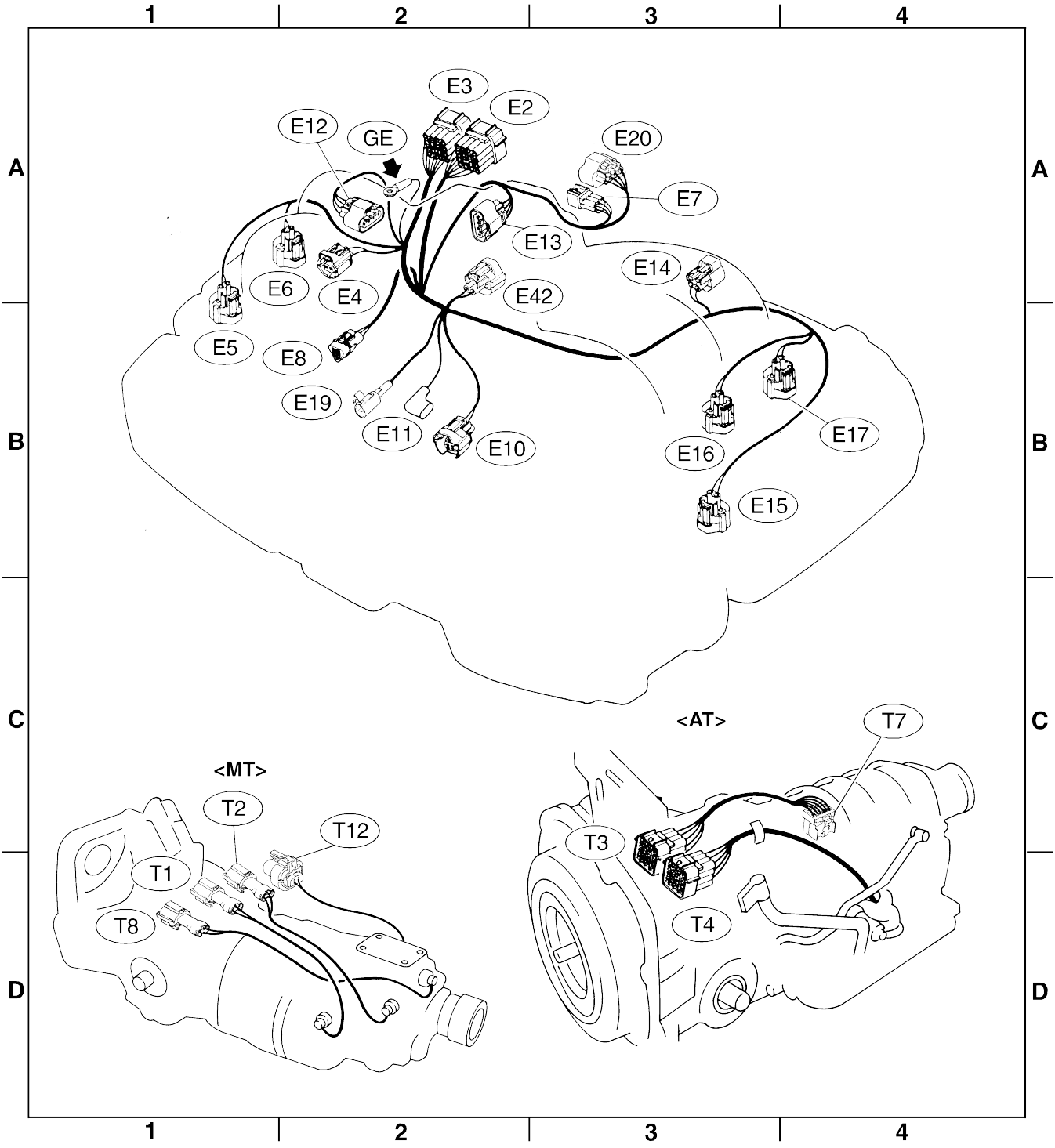
51. Engine Wiring Harness and Transmission Cord S903447

A: LOCATION S903447A13

1. NON-TURBO MODEL WITH OBD S903447A1308

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
E2	20	Light gray	A-2	B21	Bulkhead wiring harness
E3	16	Brown	A-2	B22	Bulkhead wiring harness
E4	2	Black	A-2		Purge control solenoid valve
E5	2	Light gray	B-1		Injector #1
E6	2	Light gray	A-1		Injector #3
E7	6	Black	A-3		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	Dark gray	A-2		Ignition coil
E13	4	Dark gray	A-2		Throttle position sensor
E14	2	★	A-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	1	★	B-2		Power steering oil pressure switch
E20	4	Black	A-3		Pressure sensor and intake air temperature sensor
E42	2	Purple	A-2		Air assist solenoid valve
★: Non-colored					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
T1	2	Gray	D-1	B24	Bulkhead wiring harness (MT)
T2	2	Brown	D-1	B25	
T3	12	Black	D-3	B12	Bulkhead wiring harness (AT)
T4	20	Black	D-3	B11	
T7	12	Black	C-4		Inhibitor switch (AT)
T8	2	Gray	D-1	B29	Bulkhead wiring harness (MT)
T12	3	Black	D-2	B17	Bulkhead wiring harness (MT)
★: Non-colored					

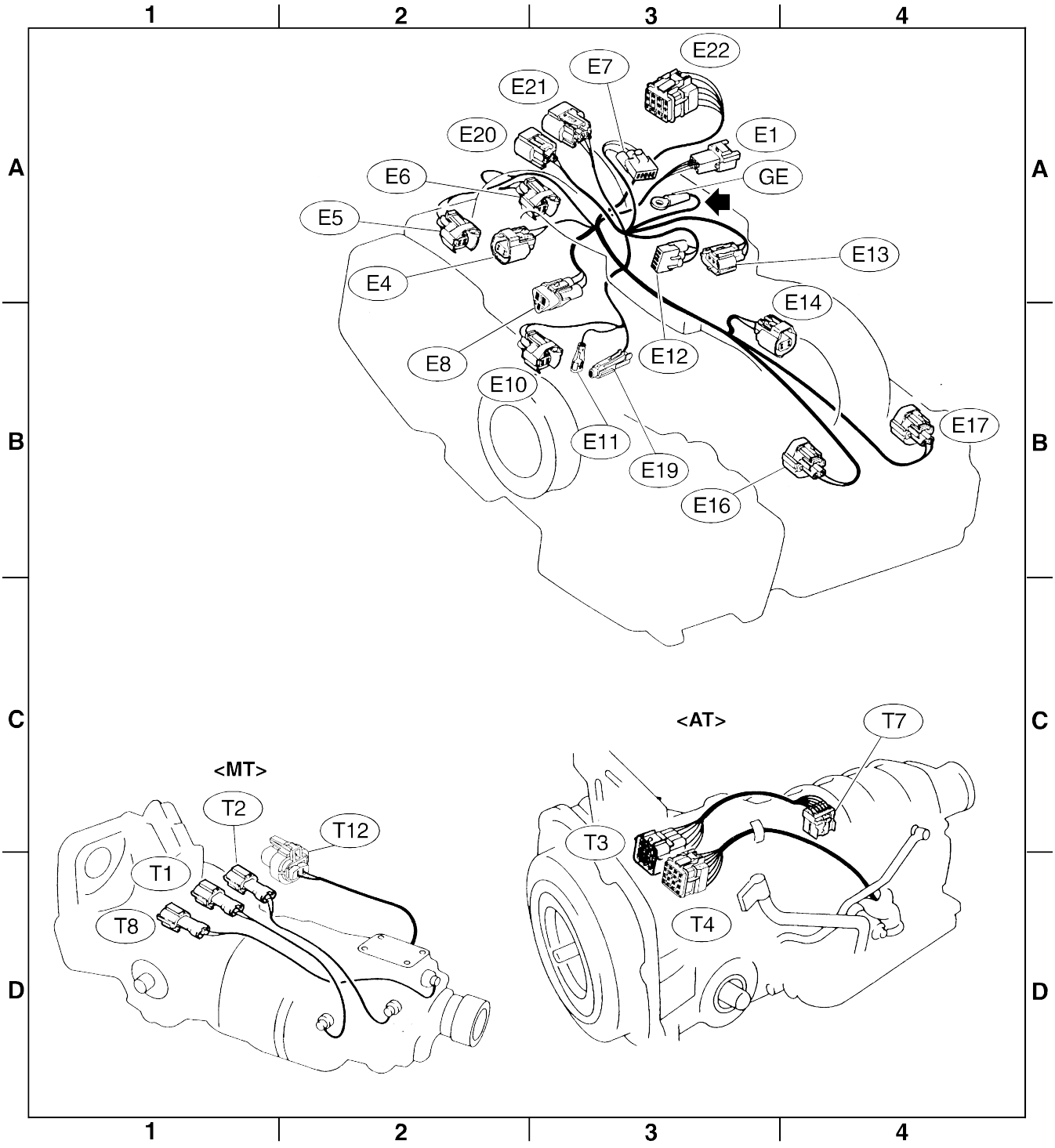

1
2
3
4
A
B
C
D
E3
E2
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S6M0500

2. NON-TURBO MODEL WITHOUT OBD S903447A1309

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
E1	6	Yellow	A-3	B20	Bulkhead wiring harness
E4	2	Black	A-2		Purge control solenoid valve
E5	2	Dark gray	A-2		Injector #1
E6	2	Dark gray	A-2		Injector #3
E7	3	Light gray	A-3		Idle air control solenoid valve
E8	3	Gray	A-3		Engine coolant temperature sensor & thermometer
E10	2	Gray	B-3		Crankshaft position sensor
E11	1	★	B-3		Oil pressure switch
E12	4	Gray	A-3		Ignition coil
E13	3	Black	A-3		Throttle position sensor
E14	2	★	A-3		Knock sensor
E16	2	Dark gray	B-4		Injector #2
E17	2	Dark gray	B-4		Injector #4
E19	1	★	B-3		Power steering oil pressure switch
E20	2	Black	A-3		Intake air temperature sensor
E21	3	Black	A-3		Pressure sensor
E22	26	Black	A-3		Engine control module
★: Non-colored					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
T1	2	Gray	D-1	B24	Bulkhead wiring harness (MT)
T2	2	Brown	D-1	B25	
T3	12	Black	D-3	B12	Bulkhead wiring harness (AT)
T4	20	Black	D-3	B11	
T7	12	Black	C-4		Inhibitor switch (AT)
T8	2	Gray	D-1	B29	Bulkhead wiring harness (MT)
T12	3	Black	D-2	B17	Bulkhead wiring harness (MT)
★: Non-colored					

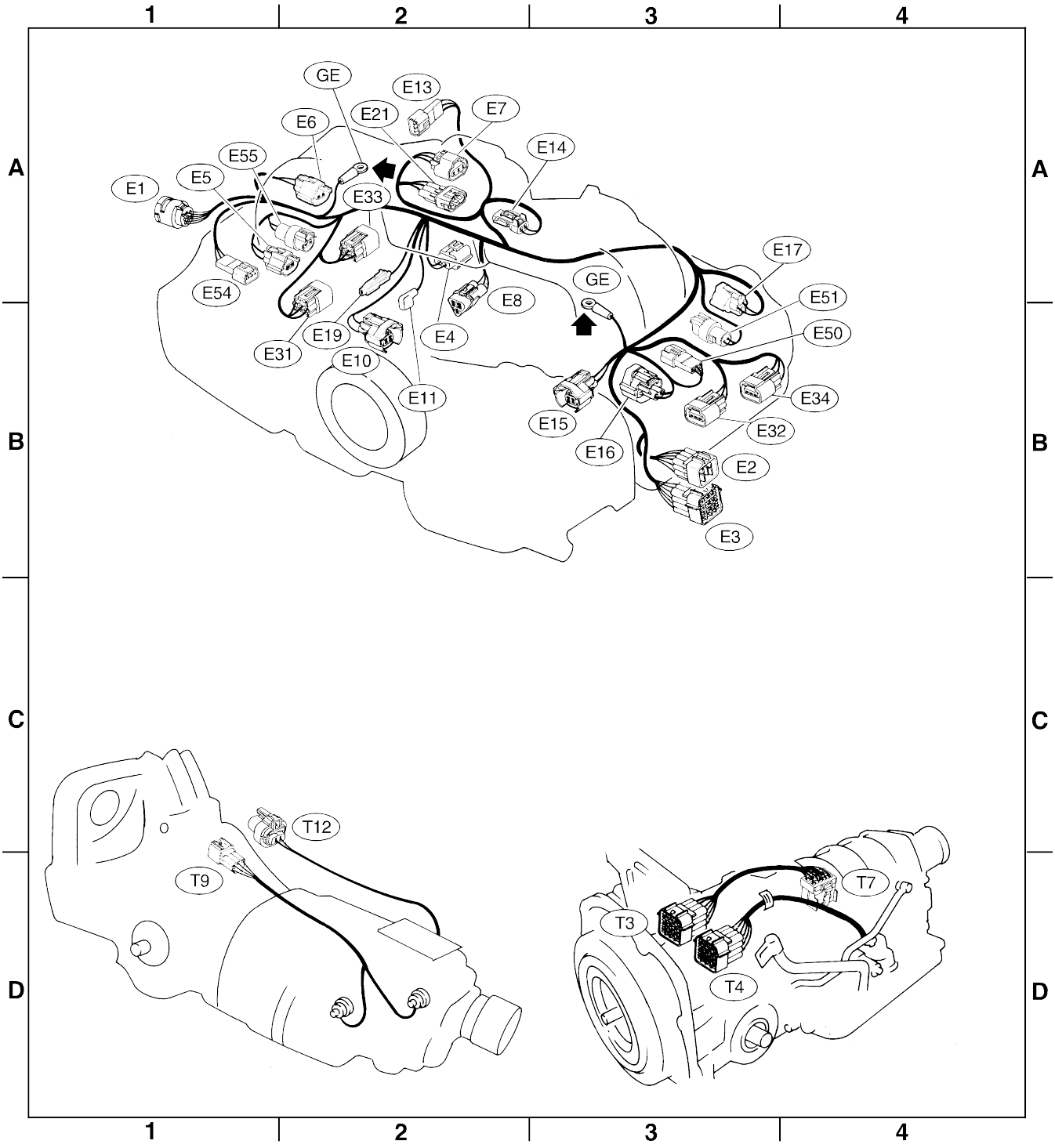

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S6M0499

3. TURBO MODEL S903447A1310

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
E1	10	Light gray	A-1	B20	Bulkhead wiring harness
E2	20	Black	B-3	F61	Front wiring harness (LHD model)
				B21	Bulkhead wiring harness (RHD model)
E3	16	Brown	B-3	F60	Front wiring harness (LHD model)
				B22	Bulkhead wiring harness (RHD model)
E4	2	Black	A-2		Purge control solenoid valve
E5	2	Dark gray	A-1		Injector #1
E6	2	Dark gray	A-2		Injector #3
E7	3	Black	A-2		Idle air control solenoid valve
E8	3	Light gray	A-2		Engine coolant temperature sensor & thermometer
E10	2	Light gray	B-2		Crankshaft position sensor
E11	1	★	A-2		Oil pressure switch
E13	3	Black	A-2		Throttle position sensor
E14	2	Gray	A-2		Knock sensor
E15	2	Light gray	B-3		Camshaft position sensor
E16	2	Dark gray	B-3		Injector #2
E17	2	Dark gray	B-3		Injector #4
E19	2	★	A-2		Power steering oil pressure switch
E21	3	Black	A-2		Pressure sensor
E31	3	★	A-1		Ignition coil #1
E32	3	★	B-3		Ignition coil #2
E33	3	Black	A-2		Ignition coil #3
E34	3	Black	B-3		Ignition coil #4
E50	3	Black	B-3		TGV angle sensor LH
E51	2	Black	B-3		TGV LH
E54	3	Black	A-1		TGV angle sensor RH
E55	2	Black	A-2		TGV RH
★: Non-colored					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
T3	12	Black	D-3	B12	Bulkhead wiring harness (AT)
T4	20	Black	D-3	B11	
T7	12	Black	D-4		Inhibitor switch (AT)
T9	4	Gray	C-1	B128	Bulkhead wiring harness (MT)
T12	4	Black	C-1	B17	Bulkhead wiring harness (MT)
★: Non-colored					


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T4

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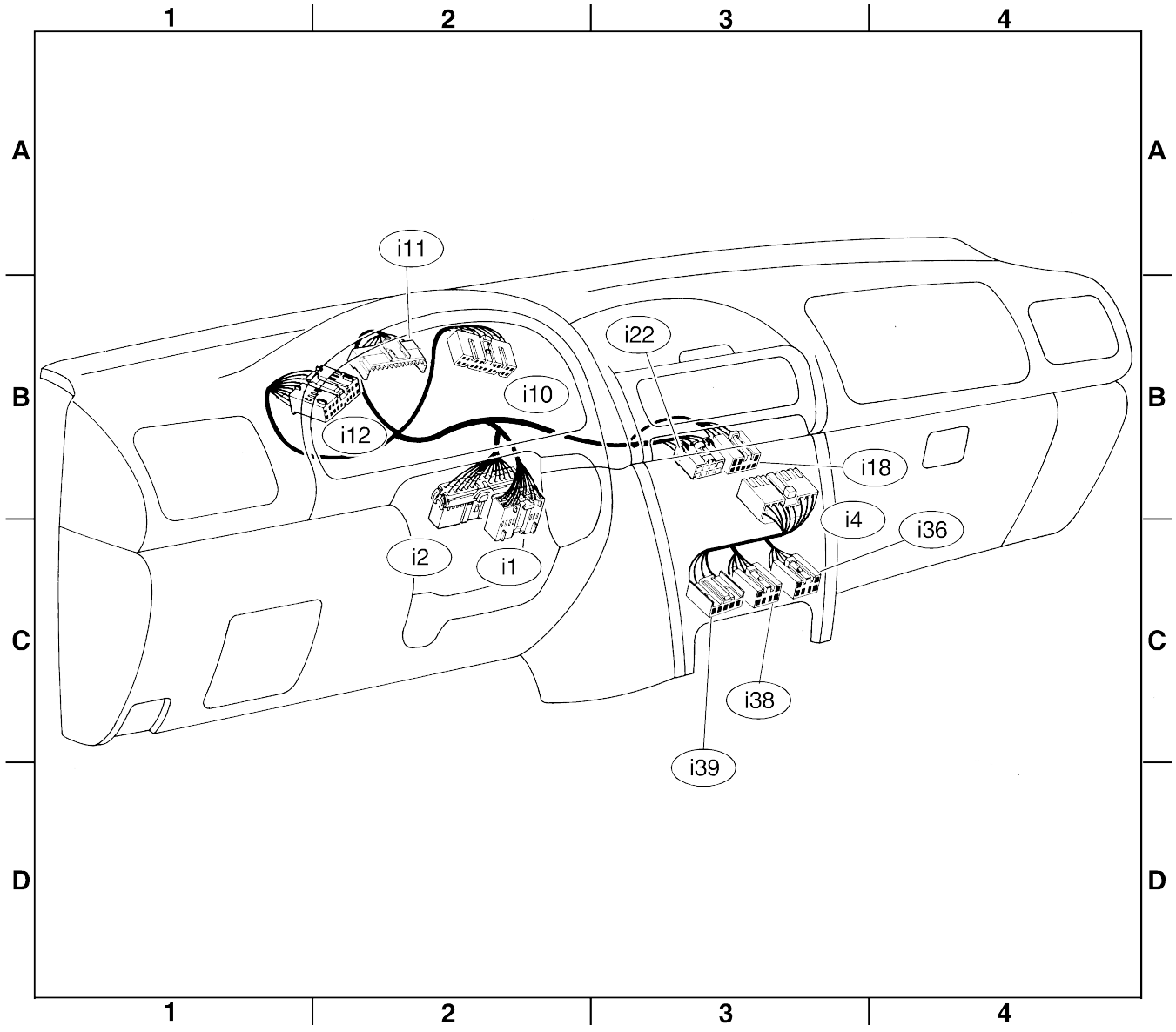
52. Instrument Panel Wiring Harness S903435

A: LOCATION S903435A13

1. LHD MODEL S903435A1302

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
i1	16	★	B-2	B36	Bulkhead wiring harness
i2	24	Black	B-2	B37	
i4	14	★	C-3	B200	
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
i36	6	Gray	C-3		Headlight washer switch
i38	6	Black	C-3		Bright switch
i39	6	★	C-3		Headlight leveling switch
★: Non-colored					

INSTRUMENT PANEL WIRING HARNESS

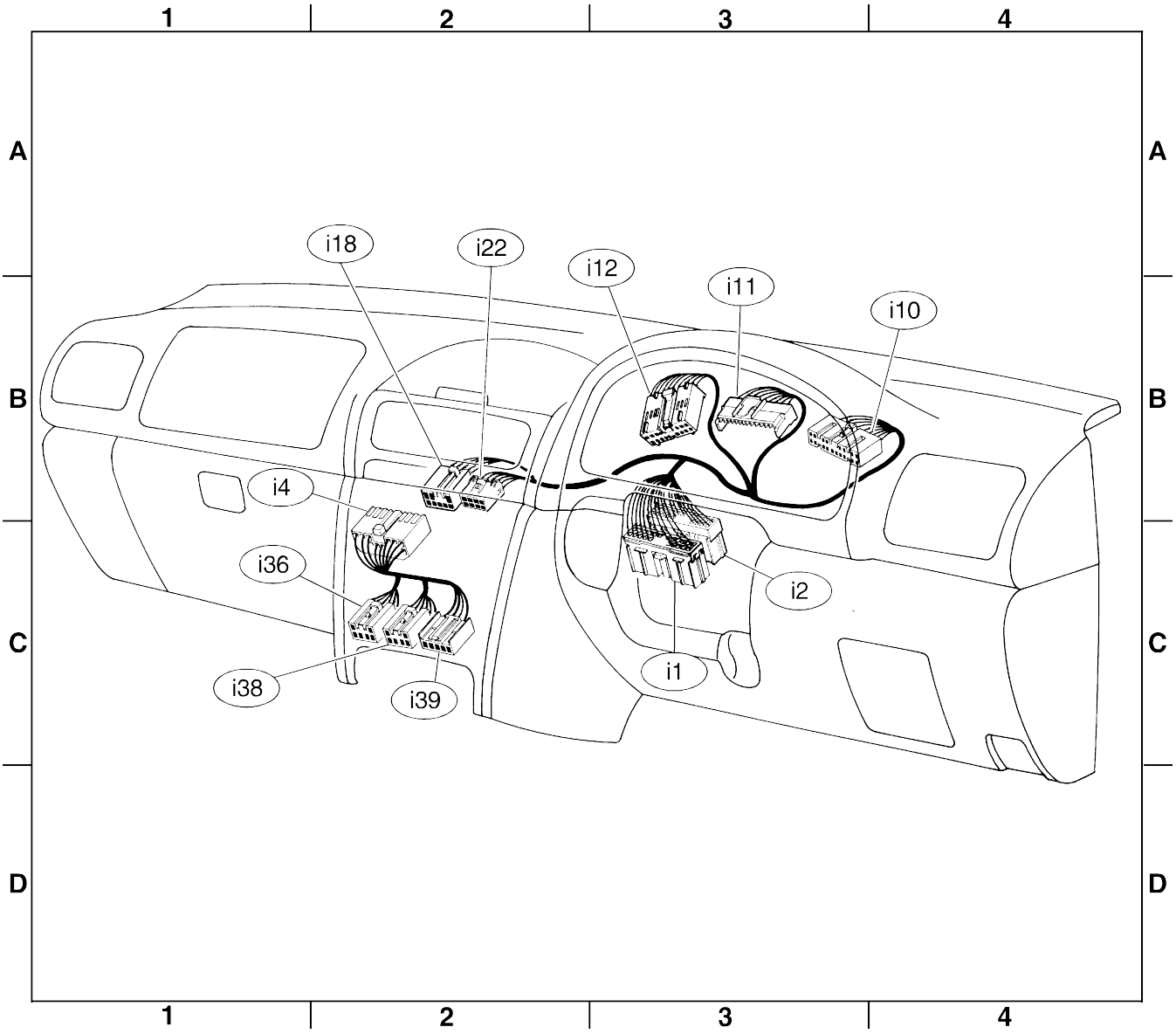


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2. RHD MODEL S903435A1301

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
i1	14	Black	C-3	B36	Bulkhead wiring harness
i2	32	★	C-3	B37	
i4	14	★	C-2	B200	
i10	18	Green	B-3		Combination meter
i11	10	Green	B-3		
i12	16	Green	B-3		
i18	8	★	B-2		Rear defogger switch
i22	8	★	B-2		Hazard switch
i36	6	Gray	C-2		Headlight washer switch
i38	6	Black	C-2		Bright switch
i39	6	★	C-2		Headlight leveling switch
★: Non-colored					

INSTRUMENT PANEL WIRING HARNESS



S6M0503

53. Rear Wiring Harness S903431

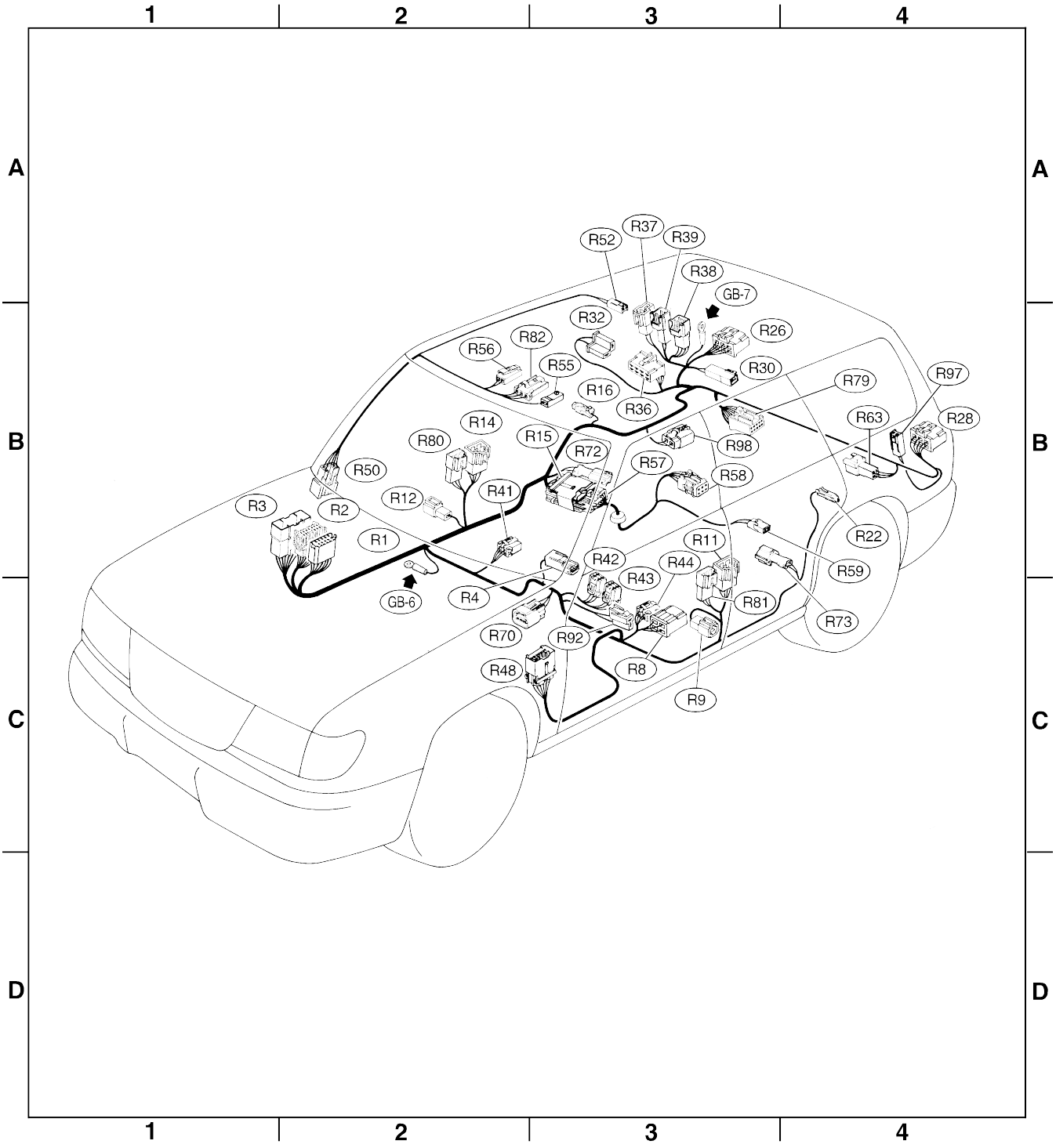
A: LOCATION S903431A13

1. LHD MODEL S903431A1306

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
R1	10	★	C-2	B97	Bulkhead wiring harness
R2	12	★	C-2	B98	
R3	20	★	C-2	B99	
R4	1	★	C-3		Parking brake switch
R8	4	★	C-3		Seat belt switch
R9	1	★	C-3		Front door switch LH
R11	4	★	C-3	D21	Rear door cord LH
R12	1	★	B-2		Front door switch RH
R14	4	★	B-2	D27	Rear door cord RH
R15	6	Black	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	★	B-3		Rear combination light RH
R28	6	★	B-4		Rear combination light LH
R30	2	★	B-3		Diode (Luggage room light)
R32	2	★	B-3		Rear accessory power supply
R36	8	★	B-3		Rear wiper intermittent module
R37	2	★	B-3	D33	Rear gate cord
R38	6	★	B-3	D34	
R39	4	★	B-3	D35	
R41	4	Blue	C-2		Seat heater RH
R42	4	★	C-3		Seat heater switch RH
R43	4	Blue	C-3		Seat heater switch LH
R44	4	Blue	C-3		Seat heater LH
R48	12	★	C-3	F55	Front wiring harness (ABS)
R50	8	★	B-2	B90	Bulkhead wiring harness
R52	*	★	A-3		Room light
R55	1	★	B-3		Sunroof motor
R56	2	★	B-2		Spot light
R57	8	★	B-3	R15	Rear wiring harness
R58	6	★	B-3		Fuel gauge module & fuel pump assembly
R59	2	★	C-3		Fuel gauge sub module
R63	4	★	B-4		License plate light
R70	3	★	C-2		ABS G sensor
R72	2	★	B-3		Rear ABS sensor RH
R73	2	★	C-3		Rear ABS sensor LH
R79	10	★	B-3		Trailer connector
R80	3	★	B-2	D64	Rear door cord RH
R81	3	★	C-3	D63	Rear door cord LH
R82	4	★	B-2		Clock
R92	2	★	C-3		Hold mode switch (AT)
R97	2	Brown	B-4		Antenna amplifier
R98	2	★	B-3		Rear differential oil temp switch (Turbo model for Europe)

REAR WIRING HARNESS

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
★: Non-colored * With sunroof models: 2 Without sunroof models: 3					



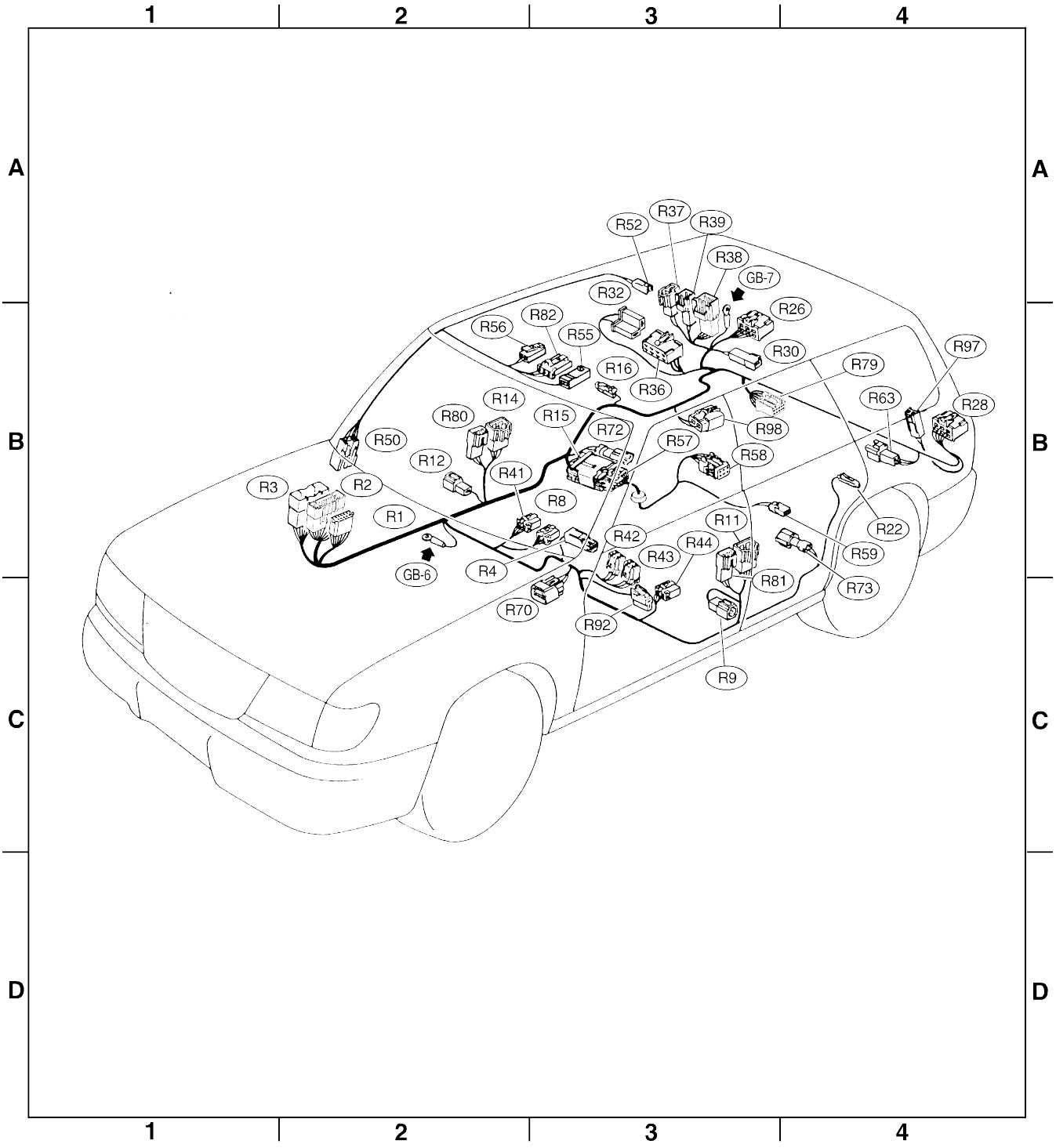
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2. RHD MODEL S903431A1301

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
R1	10	★	B-2	B97	Bulkhead wiring harness
R2	18	★	B-2	B98	
R3	20	Blue	B-2	B99	
R4	1	★	C-3		Parking brake switch
R8	4	★	C-3		Seat belt switch
R9	1	★	C-3		Front door switch LH
R11	4	★	C-3	D21	Rear door cord LH
R12	1	★	B-2		Front door switch RH
R14	4	★	B-2	D27	Rear door cord RH
R15	6	Black	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	★	B-3		Rear combination light RH
R28	6	★	B-4		Rear combination light LH
R30	2	★	B-3		Diode (Luggage room light)
R32	2	★	B-3		Rear accessory power supply
R36	8	★	B-3		Rear wiper intermittent module
R37	2	★	A-3	D33	Rear gate cord
R38	6	★	B-3	D34	
R39	4	★	B-3	D35	
R41	4	Blue	B-2		Seat heater RH
R42	4	★	C-3		Seat heater switch RH
R43	4	Blue	C-3		Seat heater switch LH
R44	4	Blue	C-3		Seat heater LH
R50	8	★	B-2	B90	Bulkhead wiring harness
R52	*	★	A-3		Room light
R55	1	★	B-3		Sunroof motor
R56	2	★	B-2		Spot light
R57	8	★	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
R70	3	★	C-3		ABS G sensor
R72	2	★	B-3		Rear ABS sensor RH
R73	2	★	C-3		Rear ABS sensor LH
R79	10	★	B-3		Trailer connector
R80	3	★	B-2	D64	Rear door cord RH
R81	3	★	C-3	D63	Rear door cord LH
R82	4	★	B-3		Clock
R92	2	★	C-3		Hold mode switch (AT)
R97	2	Brown	B-4		Antenna amplifier
R98	2	★	B-3		Rear differential oil temp switch (Turbo model for Europe)

★: Non-colored
* With sunroof models: 2
Without sunroof models: 3

REAR WIRING HARNESS



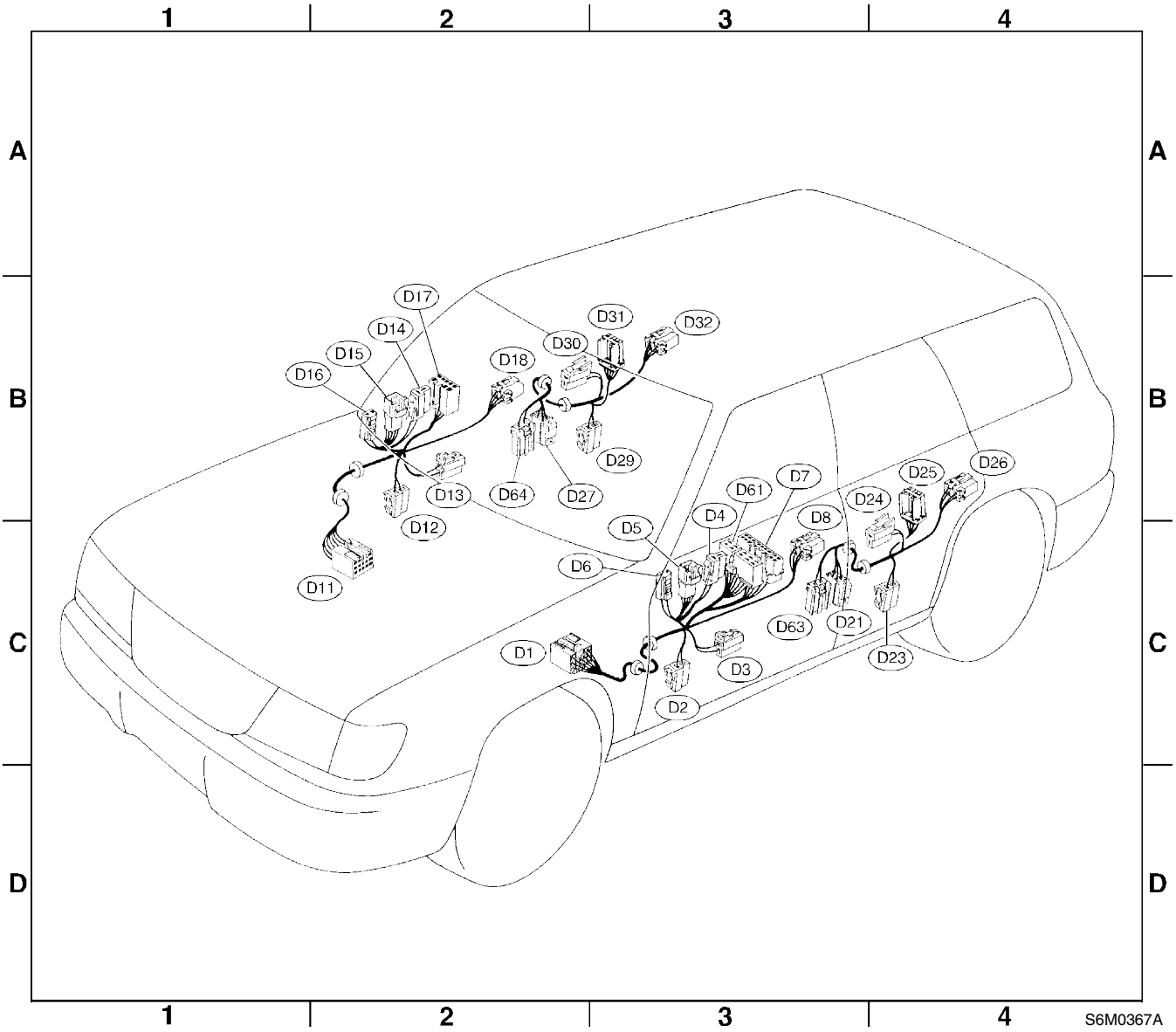
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54. Door Cord S903432

A: LOCATION S903432A13

1. LHD MODEL S903432A1302

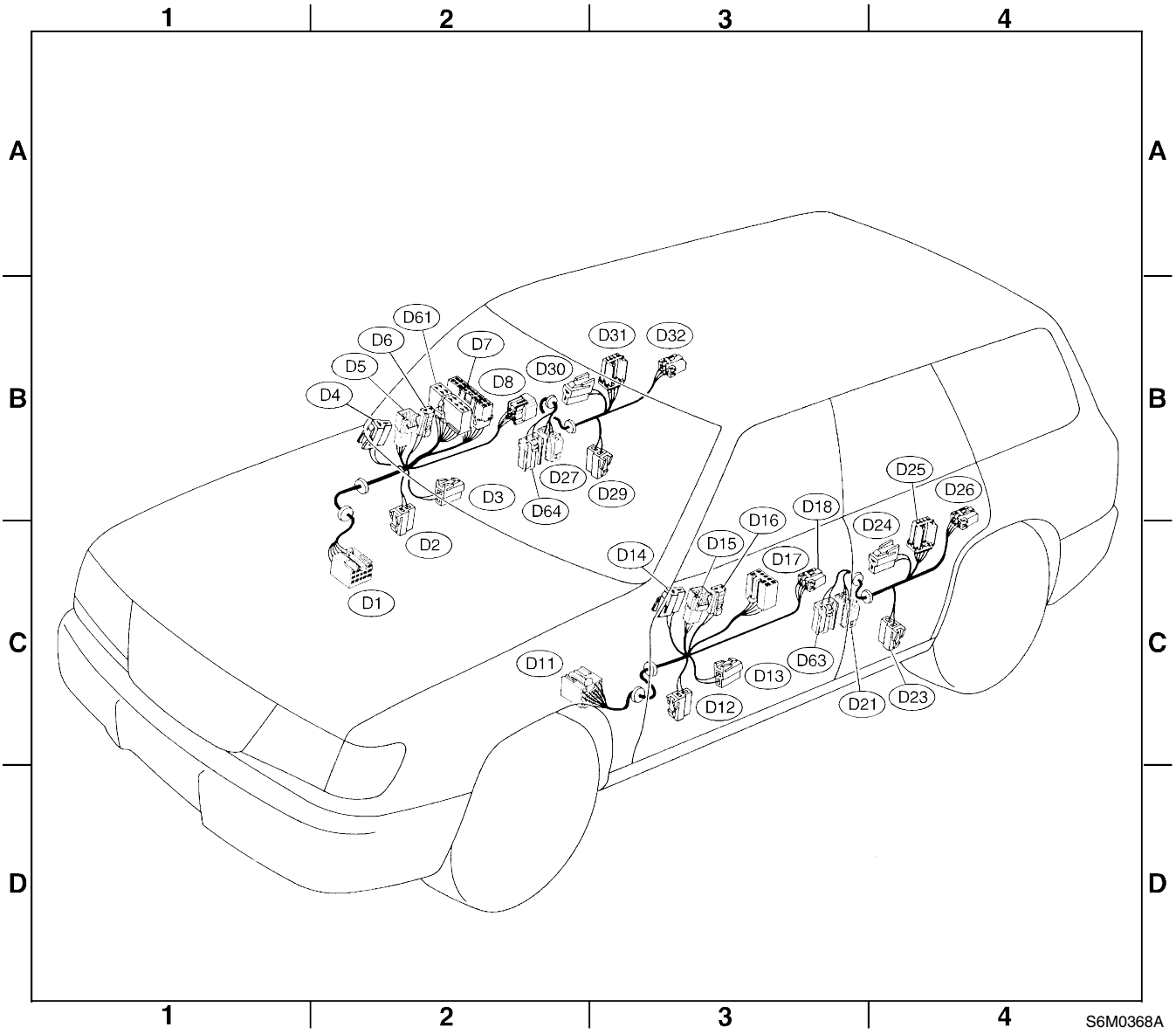
Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
D1	25	★	C-2	B30	Bulkhead wiring harness
D2	2	★	C-3		Front door speaker LH
D3	2	Blue	C-3		Front power window motor LH
D4	2	Black	C-3		Front door tweeter LH
D5	6	★	C-3		Remote control rearview mirror LH
D6	2	★	C-3		Mirror heater LH
D7	16	★	C-3		Power window main switch
D8	4	Gray	C-3		Front door lock actuator LH
D11	25	★	C-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	C-4		Rear power window motor LH
D25	6	★	B-4		Rear power window sub switch LH
D26	4	★	B-4		Rear door lock actuator LH
D27	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
D63	3	★	C-3	R81	Rear wiring harness
D64	3	★	B-2	R80	Rear wiring harness
★: Non-colored					


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2. RHD MODEL S903432A1301

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
D1	25	★	C-2	B30	Bulkhead wiring harness
D2	2	★	C-2		Front door speaker RH
D3	2	Blue	B-2		Front power window motor RH
D4	2	Black	B-2		Front door tweeter RH
D5	6	★	B-2		Remote control rearview mirror RH
D6	2	★	B-2		Mirror heater RH
D7	16	★	B-2		Power window main switch
D8	4	Gray	B-2		Front door lock actuator RH
D11	25	★	C-2	B101	Bulkhead wiring harness
D12	2	★	C-3		Front door speaker LH
D13	2	Blue	C-3		Front power window motor LH
D14	2	Black	C-3		Front door tweeter LH
D15	6	★	C-3		Remote control rearview mirror LH
D16	2	★	C-3		Mirror heater LH
D17	8	★	C-3		Front power window sub switch LH
D18	4	★	C-3		Front door lock actuator LH
D21	4	★	C-3	R11	Rear wiring harness
D23	2	★	C-4		Rear door speaker LH
D24	2	Blue	C-4		Rear power window motor LH
D25	6	★	C-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-2		Remote control rearview mirror switch
D63	3	★	C-3	R81	Rear wiring harness
D64	3	★	B-2	R80	Rear wiring harness
★: Non-colored					

DOOR CORD

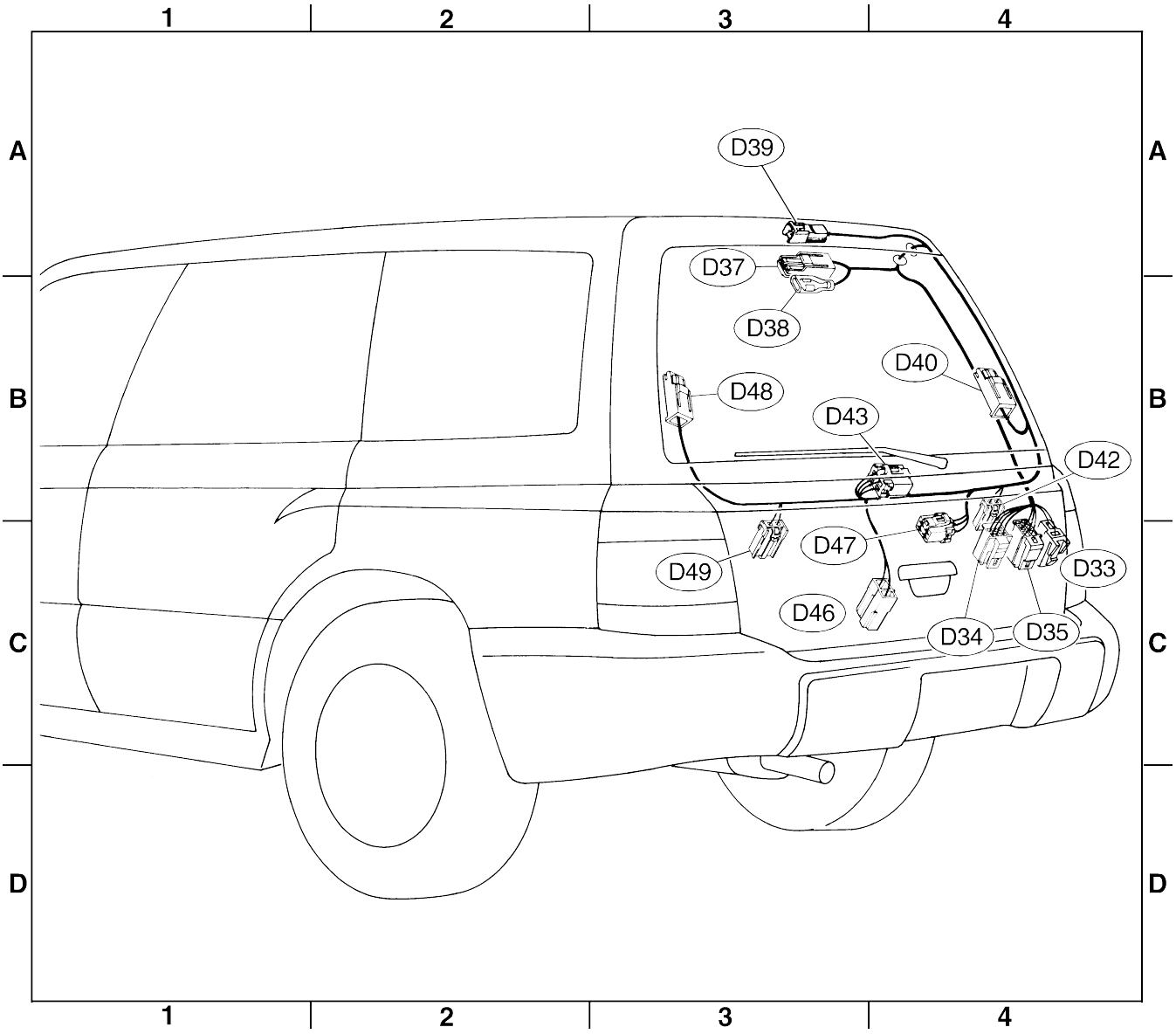

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55. Rear Gate Cord S903748

A: LOCATION S903748A13

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
D33	2	★	C-4	R37	Rear wiring harness
D34	6	★	C-4	R38	
D35	4	★	C-4	R39	
D37	1	Black	A-3		Luggage room light (Power)
D38	1	★	B-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	★	C-4		Rear gate lock actuator
D48	1	Black	B-3		Rear defogger (Ground)
D49	3	★	C-3		Rear finisher light LH
★: Non-colored					

REAR GATE CORD



S6M0449A

MEMO: